

## Collated International Comments on IPCC 4AR WGI Summary for Policymakers

SPM-1	A	0:0	0:0	Normalisation des projections climatiques: Les projets AMIP (projets d'inter comparaison de modèles atmosphériques) et CMIP (projets d'inter comparaison de modèles couplés océan-atmosphère) ont permis de standardiser les facteurs de forcing radiatif des modèles ainsi que le mode de présentation de leurs résultats. Ce qui a entraîné une meilleure fiabilité en matière de comparaison et analyse des modèles. Cependant, ces projets d'inter comparaison restent insuffisants pour affiner les projections climatiques à différents horizons (2020, 2025, 2030, 2035...), qui restent tributaires du développement des capacités et puissance des moyens de calcul. [Govt. of Algeria (Reviewer's comment ID #: 2001-1)]
SPM-2	A	0:0	0:0	Analyse des résultats des projections climatiques -Sur nos régions: Le réchauffement climatique actuel et en cours, augmente la variabilité spatiale des précipitations, contribuant ainsi à la réduction et la modification des répartitions des pluies dans les zones subtropicales (zones arides et semi arides, désertiques et sahéliennes), et une augmentation dans les zones de hautes latitudes (Les pays nordiques, Alaska, Sibérie...) et une partie des zones tropicales. L'expansion vers le nord des hautes pressions subtropicales, combinée à la tendance générale de la diminution des précipitations subtropicales, confirme de façon évidente des pluies aux limites subtropicales caractérisant l'Afrique du Nord. Les projections régionales de réductions de précipitations, prévues au 21 <sup>e</sup> nord. des zones agro climatiques. dues à l'augmentation de température notamment en Afrique. Aussi un effort important est souhaitable à fin de délimiter ces zones transition climatiques. [Govt. of Algeria (Reviewer's comment ID #: 2001-2)]
SPM-3	A	0:0	0:0	Perspectives pour le Maghreb -Modèle régional: Le Maghreb, par lui-même, constitue une zone de transition climatique et à ce titre, ferait l'objet d'une préoccupation mondiale et régionale pour évaluer quantitativement, l'impact du changement climatique. Compte tenu de l'aggravation et de la vulnérabilité des ressources naturelles (eau, agriculture, énergie et écosystème), il s'avère nécessaire développer un modèle régional propre au Maghreb, pour les besoins des plans de développements économiques et sectoriel de planification stratégique. La développement devra impliquer la communauté scientifique Maghrébine celle des pays limitrophes de la Méditerranée [Govt. of Algeria (Reviewer's comment ID #: 2001-3)]
SPM-4	A	0:0	0:0	Perspectives pour le Maghreb -Réseaux d'observation: Les réseaux d'observations devront être renforcés, particulièrement le réseau d'observation marine et l'observation par satellite, incluant la surveillance de biomasse particulièrement en Afrique, pour valider les tendances en matière projection climatique. [Govt. of Algeria (Reviewer's comment ID #: 2001-4)]
SPM-5	A	0:0	0:0	The structure and content of the SPM is generally user-friendly, however, there are a number of important messages contained in the body of the report that are either not reported in the SPM or are not given due prominence. Firstly, the advances in the detection of climate change since the TAR and the improvements in observations showing that the globe is warming, are crucial for policy makers and should be given greater prominence. Secondly, the section on the stabilisation of emissions and subsequent effects on the climate needs to be more clearly explained. Thirdly, the SPM remains very weak in its treatment of possible "abrupt climate change" and the role of feedbacks in the climate system. The treatment of this subject in Box 10.1 provides some important analysis of the potential risks of climate change "known unknowns" that are very important for policy makers and need a place in the SPM (possibly a new bolded heading). [Govt. of Australia (Reviewer's comment ID #: 2002-1)]
SPM-6	A	0:0	0:0	The SPM/TS/chapters of the AR4 seem to have a critical omission compared to the TAR. In the TAR WGI policymakers were provided with information relating to the future time points at which global emissions would have to peak/drop below 1990 levels/ decrease to a small fraction to achieve various CO2 concentrations outcomes. Relevant parts of the TAR include: Synthesis Report Question 6 and Working Group I Technical Summary Section F.10 (including Fig 25). We consider this is a very important line of information for policymakers. Consequently, we believe the topic should be covered in the AR4 SPM

				preferably on the basis of any more recent modelling; but otherwise recovering the ground presented in the TAR. This scientific topic is important because it sheds light on the timing of and scale required in global emissions reductions to achieve various stabilisation levels. We made this comment concerning the First Order Draft [Govt. of Australia (Reviewer's comment ID #: 2002-2)]	
SPM-7	A	0:0	0:0	A number of technical terms are used in the SPM that are not defined in the SPM but are found in the glossary. The authors should ensure consistent usage of each term (e.g "feedback" is used in the SPM, whereas "climate feedback" is defined in the glossary). [Govt. of Australia (Reviewer's comment ID #: 2002-3)]	
SPM-8	A	0:0	0:0	Throughout the SPM the A1B and B1 SRES scenarios are used much more frequently in an illustrative context than the other SRES storylines. While the authors specifically state that all SRES scenarios should be considered equally sound, the preponderant use of only 2 scenario families could be seen as an implicit endorsement of these above the other scenarios. The authors, therefore, need to provide an explanation (in a footnote) as to why these scenarios are more often used. [Govt. of Australia (Reviewer's comment ID #: 2002-4)]	
SPM-9	A	0:0	0:0	Throughout the SPM both "natural" and "unforced" variability seem to be used almost interchangeably. For a policy reader this distinction may be unnecessary and confuse the main story in the SPM. Suggest that the authors review the SPM to determine if it is necessary to maintain the differentiation between the two terms in the SPM. If they find it is necessary clear definitions should be included for each term. [Govt. of Australia (Reviewer's comment ID #: 2002-5)]	
SPM-10	A	0:0	0:0	The WGI SPM is shaping up well, and we were pleased with a number of revisions that have been made to improve its clarity. The following suggestions may further improve clarity for the intended audience. We note that a number of these improvements were raised by a large number of countries in the previous round of the review. [Govt. of Canada (Reviewer's comment ID #: 2004-1)]	
SPM-11	A	0:0	0:0	In general, we are concerned that some of the language is overly technical and written in a style that will be difficult for most policy makers to understand. The use of more descriptive language (such as that found in the FAQs at the end of the technical chapters) and greater clarity with respect to reference points (ie. timescales) may improve the SPM. We have provided specific comments on this below. [Govt. of Canada (Reviewer's comment ID #: 2004-2)]	
SPM-12	A	0:0	0:0	To improve clarity it should be stated clearly how the new findings relate to or represent developments from the TAR. While understanding the desire to keep the SPM short, it would be very useful to have an introductory summary that explains why this report is an advance from the TAR (see TS page 3, lines 3-8). We also provide comments in sections below where this needs to be made more clear. [Govt. of Canada (Reviewer's comment ID #: 2004-3)]	
SPM-13	A	0:0	0:0	The flow would be improved by placing the sections on observations (direct and paleo) ahead of those on drivers/causes. [Govt. of Canada (Reviewer's comment ID #: 2004-4)]	
SPM-14	A	0:0	0:0	Coverage of regional issues is unnecessarily vague. We have provided some specific comments below. [Govt. of Canada (Reviewer's comment ID #: 2004-5)]	
SPM-15	A	0:0	0:0	The SPM could be enhanced by figures that more clearly convey key messages. We have provided specific comments on this below. [Govt. of Canada (Reviewer's comment ID #: 2004-6)]	
SPM-16	A	0:0	0:0	The shaded boxes that introduce each section are not consistent in terms of content. These boxes should set the stage for the results which follow and should achieve this by doing two things: 1) describing the type of data on which the conclusions presented next are based, 2) describing major science advances since the TAR (i.e. how has the database been strengthened?). We provide specific comments below. [Govt. of Canada (Reviewer's comment ID #: 2004-7)]	
SPM-17	A	0:0	0:0	An important communication tool missing from this SPM is a figure demonstrating the connections between forcing scenario, atmospheric concentrations and projected climatic changes to 2100 and beyond, including stabilization scenarios. Suggest adding a figure similar to Figure 5 on page 14 of the TAR SPM. [Govt. of Canada (Reviewer's comment ID #: 2004-8)]	

SPM-18	A	0:0	0:0	It is a very good summary, so congratulations to the authors for their work [Govt. of Chile (Reviewer's comment ID #: 2005-1)]
SPM-19	A	0:0	0:0	There is no mention in the text about mechanisms like the PDO (Pacific Decadal Oscillation), ENSO (EL Niño Southern Oscillation) or other like Annular Modes (Arctic and Antarctic), and their relation with climate change, or whether they have or not any role [Govt. of Chile (Reviewer's comment ID #: 2005-2)]
SPM-20	A	0:0	0:0	Legend in figures such as Figure SPM-1 should be made less blurry in the final version [Govt. of Chile (Reviewer's comment ID #: 2005-3)]
SPM-21	A	0:0	0:0	Basically speaking, Chinese government is satisfied with the current version of SPM. [Govt. of China (Reviewer's comment ID #: 2006-1)]
SPM-22	A	0:0	0:0	General comment: 1) The Summary for Policy Makers should summarize the policy-relevant information of the report and should reflect the full picture of observed results and model results. Wording only referring to model results can give a biased message when conflicting results from observation are not mentioned: see specific comments Nr. 20 and 28. General comment: 2) For the section "Projections of future climate change" policy-relevance means that information is given on the potential outcomes of different policy-choices. The basic aim of policy-relevance is therefore not fully achieved, if there is no indication of how emissions under the different scenarios actually differ. General comment: 3) This lack of analysis on realistic multi-gas mitigation scenarios is a serious limitation of the whole IPCC WG1 Chapter 10. This limitation should to be flagged in the SPM as otherwise the readers could believe that the shown future climate system evolutions roughly span possible futures, while in fact mitigation scenarios are completely neglected. The brief explanation of the non-mitigation nature of SRES scenarios in the current SRES box (SPM-14, line 53-55) does not serve this purpose as this key assumption underlying all projections needs to be highlighted at the beginning of the section "Projections of future changes in Climate". [Govt. of European Community (Reviewer's comment ID #: 2008-1)]
SPM-23	A	0:0	0:0	It would be good to get more figures in the SPM, e.g. -tropical cyclones (like Fig. 3.40, but annual numbers instead of energy index) -permafrost (Fig. 4.20 or similar) It would also be useful to get a figure like 10.4 to illustrate better the temperature course of various scenarios in time (it may be that such a figure is planned for the Synthesis Report like in TAR, but anyhow...) [Govt. of Finland (Reviewer's comment ID #: 2009-1)]
SPM-24	A	0:0	0:0	West Antarctica Ice Sheet (WAIS) risk of instability: The SPM should to state an assessment of the risk of instability in relation to the WAIS, as this is highly relevant for policymakers. In the TAR it was said: "Concerns have been expressed about the stability of the West Antarctic ice sheet because it is grounded below sea level. However, loss of grounded ice leading to substantial sea level rise from this source is now widely agreed to be very unlikely during the 21st century, although its dynamics are still inadequately understood, especially for projections on longer time-scales." Since the TAR an accelerating loss of grounded ice has been observed, at present rates, which if maintained would result in about 0.04 m SLR by 2100, which is a significant fraction (10-20%) of the projected total SLR under the SRES scenarios here presented. More importantly, the mechanisms of this loss appear consistent with proposed instability theories and appear related to Deep Ocean warming. WAIS instability: Is it still "very unlikely" that there would be substantial sea level rise from WAIS in the 21st century? How has the scientific assessment of this risk changed given all relevant observations reported in Chapters 4, 5, 9 and 10, the continental ice sheet model deficiencies discussed in Chapter 8, 9 and 10 and the modelling of the individual ice streams report in Chapter 9? There are several significant new developments since the TAR. The fast dynamic response of ice shelves to warming and the acceleration of tributary glaciers and ice streams after ice shelf disintegrations (4.8 and 4.6.3.3) has raised again the possibility of larger dynamical changes in the future than are projected by state-of-the-art continental models (10.6.4.2) WAIS instability: A small but significant and accelerating loss of grounded ice is presently occurring from the Amundsen Sea Embayment of the West Antarctic possibly linked to Deep Ocean warming (4.6.3.3 and 10-62 lines 17-23). Recent work on subglacial bed topography underlying this region indicates potential instabilities in two of the main discharge ice streams (1062 lines 17-23 . If melted, ice in this region would raise sea level by 1.5m in coming centuries (10-71 line 39). Mean summer temperatures over the major West Antarctic ice shelves are about as likely as not to pass melting point if global warming exceeds 5°C, and disintegration might be

				initiated earlier by surface melting (Chapter 10-71 lines 43-56), which would have adverse implications for the mass balance of this ice sheet. Oceanic warming of ~1°C under the major ice shelves would eliminate them within centuries. (Chapter 10-71 lines 43-56). (continuation comments combined by TSU) [Govt. of Germany (Reviewer's comment ID #: 2011-1)]	
SPM-25	A	0:0	0:0	I am substantially happy with this draft. I would only suggest to add at least one more figure to support the main statement in the "Paleoclimatic Perspective" section. [Govt. of Italy (Reviewer's comment ID #: 2012-28)]	
SPM-26	A	0:0	0:0	Science (24 March 2006) and Nature (21 September 2006) both published articles regarding recent satellite images showing the most up-to-date ice melt data in Antarctica and Greenland. These important findings could have a potentially strong impact on the research published up until now and therefore they should be commented on in the SPM. [Govt. of Japan (Reviewer's comment ID #: 2013-1)]	
SPM-27	A	0:0	0:	We thank the WG1 TSU and authors on the production of the Final Draft for the AR4. The report and its Summary for Policy Makers will be an important document in guiding future action. To maximise the value of the report it will be important that the SPM is as accessible as possible to policy makers and it is in this spirit that we offer the following comments. [Govt. of New Zealand (Reviewer's comment ID #: 2015-1)]	
SPM-28	A	0:0	0:0	After reading the SPM we have learned that the gray text box at the beginning of each chapter contains scientific background information for the text that follows, however for the first time reader this might be interpreted as some kind of conclusion. To enhance readability, we propose that the presentation of this information is redesigned in the final version, possibly by making the text smaller. [Govt. of Norway (Reviewer's comment ID #: 2016-1)]	
SPM-29	A	0:0	0:0	Since radiative forcing possibly will be an unknown concept to most readers, we think that readability in many cases might be enhanced by explaining changes over time by more commonly known parameters such as emissions, concentrations and temperatures. In our view the concept of radiative forcing is most easily understood when it is used to explain the relative "strength" of the different greenhouse gases. [Govt. of Norway (Reviewer's comment ID #: 2016-2)]	
SPM-30	A	0:0	0:0	The science of climate change is complicated, and we fully understand the difficulty involved in writing a summary for policymakers. As the SPM stands, the reader must have a considerable background in climate research to understand all the details. A layman will probably just be able to understand the main statements marked in bold. It is thus vital that statements in bold tell the main story in a simple way. [Govt. of Norway (Reviewer's comment ID #: 2016-3)]	
SPM-31	A	0:0	0:0	The report is well written and coherent, and provides adequate references to the relevant chapters of the main report. A commendable feature of the SPM is that it clearly shows the range of errors / confidence limits for various figures. [Govt. of Pakistan (Reviewer's comment ID #: 2017-1)]	
SPM-32	A	0:0	0:0	It is supposed, that there is a group of readers "Policymakers" which will read the only this Summary, therefore SPM should be "closed statement", completely clear with no references to other sections of the Report. [Govt. of Russian Federation (Reviewer's comment ID #: 2018-1)]	
SPM-33	A	0:0	0:0	The format of the document is essentially changed in comparison with AR3 SPM. The cartographical projections, periods investigated, likelihood levels are changed, is frequent without visible reasons and advantages. It is inexpedient and does not facilitate problem to Policymakers as it is not always precisely underlined, what conclusions in AR4 are new in comparison with AR3 and what are cancelled. [Govt. of Russian Federation (Reviewer's comment ID #: 2018-2)]	

SPM-34	A	0:0	0:0	Likelihood levels (a footnote 5) are unsuccessful, as, first, they change terms used in AR3 and accustomed for experts. Secondly, the new scale does not include an interval 10-50 % chance. So, it is proposed to specify in footnote 5, that the scale concerns to subjective judgment of experts rather than objective frequencies from tests. Therefore it is reasonable to be limited to not more than five categories from used in AR3, for example: Very likely (greater than 90% chance), Likely (66-90% chance), Medium likelihood (33-66% chance), Unlikely (10-33 % chance), Very unlikely (less than 10% chance) or even to three ones: Unlikely (less than 33 % chance), Medium likelihood (33-67% chance), Probably (more than 67 % chance. In the last case levels “low-med-high” will be quite enough (as it is made in LOSU assessments on FIGURE SPM-2). [Govt. of Russian Federation (Reviewer’s comment ID #: 2018-3)]
SPM-35	A	0:0	0:0	Uncertainty ranges within square brackets is a somewhat misleading choice. In some instance it can be interpreted as trends, We would prefer another way of denoting uncertainty ranges. If the range is symmetric around a central value, use the standard $\pm$ symbol. In the case of asymmetric uncertainties, give separate values for + and – range. [Govt. of Sweden (Reviewer’s comment ID #: 2019-1)]
SPM-36	A	0:0	0:0	Overall we believe that the SPM is well balanced and easy to read. [Govt. of Sweden (Reviewer’s comment ID #: 2019-28)]
SPM-37	A	0:0	0:0	We would recommend to more emphasize rapid changes and positive feedbacks (until now only very short on page 13). These topics are crucial for risk management. One of the very important new findings is the experimental evidence for the positive water vapor feedback (shown in relation to the Pinatubo explosion, Soden et al. 2002), especially because for a long time there have been theories of negative feedback (e.g. Lindzen). “Small causes – large impact” should be a main message. There are excellent examples from the paleo perspective (the most recent example are the Holocene vegetation changes in the Sahel region). [Govt. of Switzerland (Reviewer’s comment ID #: 2020-1)]
SPM-38	A	0:0	0:0	We also recommend to more emphasize the importance of the hydrological cycle (and after all the water resources). Although the data is less certain, the impact is much more important than that of temperature. [Govt. of Switzerland (Reviewer’s comment ID #: 2020-2)]
SPM-39	A	0:0	0:0	It is very useful to have in page 14 the box with the explanation of the main features of the SRES scenarios referred to in the SPM [Govt. of Switzerland (Reviewer’s comment ID #: 2020-3)]
SPM-40	A	0:0	0:0	We would like to thank WG1 for a much improved final draft report and are impressed by the level of new work. [Govt. of United Kingdom (Reviewer’s comment ID #: 2022-1)]
SPM-41	A	0:0	0:0	The report sets out a very useful summary of the science position in key areas and is an excellent factual resource. The text is concise which aids readability for an expert audience. However, the overall narrative is not strong in terms of serving as a communication tool to target at those policy makers less familiar with the detail. [Govt. of United Kingdom (Reviewer’s comment ID #: 2022-2)]
SPM-42	A	0:0	0:0	We would like to make a number of general suggestions regarding presentation and structure of the SPM, which we think would make it much more accessible to a non-technical audience and bring out some of the key conclusions which we find are rather buried in the SPM. [Govt. of United Kingdom (Reviewer’s comment ID #: 2022-3)]
SPM-43	A	0:0	0:0	We are concerned that the language is very technical and difficult for a non expert audience to understand. Parts of the document come across as a supplement or extension of the Technical Summary, rather than an independent document for the intended audience. Also, we are concerned at the lack of clear statements on confidence in present levels of understanding. It is not clear whether the developments of climate change science have been significant since the publication of the Third Assessment report and what these developments are. [Govt. of United Kingdom (Reviewer’s comment ID #: 2022-4)]

SPM-44	A	0:0	0:0	We feel that it would be helpful to introduce a narrative section at the start of the report highlighting the main developments, emphasising that the science has moved on since TAR, and that there is unequivocal evidence that climate change is happening and is due primarily to human activities. Suggested text for this section is reported below (cells n.9 to 12) and also enclosed a separate document. (TSU note: please see comment for SPM 1:1 -1:10) [Govt. of United Kingdom (Reviewer's comment ID #: 2022-5)]
SPM-45	A	0:0	0:0	The key messages of the SPM could be clarified further by introducing some figures of the TS in the SPM. We have made some specific comments on the sections below. Also, the messages conveyed in the SPM do not always reflect the severity and gravity expressed in the Technical Summary. This is particularly true in the case of snow cover and ice caps, for example the SPM talks about decreases in glaciers and ice caps, whereas the TS talks about "widespread mass loss". This should be addressed in the SPM, as the scope of the SPM is to convey not only the magnitude of the changes but also the URGENCY. [Govt. of United Kingdom (Reviewer's comment ID #: 2022-6)]
SPM-46	A	0:0	0:0	We feel that the connections between greenhouse gas emissions, atmospheric concentrations and global climate is not sufficiently emphasised in the SPM. This is a key point to convey to policy makers and could be made clear by introducing a figure showing the links between socio-economic scenarios, emissions, GHG atmospheric concentrations, forcings and projected climate change, as in the TAR. [Govt. of United Kingdom (Reviewer's comment ID #: 2022-7)]
SPM-47	A	0:0	0:0	In addition to the defined likely, very likely etc. expert-derived probabilistic statements, there are also statements (in bold) of the form "very high confidence", "higher confidence" and "increased confidence". It seems that these are in no way equivalent, in a mathematical sense, to the likelihood statements but perhaps this should be made clear, or at least commented upon. [Govt. of United Kingdom (Reviewer's comment ID #: 2022-8)]
SPM-48	A	0:0	0:0	Consider creating a box/intro that states what is "New since the TAR" as a précis to the SPM. [Govt. of United States of America (Reviewer's comment ID #: 2023-1)]
SPM-908	B	0:0	0:0	The WGI SPM is well presented and concise. It provides a well founded overview of the assessment of the bibliography published after TAR. The Table SPM-1 presents a clear description of the recent climate and extreme events' trend with the corresponding likelihood of discernible human influence. These conclusions are important for the WGII and WGIII assessments. However, it should be mentioned that the SPM is written in a too much scientific language and that the figures, although clear for the specialists would rise some difficulties for the decision makers'. direct understanding. In this regard, the axis labeling, in figure SPM-1 is poor and the legends are not good enough. Finally, it looks as inconvenient to introduce new acronyms, like LOSU, when the plain language would suffice. [Govt. of Argentina (Reviewer's comment ID #: 2024-1)]
SPM-909	B	0:0	0:0	A new Page SPM-15. It is definitely wrong no to mention the critical lack of basic information from some regions of the world. Science is not developed only with mathematical models, either to obtain relative surface data from satellite observations or to project climate variables. Basic geophysical data are necessary to support and verify model's results. Developing countries, making the larger portion of the world territories should also contribute with their data. In this regard, decision making should be briefed on the fact that the implementation of GCOS as well as other observation networks will improve the reach of the science of climate. More and better data and monitoring will permit a better understanding of present climate and, hence, an improving in the outlook of future climate conditions. This must be expelled out in a special section of this SPM. [Govt. of Argentina (Reviewer's comment ID #: 2024-11)]
SPM-910	B	0:0	0:0	The SPM has been further improved, building on the already well structured earlier drafts and still has a reasonable length. My sincere congratulations. [Govt. of Austria (Reviewer's comment ID #: 2025-1)]

SPM-49	A	1:0	1:	There should be a footnote to clarify a possible confusion between volume and mass mixing ratios (e.g., ppmv versus ppm), and meaning of adopted ppX. [Govt. of Belgium (Reviewer's comment ID #: 2003-4)]
SPM-50	A	1:0	1:	Footnote Nr. 5: Despite the adoption of these likelihoods, this SPM contains too many statements, which do not comply with this scale; e.g.: Page 3, L2 "...very high confidence..."; "LOSU" in last column of Figure SPM-2; "...assessed uncertainty interval..." in L30 of P. 4; "...there is high confidence..." L30 of P.5; etc. If there is a scale for "confidence", it should be explained. [Govt. of Belgium (Reviewer's comment ID #: 2003-5)]
SPM-51	A	1:0	1:	footnote 5-include other likelihood terms for completeness and to avoid possible confusion. [Govt. of Canada (Reviewer's comment ID #: 2004-13)]
SPM-52	A	1:0	1:	Footnote 2: "the influence a factor has" -> "the influence that a factor has". [Govt. of Finland (Reviewer's comment ID #: 2009-3)]
SPM-53	A	1:0	1:	In footnote 2, we propose to add at the beginning " Radiative forcing is precisely defined in chapter 2.2, it is a measure ..." [Govt. of France (Reviewer's comment ID #: 2010-4)]
SPM-54	A	1:1	1:10	We propose an expanded intro to serve as a pointer to the summary details. The text suggested in cells n.9 to 12 could be placed on page 1 line 7: The report shows that global temperatures continue to rise and that there has been an acceleration in the rate of changes observed in the last few decades for a number of climate variables and sea level rise. Since the TAR, progress in our understanding of anthropogenic influences on climate and how the current climate is changing in space and in time has been gained through improvements of datasets, broader geographical coverage, better understanding of uncertainties, and a wider variety of measurements. The report provides indisputable evidence that human activities are responsible for the bulk of the warming of the climate since 1750. The report also shows that discernible human influences now extend on continental-average temperatures, atmospheric circulation patterns, and some types of extremes. There is now some evidence that heat waves, extreme rainfalls and the intensity of tropical cyclones are related to increasing greenhouse gas concentrations. A larger number of climate model simulations were available for this report compared to previous IPCC assessments. These indicate that by 2030 temperature will increase by a further half degree relative to the present day. By the end of the 21st century temperatures may rise by between 1.0 and 6.3°C depending on emission scenarios and model uncertainty. The actual warming will be significantly affected by the emissions of greenhouse gases that occur. Such warming will increase the frequency of heat waves and heavy precipitation events, affect storminess and reduce snow and ice cover. (continuation comments combined by TSU) [Govt. of United Kingdom (Reviewer's comment ID #: 2022-9)]
SPM-55	A	1:3	1:5	This opening sentence is awkward and long. The phrase "processes and attribution" is an unusual pairing of terms given the more common "Detection and Attribution". Suggest instead "The WG1 contribution to the IPCC Fourth Assessment report describes current scientific understanding of the dominant causes of climate change, of observed climate change and attribution thereof, and of climate processes. A range of estimates for projected future climate are also presented. The report builds upon...." [Govt. of Canada (Reviewer's comment ID #: 2004-9)]
SPM-56	A	1:4	1:5	Suggest changing "dominant causes" to "driving factors" in order to avoid the confusion with "attribution". [Govt. of China (Reviewer's comment ID #: 2006-2)]
SPM-57	A	1:4	1:4	"..the dominant causes of climate change, observed climate change,..": I find this sentence confusing. Should this read instead "..the dominant causes of observed climate change.."? [Govt. of Italy (Reviewer's comment ID #: 2012-8)]
SPM-58	A	1:4	1:4	Footnote 5 on likelihoods: Add: "These percentages are based on the authors' collective, subjective expert judgement of observations and model results" [Govt. of Netherlands (Reviewer's comment ID #: 2014-2)]

SPM-59	A	1:4	1:5	Delete “and attribution” because the sentence already mentions “dominant causes of climate change” which is essentially the same thing, and “attribution” is jargon. [Govt. of United States of America (Reviewer’s comment ID #: 2023-2)]
SPM-60	A	1:5	1:5	Either capitalize "assessments" or change to "Assessment Reports" to indicate that previous IPCC Assessment Reports are what are being referred to here. [Govt. of Japan (Reviewer’s comment ID #: 2013-2)]
SPM-61	A	1:5	1:6	Write : "It builds upon previous work of the IPCC and assess new results from the past six years of research and modelling." [Govt. of Switzerland (Reviewer’s comment ID #: 2020-4)]
SPM-62	A	1:5	1:6	Delete last sentence of the first paragraph (“It builds ... research.”) and insert the first two paragraphs of the Technical Summary (TS-3, lines 3-17) as a more substantive introduction. Major points need to be on the first page, so highlight that “likely” (TAR) has evolved to “very likely” (AR4) regarding attribution to human activities. Include the headline (SPM-8, lines 23-24): “It is very likely that anthropogenic greenhouse gas increases caused most of the observed increase in globally averaged temperatures since the mid-20th century” to the end of the first inserted TS paragraph. This increased confidence is the bottom line. Suggested inserted text follows: “In the last 6 years since the IPCC’s Third Assessment Report (TAR), significant progress has been made in understanding past and recent climate change and in projecting future changes. These advances have arisen from large amounts of new data, more sophisticated analyses of data, improvements in the understanding and simulation of physical processes in climate models, and more extensive exploration of uncertainty ranges in model results. The increased confidence in climate science provided by these developments is evident in this Working Group I contribution to the IPCC’s Fourth Assessment Report. This report finds that, “It is very likely that anthropogenic greenhouse gas increases caused most of the observed increase in globally averaged temperatures since the mid-20th century.” While this report provides new and important policy-relevant information on the scientific understanding of climate change, the complexity of the climate system and the multiple interactions that determine its behaviour impose limitations on our ability to understand fully the future course of Earth’s global climate. There is still an incomplete physical understanding of many components of the climate system and their role in climate change. Key uncertainties include aspects of the roles played by clouds, the cryosphere, the oceans, land-use, and couplings between climate and biogeochemical cycles. The areas of science covered in this report continue to undergo rapid progress and it should be recognized that the present assessment reflects scientific understanding based on the peer-reviewed literature available in mid-2006.” [Govt. of United States of America (Reviewer’s comment ID #: 2023-95)]
SPM-63	A	1:6	1:6	It would be useful if the authors could provide in a footnote the cut-off date for the inclusion of research in the WG1 report. [Govt. of Australia (Reviewer’s comment ID #: 2002-6)]
SPM-64	A	1:6	1:6	Add a third sentence to the paragraph: "Significant progress has been made in understanding past and recent climate change and in projecting future changes". (This text is sourced from the TS page 3 lines 3-4). [Govt. of Australia (Reviewer’s comment ID #: 2002-7)]
SPM-65	A	1:6	1:6	Replace “results” by “findings”, the latter having a broader meaning than the former. [Govt. of Belgium (Reviewer’s comment ID #: 2003-1)]
SPM-66	A	1:12	1:12	Change the title of the section in : "Observed changes in natural and human drivers of climate". Rationale : the section describes observed changes in the drivers. Reversing the order of "human" nad "natural" is also necessary [Govt. of Switzerland (Reviewer’s comment ID #: 2020-5)]
SPM-67	A	1:12	4:5	On the basis of the title, a policymaker may wait for a wider scientific discussion about natural drivers of (past) climate changes, frequently referred to in THE mass media (natural methane sources, sunspots, little ice age, medieval warm period, etc.). [Govt. of Finland (Reviewer’s comment ID #: 2009-2)]

SPM-68	A	1:12	4:5	Section: Human and natural drivers of climate change -It would be helpful to include a detailed breakdown of emissions, e.g. pie chart showing sectors and/or greenhouse gases (measured in global warming potential). · Policy makers do not need to know the detail of radiative forcing, e.g. figure SPM-2. It would be more effective to present a simpler chart similar in style to TAR diagram -this section should emphasise that our understanding of radiative forcing has improved since TAR and explain how. [Govt. of United Kingdom (Reviewer's comment ID #: 2022-10)]
SPM-69	A	1:13	1:19	This box describing radiative forcing is misplaced. The substantive discussion of RF does not occur until page 3. Suggest that this box is moved to line 1 page 3. [Govt. of Australia (Reviewer's comment ID #: 2002-8)]
SPM-70	A	1:13	1:19	This box should provide a simple explanation that changes in the atmospheric abundance of greenhouse gases affect global climate. [Govt. of Australia (Reviewer's comment ID #: 2002-9)]
SPM-71	A	1:13	1:18	In the first part "human and natural drivers of climate change", there is no summary about the new findings since TAR. Except here, all the other parts have it. Suggest to add a summary of new findings since TAR. [Govt. of China (Reviewer's comment ID #: 2006-3)]
SPM-72	A	1:14	1:18	This shaded box needs improving (see General Comment above). What is needed still is an explanation of how the estimates of RF have been strengthened since the TAR. The definition of RF is not needed in the Box since it is dealt with in Footnote #2. [Govt. of Canada (Reviewer's comment ID #: 2004-10)]
SPM-73	A	1:14	1:18	Readability might be enhanced by including a brief description of the significance of the sign of the radiative forcing (i.e. that a positive sign implies warming). The term might also be better explain with respect to "changes" and natural vs. anthropogenic greenhouse gases. From the definition it is, for example, unclear how the radiative forcing was in pre-industrial times and how it will be in possible future times with elevated but relatively stable concentrations of greenhouse gases. [Govt. of Norway (Reviewer's comment ID #: 2016-4)]
SPM-74	A	1:15	1:15	Replace "affect" with "alter". [Govt. of United States of America (Reviewer's comment ID #: 2023-3)]
SPM-75	A	1:16	1:16	Suggest adding "of the Earth-Atmosphere system" after "energy balance". [Govt. of China (Reviewer's comment ID #: 2006-4)]
SPM-76	A	1:17	1:18	Please, delete "warming and cooling influences on global climate" and insert old text "a range of natural and human factors that drive warming and cooling influences on global climate", as this seems to be a more precise characterisation. [Govt. of Germany (Reviewer's comment ID #: 2011-55)]
SPM-77	A	1:17	1:17	Footnote could simplify "radiative forcing" for this audience by saying in addition "corresponds to heating or cooling effect" [Govt. of United Kingdom (Reviewer's comment ID #: 2022-16)]
SPM-78	A	1:18	1:18	Add:"... climate , and to compare natural and anthropogenic causes of climate change." [Govt. of Switzerland (Reviewer's comment ID #: 2020-6)]
SPM-79	A	1:21	1:22	The first bolded sentence should include nitrous oxide, which is a dot point under this text. Suggest text of this sentence be deleted and replaced with a statement based on that found in Chapter 6 page 11 -"The present atmospheric concentrations of carbon dioxide, methane, and nitrous oxide far exceed pre-industrial values and are higher than those measured in the ice core record of the past 650,000 years." [Govt. of Australia (Reviewer's comment ID #: 2002-10)]
SPM-80	A	1:21	1:24	This bold text should mention that the concentration increases of the cited greenhouse gases are global. [Govt. of Belgium (Reviewer's comment ID #: 2003-2)]
SPM-81	A	1:21	1:24	Nitrous oxide (N <sub>2</sub> O, which is dealt with in the 3rd following bullet –Page 2, L1-3) should be cited in this bold text. [Govt. of Belgium (Reviewer's comment ID #: 2003-3)]
SPM-82	A	1:21	1:22	Please delete " far exceed pre-industrial values determined from ice cores spanning" and insert old text "are the highest experienced for". [Govt. of Germany (Reviewer's comment ID #: 2011-57)]

