WORKING GROUP I CONTRIBUTION TO THE IPCC FIFTH ASSESSMENT REPORT CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS

Reports of the Review Editors
Compilation

Note added by IPCC Working Group I Technical Support Unit (30 January 2014):
In accordance with the IPCC Procedures, the WGI AR5 Review Editors submitted their written reports to the WGI Co-Chairs prior to the 12th Session of Working Group I. Upon request of the delegates, these reports were distributed to the participants at WGI-12 and a compiled document was made available on the meeting participant website. The Review Editors' reports compiled here are those distributed to the participants at WGI-12, except that the personal names of individuals not connected with IPCC WGI AR5 have been redacted and signatures have been removed for data protection reasons.

The role of the Review Editors in an IPCC assessment is to ensure that all substantive comments received during the review of the First Order and Second Order Drafts are given appropriate consideration by the author teams and to ensure that diversity in perspectives in the literature is reflected adequately in the report. The Review Editors' reports are provided to the Panel through the Working Group Co-Chairs to document this process. They are thus part of the quality control of the review process of the assessment. They are not intended to be additional reviews of the content of the drafts of the assessment report.

Dear IPCC WGI TSU,

I read through the Ch.1 of the Final Draft (7 June,2013) .My impression and judgement is that this new draft of Ch.1 is a well revised version , with nearly all the comments and suggestions carefully considered. It meets the requirements targeted by the IPCC AR5/WG I Co-Chairs and its bureau. I have not had any major questions and suggestions. One recently merged question is the decreasing or flattening global warming during the recent decade. Although in subsections of 1.2.2 and 1.3.1 this problem is appropriately illustrated, the explanation is rather implicit or indirect. A clearer or explicit interpretation should be given. This problem is of great concern for policymakers the public and mass media. Scientifically, we should tell them what natural variability (e. g. ocean) is now working to reduce the global warming trend.

Reviewer Editor, Ding Yihui
[signature removed]

July 1, 2013

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: Linda O. Mearns, National Center for Atmospheric Research, Boulder CO USA

Final Report from Review Editor of IPCC WGI AR5 Chapter 1 Introduction

I participated in the 3rd and 4th Lead Authors' Meetings and observed the process among the CLAs and LAs of the chapter in considering the review comments on the first and second order drafts. I focus my evaluation here on the comments on the second order draft, the authors' responses to the comments, and the changes made in the chapter from the second order draft to the final draft.

There were no main areas of concern for the chapter beyond that of how to sensibly compare the global average temperature changes presented across the different IPCC ARs (as presented in Figure 1.4) when each report considered simulations based on different forcings. This difficulty was thoroughly addressed in a side meeting during the 4th LAM. The figure, figure caption, and discussion in the text now carefully describes the differences in how the global average temperature changes were calculated in each report.

All substantive reviewer comments were discussed thoroughly at the 4th LAM among the CLAs and LAs. Key comments of overarching importance to the whole chapter were discussed in detail in the chapter meetings, and responses crafted as a group. The final responses to the substantive questions were well crafted and the appropriate changes made in the final draft of the chapter.

Of particular importance were the responses to the many comments about the FAQ, which is a critical question regarding the relationship between increased scientific understanding and reducing uncertainty. The FAQ was very carefully revised after the SOD to address all the reviewer comments. It now reads very well.

Signature:

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Full Name: Linda O. Mearns Date: August 4, 2013

IPCC Review Editor Report, chapter 1, by Peter Wadhams

I have read through Chapter 1 of the Final Draft (7 June 2013). My judgement is that this new draft of Ch.1 has been well revised, with most comments and suggestions carefully assessed and considered. It meets the requirements of the IPCC AR5/WG ICo-Chairs and its bureau. I do not have any major questions and suggestions regarding what is in chapter 1. However I would like to expand on a comment of Prof Ding, who states that "One recently merged question is the decreasing or flattening global warming during the recent decade. Although in subsections of 1.2.2 and 1.3.1 this problem is appropriately illustrated, the explanation is rather implicit or indirect. A clearer or explicit interpretation should be given".

I would like to expand this into a more general comment that matters of grave public concern, relating to possible accelerations of global warming through new mechanisms and feedbacks, are not being considered in the IPCC Assessment as a whole, because of the fact that they have not fed through to refereed literature that was published before the cut-off date. I recognise the importance of the philosophy of IPCC, that it represents the consensus view of the climatic research community about the nature and pace of climate change based on rigorous scholarship alone. Clearly any retreat from this position would be wrong. Nevertheless, the slow pace of new IPCC assessments means that AR4 predictions and statements, made in 2007 and based on research carried out in 2005 or earlier, are still being quoted as "holy writ" by politically motivated individuals who seek policies that ignore very direct climatic threats. I myself have had such an experience in September 2012 when, after a well-balanced BBC TV programme on the summer retreat of Arctic sea ice, I was viciously attacked on air by a UK politician directly paid by the fossil-fuel industry (*name removed*) who, as part of his diatribe, read from the cryosphere chapter of AR4 that scientists were not predicting that summer sea ice would disappear before 2080 or later. On being asked by the program chairman (*name removed*) whether he knew more about climate change than someone who had spent all his life on this problem (i.e. me) he said "Yes – because that's what the IPCC says and that is the consensus view". Many other climate scientists have had this experience and it is a real problem. It is of concern for policymakers, the public and the mass media – all those, in fact, who are to be the users of AR5 rather than the writers of it.

Clearly as a mere review editor of chapter 1 I do not have the right to raise this. But I do so because chapter 1, anodyne and harmless as it is, does set the scene for the whole of AR5 and summarises what is in it and where to find it. There is no guide in chapter 1 as to where to find material indicative of possible accelerations or of newly developing feedbacks (be they positive or negative) which may affect the pace or nature of climate change. The result will be that when some of these phenomena begin to occur people will look in vain in AR5 for material on this, will be disappointed, and will lose faith in IPCC. And this would be bad because IPCC does represent, massively, the refined and reprocessed view of the global climate community based on well-established data. It is invaluable. The baby must not be thrown out with the bathwater.

To get around this I humbly recommend a last-minute fix-up. I suggest adding a coda to chapter 1, perhaps just a single paragraph or a box, which could be entitled "Emerging potential phenomena in climate dynamics". Then you have three columns.

Left hand column: name of phenomenon. Middle: brief description of what it is all about. Right: where in AR5 to find kindred matter which brings us almost, but not quite, up to date on this issue. Suggestions:

LH The recent fallback in global temperature (suggested by Ding)
Middle: What has happened in last couple of years and ideas as to cause
Right: where to find global temperature results in AR5

LH The recent rise in atmospheric methane levels with Arctic as probable source
Middle: Possible mechanism of offshore permafrost melt due to warm water temperatures in summer or onshore permafrost melt
Right: where to find methane levels treated in AR5

LH Accelerating retreat of Arctic sea ice, with empirical data predicting disappearance by 2015
Middle: Basis for model predictions giving longer survival time
Right: where to find discussion of sea ice extent trends in AR5.

LH Newly observed phenomena on Greenland ice sheet heralding faster ice loss (surface melt, role of moulins, speedup of glaciers)
Middle: How much additional loss has been suggested as occurring soon
Right: Present view of melt rate and its contribution to global sea level.

Obviously the above suggestions are based on my own field, but one can think of many others which could at least be raised as queries in this box, so that it does not appear that IPCC is oblivious to worrying phenomena that are too new to enter the IPCC process (possible new shape to jet stream and reasons for it; feedbacks from ocean acidification etc). Perhaps the writing committee for ch 1 could ask advice from the lead authors of the various chapters in fingering a few worrying issues of this kind which deserve an airing but are not strictly part of the rigorous IPCC process as it stands at the moment.

(Signed)

[signature removed]

Peter Wadhams

08.08.2013

Note added by IPCC Working Group I Technical Support Unit (30 January 2014):
Personal names of individuals not connected with IPCC WGI AR5 have been redacted from this report

INTERGOVERNMENTAL PANEL ON climate change

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: James Wilson Hurrell, National Center for Atmospheric Research

Final Report from Review Editor of IPCC WGI AR5, Chapter 2 – Observations: surface and atmosphere

All four REs attended the IPCC WGI AR5 meetings in Marrakech, Morocco (16-19 April 2012) and Hobart, Australia (13-19 January 2013) with the CLAs and LAs of Chapter 2. All interactions followed protocol. In particular, the REs read and considered all of the review comments on both the FOD and SOD of the chapter and discussed with the authors the most critical, contentious or controversial issues that needed to be addressed. The REs did not provide opinions on the scientific validity of specific reviewer comments, how to address reviewer comments, or suggest ways to reorganize or rewrite portions of the FOD and SOD. More detailed summaries are available in the RE reports on the earlier drafts.

Looking back to the FOD, the REs unanimously agreed the draft had much strength and reflected the expertise, balance and dedicated effort of the authors to assess progress in scientific understanding of surface and atmospheric observations since AR4. As was noted in many review comments, the FOD represented a very comprehensive (or "exhaustive", as noted by some reviewers) assessment of the literature. The format of statements at the outset of each section of the chapter reiterating the main conclusions of AR4 followed by the new or updated findings was applauded by many reviewers. Many positive comments were also made by the reviewers on the subsequent text in each section providing the assessment of the scientific evidence to support the new and/or updated AR5 findings, although variations in style, length and consistency were flagged. Moreover, many reviewers noted the justifying text in some places was much less of an assessment and more of a literature review. Some reviewers expressed different scientific opinions of the assessments in specific sections of the FOD as well, and still others had suggestions on many figures. All of these issues needed to be dealt with by the SOD.

From the reviewer comments on the FOD, the REs also identified a few areas of contention. These included:

- Interpretation of the positive correlation of socioeconomic indicators and surface warming in some regions;
- Major uncertainties and an evolving body of literature regarding the radiation budget; and
- Interpretation of historical records of tropical cycles.

The REs did not identify any sections of the FOD that did not receive adequate comment in the review process. At the end of the Marrakech meeting, the REs for Chapter 2 felt as though the author team was fully aware of the major issues and had formulated a plan to address them in the SOD.

Regarding the SOD discussed in Hobart, the REs unanimously felt it was an improvement over what was a very good FOD.

The SOD has many strong points. The assessment reflected the expertise, balance and dedicated effort of the authors, and it largely addressed the major limitations of the FOD. Specifically, major issues from the FOD addressed in the SOD includes:

- A shorter chapter, with much fewer methodological details (moved to an appendix);
- A more consistent and even ("single author") style;
- Elimination of many references and statements that did not fundamentally contribute to the new AR5 finding or update relative to AR4, including articles that were submitted at the time of the FOD but that were since rejected;
- Successful re-organization of the chapter to begin with "Atmospheric Composition" then "Radiation Budgets" before describing changes in physical variables;
- A clearer scope and rationale for the section on atmospheric circulation changes and patterns of variability, especially in the context of other chapters (especially Ch. 14) dealing with modes of natural variability; and
- Strengthened sections where AR5 reaches different conclusions than AR4.

The REs thus found the vast majority of the reviewer comments on the SOD were editorial in nature, or suggested an alternate way of stating the same fact, or pointed to other studies that were not referenced in the SOD, etc.

There were, however, some significant issues that remained to be addressed. They were:

- Comments made on the Executive Summary, relating to conciseness, consistency of format, the need to easily trace some statements back to the text in the chapter, etc.

