Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1-1	1	0	0	0	0	Excellent use for the BOX, very helpful to include previous IPCC conclusions. [Darienne Ciuro , United States]	Noted - Thank you.
1-2	1	0	0	0	0	The section "Treatment of uncertainty in IPCC" I felt like it really didn't say much. More straightfoward and clear statements could be helpful. [Darienne Ciuro , United States]	Taken into account - Section has been extensively revised.
1-3	1	0	0	0	0	Section 1.6 Road Map was very helpful, key to this chapter. [Darienne Ciuro , United States]	Noted - Thank you
1-4	1	0	0	0	0	Throughout the chapter watch out for unclosed parentheses [Darienne Ciuro , United States]	Accepted - The text has been revised.
1-5	1	0	0	0	0	Figure 1.1 is low resolution, text is hard to read. [Darienne Ciuro , United States]	Taken into account - The low resolution is partly due to the transformation for use in Word. For the Second Order Draft we will provide a high resolved Figure. We will increase the size of the text.
1-6	1	0	0	0	0	Figure 1.2 has dark sections that are distracting and hide text [Darienne Ciuro , United States]	Accepted - We modified the figure to reduce dark sections.
1-7	1	0	0	0	0	Figure 1.4 black line or shadow should be changed, black line is difficult to see in printed paper. [Darienne Ciuro , United States]	Taken into account - The Figure has been revised.
1-8	1	0	0	0	0	FAQ Figure 1.1 : I don't understand this figure. Is it really necessary? [Darienne Ciuro , United States]	Taken into account - This figure demonstrates how climate change occurs: where the forcings are which cause the climate change, and thus is an appropriate introductory figure. We have modified the figure to be more clear.
1-9	1	0	0	0	0	Overall, very well written and summarized. Sets the stage for the rest of the chapters and introduces some necessary concepts. Good use of tables and figures to clarify discussions. [Darienne Ciuro , United States]	Noted - Thank you
1-10	1	0	0	0	0	As I explain in my general comments about the report above, I think chapter 1 is one of missed opportunities. It would be much more interesting if the authors of this chapter would look at the climate issue at a meta-level. Some parts of the current chapter could be removed. For example 1.3 is totally redundant because the same information is available (more than once) elsewhere in the report. Section 1.2 would be the best place to mention some of the controversies that have surrounded the climate debate in the last few years (the leaked/hacked emails from CRU, the errors in AR4 (although the detected ones were mainly in WG2) and the panels that followed (eg IAC 2010)). Many critics of IPCC think the IPCC is acting as a gate keeper instead of a honest broker. It would be informative if the authors of chapter 1 would explain what these terms mean and whether they acted as honest brokers in the preparation of AR5. As I said above, chapter 1 is the best place to mention that there are other perspectives on the climate issue (Pielke et al., EOS 2009). Another interesting topic would be the discussion of the concept of post-normal science (Funtowicz and Ravetz "Science for the Post-Normal Age", Futures, 25/7 September 1993, 739-755.) Such reflection on the highly politicised climate issue would make the chapter much more interesting than it is now. [Marcel Crok, The Netherlands]	Rejected - The directive from IPCC is that WGI should stick to the science, and not get into discussing non-science issues, There are plenty of other forums that already discuss and have adequately explained the non-science issues you raise (e.g., the five independent panels that examined the questions about the stolen emails). Other perspectives are discussed if they actually relate to the science -- in many cases, they do not (or have been adequately considered in previous assessments) and therefore do not belong in this assessment, especially in Chapter 1.
1-11	1	0				This introduction chapter is well written but looks more like a summary of the IPCC report than an introduction. This chapter should just highllight the main AR4 conclusions and point out the new concepts that are going to be presented in the AR5 [CATHERINE BELTRAN, France]	Taken into account - While we thank you for the comment, we think the chapter needs to be more than that -- it needs to demonstrate some of the areas where improvements are being made in the science and, by the choice of using indicators, how the past assessment projections have done relative to observations (the beginning of doing that type of analysis appears in chapter 1 of AR4).
1-12	1	0				In this introduction it would be important to explain on which geological periods the authors are going to focus and why. [CATHERINE BELTRAN, France]	Rejected - The focus of the chapter is on recent changes and we only include a short discussion on the paleo record.
1-13	1	0				Figures 1.4, 1.5, 1.6, 1.7, and 1.8 use colours difficult to distingish both in the legend and in the lines used in	Taken into account - The Figures have been revised.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
						the graph [Juan A. Blanco, Canada]	
1-14	1	0				This chapter is probably the most difficult to write, and that the authors rightly want to do something a bit different from what was done in previous IPCC AR. It seems however the authors hesitate as to which direction to take, and as a result the first chapter is somewhat scattered and is not paving the way eough for the rest of the AR5. I would suggest to withdraw material that may appear like a summary of the other chapters, and spend more time on articulating not only science of AR5 and how it has been structured in this report, but also the link between WGI and the other two WG (which at present hardly get any mention). The section on uncertainty and confidence is quite useful and so is the comparison between projections and what has actually happened. However there should be much more on CMIP5 and the differences to CMIP3 should be highlighted. Similarly decadal predictions should be introduced. Also the philosophy of the climate scenarios has changed between SRES and RCP and this would need to be spelled out. [Olivier Boucher, France]	Rejected - This chapter is framed as a broad introduction to the assessment. We do have a vision for the chapter based on indicators but many of the other items inferred about by the reviewer were defined by IPCC as components for our chapter.
1-15	1	0				Style comment: on P2, L28 and at several other points in the chapter, I suggest avoiding starting a sentence or paragraph with the preposition "Because". It would be better to recast as a statement, and then qualify later in the sentence. [Timothy Carter, Finland]	Accepted - We agree, and have tried to rewrite such sentences.
1-16	1	0				The introductory part gives a rather modest impression of the work undertaken by the IPCC to synthesize knowledge about the state of the climate system. Much effort has been put to highlight uncertainty and how this is treated in AR5. While it is highly appreciated that caution is taken not to "over sell" the messages, there is a tradeoff between that and to give the impression that the work is shaky, and difficult to form policy on. Suggest therefore that you go through the first chapter one more time with this in mind. In particular the sections with results e.g. Section 1.2.3, could be clearer with respect to spelling the results out. It might as well be an idea to spell out how the procedures and the large quantity of assessed litterature is meant to ensure balance and quality in the findings. [Øyvind Christophersen, Norway]	Taken into account - The IPCC procedures on literature and thus peer-review are elaborated on in Section 1.2.1. There, we can include a statement on the large quantity of assessed literature. As this is an introduction and not a summary of the report, in Section 1.2.3 we need to stick to the general progress that has been made from the First Assessment report until now. The specific results, for example on temperature change, are addressed in the chapters we give reference to.
1-17	1	0				This chapter should include a description of natural climate variability. The chapter highlights the impact of greenhouse gases. In my opinon the separation of signal (due to changes in greenhouse gases) and the noise (the natural variability) needs to be explained related to observed climate and to the attribution and detection issue in particular. It is also crucial for Chapter 11 on near term projections and predictability and Chapter 14 on variability. Natural variability should have separate section. The discussion on the recent reduction in the warming calls for a comment already in chapter 1. [Sybren Drijfhout, Netherlands]	Accepted - A discussion on natural variability has been added to the text.
1-18	1	0				This Chapter is not written well. The logical connections between the sections is weak or missing. The section needs to be substantively reconstructed in order to be usable to follow. [SELAHATTIN INCECIK, TURKEY]	Taken into account - Much has been rewritten, but part of the problem is the many topics that need to be covered.
1-19	1	0				The balance of this chapter is towards oceans, atmosphere, but not much new information on land. More land-based information should be reported here, such as land-use change feedbacks to climate from deforestation, and change in the land-based carbon sink [Beverly Law, USA]	Accepted - We add a short paragraph on land and land-use feedbacks in Section 1.2.2.
1-20	1	0				Well structured, clear, to the point, complete, pleasant to read… congratulations [Belén Martín Míguez, Spain]	Noted - Thank you
1-21	1	0				There are many sentences with the word "may". These and similar words not in lexicon should be replaced with more appropriate words like "likely to", as these words seem to make the sentences meaningless and less confident. [Prasanth Meiyappan, USA]	Accepted - Revisions have been made as suggested.
1-22	1	0				Words such as "probably " are generally used loosely to discuss the likelihood of an impact. I would have used "certain/most likely". Every likelyhood has a "probability" and hence I find this word dsturbing and misleading sometimes in the text. [Prasanth Meiyappan, USA]	Accepted - The text has been revised. Where possible we use the agreed uncertainty language.
1-23	1	0				The point needs to be clearly made that "Scenarios are not predictions of the future, but are plausible futures which allow alternative futures or policies to be evaluated for their consequences and desirability." [Prasanth Meiyappan, USA]	Accepted - Such a statement has been added in the section on scenario development.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1-24	1	0				Moss et al. 2010 (Science) describes the new method in which storylines have been calculated for AR5 in comparison to AR4. This difference has not been highlighted in chapter 1. Moreover many places the word storylines could have been used for concise explanations. [Prasanth Meiyappan, USA]	Accepted - A short section will introduce the scenario evolution.
1-25	1	0				"could" be replaced by "likely to" at appropriate places throught the text [Prasanth Meiyappan, USA]	Taken into account - Where possible we use the agreed uncertainty language.
1-26	1	0				"predictions" be replaced by "projections" in appropriate places [Prasanth Meiyappan, USA]	Taken into account - The chapter will be checked for any inconsistencies.
1-27	1	0				Overall the chapter is a mix of technical discussion as well as a short review of the main points/results of the following chapters. Some sections are well written and concise. Others are not so cohesive. [Christian Ohneiser, France]	Noted - Thank you. Much of the chapter has been rewritten for clarity.
1-28	1	0				Insert a section regarding paleoclimate archives and the concept of Irreversibility in the Climate system (Chapter 5.7). The section should highlight the recent advances in our understanding of the Pliocene warm period. It should also highlight the concept of CO2 thresholds for ice sheet stability (e.g. Ch 5, pp39 the 400 ppm limit from stable cold ice sheets (WAIS - GIS)) and that the earth is approaching this threshold in the coming years. BOX 5.3 Highlights the existence of earth system feedbacks and that new modelling studies indicate the earth system feedbacks will enhance future warming. This is an important concept to introduce! [Christian Ohneiser, France]	Taken into account - We introduce paleoclimate and irreversibility, but other discussion of new paleo findings belongs in Chapter 5. We have revised the discussion irreversibility.
1-29	1	0				it was a good decision for chapter 1 to not repeat historical analysis (like in AR4), but to focus on concepts, definitions, and comparisons of key indicators between present and previous assessments; this should be maintained for further drafts. [Jucundus Prof. Dr. Jacobeit, Germany]	Noted - Thank you
1-30	1	0				There are many important definitions in this chapter. It is very excellent, but some of figures are not very clear and one of them very complex. [Fatemeh Rahimzadeh, Iran, Islamic Republic of]	Taken into account - Many of the figures have been redrawn.
1-31	1	0				The figures are much improved from ZOD. The text is improved also, but requires much more work. The Executive Summary, especially needs to be strengthened in its tone. I will outline questions below. [Anji Seth, United States of America]	Taken into account - Much of the text has been rewritten for improved clarity.
1-32	1	0				Overall, I find the chapter does not provide a good overview over all aspects. This can already be seen from the numerous unexplained abbreviations used (see remarks above). [Reiner Steinfeldt, Germany]	Noted - Thank you.
1-33	1	0				Content of the present chapter is sufficiently descriptive. Readily available bibliography has been sufficiently taken into account. No significant modifications are suggested to text or figures at this stage. [Dirk Thielen, Venezuela]	Noted - Thank you.
1-34	1	0				The sea level rise at the accelerated rate has started since 1880, but global temperature anomaly and CO2 concentrations are shown from 1990. If one correlates/attributes sea level rise to global warming (CO2 emissions), the 3 plots must be presented consistently from 1880. Also, how representative are 20 years since 1990 to characterise global climate change? [Pavel Tkalich, Singapore]	Rejected - These plots belong in other chapters but here we are only trying to discuss the comparison of observed changes relative to projections appearing in the previous IPCC assessments.
1-35	1	0				Generally speaking, I think the language and presentation in this introductory chapter is well written for an academic audience. Even as (primarily) a statistician I found the presentation of facts concise, clear, and direct. I think that the level of expertise required to read this chapter is appropriate for academics in fields that are interested in implications but don't have the background in the science behind it. [Bradley Tomasek, United States of America]	Noted - Thank you
1-36	1	0				Chapter 1 is, in some ways, the most important chapter in the whole WG1 Report. Many scientists and policy makers will read it and little else. Thus it is essential that Chapter 1 provide a clearly and accurate historical perspective on climate science and succinctly describe the additional scientific knowledge that has been acquired since AR4. Parts of the Chapter - in particular, the Executive Summary - are unevenly written at present and need quite significant revision to make them more accessible to the non-expert scientific community. I do realize that it may be difficult to write Chapter 1 while the other Chapters are still being drafted, but in my view, substantial revisions are needed. I have added some detailed comments below.	Taken into account - We have an iterative process to updating the executive summary; it has been extensively revised.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
						[Robert Waterland, United States of America]	
1-37	1	0				Please unify and clearly define terminology: Shortwave should always be called solar, the respective wavelength range should be specified (0.2-5 µm), longwave occasionally infrared is mentioned) should consistently be called either terrestrial (5-100 µm) or thermal infrared (3-50 µm). Shortwave and longwave should be avioded; shortwave is long for ultraviolet data, longwave is short for microwave applications. Short and long are relative terms. [Manfred Wendisch, Germany]	Taken into account - We have attempted to clarify the discussion, but the IPCC Glossary already defines shortwave and longwave as we use it in the text.
1-38	1	0				earth ---> Earth consistently throughout tghe whole chapter [Manfred Wendisch, Germany]	Accepted - The text has been revised.
1-39	1	0				Unclear language - Writing in some instances needs to be more precise and quantitative, eg, p.5, l. 3 'is thought to be". [Thomas Stocker/ WGI TSU, Switzerland]	Taken into account - The text has been revised. Where possible we use the agreed uncertainty language.
1-40	1	0				Box 1.1: Box is currently unfinished and should be expanded to include the full evolution of key statements through the assessment reports for obs, d&a, and projections. [Thomas Stocker/ WGI TSU, Switzerland]	Accepted - Text is being added. We had it there earlier, but it somehow disappeared in this version.
1-41	1	0				Suggest that a new subsection is in section 1.5, which introduces scenario evolution. This would provide a context and necessary background for 'the scenarios' as referred to page 7, line 44, including link to UNFCCC [Thomas Stocker/ WGI TSU, Switzerland]	Accepted - A short section will introduce the scenario evolution.
1-42	1	0				Section 1.3: please make sure you do not present new AR5 results but rather refer to the relevant AR5 chapters where this assessment will be given, eg, Section 1.3.4.3. [Thomas Stocker/ WGI TSU, Switzerland]	Taken into account - Concerning Section 1.3.4.3 Responding to the comments on the ZOD we used updated literature. However, as there is an overlap between this section and Chapter 4. Thus section 1.3.4.3 can be shortened. Concerning Section 1.3 in general, we compare previous projections with observations until 2011. Therefore, we need to include newer results than available for AR4.
1-43	1	0				Section 1.3.4.4: Please remove. This is a very selective and brief discussion. Because this material is not picked up again by other chapters in the WGI assessment, we consider this section unnecessary in the introductory chapter. [Thomas Stocker/ WGI TSU, Switzerland]	Accepted - subsection eliminated
1-44	1	0				Chapter is generally well written, organized and comprehensive. Suggest early on WGI be spelled out and describe roles of WGI vs WGII. SLR values are somewhat different in the text (1.3.4.1) vs Fig 1.3. Need to be consistent.In the Ex Summary, suggest important impacts of CC such as SLR, extreme events (storms, floods, droughts) be included and explicidly described. The quantification of 'uncertainity' values is a great improvement, but perhaps using the term such as 'confidence limit' could better convey the meaning to especially the lay reader.Using uncertainity seems to convey to many that we know much less than we do, that there is too little confidence in findings and predictions to take seriously. [s. jeffress (jeff) williams, usa]	Taken into account - IPCC in its leading to the assessments will discuss WG1, etc., and that is not our role in Chapter 1 of WG1. Other comments dealt with in the later responses.
1-45	1	0				For an introduction part, it would be more illuminating to clarify the time range of anthropogenic “climate change”. However, it seems there is not a clear clarification about this question in this chapter. Due to the complexity of anthropogenic forcing, I understand that it would be difficult to make precise clarifications for every mechanism, but even some very general descriptions would help lay a more concrete foundation before moving to other topics. [Gan Zhang, United States]	Taken into account - Discussion is being added on time scales.
1-46	1	1	1	1	1	I strongly recommend that each chapter have a list of abbreviations and their definitions. The reports are very abbreviation intensive and having a list quickly available would help greatly. [Nathaniel Ostrom, United States of America]	Rejected - There already exists a Glossary. When abbreviations are introduced, they are explained.
1-47	1	1	1	1	22	Remember commas before “and” on lists. Example: Page 1, Line 13, 16, and 22 [Darienne Ciuro , United States]	Editorial - copyedit to be completed prior to publication. Most, if not all, of these have already been changed.
1-48	1	1	1	1		I read the all most all 14 chapters very carefully. Except, uncompleted or un-reviewed annexes, I did not find anything missing in the document. I highly appreciate for the very succinct and very clear report. As an expert	Noted - Thank you

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
						of climate change science, I approve the draft as it is. [Medani Bhandari, Nepal]	
1-49	1	1	1	1		The draft is more clear and informative than AR3 and AR4. There is less repetitions, however, It would be a plus if we can simply add few sentences like, (executive summary): line 13-……CFC is increased over the last 200 years by %; line 14- over 100 years by % [Medani Bhandari, Nepal]	Taken into account - Thank you. Figure and caption have been redone.
1-50	1	1	1	1		Page 7: figure 1.3:a, (figure page 24), is not very clear, need more clarification in the note [Medani Bhandari, Nepal]	Accepted - Figure caption has been revised.
1-51	1	1	1	1		Page 11: line 13, data availability- is it true statement? ICIMOD work, Government of India's publications? Here are few examples of literature [Medani Bhandari, Nepal]	Taken into account - It is a fair statement that this region has the least amount of data. The additional references are being considered.
1-52	1	1	1	1		Here are few examples of literature [Medani Bhandari, Nepal]	Noted - Thank you
1-53	1	1	1	1		Armstrong, Richard L (2010) The Glaciers of the Hindu Kush-Himalayan Region A summary of the science regarding glacier melt/ retreat in the Himalayan, Hindu Kush, Karakoram, Pamir, and Tien Shan mountain ranges, International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal [Medani Bhandari, Nepal]	Noted -Thank you
1-54	1	1	1	1		ESCAP (2010) Statistical Yearbook for Asia and the Pacific 2009, The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), The United Nations Building, Bangkok, Thailand http://www.unescap.org/stat/data/syb2009/ESCAP-SYB2009.pdf (accessed on 07/17/11) [Medani Bhandari, Nepal]	Noted - Thank you
1-55	1	1	1	1		Government of India (2010) Climate Change and India: A 4x4 Assessment a Sectoral and Regional Analysis for 2030s INCCA Report #2 INCCA: Indian Network for Climate Change Assessment November 2010 Ministry of Environment & Forests Government of India http://moef.nic.in/downloads/public-information/fin-rpt-incca.pdf (accessed on 7/17/11) [Medani Bhandari, Nepal]	Noted -Thank you
1-56	1	1	1	1		Ives, JD; Shrestha, RB; and Mool, PK (2010) Formation of glacial lakes in the Hindu Kush-Himalayas and GLOF risk assessment, ICIMOD, Kathmandu, Nepal [Medani Bhandari, Nepal]	Noted -Thank you
1-57	1	1	1	1		Kelkar, Ulka and Bhadwal, Suruchi (2008) South Asian Regional Study on Climate Change Impacts and Adaptation: Implications for Human Development, Human Development Report 2007/2008 Fighting climate change: Human solidarity in a divided world Human Development Report Office, occasional paper http://hdr.undp.org/en/reports/global/hdr2007-2008/papers/kelkar_ulka%20and%20bhadwal_suruchi.pdf (accessed on 7/17/11) [Medani Bhandari, Nepal]	Noted - Thank you
1-58	1	1	1	1		Jianchu Xu,R. Edward Grumbine,Arun Shrestha, Mats Eriksson, Xuefei Yang,Yun Wang,And Andreas Wilkes (2009) The Melting Himalayas: Cascading Effects of Climate Change on Water, Biodiversity, and Livelihoods, Conservation Biology, Volume 23, No. 3, 520–530 [Medani Bhandari, Nepal]	Noted - Thank you
1-59	1	1	1	1		http://onlinelibrary.wiley.com/doi/10.1111/j.1523-1739.2009.01237.x/pdf [Medani Bhandari, Nepal]	Noted - Thank you
1-60	1	1	1	1		Rupa, K. K., A. K. Sahai, K. K. Krishna, S. K. Patwardhan, P. K. Mishra, J. V. Revadkar, K. Kamala, and G. B. Pant. 2006. High resolution climate change scenario for India for the 21st century. Current Science 90:334–345. [Medani Bhandari, Nepal]	Noted - Thank you
1-61	1	1	1	1		Ye, Q., and T. D. Yao. 2008. Glacier and lake variations in some regions on Tibetan Plateau using remote sensing and GIS technologies. Geophysical research abstracts. Volume 10. (EGU2008-A-01760, 2008. SRef-ID:1607–792/gra/EGU2008-A-01760). Copernicus Publications, Katlenburg-Lindau , Germany [Medani Bhandari, Nepal]	Noted - Thank you
1-62	1	1	1	1		Zemp, M., et al. 2008. Global glacial changes: facts and figures. World Glacier Monitoring Service, Zurich , Switzerland [Medani Bhandari, Nepal]	Noted -Thank you
1-63	1	1	1	1		Prasad, A. K.; Yang, K.-H. S.; El-Askary, H. M.; Kafatos, M. (2009) Melting of major Glaciers in the western Himalayas: evidence of climatic changes from long term MSU derived tropospheric temperature trend (1979-	Noted - Thank you

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
						2008), Annales Geophysicae, Volume 27, Issue 12, 2009, pp.4505-4519 [Medani Bhandari, Nepal]	
1-64	1	1	1	1		Ghulam Rasul, Qin Dahe, Q. Z. Chaudhry (2008) Global Warming and Melting Glaciers along Southern Slopes Of Hkh Ranges, Pakistan Journal of Meteorology Vol. 5 Issue 9: July 2008 [Medani Bhandari, Nepal]	Noted - Thank you
1-65	1	1	1	1		Samiraglia, C., C. Mayer, C. Mihalcea, G. Diolaiuti M. Belo and G. Vassena, 2007: Ongoing Variations of Himalayan and Karakoram Glaciers as Witnesses of Global Changes: Recent Studies on Selected Glaciers. Development in Earth Surface Processes No. 10 “Mountains Witnesses of Global Changes”. Elsevier Publishers, pp 235-248 [Medani Bhandari, Nepal]	Noted - Thank you
1-66	1	1	1	1		Jane Qiu (2008) China: The third pole, Nature 454, 393-396 (24 July 2008) | doi:10.1038/454393a; Published online 23 July 2 [Medani Bhandari, Nepal]	Noted - Thank you
1-67	1	1	1	1		Samjwal Ratna Bajracharya, Pradeep Kumar Mool, Basanta Raj Shrestha (2008) Global Climate Change and Melting of Himalayan Glaciers “Melting Glaciers and Rising sea levels: Impacts and implications” edited by Prabha Shastri Ranade. The Icfai’s University Press, India. 2008. 28 – 46pp. [Medani Bhandari, Nepal]	Noted -Thank you
1-68	1	1	1	1		http://geoportal.icimod.org/Publication/Files/cf894b1a-d2df-46ca-9e7a-e0577d24ea4f.pdf [Medani Bhandari, Nepal]	Noted - Thank you
1-69	1	1	1	1		Page 34 figure 1.13, what does it mean the yellow bar without any text on it? [Medani Bhandari, Nepal]	Accepted - The figure has been completely revised.
1-70	1	1	1	1		Figure 1.14 not clear [Medani Bhandari, Nepal]	Accepted - Figure caption has been revised.
1-71	1	1	1	1		The following chapters are fine [Medani Bhandari, Nepal]	Noted - Thank you
1-72	1	1	1	1		However, it would be much easier to general audience if we could add few lines on what are the anthropogenic forcing [Medani Bhandari, Nepal]	Rejected - This is explained later in the text, but it is not needed in the Executive Summary..
1-73	1	1	1	1		Once again, the First Order Draft WGI contribution to the IPCC Fifth Assessment Report [Medani Bhandari, Nepal]	Noted - Thank you
1-74	1	1	1	1		Is excellent, which incorporates the blank spots of previous reports [Medani Bhandari, Nepal]	Noted - Thank you
1-75	1	1	1	1		Thanks to the all members of writing and editing team, [Medani Bhandari, Nepal]	Noted - Thank you
1-76	1	1	1	1		I look forward to work ahead, [Medani Bhandari, Nepal]	Noted - Thank you
1-77	1	1	1	1		Sincerely, [Medani Bhandari, Nepal]	not a comment
1-78	1	1	1	1		Medani Bhandari [Medani Bhandari, Nepal]	not a comment
1-79	1	1	1	1		302 Maxwell Hall, [Medani Bhandari, Nepal]	not a comment
1-80	1	1	1	1		Syracuse University. [Medani Bhandari, Nepal]	not a comment
1-81	1	1	1	1		Syracuse, NY 13244, USA [Medani Bhandari, Nepal]	not a comment
1-82	1	1	1	1		mbhandar@syr.edu [Medani Bhandari, Nepal]	not a comment
1-83	1	1	1	15	53	The chapter is overly long and lacks clarity. Many of the sentences are long, contain too many qualifying clauses and are too complex. [David Bader, USA]	Taken into account - IPCC defined the length of the chapter. We have extensively revised to correct grammar and spelling errors.
1-84	1	1	1	37	6	While reading Chapters 1 and 2 of AR5, I was surprised by the relatively few mentions of views, findings and scholarly papers that question or differ with the prevailing climate change paradigm advocated by the IPCC. This is unfortunate, for the PROCEDURES FOR THE PREPARATION, REVIEW, ACCEPTANCE, ADOPTION, APPROVAL AND PUBLICATION OF IPCC REPORTS (1999, 2003, 2008) emphasizes and even	Taken into account - IPCC considers all minority views, but cannot cite every paper. However, we have tried to consider all peer-reviewed papers to the degree possible.

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						mandates that reasonable attention be given minority views and differences of opinion. (http://www.ipcc.ch/pdf/ipcc-principles/ipcc-principles-appendix-a.pdf) For example: [continued below] [Forrest Mims, USA]	
1-85	1	1	1	37	6	"Lead Authors are required to record in the Report views which cannot be reconciled with a consensus view but which are nonetheless scientifically or technically valid." [continued below] [Forrest Mims, USA]	Taken into account - See response above
1-86	1	1	1	37	6	“Input from a wide range of contributors is a key element in the success of IPCC assessments, and the names of all contributors will be acknowledged in the Reports. Contributions are sometimes solicited by Lead Authors but unprompted contributions are encouraged.” [continued below] [Forrest Mims, USA]	Taken into account - See above
1-87	1	1	1	37	6	“Review Editors will assist the Working Group/Task Force Bureaux in identifying reviewers for the expert review process, ensure that all substantive expert and government review comments are afforded appropriate consideration, advise lead authors on how to handle contentious/controversial issues and ensure genuine controversies are reflected adequately in the text of the Report.” [continued below] [Forrest Mims, USA]	Noted - Review editors are working with the chapter authors.
1-88	1	1	1	37	6	“Review Editors will need to ensure that where significant differences of opinion on scientific issues remain, such differences are described in an annex to the Report.” [continued below] [Forrest Mims, USA]	Noted - See above.
1-89	1	1	1	37	6	My assignment as an Expert Reviewer was “To comment on the accuracy and completeness of the scientific/technical/socio-economic content and the overall scientific/technical/socio-economic balance of the drafts.” So I must begin this review by observing that the portions of the draft I reviewed in Chapters 1 and 2 were incomplete in that they do not represent a balance of the competing views about the science. [continued below] [Forrest Mims, USA]	Taken into account - See above. Peer reviewed literature is given careful consideration throughout. Undocumented non-peer reviewed competing views are not representative of the scientific literature.
1-90	1	1	1	37	6	This is to respectfully request that the concerns expressed above be sent to the IPCC AR5 leadership in the hope that more about the uncertainties in both observations and models and at least a sprinkling of opposing and differing viewpoints will be represented in the final report. [Forrest Mims, USA]	Rejected - Reviewer does not cite any specific examples from the peer-review literature so we are not sure how to proceed with his request.
1-91	1	1	1	37	51	Major Comments: This is the first chapter of AR5. As its “preview” says it does not review the histories, but focus on the concepts and definitions of the Earth’s climate research, in addition, it examines key indicators for climate changes. All of these provide great help for either climate experts or ordinary people to understand our climate issue. [Weiwei Li, United States of America]	Noted - Thank you
1-92	1	1	1	37	51	Major Comments: However, the authors should give more explanations about what big difference of AR5 compared to the prior IPCC assessments, although very brief summary is given in Box 1.1. At the beginning of this important chapter, readers at least need to know what the most highlighted discovery in climate research is since last AR4 till now. In other words, scientific improvements should be underlined [Weiwei Li, United States of America]	Accepted - More material was there in earlier version and somehow got left out. This material has been now added back into the chapter.
1-93	1	1	4			Watch out for the word “modeling”, many are spelled “modelling”. Consistency is important. [Darienne Ciuro , United States]	Accepted - We use "modelling" consistently. The only exception is in the reference list, where a paper is cited using the spelling "modeling"
1-94	1	1	8	1	10	The word “changing” all over. I know we are talking about a changing climate, but synonyms might also work to address some of these. [Darienne Ciuro , United States]	Taken into account - We will use synonyms where appropriate.
1-95	1	1	11	1	11	Simmons not Simmonds [Olivier Boucher, France]	Accepted - The text has been revised.
1-96	1	1	11	1	11	Bjorn (spelling) [Olivier Boucher, France]	Accepted - The text has been revised.
1-97	1	1	15	1		Line 15: of the ocean (need to add a line of evidence); line 17: what is small imbalance mean [Medani Bhandari, Nepal]	Rejected - This comment refers to two separate points. 1) "of the ocean". This is the Executive Summary of the introduction of the report. The evidence is elaborated very briefly in Section 1.2.3 refer to Chapter 3, where detailed information on this issue is given. 2) "small imbalance" As this is the Executive Summary we need to be brief. More

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
							information on the radiative balance is given in Section 1.2.2.
1-98	1	1	17	1	17	I suggest to rephrase this sentence to including a phrase like 'some studies suggest…'. I don't think there's clear evidence for this statement yet. [Bennartz Ralf, US]	Rejected - As this is the Executive Summary we need to be very brief. More information on the radiative balance is given in Section 1.2.2. We feel that phrases like 'some studies suggest' would be appropriate for the main body, but not for the Executive Summary. In the main body of our Chapter (Section 1.2.2.) we give a reference for this statement. More details on the observed changes in the radiative budget are given in Chapter 2.
1-99	1	1	19	1		Line 19: such as…… (one sentence) [Medani Bhandari, Nepal]	Rejected - Sentence has been eliminated.
1-100	1	1	35	1	35	Verb missing in sentence starting after '(2)….' [Bennartz Ralf, US]	Rejected - Sentence ok as is.
1-101	1	1	42			Remove “well” in line 42 (because “well within” is not supported when adding the 2011 global temperature to Figure 1.5) [Terje Wahl, Norway]	Taken into account - Sentence has been revised, but note that Figure 1.5 does not represent the range of the extent for all prior assessments.
1-102	1	1		2		In the Executive Summary I miss a mentioning of the remaining major problem areas for 1) our understanding of the last century's climate, and 2) for reliable estimates of future developments over the first decade, the next 2-3 decades, and over the coming century. The ES very briefly mentions that certainty has increased due to improved observations and models, but fails to mention which areas considerable uncertainty and lack of understanding still remains in spite of this. AR4 mentioned a few remaining problem areas 5 years ago. Does AR5 give indications which of these problem areas have become less problematic and which have not? If so it would be good to have them summarized here, of course without much detail. The same applies if new problem-areas have been discovered as a consequence of the improved observations and the progress in modelling since AR4. They should also be mentioned. [Trond Iversen, United Kingdom of Great Britain & Northern Ireland]	Rejected - The Executive Summary of the introduction is not meant to serve as the summary of the report. These issues are addressed in the Technical Summary, especially in Part C of the Technical Summary.
1-103	1	1		4		1.2.2 Discussion of key concepts in climate “The bulk of the energy is supplied in the visible part of the electromagnetic spectrum (ems)” actually it is well known and documented that about 50% of the ems is in the visible part , that is light. Adam took measurements of the energy in the visible part of the ems at Shambat in Sudan in 1973 and found that about 52% is contained in the visible part of the spectrum (Pamphlet no 3, Sudan Meteorological Department, Sudan). [HUSSEIN ADAM, Sudan]	Rejected - According to the Webster's dictionary, the third definition of bulk (used here) is the "the main or greater part". Thus 50% of the energy being in the visible is the 'bulk' of the energy.
1-104	1	1		20		Chapter 1 well-wriiten [ABHA CHHABRA, INDIA]	Noted - Thank you
1-105	1	1				There are a lot of spelling and grammar errors, as well as some awkward phrasing throughout this chapter--more so than in other chapters I read. This text will likely be read by more people than any other chapter in the WG1 report, so it should really be combed over for errors and for places where sentences can be simplified and made more elegant. [Allison Crimmins, United States]	Accepted - Extensive rewriting has been done that hopefully has taken care of all of these issues.
1-106	1	1				Chapter 1 is very useful, although a bit inhomogeneous in style and quality. The treatment of uncertainty bit is very good. I miss a discussion of the climate sensitivity - a question asked a lot is why are we not narrowing uncertainties in it more, and it would be worth discussing somewhere that we now understand the uncertainties in our knowledge much more, and that ECS has evolved from a guess to something we can estimate from observations of a variety of climate states and changes, including palaeoclimate, and models quite rigorously. I think it would be worth adding that discussion. I have worries about key figures, which I find central to the chapter and very important to have, but which I recommend discuss uncertainties more, otherwise, they are arguably misleading. Particularly, the role of uncertainties from different origins - internal	Taken into account - Climate sensitivity and the reason for the uncertainties are currently discussed in a FAQ. But more importantly this is an issue for later chapters -- Chapter 1 is aimed at introducing the concept but not at discussing the details presented in later chapters.

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						variability uncertainty, uncertainty in forcing, and uncertainty in response - and how that affects projections could be discussed more, and should be shown in the figures illustrating the projections since the first report. It is also not clear to me what uncertainties are actually reflected in the plumes. I recommend to submit supplementary material on how the figures were assembled, what assumptions where used, etc. Key things I am missing, for example in the roadmap : a discussion of ECS and TCR and where in the report these are discussed (lots of places, so chapter 1 has an important role here to guide the reader), and a discussion of the role of detection and attribution, and probably a discussion on the evolution of estimated uncertainty ranges in future predictions and what they are based on? from model-only to probabilistic estimates that include observational information? [Gabi Hegerl, UK]	
1-107	1	1				I am marking this comment chapter 1 page 1 because the upload requires that, but the comment is meant to apply to the entire document. I would hope at minimum that this comment is conveyed to all chapter lead authors. However even better would be that the approach and objectives of the report as a whole be re-examined in a meeting of the report lead authors and chapter lead authors to at least discuss this matter and decide on a uniform goal. The authors are to be commended on a fine survey of present understanding of the climate system, of refinements in that understanding. However what comes through in the document (and I find myself doing the same thing in my comments below) is a focus on details instead of the big picture. The big picture is that the increase in CO2 and other long lived GHGs has resulted in a perturbation of the radiation balance, about 3 W m-2, that is substantial in the context of the GH effect 150 W m-2, the difference between radiation emitted at the Sfc, about 390 W m-2, and that exiting the TOA, 240 W m-2. Because of the persistence of these GHGs in the atmosphere Earth is committed to a forcing of this magnitude for circa 1 century. Absent major changes in future emissions the planet is committed to doubling and redoubling of equivalent CO2, with forcing going up to roughly 7 W m-2. This would have major effect on climate. Here are the reasons why. Here are some of the expected consequences in physical climate. These could be expected to have these sorts of consequences on ecosystems, agriculture, human society. It is this sort of big picture that I find missing in the document. This report will be even bigger and thicker than the previous one. It seems as if there is some sense on the part of the writers that the more that is included, the better to make the case to the world (and perhaps to the skeptics, legitimate ones and denyers) that the climate system is well understood in all its minutiae, that lends support to actions that might be taken to mitigate. My own feeling in this respect is that that approach will not work. Better to present big picture items and their uncertainties, and the consequences of those uncertainties. Less is more in making the case for present understanding. Here is the range of expected temperature response to this or that course of action. Here is the justification for that. I expect that this could be done at about one third the length of the present draft. And the case would be stronger. Perhaps relegate much of what is in the present report to Appendices. [Stephen E Schwartz, USA]	Rejected - These are really excellent points but they are dealt with in the summary documents rather than in the individual chapters.
1-108	1	2	1	1	1	Once more we have a report that is unable to provide scientific evidence that the climate is harmed by human emissions of trace gases. Once more there is the traditional array of excuses and euphemisms that can be used to cover up this fact. [VINCENT GRAY, NEW ZEALAND]	Rejected - Broad opinion statement has nothing to do with Chapter 1. The evidence he "wants" is found both in past IPCC assessments and in later chapters of this one.
1-109	1	2	1	2	48	In the first paragraph, is it possible to state whether the uncertainties are better known (and perhaps smaller)? With respect to random and systematic uncertainty; as well as the potential for “surprises”? Would it be valuable to summarize an uncertainty model (total uncertainty = uncertainty 1 + uncertainty 2 + ...), and then describe which uncertainties are most important to address in future research? Here drawing on section 1.4 [Michael Neil Evans, United States of America]	Taken into account - The fourth paragraph summarizes the information on uncertainties. This text is revised according to the suggestion made by the reviewer.
1-110	1	2	1	17		The Chapter overall needs a lot of "word-smithing" to read better. [Roger Gifford, Australia]	Accepted - Much has been redone for clarification.
1-111	1	2	3	2	5	Is this a conclusion of AR5? If so why does it come in chapter 1? [Olivier Boucher, France]	Rejected - The statement in the text provides context for the Chapter and is vague enough that we do not think it should not be an issue.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1-112	1	2	3	2	5	The sentence needs to say something on the timescale considered (concerns for the next 10 years, 100 years, 1000 years or more?). [Olivier Boucher, France]	Accepted - the time scale will be mentioned.
1-113	1	2	3	2	5	I have strong reservations with the sentence for the reasons hereon and others detailed below. [François GERVAIS, France]	Rejected - The statement in the text provides context for the Chapter and is vague enough that we do not think it should not be an issue.
1-114	1	2	3	2	5	The sentence: "…the scientific knowledge …has continued to increase and to further strengthen the basis for human activities being the primary driver in the concerns about climate change." is unclear, as it is grammatically flawed. It is interpreted to mean: "...human activities are still recognised as the primary driver of climate change." Please simplify the sentence. [Martin Hovland, Norway]	Taken into account - The statement in the text provides context for the Chapter and is not intended to be a precise. Nonetheless the text has been revised to further clarify the discussion.
1-115	1	2	3	2	5	The first sentence in this report should state the most important finding, clearly and directly; the current wording does neither and should be replaced. I suggest that the second half of the sentence, following "and", should be changed to "to further strengthen the conclusion that human activities are the primary driver of climate change." [JOHN OGREN, USA]	Accepted - Text has been revised towards meeting this request.
1-116	1	2	3	2	6	Sentences are poorly formulated. You could “increase and strengthen” a body of evidence, but increasing a “basis” is mixing concepts. “primary driver in concerns” is also unclear. E.g. “ Since the Fourth Assessment Report (AR4) of the IPCC, new observations, theoretical analysis and modelling studies have strengthened the conclusions that human activities are a major driver of climate change.” [Martin Juckes, UK]	Accepted - The text has been revised for clarification.
1-117	1	2	3	2	6	Replace this paragraph with the following: "Since the Fourth Assessment Report (AR4) of the IPCC, Mankind's scientific knowledge derived from observations, theoretical evidence and modelling studies has increased and further strengthened the proposition that human activities are the primary driver of climate change. At the same time, the range and capability of Humanity's observational and modelling tools have continued to improve." [Robert Waterland, United States of America]	Accepted - The text has been revised for clarification.
1-118	1	2	3	2	48	I don't are for the executive summary which comes across as a series of unrelated factoids and doesn't hit the usual points that I expect of an executive summary: What are the major findsings? And How did we procedd to reach thos findings? At the very least it is major need of a rewrite so that it flows and can be more easily followed by non-experts. [Larry Thomason, United States of America]	Taken into account - This is the Executive Summary of the introduction of the report. Major findings are summarized in the Executive Summaries of the remaining chapters and the Technical Summary. The text has been revised so it ban be more easily followed by non-experts.
1-119	1	2	3	16	45	In Section 1.3.2: In this section, the authors explained the greenhouse and then in the section 1.3.3 extreme events are explained. The scientific link is missing. In Section 1.3.4: Integration climate indicators should be defined in the beginning of this section.In Section 1.4.3 and 1.4.4: To ensure of the integrity of the structure of chapter, these subsections should be moved to the beginning of the chapter. [SELAHATTIN INCECIK, TURKEY]	Taken into account - Sentence added for clarification to 1.3.3. Sentence added to section 1.3.4. Placement of sections 1.4.3 and 1.4.4 are based on the original outline given us by IPCC.
1-120	1	2	3	37	5	You have dekliberately chosen to circulate this draft during the Christmas holiday period in the hope of stifling as many reviewers as possible. [VINCENT GRAY, NEW ZEALAND]	Rejected - Comment has nothing to do with Chapter 1.
1-121	1	2	3	37	5	There is no longer any attempt to redefine "Climate Change" to include "natural variability" not even with the object of trying to minimise its importance. You are therefore dealing throught the report with the FCCA definidiion where "Climate Change" is exclusively caused by human-influences of changes in trace gases in the atmosphere [VINCENT GRAY, NEW ZEALAND]	Taken into account - Later chapters have extensive discussion of natural variability. However, we are also adding more on natural variability to Chapter 1.
1-122	1	2	3	37	5	It was always difficult to find anything in the IPCC Reports which might be described as a "conclusion", and when you found it, it turned out to be meaningless like the one about how "humans have a discernible effect on the climate" This time there is no conclusion of any sort, except endless expressions of confidence that they understand everything much better. [VINCENT GRAY, NEW ZEALAND]	Rejected - Chapter 1 is just the Introduction to the assessment, not the complete assessment. It lays the foundation by discussing some of the outcomes of past assessments. The statement the reviewer refers to was from AR4.
1-123	1	2	3	37	5	The new scenarios are confusing and incomprehensible. You have given up trying to speculate on how the "projections" are reached and left the whole matter open. There is even more confudion than usual about the relationship between emission and atmospheric concentrations [VINCENT GRAY, NEW ZEALAND]	Rejected - The new RCP scenarios are fully explained in several journal articles. The intent in Chapter 1 is to introduce them, but not to fully describe what already

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							can be found in published journal papers.
1-124	1	2	3	37	5	There are far too many attempted simulations with l,imited success, without an admission that none or all of them provide evidence of a cause and effect relatoinship [VINCENT GRAY, NEW ZEALAND]	Rejected - Reviewer should read the sections on attribution and detection in earlier assessments and in Chapter 10 of this one. He should also read the modelling chapters (9, 11, and 12). Chapter 1 just introduces these concepts.
1-125	1	2	3	37	5	The "energy budget" which is the basis of all the mode is now even less plausible, as you admit that all of the figures have substantial uncertainty, so "balancing" is arbitrary [VINCENT GRAY, NEW ZEALAND]	Rejected - There is a substantial literature on the basic science underlying the Earth's energy budget and why an imbalance is found and to be expected. Chapter 1 introduces the concept of energy budget but the details are given in other chapters.
1-126	1	2	3	37	5	Your ."radiative forcing" budget no longer possess "Levels of Scientific Understanding" or any other evidence of uncertainty [VINCENT GRAY, NEW ZEALAND]	Rejected - Radiative forcing is discussed more extensively in later chapters (e.g., Ch. 8), including discussion of uncertainties. Chapter 1 introduces the concept.
1-127	1	2	3	37	5	You do not.notice anywhere that many climate properties are defying your "projections" by ferusing to increase. This includes temperatures and, ice extent. Also sea levels are not rising in many places [VINCENT GRAY, NEW ZEALAND]	Rejected - Chapter 1 only provides globally-averaged analyses. Details on the datasets are in other chapters (e.g., Chapters 2 and 3).
1-128	1	2	3	37	5	You should read and quote what I have to say about the IPCC. The references are " Gray V R 20oo2."The Greenhouse Delusion" http://www.amazon.com/Greenhouse-Delusion-Critique-%2522%2522Climate-2001%2522%2522/dp/0906522145/ref=sr_1_8_title_0_main?s=books&ie=UTF8&qid=1326923720&sr=1-8 Gray, V R 2006::"Climate Change 2007: The Physical Science Basis: Summary for Policymakers". Energy and Environment, 18 433-440. Gray V R 2009"The Global Warming Scam" http://nzclimatescience.net/index.php?option=com_content&task=view&id=369&Itemid=32 Gray V R 2009 "The Triumph of Doublespeak": http://nzclimatescience.net/index.php?option=com_content&task=view&id=483&Itemid=32 Gray V R 2008 "The IPCC: Spinning the Climate" http://nzclimatescience.net/index.php?option=com_content&task=view&id=376&Itemid=32 [VINCENT GRAY, NEW ZEALAND]	Rejected - None of the documents provided by the reviewer are peer reviewed and therefore not eligible for consideration by IPCC. Nor does their content add anything of value to the scientific literature.
1-129	1	2	3	37	5	You have wisely abandoned your previous detailed scenarios. since they so unsuccessfully failed to anticipate the decline in world GNP and the dramatic rises in China and India. The latest scenarios, based on emssions, are once again mainly aimed at destroying the Chinese and Indian economiies, and will fail. They might assist in the downfall of Western economies instead. [VINCENT GRAY, NEW ZEALAND]	Rejected - As seen in the figures in Chapter 1, current observed concentrations of CO2 and temperature distributions are well within the uncertainty ranges of the scenarios.
1-130	1	2	3	37	5	Other Publications of mine which are relevent and which you should quote are Gray V R 2009 "South Pacific Sea Levels: A reassessment" http://scienceandpublicpolicy.org/south_pacific.html Gray V R 2006 "Temperature Trends in the Lower Atmosphere". Energy and Environment. 17 707-714. Gray V R 2011 "The Seven Station Series" Energy and Environment 22 (4) 429-439 [VINCENT GRAY, NEW ZEALAND]	Rejected - These papers do not relate to the discussion in chapter 1, which cites the most recent data for global evaluations of temperature and sea level, not limited area or past time period analyses.
1-131	1	2	3	37	5	I will end as I began, There is, once more, no evidence that human greenhouse gas emissions are harming the climate and you do not even try to say there is. You use invalid correlations (alled "simulations" and "attributions"), innuendo, and opiniions and :"confidence" of paid, biased modellists instead. You stand no	Rejected - The reviewers statement only reflects his opinions and has no relevance to Chapter 1.

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						chance at all that the nations will adopt your economicvally damaging stabilisation scenarios and one wonders how long this absurd pretence can continue [VINCENT GRAY, NEW ZEALAND]	
1-132	1	2	3	37	6	Having now been through the entire report I would like to make some general comments. As you like to have one at a time I will put them in separate row [VINCENT GRAY, NEW ZEALAND]	Rejected - there is no review comment in this statement to respond to.
1-133	1	2	3	37	6	I recall a previous occasion when a representative of the IPCC, at a meeting I atten\ded in Washington DC assured everybody that any person wishing to make comments would be welcome. This time there have been unprecedented levels of secrecy involved in becoming a reviewer.. Invitations were sent out only to those possible reviewers chosen by yourselves with the deliberate object of discouraging anybody who may have any form of criticism. I myself provided by far the largest number of comments on the last report, yet I did not receive my invitation until I became aware of its existence. Even then, there is an air of secrecy about this whole process which violastes the published policy of the IPCC [VINCENT GRAY, NEW ZEALAND]	Rejected - The first order drafts were for expert reviewers. We welcome all objective reviews actually aimed at improving the scientific content and discussion in the assessment.
1-134	1	2	4	2	4	split infinitive, suggest edit to 'and strengthen further' [Peter Burt, UK]	Accepted - Text revised
1-135	1	2	4	2	5	„The basis for human activities being the major driver“ Strange wording. Suggest: … strengthen the scientific evidence that human activities are the primary driver for climate change that is observed/prdicted (be clear what is meant here). Drop also „in the concerns...“ (similar top of page 3) [Rolf Mueller, Germany]	Accepted - Text has been revised.
1-136	1	2	4	2	5	The language: "to further strengthen the basis for human activities being the primary driver in the concerns about climate change" lacks clarity and includes prescriptive value judgements (concerns about climate change). The following language might be more appropriate: The scientific knowledge derived since the AR4 from observations, theoretical evidence and modelling studies has continued to increase and further strengthens the conclusion that human activities are the primary driver of climate change observed in the past 40 years. This language requires that the chapters 2 to 14 can actually underpin such statement. [Klaus Radunsky, Austria]	Accepted - Text has been revised.
1-137	1	2	4	2	5	I hope this summary clause -- "… further strengthen the basis for human activities being the primary driver in the concerns about climate change." -- will be reevaluated. Anyone who reads the news knows that human activites are driving "the concerns." This summary clause is not a statement about science; it is a statement about human perceptions. The more important statement is that (1) observations continue to confirm the human influence on climate change; and (2) this human influence is projected to increase with profound consequences in the near future. The present wording gives the strong impression that IPCC is backing away from this conclusion and from its increasing emphasis in previous assessment conclusions. [Eric Sundquist, United States of America]	Accepted - Text has been revised.
1-138	1	2	4	2	5	These comments might fit in the product of WG-3. But here in WG-1 we are supposed to assess the science only. This statement is not a summary of the science of climate change, but politics masquerading as science. [James Wanliss, USA]	Accepted - Text has been revised.
1-139	1	2	4	2	6	Knowledge has increased.strengthening the basis. capabilities have improved. but still not enough to show that human-emitted gases are harming the climate [VINCENT GRAY, NEW ZEALAND]	Rejected - This statement does not relate to Chapter 1. It only indicates that the reviewers opinions do not match the findings of the science community.
1-140	1	2	4		5	"the basis for human activities being". Better (both scientifically and linguitically) would be ""the evidence that human activities are". [Eric Wolff, United Kingdom of Great Britain & Northern Ireland]	Accepted - Text has been revised.
1-141	1	2	5	2	6	“At the same time ….”: the capabilities per se are not the prime concern, and “at the same time” is not a good way of referring back to a sentence that starts “Since the ...”.: replace with, e.g. “Uncertainty has been reduced by unfolding events as well as by improved capabilities of observational and modelling tools” to reinforce the point that the improving capabilities have had a real impact on the concerns of the readers of this report. [Martin Juckes, UK]	Rejected - The suggestion is a convoluted sentence, so we disagree about this change.
1-142	1	2	5			The conclusion that human activities are the primary driver of climate change is likely to be correct, but belongs to the attribution chapter. The introduction chapter should avoid such statements. [Reto Knutti, Switzerland]	Rejected - We are just repeating conclusions of AR4.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1-143	1	2	5			The phrase 'human activities being the primary driver in the concerns about climate change.' doesn't sound right to me. It comes across as suggesting human activities are driving the concern rather than driving the climate changes. I suggest something more like "human activities being the primary driver of recent climate changes and those projected over the next centuries". [Drew Shindell, USA]	Accepted - Text has been revised.
1-144	1	2	6	2	6	State the implications of the improvement in capabilities. Why is this improvement so important that it warrants mention in the very first paragraph of the Executive Summary? I assume that it's because these improvements increase our confidence in the primary conclusion stated in the previous sentence, but you should say so directly. [JOHN OGREN, USA]	Taken into account - Text has been revised and should better satisfy this concern.
1-145	1	2	8	1	19	This reads too much like a conclusion from chapters 2 and 4 and in my opinion is somewhat out of place. [Olivier Boucher, France]	Accepted - We added a statement that this discussion is based on prior assessments.
1-146	1	2	8	2	8	“Humans are ….”: I would stick with “Human activities are ...”, as use in 1st paragraph. [Martin Juckes, UK]	Accepted - Text has been revised.
1-147	1	2	8	2	8	Kindly consider to use EARTH surface instead of land surface to accommodate both land and oceans [Faustine Fidelis Tilya, United Republic of Tanzania]	Taken into account- In this line land surface properties are meant. This statement refers to humans changing the land surface for example by land-use or deforestation. The text has been revised for clarification.
1-148	1	2	8	2	8	The words 'are changing' should be omitted, and replaced with ' influence' or something similar. The former begs the question, while my suggested change is more neutral and scientifically defensible language. [James Wanliss, USA]	Accepted - Text has been revised.
1-149	1	2	8	2	9	State the mechanism that is responsible for the greater contribution to the change in the energy budget first, and put the #2 mechanism after "as well as". [JOHN OGREN, USA]	Accepted - Text has been revised.
1-150	1	2	8	2	10	“energy budget of the planet …. throughout our planet.”: Here it is the thin layer of atmosphere, ocean and biosphere that clings to the planet, rather than the planet itself which is referred to. There may be solid earth scientists reading this report, so it is worth being aware of the distinction. It may be worth stating early on what the subject of this assessment is. I would expect it to cover atmosphere, ocean, biosphere and perhaps near surface parts of the lithosphere. It then covers the budgets of energy and composition in these spheres. After a couple of sentences explaining this it would be easier to make your point clearly. Also, be careful with the use of “throughout” in connection with budgets: the anthropogenic impact on local budgets in many areas is, I think, rather hard to detect. [Martin Juckes, UK]	Accepted - Text has been revised.
1-151	1	2	8	2	19	Sea level is mentioned, but from an energy and heat balance point of view, the increase in heat content in the oceans is very relevant. The perturbation to the radiative forcing expresses itself in a change of heat storage. The heat reservoir is mentioned, but this fundamental point is not made clear. [Sybren Drijfhout, Netherlands]	Accepted - Text has been revised. There is a sentence on heat content in the oceans.
1-152	1	2	8	2	19	Replace this paragraph with the following: "Humans are changing the energy budget of the planet by altering both the character of the land surface and the atmospheric concentrations of gases and aerosols. Multiple lines of evidence show that climate is changing all across our planet. The most compelling evidence of climate change derives from observations of the atmosphere, land, ocean and cryosphere systems. Incontrovertible evidence from in situ observations and ice core records, show that atmospheric concentrations of greenhouse gases such as carbon dioxide, methane, nitrous oxides and chlorofluorocarbons have increased over the last 200 years. In addition, land and sea surface temperatures, have clearly increased over the last 100 years. Temperature measurements show a continuing increase in the large heat content of the oceans, and analyses based on measurements of Earth's radiative budget suggest a small positive energy imbalance that serves to increase global heat content. Observations from satellites and in situ observations show a trend of reductions in glaciers, sea ice and some changes in ice sheets. Palaeoclimatic reconstructions have helped place ongoing climate change in the perspective of natural climate variability. Ecosystem indicators confirm the findings of the physical observations." [Robert Waterland, United States of America]	Accepted - Thank you. Text has been revised.
1-153	1	2	8			Need explation about the about the multiple lines of evidence. [Muhammad Amjad, Pakistan]	Rejected - Commonly used term. Not an issue.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1-154	1	2	8			I want to be able to take from this chapter an easily quotable phrase that says: we know more than we did before, and we know climate change is happening (based on multiple lines of evidence and historical records) and humans are causing it. I need a nice and neat, catchy, definitive sentence. This needs to be a short definitive quote! [Allison Crimmins, United States]	Rejected - The statement desired is more appropriate for the Technical Summary or Policymakers Summary from the entire assessment.
1-155	1	2	9	2	10	"lines of evidence"... because you want your work to be accessible to a wider community. "lines of evidence" is pompous... If the use is justified in later chapters, I would not use it in the introduction. What about just evidences or indicators? [Francois DANIS, France]	Accepted - Sentence has been modified.
1-156	1	2	9	2	10	“throughout” is misleading here, as it could be interpreted as including the planetary interior. Replace sentence, e.g. “There are multiple lines of evidence supporting the conclusion that these changes to the global energy budget are causing climate change on a global scale.” [Martin Juckes, UK]	Accepted - Sentence has been modified.
1-157	1	2	9	2	10	This language is rather dramatic and perhaps scientifically vacuous, violates objectivity, and seems again (see above comments) to attempt to lead the reader. All scientific evidence shows that climate is always changing. The issue is not whether climate changes, but whether humans ane causing dangerous (to humans) climate change. [James Wanliss, USA]	Accepted - Sentence has been modified.
1-158	1	2	10	2	11	The main "lines" of evidence…"are" based on… AND THEN "solid evidence" would be better as "credible evidence" [Anji Seth, United States of America]	Accepted - Sentence has been modified.
1-159	1	2	11	2	11	change 'system' to 'systems' [Peter Burt, UK]	Accepted - Text has been revised.
1-160	1	2	11	2	12	“solid” evidence does not sound good “in” the atmosphere. “The is incontrovertible evidence that …. concentrations of … in the atmosphere have increased …..” [Martin Juckes, UK]	Accepted - Text has been revised.
1-161	1	2	11	2	12	The qualifier "in the atmosphere" on line 11, should be moved to after "greenhouse gases" on line 12 [David Parrish, USA]	Accepted - Text has been revised.
1-162	1	2	11	2	12	"Solid evidence" is not standardized uncertainty language. It is necessary to stick to the agreed formalized uncertainty language. [Klaus Radunsky, Austria]	Accepted - Text has been revised.
1-163	1	2	11	2	13	This is much better. If the report struck to facts like this, it would be more appropriate. [James Wanliss, USA]	Noted - Thank you
1-164	1	2	12	2	12	drop „such as“ unnecessaliy vague [Rolf Mueller, Germany]	Accepted - Sentence has been modified.
1-165	1	2	12		13	"solid evidence …that concentrations of GHG...have increased". Given that this has been true for at least a decade, would it not be more helpful to write "solid evidence…for the magnitude of concentration increase of GHG…" ? [Eric Wolff, United Kingdom of Great Britain & Northern Ireland]	Accepted - Sentence has been modified.
1-166	1	2	13	2	13	About the expression: "...carbon dioxide, methane, nitrous oxides and chlorofluorocarbons have increased over the last 200 years", I consider that not all mentioned greenhouse gases have always increased over the periof of 200 years (see the corresponding Figure SPM.1 in AR4-WGI). I understand that Authors tried to present a general statement, but it must be more precise in the sense that the increase was as a mean value (since short period oscillations can be seen in the concentrations, mainly at the beginning of the considered period and even a mean decrease for Nitrous oxide). Also, since “200 years” is a precise time interval, it is probably better to say “in the last centuries” (or to put a more precise value, after a detailed analysis of each GHG). Chlorofluorocarbons were introduced in the atmosphere in the last century, not in the last 200 years. I suggest Authors to make a specific description of the time period for these contaminant gases. [Rubén D Piacentini, Argentina]	Rejected - In the Executive Summary, short statements are required that are explained in further detail in the chapter (and in later chapters).
1-167	1	2	13	2	14	The statement: "In addition, historical surface temperature, and sea surface temperature, have increased over the last 100 years." is probably incorrect as it is written. This is because it boldly states that every place on Earth has experienced increasing temperatures since 1912, which is very doubtful, and which is contradicted by other statements elsewhere in the draft AR5. The statement therefore has to be re-written. [Martin Hovland, Norway]	Accepted - Sentence has been modified.
1-168	1	2	13	2	14	for example: In addition, surface temperature and sea surface temperature have increased over the last 100	Accepted - Text has been revised.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
						years. [Larry Thomason, United States of America]	
1-169	1	2	13			In executive summary section. Disagree with the statement concentration of cfcs have increased for the past 200 years. CFC's were invented only in 1920's and the CFC concetrations have been decreasing in recent years too. So, this statement might not be accurate. [Prasanth Meiyappan, USA]	Accepted - Text has been revised.
1-170	1	2	13			tropospheric ozone should additionally be mentioned [Jucundus Prof. Dr. Jacobeit, Germany]	Rejected - Not everything needs to be mentioned here.
1-171	1	2	13			CFCs have increased over the last 200 years… CFCs are man-made, and did not exist in the atmosphere around 120 years ago. I would consider the increase in atmospheric CFCs to be different from the increase in concentrations of greenhouse gases such as carbon dioxide, methane, nitrous oxides. Perhaps omit CFCs from this sentence. [Conor Sweeney, Ireland]	Accepted - Text has been revised.
1-172	1	2	14	2	14	"historical surface temperature": unusual usage of "historical" here – omit "historical". [Martin Juckes, UK]	Accepted - Text has been revised.
1-173	1	2	14	2	14	Please, indicate if "surface temperature" corresponds to land (soil) temperature or (as I assume) to atmosphere (ambient) temperature and adds the word mean or average. Also, in the sentence:" … historical surface temperature, and sea surface temperature, have increased over the last 100 years." , same issue as my comment above, the time interval is too specific. Insert, for example: mainly after "have increased". [Rubén D Piacentini, Argentina]	Accepted - Text has been revised.
1-174	1	2	14			Delete 'historical'. [Drew Shindell, USA]	Accepted - Text has been revised.
1-175	1	2	15	2	15	No period is given for such an increase and "suggestions" are hardly evidence [VINCENT GRAY, NEW ZEALAND]	Taken into account - Text has been revised. Detailed evidence for the observations is given in Chapter 2 as well as in earlier IPCC assessments.
1-176	1	2	15	2	16	Again merely "suggests" [VINCENT GRAY, NEW ZEALAND]	Taken into account - Text has been revised.
1-177	1	2	15	2	16	Since "Observations from satellites and in situ observations suggest reductions in glaciers, sea ice and some changes in ice sheets" it is a very important sentence, it must be written in a more precise way. Note that "reduction in glaciers, sea ice" can be understood as if all the glaciers and sea ice are reducing their volumes. Also, please, replace the word "some" by other more specific one, or otherwise give a percentage value. Note: this sentence can be compared with that of IPCC AR4 (reproduced in Chapter 1, page 4, lines 23-25 and including the words: averageand widespread):"... Warming of the system is unequivocal, as now is evident from observations of increases of global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level." [Rubén D Piacentini, Argentina]	Accepted - Text has been revised.
1-178	1	2	16	2	16	"…. from satellites and in situ observations suggest reductions in glaciers…" Actually there are measurements indicating (dimostrating) reduction in "most of mountain glaciers" . I suggest to write "indicate" rather than "suggest". [Walter Dragoni, Italy]	Accepted - Text has been revised.
1-179	1	2	16	2	16	"some changes in ice sheets". This is inconsistent with a statement later in the introduction (page 10 lines 52-54) where it reads: "The Greenland Ice Sheet is losing volume and mass, and at an increasingly higher rate over the last decade. Whereas the annual net loss in 1995–2000 was 50 Gt, in 2003–2006 160 Gt was lost per year (AMAP, 2009; Mernild et al., 2009; Rignot et al., 2008a)." Should be more than "some". [Andrew Glikson, Australia]	Accepted - Text has been revised.
1-180	1	2	16	2	16	Some glaciers have reduced, but some have grown. It is a big problem to state some certainty is global reduction of glaciers. This is false. [James Wanliss, USA]	Accepted - Text has been revised.
1-181	1	2	16			"some changes in ice sheets" - what does that mean? Increase/decrease/properties? [Prasanth Meiyappan, USA]	Accepted - Text has been revised.
1-182	1	2	17	2	17	This sentence seems obscure and I am not sure than an inexpert reader can understand why this is important. Two questions, which are also suggestion to improve the sentence: 1) the sign of the small imbalance is not	Accepted - Text has been revised.