SPM-83	A	1:21	1:24	Although the current text states to "see Figure SPM-1" when referring to the atmospheric concentrations of carbon dioxide and methane over the last 650,000 years, in order to make this situation as clear as possible to policy makers including Figure TS-1 in the SPM is suggested. In addition to including Figure TS-1 in the SPM, making the following changes prior to inclusion are suggested: 1) including changes in average temperature over the past 650,000 years and 2) adding the predicted values for CO2 concentration and average temperature up to 2100 (and beyond, if possible). [Govt. of Japan (Reviewer's comment ID #: 2013-3)]
SPM-84	A	1:21	1:24	Reference to the dramatic increase in greenhouse gas concentrations since 1750 has been omitted in the current draft (please see p. SPM-1, Lines 32-34 in the previous draft as a reference point). In addition to stating that levels "far-exceed" preindustrial values and explaining the emission sources (fossil fuel use, agriculture, and land-use changes), the dramatic increase in GHG concentrations since 1750 should also be included. The suggested rewrite of this sentence is as follows: "Atmospheric concentrations of carbon dioxide and methane have increased markedly since 1750 and far exceed pre-industrial values determined from ice cores spanning the last 650,000 years." [Govt. of Japan (Reviewer's comment ID #: 2013-5)]
SPM-85	A	1:21	1:21	Consider inclusion of nitrous oxide in the list of gases and probably halocarbons [Govt. of Norway (Reviewer's comment ID #: 2016-50)]
SPM-86	A	1:21	1:21	After "methane" replace rest of sentence with "are at their highest levels in the last 650,000 years and far exceed pre-industrial values." [Govt. of United States of America (Reviewer's comment ID #: 2023-4)]
SPM-87	A	1:22	1:22	The term "concentrations" might be added after "greenhouse gases". [Govt. of France (Reviewer's comment ID #: 2010-1)]
SPM-88	A	1:23	1:24	It would be useful to sequence the principal sources of greenhouse gases in order of their relative contribution to radiative forcing. In that event are 'agriculture' and 'land-use changes' in the correct order? [Govt. of Australia (Reviewer's comment ID #: 2002-11)]
SPM-89	A	1:23	1:24	"land-use changes" should be put before "agriculture" because greenhouse gases emissions associated with land-use change are bigger than that associated with agriculture. [Govt. of China (Reviewer's comment ID #: 2006-5)]
SPM-90	A	1:23	1:23	The phrase "are due primarily to" does not convey the correct sense of an overwhelming human contribution eg is it 51% or 99%? Suggest replace the phrase with "are due almost totally to human activities with". [Govt. of Germany (Reviewer's comment ID #: 2011-2)]
SPM-91	A	1:23	1:23	after "(see Figure SPM-1) insert "is unprecedented in at least the last 20,000 years. They" are due primarily to.... [Govt. of Germany (Reviewer's comment ID #: 2011-58)]
SPM-92	A	1:25	1:25	Please insert the former text: "Observed increase in carbon dioxide, methane, and nitrous oxide, compared to pre-industrial values, and their associated positive radiative forcing (warming effect), are directly linked to fossil fuel use, agriculture, and use change, and other human activities. The concentration of these gases also increased at the end of the last ice age about 17,000 years ago as the planet warmed, but the rates of those changes were much slower than those in the last century. [2.3, 6.4]. [Govt. of Germany (Reviewer's comment ID #: 2011-59)]
SPM-93	A	1:26	1:26	For clarity insert "Due to its abundance and long lifespan in the atmosphere,..." at the start of the sentence to provide readers with some information on why CO2 is the most important GHG. [Govt. of Australia (Reviewer's comment ID #: 2002-12)]
SPM-94	A	1:26	1:26	The first sentence needs clarification: Either change wording to say CO2 is the most abundant GHG, rather than 'most important' OR provide additional information (beyond atmos concentration info) that will justify the statement. [Govt. of Canada (Reviewer's comment ID #: 2004-11)]

SPM-95	A	1:26	1:26	"Carbon dioxide is the most important anthropogenic greenhouse gas." The use of "important" seems awkward here; the intention of "important" is ambiguous. Suggest replacing "important" with: i.e. abundant, prevalent, conspicuous, critical, principal. [Govt. of Japan (Reviewer's comment ID #: 2013-4)]
SPM-96	A	1:26	1:30	We propose adding the percentage increase of CO <sub>2</sub> , to increase readability. Also for methane and nitrous oxide, the increase in per cent should be added. [Govt. of Norway (Reviewer's comment ID #: 2016-41)]
SPM-97	A	1:26	1:29	Include a statement on the record high emission rate and rate of increase in CO <sub>2</sub> abundance. Pull from TS-6, lines 46-48. [Govt. of United States of America (Reviewer's comment ID #: 2023-5)]
SPM-98	A	1:26	2:4	To complete the picture a bullet point on fluorinated gases should be added. This should deal with both Kyoto gases (HFCs, PFCs, SF <sub>6</sub> ) and gases regulated by the Montreal protocol (CFCs, HCFC, Halons etc.) [Govt. of Norway (Reviewer's comment ID #: 2016-5)]
SPM-911	B	1:26	2:3	The information provided is very much welcome. However, compared to earlier drafts the information on the rate of change (chnage in growth rate) has been lost. Even if the length is increased it is suggested to include both. [Govt. of Austria (Reviewer's comment ID #: 2025-2)]
SPM-99	A	1:27	1:27	The authors should insert a footnote explaining the abbreviations "ppm" and "ppb". Footnote number 9 in the WG1 TAR SPM could be repeated. [Govt. of Australia (Reviewer's comment ID #: 2002-13)]
SPM-100	A	1:27	1:27	The phrase "fossil carbon dioxide emissions" could be confusing for a policy reader, even with the included footnote. As the term is not used again and seems not be used in a widespread manner in the rest of the report, suggest deletion of the footnote and replacement of the start of the sentence with "Annual emissions of carbon dioxide from fossil fuel burning and cement production has increased...." This phrase is drawn directly from Chapter 7. [Govt. of Australia (Reviewer's comment ID #: 2002-14)]
SPM-101	A	1:27	1:29	"Annual fossil carbon dioxide emission increase " should be given in a longer period, e.g., some periods from 18th century to now, but not only in the 1990s and in 2000-2005, in order to be consistent with the first sentence of this bullet. Because the first sentence mentions the concentration increase from pre-industrial value to 2005. [Govt. of China (Reviewer's comment ID #: 2006-6)]
SPM-102	A	1:27	1:27	Please insert after ....280 ppm to 379 ppm in 2005. "In the period 1999 -2004 the atmospheric carbon dioxide concentration increased by more than 1,8 ppm yr <sup>-1</sup> ." [Govt. of Germany (Reviewer's comment ID #: 2011-60)]
SPM-103	A	1:27	1:30	Specify in the text that emissions of 6.4 Gt are "anthropogenic" [Govt. of Italy (Reviewer's comment ID #: 2012-1)]
SPM-104	A	1:27	1:33	The SPM should spell out ppm and ppb the first time the terms are used [Govt. of Norway (Reviewer's comment ID #: 2016-6)]
SPM-105	A	1:27	1:32	Is it obvious to the reader what ppm, GtCyr <sup>-1</sup> and ppb denotes? [Govt. of Sweden (Reviewer's comment ID #: 2019-2)]

SPM-106	A	1 : 2 7	1:27	Update CO2 concentration to 2006 (as will be done, it says, for global temperature anomaly) [Govt. of United Kingdom (Reviewer's comment ID #: 2022-17)]	
SPM-107	A	1 : 2 8	1:30	Would be more effective to denote increases as percentages in addition to absolute GtC and emissions associated with land-use change as a percentage of the average fossil CO2 emissions. This bullet makes two important points that should be stated simply - emissions are increasing rapidly and land use changes are a significant factor in addition to burning of fossil fuels. [Govt. of Canada (Reviewer's comment ID #: 2004-12)]	
SPM-108	A	1 : 2 8	1:29	We have in these lines estimates of emissions from fossil fuels and from land use change. Would it be possible to say also what is the proportion of CO2 from fossil fuel present today in the atmosphere, relative to the total of CO2 contained in it ? [Govt. of France (Reviewer's comment ID #: 2010-2)]	
SPM-109	A	1 : 2 8		Emissions of CO2 are expressed in GtC per year. This is the total mass of carbon contained in the emitted CO2, not the G23CO2 emitted. We would prefer not to use anymore this unit of GtC, which is confusing for non specialists, and to utilise only Gtons of CO2. If this unit of GtC is maintained, the equivalent in GtCO2 should be given at least. [Govt. of France (Reviewer's comment ID #: 2010-3)]	
SPM-110	A	1 : 2 9	1:30	Could the SPM specify how much of the CO2 emissions associated with land-use change are from deforestation? [Govt. of Norway (Reviewer's comment ID #: 2016-7)]	
SPM-912	B	1 : 2 9	1:29	after "2000-2005" please write " about 12% increasing from 1990 to 2005". [Govt. of Mali (Reviewer's comment ID #: 2026-1)]	
SPM-111	A	1 : 3 0	1:30	The central estimate of land use emissions from Chapter 7 should go in consistent with practice elsewhere in the SPM: 1.6 GtC yr-1 and the range in Chapter 7 page 3 is 0.5 to 2.8 GtC yr-1 for the 1990s'. Is this "likely" classification correct (is this 66% range or 90% range -it seems like the 90% range) [Govt. of Germany (Reviewer's comment ID #: 2011-3)]	
SPM-112	A	1 : 3 2	1:33	Why is no uncertainty range given for methane concentrations? [Govt. of Sweden (Reviewer's comment ID #: 2019-3)]	
SPM-113	A	1 : 3 3	1:33	After "consistent with total emissions" please insert "(sum of anthropogenic and natural sources)" [Govt. of Germany (Reviewer's comment ID #: 2011-61)]	

SPM-114	A	1 : 3 3	1:33	CH4 concentration in 2005 is 1783 ppb and not 1774 ppb, please see the "WMO greenhouse gas bulletin" (www.wmo.int/web/arep/gaw/ghg/ghg-bulletin-en-11-06.pdf) published last November [Govt. of Italy (Reviewer's comment ID #: 2012-27)]	
SPM-115	A	1:33	1:34	Perhaps an exact year should be avoided here. In Chapter 2 (2.3) it is mentioned that the slowdown in the growth rate started in the 1980's, i.e. prior to 1993. Neither has the slowdown characterised all the years since, as it is mentioned that in 1998, the growth rate was very high (reflecting more interannual variability than speaking against a long-term slowing of the growth rate?). [Govt. of Sweden (Reviewer's comment ID #: 2019-4)]	
SPM-116	A	1:33	1:33	After "1993" add "and were nearly zero from 1999-2005". Delete the rest of the sentence. [Govt. of United States of America (Reviewer's comment ID #: 2023-6)]	
SPM-913	B	1:33	1:33	after " 1774 ppb in 2005" please write "148% increasing. However growth rates..." [Govt. of Mali (Reviewer's comment ID #: 2026-2)]	
SPM-117	A	1:34	1:34	Add 'likely' between 'are' and 'due', because relative contributions are not well determined. [Govt. of Netherlands (Reviewer's comment ID #: 2014-1)]	
SPM-118	A	1:34	1:34	Replace "Most" with "The majority of". [Govt. of United States of America (Reviewer's comment ID #: 2023-7)]	
SPM-119	A	1:35	1:36	Write:"... fossil fuel use, but contributions from other sources are not well determined" [Govt. of Switzerland (Reviewer's comment ID #: 2020-7)]	
SPM-120	A	1:36	1:36	Footnote 1: Despite the definition of "climate change" being copied from the TAR, the current WG1 glossary provides a more comprehensive definition. Suggest that the authors draw more upon the current definition rather than the version in the TAR. [Govt. of Australia (Reviewer's comment ID #: 2002-15)]	
SPM-121	A	1:36	1:36	Footnote 4: the authors should clarify what the 'uncertainty ranges' apply to. For example, redraft as "Assessed uncertainty ranges for results given in this Summary..." [Govt. of Australia (Reviewer's comment ID #: 2002-16)]	
SPM-122	A	1:36	1:36	"unlikely" is missing from footnote 5 [Govt. of United Kingdom (Reviewer's comment ID #: 2022-18)]	
SPM-123	A	2:0	0:	Figures are unclear and partly irrelevant for the main message. Why include concentration changes 10000 years back in time? It is misleading to interpret a negative radiative forcing as negative human influence, the negative part is entirely due to non-anthropogenic processes. Our suggestion is that only the last 150 years are shown with a radiative forcing scale, the rest is not necessary for the SPM. [Govt. of Sweden (Reviewer's comment ID #: 2019-5)]	
SPM-124	A	2:1	2:	"The global atmospheric nitrous oxide...." [Govt. of Belgium (Reviewer's comment ID #: 2003-6)]	
SPM-125	A	2:1	2:3	This paragraph fails to emphasize that the observed increase in nitrous oxide concentrations is anthropogenic (p.2-13, ll. 3436). Suggest to insert "due to anthropogenic causes, mostly from agriculture" at the end of the first sentence and to delete the last sentence. [Govt. of European Community (Reviewer's comment ID #: 2008-2)]	
SPM-126	A	2:2	2:2	To provide further information for readers insert "(at 0.26% per year)" after "constant since 1980". [Govt. of Australia (Reviewer's comment ID #: 2002-17)]	
SPM-127	A	2:2	2:3	It would be interesting to separate the contribution of 'high input intensive agriculture', that is mostly responsible of nitrous oxide emissions, from 'low input extensive agriculture' [Govt. of Italy (Reviewer's comment ID #: 2012-2)]	

SPM-914	B	2:2	2:2	after " to 319ppb in 2005" please write " about 18% increasing". [Govt. of Mali (Reviewer's comment ID #: 2026-3)]
SPM-128	A	2:4	2:4	The TAR included a dot point in the equivalent section on halocarbons that contribute to climate change. As these group of gases remain the third most important of the LLGHGs (and are included in Figure SPM-2) it seems a strange omission and consideration should be given to including a dot point on their effect. [Govt. of Australia (Reviewer's comment ID #: 2002-18)]
SPM-129	A	2:6	2:	Figure SPM-1: It is not clear how the zero level of the right hand radiative forcing scales is determined; this determination does not appear to be consistent for the three species. [Govt. of Belgium (Reviewer's comment ID #: 2003-7)]
SPM-130	A	2:6	2:	Figure SPM-1: The relative importance of the "large" versus the "insert" panels in Figure SPM-1 should be inverted; as presented here, the Figure is not very attractive. [Govt. of Belgium (Reviewer's comment ID #: 2003-8)]
SPM-131	A	2:6	2:	Figure SPM-1: Note that forcings from F-gases or tropospheric O3 are larger than that of N2O, it might be a better use of space to show a plot of all forcings over time (eg like 2.23 but with split of LLGHG). [Govt. of Belgium (Reviewer's comment ID #: 2003-9)]
SPM-132	A	2:6	2:	Figure SPM-1: The measure of GHG concentration widely used by policy makers is CO2 equivalent concentration. Despite the difficulties associated with expressing concentrations in this way, it has become the de facto standard. The SPM would be more accessible if the (lower two) graphs of this figure could have a third vertical axis labelled in CO2e (and/or the corresponding text could contain the equivalent information). [Govt. of New Zealand (Reviewer's comment ID #: 2015-2)]
SPM-915	B	2:6	2:	figure SPM-1: This figure has been further improved. Especially in the coloured version this figure is really great and includes a lot of information in a clear and transparent manner. [Govt. of Austria (Reviewer's comment ID #: 2025-3)]
SPM-133	A	2:6		These figures are complex and would deserve more explanations, concerning i.a. the colour code and the uncertainties. [Govt. of France (Reviewer's comment ID #: 2010-5)]
SPM-134	A	2:9	2:9	Banner on Figure SPM-1 says "Time (years before present)." Change to "years before XXXX" --i.e., whatever the date is. [Govt. of United States of America (Reviewer's comment ID #: 2023-8)]
SPM-135	A	2:18	2:18	Figure SPM-2: Insert "red" before lines. [Govt. of Australia (Reviewer's comment ID #: 2002-19)]
SPM-136	A	3:0	3:	Why is it necessary to say explicitly that the understanding has increased? [Govt. of Norway (Reviewer's comment ID #: 2016-13)]
SPM-137	A	3:1	3:4	Long and awkwardly worded sentence for an SPM. Suggest splitting into two sentences. Second sentence would start with "There is very high confidence.....(and the phrase 'globally averaged' could be removed from this sentence). [Govt. of Canada (Reviewer's comment ID #: 2004-14)]
SPM-138	A	3:1	3:5	The net radiative forcing values presented cannot be pulled off the Figure provided (SPM-2) nor is it clear how they were arrived at from the information presented in the following bullets. Suggest adding a new bullet that addresses this issue of estimating NET forcing from human activities. This bullet should emphasize the masking effect of aerosols on GHG-induced warming, and clarify whether the aerosol effect on net RF is more or less than reported in the TAR. [Govt. of Canada (Reviewer's comment ID #: 2004-15)]

SPM-139	A	3:1	3:4	If possible, we think that the use of quantified scientific terms not known to the general public should be avoided in the main messages. Consequently we propose that the message is rewritten with deletion of "with a radiative forcing of 1.6 (0.6 to 2.4) Wm <sup>2</sup> " (or alternatively with the numbers in brackets). Could, for example, temperature be used as a proxy indicator in this context? [Govt. of Norway (Reviewer's comment ID #: 2016-8)]	
SPM-140	A	3:1	4:6	States, "with a radiative forcing of +1.6 [+0.6 to +2.4] Wm <sup>-2</sup> " however in Figure SPM-2 (p.SPM-3, Line 3) the total sum of the RF values is +1.84Wm <sup>-2</sup> . In addition, from p.SPM-3, Line 7 to p.SPM-4, Line 7 the total sum of the RF values is +1.81Wm <sup>-2</sup> , not +1.6Wm <sup>-2</sup> , as above (p.SPM-3, Line 1 to p.SPM-4, Line 6). Please verify the correctness of an RF value of +1.6Wm <sup>-2</sup> on p.SPM-3, Line 3. Furthermore, please check the RF values in Figure SPM-2 against the RF values on p.SPM-3, Line 7 to p.SPM-4, Line 7 for consistency. [Govt. of Japan (Reviewer's comment ID #: 2013-7)]	
SPM-141	A	3:1	5:50	Where ranges are specified (e.g., p. SPM-3), specify whether these are 1-sigma or 2-sigma ranges (68 or 95% confidence intervals if distribution is normal). If the AR4 practice is different from the TAR in this respect, it should be highlighted, and the consequences discussed in the SPM. [Govt. of Belgium (Reviewer's comment ID #: 2003-10)]	
SPM-142	A	3:2	3:2	This is the first time in the SPM that a specific IPCC confidence reading is provided. As such (similar to the standard terms used for likelihood) a footnote should be included setting out the IPCC AR4 confidence terminology. Suggest the following: "In this Summary for Policymakers, the following terms have been used to define levels of confidence in specific findings: Very high confidence at least a 90% chance of being right, High confidence about an 80% chance of being right Medium confidence about a 50% chance of being right, Low confidence about a 20% chance of being right Very low confidence less than a 10% chance of being right". [Govt. of Australia (Reviewer's comment ID #: 2002-20)]	
SPM-143	A	3:2	3:4	The second half of this sentence implies that there is "very high confidence" that human activities since 1750 have had a RF of +1.6. It is assumed that the authors actually have "very high confidence" ONLY in the finding that "the globally averaged net effect of human activities since 1750 has been one of warming". Suggest if this is the case that the sentence is broken into two. [Govt. of Australia (Reviewer's comment ID #: 2002-21)]	
SPM-144	A	3:2	3:2	".leading to very high confidence.": can this be translated in the more precise terms described in foot note 5 of page 1? Would this be "very likely"? This comment applies to similar instances when "confidence" has been used in this document instead of likelihood. [Govt. of Italy (Reviewer's comment ID #: 2012-9)]	
SPM-145	A	3:2	3:2	The term "very high confidence" is used, but is not in the lexicon of uncertainty in Footnote 5. Make the SPM consistent throughout regarding uncertainty qualifiers. [Govt. of United States of America (Reviewer's comment ID #: 2023-9)]	
SPM-146	A	3:2	3:5	This is a very strong statement that the TAR could not make. Presumably, the total radiative forcing is based on observed differences in greenhouse gas abundances between 1750 and 2005. Problem is that the authors have assumed that ALL increases in abundances are anthropogenic. The total forcing change since 1750, though dominated by human activities, cannot be totally attributed to human activities. If you are going to sum the asymmetric totals, put the period after "warming" and move this summation statement to a sub-bullet prior to the solar output one (SPM-4, lines 4-5). At present, it's an incomplete total, a sum of asymmetrically weighted quantities in varying certainties. Be very explicit with the numbers given: "... radiative forcing IN YEAR 2005(?) of +1.6 ...". Combine sentence on SPM-3, line 4-5, with the solar sub-bullet. [Govt. of United States of America (Reviewer's comment ID #: 2023-10)]	

SPM-147	A	3:3	3:4	The uncertainty range of radiative forcing may easily be misinterpreted as a range of increase over the time period. Give uncertainty range as [+0.8,-1.2] instead. [Govt. of Sweden (Reviewer's comment ID #: 2019-6)]
SPM-148	A	3:3	3:3	Add the endpoint of 2005 – i.e., 1750-2005. [Govt. of United States of America (Reviewer's comment ID #: 2023-11)]
SPM-149	A	3:4	3:5	The authors should assess if this is the correct level of uncertainty for a factor of five? On face value “likely” seems too weak (given that the best estimate of the two forcings has anthropogenic forcing a factor of 13 greater than solar). Consider instead giving level of likelihood with respect the ratio of the best estimates. [Govt. of Australia (Reviewer's comment ID #: 2002-22)]
SPM-150	A	3:4	3:4	"This is likely to have been at least five times greater than that due to solar output changes. " "This" and "that" seems somewhat unclear to us. We suggest to write "This forcing" [Govt. of Belgium (Reviewer's comment ID #: 2003-11)]
SPM-151	A	3:4	3:4	It is not absolutely clear if this relates only to solar irradiance effect : is the controversy about galactic rays and clouds excluded here ? [Govt. of Belgium (Reviewer's comment ID #: 2003-12)]
SPM-152	A	3:4	3:5	The structure and content of this sentence should be reconsidered: according to the likelihoods of footnote Nr. 5, “...likely to have been at least five times greater than...” could at least be replaced by “...very likely to have been at least two times greater than...”. [Govt. of Belgium (Reviewer's comment ID #: 2003-13)]
SPM-153	A	3:4	3:5	The radiative forcing of solar irradiance, which is obtained mainly based on recent 20-year data, should not be extended back to 1750. Given this scientific reason the sentence "This is likely to have been at least five times greater than that due to solar output changes" should be checked in order to avoid too quantitative descriptions. Therefore, it's better to delete 'five times' or add "but uncertainties are still large". [Govt. of China (Reviewer's comment ID #: 2006-7)]
SPM-154	A	3:4	3:4	Replace "solar output" by "solar irradiance" (as this is the more precise term) and add to the end of this sentence, "with estimates of the latter effect having more than halved since the TAR. (2-6)" as this comparison to the TAR estimate is an important information for policymakers. [Govt. of Germany (Reviewer's comment ID #: 2011-4)]
SPM-155	A	3:4	3:5	It might be proper to compare the effect of the human activities and that of solar output changes also on some higher level of "assessed likelihood" than the present 'likely'. For example, on the level of "very likely", how much greater has the human impact been compared to solar output variations? [Govt. of Sweden (Reviewer's comment ID #: 2019-7)]
SPM-156	A	3:4	3:4	In this sentence "likely" is related to "five times". Could it be possible to express more certainty -"virtually certain" -by taking the worst case -upper part of the uncertainty on the solar forcing and lower value of the radiative forcing -and associate it with "at least three times greater" ? [Govt. of Switzerland (Reviewer's comment ID #: 2020-8)]
SPM-157	A	3:7	3:11	Add "and a peak similar to the anthropogenic rise in CO2 can be excluded for the past 50,000 years with very high confidence." [Govt. of Denmark (Reviewer's comment ID #: 2007-2)]
SPM-158	A	3:7	3:11	The radiative forcing should refer to a year. [Govt. of Norway (Reviewer's comment ID #: 2016-9)]
SPM-159	A	3:7	3:7	Level of precision is different from what is in Figure SPM-2 on the same page (tenths vs. hundredths). [Govt. of United States of America (Reviewer's comment ID #: 2023-12)]

SPM-160	A	3:7	4:5	Any mention of water vapour and its effect on global mean temperature has been removed from the SPM. While uncertainty exists, water vapour is discussed in the Chapters as a main variable in natural forcing and at least a brief treatment in the SPM is warranted. [Govt. of Japan (Reviewer's comment ID #: 2013-8)]
SPM-161	A	3:8	3:8	It is unclear what "its" refers to; is it the rate of growth of GHGs or the rate of increase of RF? [Govt. of Australia (Reviewer's comment ID #: 2002-23)]
SPM-162	A	3:8	3:8	The uncertainty range of radiative forcing may easily be misinterpreted as a range of increase over the time period. Give uncertainty range as $[\pm 0.2]$ instead. [Govt. of Sweden (Reviewer's comment ID #: 2019-8)]
SPM-163	A	3:9	3:10	Suggest deleting "The CO2 radiative forcing increased by 20% during the last 10 years (1995-2005), the largest change observed or inferred for any decade in at least the last 200 years.". Because there are large uncertainties in the estimation of CO2 radiative forcing, here the specific value 20% is not proper to be given. [Govt. of China (Reviewer's comment ID #: 2006-8)]
SPM-164	A	3:9	3:11	Since this sentence only refers to at least 200 years back in time it might be interpreted as big changes in CO2 radiative forcing might not be unique in historic times. The use of absolute figures for change, instead of percentages, might have yielded another impression? [Govt. of Norway (Reviewer's comment ID #: 2016-10)]
SPM-165	A	3:9	3:11	Could it be possible to provide a short explanation why the 20% increase during the last 10 years has occurred ? [Govt. of Switzerland (Reviewer's comment ID #: 2020-9)]
SPM-166	A	3:10	3:10	For accuracy, delete "last 10 years (1995-2005)" replace with "the 10 years from 1995-2005". [Govt. of Australia (Reviewer's comment ID #: 2002-24)]
SPM-167	A	3:10	3:11	Delete "observed or inferred" as it is redundant and unnecessarily complicates the sentence. [Govt. of Australia (Reviewer's comment ID #: 2002-25)]
SPM-168	A	3:10	3:11	The content of this sentence is likely to be controverted; could the sentence be clarified by removing the ambiguity in the 1995-2005 largest radiative change having been either observed or inferred? [Govt. of Belgium (Reviewer's comment ID #: 2003-14)]
SPM-169	A	3:10	3:10	Replace '20%' by '0.28 Wm <sup>-2</sup> ', because there is no proper reference value for the radiative forcing. [Govt. of Netherlands (Reviewer's comment ID #: 2014-3)]
SPM-170	A	3:11	3:11	It would be important for policy makers to know how this has changed since the TAR and would suggest adding a short sentence here: "The radiative forcing all long lived greenhouse gases has increased 7% since since 1998, the year quoted in the TAR" (2-3) . [Govt. of Germany (Reviewer's comment ID #: 2011-5)]
SPM-171	A	3:13	3:13	It needs to be made clear at the start of this sentence that the RF effect of aerosols differs from the LLGHGs as it is a relatively short-term effect. [Govt. of Australia (Reviewer's comment ID #: 2002-26)]
SPM-172	A	3:13	3:13	Delete "anthropogenic" because parts of dust and organic carbon are "natural". [Govt. of China (Reviewer's comment ID #: 2006-9)]
SPM-173	A	3:13	3:18	the interpretation of this paragraph+G2 could be that it is at least very likely that the overall effect of aerosols in the atmosphere is a cooling effect; saying it clearly would improve the message. We suggest to add at the beginning of line 14 "are very likely (or extremely likely, or virtually certain?) to produce a net cooling corresponding to a total radiative forcing of ..." [Govt. of France (Reviewer's comment ID #: 2010-6)]
SPM-174	A	3:13	3:13	Delete "Anthropogenic" [Govt. of United States of America (Reviewer's comment ID #: 2023-13)]

SPM-175	A	3:14	3:14	The authors should explain (possibly in a footnote) the difference between the direct and indirect RF effect of anthropogenic aerosols. [Govt. of Australia (Reviewer's comment ID #: 2002-27)]
SPM-176	A	3:15	3:15	At several places in the manuscript, "quantified" or "constrained" may be more appropriate than "understood". [Govt. of Belgium (Reviewer's comment ID #: 2003-15)]
SPM-177	A	3:17	3:18	The words "cloud lifetime and" can be deleted as they simply repeat the concept of the "indirect cloud albedo forcing" effect, which has already been discussed in this dot point. [Govt. of Australia (Reviewer's comment ID #: 2002-28)]
SPM-178	A	3:17	3:18	The last sentence should be extended by a statement about the likely sign of the cloud-lifetime effect on net radiative forcing. [Govt. of European Community (Reviewer's comment ID #: 2008-5)]
SPM-179	A	3:17	3:17	"but remains" -> "but still remains" [Govt. of Finland (Reviewer's comment ID #: 2009-4)]
SPM-180	A	3:17	3:18	It is should be stated that the cloud effect ha the greatest uncertainty [Govt. of Italy (Reviewer's comment ID #: 2012-30)]
SPM-181	A	3:17	3:18	The last sentence in the bullet should be deleted. [Govt. of Norway (Reviewer's comment ID #: 2016-11)]
SPM-182	A	3:17	3:17	Delete "net" since the term is not defined with radiative forcing which already includes both plus and minus terms. [Govt. of United States of America (Reviewer's comment ID #: 2023-14)]
SPM-183	A	3:18	3:18	Wouldn't it be possible to say something about the sign of this influence (increase in lifetime, ch 2.4.5, l 33-34) despite the uncertainty in the magnitude? [Govt. of Sweden (Reviewer's comment ID #: 2019-9)]
SPM-184	A	3:18	3:18	Add to end of sentence "and can also force climate change." [Govt. of United States of America (Reviewer's comment ID #: 2023-15)]
SPM-185	A	3:20	3:21	The authors need to re-write this dot point to achieve the following: (1) Provide an explanation of what anthropogenic tropospheric ozone changes are, and how they come about; (2) Include the influence on RF of ozone changes in the stratosphere; and (3) Separate and make more prominent the role of halocarbons on RF. The test provided in the authors' current dot point adds nothing to information that can be gleaned from Figure SPM-2. [Govt. of Australia (Reviewer's comment ID #: 2002-29)]
SPM-186	A	3:20	3:20	Delete "anthropogenic" because part of tropospheric ozone is also "natural". [Govt. of China (Reviewer's comment ID #: 2006-10)]
SPM-187	A	3:20	3:20	Change "Anthopogenic" to "Anthropogenic". [Govt. of Denmark (Reviewer's comment ID #: 2007-3)]
SPM-188	A	3:20	3:21	The word "while": a risk of misunderstanding, as halocarbons affect stratospheric ozone, not tropospheric ozone. [Govt. of Finland (Reviewer's comment ID #: 2009-5)]
SPM-189	A	3:20	3:21	Presenting together tropospheric ozone and halocarbons in the same bullet is not very easy to read, as halocarbons are most often associated with stratospheric ozone. [Govt. of France (Reviewer's comment ID #: 2010-7)]
SPM-190	A	3:20	3:21	Our view is that the halocarbons deserve more text, and we would like to see specific information on the radiative forcing cause by the different groups of halocarbons, in a separate bullet. This could include the following sentences from the TS: "The Montreal Protocol gases (primarily CFCs and HCFCs) as a group contributed 0.32 Wm <sup>-2</sup> to radiative forcing in 2004 with CFC-12 continuing to be the third most important long-lived radiative forcing agent." And: "The concentrations of industrial fluorinated gases covered by the Kyoto Protocol (HFCs, PFCs, SF <sub>6</sub> ) are relatively small but are increasing. Their total radiative forcing in 2004 was 0.015 W m <sup>-2</sup> ." [Govt. of Norway (Reviewer's comment ID #: 2016-44)]

SPM-191	A	3:20	3:20	Delete "Anthropogenic" [Govt. of United States of America (Reviewer's comment ID #: 2023-16)]
SPM-192	A	3:21	3:21	It would be more informative for policymakers to provide references to treaties dealing with halocarbons. Therefore, we propose to add, at the end of the sentence: "... W m <sup>-2</sup> , the Montreal Protocol gases contributing 0.32±0.03 Wm <sup>-2</sup> and the industrial gases covered by the Kyoto Protocol (HFC, PFC and SF <sub>6</sub> ) contributing 0.017 Wm <sup>-2</sup> " [Govt. of Switzerland (Reviewer's comment ID #: 2020-10)]
SPM-193	A	3:24	3:33	Figure SPM 2: This figure was better done in the previous SPM draft. The column entitled "RF values" is redundant (it is a straight 'read off' from the figure, and the ranges in values are also mentioned explicitly in the text), and makes this crucial figure much heavier going. Furthermore, the critical timescale information of the previous draft has been dropped. This timescale information was a critical advance over the TAR figure. Suggest replace this figure with the previous draft [Govt. of Australia (Reviewer's comment ID #: 2002-30)]
SPM-194	A	3:24	3:33	Figure SPM 2: Using the TAR SPM Figure 3 as an example, the explanation for this Figure could be considerably improved. The TAR explanation provides much more information about the various RF components and is more clearly presented. [Govt. of Australia (Reviewer's comment ID #: 2002-31)]
SPM-195	A	3:24	3:33	Figure SPM 2: The 0.6 to 2.4 range does not appear on the graph. Include combined/total anthropogenic forcing. [Govt. of Australia (Reviewer's comment ID #: 2002-32)]
SPM-196	A	3:24	3:33	Figure SPM 2: Given the important (natural) radiative effect of volcanoes, include this as an entry in this table [Govt. of Australia (Reviewer's comment ID #: 2002-33)]
SPM-197	A	3:24	4:5	The influence of water vapour on changes of radiative forcing is not mentioned at all, because its influence is considered a feedback effect. Although it is clear that for this reason it cannot be included in Figure SPM-2, a sentence should be added in the text to mention its relevance to climate change. [Govt. of Italy (Reviewer's comment ID #: 2012-19)]
SPM-198	A	3:25	3:	Figure SPM-2: The label "Contrail Cirrus" is very misleading. Actually this number 0.01 W/m <sup>2</sup> refers only to *linear* contrails and does *not* include "spreading" cirrus or other "Aviation Induced Cloudiness". A minimal fix, for the SPM, would be to replace the label "Contrail Cirrus" with "Linear Contrails" and add footnote linked from this label to indicate that "This figure does not include "spreading cirrus" or other "Aviation Induced Cloudiness", whose forcing is substantially larger but too uncertain to give a best estimate.". If that is not possible, it would be better to remove this bar altogether (saving space) than leave the misleading 0.01W/m <sup>2</sup> to represent all "contrail cirrus". The same changes should be applied to almost-identical figures TS-5 and 2.21. Note that the more detailed figure 2.25 only calls it "contrails" which is slightly better. Note: the label "aircraft" in 2.25 is still misleading, since aircraft also contribute to several of the other forcings including CO <sub>2</sub> , NO <sub>x</sub> , CO, NMVOC, BC and SO <sub>2</sub> . [Govt. of Belgium (Reviewer's comment ID #: 2003-17)]
SPM-199	A	3:25	3:	(figure SPM-2, continued:) It is important to understand that in the paper from which this number 0.01 W/m <sup>2</sup> is taken (Sausen et al 2005), the forcing for "linear contrails" (i.e. those easily identifiable by satellite), which is much reduced since the IPCC Special Report on Aviation and the Global Atmosphere (1999), is separated from other aviation-induced cirrus whose forcing estimate has substantially increased and is now much larger, whilst much more uncertain. Numbers in Table 2.9 show that "Aviation-Induced-Cloudiness" (AIC, with persistent contrails) is 0.030 (0.010–0.080) W/m <sup>2</sup> in 2000, or 0.034 in 2004. That number 0.03 is also derived from the review of Sausen et al (2005) although the original source to which it refers (Stordal et al) gives 0.05 W/m <sup>2</sup> (the reason for the reduction by Sausen et al is not clear in their paper). The detailed text on this topic in section 2.6 (especially 2.6.3 and 2.6.4) is reasonable and comprehensively balanced. The problem lies in the summary and the summary figures. [Govt. of Belgium (Reviewer's comment ID #: 2003-18)]