- The need to do a stronger *assessment* in some sections, instead of a literature review that treated all conclusions as equally valid. Relative to the FOD draft, however, the REs felt this was less of an issue and mostly related to a few, specific sections and subsections. Examples included:

    - Sections citing reanalysis-based studies.
    - Land Use Change and Urban Heat Island Effects
    - Tropospheric temperatures (and especially the use of radiosondes)
    - Soil Moisture (either expand or delete; decision seems to favor the latter)
    - Tropospheric humidity
    - Clouds
    - DTR Precipitation extremes
    - Tropical and extratropical storms

- There were also many comments needing to be addressed on the sections dealing with changes in radiation budgets, surface temperature and especially DTR, precipitation and especially changes over the oceans, and extremes (text was too long, confidence in regional trends, etc.)

As with the FOD, the REs did not identify any sections of the SOD that did not receive adequate comment in the review process. Moreover, the REs left Hobart convinced the author team had a plan to address the issues and critiques of the SOD.

In reviewing the final draft of Chapter 2 “Observations: surface and atmosphere” it is my opinion that all substantive expert and review comments were appropriately considered and have been addressed. The CLA and LA team had the requisite balance and expertise to address the challenges outlined above and presented in more detail in earlier RE reports. The Chapter is excellent and provides an extremely useful update over the salient sections of the AR4. The full author team should be congratulated.

Signature:

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Full Name: James Wilson Hurrell Date: 4 July 2013

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: Jose A. Marengo, Centro de Ciencia do Sistema Terrestre CCST INPE, Brazil

Final Report from Review Editor of IPCC WGI AR5, Chapter 2 – Observations: surface and atmosphere

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Signature:

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Full Name: Jose A. Marengo Date: 9 July 2013

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: Fredolin TANGANG, the National University of Malaysia

Final Report from Review Editor of IPCC WGI AR5 Chapter 2: Observations: Atmosphere and Surface

In the FOD, the reviewers raised a number of important issues including: 1) The FOD was more of a literature review than an assessment; 2) FOD had variations in style, length and consistency 3) The quality of some figures were rather low.

The above issues (including others) have been addressed by the Author Team in the SOD. Clearly, the SOD had benefited from the extensive review of the FOD. In particularly, the chapter in SOD was much shorter with the elimination of text that did not contribute to the new finding since AR4. The SOD was much focused with clearer scope and rationale for most of the sections. Overall, the SOD was a much-improved chapter than the FOD. Nevertheless, as reflected in the reviewer comments of the SOD, there are further issues that need to be addressed. These major issues have been summarized in the Chapter 2 RE Interim Report. These major issues are briefly mentioned here:

- The need for strengthening of the ES
- The need for more assessment than literature review in some sections / sub-sections.
- There are substantial comments on the Section 2.3 (Changes in Radiation Budget) that need to be addressed
- Issues concerning surface temperature.
- Issues concerning precipitation
- Issues concerning extremes
- Issues concerning FAQ 2.2. Figure 2

As indicated in the rebuttal comments of the Author Team, all these issues including every comment by experts have been considered and afforded appropriate comments and worded accordingly by the Author Team in FD. Clearly, this FD of Chapter 2 has greatly benefited from the extensive review process since the ZOD.

Signature: *[signature removed]*

Full Name: Dr. Fredolin Tangang Date: June 29, 2013

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: Pedro Viterbo, Instituto Português do Mar e da Atmosfera, Lisbon, Portugal

Final Report from Review Editor of IPCC WGI AR5, Chapter 2 – Observations: surface and atmosphere

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Signature:

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Full Name: Pedro Viterbo Date: 10 July 2013

GOVERNMENT OF CANADA
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Your file – Votre référence

Our file – Notre référence

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs
From: Howard J. Freeland, Fisheries and Oceans Canada
Final Report from Review Editor of IPCC WGI AR5 Chapter 3 "Observations: Ocean"

The three Review Editors associated with Chapter 3 divided the chapter between themselves to allow each to focus on issues in which we had personal expertise; hence this report from Howard Freeland will touch on just a few issues that arose during LA meetings.

A concern expressed by many reviewers on both the FOD and SOD surrounded discrepancies between chapter 3 and chapter 13. I was personally disappointed that the complaints on the FOD were not completely addressed for the SOD. I am very happy to say that the two chapters no longer conflict with each other. This is a good conclusion, but it should have happened sooner.

Many reviewers complained, particularly regarding the SOD, about the proliferation of acronyms and initialisms, this has been brought under control.

There were many expressions of concern about the sections on salinity change and whether or not salinity acts as a sensitive rain gauge. I am happy with the changes that have taken place and I hope the reviewers are as well.

Another common concern was whether or not there should be a sea-level section in the oceans chapter, since there is a special chapter on the topic. In this case I do believe that the reviewers comments were given ample debate and were rejected for good reason. On this result I agree with the writing team, an oceans chapter without comments on sea-level would look deficient, but I assure the TSU that comments to the contrary were discussed at length.

There were very many comments in the review of the SOD that focussed on the nature of the ocean observations. From an early stage I felt that this needed to be addressed aggressively. I imagined a section within the chapter on ocean observations; the rationale is that the huge change in the quality and quantity of observations is something that clearly separates the AR4 from AR5. I didn't imagine an appendix on the ocean observing system, but I can honestly say that I like what I see very much indeed. I do believe that this appendix will make a lot of the reviewers very happy.

There were, of course, many other issues discussed and addressed. I was impressed with the proceedings of this writing group. It was always serious, and always collegial – working together as a tight team. Very few, if any, comments were treated lightly and all were given serious consideration.

[signature removed]

Signature:

Howard J. Freeland
Full Name:

10th June 2013
Date:

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To the IPCC Working Group I Co-Chairs
From: Silvia L. Garzoli
Final Report from Review Editor of IPCC WGI AR5 Chapter 3 "Observations: Ocean"

I was not able to attend the Hobart meeting. I submitted my comments and concerns through the other two reviewers who did an excellent job representing me.

The main areas of concern I expressed where mostly from inconsistencies between chapters. This was mostly due to the use of different units and different time scales.
In particular in the Executive Summary there was no consistency in the unites or percentages related to rates of exchange cited in the text (e.g. % per year or % per decade). The document emphasizes as expected, on linear trends. It is also very important, when referring to linear trends, to emphasize the percentage of variance accounted for the trend and if possible, error bars. When talking about trends consistency in time scale is crucial. In Chapter 3 this problem was solved.

There many other points brought up by the reviewers and I believe that there were almost all addressed. A point I made concerning the AMOC and Interocean exchanges is that it was heavily focus in one particular area (the North Atlantic) ignoring other important aspects of the MOC. Small changes were made, however, it could have been more complete.

Another point I made was that it was very important to demonstrate the power of observations and to recommend that historical records should be maintained. There was not a recommendation as such but the importance of long-term observation was demonstrated throughout the chapter and I am very pleased with the result. The previous report was mostly based on model results. This one is relays in observational results. This is a big improvement and it is in response of most of the reviewers comments.

To the best of my knowledge all of the review comments were taken into consideration, and in most of the cases when appropriate included. To me it was a pleasure to work with the team.

Sincerely
[signature removed]

Dr. Silvia L. Garzoli
Oceanographer CIMAS/UM
Chief Scientist Emeritus, AOML/NOAA

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Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: Yukihiro Nojiri, National Institute for Environmental Studies

Final Report from Review Editor of IPCC WGI AR5 Chapter 3 “Observations: Ocean”

The three Review Editors associated with Chapter 3 divided the chapter between themselves to allow each to focus on issues in which we had personal expertise; hence this report from Yukihiro Nojiri will describe just a several issues related mainly ocean biogeochemistry that arose during LA meetings.

Major comments for SOD were carefully treated and helped the improvement of FD. One of major concern in the SOD review was about the treatment of uncertainty in biogeochemistry part. In the FD, many of them were appropriately considered with revised phrases, mainly from the level of confidence to the likelihood scale. In the observation chapter, estimation of uncertainty range of amount can be converted to likelihood and it is much appropriate than the language of confidence level. The global ocean inventories of carbon is one of significant results of the last 20 or 30 years of oceanic observation and model researches and it is very useful to identify the likely range of the estimate in the report. The phenomenon of ocean acidification cause by the oceanic uptake of anthropogenic carbon is also expressed as “very likely” not by confidence language and the recent rate of decrease in global ocean pH was identified.

Significant improvements in the figures were done in FD with clearness. There was a point identified in the discussion of LAM4 plenary session about understanding of the difference in atmospheric CO_2 concentration unit (ppm: mole fraction) and oceanic pCO_2 (μatm: partial pressure of carbon dioxide). In Figure 3.18, the atmospheric CO_2 concentration (ppm) was converted to corresponding partial pressure (μatm), and it is accurate in scientific point of view. However, the discrepancy of approximately 10 in the numbers of ppm and μatm is hard to understand by ordinary readers, like pointed in SOD review. Suggestion in LAM4 plenary session was need of easy definition of the units. For ppm, definition is added in SPM but no definition of μatm, even though the unit is used in SPM, TS and CH.3. As it is famous results that the Mauna Loa observatory recorded CO_2 concentration exceeded 400 ppm in this spring, people have doubt in the scale in Figure 3.18. The related figures of oceanic pCO_2 with atmospheric CO_2 concentration are also in TS and SPM. I am welcome if foot note can be possible to add in the final report.

FAQ3.2 was very much improved with appropriate addition of chemical equations. Appendix 3, observation networks, is enthusiastically welcome to encourage the observational challenges and understanding of people about the ocean observation. It will contribute for improvement of the future understanding of earth climate system.

[signature removed]

Yukihiro Nojiri — July 1st, 2013

Full Name — Date

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: Jonathan Bamber

Final Report from Review Editor of IPCC WGI AR5 Chapter 4. Observations: Cryosphere

The three Review Editors have examined the reviewers' comments, the authors' response and the final draft of the chapter and have produced a combined report, which has been signed individually.

The main areas of concern arising from the SOD review comments

A number of generic areas of concern arose that cut across all parts of the chapter. These were:

a) Apply likelihood language, where necessary and appropriate.
b) Ensure consistent treatment of uncertainties in all parts of the chapter as per AR5 guidelines.
c) Use to the extent possible the same time intervals for the various time series and expand them to the end of 2012.
d) Multiple comments concerning accuracy and inconsistencies throughout the chapter and w.r.t. citing info from papers.
e) Ensure consistency between chapter 4 and chapter 13 and make sure there is no overlap and the same numbers are used throughout the report.

In addition, there were a number of concerns related to specific sections.

f) The Executive summary has to be rewritten with respect to format, contents and traceability of statements.

Sea ice section

g) There is an issue in the sea ice section concerned with the assessment of different algorithms for estimates of sea ice concentration.

Glacier section

h) Several comments concerning the structure of the section suggesting that it is confusing and lacks logical structure.
i) There are a number of comments that imply that the citations used are biased towards certain regions at the exclusion of others or are omitting some areas.
j) There are a number of comments about the confusing presentation of length, area and volume observations and measurement approaches.
k) There are multiple comments concerning the accuracy of the RGI.

Ice sheet section

l) There are problems with the numbers in Table 4.1.
m) Table 4.5: there were some concerns on how the uncertainties were calculated when combining the different studies.
n) In 4.4.4. the concept of irreversible ice-sheet changes seems to be incorrectly used to describe recent ice-sheet changes and there is overlap with chapter 13

o) The chapter should stick strictly to observations and refrain from speculative statements about what might happen in the future.

Seasonal Snow and Freshwater Ice Cover section

p) The section on seasonal snow and freshwater ice received comments on the representation of snow cover in all seasons and not just spring. Concerning the freshwater ice section data on the Great Lakes should be used to modify the conclusion that northern lakes experience larger losses.

Frozen Ground section

q) Some comments for the section on frozen ground are concerned with the lack of regional, hemispheric and global assessments. A discussion on the extent this is possible should be included. In addition “warm and cold permafrost” and “degradation” should be defined better and in a consistent way.