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						mentioned, and 2) where (in which subsystem) there is the imbalance, and why this is important? I means, normally the radiation in the atmosphere, as well as on the Earth surface, is not balanced. [Claudio Cassardo, Italy]	
1-183	1	2	17	2	17	Reference is made to The comment "Additionally, analyses based on measurements of the radiative budget suggest a small imbalance.". By contrast, Hansen et al. 2011 (www.columbia.edu/~jeh1/.../20110415_EnergyImbalancePaper.pdf) (draft paper, p. 6) states "a sustained imbalance of 1 W/m2 would melt all ice on Earth or change ocean temperature a large amount, neither of which occurred." This needs to be checked [Andrew Glikson, Australia]	Taken into account - Text has been revised. References belong in the main text, not in the Exec. Summary
1-184	1	2	17	2	17	No actual "radiation budget"can be measured and there are no reasons why it should be "balanced" [VINCENT GRAY, NEW ZEALAND]	Rejected - The radiation budget can be derived from available observations from satellites and other sources. It would be in approximate balance if it were not for the additional energy being added to the Earth's system from both natural and human-related forcings, so explaining the lack of balance is important to understanding changes occurring in the Earth's climate system.
1-185	1	2	17	2	17	What is the direction of the imbalance, and what are the implications of the imbalance for climate change? [JOHN OGREN, USA]	Rejected - Discussion of the imbalance is further discussed in the main text; this is a short statement in the Exec. Summary.
1-186	1	2	17			A comprehensive analysis of radiation budget observations does not suggest a consensus on the radiative imbalance. However, the multiple indicators of a radiation imbalance is consistent with observations. This distinction is important. [David Bader, USA]	Rejected - Later text refers to the more extensive discussion in Chapter 8. Such detail does not belong in the Executive Summary.
1-187	1	2	17			mentioning the small imbalance in the radiation budget should include an indication that it is largely caused by changes in the composition of the atmosphere [Jucundus Prof. Dr. Jacobeit, Germany]	Accepted - Text has been revised.
1-188	1	2	17			and another example: 'analyses based on measurements of the radiative budget suggest a small imbalance' to 'analyses of the Earth's radiative budget suggest an imbalance that is consistent with a warming planet' or such. [Larry Thomason, United States of America]	Accepted - Text has been revised.
1-189	1	2	18	2	18	State here that paleoclimate (paleo CO2) records indicate with high confidence that atmospheric CO2 concentrations have not exceeded 400ppm since ~2.8 Ma (figure 5.2) which illustrates for the extraordinary effect humans have on the atmosphere. [Christian Ohneiser, France]	Rejected - This is the Executive Summary of the introduction. Such a statement would be expected in Chapter 5 not Chapter 1. Here, we explain how the body of evidence for a changing climate is increasing. Palaeoclimatic reconstructions are given as one example.
1-190	1	2	18	2	19	This surely means that change has always occurred and is explicable by natural processes, Humans may be involved but there is no evidence that emissions of trace gases are a cause. [VINCENT GRAY, NEW ZEALAND]	Rejected - Evidence for the effects of trace gases having an influence. Includes infrared measurements, which over time exactly match what we expect for driving the forcing on climate. Paleoclimate changes do show past natural changes in climate. No change to sentence.
1-191	1	2	18	2	19	The sentence "Palaeoclimatic reconstructions…natural climate variability" is unclear. Consider rewording. Are you saying the Paleo data provides information on natural climate variability, which places ongoing climate change in proper context? [Norman Loeb, United States of America]	Accepted - Text has been revised.
1-192	1	2	19	2	10	How can "indicators": confirm anything? [VINCENT GRAY, NEW ZEALAND]	Rejected -Indicators confirm the changing climate. No change to the sentence.
1-193	1	2	19	2	19	The word 'confirm' doesn't seem appropriate here. I would prefer to replace it with 'consistent with' [Sybren Drijfhout, Netherlands]	Accepted - Text has been revised.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1-194	1	2	21	2	21	new observational systems must identified [PROF. YEHIA HAFEZ, Egypt]	Rejected - Not in Exec. Summary!
1-195	1	2	21	2	22	by orders of magnitude' is vague. Suggest a clearer quantification [Peter Burt, UK]	Accepted - Text has been revised.
1-196	1	2	21	2	22	"orders of magnitude" would suggest at least a factor 100, is this correct? And what are the corresponding "recent years"? [Tor Eldevik, Norway]	Accepted - Text has been revised.
1-197	1	2	21	2	26	This paragraph stresses the increase in magnitude of observations. A caveat at the end of the paragraph could say however, there is threat of loss of continuity of observations (e.g. Pending gap between Landsat land-cover and land-use change and the next comparable sensor) [Beverly Law, USA]	Rejected - This is out of the scope of our chapter.
1-198	1	2	21	2	26	This paragraph is vague. It would be much stronger if some specifics were included about the advances in observing systems and computing power. It's a summary so it can't be a detailed discussion, but it can include real numbers. [Anji Seth, United States of America]	Accepted - Text has been revised.
1-199	1	2	21	2	26	Replace this paragraph with "In the last few decades, new observational systems, especially satellite-based systems, have increased the number of observations by orders of magnitude. Tools to analyse and process these data have been developed or enhanced to cope with this increase of information, and more climate proxy data have been acquired to improve our knowledge of historical climate changes. At the same time, increases in computing speed and memory have led to the development of more sophisticated models which describe physical and chemical processes in greater detail. Finally, modelling strategies have been extended to provide estimates of the incertainty of climate change projections." [Robert Waterland, United States of America]	Accepted - Thank you. Text has been revised.
1-200	1	2	22	2	23	This sentence seems to me a bit exhaggerated and - again - obscure. First, "in recent years" is too generic. Second, which kind of observations? Third, point (which depends on the previous two): the expression "orders of magnitude" related to the increase of the number of observations in the general field of climate indicates a large growth (at least a factor 2, e.g. 100 times, maybe more). I think that it could be better to try to quantify better this number, also trying to explain which is the source of the growth.See also note 15. [Claudio Cassardo, Italy]	Taken into account - Text has been revised and should better satisfy this concern.
1-201	1	2	23			what is meant by proxy data? [Larry Thomason, United States of America]	Taken into account - Text has been revised.
1-202	1	2	25	2	25	Instead of 'in greater detail', I would prefer 'and greater detail'. That is, more processes are included as well. [Sybren Drijfhout, Netherlands]	Accepted - Text has been revised.
1-203	1	2	26	2	26	„a better estimate“ [Rolf Mueller, Germany]	Accepted - Text has been revised.
1-204	1	2	28	2	28	Replace "Because environmental systems are characterized by multiple spatial and temporal scales, uncertainties" with "Earth's climate system is characterized by multiple spatial and temporal scales, and uncertainties" [Robert Waterland, United States of America]	Accepted - Text has been revised.
1-205	1	2	28	2	31	The first sentence in this paragraph should explain why two different metrics for communicating certainty are needed. The current sentence, while being a valid statement, doesn't give this explanation. [JOHN OGREN, USA]	Accepted - Text has been revised for clarification..
1-206	1	2	28	2	36	All this amounts to is that the "estimates" are based on the "opinions" of "experts" who have a conflict of imterest, as they are paid to make them and they would lose their jobs if their opinions were unfavourable. [VINCENT GRAY, NEW ZEALAND]	Rejected - Uncertainty analyses are based on scientific evaluation not opinions. We are not paid to work on IPCC assessments, nor are any of us paid by our governments to produce science findings in any direction.
1-207	1	2	28	2	48	Uncompelling. Please strengthen this executive summary! [Anji Seth, United States of America]	Taken into account - The text has been extensively revised to strengthen it.
1-208	1	2	28		31	Existing language: "Because environmental systems are characterized by multiple spatial and temporal scales, uncertainties do not usually resolve at a single, predictable rate: new observations may reduce the uncertainties surrounding short timescale processes quite rapidly, while longer timescale processes may	Taken into account - This comment draws on two issues. The first one is stylistic. We have revised the text according to this suggestion. The second one is

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						require very long observational baselines before much progress can be made." Writing is generally stronger if you lead with what _is_ the case rather than what is _not_ the case. I think what you are trying to say here is: Environmental systems are characterized by multiple spatial and temporal scales. Consequently uncertainties are usually resolved at a variety of rates over multiple time scales rather than at a single, predictable rate: new observations may reduce the uncertainties surrounding short timescale processes quite rapidly, whereas processes that occur over longer time scales may require very long observational baselines before much progress can be made. [note also "whereas" for contrast and resolution of awkwardness in "longer timescale processes"] But that said the rest of the para seems unrelated. It gets into tech detail about expressions of confidence levels, not with a substantive issue. I was expecting some statement dealing with progress or lack of progress in various areas. [Stephen E Schwartz, USA]	about the general context. As the treatment of uncertainties using an agreed uncertainty language is one of the key concepts of this report, we feel the need to elaborate on this in the Executive Summary of our Chapter and Section 1.4. We have revise dthe text and added another figure.
1-209	1	2	28		36	(Uncertainties): The word “uncertainty” has a specific mathematical meaning within the scientific (climate) community. There is a significant problem in how “uncertainty” should be communicated to the general public. There have been studies done on this subject as regards public perception. The general public includes all scientists not within the limited confines of climate scientists. It also includes all social scientists. This paragraph will not be comprehensible to that outside community. Consider using the word “range” instead of “uncertainty.” So, when we talk about predictions/projections on global warming (Temperature), it might be highly preferable to refer to a “range” in the predicted/projected global average temperature, based on present scientific understanding, models, data analysis etc. In the case of temperature, the range will be some number +/- around a mean ensemble average prediction/projection where-in the ensemble mean is positive. In the case of soil moisture (and several other water cycle variables) this range would be +/- but surrounding a somewhat ill-defined ensemble mean of approximately zero. That is, the sign of the predicted/projected range is yet unknown. This problem is compounded by difficulties in the present global climate model projections on the regional scale. The same will apply to the “uncertainties” associated with cloud feedback and aerosol forcing (+/-) and possibly many other elements in the climate change scenario projection. Another complexity arises by the use of the words “projection” vs. “prediction.” The outside world would not understand this difference no matter how well it is explained in terms of initial conditions vs. boundary conditions or changes in “forcings” etc. To the outside world, it is a prediction. And, if the word “uncertainty” is used with the word prediction, the outside world will interpret this as a prediction that is unknown. Meaning that the word uncertain connotes unknown. The above is a #1 issue of “communication” of the work of the IPCC to the non-climate science community. Allow me to suggest that a major part of the next phase of the IPCC be spent on how to address this above mentioned issue. [Sushel Unninayar, USA]	Rejected - Section on uncertainty is closely tied to the cross-working group Guidance Note, and established practice. Ranges would be one way of expressing some aspects of uncertainty, but they cannot account for all the sorts of uncertainties climate change scientists have to deal with (process uncertainty, for instance).
1-210	1	2	31	2	32	All three IPCC Working Groups in the AR5 have 32 agreed to use two metrics for communicating the degree of certainty in key findings:' to The three IPCC working groups in AR5 used two metrics to communicate the degree of certainty in key findings:' [Larry Thomason, United States of America]	Accepted - Text has been revised.
1-211	1	2	34	2	34	Models and theory are mentioned here as separate elements in climate science. If the models are founded on theory, how are the models distinct from the theory. Are not the models detailed theoretical depictions of the climate system? If so, then why not state explicity that the models are decriptions of the theory, in other words, the "models" and the "theory" mentioned here are one in the same. If they are different, then how so? [Lee Klinger, USA]	Taken into account - Text has been revised for clarification.

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1-212	1	2	34			Why are the confidence levels expressed in qualitative format?I would assume with the availability of longer temporal and spatial data record has led to the establishment higher levels of confidence or rather statistical confidence levels can be reached in majority of the cases. [Shouraseni Roy, USA]	Rejected - IPCC has a policy of trying to establish a cross-Working Group consensus on treatment of uncertainty. This paragraph and section 1.4 introduce that agreed treatment.
1-213	1	2	35	2	35	sugest change 'qualitatively;' to 'qualitatively, and, ' [Peter Burt, UK]	Accepted - Text has been revised.
1-214	1	2	35	2	35	I don't understand how expert judgement can result in a probabilistic statement, that is not sound from a statistical point of view [Sybren Drijfhout, Netherlands]	Rejected - IPCC has a policy of trying to establish a cross-Working Group consensus on treatment of uncertainty. This paragraph and section 1.4 introduce that agreed treatment. Expert elicitation, for instance, is one way to get at subjective probabilities. In use in other working groups.
1-215	1	2	35	2	35	probabilitististically must be statistical probability [PROF. YEHIA HAFEZ, Egypt]	Rejected - There are agreed standards on how to treat uncertainty in the IPCC Fifth Assessment Report (Mastrandrea et al., 2010). We introduce these concepts and summarize them in this paragraph.
1-216	1	2	35	2	36	I would not include "expert judgement" in the context of quantitative assessment of uncertainty. However, as is mentioned afterwards, and after reading some chapters the meaning of this expression becomes clearer. [Celeste Saulo, Argentina]	Rejected - IPCC has a policy of trying to establish a cross-Working Group consensus on treatment of uncertainty. This paragraph and section 1.4 introduce that agreed treatment.
1-217	1	2	36	2	36	must removed [PROF. YEHIA HAFEZ, Egypt]	Rejected - There are agreed standards on how to treat uncertainty in the IPCC Fifth Assessment Report (Mastrandrea et al., 2010). We introduce these concepts and summarize them in this paragraph.
1-218	1	2	36			"expert judgement" cannot be objectively quantified. [David Bader, USA]	Rejected - It is not objective but it can be probabilistic. The subjective Bayesian interpretation of probability is probably the one favoured by most probability theorists, and it is in very common use.
1-219	1	2	36			(refers also to page 13, lines 15 and 32): I'm confused that specifications on the second metric for communicating the degree of certainty in key findings – i.e. quantified measures of uncertainty in a finding expressed probabilistically – also include "expert judgment". This implies a non-reproducible aspect of subjectivity and is in contradiction to the overall attribute of "quantified measures". I do not deny that some degree of expert judgment is inevitable (see p. 14, l. 9), but this should be assigned to the first metric where confidence is expressed qualitatively, and not to the second metric of quantified measures. [Jucundus Prof. Dr. Jacobeit, Germany]	Rejected - IPCC has a policy of trying to establish a cross-Working Group consensus on treatment of uncertainty. This paragraph and section 1.4 introduce that agreed treatment. Subjective Bayesian probabilities are in common use, and are both subjective (i.e. based on judgment) and expressed numerically (quantified).
1-220	1	2	37	2	49	Great paragraph! [Darienne Ciuro , United States]	Noted - Thank you
1-221	1	2	38	2	39	Replace "Each IPCC assessment, starting with the first in 1990, has provided a new set of projections of the climate change that have become more complex and detailed as the models have became more advanced." with "Each IPCC assessment has provided new computer model projections of future climate change that have become more detailed as the models have became more advanced." [Robert Waterland, United States of America]	Accepted - Text has been revised
1-222	1	2	38	2	45	The most obvious unsuccessful projectioins are ignored. These include the inability to predict the temperature of the lower troposphere, the temperature change from all the global anomalies for the past ten years and the World and local changes in GDP ov er the same period.. [VINCENT GRAY, NEW ZEALAND]	Rejected - Actually a number of journal papers have dealt with those issues and are part of the past (and current) assessments. No changes needed in the paragraph.
1-223	1	2	38		48	Think this paragraph (L: 38 – 45) needs to be re-written. E.g., L-40. Re-write as : Time-span from the first	Rejected - Chapter 1 only compares with the projects

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						projections published in 1990 to those in AR5 (Not AR4) provides a unique opportunity…etc [Sushel Unninayar, USA]	available through AR4 -- later chapters discuss the new findings for AR5.
1-224	1	2	39	2	39	...absorbed “by” the surface (missing “by”) [Darienne Ciuro , United States]	Accepted- Text revised. Comment: This refers to page 4, instead of page 2
1-225	1	2	40	2	40	Why Is the present opportunity unique? There have been opportunities for this comparison in previous Assessment Reports, and there will be opportunities in future ARs. [JOHN OGREN, USA]	Rejected - This is the first time AR4 has been compared to the prior assessments (AR4 chapter 1 did a similar coarsen through TAR).
1-226	1	2	40			The year of publication for AR4 need to be mentioned. [Muhammad Amjad, Pakistan]	Accepted - The year has been added.
1-227	1	2	41	2	41	delete comma after 'advances' [Peter Burt, UK]	Accepted - Text has been revised.
1-228	1	2	41	2	41	delete comma after 'publications" [Peter Burt, UK]	Accepted - Text has been revised.
1-229	1	2	42	2	44	Replace "The globally-averaged temperature observations are well within the uncertainty range of all previous IPCC projections, and generally are in the middle of the scenario ranges. The carbon dioxide (CO2) observations follow the projections as well. Methane (CH4) and nitrous oxide (N2O) concentration" with "Globally-averaged temperature observations and carbon dioxide (CO2) concentrations are well within the uncertainty range of all previous IPCC projections, and generally are in the middle of the scenario ranges. Observed methane (CH4) and nitrous oxide (N2O) concentrations" [Robert Waterland, United States of America]	Accepted -Text revised
1-230	1	2	42			I would add 'earlier' beofre projections here, as this type of analysis cannot yet work on the latest projections. [Drew Shindell, USA]	Accepted - Text has been revised.
1-231	1	2	43	2	45	uncertainty range must be written by numbers for all (temp, CO2, CH4, N2O) [PROF. YEHIA HAFEZ, Egypt]	Rejected - The Exec. Summary does not need to have the numbers. (see Chapter 2 for that level of detail).
1-232	1	2	44	2	45	Methane is actually below the lower limit. [Olivier Boucher, France]	Rejected - Latest years are back above in new figure.
1-233	1	2	44			to be honest I was surprised by this statement and figure 1.6; in Germany the figure of the CO2 emissions was usually used. There we have a different information (more observed emission then projected); Please add a discussion about higher emissions then projected but equal concentrations. [Frank Kreienkamp, Germany]	Rejected - This chapter does not compare the actual emissions with projected. That should appear in Chapter 6.
1-234	1	2	47	2	48	Replace this paragraph with the following: "Overall, the many notable scientific advances and associated peer-reviewed publications that have appeared since AR4 form the basis for the scientific assessment given in Chapters 2 through 14." [Robert Waterland, United States of America]	Accepted - The text has been revised.
1-235	1	2		20		Chapter 1 is an important part of the report as it should set the stage for everything that follows. Instead I find that it seem to flit around from topic to topic sometimes spending little time (and no references) on some key issues and then hitting some issues (that frankly don't seem all that crucial to me) with detailed text and references sometimes including some very new ones and others so old that they barely have any surviving relevance. It really comes across to me as a muddle mess and needs to bethoroughly rewritten in a consistent logically progressive manner. I like the text given to the discussion of certainty in climate forecasts though I wonder if it shouldn't be summarized here and given space in an appendex since it get very detailed but is more of a philosophical discussion than directly climate related. [Larry Thomason, United States of America]	Rejected - The aim of chapter 1 as defined by IPCC WG1 is to setup the rest of the assessment. Most of the topics in the chapter were actually in the outline provided by the WG1 leadership.
1-236	1	2				"Overall, the many notable scientific advances, and associated peer-reviewed publications, since AR4 provide the basis for the rest of this assessment of the science as found in Chapters 2 through 14," rather than giving any hint or clue as to what these advances have done to solidify understanding of climate change and its causes. I would urge the authors to identify major findings and state them. I am also concerned that any impression of lack of scientific advance might undermine commitment for further research. The argument being that the scientific research community has reached the end of the line in	Rejected - The aim of chapter 1 as defined by IPCC WG1 is to setup the rest of the assessment. Most of the topics in the chapter were actually in the outline provided by the WG1 leadership. The new ar5 results appear in later chapters and are specifically not to be included in this chapter.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
						developing understanding. [Stephen E Schwartz, USA]	
1-237	1	2				On looking ahead in the chapter, it seems that a thrust of the findings will be that there is a lot of improvement in modeling, observations; nothing much to change understanding. I disagree. I think that there is some major breakthrough in understanding. I would single out especially the sort of thinking reflected in Held IM, Winton M, Takahashi K, Delworth T, Zeng F, Vallis GK (2010) Probing the Fast and Slow Components of Global Warming by Returning Abruptly to Preindustrial Forcing. J Climate 23:2418-2427. doi:10.1175/2009JCLI3466.1 which relates modeling to observations and thus lends valuable perspective to climate change over the industrial period. This advance in understanding is stated also in chapter 12, page 7, line 8: "If radiative forcing were stabilized, the fraction of realized warming at that point is around 85 ± 10% of the total, and is almost independent of the forcing scenario. Equilibrium is reached only after centuries to millennia" This finding is enormously important. It means that the great majority (75-95%) of the warming that is committed at any given time, under assumption of continued constant forcing, is realized at that time. This finding also leads to the concept and quantity, transient climate sensitivity, proportionality constant between increase in GMST and forcing and its utility as a quantifier of climate sensitivity pertinent to climate change on the multi-decade to century time scale. This finding is a consequence of recognition that Earth's radiation imbalance is rather small compared to GHG forcing. The finding is somewhat tentative because if aerosol forcing is offsetting a large fraction of GHG forcing, the imbalance is a much greater fraction of the forcing and the committed warming (for constant future forcing) is consequently greater. This finding also has major implications, again because forcing at any given time also includes aerosol forcing. If the forcing were to be maintained at its value at some time in the future, then that would require fossil fuel emissions to be essentially halted. At that point aerosol forcing would decrease greatly, absent some geoengineering to maintain it, and the temperature would rapidly increase. I offer the above as an example. You may differ as to what are the key findings and advances in understanding, but I think there is a real obligation here to identify key advances in understanding and place them in perspective. [Stephen E Schwartz, USA]	Rejected - See response to comment 1-236
1-238	1	2				Another major advance is the adjusted forcing concept. The finding, AF is 1.95 ± 0.9 (Chapter 8, p 3 line 9) is also a major advance, if correct. It brings uncertainty in forcing from a factor of 4 (0.6 to 2.4) to a factor of 2.7 [Stephen E Schwartz, USA]	Rejected - see response to 1-236
1-239	1	2				Another major conceptual advance is the relation between temperature change and cumulative emitted CO2, only weakly dependent on temporal pattern of emissions. [Stephen E Schwartz, USA]	Rejected - see response to 1-236
1-240	1	2				Yet another major conceptual advance is the use of Green's function to determine climate system response to unit forcing applied for one year and then to convolve that with forcing to get response to arbitrary forcing, as advanced by Hansen et al ACP 2011. Perhaps it is premature to say that this will work, but it seems essential to get this on the table so that modeling groups will test their models against this approach. In principle it should work not just for temperature but for any climate system response, such as radiation, winds, precip. Relate to pattern scaling as described in Ch 12 [Stephen E Schwartz, USA]	Rejected - see response to 1-236
1-241	1	2				There are two main weaknesses in this AR5 Draft Version: [Terje Wahl, Norway]	Noted - This comment does not ask for a response it is an introduction to the following two comments.
1-242	1	2				a) It does not admit/address the apparent failure of the AR4 short-term global temperature projection. [Terje Wahl, Norway]	Rejected - When all uncertainties are considered, we disagree about AR4 being a failure.

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1-243	1	2				b) It implements a solar activity medium-term scenario which few, if any, solar scientists today actually believe in. [Terje Wahl, Norway]	Rejected - The Sun could have increased or decreased; an assumption of no change is a reasonable assumption.
1-244	1	2				Thus, there should be introduced a Fact-Box somewhere in AR5, titled "What went wrong with the AR4 short-term projections?" [Terje Wahl, Norway]	Rejected - It is not possible to project any eruptions of volcanoes.
1-245	1	2				This Fact-Box must discuss the following infamous statement at page 12 in the AR4 Summary for Policymakers: [Terje Wahl, Norway]	Accepted - We accidentally left out the additional key messages from the box.
1-246	1	2				"For the next two decades a warming of about 0.2 degreeC per decade is projected for a range of SRES emission sceanarios" [Terje Wahl, Norway]	Accepted - See above..
1-247	1	3	1	3	1	Chapter 1 of AR4 was a propaganda exercise for the IPCC, which ignired almost all of the previous history. It did not mention the previous voluminous mneasurements of atmospheric CO2 or the distortion of the historical studies of Fourier, Tyndall and Arrhenius which falsely claim them as originators of the current "greenhouse" theory.(see Gray V R 2010 "The Greenhouse and its Effects" http://nzclimatescience.net/index.php?option=com_content&task=view&id=756&Itemid=32 [VINCENT GRAY, NEW ZEALAND]	Rejected - No effect on this sentence. The paper cited is not peer reviewed, nor does it match the historical analyses published in the peer reviewed literature.
1-248	1	3	3	3	3	change 'a' to 'an' [Peter Burt, UK]	Accepted - Text has been revised.
1-249	1	3	3		7	Suggest don't start out comparing this chapter to chapter 1 of AR4. No one cares. Start at line 8: This chapter focuses.... [Stephen E Schwartz, USA]	Rejected - This part explains the difference between Ch1 of AR4 with AR5. If left out it would provoke the question why they do not show the same info as AR4.
1-250	1	3	3		13	(1.1: Chapter Preview): Re-write this sub-section. This is AR5, not AR4. Hence, stop referring to AR4 for other background reading that supports AR5. Only refer to AR5. If material has to be repeated from AR4, that material should be repeated with the implication that nothing has changed between AR4 and AR5. Repeated references to AR4 will confuse the outside readership? Bottom Line, each science assessment should be self contained. Reference to the past (AR4) should only be as an incidental reference that cross-maps present findings with that of previous findings. Most useful would be detail on what the differences are---based on improvements in observing technology, data analysis, and modeling etc. [Sushel Unninayar, USA]	Rejected - It is not the intention of IPCC to repeat the material from previous assessments unless there is something new. Thus the historical analyses in Chapter 1 of AR4 are referred to as a useful guide to the reader.
1-251	1	3	4	3	7	Replace "Since the last assessment, the scientific knowledge gained through observations, theoretical evidence and modelling studies has continued to increase and to further strengthen the basis for human activities being the primary driver in the concerns about climate change." with "Since the last assessment, experimental observations, theoretical evidence and modelling studies have increased Mankind's scientific knowledge and further strengthened the proposition that human activities are the primary driver of recent climate change." [Robert Waterland, United States of America]	Rejected - The suggested changes do not exactly mean the same as the original sentence.
1-252	1	3	6	3	6	split infinite: 'to further strengthen' → 'to strengthen further' [Peter Burt, UK]	Rejected - Actually we are using it as a verb here so there is no problem with it. We checked usage relative to the dictionary.
1-253	1	3	6	3	7	The sentence: "…the scientific knowledge …has continued to increase and to further strengthen the basis for human activities being the primary driver in the concerns about climate change." is unclear, as it is grammatically flawed. It is interpreted to mean: "...human activities are still recognised as the primary driver of climate change." Please simplify the sentence. [Martin Hovland, Norway]	Accepted - Sentence has been rewritten.
1-254	1	3	6			"the basis for human activities being". Better (both scientifically and linguitically) would be ""the evidence that human activities are". [Eric Wolff, United Kingdom of Great Britain & Northern Ireland]	Taken into account - nitpicking. Text has been revised.
1-255	1	3	7			also it could be "current (or ongoing) climate change" [José Daniel Pabón-Caicedo, Colombia]	Accepted - This suggested wording is more precise.
1-256	1	3	9	3	10	Is the list of key indicators comprehensive? Was it developed from a list of modeled predictions, or from a list of observations? Both could be done but the former would be more convincing from a model testing point-of-view (Chapter 9). [Michael Neil Evans, United States of America]	Rejected - We are focussing only on the physical indicators.

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1-257	1	3	10	3	10	and show how instead of and how [PROF. YEHIA HAFEZ, Egypt]	Accepted - Text revised to 'shows how'
1-258	1	3	11	3	13	Replace "Finally, the chapter discusses the directions and capabilities of current climate science, without describing the detailed progress made in the science being covered throughout the rest of this assessment." with ""Finally, the chapter succinctly discusses the elements and capabilities of current climate science." [Robert Waterland, United States of America]	Taken into account - Sentence has been revised for clarification.
1-259	1	3	12			"without describing the detailed progress". Again, don't tell us what you are not going to do; tell us what you ARE going to do. But I would say, DO tell us the major findings; you seem to be casting negative vibes in the phrase "detailed progress" as if it is unimportant, just details. In a chapter like this we want to get a sense of what are the important developments (as distinct from detailed progress). The phrase "detailed progress" seems almost dismissive. [Stephen E Schwartz, USA]	Taken into account - Sentence has been revised for clarification.
1-260	1	3	15			In section 1.2, there is no material to specify "Rationale", it is better to add some materials to support it, or change the titles of this section. [Jianting Cao, China]	Rejected - The title has been agreed on by the IPCC
1-261	1	3	17	4	10	This section has an unnecessarily defensive tone. (e.g., the paragraph lead sentences that include "… hypotheses are contingent…" and "… science strives for objectivity but inevitably …"). There is nothing technically wrong with the text, but it does not adequately "set the stage" for the extent to which AR5 builds on the previous assessments, and the extent to which the sequence of assessments reflects a positive improvement in knowledge. A less defensive perspective is provided throughout this chapter; it should be better reflected in this section. [Eric Sundquist, United States of America]	Accepted - The wording will be changed.
1-262	1	3	19	3	19	Suggested rephrasing to read: "In light of the importance and possible policy implications of climate change, the scientific community expends substantial resources on the periodic assessment of the most recent research, in order to convey to the wider community the current accumulated state of knowledge." [Timothy Carter, Finland]	Accepted - Text revised. Comment 1-264, 1-267 and 1-268 are also taken into account.
1-263	1	3	19	3	19	I would not include 'Because of possible policy implications'. This is not relevant here. [Sybren Drijfhout, Netherlands]	Rejected - But that *is* why IPCC exists. To provide policy-relevant assessments of climate science.
1-264	1	3	19	3	19	Replace "expends" by "invests" !! Minor editorial comments from this line onwards [Sharad K Jain, India]	Accepted - Text revised
1-265	1	3	19	3	21	“climate change research community expends” – I know everyone is overworked, but it is part of the job, so why emphasise it here? It gives the report a defensive tone which clouds the message, I recommend deleting this sentence. [Martin Juckes, UK]	Taken into account - Sentence has been restructured. But "extensive effort" does not mean "overworked".
1-266	1	3	19		22	"Because of possible policy implications". Don't sit on the fence. Either strike "possible" or omit the entire phrase. I don't think anyone would be surprised to learn that there are policy implications and that the authors of this report recognize that' they would be surprised if otherwise. Similarly at line 21-22: "As discussed in the Working Group II report, climate change has potentially significant implications for humans and ecosystems." I assert it is possible to state this without reliance on WGII. thus: climate change has potentially significant implications for humans and ecosystems Now look at the sentence. Potentially!! I suggest that this statement can be made without the qualifier "potentially"? Let me suggest some assertive declarative sentences: Climate change science sits at the center of the international decision-making process about the need to control emissions of CO2 and other long lived greenhouse gases to protect the planet from the consequences of increase in global temperature and other changes in the climate system that would result from such	Rejected - Line 21-22: One goal of the introduction is to point to the chapters, or other documents which discuss areas in more detail. Thus we are not relying on the WGII, but pointing readers for more information to go to WGII. "Potentially" needs to be included since this is an introductory chapter, not a chapter with conclusions.

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						emissions. These considerations are inherently quantitative. What are the changes in climate that would result from a given projected set of future emisisons, and what confidence can be placed in estimates of such changes? The answers to these questions are informed by a variety of research approaches: Analysis of observational data, climate modeling at a variety of levels, and theory. The past six years since AR4 have seen major advances on all these fronts. [Stephen E Schwartz, USA]	
1-267	1	3	19			Remove "possible" from this sentence. [Anji Seth, United States of America]	Accepted - Text has been revised.
1-268	1	3	21	3	21	Change "the state of knowledge" to "the evolving state of knowledge". [Robert Waterland, United States of America]	Accepted - Text has been revised.
1-269	1	3	21	3	22	Add: As discussed in the Working Group II report, climate change has potentially and present real significant implications for humans and ecosystems. [CRISTOBAL FELIX DIAZ MOREJON, Cuba]	Taken into account - We leave as potential, since this chapter is to introduce the subject, not conclude a result on the subject.
1-270	1	3	21	3	22	WG II report is published after this one – use a reference that will be published before it – or delete this sentence. The 3rd sentence of this paragraph is, in any case, the natural starting point. [Martin Juckes, UK]	Accepted - Sentence has been revised.
1-271	1	3	23	3	23	Change "assess the state" to "assess the current state". [Robert Waterland, United States of America]	Accepted - Text revised
1-272	1	3	24	3	24	Add: The report represents an assessment of the current state of research results,……. [CRISTOBAL FELIX DIAZ MOREJON, Cuba]	accepted-Text revised
1-273	1	3	24	3	24	Replace "represents" by "presents" [Sharad K Jain, India]	Accepted--Text revised
1-274	1	3	24	3	25	Does "as would be included in a review" referring to the first part of this sentence or the middle part of the sentence? [Gareth S Jones, UK]	Accepted - middle part of sentence: sentence rewritten following comment 1-275.
1-275	1	3	24	3	25	Replace "The report represents an assessment of the current state of research, not a discussion of all relevant papers, as would be included in a review." with "The report is not a discussion of all relevant papers, as would be included in a review." [Robert Waterland, United States of America]	Accepted-Text has been revised.
1-276	1	3	24	3	27	This suggests the authors are acting as honest brokers, which I recommend. However, in this chapter I read very little about the 'range of scientific views'. For this reason I encourage you to mention "Pielke et al. 2009: The need to consider human forcings besides greenhouse gases. Eos, Vol. 90, No. 45, 10 November 2009, 413" in this chapter as it explicitly explains what kind of different views there are. [Marcel Crok, The Netherlands]	Rejected - As stated in the text, all appropriate literature is considered, but not necessarily cited.
1-277	1	3	24	3	49	You appear to be tying yourself in knots here. You will cover all views, but not necessarily all papers? That implies that you expect there to be a significant group of papers which have no original ideas in them. The role of the WG is constrained by the IPCC principles: “to assess on a comprehensive, objective, open and transparent basis …...”: your re-phrasing only confuses the issue. It may be worth noting that the “IPCC process” is broader than the report. Decisions on inclusion/exclusion are not based on authors opinions alone, they must pass through the transparent review process. [Martin Juckes, UK]	Taken into account - Added statement on larger review process. As stated in the text, al appropriate literature is considered but not necessarily cited.
1-278	1	3	24		24	"not a discussion of all relevant papers, as would be included in a review'. Not sure why this disclaimer is here. Suggest strike. [Stephen E Schwartz, USA]	Rejected - See other comments: We cannot cite every paper, but should consider all appropriate papers in the assessment.
1-279	1	3	26	3	27	Verb missing in last part of sentence [Bennartz Ralf, US]	Accepted - Text revised
1-280	1	3	27	3	27	Insert "is" after "science" [Sharad K Jain, India]	Accepted - Text revised
1-281	1	3	29	3	31	These santances insured that the results in AR5 are may be not trueth [PROF. YEHIA HAFEZ, Egypt]	Taken into account - We clarify that there is also a review process to ensure difference opinions are considered.
1-282	1	3	29	3	35	This trivial discussion does not belong in this report, as it can be interpreted solely as a self-defence debate for	Rejected - We believe that the difference between a

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
						the IPCC, which should be totally un-necessary, as the AR5 is based on sound scientific results. [Martin Hovland, Norway]	review (citing every paper) and an assessment (looking at all papers and presenting the state of the science) is an important distinction. We also have hundreds of people telling us to cite their paper -- an assessment does not cite every related paper.
1-283	1	3	29		35	This paragraph is well crafted. [Anji Seth, United States of America]	Noted - Thank you
1-284	1	3	29		49	Not sure why all this philosophizing. What is the point you are trying to make, and why is it impt to make it? Again simple declarative statements that set out what you are doing (and not what you are not doing). Suggest something like: This assessment is a component of the scientific process of evaluating the state of understanding, in this instance, of the very complex set of scientific questions surrounding the issue of climate change. In general advances in understanding are reflected in the published scientific literature. Conventionally, and appropriately, in keeping with current scientific practice, such publications generally focus on a rather narrow topical study. This assessment examines the recent published literature with the objective of assessing newly published work in the context of the web of understanding of climate change science that takes into account prior understanding and the broad picture of that science. [Stephen E Schwartz, USA]	Taken into account - We have modified as suggested based on comments1-284 through 286.
1-285	1	3	30	3	31	Congratulations for the way in which was written the item: "1.2.1 Setting the Stage for the Assessment". The sentence:"In this sense the distinguishing feature of scientific enquiry is not its claims to truth, but its willingness to subject itself to critical re-examination", it is also a very important sentence and is normally used in support of scientific work. However, from my point of view, what it is actually significant in the first part of the sentence is the fact that the search of the thruth is the main orientation for a scientist as a "distinguishing feature". So, I recommend to change into two positive features, in place of one negative and one positive, in the following way: In this sense the distinguishing features of scientific enquiry is to search for the truth and its willingness to subject itself to critical re-examination. [Rubén D Piacentini, Argentina]	Taken into account - We have modified as suggested based on comments1-284 through 286.
1-286	1	3	30		31	Ref. " In this sense the distinguishing feature of scientific enquiry is not its claims to truth, but its willingness to subject itself to critical re-examination." While that is true, this needs to be re-phrased. Because, while true, this type of phrasing will or could cause a massive problem of perception/interpretation by the outside world, whoever. Notably: scientific enquiry does not have claims to "truth." That is certainly going to be misinterpreted. Rephrase as " The distinguishing feature of scientific enquiry is that while it always aims at seeking the "truth," it is wide open to subject itself to critical self-or-re-examination. [Sushel Unninayar, USA]	Taken into account - We have modified as suggested based on comments1-284 through 286.
1-287	1	3	31	3	32	The value of "peer review" has been compromised by the suppreesion of any crtiticisms of the "greenhouse theory" by the tactics revealed by the release of Emails from the University of East Anglia. They include control of the reviewers themselves, the sacking of editors that do not conform, and the suppression or altering of inconvenient information. [VINCENT GRAY, NEW ZEALAND]	Rejected - The review comment distorts the facts about peer review and about the stolen emails. It has no effect on the sentence as written.
1-288	1	3	35	1	35	"scientific process": there is a huge literature on scientific process – an introspective self-reference doesn't help here. Either refer to an independent review or omit (I would omit, as I don't have time to find a good independent review). [Martin Juckes, UK]	Rejected - Most reviewers find the section helpful, so we revise as indicated in 1-283 through 1-286
1-289	1	3	35	3	35	delete comma after '1' [Peter Burt, UK]	Accepted - Text revised
1-290	1	3	35	3	35	The reference 2007 is not more recent reference to take it in 2012 only [PROF. YEHIA HAFEZ, Egypt]	Rejected - This reference is to the last Chapter 1 of the WGI IPCC, and thus appropriate here.
1-291	1	3	35	3	35	bracket missing [Bennartz Ralf, US]	Accepted - Text revised
1-292	1	3	35		35	Ref. …more details are given in AR4 Chapter-1…etc.: NO, do not refer to AR4. This is AR5 and should be self-contained. If necessary, repeat AR4 but do not refer the reader to it. That should be a page-1, line-1 principle to be applied to the whole report. Again, the subject of how to "communicate" AR5 (not AR4) findings? [Sushel Unninayar, USA]	Rejected - AR5 is not self-standing and should refer to previous reports. AR4 spent a whole section discussing the scientific process, and thus is appropriate to cite here.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1-293	1	3	37	3	45	This trivial discussion does not belong in this report, as it can be interpreted solely as a self-defence debate for the IPCC, which should be totally un-necessary, as the AR5 is based on sound scientific results. [Martin Hovland, Norway]	Rejected - As seen above, most comments were positive on this section, and thus we keep the section. Additionally, many other comments suggest they do not necessarily agree that the AR5 is based on sound science.
1-294	1	3	37		49	Ref.: " Science strives for objectivity….etc.: Strongly recommend deleting L37 through L45 sentence ending with ….no definite resolution to these questions. Confine/retain the bottom part of this paragraph which starts on L45: " The IPCC process is aimed at assessing……..etc…….ending with L48 and L49. Reason: While this full paragraph is not wrong, it will create great confusion. [Sushel Unninayar, USA]	Rejected - Other comments indicate broad support for this paragraph, thus it is left in (1-292 through-1-300). The goal of this paragraph is explain that not every paper can possibly be cited, but that all ideas are assessed as part of the assessment, and the written document represents the best state of the atmosphere.
1-295	1	3	41			"our"; try to avoid first person plural; restrict it to we the authors, not scientific community. inevitably ambiguous. Pay attn to this throughout the report. [Stephen E Schwartz, USA]	Accepted--Text has been revised.
1-296	1	3	43	3	44	"how best to evaluate potential sea-level rise and the appropriate choice of prior for probabilistic estimates of climate change.". "choice of prior" can not be correct? [Andrew Glikson, Australia]	Accepted--Text has been revised.
1-297	1	3	44	3	44	text missing, choice of what? [Peter Burt, UK]	Accepted--Text has been revised.
1-298	1	3	44	3	44	'the appropriate choice for prior' the term 'prior' needs to be explained [Reiner Steinfeldt, Germany]	Accepted--Text has been revised.
1-299	1	3	46	3	46	"disagreement as well as consensus" or "consensus as well as disagreement" ? [Olivier Boucher, France]	Accepted--Text has been revised.
1-300	1	3	46	3	49	About the sentences: "In order to assess areas of scientific controversy, careful review of appropriate papers is conducted and evaluated. Not all papers on a controversial point end up being included in an assessment, but all views represented in the peer-reviewed literature are considered and presented in the assessment." Could Authors explain (at least for the Reviewers) the way in which they selected the main (published and submitted) articles (ie: The first published papers on the controversy, the impact factor of the Journal, etc)? [Rubén D Piacentini, Argentina]	Rejected - It is not really possible for the introduction to answer this question. Each section of the chapters should indicate the scientific rationale for which papers are included.
1-301	1	3	47	3	49	This is a dangerous sentence and opens the way to ignore some papers that don't fit in the perspective of the authors. Later on I will show some examples of this. AR5 is an impressive collection of literature, but the focus has been (too) much to be complete. It would have been better to look at even more detail in some of the controversial issues, like the quality of the temperature measurements, the hot spot in the tropics, hockey sticks etc. In those cases it's much better to mention all relevant papers, except when several papers are drawing the same conclusion. So in general I would prefer a report which focuses on the crucial issues and treat these in all the necessary details. This comment is actually applicable to all the chapters. [Marcel Crok, The Netherlands]	Rejected - It is not physically possible to cite every paper, thus it is inevitable that some papers will not be included. This does not mean they are ignored, or that their view point is excluded: the goal of an assessment is to include important, well justified viewpoints, but not every paper or poorly justified view point.
1-302	1	3	48	3	49	Is this really true? Even views from settled controversies and very exotic viewpoints? [Olivier Boucher, France]	Rejected - The text indicates "reasonable" disagreement, which would generally not include either disagreement from settled controversies or very exotic viewpoints with little support.
1-303	1	3	48	3	49	There are thousands of scientists, including myself, who cannot find a publisher and are not considered by this review. Most of the time their only resource is the Internet and my own publications there are now extensive. I have published in the peer-reviewed Journal "Energy and Environment":but I do not expect that these papers will be considered in this review.even when they have been "peer reviewed" by impartial experts. There are several important critical books including two volumes of an alternative expert panel from the IPCC which are also unlikely to be mentioned. [VINCENT GRAY, NEW ZEALAND]	Rejected - Our statement stands. There is zero evidence presented for any of the statements made by the reviewer.
1-304	1	3	48		49	Replace last sentence with: As an assessment, not an exhaustive review, all scientific views are represented. However, it is not possible to include every paper published on a topic. [Anji Seth, United States of America]	Accepted--Text has been revised.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1-305	1	3	49	3	49	add (the way to catch the climate change according to reference basin of the parameters is still far from us) [PROF. YEHIA HAFEZ, Egypt]	Rejected - We don't understand the comment!
1-306	1	3	49			Box 1-1 is never introduced in the main text; introduce "box 1-1" there? [Francois DANIS, France]	Accepted - This has been added.
1-307	1	3	51	3	53	Suggestion:"... with reference to temperature, pressure, humidity and other paramters (meteorological elements), the presence or absence of clouds, precipitation, snow, winds and the occurence of special phenomena, such as thunderstorms, dust storms tornadoes etc." Special phenomena exert significant impacts on humans and the biosphere.Furthermore, they are preferred objects of public perception, also in connection with climate change discussions [Karl-Heinz Bernhardt, Germany]	Accepted -Text has been revised.
1-308	1	3	51	3	53	About the sentences: "It is important to distinguish the meaning of weather from climate. Weather describes the conditions of the atmosphere at a certain place and time, with reference to the temperature, pressure, and the presence or absence of clouds, precipitation, snow, winds, etc." Do not forget humidity, that it is mentioned more frequently than pressure in weather forecasts. So, I suggest to include this word in line 52: "..... with reference to the temperature, humidity, pressure, and the presence...." [Rubén D Piacentini, Argentina]	Accepted--Text revised
1-309	1	3	51	3	57	This distinction between weather and climate seems out of place here. This is a broader context-setting section about the scientific method. Moreover, if these two terms are to be introduced, why not also distinguish climate from climate change, or climate change in general from anthropogenic climate change? All are key distinctions that are needed, but perhaps in a more appropriate section (1.2.2?) or box. [Timothy Carter, Finland]	Taken into account - We think it is better to leave this where it is as a point to be made under Setting the Stage. Paragraph has been rewritten.
1-310	1	3	51	3	57	The paragraph on weather vs climate, while important, seems a bit out of place here. This paragraph makes the entire section a bit disjointed. I think, from a communications standpoint, that this subject would make a better breakout Box and could be flushed out a little more in such a format. This is an often-confused subject for the general public, thus writing a separate box would provide easier access to casual readers, who likely won't read through the entire text of this chapter or section. UCAR/NCAR has nice webpages that explain the differences between weather and climate, and the level of scientific certainty with attributing an extreme weather event to climate change-- this may serve as a good references or template. [Allison Crimmins, United States]	Taken into account - This paragraph has been moved to Section 1.2.2. The difference between climate and climate change has been added.
1-311	1	3	51	3	57	This whole argument is specious. "Weather" does not just take place at one location,.it happens everywhere. The combined weather for all the earth is the real climate. The real climate is dominated by air temperature, wind speed and direction, cyclones, anticyclones, air and ocean movements. evaporation and precipitation of water.The "greenhouse" theory imitates a real greenhouse in ignoring the real climate outside it and fabricating an implausible static alternative based entirely on radiation with the object of justifying the pseudo religious beliefs of environmentalists that humans are destroying the planet.. [VINCENT GRAY, NEW ZEALAND]	Rejected - No effect on the sentences as written. The first part of the comment essentially is in agreement what we said, while the second half is an unfounded opinion that does not match scientific evidence.
1-312	1	3	51		57	Not sure what this para is trying to get at. Distinguish weather from climate so as to set up possible response to questions as to why there has not been an inexorable monotonic increase in GMST over the past decade? In any event the para seems to be irrelevant to the prior and following paras. It is valuable, yea esential, to define terms. This assessment deals with climate change. So need to define climate and climate change as terms. that would motivate the para. Then get into climate dealing not just with mean state but fluctuations. So I think the para could be motivated and with such motivation would be useful to include. Might also lighten up a bit with this quote from American author and humorist Mark Twain: "Climate is what we expect, weather is what we get." [Stephen E Schwartz, USA]	Taken into account - This paragraph has been moved to Section 1.2.2. A sentence on the difference between climate and climate change has been added.
1-313	1	3	51		57	The definition of climate here should include (to prepare the reader for the energy balance discussion ahead, and because it is so critical to the point): Climate is determined untlimately by earth's energy balance, which in turn sets the stage for the day-to-day weather that is possible in a given region. [Anji Seth, United States of America]	Rejected - Weather is also a product of the energy balance, and thus using energy balance to differentiate weather from climate is not possible. More discussion below on how climate is related to energy balance, so we leave this point in the latter sections.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1-314	1	3	51		57	(Referring to distinguishing between weather and climate): There is a fundamental error of conception in this definition of weather vs. climate. Nothing specifically wrong with the statement, but it is and has been the cause of great confusion even within the weather/climate community. That includes a large fraction of the weather and climate science community. To explain these nuances or mis-conceptions: All planets, including the Earth, have a “climate” or climatic regime depending on various external forcings (e.g., Solar, Orbital etc.) and feedbacks internal to the system (e.g., cloud, atmosphere-ocean interaction, snow/ice-albedo feedback, etc). Weather on a short time scale is a manifestation of the climatic regime of the planet. “Climate” is NOT the long-term mean and variations in the state of weather events at a location. To explain further: The long-term mean (including the statistics of variations and extremes et al.) is how “climate” is measured or computed at that point from observations. In other words, if the “climate” regime of the planet is disturbed (e.g., due to GHG forcing or Land Use Change, or whatever else), then the weather distribution will also change. This is a fundamental point simply not understood or mis-communicated by the climate science community to the general public. This report should not fall into this trap. Because of the peripheral question as regarding why should a person be concerned about the changes going on in the Arctic when they live in, for example, Florida. They need to be concerned, of course, because the changes going on in “remote” locations reflect changes in the climate-regime of the planet, which will be reflected in changes in the weather they experience at any one local point in time/space. [Sushel Unninayar, USA]	Rejected - No change necessary
1-315	1	3	51			it would be helpful, to introduce the concept of the German wording 'witterung' –- describing the weather for a time period starting from a couple of days towards a single season [Frank Kreienkamp, Germany]	Rejected - Unfortunately, there is not space to discuss different ideas of weather from different cultures.
1-316	1	3	53	3	53	using 'etc' is poor style. Omit. [Peter Burt, UK]	Accepted - Text revised
1-317	1	3	53	3	53	I would not say: climate refers to the long term mean… Rather: climate is the statistics of … It is mentioned more or less in the next sentence, but I would prefer to make it clear from the beginning that climate is not just about the mean [Sybren Drijfhout, Netherlands]	Rejected - The sentence indicates that climate is the long term mean and variability in weather: statistics is a more technical term that might not reach as many readers.
1-318	1	3	53	3	53	Because climate variables have elsewhere in the draft AR5 been stated to have been assessed over periods of minimum 30 years, please add "(i.e., min. 30 years)" between the words "long-term" and "mean", for clarification. [Martin Hovland, Norway]	Rejected - This is covered by the Glossary
1-319	1	3	53	3	53	“long-term”: 20 years is not everybody's idea of long term. The period used to define “climate” varies according to the application. This assessment is interested in climate on periods of decades to centuries. [Martin Juckes, UK]	Accepted--Text revised
1-320	1	3	53	3	55	Kindly consider to change to 'On the other hand, climate refers to the condition of the stated weather variableas averaged for at least 30 years at that location ….' Reference can be made to WMO definition. [Faustine Fidelis Tilya, United Republic of Tanzania]	Taken into account - Modified consistent with this suggestion, following 1-319. The Glossary defines the 30 year period.
1-321	1	3	54			"in the state of weather events" should be shortened to simply "weather." [David Bader, USA]	Accepted--text revised
1-322	1	3	54			“state of weather events” sounds curious, perhaps “state of atmospheric variables”? [Jucundus Prof. Dr. Jacobeit, Germany]	Taken into account - Modified consistent with this suggestion, following 1-322
1-323	1	3	56	3	57	Suggestion:"...statistics, including those of combined parameters and extreme events,..." The role of a combination of factors, as mentioned on page 9, lines 46, 47 in the given draft, should also be included into a simplified definition of climate. [Karl-Heinz Bernhardt, Germany]	Rejected - Combined factors seems covered by the initial statements, but this wording suggestion appears too technical.
1-324	1	3	56	3	57	Stop the sentence after "droughts". Persistence of extreme values is an extreme value. [Olivier Boucher, France]	Accepted - Text has been revised.
1-325	1	3	56			when giving examples of extreme events, I would not confine it to heat waves or droughts, frequency and/or intensity of heavy rainfall and storms should have the same chance to be mentioned [Jucundus Prof. Dr. Jacobeit, Germany]	Accepted - Text has been revised.
1-326	1	4	2	4	4	See comment above, the application of models is formulated to narrowly. I miss the predictive capabilities and the use for projections. [Sybren Drijfhout, Netherlands]	Rejected - It is not clear what this comment refers to, as no models are defined here.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1-327	1	4	2	4	10	This trivial discussion does not belong in this report, as it can be interpreted solely as a self-defence debate for the IPCC, which should be totally un-necessary, as the AR5 is based on sound scientific results. [Martin Hovland, Norway]	Rejected - As indicated in the comments on this draft, the reviewers is much more supportive of the IPCC process than other reviewers.
1-328	1	4	2	4	10	About the sentences: "The Earth sciences study the processes that shape our environment. Some of these processes can be understood through ideal laboratory experiments, altering a single element and then tracing through the effects of that controlled change. However, in common with astronomy, aspects of biology and much of social science, the openness of environmental systems, in terms of our lack of control of the boundaries of the system, their multi-scale character and the complexity of interactions within many environmental systems often hampers our ability to definitively isolate causal links, and this in turn places important limits on the nature of many of the inferences in the Earth Sciences (e.g., Oreskes et al., 1994). However, there are many cases where we may be able to make inferences using statistical tools with considerable evidential support and with high degrees of confidence." Suggestions: i) The Earth (in relation to sciences) is written with first capital letter, so the same must be done with the other sciences: Astronomy, Biology and Social; ii) Besides the arguments included in the last sentence about that ".... this in turn places important limits on the nature of many of the inferences in the Earth Sciences", another important limits to make inferences are the use of indirect measurements (ie, for determining ambient temperature from tree rings analysis, GHGs concentration derived from satellite data, etc) as well as historical data (since they can be analyzed, re-analyzed, compared with other similar data, etc but it is imposible to repeat a measurement that was done in the past). [Rubén D Piacentini, Argentina]	Accepted--Text revised for the capitalization. For the indirect measurements, this is indicated by the inferences in the statement.
1-329	1	4	2	17	46	Earth science(s)' is written inconsistently throughout the chapter. I suggest that the capital 'S' is not used. [Peter Burt, UK]	Accepted - Text has been revised.
1-330	1	4	2		10	This para is a particularly egregious example of shifting reference to first person plural. [Stephen E Schwartz, USA]	Accepted - Text has been revised.
1-331	1	4	2		10	At first glance, this paragraph reads well. But it does not convey meaning. Or rather, what does it mean. Key words can be mis-construed. For example, "…the openness of environmental systems, in terms of our lack of control of the boundaries of the system, their multi-scale character and complexity…..often hampers our ability to definitely isolate casual links, and this in turn places important limits on the nature of the many inferences in Earth sciences…etc. The outside world interpretation of this statement/paragraph would be that we really don't know much of anything? Yes, there is a partial back peddle to get out of this confusion in the follow up statement: "However, there are many cases where we may be able to make inference using statistical tools with considerable evidential support and with a high degrees of confidence. This not good enough of an explanation. A critical reader will tear this paragraph apart, if they so choose to do so. Suggest that the above paragraph be deleted or substantially rephrased—because it does not explain what it means in a satisfactory manner. [Sushel Unninayar, USA]	Taken into account - Paragraph has been revised. We do think the paragraph conveys important meaning and disagree with the reviewer.
1-332	1	4	4	52	53	The value of 1368 W/m2 for TSI is outdated. So I cannot agree that this value is "generally accepted". I think it would be better to refer to the latest and most reliable results. See: Kopp, G., and J. L. Lean (2011), A new, lower value of total solar irradiance: Evidence and climate significance, Geophys. Res. Lett., 38, L01706, doi:10.1029/2010GL045777. Thie new value about 1361 W/m2 and this value was used in Chapter 2 (see e.g. figure 2.34) and also later on [Raimund Muscheler, Sweden]	Accepted--text revised
1-333	1	4	6	4	6	Suggestion: "their spatial and temporal multi-scale character..." [Karl-Heinz Bernhardt, Germany]	Accepted--Text revised
1-334	1	4	7	4	8	"nature" doesn't seem the right word; "understanding"? [Francois DANIS, France]	Accepted--text revised
1-335	1	4	8	3	10	An exaggeration.Unless the "projections" are successful in agreeing with future climate behaviour all "inferences" are worthless. [VINCENT GRAY, NEW ZEALAND]	Rejected - No effect on the sentence. A range of scenarios are considered for the future because of the uncertainties involved in projecting the future.