SPM-200	A	3:25	3:	(figure SPM-2, continued:) Note that in the May draft both the summary of Chapter 2 and TS 2.3 included the helpful sentence: "Observational studies provide evidence that the net radiative forcing from spreading contrails and their effects on nearby cirrus cloudiness may be 2-10 times greater than the radiative forcing from persistent linear contrail cover." However this information has been removed in the new October draft. This is unfortunate, and those sentences or similar information should be re-inserted to provide the necessary context. This is VERY policy-relevant. We note that this issue is especially important to Belgium considering the high concentration of aviation cirrus above our region – for example figure 3-24 of the IPCC Special Report on Aviation (1999) suggested that radiative forcing from this source in 2050 could be up to 2.5 W/m <sup>2</sup> over our country and its neighbours, a similar magnitude to that from global CO <sub>2</sub> . Although the specific estimate of forcing for linear contrails has decreased since then, the total effect including spreading cirrus /AIC could still be of this magnitude. [Govt. of Belgium (Reviewer's comment ID #: 2003-19)]	
SPM-201	A	3:25	3:33	Figure SPM-2 would be better presented to policymakers if rotated 90degrees to be consistent with the TAR. It would also be useful for a short discussion of the increased confidence in most of these estimates of RF since the TAR. Also, Panel B as in technical summary Figure TS-5 should be included in the SPM. The conclusion of this Figure is easily grasped and effectively conveyed. [Govt. of Canada (Reviewer's comment ID #: 2004-16)]	
SPM-202	A	3:25	3:	Fig. SPM-2: Readability could be improved: The order of the radiative forcing components should be the same as in the text (by changing either the figure or the text). [Govt. of European Community (Reviewer's comment ID #: 2008-3)]	
SPM-203	A	3:25	3:	Fig. SPM-2: Readability could be improved: Three different colours should be used to distinguish CH <sub>4</sub> , N <sub>2</sub> O, and Halocarbons. Currently CH <sub>4</sub> as well as halocarbons are marked in red, which makes the correspondence between these gases and the numerical values unclear. [Govt. of European Community (Reviewer's comment ID #: 2008-4)]	
SPM-204	A	3:25	3:	Figure SPM-2: Unclear as to why the timescale values in the previous draft were replaced by RF values for the Final Draft. Timescale data is necessary to give perspective on how long the particular compound remains active in the atmosphere. [Govt. of Japan (Reviewer's comment ID #: 2013-6)]	
SPM-205	A	3:25	3:	Figure SPM-2: The forcings by CH <sub>4</sub> , N <sub>2</sub> O and Halocarbons are not well visualised. It would be better to use a separate line for each component. [Govt. of Netherlands (Reviewer's comment ID #: 2014-4)]	
SPM-206	A	3:25	3:	Figure 2: The concept of LOSU (Level of scientific understanding) is ill defined, potentially misleading and generally confusing. The uncertainty range is the most relevant concept, it clearly shows how well a quantification of a physically based effect can be made. Implicitly this also sends a message about the level of understanding. Suggestion, leave the LOSU column out of the figure. [Govt. of Sweden (Reviewer's comment ID #: 2019-11)]	
SPM-916	B	3:25	3:	figure SPM-2: This figure includes another acronym: LOSU. This is fine. However, given the relevance of the level of scientific understanding for policy makers it is recommended to inform in another footnote about the criteria that have been used to distinguish between high, medium and low LOSU. Otherwise this classification could trigger long debates and lots of interpretations. [Govt. of Austria (Reviewer's comment ID #: 2025-4)]	
SPM-207	A	3:26	3:	In figure SPM-2, consider specifying the unit in the column with radiative forcing values. [Govt. of Norway (Reviewer's comment ID #: 2016-12)]	
SPM-208	A	3:26	3:27	How about adding a value for the combined radiative forcing of all anthropogenic forcings in the Figure? [Govt. of Sweden (Reviewer's comment ID #: 2019-10)]	

SPM-209	A	3:26	3:26	Proposed changes in Figure SPM-2: 1) Include a row with an example of radiative forcing from a recent relevant volcanic event (Pinatubo) 2) Include a row with the radiative forcing due to water vapor for a temperature increase of +1 degree C. Adapt the figure caption accordingly. Rationale : these additional examples would provide very valuable information to policymakers. [Govt. of Switzerland (Reviewer's comment ID #: 2020-11)]
SPM-210	A	3:26	3:27	In Figure SPM-2, how do authors justify a "Low" confidence level for Cloud Albedo Effect, rather than "Very Low" considering the large error bar for the indirect effect? [Govt. of United States of America (Reviewer's comment ID #: 2023-17)]
SPM-211	A	3:26	3:27	In Figure SPM-2, remove "Anthropogenic" and "Natural" as y-axis labels. We do not have the data to attribute. Remove the word "total" on label "Total Aerosol" because you don't have the cloud lifetime effect. [Govt. of United States of America (Reviewer's comment ID #: 2023-18)]
SPM-212	A	3:26	26:27	In Figure SPM-2 the distinction between, CH <sub>4</sub> , N <sub>2</sub> O, and Halocarbons should be made clearer, possibly by the use of another color. [Govt. of Denmark (Reviewer's comment ID #: 2007-1)]
SPM-213	A	3:29	3:29	rewrite "...estimates and ranges in 2005 with respect to 1750, for carbon dioxide..." [Govt. of Belgium (Reviewer's comment ID #: 2003-16)]
SPM-214	A	3:29	3:33	Include a reference to other forcing factors: "additional forcing factors not included here are considered to have either a low impact or very low LOSU". [Govt. of Denmark (Reviewer's comment ID #: 2007-17)]
SPM-215	A	3:29	3:29	The figure SPM-2 could also illustrate the "range of observed volcanic aerosol contribution" in order to illustrate that this is an important but intermittent phenomena. [Govt. of Norway (Reviewer's comment ID #: 2016-45)]
SPM-216	A	3:29	3:29	The figure SPM-2 could also illustrate the "range of observed volcanic aerosol contribution" in order to illustrate that this is an important but intermittent phenomena. [Govt. of Norway (Reviewer's comment ID #: 2016-47)]
SPM-217	A	3:32	3:33	Reference should be to Figs. 2.18 and 2.23, not 2.20, and sect. 2.7.2 not 2.9 [Govt. of France (Reviewer's comment ID #: 2010-8)]
SPM-218	A	3:32	3:33	Also volcanic CO <sub>2</sub> emissions are sporadic and can be important, thus specify that volcanic CO <sub>2</sub> , besides aerosol, is not included in the figure [Govt. of Italy (Reviewer's comment ID #: 2012-3)]
SPM-219	A	4:1	4:5	Policymakers tend to think in terms of "CO <sub>2</sub> -equivalent concentrations" rather than radiative forcing. Therefore, it would be helpful to add a phrase that states the current radiative forcing in terms of CO <sub>2</sub> -equivalent concentrations. [Govt. of European Community (Reviewer's comment ID #: 2008-6)]
SPM-220	A	4:4	4:5	Despite the reduction in the RF estimate for solar output since the TAR, the authors should note that scientific understanding of this RF remains at a low level. [Govt. of Australia (Reviewer's comment ID #: 2002-34)]
SPM-221	A	4:4	4:5	Replace "solar output" by "solar irradiance", as this is the more precise term. [Govt. of Germany (Reviewer's comment ID #: 2011-56)]
SPM-222	A	4:4	4:4	It would be helpful to provide a best estimate of total radiative forcing and its uncertainty since 1750 at this point in the text [Govt. of United Kingdom (Reviewer's comment ID #: 2022-19)]
SPM-223	A	4:4	4:4	Change "have caused" to "cause". [Govt. of United States of America (Reviewer's comment ID #: 2023-19)]
SPM-224	A	4:4	4:5	Add "Several lines of evidence that had been used to provide the higher estimate (comparison with other stars, variations of cosmogenic isotopes) have been shown to be less relevant than previously believed." [Govt. of United States of America (Reviewer's comment ID #: 2023-20)]

SPM-225	A	4:5	4:5	It is not absolutely clear if this relates only to solar irradiance effect : is the controversy about galactic rays and clouds excluded here ? [Govt. of Belgium (Reviewer's comment ID #: 2003-20)]
SPM-226	A	4:6	4:6	Include two paragraphs, one on water vapor and another on volcanic eruptions from the previous version of the SPM (SOD) on page 6 lines 12 to 22. [Govt. of Switzerland (Reviewer's comment ID #: 2020-12)]
SPM-227	A	4:6		It would help to have here an additional short bullet to explain the possible effects of volcanoes, both from aerosols and from CO2 emissions; this type of question is frequently asked. [Govt. of France (Reviewer's comment ID #: 2010-9)]
SPM-228	A	4:8	4:8	This is a very important section. Not many policy makers are aware of climate changes that have already occurred. Regional detail of projected changes is more questionable than regional detail of changes that have happened, so these should be emphasised. In this sense, I suggest that an additional figure be added here to fill in the lack of information in this section of the SPM about regional detail. I think the top panels (only) of Fig. 3.9 and Fig. 3.13 could be combined to summarize this information. [Govt. of Italy (Reviewer's comment ID #: 2012-11)]
SPM-229	A	4:8	6:46	DIRECT OBSERVATIONS OF CHANGES IN CURRENT CLIMATE: Suggest that it is made clear which changes are attributable too, consistent with (or not) with the expected effects of human induced warming. At present this is not clear and it would help the policy interpretation of the SPM if this were cleared up. [Govt. of Germany (Reviewer's comment ID #: 2011-6)]
SPM-230	A	4:8	6:45	Direct observations of changes in current climate: it should be inserted a comment on the fact we do not observe trends in global precipitation as for the temperature [Govt. of Italy (Reviewer's comment ID #: 2012-31)]
SPM-231	A	4:8	7:13	Section: Direct Observations of Changes in Current Climate · Bullets from lines 9 to 21 – These bullet points help to support our predictions and fill gaps in knowledge from TAR. It would be useful to separate and highlight their relevance and implications. For example, rising atmospheric water vapour gives evidence for a positive feedback, refuting earlier suggestions -information on sea level rise is key but it does not stand out in the SPM and is somewhat confusing; suggest to include a bullet point on sea level rise as a stand alone point -it would be helpful to include reference to the TAR and explain how observations, in particular in the case of average temperature and sea level, compare to TAR [Govt. of United Kingdom (Reviewer's comment ID #: 2022-11)]
SPM-232	A	4:8	7:14	It would be helpful to provide a bullet covering evidence of increased intensification of the hydrological cycle, as expressed by changes in continental runoff and global land area experiencing drought conditions. [Govt. of United Kingdom (Reviewer's comment ID #: 2022-20)]
SPM-233	A	4:10	4:14	One of the major advances in the science of climate change that has occurred since the TAR is the improvement in observations and detection of climate change. Showing that we have much increased confidence that the globe is warming is crucial for policy makers and should be given greater prominence. This box is the only clear place in the SPM that this is addressed, as such it needs to be framed in stronger language and provide more clear examples. [Govt. of Australia (Reviewer's comment ID #: 2002-35)]
SPM-234	A	4:17	4:17	The term 'unequivocal' does not align with 'confidence' classification in the report, suggest redrafting. [Govt. of Australia (Reviewer's comment ID #: 2002-36)]
SPM-235	A	4:17	4:17	"Unequivocal" does not say enough about the magnitude and rate of observed change compared to the TAR. Can we add "unequivocal and ACCELERATING"? Also, should indicate, as per the box, that the conclusion is based on an increased body of evidence "and is now FURTHER evident from..." [Govt. of Canada (Reviewer's comment ID #: 2004-17)]

SPM-236	A	4:17	4:18	To be more precise, "in global average air and ocean temperatures, melting of snow and ice, and rising sea level" might be replaced by "in global average surface, lower atmosphere and upper ocean temperatures, melting of snow and ice in most regions, and rising global mean sea level ". This makes the text more consistent with chapter 3 (page 4, lines 3 to 9), chapter 4 (page 3, lines 13 to 21, 29 to 57), and chapter 5 (page 3, lines 3 to 9, 41 to 48) executive summaries. [Govt. of France (Reviewer's comment ID #: 2010-10)]	
SPM-237	A	4:17	4:18	It is surface temperature (also in Figure SPM-3(a)) I presume. [Govt. of Italy (Reviewer's comment ID #: 2012-33)]	
SPM-238	A	4:17	4:19	States, "Warming of the climate system is unequivocal, as is now evident from increases in global average air and ocean temperatures, melting of snow and ice, and rising sea level." This is an extremely important point and thus this sentence should be highlighted for the reader in some way (ex. larger, bolder font, embedded in a text box, etc). [Govt. of Japan (Reviewer's comment ID #: 2013-9)]	
SPM-239	A	4:17	4:18	Here it is said that the warming is evident etc. We would like to quantify the present global warming to 0,2 degrees per decade. The word "unequivocal" must be replaced with a more understandable word like "undisputable". [Govt. of Norway (Reviewer's comment ID #: 2016-15)]	
SPM-240	A	4:17	4:19	Write:"There is now an unequivocal observation of coherent warming of the global climate system, evident from increases in ..." [Govt. of Switzerland (Reviewer's comment ID #: 2020-13)]	
SPM-241	A	4:17	4:19	The vertical profile of ocean temperature would be decreasing along water depth. If we say about global warming, it would be air-sea interaction. So that let me correct about ocean temperatures to be sea surface temperature. [Govt. of Thailand (Reviewer's comment ID #: 2021-1)]	
SPM-242	A	4:17	4:17	Use the likelihood terminology of Footnote 5 (not "unequivocal"). [Govt. of United States of America (Reviewer's comment ID #: 2023-21)]	
SPM-243	A	4:19	4:19	In our view, the increase in the average global surface temperature over the last 100 years of 0.74 o C is essential information, and should be added in the chapeau/bold text of this part of the SPM. [Govt. of Norway (Reviewer's comment ID #: 2016-42)]	
SPM-244	A	4:23	4:	Figure SPM-3 Please complement with data over the past 1000 years, so that comparison with SPM-1 and with TAR is easier. The previous criticisms about the TAR "hockey stick" are actually reasons to revisit this issue. [Govt. of Belgium (Reviewer's comment ID #: 2003-21)]	
SPM-245	A	4:23	4:31	Figure SPM 3: The authors need to explain more clearly that the shaded area shows the 5-95% range of data. [Govt. of Australia (Reviewer's comment ID #: 2002-37)]	
SPM-246	A	4:23	4:31	Figure SPM-3:This figure is good but not iconic enough to really stand out. Suggest including Figure TS-6 bottom panel (Global mean temp trend with different rates of change shown for different time periods) which is a very effective figure. [Govt. of Canada (Reviewer's comment ID #: 2004-18)]	
SPM-247	A	4:23	4:	Figure SPM-3: the right axe legends are facing outward, whereas in all the other Figures of the document, inward. [Govt. of Chile (Reviewer's comment ID #: 2005-4)]	
SPM-248	A	4:23	4:31	It is not clear if figure SPM-3 a) is only land temperature or land plus SST. In any case it were interesting to separate land temperature and SST adding one more panel in figure SPM-3 [Govt. of Italy (Reviewer's comment ID #: 2012-25)]	
SPM-249	A	4:23	4:25	Is Figure SPM-3 consistent in terms of the confidence intervals shown? The top panel from Chapter 3 assesses the 5-95% confidence interval for decadal values, whereas the bottom panel the 5-95% confidence interval refers to individual values. It is not clear what the shaded area represents in the middle panel, but if it is the bars from Chapter 5, then is it not comparable to top or bottom panels. [Govt. of United States of America (Reviewer's comment ID #: 2023-22)]	

SPM-250	A	4:24	4:25	For figure SPM-3 and similar ones with legends on both sides of the figure, there should be a general rule consisting in that both legends read from left to right once you have turned the volume clockwise for right pages and anti-clockwise for left pages in order to facilitate easy reading. At least they should read both in the same way. [Govt. of France (Reviewer's comment ID #: 2010-11)]	
SPM-251	A	4:24	4:25	"million sq km" should read "106 km <sup>2</sup> " [Govt. of France (Reviewer's comment ID #: 2010-12)]	
SPM-252	A	4:24	4:	In figure SPM-3 (figure on global average sea level), specify (mm) and use numbers on the scale on the right-hand side [Govt. of Norway (Reviewer's comment ID #: 2016-14)]	
SPM-253	A	4:31	4:31	Figure SPM 3: The notations for "Figure 4.2" and "Figure 5.13", should be switched to illustrate that panel (b) is from Figure 5.13 and panel (c) is from Figure 4.2. [Govt. of Australia (Reviewer's comment ID #: 2002-38)]	
SPM-254	A	4:31	4:31	Substitute "Question 3.1" with FAQ 3.1". [Govt. of Denmark (Reviewer's comment ID #: 2007-4)]	
SPM-255	A	5:1	5:4	Please also give the global mean temperature increase above preindustrial to enable comparison with the TAR and earlier reports. [Govt. of Germany (Reviewer's comment ID #: 2011-63)]	
SPM-256	A	5:1	5:2	It would be interesting to know which of the last twelve years that is not among the 12 warmest years, and when the "missing" year actually was [Govt. of Norway (Reviewer's comment ID #: 2016-16)]	
SPM-257	A	5:1	5:2	It would be helpful to insert "(1994-2005)" OR "(1995-2006)", whichever is the correct 12-year period, after the phrase 'Eleven of the last twelve years'. [Govt. of Pakistan (Reviewer's comment ID #: 2017-2)]	
SPM-258	A	5:1	5:7	It should be underlined the beginning of warming in 1970th years practically everywhere (Figure SPM-4, p.SPM-9), especially since this period was considered in the previous report (for example, AR3 TS, p.26 and Figure 3.) [Govt. of Russian Federation (Reviewer's comment ID #: 2018-6)]	
SPM-259	A	5:1	5:1	Add to the beginning of the bullet, "Since 1994(?), .." and adjust sentence accordingly. Name the 12 years (not everyone will read the AR4 in calendar year 2007). [Govt. of United States of America (Reviewer's comment ID #: 2023-23)]	
SPM-260	A	5:1	5:7	Units for trends are "per decade" and in other places in this very same section in terms of "per year". Consider normalizing it in the SPM; when given as a rate of change, give the same units (time interval). Suggest deleting the parenthetical "(0.13 [0.10 to 0.16]°C per decade)" in line 5 because the units raise confusion with those stated above. Add "per century" after °C on lines 3 and 4. [Govt. of United States of America (Reviewer's comment ID #: 2023-24)]	
SPM-261	A	5:2	5:2	"Updated" should be deleted as it is not necessary. [Govt. of Australia (Reviewer's comment ID #: 2002-39)]	
SPM-262	A	5:2	5:3	We agree with plan of the authors to extend the findings of this paragraph to include 2006 results. This is acceptable IPCC practice since it is based upon a previously published methodological approach. [Govt. of Australia (Reviewer's comment ID #: 2002-40)]	
SPM-263	A	5:2	5:4	"The updated 100 year linear trend (1906–2005) of 0.74 [0.56 to 0.92]°C is therefore larger than the corresponding trend at the time of the TAR (1901–2000) of 0.6 [0.4 to 0.8]°C." Suggest to give the linear trend at the time of 1901-2005 in order to compare with the trend of TAR. [Govt. of China (Reviewer's comment ID #: 2006-11)]	
SPM-264	A	5:3	5:3	The authors need to either provide an explanation of a "linear trend" and "linear rate" or delete "linear". [Govt. of Australia (Reviewer's comment ID #: 2002-41)]	

SPM-265	A	5:3	5:4	This is a peculiar way to report the temperature changes. The changes from some fixed date used in earlier IPCC report, like 1900 or 1860 should also be reported. Continually moving the start date forward provides only information on the acceleration of the trend, not the total change. This will confuse readers. [Govt. of Belgium (Reviewer's comment ID #: 2003-22)]
SPM-266	A	5:3	5:3	The term «therefore» is to be excluded, because under the observed recent temperature extremes the trend for 1906-2005 could be both, more and less, than trend for 1901-2000 [Govt. of Russian Federation (Reviewer's comment ID #: 2018-4)]
SPM-267	A	5:4	5:4	The authors should make it more explicit that the finding of (0.6 [0.4 to 0.8]), is not a finding of the AR4, but rather is direct from the TAR and is provided only for the sake of comparison. [Govt. of Australia (Reviewer's comment ID #: 2002-42)]
SPM-268	A	5:4	5:6	Suggest deleting "The linear rate of warming averaged over the last 50 years (0.13 [0.10 to 0.16]°C per decade) is nearly twice that for the last 100 years."These two linear rates should not compare with each other because the time scales are not the same. [Govt. of China (Reviewer's comment ID #: 2006-12)]
SPM-269	A	5:4	5:6	Could be simplified: "warming has mainly taken place during the last 50 years". [Govt. of Finland (Reviewer's comment ID #: 2009-6)]
SPM-270	A	5:5	5:5	The term «averaged» it is necessary to exclude [Govt. of Russian Federation (Reviewer's comment ID #: 2018-5)]
SPM-271	A	5:6	5:7	Urban heat island effect is an important question raised against detection of global warming. It might be good to be more specific on the overall uncertainty associated to it (.01°C? .1 °C? ?) [Govt. of France (Reviewer's comment ID #: 2010-13)]
SPM-272	A	5:6	5:6	Add a short sentence on the accelerating decadal warming rate eg the last 20 years [Govt. of Germany (Reviewer's comment ID #: 2011-7)]
SPM-273	A	5:6	5:6	Write:"Urban heat island effects are real but local. These effects are properly handled and have negligible influence on the trends" [Govt. of Switzerland (Reviewer's comment ID #: 2020-14)]
SPM-274	A	5:6	5:7	Clarify why urban heat islands have negligible influence on global mean temperatures. [Govt. of United Kingdom (Reviewer's comment ID #: 2022-21)]
SPM-275	A	5:6	5:7	Consider replacing the last sentence of the bullet with "Urban heat islands distort the local temperature trends but have negligible influence on the global or hemispheric mean temperatures." [Govt. of United States of America (Reviewer's comment ID #: 2023-25)]
SPM-276	A	5:8	5:8	We suggest adding information on the warmest year, and maybe also the second warmest year on record, preferably in a separate paragraph since there are already too many figures in the paragraph above (lines 1-7). [Govt. of Norway (Reviewer's comment ID #: 2016-43)]
SPM-277	A	5:9	5:9	The authors should note that there remains significant uncertainty in the estimation of tropospheric trends, particularly from radiosonde record (3.4.1.1 p3-28; TS 4.2). TS 6.2.1 summarises under a key uncertainty that: "Radiosonde records are much less spatially complete than surface records and evidence suggests a number of radiosonde records are unreliable, especially in the tropics. It is likely all records of tropospheric temperature trends still contain residual errors {3.4}". The SPM needs to reflect this uncertainty. [Govt. of Australia (Reviewer's comment ID #: 2002-43)]
SPM-278	A	5:10	5:10	Delete "similar to" and replace with "broadly the same as" to make it more clear that the warming in the troposphere has been at the same quantitative level as at the surface. [Govt. of Australia (Reviewer's comment ID #: 2002-44)]

SPM-279	A	5:10	5:11	The phrase "consistent within their respective uncertainties" is not helpful for policy readers and should be deleted. [Govt. of Australia (Reviewer's comment ID #: 2002-45)]
SPM-280	A	5:10	5:11	"... warming rates..." and "...", largely reconciling a discrepancy" leave rather unclear whether reference is made to average tropospheric temperature or its time derivative. [Govt. of Italy (Reviewer's comment ID #: 2012-34)]
SPM-281	A	5:10	5:10	Should it say "...surface temperature record and are consistent..." [Govt. of United States of America (Reviewer's comment ID #: 2023-26)]
SPM-282	A	5:11	5:11	Suggest deleting 'largely reconciling...TAR'. Instead, it should be pointed out that the problems about MSU correction and the consistent warming in mid and low level of troposphere had been resolved in TAR.(reference: TAR/SPM-4) [Govt. of China (Reviewer's comment ID #: 2006-13)]
SPM-283	A	5:13	5:15	A clarification of the role of water vapour is missing. The observed increase in water-vapour concentration is mainly an expected response to increased surface temperature (section3.4) and its impact on the radiative balance of the atmosphere is well known (section 8.6). However, some consider that the small amount of human water-vapour emissions with respect to ocean evaporation, associated to water vapour being the first GHG is sometimes used to call into question the human influence on climate. Policymakers need to be well informed of the flawed character of the latter argument. [Govt. of Belgium (Reviewer's comment ID #: 2003-23)]
SPM-284	A	5:13	5:13	"...average atmospheric water vapour content...": time average, I presume. [Govt. of Italy (Reviewer's comment ID #: 2012-35)]
SPM-285	A	5:13	5:15	If possible, quantify the increased radiative forcing attributed to the extra atmospheric water vapour content observed since the 1980s. [Govt. of United Kingdom (Reviewer's comment ID #: 2022-22)]
SPM-286	A	5:13	5:15	Add to end of bullet "Water vapor is a strong greenhouse gas and can amplify radiative forcing." Authors should introduce the subject of this positive feedback somewhere in the SPM, if not here. [Govt. of United States of America (Reviewer's comment ID #: 2023-27)]
SPM-287	A	5:14	5:15	What the air can hold is water vapor, not water. So, this sentence should be "consistent with the extra water vapor that warmer air can hold". [Govt. of China (Reviewer's comment ID #: 2006-14)]
SPM-288	A	5:14	5:14	How does "broadly consistent" map onto the IPCC terminology of confidence and likelihood? Delete the qualifier "broadly" and replace with "physically". [Govt. of United States of America (Reviewer's comment ID #: 2023-28)]
SPM-917	B	5:14	5:14	At the end of the line after "water" add "vapour", so to read "water vapour". The water vapour is the effective thermodynamic driver of the enhanced meteorological processes, as a consequence of the remarkable increase in the amount of energy available in the oceans of the world. During the last 50 years, the enhanced greenhouse effect has raised the internal oceans' energy up to, approximately, $10^{23}$ Joules. [Govt. of Argentina (Reviewer's comment ID #: 2024-2)]
SPM-289	A	5:17	5:25	1) Add information to bullets about how the observations compare to those reported in the TAR 2) The observed changes to cryospheric indicators are significant in their own right and should be reported on as such, and not just in terms of their contribution to SLR. For instance, Loss of snow cover extent (especially in spring) is significant, as is loss of mountain snow water equivalent. [Govt. of Canada (Reviewer's comment ID #: 2004-19)]

SPM-290	A	5:17	5:32	Given that contributions to SLR are presented in the first two of these three bullets (.42 for thermal expansion and .50 for glaciers and ice caps), the value of 1.8 mm/yr presented in the third bullet leaves the reader wondering where the rest of the SLR is coming from. The TS explains the sea level budget has not been closed. Something needs to be said to address this issue in the SPM as well. [Govt. of Canada (Reviewer's comment ID #: 2004-20)]
SPM-291	A	5:17	5:32	For clarity: I suggest the information contained in the 3 bullets be reorganized as follows: first describe the expected sea-level changes in the 2 time frames, then consider the attribution to the various processes (sea water expand, glaciers melting). [Govt. of Italy (Reviewer's comment ID #: 2012-10)]
SPM-292	A	5:17	5:50	there are some not clear points in the sea level increase description: from 1993 to 2003 sea level was observed to increase of 1.6 mm/yr (due to water expansion) + 0.77 mm/yr (due to decreases in glaciers and ice caps, Greenland and Antarctica ice sheets excluded) + 0.41 mm/yr (due to shrinkage of the Greenland and Antarctica ice sheets) = 2.78 mm/yr, but in line 28 a total increase of 3.1 mm/yr is indicated. Which is the possible origin of the not explained 0.32 mm/yr increase? [Govt. of Italy (Reviewer's comment ID #: 2012-26)]
SPM-293	A	5:17	5:17	"...the average temperature...": same as above. ( time average, I presume. -TSU Edit) [Govt. of Italy (Reviewer's comment ID #: 2012-36)]
SPM-294	A	5:17	5:32	Line 19 states, "0.42 [0.30 to 0.54] mm yr-1 to the average sea level rise from 1961 to 2003 and 1.6 [1.1. to 2.1] mm yr-1 from 1993 to 2003." This presentation where the two time periods overlap is an ineffective comparison of the average values of the two periods. Adding the following to Line 19-21 is suggested: "However, within this period, the 10 year period from 1993 to 2003 saw an average sea level rise 40% higher (1.6 [1.1 to 2.1] mm yr-1) than the total period from 1961 to 2003 of 0.42 [0.30 to 0.54] mm yr-1." Lines 24 to 27 on the same page should also be revised in the same way. [Govt. of Japan (Reviewer's comment ID #: 2013-10)]
SPM-295	A	5:17	5:32	References to sea level rise caused by 1) thermal expansion and 2) glaciers and ice caps in the SPM and its corresponding data in Table TS-3, p. TS-26 are not congruent. Table TS-3 lists two sets of values for these sources of sea level rise: "observed" and "modelled". However, the difference between these two values is unclear, thus further explanation about what constitutes an "observed" value is required. Moreover, clarification regarding which type of values are displayed in the SPM is necessary. [Govt. of Japan (Reviewer's comment ID #: 2013-11)]
SPM-296	A	5:17	5:32	Presentation is poor and incomplete. Start briefly with observed total sea level rise and add table 5.3 from chapter 5 for clarification, attribution, and uncertainty discussion. [Govt. of Netherlands (Reviewer's comment ID #: 2014-5)]
SPM-297	A	5:17	5:21	I don't think so about this paragraph because The temperature-depth ocean water profile is temperature decreases with increasing depth. There is a boundary between surface waters of the ocean and deeper layers that are not mixed. The boundary usually begins around 100-400 meters and extends several hundred of meters downward from there. This boundary region is a rapid decrease of temperature, is called the thermocline. The thermocline is layers of water where the temperature changes rapidly with depth. 90 % of the total volume of ocean is found below the thermocline in the deep ocean. Here, temperatures approach 0 degrees Celsius. [Govt. of Thailand (Reviewer's comment ID #: 2021-2)]
SPM-918	B	5:17	5:21	The above mentioned amount of heat intake has raised the evaporation rate from oceans and seas. Therefore, for convergence with the previous bullet and also to easy the layman understanding, it is suggested to complete this bullet, mentioning the increased rate of evaporation from oceans and seas. [Govt. of Argentina (Reviewer's comment ID #: 2024-3)]

SPM-298	A	5:18	5:18	It would be more accurate and helpful to include the finding from Chapter 5 concerning ocean heat content and uptake. Suggest deleting "and that the ocean....climate system" and replacing it with a sentence based on Chapter 5/page 8: "Since 1961, the increase in ocean heat content has been much larger than in any other store of energy in the earth's heat balance, accounting for more than 90% of the increase in heat content of the earth system." [Govt. of Australia (Reviewer's comment ID #: 2002-46)]	
SPM-299	A	5:18	5:18	This statement lacks a quantitative backup. [Govt. of United Kingdom (Reviewer's comment ID #: 2022-23)]	
SPM-300	A	5:18	5:18	Can you replace "most" with a value or range? Page 5-8, line 15, gives a value for the fractional oceanic heat absorption of "more than 90%" with no confidence interval. [Govt. of United States of America (Reviewer's comment ID #: 2023-29)]	
<b>SPM-301</b>	<b>A</b>	<b>5:19</b>	<b>5:32</b>	Please carefully check the several number about sea level rising rate.It seems that there are some gaps between the total average rate and the sum of each part. Please add a simple explanation about the gap. [Govt. of China (Reviewer's comment ID #: 2006-15)]	Agree, numbers presented do not match text or table on Ch4-P35 L17-22
<b>SPM-302</b>	<b>A</b>	<b>5:19</b>	<b>5:49</b>	structure of the text : the splitting of the numbers related to sea level changes in two different sections is not very easy to read. Moreover, the trends for snowcover would fit better in the same section as the one dealing with sea ice, ice sheets. [Govt. of France (Reviewer's comment ID #: 2010-14)]	Agree, and suggest rewrite
<b>SPM-303</b>	<b>A</b>	<b>5:19</b>	<b>5:21</b>	The trend in sea level in Figure SPM-3 looks linear over the last few decades, yet the thermal expansion in the text is stated to be four times larger in the last decade. Is the increased rate indicated on lines 19-21 consistent with the linear trend represented in Figure SPM-3? There is also a smaller increase in the glacial component. Should this be explained? [Govt. of United States of America (Reviewer's comment ID #: 2023-30)]	
<b>SPM-304</b>	<b>A</b>	<b>5:19</b>	<b>5:49</b>	Suggest coalescing the various sea-level rise observations and interpretations into one spot (see also lines 25, 27-32, and 47 on this page). Then all the sea-level rise contributions would be together, adding up (or not, as the case may be) to the global average rise. It would also allow all the temperature changes to be together. [Govt. of United States of America (Reviewer's comment ID #: 2023-31)]	Agree, and suggest rewrite
<b>SPM-305</b>	<b>A</b>	<b>5:20</b>	<b>5:20</b>	Replace « 6 mm yr -1 » by « 6 mm per year » for a better understanding [Govt. of Belgium (Reviewer's comment ID #: 2003-24)]	Agree and included
<b>SPM-306</b>	<b>A</b>	<b>5:20</b>	<b>5:48</b>	Concerning sea level rise, there is a need to clarify why the total estimate for the period 1993-2003, i.e. 3.1 mm/yr differs form the total obtained for the different contributions : 1.6 (sea expansion) + 0.77(glaciers + ice caps) + 0.41 (Greenland + Antarctica) =2.78 [Govt. of France (Reviewer's comment ID #: 2010-15)]	
<b>SPM-307</b>	<b>A</b>	<b>5:23</b>	<b>5:32</b>	Suggest that the last two dot points in this section are transposed, so that discussion of the oceans and sea level rise is not broken by a discussion of the cryosphere. [Govt. of Australia (Reviewer's comment ID #: 2002-47)]	Agree, and suggest rewrite
<b>SPM-308</b>	<b>A</b>	<b>5:23</b>	<b>5:23</b>	should say "mountain glacier volume and snow cover extent". [Govt. of Belgium (Reviewer's comment ID #: 2003-25)]	
<b>SPM-309</b>	<b>A</b>	<b>5:23</b>	<b>5:23</b>	"Declined on average" masks the significant reductions in snow cover extent in northern hemisphere in Spring (Figure TS-12 is difficult to interpret but appears to suggest reductions in April snow cover extent of up to 30% since 1967). [Govt. of Canada (Reviewer's comment ID #: 2004-21)]	
<b>SPM-310</b>	<b>A</b>	<b>5:23</b>	<b>5:24</b>	"decreases in glaciers and ice caps" is a very weak statement given that the Technical Summary concludes that there have been "widespread mass losses". [Govt. of Canada (Reviewer's comment ID #: 2004-22)]	
<b>SPM-</b>	<b>A</b>	<b>5:23</b>	<b>5:23</b>	Add at end of sentence something like: " consistent with the expected effects of warming". [Govt. of Germany (Reviewer's	

<b>311</b>				comment ID #: 2011-8)]	
<b>SPM-312</b>	<b>A</b>	<b>5:24</b>	<b>5:24</b>	Insert after "rise", "increasing from " and delete "by". It is important to emphasize the accelerating character of this contribution. [Govt. of Germany (Reviewer's comment ID #: 2011-9)]	
<b>SPM-313</b>	<b>A</b>	<b>5:24</b>	<b>5:24</b>	Add "small" before both "glaciers" and "ice caps". [Govt. of United States of America (Reviewer's comment ID #: 2023-32)]	
<b>SPM-314</b>	<b>A</b>	<b>5:25</b>	<b>5:25</b>	Replace "and" by "accelarating to". The current text does not make clear that the contribution has been accelerating. [Govt. of European Community (Reviewer's comment ID #: 2008-7)]	
<b>SPM-315</b>	<b>A</b>	<b>5:27</b>	<b>5:29</b>	"The rate was faster over 1993 to 2003, about 3.1 [2.4 to 3.8] mm yr-1, but tide gauge records indicate similar rates for other periods since 1950." What is the difference between tide gauge records and satellite data? Since the tide gauge records also indicate the fast rate of SSL, why these two data have not been calibrated? [Govt. of China (Reviewer's comment ID #: 2006-16)]	
<b>SPM-316</b>	<b>A</b>	<b>5:27</b>	<b>5:32</b>	It would have location of tide gauge station. [Govt. of Thailand (Reviewer's comment ID #: 2021-3)]	
<b>SPM-317</b>	<b>A</b>	<b>5:27</b>	<b>5:30</b>	Shouldn't the global sea-level rise sum from thermal expansion and melting of glaciers and ice caps? If yes, the presented numbers for rate of increase don't add up. The value of 3.1 listed for the last decade is greater than the contributing factors of 1.6 (line 20) from thermal expansion and 0.77 (line 25) from glacial melting. The discrepancy still exists when one adds the Ice Sheet estimate of 0.41 (line 47), although it is less. Similarly the value of 1.8 (line 27) listed for 1961-2003 is (much) greater than the contributions listed from thermal expansion (0.42, line 19) plus glacial melting (0.5, line 24). Given this discrepancy, wouldn't that produce some uncertainty in the global average sea-level rise values quoted on lines 27 and 28? These values should have confidence levels associated with them. Authors might consider consulting TS-26, lines 1-9, to help reconcile. That said, how can the value for the 20th century, which is obviously strongly affected by what happened over the last 40 years, be of "high confidence" (nomenclature that needs, at minimum, to be defined at first use or converted to the footnote 5 uncertainty statements)? [Govt. of United States of America (Reviewer's comment ID #: 2023-33)]	Agree, numbers presented do not match text or table on Ch4-P35 L17-22
<b>SPM-318</b>	<b>A</b>	<b>5:28</b>	<b>5:28</b>	Delete "about" which implies a fixed quantity and substitute "at around". [Govt. of Australia (Reviewer's comment ID #: 2002-48)]	
<b>SPM-319</b>	<b>A</b>	<b>5:28</b>	<b>5:29</b>	"but tide gauge records indicate similar rates for other periods since 1950". This sentence is not clear. What is different in "tide gauge records" with "global average sea level rise" mentioned line 27 in the same paragraph? What are these "other periods" ? some special years in the 1950-2005 series ??? Please be precise, e.g. as a footnote. [Govt. of France (Reviewer's comment ID #: 2010-16)]	
<b>SPM-320</b>	<b>A</b>	<b>5:28</b>	<b>5:29</b>	An acceleration over the period 1870-2000 is found by Church and White and reported on page 5-27. Whilst there are caveats on this, it still seems that the present construction of this sentence eg ", but tide gauge records indicate similar rates for other periods since 1950" does not convey the full information to policy makers available in this Chapter 5. Consideration could be given to reflecting these findings. [Govt. of Germany (Reviewer's comment ID #: 2011-64)]	
<b>SPM-321</b>	<b>A</b>	<b>5:29</b>	<b>5:29</b>	Insert "of sea level rise" after "similar rates". [Govt. of Australia (Reviewer's comment ID #: 2002-49)]	
<b>SPM-322</b>	<b>A</b>	<b>5:30</b>	<b>5:31</b>	The final sentence of this dot point would be better placed at the start of the dot point to present a chronological progression in the discussion of sea level rise -from increased rate between the 19th-20th centuries, to total 20th century rise, to increased late-20th century rate. [Govt. of Australia (Reviewer's comment ID #: 2002-50)]	

