

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
1	35586	18	0	0	0	0	it would be helpful to have the content of FAQ 18.3 at the beginning at the chapter, since IPCC's terminology is not obvious (Daniel Farber, UC Berkeley)	We understand the request but found it more consistent to provide content on detection and attribution at the beginning of the chapter (through the Executive Summary). It will be easy for the reader to find the methods section and also the FAQs if she wants to.
2	35597	18	0	0	0	0	I was hoping that this chapter would provide an explanation of the statistical attribution methods -- based on standard statistics, Bayesian, Monte Carlo. Maybe that's elsewhere in this volume, but I think it would be very useful for many of us. (Daniel Farber, UC Berkeley)	We have dedicated substantial space to concepts and methods. Standard statistical methods are beyond the scope of this chapter. AR5WG1Ch10 has some discussion on these issues
3	37308	18	0	0	0	0	General comment: I think that it is an important chapter but it should be done after the other chapters are completed as it is fed by their results. But it is an big work to collect all these results, to put them on an homodeneous scale and to use the same rules to attribute each detected change. At this stage, I do not see clearly if the chapter intends to propose meta-analyses of the impacts or just a compilation of the significant results (done in a qualitative way). In that respect, I find very pertinent sections 18.2, 18.1 and 18.6 while sections 18.3 to 18.5 are less. (Joel Guiot, CNRS)	We agree, but the AR5 schedule does not allow for suggested procedure. 18.3-18.5 are mostly based on other chapters, and this connection has been reinforced for the SOD. No formal metaanalysis was feasible in the time frame given.
4	37309	18	0	0	0	0	General comment (2) : Sections 18.1 and 18.2 presents a detailed review of the limitations and potential of detection/attribution (strong evidence of a change, lower evidence but based on a number of series, etc...), but finally it does not appear clearly for each result, to what category belong each observed change. There is very interesting general considerations at the beginning of the chapter, followed by results, but nothing in between. (Joel Guiot, CNRS)	Overall, we have aimed at systematically improving the line of sight from individual findings, through sectoral and regional syntheses, accompanied by confidence statements, to the overall synthesis.
5	37310	18	0	0	0	0	General comment (3) on sections 18.3, 18.4 and 18.5: I understand that it is a synthesis of the previous chapters of this report + previous AR4. But such summary will be aslo in the executive summary of WGII and certainly in a more digested way. I do not see the interest to have 30 pages on that. Maybe it could be replaced by extended tables (done in an homogeneized way). If the main results seem to be redundant (I am not sure as I have not read the previous chapters), the boxes (in particular the methodological boxes), in the other hand, are useful. (Joel Guiot, CNRS)	Indeed, much of the material is now presented in tables, and a substantial effort has been made to produce a systematic synthesis that goes significantly beyond the mere repetition of material from the chapters. We do however also find justified to repeat some of the information, in order to provide a single place in the WGII report for observed impacts of climate change
6	37311	18	0	0	0	0	General comment (4) on sections 18.3 to 18.5: the various sections are not equally balanced; sometimes, specific events are mentioned in the text (with or without comments), sometimes not. I think that they should be in a table and it is not necessary to repeat them in the text (Joel Guiot, CNRS)	We have worked hard to achieve a better balance for the SOD.
7	38061	18	0	0	0	0	In general, the bulleted statements in the executive summary are not found in the main text body (including the assessment of confidence). I suggest that each statement of assessment in the executivte summary be clearly found in the text. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	We have worked hard to achieve a good line of sight between statements in the executive summary and the main text.
8	38892	18	0	0	0	0	This is a very well written chapter, embracing major impacts of climate change. Despite the complexity of the subject, the chapter portrays the diversity of the issue in a comprehensive manner. (Mohamed Tawfic Ahmed, Suez Canal University)	noted, thanks
9	39367	18	0	0	0	0	Not quite sure understand this chapter. Detection and attribution sections in all the other chapters? (Gareth S Jones, Met Office)	The stated objective was to have a fully consistent treatment of detection and attribution of observed impacts of climate change both in the regional and sectoral chapters, and - in the form of a synthesis -- in chapter 18. This objective was essentially given in the plenary-approved outline of the WGII report.
10	39793	18	0	0	0	0	The communication of the science is generally clear, although there are some places where greater clarity is required. I have several concerns regarding inconsistencies, which detract from the text. Some references are in alphabetical order, others in chronological order, and others in a random order. There is inconsistent use of Century/century; 21st, 21st, 20th, 20th, 21st-Century; inconsistent capitalisation: arctic/Arctic; inconsistent italicisation of et al.. Also, for consistency, per capita should be italicised, as should other Latin words used in an English sense (e.g. per, via, sensu); CO2 - subscript 2- and CO2 are used interchangeably. (Peter Burt, University of Greenwich)	To the best of our abilities, we have taken care of these editorial matters. Undoubtedly, professional copy-editing will take place for all these chapters, once the review process has been completed on content.
11	40798	18	0	0	0	0	For IPCC climate change has always been non anthropogenic as well as anthropogenic, contrary to UNFCCC, as recalled in the preceding reports. WG I is responsible for discussing the attribution of observed climate change to anthropogenic factors. WG II task includes the attribution of observed impacts to observed climate changes, as opposed to other drivers, the discussion of the cause of the climate changes. This chapter treats the later in several occasions starting with the Executive Summary, page 3, line 12 and finishing with FAQ 1. Attributing impacts to anthropogenic climate changes should be discussed in the synthesis report only. Formal approval by WG I scientists that the model uncertainties do not prevent the use of the concept of "attribution to anthropogenic climate change" is mandatory. The consistency of observed impacts with model projections must be complemented by a discussion of the confidence in the models projections (Michel Petit, CGIET rue de Bercy)	The chapter now states very clearly that it focuses on ALL observed impacts of climate change, no matter whether they can be attributed to anthropogenic emissions or not.
12	41880	18	0	0	0	0	Special effort to discuss about detection and attribution of each impact is greatly appreciate. Nevertheless I would like if more place was given to controversies for non climatic impacts. Some examples will be illustrated later in my comments, but more I (Nathalie BREDIA, INRA)	As the methods section states very clearly, the entire treatment of attribution requires analysis of non-climatic confounding factors. An IPCC synthesis is necessarily based on published scientific literature - therefore the limitations in confidence, with regard to climatic as well as non-climatic drivers of change, are the same as in the underlying literature. Great care was taken to make this clear throughout the chapter.

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13	42148	18	0	0	0	0	Confidence levels are not consistently provided (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	The application of confidence levels, following IPCC guidance, has been systematically improved throughout the chapter.
14	42154	18	0	0	0	0	The sections in this chapter are very dissimilar not only in terms of information and depth (from very punctual and quantitative to almost anecdotal evidence) but also in terms of writing and reporting (references, confidence levels, etc...). (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	This has been systematically improved throughout the chapter
15	42209	18	0	0	0	0	The comments made above on Ch. 11 similarly affect Ch. 18. Copied here are the comments that Sorensen referred to) Section 11.2.2: Although the section starts out with correctly mentioning the U-shaped relation between temperature and mortality, the rest of the section is focussed on extreme temperature excursion and specific diseases related primarily to high temperatures, plus very limited remarks on low temperatures. Much more exhaustive and quantitative investigations have been made, e.g. by WHO (Heat waves: risks and responses, Regional Office for Europe, Copenhagen 2004) and by J. Diaz and C. Santiago (cCASHh workshop on vulnerability to thermal stresses, Freiburg 2004), and the work has been continued by global and quantitative modelling of the impacts of changes in daily maximum and minimum average temperatures in Chapter 5 of B. Sørensen (Life-cycle Analysis of Energy Systems; Royal Society of Chemistry, RSC Cambridge 2011), with further references. Section 11.2.4.1.1: It is mentioned that the incidence of malaria is declining in several countries (e.g. Figure 11.9), but it would seem appropriate to quote the much stronger WHO model predicting near-eradication of malaria by 2030 (WHO: The global burden of disease: Updated projections, Geneva 2008). Similar projections are made by the WHO for other tropical diseases. If correct, the impact of global warming on absolute mortality would dramatically decrease. (Bent Sorensen, Roskilde University)	It is not clear to us what "comment above" relates to. We assume that chapter 11 has responded appropriately and take no further action. None of the proposed literature appears to relate to the topic of detection and attribution of observed climate change.
16	43069	18	0	0	0	0	As I see, many Boxes are dealing with methodological issues. I like to suggest locating those Boxes in the method section of 18.2 and also improving them (or adding new Boxes) in term of challenges and limitations of D&A approaches (see comment above). (Seung-Ki Min, CSIRO Marine and Atmospheric Research)	The entire sequence of boxes has been modified and all boxes are now placed in the vicinity of the section they relate to..
17	43294	18	0	0	0	0	This chapter is the result of an admirable attempt to extract relevant information from all WGII chapters while these were in the process of being compiled. CLAs and LAs are to be congratulated on this product which naturally needs some further development during the next round. Some of the discussion occurs at a (too) high level and it is not always clear what the more practical implications are. (Hans-O. Pörtner, Alfred-Wegener-Institute for Polar and Marine Research)	Thanks, all efforts have been made through SOD preparation to liaise with sectoral and regional chapters. The full analysis of the SOD will show whether additional adjustments are necessary.
18	44220	18	0	0	0	0	number and quality of figures should be increased (Georg Kaser, University of Innsbruck)	The number of figures has not been increased as compared to the FOD, but we trust that their quality is adequate for the SOD review at this stage.
19	44524	18	0	0	0	0	Figure 18.4: Figure looks good – Please be careful to maintain consistency with confidence levels given in WGI AR5 Ch10 for the relevant components of the hydrological cycle, as subsequent drafts of both chapters develop. (Thomas Stocker, IPCC WGI TSU)	All confidence plots have been fully revised, not only in chapter 18, but also in many other chapters. Care has been taken to maintain consistency with the principles stated in our methods section. Due to the difference between the detection of climate change and the detection of its impacts, the definitions from WGI had to be modified for the purposes of WGII, as is now explained in detail in the methods section.
20	44525	18	0	0	0	0	Section 18.3.1.1 (Regional water balance) – This section makes good use of the SREX, but should also update statements wherever possible based on latest draft of WGI AR5 Ch2. (Thomas Stocker, IPCC WGI TSU)	Reference to WG1 AR5 ch 2 has been included in first paragraph of 18.3.1 and other places along the text.
21	44526	18	0	0	0	0	Section 18.3.5.3. (Impacts of Extreme Weather Events on Food Production) p. 23, l.8. : please be specific about which SREX chapter you are citing here. Not clear to us if or where this attribution statement regarding frost days is supported in the SREX. (Thomas Stocker, IPCC WGI TSU)	This text has moved to 18.4.1.1. We have changed the citations as we agree with your statement on SREX. The citations used now are (Alexander et al., 2006; Zwiers et al., 2011), as well as for the occurrence of very hot nights (WGI AR5 Chapter 10.6.1)
22	45499	18	0	0	0	0	The authors have created a stimulating chapter on observed impacts. As someone who was involved in Chapter 1 of AR4, I found this AR5 chapter to be a nice next step, different in its approach but in some ways complementary. That said, I do have some issues/comments ... (Peter Neofotis, City University of New York & Climate Impacts Group, Columbia Univ )	Thanks
23	47025	18	0	0	0	0	I only comment on sections related to the cryosphere, in particular glaciers (Frank Paul, University of Zurich)	noted
24	47260	18	0	0	0	0	general comment- this chapter is very promising and I look forward to the second draft. It think ti will be important to give some consideration of the so-called slow onset impacts, which are under consideration in the UNFCCC. Meanful of the challenges of attributing this slow onset impacts. (Juan Hoffmaister, Third World Network)	The underlying literature on slow onset impacts is not very extensive, and there was therefore little material that finally entered our synthesis on this matter.
25	48166	18	0	0	0	0	The place of this chapter in the entire sequence of the report is odd. It should come very early. I would advise to consider a major change in sequencing of the chapters of the WG II report. (Jochen Harnisch, KfW)	The outline of the report is IPCC plenary approved and cannot be changed.
26	49128	18	0	0	0	0	This chapter mostly focuses on the attribution related to changes in the past. Attribution of impacts related to projected climate change should also be covered somewhere in the WG II report but is not for the moment. Suggest that you discuss with the other chapters where this should be dealt with. (Oyvind Christophersen, Climate and Pollution Agency)	As clarified in our introduction, detection and attribution of observed impacts can only refer to the past - no observations from the future are available. We do understand the reviewers' point but refer to our definition of "observations" which we believe has wide consensus around the IPCC.

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27	49563	18	0	0	0	0	The authors are to be congratulated on producing an FOD text that is already in a relatively mature state from an editorial perspective, and which already contains what would appear to be a considerable number of carefully considered and well nuanced assessments. That said, the traceability of the assessments that are made is not always clear. There are many instances where literature is reported on but does not appear to be critically appraised, and where it becomes difficult to determine whether the information that is being presented is representative of the available literature. (Francis Zwiers, Pacific Climate Impacts Consortium)	We are aware of this shortcoming in the FOD and are confident to now have provided full tracable accounts in the SOD.
28	49564	18	0	0	0	0	The usage of uncertainty language is inconsistent at this stage. It is not clear, for example, whether each instance of the word "likely" in the chapter represents a quantified likelihood assessment. In instances when it appears that a likelihood assessment is being made, it is not always clear whether the authors would be able to quantify the likelihood of the outcome that is described probabilistically. (Francis Zwiers, Pacific Climate Impacts Consortium)	see response to comment 13
29	49565	18	0	0	0	0	As a matter of editorial practice, it would be best to avoid the use "reserved words" such as likely and confidence except explicitly in statements that use calibrated uncertainty language as described in Mastrandrea et al (2010). Also, I think it would be wise to avoid using the word "significant" (or its derivatives) without a qualifier such as "statistically", so that the sense in which something is stated to be significant is clear. (Francis Zwiers, Pacific Climate Impacts Consortium)	see response to comment 13
30	49566	18	0	0	0	0	I think as a general practice, when referring to the SREX report, authors should cite specific chapters and subsections rather than the report as a whole. (Francis Zwiers, Pacific Climate Impacts Consortium)	All references to chapters in the SREX report are now cited according to guidelines
31	50979	18	0	0	0	0	1) Overall -- In preparing the 2nd-order draft, the chapter team should prioritize making each section of the chapter a polished, comprehensive treatment of topics considered. From these sections, the chapter team is then encouraged to maximize the utility of its findings, ensuring that they are robust, compelling, and nuanced. Themes to consider informing in constructing findings include decisionmaking under uncertainty, risks of extreme events and disasters, avoided damages, and limits to adaptation. To these ends, the chapter team has prepared a solid 1st-order draft adopting effective frameworks for cross-chapter syntheses in the context of detection and attribution. In effort to inform further chapter development, I provide some general and specific comments below. (Katharine Mach, IPCC WGII TSU)	We believe to have significantly advanced on all points mentioned
32	50980	18	0	0	0	0	2) Highlighting key findings -- In developing the 2nd-order draft, the chapter team should continue presenting key findings throughout the sections of the chapter, using calibrated uncertainty language to characterize its degree of certainty in these conclusions. In this way, a reader of the chapter will be able to understand how the literature reviews and syntheses throughout the chapter--the traceable accounts--support the conclusions of the chapter, especially those presented in the executive summary. Additionally, such identification of key findings throughout the chapter will further enable the chapter team to characterize the state of knowledge in the executive summary with both overarching, big-picture conclusions and meaningfully specific, richly informative conclusions. (Katharine Mach, IPCC WGII TSU)	Uncertainty language has been followed (see also comment 13), and the entire synthesis is focused upon the identification of key findings with appropriate tracable accounts.
33	50981	18	0	0	0	0	3) Specificity of described observations -- As much as possible and appropriate given the nature of conclusions drawn, the author team should continue presenting observed impacts and trends with high levels of specificity and conciseness. In this vein, the author team might further consider the following for some examples provided in the chapter: indicating relevant time periods, geographic areas, and variability for observations; and characterizing key driving factors where ranges of outcomes are presented, as part of the chapter's consideration of attribution. (Katharine Mach, IPCC WGII TSU)	There are severe limits of space for the presentation of specific findings, but we now provide precise links to the relevant chapters. Our focus was on a suitable way of synthesising findings, rather than repeating them.
34	50982	18	0	0	0	0	4) Considerations for chapter subsections on specific sectors and regions (18.3-18.5) -- In further development of these subsections of the chapter, the author team might consider the following. 1st, if there were further consistency in the structure of these chapter subsections, the reader might be better able to understand how traceable accounts are developed in each. For example, the author team might consider further ways to harmonize, across the sectoral and regional subsections, approaches to subsectioning the subsections, using figures and tables as a complement to chapter text and communicating the degree of certainty in findings through use of calibrated uncertainty language. 2nd, where the author team cross-references other chapters in support of assessment conclusions developed in those other chapters, as much as possible, it would be preferable to cross-reference the specific subsections of those other chapters--to ensure clear traceability of findings for the reader. Additionally, if the author team is developing a conclusion in THIS chapter based on assessment in other chapters, the author team should of course cross-reference the relevant subsections of those other chapters--as well, the author team should consider citing some of the key literature assessed in the other chapters, again to orient a reader who is trying to understand the support for a finding. (Katharine Mach, IPCC WGII TSU)	We have very carefully adjusted our section structure, the structure within sections, and the crosslinks to the rest of the WGII report.
35	50983	18	0	0	0	0	5) Usage conventions for calibrated uncertainty language -- Where used, calibrated uncertainty language, including summary terms for evidence and agreement, levels of confidence, and likelihood terms, should be italicized. In addition to incorporating these terms directly into sentences, the author team may find it effective, as done in many places in the chapter, to present the terms parenthetically at the end of a sentence or clause. Casual usage of the reserved uncertainty terms should be avoided, as has been flagged in some specific comments throughout the chapter. (Katharine Mach, IPCC WGII TSU)	see comment 132
36	50984	18	0	0	0	0	6) Harmonization with the Working Group 1 contribution to the AR5 -- At this stage of chapter drafting, the author team should carefully consider the working group 1 contribution. Wherever climate, climate change, climate variability, and extreme events are discussed, the chapter team should ensure that their treatment is harmonized with the assessment findings of working group 1. (Katharine Mach, IPCC WGII TSU)	For anything related to climate, this comment has been followed. For the actual definition of detection and attribution, there are important differences between WGI and WGII which we have explained in our methods section.

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37	52437	18	0	0	0	0	Detection and Attribution 1 of observed climate change is important for detection and attribution 1 of observed Impacts,the relationship between the observed climate change and the natural system change is crucial ,especial climate change and non-climate change stresses factors,so it is necessary to discuss the relationship between the observed climate change and the natural system change . (Jian Guo WU, Chinese Academy of Environmental Sciences)	this is part of our treatment of confounding factors
38	53805	18	0	0	0	0	It is not clear how D&A was determined. Some sections describe patterns without discussing whether trends were detected let alone attributed to climate change. Note that the definition of climate change includes anthropogenic and natural forcing. (Kristie L. Ebi, IPCC WGII TSU)	This should now be fully clarified by the revised section on methods as well as every single statement on detection and attribution throughout the chapter.
39	53806	18	0	0	0	0	Why is the chapter only looking at detection when there is an ex ante expectation? This suggest the chapter could be missing trends of importance but that were unexpected. Detected trends not associated with climate change are important findings. (Kristie L. Ebi, IPCC WGII TSU)	The general approach of the chapter is to focus on the detection and attribution of predicted impacts of climate change. This is consistent with the scientific method, as well as with the overall philosophy of the chapter that some understanding of the processes underlying climate impacts is crucial. It is also a practical necessity, as an enormous number of things totally unrelated to climate may exhibit change and it is neither possible nor desirable to consider all of them in the context of an IPCC report. There is no literature available for detection of unexpected changes.
40	53807	18	0	0	0	0	There is uneven uses of a multi-stressor context. Policymakers want to understand to what extent changes could be due to climate change, within the context of other drivers. (Kristie L. Ebi, IPCC WGII TSU)	The assessment of confounding factors is a cornerstone of the entire analysis. Not all underlying literature fully permits this assessment however.
41	53808	18	0	0	0	0	It would be helpful to have a standard format for presentation of results, including where confidence statements are placed. (Kristie L. Ebi, IPCC WGII TSU)	We have standardised the presentation to the extent possible, throughout the chapter.
42	53809	18	0	0	0	0	It is important to clearly articulate the scientific standard for attribution. In some cases, attribution appears to be based on one study. In other cases, there is no reference for attribution statements (such as page 42, line 41). Further, it would be helpful to have an explanation of how confidence in attribution can be higher than confidence in detection (e.g. page 21). (Kristie L. Ebi, IPCC WGII TSU)	The criterion of "one study or several studies" is a rather weak criterion since it does not take into account the different quality of studies, nor the amount of underlying data. Our assessment fo confidence is based on a number of factors, the number of studies being only one of them.
43	53810	18	0	0	0	0	This chapter is supposed to build on the AR4, not repeat those findings. (Kristie L. Ebi, IPCC WGII TSU)	We have aimed to avoid all repetition from AR4 findings.
44	53811	18	0	0	0	0	There are multiple uses of "likely" where it is not clear whether this is a confidence statement (which is what the term is reserved for) or whether it is casual usage (which is inappropriate). (Kristie L. Ebi, IPCC WGII TSU)	see comment 13
45	53812	18	0	0	0	0	It would be helpful to consistently note relevant chapter sections. (Kristie L. Ebi, IPCC WGII TSU)	Chapter sections have now been consistently noted and crosslinked.
46	53857	18	0	0	0	0	Please see supporting materials for general comments by Constance Lever-Tracy (Constance Lever-Tracy, Flinders University of South Australia)	It is not clear what is meant by this comment, it is therefore left without further action
47	53881	18	0	0	0	0	This is an important chapter and is becoming more important by the day as 2012 progresses. I believe this chapter needs a box which very clearly explains how detection and attribution works and its limitations and its strengths for a non-scientific reader. I would encourage you to consider a variety of recent D&A literature to use as examples when writing the box. The box needs to explain D&A of extreme events as well as trends in means and other measures of climate change. The box should address how climate change might affect the magnitude of events versus changes in their frequency and how D&A is different for each measure. The box should also explain the inherent mixed message implicit in some of these studies, i.e. is climate change happening or not? Some of the statistical hurdles necessary to make a detection statement and an attribution statement should be discussed. It should also discuss why D&A might be useful to some decision makers, and not so useful to others. For example, in a multi-stressor global change environment, a climate change oriented D&A of a recent extreme event may not be that helpful if the goal is to predict the frequency of re-occurrences of the event. Ultimately, I think this material will be important enough that it will need to be in the WGII Summary for Policy Makers. There is a variety of literature on D&A that might inform this box. See articles by Trenberth, Curry, Allen in WIRES Climate Change 2011. Also BAMS article on Attribution by Peterson, Stott, Herring. Also some articles in Nature on recent Extreme events. (Bradley Udall, University of Colorado)	These suggestions have been taken into account - however we have dedicated a separate subsection to extreme events and not a box.
48	54462	18	0	0	0	0	GENERAL COMMENTS: I would like to thank the authors for a very interesting and enjoyable FOD. When considering the expert review comments received on your chapter and the next round of revisions, I suggest several overall priorities. (1) Keep in mind that the preparation of the SOD is the time to ensure that each section of the chapter presents a comprehensive treatment of relevant literature, and that the Executive Summary presents findings that capture the key insights that arise from the chapter assessment. (2) This is also the time to focus on distilling the chapter text, not just fine-tuning wording but editing with a critical eye to improving quality by making discussions succinct and synthetic, while still being comprehensive. (3) Cross-chapter coordination is also important at this stage, and the author team has clearly made extensive efforts to coordinate across chapters and to prepare a framework in this chapter to synthesize information on detection and attribution. (4) Cross-Working Group coordination is important as well, and relevant chapter sections should cross-reference chapters from the other Working Groups, particularly in the case of statements about changes in mean or extreme climate conditions that are assessed in the contribution of Working Group I. (Michael Mastrandrea, IPCC WGII TSU)	This comment provides the guideline which we have followed throughout SOD preparation.

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49	54463	18	0	0	0	0	GENERAL COMMENTS 2: In addition to a variety of specific comments, there are two I would like to highlight at the outset. First, given the relevance of two definitions for "confidence" in this chapter (in a statistical sense and in the context of the calibrated uncertainty language), it will be very important to maintain a clear distinction in usage in the chapter text. In most cases this distinction is clear, but in some it may not be (e.g., Box 18-2, see specific comment there). Second, an important element of the synthesis occurring in this chapter is in assessing the confidence in detection and attribution at a global or regional scale for systems/sectors where a variety of individual studies exist but where formal meta-analyses have not been performed. Box 18-2 lays out a very clear discussion of the basis for high to very high confidence in attribution of observed biological changes to anthropogenic climate change. While meta-analyses do exist for this topic, confidence is also built on the combination of multiple lines of evidence and replication of study results. If possible, it would be very useful to present a more general discussion of the approach taken in the chapter when synthesizing across individual results and developing confidence in detection/attribution at a broader scale based on this evidence, and then to clearly identify specific cases where such synthesis is occurring, the nature of the evidence that is being synthesized, and the basis for the broader confidence assignment(s). One example from the FOD where this is done already to a certain extent is the discussion of changes in ocean species and ecosystems in 18.5.9, where confidence in attribution at a global scale is presented as higher than confidence at more specific geographic scales, taxonomic groups, or types of responses. This is a valid conclusion, but requires clear presentation of its basis. It seems to me that such situations will arise for a variety of topics as further information is filled in working with other chapters. (Michael Mastrandrea, IPCC WGII TSU)	for confidence language, see comment 13, for the build-up of confidence across a large number of studies, we have found that expert assessments differ between different impacted systems. Our final analysis and its synthesis makes the greatest possible use of expert assessments throughout the literature, making clear that a synthesis like the one in this chapter cannot be considered a formal meta-analysis.
50	54464	18	0	0	0	0	EXECUTIVE SUMMARY: The author team has made a very good start on the Executive Summary, including clear attention to providing traceable accounts (see separate comment on this) and calibrated uncertainty language (although this still needs to be added for some bullets). For the SOD, I suggest considering ways to increase the specificity of the findings in the Executive Summary. The separation of sectoral and regional findings makes sense given the structure of the chapter and the other chapters from which it draws information. However, many of the bullets on natural systems, managed ecosystems, and human systems talk about regional trends in general terms without providing specifics, and I was left wishing for more information about which regions/systems are being affected in the ways described. One approach the author team might consider would be to integrate the list of regional bullets that appears at the end of the Executive Summary into the categories in the previous two lists for natural systems and for managed ecosystems and human systems. The bullet on ocean systems and coral reefs is one example of this already. There may also be other regional details discussed in the sectoral sections. Also, if there are cross-sectoral confluences of impacts at a regional scale that would be useful to highlight separately, those could be a candidate for a separate list of bullets. (Michael Mastrandrea, IPCC WGII TSU)	We have considered the degree to which regional, and specifically sectoral information could be presented in the Executive Summary. The conclusion was that the level of detail provided in the chapter (and in related WGII chapters) cannot possibly be repeated in an Executive Summary. The result of our efforts to strike a reasonable balance between synthesis and detail is in the SOD, and we look forward to constructive review comments of this fully revised summary.
51	54465	18	0	0	0	0	TRACEABLE ACCOUNTS: The author team has made a good start to providing traceable accounts for assessment findings and highlighting the location of those traceable accounts in the Executive Summary. There are some cases where improvements could be made, and I have included comments associated with specific findings. In general, I would recommend the author team continue to strengthen the linkages between the Executive Summary findings and the corresponding chapter text. One approach would be providing some explanation of the calibrated uncertainty language used in the Executive Summary in the corresponding chapter section(s) where the traceable account appears for each finding. Confidence language is used extensively and effectively throughout the chapter, and it would be useful to be able to trace the synthesis that occurs in developing the confidence assigned to Executive Summary statements, particularly where confidence is not high (where there is an opportunity to explain why it is not high). Underlying all of this as well is the need to continue to evaluate and present/link to the evidentiary support for each confidence assignment in the chapter. We in the TSU are available to discuss these issues if it would be of use. (Michael Mastrandrea, IPCC WGII TSU)	Throughout the chapter, we have taken great care to provide all tracable accounts required.
52	37034	18	1	1	93	53	The chapter contains too many redundant information, even within-chapter references are common. On the other hand, paragraphs like e. g. page 46, lines 45 - 52 give information with confidence levels, but no sources to back this assessment. Such phrasing is an open invitation for criticism. I therefore suggest to completely change the way the topic of this chapter is addressed: with reference to the content of the figures, give a table with each figure containing the e.g. impact, the levels of confidence and agreement, and the sub-chapter of this report where the details can be found. This would spare quite some text. The place can than be used to explain how attribution is done (see comments on 18/page 17 line 45 to page 19, line 18), to give the reader an insight into the ways, problems and achievements of this science. This would raise the transparency of our work and benefit the acceptance. (Joachim Rock, Johann Heinrich von Thuenen-Institute, Federal Research Institute for Rural Areas, Forestry and Fisheries)	We recognise the challenge of redundancy and believe the SOD now takes full account of the concern expressed by the reviewer, although not by changing the structure in the way that is proposed.
53	41554	18	1	1	93	54	The structure of the chapter is correct and I would like to congratulate and acknowledge the authors for their work. Perhaps, I miss a subchapter included in chapter 18.3, on Mountain Systems. Although I am not the references here, I know that some specific reports on the impact of climate change on Alps, Pyrenees (Observatoire des Pyrénées sur Changement Climatique) and Himalaya have been published. (Maria-Carmen Llasat, University of Barcelona)	We acknowledge the indication of sites rich of additional references. Most of the studies there are more in the field of WGI or chapter 3, and we passed along the information to the respective chapter.
54	45500	18	1	3	1	19	I'm just wondering about the geographical balance of authors. Both CLA's are from Northern Hemisphere, developed world. Most of the LA's are from "Western" nation. All of the Contributing authors are from Northern Hemisphere, developed nations. All the review editors are from developed countries. I thought there was an implicit (if not explicit) understanding that the IPCC was supposed to bring together Scientists from the developing and developed world - but perhaps that mission was dropped in this Assessment? (Peter Neofotis, City University of New York & Climate Impacts Group, Columbia Univ )	The authors of this chapter have been appointed by the IPCC Bureau



#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
55	40544	18	3	0	0	0	Executive Summary -- More emphasis could be given to attribution to anthropogenic climate change. (Cynthia Rosenzweig, NASA Goddard Institute for Space Studies/Columbia University)	The amount of scientific literature that allow a direct link between the anthropogenic component of climate change and selected impacts is extremely thin, due to the major role of natural climate variability and due to confounding factors.
56	50985	18	3	4	0	0	Executive Summary -- Throughout the executive summary, the author team should italicize all calibrated uncertainty language used, including summary terms for evidence and agreement, levels of confidence, and likelihood terms. (Katharine Mach, IPCC WGII TSU)	see comment 13
57	49129	18	3	4	3	4	In the SOD you should also include findings from 18.6 Synthesis in the executive summary (Oyvind Christophersen, Climate and Pollution Agency)	Findings from 18.6 have been included in the SOD ES
58	49130	18	3	6	3	6	You may wish to specify what about how long period recent climate change refers to since the term is used many places in the chapter. (Oyvind Christophersen, Climate and Pollution Agency)	The reference period is often not stated in the underlying literature, or it differs between different studies. We have therefore not found the possibility to indicate anything more specific than "the last few decades". For the few cases, where a clear reference period was available, we have given a clear indication of it.
59	50986	18	3	6	3	6	Where the author team here states "recent climate change," it might be helpful to give a broad indication of the intended timeframe--since 1950, etc.? (Katharine Mach, IPCC WGII TSU)	see comment 58
60	48310	18	3	6	3	7	"The conclusion that there is a discernible" (the influence itself is not strengthened). (J. Graham Cogley, Trent University)	Text now reads "Impacts of recent observed climate change on physical, biological, and human systems have been detected on all continents and in most oceans. This conclusion is strengthened by observations since the AR4 as well as through more extensive analyses of earlier observations. "
61	54264	18	3	6	3	15	Regarding traceable account for this finding, there is clear support across the sections cited, but because this finding synthesizes across so many lines of evidence, the author team might consider direct discussion of this synthesis in section 18.6, perhaps in a section separate from the discussion of the reasons for concern. (Michael Mastrandrea, IPCC WGII TSU)	We believe the tracable account for the modified introductory statement is the entire chapter - it is hard to be more specific than that. The synthesis was focused more directly on the documented need by policy-makers to receive information about the reasons for concern.
62	49819	18	3	6	4	7	You no longer pretend to obtain scientific evidence. You are left to depend on subjectively based "discernibility" and "attribution" (Vincent Gray, Climate Consultant)	We find no substance in this comment that could justify changing anything in the chapter. We are documenting published scientific evidence and do not pretend anything at all.
63	53813	18	3	9	3	10	What is high confidence of influence? This is not an accepted term in the uncertainty language. (Kristie L. Ebi, IPCC WGII TSU)	statement has been replaced by standardised confidence language
64	42122	18	3	10	0	11	Attribution studies are necessarily conducted on historical data, and mostly on mean and variability (whether climate variables or any variable chosen for representing its impact). What does "Attribution of impacts in most studies is related to all recent changes in climate beyond historical means and variability" mean? This sentence does not make sense as it is now written. (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	we have modified the sentence in order to clarify
65	43295	18	3	10	3	10	While I would agree for the future the mentioning of ocean acidification of a major driver of previous change may be premature and evidence for that is weak. I would still suggest to mention it but rank it as an emerging driver. (Hans-O. Pörtner, Alfred-Wegener-Institute for Polar and Marine Research)	Throughout the chapter, this point has been addressed carefully now, indicating the emerging nature of acidification as a driver of observed impacts
66	48311	18	3	10	3	11	I do not know what this means. Perhaps "Most studies, when they attribute an impact, do so only to climatic changes that exceed natural variability."? (J. Graham Cogley, Trent University)	The sentence has been removed
67	42123	18	3	11	0	0	Smaller than what? Change for "limited"? (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	The sentence has been removed
68	40799	18	3	11	3	15	Delete this sentence : the rationale for attribution of impacts to ANTHROPOGENIC climate change is not convincing (Michel Petit, CGIET rue de Bercy)	The sentence has been removed
69	48312	18	3	13	3	13	Comma after "models". Failure to place a comma at both ends of subordinate clauses such as "using ... models" is frequent in this chapter, and it reduces readability. (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
70	49131	18	3	17	3	17	Consider if it is appropriate with a qualifier here e.g. in some or most human systems. (Oyvind Christophersen, Climate and Pollution Agency)	wording adapted to not claim validity for all systems
71	38062	18	3	17	3	21	These statement seem very similar to the ones found on page 3, lines 38-40. Make distinction clearer. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	statements later have been simplified in response to this comment
72	54265	18	3	17	3	21	Regarding traceable account for this finding, here is an example where it is not completely clear where the confidence language comes from. Again, the author team might consider direct discussion of this synthesis in section 18.6. (Michael Mastrandrea, IPCC WGII TSU)	see comment 13
73	48313	18	3	18	3	18	Insert "to the coincident impacts of" before "environmental". (J. Graham Cogley, Trent University)	fully reworded statement, accounting for the concern
74	50987	18	3	18	3	18	Where the author team uses the word "evidence" here, is evidence for detection of impacts meant, for attribution, or for both? (Katharine Mach, IPCC WGII TSU)	fully reworded statement, accounting for the concern

