

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1	4	0	0	0	0	Popp A reference is incomplete (Simiu, Emil, National Institute of Standards and Technology)	This source is no longer used in the chapter.
2	4	0	0	0	0	Overall this chapter does not provide very much in terms of quantitative information. I think the authors should strive to be more quantitative where possible. I will try to include specific suggestions below (Lobell, David, Stanford University)	Agreed. We are limited by the availability of published material. Throughout, we have increased focus on quantitative information where possible.
3	4	0	0	0	0	I wonder why any glacier, snow, and permafrost related extreme events are entirely missing in ther Asian chapter. The fact that they were basically set wrong in AR4 WG2 does not mean that they and respective studies do not exist. E.g. GLOFs are of great concern in the Himalayas and stressed water supply due to decreasing glaciers in the dry parts of the Himalaya are also a serious issue. If these topics are mentioned in the chapters about the Andes, the Alps, and the Polar Regions, they are of even higher priority in the Asian mountains. (Kaser, Georg, University of Innsbruck)	This is treated in Chapter 3.
4	4	0	0	0	0	The word Himalaya appears only one (1) time in the entire Chapter 4. The fact that some Himalaya issues went wrong in AR4 WG2 cannot lead to the exclusion of one of the most hazardous regions in the world. (Kaser, Georg, University of Innsbruck)	Agreed.
5	4	0	0	0	0	What seems to lack here is the social dimension of vulnerability, exposures and impacts. For example, the old, very young, disabled, ill, uneducated, uninformed are more vulnerable to heat waves (for a recent overview of studies see http://air-climate.eionet.europa.eu/reports/ETCACC_TP_2010_12_Urban_CC_Vuln_Adapt , chapter 3.2). This point relates also to the next heading "costs of climate extremes and disasters", since vulnerability and impacts should also be described in terms of morbidity and mortality not only in terms of monetary losses. (GERMANY)	We agree that the social dimension must be considered. Regarding section 4.5, we agree but global estimates are available for dollars and deaths. These estimates are very approximate. Morbidity estimates are even more limited and as a result are unsuited to this sort of analysis.
6	4	0	0	0	0	Table 4-16: "The Americas" shall be divided into North America, and Central and South America according to regional classification of AR 5. Many countries in Central and South America are low- and middle-income countries where highly sensitive to extremes in the context of economic and social damage; few countries in North America are low- and middle-income countries. Consistency of story line with discription in page 2 line 14 to 16 is really important for the understandings of policy makers. (JAPAN)	The regions provided in this table reflect the underlying information available in the cited source.
7	4	0	0	0	0	Chapter 4 is devoted to changes in impacts of climate extremes on human systems and ecosystems. Again, the emphasis is made on changes in extremes, but nothing is said about changes in variability. Trends in system exposure and trends in system vulnerability are considered separately, which is absolutely correct. Impacts of changes on various systems and sectors are described. In the list of references, the Stern Report is mentioned twice. It should be noted that this Report is not peer-reviewed. According to the current IPCC definition it is "grey literature", and both the IPCC Working Group II Technical Support Unit and the IPCC Bureau must be informed that this document was used as a source of information for the Special Report. (RUSSIAN FEDERATION)	Variability has been considered to the extent possible. We have followed IPCC procedures on grey literature.
8	4	0	0	0	0	Lack of relation between hydroelectric power and dam safety. (SWEDEN)	Dam safety is out of scope for the chapter.
9	4	0	0	0	0	Methodologies to estimate loss from primary (e.g.wind) data, as mentioned in section 4.6.6. of the FOD (though mentioned there certainly at a wrong place) have been removed, and are missing now in the SOD. They should be included in chapter 4. A paper describing the methodology is Klawa, M. und U. Ulbrich, 2003: A model for the estimation of storm losses and the identification of severe winter storms in Germany. Natural Hazards and Earth System Sciences, 3, 725-732. (Ulbrich, Uwe, Freie Universitaet Berlin)	The detailed methodological material has been removed as a result of comments that it was inappropriate for an assessment report. We have retained some general material on methodologies to show the limitations and methodological issues confronting cost measurements.
10	4	0	0	0	0	Some of my comments on Chapter 4 have already been made on the FOD. I wonder why they were not taken into account at this instance. (Ulbrich, Uwe, Freie Universitaet Berlin)	All comments made on the second order draft have been carefully considered and taken into account. Comments on the FOD have also been revisited, to remedy as much as possible the reviewer's concerns.
11	4	0	0	0	0	OVERALL CONCERN: We are very concerned with the overall quality of Chapter 4, as it currently falls considerably short of providing a robust, scientifically based assessment. Our concerns are outlined more specifically below, and we trust the authors will pay close attention and address appropriately these general concerns. (Stocker, Thomas, IPCC WGI TSU)	We have paid close attention to and addressed your concerns.
12	4	0	0	0	0	RESPONSE TO FOD COMMENTS: We are frustrated to find that many of our comments/suggestions made on the FOD have simply been ignored. This is particularly frustrating where our comments and suggested edits were aimed to reduce overlap and inconsistencies with the physical science as assessed in Chapter 3. (Stocker, Thomas, IPCC WGI TSU)	All of your comments on the second order draft, including those repeated from the first-order draft, have been carefully considered. Especially close attention has been paid to overlaps with chapter 3.

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13	4	0	0	0	0	MULTIPLE LINES OF EVIDENCE AND UNCERTAINTY LANGUAGE: Assessments must be based on multiple lines of independent evidence. In the most concerning instance, an entire section (4.3.2.2) is based on a single, unpublished, not yet submitted paper (Peduzzi et al). This can't be a thorough assessment. In other instances, confidence/likelihood statements are given, and a single paper cited. Such statements must come from the authors expert assessment of all the available evidence. If there is no additional evidence available this needs to be part of the discussion and will directly influence the assessment of uncertainty. (Stocker, Thomas, IPCC WGI TSU)	Throughout the chapter, this point has been carefully considered. For 4.3.2.2 in the FOD, now Box 4-2, the exposure to tropical cyclones, floods and landslides was published in the Global Assessment Report 2011. The article Peduzzi et al. 2011 cannot be used as its status was not "accepted" by 31 May 2011. In this case, it was agreed to use GAR 2011 as well as population exposure provided by the PREVIEW Global Risk Data Platform (http://preview.grid.unep.ch/)
14	4	0	0	0	0	OVERLAP WITH CHAPTER 3: There is still significant overlap with the observed and projected changes in physical extremes as assessed in Chapter 3. In many instances, this overlap is inconsistent, and Chapter 4 still contains numerous general statements referring to 'increased flooding', 'increased storms' etc, that are inconsistent with the careful assessment of these extremes given in Chapter 3. Given that Chapter 4 is significantly overlength, we now firmly recommend that any instances are removed where Chapter 4 strays into the material that is within the scope of Chapter 3. We have marked all such instances in the detailed comments. The risk is simply too high that inconsistencies will remain and jeopardise the credibility of this report. In many instances (eg, the regional assessments given in Section 5), key messages for certain extremes are repeated word-for-word from Chapter 3. We think simply referring the reader to the relevant section in Chapter 3 where this information is available, will allow chapter 4 to achieve a considerable reduction in page length. PLEASE NOTE: The structure of Chapter 3 has changed considerably since the FOD so all existing cross-referencing to Chapter 3 needs to be carefully checked. (Stocker, Thomas, IPCC WGI TSU)	Linkages with chapter 3 have been carefully revised in all cases.
15	4	0	0	0	0	FIGURES AND TABLES: Figures and tables need considerable attention. In many cases, the tables simply duplicate the same information that is more usefully shown in the figures and can therefore be removed in order to make significant page reductions. Captions for all figures are very poor, and more explanation of the figures is needed regarding underlying data sources and methods. Even symbols and units on some figures are not explained. Referencing for information given in some tables is lacking. (Stocker, Thomas, IPCC WGI TSU)	Overlap between the figures, tables, and text has been reduced considerably with a focus on maximizing effective presentation of material.
16	4	0	0	0	0	NEW MATERIAL POST-SOD: Some figures are missing completely (Fig 4-4 and 4-13). As per IPCC Policies and Procedures, all information contained in the chapters of an IPCC Report must undergo formal expert review. Therefore, substantial new material can not be introduced in preparation of the final draft of the report. Introducing entire new figures that will not be reviewed is not an option. (Stocker, Thomas, IPCC WGI TSU)	These figures have been deleted from the chapter.
17	4	0	0	0	0	REFERENCING: Referencing throughout the chapter is inaccurate and incomplete. It is unacceptable that at the stage of the Second-Order-Draft, the reviewer is unable to trace the literature upon which your chapter is based. Some examples are noted in the detail comments, but it is the authors responsibility to check that every citation has a corresponding entry in the reference list. In relation to citing IPCC reports, where ever possible, specific chapters of previous IPCC assessment reports should be cited, or alternatively the SPM, TS, or the synthesis report. Correct citation details are found in the reports. (Stocker, Thomas, IPCC WGI TSU)	All references have been checked.
18	4	0	0	0	0	LANGUAGE: The accuracy and clarity of the English language in Chapter 4 is below the standard achieved in other chapters and needs considerable attention. Some problems go beyond what a copy-editor will be qualified to address, and the authors need to make sure their sections clearly give the message that they are intending. (Stocker, Thomas, IPCC WGI TSU)	Language throughout the chapter has been carefully revised.
19	4	0	0	0	0	SREX CROSS-REFERENCING: Please note that the cross-referencing to other chapters, especially Chapters 3 and 9 is no longer accurate, given the significant restructuring of these chapters. Please check all cross-referencing to be sure cited sections are correctly identified. (Stocker, Thomas, IPCC WGI TSU)	All references to other chapters have been checked.
20	4	0	0	0	0	SECTION STRUCTURE: The setup of the individual sections of Chapter 4 differs quite a bit throughout the chapter. Some contain a large number of sub and sub-sub sections (upt to 4th/5th level headings). A more homogeneous section structure within Chapter 4, ideally also consistent with the structure of Chapter 3, would be most useful. We therefore propose that Chapter 4 follows the approach used by Chapter 3, where all the sections cover Observations, Causes for Change (Attribution), to Projections and start with (1) the status of assessment in AR4, (2) an assessment of new science since AR4, (3) key conclusions, including uncertainties and a summary of how AR4 assessment needs to be/can be revised (if at all). This setup will also allow Chapter 4 to present a much clearer and more concise scientific assessment, rather than the more limited review of a few available studies that occurs in some sections. (Stocker, Thomas, IPCC WGI TSU)	Effective structure of sections has been considered throughout.

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21	4	0	0	0	0	UNCERTAINTY TERMINOLOGY: The use of uncertainly language throughout the chapter is inconsistent with the 2010 IPCC AR5 guidance document. Please search the document and check all instances. All formal, calibrated uncertainty language must be 'italicized' and informal use of this language must be avoided. (Stocker, Thomas, IPCC WGI TSU)	Usage of calibrated uncertainty language has been checked throughout the chapter.
22	4	0	0	0	0	This chapter has lots of interesting material, but is currently a bit unwieldy. It contains impact information on global and regional scale as wel as more general discussions on underlying trends in exposure and vulnerability. Maybe some of that material could be moved to chapter 2, with chapter 4 focusing on quantitative information on trends in impacts? (International Federation of Red Cross and Red Crescent Societies (IFRC))	Focused, succint assessment has been the focus throughout for this revision of the chapter.
23	4	0	0	0	0	Could more of the reigonal information in this chapter be organized in one table, as in chapter 3? And could this then possibly also be graphically represented as in the figures in the chapter 3 FOD? (International Federation of Red Cross and Red Crescent Societies (IFRC))	Such a table has not been added, but effective presentation of information in the regional subsections has been carefully considered.
24	4	0	0	0	0	Chapter four: overall Not enough reference for flooding and cyclonic events along South Asia, specifically Bangladesh. (Islam, Md. Siarjul, North Sotuh University)	This topic is considered in section 4.4.3.
25	4	0	0	0	0	Chapter 4 provides in some instances own assesments of changes in extreme events (see comments below), which belong to Chapter 3 material. The authors should review carefully the Chapter 3 assessments and refer to Chapter 3 for this material. Note that some Chapter 3 material may be revised following the SOD review. Hence this will require careful coordination between the two chapters when preparing the final draft. (Seneviratne, Sonia, ETH Zurich)	Linkages with chapter 3 have been carefully revised in all cases.
26	4	0	0	0	0	Ce chapitre bien documenté et assorti de tableaux intéressants, développe des passages sur des questions abordées aux chapitres 2 et 3 ; les répétitions découragent le lecteur, des contractions devraient être pratiquées. La partie sur l'évolution des systèmes humains est superficielle malgré l'importance de la question. Elle cite à la file une mention des réfugiés, de la pauvreté, des zones urbains précaires, des petites îles, des écosystèmes, de la vague de chaleur de 2003 en Europe, sans aucune approche systémique, est particulièrement décevante. Ces évolutions sont-elles incontrôlables ? Il en est de même la partie sur les écosystèmes, qui cite des impacts importants mais complexes comme l'extinction d'espèces, le blanchiment des coraux, les effets de ENSO. Les dix dernières pages passent en revue les difficultés méthodologiques d'évaluation des coûts des impacts des désastres et de l'adaptation, avec des passages sur les études coût-bénéfice et sur les évolutions futures : la conclusion est naturellement très réservée. La dernière sous-sections « uncertainty in assessing the economic loss of extrêmes and disasters s'achève par une phrase sans appel "System risk such as environment incidents and financial crise makes the future risk situation more complicated and unpredictable ». C'est le bon sens et ce qui aurait dû être affirmé en peu de mots. Les tableaux nous semblent plus intéressants que les textes. L'affirmation que l'exposition et la vulnérabilité vont croître contient une erreur de principe : on peut seulement dire qu'il y a des facteurs de croissance et des raisons de craindre que la tendance défavorable des années passés se prolongera ; mais il y a aussi des facteurs de maîtrise, stimulées et organisées par une volonté d'adaptation et de réduction des désastres. C'est donc la balance entre les effets physiques du changement climatique (eux-mêmes sensibles aux efforts d'atténuation) et les effets d'adaptation qu'il faut apprécier. Il serait souhaitable de nuancer en ce sens les affirmations. (BOURRELIER, PAUL-HENRI, AFPCN)	The revision of the chapter has considered these points.
27	4	0	0	0	0	Bibliography Add : Besancenot J.P. 2010 : Evénements climatiques extrêmes et santé, pp. 73-85 in Décamps H. (animateur) : Evénements climatiques : Réduire les Vulnérabilités des Systèmes Ecologiques et Sociaux, Institut de France, Académie des Sciences, (Lex Ulis Cedex A : EDP Sciences). Birot Y. et Peyron J.L. 2010 : Ecosystèmes forestiers européens face aux événements climatiques extrêmes, pp. 47-55 in Décamps H. (animateur) : Evénements climatiques : Réduire les Vulnérabilités des Systèmes Ecologiques et Sociaux, Institut de France, Académie des Sciences, (Lex Ulis Cedex A : EDP Sciences). Fauchon Loïc 2010 Pour l'eau : le partage plutôt que le pillage in Le ciel ne va pas nous tomber sur le tête, JC Lattès et Société de Géographie, Paris. Lenotre N. 2009 Pour une dynamique du littoral in Responsabilité et Environnement L'adaptation au changement climatique p34à 40, Annales des Mines, Paris. (BOURRELIER, PAUL-HENRI, AFPCN)	These references have been considered.
28	4	0	0	0	0	Structure: I would suggest not to have just one sub-chapter (e.g. 4.2.2). Maybe the respective sub-chapter (e.g. 4.2.2.1) can be "transformed" to a box or integrated in the higher-order chapter (Koppe, Christina, Deutscher Wetterdienst)	The structure of the chapter sections has been carefully considered and revised throughout the chapter.
29	4	0	0	0	0	Chapter 4 is with over 150 pages quite long. Therefore, I would suggest that the focus should really be on extreme events and disasters and that paragraphs, which describe changes in average conditions, should be moved to AR5. (Koppe, Christina, Deutscher Wetterdienst)	The chapter has been revised to greatly increase focus on the impacts of extreme weather and climate events.
30	4	0	0	0	0	Repetitions from ch 3 should be avoided, refer to basic concepts provided in ch 1 and 2 (GERMANY)	Linkages with chapter 3 have been carefully revised in all cases with overlap reduced. Overlaps with chapters 1 and 2 have also been reduced.

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31	4	0	0	0	0	Recent reports and (available) publications on the effects, measures and recommendations for adaptation of heat wave and wildfires in Russia in summer 2010 are missing; hint: 'All-Russian Conference on Moscow's air basin under extreme weather conditions in the summer of 2010', conducted by the Russian Academy of Science, held 25 November 2010 in Moscow. (GERMANY)	Adaptation material of this nature belongs in Chapters 5 and 6 of this report. In Chapter 4 we provide an overview of the costs of adaptation in a global context.
32	4	0	0	0	0	The whole chapter : several contradiction with Chapter 3, about the expected (or not) increase in frequency and/or magnitude of extreme events : cf. next comments. (FRANCE)	Linkages with chapter 3 have been carefully revised in all cases.
33	4	0	0	0	0	Part A of the Comment : Chapter 4 focuses on the cost on climatic extremes, be they weather extreme events or extreme impacts. It states that the impacts of weather and climatic extremes are mediated by the exposure and the vulnerability of countries, including both physical and social elements. The report considers the interaction between social factors and vulnerability, but without attaching much importance to this issue. The report acknowledges that « the impacts of disasters are greatest on poorest households » (p.27), and although « at the global level, it appears that poverty is decreasing,..., for the poorest ten percent the situation is much worse with a decrease in income,... ». Part B of the Comment : Recent research on risk vulnerability has emphasized the effect of social inequality on the ability for societies to adapt to catastrophe shocks. For instance, N. Anbarci, M. Escaleras and C. A. Register (« Earthquake fatalities: the interaction of nature and political economy », Journal of Public Economics, 2005, 89, 1907-1933 ; reference quoted in the GIEC report) relate fatalities resulting from an earthquake to both per capita income (which is standard) and to the level of inequality that exists within a country through their joint impact on the likelihood of collective action being taken to mitigate the destructive potential of quakes. They first develop a theoretical model which offers an explanation as to why, in some environments, different segments of society prove incapable of arriving at what all parties perceive to be an agreeable distribution of the burden of the necessary collective action, causing the relatively wealthy simply to self-insure against the disaster while leaving the relatively poor to its mercy. Following this, they test their theoretical model by evaluating 269 large earthquakes occurring worldwide, between 1960 and 2002, taking into account other factors that influence a quake's destructiveness such as its magnitude, depth and proximity to population centers. They find strong evidence of the theoretical model's predictions. That is, while earthquakes themselves are natural phenomena beyond the reach of humankind, our collective inaction with respect to items like the creation and enforcement of building codes, failure to retrofit structures and to enact quake-sensitive zoning clearly plays a part in determining the actual toll that a given quake takes. And, it is through these and other examples of collective inaction that limited per capita income and inequality couple together with a given quake's natural destructive power in determining the actual fatalities resulting from a quake. Part C of the Comment : These results about vulnerability to earthquakes are relevant to climatic extremes. Saying that the poorest people belong to the most vulnerable categories of the world population and that they will be the main victims of future climate-related catastrophes, is certainly true . However, we should also add that fighting the consequences of climate change without reducing social inequality is to some extent self-contradictory because societies with a high degree of inequality are unlikely to develop costly adaptation strategies. (FRANCE)	We agree with the substantive point made concerning the importance of the poor and the impact of extreme events. We think that as it now stands the chapter gives this issue reasonable attention. It is also covered to varying extents in all other chapters in the report, apart from Chapter 3.
34	4	0	0	0	0	There seems to be a total absence of discussion of the effect that choosing a baseline has on the conclusions drawn. While a 30-year period might well make sense for meteorological variables when the climate is stable (and that was the situation when the 30-year period became the convention), this is an assumption that needs to be evaluated, especially in considering that potential impacts might have quite different time scales. For example, forests typically have time scales of 100 years or more (for a new forest to get started and then for the ultimate varieties to develop into a mature forest), should not the period of averaging be over 100 years or longer. If one does that, it would make clearer that prevailing forests are currently facing almost continuous extremes through most years, and this would help to explain why many are so stressed. As another example, for the Arctic and permafrost, etc., a longer baseline would seem appropriate. And one more example, for urban infrastructure, it would also seem most appropriate to have a longer time scale for issues like heat index, heat waves, etc. On the other hand, thirty years might be about right for air quality, as it takes perhaps, say, 15 years to replace the transportation fleet and upgrade emissions standards. It just seems to me that it is essential to be using a time interval as the baseline that is appropriate to the impact being studied. Just saying, as is done on page SPM 1, lines 26-27 (and footnote 1) that it is conventional to use 30 years and a variety of definitions does not seem adequate to me in terms of this assumption. (MacCracken, Michael, Climate Institute)	Attention has been given to specifying the baseline where possible in the context of material assessed, but discussion of the effect that baseline choice has on conclusions drawn has not been evaluated directly, as it is outside the scope of the chapter.

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35	4	0	0	0	0	It seems to me that the average reader is going to come to this chapter and want to get quickly in to discussion of likely impacts. Instead, what one gets are pageas and pages of context and background. I don't doubt this is all necessary, and to at least some experts is going to be interesting, but for many, they are going to want to jump to the results. This suggests to me that a lot of what is in section 4.2 and in other areas should go into an appendix (or another chapter)--it is really mainly supplementary material. I very much think that what reades are going to want is to look for a discussion about what is going on in their region and/or key sector now and in the recent past and then immediately about what is projected for the future. Right now this is spread all through a rather long chapter and is going to be quite difficult for the resource managers and planners that are likley to be the type of reader that want to probe more deeply than the SPM. (MacCracken, Michael, Climate Institute)	The opening sections of the chapter have been greatly reduced in length.
36	4	0	0	0	0	It would help throughout the chapter, particularly the long sections, to have some highlights given in bold or italics. In addition, it will be important that the first sentence of each paragraph give the main point of the paragraph, with the rest of the text giving details. (MacCracken, Michael, Climate Institute)	Maximizing the effectiveness of presentation of information and findings has been considered throughout.
37	4	0	0	0	0	I feel the lack of assessment of quality of statements presented in the chapter. The word "may" is very often used to show that some events or processes are possible, but the same word is used for events and processes which have a high probability and these which have low or even extremely low probability of occurrence (as shutdown of THC for instance). It significantly decreases the credibility of the whole text. (Wibig, Joanna, University of Lodz)	Careful attention has been paid to ensuring that the degree of certainty implied in statements precisely reflects that intended by the authors in their assessment.
38	4	0	0	0	0	Again reference to insurance (an post impact aid) should be refered to in summary of the § : as inscreasing recovering capacity (pages 7, 10, 14), resilience (§ 4.3), building most of the knowledge of the cost of impacts of extremes / economic losses (§ 4.5 and 4.6). (NUSSBAUM, Roland, Mission Risques Naturels)	Insurance is discussed in the later chapters of the report.
39	4	0	0	0	0	Chapter needs editorial improvement. Information is duplicated sometimes. E.g. regional information should all be included in 4.5. Likewise different sections of the chapter include information on changes in physical climate (extremes). This should belong to chapter 3, because chapter 4 focuses on impacts. Finally, examples are given (esp. projection related) where extremes do not play a role/have not been considered/presented outcomes were more related to changes in average climate (and this report is on extremes). Overall, this could shorten the chapter considerably (NETHERLANDS)	The structure and focus of the chapter have been carefully revised along these lines, to reduce overlap within the chapter and with other chapters and to ensure the scope of material included in the chapter is appropriate.
40	4	0	0	0	0	Focus of chapter: The chapter is more an enumeration of especially observed impacts around the world, sometimes supplemented with projections. Further assessment of these is needed. E.g. comparison between regions and sectors is often lacking (although done for tourism, Figure 4-12). Likewise, what are the most severe impacts and most vulnerable regions/systems? (NETHERLANDS)	Observations and projections have been evaluated to the extent possible, including comparisons where appropriate.
41	4	0	0	0	0	The confidence issue remains a challenge. Some bold statements provide an uncertainty statement, others don't. It would be better to add an uncertainty indicator to each relevant statement. For example, first paragraphs of the ES mention the confidence, but later sections lag on this. Likewise, the regional sections (4.5) include any information on confidence levels. (NETHERLANDS)	Usage of calibrated uncertainty language has been revised throughout.
42	4	0	0	0	0	Pay attention to referencing. In many cases multiple references are used, in other cases only one or even none. In some cases references are not listed in the reference list. (NETHERLANDS)	Referencing has ben carefully considered and checked throughout.
43	4	0	0	0	0	Often references are made to the 2007 4AR of the IPCC or even TAR. (i) Better to use original reference; (ii) If referring to IPCC is most appropriate, do it in consistent way (now both IPCC, 2007 and AR4, 2007 are used) (NETHERLANDS)	Consistent and appropriate referencing has been checked throughout.
44	4	0	0	0	0	The chapter could use a better lay-out. The report is a collection of impacts & sensitivities around the world. General information in first sections, more regional specific information in the regional section would improve this chapter. (NETHERLANDS)	The structure the chapter has been carefully considered and revised throughout.
45	4	0	0	0	0	Prudence with exaggerating statements like "unprecedented" and "Catastrophic" is required. Likewise, increases in impacts, sensitive etc. are in some cases presented, where –statistically- other conclusion can be made as well (related to figure 4-10). Further, within the chapter different types of messages are given. For example on increasing economic losses and the human factor therein. The final conclusion here is (pg 78, line 20-21) that there is "yet limited evidence for increasing losses due to anthropogenic climate change". This could be linked more to the presented observed and especially projected impacts ("we don't see yet an human contribution but project this & this, due to that & that process"). (NETHERLANDS)	Appropriate wording of findings has been ensured throughout.
46	4	0	0	0	0	The Executive summary contains various statements that refer to section 4.2.5. This section does not exist. (NETHERLANDS)	The reference has been updated appropriately
47	4	0	0	0	0	More consideration for the impacts on systems in broader context of risks (like done in Europe sub- section) would be good. The chapter mainly contains observed impacts of extremes. To assess real vulnerability and risks (e.g. of ecosystems) it is also relevant to mention the recovery/coping capacity (like done in one instance at page 36, pg 44-51). If systems recover quickly, impacts could be considered minor (or even part of the process, like burning of savanna's), whereas extremes also could lead in other systems to complete shift to another state. (NETHERLANDS)	This point has been considered in the revision of the chapter

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48	4	0	0	0	0	Consider the impacts on systems in broader context (ii). Many presented impacts are correct. But statements about the relativeness of these impacts in relation to other developments (e.g. Impacts on food production in Africa compared to population growth) are required. (NETHERLANDS)	This point has been considered in the revision of the chapter
49	4	0	0	0	0	Quite old literature is often used (before 2004). Suggestion to find more updated information (e.g. for Europe more recent information is available). (NETHERLANDS)	References used throughout the chapter have been considered accordingly.
50	4	0	0	0	0	Pg 12 lines 18-20 and 35-38 are quite similar (NETHERLANDS)	This overlap has been addressed.
51	4	0	0	0	0	Overall comment: The chapter is mainly a review and not an assessment. Much of the material is reviewing conclusions from various studies without an assessment of the state of science on the topic in question. The remedy is a complete re-write, in which the literature review parts are split out as a separate paper outside of the SREX report, leaving a much denser chapter of perhaps 5 pages in length stating what the assessment conclusions are. (UNITED STATES OF AMERICA)	The chapter has been substantially restructured, with careful attention to appropriate scope of material presented.
52	4	0	0	0	0	This chapter seems to be less supported by current citations than Chapter 3. There are also a number of instances where statements in Chapter 4 contradict statements Chapter 3 (see some examples in the detailed comments). (UNITED STATES OF AMERICA)	Consistency with chapter 3 has been ensured. References have been considered throughout as well.
53	4	0	0	0	0	There are numerous places in this chapter where certain past changes are described or where certain projections statements are made. In a number of places these are described in very vague terms (i.e., this change has happened or this change may happen). In some cases, these topics could have been placed in a more informative context by using the confidence levels or likelihood levels developed mainly in Ch. 3, but they generally were not. In other words, Ch. 4 discussions and narratives need to be better integrated with Ch. 3 assessments. In many cases in Ch. 4, there is no assessment given on the presented information. For example, the text describes a change in some metric that has been observed over some period of time. Is the change highly unusual compared with changes expected due to natural variability? Without addressing this type of question directly, the reported change is of little value in the assessment. As an aside, the number of such observed changes that could potentially be included in the assessment as “anecdotal evidence” for some position is essentially without limit. However, what is useful in the assessment are cases where such changes have been examined in the context of expected natural variability to determine if they are unusual or not (perhaps constituting a climate change detection). Or following on from that, the changes can sometimes be objectively attributed to some known causal agent, which usually requires a careful modeling study and detection/attribution methods. Chapter 3 successfully uses this approach, but the approach is for the most part not used in Ch. 4. Consequently, Chapter 4 tends to be confusing or frustrating to read and much less informative than Ch. 3 as an assessment product. (UNITED STATES OF AMERICA)	Consistency with chapter 3 has been ensured throughout, as the starting point for chapter 4's assessment.
54	4	0	0	0	0	Some material in the chapter strays too far from the theme of extremes, and should be deleted, deferring these topic to the AR5 report. Specific examples: Much the entire Polar region section (Ch. 4, p. 64, line 49 through p. 66, lines 11); (Ch. 4, p. 66, lines 24 through p. 67, line 5); All of this material should be deleted. (UNITED STATES OF AMERICA)	Deletions have been made throughout the chapter to ensure appropriate scope.
55	4	0	0	0	0	Problem with balance in presentation: much text is used speculating on possible very bad outcomes, without considering more moderately negative or neutral outcomes, or even benefits. Another imbalance is speculating or implying that observed changes are due to anthropogenic forcing without considering possible role of natural variability. (UNITED STATES OF AMERICA)	Balance in both of these senses has been carefully considered throughout the chapter
56	4	0	0	0	0	Signal to noise issues. By this I mean that observed changes in the climate or damages are described, but no rigorous assessment is done on whether the changes are unusual in the context of natural variability. Without this context the described changes are not very informative (UNITED STATES OF AMERICA)	This has been considered in the assessment of relevant information in the literature
57	4	0	0	0	0	Projections are made without confidence levels or likelihood qualifiers. Without such qualifiers, the reader does not know how to interpret the projections. The purpose of an assessment is to provide such guidance. (UNITED STATES OF AMERICA)	The degree of certainty in assessment findings has been considered throughout the chapter.
58	4	0	0	0	0	References are often missing when claims are made in the text. (UNITED STATES OF AMERICA)	Missing references have been supplied.
59	4	0	0	0	0	The quality of the text and assessment in the chapter 4 is clearly well below that of Ch. 3. For the revision, the Ch. 3 authors should be required to review Ch. 4 to help address the many problems and inconsistencies pointed out in the other comments of this review. (UNITED STATES OF AMERICA)	Consistency with chapter 3 has been ensured.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
60	4	0	0	0	0	The framing for this chapter should be carefully considered given the characterization of climate extremes in Chapter 3 and the relatively low-levels of confidence associated with observed trends and projections. On page 19 it is stated: "There is no conclusive evidence that anthropogenic climate change has led to increasing losses, and increasing exposure of people and economic assets is virtually certain to be the major cause of the long-term changes in economic disaster losses." This is a powerful statement that sets a tone for impacts discussed in this chapter. Also, on page 5 of this chapter, it is stated: "...in this chapter impacts are assessed without reference to possible adaptive action..." This is a completely unnatural situation and thus an invalid assumption. Such an assumption will lead to a gross amplification of negative impacts and will poorly reflect reality. Humans (and other species) react continually with their environment. Assuming they do not (i.e. no adaptation to environmental changes) is not appropriate for an assessment of impacts. (UNITED STATES OF AMERICA)	The sentences noted here have been clarified to accurately reflect the intended framing of the chapter.
61	4	0	0	0	0	Although discussion of the definition of 'disaster events' appears in several sections, exploration of potential impacts does not adequately separate gradual climate change from extreme events and their relationship to each other. (UNITED STATES OF AMERICA)	The revision of the chapter has increased clarity in its focus on the impacts of extreme events.
62	4	0	0	0	0	Generally paragraphs need to be examined for structure, internal consistency of ideas, topic sentences. (UNITED STATES OF AMERICA)	Careful attention has been paid to the effectiveness of paragraphs in the revision of the chapter.
63	4	0	0	0	0	There are few statements to reflect confidence or support in conclusions drawn from assessment. In many cases, insufficient references seem to have been consulted to draw assessment conclusions; if the authors feel the literature is limited, please indicate that where appropriate. In other instances, additional literature does exist, should be included, and an assessment should be made. (UNITED STATES OF AMERICA)	Referencing has been carefully considered throughout the chapter.
64	4	0	0	0	0	The connection between climate/ecosystem thresholds and vulnerability or resilience should be addressed and consistent with other chapters. (UNITED STATES OF AMERICA)	This point has been considered in the revision of the chapter.
65	4	0	0	0	0	Overall discussion of impacts to plants and animals is poorly referenced. Discussion of impacts to ocean systems, especially corals, should be expanded. (UNITED STATES OF AMERICA)	Referencing for these topics has been considered, with some improvements made.
66	4	0	0	0	0	It is remiss not to discuss the mortality impacts of the European heat wave of 2006. In a study by Fouillet et al. (2008, Has the impact of heat waves on mortality changed in France since the European heat wave of summer 2003? A study of the 2006 heat wave. International Journal of Epidemiology, doi:10.1093/ije/dym253) the authors found that far fewer people died than expected during an intense heat wave. They concluded "The excess mortality during the 2006 heat wave, which was markedly lower than that predicted by the model, may be interpreted as a decrease in the population's vulnerability to heat, together with, since 2003, increased awareness of the risk related to extreme temperatures, preventive measures and the set-up of the warning system." This result clearly demonstrates society's rapid adaptation to extreme heat. A similar situation occurred in the U.S. in 1999, a few years after the Chicago heat wave of 1995. You all appropriately cite a study comparing the impacts of the 1995 heat wave vs. a similar heatwave in 1999 (Palecki et al., 2001) on study on page 56, lines 32-36. The work of Fouillet et al. (2003) should appropriately be cited here. (UNITED STATES OF AMERICA)	References are made to the chapter 9 case study addressing this heat wave.
67	4	0	0	0	0	This section should start out with a review of human welfare, focusing on perhaps the best measure of human welfare, life expectancy. And then consider the trends in life expectancy against the trends in observed climate. After that, you could begin your speculation as to how you expect future climate changes to buck this established trend. (UNITED STATES OF AMERICA)	It is not clear what section this comment is referring to.
68	4	0	0	0	0	Structure of chapter requires major revision. It makes very little sense. E.g. section 4.2 deals with ecosystems in several places (4.2.1, 4.2.2, 4.2.3) while it remains totally unclear why that should be. The title of section 4.2 indicates that section would deal with the role of climatic extremes, something I would rather expect to be dealt with in an integrative manner at the end of this chapter. On the other hand, that section appears wanting to introduce concepts, and I would agree that impacts of climate extremes needs to be introduced. Subsections such as 4.2.2 seem to try to have a focus on complex interactions, but why here, in this first section? Why such a narrow focus (drought, fire, tropical forests, Asia, Latin America, why not also Africa)? Does this serve some illustrative purpose? That would explain the rather narrow focus. Then why not making it a box that illustrates some of the concepts that are introduced in this first section. But not a subsection in the middle of an already confusingly structured section 4.2. I have doubts that section 4.2.4 really belongs here into this chapter 4. Wouldn't it be better to properly treat this e.g. in chapter 2? Or what are the compelling reasons to do it here in ch4? Sections 4.3, 4.4, and 4.5 are the core sections that should assess "changes in impacts of climate extremes on human systems and ecosystems". Consequently I expect as the first subsection within 4.3 to find latest scientific findings on whether impacts of climate extremes on human systems and ecosystem has actually changed. I find starting 4.3 with 4.3.1 emphasizing that "climate change would contribute to and exacerbate other trends". Such a discussion would rather have to be made in section 4.2. Moreover, if the authors should have strong arguments for having such a section here, then they should justify this well, which they don't. (Fischlin, Andreas, ETH Zurich)	The structure of the chapter has been changed substantially, very much along the lines of what is suggested in this comment.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
69	4	0	0	0	0	I am afraid this chapter is in a very poor shape. I am really concerned, in particular since this is not a zero or first order draft, but the last critical review round. New material would need to be properly reviewed, and I have to admit, I am a bit at a loss and don't see clearly how the authors can accomplish all what is needed. Although it is obvious that many authors have brought thos this chapter excellent expertise and really uptodate knowledge, no clear structure, logic and philosophy is followed through. I believe this is the CLA's responsibility. Most importantly the focus needs to be put on extreme events. Given the poor shape of the text I propose to drop all the material referring to more general issues of CC impacts. The emphasis of the final effort needs to be put on extreme events and extreme impacts only. This would make the difficult task for the authors considerably easier, if as much as possible is deleted. . I suggest to rearrange most of the material such that it really follows a clear logic from begin to end. Why not first introducing and dicussing the kind of extreme events and the kind of extreme impacts that will be discussed. I suggest also to follow the so-called two "views" (better topics), i.e. extreme weather events and extreme impacts, through and structure subsections accordingly. Then discuss current, observed trends in human systems and ecosystems, following through the sequence by which types of extremes were introduced previously. Then discuss future projections and possibly future impacts for extreme events and extreme impacts both for human systems and ecosystems. Again in the sequence of event typology laid out in first part. I would drop the regional part and try to collate from that part all material pertaining to extreme events and extreme impacts for human systems and ecosystems to the retained text, first for observed evidence, then for future projections. Then sum up with costing, but ecosystems impacts need to be included in that section too. If the authors make huge efforts to use as much as possible material which was already contained in the SOD, this "rearrangement" might still sufficiently conform to IPCC rules and principles, I hope. (Fischlin, Andreas, ETH Zurich)	The chapter has been very substantially revised, with attention to its structure and scope.
70	4	0	0	0	0	Consistency with chapter 3: Throughout the chapter, wherever trends in hazards/extreme events or in physical impacts are discussed, relevant assessment findings in chapter 3 must be considered and cited as appropriate, even where other sources are also referenced. The citations to chapter 3 must indicate relevant sections, tables, figures, etc., not just chapter 3 as a whole. We have indicated locations in the chapter where consistency with chapter 3 is required. (IPCC WGII TSU)	Consistency with chapter 3 has been ensured throughout the chapter.
71	4	0	0	0	0	Use of calibrated uncertainty language: Throughout the chapter, the author team should consider characterizing their degree of certainty in assessment findings using the calibrated language outlined in the AR5 Guidance Note on Treatment of Uncertainties (Mastrandrea et al. 2010): summary terms for evidence and agreement, levels of confidence, and likelihood terms. Use of calibrated language could enable the reader to understand more fully and compare more systematically the state of knowledge across statements. (IPCC WGII TSU)	Usage of calibrated uncertainty language has been considered throughout the chapter.
72	4	0	0	0	0	Throughout the chapter, there are subsections with italicized titles that are not numbered. Per the SREX style guide, these subheadings need to be numbered. (IPCC WGII TSU)	The structure and subsections of the chapter have been revised.
73	4	0	0	0	0	Use of "threshold" and related terms. In this and other chapters, a number of related terms are used, sometimes synonymously and sometimes differently: climate threshold (which also appears in the glossary), absolute (possibly impact-related) threshold, statistical/probability-based threshold, vulnerability/social (impact-related) threshold, tipping point, critical threshold, critical transition, regime shift. These terms are used to define extreme events or impacts or to characterize non-linear, abrupt, and/or possibly irreversible changes. Where these terms are used, the author team should ensure that the usage is not ambiguous and that it is consistent across chapters. (IPCC WGII TSU)	Usage of these terms has been considered accordingly
74	4	2	48	0	0	Executive Summary. Formatting of first sentence(s) in each paragraph: We recommend bolding these sentences instead of italicizing them. Then, calibrated uncertainty language (per the AR5 Guidance Note on Treatment of Uncertainties) should be italicized, e.g., italicizing "high confidence," etc. (IPCC WGII TSU)	Agreed. Done.
75	4	2	48	0	0	Executive Summary. Stylistic considerations for presentation of key findings: The Executive Summary would be more effective if there were a more logical organization of findings throughout. For example, findings pertaining to observations could be grouped separately from findings pertaining to projections. Additionally, it would be helpful to have a clear structure in terms of level of detail presented, perhaps opening and concluding the Executive Summary with more general findings and providing more detailed findings in the middle body of the Executive Summary; as is, the level of detail changes quite dramatically from paragraph to paragraph. (IPCC WGII TSU)	The structure of the Ex Sum has been revisited and its final form reflects decision smade about the Chapter Ex Summaries for the whole SREX report.
76	4	2	50	0	0	All statements in the ES need to be linked to the relevant underlying section of the chapter. The reader needs to be able to trace how the statements in the ES were derived. (Stocker, Thomas, IPCC WGI TSU)	Agreed and this has been done.
77	4	2	50	0	0	The use of uncertainly language here, and throughout the chapter is inconsistent with the 2010 IPCC AR5 guidance document. Please check all instances. All formal, calibrated uncertainty language must be 'italicized' and informal use of this language must be avoided. (Stocker, Thomas, IPCC WGI TSU)	Agreed. We have made the changes and inserted IPCC uncertainty language as appropriate.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
78	4	2	50	0	0	The summary is redundant with chapter 2 when recognising that extreme event and disasters do not correspond. Commentaries on the positive impacts would be interesting. (BOURRELIER, PAUL-HENRI, AFPCN)	We have worked with Chapter 2 to ensure consistency and to minimise overlap. Many FOD comments also related to this point and we need to make it clear. The chapter addresses disasters so it focusses on the negative impacts of extremes. Comments on positive impacts are made in the chapter text.
79	4	2	50	0	0	The chapter also includes impacts without weather/climate extremes. This is not covered by the chapter title. (NETHERLANDS)	The chapter has been revised to ensure focus on the impacts of extreme weather and climate events.
80	4	2	50	2	52	"The chapter examines two types of "extremes": weather and climate events; and secondly extreme impacts on human and ecological systems": This sentence sounds a little bite strange. Indeed, weather and climate events are covered in chapter 3. Hence it seems that only the 2nd item "extreme impacts on human and ecological systems" should indeed describe the material of the present chapter. I would suggest to revise this sentence as follows: "The present chapter examines two types of impacts from weather and climate events on human and ecological systems: those resulting from extreme weather and climate events and impacts on the physical environment (chapter 3), and extreme impacts that may not necessarily result from these extremes but rather from a combination of changes in climate and changes in vulnerability and exposure." (Seneviratne, Sonia, ETH Zurich)	This text has been revised accordingly.
81	4	2	50	3	4	Very confusing and poorly written paragraph. I do not understand what the authors really wish to accomplish. I expect from this chapter something else than an attempt to start from scratch with all issues. The report as an entirety should have done that and the reader should be well prepared when starting with chapter 4. Instead of the generalities I am expecting here what is specific about impacts on human systems and on ecosystems. Chapters 3 and 4 should be similar, they just deal with different systems. If I compare this para with chapter 3, p. 2, l. 3-10, that para is much better written and perhaps addresses the same issues. This needs to be harmonized, possibly across all 3 chapters involved, i.e. chapter 2, 3, and 4. (Fischlin, Andreas, ETH Zurich)	Chapter 4 needs to introduce itself and the issues under its purview have been the subject of a number of FOD comments. We have however worked to clarify the paragraph.
82	4	2	50	3	4	This introductory paragraph could use some clarifications. It seems that the chapter, as a whole, considers the impacts of weather and climate events on human and ecological systems. In this context, the chapter considers extreme impacts due to extreme or non-extreme weather and climate events. The paragraph as currently phrased suggests that the chapter might consider serious negative impacts on human and ecological systems that are not directly connected to weather and climate events—for example, extreme impacts due directly to economic or government collapse are not excluded given the current presentation. It is also not fully established how the chapter considers the effects of climate change on extreme impacts due to changes in extreme or non-extreme weather and climate events, as well as changes in vulnerability and exposure. Clearly, chapter 3 assesses changes in extreme weather and climate events, but it would be good to establish here how such changes are considered in the context of assessing impacts. (IPCC WGII TSU)	This text has been revised to clarify the scope of the chapter.
83	4	2	50	3	52	Please discuss separate 1. climate extremes, 2. weather extremes (see chapter 1, 4.2 etc.) and 3. triggered extreme(s) (events). E.g. droughts can be caused by climate extremes, storms are weather extremes while wildfires and even floods are triggered extreme events. The occurrence and intensity of these triggered extreme events can be influenced e.g. the risk of wildfires can be reduced by adapted forest management, the risks of floods can be reduced by reducing water run off in land use (see chapter 4.2.2) while there is no influence on the initiating extremes. This difference is important for the development of adaptation strategies. (GERMANY)	The terminology regarding extreme weather and climate events and physical impacts has been established in chapter 3, and we use the conventions they employ.
84	4	2	50	4	36	Executive summary: It would be useful if the assessments in the executive summary would include references to the respective sections they are based on for better traceability (see for instance executive summaries of chapters 1 and 3). Moreover, it would be better if the summary sentences at the beginning of each paragraph were highlighted in bold face rather than italic, so that the assessments (in italic) can be distinguished from the main text (see again ES of chapters 1 and 3 as examples). (Seneviratne, Sonia, ETH Zurich)	Agreed and this has been done.
85	4	2	50	4	36	There is a strange mix in the Executive Summary of statements that are qualified using the usual IPCC phrases that reflect the balances of probability / confidence with those that do not. The latter appear weak and general in comparison with the former. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	We have harmonised the uncertainty language with the IPCC standards.
86	4	2	51	2	51	Chapter 4 should not examine "weather and climate extremes" - this is clearly the scope of Chapter 3. You would be better here to use the sentences from page 4 (lines 49-51). (Stocker, Thomas, IPCC WGI TSU)	The scope of chapter 4 has been clarified accordingly in the text.
87	4	2	51	2	51	I see this explanation as adding up to THREE distinct types of extremes: weather extremes, climate extremes and extreme impacts. How, if at all, do weather extremes differ from climate extremes? (Cogley, J. Graham, Trent University)	The terminology regarding extreme weather and climate events and physical impacts is uniform across the report and has been discussed in chapter 3. We use these conventions, with relevant terminology provided in the SREX glossary.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
88	4	2	51	2	51	I do not understand: Weather or climate extreme events? What is an extreme climate event? An abrupt CC because of a collapse of the meridional thermohaline overturning circulation, the sudden collapse of the West-Antarctic ice shield, or something else? Or are the authors treating both as synonyms? That would require explanation. The same is true for this confusing distinction "weather and climate", which calls also for some explanation (at least I do not understand what is really meant). Even better would probably be to delete this all and cross-reference another chapter where these general issues are well laid out. Similar thoughts apply to lines 35-38 and others, where the term used is extremes. Is every extreme really an extreme event? If there is a gradual temperature rise that ends with extreme temperatures, this is certainly a weather extreme, but is this what most people would call an extreme event? And what about a large change in temperature, remaining in mid range, but with a large ΔT over a short period of time? Is this also an extreme, or is it only an extreme event? I believe authors need to pay some attention and care to the terminology they are using throughout with respect to these issues. It is interesting to see that corresponding text in the chapter, e.g. p. 5, line 38 to p. 6, line 8, explain some of these issues. Please make better use of your text in the ES. (Fischlin, Andreas, ETH Zurich)	The terminology regarding extreme weather and climate events and physical impacts is uniform across the report and has been discussed in chapter 3. We use these conventions, with relevant terminology provided in the SREX glossary. The chapter deals only with impacts and the focus is on extremes.
89	4	2	52	2	54	This distinction between two causes of extremes is helpful, but there is one more. Often an extreme weather event does NOT result in an extreme impact. Examples can be found in the agricultural sector when the timing of extreme weather events do not coincide with sensitive stages of crop growth, or with the annual crop cycle, or where there are sufficient economic buffers (insurance, compensation payments) in place to offset the economic impact of extreme events. Suggest clarifying this along with ensuring this links to other sections in the report where this has been mentioned. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	Agreed. This is covered in the chapter text. A note has been added to the Ex Sum.
90	4	3	0	0	0	It would be helpful to summarise, perhaps through use of examples, the text from the regional section 4.5 in the Executive Summary. The existing summary at page 3 line 48, although accurate, is too general to be helpful. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	Further detail from the regional sections has been included in the revised Executive Summary.
91	4	3	1	3	1	Delete 'gradual'. (Stocker, Thomas, IPCC WGI TSU)	Done.
92	4	3	4	3	35	"Climatic extremes are observed to have widespread negative effects on biodiversity?" An unwarranted statement. Up to the present only a few cases of proven extinction can be put forward as evidence (e.g. the golden toad), and they are related to CC in general, and not climatic extremes. It is much more difficult to relate climatic extremes to biodiversity impacts than to relate range shifts or range shrinking to CC. For a thorough assessment on biodiversity issues, see Fischlin et al, 2007. The future fate of biodiversity and CC is quite a different topic, but here the authors talk about observed impacts. Cited References: ----- -- Fischlin, A., Midgley, G. F., Price, J. T., Leemans, R., Gopal, B., Turley, C., Rounsevell, M. D. A., Dube, O. P., Tarazona, J., & Velichko, A. A., 2007. Ecosystems, their properties, goods and services. In: Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (eds.). Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC). Cambridge University Press: Cambridge, UK. 211-272. (http://www.ipcc.ch) Fi103 (Fischlin, Andreas, ETH Zurich)	Text deleted
93	4	3	6	0	0	"There is high confidence that absolute losses from weather-related disasters are increasing" This statement needs a time scale to be precise. It is accurate if the start date is 1970, but arguably less so if the start date is 1990 or 2000. (Pielke, Roger, University of Colorado)	Agreed. Time scale added.
94	4	3	6	3	12	This opening statement seems quite a generalization from quite limited analyses--namely mainly from the hurricane/tropical cyclone type of impacts. Consider instead the situation in the Arctic, where very warm conditions (surely extremes compared to the 20th century) are causing all sort of costly impacts. This is also not the case in the water resource area where there is a dependence on snowpack (consider the Colorado River basin and the very low level of Lake Mead, etc.) or mountain glaciers melting back (think Peru, etc.). That heatwaves have been increasing (and it is temperature plus absolute humidity that matters most) is causing increased costs to avoid the suffering. How about the pine bark beetle and dying forests across western North America--that is from extreme cold not being so cold, and some would add forest fires? What about the increasing extent of some vector-borne diseases, etc.? The opening sentence is simply not justified, even if it is the case for hurricanes (and for a contrary view to some of that view, see Anthes, R. A., R. W. Corell, G. Holland, J. W. Hurrell, M. C. MacCracken and K. E. Trenberth, 2006: Hurricanes and global warming – Potential linkages and consequences, Bulletin of the American Meteorological Society, 87, 623-628. As the chapter makes clear elsewhere, a tremendous investment has been made through building codes and better warning systems (so more time evacuation and boarding up buildings, etc.), the costs, even normalized by population and inflation, have not gone down--that cost for building resilience counts as an impact of climate change, or at least extreme weather. Thus, for quite a number of reasons, I think this key finding needs revision. And on line 7, change "lead" to "led". (MacCracken, Michael, Climate Institute)	The nature of supporting data has been further clarified in the revised version of this statement. We have made the limitation of the existing trend analyses clear and mention that risk based analysis of some climate and weather episodes suggests a climate change signal. The case of the Arctic is discussed in section 4.4.9.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
95	4	3	6	3	12	The mentioned increase in losses can also be seen in figure 4.15. This figure (and may be also figure 4.4) also shows that such a statement depends on the periods considered/the statistical method used. The increase has esp. occurred in the 1990ties compared to early 20th century, and then stabilized. As such, more explicit statement of the periods considered should be included. (NETHERLANDS)	Agreed. A time scale has been added.
96	4	3	6	3	12	The structure of this paragraph is effective, with specific findings characterized by calibrated uncertainty language and supported with further detail and section references. It could be helpful to adopt the approach of this paragraph in other Executive Summary paragraphs. Regarding the second sentence of this paragraph, there is a subtle, but important distinction that appears to be overlooked: As presented in chapter 3, there are some hazards for which trends have been observed and detected and, in some cases, attributed to anthropogenic forcing. In this chapter, trends in losses or impacts are described, and these trends cannot be conclusively linked to such observed changes in hazards and anthropogenic forcing. Nonetheless, one would not expect the observed changes in hazards to have *no* effect on the loss/impacts trends, even if the effect cannot be detected. The phrasing used in this sentence suggests that anthropogenic climate change has had no influence on observed losses. The complexity of the factors influencing trends in losses/impacts should probably be accounted for more fully in this statement. (IPCC WGII TSU)	We agree and have tried to ensure that the complexities are clear.
97	4	3	7	0	0	"There is high agreement, but medium evidence that anthropogenic climate change has so far not lead to increasing losses." There are several dozen studies that reinforce this conclusion, and none that contradict it, so why "medium evidence"? It would be more correct to replace "but medium" with "and no". (Pielke, Roger, University of Colorado)	This is addressed in two ways: we try to set out the limitataions and complexities of this type of assessment in terms of data coverage and methods. Most studies make no mention of the certainty and confidence limits of their conclusions which are important given that small trends are being sought. Secondly, there is evidence of impacts of anthropogenic climate change in arctic reagions and in European heatwaves.
98	4	3	7	3	8	I find this statement quite daring, to say the least. The attribution issue is so complex, first for global CC, let alone for impacts, yet is addressed here in so general terms "anthropogenic climate change", not just extreme events regardless of anthropogenic causation, that I believe this to be basically inappropriate. If authors would refer here AR4 WGI and WGII reports (IPCC, 2007a,b,d) and use that wording, then I could concur. However, in this form I believe this to be a sweeping statement that needs either to be deleted or at least considerably improved and backed up with clear evidence. Cited References: ----- IPCC, 2007a. Climate change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). In: Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K. B., Tignor, M., & Miller, H. L. (eds.)Cambridge University Press: Cambridge, UK and New York, NY, USA. 996. (http://www.ipcc.ch) Ip011 IPCC, 2007b. Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). In: Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (eds.)Cambridge University Press: Cambridge, UK. vii, 973. (http://www.ipcc.ch) Ip015 IPCC, 2007d. Synthesis Report of the IPCC Fourth Assessment Report. Cambridge University Press: Cambridge, UK. 52pp. Ip030 (Fischlin, Andreas, ETH Zurich)	We have altered the wording in this section. We agree that attribution is very complex and have tried to show this.
99	4	3	14	3	14	Please consult 2010 IPCC uncertainty guidance. 'Almost certain' is not a formal term. (Stocker, Thomas, IPCC WGI TSU)	Agreed. Language in ES has been altered to bring it into line with IPCC standards.
100	4	3	14	3	15	In this sentence, "almost certainly" and "very likely" seem to suggest usage of the calibrated likelihood scale (per the AR5 Guidance Note on Treatment of Uncertainties) or something similar. If assignment of these terms is not based on probabilistic information, it would be better to use only the confidence assignment also provided in the sentence, as done, for example, on line 6 of this Executive Summary page. If usage of the terms is casual and not tied to the calibrated likelihood scale, the usage should be avoided. (IPCC WGII TSU)	Agreed. Language in ES has been altered to bring it into line with IPCC standards.
101	4	3	15	3	17	This sentence could use clarification. Human exposure is increasing "more quickly" than what--than changes in hazards are occurring due to climate change? Also, "high hazard" is an ambiguous term. Finally, what is meant by "apart from areas prone to severe drought"? It is hard to interpret this final part of the sentence without knowing what "more quickly" refers to. Does the phrase mean that, in areas prone to severe drought, hazards are increasing more rapidly than exposure? (IPCC WGII TSU)	Text deleted
102	4	3	15	3	20	It might be true that ecosystems are widely affected by extremes. But as part of a SPM, it is relevant what the knowledge is on this in due time (related to the changes presented in chaper 3). (NETHERLANDS)	Text deleted
103	4	3	16	3	16	Do you mean "rapidly developing high hazard areas"? (Fischlin, Andreas, ETH Zurich)	Text deleted
104	4	3	16	3	17	Do not understand the purpose of this clause "apart from areas prone to severe drought." Is the exposure increasing in drought prone areas? Are drought areas part of high hazard areas or is something else meant? (Fischlin, Andreas, ETH Zurich)	Text deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
105	4	3	19	3	19	Why do trends in vulnerability come so early? What kind of vulnerability do the authors have in mind? An IPCC one or something else? See my comment #1. (Fischlin, Andreas, ETH Zurich)	Text deleted
106	4	3	19	3	21	It would be more informative to indicate the nature of this "immense variability" in vulnerability trends, for example, through a map of vulnerability metric(s), rather than just concluding generalizations aren't possible. Then, a similar map or indicator of exposure could also be shown to demonstrate where generalizations can be made. Finally, it could be helpful to provide summary terms for evidence and agreement here, for example, indicating the "low agreement" and corresponding evidence, to characterize this chapter conclusion. (IPCC WGII TSU)	Text deleted
107	4	3	20	3	20	should this "no agreement" be in italics? Is it the result of a formal assessment of uncertainty? (Stocker, Thomas, IPCC WGI TSU)	We have brought the use of uncertainty language throughout ES into line with IPCC standards.
108	4	3	20	3	21	change "due to vulnerability's immense variability" to "due to the large variability in vulnerability" (Stocker, Thomas, IPCC WGI TSU)	This phrase has been deleted.
109	4	3	23	0	0	"Impacts of extreme events are almost certain to increase with climate change" How are you using the phrase "climate change" here? Presumably you are using the IPCC definition not the FCCC definition, but that is not clear (and in fact seems otherwise). If using the IPCC definition, then this statement is incorrect. It would be more accurate to say: "Impacts of extreme events are almost certain to increase under the projections of anthropogenically-influenced climate change under the scenarios of the IPCC AR4." The use of the phrase "climate change" is sloppy throughout his chapter. (Pielke, Roger, University of Colorado)	The use of the term is being clarified throughout the chapter, consistent with its definition in the SREX glossary, to indicate where we mean all forms of change and where anthropogenically induced change is the focus.
110	4	3	23	0	0	this statement excludes the role of planned and autonomous adaptation, which will very likely mediate impacts. The SPM (Page 6, Lines 2-3) acknowledges this, this statement in the ES of Chapter 4 should reflect the same finding. (NETHERLANDS)	This chapter does not deal with adaptation
111	4	3	23	3	23	"almost certain to increase": do the authors mean "virtually certain to increase"? To my knowledge "almost certain" is not an agreed IPCC term (see also SPM). On this point, please also check the term "almost certainly" on line 14. (Seneviratne, Sonia, ETH Zurich)	We have brought the use of uncertainty language into line with IPCC standards.
112	4	3	23	3	24	Please consult 2010 IPCC uncertainty guidance. You should not provide a likelihood statement, ie, 'virtually certain' when your confidence in the projections is 'low'. Also note: 'Almost certain' is not a formal term. (Stocker, Thomas, IPCC WGI TSU)	We have brought the use of uncertainty language into line with IPCC standards.
113	4	3	23	3	24	I do not understand how confidence can be "low" in a projection that something is "almost certain". (Cogley, J. Graham, Trent University)	This has been revised
114	4	3	23	3	24	How can a statement as "impacts of extreme events are almost certain" be combined with "thus the confidence in these projections is low"? (NETHERLANDS)	This has been revised
115	4	3	23	3	29	There are serious issues with this paragraph which is not consistent with the chapter 3 assessments. Chapter 3 clearly discusses the uncertainties in projected changes in some extremes; while heat extremes are virtually certain to increase on the global scale, this is not the case regarding changes in droughts, tropical cyclones, floods and hail, which have various levels of uncertainty (from medium confidence regarding changes in some regions and low confidence in others, e.g. for droughts, to low confidence in any type of projections, e.g. for hail). Regarding specific information from chapter 3, the authors should check section 3.3.2, page 30, on hail, section 3.5.1 on droughts, section 3.5.2 on floods, section 3.4.4 on tropical cyclones, section 3.4.5. on extratropical cyclones, and section 3.3.3. on winds. In particular, the first sentence ("Impacts of extreme events are almost certain to increase with climate change") appear to be a strong overstatement. On a related point, please also check FAQ 3.1. (Seneviratne, Sonia, ETH Zurich)	Consistency with chapter 3 has been ensured
116	4	3	23	3	29	While it is certainly true that it is hard to make projections of impacts because there may be changes in vulnerability, it normally costs a good deal of money to limit vulnerability (that is, build stronger buildings, protective structures like the hurricane/storm surge wall erected to reduce damages in Galveston, Texas), and this needs to be considered as an impact on people--to use an old adage, you either pay me now (to reduce vulnerability) or you pay me later (when extreme events strike). We have good indications that in many (not all) regions that the magnitude and so potential risk is going to increase--and what it seems to me we know with more than low confidence, is that this will cost society more, either to limit vulnerability or to recover after impacts. For many situations, limiting vulnerability is likely to be less costly in terms of lives and financial investment--and the question is if society will make the investment (it is not at all this is going to be the case). It seems to me that the key finding here needs to be this tradeoff between paying to reduce vulnerability or to recover from impacts--and the reason we have relatively low confidence is that we do not know what choice society will make; not about whether there will be costs for society. (MacCracken, Michael, Climate Institute)	This text has been extensively revised and clarified