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1-336	1	4	15	4	25	The attribution statement from TAR is given, but not its AR4 version, where "likely" is replaced by "very likely". Please add. [Jean-Pascal van Ypersele, Belgium]	Taken into account - The box will be revised. The sentence on the attribution from AR4 will be cited.
1-337	1	4	17	4	24	I'm not sure what is intended in this box: rather than seeking quotes, I would suggest extracting comparable information from past reports, e.g. the quantities defined later (possibly move box later as well): ECS, TCR, confidence of detection... [Martin Juckes, UK]	Taken into account - This Box is intended to give a historical overview on the major conclusions of the previous reports. A major section of this accidentally got left out and has now been added back in.
1-338	1	4	17	4	25	This box would be much more compelling if it included a comparable conclusion from AR5 and a summary sentence about how the assessments represent a cumulative advancement of knowledge. [Eric Sundquist, United States of America]	Rejected - Chapter 1 is an introduction of the WG I contribution to AR5. It does not serve as a conclusion. Therefore, the chapter provides a road-map to the report and introduces key concepts. The results of AR5 are given in the remaining chapters and will be summarized in the Technical Summary and the Summary for Policymakers. This box is intended to give a historical overview on the major conclusion of the previous reports.
1-339	1	4	17	25		The key messages are not logically selected, I am probably biased here but I think the conclusion that very likely most… anthropogenic is a key conclusion of the AR4, it is one of the most cited conclusions, and it is illogical to cite attribution conclusions for the TAR and not the AR4. I think it would be better to follow specific conclusions through the report, eg on radiative forcing (cited for AR4), observed warming (cited for AR4), and attribution [Gabi Hegerl, UK]	Accepted - This Box is intended to give a historical overview on the major conclusions of the previous reports. A major section of this accidentally got left out and has now been added back in.
1-340	1	4	18	4	18	This statement is deliberately misleading. It is obvious to all of us that humans have a discernible effect on the climate but there is no evidence that greenhouse gases are involved . [VINCENT GRAY, NEW ZEALAND]	Rejected - No effect on the sentence, which just repeats a finding from an earlier assessment. The opinions of this reviewer make no sense relative to the state of the science.
1-341	1	4	19	4	20	. "most of the warming" does not specify what warming is concerned. Is it the "average temperature of the earth's surface'? But that cannot be, since suich a quantity cannot be measured. Presumably it means the change in the unreliable mean global temperature anomaly. Then, the period of fifty years has been chosen to exclude the much more reliable radiosonde and satellite measurements which only show a warming after the large 1998 El Niño and have levelled since. . [VINCENT GRAY, NEW ZEALAND]	Rejected - The comment makes no sense. The last 50 years does include the satellite observations and other datasets. The sentence was referring to AR, which was published in 2001.
1-342	1	4	20	4	25	This is a highly subjective interpretation. Surely what is "key" is in the eye of the beholder. In my view, the most important new conclusion of the WG I AR4, though similar statements were made already in earlier assessments, was that substantial future warming is unavoidable. This is not stated in as many words, but in the highlighted headings of the SPM, this could be inferred from the statement "For the next two decades, a warming of about 0.2°C per decade is projected for a range of SRES emission scenarios. Even if the concentrations of all greenhouse gases and aerosols had been kept constant at year 2000 levels, a further warming of about 0.1°C per decade would be expected." This is "key" in my eyes, because it makes the strongest possible case supporting the need for adaptation in addition to mitigation. [Timothy Carter, Finland]	Accepted - This Box is intended to give a historical overview on the major conclusions of the previous reports. A major section of this accidentally got left out and has now been added back in.
1-343	1	4	22	4	25	This statrement is just ridiculous. We have no mechanism for measuring in a scientific manner the average of any "human activities" . None of the "observations" of "warming" mentioned are from representative samples of the earth's surface and do not justify any "equivocal" conclusion... [VINCENT GRAY, NEW ZEALAND]	Rejected - No changes to the sentence, which just repeats findings from AR4.
1-344	1	4	22			"message"; seems inappropriate. Finding? Conclusion?. but message implies suggestion or impetus for action, or at least might be read as such; want to avoid any implication of suggesting action; restrict to scientific findings. Maybe even better "key finding is a consistent picture that "the global average effect ..." " [Stephen E Schwartz, USA]	Accepted - The wording will be changed.
1-345	1	4	23	4	23	1750 (it must be clearify why exact 1750!!) [PROF. YEHIA HAFEZ, Egypt]	Rejected - This comment refers to a quote from AR4.
1-346	1	4	23			Why is the role of anthropogenic forces left out of this key finding of the soon to be released report? YOu mention on page 5 line 6 that humans cause enhancement of the greenhouse effect on the earth surface then	Accepted - This Box is intended to give a historical overview on the major conclusions of the previous

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						why keep that out of the key findings? [Shouraseni Roy, USA]	reports. A major section of this accidentally got left out and has now been added back in.
1-347	1	4	25			I would have thought the AR4 conclusion "Most of the observed increase in globally averaged temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations" would belong here as well. [Drew Shindell, USA]	Accepted - This Box is intended to give a historical overview on the major conclusions of the previous reports. A major section of this accidentally got left out and has now been added back in.
1-348	1	4	28			There are several rather new items discussed in AR5. We think it would be interesting for the readers of the report to know upfront, i.e. in the introductory section what these new items, or items that have been possible to elaborate better than in AR4. We therefore propose a section to list new items like Short Lived Climate Forcers, geoengineering, more elaborate work on the N-cycle, etc. here. [Øyvind Christophersen, Norway]	Taken into account - These points are addressed in Section 1.2.2 and Section 1.5. While we address key concepts in climate in Section 1.2.2, we elaborate on the advances of observations and modelling in Section 1.5. Thus, a new section is not needed. However, we have shortened the information on concepts covered in AR4 to give greater emphasis to new concepts and improvements in the conceptual framework since AR4.
1-349	1	4	30	6	21	1.2.2 discussion of Key concepts in climate, there is no specify the concept"climate change' before the concept "climater change commitment", it is better to add the concept "climate change" [Jianting Cao, China]	Accepted - Good suggestion. Text revised.
1-350	1	4	30	6	21	I would like to see this section conclude with a hypothesis: e.g. the net radiative forcing arising from human activity is positive. Therefore we expect the mean and variance of climate (temperature, moisture, circulation, ...) to change on top of natural variations. The relative importance of the feedbacks between radiation, circulation, water, carbon, natural and managed ecosystems, human activity govern the amplitude and patterns of change. Is the null hypothesis “no change”; or closer to a continuum of climate change (e.g. Huybers and Curry, Nature, 441, 18 May 2006, doi: 10.1038/nature04745)? [Michael Neil Evans, United States of America]	Rejected - In an assessment, it is not necessary to make such a claim. The summary documents will lead the readers through the overall findings of the assessment.
1-351	1	4	30		47	(Discussion of key concepts in climate). Comment: Given the title of this section (1.2.2), this is a pretty shoddy discussion of the key concepts in climate. And, the associated Fig 1.1 is not that good either—see comment #9. It is important to get Chapter 1 right—because it is an extended executive summary attempting to capture key relevant points with cross-references to the whole report that follows. The outside world/readership/audience may not read beyond this chapter? [Sushel Unninayar, USA]	Accepted - Title has been changed. Figure 1.1 has been revised.
1-352	1	4	30			Just "Key concepts in climate"? Instead of “Discussion...”. [Francois DANIS, France]	Accepted - Text has been revised.
1-353	1	4	30			Omit "Discussion of" [Stephen E Schwartz, USA]	Accepted - Text has been revised.
1-354	1	4	32	4	47	The summary implies that all energy drain from the Earth surface is radiative. But convection also cools the surface and moves heat to higher levels in the atmosphere. This should be included in the summary. [Ross McKitrick, Canada]	Rejected - Ultimately, energy can only be lost in terms of radiation.
1-355	1	4	32	5	35	Greater emphasis should be given to new concepts and improvements in the conceptual framework since AR4. Discussion of concepts covered in AR4 should be shortened (even more than in FOD). [Martin Juckes, UK]	Accepted - Text has been revised.
1-356	1	4	32	5	35	All of the basic concept and definition is in bold and explained clearly which is good. But the definition should be more exclusive and detailed. [Weiwei Li, United States of America]	Rejected - We do not have enough place for this. We will refer to the chapters that give more information.
1-357	1	4	32		47	Style: "Earth" vs "the Earth"; I have pretty much switched to "Earth" in lieu of "the Earth". Example: "average temperature of the Earth". Do we say "average temperature of the Mars"? Of course not. So why "the Earth"? I think Earth is preferable and suggest for consideration throughout the document. [Stephen E Schwartz, USA]	Editorial - Copyedit will be completed prior to final publication.
1-358	1	4	33	4	34	The earth's climate is "powered" by solar radiation during the day, but not at night [VINCENT GRAY, NEW ZEALAND]	Rejected - No change to the sentence. Without the Sun, there would be no earth as we know it.
1-359	1	4	34	4	34	solar radiation and solar particles [PROF. YEHIA HAFEZ, Egypt]	Rejected - Comment not clear

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1-360	1	4	34	4	34	It would be appropriate to indicate that there is actually a significant geothermal input to the climate system, which has not been assessed in this report. After "(Figure 1.1)", I therefore, suggest adding something to the effect of: "A generally unknown, but probably significant portion of the climate system is known to be affected somehow by heat from the interior Earth, i.e., geothermal heat. Where such heat occurs in sensible contact with the land and seafloor surface, it will have a warming effect, as witnessed where geysirs occur on land, and where hot vents occur on the seafloor." [Martin Hovland, Norway]	Rejected - There is no scientific basis for the current global change in climate to be associated with geothermal. These may have some local effects but no impact on the global climate.
1-361	1	4	34	4	34	I dont' know where the glossary is. Plus, I have not found any other bold faced word in the rest of the chapters I have reviewed. Maybe the glossary is meant only for the Introduction, but I found it strange. [Belén Martín Míguez, Spain]	Rejected - This question is beyond the scope of the Chapter 1 team.
1-362	1	4	34	4	35	Suggestion. "Approximately half of the energy is supplied in the visible part..."As can be seen from textbooks (for example Houghton, J. T.:The physics of atmospheres, 2nd ed., Univ. Press 1958, p.238), nearly 47% of incoming solar radiation is supplied in the 400 too 800 nm (visible) range, nearly 44% in the near infrafred and nearly 9% in the utraviolet regions. [Karl-Heinz Bernhardt, Germany]	Rejected - Chapter 1 does not give these details; this is covered in a later chapter.
1-363	1	4	34	4	35	this statement is not completely correct [PROF. YEHIA HAFEZ, Egypt]	Rejected - Nothing appears to be wrong with the sentence as written
1-364	1	4	34	4	35	About the sentence: "The bulk of the energy is supplied in the visible part of the electromagnetic spectrum." This statement must be improved, since for extraterrestrial solar irradiance (and even in general for terrestrial solar irradiance), the IR part of the spectrum, it has about the same contribution as the visible and UV has a small but significant contribution for different aspects of climate and life on Earth. [Rubén D Piacentini, Argentina]	Taken into account - Sentence has been rewritten.
1-365	1	4	34	4	36	Change, "The bulk of energy is supplied in the visible part…" to "The bulk of energy is supplied by the sun in the visible part…". I think this will help non-scientist understand the connection to "solar radiation" used in the next sentence. [Matthew Cervarich, United States of America]	Taken into account - Sentence has been rewritten
1-366	1	4	34			Change "the bulk" to "approximately half" to be correct [Roger Gifford, Australia]	Taken into account - Sentence has been rewritten.
1-367	1	4	35	4	35	Electromagnetic Spectrum should be added to the glossary or defined in the text. [Matthew Cervarich, United States of America]	Accepted - we will suggest to add this to the glossary
1-368	1	4	35	4	36	"Since the Earth has kept its temperature relatively constant over many centuries, the incoming solar energy must generally be in balance with outgoing radiation.". This statement needs to be explained since (1) the Earth energy balance is constnatly changing (Hansen et al., 2011) and (2) what is the significance of "many centuries", i.e. to what tage does it refer in terms of a previous change in the energy balance? This statement should either be explained or deleted. [Andrew Glikson, Australia]	Rejected - We use "relatively" as a qualifier.
1-369	1	4	35	4	36	All geologists know that this is untrue. The net enegy received by the earth fluictuates over periods ranging from a few seconds to billions of years and there is no mement when the input of energy equals the output in any part of the earth or as an overall average. [VINCENT GRAY, NEW ZEALAND]	Rejected - Basic physics shows that the earth must be in approximate balance over longer time scales to explain why the global temperatures have changed very little for many centuries. The sentence being slightly revised to make statement clearer.
1-370	1	4	35	4	37	I have several issues with the sentence: "Since the Earth has kept its temperature relatively constant… incoming solar energy must be in balance with outgoing radiation". First, I would say exactly the opposite- that it is because the incoming solar radiaiton has been balanced with the outgoing radiation that temerature on Earth has remained relatively constant over many centuries. I believe the cause and effect issue of this statement should be re-evaluated. My second issue is ascribing an action to the Earth as if it is a person by saying "the Earth has kept its temperature relatively constant". The Earth is not a sentient being that took actions to keep its temperature constant, unless you are a die-hard Gaia Hypothesis follower. I think this issue could be resolved by inverting the sentence such that the cause is balanced radiative budget and the effect is constant temperatures on Earth. [Allison Crimmins, United States]	Taken into account - Sentence has been revised.
1-371	1	4	35			"Since the Earth has kept its temperature relatively constant over many centuries" Earth doesnt do any keeping. I know its not a big deal, but I do think little things like this undermine the report. Better, "As Earth's	Taken into account - Sentence has been revised.

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						temperature has been relatively constant over many centuries". Better "As" than "Since" which in formal writing means "subsequent to" and is especially ambiguous here in the context of many centuries. [Stephen E Schwartz, USA]	
1-372	1	4	36	4	36	Based on the previous comment, I therefore suggest inserting "and geothermally supplied" between "solar" and "energy" [Martin Hovland, Norway]	Rejected - the amount of heat energy coming out of the Earth is actually too small to merit consideration. No action taken.
1-373	1	4	36	4	38	…Hard to read sentence. Better off separating ideas. [Darienne Ciuro , United States]	Taken into account - Sentence has been revised.
1-374	1	4	37	4	37	"Since the average temperature of the Earth is about 15°C (288 K)," This is the temprature of the Earth's surface, not of the Earth as a whole, which is in the range of ~500 - 5000 degrees Celsius. Specify "Earth surface temperature". [Andrew Glikson, Australia]	Accepted - Text has been revised
1-375	1	4	37	4	37	The average temperature of the earth cannot be measured as we are unable to distribute temperature sensors randomly over the surface. The figure is unknown. [VINCENT GRAY, NEW ZEALAND]	Rejected - Do you have to measure every cell in your body to know what the basic body temperature is? Just as with the Earth, a proper sampling tells you what you need to know. As we often find with this reviewer, this statement has no merit relative to the state of the science.
1-376	1	4	37	4	37	Qualify Statement by adding the word 'surface'. Should read: 'Since the average temperature of the Earth surface is about 15°C…' [Bennartz Ralf, US]	Accepted - Text revised
1-377	1	4	37	4	38	About the sentence: "Since the average temperature of the Earth is about 15°C (288 K), black body radiation theory indicates that the outgoing energy flux from the Earth is in the infrared part of the spectrum." The mean Earth ambient temperature must be specified for a given year. In particular, for the annual mean of 2010, it was 14.63 °C, following the GISS/NASA reference: http://data.giss.nasa.gov/gistemp/tabledata/GLB.Ts+dSST.txt (see also: http://www.earth-policy.org/indicators/C51). [Rubén D Piacentini, Argentina]	Rejected - We use the word "about". Exact numbers are given in Chapter 2.
1-378	1	4	37	4	38	Many readers of this chapter will not be familiar with the connection of mean temperature to black body radiation theory. It would be better to explain that the mean temperature determines the spectrum of the outgoing flux. Or, perhaps this sentence isn't necessary -- perhaps it is only necessary to indicate that the dominant loss is IR from the upper troposphere. [Eric Sundquist, United States of America]	Rejected - This is standard textbook knowledge that does not have to be repeated here.
1-379	1	4	37	4	47	These figures are mostly guesswork and all are subject to large uncertainties All of this ignores the influence of the real climate; air temperature, wind speed and direction, cyclomes and anticyclones, evaportaion and precipitation of water, ocean and air circulation,volcanic eruptions and cosmic rays [VINCENT GRAY, NEW ZEALAND]	Rejected - The statements in the chapter are based on a variety of measurements and physical analyses, including satellite data. No change to sentence.
1-380	1	4	37			Please add a statement towards the second stable earth – snowball earth – and a cite at the snowball earth GCM-experiments from the MPI Hamburg [Frank Kreienkamp, Germany]	Rejected - This would be rather confusing in this context.
1-381	1	4	37			please give the number of the natural greenhouse effect (~33K) [Frank Kreienkamp, Germany]	Rejected - This is too much detail for the chapter and would require extensive discussion to do properly.
1-382	1	4	38	4	39	About the sentence: "…of the incoming solar radiation, about half is absorbed the surface", add "by"at the end: "..absorbed by the surface". [Rubén D Piacentini, Argentina]	Accepted - Text revised
1-383	1	4	38	4	39	Consider to change' Of the incoming solar radiation, about half is absorbed by the Earcth's surface…' [Faustine Fidelis Tilya, United Republic of Tanzania]	Accepted - Text has been revised.
1-384	1	4	39	4	29	add 'at': '…half is absorbed at the surface.' [Bennartz Ralf, US]	Accepted - Text has been revised.
1-385	1	4	39	4	39	Write "absorbed in the surface" [Juan A. Blanco, Canada]	Accepted - Text has been revised.
1-386	1	4	39	4	39	"at the surface" [Olivier Boucher, France]	Accepted - Text has been revised.

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1-387	1	4	39	4	39	Insert "at" between "absorbed" and "the surface" [Jón Egill Kristjánsson, Norway]	Accepted - Text has been revised.
1-388	1	4	39	4	39	Word missing after "absorbed" [Ross McKitrick, Canada]	Accepted - Text has been revised.
1-389	1	4	39	4	39	missing word: … half is absorbed <at> the surface.. [Helga Nitsche, Germany]	Accepted - Text has been revised.
1-390	1	4	39	4	39	Add "by" before "the surface". Regarding Figure 1.1, I suggest that arrows should be proportional to the amount of energy implied. For example: if 50% is absorbed by the surface, this arrow should look close to half of the arrow leaving the sun. [Celeste Saulo, Argentina]	Accepted - Text has been revised. And Figure has been redrawn.
1-391	1	4	39	4	39	at the surface' instead of 'the surface [Reiner Steinfeldt, Germany]	Accepted - Text has been revised.
1-392	1	4	39	4	39	Add "by" before "the surface… [Jian Tian, United States of America]	Accepted - Text has been revised.
1-393	1	4	39	4	40	The 30% is not only due to clouds and the Earth's surface, but also gas molecules (Rayleigh scattering) and aerosols [Jón Egill Kristjánsson, Norway]	Taken into account - Text has been revised.
1-394	1	4	39	4	40	"incoming solar radiation, about half is absorbed the surface. Another 30% is reflected back to space by either clouds or the Earth's surface" Correct as "incoming solar radiation, about half is absorbed by the surface. Another 30% is reflected back to space by clouds and the Earth's surface" [Lokesh Kumar Sahu, India]	Accepted -Text has been revised.
1-395	1	4	39	4	40	the 30% reflected back to space is duein part to aerosols as well as clouds and the Earth's surface [Richard Somerville, USA]	Taken into account - Text has been revised.
1-396	1	4	39	4	40	Give references for the quoted numbers (absorbed, reflected radiation). [Manfred Wendisch, Germany]	Rejected - This is basic knowledge included in many prior books and assessments.
1-397	1	4	39			After "...about half is absorbed", insert "by". [Marcelo Galdos, Brazil]	Accepted - Text revised
1-398	1	4	39			Of the incoming solar radiation, about half is absorbed at the surface. (inserted "at" after absorbed) [Jiemjai kreasuwun, Thailand]	Accepted - Text has been revised.
1-399	1	4	39			"by the surface" [Prasanth Meiyappan, USA]	Taken into account - Text has been revised.
1-400	1	4	39			"atmospheric constituents" [Prasanth Meiyappan, USA]	Accepted - Text has been revised.
1-401	1	4	39			Missing word or phrase at "absorbed the surface" Suggest inserting "at" or "by" before "surface" [Forrest Mims, USA]	Accepted - Text has been revised.
1-402	1	4	39			... "about a half is absorbed the surface" it is necessary to change to "about a half is absorbed by the surface" [José Daniel Pabón-Caicedo, Colombia]	Accepted - Text has been revised.
1-403	1	4	40	4	41	Kindly consider to change to 'The long wave radiation (LWR) emmitted from the earths surface is largely radiated back by the atmospheric constituents (…)' [Faustine Fidelis Tilya, United Republic of Tanzania]	Accepted - Text has been revised.
1-404	1	4	40	4	42	"The longwave radiation (LWR) emitted from the surface is largely radiated back by atmosphere constituents (water vapour, CO2, CH4, N2O and other greenhouse gases (GHGs) and clouds)…". Nowhere in the paragraph is there a mention of the blackbody infrared radiation by rocks and minerals heated by incoming solar radiation? [Andrew Glikson, Australia]	Rejected - They are included in the "Earth's surface"
1-405	1	4	40	4	43	The explanation of GHE by "back radiation" of the LWR emitted from the surface is oversimplified! As can be seen from radiative transfer equations and their integration with respect to height, the downward LWR is a function of the vertical profiles of temperature and atmospheric constituents, such as GHGs and clouds, but it is independent explicitely from the radiation emitted from the surface. (In contrast, the upward LWR is a function of the temperature and constituent profiles, but also of the radiation emitted from the surface.) A	Rejected - These details are beyond the scope of this chapter, but are covered in later chapters.

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						downward LWR would exist also exist in an atmosphere without any emitting surface! In the Earth's atmosphere, downward LWR at the surface may exceed the emitted LWR, for example under a cloud layer warmer than the surface. For these reasons, the downward LWR cannot be interpreted i [Karl-Heinz Bernhardt, Germany]	
1-406	1	4	40	4	43	as a back radiated upwelling radiation! From the viewpoint of of atmospheric heat balance, the energy emitted as LWR into all direcctions originates not only from absorbed LWR, but also from other atmospheric energy sources, such as absorbed solar radiation, released latent heat etc. Suggestion:"The longwave radiation (LWR) emitted from the surface is largely absorbed by atmospheric constituents (water vapour, C02, CH4, N20 and other greenhouse gases (GHGs) and clouds), which themselves emit longwave radiation into all directions. The downward LWR adds heat to the lower layers of the atmosphere and to the surface." [Karl-Heinz Bernhardt, Germany]	Rejected - These details are beyond the scope of this chapter, but are covered in later chapters.
1-407	1	4	40	4	43	This statement is not correct. The longwave radition from the earth surface is not 'radiated back' from the atmosphere, rather it is largey absorbed by the atmosphere, which itself emits longwave radiation. Sentence should be slightly revised to reflect actual physical processes better. [Bennartz Ralf, US]	Taken into account - Text has been revised
1-408	1	4	40	4	44	This sentence has to be substantiated and illustrated following the introduction of this review report. If "the dominant energy loss of the infrared radiation of the earth is from higher layer from the troposphere", and since there is a hole in the thermal emission spectrum just at 15 micrometers which is precisely the frequency of the relevant vibration mode of the CO2 molecule, then CO2 will hardly be proven guilty in the sense of the sentence Chapter 1 Page 2 Lines 3-5, compared to the natural variability. [François GERVAIS, France]	Taken into account - Text has been revised. This is more detail than intended in the chapter (this level of detail is covered elsewhere).
1-409	1	4	41	4	41	LWR: same as before regarding arrows size. If most of the LWR is radiated back, then this portion of the arrow should be larger than the one that points to space [Celeste Saulo, Argentina]	Taken into account - Figures have been revised.
1-410	1	4	41	4	41	The upwelling surface LW is not ‘radiated back’ to the surface. Instead, it is partially absorbed by greenhouse substances, which in turn also emit LW radiation in all directions as a function of their temperature. [Gavin Schmidt, USA]	Taken into account - Sentence has been revised.
1-411	1	4	41	4	42	“constituents (water vapour, CO2, CH4, N2O and other greenhouse gases (GHGs) and clouds)” Here adding clouds is confusing once water vapour is listed as for as describing jut the constituents. [Lokesh Kumar Sahu, India]	Taken into account - Sentence has been revised,
1-412	1	4	41			a box or table listing the main greenhouse gases and their contribution would be helpful [Frank Kreienkamp, Germany]	Rejected - Such a table is included in Chapter 8 (Table 8.5).
1-413	1	4	43	4	43	The physics of the Grenhouse effect has been criticised by some (in non-convincing way in my view). Those views contribute to the "doubt" some have about the IPCC conclusions, and the IPCC would provide a very useful service to the community by assessing those views in an objective way. See Halpern et al. 2010 (DOI: 10.1142/S021797921005555X) for a basis for this assessment. [Jean-Pascal van Ypersele, Belgium]	Rejected - An attempt at falsifying the greenhouse effect that appears in an obscure journal that has been adequately responded to does not meet the necessity of discussing this in detail in the assessment where space is limited. Chapter 1 introduces the basic concept but such details would need to covered in a later chapter, if a response was warranted.
1-414	1	4	43	4	45	About the sentence: "The dominant energy loss of the infrared radiation from the earth is from higher layers of the troposphere. The Earth gains energy in the tropics and the subtropics". The first "earth" must be with an initial capital letter as the second one. [Rubén D Piacentini, Argentina]	Accepted - Text has been revised.
1-415	1	4	43			maybe it would be useful to compare the observed mean temperature of the Earth the estimated Earth temperature without an atmosphere put a scale on the magnitude of what atmospheric processes do [Larry Thomason, United States of America]	Taken into account - Text has been revised.
1-416	1	4	44	4	44	... loss of the infrared radiation from the earth system is from … [Claudio Cassardo, Italy]	Rejected- Instead Earth is now capitalized.
1-417	1	4	44	4	44	The sentence can though as confusing as it is stated that the energy loss from the Earth is higher layers of the troposphere. Moreover eventhough I am not an English-native speaker I wonder if lower and higher are the	Rejected - Text ok as is.

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						most convenient forms here. [Gillles Molinié, France]	
1-418	1	4	44	4	47	This sentence should be re-written, not very clear to general reader [Lokesh Kumar Sahu, India]	Accepted - Text has been revised.
1-419	1	4	45	4	45	looses → loses [Peter Burt, UK]	Accepted - Text has been revised.
1-420	1	4	45	4	45	"loses" [George Kiladis, USA]	Accepted - Text has been revised.
1-421	1	4	45	4	45	"looses" should be "loses" [Ross McKitrick, Canada]	Accepted - Text has been revised.
1-422	1	4	45	4	45	"loses" not "looses" [Marcus Sarofim, USA]	Accepted - Text has been revised.
1-423	1	4	45	4	45	Change "looses" by "loses". [Jian Tian, United States of America]	Accepted - Text has been revised.
1-424	1	4	45	4	46	"An energy flux in form of ocean currents and transports within the atmosphere…" This setence needs to be rewritte. For example it can be replaced by: "An energy flux is transported by ocean currents and the atmosphere". [Andrew Glikson, Australia]	Taken into account - Text has been revised to handle this concern,
1-425	1	4	46	4	46	"… in form of ocean currents and transports …". It appears that "ocean currents", which should be a form of "ocean transports", is picked out and emphasized in this sentence. If there is no special scientific or technical concern, "in form of ocean transports" or "in form of ocean currents, …, and … (etc.)" may help improve the logic of this sentence's structure. [Gan Zhang, United States]	Taken into account - Text has been revised.
1-426	1	4	46	4	47	'compensates the areas' is misleading; I would suggest 'compensates for the imbalance of the radiative energy budget between the areas' [Reiner Steinfeldt, Germany]	Taken into account - Text has been revised.
1-427	1	4	47	4	47	Need to have a primary reference here, not the Stackhouse reference from GEWEX News. I'm not sure if the work described has appeared in a peer-reviewed journal. I found this reference: Zhang, T. , Stackhouse Jr., P.W. , Gupta, S.K. , Cox, S.J. , Mikovitz, J.C.(2009). "Validation and analysis of the release 3.0 of the NASA GEWEX surface radiation budget dataset".AIP Conference Proceedings Volume 1100, 2009, Pages 597-600 but I don't think AIP Conference proceedings are peer-reviewed. I would say you should not include any work that is not peer-reviewed. [Robert Waterland, United States of America]	Taken into account - Text has been revised.
1-428	1	4	47			the Stackhouse ref seems inapprop; this is textbook stuff. [Stephen E Schwartz, USA]	Accepted - The reference has been eliminated.
1-429	1	4	47			Surely there are more foundational references than Stackhouse et al. 2011 for this statement. [Eric Sundquist, United States of America]	Taken into account - The reference has been eliminated.
1-430	1	4	49	4	49	the GLOBAL energy budget [Gavin Schmidt, USA]	Accepted - The text has been revised.
1-431	1	4	49	4	50	In the "fluctuations in the energy budget", I expected to see also a contribution of the outgoing SWR because of changes in Earth's albedo; probably what you wanted to say in the next sentence; so see next comment line 51. [Francois DANIS, France]	Accepted - We have changed "incoming" to "net incoming"
1-432	1	4	49	4	52	This bit is confusing. First of all, the energy budget can fluctuate because of other things than changes in incoming solar radiation (which I take to mean downward TOA SW radiation) and OLR. In fact reflected TOA SW radiation does fluctuate on various timescales. Then I don't think incoming solar radiation depends on the Earth's albedo, unless you're talking about incoming solar radiation at the surface rather than at TOA. Finally reliable measurements of solar radiation exists at the Earth's surface, what cannot be measured from the surface is incoming solar radiation at the top of the atmosphere. [Olivier Boucher, France]	Taken into account - The text has been revised.
1-433	1	4	49	5	4	Here and throughout, watch placement of restrictive adverbs: Can only be made from space --> can be made only from space. Similarly, largely caused by changes in the atmospheric composition --> caused largely by changes ... [Stephen E Schwartz, USA]	Accepted - Text revised
1-434	1	4	50	4	50	outgoing longwave radiation is called 'OLr' here, but 'LWR' at other places (e.g.p.5, l. 39) [Reiner Steinfeldt, Germany]	Accepted - The text has been revised. We plan to use LWR consistently.

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1-435	1	4	50	4	51	"Changes in incoming solar radiation derive from changes in the Sun's output of energy or changes in the Earth's albedo." The change in the Earth's albedo should not be lumpted with the incoming radiation since it has an effect on the outgoing radiation. [Andrew Glikson, Australia]	Accepted - The text has been revised.
1-436	1	4	50	4	51	Changes in incoming solar radiation at the top of the atmosphere are not effected by albedo. Should be more specific here. [Gareth S Jones, UK]	Accepted - The text has been revised.
1-437	1	4	50	4	51	This statement is not correct. Changes in incoming solar radiation' do not derive from albedo changes whereas changes in absorbed radiation might. Other processes both at annual and larger time scales that change 'incoming solar radiation' are changes in earth-sun distance. [Bennartz Ralf, US]	Accepted - The text has been revised.
1-438	1	4	50	4	51	Should say either "Changes in absorption of incoming solar…" or remove end phrase about albedo (change in albedo does not alter incoming solar). [Drew Shindell, USA]	Accepted - The text has been revised.
1-439	1	4	51	4	52	How "precise" the incoming solar radiation was known is a relative statement. Satellites gave values covering a range of 1361 to 1374Wm-2 (Kopp and Lean GRLdoi:10.1029/2010GL045777) [Gareth S Jones, UK]	Taken into account - We use the term "about". Exact numbers are discussed in later chapters (e.g., Chapter 8.).
1-440	1	4	51			changes in the earth albedo doesn't change the "incoming solar radiation"; but the contribution of the "incoming solar radiation". See also comment above. [Francois DANIS, France]	Accepted - The text has been revised.
1-441	1	4	51			Reliable ---> Longterm (Also from ground reliable measurements can be made, even more reliable than from space) [Manfred Wendisch, Germany]	Rejected - There are no "long term" measurements from space.
1-442	1	4	51			"changes in the Sun's output of energy, in the Sun-Earth distance, or chnages in the Earth's albedo" [Eric Wolff, United Kingdom of Great Britain & Northern Ireland]	Accepted - The text has been revised.
1-443	1	4	52	4	53	Recently, the solar radiation constant has been changed to 1360.8 W/m2, the value of 1368 W/m2 represents the old one. [Anmin Duan, China]	Taken into acount - In this chapter we only give a brief overview. Measurements of the value of the TSI and associated uncertainties are given in Chapter 8.
1-444	1	4	52	4	53	1368 seems rather high for the "generally accepted" value. Until recently it has been either 1360 or 1365Wm-2. However the latest estimate is thought to be the most accurate = 1361Wm-2, Kopp and Lean GRLdoi:10.1029/2010GL045777 [Gareth S Jones, UK]	Taken into account - In this chapter we only give a brief overview. Measurements of the value of the TSI and associated uncertainties are given in Chapter 8.
1-445	1	4	52	4	53	Mean of solar constant may be too high and is unreferenced. Suggest adding citation and range of best values. See next comment. [Forrest Mims, USA]	Taken into account - In this chapter we only give a brief overview. Measurements of the value of the TSI and associated uncertainties are given in Chapter 8.
1-446	1	4	52	4	53	See 1360.8 ± 0.5 W m−2 by Kopp and Lean in GEOPHYSICAL RESEARCH LETTERS, VOL. 38, L01706, doi:10.1029/2010GL045777, 2011 [Forrest Mims, USA]	Taken into account - In this chapter we only give a brief overview. Measurements of the value of the TSI and associated uncertainties are given in Chapter 8.
1-447	1	4	52	4	53	Give reference for 1368 W m-2 number and ist uncertainty of 0.2 % [Manfred Wendisch, Germany]	Taken into account - In this chapter we only give a brief overview. Measurements of the value of the TSI and associated uncertainties are given in Chapter 8.
1-448	1	4	52	4	55	The value of the TSI is discussed before the quantity is defined. [Georg Feulner, Potsdam]	Accepted - The sentence has been rephrased.
1-449	1	4	52	4	55	"The generally accepted mean valueis 1368 Wm-2…". Observations from SORCE-TIM suggest a value of 1361 Wm-2, which falls outside the "generally accepted value". [Norman Loeb, United States of America]	Taken into account - In this chapter we only give a brief overview. Measurements of the value of the TSI and associated uncertainties are given in Chapter 8.
1-450	1	4	52	4	55	About the sentences: "The generally accepted mean value is 1368 W m−2 with an accuracy of about 0.2%. Variations of a few tenths of a percent are common, usually associated with a passage of a solar cycle (see also Chapter 5). The solar cycle variation of total solar irradiance (TSI) is of the order of 0.1% (AMS, 2000)". Please give the corresponding reference to the "accepted mean value" and take into account that there are new data that support the high quality measurements made by the SORCE satellite instrument. See for example the reference given in this AR5-WGI FOD, Chapter 8, page 71, lines 32-24: Kopp, G., and J. L. Lean	Taken into account - In this chapter we only give a brief overview. Measurements of the value of the TSI and associated uncertainties are given in Chapter 8.

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						(2011), A new, lower value of total solar irradiance: Evidence and climate significance, Geophys. Res. Lett., 38, L01706, doi:10.1029/2010GL045777. ABSTRACT: The most accurate value of total solar irradiance during the 2008 solar minimum period is 1360.8 ± 0.5 W m−2 according to measurements from the Total Irradiance Monitor (TIM) on NASA's Solar Radiation and Climate Experiment (SORCE) and a series of new radiometric laboratory tests. This value is significantly lower than the canonical value of 1365.4 ± 1.3 W m−2 established in the 1990s, which energy balance calculations and climate models currently use. Scattered light is a primary cause of the higher irradiance values measured by the earlier generation of solar radiometers in which the precision aperture defining the measured solar beam is located behind a larger, view-limiting aperture. In the TIM, the opposite order of these apertures precludes this spurious signal by limiting the light entering the instrument. We assess the accuracy and stability of irradiance measurements made since 1978 and the implications of instrument uncertainties and instabilities for climate research in comparison with the new TIM data. TIM's lower solar irradiance value is not a change in the Sun's output, whose variations it detects with stability comparable or superior to prior measurements; instead, its significance is in advancing the capability of monitoring solar irradiance variations on climate-relevant time scales and in improving estimates of Earth energy balance, which the Sun initiates. Total Solar Irradiance at extraterrestrial level can be obtained from the SORCE web page: http://lasp.colorado.edu/sorce/data/tsi_data.htm#summary_table . [Rubén D Piacentini, Argentina]	
1-451	1	4	52			After "..mean value" reitorate exactly what is being refered to as 1368 W m-2. Is it the incoming total solar radiation above the atmosphere? [Roger Gifford, Australia]	Taken into account - The wording has been rephrased to increase clarity.
1-452	1	4	53	4	53	For clarity elsewhere in the WG1 documentation it would be helpful to consider mentioning the term solar constant in this context. [Peter Burt, UK]	Rejected - See the WG1 Glossary.
1-453	1	4	53	4	53	A value of 1368 W/m2 seems rather outdated. In Chapter 8 a value of 1365 W/m2 is used, also discussing latest results indicating that a value of 1361 W/m2 (Kopp, G., and J. L. Lean (2011), A new, lower value of total solar irradiance: Evidence and climate significance, Geophys. Res. Lett., 38, L01706, doi:10.1029/2010GL045777) might be more appropriate. [Georg Feulner, Potsdam]	Taken into account - In this chapter we only give a brief overview. Measurements of the value of the TSI and associated uncertainties are given in Chapter 8.
1-454	1	4	53	4	53	The value of TSI should be consistent between the different chapters. [Hugues Goosse, Belgium]	Accepted - We agree. In this chapter we only give a brief overview. Measurements of the value of the TSI and associated uncertainties are given in Chapter 8.
1-455	1	4	53	4	53	with uncertinty instead of accuracy [PROF. YEHIA HAFEZ, Egypt]	Taken into account - In this chapter we only give a brief overview. Measurements of the value of the TSI and associated uncertainties are given in Chapter 8.
1-456	1	4	53	4	53	The value 1368 W m-2 for the solar constant is far too high. Recent, corrected estimates are lower, see e.g., Kopp and Lean (2011: doi:10.1029/2010GL045777), who give 1360.8 W m-2 at solar minimum (+/- 0.5 W m-2) [Jón Egill Kristjánsson, Norway]	Taken into account - In this chapter we only give a brief overview. Measurements of the value of the TSI and associated uncertainties are given in Chapter 8.
1-457	1	4	53	4	53	is 1368 W/m2 still the best estimate? Pg. 58 of chapter 2 suggests 1360.8 w/m2 [Marcus Sarofim, USA]	Taken into account - In this chapter we only give a brief overview. Measurements of the value of the TSI and associated uncertainties are given in Chapter 8.
1-458	1	4	53	4	53	1368 is almost certainly wrong (~1361 is closer, Kopp and Lean, 2011 + ACMIP3 recalibration), and is unlikely to be 'generally accepted' by the time AR5 is published. [Gavin Schmidt, USA]	Taken into account - In this chapter we only give a brief overview. Measurements of the value of the TSI and associated uncertainties are given in Chapter 8.
1-459	1	4	53	4	53	This figure is incorrect. See Kopp and Lean, GRL, 2011, doi:10.1029/2010GL045777.This paper shows a value much lower, viz. 1360.8 +- 0.5 W/m2 measured from SORCE [James Wanliss, USA]	Taken into account - In this chapter we only give a brief overview. Measurements of the value of the TSI and associated uncertainties are given in Chapter 8.
1-460	1	4	53	4	55	2 sentences with same meaning except one sentence uses "few tenth%", the other "0.1%"; it seems a contradiction. One sentence only would do with only one value? [Francois DANIS, France]	Accepted - The text has been revised.
1-461	1	4	53	4	55	These two sentences repeat the same information [Gareth S Jones, UK]	Accepted - The text has been revised.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1-462	1	4	53	4	55	"Variations of a FEW tenths of a percent are common…" followed by "The solar cycle variation of total solar irradiance (TSI) is of order of 0.1% (AMS, 2000)". Please correct the inconsistency betwee these two sentences. [Norman Loeb, United States of America]	Accepted - The text has been revised.
1-463	1	4	53			1368; 0.2% Kopp and Lean (GRL 2011) estimate a total solar irradiance of 1360.8 ± 0.5 W m-2 (one sigma) at the last solar minimum, well below the range of previous estimates. This estimate gains credibility because of laboratory measurements that show that the measurement geometry of earlier generations of satellites that had reported higher values of solar irradiance were biased high as a result of scattered light. Accounting for the total solar maximum being roughly 1.6 W m-2 greater (Kopp and Lean, 2011) yields an average over the solar cycle of 1361.6 W m-2. For the average ratio of Earth's surface area to its projected area, 4.0034, the average TOA irradiance is 340.1 ± 0.1W m- 2. [Stephen E Schwartz, USA]	Taken into account - In this chapter we only give a brief overview. Measurements of the value of the TSI and associated uncertainties are given in Chapter 8.
1-464	1	4	54	4	54	… associated with a passage of a solar cycle … [a solar cycle do not pass!] [Claudio Cassardo, Italy]	Accepted - The text has been revised.
1-465	1	4	54			Could refer to both chapters 5 and 8 here, as both describe solar cycle forcing (chapter 8 shows the observational record). [Drew Shindell, USA]	Accepted -The text has been revised.
1-466	1	4	55	4	55	Refer to Section 8.3.1.1.1 for solar irradiance changes instead of AMS 2000 [George Kiladis, USA]	Accepted -The text has been revised.
1-467	1	4	55	4	55	Is there a better reference than AMS,2000? You might try this one : Lean, J. L. (2010). "Cycles and trends in solar irradiance and climate." Wiley Interdisciplinary Reviews: Climate Change 1(1): 111-122. [Robert Waterland, United States of America]	Accepted - The text has been revised.
1-468	1	4	55	4	56	Consider changing "emissivity" of longwave radiation to emission of longwave radiation. [Norman Loeb, United States of America]	Accepted - The text has been revised.
1-469	1	4	55			it should be mentioned that there are - additionally to the TSI variations in context of the 11-year solar cycle – further anomalies and variations of solar activity on larger time scales (e.g. anomalies of Maunder and Spörer types, longer-term cycles like Gleissberg or others) [Jucundus Prof. Dr. Jacobeit, Germany]	Accepted - The sentence has been rephrased.
1-470	1	4	56	4	56	"temperature of the planet". Should be "temprature of the Earth surface". [Andrew Glikson, Australia]	Accepted - The text has been revised.
1-471	1	4	56	4	57	Consider changing to: "For the atmosphere, changes in emission are predominantly due to changes in temperature, humidity, cloud cover, cloud height, and cloud thickness or in greenhouse gases… [Norman Loeb, United States of America]	Accepted - Thank you. The text has been revised.
1-472	1	4	56			"atmosphere's emissivity". I believe it is not what you are meaning: "transparency"? Or “atmosphere blocking earth emissivity”? I believe “atmosphere emissivity” could be a factor, but it's probably small compared to the rest. [Francois DANIS, France]	Accepted - The text has been revised.
1-473	1	4	57			same comment as about “emissivity” line 56. [Francois DANIS, France]	Accepted - The text has been revised.
1-474	1	5	1	1		Page 5: second paragraph (reference?) [Medani Bhandari, Nepal]	Accepted - A reference has been added.
1-475	1	5	1	5	1	This "balance" is ridiculous since most of the quantities have huge uncertainties and all the genuine influences on the cllimate have been ignored. The differences between day and night are completely neglected. [VINCENT GRAY, NEW ZEALAND]	Rejected - This comment has no basis relative to the extensive literature on the Earth's energy budget. No change to the sentence.
1-476	1	5	1	5	2	Replace "The budget of the Earth is largely in balance (Figure 1.1), but a small imbalance in the radiative budget (on the order 0.59" with "The energy budget of the Earth is largely in balance (Figure 1.1) but measurements indicate a small imbalance in the radiative budget (on the of order 0.59". [Robert Waterland, United States of America]	Accepted - The text has been revised.
1-477	1	5	1	5	4	The specific refernece to the Hansen, et al paper in the parantheses is confusing, because it may be interpreted that climate change is caused by a six year imbalance. I suggest stating the possible range of the past and current imbalance and add the trenberth, et al reference Earth's Global Energy Budget Authors:	Taken into account - Sentence redone consistent with this request.