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
75	48314	18	3	19	3	19	"Detection of climatic impacts on human systems poses". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
76	48315	18	3	21	3	21	Avoid "areas" in the sense "subjects", because it can equally well mean "regions". Here the meaning might be either "subjects" or "sectors and regions". (J. Graham Cogley, Trent University)	We have attempted to follow this advice throughout - the statement in question here has been removed
77	38063	18	3	23	3	24	It is not clear to me what is meant by these lines. One can make attribution statements for some variables? (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	the revised synthesis section, and its reflection in the Executive Summary, should make this clear now
78	38252	18	3	23	3	24	Executive Summary. "For several "reasons for concern" (as expressed by IPCC TAR and AR4), additional evidence demonstrates that attributable observations have already been recorded (medium to high confidence)". Question: Would it be possible to replace "several" by "many" as additional evidence demonstrates that attributable observations have already been recorded? (Abdalah Mokssit, Direction de la Météorologie Nationale (DMN))	Please refer to the fully revised synthesis. There are five reasons for concern, and our synthesis confirms four of them.
79	54266	18	3	23	3	24	It is not completely clear what "attributable observations" means. Attributable to climate change, or anthropogenic climate change? (Michael Mastrandrea, IPCC WGII TSU)	see comment 11
80	45501	18	3	26	3	36	I think it would be helpful to more clearly distinguish what is "new" and what is "stronger." For instance, the evidence that there are changes in snow, ice, and frozen ground was already pretty strong in AR4. Are there new types of impacts? (Peter Neofotis, City University of New York & Climate Impacts Group, Columbia Univ.)	At the level of the synthesis, this distinction cannot always be maintained, but we have strived to make it clear wherever possible
81	54267	18	3	27	3	28	Per my general comment on the Executive Summary, this is the first bullet where further detail would be useful, perhaps highlighting key examples. (Michael Mastrandrea, IPCC WGII TSU)	As mentioned above, we found very hard to involve more detail into the Executive Summary
82	50988	18	3	27	3	36	The author team may wish to clarify the relevant time frames for bullets presented here. For example, some of the verbs used in sentences imply a timeframe but do so ambiguously--does "continues" on line 27 refer only to observations from 2007-2012? In many places here, it would seem preferable to indicate the full timeframe over which discernible impacts have been available--and where the evidence base has strengthened since 2007. Also, on line 35, is it possible to further clarify what is meant by "major influence"--the most important driver, a driver with a notable impact? If possible, a more specific indication of the importance of climate change versus other drivers would be clearer. (Katharine Mach, IPCC WGII TSU)	While the reference period is not always clear from the underlying literature, a period of six years has not been considered relevant for the detection of observed impacts of climate change (see also comment 58).
83	49132	18	3	29	3	29	Is it possible to specify better what changes in hydrological systems? (Oyvind Christophersen, Climate and Pollution Agency)	The corresponding entries in the Executive Summary have been fully revised
84	54268	18	3	29	3	30	Regarding traceable account for this finding, there is no clear link to the assignment of medium confidence for impacts on water quality or coastal zones in the corresponding chapter sections. (Michael Mastrandrea, IPCC WGII TSU)	There is now full tracability from the Executive Summary to the underlying chapter sections
85	38642	18	3	31	3	32	This sentence reads as if "acidification" has already a "discernible impact" on coral reefs with very high confidence. This contradicts the earlier statement "low confidence of influence" Page 3, line 10 and no evidence is presented in this chapter to support the statement that ocean acidification is already demonstrably impacting coral reefs. (Janice Lough, Australian Institute of Marine Science)	see comment 65
86	54269	18	3	31	3	32	Regarding traceable account for this finding, high confidence is used in section 18.3.4.1, while very high confidence is used in the other locations provided. Since 18.3.4.1 is the section focusing specifically on "ocean warming, acidification and expanding hypoxia" mentioned in the ES statement, it would be useful to consider this difference in confidence assignments. (Michael Mastrandrea, IPCC WGII TSU)	all confidence statements have been carefully revised, in liaison with experts from the relevant chapters
87	49133	18	3	33	3	36	Suggest that you explain the direction of different changes positive/negative and if possible the the severity of the changes. (Oyvind Christophersen, Climate and Pollution Agency)	This level of detail cannot be provided by an executive summary, in our opinion
88	54270	18	3	33	3	36	Regarding traceable account for this finding, the assignment of medium confidence for an influence of climate change on some recent extinctions needs further explanation, as the text in section 18.3.2.3 says that confidence in the attribution of extinctions to climate change is very low, but that climate changes have been identified as a key driver of extinctions of some amphibians. (Michael Mastrandrea, IPCC WGII TSU)	The issue of extinctions has been revisited in direct collaboration with chapter 4 and should now have been treated consistently throughout the report
89	39794	18	3	35	3	36	this is confusing as it appears to contradict the conclusion presented in 4.3.2.5 (Peter Burt, University of Greenwich)	see comment 88
90	39214	18	3	38	3	40	This statement seems to be the same as the one from line 17-19 on the same page? (Christopher Reyer, Potsdam Institute for Climate Impact Research)	removed through the revision of the Executive Summary
91	54271	18	3	38	3	40	This text is somewhat similar to that in lines 17 through 19 above. It would be possible to merge the two paragraphs as an introduction to the bullet list. (Michael Mastrandrea, IPCC WGII TSU)	see comment 90
92	48316	18	3	39	3	39	Change "the presence of" to "human". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
93	48317	18	3	41	3	41	Delete "in forests", change "areas" to "forests", and reconsider "areas" at P3 L42. (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
94	54272	18	3	41	3	43	Per my general comment on traceable accounts, this is a bullet where explanation of the assignment of low confidence would be very helpful. (Michael Mastrandrea, IPCC WGII TSU)	now consistent with the respective chapter section (and explained there)
95	50989	18	3	41	4	7	Again for these bullets, the author team may wish to clarify the relevant time frames for changes overall, and also where stronger evidence since 2007 has increased confidence in the changes. Where calibrated uncertainty language is not used already, the author team should consider assignments. For some of the statements made, such as on lines 47-48 and 51-52, the author team might consider separately indicating its degree of certainty in the 2 parts of the sentences. (Katharine Mach, IPCC WGII TSU)	see comment 58
96	49134	18	3	43	3	43	What is meant by "disturbance"? Please be more specific, and list some examples of such disturbances. Is it natural or human induced disturbance? (Oyvind Christophersen, Climate and Pollution Agency)	examples for disturbances are now mentioned

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
97	54273	18	3	44	3	46	Regarding the traceable account for this finding, while the medium confidence assignment for a decrease in yields in some regions appears in the chapter text, the traceability of the assignment of low confidence in increased yields in other regions is not as clear. Section 18.3.5.1 states high confidence that warming has benefited production in some cold regions and section 18.3.5.4 states very high confidence in enhanced yield growth due to elevated CO2 (noting that this played a minor role in driving overall yield trends). It would be helpful to explain further the relationship of these statements with the low confidence assigned in the Executive Summary. (Michael Mastrandrea, IPCC WGII TSU)	The topic of agricultural yields has been fully revised in cooperation with the relevant chapter
98	49135	18	3	47	3	48	Consider to reflect other findings related to food production in the summary from the chapter in addition to or instead of the influence on the market. See page 22 line 34 - 47 (Oyvind Christophersen, Climate and Pollution Agency)	see comment 97
99	54274	18	3	47	4	7	Please assign calibrated uncertainty language to these findings. (Michael Mastrandrea, IPCC WGII TSU)	see comment 97
100	38064	18	3	49	0	0	a statistical relationship exists - What is it? (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	see comment 97
101	48318	18	3	49	3	49	Change "A statistical relation exists" to "There is a positive correlation". (J. Graham Cogley, Trent University)	see comment 97
102	49136	18	3	49	3	49	Suggest that you give the direction of the relation. E.g. if the statistical relation is negative to economic growth compared to an increase in temperature in these cases. (Oyvind Christophersen, Climate and Pollution Agency)	see comment 97
103	39366	18	3	49	3	50	Unclear sentence, which way is the "statistical relationship" supposed to work? Correlation doesn't mean causation. (Gareth S Jones, Met Office)	see comment 97
104	49137	18	3	51	3	52	Please include the findings from the study, T.C. Peterson, P.A. Stott and S. Herring (editors). Explaining extreme events of 2011 from a climate perspective. Bulletin of the American Meteorological Society, Vol. 93, July 2012, p. 1041. doi: 10.1175/BAMS-D-11-00021.1, in this statement. (Oyvind Christophersen, Climate and Pollution Agency)	The study was considered but not included since chapter 18 is about the impacts of extreme events - the treatment of extreme events themselves has been left to WGI and SREX.
105	48319	18	3	52	3	52	"yet to be clearly identified": this appears to contradict the assessment of Pall et al. 2011 in Table 18-4. The assessment of medium confidence in Min et al. (2011) at P13 L38-39 is also relevant. (J. Graham Cogley, Trent University)	This entire topic has been revised for the SOD
106	54275	18	3	53	3	54	High confidence is assigned to a similar statement in the associated chapter text, although that statement is only made for the Alps rather than globally. Please clarify whether the Executive Summary statement is global, and if so the evidence for extending this beyond the Alps. (Michael Mastrandrea, IPCC WGII TSU)	This entire topic has been revised for the SOD
107	38065	18	3	54	0	0	snow machines - Add "making" before "machines". (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
108	47255	18	4	1	4	8	It will be important to highlight in this section that some of the impacts are of non-economic nature and required different approaches to detection and attribution. Health Issues and culture included in the sections cited are useful and the chapter should be enriched with more. (Juan Hoffmaister, Third World Network)	This entire topic has been revised for the SOD
109	43296	18	4	2	4	4	This statement is poorly formulated. I can see no causal relationships between the number of hot days and the number of cold-related deaths. (Hans-O. Pörtner, Alfred-Wegener-Institute for Polar and Marine Research)	There was no intention to make this claim and the language has now been revised in order to not give this impression anymore
110	42124	18	4	5	0	7	Incomplete sentence. (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	sentence was incomplete, and the statement has been rephrased completely.
111	38066	18	4	5	4	7	No point to statement - reword. Responses to what?? (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	sentence was incomplete, and the statement has been rephrased completely.
112	45502	18	4	5	4	7	Is this a sentence ? (Peter Neofotis, City University of New York & Climate Impacts Group, Columbia Univ )	sentence was incomplete, and the statement has been rephrased completely.
113	48320	18	4	5	4	7	This bullet has no main verb. (J. Graham Cogley, Trent University)	sentence was incomplete, and the statement has been rephrased completely.
114	49138	18	4	5	4	7	Add something like "attributable to climate change" to make it consistent with the other findings in the list. (Oyvind Christophersen, Climate and Pollution Agency)	sentence was incomplete, and the statement has been rephrased completely.
115	49567	18	4	5	4	7	Suggest replacing "changes in the migration patterns" with "changes in their migration patterns". (Francis Zwiers, Pacific Climate Impacts Consortium)	sentence was incomplete, and the statement has been rephrased completely.
116	49820	18	4	9	4	41	Your "impacts" are a collection of anecdotes and cherry picks, laced with prejudice (Vincent Gray, Climate Consultant)	We find no substance in this comment that could justify changing anything in the chapter. We are documenting published scientific evidence and do not recognize any prejudice.
117	45503	18	4	9	4	42	I like these bullet points but the logic of placing them in the order they are in is not clear to me. (Peter Neofotis, City University of New York & Climate Impacts Group, Columbia Univ )	The ES has been totally restructured and the regional synthesis is now more of a summary than a list of items
118	54276	18	4	12	4	39	Please assign calibrated uncertainty language to the findings that do not yet have it. (Michael Mastrandrea, IPCC WGII TSU)	see comment 13
119	50990	18	4	12	4	41	Also for these bullets, the author team may wish to clarify the relevant time frames for the changes overall, and also where stronger evidence since 2007 has increased understanding of a given change. Where calibrated uncertainty language is not used already, the author team should consider assignments. (Katharine Mach, IPCC WGII TSU)	see comment 58
120	38067	18	4	12	4	42	Confidence statements missing for most bullet points. What is take home message for the reader? (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	see comment 117
121	49568	18	4	12	4	42	Assessed regional impacts are listed in region order - perhaps they should be listed in order of confidence? (Francis Zwiers, Pacific Climate Impacts Consortium)	see comment 117
122	47026	18	4	21	0	0	Permafrost in ... is degrading (or thawing), receding is more used for glacier retreat (Frank Paul, University of Zurich)	reworded



#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
123	47027	18	4	25	0	0	Why is New Zealand highlighted here? There is lots of evidence for retreating glaciers also from South America, Asia or the Arctic. (Frank Paul, University of Zurich)	NZ is no longer highlighted
124	44207	18	4	25	4	26	There is hardly any region where glaciers are less observed than in NZ. As for a D&A statement, glacier measurements are not detailed enough. (Georg Kaser, University of Innsbruck)	see comment 123
125	43297	18	4	27	0	28	This statement on marine communities can be widened and must include European waters as well. In fact it may be wiser to mention the major ocean basins, rather than continents. (Hans-O. Pörtner, Alfred-Wegener-Institute for Polar and Marine Research)	treatment of regional impacts in ocean has been revised throughout the chapter
126	38068	18	4	30	4	31	while streamflow has .... - Statement hangs. Where has streamflow increased? Milly et al. showed it increased in high latitudes. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	we do not recognise this problem in our FOD, but nonetheless these items have been reformulated
127	47028	18	4	35	0	0	loss of permafrost' is maybe not what you mean. I suggest to use degradation or thawing of permafrost (Frank Paul, University of Zurich)	see comment 122
128	54278	18	4	35	4	36	It would be useful to be more specific about what large-scale hydrological and ecosystem changes are meant here. (Michael Mastrandrea, IPCC WGII TSU)	more specific would have required more space, so we have rather opted for more synthetic statements
129	36506	18	4	40	0	0	...loss of coral reefs due to... (Keith Brander, DTU)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
130	41881	18	4	40	4	40	due to (to is missing) (Nathalie BREDA, INRA)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
131	48321	18	4	40	4	40	"to" after "due". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
132	53814	18	4	40	4	41	Attribution of loss of coral reefs only to warming, with no contribution from acidification? (Kristie L. Ebi, IPCC WGII TSU)	see comment 65
133	54277	18	4	40	4	41	It is not completely clear why high confidence is assigned here, as Box 18-5 uses very high confidence. Please consider explaining the difference. (Michael Mastrandrea, IPCC WGII TSU)	see comment 65
134	48322	18	4	47	4	47	This is inconsistent with the definition of "detection" in FAQ 18.1. The reaction should probably be to delete "human-caused" at P49 L23, but there are instances of variable meanings of "detection" in various places throughout the chapter. (J. Graham Cogley, Trent University)	statement has been reworded accordingly
135	49139	18	4	48	4	49	Suggest that you in the next version see if it is possible to give more information in the chapter about "the relative importance of antropogenic drivers of climate change". (Oyvind Christophersen, Climate and Pollution Agency)	see comment 11
136	42125	18	5	7	0	9	Is there any published document where this has been documented? If there is, please add the corresponding references. (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	This statement is the outcome of our assessment of the literature and not contained in a specific published document
137	41882	18	5	7	5	7	Brander et al 2011 is missing in the reference list (Nathalie BREDA, INRA)	Brander et al., 2011 is now included in the Reference list
138	39795	18	5	12	5	12	capital 'c' required, also please provide a reference for the Convention. (Peter Burt, University of Greenwich)	reference to the UNFCCC has been removed from the Introduction
139	36507	18	5	25	0	0	those atmospheric and oceanic changes... (Keith Brander, DTU)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
140	43298	18	5	25	0	0	Wouldnt it be better to say ...extent to which those atmospheric changes have influenced... as the chapter is about detection and attribution, not projection (Hans-O. Pörtner, Alfred-Wegener-Institute for Polar and Marine Research)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
141	49569	18	5	28	5	30	The chapter contains some effort in the direction described here, but at the moment, this remains relatively limited I think. Any assessment of the relative importance o climate change would have to be made regionally in the regional societal context. I think the word "analysis" should be avoided in this sentence - the job of the IPCC is to undertake an assessment rather than the kind of research that is implied by doing an analysis. (Francis Zwiers, Pacific Climate Impacts Consortium)	The revised synthesis attempts to go further in this direction, to the degree possible on the basis of the underlying literature
142	50991	18	5	30	5	30	The author team should avoid casual usage of the word "likely" as it is a reserved likelihood term. If used per the guidance for authors, the term should be italicized for clarity. (Katharine Mach, IPCC WGII TSU)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
143	50992	18	5	32	5	32	The author team might consider rephrasing the 2nd half of the sentence that is on this line. It might be clearer to indicate that such conclusions are relevant for decision-making under uncertainty. (Katharine Mach, IPCC WGII TSU)	The entire sentence has been removed in the SOD
144	50993	18	5	33	5	33	The author team here says "care has been taken to make sure that every point raised in this assessment can be supported in the literature." Support by the literature, however, is a basic requirement of assessment, and the author team might correspondingly consider rephrasing the statement here. (Katharine Mach, IPCC WGII TSU)	see comment 143
145	38069	18	5	33	5	34	very low confidence ... - WOW. Really? Needs much more or delete. Furthermore in cases were the attribution has very low confidence, how does one present a fair and balanced summary? Is each case/statement, highlighted so that reader knows it is very low confidence? (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	see comment 143
146	45504	18	5	33	5	34	I find the statement "but very low confidence in the attribution has not been used as a reason to omit any findings" disturbing. If an author states in his study that it is likely that other driving forces, such as an increase in the urban heat island effect, was likely the cause of an earlier blooming of chestnuts - I hope such as study is not placed in this assesement. If it is, the authors should mention such... Please clarify. (Peter Neofotis, City University of New York & Climate Impacts Group, Columbia Univ )	see comment 143
147	50994	18	5	38	5	38	The author team should also consider cross-referencing chapter 19 of this report here. (Katharine Mach, IPCC WGII TSU)	The footnote has been removed. We had no access to the final SOD of chapter and will be happy to work with them on the best possible consistency in the FGD

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
148	39215	18	5	40	5	41	in my opinion, you are referring only to adaptation, since mitigation does not primarily reduce consequences of climate change but climate change itself (and thus ist consequences) maybe a slight rewording can help here. (Christopher Reyer, Potsdam Institute for Climate Impact Research)	Both paragraphs on adaptation have been deleted
149	45505	18	5	46	5	46	I'm not sure if I think the use of "we" is appropriate. When you say "we," who do you mean? The chapter authors? The scientific communities? The public? (Peter Neofotis, City University of New York & Climate Impacts Group, Columbia Univ )	The use of "we" has been avoided throughout the SOD
150	48323	18	5	47	5	47	Insert "in 2005" after "landfall". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
151	48324	18	5	52	5	52	Delete the redundant "alternative". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
152	47951	18	6	0	0	0	Useful to include a summary of findings from the AR4 - perhaps something that other chapters can also include to give a sense of congruence between different chapters in WGII (Ameysi Ramos Castillo, United Nations University - Institute of Advanced Studies)	The FOD already contained a short summary and this has not been extended. However, in later sections the account for AR4 has been revised for consistency
153	48325	18	6	2	6	2	"from assessments of the costs of impacts". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
154	49140	18	6	5	6	5	Please consider to either include the findings from SREX in this section, or make a similar section for relevant findings from the SREX, as they do in chapter 16.1.2 of this draft. The complete section cut from SPM SREX page 7 that deals with anthropogenic influence and attribution; "There is evidence that some extremes have changed as a result of anthropogenic influences, including increases in atmospheric concentrations of greenhouse gases. It is likely that anthropogenic influences have led to warming of extreme daily minimum and maximum temperatures at the global scale. There is medium confidence that anthropogenic influences have contributed to intensification of extreme precipitation at the global scale. It is likely that there has been an anthropogenic influence on increasing extreme coastal high water due to an increase in mean sea level. The uncertainties in the historical tropical cyclone records, the incomplete understanding of the physical mechanisms linking tropical cyclone metrics to climate change, and the degree of tropical cyclone variability provide only low confidence for the attribution of any detectable changes in tropical cyclone activity to anthropogenic influences. Attribution of single extreme events to anthropogenic climate change is challenging. [3.2.2, 3.3.1, 3.3.2, 3.4.4, 3.5.3, Table 3-1]" (Oyvind Christophersen, Climate and Pollution Agency)	Frequent reference to SREX has been made in the sections relating to extreme event impacts
155	50995	18	6	10	6	10	"High confidence," as calibrated uncertainty language, should be italicized. (Katharine Mach, IPCC WGII TSU)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
156	39796	18	6	11	6	11	change 'be' to 'been' (Peter Burt, University of Greenwich)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
157	40545	18	6	25	0	0	Delete 'slightly' (Cynthia Rosenzweig, NASA Goddard Institute for Space Studies/Columbia University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
158	45506	18	6	25	6	25	The study is Rosenzweig et al., (2008) (not 2009) (Peter Neofotis, City University of New York & Climate Impacts Group, Columbia Univ )	thanks. this typo has been corrected.
159	40546	18	6	27	6	28	The sentence 'Attribution in a system changes all the way back to . . . ' does not accurately reflect what was done on attribution in the AR4 chapter. Attribution was done through pattern-scale methods and was done across the entire group of observations. (Cynthia Rosenzweig, NASA Goddard Institute for Space Studies/Columbia University)	The sentence has been replaced by a direct quote
160	45507	18	6	28	6	28	I think it would be more appropriate to state that "The study noted a lack of ..." because we explicitly stated this lack in our discussion in hopes that it could be filled by future research. (Peter Neofotis, City University of New York & Climate Impacts Group, Columbia Univ )	see comment 159
161	38070	18	6	29	0	0	Add "IPCC" before "working groups". (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing (comment refers to p7 ln 29)
162	50996	18	6	33	6	33	"Medium confidence," as calibrated uncertainty language, should be italicized. (Katharine Mach, IPCC WGII TSU)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
163	39797	18	6	41	6	41	replace 'like' with 'such as' (to avoid bad English), x2 (Peter Burt, University of Greenwich)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
164	43067	18	6	45	0	0	Section 18.2 - It seems that subsection 18.2.1.2 (Detecting Adaptation to Climate Change) represents one of limitations in D&A approaches and I like to suggest considering to move it under 18.2.2. (Seung-Ki Min, CSIRO Marine and Atmospheric Research)	The section 18.2.1.2 has been deleted and considerations of adaptation have been incorporated elsewhere
165	49570	18	6	48	6	48	Suggest replacing "perceived changes" with "documented changes" . I think the latter would imply that well defined metrics are being used (rather than subjective perceptions), while still being sufficiently broad to admit TEK where appropriate. (Francis Zwiers, Pacific Climate Impacts Consortium)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
166	40800	18	6	49	6	49	Delete "and, wherever possible, its anthropogenic component" (Michel Petit, CGIET rue de Bercy)	No, we do not wish to delete this, as we think it is crucial for the understanding of our approach.
167	49571	18	6	54	6	54	Suggest inserting "variations" or "changes" after "local or regional climate". (Francis Zwiers, Pacific Climate Impacts Consortium)	We believe this would make the statement more confusing and have therefore left it the way it is
168	48326	18	7	1	7	1	End the sentence after "difficult". (What is a "scale issue"? (J. Graham Cogley, Trent University)	Done as recommended
169	49572	18	7	1	7	1	Suggest inserting "change" after "climate". (Francis Zwiers, Pacific Climate Impacts Consortium)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
170	39798	18	7	2	7	2	change 'are' to 'is' (Peter Burt, University of Greenwich)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
171	38347	18	7	5	7	10	while this separation into three subsystems is both historically well-grounded and from an analytical point of view reasonable (i.e. when focusing on attribution to anthropogenic climate change), the separation of a human vs. a natural system seems artificial from a system research perspective. Available concepts from general disturbance ecology, e.g. argue against a separation of human vs. natural disturbances but rather focus on the comparability of the impacts. Authors of Chpt 4 argue along the same line (page 4, 4.2) and point out ecosystems are now viewed as containing humans rather than simply being altered by humans. This would be consistent with the second point under 18.2.1.3. (Raffael Ernst, Senckenberg Natural History Collections Dresden)	The structure of this AR, as well as our chapter, follows the climate/human/natural system structure, so we feel it is appropriate to distinguish the three subsystems for the illustrative purposes here. We now point out that these divisions are for analytical purposes.
172	39799	18	7	6	7	6	this is confusing as it implies that the climate system (sic) is separate from the natural system (sic), which it clearly isn't. I suggest another description is used to distinguish climate from other Earth/atmosphere processes. (Peter Burt, University of Greenwich)	see comment 171
173	43299	18	7	16	0	0	if you mention CO2 fertilization you could also include ocean acidification (Hans-O. Pörtner, Alfred-Wegener-Institute for Polar and Marine Research)	This text has been removed following revisions from this and other comments.
174	49573	18	7	19	7	20	The classification of something that "stems from the human system and impacts from the climate system" is not clear to me; do you mean "stems from the human system and resultant impacts from the climate system"? (i.e., an anthropogenic climate driver is one where human influence affects the climate in some way that has an impact). (Francis Zwiers, Pacific Climate Impacts Consortium)	This has been rephrased for clarity.
175	40801	18	7	20	7	20	The term "anthropogenic climate driver" is confusing (Michel Petit, CGIET rue de Bercy)	We now refer to an "anthropogenic driver of climate change".
176	45508	18	7	29	7	29	I'd be careful with saying that the report from... was an important basis for this chapter. It sounds odd and looking through that report there are some clear conceptual errors and also points of contention. I think saying something like "point of departure" would be more appropriate and safer. I could formally provide explicit examples that might cause some confusion if that report is cited as a basis if necessary. (Peter Neofotis, City University of New York & Climate Impacts Group, Columbia Univ )	We opt to not change our phrasing here. Any issues with possible errors in that report should be handled by the open scientific literature.
177	39800	18	7	34	7	34	change 'are' to 'is' (Peter Burt, University of Greenwich)	no "are" in that line
178	52102	18	7	34	7	49	The chapter team should ensure that the entries for detection and attribution in the report glossary adequately encompass the introductory definitions provided here; the glossary accordingly could be referenced here as well. (Katharine Mach, IPCC WGII TSU)	We are working on ensuring this.
179	48327	18	7	35	7	35	"without considering the cause": further difficulty with the meaning of "detection" (see comments at P4 L47 and P49 L23). (J. Graham Cogley, Trent University)	Yes, and we have modified this definition accordingly
180	38071	18	7	37	7	38	expectation - The "expectation" needs documented in some way. Your expectation may be different than mine... (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	This text has been revised following this and other comments.
181	53815	18	7	38	7	38	Why is the chapter only looking at detection when there is an ex ante expectation? This suggest the chapter could be missing trends of importance but that were unexpected. Detected trends not associated with climate change are important findings. (Kristie L. Ebi, IPCC WGII TSU)	We are not aware of significant literature on detection without ex ante expectation of change
182	53816	18	7	40	7	42	So, detection is not possible for anything but climate variables that have data for hundreds of years? That is inconsistent with the AR4, the literature, etc. (Kristie L. Ebi, IPCC WGII TSU)	This statement has been removed during the revision
183	36508	18	7	40	7	45	I suggest changing the beginning of this sentence to "A key component of attribution is..." and moving the whole paragraph to	see comment 182
184	49574	18	7	41	7	41	I'm not sure what "other", in "other surveys" refers to - this appears to be making a distinction between two kinds of surveys, but there is no other mention of a survey. (Francis Zwiers, Pacific Climate Impacts Consortium)	see comment 182
185	49575	18	7	42	7	42	Suggest giving an example of the kind of record you have in mind. (Francis Zwiers, Pacific Climate Impacts Consortium)	see comment 182
186	48328	18	7	51	7	51	Delete "conclusions". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
187	48329	18	7	51	8	2	I cannot work out what these two sentences mean. Perhaps "The unthinking assumption that correlation implies causation, and overconfidence in our understanding of causal relationships and system dynamics, are ever-present risks."? (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
188	48330	18	8	8	8	8	What is a "causal effect"? (J. Graham Cogley, Trent University)	this box has been removed
189	49576	18	8	14	8	15	This seems a bit too strong. If a bias is understood, and is present over time in a consistent manner, then presumably a biased time series may still contain useful information. For example, a thermometer that consistently records temperatures that are 2C too warm, can still tell us about temperature trends. Of course, reporting bias is a different thing - but I'm not sure that I would categorically say that it can not be corrected for (or at least, taken into account). (Francis Zwiers, Pacific Climate Impacts Consortium)	this box has been removed
190	49577	18	8	17	8	20	There are a couple of mentions of meteorological variables here in the context of a discussion about health outcomes and exposure. I suggest replacing "meteorological" with "climate". Generally, I think we would be thinking about long-term exposure to stressors (which immediately implies climate), but even when short-term (acute) exposures, such as a single heat-wave, are of concern, from a climate and risk perspective the question is whether there is evidence of changes in the frequency or intensity of such acute events (which is again a climate question). (Francis Zwiers, Pacific Climate Impacts Consortium)	this box has been removed
191	42126	18	8	20	0	22	"Any analyses much consider"? This sentence does not make sense. (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	this box has been removed
192	36509	18	8	21	0	0	must consider.. (Keith Brander, DTU)	this box has been removed

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
193	49578	18	8	23	8	23	There is something missing here - in the denominator of what? (Francis Zwiers, Pacific Climate Impacts Consortium)	this box has been removed
194	38072	18	8	31	8	31	account publication bias - needs more. Reference section 18.2.2.3. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	this box has been removed
195	49579	18	8	32	8	32	Suggest replacing "are unlikely to be possible" with "would be very challenging". As written, the statement seems a bit too negative, and also, it would be best to avoid "unlikely" unless the probability of completing a systematic review can be quantified. (Francis Zwiers, Pacific Climate Impacts Consortium)	this box has been removed
196	50997	18	8	32	8	32	"unlikely" -- If this term is being used per the uncertainties guidance for authors (reflecting a probabilistic basis for its assignment), it should be italicized. Casual usage of this reserved likelihood term should be avoided. (Katharine Mach, IPCC WGII TSU)	this box has been removed
197	42127	18	8	37	0	39	Choosing the "best-fitting" model does not guaranty that the relationship or attribution is not spurious. This has been long discussed in the statistical literature. The sentence should refer to "statistically adequate models" no "best-fitting models". In fact looking for "best fitting models" is very likely to lead to spurious statistical inferences. References: Yule, U. 1926. Why do we sometimes get nonsense-correlations between time series? A study in Society 89, 1-63; Granger, C.W.J., and Newbold, P. 1974. Spurious regressions in econometrics. Journal of Econometrics 2, 111-120; Phillips, P.C.B. 1986. Understanding spurious regression in econometrics. Journal of Econometrics 33, 311-340. (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	The reviewer misunderstands. Our point is precisely that the process of model selection (including variable selection) can give rise to spurious results and this effect must be taken into account in assessing the significance of a result. This seems clear in the sentence in question, but has been edited to improve clarity and reference has been added.
198	48331	18	8	38	8	38	Insert "model" after "best-fitting". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated
199	49580	18	8	40	8	42	I agree that the distinction between "exploratory" and "confirmatory" statistical analysis that is given here is important - but this it is not always possible to make as clear a distinction as this in climate science since we are generally not in a position where it would be possible to collect a second, independent, sample of observations. An exception would be experiments conducted with climate models, which can be carefully designed to conduct confirmatory analyses when sufficient computing resources are available. (Francis Zwiers, Pacific Climate Impacts Consortium)	We agree that it can be difficult in the case of observational studies to adhere to the principle that a hypothesis cannot generally be both formulated and tested using the same data. However, this does not mean that doing so will not lead to spurious results. This is again a reason to focus on impacts that have been predicted from basic principles rather than identified solely empirically.
200	45509	18	8	41	8	42	I believe the main point of this paragraph is the sentence "hypothesized ...the hypothesized relationship." Somehow, though, it gets a bit lost. And how is it linked to the next paragraph? (Peter Neofotis, City University of New York & Climate Impacts Group, Columbia Univ )	This and the following paragraph are now merged and this sentence has been removed.
201	48332	18	8	42	8	42	Change "cannot" to "must not!". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
202	37312	18	8	43	8	43	I should say: Neither of these principles implies that analyses that do not fully meet these principles are without value (Joel Guiot, CNRS)	this text has been removed
203	40547	18	8	53	9	2	Cite: Alexander, C., N. Bynum, E. Johnson, U. King, T. Mustonen, P. Neofotis, N. Oetlé, C. Rosenzweig, C. Sakakibara, V. Shadrin, M. Vicarelli, J. Waterhouse, and B. Weeks, 2011: Linking indigenous and scientific knowledge of climate change. Bioscience, 61, no. 6, 477-484, doi:10.1525/bio.2011.61.6.10. (Cynthia Rosenzweig, NASA Goddard Institute for Space Studies/Columbia University)	The paper is cited later in the chapter (Box 18.4)
204	48333	18	8	54	9	1	"The evidence is often ... people, and is interpreted as indicating". (J. Graham Cogley, Trent University)	This text has been removed on account of redundancy with Box 18-5.
205	42128	18	9	4	0	0	Evidence is what you get from testing. Change "Evidence for" to "Evidence from" (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	This evidence is for testing the hypothesis, not from the hypothesis.
206	47029	18	9	5	0	0	and the 'increased' melting of glaciers. Glaciers are melting (in the ablation region) also without warming. (Frank Paul, University of Zurich)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
207	48334	18	9	5	9	5	Delete "While". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
208	50998	18	9	5	9	10	The author team might consider providing citations as examples relevant to statements made here. (Katharine Mach, IPCC WGII TSU)	citation added
209	47030	18	9	6	0	0	This 'basic understanding' is only true at a very generalized level. Of course, when it is getting warmer, ice melt increases. But the impact of temperature on glaciers is more the long-term one: By increasing the ELA, the accumulation region is shrinking and the extent of a glacier adjusts to reduce ablation and reach a new balance with the changed climate. The process dominating the variability of melt at a short-term time scale is solar radiation. So the cause-effect relation is different than usually reported. (Frank Paul, University of Zurich)	The glacier example has been removed.
210	39801	18	9	9	9	9	delete ' after 'example' (Peter Burt, University of Greenwich)	This text has been removed
211	48335	18	9	14	9	14	"impacted systems". (J. Graham Cogley, Trent University)	This text has been removed
212	45511	18	9	16	9	16	This strikes me as a very broad statement to attribute to one study. Was Parmesan (2011) really the first study to prove this ? The study cited is her opinion piece on "Overstepping Attribution." (Peter Neofotis, City University of New York & Climate Impacts Group, Columbia Univ )	This text has been removed
213	50999	18	9	22	0	0	Section 18.2.1.2. The author team should consider providing background citations for material in this section. (Katharine Mach, IPCC WGII TSU)	We have removed this paragraph and speak to adaptation briefly in the definition of detection and attribution and the introduction