The authors have made a concerted effort to i) address the referees’ comments in a fair and consistent manner, ii) incorporate a large body of recent literature that is important to the chapter but which only became available within a short time from the completion date for the final draft and iii) provide information that is a true synthesis of the material rather than a precis. The upside of ii) is that the chapter contains the very latest research findings. The downside is that, in part due to the availability of recent results and in part due to referees’ comments, sections of the chapter have been substantially revised and rewritten since the SOD and these changes will not undergo further review or external scrutiny. Given this important caveat, I am of the view that the authors have given due consideration to the comments received.

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Signature:

Full Name: Jonathan Bamber Date: 4/7/13

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: Philippe Huybrechts, Vrije Universiteit Brussel, Belgium

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Signature:

Full Name: Philippe Huybrechts Date: 4 July 2013

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: Peter Lemke

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Signature:

Full Name: Peter Lemke

Date: 4. July 2013

IPCC 5AR WG I
Review Editor Team Ch. 5
Information from
Paleoclimate Archives

Bern / Grenoble / Kharagpur / Teheran, 01 July, 2013

IPCC 5AR, Chapter 5: Final Report by the Review Editors

General remarks

Thanks to a commendable job and the competence of the LAs under the leadership of both CLAs the editorial process for chapter 5 has been brought to a successful end. After the edition of the ZOD and the FOD, the main areas of concern arising from the review comments were discussed. Based on this discussion the structure of the chapters was reorganized. A strong effort was dedicated to the assessment character of the whole text as well as to a clear handling of the uncertainty problem. The LAs of the chapter have been interactively active, making necessary links with other chapters, as well as with the glossary team. The same procedure was applied based on the SOD draft. Pending open questions were intensively discussed and, if necessary, incorporated in the final draft.

Specific comments

Many questions and problems were discussed in the whole team or in small working groups, e.g.:
- The heterogeneity between sections in style and levels of detail and the need for a comprehensive introduction;
- The lack of critical assessment of the reliability of published results, as well as of a balanced assessment in the agreement between proxy records and model simulations;
- The need of a meaningful glossary;
- The edition of concluding remarks on key uncertainties;
- The determination of CO_2 concentrations during geological timescales;
- The past evolution of the WAIS;
- The precision of sea level change reconstructions;
- The mechanistic explanation of centennial scale climate variability;
- The Sun-Climate connection;
- The processes, which caused the MCA – LIA transition;
- Related uncertainties in temperature reconstructions during LGM, MCA and LIA.

Several key actions and decisions were taken during the whole editing process, including:
- Putting more emphasis on orbital temperature trends and on the Holocene prior to the last 2000 years;
- Discussing the reconstructions individually, including the hockey stick controversies;
- Adding a new introductory paragraph on the diversity of interglacials and a rationale for highlighting the LIG;
- Revising or adjusting figures, tables and captions, according to the comments.

Final remarks

The Chapter 5 RE team congratulates both CLAs and all LAs for their intensive and successful work. We are convinced that this chapter will notably contribute to the IPCC AR5! The whole team also thanks both CLAs and all LAs for the fruitful collaboration.

[signature removed]

sig. Prof. Anil Gupta
Kharagpur, India

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Grenoble, France

sig. Prof. Fatemeh Rahimzadeh
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Bern, Switzerland

Final Report from IPCC Working Group I AR5 Review Editor (RE)

27 June 2013

To the IPCC Working Group I Co-Chairs

From: Christoph HEINZE, University of Bergen, Geophysical Institute, Allégaten 70, N-5007 Bergen, NORWAY (citizenship of C. Heinze: GERMAN)

Final Report from Review Editor of IPCC WGI AR5 Chapter 6: Carbon and Other Biogeochemical Cycles

Note on areas of concern:
The SOD review (as the FOD review) included a long list of comments made by the reviewers. Many of those included minor editorial adjustments. Overall the reviewers were very constructive. The review had been thorough and comprehensive though only a part of the comments really addressed substantial issues. Among some further minor ones, there were three areas which in my view needed particular attention (though these issues were not dramatic areas of concern): (a) The role of inland waters (though possibly small amount in carbon budget, this new topic should be discussed in detail). (b) The inclusion of N_2O was not yet somewhat half-hearted (ocean: N fixation, coastal seas, estuaries etc.). (c) Overall model uncertainties especially for the terrestrial component should have been spelt out more clearly.
These issues have been addressed in the final version ((a) in *6.3.2.6.4 Carbon fluxes from inland water;* (b) in section *6.3.4.1 Atmosphere N_2O Burden and Growth Rate,* and (c) also upfront *(lines 1-7)* and at a suite of occasions in the text and the tables).

Note on consideration of expert and review comments:
I participated in the RE meetings I and II. The CLAs and LAs addressed the reviewer comments in an appropriate way. Most important critical issues were discussed among the CLAs and LAs within the entire group, while minor issues or specific corrections addressing single expertise were handled by single LAs or sub-groups of LAs. Given the extreme number of review comments, it cannot be excluded that possibly at very rare occasion a comment has been misinterpreted or not been addressed to full extent – also in view of page limitations. Overall, the result of the final chapter has substantially improved with respect to the first and second drafts. All CLAs and LAs have worked very conscientiously. They did their best within the given time frame to account for all the requests for revisions and to include these in appropriate wording to the chapter.

Signature:

[signature removed]

Full Name: Christoph Heinze Date: 27 June 2013

5 July 2013

Final Report by Review Editor
Chapter 6, WG1, IPCC 5th Assessment

Executive Summary

I have read the revised Summary carefully. It reads well because it has a logical progression. First, crucial and very well known aspects of the observed increases of CO2, CH4 and N2O over the last two centuries are mentioned, all centered on the dominating role of human activities. This is then contrasted with the pre human-dominated era, in which these three gases behaved very differently, confirming the first section. The next section is on future projections which are necessarily based on model studies and on sometimes quite incomplete understanding of biogeochemical processes and feedbacks, including climate change itself. Despite the Earth System complexity, the future projections correctly point out (I am paraphrasing) that human activities will remain the primary driver of global biogeochemical changes in the foreseeable future, including ocean acidification. The Summary then follows with the next crucial fact: human-caused emissions, especially of CO2, are irreversible on the time scale of human civilizations. Our society has already committed the Earth to changes of climate and ecosystems for thousands of years. At that point it is logical to consider what the challenges and the potential might be of large-scale engineered CO2 removal, which ends the Summary.

Carbon Dioxide Removal

My other main worry about the Second Order draft was the Carbon Dioxide Removal (CDR) section 6.5. It has improved significantly. Although there are still many individual sentences that I could question to some degree, at least it provides the main points that have to be kept in mind. They are the degree of permanence of the removal, the gigantic industrial scale, the high global removal rate required, potential side effects such as enhanced N2O emissions, and last but not least, all of the cumulative emissions have to be removed, not just the current atmospheric excess. The relatively benign nature of enhanced weathering (basically turning CO2 emissions into sea salt, which nature would accomplish in tens of thousands of years) compared to other proposals could have been presented better. The required acceleration of weathering might demand a huge expenditure of energy, however. The energy requirement, crucial for industrial feasibility, has not been mentioned at all, but perhaps that goes into another chapter.

Other sections of Ch. 6

With respect to the major comments made on other sections of the Second Order Draft, it is my impression that most of them have been addressed seriously and fairly.

[signature removed]

Pieter Tans

ipcc
INTERGOVERNMENTAL PANEL ON climate change

WMO UNEP

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: Timo Vesala, Department of Physics, University of Helsinki, Finland

Final Report from Review Editor of IPCC WGI AR5 Chapter 6 "Carbon and Other Biogeochemical Fluxes"

Description of possible areas of concern and contentious or controversial issues

No big concerns were presented during the review process.

No contentious or controversial issues were raised during the review process.

Statement on consideration of expert and review comments

I attended both the LA3 (Marrakech) and LA4 (Hobart) meetings and was present most of the time when CLAs and LAs of the Chapter 6 were discussing on the received comments, sharing the work within LAs and drafting responses to some of the comments. LAs have taken high responsibility of providing sound Chapter on Carbon and Biogeochemical Cycles and they were handling and discussing seriously on every review comment, excluding most trivial technical ones, which were just corrected if appropriate. The work between authors was divided and distributed in a good and efficiently manner and it was very transparent process to me acting as RE, and I was also well informed and provided by all new versions of the Chapter and changes made therein.

I have mentioned some minor concerns in my earlier First and Second Interim Reports. Those concerns were appropriately handled by the writing team.

Signature: *[signature removed]*

Full Name: Timo Vesala Date: Helsinki, 27 June 2103

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From:
Sandro Fuzzi (Institute of Atmospheric Sciences and Climate, Italy),
Joyce E. Penner (Department of Atmospheric, Oceanic and Space Sciences, University of Michigan, USA),
Venkatachalam Ramaswamy (NOAA/ Geophysical Fluid Dynamics Laboratory, USA),
Claudia Stubenrauch (Laboratoire de Météorologie Dynamique/ IPSL, France)

Final Report from Review Editor of IPCC WGI AR5 'Chapter 7: Clouds and Aerosols'

The First and Second Order Drafts (FOD, SOD) received a total of 1607 and 2110 comments, respectively. Many of these comments were substantive. During the Third and Fourth Lead Author meetings the most relevant review comments were discussed between the Lead Authors (LAs) and Review Editors (REs), and the Lead Authors presented ideas on how they would be addressing the different comments.

Each successive Chapter draft has improved considerably following major, engaging, searching revisions, and with improved clarity. During this process the Lead Author Team has given appropriate consideration to the substantive expert comments made by the reviewers and flagged by the Review Editors on the Chapter.

The analysis of the expert comments on the First Order Draft has led to a restructuring of the different sections, also by building separate sections for 'Radiative and Effective Radiative Forcing by Anthropogenic Aerosols' and 'Processes Underlying Precipitation Changes'. These sections have further matured with the help of expert comments on the Second Order Draft. Also receiving due attention in the final draft: definitions of new terms introduced for the first time in IPCC, statements on confidence levels, and clarifications on process descriptions.

Expert comments on the presentation of cloud observations in the Second Order Draft have also led to a revision: Since cloud observations are treated in Chapter 2, the authors made the choice to give an illustration of cloud properties from the latest satellite cloud observations at the beginning of the cloud section and to mention further studies including observations and modelling of clouds in the specific sections.

During the review process concerns were raised about the explanation for uncertainty estimates on forcings as well as for the rationale leading to the summary estimates of forcings and feedbacks. In the final chapter 7, a considerable effort has been undertaken to explain the deduction of the final expert judgements from the different studies and their uncertainties and biases. Also, text on the quantitative aspects concerning aerosol absorption and its role has been refined.

In an overall sense, the Lead Author Team has responded to the armada of expert comments in a meaningful and satisfying way, affording a balanced perspective. Responding to the comments and providing the science succinctly in the text was a challenging task, and has been undertaken with substantive but varying response style through the different sections of the text.

As Review Editors, we would like to add a concluding note. In general, since major substantive changes are usually envisioned and do take place between the SOD and the final Chapter version, it might be fruitful to have one additional, focused meeting between Lead Authors and Review Editors to discuss the next-to-final Chapter version and the responses to the expert comments. This would add more strength to the Review Editor process, going beyond the communication by email about the evolving parts of the Chapter. It would however demand a considerable additional energy in the mobilization of the LAs and REs. This is something that the IPCC will have to pay more attention to right from the start of the Assessment, perhaps defining more precisely the balancing role of the RE-ship and adding more time between SOD and the final product.