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						Trenberth, Kevin E.; Fasullo, John T.; Kiehl, Jeffrey Publication: Bulletin of the American Meteorological Society, vol. 90, issue 3, p. 311 [David Bader, USA]	
1-478	1	5	1	5	4	The number is actually 0.58+/-0.15. [Gareth S Jones, UK]	Accepted -The text has been revised.
1-479	1	5	1	5	4	The sentence should be splitted in two. [Gillles Molinié, France]	Accepted - The text has been split into two sentences.
1-480	1	5	1	5	4	I would that 'some recent studies suggest'. While very plausible, this is, in my view, by no means certain. [Bennartz Ralf, US]	Accepted - The text has been revised.
1-481	1	5	1	5	4	This sentence could be a bit confusing for someone who doesn't know the point it is trying to make. I think it could be made more straightforward to read by breaking it up into two sentences (and removing the parenthesis) or by adding a comma somewhere due to the multiple subjects of thought being expressed. [Bradley Tomasek, United States of America]	Accepted - The text has been revised.
1-482	1	5	1		4	The discussion of energy imbalance deserves a para on its own. [Stephen E Schwartz, USA]	Rejected - The detailed discussion of the earth energy imbalance is given in later chapters.
1-483	1	5	1		4	If the energy imbalance is to be discussed here, it should also be mentioned that the imbalance remained positive through a solar minimum. [Anji Seth, United States of America]	Rejected - The detailed discussion of the earth energy imbalance is given in Chapter 2.
1-484	1	5	1			parentheses should be before particle [Swarnali Sanyal, USA]	Accepted - The text has been revised.
1-485	1	5	1			The budget ---> The radiative energy budget [Manfred Wendisch, Germany]	Accepted - The text has been revised.
1-486	1	5	2	4	2	For the unit WM-2, make "-2" superscript. [Jian Tian, United States of America]	Accepted - The text has been revised.
1-487	1	5	2	5	2	"-2" should be a superindex font [Juan A. Blanco, Canada]	Accepted - The text has been revised.
1-488	1	5	2	5	2	m-2 → m-2 [Peter Burt, UK]	Accepted - The text has been revised.
1-489	1	5	2	5	2	6-year → 6 year [Peter Burt, UK]	Accepted - The text has been revised.
1-490	1	5	2	5	2	"but a small imbalance". see my comment for page 2 line 17 [Andrew Glikson, Australia]	Taken into account - The text has been revised.
1-491	1	5	2	5	2	WM-2 -2 must be upper [PROF. YEHIA HAFEZ, Egypt]	Accepted - The text has been revised.
1-492	1	5	2	5	2	W.m-2: the -2 should be an exponent. [Gillles Molinié, France]	Accepted - The text has been revised.
1-493	1	5	2	5	2	Typo in -2 (superscript) [James Wanliss, USA]	Accepted - The text has been revised.
1-494	1	5	2	5	3	"but a small imbalance in the radiative budget (on the order of 0.59 +/- 0.15 Wm-2)…". I believe the 0.15 Wm-2 uncertainty is 1-sigma, not 90% confidence level. Also note that a recent paper published in Nature Geosciences quantifies the imbalance for 2001-2010 to be 0.5 +/- 0.43 Wm-2 (90% confidence level). The error analysis is more complete than that done in Hansen et al. The reference is: Loeb et al., 2012: Observed changes in top-of-the-atmosphere radiation and upper-ocean heating consistent within uncertainty. Nature Geosc., DOI: 10.1038/NGEO1375 [Norman Loeb, United States of America]	Rejected - The detailed discussion of the earth energy imbalance is given in later chapters (e.g., Chapter 2).
1-495	1	5	2	5	4	How to reconcile this sentence with the observations for example of http://www.bom.gov.au/climate/mjo/graphics/region.ts.dateline.gif showing that since the beginning of 2008, the OLR is on an average largely above the mean of 239 W/m2, showing experimentally that, except during the last El Niño, earth is cooling ? [François GERVAIS, France]	Rejected - The detailed discussion of the earth energy imbalance is given in later chapters (e.g., Chapter 2).
1-496	1	5	2	5	4	It is not the residual imbalance that has driven climate change (imagine a planet with no heat capacity - climate change would respond instantly to the forcing, but the imbalance would always be zero). [Gavin Schmidt, USA]	Taken into account - The sentence has been revised.
1-497	1	5	2		4	The discussion of energy imbalance deserves a para on its own. The language	Rejected - Such detail belongs in a later chapter. The

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
						"but a small imbalance in the radiative budget (on the order 0.59 ± 0.15 Wm-2 during the 6-year period 2005–2010, Hansen et al., 2011) largely caused by changes in the atmospheric composition is thought to be driving the observed changes in climate" entirely misses the point. This is not driving the observed changes; it is a consequence of the forcing and is thus part of the response. It is a change in climate (namely the change in the part of the climate that is the transfer of heat among compartments). But more importantly in this context, the transfer of heat to the ocean removes that heat from the atmosphere/surface compartment of the climate system and thus _reduces_ the observable changes in observables in that compartment of the climate system that would otherwise be manifested more greatly. Additionally quantification of this imbalance is essential to understanding climate system response to forcing. It is subtractive from forcing. In general DH/dt = N = F - lambda* DeltaT where lambda is inverse of equilibriium sensitivity. Hence lambda = (F-N)/DeltaT. Or Equilibrium Sensitivity (K/W m-2) = DeltaT/(F-N). Hence Heating rate is subtractive from forcing to give effective forcing F-N. So knowledge of N is essential to interp of obsd temp increase over industrial period. Key References: Gregory, J. M., R. J. Stouffer, S. C. B. Raper, P. A. Stott, and N. A. Rayner (2002), An Observationally based estimate of the climate sensitivity, J. Climate, 15, 3117-3121. Schwartz S. E., Charlson R. J., Kahn R. A., Ogren, J. A., and Rodhe H. Why Hasn't Earth Warmed as Much as Expected? J. Climate 23, 2453-2464 (2010); doi: 10.1175/2009JCLI3461.1. Finally delete "on the order", which conventionally means order of magnitude, which is clearly not meant. [Stephen E Schwartz, USA]	discussion of the earth energy imbalance is given in Chapter 2. More on the radiative forcing and the climate sensitivity is found in Chapter 8.1.1.1.
1-498	1	5	2		4	(….small imbalance in the radiation budget…etc.): I believe that more careful explanation is required here before the general public will be able to understand this-- that includes the entire scientific community outside the climate science world, as also all policy people. In particular, for example, the previous paragraph (Pg 1-4, L: 49 – 55) implies that changes in total solar radiation of the order of 0.1% is too small to be of consequence. Yes, I know that there are time scales involved and various feedbacks involved etc., which applied over long periods of time can/will impact or cause climate change. But, the question to the reader is going to be as follows: (a) The small imbalance in the radiative budget as stated is "on the order of 0.59 +/- 0.15 W/m2 during the 6-year period from 2005 – 2010. Solar radiation is ~ 1368 W/m2, and the solar cycle variation in TSI is 0.1%. 0.1% of 1368 W/m2 = 1.368 W/m2. Of course, this change is spread out over an entirely different time scale. Moreover, that is not the Watts/m2 solar radiation absorbed at the surface of the Earth. But, this is not going to be obvious to an outside reader without further explanation. At first glance, 1.368 W/m2 is a much larger number than the small imbalance caused by GHG's etc. of "0.59 W/m2." The stated time scale of 6 years will go unnoticed. Moreover, the time scales of solar radiation change are not mentioned. I think you will see the point I am making. Subtleties such as this example need to be much better explained throughout the entire report. From this, one may infer the reasons as to why the findings of the IPCC are difficult to communicate to the non-climate science community. We (us global we) are basically talking to ourselves and take many fundamental issues for granted—on the assumption that everybody already knows all this material. That is not the case when trying to communicate a message to the world at large. [Sushel Unninayar, USA]	Rejected - Such detail belongs in a later chapter. The discussion of the earth energy imbalance is given in Chapter 2. More on the radiative forcing and the climate sensitivity is found in Chapter 8.1.1.1.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1-499	1	5	2			the unit Wm-2should be written with -2 as superscript [Swarnali Sanyal, USA]	Accepted - The text has been revised.
1-500	1	5	2			unit: Wm-2 change to Wm2 [Soydoa Vinitnantharat, Thailand]	Accepted - The text has been revised.
1-501	1	5	3	5	3	missing comma in between "composition" and "is though" [Gillles Molinié, France]	Taken into account - The text has been split into two sentences.
1-502	1	5	3	5	4	Suggestion:"... is thought to be driving the observed changes in climate, especially the climate system warming." [Karl-Heinz Bernhardt, Germany]	Accepted - The text has been revised. But we think this suggestion would require too much explanation that is likely already covered din a later chapter.
1-503	1	5	3			Is this statement incontrovertible? The wording would imply that this is with out any doubt. [Larry Thomason, United States of America]	Accepted - The text has been revised.
1-504	1	5	6	5	6	Consider to change to' Humans are changing the energy budget of the planet by changing its surface properties …' to accommodate land and oceans. [Faustine Fidelis Tilya, United Republic of Tanzania]	Accepted - The text has been revised.
1-505	1	5	6	5	7	a reference needed [PROF. YEHIA HAFEZ, Egypt]	Rejected - Why? This has been stated in the last IPCC report.
1-506	1	5	6	5	7	shoud read "such as…." [Bennartz Ralf, US]	Accepted - The text has been revised.
1-507	1	5	6	5	7	Replace "Humans are changing the energy budget of the planet by changing the land surface properties as well as atmospheric concentrations of gases and aerosols" with "Humans are changing Earth's energy budget by changing both the character of the land surface and the atmospheric concentrations of gases and aerosols". [Robert Waterland, United States of America]	Taken into account - The text has been revised
1-508	1	5	6	5	10	The main human effects on the climate are the interference with convective cooling by day by reducing turbulence and the discouraging of cooling by evaporation. [VINCENT GRAY, NEW ZEALAND]	Rejected - No basis provided for the comment.
1-509	1	5	6	6	21	All this discussion depends on the unlikely belief that radiation exchange is the only influence on the climate [VINCENT GRAY, NEW ZEALAND]	Rejected - This paragraph is not saying that there are no other influences on climate but it is saying that radiative processes are extremely importance to the Earth's budget. When climate is discussed we need make sure that other forcings are discussed.
1-510	1	5	6		27	do all anthropogenic added components to the atmosphere increase the greenhouse effect? please state example for the opposite [Frank Kreienkamp, Germany]	Taken into account - All of the listed components enhance the greenhouse gas effect. But the answer to the reviewer comment is no. Some aerosols by themselves would cool the climate.
1-511	1	5	7	5	7	Suggestion:"...of gases and aerosols (Chapter 2 and Chapter 7), whereas the direct heat release from anthropogenic energy production is negligible in the global scale, but must be considered in local and regional scales (urban climate, climate of industrial reqions)." [Karl-Heinz Bernhardt, Germany]	Accepted - The text has been revised.
1-512	1	5	7	5	7	Write "such as" [Juan A. Blanco, Canada]	Accepted - The text has been revised.
1-513	1	5	7	5	7	I would refer to chapter 8 here as well. [Olivier Boucher, France]	Accepted - The reference has been added.
1-514	1	5	7	5	7	Insert "as" after "such" [Sharad K Jain, India]	Accepted - The text has been revised.
1-515	1	5	7	5	9	Check the sentence from "Land use changes" to "..carbon content". Need to rephrase. [Jian Tian, United States of America]	Accepted - The text has been revised.
1-516	1	5	7	5	11	Replace "Land use changes such as converting forests to agriculture, modify the characteristics of vegetation, including its colour, seasonality and carbon content. For example, converting a forest to agricultural land reduces carbon storage in vegetation, adding it to the atmosphere, while also changing the short wave albedo, rates of evapotranspiration and long wave emissions (Figure 1.1)." with "Land use changes such as the	Accept - paragraph has been revised.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
						conversion of forests to agriculture, change the characteristics of vegetation, including its colour, seasonal growth and carbon content. For example, clearing and burning a forest to prepare agricultural land reduces carbon storage in vegetation, adding CO2 to the atmosphere, and changes the reflectivity of the land, rates of evapotranspiration and long wave emissions (Figure 1.1). Changes in land use and the concentration and distribution of atmospheric components can alter the Earth's reflectivity or albedo." [Robert Waterland, United States of America]	
1-517	1	5	7			statement lacking correct grammatical usage. [Prasanth Meiyappan, USA]	Accepted - The text has been revised.
1-518	1	5	7			The word "land use" has been used incorrectly. Strictly speaking land use referes to the intention causing a change in land cover such as agricultural expansion, wood logging, shifting cultivation, etc. Deforestation (forest -> cropland) is a result of land-use as deforestation can occur due to variety of reasons (eg. wood logging, agricultural expansion). Deforestation should be referred by the word "land-cover change".The statement should be reframed as land-use activities such as "agricultural expansion". Another way to do is "land cover change such as conversion of forest to agriculture". [Prasanth Meiyappan, USA]	Taken into account - The text has been revised.
1-519	1	5	7			Change "Land use changes such" to "Land use changes, such as" [Forrest Mims, USA]	Accepted - The text has been revised.
1-520	1	5	7			Land use changes such.. 'as' is missing after such [Swarnali Sanyal, USA]	Accepted - The text has been revised.
1-521	1	5	8	5	8	Add: ……..converting forests to agriculture crops and livestock pastures……. [CRISTOBAL FELIX DIAZ MOREJON, Cuba]	Taken into account - Text has been revised
1-522	1	5	8			Land use changes, such as converting forests to agriculture, modify the characteristics of vegetation, including color, seasonality and carbon content.(inserted "," after changes and "as" after such) [Jiemjai kreasuwun, Thailand]	Accepted - The text has been revised.
1-523	1	5	8			Change "colour" to "spectral reflectance and absorption" [Forrest Mims, USA]	Accepted - this wording is physically more correct.
1-524	1	5	8			among the modifications from converting forests to agriculture, changes in the water budget with redistributions between latent and sensible heat fluxes should also be mentioned [Jucundus Prof. Dr. Jacobeit, Germany]	Accepted - The text is revised.
1-525	1	5	8			colour ---> reflection [Manfred Wendisch, Germany]	Accepted - The text has been revised.
1-526	1	5	9			an indication of how much the converstion contributed would be important [Christoph Mueller, Germany]	Rejected - A comprehensive discussion can be found in Chapter 6.
1-527	1	5	10			suggest changing "adding significant part of it to atmosphere", as many underground vegetation (roots) remains unaltered many times. [Prasanth Meiyappan, USA]	Taken into account - The text has been revised.
1-528	1	5	11	5	11	"a source of albedo" reads a bit strange. [Olivier Boucher, France]	Accepted - The text has been revised.
1-529	1	5	11	5	12	Again, the reflection of gas molecules (Rayleigh scatter) needs to be added [Jón Egill Kristjánsson, Norway]	Taken into account - The text has been revised.
1-530	1	5	11	5	12	The dominant source of albedo comes from the surface and from clouds ---> The Earth's albedo is dominated by the surface and cloud reflection properties [Manfred Wendisch, Germany]	Taken into account - The text has been revised.
1-531	1	5	11	5	14	Replace "The dominant source of albedo comes from the surface and from clouds, but aerosol particles can also enhance the reflectivity of the atmosphere. On the other hand, particulate black carbon is a strong absorber, and at present is considered the second most important anthropogenic warming agent after CO2" with "Reflection from clouds and from the surface dominates Earth's albedo but reflection from atmospheric aerosols are also important. Aerosols, a diverse class of tiny, suspended liquid and solid particles, play a dual role: many reflect incoming sunlight but some aerosols can also reflect solar radiation. All aerosols absorb radiation in the infrared region of the spectrum and so they augment the greenhouse effect." [Robert Waterland, United States of America]	Taken into account - Too long, but the text has been revised.
1-532	1	5	11			"The dominant source of albedo". I think that "source" is the wrong word choice here, as "albedo" is a	Accepted - The text has been revised.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
						dimensionless ratio. It is a property, not a noun. So I'm not sure that you can have a "source" of a dimensionless ratio. This should be reworded such that the surface and clouds (noun) have a high albedo (property of the noun). [Allison Crimmins, United States]	
1-533	1	5	12	5	12	"aerosol particles can alos enhance…." is not accurate. In the following BC is discussed to have absorbing effect, so here it [Jian Tian, United States of America]	Taken into account - Sentence has been revised
1-534	1	5	12	5	12	is better to say aerosol's direct effect on climate, then separate the scattering and aboorbing aerosols in the following sentences. [Jian Tian, United States of America]	Taken into account - Sentence has been revised.
1-535	1	5	12	5	14	Is black carbon in general "considered the second most important anthropogenic agent"? Or is it for a specific part of the radiation budget? Please specify and provide supporting refs. [Tor Eldevik, Norway]	Accepted - The text has been revised.
1-536	1	5	12	5	14	No, methane is second to CO2 as warming forcing (chap 8). [Gareth S Jones, UK]	Accepted - The text has been revised..
1-537	1	5	12	5	14	About the sentence: "... On the other hand, particulate black carbon is a strong absorber, and at present is considered the second most important anthropogenic warming agent after CO2.", the importance of black carbon seems to be much larger than was considered in IPCC AR4. So, at least a reference of the Chapter and item were this point is analyzed in detail must be given or a reference to the scientific literature were this new result is included. [Rubén D Piacentini, Argentina]	Accepted - The text has been revised.
1-538	1	5	13	5	13	I'd prefer a statement that BC is the 2nd or 3rd most important anthropogenic forcing agent: CH4 is also up there, especially if O3 and stratospheric water vapor effects are included. [Marcus Sarofim, USA]	Accepted - The text has been revised.
1-539	1	5	13	5	14	"On the other hand, particulate black carbon is a strong absorber, and at present is considered the second most important anthropogenic warming agent after CO2." This statement is difficult to reconcile with radiative forcing charts, for example in Chapter 8 Figure 8.27, which indicate CH4 is more important forcing agents between 1750 and 2010. Alternatively, in stating "at present" does the statement refer to the last couple of years? If so, specify. [Andrew Glikson, Australia]	Taken into account - The text has been revised.
1-540	1	5	14	5	15	The sentence "because water vapor preferentially condenses onto particles" is inaccurate and misleading. I suggest to replace it by something like "some of the aerosols are hygroscopic, and thereby able to serve as CCN" [Jón Egill Kristjánsson, Norway]	Accepted - text has been revised.
1-541	1	5	14	5	20	This bit seems to ignore ice clouds. More than the CCN population, what determines the radiative properties of the clouds are the cloud microphysical properties (in addition to cloud height, geometrical cloud thickness etc…). [Olivier Boucher, France]	Taken into account - Text has been revised to take this into account.
1-542	1	5	14	5	26	The English needs work. [David Randall, USA]	Accepted - The text has been rewritten.
1-543	1	5	15	5	15	vapor → vapour [Peter Burt, UK]	Accepted - The text has been revised.
1-544	1	5	15	5	15	Change to "…onto particles to formation cloud condensation nuclei (CCN)…". [Jian Tian, United States of America]	Rejected - sentence ok as is
1-545	1	5	15			replace cloud condensation nuclei with"formig clound condensation nuclei" [Prasanth Meiyappan, USA]	Taken into account - The text has been revised.
1-546	1	5	19	5	20	This is inaccurate. The degree of warming / cooling is also determined by the water content of the cloud and the cloud droplet or ice crystal size (and even ice crystal shape). It is not clear what exactly is meant by "nature of the CCN population" in this context. [Jón Egill Kristjánsson, Norway]	Accepted - The text has been revised.
1-547	1	5	21	5	27	Although these are basic concepts, I suggests to add a reference here. [Claudio Cassardo, Italy]	Rejected - This is basic stuff so no reference needed.
1-548	1	5	22	5	22	"nitrose" should be "nitrous" [Olivier Boucher, France]	Rejected - actually it should be "nitrogen oxides"
1-549	1	5	22	5	22	Volatile Organic Compounds should be added to the glossary. [Matthew Cervarich, United States of America]	Taken into account - We will suggest to include VOCs in the glossary.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1-550	1	5	22	5	22	"Nitrose" s/b nitrous [Ross McKitrick, Canada]	Rejected - actually it should be "nitrogen oxides"
1-551	1	5	22	5	22	I think “nitrose oxides” should be “mono-nitrogen oxides (NO and NO2)”. Nitrous (note, not nitrose) oxide is N2O. [Eelco Johan ROHLING, United Kingdom of Great Britain & Northern Ireland]	Rejected - actually it should be "nitrogen oxides"
1-552	1	5	22	5	22	Is nitrose commonly used? Nitrogen oxides is more common, I thought? [Marcus Sarofim, USA]	Accepted - actually it should be "nitrogen oxides"
1-553	1	5	22			Hereafter are the hierarchy of ionic character of several chemical bondings of molecules relevant for air, calculated from the differences of Pauling's electronegativities, C-F : 0.43, S-F : 0.39, O-H : 0.34, N-F : 0.22, C-O : 0.19, N-H : 0.19, S-O : 0.19, C-H : 0.04, N-O : 0.04. The hierarchy of ionic characters determines the hierarchy of instantaneous dipole moments which couple with the electric field of infrared radiation and give rise to infrared absorption. It is seen that the ionic character of S-O equals that of C-O and is much larger than C-H. The sentence qualifying SO2 as negligible GHG, therefore, has to be substantiated. Is it related to the lifetime of the molecule in the atmosphere ? Relevant lifetimes obtained by isotopic observations have to be documented here. Lifetimes are given in Table 2.12 but without any explanation nor reference to their measurement, and SO2 data are not given there. About lifetimes, see also the comment about Chapter 2 Page 44 Lines 34-36 later on. [François GERVAIS, France]	Rejected - actually it should be "nitrogen oxides"
1-554	1	5	22			"nitrose oxides"? Shouldn't that be nitrogen oxides? [Roger Gifford, Australia]	Accepted - actually it should be "nitrogen oxides"
1-555	1	5	22			Nox spelled incorrectly [Prasanth Meiyappan, USA]	Accepted - Text has been revised
1-556	1	5	22			Change "nitrose" to "nitrous" [Forrest Mims, USA]	Accepted - Text has been revised
1-557	1	5	22			"nitrose oxides" should be "nitrogen oxides" [David Parrish, USA]	Accepted - Text has been revised.
1-558	1	5	22			nitrose' should be 'nitrogen', no? [Drew Shindell, USA]	Accepted - Text has been revised
1-559	1	5	23	5	23	"GHE" should be "GHG" [Andrew Glikson, Australia]	Rejected - GHE means greenhouse effect
1-560	1	5	24			"LWR active gases". This is a very awkward way to get at what you're saying. I assume you mean something like "longwave radiation reflecting"; that these gases are capable of re-radiating LWR back towards the Earth's surface. But the phrase LWR active is a little confusing. [Allison Crimmins, United States]	Taken into account - The reviewer comment is incorrect. Nonetheless the sentence has been rewritten for clarity.
1-561	1	5	25	5	27	"Since anthropogenic emission sources simultaneously emit some chemicals that affect climate, others that affect air pollution, and others that affect both, air pollution and climate science are intrinsically linked." There is a problem with the term "pollution", the question being whether all anthropogenic emissions ought to be termed "pollution" or only those considered harmful, which involves scientific and value judgements. Perhaps it is better to avoid using the term "pollution" altogether to avoid this problem? [Andrew Glikson, Australia]	Rejected - We disagree. The OECD definition (http://stats.oecd.org/glossary/detail.asp?ID=86) is: Air pollution is the presence of contaminant or pollutant substances in the air that do not disperse properly and that interfere with human health or welfare, or produce other harmful environmental effects.
1-562	1	5	25	5	27	This sentence is confusing, consider simplifing the sentence. [Jian Tian, United States of America]	Accepted - The sentence has been rewritten
1-563	1	5	25			remove "some" [Prasanth Meiyappan, USA]	Accepted - The text has been revised..
1-564	1	5	28	5	28	This may be a good place to add a section on natural climate variability [Sybren Drijfhout, Netherlands]	Taken into account - Natural variability has been added to the discussion in section 1.2.2.
1-565	1	5	29	5	29	trace gases instead of trace [PROF. YEHIA HAFEZ, Egypt]	Accepted - The text has been revised.
1-566	1	5	29	5	30	Replace "The changes in atmospheric trace constituent concentration are modifying the radiative budget, and these changes in radiation are called radiative forcing." with "Changes in the atmosphere, land, ocean and cryosphere - both natural and manmade - can perturb Earth's radiation budget and each individual perturbation is known as a radiative forcing." [Robert Waterland, United States of America]	Accepted - The text has been revised.
1-567	1	5	30	5	31	Define RF here or cite where in the report it is defined; check that a definition is used consistently through entire report. [Michael Neil Evans, United States of America]	Accepted - The definition is given. Moreover, reference is made to chapter 8 for further details on

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							these concepts.
1-568	1	5	30	5	32	The term might be new but the concept of AF is far from new (IPCC 2007 WG1 Fig 2.2). Also only SSTs are not allowed to adjust not all surface temperatures (Chap 8). [Gareth S Jones, UK]	Taken into account - Definition from Chapter 8: "This forcing is the adjusted forcing (AF), which is defined as the change in net irradiance at the TOA after allowing for atmospheric and land temperatures, water vapour, clouds and land albedo to adjust, but with sea surface temperatures (SSTs) and sea ice cover unchanged." Reference will be made to Chapter 8. Also, it is not clear if the use of the term in AR4 was exactly the same as now defined.
1-569	1	5	30	5	35	I have reviewed several manuscripts in which the use of "radiative forcing" and "global warming potential" were inaccurate and interchanged. I understand there is a strong desire to avoid repeating information in previous reports but I believe that it would be very helpful to restate the defintion here. This would help the reader understand the distinction between "radiative forcing" and "adjusted radiative forcing". [Nathaniel Ostrom, United States of America]	Taken into account - Radiative forcing and GWPs are clearly not the same, but this chapter is not the one to define GWPs .We did add the definition of RF to the chapter.
1-570	1	5	30			The "traditional definition" should not just be mentioned, it should be given here. [Manfred Wendisch, Germany]	Accepted - The definition has been added.
1-571	1	5	31	5	31	"Chapter" should be "Chapters". [Olivier Boucher, France]	Accepted - The text has been revised.
1-572	1	5	31	5	32	The new concept is named 'adjusted forcing (AF)' and thus 'radiative' can be deleted [Gunnar Myhre, Norway]	Accepted - The text has been revised.
1-573	1	5	32	5	32	"net (down minus up) irradiance". This is far from clear. [Andrew Glikson, Australia]	Accepted - Definition has been revised slightly to match that in chapter 8..Reference has been made to Chapter 8.
1-574	1	5	32	5	35	"AF is defined as the change in net (down minus up) irradiance (solar plus longwave; in W m–2) at the top of the atmosphere (TOA) after allowing for atmospheric temperatures, water vapour and clouds to adjust, but with globally-averaged surface temperature unchanged." The definition of AF is unclear. I suggest clarify and rewrite. [Andrew Glikson, Australia]	Accepted - Definition has been revised slightly to match that in chapter 8. Reference has been made to Chapter 8.
1-575	1	5	32	5	35	Comparing to the definition in 8.1.1, the statement here of "allowing… global-averaged surface temperature unchanged" is inaccurate. Although SST dominates the global mean surface temperature, however, once allowing the land surface temperature to "adjust" the overall averaged value would be different, even if it's small. I'm truly amazed by the three different descriptions given in three different places. Indeed this is a "new concept", apparently has not being well examined in literature. [Chien Wang, United States of America]	Accepted - Definition has been revised slightly to match that in chapter 8. Reference has been made to Chapter 8.
1-576	1	5	33			“solar plus longwave”. Isn't it “minus”? [Francois DANIS, France]	Accepted - Definition has been revised slightly to match that in chapter 8. Reference has been made to Chapter 8.
1-577	1	5	34	5	35	Chapter 8 defined AF as stated here except not with globally-averaged surface temperature unchanged, but rather sea surface temperatures and sea-ice cover unchanged. [Drew Shindell, USA]	Accepted - Definition has been revised slightly to match that in chapter 8..Reference has been made to Chapter 8.
1-578	1	5	37	5	37	I propose to supplement Figure 1.1 with a schema of global energy balance, as given, for example, by Fig. 1.1 in the zero order draft. [Karl-Heinz Bernhardt, Germany]	Taken into account - This has been taken into account in the revised figure.
1-579	1	5	38	5	38	figure 1.1 main physical drivers [PROF. YEHIA HAFEZ, Egypt]	Taken into account - Figure and caption have been revised.
1-580	1	5	38	5	38	Milankovitch cycles also have a role in climate change and a brief description of these may be included here [Sharad K Jain, India]	Rejected - This is outside the scope of such a simple diagram.
1-581	1	5	38	5	38	Nice figure, but I don't think “Drivers” is a good concept here: one model's driver is another internal variability	Rejected - We disagree. Drivers is commonly used in

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						and irrelevant to a third model. “Energy transformations” would be a better label for this useful schematic. [Martin Juckes, UK]	the climate science community. A sentence has been added to the text to introduce the concept.
1-582	1	5	38	5	38	About Figure 1.1: The words in the inner part of this and other figures must be written with a larger font (since they are difficult to see). [Rubén D Piacentini, Argentina]	Accepted - The figure has been revised.
1-583	1	5	38	5	38	I suggest that you cite The Warming Papers, by Archer and Pierrehumbert, in addition to Le Treut et al. 2007. [David Randall, USA]	Rejected - This comment is not related to these lines. Probable Page 3 Line 36 is meant. We don't think the additional reference is needed.
1-584	1	5	40	5	40	"can drive important changes in energy budget" is poorly worded and not clear. [Jón Egill Kristjánsson, Norway]	Accepted - "important" has been deleted.
1-585	1	5	41	5	41	About Figure 1.1: "….. (gas and particles)..". Actually the atmospere is made of different gases (plural) and particles [Rubén D Piacentini, Argentina]	Accepted - "gas "has been replaced with "gases".
1-586	1	5	43	5	43	I'd move CO2 into the "predominant" category with water vapour and clouds. At 20+%, I think it deserves that status. [Marcus Sarofim, USA]	Accepted - The figure caption has been revised.
1-587	1	5	43			This the first of 19 uses of "vapor" instead of the predominant use (54 times) of "vapour" Suggest to search "vapor" and replace with "vapour" in entire AR5. [Forrest Mims, USA]	Editorial - The UK English spelling should have been used.
1-588	1	5	44	5	44	About Figure 1.1: "...(mainly dust and sea spray)." In other part of this AR5-WGI report, it is indicated that "black carbon" is the second cause of the greenhouse effect. So, it must be included in the parenthesis, ie: (mainly black carbon, dust and sea spray). [Rubén D Piacentini, Argentina]	Accepted - The figure has been revised.
1-589	1	5	44	5	44	About Figure 1.1. d) It is not clear what means the words in the inner part of this figure: "Ocean color, waves" [Rubén D Piacentini, Argentina]	Accepted - The figure has been revised
1-590	1	5	46	5	46	need a reference [PROF. YEHIA HAFEZ, Egypt]	Rejected - This is a very general statement based on prior assessments.
1-591	1	5	46			Last sentence: This balance can be affected by anthropogenic land use change as well as climate change? This entire figure caption needs to be rewritten for clarity. [Anji Seth, United States of America]	Accepted - The caption has been revised.
1-592	1	5	47	5	47	The discussion gives the impression that the climate is inherently static and only changes in response to external forcing. Perhaps a sentence is needed to the effect of: "In the absence of external forcing the climate system is not static but exhibits periodic and chaotic variation on long and short time scales. The following discussion concerns climatic responses to specific external forcings." [Ross McKitrick, Canada]	Taken into account - A discussion on natural variability has been added to the section.
1-593	1	5	48	5	48	"the climate feedbacks describe how the climate system". The term "Earth system" is more approporiate here since the feedbacks arise not only from the climate system but also from the oceans, land, vegetation and the ice sheets - more suitably termed "Earth system". [Andrew Glikson, Australia]	Taken into account - Sentence has been revised.
1-594	1	5	48	5	53	There are a number of problems with this discussion of feedbacks: Feedbacks generally act on perturbations, not forcings. The feedback process is the same, whether the perturbation comes from external forcing or internal variability. “climate feedbacks describe”, “water vapour feedback argues”: Feedback theory provides a conceptual framework: the feedbacks themselves are not advocates, they are properties of the system – defined relative to perturbations. A feedback leads to a forcing which will, if nothing else is going on (unlikely) lead to further warming – saying that a feedback leads to warming is an over simplification. E.g. (continued from comment 24) “ … being a greenhouse gas, leads in turn to a positive forcing on the atmospheric temperature” [Martin Juckes, UK]	Taken into account - Text has been revised.
1-595	1	5	48	5	58	The paragraph on feedbacks is very good, although accompanying figure 1.2 will be overwhelming to non-scientist. I feel the figure should be left, with a complimentary figure of one of the examples. Possibly, a figure that shows the loop: Ice melts -> Albedo Decreases -> More Solar Radiation absorbed -> Atmosphere warms -> Ice Melts. The figure could be referred to immediately after the process is explained in words. Also, a negative feedback should be included to help define and explain the negative feedback process. [Matthew	Taken into account - Figure 1.2 has been revised.

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						Cervarich, United States of America]	
1-596	1	5	48	6	5	In this section, it is also worth introducing the notion of the 'Earth system sensitivity' used frequently since the AR4 to characterize those processes relevant on longer timescales than the classical Charney sensitivity. Since it has become widely adopted and discussed in detail in the paleoclimate section, the introduction should mention it. [Chris Colose, United States]	Taken into account -The Earth System sensitivity and climate sensitivity is extensively discussed for example in Chapter 9 and Chapter 10.
1-597	1	5	48	6	5	Why is FIRE - a major feedback to global warming associated with draughts and heat waves (for example see Bowman, D.M. et al., 2009. Fire in the Earth system. Science, 24 (324): 481-484) not mentioned in this paragraph and in other parts of the introduction? [Andrew Glikson, Australia]	Accepted - This has been added to the figure.
1-598	1	5	48	6	21	I believe that this draft of AR5 Chapter 1 is more balanced than AR4 as tipping points, inertia (climate change commitment) and feedbacks are given due importance despite the difficulties in predicting these. It may be useful to note literature such as Charlesworth M & Okereke C (2010, Policy responses to rapid climate change: An epistemological critique of dominant approaches, Global Environ. Change, 20:121-129, doi:10.1016/j.gloenvcha.2009.09.001) which wrestles with the policy implications of these characteristics of the climate. It may also be worth having a specific diagram that identifies feedbacks that have (e.g. arctic sea ice) or may start (e.g. permafrost melting, widespread fires in the amazon, collapse of ice shelves holding back large Antarctic ice sheets) rapidly contributing to dangerous climate change, as a summary of those aspects of climate evidence that are causing scientists the greatest cause for concern. It would be helpful if the uncertainty surrounding the timing and extent of the feedbacks and their effects could be made clear. It is vital to policy decisions for an opinion to be offered about the possibility of one tipping point being crossed, leading another inevitably to be crossed given inertia in the earth system, thus leading to another tipping point being crossed and so on – a domino effect. The limits of this opinion and uncertainties around these possible phenomena should be made clear. Some mention should also be made of other stresses to the Earth System e.g. persistent organic pollutants causing deaths of plants and animals in the oceans, leading to further changes in gases exchanged between the ocean and atmosphere. Chapter 12 page 8, section 12.5.2, 12.5.5 and Chapter 5 sections 5.6-5.7 offer some relevant thoughts; however, these are not all clear to the non-specialist, do not spell out as exactly as is possible the implications for policy decisions and would be better given more prominent treatment in chapter 1. I would suggest that this includes a phrase along the lines of 'Given the range of plausible possibilities of abrupt climate change and the high levels of uncertainty surrounding these, then clearly a more prudent (precautionary) approach to climate policy should be applied than has been the case for the last 20 years'. I recognise that this goes beyond science but believe that the scientists involved in IPCC WG1 have a responsibility as citizens to make clear to policymakers what the policy implications of the science is, on the pivotal questions that policymakers should wrestle with. [Mark Charlesworth, United Kingdom of Great Britain & Northern Ireland]	Taken into account - The "tipping points" discussion has been rewritten.
1-599	1	5	48		58	are there no examples for negative feedbacks? [Frank Kreienkamp, Germany]	Accepted - An example has been added to the text.
1-600	1	5	49	5	54	The English needs work. [David Randall, USA]	Accepted - The text has been revised.
1-601	1	5	50	5	50	decay instead of diminish [PROF. YEHIA HAFEZ, Egypt]	Rejected - We disagree.
1-602	1	5	51	5	53	The "water vapour feedback" leading to higher water vapour content of the atmosphere should be defined with respect to I amplified downward LWR emitted from water vapour itself, but not from "more greenhouse gases" altogether. Suggestion:"... will lead to more water vapour, which is the most effective greenhouse gas, and this way to a positive feedback leading to further warming." [Karl-Heinz Bernhardt, Germany]	Accepted - The text will be revised.
1-603	1	5	51	5	53	Observations mentioned in Chapter 2 Page 37 Lines 3-10 do not support water vapor feedback. [François GERVAIS, France]	Rejected - Absolute water vapour has increased. This is the quantity needed for water vapour feedback, not relative humidity.
1-604	1	5	51	5	53	This assertion about the positive feedback of water vapour is at best incomplete, for it fails to invoke the negative feedback that can accompany enhanced cloud cover that follows increased water vapour (which is alluded to at page 17, lines 23-24). If the assertion was correct, the tropics might face a runaway greenhouse effect. Correcting this assertion will provide a good example of the uncertainties and unexpected	Rejected - Here, it serves as an example to illustrate feedbacks. More details are given in Chapter 7

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						consequences that feedback(s) can provide. [Forrest Mims, USA]	
1-605	1	5	52	5	52	"argues" should be replaced by "works in such a way" [Jón Egill Kristjánsson, Norway]	Taken into account - The text has been revised.
1-606	1	5	52	5	53	Replace "For example, the water vapour feedback argues that higher temperatures will lead to more water vapour, thus more greenhouse gases in the atmosphere, and a positive feedback leading to further warming." with "An example of a positive feedback is the water vapour feedback which describes the process whereby an increase in surface temperature enhances water evaporation and increases the amount of water vapour present in the atmosphere. Water vapour is a powerful greenhouse gas: increasing it enhances the greenhouse effect and leads to further surface warming." [Robert Waterland, United States of America]	Accepted -The text has been revised.
1-607	1	5	52			Colloquial English. The water vapour feedback cannot argue anything! People argue things. [Roger Gifford, Australia]	Accepted - The text has been revised.
1-608	1	5	52			The word "argues" is out of place here. It seems defensive. The water vapor feedback is no less definite than the ice-albedo feedback, which is described more affirmatively in the next sentence. [Eric Sundquist, United States of America]	Accepted - The text has been revised.
1-609	1	5	53	5	54	May be worth closing the loop by saying something like: "...as ice surface melts, leading to more absorption of solar radiation and warming, which then leads to more melting of the ice". Alternatively, a potential negative feedback could be illustrated by using clouds. [George Kiladis, USA]	Taken into account - The text has been revised.
1-610	1	5	53	5	54	“Another example is … as ice surface melts.” Although the ice-albedo feedback is a fairly straightforward and widely known mechanism, several more words are needed to make this mechanism better clarified. Current expression omits some links in this feedback so that the cycle appears incomplete. In addition, to demonstrate the meaning of “climate feedbacks” alone, one example should be adequate in this case. If the authors intend to demonstrate “positive” and “negative”, obviously the ice-albedo feedback should be replaced. [Gan Zhang, United States]	Taken into account - The text has been revised for clarity.
1-611	1	5	54	5	54	Replace "as ice surface melts" with "as highly reflective ice surfaces melt" [Robert Waterland, United States of America]	Taken into account - The text has been revised for clarity.
1-612	1	5	54	5	55	Replace "In addition, some feedbacks operate quickly (seconds), while others can take decades to centuries" with "Some feedbacks effect therir full change quickly (seconds), while others develop over decades to centuries." [Robert Waterland, United States of America]	Taken into account - The text has been revised for clarity.
1-613	1	5	55	5	56	"the time scale of feedbacks is very important to understand the full impact of a feedback" is ambiguously worded and must be changed. What is probably meant is: "in order to understand the full impact of a feedback mechanism, its time scale needs to be considered", or something like that. [Jón Egill Kristjánsson, Norway]	Taken into account - The text has been revised for clarity.
1-614	1	5	56	5	57	The sentence says that ocean uptake of heat can take centuries to equilibrate. This implies that the oceans are unlikely to be in equilibrium at any time. [Sharad K Jain, India]	Taken into account - The text has been revised for clarity.
1-615	1	5	56	5	57	The "uptake of heat" is not a feedback; perhaps clarify what the feedback is in this contect. [Nathaniel Ostrom, United States of America]	Taken into account - Text has been revised
1-616	1	5	57			"Based on" is not correct; one way to define CS is to use the response to doubled CO2, so maybe you mean "Defined as". But one can certainly measure a climate sensitivity based on other perturbations, so "Based on" is not correct. [Eric Wolff, United Kingdom of Great Britain & Northern Ireland]	Taken into account - Text has been revised
1-617	1	5	58	5	58	"Eckholm" must be replaced by Ekholm (Nils Gustav Ekholm, 1848-1923). [Karl-Heinz Bernhardt, Germany]	Accepted - Text has been revised
1-618	1	5	58	5	58	need a recent reference [PROF. YEHIA HAFEZ, Egypt]	Rejected - This is a rather old concept.
1-619	1	5	58	5	58	the concept [PROF. YEHIA HAFEZ, Egypt]	Taken into account - Text has been revised.
1-620	1	5	58	5	58	It may be worthwhile here to emphasise that climate is never in equilibrium on all timescales, so “equilibrium” is technically speaking better named “quasi-equilibrium”, or the word “equilibrium” is retained but then the timescale over which the equilibration is considered should be mentioned. This seems pedantic, perhaps, but	Taken into account - Text has been revised and cites related box in chapter 11.

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						there is a palaeoclimate chapter here (Ch. 5), and there changes are considered that are slow but continuous, and measured over different (much longer) timescales than the future trends. So a timescale-qualification to the word equilibrium seems to be useful to me. [Eelco Johan ROHLING, United Kingdom of Great Britain & Northern Ireland]	
1-621	1	6	1	6	1	ECS is too vague and misleading a term. Define the Charney sensitivity instead. [Gavin Schmidt, USA]	Taken into account - Equilibrium climate sensitivity is elaborated on in several chapters (e.g. Chapter 5, 7, 8, 9, 10, 11, 12) . Text has been revised.
1-622	1	6	1	6	2	About references: "(Hansen et al., 1981; Manabe and Wetherald, 1967; Newell and Dopplick, 1979; Schneider et al., 1980)". I suggest to include the references with the oldest first, up to the most recent one. The same for the rest of AR5-WGI. [Rubén D Piacentini, Argentina]	Editorial - The reference list is done automatically in the edit process.
1-623	1	6	1			Here and throughout the document, I recommend that climate sensitivity be presented as response per forcing, units K/(W m-2), instead of (preferably) or in addition to (for historical continuity) units of K per CO2 doubling. The forcing of CO2 doubling varies from model to model and in Rad Transfer calculations, e.g., Collins JGR06 Rad Transfer Model Intercomp Project. Use of systematic units always advances the science; we report pressure in N m-2 or pascal in lieu of Torr because densitiy of mercury needs to be specified, etc. The problem is much worse when the unit of measurement, here temperature response per CO2 doubling is based on a quantity, CO2 doubling forcing, that is itself rather uncertain (at least 10%; probably more, especially when considering adjusted forcing). There are consequent problems of aliasing variation in sensitivity with variation in CO2 forcing (Webb Climate Dyn 06) diminishing apparent variation of sensitivity among models. For that matter look at the spread in CO2 doubling forcing in Table 9.2, Page 9-65. [Stephen E Schwartz, USA]	Rejected - TSU suggests that we stick with the traditional IPCC definition for ECS.
1-624	1	6	2	6	4	This sentence is confusing, please rewrite [Juan A. Blanco, Canada]	Accepted - The text has been revised.
1-625	1	6	2	6	5	Your description of TCR is very strict "1%yr-1 CO2 increase". To me, it seems it cannot offer any insight on other parameters if CO2 is the only thing changing; therefore, it seems it's only useful for comparing models; a draw back from ECS. I am the lay person; I don't know yet; I need to read on and I didn't have time to read chapters 9 and 12... But I expect your sentence is too short to correctly describe the TCR. [Francois DANIS, France]	Taken into account - A reference has been made to other chapters that give more information on this. The text has also been revised for clarity.
1-626	1	6	2	6	5	Not so clear in sentence. It should be divided into 2 sentences [Soydoa Vinitnantharat, Thailand]	Taken into account - The text has been revised for clarity.
1-627	1	6	3	6	3	suggest specifying "global ocean-atmosphere coupled model" [George Kiladis, USA]	Taken into account - The text has been revised for clarity.
1-628	1	6	3	6	4	the last part of the definition of TCR is unclear, particularly refering to "at the time of atmospheric CO2 doubling" [Celeste Saulo, Argentina]	Taken into account - The text has been revised for clarity.
1-629	1	6	3			"experiment". For the lay reader, experiment is with instrument. Suggestion: a "run" or a "model run" or a "simulation"... [Francois DANIS, France]	Accepted - The text has been revised.
1-630	1	6	4	6	5	A better explanation for TCR is needed here -- it is a model result, not something to "derive from observations." In one sentence, please describe why it is needed in addition to climate sensitivity. The principal point is the difference between equilibrium and transient response. [Eric Sundquist, United States of America]	Taken into account - The text has been revised for clarity.
1-631	1	6	4	6	39	It is strange to discuss radiative forcing and aerosols without mentioning clouds. [David Randall, USA]	Taken into account - Text has been revised. Why does Randall's comments all have the wrong page number???
1-632	1	6	6			I think it very impt to add "transient climate sensitivity" here. This is the proportionality between observed temp increase and forcing. This is an important emerging new concept. Key refs: Held IM, Winton M, Takahashi K, Delworth T, Zeng F, Vallis GK (2010) Probing the Fast and Slow	Taken into account - We added references to the chapters that should consider these papers.

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						Components of Global Warming by Returning Abruptly to Preindustrial Forcing. J Climate 23:2418-2427. doi:10.1175/2009JCLI3466.1 Padilla, LE, Vallis GK, Rowley CW, (2011) Probabilistic Estimates of Transient Climate Sensitivity Subject to Uncertainty in Forcing and Natural Variability. J. Climate, 24: 5521–5537. doi: http://dx.doi.org/10.1175/2011JCLI3989.1 Schwartz S. E. (2012) Determination of Earth's transient and equilibrium climate sensitivities from observations over the twentieth century: Strong dependence on assumed forcing. Surveys Geophys. In press. http://www.ecd.bnl.gov/steve/pubs/ObsDetClimSensy.pdf Other terminology, e.g., "transient climate response," has been used Dufresne J-L, Bony S. (2008) An assessment of the primary sources of spread of global warming estimates from coupled atmosphere-ocean models. J. Climate 21: 5135-5144. doi: 10.1175/2008JCLI2239.1 [Stephen E Schwartz, USA]	
1-633	1	6	6			There have been further important advances that might be discussed. Suggest language such as the following: Another key quantity is the heat uptake coefficient, kappa, the coefficient of proportionality between planetary heat uptake rate N and increase in GMST over the industrial period DeltaT, such that N = kappa*DeltaT. This expression, if accurately describing the uptake of heat by Earth climate system in response to forcing over industrial period, together with climate response to forcing, DH/dt = N = F - lambda* DeltaT, where lambda is inverse of equilibriium sensitivity, leads to DeltaT = F/(lambda + kappa), allowing identification of transient sensitivity S_tr = (lambda + kappa)^-1. The proportionality of N to DeltaT has been examined in model studies (Gregory and Forster, 2008; Dufresne and Bony, 2008) as the slope of a regression of net heat flux into the planet, relative to control runs, against GMST anomaly in the output of 16 AOGCMs that participated in the intercomparison of models over the twentieth century carried out by the IPCC (2007) Fourth Assessment; for the 16 models examined the mean value was 0.62 ± 0.13 (1 sigma); maximum 0.83; minimum 0.41. Schwartz (2012) determined kappa observationally as 1.06 ± 0.05 (1 sigma). Knowledge of kappa permits determination of equilibrium sensitivity from transient sensitivity. Dufresne J-L, Bony S. (2008) An assessment of the primary sources of spread of global warming estimates from coupled atmosphere-ocean models. J. Climate 21: 5135-5144. doi: 10.1175/2008JCLI2239.1 Gregory JM, Forster PM (2008) Transient climate response estimated from radiative forcing and observed temperature change. J Geophys Res 113:D23105. doi:10.1029/2008JD010405 Schwartz S. E. (2012) Determination of Earth's transient and equilibrium climate sensitivities from observations over the twentieth century: Strong dependence on assumed forcing. Surveys Geophys. In press. http://www.ecd.bnl.gov/steve/pubs/ObsDetClimSensy.pdf [Stephen E Schwartz, USA]	Taken into account - see response to comment 1-632
1-634	1	6	8	6	8	There are "minus" signs of different size (e.g the one included in cloud feedbacks). Do they have any meaning?, in that case this should be clarified in the figure caption. [Celeste Saulo, Argentina]	Accepted - The caption has been revised.
1-635	1	6	8	6	9	"Figure 1.2: Climate feedbacks and timescales. The climate feedbacks of increasing carbon dioxide and rising temperature include negative feedbacks such as black body radiation, lapse rate, and ocean uptake of carbon dioxide feedbacks." There is a problem here, namely: (1) Why does black body radiation (which warms the atmosphere) constitutes a "negative feedback"?; (2) How acidification of the oceans (which reduces calcification and thus reduces CO2 sequestration in the long term) constitutes a "negative feedback"? ; (3) Why the "lapse rate" (atmospheric cooling with height) constitutes "negtive feedback"? [Andrew Glikson, Australia]	Rejected - These feedbacks are indeed positive. Acifidification is discussed in Chapter 3; FAQ 3.2 "The CO2 that is taken up by the ocean does not contribute to greenhouse warming. Ocean warming, however, reduces the solubility of carbon dioxide in seawater; and thus reduces the amount of CO2 the oceans can absorb from the atmosphere." According to Chapter 7, the lapse rate feedback is strongly positive.

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1-636	1	6	8	6	9	It is not clear at all how to read "The climate feedbacks of increasing carbon dioxide and rising temperature". It is easier to misunderstand it than to understand it correctly. At the very least it would help to replace "of" by "associated with". [Jón Egill Kristjánsson, Norway]	Taken into account - The text has been revised.
1-637	1	6	9	6	9	delete comma after 'rate' [Peter Burt, UK]	Accepted - The text has been revised.
1-638	1	6	9	6	9	About Figure 1.2: "…. lapse time…". This expression is not explainded previously in the text, so an explanation must be included here (ie, in parenthesis) or in the previous text. [Rubén D Piacentini, Argentina]	Rejected - We disagree. This is a well known term.
1-639	1	6	12	6	12	?missing word: .In the samller box, the large difference <in> time scale.. [Helga Nitsche, Germany]	Taken into account - The caption has been revised.
1-640	1	6	12	6	13	last sentence in figure caption is incomplete/does not make sense [Bennartz Ralf, US]	Taken into account - The caption has been revised.
1-641	1	6	13	6	13	Wouldn't carbon cycle feedbacks deserve a mention here? [Jón Egill Kristjánsson, Norway]	Taken into account - The figure has been redone.
1-642	1	6	15	6	17	Is this consistent with how commitment is described in chapter 12? [Gareth S Jones, UK]	Taken into account - Chapter 12.5.2 : "Climate change commitment, the idea that the climate will change further after the forcing or emissions, …"; this is consistent with the definition given here. For clarity, we also include "emissions" in this statement.
1-643	1	6	15		21	Is it correct to relate irreversibility and tipping points in this way? [Anji Seth, United States of America]	Taken into account - The text has been revised.
1-644	1	6	15			Commitment refers not only to past forcing, but can also be commitment to past emission, or to constant forcing. AR4 chapter 10 defines the various forms clearly, and I suggest those definitions should remain to minimize confusion. [Reto Knutti, Switzerland]	Taken into account - For clarity, we also include "emissions" in this statement.
1-645	1	6	16	6	17	"Even if climate forcings were fixed at current values the climate system would continue to change until it came into equilibrium with those forcings.". It will help the reader if a brief indication is provided as to how can equilibrium be restored in future. [Andrew Glikson, Australia]	Taken into accout - Text has been revised to account for this concern.
1-646	1	6	16			"commitment". Careful. Commitment is a consequence of long-lived ghg's, not a consequence of present forcing, which includes some forcing by short lived aerosols. [Stephen E Schwartz, USA]	Taken into account - Agreed, but it doesn't affect the definition as stated.
1-647	1	6	17	6	17	Change "slow" to "short". [Jian Tian, United States of America]	Rejected - "slow" is the right wording in this context.
1-648	1	6	18	6	18	… time of some aspects components of the climate system ... [Claudio Cassardo, Italy]	Taken into account - Text has been rewritten.
1-649	1	6	18			"many centuries". Careful. If emissions (of both ghg's and aerosol precursors) cease, GMST will rise quickly (time scale 5 years). Brasseur GP, Roeckner E (2005) Impact of improved air quality on the future evolution of climate. Geophys Res Lett 32:L23704. doi:10.1029/2005GL023902 Knutti R, Krähenmann S, Frame DJ, Allen MR (2008) Comment on ‘‘Heat capacity, time constant, and sensitivity of Earth’s climate system’’ by S. E. Schwartz. J Geophys Res 113:D15103. doi:10.1029/2007JD009473 Knutti R., and G.-K. Plattner, 2012: Comment on “Why Hasn't Earth Warmed as Much as Expected?” by Schwartz et al. 2010. J. Climate. In press, http://dx.doi.org/10.1175/2011JCLI4038.1 Matthews HD, Caldeira K (2007) Transient climate-carbon simulations of planetary geoengineering. Proc Natl Acad Sci USA 104:9949-9954 Then over many centuries, again assuming halt of emissions, CO2 will decrease. So careful in statement. [Stephen E Schwartz, USA]	Rejected - The text is talking about the radiative forcing being constant. If aerosols suddenly stop, there is no fixed radiative forcing.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1-650	1	6	19	6	21	I do not think that speaking of "tipping point" in terms of climatic irreversibility is correct. During the last 800 millions of years, the climate reached many "extreme" situation, which today would be interpreted as "irreversible tipping points", but actually they were not. Just for example, consider the Paleocene-Eocene Thermal Maximum or to the "Snowball Earth" or the ice age at the end of the Carboniferous and so on…. Even during the Holocene there were "extreme" situations which could be interpreted as "irreversible tipping point" (the so called Holocenic climatic optimum) and so on. I suggest adding in some place, in this chapter, the concept that the climate has the "inherent capability to bear strong variations". However, at the scale of man or even of the human species, what follows a "tipping point" (difficult to define) can be considered permanent (even if it is not). [Walter Dragoni, Italy]	Taken into account - Text has been revised.
1-651	1	6	20	6	20	An additional reference is proposed: "Once a tipping point (e.g. Lenton et al. 2008) has been reached..." [Karl-Heinz Bernhardt, Germany]	Accepted - Reference has been included.
1-652	1	6	20	6	20	The concept of "tipping point" is somewhat controversial and lacks a clear physical definition. I strongly think it should be defined clearly rather than vaguely before being used. Or even better not used at all and leave it for the media. Likewise "irreversibility" is used but not defined. [Olivier Boucher, France]	Taken into account - Text has been revised and we have downplayed the term in the text.
1-653	1	6	20	6	20	I would delete 'if not impossible', I don't think it is a very precise statement. In case of hysteresis behaviour it is indeed difficult, but not impossible. [Sybren Drijfhout, Netherlands]	Taken into account - Text has been revised.
1-654	1	6	20	6	20	"tipping point"?? This is a journalistic term coined by Malcolm Gladwell, it is not a scientific term. If you want to talk about bifurcations then use the scientific term bifurcation. But thus far in the discussion the climate has been portrayed as a simple linear asymptotically stable dynamical system in which nothing changes unless a forcing is applied. It is therefore contradictory now to invoke "tipping points" or bifurcations, unless you first go back and propose that the system contains multiple nodes or equilibria and lacks global asymptotic stability. That takes me back to my previous comment. To summarize: either the system is nonlinear and contains multiple equilibria and bifurcation points, in which case the forcing discussion needs to be prefaced with the acknowledgment that the climate can and does change on its own, or you can't drop a term like "tipping points" in at this stage of the discussion. [Ross McKitrick, Canada]	Taken into account - Text has been revised and includes references. The term is also used in the scientific literature and has been for some time. We disagree about the definition implied by the reviewer; his argument would contradict what we have written and our understanding of how the climate system operates.
1-655	1	6	20	6	21	Note that it might be important how the term tippingpoint is defined in the report and to be consistent with Chapter 12. It is felt that crossing a tippingpoint could be both irreversible and reversible, therefore this sentence seems somewhat confusing. [Øyvind Christophersen, Norway]	Taken into account - Text has been revised. It has also been cross-checked with Chapter 12 to ensure consistency.
1-656	1	6	20	6	21	The way you introduce the term "tipping point" here is overly alarmistic in my opinion. I think the climate is full of (regional) tipping points. The Great Pacific Climate Shift in 1976 is a very recent one that comes to my mind. This was a step change which was detectable in the troposphere globally (Thorne, 2005). Given the introduction of the term tipping point here it is noteworthy that this 1976 climate shift is not mentioned in chapter 2. (it is mentioned though in chapter 14) [Marcel Crok, The Netherlands]	Taken into account - Text has been revised to account for the definition as used here.
1-657	1	6	20	6	21	Irreversibility depends on timescale; suggest revising sentence to "...irreversible with respect to a given timescale" and making sure use of this term in the report reflects the timescale context. [Michael Neil Evans, United States of America]	Taken into account - The text has been revised.
1-658	1	6	20	6	21	This sentence need to be rephrased, explain more about what is tipping point, and check the words such as "not impossible", etc. [Jian Tian, United States of America]	Taken into account - Text has been revised.
1-659	1	6	20			The concept/definition of irreversibility needs a clearer definition and coordination across chapters. Irreversibility is for example used for the warming due to past emissions (Solomon PNAS 2009), but it's not clear how this fits with the definition here. The warming is irreversible in the sense that it remains even if emissions are set to zero, but it's not difficult for the system to revert to its previous state if the CO2 emissions were taken out of the system. [Reto Knutti, Switzerland]	Taken into account - Text has been revised to clarify the definition of irreversibility.
1-660	1	6	20			a definition for tipping points including a cite is needed here [Frank Kreienkamp, Germany]	Accepted - References have been added.
1-661	1	6	21			it is not correct to say that once a tipping point has been reached, the change is termed irreversible. IPCC AR4 has had a schematic illustration showing different responses to an external forcing: besides irreversibility after reaching a tipping point, there may also be the possible pathways of another abrupt change or even gradual	Taken into account - Text has been revised to consider this point.

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						transitions. Internal dynamics seem to be decisive which pathway will be realized. [Jucundus Prof. Dr. Jacobeit, Germany]	
1-662	1	6	23	6	23	Climate is always changing and there is always evidence, but here you are presumably promoting the belief that all changes of climate are caused by humen emissions of trace gases; an unlikely proposition for which there is no evidence. [VINCENT GRAY, NEW ZEALAND]	Rejected - This comment is an opinion that does not align with what this section is concerned with. Climate is always changing, but the science is in why is it changing.
1-663	1	6	23			the title of 1.2.3 has the same meaning than the title of 1.3. At first, I would have disseminated 1.2.3 through 1.3, 1.4 and 1.5. But 1.2.3 is an introduction to the following so I would change the title of 1.2.3 for "Rationale of ..." with possible minor changes in the text to match that new title. [Francois DANIS, France]	Rejected - "Multiple lines of evidence" (meaning there are many ways of inferring climate change) is not the same as "indicators" (which are simple observations) and thus these different headings are appropriate as they stand.
1-664	1	6	26	6	26	… assessmensts include_ multiple.. [Helga Nitsche, Germany]	Accepted - The text has been revised.
1-665	1	6	26	6	26	Change "includes" to "include". [Jian Tian, United States of America]	Accepted - The text has been revised.
1-666	1	6	26	6	26	"… more recent assessments includes …". The use of "includes" form seems to be a mistake in grammar. [Gan Zhang, United States]	Accepted - The text has been revised.
1-667	1	6	28	6	28	system → systems [Peter Burt, UK]	Accepted - The text has been revised.
1-668	1	6	28	6	29	No average temperatures have ever been measured and this statement is based on selected anecdotes [VINCENT GRAY, NEW ZEALAND]	Rejected - Comment does not relate to the sentence cited. Globally-averaged analyses are made of the temperature record where it is referred to.
1-669	1	6	28	6	30	None of this evidence is averaged from representative samples and its importance on the climate is unclear [VINCENT GRAY, NEW ZEALAND]	Rejected - The greenhouse gas analyses are all based on the observed measurements but only using locations not influenced by local sources and sinks. Sentence as written is not affected.
1-670	1	6	28	6	30	Replace "In the atmosphere, there is solid evidence from in situ observations and ice core records that concentrations of greenhouse gases such as carbon dioxide, methane, nitrous oxides and chlorofluorocarbons have increased over the last 200 years (Chapter 8)." with "There is incontrovertible evidence from in situ observations and ice core records that atmospheric concentrations of greenhouse gases such as carbon dioxide, methane, nitrous oxides and halocarbons have increased substantially over the last 200 years (Chapter 8)." [Robert Waterland, United States of America]	Accepted - The text has been revised.
1-671	1	6	28		29	"solid evidence …that concentrations of GHG...have increased". Given that this has been true for at least a decade, would it not be more helpful to write "solid evidence…for the magnitude of concentration increase of GHG…" ? [Eric Wolff, United Kingdom of Great Britain & Northern Ireland]	Taken into account - Modified consistent with the suggestion, following 1-670.
1-672	1	6	29			"nitrous oxides" should be "nitrous oxide" [David Parrish, USA]	Accepted - The text has been revised.
1-673	1	6	29			tropospheric ozone should additionally be mentioned [Jucundus Prof. Dr. Jacobeit, Germany]	Rejected - There are no measurements of tropospheric ozone available over the entire 200 year period, so this would not be accurate.
1-674	1	6	30	6	30	About the final part of the sentence: "….chlorofluorocarbons have increased over the last 200 years (Chapter 8).", actually this man-made gases were introduced in the last century. I suggest a more precise statement about these gases. [Rubén D Piacentini, Argentina]	Taken into account - The text has been revised.
1-675	1	6	30	6	31	No genuine average measurements have been made. Such a period as 100 years is small in the eath's history and is likely to have been reversed often in the geological record. [VINCENT GRAY, NEW ZEALAND]	Rejected - This comment by the reviewer was already explained earlier.
1-676	1	6	30	6	31	Replace "In addition, historical surface temperature, and sea surface temperature have increased over the last 100 years (Chapter 2)." with "In addition, instrumental observations show that land and sea surface	Accepted - The text has been revised.