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
214	45510	18	9	24	9	24	Does something evolve toward adaptation? The use of both words is odd. I think you mean evolved to an optimal phenotype. (Peter Neofotis, City University of New York & Climate Impacts Group, Columbia Univ.)	see comment 213
215	49581	18	9	24	9	25	It would be good to have a reference to support this statement. (Francis Zwiers, Pacific Climate Impacts Consortium)	see comment 213
216	38073	18	9	25	9	25	(historical) period of time - What time period is it? 1800 to present, 1900 to present? More is needed here. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	see comment 213
217	42129	18	9	31	0	0	Change "not all" to "not at all" (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	This text has been removed
218	42130	18	9	32	0	35	Delete, this has already been said in the same paragraph. (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	see comment 213
219	43300	18	9	32	0	35	This text while interesting feels unfinished and the question un-answered. There is a lot of information on acclimatization and adaptation in species and ecosystems that could be mentioned here. Then the issue of time scale needs to be discussed as well for both human and natural systems in whether the velocity of acclimatization or adaptation matches or is able to keep up with the velocity of change. (Hans-O. Pörtner, Alfred-Wegener-Institute for Polar and Marine Research)	see comment 213
220	39802	18	9	32	9	32	insert 'a' after 'as' (Peter Burt, University of Greenwich)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
221	38074	18	9	32	9	34	It follows that ... - This sentence seems to repeat the point above. Delete? (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	see comment 213
222	49582	18	9	32	9	34	This seems repetitive of the previous sentence. (Francis Zwiers, Pacific Climate Impacts Consortium)	see comment 213
223	51000	18	9	34	9	34	It would be helpful to use a phrase that is a bit more explicit than "their reaction"--presumably, "the responses of natural systems" is meant? The intended meaning of the rhetorical question, "so what is the difference?" could also be clarified. (Katharine Mach, IPCC WGII TSU)	see comment 213
224	40549	18	9	43	0	0	Section 18.2.1.3 -- Describe and discuss the pattern attribution that was done in AR4. (Cynthia Rosenzweig, NASA Goddard Institute for Space Studies/Columbia University)	now done on page 10
225	43301	18	9	45	10	4	This differentiation of attribution approaches is well justified, but it appears rather academic and imposing the question of whether ongoing climate change is anthropogenic or not onto attribution approaches. One wonders what the resulting research requirements would be and whether it is wise to adopt such requests into climate science. For pragmatic reasons I would see the questions of whether the climate is truly changing and how much of this change is anthropogenic as a physical science question (WGI). The second option, I 50 to 53, then would take this answer and the drivers involved into account. Such disciplinary differentiation should be included into this text. This also applies to the use of the word attribution as it may be handled differently across the disciplines involved. (Hans-O. Pörtner, Alfred-Wegener-Institute for Polar and Marine Research)	In our view, these distinctions form an important part of the confidence assessment
226	51001	18	9	47	9	49	The author team might consider several potential clarifications for these statements. Where "variations" is used on line 47, does the author team mean "short-term variations"? Or are variations over a range of timescales intended here? Then, the author team might consider further explaining why such relationships are "useful for identification of reasons for concern." Additionally, aren't such relationships also useful for understanding sensitivities to different climate conditions more broadly? (Katharine Mach, IPCC WGII TSU)	this text has been removed
227	54279	18	9	48	9	49	It may be worth mentioning here as well that they can be useful for understanding sensitivity to climate conditions. (Michael Mastrandrea, IPCC WGII TSU)	this text has been removed
228	51002	18	9	50	9	51	Here, it would be helpful to clarify if the described "trends" refer to "long-term trends" in particular. (Katharine Mach, IPCC WGII TSU)	has been done
229	40802	18	10	1	10	4	This paragraph is Ok and can be kept as is. (Michel Petit, CGIET rue de Bercy)	noted
230	49583	18	10	3	10	4	I think it would be appropriate to cite the full discussion that is contained in the literature (i.e., including the comments by Hoegh-Guldberg et al, and by Stocker et al, that the Parmesan et al. 2011 piece elicited.). (Francis Zwiers, Pacific Climate Impacts Consortium)	We are citing this paper for something that was not contested by those two commentaries (that the investigation is challenging). The debate elicited by the paper was deemed outside the purpose of the IPCC report
231	40548	18	10	4	0	0	This, however, is still an important area of research. (Cynthia Rosenzweig, NASA Goddard Institute for Space Studies/Columbia University)	noted
232	51003	18	10	4	10	4	For the described "limited number of studies," does the author team mean a limited number of studies across all relevant systems: climate, physical, human, natural, biological, etc.? (Katharine Mach, IPCC WGII TSU)	yes
233	37018	18	10	6	10	8	Table 18-1 is not necessary and can be deleted if you include one or two examples in the text. (Joachim Rock, Johann Heinrich von Thuenen-Institute, Federal Research Institute for Rural Areas, Forestry and Fisheries)	This table has now been merged with a new version of Figure 18-1.
234	49584	18	10	6	10	8	I'm a bit confused by the headings in the left-hand column of Table 18-1: Both global drivers and local drivers affect local climate change. I think better titles would be "Drivers of climate change with global signatures" and "Drivers of climate change that also have local signatures", or something to that effect. For example, in the case of aerosols, we anticipate both large scale responses (hemispheric scale, partially reflecting long range transport and the actions of remote feedback processes) and more local direct responses. (Francis Zwiers, Pacific Climate Impacts Consortium)	This table and Figure 18-1 have now been merged and the labeling altered.
235	43302	18	10	10	0	0	attribution studies in what systems? (Hans-O. Pörtner, Alfred-Wegener-Institute for Polar and Marine Research)	in any systems



#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
236	49585	18	10	10	10	10	I don't think the "model-based" distinction that is made here is very clear. The key thing in any attribution study is not the "model" that is used to predict what the response to external influence might be, but rather the observations that are being interrogated. The observations have to be paramount in all detection and attribution studies (the intent, after all, is to ask a question about the observations). It might be useful to discuss Hegerl and Zwiers (2011) in this context - Hegerl, GC and FW Zwiers, 2011: Use of models in detection and attribution of climate change. WIREs Climate Change, 2, 570-591, DOI: 10.1002/wcc.121 (Francis Zwiers, Pacific Climate Impacts Consortium)	We have removed this because it did not add significantly to the understanding drawn from the assessed literature
237	44644	18	10	13	0	0	"output of each model is directly employed as an input for the next model in a logical sequence" It is necessary to be very careful with cascading models like that because with the results also uncertainties are cascaded and they are huge. It means that each model should be constrained with observed data separately and one should work with ensembles. Starting with a very large ensemble at the beginning of the cascade and using the observed data for comparison and rejecting non-behavioural simulation of each model. One might find oneself in the end without any model left. Then it is necessary to check the data, modify the model(s) or make the criteria less stringent. (Sarka D. Blazkova, T.G. Masaryk Water Research Institute)	While it is of course well advised to do this, it has never been considered necessary and in any case would be impossible in most cases due to lack of observations.
238	51004	18	10	13	10	14	In some cases isn't the analysis completed through comparison of observed and modeled outputs? Would this be worth indicating? (Katharine Mach, IPCC WGII TSU)	wording has been clarified
239	49586	18	10	16	10	19	I think the figure is useful, but I think it should be redrawn so that the paramount role of the observations that are being analysed is clear. These currently appear as balloons at the sides of the figures, whereas I think they should appear at the tops of the figures, with all else that comes into the analysis (eg., the expected responses to forcing) entering from the side. There are multiple ways to develop the latter, but the central question is about the observations that are being analysed. (Francis Zwiers, Pacific Climate Impacts Consortium)	Corrected.
240	37028	18	10	16	10	26	Please check: You mention a "multi-step approach" and an "end-to-end approach" but figure 18-2 contains only the "multi-step approach". (Joachim Rock, Johann Heinrich von Thuenen-Institute, Federal Research Institute for Rural Areas, Forestry and Fisheries)	Observations are indeed central. But the purpose of this paper is to distinguish methodological approaches. This distinction is not in how the observations are used, so we have chosen not to highlight them.
241	40815	18	10	30	0	0	Box 4.3 "Detection of Change in Ecosystems and Attribution to its Causes" treats the same problem as box 18-2. "Detection and Attribution of Changes in Biological Systems". Redundancy should be avoided, or justified with cross references and a careful checking of full consistency between both (Michel Petit, CGIET rue de Bercy)	this box has been removed
242	49587	18	10	32	10	32	Suggest replacing "trends" with "changes", since trends implicitly suggests monotonic change, whereas other types of change might plausibly be considered. (Francis Zwiers, Pacific Climate Impacts Consortium)	see comment 241
243	54280	18	10	32	10	42	As mentioned in my general comment on the chapter, here is the place where the distinction between statistical confidence and confidence from the uncertainties guidance is not completely clear. In the first sentence of the box it appears the confidence refers to statistical confidence, but in the standalone sentence after the first paragraph, it appears that confidence is referring to the calibrated uncertainty language. It would be useful to further distinguish these to avoid confusion. (Michael Mastrandrea, IPCC WGII TSU)	see comment 241
244	49588	18	10	34	10	34	Typo - replace "identify" with "identified". (Francis Zwiers, Pacific Climate Impacts Consortium)	see comment 241
245	40803	18	10	36	10	36	Replace "to climate change or anthropogenic climate change" by "to observed or predicted climate change" (Michel Petit, CGIET rue de Bercy)	see comment 241
246	45512	18	10	36	10	36	Though I like what you are saying there is a writing problem here. A species does not have a prior understanding (at least insects dont). In short, you're saying "traits of species include..." when you really mean something like traits of the "studies demonstrate..." (Peter Neofotis, City University of New York & Climate Impacts Group, Columbia Univ)	see comment 241
247	40804	18	10	41	10	41	Delete "anthropogenic" (Michel Petit, CGIET rue de Bercy)	see comment 241
248	49589	18	10	41	10	41	Typo - insert "the" ahead of "attribution". Note that articles seem to be missing relatively frequently in the text. (Francis Zwiers, Pacific Climate Impacts Consortium)	see comment 241
249	51005	18	10	41	10	41	"High" and "very high confidence," as calibrated uncertainty language, should be italicized. (Katharine Mach, IPCC WGII TSU)	see comment 241
250	39803	18	10	44	10	44	define 'very long' (Peter Burt, University of Greenwich)	see comment 241
251	39804	18	10	44	10	52	the concept of 'sign switching' is not really well defined here: I do not really understand what it means. (Peter Burt, University of Greenwich)	see comment 241
252	41883	18	10	45	10	45	Yohe (2003) is missing in the reference list (Nathalie BREDIA, INRA)	see comment 241
253	40805	18	11	2	11	3	Delete "either climate change or anthropogenic" (Michel Petit, CGIET rue de Bercy)	see comment 241
254	36510	18	11	3	0	0	sources of evidence lead to.. (Keith Brander, DTU)	see comment 241
255	43303	18	11	6	11	9	These lines indicate to me that it would be necessary to define what the term experimental means in this context and also what mechanisms are involved and at what level these are identified. It would be good to widen the number of examples somewhat beyond insects. There are examples available from other groups and ecosystems (e.g.vertebrate, namely cod and eelpout from the North Sea and Atlantic). (Hans-O. Pörtner, Alfred-Wegener-Institute for Polar and Marine Research)	see comment 241
256	49590	18	11	7	11	9	Would it be possible to add a third, more recently published, example? (Francis Zwiers, Pacific Climate Impacts Consortium)	see comment 241
257	40806	18	11	13	11	13	Delete "anthropogenic" (Michel Petit, CGIET rue de Bercy)	see comment 241
258	51006	18	11	16	11	16	"High" and "very high confidence," as calibrated uncertainty language, should be italicized. (Katharine Mach, IPCC WGII TSU)	see comment 241

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
259	49591	18	11	22	11	33	It is not clear how all of the references support the figure. For example, Karoly et al (2003) and Zwiers and Zhang (2003) are not biological attribution studies. (Francis Zwiers, Pacific Climate Impacts Consortium)	see comment 241
260	35587	18	11	35	0	39	Not all readers will understand the term "phenological" -- please define (Daniel Farber, UC Berkeley)	this has now been done in 18.3.2
261	38348	18	11	35	11	43	while this may generally be true and obviously represents a pragmatic choice, there is a certain danger in focusing exclusively on model organism and largely ignoring non-model organism. The current lack of data for many of these taxa should not be the sole reason for ignoring them in attribution studies for several reasons. One would be that quantification of response variability is itself an important piece of information and results from studies of non-model organisms may also yield information on general patterns. (Raffael Ernst, Senckenberg Natural History Collections Dresden)	see comment 241
262	43304	18	11	38	11	39	I would not agree on the differentiation that phenology changes are better understood than range shifts. Please consult WGII, chapter 6 for an understanding of range shifts in animals. (Hans-O. Pörtner, Alfred-Wegener-Institute for Polar and Marine Research)	see comment 241
263	37029	18	11	42	11	43	This sentence is problematic. Above, you give the example of farmers adapting to climate change and thus masking CC effects. The same can happen if changes in e.g. an ecosystem mask the impacts and the aggregate properties do NOT change. For example, shifts in tree species composition towards better adapted origins and species can keep NPP level, so you have to look in greater detail (species composition, e.g.) to recognize changes. (Joachim Rock, Johann Heinrich von Thuenen-Institute, Federal Research Institute for Rural Areas, Forestry and Fisheries)	see comment 241
264	39216	18	11	42	11	43	Could you briefly explain why metrics that quantify aggregated properties allow higher confidence in attribution? I think that would help the understanding here. (Christopher Reyer, Potsdam Institute for Climate Impact Research)	see comment 241
265	43068	18	11	48	0	0	Subsection 18.2.2 - I think that this subsection provides important information to note when interpreting D&A results. Hence if possible it would be useful to refine this part with more details, in particular, on how challenging issues like adaptation (see comment above), tipping points, and local non-climate factors are considered in this chapter. I understand that this part should be distinct from section 18.7 to be developed in terms of overall challenges beyond methodology. (Seung-Ki Min, CSIRO Marine and Atmospheric Research)	noted - we have tried to be more specific now
266	48336	18	11	54	11	54	"species migrating poleward or upward;". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
267	36511	18	12	1	0	0	This sentence is too cryptic to understand (Keith Brander, DTU)	the sentence has been removed
268	43305	18	12	1	0	0	full stop missing before ..Some aspects of human systems.. (Hans-O. Pörtner, Alfred-Wegener-Institute for Polar and Marine Research)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
269	48337	18	12	1	12	1	Comma after "matters", period after "second". But what is the point of the remark? (J. Graham Cogley, Trent University)	the sentence has been removed
270	49592	18	12	1	12	2	The sentence beginning when "Some aspects of human ..." seems awkwardly constructed; I'm not sure what is being implied by "other context are not". (Francis Zwiers, Pacific Climate Impacts Consortium)	the sentence has been removed
271	39805	18	12	2	12	2	change 'context' to 'contexts' (Peter Burt, University of Greenwich)	the sentence has been removed
272	49593	18	12	11	12	13	There are clear climate monitoring examples as well. Most climate observations come from observing networks that were designed for observing current weather, and the evolution of those networks over time has often not taken climate monitoring constraints into account. As a result, climate scientists spend lots of time developing homogeneity adjustments that are needed to ensure that trends in these observations provide reliable indicators of climate change. One high profile example is the global tropical cyclone record (see for example, Chapter 3 in the SREX and references therein). (Francis Zwiers, Pacific Climate Impacts Consortium)	this topic is covered by WGI
273	51007	18	12	16	0	0	Section 18.2.2.2. The author team should provide citations supporting statements made in this section. (Katharine Mach, IPCC WGII TSU)	a number of citations are now made
274	37030	18	12	16	12	35	Please add some supporting references in this sub-chapter. How do you, for example, know that systems "often" response in a chaotic way if tipping points are crossed? (Joachim Rock, Johann Heinrich von Thuenen-Institute, Federal Research Institute for Rural Areas, Forestry and Fisheries)	a number of citations are now made
275	43306	18	12	18	12	26	These comparisons of time scales for the response of various systems should be supported by relevant references. (Hans-O. Pörtner, Alfred-Wegener-Institute for Polar and Marine Research)	a number of citations are now made
276	54281	18	12	19	12	20	Here is another example where it is unclear whether confidence is referring to statistical confidence or calibrated uncertainty language. (Michael Mastrandrea, IPCC WGII TSU)	the sentence has been removed
277	44208	18	12	22	12	25	Can you provide a refenece? (Georg Kaser, University of Innsbruck)	This discussion has been condensed and now includes a references.
278	47031	18	12	23	0	0	Please write glaciers instead of mountain glaciers. A mountain glacier is a specific type of a glacier (like a valley glacier). (Frank Paul, University of Zurich)	terms have been changed
279	47032	18	12	23	12	24	On the order of decades would be sufficient. Only very few glaciers have response times <10 years (Frank Paul, University of Zurich)	the sentence has been removed
280	45513	18	12	26	12	26	When I read this I was confused because soil respiration can change from year to year. (Peter Neofotis, City University of New York & Climate Impacts Group, Columbia Univ )	the sentence has been removed
281	39806	18	12	28	12	30	examples of such sytems and/or references would help here (Peter Burt, University of Greenwich)	the sentence has been removed

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
282	54282	18	12	33	12	35	It may also be useful to mention here that at a local scale many non-climate drivers can be important, where these influences may average out at larger scales. (Michael Mastrandrea, IPCC WGII TSU)	this is now mentioned
283	41884	18	12	38	12	48	This question of bias due to publication strategies is especially important and, from my opinion, increases by the procedure of literature selection for this chapter using mainly high impact factors journals and review papers. As an example, increase in i (Nathalie BREDA, INRA)	incomplete comment, however there has not been a strategy to select high impact journals for this chapter.
284	47256	18	12	38	12	48	This section is unclear, particularly the last two sentences. (Juan Hoffmaister, Third World Network)	The paragraph has been revised and the last sentence has been deleted following this.
285	39217	18	12	42	12	42	I think you mean the Parmesan and Yohe paper from 2003 not 2004 (Christopher Reyer, Potsdam Institute for Climate Impact Research)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
286	45514	18	12	42	12	42	I believe that A Menzel also has some papers explicitly stating publication bias. (Peter Neofotis, City University of New York & Climate Impacts Group, Columbia Univ )	one of these papers is now cited at a later point in the discussion
287	39218	18	12	47	12	48	should be more concrete to be convincing (what are these efforts?) (Christopher Reyer, Potsdam Institute for Climate Impact Research)	this text has been removed
288	42131	18	12	48	0	0	How was this achieved? Explain. (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	this text has been removed
289	49594	18	12	54	12	54	Other chapters in WG2 AR4, or AR5, or both? (Francis Zwiers, Pacific Climate Impacts Consortium)	We believe that our reference clearly targets AR4 - referencing to AR5 is done elsewhere, but this sentence is an introduction reporting the past.
290	39807	18	13	2	12	2	what are sectoral chapters? (Peter Burt, University of Greenwich)	4, 5,6 and 7
291	43307	18	13	8	0	0	The reference to individual chapter results will likely benefit from FOD review. Some balancing of length may be needed. Compared to the other sections the first one on fresh water resources is rather lengthy in relation to content. The style of writing and use of uncertainty language (e.g. in brackets) or references here vs. the related chapter should be harmonized. (Hans-O. Pörtner, Alfred-Wegener-Institute for Polar and Marine Research)	We believe the balance has been significantly improved through this revision
292	51008	18	13	12	13	12	The reference here to chapters 2 and 3 presumably should be to 3 and 4? (Katharine Mach, IPCC WGII TSU)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
293	54283	18	13	15	13	18	Here and in the caption for the figure, it would be useful to provide some context for the timeframe considered across this synthesis. (Michael Mastrandrea, IPCC WGII TSU)	see comment 58
294	48338	18	13	17	13	17	Change "with a high level of" to "that are strongly influenced by". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
295	49595	18	13	17	13	18	While I think the statement about relative levels of confidence is true, I think it does need to be a bit better nuanced. The hydrological research community has an extensive literature on estimating naturalized flows in drainage basins where infrastructure, such as dams, has altered the natural hydrograph. Presumably these adjusted hydrographs provide useful information about changes in flow regimes on climatic time scales. (Francis Zwiers, Pacific Climate Impacts Consortium)	This is clarified with chapter 3 which is the best recipient of this information.
296	49596	18	13	20	13	22	I understand that the figure is currently primarily a conceptual proposal (which, in general, I like). A question that immediately comes to mind, however, concerns the positioning of the symbols; since confidence is not a quantified measure (in contrast to likelihood), is it possible to interpret the relative vertical and horizontal positions of symbols within boxes that are outlined by the grid lines that are shown? I can understand symbols that "sit on the fence" between two boxes (e.g., as illustrated for mountain permafrost and groundwater), but can one distinguish between river flow and floods, which both have low confidence in attribution, but with attribution in floods nevertheless being slightly greater than in river flow??, I suggest that this would be overinterpretation, and therefore that some thought should be given to modifying the display so that the reader is discouraged from such overinterpretation. (Francis Zwiers, Pacific Climate Impacts Consortium)	Caption has been altered to clarify sources, and include crossreferences
297	49597	18	13	20	13	22	The caption should obviously contain references and/or cross references to the text. (Francis Zwiers, Pacific Climate Impacts Consortium)	the positioning of the symbols within the boxes has no comparative meaning. Noted that concern and hope to amend with help of TSU for final design.
298	37313	18	13	20	13	25	Figure 18.4. It is not clear how are determined the levels of confidence: is it done in a previous chapter or educated feeling? (Joel Guiot, CNRS)	Caption has been altered to clarify sources, and include crossreferences
299	51009	18	13	25	0	0	Section 18.3.1.1. In revising this section, the author team should also provide updated cross-references to the findings of the working group 1 contribution to the 5th assessment report, for example on lines 33-39 of this page. All calibrated uncertainty language referenced from other reports should be italicized, including summary terms for evidence and agreement, levels of confidence, and likelihood terms. Additionally, the author team should ensure that usage of likelihood terms is per the uncertainties guidance for authors. Along these lines, please check and italicize calibrated terms on the following lines: page 13, lines 36, 37, 38, 41, and 45; page 14, lines 4, 11, 12, 13, 14, 35, and 51. (Katharine Mach, IPCC WGII TSU)	references to WG1 chapters 2 and 10 have been included
300	48339	18	13	27	13	28	"The regional water balance is the net result of gains (... and INflow) and losses (... and OUTFlow)." Avoid jargon where possible. (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
301	53817	18	13	29	13	29	Drought is not only lack of freshwater. (Kristie L. Ebi, IPCC WGII TSU)	lack of rainfall (one of the variables defining drought)
302	49598	18	13	33	13	39	Westra et al (2012, submitted to J Climate) would also be relevant here. Westra, S., LV Alexander, FW Zwiers, 2012: Global increasing trends in annual maximum precipitation. J Clim, submitted. (Francis Zwiers, Pacific Climate Impacts Consortium)	not published yet... Have no access to the draft.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
303	38075	18	13	34	13	35	Heavy rainfall - Here and later in this section - Is heavy rainfall defined? (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	Now it is defined in the text.
304	48340	18	13	35	13	36	"events" after "rainfall". Delete "of the sub-regions". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
305	38076	18	13	36	13	36	with medium or low confidence - It is not clear to me what the confidence statement is referring to. This is also a problem in line 37. Is the confidence statement regarding the fraction of subregions, varying sign of the change or that the changes are due to increasing GHG? (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	The confidence statements refer to the attribution to anthropogenic influence in the trend.
306	48341	18	13	41	13	41	Change "is an important driver of" to "causes". To guide the reader into the long next sentence, insert "only" before "limited". (J. Graham Cogley, Trent University)	We did not find suitable references for this
307	47257	18	13	41	13	44	This section is good and could be complemented with an consideration of the role fo Traditonal knowledge. (Juan Hoffmaister, Third World Network)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
308	49599	18	13	43	13	43	Note that the hydrological definition of "flood" is not the same as the impact definition. Presumably the impacts that are most often relevant are related to overtopping of banks and levies. Gauging stations do not necessarily report whether overtopping has occurred, since they primarily report the height of water. Moreover, the annual flood (highest water) may not necessarily correspond with overtopping each year. (Francis Zwiers, Pacific Climate Impacts Consortium)	comment is reflected by revised text
309	48342	18	13	43	13	44	"and because there are other drivers, such as changes in land use and human alteration of river channels". (J. Graham Cogley, Trent University)	comment is reflected by revised text
310	54284	18	13	44	13	47	Over what time frame were these increases and decreases in floods found? (Michael Mastrandrea, IPCC WGII TSU)	periods included
311	48343	18	13	45	13	45	Change "precipitation" to "rainfall" and delete "pluvial". (J. Graham Cogley, Trent University)	Corrected.
312	48344	18	13	46	13	47	"evidence for decreases as well as increases". The present order is inconsistent with the thrust of the sentence. (J. Graham Cogley, Trent University)	Corrected.
313	35588	18	13	47	0	48	The Pall study seems very significant -- worth more discussion (Daniel Farber, UC Berkeley)	a few more words included
314	38077	18	13	47	13	47	signal is detectable - With what confidence? (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	20 % increase in risk
315	49600	18	13	47	13	48	I'm not sure if Pall et al (2011) was the "first attribution study of floods". Even if this is true, that phrase does not convey the object of the Pall et al study very well. It is a first study of a flooding event in which the question was posed as to whether human influence on the climate system had increased the likelihood of that flooding event. There are other studies (notably the Barnett et al, 2008, Science) that have asked detetction and attribution questions about changes in the timing of annual peak flows (annual floods). (Francis Zwiers, Pacific Climate Impacts Consortium)	word 'first' deleted. Comment on Barnett et al 2008 included
316	38078	18	13	52	13	52	anywhere - Add "in the world" after "anywhere". (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
317	38079	18	13	52	13	52	significant - statistically speaking (if so, what are the confidence limits?) or degree of impact (needs an adjective). (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	For the Himalayas there is statistically significant evidence of change, but not for some other regions. Has been modified
318	37314	18	13	52	14	10	the abbreviation GLOF is used only twice. Then it is better to use the full name for easy reading (Joel Guiot, CNRS)	GLOFs are repeatedly mentioned in the text later, so introducing the acronym makes sense
319	54285	18	13	53	13	53	It is not completely clear what "slight to substantial" means here. (Michael Mastrandrea, IPCC WGII TSU)	wording has been improved
320	48345	18	14	1	14	1	It will be useful to cite Loriaux and Casassa 2012 here: Loriaux, T., and G. Casassa, 2012, Evolution of glacial lakes from the Northern Patagonia Icefield and terrestrial water storage in a sea-level rise context, Journal of Glaciology, submitted. (J. Graham Cogley, Trent University)	The indicated papers were checked, their focus is more on future lakes (which is not the scope of this chapter), but they provide some evidence of recently formed lakes, and some of them have been additionally referenced.
321	39316	18	14	1	14	2	Concerning the growing number of lakes in the Alps, cf. Künzler, M., Huggel, C., Linsbauer, A. and Haeblerli, W. (2010): Emerging risks related to new lakes in deglaciating areas of the Alps. In: J.-P. Malet, T. Glade, N. Casagli (eds) Mountain Risks: Bringing Science to Society. Proceedings of the 'Mountain Risk' International Conference, 24-26 November 2010, Firenze, Italy, CERIG Editions, Strasbourg, France, 453-458. The development in the near future of many more lakes is highly probable, an important reference would be: Frey, H., Haeblerli, W., Linsbauer, A., Huggel, C. and Paul, F. (2010): A multi level strategy for anticipating future glacier lake formation and associated hazard potentials. Natural Hazards and Earth System Science 10, 339-352. New lakes also provide new possibilities. New lakes also provide new possibilities for hydropower production: Terrier, S., Jordan, F., Schleiss, A.J., Haeblerli, W., Huggel, C. and Künzler, M. (2011): Optimized and adapted hydropower management considering glacier shrinkage scenarios in the Swiss Alps. Proceedings of the International Symposium on Dams and Reservoirs under Changing Challenges - 79th Annual Meeting of ICOLD, Swiss Committee on Dams, Lucerne, Switzerland (Schleiss, A. & Boes, R.M., Eds), Taylor & Francis Group, London, 497 - 508. (Wilfried Haeblerli, University of Zurich)	reference now included
322	38080	18	14	2	14	2	more likely to occur - However it was noted that no increase has been detected to date. Should not the statement be qualified? I would add "seem" before "more likely". (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	wording has been changed
323	48346	18	14	2	14	2	This is too assertive. Say "since it suggests an increased likelihood of GLOFs." (J. Graham Cogley, Trent University)	corrected.

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324	49601	18	14	4	14	8	The SREX assessment was a bit weaker than the AR4 assessment with respect to drought, so I would have thought that both assessments should have been discussed in this paragraph to set the context for the discussion that follows. Deferring discussion of the SREX to the end of the next paragraph sends an implicit message that the authors give it less importance than the AR4 assessment. That might be the case - but then they should be explicit in their evaluation of the two assessments, and give reasons. (Francis Zwiers, Pacific Climate Impacts Consortium)	Text has been rearranged.
325	41885	18	14	6	14	6	Doe et al (2009) is missing in the reference list (Nathalie BREDA, INRA)	paragraph removed
326	49602	18	14	10	14	13	Where do numbers like 77%, 53.8% and 11.5% come from - and is the level of precision that is implied by the use of two or three significant digits justified? (Francis Zwiers, Pacific Climate Impacts Consortium)	From Table 3.2 of SREX. Numbers have been rounded and explanation added
327	38081	18	14	11	14	11	varying trend - Not clear if this means in space or time or both. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	time trend.
328	48347	18	14	11	14	13	Drop the decimal digits, which are too precise for a statement about only 26 objects. (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
329	39808	18	14	12	14	12	change 'assesses' to 'assessed' (Peter Burt, University of Greenwich)	Yes. But changed to number of sub regions.
330	39219	18	14	12	14	13	are both numbers really 11.5%? (Christopher Reyer, Potsdam Institute for Climate Impact Research)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
331	38082	18	14	19	14	33	Surprised that the Milly et al results are not mentioned here. The Milly summary is a lot clearer than what I find here. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	We have not been able to unambiguously identify this reference
332	48348	18	14	23	14	23	Delete "due". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
333	48349	18	14	24	14	24	Change "wet season rainfall has" to "wet seasons have". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
334	39809	18	14	25	14	25	see also Coelho et al. (2012). Climate diagnostics of three major drought events in the Amazon and illustrations of their seasonal precipitation predictions. Meteorological Applications, 19:2 237-255. (Peter Burt, University of Greenwich)	mentioned in the South America summary
335	48350	18	14	25	14	27	Do not capitalize "basin". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
336	49603	18	14	26	14	26	Insert "the" ahead of "La Plata". (Francis Zwiers, Pacific Climate Impacts Consortium)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
337	48351	18	14	28	14	28	"ascribed", not "appointed". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
338	49604	18	14	32	14	32	What criterion defines the "top 200 rivers" (I assume they are ranked by annual flow), and what confidence is there in the data given the health warning that was given earlier concerning stream flow data. (Francis Zwiers, Pacific Climate Impacts Consortium)	ranked by river flow.
339	49605	18	14	35	14	35	There are two strong regional assessments here - stated in a single sentence! They seem to be substantially in variance with global assessments, which is ok, but I think more would need to be done to support or better nuance the assessments, e.g., to be clear that the thing that is being assessed is whether rainfall and streamflow in this region show statistically significant change without attribution of the mechanism of change. I think in this case it would be helpful to be clear about the extent to which there is evidence to link these observed changes to anthropogenic forcing of the climate system, which I suspect is a lot more tenuous given the challenges in attributing the causes of changes in rainfall distributions globally. (Francis Zwiers, Pacific Climate Impacts Consortium)	text removed for shortness.
340	48352	18	14	37	14	39	At L37 change "level" to "storage" and at L39 delete "level and". (J. Graham Cogley, Trent University)	Thanks, but we have removed this paragraph following other comments.
341	35434	18	14	43	0	0	"Glacier decay" is an odd phrase, "glacier retreat" would be better. (David Vaughan, British Antarctic Survey)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
342	41886	18	14	45	14	45	Aguilera and Murillon, 2009 is missing in the reference list (Nathalie BREDA, INRA)	no, it is not missing
343	38893	18	14	47	0	0	When discussing water quality, it might be a good idea to address groundwater salinity, as one of the consequences of sea level rise, and over - abstraction, as one of the major water quality impacts caused by climate change (Mohamed Tawfic Ahmed, Suez Canal University)	this is now briefly discussed in 18.3.3.3, but there is very little observation-based evidence relating this to climate change
344	46098	18	14	47	14	47	In line 27, page 3 of Chapter 3 it says that it is difficult to link it to climate change (Luis E. Garcia, World Bank)	comment added
345	48353	18	14	49	14	49	Change "carrying remains" to "delivering residues". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
346	48354	18	14	53	14	53	"Blanca". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
347	42135	18	15	0	16	0	A lot of the Section "18.3.1.2 The cryosphere" is based in two papers that are in preparation. (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	If this comment refers to chapters of IPCC AR5 WGI report, the issue will be solved at the time of publication.
348	44210	18	15	3	0	0	18.3.1.2. The Cryosphere: As for the WG1 SOD deadlines a large number of papers have been submitted to journals which may have to be considered also here. (Georg Kaser, University of Innsbruck)	We were checking for additional papers, in collaboration with WGI LA's.
349	51010	18	15	3	0	0	Section 18.3.1.2. In revising this section, the author team should italicize calibrated uncertainty language used. For likelihood terms, the author team should also ensure that usage is not casual. Please check and italicize calibrated terms on the following lines: page 15, lines 7, 15, and 26; page 16, lines 7, 9, 11, and 13. (Katharine Mach, IPCC WGII TSU)	wording has been adapted