SPM-323	A	5:30	5:30	States: "an increase in the longer-term trend." It is unclear whether this phrase refers to "recent acceleration of the long-term trend" or "just the increase as reflection of the steady long-term trend." Clarification of the expression is necessary. [Govt. of Japan (Reviewer's comment ID #: 2013-12)]
SPM-324	A	5:31	5:31	It looks like the glacier plus thermal expansion terms (which are modelled, and this should be said) add to about 0.9mm/yr while the observed is twice that value. This paragraph needs to say that there is a big contribution missing from the modelled values, and present the inadequate model values for ice sheet contribution and link to the bullet on observed ice sheet contribution below. Otherwise, it looks like you are trying to pretend that the 0.41 mm/yr (page 5 line 47) comes from the models, in which case everything would be more or less fine. But it's not! [Govt. of Belgium (Reviewer's comment ID #: 2003-26)]
SPM-325	A	5:32	5:32	What are the respective contributions to the average 0,17 m sea level rise arising from the following factors: melting down of mountain glaciers, evolution of the ice sheets of Greenland and Antarctica and sea water expansion (due to temperature increase) ? [Govt. of Belgium (Reviewer's comment ID #: 2003-27)]
SPM-326	A	5:35	5:35	Suggest reversion to wording based on the previous SPM draft for clarity. Replace first sentence with "A broad range of climatic variables provide clear evidence of systematic changes in the climate on global, continental and regional scales". [Govt. of Australia (Reviewer's comment ID #: 2002-52)]
SPM-327	A	5:35	5:37	Indicate in these statements what is new since the TAR. Also reorder sentence to clearly indicate the information in this section is different than that presented above. Suggest: "At the continental or ocean basin scale, numerous changes in climate have also been observed." [Govt. of Canada (Reviewer's comment ID #: 2004-23)]
SPM-328	A	5:35	5:36	"These include wind patterns, precipitation, ocean salinity, sea ice, ice sheets, and aspects of extreme weather." "wind patterns" should be deleted, because there are no corresponding description about wind patterns in the following bullets. [Govt. of China (Reviewer's comment ID #: 2006-17)]
SPM-329	A	5:35	5:36	5 36 Replace with: "Numerous changes higher than the global average have been observed in certain regions including, Arctic temperature increase twice the global average, increased precipitation in several regions and more intense droughts in the tropics and subtropics." Rational: The draft bold text here covers the next 10 bullets. We suggest this s split in two parts one about regional changes different from the global average and one about extremes and variability. [Govt. of Norway (Reviewer's comment ID #: 2016-51)]
SPM-330	A	5:35	5:35	Add, at the end of the sences: "...or ocean basins and are consistent with global warming." [Govt. of Switzerland (Reviewer's comment ID #: 2020-15)]
SPM-331	A	5:35	5:36	I think that Numerous changes in climate have been observed at the scales of atmosherics or oceanics. [Govt. of Thailand (Reviewer's comment ID #: 2021-4)]
SPM-332	A	5:35	6:31	This section needs to be reviewed and restructured. The section should provide a selection of important observations of climate change focussing on the regional level, but with a coherent storyline that the observations provide clear evidence of a changing climate. The present dot points seem not to have good structure or balance. [Govt. of Australia (Reviewer's comment ID #: 2002-51)]
SPM-333	A	5:35	6:31	The lack of mention of the changing Walker Circulation—published well within the AR4 period—is a serious omission (Vecchi et al., Nature summer 2005). This major new climate change certainly has large policy implications. [Govt. of United States of America (Reviewer's comment ID #: 2023-34)]
SPM-334	A	5:36	5:36	Insert "changes to" before "wind patterns". Replace "sea ice, ice sheets" with "sea ice and ice sheet extent" [Govt. of Australia (Reviewer's comment ID #: 2002-53)]
SPM-335	A	5:36	5:36	The summary statement should include a reference to ocean acidity. In addition, there should be added a dot point explaining the current state of knowledge concerning ocean acidity. [Govt. of Australia (Reviewer's comment ID #: 2002-54)]

SPM-336	A	5:40	5:40	The authors need to provide some analysis for their statement that Arctic temperatures have high decadal variability. For a policy reader, as currently drafted, it is unclear whether Arctic warming over the past 100 years is unusual. This is exacerbated by the final sentence, which should be deleted, unless some further context is provided. [Govt. of Australia (Reviewer's comment ID #: 2002-55)]
SPM-337	A	5:40	5:40	In this sentence the "however" seems misleading and is not supported by the tone of Chapter 3. [Govt. of Canada (Reviewer's comment ID #: 2004-24)]
SPM-338	A	5:40	5:41	Please delete "also", since it is unclear what it relates to. Please also delete "appears to have" and if possible be more specific about the "different spatial distribution". [Govt. of Denmark (Reviewer's comment ID #: 2007-5)]
SPM-339	A	5:40	5:40	Arctic temperatures : a warm period is mentioned for 1925 to 1945 : was the amplitude similar ? [Govt. of France (Reviewer's comment ID #: 2010-17)]
SPM-340	A	5:41	5:41	Clarify what spatial distribution is being referenced in the final clause. What different spatial distribution occurred in that time period? [Govt. of United States of America (Reviewer's comment ID #: 2023-35)]
SPM-341	A	5:45	5:46	How do these values compare to those reported in the TAR? [Govt. of Canada (Reviewer's comment ID #: 2004-25)]
SPM-342	A	5:47	5:50	The authors should consider whether the final dot point on this page would be better placed in the previous section in the discussion of sea level rise (around line 27). The section as it is currently in refers to observed changes in climate rather than sea level. [Govt. of Australia (Reviewer's comment ID #: 2002-56)]
SPM-343	A	5:47	5:49	How do these values compare to those reported in the TAR? [Govt. of Canada (Reviewer's comment ID #: 2004-26)]
SPM-344	A	5:47	5:48	"Taken together, shrinkage of the ice sheets of Greenland and Antarctica has contributed 0.41 [0.06 to 0.76] mm yr <sup>-1</sup> to sea level rise over 1993 to 2003." The sea level rise has been discussed in former paragraph ( P5,L27), so the contribution of Greenland and Antarctica should be put together with the contribution of glaciers, ice caps and warming of seawater. [Govt. of China (Reviewer's comment ID #: 2006-18)]
SPM-345	A	5:47	5:48	This information (originally from Ch. 4-3, lines 47-57) should be presented in a more disaggregated way by providing separate figures for (1) the change between 1961-2003 and 1993-2003 separately and (2) the contribution of the Greenland ice sheet and the Antarctic ice sheet. [Govt. of European Community (Reviewer's comment ID #: 2008-8)]
SPM-346	A	5:47	5:49	Move to line 26 so that this is together with all of the SLR terms [Govt. of Germany (Reviewer's comment ID #: 2011-10)]
SPM-347	A	5:47	5:48	The contribution of each ice sheet needs to be separated and the change between 1961-2003 and 1993-2003 shown in the text eg from Table 5.5.2. Greenland ice sheet 1961-2003 0.05 ± 0.12 1993-2003 0.21 ± 0.07 Chapter 4, Section 4.6.2 Antarctic ice sheet 1961-2003 0.14 ± 0.41 1993-2003 0.21 ± 0.35 Chapter 4, Section 4.6.2 [Govt. of Germany (Reviewer's comment ID #: 2011-11)]
SPM-348	A	5:47	5:49	Presentation is poor and incomplete. Start briefly with observed total sea level rise and add table 5.3 from chapter 5 for clarification, attribution, and uncertainty discussion. (See comment 5 of The Netherlands) [Govt. of Netherlands (Reviewer's comment ID #: 2014-6)]
SPM-349	A	5:47	5:49	Why isn't the recent loss of the Larsen ice shelves mentioned here? [Govt. of United States of America (Reviewer's comment ID #: 2023-36)]

SPM-350	A	5:48	5:49	The authors should provide analysis of what the increasing flow speed of Greenland and Antarctic outlet glaciers may mean for sea level rise. [Govt. of Australia (Reviewer's comment ID #: 2002-57)]	
SPM-351	A	5:48	5:49	The rapid acceleration of discharge ice streams in the West Antarctic and Greenland with consequential acceleration of mass loss needs to be given more prominence here particularly given the likely connection between warming, ice shelf and grounding line retreat, the acceleration of ice stream and present and future sea level rise. Replace the sentence "Flow speed has increased for some Greenland and Antarctic outlet glaciers, which drain ice from the interior of the ice sheets. {4.6, 4.8, 5.5}" with something like "Most results indicate accelerating mass loss from Greenland during the 1990s and to 2005, with accelerating ice flow being the major cause of loss ahead of increased melting." {4.6.2.2.1 page 4-24 lines 30-31 and page 424 lines 18-26} "Acceleration of mass loss is also likely to have occurred in Antarctica {4.6.2.2.2 page 4-15 line 49 } with rapid increases in dynamical loss rates observed in the Amundsen sea region West Antarctic and on the Antarctic Peninsula" {4.6.3.3}. "Many of these changes have followed reduction or loss of ice shelves" {4.6.3.3, 4.8}. [Govt. of Germany (Reviewer's comment ID #: 2011-12)]	
SPM-352	A	5:49	5:49	Please clarify that this is basically a WAIS phenomenon (Amundsen sea plus Peninsula). Why not mention WAIS? or say WAIS plus Peninsula. [Govt. of Belgium (Reviewer's comment ID #: 2003-28)]	
SPM-353	A	5:50	5:50	The break-up of the Larsen-B ice shelf is well known amongst policy readers. The SPM should not remain silent on this event. Suggest that the TS finding that "Ice thinning occurred in the Antarctic Peninsula and Amundsen shelf ice during the 1990s. Tributary glaciers have accelerated and complete break-up of Larsen-B ice shelf occurred in 2002" is included at this point in the SPM. [Govt. of Australia (Reviewer's comment ID #: 2002-58)]	
SPM-354	A	5:50	5:50	In footnote 6, "near surface air temperature" should be made clearer: is it surface temperature, or classical 2m temperature? The two parameters may differ quite a lot, depending on surface properties. [Govt. of France (Reviewer's comment ID #: 2010-18)]	
SPM-355	A	6:1	6:2	The statement regarding temperatures at the top of the permafrost layer does not quite reflect statements in 4.7. Recommend: "Although there is a great deal of variability in the observed changes in shallow permafrost temperature, increases (up to 3°C) have been observed throughout the Arctic since the 1980s." [Govt. of Canada (Reviewer's comment ID #: 2004-27)]	
SPM-356	A	6:3	6:3	Add a sentence on the observed loss of CH4 from melting permafrost as this relevant to the issues related to the coupling of climate system changes and biogeochemical cycles: "Observations indicate substantial increases in CH4 released from northern peatlands that are experiencing permafrost melt". This sentence can be found in Chapter 7 page 7-42 lines 16-17 and appears to be an important observation in relation to climate system changes. [Govt. of Germany (Reviewer's comment ID #: 2011-13)]	
SPM-357	A	6:5	6:10	This bullet is misleading and therefore unacceptable. As an example we may take the SAHEL precipitation trends as shown in figure 3.13 in Chapter 3. For the period 1901-2005 a significant drying trend is shown. For the period 1979-2005, during which a much stronger anthropogenic warming was present, a significant positive trend in the SAHEL precipitation was observed. A closer look at figure 3.13 shows that there are very few regions in the world with a significant trend with the same sign both in the period 1901-2005 and in the period 1979-2005. We repeated this trend exercise for the CRU data set and found again conflicting results. Apparently, regional precipitation is too variable, to detect robust trends in precipitation in most parts of the globe. This bullet should be completely rephrased or deleted. [Govt. of Netherlands (Reviewer's comment ID #: 2014-7)]	
SPM-358	A	6:5	6:10	Why don't the precipitation trends have a confidence level associated with them, especially given the last lines of this bullet? [Govt. of United States of America (Reviewer's comment ID #: 2023-37)]	

SPM-359	A	6:6	6:7	Could the SPM specify what is meant by "significantly increased precipitation"? [Govt. of Norway (Reviewer's comment ID #: 2016-17)]
SPM-360	A	6:8	6:10	It would be helpful to specify why "robust long-term trends have not been observed for other regions". Is it due to the nature of the trends (low signal/noise), the quality of the observations, or the number or quality of the analyses of the observations? [Govt. of United States of America (Reviewer's comment ID #: 2023-38)]
SPM-361	A	6:12	6:16	This bullet is misleading and hardly supported by the evidence given in Chapter 3. There are virtually no direct objective observations of drought. Therefore most of the analysis in Ch3.3 is based on a primitive drought index which depends strongly on precipitation observations. Since drought is often seasonal, the variability in precipitation and drought is even higher than in the annual mean, and significant trends are even more difficult to ascertain. Therefore the statements in this bullet should be weakened considerably, or the bullet should be deleted. [Govt. of Netherlands (Reviewer's comment ID #: 2014-8)]
SPM-362	A	6:12	6:16	It is unclear how this paragraph is coupled to anthropogenic climate change. Changes in SST and circulation patterns are lumped together with precipitation and snow cover changes. While temperature changes are very likely to be associated with anthropogenic climate change the circulation changes are not equally likely to be associated with anthropogenic climate change. [Govt. of Sweden (Reviewer's comment ID #: 2019-12)]
SPM-363	A	6:14	6:16	"Changes in sea surface temperatures (SST) ... have also been linked to droughts" is unclear : does it mean that these changes are another cause of the more intense and longer droughts ? [Govt. of France (Reviewer's comment ID #: 2010-19)]
SPM-364	A	6:14	6:15	Change "... (SST), atmospheric circulation patterns, and decreased snowpack and snow cover have..." to "... (SST) and atmospheric circulation patterns, and decreased snowpack and snow cover, have..." Also, does "linked" mean "contributing"? [Govt. of United States of America (Reviewer's comment ID #: 2023-39)]
SPM-365	A	6:15	6:15	The statement that "decreased snowpack and snow cover have also been linked to droughts" is probably too weak for inclusion in the SPM. Chapter 3 (upon which this statement is based) suggests that this finding is drawn from specific North American conditions and, therefore, if the statement is to be retained this should be made clear. [Govt. of Australia (Reviewer's comment ID #: 2002-59)]
SPM-366	A	6:15	6:15	It is not obvious that "snowpack" refers to the thickness of the snow cover. Suggest rewording as "...decreased thickness and extent of the snowpack". [Govt. of United States of America (Reviewer's comment ID #: 2023-40)]
SPM-367	A	6:18	6:19	For the section to flow more coherently suggest that this dot point on salinity changes in the oceans is transposed with the following dot point on heavy precipitation. This will allow the points directly related to precipitation to be grouped together. [Govt. of Australia (Reviewer's comment ID #: 2002-60)]
SPM-368	A	6:18	6:19	It would be useful if the authors could provide some information on the timescale/rate of change over which observations of increasing salinity have been noted. [Govt. of Australia (Reviewer's comment ID #: 2002-61)]
SPM-369	A	6:18	6:19	"Basin-scale changes in ocean salinity provide further evidence of changes in the Earth's water cycle." This statement is too empty, detailed information of the change in ocean salinity should be added. For example, whether the salinity in high latitude is decreasing? [Govt. of China (Reviewer's comment ID #: 2006-19)]
SPM-370	A	6:18	6:19	Specify "Basin-scale changes in ocean salinity". [Govt. of Denmark (Reviewer's comment ID #: 2007-6)]
SPM-371	A	6:18	6:19	A bit more information would be helpful to understand the importance of the item. [Govt. of Finland (Reviewer's comment ID #: 2009-7)]

SPM-372	A	6:18	6:19	The placement of this statement feels awkward. Although one can infer that the Earth's water cycle was referred to in the preceding statement, to suddenly introduce ocean salinity changes is confusing. Suggest removing "further" to have the statement read: "Basin-scale changes in ocean salinity provide evidence of changes in the Earth's water cycle." [Govt. of Japan (Reviewer's comment ID #: 2013-13)]	
SPM-373	A	6:18	6:19	Delete. This is a useless statement without a proper interpretation. [Govt. of Netherlands (Reviewer's comment ID #: 2014-9)]	
SPM-374	A	6:18	6:19	This sentence should be a bit more explaining. Which are the changes meant? Are these in agreement with other changes in the Earth's water cycle? [Govt. of Sweden (Reviewer's comment ID #: 2019-13)]	
SPM-375	A	6:18	6:19	Suggest changing "Basin-scale" to "Ocean-wide". Also, 'ocean salinity changes' needs elaboration. Do you mean freshening of ocean salinity? And what are the implications for ocean circulation? Granted, this is the Observations section; however, these major issues need to be addressed in an appropriate portion of the SPM. [Govt. of United States of America (Reviewer's comment ID #: 2023-41)]	
SPM-919	B	6:18	6:22	In the bullets in these lines, it has to be noted that no reference is made on the period in which changes have occurred. Information on the heavy precipitation events is important to decision making due to the socio-economic impacts. Although this issue pertains to the WGII domain, the scientific information on the 20th century time interval these changes have exacerbated is of interest to decision making. [Govt. of Argentina (Reviewer's comment ID #: 2024-4)]	
SPM-376	A	6:20	6:20	Insert the following in bold: "Several changes in climate variability and extreme weather events have been observed including increased frequency of heavy rain or snow fall, changes in extreme temperatures and more-intense tropical cyclones". Rational: This follows the suggested change in SPM-5 35-36 with a split up of the message. [Govt. of Norway (Reviewer's comment ID #: 2016-52)]	
SPM-377	A	6:21	6:22	It would be useful if the authors could provide some analysis of the regional scope over which heavy precipitation have increased (i.e. in the tropics; in the Northern Hemisphere, etc.) [Govt. of Australia (Reviewer's comment ID #: 2002-62)]	
SPM-378	A	6:21	6:22	Specify whether this is a global feature. [Govt. of Denmark (Reviewer's comment ID #: 2007-7)]	
SPM-379	A	6:21	6:22	These two lines should be more elaborated. First, the fact that there may be an increase in the total mass of atmospheric water vapor does not imply that there should be more precipitation only because at higher temperatures the air may contain more water vapor without it precipitating. Precipitation is a flux, not a pool. This reasoning is too simplistic and should not be put forward. Second, even in a stable climate, statistics will show regions where there are more heavy precipitations and regions where there are less. Is this increase global? If possible, some insight should be given on the consistency of the patterns. Third, what is the definition of heavy precipitation used here? Many times it is understood by medias as extreme rainfall, whereas here it probably means precipitation above percentile 90, or above a given threshold (10 or 20 mm per day?). For instance, in chapter 3.8 there is a quotation of a paper of Fowler and Kilsby who mention 10 days totals: this is quite different from heavy precipitation in a few minutes e.g. from a convective storm. Fourth, some numbers should be given in order to quantify this statement. In short, we suggest first to define more accurately "heavy precipitation", and to say for instance : "The global frequency of heavy precipitations events has increased, consistent with the increased evaporation under warmer conditions which induces also the observed increases of atmospheric water vapor." [Govt. of France (Reviewer's comment ID #: 2010-20)]	
SPM-380	A	6:21	6:22	Respect to the different regional analyses quoted in 3.8.2.2, this statement seems too strong. A region by region analysis, as for the precipitation, could be usefull. [Govt. of Italy (Reviewer's comment ID #: 2012-32)]	

SPM-381	A	6:21	6:21	Write:"..., consistent with global warming and ..." [Govt. of Switzerland (Reviewer's comment ID #: 2020-16)]	
SPM-382	A	6:21	6:22	It would be helpful to add some information about where 'the frequency of heavy precipitation events has increased'. Is this a consistent pattern globally, more pronounced in some latitudes than others, greater at higher than lower elevations, etc.? [Govt. of United Kingdom (Reviewer's comment ID #: 2022-24)]	
SPM-383	A	6:21	6:22	The statement "The frequency of heavy precipitation events has increased, ..." may be taken to mean 'everywhere,' which almost certainly is not true. Consider re-crafting this sentence with appropriate modifiers to provide a clearer statement consistent with findings. Add the geographical qualifier (e.g., TS-21, line 7) "...in many land regions". Also, shouldn't there be a likelihood qualifier here and throughout much of this page? Refer at minimum to Table SPM-1 in all relevant instances. In this particular case, add "(see Table SPM-1)" after "increased", so readers see the confidence level. [Govt. of United States of America (Reviewer's comment ID #: 2023-42)]	
SPM-384	A	6:24	6:25	"Cold days, cold nights and frost have become rarer..." The word "rarer" is too tough, "less frequent" may be better. It can also be related to "more frequent" of hot days. [Govt. of China (Reviewer's comment ID #: 2006-20)]	
SPM-385	A	6:25	6:25	Change "rarer" to "less frequent" because "rarer" could describe spatial or temporal frequency. Do you mean "less widespread" as well? [Govt. of United States of America (Reviewer's comment ID #: 2023-43)]	
SPM-386	A	6:27	6:27	Add a bullet on midlatitude storms in view of the statement in SPM12, 32. [Govt. of Netherlands (Reviewer's comment ID #: 2014-10)]	
SPM-387	A	6:28	6:28	The first sentence and first half of the second sentence are phrased in much weaker language than what is found in the TS and table SPM-1. For consistency suggest they are replaced with "Globally, it is likely that the proportion of tropical cyclones reaching the most intense categories has increased since 1970, although there is no clear trend in the total numbers of tropical cyclones. This is correlated with....". In addition the footnote should include a statement that "The numbers of hurricanes in the North Atlantic have, however, been above normal (based on the 1981 – 2000 average) in 9 of the years from 1995 to 2005." [Govt. of Australia (Reviewer's comment ID #: 2002-63)]	
SPM-388	A	6:28	6:29	this sentence could be more precise, as the trend suggested by satellite data is quite strong, almost doubling the numbers of categories 4 and 5 cyclones. We propose to say:"Satellite records suggest in all ocean basins a strong trend towards..." [Govt. of France (Reviewer's comment ID #: 2010-21)]	
SPM-389	A	6:28	6:31	Replace by: 'Data on trends in the number and intensity of tropical storms are inconclusive, although there are indications for more intense storms since about 1970, correlated with higher tropical SSTs.' [Govt. of Netherlands (Reviewer's comment ID #: 2014-11)]	
SPM-390	A	6:28	6:31	This paragraph could, perhaps, equally well be moved after the current Line 34. Or, is the meaning to convey that a change in tropical cyclone intensity has been observed now? The formulation is a bit searching on this. [Govt. of Sweden (Reviewer's comment ID #: 2019-14)]	
SPM-391	A	6:28	6:30	Replace second sentence of bullet with "Several studies based on the interpretation of long-term satellite records provide evidence that increasing tropical sea surface temperatures are associated with more intense, but not necessarily more frequent, typhoons since about 1970." The SPM needs to reflect the vigorous and ongoing debate regarding this issue. Recent analyses using a homogenous satellite data record spanning 1983 to 2005 find no significant increase in hurricane frequency and intensity outside the Atlantic basin, and questions remain as to the adequacy of observational data sets for detecting hurricane trends prior to the satellite era. [Govt. of United States of America (Reviewer's comment ID #: 2023-44)]	

SPM-392	A	6:30	6:31	"There are concerns about the quality of tropical cyclone data, particularly before the satellite era." This sentence should be deleted, because the "observed warming of tropical SSTs" is also obtained from satellite data. [Govt. of China (Reviewer's comment ID #: 2006-21)]	
SPM-393	A	6:30	6:31	What does this sentence mean for policy makers? Would suggest adding at the end a phrase like ", however the association observed between SST and intensity appears robust". [Govt. of Germany (Reviewer's comment ID #: 2011-14)]	
SPM-394	A	6:30	6:31	It would be helpful to add "(since mid 1980s)" at the end of the sentence in order to clarify the time period meant by 'before the satellite era'. [Govt. of Pakistan (Reviewer's comment ID #: 2017-3)]	
SPM-395	A	6:31	6:31	Define the pre-satellite era in terms of years (before 1970 or 1979?). [Govt. of Sweden (Reviewer's comment ID #: 2019-15)]	
SPM-396	A	6:32		the subject of the increase in ocean acidity should also be mentioned; please add a bullet on this subject [Govt. of France (Reviewer's comment ID #: 2010-22)]	
SPM-397	A	6:34	6:34	The authors should state the timescale, over which these aspects of climate have not changed. Is it since the TAR? In the observational record? Since 1750? [Govt. of Australia (Reviewer's comment ID #: 2002-64)]	
SPM-398	A	6:34	6:34	"Some important aspects of climate appear not to have changed." It is really "not have changed" or there is no study to show it has changed? [Govt. of China (Reviewer's comment ID #: 2006-22)]	
SPM-399	A	6:34	6:34	Replace 'appear not to have changed' by 'may not have changed'. [Govt. of Netherlands (Reviewer's comment ID #: 2014-12)]	
SPM-400	A	6:34	6:34	We miss a bullet about changes during the last 50 years in extreme wind at mid-latitudes. [Govt. of Norway (Reviewer's comment ID #: 2016-18)]	
SPM-401	A	6:36	6:36	Suggest that the authors add that DTR has generally declined over a longer period. [Govt. of Australia (Reviewer's comment ID #: 2002-65)]	
SPM-402	A	6:36	6:37	This bullet point is better made in chapter 3, page 3-17, lines 19-23. Suggest changing to: " The decline in DTR since 1950 reported in the TAR has now ceased. Since 1979, daily minimum and daily maximum temperatures increased in most parts of the world." However, this point does not belong under the heading " some important aspects of climate have not changed" while the DTR has not changed, both daily minimum and daily maximum have. Move to previous section. [Govt. of Canada (Reviewer's comment ID #: 2004-28)]	
SPM-403	A	6:36	6:37	"Data available since the TAR show that the average difference between day-and night-time temperatures has not changed since 1979, both having risen at about the same rate." What does the "day-and night-time temperatures" mean? Does it mean the average temperature of day-and night-time or the maximum and minimum temperature? Evidence has shown that the DTR (diurnal temperature range) has significantly decreased. [Govt. of China (Reviewer's comment ID #: 2006-23)]	
SPM-404	A	6:36	6:37	"Day-and night-time temperatures have risen at about the same rate since 1979 ": this is a very different statement than in previous reports. In the TAR, the statement was that for 1950-1993, the increase of minimum temperature is at a double rate than the daily maximum temperatures. In AR4, this is also obtained for 1950-2004 (chap 3.2 page 3-11) but not for the period 1979-2004 : why ? Is this valid over continents, or worldwide including maritime environment? A similar rate for day and night is surprising relatively to the differential effect of aerosols between day and night. [Govt. of France (Reviewer's comment ID #: 2010-23)]	

SPM-405	A	6:36	6:37	Replace by: 'Data on the difference between day-and night-time temperature are inconclusive. Some regions show positive trends, while other regions show negative trends. The global mean difference over land shows little change since 1979. {3.2, figure 3.11, figure 3.2} [Govt. of Netherlands (Reviewer's comment ID #: 2014-13)]	
SPM-406	A	6:36	6:37	It should be specified whether the conclusion on "Reduced diurnal temperature range" due to faster growth of night temperatures (see AR3 SPM Table1, p.15) is cancelled. [Govt. of Russian Federation (Reviewer's comment ID #: 2018-7)]	
SPM-407	A	6:36	6:37	If there is no geographic language attached, is the reader to assume that these are global averages? This needs to be made clear, both here and elsewhere in the SPM text. And, in many cases, authors apparently co-mingle land vs. ocean, and such distinctions also warrant delineation. [Govt. of United States of America (Reviewer's comment ID #: 2023-45)]	
SPM-408	A	6:37	6:37	What about before 1979? This may seem peculiar to some readers unless reason for focussing on 1979 is explained. Again, the anchoring date seems changed since earlier reports? [Govt. of Belgium (Reviewer's comment ID #: 2003-29)]	
SPM-409	A	6:39	6:39	The authors should point out that reduced warming and lack of trend in Antarctic sea-ice is consistent with 20C CGCMs forced runs [Govt. of Australia (Reviewer's comment ID #: 2002-66)]	
SPM-410	A	6:39	6:41	There are statistically significant trends in Antarctic sea ice, just not on a zonal-average or Southern Ocean-average scale. Over the last 2 decades, sea-ice concentrations and duration have been decreasing strongly in the western Antarctic Peninsula and southern Bellingshuasen sea-ice regions (numerous references) while increasing in the western Ross Sea (again numerous references). So, as a whole, there is little significant change, but regionally these are strong trends: in the first region, there has been a decrease of 85 annual sea-ice days between 1979 and 2004, and in the second region an increase of 60 days. The statement as given in this paragraph is misleading and should be altered to indicate that there are regionally significant trends, but not hemispherically. [Govt. of United States of America (Reviewer's comment ID #: 2023-46)]	
SPM-411	A	6:40	6:41	The final clause in the sentence (beginning 'consistent with the lack...') seems confusing. Sea ice occurs on margins of the continent, so it is hard to see how average temperature across the continent is relevant. Suggest possibly deleting the final clause as it is an inferential comment on the first part of the sentence [Govt. of Australia (Reviewer's comment ID #: 2002-67)]	
SPM-412	A	6:40	6:40	The TS (at page 50) notes that "There is, however, insufficient data to draw conclusions about trends in the thickness of Antarctic sea ice" this should also be noted at this point in the SPM. [Govt. of Australia (Reviewer's comment ID #: 2002-68)]	
SPM-920	B	6:40	6:40	Physically-wise, it will be necessary to modify the text "warming in atmosphere temperatures". Even agreeing that it is a speaking / writing simplification, it is physically wrong to say that atmospheric temperature warm. The amount of energy is not related solely with the temperature. Therefore, to be correct, the sentence shall read "consistent with the observed lack of atmospheric temperature increases". [Govt. of Argentina (Reviewer's comment ID #: 2024-5)]	
SPM-413	A	6:41	6:41	Would it not be more correct to relate the Antarctic sea ice extent (no change) to temperatures over the ocean around the continent, rather than across it? [Govt. of Sweden (Reviewer's comment ID #: 2019-16)]	
SPM-414	A	6:43	6:45	States that there is no discernable trend in MOC, as a result of observational analyses, while p. 13, Lines 18 to 23 says, as a projection of oceanographic circulation in the future: "it is very likely that MOC will slow down during the 21st century, but very unlikely that MOC will undergo a large abrupt transition during the 21st century." Some explanations on the differences between the analysis and future projection should be added. [Govt. of Japan (Reviewer's comment ID #: 2013-14)]	

SPM-415	A	6:43	6:44	Write:"...trends exist in the meridional overturning circulation ..." [Govt. of Switzerland (Reviewer's comment ID #: 2020-17)]	
SPM-416	A	6:44	6:44	As this is the first time that meridional overturning circulation is mentioned in the SPM an explanation of this phenomenon would help a policy audience. [Govt. of Australia (Reviewer's comment ID #: 2002-69)]	
SPM-417	A	6:44	6:45	Suggest deletion of "large-scales" and "small scales" as from the examples provided it is self-evident. [Govt. of Australia (Reviewer's comment ID #: 2002-70)]	
SPM-418	A	6:44	6:44	"the meridional overturning circulation of the global ocean" would be very unclear for many policymakers. It would help to add a footnote with some explanations, including the relation of MOC with the Gulf Stream. It would also be very helpful to have a statement saying if a slowing of this circulation is already observed or not.G48 [Govt. of France (Reviewer's comment ID #: 2010-24)]	
SPM-419	A	6:46	6:46	Add bullet: The dominant pattern of interannual variability, ENSO, does not show a significant trend.. [Govt. of Netherlands (Reviewer's comment ID #: 2014-14)]	
<b>SPM-420</b>	<b>A</b>	<b>7:1</b>	<b>7:13</b>	Table SPM-1: suggest this table is moved to the end of the SPM after the discussion of attribution and projections of climate change. Its current location pre-empts much of the later discussion in the SPM. [Govt. of Australia (Reviewer's comment ID #: 2002-71)]	Could support: There is some logic to this point since the table includes projections but not high priority
<b>SPM-421</b>	<b>A</b>	<b>7:1</b>	<b>7:13</b>	Table SPM-1: final row: "extreme high sea level" is not defined in Table 3.7 (as suggested by footnote (a)) therefore suggest a definition of what this encompasses is included. It also should be clearly stated that the Table (and chapter 5) is referring to "Storm surge related extreme high sea level". [Govt. of Australia (Reviewer's comment ID #: 2002-72)]	Increased impact of flooding with rising sea levels (excludes tsunamis).
<b>SPM-422</b>	<b>A</b>	<b>7:1</b>	<b>7:13</b>	Table SPM-1 --Suggest using Table TS-4 as is, along with the caption which better explains the use of formal studies and expert judgement. [Govt. of Canada (Reviewer's comment ID #: 2004-29)]	
<b>SPM-423</b>	<b>A</b>	<b>7:1</b>	<b>7:13</b>	Define "extreme high sea level" because Table 3.7 in Chapter 3 does not contain this phenomenon. [Govt. of United States of America (Reviewer's comment ID #: 2023-47)]	Increased impact of flooding with rising sea levels (excludes tsunamis).
<b>SPM-424</b>	<b>A</b>	<b>7:1</b>	<b>7:13</b>	In third column (on discernible human influences) associated with Tropical Cyclone phenomenon, substitute "inconclusive" for "more likely than not". Refer to U.S. Government comment on SPM-6, lines 28-31, for argument regarding lack of consensus. [Govt. of United States of America (Reviewer's comment ID #: 2023-48)]	<i>Likely</i> in the North Atlantic
<b>SPM-425</b>	<b>A</b>	<b>7:1</b>	<b>7:13</b>	Clarify to what areas of the globe Table SPM-1 refers (e.g., only drought has a geographic qualifier), since these changes are not observed everywhere. If it is the global average throughout, this should be stated in the table title. [Govt. of United States of America (Reviewer's comment ID #: 2023-49)]	See suggested edits