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
117	4	3	23	3	29	Impacts v. losses. In this paragraph, impacts and losses are implied to be synonymous. It would be better to be explicit about the relationship between impacts and losses and then to be consistent in use of the terms, in this paragraph and throughout the Executive Summary and chapter. (IPCC WGII TSU)	Agreed. This has been done.
118	4	3	24	3	28	Comparing socioeconomic changes with climate changes in terms of impacts, I think the time frame that one considers may be important. Is this referring only through 2100, as sea level rise may take a number of centuries to occur but eventually could claim large tracts of land. (UNITED STATES OF AMERICA)	We agree that the time frame used is important and specify the time frames used. We do not go beyond 2100.
119	4	3	24	3	28	A reference which could be included somewhere in the report and discussion (Ch. 3 and or 4) is Sherwood and Huber (PNAS, 2010, www.pnas.org/cgi/doi/10.1073/pnas.0913352107) who consider at least the possibility of rising heat stress coupled with human health limits eventually making large parts of the planet virtually uninhabitable (implying a large social cost). This raises the issue of whether the impacts of extreme heat on human health is adequately covered in the report Ecosystem impacts seem to be covered better (e.g., section 4.2.3.3). (UNITED STATES OF AMERICA)	Comment was considered in chapter revision though citation not added
120	4	3	26	0	0	"For the studies that do consider socioeconomic as well as climate change, there is medium agreement, but limited evidence that the expected changes in exposure are at least as large as the effects of climate change." This statement is incorrect and badly written. There is high agreement among studies that the effects on losses of changes in exposure are, with only a few exceptions, larger than the projected effects of human-caused climate change. In many cases the effects of human-caused climate change on losses are dwarfed by the changes in losses due to increased exposure. Again, there is sloppiness here in the use of the phrase "climate change." (Pielke, Roger, University of Colorado)	Agreed and we have tightened up the language.
121	4	3	26	3	26	... 'some studies have addressed flash floods and hail damage' - where? (Stocker, Thomas, IPCC WGI TSU)	Text revised
122	4	3	26	3	28	First, it would be preferable to specify "socioeconomic change" explicitly rather than just implying it, since the current sentence construction could be confusing. Second, the sentence says "the expected changes in exposure are at least as large as the effects of climate change." It appears the sentence intends to say that changes in loss due to changes in exposure are at least as large as changes in loss due to climate-change-related changes in hazards. If this is the intended meaning, the sentence should be clarified. In addition, the sentence seems to separate changes in exposure from climate change when earlier in the Executive Summary it is said that "gradual climate change can have major effects on vulnerability and exposure." (IPCC WGII TSU)	Text revised accordingly
123	4	3	27	3	27	What does this statement ("medium agreement" and "limited evidence") imply in terms of likelihood and/or confidence? (Seneviratne, Sonia, ETH Zurich)	We have brought ES into line with IPCC standards on uncertainty language.
124	4	3	31	0	0	"Adaptation costs and disaster losses for the projected increasing climate and weather extremes will increase the costs of development. There is medium agreement and evidence that this increase could almost halt economic development in some areas." More sloppiness. Is "adaptation" used here to refer specifically to the costs of responding to changes due to human-caused climate change? Or to changes from increased exposure as well? I find this statement to be overstated. (Pielke, Roger, University of Colorado)	Text deleted
125	4	3	31	3	32	A potentially important conclusion on the costs of development. It needs a reference to the original text, which I assume is 4.6.1.2. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	Text deleted
126	4	3	31	3	33	I would suggest that it be indicated that adaptation costs not only "will increase" but "have increased in at least some areas"--a prime example being the Arctic where all sorts of impacts are having to be faced now. (MacCracken, Michael, Climate Institute)	Text deleted
127	4	3	31	3	33	It is not clear what "projected increasing" climate and weather extremes means. Is it referring to increasing impacts of extreme events mentioned in the previous paragraph? Please clarify. Additionally, it would be helpful to provide as much information as possible on the spectrum of effects on economic development in different areas, including this large-consequence possible outcome of halted economic development in some regions. For example, chapter 8 includes a related discussion of the effects of disasters on economic growth (ch. 8, p. 7, lines 31-48) that should be considered here. (IPCC WGII TSU)	Text deleted
128	4	3	32	3	32	use italics to highlight assessed levels of uncertainty, even if it's the level of agreement / amount of evidence. Otherwise replace wording. (Stocker, Thomas, IPCC WGI TSU)	This has been done throughout ES.
129	4	3	35	3	35	How were these 'widespread negative effects' measured? (Stocker, Thomas, IPCC WGI TSU)	Text deleted
130	4	3	35	3	36	This sentence seems too general and too negative. Some ecosystems depend for their existence on periodically recurring extreme events such as fire. This chapter also mention such examples, for instance the periodic bloom in deserts when rainfall occurs (page 6, lines 10-14). Moreover, some ecosystems can be protected by the occurrence of specific extremes, e.g. because they kill some potential threat (such as the pine beetle). Please comment. (Seneviratne, Sonia, ETH Zurich)	Text deleted
131	4	3	39	0	0	after "environmental contamination" add ", eutrophication" (GERMANY)	Text deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
132	4	3	41	3	42	Please consider rephrasing the sentence to remove the use of "more likely" given the term's similarity to calibrated uncertainty language. Then, do "close links" mean sensitivity? (IPCC WGII TSU)	We have modified the Executive Summary to reflect IPCC uncertainty language
133	4	3	41	3	46	Instead of « private », write « public or private, or partnership public-private ». Regulation policy could be mentioned. (BOURRELIER, PAUL-HENRI, AFPCN)	Text revised substantially
134	4	3	48	3	49	Here you make a projection, but do not assign any confidence. It is also questionable whether you should lump heatwaves, drought and floods together. Surely the level of confidence you can assign to projected impacts of heatwaves will be different compared to floods. (Stocker, Thomas, IPCC WGI TSU)	Text deleted
135	4	3	48	3	49	"However in most regions ... are projected to increase". This sentence is not consistent with chapter 3. While heatwaves are consistently projected to increase in most regions, this is not the case with droughts and floods. Changes in wildfires are not assessed in Chapter 3. But existing literature suggests that projected changes in wildfire are more complex than reported as present in Chapter 4. In particular, Scholze et al. (2008) have shown complex projected changes in wildfire occurrence, including both increases and decreases depending on the region (see their figure 2). [Scholze M.W., et al. 2008: A climate-change risk analysis for world ecosystems, PNAS, 103(35), 13116-13120] (Seneviratne, Sonia, ETH Zurich)	Text deleted
136	4	3	48	3	52	In discussing heat waves, it should also be noted that the absolute humidity will also be rising, so the heat index rises much more than just the temperature increase. Regarding this paragraph generally, as we go through the century, the amount of climate change is going to exceed many of the variations that are already occurring--thus, conditions as warm as the heat wave in Europe might go from a 1 in 500-year occurrence to a 1 in a few year occurrence--the consequences then will not be from changes in exposure and vulnerability, but from changes in the climate. Actually, it will be investing in reducing vulnerability--not increases in vulnerability--that is likely to be what most affects (hopefully limits) impacts. (MacCracken, Michael, Climate Institute)	Text deleted
137	4	3	48	3	52	Seems to me to be out of order. Please note, lines 19-21 state something similar. Therefore, why not merging these paras and finding the proper logical place? (Fischlin, Andreas, ETH Zurich)	Text deleted
138	4	3	48	3	52	This paragraph overlaps and is somewhat inconsistent with the paragraphs given on lines 23 through 33. Please combine and harmonize these paragraphs. (IPCC WGII TSU)	Text deleted
139	4	3	51	0	0	The trajectories of the great emerging countries with half of the world population are particularly difficult to predict. Challenges are impressive but capacity too. (BOURRELIER, PAUL-HENRI, AFPCN)	Text deleted
140	4	4	0	0	0	Section 4.6 that reviews studies that estimate the costs of adaptation is important. I suggest that there should be a conclusion in the Executive Summary that captures the state of knowledge on adaptation costs. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	Material has been added to the executive summary accordingly.
141	4	4	1	0	0	Three passages in Chapter 4 all state the same thing: "there is robust evidence and high agreement that deforestation results in decreased precipitation and increased local temperatures in tropical areas" (page 4, line 1; page 10, line 36; page 12, line 35). I agree that this statement accurately describes the temperature response to tropical deforestation. However, I believe there are regional and seasonal variations in the precipitation response that are inconsistent with this statement. Findell et al. (2006) show that complete deforestation of all tropical forests leads to systematic increases in temperature throughout the tropics in the GFDL model, but the precipitation response shows spatial and seasonal differences that are both positive and negative, indicating that the simple statement of decreased precipitation in response to deforestation is too broad. Even in the annual mean, many tropical areas seem to show a precipitation increase in response to deforestation in this model, though the annual mean difference in the Amazon Basin does indicate a reduction of precipitation with complete deforestation. Additional modeling work focused on deforestation of the Amazon alone is consistent with the result of Findell et al. (2006). Costa and Foley (2000) and Berbet and Costa (2002) show similar regional and seasonal variations in the precipitation response. Additionally, much research shows that the scale and pattern of deforestation can have dramatic effects on the precipitation response. D'Almeida et al. (2007) show that partial deforestation can increase land surface heterogeneity, which can in turn lead to an increase in convection. Nobre et al. (2009) also showed that the fraction and pattern of deforestation both have significant consequences for the precipitation response. Roy (2009) shows that the typical fishbone pattern of deforestation can lead to enhanced mesoscale convection and increased precipitation over deforested patches, leading to accelerated vegetation recovery over these deforested areas. All of these results lead me to believe that the precipitation response to tropical deforestation is dependent on the scale and pattern of the disturbance. I believe the quoted statement should be modified to reflect these nuances in the precipitation response to deforestation. (UNITED STATES OF AMERICA)	Text deleted
142	4	4	1	4	1	What does this statement ("robust evidence" and "high agreement") imply in terms of likelihood and/or confidence? (Seneviratne, Sonia, ETH Zurich)	We have modified the Executive Summary to reflect IPCC uncertainty language
143	4	4	1	4	2	Poor grammar. Why not "There is robust evidence and high agreement from tropical areas that deforestation induces decreases in precipitation and increases in local temperatures."? (Fischlin, Andreas, ETH Zurich)	Text deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
144	4	4	1	4	4	Not just tropical areas. Deforestation affects local temperatures in most locations and has affect rainfall in south-western Australia. Pitman et al. 2004. Effect of land cover change on the climate of southwest Western Australia. J. Geophysical Research 109, D18109, doi:10.1029/2003JD004347 (Chambers, Lynda, Australian Bureau of Meteorology)	Text deleted
145	4	4	1	4	4	(See also Ch 3, p. 10, lines 36-40 and Ch. 3, p. 12, lines 35-38). This assessment that deforestation results in decrease precipitation in tropical areas seems to belong more in Ch. 3 on impacts on the physical environment than in Ch. 4. In any case, it would benefit from the high level of scrutiny that the Ch. 3 authors have given to such statements. (UNITED STATES OF AMERICA)	Text deleted
146	4	4	2	4	2	Change "dryer" to "drier"--and also check elsewhere, including page 11, lines 25 and 51. (MacCracken, Michael, Climate Institute)	Text deleted
147	4	4	2	4	3	Is the "very likely" assignment in this sentence supported by probabilistic information? If not, a confidence assignment would be more appropriate. (IPCC WGII TSU)	Text deleted
148	4	4	3	4	4	In this sentence, the phrase "without such experience" is ambiguous. Presumably regions without previous forest fires are meant, and if so, the current phrasing should be clarified. (IPCC WGII TSU)	Text deleted
149	4	4	4	4	10	Increasing exposure might be a truthful ascertainment. But to remain objective, consider to add some sentences about coping capacity etc. (NETHERLANDS)	The sentence has been revised to address this point.
150	4	4	6	0	0	"Most estimates of disaster impacts are based on direct losses, recorded largely as monetized direct damages to infrastructure, productive capital stock and buildings, only, and as a result seriously underestimate loss" This statement reflects a poor understanding of the hazards literature. There is no such thing as a "total estimate" of loss. Any such estimate requires some bounding of time and space. Extreme events also have positive impacts, e.g., after the 2003 European heat wave death rates in 2004 were marked lower, and economic growth often accelerates after a disaster. Measures of direct losses are but one metric, they are not the only relevant metric, but it would be incorrect to claim that they "underestimate loss." There are simply different measures which have various strengths and weaknesses. (Pielke, Roger, University of Colorado)	We have deleted the expressions about total loss estimates. The underlying chapter section sets out why direct losses are generally only part of the loss picture. We discuss within the word limit the issue of post-disaster economic growth, but cannot go into detail. Overall, the section reflects current disaster economics literature.
151	4	4	6	4	7	Move "only" to before "on direct losses", or if this is wrong recast the sentence so that there is no ambiguity about which words are qualified by "only". (Cogley, J. Graham, Trent University)	The sentence has been revised
152	4	4	6	4	8	The statement that most estimates of disaster impacts seriously underestimate loss is not well supported by section 4.6.1.1, which states that measuring the effects of disasters is prone to both overestimation and underestimation. Any estimate that only considers direct losses will be underestimated, as in the case of EM-DAT. But this should not be generalized to "most estimates". (CANADA)	We agree that the statements can be seen as contradictory. The "most estimates" statement is based on our assessment. The statement that estimates both under and overestimate loss in different circumstances refers to methodological issues that can effect estimation especially when economic principle are not applied. The sentence has been clarified.
153	4	4	8	4	8	What's the "EM-DAT" data base? Need to provide a reference. (Stocker, Thomas, IPCC WGI TSU)	Deleted. It is referred to and discussed in the text of Chapter 4.
154	4	4	8	4	9	The statement that this approach excludes indirect losses which are primarily the economic flows that constitute livelihoods and economies, is wrong because it can be shown that those indirect losses are canceled out through market mechanism. But it is correct to say that this approach exclude intangible losses which include ecosystem services, human lives, quality of life and cultural impacts. But those values can be measured within the context of cost benefit analysis manuals for transport projects (value of life, health, natural park project(recreational benefit, value of ecosystem) , world heritage project, water, quality project, etc (morisugi, Hisayoshi, Nihon University)	Text deleted
155	4	4	10	0	0	Inverse ecosystem services and human lives. (BOURRELIER, PAUL-HENRI, AFPCN)	Text deleted
156	4	4	12	4	13	It is not clear how floods lead to wildfires. (Wright, Richard, American Society of Civil Engineers)	We cannot match the comment to the text.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
157	4	4	12	4	26	I am not convinced that it is appropriate to determine a proportion of GDP across very large regions. The basis of this seems to be a presumption that all such resources could be brought to bear to deal with the impacts. I think Katrina provides a clear indication that in large countries this is not necessarily the case (much as one might think it should be). It really depends on the type of government one presumes. Were every nation an old time kingdom (or maybe modern dictatorship), perhaps all resources in a domain could be applied to deal with an impact, but when the entities below the national level have come together voluntarily, it is not at all clear the resources can be assembled and collectively applied. The case of Katrina provides an interesting example of the limitations--some resources were provided, but a lot of the other response was to taken in refugees from the region, and the region is far from recorded. Would it really be the case that resources across the European Union would be collectively applied, to deal with impacts and to accept refugees? It seems to me that calculating a relative impact by dividing by the GDP across very large regions is really somewhat suspect. I would also note that in modern developed economies resources are typically well-stretched out and committed to ensure optimal performance, and there can be a great difficulty in diverting resources to deal with other problems--so perhaps economic models should have a term that realtes to foregone benefits across society from needing to divert the resources--so fully representing the terms mentioned in the last sentence of the finding PLUS the amount that has been invested to enhance the resilience to impacts, which also counts. (MacCracken, Michael, Climate Institute)	The first part of this comment has been considered, but proportion of GDP has been retained for the comparisons. In response to part 2 of the comment - the EU has long supported areas devastated by natural disasters, and has formal protocols in place to this effect and there is a special fund for this purpose (the Solidarity Fund): Council decision 2001/792/EC; Council Regulation No 2012/2002 of 11 Nov 2002.
158	4	4	20	4	22	Which sections are meant with the references "4.6.XX"? (Seneviratne, Sonia, ETH Zurich)	The references to sections have been revised.
159	4	4	23	4	23	"Medium agreement," as calibrated uncertainty language per the AR5 Guidance Note on Treatment of Uncertainties, should be italicized. (IPCC WGII TSU)	All calibrated uncertainty statements have been italicised.
160	4	4	28	4	32	Delete - there is no need to include this paragraph on 'definitions' within the ES. In any case, these concepts are addressed within chapter 1. (Stocker, Thomas, IPCC WGI TSU)	This paragraph has been deleted.
161	4	4	28	4	32	Note that the present SREX definition of "extreme (weather or climate) event" does not include the term "rare" (see glossary and chapter 3, section 3.1.2, page 5). This definition was the result of several discussions within the chapter 3 author team and of inputs from FOD reviewers. The various points mentioned in this paragraph are addressed in more detail in chapter 3 (Section 3.1.2). I would suggest to remove this paragraph and to replace it with a reference to Section 3.1.2. (e.g. "The definition of extreme events is complex and requires consideration of various aspects as discussed in Chapter 3 (Section 3.1.2)"). (Seneviratne, Sonia, ETH Zurich)	This paragraph has been deleted.
162	4	4	28	4	32	These definitions come way too late and need to be stated at the very beginning to better understand the authors. (Fischlin, Andreas, ETH Zurich)	This paragraph has been deleted.
163	4	4	31	4	32	"it is neither practical nor useful to define extremes precisely": I do not think this is right. It is trivial to observe that a different definition is needed for each variable, but surely there must BE such a definition for each variable, and equally surely each definition must involve a tail of a probability distribution function (and, in the SREX context, changes in the tail). Whether the PDF is known is another question, and there may be special cases. An example is outburst floods from moraine-dammed glacial lakes, which are likely to happen either not at all or only once (because the outburst will destroy the dam). But I suggest that some discussion here of how extremes can be considered in a methodologically unified way would be valuable. (Cogley, J. Graham, Trent University)	This paragraph has been deleted.
164	4	4	34	4	36	Please consult 2010 IPCC uncertainty guidance. 'Medium uncertainty' and 'high uncertainty' are not formal terms. (Stocker, Thomas, IPCC WGI TSU)	We have brought such statements into line with the IPCC guidance.
165	4	4	34	4	36	I don't think the ideas here are well expressed. I also don't recall the term "medium uncertainty" being in the IPCC lexicon--I thought the approved term was medium confidence. Further, the text literally says this applied to the assessments rather than to the impacts themselves. And then there is "high uncertainty"--which I assume means "low confidence"--when impacts are projected; again this seems to apply to the purposes rather than the impacts themselves, and it is just not clear this is an appropriate conclusion (this uncertainty results mainly from not being able to project whether society will invest to build resilience or not invest and fully experience the impacts; think about New Orleans, they will eventually, when sea level is higher and a strong hurricane hits, suffer very large costs if they do not move out of the city--so pay to move the city or suffer the consequences--that is indeed not well-established). I would suggest rewording to something like: "There is medium confidence in the projections of intensifying impacts; however, because the consequences of extreme events will depend so much on how much is invested to build resilience, projections of impact costs can only be made with low confidence." I the second sentence, I would also change "Besides" to "In addition to" and change the word "values" to "choices" (MacCracken, Michael, Climate Institute)	Text deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
166	4	4	34	4	36	The terms "medium uncertainty" and "high uncertainty" resemble calibrated uncertainty language, but these terms are not consistent with the metrics provided in the AR5 Guidance Note on Treatment of Uncertainties. Also, the sentence referring to "sources of uncertainty in Chapter 3" is ambiguous--uncertainties related to observations, attribution, or projections? for some extreme climate/weather events more than others? Then, what do "major uncertainties in future social values and technologies" refer to? Are these uncertainties that can be characterized through use of socioeconomic scenarios, or are they uncertainties that cannot be effectively characterized through use of socioeconomic scenarios? (IPCC WGII TSU)	Text deleted
167	4	4	41	4	41	Possible changes' should be written as 'Projected changes'. (Stocker, Thomas, IPCC WGI TSU)	The sentence has been revised accordingly.
168	4	4	41	4	51	These paragraphs more effectively introduce the chapter, as compared to the opening of the Executive Summary. Perhaps some of the wording here could be incorporated into the opening of the Executive Summary. (IPCC WGII TSU)	This point has been taken into account in the revision of the executive summary and the opening of the introduction.
169	4	4	44	4	47	Who is referred to when stating that "we need to examine..." or "we also need to clarify..."? Please clarify. (Stocker, Thomas, IPCC WGI TSU)	This sentence has been deleted.
170	4	4	45	4	45	Vulnerability (V)? What is meant here? Finally of course I am missing here adaptation (A) and the role of Adaptive capacity (Ac) for any resulting V ($V = f(E,S,Ac)$). Please see my comment #1. (Fischlin, Andreas, ETH Zurich)	The definition of vulnerability is the subject of chapter 2. Chapter 1 also deals with this issue. In this chapter we use the definition of vulnerability presented in the SREX glossary, which is consistent with the definition as discussed in chapters 1 and 2.
171	4	4	46	4	46	Is there any scientific reason to put the emphasis on negative impacts? Suggest to explain this choice of emphasis. (Stocker, Thomas, IPCC WGI TSU)	The report is about disasters, so we concentrate on negative issues. However, the fact that there are positive effects is mentioned and some examples are provided for natural systems and in the section covering economic impacts. Further context is now provided for this focus in the introduction.
172	4	4	46	4	47	It is stated that climate change can also have positive effects. It's positive that the issue is approached from different perspectives. However, as this report is on extremes, it is more difficult to think on positive effects. Examples are given on pg 6 line 10-14. Move these to page 4 to make the statement more understandable. (NETHERLANDS)	We agree; climate and weather extremes can generate positive impacts especially in some economic sectors and ecosystems. Many review comments want us to acknowledge this.
173	4	4	46	4	47	Emphasis by whom, this chapter, policy makers? In the context of vulnerability, yes, the emphasis is on adverse impacts, but that's not true in general and this chapter should be careful to not introduce any bias here. An even IF the authors mean that the emphasis is coming from the outside, the authors have to deal with this very carefully and not just accept this as unproblematic. IPCC has to assess the scientific understanding, regardless of what the general public emphasizes and present the assessment in a policy relevant manner. See my comment #1. (Fischlin, Andreas, ETH Zurich)	This report is about disasters, so we concentrate on negative impacts in the chapter. This has been clarified. However, the fact that there are positive effects is mentioned and some examples are provided for natural systems and in the section covering economic impacts. Chapters 1 and 2 explore the definitional issues in detail, but revising the topic of the report is not within our scope.
174	4	4	49	4	49	In order to be consistent with the Glossary and Chapter 3, we suggest to revise the statement that "impacts are examined in two ways" to "two different types of impacts are examined: (i) impacts from extreme weather and climate events and (ii) impacts triggered by an accumulation of moderate weather or climate events, incl. compound events" (see Glossary and Chapter 3, page 51/52 (Stocker, Thomas, IPCC WGI TSU)	We have reworded the sentences dealing with the two types of impacts as suggested to clarify the meaning. Additionally, as the report is about disasters due to climate extremes we are not considering the impacts from gradual climate change.
175	4	4	49	4	50	Interesting distinction, however I have difficulties to see this as two ways of viewing impacts. Isn't meant to answer two questions: 1) What are the effects of extreme weather events on human systems and ecosystems? 2) What are extreme impacts of CC (in general?) on human systems and ecosystems? (Fischlin, Andreas, ETH Zurich)	We have reworded the sentences dealing with the two types of impacts as suggested to clarify the meaning. Additionally, as the report is about disasters due to climate extremes we are not considering the impacts from gradual climate change.
176	4	4	50	4	50	extremes are not necessarily extreme events and vice versa (see also my comment #8) (Fischlin, Andreas, ETH Zurich)	We have reworded the sentences dealing with the two types of impacts as suggested to clarify the meaning.
177	4	4	51	4	51	delete "These two ways of viewing" (Stocker, Thomas, IPCC WGI TSU)	The sentence has been reworded accordingly.
178	4	4	53	4	53	What disasters do the authors have in mind? (Fischlin, Andreas, ETH Zurich)	Weather and climate related disasters as consistent with the IPCC's mandate for this report.
179	4	4	54	5	1	It seems that strategies to reduce risk from one form of climate extreme can increase or decrease risk from other extremes, although only increasing risk is discussed here. (IPCC WGII TSU)	Agreed, changed to address this.
180	4	5	1	5	1	But there might also be the opposite, i.e. conflicting objectives. (Fischlin, Andreas, ETH Zurich)	Agreed, changed to address this.
181	4	5	1	5	4	delete text starting from "In writing this chapter..." -- this information on the structure of the report should be provided in Chapter 1. (Stocker, Thomas, IPCC WGI TSU)	We have considered this point, but we feel this is needed for clarity and linkage with the rest of the report.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
182	4	5	2	5	2	This is so important that this chapter ignores adaptation that this needs to be stated clearly and prominently everywhere, i.e. in the SPM and the ES of the chapter, not "hide" it here in the text. (Fischlin, Andreas, ETH Zurich)	We don't think it is hidden as the report has four chapters - nearly half the report - devoted to adaptation.
183	4	5	2	5	4	The phrase "adaptive action" could be confusing. It would be better to indicate that the chapter does not consider either climate change adaptation or disaster risk reduction in its assessment of impacts. (IPCC WGII TSU)	The sentence has been revised accordingly.
184	4	5	3	5	5	Why should the chapter attempt to make a distinction in something it ignores deliberately in the first place? (Fischlin, Andreas, ETH Zurich)	The second half of this sentence has been deleted.
185	4	5	6	5	6	Chapter 4 does not need to be examining concepts and definitions. This is the role of Chapters 1. Here you only need to specify if and where concepts and definitions may be different from those introduced in earlier chapters. (Stocker, Thomas, IPCC WGI TSU)	Agreed, the text has been modified to reflect this comment.
186	4	5	9	0	0	Chapter instead of Chapters (Wibig, Joanna, University of Lodz)	Done
187	4	5	9	5	9	Chapters --> Chapter (Stocker, Thomas, IPCC WGI TSU)	Done
188	4	5	11	0	0	adaptation instead of afaptation (Wibig, Joanna, University of Lodz)	Done
189	4	5	11	5	11	afaptation --> adaptation (Stocker, Thomas, IPCC WGI TSU)	Done
190	4	5	14	5	14	To resolve some of the structural issues (see my comment #7) I suggest to delete "Role of " (Fischlin, Andreas, ETH Zurich)	The section title has been revised accordingly.
191	4	5	16	0	0	On « extreme » see OG2. (BOURRELIER, PAUL-HENRI, AFPCN)	This text has been deleted.
192	4	5	16	6	14	Delete section 4.2.1 - The definition of 'Extreme' is introduced in Chapter 1 and further expanded in Chapter 3. You do not need to duplicate this material here. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted.
193	4	5	16	8	28	The construction of sub-sections, 4.2.1.1.-4.2.1.1.1.; 4.2.1.2. is inappropriate and 4.2.1.2. is too short to be independent as one small section. (NISHIMORI, Motoki, National Institute for Agri-Environmental Sciences)	Much of this text has been deleted, and the section has been restructured.
194	4	5	18	5	18	see my comment #8 (Fischlin, Andreas, ETH Zurich)	This text has been deleted.
195	4	5	21	5	28	Don't reiterate, reference please (Fischlin, Andreas, ETH Zurich)	This text has been deleted.
196	4	5	23	5	28	This paragraph quoted from Chapter 1 should be updated to the most recent version. (IPCC WGII TSU)	This text has been deleted.
197	4	5	30	5	31	I was surprised to see that the definition of extremes applies only to atmospheric phenomena and not to what can happen in the ocean (e.g., an El Nino even, hypoxia, sea ice meltback, etc.) and in hydrologic situations on land (e.g., drought/soil moisture minima, melting permafrost, etc.). And what about sea level rise/storm surges, ocean acidification and resulting consequences of low pH deep water comes up onto the coastal shelves? And what about major loss of glaciers or ice sheets? (MacCracken, Michael, Climate Institute)	This text has been deleted.
198	4	5	30	5	36	Box 3.1 was removed from chapter 3 following reviewers' comments to the FOD. Nonetheless, all of the concepts that this paragraph refers to are still addressed in Chapter 3. Section 3.1.2 states that "climate extremes" can be either defined with respect to their probability of occurrence or related to a specific (possibly impact-related) threshold (chapter 3, page 6). These two alternative definitions of extremes are also included in the new SREX definition of "extreme (weather or climate) events" (see Section 3.1.2, page 5). Compound (multiple) events are now addressed in Section 3.1.3. The last point of this paragraph is addressed in the last sentence of the new SREX definition: "Not all extreme weather and climate events have necessarily extreme impacts" (chapter 3, page 6, lines 1-2). (Seneviratne, Sonia, ETH Zurich)	This text has been deleted.
199	4	5	30	6	8	References to discussions of definitions of extremes in Chapter 3 are now inaccurate. Much of the discussion has been moved from Chapter 3 into Chapter 1. (Nicholls, Neville, Monash University, School of Geography & Environmental Science)	This text has been deleted.
200	4	5	31	5	31	You mean probably sensitivity, since you stated earlier you ignore adaptation (see my comment #1) (Fischlin, Andreas, ETH Zurich)	This text has been deleted.
201	4	5	38	0	0	Why not use common language throughout the report? (UNITED STATES OF AMERICA)	This text has been deleted.
202	4	5	38	5	38	It is difficult to understand and assess the information in this chapter if it is not clear whether the information is given for weather extremes or climate extremes or hazards triggered by them. Please check whether the following information can be proper linked with one or more of these events. (GERMANY)	This text has been deleted.
203	4	5	40	6	8	These two paragraphs overlap with material addressed in more detail in chapter 3 (See sections 3.1.2, 3.1.3 and 3.1.4). This text could be significantly reduced, just providing a few references to chapter 3. (Seneviratne, Sonia, ETH Zurich)	This text has been deleted.
204	4	5	40	6	14	These paragraphs could do a better job clearly laying out the interactions between hazards, exposure, and vulnerability in the context of extreme and non-extreme events and impacts. For example, in the final paragraph cited here "damage" and "benefits" are mentioned without discussion of the neutral outcomes when exposed populations are not vulnerable, for example. (IPCC WGII TSU)	This text has been deleted.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
205	4	5	41	5	42	"means that it is not practical nor useful to define extremes precisely (see Chapter 3, Sections 3.1.1.1 and Box 3.1)": The corresponding text from Chapter 3 has been significantly revised. This reference could be replaced with "it is difficult to precisely define an extreme" in Section 3.1.2 (page 7, line 4 of chapter 3). (Seneviratne, Sonia, ETH Zurich)	This text has been deleted.
206	4	5	48	5	49	Unclear, needs some spelling out (Fischlin, Andreas, ETH Zurich)	This text has been deleted.
207	4	5	51	5	52	This sentence should probably include references to chapter 3 regarding the issues of event sequencing and seriality, as well as compounding (see Section 3.1.3) and chapter 1 regarding the dimensions induced by exposure and vulnerability. (Seneviratne, Sonia, ETH Zurich)	This text has been deleted.
208	4	6	2	6	2	"(also see section 3.1.4)"; replace with "(also see sections 3.1.3 and 3.1.4)". (Seneviratne, Sonia, ETH Zurich)	This text has been deleted.
209	4	6	4	6	8	The issue of the rising absolute humidity should also be mentioned. In addition, Arctic sea ice is at an extreme. I would also refer back to my general comment that whether situations are an extreme or not depends on the baseline that is chosen--were the baseline 1900-1999, then a very large share of conditions a decade are likely considered to be an extreme. (MacCracken, Michael, Climate Institute)	This text has been deleted.
210	4	6	5	0	0	What do the authors mean by an "absolute" extreme.? A more explicit explanation should be provided regarding the definition of "absolute extreme" and "relative extreme". (JAPAN)	This text has been deleted.
211	4	6	7	6	8	This statement is rendered incorrect by the warmth of 2010. Neither 1998 nor 2010 are in the decade of 2000s. (Global Climate Observing System Steering Committee)	This text has been deleted.
212	4	6	8	6	8	Please cite specific IPCC Chapter. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted.
213	4	6	8	6	8	It is unclear what source IPCC (2007) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This text has been deleted.
214	4	6	12	0	0	Floods should be replaced by 'Extremes', since also refer to fire. (Chambers, Lynda, Australian Bureau of Meteorology)	This text has been deleted.
215	4	6	13	6	14	This is a well known phenomenon that could be phrased in more general terms. Moreover, more recent literature could be used to substantiate this than Kotwicki, 1986 or then it is so general knowledge that you need no reference. (Fischlin, Andreas, ETH Zurich)	This text has been deleted.
216	4	6	17	6	17	Delete either "Role in " or replace it by "Extremes in " (Fischlin, Andreas, ETH Zurich)	This text has been deleted.
217	4	6	19	6	19	I guess you mean "extreme events and extreme impacts" not only "impacts from extreme events"? (Fischlin, Andreas, ETH Zurich)	This text has been deleted.
218	4	6	19	6	20	Delete this first sentence. Suggest to avoid unscientific and unsupported general statements like "have a very high profile", "are fodder for global media and politics", or "people almost everywhere seem motivated...." (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted.
219	4	6	25	6	26	Sequence of references is often wrong, this is just one illustrative example. (Fischlin, Andreas, ETH Zurich)	This text has been deleted.
220	4	6	27	0	0	Extremes can often generate benefits. For example, tropical cyclone rainfall can have either positive or negative impacts, depending on circumstances (UNITED STATES OF AMERICA)	This text has been deleted.
221	4	6	29	6	29	The citation for Anderson (1990) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted.
222	4	6	31	6	33	How have regulations, organisations and policy been changed? Also, the information within the bracket is unclear. (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This text has been deleted.
223	4	6	32	6	32	The citation for Victorian Royal Bushfire Commission (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted.
224	4	6	34	0	0	Schneider et al. (2010) is not seen in References. (NISHIMORI, Motoki, National Institute for Agri-Environmental Sciences)	This text has been deleted.
225	4	6	34	6	34	The citation for Schneider et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted.
226	4	6	36	6	36	The cited book of Diomand is not a scientific and peer-reviewed literature. Moreover, many conclusions are heavily debated scientifically. (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This text has been deleted.
227	4	6	37	6	37	worse case --> worst case? (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted.
228	4	6	41	6	43	"These include the drainage of the Fens in England between the middle ages and 1800s (Ravensdale, 1974), the protection of the Dutch coast, and hydraulic engineering feats in the Middle East and Asia (Wittfogel, 1957)." Add: and the widespread use of irrigation systems for agriculture and food production. (UNITED STATES OF AMERICA)	This text has been deleted.
229	4	6	43	6	43	It is unclear what source Wittfogel (1957) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This text has been deleted.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
230	4	6	43	6	46	More generally humans responded to extremes by attempting to manage exposure, for example by avoiding the occupation of areas prone to flooding, and by reducing vulnerability through various techniques such as raising dwellings above flood level in flood prone areas, or by ensuring food availability in spite of droughts or frosts. Add, or by developing home heating and air conditioning systems. (UNITED STATES OF AMERICA)	This text has been deleted.
231	4	6	47	6	47	If this usage of calibrate language ("unlikely") is not based on probabilistic information (where probabilistic information includes formally quantified expert judgment), it would be preferable to present an assigned level of confidence. (IPCC WGII TSU)	This text has been deleted.
232	4	6	47	6	48	Typo citation: For Pedduzi et al. (2009), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	This text has been deleted.
233	4	6	47	6	48	It is unclear what source Pedduzi et al. (2009) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This text has been deleted.
234	4	6	52	6	53	The citation for Dodman and Satterwaite (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted.
235	4	6	53	6	53	Change "substinance" to "subsistence" (MacCracken, Michael, Climate Institute)	This text has been deleted.
236	4	7	7	0	0	Ref should be Huq et al., 2007 (Sygna, Linda, Department of Sociology and Human Geography)	This text has been deleted.
237	4	7	7	7	7	The citation for Satterthwaite et al. (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted.
238	4	7	10	8	16	The criteria for using the words "wealthier," "richer" and "poorer" should be provided. (JAPAN)	This text has been deleted.
239	4	7	10	8	16	Is this now on adaptation to CC (ignored deliberately) or mitigating damage from extreme events and/or extreme impacts? Alternative title "Wealth and adaptation to extremes" (or "Wealth and mitigation of extreme impacts") (Fischlin, Andreas, ETH Zurich)	This text has been deleted.
240	4	7	12	7	12	In addition to "much effort" it is important to also mention that this requires "significant resources". And that this has been going on to help limit the damage from hurricanes and tropical cyclones should also be mentioned. Yes, there are more people on coasts and structures cost more, but at least some of that extra cost is to increase resilience in order to reduce impacts. So, yes, wealth can reduce damage or limit its increase--that is, build resilience. (MacCracken, Michael, Climate Institute)	This text has been deleted.
241	4	7	15	7	15	The citation for Cembrano (2004) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted.
242	4	7	16	0	0	The phrase about earthquakes is not necessary here and can be deleted. (UNITED STATES OF AMERICA)	This text has been deleted.
243	4	7	20	7	23	"There are also groups of people such as the homeless and many of the elderly whose circumstances expose them or render them vulnerable to certain climate extremes such as heatwaves and cold." In affluent societies, social programs are often developed to help lessen the impacts of climate extremes on these populations (such as the establishment of heating and/or cooling centers during cold/hot outbreaks, neighborhood programs to check on elderly, etc. (UNITED STATES OF AMERICA)	This text has been deleted.
244	4	7	21	0	0	The section on the role in natural systems is rather brief. Other dependencies on extreme events are known, such as chilling requirement for the phenological system (see also: Mark D. Schwartz, Jonathan M. Hanes: Continental-scale phenology (2009): warming and chilling. International Journal of Climatology. Volume 30, Issue 11, pages 1595–1598 (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This text has been deleted.
245	4	7	22	0	0	Consider mentioning children also (ref. Bartlett, S. 2008, Confalonieri et al., 2007) (Sygna, Linda, Department of Sociology and Human Geography)	This text has been deleted.
246	4	7	28	7	28	It is unclear what source Benson and Clay (2004) corresponds to in the chapter's reference list, given multiple references for these authors and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This text has been deleted.
247	4	7	33	7	34	what's the reason to bring in "geological extremes" here? What is a geological extreme in the first place? And how relevant would this be in the context of this report which deals with weather and climate extremes? (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted.
248	4	7	33	7	42	This is in contrast with the recent Japan earthquake/tsunami. So it is difficult to compare climate and geological extremes (GREECE)	This text has been deleted.
249	4	7	35	7	42	This is a very confusing way of presenting this information--a clearer way of presenting the information/making the point is needed. (MacCracken, Michael, Climate Institute)	This text has been deleted.
250	4	7	38	7	38	It is unclear what source Benson and Clay (2004) corresponds to in the chapter's reference list, given multiple references for these authors and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This text has been deleted.
251	4	7	42	7	42	The citation for Cashell (2005) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
252	4	7	44	7	46	I don't understand this--does not saying there is a linear relationship with wealth mean that damage goes up with wealth? Is this what is meant, or is inversely related what is meant. And is this for absolute amounts or percent of GDP? (MacCracken, Michael, Climate Institute)	This text has been deleted.
253	4	7	44	7	49	This whole paragraph needs to be made clearer and the complex links between wealth and the impacts of extreme events needs to be elaborated on, to avoid the complacency. The same point is treated in chapter 5 (page 31) . The generalization that (Sygna, Linda, Department of Sociology and Human Geography)	This text has been deleted.
254	4	7	44	7	49	What linear relationship? The more extreme a weather event, the less the impact if the society is wealthy? This seems to be written without paying proper attention first to the physics of extremes and then to the physics and biology of the impacts, way before wealth comes into play. Or do the authors want to tell the reader that there is really such a correlation that ignores the causal chain of causes and effects? Do perhaps authors include past adaptation in their thinking, e.g. autonomous adaptation to recent CC, and mix everything, exposure (E), sensitivity (S), adaptive capacity (Ac) and mitigation of impacts? For instance, the E to CC is not the same for wealthy countries and developing countries, which has little to do with wealth, but much more with geography and the nature of the climate system and where developing countries happen to be on the globe. Of course the result is less impacts the wealthier you are, but not because of the wealth, but because developing countries happen to be found in geographical regions with already high temperatures (e.g. I am thinking here of impacts as described in Easterling et al., 2007). Cited References: ----- Easterling, W. E., Aggarwal, P. K., Batima, P., Brander, K. M., Erda, L., Howden, S. M., Kirilenko, A., Morton, J., Soussana, J.-F., Schmidhuber, J., & Tubiello, F. N., 2007. Food, fibre and forest products. In: Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (eds). Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC). Cambridge University Press: Cambridge, UK. 273-313. (http://www.ipcc.ch) Ea011 (Fischlin, Andreas, ETH Zurich)	This text has been deleted.
255	4	7	44	7	49	It is unclear what "units" of impact are being considered here. Also, what does it mean that "small island countries" are "especially likely to suffer extreme impacts"? Does this mean that impacts are more likely to be extreme for these countries because everything is exposed as once? It would be helpful to clarify what is meant. Additionally, it seems that the relationship between impacts and wealth is a linear "inverse" relationship, although the opposite could be implied by the current wording. (IPCC WGII TSU)	This text has been deleted.
256	4	7	46	7	46	The citation for FitzGerald (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted.
257	4	7	47	7	47	The citation for Kellenberg and Mobarak (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted.
258	4	7	48	7	49	Unclear sentence (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This text has been deleted.
259	4	7	51	0	0	Replace human impacts with mortality, since this paragraph is focusing on the latter. (Sygna, Linda, Department of Sociology and Human Geography)	This text has been deleted.
260	4	7	51	0	0	human mortality from, rather than human impacts of (UNITED STATES OF AMERICA)	This text has been deleted.
261	4	7	51	8	2	Maybe use the Toya and Skidmore (2007) to point out that wealth is not the only significant factor in relation to disaster-related deaths, countries with higher incomes, higher education levels, greater openness to foreign technology and assistance, more developed financial sectors and smaller governments have fewer disaster related deaths than countries without these properties. (Sygna, Linda, Department of Sociology and Human Geography)	This text has been deleted.
262	4	7	51	8	16	I see now what the authors seem to have in mind (see my comment #35). Wealthier countries are better preadapted to extremes. (?) However, do they really compare disasters of a similar kind and magnitude? I do not know IFRC, but could it not be it lists all sorts of disasters, big and small ones and that might have an influence on the number of deaths (at least in addition to the effect the authors appear to have in mind). (Fischlin, Andreas, ETH Zurich)	This text has been deleted.
263	4	7	52	7	52	The citation for Peduzzi (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted.
264	4	7	52	7	53	delete "as shown by the following figures". Just write "This can be illustrated by..." (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted.
265	4	7	53	7	53	Grothmann and Patt 2005 is missing in the literature list. However, this article does not address the hurricane Katrina. (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This text has been deleted.
266	4	8	7	8	8	Typo citation: For Medonca and Wallace (2004), the first author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	This text has been deleted.
267	4	8	12	8	12	Typo: "Nagis" is given instead of "Nargis" on this line. (IPCC WGII TSU)	This text has been deleted.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
268	4	8	19	0	0	It's surprising to see that you constrain the discussion on natural systems in section 4.2.1.2. on reproduction. What about other effects of extremes on ecosystem functioning etc.? (Stocker, Thomas, IPCC WGI TSU)	In the reordering and revision of section 4.2, balance of this subsection has been improved.
269	4	8	19	8	19	Delete "Role in " or make similar changes as given and suggested in my comment #26 (Fischlin, Andreas, ETH Zurich)	This subsection title has been deleted.
270	4	8	19	8	28	Section 4.2.1.2 Extremely brief, particularly compared to 2 pages on human systems. If not expanded greatly here then would benefit from links to subsequent expansion on the topic in section 4.2.3.3 (for example). (Chambers, Lynda, Australian Bureau of Meteorology)	This point has been considered in the reordering and revision of section 4.2.
271	4	8	21	8	21	Sorry, wind dispersal is not an extreme. Seasons neither. (Fischlin, Andreas, ETH Zurich)	The sentences have been revised accordingly.
272	4	8	21	8	28	This is so a poor section, it might be better to just delete it or then replace it with something really substantial. Sorry, but I believe this is unacceptable for IPCC standards. Such sections make me really very, very concerned, since I understand this text is the SOD. Who would review such a section written completely from scratch after the SOD? (Fischlin, Andreas, ETH Zurich)	This subsection has been reworked in the reordering and revision of section 4.2 to provide a brief introduction to the topics treated more extensively in subsequent sections of the chapter.
273	4	8	26	8	26	The citation for Rogers (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The intended citation has been clarified.
274	4	8	31	0	0	The important interaction between heat waves and soil moisture could be mentioned: If average soil moisture conditions had been maintained in the spring and summer of 2003, then summer heat anomalies would have been about 40% less severe in some regions of Europe (Fischer, E.M., Seneviratne, S.I., Vidale, P.L., Lüthi, D., Schär, C., 2007. Soil moisture-atmosphere interactions during the 2003 European summer heat wave. J. Climate 20, 5081–5099.) (Holsten, Anne, Potsdam Institute of Climate Impact Research)	The European heatwave is not considered in this section.
275	4	8	31	0	0	Section 4.2.2 presents some examples of tropical forests ; example of temperate climate countries densely populated like France is also instructive. (Briot 2010) (BOURRELIER, PAUL-HENRI, AFPCN)	This point has been considered, and we feel that the box at the end of this section addresses this issue of balance.
276	4	8	31	0	0	Section 4.2.2. Although this section should be about climate events, exposure, and vulnerability, according to its title, the section in fact focuses on interactions between climate conditions, deforestation, fires, and ecosystem impacts. Exposure and vulnerability as defined in the glossary focus on humans, which seems inconsistent with the discussion here. The discussion in this section is useful but should be framed more appropriately, and in this vein the discrepancy between the title and content of the section needs to be addressed. (IPCC WGII TSU)	The section has been substantially revised and now addresses all of these concerns regarding definitions, focus, and framing.
277	4	8	31	12	41	The role of this section in the outline is unclear. Page 8, line 38 states, "This section will explore these factors focussing [sic] on the impacts from extreme precipitation events and flooding." Yet, there are 2 regional examples related to forest fires and drought (4.2.2.1.1 and 4.2.2.1.2). (UNITED STATES OF AMERICA)	Agreed, text has been modified to clarify.
278	4	8	31	12	41	Two more publications about wild fires which you may include: Flannigan, M., Stocks B., Turetsky M., Wotton, M. 2009: Impacts of climate change on fire activity and fire management in the circumboreal forest. GLOBAL CHANGE BIOLOGY Volume: 15 Issue: 3 Pages: 549-560 and Mikael Ohlson, Kendrick J. Brown, H. John B. Birks, John-Arvid Grytnes, Greger Hörnberg, Mats Niklasson, Heikki Seppä and Richard H. W. Bradshaw (2011): Invasion of Norway spruce diversifies the fire regime in boreal European forests. Journal of Ecology 2011, 99, 395–403 (NORWAY)	These citations have been considered for the substantially revised inclusion of wildfire material in the chapter.
279	4	8	36	8	40	Why are these non-climatic factors "singled out"? Why not comprehensively dealing first with the climatic and then the non-climatic factors? IPCC assessments must be comprehensive and I therefore suggest to revise this text in a major way accordingly. (Fischlin, Andreas, ETH Zurich)	No non-climatic factors are specified in this paragraph. The purpose of the chapter is to look at factors underlying impacts which include climatic factors. As the comment indicates, climatic factors have been dealt with first in Chapter 3.
280	4	8	37	8	38	Due to the focus of the chapter, consider to include ecosystems here. E.g. replace "human-altered environment" by ecosystems (NETHERLANDS)	Done
281	4	8	38	8	40	Although these sentences state that the section will consider extreme precipitation and flooding, wildfires are the primary focus, not only in Box 4.1 but also throughout other subsections. (IPCC WGII TSU)	Text has been modified accordingly.
282	4	8	42	8	53	Also mention demographic trends in developed countries; in developed countries population and wealth are also accumulating in exposed areas, pulled by economic opportunities and estetic factors (Sygna, Linda, Department of Sociology and Human Geography)	Added.
283	4	8	45	8	45	The citation for McGranahan (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been clarified accordingly.
284	4	8	48	8	48	who is "we"? (Stocker, Thomas, IPCC WGI TSU)	Text has been amended.
285	4	8	48	8	50	"Here we see a key tension between climate change adaptation and development; living in these areas without appropriate adaptation is maladaptive from a climate change perspective..." Here again you seem to conflate climate and climate change. For instance, the vulnerability from the event that you just described--urbanization driving poor people to migrate to areas where effective flood protection is not assured—is dominated by the climate rather than climate change. (UNITED STATES OF AMERICA)	In the area of climate related disasters, discussion about drivers and impacts generally has difficulty separating out climate factors from climate change with the current level of uncertainty about the amount and details of changes.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
286	4	8	53	8	53	The citation for Grothmann and Patt (2005) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The reference has been added.
287	4	9	1	9	2	"Land cover changes induce ... flood intensity and frequency." The text should include some references for this statement. Furthermore it should also note that there are still large uncertainties regarding the effects of land cover changes on the water cycle. For instance Pitman et al. (2009) have shown that different models applying the same basic land cover change scenario could yield results of opposite sign in terms of evapotranspiration (or sensible heat flux) anomalies on the regional scale [Pitman et al. 2009: Uncertainties in climate responses to past land cover change: First results from the LUCID intercomparison study. Geophys. Res. Lett., 36, L14814, doi:10.1029/2009GL039076] (Seneviratne, Sonia, ETH Zurich)	Agreed and reference added. The paragraph is not about climate and the water cycle. It is about surface features and runoff with evapotranspiration held constant.
288	4	9	6	0	0	provide references (UNITED STATES OF AMERICA)	This citations already provided in this paragraph pertain to this sentence as well.
289	4	9	10	9	10	(Crozier, 2010) - not in reference list. (Stocker, Thomas, IPCC WGI TSU)	The reference has been added.
290	4	9	10	9	10	The citation for Crozier (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The reference has been added.
291	4	9	12	9	12	Sure, but why should drought be viewed exclusively as a non-physical and non-natural phenomena? See my previous comment on this section. (Fischlin, Andreas, ETH Zurich)	The paragraph is based on droughts as interactions between natural and human conditions like all natural disasters. To clarify this, the text has been modified.
292	4	9	17	9	19	The authors could also cite here the recent publication by Rodell et al. (2009), which identified significant groundwater withdrawal in Northern India from measurements of the GRACE satellite mission [Rodell, M., et al. 2009: Satellite-based estimates of groundwater depletion in India. Nature, 460, 999-1002.] (Seneviratne, Sonia, ETH Zurich)	This citation has been added as suggested.
293	4	9	19	0	0	Could also mention effect of Volga river's dams and water use on Caspian Sea water level (Arpe and Leroy, 2007; ElGundi and Giorgi; 2007) (International Petroleum Industry Environmental Conservation Association (IPIECA))	The impact of the Aral Sea drying is very severe economically and ecologically. While the decline in the Caspian is more incremental and related to water quality issues more than quantity. So we feel that it does not fit well in a paragraph on drought.
294	4	9	23	9	24	Is 'likely' meant here as calibrated uncertainty language? If so, please italicize. BTW, the assessment can not be based on a single study! (Stocker, Thomas, IPCC WGI TSU)	No. The word has been changed away from IPCC reserved language.
295	4	9	26	9	29	Chapter 3 address the issue of compound/conjoint hazards in more detail (Section 3.1.3). It would be useful to add a reference to Section 3.1.3 in the text. (Seneviratne, Sonia, ETH Zurich)	A reference has been added
296	4	9	26	9	39	Please make sure to use "hazard" and "extreme event" in line with the definitions provide in the Glossary. Reference to Glossary for hazard is mentioned on page 13 only. (Stocker, Thomas, IPCC WGI TSU)	Consistent usage of these terms has been ensured in the paragraph.
297	4	9	26	9	39	"Cascading" and "conjoint" hazards described here are presented as distinct, yet the examples used are overlapping. It would be helpful to explicitly comment on the degree to which cascading and conjoint hazards are distinct concepts. Also, it would be helpful to discuss chapter 3's related term, "compound" or "multiple" events, as described in section 3.1.3. (IPCC WGII TSU)	The text has been revised accordingly to ensure clarity.
298	4	9	27	9	28	"generally independent of each other": While conjoint events may be independent of each other, this does not need to be the case. Section 3.1.3 lists several cases where two extremes may happen conjointly because they are related in some way: 1) both of the events may be the result of the same forcing (regional climate change, ENSO); 2) the two events may mutually enhance each other due to feedbacks (see also Section 3.1.4); 3) one event may be conditional on the other. This should be noted here, possibly with a simple reference to Sections 3.1.3 and 3.1.4. In fact, the noted examples (heat wave, drought, and wild fires) are examples of extremes that tend to occur simultaneously because of common forcing, feedbacks and dependence on one extreme on the other (see also Section 3.1.4. regarding feedbacks between droughts and heatwaves). (Seneviratne, Sonia, ETH Zurich)	The relevant text has been deleted. Reference to Chapter 3 added.
299	4	9	31	0	0	Reference needed for the statement on "ecological recovery" (NETHERLANDS)	The example has been deleted
300	4	9	31	9	31	"postfire ecological recovery", what is this? Recovery of ecosystems or some other recovery? Again, reasoning is not comprehensive enough and too narrow. (Fischlin, Andreas, ETH Zurich)	The example has been deleted
301	4	9	33	9	35	Are the given examples really cascading impacts or instead simple second-order impacts? (NETHERLANDS)	The wording has been revised to ensure clarity.
302	4	9	43	0	0	Box 4-1. This box should cite case study 9.2.5 as appropriate and consider reducing overlaps between the two discussions. (IPCC WGII TSU)	Agreed, done. We have referred to 9.2.5 and reduced the text..
303	4	9	43	10	22	The 2010-2011 Australian Floods of Queensland and Victoria could enrich Box 4-1 (GREECE)	We agree that they could, and the evolution of the flood risk in Queensland is largely due to increasing exposure. But the hazard has not evolved in the same way that the fire hazard changed over time with drought.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
304	4	9	47	9	47	The citation for Karoly (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Changed to Karoly 2010. D. Karoly, The recent bushfires and extreme heat wave in southeast Australia. Bull. Australian Meteorol. and Oceanogr. Soc. 22, 10-13 (2010).
305	4	9	48	9	49	The citation for Royal Commission (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been clarified
306	4	10	0	12	0	The section 4.2.2.1 contains much regional information. This would fit better in section 4.5 (NETHERLANDS)	It is an example of risk evolution and the connections between risk elements.
307	4	10	5	10	5	The citation for Handmer et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This citation has been added to the reference list
308	4	10	7	10	7	To cite here such a large 4 volume work sweepingly with MEA, 2005 is not very helpful and provides no real backing up. Needs careful referencing. Moreover, I wonder whether it would not be useful in this context to cite also IPCC works, e.g. Fischlin et al., 2007, Easterling et al., 2007, and/or Nicholls et al., 2007 (plus perhaps some regional chapters). Cited References: ----- -- Fischlin, A., Midgley, G. F., Price, J. T., Leemans, R., Gopal, B., Turley, C., Rounsevell, M. D. A., Dube, O. P., Tarazona, J., & Velichko, A. A., 2007. Ecosystems, their properties, goods and services. In: Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (eds.). Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC). Cambridge University Press: Cambridge, UK. 211-272. (http://www.ipcc.ch) Fi103 Easterling, W. E., Aggarwal, P. K., Batima, P., Brander, K. M., Erda, L., Howden, S. M., Kirilenko, A., Morton, J., Soussana, J.-F., Schmidhuber, J., & Tubiello, F. N., 2007. Food, fibre and forest products. In: Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (eds.). Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC). Cambridge University Press: Cambridge, UK. 273-313. (http://www.ipcc.ch) Ea011 Nicholls, R. J., Wong, P. P., Burkett, V., Codignotto, J., Hay, J., McLean, R., Ragoonaden, S., & Woodroffe, C. D., 2007. Coastal systems and low-lying areas. In: Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (eds.). Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC). Cambridge University Press: Cambridge a.o. 315-357. (http://www.ipcc.ch) Ni063 (Fischlin, Andreas, ETH Zurich)	Agreed. We have deleted the MEA and use other specific references about the Victorian 2009 and earlier fires.
309	4	10	7	10	7	Typo citation: For Millenium Ecosystem Assesment (2005), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	This citation has been removed
310	4	10	9	0	0	While Chapter 3 concludes that it is very likely that heatwaves will increase, it also concludes that there is only medium confidence that droughts will worsen, and only in some areas. So the statement should be restricted to hot conditions, and not dry conditions. (Nicholls, Neville, Monash University, School of Geography & Environmental Science)	Agreed and text has been deleted and replaced with reference to Chapter 3.
311	4	10	9	0	0	become more frequent by when? It would be useful to mention several places in the report what is meant by the projections given in the report. I assume they generally refer to the end of the 21st century, but the reader could be reminded of this at the beginning for Ch. 3 and Ch. 4 at least. (UNITED STATES OF AMERICA)	This text has been deleted
312	4	10	9	10	9	If this usage of calibrated language ("very likely") is not based on probabilistic information (where probabilistic information includes formally quantified expert judgment), it would be preferable to present an assigned level of confidence. Additionally, it is not clear how the footnote applies to this sentence. (IPCC WGII TSU)	This text has been deleted
313	4	10	9	10	12	Delete this paragraph - It is not within the scope of Chapter 4 to be providing these observations and projections of climate extremes. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
314	4	10	9	10	12	This paragraph should be replaced with appropriate references to chapter 3. In addition, please note that it is not consistent with chapter 3 with respect to the projected changes in dry conditions: Indeed, projected changes in drought are assessed as being of medium confidence in chapter 3, and it is noted that only few regions display consistent trends towards dry conditions. (Seneviratne, Sonia, ETH Zurich)	The text has been deleted and replaced with reference to Chapter 3.
315	4	10	9	10	12	You need here to cite Fischlin et al, 2007 (e.g. section 4.4.5, but also others), containing a much more comprehensive assessment of this issue than what is done here. Cited References: ----- Fischlin, A., Midgley, G. F., Price, J. T., Leemans, R., Gopal, B., Turley, C., Rounsevell, M. D. A., Dube, O. P., Tarazona, J., & Velichko, A. A., 2007. Ecosystems, their properties, goods and services. In: Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (eds.). Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC). Cambridge University Press: Cambridge, UK. 211-272. (http://www.ipcc.ch) Fi103 (Fischlin, Andreas, ETH Zurich)	The text has been deleted and replaced with reference to Chapter 3.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
316	4	10	11	0	0	in this section you should cite Crompton et al. 2010: Crompton, R. P., K. J. McAneney, K. Chen, R. A. Pielke Jr., and K. Haynes (2010), Influence of Location, Population and Climate on Building Damage and Fatalities due to Australian Bushfire: 1925-2009. Weather, Climate, and Society 2 300-310, doi: 10.1175/2010WCAS1063.1 ; http://sciencepolicy.colorado.edu/admin/publication_files/2010.41.pdf Which concludes: "This study has shown that increasing building damage due to bushfire in Australia is largely being driven by increasing dwelling numbers and that the impact of greenhouse gas-driven climatic change is not detectable at this time." (Pielke, Roger, University of Colorado)	The text has been deleted and replaced with reference to Chapter 3.
317	4	10	15	10	15	The citation for Royal Commission (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted
318	4	10	19	10	19	The citation for Loane and Gould (1986) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted
319	4	10	19	10	19	The citation for Royal Commission (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted
320	4	10	19	10	20	This sentence is not clear. Asset protection could be further defined. Then, what does "effective" mean in this context? (IPCC WGII TSU)	This text has been deleted
321	4	10	25	12	41	Is I commented earlier (my comment #7), I do not well understand the purpose of this section. While it contains interesting material, it does not relate to any of the previous discussions nor the following text. It would much better be formulated as another box. And as I stated earlier, unless it becomes a box (much shortened) I do not see why only Asia and the Americas are discussed, but not Africa. Admitted, Brazil is a deforestation hot spot (e.g. areal losses of humid tropical forests between 2000 to 2005, 47.8% are in Brazil, Hansen et al, 2008), but IPCC reports need to be comprehensive, whereas a box serving illustrative purposes can be very selective. Cited References: ----- Hansen, M. C., Stehman, S. V., Potapov, P. V., Loveland, T. R., Townshend, J. R. G., DeFries, R. S., Pittman, K. W., Arunarwati, B., Stolle, F., Steiner, M. K., Carroll, M., & DiMiceli, C., 2008. Humid tropical forest clearing from 2000 to 2005 quantified by using multitemporal and multiresolution remotely sensed data. Proc. Natl. Acad. Sci. USA, 105(27): 9439-9444. http://dx.doi.org/10.1073/pnas.0804042105 Ha335 (Fischlin, Andreas, ETH Zurich)	This section was in a box in the zero order draft, but was then placed in the text following reviewers comments. We agree that this section should not be place here and it has been incorporated into other parts the chapter. Regarding the comments on why Africa is not included, we are here providing an example of positive feedbacks which are likely to occur in both Amazonia and Indonesia. For Central Africa, GCM models are suggesting wetter conditions and therefore there is less evidence (and much less literature) to support such statement for central Africa. In Africa, more focus is placed on desertification in sahel region following similar positive feedback (Mahé et al., 2002; Amani et al., 2002).
322	4	10	28	10	28	"the only hazards": This is not correct. This also applies to droughts in those regions where an enhancement of dry conditions are projected. Indeed, in these regions droughts are a result of climate change, but may as well lead to an enhancement of climate change, both in terms of the local temperatures, as well as with respect to potential carbon release from impacts on plants (both effects mentioned under Section 3.1.4). It is likely that further examples could be found. (Seneviratne, Sonia, ETH Zurich)	This paragraph has been deleted
323	4	10	28	10	28	Should permafrost thawing also be included in this list? (UNITED STATES OF AMERICA)	This paragraph has been deleted
324	4	10	28	10	29	Caution! FFW are NOT the only hazard with a positive feedback loop to CC. Windthrow is another example, although with a lesser magnitude, less stringent attribution and more uncertainty because C release after disturbance is much slower than in the case of fires. To be safe I suggest you change "only" to e.g. "most pronounced". (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	This paragraph has been deleted
325	4	10	28	10	29	The opening sentence of 4.2.2.1 should be rigorously justified or omitted. For a possible counter example, urban heatwaves may be exacerbated by greenhouse-gas increases, and may exacerbate them if the heatwaves cause increased use of air conditioning. (Global Climate Observing System Steering Committee)	This paragraph has been deleted
326	4	10	28	10	29	Heatwaves, droughts, and desertification are also exacerbating and exacerbated by climate change. Deglaciation would also fit into this category - reduced global albedo etc. Better to modify this sentence to: 'Forest fires.....are an example of a hazard which are both exacerbating.....' (Stocker, Thomas, IPCC WGI TSU)	This paragraph has been deleted
327	4	10	28	10	29	exacerbation of forest fires and wildfire by climate change: it is not clear whether this is true in a general sense. While some enhanced occurrence of fires could take place in some regions, some model results also suggest a decreased occurrence of fires in other regions (see e.g. Scholze et al. 2008, Fig. 2). The text should be more nuanced on this point. [Scholze M.W., et al. 2008: A climate-change risk analysis for world ecosystems, PNAS, 103(35), 13116-13120] (Seneviratne, Sonia, ETH Zurich)	This paragraph has been deleted
328	4	10	28	10	29	It seems that fires are not the only example of such hazards. For example, permafrost melting and heat waves could potentially be seen as exacerbating and being exacerbated by climate change (through, for instance, permafrost melting leading to methane release or heat waves leading to release of carbon from terrestrial ecosystems). (IPCC WGII TSU)	This paragraph has been deleted
329	4	10	31	10	31	The citation for Van der Werf (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This paragraph has been deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
330	4	10	31	10	32	"The frequency and extent of FFW are likely to increase under a warmer climate (IPCC AR4, 2007)". Do the authors take ownership for this assessment? As mentioned above the global study from Scholze et al. (2008) also show a fair number of regions with decreases in fire occurrence. (Seneviratne, Sonia, ETH Zurich)	This paragraph has been deleted
331	4	10	31	10	34	Unclear formulation/explanation. If fires become more frequent, ecosystems will contain less carbon/be smaller C sink (as also mentioned in figure 4.1), and not more/larger sink. (NETHERLANDS)	This paragraph has been deleted
332	4	10	32	10	32	Please cite specific IPCC Chapter. (Stocker, Thomas, IPCC WGI TSU)	This paragraph has been deleted
333	4	10	32	10	32	The citation for IPCC AR4 (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This paragraph has been deleted
334	4	10	33	10	34	The citation for Luysaert et al. (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This paragraph has been deleted
335	4	10	36	0	0	This positive impact instead of To this positive impact (Wibig, Joanna, University of Lodz)	This paragraph has been deleted
336	4	10	36	10	36	First sentence in line needs rephrasing. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	This paragraph has been deleted
337	4	10	36	10	36	sentence: "to this positive feedback is added to the deforestation process"? (Stocker, Thomas, IPCC WGI TSU)	This paragraph has been deleted
338	4	10	36	10	40	Given that the author team has assigned robust evidence and high agreement to this finding, would it be possible to provide a level of confidence for the finding? (IPCC WGII TSU)	This paragraph has been deleted
339	4	10	36	10	42	The discussion of the feedbacks between deforestation/drought/fires/climate change and corresponding Fig. 4.1 are too simplified (see also comment on Fig. 4.1). For instance, there are still large uncertainties regarding feedbacks between land cover and precipitation (e.g. Pitman et al. 2009, GRL). One observational study showed an impact of deforestation on cloud cover in the Amazon (Wang et al. 2009), but I do not know any observational study that demonstrated an effect of deforestation on precipitation. Evidence based on models is uncertain since models show a wide variety of behaviour wrt to soil moisture-precipitation feedbacks (Seneviratne et al. 2010). Furthermore, climate models do not agree with respect to projected changes in drought conditions in several regions, in particular in tropical regions (chapter 3, Section 3.5.1). This paragraph should be a bit more careful in its assessment. It is possible that the described feedback loops are of relevance, but I doubt that the terms "robust evidence" and "high degree of agreement" apply in this case. [Pitman et al. 2009: Uncertainties in climate responses to past land cover change: First results from the LUCID intercomparison study. Geophys. Res. Lett., 36, L14814, doi:10.1029/2009GL039076 ; Wang, J.F. et al. 2009: Impact of deforestation in the Amazon basin on cloud climatology. PNAS, 106(10), 3670-3674; Seneviratne S.I. et al., 2010: Investigating soil moisture-climate interactions in a changing climate: A review. Earth-Science Reviews, 99, 125-161;] (Seneviratne, Sonia, ETH Zurich)	This paragraph has been deleted
340	4	10	38	10	38	The citation for Nobre (1991) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This paragraph has been deleted
341	4	10	38	10	38	Typo in citation: For Zheng et al. (1997), only two authors are listed in the chapter's reference list. Please ensure the citation is correct and harmonize the reference in both locations (chapter text and reference list). (IPCC WGII TSU)	This paragraph has been deleted
342	4	10	40	10	42	If this usage of calibrated language ("very likely") is not based on probabilistic information (where probabilistic information includes formally quantified expert judgment), it would be preferable to present an assigned level of confidence. (IPCC WGII TSU)	This paragraph has been deleted
343	4	10	41	10	41	Typo citation: For Hofmann et al. (2003), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	This paragraph has been deleted
344	4	10	41	10	41	It is unclear what source Van der Werf et al. (2008) corresponds to in the chapter's reference list, given multiple references for these authors and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This paragraph has been deleted
345	4	10	41	10	41	The citation for Nepstad (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This paragraph has been deleted
346	4	10	44	10	44	Figure 4-1: Please provide the source for this figure. (Stocker, Thomas, IPCC WGI TSU)	This figure has been deleted
347	4	10	47	10	48	Statement is too general: Older studies also exist that show a negative feedback of climate on the C sink, but these were regional (especially in tropical regions). (NETHERLANDS)	This paragraph has been deleted
348	4	10	47	10	51	Are results from only a 10-year period of measurement considered significant? (Stocker, Thomas, IPCC WGI TSU)	This paragraph has been deleted
349	4	10	47	10	51	This statement seems to contradict results from NOAA Carbon tracker, which show land sinks and forest carbon uptake as continuing throughout the last decade (UNITED STATES OF AMERICA)	This paragraph has been deleted
350	4	10	49	0	0	Wrong unit: 0.55 Mt should be 0.55 Gt (or Pg as used in Zhao & Running, 2010) (NETHERLANDS)	This paragraph has been deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
351	4	10	53	10	54	One study suggested enhanced vegetation activity during the 2005 drought in the Amazon because photosynthesis is limited by cloud cover during wet periods (Saleska et al. 2005). There has been significant debate on these results in the literature (e.g. Samanta et al. 2010, Zhao and Running 2010), but it is still unclear whether: 1) there might indeed be enhanced drought in the future in the Amazon (see Section 3.5.1); 2) whether enhanced drought would necessarily lead to decreased vegetation activity. It is important to note these possible effects but with caveats. [Saleska et al. 2005, Amazon Forests Green-Up During 2005 Drought, Science, 318, 612; Samanta et al. 2010, GRL, 37, L05401; Zhao and Running, 2010, Science, 329, 942-943] (Seneviratne, Sonia, ETH Zurich)	This paragraph has been deleted
352	4	11	0	12	0	It is unclear what the function of section 4.2.2.1.2 is plus it contains quite some duplicate information. The most relevant part is paragraph at pg 12, lines 35-38. Consider describing the causes of deforestation (pg 12, lines 22-25) first, followed by the climate contribution (combine first and last paragraph of section). End with the slowing down process (pg 12, lines 27-33). (NETHERLANDS)	This paragraph has been deleted
353	4	11	4	11	4	These results are partly debated for the Amazon (see also above comment). The study of Saleska et al. (2005) should be mentioned. (Seneviratne, Sonia, ETH Zurich)	This paragraph has been deleted
354	4	11	7	11	7	delete "more research on these processes is required" -- prescriptive. (Stocker, Thomas, IPCC WGI TSU)	This paragraph has been deleted
355	4	11	8	0	0	what kind of wave energy? (UNITED STATES OF AMERICA)	This paragraph has been deleted
356	4	11	11	11	12	Give units. Is these per year? (UNITED STATES OF AMERICA)	This paragraph has been deleted
357	4	11	14	11	19	This statement would be more robust if the authors would indicate the evidence underlying the IPCC AR4 assessment and provide their own assessment. (Seneviratne, Sonia, ETH Zurich)	This paragraph has been deleted
358	4	11	14	11	45	Focus of section is Asia, yet China and India were not mentioned. (UNITED STATES OF AMERICA)	Regional balance across Asia for this section has been improved in the final draft of the chapter.
359	4	11	14	12	41	Section 4.2.2.1.2. The discussion of this section seems to assume that droughts will increase in most regions as a consequence of climate change. Present evidence from model scenarios is still inconclusive on this point in several regions, in particular in tropical areas where consequent forest fires would be of relevance to the carbon cycle. Hence, while it is important to address this issue in this chapter, the text should be consistent with chapter 3 (Section 3.5.1) and consider drought in tropical regions as a possible scenario but not as a likely scenario (in the IPCC sense). (Seneviratne, Sonia, ETH Zurich)	The text retained from this section has been greatly reduced
360	4	11	16	11	16	(Erdnethuya 2003, in AR4) - Why do you single out one paper from the AR4? Are you saying that this assessment in the AR4 was based on this single paper? Surely not. (Stocker, Thomas, IPCC WGI TSU)	This paragraph has been deleted
361	4	11	16	11	16	The citation for Erdnethuya (2003) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This paragraph has been deleted
362	4	11	17	11	19	Mention human direct impact on fire here as well. (UNITED STATES OF AMERICA)	This paragraph has been deleted
363	4	11	19	11	19	As noted in the general comments - please cite a specific chapter of the AR4, in this case (Cruz et al. 2007). (Stocker, Thomas, IPCC WGI TSU)	This paragraph has been deleted
364	4	11	19	11	19	Please cite specific IPCC Chapter, ie, Meehl et al. 2007. (Stocker, Thomas, IPCC WGI TSU)	This paragraph has been deleted
365	4	11	19	11	19	The citation for IPCC AR4 (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This paragraph has been deleted
366	4	11	21	0	0	"In recent studies, Sumatra's fire emissions show a positive linear trend, approximately doubling between 2000 and 2006." The IPCC defines "climate change" as occurring on time scales of 30 to 50 years and longer. It is not clear how then to interpret a "trend" observed over 7 years. In a climate context, such a "trend" has little meaning. There are many anecdotes throughout this chapter of events that occur on time periods much less than climate time scales. (Pielke, Roger, University of Colorado)	This paragraph has been deleted
367	4	11	21	11	22	Provide reference for the this statement (UNITED STATES OF AMERICA)	This paragraph has been deleted
368	4	11	21	11	26	Can you strengthen the important results given in this paragraph with additional references. (Stocker, Thomas, IPCC WGI TSU)	This paragraph has been deleted
369	4	11	22	11	25	What is the assessment? What are the confidence and/or likelihood levels? (UNITED STATES OF AMERICA)	This paragraph has been deleted
370	4	11	22	11	26	It is unclear what source Van der Werf et al. (2008) corresponds to in the chapter's reference list, given multiple references for these authors and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This paragraph has been deleted
371	4	11	23	11	24	The fire impact on climate through the carbon cycle is expected to be relatively small, since the emissions are small relative to fossil fuel emissions (UNITED STATES OF AMERICA)	This paragraph has been deleted
372	4	11	26	11	26	It is not clear what the word "emissions" is referring to--emissions of what? Emissions from fires? (MacCracken, Michael, Climate Institute)	This paragraph has been deleted
373	4	11	28	0	0	Figure 4-2: Caption needs much more explanation. What region is shown here? What are the units on the colour bar? How were fire detections observed? What is the source of this figure? (Stocker, Thomas, IPCC WGI TSU)	This paragraph has been deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
374	4	11	33	0	0	609 mm per season? Per year? (UNITED STATES OF AMERICA)	This has been deleted.
375	4	11	33	11	33	With all of the talk about uncertainties, giving a precise figure like 609 mm (3 significant figures) seems very out of sorts. (MacCracken, Michael, Climate Institute)	This has been deleted.
376	4	11	35	11	35	It is unclear what source Van der Werf et al. (2008) corresponds to in the chapter's reference list, given multiple references for these authors and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	There was a duplication of bibliographic info. Resolved.
377	4	11	36	11	40	Do you really wish to discuss biotic feedback issues in this report? Perhaps in a box that would make sense to remind people of other aspects than the ones really discussed in this report, but then it might be advisable to start such a sentence by "Besides, the emissions from such fires are also ..." (Fischlin, Andreas, ETH Zurich)	This has been deleted.
378	4	11	37	0	0	Wrong unit: 70 Mt of carbon should be 70 Gt of carbon (or better 70 Pg) (NETHERLANDS)	This has been deleted.
379	4	11	37	11	37	The Immerzi et al. (1992) reference is not provided in the reference list. Additionally, the figure "70 Mt of carbon" appears incorrect. Given that it is stated to be equivalent to nine years of contemporary global fossil fuel emissions, 70 Gt seems more likely to be of the right order of magnitude. (IPCC WGII TSU)	This has been deleted.
380	4	11	37	11	37	The citation for Immerzi et al. (1992) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This has been deleted.
381	4	11	39	11	39	It is unclear what source Van der Werf et al. (2008) corresponds to in the chapter's reference list, given multiple references for these authors and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This has been deleted.
382	4	11	39	11	40	When you say "Fires of peatlands" does this mean smoke from fires? (MacCracken, Michael, Climate Institute)	This has been deleted.
383	4	11	42	11	45	This information belongs in the caption for Figure 4-2. (Stocker, Thomas, IPCC WGI TSU)	This has been deleted.
384	4	11	42	11	45	This paragraph is presumably describing Figure 4-2. The figure needs to be clearly cited in the paragraph for it to make sense. (IPCC WGII TSU)	This has been deleted.
385	4	11	44	0	0	What does it mean "the number of detected fires": in one place, in the radius of x? km? (Wibig, Joanna, University of Lodz)	This has been deleted.
386	4	11	44	11	45	It is unclear what source Van der Werf et al. (2008) corresponds to in the chapter's reference list, given multiple references for these authors and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This has been deleted.
387	4	11	50	11	51	It is again not clear if the authors take ownership for the AR4 assessment. The SREX assessment regarding projected changes in forest fires should take into account that our present assessment regarding projected changes in droughts is more conservative than that of the IPCC AR4, due to more recent evidence from various sources (see Chapter 3, Section 3.5.1). (Seneviratne, Sonia, ETH Zurich)	The text has been revised accordingly. The text has also been moved within the chapter.
388	4	11	50	11	51	Reference the chapter from the IPCC AR4 (UNITED STATES OF AMERICA)	This text has been revised accordingly. The text has also been moved within the chapter.
389	4	11	50	11	51	First, the quotation from the AR4 needs to be part of a sentence, not just a stand-alone quote without introduction. Second, the second sentence about "likely" dryer conditions needs to reflect the assessment of chapter 3, citing referenced chapter 3 sections. (IPCC WGII TSU)	This text has been revised accordingly. The text has also been moved within the chapter.
390	4	11	51	0	0	Consider reference to original source (Scholze et al, 2005) instead of AR4, 2007 (NETHERLANDS)	The relevant AR4 chapter is now referenced. The text has also been moved within the chapter.
391	4	11	51	0	0	"dryer conditions which are likely to increase" could be taken as applying to Central and South America as a whole. This is inconsistent with the projections assessment in Ch. 3 (see Table 3.3). (UNITED STATES OF AMERICA)	This was taken from AR4, but we now need to take ch.3 considerations. This has been corrected. The text has also been moved within the chapter.
392	4	11	51	11	51	You must delete 'contributing to this are dryer conditions which are likely to increase'. It is not within the scope of Chapter 4 to be providing such projections. This is inconsistent with the projections given in Chapter 3! Table 3.3 indicates there is low-medium confidence in projected dryness for South and Central America and therefore, quite appropriately, no likelihood statement is given. (Stocker, Thomas, IPCC WGI TSU)	Linkages to chapter 3 have now been made. The text has also been moved within the chapter.
393	4	11	51	11	51	The citation for AR4 (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The relevant AR4 chapter is now referenced. The text has also been moved within the chapter.
394	4	11	52	11	53	Change "South Mexico" to "southern Mexico" (MacCracken, Michael, Climate Institute)	Done. The text has also been moved within the chapter.
395	4	12	5	12	5	Clarify what is meant by the "new dynamic"? Provide evidence for the statement that "isolating one of the processes is less relevant...". (Stocker, Thomas, IPCC WGI TSU)	The statement has been clarified. The text has also been moved within the chapter.
396	4	12	7	12	8	This paragraph should however note that climate models do not present sufficient agreement regarding a possible increased occurrence of drought in the Amazon region (see chapter 3, Section 3.5.1). All of this discussion is dependent on the assumption that drought may indeed increase in this region. There is not sufficient evidence of this at present. (Seneviratne, Sonia, ETH Zurich)	This text has been deleted.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
397	4	12	7	12	9	The mechanism through which forest fires are a trigger for deforestation needs to be more clearly described. (IPCC WGII TSU)	This text has been deleted.
398	4	12	7	12	27	It's good that the relationship between (Climate-induced) droughts and forest distribution & functioning is explained. But how important is this compared to direct human impacts due to land-use changes? In lines 23-25 some of these human impacts are described, indicating that these are more relevant. (NETHERLANDS)	This text has been deleted.
399	4	12	7	12	41	Some of this material could go to the section 4.2.1.2, which might be profitable for both that section (see my comment #38) as well as help to shorten these sections (see my comment #45). (Fischlin, Andreas, ETH Zurich)	This text has been deleted.
400	4	12	8	12	8	It is unclear what source Van der Werf et al. (2008) corresponds to in the chapter's reference list, given multiple references for these authors and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This text has been deleted.
401	4	12	8	12	8	The citation for Nepstad (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted.
402	4	12	12	0	0	Reference needed for statement (NETHERLANDS)	This text has been deleted.
403	4	12	15	12	16	Is 'likely' meant here as calibrated uncertainty language? If so, please italicize. BTW, the assessment can not be based on a single study! (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted.
404	4	12	16	12	16	The citation for Hofmann et al. (2003) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted.
405	4	12	23	12	23	The citation for Cochrane and Laurance (2002) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted.
406	4	12	24	12	25	why is part of the sentence in italics? (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted.
407	4	12	24	12	25	Why is this italicized? Is there an associated confidence? (UNITED STATES OF AMERICA)	This text has been deleted.
408	4	12	27	12	33	Storage of carbon by trees is not the same as sinking. Old trees storage a big amount of carbon but their biomass content is stable, so they stop sinking the new amounts of carbon. Young trees carbon storage is small, but their biomass is rapidly increasing so they effectively capture carbon through photosynthesis. (Wibig, Joanna, University of Lodz)	This text has been deleted.
409	4	12	29	12	30	This does not read as it is intended--literally, it says that 60% of the biomass is in just 1% of the trees that have large diameters, and so 99% of the large diameter trees and all the rest have 40% of the biomass. It should be revised to say "60% of the biomass is contained in the 1% of the trees that have the largest diameters" or something similar. (MacCracken, Michael, Climate Institute)	This text has been deleted.
410	4	12	33	12	33	The citation for Dixon et al. (1994) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted.
411	4	12	35	12	35	Delete "For tropical areas" - see end of sentence. (Global Climate Observing System Steering Committee)	This text has been deleted.
412	4	12	35	12	35	decreased --> decreased (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted.
413	4	12	35	12	38	This text is repeated on page 10, lines 36-41 (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted.
414	4	12	35	12	41	These paragraphs are nearly identical to sentences above (page 10, lines 36-42) and should be removed. Additionally, "in all regions" at the start of the second paragraph is ambiguous--all regions of Central and South America, Amazonia, etc.? Or does the author team simply mean that "in general" where climate becomes drier and warmer (which is not projected for all regions; Table 3.3) forest fires will occur more frequently? (IPCC WGII TSU)	This text has been deleted.
415	4	12	36	12	36	The citation for Nobre (1991) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted.
416	4	12	36	12	36	Typo in citation: For Zheng et al. (1997), only two authors are listed in the chapter's reference list. Please ensure the citation is correct and harmonize the reference in both locations (chapter text and reference list). (IPCC WGII TSU)	This text has been deleted.
417	4	12	38	12	38	Typo citation: For Raamos da Silva et al. (2008), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	This text has been deleted.
418	4	12	40	0	0	Hofmann instead of hofmann (Wibig, Joanna, University of Lodz)	This text has been deleted.
419	4	12	40	0	0	"In all regions a drier and warmer [sic] climate is very likely to exacerbate forest fire risk." This is confusing as written. Does it mean that all regions are very likely to become drier and warmer? That is not consistent with Ch. 3 projections assessment (Table 3.3). Or is this intended as a condition statement that if regions get drier and warmer, then this is very likely to exacerbate forest fire risk? If so, it should be reworded to be clearly a conditional statement. (UNITED STATES OF AMERICA)	This text has been deleted.
420	4	12	40	12	40	Is 'very likely' meant here as calibrated uncertainty language? If so, please italicize. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
421	4	12	40	12	40	Typo citation: For Hofmann et al. (2003), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	This text has been deleted.
422	4	12	40	12	41	It is unclear what source Van der Werf et al. (2008) corresponds to in the chapter's reference list, given multiple references for these authors and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This text has been deleted.
423	4	12	41	12	41	The citation for Nepstad (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted.
424	4	12	48	12	48	While I think I understand what is meant, I don't think "mediated" is the right word for the public--when people think of this word I think they think of things being brought together by a mediator. Maybe say "The impacts of weather and climate extremes in any given region are determined by its exposure and vulnerability" or "The exposure and vulnerability of a particular location determine the impacts that result from weather and climate extremes." (MacCracken, Michael, Climate Institute)	Changed along the lines suggested here.
425	4	12	48	12	48	What V? (Fischlin, Andreas, ETH Zurich)	If this refers to the definition of vulnerability, that is defined in the Glossary and in Chapters 1 and 2.
426	4	12	48	12	54	Repetitive to earlier texts (again MEA, cant be cited this sweepngly (see my comment #43) (Fischlin, Andreas, ETH Zurich)	Repetition has been reduced, and the reference has been changed.
427	4	12	50	12	54	This flooding example is very similar to discussion above (1st paragraph, p. 9), and overlap should be eliminated. (IPCC WGII TSU)	Overlap has been reduced.
428	4	12	53	12	54	Typo citation: For Millenium Ecosystem Assesment (2005), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	The reference has been changed.
429	4	13	3	13	3	please refer to Glossary here, in addition to referring to Chapter 1 (Stocker, Thomas, IPCC WGI TSU)	Done
430	4	13	4	13	4	The citation for Revi (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation added
431	4	13	4	13	4	The citation for Adger et al. (2001) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation added
432	4	13	4	13	5	The citation for Dodman and Satterwaite (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation clarified
433	4	13	8	13	8	This chapter should not redefine 'vulnerability'. (UNITED STATES OF AMERICA)	Agreed - text changed to refer to report definitions.
434	4	13	8	13	8	The citation for EMA (1998) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This citation has deleted from the text
435	4	13	8	13	9	Please refer to the SREX glossary definition here. If the Chapter 4 definition is different from the glossary version, you need to explain in the text why this is so. (Stocker, Thomas, IPCC WGI TSU)	Agreed - text changed to refer to report definitions.
436	4	13	9	13	11	Since Holling's, admitted seminal work, much has happened. I suggest authors read Fischlin et al., 2007 and all the literature reviewed and assessed in there and then consider IPCC definitions in the corresponding glossary (IPCC, 2007b) I wrote having in particular these issues in mind. This para falls short of giving all the issues surrounding these concept justice. Cited References: ----- Fischlin, A., Midgley, G. F., Price, J. T., Leemans, R., Gopal, B., Turley, C., Rounsevell, M. D. A., Dube, O. P., Tarazona, J., & Velichko, A. A., 2007. Ecosystems, their properties, goods and services. In: Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (eds.). Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC). Cambridge University Press: Cambridge, UK. 211-272. (http://www.ipcc.ch) Fi103 (Fischlin, Andreas, ETH Zurich)	The text is about resilience as widely used today in disaster risk reduction, rather than about ecosystems. Holling is mentioned only because one major theme in th modern application of the concept to human systems anchors itself in his work.
437	4	13	10	0	0	Refere to Folke, C., Carpenter, S.R., Elmquist, T., Gunderson, L.H., Holling, C. S. and Waltar, B.H., 2002. Resilience and sustainable development: Building adaptive capacity in a world of transformations. Ambio 31, pp. 437-40; Adger W.N., 2000. Social and ecological resilience: Are they related? Prog. Hum. Geogr. 24, 347-64. (Sygna, Linda, Department of Sociology and Human Geogranhv)	Added.
438	4	13	10	13	10	The citation for Handmer and Dovers (2005) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The reference has been clarified.
439	4	13	12	13	12	please specify what you mean by "the language of resilience". (Stocker, Thomas, IPCC WGI TSU)	Done.
440	4	13	13	13	13	It is unclear what source Handmer (2003) corresponds to in the chapter's reference list, given multiple references for these authors and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	The reference has been clarified.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
441	4	13	16	0	0	Section 4.2.3.2: Again, you do not need to repeat concepts that have already been introduced in earlier chapters. Here you only need to specify (as briefly as possible) if the Chapter 4 understanding of 'disaster' is different from that which is introduced in Chapter 1. (Stocker, Thomas, IPCC WGI TSU)	This section has been revised accordingly
442	4	13	18	13	18	It would be helpful to indicate explicitly the distinction between the glossary definition of disaster (focused on humans) versus the broader consideration in this chapter of extreme ecosystem impacts that are not necessarily disasters by the glossary definition. (IPCC WGII TSU)	This distinction has been clarified in revision of the section
443	4	13	18	13	19	The citation for Fritz (1961) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted
444	4	13	18	13	37	Is this discussion of definitions for disasters consistent with that proposed in Ch1 (or other chapters?) (UNITED STATES OF AMERICA)	The text has been revised to ensure consistency
445	4	13	24	13	37	Please explain that the definition of "disaster" or "catastrophe" differs according to the context and the intention. In several countries "disaster" has a legal definition and is used for administrative purposes. If a local authority is not able to cope with an event (note: this must not be a hazard) the authority declares that the event is a disaster and then a higher authority takes over the responsibility and makes her resources available. Science, people and media define disaster by other criteria like the size of danger or effects. These different approaches should be made clear to allow to understand the approaches for disaster management. (GERMANY)	The discussion of this term has been reduced here, with indications that the chapter uses the definition of "disaster" established in the glossary and in chapter 1.
446	4	13	35	13	36	It would be most clear to indicate, at least parenthetically, that "susceptibility to harm" is equivalent to vulnerability. (IPCC WGII TSU)	The revision of this subsection and the preceding subsection clarifies the context for this for phrase
447	4	13	45	13	45	The citation for Mendelsohn et al. (2006) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation removed.
448	4	13	47	13	47	The citation for Satterthwaite et al. (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation added
449	4	13	49	13	49	The citation for Costello et al. (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The intended reference has been clarified
450	4	13	51	13	51	First word on line is "considered" (MacCracken, Michael, Climate Institute)	The sentence has been deleted
451	4	13	53	13	53	Typo citation: For Handmer and Dover (2007), the second author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	Correct spelling is Dovers.
452	4	14	0	0	0	Box 4-2. This box may be more appropriately placed in a later chapter of the report. (IPCC WGII TSU)	Box 4-2 has been removed from the report
453	4	14	0	15	0	Fig/Table: box 4-2, comment: Shorten box. Most informative sections are paragraphs pg 15, incl. fig 4-3. Paragraphs in page 14 are less useful. (NETHERLANDS)	Box 4-2 has been removed from the report
454	4	14	1	14	9	This para is too narrow and considers only human systems. This chapter has as well to deal with ecosystems. Much of what is written here is questionable for ecosystems. (Fischlin, Andreas, ETH Zurich)	This subsection has been revised to clarify that it focuses on human systems.
455	4	14	5	14	5	The citation for Dodman and Satterthwaite (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The intended reference has been clarified
456	4	14	11	14	19	This good point is also made at page 27, 12-23, consider concentrating it all on page 27 (Sygna, Linda, Department of Sociology and Human Geography)	The point on page 27 has been moved into the economics section where it will be much reduced. So we are leaving the point on page 14 where it is.
457	4	14	23	0	0	Box 4-2: 'Successful paths to adaptation' - The box is out of context and outside of the scope of Chapter 4; Adaptation is the focus of Chapters 5-8. The link between the Montreal protocol, extreme events, and the collapse of past societies is not clearly constructed. The Diamond (2005) book can not serve as the primary basis for a scientific assessment. (Stocker, Thomas, IPCC WGI TSU)	Box 4-2 has been removed from the report
458	4	14	23	16	6	Box 4-2: Very interesting box! (Seneviratne, Sonia, ETH Zurich)	Box 4-2 has been removed from the report
459	4	14	23	16	6	This is an important box but it needs to be worded better. Many would say that this discussion is about mitigation, and reasons and consequences of inaction, and what extreme impacts will result from inaction. Also, is it appropriate to limit this discussion to the role of decisions makers, what about businesses, general public. This also opens up the discussion of different reasons for inactions. (Sygna, Linda, Department of Sociology and Human Geography)	Box 4-2 has been removed from the report
460	4	14	23	16	8	The intention behind this box does not become clear. The heading indicates a focus on "successful paths to adaptation", however, first mitigation strategies are described in terms of the 2°C target. Therefore a stronger focus could be set on the actual paths towards adaptation. The cited book by Diamond is neither scientific literature nor peer-reviewed. It is therefore not understandable why conclusions from this book are highlighted here. (Holsten, Anne, Potsdam Institute of Climate Impact Research)	Box 4-2 has been removed from the report