#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
350	53818	18	15	3	0	0	Please ensure consistency with WGI, including the confidence statements. (Kristie L. Ebi, IPCC WGII TSU)	WGI related statements incl. confidence statements are in line with WGI
351	47033	18	15	5	0	0	Please use glaciers instead of mountain glaciers. In WGI we use glaciers also for icecaps, i.e. every perennial land ice mass that is not part of the two ice sheets is named glacier. (Frank Paul, University of Zurich)	wording has been adapted
352	38083	18	15	5	15	5	significant - statistically speaking (if so, what are the confidence limits?) or degree of impact (needs an adjective). (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	wording has been adapted
353	39317	18	15	5	15	8	What is the reference "Bindoff et al. (in preparation)"? Make reference to the high-level overview of UNEP (2007): Global outlook for ice & snow. UNEP/GRID-Arendal, Norway. (Wilfried Haeberli, University of Zurich)	Bindoff et al is chapter 10 of WGI (notation has changed now). The UNEP study is important but is more the field of WGI. The concept in our chapter is to refer to WGI for those aspects covered by them.
354	48355	18	15	10	15	10	Delete "Depending on regional climate.". (J. Graham Cogley, Trent University)	The cryosphere section has been strongly reduced in SOD as compared to FOD and we now only make short reference to AR5 WGI
355	39318	18	15	10	15	12	The best overview on existing data worldwide is still WGMS/UNEP (2008): WGMS (2008): Global Glacier Changes: Facts and Figures (Zemp, M., Roer, I., Kääb, A., Hoelzle, M., Paul, F. and Haeberli, W. eds.), UNEP, World Glacier Monitoring Service, University of Zurich, Switzerland. IPCC should include such standard information sources from international programs. (Wilfried Haeberli, University of Zurich)	This level of information needs to be captured from WGI, AR5, chapter 4.
356	45515	18	15	10	15	22	I'm curious as to what are the different rates of changes in the different regions. Could this information be assessed? (Peter Neofotis, City University of New York & Climate Impacts Group, Columbia Univ )	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
357	49606	18	15	10	15	22	There is very recent literature on Tibetan glaciers (Yao, et al, 2012 - Nature Climate Change, doi:10.1038/nclimate1580) that presumably should be assessed here. (Francis Zwiers, Pacific Climate Impacts Consortium)	The paper has been checked but is considered to be in the field of WGI.
358	38084	18	15	14	15	14	region climate pattern - A word is missing here. Changes? (after pattern) (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
359	48356	18	15	14	15	14	The English spelling is "Karakoram". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
360	49607	18	15	14	15	14	Typo - replace "pattern" with "patterns". (Francis Zwiers, Pacific Climate Impacts Consortium)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
361	42132	18	15	17	0	19	"for the past decades". Please clarify how many decades, it is quite relevant. (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	Specification has been made (2-3 decades)
362	48357	18	15	17	15	18	Following agreed usage in WGI, delete "and ice caps". That is, "glacier" is understood to include "ice cap". (J. Graham Cogley, Trent University)	Corresponding changes made.
363	42133	18	15	19	0	0	Add how much is the total observed sea level rise (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	This information can be derived from the indication, and essentially is found in WGI.
364	48358	18	15	20	15	20	"are not well known and are difficult to attribute". (J. Graham Cogley, Trent University)	statement has been removed
365	38085	18	15	21	15	21	regional climate, ocean currents, and warming - This is a funny mixture of items on this list that makes no sense to me. What is in view here? (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	statement has been removed
366	48359	18	15	24	15	25	"The loss of glacier ice causes ...". But this sentence is not very valuable and could be deleted, along with its two references. (J. Graham Cogley, Trent University)	The paragraph has been reworded and modified.
367	49608	18	15	24	15	29	The time scale of change that is being discussed here is not fully clear to me. I assume the discussion concerns the effects of current changes in mass balance rather than the continuing isostatic rebound from the last major glaciation of the Northern Hemisphere. I'm not at all expert in this area - but wouldn't the response to current mass balance changes represent a relatively modest perturbation to the ongoing process of isostatic adjustment to the last major glaciation? (Francis Zwiers, Pacific Climate Impacts Consortium)	we agree for the latter part of the statement but have kept the first part
368	45517	18	15	24	15	37	Nice information but how is it ordered in this paragraph? The next paragraph is much better. The topic sentence helps. (Peter Neofotis, City University of New York & Climate Impacts Group, Columbia Univ )	The comment is valid, and in fact, time scale needs to be added. It is 'recent' (decadal-scale) mass loss, and the reference detects uplift based on this recent mass change.
369	39319	18	15	33	0	0	As mentioned before (informal review), the reference to Werder et al. (2010) is delicate in that this study contains basic and dangerous misconceptions about the flood hydrograph and corresponding estimates of peak discharge and warning time. Is it really necessary that IPCC cites such problematic and controversial papers? The reference to Huggel et al. 2011 is by far enough. (Wilfried Haeberli, University of Zurich)	this reference is no longer cited
370	38086	18	15	36	15	37	Slope instabilities ... - hangs. More is needed if kept. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	The sentence has been expanded to clarify the time scale involved.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
371	39320	18	15	36	15	37	It would be important to mention that the destabilisation of icy slopes is especially critical in connection with the formation of new lakes at the foot of such slopes, because of the possible impact waves potentially creating fa-reaching flood catastrophes, cf. (a) Haeberli, W., Clague, J.J., Huggel, C. and Kääh, A. (2010): Hazards from lakes in high-mountain glacier and permafrost regions: Climate change effects and process interactions. <i>Avances de la Geomorfología en España, 2008-2010, XI Reunión Nacional de Geomorfología, Solsona, 439-446.</i> (b) Künzler, M., Huggel, C., Linsbauer, A. and Haeberli, W. (2010): Emerging risks related to new lakes in deglaciating areas of the Alps. In: J.-P. Malet, T. Glade, N. Casagli (eds) <i>Mountain Risks: Bringing Science to Society. Proceedings of the 'Mountain Risk' International Conference, 24-26 November 2010, Firenze, Italy, CERG Editions, Strasbourg, France, 453-458.</i> (Wilfried Haeberli, University of Zurich)	The hazards related to landslide impacts into lakes are now mentioned in 18.3.1.3. (Erosion, landslides and avalanches).
372	48360	18	15	39	15	39	"Observed changes in downstream systems due to glacier retreat ...". (J. Graham Cogley, Trent University)	clarified
373	48361	18	15	41	15	41	Change "Zongxing" to "Z.X. Li". See also P76 L47-49. (J. Graham Cogley, Trent University)	corrected.
374	54286	18	15	51	15	52	Is it the variation in runoff changes that is often attributed to climate change? This could be clarified. (Michael Mastrandrea, IPCC WGII TSU)	clarified
375	42134	18	15	52	0	0	Add "and are" before "often" (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
376	54287	18	15	52	15	53	Please specify the timeframe for these positive trends. (Michael Mastrandrea, IPCC WGII TSU)	time frame has been specified
377	53819	18	15	52	17	52	Does the author team agree with the attribution? (Kristie L. Ebi, IPCC WGII TSU)	the statement is based on our assessment
378	49609	18	15	54	15	54	Does "for a 35 to 60% glacier cover" mean "for catchments with 35 to 60% glacier coverage"? If so, perhaps that change could be made. (Francis Zwiers, Pacific Climate Impacts Consortium)	the numbers have been removed
379	48362	18	16	5	16	5	"4% per decade". (J. Graham Cogley, Trent University)	the numbers have been removed
380	49610	18	16	6	16	6	Does "significant" mean "statistically significant"? (Francis Zwiers, Pacific Climate Impacts Consortium)	has been checked once more with WG I, chapter 4 and is correct.
381	38087	18	16	8	16	8	Arctic sea ice has decreased since the 1980s - Reference? (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	Statement has been removed/modified, references are provided.
382	48363	18	16	8	16	8	"has decreased". (J. Graham Cogley, Trent University)	No confidence statement is made for this statement (according to WGI, chapter 4)
383	39368	18	16	8	16	9	What is confidence in this statement? A confidence is given for Arctic sea ice statement in previous sentence. (Gareth S Jones, Met Office)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
384	38088	18	16	9	16	9	strong regional differences - Reference? (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	reference to WGI is given
385	49611	18	16	9	16	9	Suggest inserting "at least some of the" ahead of "decline in Arctic sea ice". Is there literature that quantifies the amount of reduction in Arctic sea ice extent that is attributable to human influence? The only study that I am aware of is Min et al, 2008, GRL which describes a formal detection and attribution study on Arctic sea ice extent. Along with others, this study finds that models under estimate the extent of the reduction considerably - which makes it difficult to quantify the amount of change that can be attributed to human influence. Min, S.-K., X. Zhang, F. W. Zwiers, and T. Agnew (2008), Human influence on Arctic sea ice detectable from early 1990s onwards, <i>Geophys. Res. Lett.</i> , 35, L21701, doi:10.1029/2008GL035725. A final comment is the text should clearly state "decline in Arctic sea ice extent" throughout rather than "decline in Arctic sea ice", since it is the extent, rather than volume, that is (reasonably) well monitored. (Francis Zwiers, Pacific Climate Impacts Consortium)	wording adapted
386	48364	18	16	13	16	13	"freeze-up and earlier". (J. Graham Cogley, Trent University)	This suggestion would change the meaning of the sentence, and is not appropriate here.
387	49612	18	16	13	16	13	Typo - insert "and" after "freeze-up". (Francis Zwiers, Pacific Climate Impacts Consortium)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
388	48365	18	16	14	16	16	"Changes in river and lake ice, such as ice-induced floods ... events, can have effects". (J. Graham Cogley, Trent University)	This suggestion would change the meaning of the sentence, and is not appropriate here.
389	41887	18	16	21	16	21	Brown and Mote, 2009 is missing in the reference list (Nathalie BRED, INRA)	reference has been removed
390	38089	18	16	23	16	23	changes in snow cover - Add "reductions" after snow cover? What is the influence? (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	"reduction" has been added
391	48366	18	16	27	16	28	"degradation of permafrost, both in mountainous regions and in high-latitude lowlands, have". (J. Graham Cogley, Trent University)	it is "changes and degradation ... have"
392	48367	18	16	29	16	29	"polewards". (J. Graham Cogley, Trent University)	wording has been adapted
393	48368	18	16	32	16	32	"attributes". They are not "parameters". (J. Graham Cogley, Trent University)	wording has been adapted
394	49613	18	16	32	16	32	Significant in what sense - statistically? (Francis Zwiers, Pacific Climate Impacts Consortium)	wording has been adapted
395	54288	18	16	32	16	36	Please specify the timeframe for these increases. (Michael Mastrandrea, IPCC WGII TSU)	time frame has been added (21st century)
396	48369	18	16	33	16	33	Delete "and partly dramatic". "have been observed ... and have been attributed" (J. Graham Cogley, Trent University)	wording has been adapted
397	49614	18	16	33	16	33	"Partly dramatic"? I presume "particularly dramatic" is meant. I would, however, avoid this kind of embellishment - wouldn't it be sufficient to say that there are (statistically) significant increases? (Francis Zwiers, Pacific Climate Impacts Consortium)	wording has been adapted
398	48370	18	16	35	16	35	"have been observed". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
399	41888	18	16	38	16	39	Costard et al., 2007 is missing in the reference list (Nathalie BRED, INRA)	reference has been added

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
400	48371	18	16	39	16	39	Change "higher dynamics in" to "more volatile". (J. Graham Cogley, Trent University)	we do not believe that volatile is a suitable term here
401	38894	18	16	47	0	0	18.3.1.3 Erosion, Landslides and Avalanches: Flashfloods are among the major drivers of land erosion, especially in drylands. Some reference to this fact might be incorporated in this section. (Mohamed Tawfic Ahmed, Suez Canal University)	Good point. this information has been shared with Chapter 3, as it is more appropriate for that Chapter, and can not be included in Ch18 for reasons of space
402	51011	18	16	47	0	0	Section 18.3.1.3. In revising this section, the author team should italicize calibrated uncertainty language used. For likelihood terms, the author team should also ensure that usage is not casual. Please check and italicize calibrated terms on the following lines: page 16, lines 49, 50, 51, 53, and 54; page 17, lines 1, 9, 10, 12, and 27. (Katharine Mach, IPCC WGII TSU)	Confidence language/terms have been included
403	53820	18	16	47	0	0	Many of the confidence statements in this section are based on one study (Kristie L. Ebi, IPCC WGII TSU)	we have added more references. Generally, for the impact literature, we do not consider the number of studies to be a good indicator of scientific validity
404	47258	18	16	47	17	43	The section lacks references to the experience with tropical glacier loss in Latin America andes, for which references are provided above and also some references are included in Chapter 27 of this FOD. Please expand or mainstream consideration of this issue in this and the relevant sections of the chapter. (Juan Hoffmaister, Third World Network)	There are very few studies on landslides in relation with glacier shrinkage in the tropical Andes, a few exist on erosion related aspects, but typically in connection with rainfall patterns.
405	49141	18	16	49	17	2	Please integrate key findings related to this aspect into the executive summary (Oyvind Christophersen, Climate and Pollution Agency)	done
406	48372	18	16	50	16	50	"but as yet" (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
407	48373	18	16	51	16	52	"in the western Himalaya in relation to". Do not cite unpublished sources such as Wulf et al. (J. Graham Cogley, Trent University)	this study is now published
408	49615	18	16	52	16	52	Is this to be submitted for publication? (Francis Zwiers, Pacific Climate Impacts Consortium)	this study is now published
409	49616	18	17	1	17	1	Typo - insert "the" ahead of "recent decline". (Francis Zwiers, Pacific Climate Impacts Consortium)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
410	48374	18	17	4	17	4	"can be significantly influenced by changes in the frequency". The direction of causality is wrong. (J. Graham Cogley, Trent University)	The direction of causality is correct, but a clarifying word has been added (changes in sediment yield, e.g. from rock falls, disintegration of rock glaciers).
411	48375	18	17	9	17	10	Change "mountain areas" to "permafrost areas" and delete "with permafrost occurrence". (J. Graham Cogley, Trent University)	we prefer the term 'permafrost occurrence' because in mountain areas permafrost is spatially highly heterogeneous
412	41889	18	17	11	17	11	Raveland and Deline, 2010 is missing in the reference list (Nathalie BRED, INRA)	has been added to the reference list
413	41890	18	17	12	17	12	Huggel et al., 2012 precise 2012 a or 2012 b (Nathalie BRED, INRA)	has been corrected
414	49617	18	17	16	17	21	Neither the caption nor the text give details about the third panel that is shown in the figure, which I assume is an indicator of global or regional mean temperature. The silent inclusion of the temperature diagram suggests an implicit attribution, which if intended and defensible, should be made explicit. The caption needs to provide references for the source of the figure. (Francis Zwiers, Pacific Climate Impacts Consortium)	this figure has been removed
415	49618	18	17	20	17	20	Typo - insert "at" ahead of "the local level". (Francis Zwiers, Pacific Climate Impacts Consortium)	this figure has been removed
416	48376	18	17	20	17	21	"level, or attention can be restricted to large-volume slides, which". (J. Graham Cogley, Trent University)	this figure has been removed
417	49619	18	17	20	17	21	The caveat that is given here appears to be important - but the sentence is unclear because it seems to be a bit grammatically challenged. Some additional detail describing exactly the conditions under which local and regional information can be compared would be helpful. (Francis Zwiers, Pacific Climate Impacts Consortium)	this figure has been removed
418	53821	18	17	26	17	26	This raises the question of other attribution statements were qualitative or quantitative. (Kristie L. Ebi, IPCC WGII TSU)	has been changed to new attribution language (minor/major role of climate driver)
419	41891	18	17	28	17	28	Huggel et al., 2012 precise 2012 a or 2012 b (Nathalie BRED, INRA)	has been corrected
420	49620	18	17	31	17	31	Typo - insert "the" ahead of "frequency". (Francis Zwiers, Pacific Climate Impacts Consortium)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
421	39810	18	17	35	17	35	not clear to me how exposure and population growth are linked (Peter Burt, University of Greenwich)	If population grows settlement areas extend, and thus, exposure increases.
422	48377	18	17	37	17	38	"no change ... either in Switzerland ... or in Europe". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
423	49621	18	17	39	17	39	It is not clear what the "missing trend" refers to. (Francis Zwiers, Pacific Climate Impacts Consortium)	the sentence has been removed
424	39220	18	17	45	0	0	Section 18.3.2: Until now it seemed a bit unclear to me what this section adds to the respective parts of chapter 4. Maybe this could be carved out more clearly. (Christopher Reyer, Potsdam Institute for Climate Impact Research)	as with other sections, this provides a synthesis of detection and attribution from the respective chapter
425	40860	18	17	45	0	0	Section 18.3.2 - This section seems to omit detection and attribution of impacts of climate change on wildfire which is, of course, a major ecological process. Two possible references for the western United States: Westerling et al. 2006 (detection only), Little et al. 2009 (detection and attribution). [Westerling, A., H.G. Hidalgo, D.R. Cayan, and T.W. Swetnam. 2006. Warming and earlier Spring increase western U.S. forest wildfire activity. Science 313: 940-943. Littell, J.S., D. McKenzie, D.L. Peterson, and A.L. Westerling. 2009. Climate and wildfire area burned in western U.S. ecoprovinces, 1916-2003. Ecological Applications 19: 1003-1021.] (Patrick Gonzalez, National Park Service)	is now discussed to the degree possible

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
426	51012	18	17	45	0	0	Section 18.3.2. Throughout this section, the author team should italicize calibrated uncertainty language used. For likelihood terms, the author team should also ensure that usage is not casual. Please check and italicize calibrated terms on the following lines: page 17, lines 49, 50, and 51; page 18, line 38. (Katharine Mach, IPCC WGII TSU)	see comment 13
427	54289	18	17	45	0	0	Section 18.3.2: I would recommend against the approach taken in this section to present a discussion of literature assessed in Chapter 4 without the references provided there. Other sections of this chapter seem to have struck a balance between citing literature directly and cross-referencing other chapters, and in my view it would be preferable to follow that approach. In a variety of cases in this section, analyses, findings, evidence, etc. are referred to without citations, ostensibly because these citations are provided in chapter 4. In these cases perhaps at minimum an exemplary paper can be referenced here directly with cross-references to chapter 4 sections supplementing these direct citations. (Michael Mastrandrea, IPCC WGII TSU)	some very few references to key sources are now given, but due to the huge amounts of literature given in chapter 4, we believe that more cannot be done
428	49622	18	17	45	17	45	Why the parentheses in the sub-section title? Suggest replacing the title with "Terrestrial and Inland Water Systems". (Francis Zwiers, Pacific Climate Impacts Consortium)	done
429	37031	18	17	45	19	18	This section is completely redundant with chapter 4. Either delete it or shift focus from "what happened" to "how has this been attributed" and explain, with e.g. one example / sub-section, how in this reference study data were sampled and the task of attribution had been solved. The whole report would benefit from this, as one common argument in a debate with "sceptics" or "normal people" is: "I don't understand how you can say ... from ..." - HERE is - in my opinion - the place to address THIS problem and it needs to be addressed. (Joachim Rock, Johann Heinrich von Thuenen-Institute, Federal Research Institute for Rural Areas, Forestry and Fisheries)	No, we do not agree. The revision and co-evolution with chapter 4 has further reduced the redundancies that were in the FOD.
430	51013	18	17	53	17	54	The author team of chapter 18 should also carefully consider support and traceability for the statements, even where cross-references are provided as the main form of support. (Katharine Mach, IPCC WGII TSU)	done
431	41892	18	18	3	18	16	really few references for this section (Nathalie BRED, INRA)	see comment 427
432	49623	18	18	7	18	7	Typo - replace "has" with "have". (Francis Zwiers, Pacific Climate Impacts Consortium)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
433	42136	18	18	9	0	0	"from X to 2008"? (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	corrected.
434	42717	18	18	9	0	0	I assume that there should be year listed here rather than X (Marie Keatley, University of Melbourne)	see comment 433
435	38090	18	18	9	18	9	Type-o "X" (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	see comment 433
436	39811	18	18	9	18	9	text incomplete and 'its end' is poor English (Peter Burt, University of Greenwich)	We do not think that the text is incomplete and we currently see no better way to refer to the end of summer than by saying "its end"
437	39812	18	18	10	18	11	references and examples required (Peter Burt, University of Greenwich)	see comment 427
438	42137	18	18	12	0	14	Please add references to such works. (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	see comment 427
439	39813	18	18	16	18	16	delete . after 'species' (Peter Burt, University of Greenwich)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
440	41894	18	18	19	19	28	This section is really poor, so few references! Moreover, adverse impacts due to extreme events should be mentioned as a way to limit positive effect of temperature increase (Nathalie BRED, INRA)	same comment as comment 427 (we do not understand what "adverse impacts of extreme events" might be)
441	41893	18	18	22	18	22	A reference should be added at least (Nathalie BRED, INRA)	see comment 427
442	49624	18	18	24	18	24	Typo - insert "the" ahead of "preindustrial". (Francis Zwiers, Pacific Climate Impacts Consortium)	done
443	49625	18	18	25	18	25	What does the uncertainty range represent (+/- one sigma, 5-95%, some other uncertainty range??). (Francis Zwiers, Pacific Climate Impacts Consortium)	we chose not to carry this detail from the reference to our chapter
444	48119	18	18	31	18	50	Section 18.3.2.3 This section needs strengthening. In the first paragraph, there is only one pre-AR4 reference. Please look for more references, considering e.g. Sinervo et al (Science, 2010, dealing with lizards, worldwide, from 1975 to 2009). (Philippe Marbaix, Université catholique de Louvain)	has been rewritten to the best possible efforts in collaboration with chapter 4
445	39814	18	18	33	18	33	reference required and, ideally, quantification (Peter Burt, University of Greenwich)	the entire point about extinctions has been revisited and largely removed after consultation with chapter 4
446	52436	18	18	33	18	50	add content of evolutionary and genetic ,aquatic animals (Jian Guo WU, Chinese Academy of Environmental Sciences)	see comment 445
447	39815	18	18	38	18	38	see page 3, lines 33-36 of this Chapter (Peter Burt, University of Greenwich)	see comment 445
448	49626	18	18	38	18	38	This sentence doesn't seem to follow well from the preceding discussion. Suggest something like "Therefore, confidence in the attribution of some fraction of the overall rate of extinctions to climate change is ...". (Francis Zwiers, Pacific Climate Impacts Consortium)	see comment 445
449	38510	18	18	40	18	40	See also for recent comments on observed extinctions: Thomas, C.D. & M.Williamson. 2012. Extinction and climate change. Nature 482, E4-E5 doi10.1038/nature10858 (Chris D Thomas, University of York)	see comment 445
450	39816	18	18	40	18	40	where else? (Peter Burt, University of Greenwich)	see comment 445
451	45516	18	18	40	18	40	There were several follow up studies to the Pounds et al., 2006 study and to just cite this one is asking for trouble. (Peter Neofotis, City University of New York & Climate Impacts Group, Columbia Univ )	see comment 445
452	39817	18	18	44	18	45	per decade over what period? (Peter Burt, University of Greenwich)	different periods in different regions

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
453	43836	18	18	44	18	46	The number of species studied has considerably increased since the AR4. Overall, terrestrial species have recently moved poleward about 17 km per decade (sites in Europe, North America and Chile) and 11 m per decade in altitude up mountains (sites in Europe, North America, Malaysia, and Marion Island), which corresponds to predicted range shifts due to warming (Chen et al., 2011c). Over the last decades, arthropods have moved large and statistically significant distances towards the poles (many 10's of km). (Pam Berry, Oxford)	the present text is based on chapter 4, and more detail can be found there
454	47896	18	18	44	18	46	It is important not to use the Chen paper to generalize to all terrestrial species, as this study was made up primarily of arthropods. Few plants and no trees were used as I recall. So don't make people assume these numbers apply to trees. (Louis Iverson, US Forest Service)	see comment 453
455	39818	18	18	46	18	46	imprecise: what period is 'the last decades'? (Peter Burt, University of Greenwich)	see comment 452
456	39819	18	18	47	18	47	change '10's' to '10s' (Peter Burt, University of Greenwich)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
457	38511	18	18	47	18	50	This statement is strong, relative to the evidence, although it could be true! (Chris D Thomas, University of York)	thanks
458	49627	18	18	48	18	50	It might be helpful to define dispersal capacity - and to give non-expert readers (such as myself) some explanation as to why butterflies would generally have higher dispersal capacity than birds. (Francis Zwiers, Pacific Climate Impacts Consortium)	we refer to chapter 4 for this
459	39820	18	18	49	18	49	what do you mean by limited dispersal? Many birds can migrate/disperse long distances (Peter Burt, University of Greenwich)	see comment 458
460	40861	18	19	1	0	0	Section 18.3.2.4 - This section seems to omit a global review of detection and attribution studies on biome shifts, which could be briefly cited in this way: "Field research has detected elevational and latitudinal shifts of sets of plant species attributable to climate change that have shifted the location of biomes at numerous sites in boreal, temperate, and tropical ecosystems (Gonzalez et al. 2010)." [Gonzalez, P., Neilson, R.P., Lenihan, J.M., and Drapek, R.J., 2010: Global patterns in the vulnerability of ecosystems to vegetation shifts due to climate change. Global Ecology and Biogeography, 19(6), 755-768.] (Patrick Gonzalez, National Park Service)	We have almost exactly that phrase at the beginning of the section. For references, we have kept them at an absolute minimum and refer to chapter 4
461	49628	18	19	4	19	4	Is the use of "likely" here intended to convey an IPCC likelihood assessment? If so, is the probability that the statement is correct quantifiable (based on the available literature)? If not, perhaps confidence language would be more appropriate. (Francis Zwiers, Pacific Climate Impacts Consortium)	"likely" is removed
462	38091	18	19	7	19	7	Type-o "refs" needed. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	see comment 458
463	39821	18	19	7	19	7	references required (Peter Burt, University of Greenwich)	see comment 458
464	39822	18	19	7	19	7	insert 'global' before 'warming' (Peter Burt, University of Greenwich)	no, it is local not global warming that affects those trees
465	41895	18	19	7	19	7	Refs to be added (Nathalie BRED, INRA)	see comment 458
466	51014	18	19	7	19	7	The missing references should be supplied. (Katharine Mach, IPCC WGII TSU)	see comment 458
467	41896	18	19	9	19	9	It should be precise here that mortality is not always the issue of these extreme drought events; at least forest productivity (and/or Carbon sink) is severely impacted for several years after the event. A plenty of papers reported this impact since the e (Nathalie BRED, INRA)	specifics to be found in chapter 4
468	42138	18	19	14	0	0	Change "manu" to "many" (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
469	49629	18	19	14	19	14	Typos - insert "the" ahead of "composition", and replace "manu" with "many". (Francis Zwiers, Pacific Climate Impacts Consortium)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
470	39823	18	19	15	19	15	the plural of 'caribou' is 'caribou' (Peter Burt, University of Greenwich)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
471	51015	18	19	26	19	27	"High" and "very high confidence," as calibrated uncertainty language, should be italicized. (Katharine Mach, IPCC WGII TSU)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
472	49630	18	19	33	19	44	Presumably the entire discussion here is about the North Atlantic. Is any literature available to describe the impacts of changes in storminess in other basins, for example? (Francis Zwiers, Pacific Climate Impacts Consortium)	This section if a synthesis of discussions in Chapter 5. Evidence presented there includes North East Pacific, but may still show publication bias for well studied regions.
473	49631	18	19	34	19	34	Typo - replace "has" with "have". (Francis Zwiers, Pacific Climate Impacts Consortium)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
474	52655	18	19	36	19	39	Brattegard (2011) Changes in Norwegian marine benthic organisms. Utredning for DN 2011-8 (In Norwegian) reports that of about 1600 benthic marine species that were defines as southern species in Norway , having their northern distribution limit somewhere on the Norwegian coast, 565 species have moved further north along the coast , on average 750-10000 kilometers during their period from 1997-2010. (Else Marie Løbersli, Norwegian directorate for nature management)	Thanks for this interesting information. it has been forwarded to Chapter 5 (Coastal Systems), however, unfortunately we are unable to include literature that is not in English, unless Lead Authors have sufficient command of it.
475	54290	18	19	42	19	44	Please specify the other timeframe which is being compared to 1971 through 1994 here, as well as the geographical area for which the statement is being made. (Michael Mastrandrea, IPCC WGII TSU)	this statement has been omitted from the text
476	42139	18	19	43	0	0	Why is 1971-1994 used as a reference period? (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	this statement has been omitted from the text



#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
477	35631	18	20	1	20	10	This text is identical to that of chapter 6 page 13; See my comment chapter 6 page 13 lines 46 to 48 (Goneri Le Cozannet, BRGM)	We have not access to other chapters expert comments. We have not found that same statement in Chapter 6 FOD, so unfortunately can not respond to this comment. The text has been rephrased nonetheless.
478	49632	18	20	3	20	10	Coastal erosion in the Gulf of St. Lawrence has been a focus of study at Ouranos - a regional climate change impacts consortium located in Montreal. The principle reports from this work are in French (e.g., see <a href="http://www.ouranos.ca/media/publication/20_Rapport_Savard_maritime_2008.pdf">http://www.ouranos.ca/media/publication/20_Rapport_Savard_maritime_2008.pdf</a> ), but those involved may have subsequently published some of this work in the English language peer reviewed literature, so it might be worth contacting them. (Francis Zwiers, Pacific Climate Impacts Consortium)	Thanks for the kind advice. We have checked that report in the french original version, but could not find relevant information (such as historical changes, or discussion of climate change contribution to observed impacts).
479	51016	18	20	26	0	0	Section 18.3.4. To enhance readability and clarity, the author team should consider moving calibrated uncertainty language to the end of sentences or clauses, within parentheses, where possible. Additionally, all calibrated uncertainty language used should be italicized; please accordingly check and italicize calibrated terms on the following lines: page 20, lines 32,44, 46, 47, 48, 51, and 53; page 21, lines 4, 6, 15, 16, 18, 19, 20, 23, 28, 30, 31, 32, 35, 39, 50, and 53. (Katharine Mach, IPCC WGII TSU)	during rewrite, much of the highlighted phrases have been deleted or changed, also to improve clarity of confidence language. Italication has been done where appropriate.
480	51017	18	20	26	0	0	Section 18.3.4. For statements presented in this section, traceability to assessment in chapter 6 needs to be enhanced. For each conclusion given, the author team should provide cross-references to the specific relevant sections of Chapter 6 or the corresponding entries in tables 18-2 and 18-3. In some cases, the author team might consider repeating a few key references in support of statements, here within the text of the chapter, in addition to presentation in the tables. (Katharine Mach, IPCC WGII TSU)	this advice has been followed in the rewrite of Chapter 18.3.4, and traceable account to Chapters 30 and 6 has been improved for both tables and text. In most cases, we have refrained from repeating key references, as that may give a skewed image, and in many cases, highlighting one reference won't do justice to the underlying assessment.
481	43047	18	20	26	20	26	18.3.4. Ocean Systems seems to be a synthesis of Chapter 6, and there is no new information here. (Cliff Law, NIWA)	that is correct. 18.3.4 is a synthesis of Chapter 6 assessment.
482	41897	18	20	26	20	32	references should be added in this section (Nathalie BREDAS, INRA)	This section no longer exists, and crossreferences to Chapter 6 and 30 have been inserted at appropriate places in the new draft
483	49633	18	20	26	20	38	It seems to me that more should be done to provide a traceable account of the basis of assessments, such as that of high confidence in synergistic amplification of warming effects. Some references are given in the table, but critical evaluation of the literature in the text is missing. (Francis Zwiers, Pacific Climate Impacts Consortium)	to avoid redundancy, most of the issues addressed in the box are not taken up in the text. the breadth of issues covered in Chapter 18 precludes a full discussion of every item in the synthesis, as this is being done in the underlying sectoral and regional chapters. we have improved crossreferencing. the statement on synergistic amplification has been removed.
484	54291	18	20	32	20	32	Is there a general time frame for the observed changes presented in Table 18-2 that can be provided here where it is introduced? (Michael Mastrandrea, IPCC WGII TSU)	see comment 58
485	43308	18	20	34	21	44	The table legends 18-2 and 18-3 are identical. (Hans-O. Pörtner, Alfred-Wegener-Institute for Polar and Marine Research)	no, in fact there is a difference: 18-2 is "general processes" and 18-3 is "species or site specific processes). However, table numbering has changed from FOD to SOD
486	43048	18	20	35	20	35	Table 18.2 is very useful, but its primarily a summary of the discussion of Chapter 6; and consequently would be more appropriate in Chapter 6 as a concluding summary table (Cliff Law, NIWA)	Chapter 18 is synthesizing information from sectoral chapters such as Chapter 6, therefore we consider this format to be appropriate.
487	53822	18	20	41	0	0	This section does not provide references for the D&A statements. The placement of the confidence statements can be awkward. It would be better to have a standard format for including confidence statements. (Kristie L. Ebi, IPCC WGII TSU)	Chapter 18.3.4 has been substantially rewritten, with a focus on improved confidence language and traceable accounts. Most of the traceable account for statements in that section had been provided in the tables 18-2 to 18-3, and this has been kept as a general structure in the rewrite, in order to minimize redundancy.
488	49634	18	20	45	20	46	This statement needs support from the literature. (Francis Zwiers, Pacific Climate Impacts Consortium)	this statement has been omitted from the text, as it is not relevant for detection and attribution discussion
489	44648	18	20	46	20	46	"ocean acidification is unprecedented in the last 300 Ma". There is no citation of a source of this finding. (Sarka D. Blazkova, T.G. Masaryk Water Research Institute)	this statement has been omitted from the text, as it is not relevant for detection and attribution discussion
490	39824	18	20	50	20	50	change 'zone' to 'zones' (Peter Burt, University of Greenwich)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
491	40550	18	21	4	21	5	These attribution studies to anthropogenic warming need to be critically assessed. (Cynthia Rosenzweig, NASA Goddard Institute for Space Studies/Columbia University)	it is not clear what this comment refers to. However, the OCLTT concept has been removed from the SOD text, and the assessment of the underlying literature has been spelled out more clearly. Most studies do not attribute to anthropogenic warming, but to regional temperature trends. However, most of that analysis is done within chapters 30 and 6, and therefore references to appropriate sections of those chapters have been inserted.
492	39825	18	21	5	21	5	insert , after 'especialy' (Peter Burt, University of Greenwich)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
493	54292	18	21	6	21	9	In general, we would expect to see a statement about the level of agreement paired with the statement "robust evidence." Do you intend that there is robust evidence and high agreement, and thus high confidence in the finding? (Michael Mastrandrea, IPCC WGII TSU)	this has been revised during rewrite.
494	53823	18	21	7	21	7	Please define OCLTT. (Kristie L. Ebi, IPCC WGII TSU)	this has been removed from SOD text
495	39826	18	21	9	21	9	replace 'like' with 'such as' (Peter Burt, University of Greenwich)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
496	39827	18	21	14	21	14	reference required (Peter Burt, University of Greenwich)	traceable account/references for this statement is contained in table 18-2 (now SOD table 18-1). In general, as this is a synthesis of a much more detailed discussion contained in chapter 6, it is not appropriate to give a single reference in many cases.
497	36512	18	21	14	21	15	refer to ch6 (Keith Brander, DTU)	we have improved traceable account to Chapter 6 throughout the text, though this statement has been altered. Much of traceable account is still to be found in tables.
498	49635	18	21	14	21	15	Is the statement about possible changes in NPP a projection? If so, I don't think it really belongs in this chapter (which presumably, should deal with historical and current change). (Francis Zwiers, Pacific Climate Impacts Consortium)	true, this statement has been omitted from text. We do report on past and observed changes of NPP in the oceans in table 18-2 (now SOD 18-1).
499	51018	18	21	14	21	16	The author team is presumably referring to an outcome that has potentially been observed here, even though the verbs used are not completely clear. It would be preferable to more specifically indicate time frame of these changes. (Katharine Mach, IPCC WGII TSU)	this statement has been omitted from text. We do report on past and observed changes of NPP in the oceans in table 18-2 (now SOD 18-1).
500	39828	18	21	17	21	17	add 's' to 'ME' (Peter Burt, University of Greenwich)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
501	39829	18	21	20	21	23	references required (Peter Burt, University of Greenwich)	traceable account/references for this statement is contained in table 18-2 (now SOD table 18-1). In general, as this is a synthesis of a much more detailed discussion contained in chapter 6, it is not appropriate to give a single reference in many cases.
502	49142	18	21	28	21	42	Can you also specify results related to the kelp forest. Ref also results in ch 5 and 30. (Oyvind Christophersen, Climate and Pollution Agency)	Kelp forests are discussed in Coastal ecosystems, SOD 18.3.3; references to Ch30 have been improved.
503	54293	18	21	28	21	42	It is unclear whether the attribution discussed in this paragraph is to climate change or anthropogenic climate change. In addition, it is unclear how the medium confidence assignments at the beginning of the roman numeral list relate to the high confidence assignments that appeared within the list. Finally, here and in Table 18-3, please specify the timeframe over which these observed changes are considered. (Michael Mastrandrea, IPCC WGII TSU)	this has been rephrased and clarified.
504	49143	18	21	31	21	33	Give the direction of the changes e.g. "(i) reduced abundance and overall biomass" if that is meant. (Oyvind Christophersen, Climate and Pollution Agency)	direction of such changes will vary within different regions and ecosystems. Not direction can be given. However, this text is no longer included in SOD 18.3.4
505	42140	18	21	34	0	0	Repeated word (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	deleted the 2nd word, but actual language may have been lost during further editing
506	40807	18	21	34	21	34	How overfishing compares with climate change in "reduced body body size" ? See FAQ 6.6 (Michel Petit, CGIET rue de Bercy)	this statement has been omitted from the new draft, however, discussion of the influence of fishery has been improved throughout section 18.3.4
507	36513	18	21	39	0	0	I do not think most fisheries experts would have high confidence that past changes in catch potential of cod in this area are attributable to climate change, and certainly not to anthropogenic climate change. (Keith Brander, DTU)	this statements has been omitted from revised draft.
508	40808	18	21	39	21	40	Is not overfishing the main cause, possible exacerbated by climate change ? (Michel Petit, CGIET rue de Bercy)	this statement has been omitted from the new draft, however, discussion of the influence of fishery has been improved throughout section 18.3.4
509	49636	18	21	50	21	53	I'm not an expert, but it seems to me that this is an example of an assessment that covers just about all contingencies. A more specific assessment, possibly with lower confidence, might be more informative. (Francis Zwiers, Pacific Climate Impacts Consortium)	these lines have been omitted from the new draft, and more specific assessment is provided in tables 18-2 and 18-3.
510	39830	18	21	52	21	52	change 'penguins' to 'penguins' (Peter Burt, University of Greenwich)	done
511	54294	18	22	2	22	5	Is there a specific geographical range for this statement, or is this a global statement? (Michael Mastrandrea, IPCC WGII TSU)	this is a global statement on species level, which has been removed from text but is still withing table 18-2
512	39831	18	22	3	22	3	move , to after 2nd 'and' (Peter Burt, University of Greenwich)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
513	39832	18	22	6	22	6	change 'earth' to 'Earth' (Peter Burt, University of Greenwich)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
514	51019	18	22	9	0	0	Section 18.3.5. Throughout this section, the author team should italicize calibrated uncertainty language used. For likelihood terms, the author team should ensure that usage is not casual. Please check and italicize calibrated terms of the following lines: page 22, lines 35, 37, 38, 41; page 23, lines 14, 27, 35, 45. (Katharine Mach, IPCC WGII TSU)	see comment 13