[signature removed]

Signature:

Full Name: Sandro Fuzzi Date: 1st July, 2013

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From:
Sandro Fuzzi (Institute of Atmospheric Sciences and Climate, Italy),
Joyce E. Penner (Department of Atmospheric, Oceanic and Space Sciences, University of Michigan, USA),
Venkatachalam Ramaswamy (NOAA/ Geophysical Fluid Dynamics Laboratory, USA),
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Final Report from Review Editor of IPCC WGI AR5 'Chapter 7: Clouds and Aerosols'

The First and Second Order Drafts (FOD, SOD) received a total of 1607 and 2110 comments, respectively. Many of these comments were substantive. During the Third and Fourth Lead Author meetings the most relevant review comments were discussed between the Lead Authors (LAs) and Review Editors (REs), and the Lead Authors presented ideas on how they would be addressing the different comments.

Each successive Chapter draft has improved considerably following major, engaging, searching revisions, and with improved clarity. During this process the Lead Author Team has given appropriate consideration to the substantive expert comments made by the reviewers and flagged by the Review Editors on the Chapter.

The analysis of the expert comments on the First Order Draft has led to a restructuring of the different sections, also by building separate sections for 'Radiative and Effective Radiative Forcing by Anthropogenic Aerosols' and 'Processes Underlying Precipitation Changes'. These sections have further matured with the help of expert comments on the Second Order Draft. Also receiving due attention in the final draft: definitions of new terms introduced for the first time in IPCC, statements on confidence levels, and clarifications on process descriptions.

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During the review process concerns were raised about the explanation for uncertainty estimates on forcings as well as for the rationale leading to the summary estimates of forcings and feedbacks. In the final chapter 7, a considerable effort has been undertaken to explain the deduction of the final expert judgements from the different studies and their uncertainties and biases. Also, text on the quantitative aspects concerning aerosol absorption and its role has been refined.

In an overall sense, the Lead Author Team has responded to the armada of expert comments in a meaningful and satisfying way, affording a balanced perspective. Responding to the comments and providing the science succinctly in the text was a challenging task, and has been undertaken with substantive but varying response style through the different sections of the text.

As Review Editors, we would like to add a concluding note. In general, since major substantive changes are usually envisioned and do take place between the SOD and the final Chapter version, it might be fruitful to have one additional, focused meeting between Lead Authors and Review Editors to discuss the next-to-final Chapter version and the responses to the expert comments. This would add more strength to the Review Editor process, going beyond the communication by email about the evolving parts of the Chapter. It would however demand a considerable additional energy in the mobilization of the LAs and REs. This is something that the IPCC will have to pay more attention to right from the start of the Assessment, perhaps defining more precisely the balancing role of the RE-ship and adding more time between SOD and the final product.

Signature:

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Full Name: Joyce E. Penner

Date: 26 June 2013

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From:
Sandro Fuzzi (Institute of Atmospheric Sciences and Climate, Italy),
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Full Name: Venkatachalam Ramaswamy Date: June 26, 2013

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Full Name: Claudia Stubenrauch Date: June 26, 2013

INTERGOVERNMENTAL PANEL ON climate change

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: Daniel J. Jacob, Harvard University

Final Report from Review Editor of IPCC WGI AR5 Chapter 8 Anthropogenic and Natural Radiative Forcing

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Full Name: Daniel J. Jacob Date: 1 July 2013

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Daniel Jacob, A Ravishankara, Keith Shine

1 February 2013

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Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: A. R. Ravishankara, NOAA/ESRL/CSD, Boulder CO 80305 USA

Final Report from Review Editor of IPCC WGI AR5 Chapter 8 Anthropogenic and Natural Radiative Forcing

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Full Name: A.R. Ravishankara Date: 1 July 2013

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Daniel Jacob, A Ravishankara, Keith Shine

1 February 2013

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INTERGOVERNMENTAL PANEL ON climate change

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11. An important comment addressed the SOD classification of uncertainties in radiative forcing metrics as “scientific” vs. “structural”. As pointed out by the comment, some of the uncertainties classified as “structural” actually reflect choices on the part of the user. The authors agreed that this is an important comment and will deal with it appropriately.
12. Some comments pointed out the large uncertainty of the RCP future projections of short-lived forcing agents, specifically their tendency to likely underestimate future emissions. Alternate projections are available from the literature and from later chapters in this report, and should at least be referenced. The authors appear to be cognizant of this and willing to make necessary changes.

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: Isaac M. Held, Geophysical Fluid Dynamics Laboratory/NOAA/Dept. of Commerce/USA

Final Report from Review Editor of IPCC WGI AR5 Chapter 9: "Evaluation of Climate Models"

The authors of Chapter 9 have handled the numerous reviewer comments on the first and especially the second order drafts carefully and conscientiously.

The Chapter is a difficult one to write, as best exemplified by the many comments that related to the selection of some aspects of the model simulations for inclusion rather than others. The Final draft addresses this issue much more directly. It does not go as far as some of the Review Editors would have preferred in including, for every aspect of the climate models being evaluated, a direct statement as to why evaluation of this aspect is important for evaluating climate change simulations. One is obviously limited by what is in the literature and by a desire for continuity with past IPCC reports, and the authors' movement in this direction in the Final draft is welcome and more than adequate.

The controversy concerning trends in tropical tropospheric temperatures and their overestimation in models was handled very well by the writing team. The First Order draft was rather one-sided, but the Second and Final drafts achieved a much better balance.

The Executive Summary for the Chapter came in for a lot of criticism in previous drafts. It was rather careless in the use of uncertainty language and inconsistent in places with the text in the Chapter. The final Executive Summary is a great improvement, with much more consistent use of the recommended uncertainty language, and is a better summary of the key points in the underlying text.

The final draft puts less weight on the quality of the model's ability to simulate the 20th century global mean temperature evolution, as is appropriate and consistent with some reviewer comments given the potential for tuning to this metric with differing aerosol forcings and climate sensitivities.

I have no hesitation in giving my endorsement of this Final Draft as reflecting appropriate responses to the many expert and reviewer comments on this Chapter and a conscientious effort at maintaining balance on contentious issues.

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Isaac M. Held June 28, 2013

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: Andy Pitman, University of New South Wales, Australia

Final Report from Review Editor of IPCC WGI AR5 chapter 9 “Evaluation of Climate Models”

As with previous drafts, the number and variety of reviewers’ comments are considerable. The following were those that I found particularly significant.

1. Language, and consistency of language, treatment of uncertainty. Reviewers noted inconsistencies in the use of some terminology. This is inevitable I think and I note that there are less criticisms of this than in earlier drafts. The authors have improved this, and their responses to these comments on the final set of comments highlights further improvements

2. Breadth and length of the chapter. A formal assessment of the literature pertaining to model evaluation is by necessity long and broad. The length restriction on Chapter 9 was appropriate in the context of AR5 and the authors have done a very good job. However, in future assessments I think thought needs to be invested in a different way to undertake this Chapter. This is, in part, the background to comment 9-16. I have some sympathy with this (vastly too late) comment. The authors’ response is correct, but for future assessments this comment is worth reviewing.

3. Many comments were understandably about the Executive Summary. This has been thoroughly and appropriately revised.

4. The issues of a “lack of warming” over the last 10-15 years was raised by several reviewers. I think the way this has been handled via Box 9.2 is outstanding. However, so far as I can tell, Box 9.2 has not been subject to external review as a consequence of timing. This is worrisome.

5. There are many comments around “tuning”. The authors have done what is possible – and it is not for IPCC to tell CMIP-5 how to function. However, this is an issue that deserves to be taken up elsewhere.

6. It seems to me that there is a nice balance of “Rejected”, “accepted”, “taken into account” in terms of how the comments have been dealt with.

7. The issue of tropospheric temperature trends remains contentious and there is no way Chapter 9 could satisfy all reviewers. I think Chapter 9 does a very fine job on balance and it is now for the science community to take these issues forward.

8. I read the comments and responses to the land sections with particular interest. I found them technically correct and balanced. It points to several areas where the

science community needs to become more active but that is not IPCC's concern of course.

The process of review of Chapter 9 has been rigorous in my judgment. The number of useful comments received by the authors has been very significant and many of these have been of high quality. In many instances, the comments have been contradictory with other reviewers' comments requiring a high level of expert analysis and expert judgment to resolve. In my judgment, the authors have accommodated the reviewers' comments at a very high level of professionalism. They have undertaken changes to the structure and content of Chapter 9 guided by the reviewers' comments in ways consistent with the scientific literature. The authors have also largely taken on the overarching comments by the Review Editors. They have not followed all of our advice – but of course they should not necessarily have done so. They have written Chapter 9 appropriately independently of the Review Editors, but in ways that this Review Editor is entirely comfortable with. Chapter 9 therefore provides a robust, accurate and up to date assessment of the capacity of climate models. It is a credit to the Convening Lead Authors and to the Lead Authors that this has been achieved.

Signature:

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Full Name: Andrew Pitman Date: July 16th 2013.

INTERGOVERNMENTAL PANEL ON climate change

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: Serge PLANTON, Météo-France, Centre National de Recherches Météorologiques

Final Report from Review Editor of IPCC WGI AR5 chapter 9 “Evaluation of Climate Models”

Different points of concern have been identified in the review process at the different steps of the chapter preparation. Those that were raised from the FOD and associated expert comments, were for the most part addressed in the SOD as stated in the second REs intermediate report. This last report also makes a list of key review comments to the SOD and of remaining points of concern including contentious issues. They are listed below in italics followed with some consideration on the way the authors have addressed these points in their responses to comments and in the final text of the report:

- *Concerning language, several comments addressed the use of the uncertainty language, the lack of justification of some confidence statements and the lack of quantitative terminology in the Executive Summary.* Terms like “correctly” and “realistic” have been replaced, and the terminology has been made more quantitative where possible with specific attention to the guidance notes on uncertainty language.
- *The Executive Summary is too general, should give new and key findings clearly, and its format needs to be corrected.* The format of the Executive Summary is now consistent with the agreed style, the presentation of the references to sections and figures follows the recommendations. The executive summary has also been extensively revised focusing on high-level results and avoiding discussion.
- *Metrics are not successful at separating “good” from “bad” models, there is a lack of discussion of the utility of metrics for evaluating the quality of model projections and of process-based metrics.* The limitation of existing use of metrics to constrain model projections is recognized particularly in the Executive Summary (last paragraph). The discussion in section 9.2.3 is also a little bit more focuses on the limitations and utility of metrics.
- *Several comments seek statements on whether CMIP5 is better than CMIP3.* The progress in the performances of models since the AR4 is more systematically addressed in the Executive Summary when appropriate.
- *The reviewers comments have pointed to many additional references.* Recent proposed references have been generally added.
- *There is some important missing assessments:*
    - *Performance of CMIP5 models for soil moisture.* A few papers concerning soil moisture have been added in the text, but there is a lack of literature on CMIP5 model evaluation (Note that the response to comment 9-1339 is not correct since there is no more reference in the text to Sheffield et al. 2012, not published before the 15th of March 2013).
    - *The uncertainty of the observations of proxies and biomass observations.* Discussion of the uncertainty of paleoclimate and biomass observations are respectively relevant to chapter 5 and 6 (note a wrong reference to section 9.5.2 in box 9.3, p61-l22, concerning the uncertainty of paleoclimate reconstructions).
    - *The implication of variability on the comparison between models and observations.* It is not clear whether the more general discussion on this topic has been introduced as stated in the response to comment 9-1439.

- *Some teleconnection.* A few teleconnections have been added (Indo-Pacific).
- *The evaluation of simple models and EMICS.* Text and figures have been added (section 9.8.1).