SPM-426	A	7:1	7:13	Since often used as a standalone item, footnote the table to refer to the certainty definitions found on TS-4, and the methodology in Chapter 9 to come to those qualifiers. Add SPM footnote 5 back in as a footnote to the table too. [Govt. of United States of America (Reviewer’s comment ID #: 2023-50)]	
SPM-427	A	7:1	7:13	There is a thread on heat waves that starts in FAQ 3.3 in Chapter 3 that states that “More warm extremes imply an increased frequency of heat waves.” Since there is little direct evidence that true heat waves have increased and must be “implied,” this statement does not rise to the level of likely in Table SPM-1 and the similar table in Chapter 3; in both instances the uncertainty should be more likely than not. This statement then leads into the statement on projected increases in heat waves in the SPM that “It is very likely that hot extremes, heat waves, and heavy precipitation events will continue to become more frequent. {10.3}” There may be high confidence that there will be increases in heat waves over the 21st century, but not that they “continue” since it has not been directly established that they have increased over the last half of the 20th century. [Govt. of United States of America (Reviewer’s comment ID #: 2023-51)]	The detection of this trend is premature and the literature does not indicate that recent high profile heat waves are outside the range of natural variability.
SPM-428	A	7:1	7:13	Delete “continuation of” in the fourth column header. [Govt. of United States of America (Reviewer’s comment ID #: 2023-52)]	Since some of the trends are not yet detectable, there is no reason to say they will continue
SPM-429	A	7:1	7:13	<p>In Chapters 3 and 9, from whence most if not all of the information for Table SPM-1 is pulled, these are just “Extreme Weather Event” phenomena. At minimum, delete “and climate events” from line 4 of the title. However, a more comprehensive treatment is preferable. This table provides the authors with a valuable opportunity to communicate the “Climate Event” findings of the underlying report, even if only addressing items that warranted elevation to the SPM itself. It is the belief of the U.S. Government that Table SPM-1 should be significantly modified to more fully serve the purpose for which it is expressly intended—that is, to indicate “recent trends which have a discernible human influence and are likely to continue in the 21st century”. Tables traditionally recapture key points in the accompanying text, and are often used as standalone presentation vehicles. Table SPM-1 should fulfill this role with respect to trends. As it now stands, only a few of the trends deemed worthy of discussion in the document are included, and one could argue they are not even the most important ones. It is recognized that the table was originally focused on extremes; but, given that it is so explicitly concerned with trends and anthropogenic influence, it gives the impression that the trends mentioned are the only ones worth highlighting as having an attributable human influence (5 out of 7 with marginal certainty). This deficiency could be corrected by either adding phenomena with more pronounced human influence or by removing the attribution column. At a minimum, Table TS-4 (TS-30, lines 1-13) should be substituted for Table SPM-1 as foundation of the editing process, because this version of the table explains the origins of the attributions.</p> <p>The following is a list of parameters that are mentioned in the SPM itself, with trends currently occurring and likely having a discernible human influence (or at least more likely than not) and whose trends are likely to continue in the 21st century:</p> <ol style="list-style-type: none"> <li>1. Carbon dioxide</li> <li>2. Nitrous oxide</li> <li>3. Positive radiative forcing</li> <li>4. Global average surface air temperature</li> <li>5. Low-to mid-tropospheric temperature</li> <li>6. Atmospheric water vapor</li> </ol>	

				<p>7. Global ocean temperatures</p> <p>8. Global average sea level</p> <p>9. Northern Hemisphere snow cover and mountain glaciers</p> <p>10. Arctic sea ice</p> <p>11. Greenland and Antarctic ice sheets (here one could make the point that their trend in the 21st century is uncertain, even though the trend currently is for shrinkage)</p> <p>12. Increased precipitation (N. America, S. America, northern Europe, northern and central Asia; the model projections could be used to suggest whether these are likely to continue and, if so, it would increase the likelihood that the current trend is due to human influence).</p> <p>13. Decreased precipitation (Sahel, the Mediterranean, southern Africa and parts of southern Asia; again use models to estimate continued likelihood and current anthropogenic influence).</p> <p>14. More intense and longer droughts</p> <p>15. Specific basin-scale salinity changes (in particular, if the North Atlantic is getting fresher)</p> <p>16. Frequency of heavy precipitation events</p> <p>17. Extreme temperatures – cold nights and frosts, hot days, hot nights, and heat waves</p> <p>18. Tropical cyclones (appropriately caveated)</p> <p>19. Atmospheric circulation. Omitted are items (such as methane) that do not have current trends. Adding true “climate events” provides authors with more signals to give higher degrees of certainty (including very likely, extremely likely, and virtually certain). Given the current space devoted to Table SPM-1, this list, in part or in its entirety, would fit on one page. It would provide a convenient summary of both past changes, likely predictions, and the probability of anthropogenic influence. [Govt. of United States of America (Reviewer’s comment ID #: 2023-96)]</p>	
<b>SPM-430</b>	<b>A</b>	<b>7:3</b>	<b>7:</b>	Table SPM-1, 2nd column, last line: Why only "likely"? There could be a good reason but since mean sea level has gone up with certainty, it is hard to understand why increase in extremes is less certain, especially when it is not even quantified. [Govt. of Belgium (Reviewer’s comment ID #: 2003-32)]	Although sea level has risen, there a trend in flooding is not yet attributable to the changes
<b>SPM-431</b>	<b>A</b>	<b>7:3</b>	<b>7:</b>	Table SPM-1, 4th column, last line: Why only "likely"? If the average sea level increases, the return period of extreme high sea level events (due to storm surges) decreases automatically, with very high likelihood. [Govt. of Belgium (Reviewer’s comment ID #: 2003-33)]	See above
<b>SPM-432</b>	<b>A</b>	<b>7:3</b>	<b>7:13</b>	A note of (e) should be added in Table SPM-1 in order to explains that the three types of likelihood in different columns have different meanings in order to avoid misunderatanding because they are derived from observation, detection and projection respectively. [Govt. of China (Reviewer’s comment ID #: 2006-24)]	
<b>SPM-433</b>	<b>A</b>	<b>7:3</b>	<b>7:13</b>	Table SPM-1. Please check the content of the table and the corresponding content in the text to keep them consistent, especially in the section "Understanding and attributing climate changes". [Govt. of China (Reviewer’s comment ID #: 2006-25)]	
<b>SPM-434</b>	<b>A</b>	<b>7:3</b>	<b>7:13</b>	In the last line of Column 1 in table Spm-1,"Increased incidence of extreme high sea level (excludes tsunamis)", what is the timescale of extreme high sea level? If it exclude tsunamis, then storm tide should also be excluded, so, what can cause extreme high sea level? [Govt. of China (Reviewer’s comment ID #: 2006-26)]	Change to impact of flooding
<b>SPM-435</b>	<b>A</b>	<b>7:3</b>	<b>7:4</b>	It is offered to replace heading of a column 4 "Likelihood of continuation of trend based on projections for 21st century using SRES scenarios" on "Likelihood that projections for 21st century using SRES scenarios detect tendency similar to observed trend" [Govt. of Russian Federation (Reviewer’s comment ID #: 2018-8)]	Disagree since some trends not yet observed

<b>SPM-436</b>	<b>A</b>	<b>7:6</b>	<b>7:7</b>	Table SPM-1 : the writing with "/" is not very clear warmer/fewer cold, days/nights does that mean warmer or fewer cold, days and nights? [Govt. of France (Reviewer's comment ID #: 2010-25)]	
<b>SPM-437</b>	<b>A</b>	<b>7:6</b>	<b>7:7</b>	Table SPM-1 : the last bullet is not very clear "increased incidence of extreme high sea level" : does this correspond to increased sea level and its consequences on increasing the occurrence of high sea level associated with extreme meteorological conditions ? This seems also very much linked with the preceeding line on tropical cyclones. Also the word "incidence" should not be used, as it is synonymous of impacts treated by Working Group II. [Govt. of France (Reviewer's comment ID #: 2010-26)]	Change to impact of flooding
<b>SPM-438</b>	<b>A</b>	<b>7:6</b>	<b>7:14</b>	table SPM-1: Delete 'discernable' in the heading of the third column. [Govt. of Netherlands (Reviewer's comment ID #: 2014-15)]	Could support: but not high priority
<b>SPM-439</b>	<b>A</b>	<b>7:6</b>	<b>7:14</b>	table SPM-1, statements on droughts, tropical cyclones and high sea level: Insufficient data are available for the assessment of the likelihood of trends and human influence. [Govt. of Netherlands (Reviewer's comment ID #: 2014-16)]	Agree and suggest changes for sea level and cyclones, Could support for drought but not high priority
<b>SPM-440</b>	<b>A</b>	<b>7:6</b>	<b>7:14</b>	Table SPM-1: Move this table to SPM10, 25 just ahead of the section on projections. [Govt. of Netherlands (Reviewer's comment ID #: 2014-19)]	Could support: There is some logic to this point since the table includes projections but not high priority
<b>SPM-441</b>	<b>A</b>	<b>7:6</b>	<b>7:7</b>	Should be adjusted in case of new levels of likelihood (see comment 3) [Govt. of Russian Federation (Reviewer's comment ID #: 2018-9)]	
<b>SPM-442</b>	<b>A</b>	<b>7:9</b>	<b>7:9</b>	It should be: (a) See Footnote 5 (SPM-1) and Table 3.7 for definitions [Govt. of Russian Federation (Reviewer's comment ID #: 2018-10)]	
SPM-443	A	7:16	7:16	Add Figure TS-20 Top (Records of Northern Hemisphere (NH) temperature variation during the last 1300 years ). A similar figure appeared in the TAR and there was much controversy over this and high level attention from several governments to the question of its veracity. Significant new work has been reported since then confirming the findings and it is relevant for policymakers, therefore it should be included in the SPM. [Govt. of Germany (Reviewer's comment ID #: 2011-70)]	Support highlighting progress on hockey stick controversy
SPM-444	A	7:16	7:16	Change the title of the section : "Learnig from past climate" Rationale : the current title is not clear [Govt. of Switzerland (Reviewer's comment ID #: 2020-18)]	
SPM-445	A	7:16	8:9	This section is a poorly developed. It is missing a discussion of abrupt change. This would seem a gap in important messaging for Policymakers. Consider using lines 42-48 from page TS-31. Also, this section should do more to address the 'hockey stick' issue explicitly (see comment below). [Govt. of Canada (Reviewer's comment ID #: 2004-30)]	Support highlighting progress on hockey stick controversy

SPM-446	A	7:16	8:9	In the paleoclimatic section no mention is given to the 'climate optimum' period. This period was located before of the last 1300 years and after the last interglacial period. The spatial extent of the temperature anomaly during this period was not global, and it is possible that this is the reason why it is not mentioned in this report. All the same, given the fact that it is very well known to the public, maybe a sentence should be added within this Section about it and its relation to the present temperature anomalies. [Govt. of Italy (Reviewer's comment ID #: 2012-20)]	Oppose - Climate optimum is a personification of climate conditions and not a useful term
SPM-447	A	7:16	8:9	Section: A Paleoclimatic Perspective · this section is particularly weak. it is not clear what its aim is and what is new since TAR - this section could be used to discuss abrupt changes by drawing from the TS (TS 3.5) -It would be very helpful to include a chart showing temperature and CO2 levels in the past to demonstrate correlation and unprecedented nature of recent changes [Govt. of United Kingdom (Reviewer's comment ID #: 2022-12)]	Agree/support changes
SPM-448	A	7:16	8:9	It is not clear how the second bullet point might inform policy-making. Is this simply to help explain why global mean temperatures were higher than present in the last interglacial period without anthropogenic greenhouse gases? Alternatively, this section could be deleted as it adds nothing except confusion to the main messages of the SPM. [Govt. of United Kingdom (Reviewer's comment ID #: 2022-25)]	Need to clarify that under the most recent past interglacial warming conditions sea levels were significantly higher
SPM-449	A	7:18	7:19	To provide a policy reader with further information about what paleoclimatic studies consist of, suggest that after the first sentence a second sentence is added, as derived from the TS "Paleoclimatic studies make use of measurements derived from bore hole temperatures, ocean sediment bore-water change, and glacier extent changes, as well as proxy measurements involving the changes in chemical, physical and biological parameters that reflect past changes in the environment where the proxy grew or existed". This would then allow the deletion of "(e.g tree ring width)". [Govt. of Australia (Reviewer's comment ID #: 2002-73)]	Agree/support suggested change will provide policy makers with a better understanding of what paleoclimate records - merge with comment 450
SPM-450	A	7:18	7:24	The shaded box needs to be improved and should include a discussion of what is new from the TAR, as well as the relevance of past climate to future climate change. Suggested text: "Paleoclimatic studies use changes in climatically sensitive indicators to infer past changes in climate on time scales ranging from hundreds to millions of years. Such proxy data document the magnitude and rate of past climate changes, including abrupt changes, and their associated impacts, providing important context for historic trends and future projections. There is increased confidence concerning reconstructions of past climate, as new studies using multiple indicators and data from different regions of the world together show coherent patterns of change." [Govt. of Canada (Reviewer's comment ID #: 2004-31)]	Agree/support suggested change
SPM-451	A	7:18	7:24	The uncertainty of paleoclimate data should be carefully described. It should be mentioned that these data can not simply be used to be a reference for the current climate or future projection without any consideration. In L4-6 of SPM-14, for example, paleoclimate temperature data is used as an evidence to support the future projection without mentioning any uncertainty. The wording needs to be revised. [Govt. of China (Reviewer's comment ID #: 2006-27)]	Good point but the temperature 125,000 years ago were inferred from climate model simulations on

					SPM-14 L4-6. For SPM-7: 23-24 suggest changing “spatial coverage” to “spatial and temporal coverage, as well as challenges when using environmental proxies to infer climate conditions.
SPM-452	A	7:18	8:9	There are no figures in this section. A figure (a crucial figure) could help to illustrate and summarize the statement in bold letters (lines 27-28). [Govt. of Italy (Reviewer’s comment ID #: 2012-29)]	
SPM-453	A	7:19	7:19	Replace "hundreds" by "years" to reflect the whole range of time-scales [Govt. of Germany (Reviewer’s comment ID #: 2011-62)]	Agree, support suggested change
SPM-454	A	7:23	7:24	Uncertainties generally increase with time into the past due to increasingly limited spatial coverage AND the nature of the recording process. [Govt. of Belgium (Reviewer’s comment ID #: 2003-30)]	Agree but see SPM- 451
SPM-455	A	7:27	7:27	Suggest that the statement in chapter 6 concerning improvements in certainty since the TAR, is inserted at the start of this sentence to provide further context for policy readers, (i.e "The TAR pointed to the <b>exceptional</b> warmth of the late 20th century, relative to the past 1000 years. Subsequent evidence has strengthened this conclusion. Paleoclimate information.....") [Govt. of Australia (Reviewer’s comment ID #: 2002-74)]	Agree and adopt suggested change in wording.
SPM-456	A	7:27	7:28	This statement needs to be split in two sentences. [Govt. of Belgium (Reviewer’s comment ID #: 2003-31)]	Agree split.
SPM-457	A	7:27	7:28	This is a weak bolded statement that says very little and buries two important but separate issues into one sentence. Suggest rewording to make strong clear statements about 1) the nature of the recent warming in context of past climate, 2) the significance of warming of the magnitude observed in terms of consequences (e.g. ice sheet retreat) for the climate system. For (1), we would also suggest that the word “unusual” is not strong enough in reporting on recent observations. If the evidence warrants it, suggest use of term "unprecedented warming" (within appropriate timeframe). [Govt. of Canada (Reviewer’s comment ID #: 2004-32)]	
SPM-458	A	7:27	7:27	It is difficult to interpret the meaning of this sentence. We propose the following wording: Paleoclimate information supports the notion that the recent warming is unusual also in a longer time perspective, i.e. a few thousand years. Paleoclimate information also suggests that.....etc. [Govt. of Sweden (Reviewer’s comment ID #: 2019-17)]	
SPM-459	A	7:27	7:27	Suggest changing to “...suggests that past warming has also driven large-scale...” [Govt. of United States of America (Reviewer’s comment ID #: 2023-53)]	

SPM-460	A	7:27	7:28	This sentence is really two points that are totally independent as articulated in the two paragraphs that follow, and has to be read very carefully to properly interpret the message. The danger for policymakers is that one can easily assume that “unusual nature of the recent warming” and “past warming” are the same warming, whereas the paragraphs that follow indicate that one is past recent warming during the second half of the 20th century and the other past warming was 125,000 years ago. At the very least, break the statement into two sentences, as edited and as follows: “Paleoclimate information supports the unusual nature of the recent warming. Paleoclimate evidence suggests that more distant past warming (glacier-free periods of the last 500,000 years) has driven large-scale ice sheet retreat and sea level rise.” [Govt. of United States of America (Reviewer’s comment ID #: 2023-54)]	
SPM-461	A	7:27	8:2	The key finding for this section is that it is very likely that 20th century temperatures were the hottest in the Northern Hemisphere in the past 500 years. This should be more prominent. Suggest that the last sentence of the first dot point in this section, is moved to become the second sentence of the bolded section header. [Govt. of Australia (Reviewer’s comment ID #: 2002-75)]	
SPM-462	A	7:27	8:2	The TAR had a figure showing a millennium-scale temperature reconstruction (the so-called "hockeystick curve") that sparked an unusually heated controversial discussion, including by policymakers. The present text should therefore be complemented by an updated version of this figure from the Technical summary. [Govt. of European Community (Reviewer’s comment ID #: 2008-9)]	
SPM-463	A	7:30	7:30	Insert "over the past 1000 years" between "temperatures" and "than" to make it clear what the recent studies have found. [Govt. of Australia (Reviewer’s comment ID #: 2002-76)]	
SPM-464	A	7:30	7:33	Awkward and long sentence and one that does not follow directly from the bolded sentence above and the message gets lost. Suggest restructuring the paragraph. The phrasing is better in Technical Summary (page TS-30 lines 31-33). Also, suggest adding to end of line 31 the phrase from the Technical Summary (TS-31 lines 14-15) “these are likely linked to natural forcings due to volcanic eruptions and/or solar activity.” [Govt. of Canada (Reviewer’s comment ID #: 2004-33)]	
SPM-465	A	7:30	7:30	Insert 'multidecadal' between greater and variability. [Govt. of Netherlands (Reviewer’s comment ID #: 2014-17)]	
SPM-466	A	7:30	7:31	Suggest replacing the first sentence of the bullet with “Some studies since the TAR have indicated greater cooling during the so-called Little Ice Age, particularly during the 12 to 14th, 17th, and 19th centuries.” [Govt. of United States of America (Reviewer’s comment ID #: 2023-55)]	
SPM-467	A	7:30	8:2	It would be extremely useful to provide a figure in support of this bullet point, such as the top panel of Figure TS-20. It would deal with the contentious part of the "hockey stick curve" and is something most policy makers will expect to be clearly addressed in the SPM. [Govt. of Canada (Reviewer’s comment ID #: 2004-34)]	
SPM-468	A	7:31	7:31	For the sentence to make grammatical sense suggest inserting "finding that cooler periods existed" after "particularly". [Govt. of Australia (Reviewer’s comment ID #: 2002-77)]	
SPM-469	A	7:32	7:32	The second sentence ("Warmer periods...the TAR") is too obtuse for policy readers. For example: What is the uncertainty range?; and Why is the connection made to the TAR? [Govt. of Australia (Reviewer’s comment ID #: 2002-78)]	
SPM-470	A	7:32	7:32	It should be noted that only one study found that slightly warmer conditions may have existed in the 11th century than was indicated in the TAR. [Govt. of Australia (Reviewer’s comment ID #: 2002-79)]	
SPM-471	A	7:32	7:33	" Average Northern.." replace with "In the FAR average Northern.." . The goal is to clarify which results are new. [Govt. of Italy (Reviewer’s comment ID #: 2012-12)]	
SPM-472	A	7:32	7:33	"Average Northern Hemisphere temperatures....": are these surface temperatures? [Govt. of Italy (Reviewer’s comment ID #: 2012-37)]	

SPM-473	A	7:32	7:32	Clarification: Warmer periods before the 20th century are within the uncertainty range given in the TAR. [Govt. of Sweden (Reviewer's comment ID #: 2019-18)]	
SPM-474	A	7:32		please insert here the top part of figure TS-20, representing the NH temperature reconstructions, which shows very clearly the evolution of temperatures in the last 1300 years, and the uncertainties associated to these estimations. [Govt. of France (Reviewer's comment ID #: 2010-27)]	
SPM-475	A	7:33	7:33	Replace "very likely warmer" by "very likely higher" (a temperature can not be warm) [Govt. of Netherlands (Reviewer's comment ID #: 2014-18)]	
SPM-476	A	7:33	8:1	"...temperatures during the second half of the 20th century were very likely warmer than during any other 50-year period in the last 500 years and likely the warmest in at least the past 1300 years." What is the difference between 500 and 1300 years, e.g., the confidence level of "very likely" and "likely"? It should be mentioned that the 500 years include LIA and the 1300 years include MWP. [Govt. of China (Reviewer's comment ID #: 2006-28)]	
SPM-477	A	8:1	8:1	Replace "warmest" by "highest". [Govt. of Netherlands (Reviewer's comment ID #: 2014-20)]	
SPM-478	A	8:4	8:9	A sea level rise between 4 and 6 m linked with a polar temperature rise between 3 and 5 °C looks inconsistent with i) the forecast 0,19m to 0,58m sea level rise by 2100, which is associated with a +1 to +6,3 °C temperature rise (see page 11, lines 11 to 26) and ii) the indication that "warming is expected to be greatest (...) at high northern latitudes" (see page 11, lines 48 and 49). This apparent discrepancy needs to be explained? [Govt. of Belgium (Reviewer's comment ID #: 2003-34)]	Agree, insert "sustained for millennia"
SPM-479	A	8:4	8:9	We would also like to know the global temperature estimate for this interglacial period. [Govt. of Norway (Reviewer's comment ID #: 2016-20)]	
SPM-480	A	8:5	8:5	Insert "the" between "to" and "retreat", as it was not the retreat that cause the sea level rise per se but rather the effect of the retreat. [Govt. of Australia (Reviewer's comment ID #: 2002-80)]	
SPM-481	A	8:5	8:5	Replace "polar ice" with "from the Greenland Ice Sheet, other Arctic ice caps and possibly from Antarctica" (6-22 lines 3346). Because of the implications for the future response of ice sheets to warming it is informative to indicate where the ice is thought to have come from. [Govt. of Germany (Reviewer's comment ID #: 2011-15)]	
SPM-482	A	8:5	8:5	Does "polar" refer to both north and south? How do orbital changes get factored in? [Govt. of United States of America (Reviewer's comment ID #: 2023-56)]	
SPM-483	A	8:6	8:6	The chapter says "present" not "20th century". [Govt. of Belgium (Reviewer's comment ID #: 2003-35)]	
SPM-484	A	8:6	8:6	Is it the "20th century" or the "present": chapter says the latter. [Govt. of Germany (Reviewer's comment ID #: 2011-65)]	
SPM-485	A	8:6	8:7	This sentence is not quite correct and should have "summer" added to it eg "average polar summer temperatures at that time were 3 to 5°C warmer than the 20th century". In addition the global warmth during the Last Interglacial needs to be included so that this can be put in the context of projections and hence the relevance to policy makers shown. [Govt. of Germany (Reviewer's comment ID #: 2011-69)]	Simulated
SPM-486	A	8:6	8:6	Replace "warmer" by "higher". [Govt. of Netherlands (Reviewer's comment ID #: 2014-21)]	

SPM-487	A	8:7	8:9	The phrase stating "implying that there may also have been a contribution from Antarctica" is unclear as it does not provide a likelihood statement. In contrast, the chapter summary (page 6-4, lines 6-8) reads: "This is consistent with ice sheet modelling suggestions that large-scale retreat of the south Greenland Ice Sheet and other Arctic ice fields likely contributed a maximum of 2 to 4 m of last interglacial sea level rise, with most of any remainder likely coming from the Antarctic Ice Sheet." The cited phrase in the SPM should be replaced by the cited text (after the comma) from Chapter 6.. [Govt. of European Community (Reviewer's comment ID #: 2008-10)]	
SPM-488	A	8:7	8:7	Clarify the global warmth during the Last Interglacial so that the polar warming can be put into context. The chapter is not clear on the subject "The climate of the LIG has been inferred to be warmer than present (Kukla et al., 2002), although the evidence is regional and not necessarily synchronous globally, consistent with our understanding of the primary forcing." (617 lines 33-35) [Govt. of Germany (Reviewer's comment ID #: 2011-16)]	
SPM-489	A	8:8	8:9	There seems to be an imprecision in the latter part of this sentence which says "implying that there may also have been a contribution from Antarctica. {6.4}". The total SLR was "likely" 4-6m, and the contribution of Greenland and arctic land ice was likely 4m, implying that it is at least "as likely as not" or maybe "likely" that there was contribution from Antarctica. In addition the question of from which part of Antarctic this came is not clear: the underlying literature in 6,4 points to several lines of evidence implying that the WAIS was a source and there is little or no evidence of an EAIS source. Can this be clarified in the SPM please. [Govt. of Germany (Reviewer's comment ID #: 2011-66)]	
SPM-490	A	8:8	8:9	In the Second Order Draft of this chapter it was said "suggest that the Antarctic Ice Sheet likely also contributed to the last interglacial high stand. The rate of sea level rise leading to this high-stand may have exceeded 1 m/century." (SOD 6-3 lines 1-2). The underlying literature appears to support this interpretation? If it still stands it needs to be included in the SPM here. [Govt. of Germany (Reviewer's comment ID #: 2011-67)]	
SPM-491	A	8:8	8:8	Change "implying" to "suggesting". [Govt. of United States of America (Reviewer's comment ID #: 2023-57)]	
SPM-492	A	8:9	8:9	Again, why not refer to WAIS, as chapter 10 does, since there is not compelling evidence that EAIS made a contribution (although it can't be ruled out). Also, why use "may"? If 4-6m SLR is "likely" and "no more than 4m" (from Greenland and other Arctic ice) is also "likely" then isn't a WAIS contribution also "likely" ? Please be logical. [Govt. of Belgium (Reviewer's comment ID #: 2003-36)]	
SPM-493	A	8:10	8:10	It should be acknowledged in the SPM that our paleoclimatic knowledge of the Southern Hemisphere is much more limited than the Northern Hemisphere. Suggest the inclusion, as a new dot point of the chapter 6 finding that "Knowledge of climate variability over the last 1000 years in the Southern Hemisphere and tropics is limited due to the lower density of paleoclimatic records". [Govt. of Australia (Reviewer's comment ID #: 2002-81)]	
SPM-494	A	8:12	8:46	The 'Understanding and attributing climate change' section should include a statement about how much the observed sea-level rise can be attributed to anthropogenic influence. (section 9.5.2) [Govt. of Belgium (Reviewer's comment ID #: 2003-37)]	
SPM-495	A	8:12	8:46	The 'Understanding and attributing climate change' section should better clarify our understanding of the role of solar radiation on climate change over the past 50 years. [Govt. of Belgium (Reviewer's comment ID #: 2003-38)]	
SPM-496	A	8:12	8:12	Change the title of the section : "Understanding and attributing current climate change" Rationale : the section is focused on the last 50 years [Govt. of Switzerland (Reviewer's comment ID #: 2020-19)]	

SPM-921	B	8:12	8:20	Under the umbrella of the Section Understanding and Attributing Climate Change, the statement is made on the assumption that there is sufficient geophysical data to permit a reliable computation of globally and continental averaged temperatures since the mid-20th century. Although it may be acceptable that the confidence of such statements relies on data obtained from long-time established meteorological observation stations, it has to be recognize that there are large continental areas with no observation stations and with stations which operation has decayed in the last decades. It is also known that the Southern Hemisphere oceans have very few observations, although it may be argued that satellite observations may provide some information impossible to obtain over land. In this regards, for a host of reasons, it would be opportune to point out such deficiencies. This is important since we are aiming to brief decision makers about climate change and its implications on the physics of climate, it would be more than necessary to remark the value of observations, even if the case that satellites would provide some solutions (though limited in many respects). No science can be developed without the necessary basic data. Therefore, it is suggested to report that, in spite of known deficiencies in the density and operation of observation stations, it is likely that, based in the available records of reliable and permanent observation stations, the conclusions are valid and the figure SPM-4 is effectively representative of the regional averaged temperature changes. [Govt. of Argentina (Reviewer's comment ID #: 2024-6)]	
SPM-497	A	8:12	10:22	Section: Understanding and attributing change -Suggest including Figure TS-23 [Govt. of United Kingdom (Reviewer's comment ID #: 2022-13)]	
SPM-498	A	8:12	10:22	Understanding and attributing climate change. What about the growing body of work on detection and attribution of climate change in rainfall and river flow records? [Govt. of United Kingdom (Reviewer's comment ID #: 2022-26)]	
SPM-499	A	8:12	14:18	Some climate projections are given with no specification of their likelihood (es: contraction of snow cover extent SPM-12, line 16 to 17). This happens several times in the text. Maybe a sentence should be added in Note 5 SPM-1 saying that in some cases results are certain, and in this case no likelihood is specified for the result, or likelihood should be added in all cases. [Govt. of Italy (Reviewer's comment ID #: 2012-21)]	
SPM-500	A	8:14	8:15	The first sentence concerning detection of climate change, (which is repeated at TS page 33, lines 3-4) does not clearly match the glossary definition and may be confusing for policy readers. Suggest that the glossary definition is repeated: "Detection of climate change is the process of demonstrating that climate has changed in some defined statistical sense, without providing a reason for that change". [Govt. of Australia (Reviewer's comment ID #: 2002-82)]	
SPM-501	A	8:14	8:15	"Natural variability" needs to be clearly defined somewhere in the text (as in footnotes on p.1). Policy-makers will generally assume that natural variability is a function of non-anthropogenic drivers -rather than the concept of "unforced variability" introduced later in section (SPM10 line 19). [Govt. of Canada (Reviewer's comment ID #: 2004-35)]	
SPM-502	A	8:14	8:34	The term 'unforced variability' line 34 and in some other places is not clear. It seems to mean here 'non anthropogenic' while the same term page 10 line 19 used for the past 700 years means 'internal variability' (i.e., without volcanic and solar forcings). Thus there is some incoherence. Please define clearly 'natural variability' and 'unforced variability' . For the definition of detection, "natural variability" should be replaced by "internal variability" in consistency with Chapter 9 definition of detection (see in particular page 5, lines 54-56). Volcanic eruptions are said to have contributed to the observed past variability. Is this considered forced variability ? [Govt. of France (Reviewer's comment ID #: 2010-28)]	
SPM-503	A	8:14	8:15	This definition of climate change is not in agreement with Note 1 on Page 1, that defines climate change in IPCC usage [Govt. of Italy (Reviewer's comment ID #: 2012-4)]	
SPM-504	A	8:14	8:15	This sentence does not appear to be fully consistent with the definition of "Climate Change in IPCC usage" as provided in footnote 1 on page SPM-1. Its construction may be rechecked and modified appropriately, if deemed desirable. [Govt. of Pakistan (Reviewer's comment ID #: 2017-4)]	

SPM-505	A	8:14	8:15	The statement «Climate change is said to be detected when there is only a small likelihood that observed changes might have occurred solely due to natural variability» is to be excluded or adjusted according to the basic concept: “Climate change in IPCC usage refers to any change in climate over time, whether due to natural variability or as a result of human activity” (see SPM-1, a footnote 1) [Govt. of Russian Federation (Reviewer’s comment ID #: 2018-11)]	
SPM-506	A	8:14		"Only a small likelihood" might be substituted by "unlikely". [Govt. of Norway (Reviewer’s comment ID #: 2016-21)]	
SPM-507	A	8:16	8:16	"...in well-tested models...". This is, in my opinion, a misleading statement: the testing of these models is a totally open question. [Govt. of Italy (Reviewer’s comment ID #: 2012-38)]	
SPM-508	A	8:17	8:19	Replace the text with the correct text from TAR WGI SPM: The TAR concluded that: “There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities.” [Govt. of Norway (Reviewer’s comment ID #: 2016-49)]	
SPM-509	A	8:23	8:43	P8 L23 "It is very likely that anthropogenic greenhouse (...) globally averaged temperatures" and P8 L42 "It is likely (...) anthropogenic warming over the past 50 years averaged over each continent (...)" It might be difficult for the non-specialist to understand that these two apparently similar sentences are given different likelihood estimates, especially knowing (as written) that continents warm more. It might be useful to explain in a few words (the higher confidence for global / or oceans) [Govt. of Belgium (Reviewer’s comment ID #: 2003-39)]	
SPM-510	A	8:23	8:23	The combination of the two terms "most of the observed increase" and "very likely" leaves too much room for interpretation. It is suggested that the term "most" is replaced by a specific percentage (e.g., 90%) in a similar way as on p. SPM-3, lines 4-5. [Govt. of European Community (Reviewer’s comment ID #: 2008-11)]	
SPM-511	A	8:23	8:23	Is this "very likely" statement correct when one considers all the evidence and when coupled with "most" (>51%?) in the same sentence. Would it not be "extremely likely" or even "virtually certain" that GHG increases have caused more than 50% of the observed warming? It would be very likely that they had caused more than say, 85% of the warming? [Govt. of Germany (Reviewer’s comment ID #: 2011-17)]	
SPM-512	A	8:23	8:26	We would like this statement saying that it is very likely that increased greenhouse gas cause most of the observed global temperature. The word “Discernible” should be replaced with “It is evident”. [Govt. of Norway (Reviewer’s comment ID #: 2016-19)]	
SPM-513	A	8:23	8:23	Write: "It is very likely that the increase in atmospheric concentrations of anthropogenic greenhouse gas caused most of the ..." [Govt. of Switzerland (Reviewer’s comment ID #: 2020-20)]	
SPM-514	A	8:24	8:26	The following line doesn't make sense: "Discernable human influences now extend to other aspects of climate, including continental-average temperatures, atmospheric circulation patterns, and some types of extremes." "Some types of extremes" is too vague for inclusion in the SPM. Revision to provide more detailed examples is requested. [Govt. of Japan (Reviewer’s comment ID #: 2013-15)]	
SPM-515	A	8:25	8:26	Suggest that the end of this sentence is deleted and replaced with the clearer construction from the TS, which also includes changes to ocean heat content (e.g. " including changes in global ocean heat content, as well as continental scale temperature trends, temperature extremes and atmospheric circulation (see Figure SPM-4....)".. [Govt. of Australia (Reviewer’s comment ID #: 2002-83)]	
SPM-516	A	8:28	8:28	It would be useful for the authors to include the period over which the suppressed warming effect has occurred. [Govt. of Australia (Reviewer’s comment ID #: 2002-84)]	
SPM-517	A	8:28	8:30	the offset on local warming due to volcanic aerosols is well taken. Yet, on Page 3, L33, it is said that volcanic aerosols are not included in Figure SPM-2 , due to their episodic nature. Can these two argumentations be reconciled? [Govt. of Belgium (Reviewer’s comment ID #: 2003-40)]	

SPM-518	A	8:28	8:30	The sentence reads: "It is likely that greenhouse gases alone would have caused more warming than observed because volcanic and anthropogenic aerosols have offset some warming that would otherwise have taken place." However, Fig. 2 shows that it is "virtually certain" that the net radiative forcing effect of anthropogenic aerosols is negative, and that it is "extremely likely that total anthropogenic radiative forcing is smaller than radiative forcing from long-lived greenhouse gases and ozone. Hence, it is not clear why it should only be "likely" that greenhouse gases alone would have caused more warming than observed. Suggest to change the term "likely" into "very likely" or "extremely likely". [Govt. of European Community (Reviewer's comment ID #: 2008-12)]	
SPM-519	A	8:28	8:30	For additional lucidity, these lines could be moved after the present Line 40, to become the third bullet. [Govt. of Sweden (Reviewer's comment ID #: 2019-19)]	
SPM-520	A	8:28	8:28	Write:"It is likely that anthropogenic greenhouse gas emissions alone would have caused ..." [Govt. of Switzerland (Reviewer's comment ID #: 2020-21)]	
SPM-521	A	8:29	8:29	It is not certain that cooling due to aerosols explains all the difference between observed and greenhouse gas only induced warming. It is, however, a possible explanation for the observed difference. Change "have" to can and aerosols to aerosol particles. [Govt. of Sweden (Reviewer's comment ID #: 2019-20)]	
SPM-522	A	8:32	8:34	This statement consist of a double negative. Can it be put around the other way? Eg it is "extremely likely" that the global climate change of the last 50 years was caused by human induced increases in GHGs... [Govt. of Germany (Reviewer's comment ID #: 2011-18)]	
SPM-523	A	8:32	8:32	"...widespread warming...". What is the meaning, here, of "widespread"? [Govt. of Italy (Reviewer's comment ID #: 2012-39)]	
SPM-524	A	8:32	8:34	Suggest changing to "extremely likely that the past climate change of the last 50 years was not caused by natural variability alone." [Govt. of United States of America (Reviewer's comment ID #: 2023-58)]	
SPM-525	A	8:34	8:34	To make this sentence clearer for policy readers suggest that line 34 is replaced with "...can be explained without external forcing, and very unlikely that it is due to known natural external causes alone", which is directly from chapter 9. [Govt. of Australia (Reviewer's comment ID #: 2002-85)]	
SPM-526	A	8:34	8:34	What is "unforced variability"? It is very hard for policy-makers to understand. An explanation needs to be added. [Govt. of China (Reviewer's comment ID #: 2006-29)]	
SPM-527	A	8:34	8:34	specify "... of the past fifty years was caused by unforced NATURAL variability alone" or alternatively try to get rid of this double negation. [Govt. of Denmark (Reviewer's comment ID #: 2007-8)]	
SPM-528	A	8:34	8:34	Replace 'unforced variability alone' by 'happened purely by chance'. [Govt. of Netherlands (Reviewer's comment ID #: 2014-22)]	
SPM-529	A	8:36	8:37	The use of the term "free atmosphere" is too technical for a policy reader. Suggest that the sentence is restructured to read "...attributed to anthropogenic forcing at the surface, in atmospheric temperatures, in temperatures..." [Govt. of Australia (Reviewer's comment ID #: 2002-86)]	
SPM-530	A	8:38	8:38	Unless you explain the possible role of ice sheets in sea level rise, this particular attribution may not stand up. What you may be able to attribute to human role is the thermal expansion and glacier parts but what about the rest of it ? So you ought to say which contributions to sea level rise can be attributed. Again the wording is ambiguous. [Govt. of Belgium (Reviewer's comment ID #: 2003-41)]	
SPM-531	A	8:39	8:39	The authors need to provide further explanation of what is meant by "largely". [Govt. of Australia (Reviewer's comment ID #: 2002-87)]	