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
515	37377	18	22	13	22	26	the concept "Food Production system" also occurred in chapter 7, suggest to coordinate them (Liyong Xie, Shenyang Agricultural University)	18.3.5 is a synthesis of Chapter 7's assessment of detection and attribution of observed CC impacts on food systems, and development proceeds in a coordinated way
516	36514	18	22	23	22	24	Fisheries evidence is good for climate variability but not for anthropogenic climate change. (Keith Brander, DTU)	see comment 11
517	49637	18	22	23	22	24	For non-expert readers, it would be useful to list other food production systems. (Francis Zwiers, Pacific Climate Impacts Consortium)	We have removed this sentence as it duplicated what was stated in the text above.
518	37315	18	22	27	22	47	Crops: is it not a human system? (Joel Guiot, CNRS)	It is a coupled human natural system. As it most certainly is a managed system, we have moved it into the human systems section.
519	41898	18	22	29	22	29	farmers and not famers (r is missing) (Nathalie BREDA, INRA)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
520	51020	18	22	34	22	34	It would be preferable to refer to the specific section of chapter 7 relevant here. Additionally, throughout this section, references to specific sections of Chapter 7 should be used where they support statements made. (Katharine Mach, IPCC WGII TSU)	We have inserted the pointers.
521	49144	18	22	35	22	38	Please integrate key findings related to this aspect into the executive summary (Oyvind Christophersen, Climate and Pollution Agency)	We have added a summary of food systems in the executive summary under the human systems section.
522	49638	18	22	41	22	41	I would avoid the use of calibrated language here. Also, I think the opposite is intended to what is actually said - i.e., the crop modelling studies are performed at scales on which attribution of observed climate changes remains difficult. The WG1 AR5 reference would be Chapter 10. Note also that WG1 AR4 Chapter 9 has considerable discussion concerning the scales at which they felt attribution was not yet possible. (Francis Zwiers, Pacific Climate Impacts Consortium)	the statement has been rephrased, incorporating this very valid comment, and more detail and references to WG1 have been added
523	51021	18	22	41	22	42	This chapter reference should be completed. (Katharine Mach, IPCC WGII TSU)	the statement has been rephrased, and references to WG1 has been completed
524	49639	18	22	43	22	43	Typo - insert "are" ahead of "focused". (Francis Zwiers, Pacific Climate Impacts Consortium)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
525	39365	18	22	43	22	45	or more correctly anthropogenic and natural influences are detected with anthro being dominant contributor to NH summer temperatures. (Gareth S Jones, Met Office)	We have now referenced the proper WG1 10 section.
526	49640	18	22	45	22	46	This needs to be a bit more nuanced than stated here so that the size of the human contribution is clear. There will, no doubt, be a WG1 AR5 Ch 10 assessment of how much warming is attributable, and that should be repeated here. (Francis Zwiers, Pacific Climate Impacts Consortium)	We have now referenced the proper WG1 10 section.
527	49641	18	22	46	22	47	Since this is an indication from crop models (rather than direct observations), I think "has had significant" should be changed to "could have had" or "is estimated to have had" to indicate more strongly that there is uncertainty in the assessment of the impact. (Francis Zwiers, Pacific Climate Impacts Consortium)	We have made this change.
528	51022	18	22	50	0	0	Section 18.3.5.2. The author team should consider combining this section with 18.3.4.3. (Katharine Mach, IPCC WGII TSU)	Fisheries output and observations relevant for commercially exploited fish is the focus of this section, while biological changes on ocean scale are addressed in 18.3.4. Appropriate links and crossreferences have been established.
529	49642	18	22	50	22	50	Will this be beefed up for the SOD? (Francis Zwiers, Pacific Climate Impacts Consortium)	there is not very much evidence for observed climate change impacts on Fisheries, and this has been worked out more clearly in current text. Some more examples have been added. Appropriate links and crossreferences have been established to oceans Sections discussing changes in marine ecosystems in 18.3.4 and Chs 6 and 30
530	39833	18	22	53	22	53	quantify 'recent decades' (Peter Burt, University of Greenwich)	We have properly stated the timeframes throughout the chapter.
531	54295	18	23	4	23	6	Please specify the timeframe for these changes. (Michael Mastrandrea, IPCC WGII TSU)	We have properly stated the timeframes throughout the chapter.
532	39834	18	23	5	23	5	replace 'would have' with 'has' (Peter Burt, University of Greenwich)	We have made this change
533	38895	18	23	9	0	0	18.3.5.3 Impact of Extreme Weather Events on Food Production: Flashfloods can cause substantial damage to soil, with serious losses of food production. Sediments and debris carried out by the floods tend to cover soil and turning it unsuitable for agriculture. (Mohamed Tawfic Ahmed, Suez Canal University)	We have found no studies that deal with detection and attribution here and have therefore not changed the text.
534	54296	18	23	9	0	0	Section 18.3.5.3: Please specify the timeframe for the changes mentioned in this section. (Michael Mastrandrea, IPCC WGII TSU)	see comment 58
535	49145	18	23	13	23	13	Consider to use e.g. increasing instead of positive which can have a double meaning. (Oyvind Christophersen, Climate and Pollution Agency)	Increasing implies a change in the trend. Positive refers to its slope. We have removed this language due to redundancy but the original language was factually correct.
536	49643	18	23	14	23	14	Suggest replacing "likely" with another modifier to avoid the use of IPCC calibrated language in this sentence. (Francis Zwiers, Pacific Climate Impacts Consortium)	We have changed the language.
537	53824	18	23	14	23	23	Do you mean attributable to climate change? (Kristie L. Ebi, IPCC WGII TSU)	We have changed the language.
538	41899	18	23	17	23	17	Porter and Gawith, 1999 is missing in the reference list (Nathalie BREDA, INRA)	We have added it.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
539	49644	18	23	18	23	18	Insert "partially" to make it clear that greenhouse gas forcing might not be responsible for all of the observed change in daytime temperature extremes. Indeed, as Zwiers et al (2011) show, the discrepancy between observed and model simulated changes in temperature extremes is substantial for daytime maximum temperature extremes. (Francis Zwiers, Pacific Climate Impacts Consortium)	We have added the word "partially".
540	35589	18	23	23	0	24	Not sure how "may have had" fits on the scale -- low confidence? Medium? (Daniel Farber, UC Berkeley)	This line has no words. No changes made
541	51023	18	23	30	23	32	The author team might consider if this statement, which is forward-looking, is appropriate in this section. (Katharine Mach, IPCC WGII TSU)	We have deleted it for this reason.
542	54297	18	23	35	23	37	Please specify the timeframe for these changes. (Michael Mastrandrea, IPCC WGII TSU)	see comment 58
543	43798	18	23	44	23	46	Regarding the chapter's goal to attribute changes in socio-ecological systems to climate variability and change, there is recent evidence for the impacts of weather extremes on food security (Sietz et al. 2011). The study reveals typical vulnerability patterns for smallholders in the Peruvian Altiplano and presents an advanced procedure of validation. It shows that the vulnerability patterns correlate clearly with an independent data set of reported differential vulnerability outcome. The similarities of households given by the vulnerability patterns hold true for the reported vulnerability outcome. Though this correlation does not imply causality, it supports our understanding of vulnerability-creating mechanisms. In addition, the outcome-based aspect of validation is complemented in a second step. Here, the hypotheses used to define and indicate the relevant processes were tested. This test shows that the vulnerability-creating mechanisms implied by the identified clusters are consistent with independently reported processes that explain the household-specific damages caused by weather extremes. This two-step approach is an advanced form of validation: since (a) the vulnerability patterns prove to be empirically valid corresponding to reported outcomes of vulnerability and (b) since the pertinent vulnerability-creating mechanisms are consistent and plausible. The advanced validation clearly strengthens the credibility of the identified vulnerability patterns and demonstrates their value for decision-making processes. REFERENCE: Sietz, D., Mamani Choque, SE. and Lüdeke, MKB. (2011) Typical patterns of smallholder vulnerability to weather extremes with regard to food security in the Peruvian Altiplano. Reg. Environ. Chang., Published online: 15 November 2011. DOI: 10.1007/s10113-011-0246-5. (diana sietz, Wageningen University)	Chapter 18 deals with Detection and Attribution to Climate Change. While vulnerability is an important component, the recommended study does not make any D&A statements for climate change. We have therefore not added it.
544	53825	18	23	48	23	52	Are these global studies? (Kristie L. Ebi, IPCC WGII TSU)	Lobell et al 2011 is. We have cited it.
545	39835	18	23	51	23	51	change '1970's' to '1970s' (Peter Burt, University of Greenwich)	We have made this change.
546	42143	18	24	0	25	0	Section 18.4.2.1 Economic growth. Most of this section is based on one unpublished study. Suggestion: compare the estimates of Dell for 1°C with the calibration of the damage functions in IAMs. (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	This is not true. There are three papers in this section, all of which are published. Due to the scarcity of literature, the confidence statements are all low.
547	39836	18	24	1	24	1	(missing from reference (Peter Burt, University of Greenwich)	ref in p 24 ln 1 is Lobell et al 2011, which is in the Refflist
548	51024	18	24	1	24	3	The author team should specify the time frame over which this increase was measured. (Katharine Mach, IPCC WGII TSU)	We have properly stated the timeframes throughout the chapter.
549	40551	18	24	16	0	0	Section 18.4.1 -- Cite: Rosenzweig, C., W.D. Solecki, S.A. Hammer, and S. Mehrotra (Eds.), 2011: Climate Change and Cities: First Assessment Report of the Urban Climate Change Research Network. Cambridge University Press. -- A major report related to climate change and cities. (Cynthia Rosenzweig, NASA Goddard Institute for Space Studies/Columbia University)	"Rosenzweig and Solecki, 2011" actually refers to that reference, citation in text will be corrected
550	51025	18	24	16	0	0	Section 18.4.1. In this section, the author team should consider explicit cross-referencing of relevant sections from chapter 8. Additionally, calibrated uncertainty language (such as "robust evidence") should be italicized. For the opening sentence, the team should consider also indicating that such case studies have to be linked to broader understanding of climate and larger scale. Finally, further citations or cross-referencing should be provided for the 2nd paragraph of the section as appropriate. (Katharine Mach, IPCC WGII TSU)	We have completely rewritten this section with significant input from chapter 8. Due to the large role of other confounders, detection and attribution in the sense of chapter 18 has not yet been achieved. We make clear that there are significant sensitivities, yet no detected impacts.
551	35590	18	24	18	0	0	is "robust" a defined IPCC term? Does this mean the same as "high confidence"? (Daniel Farber, UC Berkeley)	No it is not. That is why we used it in this context as we do not want to make a confidence statement here.
552	42141	18	24	18	0	19	Too strong sentence. Consistent with climate projections? Three problems: 1) model resolution and city size (even if downscaling is considered, how many cities around the world have downscaled scenarios and have conducted analyses that permit to support this statement?); 2) local effects such as the UHI; 3) is this consistent for ALL cities? In both variability and change? (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	We use and reference text from chapter 8 here, which is properly referenced now.
553	53826	18	24	18	24	18	What is the level of agreement? (Kristie L. Ebi, IPCC WGII TSU)	We did not take a stand.
554	49645	18	24	18	24	19	The evidence needs to be presented and critically appraised to convince the reader of the claim that it is robust. A-priori, there would be only limited reason to expect climate change in cities to differ from climate change elsewhere, yet this paragraph seems to imply that cities are experiencing more profound changes than elsewhere. (Francis Zwiers, Pacific Climate Impacts Consortium)	We have made more explicit reference to important issues such as the urban heat island effect.
555	54298	18	24	18	24	24	These statements seem somewhat overgeneralized, as not all of the changes listed will affect all urban areas--for example, not all urban areas will face increased probability of flooding. An alternative approach might be to provide more specific examples of risks without implying that all risks apply to all locations. (Michael Mastrandrea, IPCC WGII TSU)	see comment 550
556	49146	18	24	18	24	37	Suggest that you here include also finding related to impact of climate change on the air quality in cities e.g. related to heat waves and ozone concentration and PM10 in cities. See 8.2.2.1, 11.2.8 and 11.5.5 (Oyvind Christophersen, Climate and Pollution Agency)	We could not find a literature on D&A here so have not added anything on this topic.
557	39837	18	24	21	24	21	what does 'this' refer to? (Peter Burt, University of Greenwich)	This was a typographical error, which we have fixed.
558	42142	18	24	24	0	0	Both the causes and consequences... (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	Good point. As we are interested in detecting impacts, we have focused on the consequences.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
559	54299	18	24	27	24	37	The impression given by the second paragraph seems to diverge from that given in the beginning of the previous paragraph, which implies robust evidence for detection of changes in many urban areas. Even though the second paragraph starts with a focus on attribution, it appears to cover issues related to detection as well, and it would be useful to harmonize these points further. (Michael Mastrandrea, IPCC WGII TSU)	We have made it clear throughout the chapter now when we talk about observed sensitivities instead of detected impacts (which is sensitivity times change in climate). For urban, we have detected and attributed very little at this point.
560	49646	18	24	36	24	37	NPCC should be cited at Horton et al, I think. Also, I would hope that additional peer reviewed literature sources could be cited in this context. (Francis Zwiers, Pacific Climate Impacts Consortium)	NPCC was missing from RefList, will be added as Horton et al., 2009
561	51026	18	24	40	0	0	Section 18.4.2. Throughout this section, the author team should italicize calibrated uncertainty language used. For likelihood terms, the author team should also ensure that usage is not casual. Please check and italicize calibrated terms on the following lines: page 24, line 53; page 25, lines 19, 52; page 26, lines 9, 39, 41, 45; page 27, line 49. (Katharine Mach, IPCC WGII TSU)	edits done, content checked
562	39838	18	24	44	24	45	sense a bit vague. Also, which countries? (Peter Burt, University of Greenwich)	Across all countries with consistent data (as used in the cited reference).
563	36427	18	24	44	25	4	The attempt to be careful not to lapse into climate determinism here is noted, but I find two difficulties with the language of this paragraph. First, as worded, this section does not seem to adequately differentiate between: a) "a negative cross sectional correlation" between "per capita income and temperature both across regions and across regions within countries," which can be interpreted as climate determinism despite the caveats provided, and b) the fact that changing (increasing) temperatures within a given country or region of a country have been associated with lower economic growth in the short term, which is entirely reasonable and is in keeping with climate change predictions. Second—and this is closely related to the first point—there does not appear to be any acknowledgment that the economies of low income (developing) countries are closely tied to the economic policies of high income (developed) countries. Therefore, even if it is true that increasing temperatures have been associated with lower economic growth in the short term, this emphasis postulates temperature as the main driver of economic growth, without considering other factors, so this too can be construed as deterministic. (Philip Garone, California State University, Stanislaus)	We have dropped the language on climate determinism and simply state that the mechanisms are not well understood.
564	49647	18	24	44	25	4	Is it necessary to allude to "climate determinism" at all? It is one thing to note that short term temporal variations in regional mean climatic conditions are associated with short term temporal variations in regional economic indicators, but it is quite another to allude to apparent spatial correlations between mean climate, and historical economic performance. It is not clear to me which of these two things is being discussed here, and would suggest that the latter should be avoided. (Francis Zwiers, Pacific Climate Impacts Consortium)	We have dropped the word climate determinism as the discussion is, as you correctly state, not about a cross section correlation but year to year variation (or 15 year average to 15 year average variation).
565	39839	18	24	52	24	52	where: globally, specific countries? (Peter Burt, University of Greenwich)	For developing countries. We have pointed this out now.
566	49648	18	24	53	24	53	This appears to be inappropriate use of the confidence language. The IPCC confidence language is non-quantitative and should not be confused with the use of the term "confidence" in statistics, where the word refers to confidence intervals (which are quantified), and also sometimes to the results of significance tests. I assume that "detected only with low confidence" refers to the latter (reporting on the statistical significance of an outcome) and so I would suggest that this be reworded to say something like "and are only detected at low levels of statistical significance". (Francis Zwiers, Pacific Climate Impacts Consortium)	We have removed this statement
567	44209	18	25	6	25	6	Note that in WG1 the term "glaciers and ice caps" has been by "glaciers" in order to avoid public confusion as non experts many times use "ice caps" for either the ice sheets or even for the arctic sea ice. Consistency should be kept within AR5 (Georg Kaser, University of Innsbruck)	Noted, thank you.



#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
568	41555	18	25	7	26	34	Although the subchapter 18.4.2.2 contains very interesting information, it is a little confusing and it should be organized following a discursive line: first paragraph is OK, it contains main definitions and concepts; second paragraph could concentrate all the results published in IPCC 2012 and related references because paragraphs 2, 5 and 8 contains information that is repetitive. I also include some specific new references not included in the subchapter that support some comments. The different paragraphs could be reorganized attending to: - The observations about the increase of economic losses due to extreme weather - The factors that could be involved in this increase: a major exposure and vulnerability; increasing concentrations and values of assets; changes in the total amount of annual surcharges (premiums) paid by customers to insurance companies and changes in the value of dwellings increase in the national GDP (Barredo et al, 2012); higher insurance penetration; potential (or not) increase of extreme weather events. - Other factors that should be considered when observed trends in economic losses due to extreme weather events are analyzed and that can introduce uncertainties: the different methodologies and approaches applied (Bubeck et al, 2011); vulnerability reduction (Bouwer, 2011a); uncertainties associated to extreme weather events databases and different criteria followed by insurances companies (Llasat et al, in press); improvements of forecasting, early warning, etc - Countries and regions mainly affected by economic losses (add some comments about the differences N-S or developed and developing countries) and specific information on extreme weather events and countries. In this paragraph the reference of (Gayà et al, 2011) (that shows the strong impact of changes in perception and damages attribution) could be added, as well as those of Barredo (2009) (referred to flood losses in Europe) and (Pielke Jr. and Downton, 2000) (referred to flood losses in U.S.) Barredo, J. I.: Normalised flood losses in Europe: 19702006, Nat. Hazards Earth Syst. Sci., 9, 97–104, doi:10.5194/nhess-9-97-2009, 2009 Barredo, J.I., D. Saurí, and M. C. Llasat, 2012. Assessing trends in insured losses from floods in Spain 1971–2008. Nat. Hazards Earth Syst. Sci., 12, 1723–1729, 2012. www.nat-hazards-earth-syst-sci.net/12/1723/2012/ doi:10.5194/nhess-12-1723-2012. Bubeck, P., de Moel, H., Bouwer, L.M. and Aerts, J. C. J. H., 2011. How reliable are projections of future flood damage? Nat. Hazards Earth Syst. Sci., 11, 3293–3306. www.nat-hazards-earth-syst-sci.net/11/3293/2011/ doi:10.5194/nhess-11-3293-2011 Gayà, M., M.C. Llasat and J. Arús: Tornadoes and waterspouts in Catalonia (1950-2009). Nat. Hazards Earth Syst. Sci., 11, 1875–1883, 2011 Llasat, M.C., Llasat-Botija, O.Petrucci, A.A. Pasqua, J.Rossello, F. Vinet, L. Boissier, 2012 : Floods in North-Western of Mediterranean Region: a comparison with global databases. La Houille Blanche, in press. (Note: this paper will be published in autumn; I can send you it if you need it) Pielke Jr., R. A. and Downton, M. W.: Precipitation and Damaging Floods: Trends in the United States, 1932–97, J. Climate, 13, 3625–3637, 2000 (Maria-Carmen Llasat, University of Barcelona)	In light of this and other comments, this section has been completely re-written. We now follow some of the structure and references (thanks!) you suggest. However we do not delve too deeply into trends in the insurance industry, leaving that to the more detailed coverage in Chapter 10.
569	49649	18	25	19	25	23	It would be helpful to summarize here what is known about the causes of the increase in losses, rather than leaving this to line 50. (Francis Zwiers, Pacific Climate Impacts Consortium)	We now point out the diversity of drivers in the first paragraph, with further details remaining later in the text.
570	54301	18	25	19	25	23	Please ensure clarity here about what was directly stated in the SREX report and what are related points being made by the Chapter 18 author team here. (Michael Mastrandrea, IPCC WGII TSU)	We have re-written this statement to accurately reflect the conclusion of the SREX chapter.
571	39840	18	25	20	25	20	insert 'the' after 'between' (Peter Burt, University of Greenwich)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
572	39841	18	26	16	26	16	move 'conclusively' to after 'estimate' to remove split infinitive (Peter Burt, University of Greenwich)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
573	48468	18	26	20	26	27	This seems a fair assessment of the literature. However, perhaps two caveats could be considered: 1) the attribution of increasing losses to increased exposure of people and assets generally takes the form of showing that GDP growth and damage growth are of similar magnitude: in at least some of this literature, there are caveats about the fact that we would expect better building codes over time to reduce the rate of damage growth, which isn't seen... this leaves room for there to be a climate change factor. 2) the absence of AGW-induced changes in tropical cyclone activity is a good argument for a lack of AGW-induced tropical cyclone damage. Two caveats - first, while Accumulated Cyclone Energy shows little trend, the alternate metric Power Dissipation Index (Emmanuel et al.) has shown an increase which is correlated with SSTs (North Atlantic only, and doesn't address frequency of landfalling). Second: SLR changes, and increased precipitation changes from these kind of storms could both increase damages even in the absence of any changes in frequency or power. It might be good to mention these issues? (apologies for lack of citations, but I don't have them on hand, and I imagine that the chapter authors know this literature better than I do in any case) (Marcus Sarofim, US EPA)	You raise some excellent points and we have re-written this section following suggestions from this and other comments. However, in this chapter we are restricted to what observational evidence, through detection and attribution analysis, can tell us. We now discuss the sea level rise issue in this context.
574	49650	18	26	26	26	27	Should also cite WG1, Ch 10 - which contains a discussion of whether observed changes in tropical cyclone activity are attributable to human influence on the climate system. (Francis Zwiers, Pacific Climate Impacts Consortium)	We now reference the appropriate sections of WGI Chapter 10.
575	49147	18	26	35	27	12	Please include the findings from the study, T.C. Peterson, P.A. Stott and S. Herring (editors). Explaining extreme events of 2011 from a climate perspective. Bulletin of the American Meteorological Society, Vol. 93, July 2012, p. 1041. doi: 10.1175/BAMS-D-11-00021.1, when revisiting box 18-3. (Oyvind Christophersen, Climate and Pollution Agency)	We now include one of the studies in that supplement in an expanded table.
576	54302	18	26	39	26	40	Please refine the wording of this statement, as some patterns of extreme events are already changing. It would be useful to cross-reference relevant chapters of IPCC AR5 Working Group 1, as well as the SREX report. (Michael Mastrandrea, IPCC WGII TSU)	In response to other comments, this box and section has been re-written and this sentence no longer appears.
577	49651	18	26	46	26	46	It is not clear what "balance" is being discussed, although I assume the author has in mind a balance between increasing drought on the one hand, and increasing precipitation extremes on the other. To refer to this as a balance probably implies greater confidence in our ability to close the water budget on local to regional and continental scales than can actually be achieved. (Francis Zwiers, Pacific Climate Impacts Consortium)	It was intended to refer to field significance, but was not very clear. In response to other comments, this box and section has been re-written and this sentence no longer appears.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
578	44647	18	26	47	26	51	"but a change in climate may also lead to new types of extreme weather events outside the bounds of historically documented weather". There is no citation after this and there is no example. Of course an event of the same kind but larger can happen (compare the method of "probable maximum precipitation" and "probable maximum flood"). Large events with the return period 1000 or 10 thousand years we can model now using a weather simulator, even with uncertainty. Such events are required for the evaluation of the safety of dams. But they are still events of the same kind as those observed (in the statistical sense). (Sarka D. Blazkova, T.G. Masaryk Water Research Institute)	Good point, and we have removed this sentence.
579	49652	18	26	47	26	51	This seems rather fuzzy, and I think leads the non-critical reader towards making potentially unwarranted inferences about the causes of observed extremes. SREX Chapter 3 FAQ 3.2 deals with the question in part - while records occur in individual places, it is argued that it is hard to identify specific events that fully lie outside the range historical variability. There is a small literature on "records" that suggests that warm temperature records are being broken more frequently than would be anticipated in a stationary world (and vice-versa for cold records) - e.g., Meehl et al, 2009 - that could be evaluated in this context. Meehl, G.A., C. Tebaldi, G. Walton, D. Easterling, and L. McDaniel, 2009c: The relative increase of record high maximum temperatures compared to record low minimum temperatures in the U.S. Geophysical Research Letters, 36, L23701. (Francis Zwiers, Pacific Climate Impacts Consortium)	Good point, and we have removed this sentence.
580	49653	18	26	53	26	53	Unprecedented in what sense? Relative to the historical instrumental record? (Francis Zwiers, Pacific Climate Impacts Consortium)	With additional literature available, we have expanded this table and are no longer enforcing this "unprecedented" criterion.
581	54303	18	26	53	27	1	Please consider the wording here to communicate clearly that attribution in this context is in terms of a major influence of anthropogenic climate change on the magnitude or related characteristics of a given event. (Michael Mastrandrea, IPCC WGII TSU)	In the table caption we now specify that the attribution statement is for a "substantial" contribution (the sentence in the text was considered redundant and removed).
582	53827	18	26	54	26	54	What is the author team assessment? (Kristie L. Ebi, IPCC WGII TSU)	Correct, the evidence for attribution comes from the literature but the assessment is ours. This is now stressed in the table caption (the sentence in the text was considered redundant and removed).
583	51027	18	26	54	27	1	The author team should consider indicating that, for claims in the literature, strength of the claims has been assessed here. (Katharine Mach, IPCC WGII TSU)	Good point, we now indicate that in the table caption (the sentence in the text was considered redundant and removed).
584	54952	18	27	6	0	0	Table 18-4 Concerning the hot summer of 2003: Please note that only Luterbacher et al. (2004) make the statement that the hot summer of 2003 is the warmest for at least 500 years. This is not the case for Schär et al. (2004) (Juerg Luterbacher, Justus Liebig University Giessen)	True, but the other cited papers considered part of that period using other observational sources, and therefore add further support to part of the statement.
585	54953	18	27	6	0	0	Table 18-4 concerning the warm autumn 2006/winter 2007 please apart from Luterbacher et al. 2007 include the following reference in the following cell: ...partial second flowering or extended flowering in 2006, early flowering in 2007: Rutishauser, T., Luterbacher, J., Defila, C., Frank, D., and Wanner, H. 2008: Swiss Spring Plant Phenology 2007: Extremes, a multi-century perspective and changes in temperature sensitivity, Geophys. Res. Lett., 35, L05703. (Juerg Luterbacher, Justus Liebig University Giessen)	We considered this paper, but note it applies to Switzerland while the statement applies to Europe.
586	39842	18	27	10	27	10	format of reference wrong (Peter Burt, University of Greenwich)	Removed brackets
587	49654	18	27	10	27	10	Who made the assessments that are reported in this table - Coumou and Rahmstorf, or the Ch 18 author team? I would hope that it would be the latter, and also that the chapter would provide the "line of sight" discussion that supports each assessment. (Francis Zwiers, Pacific Climate Impacts Consortium)	It was indeed the authors and we now specify that in the caption.
588	40552	18	27	15	0	0	Section 18.4.2.3 -- Cite: Hammer, S. A., J. Keirstead, S. Dhakal, J. Mitchell, M. Colley, R. Connell, R. Gonzalez, M. Herve-Mignucci, L. Parshall, N. Schulz, M. Hyams, 2011: Climate change and urban energy systems. Climate Change and Cities: First Assessment Report of the Urban Climate Change Research Network, C. Rosenzweig, W. D. Solecki, S. A. Hammer, S. Mehrotra, Eds., Cambridge University Press, Cambridge, UK, 85–111. (Cynthia Rosenzweig, NASA Goddard Institute for Space Studies/Columbia University)	We have cited this paper in the chapter.
589	39843	18	27	17	27	19	the implication here is that this in the non-tropics. Is this the case? What about increased cooling demand in the tropics year-round under warming scenarios? (Peter Burt, University of Greenwich)	This is true not just in high income countries. The sentence does not say that.
590	54304	18	27	17	27	19	The referenced study is for California--is there further support for generalization of this conclusion as a global statement? (Michael Mastrandrea, IPCC WGII TSU)	We have added further citations at the end of the paragraph.
591	49655	18	27	21	27	21	What distinguishes "energy" from "electricity"? (Francis Zwiers, Pacific Climate Impacts Consortium)	Electricity is one form of energy. There are others
592	37982	18	27	21	27	23	You can also add the following reference, which also shows the U-shape in a Southern European country (Greece): Mirasgedis, S., Sarafidis, Y., Georgopoulou, E., Lalas, D.P., Moschovits, M., Karagiannis, F. and Papakonstantinou, D., 2006: "Models for Mid-term Electricity Demand Forecasting Incorporating Weather Influences", Energy 31(2-3), pp. 208-227. (Elena Georgopoulou, National Observatory of Athens)	We initially did not cite this study as it is a forecasting study. We will cite it in the next draft.
593	37984	18	27	29	27	29	Add also Rübhelke and Vögele, 2011 on the impacts of CC on cooling water for nuclear power. (Elena Georgopoulou, National Observatory of Athens)	We have cited chapter 10.
594	37983	18	27	29	27	30	This is a theoretical impact in case of reduced intensity/ duration of sunshine under the future climate. However, there are no studies showing that such a reduction will be the case (see also Chapter 10, page 7, line 53 on this), and this should be clearly mentioned here. (Elena Georgopoulou, National Observatory of Athens)	The statement simply refers to a sensitivity, not a projection. We have left the language as is.
595	39844	18	27	32	27	32	delete , after 'transmission' (Peter Burt, University of Greenwich)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
596	37985	18	27	32	27	39	Regarding electricity transmission, I think that even more important are the impacts of extreme events, and on this there aren't yet any studies quantifying these impacts. (Elena Georgopoulou, National Observatory of Athens)	We agree, but there is no literature to draw on.
597	39845	18	27	33	27	33	change 'regions' to 'region' (Peter Burt, University of Greenwich)	regions is correct "vary across different...regions"
598	37987	18	27	40	27	41	Transport is missing. On observed impacts, 2 cases could be mentioned, namely (a) low water levels in Rhine during 2003 heat wave, which led to restricted load of ships and a consequent increase of transport prices (Jonkeren et al., 2007; 2009), and (b) the opening of the Northwest passage in 2008 and of the Northern Sea Route in 2009 to cargo ships (Lassere and Pelletier, 2011; Liu and Kronbak, 2010). (Elena Georgopoulou, National Observatory of Athens)	We have passed this on to chapter 10 for review and potential inclusion in the next draft.
599	47034	18	27	42	0	0	You might consider to cite here the study by: Florian Ritter, Markus Fiebig, and Andreas Muhar (2012): Impacts of Global Warming on Mountaineering: A Classification of Phenomena Affecting the Alpine Trail Network. Mountain Research and Development, 32(1):4-15. 2012. (Frank Paul, University of Zurich)	We have passed this on to chapter 10 for review and potential inclusion in the next draft.
600	37986	18	27	47	27	52	On this see also refs included in Chapter 23 (Europe). (Elena Georgopoulou, National Observatory of Athens)	we have no access to Comments to other chapters, and can therefore unfortunately not respond to this comment.
601	51028	18	28	3	0	0	Section 18.4.3. Throughout this section, the author team should italicize calibrated uncertainty language used. For likelihood terms, the author team should ensure the usage is per the uncertainties guidance and not casual. Please check and italicize calibrated terms on the following lines: page 28, lines 5, 28, 37; page 29, line 1. (Katharine Mach, IPCC WGII TSU)	Done, and confirmed with Chapter 11.
602	49656	18	28	5	28	5	The date on the reference should be 2007. (Francis Zwiers, Pacific Climate Impacts Consortium)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
603	54305	18	28	11	28	11	It would be useful to know which disease systems? (Michael Mastrandrea, IPCC WGII TSU)	Following further consideration of this section we concluded that this topic belongs in 18.2 so this sentence has been removed.
604	53828	18	28	12	28	12	How is high quality defined and determined? (Kristie L. Ebi, IPCC WGII TSU)	Following further consideration of this section, we concluded that this topic belongs in 18.2 so this sentence has been removed.
605	39846	18	28	20	28	20	please explain temperature/rainfall relationship (Peter Burt, University of Greenwich)	We now point out that the relationships are nonlinear, but do not further specify because they are complex.
606	39847	18	28	25	28	25	this is vague: please provide more detail (Peter Burt, University of Greenwich)	Yes, we know elaborate on the magnitude of the role and specify the location.
607	49657	18	28	37	28	37	Typo - insert "the" ahead of "distribution" (Francis Zwiers, Pacific Climate Impacts Consortium)	Thanks, done.
608	49658	18	28	39	28	39	Typo - replace "the disease" with "these diseases" (I *think* two diseases are being discussed). (Francis Zwiers, Pacific Climate Impacts Consortium)	Yes, done.
609	39848	18	28	41	28	41	the abbreviation 'NE' is not standard, and also unnecessary (Peter Burt, University of Greenwich)	This section of text did not deal with the effects of climate change and so has been removed.
610	39849	18	28	49	28	49	Is this extension to the start or end of the pollen season, or both? (Peter Burt, University of Greenwich)	It is mainly a later end, but we do not believe that specificity is needed here.
611	48467	18	28	52	29	3	First: "will have been" is a mouthful. Can't you just say "is associated"? Second: I think this is an important point: if you can link AGW to an increase in hot days, and it is known that hot days are linked to mortality, then there is an AGW to mortality link without the need to do a formal attribution analysis of single events. I think the chapter already makes this point (a counterexample that is well-discussed in this chapter is hurricanes, where the AGW to observed hurricane link is not yet clear, so therefore an AGW to observed-damage link would be somewhat surprising). But I seem to remember AR4 has some instances where even though A almost certainly implied B, and A was very-likely due to AGW, B was considered to be only likely due or less... (Marcus Sarofim, US EPA)	After further consideration this sentence was removed as it moves beyond detection and attribution. This topic is discussed in detail though in 11.2 and 11.4.
612	49659	18	28	52	29	3	This last paragraph is very important, and hopefully will be developed more completely in the SOD. One issue that I have become aware of (through discussion with a couple of epidemiologists at a recent meeting) is that extreme temperature exposure / mortality relationships are very place specific and that they can not be easily transferred between locations. This is presumably an issue that needs to be taken up in discussion of attribution. (Francis Zwiers, Pacific Climate Impacts Consortium)	We have now expanded this discussion, including noting some of the other factors involved explicitly.
613	53829	18	28	52	29	3	References are needed. (Kristie L. Ebi, IPCC WGII TSU)	Citations have now been added to this discussion.
614	51029	18	28	54	28	54	The author team should reference the specific chapters and potentially the specific chapter sections intended with this parenthetical mention. (Katharine Mach, IPCC WGII TSU)	We now specify the relevant SREX chapter.
615	38092	18	29	1	29	2	very likely ... will have been - Does the relationship exist or not? Weird language. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	After further consideration this sentence was removed as it moves beyond detection and attribution. This topic is discussed in detail though in 11.2 and 11.4.
616	54306	18	29	8	0	0	Section 18.4.4.1: It would be very useful to cross-reference and coordinate with other chapters discussing this issue, including Chapters 12, 16, and 19. (Michael Mastrandrea, IPCC WGII TSU)	We have coordinated with Chapter 12 and 19 on this issue, and will continue to do so to ensure consistency. We also checked text of Ch16 related to this issue.
617	49148	18	29	8	30	23	Please integrate key findings related to Human security into the executive summary (Oyvind Christophersen, Climate and Pollution Agency)	done (with great caution)
618	39850	18	29	12	29	12	change 'climatic' to 'climate' (Peter Burt, University of Greenwich)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
619	49660	18	29	12	29	12	Typo - replace "affect" with "affects". (Francis Zwiers, Pacific Climate Impacts Consortium)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
620	49661	18	29	17	29	22	Is the climate record sufficient to robustly support analyses of the association between climate variations and conflict in Africa? This is perhaps the part of the inhabited world with the least comprehensive collection of accessible historical instrumental climate data. See for example, lines 19-21, page 32. (Francis Zwiers, Pacific Climate Impacts Consortium)	We are reporting findings in the published literature where the question of data quality is addressed. We have modified the material in this section to note that data quality is a concern.
621	35592	18	30	0	0	39	"mounting evidence" means just what? (Daniel Farber, UC Berkeley)	"mounting" has been deleted
622	42144	18	30	0	31	0	Box 18.4. The examples presented in this box are very weak and hardly illustrate the value of traditional knowledge, on the contrary portraits it as being very basic (which is not true). The comparison of TEK and scientific observations leads to obvious conclusions that could be made by any society, not necessarily with ancestral, indigenous knowledge. (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	The potential and limitations of traditional ecological knowledge are discussed in this box. Generally, there is growing concern that TEK is not sufficiently accounted for by science-policy interfaces such as the IPCC and IPBES. It is therefore desirable to increase these efforts.
623	35110	18	30	1	0	0	"18.4.4.2. Migration" I suggest including data from the annual reports from the Internal Displacement Monitoring Centre since they have been monitoring global (internal and external) displacement due to natural hazard-induced disasters, including climate-related disasters, over the past 4 years. Numbers for 2011 show that around 14,9 million people were displaced. Around 90 percent is due to climate-related disasters, and around 90 percent is in Asia. A few mega-disasters often displace huge amounts of people such as the floods in China in 2010. So far the numbers exclude people displaced in slow-onset disasters, such as drought, due to the challenges related to determining causality and forced displacement (rather than voluntary migration) in such cases. The reports are all available at <a href="http://www.internal-displacement.org">www.internal-displacement.org</a> (Vikram Kolmannskog, Norwegian Refugee Council)	the report has been passed on to Chapter 12 for due consideration. As it is very detailed, and lacks a focus on climate change, we have not considered it appropriate to include this in our assessment.
624	54307	18	30	1	0	0	Section 18.4.4.2: Again, it would be useful to cross-reference and coordinate with other chapters discussing this issue, including Chapters 12 and 20. (Michael Mastrandrea, IPCC WGII TSU)	We have coordinated with Chapter 12 on this issue. Chapter 20 had no relevant information in their FOD.
625	49662	18	30	4	30	4	Suggesting moving "possible" to just before "relationships", so that the opening part of the sentence reads "Empirical detection of such possible relationships ...". It is the relationships that are hypothesized, after all. Also, is "empirical" needed here? (Francis Zwiers, Pacific Climate Impacts Consortium)	deleted "possible"
626	35591	18	30	11	0	16	this seems extremely important and worth additional detail (Daniel Farber, UC Berkeley)	Given the limited information available related to detection and attribution, and the ample coverage of this issue in other chapters (e.g. Ch12), we decided to not broaden our discussion.
627	49663	18	30	14	30	15	Is it clear what "statistical attribution" is, and how it would be distinguished from "non-statistical attribution"? (Francis Zwiers, Pacific Climate Impacts Consortium)	Statistical attribution refers to the identification of a climate effect on a process through the establishment of a statistically significant relationship between variability in the system of interest and one or more climate variables (after controlling for the effect of non-climate factors). As explained in the methods section, attribution can also be based on process understanding. The present statement has been retained in order to clarify that the study in question made a statistical assessment without considering the mechanisms of the impact.
628	49664	18	30	18	30	18	Suggest deleting "climate change-induced" from the sentence. Presumably the statement is equally true if it just says "Drought has prompted ...", and this formulation would avoid the implied question as to how to distinguish between "climate change-induced" drought and other types of drought. (Francis Zwiers, Pacific Climate Impacts Consortium)	Climate change induced has been deleted as suggested. Differentiation can not be supported.
629	51030	18	30	32	30	32	"Low confidence," as calibrated uncertainty language, should be italicized. (Katharine Mach, IPCC WGII TSU)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
630	37032	18	30	43	32	5	Please clarify whether you use the term "indigenous" only in reference to e.g. developing countries' inhabitants or if this term also captures people living in rural areas in industrialized countries. The problems you describe here are similar in both cases, although on different absolute levels. In addition, please do not use the term "western science". Is there some sort of southern, eastern or northern science? Do Europeans practice eastern science compared to Canadians, western science compared to Japan, and north-western science compared to Australia? (Joachim Rock, Johann Heinrich von Thuenen-Institute, Federal Research Institute for Rural Areas, Forestry and Fisheries)	Changed the text on p. 30, lines 43-44 to: For indigenous peoples whose livelihoods and lives are often tied to specific homelands, their specific rights, including the right to life, adequate food, water, health, adequate housing, and the right to self-determination, are directly affected by the impacts of climate change.
631	44212	18	30	50	0	0	As for traditional ecological knowledge one may look at papers from the CRASS group at the University of Cambridge UK such as: DIEMBERGER, H. et al. 2012. Communicating Climate Knowledge Proxies, Processes, Politics. Current Anthropology, 53, 226-244. (Georg Kaser, University of Innsbruck)	included this paper, added to list of citations on p. 31, lines 2-3
632	49665	18	30	50	31	47	I thought this was a very nicely written box. (Francis Zwiers, Pacific Climate Impacts Consortium)	Thank you, so did we.
633	39369	18	30	53	31	1	"western science" is very patronising and is also potentially insulting to non "western" scientists across the world. (Gareth S Jones, Met Office)	changed "western science" to "the natural and social sciences" on p. 31, lines 1, 3. Changed "western science" to "the natural sciences" on p. 31 lines 33 and 45.
634	47952	18	31	0	0	0	Useful to link this informative case study with references to IP and Tk in Chapter 12 Page 11 (Ameyali Ramos Castillo, United Nations University - Institute of Advanced Studies)	This reference can be made, if adequate, once we have SOD versions of chapter 12 and sure this is still in there. The FOD box of Chapter 12 did not contain relevant information