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
461	4	14	25	0	0	"The Montreal protocol is often provided as a successful example of adaptation." This is incorrect – The Montreal protocol is often cited as an example of successful mitigation. Wearing sunscreen would be an example of adaptation to ozone depletion. Section 4.2.3.2 wanders all over the place and adds little substance to the discussion. (In fact, there is considerable text in this chapter that adds little value. Rather than close to 100 pages, it could be cut by two thirds. (Pielke, Roger, University of Colorado)	Box 4-2 has been removed from the report
462	4	14	25	14	25	I think it is confusing to say the Montreal Protocol (note capitalization) is adaptation, when what it did was to cut emissions, which in the climate change arena is called mitigation. You might want to say that the Montreal Protocol was successful because of technological innovation. (MacCracken, Michael, Climate Institute)	Box 4-2 has been removed from the report
463	4	14	25	14	25	Isn't this also (or solely?) an example of mitigation? (UNITED STATES OF AMERICA)	Box 4-2 has been removed from the report
464	4	14	25	14	25	You probably mean mitigation , not adaptation!?! (Fischlin, Andreas, ETH Zurich)	Box 4-2 has been removed from the report
465	4	14	25	14	25	It is not clear that "adaptation" is the best word to characterize the Montreal protocol since adaptation is defined here in a climate change context. (IPCC WGII TSU)	Box 4-2 has been removed from the report
466	4	14	25	16	6	We think the discussion of the montreal protocol does not fit appropriately within this box. The box overall should be tightened for clarity of ideas. (UNITED STATES OF AMERICA)	Box 4-2 has been removed from the report
467	4	14	28	14	29	It is confusing to have "it" three times in one sentence. (MacCracken, Michael, Climate Institute)	Box 4-2 has been removed from the report
468	4	14	32	14	32	Please cite specific IPCC Chapter. (Stocker, Thomas, IPCC WGI TSU)	Box 4-2 has been removed from the report
469	4	14	32	14	32	I would change the word "contain" to "limit" (MacCracken, Michael, Climate Institute)	Box 4-2 has been removed from the report
470	4	14	32	14	32	It is unclear what source IPCC (2007) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	Box 4-2 has been removed from the report
471	4	14	33	14	34	Recheck that Chapter 3 said "a 2 C rise will have severe consequences in terms of extremes"--I think they should say this, but the chapter seemed pretty cautious. (MacCracken, Michael, Climate Institute)	Box 4-2 has been removed from the report
472	4	14	34	14	37	Reference needed for such a strong statement. (NETHERLANDS)	Box 4-2 has been removed from the report
473	4	14	35	14	35	The words "may" and "might" ought to be changed to the IPCC lexicon. (MacCracken, Michael, Climate Institute)	Box 4-2 has been removed from the report
474	4	14	42	14	42	BOX 4-2 Comment: 1.) the definition of and the limitation to small glaciers is unintelligible; 2.) the statement would only make sense if glaciers were the only water suppliers during the respective season; 3.) I do not know of any scientific study from which one can conclude that "populations living in areas where water supply during the dry season is provided by small glaciers" (not even if the statement is changed to "by glaciers only") may have to be evacuated (as stated in lines 35 to 36 and to which the statement is referred to (This is specifically of concern ... e.g.; lines 39 ff. This statement can only be kept if a respective peer-reviewed literature can be cited. (Kaser, Georg, University of Innsbruck)	Box 4-2 has been removed from the report
475	4	14	43	0	0	Oil and gas industry is an industry sector worth mentioning as it is affected worldwide by extreme events : TCs, sea level rise and wave climate, water resources, permafrost and sea ice extent ... (SwissRe 2009 papers already in References) (International Petroleum Industry Environmental Conservation Association (IPIECA))	Box 4-2 has been removed from the report
476	4	14	44	14	45	the statement on erosion from sea level rise contradicts a statement in Chapter 3 (UNITED STATES OF AMERICA)	Box 4-2 has been removed from the report
477	4	14	46	14	46	For IPCC (2007b) the publication year does not carry a letter in the chapter's reference list, and there are multiple references from this author and publication year in the list. Please ensure the citation is correct and harmonize the reference in both locations (chapter text and reference list). (IPCC WGII TSU)	Box 4-2 has been removed from the report
478	4	14	49	0	0	Needs to be modified. Their are certainly thresholds in human systems that involves changes at rates beyond a that systems are able to adapt (Schneider et al., 2007) as said above (in lines 34-37) (Sygna, Linda, Department of Sociology and Human Geography)	Box 4-2 has been removed from the report
479	4	14	49	14	53	Ecosystems can adapt too (although more slowly than humans). E.g. Yamano et al, recently showed that even coral reefs can migrate (GRL, 2011, Vol 38) (NETHERLANDS)	Box 4-2 has been removed from the report
480	4	14	49	14	53	The readers of this report need to know inasmuch this chapter complements or updates Fischlin et al., 2007. Please use accordingly and this argumentation provided here is too simplistic. Cited References: ----- Fischlin, A., Midgley, G. F., Price, J. T., Leemans, R., Gopal, B., Turley, C., Rounsevell, M. D. A., Dube, O. P., Tarazona, J., & Velichko, A. A., 2007. Ecosystems, their properties, goods and services. In: Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (eds.). Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC). Cambridge University Press: Cambridge, UK. 211-272. (http://www.ipcc.ch) Fi103 (Fischlin, Andreas, ETH Zurich)	Box 4-2 has been removed from the report

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
481	4	14	50	14	50	"or coral reefs (Hoegh-Guldberg, 2007, see Section 4.5.9 and 4.3.3.1) where there are temperature thresholds above which survival of selected species is no longer possible. In these cases the only solution relies on international efforts in mitigating GHG." Coral reefs can expand into waters once too cool for their establishment. Recent evidence of this has been documented in Japan (Yamano, H., et al., 2011. Rapid poleward range expansion of tropical reef corals in response to rising sea surface temperatures. Geophysical Research Letters, 38, L04601, doi:10.1029/2010GL04674.) (UNITED STATES OF AMERICA)	Box 4-2 has been removed from the report
482	4	14	51	14	51	The citation for Hoegh-Guldberg (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Box 4-2 has been removed from the report
483	4	15	1	15	1	It would be more clear to indicate explicitly that the parenthetical "white area in Figure 4-3" refers to situations relevant to climate change. (IPCC WGII TSU)	Box 4-2 has been removed from the report
484	4	15	1	15	51	I doubt that such a broad issue as collapse of a society needs to be discussed here. Extremes? Do they matter or is it rather gradual change, that is understood to have caused some of these collapses? Please focus on those cases, such as the Maya, where indeed drought is proposed to have played a role. Moreover, the entire relationship between CC, impacts, adaptation and mitigation and then possibly exceeding the adaptive capacity by an entire society, let alone in the case of global CC by all of humanity, is such a complex issue, that I doubt it can be properly dealt with in this box. Cut it out or treat it really properly and well, which, I am afraid, is currently not the case. (Fischlin, Andreas, ETH Zurich)	Box 4-2 has been removed from the report
485	4	15	9	15	9	The citation for Benson, Petersen and Stein (2006) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Box 4-2 has been removed from the report
486	4	15	16	16	8	Chapter 4 should not stray into decision making associated with adaptation. These issues should be covered in chapters 5 - 8. Much of this text and Figure 4-3 could be better placed as a box within Chapter 8. (Stocker, Thomas, IPCC WGI TSU)	Box 4-2 has been removed from the report
487	4	15	17	0	0	Figure 4-3: Give source/reference for this figure. Please expand the very unhelpful, short caption. (Stocker, Thomas, IPCC WGI TSU)	Box 4-2 has been removed from the report
488	4	15	17	0	0	Fig: Reference needed for figure 4-3 (NETHERLANDS)	Box 4-2 has been removed from the report
489	4	15	21	0	0	At these lines it's stated that fig 4-3 provides examples. This should also be mentioned in the caption of the figure to give the figure a correct value of understanding. (NETHERLANDS)	Box 4-2 has been removed from the report
490	4	15	33	16	6	Please take note of the research in risk perception and behavior especially related to low probability high consequence risks (lphcr). E.g. personal experience and cultural attitudes highly influence how is dealt with lphcr. This is relevant because climate change may cause extreme events of "new" kind or severity i.e. without personal experience or without experience of societies. The missing experience is one main obstacle for "rational" decisions to start adaptation measures for these new or more extreme events. (GERMANY)	Box 4-2 has been removed from the report
491	4	15	51	15	51	Adding before brackets: "..., that is to step property rights on the resource (...)". This is the recognized terminology in the marine resource economics, and specifically in new Institutional Economics. (SPAIN)	Box 4-2 has been removed from the report
492	4	15	51	15	51	To add a new reference between brackets: (...; Libecap, 2005) for supporting the added text. (SPAIN)	Box 4-2 has been removed from the report
493	4	16	0	17	0	Section 4.2.3.3, Comments: i) This is more a kind of introduction on how different types of extremes can affect different ecosystems, ii) The section can be shortened. Consider to put it more in the beginning of the chapter. iii) Suggestions for shortening: delete pg 16 lines 21-29 (more suitable as a part of chapter 3), pg 17 lines 1-5 (is more an example of ecological succession due to changing environmental conditions). (NETHERLANDS)	Box 4-2 has been removed from the report
494	4	16	2	16	2	Spelling is "Reluctance" (MacCracken, Michael, Climate Institute)	Box 4-2 has been removed from the report
495	4	16	11	0	0	Also possibly positive effects, such as vital floods for riverine ecosystems could be mentioned. (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This revised section opens with a description of positive effects and dependencies on extreme events
496	4	16	11	0	0	Section 4.2.3.3. The first few paragraphs of this section include a number of (often sparsely cited) sentences that over-generalize and appear to overstate conclusions that can be drawn from the literature that is cited. The later paragraphs in the sections list a number of specific examples drawn from the literature. To provide an effective assessment, the more general statements in the section, either at the beginning or end of the section, need to be clearly derived from literature reviewed in the section. Use of calibrated uncertainty language could help indicate the degree of certainty in these assessment findings, per the AR5 Guidance Note on Treatment of Uncertainties. (IPCC WGII TSU)	These points have been considered for material retained in the revised chapter
497	4	16	13	16	14	Concerning a possible sixth major extinction phase see also this recent article: Barnosky AD, Matzke N, Tomiya S, Wogan GO, Swartz B, Quental TB, Marshall C, McGuire JL, Lindsey EL, Maguire KC, Mersey B, Ferrer EA. (2011): Has the Earth's sixth mass extinction already arrived? Nature, Volume:471, Pages: 51-57 (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This text has been deleted from the chapter
498	4	16	13	16	14	who is "we"? (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted from the chapter

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
499	4	16	13	16	15	This is a very significant opening statement you make here, and needs to be supported by more than one cited reference, ie, multiple lines of evidence needed. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted from the chapter
500	4	16	13	16	15	There is a large and growing body of literature to support this statement and the next. Additional references should be included. Please consider, among others, Barnosky, et al. 2011 Nature 471; Chapin et al. 2000 Nature 405; Wake and Vredenburg 2008 PNAS vol 105 Supp. 1. (UNITED STATES OF AMERICA)	This text has been deleted from the chapter
501	4	16	13	16	19	Impacts on ecosystems and threats of biodiversity losses need to be treated in a more separated manner. Moreover, these 2 paras are poorly written and need much improvement. I suggest the authors to first read Fischlin et al., 2007 and then add latest research to this, but do not cite old works such as Wilson, 1999 as THE key reference. Notably section 4.4.11 (Fischlin et al., 2007) discusses carefully (with a minimum of words) more recent understanding of the relationship between LUC, global change, and CC and their impacts on ecosystems and notably biodiversity. Cited References: ----- Fischlin, A., Midgley, G. F., Price, J. T., Leemans, R., Gopal, B., Turley, C., Rounsevell, M. D. A., Dube, O. P., Tarazona, J., & Velichko, A. A., 2007. Ecosystems, their properties, goods and services. In: Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (eds.). Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC). Cambridge University Press: Cambridge, UK. 211-272. (http://www.ipcc.ch) Fi103 (Fischlin, Andreas, ETH Zurich)	This text has been deleted from the chapter
502	4	16	14	0	0	Can you give some context/definition about the "sixth major biodiversity extinction" ? (FRANCE)	This text has been deleted from the chapter
503	4	16	14	16	14	Here, the phrase "biodiversity extinction" is somewhat ambiguous. Is a mass extinction event, which would lead to reduced biodiversity, intended? (IPCC WGII TSU)	This text has been deleted from the chapter
504	4	16	17	16	17	provide evidence and uncertainty for the statement "will exacerbate"; change to "land use and LAND cover change" (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted from the chapter
505	4	16	17	16	19	Source missing (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This text has been deleted from the chapter
506	4	16	21	0	0	"The frequency and magnitude of extreme events is projected to increase" : vague, and partial contradiction with Chapter 3 (FRANCE)	This text has been deleted from the chapter
507	4	16	21	16	21	The general statement that frequency and magnitude of extreme events is projected to increase could be differentiated according to findings of this SREX report. (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This text has been deleted from the chapter
508	4	16	21	16	21	Remove the inaccurate IPCC WGI citation, and replace with (see Chapter 3). You also need to clarify, and say: "The frequency and magnitude of SOME extreme events are projected to increase". (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted from the chapter
509	4	16	21	16	21	This statement about the frequency and magnitude of extreme events should be derived from and cite the assessment findings of chapter 3, not the AR4. (IPCC WGII TSU)	This text has been deleted from the chapter
510	4	16	21	16	21	The citation for IPCC WGI, (200) is incomplete, and seems not to be provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted from the chapter
511	4	16	21	16	22	This sentence is much too exaggerated. It is not consistent with chapter 3. Not all extremes are projected to increase, and some extremes presenting some increases in the future do not so in all regions. Moreover, some extremes are projected to decrease in some regions (see chapter 3 for these two statements). It is also awkward to use here an IPCC AR4 assessment instead of the chapter 3 assessment. Here is a suggestion for reformulating this sentence (consistent with chapter 3): "In regions where the frequency and magnitude of some extreme events is projected to increase (Chapter 3), there is a risk that impacted ecosystems...". On this overall topic, please also check FAQ 3.1. (Seneviratne, Sonia, ETH Zurich)	This text has been deleted from the chapter
512	4	16	21	16	23	The Cardoso et al. (2008) reference is ambiguous, given several listed in the reference section. For any of the listed citations, the second half of the sentence here seems an overgeneralization--for which ecosystems and for which extreme events is this statement valid? What is meant by "recover fully" and by "far-reaching? (IPCC WGII TSU)	This text has been deleted from the chapter

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
513	4	16	22	16	23	Cardoso et al., 2008 is not a good reference for this. Again I suggest to make better use of MEA and IPCC, i.e. Duraipapp et al., 2005, Reid et al., 2005, Fischlin et al., 2007, plus Warren et al., 2010 etc. Besides there are 3 Cardoso et al., 2008 in the list of references. Cited References: ----- Duraipapp, A., Naeem, S., Agardi, T., Ash, N., Cooper, D., Díaz, S., Faith, D. P., Mace, G., McNeilly, J. A., Mooney, H. A., Oteng-Yeboah, A. A., Pereira, H. M., Polasky, S., Prip, C., Reid, W. V., Samper, C., Schei, P. J., Scholes, R., Schutysen, F., & van Jaarsveld, A. (eds.), 2005. Ecosystems and human well-being: biodiversity synthesis. Island Press: Washington, DC. 100pp. Du043 Fischlin, A., Midgley, G. F., Price, J. T., Leemans, R., Gopal, B., Turley, C., Rounsevell, M. D. A., Dube, O. P., Tarazona, J., & Velichko, A. A., 2007. Ecosystems, their properties, goods and services. In: Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (eds.). Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC). Cambridge University Press: Cambridge, UK. 211-272. (http://www.ipcc.ch) Fi103 Reid, W. V., Mooney, H. A., Cropper, A., Capistrano, D., Carpenter, S. R., Chopra, K., Dasgupta, P., Dietz, T., Duraipapp, A. K., Hassan, R., Kasperson, R., Leemans, R., May, R. M., McMichael, A. J., Pingali, P., Samper, C., Scholes, R., Watson, R. T., Zakri, A. H., Shidong, Z., Ash, N. J., Bennett, E., Kumar, P., Lee, M. J., Raudsepp-Hearne, C., Simons, H., Thonell, J., & Zurek, M. B. (eds.), 2005. Ecosystems and human well-being: synthesis. Island Press: Washington, DC. 155pp. Re105 Warren, R., Price, J., Fischlin, A., Midgley, G., & Santiago de la Nava, S., 2010. Increasing impacts of climate change upon ecosystems with increasing global mean temperature rise. Clim. Chang., 98(publ. online 21.Aug.): 1-37. http://dx.doi.org/10.1007/s10584-010-9923-5 Wa152 (Fischlin, Andreas, ETH Zurich)	This text has been deleted from the chapter
514	4	16	22	16	23	It is unclear what source Cardoso, et al. (2008) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This text has been deleted from the chapter
515	4	16	23	16	24	Better to be worded as '.....given that such situations CAN be unprecedented'. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted from the chapter
516	4	16	24	16	26	Note that chapter 3 also includes a section on "Surprises" which addresses tipping points within the Earth system, including low-probability high-impact events that may result from climate change (Section 3.1.7). Amazon die-back is mentioned in that section. (Seneviratne, Sonia, ETH Zurich)	This text has been deleted from the chapter
517	4	16	24	16	26	Some examples here are more nearly physical impacts, as opposed to extreme climate and weather events, and the distinction should be clarified. Additionally, the time frame meant by "sudden and transient temperature changes" is not completely clear. (IPCC WGII TSU)	This text has been deleted from the chapter
518	4	16	26	16	26	In most glaciers melting is a constant process. I suggest to remove "melting" from this statement. (Kaser, Georg, University of Innsbruck)	This text has been deleted from the chapter
519	4	16	28	16	28	Not clear how 'midsummer frost' will be 'inducted' by climate change. Cold days are projected to decrease. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted from the chapter
520	4	16	28	16	29	I object to this statement. First, Parmesan reports on local extinctions, not extinctions per se. A difference the reader might overlook. Secondly even for the amphibians in Costa Rica, claiming that the extinction has been directly observed is too daring. Yes, Pounds et al., 1999 have reported amphibian extinctions, but there was also a debate on this, IPCC can not afford not to discuss this and presenting these things as if they would be clear-cut facts is not admissible here. Again I suggest to make good use of more recent works and discuss the caveats on these issues properly, most of all, all the literature on CC and biodiversity up to 2007 was reviewed and assessed in AR4 (Duraipapp et al., 2005 and notably Fischlin et al., 2007 (sections 4.4.11) and Warren et al., 2010). Cited References: ----- Duraipapp, A., Naeem, S., Agardi, T., Ash, N., Cooper, D., Díaz, S., Faith, D. P., Mace, G., McNeilly, J. A., Mooney, H. A., Oteng-Yeboah, A. A., Pereira, H. M., Polasky, S., Prip, C., Reid, W. V., Samper, C., Schei, P. J., Scholes, R., Schutysen, F., & van Jaarsveld, A. (eds.), 2005. Ecosystems and human well-being: biodiversity synthesis. Island Press: Washington, DC. 100pp. Du043 Fischlin, A., Midgley, G. F., Price, J. T., Leemans, R., Gopal, B., Turley, C., Rounsevell, M. D. A., Dube, O. P., Tarazona, J., & Velichko, A. A., 2007. Ecosystems, their properties, goods and services. In: Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (eds.). Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC). Cambridge University Press: Cambridge, UK. 211-272. (http://www.ipcc.ch) Fi103 Warren, R., Price, J., Fischlin, A., Midgley, G., & Santiago de la Nava, S., 2010. Increasing impacts of climate change upon ecosystems with increasing global mean temperature rise. Clim. Chang., 98(publ. online 21.Aug.): 1-37. http://dx.doi.org/10.1007/s10584-010-9923-5 Wa152 (Fischlin, Andreas, ETH Zurich)	This text has been deleted from the chapter
521	4	16	31	16	32	Be more precise - which disturbances, which region, which time frame? (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted from the chapter
522	4	16	31	16	33	Use of "will" in both of these sentences is problematic. Presumably, these statements should be qualified to indicate relevant assumptions (for example, what extreme weather events will cause such effect, over what time scales?). Additionally, what is meant by "low level of ability for sustainability"? (IPCC WGII TSU)	This text has been deleted from the chapter

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
523	4	16	31	16	35	To cite the heavily debated Thomas et al, 2004 only is very daring (e.g. Pearce, 2010). Moreover, Fischlin et al, 2007 have based their assessment on 19 studies, not only one and came up with more modest figures, 20-30% at an increasingly high risk of extinction if warming exceeds 2 to 3°C above preindustrial (IPCC, 2007e, p.11). Quantitative extinction risks need also to be clearly qualified, what scenario, what methodology was used to make the estimate etc. I repeat myself, please make good use of more recent works (Duraiappah et al., 2005 and notably Fischlin et al., 2007 (sections 4.4.11) and Warren et al., 2010). Cited References: ----- Duraiappah, A., Naeem, S., Agardi, T., Ash, N., Cooper, D., Díaz, S., Faith, D. P., Mace, G., McNeilly, J. A., Mooney, H. A., Oteng-Yeboah, A. A., Pereira, H. M., Polasky, S., Prip, C., Reid, W. V., Samper, C., Schei, P. J., Scholes, R., Schutyser, F., & van Jaarsveld, A. (eds.), 2005. Ecosystems and human well-being: biodiversity synthesis. Island Press: Washington, DC. 100pp. Du043 Fischlin, A., Midgley, G. F., Price, J. T., Leemans, R., Gopal, B., Turley, C., Rounsevell, M. D. A., Dube, O. P., Tarazona, J., & Velichko, A. A., 2007. Ecosystems, their properties, goods and services. In: Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (eds.). Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC). Cambridge University Press: Cambridge, UK. 211-272. (http://www.ipcc.ch) Fi103 IPCC, 2007e. Summary for policymakers. In: Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (eds.). Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC). Cambridge University Press: Cambridge, UK. 7-22. (http://www.ipcc.ch) Ip016 Pearce, F., 2010. Can we trust the IPCC on the big stuff? New Scientist, 2010(2749): 8-10. http://www.newscientist.com/article/mg20527493.700-can-we-trust-the-ipcc-on-the-big-stuff.html?full=true&print=true Pe190 Warren, R., Price, J., Fischlin, A., Midgley, G., & Santiago de la Nava, S., 2010. Increasing impacts of climate change upon ecosystems with increasing global mean temperature rise. Clim. Chang., 98(publ. online 21.Aug.): 1-37. http://dx.doi.org/10.1007/s10584-010-9923-5 Wa152 (Fischlin, Andreas, ETH Zurich)	This text has been deleted from the chapter
524	4	16	31	16	52	Surely these paragraphs can be updated with information from post-AR4 studies. Uncertainty assessment must be added. (Stocker, Thomas, IPCC WGI TSU)	This text has been substantially revised to address these points
525	4	16	33	16	35	The Thomas et al, 2005 paper is not very appropriate here. It only includes extremes to a limited extent. (NETHERLANDS)	This text has been deleted from the chapter
526	4	16	35	16	35	There is a substantial body of literature to support this idea, much of which has appeared more recently than Thomas et al 2004; the authors should include additional references. (UNITED STATES OF AMERICA)	This text has been deleted from the chapter
527	4	16	35	16	35	The citation for Thomas (2004) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted from the chapter
528	4	16	37	16	43	The majority of the references in this section are very dated. Given that this links to the SPM, it is an important section - would be better to see more up to date references. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	The material in this section has been greatly reduced in length to provide a brief introduction.
529	4	16	40	16	41	Typo citation: For Korner et al. (2005b), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	The citation has been revised accordingly
530	4	16	41	16	43	There may be other relevant citations for amphibian studies on the Monteverde preserve, e.g., Pounds et al. (2006) Nature 439: 161-167. (IPCC WGII TSU)	This example has been deleted
531	4	16	48	16	49	The verb "descended" here is highly ambiguous--does it mean declined in elevation, declined in population, or newly invaded? (IPCC WGII TSU)	This example has been deleted
532	4	16	49	16	49	Please cite specific IPCC Chapter. (Stocker, Thomas, IPCC WGI TSU)	This example has been deleted
533	4	16	49	16	50	Increased storm' is too vague. To be consistent with the projections given in Chapter 3, you should say: 'increased intensities of tropical cyclones in some ocean basins.....'. Not sure what you mean to include under 'other extreme events'? (Stocker, Thomas, IPCC WGI TSU)	This example has been deleted
534	4	16	51	16	51	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	Usage of the term is now avoided. The text has also been moved within the chapter
535	4	16	52	16	52	Please cite specific IPCC Chapter. (Stocker, Thomas, IPCC WGI TSU)	The reference has been updated. The text has also been moved within the chapter

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
536	4	16	52	16	52	I am surprised to find a reference to Fischlin et al., 2007. However, this is not properly done by citing IPCC, AR5, GWII, 4.2.1. Recommended citation is Fischlin et al., 2007, 4.2.1. Cited References: ----- Fischlin, A., Midgley, G. F., Price, J. T., Leemans, R., Gopal, B., Turley, C., Rounsevell, M. D. A., Dube, O. P., Tarazona, J., & Velichko, A. A., 2007. Ecosystems, their properties, goods and services. In: Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (eds.). Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC). Cambridge University Press: Cambridge, UK. 211-272. (http://www.ipcc.ch) Fi103 (Fischlin, Andreas, ETH Zurich)	The reference has been updated. The text has also been moved within the chapter
537	4	17	1	17	5	There needs to be more context for the factual information provided here so that the point being made can be understood. (IPCC WGII TSU)	This text has been deleted from the chapter
538	4	17	1	17	11	More of this would be required, however, more comprehensively and please by clearly focusing on extreme events and extreme impacts (as the chapter claims to do), not a general impact assessment. (Fischlin, Andreas, ETH Zurich)	This point has been considered. Most of the text has been deleted, and some has been moved to a subsequent section of the chapter
539	4	17	5	17	5	The citation for Yin et al. (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted from the chapter
540	4	17	7	0	0	Meaning of the sentence is unclear. What does "increase of nitrogen" mean (availability, emissions...)? The cited reference (Wang) does not support this general conclusion, as Wang et al show (page 23) that heat-waves may cause lower N-mineralization rates, which in turn means lower N availability and emissions. Still, I would not support this general conclusion either. The relevant feedbacks between the nitrogen cycle and the climate system are complex and I thus suggest to cite at least a general review such as Gruber&Galloway, nature, 2008(451)293-296 (although not addressing extreme events it gives a nice overview of the possible feedbacks). There are two references Wang et al, 2008; please specify (2008a and 2008b). (GERMANY)	This text has been deleted from the chapter
541	4	17	7	17	7	"An increase in heat leads to an increase of nitrogen in summer, influencing the effect of heat waves."But it does not specify which part of the nitrogen increases emission, that is, nitrogen oxide, or nitrogen leaching, plant nitrogen content, and so on. Therefore, it needs clarification and literature support. In fact, in recent years, the increase in global terrestrial NPP is represented with a net carbon sink in the terrestrial ecosystem, in which nitrogen deposition should be a contributing factor. (CHINA)	This text has been deleted from the chapter
542	4	17	7	17	7	Please add short explanation for this "increase in nitrogen" and specify where (and in what form) nitrogen is increasing (atmosphere, land biota, ?) (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted from the chapter
543	4	17	7	17	7	What form of nitrogen is intended here? Additionally, is this statement supported (presumably) by both of the citations that follow in the paragraph? (IPCC WGII TSU)	This text has been deleted from the chapter
544	4	17	9	17	9	It is unclear what source Wang et al. (2008) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This text has been deleted from the chapter
545	4	17	10	17	10	The genus name provided here needs to be capitalized. (IPCC WGII TSU)	This text has been deleted from the chapter
546	4	17	11	17	11	The citation for Aeryt (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted from the chapter
547	4	17	13	17	14	Again, this is not true everywhere. Most regions are projected to experience more frequent and more intense heat events, but only a few regions are consistently projected to experience more drought events (chapter 3). (Seneviratne, Sonia, ETH Zurich)	The text has been revised accordingly. The text has also been moved within the chapter
548	4	17	13	17	15	Provide references (Stocker, Thomas, IPCC WGI TSU)	The text has been revised accordingly. The text has also been moved within the chapter
549	4	17	13	17	15	It is not clear what "warming temperatures" means in this context--what is the time scale (e.g., trends over many years or a shorter episode of warming)? This ambiguity makes it difficult to interpret the statement in the third sentence about "two years" being required for recovery to pre-warming "levels." Also, the literature supporting these statements is not clear. (IPCC WGII TSU)	The text has been revised accordingly. The text has also been moved within the chapter

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
550	4	17	13	17	22	Too general and Fischlin et al., 2007 assess the heat wave 2003 impact on ecosystems much more comprehensively (Fischlin et al., 2007, box 4.1; Easterling, et al., 2007, box 5.1) all nicely collated in Parry et al., 2007. Cited References: ----- Easterling, W. E., Aggarwal, P. K., Batima, P., Brander, K. M., Erda, L., Howden, S. M., Kirilenko, A., Morton, J., Soussana, J.-F., Schmidhuber, J., & Tubiello, F. N., 2007. Food, fibre and forest products. In: Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (eds.). Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC). Cambridge University Press: Cambridge, UK. 273-313. (http://www.ipcc.ch) Ea011 Fischlin, A., Midgley, G. F., Price, J. T., Leemans, R., Gopal, B., Turley, C., Rounsevell, M. D. A., Dube, O. P., Tarazona, J., & Velichko, A. A., 2007. Ecosystems, their properties, goods and services. In: Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (eds.). Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC). Cambridge University Press: Cambridge, UK. 211-272. (http://www.ipcc.ch) Fi103 Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E., 2007. Cross-chapter case studies. In: Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (eds.). Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC). Cambridge University Press: Cambridge, UK. 843-868. (http://www.ipcc.ch) Pa134 (Fischlin, Andreas, ETH Zurich)	Most of this text has been deleted. The remaining text has also been moved within the chapter
551	4	17	14	17	15	This sentence does not mention the possible increased water-use efficiency of plants under enhanced CO2 (e.g. Leuzinger et al. 2005, Gedney et al. 2006). The importance of this effect is debated, but should be discussed (see also Section 3.5.1). [Leuzinger et al., 2005: Responses of deciduous forest trees to severe drought in Central Europe, Tree physiology, 25, 641-650; Gedney, N., et al. 2006: Nature. 439. 835-838] (Seneviratne, Sonia, ETH Zurich)	This sentence has been deleted
552	4	17	16	17	18	Again, this is assuming that drought will be more frequent in future in the Amazon region, although models show too limited agreement on this point (Section 3.5.1). The sentence should be revised or removed. (Seneviratne, Sonia, ETH Zurich)	This text has been deleted.
553	4	17	19	17	21	This sentence about extreme cold seems out of place in this paragraph about warming. (IPCC WGII TSU)	This text has been deleted.
554	4	17	21	17	22	This sentence could add a reference to Section 3.1.4, which highlights positive feedbacks between (and thus enhanced chance for co-occurrence of) drought and heatwaves in that region. (Seneviratne, Sonia, ETH Zurich)	This text has been deleted.
555	4	17	21	17	22	Something more about implications of heat waves for vegetation is necessary. From this sentence it is even difficult to find if this implications are positive or negative. (Wibig, Joanna, University of Lodz)	This text has been deleted.
556	4	17	22	0	0	I suggest to add a new sentences "Extremely hot temperature (more than 34 degrees Celsius) and associated increase of thickness of epilimnion during the summer season in Lake Biwa, a temperate lake located in Japan, is projected by coupling MRI-GCM and Biwa-3D integrated assessment model, which may induce catastrophic impact on lake water quality during that period (Yamashiki et al. 2010)." The English reference to be added is "Yamashiki, Y., M. Kato, K. Takara, E. Nakakita, M. Kumagai, and J. Chunmeng, 2010: Sensitivity analysis on Lake Biwa under the A1B SRES climate change scenario using Biwa-3D Integrated Assessment Model: part I – projection of lake temperature. Hydrological Research Letters, 4, 45-49." (Nakakita, Eiichi, Kyoto University)	This text has been deleted.
557	4	17	24	17	32	Cited references are inappropriate to back this up. Moreover, too specific almost anecdotal evidence. Comprehensive assessment required. See ..., I risk to repeat myself ;-) (box 4.3, 4.5 is on animals, which may help, but you need to do it while focusing on extremes only). (Fischlin, Andreas, ETH Zurich)	Most of this text has been deleted. The remaining text has also been moved within the chapter
558	4	17	27	17	27	Typo in citation: For Thibault et al. (2008), only two authors are listed in the chapter's reference list. Please ensure the citation is correct and harmonize the reference in both locations (chapter text and reference list). (IPCC WGII TSU)	The reference has been revised accordingly
559	4	17	30	17	30	"Bull, 1980, cited in Easterling et al., 2000" -- please use original references for your assessment! (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted.
560	4	17	35	0	0	Why do you consider the D&A of climate change impacts before you have even assessed any observed trends? this section seems completely out of place, and surely should follow at the end of Section 4.3. In any case D&A has already been introduced as a concept in Chapter 3, so you do not need to provide a mini-summary of the 2010 IPCC D&A guidance document here. (Stocker, Thomas, IPCC WGI TSU)	Agreed. This section has been moved to section 4.5, and the summary of the guidance document has been removed.
561	4	17	35	0	0	Section 4.2.4: The discussion of costs and (economic) losses would be better placed in Section 4.6.3 on "Estimates of Global and Regional Costs" starting on page 77ff (Stocker, Thomas, IPCC WGI TSU)	This section has been moved to section 4.5 (previously 4.6).
562	4	17	35	0	0	The title is confusing : instead of : « Attribution of climate change impacts » write « Attribution of impacts to climate change ». (BOURRELIER, PAUL-HENRI, AFPCN)	Title has been changed to "Attribution of Impacts to Climate Change: Observations and Limitations"
563	4	17	35	0	0	Section 4.2.4 could be substantially improved. It overly relies on references from few authors or grey literature. Also sentence structure is at times misleading (esp. p19 line 4-8). (UNITED STATES OF AMERICA)	Efforts have been made to improve the referencing and clarity of writing.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
564	4	17	35	0	0	Section 4.2.4. Throughout this section, there is a subtle distinction that should be sustained more clearly: As presented in chapter 3, there are some hazards for which trends have been observed and detected and, in some cases, attributed to anthropogenic forcing. In this section, trends in losses or impacts are described, and these trends cannot be conclusively linked to such observed changes in hazards. Nonetheless, one would not expect the observed changes in hazards to have *no* effect on the loss/impacts trends, even if the effect cannot be detected. In some cases, the phrasing used in this section suggests that, where attribution cannot be made, changes are due only to changes in exposure and vulnerability. The complexity of the factors influencing trends in losses/impacts should be accounted for more fully in this section's conclusions. A place in chapter 4 where such complexity is noted is the paragraph on page 79 from lines 9 to 19. (IPCC WGII TSU)	Efforts have been made to improve the treatment of this distinction.
565	4	17	40	17	40	It is unclear what source IPCC (2007) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	Citation removed.
566	4	17	43	17	45	What do you mean by "this material will be reviewed in Chapter 3"? Delete this sentence. (Stocker, Thomas, IPCC WGI TSU)	Sentence deleted
567	4	17	43	17	45	First, this conclusion from the WGII AR4 SPM did not have an assigned level of confidence so "very high confidence" should not be added here. Second, the reference to chapter 3 needs to be much more specific, for example, indicating the sections and/or tables providing relevant information on regional climate changes. The phrase "this material" should be clarified since chapter 3 does not consider all of the natural system consequences assessed by WGII in the AR4, which could be implied by the current phrasing. (IPCC WGII TSU)	Citation to Rosenzweig et al. (2007) added (WGII AR4 Chapter 1), where this confidence assignment was made. Sentence referencing chapter 3 deleted.
568	4	17	43	17	47	Give chapter reference in IPCC AR4 (UNITED STATES OF AMERICA)	Citation to Rosenzweig et al. (2007) added (WGII AR4 Chapter 1).
569	4	17	45	0	0	Delete "particularly temperature increase". As climate is a complex system with combinations of many processes, it is hard to attribute to a single factor. (NETHERLANDS)	The phrase, "particularly regional temperature increases" is part of the AR4 finding cited here, and thus it is retained here (with "regional") added for complete consistency.
570	4	17	45	17	45	Please cite specific IPCC Chapter. (Stocker, Thomas, IPCC WGI TSU)	Citation to Rosenzweig et al. (2007) added (WGII AR4 Chapter 1).
571	4	17	45	17	45	It is unclear what source IPCC (2007) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	Citation to Rosenzweig et al. (2007) added (WGII AR4 Chapter 1).
572	4	17	47	18	11	Check consistency with corresponding discussion in chapter 3 (Section 3.2.2.3). (Seneviratne, Sonia, ETH Zurich)	Summary of the guidance document has been removed.
573	4	17	50	18	11	It is not necessary for any of the 4 D&A methods to be detailed here. Simple refer to IPCC 2010 document and note that it's not IPCC that "sets out four methods", but Hegerl et al., i.e., provide correct reference. Even less logical why you now detail the first two methods only. (Stocker, Thomas, IPCC WGI TSU)	Summary of the guidance document has been removed.
574	4	18	6	18	6	correct reference to Daufresne et al. 2004 (Stocker, Thomas, IPCC WGI TSU)	Summary of the guidance document and this reference have been removed.
575	4	18	6	18	6	The citation for Rosenzweig et al. (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Summary of the guidance document and this reference have been removed.
576	4	18	6	18	6	Typo citation: For Dauufresne et al. (2004), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	Summary of the guidance document and this reference have been removed.
577	4	18	7	18	7	It is unclear what source Menzel et al. (2006) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	Summary of the guidance document and this reference have been removed.
578	4	18	8	18	8	It is unclear what source Menzel et al. (2006) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	Summary of the guidance document and this reference have been removed.
579	4	18	13	0	0	Suppress anthropogenic (see OG 4). (BOURRELIER, PAUL-HENRI, AFPCN)	Forcing can come from other sources than anthropogenic ones, and therefore this word is needed.
580	4	18	13	18	14	Add a reference to FAQ3.2 at the end of this sentence. (Seneviratne, Sonia, ETH Zurich)	Reference has been added.
581	4	18	13	18	14	This statement implies that natural and climate-change related extremes can be separated--and this is just not the case. Human-induced changes to the climate affect everything to some extent--and that extent will increase over time. Indeed, ENSO will we think go on, but that does not mean that it is a completely natural event as it will be different than it would have been, to the specific event will be different--surely not completely natural. Thunderstorms will occur at convective frontal boundaries, but they will be affected, everything will be affected. (MacCracken, Michael, Climate Institute)	Agreed. One approach to address this issue is to analyze changes in the likelihood of events of specific magnitudes occurring over time, rather than attempting to attribute the occurrence of one specific event "to climate change."

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
582	4	18	13	18	18	The first sentence of this paragraph indicates that such complications are specific to the case of extreme weather and climate events. Similar complications, however, arise for other instances of attribution to anthropogenic forcing. The second sentence in the paragraph is problematic because it provides an example of detection instead of attribution; detection and attribution are of course linked but should not be conflated. (IPCC WGII TSU)	The first sentence has been modified to show that it is not specific to extremes. The second sentence has been deleted.
583	4	18	16	0	0	"human-induced changes in mean temperature have been shown to increase the likelihood of extreme heat waves" There should be some mention of uncertainty in this claim, which Stott et al. has but does not appear here. (Pielke, Roger, University of Colorado)	The text has been revised to address this point.
584	4	18	17	18	18	There are surely more references than just Stott et al. (MacCracken, Michael, Climate Institute)	The text has been revised to address this point.
585	4	18	20	19	17	This section should suffice for virtually the entire chapter. "There is no conclusive evidence that anthropogenic climate change has led to increasing losses, and increasing exposure of people and economic assets is virtually certain to be the major cause of the long-term changes in economic disaster losses." Not sure what the rest of the chapter is even for, other than to present scary scenarios of what may happen. Basically, all observed changes in vulnerability etc. cannot be linked to climate change. (UNITED STATES OF AMERICA)	We have reexamined the material in this section. There is no evidence that loss trends are related to climate change, but there are important qualifiers to this statement, as discussed in this section.
586	4	18	21	0	0	"The principal challenge is the attribution to climate change of both the occurrence of and losses from extreme events." An odd sentence, and again very sloppy in its use of the phrase "climate change." (Pielke, Roger, University of Colorado)	Sentence has been rewritten and climate change qualified.
587	4	18	21	0	0	Are grey reports the only possible references to such strong statements? E.g. other references? (NETHERLANDS)	We have added non-grey references and a recent comprehensive grey report. Detailed global analyses appear to be mostly in the grey, as in UNEP and re-insurance, literature. We have followed IPCC procedures for grey-literature.
588	4	18	21	18	21	The citation for Munich Re (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Changed to Munich Re 2011.
589	4	18	21	18	21	It is unclear what source UN-ISDR (2009) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	Changed to UN-ISDR 2009b
590	4	18	22	18	23	Indeed, and this controlling for changes in exposure and variability needs to be done on the hurricane findings as well, as improved building standards and other efforts to limit vulnerability have likely limited the increase in damages, and so are a cost to build resilience in lieu of damages. (MacCracken, Michael, Climate Institute)	Agreed. Specific reference to this is made later in this section on attribution.
591	4	18	24	18	25	Consider rephrasing "future scenarios will affect future economies and people" since the future scenarios don't affect future economies and people. Rather, they are scenarios of future changes in economies and people. The author team perhaps instead intended something like the phrase "projections of future changes in extreme events"? (IPCC WGII TSU)	Sentence moved to section 4.5.4.2 and reworded as suggested.
592	4	18	26	18	26	Including a new paragraph for highlighting the need of assessing climate change impacts: "Impact assessments represent the foundation of the planning process, and the tools currently available can help to identify potential vulnerabilities. However the uncertainties and limitations inherent in the several methods need to be acknowledged and deliberately taken into account in the application of assessment results, through baseline scenario planning, adaptive and implementation effort (Lawler et al., 2010; Pearson et al., 2006; Marmion et al., 2009; Buisson et al., 2010; Rowland et al., 2011)." (SPAIN)	For this point, we feel that the revised sections on the uncertainties and limitations of current approaches and studies cover the issues.
593	4	18	27	0	0	Figure 4-4: As per IPCC Policies and Procedures, all information contained in the chapters of an IPCC Report must undergo formal expert review. Therefore, substantial new material can not be introduced in preparation of the final draft of the report. Introducing a new figures that will not be reviewed is not an option. (Stocker, Thomas, IPCC WGI TSU)	Figure 4-4 has been deleted.
594	4	18	27	0	0	fig. 4-4, comment: Why is this figure shown, when there is that much uncertainty (as mentioned in line 31-54) or even without real evidence (stated page 19 line 4)? (NETHERLANDS)	Figure 4-4 has been deleted.
595	4	18	31	18	33	In this sentence, it seems that "to underlying societal trends" would be clearer than "by underlying societal trends." (IPCC WGII TSU)	Change made as suggested.
596	4	18	31	18	40	As the issue is highly complex and controversial, this paragraph should be rewritten in a more clear way. Currently there is a sentence that says that "a few studies claim that a climate change signal is found", then a conclusion that says that the weight of evidence is just the opposite. We suggest a clearer explanation of why some papers are apparently dismissed. We certainly agree that the majority of papers see no trend in normalized losses, but is this a universal conclusion? This should be clarified, especially as this is needed for the SPM, which currently says that there is "high agreement" that increasing loss cannot yet be attributed to climate change. Please check that if such an important statement is done, there are indeed no valid expert views against it. This is also very important as it is partly a departure from the AR4 (section 1.3.8.4 and 1.3.8.5, that were criticized). (BELGIUM)	We have re-written the sentences mentioned by this comment and qualified the statement about the studies mentioned. They are generally papers in the nature of reviews and commentary rather than empirical studies.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
597	4	18	31	18	40	More comments on uncertainties and possible reasons for potentially missing an effect of climate change could be useful - e.g. some authors suggest that studies that "normalize" the trends still lack accounting for risk reduction efforts that are taking place over time (see e.g. the conclusion of Bouwer, BAMS, 2011) (in absence of climate change, the normalized trend could thus be negative, so that no observed trend could indicate that climate change is having an effect). (BELGIUM)	These issues are discussed in the final paragraphs of the section.
598	4	18	31	19	17	I do not understand what this text has to do with detection and attribution. I suggest to delete it all. (Fischlin, Andreas, ETH Zurich)	It is about the attribution to climate change of trends in losses, and event losses. This is a key issue for governments.
599	4	18	33	0	0	"A few studies claim that an anthropogenic climate change signal can be found in the records of disaster losses (Mills, 2005; Höppe and Grimm, 2009; Malmstadt et al., 2009; Schmidt et al., 2009). This statement is extremely misleading, and is evocative of the same sort of misleading sloppiness in the AR4 using citations that do not support the claims being made. First, Mills, 2005 was a commentary and included no original data or analysis – it is not a "study" as claimed here. It mistakenly cited IPCC TAR as providing evidence of attribution (see The Climate Fix for discussion - http://cstpr.colorado.edu/prometheus/?p=3566) This reference thus does not support the claim made. Here, rather than the secondary citation of Mills, you should cite original sources to avoid such errors. If you go to the primary sources you will find that they do not support the claims that you are making. Höppe and Grimm, 2009 has no analysis or data but speculates that the rising costs of hurricane losses might be attributed in part to human-caused climate change. It also is not a "study." Yet Hoepppe is co-author of Schmidt et al. 2009, which is a detailed quantitative analysis which concludes, "There is no evidence yet of any trend in tropical cyclone losses that can be attributed directly to anthropogenic climate change." Here as well when you go to the primary literature it says something very different than is being implied. Thus, Mills, 2005 should be removed. If you include Hoepppe and Grimm, you should note that it does not contain any original analysis. You should remove Schmidt et al. as it does not support the claim being made, in fact, it directly contradicts that claim. The citing of Malmstadt et al. is odd because it contains no discussion whatsoever about attribution to greenhouse gases, and is a limited regional study in any case. This should also be removed. There is no support in the peer reviewed literature to support the claim being made here, it should thus be deleted. (Pielke, Roger, University of Colorado)	We have made text changes to reflect the research status of these publications, and have deleted them where they are not appropriate.
600	4	18	33	18	33	Typo citation: For Pielke et al. (2005), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	Reference has been corrected.
601	4	18	34	18	35	The citation for Höppe and Grimm (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This reference has been added to the reference list.
602	4	18	36	18	36	The sentence on this line is ambiguous and should be clarified. (IPCC WGII TSU)	Sentence deleted.
603	4	18	37	0	0	"The weight of evidence is that no long-term trends can be found in normalized losses that can be attributed to climate change." This sentence continues the major problem in this chapter of using the phrase "climate change" very loosely. What is meant here (or should be meant) is "The weight of evidence is that no long-term trends can be found in normalized losses that can be attributed to changes in climate that result from the emission of greenhouse gases." (Pielke, Roger, University of Colorado)	Agreed that we cannot attribute to climate change caused by greenhouse gases. But longitudinal loss studies look for climate change signals and to our knowledge do not discriminate between natural and human caused climate change. Where studies do discriminate we highlight this
604	4	18	40	18	40	The citation for Neumayer and Barthel (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Reference has been corrected.
605	4	18	42	18	42	The phrase "climate change induced" should be avoided here. A trend in storms is a manifestation of climate change, not something induced by climate change. The trend may be induced by anthropogenic emissions of greenhouse gases or some other agent of climate change. (Global Climate Observing System Steering Committee)	Sentence has been revised to remove this phrase.
606	4	18	43	18	43	Typo citation: For Pielke et al. (2003), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	Reference has been corrected.
607	4	18	43	18	43	Typo citation: For Pielke et al. (2008), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	Reference has been corrected.
608	4	18	44	18	44	It is unclear what source Zhang et al. (2009) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	Reference has been corrected.
609	4	18	44	18	44	The citation for Barredo (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Reference has been corrected.
610	4	18	45	18	45	Is 'likely' meant here as calibrated uncertainty language? If so, please italicize. Otherwise replace. (Stocker, Thomas, IPCC WGI TSU)	Sentence has been reworded to remove the term.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
611	4	18	45	18	45	The term "likely" here appears to be used casually, not per the AR5 Guidance Note on Treatment of Uncertainties. Since it is reserved language, its usage should thus be avoided. (IPCC WGII TSU)	Sentence has been reworded to remove the term.
612	4	18	46	0	0	"An exception is the study by Nordhaus (2010), who finds a significant increase in tropical cyclone losses in the US since 1900" You should point out that there are no trends in either hurricane landfall frequency or intensity in the US since 1900. Clearly, Nordhaus has a bias in its results as there is no physical basis for expecting an increase in normalized losses. Bouwers has a reply to Nordhaus in press in Climate Change Economics. See also the graphs provided below. (Pielke, Roger, University of Colorado)	This text has been deleted.
613	4	18	46	18	46	Typo citation: For Pielke et al. (2008), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	This text has been deleted.
614	4	18	46	18	46	The citation for Nordhaus (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted.
615	4	18	48	18	48	Typo citation: For Pielke et al. (2008), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	This text has been deleted.
616	4	18	50	18	50	It's odd to start a new paragraph with "It also holds for..." -- what is "it" referring to? Please clarify. (Stocker, Thomas, IPCC WGI TSU)	"It" refers to the absence of a climate signal. This has been made clear.
617	4	18	50	18	50	The citation for Hilker et al. (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation has been added.
618	4	18	51	18	52	Typo citation: For Fenqing et al. (2005), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	Reference has been corrected.
619	4	19	1	19	1	The citation for Hilker et al. (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation has been added.
620	4	19	4	0	0	Same remark (BOURRELIER, PAUL-HENRI, AFPCN)	The referenced phrase has been deleted.
621	4	19	4	19	6	This is too strongly worded, based too much on the reported findings from hurricane damage studies. Clearly, those in the Arctic are feeling impacts, so are those facing reduced water resources from loss of mountain glaciers and seasonal snowpack, from spread of some disease vectors, from the shifting locations of fisheries, from biodiversity loss, and more. The statement here just seems to me far too narrow. (MacCracken, Michael, Climate Institute)	Further discussion of relevant uncertainties has been added. Discussion of general impacts of climate change is outside the scope of this report.
622	4	19	7	19	8	Please use correct wording from Chapter 3: '...focus on windstorms, where there is low confidence in observed trends, and any attribution of changes to human influence'. (Stocker, Thomas, IPCC WGI TSU)	Change made as suggested.
623	4	19	11	19	11	What is longitudinal loss data? And what's a longitudinal impact analysis (see line 17)? Please explain. (Stocker, Thomas, IPCC WGI TSU)	This is a standard term in the literature.
624	4	19	13	0	0	Do studies really show similar results? Reading the earlier paragraphs another impression is given. (NETHERLANDS)	We have clarified this by indicating that the contradictory material is in the nature of reviews and commentary rather than empirical research.
625	4	19	20	0	0	The chapter 4.3 is named "Observed trends in exposure and vulnerability", however, often results of projections are addressed (e.g. see subheadings) (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This section has been deleted with relevant material merged into subsequent sections of the chapter
626	4	19	20	0	0	Section 4.3. The title of this section creates the expectation that observed trends will be the focus, but some subsections are entitled "observed and projected" and observed and projected trends are discussed even in sections labeled as only covering "observed" trends. The section has substantial issues with logical organization and flow, and it does not read as a comprehensive assessment. Instead, it reads as a haphazard assortment of topics covered. Additionally, sections 4.3 and 4.4 substantially overlap in their considerations of trends and aspects of vulnerability, exposure, and impacts. We strongly recommend that all of the material in section 4.3 be integrated into relevant subsections of 4.4. For the material in each subsection of 4.3, there seems to be an appropriate subsection of 4.4 where integration would be possible (e.g., 4.3.5 could be integrated with 4.4.3, 4.3.4.2 could be integrated with 4.4.2, many parts of 4.3.4.1 could be integrated with 4.4.6, etc.). For the revised and integrated subsections, it should be made clear why topics and examples have been chosen and how they fit into the broader available knowledge base. Are the topics covered the only ones for which evidence/literature is available? If so, this needs to be made much more clear, including description of topics for which evidence is not available. (IPCC WGII TSU)	This section has been deleted with relevant material merged into subsequent sections of the chapter
627	4	19	20	20	18	This discussion could include other also important trends that are generated and exacerbated climate change. Other trends includes food insecurity, biodiversity loss, growing inequality and poverty, monoculture crops and forests. Could also bring in the multiple stressors discussion here (O'Brien, Leichenko; Eakin and others). (Sygna, Linda, Department of Sociology and Human Geography)	This section has been deleted with some relevant material merged into subsequent sections of the chapter

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
628	4	19	20	32	20	Section 4.3 overall: No real assessment of the past changes with respect to natural variability vs anthropogenic climate change causes. Therefore, this material could be greatly shortened here, and with the extensive literature review submitted to a journal as a review paper on the topic. (UNITED STATES OF AMERICA)	This section has been deleted with some relevant material merged into subsequent sections of the chapter
629	4	19	22	0	0	This is not a proper section title, please reformulate. And then it seems that this section is more about water resources management than anything else. (Stocker, Thomas, IPCC WGI TSU)	This section has been deleted with some relevant material merged into subsequent sections of the chapter
630	4	19	25	19	25	Change to "has increased by 17-fold" (MacCracken, Michael, Climate Institute)	The text has been revised accordingly. The text has also been moved within the chapter
631	4	19	25	19	26	i) Reference of Mechler & Kundzewics is missing, ii) The given increases are based on one single study. As presented, however, it suggests a kind of certainty. May be present it in more qualitative manner (NETHERLANDS)	The text has been revised accordingly. The text has also been moved within the chapter
632	4	19	25	19	26	The citation for Mechler and Kundzewicz (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation has been added.
633	4	19	29	0	0	Is there a more recent ref? (Sygna, Linda, Department of Sociology and Human Geography)	This question has been considered although another reference has not been added. The text has been moved within the chapter
634	4	19	31	23	10	I was looking forward to get to the core of this chapter. I have to admit I am disappointed. This text looks like a haphazardly put together collage of bits and pieces, making very little sense to me. E.g. p. 21, lines 38-40, start by merely discussing TC frequency. But what has this to do with exposure? Do the authors imply that CC itself means a trend in exposure? I was rather expecting that exposure trends have first of all something to do with human systems exposing themselves more or less to CC impacts. I find this notion most confusing. I suggest authors subdivide this section into clear parts: Trends in extremes (possibly simply cross-reference chapter 3), trends in exposure, trends in sensitivity, trends in adaptive capacity, and trends in vulnerability of the various systems they have to discuss. (Fischlin, Andreas, ETH Zurich)	Section 4.3 has been deleted with relevant material merged into subsequent sections of the chapter, with the aim of improving the logic of material presented
635	4	19	37	19	37	Reference needed for this 2% figure. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
636	4	19	37	19	48	This material is mostly about nonclimate issues and can be deleted. The single reference to a climate impact on line 38 is not that informative, because there is not assessment of its importance relative to the nonclimatic effects. (UNITED STATES OF AMERICA)	This text has been deleted
637	4	19	47	19	47	Change "In result" to "As a result" (MacCracken, Michael, Climate Institute)	This text has been deleted
638	4	19	50	19	51	Not a sentence (Global Climate Observing System Steering Committee)	This text has been deleted
639	4	19	53	0	0	Add reference for the given numbers (NETHERLANDS)	This text has been deleted
640	4	20	0	21	0	Section 4.3.2.1. Issues in Unveiling Trends: Unclear what the purpose of this section is. It needs to be made consistent with other sections, referring in more detail to disaster normalization for wealth and exposure. For instance, I have the impression that this section is not very consistent with sections 4.5.6 (p. 58) or 4.2.4. (p. 28) I agree it is important that the shortcomings of disaster databases such as those mentioned are highlighted. In addition, it should be mentioned that they have important value, and that international and national efforts should be directed to improve the quality and consistency of these disaster databases. (Huggel, Christian, University of Zurich)	Section 4.3 has been deleted with relevant material merged into subsequent sections of the chapter, with the aim of improving the logic of material presented. Additionally, the material from this particular subsection has been included in a box, and these points have been considered in its revision.
641	4	20	6	20	6	Typo citation: For Aggerwal and Singh (2010), the first author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	This text has been deleted
642	4	20	8	0	0	Dont see how extreme events contributes to and exacerbates the aging of the population. I think that this demographic-vulnerability discussion would fit very well into the section on Global and Regional Trends in Vulnerability Factors (4.3.4.1). Both the aging and the vulnerability of older people is also true in developed countries. In O'Brien et al. (2008) we had a box on Children and the Elderly: " More elderly will be exposed to climate change in the coming decades, particular in OECD countries. By 2050, it is estimated that 1 in 3 people will be above 60 years in OECD countries, as well as 1 in 5 at the global scale (UN, 2002. World Population Ageing 1950-2050. Department of Economic and Social Affairs, Population Division, New York)". Factors influencing the levels of vulnerability of older people includes deterioration of health, personal lifestyles, loneliness, poverty, or inadequate health and social structures (OECD, 2006. Declaration on integrating climate change adaptation into development cooperation. Paris.). Other ref. on vulnerability of older people to heat waves: Wolf, J., Adger, W.N., Lorenzoni, I., Abrahamson, V., Raine, R. (2010) "Social capital, individual responses to heat waves and climate change adaptation: An empirical study of two UK cities", Global Environmental Change 20(1): 44-52.) (Sygna, Linda, Department of Sociology and Human Geography)	The sentence has been reworded slightly and moved to a subsequent section to address these points
643	4	20	8	20	9	What about other demographic influences? (Holsten, Anne, Potsdam Institute of Climate Impact Research)	The sentence has been reworded slightly and moved to a subsequent section where it fits into a broader context.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
644	4	20	8	20	9	Why is this sentence separate? (Stocker, Thomas, IPCC WGI TSU)	The sentence has been moved to a subsequent section to address these points
645	4	20	8	20	9	This short paragraph should consider and cite case study 9.2.2 as appropriate. (IPCC WGII TSU)	The sentence has been reworded slightly and moved to a subsequent section where reference to the case study is made
646	4	20	11	20	11	"... the past is not really a key to the future..." I don't think Milly et al, 2008 says this. He says just the opposite. "Modeling should be used to synthesize observations; it can never replace them." And "In a non-stationary world, continuity of observations is critical." This is perhaps the most egregious example of the underlying bias against data and paleo/proxy data; personal misinterpretations/statements have no place in a scientific report. (UNITED STATES OF AMERICA)	This text has been deleted
647	4	20	11	20	12	Please provide evidence for the statement "It's now reasonable to assume that", reference to Milly et al. is not sufficient. How (un)certain is this statement? (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
648	4	20	11	20	12	Two parts of this sentence ("the past is not really a key to the future" and "we are entering a situation with no analogy in past records") are overly generalized beyond the context in which they are discussed in Milly et al. (2008). They should thus be revised appropriately to be more specific here. (IPCC WGII TSU)	This text has been deleted
649	4	20	11	20	18	It does not become clear here, how climate change contributes to or exacerbated other trends. (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This text has been deleted
650	4	20	11	20	18	Consider moving this section into another part of the chapter, as it does not fit to well into the trend discussion, possibly move upfront to 4.2.1. What is Extreme (Sygna, Linda, Department of Sociology and Human Geography)	This text has been deleted
651	4	20	12	20	12	Depends what you mean by 'past'!. Better to say: '...with no analogy in historical records'. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
652	4	20	12	20	13	We concur, add a descriptions/explanation. (UNITED STATES OF AMERICA)	This text has been deleted
653	4	20	14	0	0	Shouldn't "latter" be "former." (Wright, Richard, American Society of Civil Engineers)	This text has been deleted
654	4	20	14	20	14	"latter" should be "former" (Global Climate Observing System Steering Committee)	This text has been deleted
655	4	20	18	20	18	It is unclear what source Kundzewicz et al. (2010) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This text has been deleted
656	4	20	21	0	0	Section 4.3.2: English is particularly unclear in this section and needs careful checking. (Stocker, Thomas, IPCC WGI TSU)	The text has been revised accordingly
657	4	20	21	0	0	Section 4.3.2. In considering physical exposure, this section covers more than just exposure as defined in the glossary because it considers hazard frequency and changes in that frequency. This relationship needs to be better clarified. It would be helpful to describe how exposure in the glossary (of people and their assets) compares to population exposure and then physical exposure. Such a discussion would also help make clear why hazards are being discussed in this section. (IPCC WGII TSU)	Population living in exposed area multiplied by the average yearly frequency provides the average number of people exposed per year, thereafter called "physical exposure". This definition has been clarified in the text
658	4	20	21	20	21	delete bracket in section title (Stocker, Thomas, IPCC WGI TSU)	The text in this section has been moved to a box with a different title.
659	4	20	21	20	21	The parenthetical part of this section title is very hard to interpret. (IPCC WGII TSU)	The text in this section has been moved to a box with a different title.
660	4	20	23	21	31	There are many areas in the world (depending to the geographical scale considered), where the frequency of floods and/or storms losses is more than one (see remark N° 9) (NUSSBAUM, Roland, Mission Risques Naturels)	This text has been deleted. However, this is a valid comment. The exposure here is frequency x population, meaning that a population hit twice by a flood as an average per year is counted twice. Hence this issue is being addressed. For information, the resolution of these models is 1 x1 km, figures are then aggregated at the national and regional level, but initial resolution is very high (for a global model). One thing to consider when floods occur more than once per year, one may consider that this is not a hazardous event but a normal seasonality of the river flows, to which land planning has failed to take into consideration. I.e. not a natural hazard.
661	4	20	28	20	31	First, "the frequency can be higher than 1" is ambiguous. It would be better to say, "the frequency can be higher than 1 hazard per year," assuming that is what is meant. Second, the phrasing of the last sentence suggests it describes a separate "case," but in fact it appears that the sentence is describing the case discussed in the previous sentence. It would therefore be clearer to introduce the second sentence here with "in such cases." (IPCC WGII TSU)	This text has been deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
662	4	20	33	20	35	Not clear why the first relationship is quantitative, while the second is qualitative. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
663	4	20	35	20	35	reference to "Check Alcantra-Ayala"? (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
664	4	20	35	20	35	Typo citation: For Alcantra-Ayala (2002), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	This text has been deleted
665	4	20	41	20	41	delete "one shouldn't forget that" -- not needed (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
666	4	20	41	20	41	The citation for UN (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted
667	4	20	42	20	42	The citation for Satterthwaite et al. (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted
668	4	20	48	20	54	The assessment here of cyclone frequency should reference and consider the conclusions of chapter 3. Additionally, the transition "however" at the start of the second sentences seems as if it would be better placed at the start of the third sentence or deleted. (IPCC WGII TSU)	No, this has nothing to do with detected or modelled hazard frequency, it is about the amount of reported disasters (hence impacts) by global database. The sentence rephrased: Although one can see an increase of reported Tropical Cyclones disaster (from 21.7 to 63) see table 4.1, one should not...
669	4	20	49	20	49	who is "we"? (Stocker, Thomas, IPCC WGI TSU)	OK, was rephrased: Although one can see an increase of reported Tropical Cyclones disaster (from 21.7 to 63) see table 4.1, one should not...
670	4	20	50	20	50	(from 21.7 to 63) - over what time period? Is this global? (Stocker, Thomas, IPCC WGI TSU)	1970-79 to 2000-2009 as in Table 4.1
671	4	20	50	20	50	delete "one should not too quickly conclude" and "one cannot use" -- not needed (Stocker, Thomas, IPCC WGI TSU)	The text has been revised to somewhat address these points.
672	4	20	53	20	53	It is unclear what source Peduzzi et al. (2009) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	(Peduzzi et al., 2009b) Peduzzi, P., Dao, H., Herold, C., and Mouton, F. 2009b: Assessing global exposure and vulnerability towards natural hazards: the Disaster Risk Index, Nat. Hazards Earth Syst. Sci. 9. 1149-1159.
673	4	21	3	0	0	Table 4-1: Caption must include the original source of this data. (Stocker, Thomas, IPCC WGI TSU)	Reference the source of data has been added
674	4	21	6	21	6	delete "it's important to note" -- not needed (Stocker, Thomas, IPCC WGI TSU)	Done
675	4	21	6	21	11	What is the conclusion of the discribed study? (Holsten, Anne, Potsdam Institute of Climate Impact Research)	That access to information needs to be taken into consideration when assessing disaster trends. Comment added
676	4	21	11	21	11	How was the population distribution extrapolated up to 2030? More details needed. (Stocker, Thomas, IPCC WGI TSU)	Using UN population extrapolation and GIS modelling. However, this paper is not published, so we stick to what was published in GAR 2011 and data available on-line up to 2010 (deleting this text). We recently published (on-line see The PREVIEW Global Risk Data Platform http://preview.grid.unep.ch) Peduzzi et al. 2011) the data for people to have a look at them.
677	4	21	13	21	15	This reference should be listed in the reference list instead of in a footnote. Please add the reference to the reference list and remove the footnote. (IPCC WGII TSU)	This text has been deleted.
678	4	21	18	0	0	The chapter 4.3.2.2. is only based on results of Peduzzi et al. 2011. If such a lack in research exists, this could be stated in the chapter. (Holsten, Anne, Potsdam Institute of Climate Impact Research)	The exposure to tropical cyclones, floods and landslides were published in the Global Assessment Report 2011. The article Peduzzi et al. 2011 cannot be used as its status was not "accepted" by 31 May 2011. In this case, it was agreed to aggregate the data published on-line on the PREVIEW Global Risk Data Platform (Peduzzi et al., 2011) to aggregate the original data at IPCC region levels. So Peduzzi et al. 2011 now refers to the on-line application providing access to the data and which was published on 10 May 2011. See http://preview.grid.unep.ch