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						temperatures have increased over the last 100 years (Chapter 2)." [Robert Waterland, United States of America]	
1-677	1	6	30			Chapter 6 should be cited here, as well as Chapter 8. [Eric Sundquist, United States of America]	Accepted - The text has been revised.
1-678	1	6	31	6	32	Please, specified for which type of variables. The whole of variables above mentioned could be measured by satellites? [Jhan Carlo Espinoza, Peru]	Rejected - We disagree. There are too many types of measurements to be included here: surface temperature, winds, humidity, clouds, precipitation, ocean heights, ocean colour, land surface ,etc.
1-679	1	6	31	6	32	This sentence does not make sense [David Parrish, USA]	Taken into account - Modified by other comments (e.g. 1-676)
1-680	1	6	32	6	32	"allow a much broader spatial distribution of measurements" [George Kiladis, USA]	Accepted - The text has been revised.
1-681	1	6	32	6	32	"...much broader spatial distribution" Add "of observations." [Forrest Mims, USA]	Taken into account - Modified consistent with suggestion, following 1-680.
1-682	1	6	33	6	33	Measurements suggest that changes are likely to be periodic [VINCENT GRAY, NEW ZEALAND]	Rejected - Over long time periods the oceans can show periodic changes due to periodic forcings, like the effects of the ice ages, but the changes in the last 50 years show a global increase in the ocean heat that cannot be explained by natural forcings.
1-683	1	6	33	6	33	What is "large heat reservoir"? Is it just ocean? [Jian Tian, United States of America]	Noted - Yes the ocean is meant here.
1-684	1	6	34	6	35	As above "some changes" is inconsistent with estimates of Greenland ice melt given elsewhere in Chapter 1 (page 10 lines 52-54) [Andrew Glikson, Australia]	Taken into account - The estimates given on page 10 lines 52-54 suggest an increase, which is a change (this is why the sentence is ambiguous on the sense of the change).
1-685	1	6	34	6	35	Ths behaviour is periodic. Many Glaciers and ice are currently advancing [VINCENT GRAY, NEW ZEALAND]	Rejected - As discussed in Chapter 4, over 90% of the glaciers in the world have seen substantial decreases. Some are not changing and few are increasing due to factors related to the changing climate. Sentence does not need to be changed due to this review comment.
1-686	1	6	35			measurements of radiative budget. careful. imbalance comes from ocean heat content measmts, not radiation measmts [Stephen E Schwartz, USA]	Accepted - The text has been revised.
1-687	1	6	36	6	38	Add that several results have been published on peer-reviewed journals (repetita juvant!). [Claudio Cassardo, Italy]	Rejected - Here the text does not review the literature (or cite), but rather simply introduces the topic.
1-688	1	6	36	6	38	It would be very surprising if there was evidence that the climate was not changinjg [VINCENT GRAY, NEW ZEALAND]	Rejected - Comment does not affect the sentence as written.
1-689	1	6	36			it should be indicated that the small imbalance in the radiation budget is largely caused by changes in the composition of the atmosphere [Jucundus Prof. Dr. Jacobeit, Germany]	Rejected - The impact of small changes in composition on the radiative budget are discussed in the next section.
1-690	1	6	40	6	40	This statement is not clear [PROF. YEHIA HAFEZ, Egypt]	Rejected - We disagree. Sentence fine as is. This statement was not highlighted by other reviewers, which suggest it is clear.
1-691	1	6	43	6	43	I think modellers introduce "assumptions" in models not "hypotheses". But they use models and data to test "hypotheses". [Olivier Boucher, France]	Rejected - We disagree. Modellers have hypotheses about how the world works, and they then use these to make assumptions and test them.

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1-692	1	6	44	6	44	"Since these models can only represent the existing state of knowledge, they are not perfect". The term "not perfect" is not warranted since it is obvious models can not be "perfect". [Andrew Glikson, Australia]	Rejected - It helps in discussing models with non-modellers to be clear that models can never be perfect (as they are models!).
1-693	1	6	44	6	44	“represent existing knowledge”: the degree to which they represent existing knowledge is compromised by constraints of numerical representation. E.g. our knowledge of the diurnal cycle of tropical convection is not in the models. [Martin Juckes, UK]	Accepted - The text has been revised.
1-694	1	6	44	6	44	Even improving our knowledge on processes, numerical calculations and the chaotic nature of small scale phenomena limit the predictability. I propose to remove this sentence. [Gillles Molinié, France]	Rejected - Explaining to non-modellers that models are an attempt at understanding the world is important, and thus, while this sentence is not helpful for specialists, it will help non-specialists understand something about the uses of models.
1-695	1	6	44	6	45	… however, as they use different parameterizations, they are important tools for analyzing uncertainties … [Claudio Cassardo, Italy]	Rejected - The concept of different parameterizations has not yet been introduced, and thus seems too difficult for this paragraph.
1-696	1	6	44	6	45	Another factor that limits the capability of the models is that even in the presence of sophisticated knowledge (e.g. radiative transfer theory), severe simplifications are required because of computational constraints [Jón Egill Kristjánsson, Norway]	Accepted - The text has been revised.
1-697	1	6	45			about analyzing the "uncertainties" of the model. I am afraid that, for the lay readers, "uncertainties" mean error bars. What about "uncertainties or unknowns"? Comment valid for all the "uncertainties" of chapter 1 until p.1-12 which clarify the noun. [Francois DANIS, France]	Accepted - The text has been revised.
1-698	1	6	48	6	48	Do you mean "climate change" in general or "past climate change" here? [Olivier Boucher, France]	Taken into account - We mean climate change in general. To better understand past climate change, helps us understand future climate change.
1-699	1	6	48	6	49	Perhaps a better way to state this point is this: One of the most powerful methods for understanding climate change involves the use of statistical tools to test the predictions of models against empirical observations. [Forrest Mims, USA]	Accepted - The text has been revised.
1-700	1	6	48	6	55	This is just correlation, a procedure which cannot provide evidence for cause and effectr [VINCENT GRAY, NEW ZEALAND]	Rejected - No change to sentence. Attribution and detection is much more than "correlation".
1-701	1	6	48	6	55	Must be rewritten. Meaningsless argument when not taking the ozone level also into account. [Terje Wahl, Norway]	Rejected - This statement does not indicate whether ozone was included or not, and thus it is not clear why the reviewers objects.
1-702	1	6	49	6	49	Boldface and precisely define here (if possible to do so) “detection and attribution” which is subject of Ch 10. [Michael Neil Evans, United States of America]	Accepted - The text has been revised.
1-703	1	6	50	6	51	"climate effects from greenhouse gas increases will have a different temperature distribution" is clumsily worded. Suggestion: "the temperature response to greenhouse gas increases will have a different distribution" [Jón Egill Kristjánsson, Norway]	Accepted - The text has been revised.
1-704	1	6	52	6	52	insert comma after 'example' [Peter Burt, UK]	Accepted - The text has been revised.
1-705	1	6	52	6	52	..example satellite and radiosonde observations…. [Helga Nitsche, Germany]	Accepted - The text has been revised.
1-706	1	6	52	6	54	The stratospheric temperature issue is more complex than suggested. Please see, for example, text and figures at http://wires.wiley.com/WileyCDA/WiresArticle/wisId-WCC125.html Also, with respect to the absolute nature of the statement (line 54), "...but which would not be expected if the Sun is driving the climate change....", a better (and safer) choice of words is "...but which might not be expected if only the sun is driving climate change...." (or "...if the sun is the main driver of climate change....") [Forrest Mims, USA]	Rejected - There is really nothing new in that paper. Of course one has to account for stratospheric ozone change, volcanic eruptions, etc. To do the analysis correctly, but even the earliest analysis of this, like Miller et al. (1992) did just that.
1-707	1	6	52	6	55	This statmemt need rewritten [PROF. YEHIA HAFEZ, Egypt]	Accepted - The text has been revised for clarity.

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1-708	1	6	52	6	55	The satellite and balloon-measured changes in the tropical tropospheric temperatures over the 1979-2009 interval are not consistent with models primarily driven by GHG's and the differences are statistically significant (McKitrick et al. 2010). Also the radiosonde records over 1958-2010 are significantly different from (i.e. below) models (McKitrick and Vogelsang 2011). So the claim that "For example satellite observations of atmospheric temperature show increases in tropospheric temperature and decreases in stratospheric temperatures, consistent with the increase in greenhouse gas effects found in climate model simulations," is inaccurate. At most you could say something like "For example, comparisons in the troposphere and stratosphere between models and observations using data from satellites and weather balloons are discussed in Chapter XX. Some comparisons have indicated that models cannot replicate observations without including the effects of anthropogenic forcings (Hegerl et al. 2007), but some important discrepancies are now apparent between GHG-forced models and observations (e.g. McKitrick et al. 2010, 2011a,b)." [Ross McKitrick, Canada]	Rejected - There have been a variety of journal papers responding to the tropical troposphere issue raised by Douglass et al (2007). For example, Santer et al. (2008) effectively dismisses this issue. In any case, that issue is not what is being discussed in this section. We are discussing the differences between an increasing tropospheric temperature and a decreasing stratospheric temperature.
1-709	1	6	52	6	55	References: McKitrick, Ross R., Stephen McIntyre and Chad Herman (2010) "Panel and Multivariate Methods for Tests of Trend Equivalence in Climate Data Sets". Atmospheric Science Letters, DOI: 10.1002/asl.290. (http://onlinelibrary.wiley.com/doi/10.1002/asl.290/abstract); R. McKitrick, Stephen McIntyre, Chad Herman, Corrigendum, Atmospheric Science Letters, 2011a, 12, 4; McKitrick, Ross R. and Timothy Vogelsang (2011b) "Multivariate trend comparisons between autocorrelated climate series with general trend regressors" University of Guelph Economics Department Discussion Paper 2011-09 (http://www.uoguelph.ca/economics/sites/uoguelph.ca.economics/files/2011-09.pdf) In preparation. [Ross McKitrick, Canada]	Rejected - These papers do not relate to the issue being discussed..
1-710	1	6	52	6	55	This statement could be expressed more clearly by more directly stating that the observed vertical temperature variations are consistent with the outputs from climate models. Furthermore, that these observations are inconsistent with expected changes arising from what would occur if only driven by changes in the Sun. [Bradley Tomasek, United States of America]	Accepted - The text has been revised for clarity.
1-711	1	6	53	6	53	It is not clear what is meant by "increase in greenhouse gas effects" [Jón Egill Kristjánsson, Norway]	Accepted - The text has been revised.
1-712	1	6	54	6	54	"is" should be replaced by "were" [Jón Egill Kristjánsson, Norway]	Accepted - The text has been revised.
1-713	1	6	54	6	54	wrong tense in if-clause. Should read '...if the sun was driving…" [Bennartz Ralf, US]	Taken into account -The text has been revised.
1-714	1	6	54	6	54	“if the Sun is driving…” would more be correctly stated as “if the Sun were driving…” (i.e., subjunctive form, for a hypothetical statement) [Eelco Johan ROHLING, United Kingdom of Great Britain & Northern Ireland]	Accepted - The text has been revised.
1-715	1	6	54			the sentence “which would not be expected if the Sun is driving the climate change” have to be changed with the statement “which would not be expected if just the Sun is driving the climate change” [José Daniel Pabón-Caicedo, Colombia]	Taken into account - The text has been revised for clarity.
1-716	1	6	55			another difference should be added: if the sun would drive climate change, maximum warming would be expected in lower latitudes during summer; if GHG are driving climate change, maximum warming is expected in higher latitudes during winter (as already observed) [Jucundus Prof. Dr. Jacobeit, Germany]	Rejected - We think that one example is sufficient.
1-717	1	6	56	6	56	...missing a “to” [Darienne Ciuro , United States]	Noted - Comment: This comment does not relate to this line. It is likely the issue was taken care of by our revisions.
1-718	1	6	56	6	56	Nowadays satellite assimilation is developing very fast in climate research. Maybe another paragraph can be included here? [Jian Tian, United States of America]	Rejected - Satellite assimilation cannot help us reconstruct past climate, or project future climate, and therefore isn't really a separate line of evidence.
1-719	1	6	58	6	58	"precise and quantitative reconstructions of key climate variable over a wide range of time scales provide …". I do not think that there are many "precise" (and reliable) reconstructions when we go much back in time. [Walter Dragoni, Italy]	Accepted - Text has been revised.
1-720	1	6	58	6	58	"Precise and quantitative" is overly promotional. "Quantitative" maybe, but "precise" is an unwarranted blanket	Accepted - Text has been revised.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
						assertion regarding large-scale paleoclimate reconstructions. [Ross McKitrick, Canada]	
1-721	1	6	58	7	8	"precise and quantitative": you are joking!. They are based on anecdotes and sheer guesswork. [VINCENT GRAY, NEW ZEALAND]	Rejected - Disagree on the nonsense about "anecdotes and sheer guesswork" bit nonetheless the sentence has been revised.
1-722	1	7	1	7	3	In view of the significance of these studies and the public controversy associated with the only two authors cited here, might it not be good for an IPCC report to also cite an author(s) having somewhat different views? [Forrest Mims, USA]	Rejected - Comment does provide a suggested reference and we do not know of any acceptable peer-reviewed papers that would disagree with the statement. Blogs and the media do not count.
1-723	1	7	2	7	3	Mann et al (2009) [Mann, M.E., Zhang Z., Rutherford, S., Bradley, R.S., Hughes, M.K., Shindell, D., Ammann, C., Falugevi, G., Ni, F., Global Signatures and Dynamical Origins of the “Little Ice Age” and “Medieval Climate Anomaly”, Science, 326, 1256-1260, 2009] is probably a better choice of reference to cite here than Mann et al (2008), because the former not only assesses evidence from proxy reconstructions, but provides interpretation in terms of dynamical mechanisms related to e.g. ENSO and the NAO/AO/NAM and the role of radiative forcings--something that is emphasized in the passage in question. [Michael Mann, USA]	Noted - Thank you
1-724	1	7	5	7	5	volcanic and solar activity e.g (……) [PROF. YEHIA HAFEZ, Egypt]	Accepted - Text has been revised.
1-725	1	7	5	7	5	the reference must be at the end of the statement [PROF. YEHIA HAFEZ, Egypt]	Accepted - Text has been revised.
1-726	1	7	6	7	8	Revise to “...attribute reconstructed paleoclimate to past variations in reconstructed external forcings”. Reconstructed, to differentiate from direct observations in most cases; paleoclimate to indicate ability to examine indicators of temperature, moisture, process variations (e.g. ENSO). [Michael Neil Evans, United States of America]	Accepted - The sentence has been revised.
1-727	1	7	10	11	35	This section could be reordered. It seems that section 1.3.2 (Greenhouse Gas Concentrations) would more naturally come first, with section 1.3.1 (Global and Regional Surface Temperatures) following. I would then follow with section 1.3.4, though I don't understand what you mean by "integrative" in the heading of this section. Finally, I would end with extreme events. I would however call this section "climate extremes" rather than "Extreme Events" in keeping consistent with the SREX report. Unless this sequencing follows some other order within the report, I would recommend reording this entire section. [Allison Crimmins, United States]	Rejected - Structure is given by TSU
1-728	1	7	10	11	35	All observations should include an estimate of observational error. This should be visualized in the figures as well, otherwise many statements that are made are not substantiated. [Sybren Drijfhout, Netherlands]	Taken into account - The revised figures now include observational error estimates.
1-729	1	7	10	11	35	Among the indicators of climate change, if possible, more indicators should be considered, such as humidity, rainfall.(Qiyong Liu, China CDC) [Qiyong Liu, China]	Rejected - No global data available for these.
1-730	1	7	10	11	35	The series of figures (Fig. 1.4 through 1.11) accompanying this section are particularly compelling. Could comparable time-series figures be added for ocean acidification and ice indicators? [Eric Sundquist, United States of America]	Rejected - We are unable to do this. These were not explicitly prognosed in earlier assessments.
1-731	1	7	10			This section is quite useful but it would benefit from two things. One would be to clarify that a projection is not a forecast, therefore one can only assess the short-term plausibility of the projections and models used and nothing else. Second thing would be to start the SAR, TAR and AR4 projections at their corresponding years rather starting them all in 1990, or those for TAR and AR4 should not be called projections, but hindcast or something like that. [Olivier Boucher, France]	Accepted - The text has been revised.
1-732	1	7	10			in section 1.3 indicators of climate change, there is no precipitation as indicator of climate change. In fact, precipitation is one of the most inportant indicators, for example, precipitation changes are parts of climate change. [Jianting Cao, China]	Rejected - Precipitation is temporally and spatially inhomogeneous. Worldwide datasets are not available for this evaluation.
1-733	1	7	12	7	21	Section 1.3: The introduction here was more confusing than helpful so maybe look to make it more clear and concise. [Jeffrey Curtis, United States of America]	Taken into account - It is not clear what the concern of the reviewer was. We did revise the text for clarification.

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1-734	1	7	12	7	21	Sheer wishful thinking!. Climate always chsnges anyway and the correlations are mostly laughable. [VINCENT GRAY, NEW ZEALAND]	Rejected - Comment is opinion with no bearing on scientific analysis.
1-735	1	7	12	8	51	I think it would make more sense to place the greenhouse gas concentrations discussion before the discussion of the temperature response. [Martin Juckes, UK]	Rejected - temperature is shown first because that was the only indicator shown in a similar plot in Chapter 1 of AR4.
1-736	1	7	14	7	14	this reference is 2001 not recent to say updated e now in 2012 [PROF. YEHIA HAFEZ, Egypt]	Accepted - Text has been revised.
1-737	1	7	16	7	19	See also comment 2: can this be revised to first summarize the most important predictions coming solely from the AR4 and earlier climate simulations (for 20th and 21st centuries); then (for the 20th century) what the observations show. For predictive validation it would be helpful to show how predictions made in AR1, for example, compare with observations since then, given the 20+ intervening years (for many climate change indicators, the 5+ years between AR4 and AR5 might be difficult to read given (natural) interannual variations.) For example, in Figs 1.4 and 1.5, show FAR, SAR, TAR, AR4 results with hatched or dashed lines for intervals that are 'hindcast', e.g. for AR4, prior to 2005, to distinguish from true predictions forward in time from the date when the modeling was completed. [Michael Neil Evans, United States of America]	Rejected - Interesting idea, but it would further complicate an already busy set of figures.
1-738	1	7	20	7	20	Check "the many analyses". [Jian Tian, United States of America]	Accepted - Text has been revised
1-739	1	7	22			("The narrowest projection is from the most recent assessment, AR4): Once again, the most recent assessment is supposed to be AR5, not AR4??? Same comment applies to many sections of this report, and Figures 1.6, 1.7, 1.8 [Sushel Unninayar, USA]	Rejected - In chapter 1, we only compare with the past assessments, while in the later chapters the new model results and other findings for AR5 are presented.
1-740	1	7	23	7	23	In Fig. 1.3, middle left of top figure, replace "it is widespread…" with "Warming is widespread over the upper 700 m…" There are several instances of missing spaces, such as "coverduration" (right column top) and "Arcticland" (bottom of middle column) [George Kiladis, USA]	Accepted - The figure has been revised.
1-741	1	7	24	7	24	About the text included in Figure 1.3.a. OCEAN: "The world oceans has warmed since 1950….", but in AR4-WGI it was informed about the mean steady increase of the ocean level at least from the 1870 decade (see FAQ 5.1. Figure 1). So it is not appropriate to use a fixed year (1950) for the starting year for temperature increase of the oceans. [Rubén D Piacentini, Argentina]	Accepted - Figure has been revised.
1-742	1	7	24	7	24	About the text included in Figure 1.3.a. LAND: "Bird species in North America habe…" (or have?). [Rubén D Piacentini, Argentina]	Taken into account - In the revised Figure the sentence on birds is removed.
1-743	1	7	24	7	24	About the text included in Figure 1.3.b. LAND: "Significantly increased precipitation in the eastern parts of North and South American…". Could you specify which part of South America is considered the East, since some regions could have more precipitation but other not? [Rubén D Piacentini, Argentina]	Rejected - That would be to detailed for an introduction. More details are found in other chapters.
1-744	1	7	24	7	24	INSIDE Figure 1.3:a) . In the area describing changes in the "tropopause": it seems that the comment about CO2 concentration should start as a new bullet [Celeste Saulo, Argentina]	Accepted - A new bullet point is added.
1-745	1	7	24	7	25	Figure 1.3 a need to be more illustrative [ABHA CHHABRA, INDIA]	Accepted - The figure is revised.
1-746	1	7	27	7	31	The notion of global mean surface temperature has been criticised (in non-convincing way in my view). See Christopher Essex, Ross McKitrick, Bjarne Andresen 2007, "Does a Global Temperature Exist? "J. Non-Equilib. Thermodyn. 2007 Vol. 32 No. 1, DOI 10.1515/JNETDY.2007.001. The views expressed in this article contribute to the "doubt" some have about the IPCC conclusions, and the IPCC would provide a very useful service to the community by assessing this article in an objective way. [Jean-Pascal van Ypersele, Belgium]	Rejected - Chapter 2 on Observations deals with this issue. while the reviewer finds it non-convincing to have a globally-averaged temperature based on one paper in a rather obscure journal that most atmospheric scientists will not even have seen, it is hard to see why we need to consider this in Chapter 1.
1-747	1	7	27	7	52	These comparisons are very useful. However the levelling off in temperature since 2005 leads to a change from previous evidence for tracking close to the upper limit of the TAR projections prior to that date. This may deserve comment. [Donald Forbes, Canada]	Rejected - Chapter 2 issue; natural variability is to be expected. Text has been added to discuss this.

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1-748	1	7	27	8	12	The paragraph “1.3.1 Global and regional surface temperatures” does not mention any thing on regional level [José Daniel Pabón-Caicedo, Colombia]	Rejected - Regional analyses are considered in Chapter 2. The intention in Chapter 1 is to give an overview comparison with the prior projections.
1-749	1	7	29	7	46	The authors should state more clearly that the old IPCC projections were "too pessimistic". The graphs in figure 1.4 would be much more interesting if the temperature of the decades before the reference period were reported. In this way the reader could appreciate what really happened, and consider if there is or not any ciclicity and the magnitude of climatic variations during the early years of XX century. [Walter Dragoni, Italy]	Rejected - The intention in Figure 1.4 is to show the comparison with projections not with the historical evaluation so while the past period would show the increasing trend in observed temperature it would not add to the basis for the figure.
1-750	1	7	29	7	46	Figure 1.4 title says "anomalies" but the vertical axis says "changes". These don't mean the same thing. [Ross McKitrick, Canada]	Accepted - The figure has been revised.
1-751	1	7	29	7	46	I have a concern about Figure 1.4. Is it really the case that all models simulated exactly the same global average anomaly for the year 1990? I don't think so. This means that we are being shown a spread of projections artificially pinched together at the starting value, which in turn means that the claim that the observations lie in the upper part or the lower part of the distribution later in the decade is dependent on how the projection range is displaced and dilated. If you are going to show a comparison of models and observations then show the actual model global anomaly projection range starting at 1990 and carry the spread through to 2015. If what you want to do, however, is compare the trends after 1990 to the model trends after 1990, so the vertical displacement isn't an issue, then graph the trend coefficients. Also please see cell 48 which compares Figure 1.4 to Figure 9.10. [Ross McKitrick, Canada]	Rejected - The projections from the models were rescaled to the same anomaly period so that they could be readily compared.
1-752	1	7	29	7	52	Rewrite the judgement on AR4 model performance when global temperature for 2011 is included in Figs 1.4 and 1.5. [Terje Wahl, Norway]	Accepted - Figure has been redrawn to include 2011 data and the findings in the text have been revised as warranted.
1-753	1	7	29	8	11	Would like to see a reference also to the SRREN in this chapter, and think this section is the appropriate place. The reason for this is that the scenarios that aim at keeping the temperature below two degrees all demonstrate the need for a large portion of renewable energy including biomass. [Øyvind Christophersen, Norway]	Rejected - This comment is relevant to WGIII but does not fit with the aims of science-based discussion in WGI.
1-754	1	7	29	8	11	interesting comparison – but in my point of view is one model (MAGIC) not representing IPCC stages like the AR4 model run results– especially if an full forcing run is used – please use more SRES based models or remove the figure – this comparison is on a very weak basement --- if you want to use this figure you have to add at least a detailed comment on full forcing runs and the difference to normal Scenarios runs [Frank Kreienkamp, Germany]	Rejected - The aim is to represent the range of results from the earlier assessments.
1-755	1	7	29	8	52	"Observed temperatures" is completely untrue These are not observations at all and they are not measured temperatures. They are "Mean Temperature anomalies" based on multiple averaging of many, varied , miscellaneous and unrepresentative temperatures taken by many unidentified observers in constantly changing conditions and locations. They are certainly not "temperatures" at all. Also there is no mention of the very large accumulated uncertainties which should be attached to all the figures. [VINCENT GRAY, NEW ZEALAND]	Rejected - Figure caption fully explains the figure. These are anomalies relative to the globally- and annually-averaged temperatures. See chapter 2 for more on the observations. We are adding "as anomalies relative to 1961-1990 " to the text for clarity.
1-756	1	7	29		46	It would be a mistake not to refer to the apparent flatness of the curve (and the data points) after 2000. Hopefully this is address elsewhere but it should really be here as well. This is a controversal point in the general public discourse and there's not point burying our heads in the sand and not addressing it. I know it is data and that climate is complicated and there have been some low order impacts on the climate that have slowed warming but we have to acknowledge that an apparent ledge exists. [Larry Thomason, United States of America]	Taken into account - The text has been revised. See also Chapter 2.
1-757	1	7	29			Section 1.3.1 and Fig. 1.4: I'm worried about this comparison. Even though the text states various limitations in terms of the models and scenarios, the figure is going to be used to judge whether the IPCC projections were correct. The point is that they never were intended to be predictions on such short timescales. Up to the TAR the GCMs did not include natural forcing, and even in AR4 some models did not have volcanic and solar forcing, and some also didn't have aerosols. That is only partly solved by emulating them with an EBM. In	Taken into account - We agree that additional discussion is warranted. Text has been added to make these points. However, we disagree about dropping these comparisons between observations and models -- a similar figure for temperature is

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						addition, the scenarios were that are designed to span a broad range, not necessarily to predict he most likely outcome. Also, the scenarios in earlier reports differed from those in later reports (not currently mentioned). Finallly, there are issue on how natural forcing for example is treated after the observed period. Some models switch volcanic to zero, while others (and MAGICC in some papers) use a constant mean volcanic forcing (which causes a slight cooling after 2000). The biggest issue however in my view is showing the forced response from an EBM on top of a single realization of climate in the observations (even if it is stated in the text). There is no reason that those should agree. In summary, the way the models and scenarios were set up is so different from reality that conclusions on those short time frames should be avoided. Those simulations were designed to tell us about warming in 2050 or 2100, but not in the next 10 years, and those short term predictions were never interpreted in earlier IPCC reports, for good reasons. I think the only comparison that could be defended would be to select a subset of the AR4 models that included all forcings, and show them as individual lines along with the observations (as in AR4 Fig. 9.5a). I argue not to compare TAR or earlier projections to observations on those timescales. [Reto Knutti, Switzerland]	shown in AR4 has been of great interest to the readers. The fact that the projections compare well with the observations makes a strong point that the past projections have a basis in reality. Text has been revised to also discuss the importance of natural variability.
1-758	1	7	30	7	30	replace "temperature" by "surface temperature" here and where appropriate. [Olivier Boucher, France]	Accepted - The text has been revised.
1-759	1	7	34	7	34	missing a space before parenthesis [Darienne Ciuro , United States]	Accepted - Text has been revised.
1-760	1	7	34	7	34	the anomalies must relative to 1981-2010….. (1961-1990) it is old now [PROF. YEHIA HAFEZ, Egypt]	Rejected - making the anomalies relative to 1961-1990 is common practice; it really does not affect the results to choose any given 30 year period.
1-761	1	7	34	7	34	The obs, FAR, SAR and TAR curves start with the same value in 1990. Anomalies are offset by the change in the observed 1961-1990 climatology, not each model's 1961-1990 climatology. This needs to be clarified, or else there is an impression of perfect model results for 1960-1990 with identical results for 1990. [Arne Melsom, Norway]	Taken into account - Text has been revised to make sure this is discussed.
1-762	1	7	34	7	34	Why did you chose 61-90 as the reference period?. I think it would be necessary to explain why this has been selected as the reference period. For example, in Chapter 2 trends are analized up to 2010. [Celeste Saulo, Argentina]	Taken into account - Text has been revised. The choice of 30 year period does not affect the analysis.
1-763	1	7	34	7	35	The use here of a reflection boundary condition on the smooth is problematic. This amounts to the assumption that the time series approaches the boundary with zero slope, an assumption which is known to yield an underestimation bias for non-stationary time series containing a long-term trend. A more appropriate boundary condition in such cases involves minimizing the 2nd derivative, not the 1st derivative. Please see Mann [2008] (which might be referenced in this context): Mann, M.E., Smoothing of Climate Time Series Revisited, Geophys. Res. Lett., 35, L16708, doi:10.1029/2008GL034716, 2008. The spline approaach used in WG1 chapter 2 would also be a preferable alternative to the current approach. [Michael Mann, USA]	Taken into account - The filter is consistent with earlier reports.
1-764	1	7	34	7	36	Is the filter only applied to the data visible in the figure? [Gareth S Jones, UK]	Noted - The filter has also been applied to the data before 1990.
1-765	1	7	34	7	36	The use of "ends reflected" is almost always misleading, e.g. what would the plot look like if the last datapoint was in 2000? Almost certainly a downturn at the end. Show alternative methods. e.g. see discussion in Mann GRL 2008, doi:10.1029/2008GL034716 [Gareth S Jones, UK]	Taken into account - The figure has been revised to consider this concern.
1-766	1	7	34	7	36	I'm not keen on the smoothed line using a binomial with ends reflected. If 'ends reflected' means simply reflecting the last 6 values past the end, that will flatten out the slope at the start and end (which is what the smooth line does). That gives a misleading indication that the rate of change dropped in the latter part of the 2000s decade. I think it would be better to show a smooth line that simply does not extend past 6 points from the end. For the start, you could use the real data prior to 1990, so shouldn't be a problem at that end. I don't think it's appropriate to show something as 'observations' when the values will change as future years become available. [Drew Shindell, USA]	Taken into account - The figure has been revised to consider this concern.
1-767	1	7	34			This comment references the description of observed temperatures vs. predicted temperatures. The text states that the observations are "roughly in the middle of the AR4 model results." But the figure on page 1-25 could easily be interpreted to show that the observed temperature has leveled off over the past seven or eight	Rejected - This point is discussed in later chapters. A running mean of the temperatures based on the 30 year statistics representative of climate would still

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						years (since ~ 2004) at a level near the extreme lower end of the AR4 predictions. This is critical because this graph, as presented, will used to demonstrate that the models are wrong and unreliable. More discussion is needed at this point about what the graph demonstrates and about the uncertainty associated with it. [Julian Levy, United States of America]	produce an increasing temperature. It is dangerous to look at putting a trend through such a short time period.
1-768	1	7	35	7	35	Draw on definitions of equilibrium + transient + commitment climate change to briefly explain why a 13 point filter is appropriate. [Michael Neil Evans, United States of America]	Taken into account - The figure has been revised to consider this concern.
1-769	1	7	37	7	38	If (from public press) I expected that sentence to be true, on figure 1.4, I cannot see that 2010 observation is in the upper range of TAR. Is the figure wrong? [Francois DANIS, France]	Taken into account - The text has been revised.
1-770	1	7	37	7	38	The figure does not support this text. More than 50% of the individual observations lie outside what is claimed is the TAR projection, and even the smoothed observations does occasionally. [Gareth S Jones, UK]	Taken into account - The text has been revised for clarity.
1-771	1	7	38			"...and roughly in the middle of the AR4 model results." should be "and at the low range of the AR4 model results." when properly aligned as commented above. [Stephen Gaalema, USA]	Taken into account - The text has been revised for clarity.
1-772	1	7	38			it should be mentioned that during the last years global mean temperatures have not continued to increase as distinctly as they did during the 1990s (Fig. 1.4); possible reasons for this could also be mentioned, or at least an indication could be added where this topic is discussed in AR5 [Jucundus Prof. Dr. Jacobeit, Germany]	Rejected - The actual observations are discussed in more depth in Chapter 2.
1-773	1	7	39	7	39	"model analyses"??? Surely, this should be "model projections"? [Jón Egill Kristjánsson, Norway]	Accepted - The text has been revised.
1-774	1	7	39	7	40	As far as I can tell these model analyses shown in figure 1.4 don't account for any natural variability. [Gareth S Jones, UK]	Taken into account - Model results only account for the scenarios analyzed. Text has been added to discuss the effect of natural variability.
1-775	1	7	39	7	40	The narrative fails to address the 2002-2010 flattening of the observed temperature that is so visually obvious in Fig. 1.4. This flattening is a key aspect of a chart that shows a significant increase in temperature prior to 2002 and definitely deserves discussion. Please add 2011 to Fig. 1.4. [Forrest Mims, USA]	Taken into account - The observations are more fully discussed in Chapter 2. While we use the observations here, the intent is to not take away from the discussion on observations in the later chapters. We did add a sentence for reader to see Chapter 2.
1-776	1	7	39	7	43	If the TAR and AR4 analyses are based on MAGICC, that means that there is _no_ year-to-year natural variability included (not just, "do not fully acount for"). Which is consistent with the very small uncertainty in temperature the first few years, despite year-to-year variability on the order of a tenth of a degree in models. It would be good to acknowledge this, and perhaps for AR5 the near-term projection chapter can do this comparison more cleanly. [Marcus Sarofim, USA]	Accepted - The text has been revised to account for this issue.
1-777	1	7	40	7	40	accounts → account [Peter Burt, UK]	Accepted - Text has been revised
1-778	1	7	41	7	41	“the TAR and AR4 results are based on MAGICC”: why? Surely it would be better to use the actual results. Do the MAGICC estimates include uncertainty associated with carbon-cycle feedbacks? [Martin Juckes, UK]	Rejected - We refer here to the old TAR and AR4 results which are not available from the actual 3-D models.
1-779	1	7	42	7	42	"attempts to represents" should be "attempts to represent". [Andrew Glikson, Australia]	Accepted - The text has been revised.
1-780	1	7	42	7	42	…attempts to represent …. [Helga Nitsche, Germany]	Accepted - The text has been revised.
1-781	1	7	42	7	42	“represents” should be “represent” [Eelco Johan ROHLING, United Kingdom of Great Britain & Northern Ireland]	Accepted - The text has been revised.
1-782	1	7	42	7	42	Delete "the" before "more complex models". [Jian Tian, United States of America]	Accepted - The text has been revised.
1-783	1	7	42	7	42	“… model that attempts to represents …”. The use of “represents” form seems to be a mistake in grammar. [Gan Zhang, United States]	Accepted - The text has been revised.
1-784	1	7	44			This chapter is too much hung up on the past. Anyone interested in the previous reports can always go back and look at them or else this material can be presented in an appendix section and not waster the reader's	Rejected - There are separate documents for providing the summary of findings from the full

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						time reviewing past material. I would suggest to get the general reader and particularly policy makers and journalists attention the authors present the main findings in this chapter and [Shouraseni Roy, USA]	assessment.
1-785	1	7	45	7	45	Change "compare" to "agree". [Jian Tian, United States of America]	Accepted - The text has been revised.
1-786	1	7	46			Given that the skeptics place great emphasis on the lack of positive global average surface temperature trend for the 2001-2010 period (or even 1998- 2010) taken in isolation (as is evident in Figure 1.4), this highly visible and politically important document is a prudent place to explain exactly and clearly why that obserfvation is not necessarily evidence that global warming is not still occurring. I think this is a big issue for the credibility of climate science in the community that is quite heavily influenced by those who essentially don't want (or cannot afford) to believe that climate is changing or will change. Given that it is the Introduction and therefore will be more read than the other Chapters, such an explanation, if convincing to lay readers, could well become one of the more visible, journalistically discussed and influential bits of the whole of AR5. Its an opportunity to get people's perceptions straightened out. [Roger Gifford, Australia]	Taken into account - The observations are more fully discussed in Chapter 2. While we use the observations here, the intent is to not take away from the discussion on observations in the later chapters. We did add a sentence for reader to see Chapter 2
1-787	1	7	47	8	36	Is Chapter 1 the best place for this box on geoengineering? [David Randall, USA]	Rejected - It was a WGI decision to remove the geoengineering box from Chapter 1.
1-788	1	7	48	7	49	"model analyses"??? Surely, this should be "model projections"? [Jón Egill Kristjánsson, Norway]	Taken into account - Not all are projections, as stated in the text.
1-789	1	7	48	7	52	Please see comment 20 above. The wedge-shaped model predictions of temperature in Figs. 1.4 and 1.5 offer no information about the observed flattening of temperature since 2002. Also, this statement is clearly incorrect: "... the observed data is typically in the middle of the projected ranges." The model prediction is too low for the first half of the series and on the way to becoming too high in the second half. [Forrest Mims, USA]	Taken into account - The observations are more fully discussed in Chapter 2. While we use the observations here, the intent is to not take away from the discussion on observations in the later chapters. We did add a sentence for reader to see Chapter 2
1-790	1	7	49	7	49	the abbreviation 'SRES' is not explained [Reiner Steinfeldt, Germany]	Accepted - The text has been revised.
1-791	1	7	49	7	52	Consider a brief explanation of "SRES scenarios" here, otherwise the points made will be meaningless to many without a background [George Kiladis, USA]	Accepted - The text has been revised.
1-792	1	7	49			for readability, it would be good to introduce SRES at that point; the sentence page 1-15, line 36-38 is a good one. [Francois DANIS, France]	Accepted - The text has been revised.
1-793	1	7	50	7	50	is → are [Peter Burt, UK]	Accepted - The text has been revised.
1-794	1	7	50			"...the observed data is typically in the middle of the projected ranges." should be "...the observed data is typically in the low portion of the projected ranges." [Stephen Gaalema, USA]	Accepted - The text has been revised.
1-795	1	7	51	7	51	A 1 fi → A1F1 [Peter Burt, UK]	Accepted - The text has been revised.
1-796	1	7	51	7	51	This is an important point. The other point is that the data are not inconsistent with A1FI. [Donald Forbes, Canada]	Accepted - Thanks. Text has been revised.
1-797	1	7	52	7	51	→ century, as shown [Peter Burt, UK]	Accepted - The text has been revised.
1-798	1	7	55	7	55	"Estimated" is right. Any agreement with the models is accidental. [VINCENT GRAY, NEW ZEALAND]	Rejected - Comment is opinion with no bearing on what is said in the sentence.
1-799	1	7	55	7	55	About Figure 1.4: The "Observed smoothed" (solid black) curve could be more similar to the "Observed" (solid square) data and mainly the "AR4" (red band) results, if a smaller window would be used, reproducing rather well the minimum at the year 1992. Please analyze this subject with more detail. [Rubén D Piacentini, Argentina]	Taken into account - The figure has been redrawn
1-800	1	7	55	7	57	the anomalies value must recalculated relative to 1981-2010 [PROF. YEHIA HAFEZ, Egypt]	Rejected - The choice of the anomaly period is a standard one and does not affect the results.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1-801	1	7	55	8	5	This shows how the IPCC projections always grossly exaggerate, are completely unreliable and should be ignored. Who will believe the current ones? [VINCENT GRAY, NEW ZEALAND]	Rejected - Actually the observations and models agree well on climatic time scales as shown in the figure. Comment is opinion with no bearing on what is said in the sentence.
1-802	1	7	56	8	5	These are not "temperature changes," they are changes in "Mean global temperature anomalies" [VINCENT GRAY, NEW ZEALAND]	Rejected - Figure caption fully explains the figure. These are anomalies relate to the globally- and annually-averaged temperatures as explained in the caption.
1-803	1	7		8		Figure 1.4, Figure 1.5: The initial range in the AR4 projections is not explained. There is a reference to AR4 Fig. 10.26, but no relevant information about the intial range is provided there, either. [Arne Melsom, Norway]	Taken into account - The text has been revised to add to the explanation of the figures.
1-804	1	7		11		I don't really understand the content and balance of section 1.3. It seems to be nearly 5 pages, mainly summarising content of chapter 2, out of a total of 16 pages for the whole chapter. I don't really understand why this has such a large emphasis in this chapter, it feels unbalanced. [Eric Wolff, United Kingdom of Great Britain & Northern Ireland]	Rejected - the intent as stated is to discuss various indicators relate to past assessment projections, thus setting the stage for the analyses presented throughout the rest of the assessment.
1-805	1	7				Figure 1.4: Uncertainty in the observation-based estimate should at a minimum be quoted in the caption. [Arne Melsom, Norway]	Accepted - Uncertainties of observations has been added to the figure and are discussed in the text.
1-806	1	7				Figure 1.4: The shading of the projection ranges based on FAR, SAR and TAR should not start from a point, but with an initial range corresponding to the respective projections' inter-annual variability. Models were not initialized from an analysis of observations, so their state in 1990 w.r.t. inter-annual variability is arbitrary. [Arne Melsom, Norway]	Accepted - Explanation has been added to the text.
1-807	1	8	5	8	5	I propose to insert into Fig. 1.4 an appropriate mark characterizing the uncertainties in the observed temperatures. [Karl-Heinz Bernhardt, Germany]	Accepted - Uncertainties of observations has been added to the figure and are discussed in the text.
1-808	1	8	5	8	5	The uncertainties in the original observed temperatures would, by now, have multiplied to such an extent as to overwhelm the graph, so you are wise not to show them.. [VINCENT GRAY, NEW ZEALAND]	Accepted - Uncertainties of observations has been added to the figure and are discussed in the text. Uncertainties do not grow!
1-809	1	8	5	8	5	About the sentence: "Uncertainties in the observed temperatures are not shown.", that it is also reproduced in the capture of Figure 1.4 and others (Figures 1.5, 1.6, 1.7, 1.8 and 1.11), I consider that it can not be included. In place of it, it must be indicated which is the corresponding uncertainties (error bars), since a scientific information is not complete if the main value is not presented with its uncertainty. [Rubén D Piacentini, Argentina]	Accepted - Uncertainties of observations has been added to the figure and are discussed in the text.
1-810	1	8	8	8	11	This "range" is arbitrary and is unrelated to the true uncertainties [VINCENT GRAY, NEW ZEALAND]	Rejected - The ranges shown represents the resutls of the climate models used in AR4. This range also accounts for known uncertainties in the climate sensitivity.
1-811	1	8	8	8	11	Not quite as bad as the last but it looks like it is going to run off the scale in 2012 [VINCENT GRAY, NEW ZEALAND]	Rejected - The statement relates to Figure 1.5 on page 26. Is the reviewer predicting the globally-averaged temperature will be higher than any of the models in 2012? Even if one year were different than the model range, it would not be saying anything about temperature over climatic time scales.
1-812	1	8	8	8	11	Referring to comments 20 & 21, might it not be good to include in the caption a reasonable model reliability disclaimer in the event a future AR reports continued flattening or even cooling of the observational record? Lines 25-26 on this page and Fig. 1.7 demonstrate the wisdom of allowing for future uncertainties. [Forrest Mims, USA]	Taken into account - The observations are discussed in more detail in Chapter 2. Sentence added about this.
1-813	1	8	11	8	11	the baseline must change to 1981-2010 [PROF. YEHIA HAFEZ, Egypt]	Rejected - Choice of period is arbitrary and does not affect the findings.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1-814	1	8	11	8	11	Last sentence should read "… projections …" [Bennartz Ralf, US]	Rejected - Sentence was correct as written.
1-815	1	8	11	8	12	I do not like this too simple explaination of figure 1.9 because it can be misleading for non-expert readers. It should be underlined more effectively that, if the PDF changes shape and shifts (as it happens, for instance, in figure 1.9c), the number of extreme events can change in a non-trivial way. For instance, it can be used as example the case of freezing and hot days, showing that such change of PDF can have as consequence a large increase of hot days but just a small decrease (and not a disappearence) of freezing days. [Claudio Cassardo, Italy]	Taken into account - This comment probably refers to Page 9 Line 11-12. The figure has been replaced, and further text added.
1-816	1	8	13	8	14	Some comment is needed here on not just concentrations of greenhouse gases but on how the sources are understood to be anthropogenic (esp. in the case of CO2). This is necessary because of commentary questioning (amazingly) the anthropogenic origin of the post-industrial rise (attempting to attribute to volcanoes etc.) [William Howard, Australia]	Rejected - A later chapter describes the CO2 observations and carbon cycle in much more detail than intended here.
1-817	1	8	13	8	37	A little more detail on the Greenhouse as concentration will be useful [Swarnali Sanyal, USA]	Taken into account - Text revised, but not sure what the reviewer wanted.
1-818	1	8	13	8	51	Greenhouse Gas Concentrations are listed under "Indicators of Climate Change" and this is inappropriate as they are putative forcings. One major objective of AR5 is to bolster the case for GHGs as forcing climate change therefore they need to be seperated from the indicators themselves. [William Howard, Australia]	Rejected - The greenhouse gases are already well accepted as drivers of climate change (e.g., see AR4). We don't understand the objection.
1-819	1	8	13	8	52	All the measurements are from unrepresentative samples. Measurements over land surfaces are almost forbidden, because you are afraid they will not fit the models. [VINCENT GRAY, NEW ZEALAND]	Rejected - The analyses avoid measurements that are affected by local sources and sinks, so that the resulting concentrations reflect the globally-averaged concentrations for these long-lived gases. Text not affected.
1-820	1	8	13			Consider swapping sections 1.3.1 and 1.3.2 [Olivier Boucher, France]	Rejected - We start with temperature as a connection to the similar figure in AR4.
1-821	1	8	15	8	15	Replace "Another key indicator is the changing concentrations of the greenhouse gases that are driving the concerns about climate change." with "Further key indicators of climate change are the changing concentrations of the important greenhouse gases." [Robert Waterland, United States of America]	Accepted - The text has been revised.
1-822	1	8	15	8	16	I might be wrong but I thought what was "driving the concerns about climate change" was the changing climate? [Gareth S Jones, UK]	Rejected - It is the projections of further changes continuing well into the future that is the issue.
1-823	1	8	15	8	26	Greenhouse gas concentrations, should consists all gases such as CO2, N2O, Methane, O3, Water vapour. and the time changes of these gases in the period ranging from the 4th IPCC report to 5th IPCC report should be mentioned clear, here within this section it is not so clear, i.e the changes of all GGC. [ALI GEATH ELJADID, LIBYA]	Rejected - All of these are indeed greenhouse gases, but the concerns about climate change are primarily related to those being directly affected by human activities. They are the basis for the scenarios evaluated.
1-824	1	8	15			"Another indicator". I would say the first indicator. [Stephen E Schwartz, USA]	Taken into account - The text has been revised for clarity.
1-825	1	8	16	8	16	Figure → Figures [Peter Burt, UK]	Accepted - The text has been revised.
1-826	1	8	16	8	16	delete 2nd 'Figure' [Peter Burt, UK]	Accepted - The text has been revised.
1-827	1	8	16	8	17	The referenced figures do not primarily show trends, but recent data/model summaries. Trends can be extracted by changes, suitably averaged. [Terrence Joyce, USA]	Taken into account - We have revised the text for clarity
1-828	1	8	16	8	19	"Figure 1.6 through Figure 1.8 show the recent observed trends for the gases of most concern, CO2, CH4, and N2O (see Chapter 6 for more detailed discussion of these and other key gases). Measurements of these gases with long atmospheric lifetimes come from a number of monitoring stations throughout the world." "with long atmospheric lifetimes" is not correct as CH4 and N2O have lifetimes orders of magnitude shorter than CO2 (http://en.wikipedia.org/wiki/Greenhouse_gas#Atmospheric_lifetime) [Andrew Glikson, Australia]	Rejected - Ch4 (9 year) and N2O (100 years) have atmospheric lifetimes long enough that they are well mixed in the atmosphere except for the slight hemispheric gradient due to more emissions in the Northern Hemisphere.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1-829	1	8	16	8	24	When discussing fig. 1.6,7,8 the text states that the narrowest projections are from AR4. However, the impression given by these figures is very misleading since e.g. the AR4 numbers for the 1990s were not true projections, but based on known history. See also my next comment (no. 6). [Arne Melsom, Norway]	Accepted - Good point. The text has been revised.
1-830	1	8	17	8	17	refer to chapter 8 here as well [Olivier Boucher, France]	Accepted - The text has been revised.
1-831	1	8	17	8	17	delete comma after CH4 [Peter Burt, UK]	Editorial - Thank you. Copyedit is to be completed prior to publication
1-832	1	8	18	8	18	Replace "gases with long atmospheric lifetimes" with "long-lived gases". [Robert Waterland, United States of America]	Accepted - The text has been revised.
1-833	1	8	18		19	"Measurements of these gases with long atmospheric lifetimes come from a number of monitoring stations throughout the world." This is a pretty weak statement. These measurements are unquestioned evidence. [Stephen E Schwartz, USA]	Accepted - The text has been revised.
1-834	1	8	19	8	19	I think that it would be necessary to comment about the representativeness of these measurements. Unfortunately I can not review chapter 6, but this topic is probably further discussed there. In this case, the reader could be referred to this chapter to better understand the representativeness/reliability of these data at global scale. [Celeste Saulo, Argentina]	Taken into account -Later chapters discuss the observations. Text has been revised though for clarity.
1-835	1	8	20	8	30	Currently the discussion about CO2 is attached with this section's first paragraph, which introduces the basics about greenhouse gas concentrations; and discussions about CH4 and N20 are put in two separated paragraphs. When readers go through paragraphs quickly, a structure like this will distract their attention from CO2, but highlight CH4 and N20 – apparently not intended by the authors. It may be worthwhile to put discussions about CO2, CH4 and N20 together or in 3 separated paragraphs. [Gan Zhang, United States]	Accepted - The text has been revised.
1-836	1	8	21	8	22	Replace "The projections from the First Assessment Report (FAR; IPCC, 1990) are much broader than those from the more recent assessments. The narrowest projection is from the most recent assessment, AR4." with ""The range of projections from the First Assessment Report (FAR; IPCC, 1990) is much larger than those from more recent assessments. The narrowest projection range is from the most recent assessment, AR4." [Robert Waterland, United States of America]	Accepted - Thanks. The text has been revised.
1-837	1	8	24	8	26	The disagreement between observations and projections for CH4 has to be discussed. It is an illustration that models do not capture some key ingredients. [François GERVAIS, France]	Taken into account - It has nothing to do with the models. It has to do with the emissions scenarios used. Text has been added for clarity.
1-838	1	8	24			some reasoning on the slowing trend and the renewed growth of CH4 should be given, see for example Frankenberg, C. et al. 2011: Global column averaged methane mixing ratios from 2003 to 2009 as derived from SCIAMACHY: Trends and variability. J. Geophys. Res. 116, D04302, doi:10.1029/2010JD014849. Dlugokencky, E. J. et al. 2009: Observational constraints on recent increases in the atmospheric CH4 burden. Geophys. Res. Lett. 36, L18803, doi:10.1029/2009GL039780. Rigby, M. et al. 2008: Renewed growth of atmospheric methane. Geophys. Res. Lett., 35, L22805, doi:10.1029/2008GL036037. Bousquet, P. et al. 2006: Contribution of anthropogenic and natural sources to atmospheric methane variability. Nature 443, 439-443. [Jucundus Prof. Dr. Jacobeit, Germany]	Taken into account - Text added to refer to discussion on the observations in later chapters.
1-839	1	8	25	8	25	methane → CH4 [Peter Burt, UK]	Accepted - The text has been revised.
1-840	1	8	25	8	25	insert 'in' after 'increased' [Peter Burt, UK]	Accepted - The text has been revised.
1-841	1	8	25	8	25	About the expresion: "...methane concentrations have increased the last two years", it must be detailed the years, since for the moment fo the publication of AR5-WGI, there will be at least 2 more years. [Rubén D Piacentini, Argentina]	Accepted - The text has been revised.
1-842	1	8	25	8	25	Replace "have increased" with "have begun to increase again in". [Robert Waterland, United States of America]	Accepted - The text has been revised.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1-843	1	8	25	8	25	Replace "The projections all assumed larger increases" with "Projections in FAR through AR4 all assumed larger methane concentration increases". [Robert Waterland, United States of America]	Accepted - The text has been revised.
1-844	1	8	25			I have not seen in the respective figure, that "methane concentrations have increased the last two years". [Manfred Wendisch, Germany]	Taken into account - The figure and the text have been revised.
1-845	1	8	28	8	30	To be more precise, it seems to me that the observed data is typically in the lower part of the TAR and AR4 projected ranges. [Claudio Cassardo, Italy]	Noted - Yes, as stated in the text.
1-846	1	8	31	8	31	May discuss the reason for the temporal trend of greenhouse gases. [Jian Tian, United States of America]	Rejected - Well discussed in prior assessments and in Chapter 6 of this one.
1-847	1	8	33	8	33	About Figure 1.6: "Estimated observed globally and annually averaged carbon dioxide concentrations..",please explain why the first two words are included together: "Estimated observed". The same for Figure 1.7. [Rubén D Piacentini, Argentina]	Accepted - Good point. Should just be "Observed".
1-848	1	8	33	8	37	The extreme projections are always wrong, but the measurements do not include land surfaces [VINCENT GRAY, NEW ZEALAND]	Rejected - See response above. No effect on text.
1-849	1	8	40	8	44	Further evidence that IPCC projections are completely useless. How long can it continue? [VINCENT GRAY, NEW ZEALAND]	Rejected - Text explains the figure. Such opinion statements are worthless to improving the assessment as there is no content.
1-850	1	8	40	8	51	in whole the report should use symboles such as CO2, CH4 , or Names carbon dioxide, methane, ..et, in this report in many places authors using some times symboles and in other place they use names. it will be good if they using the symboles in text and the elements names can be drown in appendix . [ALI GEATH ELJADID, LIBYA]	Rejected - It is common in the scientific literature, to use the name the first time and the symbol largely thereafter.
1-851	1	8	41	8	43	About Figure 1.7: "….Estimated observed global annual CH4 concentrations are shown in black (NOAA Earth System Research Laboratory measurements, updated from Dlugokencky et al., 2009).", please explain how was obtained the 2010 CH4 concentration,since this last reference of the updated data goes up to 2009. [Rubén D Piacentini, Argentina]	Taken into account - Later NOAA analyses of observations as explained in the figure caption; reference to the website added.
1-852	1	8	47	8	51	Further evidence that extreme projections are always wrong. [VINCENT GRAY, NEW ZEALAND]	Rejected - Opinion statement with no effect on the text. It is actually amazing that the projections made over 20 years ago about this gas are still within the range of the observed trends.
1-853	1	8	48	8	49	About Figure 1.8: "…Observed global annual N2O concentrations are shown in black (NOAA Earth System Research Laboratory measurements, updated from Elkins and Dutton, 2010).", same as before (how the 2010 N2O concentration was determined?). [Rubén D Piacentini, Argentina]	Taken into account - Later NOAA analyses of observations as explained in the figure caption; reference to the website added.
1-854	1	8	53	9	50	The discussion of Extreme Events is quite broad and can be applied to both naturally and anthropogenically influenced climate change. But this point is absent from the narrative prior to page 9, lines 48-49. Since elsewhere AR5 stresses the human influence and because of the media's preoccupation with extreme weather events, the disclaimer in lines 48-49 deserves amplification. Then there is this statement on Page 9, lines 41-42: "...the AR4 also stresses the overall increase in intense tropical cyclone activity." Missing, of course, is the sharp decline in Atlantic hurricane activity, a welcome fact very well known to people who are affected by such storms. Perhaps this is covered elsewhere in AR5. It certainly deserves mention here in view of the prediction from AR4. increase in intense tropical cyclone activity. See comment 29 below for a reference. [Forrest Mims, USA]	Taken into account - The newest assessment of tropical cyclone activity is done in the SREX Chapter 3.4.4.. We will give a reference to this chapter. While the global frequency of tropical cyclones remains steady, the interannual and spatial variability is large. Therefore, changes in North Atlantic tropical cyclone activity do not necessarily reflect global changes. The SREX concludes: "There is low confidence that any observed long-term (i.e., 40 years or more) increases in tropical cyclone activity are robust, after accounting for past changes in observing capabilities" (Page 160 second paragraph). Concerning the attribution of any trends to human activity they conclude: "The present assessment regarding detection and attribution of trends in tropical cyclone activity is similar to the WMO assessment (Knutson et al., 2010): the

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
							uncertainties in the historical tropical cyclone records, the incomplete understanding of the physical mechanisms linking tropical cyclone metrics to climate change, and the degree of tropical cyclone variability – comprising random processes and linkages to various natural climate modes such as El Niño – provide only low confidence for the attribution of any detectable changes in tropical cyclone activity to anthropogenic influences" (Page 161; second column; first paragraph).
1-855	1	8	53	10	2	Unsatisfactory, as there is no comparison with what has happened in the past, when measurement systems had not been developed. [VINCENT GRAY, NEW ZEALAND]	Rejected - For many parts of the world we have over 100 years of observations to use in assessing severe precipitation over land but for other types of extreme events it is indeed difficult and text says so.. The text discusses the difficulties with sparse data.
1-856	1	8	55	8	56	Kindly consider to change to ' Extreme weather or extreme climate events are defined as the occurrence of a value of weather or climate variable that is greater or lower than a specified threshold, …'. Example: excessive or deficient rainfall at a location during a season are likely to produce floods or droughts respectively. The threshold here is mean rainfall at the location during that season. [Faustine Fidelis Tilya, United Republic of Tanzania]	Taken into account - The text has been revised for clarity.
1-857	1	8	55	8	58	The definition of extereme events is too long and confusing, even for those familiar with the concept. I suggest a much simpler definition and leave the more detailed explanation for the actual chapter. [David Bader, USA]	Taken into account -The IPCC definition from the Glossary is now used.
1-858	1	8	55	8	59	The definition in the SREX SPM is more appropriate for this introductory section. Please insert that definition of extreme events. [Øyvind Christophersen, Norway]	Taken into account -The IPCC definition from the Glossary is now used.
1-859	1	8	55		56	is a very cold day not an extreme event – I have learnt that depending on the meteorological parameter extreme events are possible on both sides – please change to '… greater, smaller or equal …' [Frank Kreienkamp, Germany]	Taken into account -The IPCC definition from the Glossary is now used.
1-860	1	8	55			Good use of figures 1.9a. However, this section is poorly constructed and leaves the reader confused. What is the message? Is this section meant to illustrate the degree of complexity in defining 'extreme weather events'? [Christian Ohneiser, France]	Taken into account - This section serves as a very brief introduction on extreme events. Any definitions given in this section are consistent with the SREX report. More information on the physical understanding of extreme events are found in Chapter 3 of the SREX report.
1-861	1	8	56	8	56	insert 'to' after 'equal' [Peter Burt, UK]	Accepted - The text has been revised.
1-862	1	8	56	8	56	"greater than or equal to" [George Kiladis, USA]	Accepted - The text has been revised.
1-863	1	8	56	8	56	Change to "greater than or equal to". [Jian Tian, United States of America]	Accepted - The text has been revised.
1-864	1	8	56			add 'to' between equal and a [Elie Verleyen, Belgium]	Accepted - The text has been revised.
1-865	1	8	58	8	58	such as drought, floods and hot waves…. [PROF. YEHIA HAFEZ, Egypt]	Accepted - The text has been revised.
1-866	1	8	59	8	59	Seneviratne et al., 2012 and Hafez 2012 [PROF. YEHIA HAFEZ, Egypt]	Rejected -The introduction does not assess the full range of literature on extreme events as done in the SREX report or Chapter 2 of this report. Chapter 2 section 2.6.6.3 Weather Types and Blocking assesses heat waves.
1-867	1	8	59	8	59	Y.Y. Hafez (2012): Blocking Systems Persist over North Hemisphere and Its Role in Extreme	Rejected -The introduction does not assess the full