- *Contentious issues:*
  - *Upper tropospheric temperature trends.* Progress has been made concerning the presentation of the discrepancies between modeled and observed tropical tropospheric temperature trends. Logically, requests for a new diagnostic and for a discussion of a specific interpretation of the discrepancies have been rejected, because there are not supported by published material. The summary of the discussion has been revised and introduced in part in the Executive Summary.
  - *The reproduction of last decades surface temperature trends.* The debate on the larger simulated warming trends in the tropical lower troposphere and in the tropical middle troposphere over the last decades compared to observations, is well reflected. The new box added on this topic (Box 9.2) includes an assessment of current knowledge on possible explaining factors of the differences between models and observations based on recent literature (published before the 15th of March 2013). However, this is an on-going scientific debate with new published literature since then.
  - *Sea ice trends.* The statement has been corrected and is less confident in the simulation of trends (but with a robust evidence for an improvement compared to AR4).
  - *The improvement of the representation of clouds.* A contradiction between different statements has been corrected and the improvements in the models simulations of clouds have been clarified.
  - *Climate sensitivity.* Some statements on climate sensitivity have been revised to follow the comments. The discussion on the mode of calculation of effective climate sensitivity has been simplified.
  - *Model tuning.* The authors had a little literature at their disposal on this topic. This limits the discussion in the text of the report as reflected in the response to comments. Recognizing possible impact of model tuning, the authors no more make a link between the very high confidence that model reproduce the general features of the global-scale surface temperature increase over the historical period, and the response of models to forcings.
- *The review editors suggested that a sentence be included, for each aspect of model simulations that is being evaluated, that highlights why this evaluation is relevant for interpreting climate projections.* This recommendation was not strictly followed but the sub-section 9.8.3, entirely devoted to the topic of the implication of model evaluation for model projections, has been extended (see also response to comment 9-16).

I thus conclude that substantive expert and review comments have received appropriate consideration by the Lead Authors through changes in the structure and content of the final version of the chapter. The main contentious issues raised by the expert reviewers have also been presented in a balanced form, taking into account the requirement to support the assessments by existing literature.

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Serge PLANTON Date: 29 June 2013

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: Zong-Ci Zhao, National Climate Center, China Meteorological Administration

Final Report from Review Editor of IPCC WGI AR5 Chapter 9 Evaluation of climate models

General speaking, the total review comments of chapter 9 are 2463. Rejected review comments by the LAs are about 211 (9% of total) and accepted comments are about 289 (11% of total). Others included noted, taken into account, agreed and editorial are about 1963 (79% of total).

The main areas of concern arising from the review comments are (1) The uses of the uncertainties and reliability languages are the lack of quantitative terminology; (2) The executive summary is too general and should provide new and key findings clearly; (3) How to employed the metrics to evaluate the model quality (good/bad); (4) Important missing evaluation; (5) Is CMIP5 better than CMIP3? (6) Models tuning explanation: why, how, what; (7) Controversial issue: the fact that the CMIP5 models have not reproduced the temperature trends of the last decade and why; (8) Cross chapters;

How these were handled: (1) Taken into account. The languages of uncertainties and reliability have agreed with the IPCC rules; (2) Accepted. Executive summary has been thoroughly revised and some parts have been taken into account to be improved, especially for Figure 9.44; (3) Taken into account. Section 9.3.2.1 has been removed and extended section 9.3.2; (4) Taken into account or noted or accepted. Some new studies have been added and improved some sections; (5) Taken into account. FAQ9.1 provided Figure 1 to compare CMIP2, CMIP3 and CMIP5. Figure 9.44 compared with CMIP3 and presented some results since CMIP3; (6) Taken into account: Box 9.1 explained why, how and what tuning for models in detail; (7) Adding Box9.2 and Figure 9.8 to explain “climate models and hiatus in global-mean surface warming of the past 15 years; (8) Each LA has cross-checked their section with other chapters to the best extent possible;

Chapter 9 of AR5 is developed relative to AR4. Key points are: (1) more observed data from five spheres were used to compare with model simulations. Therefore, it provided more evidences to evaluate the model reliability; (2) evaluation of time-scales is from daily, monthly, seasonal, annual, inter-annual and inter-decadal variability; (3) evaluation of space-scales is from global, hemisphere, continental, zonal, 21 regional areas; (4) levels of confidences are quantity; (5) evaluated more variables of five spheres; (5) key feedbacks, sensitivity, response and parameters have been evaluated; (6) more simple and complex models have been evaluated; (7) metrics; (8)CMIP5 has more model groups jointed and evaluated;

I read Chapter 9 from the beginning to the end carefully. To compare with SOD of Chapter 9, I believe that this last Chapter 9 have been improved and revised for many parts and made it much better than SOD. CLAs and LAs considered and made responses to all of

comments seriously and carefully. LAs have checked all of those comments carefully during revisions and editing. Therefore, Chapter 9 is a good situation and ready to be published after some editorial revisions are carried out.

At last, I need to emphasize that the climate models have a long journey to go for the improving and revising descriptions and simulations of earth system in future.

Signature:

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Full Name: Zong-Ci Zhao Date: June 27, 2013

Chapter 10: Detection and Attribution of Climate Change: from Global to Regional

Final Review Editors Report, July 1st 2013

To the IPCC Working Group I Co-Chairs,

From: Judit Bartholy, Robert Vautard and Tetsuzo Yasunari

General considerations

This document contains the final Editor Review report of Chapter 10, "Detection and attribution of Climate Change: from Global to Regional". All three Review Editors have agreed to produce and sign this common document.

The three Review Editors have reviewed the First and Second Order Draft and the expert reviews, attended the Third and Fourth Lead Author Meeting that were held in Marrakech and in Hobart in April 2012 and January 2013. Two interim reports were provided before this final report. The only new elements for this final report are the answers of the authors to the review comments, as well as the final chapter draft itself.

Chapter 10 is a very important and sensitive chapter as it addresses the causes of observed climate changes. Consequently it needs unequivocal and objective assessments based on a rigorous methodology. In general, the Review Editors acknowledge the effort that has been put, along the chapter work, to discuss and address all comments and spend a sufficient amount of time on the most important issues and questions that were raised during the author meetings.

The whole review process was respectful of procedures. However, since the process does not include any further review after SOD, all the material added between the SOD and the FD is not expert reviewed. This can lead to a situation where a significant amount of new material is added, in particular in response to the SOD review comments, with no mechanism to review it. Such significant changes and additions, responding to review comments, were made in Chapter 10 but also other Chapters impacting Chapter 10 (see below).

Specific points of the responses to FOD review

Review editors acknowledge the detailed responses, with convincing arguments, to reviewers. For the most important points in our interim reports our remarks are:

Past decade or so: A number of SOD comments pointed the need of more explanations on the divergence between simulations and observations in the last decade or so. A box in Chapter 9 containing important new material is now added, which specifically addresses this issue. It is based on most recent publications, but the investigation of this topic is currently in strong development, with more publications coming out every month. In response to reviewer comments, a strong statement is made, in Chapter 10, with *medium confidence*, about attribution of the past hiatus decade, based solely on "expert judgement". This statement contrasts with the more firmly rooted other statements, and may require additional review, or be formulated differently in order to more properly address reviewer comments and reach the standard of other statements.

Solar variability: Sun's role in climate change was not convincingly described and the weight of its account is found unbalanced, with literature missing, and a discussion on variability and relations

found at regional changes; a box has been added, and responses were provided, addressing in our opinion all issues raised by the numerous comments.

Wording in Executive summary: a number of comments were made on improving the quality of wording to make it fully understandable. These comments were answered and the ES quality has improved.

Consensus was not found for the likelihood of the statement concerning the attribution of temperature change in some regions. Consensus appears now to have been reached.

On 10.5.2 Ice Sheets, Ice Shelves and Glaciers: Descriptions are too qualitative, compared to the other subsections. Particularly, the part on glaciers is problematic. Though most of the glaciers in the world are retreating since 1960's (chap. 4.3), there are still big uncertainties to quantitatively assess climate change impact on the world glacier retreating trend. This subsection needs to follow the discussion at 4.3 where they referred only two new "global-type" but simple mass balance models (Marzeion et al., 2012; Hirabayashi et al., 2013) which could attribute the recent glacier mass changes to climate change but with large uncertainties in their models. So, although the overall glacier retreat trend is robust as observation, the evaluation for A-D "likely" may need some more additional description on the uncertainties by referring the discussion at 4.3 (Figure 4.12). The LAs need to reconsider how to assess D-A when there are no or very few compatible models of quantative assessment of changes, e.g., glaciers.

Minor issues

- Comment #466 on winds in the ES may not be sufficiently well answered: Sea Level Pressure is not the only driver of surface winds. No answers were given about the other drivers.
- Comment #1011 has no answer, and contains only a rejection.
- In our previous Review Editors Report we asked in Section 10.3 a more critical discussion on tropospheric temperature trends, in relation to surface temperature trends, but it does not appeared in the final version.
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Judit Bartholy

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Robert Vautard

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Tetsuzo YASUNARI

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: DELECLUSE Pascale, Météo-France

Final Report from Review Editor of IPCC WGI AR5 Chapter 11 : Near-term Climate Change: Projections and Predictability

Chapter 11 is a new chapter in the IPCC report and it took some time to find a balance between predictions and projections, and to correctly articulate the discussions with the other chapters. The latest version is much improved and reaches some balance.

The exercise of assessment was difficult because most literature on the subject was on-going, the projections were hardly interpreted, and the coordinated prediction experiments from CMIP5 that were highly expected opened more questions than answers. Two difficult points came into discussion : the difficulty for RCP projections range to represent observed mean temperature of the last decade and the issue of projections for atmospheric composition and air quality to 2100.

I have seen the work progressing from a juxtaposition of independent contributions into a well-integrated and balanced assessment, focused on near-term climate change, and with clear articulation with other chapters. The authors have done a very nice job in simplifying and reducing the earlier version, better defining their scope and their border with the other chapters.

Near term prediction : the organization has greatly improved and after a useful part that clearly explains the terminology and the assessment methodology to estimate the forecast quality, this part focuses on CMIP5 results. It discusses the limitation and difficulty of the exercise and also the areas where some predictability is emerging. The new redaction responds to most comments that were expressed : statistical models are discussed, definitions are clarified, sources of uncertainty are discussed, areas of potential predictability are presented... This part ends by a paragraph "realizing potential" that opens ways to improve the present state of work.

Near-term projections : one key issue here was to discuss the range of projected global temperature versus recent observations. This was a rather perilous task, and the authors were able to make interesting assessment from existing literature, pointing out that on this time range, the main source of uncertainty is the natural variability. The notion of TOE, a key notion in this time range, is well presented. In agreement with many comments, a larger discussion is done now on precipitation, drought, soil moisture, runoff...

The part "Projections or atmospheric composition and air quality to 2100" has also benefited from many useful comments. It compares the spread between scenarios to the CLE and MFR scenarios. It is not fully consistent to the previous part (it goes till 2100, and insists on RCP8.5) but most discussions are useful and based on existing literature.

The chapter still needs some editorial corrections : omitted or repeated words or paragraphs, correct format for included literature, full label for pictures... The pictures numbers need to be checked throughout the text.

The authors provided appropriate responses to the 1382 comments that were made. Their responses clearly state whether the comment was agreed, noted or rejected. Most important ones did contribute to modify the structure and organization of the different parts (parts on predictability and on air composition have clearly benefited from the numerous detailed comments that were expressed). The response to each rejected comment is justified either from a scientific point of view, either from literature outside the range considered in this report.

In conclusion: the authors have done a very difficult job of assessment in a delicate chapter at the crossing point of many roads; they now provide fair discussions on many difficult points from a literature that is rising quickly. This is a very nice job.