SPM-532	A	8:39	8:39	The term "largely attributed" suggests that a likely or very likely statement could be employed. [Govt. of United Kingdom (Reviewer's comment ID #: 2022-27)]
SPM-533	A	8:42	8:42	Whilst present for reasons of scientific purity, would it be clear (and still correct) to delete the word "averaged"? [Govt. of Australia (Reviewer's comment ID #: 2002-88)]
SPM-534	A	8:42	8:45	This bullet would be strengthened and provide an important point for policymakers by including the following sentence from the Technical Summary (page 36, line 17-19): The ability of coupled climate models to simulate the temperature evolution on each of six continents provides stronger evidence of human influence on the global climate than was available in the TAR". Add reference to Figure SPM-4 at the end of this sentence. [Govt. of Canada (Reviewer's comment ID #: 2004-36)]
SPM-535	A	8:42	8:45	Why is the Antarctica not mentioned here? [Govt. of Italy (Reviewer's comment ID #: 2012-40)]
SPM-536	A	8:42	8:42	Delete 'significant' because the qualification "likely" is sufficient. [Govt. of Netherlands (Reviewer's comment ID #: 2014-23)]
SPM-922	B	8:42	8:45	When referring to model simulation, we should remember their degree of reliability. Therefore, at the end of line 44, it is suggested to say "may" instead of "are", so to read: "may be simulated by models that include anthropogenic forcing". [Govt. of Argentina (Reviewer's comment ID #: 2024-7)]
SPM-537	A	8:43	8:43	"except over Antarctica". This needs an explanation, e.g. as a footnote. Why would global warming not affect Antarctica, and does this alleviate part of sealevel rise concerns because Antarctica ice may not melt ? [Govt. of France (Reviewer's comment ID #: 2010-29)]
SPM-538	A	8:44	8:46	It is unclear what the second sentence adds to the storyline. If it is simply that observed patterns of warming on a global scale are matched in model results, this should be stated more clearly. [Govt. of Australia (Reviewer's comment ID #: 2002-89)]
SPM-539	A	8:44	8:44	"..over time, are simulated.." should this read "..over time, are only simulated.."? [Govt. of Italy (Reviewer's comment ID #: 2012-13)]
SPM-540	A	8:45	8:45	Please add "with high likelihood" after "simulated", otherwise this is a really meaningless statement. The figure SPM-4 is actually very impressive so why not find a strong word here? [Govt. of Belgium (Reviewer's comment ID #: 2003-42)]
SPM-541	A	8:45	8:45	The fact that the observed patterns of warming are simulated by models which include anthropogenic forcing suggests that only anthropogenic forcing is required to reproduce the observed warming. A more strict requirement is that they are simulated by models which include both anthropogenic and natural forcing. Hence the statement may be strengthened. [Govt. of United Kingdom (Reviewer's comment ID #: 2022-28)]
SPM-542	A	8:45		The general characteristics of climate models are not recalled in this SPM. It would probably help for the understanding of many policymakers if some explanation would be given of what are climate models. Indeed, some non informed persons believe that they are just an extrapolation of past observations with some artificial random superimposed on it. We propose for instance to include a box with a definition along these lines: "Climate models are computer simulations of the atmosphere and the ocean behavior, aiming at reproducing the observed phenomena making the most possible rigorous use of all the known and relevant laws of physics such as the equations of fluid mechanics, of thermodynamics, of electromagnetism and of chemistry" [Govt. of France (Reviewer's comment ID #: 2010-30)]
SPM-543	A	8:46	8:46	Suggest including Figure TS-23 in the SPM as well as the existing Figure SPM-4. [Govt. of Canada (Reviewer's comment ID #: 2004-37)]
SPM-544	A	9:2	9:13	Figure SPM-4: The uncertainty associated with the time series of global ocean temperature seems too low early in record. Shouldn't the global ocean black line be dashed for the early part of century? [Govt. of Australia (Reviewer's comment ID #: 2002-90)]

SPM-545	A	9:2	9:13	Again, Antarctica should be considered in Fig. SPM-4. [Govt. of Italy (Reviewer's comment ID #: 2012-41)]	
SPM-546	A	9:2	9:14	Figure SPM-4: Error bars should be added to the observations. [Govt. of Netherlands (Reviewer's comment ID #: 2014-27)]	
SPM-547	A	9:2	9:6	In Figure SPM-4, add a panel for Antarctica, especially since it's the only outlier. Although the Arctic is not a continent, consider adding it to show the high-profile rapid warming trends and change the illustration banner accordingly. [Govt. of United States of America (Reviewer's comment ID #: 2023-59)]	
SPM-548	A	9:3	9:	Figure SPM-4-Suggest changing text for caption to: Comparison of observed global and continental scale changes in air temperature with those produced from climate model simulations, using both natural and anthropogenic forcings. Decadal averages of observations are shown (black line) for the period 1906-2005, using the corresponding average for 1901-1950 as the base period. Lines are dashed where spatial coverage of observations is less than 50%. Shaded bands compare observations with model simulations: the blue band shows the 5-95% range from 19 simulations from 5 models when only natural forcings are included; the red band shows the corresponding range using 58 simulations from 14 models using both natural and anthropogenic forcings. [Govt. of Canada (Reviewer's comment ID #: 2004-38)]	
SPM-549	A	9:3	9:	Figure SPM-4 : in the legend, the sentence "the changes shown are unadjusted model output in regions where observations are available" needs clarification. [Govt. of France (Reviewer's comment ID #: 2010-35)]	
SPM-550	A	9:3	9:	Figure SPM-4: All time series are to be updated till 2005, according to the Figure caption (or Figure caption is to be adjusted) [Govt. of Russian Federation (Reviewer's comment ID #: 2018-12)]	
SPM-551	A	9:3	9:	Figure SPM-4: to add borders of the regions for "continents" (for example, what is Asia?) and to show grid lines on each of regional figures (for obviousness) [Govt. of Russian Federation (Reviewer's comment ID #: 2018-13)]	
SPM-552	A	9:3	9:	Figure SPM-4: to check up dashed curves for such continents as Asia, Africa: whether observation coverage could in the beginning of the last century to be not below than 50% ? [Govt. of Russian Federation (Reviewer's comment ID #: 2018-14)]	
SPM-923	B	9:3	9:	Figure SPM-4: It is a very impressive figure. Congratulations. [Govt. of Austria (Reviewer's comment ID #: 2025-6)]	
SPM-553	A	9:10	9:10	"using only natural forcings" -> "using only natural forcings, including xxxx". Please add. [Govt. of Finland (Reviewer's comment ID #: 2009-8)]	
SPM-554	A	9:11	9:11	Replace '58 model' by '58'. [Govt. of Netherlands (Reviewer's comment ID #: 2014-24)]	
SPM-555	A	9:12	9:12	The authors should review whether it is necessary to include the final sentence of the descriptive text for Figure SPM 4, it seems repetitive and includes the confusing term "unadjusted model output". [Govt. of Australia (Reviewer's comment ID #: 2002-91)]	
SPM-556	A	9:12	9:12	The sentence "The changes shown are unadjusted model output where regions where observations are available" is difficult to understand. Is the model output sampled for the sites for which observations are available? What is the meaning of "unadjusted"? Does the sentence add information to the readers of SPM? [Govt. of Sweden (Reviewer's comment ID #: 2019-21)]	
SPM-557	A	9:12	9:12	In Figure SPM-4 caption, delete "unadjusted" or define what is meant by that term. [Govt. of United States of America (Reviewer's comment ID #: 2023-60)]	

SPM-924	B	9:12	9:13	It is proposed to delete the last sentence, beginning with "The changes shown are unadjusted model output ...". This detail does not include real information for the policy maker but is only useful for modelers who have the knowledge about adjustments of model outputs. This sentence might only result in lowering the value of the information provided by figure SPM-4. Readers might think that adjusted model output might deliver different results. [Govt. of Austria (Reviewer's comment ID #: 2025-7)]	
SPM-558	A	9:17	9:18	For clarity suggest that the end of this sentence is replaced with "...observed temperature changes on smaller than continental scales and over timescales of less than 50 years", which is from the TS. [Govt. of Australia (Reviewer's comment ID #: 2002-92)]	
SPM-559	A	9:17	9:17	Insert before "Difficulties": "Anthropogenic influence has been detected in some sub-continental land areas. But ". This result is indeed a new one since the TAR. It is reported in chapter 9 (section 9.4.2.2) and in the executive summary of this chapter (page 3, lines 37-39). The present paragraph insists upon the difficulties to estimate the contribution of greenhouse gas increase at the sub-continental scale but the detection of an anthropogenic influence at this scale was achieved in some cases (chapter 9, page 34, lines 6 to 8 and the following of the section). [Govt. of France (Reviewer's comment ID #: 2010-31)]	
SPM-560	A	9:17	9:24	For the first time we can see the fingerprint of human activity in recent warming, not just globally, but locally in the Europe and in other continents, see for example the work of Karoly and Stott on anthropogenic warming of central England temperature. This is a major developemnt and should be mentioned in the SPM. [Govt. of United Kingdom (Reviewer's comment ID #: 2022-29)]	
SPM-561	A	9:17	9:24	These two paragraphs summarise weaknesses our understanding of recent climate change but they do not inform the policymaker of the consequences these modelling inadquecies have on our statements of attribution. For instance, to what extent does our underestimation of the circulation strength affect our statements that man has influenced the climate. [Govt. of United Kingdom (Reviewer's comment ID #: 2022-30)]	
SPM-562	A	9:17	9:18	Define "smaller scales" in the first sentence, or better yet just say what scales you are talking about. [Govt. of United States of America (Reviewer's comment ID #: 2023-61)]	
SPM-563	A	9:18	8:18	Same comment on the definition of "unforced variability" as for page 8 lines 14 sqq. [Govt. of France (Reviewer's comment ID #: 2010-32)]	
SPM-564	A	9:22	9:22	Replace 'likely' by 'more likely than not'. {see Selten et al. 2004, GRL; van Ulden and van Oldenborgh, 2006, ACP.} [Govt. of Netherlands (Reviewer's comment ID #: 2014-25)]	
SPM-565	A	9:22	9:24	Elaborate on "Human influences". Clarify that the influences are indeed related to greenhouse gas forcing. [Govt. of United States of America (Reviewer's comment ID #: 2023-62)]	
SPM-566	A	9:23	9:23	Changes in atmospheric circulation: blocking frequency could be added to storm tracks, winds, and temperature patterns. [Govt. of France (Reviewer's comment ID #: 2010-33)]	
SPM-567	A	9:23	9:24	"However, the observed changes in the Northern Hemisphere circulation" : I suggest to add : "in the Northern atmospheric circulation". Please specify also which types of changes are larger than simulated; policymakers will probably not look into the full report. [Govt. of France (Reviewer's comment ID #: 2010-34)]	
SPM-568	A	9:24	9:24	"Simulated" to what? The authors should insert "response to 20th century forcing change". [Govt. of Australia (Reviewer's comment ID #: 2002-93)]	
SPM-569	A	9:24	9:24	Replace 'larger than simulated' by 'quite different from simulated changes' { see Van Ulden and van Oldenborgh, 2006, Atmospheric Chemistry and Physics' } [Govt. of Netherlands (Reviewer's comment ID #: 2014-26)]	

SPM-570	A	9:24	9:24	The last part of the sentence seems to imply that reality is responding even more forcefully to global warming than the models simulate. However, another possibility is that the larger flow fluctuations could be decoupled from global warming and just associated with natural variability. This aspect is not well captured in the present formulation. [Govt. of Sweden (Reviewer's comment ID #: 2019-22)]	
SPM-571	A	10:1	10:3	Syntactically challenged sentence. Restructure as follows: "For the most extreme hot nights, cold nights, and cold days, temperatures are likely to have...." Otherwise it might be misread to mean the number of cold nights and days have increased with global warming! [Govt. of United States of America (Reviewer's comment ID #: 2023-63)]	
SPM-572	A	10:2	10:2	For consistency with Table SPM-1, the start of this sentence should read, "It is more likely than not that anthropogenic forcing has increased...." [Govt. of Australia (Reviewer's comment ID #: 2002-94)]	
SPM-573	A	10:2	10:2	The very weak word "may" should be replaced by a likelihood statement. [Govt. of Belgium (Reviewer's comment ID #: 2003-43)]	
SPM-574	A	10:2	10:3	The sentence "Anthropogenic forcing may have increased the risk of heat waves." does not use appropriate uncertainty language. Table SPM-1 assigns "more likely than not" to this statement. The sentence should be changed to "It is more likely than not that anthropogenic forcing has already increased the risk of heat waves." [Govt. of European Community (Reviewer's comment ID #: 2008-13)]	
SPM-575	A	10:2	10:2	Change "may" to "more likely than not"? The latter seems more consistent with the underlying material [Govt. of Germany (Reviewer's comment ID #: 2011-19)]	
SPM-576	A	10:2	10:3	Change "Anthropogenic forcing may have increased the risk of heat waves" in order to use consistent probability/likelihood language with table SPM-1, where it says "more likely than not". [Govt. of Germany (Reviewer's comment ID #: 2011-20)]	
SPM-577	A	10:2	10:2	Replace 'may' by one of the standard likelihood statements. [Govt. of Netherlands (Reviewer's comment ID #: 2014-28)]	
SPM-578	A	10:2	10:2	In the light of recent developments, some weight could be added to this sentence, for example "there is some scientific evidence that anthropogenic forcings have increased the risk of heat waves". [Govt. of United Kingdom (Reviewer's comment ID #: 2022-31)]	
SPM-925	B	10:2	10:3	The wording "Forcing may have increased the risk of heat waves" lacks the clarity of interpretation in terms of likelihood. It would be very helpful to improve clarity also in the context of linkage between change in radiative forcing and heat waves. Perhaps an indication in terms of LOSU might be a more appropriate solution? [Govt. of Austria (Reviewer's comment ID #: 2025-5)]	
SPM-579	A	10:2		The term "may" is not in the scales of likelihood presented in note 5 page 1. As the probability of having more heatwaves is not quantified the text should be more affirmative on this point. We propose to say instead : "Anthropogenic forcing is likely to have increased the risk..." , or even, following chapter 9.4.3.3. "to have significantly increased the risk" [Govt. of France (Reviewer's comment ID #: 2010-36)]	
SPM-580	A	10:6	10:7	Statement at the top: "There is now increased confidence in the understanding of the climate system response to radiative forcing." This statement should be replaced with a statement about the sensitivity to a doubling of CO2. As it stands now, it does not really tell us anything. I have problems to understand that the statement, and the two bullets below, have anything to do with paleoclimatology. [Govt. of Norway (Reviewer's comment ID #: 2016-26)]	
SPM-581	A	10:6	10:7	Authors need to be clearer that they are talking about climate sensitivity. Change sentence to "There is now increased confidence in the estimation of climate sensitivity to radiative forcing." And explain why there is increased confidence. [Govt. of United States of America (Reviewer's comment ID #: 2023-64)]	

SPM-582	A	10:9	10:9	For clarity suggest that the is sentence be reworded as follows "Analysis of models combined with observational records suggest ...." [Govt. of Australia (Reviewer's comment ID #: 2002-95)]
SPM-583	A	10:9	10:11	"warming expected if carbon dioxide concentrations were to be sustained at 550 ppm" Please write the hypothesis about other gases used here : no change = this is equivalent CO2 ? [Govt. of Belgium (Reviewer's comment ID #: 2003-44)]
SPM-584	A	10:9	10:16	A footnote would be useful to note that these values include the 0.7-0.9 °C increase in global temperature that has occurred between pre-industrial and present. Policy-makers are frequently confused when presented with these estimates and projected warming for present century . Also, what is new vis-à-vis the TAR? Should something be said about the better understanding of probabilities? [Govt. of Canada (Reviewer's comment ID #: 2004-39)]
SPM-585	A	10:9	10:11	There are several problems with this sentence. First, and very importantly, it erroneously refers to carbon dioxide concentrations rather than to equivalent carbon dioxide concentrations. Second, it fails to compare the updated likely range of the equilibrium climate sensitivity with the range from the TAR. The important term climate sensitivity is only mentioned in footnote 10 but not in the main text. Third, it does not specify whether the implied "likely range" of climate sensitivity is closer to 66% or to 90%, both of which are possible according to Footnote 5. Box 10.2, Figure 2 defines the "likely between" range for climate sensitivity from 2°C to 4.5°C as the 66% uncertainty interval centered around the median. All three issues could be addressed by changing the current text "... that the equilibrium global average warming expected if carbon dioxide concentrations were to be sustained at 550ppm is likely to be in the range 2 to 4.5°C above pre-industrial values, with a best estimate of 3°C" to "... that equilibrium climate sensitivity is likely (66%) to be in the range 2 to 4.5°C, with a best estimate of 3°C, and it is very unlikely to be less than 1.5°C. This range is higher than in the TAR, which stated that equilibrium climate sensitivity is likely between 1.5°C and 4.5°C. Hence, the equilibrium global average warming expected if greenhouse gas were to be sustained at twice the pre-industrial concentrations (approximately 560 ppm carbon dioxide equivalent concentrations) is likely (66%) to be in the range 2 to 4.5°C above pre-industrial values, with a best estimate of 3°C." [Govt. of European Community (Reviewer's comment ID #: 2008-14)]
SPM-586	A	10:9	10:16	This bullet should be put in the section on "projections of future changes in climate" [Govt. of France (Reviewer's comment ID #: 2010-37)]
SPM-587	A	10:9	10:9	What is the "equilibrium" warming? Note that the classical concept of a time average coinciding with a "fixed point" (is this the "equilibrium"?) has been proved a long time ago to be totally wrong. [Govt. of Italy (Reviewer's comment ID #: 2012-42)]
SPM-588	A	10:9	10:16	We would like to see the expression "sensitivity" for a doubling of the concentrations of CO2 since industrial revolution. [Govt. of Norway (Reviewer's comment ID #: 2016-22)]
SPM-589	A	10:9	10:9	Write:"Climate models using observations suggest that ..." [Govt. of Switzerland (Reviewer's comment ID #: 2020-22)]
SPM-590	A	10:10	10:11	It is not proper to only show the sensitive experiment results for 550 ppm CO2. Suggest providing a full image about all sets of sensitive experiments, or at least three experiment results, or delete this individual one. [Govt. of China (Reviewer's comment ID #: 2006-30)]
SPM-591	A	10:10	10:10	It is not clear from the context whether this statement refers to carbon dioxide EQUIVALENTS. A clear statement should be made throughout the SPM whether CO2 equivalent concentrations are considered. If this is never the case that should also be made clear. [Govt. of Denmark (Reviewer's comment ID #: 2007-9)]
SPM-592	A	10:10	10:12	Would it be possible to give also the likely temperature ranges for stabilisation of GHG concentrations at level 450 ppm? [Govt. of Finland (Reviewer's comment ID #: 2009-9)]

SPM-593	A	10:10	10:11	Change the current text "... that the equilibrium global average warming expected if carbon dioxide concentrations were to be sustained at 550ppm is likely to be in the range 2 to 4.5°C above pre-industrial values ... " to "... that the equilibrium global average warming expected if carbon dioxide EQUIVALENT concentrations were to be sustained at TWICE THE PREINDUSTRIAL CONCENTRATIONS (APPROXIMATELY 560PPM) is likely to be in the range 2 to 4.5°C above preindustrial values ... ". First of all, "equivalent" needs to be inserted, as non-CO2 radiative forcing agents would add to the projected warming otherwise. Secondly, 550ppm is not exactly matching the doubled pre-industrial concentrations, which are either assumed as 278ppm or 280ppm. Compare Table 10-8 / Table TS-5. [Govt. of Germany (Reviewer's comment ID #: 2011-21)]	
SPM-594	A	10:10	10:13	The "likely between range" for climate sensitivity from 2°C to 4.5°C is a 66% uncertainty interval according to Box 10.2, Figure 2. It is suggested that this crucial quantitative information is added here by changing "... is likely to be in the range ..." to "... is likely (66%) to be in the range..." Otherwise the reader will consider that footnote 5 would apply, where it is specified that "likely" refers to the 66% to 90% uncertainty band. [Govt. of Germany (Reviewer's comment ID #: 2011-22)]	
SPM-595	A	10:10	10:10	Please make clear that the warming figures given are for a world in which only CO2 has been allowed to increase, and other GHGs are held at their pre-industrial concentrations. We believe a policy maker would not interpret in this way the figure of 550 ppm given here, unless these conditions are stated explicitly. [Govt. of New Zealand (Reviewer's comment ID #: 2015-3)]	
SPM-596	A	10:10		Additional text on, for example, current concentration levels might enhance readability. [Govt. of Norway (Reviewer's comment ID #: 2016-23)]	
SPM-597	A	10:11		The value of the pre-industrial temperature mentioned here is not given in the SPM. In other places, the comparison is made with the 1960-1999 average. What is exactly, in degrees Celsius, the pre-industrial temperature in comparison to these? If such a preindustrial reference is given, it should be scientifically substantiated. The same remark applies for page 11 line 38 and for page 15 line 2. More generally, it would be clearer if only one temperature reference was used. [Govt. of France (Reviewer's comment ID #: 2010-38)]	
SPM-598	A	10:12	10:13	It would be of assistance if the authors could ascribe a "likelihood" reading to qualify their statement that "values substantially higher than 4.5C cannot be ruled out" (i.e. is it "very unlikely" that values substantially higher than 4.5C would occur?) [Govt. of Australia (Reviewer's comment ID #: 2002-96)]	
SPM-599	A	10:13	10:13	Based on Chapter 9, page 9-64, a better explanation of the likelihoods of values below 1.5C and above 4.5C is needed, particularly since the likelihoods are described as being different. Yet, as currently written, use of phrase "cannot be excluded" suggests that values above 4.5 might be even less likely than values below 1.5, which have been determined to be "very unlikely". A better description of the probability distribution of projections would help clarify the corresponding likelihoods of the higher and lower values. [Govt. of Canada (Reviewer's comment ID #: 2004-40)]	
SPM-600	A	10:13	10:13	"..., but agreement of models with observations.." I think this is confusing to a policy maker since we are talking about future projections. Maybe a simpler statement could be formulated. [Govt. of Italy (Reviewer's comment ID #: 2012-14)]	
SPM-601	A	10:13	10:13	Replace 'but ..... values.' by 'but models with such a high sensitivity are less successful in simulating the past..' [Govt. of Netherlands (Reviewer's comment ID #: 2014-29)]	
SPM-602	A	10:13	10:15	Replace 'Water vapour .... uncertainty.' by 'Water vapour changes are now better understood than in the TAR and are likely to produce a dominant positive feedback to the climate sensitivity. Cloud feedbacks remain the largest source of uncertainty.' [Govt. of Netherlands (Reviewer's comment ID #: 2014-30)]	
SPM-603	A	10:13	10:13	Add "of past climate" after "observations" (line 13) [Govt. of United States of America (Reviewer's comment ID #: 2023-65)]	

SPM-604	A	10:13	10:16	How can it be known for sure that water vapor feedbacks are the dominant ones when there is still uncertainty in cloud feedbacks, especially since there are links between the two? [Govt. of United States of America (Reviewer's comment ID #: 2023-66)]	
SPM-605	A	10:18	10:18	It is unclear why the authors changed the word "substantial" which appears in the text of Chapter 9 and the TS, to "significant". Suggest reversion to "substantial". [Govt. of Australia (Reviewer's comment ID #: 2002-97)]	
SPM-606	A	10:18	10:19	The double negative in the phrasing of the first sentence is difficult to understand ("...were not due to unforced variability alone"). Can this be put into positive language? [Govt. of Australia (Reviewer's comment ID #: 2002-98)]	
SPM-607	A	10:18	10:19	It is a very confusing sentence. "at least the seven centuries prior to 1950" need some supports from paleoclimate record. Again, "unforced variability alone" is difficult to understand. [Govt. of China (Reviewer's comment ID #: 2006-31)]	
SPM-608	A	10:18	10:19	This sentence is very hard to understand due to the double negation. It should be rephrased without double negation, e.g. by changing "very likely" to "very unlikely" and deleting "not". [Govt. of European Community (Reviewer's comment ID #: 2008-15)]	
SPM-609	A	10:18	10:19	Same comment on the definition of "unforced variability" as for page 8 lines 14 sqq. [Govt. of France (Reviewer's comment ID #: 2010-39)]	
SPM-610	A	10:18	10:22	We consider that the current draft SPM remains excessively indulgent with respect to claims for the importance of solar variations in forcing past and present climate change. This judgment is based on the evidence and new findings now summarized correctly in chapters 2, 6, and 9 of the final draft of AR4. Concerning action of solar variability, we suggest to use the term "not likely" which stands for <50% (cf. note 5 of page SPM-1) [Govt. of France (Reviewer's comment ID #: 2010-40)]	
SPM-611	A	10:18	10:18	How do you justify very likely considering the admitted difficulties in quantifying solar and volcanic forcings? [Govt. of United States of America (Reviewer's comment ID #: 2023-67)]	
SPM-612	A	10:18	10:22	Consider moving this bullet to become the second bullet of the Paleoclimate section (before bullet on SPM-8, lines 4-9). [Govt. of United States of America (Reviewer's comment ID #: 2023-68)]	
SPM-613	A	10:21	10:21	Add "also" between "forcing" and "contributed". To refer to the fact that anthropogenic forcing also contributed to Northern Hemisphere warming for other periods (in particular since the mid-20th century as stated before for the global average). [Govt. of France (Reviewer's comment ID #: 2010-41)]	
SPM-614	A	10:25	10:25	Change the title of the section : "Projections of future climate change" Rationale : the new wording corresponds to the current use [Govt. of Switzerland (Reviewer's comment ID #: 2020-23)]	
SPM-615	A	10:25	14:55	The section needs to make the following points clear: 1) regardless, there are commitments to warming due to historical emissions; 2) near-term warming projections are (relatively) insensitive to choice of emission scenario; and 3) after 2030 warming is significantly affected by choice of emissions scenario. These points need to be enhanced and the order must flow logically. [Govt. of Canada (Reviewer's comment ID #: 2004-41)]	
SPM-616	A	10:25	14:55	This section is missing a Figure like Figure 5 in the SPM of the TAR (WG1 report), The Global Climate of the 21st Century, showing the different emission and concentration paths for SRES scenarios, and projections for temp and SLR. Readers need a visual reminder of how the SRES scenarios differ and need to be able to follow from emissions to concentrations to temp change to SLR. [Govt. of Canada (Reviewer's comment ID #: 2004-42)]	

SPM-617	A	10:25	14:55	In the whole discussion about projections a figure showing the most relevant SRES scenarios and/or their implications on climate variables is missing. This could be included in the box on page 14. [Govt. of Denmark (Reviewer's comment ID #: 2007-10)]	
SPM-618	A	10:25	14:55	The section "Projections of future changes in climate" fails to provide quantitative information on emissions. In contrast, the TAR did provide some information on the emissions for each scenario. The TAR SPM provided a graph with the timeseries of CO2 and SO2 emissions (TAR SPM-Figure 5); the AR-4 government review draft provided a figure with cumulative emissions for each scenario (Figure TS-33 SOD), although only in the Technical Summary. In this current final AR4-SPM draft, it is not acceptable that all information on emissions is deleted and no indication on emission for the analyzed scenarios can be found, neither in the SPM nor TS. It is strongly recommended that this lack of quantitative information on the used emission scenarios is dealt with in a sufficiently prominent place comparative to the TAR. Thus, a table with cumulative emissions has to be given in the SPM or alternatively, the current figure TS-27 on temperature implications needs to be lifted into the SPM and amended by an indication of emissions (similar to Figure TS-33 SOD). Section "Projections of future changes in climate": The current footnote 11 highlighting the CO2e concentrations across SRES is inadequate for the following reasons: a) The footnote does not address emissions. The SRES scenarios are EMISSION scenarios with clearly defined emissions; concentrations can vary widely depending upon, e.g. carbon cycle feedbacks. Figure 10.20 a) shows a range of 700ppm to >1000 ppm for CO2 only concentrations for the A2 scenario, which highlights that the CO2e concentration stated in footnote 11 of 1250ppm must be a gross oversimplification. Cumulative emissions are by definition precise and can be stated as CO2 emissions only (as CO2 is by far the most important radiative forcing agent); or as GWP-weighted GHG emissions b) Secondly, the information in the footnote on the scenario emission differences needs to be highlighted where the temperature and sea level results are stated, not hidden in a footnote, as information on the difference in emissions between scenarios is highly policy relevant, because policies address emissions. (continuation comments combined by TSU) [Govt. of Germany (Reviewer's comment ID #: 2011-23)]	
SPM-619	A	10:25	14:55	SEction "Projections of future changes in climate" -comment on the lack of results for mitigation scenarios: Throughout the SPM, there are no results given how the climate system could evolve under mitigation scenarios below the range of "business-as-usual" SRES scenarios. Given that these SRES scenarios explicitly exclude the realities of the UNFCCC and the Kyoto Protocol, all these future SRES projections are hypothetical. The CO2-only SP scenarios (Figure 10-22) or hypothetical scenarios (SPM page 10, line 26 ff) do provide some, although much too abstract, information on a more realistic future in which emissions are reduced in some parts of the world. This lack of analysis on realistic multi-gas mitigation scenarios is a serious limitation of the whole IPCC WG1 chapter on projections. This limitation has to be clearly flagged in the SPM as otherwise the reader will tend to believe that the shown future climate system evolutions roughly span possible futures, while in fact mitigation scenarios are completely neglected. SEction "Projections of future changes in climate" -comment on the lack of results for mitigation scenarios: The brief explanation of the non-mitigation nature of SRES scenarios in the current SRES box (SPM-14, line 53-55) does not serve this purpose as this key assumption underlying all projections needs to be highlighted at the beginning of the section "Projections of future changes in Climate" (SPM-10, lines 27-33). Furthermore, a detailed reasoning should be given of why realistic mitigation scenarios were not presented in this WG1 report despite that there had been a special cross-working group task force between WG3 and WG1 working on climate responses for multi-gas mitigation scenarios. (continuation comments combined by TSU) [Govt. of Germany (Reviewer's comment ID #: 2011-24)]	
SPM-620	A	10:25	14:55	The section on "Projections of Future Changes in Climate" lacks a single figure showing future projections for key climate variables for a range of emissions scenarios. Figure 5 of the WG 1 TAR SPM did that, and it became (justifiably) one of the most cited figures of the TAR. It is strongly suggested to produce an analogous figure for the WG 1 AR4 SPM to provide a concise overview of projections for greenhouse gas emissions, concentrations, and key global climate variables. [Govt. of Germany (Reviewer's comment ID #: 2011-25)]	

SPM-621	A	10:25	14:55	Add figure 10.4 (Multi-model means of surface warming) to this section ("Projections of Future Changes in Climate"). [Govt. of Netherlands (Reviewer's comment ID #: 2014-42)]	
SPM-622	A	10:25	14:55	Section: Projections of Future Changes in Climate -This section should emphasise two key points, which although mentioned do not come across very clearly. 1) we are already committed to some degree of climate change because of past emissions; 2) projections of change for the next 30 years do not depend on emissions scenarios, whereas choice of emissions scenarios significantly affect the warming we can expect in the second half of the 21 century. This points are key messages for policy makers and should be stressed in the SPM. -the list of projected warmings for various scenarios is very confusing and difficult to read. Suggest to present data as in the TAR or add a table. [Govt. of United Kingdom (Reviewer's comment ID #: 2022-14)]	
SPM-623	A	10:25	14:55	-A schematic figure from TAR SPM showing different timescales for emissions, concentrations, temperature and sea level changes would be helpful in understanding lags. · It would be helpful to include a chart showing projected temperature changes with uncertainties. · Mean temperature estimates for SRES scenarios are less than in TAR (particularly when the minimum of likely climate sensitivity range has increased) and an explanation for that is needed -regional projections are also unclear.It would be helpful to provide more infomation on this and compare new results to TAR -the role of the climate -carbon cycle feedback is downplayed. It is not clear how the carbon cycle may affect changes in the longer term. Also, it would be helpful to mention other possible feedbacks that could effect estimates that are not yet included in models – e.g. natural methane emissions from permafrost and wetland. Suggest clarify this point on page 13. -it would be useful to improve the presentation of the SRES scenarios. As it stands, it is not clear what they are and how they differ. Suggest add a figure on the scenarios [Govt. of United Kingdom (Reviewer's comment ID #: 2022-15)]	
SPM-624	A	10:25		Section "Projections of Future Changes in Climate". This section lacks a single figure showing future projections for key climate variables for a range of emissions scenarios. Figure 5 of the WG 1 TAR SPM did that, and it became one of the most-cited figures of the TAR. It is strongly suggested to produce an analogous figure for the WG 1 AR4 SPM to provide a concise overview of projections for greenhouse gas emissions, concentrations, and key global climate variables. In contrast to the TAR, this figure should also contain climate change projections for selected emssion scenarios that include climate policies (i.e. mitigation or stabilization scenarios), as discussed by WG 3. If such projections are not available, this fact needs to be acknowledged explicitly (e.g. on p. 10, line 32). [Govt. of European Community (Reviewer's comment ID #: 2008-16)]	
SPM-625	A	10:27	10:33	The chapeau for this section should be revised to include an explanation as to why projections for different emissions scenarios were not combined in the report as was done in the FAR, SAR and TAR. (see TS-39, lines 21-27 for sample wording). [Govt. of Canada (Reviewer's comment ID #: 2004-43)]	
SPM-626	A	10:27	10:29	Awkward sentence. Suggested revision: "A major advance of this assessment of climate change projections compared with the TAR is the large number of simulations available using the IPCC SRES scenarios. These, together with new approaches to constraining projections using observational data, provide a quantitative basis for estimating likelihoods of expected warming." [Govt. of Canada (Reviewer's comment ID #: 2004-44)]	
SPM-627	A	10:27	10:28	The "large number of simulations available" is not "A major advance" in itself! See below at point 18. (SPM page 11, lines 20-21. -TSU Edit) [Govt. of Italy (Reviewer's comment ID #: 2012-43)]	
SPM-628	A	10:28	10:28	"together with new approaches to constraints from observations" should be explained better. [Govt. of Finland (Reviewer's comment ID #: 2009-10)]	
SPM-629	A	10:28	10:28	What are the "new approaches to constraints from observations"? There are some, but they are not considered in the Final Draft. [Govt. of Italy (Reviewer's comment ID #: 2012-44)]	