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
						Hot Waves over Russia During Summer 2010. A chapter in the book "Atmospheric Models", ISBN 979-953-307-335-3. INTECH PRESS, In Tech d.o.o. www.intechweb.org, Croatia.(In Press) [PROF. YEHIA HAFEZ, Egypt]	range of literature on extreme events as done in the SREX report or Chapter 2 of this report. Chapter 2 section 2.6.6.3 Weather Types and Blocking assesses heat waves.
1-868	1	8	59	8	59	Change "combine" to "to be combined". [Jian Tian, United States of America]	Accepted - The text has been revised.
1-869	1	8	59	8	59	"... several factors need to combine to produce ... ". Instead of "need to combine", "need to be combined" or "need combining" might help make the expression grammatically natural. [Gan Zhang, United States]	Accepted -The text has been revised.
1-870	1	8		17		Linkage of Introductory Chapter to Chapter 6 need to strengthen [ABHA CHHABRA, INDIA]	Taken into account - Text added to make this connection.
1-871	1	8				Figure 1.6, Figure 1.7, Figure 1.8: The figures should show the evolution with no. of years since the start of each projection period on the x-axis, rather than calendar year. Thus, the misleading nature of the presentation discussed in my previous comment (no. 5) can be eliminated. [Arne Melsom, Norway]	Takeninto account - Makes the figure too difficult to explain if it was revised in this way; text has been revised.
1-872	1	9	1	9	12	Again, the paragraph is complicated and the wording complex. The point gets lost in the wordiness. [David Bader, USA]	Accepted - The text has been revised for clarity.
1-873	1	9	1	9	12	The reasoning and diagrams are clear but assuming normal distributions is a significant assumption, particularly in systems with tipping points. The significance of this assumption should perhaps be clarified. [Mark Charlesworth, United Kingdom of Great Britain & Northern Ireland]	Accepted -The text has been revised for clarity.
1-874	1	9	2	9	5	The probability of occurrence of values of a climate or weather variables can be described by a probability distribution function that for some variables is shipped similarly to a normal distribution or Gaussian curve as in temperature data while gamma distribution function is good fitting the precipitation data. [ALI GEATH ELJADID, LIBYA]	Accepted - The text has been revised.
1-875	1	9	2	9	12	I really like Figure 9, it is very instructive! Perhaps this discussion could be extended? [Jón Egill Kristjánsson, Norway]	Taken into account - Thank you. The text has been revised for further clarity.
1-876	1	9	3	9	3	delete "'Normal' of" and "(the familiar 'bell' curve)" [Manfred Wendisch, Germany]	Accepted - The text has been revised.
1-877	1	9	3			… "for some variables" … could further be specified like "(e.g. mean temperature, but not precipitation)" [Jucundus Prof. Dr. Jacobeit, Germany]	Accepted - The text has been revised.
1-878	1	9	4			From page 1-8, the reading is much easier and sometime a bit patronizing like the "bell curve" of page 9 line 4. The reading will become difficult again from page 14. [Francois DANIS, France]	Accepted - The text has been revised for clarity.
1-879	1	9	5			The maximum feasible event is a physical, not a statistical concept - statistically, the higher the event the less likely with no distinct maximum - so I'd recommend to rephrase this [Gabi Hegerl, UK]	Accepted - The text has been revised.
1-880	1	9	7	9	12	Following my previous comment, I suggest to eliminate the references to Figure 1.9 [Belén Martín Míguez, Spain]	Taken into account - Figure has been redone.
1-881	1	9	8	9	8	Instead of sea level rise, may be we should generalise it as sea level variations to take on board sea level declines! In western Indian Ocean, instrument records and satellite altmetry are portraying declining sea levels (Ragoonaden, 2006) and (Leuliette et al, 2004) ! [Faustine Fidelis Tilya, United Republic of Tanzania]	Accepted - The text has been revised.
1-882	1	9	11	9	12	Note that the IPCC SREX (SPM and Chapter 1) includes a similar figure to that displayed in Fig. 1.9, but that additionally illustrates changes in extremes related to changes in the skewness of distributions. This is also an important aspect that may be worth illustrating in the AR5. (See also text from Section 3.1.6 of the SREX on this point). [Sonia Seneviratne, Switzerland]	Taken into account - The figure has been replaced by a new figure.
1-883	1	9	14	9	16	need a reference [PROF. YEHIA HAFEZ, Egypt]	Rejected - The statements refer to earlier assessment reports.
1-884	1	9	14	9	21	This whole paragraph is muddled and difficult to read. [Peter Burt, UK]	Taken into account - We have revised the paragraph

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
							for clarity.
1-885	1	9	15	9	15	"was" should be "were" [Olivier Boucher, France]	Accepted - The text has been revised.
1-886	1	9	15	9	15	was → were [Peter Burt, UK]	Accepted - The text has been revised.
1-887	1	9	20			What do you mean by more robust? More certain? It would be up to the modeling chapters to make that statement if it is justified. [Reto Knutti, Switzerland]	Accepted - The text has been revised.
1-888	1	9	25	25	26	table - with no number [ALI GEATH ELJADID, LIBYA]	Rejected - In this line we refer to tables that were in previous assessments
1-889	1	9	28	9	29	“In the observations for the “higher maximum temperature” shifted from “likely” to “very likely”, …. ”. This sentence is incorrect somehow. I cannot work out what is meant with it. It there a word missing, perhaps? [Eelco Johan ROHLING, United Kingdom of Great Britain & Northern Ireland]	Taken into account - The text has been revised.
1-890	1	9	32	9	32	"The confidence... in lower??? minimum temperature..." is in contradiction to Fig. 1.10, where "higher minimum l temperatures" are considered as "very likely" or "virtually certain", resp., which is in accordance with the effect of enhanced GEHE. [Karl-Heinz Bernhardt, Germany]	Accepted - The text has been revised.
1-891	1	9	32	9	32	is 'lower minimum tempertures' really true? On p.9, l. 26-27 it is 'higher minimum temperatures' [Reiner Steinfeldt, Germany]	Accepted - The text has been revised.
1-892	1	9	32			Should this line not start with "higher minimum temperatures"? [Roger Gifford, Australia]	Accepted - The text has been revised.
1-893	1	9	32			higher minimum temperatures (instead of lower …) [Jucundus Prof. Dr. Jacobeit, Germany]	Accepted - The text has been revised.
1-894	1	9	33	9	33	do you mean "daily" or "diurnal" here? [Olivier Boucher, France]	Accepted - The text has been revised.
1-895	1	9	33	9	33	Should this be extremes-Table? [Peter Burt, UK]	Accepted - The text has been revised.
1-896	1	9	34	9	34	century → Century [Peter Burt, UK]	Accepted - The text has been revised.
1-897	1	9	34			decrease in 21st century projections (instead of increase …) [Jucundus Prof. Dr. Jacobeit, Germany]	Accepted - A decrease in the diurnal temperature range is meant.
1-898	1	9	34			space after projections [Elie Verleyen, Belgium]	Accepted - The text has been revised.
1-899	1	9	35	9	35	"due to biases" [Olivier Boucher, France]	Accepted - The text has been revised.
1-900	1	9	36	9	36	"due to biases" [George Kiladis, USA]	Accepted - The text has been revised.
1-901	1	9	36	9	36	…in the SREX due to… [Helga Nitsche, Germany]	Accepted - The text has been revised.
1-902	1	9	36	9	36	Change "were" to "was"; add "to" after "due". [Jian Tian, United States of America]	Accepted - The text has been revised.
1-903	1	9	36	9	37	“were” should be “was” (the sentence noun “confidence” is singular) [Eelco Johan ROHLING, United Kingdom of Great Britain & Northern Ireland]	Accepted - The text has been revised.
1-904	1	9	36			add 'to' between due and biases [Elie Verleyen, Belgium]	Accepted - The text has been revised.
1-905	1	9	46	9	46	. → , and Especially → especially [Peter Burt, UK]	Rejected - Combining the two sentences would result in an even longer sentence, which may be hard to read.
1-906	1	9	46	9	50	"however, it may be possible to estimate the human related contribution to such changes in the probability of occurrence of extremes (for example see Min et al., 2011; Pall et al., 2011). Has the SREX report taken into account the latest reports by Munich-Re	Rejected - As an introduction Chapter 1 describes the knowledge of AR4, in case of the extremes the SREX. The assessment of the observed changes in extremes

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						(https://www.munichre.com/touch/login/en/service/login.aspx?ReturnUrl=/touch/publications/en/list/default.aspx?id=1060), indicating a near-doubling in the frequency of extreme weather events between 1998 - 2008? [Andrew Glikson, Australia]	is found in Chapter 2 and the assessment of detection and attribution of extremes if found in Chapter 10.
1-907	1	9	46	9		I suggest to explain the affirmation: ¨ Especially for extremes that are the result of the combination of factors such as droughts, linking a particular extreme event to a single, specific causal relationships are difficult to analyze ¨, because don´t have neither scientific nor clear explanation [CRISTOBAL FELIX DIAZ MOREJON, Cuba]	Taken into account - We have revised the text for clarification.
1-908	1	9	47	9	48	sentence is not correct [Jucundus Prof. Dr. Jacobeit, Germany]	Taken into account - The text has been revised for clarity.
1-909	1	9	47	9	48	“linking a particular extreme event to a single, specific causal relationships are difficult to analyze”. This is grammatically extremely poor, and incorrect. First, “relationships” may need to be “relationship”. Second, instead of “are difficult to analyse”, perhaps you mean “remains difficult”? [Eelco Johan ROHLING, United Kingdom of Great Britain & Northern Ireland]	Taken into account - The text has been revised for clarity.
1-910	1	9	47	9	50	or- the reason- may be due to " total energy balance , general circulation", please see the energy budget section in this report. [ALI GEATH ELJADID, LIBYA]	Rejected - This comment seems to refer to another line.
1-911	1	9	48	9	48	"relationship is difficult" [George Kiladis, USA]	Accepted - The text has been revised.
1-912	1	9	48	9	50	Text states that "it may be possible to estimate the human related contribution to such changes in the probability of occurrence of extremes" and cites Min et al. (2011). There is some confusion as to what this study showed. Using highly-convoluted data acceptance crtieria and interpolation, this study demonstrated increasing intensities of 'extreme' precipitation over 5 successive decadal periods, limited to the Northern Hemisphere. The claim was made that this demonstrates anthropogenic influence through increased anthropgenic emissions and consequent temperatures. However, the NH did not demonstrate sucessively higher temperatures of the decadal 'bins' utilised in analysing the precip. Either the interpolation etc. renders the trend spurious, or else the increased precip cannot be due to hemispheric temperature increases as none occurred during the decades of the 50's, 60's, until mid-1970's. The confidence in this paper is therefore very low. Reference should be removed Min, S.-K., X. Zhang, F. W. Zwiers, and G. C. Hegerl, 2011: Human contribution to more-intense precipitation extremes. Nature, 470, 378-381. [Stewart Franks, Australia]	Accepted - We delete this reference. Instead we refer to the SREX report, where these issues are assessed.
1-913	1	9	48			after “in some cases” it could be added “(e.g. precipitation extremes)” - in view of the cited literature [Jucundus Prof. Dr. Jacobeit, Germany]	Accepted - The text has been revised.
1-914	1	9	49	9	49	e.g see Min et al., [PROF. YEHIA HAFEZ, Egypt]	Accepted - The text has been revised.
1-915	1	9	50			an event paper is as cited Pall, but not Min - cite e.g. Stott et al. 2005 (see ch10) or the new Otto paper. [Gabi Hegerl, UK]	Taken into account - We delete this reference. Instead we refer to the SREX report, where these issues are assessed.
1-916	1	9	50			from SREX some further results should be mentioned like the only medium confidence in summer continental drying or the low to medium confidence in intense tropical cyclone activity increases [Jucundus Prof. Dr. Jacobeit, Germany]	Taken into account - Although we need to be very brief here, some statements from the SREX report that were not analyzed in AR4 are mentioned.
1-917	1	9	53	9	53	I have created a small table to illustrate the ideas given in the first para on page 1-9 and this can be displayed along with Fig. 1.9. But I am not able to paste the table here. It can be shared if needed. [Sharad K Jain, India]	Taken into account - Figure 1.9 has been replaced with a new figure.
1-918	1	10	1	10	1	Figure 1.10: mispelling in the cell of SREX (confidence in observed chages) / Increased summer continental drying..: replace "regiona" with "regions" and "exist" with "exists" [Celeste Saulo, Argentina]	Accepted - The figure has been revised.
1-919	1	10	2	20	49	The flow is good and all citations captured well [Faustine Fidelis Tilya, United Republic of Tanzania]	Noted - Thanks.
1-920	1	10	4	10	16	we take about m meters per years ----- so what are the accurecy of the measurements of see level (must written) [PROF. YEHIA HAFEZ, Egypt]	Rejected - See chapter 3

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1-921	1	10	4	11	13	For each of 1.3.4.{2-3}, which of these observed changes are robust predictions of climate system models. For Fig 1.11, see suggested revision in comment 7. [Michael Neil Evans, United States of America]	Rejected - Sorry, we do not understand this question.
1-922	1	10	4	11	35	Since elsewhere the FAR stresses anthropogenic roles in climate change, the discussion of indicators fails to pass the IPCC objectivity test. The indicator changes that are presented can also accompany purely natural changes or a combination of natural and anthropogenic change. This deserves a line or two in the FAR, for the popular media often declares various indicators to be solely a result of human activity. [Forrest Mims, USA]	Taken into account - Text was added earlier about the difficulty in interpreting the FAR results for these comparisons.
1-923	1	10	6	10	6	Section 1.3.4.1 There is a whole chapter devoted to Sea Level. Wouldn't it make sense to make some reference to it here? [Belén Martín Míguez, Spain]	Accepted - Text now refers to chapters 3 and 13.
1-924	1	10	6	10	16	A short discussion on changes in heat content (trend and variability) should be mentioned. [Sybren Drijfhout, Netherlands]	Rejected - See Chapter 3.
1-925	1	10	6	10	16	This could be expanded to include the evidence for large decadal variance in the 20th century, leading to caution in interpetation of accelerated SLR, but also to note that "the closure of the observational budget … represents a significant advance since the AR4" (Chapter 13, p. 13-22, lines 14-17). [Donald Forbes, Canada]	Accepted - Text has been revised.
1-926	1	10	6	10	16	Older sea level measurements are prone to upwards bias as equipment is damaged by storms and local land level is depressed by buildings, removal of groundwater and minerals. Modern equipment with GPS measuring devices has found much lower rises and in some cases (Pacific Islands and Australia) no rise at all. [VINCENT GRAY, NEW ZEALAND]	Rejected - We specifically show in the figure two types of measurements so as to account for such uncertainties. Land changes are accounted for in the analyses used in the assessment -- see Chapter 3.
1-927	1	10	6	10	16	Maybe we can combine "sea level" and "ice" together? Or give details about why sea level rises. [Jian Tian, United States of America]	Rejected - We do not see a reason to do this.
1-928	1	10	6			Section 1.3.4.1 and Fig. 1.11: Similar concerns apply here as mentioned for the temperature projections in Fig. 1.4. Earlier models did not include all the forcings, so there is no reason that they should get the thermal expansion correct. In particular the lack of volcanic forcing is a problem, which is visible in thermal expansion long after the eruption. I argue that projections for sea level were never made to be interpreted on those timescales, and comparison is best avoided. [Reto Knutti, Switzerland]	Accepted - Text has been revised. We agree with the concern and have modified the text to reflect this concern.
1-929	1	10	8	10	16	I suggest to present from chapter 13a short information about the contribution of thermally induced sea water expansion compared with the effect of ice sheets melting to accelerated sea level rise. [Karl-Heinz Bernhardt, Germany]	Rejected - Those details are discussed in chapter 3.
1-930	1	10	8	10	16	In figure 1.11 two data sources are shown: tide gauge and altimeters. Without any doubt, both data are well contained at the internal of the shaded areas of AR4 and also TAR. However they present some oscillations that, in the last 12 years, if detrended seem to be out of phase between each other (especially around 2002 and 2005-6. I do not know about the uncertainty of such data, so cannot argue if they are statistically different. Maybe a comment about these differences can clarify better... [Claudio Cassardo, Italy]	Taken into account - The figure has been revised. A more detailed discussion on sea level measurements and their uncertainties is given in Chapter 3.7.
1-931	1	10	8	10	16	Given the debate about the low-balling of future sea level change in AR4, what is presented in this summary is underwhelming. Compare this discussion, for example, with the level of detail presented section 1.5.2 on modelling capabilities. This MUST be redressed. ALso consider adding a FAQ about this point. [Terrence Joyce, USA]	Rejected - This section is on past sea level rise. Future sea level rise is assessed in Chapter 13.
1-932	1	10	8	10	16	To insert "From 1880 there is an acceleration of sea level rise about 0.01 mm year-2 (Church and White, 2006; Church and White, 2011; Jevrejeva et al., 2008)" [Pavel Tkalich, Singapore]	Rejected - The text already covers (and reference) trends starting from 1900 and onwards
1-933	1	10	8	11	16	Given that some of the tipping points discussed in the literature would directly affect sea level it may be helpful to note this here, particularly given the faster arctic sea ice melting than predicted in AR4. [Mark Charlesworth, United Kingdom of Great Britain & Northern Ireland]	Rejected - We do to see the relevance regarding the connection made between arctic sea ice melting and global sea level
1-934	1	10	11	10	11	20th century → 20th Century [Peter Burt, UK]	Accepted - The text has been revised.
1-935	1	10	12	10	12	Value of 3.3 mm yr. This value does not match the value presented in section 13.3.2 (3.2 mm/yr) neither is supported by a reference here. [Belén Martín Míguez, Spain]	Taken into account - We now cross-reference Chapters 3 and 13 for these details.

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1-936	1	10	12	10	12	The figure referred to give 3.2 +- 0.4 mm rather than the 3.3+-0.4 mentioned in the text (see figure at: http://sealevel.colorado.edu/results.php) [Bennartz Ralf, US]	Accepted - The text has been updated. Currently (April 2012), the value is 3.1+-0.4.
1-937	1	10	12			The sentence omits to mention the strong deceleration observed recently in Fig. 13.3. Note also that since it has been launched in 2002, the altimeter of the European satellite ENVISAT shows a rate of increase of only 0.6 mm per year which is much smaller than the rate of 1.7 mm per year given by the historical tide gauges during the twentieth century. Remember that if we consider a sinusoid of period 60 years, the curve may be decomposed in, say, 8 segments, each roughly 7.5 years long : accelerating, maximum positive slope (observed in the eighties and beginning of the nineties), decelerating, top pause (ending now), decelerating, maximum negative slope, accelerating, bottom pause. The 8 years of observations of ENVISAT is instructive from this point of view since it fits a portion of the "decelerating - top pause" sequence. The time dependence of altimetric data is of central importance because satellite altimetry captures ocean thermal expansion, viz. sea temperature and ocean heat content, and also melting of continental ice. [François GERVAIS, France]	Rejected - Sea level observations are discussed in more detail in Chapter 3.
1-938	1	10	12			From the graph in Figure 1.11, I would estimate roughly 5 cm / 20 years = 2.5 mm per year sea level rise. In the text a value of 3.3 mm per year is mentioned. What is the explanation for this obvious mismatch between text and figure? [Manfred Wendisch, Germany]	Taken into account - The mean sea level rise in the altimeter data 2.6 mm/y since 1992 and 2.8 mm/y since 1990 according to the tide gauges. Text has been revised.
1-939	1	10	12			The statement that 'is significantly different from previous decades' is not rigorously correct. It is true that the rate since 1990 has been higher than the 20th century as a whole but there have been earlier periods of similar length when rates were similarly high. I suggest this is changed to read as follows. “From the historical tide gauge record, we know that the 20th century rate of sea level rise is 1.7 ± 0.2 mm/yr (Holgate, 2007), and that the high rate since 1990 (3.3 ± 0.4 mm/ yr) is comparable to or larger than the highest rates measured over a similar period earlier in the 20th century (e.g. Holgate and Woodworth, 2004; Woodworth et al., 2009), with sea level trends in different ocean basins becoming more consistent over the last 20 years (Jevrejeva et al., 2006; Merrifield et al., 2009). [Philip Woodworth, United Kingdom of Great Britain & Northern Ireland]	Accepted - text has been revised and additional reference added
1-940	1	10	12			The additional references are: Holgate, S.J. and Woodworth, P.L. 2004. Evidence for enhanced coastal sea level rise during the 1990s. Geophysical Research Letters, 31, L07305, doi:10.1029/2004GL019626. Woodworth, P.L., White, N.J., Jevrejeva, S., Holgate, S.J., Church, J.A. and Gehrels, W.R. 2009. Evidence for the accelerations of sea level on multi-decade and century timescales. International Journal of Climatology, 29, 777-789, doi:10.1002/joc.1771. [Philip Woodworth, United Kingdom of Great Britain & Northern Ireland]	Accepted - Text has been revised
1-941	1	10	18	10	24	Ocean acidification has no impact on climate/climate change and climate change itself has no impact on acidification. Any reference to acidification should be removed as it is entirely tangential to the role of the IPCC 5AR. It suggests a bias toward reduction of CO2 emissions for non-climate reasons. [Stewart Franks, Australia]	Rejected - We disagree and we believe we have been clear on this in the last sentence in the paragraph
1-942	1	10	18	10	33	Representative samples have yet to be measured and there is no evidence that a change of variability has any harmful consequences that cvannot be handled by evolution. [VINCENT GRAY, NEW ZEALAND]	Rejected - There is an extensive literature backing what is stated in the existing text.
1-943	1	10	20	10	20	ocean → oceans [Peter Burt, UK]	Accepted - The text has been revised.
1-944	1	10	22	10	22	It should be mentioned how the reported change in pH was found, has the pH decrease been measured or deduced from known oceanic uptake of CO2? [Arne Melsom, Norway]	Accepted - The text has been revised.
1-945	1	10	22	10	22	I believe that the pH shift cited refers only to the surface mixed layer. It may be important to indicate that this shift does not refer to the entire ocean. [Nathaniel Ostrom, United States of America]	Accepted - The text has been revised.
1-946	1	10	22	10	23	Check the references! Zeebe et al. (2008) do not find this reduction, they quote it from Raven (2005). [Arne Melsom, Norway]	Accepted - The text has been revised.
1-947	1	10	23	10	24	A reference at the end of this sentence would be useful. [Gareth S Jones, UK]	Accepted - Reference to WGII added to the text.
1-948	1	10	24	10	24	I don't know what "health of the world's ocean" means, I suggest rewriting as "health of the world's ocean ecosystems". [Olivier Boucher, France]	Accepted - The text has been revised.

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1-949	1	10	24	10	24	need a reference [PROF. YEHIA HAFEZ, Egypt]	Accepted - Reference to WGII added to the text.
1-950	1	10	24			this statement should be specified in more detail, or a link to the corresponding AR5 chapter should be given [Jucundus Prof. Dr. Jacobeit, Germany]	Accepted - Links made to later chapters
1-951	1	10	26			change location of Figure 1.11 [Elie Verleyen, Belgium]	Rejected - Not an issue
1-952	1	10	27	10	27	It sounds confusing to say "with the seasonal signals removed" in the caption of Fig. 1.11 since these are annual sea level values, but I realize this is has to do with the irregular temporal sampling of the original data. Nevertheless, consider removing "with the seasonal signals removed" from the caption, or perhaps say something like "annual averages of deseasonalized data". [George Kiladis, USA]	Taken into account - The text has been revised.
1-953	1	10	31	10	31	was → were [Peter Burt, UK]	Accepted - The text has been revised.
1-954	1	10	32	10	32	This data was → These data were [Peter Burt, UK]	Accepted - The text has been revised.
1-955	1	10	32	10	32	“data was…”. Throughout this chapter there is a confusion about singular or plural use of the word data. It is plural. So the correct verb form should be plural (i.e., were). In any case, consistency is needed throughout the chapter on the use od data as singular or plural. [Eelco Johan ROHLING, United Kingdom of Great Britain & Northern Ireland]	Accepted - The text has been revised.
1-956	1	10	35	11	13	No account is taken of the periodic changes caused by the Pacific and Atlantic ocean oscillations. There is every current indication that a downward trend in these is leading to increasing ice and glaciers. [VINCENT GRAY, NEW ZEALAND]	Rejected - The existing text uses the latest published information on the trends. The reviewer did not provide published information to back his statement.
1-957	1	10	35	11	13	section 1.3.4.3 and Fig 1.3 a): In the section « Ice indicators », it is probably worth mentionning that vertical profiles of englacial temperature measured through the entire thickness of mountain cold glaciers, or through ice sheets, provide clear evidence of global warming over the last decades or century. This proxy of air temperature is of particular interest especially for mountain cold glaciers, located usually in high altitude and remote places, not accessible to direct observations. This kind of study has been done in the Alps [Lüthi and Funk, 2001; Vincent et al, 2007], with good results in agreement with direct observations. It has also been done in the tropical Andes [Gilbert et al., 2010] where such evidences of high elevation warming is needed given that air temperature trends at high altitude in the tropics is still uncertain. Gilbert et al. [2010] show two warming phases from 1900 to 1960 (+0.5 ± 0.3 K starting approximately in 1920-1930) and from 1985 to 1999 (+0.6 ± 0.2 K), corresponding to a mean atmospheric temperature rise of 1.1 ± 0.2 K over the 20th century, in Bolivia (16°S), at 6340 m asl. Ref : Lüthi, M. P., and M. Funk (2001), Modelling heat flow in a cold, high-altitude glacier: interpretation of measurements from Colle Gnifetti, Swiss Alps, J. Glaciol., 47, 314-323. Vincent, C., E. Le Meur, D. Six, P. Possenti, E. Lefebre, and M. Funk (2007), Climate warming revealed by englacial temperature at Col du Dome (4250 m, Mont Blanc area), Geophys. Res. lett., 34 (L16502), doi:10.1029/2007GL029933. Gilbert, A. P.Wagnon, C. Vincent, P. Ginot and M. Funk, 20th century temperature reconstitution in a high altitude tropical site from Illimani (6340 m a.s.l., Bolivia 16°39’S) englacial temperature, J. Geophys. Res., 115, D10109, doi:10.1029/2009JD012961, 2010 [Patrick Wagnon, France]	Taken into account - Hopefully the reviewer made sure this is handled in Chapter 4. The discussion here in Chapter 1 is only to highlight the concerns about the issues. We did add one sentence on this to the section.
1-958	1	10	37	10	37	This statement is too strong. Global climate change is certainly not the only factor responsible for the rapid decline in summer Arctic sea ice extent observed during the last decades (see Section 10.5.1.1) [Thierry Fichefet, Belgium]	Accepted - The text has been revised.
1-959	1	10	37	10	39	need a reference [PROF. YEHIA HAFEZ, Egypt]	Rejected - The reference to NSIDC covers this
1-960	1	10	37	10	45	An important paper that deserves mention here is Rampal et al. (2011, doi:10.1029/2011JC007110). Importantly, it not only addresses sea ice extent, but also ice thickness. [Jón Egill Kristjánsson, Norway]	Accepted - The text has been revised.
1-961	1	10	37			The word "global" is inappropriate, for temperature in the Arctic has generally risen more than temperature	Accepted - The text has been revised.

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						elsewhere. The instrumental record shows numerous mid-latitude stations with essentially flat trends during the time Arctic ice has been in decline. [Forrest Mims, USA]	
1-962	1	10	37			I wonder if a figure showing the temporal changes of ice extent in the Arctic, Antarctic and Greenland could be added. That would be very illustrative in my opinion. [Manfred Wendisch, Germany]	Rejected -This should be in Chapter 4.
1-963	1	10	38	10	38	Replace "about -4%" with "a decrease of about 4%". [Robert Waterland, United States of America]	Accepted - The text has been revised.
1-964	1	10	39	10	40	Are the years given in order of lowest amount of ice? In which case decreasing or increasing? [Gareth S Jones, UK]	Accepted - The text has been revised.
1-965	1	10	40	10	40	The 2011 minimum should be added to the list. [Thierry Fichefet, Belgium]	Accepted - The text has been revised.
1-966	1	10	40	10	40	"last five summers: 2007, 2011, 2008, 2009 and 2010". Does this sequence represent progressive decrease in sea ice, namely was the decrease least in 2007 and most in 2010 in the order shown? [Andrew Glikson, Australia]	Accepted - The text has been revised.
1-967	1	10	40	10	43	Give more specific http reference than just nsidc.org…. This link will just lead to NSIDC's home page…. [Bennartz Ralf, US]	Accepted - The text has been revised.
1-968	1	10	42	10	42	Replace "under" by "less than" [Sharad K Jain, India]	Accepted - The text has been revised.
1-969	1	10	42	10	42	Insert “of” between “summer” and “2010”. [Eelco Johan ROHLING, United Kingdom of Great Britain & Northern Ireland]	Accepted - The text has been revised.
1-970	1	10	43	10	45	Today, there are models that capture reasonably well the recently observed rapid decrease in summer Arctic sea ice extent (see Chapters 9 and 12). [Thierry Fichefet, Belgium]	Taken into account - Text has been revised
1-971	1	10	44	10	44	Insert “the” before “basic physics” [Eelco Johan ROHLING, United Kingdom of Great Britain & Northern Ireland]	Taken into account -Text has been revised
1-972	1	10	44			Please refer to CMIP3 explicitly here. Agreement of CMIP5 with observed sea ice trends is much closer. [Reto Knutti, Switzerland]	Taken into account - Sentence has been revised.
1-973	1	10	47	10	48	Replace "Satellite data show the opposite direction for sea ice extent in the Antarctic where the trend is positive and about 2 % per decade. The reason for the positive trend may be in part due to the ozone hole, which" with "Satellite data show that sea ice extent is increasing in the Antarctic by about 2 % per decade. The observed increase in sea ice may be, at least partially, an indirect result of stratospheric ozone depletion, which " [Robert Waterland, United States of America]	Taken into account - Text has been revised
1-974	1	10	48	10	50	As mentioned in Section 10.5.1.1, there is low confidence in the scientific understanding of the observed increase in Antarctic sea ice extent. In particular, the importance of the ozone hole is still debated in the scientific community. [Thierry Fichefet, Belgium]	Taken into account - Text has been revised
1-975	1	10	48	10	50	Should cite Steig et al '09 [Steig, E.J., Schneider, D.P. Rutherford, S.D., Mann, M.E., Comiso, J.C., Shindell, D.T., Warming of the Antarctic ice sheet surface since the 1957 International Geophysical Year, Nature, 457, 459-463, 2009] which challenges the attribution simply to ozone depletion/reduced westerlies. Using a set of simulations with GISS ModelE and various alternative atmospheric and oceanic boundary conditions. They find that larger-scale atmospheric circulation changes unrelated to the AO/AAO and ozone depletion. [Michael Mann, USA]	Taken into account - Text has been revised by adding one reference
1-976	1	10	48	10	54	Chapter 10 (page 42, lines 16-38) gives much less strong conclusions about the causes of the positive trend in the Antarctic sea ice extent. [Hugues Goosse, Belgium]	Taken into account - Text has been revised
1-977	1	10	49	10	49	insert 'in' after 'resulted' [Peter Burt, UK]	Taken into account - Text has been revised
1-978	1	10	49	10	49	"Deepening of lows…" should be changed to "Deepening of low pressure systems". I feel "lows" are used colloquially within the Earth Science community but may be meaningless to non-scientists. [Matthew Cervarich, United States of America]	Taken into account - Text has been revised

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1-979	1	10	49	10	49	"resulted a deepening" should be "resulted in a deepening" [Andrew Glikson, Australia]	Taken into account - Text has been revised
1-980	1	10	49	10	50	The attribution of changes in the Southern Ocean to changes in stratospheric ozone is credible but I am not sure to which extent this is a fully proven hypothesis. The Met Office has a model with an extended stratosphere and the ozone forcing, and it does not really show up. [Olivier Boucher, France]	Taken into account - Text has been revised
1-981	1	10	49	19	49	"of the lows in West Antarctica". Specify which type of lows, i.e. temprature lows? [Andrew Glikson, Australia]	Taken into account - Text has been revised
1-982	1	10	52	10	52	?missing words: ..volume and mass, and <moreover?> at an…. [Helga Nitsche, Germany]	Taken into account - Text has been revised
1-983	1	10	52	10	52	Replace "at an increasingly higher rate" with "the rate of decrease has increased". [Robert Waterland, United States of America]	Accepted - The text has been revised.
1-984	1	10	57	10	57	delete comma after 'runoff' [Peter Burt, UK]	Accepted - The text has been revised.
1-985	1	10	57	10	57	I think 2010 was the record year; see the discussion between Jason Box and Frauenfeld et al. (Frauenfeld, O.W., P.C. Knappenberger, and P.J. Michaels, 2011. A reconstruction of annual Greenland ice melt extent, 1785-2009. Journal of Geophysical Research, 116, D08104, doi: 10.1029/2010JD014918.) The discussion is on their blogs, see http://www.worldclimatereport.com/index.php/2011/05/02/attempts-to-box-us-out/ and http://www.meltfactor.org/blog/?p=366 [Marcel Crok, The Netherlands]	Taken into account - Text has been revised and one new reference added.
1-986	1	10	58			in the context of Greenland ice loss, ice flow dynamics in large outlet glaciers should additionally be mentioned. This might lead to increased ice loss; on the other hand, however, there are also indications that ice flow is characterized by strong interannual variability reflecting short-term dynamical adjustments; this would imply that recent rates of ice loss in outlet glaciers are transient and unsuitable for extrapolations into the future, see for example Nick, F.M. et al. (2009): Large-scale changes in Greenland outlet glacier dynamics triggered at the terminus. Nature Geoscience 2: 110-114. Hamilton, G. (2010): Rapid ice sheet changes: Southeast Greenland and beyond. Abstracts of the Copenhagen Workshop on Palaeoclimatology, Oceanography and Glaciology in the Helheim Glacier region. [Jucundus Prof. Dr. Jacobeit, Germany]	Taken into account - The following statement takes care of this comment: "…..ice loss due to melt and ice discharge…"
1-987	1	10		10		Section 1.3.4.1 This section should be more consistent with section 13.3.2 in terms of the choice of relevant references providing a 1.7 mm/yr result for the rate of sea level rise. I suggest to include those referenced in Section 13.3.2, page 16, line 30. [Belén Martín Míguez, Spain]	Accepted - The text has been revised.
1-988	1	10				Figure 1.11: There is a mis-match in the datasets that the black and red lines refer to between the inset line label box and the figure caption. I suspect that the figure caption is wrong. [Arne Melsom, Norway]	Taken into account - Figure 1.11 has been redone
1-989	1	11	2	11	3	The reported ice mass losses for 1996 and 2006 are not consistent with the statement that estimated mass loss has increased. The two ranges largely overlap, so no conclusion about the trend can be drawn. Alternatively, it may be stated that the change in mass loss from 1996 to 2006 is anywhere between a decrease of 127 Gt and an increase of 213 Gt. [Arne Melsom, Norway]	Taken into account - Added "estimated" to partly respond to this comment. The figures given are the most likely estimated quantities (with uncertainties, of course). I
1-990	1	11	2	11	3	About the expresion: "..Estimates show that annual mass loss in Antarctica has increased, from 75–231 Gt in 1996 to 104–288 Gt in 2006,", it is the first time that a quantity is detailed with an interval. Could the Authors obtain from the source and present the mean (or median) value plus minus the uncertainty? [Rubén D Piacentini, Argentina]	Accepted - The text has been revised.
1-991	1	11	2	11	3	Are there any estimations of trend? Is it linear, or stronger? [Pavel Tkalich, Singapore]	Taken into account - Partly covered by revision made on the comment above but later chapters should really cover this.
1-992	1	11	4	11	4	have → has [Peter Burt, UK]	Accepted - The text has been revised.
1-993	1	11	4	11	4	Change "have" to "has", or change "loss" to "losses". [Jian Tian, United States of America]	Accepted - The text has been revised.
1-994	1	11	9	11	9	helpful to give the date of the Little Ice Age (at least in this context) [Peter Burt, UK]	Accepted - The text has been revised.

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1-995	1	11	9	11	9	The statement "Glaciers around the globe have been shrinking since the end of the Little Ice Age" is problematic, because it implies (erroneously) that the current global retreat which appears to be unprecedented in several millennia (in some places more than 10,000 years as documented from tropical glacier records) can be understood simply as a retreat from the depths of the Little Ice Age. That of course is false. The current retreat is not simply the result of the end of some period of natural cooling but, in fact, can be attributed to the unprecedented warming of recent decades which--in turn---can only be explained in detection/attribution exercises, from anthropogenic forcing (see any of the past three IPCC assessments). Please eliminate the sentence or modify it in a way that is more consistent with prevailing scientific understanding. [Michael Mann, USA]	Accepted - The text has been revised.
1-996	1	11	9	11	10	Define the term "Little Ice Age". Was it a global/regional phenomenon or is it a term often misused? Have glaciers everywhere been shrinking since the end of this poorly defined period? [Gareth S Jones, UK]	Accepted - The text has been revised.
1-997	1	11	9	11	13	Here it is not mentioned that, in a few regions of the world, there are a few isolated cases in which glaciers are not retreating, because the discussion is done at regional scale. However, just to not be accused to ignore such phenomena, which do not have any relevance on the global view, I am suggesting a quick mention here. Concerning the sentence "The Himalayas is among the regions with the least available data", it seems useless in this context; I suggest to add that, due to this data limitatin, it is hard to take a general conclusion from the exam of Himalayan data. [Claudio Cassardo, Italy]	Accepted - The text has been revised.
1-998	1	11	9	11	13	Oerlemans (2005). Extracting a climate signal from 169 glacier records. Science 308: 675-677. Is still a very relevant publicaion here [Elie Verleyen, Belgium]	Rejected - Old reference
1-999	1	11	9	11	13	This paragraph is somewhat dated. You should add the conclusions from, and references to, Copland et al., Ann. Glaciol, 50, 41-99 (2009) and Cogley Ann. Glaciol, 50, 96-00 (2009). [Robert Waterland, United States of America]	Accepted - The text has been revised.
1-1000	1	11	11	11	11	delete comma after 'USA' [Peter Burt, UK]	Rejected - We disagree
1-1001	1	11	13	11	13	say "least amount of data" otherwise it sounds like the data aren't available [George Kiladis, USA]	Taken into account - Sentence has been eliminated.
1-1002	1	11	13	11	13	After the statement "The Himalayas is among the region with least available data " following could be added "However, based on a short period of INSAT (Indian National Satellite) data spring snow cover area has been declining and snow has been melting faster from winter to spring (Kripalani et al., 2003) [Ramesh Kripalani, India]	Taken into account - Sentence has been eliminated.
1-1003	1	11	13	11	13	“Himalayas” is plural, so “is” should be “are". [Eelco Johan ROHLING, United Kingdom of Great Britain & Northern Ireland]	Taken into account - Sentence has been eliminated.
1-1004	1	11	13			Context would be helpful here in terms of how important the unavailability of the Himalayas data is. Even though this is only an introductory chapter some quantification (even if it estimated) would bring in some perspective to this situation of the melting of inland glaciers. [Bradley Tomasek, United States of America]	Taken into account - Sentence has been eliminated.
1-1005	1	11	15	11	35	This section is heavily dependent on selective anecdotes by prejudiced observers. . [VINCENT GRAY, NEW ZEALAND]	Taken into account - Section has been eliminated.
1-1006	1	11	15	11	35	There is a circular argument here. We only know that these ecosystem indicators are influenced by temperatures by comparing with observations of temperature in the first place. So that changes in these indicators are not extra bits of information about changes in temperature. Only where there are no temperature records (e.g. old phenology records) are these changes providing extra information. This is not clear here. [Gareth S Jones, UK]	Taken into account - Section has been eliminated.
1-1007	1	11	15	35		You have a very short text about ecosystems system. Of course I know that this subject relates to WGII. You have described that you only have touch this subject. In fact for the other subject you have touch the subject too. Of course you postpone those subject to the chapters. but for ecosystem indicator, it is not possible. as a consequence, please lengthen this paragraph. [Fatemeh Rahimzadeh, Iran, Islamic Republic of]	Taken into account - Section has been eliminated.
1-1008	1	11	15			Should WG1 really talk about Ecosystem indicators? I think we should leave this to WG2 who have the	Taken into account - Section has been eliminated.

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						experts in this area [Gabi Hegerl, UK]	
1-1009	1	11	17		28	(Ecosystem Indicators): The references are fine, but give/add some examples here. Or, a better phrasing/explanation. Also see previous comment on adding text describing changes to "official" classifications of plant species habitat for agricultural and horticultural guidelines. Follow the format for the description of "Birds" which is good (L: 30 – 35). [Sushel Unninayar, USA]	Taken into account - Section has been eliminated.
1-1010	1	11	18	11	18	Insert comma after 'events' [Peter Burt, UK]	Taken into account - Section has been eliminated.
1-1011	1	11	26	11	26	Need to add "the length of the" before "growing season". [Jón Egill Kristjánsson, Norway]	Taken into account - Section has been eliminated.
1-1012	1	11	27			What type of change?? In timing or magnitude needs o be mentioned. [Prasanth Meiyappan, USA]	Taken into account - Section has been eliminated.
1-1013	1	11	30	11	35	Only birds are mentioned here. Ok, this is just a summary, but why not mention shorthly also other phenmana (tree blossoming)? [Claudio Cassardo, Italy]	Taken into account - Section has been eliminated.
1-1014	1	11	30	11	35	The references for the late 1990s are too dated for the point that is being made. According to Phil Jones of East Anglia University, and our ground data, there has been no warming for over a decade. This follows a longer decadal trend of clear warming.So using papers from the very end of a warming trend is not the best choice. [James Wanliss, USA]	Taken into account - Section has been eliminated.
1-1015	1	11	34			There is no Brown et al. 1999 in the reference but there is Brown & Bhagabati (1999) [Soydoa Vinitnantharat, Thailand]	Taken into account - Section has been eliminated.
1-1016	1	11	37	11	37	The paragraph 9.2.2.7 and 9.7 contain several issues that are highly relevant for this paragraph too and for the FQA of this chapter, which should be added or merged to avoid overlap. [Bram (Abraham) Bregman, Netherlands]	Taken into account - The FAQ has been rewritten and the section has been edited.
1-1017	1	11	37	11	37	This is a good section to introduce the paper Curry JA and Webster PJ (2011) 'Climate science and the uncertainty monster'. Bull Amer Meteorol Soc. An alternative is to mention it even earlier in the chapter, in section 1.2.1. Some important messages from this paper: (Page 1678) The monster is too big to hide, exorcise, or simplify. Increasing concern that scientific dissent is underexposed by the IPCC's consensus approach argues for ascendancy of the monster detection and adaptation approaches. The challenge is to open the scientific debate to a broader range of issues and a plurality of viewpoints and for politicians to justify policy choices in a context of an inherently uncertain knowledge base (e.g., Sarewitz 2004). (Page 1678) A strategy used by climate policy proponents to counter the strategies of the merchants of doubt (Oreskes and Conway 2010; Schneider and Flannery 2009) has been the establishment of a broad international scientific consensus with high confidence levels, strong appeals to the authority of the consensus relative to opposing viewpoints, and exposure of the motives of skeptics. While this strategy might have been arguably useful, needed, or effective at some earlier point in the debate to counter the politically motivated merchants of doubt, these strategies have enraged the uncertainty monster, particularly since the Climategate e-mails and errors that were found in the IPCC AR4 Working Group II (WGII) report (e.g., Van der Sluijs et al. 2010). (Page 1678) Oppenheimer et al. (2007, p.) remark that "the establishment of consensus by the IPCC is no longer as important to governments as a full exploration of uncertainty." The institutions of climate science, such as the IPCC, the professional societies and scientific journals, national funding agencies, and national and international policy-making bodies, have a key role to play in taming the uncertainty monster. Objectives of taming the monster at the institutional level are to improve the environment for dissent in scientific arguments; to make climate science less political, clarify the political values and visions in play; to expand political debate; and to encourage experts in the social sciences, humanities, and engineering to participate in the evaluation of climate science and its institutions. [Marcel Crok, The Netherlands]	Rejected - A lot of this material, interesting in its own right, is not really the subject of this section, which is about how the Report *treats* uncertainty. The policy dimensions referred to (Oreskes & Conway, Schneider & Flannery, Oppenheimer...) are beyond the scope of WGI. The Curry and Webster paper makes some interesting and valuable observations, but much of this (model quality, D&A) is relevant to specific chapters and inferences, rather than to a general descriptive treatment of how IPCC deals with uncertainty.
1-1018	1	11	37	14	21	This section tries to justify the crucial defect of all the models. None of them has been validated by the generally accepted procedure of having been shown to be capable of future climate prediction over their entire range of use to an acceptable level if accuracy. Instead you supply this complex supposedly statistically valid justification for what is no more than a system of sole reliance on the opinions of those who are paid to	Rejected - This comment is an opinion about models, whereas the text on uncertainties actually discusses the overall analysis of observations and models. The reviewer comment reflects a lack of understanding of

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						produce the models and therefore have a conflict of interest in their success. Quantitative figures for their pure guesswork are just farcical. [VINCENT GRAY, NEW ZEALAND]	the science.
1-1019	1	11	37	14	21	(Section 1.4 on “Treatment of Uncertainty,” the whole section): See earlier comments on this subject. To repeat, there is a basic conceptual problem between how “science” defines and understands the term uncertainty in contrast with the public perception of this terminology. One may note that the clinical trials in the pharmaceutical industry are not defined in terms of “uncertainly.” If it were, there would not be anybody buying any new found medication. The same applies to medial or biomedical research as a generic group. The scientific uncertainty as used here only refers to a very specific segment or sub-segment of the scientific community. And, it has specific and rigorous meaning to the membership of this community. Our community of climate sciences is one such community, and we are having a perennial problem of how this specialized concept is to be communicated to the rest of the world which includes scientists from many other professions. Bottom Line: Rephrase. Use words such as “range” or “spread.” Also used by stock market analyses. No, they do not use the word uncertainty or attempt to quantify it either. The closest they come to this is via the mention of “volatility” which may be translated into probabilistic variability, if you wish, in the climate change context. Section 1.4.4 (Uncertainty treatment in this assessment) is reasonably good. It should go up-front? [Sushel Unninayar, USA]	Rejected - IPCC has used "uncertainty" and uncertainty guidance language for some time now. IPCC uncertainty guidance has been iterated several times and is quite well-aligned with, for instance, the recommendations of the Inter-Academy report. Given external assessments and the extensive, largely satisfactory precedence in previous Assessment Reports, we see no justification for a complete change of tack.
1-1020	1	11	37			Section1.4. This section is key to the whole report. It acknowledges the fact that probabilities often involve expert judgement, and even notes that in the case of expert judgment there is a tendency towards overconfidence, but it does not consider the implications. One should either state that AR5 may overestimate confidence in models and data, or one should make use of extended and well-documented expert panels. [Gerbrand KOMEN, Netherlands]	Taken into account - The section has completely been rewritten.
1-1021	1	11	37			Section 1,4 : This thorough presentation of the various type of uncertainties is mostly welcome and should be kept in the final version. It might be complemented by dealing with mentionning the compromise that the authors have to make between the precision of the statement and the uncertainty : the more precise is a statement, the larger is the related uncertainty [Michel Petit, France]	Noted - Thank you. The complementary point you make has been made on occasions before - will discuss in LAM.
1-1022	1	11	37			Section 1,4 : An example of the importance of the compromise is illustrated by the first line of figure 1,10 : Higher maximum temperature and more hot days is so vague that it does not provide the policy makers with a policy relevant information. A less certain, but more quantitative statement would much more useful. [Michel Petit, France]	Accepted - but it can be hard to know exactly how to deal with this generically and pithily, other than to ask Authors and experts
1-1023	1	11	37			I suggest to move the paragraph regarding Treatment of Uncertainties before the descritpion of the multiple lines of evidence for Climate Change, because confidence and uncertainty are mentioned in the latter paragraph (e. Figs.1.4-1.10) [Elie Verleyen, Belgium]	Rejected - IPCC gave us the structure used here.
1-1024	1	11	39	11	54	The subsection 1.4.1 Uncertainty in Environmental Systems isn´t well explained for the main matter Environmental Systems, would be more directed to this matter. [CRISTOBAL FELIX DIAZ MOREJON, Cuba]	Rejected - We don't understand this comment.
1-1025	1	11	41	13	5	The entire 1.4 paragraph is rather obscure: simple enough for people with a fair knowledge of statistics, arcane for who does not know it. In my opinion the paragraph should be simplified and shortened. [Walter Dragoni, Italy]	Rejected - information already compressed and simplified. Primary audience will be able to understand it.
1-1026	1	11	41	14	21	Given the use of uncertainty by climate sceptics to minimise action to reduce emissions, I think that it will be worth stating explicitly that uncertainty of climate science could mean that the situation could be worse than is predicted (e.g. arctic sea ice) as well as better. Indeed, logically given; the large areas of uncertainty, the tipping points and the inertia in the Earth System, assuming more dangerous climate change than predicted is more rational than assuming less dangerous change than predicted. Assuming worst case is also the more rational policy assumption, as we only have one planet to carry out the experiment with. [Mark Charlesworth, United Kingdom of Great Britain & Northern Ireland]	Rejected - This section is describing how the Report characterises uncertainty, and specifying policy assumptions is well beyond the IPCC mandate.
1-1027	1	11	43	11	43	Change "no" to "not". [Jian Tian, United States of America]	Accepted - The text has been revised.
1-1028	1	11	43	11	44	Replace "Climate science is no different in this regard to any other sort of biological or physical science, though the complexity of the climate system and the large range of processes involved do bring particular	Accepted - The text has been revised.

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						challenges." with "Climate science is no different in this regard, though the complexity of the climate system does bring particular challenges." [Robert Waterland, United States of America]	
1-1029	1	11	43			"any other sort of" please consider revising [Prasanth Meiyappan, USA]	Taken into account - Section has been eliminated.
1-1030	1	11	44	1	44	A definition of uncertainty may be given here or in glossary. A definition given in an IPCC document is: "An uncertainty is a parameter, associated with the result of measurement that characterises the dispersion of the values that could be reasonably attributed to the measured quantity." Source: http://www.ipcc-nggip.iges.or.jp/public/gp/english/A3_Glossary.pdf [Sharad K Jain, India]	Taken into account - Glossary definition has been reconsidered.
1-1031	1	11	46	11	46	must removed it is written in page 2 lines 28-29 [PROF. YEHIA HAFEZ, Egypt]	Rejected - Page 2 is the executive summary
1-1032	1	11	46	11	46	Replace "environmental systems are" with "Earth's climate system is". [Robert Waterland, United States of America]	Taken into account - Text has been revised.
1-1033	1	11	46	11	47	"uncertainties do not usually resolve at a single, predictable rate" is hard to follow. Rephrasing needed. [Jón Egill Kristjánsson, Norway]	Taken into account - Text amended - have replaced "resolve" with "reduce" - changes the sense slightly but the gain in clarity is probably worth the loss in generality.
1-1034	1	11	56	11	56	It would be good to add the work of Hawkins, E, and R. Sutton, BAMS, 1095-1107, 2009. [Bram (Abraham) Bregman, Netherlands]	Accepted - Text revision includes this reference.
1-1035	1	12	1	12	2	Replace ""Uncertainty" is a complicated concept, and can be used to characterize states of knowledge as diverse as near-but-not-complete certainty through to quite vague speculation. It is a complex" with "Uncertainty is a complex" [Robert Waterland, United States of America]	Taken into account - Sentence has been revised.
1-1036	1	12	2	12	2	Delete "to" after "through". [Jian Tian, United States of America]	Accepted - The text has been revised.
1-1037	1	12	4	12	4	To add greater completeness, it may well be worth adding the anatomy of surprise and ignorance in Faber M, Proops J & Manstetten R (1998, Ecological economics; concepts and methods, Cheltenham: Edward Elgar pp. 205-29) to the Moss and Schneider 2000 reference. [Mark Charlesworth, United Kingdom of Great Britain & Northern Ireland]	Rejected - These are handled by the existing categories - "uncertainty in existing climate models"; i.e. "structural uncertainty" and "uncertainty in the functional forms…". All are basically types of epistemic uncertainty.
1-1038	1	12	11	12	12	inhomogeneity should be listed as a further source of uncertainty in measured time series [Jucundus Prof. Dr. Jacobeit, Germany]	Accepted - The text has been revised.
1-1039	1	12	12	12	12	judgment → judgement (not legal context) and delete comma after judgment (sic) [Peter Burt, UK]	Accepted - The text has been revised.
1-1040	1	12	12	12	16	should be "... internal variability and initial condition uncertainty ..." the "or" currently suggests that they are the same type of uncertainty. [Gareth S Jones, UK]	Accepted - The text has been revised.
1-1041	1	12	14	12	14	should read "...due to uncertainty of future …" [Bennartz Ralf, US]	Accepted - The text has been revised.
1-1042	1	12	14	12	14	Replace "uncertainty future emissions" with "uncertainty in future emissions". [Robert Waterland, United States of America]	Taken into account - Instead 'of' has been added
1-1043	1	12	14			add "of" before "future" [Roger Gifford, Australia]	Accepted - The text has been revised.
1-1044	1	12	18	11	18	Unclear what is meant by "model structure". Do you mean "processes"? [Jón Egill Kristjánsson, Norway]	Taken into account - Not just "processes" but decisions regarding the functional form of how those processes are modelled.
1-1045	1	12	18	12	20	Significant elements of both observational uncertainty and modelling uncertainty are already captured in future climate projections (see Sexton et al(2011a) in Climate Dynamics or Sanderson (submitted to Climatic Change)) and these probably do a more thorough job than detection and attribution (d&a) in that they deal with modelling uncertainty in terms of both parametric and structural uncertainty, whereas d&a deals with modelling	Taken into account - No special treatment intended - text revised to include "and observationally-constrained model projections of future climate" but the sentence is starting to get unwieldy.