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679	4	21	18	0	0	1) It is not appropriate to have an entire section (including 7 tables and figures!) based on a single paper. 2) This paper is not yet published, and was not even available in a final submitted format at the time of the SOD review. Irrespective of whether or not the paper is 'accepted' by the strict deadline of May 31, for this section to remain, it must be transformed from a review of a single paper, into an assessment of human exposure to tropical cyclones based on multiple sources of literature. If the paper is not accepted by May 31, any reference to this paper must be removed from Chapter 4. (Stocker, Thomas, IPCC WGI TSU)	The exposure to tropical cyclones, floods and landslides were published in the Global Assessment Report 2011. The article Peduzzi et al. 2011 cannot be used as its status was not "accepted" by 31 May 2011. In this case, it was agreed to aggregate the data published on-line on the PREVIEW Global Risk Data Platform (Peduzzi et al., 2011) to aggregate the original data at IPCC region levels. So Peduzzi et al. 2011 now refers to the on-line application providing access to the data and which was published on 10 May 2011. See http://preview.grid.unep.ch
680	4	21	18	0	0	Section 4.3.2.2 needs to be improved. The section relies substantially on one author's 'in prep' work. There is subjective language that should be removed. (UNITED STATES OF AMERICA)	The exposure to tropical cyclones, floods and landslides were published in the Global Assessment Report 2011. The article Peduzzi et al. 2011 cannot be used as its status was not "accepted" by 31 May 2011. In this case, it was agreed to aggregate the data published on-line on the PREVIEW Global Risk Data Platform (Peduzzi et al., 2011) to aggregate the original data at IPCC region levels. So Peduzzi et al. 2011 now refers to the on-line application providing access to the data and which was published on 10 May 2011. See http://preview.grid.unep.ch
681	4	21	18	0	0	Section 4.3.2.2. All tables and figures associated with this section need to be referenced and described in the chapter text, aside from the indication of their placement. Additionally, the clarity of the presentation needs to be improved in terms of explanation of methods and results assessed. (IPCC WGII TSU)	Done
682	4	21	18	22	34	Tropical cyclones is not a hazard in itself, but its consequences are: cyclonic waves and surge inducing flooding, erosion, scouring, involvement of debris; wind associated with fall of debris, heavy rains with flooding, eventually lahars in volcanic areas... These hazards should be mentioned somewhere, potentially in this section (MODARESSI, HORMOZ, BRGM)	Description of physical hazard should be in chapter 3.
683	4	21	18	22	34	This section should be carefully checked with section 3.4.4. Assessments of changes in tropical cyclones including Figs. 4.5 and 4.6 do not belong in this chapter, since this corresponds to chapter 3 material. Moreover, much of the material is from a study that was in preparation at the time of the SOD submission, so I am not sure that it can be considered as SREX material. (Seneviratne, Sonia, ETH Zurich)	This was done for lines 38-43 where we are talking about change in tropical cyclones frequency and intensity. The rest of the text is about changes in demography influencing exposure (not in the scope of Chapter 3).
684	4	21	20	21	21	It would be helpful to indicate the physical exposure of 122.7 million is for the year 2010. (IPCC WGII TSU)	Checked
685	4	21	21	22	53	The citation for Peduzzi et al. (2011) (which occurs 11 times in these paragraphs) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The exposure to tropical cyclones, floods and landslides were published in the Global Assessment Report 2011. The article Peduzzi et al. 2011 cannot be used as its status was not "accepted" by 31 May 2011. In this case, it was agreed to aggregate the data published on-line on the PREVIEW Global Risk Data Platform (Peduzzi et al., 2011) to aggregate the original data at IPCC region levels. So Peduzzi et al. 2011 now refers to the on-line application providing access to the data and which was published on 10 May 2011. See http://preview.grid.unep.ch
686	4	21	22	21	23	Here it is said that computing trends in physical exposure requires consideration of hazard frequency, yet the table discussed in the paragraph (Table 4-2) assumes constant hazard. This assumption, seemingly contradicting the sentence here, should be explained in the text. It would probably be clearer to discuss and present both tables (Tables 4-2 and 4-3) together here to clarify the apparent contradiction. (IPCC WGII TSU)	Given that the paper was not published by the cutoff deadline, we need to delete this part.
687	4	21	32	21	32	"are only observed" could be replaced by "occur only", unless the sentence is intended to be a comment on the observing system (Global Climate Observing System Steering Committee)	This text has been deleted
688	4	21	34	0	0	Table 4-2, 4-3, and 4-4 are not needed. This is an overload of information here coming from a single paper, and the most crucial information is more usefully displayed in the figures. (Stocker, Thomas, IPCC WGI TSU)	The information of table 4.2 is kept. Reference is made PREVIEW Global Risk Data Platform, which provides national figures. These values were aggregated into regions shown. Raster data as well as aggregated data are made available through this web site http://preview.grid.unep.ch
689	4	21	38	21	38	It seems that Figure 4-5 is intended here, not Figure 4-3. (IPCC WGII TSU)	Now only refer to section 3.4.4

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
690	4	21	38	21	39	Need to be consistent with wording from Chapter 3, ie, 'it is likely the global frequency of tropical cyclones will either decrease, or remain unchanged'. (Stocker, Thomas, IPCC WGI TSU)	The text has been revised accordingly
691	4	21	38	21	39	What do you mean with "except in North Atlantic where uncertainties go both ways"? Delete, and stick to the wording used by Chapter 3. (Stocker, Thomas, IPCC WGI TSU)	The text has been revised accordingly
692	4	21	38	21	39	This assessment should refer to chapter 3 and not to material from chapter 4 (assessment of change in climate extremes). (Seneviratne, Sonia, ETH Zurich)	It was a figure done with Jim Kossin, tropical cyclone focal point for chapter 3. However, the figure is now removed.
693	4	21	38	21	43	We don't understand this analysis. For example, Pielke Jr. (2007, Future Economic Damage from Tropical Cyclones: Sensitivities to Societal and Climate Changes, Proceedings of the Philosophical Transactions of the Royal Society) reports that tropical cyclone damage from society changes (population and wealth growth) alone will increase by several hundreds of percent by 2050. This change is many times greater than the changes reported in lines 38-43. It would seem that Pielke Jr (2007) ought to be cited and reviewed here as well. (UNITED STATES OF AMERICA)	This analysis was based on a paper, which looks at latest conclusion on tropical cyclones frequency and intensity by Knutson et al. , 2010 and crossing them with data from the PREVIEW Global Risk Data Platform on exposure. This section was removed as the paper is not published within the deadlines imposed by SREX. Regarding Pielke (2007), this is a theoretical exercise (very interesting) showing that regardless of climate change influence, risk will increase due to forecasted changes in exposure (human and assets). Pielke is demonstrating that even true a 36% increase intensity, the impacts would be more driven by societal conditions rather than through climate change. His theoretical exercise is useful but the range of hypothesis is largely out of range. However, his conclusions are in-line with GAR 2011 projections. We may use Pielke to justify such point. However, prediction by Pielke cannot be used as such, this is based on extreme increase in tropical cyclone intensity which range is way out of the prediction from Chapter 3.
694	4	21	39	21	40	11.6% globally, or NA only? (Stocker, Thomas, IPCC WGI TSU)	globally by 2030, text added
695	4	21	39	21	41	Confidence and likelihood levels are missing for some of this material. (UNITED STATES OF AMERICA)	Agree, now corrected.
696	4	21	41	21	41	"on a less positive note"?? - Are you suggesting an increase in physical exposure of 7.9% is positive news? Delete "on a less positive note" -- it's not needed and reflects your personal judgement. (Stocker, Thomas, IPCC WGI TSU)	This part was deleted
697	4	21	41	21	41	It is not clear what the range presented here represents: the full range of model outcomes or a percentile range? (IPCC WGII TSU)	This part was deleted
698	4	21	41	21	42	Again this assessment should only refer to chapter 3. (Seneviratne, Sonia, ETH Zurich)	This part was deleted
699	4	21	42	0	0	The statement about likely increase in tropical cyclone winds only applies to the strongest systems. Should include "maximum" here. (Nicholls, Neville, Monash University, School of Geography & Environmental Science)	This part was deleted
700	4	21	42	21	42	It seems that Figure 4-6 is intended here, not Figure 4-5. (IPCC WGII TSU)	This part was deleted
701	4	21	43	21	43	You can not assign 'likely' based on the results from one 'unpublished' study that looks at exposure!. Multiple lines of evidence are needed. Chapter 3 say nothing about exposure, so you can not simply twist their use of 'likely' to apply to exposure here. (Stocker, Thomas, IPCC WGI TSU)	This part was deleted
702	4	21	45	0	0	There is no need for Chapter 4 to include Figure 4-5. The models reviewed in this figure were all assessed in Chapter 3. A reader would not and should not look in Chapter 4 for information on projected cyclone frequencies, where there are no expertise amongst the author team on this subject. Here, to provide the context for your assessment of human exposure to tropical cyclones, you just need to appropriately and accurately repeat the projections given in Chapter 3. If this figure had been produced earlier, and passed through peer-review, it might have made a useful contribution to Chapter 3. (Stocker, Thomas, IPCC WGI TSU)	This part was deleted
703	4	21	46	0	0	Figure 4.5: What do they black lines connecting the x-axis with the boxes mean? What's the range given by the box size? You must provide much more detailed information on what is shown, how it has been derived, etc. in the caption. (Stocker, Thomas, IPCC WGI TSU)	This part was deleted
704	4	21	47	21	47	Typo citation: For Knutson et al. (2010), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	This part was deleted
705	4	21	51	21	51	what are "the IPCC regions" -- explain and provide a reference at least. (Stocker, Thomas, IPCC WGI TSU)	This part was deleted
706	4	22	4	22	53	More references and confidence and/or likelihood levels are needed to support and qualify this information (UNITED STATES OF AMERICA)	The text has been revised, with substantial deletions, and now further addresses these points

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
707	4	22	11	0	0	Figure 4.6: What do you mean by 'intensity'? Mean maximum wind speed? Rainfall intensity? You must provide much more detailed information on what is shown, how it has been derived, etc. in the caption (Stocker, Thomas, IPCC WGI TSU)	This part was deleted
708	4	22	13	22	13	Typo citation: For Knustson et al. (2010), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	This part was deleted
709	4	22	16	0	0	Figure 4.7: What do they black lines connecting the x-axis with the boxes mean? What's the range given by the box size? You must provide much more detailed information on what is shown, how it has been derived, etc. in the caption. (Stocker, Thomas, IPCC WGI TSU)	This figure was removed
710	4	22	18	0	0	Table 4-2, 4-3, and 4-4 are not needed. This is an overload of information here coming from a single paper, and the most crucial information is more usefully displayed in the figures. (Stocker, Thomas, IPCC WGI TSU)	The information of table 4.2 is kept. Reference is made PREVIEW Global Risk Data Platform, which provides national figures. These values were aggregated into regions shown. Raster data as well as aggregated data are made available through this web site Http://preview.grid.unep.ch
711	4	22	22	22	25	Please check and clarify the language in this paragraph. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted.
712	4	22	27	0	0	The heading numbering suggests, that this chapter is a subsection of the tropical cyclone chapter. However, from the contents this does not become clear. (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This text has been deleted.
713	4	22	27	0	0	Tables 4-2, 4-3, and 4-4 are not needed. This is an overload of information here coming from a single paper, and the most crucial information is more usefully displayed in the figures. (Stocker, Thomas, IPCC WGI TSU)	The information of table 4.2 is kept. Reference is made PREVIEW Global Risk Data Platform, which provides national figures. These values were aggregated into regions shown. Raster data as well as aggregated data are made available through this web site Http://preview.grid.unep.ch
714	4	22	31	22	31	On this line, it seems that "physical exposure" is intended instead of "population exposure." (IPCC WGII TSU)	This text has been deleted.
715	4	22	31	22	34	Delete - You can not formulate a likelihood statement based on exposure modelling results from one study! This does not constitute an expert assessment. Multiple lines of evidence are needed. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted.
716	4	22	32	22	33	"despite likely expected reduction in tropical cyclones frequency": this should refer to chapter 3 assessments. (Seneviratne, Sonia, ETH Zurich)	This text has been deleted.
717	4	22	37	22	44	This section (4.3.2.2.1) should reference the chapter 3 assessments regarding projected changes in flood occurrence (low confidence; see section 3.5.2) (Seneviratne, Sonia, ETH Zurich)	Reference to chapter 3 was added (3.5.2)
718	4	22	39	22	47	(plus table 4.5) The Peduzzi et al. 2011 paper is a paper listed as 'in preparation'. Therefore comments: i) Especially the given 21.4% increase in projected exposure is difficult to follow (and why that precise number?), ii) At least for observed changes other references are available (e.g. the mentioned Peduzzi 2009 paper). (NETHERLANDS)	The exposure to tropical cyclones, floods and landslides were published in the Global Assessment Report 2011. The article Peduzzi et al. 2011 cannot be used as its status was not "accepted" by 31 May 2011. In this case, it was agreed to use GAR 2011.
719	4	22	40	22	40	Not clear why Peduzzi et al. 2011 is cited here. The name of this paper suggests it deals only with Tropical Cyclones. In any case, as with the previous section on tropical cyclones, this assessment of Flood Exposure cannot be based on a single paper, and will need to be completely removed if the Peduzzi et al paper is not accepted for publication by May 31st. (Stocker, Thomas, IPCC WGI TSU)	The exposure to tropical cyclones, floods and landslides were published in the Global Assessment Report 2011. The article Peduzzi et al. 2011 cannot be used as its status was not "accepted" by 31 May 2011. In this case, it was agreed to use GAR 2011.
720	4	22	40	22	40	The reference to Peduzzi et al. (2011) provided in the reference section does not refer to floods. Therefore, it is unclear what citation is intended here, as well as in the legend for Table 4-5. (IPCC WGII TSU)	The exposure to tropical cyclones, floods and landslides were published in the Global Assessment Report 2011. The article Peduzzi et al. 2011 cannot be used as its status was not "accepted" by 31 May 2011. In this case, it was agreed to use GAR 2011.
721	4	22	40	22	41	"lack of clear projections on future precipitation trends" - this is a generalisation and ignores all the uncertainties with factors other than precipitation that will influence future flood trends. Note that Chapter 3 treat precipitation and flood projections separately, each with their own related uncertainties. It would be better here to keep the wording more specific: '...on past flood events, and uncertainty associated with projected trends in future flood frequencies and magnitudes (See section 3.5.2), makes it difficult to estimate future flood hazards'. (Stocker, Thomas, IPCC WGI TSU)	Thank you, your suggestion has been incorporated and old text deleted.
722	4	22	46	22	47	Table 4-5 is not needed. This is an overload of information here coming from a single paper, and the most crucial information is more usefully displayed in the figures. (Stocker, Thomas, IPCC WGI TSU)	The information of this table is kept References is made on GAR 2011, which provides national figures. These values were aggregated into regions shown. Raster data as well as aggregated data are available on-line for verification (preview.grid.unep.ch)

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
723	4	22	50	0	0	The heading numbering suggests, that this chapter is a subsection of the tropical cyclone chapter. However, from the contents this does not become clear. (Holsten, Anne, Potsdam Institute of Climate Impact Research)	Thank you, this was an error in heading level and was corrected.
724	4	22	50	23	10	Check consistency with chapter 3 (Sections 3.1.2 and 3.5.6). (Seneviratne, Sonia, ETH Zurich)	Links to chapter 3 included.
725	4	23	2	23	6	What is the assessment? What are the confidence and/or likelihood levels? (UNITED STATES OF AMERICA)	This text has been deleted.
726	4	23	3	0	0	Is "23.8%" reported to more significant digits than is justified? (UNITED STATES OF AMERICA)	This text has been deleted.
727	4	23	6	23	6	The citation for Peduzzi (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted.
728	4	23	8	0	0	Table 4-6: How were these numbers derived? Based on modelled precipitation changes? What models? What scenarios? How about uncertainties? (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted.
729	4	23	9	23	10	The citation "Disaster Risk Index, Nat. Hazards Earth Syst. Sci., 9, 1149–1159" is not correct. Please change the format of this citation to "author, year". (IPCC WGII TSU)	This text has been deleted.
730	4	23	10	0	0	Reference in text differs from the reference in the table. (NETHERLANDS)	This text has been deleted.
731	4	23	13	0	0	The heading of chapter 4.3.3. is rather broad, given that the only subsection is related to only coastal systems. (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This section has been deleted with some relevant material incorporated into subsequent sections of the chapter
732	4	23	13	0	0	Section 4.3.3. The title of the section provides the expectation of a comprehensive assessment of observed and projected trends in hazards and impacts, while the content focuses specifically on coastal systems. In addition, the title itself is ineffective. Also, it is not clear why information in the previous section is not a subsection of 4.3.3. Finally, the information that is presented in this section ably reviews relevant sources, but without drawing conclusions of the author team's assessment of the sources, especially within the subsections 4.3.3.1.1 and 4.3.3.1.2. The section would be much more effective if the author team provided an indication of the overall state of knowledge for topics covered. (IPCC WGII TSU)	This section has been deleted with some relevant material incorporated into subsequent sections of the chapter
733	4	23	16	0	0	Vulnerability et strategy of managing Coastal Systems are scattered between many chapters. Yet, it is a problem of major importance as coastal line concentrates population, wealth et cumulates risks. France as others European countries are seeking a strategy. Référence (Lenotre 2009). Tsunami hazard could be mentioned. (BOURRELIER, PAUL-HENRI, AFPCN)	This section has been deleted with some relevant material incorporated into subsequent sections of the chapter
734	4	23	16	23	35	Check consistency with chapter 3 (Section 3.5.5 "Coastal Impacts"). (Seneviratne, Sonia, ETH Zurich)	This text has been deleted
735	4	23	18	0	0	Should it be "Coastal systems are among the world's most exposed areas ..." (Sygna, Linda, Department of Sociology and Human Geography)	This text has been deleted
736	4	23	18	23	35	It should be added that coastal vulnerability should be assessed taking into account climate and non climatic driven hazards (e.g. Tsunamis) See e.g. Garcin et al. 2008. Garcin, M., J. F. Desprats, M. Fontaine, R. Pedreros, N. Attanayake, S. Fernando, C. H. E. R. Siriwardana, U. De Silva, and B. Poisson, Integrated approach for coastal hazards and risks in Sri Lanka, Natural Hazards and Earth Systems science. 2008. (MODARESSI. HORMOZ. BRGM)	This text has been deleted
737	4	23	18	23	35	Definition of vulnerability in this paragraph v. the glossary: The glossary entry for vulnerability pertains to human beings, their livelihoods, and their support systems. The definition employed here extends more broadly to ecosystems, beyond the connection to human support systems. It would be helpful to explicitly use the term "vulnerability" where connections to human systems are made and to discuss "impacts" where only ecosystem effects are considered. Additionally, the last sentence refers to Table 4-7 in the context of differential vulnerability to hazards, whereas the table itself focuses on exposure. The apparent conflation of vulnerability and exposure needs to be remedied. (IPCC WGII TSU)	This text has been deleted
738	4	23	18	25	9	Is sea level rise per se an extreme event? This text, although containing much very good material, is not focusing on extreme events, nor extreme impacts. I fear that the best is to shorten most of this text and retain only what really relates to extreme events and extreme impacts. And why are only costal wetlands, coral reefs, and seagrasses discussed as examples of natural systems. There are many more natural systems (or ecosystems) that need to be covered here. (Fischlin, Andreas, ETH Zurich)	This text has been deleted
739	4	23	21	23	22	It is unclear what source Wang et al. (2008) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This text has been deleted
740	4	23	24	23	26	This sentence needs to be made clearer. Why has ability to respond decreased as with increased coastal settlements and infrastructure. (Sygna, Linda, Department of Sociology and Human Geography)	This text has been deleted
741	4	23	24	23	26	As phrased, this sentence seems to imply that exposure of coastal communities/assets has increased because the ability of coastal systems to respond has decreased. However, the changes in exposure are distinct from the ability to respond (an element of vulnerability). even though these changes are seemingly conflated here. (IPCC WGII TSU)	This text has been deleted
742	4	23	25	23	25	Is "significantly" based on a statistical analysis? Otherwise replace by "substantially" (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
743	4	23	26	23	27	Why are predictions of exposure to climate extremes only required at decadal to century scales? (IPCC WGII TSU)	This text has been deleted
744	4	23	41	0	0	Section 4.3.3.1: this section is predominantly about non-extreme climate (and related) changes? Given that the focus of the report is on extreme weather and climate events the section could be shortened, mostly by removing unnecessary detail. (Stocker, Thomas, IPCC WGII TSU)	This section has been deleted with some relevant material incorporated into subsequent sections of the chapter
745	4	23	41	25	41	Besides, I am having difficulties with this deep nesting 4.3.3.1.1. I suggest to drop the numbering the latest at level 4 and to use italic, unnumbered headings or even start a para with the heading as an italic headline within the para (see e.g. AR4). (Fischlin, Andreas, ETH Zurich)	This section has been deleted with some relevant material incorporated into subsequent sections of the chapter
746	4	23	43	0	0	sea level changes and land movements (UNITED STATES OF AMERICA)	This material has been removed from the chapter
747	4	23	45	23	45	The use of 'likely' here can not be based on a single cited reference. Multiple lines of evidence are needed. (Stocker, Thomas, IPCC WGII TSU)	This material has been removed from the chapter
748	4	23	45	23	45	If this usage of calibrate language ("likely") is not based on probabilistic information (where probabilistic information includes formally quantified expert judgment), it would be preferable to present an assigned level of confidence. (IPCC WGII TSU)	This material has been removed from the chapter
749	4	23	47	23	49	What is the assessment? What are the confidence and/or likelihood levels? (UNITED STATES OF AMERICA)	This material has been removed from the chapter
750	4	23	49	23	49	The citation for Loder et al. (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
751	4	24	6	24	6	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	This material has been removed from the chapter
752	4	24	11	24	12	The citation for Riddin and Adams (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
753	4	24	17	24	17	The citation for McKee (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
754	4	24	28	24	49	Why is ocean acidification not discussed here? (Stocker, Thomas, IPCC WGII TSU)	This material has been removed from the chapter
755	4	24	28	24	49	As ocean temperature rises coral reefs may also expand their range and establish in new regions. A rapid northward expansion along the coast of Japan was recently documented by Yamano (2011). (UNITED STATES OF AMERICA)	This material has been removed from the chapter
756	4	24	29	24	29	The citation for McClanahan et al. (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
757	4	24	36	24	36	The citation for Miller et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
758	4	24	37	24	37	The citation for Ateweberhan and McClanahan (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
759	4	24	37	24	37	The citation for Williams et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
760	4	24	40	24	41	The citation for Purkis et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
761	4	24	42	24	42	Typo citation: For Montagnoni (2005), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
762	4	24	42	24	42	The citation for Lambrechts et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
763	4	24	43	24	43	The citation for Ouillon et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
764	4	24	43	24	43	The citation for Williams et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
765	4	24	44	24	44	The citation for Carpenter et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
766	4	24	51	24	54	why would changes in dissolved CO2 affect sea grass growth? (UNITED STATES OF AMERICA)	This material has been removed from the chapter
767	4	25	4	25	4	It is unclear what source Cardoso et al. (2008) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This material has been removed from the chapter
768	4	25	5	25	5	The citation for RIVAMP (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
769	4	25	6	25	6	The citation for Knudby et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been removed from the chapter

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
770	4	25	7	25	7	The citation for Ballestri et al. (2006) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
771	4	25	12	0	0	Section 4.3.3.1.2. This section should consider and cite case study 9.2.8. In addition, overlap and inconsistencies should be addressed. (IPCC WGII TSU)	This section has been deleted with some relevant material incorporated into subsequent sections of the chapter
772	4	25	16	25	19	This is a nice description of the interaction of sea level rise with storms and would be useful to highlight by including in Exec summary or similar: "The most devastating coastal impacts are thought to be...superimposed upon the long-term sea level rise" (UNITED STATES OF AMERICA)	This point has been considered in the revision of the chapter
773	4	25	18	25	18	The citation for Mosunder et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been added
774	4	25	19	25	19	The citation for Frazier et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been added
775	4	25	20	25	20	The citation for Wardekker et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been added
776	4	25	23	25	24	The citation for Irish et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been added
777	4	25	27	25	27	The citation for Hanson et al. (in press) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been added
778	4	25	32	25	33	The citation for Dawson et al. (2005) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been added
779	4	25	33	25	37	In this sentence, 2/3 of projected exposure is said to be due to socio-economics reasons. It would be helpful to clarify what will cause the other 1/3 of projected exposure. (IPCC WGII TSU)	This material has been deleted
780	4	25	36	25	36	The citation for Adamo (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been added
781	4	25	36	25	40	In addition to simply reporting the results of Lenton et al. you need to assess what the realism of these tipping scenarios being reached is. (Stocker, Thomas, IPCC WGI TSU)	These sentences have been revised accordingly
782	4	25	43	0	0	Table 4.18: how confident are you about the numbers and the precision provided? Suggest to round numbers and to add uncertainties/error bars if possible. (Stocker, Thomas, IPCC WGI TSU)	The table has been revised accordingly
783	4	25	45	25	46	The citation for Oh and Reuveny (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been added
784	4	25	46	25	46	If this usage of calibrate language ("likely") is not based on probabilistic information (where probabilistic information includes formally quantified expert judgment), it would be preferable to present an assigned level of confidence. (IPCC WGII TSU)	The usage of the term likely has been deleted here
785	4	25	46	25	46	The citation for Fink et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been deleted
786	4	25	46	25	47	What multiple lines of evidence is this 'likely' assessment based on? (Stocker, Thomas, IPCC WGI TSU)	The usage of the term likely has been deleted here
787	4	26	6	0	0	Give chapter reference in CCSP. (UNITED STATES OF AMERICA)	This material has been deleted
788	4	26	6	26	11	delete text starting from "Experts at an UNCTAD Expert Meeting..." -- this reads like a Workshop report containing information that is not relevant for the scientific assessment to be provided in this Chapter. (Stocker, Thomas, IPCC WGI TSU)	This material has been deleted
789	4	26	11	26	11	The citation for Becker et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been deleted
790	4	26	17	26	17	The phrase "climate change-driven extremes" is not ideal: there are extremes for which frequency, magnitude, etc. are projected to be influenced by climate change, but the extremes themselves are not driven, per se, by climate change. (IPCC WGII TSU)	This material has been removed from the chapter
791	4	26	21	26	22	The citation for Neumayer and Barthel (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
792	4	26	21	26	23	This is only a 30 year period though. (Darch, Geoff, Atkins & University of East Anglia)	This material has been removed from the chapter
793	4	26	25	26	37	For results on vulnerability of beach tourism to climate change with regard to multiple stimuli see also: Perch-Nielsen, S. The vulnerability of beach tourism to climate change—an index approach. In Climatic Change, 100 (3): 579-606, 2010. (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This material has been removed from the chapter
794	4	26	25	26	37	Tourism is also synonymous with skiing in mountains, which is a form of mass tourism. Ski runs are also under increasing threat to erosion. Some ski resorts are over-exploiting water resources due to high local water consumption and artificial snow making (de Jong, Carmen, University of Savoy)	This material has been removed from the chapter
795	4	26	29	0	0	beach erosion is also due to sediment starvation due to high trapping efficiency of dam reservoirs (see other publications by Snoussi) (de Jong, Carmen, University of Savoy)	This material has been removed from the chapter

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
796	4	26	31	26	31	The citation for Rigall-Torrent et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
797	4	26	32	26	32	The citation for Pacheco and Lewis-Cameron (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
798	4	26	43	0	0	Global and regional trends in exposure and vulnerability factors : exposure is justified as growing exposure is the leading factor of risks. (BOURRELIER, PAUL-HENRI, AFPCN)	This material has been removed from the chapter
799	4	26	43	0	0	Section 4.3.4.1. The information presented in this section reviews relevant sources, but without drawing conclusions of the author team's assessment of the sources. The section would be much more effective if the author team provided an indication of the overall state of knowledge for topics covered. (IPCC WGII TSU)	This material has been removed from the chapter
800	4	26	43	28	16	Bring in the discussion about demographic factors/trends influencing vulnerability , children, elderly, woman, see comment 50. (Svagna, Linda, Department of Sociology and Human Geography)	This material has been removed from the chapter
801	4	26	45	26	45	Please add an assessment of the uncertainty associated with the statement that "human exposure to climate hazards is increasing". BTW, Section 4.3.2 mostly focuses on tropical cyclones. It's inappropriate to expand this tropical cyclone assessment to climate hazards in general. (Stocker, Thomas, IPCC WGI TSU)	This material has been removed from the chapter
802	4	26	48	26	49	"as defined in this chapter" -- are you implying that the definitions given in Chapter 4 are different from the definitions given in Chapter 1 or 2 (or the Glossary) of this report. If so, please specify what these differences are. (Stocker, Thomas, IPCC WGI TSU)	This material has been removed from the chapter
803	4	27	7	27	8	The context of this statement is not clear. (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This material has been removed from the chapter
804	4	27	9	27	9	The citation for Hardor and Paniella (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
805	4	27	16	27	16	Please explain expression "uprooted population". (Stocker, Thomas, IPCC WGI TSU)	This material has been removed from the chapter
806	4	27	26	27	26	The citation for Global risk assessment (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
807	4	27	26	27	29	This assumption has to be clarified (NUSSBAUM, Roland, Mission Risques Naturels)	This material has been removed from the chapter
808	4	27	31	27	31	It is unclear what source UNISDR (2009) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This material has been removed from the chapter
809	4	27	34	27	34	References needed as evidence for "poverty is decreasing". (Stocker, Thomas, IPCC WGI TSU)	This material has been removed from the chapter
810	4	27	40	27	40	Use correct citation. (Stocker, Thomas, IPCC WGI TSU)	This material has been removed from the chapter
811	4	27	40	27	40	The citation for Global assessment report on disaster risk reduction (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
812	4	27	49	27	49	The citation for Global assessment report on disaster risk reduction (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
813	4	27	49	28	6	It's not appropriate to simply copy/paste from UNISDR reports (not UNISRD, we assume); you need to provide your own assessment based on most recent literature. (Stocker, Thomas, IPCC WGI TSU)	This material has been removed from the chapter
814	4	27	49	28	6	These sections consist of unintroduced quotes. The provided quotes must be incorporated into sentences within the sections. (IPCC WGII TSU)	This material has been removed from the chapter
815	4	27	50	27	52	It would be interesting to know the reason for this higher vulnerability. (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This material has been removed from the chapter
816	4	27	52	27	52	Typo citation: For UNISRD (2009), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
817	4	27	52	27	52	It is unclear what source UNISRD (2009) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This material has been removed from the chapter
818	4	28	1	28	1	The citation for Global assessment report on disaster risk reduction (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
819	4	28	6	28	6	Typo citation: For UNISRD (2009), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
820	4	28	6	28	6	It is unclear what source UNISRD (2009) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This material has been removed from the chapter
821	4	28	8	28	16	The chapter could be renamed to "Ecosystem services" as this is the focus here and since it is embedded in the chapter related to human vulnerability. (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This material has been removed from the chapter

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
822	4	28	9	28	9	Typo citation: For Millennium Assessment (2005), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	This material has been removed from the chapter
823	4	28	9	28	16	Previous criticism I raised applies here as well. Only with line 13 is the topic extremes really addressed. But then at no depth. Needs to be carefully extended. (Fischlin, Andreas, ETH Zurich)	This material has been removed from the chapter
824	4	28	14	28	16	Is this statement consistent with the study of Ciais et al. (2005, Nature)? [Ciais et al. 2005, Nature, 437, 529-533] (Seneviratne, Sonia, ETH Zurich)	This material has been removed from the chapter
825	4	28	19	0	0	Section 4.3.4.2 is titled 'Examples of Observed and Projected Trends in Human and Sector Vulnerability,' yet there is little or no discussion of projected trends. (UNITED STATES OF AMERICA)	This section has been deleted with some relevant material move to subsequent sections of the chapter
826	4	28	19	0	0	Section 4.3.4.2. This section should be further distinguished from the previous section. For example, it seems that "human vulnerability" is covered in the previous section, and it is not clear how the treatment here is distinct. (IPCC WGII TSU)	This section has been deleted with some relevant material move to subsequent sections of the chapter
827	4	28	19	0	0	Section 4.3.4.2. It seems odd that this section provides information only for the water sector. The water sector seems a very narrow example given the broader section title of "human and sector vulnerability." (IPCC WGII TSU)	This section has been deleted with some relevant material move to subsequent sections of the chapter
828	4	28	19	28	19	Examples --> Example; only one example is given here ("Water Sector") (Stocker, Thomas, IPCC WGI TSU)	This section has been deleted with some relevant material move to subsequent sections of the chapter
829	4	28	28	28	39	This paragraph should reflect on residual risk e.g. the concentration of exposure behind defences, population growth in drought-prone areas. (Darch, Geoff, Atkins & University of East Anglia)	This addition is inconsistent with the focus of the destination section for this text
830	4	28	31	28	33	This sentence seems to suggest that exposure is a component of vulnerability. It would be best to revise the sentence to reflect the distinct definitions of vulnerability and exposure as presented in the glossary. (IPCC WGII TSU)	The text in this paragraph could be interpreted as consistent with the glossary definitions of these terms.
831	4	28	41	28	47	figure 4-9 shows the increase in globally recorded disasters not in all disasters as can be understand from the text. It is a big difference. (Wibig, Joanna, University of Lodz)	This material has been removed from the chapter
832	4	28	50	0	0	Figure 4-9: Not clear what you mean by windstorm? This is not really what one would think of as being water-related. 'Slide' is very vague - please be specific, ie, "landslide". In summary, the caption needs to be substantially expanded to cover all the information not provided in the Chapter main text. (Stocker, Thomas, IPCC WGI TSU)	This material has been removed from the chapter
833	4	29	11	0	0	Table 4-9: This table is not at all useful and the trends described in this table are much better illustrated in Figure 4-9. Not clear what the three columns relate to. The information contained in this table should simply be integrated into the main text. Suggest this table is deleted. (Stocker, Thomas, IPCC WGI TSU)	This material has been removed from the chapter
834	4	29	14	29	21	For strong changes in water resources in China and the relation to climate change and water withdrawel see also: Yang (2010), A half a century of changes in China's lakes: Global warming or human influence?, Geophys. Res. Lett., 37, L24106, doi:10.1029/2010GL045514. (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This material has been removed from the chapter
835	4	29	15	29	15	What do you mean by 'demand side'? (Stocker, Thomas, IPCC TSU)	This material has been removed from the chapter
836	4	29	23	30	1	Is this box necessary? The heat wave in Europe in Summer 2003 is dealt with by a case study in Chapter 9, so a reference to Chpater 9 could be given instead. (Global Climate Observing System Steering Committee)	We feel that important points are made here, and we thus have chosen to retain this box in the chapter
837	4	29	25	0	0	Box 4-3: Given that Chapter 4 is significantly overlength, we do not see the need to include this box on the European heatwave. This material is treated in much more comprehensive detail in Case Study 9.2.2. This overlap and redundancy is not useful for the reader. (Stocker, Thomas, IPCC WGI TSU)	We feel that important points are made here, and we thus have chosen to retain this box in the chapter
838	4	29	25	0	0	Box 4-3. This box is not referred to in the chapter text. Additionally, its placement within the vulnerability sections seems somewhat at odds with the predominant focus on the hazard and impacts of this heat wave. It would be helpful to increase focus on vulnerability within the box or move it to the previous section. Also, overlap with case study 9.2.2 should be considered, perhaps with the material in this box moved instead to the case study. (IPCC WGII TSU)	We feel that important points are made here, and we thus have chosen to retain this box in the chapter. We have moved the box in the chapter to increase the logic of its placement
839	4	29	27	29	31	Maybe this first paragraph should already note that the 2003 event was both a heatwave and drought event (e.g. Ciais et al. 2005, Nature; Andersen et al. 2005, GRL). [Ciais et al. 2005, Nature, 437, 529-533; Andersen et al. 2005, GRL, 32, L18405]. Namely, the low streamflow levels mentioned later on were more likely the result of the drought than of the heatwave. Obviously, both the drought and heatwave events enhanced one another (see also Section 3.1.4). (Seneviratne, Sonia, ETH Zurich)	We do not see any contradiction between this comment and the text: that both the drought and heatwave were significant.
840	4	29	29	29	31	This comparison with the 40s and 50s is misleading. Given the distribution of summer temperatures using as baseline period 1961-1990, gives that summer 2003 was a once in 3.4 million years event! (own calculations) (Fischlin, Andreas, ETH Zurich)	This sentence has been deleted
841	4	29	34	29	34	Typo citation: For Schär and Jendritzky (2004), the first author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	The reference has been clarified

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
842	4	29	37	0	0	Add (Besancenot, 2010) (BOURRELIER, PAUL-HENRI, AFPCN)	Insufficient details have been provided so we are unable to take the recommended action.
843	4	29	41	0	0	Reference for the statement that: "deaths were also associated with housing and social conditions" is missing (Koppe, Christina, Deutscher Wetterdienst)	Two references have been added (Vandentorren et al. 2006; Borrell et al. 2006).
844	4	29	50	29	50	We did not find the reference (Sénat,2004) at the end of the Chapter : does it refers instead to "(Létard,2004)" ? (FRANCE)	The reference has been added
845	4	29	50	29	50	The citation for Sénat (2004) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The reference has been added
846	4	29	54	29	54	There were similarly rare events, e.g. July 2006, fall 2006, April 2007, at least in Switzerland (extent re rest of Europe needs to be checked), which could all be mentioned at the end of this box. Chapter 3 should have the needed references. (Fischlin, Andreas, ETH Zurich)	We agree, but tight word limits mean that we can only focus on the overall picture, and provide details of the large scale impacts.
847	4	30	4	0	0	Section 4.3.5: English is particularly unclear in this section and needs careful checking. The structure of this section is also very confusing; Mixing of extreme events and parameters; too many subsections; too narrow focus on US and Europe. (Stocker, Thomas. IPCC WGI TSU)	The text has been revised accordingly, and much of it is been moved to subsequent sections in this chapter.
848	4	30	4	0	0	Vulnerability as defined in the glossary does not pertain to ecosystems in isolation. Would it be better to discuss ecosystem sensitivity or susceptibility? (IPCC WGII TSU)	Consistency with the glossary definitions has been ensured for the current usage of these terms.
849	4	30	6	0	0	"Extreme climatic events have increased in frequency and magnitude" if I understood chapter 3 correctly, this statement is not true for all kind of extreme climatic events and not all regions, or can be said only with medium to low confidence. This should be pointed out in chapter 4.3.5. too. (Koppe, Christina, Deutscher Wetterdienst)	This text has been deleted from the chapter
850	4	30	6	30	6	SOME extreme climatic events have increased..... (see Chapter 3). (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted from the chapter
851	4	30	6	30	7	This statement is rather unspecific given the that past trends are not apparent for several extreme events as stated in the summary report (SPM). (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This text has been deleted from the chapter
852	4	30	6	30	17	The verb tenses in these paragraphs are not correct. The verb tenses being used make it sound as if the observed trends were isolated instances that occurred in some locations in the past. In fact, it seems that observed trends more broadly are being characterized. The verb tenses must be revised for the paragraphs to be correctly interpreted by the reader. (IPCC WGII TSU)	This text has been deleted from the chapter
853	4	30	7	30	9	This is nearly the same sentence as in the Executive Summary, page 3, lines 35ff, however here the qualifier "negative" is missing? (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted from the chapter
854	4	30	12	0	0	This chapter strongly focuses on the flora, especially on trees. If there is scarce literature on drought impacts on the fauna and on ecosystems in general, this could be stated here. (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This text has been deleted from the chapter
855	4	30	12	0	0	Section 4.3.5.1. The examples provided in this section focus primarily on trees and plant species, whereas the section titles and introductions imply that ecosystem vulnerability/sensitivity will be considered more broadly. Because of this reason and also because conclusions are not clearly presented, the section seems a review of somewhat haphazardly selected literature as opposed to a comprehensive assessment. (IPCC WGII TSU)	This section has been deleted from the chapter with some relevant material moved to subsequent sections.
856	4	30	12	30	17	This paragraph seems to refer to a specific drought. Which one? Europe in 2003? It seems so from what one sees in line 29 below. Some rewriting is needed. (Global Climate Observing System Steering Committee)	This text has been deleted from the chapter
857	4	30	12	30	17	It seems that this paragraph is only referring to the 2003 event, but the overall section addresses observed trends in ecosystem variability independently of the region. There is literature for other regions as well. (Seneviratne, Sonia, ETH Zurich)	This text has been deleted from the chapter
858	4	30	12	30	39	What is the assessment? What are the confidence and/or likelihood levels? (UNITED STATES OF AMERICA)	This section has been deleted from the chapter with some relevant material moved to subsequent sections.
859	4	30	14	0	0	effects widespread? Clarify: when? Where? Everywhere? (UNITED STATES OF AMERICA)	This text has been deleted from the chapter
860	4	30	14	30	14	"The effects of drought and heat wave were widespread" - Where? Globally? Regionally? What time period are you referring to here?; statement "and surprisingly" -- either delete or explain why this is surprising. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted from the chapter
861	4	30	14	30	16	The second sentence of this paragraph appears overly specific and misplaced in this short introductory paragraph to the sections that follow. Also, it is not clear to the reader why the word "surprisingly" is being used here. Its usage needs to be explained. (IPCC WGII TSU)	This text has been deleted from the chapter
862	4	30	14	30	17	Very narrow view of topic and too regionalised. Should include more than just beech and European situation, e.g. Amazon - discussed on page 54 (lines 41-47). First sentence (line 14) also needs to be placed in context. (Chambers, Lynda, Australian Bureau of Meteorology)	This text has been deleted from the chapter

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
863	4	30	14	30	17	Statement on Beech sensitivity & less sensitive are coniferous stands: i) Why use the word 'surprisingly' in line 15?, ii) - Unclear whether all beech in the world are highly sensitive, or in particular regions, iii) How about other broadleaved tree species outside the Mediterranean? How about none tree species (e.g. wetlands)? iv) L26 mentions that Pine (Pinus pinea) is affected by droughts. Similar, the subsequent section (stating in line 44-50 that all tree species are affected). This conflicts with the low sensitivity of coniferous stands. (NETHERLANDS)	This text has been deleted from the chapter
864	4	30	16	30	16	"Granier, Reichstein et al. 2007". It seems that this reference is to the two papers by Granier et al. 2007 and Reichstein et al. 2007. But only the article by Reichstein et al. 2007 is in the reference list. The reference for Granier et al. 2007 is as follows: Granier, A., et al. 2007: Evidence for soil water control on carbon and water dynamics in European forests during the extremely dry year: 2003. Agr. For. Meteor., 143, 123-145. (Seneviratne, Sonia, ETH Zurich)	This text has been deleted from the chapter
865	4	30	16	30	16	The citation for Granier, Reichstein et al. (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted from the chapter
866	4	30	20	0	0	Section 4.3.5.1.1. This section seems to focus primarily on ecosystem impacts, as opposed to vulnerability/sensitivity of ecosystems, in contradiction to the title and purpose of section 4.3.5. (IPCC WGII TSU)	This section has been deleted from the chapter with some relevant material moved to subsequent sections.
867	4	30	20	31	33	The citations in these paragraphs require substantial revision and attention. Many citations are not provided in the chapter's reference list, or it is unclear what source a citation corresponds to in the reference list. The missing citations must be added to the reference list. Then, all citations must be checked to ensure that they can be unambiguously linked to a reference in the reference list. (IPCC WGII TSU)	This section has been deleted from the chapter with some relevant material moved to subsequent sections.
868	4	30	22	31	54	Very focused on vegetation in northern hemisphere - should be more comprehensive of other systems/regions, including the oceans. (Chambers, Lynda, Australian Bureau of Meteorology)	This section has been deleted from the chapter with some relevant material moved to subsequent sections.
869	4	30	29	0	0	there is no reference "Granier, Reichstein et al., 2007"! (GERMANY)	The reference has been clarified
870	4	30	29	30	29	"Granier, Reichstein et al. 2007": Same comment as above. (Seneviratne, Sonia, ETH Zurich)	The reference has been clarified
871	4	30	31	30	32	"...time-lag between climatic extremes and forest decline is widespread" - do you mean it is geographically widespread, or that there are a wide range of values? Please clarify. (Stocker, Thomas, IPCC WGI TSU)	This sentence has been deleted
872	4	30	36	30	36	"Granier, Reichstein et al. 2007": Same comment as above. (Seneviratne, Sonia, ETH Zurich)	This sentence has been deleted
873	4	30	42	30	42	Species death? Extinction? No, the text discusses only mortality. Change the title accordingly or improve the text. (Fischlin, Andreas, ETH Zurich)	This sentence has been deleted
874	4	30	42	31	7	Evergreen coniferous species mortality which were caused by the coupling of the drought and higher temperature from winter to spring have been observed in Republic of Korea (Lim et al. 2010). In 1998, 2002, 2007 and 2009 which were the year of high winter-spring temperature with lower precipitation, Pinus densiflora and P. koraiensis were affected by droughts and many of them in crown layer were died, while deciduous species were survived. Similarly, Abies koreana on high elevation which in an endemic species in Korea is declining according to the rise of temperature in winter since late 1990s. In Northeast Asia, while it is dry from fall to spring, the temperature in that period has been increased rapidly, mortality of evergreen coniferous species occurred and these species are especially vulnerable in the warmer climate (Lim et al. 2010, Allen et al. 2010). (REPUBLIC OF KOREA)	These citations and this material have been added
875	4	30	44	30	45	This sentence must be clarified. What is meant by "death of species" (e.g., extinction?), what is meant by "ultimate stage," and what is meant by "bottleneck event"? (IPCC WGII TSU)	This paragraph has been deleted
876	4	30	44	31	7	Not just plants affected. Could also include lizard and bird heat related papers. Eg Huey et al. 2009 Why tropical forest lizards are vulnerable to climate warming. Proc R. Soc B (published online). McKechnie AE, Wolf BO 2010 Climate change increases the likelihood of catastrophic avian mortality events during extreme heat waves. Biology Letters 6, 253-256 (Chambers, Lynda, Australian Bureau of Meteorology)	This paragraph has been deleted
877	4	30	45	30	45	It does not become clear, to which climatic event is referred to. (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This paragraph has been deleted
878	4	30	47	0	0	Delete "spectacular" (~1% change). Also it should be France, not French. (UNITED STATES OF AMERICA)	This paragraph has been deleted
879	4	30	53	39	53	The citation for UN/POP/EGM-URB/2008/16 is not provided in the chapter's reference list, and is not in the right format. Please ensure this citation is added to the reference list and change the format of the in-text citation to "author, year". (IPCC WGII TSU)	This comment does not apply to this section
880	4	31	1	31	17	What is the confidence level in these statements? How confident are we in distinguishing drought effects from disease effects? (UNITED STATES OF AMERICA)	This section has been deleted from the chapter with some relevant material moved to subsequent sections.
881	4	31	12	0	0	Unclear and too general. (Which forest ecotone shows a increasing pine mortality? Where?) (NETHERLANDS)	This sentence has been deleted
882	4	31	12	31	12	What region are you referring to in relation to the "1950s drought". (Stocker, Thomas, IPCC WGI TSU)	This sentence has been deleted
883	4	31	12	31	12	location? Also, there are other examples in the literature that could be cited in this section. (UNITED STATES OF AMERICA)	This sentence has been deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
884	4	31	20	31	20	This section should include a discussion of carbon uptake in oceans. (UNITED STATES OF AMERICA)	This section has been deleted from the chapter with some relevant material moved to subsequent sections.
885	4	31	22	31	31	An issue here is the effect of temperature vs dryness in affecting the ecosystems. These two effects are conflated here. (UNITED STATES OF AMERICA)	The linkage between temperature and dryness in this context has been noted.
886	4	31	28	31	29	The article by Jones and Cox (2005) suggests a possibly detectable effect of the 2003 heatwave in the Mauna Loa record. Maybe a reference to that article could be added. [Jones and Cox 2005, GRL, 32 (14), L14816]. (Seneviratne, Sonia, ETH Zurich)	This reference has been considered
887	4	31	34	0	0	Section 4.3.5.2. The information presented in this section reviews a few relevant sources, but without drawing conclusions of the author team's assessment of the sources. The section would be much more effective if the author team provided an indication of the overall state of knowledge for topics covered. Additionally, it seems that a more comprehensive assessment, including more sources, is necessary. (IPCC WGII TSU)	This section has been deleted from the chapter with some relevant material moved to subsequent sections.
888	4	31	36	31	37	Needs context as to where and when. (Chambers, Lynda, Australian Bureau of Meteorology)	The sentence has been revised accordingly to clarify it
889	4	31	36	31	37	Is this statement valid in such a general way? (Holsten, Anne, Potsdam Institute of Climate Impact Research)	The sentence has been revised accordingly to clarify it
890	4	31	36	31	37	WHERE was the "extreme flood"? Don't you mean to say - "An extreme flood CAN cause large...." (Stocker, Thomas, IPCC WGI TSU)	The sentence has been revised accordingly to clarify it
891	4	31	36	31	37	Unclear example. (Where, when? Is there a relation with the second paragraph of this section?) (NETHERLANDS)	The sentence has been revised accordingly to clarify it
892	4	31	36	31	45	One can conclude here that ecosystems are vulnerable to weather/climate variability. What is the assessment/relevance with respect to anthropogenic climate change? (UNITED STATES OF AMERICA)	This section has been deleted from the chapter with some relevant material moved to subsequent sections.
893	4	31	37	31	37	Typo in citation: For Thibault et al. (2008), only two authors are listed in the chapter's reference list. Please ensure the citation is correct and harmonize the reference in both locations (chapter text and reference list). (IPCC WGII TSU)	The reference has been revised accordingly
894	4	31	39	31	45	What about positive effects of floods on ecosystems, e.g. where floods form a vital part of the system? (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This is a very good point, which has been briefly addressed in section 4.2.1.
895	4	31	40	31	41	Typo in citation: For Thibault et al. (2008), only two authors are listed in the chapter's reference list. Please ensure the citation is correct and harmonize the reference in both locations (chapter text and reference list). (IPCC WGII TSU)	The reference has been revised accordingly
896	4	31	41	31	41	"wiping out parts of its population" - are you still referring to rodents here? Or do you mean human population here? (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted from the chapter
897	4	31	45	31	45	It is unclear what source Cardoso et al. (2008) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This text has been deleted from the chapter
898	4	31	48	0	0	Section 4.3.5.3. The information presented in this section reviews a few relevant sources, but without drawing conclusions of the author team's assessment of the sources. The section would be much more effective if the author team provided an indication of the overall state of knowledge for topics covered. Additionally, it seems that a more comprehensive assessment, including more sources, is necessary. (IPCC WGII TSU)	Most of this paragraph has been deleted from the chapter
899	4	31	48	31	54	The results and costs from storm Lothar in 1999 are missing. This should be added as an example of extreme storm events and its losses in €. (GERMANY)	Most of this paragraph has been deleted from the chapter
900	4	31	48	32	29	The citations in these paragraphs require substantial revision and attention. Many citations are not provided in the chapter's reference list, or it is unclear what source a citation corresponds to in the reference list. The missing citations must be added to the reference list. Then, all citations must be checked to ensure that they can be unambiguously linked to a reference in the reference list. (IPCC WGII TSU)	Most of this text has been deleted from the chapter
901	4	31	50	31	54	Concerning the vulnerability of trees and forest stands to storms and its projection for the future climate see also: Klaus M., Holsten A., Hostert P., Kropp J.P. (2011): An integrated methodology to assess windthrow impacts on forest stands under climate change. Forest Ecology and Management, doi:10.1016/j.foreco.2011.02.002, in press (available online) (Holsten, Anne, Potsdam Institute of Climate Impact Research)	Most of this paragraph has been deleted from the chapter
902	4	32	2	32	2	"Cyclones are discussed elsewhere in Chapter 4" -- where? Please specify. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted from the chapter
903	4	32	7	32	16	The entire paragraph sounds very alarming, might be problematic because of: i) Section is based on only one, 12 year old reference, ii) Consider that ENSO has always occurred in the past, although may be with different cycle/frequency and severity, iii) Line 12 & 14 contain exaggerating wording (NETHERLANDS)	This text has been deleted from the chapter
904	4	32	11	0	0	The phrase switching over to a strong La Nina is here for what reason? Are fast transitions found to be important for the ecological impacts? (UNITED STATES OF AMERICA)	This text has been deleted from the chapter
905	4	32	18	32	20	This sentence is not entirely true and contradicts information on page 36 (lines 38-42). There are many papers describing impacts on ENSO on species - particularly marine and waterbirds. (Chambers, Lynda, Australian Bureau of Meteorology)	This text has been deleted from the chapter

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
906	4	32	22	32	27	This paragraph is of very general nature and could be moved to a more prominent position. (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This text has been deleted from the chapter
907	4	32	22	32	27	Suggest to delete the statements provided in brackets. Those read like rather weak excuse. In fact, the problem of research having been published in non-english languages could have been overcome by inviting contributing authors from the relevant countries to assist, who then could have assessed this additional research. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted from the chapter
908	4	32	22	32	27	Why here suddenly special attention to developing societies? i) The overall section is on ecosystems, ii) Correct that less information is available for developing countries. But this is valid for most/all points made in the entire chapter. If statement should remain. place it in broader context of data availability (NETHERLANDS)	This text has been deleted from the chapter
909	4	32	22	32	27	The parenthetical description here is not appropriate to include in the chapter text because, for example, non-English articles can be included if English abstracts are provided. (IPCC WGII TSU)	This text has been deleted from the chapter
910	4	32	23	32	27	The wording "lacks the paper in English" is not reasonable because as this is a report of IPCC, which is a gathering of member countries. Many governments take part in it. Further, there are also authors who are from different countries and whose mother tongues are not English. Therefore, the paper and information in other languages should be and can be emphasized. (CHINA)	This text has been deleted from the chapter
911	4	32	30	32	30	Why is the "Coral Reef Bleaching" subsection called "Case Study", but other subsection in this section 4.3.5 are not? This seems inconsistent. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted from the chapter
912	4	32	30	32	30	Why was this particular case study selected? Why aren't there others? (UNITED STATES OF AMERICA)	This text has been deleted from the chapter
913	4	32	36	32	37	How robust are these percentages? Can additional studies be cited here? (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted from the chapter
914	4	32	41	32	42	Be careful with the statement of increasing bleaching. Based on figure 4-10, someone could also state the opposite (peaking in 1998 and decreasing afterwards), considering that SST is in general still increasing. (NETHERLANDS)	This text has been deleted from the chapter
915	4	32	42	32	42	is there confidence or likelihood that can be assigned to this statement? (UNITED STATES OF AMERICA)	This text has been deleted from the chapter
916	4	32	43	32	43	The citation for Berkemans et al. (2004) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted from the chapter
917	4	32	46	0	0	Figure 4-10: Figure has to be improved considerably. What is a bleaching record? How were these records observed? How is the colour coded High-Unknown scale derived? What is the source of this data?. The highly unusual labelling of the X-axis is not appropriate. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted from the chapter
918	4	32	47	0	0	Fig 4-10, comment: Reference in figure 4-10 is missing (NETHERLANDS)	This text has been deleted from the chapter
919	4	33	4	33	6	Can this statement on lines 4-6 be updated based on results from the AR4 rather than the TAR? Suggest to rewrite the statement clarifying what kind of results from AOGCMs (projected ocean temperatures, we assume) have been used as the basis for the bleaching analysis. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted from the chapter
920	4	33	4	33	9	This paragraph focuses on projected, trends, however, is embedded in within the chapter on observed trends in ecosystem vulnerability. A stronger distinction should thus be made between observations and projections. (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This text has been deleted from the chapter
921	4	33	4	33	9	This paragraph is on projections, whereas rest of section is on observations (NETHERLANDS)	This text has been deleted from the chapter
922	4	33	11	33	13	Suggestion to move the vulnerability sentence to line 4. This is the basis for the projections. (NETHERLANDS)	This text has been deleted from the chapter
923	4	33	12	33	12	change "prediction" to "projection" (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted from the chapter
924	4	33	13	33	14	How is 'high solar radiation' related with climate change? (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted from the chapter
925	4	33	17	33	17	suggest to refer to the Chapter 3 assessment of tropical cyclones here. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted from the chapter
926	4	33	21	33	21	In discussion coral reefs, the recent findings of Yamano (2011) should be included as they demonstrate that coral reefs can rapidly expand their ranges as rising SST opens up regions that previously were too cold for the establishment of coral communities. (UNITED STATES OF AMERICA)	This text has been deleted from the chapter
927	4	33	23	0	0	Section 4.4 shows a lot of redundancy with section 4.3, especially 4.3.4, e.g. water subsection p33 and water subsection p28, please limit redundancy. (Stocker, Thomas, IPCC WGI TSU)	Section 4.3 has been deleted from this chapter to address this point, with some relevant material moved to section 4.4 and other parts of the chapter
928	4	33	23	0	0	Section 4.4. The material in section 4.3 should be merged into section 4.4. Please see our extended comment for section 4.3. (IPCC WGII TSU)	Section 4.3 has been deleted from this chapter to address this point, with some relevant material moved to section 4.4 and other parts of the chapter
929	4	33	23	44	36	Section 4.4. overall: No assessment here of anthropogenic climate change contribution to past or future changes. Therefore this material could be greatly shortened here, and with the extensive literature review submitted to a journal as a review paper on the topic. (UNITED STATES OF AMERICA)	Section 4.3 has been deleted from this chapter to address this point, with some relevant material moved to section 4.4 to strengthen the assessment of this section
930	4	33	25	0	0	Section 4.4.1. This paragraph needs to be revised to provide a clear, concise introduction to the scope of material being assessed in the subsections to follow, reflecting a more robust description of the strengths and limitations of the underlying literature. (IPCC WGII TSU)	The section has been revised accordingly

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
931	4	33	27	33	27	delete "existing" -- non-existing studies obviously can not be assessed. (Stocker, Thomas, IPCC WGI TSU)	Deleted.
932	4	33	27	33	37	Please check whether in this paragraph the dependence of vulnerability from the frequency of events should be explained. The highest vulnerability exists when an event affects systems the "first" time (see page 29 line 2 different effects of hurricanes at Bangladesh and Myanmar). Vulnerability decreases when events affect a (human) system in one generation again, because precaution measures are kept for some time. Therefore the vulnerability for "new" or "stronger" (due to climate change) weather or climate extremes and hazards triggered by them could be higher than that one observed in the past. This has to be regarded in cost/benefit analysis of adaptation measures. (GERMANY)	The description of the vulnerability in this paragraph has been carefully checked and revised to ensure accuracy In this introductory context
933	4	33	31	33	32	it might be partially due to the limited availability of reliable detailed knowledge on change in extreme events' - It is not within the scope of chapter 4, or the expertise of the authors to judge in such general terms, the reliability of knowledge relating to extreme events. You can certainly refer to: "limitations associated with incomplete knowledge and uncertainty associated with changes in some extreme events (Chapter 3 - Section 3.2.3)". (Stocker, Thomas, IPCC WGI TSU)	The sentence has been revised accordingly
934	4	33	35	33	35	What do you mean - "Are taken up"? (Stocker, Thomas, IPCC WGI TSU)	Deleted.
935	4	33	40	0	0	Table 4-10: We really struggle to see the logic behind the design of this table -- it's more an Appendix or Supplementary Material than anything else. What do you want readers to take from this table? What key messages are being illustrated here? Some of the entries under 'Hazards/exposures and their extents' make no sense - since when is daily max temperature considered a hazard? This table needs considerable thought, and redesign if it is to serve a useful purpose, occupying 7 pages of this report. (Stocker, Thomas, IPCC WGI TSU)	This table has been deleted
936	4	33	43	0	0	The chapter on the water sector could be extended by the issues of groundwater and soil water changes. The latter is especially relevant for agriculture and ecosystems. A simulation study for the North-East Lowlands of German for example has shown, that even a possible increase in precipitation in this area could lead to reductions in soil moisture. An also possible strong reduction in precipitation could led to extreme dry conditions of soil moisture similar to what has been experienced in the exceptionally hot summer of 2003. This would then have large consequences especially for protected wetland areas. (see: Holsten A.; Vetter V.; Vohland K.; Krysanova V. (2009): Impact of climate change on soil moisture dynamics in Brandenburg with a focus on nature conservation areas. Ecological Modelling, 220/17, 2076-2087, doi:10.1016/j.ecolmodel.2009.04.038) (Holsten, Anne, Potsdam Institute of Climate Impact Research)	These issues are not relevant for Chapter 4
937	4	33	43	0	0	How does section 4.4.2 relate to section 4.3.3.2? (UNITED STATES OF AMERICA)	Section 4.3 has been deleted from this chapter to address this point, with some relevant material integrated into section 4.4
938	4	33	43	0	0	There is no mention of water quality or groundwater in this assessment. Please consider addressing these issues in this discussion. (UNITED STATES OF AMERICA)	These topics are mentioned, but their assessment should more properly happen in chapter 3
939	4	33	43	0	0	There is no mention of water quality or groundwater in this assessment. Please consider addressing these issues in this discussion. (UNITED STATES OF AMERICA)	These topics are mentioned, but their assessment should more properly happen in chapter 3
940	4	33	43	0	0	Section 4.4.2. All of the chapter 3 references need to be updated to reflect the most recent chapter 3 section structure and assessment findings. (IPCC WGII TSU)	The text has been revised accordingly
941	4	33	43	0	0	Section 4.4.2. The information presented in this section reviews relevant sources, but could be improved by more clearly drawing conclusions of the author team's assessment of the sources. The effectiveness of the section could be increased if the author team provided an indication of the overall state of knowledge for topics covered, perhaps presenting conclusions characterized by calibrated uncertainty language per the AR5 Guidance Note on Treatment of Uncertainties. (IPCC WGII TSU)	Yes, the text has been revised accordingly in FGD.
942	4	33	43	35	46	Please check for consistency with chapter 3 (in particular sections 3.5.1 and 3.5.2). Some references to chapter 3 seem to date back to the FOD. (Seneviratne, Sonia, ETH Zurich)	Consistency with chapter 3 has been ensured
943	4	33	49	0	0	Add (Fauchon 2010) (BOURRELIER, PAUL-HENRI, AFPCN)	This reference is unknown to the authors
944	4	33	53	33	54	If you want to cite chapter 3 here, you need to accurately do so. Possible wording would be: "There is medium confidence that the projected duration and intensity of hydrological drought will increase in some regions with climate change (Section 3.5.1), but other factors leading to a reduction in river flows or groundwater recharge are changes in agricultural land cover, and upstream interventions". NOTE: Chapter 3 do not project future 'river flows', as you are suggesting here with your current wording, but consider 'hydrological drought' ie, a term which refers to negative anomalies in stream flow. (Stocker, Thomas, IPCC WGI TSU)	Accordingly, assessment of studies on physical change will not be done in this chapter but in Chapter 3, with reference provided here.
945	4	34	3	34	4	Demand is also affected by weather extremes and by climate change. (Darch, Geoff, Atkins & University of East Anglia)	The text has been revised accordingly

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
946	4	34	12	34	12	After "... local catchment scale." Could be added the following section that summarizes the results of a local water availability impact study that will be soon published in Climatic Change Letters: The study of Tsanis et al., (2010) presents a local impact study of water shortage and extremes under A1B SRES emission scenario. The state-of-the-art Ensembles dataset was employed to assess the impact of the changing climate on the water availability of the island of Crete at basin scale. An ensemble of precipitation and temperature modeled data is used as input for a rainfall-runoff model previous calibrated for the whole island with the principle of regionalization. Data analysis for the period 1970-2100 revealed an overall decreasing precipitation trend which, combined with a temperature rise, leads to substantial reduction of water availability. They concluded that by 2100 there is an 80% probability that a projected 5.4 oC temperature increase will decrease the water availability by almost 50% while the probability that it will remain unchanged is less than 5%. The quantitative impact of these changes on water availability can be substantial at watershed level, especially in a Mediterranean island like Crete. REFERENCE: Tsanis, I.K., Koutroulis A.G., Daliakopoulos, I.N., D. Jacob., 2010: Severe Climate-Induced Water Shortage and Extremes in Crete, Climatic Change Letters, (in press), DOI: 10.1007/s10584-011-0048-2 (GREECE)	This reference refers to hydrological change, and not a quantitative assessment on a specific supply system: it is more relevant for Chapter 3
947	4	34	14	34	14	Cost is considered indirectly via option appraisal (e.g. in investment plans by water companies). (Darch, Geoff, Atkins & University of East Anglia)	Agreed - but virtually none of such studies have been published
948	4	34	20	34	20	Typo citation: For Kim and Kalvarachi (2009), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	The citation has been revised
949	4	34	22	0	0	not Macdonald et al. (2009) , but MacDonald et al. (2009) (NISHIMORI, Motoki, National Institute for Agri-Environmental Sciences)	The citation has been revised
950	4	34	29	34	29	Should be: (see Section 3.5.1) (Stocker, Thomas, IPCC WGI TSU)	The reference has been revised
951	4	34	30	34	41	This is all based on a single study.... Could you add additional studies in support of your assessment? (Stocker, Thomas, IPCC WGI TSU)	there were none published at time of drafting.
952	4	34	33	34	33	Our understanding of the Lehner et al papers, is that two Global Climate Models were used - ECHAM4, and HadCM3. This also needs to be corrected in the caption for figure 4-11, which refers to ECHAM4 and HadCM3 as being 'climate scenarios'. (Stocker, Thomas, IPCC WGI TSU)	The text and legend have been revised accordingly
953	4	34	34	34	34	What do you mean by "present 100-year return period" - is this referring to the 1961 - 1990 return period? Please specify. (Stocker, Thomas, IPCC WGI TSU)	The text has been revised accordingly
954	4	34	43	34	43	See comment relating to Chapter 4 page 18 line 42. Climate change does not alter the partitioning of precipitation. A changed partitioning of precipitation is a manifestation of climate change. Increased greenhouse gas emissions or some other agent of climate change may alter the partitioning. (Global Climate Observing System Steering Committee)	The text has been revised accordingly
955	4	34	43	34	45	Although a reference is given to the chapter 3 section on floods (which needs to be updated to reflect the current chapter 3 section structure), it seems that citations to other chapter 3 sections on precipitation and drought would be appropriate. (IPCC WGII TSU)	The text has been revised
956	4	34	45	34	45	Should be (Section 3.5.1) (Stocker, Thomas, IPCC WGI TSU)	The text has been revised
957	4	34	47	34	47	Typo citation: For Brontsert et al. (2007), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	The reference has been revised
958	4	34	49	34	50	Catchment Flood Management Plans (England and Wales) explicitly consider social vulnerability through the Social Flood Vulnerability Index (see Tapsell, S.M., Penning-Rowsell, E.C., Tunstall, S.M. and Wilson, T.L. 2002. Vulnerability to flooding: health and social dimensions. Philosophical Transactions of the Royal Society of London Series A – Mathematical Physical and Engineering Sciences, 360, 1511–1525.) (Darch, Geoff, Atkins & University of East Anglia)	Agree - but the text refers to changing impacts due to climate change.
959	4	35	1	35	25	The EU funded research FP6 project WATCH (www.eu-watch.org) will soon publish (ends 31/07/2011) the final reports that include analysis, quantification an prediction of the components of the current and future global water cycles and related water resources states; evaluate their uncertainties and clarify the overall vulnerability of global water resources related to the main societal and economic sectors, including large scale floods and droughts. IPCC SREX could be updated with the project results. (GREECE)	The publication of this report falls after the cutoff deadline for literature in the SREX report
960	4	35	1	35	46	A long discussion of flooding and impacts is presented. However what is missing is some conclusion on what the discussed material means as a whole. Also missing is the Ch. 3 assessment of confidence levels in flooding projections (e.g., Ch. 3, p. 57-58, Section 3.5.2). A better integration is needed with Ch. 3 assessment results. (UNITED STATES OF AMERICA)	Linkage with chapter 3 material has been improved, and the revision of the section has focused on highlighting findings as well
961	4	35	12	35	13	Can you be more specific about the socio-economic scenarios being used? Are these SRES scenarios? (Stocker, Thomas, IPCC WGI TSU)	The sentence has been clarified