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
635	35593	18	31	4	0	5	this seems a bit odd in what's supposed to be a scientific report -- why do all this complicated modeling if we can just ask people on the street whether they think things have gotten warmer?? Or is it only people in neolithic societies whose views are entitled to credibility? (Daniel Farber, UC Berkeley)	see comment 622
636	48378	18	31	12	31	12	falling glacier "blocks": does this mean "ice and snow avalanches"? (J. Graham Cogley, Trent University)	We use this term (in quotation marks) as was reported by local people. The interpretation is typically small ice avalanches / ice falls
637	44211	18	31	13	0	0	RABATEL, A., FRANCO, B., SORUCO, A., GOMEZ, J., CÁCERES, B., CEBALLOS, J. L., BASANTES, R., VUILLE, M., SICART, J.-E., HUGGEL, C., SCHEEL, M., LEJEUNE, Y., ARNAUD, Y., COLLET, M., CONDOM, T., CONSOLI, G., FAVIER1, V., JOMELLI, V., GALARRAGA, R., GINOT, P., MAISINCHO, L., MENDOZA, J., MÉNÉGOZ, M., RAMIREZ, E., RIBSTEIN, P., SUAREZ, W., VILLACIS, M. & WAGNON, P. 2012. Review article of the current state of glaciers in the tropical Andes: a multi-century perspective on glacier evolution and climate change. The Cryosphere Discuss., 6, 2477–2536 (Georg Kaser, University of Innsbruck)	This paper has been included in the South America subchapter and table entries in the regional section
638	39851	18	31	14	31	14	delete 'warming', 'warming temperatures' is a physically incorrect phrase anyway (Peter Burt, University of Greenwich)	replaced by "rising"
639	39852	18	31	15	31	15	edit to remove sentence starting with 'And' (Peter Burt, University of Greenwich)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
640	39853	18	31	34	31	34	delete , after 'have' (Peter Burt, University of Greenwich)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
641	49149	18	31	49	32	2	Suggest that you also include impacts on poor children. (Oyvind Christophersen, Climate and Pollution Agency)	we did not find suitable references for this
642	39222	18	32	8	0	0	Section 18.5: For some regions there are subheadings introducing the systems affected, for others not. This could be made consistent. Furthermore, the existing subheadings themselves should be consistent (e.g. "Health" in the CSA section and "Human health" in the Small Islands section) (Christopher Reyer, Potsdam Institute for Climate Impact Research)	These regional sections have been slimmed down considerably and now all lack subheadings. In the new corresponding tables though the entries for each region are categorised according to a common set.
643	49666	18	32	16	32	20	The Loarie et al paper in Nature (2009) on the velocity of climate change might be relevant to this discussion. Nature, Vol 462   24/31 December 2009   doi:10.1038/nature08649 (Francis Zwiers, Pacific Climate Impacts Consortium)	Thanks. However, this section has now been slimmed down to a summary referring to Chapter 22 for details with most other references dropped.
644	45518	18	32	18	32	18	How is this a "for instance" ? You're talking scopes of migration and then jump to precipitation. This paragraph has no logical flow. (Peter Neofotis, City University of New York & Climate Impacts Group, Columbia Univ )	Good point. The second part of this sentence has been deleted.
645	40862	18	32	27	32	28	It would be clearer to match the citations to the subjects so that the sentence reads "...on tree density (Gonzalez et al. 2012) and river discharges (le Polaine de Waroux and Lambin, 2011)..." (Patrick Gonzalez, National Park Service)	This statement has been moved to a table. Both papers examine tree density so the comment on river discharges has been removed.
646	40863	18	32	31	32	31	A detection and attribution study in the Sahel provides a key ecological example that it would be good for the chapter to describe more than the current text does, by saying, for example: "Multivariate analyses of climate, soil, and population attribute 1954-2002 tree cover changes in the Sahel to anthropogenic climate change (Gonzalez et al. 2012)." [Gonzalez, P., C.J. Tucker, and H. Sy, 2012: Tree density and species decline in the African Sahel attributable to climate. Journal of Arid Environments, 78, 55-64.] (Patrick Gonzalez, National Park Service)	We have chosen not gone into more depth because specific topics are dealt with in more detail in Chapter 22 (Africa) with a summary given here.
647	49667	18	32	33	32	33	Make it clear that Giannini et al, 2009, is an entry point to a substantial literature on this topic. (Francis Zwiers, Pacific Climate Impacts Consortium)	This text has been moved into a table, and for this entry we have added additional references.
648	53830	18	32	38	32	38	Presumably this refers to malaria? (Kristie L. Ebi, IPCC WGII TSU)	Yes, and this is now clear in the table entry in which this statement now appears.
649	53831	18	32	45	32	51	This was previously covered. (Kristie L. Ebi, IPCC WGII TSU)	After further consideration, including your point, this paragraph has been removed.
650	51031	18	32	46	32	46	The author team should consider characterizing this evidence with summary terms for evidence (and agreement). (Katharine Mach, IPCC WGII TSU)	After further consideration, this paragraph has been removed because it did not discuss detection and attribution with respect to climate change.
651	51032	18	33	9	0	0	Section 18.5.2. Throughout this section, the author team should italicize calibrated uncertainty language used. For likelihood terms, the author team should ensure that usage is not casual. Please check and italicize the calibrated terms on the following lines: page 33, lines 18, 38, 39, 41, 46, 47, 51, 53, 54. (Katharine Mach, IPCC WGII TSU)	see comment 13
652	49668	18	33	13	33	14	Isn't it possible that the timing of the arrival of migrant species might be as reflective of climate change outside the region of arrival (e.g., en route, or in the wintering grounds) than within the region of arrival? (Francis Zwiers, Pacific Climate Impacts Consortium)	Yes it is, but we have still retained it in the Europe section of Table 18-7 because the impact occurs within Europe.
653	51033	18	33	14	33	14	It would be best to reference the specific section of chapter 4 meant here. (Katharine Mach, IPCC WGII TSU)	Done in the new Table 18-7.
654	49669	18	33	18	33	18	What results in high confidence in one case, and low confidence in another? There presumably needs to be a critical discussion of the evidence basis for these assessments in the chapter. (Francis Zwiers, Pacific Climate Impacts Consortium)	The evidence (and some discussions) behind these assessments are now indicated in the new Table 18-8.
655	41900	18	33	22	33	28	This section is an example of non unequivocal attribution to climate change. Mountains vegetation distribution could be interpreted in another way. Please look at the following paper in press in Journal of Vegetation Sciences Jeanne Bodin, Vincent Badeau, E (Nathalie BRED, INRA)	It is unclear what paper was being suggested here.
656	41901	18	33	30	33	30	Oleson et al. 2011 is missing in the reference list (Nathalie BRED, INRA)	Thanks, this paper is no longer cited.
657	38093	18	33	31	33	31	although national ... - Hangs? So? Finish the point. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	This text no longer appears in the new more concise section.



#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
658	49670	18	33	31	33	31	It would be helpful to nonspecialists if you could describe the distinction between statistical and potential yields. (Francis Zwiers, Pacific Climate Impacts Consortium)	This text no longer appears in the new more concise section.
659	39854	18	33	32	33	32	change 'on' to 'onwards' (Peter Burt, University of Greenwich)	Thanks, although this text has been removed in the new more concise section.
660	54308	18	33	37	33	39	Can a statement about the level of agreement be made here as well, as a counterpart to "limited evidence"? (Michael Mastrandrea, IPCC WGII TSU)	Good point. This has been rephrased in the new Table 18-9.
661	53832	18	33	41	33	41	What is the level of agreement? (Kristie L. Ebi, IPCC WGII TSU)	This discussion has been removed in the new more concise section.
662	42273	18	33	41	33	42	Please be aware that there are more actors like nitrogen deposition and so on. Maybe it is good to write some words on multiple actors like climate change, nitrogen deposition, diseases and so on. (Klaas Van der Hoek, RIVM)	This discussion has been removed in the new more concise section.
663	41902	18	33	42	33	42	Rodolff et al., 2007 and Bertini et al., 2011 are missing in the reference list (Nathalie BREDIA, INRA)	Thanks, these papers are no longer cited.
664	41903	18	33	45	33	45	Jönsson et al. 2011 is non adapted reference (Nathalie BREDIA, INRA)	We do not understand the meaning of a "non adapted reference"
665	39221	18	33	45	33	48	These sentences are referring to animal diseases and are somewhat unexpected here since the first sentences of this paragraph deal with climate change effects on plant pests and diseases. Maybe a topical sentence can help? (Christopher Reyer, Potsdam Institute for Climate Impact Research)	This section has been restructured and rewritten and the jump in topics no longer occurs.
666	41904	18	33	46	33	46	Guis et al., 2012 is missing in the reference list (Nathalie BREDIA, INRA)	Thanks, this paper is no longer cited.
667	49671	18	33	46	33	46	To a non-specialist, "caused the spread" seems a strong statement. Would "contributed to the spread" be better? (Francis Zwiers, Pacific Climate Impacts Consortium)	This section has been rewritten and this statement no longer appears.
668	49672	18	33	47	33	48	Is the use of IPCC calibrated language in this sentence intentional? If so, is "likely extended" the author's assessment; also, what is the basis for assessing a quantified probability? (Francis Zwiers, Pacific Climate Impacts Consortium)	No, removed.
669	41905	18	33	48	33	48	van Dijk et al., 2010 : should be replaced by a more relevant paper like Gray et al., 2009 (already cited in the reference list); please also give the place of another interpretation of the ticks expansion with Jaenson et al, 2012 <a href="http://www.ncbi.nlm.nih.g">http://www.ncbi.nlm.nih.g</a> (Nathalie BREDIA, INRA)	Thanks, although this discussion has been removed in the new more concise section.
670	42145	18	33	50	0	53	These two sentences wrongly mix the increase in the frequency of events and in the damages as if it was the same thing. (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	Good point. This discussion has been removed.
671	39855	18	33	50	33	50	change 'damages' to 'damage' and 'have' to 'has' (Peter Burt, University of Greenwich)	Thanks, although this discussion has been removed in the new more concise section.
672	49673	18	33	50	33	51	The sentence structure needs a bit of work; increased exposure would contribute to increases in damages, but presumably not to any changes in the frequency of river flood events. (Francis Zwiers, Pacific Climate Impacts Consortium)	This section has been rewritten and this statement no longer appears.
673	39856	18	33	51	33	51	insert 'the' before 'contribution' (Peter Burt, University of Greenwich)	Thanks, although this discussion has been removed in the new more concise section.
674	49674	18	33	52	33	53	Make sure the right WG1 chapters are cited. Chapter 2 presumably describes observed changes in the frequency of hot days and nights, while Chapter 10 would assess any studies that attribute causes to those changes. (Francis Zwiers, Pacific Climate Impacts Consortium)	Thanks, although this discussion has been removed in the new more concise section.
675	39247	18	33	53	0	0	suggest to substitute 'hot nights' by 'tropical nights' (Thomas Voigt, Umweltbundesamt / Federal Environment Agency)	Thanks, although this discussion has been removed in the new more concise section.
676	49675	18	33	53	33	54	This assessment combines likelihood language with confidence language inappropriately. In the current guidance on the use of uncertainty language (Mastrandrea et al, 2010), confidence is assessed first, and likelihood is assessed if probabilities can be quantified, and if only confidence is sufficiently high (usually high, or very high). (Francis Zwiers, Pacific Climate Impacts Consortium)	Thanks, although this discussion has been removed in the new more concise section.
677	35435	18	34	0	0	0	At the least a citation is needed for the statement "there is evidence of rapid deglaciation". However, I don't think this really jives with assessment in WGI Ch4, where Himalayas is not considered a well measured system. And, there have been recent papers (based on GRACE data) that suggest ice-loss is less than previously thought. (David Vaughan, British Antarctic Survey)	This statement has been removed in the course of restructuring Section 18.5. The relevant statement in Table 18-6 holds, crossreferences to WG1 and several very recent references on Himalaya Glacier mass volume.
678	42146	18	34	0	35	0	Section 18.5.3 Asia. In general no confidence levels are provided for the statements. (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	Confidence assessment is now provided in Tables 18-6 through 18-9.
679	51034	18	34	3	34	3	The author team should also consider referencing table 18-4 here. (Katharine Mach, IPCC WGII TSU)	Thanks, although this discussion has been removed in the new more concise section.
680	51035	18	34	6	0	0	Section 18.5.3. Throughout this section, the author team should italicize calibrated uncertainty language used; please see page 34, lines 17, 20, 22, 28, 40, 43 (here preferably use a summary term from the guidance for authors), 47, 53 (also here please use a summary term from the guidance for authors); page 35, lines 13, 20. (Katharine Mach, IPCC WGII TSU)	There is no calibrated language now in this section, while the calibrated language in the new Tables 18-6 through 18-9 is italicised.
681	51036	18	34	8	34	10	For statements here, the author team may wish to consider several further specifics to present. 1st, is it possible to specify the years intended by "the last century"--1900-2000, 1910-2010, etc.? 2nd, for the description of increasing intensity and frequency of extreme weather events, it would be preferable to indicate what types of events are meant here, also with cross-reference to findings of the working group one contribution to the 5th assessment report and potentially also to chapter 3 of the special report on extremes. (Katharine Mach, IPCC WGII TSU)	Text has been changed substantially. This sub-section no longer has any statements with references to specified periods (years), and also there no longer is a reference to extreme events.