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						uncertainty as a whole. Certainly both future projections and d&a need to incorporate obs and modelling uncertainty. But the last sentence of this paragraph seems to give d&a some special treatment by using it as an example in a paragraph that has been mostly about future projections. I suggest replacing “such as detection and attribution” with “such as detection and attribution, and observationally-constrained ranges of climate sensitivity and projections of future climate. ” REFERENCE D. M. H. Sexton and James M. Murphy and M. Collins and Mark J. Webb Multivariate probabilistic projections using imperfect climate models Part I: outline of methodology Clim. Dyn. 2011 10.1007/s00382-011-1208-9 [David Sexton, UK]	
1-1046	1	12	23	12	23	suggest replacing hyphens with commas, oks less clumsy [Peter Burt, UK]	Accepted - The text has been revised.
1-1047	1	12	26	12	26	“conditionalities” should be “conditions”. In English, “conditionality” refer to the practice of using conditions, not to the conditions themselves (as implied here) [Eelco Johan ROHLING, United Kingdom of Great Britain & Northern Ireland]	Accepted - The text has been revised.
1-1048	1	12	26	12	30	This language is very much in line with what is suggested above, especially in the opening comments. [Forrest Mims, USA]	Noted - Thank you
1-1049	1	12	28	12	28	draw → draws [Peter Burt, UK]	Accepted - The text has been revised.
1-1050	1	12	28	12	28	"draws on" [George Kiladis, USA]	Accepted - The text has been revised.
1-1051	1	12	28	12	28	Chang "draw" to "draws". [Jian Tian, United States of America]	Accepted - The text has been revised.
1-1052	1	12	32	14	21	Treatment of uncertainty - here a clear distinction need sto be made between uncertainty arising in observations and statistical dispersion within data, versus dispersion in model projection fields or time series of future or past climate, which are not the same as data. For the future projections of course there are no data (yet) and this needs to be made clear. The text does not do that. [William Howard, Australia]	Rejected - Text in previous section discusses different sorts of uncertainty arising from data and models. This section(1.4.3) aims to provide a consistent framework for the treatment of all sorts of uncertainty (across all 3 Working Groups).
1-1053	1	12	34	12	34	chapter → Chapter [Peter Burt, UK]	Accepted - The text has been revised.
1-1054	1	12	45	14	22	"could provide a structure for consistent treatment of uncertainty across the IPCC’s remit"; this statement is jargon. Much of this discussion should be relegated to an appendix; deadly in an introduction. [Stephen E Schwartz, USA]	Rejected - structure already agreed, and most believe a treatment of uncertainty required here.
1-1055	1	12	49			see also comment 11 AR5 is used here instead of FAR. I prefer the first but consistency is important. AR5 is also used on p.14, L.12 [Elie Verleyen, Belgium]	Rejected - FAR = First Assessment Report, AR5 is this report.
1-1056	1	12	51	12	51	references must rewritten according to the time. [PROF. YEHIA HAFEZ, Egypt]	Editorial - Copy edit will be finalized prior to publication.
1-1057	1	12	51			Check reference Budescy et al. (2009) in the reference [Soydoa Vinitnantharat, Thailand]	Rejected - The reference has been correct.
1-1058	1	13	1	13	5	This para confuses the differences and relationships between the probability and confidence language. The point is not just that a high probability statement usually also has high confidence, but the issue is more general: for any statement where the authors feel able to quantify the probability of the outcome and thus give any likelihood statement, they will generally have high confidence in their understanding of the underlying science (based on multiple lines of evidence, consistency of theory with observations, etc etc). Thus, you could have very high confidence in an outcome being very unlikely. Please revise this para to capture this broader relationship between probability and confidence: assigning quantified probabilities to an outcome (no matter what the probability is) requires high or very high confidence in our understanding of the outcome. [Andy Reisinger, New Zealand]	Rejected - this is straight from the agreed, cross-WG Uncertainty Guidance Notes. Immediately above section 1.4.4 we do already say "if something is described as having a high likelihood, then in the absence of additional qualifiers it should be taken as read that it also has reasonably high confidence"
1-1059	1	13	4	13	5	This is very sloppy English. Please insert "having a" before "high likelihood". Likewise, "is … confidence" is ambiguous. "has … confidence" would at least be correct English. [Jón Egill Kristjánsson, Norway]	Accepted - The text has been revised.
1-1060	1	13	4	13	5	reformulate sentence '...should be taken as read….' is awkward [Bennartz Ralf, US]	Accepted - The text has been revised.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1-1061	1	13	5	13	5	that it is also' → 'there is also' OR → 'that it also has' [Peter Burt, UK]	Accepted - The text has been revised.
1-1062	1	13	7	14	21	At many places the word 'probabilistic' is used. Statistically this is not sound; it is often not related to a probability or likelihood in the statistical sense, but refers to a frequency distribution (e.g. of model outcome) and are strongly conditioned. Care should be taken in the definition of 'probability'. If it is used in this way, this difference between a frequency distribution and a probability should be made clear to avoid confusion. [Sybren Drijfhout, Netherlands]	Rejected - Using probabilistic in the wide sense 2 of Oxford English Dictionary.
1-1063	1	13	7	14	21	The chapter is unclear on minority views or on issues that climate scientists disagree on. Agreeing to disagree is fundamental to science. It is unclear how the IPCC report treats this. That is, is this a consensus report or does it include assessments of issues where there is disagreement? I think the latter needs attention as well. Related to this, it is unclear how the recommendations of the Interacademy Council are dealt with in WG 1. A clear statement is needed. [Sybren Drijfhout, Netherlands]	Rejected - There is definitely consideration of disagreements in the science based on peer review literature. However, it is not our intention to deal with blogs and other minority expressions that do not meet the criteria of being published in the science literature. The section cited on confidence and uncertainty is intended to deal with the state of science considering the peer reviewed literature.
1-1064	1	13	11	13	11	Confidence → confidence [Peter Burt, UK]	Accepted - The text has been revised.
1-1065	1	13	12	13	13	Feedback mechanisms may be unrealistic in the models but is it correct to say that they are "poorly resolved?" [David Randall, USA]	Rejected - Wrong page.
1-1066	1	13	13	13	13	. → , and, [Peter Burt, UK]	Accepted - The text has been revised.
1-1067	1	13	14	13	14	Quantified → quantified [Peter Burt, UK]	Accepted - The text has been revised.
1-1068	1	13	15	13	15	"expert judgement" - is it anywhere specified and/or examplified how this converts into quantified likelihood? [Tor Eldevik, Norway]	Rejected - See paragraph 8 of Mastrandrea et al., 2010, Guidance Notes for Lead Authors of the IPCC Fifth Assessment Report on Consistent Treatment of Uncertainties.
1-1069	1	13	15			"Expert judgement," is not an objectively quantified measure. Two experts can disagree. [David Bader, USA]	Rejected - Of course. Not all sources of uncertainty are amenable to measurement. As part of the assessment of key findings, "author teams should evaluate the associated evidence and agreement". Assessment of the level of agreement and disagreement is part of the assessment procedure. See Mastrandrea et al., 2010 Guidance Notes for Lead Authors of the IPCC Fifth Assessment Report on Consistent Treatment of Uncertainties
1-1070	1	13	22			the declaration that “for a given evidence and agreement statement, different confidence levels could be assigned” requires further explanations which have to exclude that such a kind of “flexibility” is nothing else than pure subjectivity; perhaps some particular examples of reasoning might contribute to a better understanding of what is meant by “flexibility” in this context. [Jucundus Prof. Dr. Jacobeit, Germany]	Rejected - Wording follows exactly the practice outlined in Mastrandrea et al., 2010 Guidance Notes for Lead Authors of the IPCC Fifth Assessment Report on Consistent Treatment of Uncertainties
1-1071	1	13	27			"statistical confidence" could become confusing. “Likelihood” has already been introduced so why not use that word? [Francois DANIS, France]	Rejected - we think we need to make sure that it's clear that "confidence" in an assessment is not the same as "statistical confidence".
1-1072	1	13	32	13	32	suggest saying "statistical or model analysis, or other quantitative analysis along with the elicitation of expert views" since expert views are not quantitative. [George Kiladis, USA]	Rejected - Some studies in climate science do elicit probabilities from experts. See, e.g., Morgan, M.G., Keith, D.W., 1995. Subjective judgments by climate experts. Environmental Policy Analysis 29 (10), 468–476.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1-1073	1	13	38	1	38	In Table 1.1, there is considerable overlap in likilihood of outcome. The following non-ovelapping bands are proposed: Virtually certain: 99-100, Very likely 90-99, likely 66-90, unlikely 10-33, very unlikely 1-10, exceptionally unlikely 0-1. [Sharad K Jain, India]	Rejected - Wording follows exactly the practice outlined in Mastrandrea et al., 2010 Guidance Notes for Lead Authors of the IPCC Fifth Assessment Report on Consistent Treatment of Uncertainties
1-1074	1	13	38	13	38	Table 1.1: Is it necessary to present the "100%" and "0%" values ? Simplier to say "greater than 90% probability" or "less than 10% probability" [Gareth S Jones, UK]	Rejected - Wording follows exactly the practice outlined in Mastrandrea et al., 2010 Guidance Notes for Lead Authors of the IPCC Fifth Assessment Report on Consistent Treatment of Uncertainties
1-1075	1	13	38	13	39	Terma' → 'term' [Peter Burt, UK]	Accepted - The text has been revised.
1-1076	1	13	38	13	39	The 'About as likely as not' and 'Unlikely' categories do not make sense! A value of 33% could be assigned to either! [Peter Burt, UK]	Rejected - Wording follows exactly the practice outlined in Mastrandrea et al., 2010 Guidance Notes for Lead Authors of the IPCC Fifth Assessment Report on Consistent Treatment of Uncertainties
1-1077	1	13	38	13	42	I do not see where note "a" of Table 1.1 is recalled in the text. But I do not understand why the three additional terms used in the note have not been incorporated in the Table. If they are all used in the WGI, I think they must be listed with the others... [Claudio Cassardo, Italy]	Rejected - The suggested change would make the Table rather confusing.
1-1078	1	13	38	13	42	if possible : likelihood terms used in AR5 ranges maybe changes to : virtually certain 99-100% , very likely 90-99%, likely 66-90%, about as liekly as not 33-66%, unlikely 10-33 %, very unlikely 5-10 %, exception unlikely 0-5%. Also figure 1.10 informations related to this section so it will be more benefits if mentioned about here. [ALI GEATH ELJADID, LIBYA]	Rejected - Wording follows exactly the practice outlined in Mastrandrea et al., 2010 Guidance Notes for Lead Authors of the IPCC Fifth Assessment Report on Consistent Treatment of Uncertainties
1-1079	1	13	38			Table 1.1 Replace "Terma" for "Term" [Marcelo Galdos, Brazil]	Accepted - The text has been revised.
1-1080	1	13	39	13	42	Why not include these terms in the table? [Gareth S Jones, UK]	Rejected - The suggested change would make the Table rather confusing.
1-1081	1	14	4	14	10	This is an extremely important paragraph, that should be expanded with a discussion of relevant recent literature, discussing the pitfalls of expert judgment in what Funtowicz and Ravetz call postnormal science, see e.g. Funtowicz and Ravetz (1993) Science for the Post Normal age, Futures 25: 739-755. Explicit reference to Mastrandrea, M.D., C.B. Field, T.F. Stocker, O. Edenhofer, K.L. Ebi, D.J. Frame, H. Held, E. Kriegler, K.J. Mach, P.R. Matschoss, G.-K. Plattner, G.W. Yohe, and F.W. Zwiers, 2010: Guidance Note for Lead Authors of the IPCC Fifth Assessment Report on Consistent Treatment of Uncertainties. Intergovernmental Panel on Climate Change (IPCC) would also be in place here.. [Gerbrand KOMEN, Netherlands]	Taken into account - Mastrandrea et al. 2010 is now cited.
1-1082	1	14	4	14	10	Other references that should be discussed comprise: - Curry, J.A. en P.J. Webster, 2011: Climate Science and the Uncertainty Monster. BAMS online. - Funtowicz, S.O. & Ravetz, J.R., 1993. Science for the post-normal age. Futures 25: 739-755.3. - Janssen, P.H.M., Petersen, A.C., Van der Sluijs, J.P., Risbey, J., Ravetz, J.R. (2005), A guidance for assessing and communicating uncertainties.Water science and technology, 52 (6) 125-131. - Sluijs, Jeroen van der Matthieu Craye, Silvio Funtowicz, Penny Kloprogge, Jerry Ravetz, and James Risbey (2005), Experiences with the NUSAP system for multidimensional uncertainty assessment in Model based Foresight Studies, Water science and technology, 52 (6), 133-144. - P. Kloprogge, J.P. van der Sluijs and A.C. Petersen (2011). A method for the analysis of assumptions in model-based environmental assessments. Environmental Modelling & Software 26, 289-301. [Gerbrand KOMEN, Netherlands]	Taken into account - Mastrandrea et al. 2010 is now cited.
1-1083	1	14	4	14	10	Still other references that should be discussed comprise: - Petersen, A.C., 2006a. Simulation uncertainty and the challenge of postnormal science. In: Lenhard, J., Küppers, G. & Shinn, T. (eds): Simulation: Pragmatic Constructions of Reality – Sociology of the Sciences, vol. 25. Springer (Dordrecht) the Netherlands: 173-185. - Risbey, J., J. van der Sluijs, P. Kloprogge, J. Ravetz, S. Funtowicz, and S. Corral Quintana (2005): Application of a Checklist for Quality Assistance in Environmental Modelling to an Energy Model.	Rejected - Thank you for the references, but discussing these would add too much to the section.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
						Environmental Modeling & Assessment 10 (1), 63-79. - Sluijs, J.P. Van der (2012 / in press). Uncertainty and dissent in climate risk assessment, a post-normal perspective, Nature and Culture, 7 (?):???-???. - Sluijs, Jeroen van der (2005), Uncertainty as a monster in the science policy interface: four coping strategies. Water science and technology, 52(6), 87-92. [Gerbrand KOMEN, Netherlands]	
1-1084	1	14	4	14	10	The following papers are also relevant: - Sluijs, Jeroen van der, Matthieu Craye, Silvio Funtowicz, Penny Kloprogge, Jerry Ravetz, and James Risbey (2005) Combining Quantitative and Qualitative Measures of Uncertainty in Model based Environmental Assessment: the NUSAP System, Risk Analysis, 25 (2). p. 481-492. - Swart, R., Bernstein, L., Ha-Duong, M. & Petersen, A., 2008. Agreeing to disagree: uncertainty management in assessing climate change, impacts and responses by the IPCC. Climatic Change, in press, doi:10.1007/s10584-008- 9444-7: 29 pp. - Wardekker, J.A., Van der Sluijs, J.P., Janssen, P.H.M., Kloprogge, P. & Petersen, A.C., 2008. Uncertainty communication in environmental assessments: views from the Dutch science-policy interface. Environmental Science & Policy 11: 627-641. [Gerbrand KOMEN, Netherlands]	Taken into account - Mastrandrea et al. 2010 is now cited.
1-1085	1	14	4	14	10	This para seems to say that scientists always tend to be overconfident in their findings. This appears both too bold and is not justified. Even more importantly, by implication, or at least by easy misinterpreted, it seems to say that IPCC conclusions also always underestimate the true uncertainties. I doubt that this is what the authors want to say. Morgan and Keith (1995) (amongst many others) have shown that overconfidence can also arise in assertions of ignorance. In addition, the IPCC guidance on assessing and communicating uncertainty is intended to counterbalance these effects of group-think. Please revise this para to make clear that while these risks exist, they also exist at the other extreme, and that the purpose of the IPCC guidance is to counterbalance both extremes as much as possible and produce assessments that communicate uncertainty in a more robust and balanced way than intuitive thinking and assessments by individual experts can offer. [Andy Reisinger, New Zealand]	Rejected - sentence is clearly referring to a "tendency", not a universal feature of expert judgment.
1-1086	1	14	8	14	10	Claim is wrong. Expert opinion is not inevitable because of the size of the field that is climate science. It is inevitable because of the lack of robust and unequivocal measurements of many of the key aspects of climate, as well as the known limitations of GCMs. More emphasis should be placed on the difference between expert opinion and demonstrable science. [Stewart Franks, Australia]	Accepted - The text has been revised.
1-1087	1	14	8			"Nevertheless" should be removed [Prasanth Meiyappan, USA]	Accepted - The text has been revised.
1-1088	1	14	10	14	41	The final sentence is not clear. Is written “although its usefulness is detecting long term climate trend is limited” [José Daniel Pabón-Caicedo, Colombia]	Rejected - unclear as to what suggestion is being made.
1-1089	1	14	12	14	12	chapter → Chapter [Peter Burt, UK]	Accepted - The text has been revised.
1-1090	1	14	12	14	21	This paragraph makes the chapter teams seem strangely passive concerning the uncertainty guidelines. Some readers might infer that the guidelines were accepted reluctantly. A more positive tone would be more effective here. [Eric Sundquist, United States of America]	Taken into account - We think we came up with an agreed upon structure that is coherent and practical. We have revised the paragraph for clarity.
1-1091	1	14	12		14	(…..so that contributors to the AR5 might be sensitized to the ways of presentation, framing, context…..etc): This is an important statement. And, it becomes clear that the AR5 community does not comprehend this yet? It is not a problem of translation to other languages (L: 20-21). It is a deeper problem. Nothing to do with precision either. [Sushel Unninayar, USA]	Noted - Agree it is an important point. Text not affected.
1-1092	1	14	16	14	16	chapter → Chapter [Peter Burt, UK]	Accepted - The text has been revised.
1-1093	1	14	20	14	20	Will a reader of a translated version of this document know what the original language was? Rather than assume the answer, why not insert "from English" after "assessment"? [JOHN OGREN, USA]	Accepted - The text has been revised.
1-1094	1	14	23	14	28	In the beginning of this part, it's better to give a brief summary of measurement and modelling capabilities.(Qiyong Liu, China CDC) [Qiyong Liu, China]	Rejected - This section is intended to be very short. Adding more is beyond the purpose.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
1-1095	1	14	27	14	27	What is "interpretation of scientific conjecture"? Reword. [David Randall, USA]	Rejected - Wording is ok for the context of the sentence.
1-1096	1	14	28	14	28	Should read 'Capabilities of Observations' or 'Observational capabilitites' [Bennartz Ralf, US]	Accepted - The text has been revised.
1-1097	1	14	28	15	6	This section on the current state of observations for model validation is overly optimistic. See especially Section 3.2.1 of Chapter 3 of the IPCC SREX report (2012), which highlights main observational issues related to extremes. In particular: 1) Records that are satisfactory for assessments of mean climate are often not for respective assessments of extremes because there is by definition less data for extremes than for mean climate; 2) Even where there is an ample amount of observations, issues related to the homogeneity of data records can be large; 3) There is simply a lack of data for many extremes and phenomena highly relevant to impacts (e.g. soil moisture/droughts, runoff/floods, tropical cyclones, extratropical cyclones, thunderstorms, tornadoes); 4) Finally, even for relatively "well observed" variables, there can be an important lack of data for extremes in specific regions (e.g. some extreme indices for temperature and precipitation in Africa and part of South America, see Alexander et al. 2006, JGR). Reference: Alexander, L.V., et al. 2006, JGR, VOL. 111, D05109, doi:10.1029/2005JD006290. [Sonia Seneviratne, Switzerland]	Taken into account - This is a Chapter 2 issue and beyond the scope of Chapter 1. We now refer to the later chapters.
1-1098	1	14	28	15	6	It also seems strange that this section is not referring to Chapters 2, 3 and 4 of the AR5, since these are specifically assessing the status of observational records. [Sonia Seneviratne, Switzerland]	Accepted - The text has been revised.
1-1099	1	14	30	14	31	See also note 2. In fig. 1.12 the use of satellites in the period 1996-2010 (recent years?) shows an increment of 5 times (which is less than one order of magnitude). I may be wrong, thus if the statement is true please add a reference. [Claudio Cassardo, Italy]	Taken into account - One can see from Figure 1.12 that there has been a very strong increase of observational datasets. More detailed information is found in the Chapters 2-4.
1-1100	1	14	30	14	32	The increase in obseravtino system has been non-uniform and although variabilities have increased at several places, the increase in the number of observation stations is not commensurate. [Sharad K Jain, India]	Accepted - The text has been revised.
1-1101	1	14	30	14	36	Many observations, although have been greatly improved, are still in local scale which could not represent the true climate change. [Jian Tian, United States of America]	Rejected - The comment is not clearly understood.
1-1102	1	14	30	14	36	So another important issue (besides instrument and number of observations) is the improvement of observation at places where [Jian Tian, United States of America]	Rejected - This is for later chapters, not chapter 1.
1-1103	1	14	30	14	36	there is no data before. Maybe can add some updates during recent years on this topic. [Jian Tian, United States of America]	Rejected - This is for later chapters, not chapter 1.
1-1104	1	14	31			innovative tools to analyse and process the increased data should be mentioned [Jucundus Prof. Dr. Jacobeit, Germany]	Rejected - That is already mentioned.
1-1105	1	14	33	14	33	"Proxy" should be added to the glossary or defined in text. [Matthew Cervarich, United States of America]	Rejected - Proxy is already in the glossary.
1-1106	1	14	35	14	36	For me, an "experimental strategy" is applied to deploy experiments and make measurements but doesn't apply to models... see also comment page 1-6 line 3... [Francois DANIS, France]	Rejected - Not true. The term is often used in modelling.
1-1107	1	14	35	14	36	"It should be kept in mind that". I don't see the need for that comment. Starting with "The increase..." seems enough. [Francois DANIS, France]	Accepted - The text has been revised.
1-1108	1	14	38	14	41	The end of this sentence is grammatically wrong. Sentence is too long. [Bennartz Ralf, US]	Accepted - Sentence has been restructured.
1-1109	1	14	38			"Reanalysis" as a lay reader, that word doesn't mean anything (I thought it was the re-analysis of satellites' data) so I couldn't understand the sentence until I asked a scientist in my lab who told me about it. You want AR5 to be more accessible... and this introduction will be read by many; I think explaining what is reanalysis could be useful to the lay reader; I understood something like: statistical approach to make compatible different observations and integrate them into models and fill gaps. (or send readers to box 2.3?) [Francois DANIS, France]	Accepted - We suggest that "reanalysis" be added to the glossary.
1-1110	1	14	38			For the audience there needs to be an extra sentence here to explain just what is meant by "reanalysis" and "reanalysis products". Also the specific use of the word "assimilation" in this context needs explaining in an	Accepted - We suggest that "reanalysis" be added to the glossary.

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						Introductory chapter. [Roger Gifford, Australia]	
1-1111	1	14	38			Define "reanalysis products" for non-specialists. [Eric Sundquist, United States of America]	Accepted - We suggest that "reanalysis" be added to the glossary.
1-1112	1	14	40	14	40	is → in [Peter Burt, UK]	Accepted - The text has been revised.
1-1113	1	14	40	14	40	"usefulness in detecting" [George Kiladis, USA]	Accepted - The text has been revised.
1-1114	1	14	40	14	40	wording: .., altough ist usefulness is detecting…: better: although their uselfulness of detecting... [Helga Nitsche, Germany]	Accepted - The text has been revised.
1-1115	1	14	40	14	40	About the expresion: " …. although its usefulness is detecting long term climate trend ". It must be "usefulness in detecting". [Rubén D Piacentini, Argentina]	Accepted - The text has been revised.
1-1116	1	14	40	14	41	The meaning of this sentence is not clear. Maybe a reordering or verb cheking is needed. Could be just a mistake and it should be "..its uselfulness in detecting.." [BEGONA ARTINANO, SPAIN]	Accepted - The text has been revised.
1-1117	1	14	40	14	41	"... although its usefulness is detecting long term climate trend is limited". The word "is" in "... its usefulness is detecting ..." might be misused here. The authors may actually intend to use "in" instead. [Gan Zhang, United States]	Accepted - The text has been revised.
1-1118	1	14	51	14	52	I understand what the authors want to say but it is not true that AIRS and IASI have better stability over time. Rather, these sensors are instrumental to achieve a better temproal stability for other sensors, like HIRS. They also act as a calbiration reference. [Bennartz Ralf, US]	Accepted - The wording has been changed following the comments of the reviewer..
1-1119	1	14	54	14	55	Why is ARGO spelled out as compared to other acronyms e.g. AIRS, IASI, GCOS, GPS? If it is spelled out it should at least be decapitalized. [Bennartz Ralf, US]	Accepted - The text has been revised. The letters are no longer capitalized.
1-1120	1	14	54	14	55	Replace "ARGO (GLOBAL ARRAY OF PROFILING FLOATS) system" with "Argo global array of profiling floats system". [Robert Waterland, United States of America]	Accepted - The text has been revised. The letters are no longer capitalized.
1-1121	1	14	54	14	55	"... ARGO (GLOBAL ARRAY OF PROFILING FLOATS) system ...". Originally ARGO is the abbreviation for "Array for Real-Time Geostrophic Oceanography"; it is also unclear why "... (GLOBAL ARRAY OF PROFILING FLOATS) ..." appears in upper case. This expression causes inconsistency with this document's abbreviation convention. [Gan Zhang, United States]	Accepted - The text has been revised. The letters are no longer capitalized.
1-1122	1	14	55	14	55	meters → metres OR m [Peter Burt, UK]	Accepted - The text has been revised.
1-1123	1	14	55	14	55	the ARGO floats measure temperture and salinity in the upper 2000 m of the ocean, not the upper 1500 m [Reiner Steinfeldt, Germany]	Accepted - The text has been revised.
1-1124	1	14	57	14	57	"... Argo profiling float ...". To keep consistency, "Argo" should be replaced with "ARGO". [Gan Zhang, United States]	Accepted - The text has been revised.
1-1125	1	15	4	15	4	"observations of variables" [George Kiladis, USA]	Accepted - The text has been revised.
1-1126	1	15	4	15	6	This paragraph is very short. Information on major achievements in land observations needs to be added here (e.g. remote sensing of deforestation, in situ observations of changes in terrestrial evapotranspiration and carbon dioxide exchange, longer record of remotely sensed albedo changes with land-use change) [Beverly Law, USA]	Taken into account - More details will be provided in the revised paragraph.
1-1127	1	15	5	15	6	"soil moisture […] monitoring from space": While the availability of new measurements of surface soil moisture from microwave remote sensing is a welcome advance, this technique only provides measurements of soil moisture in the top few centimeters of the soil and has several issues in regions with dense vegetation cover (e.g. De Jeu et al. 2008, Surv. Geophysics). For those measurement as for any other satellite remote sensing estimates, ground-truth data is essential to provide calibration for the satellite measurements. In the case of land hydrology (soil moisture, evapotranspiration), such measurements are still very scarce (e.g. Seneviratne et al. 2010, ESR). Furthermore, if this section mentions satellite records, it should in this case also mention	Taken into account - More details will be provided in the revised paragraph.

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						their usual short record length and the overall inhomogeneity of the data due to the regular changes in instruments, which imply significant limitations for the inference of trends. Refs: De Jeu, R., et al., 2008, Surv. Geophysics, 29, 399-420; Seneviratne, S.I., et al., 2010, Earth-Science Reviews, 99, 125-161. [Sonia Seneviratne, Switzerland]	
1-1128	1	15	9	15	9	About the expression "..Figure 1.12: Number of satellite instruments from which data have been assimilated in ECMWF's production streams", the notation ECMWF has not been defined before. [Rubén D Piacentini, Argentina]	Accepted - The text has been revised.
1-1129	1	15	9	15	11	Does the ECMWF operational analysis have any relevance to this report? Better to replace with a one line reference (usage of satellite data in NWP has …...) or with information on climate relevant satellite data. [Martin Juckes, UK]	Accepted -Text has been revised to serve as an example.
1-1130	1	15	9			define ECMWF [Elie Verleyen, Belgium]	Accepted - The text has been revised.
1-1131	1	15	13	15	13	Change the heading to "Capabilities in Global Climate Modelling". [Robert Waterland, United States of America]	Rejected - The captions are agreed with the IPCC.
1-1132	1	15	13			this section does not talk about the land-use harmonization newly added in AR5 after recognising the importance to include hisotrical and future land use change in impact assessments. [Prasanth Meiyappan, USA]	Taken into account - The text will be revised.
1-1133	1	15	15	15	16	Is it worth mentioning here that the increasing resolution of GCMs is enabled and determined by the increasing size and speed of supercomputers? [Roger Gifford, Australia]	Rejected - Not necessary. No changes to text.
1-1134	1	15	15	15	34	I think the text here picks up on some model improvements but lacks some structure. I don't think the grids for atmospheric models have become more sophisticated recently (this will be for AR6). Not sure why radiation is picked up on. More important is a real shift to Earth System Models by a number of groups for AR5 and this should be highlighted as a major development since AR4. Note that PCMDI is not an international project but an institute. [Olivier Boucher, France]	Rejected - We don't agree -- many improvements are being made in the models, some of which will make it to AR5. PCMDI is not an institute it is a "Program for Climate Model Diagnosis and Intercomparison" hosted at Lawrence Livermore National Laboratory.
1-1135	1	15	15	15	34	Feels like the four individual points get lost in the long paragraph. [Jeffrey Curtis, United States of America]	Accepted - The text has been revised.
1-1136	1	15	15	15	34	New aspects of CMIP5 worth mentioning are: decadal predictions initialised with the observed ocean state, palaeo simulations, centennial projections with coupled-carbon cycle, “cloud forcing” experiments. [Martin Juckes, UK]	Taken into account - This is covered by some of the general comments in the section. Text has been revised for clarity.
1-1137	1	15	16	15	16	It is not just the horizontal and vertical resolution that have increased, but also the resolution in time. Arguably, the improved modelling capabilities have come as much from the increased time resolution as from the increased spatial resolution. I suggest changing this sentence to: "First, there has been a continuing increase in horizontal and vertical resolution, as well as resolution in time." [Paul Williams, UK]	Rejected - The temporal resolution has not changed. However, models are being run for much longer time periods.
1-1138	1	15	18	15	18	shouls read 'making use of parallel computer architectures' (without 'the' and plural) [Bennartz Ralf, US]	Accepted - The text has been revised.
1-1139	1	15	18			progress in spatial resolution of regional models and multiple nesting approaches should be specified [Jucundus Prof. Dr. Jacobeit, Germany]	Accepted - The text has been revised for clarity without going into too much detail.
1-1140	1	15	20	15	20	Both occurrences of "resolution" should be replaced by "grid spacing". Using them synonymously is common jargon, but incorrect. [Jón Egill Kristjánsson, Norway]	Accepted - The text has been revised.
1-1141	1	15	22	15	34	The correct terminology is 'Firstly, …' and not 'First, …' the same for secndly, thirdly, etc…. [Bennartz Ralf, US]	Accepted - The text has been revised.
1-1142	1	15	24	15	25	I'm not sure the introduction is the right place to speak about future improvements. [Francois DANIS, France]	Taken into account - Text has been revised to clarify this concern.
1-1143	1	15	25	15	25	split infinitive → example to represent nitrogen effects on the carbon cycle better. [Peter Burt, UK]	Accepted - The text has been revised.
1-1144	1	15	25	15	27	Again, it's a sentence that a lay reader cannot understand... what is ensemble techniques? what is a	Taken into account - The text has been revised to

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
						"sample(s)", How a model can "generate the samples". [Francois DANIS, France]	clarify this.. However, the chapters are not written for lay readers!
1-1145	1	15	30	15	47	There should be more information here on CMIP5 and the RCP. There is a paradigm shift between SRES and RCP and this should be reflected here (RCP is not an IPCC initiative, RCP are representative pathways rather than projections, etc). The decadal projections are not mentioned although an important part of CMIP5. CORDEX should be mentined as well. [Olivier Boucher, France]	Taken into account - New box has been added to discuss SRES and RCP in much more detail.
1-1146	1	15	36	15	38	It would be highly interesting to get model analyses for a range not only of possible future emission and other scenarios of human activities, but also for a range of possible natural climate influencing factors. This concerns, for example, effects of changing solar activity or impacts of volcanic activities, such as Pinatubo-, Krakatoa- or Tarn bora-magnitude eruptions. The interaction of such possible stochastic natural events with man-made climate change should be a topic of future climate modelling! [Karl-Heinz Bernhardt, Germany]	Taken into account - Good idea for future research. This cannot be done in the introduction of this report. New box has been added to discuss SRES and RCP in much more detail.
1-1147	1	15	36	15	47	Reference to Moss et al. (Nature, 2010) needed, though I understand that the interpretation of RCPs is evolving. The change from SRES scenarios tied to specific socio-economic pathways to RCPs is a significant one. [Martin Juckes, UK]	Taken into account - New box has been added to discuss SRES and RCP in much more detail.
1-1148	1	15	37	15	47	Models are described as instruments with the collective knowledge of the climate system. They are described as tools to develop hypotheses. I agree on this part, but would like to add that models have predictive capabilities as well. A new chapter (chapt 11) is dedicated to this issue. Since this is new, it should be mentioned. This allows for verifying models, very much alike NWP. Moreover, models are used to make projections, conditioned on emissions or concentrations of greenhouse gases and aerosols and changes in land use. These additional aspects of our modelling could be added here. Finally, systematic and structural uncertainty of models should be mentioned. [Sybren Drijfhout, Netherlands]	Taken into account - New box has been added to discuss SRES and RCP in much more detail. Chapter 11 is also referred to in the text.
1-1149	1	15	37			please define SRES; already used in fig.1.5 as well so might be good to define the acronym there [Elie Verleyen, Belgium]	Taken into account - New box has been added to discuss SRES and RCP in much more detail.
1-1150	1	15	38	15	38	the expression 'pathways' should be explanation some detail [Reiner Steinfeldt, Germany]	Rejected - Moss et al. (2010) is cited. More information is given in this paper.
1-1151	1	15	40	15	41	"For the CMIP5 developed from modelling studies from the AR5 Assessment,.." can be shortened to, "For CMIP5…" [David Bader, USA]	Accepted - The text has been revised.
1-1152	1	15	40	15	47	Readers will naturally wonder, from this description and from Fig. 1.15, why there was a need for the new RCP scenarios. This need should be described here. [Eric Sundquist, United States of America]	Taken into account -New box has been added to discuss SRES and RCP in much more detail.
1-1153	1	15	41	15	42	Representational Concentration Pathways (RCPs)' the meaning of this term should be explained, espescially as in chapter 8 the abbriviation 'RCP' occurs without further explanation [Reiner Steinfeldt, Germany]	Taken into account - New box has been added to discuss SRES and RCP in much more detail.
1-1154	1	15	41	15	47	The Representative (and nort Representationnal) Concentration Pathways appear for the first time in an IPCC report. This concept and the rationale for introducing it should be described in this introductory chapter in a way easily understood by non-specialists. Chapter 8 refers to "RCPs" but never defines them. Chapter 11, page 2 and chapter 12, on pages 3 and 9, are more explicit, but do not give a clear synthetic description which any way should appear in chapter 1, before the introduction of figure 1.15. [Michel Petit, France]	Taken into account - New box has been added to discuss SRES and RCP in much more detail.
1-1155	1	15	41			some basic outline of the four new RCP scenarios should be added to this chapter “Introduction”, perhaps separately from the main text [Jucundus Prof. Dr. Jacobeit, Germany]	Taken into account - New box has been added to discuss SRES and RCP in much more detail.
1-1156	1	15	43	15	43	delete 'to' [Peter Burt, UK]	Accepted - The text has been revised.
1-1157	1	15	43	15	43	consider → considering [Peter Burt, UK]	Accepted - The text has been revised.
1-1158	1	15	46			add 'RF' after radiative forcing [Elie Verleyen, Belgium]	Accepted - The text has been revised.
1-1159	1	15	48	15	48	Add a new paragraph talking about the current shortcomings and limits of climate models? [Jian Tian, United States of America]	Rejected - This is beyond this chapter. See Chapter 9 for the details.

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1-1160	1	15	50	15	50	About Figure 1.13. In this figure the text includes in the inner part: "Non Sulfate Aerosoles" near the year 2001. The correct words are "Non Sulfate Aerosols". Also, at the bottom of the figure "Present day" must be changed by a given year (2011 or 2012?), since at the time the AR5-WGI will be published, this part of the figure will be in the past. [Rubén D Piacentini, Argentina]	Taken into account - The figure has been revised. We use "2012" instead of "present day" and "other aerosols" instead of "non-sulfate aerosoles".
1-1161	1	15	50	15	53	why the H. Resolusion is 100 km not 125 km ? [PROF. YEHIA HAFEZ, Egypt]	Rejected - Figures would not look different.
1-1162	1	15	52	15	52	Not every climate model is a spectral model. [Olivier Boucher, France]	Accepted - wording has been changed.
1-1163	1	15	56	16	2	I think legenda (section b) is partially misleading. Here a suggestion of modification. Figure 1.14: a) Illustration of the Eastern North American topography in a resolution of 110 km x 110 km (typical of global climate models used in AR5 and some global climate modelling studies in AR4). b) Illustration of the Eastern North American topography in a resolution of 30 km x 30 km (used in some regional climate models for AR5). [Claudio Cassardo, Italy]	Accepted - The text has been revised.
1-1164	1	15	57	16	2	'Geographic resolution characteristic in global illustration of the North American topography at the resolution of 110 km x 110 km typical of ... and of 30 km x 30 km as approximately used in some cases for AR5' the phrasing of this sentence is quite fussy; maybe it can be shortened and replaced by 'the resolution of 110 x 110 km is typical of ... and the one of 30 km x 30 km is similar to what is used in some cases for AR5 [Reiner Steinfeldt, Germany]	Accepted - The text has been revised.
1-1165	1	15				Fig 1.13 does not make sense for the development of climate models. Instead of this, a temporal variation can be useful to show this developing on the horizontal axis. Fig 1.14 . My suggestion is: no needs a figure to show the difference of horizontal resolution for regional models. The authors can remove this figure from the chapter 1. [SELAHATTIN INCECIK, TURKEY]	Taken into account - Concerning Fig 1.13 the figure has been revised. Concerning Fig 1.14 rejected. We believe the figure has value.
1-1166	1	16	1	16	1	why the H. Resolusion is 30 km not 31.25 km ? [PROF. YEHIA HAFEZ, Egypt]	Accepted - The text has been revised.
1-1167	1	16	3	16	3	It would be clearer to head figure 1.15 'Radiative Forcing' and then use the acronym in the legend [Mark Charlesworth, United Kingdom of Great Britain & Northern Ireland]	Accepted - The figure is revised.
1-1168	1	16	5	16	5	may want to define RF in the figure caption since the original definition is way back on pg. 5 [George Kiladis, USA]	Rejected - It is included in the head of the revised figure.
1-1169	1	16	5	16	5	the abbreviation 'RF' should be explained (raditive forcing) [Reiner Steinfeldt, Germany]	Rejected - It is included in the head of the revised figure.
1-1170	1	16	5	16	8	About Figure "Figure 1.15: Projected total RF (Wm-2) from 2000 to 2100. Previous IPCC assessments (SAR IS92a, TAR/AR4 SRES A2 & B1) are compared with RCP scenarios reported as CO2-equivalent (Meinshausen et al., 2011) and with those RCP emissions scenarios assessed here including uncertainties in natural emissions and atmospheric residence time. The uncertainty in RF for year 2000 (see Chapter 8) is not shown, nor projected here.", i) The x axis goes from 1950 to 2100, so the data span from the past to the future and the main title needs to be modified, for example in the following way: " Total Radiative Forcing (RF) from 1950 to 2100; ii) If the uncertainty is not explicitly shown (as error bars), it must be included at least in the figure caption. [Rubén D Piacentini, Argentina]	Taken into account - Figure and Caption have been redone.
1-1171	1	16	10			section 1.6 may be a road map to the rest of the report, but it does not include a substantial summary [Jucundus Prof. Dr. Jacobeit, Germany]	Rejected - Chapter 1 is introduces the other chapters but it is not the intention to present the outcomes of each chapter.
1-1172	1	16	15			To my opinion, it's not a summary but an overview. [Francois DANIS, France]	Accepted - Title changed.
1-1173	1	16	18	16	22	Replace "Assess information from all climate system components on climate variability and change as obtained from instrumental records and climate archives. It covers all relevant aspects of the atmosphere up to the stratosphere, the land surface, the oceans, and the cryosphere. Information on the water cycle, including evaporation, precipitation, runoff, soil moisture, floods, drought, etc., is assessed." with "These chapters present new climate change information obtained from instrumental records and climate archives. The chapters examine all major climate system components including the Earth's atmosphere up to the	Taken into account - Section has been revised.

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						stratosphere; the land surface; the oceans; and the cryosphere. Information on the water cycle, including evaporation, precipitation, runoff, soil moisture, floods and drought are assessed." [Robert Waterland, United States of America]	
1-1174	1	16	23	16	23	delete 'many' [Peter Burt, UK]	Accepted - The text has been revised.
1-1175	1	16	25	16	26	Replace "Covers all relevant aspects from observations, process understanding, to projections from global to regional scale." with "These chapters consider the insights and understandings obtained from climate observations." [Robert Waterland, United States of America]	Taken into account - Section has been revised.
1-1176	1	16	29	16	29	"…as well as their role in climate feedbacks" [Olivier Boucher, France]	Taken into account - Text has been revised.
1-1177	1	16	32	16	32	Radiative Forcing → radiative forcing [Peter Burt, UK]	Accepted - The text has been revised.
1-1178	1	16	37			Information regarding detection and attribution of changes on global to regional 37 scales is assessed in Chapter 10: that is the only discussion that I found (but I did rush my review, so sorry if I didn't catch it) on what assumptions are used in detection and attribution, and what its good for. This is much too sparse - while the d+a chapter has usually a very visible role, it needs to be explained to a reader not coming from a specialized background what is done there, and why this has a key role between future climate change modelling and documentation of radiative forcing and observed climate change. Its arguably the glue that ties those topics together, investigating if the radiative forcing has impacted climate in the past and if this can be distinguished in observations, and what observations tell us about uncertainty in future changes - the d+a chapter has implications for projections which are discussed there [Gabi Hegerl, UK]	Rejected - The section on detection and attribution is as long as the sections on the other chapters.
1-1179	1	16	51	16	51	"form" should be "forms" [Eelco Johan ROHLING, United Kingdom of Great Britain & Northern Ireland]	Rejected - 'form' related to 'Maps', which is plural.
1-1180	1	17	1	17	1	I believe there is an additional fundamental uncertainty dealing with the incomplete description of transport processes, reflected by the truncation of differential equations that introduces different solutions (either chaotic, as bifurications or as as separated sets of solution members). The current answer is heaviliy proces-oriented for very good reasons though. But even if we know all processes very well, we will be left with this uncertainty. Many people do not realise this. [Bram (Abraham) Bregman, Netherlands]	Taken into account - FAQ has been totally rewritten.
1-1181	1	17	1	17	1	Finally, we have to emphasize expert judging as a source of uncertainty as has been described in paragraph 1.4 page 14, lines 4 to 10. [Bram (Abraham) Bregman, Netherlands]	Taken into account - FAQ has been totally rewritten.
1-1182	1	17	1	17	44	This paragraph is peculiar: it states that today the knowledge has improved very much, but at the same time states that the projections about the next and far future are as much uncertain as in the previous IPCC reports. This generates in the reader some embarrassing confusion. I suggest making a short list (point after point) stating what today is known compared to the past IPCC reports, and what is not known. I think would be good adding also a sentence stating that, no matter how much our knowledge will improve, for such a complex system it will never be possible to make previsions as good as in other sciences. [Walter Dragoni, Italy]	Taken into account - FAQ has been totally rewritten and this is incorporated.
1-1183	1	17	1	17	46	The uncertainties are exclusively based on the prejudiced opinions of the modellists and it is interesting to know that these opiniions have not changed [VINCENT GRAY, NEW ZEALAND]	Taken into account - FAQ has been totally rewritten.
1-1184	1	17	1	17	46	This is a great question, but much of the answer does not address the question. The first reason given -- that we now know more about what we don't know -- is the only real answer. The other 3 "reasons" are just descriptions of sources of uncertainty, not explanations for why uncertainties haven't decreased. Perhaps the first reason could be developed for each of the sources of uncertainty described in the last 3 "reasons." Also -- very important -- this FAQ would be a nice place to incude a statement about the inherent uncertainties of climate projections. [Eric Sundquist, United States of America]	Taken into account - The first reason is quite independent of the second, which basically says the final point of the reviewer: that there are inherent uncertainties in the system. FAQ has been totally rewritten and this latter point is incorporated.
1-1185	1	17	1	17	48	FAQ1.1: The language for this FAQ is well suited to a non-specialist audience, and the diagram illustrates the concepts well. However in line with the standard style for WG1 FAQs I suggest adding a 1 paragraph "summary answer" in italics at the beginning. [David Wratt, New Zealand]	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite.
1-1186	1	17	4	17	5	Similar, but very different! TAR and AR4 projections were based on projected emissions; AR5 WG1 projections will be based on representative pathways – you can not just compare the two sets of numbers.	Taken into account - FAQ has been totally rewritten.

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						[Martin Juckes, UK]	
1-1187	1	17	4	17	6	To be consistent with the standard style for WG1 FAQs, I suggest you start with a "brief summary answer" paragraph rather than starting with a restatement of the question. This summary would draw from what you have said in the body of the answer and illustrated in FAQ1.1 Fig 1. The present first paragraph, ie lines 4-6. could then be retained as a second paragraph. [David Wratt, New Zealand]	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite.
1-1188	1	17	4	17	21	If nothing else, confidence (in the Mastrandrea et al 2010 sense) should increase, as there is far more quantification of uncertainties, particularly the carbon-cycle feedback. This is a substantial step forward. [Martin Juckes, UK]	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite.
1-1189	1	17	4			Maybe change "uncertainties' to "perceived uncertainties" to be consistent with terminology in FAQ1.1, Fig1 ? [David Wratt, New Zealand]	Taken into account - FAQ has been totally rewritten and perceived uncertainties is no longer used.
1-1190	1	17	5	17	6	The question for WG1 is what is happening to the uncertainty for a given emissions pathway, uncertainty in the emissions pathway has to be handled seperately, because there are fundamentally different approaches in AR4 and AR5. [Martin Juckes, UK]	Rejected - Even with this issue, the uncertainties wouldn't decrease. This FAQ is for layman, and thus discussing particular emissions trajectories seems too technical.
1-1191	1	17	8	17	8	The uncertainty is not “due to” our improved understanding! [Martin Juckes, UK]	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite.
1-1192	1	17	8	17	21	“previously ignored”: what processes are you referring to as ignored? Carbon cycle feedbacks were certainly not ignored in AR4. [Martin Juckes, UK]	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite.
1-1193	1	17	11	17	11	Replace "start" by "begin" [Sharad K Jain, India]	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite.
1-1194	1	17	11	17	27	This language is also in line with suggestions given above. It would certainly be good to address these topics in the main text along with relevant citations. [Forrest Mims, USA]	Rejected - Unfortunately we do not have the space in this chapter to discuss these issues in more depth than in section 1.4.4.
1-1195	1	17	14	17	14	insert comma after 'However' [Peter Burt, UK]	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite.
1-1196	1	17	15	17	15	Replace "more might" by "more CO2 might" [Sharad K Jain, India]	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite.
1-1197	1	17	18	17	18	Please delete "onto climate" [Jón Egill Kristjánsson, Norway]	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite.
1-1198	1	17	19			the terms “real uncertainty” and “perceived uncertainty” are not convincing; I would prefer to speak about “identified uncertainties” and “total uncertainties”; according to Fig. FAQ 1.1, the percentages of the former with respect to the latter seems to increase [Jucundus Prof. Dr. Jacobeit, Germany]	Taken into account - FAQ has been totally rewritten.
1-1199	1	17	24	17	24	using 'etc' is poor style. Omit. [Peter Burt, UK]	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite.
1-1200	1	17	32	17	32	Please rephrase this sentence. The statement that we are forced to study human influence feeds the sceptic view that IPCC is prejustified towards human influences. These FAQ's serve as society window and thus we need to be very cautious about the wording. The IPCC must avoid this impression to prevent escalation of criticism. The IPCC is intrinsically interested in the behaviour of the climate system by natural and antropogenic processes. It is important that this message is send out consistently. [Bram (Abraham) Bregman, Netherlands]	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite.
1-1201	1	17	32	17	33	About the expression: "….Because some of the forcings are negative (e.g., aerosol)...", the example is only partially correct, since black carbon aerosol has a positive feedback (see Figure 2.21, page 205 of AR4-WGI). So, please specify better or change the example between parenthesis. [Rubén D Piacentini, Argentina]	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite.

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1-1202	1	17	33	17	33	Unclear what is meant by "not spatially well distributed". How about "not evenly distributed" [Jón Egill Kristjánsson, Norway]	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite.
1-1203	1	17	34			I think a sentence is missing here to conclude the argument. Because the forcing is difficult to estimate, the climate feedbacks (and therefore future projections) are uncertain. The way it stands the paragraph is difficult to understand. [Reto Knutti, Switzerland]	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite.
1-1204	1	17	36	17	39	It is not just the policy decisions that determines the uncertainty, it is the dynamics of a society, the economy in its broadest meaning, that contain a inherent deep uncertainty. It is relevant to check the references listed by M. Hulme in his commentary Meet the Humanities, Nature Clim. Change, vol 1., 4, 177 - 179, 2011. [Bram (Abraham) Bregman, Netherlands]	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite.
1-1205	1	17	36	17	39	We know how to separate different components of uncertainty-- we need to work with a physically based definition of climate sensitivity and keep analysis of policy decisions separate. Delete this paragraph. [Martin Juckes, UK]	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite.
1-1206	1	17	37	17	37	emission → emissions [Peter Burt, UK]	Taken into account - FAQ has been totally rewritten.
1-1207	1	17	38	17	39	"Climate sensitivity" is not effected by what humans do. It is a diagnosed quality of the climate system. From estimates of the forcing from human (and other) activity together with the climate sensitivity it is possible to estimate what the climate will do. [Gareth S Jones, UK]	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite.
1-1208	1	17	38	17	39	finding the true climate sensitivity …' climate sensitivity' is a scientific term describing the temperaure (or climate) response to a given forcing. Here, the forcing itself is unknown or might change (l.39), so it is not the 'true climate sensitivity' that has to be examined, but the true temperature (or climate) change for the unknown and variable forcing. [Reiner Steinfeldt, Germany]	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite.
1-1209	1	17	38			I don't think "the true climate sensitivity" is the correct wording here since the point made in this paragraph is uncertainty related to future emissions. [Jan Fuglestvedt, NORWAY]	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite.
1-1210	1	17	38			I would skip the final sentence here on climate sensitivity, it confuses the scenarios uncertainty and the physical uncertainty. If we estimate climate sensitivity then our decisions are not important, because it's all in the past. I suggest to clearly separate the physcial uncertainty from the scenario uncertainty in this FAQ, since one is a property of the climate system, whereas the other is a choice of our society. [Reto Knutti, Switzerland]	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite.
1-1211	1	17	39			Replace "humans" by "humans' " or "human". [David Wratt, New Zealand]	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite.
1-1212	1	17	43	17	43	About the expression in Figure FAQ 1.1: "...The real uncertainties decrease as there is more data, better understanding and the time becomes closer". Please, explain in more detail what means that "The real uncertainties decrease as .... the time became closer". [Rubén D Piacentini, Argentina]	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite.
1-1213	1	17				comment on FAQ1.1: Several parts of this section are extremely ill-posed and not put together well. First, the title is very misleading: "uncertainties" is very broad yet the section only discusses global mean surface temperature. It is unclear whether you are talking about "real uncertainties" or "perceived" ones in the title. Second, there is not even a graph or a quantiative example of what the projections were between the first and fifth assessment- the closest thing in this whole chapter is Figure 1.4 (not referenced in the FAQ), which only goes out to 2015, and in fact gives the impression that some of the spread has narrowed (although uncertainties aren't plotted). The second paragraph is still more misleading. What specifically has been "ignored" before and over what timeframe was it/was it not considered? This could be easily read as saying that uncertainties in feedbacks or forcings have never been considered prior to AR5, which is absurd. The first sentence in the third paragraph is too generalized, and a specific carbon cycle example does not rectify this. In the fourth paragraph (line 26), what is the basis for the number "20-200" years when a number of feedback processes operate on timescales both shorter and longer than this? Next, the "second" and "third" reasons for not reducing "uncertainty" are not independent of each other, since climate sensitivity depends upon these feedback processes. There is also an awkward transition in talking about climate sensitivity to talking about aerosol forcing (you could elaborate and mention that the observational record on its own is a weak constraint on sensitivity since we don't know the net forcing too well). The very last sentence (line 38) does not follow	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite.

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						whatsoever from the statements prior about policy options, since climate sensitivity is typically defined as a response to a specific forcing (like a doubling of CO2, or per W/m2). Finally, this FAQ never actually answers the initial question, it just discusses factors that make it a challenging problem. [Chris Colose, United States]	
1-1214	1	17				The FAQ is pretty weak. 1) is admission of previous overconfidence as well as feedbacks. 2) and 3) are also feedbacks, as sensitivity depends on feedbacks; so these are not independent; merge them; take feedbacks out of 1. And 4 is not process science so it doesnt belong here at all. So it boils down to 1) prior overconfidence; and 2) Its a tough problem. My concern is that neither of these inspires confidence that the climate research community is up to the task. This prompts the question whether the models are up to the task. So all in all I dont think this FAQ strengthens the document and I would recommend deleting it. PS, watch the first person plural. Whose perception? [Stephen E Schwartz, USA]	Taken into account - FAQ has been totally rewritten and this is incorporated into the rewrite. Most of the other reviewers think this is an important FAQ, so we retain it, although rewritten.
1-1215	1	17				FAQ 1.1 Figure 1: I think it would be appropriate to label the light-blue areas something along the lines of, “Uncertainty arising from ignored components.” It may also be helpful to state the fact (in the caption or FAQ) that as our modeling progresses we have greater confidence in quantitative results like ranges of error around mean values, likelihoods of scenarios, etc. due to the the shrinking number of ignored processes. [Bradley Tomasek, United States of America]	Taken into account - FAQ has been totally rewritten and perceived uncertainty is removed.
1-1216	1	17				FAQ 1.1: The FAQ currently is currently short on discussion regarding how the understanding of the climate system has increased (e.g., improved understanding of past changes and their causes), which is necessary to cover the first component of the FAQ. Draw upon the discussions given in other chapters. [Thomas Stocker/ WGI TSU, Switzerland]	Taken into account - FAQ has been totally rewritten with this in mind, although we are not allowed to refer to chapters.
1-1217	1	17				FAQ 1.1: The FAQ is not yet comprehensive enough in terms of highlighting and explaining the different types of uncertainty involved (e.g., process understanding, scenario). We note that the FAQ is currently focused uniquely on projections, and it will be necessary to also consider observations, associated uncertainties and their changes over time, and how they feed in to projection uncertainties. Draw upon the discussions given in other chapters. [Thomas Stocker/ WGI TSU, Switzerland]	Taken into account - FAQ has been totally rewritten with this in mind.
1-1218	1	17				FAQ 1.1: Delete lines 12 - 14 'would stay the same in the future'. This is not accurate. Consider to include a specific example. [Thomas Stocker/ WGI TSU, Switzerland]	Taken into account - FAQ has been totally rewritten.
1-1219	1	17				FAQ 1.1: We find the final sentence stating that the true climate sensitivity requires understanding... of changes in the forcing to be incorrect. Climate sensitivity should be independent of the changes in forcing. [Thomas Stocker/ WGI TSU, Switzerland]	Taken into account - FAQ has been totally rewritten.
1-1220	1	17				FAQ 1.1, Fig 1: Consider a graphic that distinguishes between uncertainties regarding process understanding, scenario uncertainty, modeling uncertainty. Add the sequence of the IPCC assessment reports to the time axis. [Thomas Stocker/ WGI TSU, Switzerland]	Taken into account - Figures have been revised with this in mind.
1-1221	1	18	6	18	34	The brief discussion of modeling capabilities should make reference to (at least) chapters 6, 7, and 9. [David Randall, USA]	Rejected - FAQ are not allowed to refer to chapters, unfortunately.
1-1222	1	18	20			In the reference, All authors should be written, do not use et al. [Soydoa Vinitnantharat, Thailand]	Editorial - Copy edit will be finalized prior to publication.
1-1223	1	18	40	18	40	Reference Ekholm, N. 1901 (not Eckholm) may be completed: "On the variations...") Quart. J. Roy. Meteorol. Soc.27, 1. [Karl-Heinz Bernhardt, Germany]	Accepted - Text revised
1-1224	1	18	40			Where was the Eckholm work published? [Drew Shindell, USA]	Accepted - Text has been updated.
1-1225	1	19	21	19	21	Following reference could be added "Kripalani, R.H., et al., 2003:Western Himalayan snow cover and Indian monsoon rainfall: A re-examination with INSAT and NCEP/NCAR data. Theoretical and Applied Climatology,74,1-18." [Ramesh Kripalani, India]	Rejected . No reference is made to this paper. This is probably more relevant to chapter 2, as we do not assess the full range of literature in the introduction.
1-1226	1	19	21			Please change CO2 to CO2 [Soydoa Vinitnantharat, Thailand]	Accepted - the reference has been revised.
1-1227	1	19	25	19	26	To add: Lenton, T. M..H. Held, E. Kriegler, J. W. Hall, W. Lucht, S. Rahmstorf, H. J. Schellnhuber,2008:	Accepted - Reference has been added.