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
962	4	35	19	35	19	The citation for Ciscar (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	will do - the final report is now published
963	4	35	19	35	25	The report, very rightly, considers the recent PNAS publication (http://www.pnas.org/content/early/2011/01/27/1011612108.abstract) on the PESETA study about impacts of climate change in Europe. However, SREX is referring only to the river floods work, while the publication also covered agriculture, coastal systems, tourism and human health, and in an integrated way. In that respect, SREX editors may find useful to consider also these aspects. (European Commission, DG Research, Directorate Environment Climate Change & Environmental Risks Unit)	These other topics are considered elsewhere in the chapter and report
964	4	35	23	0	0	Reference is missing of the comparison of processes in temperate and tropical systems (NETHERLANDS)	It seems this comment does not pertain to this section
965	4	35	23	35	23	The citation for Ciscar (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	will do - the final report is now published
966	4	35	37	35	38	This sentence does not seem consistent with chapter 3 (Section 3.5.2). Section 3.5.2 notes low confidence in observed trends in floods. (Seneviratne, Sonia, ETH Zurich)	the sentence refers to future changes, not past trends, and relates just to one climate model
967	4	35	41	0	0	Table 4-11: Need to explain the top row - ie, what do the abbreviation refer to (GCMs and SRES scenarios). What is the temperature value given in brackets in the top row? What are the error bars and uncertainties associated with these numbers.... Need to provide much more than just the best estimate (or central value). (Stocker, Thomas, IPCC WGI TSU)	The terms have been clarified and the numbers in the top row are temperature increase in European region for each model.
968	4	35	41	35	41	The citation for Ciscar (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	will do - the final report is now published
969	4	35	44	0	0	Figure 4-11: HadCM3 and ECHAM4 are not scenarios! They are global climate models. Please correct figure caption. Specify what is meant by 'todays 100-year event': 1961 - 1990? (Stocker, Thomas, IPCC WGI TSU)	The legend has been revised
970	4	35	49	0	0	The structure of the chapter is unclear. Moreover, what about other ecosystems besides the mentioned grasslands and deserts? (Holsten, Anne, Potsdam Institute of Climate Impact Research)	The section has been revised to improve its structure and treatment of a variety of ecosystems
971	4	35	49	0	0	Numerous incorrect citations to IPCC. Please cite specific chapters. (Stocker, Thomas, IPCC WGI TSU)	The citations have been revised
972	4	35	49	0	0	Section 4.4.3. The information presented in this section reviews relevant sources, but could be improved by more clearly drawing conclusions of the author team's assessment of the sources and using calibrated uncertainty language (per the AR5 Guidance Note on Treatment of Uncertainties) to characterize the author team's degree of certainty in these conclusions. (IPCC WGII TSU)	Section has been substantially revised with an emphasis on highlighting conclusions
973	4	35	51	35	51	"could have serious impact on" -- this is a rather vague statement. Is it necessary here at the start of section 4.4.3? (Stocker, Thomas, IPCC WGI TSU)	The opening statement has been revised
974	4	35	51	35	53	First sentence is in principle correct. However: 1) other ecosystems rely on the occurrence of certain extremes (e.g. ecosystem fires) and 2) extremes always occurred. The challenge for a report like this SREX report is to describe the consequences of changes in frequency and severity of these extremes. (NETHERLANDS)	Revised to emphasize the substantial effect extremes have on ecosystems, taking these points into consideration.
975	4	35	51	35	53	Reference is missing to the 80% reduction (NETHERLANDS)	It is not clear what this comment is referring to
976	4	35	51	37	52	This section is too broad and discusses impacts in too general terms. The focus on extreme events needs to be strengthened. As before I am also having conceptual difficulties: Is fire per se always an extreme event? If a fire regime with frequent fires is changing due to CC, is this to be considered a change in extreme events or just a change in means? (Fischlin, Andreas, ETH Zurich)	This section has been revised to increase focus on impacts of extreme weather and climate events
977	4	36	1	36	1	Is 'likely' meant here as calibrated uncertainty language? If so, please italicize. Otherwise replace. (Stocker, Thomas, IPCC WGI TSU)	Usage of this term has been removed
978	4	36	6	36	6	Which glossary are you referring to here? 'endemic succulent' will not be in the SREX glossary! (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
979	4	36	7	36	7	what is "appreciable mortality"? (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
980	4	36	8	36	8	Incorrect citation of our work Fischlin et al, 2007. But more importantly, what about research since then? Confirmation, contradicting findings, updates? Cited References: ----- Fischlin, A., Midgley, G. F., Price, J. T., Leemans, R., Gopal, B., Turley, C., Rounsevell, M. D. A., Dube, O. P., Tarazona, J., & Velichko, A. A., 2007. Ecosystems, their properties, goods and services. In: Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (eds.). Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC). Cambridge University Press: Cambridge, UK. 211-272. (http://www.ipcc.ch) Fi103 (Fischlin, Andreas, ETH Zurich)	This text has been deleted
981	4	36	8	36	8	The citation "IPCC, AR4, GWII, section 4.4.2" is not correct. Please cite chapters of previous IPCC Assessment Reports by giving the author names of the chapter, followed by the publication year. Also, list this citation in the reference list under the author names. (IPCC WGII TSU)	This text has been deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
982	4	36	10	36	19	This paragraph seems to compare the magnitude of impacts due to extreme events to the magnitude of impacts due to gradual climate change (over an unspecified time period). The rationale for this comparison is not clear. It should be considered whether this comparison is the most useful one to make. (IPCC WGII TSU)	The paragraph has been reduced in length to clarify this point
983	4	36	13	36	13	Please clarify "4 days, 1oC" -- 4 days per oC? (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
984	4	36	16	36	16	Please cite a specific IPCC chapter. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
985	4	36	17	36	17	clarify what you mean by "the vigour of their effects may reach a decadal scale of warming" -- don't understand the "decadal scale of warming" part. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
986	4	36	17	36	19	The relation between phenology, extreme events and diversity does not become clear. (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This text has been deleted
987	4	36	21	36	21	Is 'likely' meant here as calibrated uncertainty language? If so, please italicize. Otherwise replace. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
988	4	36	21	36	23	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. We also wonder if this sentence reflects the author team's assessment of literature for this topic or is a more general introduction. If it does reflect the author team's assessment, it would be beneficial to characterize the finding with calibrated uncertainty language, perhaps summary terms for evidence and agreement or levels of confidence, per the AR5 Guidance Note on Treatment of Uncertainties. (IPCC WGII TSU)	This text has been deleted
989	4	36	24	36	25	Very vague, and generalised statements here on fire frequencies. For what time period were 'greater fire frequencies' noted in the Mediterranean Basin? How were these frequencies projected? Uncertainties? (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
990	4	36	25	36	25	Is 'likely' meant here as calibrated uncertainty language? If so, please italicize. Otherwise replace. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
991	4	36	25	36	25	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	This text has been deleted
992	4	36	26	36	26	Incorrect citation of our work Fischlin et al, 2007. But more importantly, what about research since then? Confirmation, contradicting findings, updates? Cited References: ----- Fischlin, A., Midgley, G. F., Price, J. T., Leemans, R., Gopal, B., Turley, C., Rounsevell, M. D. A., Dube, O. P., Tarazona, J., & Velichko, A. A., 2007. Ecosystems, their properties, goods and services. In: Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (eds.). Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC). Cambridge University Press: Cambridge, UK. 211-272. (http://www.ipcc.ch) Fi103 (Fischlin, Andreas, ETH Zurich)	This text has been deleted
993	4	36	26	36	26	Typo in citation: For Pausas et al. (2004) only two authors are listed in the chapter's reference list. Please ensure the citation is correct and harmonize the reference in both locations (chapter text and reference list). (IPCC WGII TSU)	This text has been deleted
994	4	36	26	36	26	The citation "IPCC, AR4, GWII, section 4.4.3" is not correct. Please cite chapters of previous IPCC Assessment Reports by giving the author names of the chapter, followed by the publication year. Also, list this citation in the reference list under the author names. (IPCC WGII TSU)	This text has been deleted
995	4	36	28	0	0	The concept and implications of nonlinear systems dynamics in ecosystems seems crucial to assessing impacts and should be included in additional sections of report (UNITED STATES OF AMERICA)	This text has been deleted
996	4	36	32	36	34	Is this sentence consistent with Section 4.3.5.4.? (Seneviratne, Sonia, ETH Zurich)	This text has been deleted
997	4	36	37	36	37	The citation for Jentsch & Beierkuhnlein (2003) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted
998	4	36	38	36	38	This contradicts early sections where you suggest that future climate extremes have no precedent from the past. Should be reworded to: "Current extreme climate event CAN provide an indication....." (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
999	4	36	38	36	39	Is the "warm-water phase of ENSO" a commonly used term -- wouldn't it be necessary to specify where the warm water could be found? (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1000	4	36	41	36	41	Incorrect citation of our work Fischlin et al, 2007. But more importantly, what about research since then? Confirmation, contradicting findings, updates? Cited References: ----- Fischlin, A., Midgley, G. F., Price, J. T., Leemans, R., Gopal, B., Turley, C., Rounsevell, M. D. A., Dube, O. P., Tarazona, J., & Velichko, A. A., 2007. Ecosystems, their properties, goods and services. In: Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (eds.). Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC). Cambridge University Press: Cambridge, UK. 211-272. (http://www.ipcc.ch) Fi103 (Fischlin, Andreas, ETH Zurich)	This text has been deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1001	4	36	41	36	42	The citation "IPCC, AR4, GWII, section 4.4.9" is not correct. Please cite chapters of previous IPCC Assessment Reports by giving the author names of the chapter, followed by the publication year. Also, list this citation in the reference list under the author names. (IPCC WGII TSU)	This text has been deleted
1002	4	36	51	36	51	Typo in citation: For Mc Kechnie et. al. (2010) only two authors are listed in the chapter's reference list. Please ensure the citation is correct and harmonize the reference in both locations (chapter text and reference list). (IPCC WGII TSU)	The citation has been clarified
1003	4	36	53	0	0	The mentioned Aurajo study is not based on climate extremes. Proposition to delete this paragraph. (NETHERLANDS)	This text has been deleted
1004	4	36	53	36	54	"could trigger" is a rather vague statement. Please provide uncertainty assessment. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1005	4	36	54	37	2	The relationship between the "4 emissions scenarios" and the four models described in the subsequent sentence fragment is not clear. Additionally, the description seems inconsistent with the cited study (Araujo et al., 2006). Finally, the IPCC does not propose models. (IPCC WGII TSU)	This text has been deleted
1006	4	37	1	37	2	Delete the sentence starting with "One model proposed by..."; The IPCC does not 'propose' climate models! Five GCM model runs were used in this study; 4 from HadCM3 and 1 from CSIRO. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1007	4	37	3	37	3	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	This text has been deleted
1008	4	37	5	37	5	Delete ", including Portugal, Spain and France" -- that's basically what makes up "Southwest of Europe". (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1009	4	37	9	37	9	hotpots --> hotspots (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1010	4	37	11	37	13	Is there a direct link between these mentioned extreme events and climate change? (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This text has been deleted
1011	4	37	11	37	13	This sentence introducing ecological surprises conflates description of physical events, physical impacts, and ecological impacts. It is difficult to determine exactly what is meant by an ecological surprise from this sentence. (IPCC WGII TSU)	This text has been deleted
1012	4	37	16	37	16	Incorrect citation of our work Fischlin et al, 2007. But more importantly, what about research since then? Confirmation, contradicting findings, updates? Cited References: ----- Fischlin, A., Midgley, G. F., Price, J. T., Leemans, R., Gopal, B., Turley, C., Rounsevell, M. D. A., Dube, O. P., Tarazona, J., & Velichko, A. A., 2007. Ecosystems, their properties, goods and services. In: Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J., & Hanson, C. E. (eds.). Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC). Cambridge University Press: Cambridge, UK. 211-272. (http://www.ipcc.ch) Fi103 (Fischlin, Andreas, ETH Zurich)	The citation has been clarified
1013	4	37	16	37	16	The citation "IPCC, AR4, GWII, 4.4.10" is not correct. Please cite chapters of previous IPCC Assessment Reports by giving the author names of the chapter, followed by the publication year. Also, list this citation in the reference list under the author names. (IPCC WGII TSU)	The citation has been clarified
1014	4	37	16	37	18	"could also impact on" is a rather vague statement. Please provide uncertainty assessment. (Stocker, Thomas, IPCC WGI TSU)	The text has been clarified
1015	4	37	17	37	17	Typo in citation: For McKechnie et. al. (2010) only two authors are listed in the chapter's reference list. Please ensure the citation is correct and harmonize the reference in both locations (chapter text and reference list). (IPCC WGII TSU)	The citation has been clarified
1016	4	37	18	37	18	Typo citation: For Arau' jo, et al. (2006), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	The citation has been clarified
1017	4	37	20	37	26	"ENSO event could lead to some extremes that impact on ecosystems" is an extremely vague statement. Please be more specific and provide uncertainty assessment for these statements. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1018	4	37	20	37	26	The first sentence is general, but correct. The remaining sentences of the paragraph have, however, limited relation to this. Are these really impacts of ENSO? Again, propose to delete this. Use 1st sentence as a base for subsequent paragraph (NETHERLANDS)	This text has been deleted
1019	4	37	20	37	36	These paragraphs do not seem consistent with Section 4.3.5.4. (Seneviratne, Sonia, ETH Zurich)	This text has been deleted
1020	4	37	29	37	34	Are these assessments of ENSO-related physical climate changes consistent with the assessment provided in Chapter 3? Please verify. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1021	4	37	34	0	0	"unprecedentedly prolonged and strong ENSO episodes" needs a reference, and also more context (e.g., "ENSO episodes of duration and intensity that were unprecedented in the historical record [reference]" (UNITED STATES OF AMERICA)	This text has been deleted
1022	4	37	35	0	0	Reference missing on impacts on vegetation production (NETHERLANDS)	This text has been deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1023	4	37	36	37	36	The citation for Both (2006) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted
1024	4	37	38	37	48	Delete last sentence of 1st paragraph and merge these paragraphs. (NETHERLANDS)	This text has been deleted
1025	4	37	38	37	52	These paragraphs on ecosystem services seems to be a bit out of place here; suggest to move this to the introduction part of the section as it's not really providing an assessment, rather providing a number of general statements. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1026	4	37	43	37	48	The statements in this paragraph need to be further supported by relevant citations. In particular, the second sentence requires citation and perhaps more subtle consideration of complexities. Additionally, these sentences should directly support the final sentence of the preceding paragraph on ecosystems providing protection from disasters and extreme weather. (IPCC WGII TSU)	This text has been deleted
1027	4	37	44	37	46	These two examples of feedbacks are at such opposite ends of the scale they should not be put in the same sentence. The loss of forest protection for avalanches is an obvious, direct, local-scale feedback, whereas the CO2 example makes a gigantic leap that links future drought and wildfire to increased global atmospheric CO2. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1028	4	37	46	37	48	Also other dependencies of ecosystems on extreme events are known, such as chilling requirement for the phenological system (see: Mark D. Schwartz, Jonathan M. Hanes: Continental-scale phenology (2009): warming and chilling. International Journal of Climatology. Volume 30, Issue 11, pages 1595–1598 (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This text has been deleted
1029	4	37	50	37	52	Is this statement valid in such a general way? (Holsten, Anne, Potsdam Institute of Climate Impact Research)	This text has been deleted
1030	4	37	50	37	52	replace sentence by: "The reaction of ecosystems to extreme events depends on different factors (Jentsch&Beierkuhnlein, 2008). In general, diverse ecosystems are more likely to sustain and to recover from extreme climate events, thus biodiversity is important in reducing damage risks (Cairns, 1997)." (GERMANY)	This text has been deleted
1031	4	37	50	37	52	NEW REFERENCE: Jentsch A. & Beierkuhnlein C.: C.R. Geoscience 340 (2008) 621-628. Comment: The question whether the "insurance hypothesis" holds also true for extreme events is not yet settled (in fact discussions are just starting). I thus suggest to put the statement of Cairns into perspective. (GERMANY)	This text has been deleted
1032	4	37	50	37	52	The importance of biodiversity for sustainable ecosystem services is a new dimension here. It might be better to avoid it here (=delete paragraph). (NETHERLANDS)	This text has been deleted
1033	4	37	50	37	52	These sentences presumably could be supported by additional, more recent citations. (IPCC WGII TSU)	This text has been deleted
1034	4	38	1	0	0	lack of uncertainty assessment is striking: "can be affected", "will affect", "will have negative impacts", "will negatively impact" etc. need to be complemented with information on evidence/agreement, confidence, likelihood. (Stocker, Thomas, IPCC WGI TSU)	The degree of certainty implied in statements has been carefully considered
1035	4	38	1	0	0	Suggest that in section 4.4.4 on Food Security, the authors also include a discussion of risks to populations that rely on traditional subsistence activities to maintain their food systems and their food security. The authors should also talk about Aboriginal vulnerability in the context of food security and climate change. (CANADA)	The section has been rearranged to place the risk to populations at the beginning of the section. The scope of the effort in this section covers all subsistence agriculture which would include the Aboriginal populations.
1036	4	38	1	0	0	We recommend explaining the impacts of extreme climate events on malnutrition. Suggested text: "Another significant concern is that changing climatic conditions could create a vicious cycle of disease and hunger, thereby making affected populations more vulnerable to infectious disease (UNSCN, 2010). Climate change will have an impact on sanitation systems, and water quality and availability through changes in precipitation patterns and glacial melt. Further, climate change might impact on different diseases including diarrhoea, respiratory illness, as well as waterborne, food-borne, and vector-borne diseases through changes in habitat suitability (Confalonieri et al., 2007)." Sources: UNSCN (2010) Climate Change and Nutrition Security. Geneva: UNSCN Secretariat.; Confalonieri, U., Menne, B., Akhtar, R., Ebi, K. L., Hauengue, M., Kovats, R. S., Revich, B. and Woodward, A. 2007 Human Health. In Climate change 2007: impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (eds M. L. Parry, O. F. Canziani, J. P. Palutikof, P. J. v. d. Linden and C. E. Hanson), pp. 273-313. Cambridge, UK: Cambridge University Press. (World Food Programme (WFP))	The additional material of climate impacts on disease and malnutrition is beyond the scope of this section and is better addressed in other sections of this report.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1037	4	38	1	39	37	We recommend mentioning the impact of other extreme events (floods, cyclones) on food security. Suggested text: "In addition to droughts, floods and tropical cyclones can negatively affect food security. Heavy rainfall can lead to crop losses over wide areas, as well as devastating food stores, assets and arable land (Falloon and Betts, 2010). Further studies on the impacts of climate variability show that flood events can be linked to fungal infections in grains and therefore lower food quality (Kettlewell et al., 1999). Cyclones, too, have the potential to devastate a region with negative impacts on crop and land, infrastructure, and livelihoods. Cyclone Nargis, for instance, resulted in significant societal losses in Myanmar: 40 km of rural coastal areas and regions were inundated (Webster, 2008); soil salinisation made 50,000 acres of rice cropland unfit for planting (Stover and Vinck, 2008); rice seeds, fertilisers, farm machinery and valuable land were lost, thereby affecting the winter 2008/2009 rice crop (FAO, 2009)." Sources: Falloon, P. D. and Betts, R. 2010 Climate impacts on European agriculture and water management in the context of adaptation and mitigation – the importance of an integrated approach. <i>Sci. Total Environ.</i> 408(23): 5667-5687.; Kettlewell, P.S., Sothorn, R.B. and Koukkari, W.L. (1999) 'UK wheat quality and economic value are dependent on the North Atlantic Oscillation.' <i>J. Cereal Sci.</i> 29: 205-209.; Webster, P.J. 2008 Myanmar's deadly daffodil. <i>Nat. Geosci.</i> 1, 488-490.; Stover E., Vinck P. 2008 Cyclone Nargis and the politics of relief and reconstruction aid in Burma (Myanmar). <i>J. Am. Med. Assoc.</i> 300, 729-731. ; FAO 2009 FAO/WFP crop and food security assessment mission to Myanmar. Online at http://www.fao.org/docrep/011/ai478e/ai478e00.htm (World Food Programme (WFP))	Some further details along these lines have been added to the section
1038	4	38	2	0	0	Issue of concern: Exacerbated food insecurity in West Africa due to drought. Trend in aggregate vulnerability and exposure at scale of risk management in example region: Medium confidence that extreme temperatures and drought conditions will have negative impacts on grain yield. Medium confidence that water scarcity associated with drought can reduce food supply. High confidence that population growth, especially in food insecure areas, will add stress to food security in drought-prone areas (World Food Programme (WFP))	These points have been considered in the revision of this section
1039	4	38	6	38	14	Most of the statements in this paragraph need to be further supported by relevant citations. In particular, the final sentence requires citation and perhaps more subtle consideration of complexities. (IPCC WGII TSU)	The section has been reduced in length and revised accordingly
1040	4	38	8	38	8	Typo citation: For Battisti and Naylor (2009), the first author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	The reference name is spelled correctly in the text.
1041	4	38	8	38	9	Battisti and Naylor assume no adaptive response by farmers. This "dumb farmer" scenario defies reality and should not serve as a basis for gauging climate change impacts on agriculture. (UNITED STATES OF AMERICA)	The purpose was not to debate adaptation and the next sentence did discuss the role of adaptation. This sentence was left unchanged.
1042	4	38	8	38	9	For this sentence describing Battisti and Naylor (2009), what are the "future high temperatures" evaluated and over what time frame are corresponding impacts considered? (IPCC WGII TSU)	This sentence has been revised to better reflect the findings of the paper
1043	4	38	16	38	17	These are not the original citations for this evidence. It should be Wheeler T.R., Craufurd P.Q., Ellis R.H., Porter J. R. and Vara Prasad P.V. (2000). Temperature variability and the yield of annual crops. <i>Agriculture, Ecosystems and Environment</i> , 82, 159-167 (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	Added reference
1044	4	38	17	38	20	The citations supporting these sentences need to be clarified. If the Hatfield citations in the first sentence pertain to all sentences in the paragraph, please indicate this more clearly. (IPCC WGII TSU)	The paragraph has been clarified accordingly
1045	4	38	22	38	29	this paragraph misses a lot of the literature. It really only talks about lab-based studies when there is a lot of evidence from actual harvests that extreme temperatures are important. This includes Schlenker, W. & Roberts, M. J. Nonlinear temperature effects indicate severe damages to U.S. crop yields under climate change. <i>Proceedings of the National Academy of Sciences</i> 106, 15594-15598 doi:10.1073/pnas.0906865106 (2009), and Lobell, D. B., Bänziger, M., Magorokosho, C. & Vivek, B. Nonlinear heat effects on African maize as evidenced by historical yield trials. <i>Nature Climate Change</i> , in press (2011) and see papers cited in Wassmann, R. et al. Climate change affecting rice production: the physiological and agronomic basis for possible adaptation strategies. <i>Advances in Agronomy</i> (2009). (Lobell, David, Stanford University)	The articles cited in the chapter provide a summary of a selection of current literature on impacts of extreme events.
1046	4	38	27	38	28	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. Additionally, this sentence is highly redundant with the first sentence in the paragraph but implies a different certainty in the negative impacts on yield. (IPCC WGII TSU)	Modified the terms in the section.
1047	4	38	29	38	29	is it customary to just point readers to a review article? Isn't the idea here that the information should be synthesized within this report? (Lobell, David, Stanford University)	The literature on this topic is extensive and we felt that the some of the current summary articles provide an overview and synthesis of the current state of the knowledge. We have elected to keep the review articles as part of the references.
1048	4	38	31	38	32	this sentence is unclear, and I'm not really sure what the entire paragraph is trying to say (Lobell, David, Stanford University)	This text has been deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1049	4	38	31	38	32	This sentence is highly redundant with the first and fifth sentences in the previous paragraph. Although it consistently describes the negative impacts on yield as compared to the first sentence, it implies a different degree of certainty in impacts on yields as compared to the fifth sentence. (IPCC WGII TSU)	This text has been deleted
1050	4	38	34	38	35	This sentence is somewhat redundant with the fifth sentence in the previous paragraph, yet it implies a different degree of certainty in impacts on growth. (IPCC WGII TSU)	This text has been deleted
1051	4	38	37	38	50	this paragraph requires editing (UNITED STATES OF AMERICA)	The paragraph has been substantially revised
1052	4	38	38	38	38	it seems odd to include just an example from Czech Republic. There are many examples of drought-yield effects in the literature. Are there others the authors can put here? (Lobell, David, Stanford University)	Added another study from the US.
1053	4	38	38	38	41	You are not required to provide a detailed review - but you must assess this voluminous amount of scientific literature, and support your comprehensive assessment with appropriately cited literature. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1054	4	38	41	38	43	give a citation for the argument that ENSO events have an effect on glacier melting on South America (UNITED STATES OF AMERICA)	References have been added
1055	4	38	41	38	46	References are needed. (Kaser, Georg, University of Innsbruck)	References have been added
1056	4	38	42	38	42	Please provide references supporting this link between glacier retreat, global warming, and El Nino. (Stocker, Thomas, IPCC WGI TSU)	References have been added
1057	4	38	43	38	44	The sentence indicates that melting on Andean glaciers occurs only during the dry season whereas it is most efficient during the wet season and reduced during the dry season. A rephrasing could make this possibly clearer: "Whit precipitation limited to only few months per year, glaciers are the onyl significant water source during the dry season". There is some literature out about this e.g.: Kaser G, Juen I, Georges C, Gómez J, & Tamayo W (2003) The impact of glaciers on the runoff and the reconstruction of mass balance history from hydrological data in the tropical Cordillera Blanca, Peru. Journal of Hydrology 282:130-144. * Mark BG & Seltzer GO (2003) Tropical glacier meltwater contribution to stream discharge: a case study in the Cordillera Blanca, Peru. Journal of Glaciology 49(165):271-281 * Kaser G, Georges C, Juen I, & Mölg T (2005) Low-latitude glaciers: Unique global climate indicators and essential contributors to regional fresh water supply. A conceptual approach. Global Change and Mountain Regions: A State of Knowledge Overview, Advances in Global Change Research, eds Huber U, Bugmann HKM, & Reasoner MA (Kluwer, New York), Vol 23, pp 185 - 196. * Casassa G, López P, Pouyaud B, & Escobar F (2009) Detection of changes in glacial run-off in alpine basins: examples from North America, the Alps, central Asia and the Andes. Hydrological Processes 23:31-41. * Kaser G, Großhauser M, & Marzeion B (2010) Contribution potential of glaciers to water availability in different climate regimes. PNAS 107(47):20223-20227. (Kaser, Georg, University of Innsbruck)	Adopted the suggested sentence.
1058	4	38	43	38	44	this sentence makes no sense - rephrase (UNITED STATES OF AMERICA)	The sentence has been deleted
1059	4	38	44	38	49	These sentences on physical impacts would benefit from citing relevant assessments in chapter 3 pertaining to regional or global trends in floods, drought, glacier-related debris flows, and GLOFs. (IPCC WGII TSU)	This text has been deleted
1060	4	38	46	38	50	Non of the given references investigates the addressed problems. I also miss references e.g. about these problems in the Himalaya. (Kaser, Georg, University of Innsbruck)	This text has been deleted
1061	4	38	46	38	50	Delete these final 5 lines - no link is made with 'food systems and food security' and this material is covered in Chapter 3. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1062	4	38	46	38	50	Check consistency with and add reference to chapter 3 (Section 3.5.6). (Seneviratne, Sonia, ETH Zurich)	This text has been deleted
1063	4	38	49	38	49	"GLOF": It seems strange to use this acronym here. If you do, a reference to Section 3.5.6 should be added. (Seneviratne, Sonia, ETH Zurich)	This text has been deleted
1064	4	38	49	38	50	This sentence would be clearer if "risk of" were deleted. Because consequences are a component of risk, it does not make sense to describe risk causing consequences. (IPCC WGII TSU)	This text has been deleted
1065	4	38	50	0	0	There exist more specific studies on GLOFs in the Andes than those referenced, e.g.: Carey, M. 2005. Living and dying with glaciers: people's historical vulnerability to avalanches and outburst floods in Peru. Global and Planetary Change, 47(2-4): 122-134. Reynolds, JM. 1992. The identification and mitigation of glacier-related hazards: examples from the Cordillera Blanca, Peru. In Geohazards, natural and man-made. Mc Call, GJH, Laming, DJC and Scott, SC (Eds.). Chapman & Hall, London. pp. 143-157. (Hügel, Christian, University of Zurich)	This text has been deleted
1066	4	38	53	38	54	not (Easterling, W and Apps, M, 2005) , but (Easterling and Apps, 2005) (NISHIMORI, Motoki, National Institute for Agri-Environmental Sciences)	Changed in the text
1067	4	38	53	39	4	why is the easterling and apps cited as opposed to the Ch5 in AR4 WG2, which the former is just a brief summary of? (Lobell, David, Stanford University)	Added to this section
1068	4	39	4	0	0	Same as above point. (NISHIMORI, Motoki, National Institute for Agri-Environmental Sciences)	Modified this section.
1069	4	39	7	39	8	It is not clear what this "initial obvious impact" results from. (IPCC WGII TSU)	This text has been deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1070	4	39	9	39	9	What is expected to be exacerbated under climate change? Crop-failure or migration, or both? It is not clear. References also need to be cited. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1071	4	39	9	39	10	You must cite references as evidence for increasing floods and droughts in Malawi. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1072	4	39	9	39	10	this statement needs to be supported by a citation (UNITED STATES OF AMERICA)	This text has been deleted
1073	4	39	18	39	21	The precision of language in these sentences needs to be increased to indicate what is meant by "probably the most severely impacted," "most vulnerable," and "particularly vulnerable." (IPCC WGII TSU)	Rewrote this section to address this concern
1074	4	39	21	39	21	It is unclear what source FAO (2008) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	Added letters to indicate multiple references and incorporated into the text.
1075	4	39	21	39	22	Why is this sentence in brackets? (Stocker, Thomas, IPCC WGI TSU)	Removed brackets.
1076	4	39	24	39	24	The citation for Vincent et al. (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This sentence has been deleted
1077	4	39	29	39	30	The term "risk" on these lines is used casually and should be avoided. (IPCC WGII TSU)	This text has been revised
1078	4	39	31	39	31	Is it not clear what exactly is meant by the term "threat of damage." We suggest employing one of the terms used more broadly in this report and chapter (disaster, extreme impact, etc.) if one of these terms corresponds to the intended meaning here. (IPCC WGII TSU)	This text has been deleted
1079	4	39	32	39	32	It is not clear what is meant by "vulnerability...in the event of a disaster." Is susceptibility to impacts due to hazardous physical events intended here, consistent with the glossary entry for "vulnerability"? (IPCC WGII TSU)	This text has been deleted
1080	4	39	32	39	32	The citation for CSIRO (2007a) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted
1081	4	39	35	39	37	What multiple lines of evidence have predicted an increase in the frequency of lightning? References must be cited. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1082	4	39	35	39	37	This sentence needs to be supported by literature citations or deleted. (IPCC WGII TSU)	This text has been deleted
1083	4	39	36	39	37	"if, as predicted, climate change increases the frequency of lightning strikes" A reference is needed for this statement (UNITED STATES OF AMERICA)	This text has been deleted
1084	4	39	40	44	36	A chapter on "industry" is missing. "Industry" can be affected by climate extremes e.g. droughts make cooling water unavailable and by weather extremes e.g. storms can destroy facilities and by hazards triggered by both e.g. floods can wash installations away. These direct impacts can cause remarkable damage and loss. Beside that secondary effects like loss of production, interruption of supply and releases of hazardous substance can cause additional huge damage and loss. Therefore please check whether a chapter "industry" can be added or "industry" can be included in the chapter "infrastructure". It should be made clear that the industry is not only a remarkable cause of climate change but although will be a victim of it. (GERMANY)	This topic is considered to some extent in the section on infrastructure
1085	4	39	42	0	0	Human settlements are the results of deliberate decisions ; understanding how is of great importance to influence the choice. (BOURRELIER, PAUL-HENRI, AFPCN)	This point has been considered in the revision of this section
1086	4	39	42	0	0	Section 4.4.5.1. Missing references need to be filled in. (IPCC WGII TSU)	The text has been modified accordingly
1087	4	39	42	0	0	Section 4.4.5.1. The information presented in this section reviews relevant sources, but could be improved by more clearly drawing conclusions of the author team's assessment of the sources. The effectiveness of the section could be increased if the author team provided an indication of the overall state of knowledge for topics covered, perhaps presenting conclusions characterized by calibrated uncertainty language per the AR5 Guidance Note on Treatment of Uncertainties. (IPCC WGII TSU)	Clearer articulation of conclusions has been considered in the revision of this section
1088	4	39	44	39	51	Please address the relevance of design or layout criteria either traditional or in form of standards used for (normal) settlement. Buildings and other structures are designed to withstand a defined level of impact by flood, wind etc. If the level of impact by weather extremes or triggered hazards exceeds these design criteria (e.g. due to climate change) the damage increases suddenly. (The same is true for infrastructure, industry.) (GERMANY)	We agree that these points are important factors in impacts in formal settlements. However, we feel this would introduce a level of detail inconsistent with the report. Regulations are often not well connected with existing levels of hazard, and compliance varies widely
1089	4	39	46	39	46	The citation for UN/POP/EGM-URB/2008/16 is not provided in the chapter's reference list, and is not in the right format. Please ensure this citation is added to the reference list and change the format of the in-text citation to "author, year". (IPCC WGII TSU)	This citation has been clarified
1090	4	39	46	39	47	Typo citation: For Kovats and Aktar (2008), the second author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	This citation has been clarified

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1091	4	39	46	39	48	You must delete: 'All these hazards are expected to increase with climate change'. Heat Wave is the only example from this list for which Chapter 3 project an increase with high confidence. There is low confidence for flood and landslide projections, and storms are complicated (decreasing frequency overall but increased frequency of the most intense tropical storms, and low confidence in extra tropical storms). These generalising, inaccurate statements must be removed from chapter 4! (Stocker, Thomas, IPCC WGI TSU)	Consistency with chapter 3 has been ensured
1092	4	39	46	39	48	Partial contradiction with Ch. 3 : "Flooding, landslides (UN/POP/EGM-URB/2008/16), storms, heat waves (Kovats and Aktar, 2008) and wildfires (ref) have produced historically important damages in human settlements. All these hazards are expected to increase with climate change." (FRANCE)	Consistency with chapter 3 has been ensured
1093	4	39	47	39	47	missing references!!! "(ref)" (Stocker, Thomas, IPCC WGI TSU)	The text has been modified accordingly
1094	4	39	49	39	51	Further citations should be added to support this sentence, in addition to the chapter 9 case study. Additionally, it would be preferable to describe more specifically the vulnerabilities of coastal settlements, instead of just stating that they are "especially at risk." (IPCC WGII TSU)	Reference to chapter 3 is now made.
1095	4	39	50	0	0	"...with sea level rise and increases in coastal storm activity..." The projections for tropical storms are more nuanced (see Ch. 3) with projected likely decrease (or no change) in global tropical storm frequency and projected likely increase in global mean tropical cyclone intensity. (UNITED STATES OF AMERICA)	Consistency with chapter 3 has been ensured
1096	4	39	50	39	50	What is meant by 'increases in coastal storm activity'? It is clear from chapter 3 that there will be a decrease or no-change in coastal storm frequency! These generalising, inaccurate statements must be removed from chapter 4! (Stocker, Thomas, IPCC WGI TSU)	Consistency with chapter 3 has been ensured
1097	4	39	53	39	53	It seems that "risk" is being used here casually and should be avoided. (IPCC WGII TSU)	The usage of the term "risk" here is appropriate
1098	4	40	1	40	1	missing references!!! "(ref)" (Stocker, Thomas, IPCC WGI TSU)	A reference has been provided
1099	4	40	3	40	3	It is unclear what source UNECE (2009) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This citation has been clarified
1100	4	40	4	40	4	Please explain expression "makeshift housing". (Stocker, Thomas, IPCC WGI TSU)	Changed to very low quality housing.
1101	4	40	8	40	13	missing references!!! "(ref)" (Stocker, Thomas, IPCC WGI TSU)	References have been provided
1102	4	40	9	40	11	The process through which settlements increase exposure should be better explained--is a feedback loop implied, and what is the nature of the relevant linkages here? Additionally, what is meant by "accelerating rate"--acceleration is occurring over what time frame, and why is acceleration occurring? (IPCC WGII TSU)	Sentence has been changed to show that for example removal of sand dunes and mangroves increases exposure to coastal hazards such as storm surge. "Accelerating rate" has been deleted.
1103	4	40	11	40	11	Is 'likely' meant here as calibrated uncertainty language? If so, please italicize. Otherwise replace. (Stocker, Thomas, IPCC WGI TSU)	Usage of the term has been avoided
1104	4	40	11	40	13	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. Additionally, it is unclear why and in what situations evacuation needs to be considered. (IPCC WGII TSU)	Usage of the term has been avoided
1105	4	40	12	40	12	At the stage of the second order draft, it is inappropriate to have such strong statements, ie, evacuation of SIDs, without yet providing supporting references. (Stocker, Thomas, IPCC WGI TSU)	The statement has been revised accordingly
1106	4	40	15	0	0	Chapter 3 concludes that there is low confidence in predictions of changes in floods. So the statement here seems overly certain. (Nicholls, Neville, Monash University, School of Geography & Environmental Science)	This text has been deleted
1107	4	40	15	40	15	Again - Chapter 3 does not project an increase in flooding with climate change! These generalising, inaccurate statements must be removed from chapter 4! (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1108	4	40	15	40	15	Partial contradiction with Ch. 3 : "flooding – expected to increase with climate change" (FRANCE)	This text has been deleted
1109	4	40	15	40	16	"Urbanization exacerbates the negative effects of flooding – expected to increase with climate change...through greatly increased runoff concentration peak and volume" This projection seems different from the flooding assessment statements presented in Ch. 3. Perhaps this is because this deals with urban flooding, and the two chapters (3&4) could perhaps come to some agreement on assessment language that addresses the urban flooding issue in particular under climate change. (UNITED STATES OF AMERICA)	The inconsistent text has been deleted
1110	4	40	15	40	18	The sentence should start as follows: "Rapid and unplanned urbanization, often due to rapid growth of regional population, exacerbates the negative...." (GERMANY)	Rapid and unplanned urbanisation often does exacerbate flooding and this point is made later in the same paragraph. But the issue is wider than this, and the sentence and paragraph explain why urbanisation per se increases flood risk. The paragraph has been modified slightly

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1111	4	40	15	40	18	It is unclear whether the author team is asserting that negative effects of flooding, flooding itself, or both are expected to increase with climate change. This ambiguity should be clarified. Additionally, projections of changes in flooding due to climate change need to reflect and cite the assessments of chapter 3, and citations beyond the chapter 9 case study need to be provided for any statements about the changes in the effects/impacts of flooding. Also, the case study reference is incorrect; it should be 9.2.8 (IPCC WGII TSU)	The text has been revised accordingly
1112	4	40	17	40	17	The citation for Douglas (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been clarified
1113	4	40	26	0	0	... and in densely settled regions in the Alps and Himalayas (de Jong, Carmen, University of Savoy)	Added. Also references for this point have been included: for the European Alps (Crosta et al. 2004) and Himalayas (Petley et al. 2007).
1114	4	40	26	40	26	Please explain expression "slope failure risk". (Stocker, Thomas, IPCC WGI TSU)	The sentence has been clarified
1115	4	40	26	40	26	If "risk" is being used casually here, it may be preferable to delete the word from the sentence. (IPCC WGII TSU)	The sentence has been clarified
1116	4	40	27	40	27	The citation for Loveridge (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been clarified
1117	4	40	28	40	28	Because risk incorporates exposure as described in the glossary entry for disaster risk, it would be preferable to avoid casual use of the term "exposed" here. (IPCC WGII TSU)	The sentence has been clarified
1118	4	40	33	40	37	These sentences on urban heat islands and related impacts must provide supporting citations beyond the chapter 9 case study. (IPCC WGII TSU)	Supporting references have been added.
1119	4	40	33	40	40	studies of projected future heat stress on humans by Sherwood and Huber (PNAS 2010) and Willett and Sherwood (Int J. Climatol., 2010) could be included here. (UNITED STATES OF AMERICA)	While these references are good, they deal with circumstances (7-11 degrees + warming) well beyond those contemplated by the report.
1120	4	40	35	40	37	"Heat waves combined with urban heat islands (UHI) can result in massive death tolls with the elderly and outdoor workers being most vulnerable." This only occurs when heat waves are unexpected. As the frequency and intensity of heat waves increases, the mortality rate from them decreases. This is shown by numerous studies, including Palecki et al. (2001), Davis et al. (2003), Fouillet et al. (2008). (UNITED STATES OF AMERICA)	Our statement is not absolute as it recognises that the outcome will be contingent on local factors. We have added the point (with recent references) that warnings and appropriate action can make a substantial difference
1121	4	40	36	40	37	Can you cite references supporting this statement that outdoor workers are most vulnerable? Elsewhere, throughout SREX, the Elderly, unwell, and socially isolated are referred to as the most vulnerable to heatwaves. (Stocker, Thomas, IPCC WGI TSU)	The phrase has been reworded, and a reference added.
1122	4	40	37	40	37	Instead of using the phrase "a challenge to the future," it would be preferable to be more specific. (IPCC WGII TSU)	The phrase has been reworded
1123	4	40	38	40	38	It is unclear what source Wilby (2003a) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	The citation has been clarified
1124	4	40	40	40	40	The citation for Stevenson et al. (2006) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been deleted
1125	4	40	42	0	0	This general statement is too confident, and does not reflect the more nuanced conclusions of Chapter 3. (Nicholls, Neville, Monash University, School of Geography & Environmental Science)	Consistency with chapter 3 has been ensured
1126	4	40	42	40	42	Partial contradiction with Chapter 3 : "The frequency and severity of most forms of storms are predicted to increase" (FRANCE)	Consistency with chapter 3 has been ensured
1127	4	40	42	40	42	"The frequency and severity of most forms of storms are predicted to increase..." Apparently the authors of this statement didn't read Chapter 3. (UNITED STATES OF AMERICA)	Consistency with chapter 3 has been ensured
1128	4	40	42	40	43	The changes in frequency and severity of storms differ strongly between regions. See also Summary report (SPM), p.5, line 12-15. The cited sources for this statements do not seem suitable: FitzGerald et al. 2008: This article focuses on coastal impacts such as storm surges; Hess et al. 2008: this article reviews multiple hazards for the US, and only cites one research article on tropical cyclone activity; Swiss Re 2006: here, the original article by Schwiez et al. 2010 should be cited instead. Moreover also they found a regional heterogeneity of storm changes with decreases in Northern and Southern Europe. (Holsten, Anne, Potsdam Institute of Climate Impact Research)	Now only reference to chapter 3 is made for the statement
1129	4	40	42	40	44	These statements should be modified to bring them into agreement with those of Ch.3. For example, the frequency of tropical cyclones is not projected to increase. Also, Emanuel 2005 is not an appropriate citation to base such a likelihood statement on as the paper provides no such projection. This sentence is also hard to follow due to some grammatical issues. I recommend revisiting the summary statements for ETC's and TCs in Ch.3, and modifying this section accordingly. (Kossin, James, NOAA / NESDIS / National Climatic Data Center)	Consistency with chapter 3 has been ensured

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1130	4	40	42	40	44	Delete "the frequency and severity of most storms are predicted to increase"!!! We have commented in the ZOD, and FOD that this is simply not true, and inconsistent with the projections given in chapter 3. Refer to Table 3.1 - all that can be said is that there will be a 'likely' increase in the intensity of tropical cyclones, BUT not in all ocean basins. You might say therefore, that the 'destructive potential' will likely increase in some regions as a result of this projected increase in intensity of maximum windspeed and rainfall rates, but you must refer to Chapter 3, Section 3.4.4. (Stocker, Thomas, IPCC WGII TSU)	Consistency with chapter 3 has been ensured
1131	4	40	42	40	44	"The frequency and severity of most forms of storms are predicted to increase..." and "The destructive potential of cyclones is likely to increase set to develop..." These are inconsistent with much the assessment of tropical storms and extratropical storms in Ch. 3. See Table 3.1 for a summary. The Ch. 3 assessments should be followed here. The second statement also has some miswording at the end which I don't think was intended (UNITED STATES OF AMERICA)	Consistency with chapter 3 has been ensured
1132	4	40	42	40	44	These two sentences must reflect and cite the assessments of chapter 3. Additionally, the use of "likely" in the second sentence appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	Consistency with chapter 3 has been ensured
1133	4	40	42	40	46	This text does not seem consistent with chapter 3. Please check carefully and provide adequate references. (Seneviratne, Sonia, ETH Zurich)	Consistency with chapter 3 has been ensured
1134	4	40	44	0	0	There are more recent and more appropriate citations that Emanuel (2005) Section 4.4.6 is unclear. There is no evidence (that I am aware of) that directly links human health impacts to the climate change effects of carbon dioxide on extremes, certainly not in any aggregate sense that would allow for a discussion of trends. The issue is of course made very difficult because of the large decrease in loss of life from extremes over the past century (see the Hohenkammer workshop report - http://cstpr.colorado.edu/sparc/research/projects/extreme_events/munich_workshop/workshop_report.html) (Pielke, Roger, University of Colorado)	This text has been deleted
1135	4	40	44	0	0	Section 4.5.2 should cite the following paper: Di Baldassarre, G., A. Montanari, H. Lins, D. Koutsoyiannis, L. Brandimarte, and G. Blöschl (2010), Flood fatalities in Africa: From diagnosis to mitigation, Geophys. Res. Lett., 37, L22402, doi:10.1029/2010GL045467 Excerpt: "Based on the results of both continental and at-site analyses, we find that the magnitude of African floods has not significantly increased during the Twentieth Century (Figures 2 and 3), and that climate has not been a consequential factor in the observed increase in flood damage. This is consistent with the results previously obtained [Kundzewicz et al., 2005; Bates et al., 2008; Petrow and Merz, 2009; Lins and Slack, 1999; Mudelsee et al., 2003] in different areas, such as North America, Europe, and Australia." (Pielke, Roger, University of Colorado)	This comment does not apply to this passage on page
1136	4	40	44	40	46	The phrase "have destroyed modern cities" seems an oversimplification given that these cities still exist. (IPCC WGII TSU)	The text has been revised accordingly
1137	4	40	46	40	47	Are you prepared to base this significant statement regarding Small Island States on a single paper? (Stocker, Thomas, IPCC WGII TSU)	The text has been revised with further citations added
1138	4	40	46	40	47	Instead of using the term "probably," it would be preferable to characterize this sentence with calibrated uncertainty language, per the AR5 Guidance Note on Treatment of Uncertainties. As is, it is unclear what is meant by "probably have the highest risk." (IPCC WGII TSU)	The text has been revised accordingly
1139	4	40	50	0	0	Section 4.4.5.2. The information presented in this section reviews relevant sources, but could be improved by more clearly drawing conclusions of the author team's assessment of the sources. The effectiveness of the section could be increased if the author team provided an indication of the overall state of knowledge for topics covered, perhaps presenting conclusions characterized by calibrated uncertainty language per the AR5 Guidance Note on Treatment of Uncertainties. (IPCC WGII TSU)	The revision of the section has aimed to emphasize conclusions
1140	4	40	50	41	38	Please consider secondary risks by some infrastructure in case of extreme weather or hazards triggered by it. E.g. extreme precipitation can damage dams and extreme floods dikes, which causes additional hazards by the water usually kept by them. The same is true for (industrial) installations containing hazardous substances. An extreme event can cause releases of hazardous substances (if layout criteria were exceeded etc.) and the release can cause more damage than the extreme event itself (this is called "Natech": Natural Hazard Triggered Chemical/Industrial Accident see Cruz, A.). The relevance of excess of design criteria and of secondary risks and the linkage of both needs to be considered in cost/benefit analysis of adaptation to more intense events due to climate change. (GERMANY)	Considered. A new sentence was added.
1141	4	40	53	40	53	See recent reports prepared for the UK Government (see www.defra.gov.uk) on infrastructure impacts; also note that infrastructure operators (water, ports, electricity etc) have a legal obligation to report on climate change impacts and adaptation under the UK Climate Change Act 2008. (Darch, Geoff, Atkins & University of East Anglia)	It is good to know, but in practice this is not the case worldwide.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1142	4	41	1	0	0	An example of vulnerable infrastructures against future climate change effect are the oil industry facilities in the North Caspian Sea. In 3-5m of water depth, they are at risks with current future projections of ~3m in water level reduction (Rensen et al. 2007; Arpe and Leroy, 2007; Elguindi and Girogi, 2007). (International Petroleum Industry Environmental Conservation Association (IPIECA))	Long-term processes are not considered in this report
1143	4	41	1	41	2	statement consistent with Chapter 3's assessment? (Stocker, Thomas, IPCC WGI TSU)	The statement has been modified accordingly
1144	4	41	1	41	2	"an increase in flood producing rainfall is likely to affect the capacity and maintenance of ...infrastructure..." This projection seems different from the flooding assessment statements presented in Ch. 3. Perhaps this is because this deals with urban flooding, and the two chapters (3&4) could perhaps come to some agreement on assessment language that addresses the urban flooding issue in particular under climate change. (UNITED STATES OF AMERICA)	The statement has been modified accordingly to ensure consistent see with chapter 3
1145	4	41	1	41	2	The use of "likely" on both of these lines appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	Usage of the term has been avoided
1146	4	41	3	41	3	The citation for Douglas (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	It was changed to Douglas et al., 2008
1147	4	41	11	41	11	The two uses of "likely" on this line appear to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore use of the term should be avoided. (IPCC WGII TSU)	Usage of the term has been avoided
1148	4	41	13	41	15	Sorry, but this example is ridiculous. Such a "hold-up" occurs multiple times every day just by traffic accidents in several European countries and in Northern America. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	This text has been deleted
1149	4	41	18	41	18	The citation for EA (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Changed to McGregor, et al., 2007
1150	4	41	22	41	22	Delete: 'the increase in storm activity..'. This is not supported by the assessment for extra-tropical storms provided in Chapter 3. These generalising, inaccurate statements must be removed from chapter 4! (Stocker, Thomas, IPCC WGI TSU)	Sentence deleted
1151	4	41	22	41	22	Write "An increase in storm activity could potentially" instead of "The increase in storm activity could potentially" (FRANCE)	Sentence deleted
1152	4	41	25	41	25	Typo citation: For Rubbelke and Voge (2011), the first author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	Changed to Rübbelke & Vögele (2011)
1153	4	41	27	41	28	See also Arkell, B.P. and Darch, G.J.C. 2006. Impact of climate change on London's transport network. Proceedings of the Institute of Civil Engineers: Municipal Engineer, 159, ME4, 231-237. (Darch, Geoff, Atkins & University of East Anglia)	Citation included
1154	4	41	28	41	28	Why should 'solar radiation' be expected to increase? References?? (Stocker, Thomas, IPCC WGI TSU)	Deleted solar radiation
1155	4	41	28	41	29	"reduce life of asphalt..." -- "lifetime"? (Stocker, Thomas, IPCC WGI TSU)	This text has been changed
1156	4	41	29	41	29	Include Meizhu et al. 2010 in the literature list. (Holsten, Anne, Potsdam Institute of Climate Impact Research)	It was included
1157	4	41	33	41	34	what robust (ie, more than 1 paper) evidence do you have for increased wind and lightning events? Note that Chapter 3 has low confidence for either observed or projected trends in extreme wind. Not clear here whether you are referring to observations or projections, but in any case, Chapter 3 (3.3.2) should be cited in relation to extreme rainfall - BUT make sure your wording is consistent with what they say in Table 3.1. (Stocker, Thomas, IPCC WGI TSU)	Consistency with chapter 3 has been ensured
1158	4	41	33	41	34	It is unclear whether this sentence pertains to changes that have been observed or that are projected, and its wording should be clarified to address this ambiguity. In addition, the mentioned "increased frequency and intensity" should reflect and cite the assessment of chapter 3. (IPCC WGII TSU)	Consistency with chapter 3 has been ensured
1159	4	41	36	41	36	Where and when did these storms occur? (Holsten, Anne, Potsdam Institute of Climate Impact Research)	Information has been added.
1160	4	41	45	0	0	.. And developed countries (de Jong, Carmen, University of Savoy)	Mentioned later
1161	4	41	46	0	0	... like floods, "droughts", " snow deficit" (de Jong, Carmen, University of Savoy)	Those examples are implicit
1162	4	41	46	41	46	It is 'widely recognised' - and yet you cite only one single paper in support of this statement. This is a very significant statement that you make here, and it needs to be supported with multiple lines of evidence. (Stocker, Thomas, IPCC WGI TSU)	Other one added. There are many references later in the text. The sentences has also been reworded
1163	4	41	46	41	48	The first half of this sentence must be clearly supported by literature citations and further clarified--for example, for what time frame and for what climate scenarios is this assertion being made? (IPCC WGII TSU)	It is not referred to scenarios, just to extreme events occurring with our without climate change.
1164	4	41	50	42	5	This paragraph and the categories it describes need to be supported by literature citations. If the categories instead more generally reflect the analysis of the author team based on its assessment of the literature, this fact needs to be clarified. (IPCC WGII TSU)	Citation included
1165	4	41	52	0	0	operating costs and "ecosystem health" (de Jong, Carmen, University of Savoy)	That is point b on indirect impacts

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1166	4	42	0	0	0	Suggested citations: 1) de Jong 2011 Artificial Production of Snow, Encyclopedia of Snow, Ice and Glaciers (Eds. Haritashya, U.K. Singh, P. et Singh, V.P). Springer. 2) Schoeneich, P. and de Jong, C. (2009). Changes in the Alpine environment. How will the Alpine environment be tomorrow? Journal of Alpine Research, 96, 4. pp. 65-76., 3) de Jong C., Barth, T. (2008). Challenges in Hydrology of Mountain Ski Resorts under Changing Climatic and Human Pressures. ESA Proceedings (Ed.), Surface Water Storage and Runoff: Modeling, In-Situ data and Remote Sensing, Geneva 4) de Jong, C., Lawler, D. and Essery, R. (2009) Mountain Hydroclimatology and Snow Seasonality - Perspectives on climate impacts, snow seasonality and hydrological change in mountain environments Mountain Hydroclimatology and Snow Seasonality, Special Issue of Hydrological Processes, p 955-961. 6) Töglhofer1, Ch, Eigner, F, Prettenhaler, F. Impacts of snow conditions on tourism demand in Austrian ski areas, Climate research, Vol. 46: 1–14, 2011 7) Snow reliability in ski resorts considering artificial snowmaking Hofstätter, M.; Formayer, H.; Haas, P. EGU General Assembly 2009, Vienna, Austria (de Jong, Carmen, University of Savoy)	Similar cites included in the following lines
1167	4	42	1	0	0	as well as avalanches and rock falls and crevasses in glaciers threatening summer glacier skiing (de Jong, Carmen, University of Savoy)	This happens even without climate change
1168	4	42	1	42	1	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	Deleted
1169	4	42	3	42	3	"It is not unlike" -- unclear, please clarify? (Stocker, Thomas, IPCC WGI TSU)	The sentence has been reworded
1170	4	42	3	42	3	On this line, the intended use of "unlikely" appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	The sentence has been reworded
1171	4	42	7	0	0	and snow cover deficit (de Jong, Carmen, University of Savoy)	This point is considered subsequently in the section
1172	4	42	7	42	8	What exactly is meant by "long-term climate change effects," as well as the parenthetical examples, is unclear. (IPCC WGII TSU)	The statement has been clarified
1173	4	42	12	42	12	Is 'likely' meant here as calibrated uncertainty language? If so, please italicize. Otherwise replace. (Stocker, Thomas, IPCC WGI TSU)	Changed
1174	4	42	12	42	12	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	Changed
1175	4	42	14	0	0	"at the snow limit" (de Jong, Carmen, University of Savoy)	Changed
1176	4	42	16	0	0	... high water and energy consumption and high investment and maintenance costs and considerable environmental impacts, including land use change and CO2 release by soil erosion on ski runs and wetland destruction for building snowmaking reservoirs. Since no snowmaking is possible at temperatures above - 3°C, this form of adaptation is highly limited by global warming. (de Jong, Carmen, University of Savoy)	This may be indicated in the adaptation chapters.
1177	4	42	20	42	20	To add other significant reference between "Hamilton et al." and "Scott et al.": (...2005; Bigano et al., 2006; ...). (SPAIN)	Inserted
1178	4	42	20	42	22	Please clarify - Regional projections are themselves quantitative. Do you mean that the conversion of these physical climate projections into projections of impacts is qualitative? Perhaps better wording would therefore be: "Quantitative regional climate projections in the frequency..... provide a basis for the qualitative understanding of regional impacts" (Stocker, Thomas, IPCC WGI TSU)	The statement has been re-worded
1179	4	42	20	42	22	Although this sentence implies that the information in Table 4-12 is tied to chapter 3's findings, these linkages are not clearly made in the table. To the extent that the table's information is tied to chapter 3, citations to relevant chapter 3 sections need to be provided. (IPCC WGII TSU)	The table has been deleted
1180	4	42	22	42	22	How were these 'hotspot' regions derived? Is there some quantitative basis for the identification of hotspots? (Stocker, Thomas, IPCC WGI TSU)	Not quantitative, just qualitative and descriptive
1181	4	42	28	0	0	Figure 4-12: You can not single out 'hotspot' regions like this without providing detail on the basis used to identify these regions. The figure caption therefore needs considerable extension. (Stocker, Thomas, IPCC WGI TSU)	This figure has been deleted
1182	4	42	31	0	0	This line appears extraneous or out of place. (UNITED STATES OF AMERICA)	It has been linked to the below text.
1183	4	42	31	43	6	"A number of potential of climate extreme impacts on tourism regions and activities can be pointed out." All the examples provided in the text are negative impacts. Not a single positive impact could be posited? Changes in extreme weather do not only lead to negative impacts on society. (UNITED STATES OF AMERICA)	Gradual climate change is expected to lead to positive outcomes for tourism especially in northern Europe. However, extreme events generally do not lead to short term positive outcomes for the affected areas, although other tourist destinations may gain the business meaning that the tourism industry as a whole does not lose. There may be longer term gains with new infrastructure for example. A sentence has been added to the box. Please note that the box deals only with tourism not with society.
1184	4	42	33	42	34	This statement should be placed in context by also noting that the numbers of tropical cyclones are not projected to increase.(Chapter 3). (Nicholls, Neville, Monash University, School of Geography & Environmental Science)	Consistency with chapter 3 has been ensured

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1185	4	42	33	42	34	Your repetition from Chapter 3 here is not accurate, eg, 3 - 11%! In any case, there is no need for you here in Chapter 4 to repeat such specific details from Chapter 3. Simply provide an accurate summary statement such as: "The assessment provided in Chapter 3 (see Section 3.4.4) projects with medium confidence, that the frequency of the most intense storms will increase in SOME ocean basins". (Stocker, Thomas, IPCC WGI TSU)	Consistency with chapter 3 has been ensured
1186	4	42	33	42	34	The unlikely increase (likely decrease or no change) in frequency should also be mentioned here (see Section 3.4.4.) (Seneviratne, Sonia, ETH Zurich)	Consistency with chapter 3 has been ensured
1187	4	42	33	42	34	"Global tropical cyclone intensity is projected to increase during the 21st century between 3 and 11% under conditions roughly equivalent to A1B emissions scenarios (Chapter 3 SREX report)." Somehow the qualifying statements of probability and confidence got left off of this sentence. This affliction is found throughout this Chapter. Chapter 3 goes to great efforts to assign qualitative descriptors to extreme event trends and expectations, and Chapter 4 oftentimes leaves off these qualifications. (UNITED STATES OF AMERICA)	Consistency with chapter 3 has been ensured
1188	4	42	33	42	34	The intensity change range is between 2 and 11% (see Ch. 3, p. 45). It could also be mentioned here that the global frequency of tropical storms is likely to either decrease or remain essentially unchanged (see Ch.3, p. 45). (UNITED STATES OF AMERICA)	Consistency with chapter 3 has been ensured
1189	4	42	33	42	34	This sentence must clearly reflect and cite the assessment findings of chapter 3. Please note that intensity is not equivalent to maximum wind speed. Relevant sentences from section 3.4.4 include the following: "It is likely that the global frequency of tropical cyclones will either decrease or remain essentially unchanged, and an increase in mean tropical cyclone maximum wind speed (+2 to +11% globally) is likely, although increases may not occur in all tropical regions. While it is likely that overall global frequency will either decrease or remain essentially unchanged, there is medium confidence that the frequency of the most intense (e.g., Saffir-Simpson Category 4-5) storms will increase in some ocean basins." (IPCC WGII TSU)	Consistency with chapter 3 has been ensured
1190	4	42	33	42	38	In chapter 3 (page 45 lines 37-48) there is summary of past and projected changes in tropical cyclones. The decrease of frequency with medium confidence that frequency of most intensive storms will increase is mentioned. Findings in chapter 4 should be consistent with other statements in the same report. (Wibig, Joanna, University of Lodz)	Consistency with chapter 3 has been ensured
1191	4	42	41	42	42	the rate of sea level rise should be updated to the present rate of ~3 mm per yr (Univ Colorado, 2010) (UNITED STATES OF AMERICA)	Changed
1192	4	42	41	42	43	The sea level rise projection given here is global and should not be assumed to apply at a specific location unless literature supports the global trend applying at that location. (IPCC WGII TSU)	It is used as an indication
1193	4	42	45	0	0	please put in a real snow citation, e.g. from SLF (de Jong, Carmen, University of Savoy)	These citations are only referred to the ski problem
1194	4	42	47	42	49	Please provide some assessment of uncertainty for these numbers (67%, 50%): Which models were used to assess them, how reliable are these estimates? (Seneviratne, Sonia, ETH Zurich)	It is not referred to any specific model
1195	4	42	50	0	0	one "until" is enough (Wibig, Joanna, University of Lodz)	OK
1196	4	42	52	42	53	.. but accompanied by increasing water stress and local water conflicts, in particular in the French Alps, as during the drought winter 2010/2011. It would be vey important to cite the recent EEA report on, "Regional climate change and adaptation: the Alps facing the challenge of changing water resources", Report 8, (2009), pp. 143 (de Jong, Carmen, University of Savoy)	A sentence was added with the reference of EAA 2009
1197	4	43	1	43	2	Please clarify what is meant by a "tropical night." (IPCC WGII TSU)	Done
1198	4	43	2	43	4	These sentence fragments need to be made into readable sentences. (IPCC WGII TSU)	The text has been revised
1199	4	43	3	43	3	Typo citation: For Esteban Talaya et al. (2005), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	Checked
1200	4	43	6	0	0	and the influence of increased air conditioning and the limited water availability. Some beach tourism areas are already facing extreme water stress since decades, e.g. Greece and Spain (de Jong, Carmen, University of Savoy)	Agree
1201	4	43	6	43	6	To add a new reference into the brackets: (...; European Commission, 2007). The EC studied the expected climatic changes in Europe for the periods 2011-2040 and 2071-2100. (SPAIN)	That reference refers to physical impacts, see chapter 3
1202	4	43	6	43	6	The citation for Hamilton et al. (2003) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Changed. It was Hamilton et al., 2005
1203	4	43	8	43	9	Is this the assessment of Scott et al 2008, or is this the expert assessment of the chapter 4 authors in 2011? (Stocker, Thomas, IPCC WGI TSU)	This was already indicated by Scott et al 2008
1204	4	43	8	43	9	The descriptions in the previous paragraphs and the mention of gaps here do not fully cover all of the hotspot and gap regions depicted in Figure 4-12. (IPCC WGII TSU)	Some hotspot areas have limited data.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1205	4	43	11	0	0	Table 4.12: The third column (Potential extreme impacts) has major problems, because you stray into listing trends in climate extremes and physical impacts which are without any cited scientific evidence, and which are often inconsistent with the carefully assessed material in Chapter 3. What multiple lines of evidence do you have for 'increased coastal storms in the Mediterranean'? or 'summer floods in central Europe and UK?', or 'Tropical storms to increase in the Caribbean'? or 'Increase in hurricane intensity in SE USA'? or 'Floods during monsoon season to worsen in Asia', or 'increases in droughts and flooding in Africa'? You simply can not provide this sort of information without providing evidence you have completed a careful assessment of the available literature. If you insist on providing this sort of information here, you need to take it directly from the regional information provided in Chapter 3, eg, Table 3.3. (Stocker, Thomas, IPCC WGI TSU)	The table has been deleted.
1206	4	43	12	43	12	It is unclear what source IPCC (2007) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	The table has been deleted.
1207	4	43	16	0	0	Section 4.4.6. It seems that human health and well-being are considered in this section, but security largely is not. Ideally, the section would also assess vulnerability, exposure, and impacts related to security. (IPCC WGII TSU)	Security refers to threat to life. Injuries and deaths due to extreme events can be considered as security issue. Another issue addressed in security is food, and this issue is dealt with in other sections.
1208	4	43	18	43	18	Cite a specific AR4 chapter. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1209	4	43	18	43	19	The specific AR4 chapter supporting this statement should be cited here. (IPCC WGII TSU)	This text has been deleted
1210	4	43	18	43	20	It should be made clear that malnutrition and diarrhoeal disease are important because the current burden of these diseases are very high - not because they are extremely sensitive to climate or climate change. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	This text has been deleted
1211	4	43	18	43	20	We recommend including projections on climate change impacts on hunger. For example, Parry et al (2009) estimate that, with no adaptation, climate change will exacerbate the risk of hunger for 100 to 200 million people by 2050. Source: Parry, M., Evans, A., Rosegrant, M.W. and Wheeler, T. (2009) Climate change and hunger: Responding to the challenge. Rome: WFP. (World Food Programme (WFP))	But is this considered to be due to extreme events? In any case, this can be dealt with in food security section.
1212	4	43	18	43	20	We recommend including IFPRI's assessment of climate impacts on malnutrition. Suggested text: "Nelson et al. (2010) suggest that overall, the number of malnourished children could fall by over 45 percent between 2010 and 2050 in more optimistic scenarios due to socioeconomic development. The benefits are greatest in middle-income developing countries which have the largest share of the world's population (projections suggest that the number of malnourished children could fall between 10 and 50 percent). However, for low-income developing countries, the benefits are significantly smaller with a decline in malnourishment of 37 percent in the optimistic scenario and an increase of more than 18 percent in the pessimistic scenario." Source: Nelson, G.C., Rosegrant, M.W. et al. (2010) Food security, farming and climate change to 2050: Scenarios, results, policy options. Washington, D.C.: IFPRI (World Food Programme (WFP))	Much of the part added by this recommended revision is on adaptation by socioeconomic development and not relevant to this section.
1213	4	43	22	43	22	What is meant here by "research conducted includes"? Does this mean that research pertaining to the impacts of these extreme events on human health, well-being, and security has been conducted? (IPCC WGII TSU)	The text has been clarified
1214	4	43	22	43	24	These generalising, inaccurate statements must be removed from chapter 4! You can not lump heatwaves, floods, droughts, and cyclones together in such a general statement. You could say: "However, the characteristics of extreme weather and climate events will change as a result of global warming, with, for example, an increase in length, frequency and/or intensity of heatwaves projected over most regions (see Chapter 3)." With such wording, you are still providing a general picture of a changing climate, while at the same time providing a more specific, and accurate example that is consistent with Chapter 3. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1215	4	43	23	43	24	This general statement does not reflect the nuanced conclusions of Chapter 3. Not every extreme is projected to increase. (Nicholls, Neville, Monash University, School of Geography & Environmental Science)	This text has been deleted
1216	4	43	23	43	24	This statement is entirely inconsistent with statements in Chapter 3! (UNITED STATES OF AMERICA)	This text has been deleted
1217	4	43	23	43	24	"the frequency and severity of ...floods, droughts and the magnitude of cyclones increases as global warming occurs" This is not a very good characterization of the assessment of these as contained in Ch. 3. The intensity of tropical cyclones is likely to increase. See Ch. 3, p. 113 for a summary projection for floods and droughts. Statements on floods and droughts should be used which convey also the confidence or likelihood levels in the projections, rather than vague statements which do not convey this information and are prone to misinterpretation by readers. (UNITED STATES OF AMERICA)	This text has been deleted
1218	4	43	24	0	0	Statements regarding the increase in cyclones should be consistent with previous chapters and SPM (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	This text has been deleted
1219	4	43	26	43	31	This paragraph should consider and cite case study 9.2.2. (IPCC WGII TSU)	Agreed and revised.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1220	4	43	27	43	29	The "mortality pattern" should be more fully described--is it a geographical, temporal, demographic, etc. pattern? Also, what is meant by "heat effect," and what does it mean that the "the heat effect lasted longer"? (IPCC WGII TSU)	The text has been revised accordingly
1221	4	43	27	43	31	There must be better sources of information regarding heat waves in south Asia than this reference. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	The reference was cited to show the difference in mechanism between developed and developing countries. The paragraph was also revised to show broader picture.
1222	4	43	29	43	31	Delete this call for "more research...in developing countries..." -- this is not appropriate in an IPCC Special Report. (Stocker, Thomas, IPCC WGI TSU)	The text has been revised accordingly
1223	4	43	29	43	31	The author team should carefully consider whether this sentence, which lacks citations and is tangential to the topics covered in this section (vulnerability, exposure, and impacts), should be included here. (IPCC WGII TSU)	Agreed and deleted.
1224	4	43	33	43	34	Suggest changing the wording to: "Floods cause deaths, injuries, and may be followed by infectious diseases". Floods both directly and indirectly causes deaths and injuries. Also flooding does not always cause infectious diseases: outbreaks of infectious diseases are mostly caused by the sanitary conditions following the flood. (Grynszpan, Delphine, UK Health Protection Agency)	The text has been revised accordingly
1225	4	43	33	43	34	First, not all floods cause all (or any) of the impacts described here, and this point should be clarified. Additionally, heat waves also do not cause these impacts in all cases (or perhaps never for diarrhea?), and heat waves are not considered in this paragraph--thus, it would preferable to delete the mention of heat waves in this sentence. (IPCC WGII TSU)	The text has been revised accordingly
1226	4	43	34	43	34	Suggest changing the wording to "the severe flood in 1998 was associated with an increase in diarrheal illnesses" (Grynszpan, Delphine, UK Health Protection Agency)	The text has been revised accordingly
1227	4	43	36	43	38	Delete "On the contrary" on line 37. It may be more appropriate to rephrase both sentences to say that although there have been reports of outbreaks of infectious diseases after flooding in developed countries, overall the risk assessment has not changed significantly since the WHO 2002 report. The risk of outbreaks of infectious diseases, including gastrointestinal illnesses, is related to the sanitary conditions following a flood and to the general health status of the population. Although there have been a number of reports of infectious disease outbreaks following floods in several developed countries, these have been milder and short lived compared to outbreaks experienced in the developing world. It can be argued that at least some of these outbreaks were only picked up because the developed countries had strong surveillance systems in place and would not have been picked up in a developing country. (Grynszpan, Delphine, UK Health Protection Agency)	This text has been deleted
1228	4	43	36	43	38	This paragraph is very confused. The authors are confusing very different things- the first line (WHO assumption) is an assumption in a global modelling assessment about diarrhoeal rates attributable to climate change. The latter sentence (the Scitler et al. 2007) is an observational study. The two cannot be compared. The statement regarding the WHO modelling should be deleted. There have been several reviews which show that infectious disease risks following flooding in high income countries (Europe,, US) are very low -with some notable exceptions (e.g. New Orleans). The paragraph needs to be more comprehensive and more balanced. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	This text has been deleted
1229	4	43	39	43	39	First sentence in line needs rephrasing. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	The text has been revised
1230	4	43	39	43	39	Sentence beginning "In some cases....." makes no sense. (Stocker, Thomas, IPCC WGI TSU)	The text has been revised
1231	4	43	39	43	39	Missing phrase after "In some cases" (Grynszpan, Delphine, UK Health Protection Agency)	The text has been revised
1232	4	43	39	43	40	This paragraph should consider and cite case study 9.2.4. (IPCC WGII TSU)	Case study has been referenced
1233	4	43	42	43	42	More cautious wording may be warranted here. Unless you are certain that all 138,000 deaths were correlated to the cyclone itself, it would be more appropriate to state that "138,000 people died following a cyclone". (Grynszpan, Delphine, UK Health Protection Agency)	This text has been deleted
1234	4	43	42	43	43	unclear statement "The risk factors for mortality were those who did...". Please clarify. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1235	4	43	42	43	43	Recommend rephrasing to "People at highest risk of mortality were those who..." since these were unlikely to be the only risk factors for mortality. (Grynszpan, Delphine, UK Health Protection Agency)	This text has been deleted
1236	4	43	42	43	44	There are many other cyclones that should be considered to provide a more comprehensive assessment here. (IPCC WGII TSU)	This text has been deleted
1237	4	43	42	43	44	This paragraph should consider and cite case study 9.2.1. (IPCC WGII TSU)	This text has been deleted
1238	4	43	43	43	43	Change wording to " The authors concluded that" (Grynszpan, Delphine, UK Health Protection Agency)	This text has been deleted
1239	4	43	46	43	47	Drought is not a "trigger" for human ignited forest fires, it is a predisposing factor. The human is the trigger! In any case, why is this sentence included here? It is repeated earlier in the chapter, and can be deleted here. (Stocker, Thomas, IPCC WGI TSU)	Text has been revised accordingly

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1240	4	43	46	43	47	It seems there are other impacts of drought on human health, well-being, and security that should be considered here to provide a more comprehensive assessment. (IPCC WGII TSU)	Text has been revised accordingly
1241	4	43	53	43	53	The citation for McMichael (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been added
1242	4	43	53	43	53	Typo in citation: For Campbell-Lendrum et al. (2007) only two authors are listed in the chapter's reference list. Please ensure the citation is correct and harmonize the reference in both locations (chapter text and reference list). (IPCC WGII TSU)	This reference has been deleted
1243	4	44	0	70	0	Section 4.5 Comment: Many of the regional subsections of Section 4.5 include material on observed trends or future projections of extremes. Consistency is vital between such material in this chapter and regional trend/projection material in Chapter 3 (e.g. Tables 3.2, 3.3). I've pointed out some problems if this nature with Section 4.5.7 but also recommend careful checking and consultation between Ch 3 and Ch4 authors on the other regional subsections of Section 4.5. (Wratt, David, NIWA)	Consistency with Chapter 3 has been ensured throughout this section
1244	4	44	1	44	14	Another important indirect impact is from loss of income - e.g. Loss of livelihood, or from damage to the local economy. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	Agreed. The sentence was revised.
1245	4	44	12	0	0	The original papers should be cited here rather than review papers. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	The review was cited to show there are many papers on this issue. The originals can be easily tracked from the review and I think it is relevant to cite the review paper here.
1246	4	44	16	44	17	The citation for Neria, Nandi et al. (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Neria, Y., A. Nandi, et al. (2008). "Post-traumatic stress disorder following disasters: a systematic review." Psychological Medicine 38: 467-480.
1247	4	44	16	44	28	This paragraph on mental health impacts should be carefully linked to the relevant paragraphs in the previous section (2.5). Also, care should be taken in saying that impacts on PTSD are "substantial"- they are not. PTSD is rare. The impacts on mortality and infectious disease in low income countries are much more significant. A less US bias to the perspective of impacts is required! (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	PTSD is not rare even in rescue workers who are considered to be resilient to PTSD. Ref:Berger W, Coutinho ES, Figueira I, Marques-Portella C, Luz MP, Neylan TC, Marmar CR, Mendlowicz MV. Rescuers at risk: a systematic review and meta-regression analysis of the worldwide current prevalence and correlates of PTSD in rescue workers. Soc Psychiatry Psychiatr Epidemiol. 2011 Jun 18. [Epub ahead of print].
1248	4	44	19	44	19	The citation for Morrissey and Reser (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Morrissey, S. A. and J. P. Reser (2007). "Natural disasters, climate change and mental health considerations for rural Australia." Australian Journal of Rural Health 15(2): 120-125.
1249	4	44	26	44	26	The citation for Neria, Nandi et al. (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Neria, Y., A. Nandi, et al. (2008). "Post-traumatic stress disorder following disasters: a systematic review." Psychological Medicine 38: 467-480.
1250	4	44	31	44	36	You may wish to review the grammar in this paragraph (typos?) (Grynszpan, Delphine, UK Health Protection Agency)	Revised.
1251	4	44	34	44	34	"Subjects" - do you mean "studies"?? (Stocker, Thomas, IPCC WGI TSU)	The sentence has been deleted
1252	4	44	34	44	36	There is lot of information on the health effects of disasters in Asia, South America and Africa. It is mistake to look in the "climate change" literature for information on vulnerability -the last 3 lines should be deleted. It is hoped that a more geographically balanced review can be achieved before the final draft. (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND)	The lines were deleted.
1253	4	44	39	0	0	Section 4.5: Throughout the regional section, physical climate observations and projections that are assessed in detail in Chapter 3 are repeated here, without accuracy. In other instances, Chapter 4 provide their own observations and projections that are not based on a comprehensive assessment and are sometimes inconsistent with Chapter 3. We see no reason for Chapter 4 to repeat this material, with some exceptions where a brief summary of climate observations and projections are useful to set the stage for impacts in each reason. Chapter 4 is overlength, and will benefit from removing this redundant and inaccurate material highlighted in the detailed comments to follow. (Stocker, Thomas, IPCC WGI TSU)	Reduction of overlap and consistency with chapter 3 have been ensured
1254	4	44	39	0	0	Structure of the subsections: we think that the overall Section 4.5. would benefit a lot from a more harmonized structure of the subsections. While we appreciate that "Each region will likely have its own priorities" we think that a common structure will make the text more easily accessible to readers. (Stocker, Thomas, IPCC WGI TSU)	Attempt to improve the structure has been made, to a practicable extent
1255	4	44	39	0	0	Section 4.5: The discussion of costs and (economic) losses would be better placed in Section 4.6.3 on "Estimates of Global and Regional Costs" starting on page 77ff (Stocker, Thomas, IPCC WGI TSU)	Cost estimates not in 4.5 (now 4.4) anymore

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1256	4	44	39	0	0	Hazards and exposure/vulnerability are too intimately mixed in this compilation. The géographic review could be shortened by referring to the report of GIEC working group 2. (BOURRELIER, PAUL-HENRI, AFPCN)	Much of climate hazard (Chap. 3 - related material) has been deleted with appropriate reference to chapter 3 made instead
1257	4	44	39	70	40	Section 4.5 overall: With the exception of section 4.5.6 on North America, no assessment of past of future changes, with respect to anthropogenic climate change contribution, is done here. Therefore, this material could be greatly shortened here, and with the extensive literature review submitted to a journal as a review paper on the topic. (UNITED STATES OF AMERICA)	Attribution of impacts of climate extremes is very difficult, and it is hard to find in literature
1258	4	44	39	81	13	There are many literatures about TROPICAL CYCLONE DAMAGES and other main meteorological disasters in China. Please pay attention to the references as follows and add them into section 4.5 or 4.6 if possible: 1)Qiang Zhang, Liguang Wu, and Qi ufeng Liu,TROPICAL CYCLONE DAMAGES IN CHINA(1983-2006),AMERICAN METEOROLOGICAL SOCIETY,APRil 2009,489-495;2)Xiao Fengjin • Xiao Ziniu,Characteristics of tropical cyclones in China and their impacts analysis,Nat Hazards (2010) 54:827–837;3)Yongguang Wang,Zijiang Zhou,Qiang Zhang and Chaoying Huang,Main meteorological disasters and their impacts on the economic and societal developments in China,Int. J. Risk Assessment and Management, Vol. 8, No. 4, 2008,384-394.The texts has sent as attachments in E-mail (CHINA)	References to Zhang et al. (2009) and to Xiao and Xiao (2010) included in 4.4.3
1259	4	44	41	70	40	In general, useful information and data in Chapter 4. Section 4.5 would benefit from data being organised under the common headings, e.g. some have sub-sections on Adaptation (strategies at play), Cost, Interpretation of change while others do not. (International Petroleum Industry Environmental Conservation Association (IPIECA))	Adaptation is discussed in later chapter and costs - in 4.6 (now 4.5).
1260	4	44	41	70	40	Surprised that potential impacts to indigenous peoples in terms of traditional and cultural activities are not discussed in more detail in this section, e.g. Polar Region, South America. (International Petroleum Industry Environmental Conservation Association (IPIECA))	Lack of literature on impacts of changes in climate extremes (rather than mean values) on indigenous peoples
1261	4	44	44	44	44	After this first sentence add: "For a comprehensive assessment of observed and projected regional changes in climate and weather extremes, refer to Chapter 3 (Sections 3.2 - 3.5, and Tables 3.2 and 3.3). (Stocker, Thomas, IPCC WGI TSU)	Done as proposed
1262	4	44	49	44	50	Do not need this sentence "There is strong interest". The reader knows this, that is why the report was requested in the first place and why the reader is reading! (Stocker, Thomas, IPCC WGI TSU)	Sentence deleted
1263	4	45	0	70	0	I would suggest to use the same structure for all regional chapters, as far as it makes sense. E.g. i)introduction - ii) temperature extremes iii) floods ... (Koppe, Christina, Deutscher Wetterdienst)	We also tried to do this to the extent possible, but it is difficult
1264	4	45	5	45	6	This statement does not reflect the content of Chapter 3. For example, Di Baldassarre et al found no evidence of increases in the magnitude of African floods. Also see Table 3.2 for African detail. (Nicholls, Neville, Monash University, School of Geography & Environmental Science)	Consistency with chapter 3 has been ensured
1265	4	45	5	45	7	Is this statement consistent with the findings in Chapter 3? (UNITED STATES OF AMERICA)	Consistency with chapter 3 has been ensured
1266	4	45	5	45	7	This statement should at least reference relevant information in chapter 3, even if other sources are also considered. (IPCC WGII TSU)	Consistency with chapter 3 has been ensured
1267	4	45	5	45	8	Please check chapter 3 for consistency and provide respective references for climate assessments. There is only medium confidence in observed trends in drought in Africa. There is low confidence in trends in floods. For instance, Di Baldassarre et al. (2010) found no evidence that the magnitude of African floods has increased during the 20th century (Section 3.5.2). (Seneviratne, Sonia, ETH Zurich)	Consistency with chapter 3 has been ensured
1268	4	45	6	45	6	Define 'past few years'? Clarify what you mean. (UNITED STATES OF AMERICA)	Deleted
1269	4	45	6	45	6	It is unclear what source IPCC (2007) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	Deleted
1270	4	45	6	45	7	Chapter 3 (Section 3.5.2) state that evidence from Africa concerning any observed trend is flooding is limited, and cite a 2010 paper which found no evidence for any change in African floods during the 20th century. For drought, Chapter 3 states that there is medium confidence that drought has increased in Africa as a whole, but with regional variations (Table 3.2). Your sentence must be reworded to accurately reflect the expert assessment of Chapter 3, if this sentence is needed at all. (Stocker, Thomas, IPCC WGI TSU)	Modified in the spirit of this comment
1271	4	45	8	45	8	The citation for Washington et al. (2004) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation has been added
1272	4	45	9	45	9	Is 'likely' meant here as calibrated uncertainty language? If so, please italicize. Otherwise replace. (Stocker, Thomas, IPCC WGI TSU)	Sentence deleted
1273	4	45	9	45	9	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	Sentence deleted
1274	4	45	12	45	14	This sentence presumably is referring specifically to Africa, and this focus should be clarified to avoid confusion. Additionally, it is not clear why 3.2.3 is the only chapter 3 section cited. (IPCC WGII TSU)	This has been clarified