Signature:

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Full Name: DELECLUSE Pascale Date: 2013, June the 30th

INTERGOVERNMENTAL PANEL ON climate change

WMO UNEP

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: Tim Palmer, University of Oxford

Final Report from Review Editor of IPCC WGI AR5 Chapter 11 Near Term Climate Change

Chapter 11 presents a new idea for IPCC – a discussion of initialized and uninitialized decadal-timescale integrations for the near term. I personally continue to be a little skeptical that decadal prediction is a sufficiently mature topic for incorporation into a main IPCC assessment report (and would personally have preferred the Chapter to deal with topics of relevance to IPCC arising from initialized predictions on all timescales). Nevertheless, the Chapter authors have done a good job synthesizing the available material. The relatively small number of substantive review comments reflects the rather technical nature of much of the Chapter, and perhaps its relative lack of maturity. Nevertheless, the authors have tackled these comments appropriately. Main areas of concern focused around making sure that the difference between the initialized and uninitialized projections were explained properly, that definitions eg of predictability were understandable, and that there were no inconsistencies between results from the near-term analysis of the uninitialized projections and the results in the chapter on long-term climate change. An addition problem arises in drawing substantive conclusions from the relatively small sample of forecasts available, and hence in assessing the statistical reliability of results. Also the Executive Summary was much too long in early drafts.

All substantive expert and review comments have been afforded appropriate consideration.

Signature:

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Full Name: Timothy Noel Palmer Date: 27/6/2013

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: Ted Shepherd, Department of Physics, University of Toronto, Canada

Final Report from Review Editor of IPCC WGI AR5 Chapter 11: Near Term Climate Change: Projections and Predictability

Chapter 11 addressed a new topic for IPCC WGI and this presented several challenges. One was to introduce the concept of probabilistic predictions. There was confusion amongst many of the reviewers on the distinction the authors made between predictions and projections, which is less of a fundamental distinction than an operational one, and the difference between the technical language used here and common usage. This was not helped by the fact that most of the skill found in initialized predictions so far seems to come from forcing (or the history of past forcing in the initial conditions), which is also in principle contained in the projections, leaving something of a disconnect between the theoretical discussion of predictability and the actual predictions. The authors addressed this to the extent they could through extensive rewriting and illustrative figures.

Since the forced component of the response to climate change was covered comprehensively by Chapter 12, this introduced some duplication and inconsistency between the two chapters, which required careful management. In many cases, near-term trends are much weaker than natural variability, and there was controversy over how such a situation should be discussed, since statistical significance is different from physical significance. The authors addressed this through acknowledging the different approaches.

By focusing on the near term, this chapter had to face issues verging on “real time” climate prediction, e.g. will the accelerated Arctic sea-ice loss or the hiatus in global warming continue in the future, or reverse? Many reviewers clearly expected strong statements to be made along those lines in this Chapter, but the reliability of the near-term predictions has yet to be established and thus little could be said from that perspective. The authors addressed this by a strong attempt to manage expectations.

The focus on the near term also led to a certain difficulty in discussing the various aerosol and air-quality scenarios used in the CMIP5 and ACCMIP simulations in a value-free way, where in some cases the scenarios seem already to be at odds with observed or expected behaviour. The authors addressed this through careful use of language.

The chapter was comprehensively reviewed, mainly by experts in the subject (unfortunate but perhaps not surprising given the novelty of this subject), and in my view all substantive expert and review comments were afforded appropriate consideration. Some clean-up of the author responses is required, but none of this seems likely to affect the substance of the responses. (Similarly some clean-up of the chapter text is also required.)

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Signature:

Full Name: Theodore G. Shepherd Date: 3 July 2013

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: Francis Zwiers, Pacific Climate Impacts Consortium, University of Victoria

Final Report from Review Editor of IPCC WGI AR5 Chapter 11 (Near-term Climate Change: Projections and Predictability)

The authors of Chapter 11 are to be congratulated on producing an excellent assessment that covers three important areas – the short term predictability of the climate system, near term projections of future change, and projections of atmospheric composition and air quality through to the end of the 21st century. It has been rewarding to see the chapter evolve from its initial draft consisting of relatively rough individual contributions into a well-integrated final draft containing a set of mature and very well considered assessments.

The chapter has been well reviewed, receiving a total of 2021 comments (639 on the first order draft, and 1382 on the second order draft). The very large majority of these comments were constructive, and the authors have given careful consideration to all comments, responding appropriately in all cases. The authors have incorporated reviewer suggestions where possible, and they have provided clear explanations in cases where they have disagreed with reviewers, where space limitations do not allow expansion of the chapter, or where the comment extends to topics beyond the scope of the chapter.

Notable issues raised by the reviewers that have been resolved in the course of developing and finalizing the chapter include (a) clarification of the distinction between projection and prediction, (b) whether there is sufficient confidence in the still emerging literature on decadal prediction to warrant the inclusion of a decadal prediction in the chapter (as distinct from a projection), and (c) the balance and scope of the assessment of the projections of atmospheric composition and air quality. These issues have been well resolved by the authors.

Overall, it is my view an excellent chapter has been produced, and its development has benefited from the constructive comments of the reviewers and the thoughtful and thorough responses of the authors.

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Full Name: Francis Zwiers Date: 30 June 2013

INTERGOVERNMENTAL PANEL ON climate change

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: **Sylvie Joussaume,** CNRS, IPSL/Laboratoire des Sciences du Climat et de l'Environnement, FRANCE

Final Report prepared jointly by the Review Editor team of **IPCC WGI AR5 Chapter 12**: Long-term Climate Change: Projections, Commitments and Irreversibility

The Review Editors have noticed clear improvements from the first order draft to the final draft of Chapter 12. The LAs carefully considered the issues raised and the suggestions for improvements offered during the two steps of the review process. The Review Editors consider that the Author team answered well and comprehensively the review comments received after both the FOD (853 review comments) and the SOD (1506 review comments).

The main issues raised by the reviewers were the needs to:

- Better state the basis for the uncertainty and confidence statements and likelihood statements that are conditional on global warming
- Better emphasize what information and which results are new relative to the AR4 and SREX
- More clearly describe RCPs and the difference between RCP concentration-driven and emission-driven simulations
- Display changes of temperature relative to pre-industrial
- Add discussion on targets other than the 2°C target
- Further assess risks of drought
- Improve the abrupt climate change and irreversibility section
- Improve cross-chapter referencing especially with regards to Chapter 1 on RCPs, Chapter 5 on paleoclimates (in particular with regards to abrupt changes), Chapter 9 on model evaluation, Chapter 11 on near term projections, Chapters 6 and 13 for a more complete view on future climate changes.

These issues have been addressed by the Author team and text changed accordingly.

No real contentious issue emerged from review comments. A few reviewer comments raise more philosophical issues: specifically concerning the use of models for future climate as well as concerning the composition of the author team, which were answered in a respectful and constructive manner.

The Review Editor team of Chapter 12 considers that all substantive expert and review comments were afforded appropriate consideration, well answered, and this has led to improvements in the Chapter 12 content.

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Signature:

Full Name: SYLVIE JOUSSAUME Date: 1rst July 2013

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WMO UNEP

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

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Date: 30/07/2013

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Signature: *[signature removed]*

Full Name: Karl E. Taylor Date: 1 July 2013

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INTERGOVERNMENTAL PANEL ON climate change

WMO UNEP

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: Prof. Simon Tett, School of Geosciences, University of Edinburgh

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Signature:

Full Name: Simon F. B Tett Date: 1/7/2013

This is the joint final report by the four Review Editors of **Chapter 13 Sea Level Change Working Group I** based on the final draft as made available early June 2013.

To the IPCC working Group I Co-chairs

From: J. Jouzel, R. S. W. van de Wal, P. Woodworth, C. Xiao

The final draft of Chapter 13 is an authoritative assessment of knowledge of past, present and future sea level changes. The draft has been much improved over earlier versions and is now much more readable, although inevitably technical in places. It is an assessment, which is internally consistent.

Specific issues raised in earlier drafts concerned issues such as the need for a proper explanation of differences of projections of semi-empirical models compared to process-based models. This has been taken care of as well as it could have been, with an extra figure (13.12) added. There is a clear justification for the use of the two types of models, a section on differences in results and an attempt to explain the significant differences as well as an assessment of the level of confidence of the two methods. A second point of concerns, extensively discussed at the LA4 in Hobart as well as critized by the reviewers was related to the assessment of the dynamical contribution of ice sheet in projections and to the fact whether they should be taken scenario dependent or not. Clearly the assessment is based on a limited number of recent studies but this is expressed satisfactory in the Final Draft as well as the likelihood of extreme sea level changes due to marine ice sheet instability.

In the previous report it was requested to make a clear distinction between AR4 and AR5. In most places this is satisfactory handled. However at the top of page 13-54 a small Table would help the reader. As it is it remains a little vague how to close precisely the difference in the total estimates of AR4 and AR5. What is the difference in the glacier contribution and Greenland SMB. Is the difference then fully explained? Another scan on whether the differences between AR4 and AR5 are crystal clear would be good.

Also there were general concerns as to overlap with Chapter 3; we know that the LAs of both chapters have been communicating well for the final draft and prevented overlap. From the text it remains unclear whether the box on the closure of the energy budget needs to be in this chapter. There is a brief justification for it in the box itself, but it is suggested to incorporate this in the chapter main text.

At the 4th lead author meeting there were additional concerns that some data sets (notably altimetry) from particular groups were being shown when others, equally good, were available, so we are pleased to see in figure 13.3(d) for example that time series from 5 groups have been averaged.

However, there have been important changes between the SOD and final draft, which we would have appreciated seeing before the final draft was submitted. For example, the 'multi-millennial' and 'regional change' sections have been rewritten significantly for the final draft. We would have appreciated the chance to comment on these issues although we realize that there is no formal requirement to do so.

Overall, the issues raised in our Second Interim Report have been taken care of adequately, and we have no major differences with the authors concerning the science.

As for the review process itself, there were over 1000 review comments received after both the FOD and SOD, which represented a lot of work for everyone. We know that these were discussed seriously, both at the LA meetings and outside, and the responses of CLAs are acceptable. We believe that 80% of comments received by external reviewers were useful.

Minor issues

References to the NRC (2012) report seem to be reference to grey literature, which should be prevented. In addition there appear to be a few other references, which are to our knowledge not peer reviewed literature. Please go through the list once more and consider the need of those references.

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This report has been finalize the 28th of June 2013

J. Jouzel, Laboratoire des Sciences du Climat et de l'Environnement/ Institut Pierre Simon Laplace Saclay, France.
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R. S. W. van de Wal, Institute for Marine and Atmospheric research Utrecht, Utrecht University, Netherlands.

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Specific issues raised in earlier drafts concerned issues such as the need for a proper explanation of differences of projections of semi-empirical models compared to process-based models. This has been taken care of as well as it could have been, with an extra figure (13.12) added. There is a clear justification for the use of the two types of models, a section on differences in results and an attempt to explain the significant differences as well as an assessment of the level of confidence of the two methods. A second point of concerns, extensively discussed at the LA4 in Hobart as well as critized by the reviewers was related to the assessment of the dynamical contribution of ice sheet in projections and to the fact whether they should be taken scenario dependent or not. Clearly the assessment is based on a limited number of recent studies but this is expressed satisfactory in the Final Draft as well as the likelihood of extreme sea level changes due to marine ice sheet instability.

In the previous report it was requested to make a clear distinction between AR4 and AR5. In most places this is satisfactory handled. However at the top of page 13-54 a small Table would help the reader. As it is it remains a little vague how to close precisely the difference in the total estimates of AR4 and AR5. What is the difference in the glacier contribution and Greenland SMB. Is the difference then fully explained? Another scan on whether the differences between AR4 and AR5 are crystal clear would be good.

Also there were general concerns as to overlap with Chapter 3; we know that the LAs of both chapters have been communicating well for the final draft and prevented overlap. From the text it remains unclear whether the box on the closure of the energy budget needs to be in this chapter. There is a brief justification for it in the box itself, but it is suggested to incorporate this in the chapter main text.