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						Tipping elements in the Earth's climate systems. PNAS 105(6), 1786-1793. [Karl-Heinz Bernhardt, Germany]	
1-1228	1	19	25	19	26	The answer to the FAQ is not very good. A better answer is that uncertainty is never completely eliminated in science. Uncertainty can become smaller over time, and in fact it is becoming smaller with time for climate change science. [David Randall, USA]	Taken into account - FAQ has been totally rewritten.
1-1229	1	19	55	19	56	About the Reference: "Morgan, M. G., and M. Henrion, 1990: Uncertainty: A Guide to Dealing with Uncertainty in Quantitative Risk and Policy Analysis.", it must be completed with Journal/Book, volume, pages. [Rubén D Piacentini, Argentina]	Taken into account - The reference is updated. No journal or volume as this is a book title. The number of pages have been included.
1-1230	1	19	57	19	58	About the Reference: "Morgan, M. G., et al., 2009: Best Practice Approaches for Characterizing, Communicating, and Incorporating Scientific Uncertainty in Climate Decision Making. ", it must be completed with Journal/Book, volume, pages. [Rubén D Piacentini, Argentina]	Taken into account - The reference is updated. No journal or volume as this is a book title. The number of pages have been included.
1-1231	1	20	34	20	34	Typo in reference: "Frohlich" should read "Fröhlich". [Georg Feulner, Potsdam]	Accepted - The reference has been updated.
1-1232	1	22	1	22	2	Figure 1.1: Why the order of this figure is “b.c.a.d” rather than “a.b.c.d” Figure caption: “(d) Although the atmosphere is largely transparent to incoming solar radiation, both short and long wave interactions are important for the energy balance.” This seems like a factual statement rather than the description of figure “d” explanatory caption should be required. [Lokesh Kumar Sahu, India]	Taken into account - Caption has been revised.
1-1233	1	22	1	22	13	Figure 1.1b-1.1c. The processes shown in (b) and (c) are not significantly different, e.g. it does not give the reflective processes of short wave radiation, etc. Please try to make the schematic diagrams more easily to distinguish different processes. [Weiwei Li, United States of America]	Taken into account - Caption has been revised.
1-1234	1	22	1			I think this figure is obscure, mostly because it is trying to cover both climate and climate change at the same time. What is a anthropogenic flux of precipitation? I'd suggest you focus on the climate system in Fig 1.1 and climate change in Fig 1.2 [Olivier Boucher, France]	Taken into account - Figure has been redone
1-1235	1	22	1			“Atmospheric short waves interactions”. Maybe I'm fussy but the box b. shows fluxes, not interactions with the SWR (because SWR are not shown). The confusion can be avoided by adding some text better describing that part of the figure. Suggestion: “Fluxes leading to changes in atmospheric interactions with short waves radiation. Those interactions are driven by ...”? Same comment for c. Part d. is more visual with color so no comment. [Francois DANIS, France]	Taken into account - Figure has been redone
1-1236	1	22	2	22	3	This figure is not very clear; the text is too small and some of the graphics is too small also. [Jón Egill Kristjánsson, Norway]	Taken into account - Figure has been redone
1-1237	1	22	5	22	13	Shows IPCC theoretical greenhouse which ignores the real climate of air temperatures, winds, cyclones, anticyclones, convection, evporation and precipitation. The earth is flat. The sun shines with equal intensity all day and all night, the only energy exchange is radiation, There could never be a "balance", all of the figures are constants without uncerttainties. No wonder it has no predictive value. [VINCENT GRAY, NEW ZEALAND]	Rejected - This graphic is a cartoon representation. It is not intended to reflect all of the important dynamical processes and other processes that are also important to the climate system. The opinion in this review comment does not itself affect the figure as shown or discussed in the text.
1-1238	1	22	6	22	6	Missing dot mark in between "(LWR)" and "Natural" [Gillles Molinié, France]	Taken into account - Figure has been redone
1-1239	1	22	10			should read predominantly [Elie Verleyen, Belgium]	Taken into account - Figure has been redone
1-1240	1	22		22		Figure 1, panel c. The double green/gray arrow in between HO2 and the cloud is not explicitly mentionned in the text. [Gillles Molinié, France]	Taken into account - Figure and caption have been redone
1-1241	1	22				The Figure 1.1 (a,b,c) need the supporting figure discussed in Section 1.2.2 [Muhammad Amjad, Pakistan]	Taken into account - Figure has been redone
1-1242	1	22				Figure 1.1: This figure is very bad-- it is difficult to see, difficult to read, difficult to understand. I've seen diagrams like this all my life, and yet this figure is still confusing to me. The graphic layout of this figure is very poorly done. My eye is draw to the top of the diagram first, though the "beginning" section a is in the middle.	Taken into account - Figure has been redone

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						And who knows where section d fits in- it sort of looks like its underground in the center of the Earth. Sections b and c look identical and I have to squint to see the minute differences. It took me 10 minutes to understand that section b was associated with the blue arrows in section a, and that section c was associated with the red arrows in section a. And all the green arrows are exactly the same as the grey arrows. Should the proportion of the arrow that is grey demonstrate the relative proportion of these fluxes that are anthropogenic versus natural? Sectoin d tells me nothing. Overall this figure is confusing and will not transfer easily to any sort of educational materials. No matter how this is resized, the text will always be difficult to read in this format. Even the title is misleading: the diagram does not just show the main drivers of climate change, it shows the whole Earth energy budget that drives our climate (not just changes to that climate). This is an elegant system, but the drawing is anything but elegant. [Allison Crimmins, United States]	
1-1243	1	22				Figure 1.1.c. Include N2O in the figure, after CH4 (it is already in the caption) [Marcelo Galdos, Brazil]	Taken into account - Figure and caption have been redone
1-1244	1	22				Figure 1.1.a. Insert space between the words "Latent" and "heat". [Marcelo Galdos, Brazil]	Taken into account - Figure and caption have been redone
1-1245	1	22				Figure 1caption : does the solar cycle really cause 'important' variations in the energy budget? It's a quite subtle change and hard to detect! [Gabi Hegerl, UK]	Taken into account - Figure and caption have been redone
1-1246	1	22				Fig. 1.1: on page 4, line 44, it is correctly mentioned that "dominant energy loss of the infrared radiation from the earth is from higher layers of the troposphere", this is, however, not perceptible within Fig. 1.1 (part a) [Jucundus Prof. Dr. Jacobeit, Germany]	Taken into account - Figure and caption have been redone
1-1247	1	22				Fig. 1.1: N2O (mentioned in the Figure caption) is missing in the Fig. itself (part c) [Jucundus Prof. Dr. Jacobeit, Germany]	Taken into account - Figure and caption have been redone
1-1248	1	22				Fig. 1.1: caption (p. 22, l. 12): after "short and long wave interactions" it should be added "at the surface" [Jucundus Prof. Dr. Jacobeit, Germany]	Taken into account - Figure and caption have been redone
1-1249	1	22				Fig. 1.1: part a: instead of "thermal" it should be written "sensible heat"; additionally, the arrows for latent heat and sensible heat are not proportionally [Jucundus Prof. Dr. Jacobeit, Germany]	Taken into account - Figure and caption have been redone
1-1250	1	22				Fig. 1.1: atmospheric back radiation and greenhouse effect are not mentioned explicitly in the Fig. (part a) [Jucundus Prof. Dr. Jacobeit, Germany]	Taken into account - Figure and caption have been redone
1-1251	1	22				Fig. 1.1.: To be consistent with the "ocean color" entry under the Oceans box, the Land box should also mention the "surface albedo. In addition, it is not only the vegetation type that is relevant over land, but also the fraction of vegetation cover, the soil moisture status (the albedo of wet soil signifcantly difers from the albedo of dry soil, and the albedo of vegetation also depends on the soil moisture status), as well as the plant phenology (e.g. variation of plant activity and also plant color over the course of the year). [Sonia Seneviratne, Switzerland]	Taken into account - Figure and caption have been redone
1-1252	1	22				(9) Pg 1-4, Line 34 (w/Ref. to Fig 1.1). This figure (1.1) needs to be improved, and/or the figure legend rephrased/expanded. E.g., Fig 1.1 (b): Since ALL the arrows have green and grey, there would be no distinction between natural and anthropogenic fluxes and consequently the figure looses meaning. Moreover, what exactly are "anthropogenic" precipitation or evaporation or depositions, or clouds feedbacks etc. I could create a story for this with some imagination but this depiction may not make sense to an outside reader? Example#2, Fig 1.1 (d): It would not be clear as to how ocean waves are due to surface short/long wave interactions. Fig 1.1 (a), the "primary" figure could/should perhaps have some numbers in Watts/m2. There are other aspects of Fig 1.1 that could come across as confusing to an outside reader—e.g., Why is evaporation identified under atmospheric long wave interaction and not equally under atmospheric shortwave interaction. And, in (b) and (c) what has "deposition got to do with either shortwave or long wave radiation. There are many other issues with this figure. It looks good at first glance, but at second glance it does not mean a whole lot. Some representation could even be wrong or wrongly designated in either the figure or the explanatory legend. Be careful here, because this is an important figure attempting to capture many things—perhaps too	Taken into account - Figure and caption have been redone

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						many. [Sushel Unninayar, USA]	
1-1253	1	22				Figure 1.1: poor technical quality, short wave ---> solar; long wave ---> terrestrial [Manfred Wendisch, Germany]	Taken into account - Figure and caption have been redone
1-1254	1	22				Figure 1.1: Text “Latentheat” in Panel a. A space is missing here, and the expression should be “Latent heat”. The positions of “Latentheat” and “Thermal Evapotranspiration” may be a little misleading, and I feel confused about the corresponding relations between the arrows and these texts. [Gan Zhang, United States]	Taken into account - Figure and caption have been redone
1-1255	1	23	1	23	2	Figure 1.2: The forest fire emission should also be depicted /which should be more important than those by ships. [Lokesh Kumar Sahu, India]	Taken into account - Figure and caption have been redone
1-1256	1	23	1	23	9	a more schematic figure would be easier to understand [Swarnali Sanyal, USA]	Taken into account - Figure and caption have been redone
1-1257	1	23	1	23	9	Figure 2. provides chart of degree to which Climate is affected by varies phenomena using size of symbol “+” or “-“. Sometimes it is difficult to judge the size, such as near “Ocean Circulation” “+” looks bolder/larger than “-“, but one expects the signs must be of the same size. [Pavel Tkalich, Singapore]	Taken into account - Figure and caption have been redone
1-1258	1	23	2			Fig. 1.2: Nice figure but a bit wild in my view with words bending and squeezing into arrows. I would propose to clean it up a bit and use less effects for the text labels. [Reto Knutti, Switzerland]	Taken into account - Figure and caption have been redone
1-1259	1	23	4	23	9	Another exercise which ignores the main mechanisms of heat transfer which are convection and evaporation.precipitation. [VINCENT GRAY, NEW ZEALAND]	Rejected - The graphic actually has arrows shown to specifically represent the importance of evaporation and convection.
1-1260	1	23	5	23	8	The "ocean uptake carbon didoxide feedback" may be negative with respect to rising carbon dioxide in the atmosphere. I However, there exists a positive feedback with global warming, since the carbon dioxid uptake potential is diminished in a warmer ocean and, therefore, less carbon dioxide added into the atmosphere by human activities is deposited in the ocean. This results in a positive feedback for global warming, added to that of water vapour [Karl-Heinz Bernhardt, Germany]	Taken into account - Figure and caption have been redone
1-1261	1	23				Figure 1.2: This figure is also quite difficult to understand. It is very busy and does not immediately convey that the topic is feedbacks. The labeling (both words and positive/negative forcing) is messy and does not provide a sense of which feedbacks enhance warming and which don't. Perhaps its the way the entire image is on its side, showing the curvature of the Earth with half the diagram ice-- its just hard to see what it is you're trying to depict here. This should be cleaned up, with less swooping text in myriad colors. I would suggest trying to create a symbol for positive, negative, and both types of feedbacks that incorporate their textual label within the symbol. The timescales box is fine. As a further consideration, I would suggest turning this diagram into a web tool, where hovering over any one feedback would open a box of text to the side that explains the feedback cycle in more detail. [Allison Crimmins, United States]	Taken into account - Figure and caption have been redone
1-1262	1	23				Figure 1.2: It is busy and very complex. Please clarify it. You can clarify the figures. and I suggest For more clarification you can use different colors for positive , negative and mix feedback. [Fatemeh Rahimzadeh, Iran, Islamic Republic of]	Taken into account - Figure and caption have been redone
1-1263	1	23				Fig. 1.2: Biogeophysical feedbacks over land are missing from this figure. [Sonia Seneviratne, Switzerland]	Taken into account - Figure and caption have been redone
1-1264	1	23				Pg 1-5, Line 51 (referring to Fig 1.2 for a representation of some of the key feedbacks): Comment: Fig 1.2 is a complex figure. Its veracity should be examined carefully. Should there be a +/- annotation on aerosols etc? The figure legend could be obscure to an outside reader. Perhaps explain more carefully what and why blackbody radiation feedback is negative, lapse rate feedback etc. [Sushel Unninayar, USA]	Taken into account - Figure and caption have been redone
1-1265	1	23				Fig.1.2: delete 'feedback' after each of the feedback processes and metion in caption that feedbacks are given in yellow boxes or alternatively add 'feedback' after each feedback process to be conistent [Elie Verleyen, Belgium]	Taken into account - Figure and caption have been redone

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1-1266	1	23				Figure 1.2: Could the plus and minus signs be quantified in some way? [Manfred Wendisch, Germany]	Taken into account - Figure and caption have been redone
1-1267	1	23				The time range for ice albedo feedbacks needs to extend to much longer timescales. You have included only sea ice and snow effects, but ice sheets have timescales into millennia. This is misleading unless you either extend the bar or define it more narrowly. [Eric Wolff, United Kingdom of Great Britain & Northern Ireland]	Taken into account - Figure and caption have been redone
1-1268	1	24	0	24	0	Fig.1.3a, section 'Tropopause', 3rd line: a line break should occur before 'CO2 concentrations ...' [Reiner Steinfeldt, Germany]	Taken into account - Figure and caption have been redone
1-1269	1	24	0	24	0	Fig.1.3 the headline of both figures is 'ocean, land, ice', but the upper part of the figure deals with the atmosphere, so 'atmosphere' should also be included into the headline (there could be one line 'atmosphere' at the top of the figures and the line 'ocean, land, ice' between the part dealing with the atmospheric changes and the changes on ocean land, and ice [Reiner Steinfeldt, Germany]	Taken into account - Figure and caption have been redone
1-1270	1	24	1	24	1	Minor comments on figure: 1) Label Troposphere box as "troposphere" in same way that Strat and Surface boxes are labeled. 2) Give CO2 concentration its own line. 3) N2O should be an "oh" not a zero, "snowpack" not "snowpach", and "have" not "habe". 4) What period is the record low for spring snow cover duration? As written, it sounds like 1966-present is the "record low" but that doesn't make sense since 1966 is when observations started... [Marcus Sarofim, USA]	Taken into account - Figure and caption have been redone
1-1271	1	24	1	24	2	Suggestion to write 'Troposphere and Tropopause' instead of 'Tropopause alone [Helga Nitsche, Germany]	Taken into account - Figure and caption have been redone
1-1272	1	24	1	24	2	please check:"warming with altitude… ..in the tropics (only?) [Helga Nitsche, Germany]	Taken into account - Figure and caption have been redone
1-1273	1	24	1	24	2	for 'Near Surface': on the right side: "record low spring snow cover duration over the Arctic since…": does it refer to a specific (recent) year? [Helga Nitsche, Germany]	Taken into account - Figure and caption have been redone
1-1274	1	24	1	24	2	Figure 1.3, (a,b) Yellow color should be replaced by some better one too striking! [Lokesh Kumar Sahu, India]	Taken into account - Figure and caption have been redone. The colour is changed similar to the colour used in the TAR for a similar figure.
1-1275	1	24	3	24	4	for Troposphere, 2nd bullet: 'Cloud amount is changing,…' : ?does this refer to the tropics? If it is meant globally: Is there a reliable data set to derive this finding from? [Helga Nitsche, Germany]	Taken into account - The sentence is rephrased and consistent with Chapter 2.
1-1276	1	24	3			fig. 1.3b says: "Oceans are becoming more acidic…", which implies they are currently acidic (not true). This is like saying someone with no debt, whose bank account reduced from $1200 to $1000, is going deeper into debt. [Stephen Gaalema, USA]	Taken into account - Figure and caption have been redone. Sentence has been revised to handle this concern.
1-1277	1	24	6	24	6	figure 1.3 must be has three separte coloumns [PROF. YEHIA HAFEZ, Egypt]	Taken into account - Figure and caption have been redone
1-1278	1	24	6	24	7	Another exercise which ignores the main influences on temperature at the surface which are convection, turbulence, land forms, air and ocean curculatioin [VINCENT GRAY, NEW ZEALAND]	Rejected - This figure is not intended to show processes, just key indicators of change.
1-1279	1	24		24		Can no information be added to the empty "ice"-part of Figure 1.3b? [Tor Eldevik, Norway]	Taken into account - Figure and caption have been redone
1-1280	1	24		24		Figure 3.a: spelling issue habe -> have [Gillles Molinié, France]	Taken into account - Figure and caption have been redone
1-1281	1	24				Figure 1.3: Way, way too much text. This needs to be combined into one figure, instead of copying the first figure and sticking more text into it. The separation between temperature and hydrology seems arbitrary (shifting birds species and timing of greening is mentioned- theres no reason to not include all the indicators in one figure). As it stands, as two figures, its too hard to read and/or replicate. The "bullet" points need to be actual bullet points- very short blurbs that give you the gist. [Allison Crimmins, United States]	Taken into account - Figure and caption have been redone

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1-1282	1	24				I have to say, I found this figure difficult: too much written in a small type face. And with maybe mistakes in that new figure? I'm fussy again: Part a), in tropopause: - the 3rd"»": "... jet stream toward pole..." Somehow, what went to the press was not a displacement of the jet stream (that I don't discuss) but a weakening of polar jet. The weakening explains the cold spells and snowmageddon which is still present in the mind of lay readers. Following the lay press (New Scientist), I found those 3 publications on that subject: Science, 4 November 2011; Vol. 334 no. 6056 pp. 655-659 Tellus A; Volume 62, Issue 1, pages 1–9, January 2010 Geophysical Research Letters, VOL. 38, L17701, 6 PP., 201 [Francois DANIS, France]	Taken into account - Figure and caption have been redone
1-1283	1	24				Part a), near surface, Land, 7th "»": "Decline of vertebrate population". Probably not the right place to put that point as climate change skeptics would argue that you cannot prove the decline is due to climate change... hunting, overfishing leading to less food, etc. may explain the decline? Better leave that question to WGII? [Francois DANIS, France]	Taken into account - The figure has been revised.
1-1284	1	24				Part a), near surface, Ice: Additional point: Species mixing between Pacific and Atlantic via north of Canada as shown in "Frozen Planet" of Attenborough BBC 2011? I believe a pacific species of whale has been found in Mediterranean sea but can't find the reference. Part b), near surface, 2nd"»": stronger polar vortices...". Same comment as Part a), tropopause, the 3rd"»". [Francois DANIS, France]	Taken into account - That's rather an issue for WG II.
1-1285	1	24				And there are many abbreviations which haven't been introduced yet: LLGHG, SST, MSL, ENSO. [Francois DANIS, France]	Taken into account - These abbreviations have been deleted. Suggest to include them in the glossary.
1-1286	1	24				Figure 1.3: I like the figure as summary figure, but shouldn't something like this be in chapter 2 with likelihoods emerging from that chapter? Sitting in ch1, this figure might be difficult to synchronize with the chapter 2 and chapter 10 findings - chapter 10 has an overview table about attributable changes. NOt having likelihood qualifyers might make the findings sound more certain than they are [Gabi Hegerl, UK]	Taken into account - We make sure that other chapters see the figure to ensure compatibility.
1-1287	1	24				Figure 1.3: Are changes in human emissions "temperature indicators"? [Gareth S Jones, UK]	Taken into account - Figure and caption have been redone
1-1288	1	24				Figure 1.3: Radiative forcing is not a "temperature indicator" [Gareth S Jones, UK]	Accepted - The figure has been revised.
1-1289	1	24				Figure 1.3: regarding the Arctic temperatures bullet point. Do we have a good idea of the trend over the Arctic over the last 100 years? [Gareth S Jones, UK]	Taken into account - The sentence on Arctic temperatures has been deleted.
1-1290	1	24				figure typo..fig 1.3a under land (yellow shade), "bird species habe" - replace habe with have [Prasanth Meiyappan, USA]	Taken into account - The statement on birds is not in the updated version of the figure.
1-1291	1	24				Fig. 1.3: part a, l. 5/6: it is unclear why poleward displacements of jet streams are mentioned together with increases of CO2 concentration [Jucundus Prof. Dr. Jacobeit, Germany]	Rejected - That's one of the responses.
1-1292	1	24				Fig. 1.3: part b, l.1: tropospheric water vapour is increasing only over ocean areas, not in continental domains, see for example: Mieruch, S. et al. 2008.: Analysis of global water vapour trends from satellite measurements in the visible spectral range. Atmos. Chem. Phys. 8: 491–504. Wagner, T. et al. 2006: Global trends (1996–2003) of total column precipitable water observed by Global Ozone Monitoring Experiment (GOME) on ERS-2 and their relation to near-surface temperature. J. Geophys. Res. 111, D12102, doi:10.1029/2005JD006523 [Jucundus Prof. Dr. Jacobeit, Germany]	Taken into account - The figure has been revised. The reader is referred to Chapter 2 for more information. In their executive summary it says: "Observations from radiosonde, GPS, and satellite measurements indicate increases in tropospheric water vapour at large spatial scales, which are consistent with the observed increase in atmospheric temperature."
1-1293	1	24				Fig. 1.3: part b, l. 8/9: ocean salinity changes with opposite signs in different latitudes (increasing in subtropical latitudes, decreasing in subpolar latitudes) [Jucundus Prof. Dr. Jacobeit, Germany]	Accepted - That is included in "widespread changes". More information is given in Chapter 3.
1-1294	1	24				Fig. 1.3: part b, l. 14-16: changes in tropical cyclone activity in the North Atlantic should be specified more clearly: increases in intensity, whereas frequency varies in dependence of the Atlantic Multidecadal Oscillation [Jucundus Prof. Dr. Jacobeit, Germany]	Taken into account - the figure has been revised. Tropical cyclones are deleted.

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1-1295	1	24				Fig. 1.3, part b: Sahel drying has been prominent from the 1960s to the 1980s, but recent trends are much weaker and interrupted by some wet anomalies; trend maps of annual precipitation from the IPCC AR4 even show positive signs in this region for the period 1979-2005 [Jucundus Prof. Dr. Jacobeit, Germany]	Taken into account - The figure has been revised. The sentence on Sahel drying is replaced by a more general statement on precipitation changes.
1-1296	1	24				Please an appropriate caption for the figure 1.3 page 24. The length of IPCC figures are always too long as without reading the text are understandable . But for this figure it is not. You described in the caption, ….indicators showing that system is changing. It is very general statement that may be true for all times. But in the figures, you have described the climate change factor during recent decades and presenting some evidences relates to recent decades [Fatemeh Rahimzadeh, Iran, Islamic Republic of]	Accepted - The caption has been revised.
1-1297	1	24				Pg 1-6, Line 28 (Fig 1.3a): Comment: This Fig needs a few corrections and needs updating. Examples include: (a) On top of figure, delete Tropopause, replace with troposphere—because text below deals with Troposphere and not Tropopause; (2) Add to middle part of graphic under :Near Surface—Land): Habitat of plant species have changed—Ref., new USDA classification for N-America to guide agriculture and horticulture—published in the News Papers a week or two ago; (c) Convert some or many numbers from NN/Year to absolute numbers for the time period referenced—e.g., sea level rise from 1993 – 2003 is thus estimated at 3,1 x 20 = 62 mm. Similarly, add numbers in square kilometers to the shrinkage in Arctic ice since 1978; etc. Also: Pg 1-7, L: 12 – 14 (Fig. 1.3—again): Mentioned—updated from IPCC 2001. This update is not complete yet. Moreover, the Figure legend is highly inadequate and does not reflect the content of the figure. [Sushel Unninayar, USA]	Taken into account - Figure and caption have been redone
1-1298	1	24				Fig.1.3: under tropopause: shouldn't 'CO2 concentration has increased ..." be a separate bullet? [Elie Verleyen, Belgium]	Taken into account - Figure and caption have been redone
1-1299	1	24				Fig.1.3: should read mountain snowpack [Elie Verleyen, Belgium]	Taken into account - Figure and caption have been redone
1-1300	1	24				Fig.1.3: should read bird species ... have shifted [Elie Verleyen, Belgium]	Taken into account - Figure and caption have been redone
1-1301	1	24				Fig.1.3: space between Arctic and land [Elie Verleyen, Belgium]	Taken into account - Figure and caption have been redone
1-1302	1	24				Fig.1.3: space between snow cover duration [Elie Verleyen, Belgium]	Taken into account - Figure and caption have been redone
1-1303	1	24				Figure 1.3: A terrible figure! Should be replaced by a table. [Manfred Wendisch, Germany]	Taken into account - The figure has been revised. Now it reads more like a table.
1-1304	1	24				Figures general: Show uncertainty for observations. [Thomas Stocker/ WGI TSU, Switzerland]	Taken into account - Figure and caption have been redone. Adding uncertainty limits require input from all other chapters, so these have not been included at this point.
1-1305	1	24				Fig 1.3: Figure includes new AR5 observational results which should not be presented in chapter 1, but carefully assessed in the subsequent chapters. The figure should rather focus on indicators, mechanisms and processes. [Thomas Stocker/ WGI TSU, Switzerland]	Taken into account - We now point to the related chapters, but we would argue that discussing indicators also means given some sense of the trends.
1-1306	1	24				CO2 has increased by nearer 40% than 35% since the Industrial Revolution (which is already a strange Eurocentric term to use) [Eric Wolff, United Kingdom of Great Britain & Northern Ireland]	Taken into account - Figure and caption have been redone
1-1307	1	24				SST part - SSTs cannot spread to 700 m depth. You mean "Warming of the ocean extends to 700 m…" [Eric Wolff, United Kingdom of Great Britain & Northern Ireland]	Accepted - The figure is revised.
1-1308	1	24				This figure looks horrible I'm afraid, really hard to read [Eric Wolff, United Kingdom of Great Britain & Northern Ireland]	Taken into account - The figure has been revised. Larger fonts are used.
1-1309	1	25	1	1	1	Page 7: figure 1.4, 5, 6, 7, 8, 11 (page 25-29, 32): side line indicators need to clarify [Medani Bhandari, Nepal]	Taken into account - The figure captions will be

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
							revised.
1-1310	1	25	1	12	1	I don't like this figure (nor the equivalent in AR4). it fundamentally mixes up different issues. The individual dots obviously include interannual variability, while none of the projections shown do. The smooth is making assumptions about the end points that amount to a prediction of future events. Thus either include all the variability in the CMIP3/CMIP5 projections or only plot trend lines. [Gavin Schmidt, USA]	Taken into account - Figure and caption have been redone
1-1311	1	25	1	25	10	Figure 1.3b, "Cloud amount is changing but difficult to assess since changes are dominated by ENSO." This statement might be questionable, since cloud amount does not directly and/or chiefly related to ENSO for some parts of the globe. [Anmin Duan, China]	Taken into account- The figure has been revised.
1-1312	1	25	1	25	12	1) Note sure I like the reflected ends for smoothing: it means that an additional data point will change the last 6 years of the smooth. I'd prefer a 5-year moving average, or other method that leaves the last several years of the smooth blank. 2) If observed temps are relative to 1961 to 1990, shouldn't the temperature projections also be relative to that time period rather than pinned to 1990? [Marcus Sarofim, USA]	Taken into account - Figure and caption have been redone
1-1313	1	25	1			"temperature" should be "surface temperature". Projections for AR4 should start around 2005 rather than in 1990 or should be called differently. [Olivier Boucher, France]	Taken into account - Figure and caption have been redone
1-1314	1	25	1			In fig1.4, the alignment of the starting point of AR4 estimate with observed data appears unreasonable (apparently because of aligning to over-smoothed observed), making the fit from 1990 to 1997 very poor. Proper alignment will call into question the statement about 2006 to 2010 observed being in the middle of the predicted range. The alignment is done properly in fig. 9.10 [Stephen Gaalema, USA]	Taken into account - Figure and caption have been redone
1-1315	1	25	4	25	4	figure 1.4 must replaced by another one with anomalies period relative to (1981-2010) [PROF. YEHIA HAFEZ, Egypt]	Rejected - We do not need to change the anomaly period.
1-1316	1	25	4	25	12	This shows how the IPCC projections always grossly exaggerate, are completely unreliable and should be ignored. Who will believe the current ones? [VINCENT GRAY, NEW ZEALAND]	Rejected - This comments was also given earlier in the discussion of text, and it was responded to there.
1-1317	1	25	10	25	10	If the shading doesn't represent uncertainty then what is it? [Marcel Crok, The Netherlands]	Taken into account - Figure and caption have been redone
1-1318	1	25	11			I don't understand what you mean by "the shading…do (sic) not represent uncertainty estimates". In the text (page 7, line 39), you say that they do account for different emisssions scenarios, so I am left uncertain what those envelopes do and don't include. You need to spell it out. [Eric Wolff, United Kingdom of Great Britain & Northern Ireland]	Taken into account - Figure and caption have been redone
1-1319	1	25		26		Figs 1.4 and 1.5, there is an abrupt cooling dip around 1992 in AR4 temperatures (from Mt Pinatubo erruption?). Is this alluded to? [Tor Eldevik, Norway]	Taken into account - This is discussed in the text. Yes, it is related to the eruption.
1-1320	1	25		29		Consider to include the projection space from AR5, the RCP scenarios in these figures. [Øyvind Christophersen, Norway]	Rejected - AR5 results are not to be included in Chapter 1.
1-1321	1	25		29		Figure 1.4-1.8: Grey background is distracting, legends are also large and distracting [Jeffrey Curtis, United States of America]	Taken into account - Figure and caption have been redone
1-1322	1	25		29		"Uncertainties in the observed... not shown". As an engineer, I guess that uncertainties on gas concentration are low and uncertainties on temperature anomalies are high. But a little comment may help lay readers. Suggestions: about the same/smaller than the size of the square for gases, about ... (±0.05°?) for the smoothed T° anomalies? [Francois DANIS, France]	Taken into account - Figure and caption have been redone
1-1323	1	25		29		Omit the box around the graphs. Could the variability of the annual global means of the measurements (temperature or gas concentrations) be quantified (some sigma standard deviation value)? That would allow to include a kind of vertical variability bar for each full square symbol. Why the full squares are connected by lines for the gas concentration plots, for the temperature there are no such connecting lines (which I find is more useful). [Manfred Wendisch, Germany]	Taken into account - Figure and caption have been redone
1-1324	1	25		32		For the figures with captions that indicate "Uncertainties in … are not shown," please indicate best estimates	Taken into account - The figure will be redrawn.

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						of the uncertainties using whiskers or similar symbols. [Eric Sundquist, United States of America]	Uncertainty estimates are included using error bars.
1-1325	1	25				Fig. 1.4 : The projection of recent smoothed temperatures strongly deviates from model projections. It is even more accentuated with the data point of 2011, here omitted. It would be fair to recognize and to admit that observations do no longer follow the model trends since 13 years, nearly a quarter of the period of 60-years sinusoid addressed in the introduction of this referee's report. [François GERVAIS, France]	Taken into account - Figure and caption have been redone.
1-1326	1	25				Figure 1.4: I am sorry if I sound like a broken record, but that figure needs the internal variability plotted in. Otherwise it looks like particularly the first few years fall off the plumes, but we know they don't! it would be quite easy - just estimate the internal variability in trends over 1-25 years in global mean temperature from a reasonable model's control simulation, and lay it below the present uncertainty, shaded slightly differently to distinghish it - the result would be an additional uncertainty thats huge for the early trends and then drops sharply. Assuming that the plumes now shown reflect only modelling uncertainty (eg sensitivity) not internal variability - but as shown its got to be that since otherwise they wouldnt start in a point in 1990! Rowan Sutton or his colleague Ed Hawkins wrote papers about these uncertainties and may be able to provide these estimates easy. I am fine not including observational uncertainty as thats comparatively small (if you want to you could just plot 2 obs datasets). Also, what exactly are the projections showing - the 'likely' ranges from AR4 that are probabilistic, or the model based ranges? [Gabi Hegerl, UK]	Taken into account - Figure and caption have been redone. We are considering how to account for natural variability.
1-1327	1	25				Figure 1.4 This figure is extremely misleading for a number of reasons - most important of which is that it will be mis-interpretated to suggest that past model projections are inconsistent with the observations (others have used almost identical figures to make such incorrect claims). The figure should be either removed or completely re-designed. [Gareth S Jones, UK]	Taken into account - Figure and caption have been redone. This figure is base don a similar figure that appeared din AR4.
1-1328	1	25				figure 1.4: The upper limit of the FAR projection is much larger than displayed in the similar figure in AR4 (IPCC 2007 WG1 Fig 1.1). Was the FAR figure incorrect or has an error appeared here? [Gareth S Jones, UK]	Taken into account - Figure and caption have been redone.
1-1329	1	25				figure 1.4: The observations are given relative to their 1961-1990 mean. However the FAR, SAR and TAR projections all start at the same place in 1990 equal to the smoothed observations point. Without any explanation this makes no sense. The AR4 annual values also have a range around the 1990 smoothed observational point - there is no explanation why its a range here whilst the FAR, SAR and TAR values are at a point. The observations and model data should all be treated the same. [Gareth S Jones, UK]	Taken into account - Figure and caption have been redone.
1-1330	1	25				figure 1.4: The use of a smoothing filter on the observations that has serious end effects is misleading especially when compared to other data that is smoothed differently and do not have the same boundary constraints. See Mann GRL 2008, doi:10.1029/2008GL034716 for discussion. [Gareth S Jones, UK]	Taken into account - Figure and caption have been redone.
1-1331	1	25				figure 1.4: The caption says the model projections are shown as ranges of "global annual temperature change", but the lines are so straight for FAR, SAR and TAR that they must represent long term trends of some kind. Nowhere is this explained. [Gareth S Jones, UK]	Taken into account - Model results for this period are rather straight from the projections. Figure and caption have been redone.
1-1332	1	25				figure 1.4: The AR4 range only has interannual variations following the 1991 mt pinatubo eruption (with no internal climate variabiltiy), but is compared with annual observations (which will have internal climate variability) and a smoothed observations. This is like comparing apples with oranges. At the very least the smoothing done to the observations should be done to the AR4 (ideally with a less biased method) as well. [Gareth S Jones, UK]	Taken into account - Figure and caption have been redone
1-1333	1	25				figure 1.4: For the figure to make any sense the all data from models and observations should have same reference period and be smoothed in same way, with the internal climate variability also accounted for in the model projections. Otherwise without comparing like with like it is unlikely if any conclusions can be deduced from the figure. [Gareth S Jones, UK]	Taken into account - Figure and caption have been redone
1-1334	1	25				Fig. 1.4 (refers also to Figs. 1.6, 1.7, 1.8, 1.11): why are projections from AR5 not included in these comparisons? This would be interesting especially with respect to the largest model projected range [Jucundus Prof. Dr. Jacobeit, Germany]	Rejected - AR5 results are not to be included in Chapter 1 because this chapter comes before the findings are discussed in the later chapters.
1-1335	1	25				Pg 1-7, L: 29 – 46 (Section 1.3.1 and Fig 1.4): Comment: (a) The figure does not show AR5 results—why? The whole discussion is about AR4?; (2) The observed T change, smoothed by a 13-point binomial filter	Rejected - AR5 results are not to be included in Chapter 1 because this chapter comes before the

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						seems to show that the T change from about 2003 or 2004 is essentially flat? This needs to be explained more carefully in some manner. [Sushel Unninayar, USA]	findings are discussed in the later chapters.
1-1336	1	25				Fig 1.4 forward: For all these figures, there should be a separation of scenarios used in AR4. The AR4 purposely did not provide a combined scenario range to highlight the differences in the uncertainties. Fig 1.5 restrict to the 3 SRES scenarios (A1B, A2, B1) for which results from GCMs were available at the time of AR4. Mark date of assessment reports on the time axis. [Thomas Stocker/ WGI TSU, Switzerland]	Taken into account - That is the basis for also including Figure 1.5.
1-1337	1	26	1	26	8	As with figure 1.4. Either include all the variability in the CMIP3/CMIP5 projections or only plot trend lines [Gavin Schmidt, USA]	Taken into account - Figure and caption have been redone
1-1338	1	26	1			In fig1.5, the alignment of the starting point of AR4 estimate with observed data als appears unreasonable, making the fit from 1990 to 1997 very poor. The AR4 simulations should be aligned to the observed data known at the time the simulations were done. [Stephen Gaalema, USA]	Taken into account - Figure and caption have been redone
1-1339	1	26	4	26	4	figure 1.5 must replaced by another one with anomalies period relative to (1981-2010) [PROF. YEHIA HAFEZ, Egypt]	Rejected
1-1340	1	26	4	26	7	Not quite as bad as the last but it looks like it is going to run off the scale in 2012 [VINCENT GRAY, NEW ZEALAND]	Rejected - Already responded to earlier in the text. Nonetheless interesting that the reviewer is predicting the globally-averaged temperatures in 2012 by early February.
1-1341	1	26	5			for clarity, what about writing A1T, A1B and A1FI beside high, low and mid range. [Francois DANIS, France]	Taken into account - Figure and caption have been redone
1-1342	1	26				Fig. 1.5 : Same as remark to Fig. 1.4 (1 25). [François GERVAIS, France]	Taken into account - Figure and caption have been redone
1-1343	1	26				figure 1.5: For the figure to make any sense the data from models and observations should have same reference period and be smoothed in same way, with the internal climate variability also accounted for in the model projections. Otherwise without comparing like with like it is unlikely if any conclusions can be deduced from the figure. What does the shading represent? It would be much better to use the model output from figure 10.5 (IPCC 07) than figure 10.26 to compare climate changes over just 25 years enabling a more fair comparison [Gareth S Jones, UK]	Taken into account - Figure and caption have been redone
1-1344	1	26				Pg 1-7, L: 48 – 52 (Fig 1.5): Unless I am missing something here, why is the discussion about AR4 model analyses….etc. Isn't this supposed to be about AR5 models and analyses? [Sushel Unninayar, USA]	Rejected - Chapter 1 gives the historical overview. It does not include AR5 findings.
1-1345	1	27	1	27	2	Observational co2 chart should be updated with values for 2011 and now 2012. [Michael Mann, USA]	Accepted - The figure is being update das new data is available.
1-1346	1	27	1	27	2	Typo/grammatical errors in table, e.g. SREX Summer Drying observed: "some regiona" and "but some opposite trend exist" [Michael Mann, USA]	Taken into account - Wrong page. Figure 1.3 has been redone.
1-1347	1	27	1	27	2	"low confidence" for observed "intense tropical cyclone activity increases" is indefensible. Prominent peer-reviewed literature argues for medium-to-high confidence. See e.g: Elsner, J. B., J. P. Kossin, and T. H. Jagger, 2008: The increasing intensity of the strongest tropical cyclones. Nature, 455, 92-95. A reading of chapter 2, on which this is based, suggests a deficient review of this area of the science, with too much emphasis placed on the one group (GFDL and their direct collaborators), and only lip service paid to work of other experts such as Elsner, Kossin, Emanuel, and Holland. [Michael Mann, USA]	Taken into account - Wrong page. Figure 1.3 has been redone.
1-1348	1	27	1	27	2	"medium confidence" for predicted "intense tropical cyclone activity increases" is not defensible. Work by leading experts in the field such as Emanuel and Holland directly contradicts this, suggesting instead high level of confidence in the conclusion. [Michael Mann, USA]	Taken into account - Wrong page. Figure 1.3 has been redone.
1-1349	1	27	4	27	8	The extreme projections are always wrong, but the measurements do not include land surfaces [VINCENT GRAY, NEW ZEALAND]	Rejected - Comment is opinion that does not affect the figure.

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1-1350	1	27	4			“Estimated observed...” Sound strange. Why not Estimation from observation .... of CO2/methane? [Francois DANIS, France]	Taken into account - Figure and caption have been redone
1-1351	1	27		29		Figure 1.6-1.8: Possibly remind the reader that the bars on the side are not error bars similar to how the reader was told this for Figure 1.4 and actually the extent of the range of the scenarios. [Jeffrey Curtis, United States of America]	Taken into account - Figure and caption have been redone
1-1352	1	28	1	29	1	fig. 1.7 and 1.8 starting points to observed seem mis-aligned. [Stephen Gaalema, USA]	Taken into account - Figure and caption have been redone
1-1353	1	28	4	28	5	same remark as page 27 [Francois DANIS, France]	Taken into account - Figure and caption have been redone
1-1354	1	28	4	28	8	Further evidence that IPCC projections are completely useless. How long can it continue? [VINCENT GRAY, NEW ZEALAND]	Rejected - comment is opinion that does not affect the figure.
1-1355	1	29	4	29	8	Further evidence that extreme projections are always wrong. [VINCENT GRAY, NEW ZEALAND]	Rejected - comment is opinion that does not affect the figure.
1-1356	1	30	1	30	1	Figure 1.12: It's unclear why panel c) should be expressed as a chance (less chance for cold weather) while panels a) and b) simply note more or less cold weather. [Susan Anenberg, USA]	Taken into account - Wrong figure, but nonetheless Figure and caption have been redone.
1-1357	1	30	4	30	6	Illustrates the IPCC obsession with the Gaussian distribution, which is not appropriate here, and hardly ever is. [VINCENT GRAY, NEW ZEALAND]	Rejected - This graphic is intended to make a point. The use of a Gaussian distribution is indeed only an approximation of many important climate variable datasets.
1-1358	1	30		31		Very poor technical quality of the two figures 1.9 and 1.10. [Manfred Wendisch, Germany]	Taken into account - Figure and caption have been redone
1-1359	1	30				Figure 1.9 c: "Less change for cold weahter": should it really be "change" or rather "chance"? [Olaf Eisen, Germany]	Taken into account - The figure has been replaced by a new Figure.
1-1360	1	30				Figure 1.9. I do not think Figure 1.9 is necessary to understand the text or adds anything relevant. Some space could be spared by eliiminating it. [Belén Martín Míguez, Spain]	Taken into account - The figure has been replaced by a new Figure.
1-1361	1	30				Fig 1.9: For consistency and continuity, you might consider to use the same figure as published in the recent SREX SPM - we suggest using the term "extreme' rather than 'record' for describing the tails, given that 'extreme events' are picked up in the contents of many subsequent chapters. [Thomas Stocker/ WGI TSU, Switzerland]	Taken into account - The figure has been replaced by a new Figure.
1-1362	1	31	1	31	5	The phenomena need a little more explanation: e.g. what does “more intense precipitation events” mean? Greater frequency of intense precipitation events or increased intensity of precipitation events? [Martin Juckes, UK]	Rejected - We use the same wording as the extreme tables in the past assessment reports.
1-1363	1	31	1	31	5	If there is not space to explain the terminology, the key message should be summarised. [Martin Juckes, UK]	Rejected - We use the same wording as the extreme tables in the past assessment reports.
1-1364	1	31	2	31	6	The table makes no mention of fire - a major feedback associated with droughts and heat waves. [Andrew Glikson, Australia]	Rejected - Fire has not been mentioned in the past assessment's extreme tables.
1-1365	1	31	4	31	5	Biased opinions from people wih a conflict of interest, since they are paid to do so. [VINCENT GRAY, NEW ZEALAND]	Rejected - Review comment is pure opinion with no basis. IPCC does not pay the scientists providing their expertise to the assessment at all.
1-1366	1	31				The "higher minimum temperatures virtually certain in nearly all land areas" is bothersome to me, I don't like the "nearly". As the North polar jet stream is weaker, the cold from the polar region may come down to mid latitude therefore, somewhere in time on that figure, I expect the minimum temperature to decrease before increasing (see also comment of page 1-24 with references). I recognize that that effect is quite local (between about 50 and 60°N)... but it covers a land area large enough to contradict your "nearly all land areas". To me,	Rejected - This is information from previous "extreme tables"

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						nearly means 95%... you may change your “nearly” by a number; 80%? [Francois DANIS, France]	
1-1367	1	31				Some of the projections of previous reports are contradicted by the above remarks regarding observations : 1 10 12, 1 25, 1 26. [François GERVAIS, France]	Rejected - We don't understand the comment.
1-1368	1	31				The table is I think hoodwinking a bit = not in all cases have confidences increased, eg not for the tropical cyclones! (eg the information in the detection and attribution column on tcs in the extremes tables is now less confident, which is not included in this figure) - I think it is important to stress that sometimes if you have more information you become more cautious [Gabi Hegerl, UK]	Taken into account - Figure actually agrees with the example reviewer makes. Text has been revised to account for the differences between AR4 and SREX confidence levels.
1-1369	1	31				Fig 1.10 Have the confidence terms, "likely" etc, been defined yet? They should be defined near where first used. [Gareth S Jones, UK]	Taken into account - Confidence level discussion is section 1.4. Caption now refers to that section.
1-1370	1	31				Figure1.10 is very useful. Is it possible to draw such table for the other climatic factor? Page 31 [Fatemeh Rahimzadeh, Iran, Islamic Republic of]	Rejected - Figure is limited to available info on extreme events.
1-1371	1	31				Fig.1.10: should read some regions in 7th row and 4th column of table [Elie Verleyen, Belgium]	Accepted - text revised
1-1372	1	31				Fig 1.10: There is a large risk with this table that likelihood statements are inappropriately generalized from their original context. This is notable for the SREX entries, where caveats such as 'in some seasons and areas' are missing. In several instances, a direct comparison between the assessments is not appropriate without these additional caveats. As a solution, we suggest to make the entries in the first column more general, and then provide the mores specific details in the entry for each assessment to avoid this risk of generalization. [Thomas Stocker/ WGI TSU, Switzerland]	Taken into account - Figure and caption have been redone. Text is also revised to account for this issue.
1-1373	1	32	4	32	6	The key in the figure has the opposite colours to what is mentioned in the caption for the observations. [Gareth S Jones, UK]	Taken into account - Figure has been revised.
1-1374	1	32	4	32	10	Again the extreme projections are wrong, but also the tide gauge measurement changes are exaggerated, as modern measurements show small or negliginle changes [VINCENT GRAY, NEW ZEALAND]	Rejected - As seen in the figure, there is good agreement between altimeter and tidal gauge instruments. As discussed in Chapter 3, sea level does have to account for land height changes.
1-1375	1	32				Figure 1.11: X axis label says Years instead of Year [Jeffrey Curtis, United States of America]	Accepted - Axis label revised.
1-1376	1	32				Figure 1.11. Inconsistency between figure and caption re observations (red vs. black). I suggest showing only the satellite data in this figure. These are better constrained and the difference between satellite and tide gauge data raises questions and is a distraction from the main point. [Donald Forbes, Canada]	Taken into account - Both observations are shown as an indication of uncertainties.
1-1377	1	32				Its an excellent idea to show the sea level projections. However, the uncertainties are different in nature from those in the surface temperature figure - at least for AR4 you compare a probabilistic projection for temperature with a model-only based estimate that the SPM table highlights as missing key processes that would increase uncertainties. So I would think very carefully about how to present uncertainties, and make sure the caption is explicit about it. Again, I think these are excellent, important figures which is why its important to get them right [Gabi Hegerl, UK]	Taken into account - We agree, but these uncertainties are difficult to represent.
1-1378	1	32				Fig 1.11 It is not a helpful comparison showing long term trends, centred at 1990, compared with observed annual values. [Gareth S Jones, UK]	Rejected - The intent here is to provide a comparison with projections starting with a common point.
1-1379	1	32				Fig 1.11: Near term evolution of Sea Level were not provided in the AR4. Would be more accurate to refer to this projection as 'Church et al. 2011 based on CMIP3 available at the time of AR4'. [Thomas Stocker/ WGI TSU, Switzerland]	Taken into account - Figure and caption have been redone. We also add citation to Church et al. (2011) figure showing results based on AR4.
1-1380	1	33	1	33	1	Fig. 1.12: the colour odes of the satellites are very difficult to read. e.g. it seems that Envisat contributed since 1996, which is not true. [Rolf Mueller, Germany]	Taken into account - Figure and caption have been redone
1-1381	1	33	4	33	4	I am sure that figure 1.10 will change when using 1981-2010 instead of 1961-1990 [PROF. YEHIA HAFEZ, Egypt]	Rejected - The reference period will not be changed. It will not influence the results.

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1-1382	1	33				Fig 1.12: Consider to show quantitative analyses of monitored climate parameters instead of instrumentation/satellite products. [Thomas Stocker/ WGI TSU, Switzerland]	Taken into account - Figure is being redone.
1-1383	1	34	1	34	1	Figure 1.13 is confusing. The circularity gives the impression that model development proceeds in a cycle according to the noted processes. In reality, all physical process modules are continually improved upon. It's also unclear what the "Degree of sophistication" spoke is intended to convey. [Susan Anenberg, USA]	Taken into account - Figure and caption have been redone
1-1384	1	34	1	34	2	Figure 1.13: Green-yellowish wing is not described if it is “present day” then should be written along. [Lokesh Kumar Sahu, India]	Taken into account - Figure and caption have been redone
1-1385	1	34	1	34	2	Figure 1.13 is at best hucksterism and has no place in a scientific assessment. [Stephen E Schwartz, USA]	Taken into account - Figure and caption have been redone
1-1386	1	34	1	34	7	Not at all sure that this figure adds anything useful. [Gavin Schmidt, USA]	Taken into account - Figure and caption have been redone
1-1387	1	34	2			Fig. 1.13: I don't see the reason why this time developement shoud be arranged in such wheel shaped form. This merely confuses the reader. Fig. 1.2. in AR4 was much easier to read and had an educational value. I would prefer to see this in a more traditional form. [Reto Knutti, Switzerland]	Taken into account - Figure and caption have been redone
1-1388	1	34	4	34	7	It will never work by ignoring the real climate outside "the greenhouse" you have invented. [VINCENT GRAY, NEW ZEALAND]	Rejected - The comment is an opinion with no connection to the figure. The greenhouse effect is observed. Observations are fully considered.
1-1389	1	34	4			"... how ..." I would argue that the figure doesn't show "how" but just the different components which are coupled into the models. [Francois DANIS, France]	Taken into account - Figure and caption have been redone
1-1390	1	34	5	34	7	As this chapter is an introduction, you should explain what "T21L9" and "T95L95" are. [Gareth S Jones, UK]	Taken into account - Figure and caption have been redone
1-1391	1	34	6			In the text, what about giving also the increase of resolution in altitude? [Francois DANIS, France]	Taken into account - Figure and caption have been redone
1-1392	1	34	7			"experiments"... simulations? [Francois DANIS, France]	Taken into account - Figure and caption have been redone
1-1393	1	34	7			please explain in the text the relevance of three independent experiments, what is meant by experiment? [Elie Verleyen, Belgium]	Taken into account - Figure and caption have been redone
1-1394	1	34				This figure do not pay full justice to the model development that has taken place since the 1970s. Propose that you include a figure that elaborates more the progress made. If the figure is not completely changed, it is necessary as a minimum to make it understandable why there is an empty fan. "degree of sophistication" does in our view not say much. [Øyvind Christophersen, Norway]	Taken into account - Figure and caption have been redone
1-1395	1	34				Figure 1.13: This "figure" actually made me laugh outloud. It's atrocious! What does it even mean? How does it "show how different components are coupled into comprehensive climate models"? It doesn't. How does is show that resolution has increased? It doesn't. Its like a rainbow pinwheel of misspelled random thoughts swirling into South America or something. This figure adds absolutely no value to this product (except for the laugh). I'm not sure why one of the pinwheels is empty and one says "degree of sophistication". The other pinwheel arms don't say what degree of sophistication we're discussing, but only names of components. I'm not sure why the time labels around the exterior are inconsistent and oddly spaced. Why is this in a pinwheel shape at all- what is that supposed to symbolize? This is a horribly embarassing image. I would strongly suggest removing this figure. If there is some desire to have an image depicting changes in modeling capabilities, I would suggest a good old-fashioned timeline. [Allison Crimmins, United States]	Taken into account - Figure and caption have been redone
1-1396	1	34				Fig. 1.13: the caption specifies the increase in horizontal resolution, but not the increase in vertical resolution [Jucundus Prof. Dr. Jacobeit, Germany]	Taken into account - Figure and caption have been redone
1-1397	1	34				Figure 1.13 is not scientific figure. it is same commercial figures. [Fatemeh Rahimzadeh, Iran, Islamic	Taken into account - Figure and caption have been

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						Republic of]	redone
1-1398	1	34				Figure 1-13: This appears to be a new version. While I applaud the creativity, it does not relate as much information as clearly (to me) as the older version having a straight time line. Its not clear - is there a significance to the starting point of each "rotor" with respect to the time in years? [Anji Seth, United States of America]	Taken into account - Figure and caption have been redone
1-1399	1	34				Figure 1.13: Aren't "Aerosoles" a kind of shoe? Should be "Non-Sulphate Aerosols". [Drew Shindell, USA]	Taken into account - Figure and caption have been redone
1-1400	1	34				(Section 1.5.2: Capabilities in Modeling, and Fig 1.13): This is not too great a figure. Perhaps it needs to be re-done. As it stands, it does not have too much meaning. The Figure legend also seems to be obsolete? Update, perhaps. [Sushel Unninayar, USA]	Taken into account - Figure and caption have been redone
1-1401	1	34				Fig 1.13: Not clear what the circular nature of this figure is meant to imply. We much preferred the version given in the ZOD (ZOD fig 1.10), which provided a clear horizontal timeline of model development, and was a useful update to the earlier figure provided in the Third Assessment Report. (2001, Technical Summary, p. 48). [Thomas Stocker/ WGI TSU, Switzerland]	Taken into account - Figure and caption have been redone
1-1402	1	35	6	35	10	To me, the last sentence is clear and should be enough without the 2 first sentences. [Francois DANIS, France]	Taken into account - Caption has been revised.
1-1403	1	35				Figure 1.14 The matter of improved resolution is very basic and does not require of Figure 1.14 to be understood. I suggest to eliminate it. [Belén Martín Míguez, Spain]	Rejected - This figure is aimed at showing the direction where modelling is going.
1-1404	1	35				Fig 1.14: We would favour an updated version of AR4 Fig 1.4, which shows the clear emergence of islands and other complex topography as the resolution increases. [Thomas Stocker/ WGI TSU, Switzerland]	Accepted - We introduce a new figure with more complex topography and islands.
1-1405	1	36	1	36	5	What does color denote, and provide color scale bar. Also provide vertical scale bar, and while you are at it, horizontal. [Stephen E Schwartz, USA]	Rejected - No colour bar is needed for the purpose of this figure.
1-1406	1	36	1			and throughout the document: May I suggest that whenever there are simple point or line data in a figure, that there be a web site with the numerical data available for further analysis by the scientific community. Surely in this age in which data storage is cheap (as evidenced by the size of the graphics files for the color figures in this report) a few hundred kb for ascii files of data such as these would not be a burden on the IPCC. [Stephen E Schwartz, USA]	Taken into account - TSU stated that this be fine but a not a high priority for the authors.
1-1407	1	36	4	36	4	I hope that figure 1.15 will be (1950-2050) only not for 2100 to avoid the unceretainty [PROF. YEHIA HAFEZ, Egypt]	Taken into account - Figure and caption have been redone
1-1408	1	36	4	36	9	If the RCP scenarios (Meinshausen et al 2011) are a key basis for modeling predictions (see note 9) then their development should be described in more detail in the introduction. For instance, they incorporate feedbacks to atmospheric composition via processes described in 1.2.2, 1.3.2, 1.4.2, 1.5.1, 1.5.2, FAQ 1.1 (climate sensitivity). [Michael Neil Evans, United States of America]	Taken into account - Figure and caption have been redone. Also special box added on the scenarios to provide more detail.
1-1409	1	36	5	36	5	There is no need for "CO2 equivalent" if the unit is Wm-2. Just say "total forcing". [Olivier Boucher, France]	Taken into account - Text has been revised.
1-1410	1	36				I'm happy to see that scenario RCP3p; a bit of faith in politics and common sense and a bit of hope. Unfortunately, I couldn't find it in the annex II. So I carry on with that scenario. I was happy to see it because scenario RCP3p seems to correlate well with world3 model of the 80's... (see “The limits to growth”, D.H. Meadows et al., Universe books, 1972 and also NewScientist issue page ...). If it's the case, I'm glad to see that IPCC is also using this model (recession from 2030 because of lack of understanding of climate change by politicians; if you interpret the book with 2012 knowledge). [Francois DANIS, France]	Noted - No action is needed to this comment.
1-1411	1	36				I believe world3 model is very relevant to your work as the lack of response from government has been predicted as well as the climate change and even if the book is not a peer review work, it may add some weight to your work on political ground. And critics cannot denounce it because after 40 years, we are still very much on the predicted path. In a way, it's the most optimistic prediction, and you need scenarios anyway, so why not that one because it integrates many variables, more than just business as usual, etc. [Francois	Noted - No action is needed to this comment.

Comment No	Chapter	From Page	From Line	To Page	To Line	Comment	Response
						DANIS, France]	
1-1412	1	36				Figure1.15 legends are not right. Eg RCP 8.5 is written as RCP 85 [Prasanth Meiyappan, USA]	Accepted - Text has been revised.
1-1413	1	36				Figure 1.15: I don't understand what is meant by 'RCP emissions scenarios assessed here including uncertainties in natural emission and atmospheric residence time". There are no uncertainty ranges shown in this plot. The MAGICC modeling in Meinshausen et al may make some assumptions about natural emissions and atmospheric residence times, but if you're showing one set of RCP forcings then it's based on the particular assumptions used, not their uncertainties. [Drew Shindell, USA]	Accepted - Figure has been redone and text has been added
1-1414	1	36				Fig 1.15: The figure currently lacks any indication of uncertainty. More detail is required in the caption regarding what is shown (which models etc). [Thomas Stocker/ WGI TSU, Switzerland]	Accepted - Figure has been redone and text has been added
1-1415	1	37	1	37	6	Revise this figure to show an example of a bias correction; e.g. as possibly evident in fig 1.11 from FAR to SAR to TAR to AR4. [Michael Neil Evans, United States of America]	Taken into account - Figure is intended to show crudely the differences between the scenarios. A Box has been added to further describe the scenarios.
1-1416	1	37	2			FAQ 1.1 Fig. 1: I suggest to use only one type of font, no italics for "time", and less pronounced curly brackets to simplify the figure. [Reto Knutti, Switzerland]	Taken into account - Figure has been redone
1-1417	1	37	4	37	4	The additional identification of process may not be sudden. Hence the narrowing cylinder may have a rapid expansion near the lines of "additional …" [Sharad K Jain, India]	Taken into account - Figure has been redone
1-1418	1	37	4	37	6	Just kidding yourselves [VINCENT GRAY, NEW ZEALAND]	Noted - Nothing in the statement to respond to.
1-1419	1	37		37		FAQ 1.1 Figure 1 may appear very simple, but its message on uncertainties wrt process understanding appears far from intutive to this reviewer. [Tor Eldevik, Norway]	Taken into account - Figure has been redone
1-1420	1	37				Faq1.1 fig 1 I am afraid I did not understand this figure. [Gareth S Jones, UK]	Taken into account - Figure has been redone
1-1421	1	37				Figure FAQ 1.1 This Figure does not seem helpful or illustrative to me. To me it comes more as a distraction, the concept is clear enough in the text. I suggest to eliminate it. [Belén Martín Míguez, Spain]	Taken into account - Figure has been redone
1-1422	1	73	3	73	25	This nicely written section is redundant from that of Chap 14, p21/22 [Eric Guilyardi, France]	Noted - This comment does not relate to Chapter 1
1-1423	1	105	2	105	6	Figure 15.19 a) 18O values of Northgrip ice on the Y axis should be minus (-) values (as 18O/16O values decrease with lower temprature in the ice). [Andrew Glikson, Australia]	Noted - This comment is not related to Chapter 1