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1275	4	45	13	45	13	citation should be (Section 3.2) (Stocker, Thomas, IPCC WGI TSU)	Consistency with chapter 3 has been ensured with reference added
1276	4	45	16	45	20	In addition to agriculture, we suggest adding food security as one of the most vulnerable sectors in Africa. To illustrate this, we recommend highlighting the fact that all the approved National Adaptation Programmes of Action (NAPAs) mention agriculture and/or food security as one of the most vulnerable sectors. (World Food Programme (WFP))	This is a good suggestion, but a flat-rate reference to all NAPAs is not sufficient. Agriculture is a sector while (related) food security is a state (not a sector). No action taken.
1277	4	45	18	45	19	The description of increasing variability must consider and cite relevant chapter 3 sections and findings. Additionally, it should be clarified what is meant by increasing variability "in seasons" and in "rainfall, drought and weather extremes." (IPCC WGII TSU)	The text has been revised appropriately.
1278	4	45	22	45	22	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	Sentence deleted
1279	4	45	22	45	25	The relationship between the second sentence and biodiversity and tourism (mentioned in the first sentence) is not clear. (IPCC WGII TSU)	The first sentence has been deleted
1280	4	45	25	45	25	It is unclear what source Reid et al. (2007) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	The citation has been revised accordingly.
1281	4	45	27	0	0	Figure 4-13: As per IPCC Policies and Procedures, all information contained in the chapters of an IPCC Report must undergo formal expert review. Therefore, substantial new material can not be introduced in preparation of the final draft of the report. Introducing an entire new figure that will not be reviewed is not an option. (Stocker, Thomas, IPCC WGI TSU)	The figure has been deleted
1282	4	45	32	45	33	Delete this first sentence - this is the observation from one paper, and not an assessment. Chapter 3 (Table 3.2) does assess that cold days have decreased in these regions, but states there is insufficient literature regarding heat waves/warm spells. (Stocker, Thomas, IPCC WGI TSU)	Deleted
1283	4	45	32	45	33	Please check chapter 3 for consistency and provide respective references for climate assessments. There is low confidence in observed trends in heat extremes in Africa (Table 3.2). (Seneviratne, Sonia, ETH Zurich)	Sentence deleted
1284	4	45	32	45	35	These sentences *must* reflect and cite the assessments of chapter 3 (including Table 3.2), in addition to any other relevant citations. (IPCC WGII TSU)	Sentence deleted
1285	4	45	32	45	40	What is the broader context? Is the number of casualties increasing due to increasing extreme events (e.g. droughts) or due to socio-economic developments (esp. population growth due to which people have to live in more drought-prone regions/have to use the land more intense)? (NETHERLANDS)	This text is intended to provide one example
1286	4	45	33	45	33	The citation for New et al. (2006) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Sentence deleted
1287	4	45	37	45	38	This reference should be updated to case study 9.2.3, without reference to the title. (IPCC WGII TSU)	This has been deleted
1288	4	45	44	45	44	The citation for Verchusen et al. (2000) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation has been clarified
1289	4	45	47	45	48	Reference needed. (Stocker, Thomas, IPCC WGI TSU)	Sentence deleted
1290	4	45	51	45	51	The citation for Schulze et al. (2001) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation has been added
1291	4	45	53	45	53	Typo in citation: For Nkomo et al. (2006) only two authors are listed in the chapter's reference list. Please ensure the citation is correct and harmonize the reference in both locations (chapter text and reference list). (IPCC WGII TSU)	The citation has been clarified
1292	4	46	8	46	9	Redundant statement, see p45 l38 (Stocker, Thomas, IPCC WGI TSU)	Sentence deleted
1293	4	46	11	46	11	Would be useful to convert to \$US. (Stocker, Thomas, IPCC WGI TSU)	IFM-The N\$275 million was converted using the conversion rate one USD varied between 5.70-6.35 N\$ during 2003-2004 with reference to: http://www.tradingeconomics.com/namibia/currency
1294	4	46	13	46	14	The citation for Molua & Lambi (2006) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation has been added
1295	4	46	17	46	18	"Recent studies on observed rainfall trends ..." If a study only was done for 1961-1990, one wouldn't expect to identify trends. (UNITED STATES OF AMERICA)	Sentence deleted
1296	4	46	17	46	20	Replace with conclusions from Chapter 3, including Table 3.2. (Nicholls, Neville, Monash University, School of Geography & Environmental Science)	Consistency with chapter 3 has been ensured
1297	4	46	17	46	20	Delete, or rewrite accurately based on information given in Table 3.2., where decreases in extreme precip are observed for West and East Africa. (Stocker, Thomas, IPCC WGI TSU)	Consistency with chapter 3 has been ensured

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1298	4	46	17	46	20	Please check chapter 3 for consistency. There is low confidence in trends in heavy precipitation events in Africa (Table 3.2). Climate assessments belong under chapter 3. (Seneviratne, Sonia, ETH Zurich)	Consistency with chapter 3 has been ensured
1299	4	46	17	46	24	These sentences should reflect and cite specific sections and findings in chapter 3, in addition to any other relevant citations. (IPCC WGII TSU)	Consistency with chapter 3 has been ensured
1300	4	46	20	46	20	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	Usage of the term has been deleted
1301	4	46	20	46	20	For Tadross et al. (2005a), the publication year does not carry a letter in the chapter's reference list. Please ensure the citation is correct and harmonize the reference in both locations (chapter text and reference list). (IPCC WGII TSU)	Deleted
1302	4	46	22	46	24	Is this statement consistent with the findings in Chapter 3? (UNITED STATES OF AMERICA)	Consistency with chapter 3 has been ensured
1303	4	46	24	46	24	Should cite Table 3.2 here, which based on more recent literature also supports the observed trend of increased dryness in the Sahal and Southern Africa. (Stocker, Thomas, IPCC WGI TSU)	Consistency with chapter 3 has been ensured
1304	4	46	30	46	31	This correlation between ENSO and rainfall needs supporting references. (Stocker, Thomas, IPCC WGI TSU)	A number of supporting references have been added.
1305	4	46	30	46	31	this statement should be supported by a citation (UNITED STATES OF AMERICA)	A number of supporting references have been added.
1306	4	46	30	46	31	A citation needs to be provided for this sentence. (IPCC WGII TSU)	A number of supporting references have been added.
1307	4	46	32	46	32	This reference should be changed to 9.2.4. (IPCC WGII TSU)	The reference has been updated
1308	4	46	34	46	35	The citation for Osman-Elasha (2006) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation has been clarified
1309	4	46	40	46	40	What multiple lines of evidence can you cite as the basis for this projection? (Stocker, Thomas, IPCC WGI TSU)	The sentence has been revised accordingly
1310	4	46	40	46	40	"predicted" should be "projected" (Stocker, Thomas, IPCC WGI TSU)	The sentence has been revised accordingly
1311	4	46	40	46	42	Projected flooding and damage to African port cities. The statements are too vague with respect to confidence levels or likelihood. Compare with Ch 3 sections on flooding and use appropriate confidence levels or likelihood. (UNITED STATES OF AMERICA)	The sentence has been revised accordingly
1312	4	46	40	46	42	The first sentence of this paragraph appears to be a conclusion that extends beyond the scale of evidence provided. The conclusion would strongly benefit from characterization of the author team's degree of certainty in it, for example through use of summary terms for evidence and agreement or levels of confidence, as described in the AR5 Guidance Note on Treatment of Uncertainties. (IPCC WGII TSU)	The sentence has been revised accordingly
1313	4	46	44	46	46	The wording of the second sentence implies that it should follow logically from the first. This linkage, however, is not at all apparent to the reader and needs to be clarified. Additionally, is "exposure" meant in the second sentence as defined in the glossary? (IPCC WGII TSU)	These sentences have been deleted
1314	4	46	48	47	2	Please check chapter 3 (Section 3.5.8) for consistency and provide respective references. (Seneviratne, Sonia, ETH Zurich)	Modified accordingly
1315	4	46	51	46	51	The citation for Osman-Elasha (2006) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation has been clarified
1316	4	46	52	46	52	"... negative impacts..." Here and elsewhere in the report, there is little to no discussion on benefits of a warming climate. Why not? Certainly there are benefits for some agricultural areas from an influx of dusts (or certain types of dust). (UNITED STATES OF AMERICA)	Dust storms do not have positive impact, in general.
1317	4	47	4	47	12	On PSL1 you have stated that adaptation is not considered in Ch4, therefore, to be consistent this paragraph should be moved to Ch5. (Koppe, Christina, Deutscher Wetterdienst)	This paragraph has been deleted
1318	4	47	5	47	5	Is the use of emergency animal feed adaptation or coping? (UNITED STATES OF AMERICA)	This paragraph has been deleted
1319	4	47	8	47	8	For Seo and Mendelsohn (2006b), the publication year does not carry a letter in the chapter's reference list. Please ensure the citation is correct and harmonize the reference in both locations (chapter text and reference list). (IPCC WGII TSU)	This paragraph has been deleted
1320	4	47	12	47	12	The citation for Adger (2002) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This paragraph has been deleted
1321	4	47	15	0	0	Section 4.5.3. The information presented in this section reviews relevant sources, but could be improved by more clearly drawing conclusions of the author team's assessment of the sources, perhaps presenting conclusions characterized by calibrated uncertainty language per the AR5 Guidance Note on Treatment of Uncertainties. (IPCC WGII TSU)	The revision of the section has taken these points into consideration
1322	4	47	17	47	17	Cite a specific AR4 chapter. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1323	4	47	17	47	17	A specific citation to the relevant AR4 chapter would be preferable to the citation provided for this sentence. (IPCC WGII TSU)	This text has been deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1324	4	47	17	47	17	It is unclear what source IPCC (2007) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This text has been deleted
1325	4	47	17	47	18	Being sensitive does not automatically imply that a region is vulnerable. Again, coping capacity is important here. Thus, the first sentence might be correct, the second is too general. (NETHERLANDS)	The sentences have been revised in a way that addresses some of these points
1326	4	47	18	47	18	"susceptible TO" (Stocker, Thomas, IPCC WGI TSU)	Revised.
1327	4	47	20	47	22	You imply here with 'at threat' that the frequency and magnitude of these extreme events will all increase in Asia. You have no basis to make this generalised statement. You could reword to something less problematic like: "Asia can also expect changes in the frequency and magnitude of extreme weather and climate events, such as heatwaves, extreme rainfall, floods, droughts, and tropical cyclones (see Chapter 3 section 3.3 - 3.5 for details)".... (Stocker, Thomas, IPCC WGI TSU)	Revised.
1328	4	47	20	47	22	. "changes in frequency and magnitude of ... tropical cyclones" Note that according to Ch. 3 assessment the frequency of tropical cyclones globally is likely to decrease or remain unchanged. (UNITED STATES OF AMERICA)	Consistency with chapter 3 has been ensured
1329	4	47	20	47	22	This sentence *must* reflect and cite the assessments and relevant sections of chapter 3, in addition to any other citations provided. (IPCC WGII TSU)	Consistency with chapter 3 has been ensured
1330	4	47	25	47	26	It needs to be clarified what is meant by "a relative and absolute high exposure to population and GDP." Population and GDP are exposed, rather than other elements being exposed to them. (IPCC WGII TSU)	The paragraph is deleted.
1331	4	47	28	47	31	Again, these statements are not quite congruent with Ch.3, and issuing a likelihood statement here may be too strong. Perhaps this can be reworded to tone down the certainty and bring it more in line with the uncertainties described in Ch.3. (Kossin, James, NOAA / NESDIS / National Climatic Data Center)	The paragraph is deleted.
1332	4	47	28	47	31	Delete - this is not an expert assessment by Chapter 4. You can not link enhanced coastal disasters to tropical cyclone activity on the basis of a single 2000 paper. (Stocker, Thomas, IPCC WGI TSU)	The paragraph is deleted.
1333	4	47	28	47	31	Could mention here that the amplification of storm-surge heights would result from projected sea level rise. The other factors mentioned (TC effects) are more uncertain as the intensity increase is only rated as likely (and not necessarily in all basins) and there is also a projection of a likely decrease in global tropical storm frequency (again not necessarily in all basins). Also I'm not sure why increase in SST is mentioned here as a factor, unless in terms of a driving factor for the storm changes...but there are other factors besides local SSTs affecting the storm climate. (UNITED STATES OF AMERICA)	The paragraph is deleted.
1334	4	47	28	47	31	This paragraph needs to reflect and cite the assessments and relevant sections of chapter 3. (IPCC WGII TSU)	The paragraph is deleted.
1335	4	47	33	47	35	Here this sentence does not mean coastal flooding. Actual mean is "storm surge" or "high tide water". (Kazama, So, Tohoku University)	Revised.
1336	4	47	38	0	0	"298,4001,2687(billion JPY)" might be a simple mistake. Could you please check a relevant literature ? (JAPAN)	These are the numbers for Tokyo Bay, Ise Bay, and Osaka Bay respectively. In order to avoid confusion, the text is revised. ("and" is added between "4001," and "2687".)
1337	4	47	38	0	0	what is the time period of projections? (UNITED STATES OF AMERICA)	This damage was estimated based on artificial assumptions noted in the paragraph. Thus the estimates are not for any specific years. No revision has been made based on this comment.
1338	4	47	38	47	38	Please use only one currency (normally US\$) to facilitate comparison between sections. (Stocker, Thomas, IPCC WGI TSU)	Revised. "1US\$=100JPY" is assumed for approximate conversion.
1339	4	47	44	47	45	It is unclear what source Masutomi et al. (2010) corresponds to in the chapter's reference list, given the only reference by this author in the reference list contains no publication year. Please ensure the citation is correct and harmonize the reference in both locations (chapter text and reference list). (IPCC WGII TSU)	The reference has not been accepted yet. Thus, the paragraph based on this reference will be deleted in FGD text.
1340	4	47	48	47	51	Do these sentences imply that awareness, governance, and development were improving in China and India since 1983 and 1977, respectively, and such improvements are why no trends in losses have been observed? The logical linkages within the paragraph should be strengthened to clarify the point being made. (IPCC WGII TSU)	Sentences have been reorganized to clarify two points being made.
1341	4	47	50	47	50	It is unclear what source Zhang et al. (2009) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This article will be cited in FGD text as "Zhang, Q., Wu, L. , and Kiu, Q. (2009a)"
1342	4	48	2	48	6	This paragraph should consider and cite case study 9.2.4. (IPCC WGII TSU)	The case study 9.2.4 is newly cited not in this paragraph but in another paragraph below.
1343	4	48	3	48	3	The citation for Shen et al. (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation has been added

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1344	4	48	5	48	6	It is unclear why this sentence is characterized by "however" in that it seems to follow from the previous sentence, instead of standing in contrast to it. (IPCC WGII TSU)	The sentence is removed, since it does not work as an example of large flood risk in India, Bhagladesh and China.
1345	4	48	8	48	9	"In July 2005, severe flooding occurred in Mumbai, India. 944 millimetres of rain fell in a 24-hour period, nearly half of the average yearly rainfall of 2147 centimetres (Kshirsagar, 2006)". Here, "centimetres" should be "millimetres". (Chen, Xing, Nanjing University)	Revised.
1346	4	48	8	48	15	Maybe mention 2010 floods in Pakistan if literature is available. (Seneviratne, Sonia, ETH Zurich)	Due to the page limitation, case of Pakistan is not added.
1347	4	48	9	48	9	The citation for Kshirsagar (2006) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Kshirsagar, N.A., Shinde, R.R., and Mehta, S. , 2006: Floods in Mumbai: Impact of public health service by hospital staff and medical students. Journal of postgraduate medicine, 52(4), 312-314.
1348	4	48	12	48	12	It is unclear what source Ranger et al. (2010) corresponds to in the chapter's reference list, given the only reference by this author in the reference list contains no publication year. Please ensure the citation is correct and harmonize the reference in both locations (chapter text and reference list). (IPCC WGII TSU)	This article will be cited as "Ranger et al. (2011)" in FGD text. The reference list will be also amended.
1349	4	48	18	48	18	The citation for NAPA (2005) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Ministry of Environment and Forest (Government of the People's Republic of Bangladesh), 2005: National Adaptation Programme of Action (NAPA) Final Report.
1350	4	48	24	48	24	It would be preferable to indicate more precisely what "moderate and high flood prone" means, perhaps in terms of exposure to floods with given return periods. (IPCC WGII TSU)	The sentence is removed
1351	4	48	29	48	30	this statement needs to be supported by a citation (UNITED STATES OF AMERICA)	This statement is examined in Shankman et al (2006), which is cited in the latter sentence in the same paragraph.
1352	4	48	34	48	34	Typo citation: For Fenqing et al. (2005), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	The reference list is correct. This article will be cited as "Fengqing et al. (2005)" in FGD text.
1353	4	48	37	48	42	These statements need to be consistent with Chapter 3. (Nicholls, Neville, Monash University, School of Geography & Environmental Science)	Deleted.
1354	4	48	37	48	42	Delete - You can not provide an expert assessment of flooding trends based on the results from single papers. These regional observations are noted in section 3.5.2 of Chapter 3, but within a context where it is clear that they are the results from individual studies and it is clearly stated that the evidence for any regional trends is limited. A likelihood statement such as 'very likely' can not be based on a single paper. (Stocker, Thomas, IPCC WGI TSU)	Deleted.
1355	4	48	37	48	42	Remove paragraph and replace with reference to chapter 3 (Section 3.5.2). There is low confidence in observed trends in floods. (Seneviratne, Sonia, ETH Zurich)	Deleted.
1356	4	48	41	48	41	The citation for Bhutiyani et al. (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Deleted.
1357	4	48	41	48	41	For Hirabayashi et al. (2008b), the publication year does not carry a letter in the chapter's reference list. Please ensure the citation is correct and harmonize the reference in both locations (chapter text and reference list). (IPCC WGII TSU)	Deleted.
1358	4	48	41	48	42	is this statement generally supported as very likely? It seems to contradict statements in Chapter 3. (UNITED STATES OF AMERICA)	Deleted.
1359	4	48	41	48	42	. "very likely that there will be an increase in the risk of floods in most humid Asian monsoon regions" This is not consistent with the assessment of flooding in Ch. 3. (See p. 57 and 58 in Ch. 3). (UNITED STATES OF AMERICA)	Deleted.
1360	4	48	49	49	7	These paragraphs need to be revised to provide a more comprehensive assessment of vulnerability, exposure, and impacts related to temperature extremes in Asia. (IPCC WGII TSU)	The text has been revised to provide a brief example
1361	4	48	50	0	0	. "Global warming is accompanied by an increase in the frequency and intensity of heat waves..." According to Ch. 3, p. 25, this could be termed as very likely on a global scale. So "Global warming is very likely to be accompanied by an increase globally in the..." (UNITED STATES OF AMERICA)	Consistency with chapter 3 has been ensured
1362	4	48	50	48	53	These statements need to be consistent with Chapter 3. (Nicholls, Neville, Monash University, School of Geography & Environmental Science)	Consistency with chapter 3 has been ensured
1363	4	48	50	48	53	Delete - You do not need to provide a mini-assessment of observed changes in temperature extremes based on an outdated and not entirely appropriate source. The reader knows they can find this information assessed by the relevant climate experts in Chapter 3. (Stocker, Thomas, IPCC WGI TSU)	Consistency with chapter 3 has been ensured
1364	4	48	50	48	53	Remove paragraph and replace with reference to chapter 3 (Section 3.3.1 and Tables 3.2 and 3.3). (Seneviratne, Sonia, ETH Zurich)	Consistency with chapter 3 has been ensured
1365	4	48	50	48	53	These sentences *must* reflect and cite the assessments of chapter 3 (including Table 3.2), in addition to any other relevant citations. (IPCC WGII TSU)	Consistency with chapter 3 has been ensured

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1366	4	48	52	48	53	This paragraph should consider and cite case study 9.2.6. (IPCC WGII TSU)	The text has been deleted.
1367	4	49	9	49	44	West Asia also has experienced sever droughts. I think this area should be mentioned here also(warteng et al., 2009; Rahimzadeh et al., 2009). (Rahimi, Mohammad, I.R. of Iran Meteorological Organization)	Due to the page limitation, case of West Asia is not added.
1368	4	49	10	49	11	. A way of rephrasing the second sentence of this paragraph that is more consistent with Ch. 3 (p. 52) is: "Increasing dryness has been observed particularly in East Asia during the second half of the 20th century, adversely...." (UNITED STATES OF AMERICA)	Modified
1369	4	49	10	49	12	These statements do not reflect Chapter 3 conclusions - see table 3.2. (Nicholls, Neville, Monash University, School of Geography & Environmental Science)	Consistency with chapter 3 has been ensured
1370	4	49	10	49	12	Delete sentence beginning "Increasing frequency". The assessment in Chapter 3 (table 3.2) states that there is low confidence in any changes in drought throughout Asia, with the exception of East Asia. You can not invent you own statements on observed trends that have no basis, and contradict the expert assessment of Chapter 3. (Stocker, Thomas, IPCC WGI TSU)	Consistency with chapter 3 has been ensured
1371	4	49	10	49	17	Is this statement consistent with the findings in Chapter 3? (UNITED STATES OF AMERICA)	Consistency with chapter 3 has been ensured
1372	4	49	10	49	22	These paragraphs must consider, reflect, and cite relevant assessments in chapter 3. (IPCC WGII TSU)	Consistency with chapter 3 has been ensured
1373	4	49	16	49	17	Delete - There is limited evidence for increased droughts, and it is not within the scope of Chapter 4 to attempt to attribute changes in climate extremes with ENSO or other modes of climate variation. (Stocker, Thomas, IPCC WGI TSU)	Consistency with chapter 3 has been ensured
1374	4	49	16	49	17	(attribution of increased drought largely to a rise in temperatures) See Ch. 3, p. 50-52 for a better discussion of attribution causes for increasing dryness. (UNITED STATES OF AMERICA)	Consistency with chapter 3 has been ensured
1375	4	49	25	49	25	The citation for Bhuiyan et al. (2006) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Bhuiyan, C., Singh, R.P., and Kogan F.N.: Monitoring drought dynamics in the Aravalli region (India) using different indices based on ground and remote sensing data. International Journal of Applied Earth Observation and Geoinformation, 8(4), 289-302.
1376	4	49	27	49	28	The citation for Widawsky and O'Toole (1990) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Widawsky, D.A., and O'Toole, J.C., 1990: Prioritizing the rice biotechnology research agenda for Eastern India. Rockefeller Foundation Press, New York
1377	4	49	29	49	29	The citation for Pandey et al. (2000) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Pandey, S., Behura, D.D., Villano, R., Naik, D., 2000. Economic costs of drought and farmers' coping mechanisms: a study of rainfed rice systems in eastern India. International Rice Research Institute (IRRI) Discussion Paper Series 39, IRRI, Los Banos, Philippines.
1378	4	49	40	49	40	The citation for Xinua (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Text deleted
1379	4	49	46	49	52	The biggest wildfires happen mainly in Indonesia. This is huge damage for not only Indonesia but also other countries. This description is necessary. (Kazama, So, Tohoku University)	Description of wildfire in Indonesia which was in 4.2.2.1.1 in SOD is imported.
1380	4	49	47	49	47	Typo in citation: For Su et al. (2004) only two authors are listed in the chapter's reference list. Please ensure the citation is correct and harmonize the reference in both locations (chapter text and reference list). (IPCC WGII TSU)	The in-line citation should be revised. The correct citation is "Su and Liu (2004)".
1381	4	50	6	50	6	The citation for OECD (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The paragraph is deleted.
1382	4	50	9	50	10	Provide reference for 200% projection. (Stocker, Thomas, IPCC WGI TSU)	The paragraph is deleted.
1383	4	50	10	50	12	For the results described in this sentence, it would be preferable to indicate the nature of assumptions made, the sensitivity of the projections to those assumptions, and the range of percentage increase projected for the cities mentioned. (IPCC WGII TSU)	The paragraph is deleted.
1384	4	50	19	50	19	The citation for OECD (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The paragraph is deleted.
1385	4	50	27	52	47	Please check whether information on extreme precipitation events and their expected frequency and intensity can be added in a separate paragraph as they can cause flash floods or urban floods which should be kept separate from riverine floods, which are caused by other weather conditions as well. For Germany especially the development of Vb-weather condition is of relevance as they already exceeded historical extremes and caused some harmful floods (2002, 2005). (GERMANY)	This is already addressed in chapter 3, tables 3.2 and 3.3.
1386	4	50	30	50	31	connection of these sentences to overall paragraph needs to be improved. (UNITED STATES OF AMERICA)	Revision was carried out accordingly
1387	4	50	37	50	46	The work of Fouillet et al. (2008) on the rapid adaptation to heat waves in Europe should be reviewed in section on European heat waves. (UNITED STATES OF AMERICA)	A sentence was added accordingly

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1388	4	50	38	0	0	Delete one of the "Summers" (Koppe, Christina, Deutscher Wetterdienst)	One "summer" was deleted
1389	4	50	38	50	38	"Summer" does not need to appear twice in this line. (Global Climate Observing System Steering Committee)	One "summer" was deleted
1390	4	50	38	50	38	It is unclear what source Della-Marta et al. (2007) corresponds to in the chapter's reference list, given the only reference by this author in the reference list contains a letter after the publication year. Please ensure the citation is correct and harmonize the reference in both locations (chapter text and reference list). (IPCC WGII TSU)	It was corrected in the reference list
1391	4	50	40	50	42	The chapter 9 references need to be updated to reflect the most recent outline of chapter 9 and its case studies. The reference here should be to 9.2.2. (IPCC WGII TSU)	Changed accordingly
1392	4	50	41	50	42	It is unclear what source Wilby (2003) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	Deleted here
1393	4	50	43	50	43	The citation for London and Wilby (2003a) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Changed to refer properly in reference list.
1394	4	50	44	50	44	The citation for UN (2004) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation has been clarified
1395	4	50	46	0	0	I would suggest to say "heat load" instead of "heat feeling" (Koppe, Christina, Deutscher Wetterdienst)	Changed to heat load
1396	4	50	50	50	52	Mentioning the relative importance of disasters is very important. But is it really that easy as described. E.g. floods have more often long-term impacts compared to droughts. (NETHERLANDS)	The sentence was reworded.
1397	4	51	5	0	0	Is the projection of a very likely increase in forest fire danger in the Mediterranean consistent with Ch. 3 projections for the region, such as medium confidence of an increase in dryness (see p. 123 or Ch. 3)? The likelihood level seems rather high given that comparison, but perhaps this is due to the high confidence in a temperature increase as opposed to the less confident projection of dryness increase? (UNITED STATES OF AMERICA)	The sentence was reworded accordingly
1398	4	51	5	51	5	Assuming "very likely" on this line is being used as calibrated uncertainty language per the AR5 Guidance Note on Treatment of Uncertainties, it should be italicized. If use of the term is instead casual, it should be avoided. (IPCC WGII TSU)	The sentence was reworded accordingly
1399	4	51	5	51	7	These assessments should be much more nuanced. Fire risk is likely to depend on the occurrence of drought as highlighted in chapter 4, and there is only medium confidence in changes in drought (chapter 3). Moreover, while projections consistently suggest an increasing risk of drought in the Mediterranean, this is not the case for many other regions, in particular in Northern Europe. Please check consistency with drought projections in chapter 3. In particular the uncertainty assessment "very likely" seems too confident (Seneviratne, Sonia ETH Zurich)	The sentence was reworded accordingly
1400	4	51	5	51	9	How are first and last sentences related? Stating first that "fire danger is increasing", ending with "no translating into increased fire occurrence" (NETHERLANDS)	Re-worded
1401	4	51	6	51	6	To add an updated reference at the end of the brackets: (...; Arianoutsou et al., 2011). They evaluate the fire danger and the forest resilience in Greece after the last fires. (SPAIN)	The reference was added
1402	4	51	6	51	6	The citation for Pausas (2004) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation was deleted
1403	4	51	6	51	7	Typo citation: For Goldammer et al. (2005), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	The citation was deleted
1404	4	51	13	51	13	It would be much preferable to cite specific relevant sections in chapter 3. (IPCC WGII TSU)	Done
1405	4	51	18	51	19	"...total monetary damage...is projected to rise strongly" Given the context of this report, this statement then raises the question of why damage will increase. Is this due to changes in population, infrastructure, and wealth or due to changes in climate? What fraction would be attributable to changes in climate? Is that climate contribution projection consistent with Ch. 3? (UNITED STATES OF AMERICA)	It is difficult to separate these three components. Some examples where this separation is possible are given
1406	4	51	18	51	19	It would be preferable to specify what is meant by "projected to rise strongly"--at what rate and over what time scale? (IPCC WGII TSU)	It was added: with damages estimated to amount by 2100 without adaptation to roughly € 17× 109 per year under A2 and B1 scenarios.
1407	4	51	20	0	0	The Netherlands is indeed highly sensitive for flooding (26% is below sea level; 29% is prone to river floods), but it is less susceptible/vulnerable due to long-term adaptation measures taken over centuries. (NETHERLANDS)	It is true, it is indicated that these estimates refers to lack of adaptation measurements.
1408	4	51	21	51	22	It would be preferable to mention what is meant by "adaptation" and perhaps give indication of the number of people flooded and the magnitude of total damage costs to put the changes in context. (IPCC WGII TSU)	Adaptation is dealt in a different chapter, and quantified numbers differ on the different adaptation capacities.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1409	4	51	24	0	0	The text and the references do not reflect current knowledge. Several authors have published studies on European wind storm risk, its impacts, and changes under increasing greenhouse gas concentrations. They point to an increasing damage risk in western Europe, also mentioning the dependence on adaptation. Here are some references to work in which I was involved. Other papers are cited within. All these studies are based on simulated wind output from the GCMs and RCMs. While there is some variability in the signals between different runs and models, the overall signal is apparently rather stable. It is also partly reflected by Fig. 3.9 in the previous chapter 3 of SREX. Donat MG, Leckebusch GC, Wild S, Ulbrich U. (2010a) Benefits and limitations of regional multi-model ensembles for storm loss estimations. Climate Research . DOI: 10.3354/cr00891 (accepted, in press) Donat MG, Leckebusch GC, Wild S, Ulbrich U. (2010b) Future changes of European winter storm losses and extreme wind speeds in multi-model GCM and RCM simulations. Natural Hazards and Earth System Sciences (accepted) Donat MG, Leckebusch GC, Pinto JG, Ulbrich U. (2010c) European storminess and associated circulation weather types: future changes deduced from a multi-model ensemble of GCM simulations. Climate Research 42:27-43. DOI:10.3354/cr00853 Leckebusch, G. C., U. Ulbrich, L. Fröhlich, and J. G. Pinto, 2007: Property loss potentials for European midlatitude storms in a changing climate. Geophys. Res. Lett., 34, L05703, doi:10.1029/2006GL027663. Pinto, J.G., L. Fröhlich, G.C. Leckebusch, U. Ulbrich, 2007: Changing European Storm loss potentials under modified climate condition according to ensemble simulations of the ECHAM5/MPI-OM1 GCM. Natural Hazards and Earth System Sciences, 7, 165–175. (Ulbrich, Uwe, Freie Universitaet Berlin)	A new sentence was added to update the information regarding projected damages. Two referenes were added. : "Similar results are obtained from GCMs and RCMs run under IPCC SRES A1B emission scenario (Donat et al., 2010) with mean loss ratios to increase assuming no adapatation at the end of the 21Century in Western and Central Europe (e.g. Germany by 37.7% and Pland by 12.1% according to the GCM), and to decrease in over Southern Europe (e.g., for the Iberian Peninsula –10.1%). Adaptation to the changing wind climate may reduce by half the estimated losses (Leckebusch et al., 2007; Donat et al., 2010). As a result, adaptation through adequate sea defenses and the management of residual risk is essential"
1410	4	51	24	51	45	Is there anything known about changes in frequency, favoured areas or intensity of tornados? At the moment design criteria for houses etc. do not consider impacts by tornados. Detection and observation systems linked with alarm systems do not exist (e.g., in Germany). Exposure and vulnerability are therefore higher then for winter storms. (GERMANY)	The tornado's projection is to be addressed in chapter 3, not in chapter 4.
1411	4	51	24	51	46	Please check consistency with chapter 3. (Seneviratne, Sonia, ETH Zurich)	Done
1412	4	51	25	51	25	Must provide a reference supporting your claim that windstorms are the most destructive climate extremes in Europe. (Stocker, Thomas, IPCC WGI TSU)	The sentence was changed to "Windstorms have been one of the most important natural hazards for the insurance industry in Europe (Munich Re NatCatSERVICE data cited in EEA, 2008). "
1413	4	51	25	51	28	Delete two sentences beginning from "Severe windstorms....." - It is not within the scope of Chapter 4 to be attempting to attribute climate extremes with large scale modes of climate variability. (Stocker, Thomas, IPCC WGI TSU)	Done
1414	4	51	25	51	40	These paragraphs should consider, reflect, and cite any relevant assessments in chapter 3. (IPCC WGII TSU)	Chapter 3 is cited
1415	4	51	31	0	0	Why is the term "immense" used here? (NETHERLANDS)	Immense was deleted
1416	4	51	31	51	31	The citation for Schwierz et al. (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Reference was updated
1417	4	51	34	51	34	The citation for Schumacher and Bugmann (2006) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The reference was deleted
1418	4	51	36	51	37	How reliable is this estimate? What evidence is it based on? (Seneviratne, Sonia, ETH Zurich)	Example clarified
1419	4	51	36	51	38	Regarding the projection of a "likely" increase in expected losses due to storm surges in Northern Europe of 100 to 900% by end of century, depending on the country: Is this projection and likelihood consistent with Ch. 3? What sea level rise and wind storm change projection was assumed for this and how confident are we in each these two contributions to the change? (UNITED STATES OF AMERICA)	Example clarified
1420	4	51	36	51	40	Surely this paragraph fits better within the coastal flooding section? (Stocker, Thomas, IPCC WGI TSU)	Example clarified
1421	4	51	36	51	40	(i) Isn't this 'gray' literature; (ii) as summarized in the IPCC, 2007 4AR, a very high level of uncertainty exists for projected storms in Europe. Frequency and strength might decrease or increase, depending on the model (NETHERLANDS)	Changes in the text were made accordingly
1422	4	51	43	51	43	The citation for Barredo (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation clarified
1423	4	51	43	51	44	It needs to be clarified whether the increasing damages to forests described here are observed trends or observed trends attributed to anthropogenic climate change--the intended meaning of the sentence within the paragraph is currently not clear. (IPCC WGII TSU)	Formal attribution not asserted in sentence
1424	4	51	48	52	11	Please check whether this paragraph could be focused on riverine floods. In this case the relevance/influence of changes in maximum snow depth and snow melt processes on riverine floods should be discussed as well. (GERMANY)	This issue refers to physical systems and it should be addressed in chapter 3
1425	4	51	48	52	18	Please check consistency with chapter 3 (Sections 3.5.2 and 3.5.6) (Seneviratne, Sonia, ETH Zurich)	Consistency ensured

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1426	4	51	49	51	49	Must provide a reference supporting your claim that flooding is the most frequent and widespread natural risk in Europe. (Stocker, Thomas, IPCC WGI TSU)	Floods affect all European countries, lowlands, uplands, etc. A cite with such statement is provided: European Environmental Agency, 2008: pag. 96.
1427	4	51	53	51	54	This sentence should consider and cite case study 9.2.4. (IPCC WGII TSU)	Considered but not added
1428	4	52	1	0	0	The statement "...is likely to increase the probability of flash floods" does not appear in Ch3 (see Ch3 P3 lines 27-32). (Koppe, Christina, Deutscher Wetterdienst)	The sentence is now changed accordingly. The increase in projected heavy precipitation for Europe is indicated in Table 3.3.
1429	4	52	1	52	1	Should cite Table 3.2, in relation to increased extreme precipitation in parts of Europe. (Stocker, Thomas, IPCC WGI TSU)	Re-worded
1430	4	52	1	52	1	Is 'likely' meant here as calibrated uncertainty language? If so, please italicize. Otherwise replace. BTW, the assessment can not be based on a single study! (Stocker, Thomas, IPCC WGI TSU)	Re-worded
1431	4	52	1	52	1	Assuming "likely" on this line is being used as calibrated uncertainty language per the AR5 Guidance Note on Treatment of Uncertainties, it should be italicized. If use of the term is instead casual, it should be avoided. (IPCC WGII TSU)	Re-worded
1432	4	52	2	52	2	For EEA (2004b), the publication year does not carry a letter in the chapter's reference list. Please ensure the citation is correct and harmonize the reference in both locations (chapter text and reference list). (IPCC WGII TSU)	b was deleted
1433	4	52	4	52	4	The citation for Robinson et al. (2003) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation has been added
1434	4	52	5	52	5	Moreover, in the frame o HYDRATE EU funded research project, Gaume et al., (2009) compiled and analyzed an atlas of extreme flash floods in Europe containing over 550 documented events. Results show that the most extreme flash floods are greater in magnitude in the Mediterranean countries than in the inner continental countries and that there is a strong seasonality to flash flood occurrence revealing different climatic forcing mechanisms in each region. REFERENCE: Gaume E., V. Bain, P. Bernardara, O. Newinger, M. Barbuc, A. Bateman, L. Blaškovičová, G. Blöschl, M. Borga, A. Dumitrescu, J. Garcia, A. Irimescu, S. Kohnova, A. Koutroulis, L. Marchi, S. Matreata, V. Medina, E. Preciso, D. Sempere-Torres, G. Stancalie, J. Szolgay, I. Tsanis, D. Velasco, A. Viglione, 2009: A collation of data on European flash floods, Journal of Hydrology, Volume 367, Issues 1-2, 70-78. (GREECE)	I know that work, although the study deals with hydrometeorological mechanisms and not much to climate change.
1435	4	52	9	52	9	The technical report which was summarised in the reference Mayor of London (2005) was written up in a peer-reviewed journal article - see Arkell, B.P. and Darch, G.J.C. 2006. Impact of climate change on London's transport network. Proceedings of the Institute of Civil Engineers: Municipal Engineer, 159, ME4, 231-237. (Darch, Geoff, Atkins & University of East Anglia)	Cite changed to Arkell and Darch
1436	4	52	9	52	9	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	Use avoided
1437	4	52	14	0	0	Reference missing for statement on "impacts. Is this also Huggel et al, 2004? (NETHERLANDS)	Inserted other reference by Haerberli et al., 2004
1438	4	52	20	52	26	Please check consistency with chapter 3 (Section 3.5.6) (Seneviratne, Sonia, ETH Zurich)	Text modified accordingly
1439	4	52	21	52	26	Section on Landslides in Europe: This section needs revision. The statement that landslide activity in most regions of Europe are decreasing is poorly referenced and not in line with more recent research. Corominas (2005) is not a particularly good reference. Rather it should be mentioned that there is a general lack of information of trends in landslide activity. For some regions where studies were possible thanks to reasonably well established data bases no significant trend was found (e.g. Switzerland, cf. Hilker, N. Badoux, A. Hegg, C. 2009. The Swiss flood and landslide damage database 1972-2007. Natural Hazards and Earth System Sciences, 9(3): 913–925. For local case studies, cf. for instance to Stoffel, M. 2010. Magnitude–frequency relationships of debris flows—A case study based on field surveys and tree-ring records. Geomorphology, 116(1-2): 67–76. Stoffel, M. Beniston, M. 2006. On the incidence of debris flows from the early Little Ice Age to a future greenhouse climate: a case study from the Swiss Alps. Geophysical Research Letters, 33(16): 16404. Furthermore, I strongly recommend to consult SREX Chapter 3, section 3.5.6., to have consistency between chapters (Huggel, Christian, University of Zurich)	Text modified accordingly
1440	4	52	21	52	26	This paragraph needs to reflect and cite the assessments and relevant sections of chapter 3. Also, the final sentence seems to reflect the assessment finding of chapter 3 regarding heavy precipitation events (e.g., Table 3.1), but chapter 3 is not cited. In addition, "likely," when used as calibrated uncertainty language per the AR5 Guidance Note on Treatment of Uncertainties, should be italicized. (IPCC WGII TSU)	Text modified accordingly
1441	4	52	24	52	24	The citation for Corominas et al. (2005) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation clarified
1442	4	52	25	52	25	Delete - likely to be enhanced by climate change. There is 'low confidence' in any link between climate change, increased rainfall and shallow landslides (table 3.1). There is 'medium confidence' that extreme precipitation will increase in parts of Europe (table 3.2). (Stocker, Thomas, IPCC WGI TSU)	Re-worded

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1443	4	52	28	52	47	I recommend to consult and reference that new Technical Paper of the European Env Agency (released in March 2011) on Climate Change Impacts on Snow, Ice and Permafrost in Europe (http://acm.eionet.europa.eu/reports/ETCACC_TP_2010_13_Cryosphere_CC_Impacts). (Huggel, Christian, University of Zurich)	Good report, but mainly dealing with impacts on physical system, and not much on damages on human systems and ecosystems.
1444	4	52	28	52	47	Please check whether some information on possible changes of maximum snow depth can be added. Some people assume that warming would reduce the maximum snow depths. In fact more precipitation in winter and warmer winters (0 to -10°C instead of 10 to -20°C) can increase the maximum snow depths in some regions. This can cause an exceed of snow load design criteria of roofs of houses, installations etc. Several collapses make aware of the possible risk of such a development. (GERMANY)	This is mainly an issue of physical impacts (chapter 3), that we are trying to avoid in our chapter 4.
1445	4	52	31	0	0	Correct that exposure is increasing. But what are the real risks, given measures taken (NETHERLANDS)	Probably low, but difficult to quantify
1446	4	52	32	52	34	This sentence should consider, reflect, and cite the assessments of chapter 3. (IPCC WGII TSU)	Considered, with modifications to paragraph
1447	4	52	35	52	36	predictions --> projections; "highly uncertain" is not a term used in the calibrated IPCC uncertainty language -- revise. (Stocker, Thomas, IPCC WGI TSU)	Revised
1448	4	52	35	52	36	It would be preferable to characterize the degree of certainty in these model projections using calibrated uncertainty language, such as an assigned level of confidence, per the AR5 Guidance Note on Treatment of Uncertainties. (IPCC WGII TSU)	Revised
1449	4	52	47	0	0	Please add vulnerability to climate change and water resources for emerging countries such as China, Turkey and Asia to skiing and artificial snow making (de Jong, Carmen, University of Savoy)	This part was deleted
1450	4	52	49	53	22	discussion of adaptation potential etc. seems outside of the remit of Chapter 4 and could be moved to one of the latter Chapters. Given the Chapter is substantially overlength, we suggest to remove/reduce this section substantially. (Stocker, Thomas, IPCC WGI TSU)	This part was deleted
1451	4	53	9	53	9	Change wording to: "Due to uncertainty in climate projections, it is" (Stocker, Thomas, IPCC WGI TSU)	This part was deleted
1452	4	53	12	0	0	What is the assessment of the 'climate change safety factor' approach? How does it relate to other adaptation frameworks discussed, especially in chapter 1 or 8? (UNITED STATES OF AMERICA)	This part was deleted
1453	4	53	12	53	12	For Kundzewicz et al. (2010a, b) the different publications from this author and year are not distinguished by a letter in the chapter's reference list. Please ensure the citation is correct and harmonize the reference in both locations (chapter text and reference list). (IPCC WGII TSU)	This part was deleted
1454	4	53	13	53	13	The citation "COM/2007/0414 final" is not correct. Please change the format of this citation to "author, year" and list the reference in the chapter's reference list. (IPCC WGII TSU)	This part was deleted
1455	4	53	18	53	18	Schelhaas et al. (2009) is missing in the references. (Rock, Joachim, Johann Heinrich von Thuenen-Institute)	This part was deleted
1456	4	53	20	53	22	It would be preferable to indicate the nature of assumptions made for these projections of the benefits of adaptation--over what time scales, for what magnitude of climate change? (IPCC WGII TSU)	This part was deleted
1457	4	53	24	0	0	Table 4-13: The second column (Changes in hazard) MUST BE DELETED. These changes are frequently inconsistent with the carefully assessed trends given in Chapter 3, and are not based on multiple lines of cited evidence. This Table, if it is to remain included, must be limited to coverage of exposure, vulnerability and Impacts only. Also - would 'socially isolated' not be a more appropriate term to use then 'lonely' in column 4. (Stocker, Thomas, IPCC WGI TSU)	This table has been deleted
1458	4	53	28	53	28	Is 'very likely' meant here as calibrated uncertainty language? If so, please italicize. Otherwise replace. (Stocker, Thomas, IPCC WGI TSU)	This part was deleted
1459	4	53	28	53	29	Please revise sentence, since confidence in changes in some of these extreme is not high (chapter 3). Here is a suggestion: "Changes in weather-related disasters (i.e. potential changes in the occurrence of heatwaves, droughts, floods, see chapter 3 for respective uncertainty of projections) could have different economic impacts across and within European Union States". (Seneviratne, Sonia, ETH Zurich)	This part was deleted
1460	4	53	28	53	29	The use of "very likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	This part was deleted
1461	4	53	29	53	29	"European Nations" or "European States" - why do you limit to European Union member states? (Stocker, Thomas, IPCC WGI TSU)	This part was deleted
1462	4	53	30	53	30	The citation for OECD (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This part was deleted
1463	4	53	31	53	32	The phrase "highest portion of the economic loss" seems inconsistent with the metric actually provided, percentage of GDP. Does this mean that Europe's 0.11% of GDP is among the top 3 regional losses (expressed as a percentage of GDP)? (IPCC WGII TSU)	This part was deleted
1464	4	53	40	53	51	To the extent relevant, the assessment findings of chapter 3 should be considered and cited here. (IPCC WGII TSU)	This part was deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1465	4	53	40	54	14	These two paragraphs do not deal with extremes events, therefore I would suggest to delete them and move it to the respective section in AR5 (Koppe, Christina, Deutscher Wetterdienst)	This part was deleted
1466	4	53	41	0	0	Lozano et al 2010 is not in the reference list (Huggel, Christian, University of Zurich)	This part was deleted
1467	4	53	41	53	41	The citation for Lozano et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This part was deleted
1468	4	53	42	53	42	How is "abrupt climate change" defined here? It is obviously not used as in climate research where the term abrupt usually refers to time scales faster than the typical time scale of the responsible forcing. I suggest avoiding this term here (Kaser, Georg, University of Innsbruck)	This part was deleted
1469	4	53	42	53	42	Delete - 'are experiencing abrupt climate change'. A glacier or forest can not experience abrupt climate change - it could respond to abrupt climate change, but this is not the case here. Possible rewording would be: "...are undergoing rapid change" (Stocker, Thomas. IPCC WGI TSU)	This part was deleted
1470	4	53	42	53	43	The citation for Vergara et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This part was deleted
1471	4	53	43	0	0	Ruiz et al, 2011: to which Journal was this paper submitted? Is it accepted? (Huggel, Christian, University of Zurich)	This part was deleted
1472	4	53	46	53	49	The references on which the given numbers and the entire statements is based are both web pages. The first one, referring to an internal report of INRENA, is not accessible anymore, the second one leads to a lecture note. Neither of the tow references meets the IPCC requirements. The entire statement has to be redone by using original literature such as e.g.: Kaser G (1999) a review of the modern fluctuations of tropical glaciers, Global and Planetary Change 22:93-103. Georges C (2004) The 20th century glacier fluctuations in the Cordillera Blanca (Peru). Arctic, Antarctic, and Alpine Research 36(1): 100-107; Racoviteanu AE, Arnaud Y, Williams MW, & Ordonez J (2008) Decadal changes in glacier parameters in the Cordillera Blanca, Peru, derived from remote sensing. Journal of Glaciology 54(186):499-510. and summarized to some extent by Vuille M., et al. (2008) Climate change and tropical Andean glaciers - Past, present and future, Earth Science Review 89:79-96. (Kaser, Georg, University of Innsbruck)	This part was deleted
1473	4	53	47	0	0	Kaser, 2005: I don't think that a university lecture (powerpoint presentation) should be referenced in this report. Additionally, the indicated link is not valid. (Huggel, Christian, University of Zurich)	This part was deleted
1474	4	53	47	0	0	INRENA, 2006: The Peruvian gov't institution INRENA no longer exists, ie. it was transformed into a new agency called ANA. Accordingly, the indicated link does not exist any more. Additionally, the indicated numbers of glacier retreat do not correspond to studies published in peer-reviewed journals. Please consult Georges, C. 2004. 20th-century glacier fluctuations in the tropical Cordillera Blanca, Peru. Arctic, Antarctic, and Alpine Research, 36(1): 100-107. Racoviteanu, AE. Arnaud, Y. Williams, MW. Ordonez, J. 2008. Decadal changes in glacier parameters in the Cordillera Blanca, Peru, derived from remote sensing. Journal of Glaciology, 54(186): 499-510. Silverio, W. Jaquet, JM. 2005. Glacial cover mapping (1987-1996) of the Cordillera Blanca (Peru) using satellite imagery. Remote sensing of environment, 95(3): 342-350 (Huggel, Christian, University of Zurich)	This part was deleted
1475	4	53	49	53	51	all of the statements giving specific glacier loss rates need to be supported by explicit citations (cf., Himalayan glacier error in AR4 WG2) (UNITED STATES OF AMERICA)	This part was deleted
1476	4	53	50	53	51	You must provide robust references supporting your claim that small glaciers are likely to disappear within a generation or otherwise delete this statement. Remember the 2035 Himalayan error based on a non-published report! Do you mean 'likely' as a formal IPCC likelihood statement? If not, replace with another appropriate word. (Stocker, Thomas, IPCC WGI TSU)	This part was deleted
1477	4	53	50	53	52	The following statements need respective references: Many of the smaller glaciers in the Andes have already been heavily affected and others are likely to completely disappear within a generation. Glacier retreat diminishes the mountains' water regulation capacity (Kaser, Georg, University of Innsbruck)	This part was deleted
1478	4	53	51	53	51	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	This part was deleted
1479	4	54	4	54	4	It is preferable not to place the assessment at a specific point in time through use of the phrase "data recently made available." (IPCC WGII TSU)	This part was deleted
1480	4	54	4	54	13	PLEASE NOTE: Ruiz et al. must be accepted for publication by May 31 2011 for this material to remain in the chapter. (Stocker, Thomas, IPCC WGI TSU)	This part was deleted
1481	4	54	5	54	13	The sentences in this paragraph are nearly all qualified in some way to indicate uncertainties in the information described. It would be much preferable to characterize the degree of certainty in these statements through use of calibrated uncertainty language per the AR5 Guidance Note on Treatment of Uncertainties. (IPCC WGII TSU)	This part was deleted
1482	4	54	12	54	13	The citation for Vergara et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This part was deleted
1483	4	54	16	54	18	The comparison of carbon processed by forests to carbon released through emissions is perhaps misleading because it could lead to the interpretation that forests are emitting that carbon. (IPCC WGII TSU)	This part was deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1484	4	54	23	54	30	This paragraph provides a clear explanation of trends in forest processes. It could be strengthened further by providing more information on relevant assumptions--for example, indicating relevant timescales and magnitudes of climate change--as well as indicating the degree of certainty in statements made through use of calibrated uncertainty language (per the AR5 Guidance Note on Treatment of Uncertainties). (IPCC WGII TSU)	This part was deleted
1485	4	54	24	0	0	is really "respiration" meant or "evapotranspiration" or "evaporation"? I would expect the latter (Koppe, Christina, Deutscher Wetterdienst)	This part was deleted
1486	4	54	33	54	33	The citation for Vergara and Scholz (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This part was deleted
1487	4	54	33	54	36	For the results described in this sentence, it would be preferable to indicate the nature of assumptions made (e.g., it seems there should be uncertainty even for a given emissions scenario under different model assumptions), the sensitivity of the projections to those assumptions, and the range of projected probabilities of dieback occurrence. (IPCC WGII TSU)	This part was deleted
1488	4	54	37	54	38	It would be useful to know the described study's rationale for linking dieback and dangerous climate change. It is also important to consider the wording as it does not seem that dieback itself is a threshold--instead, it seems that conditions triggering dieback are a threshold. (IPCC WGII TSU)	This part was deleted
1489	4	54	38	54	39	: "strongly suggests that deforestation should be rapidly reduced" Is this a policy recommendation? Is such a statement appropriate for this report? (UNITED STATES OF AMERICA)	This part was deleted
1490	4	54	41	54	47	This should be part of the Chapter 3 assessment -- not within the remit of Chapter 4 to provide assessments of the physical basis of drought (not even regional). (Stocker, Thomas, IPCC WGI TSU)	This part was deleted
1491	4	54	41	54	47	add reference to Lewis et al., 2011, Science and discuss 2010 drought (UNITED STATES OF AMERICA)	This part was deleted
1492	4	54	42	54	42	It is unclear what source Marengo et al. (2008a) corresponds to in the chapter's reference list, given the multiple references for this author and year are not distinguished by adding letters in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This part was deleted
1493	4	54	42	54	42	The citation for Zheng et al. (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This part was deleted
1494	4	54	46	54	46	The citation for Climanalise (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This part was deleted
1495	4	54	46	54	47	It would be preferable to quantify the "increases in forest fires" instead of more ambiguously describing them as "enormous." (IPCC WGII TSU)	This part was deleted
1496	4	54	47	54	47	Typo citation: For Mlahi et al. (2008), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	This part was deleted
1497	4	55	2	55	2	Typo citation: For Fischer et al. (2007), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	This part was deleted
1498	4	55	7	55	7	The citation for Silva Dias et al. (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Deleted
1499	4	55	10	55	13	These sentences must reflect and cite the assessments of chapter 3, in addition to any other relevant citations. Additionally, it would be preferable to use calibrated uncertainty language to characterize the degree of certainty in the statements (per the AR5 Guidance Note on Treatment of Uncertainties). (IPCC WGII TSU)	Deleted, reference to Chapter 3 added
1500	4	55	10	55	18	Delete - Table 3.3 contains projections for rainfall extremes in South America. You do not need to include your own assessment here. (Stocker, Thomas, IPCC WGI TSU)	This part was deleted
1501	4	55	11	0	0	Kitoh et al 2010 is not in the reference list (Huggel, Christian, University of Zurich)	This part was deleted
1502	4	55	11	55	12	The citation for Kitoh et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This part was deleted
1503	4	55	13	55	13	The citation for Halylock et al. (2006) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This part was deleted
1504	4	55	13	55	18	This text section suggests that the tropical Atlantic may warm more than the NINO3 region in the future, leading to extreme rainfall impacts over S. America. The Guenni et al. (2010) reference cited is not published so it is difficult to evaluate the likelihood of this projection. In any case the SST pattern projection would be an issue more for Ch. 3 than Ch. 4. The Vecchi et al. paper (Science, 31 OCTOBER 2008) shows that it is highly uncertain whether the tropical Atlantic SST will warm more than the tropical mean SST. As they note, this is an important issue not just for S. American precipitation but for Atlantic hurricane activity as well and so has received considerable attention. Given the high level of uncertainty, I think this speculative text section should just be deleted. (UNITED STATES OF AMERICA)	This part was deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1505	4	55	18	55	20	The citation provided precedes one of the "devastating episodes" mentioned, so the sentence should be clarified with a later citation or with reference to first "episode" (singular), it seems. (IPCC WGII TSU)	This part was deleted
1506	4	55	23	55	23	"increasingly document" - then please cite this documentation (Stocker, Thomas, IPCC WGI TSU)	Revised
1507	4	55	26	55	26	The citation for Easkin (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Deleted
1508	4	55	31	55	33	The range of projected outcomes and assumptions on which these projections are based (e.g., sea surface temperature scenarios and, if possible, their relative likelihoods) should be more clearly specified. As is, it is difficult for the reader to understand where this statement fits in the spectrum of possible outcomes. (IPCC WGII TSU)	Revised
1509	4	55	35	55	35	It would be preferable to reword this line to indicate that coral collapse can have major economic impacts, as listed. The current wording, following the previous paragraph, perhaps overly implies that this collapse is inevitable. (IPCC WGII TSU)	This part was deleted
1510	4	55	35	55	41	Analysis based on a single study? Need to provide assessment of multiple lines of independent evidence. (Stocker, Thomas, IPCC WGI TSU)	This part was deleted
1511	4	55	41	55	41	Is 'likely' meant here as calibrated uncertainty language? If so, please italicize. Otherwise replace. (Stocker, Thomas, IPCC WGI TSU)	This part was deleted
1512	4	55	41	55	41	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	This part was deleted
1513	4	55	47	55	47	The citation for Lewsay et al. (2004) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Text deleted
1514	4	55	50	55	50	The citation for IMF (1999) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation has been clarified
1515	4	55	53	55	53	Typo citation: For Pielke et al. (2003), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	Revised
1516	4	56	1	56	1	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	Deleted
1517	4	56	5	0	0	Section 4.5.6: We appreciate that you have done a careful job of accurately integrating the assessment from Chapter 3 regarding observed and projected trends into this North American section. But, given that chapter 4 is considerably over length, this repetition of information from Chapter 3 is not essential. Either at the beginning of Section 4.5 or for each regional sub-section, the reader just needs to be directed to Chapter 3, and especially tables 3.2 and 3.3 for this information. By focusing on regional IMPACTS in section 4.5 and removing duplicated material coming from Chapter 3, a considerable page length will be achieved. (Stocker, Thomas, IPCC WGI TSU)	Done
1518	4	56	5	56	5	Is there literature regarding snow storms and blizzards that could be assessed for North America? (Stocker, Thomas, IPCC WGI TSU)	Authors have not found or assessed such information
1519	4	56	17	0	0	Section 4.5.6 seems to include far more information on confidence and likelihood than sections on other regions. Is this due just to better information, or could the same be included in discussion of other regions? (UNITED STATES OF AMERICA)	Standards differed
1520	4	56	17	56	27	Delete this paragraph - Observed and projected trends in heatwaves for North America are extensively covered in Chapter 3. You do not need to repeat this information here. The second paragraph is a logical starting place for this section, dealing with IMPACTS of heat waves. (Stocker, Thomas, IPCC WGI TSU)	Most text deleted, reference given
1521	4	56	17	56	27	Check consistency with chapter 3, also following SOD review. (Seneviratne, Sonia, ETH Zurich)	Most text deleted, reference given
1522	4	56	17	56	27	All of the references to chapter 3 assessment findings need to be updated to reflect the different likelihood terms assigned in the chapter 3 SOD, as well as the new chapter 3 section organization (see, e.g., Table 3.1 for a summary). (IPCC WGII TSU)	Most text deleted, reference given
1523	4	56	38	56	38	Rewording: "While heat waves are projected to increase in intensity and duration (see Table 3.3, Chapter 3), their net effect....." (Stocker, Thomas, IPCC WGI TSU)	Modified as proposed
1524	4	56	38	56	40	Several studies show that the sensitivity of the population of large U.S. cities to extreme heat events has been declining over time. A brief review of these studies should be included in this section. They are, primarily: Davis, R.E., et al., 2003. Changing heat-related mortality in the United States. Environmental Health Perspectives, 111, 1712-1718. Kalkstein et al., 2010. An evaluation of the progress in reducing heat-related human mortality in major U.S. cities. Natural Hazards, doi:10.1007/s11069-010-9552-3 (UNITED STATES OF AMERICA)	Useful comment, followed
1525	4	56	44	56	44	The citation for Wang and Angell (1999) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation has been added

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1526	4	56	48	56	52	Delete this paragraph - Observed and projected trends in drought for North America are extensively covered in Chapter 3. You do not need to repeat this information here. The next paragraph is a logical starting place for this section, dealing with IMPACTS of droughts (Stocker, Thomas, IPCC WGI TSU)	Most text deleted, reference given
1527	4	56	48	56	52	Check consistency with chapter 3, also following SOD review. (Seneviratne, Sonia, ETH Zurich)	Most text deleted, reference given
1528	4	56	48	56	52	All of the references to chapter 3 assessment findings need to be updated to reflect the different likelihood terms assigned in the chapter 3 SOD, as well as the new chapter 3 section organization (see, e.g., Table 3.1 for a summary). (IPCC WGII TSU)	Most text deleted, reference given
1529	4	56	50	56	51	Statement in Table 3.3 about projected drought is less confident than statement here. (Nicholls, Neville, Monash University, School of Geography & Environmental Science)	Most text deleted, reference given
1530	4	56	50	56	51	. "Increase in drought area likely in southwest United States and northwest Mexico..." This appears inconsistent with Ch. 3, Table 3.3. Although there is a "consensus of most climate-model projections" (Ch. 3, p. 54, lines 15-17) the confidence in projecting drying in this region seems to be medium or medium to low confidence according to Table 3.3, indicating that the projection is not rated as "likely". (UNITED STATES OF AMERICA)	Most text deleted, reference given
1531	4	57	15	0	0	Chap 4, page 57, line 15-16: In addition to the Christensen et al. reference, should add that the effect of climate change on the reliability of the water supply has been more thoroughly explored in Barnett and Pierce (2008, 2009). Full refs: Barnett, T. P. and Pierce, D. W., 2008: When will Lake Mead run dry? J. Water Resources Research, v. 44, W03201, doi:10.1029/2007WR006704. Barnett, T. P., and D. W. Pierce, 2009: Sustainable water deliveries from the Colorado River in a changing climate. Proceedings of the National Academy of Sciences, doi:10.1073/pnas.0812762106 (UNITED STATES OF AMERICA)	Useful comment, followed
1532	4	57	16	57	16	The use of "likely" here could be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	"is projected" instead
1533	4	57	30	0	0	the discussion of flooding confuses increases in precipitation with increases in flooding. See for instance: Villarini, G., and J. A. Smith (2010), Flood peak distributions for the eastern United States, Water Resour. Res., 46, W06504, doi:10.1029/2009WR008395. Excerpt: "Only a small fraction of stations exhibited significant linear trends. For those stations with trends, there was a split between increasing and decreasing trends. No spatial structure was found for stations exhibiting trends. There is little indication that human-induced climate change has resulted in increasing flood magnitudes for the eastern United States." See also: http://books.google.com/books?id=aEdvoAe1E6EC&pg=PA1&ots=HPVaZdq2CY&dq=%22Trend%20detection%20in%20river%20flow%20series%22%20kundzewicz&lr&pg=PA16#v=onepage&q=%22Trend%20detection%20in%20river%20flow%20series%22%20kundzewicz&f=false Excerpt: "A recent study of trends in long time series of annual maximum river flows at 195 gauging stations worldwide suggests that the majority of these flow records (70%) do not exhibit any statistically significant trends. Trends in the remaining records are almost evenly split between having a positive and a negative direction." There is a lot of "cherry-picking" of various single extreme events in this section (and throughout) which has no obvious (or non-obvious) connection to climate changes, human-caused or otherwise. (Pielke, Roger, University of Colorado)	Changed
1534	4	57	30	57	54	This discussion tends to co-mingle heavy precipitation and flooding issues, whereas these are related but distinct issues that have been assess separately in Ch. 3. More effort should be made to incorporate the Ch. 3 assessments on flooding into the discussion. (UNITED STATES OF AMERICA)	Large part deleted
1535	4	57	31	57	35	I seem to recall reading earlier in the report that there haven't been any noticeable changes in heavy precipitation. Clarify as necessary. (UNITED STATES OF AMERICA)	Shortened, rerefence to Chapter 3 provided
1536	4	57	31	57	37	Delete this paragraph - Observed and projected trends in flood for North America are extensively covered in Chapter 3. You do not need to repeat this information here. The next paragraph is a logical starting place for this section, dealing with IMPACTS of floods (Stocker, Thomas, IPCC WGI TSU)	Shortened, reference to Chapter 3 provided
1537	4	57	31	57	37	Check consistency with chapter 3, also following SOD review. (Seneviratne, Sonia, ETH Zurich)	Shortened, reference to Chapter 3 provided
1538	4	57	31	57	37	All of the references to chapter 3 assessment findings need to be updated to reflect the different likelihood terms assigned in the chapter 3 SOD, as well as the new chapter 3 section organization (see, e.g., Table 3.1 for a summary). (IPCC WGII TSU)	Shortened, reference to Chapter 3 provided
1539	4	57	33	57	35	This statement does not reflect the contents of Table 3.3. (Nicholls, Neville, Monash University, School of Geography & Environmental Science)	Shortened, reference to Chapter 3 provided
1540	4	57	36	0	0	Should be "very likely" here, to match table 3.1. (Nicholls, Neville, Monash University, School of Geography & Environmental Science)	Deleted
1541	4	58	5	58	6	Delete "and variations in reginal climate" for consistency with Table 3.1. (Nicholls, Neville, Monash University, School of Geography & Environmental Science)	Shortened, reference to Chapter 3 provided

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1542	4	58	5	58	14	Delete this paragraph - Observed and projected trends in storms/cyclones and sea level etc are extensively covered in Chapter 3. You do not need to repeat this information here. The next paragraph is a logical starting place for this section, dealing with IMPACTS. (Stocker, Thomas, IPCC WGI TSU)	Shortened, reference to Chapter 3 provided
1543	4	58	5	58	14	Check consistency with chapter 3, also following SOD review. (Seneviratne, Sonia, ETH Zurich)	Shortened, reference to Chapter 3 provided
1544	4	58	5	58	14	All of the references to chapter 3 assessment findings need to be updated to reflect the different likelihood terms assigned in the chapter 3 SOD, as well as the new chapter 3 section organization (see, e.g., Table 3.1 for a summary). (IPCC WGII TSU)	Shortened, reference to Chapter 3 provided
1545	4	58	9	0	0	"For tropical cyclones, there has been no global trend in frequency since 1983, but an increasing global trend in intensity since 1983" Why 1983? We have a paper under review (Cli. Chg. Ltrs.) that finds no trends in TC landfalls (frequency or intensity) on climate time scales in any basin worldwide. (Pielke, Roger, University of Colorado)	Shortened, reference to Chapter 3 provided
1546	4	58	9	58	10	Again, please revisit Ch.3's summary statements and modify accordingly. Trends in past data are highly suspect and there is little confidence that any are robust. (Kossin, James, NOAA / NESDIS / National Climatic Data Center)	Shortened, reference to Chapter 3 provided
1547	4	58	9	58	10	In table 3.1 there is no information about an increasing global trend in tropical cyclones intensity since 1983 (Wibig, Joanna, University of Lodz)	Shortened, reference to Chapter 3 provided
1548	4	58	9	58	14	Revise text to reflect latest version of Table 3.1. (Nicholls, Neville, Monash University, School of Geography & Environmental Science)	Shortened, reference to Chapter 3 provided
1549	4	58	19	58	19	Typo citation: For Pielke et al. (2008), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	Pielke jr.
1550	4	58	21	58	22	References needed for these studies that simulate increased hurricane damages. (Stocker, Thomas, IPCC WGI TSU)	Phrase removed
1551	4	58	21	58	22	"simulations indicate climate change will increase mean damages from North American hurricanes" The use of "will" here makes the statement too strong as not all model simulations indicate this, and the science is still developing and not mature on this topic. See for example the Bender et al. results in Table 4-17. (UNITED STATES OF AMERICA)	Revised accordingly
1552	4	58	26	58	30	confidence? Other references? This is a pretty declarative statement. (UNITED STATES OF AMERICA)	Example revised accordingly
1553	4	58	27	58	27	Typo citation: For Pielke et al. (2008), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	Pielke jr.
1554	4	58	28	0	0	"While some of this increase in vulnerability has been offset by adaptation and improved building codes, the ratio of hurricane damages to national GDP has increased by 1.5 percent per year over the past half century (Nordhaus, 2006)." The Nordhaus study's conclusion of a 1.5% per year increase is based on the choice of start and end dates, ending as it does with 2005. Here is what the Nordhaus data looks like, making the reference to an annual percentage increase look rather silly: (see supporting material <Pielke-graphics.pdf> (Pielke, Roger, University of Colorado)	Example revised accordingly
1555	4	58	40	58	42	The statement that the increase in US hurricane losses since the 1970s is "largely attributable to natural variability" is too confident a statement about attribution for this issue. At present, the fraction of this increase attributable to natural variability vs anthropogenic forcing is not robustly quantifiable. A better ending would be "though this may have been largely attributable to natural variability" (UNITED STATES OF AMERICA)	This text has been deleted
1556	4	58	40	59	3	The useful discussion in these paragraphs should be closely linked with the more general discussion of detection and attribution of trends in disaster losses due to climate change in section 4.2.4. Consistency and comprehensive of citations should be ensured. (IPCC WGII TSU)	This text has been deleted
1557	4	58	42	0	0	The remark about the relation of increase of losses to the increase in hurricane activity in inconsistent with findings in chapter 3 page 42 lines 4-6 "Similarly, increases in the length of the North Atlantic hurricane season have been noted (Kossin, 2008), but the uncertainty in the amplitude of the trends and the lack of additional studies limits the utility of these results for a meaningful assessment" (Wibig, Joanna, University of Lodz)	This text has been deleted
1558	4	58	42	58	43	This sentence on losses from Hurricane Katrina could be moved to the paragraph on lines 16-24 of page 58, where impacts of Katrina are already discussed. (IPCC WGII TSU)	Done
1559	4	58	47	58	47	Typo citation: For Pielke et al. (2008), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	Pielke jr.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1560	4	58	50	0	0	The following sentence in the report (p. 58, line 50) is wrong: "Malmstadt et al. (2009) and Schmidt et al. (2009) however maintain that an anthropogenic climate change signal can be found in the normalised loss record for hurricanes." Schmidt et al. 2009 actually say the opposite to what is reported here: "There is no evidence yet of any trend in tropical cyclone losses that can be attributed directly to anthropogenic climate change." Malmstadt et al. (2009) is a discussion of trends in losses in Florida and is not even remotely an attribution study (and I doubt any climate scientist would even claim that the signal of GHGs can be seen in a regional record of damage for an area as small as Florida). Both studies are egregiously miscited here. (Pielke, Roger, University of Colorado)	This text has been deleted
1561	4	59	9	59	10	The "other causes" mentioned here and the causes to which they are an alternative need to be specified more clearly. (IPCC WGII TSU)	This text has been deleted
1562	4	59	13	59	14	"Chronic Everyday hazard"? - severe weather occurs every day?; "It has evidence that ..." -- what does this mean? (Stocker, Thomas, IPCC WGI TSU)	Deleted
1563	4	59	14	59	14	"is PROBABLY the deadliest weather hazards in the US"? Based on your expert assessment can you not construct a more useful conclusion than 'probably'? An assessment should be possible here using terminology described in the IPCC guidance for uncertainty. (Stocker, Thomas, IPCC WGI TSU)	Deleted
1564	4	59	18	62	48	Confusion in region covered: P59 Lines 20-21 says "The region of Oceania consists of Australia and New Zealand and several Small Island States that are tackled in Section 4.5.10". P 59 Line 23 to P62 line 27 appears to be solely about Australia and New Zealand. But Pacific Island Country (PIC) costs are covered in P62 line 29 to P62 line 48. Section 4.5.10 does cover Pacific Island small island states, but refers readers back to Section 4.5.7 for discussion of costs. (Wratt, David, NIWA)	The confusion has been reduced
1565	4	59	18	62	48	Comment continued: For improved clarity I recommend relabelling Section 4.5.7 as "Australasia" and moving the PIC material from page 62 lines 29-48 to Section 4.5.10. (Wratt, David, NIWA)	Oceania is AUS, NZ, PICs. The latter assessed under SISs
1566	4	59	18	62	48	There are inconsistencies between some of the material on observed and projected climate changes in Section 4.5.7 (including Table 4.14) and some of the observed and projected changes outlined in Chapter 3. Consultation is essential between Chapter 4 Lead Authors and Chapter 3 Lead Authors regarding Section 4.5.7 including Table 4.14, to correct these inconsistencies. (Wratt, David, NIWA)	Consistency with chapter 3 has been ensured
1567	4	59	20	59	20	tackled' - 'assessed'. (Stocker, Thomas, IPCC WGI TSU)	The sentence has been revised
1568	4	59	20	62	48	This section might be better with the small island states moved to section 4.5.10 (since they are covered there as well). (Chambers, Lynda, Australian Bureau of Meteorology)	Moved to 4.5.10
1569	4	59	29	59	33	This text does not seem consistent with chapter 3. Please check very carefully. For instance, increases in heatwaves are only projected as very likely for Australia, not virtually certain. Chapter 3 notes that there is low confidence wrt to trends in floods and landslides. There is only medium confidence in trends in drought and Australia does not show consistent increases of drought across models and for all drought indices. Section 3.5.3 assesses that "a general assessment of the effects of storminess changes on storm surge is not possible at this time." (Seneviratne, Sonia, ETH Zurich)	Consistency with chapter 3 has been ensured
1570	4	59	29	59	34	No references are provided for any of the climate extreme projections given here (or is the Hennessy et al reference in line 35 supposed to cover them all?). As outlined specifically in further comments below, some of these statements conflict with Chapter 3, or with primary sources. Please correct, and also add references – either a cross-reference back to Table 3.3 or literature references. (Wratt, David, NIWA)	Consistency with chapter 3 has been ensured
1571	4	59	29	59	38	Are these statements consistent with the findings in Chapter 3? (UNITED STATES OF AMERICA)	Consistency with chapter 3 has been ensured
1572	4	59	29	59	38	All of the references to chapter 3 assessment findings need to be checked against the most recent likelihood terms assigned in the chapter 3 SOD, and corresponding chapter 3 sections should be cited here. (IPCC WGII TSU)	Consistency with chapter 3 has been ensured
1573	4	59	29	59	38	All of the statements within these lines are claimed to be true for "Oceania" (line 29) but they appear to focus only on Australia and New Zealand. Recommendation: Replace "Oceania" in line 29 with "Australasia". (Wratt, David, NIWA)	Oceania is AUS, NZ, PICs. The latter assessed under SISs
1574	4	59	29	59	51	Delete these paragraphs - Observed and projected trends for this region are extensively covered in Chapter 3. You do not need to repeat this information here. Your focus should be on IMPACTS. (Stocker, Thomas, IPCC WGI TSU)	Consistency with chapter 3 has been ensured
1575	4	59	30	59	31	In Oceania "Heat waves and fires, floods, landslides, droughts, and storm surges are projected to increase in frequency and intensity." This statement does not sufficiently acknowledge some of the uncertainties in the projections for many of these phenomena (especially drought, floods and any phenomena driven by tropical cyclones) as discussed in Ch. 3 (low confidence on many projections for flood and drought, and a projected decrease in frequency of tropical cyclones, although with an increase of intensity, etc.) (UNITED STATES OF AMERICA)	Consistency with chapter 3 has been ensured