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682	47035	18	34	17	0	0	You might consider to add here: Annina Sorg, Tobias Bolch, Markus Stoffel, Olga Solomina & Martin Beniston (2012): Climate change impacts on glaciers and runoff in Tien Shan (Central Asia). Nature Climate Change, doi:10.1038/nclimate1592. (Frank Paul, University of Zurich)	Although we have not included the suggested citation in our key references, findings are sufficiently anchored in Box 3-1 (please see Table 18-6 for crossreferences and key literature)
683	44213	18	34	17	34	18	A much more complex discussion is needed for Himalaya glaciers. See WG2 Ch3 Himalaya Box and WG1 Ch4 (Georg Kaser, University of Innsbruck)	Text has been changed and reduced substantially. Table 18-6 shows a synthesis assessment, and points to Chapters 3 (Box 3-1) and WG1 Chapter 4 for a more in depth discussion of the complexities of the Himalayan glacier changes
684	48379	18	34	17	34	18	"rapid deglaciation": first, this means rapid *complete* removal of glacier ice; "shrinkage" or "mass loss" would be more accurate. Second and more important, Kaeae et al. 2012 (Contrasting patterns of early 21st century glacier mass change in the Hindu Kush – Karakoram – Himalaya, Nature, to be published 23 August 2012) measure a Himalaya-wide mass balance that is considerably less negative than the global average. (J. Graham Cogley, Trent University)	Text has been changed substantially, with the confidence level in the finding for the detection of impact on water availability corrected; please see Table 18-6. Käb et al has been included in the reference list
685	49676	18	34	20	34	20	If there is low confidence in the finding that water availability has been reduced, does it make sense to describe the reduction as a "Marked decline". The emphasis that is given by saying the decline is "Marked" seems to contradict the confidence assessment. (Francis Zwiers, Pacific Climate Impacts Consortium)	Acknowledged. Formulation has been revised accordingly.
686	54309	18	34	20	34	21	It would be useful to explain the reasons for "low confidence" here. (Michael Mastrandrea, IPCC WGII TSU)	Text has been changed. Confidence levels have been reassessed and the supporting literature is listed in Table 18-6.
687	49677	18	34	24	34	24	Suggest inserting "at least" prior to "part of which must be attributed", to leave open the possibility that the confounding factors might be the predominant factors. (Francis Zwiers, Pacific Climate Impacts Consortium)	Thanks, this text has been rephrased taken this comment into consideration.
688	48380	18	34	28	34	31	Do not define the acronym at L28, and spell it out at L31. (J. Graham Cogley, Trent University)	This acronym has been removed.
689	48381	18	34	30	34	30	Delete "Mountains". "Shan" is Chinese for "mountain range". (J. Graham Cogley, Trent University)	Thanks, although we have now removed this text.
690	48382	18	34	33	34	33	Do not define the acronym. (J. Graham Cogley, Trent University)	This acronym has been removed.
691	48383	18	34	34	34	34	End the sentence at "frost depth". (J. Graham Cogley, Trent University)	This text has been rephrased.
692	54310	18	34	34	34	35	Which human activities are meant here? Land use change? (Michael Mastrandrea, IPCC WGII TSU)	This text has been removed in a more concise Asia section.
693	42147	18	34	39	0	42	Can the confidence level of attribution be high when 1) less than 20 years were used for producing the estimates; 2) the trend cannot be confirmed for the following period? These characteristics do not seem to correspond to a high confidence statement. (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	This statement has been revised in the new Table 18-7 and the assessment of confidence revised accordingly and following this comment.
694	49678	18	34	43	34	43	Why is there higher confidence in observed changes in these regions than elsewhere? (Francis Zwiers, Pacific Climate Impacts Consortium)	Confidence levels depend on available literature and quality of data. As a consequence they can be inhomogenous across regions.
695	49679	18	34	45	34	45	Perhaps reconfirm what "this change" refers to - is "this change" the 9.5 days/decade mentioned on line 41? (Francis Zwiers, Pacific Climate Impacts Consortium)	This sentence has been removed in the new more concise section.
696	39857	18	34	46	34	47	non seq (Malaysia is not in Japan) (Peter Burt, University of Greenwich)	Oops, thanks. We have now removed this statement in any case.
697	54311	18	34	52	35	11	Please specify time frames for the changes described here. (Michael Mastrandrea, IPCC WGII TSU)	see comment 58
698	49680	18	35	13	35	13	The percentage change range that is quoted here (given to 2 significant digits) seems too precise given the assessment of low confidence. Would it be more appropriate to say "more than half of species ... (low confidence)"? (Francis Zwiers, Pacific Climate Impacts Consortium)	Good point. This statement is no longer included.
699	49681	18	35	13	35	16	Does Feely et al report on the same range of species as previous studies? If not, is it possible that the Feely et al study is not contradictory to others? (Francis Zwiers, Pacific Climate Impacts Consortium)	Good point. This statement is no longer included.
700	54312	18	35	13	35	16	It would be useful to understand more clearly the relationship between the assignment of low confidence here, the reasons for that assignment, and why nevertheless this newer study is judged to be more robust than the previous studies it contradicts. (Michael Mastrandrea, IPCC WGII TSU)	This statement has been removed following this and other comments.
701	39223	18	35	14	35	15	An example/Reference of which studies have been contradicted by Feely et al. 2007 would be good (Christopher Reyer, Potsdam Institute for Climate Impact Research)	This statement has been removed following this and other comments.
702	39858	18	35	24	35	24	poor expression. Do you mean large areas of seaweed or seaweed which is large in growth (and in either case please quantify). Also, 'seaweeds' should be 'seaweed' (Peter Burt, University of Greenwich)	We mean large in size, such as kelp.
703	49682	18	35	24	35	24	Increases in what property of coastal surface waters - temperature? (Francis Zwiers, Pacific Climate Impacts Consortium)	This statement has been moved to Table 18-8 and the confusing text removed.
704	49683	18	35	34	35	35	Would Jordan be considered representative of the part of Asia that is not in China? That's more or less what "Elsewhere in the region (Jordan)..." implies. (Francis Zwiers, Pacific Climate Impacts Consortium)	This text has been removed in the new more concise section.
705	54313	18	35	39	35	39	If this is meant as a formal assignment of confidence, please italicize "low" and remove the word "rather". (Michael Mastrandrea, IPCC WGII TSU)	This statement has been removed following this comment.
706	51037	18	35	42	0	0	Section 18.5.4. Throughout this section, the author team should italicize calibrated uncertainty language used. For likelihood terms, the author team should ensure that the usage is not casual. Please check and italicized terms on page 36, lines 8, 14, 20, 23, 44. Also, the missing reference on page 36, line 3, should be supplied. (Katharine Mach, IPCC WGII TSU)	This section no longer contains uncertainty language, while the corresponding confidence language in the new Tables 18-6 through 18-9 is now italicised.
707	49684	18	35	47	35	49	What is the evidence basis for these assessments? (Francis Zwiers, Pacific Climate Impacts Consortium)	We now reference the assessment in Chapter 25.2 and Table 25-1.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
708	35594	18	35	51	0	53	am I to understand that there haven't been any attribution studies for this extremely important event? (Daniel Farber, UC Berkeley)	For the attribution of the dry period to greenhouse gas concentrations? To our knowledge no.
709	38643	18	35	51	35	53	These statements need checking and clarifying as to exactly what part of Australia is being referred to. 2010, for example, was an exceptionally wet year over much of Australia (see Australian Bureau of Meteorology time series: <a href="http://www.bom.gov.au/cgi-bin/climate/change/timeseries.cgi?graph=rranom&amp;area=aus&amp;season=0112&amp;ave_yr=0">http://www.bom.gov.au/cgi-bin/climate/change/timeseries.cgi?graph=rranom&amp;area=aus&amp;season=0112&amp;ave_yr=0</a> ). The Gallant and Gergis (2011) paper is specific to the Murray-Darling basin and the reconstruction ends in 1988. As it stands, this does not capture the regional variations in recent rainfall patterns. (Janice Lough, Australian Institute of Marine Science)	This statement has been removed following this and other comments.
710	39859	18	35	52	35	52	replace 'warm temperatures' with 'higher temperatures' ('warm temperature' is physically meaningless) (Peter Burt, University of Greenwich)	This statement has been removed following this and other comments.
711	44214	18	36	1	36	2	There are no reliable measurements showing such glacier mass or volume losses in NZ. See WG1 Ch4 (Georg Kaser, University of Innsbruck)	We now provide confidence assessments and references which reflect points raised by this and other comments.
712	44215	18	36	2	36	5	Check carefully and be consistent with what WG1 Ch10 says about glacier changes, climate change, and internal variability (Georg Kaser, University of Innsbruck)	WG1 Ch10 are examining the question of attribution to changes in atmospheric concentrations, whereas in this chapter we are concerned with attribution to local observed climate change.
713	48384	18	36	2	36	5	A more recent reference is: Chinn, T., B.B. Fitzharris, A. Willsman and M.J. Salinger, 2012, Annual ice volume changes 1976-2008 for the New Zealand Southern Alps, Global and Planetary Change, 92/93, 105-118. Although some of its methods are debatable, it finds a rate of mass loss for the last 30 years considerably less than that for the previous 100 years. (J. Graham Cogley, Trent University)	Thanks, we have included it.
714	39860	18	36	4	36	4	second 'n's in Nino and Nina need to be enyes (Peter Burt, University of Greenwich)	Done.
715	42718	18	36	14	36	18	There are also Australian studies show changes in flowering phenology. The Green reference also has changes in bird and insect phenology Gallagher RV, Hughes L, Leishman MR (2009) Phenological trends among Australian alpine species: using herbarium records to identify climate-change indicators. Australian Journal of Botany 57, 1-9. Green K (2010) Alpine taxa exhibit differing responses to climate warming in the Snowy Mountains of Australia. Journal of Mountain Science 7(2), 167-175. Keatley MR, Hudson IL (2012) Detecting change in an Australian flowering record: Comparisons of linear regression and CUSUM change point analysis. Austral Ecology. DOI: 10.1111/j.1442-9993.2011.02344.x MacGillivray F, Hudson IL, Lowe AJ (2010) Herbarium collections and photographic images: Alternative data sources for phenological research. In 'Phenological Research: Methods for environmental and climate change analysis.' (Eds IL Hudson and Keatley M.R) pp. 425-463. (Springer: Dordrecht) Rumpff L, Coates F, Morgan J (2010) Biological indicators of climate change: evidence from long-term flowering records of plants along the Victorian coast, Australia. Australian Journal of Botany 58, 428-439. Additionally, there are also studies related to birds Chambers LE, Gibbs H, Weston MA, Ehmke GC (2008) Spatial and temporal variation in the breeding of Masked Lapwings ( <i>Vanellus miles</i> ) in Australia. Emu 108, 115-124. Gibbs H (2007) Climatic variation and breeding in the Australian Magpie ( <i>Gymnorhina tibicen</i> ): a case study using existing data. Emu 107, 284-293. Gibbs HM, Chambers LE, Bennett AF (2011) Temporal and spatial variability of breeding in Australian birds and the potential implications of climate change. Emu 111, 283-291. (Marie Keatley, University of Melbourne)	All suggested references have been considered, and incorporated in the assessment of detection and attribution of observed impacts on terrestrial ecosystems in Australia in Table 18-7, though not all are included in key references for reasons of length.
716	49685	18	36	16	36	16	I wouldn't have thought of fire (or at least, not naturally ignited wild fires) as being non-climatic drivers. (Francis Zwiers, Pacific Climate Impacts Consortium)	This text has been altered and the reference to fire removed.
717	49686	18	36	22	36	22	Suggest deleting "successfully" - the IPCC assessment process is not a quest for success in establishing linkages with climate change. (Francis Zwiers, Pacific Climate Impacts Consortium)	Done.
718	39861	18	36	31	36	31	delete , after 'sedimentation' (Peter Burt, University of Greenwich)	This text has been altered in a new more concise section.
719	39862	18	36	35	36	35	sentence does not make sense (Peter Burt, University of Greenwich)	This sentence has been removed.
720	39863	18	36	44	36	44	insert 'most' before 'likely' (Peter Burt, University of Greenwich)	This statement has been removed.
721	49687	18	36	44	36	44	Is the use of calibrated uncertainty language ("...has been detected, likely because ...") intentional, and if so, what is the evidence basis for the assessment? (Francis Zwiers, Pacific Climate Impacts Consortium)	This statement has been removed in the new more concise section.
722	42149	18	37	0	38	0	Section 18.5.6 Central and South America. No attribution of climate change is presented. Confidence levels are not provided. Nothing is said about the limiting factor of data availability and quality (and needs) for filling these very important gaps. (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	We summarise observed climate changes but do not discuss their causes, which is the task of AR5 WGI Ch10. Confidence assessments are now provided in the associated Tables 18-6 through 18-9, and we have included a brief discussion of gaps.
723	47895	18	37	1	37	4	Consider using this new publication which assesses risk for forest ecosystems in the eastern U.S.: Iverson L., Matthews S., Prasad A., Peters M. and Yohe G. 2012. Development of risk matrices for evaluating climatic change responses of forested habitats. Climatic Change 114: 231-243. (Louis Iverson, US Forest Service)	Thanks, but given the now more condensed version of this section we have decided not to include this.
724	39864	18	37	9	37	10	sentence does not make sense (Peter Burt, University of Greenwich)	This sentence has been removed in the new more concise section.
725	54314	18	37	9	37	13	This provided a sense of the timeframe over which these changes are considered. (Michael Mastrandrea, IPCC WGII TSU)	These entries have been moved to Tables 18-6 through 18-9, and because the new entries are generic we have not specified a time period.
726	42151	18	37	10	0	11	"for some time" please be more precise. It is important to know how long these changes have been taking place. (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	These entries have been moved to Tables 18-6 through 18-9, and because the new entries are generic we have not specified a time period.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
727	48385	18	37	10	37	10	Delete "as". Comma after "patterns". Change "has" to "have". (J. Graham Cogley, Trent University)	Thanks, although this text has been removed in the new more concise section.
728	49688	18	37	11	37	11	What is the supporting evidence for this statement, that further changes have occurred due to melting? (Francis Zwiers, Pacific Climate Impacts Consortium)	We have removed this text.
729	54315	18	37	18	37	19	Again, please specify a timeframe for this retreat. (Michael Mastrandrea, IPCC WGII TSU)	It is the second half of the 20th century, as specified now in Table 18-7.
730	44217	18	37	18	37	21	Cross check and be consistent with WG1 Ch4 (Georg Kaser, University of Innsbruck)	We have coordinated with Ch27 on this.
731	35436	18	37	19	0	0	Cite to WG1 Ch4 for assessment of Central and S. America (David Vaughan, British Antarctic Survey)	We have coordinated with Ch27 on this.
732	44216	18	37	19	0	0	RABATEL, A., FRANCO, B., SORUCO, A., GOMEZ, J., CÁCERES, B., CEBALLOS, J. L., BASANTES, R., VUILLE, M., SICART, J.-E., HUGGEL, C., SCHEEL, M., LEJEUNE, Y., ARNAUD, Y., COLLET, M., CONDOM, T., CONSOLI, G., FAVIER1, V., JOMELLI, V., GALARRAGA, R., GINOT, P., MAISINCHO, L., MENDOZA, J., MÉNÉGOZ, M., RAMIREZ, E., RIBSTEIN, P., SUAREZ, W., VILLACIS, M. & WAGNON, P. 2012. Review article of the current state of glaciers in the tropical Andes: a multi-century perspective on glacier evolution and climate change. The Cryosphere Discuss., 6, 2477–2536 (Georg Kaser, University of Innsbruck)	Thanks, we have forwarded this reference to Ch27, who deal with this topic in more detail.
733	49689	18	37	20	37	21	"face significant reductions" sounds like a projection of future change, which is I would think would be inappropriate for this chapter since it deals with historical and current change. (Francis Zwiers, Pacific Climate Impacts Consortium)	Corrected in the new statement in Table 18-7.
734	54316	18	37	20	37	21	Is this statement about glaciers and icefields in the extratropical Andes a statement about past changes or possible future changes? If future, its relevance here is not clear. (Michael Mastrandrea, IPCC WGII TSU)	Corrected in the new statement in Table 18-7.
735	51038	18	37	21	37	21	The specific relevant sections of chapter 27 should be supplied here. (Katharine Mach, IPCC WGII TSU)	Done.
736	48386	18	37	29	37	30	Too many references for just one basin. Select one or two. (J. Graham Cogley, Trent University)	Done in the new statement in Table 18-7.
737	48387	18	37	30	37	30	"Increasing runoff": contradicted in the next paragraph's ", nor elsewhere in in South America" (L35-36, where "nor" should be "or in that of other rivers"). (J. Graham Cogley, Trent University)	The latter text has been deleted.
738	49690	18	37	31	37	31	Suggest replacing "trends in land use change" with "land use changes". Trends in changes sounds like an accelerating process. Land use change already refers to change over time, and thus trends in land use change would imply a change in a change (i.e., the second derivative of land use). (Francis Zwiers, Pacific Climate Impacts Consortium)	We have not altered the sentence because of the need to indicate that the changes are secular and occurring over long time scales.
739	48388	18	37	38	37	38	"decreasing", not "drying". (J. Graham Cogley, Trent University)	This text has been deleted in the new more concise section.
740	48389	18	37	42	37	42	"in some cities". (J. Graham Cogley, Trent University)	Thanks, although this discussion has been removed in the new more concise section.
741	49691	18	37	42	37	42	Suggest inserting "also" ahead of "a challenge" (since this appears to be an additional challenge). (Francis Zwiers, Pacific Climate Impacts Consortium)	Thanks, although this discussion has been removed in the new more concise section.
742	39865	18	37	43	37	43	what is the cause of the increased rainfall amounts? (Peter Burt, University of Greenwich)	That is WGI's remit.
743	54317	18	37	47	37	48	It would be useful to provide further details here. (Michael Mastrandrea, IPCC WGII TSU)	This statement has been removed in the new more concise section.
744	39224	18	37	51	0	0	Section 18.5.6.2 I had the feeling that a statement on forests is missing here. (Christopher Reyer, Potsdam Institute for Climate Impact Research)	We now include a statement on the Amazon rainforest in Table 18-7.
745	42150	18	37	54	0	0	Delete "an" (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	Suggested edit has been accepted and incorporated, but actual language may have been lost during further editing.
746	44645	18	38	0	38	0	There are also papers saying that coral bleaching occurs more probably from abrupt change of temperature both upwards and downwards. (Sarka D. Blazkova, T.G. Masaryk Water Research Institute)	Unfortunately space constraints mean that we cannot delve deeply into system mechanics in this chapter.
747	49692	18	38	1	38	1	"Conversion of natural ecosystems" into what? (Francis Zwiers, Pacific Climate Impacts Consortium)	This statement has been removed in the new more concise section.
748	38349	18	38	3	38	4	the citation of Pounds et al. 2006 is a bit misleading the way it is cited. It should at least be explained that it is not climate change (or higher mean temp.) per se that lead to amphibian extinctions but rather a fungal disease (chytrid fungus Batrachochytrium dendrobatidis) that is favoured by daytime cooling and nighttime warming and therefore, these climatic pattern changes may ultimately promote the spread of the disease (this view has recently been questioned and since the appearance of the 2006 Nature paper, studies with varying results have been published that at least relativize generalizations of the particular findings of Pound et al., e.g. Kriger KM. (2009) Lack of evidence for the drought-linked chytridiomycosis hypothesis. J Wildl Dis. 2009 Apr;45(2):537-41.) The paper also focuses on a particular group of frogs, namely the genus Atelopus, which has experienced large declines and numerous extinctions particularly in montane regions, whereas low land populations do not seem to be affected as much. The bottom line is that circumstances (particularly susceptible group of frogs in habitats that are infested by a pathogenic fungus) are very special in this case, generalizations are difficult to achieve and the effects (extinction of species) are mediated through the altered dynamics of a pathogen. It is reasonable to cite the study as an example but it would be better to clearly state the restrictions. More recent examples investigating extinction potentials due to climate change are, e.g.: Blaustein, A.R.; Walls, S.C.; Bancroft, B.A.; Lawler, J.J.; Searle, C.L.; Gervasi, S.S. Direct and Indirect Effects of Climate Change on Amphibian Populations. Diversity 2010, 2, 281-313., Miguel B. Araújo, Diogo Alagador, Mar Cabeza, David Nogués-Bravo, Wilfried Thuiller (2011) Climate change threatens European conservation areas. Ecology Letters, Volume 14, Issue 5, pages 484–492, but none of them provides direct evidence. (Raffael Ernst, Senckenberg Natural History Collections Dresden)	This discussion has been removed in the new more concise section.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
749	51039	18	38	3	38	4	The author team should consider and cross-reference discussion of this topic earlier in Chapter 18. (Katharine Mach, IPCC WGII TSU)	This discussion has been removed in the new more concise section.
750	45519	18	38	4	38	4	Again, if you just cite the 2006 Pounds you're going to run into some problems... (Peter Neofotis, City University of New York & Climate Impacts Group, Columbia Univ )	This discussion has been removed in the new more concise section.
751	54318	18	38	9	38	12	Please specify a timeframe for these changes. (Michael Mastrandrea, IPCC WGII TSU)	This discussion has been removed in the new more concise section.
752	54319	18	38	16	38	17	Is there a separate citation for this last sentence of the paragraph? Also, is there literature available about what has occurred since 2007? (Michael Mastrandrea, IPCC WGII TSU)	This sentence has been removed in the new more concise section.
753	40553	18	38	20	0	0	Section 18.5.6.4 -- This seems repetitive to the crops section described earlier. (Cynthia Rosenzweig, NASA Goddard Institute for Space Studies/Columbia University)	This regional section has been shortened considerably and is now more concise.
754	49693	18	38	28	38	30	I think this needs a critical view given that many of the key drivers of yield increases elsewhere appear to have been non-climatic (e.g., changes in tillage and crop management, inputs such as fertilizers, hybridization, etc). (Francis Zwiers, Pacific Climate Impacts Consortium)	This statement is now in Table 18-9 with an assessment of confidence in attribution assigned considering the points raised here.
755	51040	18	38	33	38	33	"likely" -- If this term is being used per the uncertainties guidance for authors (reflecting a probabilistic basis for its assignment), it should be italicized. Casual usage of this reserved likelihood term should be avoided. (Katharine Mach, IPCC WGII TSU)	The "likely" has been removed.
756	39866	18	38	34	38	35	poor English, sense of sentence not clear (Peter Burt, University of Greenwich)	This statement has been removed in the new more concise section.
757	54320	18	38	34	38	36	Please specify a timeframe for these changes. (Michael Mastrandrea, IPCC WGII TSU)	This statement has been removed in the new more concise section.
758	39867	18	38	36	38	36	how does observing precipitation benefit rice and soybean (yields)? (Peter Burt, University of Greenwich)	This text has been removed in the new more concise section.
759	49694	18	38	41	38	42	Surely this is a statement that is subject to uncertainty, and thus should be qualified with appropriate uncertainty language, e.g. by using confidence language and by providing the supporting arguments as to why a given confidence level was chosen. (Francis Zwiers, Pacific Climate Impacts Consortium)	Confidence assessments are now included for more specific statements in Table 18-7.
760	49695	18	38	46	38	48	Is this a climate change issue? (Francis Zwiers, Pacific Climate Impacts Consortium)	The confidence assessment of attribution in this statement in Table 18-7 has considered this point.
761	49696	18	38	50	38	50	This statement also needs an associated uncertainty assessment - although I realize that in this case, the uncertainty might be very small. (Francis Zwiers, Pacific Climate Impacts Consortium)	This statement has been removed in the new more concise section.
762	39868	18	38	52	38	52	CA =? (Peter Burt, University of Greenwich)	This text has been removed in the new more concise section.
763	42153	18	39	0	0	0	Section 18.5.7 is based in only 3 papers, references and confidence levels are missing for supporting some statements, and it is difficult to read. (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	Section 18.5.7. has been completely rewritten in Ch 18 SOD; all references to background publications are now in Tables 18-6, 18-7, and 18-8. Many references have been added to the assessment.
764	42152	18	39	0	40	0	Sections 18.8.5 and 18.8.5.1 are too similar to each other (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	There are no sections with these numbers in our FOD, not on page 39 not elsewhere
765	49697	18	39	2	39	2	Overall, I thought this subsection required more of a critical appraisal, and support from a wider range of literature. (Francis Zwiers, Pacific Climate Impacts Consortium)	Section 18.5.7. has been completely rewritten in Ch 18 SOD; all references to background publications are now in Tables 18-6, 18-7, and 18-8. Many references have been added to the assessment.
766	39869	18	39	7	39	7	reference required (Peter Burt, University of Greenwich)	We now refer to WGI AR5 Ch10.
767	49698	18	39	7	39	7	This is a statement that is oft repeated, but it is not clear if the statement would be true if recent rates of change in different regions were expressed relative to natural variability in each region - that is, signal to noise ratios may be no larger in the Arctic than elsewhere. The recent literature on the emergence of the forced signal relative to natural variability would be pertinent to an assessment of this issue. See recent papers by Mahlstein et al (2011, ERL, stacks.iop.org/ERL/6/034009), Hawkings and Sutton (2012, GRL, doi:10.1029/2011GL050087) and the assessment in WG1 Chapter 11). (Francis Zwiers, Pacific Climate Impacts Consortium)	We now discuss this and refer to WGI AR5 Ch10.
768	51041	18	39	7	39	8	To put in context the degree to which these changes are rapid and/or dramatic, it would be effective to provide comparative contrasts, in terms of rates of change historically and/or for other regions. (Katharine Mach, IPCC WGII TSU)	We now discuss this and refer to WGI AR5 Ch10.
769	39870	18	39	12	39	12	this is misleading. Almost all soil could be defined as being organic except for those just forming from weathered parent materials). Do you mean a specific organic content? (Peter Burt, University of Greenwich)	This sentence has been removed in the new more concise section.
770	48390	18	39	15	39	15	"led". (J. Graham Cogley, Trent University)	Thanks, although this discussion has been removed in the new more concise section.
771	48391	18	39	16	39	16	"effects", not "causes". (J. Graham Cogley, Trent University)	Thanks, although this discussion has been removed in the new more concise section.
772	49699	18	39	16	39	16	Does this statenemt, about ice wedges and shallow pools vanishing, hold broadly across the Arctic (a huge region, which is only sparcely occupied by humans and very incompletely observed)? A critical uncertainty asseement of this (and other statements) would be appropriate. (Francis Zwiers, Pacific Climate Impacts Consortium)	This discussion has been removed in the new more concise section, however several new references on the subject are included in Ch 18 SOD Table 18-6.



#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
773	42155	18	39	23	0	0	A number of case studies have provided evidence on the detection and attribution at continental levels (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	There is now more extensive reference to the literature in Tables 18-6 through 18-9.
774	48392	18	39	23	39	23	"their". (J. Graham Cogley, Trent University)	This text has been removed in a more concise Polar section.
775	49700	18	39	24	39	24	I think this is a misinterpretation of the term "single step attribution", which is intended to describe studies that make evaluate whether an impact of greenhouse gas emissions (and other external forcers) can be detected in the impacted system of interest. See the guidance paper on detection and attribution ( <a href="https://www.ipcc-wg1.unibe.ch/guidancepaper/IPCC_D&amp;A_GoodPracticeGuidancePaper.pdf">https://www.ipcc-wg1.unibe.ch/guidancepaper/IPCC_D&amp;A_GoodPracticeGuidancePaper.pdf</a> ). (Francis Zwiers, Pacific Climate Impacts Consortium)	This statement has been removed.
776	48393	18	39	29	39	29	Change "slower" to "more slowly". (J. Graham Cogley, Trent University)	This text has been removed in a more concise Polar section.
777	37316	18	39	32	39	38	Most of the tables shows results of detection and attribution, but they have all a different structure. I suggest to indicate in all the tables the confidence level of each result (Joel Guiot, CNRS)	This is now done in Tables 18-6 through 18-9.
778	49150	18	39	42	39	46	Check the balance in tis text that put very much emphasis on the other masking changes which is very important. However, it seems that there also are changes where the attribution is clearer. E.g. see 18.5.8.4 Human health. (Oyvind Christophersen, Climate and Pollution Agency)	Our assessment of attribution of impacts must consider climate change within the context of other drivers of change, especially when considering human systems.
779	51042	18	39	42	39	46	The author team should consider providing further citations for these statements. Additionally, if "likely" is being used on line 42 per the uncertainties guidance for authors, it should be italicized; casual usage of this reserved likelihood term should be avoided. (Katharine Mach, IPCC WGII TSU)	Further citations for this section are now listed in Tables 18-6 through 18-9. The "likely" has been removed.
780	49151	18	39	48	31	49	You may consider to include thekey finding in the Box also here. (Oyvind Christophersen, Climate and Pollution Agency)	This section has been restructured and made more concise, while the box has been moved to an earlier section.
781	49701	18	40	5	40	5	Suggest inserting "virtually" ahead of "impossible", to leave open a remote possibility that methodological or other developments may eventually allow attribution. (Francis Zwiers, Pacific Climate Impacts Consortium)	This text has been removed in a more concise Islands section.
782	49702	18	40	17	40	17	Typo - replace "premises" with "premise". (Francis Zwiers, Pacific Climate Impacts Consortium)	This text has been removed in a more concise Islands section.
783	39871	18	40	19	40	19	insert , after "Islands" (Peter Burt, University of Greenwich)	This text has been altered in a new more concise section.
784	49703	18	40	21	40	21	Is this intended to be an assessment that is made with calibrated likelihood language? If so, a critical evaluation of the evidence basis for the assessment is required. (Francis Zwiers, Pacific Climate Impacts Consortium)	This text has been altered in a new more concise section.
785	51043	18	40	21	40	21	"likely" -- If this term is being used per the uncertainties guidance for authors (reflecting a probabilistic basis for its assignment), it should be italicized. Casual usage of this reserved likelihood term should be avoided. (Katharine Mach, IPCC WGII TSU)	This text has been altered in a new more concise section and the "likely" has been removed.
786	54321	18	40	21	40	22	Does this mean that no such studies have been done? Or that studies have been done that have not identified such an influence? Further clarity here would be helpful. (Michael Mastrandrea, IPCC WGII TSU)	We have clarified this in the pretext of 18.5.8 Small Islands section, and table 18-8; there are very few studies addressing this issue at all, and they do not report on relative influence of SLR related to anthropogenic climate change.
787	39872	18	40	32	40	32	space required between numbers and units (x2) (Peter Burt, University of Greenwich)	This text has been altered in a new more concise section.
788	40554	18	40	43	0	0	Section 18.5.6.5 -- This also seems repetitive, as do many of the sections in this part of the chapter. (Cynthia Rosenzweig, NASA Goddard Institute for Space Studies/Columbia University)	This section has been restructured and made more concise.
789	39873	18	40	51	40	51	2nd 'n' of Nino should be enye (Peter Burt, University of Greenwich)	Done, thanks.
790	39874	18	40	54	40	54	lower case 'l' required for leptospirosis (Peter Burt, University of Greenwich)	This text has been removed in a more concise Islands section.
791	44646	18	41	0	41	0	ditto (Sarka D. Blazkova, T.G. Masaryk Water Research Institute)	It is not clear what this comment refers to.
792	43309	18	41	5	0	51	The usefulness of another box specializing on coral reefs should be examined. The size of this box equals the one in chapter 5 and one wonders whether some condensation and integration with other ocean sections should occur. (Hans-O. Pörtner, Alfred-Wegener-Institute for Polar and Marine Research)	The box, now 18-3, has been shortened, and focused more on detection and attribution of observed impacts on Coral Reefs. There is only limited overlap with CC_CR, which is much longer and discusses future impacts and other issues. Structurally, a central summary for Coral Reefs is indispensable for Chapter 18.
793	38644	18	41	7	41	32	This section needs careful cross-checking with the information presented about coral reefs in Chapters 5 and 6. (Janice Lough, Australian Institute of Marine Science)	The text of Box 18-3 has been reviewed various times by Chapter 5 and Chapter 6 authors.
794	51044	18	41	14	41	15	It would be helpful to clarify what is meant in the 2nd half of the sentence--in particular, I am unclear on the author team's intended meaning of "translate as the movement." (Katharine Mach, IPCC WGII TSU)	that formulation has been changed in the current version of Box 18-3.
795	49704	18	41	22	41	22	The sentence has a redundant "began". (Francis Zwiers, Pacific Climate Impacts Consortium)	acknowledged, but might have been removed by further editing
796	51045	18	41	23	41	23	It would be preferable to refer to the specific relevant section of chapter 5. (Katharine Mach, IPCC WGII TSU)	Reference has been changed to refer to coral reef Box CC_CR in Box 18-3
797	38645	18	41	28	41	28	I do not consider "sudden" to be the best adjective for environmental stressors triggering coral bleaching. Rather unusual and extreme would be better. (Janice Lough, Australian Institute of Marine Science)	this word has been removed from revised text of Box 18-3
798	38646	18	41	30	41	30	Need to make it clear that as a result of bleaching corals may die, partially die or recover - as it stands it reads as if bleaching always results in coral death. (Janice Lough, Australian Institute of Marine Science)	this has been clarified in current text of Box 18-3
799	49705	18	41	30	41	32	It is not clear from the text whether the acidification issue is being dealt with as part of historical and current environmental change that affects coral reefs, or whether this is really being introduced in the sense of a projection (of future pressures). If the latter, then it is not clear if this is appropriate for this chapter, which deals with past and current change. (Francis Zwiers, Pacific Climate Impacts Consortium)	Ocean acidification has been omitted from current version of Box 18_3, which focuses on attribution to warming and heat waves.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
800	54322	18	41	30	41	32	Is the intention that this statement demonstrates the sensitivity of corals? In the context of this chapter on observed impacts, this would seem to be its primary relevance. (Michael Mastrandrea, IPCC WGII TSU)	this statement has been removed from the revised text, and references to projections have been removed.
801	38647	18	41	31	41	32	Need to clarify that no evidence, as yet, of coral calcification rates being impacted in the field by observed ocean acidification to date. (Janice Lough, Australian Institute of Marine Science)	Ocean acidification has been omitted from current version of Box 18_3, which focuses on attribution to warming and heat waves. Some discussion of OA effects on calcification is contained in 18.3.4
802	49706	18	41	38	41	40	The first two sentences of this paragraph are repetitive. (Francis Zwiers, Pacific Climate Impacts Consortium)	Box 18_3 has been restructured, and repetitiveness has been removed.
803	45520	18	41	39	41	39	cut "is advanced and." Advanced compared to what? Just be explicit about what is understood. (Peter Neofotis, City University of New York & Climate Impacts Group, Columbia Univ )	this formulation has been removed, and the issue has been clarified
804	51046	18	41	42	41	44	"likely" -- If this term is being used per the uncertainties guidance for authors (reflecting a probabilistic basis for its assignment), it should be italicized. Casual usage of this reserved likelihood term should be avoided. (Katharine Mach, IPCC WGII TSU)	formulation has been changed, now using confidence language. Authors have carefully gone through the attribution language used and have fixed these issues.
805	49707	18	41	43	41	44	What is the relevance of this monitoring/prediction capability to this chapter? (Francis Zwiers, Pacific Climate Impacts Consortium)	the capability to reliably follow and predict such changes is underpinning the robustness of the underlying mechanism and system understanding. However, this formulation has been removed, and the issue has been clarified
806	51047	18	41	47	41	47	"Very high confidence," as calibrated uncertainty language, should be italicized. (Katharine Mach, IPCC WGII TSU)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
807	49708	18	41	48	41	51	It is not clear that discussion of projections is within the remit of this chapter - although perhaps future detectability is an issue for its consideration? (Francis Zwiers, Pacific Climate Impacts Consortium)	The reference to future and projections has been removed during rewrite of Box 18-3
808	43070	18	42	2	0	0	I think that subsection 18.5.9 (Oceans) and subsection 18.3.4 (Ocean Systems) should be more distinguishable from each other - I assume that the latter should cover more on Regional Ocean. (Seung-Ki Min, CSIRO Marine and Atmospheric Research)	Both sections have been combined into 18.3.4 during rewrite, with regional information summarized in 18.3.4.2. Coverage of regional specifics has been improved.
809	51048	18	42	2	0	0	Section 18.5.9. The author team should consider this section with respect to the sectoral section on oceans, ensuring sufficient distinction and reduction of overlap. Throughout the section, the author team should italicize calibrated uncertainty language. For likelihood terms, the author team should ensure the usage is not casual. Please check and italicize the calibrated terms on lines 7, 10 (is it possible to specify the range of uncertainty terms relevant here?), 15, 31, 38, 41, 48, 53. (Katharine Mach, IPCC WGII TSU)	To remove redundancy, both Oceans sections have been combined into 18.3.4 during rewrite, with regional information summarized in 18.3.4.2. Coverage of regional specifics has been improved. Calibrated confidence language has been italicized throughout.
810	43310	18	42	2	43	12	As the approach and message of the two ocean sections is similar, one wonders whether they should be combined into one section (Hans-O. Pörtner, Alfred-Wegener-Institute for Polar and Marine Research)	To remove redundancy, both Oceans sections have been combined into 18.3.4 during rewrite, with regional information summarized in 18.3.4.2. Coverage of regional specifics has been improved.
811	51049	18	42	5	42	5	It would be preferable to specify the timeframe for the described decline in pH. (Katharine Mach, IPCC WGII TSU)	This has been moved to the introductory text in 18.3.4, and 18.3.4.2, and timeframes have been specified.
812	49709	18	42	6	42	7	Wouldn't the attribution aspect of observed changes in ocean properties be dealt with primarily by Chapter 10 of WG1 (which has an oceanographer as one of its CLAs). (Francis Zwiers, Pacific Climate Impacts Consortium)	References have been extended to include both WG1 chapter 10 and 3; we have included information on ocean property changes we deemed useful for attribution exercise.
813	42169	18	42	7	42	9	Abbreviations like GHG, ENSO, NAO and PDO are used without explaining these terms. May be explained once at the start and then alter on abbreviations can be used (Naeem Manzoor, Global Change Impact Studies Centre (GCISC))	ENSO, NAO; PDO and AMO have been written out when they first appear in the chapter, and references to the Ocean chapters have been inserted. Detailed explanation is beyond the mandate of Chapter 18.
814	51050	18	42	22	42	22	By "climate" here, which parameters does the author team mean? For example, temperature only? (Katharine Mach, IPCC WGII TSU)	has been moved to 18.3.4.2, and rephrased "consistent with regional climate change", as this will differ for every case analysed.
815	35595	18	42	29	0	31	I hope this finding is flagged in the summary for policy makers (Daniel Farber, UC Berkeley)	there has been an adjustment to the that assessment, however the fact that we can observe ocean ecosystems respond to warming has been highlighted in the ES
816	51051	18	42	30	42	22	It would be preferable to provide a bit of "hard evidence" in some form to illustrate the descriptor "overwhelmingly." (Katharine Mach, IPCC WGII TSU)	that formulation has been changed
817	49710	18	42	32	42	32	Suggest inserting something like "[descriptor] of" ahead of "recent changes" where [descriptor] provides some sense of the importance of anthropogenic climate change as a driver relative to other agents of change. Eg, most? A considerable part? Some other qualifier? (Francis Zwiers, Pacific Climate Impacts Consortium)	that formulation is no longer contained in the new draft, and the new discussion should clarify the concern (see 18.3.4). In general, this is a very valid comment the team has tried to follow wherever possible.
818	49711	18	42	41	42	41	Is it the intent to use calibrated likelihood language here? If so, a critical appraisal of the evidence basis should be given. (Francis Zwiers, Pacific Climate Impacts Consortium)	this was used colloquially, and statement has been revised
819	39875	18	42	46	42	46	move 'quantitatively' to after 'factors' to remove split infinitive and improve clarity (Peter Burt, University of Greenwich)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
820	49712	18	42	53	42	53	Typo - insert "the" ahead of "ability". (Francis Zwiers, Pacific Climate Impacts Consortium)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
821	42156	18	43	0	44	0	Section 18.6 Synthesis. One of the things that are more clearly shown in this chapter (as well as in previous IPCC assessments) is that there is a persistent gap of knowledge regarding how large parts of the world are being affected by observed climate change. This fact clearly constitutes a barrier for identifying potential tipping points for dangerous climate change. It would be valuable to bring this issue forward and present it part of the conclusions of the chapter. (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	Good point. This now emerges in the discussion of the "Distributions" RFC and in Section 18.7.
822	49713	18	43	1	43	2	What is the phenomenon? Two were mentioned in the opening part of the sentence. Also, I think the determination of whether human influence on the climate is affecting ENSO or the PDO is still in its very early days, so my inclination would be not to raise this issue until it is better established in the literature. (Francis Zwiers, Pacific Climate Impacts Consortium)	this statement has been removed from the revised text, the equivalent text in 18.3.4.2 refers to strong influence of ENSO and PDO hindering attribution, without s reference to potential GHG implications on those processes.
823	40555	18	43	12	0	0	Section 18.6 -- The chapter organization provides only a 'soft link' to attribution to anthropogenic. This issue needs to be sharpened. (Cynthia Rosenzweig, NASA Goddard Institute for Space Studies/Columbia University)	We have discussed attribution to anthropogenic climate change where the literature provides information.
824	49714	18	43	12	43	12	I generally like the synthesis diagrams that are proposed for this section, but I do have comments. It might be useful to accompany the diagrams with detailed tables of assessments (as was done in SREX, Chapter 3), so that a traceable account of each assessment presented visually is also available in a convenient form. (Francis Zwiers, Pacific Climate Impacts Consortium)	We now include tables supporting these figures.
825	46140	18	43	14	43	24	Noted. Question: will this influence and how much will Chapters 19 and 20 be changed? (Luis E. Garcia, World Bank)	We are working to integrate with Chapters 1 and 19.
826	48394	18	43	19	43	20	"For most assessments ... care has been taken": presumably by the IPCC assessors. But there is often ambiguity elsewhere in the text about whether the assessment of confidence was made by the IPCC or the authors of the cited studies. (J. Graham Cogley, Trent University)	We have endeavoured to clarify this throughout.
827	49715	18	43	19	43	20	Why for only "most" assessments (i.e., more than half)? (Francis Zwiers, Pacific Climate Impacts Consortium)	This text is inaccurate and has been deleted.
828	37317	18	43	19	43	21	it does not appear so clearly that care has been taken in previous sections on confidence assessment; it is not so clearly explained how a common scale has been adopted. (Joel Guiot, CNRS)	We now emphasise and clarify the role of the guidance documentation and other chapters.
829	48395	18	43	22	43	22	"are", not "is". (J. Graham Cogley, Trent University)	Done, thanks.
830	53833	18	43	26	43	26	This figure is included in chapter 1, so it isn't needed here. (Kristie L. Ebi, IPCC WGII TSU)	Yes. The figure and some associated discussion has been deleted.
831	45522	18	43	26	43	27	Figure 18-6 also appears on Chapter 1 page 8, as figure 1-5 (Avelino Suarez, Institute of Ecology and Systematic, Cuban Environmental Agency)	Yes. The figure and some associated discussion has been deleted.
832	49716	18	43	26	43	27	Is it necessary to repeat this figure here? Every chapter should be using this framework for its assessments. (Francis Zwiers, Pacific Climate Impacts Consortium)	Yes. The figure and some associated discussion has been deleted.
833	49717	18	43	29	43	41	Sounds like you are defending a proposal ... to whom? (Francis Zwiers, Pacific Climate Impacts Consortium)	This introduction has been rewritten with this comment in mind.
834	45523	18	43	29	44	39	Refers to Reasons for Concern, also C1 Page 14 lines 1-42 and C 19 Box 19-2 pages 6-7. Would be good to coordinate the text, to eliminate duplications and refers to the other sections of the AR5 WG II contribution. (Avelino Suarez, Institute of Ecology and Systematic, Cuban Environmental Agency)	We are coordinating with Chapters 1 and 19, and have removed some of the introduction here.
835	46095	18	43	29	46	14	Since this part is about risk, shouldn't it be rather in Chapter 19? (Luis E. Garcia, World Bank)	We are coordinating with Chapter 19, but believe this particular synthesis belongs (at least) in our chapter.
836	40809	18	43	29	49	10	This discussion is not relevant in chapter 18 and should be shifted to chapter 19. (Michel Petit, CGIET rue de Bercy)	We are coordinating with Chapter 19, but believe this particular synthesis belongs (at least) in our chapter.
837	42157	18	43	38	0	53	Section 18.6 Synthesis. Another important Reason for Concern regarding "dangerous anthropogenic interference with the climate system" is the current lack of knowledge in large parts of the world, which are (many of them) quite sensitive in terms biodiversity and ecosystems and also in terms of the most vulnerable societies (LA, Africa, Asia...). It may be convenient to add a sixth RfC: Distribution of data and information. There are sharp differences across regions in terms of data availability and quality as well as of information about the observed changes that can be a barrier for detecting potential tipping points for dangerous climate change. (Francisco Estrada Porrua, Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México)	We are not in a position to develop more reasons for concern, but in any case the discussion of distribution of evidence arising natural in the existing RFC.
838	53834	18	43	38	44	25	This is extensively covered in chapter 19, so can be significantly reduced here with references to appropriate sections of chapter 19. (Kristie L. Ebi, IPCC WGII TSU)	We are coordinating with Chapters 1 and 19, and have removed some of the introduction here.
839	48396	18	43	48	43	48	Change "Even then, there was higher confidence" to "There was increased confidence". (J. Graham Cogley, Trent University)	This introduction has been rewritten and this text no longer appears.
840	51052	18	43	48	43	48	It would be clearest to specify that "even then" refers to the state of understanding in the 3rd assessment report. (Katharine Mach, IPCC WGII TSU)	This introduction has been rewritten and this text no longer appears.
841	48397	18	44	18	44	18	"This visual was first included". Or say "version" rather than "iteration". (J. Graham Cogley, Trent University)	This text has been modified accordingly.
842	48400	18	44	27	44	33	Some discussion of how confidence might be low in detection but high in attribution, i.e. of how to get into the upper left hand corner, is essential here. (J. Graham Cogley, Trent University)	This arose from an earlier definition of attribution, but following discussion with other chapters at LAM3 we decided not to follow this definition.
843	48398	18	44	30	44	30	"confidence in". Do not shrink from repeating a conjunction or preposition. (J. Graham Cogley, Trent University)	This text has been heavily altered, but we have followed this advice throughout the new draft.
844	48399	18	44	33	44	33	"confidence in". (J. Graham Cogley, Trent University)	This text has been heavily altered, but we have followed this advice throughout the new draft.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
845	49718	18	44	35	44	39	I think I can understand boxes that lie below the diagonal (ie, lower confidence in attribution than in detection), but boxes that lie substantially above the diagonal would, presumably, have to be very carefully supported. In addition, see also my previous comment regarding Figure 18.4 - similar comments regarding the positioning of symbols apply here. (Francis Zwiers, Pacific Climate Impacts Consortium)	see comment 842
846	38094	18	44	42	0	0	section 18.6.1 - The summary statement found here should be also found in the sections referenced. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	We have now more closely coordinated the writing of this section with other relevant sections and chapters.
847	49719	18	44	44	44	50	I'm afraid that I don't understand what this figure is attempting to show. Based on the title, I would expect to see a metric of relative risk - so I'm confused the detection and attribution assessments that are shown on the x- and y-axes. (Francis Zwiers, Pacific Climate Impacts Consortium)	We have endeavoured to clarify these completed figures now, which form an important part of our synthesis.
848	39876	18	44	52	44	52	bad English: I doubt coral reefs are 'standing out' (Peter Burt, University of Greenwich)	This section has been re-written and corals are no longer "standing out".
849	51053	18	44	52	44	52	It would be preferable to use wording more specific to indicate what is meant by "standing out here." Additionally, "very high confidence," as calibrated uncertainty language, should be italicized. (Katharine Mach, IPCC WGII TSU)	see comment 848
850	35882	18	45	0	0	0	Figure 10-12: The confidence levels shown are low and this inhibits scientists communicating the real dangers of climate change to the media and the public. There needs to be a very high priority for research to improve the timeliness and confidence levels in the detection and attribution of extreme events. There are already moves by climate scientists in this direction and these should be acknowledged and encouraged. (Constance Lever-Tracy, Flinders University of South Australia)	Good point, we are limited by available observations and research, as we now emphasise in 18.1, 18.2, 18.6, and 18.7. We are not however tasked with assessing analysis methods.
851	51054	18	45	3	45	33	Calibrated uncertainty language used on this page should be italicized. For likelihood terms, the author team should also ensure that usage is not casual. Please check and italicize the calibrated terms on lines 3, 4, 5, 9, 11, 32, 33. (Katharine Mach, IPCC WGII TSU)	Yes, done.
852	39877	18	45	5	45	5	). missing after 30.5.6.1 (Peter Burt, University of Greenwich)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
853	38095	18	45	9	45	9	Arctic sea ice loss ... detection and attribution - References? What part of sea loss is in view? I assume extent. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	We no longer discuss the attribution of sea ice changes, which is covered in WGI AR5 Ch10.
854	49720	18	45	9	45	9	I think the discussion on this has missed a key paper - the only formal detection and attribution study of the observed change in Arctic sea-ice extent (Min et al, 2008, GRL). (Francis Zwiers, Pacific Climate Impacts Consortium)	see comment 853
855	38096	18	45	15	22	0	Confidence statements missing for both statements. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	We no longer discuss these two topics in this section, but have added confidence statements in all entries.
856	35437	18	45	32	45	33	Very similar statements appear in WG Ch4 (with lots of cited sources), so if this chapter is also making such statements, we better ensure the confidence language does not conflict (David Vaughan, British Antarctic Survey)	We have now more closely coordinated the writing of this section with other relevant sections and chapters.
857	44218	18	45	32	45	34	Cross check and refer to WG1 Ch4 (Georg Kaser, University of Innsbruck)	We have now more closely coordinated the writing of this section with other relevant sections and chapters.
858	38097	18	45	33	45	33	Robust evidence - statement too vague. More precision is needed for the robust evidence to apply. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	This text has been removed in the new largely re-written section.
859	39225	18	45	37	0	0	Section 18.6.2. Just a comment: I was surprised that there is no statement on drought here/heat waves here since there are several high-quality papers on this. (Christopher Reyer, Potsdam Institute for Climate Impact Research)	We now discuss heat waves, dry spells, and droughts.
860	48402	18	45	39	45	39	"relates". (J. Graham Cogley, Trent University)	This section has been re-written and this text no longer appears.
861	49721	18	45	39	45	47	It seems to me that there is a literature on the detection and attribution of changes in extreme events (temperature primarily, with a bit of literature on precipitation extremes as well) that could be a bit more fully discussed in the chapter. Much of the recent literature has been assessed in SREX, Chapter 3. (Francis Zwiers, Pacific Climate Impacts Consortium)	We have now included some summary of that literature, but with heavy reference to SREX and WGI AR5 Ch10.
862	53835	18	45	44	45	44	Please define a careful assessment. (Kristie L. Ebi, IPCC WGII TSU)	This section has been re-written and this text no longer appears.
863	35596	18	45	46	0	0	Please highlight this finding about extreme precipitation events in the U.S. -- it's potentially very important in the public debate (Daniel Farber, UC Berkeley)	This section has been re-written and the figure altered accordingly. Unfortunately this particular statement was considering to be no longer appropriate for inclusion here (but it was discussed in SREX).
864	38098	18	46	1	46	1	statistically significant trends - I could not find this statement in 18.3.1. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	This section has been re-written and this text no longer appears.
865	51056	18	46	1	46	2	The author team should consider cross-referencing the findings of the working group 1 contribution here, also potentially with calibrated uncertainty language assigned in that context. (Katharine Mach, IPCC WGII TSU)	We have now done that in Table 18-11a.
866	51055	18	46	3	47	26	Calibrated uncertainty language used on these pages should be italicized. Please italicize the calibrated terms on page 46, lines 3, 8 (is "very low" appropriate here?), 10, 11, 22, 33, 48-51; page 47, lines 2, 4, 26. (Katharine Mach, IPCC WGII TSU)	Done.
867	38099	18	46	7	46	7	graph - What graph? (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	We have corrected the reference to Fig 18-11.
868	48403	18	46	8	46	8	Should "even though" be "even if" or "even when"? I do not think this applies to Pall et al. 2011 and their analysis of floods in England and Wales, for example. See also Table 18-4, and my comment at P3 L52. (J. Graham Cogley, Trent University)	This text has been removed in the new largely re-written section, but in any case Pall et al. did not examine economic losses.
869	48401	18	46	9	45	9	"high in confidence in both detection". (J. Graham Cogley, Trent University)	This text has been removed in the new largely re-written section.
870	46096	18	46	17	0	0	Section 18.6.3 Distribution of Impacts: does this synthesizes or duplicates some of the material in Chapter 21? (Luis E. Garcia, World Bank)	No, Chapter 21 is not covering detection and attribution.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
871	48404	18	46	17	0	0	I would expect section 18.6.3 to be considerably shorter in the SOD. Much of the text simply repeats examples from earlier sections, and something more like a synthesis than a summary is required. (J. Graham Cogley, Trent University)	This section has been restructured and rewritten with this in mind.
872	37035	18	46	17	48	16	All information given here is redundant. Please either use a driver or impact-based orientation ("heatwaves have been noted in ...") or a region-specific organisation, but this latter approach would also be completely redundant. (Joachim Rock, Johann Heinrich von Thuenen-Institute, Federal Research Institute for Rural Areas, Forestry and Fisheries)	This section has been restructured and rewritten and we hope is now less redundant.
873	48407	18	46	18	46	18	"comparatively", not "comparably". Make the same change at P46 L10. (J. Graham Cogley, Trent University)	This section has been re-written and this text no longer appears.
874	39878	18	46	19	46	19	insert 'the' after 'While' (Peter Burt, University of Greenwich)	Thanks, but this text has been modified such that this no longer applies.
875	38100	18	46	36	46	37	most rapid warming on earth - Over the top. Over what period? More precision needed. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	This text no longer appears in the new rewritten section.
876	48405	18	46	36	46	37	"the most rapid warming on Earth": as at P39 L7, this is a large claim. It is large enough to require a reference, probably to an appropriate part of the WG1 report. (J. Graham Cogley, Trent University)	This text no longer appears in the new rewritten section.
877	48406	18	46	37	46	37	"As noted above": where? Section 18.5.7 makes no claim of confidence, high or low, in any of these or other changes. (J. Graham Cogley, Trent University)	This section has been re-written and this text no longer appears.
878	37033	18	46	41	46	41	Lemmings ARE rodents, to. They belong to the Order Rodentia (rodents), Superfamily Muroidea, Family Cricetidae, subfamily Arvicolinae, Tribe Arvicolini, Genus Lemmiscus. They join the tribe with Microtus voles and others, but some other voles Genus' are linked with them at the Subfamily level only. (Joachim Rock, Johann Heinrich von Thuenen-Institute, Federal Research Institute for Rural Areas, Forestry and Fisheries)	This section has been re-written and this text no longer appears.
879	40864	18	46	47	46	47	Delete the word "southern" so that the statement includes the range shifts detected and attributed in the African Sahel. (Patrick Gonzalez, National Park Service)	These two topics are now given separate entries in Table 18-7.
880	38101	18	46	48	46	48	Great Lakes - Where are these in Africa? (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	Along the Rift Valley.
881	45521	18	47	1	47	53	I think you need some sort of table with Regions on one axis and sector on another and then assess confidence levels of attributed changes. For instance, it would be nice to see for the Cryosphere, that changes in some regions (i.e. Arctic) are have a higher confidences of being due to climate change then other regions (i.e. South American glaciers). If this is true, of course. The trouble with figures 18-8 through 18.10 is that it they really don't allow easy comparison of the regions and are a bit too in-crowd. I think a simple table with on one axis sectors and the other axis the regions and within it confidence statements that the changes are occurring due to climate change would be more compelling. (Peter Neofotis, City University of New York & Climate Impacts Group, Columbia Univ )	We have generated tables (in 18.5) and resulting figures for this section now.
882	39879	18	47	5	47	5	change 'Megacities' to 'megacities', and give examples (Peter Burt, University of Greenwich)	This section has been re-written and this text no longer appears.
883	39880	18	47	10	47	10	CA =? (Peter Burt, University of Greenwich)	Central America, but this text has been removed from the new rewritten text.
884	41906	18	47	12	47	16	Positive impact should be presented as new opportunities (Nathalie BREDA, INRA)	We figure that if people took advantage of the situation then it was an opportunity.
885	38102	18	47	33	47	33	anthropogenic climate change has driven - How wide spread? Where? More is needed here. (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	This text has been removed in a new rewritten section.
886	38103	18	47	43	47	43	I assume heat deaths increase and cold deaths decrease. If so, reword. If not, what is the logic that climate change is related to the changes? (Ronald Stouffer, Geophysical Fluid Dynamics Laboratory/NOAA)	This has been rephrased in the new Table 18-9.
887	48408	18	48	7	48	7	See comment at P34 L17-18. The imminent appearance in Nature of Kaeab et al. makes this assessment of mass loss from Himalayan glaciers out of date. (J. Graham Cogley, Trent University)	Thanks, we have updated this assessment accordingly.
888	44219	18	48	7	48	9	This statement is not correct as it stands. See comment ad page 34, lines 17 - 18. (Georg Kaser, University of Innsbruck)	Thanks, we have updated this assessment accordingly.
889	52438	18	48	9	48	9	"decreased water availability in others (China)".may be more other factors than climate change (Jian Guo WU, Chinese Academy of Environmental Sciences)	This text has been removed in a new rewritten section.
890	37036	18	48	19	48	43	It does not become clear what you mean to aggregate to? Do you want to show impacts on higher-order systems (human systems, for example) or the "sum of all impacts" in a given region? (Joachim Rock, Johann Heinrich von Thuenen-Institute, Federal Research Institute for Rural Areas, Forestry and Fisheries)	We now clarify that we mean aggregation across systems that use the same calibrated metric or are otherwise at least qualitatively comparable.
891	39226	18	48	21	48	24	I think an explanation like this should appear in the real text and not only in the editorial comments. (Christopher Reyer, Potsdam Institute for Climate Impact Research)	Good point, and we now include a discussion.
892	53836	18	48	28	48	28	Does the complexity actually preclude attribution or make it more difficult? (Kristie L. Ebi, IPCC WGII TSU)	More difficult. This statement has been removed from the new rewritten section.
893	51057	18	48	30	49	8	Calibrated uncertainty language used on these pages should be italicized. For likelihood terms, the author team should also ensure that usage is not casual. Please check and italicize the calibrated terms on page 48, lines 30, 35, 40; page 49, lines 1, 8. (Katharine Mach, IPCC WGII TSU)	Done.