SPM-630	A	10:28	10:28	Shouldn't "to" be "and"?? [Govt. of Sweden (Reviewer's comment ID #: 2019-23)]
SPM-631	A	10:28	10:28	"to constraints from observations" is syntactically incorrect. Fix it. [Govt. of United States of America (Reviewer's comment ID #: 2023-69)]
SPM-632	A	10:30	10:31	Expand the text "Approximate CO2 equivalent concentrations corresponding to ... 1250 and 1550 ppm respectively" in footnote 11 in order to cover (cumulative) CO2 and/or GHG emissions, not concentrations. The SRES scenarios can not be defined in terms of their concentrations, as concentrations depend strongly on the model with which the SRES EMISSION scenarios are processed. For example, see the range of CO2 concentrations for the SRES scenario A2 produced by the C4MIP models (figure 10-20). Furthermore, the information on emission differences across the SRES scenarios needs to be lifted in the main text, either into an extra table or as additional information into a figure. The figure TS-33 in the Government Review draft provided such information on cumulative emissions for the analyzed SRES scenarios. The complete deletion of any prominent information on SRES emission differences in the current "Final Draft" is not acceptable. [Govt. of Germany (Reviewer's comment ID #: 2011-26)]
SPM-633	A	10:30	10:31	Change "These include SRES illustrative marker scenarios for the 2000-2100 period and ...." to "These include SRES illustrative marker scenarios for the 2100-2100 period, which do not assume any climate mitigation initiatives, and ...". See reasoning under general point on SPM "Lack of results for mitigation scenarios". The reference to the non-mitigation nature of SRES scenarios in footnote 11 is not sufficient given the experience with the TAR, that the 1.4-5.8°C SRES range was too often misinterpreted as a range spanning all possible climate futures. [Govt. of Germany (Reviewer's comment ID #: 2011-27)]
SPM-634	A	10:31	10:31	Footnote 11 provides (approximate) concentrations but no cumulative emissions for the SRES scenarios even though the SRES scenarios are defined in terms of emissions not concentration. This is problematic for two reasons. First, quantitative data on emissions differences between scenarios is lacking even though it is emissions not concentrations that are regulated by current international agreements. Second, the text does not reflect the considerable uncertainty in greenhouse gas concentrations and associated radiative forcing calculated by different models (see, e.g., Figure 10.20.a). It is suggested that the text is changed so that SRES scenarios are referred to by their cumulative CO2 and/or GHG emissions. If concentrations are also given they should be stated as "likely" ranges consistent with recent findings on carbon cycle feedbacks. [Govt. of European Community (Reviewer's comment ID #: 2008-17)]
SPM-635	A	10:32	10:33	The final sentence of the boxed text is more properly a footnote. As mentioned in general comments the A1B and B1 SRES scenarios are used much more frequently in an illustrative context than the other SRES storylines. While the authors specifically state that all SRES scenarios should be considered equally sound, the preponderant use of only 2 scenario families could be seen as an implicit endorsement of these above the other scenarios. The authors, therefore, need to provide an explanation (in a footnote) as to why these scenarios are more often used. [Govt. of Australia (Reviewer's comment ID #: 2002-99)]
SPM-636	A	10:32	10:33	Consider placing the following sentence in italics: "This Working Group I assessment does not consider the plausibility or likelihood of any specific emission scenario." [Govt. of Japan (Reviewer's comment ID #: 2013-16)]
SPM-637	A	10:36	10:38	The point on commitment should be dealt with first, as per the order of subsequent bullets. Add "even" in front of "if". "Projected for a range of SRES emission scenarios" does not make the point that warming to 2030 is insensitive to scenario clearly enough. Suggest: "Even if concentrations of forcing factors had been stabilized at year 2000 levels, a committed warming of 0.1°C per decade would have been expected. For the next two decades, warming is relatively insensitive to choice of emission scenario and projected to be about 0.2°C per decade for the range of SRES emission scenarios. After 2030, projected warming is significantly affected by choice of emission scenario for the 2000-2100 period." [Govt. of Canada (Reviewer's comment ID #: 2004-45)]

SPM-638	A	10:36	10:38	Statement at the bottom. Here it is said that the warming will be about 0,2 degrees per decade the next two decades. I find it unwise to give statements for such a short period as 20 years for which natural variations might become substantial. A time slice of 30 years is recommended. In the first bullet below, it is stated for the first time that the observed warming now is 0,2 degrees per decade. This should be said much earlier and in bold. [Govt. of Norway (Reviewer's comment ID #: 2016-27)]	
SPM-926	B	10:36	10:38	Reference is made to the warming projections under a range of SRES. It is also mentioned that "if concentrations had been stabilized at the year 2000 level" which, as we know, it is not the case, then warming would be different. However, no reference is made to other possible stabilization levels, under which more valid information could be made available for decision making actions. This is a shortcoming calling for solution. [Govt. of Argentina (Reviewer's comment ID #: 2024-8)]	
SPM-639	A	10:37	10:47	"Committed Warming": The temperature rise due to "committed warming" has been overestimated. It is clear from the figures TS-26 and 10.4 that the rise due to committed warming is substantially less than half that of the other scenarios. Fig TS-26 suggests that committed warming is about 0.06°C/decade over 25 years. This can not be rounded to 0.1°C/decade. Fig TS-32 / 10.4 (showing a longer timescale) suggests about 0.05°C/decade over 40 years (and declining thereafter) [Govt. of Belgium (Reviewer's comment ID #: 2003-45)]	
SPM-640	A	10:37	10:47	SPM text refers to {9.4, 10.3} but it's not obvious how 9.4 provides information about this case. TS text 5.1 contains same number 0.1C with ref to {10.3, 10.5, 10.7} Ch10 sec 10.3 (see esp pg 106) refers to fig 10.4 and table 10.5 -footnote 10.5(a) seems clearly wrong, this experiment does not continue beyond 2100 (suggesting that this footnote, including a typo, has been hastily added?!) Ch10 sec 10.5 has no specific data on this problem, only a speculative statement (unreferenced) that "over the next few decades, about half of the projected warming would occur as a result of radiative being held constant at year 2000 levels" Ch10 sec 10.7 is about commitment after 2100, which is also about 0.05°C/decade during the next century [Govt. of Belgium (Reviewer's comment ID #: 2003-46)]	
SPM-641	A	10:37	10:38	"committed" is a extra word. It should be deleted. "...a warming of 0.1C..." is enough here. In the first part of this section (L27-33 of P10), the description about "commitment experiments" has been deleted compared with the last version of SPM. "Held constant" or "stablization" has clearly explained what these experimens mean. [Govt. of China (Reviewer's comment ID #: 2006-32)]	
SPM-642	A	10:37	10:37	Specify "GREENHOUSE GAS AND AEROSOL concentrations" and indicate how long the commitment period is. [Govt. of Denmark (Reviewer's comment ID #: 2007-11)]	
SPM-643	A	10:37	10:37	Suggest delete "committed" as it can have many different meanings, thus the use of this word is confusing and can be misleading. This holds for the same use elsewhere (e.g. SPM-10 46). [Govt. of Germany (Reviewer's comment ID #: 2011-28)]	
SPM-644	A	10:37	10:37	Write: "...at year 2000 levels, a resulting global warming of 10. C ..." [Govt. of Switzerland (Reviewer's comment ID #: 2020-24)]	
SPM-645	A	10:37	10:	The U.S. Government objected to the newly invented use of the term "committed warming" in the Expert and Government Review SPM draft for two reasons: (1) Hansen pioneered the use of this and defined it 2 decades ago as "unrealized warming;" and (2) it mistakenly projects that this limited warming is all that we are committed to. Use the original published definitions or, at a minimum, delete the word "committed." [Govt. of United States of America (Reviewer's comment ID #: 2023-70)]	

SPM-646	A	10:38	10:38	Does this need some sort of caveat related to the possible role of natural variability over short periods? It could be read as a prediction which could be dicey. [Govt. of Belgium (Reviewer's comment ID #: 2003-47)]	
SPM-647	A	10:38	10:38	The figure of 0.1 °C/decade given here for expected warming if concentrations were stabilised at year 2000 levels, seems inconsistent with the figures for observed warming of 0.13 °C/decade given on page 5 line 5 of the SPM and of "about 0.2 °C/decade" on page 10 line 42 of the SPM. A policy maker would expect the GHG concentrations in year 2000 to exceed the concentrations in most of the 50 years 1956 -2005 and therefore that the modelled warming for a system at year 2000 concentrations to exceed the observed range (page 5 line 5) of 0.1 to 0.16 over the last 50 years. He/she would also expect that this modelled warming , if not exceeding the observed warming for 1990 -2005, was at least more than the half of the warming that is indicated (page 10 line 42) as being observed. While we appreciate that there may be other natural variations influencing the observed values, and that these figures may be those drawn from and clarified in the body of the report, it is important to the credibility of this document that a policy maker reading it is not troubled by apparent inconsistencies. [Govt. of New Zealand (Reviewer's comment ID #: 2015-4)]	
SPM-648	A	10:40	10:40	"global averaged temperature increases": again surface temperatures (see, for example, the following page 11, line 14) should be, probably, specified. [Govt. of Italy (Reviewer's comment ID #: 2012-45)]	
SPM-649	A	10:40	10:43	According to the text in 1.2, that this bullet partly refers to, it is not the change in global average temperature in itself that should be used as evidence here. Instead, reference should be made to the "model-predicted fingerprints of anthropogenic climate change" that "are clearly statistically identifiable in observed data" (cf. p 1-10, 116-17). [Govt. of Sweden (Reviewer's comment ID #: 2019-24)]	
SPM-650	A	10:40	10:43	Suggest rewording of this bullet for clarity: "Confidence in warming projections for the next few decades are strengthened by the agreement between the observed warming during 1990-2005 of 0.2°C per decade and the warming projection of 0.150.3°C per decade, as made in the IPCC First Assessment Report in 1990." [Govt. of United States of America (Reviewer's comment ID #: 2023-71)]	
SPM-651	A	10:45	10:48	Make into two bullets after "oceans" to make these two separate points clear. In second sentence (make a new bullet), change "would be expected" to "is projected for". "About twice as much warming (0.2°C per decade) is projected for emissions within the range of the SRES scenarios. Best-estimate ...[etc.] ". [Govt. of Canada (Reviewer's comment ID #: 2004-47)]	
SPM-652	A	10:45	11:4	The bullet point is somewhat hard to comprehend, since an increase of 0.1C is related to radiative forcing agents, while an increase of 0.2C is related to emission levels. Does an increase of 0.1C correspond to a situation when emissions are so low that the concentrations are kept constant? [Govt. of Norway (Reviewer's comment ID #: 2016-24)]	
SPM-653	A	10:46	10:46	Suggest including a footnote defining "Committed Warming" drawing upon Box TS 5.2 "Committed warming is defined here as the further change in global mean temperature after atmospheric composition, and hence radiative forcing, is held constant, implying a large instantaneous reduction in emissions". [Govt. of Australia (Reviewer's comment ID #: 2002-100)]	
SPM-654	A	10:46	10:46	Delete "would continue" as this implies that this is the path we are on and it is not-we are on the 0.2'C/decade path. Or in some way make it clear that this is hypothetical. [Govt. of Canada (Reviewer's comment ID #: 2004-46)]	
SPM-655	A	10:46	10:46	Same as above, "a committed warming" should be changed to "warming" only. [Govt. of China (Reviewer's comment ID #: 2006-33)]	
SPM-656	A	10:46	10:46	As comment 2 above: The figure of 0.1 °C/decade warming given here seems inconsistent with the figures for observed warming of 0.13 °C/decade given on page 5 line 5 and 0.2 °C/decade on page 10 line 42. [Govt. of New Zealand (Reviewer's comment ID #: 2015-5)]	

SPM-657	A	10:46	10:46	Write:"...that a resulting global trend ..." [Govt. of Switzerland (Reviewer's comment ID #: 2020-25)]
SPM-658	A	10:46	10:46	Another use of the newly coined "committed" expression. [Govt. of United States of America (Reviewer's comment ID #: 2023-72)]
SPM-659	A	10:48	11:1	"none of which considered climate initiatives": either remove or add an explanation, something like -> "none of which considered climate initiatives, but in some cases still assumed reductions in the emissions due to other reasons." [Govt. of Finland (Reviewer's comment ID #: 2009-11)]
SPM-660	A	10:48	11:1	Delete clause " , none of which considered climate initiatives." This eliminates need to specify which climate initiatives; interested parties can consult the Special Report on Emissions Scenarios. [Govt. of United States of America (Reviewer's comment ID #: 2023-73)]
SPM-661	A	10:49	11:1	We do not find meaning in "none of which is considered climate initiatives." [Govt. of Norway (Reviewer's comment ID #: 2016-25)]
SPM-662	A	11:0	11:	(in part related to point about committed warming) Perhaps TS-32 could be included in the SPM? It could convey more critical information than SPM 1c (N2O) or 3c (snow). [Govt. of Belgium (Reviewer's comment ID #: 2003-58)]
SPM-663	A	11:1	11:1	This need additional words like "emissions mitigation initiatives aimed at limiting climate change". [Govt. of Belgium (Reviewer's comment ID #: 2003-48)]
SPM-664	A	11:1	11:1	Please define what is meant by "climate initiative", or use another term. [Govt. of France (Reviewer's comment ID #: 2010-42)]
SPM-665	A	11:1	11:1	"climate initiatives" for clarity could be replaced with "initiatives to curb emissions". [Govt. of Italy (Reviewer's comment ID #: 2012-15)]
SPM-666	A	11:1	11:1	What is the meaning of "Best-estimate" here? [Govt. of Italy (Reviewer's comment ID #: 2012-46)]
SPM-667	A	11:1	11:1	What is meant by "climate initiatives"? Be more specific. [Govt. of Sweden (Reviewer's comment ID #: 2019-25)]
SPM-668	A	11:1	11:4	Suggest that the last sentence beginning with "Best-estimate projections..." be made its own bullet. [Govt. of United States of America (Reviewer's comment ID #: 2023-74)]
SPM-669	A	11:4	11:4	"Figure TS-36" does not exist, replace with "Figure TS-26". [Govt. of Australia (Reviewer's comment ID #: 2002-101)]
SPM-670	A	11:4	11:4	Figure TS-36 does not exist : refers to TS-26 [Govt. of France (Reviewer's comment ID #: 2010-43)]
SPM-671	A	11:7	11:9	The term "current" is ambiguous the authors should give a specific period. This level of confidence ("very likely") also seems too weak given the unanimity of the projections. For all scenarios *minimum* projected warming (2090-2099) are larger (often substantially larger) than observed warming over the 20th century. Suggest change wording to "extremely" – which would be especially appropriate if the "current" trend was calculated over the period 1900-2006. [Govt. of Australia (Reviewer's comment ID #: 2002-102)]
SPM-672	A	11:7	11:40	The range of emission scenarios, temperatures, and sea level were shown prominently in the TAR SPM. What many policy makers will look for in this SPM is an update for these plots. Please provide them in an additional figure, using an intermediate complexity model assessed in either the TAR or the AR4, and tuned to reproduce the AR4 AOGCM results. [Govt. of Belgium (Reviewer's comment ID #: 2003-49)]
SPM-673	A	11:7	11:40	The fact that no mitigation or stabilization scenarios have been used in the WG1 contribution to the AR4 represent a serious shortcoming of this assessment. The reasons for which WG1 deliberately avoided to run models with such scenarios need to be explained in the SPM. [Govt. of Belgium (Reviewer's comment ID #: 2003-50)]

SPM-674	A	11:7	11:9	This chapeau needs to make clear that, compared to insensitivity in the near-term, today's choice of emissions affect longer term warming. Currently this important point is buried in the bullet. Suggest: "Continued greenhouse gas emissions at or above current rates will significantly affect projected warming for the latter 21st century and induce many changes..." [Govt. of Canada (Reviewer's comment ID #: 2004-48)]	
SPM-675	A	11:7	11:7	Insert “, together with historical emissions,” between “current rates” and “would cause“, because temperature change is the result of accumulative emissions during the past centuries. [Govt. of China (Reviewer's comment ID #: 2006-34)]	
SPM-676	A	11:7	11:9	The statement in bold about the warming during the present century should include some of the main information found in the first and third bullet below giving a range of temperature increase and a range of sea level rise. Furthermore the text in bold should include the difference in (best estimates) temperature increase between the the SRES scenarios B1 and A1F1 which is 2.3 degrees telling that this difference is due to higher emissions in the A1F1 scenario. Alternatively, the same of this information could be put in a separate table. Also here the time slices of two decades seems too short. [Govt. of Norway (Reviewer's comment ID #: 2016-33)]	
SPM-677	A	11:7	11:40	Continued greenhouse gas emissions....Rather than listing the global mean temperature changes and sea level rise (with model uncertainty bounds) for each SRES scenario, the same information could be more clearly presented as a table. Also clarify that the reported figures are for total sea level rise (i.e. combines all components). What if any progress has been made since TAR in narrowing uncertainty bounds for regional variations in projected sea level rise? [Govt. of United Kingdom (Reviewer's comment ID #: 2022-32)]	
SPM-678	A	11:11	11:15	The authors need to explain why they have not used 90% or 95% intervals, as these are more widely used. [Govt. of Australia (Reviewer's comment ID #: 2002-103)]	
SPM-679	A	11:11	11:15	The range of temperatures reported in the TAR (1.4-5.8°C) for the full set of SRES and the full range of climate models sensitivities should be compared explicitly to the range given in this paragraph (1-6.3°C), with comments on the reasons for the differences. [Govt. of Belgium (Reviewer's comment ID #: 2003-51)]	
SPM-680	A	11:11	11:15	Further to our comment asking for a explanation of why the range of projections is not combined as in the TAR, the list of projected warmings for various scenarios is very difficult to read. If avoiding a single range is the point (as in TAR range of 1.4-5.8), at the very least, present the numbers in table format under columns headed Scenario, Best Estimate, Likely Range. Discussion of how the projection ranges were chosen, i.e. use of minus 40% to plus 60% of the best estimate (as noted in chapter 10), rather than the more standard 5-95% range, would be of value. [Govt. of Canada (Reviewer's comment ID #: 2004-49)]	
SPM-681	A	11:11	11:13	There is an inconsistency between the length of the future reference period (2090-2099) and the length of the current reference period (1980-1999). Please adjust either one of these to have the same length or both to become a 30-year reference period as in TAR. [Govt. of Denmark (Reviewer's comment ID #: 2007-15)]	
SPM-682	A	11:11	11:15	Although it is very good to give the range of model projections for each scenario, it would be good to add the global range : 1 to 6.3°C, and to specify whether it is comparable and established in the same way as the range of 1.4 to 5.8 °C in the TAR. Was this range in TAR also a likely range, as is meant in note 5 page 1 of the present SPM? A synthetic figure like the one of the TAR is missing (as well as for the scenarios). According the following paragraph this range includes projections with coupled climate-carbon models. Is that right ? [Govt. of France (Reviewer's comment ID #: 2010-44)]	
SPM-683	A	11:11	11:13	Append the sentence “Projected globally-averaged surface warming .... will be significantly affected by the actual emissions that occur” with quantitative information on how the CO2 and GHG emissions actually differ across the set of analyzed SRES scenarios. [Govt. of Germany (Reviewer's comment ID #: 2011-29)]	

SPM-684	A	11:11	11:26	Comparing the text with that in the Technical Summary, it seems that the period over which projections are averaged is 2080 to 2099 instead of 2090 to 2099, as written in the text at line 11. Please check. [Govt. of Italy (Reviewer's comment ID #: 2012-22)]	
SPM-685	A	11:11	11:15	The values given here for warming relative to 1980-1999 may be perceived erroneously as the values for the full projected effect of anthropogenic forcing. While the full text, and the bold text above, makes explicit that it is warming relative to 1980-1999 rather than relative to pre-industrial that is being discussed, it would be more secure to include the statement "These changes need to be added to the observed changes from pre-industrial times to year 2000, given [on page SPM 5] to obtain the total anthropogenic forcing that is projected." This statement could be included either as a continuation of line 9 above, or (suitably modified) within this paragraph. [Govt. of New Zealand (Reviewer's comment ID #: 2015-6)]	
SPM-686	A	11:11	11:15	it seems these numbers have changed since the last draft, but it is not clear why. They don't match with the results in chapter 10.5 (page 48). Are new results included? [Govt. of United Kingdom (Reviewer's comment ID #: 2022-33)]	
SPM-687	A	11:11	11:15	it isn't clear if the numbers in this paragraph include carbon cycle feedbacks or not. And hence if the discussion in the next paragraph is an explanation of these, or if the temperatures are meant to be increased higher than stated here when Carbon cycle is included. [Govt. of United Kingdom (Reviewer's comment ID #: 2022-34)]	
SPM-688	A	11:11	11:15	Readability might be enhanced by writing an interval in the main text and including the scenario information in brackets. [Govt. of Norway (Reviewer's comment ID #: 2016-28)]	
SPM-689	A	11:13	11:15	It would be easier to read if the climate ranges for the SRES scenarios were set out in a table. [Govt. of Australia (Reviewer's comment ID #: 2002-104)]	
SPM-690	A	11:13	11:15	These new estimates are based on a new reference period (1980-1999). Please specify the difference between 1961-90 and 1980-1999 reference values. [Govt. of Denmark (Reviewer's comment ID #: 2007-16)]	
SPM-691	A	11:13	11:15	According to footnote 4, the uncertainty ranges refer to 90% confidence intervals. According to footnote 5, a 90% likelihood is exactly the threshold that separates "likely" from "very likely" statements. Hence, it would be equally correct to say that the true value of a variable is "likely" or "very likely" within a 90% confidence interval. The text uses the term "likely" in this case. In order to avoid the subjective (but potentially important) decision which of the two verbal expressions to use, the vague term "likely range" should be replaced by the exact term "90% confidence interval". [Govt. of European Community (Reviewer's comment ID #: 2008-18)]	
SPM-692	A	11:13	11:13	As above. (What is the meaning of "Best-estimate" here? -TSU Edit) [Govt. of Italy (Reviewer's comment ID #: 2012-47)]	
SPM-693	A	11:14	11:15	Please summarize the range of estimates in one short sentence such as: "IPCC scenarios indicate a likely global warming of 24 degrees C towards the end of the 20th century". [Govt. of Denmark (Reviewer's comment ID #: 2007-18)]	
SPM-694	A	11:14	11:15	Please specify how these uncertainty range compare to the ranges given in TAR, i.e. 2-sigma vs. 1.65-sigma (see chapter 10). [Govt. of Denmark (Reviewer's comment ID #: 2007-21)]	
SPM-695	A	11:14	11:15	The fact that the temperature changes given for the A1T and B2 scenarios are the same, while the footnote on the previous page (SPM-10) gives the approximate CO2 equivalents of these scenarios as 700 and 800 ppm respectively, will appear inconsistent to a reader. If these figures are retained (and I can't find the reference in the body of the report to check their accuracy) some clarification could possibly be given in the box describing the scenarios at the end of the SPM. [Govt. of New Zealand (Reviewer's comment ID #: 2015-7)]	

SPM-696	A	11:14	11:15	Reduce the number of figures in this bullet point e.g. just give the best estimates and then the full range for all scenarios together. Alternatively the full range could be given in a table or an figure. [Govt. of Norway (Reviewer's comment ID #: 2016-53)]
SPM-697	A	11:14	11:15	Present these values in a table together with the values below in page 11 lines 24 to 26 [Govt. of Switzerland (Reviewer's comment ID #: 2020-26)]
SPM-698	A	11:16	11:16	The projections of climate change presented in the SPM are predominately about global averages. Policymakers also have a strong interest in regional effects -notably in their own regions. We propose adding another dot point on projected regional temperature changes, which could be based upon the TS at page 42 lines 37-40. [Govt. of Australia (Reviewer's comment ID #: 2002-105)]
SPM-699	A	11:17	11:21	Are carbon dioxide feedbacks incorporated in the ranges presented in the preceding paragraph or not? Is the 1 degree in addition to the 3.2 making it 4.2 with c-cycle feedbacks? Be clear. Also, why is the result for A2 only given here? Perhaps it would help if this paragraph began with a statement explaining to the reader that there are, at present, only a few fully coupled carbon cycle-climate models and therefore the magnitude of this feedback is uncertain but known/expected to be positive (as explained in the existing first sentence and SPM-13 line 30). [Govt. of Canada (Reviewer's comment ID #: 2004-50)]
SPM-700	A	11:17	11:17	The term "uptake" should be changed in "net uptake" since it is related to the net flux of the biosphere or the oceans, that is the sum of uptake (photosynthesis) and respiration [Govt. of Italy (Reviewer's comment ID #: 2012-5)]
SPM-701	A	11:17	11:17	Increased temperature can increase land uptake by photosynthesis in wet conditions, and can decrease it in dry/stressed conditions; increased temperature generally always increases ecosystem respiration (i.e. CO2 released to atmosphere); the net balance of photosynthesis and respiration cannot be directly and simply related to temperature [Govt. of Italy (Reviewer's comment ID #: 2012-6)]
SPM-702	A	11:17	11:17	Warming tends also to decrease the amount of CO2 that can be contained within the oceans, causing a release of CO2 into the atmosphere [Govt. of Italy (Reviewer's comment ID #: 2012-7)]
SPM-703	A	11:17	11:21	Here one tries to express statements that might not be related. What about the other scenarios than A2, are additional CO2 after warming included? [Govt. of Norway (Reviewer's comment ID #: 2016-29)]
SPM-704	A	11:17	11:21	It should be made clear if the carbon dioxide feedback that is discussed in this paragraph is included in the models discussed in the previous bullet point or if this is an additional warming that should be added on top of the numbers mentioned in there. [Govt. of Sweden (Reviewer's comment ID #: 2019-26)]
SPM-705	A	11:18	11:19	The current text may not make clear to readers why the upper range of projections has increased. Suggest to change it (according to TS-45, lines 54-57) to "For the A2 scenario, the projected increase in atmospheric CO2 concentrations over the 21st century is likely between 10% and 25% higher than projections without this feedback, adding more than 1°C to global average warming at 2100." [Govt. of European Community (Reviewer's comment ID #: 2008-19)]
SPM-706	A	11:18	11:19	rather than "carbon dioxide feedback", it would be helpful to call it "climate-carbon cycle feedback" -it is the action of climate change on the carbon cycle that causes it. [Govt. of United Kingdom (Reviewer's comment ID #: 2022-35)]
SPM-707	A	11:19	11:19	The carbon dioxide feedback': be more explicit: this may be a phrase the policymaker is not familiar with [Govt. of Belgium (Reviewer's comment ID #: 2003-52)]
SPM-708	A	11:19	11:19	Need to make clear if the 1C is included in ranges given above, or not. Why only scenario are A2? [Govt. of Belgium (Reviewer's comment ID #: 2003-53)]

SPM-709	A	11:20	11:21	It would make more sense if this sentence was included in the previous dot point, to make it clear why the AR4 ranges have increased from the TAR. [Govt. of Australia (Reviewer's comment ID #: 2002-106)]	
SPM-710	A	11:20	11:21	! The fact that a "...broader range of models..." has "...been considered..." does not necessarily entail that "Assessed uncertainty ranges..." are "...larger...". By the way, this statement seems to be in contrast with the one referred to in 13 above. (SPM page 10, lines 27-28. -TSU Edit) [Govt. of Italy (Reviewer's comment ID #: 2012-48)]	
SPM-711	A	11:23	5:26	Reduce the number of figures in this text it is too complicated. E.g. give the best estimates and then the full range for all scenarios. . [Govt. of Norway (Reviewer's comment ID #: 2016-54)]	
SPM-712	A	11:23	11:27	The authors need to explain why the ranges presented are not given relative to some earlier period (i.e. rather than 1980 1999), which would be more consistent with other parts of the SPM. [Govt. of Australia (Reviewer's comment ID #: 2002-107)]	
SPM-713	A	11:23	11:26	As with the temperature projections it would be easier to read if these figures were presented as a table. [Govt. of Australia (Reviewer's comment ID #: 2002-108)]	
SPM-714	A	11:23	11:26	This paragraph is also very difficult to read. Again, suggest presenting the numbers in tabular format. [Govt. of Canada (Reviewer's comment ID #: 2004-51)]	
SPM-715	A	11:23	11:34	Sea-level rise projections. The treatment and interpretation of model-based SLR projections in the SPM is very problematic due to two (related) reasons. First, the estimates reported here do not include ice sheet dynamical response to warming and would therefore appear to be a lower bound on sea level rise. Second, observed sea level rise over the past decades is significantly underestimated by current models. According to Table 9.2, the observed 1961–2003 average rate is 1.8 mm/yr, while the average rate given by the models with all forcings is only 1.2 mm/yr. The series limitations of current models in reproducing observed sea-level rise have been clearly stated in the main text (p. 10-64, lines 24-28): "...This indicates a deficiency in current scientific understanding of sea level change and might imply an underestimate in projections". The large gap between model projections and observations needs to be emphasized in the SPM text as well, and it needs to be considered in the interpretation of their results. In particular, the sentence starting on line 28 should be changed to "Model projections of sea level rise are smaller than in the TAR but observed sea level rise over the past decades (1961-2003) is significantly underestimated by current models." [Govt. of European Community (Reviewer's comment ID #: 2008-20)]	
SPM-716	A	11:23	11:26	The figure of 58 cm is well below the estimations of the TAR, which predicted sea level rise up to 90 cm. This should be said and explained. [Govt. of France (Reviewer's comment ID #: 2010-45)]	

SPM-717	A	11:23	11:24	Sea level projections This section mentions the projections, but it does not mention the fact the very models used for these projections underestimate past sea level rise. According to Table 9.2, the observed 1961–2003 average rate is 1.8 mm/yr, while the average rate given by the models with all forcings is 1.2 mm/yr (the latter incorporates observed not modelled ice sheet changes). That means: the observed sea level rise over this period was 50% greater than that given by the models! For the 1993-2003 period the total model-based estimates described in Chapter 9 for ice sheet mass balance are $-0.1 \pm 0.4$ mm/yr whereas the observations indicate a loss of $+0.41 \pm 0.35$ mm/yr (see Table 5.3 and summary in Table 9.2). The sum of the observed components of sea level rise is $2.8 \pm 0.7$ mm/yr, whereas the sum of all model based estimates (including modelled ice sheets) is $2.1 \pm 0.9$ mm/yr. (Table 9.2 adds the observed ice sheet changes into the modelled columns, whereas a better picture can be obtained by including the modelled ice sheet changes described in that chapter). Sea level projections: The gap between modelled and observed contributions to SLR is extremely serious and raises basic concerns as to what extent the projections can be relied upon. Hence, it would not be honest to cite a future range based on these models without mentioning the fact that they greatly underestimate past sea level rise. (continuation comments combined by TSU) [Govt. of Germany (Reviewer's comment ID #: 2011-30)]	
SPM-718	A	11:23	11:34	Sea level projections: The sea level projections and the characterization of ranges and the uncertainties raise unusual difficulties compared to other aspects of this SPM. The final version of the Chapter differs significantly from the Second Order Draft with the addition of methodological appendices, new assumptions in relation to an attempt to scale ice sheet dynamical contributions etc all of which governments have not had the chance to comment. A briefing and discussion with authors soon after the start of the Plenary would therefore be recommended. At the very least an expanded outline of the uncertainties and limitations on the present SLR projections will be essential to the SPM in this area. [Govt. of Germany (Reviewer's comment ID #: 2011-31)]	
SPM-719	A	11:23	11:26	These estimates do not include ice sheet dynamical response to warming and would therefore appear to be a lower bound on sea level rise and need to be qualified accordingly. [Govt. of Germany (Reviewer's comment ID #: 2011-32)]	
SPM-720	A	11:23	11:31	Clarify to what extent the stated upper bounds are simply lower because a smaller sigma uncertainty range is provided. TAR gave 2sigma uncertainty ranges, whereas AR4 states only 1.65 sigma uncertainty ranges (5%-95%) (see Chapter 10, page 65, line 23). Without clarification, the reader is misled in believing that only better scientific understanding caused smaller uncertainties, while in fact a large part is due to different terminology. [Govt. of Germany (Reviewer's comment ID #: 2011-35)]	
SPM-721	A	11:23	11:34	The basis for the ranges and uncertainty estimates given for SLR differ radically from those used in the TAR and for temperature projections. It is not clear that the basis described in Appendix 10.A.6 Combination of Uncertainties is fully correct: "For each scenario, timeseries of temperature rise and the consequent land ice contributions to sea level are generated using a Monte Carlo simulation (van der Veen, 2002). The uncertainties in the resulting land ice sum and in thermal expansion are assumed to be normal and are combined in quadrature, since temperature rise and thermal expansion are not significantly correlated for a given scenario in AOGCM results (Section 10.6.1)." Why cannot the methodology used for the temperature projections be used to compute all the relevant terms for SLR? What is the Monte Carlo simulation used, where is it published and available for review? [Govt. of Germany (Reviewer's comment ID #: 2011-68)]	
SPM-722	A	11:23	11:26	For policy maker the 2030 timeframe is what is of greater relevance. I strongly suggest that sea-level changes for this period be specified, as done for temperature. [Govt. of Italy (Reviewer's comment ID #: 2012-16)]	
SPM-723	A	11:23	11:26	Readability might be enhanced by writing an interval in the main text and including the scenario information in brackets. [Govt. of Norway (Reviewer's comment ID #: 2016-30)]	

SPM-724	A	11:23	11:26	The projected ranges of sea level rise will mislead the primary audience of the SPM, because the projections are based entirely on models that fail to account for possible increases in ice discharges from the Greenland and Antarctic ice sheets. The contributions from these polar ice sheets have the potential to exceed the processes that the models include. Many people are aware of the recent reports about increased ice sheet contributions to sea level. It is misleading to provide estimates only for the processes that have been modeled (such as thermal expansion and increased high-latitude precipitation) while ignoring the potentially larger contributions that models cannot yet estimate (associated with ice sheet dynamics). It is also misleading for those projections to be based on the assumption that, even in the worst of cases, Antarctica will remain too cold to contribute to sea level, because the data indicate that it already making a contribution. The proposed IPCC AR4 projections state, in effect, that the risk of a significant rise in sea level during the next century is less than previously believed, even though the most important recent observations show that the ice sheets—taken as a whole—are contributing more than previously expected. As written, the model output does not bound the full range of uncertainty. [Govt. of United States of America (Reviewer’s comment ID #: 2023-97)]	
SPM-725	A	11:24	11:26	Please summarize the range of estimates in one short sentence such as: "IPCC scenarios indicate a likely global sea level rise of 0.3-0.5 m towards the end of the 20th century". [Govt. of Denmark (Reviewer’s comment ID #: 2007-19)]	
SPM-726	A	11:24	11:26	Present these values in a table together with the values below in page 11 lines 24 to 26 [Govt. of Switzerland (Reviewer’s comment ID #: 2020-27)]	
SPM-727	A	11:26	11:26	This cries out for more explanation because the observed 1993-2003 ice sheet contribution noted above is by itself larger than the mid-range here. Explain how this will be so. One reason is that these projections are from models that do not handle ice sheets credibly. They need to say this clearly. How does it link to the statement in the next bullet on ice sheets? This remains much too murky. [Govt. of Belgium (Reviewer’s comment ID #: 2003-54)]	
SPM-728	A	11:26	11:26	Add: ‘These projections do not include estimates of increased discharge rates from Greenland and Antarctica.’ [Govt. of Netherlands (Reviewer’s comment ID #: 2014-31)]	
SPM-729	A	11:28	11:30	It would be useful as well to add a comment that the range of upper/lower bounds on estimates is reduced and provide an explanation why. [Govt. of Australia (Reviewer’s comment ID #: 2002-109)]	
SPM-730	A	11:28	11:34	There has been a change in methodology for reporting uncertainty intervals between the TAR and the AR4 FGD: Uncertainty ranges in the TAR represented +/-2 standard deviations but in AR4 they represent +/-1.65 standard deviations only (p. 10-65, lines 22-23). This important change in methodology needs to be mentioned here, and it needs to be discussed in connection with the assertion that "the upper bounds of the uncertainty intervals are smaller than in the TAR". [Govt. of European Community (Reviewer’s comment ID #: 2008-21)]	
SPM-731	A	11:28	11:29	Change the current first sentence “Projections of sea level rise are smaller than given in the TAR, mainly due to improved estimates of ocean heat uptake” to “MODEL projections of sea level rise are smaller than in the TAR, although observed sea level rise over the past decades (1961-2003) is underestimated by current models.” The serious limitation of current models, i.e. that they are not able to reproduce recent sea level rise sufficiently, has to be stated more prominently and “projections” might have to be clearly flagged as “MODEL projections”. The mismatch between current models and observed sea level rise is significant, as highlighted in the main text, see Chapter 10-page 64 lines 24-28, where it states that: “... This indicates a deficiency in current scientific understanding of sea level change and might imply an underestimate in projections”. [Govt. of Germany (Reviewer’s comment ID #: 2011-33)]	
SPM-732	A	11:28	11:29	Is this due to the thermal expansion of water? -if so, this information might be included in the text. [Govt. of Norway (Reviewer’s comment ID #: 2016-31)]	
SPM-733	A	11:28	11:34	Insert “the thermal expansion component” between “Projections of” and “sea-level rise”, and replace “are smaller than given in the TAR” with “have a narrower range than given in the TAR” --to result in “Projections of the thermal expansion component of sea-level rise have a narrower range than given in the TAR, ...” The lowest projection given this time (19 cm) is more than double the (9 cm) low estimate from the TAR. [Govt. of United States of America (Reviewer’s comment ID #: 2023-75)]	