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1576	4	59	30	59	31	The Australia/NZ section of Table 3.3 indicates: "low confidence – Lack of agreement" regarding the sign of projected changes of Heavy Precipitation for the region as a whole. Please modify the P59 line 30-31 projection for floods and landslides to be consistent with the Table 3.3 material on high-intensity rainfalls. (Table 3.3 does suggest an increase in High Precip events in most of NZ (low-med confidence) – so you may wish to consider a statement containing within-region differences). (Wratt, David, NIWA)	Consistency with chapter 3 has been ensured
1577	4	59	30	59	32	These statements do not reflect the conclusions in Tables 3.1 and 3.3. (Nicholls, Neville, Monash University, School of Geography & Environmental Science)	Consistency with chapter 3 has been ensured
1578	4	59	33	59	34	Please ensure comments on floodplain and urban drainage/sewerage failure risks are compatible with Table 3.3 heavy rainfall event projections (will this require an indication of within-region differences?) and provide literature references. (Wratt, David, NIWA)	Consistency with chapter 3 has been ensured
1579	4	59	35	59	38	"In New Zealand overall mean temperatures have risen marginally ...". This statement is WRONG. E.g. Zheng et al, Journal of Climate 10, 317-326 (1997) find that "The trend in ΔT for 1896–1994 is $0.11 \pm 0.035^\circ\text{C}/\text{decade}$ (95% confidence interval). This is about double the trend reported for global data ... The trends in maximum and minimum temperature over this period are not statistically different. However, for the later period of 1951–90, the trend in maximum temperature reduces to an insignificant value, while the trend in minimum temperature remains high..." (Wratt, David, NIWA)	This has been deleted, and consistency with chapter 3 has been ensured
1580	4	59	35	59	38	Comment continued: A recent review of NZ long-term data by Mullan et al (http://www.niwa.co.nz/_data/assets/pdf_file/0007/108934/Report-on-the-Review-of-NIWAas-Seven-Station-Temperature-Series_v3.pdf) indicates a trend of $0.91 \pm 0.29^\circ\text{C}/\text{Century}$ for 1909-2009. Please correct. (Note – The Salinger and Griffiths paper quoted in the SOD considers trends from 1951-98, not the full period for which data is available). (Wratt, David, NIWA)	This has been deleted, and consistency with chapter 3 has been ensured
1581	4	59	40	59	40	The reference should likely point to Section 3.4.2 (Seneviratne, Sonia, ETH Zurich)	Consistency with chapter 3 has been ensured with this reference made
1582	4	59	41	59	43	I recommend addition of the word "often", changing these sentences to "El Nino OFTEN brings The converse OFTEN occurs during La Niña ...". This is because while this El Nino / La Nina behaviour is generally the case, it is not always followed in NZ. (I don't have the quoted Mullan 1995 reference to hand and can't access it over the internet, but I expect it makes this point). (Wratt, David, NIWA)	Consistency with chapter 3 has been ensured
1583	4	59	43	59	43	The citation for Mullan (1995) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted
1584	4	59	46	59	47	The citation for Alexander et al. (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted
1585	4	59	46	59	51	These climate assessments do not belong in chapter 4. This paragraph should refer to chapter 3 for consistency. (Seneviratne, Sonia, ETH Zurich)	This text has been deleted
1586	4	60	3	60	3	please insert 'heat wave' (AUSTRALIA)	Done
1587	4	60	6	0	0	Which warming region? (Chambers, Lynda, Australian Bureau of Meteorology)	Climate not region. This has been clarified
1588	4	60	6	60	15	Please indicate which emissions scenario the projections of heat-related death rates given for 2020, 2050 and 2100 correspond to, and whether or not they are assume any adaptation (autonomous or planned) to changing conditions. (Wratt, David, NIWA)	Explanatory text added
1589	4	60	10	60	10	28, 51 and 88 are very precise numbers. Consideration might be given to saying "about 30, 50 and 90" (Global Climate Observing System Steering Committee)	Changes in the text were made accordingly
1590	4	60	11	60	11	change "predicted" to "projected" (Stocker, Thomas, IPCC WGI TSU)	Done
1591	4	60	14	0	0	"deaths than" instead of "death that those" (Wibig, Joanna, University of Lodz)	Reworded
1592	4	60	18	60	18	Delete this statement on droughts - you have generalised what are complex patterns of drought in this region, eg, in Northern Australia, dryness has decreased. (Stocker, Thomas, IPCC WGI TSU)	Consistency with chapter 3 has been ensured
1593	4	60	18	60	18	This statement is not consistent with chapter 3 (Section 3.5.1). Uncertainty regarding long-term trends in drought occurrence in Australia is still large, despite the occurrence of very dry years in the past decade. (Seneviratne, Sonia, ETH Zurich)	Consistency with chapter 3 has been ensured
1594	4	60	18	60	18	Is this statement consistent with the findings in Chapter 3? (UNITED STATES OF AMERICA)	Consistency with chapter 3 has been ensured
1595	4	60	18	60	20	Table 3.2 indicates a decrease in dryness (including the Palmer Drought Severity Index PDSI) in Northwest and Central Australia, but an increase in SE Australia and the SW tip of Australia, since mid-20th Century. This suggests line P60 Line 18 "Droughts have become more severe ..." is too general, and may need to be broken down regionally. (Wratt, David, NIWA)	Consistency with chapter 3 has been ensured

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1596	4	60	22	60	24	New Zealand has experienced several droughts since 1997-1998 El Nino drought. The 2007 to 2009 drought extended over two successive summers and effected the majority of the country. The on-farm net incomes are estimated to be \$1.5Billion lower due to the drought, with the value of stock reducing \$1.9Billion in value. Off Farm income, as a result of reduced productivity, was \$3Billion lower (Butcher Partners Ltd 2009, please contact NZ Focal Point for a copy of this report) (NEW ZEALAND)	Text and reference added
1597	4	60	24	60	24	The citation for OCDESC (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation has been clarified
1598	4	60	24	60	28	Please provide references to back up these statements. (Wratt, David, NIWA)	Citation has been clarified
1599	4	60	31	60	32	. "Annual streamflow in the [Murray-Darling] Basin [in Australia] is likely to fall 10-25% by 2050 and 16-48% by 2100 (Hennessy et al. 2007)." Is this projection and the likelihood assessment consistent with the updated assessments in Ch. 3? Is the assessment of streamflow changes done in Ch. 3 or 4? Which chapter is responsible for this issue? (UNITED STATES OF AMERICA)	This text has been deleted
1600	4	60	34	60	34	Which evidence is this assessment based on? Projected changes in drought in Australia are not consistent enough to provide such a statement (Chapter 3, Section 3.5.1). (Seneviratne, Sonia, ETH Zurich)	The text has been revised accordingly
1601	4	60	34	60	36	This section could refer to the Free-Air Concentration Enrichment experiment at Horsham and Walpeup through the Univeristy of Melbourne (AUSTRALIA)	Not included (too tangential)
1602	4	60	42	60	42	The specific relevant case study in chapter 9 (9.2.5) should be cited here. (IPCC WGII TSU)	A reference has been made
1603	4	60	46	60	46	The term "likely" here should be italicized, assuming it is being used per the AR5 Guidance Note on Treatment of Uncertainties. (IPCC WGII TSU)	Use of the term has been eliminated
1604	4	60	49	60	49	The term "likely" here should be italicized, assuming it is being used per the AR5 Guidance Note on Treatment of Uncertainties. (IPCC WGII TSU)	Use of the term has been eliminated
1605	4	61	1	61	4	Delete this paragraph - Observed and projected trends in precipitation and floods are extensively covered in Chapter 3. Providing your own assessment here, based on the citation of a single paper is not appropriate. (Stocker, Thomas, IPCC WGI TSU)	Consistency with chapter 3 has been ensured
1606	4	61	2	61	4	Check consistency with chapter 3, also following SOD review. (Seneviratne, Sonia, ETH Zurich)	Consistency with chapter 3 has been ensured
1607	4	61	2	61	4	This statement should reflect and cite the assessment findings and relevant sections of chapter 3. (IPCC WGII TSU)	Consistency with chapter 3 has been ensured
1608	4	61	2	61	4	Please discuss with Chapter 3 authors so you have consistency between statements here and in Table 3.2. e.g. This chapter claims increases in extreme daily rainfall in NW Australia; Table 3.2 says: "Low confidence – insufficient statements for assessment" for N Australia (which presumably includes the NW). Table 3.2 has no indication of the decreases of extreme daily rainfall in the SE, SW and Central East Coast of Australia claimed here. (Wratt, David, NIWA)	Consistency with chapter 3 has been ensured
1609	4	61	6	61	6	The citation for OCDESC (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation has been clarified
1610	4	61	6	61	6	"Floods are New Zealand's most frequently experienced and expensive hazard". This is probably true for frequency, but it is definitely NOT TRUE for expense. Individual earthquakes, droughts, and high wind/wave damage events have all cost more than recorded individual flood events. For example on P60 lines 23-24 you quote the estimated cost of the 1997-98 drought conditions as NZ\$750 (Wratt David NIWA)	The sentence has been revised accordingly
1611	4	61	6	61	6	Comment continued: The most expensive flood events listed by the Insurance Council of NZ (http://www.icnz.org.nz/current/weather) are around NZ\$125M. The sinking of the Wahine in a storm cost NZ\$146M. The costs of the recent Christchurch earthquake are not yet in, but are expected to be several billion NZ\$. Please correct. (Wratt, David, NIWA)	Noted, but no action (space, costs removed from 4.4)
1612	4	61	10	61	10	The term "likely" here should be italicized, assuming it is being used per the AR5 Guidance Note on Treatment of Uncertainties. (IPCC WGII TSU)	Use of the term has been eliminated
1613	4	61	10	61	11	Future trends in precipitation in this region show significant variation which you ignore in your wording here, eg, wetter in the West, and dryer in the East of New Zealand. Better wording would be: "An increase in precipitation intensity across some parts of New Zealand (see Table 3.3, chapter 3) is expected to cause greater erosion....." (Stocker, Thomas, IPCC WGI TSU)	Re-worded accordingly
1614	4	61	10	61	11	. "Increase in precipitation intensity is likely to cause ... more landslides..." The statement is difficult to interpret. Do the authors mean to say that an increase in landslides is likely to occur over the 21st century, or do they mean to say that an increase in precipitation intensity, all other factors being equal, would likely lead to a higher probability of a landslide. In terms of the first interpretation, this assessment would be inconsistent with Ch. 3, p. 69: "There is low confidence in projected changes in the magnitude and frequency of shallow landslides in temperate and tropical regions, as they depend mainly on frequency and intensities of rainfall events and anthropogenic land-use." The statement needs to be rewritten/clarified. (UNITED STATES OF AMERICA)	Re-worded accordingly

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1615	4	61	10	61	14	Please indicate what climate change emissions scenarios the projected changes in inundation for Westport relate to. Please also indicate whether these projected changes are related only to changes in precipitation or are also affected by projected sea level changes. (Westport is located at the mouth of the Buller River). (Wratt, David, NIWA)	This text has been deleted
1616	4	61	11	61	14	Proportion of Westport inundated by a 50yr event "projected to rise by 13 to 30% by 2030 ... Peak flow is projected to increase by 4% by 2030" etc. These are simply quoted from a study. Is there any assessment here? What is the confidence level for our ability to make such projections? The assessments on flooding in Table 3.3 suggest it would be low confidence. Why is there no attempt at assessment or reference to the assessments of flooding projections in Ch. 3. Also the changes out to 2030 would seem to be potentially greatly influenced by natural variability. This is the outer time scale of decadal prediction efforts. Is there any skill in such models for this metric at such time scales? (UNITED STATES OF AMERICA)	This text has been deleted
1617	4	61	14	61	14	"Peak flow is projected to increase by 4% by 2030 and by 40% by 2080". Please indicate whether this statement is just for the Buller River at Westport, or is a more general statement for a larger region – and what emissions scenarios it relates to. (Wratt, David, NIWA)	This text has been deleted
1618	4	61	16	61	22	Projected changes in coastal hazards from sea level rise + storm surge etc are also an issue for New Zealand. I suggest an appropriate comment be added, drawing on "Ministry for the Environment 2008. Coastal Hazards and Climate Change. A Guidance Manual for Local Government in New Zealand. 2nd edition. Revised by Ramsay, D, and Bell, R. (NIWA)." (Wratt, David, NIWA)	Done
1619	4	61	16	61	22	Comment continued: Web ref for NZ coastal hazards report quoted above: http://www.mfe.govt.nz/publications/climate/coastal-hazards-climate-change-guidance-manual/coastal-hazards-climate-change-guidance-manual.pdf (Wratt, David, NIWA)	Done
1620	4	61	21	61	22	Delete - You can not form a likelihood statement on the basis of a single study! (Stocker, Thomas, IPCC WGI TSU)	Changed
1621	4	61	24	61	27	An increase in intense systems is mentioned, but where is the assessment? What does the result mean? Is the change explainable simply due to natural variability? What about data homogeneity problems that are discussed in the quoted studies. The statement without this additional context seems to suggest there has been a detectable (in the sense of being unlikely to be explainable by natural variability alone) change in the tropical cyclones. But this is only due to the omission of the issues just discussed. The authors should also quote as from Ch. 3, p. 45: "there is low confidence that any reported long-term increases in tropical cyclone activity are robust, after accounting for past changes in observing capabilities." (UNITED STATES OF AMERICA)	This text has been deleted
1622	4	61	24	61	27	Please consult with Chapter 3 to ensure consistency regarding tropical cyclones (Chapter 3, P45, lines 37-38" "...there is low confidence that any reported long-term increases in tropical cyclone activity are robust, after accounting for past changes in observing capabilities"; Present chapter: "...there has been an increase in intense systems...") (Wratt, David, NIWA)	This text has been deleted
1623	4	61	25	61	27	Delete this paragraph - These are observed trends of the physical climate which should be assessed in chapter 3! What can you say about IMPACTS of tropical cyclones in this region?? (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1624	4	61	25	61	27	Check consistency with chapter 3, also following SOD review. (Seneviratne, Sonia, ETH Zurich)	This text has been deleted
1625	4	61	29	61	47	Would the section on "coping with extremes" be better placed in one of the latter Chapters? It might be beyond the remit of Chapter 4. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1626	4	61	40	61	41	Typo citation: For Dixen et al. (1997), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	This text has been deleted
1627	4	61	42	61	47	We suggest rewording to reflect that the assistance given is only in events deemed medium and large, and the assistance it targeted to support the 'farming families', rather than the business. Suggest using "For agricultural disasters, particularly drought, farmers are eligible for Adverse Events recovery assistance administered by the Ministry of Agriculture and Forestry and to social welfare services (Ministry of Social Development) where their income is severely reduced. Only in medium or large scale events is the assistance offered, and the criteria for determining event size is established and applied consistently (Ministry of Agriculture and Forestry, 2009). Where a farm is considered to be unsustainable as the result of the event, and the owner must sell, 'new start' grants are made available to assist farmers to leave the industry (Ministry of Agriculture and Forestry, 2010)." (NEW ZEALAND)	This text has been deleted
1628	4	61	49	0	0	Table 4-14: The second column (Changes in Climate Extremes) MUST BE DELETED. These changes are frequently inconsistent with the carefully assessed trends given in Chapter 3, and are not based on multiple lines of cited evidence. It is unclear from the table caption whether these trends are even specific to Oceania or more general. This Table, if it is to remain included, must be limited to coverage of exposure, vulnerability and Impacts only. Table caption - what region is this table covering? Oceania? Australia? (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1629	4	61	49	61	49	Table 4.14. This Table is labeled "Climate Extremes, Variability and Impacts". It comes immediately after two pages of text which are only about Australia and New Zealand, and it is followed by another half page of text which is only about Australia and New Zealand. However most examples in it appear to relate to coral atolls and/or Papua New Guinea (ie the Pacific Island Countries which are covered in Section 4.5.10). Please expand the label to clarify what region this Table relates to. (Wratt, David, NIWA)	This text has been deleted
1630	4	61	49	61	49	If this Table relates only to PICs I suggest you move it to Section 4.5.10. If it also relates to Australia and New Zealand please modify the cell entries to reflect this. (Wratt, David, NIWA)	This text has been deleted
1631	4	61	49	61	49	Please expand the column heading "Changes in climate extremes" to clarify whether this is referring to observed changes to data to date, or projected changes for the future. If projections, then indicate the time scale under consideration (e.g. late 21st Century?). (Wratt, David, NIWA)	This text has been deleted
1632	4	61	49	61	49	Please consult with Chapter 3 lead authors to ensure consistency between entries in this table, and Tables 3.2 and 3.3. If this table is supposed to represent all of Oceania (Australia, NZ, PICs) then see my earlier comments about inconsistencies between some chapter 3 table entries and some chapter 4 statements. Please also provide literature references in the cells of Table 4.14 to back up the statements in these cells. (Wratt, David, NIWA)	This text has been deleted
1633	4	62	14	62	16	It would be preferable to specify more specifically the time frame and magnitude of the trends described. (IPCC WGII TSU)	This text has been deleted
1634	4	62	19	62	20	"Climate change is concurrently expected to increase the frequency and severity of extreme weather events (Alexander & Arblaster, 2009)." This statement by itself is too vague. What extreme events are expected to change like this? Be specific. What are the likelihood levels? Chapter 3 should be used to include the proper likelihood or confidence qualifiers on the "expected" changes for the specific type of extreme event. The authors could simply change the phrase to "some extreme weather events" and cite Ch. 3, but again the statement becomes so vague that it's not very useful.. (UNITED STATES OF AMERICA)	This text has been deleted
1635	4	62	19	62	21	This overly general and simplified statement does not consistently reflect the Chapter 3 assessment. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1636	4	62	19	62	21	This statement must reference relevant information in chapter 3, even if other sources are also considered. (IPCC WGII TSU)	This text has been deleted
1637	4	62	24	62	27	Does this statement take into account figures from the Insurance Council of New Zealand. They publish data on natural disasters which have occurred in New Zealand since 1968 (up to Jan 2011), including storms, floods, tornadoes and snowstorms and the costs to the insurance industry arising from these events. See http://www.icnz.org.nz/current/weather/ (NEW ZEALAND)	This text has been deleted
1638	4	62	24	62	27	This statement about the lack of cost estimates for New Zealand natural disasters appears to overlook material made publicly available by the Insurance Council of New Zealand. See "The cost of disaster events", http://www.icnz.org/nz/current/weather . This documents storm, flood, tornado and snowstorm events since 1968 and their costs to the insurance industry. It also contains some information on earthquake costs, but not of drought-related costs. (Wratt, David, NIWA)	This text has been deleted
1639	4	62	24	62	27	Comment continued: I suspect the costs you have quoted in P62 lines 25-26 also exclude the costs of droughts (given your estimate on P60 lines 23-34 of NZ\$750M for just one drought event, and the fact that just the flood/storm events from the Insurance Council Table sum to more that US\$1 billion). Please revise your wording and / or the costs quoted here. (Wratt, David, NIWA)	This text has been deleted
1640	4	62	29	62	29	The acronym PIC needs to be defined. (IPCC WGII TSU)	This text has been deleted
1641	4	62	29	62	48	PICs are discussed here (without defining the acronym) but then they are discussed again in section 4.5.10 on page 68, where the acronym is defined. The two sections could be brought together. (Global Climate Observing System Steering Committee)	This text has been deleted
1642	4	62	29	62	48	should this PIC paragraph not be moved to the corresponding regional section 4.5.10? (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1643	4	62	34	62	34	The citation for Guha-Sapir et al. (2004) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted
1644	4	62	44	62	48	These sentences could cite relevant sections in chapter 5. (IPCC WGII TSU)	This text has been deleted
1645	4	62	51	0	0	Section 4.5.8. First, much of the material in this section seems more appropriate for the assessments of the AR5, as opposed to this report. Second, in most places where extreme impacts are mentioned in this section, they need to be situated in the spectrum of possible outcomes and their relative likelihoods. Third, the comprehensiveness of many paragraphs needs to be increased, with more extensive assessment of relevant literature. (IPCC WGII TSU)	Section dramatically reduced and streamlined
1646	4	62	51	64	44	Subchapter "Open Oceans" describes "mean" impacts of warning. In a special report on "extreme events and disasters" the focus should be on the latter. My suggestion would be, either to move this section to AR 5, or to point out the "extreme" or "disaster" character of the described impacts. (Koppe, Christina, Deutscher Wetterdienst)	Section dramatically reduced and streamlined accordingly

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1647	4	62	53	62	53	It is debatable whether the oceans should be described as having a "driving role". They are certainly a big thermal buffer, but the ocean circulation is part driven by the wind, and the heat input into the ocean is determined by what gets through the atmosphere from the sun. (Global Climate Observing System Steering Committee)	Reworded
1648	4	62	53	63	6	Delete the first sentence in the open Oceans section -- it's overly general and not useful; change "predictions" to "projections"; consult Uncertainty Guidance Note to revise "very high level of uncertainty". (Stocker, Thomas, IPCC WGI TSU)	We believe the first sentence is useful. The second one is deleted.
1649	4	62	54	62	54	It would be preferable to characterize the degree of certainty in these predictions using calibrated uncertainty language, such as an assigned level of confidence, per the AR5 Guidance Note on Treatment of Uncertainties. The author team should also more clearly indicate the relevant sources of uncertainty. (IPCC WGII TSU)	Sentence deleted
1650	4	62	54	63	1	On these two lines, the term "events" is used twice, where it seems the term "impacts" is preferable given the examples provided and the glossary entry for extreme events. (IPCC WGII TSU)	Sentence deleted
1651	4	63	1	63	1	Keller et al - not in reference list. (Stocker, Thomas, IPCC WGI TSU)	Sentence deleted
1652	4	63	1	63	1	The citation for Keller et al. (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Sentence deleted
1653	4	63	1	63	6	Are you comfortable basing the information contained in this paragraph, including the possibility of mass extinction on a single reference (that is not even in the reference list for the SOD reviewers to be able to critically evaluate)? (Stocker, Thomas, IPCC WGI TSU)	Revised accordingly
1654	4	63	4	63	6	This statement should be supported by relevant citations. Additionally, the mention of one outcome (mass extinction) should be placed within the context of the spectrum of possible outcomes and their relative likelihoods, to the extent the literature provides relevant information. (IPCC WGII TSU)	Revised accordingly
1655	4	63	9	63	10	Many other factors (e.g., pollution, solar radiation) can be important as well. (UNITED STATES OF AMERICA)	Yes, but only some factors as examples listed
1656	4	63	13	0	0	"Some" fish populations? (UNITED STATES OF AMERICA)	This text has been deleted
1657	4	63	14	63	14	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	This text has been deleted
1658	4	63	14	63	14	The citation for Johnson (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted
1659	4	63	14	63	15	Is 'likely' meant here as calibrated uncertainty language? If so, please italicize. Otherwise replace. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1660	4	63	15	0	0	Is this an assessment of the sign of the change? Make clearer (UNITED STATES OF AMERICA)	This text has been deleted
1661	4	63	20	63	22	How much expansion of these oxygen minimum zones and by when? (UNITED STATES OF AMERICA)	This text has been deleted
1662	4	63	22	63	22	If Figure 1 is within Vaquer-Sunyer and Duarte (2008), it doesn't seem necessary to mention it within the parentheses here. (IPCC WGII TSU)	This text has been deleted
1663	4	63	24	63	24	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	This text has been deleted
1664	4	63	27	0	0	ventilation of deeper waters (UNITED STATES OF AMERICA)	This text has been deleted
1665	4	63	29	63	31	It would be preferable to indicate the time frame and magnitudes of climate change relevant to this projection. (IPCC WGII TSU)	This text has been deleted
1666	4	63	30	63	31	increase stratification in high latitudes (process enhances mixing in low latitudes) (UNITED STATES OF AMERICA)	This text has been deleted
1667	4	63	33	0	0	This limitation of exchange of water masses seems (UNITED STATES OF AMERICA)	This text has been deleted
1668	4	63	33	63	41	Ocean bio geochemical models do not show huge changes. Quantification of amount of change is important (UNITED STATES OF AMERICA)	This text has been deleted
1669	4	63	43	63	54	It is much too strong. There is at least the same number of papers showing that the MOC collapse in the 21st century is almost impossible. These statements are also inconsistent with chapter 3 (page 10 line 38) (Wibig, Joanna, University of Lodz)	This text has been deleted
1670	4	63	43	64	3	The hypothesis for MOC collapse has been generally discredited and is not discussed at all in Chapter 3. This paragraph should be deleted in its entirety. (UNITED STATES OF AMERICA)	This text has been deleted
1671	4	63	44	63	44	communication' - linkages? (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1672	4	63	44	63	46	The possible failure of the MOC is not assessed in Chapter 3 - remove this citation. The reason it is not assessed is because the AR4 considered it very unlikely that the MOC will undergo a large change in the 21st century (the time period of concern for SREX). What studies are you referring to when you say that FAILURE of the MOC is 'one of the most profound and potentially rapid changes in circulation predicted (projected!) by climate models'? If you insist on including this possibility of rapid MOC failure, you must refer to Chapter 10 of the AR4, and state it is 'very unlikely' this will occur in the 21 century. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1673	4	63	46	63	46	The MOC is hardly discussed in Chapter 3 (as noted there). So it would be good to have an IPCC "confidence" or "likelihood" statement about it, given that it is discussed here. (Global Climate Observing System Steering Committee)	This text has been deleted
1674	4	63	49	0	0	"along the sea floor" is too deep (UNITED STATES OF AMERICA)	This text has been deleted
1675	4	63	52	0	0	Delete "or collapse" and add reference to AR4 (Meehl et al. 2007) (UNITED STATES OF AMERICA)	This text has been deleted
1676	4	63	52	63	52	Many models predict a weakening or collapse' - again, where are the references to these 'many' studies?, and again, you must make it clear that the IPCC expert assessment given in Chapter 10 of the AR4 considered such a 'collapse' as being 'very unlikely'. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1677	4	63	53	63	53	The citation for Keller et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted
1678	4	64	1	64	3	No assessment of likelihood provided and the balance is all wrong in presenting state of science (UNITED STATES OF AMERICA)	This text has been deleted
1679	4	64	5	64	16	Numbers are necessary: ocean acidity and observed change of acidity. (Wibig, Joanna, University of Lodz)	This text has been deleted
1680	4	64	5	64	44	No clear concept that distinguishes between extremes and general impacts. E.g. is a slow gradual change in ocean acidity, i.e. lowering of pH, an extreme event? If not, why discuss it? (Fischlin, Andreas, ETH Zurich)	This text has been deleted
1681	4	64	7	64	7	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	This text has been deleted
1682	4	64	9	64	11	Such impacts are a function of the future emission scenario. The notion of how projections depend on scenario is generally missing in such discussions (UNITED STATES OF AMERICA)	This text has been deleted
1683	4	64	10	64	10	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	This text has been deleted
1684	4	64	14	0	0	"feeding" replace with "which are food for" (UNITED STATES OF AMERICA)	This text has been deleted
1685	4	64	18	64	19	"(temperature, stratification, acidity) increases the probability for extreme events in the ocean" what extreme events in the ocean? I have no idea what the authors might have in mind. Please delete. (Fischlin, Andreas, ETH Zurich)	This text has been deleted
1686	4	64	19	64	19	The term "events" is used here, but it seems the term "impacts" is preferable given the glossary entry for extreme events. (IPCC WGII TSU)	This text has been deleted
1687	4	64	21	64	21	It would be preferable to use a more measured, precise term instead of "spectacular." (IPCC WGII TSU)	This text has been deleted
1688	4	64	21	64	26	What section of Chapter 3 are you referring to here? Chapter 3 do not have any text supporting this statement that we are aware of. Please cite supporting literature for this statement if it is to remain. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1689	4	64	21	64	26	There is a signal to noise issue here. Not addressed is how much of the changes are attributable to anthropogenic forcing and how much is attributable to internal climate variability or natural forcings. There is no assessment here (UNITED STATES OF AMERICA)	This text has been deleted
1690	4	64	29	64	30	Is 'likely' meant here as calibrated uncertainty language? If so, please italicize. Otherwise replace. (Stocker, Thomas, IPCC WGI TSU)	"can" used
1691	4	64	30	64	30	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	"can" used
1692	4	64	32	64	37	No assessment here, just review of studies (UNITED STATES OF AMERICA)	This text has been deleted
1693	4	64	35	64	35	The citation for Redistribution of Fish Catch by Climate Change (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted
1694	4	64	35	64	38	It needs to be clarified if the percentage increase mentioned is for catches overall in high latitude or for the percentage of total global catch originating from high latitudes. (IPCC WGII TSU)	This text has been deleted
1695	4	64	37	64	38	The citation for Redistribution of Fish Catch by Climate Change (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted
1696	4	64	40	64	40	"It is assessed...." - then please cite the literature that this assessment is based on. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1697	4	64	40	64	43	Confidence or likelihood levels? (UNITED STATES OF AMERICA)	This text has been deleted
1698	4	64	40	64	44	This paragraph, if included, requires a citation. More importantly, the comparison provided across two years needs to be situated in the context of trends observed over longer periods. If this is not possible, the paragraph should be deleted. (IPCC WGII TSU)	This text has been deleted
1699	4	64	47	0	0	Section 4.5.9 Polar region is uncomplete and omit a lot of recent work/studies (International Petroleum Industry Environmental Conservation Association (IPIECA))	This section has been substantially revised

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1700	4	64	47	0	0	Section 4.5.9: This section is almost entirely focussed on describing poorly assessed physical changes in polar regions, with almost nothing on human systems and ecosystems. The referencing in this section remains very poor. Your focus here must be on impacts to human systems and ecosystems. (Stocker, Thomas. IPCC WGI TSU)	Focus has been improved in the revision of the section
1701	4	64	47	0	0	Section 4.5.9 The chapter on polar regions seems to be different from the other chapters in regard to focus on extreme events. It mainly tries to give an overview on some of the climate processes in the Arctic. The text is partly based on outdated references, within areas that research has developed further the last years. The chapter needs considerable work to appear credible, also in regard to geographical focus. It also seems not to be balanced in regard to presentation of the different climate processes, and finally, some important aspects are not mentioned at all. ACIA (Arctic Climate Impact Assessment) from 2004 contains more updated knowledge than presented here, and many themes from ACIA have been further developed after 2004. During spring 2011 SWIPA (Snow, Water, Ice and Permafrost in the Arctic) will present its main report (http://www.amap.no/swipa/SWIPA%20Brochure%20Final.pdf). To get updated knowledge into the special report from IPCC, we would suggest that completion of the report is done after release of the SWIPA-report. Some examples of the issues where we see a need to re-write the text is given below, but the short time available does not allow a complete suggestion on reorganisation of the chapter. (NORWAY)	The scope of this section has been carefully considered and substantially revised
1702	4	64	47	0	0	Section 4.5.9 Examples of extreme events not mentioned in the chapter are storm surges after increased sea level, which has a great potential for economic losses from the coastal communities in the Arctic, the potential change in the frequency of intense storms and the modelled changes in areal distribution of polar lows. (NORWAY)	This topic is addressed to some extent in the discussion of coastal erosion
1703	4	64	47	68	16	Section 4.5.9: The definition of polar region requires clarification. The section refers to both the Arctic and the Antarctic at the outset, but all further discussion is about the Arctic. If this is the case, then the section title should be changed to "Arctic" or "Arctic Regions". Furthermore, the introductory paragraph needs to clearly define what is included in the authors definition of "Arctic". In the introductory paragraph, there is reference to the Arctic as a vast treeless territory, but there is also reference to north of 60°N latitude which encompasses significant areas below treeline. A number of examples throughout this section are for areas below treeline and would refer to the "Sub Arctic" rather than "Arctic". (CANADA)	These point have been considered in the revision of the section
1704	4	64	47	68	16	Suggest including a discussion on the impact of wild fires, which is especially important for regions below the tree line. Wild fires can be associated with extreme warm and dry conditions. One effect of fires is damage to vegetation and surface organic layer which leads to ground warming, increased thaw depths and possibly permafrost degradation (e.g. Smith et al. 2008; Viereck et al 2008). This has implications for drainage, habitat etc. Slope instability, such as active layer detachments, have also been observed to occur following fires (e.g. Lewkowicz and Harris 2005 a, b; Lipovsky et al. 2006). References include: Viereck, L.A., Werding-Pfisterer, N.R., Adams, P.C., and Yoshikawa, K. 2008. Effect of wildfire and fireline construction on the annual depth of thaw in a black spruce permafrost forest in Interior Alaska: A 36-year record of recovery. In Ninth International Conference on Permafrost. Edited by D.L. Kane and K.M. Hinkel. Fairbanks Alaska. Institute of Northern Engineering, University of Alaska Fairbanks, Vol.2, pp. 1845-1850. Smith, S.L., Burgess, M.M., and Riseborough, D.W. 2008. Ground temperature and thaw settlement in frozen peatlands along the Norman Wells pipeline corridor, NWT Canada: 22 years of monitoring. In Ninth International Conference on Permafrost. Edited by D.L. Kane and K.M. Hinkel. Fairbanks Alaska. Institute of Northern Engineering, University of Alaska Fairbanks, Vol.2, pp. 1665-1670. Lipovsky, P.S., Coates, J., Lewkowicz, A.G., and Trochim, E. 2006. Active-layer detachments following the summer 2004 forest fires near Dawson City, Yukon. In Yukon Exploration and Geology 2005. Yukon Geological Survey, pp. 175-194. Lewkowicz, A.G., and Harris, C. 2005a. Frequency and Magnitude of Active-layer Detachment Failures in Discontinuous and Continuous Permafrost, Northern Canada. In Permafrost and Periglacial Processes. John Wiley & Sons Ltd., pp. p. 115-130. Lewkowicz, A.G., and Harris, C. 2005b. Morphology and geotechnique of active-layer detachment failures in discontinuous and continuous permafrost, northern Canada. Geomorphology, 69: 275-297. (CANADA)	Wildfires are considered in other sections of the chapter
1705	4	64	47	68	16	There is not much on slope instability which can result from extreme warming (in addition to fires as in above comment) and can include active layer detachments (e.g. Lewkowicz, 2007). Occurrence of retrogressive thaw slumps has been observed to increase in the Mackenzie Delta region over the last 50 years likely due to talik expansion and climate change may be partially responsible along with ongoing ground warming related to disturbance of vegetation map following initial slumping (Lantz and Kokelj 2008; Kokelj et al. 2009). References: Lewkowicz, A.G. 2007. Dynamics of active-layer detachment failures, Fosheim Peninsula, Ellesmere Island, Nunavut, Canada. Permafrost and Periglacial Process, 18: 89-103.; Lantz, T.C., and Kokelj, S.V. 2008. Increasing rates of retrogressive thaw slump activity in the Mackenzie Delta region, N.W.T., Canada. Geophysical Research Letters, 35(L06502): 5.; Kokelj, S.V., Lantz, T.C., Kanigan, J., Smith, S.L., and Coutts, R. 2009. Origin and polycyclic behaviour of tundra thaw slumps, Mackenzie Delta region, Northwest Territories, Canada. Permafrost and Periglacial Processes, 20(2): 173-184. (CANADA)	This topic is more properly considered by chapter 3

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1706	4	64	47	68	16	There is very little discussion of impacts of extreme warming on the cryosphere and only long-term changes are discussed. Atkinson et al. (2006) investigated the impact of extreme warming in 1998 on the Canadian arctic cryosphere. Additional publications already provided in chapter 3 comments discuss impacts of short-term climate variability and extreme events on permafrost. Reference: Atkinson, D.E., Brown, R., Alt, B., Agnew, T., Bourgeois, J., Burgess, M., Duguay, C., Henry, G., Jeffers, S., Koerner, R., Lewkowicz, A.G., McCourt, S., Melling, H., Sharp, M., Smith, S., Walker, A., Wilson, K., Wolfe, S., Woo, M.-k., and Young, K. 2006. Canadian cryospheric response to an anomalous warm summer: a synthesis of the Climate Change Action Fund Project "The state of the Arctic Cryosphere during the extreme warm summer of 1998". Atmosphere-Ocean, 44(4): 347-375. (CANADA)	These topics are considered to some extent in the section
1707	4	64	50	64	52	The first sentence in the chapter totally ignores the ocean areas that the Arctic consists of. Human activity is already important in parts of these areas (eg. fishing, petroleum), and might be more important in the future (eg. petroleum, shipping, research) (NORWAY)	This point has been incorporated in the revision of this opening sentence
1708	4	64	50	64	54	The definition of the Arctic region should include a reference, e.g. as below, and also note that the delimitation of the Arctic may differ according to disciplinary and different political definition. (Potential reference: ACIA [Arctic Climate Impact Assessment] (2004) Impacts of a Warming Arctic - Arctic Climate Impact Assessment. Cambridge: Cambridge University Press. (SWEDEN)	Done
1709	4	64	52	64	52	Example: "Slow climate changes in the Polar Regions can lead to extreme impacts". We presuppose that it is not slow climate changes but escalating, projected or expected climate changes that can lead to extreme impacts (NORWAY)	This text has been deleted
1710	4	64	52	64	54	Please clarify: Is reference being made to seasonal freeze-thaw cycles in the statement that says increasing temperatures are accompanied by phase transitions of water into ice and into water? (CANADA)	This text has been deleted
1711	4	65	1	65	12	Delete this paragraph - you can not begin with a likelihood statement formed on the basis of a single pre-AR4 paper (Hassol 2004). This material is covered by Chapter 3, and it is not within the scope of Chapter 4 to be repeating this information. (Stocker, Thomas. IPCC WGI TSU)	This text has been deleted
1712	4	65	2	65	3	The "almost twice as fast" is written as if virtually certain, but there are poor time/space sampling issues to contend with (UNITED STATES OF AMERICA)	This text has been deleted
1713	4	65	2	65	12	These sentences should consider and cite the assessments and relevant sections of chapter 3. (IPCC WGII TSU)	This text has been deleted
1714	4	65	6	65	6	"warming first leads to changes in the cryosphere" This choice of words seems not totally accurate (UNITED STATES OF AMERICA)	This text has been deleted
1715	4	65	6	65	9	A number of these references are old or not relevant to discussion on observations of borehole permafrost temperature. Beilman et al. (2001) does not present information from borehole temperatures and should be removed. There has been much work done in the past few years (e.g. during IPY) and the number of measurements has increased greatly. The following should be consulted: Smith, S.L., Romanovsky, V.E., Lewkowicz, A.G., Burn, C.R., Allard, M., Clow, G.D., Yoshikawa, K., and Throop, J. 2010. Thermal state of permafrost in North America - A contribution to the International Polar Year. Permafrost and Periglacial Processes, 21: 117-135. Romanovsky, V.E., Smith, S.L., and Christiansen, H.H. 2010a. Permafrost thermal state in the polar Northern Hemisphere during the International Polar Year 2007-2009: a synthesis. Permafrost and Periglacial Processes, 21: 106-116. Romanovsky, V.E., Drozdov, D.S., Oberman, N.G., Malkova, G.V., Kholodov, A.L., Marchenko, S.S., Moskalenko, N.G., Sergeev, D.O., Ukrainsteva, D.G., Abramov, A.A., and Vasiliev, A.A. 2010b. Thermal state of permafrost in Russia. Permafrost and Periglacial Processes, 21: 106-116. Christiansen, H.H., Etzelmuller, B., Isaken, K., Juliussen, H., Farbot, H., Humlum, O., Johansson, M., Ingeman-Neilsen, T., Kristensen, L., Hjort, J., Holmlund, P., Sannel, A.B.K., Sigsgaard, C., Akerman, J., Foged, N., Blikra, L.H., Pernosky, M.A., and Odegard, R. 2010. Thermal state of permafrost in the Nordic area during the IPY 2007-2009. Permafrost and Periglacial Processes, 21: 156-181. Zhao, L., Wu, Q., Marchenko, S.S., and Sharkhuu, N. 2010. Thermal state of permafrost and active layer in Central Asia during the International Polar Year. Permafrost and Periglacial Processes, 21: 198-207. Burn, C.R., and Zhang, Y. 2009. Permafrost and climate change at Herschel Island (Qikiqtaruk), Yukon Territory, Canada. Journal Geophysical Research, 114(F02001): 16. Osterkamp, T.E. 2008. Thermal state of permafrost in Alaska during the fourth quarter of the twentieth century. In Proceedings Ninth International Conference on Permafrost. Edited by D.L. Kane and K.M. Hinkel. Fairbanks. Institute of Northern Engineering, University of Alaska Fairbanks, Vol.2, pp. 1333-1338. Taylor, A.E., Wang, K., Smith, S.L., Burgess, M.M., and Judge, A.S. 2006. Canadian Arctic Permafrost Observatories: detecting contemporary climate change through inversion of subsurface temperature time-series. Journal of Geophysical Research, 111(B02411, doi:10.1029/2004JB003208): 14. (CANADA)	This text has been deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1716	4	65	6	65	9	Rapid warming with respect to permafrost temperature is not true everywhere in Alaska, Canada etc. In fact, for some areas the change in permafrost temperature has been very small or negligible (especially in warm ice-rich soils). Refer to: Smith, S.L., Romanovsky, V.E., Lewkowicz, A.G., Burn, C.R., Allard, M., Clow, G.D., Yoshikawa, K., and Throop, J. 2010. Thermal state of permafrost in North America - A contribution to the International Polar Year. Permafrost and Periglacial Processes, 21: 117-135. Romanovsky, V.E., Smith, S.L., and Christiansen, H.H. 2010a. Permafrost thermal state in the polar Northern Hemisphere during the International Polar Year 2007-2009: a synthesis. Permafrost and Periglacial Processes, 21: 106-116. Romanovsky, V.E., Drozdov, D.S., Oberman, N.G., Malkova, G.V., Kholodov, A.L., Marchenko, S.S., Moskalenko, N.G., Sergeev, D.O., Ukrainsteva, D.G., Abramov, A.A., and Vasiliev, A.A. 2010b. Thermal state of permafrost in Russia. Permafrost and Periglacial Processes, 21: 106-116. Christiansen, H.H., Etzelmuller, B., Isaken, K., Juliussen, H., Farbot, H., Humlum, O., Johansson, M., Ingeman-Neilsen, T., Kristensen, L., Hjort, J., Holmlund, P., Sannel, A.B.K., Sigsgaard, C., Akerman, J., Foged, N., Blikra, L.H., Pernosky, M.A., and Odegard, R. 2010. Thermal state of permafrost in the Nordic area during the IPY 2007-2009. Permafrost and Periglacial Processes, 21: 156-181. Zhao, L., Wu, Q., Marchenko, S.S., and Sharkhuu, N. 2010. Thermal state of permafrost and active layer in Central Asia during the International Polar Year. Permafrost and Periglacial Processes, 21: 198-207. Burn, C.R., and Zhang, Y. 2009. Permafrost and climate change at Herschel Island (Qikiqtaruk), Yukon Territory, Canada. Journal Geophysical Research, 114(F02001): 16. Osterkamp, T.E. 2008. Thermal state of permafrost in Alaska during the fourth quarter of the twentieth century. In Proceedings Ninth International Conference on Permafrost. Edited by D.L. Kane and K.M. Hinkel. Fairbanks. Institute of Northern Engineering, University of Alaska Fairbanks, Vol.2, pp. 1333-1338. Taylor, A.E., Wang, K., Smith, S.L., Burgess, M.M., and Judge, A.S. 2006. Canadian Arctic Permafrost Observatories: detecting contemporary climate change through inversion of subsurface temperature time-series. Journal of Geophysical Research, 111(B02411, doi:10.1029/2004JB003208): 14. (CANADA)	This text has been deleted
1717	4	65	6	65	9	There are no references given for observations of permafrost degradation. References for the loss of frozen peatland include: Vallée, S., and Payette, S. 2007. Collapse of permafrost mounds along a subarctic river over the last 100 years (northern Québec). Geomorphology, 90: 162-170. Payette, S., Delwaide, A., Caccianiga, M., and Beauchemin, M. 2004. Accelerated thawing of subarctic peatland permafrost over the last 50 years. Geophysical Research Letters, 31(L18208). Fortier, R., and Aubé-Maurice, B. 2008. Fast permafrost degradation near Umiujaq in Nunavik (Canada) since 1957 assessed from time-lapse aerial and satellite photographs. In Ninth International Conference on Permafrost. Edited by D.L. Kane and K.M. Hinkel. Fairbanks. Institute of Northern Engineering, University of Alaska Fairbanks, Vol.1, pp. 457-462. Beilman, D.W., and Robinson, S.D. 2003. Peatland permafrost thaw and landform type along a climate gradient. In Proceedings Eighth International Conference on Permafrost. Edited by M. Phillips, S.M. Springman, and L.U. Arenson. Zurich, Switzerland. A.A. Balkema, Vol.1, pp. 61-65. Kershaw, G.P. 2003. Permafrost landform degradation over more than half a century, Macmillan/Caribou Pass region, NWT/Yukon, Canada. In Proceedings of 8th International Conference on Permafrost. Edited by M. Phillips, S.M. Springman, and L.U. Arenson. Zurich Switzerland. July 2003. A.A. Balkema, Lisse, pp. p. 543-548. Camill, P. 2005. Permafrost thaw accelerates in boreal peatlands during late-20th century climate warming. Climate Change, Vol. 68: p. 135-152. (CANADA)	This text has been deleted
1718	4	65	6	65	9	Suggest the inclusion of recent references examining active layer changes. Note in some areas there has not been obvious trends in active layer and it reflects short-term fluctuations. References include: Smith, S.L., Wolfe, S.A., Riseborough, D.W., and Nixon, F.M. 2009. Active-layer characteristics and summer climatic indices, Mackenzie Valley, Northwest Territories, Canada. Permafrost and Periglacial Processes, 20(2): 201-220. Burn, C.R., and Kokelj, S.V. 2009. The environment and permafrost of the Mackenzie Delta area. Permafrost and Periglacial Processes, 20(2): 83-105. Nelson, F.E., Shiklomanov, N.I., and Streletskiy, D.A. 2008. A permafrost observatory at Barrow, Alaska: long-term observations of active-layer thickness and permafrost temperature. In Ninth International Conference on Permafrost. Edited by D.L. Kane and K.M. Hinkel. Fairbanks Alaska. Institute of Northern Engineering, University of Alaska Fairbanks, Vol.2, pp. 1267-1272. Nelson, F.E., Shiklomanov, N.I., Hinkel, K.M., and Brown, J. 2008. Decadal results from the Circumpolar Active Layer Monitoring (CALM) Program. In Ninth International Conference on Permafrost. Edited by D.L. Kane and K.M. Hinkel. Fairbanks Alaska. Institute of Northern Engineering, University of Alaska Fairbanks, Vol.2, pp. 1273-1280. Streletskiy, D.A., Shiklomanov, N.I., Nelson, F.E., and Klene, A.E. 2008. Thirteen years of observations at Alaskan CALM sites: long-term active layer and ground surface temperature trends. In Ninth International Conference on Permafrost. Edited by D.L. Kane and K.M. Hinkel. Fairbanks, Alaska. Institute of Northern Engineering, University of Alaska Fairbanks, Vol.2, pp. 1727-1732. (CANADA)	This text has been deleted
1719	4	65	10	0	0	It should be mentioned the recent results of the study of Romanovsky et al. (2010) Permafrost Thermal State in the Polar Northern Hemisphere during the International Polar Year 2007–2009: a Synthesis, Permafrost and Periglac. Process. 21: 106–116 (International Petroleum Industry Environmental Conservation Association (IPIECA))	This text has been deleted
1720	4	65	11	0	0	Unfortunately, there is no section 5.4.8 dealing in details with Arctic Region (International Petroleum Industry Environmental Conservation Association (IPIECA))	This text has been deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1721	4	65	14	65	17	The section is difficult to understand in terms of how climate change and extremes are less noticeable in Arctic regions. Projections and historic data shows that the Arctic region have experienced and will continue to experience larger temperature rises than the global mean. Villages have already been abandoned due to increased erosion in Canada, and the aspect of indigenous people in the Arctic is not mentioned at all in the chapter. (NORWAY)	This text has been deleted
1722	4	65	19	65	21	The term "heating season" should be clarified to indicate that indoor artificial heating is being referred to. (IPCC WGII TSU)	The text has been clarified
1723	4	65	21	65	21	The citation for Sherstyukov (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been clarified
1724	4	65	23	0	0	"Warming cryosphere" subsection. This subsection should consider and cite case study 9.2.6. (IPCC WGII TSU)	A reference has been added
1725	4	65	23	65	51	This section is incomplete. This should address in details recent results on both Arctic sea ice extent reduction and the Greenland ice sheet mass balance and outlet glaciers. For sea ice, there are numerous published studies on observed and projected changes (e.g : Kwok et al. JGR 2009; Lindsay, 2009; Journal of Climate; Feng et al, 2011, Climate Dynamic; Stroeve, GRL 2007; ...). For Greenland, this is also the case concerning both the Greenland mass balance (Sorensen et al. 2010, mentioned before) and the current regimes of the outlet glaciers : Straneo, Science, 2010; Rignot, Science, 2010; Joughin, Journal of Glaciology, 2010; Thomas, Journal of Glaciology, 2009) (International Petroleum Industry Environmental Conservation Association (IPIECA))	The scope of this section has been substantially altered in its revision
1726	4	65	23	66	3	same concern as for "Open Oceans" (Koppe, Christina, Deutscher Wetterdienst)	It is unclear what is meant by this comment
1727	4	65	24	0	0	"Recently" is too vague. What is the time scale? Decades? (UNITED STATES OF AMERICA)	This text has been deleted
1728	4	65	24	65	26	The phrase "recently observed changes have been happening at rates significantly faster than predicted in previous expert assessments" needs to be supported more fully by literature citations. Some citations provided in subsequent paragraphs may be relevant. (IPCC WGII TSU)	This text has been deleted
1729	4	65	24	65	28	Stroev et al. (2007) = Stroeve et al. (2007) (Kaser, Georg, University of Innsbruck)	This text has been deleted
1730	4	65	24	65	28	Variability also needs to be mentioned here. Are all of the changes necessarily 100% anthropogenic? (UNITED STATES OF AMERICA)	This text has been deleted
1731	4	65	26	0	0	Stroev is spelled wrong--should be Stroeve (UNITED STATES OF AMERICA)	This text has been deleted
1732	4	65	26	65	26	Neither of the two papers cited are in relation to the Greenland Ice Sheet. Should also be Stroeve et al.. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1733	4	65	26	65	26	Typo citation: For Stroev et al. (2007), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	This text has been deleted
1734	4	65	26	65	26	The citation for Anisimov et al. (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted
1735	4	65	28	65	28	Typo citation: For Stroev et al. (2007), the author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	This text has been deleted
1736	4	65	30	65	32	The section is an example of out-dated references. 2007 was the record year of extreme melts from the Greenland ice sheet, but is not mentioned in the draft repost since the newest source of knowledge used here is from 2004. (NORWAY)	This text has been deleted
1737	4	65	30	65	51	Why do you need to include this level of detail on physical changes to the Greenland Ice Sheet? You do not in anyway illustrate that these changes are 'extreme', or indicate any possible extreme impact on human systems or ecosystems. NOTE: a more recent study has questioned the results from Velicogna, so highlighting results from this one study is not an assessment and is problematic. On line 43 - you cite a permafrost paper in connection to thickening and thinning of the Greenland Ice Sheet! We suggest these lines are deleted, and you focus on human and ecosystem impacts. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1738	4	65	34	65	34	Signal or noise? What is the assessment? (UNITED STATES OF AMERICA)	This text has been deleted
1739	4	65	34	65	40	A recent study (Wu, X., et al., 2010. Simultaneous estimation of global present-day water transport and glacial isostatic adjustment. Nature Geoscience, published on-line August 15, 2010, doi: 10.1038/NGE0938) has found the GRACE based estimates of ice loss from Greenland and Antarctic (such as the one you quote from Velicogna, 2009) to be too large by approximately 50%. (UNITED STATES OF AMERICA)	This text has been deleted
1740	4	65	34	65	51	add updated reference and values from Rignot et al., 2011, GRL (UNITED STATES OF AMERICA)	This text has been deleted
1741	4	65	39	65	40	This section should refer to Wu et al (nature geoscience) concerning adjustments for isostatic rebound. Wu, X., M. B. Heflin, et al. (2010). "Simultaneous estimation of global present-day water transport and glacial isostatic adjustment." Nature Geosci 3(9): 642-646 (AUSTRALIA)	This text has been deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1742	4	65	42	65	51	Note that most tide water glaciers taht have accelerated their discharge have started slowing down again (Kaser, Georg, University of Innsbruck)	This text has been deleted
1743	4	65	42	65	51	This paragraph needs to be improved with updated references (e.g., Pritchard et al., 2009, Nature; and many others) (UNITED STATES OF AMERICA)	This text has been deleted
1744	4	65	43	65	43	The citation for Anisimov et al. (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted
1745	4	65	49	65	51	Signal or noise? What is the assessment? (UNITED STATES OF AMERICA)	This text has been deleted
1746	4	65	53	65	54	has inceased instead of increased has (Wibig, Joanna, University of Lodz)	This has been changed
1747	4	65	53	66	3	Observed permafrost thaw is assessed in Chapter 3. Repetition is not needed here. The appropriate contribution of Chapter 4 on this subject begins at line 5, where impacts of thawing are discussed. (Stocker, Thomas, IPCC WGI TSU)	The text has been revised accordingly
1748	4	65	53	66	3	Time period in which these changes have or will occur should be provided. (CANADA)	The text has been revised accordingly
1749	4	66	1	66	1	Where does the statement "permafrost degradation is increasing" come from? Please include a reference. (CANADA)	This text has been deleted
1750	4	66	3	0	0	Should also include recent results from Romanovsky et al. (2010) Permafrost Thermal State in the Polar Northern Hemisphere during the International Polar Year 2007–2009: a Synthesis, Permafrost and Periglac. Process. 21: 106–116 (International Petroleum Industry Environmental Conservation Association (IPIECA))	This text has been deleted
1751	4	66	3	66	4	Suggest avoiding the word "dramatically" when describing changes in thaw depth as the magnitude of the changes is not the same everywhere. It should also be noted that the loss of permafrost reported by Burgess et al (2000) was predicted to occur from a site in the southern NWT where permafrost was very thin (only 5-10 m thick) and very warm (close to 0°C). Loss of permafrost was not predicted to occur from other more northerly sites (with colder, thicker permafrost) that were considered in their study. It is important to add this additional information. There are other more recent modelling studies that could also be cited. This includes studies by Woo et al. (2007) and Yi et al. (2007) which examine the role the organic layer place in reducing the effect of rising air temperatures on active layer changes. References: Woo, M.-k., Mollinga, M., and Smith, S.L. 2007. Climate warming and active layer thaw in the boreal and tundra environments of the Mackenzie Valley. Canadian Journal Earth Sciences, 44: 733-743. Yi, S., Woo, M.-k., and Arain, M.A. 2007. Impacts of peat and vegetation on permafrost degradation under climate warming. Geophysical Research Letters, 34(L16504): 5. (CANADA)	This text has been deleted
1752	4	66	5	66	11	add reference and inferences from Schaeffer et al., 2011, Tellus (UNITED STATES OF AMERICA)	This text has been deleted
1753	4	66	6	66	6	The citation for Anisimov et al. (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted
1754	4	66	13	66	21	While the damage to infrastructure may be related to thawing permafrost, it is not necessarily a result of climate warming. Construction and operation of infrastructure can result in changes in the ground thermal regime that may result in thawing. Also, lack of consideration of the underlying ground conditions, or inadequate knowledge of ground conditions etc, and associated inappropriate design can also result in damage to structures. In ACIA Ch 16, the difficulty in distinguishing between these causes and climate change was highlighted (see also in IPCC 4AR WG2 polar chp and Prowse et al, 2009). Modelling by Smith and Riseborough (2010) for example has examined the relative contributions of the disturbance of the ground surface due to construction activities and climate change in the evolution of the ground thermal regime. The disturbance effects can outweigh the climate change effects which generally become more important in the long-term. References: Smith, S.L., and Riseborough, D.W. 2010. Modelling the thermal response of permafrost terrain to right-of-way disturbance and climate warming. Cold Regions Science and Technology, 60: 92-103. Prowse, T.D., Furgal, C., Chouinard, R., Melling, H., Milburn, D., and Smith, S.L. 2009. Implications of climate change for economic development in Northern Canada: energy, resource, and transportation sectors Ambio, 38(5): 272-281. (CANADA)	Current wording does not give attribution
1755	4	66	13	66	21	Some changes in damage over time are presented, but what are we supposed to conclude? There is no assessment of signal to noise (whether the change is highly unusual compared to changes expected from natural climate variability or even variability due to other non-climate related factors). Thus the usefulness or information content for the assessment is very low. (UNITED STATES OF AMERICA)	This point has been considered in the revision of the suction
1756	4	66	27	66	27	Ch.4 Pg. 64 Line 47 The authors should consider changing the name of the section to "Arctic Regions," or include more information on the Antarctic. The suggestion is derived from the large focus on the impacts on the Arctic and limited discussion on the Antarctic. (CANADA)	The phrase has been deleted here
1757	4	66	32	66	48	same concern as for "Open Oceans" (Koppe, Christina, Deutscher Wetterdienst)	It is unclear what this comment refers to
1758	4	66	36	66	36	Use proper reference (Hassol 2004) (Stocker, Thomas, IPCC WGI TSU)	The reference has been revised
1759	4	66	36	66	36	The citation for Impact of Climate Arctic (2004) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The reference has been revised

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1760	4	66	40	0	0	Increase in number of Greenland icebergs should also reference recent studies : Straneo, Science, 2010; Rignot, Science, 2010; Joughin, Journal of Glaciology, 2010; Thomas, Journal of Glaciology, 2009) (International Petroleum Industry Environmental Conservation Association (IPIECA))	Thanks for this suggestion. References do not fit reality (no papers by the first authors were published in Science in 2010), However, two useful papers of these authors were found elsewhere and inserted.
1761	4	66	43	66	44	A statement is given on the development of decreasing numbers of snow days the past three decades, with a scientific source from 2002. This means that the last decade's development in number of snow days actually is not included in the statement, and therefore makes it possible to misunderstand. (NORWAY)	This text has been deleted
1762	4	66	45	66	46	It would be preferable to indicate the time frame and magnitudes of climate change relevant to these projections. (IPCC WGII TSU)	This text has been deleted
1763	4	66	46	66	46	Please cite specific IPCC chapter. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1764	4	66	46	66	46	It is unclear what source IPCC (2007) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This text has been deleted
1765	4	66	46	66	48	Is transportation really made easier with the loss of ice roads, road slumping due to permafrost thaw etc? (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1766	4	66	50	66	52	Delete - an assessment of snow cover trends can not be based on a single paper. An assessment of early spring melt and related flooding is covered in the flood section of Chapter 3. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1767	4	66	51	66	51	It would be preferable to more specifically indicate what is meant by "sharp warming." (IPCC WGII TSU)	This text has been deleted
1768	4	67	1	67	1	Rewording: "Warming in the Arctic has led to a shift....." (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1769	4	67	1	67	5	same concern as for "Open Oceans" (Koppe, Christina, Deutscher Wetterdienst)	It is unclear what this comment is referring to
1770	4	67	4	67	4	The citation for Truong and Palm (2006) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The reference has been clarified
1771	4	67	4	67	5	This statement requires relevant citation(s). Additionally, it would be preferable to indicate the time frame and magnitudes of climate change relevant to these projections. (IPCC WGII TSU)	This sentence has been deleted
1772	4	67	8	67	10	Signal or noise? Role of natural variability vs anthropogenic forcing assessed? (UNITED STATES OF AMERICA)	No results found to reply to this comment
1773	4	67	8	67	14	Assessment is missing (UNITED STATES OF AMERICA)	Half of this text has been removed
1774	4	67	10	67	10	The last line of this paragraph needs to be clarified so that the reader can infer its intended meaning. (IPCC WGII TSU)	The text has been revised
1775	4	67	12	67	22	Delete - The IPCC expert assessment given in Chapter 10 of the AR4 considered such a collapse of the THC and MOC shutdown to be 'very unlikely' within the 21st century (the time period of concern for SREX). Chapter 3 of SREX specifically did not address possible abrupt changes to the MOC, with no basis existing to reconsider the assessment of the AR4. It is inappropriate therefore, for Chapter 4 to include this material here where associated uncertainties are not even provided. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1776	4	67	12	67	22	The THC collapse is not discussed in Chapter 3 and has largely been discredited as a likely future outcome. (UNITED STATES OF AMERICA)	This text has been deleted
1777	4	67	12	67	22	The description of THC collapse and coastal sea level rise do not seem to fit in this section on "floods." (IPCC WGII TSU)	This text has been deleted
1778	4	67	13	67	14	It would be preferable to be more specific about what is meant by "processes occurring on the scale of the Arctic region are capable to change the climate system at the planetary scale." (IPCC WGII TSU)	This text has been deleted
1779	4	67	16	0	0	THC-collapse? Collapse is not defined here. If it means "weakening", the statement is OK. If it means a shutoff, then the statement is not OK as AR4 models do not show a shutoff. (UNITED STATES OF AMERICA)	This text has been deleted
1780	4	67	16	67	16	A rather precise sea-level rise of about 80cm is quoted for a THV-collapse simulation. Again, it would be good to see a "confidence " or "likelihood" statement about this. Ideally, this too would be covered first in Chapter 3. (Global Climate Observing System Steering Committee)	This text has been deleted
1781	4	67	16	67	20	These statements require relevant citations. (IPCC WGII TSU)	This text has been deleted
1782	4	67	22	67	22	The citation for Vellinga and Wood (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted
1783	4	67	24	67	27	References for this paragraph? (Stocker, Thomas, IPCC WGI TSU)	Citation has been added
1784	4	67	29	67	31	Some changes in a climate or damage metric over time are presented, but what are we supposed to conclude? There is no assessment of signal to noise (whether the change is highly unusual compared to changes expected from natural climate). Thus the usefulness or information content for the assessment is very low. (UNITED STATES OF AMERICA)	This point has been considered in the revision of this section