At the 4th lead author meeting there were additional concerns that some data sets (notably altimetry) from particular groups were being shown when others, equally good, were available, so we are pleased to see in figure 13.3(d) for example that time series from 5 groups have been averaged.

However, there have been important changes between the SOD and final draft, which we would have appreciated seeing before the final draft was submitted. For example, the 'multi-millennial' and 'regional change' sections have been rewritten significantly for the final draft. We would have appreciated the chance to comment on these issues although we realize that there is no formal requirement to do so.

Overall, the issues raised in our Second Interim Report have been taken care of adequately, and we have no major differences with the authors concerning the science.

As for the review process itself, there were over 1000 review comments received after both the FOD and SOD, which represented a lot of work for everyone. We know that these were discussed seriously, both at the LA meetings and outside, and the responses of CLAs are acceptable. We believe that 80% of comments received by external reviewers were useful.

Minor issues

References to the NRC (2012) report seem to be reference to grey literature, which should be prevented. In addition there appear to be a few other references, which are to our knowledge not peer reviewed literature. Please go through the list once more and consider the need of those references.

Figures can have a more consistent layout.
Figure 13.3c requires a quantity at the left vertical axis.
Figure 13.7 requires a completion of the legend red is observed from altimetry.
Figure Box 13.1a inconsistency between legend and caption land use change in legend surface albedo in caption.
Figure Box 13.1b unclear why numbers are in Legend, provide colour with legend like for total energy in panel Box 13.1a.
Figure 13.12 (9) is only in caption not in figure.
Figure 13.13 unclear it looks like there are 5 components whereas there are 4 mentioned in the caption, probably caused by unclear difference between light and dark blue and the lack of colour for the lines in panel c.
Figure 13.14a unclear what lines are. Be consistent with fonts, use everywhere a value for m/K, use everywhere Kelvin, and mention in each panel the rate of change not just in a few. Dotted for 2.3 in panel e not visible.
Number of figure in 13.6 large: some could possibly combine 13.16 and 13.17. Both atmospheric loading for RCP4.5 and 8.5 is overdone.
Figure 13.22 grid rather than grit.
Figure 13.25 nearly no difference visible between 13.25a and b. So leave out panel b.
Figure 13.26 explain delta Tm and Delta Hs in caption.
Figure 13.27 for me tide gauge and RCP4.5 have same colour, please change.

This report has been finalize the 28th of June 2013

J. Jouzel, Laboratoire des Sciences du Climat et de l'Environnement/ Institut Pierre Simon Laplace Saclay, France.
R. S. W. van de Wal, Institute for Marine and Atmospheric research Utrecht, Utrecht University, Netherlands.
P. Woodworth, National Oceanography Centre, United Kingdom.
Dr.XIAO, Cunde
State Key Labarotary of Cryospheric Sciences, Cold and Arid Regions Environmental and Engineering Res earch Institute, Chinese Academy of Sciences
Also at Institute of Climate System, Chinese Academy of Meteorological Sciences, China.

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INTERGOVERNMENTAL PANEL ON climate change

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: John C. Fyfe, CCCma, Environment Canada, Victoria, BC Canada

Final Report from Review Editor of IPCC WGI AR5 Chapter 14: *Climate Phenomena and their Relevance for Future Regional Climate Change*

Précis:

A number of significant areas of concern arose from the review comments which the authors successfully addressed one-by-one but with varying degrees of success. No contentious or controversial issues were raised during the review process.

Detailed Report:

This was a particularly challenging chapter.

First, the predetermined thrust of the Chapter on the role of large-scale processes in regional climate change, while laudable, was understandably hard for the authors to follow through on, in a complete and systematic way, given the lack of a significant body of literature with this specific emphasis. This issue, in one form or another, was repeatedly raised by the reviewers. The authors recognized this as a major issue and tried as best they could to address the distinction between the roles of local and large-scale phenomena in regional climate change.

Second, this Chapter, more than any other, relied heavily on the other Chapters and Annex I and for this reason probably matured more slowly than the others. Many of the review comments concerned cross-referencing to other Chapters (and the IPCC SREX Report), which by the final draft was pretty much accomplished in my estimation. The Chapter was also hampered by the lack recent multi-model Regional Climate Model information (e.g. from CORDEX which hadn't really followed through in time). This, of course, was out of the control of the Chapter team, but where they could they did include some amount of single-model RCM content.

A major shortcoming of earlier drafts of the Chapter was an uneven, and sometimes incorrect, application of the "calibrated language". The authors were fully aware this through the review comments, and collectively took steps to educate themselves on the proper application of the calibrated language. In this regard, the final draft is much improved over the second draft. Many review comments also made clear that the level of English was uneven in the Chapter, and this was mostly eventually rectified.

It should be noted that drafts earlier than the last one where very uneven in terms of the quality and distribution of figures. The author team was fully aware of this and between the

second and final draft had produced a set of mostly high quality graphics with a better distribution through the Chapter. That said, some of the new figures (and supporting text) have not been subject to review and for this reason the situation, while understandable, is less than optimal. The same situation exists with respect to references. Many of the review comments highlighted the fact that some references in earlier drafts were outdated (mostly by no fault of the authors since the new CMIP5-based literature was rapidly evolving). The author team most certainly took these comments to heart and by the final draft had assessed (and not just reviewed) much more of the recent literature. The downside here is that some of this assessment appears for the first time in the final draft, and hence was not subject to reviewer scrutiny. In short, the Chapter could probably have benefited from another round of reviews.

In summary, this was a challenging Chapter but despite the challenges the author team produced a fine final product that addressed, in varying degrees, all of the major (and minor) issues raised during the review process.

Congratulations to the author team!

Signature:

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Full Name: John C. Fyfe Date: June 28, 2013

FINAL REVIEW EDIOR REPORT – IPCC WGI – CHAPTER 14

Won-Tae Kwon

This report is the final Review Editor's comment for Chapter 14 of the IPCC WGI, after receiving Final Draft.

Several major issues were recommended to the Author team by Review Editors, after reviewing the expert and government comments for FOD and SOD. How the major issues has been addressed will be summarized in this report.

1) *Better connection with earlier reports (especially AR4 and SREX)*

   Generally there are some references towards earlier IPCC reports, but in some sections it needs to be more clearly pointed out the advancements.

2) *More cross-chapter referencing, including model performance on the modes and variability*

   Several review comments stated to improve cross-chapter referencing with Chapter 2 (observation), Chapter 9 (model evaluation), Chapter 10 (attribution and predictability), and Chapters 11 and 12 (near-term and longer-term projections). It seems that the cross-chapter issues have been referenced more often than SOD but in some sections cross-referencing is seldom indicated. Use of Atlas has been very limited.

   Several review comments recommended to assess the performance of the models relevant to the modes and phenomena (especially with Chapter 9). There has been significant improvement in this issue.

3) *Needs for clear statements on how the modes and patterns related to regional climate*

   This issue is very important for Chapter 14. Since SOD and following lead author meeting in Hobart, this has been addressed much better and more systematically. However, there are needs for further improvements in some regional sections: length of each regional section is uneven and contents could be more coherent and consistent.

4) *Restructuring of the Chapter*

   There has been great improvement on structural issue since SOD.

5) *Focusing on Executive summary*

The key messages from Chapter 14 have been well summarized in Executive summary, especially comparing with SOD.

6) *Too many old references*

It is recommended by Expert Reviewer to discard references prior to about 2005. However, there are still old references remained in the reference list. Some of them would be essential but some of them could be discarded without changing the assessment results, after author's careful consideration.

7) *Need for new and improved figures*

The author team has adequately improved figures.

8) *Length of text*

Has been dealt with.

9) *Acronyms*

It is recommended to establish acronyms and cleaned up jargon. Now there is a list of acronyms.

10) *Expertise of Lead Authors*

The Chapter 14 Author team is consisted of several experts with similar expertise, which makes the writing and assessing process a little bit problematic. This needs to be considered for selection of authors for AR6 (if the Panel allows).

There are many issues has been dealt with throughout teamwork but some of issues could be improved a little bit more. It is clear that the CLAs and LAs have been worked very hard to produce much improved Chapter 14 report since Hobart meeting. I would like to express my appreciation to Authors for their contribution towards AR5.

[signature removed]

23 August 2013,

INTERGOVERNMENTAL PANEL ON climate change

WMO UNEP

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: Kevin Trenberth, NCAR, Boulder, CO, USA

1 July 2013

Final Report from Review Editor of IPCC WGI AR5 Chapter 14: *Climate Phenomena and their Relevance for Future Regional Climate Change*

Three RE reports were written; 2 were the formal ones following each major review, but in addition an update was provided on April 13, 2013 (written by me) to help the authors prioritize their precious time in the last few days before the final version of the chapter was due. This was based upon the chapter at that time.

To summarize the progress in this chapter from my perspective: it has been a struggle. This final version has evolved in positive and much needed ways and it is quite different than the SOD; but therefore another round of reviews is really warranted for this chapter.

The first order draft was not very useful and a major reorganization of the chapter occurred with RE help. The writing was very uneven throughout the chapter. Our comments and recommendations also resulted in recruitment of a number of new contributing authors. Following the 3rd LA meeting in Marrakech, the REs wrote a report on recommendations for actions. This had some impact and we know some actions were taken, but no response was given to us, and some things were not done. In general the response did not take our report adequately into account. *We recommend that the LAs and CLAs should be asked and even required to respond to the RE reports.* This was done for the second RE report (responses received in June 2013).

Our comment on the SOD draft was: "The SOD chapter was quite different than the FOD. Unfortunately it is not yet converged on a polished product. This version is long: much too long, 75% over target, such that it needs to be cut by a third. " So the next draft was improved but came in much too long and was much more of a review than an assessment. Other major issues were with calibrated language and the need to cut older material and start from AR4 and SREX. We also noted "The advice given was also that statements about future changes MUST be conditioned on how well the models simulate the past and current conditions, and predictability considerations." We recommended a strategic set of priorities for advancing the chapter. We summarized as follows: "The LAs and CLAs of Chapter 14 have worked diligently throughout the Hobart meeting so that some substantial progress has already occurred in revamping sections. They have also developed a plan for moving ahead with a time line and with names identified for each action. The amount of work remaining to be done is challenging, and it will be vital for the Lead Authors to meet the milestones set by the CLAs in this plan so that a fully satisfactory "final draft" is produced on time for delivery to the TSU."

By April 2013, with the deadline looming, I examined the progress at the request of the CLAs (all REs were asked but I was the only one who responded) and wrote the following:

It is extremely important at this stage to focus on the main messages coming from the Chapter and so this means focusing on the executive summary. That should state the basis for this chapter: the concerns about modes and patterns and their importance for regional and even continental scale changes. It should point out that models vary in their ability to replicate these and the teleconnections, which qualifies confidence statements about expected changes using model projections.

Statements about expected changes without a statement about the basis and confidence in those changes is not meaningful. In general the basis is the CMIP5 projections. So do the models replicate the phenomenon with veracity and are those that don't excluded? "Based on the models that replicate the phenomenon reasonably well, over the past century(?) projections suggest …"

I personally do not find statements saying "CMIP5 models show…" without also a statement about the merits or quality of the CMIP models wrt the phenomenon in question to be very useful. Also it seems very non-discriminating to lump all CMIP5 model together. Some do a lot better than others and some do not replicate the phenomenon (like El Nino) at all in some cases.

Similarly, projections for the end of the 21st century without a statement of the scenario are also not meaningful. If things like aerosols play a role then that ought to be called out.

There remain some places where there are long strings of references and quite a few are pre-AR4 (and should be eliminated) e.g. sec 14.4.2; l 41.

The tropical cyclone section seems unduly long.