#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
894	46953	18	48	46	49	10	In addition to the examples given, that Arctic sea ice has melted more quickly than predicted in AR4 is a clear example of a large scale discontinuity or tipping point that has already been crossed. The change in surface albedo associated with this melting suggests that this will increase the likelihood of the crossing of further tipping points. As per the UNFCC, this clearly mandates calls for much greater application of precaution - in particular in regards to mitigation. Given the intrinsically optimistic tone of economic policy advice in AR5, greater overall balance would be brought about by making this call strong, clear and highly visible. See my comments on earlier chapters for some further logic behind this comment. (Mark Charlesworth, Keele University)	We now refer to the discussion in WGI AR5 Ch10.
895	49722	18	48	48	48	2	I wonder if this topic is really appropriate for this chapter given that its focus is, presumably, the detection and attribution of [historical and current] change. If it is thought that the detection and attribution of potential future change deserves some discussion, then perhaps the scope of this section could be broadened a bit to also include topics such as projection of the date of the local emergence of the climate change signal from the current range of local natural variability (e.g., papers such as Mahlstein et al, 2011, ERL and Hawkins and Sutton, 2012, GRL, cited in an earlier comment). (Francis Zwiers, Pacific Climate Impacts Consortium)	We are not discussing whether will reach discontinuities in the future, but rather a) whether any have already been reached and b) whether there is D&A evidence that we are approaching any. We have endeavoured to clarify this in the text.
896	48409	18	48	53	48	53	"hint at the onset". (J. Graham Cogley, Trent University)	Thanks, although this text has been otherwise modified already.
897	48410	18	49	13	0	0	I can think of one large gap that needs to be filled: studies of detection and attribution of impacts need to advance beyond the anecdotal level. This will probably require, firstly, more, and more comprehensive, meta-analyses of the literature, so that assessments become more than enumerations of regional and local examples. Figures such as 18-4 and 18-8 to 18-12 constitute an important step in this direction. Secondly, more studies are required in which the most powerful tools available, including GCMs and advanced statistical methods, are applied to particular instances of the detection-attribution problem. (J. Graham Cogley, Trent University)	Thank you. We have rewritten this section with this partly in mind.
898	49723	18	49	19	49	19	I'm not sure that more questions are needed - perhaps different questions with more depth of response would be appropriate. For example, I think substantially more depth of response could be provided in FAQ 18.4 (drawing upon expertise that is already in the chapter). (Francis Zwiers, Pacific Climate Impacts Consortium)	we have altered our FAQs, following this comment.
899	46097	18	49	21	49	43	Does this synthesizes the discussion about detection and attribution discussed previously in Chapter 3? (Luis E. Garcia, World Bank)	We do not understand that comment.
900	48411	18	49	22	49	22	"revelation" is the wrong word. Perhaps "uncovering" or "identification"? (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
901	53837	18	49	22	49	22	Revelation? (Kristie L. Ebi, IPCC WGII TSU)	Changed as suggested to "identification"
902	53838	18	49	23	49	23	The IPCC definition of climate change includes anthropogenic and natural forcing. (Kristie L. Ebi, IPCC WGII TSU)	this has been clarified
903	48412	18	49	24	49	24	Either replace "short-term" with "natural", or insert "natural" before "short-term". The shortness of many records means that our knowledge of longer-term variations is often inadequate, but the real question is whether the observations are unusual when set against what might have happened in the absence of human activity. (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
904	48413	18	49	25	49	26	"partly or solely the result". "entirely due to other causes". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
905	53839	18	49	26	49	26	D&A should be taking a multistressor approach, not just focusing on trends that can be 100% attributed to climate change. (Kristie L. Ebi, IPCC WGII TSU)	We certainly agree, and discuss confounding factors a lot. That is where we speak to multiple stressors.
906	51058	18	49	31	49	49	The author team should avoid casual usage of "likely" on line 31 and of "unlikely" on line 49. (Katharine Mach, IPCC WGII TSU)	casual use has been omitted from that paragraph, and the whole chapter
907	48414	18	49	32	49	32	"supports development of this understanding". (J. Graham Cogley, Trent University)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
908	53840	18	49	34	49	43	This FAQ is included in chapter 1, so should be deleted here. (Kristie L. Ebi, IPCC WGII TSU)	we have rephrased FAQ1, however, it still refers to detection, as we found that there is a lack of clarity
909	48415	18	49	47	49	47	Begin this answer more emphatically: "In general, no. Although it is possible in principle ...". (J. Graham Cogley, Trent University)	the answer to FAQ4 has been completely rephrased, taking a different angle.
910	53841	18	49	51	49	51	Has there been an assessment of which D&A findings are particularly important in the short and long term? (Kristie L. Ebi, IPCC WGII TSU)	there is no line 51 on page 49? The answer to the question is our Executive Summary
911	41911	18	55	39	55	40	Dai et al 2011 is cited twice (Nathalie BREDA, INRA)	acknowledged
912	41912	18	57	24	57	24	something wrong to be removed ... et al, 2011 ? (Nathalie BREDA, INRA)	acknowledged
913	41913	18	59	2	59	2	Climate and not cliamte (Nathalie BREDA, INRA)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
914	41914	18	59	4	59	4	Reference to be completed (volume, pages) (Nathalie BREDA, INRA)	Volume and pages numbers have been included
915	41915	18	59	17	59	17	Reference to be completed (title, authors, journal, volume, pages) (Nathalie BREDA, INRA)	Reference has been omitted from text
916	41916	18	59	41	59	41	Reference to be completed (volume, pages) (Nathalie BREDA, INRA)	Reference has been omitted from text
917	41917	18	67	24	67	24	Reference to be completed (title, authors, journal, volume, pages) (Nathalie BREDA, INRA)	Reference has been omitted from text
918	48416	18	76	47	76	49	The personal and family names of all the authors have been confused. (See also P15 L41.) The correct author list, in the style of the references for Tong et al. 2010a,b, is: Li Z.X., Y.Q. He, T. Pu, W.X. Jia, X.Z. He, H.X. Pang, N.N. Zhang, Q. Liu, S.J. Wang, G.F. Zhu, S.X. Wang, L. Chang, J.K. Du and H.J. Xin. (J. Graham Cogley, Trent University)	Thanks, acknowledged and changed

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
919	43071	18	77	0	0	0	Table 18-1: This table plays an important role in giving general idea on what will be covered in this chapter. I wonder if it is possible to connect drivers in this table with those in Figure 18.1 (by denoting External, Internal, and Anthropogenic drivers as in Figure 18.1). (Seung-Ki Min, CSIRO Marine and Atmospheric Research)	Good point, and we have now merged Table 18-1 and Figure 18-1.
920	51059	18	77	0	0	0	Table 18-1. The author team might consider developing this table into a figure that presents visual depictions of relationships between the drivers characterized here. Please contact the TSU if you would like technical support for developing such a figure. (Katharine Mach, IPCC WGII TSU)	A good idea, and we now have worked with the TSU to merge Table 18-1 and Figure 18-1.
921	53842	18	77	0	0	0	It is unclear why the right hand column is included. (Kristie L. Ebi, IPCC WGII TSU)	Table 18-1 has now been integrated into Figure 18-1 and the part corresponding to this column has now been elaborated on.
922	53966	18	77	0	0	0	Table 18-1: It would be helpful to have headers. As it is presented, the information presented here looks more suitable for a figure than a table? (Yuka Estrada, IPCC WGII TSU)	Good point, and we have now merged Table 18-1 and Figure 18-1.
923	39227	18	78	0	0	0	Table 18-2. also the abbreviation 'Cat', should be explained in the title (also in the following tables) (Christopher Reyer, Potsdam Institute for Climate Impact Research)	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
924	53843	18	78	0	0	0	Who decided the confidence levels? Were they decided by the author team or were these reported in the citations? (Kristie L. Ebi, IPCC WGII TSU)	Confidence assessment derived by expert judgment of the Chapter 6 team, based on their analysis, and the underlying literature
925	42166	18	79	0	0	0	Abbreviations 'AC and PP' are used in row 2 and col. 5 of the Table 18-3 but these may be detailed accordingly in the table (Naeem Manzoor, Global Change Impact Studies Centre (GCISC))	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
926	42167	18	79	0	0	0	Abbreviation 'FCP' is used in Row 8 and Col 5 of the Table 18-3 but not detailed in the table (Naeem Manzoor, Global Change Impact Studies Centre (GCISC))	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
927	53967	18	79	0	0	0	Table 18-3: Missing note/footer for * in the last cell of Cat column? (Yuka Estrada, IPCC WGII TSU)	explanation is given in row 5
928	48417	18	80	0	0	0	Table 18-4, 2000 row: In my home chapter (3, Freshwater resources; P13 L52 to P14 L2), assessing Pall et al. 2011, I rated the contribution of anthropogenic emissions to the increased risk of flooding in England and Wales in autumn 2000 as "very likely", with the same assessment for the more widely observed intensification of extreme precipitation events documented by Min et al. 2011. I am not inclined at present to alter either of those assessments. (J. Graham Cogley, Trent University)	We now discuss this event in the text (without confidence assessment) rather than the table because the literature does not fit easily into the categories of the table. However, we note that Kay et al. (2011) found less conclusive results than Pall et al. (2011) using a highly related (e.g. same climate model data) but slightly different analysis approach. Both only considered anthropogenic greenhouse gas emissions, not the full anthropogenic forcing, and neither considered the relative contribution in comparison to other drivers of flood risk.
929	49152	18	80	0	0	0	Table 18-4: Please consider to update table 18-4 with the examples threatened in the study, T.C. Peterson, P.A. Stott and S. Herring (editors). Explaining extreme events of 2011 from a climate perspective. Bulletin of the American Meteorological Society, Vol. 93, July 2012, p. 1041. doi: 10.1175/BAMS-D-11-00021.1 (Oyvind Christophersen, Climate and Pollution Agency)	Good idea. We have now included the Thai flooding study from that collection.
930	51060	18	80	0	0	0	Table 18-4. In the table caption, where the author team mentions "confidence" it would be preferable to indicate that likelihood is also characterized in some cases. Throughout the table, calibrated uncertainty language should be italicized. (Katharine Mach, IPCC WGII TSU)	We have now dropped the use of likelihood terminology in this table, for consistency, and italicised all confidence terms.
931	53844	18	80	0	0	0	Please define how a substantial contribution was determined. (Kristie L. Ebi, IPCC WGII TSU)	Given the varied nature of entries in the table, we do not have a quantitative definition for "substantial" here. Our guideline is that the nature of the event would have been appreciably different, perhaps even not occurring, in the absence of the driver.
932	37318	18	80	0	80	0	row 2006-2007 of the table, maybe add an information which can be useful: After Guiot et al, 2010, hottest record summer in the last 1000 years in Europe (average) is 2006 (Joel Guiot, CNRS)	Thanks, but we have decided not to include this in part because we already have a number of European events listed.
933	54324	18	81	0	0	0	Table 18-5: The scope of the column "observed climate change" is not completely clear, as some of the entries are events rather than changes in climate, and climate variability is mentioned as well. I suggest thinking further about how to title this column to cover the information it contains. (Michael Mastrandrea, IPCC WGII TSU)	Thanks. We have modified the column headings to better reflect the content of the table, now reading "related climate driver" and "impact on livelihoods"
934	51061	18	82	0	0	0	Table 18-6. For examples in this table, it would be helpful to characterize the degree of certainty in detection and attribution through use of calibrated uncertainty language. Additionally, the final column of the table should be separated into attribution and confounding factors as separate columns, for clarity. For the Lakes entry, the author team should indicate more specifically which previous report is relevant. (Katharine Mach, IPCC WGII TSU)	Confidence for detection and attribution added in all cases; the information is now (Ch18 SOD) distributed in Table 18-6 and 18-7, and to some extent in Table 18-10 and 18-11b. Numerous references added.
935	54325	18	82	0	0	0	Table 18-6: The combination of attribution and confounding factors in the last column is somewhat confusing. It would be best to clearly distinguish these, perhaps in two separate columns. (Michael Mastrandrea, IPCC WGII TSU)	Confidence for detection and attribution added in all cases; the information is now (Ch18 SOD) distributed in Table 18-6 and 18-7, and to some extent in Table 18-10 and 18-11b. Numerous references added. Confounding factors have been removed as table column, but are pointed out for some entries
936	51062	18	83	0	0	0	Table 18-7. For examples in this table, it would be helpful to characterize the degree of certainty in detection and attribution through use of calibrated uncertainty language. Additionally, the final column would be best if separated into attribution and confounding factors more distinctly. (Katharine Mach, IPCC WGII TSU)	Confidence for detection and attribution added in all cases; the information is now (Ch18 SOD) distributed in Table 18-6 and 18-7, and to some extent in Table 18-10 and 18-11b. Numerous references added.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
937	54326	18	83	0	0	0	Table 18-7: The combination of attribution and confounding factors in the last column is somewhat confusing. It would be best to clearly distinguish these, perhaps in two separate columns. (Michael Mastrandrea, IPCC WGII TSU)	Confidence for detection and attribution added in all cases; the information is now (Ch18 SOD) distributed in Table 18-6 and 18-7, and to some extent in Table 18-10 and 18-11b. Numerous references added. but are pointed out for some entries
938	43072	18	84	0	0	0	Figure 18-1: I have a few questions/suggestions on this schematic plot. (1) I guess that Natural and Climate System may affect each other through internal process. If so, arrows for these interactions seem to be missing. (2) What can be internal driver from Human to Natural System? Explaining this with examples would be useful to understand this plot and this chapter. (3) Which arrows best represent "climate change impacts on Natural and Human system" consistent with main objectives of this chapter? (Seung-Ki Min, CSIRO Marine and Atmospheric Research)	We have merged Table 18-1 and Figure 18-1 into a figure which we hope more clearly represents how each system can drive the other, with the use of examples.
939	53968	18	84	0	0	0	Figure 18-1: It is an interesting figure to communicate some concepts discussed in the chapter. But the multiple and complex interaction of arrows within green circles make this figure hard to read. It needs a legend for the red dotted lines drawn within blue lines. Also, the way it is illustrated here, there seems to be clean boundaries between three systems. It would be helpful for readers to have further clarification on differences between internal vs external drives perhaps by including some examples. It is a little confusing to me that internal drives as well as external drives are both originating from the outside of the given system. (Yuka Estrada, IPCC WGII TSU)	We have merged Table 18-1 and Figure 18-1 into a figure which we hope more clearly represents how each system can drive the other, with the use of examples.
940	54327	18	84	0	0	0	Figure 18-1: It would be useful to consider adding examples within each arrow to further enrich this interesting figure. (Michael Mastrandrea, IPCC WGII TSU)	Good idea, and we have now added some examples.
941	37037	18	84	0	84	0	Figure 18-1: Please rework this figure. Either there must be a second arrow (in blue) from the human system to the climate system, indicating indirect influences (as shown with the natural system), or the blue arrow from human to natural systems has to be deleted. As it is now, relations from the human to the climate system are treated differently than from human to natural systems. (Joachim Rock, Johann Heinrich von Thuenen-Institute, Federal Research Institute for Rural Areas, Forestry and Fisheries)	We have modified this figure, including description, in a way which we hope is more clear. The definition of the arrow colours means only red arrows can go from the human system to the climate system, while blue arrows can go anywhere else.
942	44643	18	85	0	0	0	Fig. 18-2 see the following comment (Sarka D. Blazkova, T.G. Masaryk Water Research Institute)	not clear what this comment refers to
943	51063	18	85	0	0	0	Figure 18-3. For this figure, it would be helpful to indicate how the lines relate to the bubbles in terms of supporting citations. (Katharine Mach, IPCC WGII TSU)	this figure has been omitted from the SOD
944	53969	18	85	0	0	0	Figure 18-3: The visibility of this figure should be improved, especially for print purposes. The light colors on a gray background would not show. I am not exactly sure how to read this figure. Assuming that the circles are illustrating specific studies, how are the lines drawn from the (collections of?) circles? (Yuka Estrada, IPCC WGII TSU)	this figure has been omitted from the SOD
945	54328	18	85	0	0	0	Figure 18-3: It would be helpful to include some explanation of the nonlinearities in the blue and light green lines in the figure caption. Nonlinearities in the blue line seem to be related to the spatial scale of available studies, but the nonlinearity in the light green line is not so clearly linked. (Michael Mastrandrea, IPCC WGII TSU)	this figure has been omitted from the SOD
946	37038	18	85	0	85	0	Figure 18-3: Please rework the figure. The lines are confusing and the message does not become clear. How do you justify a steep increase in the confidence when following the light-green or the blue curve? Showing such clear, distinct lines without proper base data is dangerous. (Joachim Rock, Johann Heinrich von Thuenen-Institute, Federal Research Institute for Rural Areas, Forestry and Fisheries)	this figure has been omitted from the SOD
947	53845	18	86	0	0	0	It would be helpful to have a sense of how much climate change contributed to the trend (e.g. what is the importance of other drivers and how to these other drivers interact with climate change?). (Kristie L. Ebi, IPCC WGII TSU)	For all of the entries in the plot, attribution is for a major contribution of climate change.
948	53970	18	86	0	0	0	Figure 18-4: Visually speaking, having too many colors and shapes/symbols makes figures harder to read. Because human eyes have evolved naturally to recognize patterns, it would be most effective to communicate if the same colors or shapes are being used to represent something specific in common. It is also important that such grouping/patterns are labeled clearly in the legend to guide readers. If grouping is not feasible, author teams could consider using numbers as an alternative instead of using symbols. Use of numbers instead of relying on many different colors may also help color-blind readers who would have difficulties telling apart certain groups of colors. (Yuka Estrada, IPCC WGII TSU)	the current version of the figure has taken these concerns into account, by using shapes for categories, and numbers as identifiers for certain processes within those categories. Colours are not used any more. However, design may change for final draft.
949	54329	18	87	0	0	0	Figure 18-5: Please specify the region for which temperature is displayed in the bottom panel here. (Michael Mastrandrea, IPCC WGII TSU)	This figure has been removed
950	41907	18	88	0	0	0	Legend of Figure 17-7 : reason for concern (t should be removed) (Nathalie BREDA, INRA)	refers to Fig 18-7, suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
951	42168	18	88	0	0	0	The word 'Concern' may be replaced with the word 'Concern' in the caption of the Figure 18-7 (Naeem Manzoor, Global Change Impact Studies Centre (GCISC))	suggested edit has been accepted and incorporated, but actual language may have been lost during further editing
952	51064	18	88	0	0	0	Figure 18-7. For an unfamiliar reader, it would be beneficial to indicate in the figure caption how the color scheme (white to red) should be interpreted. (Katharine Mach, IPCC WGII TSU)	This figure has been removed as it is covered in Ch19.
953	53846	18	88	0	0	0	These figures are not needed. (Kristie L. Ebi, IPCC WGII TSU)	Figure 18-7 has been removed from SOD
954	53971	18	88	0	0	0	Figure 18-7: The visibility of this figure should be improved. Even if figures from other sources are used, a legend and an explanatory caption should be provided. (Yuka Estrada, IPCC WGII TSU)	This figure has been removed as it is covered in Ch19.

#	ID	Ch	From Page	From Line	To Page	To Line	Comment	Response
955	51065	18	89	0	0	0	Figure 18-8. In the figure caption where the author team is referring to "trends in relevant climate variables," presumably climate change is intended--rather than both climate variability and climate change--which it would be helpful to clarify. Within the figure caption, it would also be helpful to explain that positioning within a box has no intrinsic meaning (no subdivisions within boxes). Clarifications of these forms would be beneficial also for the figure legends for figures 18-9 through 18-12. (Katharine Mach, IPCC WGII TSU)	Thanks, we have heavily revised the captions for these figures with this comment in mind.
956	54330	18	89	0	0	0	Figure 18-8: This culminating figure is both ambitious and very interesting. I have a few comments related to the content and presentation. First, visually, the solid symbols stand out more, and it may be appropriate to make those indicative of attribution to anthropogenic climate change rather than the reverse. Second, since the position within each box does not have meaning, all boxes should have a uniform position in the box center, unless they are crossing borders. Right now, there is unexplained variation. Third, where it is appropriate, it would be helpful to cite the relevant section(s) of chapter 18 where specific entries are discussed if this can be done compactly in the legend. Finally, it would be useful to explain in the caption the reasons for including changes in global temperature, sea level, and cryosphere from Working Group 1, as these are not directly impacts on natural and managed systems. (Michael Mastrandrea, IPCC WGII TSU)	Thanks, this and other figures have been highly modified following these suggestions. The references are contained in the associated tables, as we now indicate in the captions.
957	53972	18	89	0	93	0	Figure 18-8 to Figure 18-12: As mentioned in comment for Figure 18-4, it would be helpful for readers to have some sort of organizations or grouping. Because these figures are intended to be standardized across chapters, some consistency and/or basic rules on key features of color, layout, or markers would be helpful for readers. For instance, the following are some questions that may help to think about creating basic rules. A) Rectangles in Figure 18-9 are wider than those in Figure 18-8. Does this imply that the confidence in detection of those depicted in Figure 18-9 is more variable? Aren't these just qualitative assessments? B) Is it possible to always use open symbols to denote attribution with respect to anthropogenic emissions, while solid symbols denote attribution with respect to observed trends in relevant climate variables? Or use certain shape for certain categories? I see that squares are used for impacts on human systems in Figure 18-11 but circles are used for impacts of extreme weather events in Figure 18-10 and impacts on major systems in Figure 4-8. C) There are three markers in the medium-medium cell of the top panel of Figure 18-11. Is it ok to interpret that SADC has a higher confidence in detection than ECOWAS or species range shift? (Yuka Estrada, IPCC WGII TSU)	Thanks, this and other figures have been highly modified following these suggestions.
958	41908	18	90	0	0	0	Figure 18-9: From my opinion, endemic high alpine plants would better have a lower degree of confidence in attribution (see also my comment page 33 lines 22-28) (Nathalie BRED, INRA)	Thanks. We have removed this entry in the highly revised figure.
959	41909	18	91	0	0	0	Figure 18-10: drought and heat wave should be added (an associated risks of fire, especially for forest impacts) (Nathalie BRED, INRA)	In the pair of figures now arising from this figure, we include dry spells on the climate side. On the impacts side we only included Arctic drought, in part because of the geographic and climatological complexity of the relationship between climate and drought. We have not found much literature linking wildfire to weather extremes, and inasmuch as it exists it is similarly geographically and climatologically complex. Both drought and wildfire are included in the regional contexts of Table 18-7 and Figure 18-6.
960	49153	18	91	0	0	0	Figure 18-10: Please be sure to include also heatwaves and droughts in Figure 18-10 (Oyvind Christophersen, Climate and Pollution Agency)	see comment 959
961	53847	18	91	0	0	0	Please ensure consistency with WGI. (Kristie L. Ebi, IPCC WGII TSU)	We have modified assessments, where appropriate, following conclusions of SREX and WGI AR5 Ch10.
962	54323	18	91	0	0	0	Figure 18-10: The caption here should make it clear that this is about detection and attribution of changes in extreme weather events and their impacts. (Michael Mastrandrea, IPCC WGII TSU)	We now ensure this in the successor to this figure.
963	41910	18	92	0	0	0	Figure 18-11 Europe : From my opinion, distribution of ticks would better have a lower degree of confidence in attribution (see also my comment page 33 line 48) (Nathalie BRED, INRA)	Thanks. We have removed this entry in the highly revised figure.