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1785	4	67	31	67	31	Typo citation: For Semyonov and Korshunov (2006), the first author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	Citation has been clarified
1786	4	67	35	67	36	Is this increasing probability of flooding based on the expert assessment of the Chapter 4 authors, or simply a result coming from the one cited paper? You must have multiple lines of evidence, or otherwise reword to make it clear that this was an observation reported in ONE study and is not an assessment. (Stocker, Thomas, IPCC WGI TSU)	This statement has been revised accordingly
1787	4	67	38	67	39	Typo citation: For Semyonov and Korshunov (2006), the first author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	Citation has been clarified
1788	4	67	41	67	42	Some changes in a climate or damage metric over time are presented, but what are we supposed to conclude? There is no assessment of signal to noise (whether the change is highly unusual compared to changes expected from natural climate). Thus the usefulness or information content for the assessment is very low. (UNITED STATES OF AMERICA)	This text has been deleted
1789	4	67	42	67	42	Cite the specific AR4 chapter. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1790	4	67	42	67	42	The citation for the "IPCC Assessment Report, 2008" must be provided in the chapter's reference list. (IPCC WGII TSU)	This text has been deleted
1791	4	67	42	67	42	The citation for IPCC Assessment Report (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This text has been deleted
1792	4	67	45	67	47	This statement needs to be compared to statements in Chapter 3, which are more equivocal on this issue. (UNITED STATES OF AMERICA)	Done, in consultation with ch 3 experts
1793	4	67	49	67	51	This statement requires relevant citation(s). (IPCC WGII TSU)	This text has been deleted
1794	4	68	1	68	2	The scope of communities that would be affected in this way is unclear based on this generalized statement. Further specificity is needed. (IPCC WGII TSU)	This text has been deleted
1795	4	68	8	68	12	Some changes in a climate or damage metric over time are presented, but what are we supposed to conclude? There is no assessment of signal to noise (whether the change is highly unusual compared to changes expected from natural climate). Thus the usefulness or information content for the assessment is very low. (UNITED STATES OF AMERICA)	This point has been considered in the revision of the section
1796	4	68	9	68	9	Rewording: "Contributing factors were considered to be....." -- or perhaps delete? (Stocker, Thomas, IPCC WGI TSU)	The text has been revised accordingly
1797	4	68	11	68	12	An explanation "may be"?? If you can cite supporting references then you should not need to say "may be". If you can not cite supporting references this statement must be deleted. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1798	4	68	19	0	0	Section 4.5.10. This section would benefit from tightening and shortening. The subsections on changing vulnerabilities and disaster management overlap with and could be moved to chapter 5. (IPCC WGII TSU)	Section tightened and shortened
1799	4	68	19	0	0	Section 4.5.10. This section should consider and cite case study 9.2.9. (IPCC WGII TSU)	A reference has been added
1800	4	68	23	68	23	The citation "Hyogo Declaration; Barbados Declaration, UNFCCC" is not correct. Please change the format of this citation to "author, year" and list the reference in the chapter's reference list. (IPCC WGII TSU)	Proper format added
1801	4	68	25	68	26	Delete sentence 'Changes to climate means or variability may lead to extreme impact'. This is not a statement specific to Small Island States, and is a concept already discussed in detail in Chapter 1 and 3. (Stocker, Thomas, IPCC WGI TSU)	Deleted
1802	4	68	27	68	27	The citation for Lewis (1979) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Reference deleted
1803	4	68	29	68	29	this statement contradicts what is in Chapter 3 (UNITED STATES OF AMERICA)	This is essentially a common-sense, statement. I see no contradiction with Ch. 3 - if sea level rises the island area decreases
1804	4	68	29	68	29	The citation for FitzGerald (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The reference has been corrected
1805	4	68	35	68	37	The author team should consider characterizing the evidence described here with the summary terms outlined in the AR5 Guidance Note on Consistent Treatment of Uncertainties. (IPCC WGII TSU)	The revision of the section has ensured that conclusions are more clearly articulated
1806	4	68	36	68	37	Please quantify "seriously compromised"... (Stocker, Thomas, IPCC WGI TSU)	This sentence has been deleted
1807	4	68	37	68	37	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	This sentence has been deleted
1808	4	68	37	68	37	The citation for FitzGerald (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	This sentence has been deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1809	4	68	37	68	38	"many small islands are likely to experience increased water stress as a result of climate change." This simply cites a previous assessment. For this new assessment, does the statement and likelihood still apply and are the projected changes and likelihood levels consistent with Ch. 3. If so, Ch. 3 sections or tables should be cited as support. (UNITED STATES OF AMERICA)	This sentence has been deleted
1810	4	68	40	68	42	Please quantify the "general increasing trend in the number of disasters reported annually." (Stocker, Thomas, IPCC WGI TSU)	In my opinion, this is a sufficient general information about increasing trend . Quantification comes in the source.
1811	4	68	40	68	42	Increasing trend in reported disasters in small island states since 1950. By itself this finding is not very useful. What are the causes? What are roles of anthropogenic climate change vs natural variability or other non-climate factors such as demographic trends? (UNITED STATES OF AMERICA)	It is clearly a multi-factor case, where both climatic and non-climatic factors play a role. Attribution is not available in references known to the authors. The existing sentence is strict, even if - possibly - not very useful.
1812	4	68	52	69	10	These statements require relevant citations. (IPCC WGII TSU)	Citation has been added
1813	4	69	7	69	8	Reference needed for this statement concerning flood fatalities. (Stocker, Thomas, IPCC WGI TSU)	Citation has been added
1814	4	69	12	0	0	Table 4-15: This is a nice table. Only comment - please add 'land area' to the first entry under 'Plate-boundary Islands' so that it reads: 'large land area'. (Stocker, Thomas, IPCC WGI TSU)	This alteration has been made
1815	4	69	16	0	0	SIS not yet defined. (Chambers, Lynda, Australian Bureau of Meteorology)	Defined now in the first sentence of this 4.5.10
1816	4	69	16	69	33	These statements require relevant citations. (IPCC WGII TSU)	Reference added
1817	4	69	17	69	17	"Ghyben-Herzberg fresh water lens" -- suggest to explain what this is. (Stocker, Thomas, IPCC WGI TSU)	It's a complex explanation, better delete names. Technical explanation would take precious space
1818	4	69	20	69	20	explain "epitomizing the divergence" (Stocker, Thomas, IPCC WGI TSU)	This sentence has been deleted
1819	4	69	23	69	23	For (ref):Please ensure this citation here is added both in the text and in the chapter's reference list. (IPCC WGII TSU)	This sentence has been deleted
1820	4	69	25	69	25	For (ref):Please ensure this citation here is added both in the text and in the chapter's reference list. (IPCC WGII TSU)	Reference added
1821	4	69	28	69	28	Delete 'sea-level rise and variability' (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1822	4	69	28	69	28	explain why it's necessary to also consider geological disasters in this report on weather and climate extreme events. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1823	4	69	35	70	40	need to provide many more references in all these paragraphs in support of your assessment. It's clearly not appropriate to cite 1 or 2 studies only! (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1824	4	69	47	69	54	These statements require relevant citations. (IPCC WGII TSU)	This text has been deleted
1825	4	70	16	0	0	To say that a disaster is climate related (as in line 16) is not that useful for this assessment report. What would be more useful is to be able to say that the risk of the disaster was increased by some amount due to anthropogenic climate change. (UNITED STATES OF AMERICA)	This text has been deleted
1826	4	70	23	70	23	replace reference to section 4.5.7, it should be Section 4.6 (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1827	4	70	25	70	40	Move section to one of Chapters 5/6/7 entitled "Managing...." -- "Disaster Management" is outside the remit of Chapter 4 (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1828	4	70	25	70	40	This section on disaster management is rather arbitrary here -- it would be good to have an equivalent for the other regions. However, it would then need to include much more on trends (there is literature from CRED, insurance and humanitarian agency reports and databases -- feel free to contact us for further information). For small island states (Pacific) there is good analysis in the (reviewed) World Bank report "Not if but when" (2006) which should also be cited here. (International Federation of Red Cross and Red Crescent Societies (IFRC))	This text has been deleted
1829	4	70	26	70	29	These statements require relevant citations. (IPCC WGII TSU)	This text has been deleted
1830	4	70	33	70	33	Delete "Encouragingly" -- not needed, just present the scientific facts. (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1831	4	70	36	70	37	"have increased significantly" -- Please provide the basis for this statement, incl. references. How much is "significantly", does it carry a statistical meaning? If not replace by, e.g., "substantially". (Stocker, Thomas, IPCC WGI TSU)	This text has been deleted
1832	4	70	36	70	40	These statements require relevant citations. (IPCC WGII TSU)	This text has been deleted
1833	4	70	43	80	26	Section 4.6 overall: This section again is not an assessment but a review. Therefore, this material could be greatly shortened here, and with the extensive literature review submitted to a journal as a review paper on the topic. The exception is Section 4.6.5 at the end, which is OK and can be kept as is. (UNITED STATES OF AMERICA)	We agree to some extent, and shortened the material. Yet, some of the discussion on the link of development and extremes, as well as extremes and development, seems important, and does not come up prominently in the SREX. Economically-minded readers will look for this here, so we decided to keep some of the discussion.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1834	4	70	43	81	13	Why is this chapter limited to disasters only e.g. caused by weather extremes? In fact climate extremes and climate change will have an additional impact. Climate extremes may hamper economic activities without causing disasters. E.g. droughts may reduce activities like agriculture or tourism without causing as disaster. Climate change (including weather and climate extremes) will cause a change of location of economic activities or even relocation. E.g. power plants or chemical facilities will not be build if sufficient and sufficient cold cooling water is not available or even for a month in a year. Both effects may cause more loss at some countries or regions than the disasters considered here only. (GERMANY)	We have limited the discussion mostly to extremes due to focus of the literature, which discusses today's events associated with climate variability and extremes.
1835	4	70	43	81	13	I fear this entire section is completely ignoring ecosystems and having only human systems in mind. This introduces a very serious bias into an IPCC report, which is not acceptable. Moreover, costing ecosystem impacts is a thorny issue in general, let alone to do that for extreme events and/or extreme impacts. I see none of this discussed seriously here, although IMHO this needs to be properly assessed in a chapter like this. I suggest authors read at least Fischlin et al, 2007, section 4.5 for a succinct review of these issues. More recent literature could then be added. (Fischlin, Andreas, ETH Zurich)	This is mentioned, but not a lot of literature is available.
1836	4	70	45	0	0	This section is introduced on page 70 as to "focus on economic impact of...." and to "comprise observed and projected economic impacts, including economic losses and future trends in extreme events and disasters in key regions...", etc. However what then follows on page 71ff in sections 4.6.1.1 and 4.6.1.2 are very general considerations and qualitative discussions framing the issue, but no quantitative assessment whatsoever. This general textbook style material would actually fit much better in the introductory Chapter 1 and we thus suggest to remove it from Chapter 4, also keeping in mind the substantial overlength of the Chapter 4 SOD. If part of this general discussion is to remain in Chapter 4, the we suggest to carefully and substantially shorten the sections and to combine with section 4.6.2, really focusing on what is absolutely necessary as background for what is being assessed in section 4.6.3. (Stocker, Thomas, IPCC WGII TSU)	We agree to some extent, and shortened the material. Yet, some of the discussion on the link of development and extremes, as well as extremes and development, seems important, and does not come up prominently in the SREX. Economically-minded readers will look for this here, so we decided to keep some of the discussion.
1837	4	70	53	70	54	The term "total costs," carefully introduced here, is confusing because the term does not recur in the section. It is then difficult to interpret how "economic costs" and "economic impacts" as used in 4.6.1.1 compare to "total costs" introduced here. (IPCC WGII TSU)	Agreed and this is deleted.
1838	4	71	1	72	50	Damage cost should be defined theoretically as the willingness to pay which is measured as equivalent income change of impacts including all direct and indirect tangible and intangible impacts. (morisugi, Hisayoshi, Nihon University)	This is one way to measure this using stated preference methods. The literature mostly focusses on revealed preference methods and reported and modelled damages to stocks and flows.
1839	4	71	8	71	10	The phrase "broken down" implies that "damage costs or losses, adaptation costs, and residual damage costs" are three separate components of economic costs. However, it seems that they in fact may overlap to some extent, with damage costs/losses including residual damage costs. A clearer presentation of the linkages between these three categories of costs and their relationship to losses attributable to climate change would be helpful. (IPCC WGII TSU)	This has been rephrased as can be "subdivided into..." and the sentence has been revised.
1840	4	71	15	71	15	Here it is not clear whether "economic impact of extremes and disasters on economies, societies and ecosystems" is equivalent to "total costs" as defined at the bottom of p. 70, given that the short introduction to total costs on that page implies that economic impacts are a component of total costs. (IPCC WGII TSU)	The 'total' in 'total costs' has been deleted, and this discussion has been clarified.
1841	4	71	18	71	19	About "Note that impacts on the informal or undocumented economy may be very important in some areas and sectors" : it is true of course, and it is not only the case in developing countries. The sentence seem to imply that these are not included : if it is the case, I strongly suggest that it is written, in a very explicit way. If it is not the case, and if some studies on this topic are available, it would be very interesting to quote them. (FRANCE)	We clarify this some more now.
1842	4	71	20	0	0	monetary values (FRANCE)	Yes, this has been corrected.
1843	4	71	20	71	21	"These items are" is repeated again on line 54. (Stocker, Thomas, IPCC WGII TSU)	The sentence has been deleted.
1844	4	71	22	71	22	The citation for Handmer et al. (2003) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	the sentence and the citation have been deleted.
1845	4	71	26	71	26	The citation for World Bank/UN (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been added.
1846	4	71	35	71	51	The definition of direct and indirect impacts should be "harmonized" with more traditional economic definitions of direct and indirect costs, which would help to establish a link to economic assessment tools. Direct costs are in the Chapter defined as immediate impacts from climate events. I will suggest that direct impacts also include longer term impacts of events. (Halsnaes, Kirsten, Risø DTU)	There are different choices and ways to classify the impacts, and we report the dominant one in the disaster literature, which seems most useful here.
1847	4	71	36	71	36	The citation for World Bank/UN (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been added.
1848	4	71	37	71	37	The citation for Gaiha, Hill & Thapa (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Sentence has been deleted.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1849	4	71	53	72	1	This introduction to intangible impacts is very similar to the introduction to the concept on lines 19-22 on p. 71. (IPCC WGII TSU)	The lines 19-22 have been deleted, and the paragraph has been revised.
1850	4	71	53	72	7	There are other difficult issues involved in valuation CC impacts in monetary terms than mentioned (markets versus non markets). These issues i.e. involves intergenerational and intra-generational issues, the unknown preferences of future generations, and discounting (Halsnaes, Kirsten, Risø DTU)	We discuss such issues in the uncertainty section 4.5.6.
1851	4	72	1	72	1	The citation for Handmer et al. (2003) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been corrected.
1852	4	72	4	72	4	To add a new reference between "Carson et al." and "Handmer et al.": (...; Bateman et al., 2002; ...). This citation is one of the most significant references about non-market assessment in the economic literature (SPAIN)	This citation was considered though not included.
1853	4	72	4	72	4	The citation for Pagiola et al. (2004) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been added.
1854	4	72	14	72	14	The citation for Tol (1994) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been corrected.
1855	4	72	23	72	23	Please cite a Specific IPCC chapter. (Stocker, Thomas, IPCC WGI TSU)	Citation has been clarified
1856	4	72	23	72	23	The citation for IPCC (2001) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation has been clarified
1857	4	72	24	72	25	The citation for IPCC (2001) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation has been clarified
1858	4	72	42	72	42	The citation for Albala-Bertrand (1999) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been corrected.
1859	4	72	43	72	43	The citation for Kellenberg and Mobarak (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been added.
1860	4	72	44	72	44	The citation for Lester (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation was deleted.
1861	4	72	44	72	44	Typo citation: For Okuyama, Sabin (2009), the second author's name is spelled differently in the chapter text, as compared to the chapter reference list. Please ensure correct spelling of the author's name in both the text and the reference list. (IPCC WGII TSU)	The spelling mistake has been corrected.
1862	4	72	44	72	44	The citation for Sanghi (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation has been removed and replaced by World Bank (2010b).
1863	4	72	49	72	49	The citation for Gurenko (2004) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation and its paragraph have been deleted.
1864	4	72	49	72	49	The citation for Cummins and Mahul (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation and its paragraph have been deleted.
1865	4	72	49	72	49	It is unclear what source Benson and Clay (2004) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	The citation and its paragraph have been deleted.
1866	4	73	1	73	13	This paragraph should consider and cite case study 9.2.9. (IPCC WGII TSU)	A reference to the case study has been added.
1867	4	73	1	73	13	The citations in this paragraph require substantial revision and attention. Many citations are not provided in the chapter's reference list, or it is unclear what source a citation corresponds to in the reference list. The missing citations must be added to the reference list. Then, all citations must be checked to ensure that they can be unambiguously linked to a reference in the reference list. (IPCC WGII TSU)	The text has been corrected.
1868	4	73	6	73	10	The beginning of the sentence mentions "negative impacts on short term growth" and then "positive and negative on short term growth". 1) must one read "long term growth" in the second part of the sentence ? 2) the term "effect" is very unprecise : some of these effects could be quoted, so that the reader understands what is meant without looking in the papers. (FRANCE)	We changed this text and hope it is clearer.
1869	4	73	6	73	10	This sentence would be easier to understand if the information on negative effects were presented only once (in the first half of the sentence). (IPCC WGII TSU)	We changed this text and hope it is clearer.
1870	4	73	16	73	16	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	Yes, we adjusted the text.
1871	4	73	20	73	20	The citation for Albala-Bertrand (1999) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been corrected.
1872	4	73	20	73	21	The citation for Lester (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation was deleted.
1873	4	73	25	73	25	The citation for Mechler (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been removed.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1874	4	73	26	73	26	The citation for World Bank (2001) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been removed.
1875	4	73	26	73	26	The citation for Cavallo and Noy (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been corrected.
1876	4	73	30	73	30	Please cite a Specific IPCC chapter. (Stocker, Thomas, IPCC WGI TSU)	The citation has been corrected.
1877	4	73	30	73	30	It is unclear what source IPCC (2007) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	The citation has been corrected.
1878	4	73	34	73	34	The citation for OECD (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation changed to Nicholls, et al, 2008.
1879	4	73	34	73	34	The citation for IPCC (2001b) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been added.
1880	4	73	37	73	37	The citation for Birch and Wachter (2006) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been added.
1881	4	73	41	73	41	The citation for Kellenberg and Mobarak (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been added.
1882	4	73	41	73	41	The citation for Patt et al. (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been corrected.
1883	4	73	44	73	44	The citation for Gaiha, Hill & Thapa (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been removed.
1884	4	73	46	73	46	The citation for OECD (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation changed to Nicholls, et al, 2008.
1885	4	73	52	73	52	The citation for Lal et al. (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been corrected and added.
1886	4	74	1	74	1	The citation for Patt et al. (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been corrected.
1887	4	74	10	74	10	The citation for Neumayer and Plumper (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been added.
1888	4	74	13	0	0	Section 4.6.2: this section on "Methodologies for Evaluating Disaster Impacts and Adaptation Costs" includes many very general considerations and lots of textbook style material that can easily be shortened substantially without losing anything for the assessment. It seems to us that their main purpose here is to prepare the grounds for the section to follow assessing the actual costs of impacts, not to lay out in lengthy detail methods/tools to arrive at these cost analyses. Perhaps one way to help shorten these sections and to focus on what is needed in Chapter 4.6.3. would be to move the material on methods and tools into a separate box. (Stocker, Thomas, IPCC WGI TSU)	THE METHODS DISCUSSION HAS BEEN SHORTENED, AND OTHER COMMENTS HAVE REQUESTED DETAIL.
1889	4	74	17	74	25	The citations in this paragraph require substantial revision and attention. Many citations are not provided in the chapter's reference list, or it is unclear what source a citation corresponds to in the reference list. The missing citations must be added to the reference list. Then, all citations must be checked to ensure that they can be unambiguously linked to a reference in the reference list. (IPCC WGII TSU)	Revisions made
1890	4	74	19	74	19	Solomon et al.' - not in reference list. (Stocker, Thomas, IPCC WGI TSU)	Citation has been corrected.
1891	4	74	19	74	20	focused on gradual climate change...' repeated again on Page 76, line 6. (Stocker, Thomas, IPCC WGI TSU)	We have gone through the chapter to ensure that the focus, and the detail, are on extremes and not on gradual climate change.
1892	4	74	24	0	0	Nordhaus 2010, Narita et al 2009, 2010 are not in the reference list (Huggel, Christian, University of Zurich)	Citations have been added.
1893	4	74	24	74	25	It is unclear what source Mechler et al. (2010) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This citation has been removed.
1894	4	74	29	74	29	It is unclear what source Parry et al. (2009) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This publication has been distinguished as 'Parry et al(2009a)'.
1895	4	74	32	74	32	It is unclear what source Parry et al. (2009) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This publication has been distinguished as 'Parry et al(2009a)'.
1896	4	74	33	74	33	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	Sentence has been rephrased.
1897	4	74	34	0	0	solely instead of soley (Wibig, Joanna, University of Lodz)	The sentence has been deleted.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1898	4	74	40	74	40	It should be mentioned that Both approaches define the damage cost as the willingness to pay to avoid the impacts and measured by the equivalent income change for all the impact. The top down looks at the incidence of damage. Bottom up looks at the origin of damage by using the short cut theory saying that indirect impacts are cancel out each other by market mechanism. (morisugi, Hisayoshi, Nihon University)	While we recognise that this is one theoretical view of the two general approaches, we define them conventionally with bottom up conceptualised as willingness to pay, but not top down. Cancelling of indirects depends on a number of factors including spatial and temporal scales and substitutability.
1899	4	74	45	74	45	The citation for Chang et al. (1997) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation has been removed.
1900	4	74	46	74	46	The citation for Okuyama (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation has been removed.
1901	4	75	11	75	12	please explain what is meant by "aggregated on a partial equilibrium basis". Provide references. (Stocker, Thomas, IPCC WGI TSU)	This has been deleted now.
1902	4	75	14	75	24	These statements would benefit from further relevant citations. (IPCC WGII TSU)	Passages have been deleted.
1903	4	75	19	75	21	delete sentence "These impacts are considered intangible...". Seems to repeat what is said on page 74, lines 28/29. (Stocker, Thomas, IPCC WGI TSU)	Yes, we adjusted the text.
1904	4	75	24	75	24	The citation for Ciscar et al. (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation has been corrected.
1905	4	75	29	75	32	I am not sure that it is right that economic cost estimates of adaptation often has been made by economic IAM's, and what is economic IAM's (Halsnaes, Kirsten, Risø DTU)	We have clarified this. Integrated Assessment Models are used but require detailed economic models.
1906	4	75	34	75	34	The citation for UNFCCC (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation has been corrected.
1907	4	75	36	75	36	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	Yes, we adjusted the text.
1908	4	75	39	0	0	Yohe, et al, 1996; 1995, 2011 not in ref. list (Huggel, Christian, University of Zurich)	Added
1909	4	75	39	75	39	The citation for Yohe et al. (1996) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been added.
1910	4	75	39	75	39	The citation for Yohe et al. (1995) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been added.
1911	4	75	39	75	39	The citation for Yohe et al. (2011) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been added.
1912	4	75	39	75	39	The citation for West et al. (2001) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been added.
1913	4	75	41	77	3	The citations in these paragraphs require substantial revision and attention. Many citations are not provided in the chapter's reference list, or it is unclear what source a citation corresponds to in the reference list. The missing citations must be added to the reference list. Then, all citations must be checked to ensure that they can be unambiguously linked to a reference in the reference list. (IPCC WGII TSU)	Revisions made
1914	4	75	42	0	0	Schneider et al 2010 is not in the reference list (Huggel, Christian, University of Zurich)	The citation has been added.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1915	4	76	15	77	3	We recommend expanding the discussion about the cost-effectiveness of disaster risk reduction and adaptation costs in this section. To illustrate the range of analyses on the cost-effectiveness of DRR costs, we suggest adding a box with the following examples: We recommend including a box highlighting some examples. The following could be included: • For infrastructure improvement, the cost-benefit ratio can be as high as 12 (Indonesia), 19 (India), 15 (Turkey) and 4.89 (St. Lucia) if the buildings last 25 years. • Large-scale public investments in the US can return up to 10 dollars (illustrated by the example of Hurricane Katrina). • Coastal protection through mangroves in Thailand has been estimated to have a benefit-cost ratio of around 17. • The benefit-cost ratio (calculated as avoided losses) of early warning systems and forecast data is often higher than 10 (35-40 in China; 70 in Mozambique; 14.4 in some Asian countries and 3 in the US). • A planned polder system in Peru, supported by Gesellschaft für Technische Zusammenarbeit (GTZ), the German technical development agency, whereby floodwaters would be diverted in a polder retention basin, has been calculated to have an estimated benefit-to-cost ratio of 3.8. A GTZ-supported integrated water management and flood protection scheme in Indonesia has an estimated ratio of 2.5. (Mechler, 2005). • Non-governmental organisation (NGO) interventions to reduce the impact of flooding in Bihar and of flooding and drought in Andhra Pradesh, India, have estimated benefit-cost ratios of 3.8 and 13.4, respectively. (Cabot Venton and Venton, 2005). • A Vietnam Red Cross mangrove planting programme in eight provinces in Vietnam to provide protection to coastal inhabitants from typhoons and storms cost an average US\$ 0.13 million a year over the period 1994 to 2001, but reduced the annual cost of dyke maintenance by US\$ 7.1m. The programme also helped save lives, protect livelihoods and generate livelihood opportunities. (World Disasters Report: Focus on reducing risk IFRC, 2002) • Spending 1 per cent of a structure's value on vulnerability reduction measures can reduce probable maximum loss from hurricanes by around a third in the Caribbean, according to regional civil engineering experts. (World Bank. Managing Catastrophic Risks Using Alternative Risk Financing and Insurance Pooling Mechanisms. Discussion draft. Washington, DC: World Bank) Suggested reference: United Nations and World Bank (2010) Natural Hazards, UnNatural Disasters: The Economics of Effective Prevention. Washington, D.C.: World Bank. Mechler, R. (2005) Cost-benefit Analysis of Natural Disaster Risk Management in Developing Countries: Manual. Bonn: Deutsche Gesellschaft für Zusammenarbeit (GTZ) GmbH. Cabot Venton, C. and Venton, P. (2004) Disaster preparedness programmes in India: A cost benefit analysis. Humanitarian Practice Network Paper 49. London: Overseas Development Institute IFRC (2002) World Disasters Report 2002. IFRC: Geneva (World Food Programme (WFP))	The numbers are not very robust and selective, as well there is little space, so we could not add this.
1916	4	76	17	76	51	Most of this section is a general discussion about strengths and limitations of CBA, and the issues are not specific for disasters. The chapter should in some places have a more general discussion about assessment tools both applying to adaptation and disasters and alternative tools such as MCA should also be included. (Halsnaes, Kirsten, Risø DTU)	We have taken this point into consideration in the revision.
1917	4	76	23	76	23	"arrive at the right choice" -- please avoid such qualifying expressions. (Stocker, Thomas, IPCC WGI TSU)	Sentence has been deleted.
1918	4	76	25	76	27	The acronyms DRR (Disaster Risk Reduction?) and DRM (Disaster Risk Management?) are not explained in the text (GERMANY)	They are now spelled out in their first usage, and they are discussed in detail in other chapters and defined in the glossary.
1919	4	76	25	76	27	it is not defined what DRR and DRM mean. (Wibig, Joanna, University of Lodz)	They are now spelled out in their first usage, and they are discussed in detail in other chapters and defined in the glossary.
1920	4	76	31	76	31	France yet make CBA mandatory too for some State's help for flood prevention to local communities (FRANCE)	This is more of a comment than a review suggestion.
1921	4	76	37	76	39	Use appropriate wording or delete this paragraph -- as it currently stands, it's does not make sense at all. E.g., what does it mean to say that "disaster events are probabilistic" or that "benefits of DRR are probabilistic"? Please clarify. (Stocker, Thomas, IPCC WGI TSU)	The occurrence of disaster events can be expressed as a probability and it follows that the benefits of reducing the impact of that event can be expressed in probabilistic terms. The text has been clarified.
1922	4	77	6	0	0	Section 4.6.3: Estimates of Global and Regional Costs: Error and Uncertainty estimates are almost completely missing from the assessment of costs provided in this section. There must be some indications in the text as to how confident you are about these numbers. It's not enough to just report numbers from reports, without assessing their quality, robustness etc. We acknowledge the mentioning of "a number of issues" on page 78, lines 7-11, but this does not satisfy the required in-depth assessment. (Stocker, Thomas, IPCC WGI TSU)	We have taken this point into consideration in the revision.
1923	4	77	6	0	0	The assessments of costs provided in section 4.2.4 and in some of the regional subsections of section 4.5 (e.g., Asia) would be better placed here. Suggest to collect all the costs related information and combine them here to a more thorough, more quantitative assessment of costs of impacts and adaptation. (Stocker, Thomas, IPCC WGI TSU)	Yes, we have further refined the focus of this and other sections accordingly.
1924	4	77	6	0	0	Estimates of global and regional costs, of what? (UNITED STATES OF AMERICA)	Agreed, changed section title
1925	4	77	6	79	24	Figure 4.16 and Table 4.17 are inserted in the section 4.6.3, but never cited (Wibig, Joanna, University of Lodz)	Figure 4-16 is deleted, Table 4-17 is now referred to in the corresponding text.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1926	4	77	10	77	10	delete "some" -- or are you implying that only a subset of the uncertainty issues are being assessed? Why would "some" be left out in a comprehensive assessment of the science? (Stocker, Thomas, IPCC WGI TSU)	Revised
1927	4	77	13	0	0	Section 4.6.3.1. Non-overlapping information on disaster losses at the national level provided in chapter 6, page 4, lines 3-41, should be moved to this section. (IPCC WGII TSU)	accepted, the discussion is revised in the spirit of this comment.
1928	4	77	18	77	18	The citation for Munich Re (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	the figure has been updated to "Munich-Re,2011"
1929	4	77	18	77	18	It is unclear what source UN-ISDR (2009) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	The citations has been clarified as "UNISDR, 2009b" in the chapter text, as the reference list.
1930	4	77	21	77	22	"there is consensus" -- please clarify whether you are basing your consensus statement on the assessments provided in Chapter 3 and 4 of this report. If so, then make this very clear. If not, please provide evidence, incl. references. (Stocker, Thomas, IPCC WGI TSU)	Agreed, but this is discussed in 4.2.2 (and referred to here)
1931	4	77	26	77	35	"The Americas" shall be divided into North America, and Central and South America according to regional classification of AR 5. (JAPAN)	The classification is based on the available reference.
1932	4	77	26	77	35	The term "damage losses" shall be defined clearly. (JAPAN)	Agreed, we changed to "global direct damages"
1933	4	77	26	77	35	It should be stronger underlined that such structure of losses is mainly because of lack of relevant data and literature. (Wibig, Joanna, University of Lodz)	we have revised the sentence to indicate there is more information available for developed countries and the northern hemisphere.
1934	4	77	27	77	27	The citation for WB (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been clarified and added.
1935	4	77	29	77	29	Please cite this 'relevant literature' (Stocker, Thomas, IPCC WGI TSU)	This has been deleted now, as it was superfluous
1936	4	77	38	0	0	Table 4.16: how confident are you about the numbers and the precision provided (e.g., 22.82, 1.19....)? Suggest to round numbers and to add uncertainties/error bars if possible. (Stocker, Thomas, IPCC WGI TSU)	We cannot provide error bars, but summary terms for evidence and agreement in the regional distribution are now included
1937	4	77	44	77	44	The citation for Cavallo and Noy (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation is added.
1938	4	77	48	0	0	Figure 4-14: Caption needs to explain what is represented by the box and stems (eg, quartiles, median etc.). Explain LAC in caption. (Stocker, Thomas, IPCC WGI TSU)	The figure has been deleted.
1939	4	77	52	77	53	Do you mean that there has been increased reporting of extreme events? You need to make it clear that this is not the same as an actual, scientifically observed physical increase in extreme events, as assessed in Chapter 3, where for many extreme events no increasing trend has been identified. (Stocker, Thomas, IPCC WGI TSU)	This is scientifically observed increasing impacts, no different from evidence presented in Chapter 3 (see references in this particular paragraph)
1940	4	77	52	78	2	Trend in overall and insured losses can not be interpreted as a trend in reported extreme events or change in frequency of extreme events (Wibig, Joanna, University of Lodz)	Agreed, this may have been interpreted like this. We have deleted the sentence on page 78, lines 1-2. [LB]
1941	4	77	52	78	18	Critical remarks to the 'increasing trends in disaster impacts and climate change' are good. But why then show these figures, given the presented and other remarks (and even conclusion that there is no evidence for increasing losses due to anthropogenic climate change)? (NETHERLANDS)	We indicate now the importance of these increasing costs to society (regardless of cause)
1942	4	77	53	0	0	extreme events instead of extremes events (Wibig, Joanna, University of Lodz)	corrected
1943	4	78	1	78	2	"it is suggested" - by who? Give citations. (Stocker, Thomas, IPCC WGI TSU)	Agreed, this sentence is now deleted [LB]
1944	4	78	1	78	5	The two sentences on whether loss trends can be linked to changes in hazards and/or climate change are important and should be clarified. For example, some types of extreme events are changing in frequency, others in magnitude, and still others in both or neither. It would be helpful to reflect this complexity more clearly in the first sentence's description about what can be "noticed" in loss records. Both sentences would very much benefit from clear citations to supporting literature or chapter sections. Additionally, for the second sentence, there is a subtle distinction that should be sustained more clearly: One would not expect observed changes in hazards to have *no* effect on the loss/impacts trends, even if the effect cannot be detected. The phrasing of the second sentence here suggests that (where attribution cannot be made) changes are categorically not due to climate change. The complexity of the factors influencing trends in losses/impacts should be accounted for more fully here, perhaps in combination with the treatment on lines 20-21 of this page. A place in chapter 4 where such complexity is noted is the paragraph on page 79 from lines 9 to 19. Finally, the placement for the reference to Figure 4-15 is odd given that it does not indicate the frequency of hazards, only the trends in loss over time. (IPCC WGII TSU)	Agreed, this sentence is now deleted, and the suggested issues are discussed now in the section of attribution, later in this part of the chapter
1945	4	78	4	78	5	This seems to contradict other statements in the report. I think this is the correct interpretation for this report. (UNITED STATES OF AMERICA)	Agreed, we will bring other parts in line with this statement
1946	4	78	13	0	0	Figure 4-15: Munich-Re 2007 not in reference list. Is this figure consistent with data reported by other reinsurers, eg Swiss RE. Are there data from non-commercial sources that can be used for comparison? It would be extremely valuable to base the loss information on multiple sources. (Stocker, Thomas, IPCC WGI TSU)	the citation has been updated as "Munich Re, 2011", and also included multiple sources now (Swiss Re, Munich Re, CRED) [LB]

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1947	4	78	15	78	15	The citation for Munich-Re (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	the citation has been updated as "Munich Re, 2011"
1948	4	78	17	0	0	Figure 4-16: Figure needs more explanation in the caption. No y-axis annotation. How has the 'normalization' been completed? What is the source of this information? NOTE: This figure is not referred to in the text - what is the message coming out of this figure? Impacts and losses have decreased? On style, we strongly recommend to improve the layout from the standard excel layout (grey background, horizontal grid lines, etc.). (Stocker, Thomas, IPCC WGI TSU)	The figure has been deleted.
1949	4	78	20	0	0	"In conclusion, as highlighted in Section 4.2.4 there is only very limited evidence that anthropogenic climate change has lead to increasing losses; increasing exposure is the main reason for long term changes in economic losses." Even this conclusion is overstated. There is not even limited evidence at this point. The "limited evidence" cited here, as shown above, is miscited and misleading. (Pielke, Roger, University of Colorado)	Agreed, we have deleted this sentence
1950	4	78	20	0	0	Suppress anthropogenic (voir OG2). (BOURRELIER, PAUL-HENRI, AFPCN)	Agreed, we have deleted this sentence
1951	4	78	23	78	25	This statement should refer to chapter 3 instead of sections from chapter 4. (Seneviratne, Sonia, ETH Zurich)	Agreed, we have deleted this sentence, and refer to chapter 3 now
1952	4	78	23	78	25	This sentence *must* reflect and cite the assessments and relevant sections of chapter 3, in addition to any other citations provided. (IPCC WGII TSU)	Agreed, we have deleted this sentence, and refer to chapter 3 now
1953	4	78	23	78	31	need to refer to Chapter 3 here. Sections 4.3-4.5 do not provide the information on extremes and trends in the future, this is clearly part of the Chapter 3 analysis. (Stocker, Thomas, IPCC WGI TSU)	Agreed, we have deleted this sentence, and refer to chapter 3 now
1954	4	78	27	78	31	It is unclear if the second sentence presents an overall generalization about the effects of socioeconomic development worldwide or if it is specific to the elements mentioned in the first sentence here--coastal cities and least developed countries. It is important that the level of generalization intended here is clearly specified. Additionally, if the use of "very likely" is casual (and is not calibrated language per the AR5 Guidance Note on Treatment of Uncertainties), it should be avoided. (IPCC WGII TSU)	Agreed, the sentences are deleted, and the literature is treated in wider context later in the section
1955	4	78	28	78	28	The citation for Hallegatte et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been added.
1956	4	78	28	78	28	The citation for OECD (2008) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation is changed as "Nicholls, et al, 2008"
1957	4	78	29	78	29	The citation for Patt et al. (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been corrected.
1958	4	78	34	0	0	"Section 4.3.2.2 examines cyclone impacts in depth. The evidence is that to date no trends in impacts can be attributed to climate change. There are many methodological issues with these studies." No such methodological issues have been presented. This statement is a cheap shot. In fact, if you look at the graphs above, you will see that the methodology used by Pielke et al. (2008) and successfully replicated by Schmidt et al. (2009) and Nordhaus (2006), is able to reproduce trends in the physical characteristics of hurricane incidence over time. Such normalizations have been in the literature for almost 15 years and have stood the test of time (e.g., they have repeatedly be shown to carry an ENSO signal and they faithfully reproduce the physical characteristics of storm trends). If there are methodological issues, then they should be discussed explicitly in this report with reference to peer reviewed studies. I am unaware of any such methodological critiques, much less any that would imply different results. (Pielke, Roger, University of Colorado)	There is indeed no literature to support that there are issues with the adjustment, the sentence is deleted. However, in other places we do indicate that most studies have ignored adaptation/risk reduction, which is acknowledge for instance by Bouwer 2011.
1959	4	78	35	0	0	the discussion of studies of the future projected impacts of tropical cyclones here is highly selective. Instead, this section should rely on Laurens Bouwer's in press comprehensive review of this literature. (Pielke, Roger, University of Colorado)	Agreed, we have merged this reference of WB 2010 now with text on other literature
1960	4	78	37	78	40	The assessment here of damage by tropical cyclones should refer to the tropical cyclone assessment provided in Chapter 3. (Stocker, Thomas, IPCC WGI TSU)	Agreed, has been deleted
1961	4	78	41	78	41	The citation for Bender et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation is added.
1962	4	78	42	78	42	The use of "unlikely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. Additionally, it would be much preferable to present, in addition to "260 years from now," how this estimated value sits within the spectrum of possible values. (IPCC WGII TSU)	agreed, the word "unlikely" has been deleted
1963	4	78	43	78	44	"in the context of the significant uncertainties with the modelling involved" -- Which modelling are you referring to here? The modelling of projected climate change? Or of related impacts? Or of related costs? Please be specific! BTW, how uncertain are "significant uncertainties"? Suggest to replace by, e.g., "substantial". And Suggest to refer to Chapter 3 when "the modelling" also refers to modelling of the physical climate system and impacts. (Stocker, Thomas, IPCC WGI TSU)	Sentence has been deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1964	4	78	46	0	0	this discussion is notable for is neglect of the work of Laurens Bouwer et al. on floods. (Pielke, Roger, University of Colorado)	The discussion on floods does include work by Bouwer (Bouwer et al. 2010; Maaskant et al. 2009)
1965	4	78	47	78	47	The citation for ABI (2009) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Reference has been provided
1966	4	78	48	78	48	The citation for Bouwer et al. (2010) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Reference has been provided
1967	4	78	48	78	49	The citation for Schreider et al. (2000) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Reference has been provided
1968	4	78	52	78	52	It is unclear what source Dawson et al. (2009) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	Done
1969	4	79	1	79	26	The citations in these paragraphs require substantial revision and attention. Many citations are not provided in the chapter's reference list, or it is unclear what source a citation corresponds to in the reference list. The missing citations must be added to the reference list. Then, all citations must be checked to ensure that they can be unambiguously linked to a reference in the reference list. (IPCC WGII TSU)	The references have been added or clarified.
1970	4	79	9	79	9	Replace "frequency of weather hazards" with "frequency and intensity of weather hazards" (Seneviratne, Sonia, ETH Zurich)	Agreed, has been "intensity" is now included
1971	4	79	27	80	26	Tables 4.18 and 4.197 are inserted in the section 4.6.4, but never cited (Wibig, Joanna, University of Lodz)	Citations are now provided
1972	4	79	30	79	31	It is unclear what source Parry et al. (2009) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	Publication has been distinguished with 'Parry et al(2009a)'.
1973	4	79	31	79	31	The citation for Solomon (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Citation deleted
1974	4	79	31	79	31	It is unclear what source Parry et al. (2009) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	Publication has been distinguished with 'Parry et al(2009a)'.
1975	4	79	33	79	33	It is unclear what source Parry et al. (2009) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	Citation deleted
1976	4	79	34	79	35	Are these estimate global or for a particular region? Please clarify. (Stocker, Thomas, IPCC WGI TSU)	These are global figures.
1977	4	79	40	79	40	The citation for World Bank (2006) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Reference has been placed in the reference list.
1978	4	79	42	79	42	For Stern Review (2006): Please check this citation for consistency with how the reference is listed in the reference list. (IPCC WGII TSU)	The citation has clarified as listed in the reference.
1979	4	79	42	79	42	The citation for Oxfam (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation is added.
1980	4	79	42	79	42	The citation for UNDP (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation is added.
1981	4	79	53	0	0	Table 4-19: What is the source of this information? You need to explain what are 'wet' and 'dry' scenarios. And please avoid unscientific titles like "...will shoulder the biggest burden" (Stocker, Thomas, IPCC WGI TSU)	We adaptaed the text as follows: "... two scenarios assessed, which were a scenario with the most precipitation ('wet') and one with the least precipitation ('dry') among all scenarios chosen, which employ socioeconomic driver information of the IPCC's SRES A2 scenario "
1982	4	80	2	80	2	It is unclear what source Parry et al. (2009) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This publication has been distinguished with 'Parry et al(2009a)'.
1983	4	80	3	80	3	It is unclear what source Parry et al. (2009) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This publication has been distinguished with 'Parry et al(2009a)'.
1984	4	80	13	80	13	The citation for Gaddis et al. (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation is added.
1985	4	80	16	80	16	It is unclear what source Mechler et al. (2010) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	The sentence has been deleted.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1986	4	80	17	80	17	The citation for Costanza, Farley (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation is added.
1987	4	80	20	80	22	It is not clear what "climate proofing" is in this context, and this should be clarified. (IPCC WGII TSU)	The sentence has been revised.
1988	4	80	21	80	21	It is unclear what source Reid et al. (2007) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	The citation has been deleted in the text.
1989	4	80	21	80	26	Is 'likely' meant here as calibrated uncertainty language? If so, please italicize. Otherwise replace. (Stocker, Thomas, IPCC WGI TSU)	Yes, done now.
1990	4	80	24	80	24	The citation for OECD (2007) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The sentence has been deleted.
1991	4	80	25	80	25	The use of "likely" here appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	Yes, we adjusted the text.
1992	4	80	26	80	26	It needs to be specified to what "much greater" is being compared. (IPCC WGII TSU)	The sentence has been deleted
1993	4	80	32	80	32	It is unclear what source Parry et al. (2009) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	These publications have been distinguished with 'Parry et al(2009a)'.
1994	4	80	33	80	33	The citation for Tol (2005) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been deleted.[ZY]
1995	4	80	40	80	40	It is unclear what source Carter et al. (2007) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	These publication has been distinguished with 'Carter et al (2007a)'.
1996	4	80	41	80	41	Please reword: "Climate models are CHALLENGED when reproducing spatially explicit climate extremes, due to". It is not within the expertise or scope of Chapter 4 to judge if climate models are 'good' or not. (Stocker, Thomas, IPCC WGI TSU)	Thank you and done so.
1997	4	80	43	80	43	Replace the Weitzman citation with a reference to chapter 3 (Section 3.2.3). (Stocker, Thomas, IPCC WGI TSU)	accepted.
1998	4	80	43	80	44	Reword: "Hence projections of extreme events in the future contain uncertainty, hindering projections of" Again, It is not within the expertise or scope of Chapter 4 to judge the uncertainty level of projections. (Stocker, Thomas, IPCC WGI TSU)	Yes, this has been corrected.
1999	4	80	44	80	46	Delete this sentence beginning "Nonetheless...." - It is not within the expertise or scope of Chapter 4 to be assessing the uncertainty of climate projections. These issues are comprehensively assessed in chapter 3. (Stocker, Thomas, IPCC WGI TSU)	Sentence has been deleted.
2000	4	80	46	80	46	The citation for Christenson (2003) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	Sentence has been deleted.
2001	4	80	48	80	48	The citation for UNDP (2004) is not provided in the chapter's reference list. Please ensure this citation is added to the reference list. (IPCC WGII TSU)	The citation has been added.
2002	4	81	3	81	3	It is unclear what source Parry et al. (2009) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	This publication has been distinguished with 'Parry et al(2009a)'.
2003	4	81	9	81	9	It is unclear what source Dawson et al. (2009) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	Citation has been removed.
2004	4	81	12	81	12	It is unclear what source Carter et al. (2007) corresponds to in the chapter's reference list, given multiple references for this author and year in that list. Please revise the citation so that its corresponding reference is unambiguous. (IPCC WGII TSU)	These citation has been distinguished with 'Carter et al (2007a)'.
2005	4	82	15	82	16	Insert "Allen, C.D., A.K. Macalady, H. Chenchouni, D. Bachelet, N. McDowell, M. Vennetier, T. Kitzberger, A. Rigling, D.D. Breshears, E.H. Hogg, P. Gonzalez, R. Fensham, Z. Zhang, J.-H. Lim, J. Castro, N. Demidova, G. Allard, S.W. Running, A. Semerci, and N. Cobb. 2010. A global overview of drought and heat-induced tree mortality reveals emerging climate change risks for forests. <i>Forest Ecology and Management</i> 259: 660–684 " (REPUBLIC OF KOREA)	OK
2006	4	84	21	84	22	For Benson and Clay (2004): This reference seems to be redundant with the reference listed on p. 84, ll. 23-24. Please check if those references refer to the same document and remove the redundant entry. (IPCC WGII TSU)	The references have been reconciled, and the redundant entry deleted.
2007	4	84	23	84	24	For Benson and Clay (2004): This reference seems to be redundant with the reference listed on p. 84, ll. 21-22. Please check if those references refer to the same document and remove the redundant entry. (IPCC WGII TSU)	The references have been reconciled, and the redundant entry deleted.
2008	4	85	46	85	47	Bronstert, A., A. Baardossy, et al. (2007): All author names should be listed here for this reference, without use of "et al." Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been provided.

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2009	4	86	1	86	2	For Brookshire, D. S., S. E. Chang, et al. (1997): All author names should be listed here for this reference, without use of “et al.” Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been provided.
2010	4	86	5	86	6	For BTE (2001): This listed source is not available at the link provided. Please revise or delete the provided URL. (IPCC WGII TSU)	The URL has been deleted from the citation.
2011	4	87	9	87	15	For Cardoso et al. (2008): Publications by the same author from the same year should be distinguished by adding ‘a’, ‘b’, ‘c’ etc. to the publication year. Please add those letters in the reference list and everywhere you are citing these sources in the text. (IPCC WGII TSU)	The citations have been clarified accordingly in the reference list, as well as in the chapter text.
2012	4	87	29	87	35	For Carter et al. (2007): Publications by the same author from the same year should be distinguished by adding ‘a’, ‘b’, ‘c’ etc. to the publication year. Please add those letters in the reference list and everywhere you are citing these sources in the text. (IPCC WGII TSU)	The citations have been clarified accordingly in the reference list, as well as in the chapter text.
2013	4	89	12	89	14	For Cork, S. J. (2001): This listed source is not freely available at the link provided. Please revise or delete the provided URL. (IPCC WGII TSU)	The URL has been deleted from the citation.
2014	4	89	28	89	29	For Crompton, R.P., et al. (2010): All author names should be listed here for this reference, without use of “et al.” Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been provided.
2015	4	90	21	90	26	For Dawson et al. (2009): Publications by the same author from the same year should be distinguished by adding ‘a’, ‘b’, ‘c’ etc. to the publication year. Please add those letters in the reference list and everywhere you are citing these sources in the text. (IPCC WGII TSU)	The citations have been clarified accordingly in the reference list, as well as in the chapter text.
2016	4	90	31	90	33	For Defra (2004a): This listed source is not available at the link provided. Please revise or delete the provided URL. (IPCC WGII TSU)	The URL has been deleted from the citation.
2017	4	90	44	90	45	For Delpla, I., A.V. Jung, et al. (2009): All author names should be listed here for this reference, without use of “et al.” Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been provided.
2018	4	90	50	90	52	For DFID (2004): This listed source is not available at the link provided. Please revise or delete the provided URL. (IPCC WGII TSU)	The URL has been deleted from the citation.
2019	4	91	38	0	0	Easterling and Apps, 2005: not (165-89.), but (165-189.) (NISHIMORI, Motoki, National Institute for Agri-Environmental Sciences)	The reference has been revised accordingly.
2020	4	91	44	91	44	For Ebi, K.L. and J. Balbus (2008): The information on this reference seems to be incomplete. Please add the missing information, e.g. on the publisher, for this reference. (IPCC WGII TSU)	The missing information has been provided.
2021	4	92	9	92	10	For Ellson, R.W., J.W. Milliman, et al. (1984): All author names should be listed here for this reference, without use of “et al.” Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been provided.
2022	4	92	33	92	35	For European Commission (2009): This listed source is not available at the link provided. Please revise or delete the provided URL. (IPCC WGII TSU)	The URL has been deleted from the citation.
2023	4	92	38	92	39	For Eurostat (2010): The information on this reference seems to be incomplete. Please add the missing information, e.g. on the publication where this article appeared, for this reference. (IPCC WGII TSU)	The missing information has been provided.
2024	4	92	48	92	53	For FAO (2008): Publications by the same author from the same year should be distinguished by adding ‘a’, ‘b’, ‘c’ etc. to the publication year. Please add those letters in the reference list and everywhere you are citing these sources in the text. (IPCC WGII TSU)	The citations have been clarified accordingly in the reference list, as well as in the chapter text.
2025	4	93	45	93	46	For Fowler, H. J., C. G. Kilsby, et al. (2003): All author names should be listed here for this reference, without use of “et al.” Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been provided.
2026	4	94	8	94	9	For Gaiha, K. H. and G. Thapa (2010): This listed source is not available at the link provided. Please revise or delete the provided URL. (IPCC WGII TSU)	The reference has been deleted
2027	4	94	45	94	46	For Guimaraes, P., F.L. Hefner, et al. (1993): All author names should be listed here for this reference, without use of “et al.” Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been provided.
2028	4	97	5	97	6	For Hoffman, R. N. et al. (2010): All author names should be listed here for this reference, without use of “et al.” Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been provided.
2029	4	97	12	97	15	For Holper et al. (2007): This listed source is not available at the link provided. Please revise or delete the provided URL. (IPCC WGII TSU)	The URL has been deleted from the citation.
2030	4	97	27	97	28	For Huq, S., S. Kovats, et al. (2007): All author names should be listed here for this reference, without use of “et al.” Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been provided.
2031	4	97	41	97	41	For INRENA (2006): This listed source is not available at the link provided. Please revise or delete the provided URL. (IPCC WGII TSU)	The reference has been deleted
2032	4	97	41	97	41	For INRENA (2006): The information on this reference is incomplete. Please add the missing information for this reference, e.g. the title of the document / publication. (IPCC WGII TSU)	The reference has been deleted
2033	4	97	42	97	47	For IPCC (2007): Publications by the same author from the same year should be distinguished by adding ‘a’, ‘b’, ‘c’ etc. to the publication year. Please add those letters in the reference list and everywhere you are citing these sources in the text. (IPCC WGII TSU)	The citations have been clarified accordingly in the reference list, as well as in the chapter text.

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2034	4	98	13	98	16	For Johnson and Welch (2010): The link provided for this reference does not link directly to the document cited. Please revise or delete the provided URL. (IPCC WGII TSU)	The URL has been deleted from the citation.
2035	4	98	39	98	40	For Kaser (2005): This listed source is not available at the link provided. Please revise or delete the provided URL. (IPCC WGII TSU)	The reference has been deleted
2036	4	100	4	100	6	For Kundzewicz et al. (2010): Publications by the same author from the same year should be distinguished by adding 'a', 'b', 'c' etc. to the publication year. Please add those letters in the reference list and everywhere you are citing these sources in the text. (IPCC WGII TSU)	The citations have been clarified accordingly in the reference list, as well as in the chapter text.
2037	4	100	18	100	19	For Kundzewicz et al. (2010): Publications by the same author from the same year should be distinguished by adding 'a', 'b', 'c' etc. to the publication year. Please add those letters in the reference list and everywhere you are citing these sources in the text. (IPCC WGII TSU)	The citations have been clarified accordingly in the reference list, as well as in the chapter text.
2038	4	100	20	100	23	For Kunkel, K.E., et al. (2008): All author names should be listed here for this reference, without use of "et al." Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been provided.
2039	4	101	5	101	6	Insert "Lim, J.-H., J.H. Chun and J.H. Shin. Global warming related dieback of evergreen coniferous forests in Korea due to high temperature and drought stress in winter season. Proceedings of the XXIII IUFRO 2010 World Congress, 23-28 August, Seoul. The International Forestry Review 12(5):44-44" (REPUBLIC OF KOREA)	The citation has been added.
2040	4	102	18	102	25	For Marengo et al. (2008): Publications by the same author from the same year should be distinguished by adding 'a', 'b', 'c' etc. to the publication year. Please add those letters in the reference list and everywhere you are citing these sources in the text. (IPCC WGII TSU)	The citations have been clarified accordingly in the reference list, as well as in the chapter text.
2041	4	102	35	102	36	For Masutomi et al.: The reference contains no publication year. Please add this information to the reference and check for consistency where citing this source in the chapter text. (IPCC WGII TSU)	The reference has been deleted
2042	4	102	40	102	42	For Mayor of London (2005): This listed source is not available at the link provided. Please revise or delete the provided URL. (IPCC WGII TSU)	The URL has been deleted from the citation.
2043	4	103	19	103	20	For McMichael, A., D. Campbell-Lendrum, et al. (2003): All author names should be listed here for this reference, without use of "et al." Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been provided.
2044	4	103	19	103	24	For McMichael et al. (2003): Publications by the same author from the same year should be distinguished by adding 'a', 'b', 'c' etc. to the publication year. Please add those letters in the reference list and everywhere you are citing these sources in the text. (IPCC WGII TSU)	The citations have been clarified accordingly in the reference list, as well as in the chapter text.
2045	4	103	21	103	24	For McMichael et al. (2003): This listed source is not available at the link provided. Please revise or delete the provided URL. (IPCC WGII TSU)	The URL has been deleted from the citation.
2046	4	103	38	103	46	For Mechler et al. (2010): Publications by the same author from the same year should be distinguished by adding 'a', 'b', 'c' etc. to the publication year. Please add those letters in the reference list and everywhere you are citing these sources in the text. (IPCC WGII TSU)	These publications have been distinguished with 'a' and 'b'.
2047	4	104	5	104	6	For Mendelsohn et al. (2010): The information on this reference seems to be incomplete. Please add the missing information, e.g. on the publication where this article appeared, for this reference. (IPCC WGII TSU)	The missing information has been added to complete this reference.
2048	4	104	9	104	10	For Menzel, A. et al. (2006): All author names should be listed here for this reference, without use of "et al." Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been added to complete this reference.
2049	4	104	9	104	12	For Menzel, A. et al. (2006): Publications by the same author from the same year should be distinguished by adding 'a', 'b', 'c' etc. to the publication year. Please add those letters in the reference list and everywhere you are citing these sources in the text. (IPCC WGII TSU)	These publications have been distinguished with 'a' and 'b'.
2050	4	104	33	104	36	For Ministry of Agriculture and Forestry (2010): This listed source is not available at the link provided. Please revise or delete the provided URL. (IPCC WGII TSU)	The URL has been updated to link to the source.
2051	4	104	34	104	35	Incorrect URL, replace with http://www.maf.govt.nz/environment-natural-resources/funding-programmes/natural-disaster-recovery/on-farm-adverse-events-recovery-plan.aspx (NEW ZEALAND)	The URL has been updated as requested.
2052	4	105	39	105	41	For Nepstad et al. (2008): This reference seems to be redundant with the reference listed on p. 105, ll. 45-46. Please check if those references refer to the same document and remove the redundant entry. (IPCC WGII TSU)	Redundant reference has been deleted.
2053	4	105	45	105	46	For Nepstad et al. (2008): This reference seems to be redundant with the reference listed on p. 105, ll. 39-41. Please check if those references refer to the same document and remove the redundant entry. (IPCC WGII TSU)	Redundant reference has been deleted.
2054	4	107	35	107	36	For Park, J.H., L. Duan, et al. (2010): All author names should be listed here for this reference, without use of "et al." Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been added to complete this reference.
2055	4	107	45	107	51	For Parry et al. (2009): Publications by the same author from the same year should be distinguished by adding 'a', 'b', 'c' etc. to the publication year. Please add those letters in the reference list and everywhere you are citing these sources in the text. (IPCC WGII TSU)	The citations have been clarified by deleting the redundant citation and then adding 'a' and 'b'.
2056	4	108	3	108	3	For Parry et al. (2009): Publications by the same author from the same year should be distinguished by adding 'a', 'b', 'c' etc. to the publication year. Please add those letters in the reference list and everywhere you are citing these sources in the text. (IPCC WGII TSU)	The citations have been clarified by deleting the redundant citation and then adding 'a' and 'b'.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
2057	4	108	21	108	23	For Pearce et al. (2005): This listed source is not available at the link provided. Please revise or delete the provided URL. (IPCC WGII TSU)	This URL has been deleted and the reference has been updated.
2058	4	109	15	109	15	For Popp (2006): The information on this reference is incomplete. Please add the missing information for this reference. (IPCC WGII TSU)	This reference has been deleted.
2059	4	109	25	109	27	For Preston, B et al. (2006): All author names should be listed here for this reference, without use of “et al.” Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been added to complete this reference.
2060	4	109	42	109	43	For Rachold, V., et al. (2005): All author names should be listed here for this reference, without use of “et al.” Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been added to complete this reference.
2061	4	110	1	110	2	For Randerson, J.T., et al. (2002a): All author names should be listed here for this reference, without use of “et al.” Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been added to complete this reference.
2062	4	110	3	110	5	For Randerson, J.T., et al. (2002b): All author names should be listed here for this reference, without use of “et al.” Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been added to complete this reference.
2063	4	110	6	110	8	For Randerson, J.T., et al. (2002c): All author names should be listed here for this reference, without use of “et al.” Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been added to complete this reference.
2064	4	110	9	110	11	For Randerson, J.T., et al. (2002d): All author names should be listed here for this reference, without use of “et al.” Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been added to complete this reference.
2065	4	110	16	110	18	For Ranger et al.: The reference contains no publication year. Please add this information to the reference and check for consistency where citing this source in the chapter text. (IPCC WGII TSU)	The missing information has been added to complete this reference.
2066	4	110	41	110	42	For Reid, H. et al. (2007): All author names should be listed here for this reference, without use of “et al.” Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been added to complete this reference.
2067	4	110	41	110	45	For Reid et al. (2007): Publications by the same author from the same year should be distinguished by adding ‘a’, ‘b’, ‘c’ etc. to the publication year. Please add those letters in the reference list and everywhere you are citing these sources in the text. (IPCC WGII TSU)	The citations have been clarified by deleting the redundant citation.
2068	4	111	28	111	28	For Root, T. L. et al. (2003): All author names should be listed here for this reference, without use of “et al.” Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been added to complete this reference.
2069	4	111	37	111	38	For Ruiz et al. (2008): This reference seems to be redundant with the reference listed on p. 111, ll. 39-40. Please check if those references refer to the same document and remove the redundant entry. (IPCC WGII TSU)	The citations have been clarified by deleting the redundant citation.
2070	4	111	39	111	40	For Ruiz et al. (2008): This reference seems to be redundant with the reference listed on p. 111, ll. 37-38. Please check if those references refer to the same document and remove the redundant entry. (IPCC WGII TSU)	The citations have been clarified by deleting the redundant citation.
2071	4	115	43	115	45	For UNECE (2009): Publications by the same author from the same year should be distinguished by adding ‘a’, ‘b’, ‘c’ etc. to the publication year. Please add those letters in the reference list and everywhere you are citing these sources in the text. (IPCC WGII TSU)	The citations have been clarified by deleting the redundant citation.
2072	4	116	22	116	24	For Van der Werf et al. (2008): This reference seems to be redundant with the reference listed on p. 116, ll. 25-27. Please check if those references refer to the same document and remove the redundant entry. (IPCC WGII TSU)	The citations have been clarified by deleting the redundant citation.
2073	4	116	22	116	27	Van de Werf et al, 2008 is mentioned twice. (NETHERLANDS)	The citations have been clarified by deleting the redundant citation.
2074	4	116	25	116	27	For Van der Werf et al. (2008): This reference seems to be redundant with the reference listed on p. 116, ll. 22-24. Please check if those references refer to the same document and remove the redundant entry. (IPCC WGII TSU)	The citations have been clarified by deleting the redundant citation.
2075	4	116	39	116	40	For Veijalainen, N., E. Lotsari, et al. (2010): All author names should be listed here for this reference, without use of “et al.” Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been added to complete this reference.
2076	4	117	29	117	32	For Wang et al. (2008): Publications by the same author from the same year should be distinguished by adding ‘a’, ‘b’, ‘c’ etc. to the publication year. Please add those letters in the reference list and everywhere you are citing these sources in the text. (IPCC WGII TSU)	The citations have been clarified accordingly in the reference list, as well as in the chapter text.
2077	4	117	48	117	49	For Whitehead, P.G., R.L. Wilby, et al. (2009): All author names should be listed here for this reference, without use of “et al.” Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been added to complete this reference.
2078	4	118	14	118	15	For Wilby (2003): Publications by the same author from the same year should be distinguished by adding ‘a’, ‘b’, ‘c’ etc. to the publication year. Please add those letters in the reference list and everywhere you are citing these sources in the text. (IPCC WGII TSU)	The citations have been clarified accordingly in the reference list, as well as in the chapter text.
2079	4	118	32	118	32	For Wittfogel (1957): This reference seems to be redundant with the reference listed on p. 118, ll. 33-34. Please check if those references refer to the same document and remove the redundant entry. (IPCC WGII TSU)	The citations have been clarified by deleting the redundant citation.
2080	4	118	33	118	34	For Wittfogel (1957): This reference seems to be redundant with the reference listed on p. 118, l. 32. Please check if those references refer to the same document and remove the redundant entry. (IPCC WGII TSU)	The citations have been clarified by deleting the redundant citation.
2081	4	118	37	118	39	For Woodruff et al. (2005): This listed source is not available at the link provided. Please revise or delete the provided URL. (IPCC WGII TSU)	The URL has been deleted from the citation.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
2082	4	118	47	118	48	For World Bank (2007): The link provided for this reference does not link directly to the document cited. Please revise or delete the provided URL. (IPCC WGII TSU)	The URL has been deleted from the citation.
2083	4	119	25	119	27	For Zebisch, M., et al. (2005): All author names should be listed here for this reference, without use of "et al." Please add the other author names to the reference list. (IPCC WGII TSU)	The missing information has been added to complete this reference.
2084	4	119	33	119	36	For Zhang et al. (2009): Publications by the same author from the same year should be distinguished by adding 'a', 'b', 'c' etc. to the publication year. Please add those letters in the reference list and everywhere you are citing these sources in the text. (IPCC WGII TSU)	The citations have been clarified accordingly in the reference list, as well as in the chapter text.
2085	4	120	0	0	0	What is the differences between Asia 1 and Asia 2 in tables 4.2,4.3, and 4.4? (Rahimi, Mohammad, I.R. of Iran Meteorological Organization)	Indeed this crucial information was missing. Asia 1 includes countries under the North Indian Ocean influence (Sri Lanka; India; Bangladesh, Pakistan, Nepal, Bhutan, Mianmar), whereas Asia 2 includes countries under the North West Pacific influence (China, Japan, Philippines, Vietnam, Cambodia, Laos, Thailand). However this distinction was removed.
2086	4	120	0	0	0	The classes for IPCC-Regions sound not to be same in Tables. (Rahimi, Mohammad, I.R. of Iran Meteorological Organization)	There were a distinction between Asia I and Asia II to take into account the difference in Tropical cyclones activity in North West Pacific and in North Indian ocean. However this distinction was removed.
2087	4	120	0	0	0	Table 4-1. First, the table is not referenced in the chapter text. Second, it would be helpful to indicate the scale at which "disaster" here is defined. For example, if a tropical cyclone hits multiple countries and causes disaster in all of them, does this situation correspond to one or multiple disasters in row three of the table. If "disaster" is not defined at the country level (i.e., multiple disasters in the given situation), the statistic presented on the fourth row of the table isn't very informative. (IPCC WGII TSU)	table is now referred in the text. The criteria used by EM-Dat to report a disaster are as follows: a disaster according to EM-DAT is an event which outcome includes at least one of the following criteria: - 10 or more people killed; - 100 or more people affected; - Declaration of a state of emergency - Call for international
2088	4	120	0	0	0	Table 4-2. It would be helpful to indicate more clearly what is meant by Asia 1 and Asia 2 in this table. (IPCC WGII TSU)	There were a distinction between Asia I and Asia II to take into account the difference in Tropical cyclones activity in North West Pacific and in North Indian ocean. However this distinction was removed.
2089	4	120	0	121	0	It is necessary to clarify the geographic coverage of Asia 1 and Asia 2 in Table 4-2, Table 4-3 and Table 4-4, indicating which countries belong to Asia 1 and which countries belong to Asia 2. (CHINA)	Indeed this crucial information was missing. Asia 1 includes countries under the North Indian Ocean influence (Sri Lanka; India; Bangladesh, Pakistan, Nepal, Bhutan, Mianmar), whereas Asia 2 includes countries under the North West Pacific influence (China, Japan, Philippines, Vietnam, Cambodia, Laos, Thailand). However this distinction was removed.
2090	4	120	0	121	0	Table 4-1 to Table 4-6: There are too many tables and Figures cited from an unpublished paper (Peduzzi et al., 2011). (CHINA)	The exposure to tropical cyclones, floods and landslides were published in the Global Assessment Report 2011. The article Peduzzi et al. 2011 cannot be used as its status was not "accepted" by 31 May 2011. In this case, it was agreed to use GAR 2011. Additionally, only three of these six tables are being retained in the chapter, and the figures are not being included.
2091	4	120	0	143	0	Tables: Please check consistency with chapter 3 material very carefully. Chapter 3 authors can likely help with this task. (Seneviratne, Sonia, ETH Zurich)	Consistency with chapter 3 has been ensured.
2092	4	121	0	0	0	Table 4-4. It would be helpful to comment, in the table legend, on why the percentage exposure for category 5 cyclones is zero in all cases. Presumably, this exposure is not truly zero but rounds to 0.0%? (IPCC WGII TSU)	This table has been deleted
2093	4	121	0	0	0	Table 4-6. The title of this table refers to floods even though it should presumably refer to landslides, based on the chapter text. In addition, Peduzzi et al. (2009b) should be cited, it seems, instead of Peduzzi et al. (2011). (IPCC WGII TSU)	This table has been deleted
2094	4	122	0	0	0	Table 4-7. This table would benefit from substantial clarifications. First, for these coastal systems, it is not clear in the context of what hazards exposure is being considered. For example, does the listed "current exposure" refer to all of the subsequent categories (e.g., RSLR, storm surges, storm waves, and extreme rainfall)? Second, the symbols could be clarified, better distinguishing current and projected exposure (for example, by using delta symbols for the projected changes). Also, the meanings of the thr and o symbols need to be better clarified in the table legend. The time frame for projections also needs to be clarified. Finally, why are single x's appearing in some of the columns for projected change? (IPCC WGII TSU)	This table has been deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
2095	4	123	0	0	0	Table 4-9. Because this table lacks column headings, it is nearly impossible to understand. For example, how is the information in each column different from or related to the information in the other columns? (IPCC WGII TSU)	This table has been deleted
2096	4	123	1	0	0	The table lacks headings. In first row and second column there is "increase in every region" and in third column of the same row "decreasing trend with occasional peaks". Without headings it is not understandable. (Wibig, Joanna, University of Lodz)	This table has been deleted
2097	4	124	0	0	0	Table 4-1 Comment: Text portions criticized in the main body of the SREX SOD need to be corrected also here (Kaser, Georg, University of Innsbruck)	This table has been deleted
2098	4	124	0	0	0	Table 4-1 Comment: The table as a whole is quite confusing. It could be improved by reorganization. I don't find it useful to repeat word by word text portions from the main text. (Kaser, Georg, University of Innsbruck)	This table has been deleted
2099	4	124	0	0	0	table 4-10 seems more literature review than analysis -- really valuable to include this sort of specific information, but it needs more analysis/clustering to be relevant for decision-making (International Federation of Red Cross and Red Crescent Societies (IFRC))	This table has been deleted
2100	4	124	0	0	0	Table 4-10. First, the table is not referenced in the chapter text. Second, the author team should seriously consider whether the table adds value beyond the chapter text and whether its length is justified. The table should probably be deleted, with key examples not currently in the corresponding section incorporated into the chapter text. (IPCC WGII TSU)	This table has been deleted
2101	4	124	0	131	0	I find Table 4.10. a bit confusing, because it extends over several pages. Thus, I would suggest to divide it into several tables either structured by sectors or regions... (Koppe, Christina, Deutscher Wetterdienst)	This table has been deleted
2102	4	128	0	128	0	The middle of table has "Kawagoe and Kazama(2009) reference. This is "S. Kawagoe, S. Kazama, and P. R. Sarukkalige, Probabilistic modelling of rainfall induced landslide hazard assessment, Hydrology and Earth System Science, 14, 1047-1061, 2010." (Kazama, So. Tohoku University)	This table has been deleted
2103	4	128	0	128	0	Regarding "Kawagoe and Kazama(2009), deposition of sedimentation in reservoirs is accelerated by climate change(K. Ono, T. Akimoto, L. N. Gunawardhana, S. Kazama, and S. Kawagoe, Distributed specific sediment yield estimations in Japan attributed to extreme-rainfall-induced slope failures under a changing climate, Hydrology and Earth System Science, Vol.15, pp.197-207, 2011.). (Kazama So. Tohoku University)	This table has been deleted
2104	4	129	0	0	0	Table 4-10 : The energy section should mention the worldwide vulnerability of the oil and gas industry . Indeed, offshore and coastal infrastructures can especially be impacted by TCs, water resources scarcity, sea level rise and associated wave climate, permafrost degradation and sea ice reduction/iceberg increase. (International Petroleum Industry Environmental Conservation Association (IPIECA))	This table has been deleted
2105	4	129	0	129	0	The hydroelectric production over the period 1920-2000 in the Iberian Peninsula is shown as an example of the links between sectors, exposures, vulnerability and impacts due to its high share in the electric production and its reliance on rainfall. Spanish hydroelectric contribution in the final electric production has decreased since the 1970s from shares of 40% to 11,8% in 2000. Just for information, please be aware that from 2004 to 2010 the contribution of the hydroelectric production accounted an average of 9,3% with a minimum of 6,3% (2005) and a maximum of 14,1% (2010). Therefore, the situation has changed significantly in terms of dependency on precipitations and can be pointed out in the report also as an example of protection to vulnerability (SPAIN)	This table has been deleted
2106	4	130	0	0	0	T4.10 Add FFSA study on the impact of climate change impacts (see enclosure 1) (NUSSBAUM, Roland, Mission Risques Naturels)	This table has been deleted
2107	4	132	0	0	0	Table 4-11. Given the section's focus on exposure (along with vulnerability and impacts), it could be helpful to the reader to clarify that "population affected" is an indicator of exposure. (IPCC WGII TSU)	This fact seems to be sufficiently clear from the current wording
2108	4	133	0	0	0	Table: possible extreme impacts in Central Europe: less snow at medium and higher altitudes as well. Austria and Switzerland, why is tourism only "slightly" dependant on climate, winter tourism is highly dependant on temperatures and snow and negatively effected by warm temperatures and rainfall. Droughts and higher evaporation to affect lake resorts and mountain also in the Alps. Already effecting the maritime Alps and the Pyrenees very severely landscapes (de Jong, Carmen, University of Savoy)	This table has been deleted
2109	4	133	0	0	0	Table 4-12. Do the entries in the fourth column reflect projected impacts, or do they reflect conditions for which extreme impacts would be expected if the conditions occur? To the extent that the entries reflect projected trends in hazards and physical impacts, they need to reflect and cite the assessments of chapter 3. (IPCC WGII TSU)	This table has been deleted

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
2110	4	136	0	0	0	Table 4-13. First, the table is not referenced in the chapter text. Second, all changes in hazards must consider, reflect, and cite the relevant assessments of chapter 3. Third, all sources of information for other entries in the table need to be specified, referring either to the chapter text or additional relevant sources. Fourth, the entries for exposure and vulnerability need to be carefully considered and clarified. For example, exposure descriptors relating to the geography of exposure could be labeled as such, with other characteristics (e.g., specific population groups) clearly distinguished. Across the entries for vulnerability and exposure, trends (e.g., "increasing number of population") and characteristics ("population of flood-prone and slide-prone areas") are mixed; it would be preferable to consistently present characteristics, followed by indication of trends instead of alternating between different presentation styles. In a few instances, entries in one column seem as if they would be more appropriately placed in other columns (e.g., is "conditions for summer tourism industry in the south deteriorate" more of an impact than a vulnerability?). Fifth, the use of "likely" in the first row's entry for impacts appears to be casual, not tied to the AR5 Guidance Note on Treatment of Uncertainties, and therefore its use should be avoided. (IPCC WGII TSU)	This table has been deleted
2111	4	136	0	136	0	This table is nice and clear -- we strongly suggest do something like this for all regions, summarizing all key findings on impacts in this chapter (somewhat similar to the regional tables in chapter 3, but with the sort of information now in this Europe table). A lot of the other tables for this chapter are somewhat ad-hoc. (International Federation of Red Cross and Red Crescent Societies (IFRC))	This table has been deleted
2112	4	138	0	0	0	Table 4-14. Would be useful to have a caption that reflects the region covered (Oceania). (Chambers, Lynda, Australian Bureau of Meteorology)	This table has been deleted
2113	4	138	0	0	0	Table 4-14. First, the table is not referenced in the chapter text. Second, all changes in hazards must consider, reflect, and cite the relevant assessments of chapter 3. Third, all sources of information for other entries in the table need to be specified, referring either to the chapter text or additional relevant sources. (IPCC WGII TSU)	This table has been deleted
2114	4	141	1	141	15	table 4.16 - from the title the reader can have an impression that droughts occur mainly in America and only incidentally are noted in Africa (9 cases in Africa against 35 in America, and losses in Africa less than one promile of losses in America. It should be explicitly written that there are cases and losses reported in one or a few datasets, not all. (Wibig, Joanna, University of Lodz)	Agreed, droughts are possibly underrepresented for Africa. We have inserted a sentence now in the text, where the data from the table is discussed
2115	4	142	0	0	0	Table 4-17: The citation from a PhD thesis is apparently not appropriate. Percentage numbers given for the Leckebusch et al paper (which was regularly cited in the FOD) are not found in their paper! Have they be guessed? If so, how? (Ulbrich, Uwe, Freie Universitaet Berlin)	Estimated future losses are given in the table as percentage change in the year 2040, relative to the baseline year 2000. Median changes in losses are calculated on the basis of the average change estimates from the different studies, for different hazard types (floods, and windstorms). The same was done for the impact of socioeconomic change on future losses. Estimates from studies that projected changes in losses for other periods or with reference to other baselines years (1990-2006) were scaled to reflect the percentage change in the 40-year period between 2000 and 2040. It was assumed that changes occur linearly, i.e. the same incremental change per year. This is a simplification, as changes in climate and consequent changes in weather extremes do not necessarily occur linearly". So the numbers in the table refer to projected loss change for the year 2040 compared to 2000; this is why the percentages from Leckebusch et al. 2007 listed in the SREX table are different from the ones in their paper (Note that expert reviewer Ulbrich is a co-author on this particular paper).
2116	4	142	0	0	0	Table 4-17. This table very effectively presents information on the influence of trends in climate change and exposure on projected impacts. It could perhaps be further improved if, in part B, median estimated loss is given also by hazard type, as done in part A. The table also needs to be referenced in the chapter text. (IPCC WGII TSU)	The table has been referenced in the chapter text.
2117	4	143	0	0	0	Table 4-19. The table legend needs to provide several clarifications: First, what is "X-sum"? Second, what are the units of the numbers presented? Third, the table needs to be cited in the chapter text. (IPCC WGII TSU)	We changed this now.
2118	4	143	0	0	0	Table 4-18. The table needs to be referenced in the chapter text. (IPCC WGII TSU)	This has been done now.
2119	4	143	0	0	0	Table 4-18. Overlap and consistency between this table and Table 7-1 should be considered. It should also be considered whether both tables are needed. (IPCC WGII TSU)	The table fits well here. We have checked both the chapter 4 and Chapter 7 figures against the original sources. As a result minor adjustments have been made to both figures. These adjustments are reflected in the text.

#	Chapter	From Page	From Line	To Page	To Line	Comment	Response
2120	4	144	0	0	0	Figure 4-2. Units and labels for the color bars need to be provided in the figure (not just in the chapter text). Otherwise, it is impossible to unambiguously understand what is being conveyed in the figure. Additionally, it would be easier to view and understand the figure if the color scheme for the red to yellow bar were reversed (more fires being more red). (IPCC WGII TSU)	This figure has been deleted
2121	4	144	0	144	0	Figure 4.1: This figure is oversimplified and not consistent with chapter 3. Droughts are not consistently projected to increase in many regions (with the exception of the Mediterranean, Central North America and Southern Africa, Section 3.5.1). These regions are not covered with extensive forests. Regions where the highlighted feedback loop could be important, in particular the Amazon forest, have partly inconsistent projections with respect to changes in drought. Hence I would recommend to remove this figure. (Seneviratne Sonia ETH Zurich)	This figure has been deleted
2122	4	145	0	0	0	Fig. 4-5: Tropical cyclone hazard frequency is an incorrect term, I guess just cyclone frequency is meant here (Huggel, Christian, University of Zurich)	This figure has been deleted
2123	4	145	0	0	0	Figure 4-3. In the figure legend, it would be more clear to move the parenthetical "white area" to after "climate change," since the white area seems to reflect situations relevant to climate change. Additionally, in the context of climate change, it seems that there are problems that can be anticipated but cannot be avoided. (IPCC WGII TSU)	This figure has been deleted
2124	4	145	0	145	0	Figure 4-3 is very interesting and deserves to be in the report at large, but seems to belong more in the management context, possibly chapter 8 (International Federation of Red Cross and Red Crescent Societies (IFRC))	This figure has been deleted
2125	4	145	0	146	0	Figures 4-5 to 4-7: these figures represent critical information and therefore I think it is not recommendable to base the information basically on one paper which is in preparation and therefore has not undergone any review process (at least this cannot be assumed). (Huggel, Christian, University of Zurich)	These figures have been deleted
2126	4	145	0	146	0	Figure 4-5 to Figure 4-7: There are too many tables and Figures cited from an unpublished paper (Pедуzzi et al., 2011). (CHINA)	These figures have been deleted
2127	4	145	0	146	0	Fig. 4-5 and 4-6. These should probably just be deleted. The combining of the results of Table S.1 and S.2 from Knutson et al. in the manner done in Fig. 4-5 and 4.6 is questionable (and still has not gone through peer review.) The remedy here is to return to Table S.1 and S.2 of the Knutson et al. report, and report on the approximate full range of models as was done in Knutson et al. The figures drop out too many model results using only the interquartile range. Then the results are used inappropriately to come up with "likely" projections as mentioned in a previous comment. (UNITED STATES OF AMERICA)	These figures have been deleted
2128	4	146	0	0	0	Fig. 4-6: please add the unit of the y-axis (Huggel, Christian, University of Zurich)	These figures have been deleted
2129	4	146	0	146	0	Figure 4-6 seems to belong to chapter 3. It could have merited being put side-by-side with 4.7 if the classification of the areas was the same, but it isn't, so the reader is not really served by having this information repeated (possibly leading to confusion about where to find what, and how to weigh the slightly different depictions) (International Federation of Red Cross and Red Crescent Societies (IFRC))	This figure has been deleted
2130	4	148	0	0	0	Figure 4-10. This figure would be clearer if only some years were shown on the x-axis. Additionally, the source of the data shown in the figure is not specified. (IPCC WGII TSU)	This figure has been deleted
2131	4	150	0	0	0	Figure 4-12. In the figure legend, it would be informative for the reader to define how "hotspots" and "regional information gaps" are determined from the described indicators. (IPCC WGII TSU)	This figure has been deleted
2132	4	151	0	0	0	Figure 4-16. First, the figure needs to be referred to in the chapter text, aside from the indication of placement location. Second, the y-axis needs a label. Third, the source of the data in the table needs to be specify. (IPCC WGII TSU)	This figure has been deleted
2133	4	151	0	151	0	Several figures are missing. However, from the captions it seems that the intention is to include only disasters by impact on GDP. We would suggest also displaying people killed and affected (and include a clear caveat on the quality of the data -- we realize that there are challenges, but this also applies to the damage data). In addition, it would be good to include a figure or table comparing impacts (and ideally also trends therein) by type of countries (e.g. the UN classification of least, middle and highly developed countries) -- this comparative information is highly sought after by policy makers. (International Federation of Red Cross and Red Crescent Societies (IFRC))	We have attended to this in the final draft and some key figures with policy relevance as suggested here have been included.