In section 14.8, I would like to see not so much statements just about what might happen in a region but also what dependencies there are on the modes and patterns of variability and whether those are predictable? Is this section tied adequately to the first sections? And are the resulting statements consistent?

It would be nice to see FAQ 14.1 extended to include a statement about the important role of some modes in certain regions and that this can create rather different changes compared to global for several decades.

The references take a LOT of room. Some are not really needed, but most are post 2005. To have so many means the chapter is more leaning toward being a review rather than an assessment. But I note that the references formats are long: no abbreviations or et al. Also they should come in a much smaller font. You should be able to cut the reference sections in half: 46 pages of references currently!!!

It is evident that my interim report had some impact and the chapter evolved quite rapidly toward the end. In examining the final version of the chapter, my comment is that yes, further major progress has been made. In fact I am very impressed with some of the progress and the figures. Out of 27 figures only 7 are identifiable with those in the SOD. But the fact that so many of these figures are new and different means that the final chapter has not been reviewed, because it is now so different. In addition, very few of the figures are adapted from the literature as updates but instead have evidently been generated by the LAs. While this is admirable, it is not in the spirit of the IPCC, which is not supposed to do research.

In many respects this chapter has been running about one whole step behind the IPCC timetable. Jens Christensen stated after it was done "Some colleagues simply never picked up the task and I did not push hard enough, I suppose. A few more with seniority from IPCC would have been welcome."

A few observations as a commentary on the final product:

Some of our suggestions have not really been adopted. For instance the advice to properly qualify statements with how well models perform and the basis for confidence is still not well done in the Exec summary.

To say "The following large-scale climate phenomena are increasingly well-simulated by climate models and so provide a scientific basis for understanding and developing credibility in future regional climate change." avoids saying that some of these are still really poorly simulated and the basis is not adequate to say very much. For instance: "There is growing evidence of improved skill of climate models in reproducing climatological features of the global monsoon" really puts a positive spin on the mixed and even poor performance of models, and thus the assessment of the basis (or its absence) for projections is not well communicated. A similar positive spin is placed on blocking, and simulations of modes. There is a risk of overstating the confidence in results as a consequence and perhaps this was done in order to be able to say something that might get into the SPM. The evidence sometimes does not really support the confidence that is stated, a point made by several review comments (e.g. SOD comment 90 by Reto Knutti).

Reviewer responses by the LAs are adequate and all comments appear to have been addressed. Some responses could be better for some SOD comments like number 63, and there are some spelling errors, like in 97. In 1145 the opposite of what is meant is stated: remove "not". Response 1200 makes no sense. Several responses say they will "take a look" and respond if they agree but they do not say what the final response was (e.g., 1219). Some don't make sense to me (e.g.,1221, 1222). The authors may wish to make another quick pass at the responses to update a number of them.

Overall comments on procedures.

It was extremely frustrating to not be able to make review comments and suggestions on the chapter of which we were review editors. Advice was given about procedures and priorities and how to organize, and I believe these were effective. But I would not do this again and I think the whole process needs major revisions. I would like the following added to the chapter to ensure that we (REs) are not responsible for any text:

Review Editors were responsible only for seeing that review comments were appropriately responded to. They were not permitted to comment on their own chapter and therefore have no responsibility for the content or quality of the chapter. They do not necessarily endorse the chapter.

I do not say this lightly. Because I am often quoted in the media and I had a lot of exposure via "climategate"; climate change deniers are apt to take stuff out of the chapter and attribute it to me personally. Therefore I hope that such a disclaimer can be added.

Signature:

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Full Name: Kevin E. Trenberth Date: 1 July 2013

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To: IPCC Working Group I Co-Chairs

From: David Wratt, National Institute of Water and Atmospheric Research, Wellington, New Zealand

Final Report from Review Editor of IPCC WGI AR5 Chapter 14: Climate Phenomena and their Relevance for Future Regional Climate Change.

General Comments

This Chapter was a particularly challenging one for the authors. The scope was different from chapters in previous assessments, the authors had to deal with a large number of phenomena / modes in the literature while aiming to keep the text concise and comprehensible to a non-expert reader, there were high expectations placed on the authors regarding transferring their key assessment findings about phenomena / modes into climate implications for regions, and the author team was a large one with many members who had not before participated in an IPCC assessment.

As a result of these challenges both the First Order Draft and the Second Order Draft fell rather short of final expectations in a number of areas, and received many substantive review comments. I am pleased to note as a Review Editor that in my view the author team rose to the challenge by providing a Final Draft that was much improved over the SOD. They did this by addressing the major points raised by reviewers, including those summarized our joint Review Editor report provided at the end of the January 2013 final Lead Authors' meeting in Hobart. In fact the CLAs provided a response to the REs in early June, specifically outlining how they had addressed the main points from the January 2013 RE report.

This responsiveness to review comments does mean that some parts of the Final Draft are substantially different from the SOD. In an ideal world it would have been better if many of these changes had been made between the FOD and the SOD, so that experts would have had more opportunity to review them. However I am satisfied that the author team did give these changes careful consideration and ensured they were justified by the literature.

Specific Comments

The main areas of concern that (based on review comments) I still held in common with the other REs in late January (summarized in italics), and the actions taken by Chapter 14 authors to address them, are listed briefly below:

The SOD was still much too long – some 75% over target, and had still not converged on a polished product: The authors discussed this during the January Hobart LA meeting, and subsequently reduced the length of the Final Draft substantially, by trimming material and by moving supporting material to a Supplementary Material annex.

(a) Length and Focus: Desirable to substantially shorten and tighten many of the sections: See my comment above regarding length. Also, my reading of the Final Draft confirms that the Sections are now much tighter and more focused than they were in the SOD.

(b) Need to assess rather than review - this may help with length and focus too: Again, from my reading of the Final Draft there has been a substantial shift in this direction.

(c) Correctly using the calibrated IPCC uncertainty language - and reconsidering some of chosen uncertainty levels in the light of expert review comments: Many review comments on the SOD made the point that uncertainty language had been incorrectly used, for example by mixing confidence and likelihood language in one sentence. The REs worked with the Chapter 14 LAs in Hobart to help them understand the calibrated uncertainty language – and in my view it is now used correctly in the Final Draft. From their entries on the Excel Spreadsheet it appears the LAs have carefully considered the places where reviewers questioned their uncertainty assessments.

(d) Desirability of a more coherent and consistent approach between regions in Section 14.7 on future regional change (level of detail, subheadings etc) and trying to better relate material in the regional sections to the earlier phenomena discussions: A more homogeneous approach was taken to the regions in the Final Draft than in the SOD. For the Final Draft the authors also have worked on linking their assessment of likely changes in phenomena through to their regional discussions, including by developing material such as that provided in Tables 14.2 and 14.3.

(e) Work on specific technical issues raised by reviewers: From sitting in on the Chapter 14 discussions in Hobart and at the previous LA meeting, reading the Final Draft, reading the feedback the CLAs provided in early June on the summary of key issues from reviewer comments in the January RE report, and viewing the author responses in the Excel Spreadsheet of review comments, it is my view that the LAs did meet this requirement. However while on the whole the Chapter 14 LAs did a good job of documenting their responses in the SOD review spreadsheet, there were still a few places where answers indicated what the authors intended to do rather than saying what they actually did. I therefore suspect there are a few placed where authors entered their intentions ahead of the Hobart LA meeting, bit did not update the entries to reflect the changes actually made in the Final Draft. I have brought these points to the attention of the WG1 TSIU, and I understand they are contacting the Chapter 14 CLAs to ask them to ensure such entries are updated, to form the "spreadsheet of record" that will be archived.

Notes for Copy Editing:

On reading the Final draft I did pick up a few editorial matters, most of which are matters that could be addressed during copy editing. I have listed them below for the assistance of the copy editor:

First Sentence of the Chapter 14 Executive Summary: This sentence does not make grammatical sense.

Caption for Table 14.1 line 16: I think this should read "… and light BLUE for increasing precipitation" (not "light green" as in the current text).

Caption for Figure 14.8, second line: I think this should read "…(colour contours at intervals of 0.2°C; negative DASHED) …." (ie "dashed" not "shaded").

Final RE Statement:

It is my view as a Review Editor that all substantive expert and review comments were afforded appropriate consideration by the Chapter 14 Author Team.

Signature:

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Full Name: David Stuart Wratt Date: 30 June 2013

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: **Sylvie Joussaume,** CNRS, IPSL/Laboratoire des Sciences du Climat et de l'Environnement, FRANCE

Final Report prepared by the Review Editor Team of IPCC WGI AR5 **Technical Summary**

The Review Editors have noticed clear improvements of the Final Draft version of the Technical Summary (TS) after the review process of the First Draft. Most comments from the FOD review concerned: structural aspects of the text, questions on scientific content or requests to add information related to policy issues. The LA team has answered many of the review comments comprehensively (1557 review comments) and accounted for most of these comments in the Final Draft of TS. In addition, substantive changes to the underlying chapters were also included in the Final Draft. The main issues raised by the reviewers were the needs to:

- Better emphasize differences with previous assessments: AR4 and SREX.
- Better ensure consistencies between TS and chapters.
- Improve text and cross-chapter consistency on key scientific issues:
    - Past 15 years global surface temperature warming trend hiatus, now included in a Box TS.3 and Box 9.2.
    - Box on the Sun's influence on the Earth's climate in Box 10.2, referred to in TS
    - Better put in perspective future changes with respect to past changes: upgraded in Box TS.5
    - Better clarify the concepts of radiative forcing and effective radiative forcing (Box TS.2)
    - Improve Box TS.4 on model evaluation in agreement with statements in chapter 9, in particular with regards to sea ice retreat (Figure TS.17)
- Improve text on key policy issues:
    - Better description of RCPs and of differences with SRES (Box TS.6 and Section 12.3)
    - Clarify projections versus the 2°C climate target: Table TS.1 provides the table and how to convert projections relatively to different reference periods
    - A better balance between carbon metrics was requested by several reviewers (TS3.8)

These issues have been addressed by the Author team and text changed accordingly. No real contentious issue emerged from review comments.

The Review Editor team of the Technical Summary considers that all substantive expert and review comments were afforded appropriate consideration, and most led to improvements in the TS content.

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Signature:

Full Name: SYLVIE JOUSSAUME Date: 31rst JULY 2013

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: Joyce E. Penner, University of Michigan

Final Report prepared by the Review Editor Team of IPCC WGI AR5 **Technical Summary**

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These issues have been addressed by the Author team and text changed accordingly. No real contentious issue emerged from review comments.

The Review Editor team of the Technical Summary considers that all substantive expert and review comments were afforded appropriate consideration, and most led to improvements in the TS content.

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Full Name: Joyce E. Penner Date: July 31, 2013

Final Report from IPCC Working Group I AR5 Review Editor (RE)

To the IPCC Working Group I Co-Chairs

From: Fredolin Tangang, The National University of Malaysia

Final Report prepared by the Review Editor Team of IPCC WGI AR5 **Technical Summary**

The Review Editors have noticed clear improvements of the Final Draft version of the Technical Summary (TS) after the review process of the First Draft. Most comments from the FOD review concerned: structural aspects of the text, questions on scientific content or requests to add information related to policy issues. The LA team has answered many of the review comments comprehensively (1557 review comments) and accounted for most of these comments in the Final Draft of TS. In addition, substantive changes to the underlying chapters were also included in the Final Draft. The main issues raised by the reviewers were the needs to:

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These issues have been addressed by the Author team and text changed accordingly. No real contentious issue emerged from review comments.

The Review Editor team of the Technical Summary considers that all substantive expert and review comments were afforded appropriate consideration, and most led to improvements in the TS content.

Signature: *[signature removed]*

Full Name: Fredolin Tangang Date: Aug 1, 2013