SPM-734	A	11:29	11:30	Sentence that reads “Smaller assessed uncertainties in glacier and ice cap changes also contribute to a reduced upper bound” is awkwardly worded. Suggest instead something like “An improved knowledge base about glacier and ice cap changes have enabled uncertainties in this area to be reduced, which has also contributed to a reduction in the upper bound for SLR projections.” [Govt. of Canada (Reviewer’s comment ID #: 2004-52)]	
SPM-735	A	11:29	11:30	Suggest replacing the sentence "Smaller assessed uncertainties in glacier and ice cap changes also contribute to a reduced upper bound" as it is not clear that it is correct. A possible expanded reformulation would be: "Compared to the TAR a smaller estimate of the contribution of glacier and ice caps has been made due to methodological improvements and changes, however large uncertainties remain in relation to the global mass balance sensitivity, the total volume of ice and the contribution of glacier and ice caps around Greenland and Antarctica, which account for about half of the total ice volume of G&IC. The contribution of these latter glaciers has been limited to a fixed fraction (20%) of the calculated melting of G&IC outside of the ice sheet peripheries, although it is likely that melt and discharge rate from these would increase with time during the 21st century as is already evidenced from the Antarctic Peninsula and fringing glaciers of the Greenland ice sheet". Reason 1) Global mass balance sensitivity: -this has been tuned since the SOD to fit observations as the model based estimates were far too low and remains static in the course of the 21st century. Model based estimates of this factor are $0.36 \pm 0.14 \text{ mm yr}^{-1} \text{ K}^{-1}$ , regression against data to the 1990s gives $0.65 \pm 0.40 \text{ mm yr}^{-1} \text{ K}^{-1}$ and over recent decade $\sim 0.8 \text{ mm yr}^{-1} \text{ K}^{-1}$ (Chapter 10 SOD pages 57-58) and final used is $0.80 \pm 0.33 \text{ mm yr}^{-1} \text{ K}^{-1}$ . There is evidence of an increasing sensitivity in recent decades. It is noted in Chapter 10 that there is a substantial difference between model based estimates and observations and that "The current state of knowledge does not permit a satisfactory explanation of the difference". Reason 2) The total volume of ice in all G&IC appears to be more uncertain than in the TAR which estimated a total volume of 0.5m SLE about half of which was in the periphery of the two ice sheets. The SLE volume for G&IC not immediately associated with the ice sheets is 0.15-0.37m (Table 4.3) and around the ice sheets one estimate is given of 0.25m, giving a total range of 0.4m-0.72m. The latter estimate does not include the ice volumes of the Antarctic Peninsula, nor the fringing glaciers of East Antarctica which are dynamically disconnected from the ice sheet (4.5.1 page 17) and can be expected to, or are already, respond(ing) on different timescale than the ice sheet itself. Reason 3) The melting of ice from the peripheral ice sheets and glaciers of the ice sheets was not estimated in the TAR and here is done by adding 20% to the non ice sheet related G&IC SLR estimates. There is little or no observational or physical basis for applying this assumption throughout the 21st century. On one estimate the glaciers of the Antarctic Peninsula (4-25) are presently discharging an ice volume equivalent to about 15% of the losses from G&IC not immediately associated with the ice sheets in the 1993-2003 period. Even if 20% were an appropriate fraction now it cannot be assumed to remain constant and most likely would increase as polar warming extends further and changes either the mass balance or the dynamics of the G&IC immediately associated with the ice sheets. Hence this is very likely too low an estimate. (continuation comments combined by TSU) [Govt. of Germany (Reviewer’s comment ID #: 2011-34)]	
SPM-736	A	11:29	11:29	Add “small” before “ice cap” and delete the callout for footnote 7. [Govt. of United States of America (Reviewer’s comment ID #: 2023-76)]	
SPM-737	A	11:30	11:30	I believe there were also important methodological changes in dealing with reporting uncertainty and other factors (see Ch 10). Please mention which values would result if same basis were used as in TAR, that is, separating out real improvements from matters of choice. [Govt. of Belgium (Reviewer’s comment ID #: 2003-55)]	
SPM-738	A	11:30	11:30	Add new sentence between "bound" and "However": Moreover the TAR gave wider uncertainty ranges (plus or minus 2 standard deviations, while now plus or minus 1.65 standard deviations). [Govt. of Netherlands (Reviewer’s comment ID #: 2014-32)]	

SPM-739	A	11:30	11:30	If we can estimate the effect of carbon cycle feedback in temperatures, why can't we do it in sea level rise? [Govt. of United Kingdom (Reviewer's comment ID #: 2022-36)]	
SPM-740	A	11:30	11:34	Delete everything after "...upper bound." and replace with "However, recent events including the apparent increase in the rate of sea-level rise over the last decade, and the disintegration of several Larsen ice shelves, has increased the uncertainty about the response of the Greenland and Antarctic ice sheets to global warming and contributions to sea-level rise." [Govt. of United States of America (Reviewer's comment ID #: 2023-77)]	
SPM-741	A	11:31	11:34	The final sentence on possible SLR effects due to increasing ice discharge rates is based on, as stated, a limited understanding. As such it is probably inappropriate in the SPM to include the possible percentage increase to SLR that could result. Suggest that the end of the sentence simply states that increased discharge rates could add significantly to future SLR. [Govt. of Australia (Reviewer's comment ID #: 2002-110)]	
SPM-742	A	11:31	11:31	It is unclear whether this means that the SLR values do not precisely correspond to the full range of temperatures given above. Needs clarification. [Govt. of Belgium (Reviewer's comment ID #: 2003-56)]	
SPM-743	A	11:31	11:34	Ice sheet dynamics -General: The scaling of ice sheet dynamical discharges with temperature does not seem well based. It is somehow the lowest order of scaling that could be plausible. The motivation to do is understandable: fast ice sheet dynamics are now being observed and present ice sheet models do not capture this and in the case of Antarctica appear to have the wrong sign of mass change. Using this ad hoc term, introduced into the final draft without the opportunity for government review, without showing the implications of a plausible non linear relationship is not scientifically acceptable as the reader is guided towards a linear response as though this is the most likely, when it is not. Given the late introduction of this term and other plausible dynamical ice sheet responses for each ice sheet should also be computed by the authors for discussion at the Plenary and compared to the central estimates of the other terms. Ice sheet dynamics -Greenland: In the TAR Chapter 11 SLR projections a factor of 0.1 was used as a fraction of surface mass balance (SMB) changes to give an estimate of ice dynamic changes. Since the TAR it has become clear that at least half of the ice loss from Greenland is dynamic in origin and that fast ice dynamics is associated with increasing temperature. A plausible middle range then for the AR4 would be to assume, given the already noted deficiencies in the continental ice sheet models, that Greenland ice dynamical changes are likely to be of the same order as the SMB: is there a basis for assuming that the ice dynamics will slow down compared to the SMB changes? One would think not. A plausible middle estimate of ice sheet dynamics for the GIS would this be equivalent to the SMB changes projected in each scenario. Ice sheet dynamics -West Antarctica Ice Sheet (WAIS): In the TAR it was argued that a "major loss of grounded ice, and accelerated sea level rise, is very unlikely during the 21st century" from the WAIS. Since the TAR large dynamical changes have been observed in the Amundsen Sea sector of the WAIS in response to ice shelf melting and ocean warming, and in relation to the acceleration of discharge glaciers on the Antarctic Peninsula in response to ice shelf disintegration (4-27 lines 38-44). Present loss rates from the WAIS Amundsen sea sector are around 0.4mm/yr SLE and have accelerate quite significantly in the last decade and appear to be forced by oceanic warming (4.6.3). If this were to continue unchanged it would raise sea level by 0.04 m over 100 year, which is close to the lower bound of the "scaled up ice sheet discharge" in Table 10.7. If it increases by a factor of 3 then it would exceed any of the scaled up discharges in Table 10.7. Given the flow accelerations observed over the last 20 years such acceleration is not implausible and could even be categorized as "likely". Insight has also been gained into the WAIS subglacial bed topography in the Amundsen sea sector which is relevant to the instability issue. This adds to the plausibility that ice dynamical discharge in this region is unlikely to slow and could plausibly increase by factor 2-5 over the next century. (see literature cited by Vaughan (2006b). Vaughan (2006b) is cited in Chapter 10). (continuation comments combined by TSU) [Govt. of Germany (Reviewer's comment ID #: 2011-36)]	
SPM-744	A	11:31	11:34	Ice sheet dynamics -West Antarctica Ice Sheet (WAIS) (cont. of comment 46): [Govt. of Germany (Reviewer's comment ID #: 2011-37)]	
SPM-745	A	11:31	11:31	Add after 'lacking.' : Moreover, the current generation climate models fail to simulate adequately the observed 20th century sea level rise, which might imply an underestimate in projections.' [Govt. of Netherlands (Reviewer's comment ID #: 2014-33)]	

SPM-746	A	11:31	11:31	Start 'If recently observed etc.' As a new bullet. [Govt. of Netherlands (Reviewer's comment ID #: 2014-34)]
SPM-747	A	11:33	11:33	Suggest, instead of "central estimate", using "best estimate". [Govt. of Canada (Reviewer's comment ID #: 2004-53)]
SPM-748	A	11:33	11:34	This last sentence should emphasize that the current LOSU is STILL too limited. [Govt. of Denmark (Reviewer's comment ID #: 2007-12)]
SPM-749	A	11:33	11:33	"that would add 10 to 25% of the central estimate" Sentence unclear : does this mean that the minimum and maximum estimates would not be changed ? [Govt. of France (Reviewer's comment ID #: 2010-46)]
SPM-750	A	11:36	11:40	This is a new finding since the TAR and should be flagged as such. Need to state what the climatic significance and implications of this are. [Govt. of Canada (Reviewer's comment ID #: 2004-54)]
SPM-751	A	11:36	11:40	What would be the consequence of shallow-carbonate dissolution? A short sentence would be helpful. [Govt. of France (Reviewer's comment ID #: 2010-47)]
SPM-752	A	11:36	11:40	What will be the possible consequence of increased ocean acidification in conjunction with increased temperature, in terms of sink for CO <sub>2</sub> ? Will the capacity of the ocean to store carbon remain the same, or become lower? [Govt. of France (Reviewer's comment ID #: 2010-48)]
SPM-753	A	11:36	11:40	Append the paragraph on ocean acidification with a brief explanation on what the effects could be of increasing acidification and the "dissolution of shallow-water carbonate sediments". Briefly specify possible effects on the marine carbon cycle and food chain. In the present form, the statement on ocean acidification and its possible significance is not very accessible to the general reader. Two sentences are needed on the significance of this process (acidification): "It is certain that the ocean's capacity to buffer increasing atmospheric CO <sub>2</sub> will decline in the future as ocean with potentially severe consequences (7.3.4.2). Ecological changes due to expected ocean acidification may be severe -for corals and pelagic ecosystems" (Box 7.3: Marine Carbon Chemistry and Ocean Acidification). " [Govt. of Germany (Reviewer's comment ID #: 2011-38)]
SPM-754	A	11:36	11:40	States: "Ocean acidification would eventually lead to dissolution of shallow-water carbonate sediments" however, the last part of this sentence (which is repeated in Chapter 10, p. 5, Line 10-11), "...and could affect marine calcifying organisms." has been cut off in the SPM. It is suggested to include this last point as it illustrates the effects of ocean acidification. If not included a rationale is required for why it exists in Chapter 10, but not in the SPM. [Govt. of Japan (Reviewer's comment ID #: 2013-17)]
SPM-755	A	11:36	11:40	State the significance / policy relevance of ocean acidity? Move the footnote 12 callout after "units". [Govt. of United States of America (Reviewer's comment ID #: 2023-78)]
SPM-756	A	11:37	11:38	In which time period of the 21st century will pH reduce between 0.14 and 0.35 units? This should be clarified. [Govt. of China (Reviewer's comment ID #: 2006-35)]
SPM-757	A	11:38	11:38	It would seem more precise and clear to replace 'extending' with 'in addition to'. [Govt. of Australia (Reviewer's comment ID #: 2002-111)]
SPM-758	A	11:38	11:38	Does "extending" mean "in addition to"? [Govt. of Belgium (Reviewer's comment ID #: 2003-57)]
SPM-759	A	11:38	11:39	This sentence has limited practical value in its current form. It should be amended by a statement about the expected effects of the dissolution of shallow-water carbonate sediments on carbon cycling and/or biological systems. [Govt. of European Community (Reviewer's comment ID #: 2008-22)]
SPM-760	A	11:38	11:40	The effects of dissolution of shallow-water carbonate sediments should be explained. [Govt. of Norway (Reviewer's comment ID #: 2016-32)]

SPM-761	A	11:39	11:39	"...dissolution of shallow-water carbonate sediments" by itself provides no assistance to policy readers suggest that after "sediments" the following is added "and could produce major changes in marine organisms and ecosystems, although there is a high level of uncertainty as to what these changes would be". This is more reflective of the findings in chapter 10. [Govt. of Australia (Reviewer's comment ID #: 2002-112)]	
SPM-762	A	11:39	11:39	add after 'sediments' ; 'and would affect marine ecosystems.' [Govt. of Netherlands (Reviewer's comment ID #: 2014-35)]	
SPM-763	A	11:39	11:39	The word 'eventually' is too vague to use when addressing this important topic, and is anyway hardly consistent (at least in the ocean-change context) with the timing given in the body of the report of "... during the 21st century ..." (Chapter 10 page 40 line 25). Policy makers need some idea of the timeframe, even if it has wide error bars. Please either use a more specific time or add an explanation to the end of the sentence (line 39) such as: "[dissolution ... sediments] possibly as soon as during the 21st century." [Govt. of New Zealand (Reviewer's comment ID #: 2015-8)]	
SPM-764	A	11:39	11:39	Explain why "dissolution of shallow-water carbonate sediments" is noteworthy.Suggested text "... with implications for the stability and longevity of the coral reefs and major food sources for fish and other animals". [Govt. of United Kingdom (Reviewer's comment ID #: 2022-37)]	
SPM-765	A	11:43	11:44	The sequence of specific regional changes should summarise those appearing following the dot points and should follow the same sequence -for example, 'ice' would follow 'precipitation'. It would be useful to follow a standard sequencing throughout the SPM when dealing with change parameters in the climate system. [Govt. of Australia (Reviewer's comment ID #: 2002-113)]	
SPM-766	A	11:43	11:45	Please change "precipitation, and some aspects of extremes and of ice" into "some aspects of precipitation, of extremes and of ice". From TAR to now, there has been no obvious improvement in model simulations of precipitation. [Govt. of China (Reviewer's comment ID #: 2006-36)]	
SPM-767	A	11:43	11:43	What is the "...higher confidence..." based upon? [Govt. of Italy (Reviewer's comment ID #: 2012-49)]	
SPM-768	A	11:43	13:25	Provide the information under which scenarios these climate impacts are expected. If those projected impacts are based on SRES scenarios, add the clarification at relevant places "... under the SRES scenario(s) XY, which assumes no additional climate initiatives" [Govt. of Germany (Reviewer's comment ID #: 2011-39)]	
SPM-927	B	11:43	13:23	The first bullet informs that projected warming in the 21st century shows scenario independent geographical patterns. Although the following bullets refer to a global framework, it would be interesting to inform decision makers on the likelihood of different range of hot extremes and heat waves, between the Northern continental hemisphere and the Southern oceanic one. These differences are geographical nature and should be reported to decision levels. [Govt. of Argentina (Reviewer's comment ID #: 2024-9)]	
SPM-928	B	11:43	13:23	Further, no reference is made on the geophysical effects of the Earth's warming on mountain glaciers, particularly those in inter-tropical regions. The physical problems involved in the glacier's lake formation are difficult to explain, however, information on the increasing probability of accelerated glaciers retreat and glacier lake outburst floods (GLOFs), would be of importance to decision making. Convergence of this issue treatment between WGI and WGII, would serve the purpose to activate efforts to reduce the adverse effects of these events and their implication on water resources availability. [Govt. of Argentina (Reviewer's comment ID #: 2024-10)]	
SPM-769	A	11:47	11:47	Suggest making it simpler: "In all SRES(?) scenarios, the projected warming in the 21st century shows geographical patterns similar...." [Govt. of United States of America (Reviewer's comment ID #: 2023-79)]	

SPM-770	A	11:48	11:48	The phrasing "those observed" is obviously meant to relate to preceding patterns, but as currently drafted is likely to be ambiguously interpreted by policy readers, to relate to the magnitude of change. Suggest redrafting the sentence to " ...patterns similar to those emerging in climate observations over the past 50 years". [Govt. of Australia (Reviewer's comment ID #: 2002-114)]
SPM-771	A	11:48	11:48	"geographical patterns observed over the past 50 years"are quoted : but most of the maps show 1979-2005 (Chap 3 and TS-6). 50 years should be replaced by 30 years. [Govt. of France (Reviewer's comment ID #: 2010-49)]
SPM-772	A	11:48	11:48	Add "most" before "high northern latitudes". [Govt. of United States of America (Reviewer's comment ID #: 2023-80)]
SPM-773	A	11:49	11:49	The authors should confirm that "the Southern Ocean" rather than "southern oceans" (as in the TS at page 42 line 42), is accurate, and ensure consistency with the TS. [Govt. of Australia (Reviewer's comment ID #: 2002-115)]
SPM-774	A	11:49	11:49	The statement "Warming is ... least over the Southern Ocean and North Atlantic" is in contradiction with 10.3, where sea ice is mentioned to have an influence on higher warming on high latitude oceans. Is the lesser warming over the Southern Ocean and North Atlantic related to the thermohaline circulation? This sentence should be clarified if possible. [Govt. of Denmark (Reviewer's comment ID #: 2007-13)]
SPM-775	A	12:0	12:	Some other figures that might help to distinguish the effect of scenarios in a relatively short time-horizon are Fig 10.18 regarding (Dry days – this is particularly remarkable) and Fig 10.13 (Sea-Ice – which includes the committed warming). [Govt. of Belgium (Reviewer's comment ID #: 2003-59)]
SPM-776	A	12:1	12:13	Figure SPM-5: The authors should provide a footnote explaining what AOGCMs are. Note also that this is also omitted from TS page 40. [Govt. of Australia (Reviewer's comment ID #: 2002-116)]
SPM-777	A	12:1	12:13	Figure SPM-5: The authors should consider the need for the left hand panel to be included. For policy readers the charts of relative probability are difficult to understand and the attendant caption does not provide much assistance. Suggest deletion of left hand panels and the provision of written explanation of the probabilities of the estimated global average warming. [Govt. of Australia (Reviewer's comment ID #: 2002-117)]
SPM-778	A	12:1	12:13	Figure SPM 5: There is an issue with the colour used in the legend and the colours in the charts. (i) In the left-hand charts (GMST change) colour coding of single-orange/ red-probability distribution is used, however, their temperature spans bear no resemblance to the colour legend used below the charts set. (ii) In the third column of charts (2090-2099) the intense reds cannot be related to the indiscriminate colour sequence above about 3 degrees C. [Govt. of Australia (Reviewer's comment ID #: 2002-118)]
SPM-779	A	12:1	12:13	Figure SPM-5: As previously noted the authors should explain why they have chosen to focus on the B1, A1B and A2 scenarios. [Govt. of Australia (Reviewer's comment ID #: 2002-119)]
SPM-780	A	12:1	12:13	It is better to change "surface temperature" into "surface air temperature". "surface temperature" is sometimes different from "surface air temperature ( 2m above surface)". [Govt. of China (Reviewer's comment ID #: 2006-37)]
SPM-781	A	12:1	12:14	The wording of the label of the vertical axis in the left panels is not well chosen. The original wording was PDF(1/°C), which is probably difficult to understand for the public.Would it be possible to find a better solution? [Govt. of Italy (Reviewer's comment ID #: 2012-23)]
SPM-782	A	12:1	12:13	Fig SPM-5. Do these maps and PDFs include carbon cycle feedback? If not, this should be clearly stated (ie inconsistency with page 11 line 11 para) [Govt. of United Kingdom (Reviewer's comment ID #: 2022-38)]

SPM-783	A	12:1	12:13	Fig SPM-5. Clarify that each line in the PDFs corresponds to a different study. [Govt. of United Kingdom (Reviewer's comment ID #: 2022-39)]
SPM-784	A	12:3	12:12	Figure SPM-5: The probabilistic temperature projections for various SRES scenarios have apparently been calculated with different methodologies. The left panel show 5, 4, and 7 cumulative probability distributions for the B1, A1B and A2 scenarios, respectively. Missing probability distribution functions should be appended to make the probabilistic projections for the B1, A1B and A2 scenarios better comparable. [Govt. of European Community (Reviewer's comment ID #: 2008-23)]
SPM-929	B	12:3	12:	Figure SPM-5: The improvement of this important figure that informs now very clearly about the difference in changes of temperature depending on various emission pathways is very much appreciated. [Govt. of Austria (Reviewer's comment ID #: 2025-8)]
SPM-785	A	12:4	12:13	Figure SPM-5: The possibility to summarize this information in one figure and two maps should be investigated. [Govt. of Norway (Reviewer's comment ID #: 2016-34)]
SPM-786	A	12:8	12:12	Figure SPM-5: Check the probability density distributions for A1B. Why is the wide pdf that is shown under both B1 and A2 for 2090-2099 warming not apparent in the A1B plot? Did that specific study not analyze A1B? Append missing pdfs to make the B1, A1B and A2 plots better comparable. [Govt. of Germany (Reviewer's comment ID #: 2011-40)]
SPM-787	A	12:8	12:12	The text to figure SPM-5 should explain that the difference between the average projections in temperature between the three scenarios illustrates that the warming will be higher for higher emission levels. [Govt. of Norway (Reviewer's comment ID #: 2016-55)]
SPM-788	A	12:8	12:8	"globally averaged surface temperatures...." Add the word "surface" to the caption even though in figure banner. [Govt. of United States of America (Reviewer's comment ID #: 2023-81)]
SPM-789	A	12:16	12:16	The authors should provide an indication of whether snow cover will decline in all geographical regions or just some. [Govt. of Australia (Reviewer's comment ID #: 2002-120)]
SPM-790	A	12:16	12:33	This section on regional projections is unnecessarily vague. In which aspects of regional projections is there more confidence? I.e. Snow cover is projected to contract, but at a faster or slower rate and to what extent compared to earlier assessments? [Govt. of Canada (Reviewer's comment ID #: 2004-55)]
SPM-791	A	12:16	12:17	Delete all of them. There is no useful new information in this passage. [Govt. of China (Reviewer's comment ID #: 2006-38)]
SPM-792	A	12:16	12:17	This statement currently is very vague as it describes neither scale nor timing of the decrease in snow cover. [Govt. of European Community (Reviewer's comment ID #: 2008-24)]
SPM-793	A	12:16	12:16	Add at end of first sentence "substantially by mid century" or a similar phrase that describes scale and timing [Govt. of Germany (Reviewer's comment ID #: 2011-41)]
SPM-794	A	12:16	12:33	These are very important and should be included in a revised/expanded Table SPM-1. Refer to detailed U.S. Government comment regarding page SPM-7, lines 1-13. [Govt. of United States of America (Reviewer's comment ID #: 2023-82)]
SPM-795	A	12:19	12:21	If possible it would be helpful for the authors to provide some analysis of how much sea ice extent is projected to decline in the Antarctic by 2100. [Govt. of Australia (Reviewer's comment ID #: 2002-121)]
SPM-796	A	12:19	12:19	"shrink" by how much and when? [Govt. of Germany (Reviewer's comment ID #: 2011-42)]
SPM-797	A	12:19	12:19	Insert 'In some projections,' before 'arctic'. [Govt. of Netherlands (Reviewer's comment ID #: 2014-36)]
SPM-798	A	12:19	12:19	Add "Extent and thickness of..." to beginning of sentence. [Govt. of United States of America (Reviewer's comment ID #: 2023-83)]

SPM-799	A	12:23	12:23	An explanation of what a "hot extreme" is necessary. [Govt. of Australia (Reviewer's comment ID #: 2002-122)]
SPM-800	A	12:23	12:23	It would be helpful to add geographical regions where these extremes will become more frequent. [Govt. of United Kingdom (Reviewer's comment ID #: 2022-40)]
SPM-801	A	12:26	12:29	These sentences should be made more consistent with those that are included in chapter 10 executive summary (page 6, lines 21 to 25). In particular, the increase of peak wind speed is not a common feature of climate change simulations even with some high resolution models (see also chapter 10, page 36, lines 2 to 8). We propose : "The number of tropical cyclones (typhoons and hurricanes) per year is projected to decrease but their intensity is expected to increase, with some consistent increase of peak wind intensities, but a more consistent projected increase in mean and peak precipitation intensities." [Govt. of France (Reviewer's comment ID #: 2010-50)]
SPM-802	A	12:26	12:29	States that tropical cyclone events will decrease in frequency but increase in intensity in the future, however SPM-6, Line 28 states that "there is no clear trend in the annual number of cyclones." In order to avoid confusion between observational analyses and future projections, it is suggested to add brief clarification/reconciliation on the apparent discrepancy between the two statements. [Govt. of Japan (Reviewer's comment ID #: 2013-18)]
SPM-803	A	12:26	12:26	Delete the statement on the number of cyclones, because current models are just not good enough. [Govt. of Netherlands (Reviewer's comment ID #: 2014-37)]
SPM-804	A	12:26	12:27	What are the confidence levels of the statements about tropical cycle frequency and intensity? [Govt. of United States of America (Reviewer's comment ID #: 2023-84)]
SPM-805	A	12:27	12:27	Replace 'is expected' by one of the standard likelihood statements. [Govt. of Netherlands (Reviewer's comment ID #: 2014-38)]
SPM-806	A	12:28	12:28	Delete "apparent" replace with "observed" to illustrate that the increase in proportion of intense storms since the 1970s is well documented. [Govt. of Australia (Reviewer's comment ID #: 2002-123)]
SPM-807	A	12:28	12:28	"The apparent increase.." how informative is this fact to a policy maker when considering projections? [Govt. of Italy (Reviewer's comment ID #: 2012-17)]
SPM-808	A	12:28	12:29	What does "apparent increase" imply? Delete sentence unless strong evidence exists regarding the "apparent increase". Alternatively, replace that sentence with "The ability of these AOGCMs to simulate typhoons and hurricanes has not been adequately demonstrated." [Govt. of United States of America (Reviewer's comment ID #: 2023-85)]
SPM-809	A	12:28		The term "apparent" seems quite weak considering the quality of the observations showing this increase. We propose to replace "apparent" by "actual". [Govt. of France (Reviewer's comment ID #: 2010-51)]
SPM-810	A	12:31	12:33	The wind, precipitation, and temperature patterns change not only outside the tropics but also in the tropics. Observations show evidence for obvious changes in them in the tropics during the last 20 years, so the projections of future should include that of the tropics. [Govt. of China (Reviewer's comment ID #: 2006-39)]
SPM-811	A	12:31	12:31	What is the confidence level of the statement about poleward moving storm-track changes? [Govt. of United States of America (Reviewer's comment ID #: 2023-86)]
SPM-812	A	13:1	13:15	It is suggested that the first dot point on this page, which deals with precipitation, and Figure SPM-6 be moved to page 12, directly below Figure SPM-5. This would provide precipitation projections with a better prominence in the section, and it follows the structure of the other parts of the SPM. [Govt. of Australia (Reviewer's comment ID #: 2002-124)]

SPM-813	A	13:1	13:4	This paragraph fails to provide information on expected precipitation changes in the tropics. TS-54, lines 38-40 states that "precipitation generally increases in the tropical precipitation maxima". This statement should be added, with a likelihood estimate, to the SPM text. It is further suggested to add the names of specific regions where increases or decreases are very likely to occur (from TS-56, lines 8-16). [Govt. of European Community (Reviewer's comment ID #: 2008-25)]	
SPM-814	A	13:1	13:4	Clarify whether these estimates include carbon cycle feedback [Govt. of United Kingdom (Reviewer's comment ID #: 2022-41)]	
SPM-815	A	13:2	13:2	Note that the expected increase in precipitation at high latitudes does not imply that soil moisture increases, of importance to the future of methane emissions from soils (the average soil moisture response actually decreases in models). It would be very useful to indicate that here. [Govt. of United States of America (Reviewer's comment ID #: 2023-87)]	
SPM-816	A	13:2		Please add "yearly" before precipitation; indeed, this can vary with seasons. [Govt. of France (Reviewer's comment ID #: 2010-52)]	
SPM-817	A	13:5		It would be useful to have also some information on intertropical and equatorial precipitation amounts. [Govt. of France (Reviewer's comment ID #: 2010-53)]	
SPM-818	A	13:6	13:15	Figure SPM-6: the authors should explain why they have adapted Figure 10.9, for the purposes of the SPM. In particular it is not clear why the 20 year averages used in Figure 10.9 have been reduced to 10 year averages. [Govt. of Australia (Reviewer's comment ID #: 2002-125)]	
SPM-819	A	13:6	13:15	Figure SPM-6: As previously noted the authors should explain why they have chosen to focus on the A1B scenario. [Govt. of Australia (Reviewer's comment ID #: 2002-126)]	
SPM-820	A	13:6	13:15	Figure SPM-6 : the figure for precipitation is much clearer than what was provided for the TAR, but it would be helpful to say the reason for choosing scenario A1B. [Govt. of France (Reviewer's comment ID #: 2010-54)]	
SPM-821	A	13:6	13:15	figure SPM-6 : This figure differs from figure 10.9 in chapter 10, both with respect to the scenario period and with respect to the agreement criteria. Moreover, it is doubtful if the seasons DJF and JJA are appropriate to illustrate precipitation changes in the tropics. Probably, figure 10.12 which gives the more robust changes in the annual mean precipitation for 2080-2099 is a better candidate for inclusion in the SPM. [Govt. of Netherlands (Reviewer's comment ID #: 2014-39)]	
SPM-822	A	13:7	13:7	This figure is very useful. Of all land regions, only few have same sign precipitation anomaly in both DJF and JJA and so are more likely to be impacted by droughts. Southern Europe, Northern Africa and Middle-East regions (climatologically already dry) are among these critical regions and should be explicitly mentioned. [Govt. of Italy (Reviewer's comment ID #: 2012-18)]	
SPM-823	A	13:7	13:	Fig SPM-6. Say that these maps do not include carbon cycle feedback. [Govt. of United Kingdom (Reviewer's comment ID #: 2022-42)]	
SPM-930	B	13:11	13:14	Caption to figure SPM-6: It is suggested to add some language in order to put the change in precipitation amount in perspective for policy makers. Such explanatory note seems to be important because in addition to changes in the amount of precipitation projected patterns of precipitation are also dependent on the distribution of precipitation in time and on the nature of precipitation (snow, rain, etc). Such note might read as follows: It should be noted that the pattern of precipitation is also dependent on the distribution of precipitation in time and the nature of precipitation. Both may also change because of climate change. [Govt. of Austria (Reviewer's comment ID #: 2025-10)]	
SPM-824	A	13:18	13:23	Would be useful to link term MOC with the more commonly known term of thermohaline circulation. [Govt. of Canada (Reviewer's comment ID #: 2004-56)]	

SPM-825	A	13:18	13:18	"Atlantic meridional overturning circulation (MOC)" : same remark as for page 6 line 44; a definition of MOC would be helpful. [Govt. of France (Reviewer's comment ID #: 2010-55)]
SPM-826	A	13:18	13:20	Clarify whether these estimates include carbon cycle feedback [Govt. of United Kingdom (Reviewer's comment ID #: 2022-43)]
SPM-827	A	13:18	13:23	The consequences of changes in MOC should be explained. [Govt. of Norway (Reviewer's comment ID #: 2016-35)]
SPM-931	B	13:18	13:23	The text is unclear whether the range of reduction of MOC relates to model uncertainties or to different emission scenarios. Such clarification would be welcome. [Govt. of Austria (Reviewer's comment ID #: 2025-9)]
SPM-828	A	13:20	13:21	It is hard for readers to understand this sentence "Temperatures in the Atlantic region are projected to increase despite such changes due to the much larger warming associated with projected increases of greenhouse gases" due to its unclear relationship with other sentences. In addition, Temperature changes in the North Atlantic and Southern Ocean have been discussed in SPM-11, line 47-50. Therefore, it is suggested to delete this sentence. [Govt. of China (Reviewer's comment ID #: 2006-40)]
SPM-829	A	13:21	13:22	A statement with too high confidence attached: "It is very unlikely that the MOC will undergo a large abrupt transition during the 21st century." The term "very unlikely" suggests a high confidence (more than 90% likelihood that no large abrupt transition happens) that is not supported by the body of the report. The words "verly unlikely" should therefore be changed to "unlikely". [Govt. of European Community (Reviewer's comment ID #: 2008-26)]
SPM-830	A	13:21	13:22	MOC change "unlikely": Change the word "very unlikely" to "unlikely", in order for the statement to become consistent with the body of the report, i.e. it should correctly read: "It is unlikely that the MOC will undergo a large abrupt transition during the 21st century." The statement as it is, "It is very unlikely that the MOC will undergo a large abrupt transition during the 21st century", suggests a high confidence (90% likelihood that no large abrupt transition happens) that is not supported by the body of the report. What is this statement based on? [Govt. of Germany (Reviewer's comment ID #: 2011-43)]
SPM-831	A	13:21	13:22	MOC change "unlikely" Reason 1 -Modeling: As intercomparison studies cited in chapter 8 find, models differ greatly in their stability of the MOC. The chapter speaks about a the "wide range of MOC responses in the coupled models used here". The reasons for these discrepancies are not well understood. Also, most models do not include meltwater from the Greenland ice sheet. Those models that did include it find that this is a crucial mechanism that may decide whether a "large abrupt transition" occurs. The SPM itself highlights how uncertain the meltwater influx from Greenland is, when it states: "Dynamical processes not included in current models but suggested by recent observations could increase the vulnerability of the ice sheets to warming, increasing future sea level rise. Understanding of these processes is limited and there is no consensus on their magnitude." Some models have shown "large abrupt transitions" in the MOC within the 21st century, e.g. the paper by Schaeffer et al. 2002 cited in chapter 10. Overall, this state of modeling does not justify to make any claims with 90% confidence. [Govt. of Germany (Reviewer's comment ID #: 2011-44)]
SPM-832	A	13:21	13:22	MOC change "unlikely" Reason 2 -Observations: As the SPM correctly states: "There is insufficient evidence to determine whether trends exist in some other variables, for example, the meridional overturning circulation of the global ocean." That is: we can't even tell from observations whether the MOC is changing or not. This serious lack of data does not justify high-confidence statements to be made. [Govt. of Germany (Reviewer's comment ID #: 2011-45)]

SPM-833	A	13:21	13:22	MOC change "unlikely" Reason 3 -Experience from past climate changes: Chapter 6 concludes: "Some authors have argued that climate models tend to underestimate the size and extent of past abrupt climate changes (Alley et al., 2003), and hence may underestimate the risk of future ones. However, such a general conclusion is probably too simple, and a case-by-case evaluation is required to understand which effects may be misinterpreted in the paleoclimatic record and which mechanisms may be underestimated in current models. This issue is important for an assessment of risks for the future: the expected rapid warming in the coming centuries could approach the amount of warming at the end of the last glacial, and would occur at a much faster rate. Hence, meltwater input from ice sheets could again become an important factor influencing the ocean circulation, as for the Younger Dryas and 8.2 ka events. A melting of the Greenland Ice Sheet (equivalent to 7 m of global sea level) over 1,000 years would contribute an average freshwater flux of 0.1 Sv; this is a comparable magnitude to the estimated freshwater fluxes associated with past abrupt climate events. Most climate models used for future scenarios have thus far not included meltwater runoff from melting ice sheets. Inter-comparison experiments subjecting different models to freshwater influx have revealed that while responses are qualitatively similar, the amount of freshwater needed for a shutdown of the Atlantic circulation can differ greatly between models; the reasons for this model-dependency have not yet been fully understood (Rahmstorf et al., 2005; Stouffer et al., 2006). At present knowledge, future abrupt climate changes due to ocean circulation changes cannot be ruled out." Again this clearly does not support the SPM statement. (continuation comments combined by TSU) [Govt. of Germany (Reviewer's comment ID #: 2011-46)]	
SPM-834	A	13:21	13:23	Because we do not know if the MOC in coupled models is in the right parameter range, we propose to replace 'It is very unlikely....confidence' by: 'The risk for the MOC to undergo large abrupt changes during the 21th century cannot be assessed with confidence, but seems unlikely (less than 50% chance).' [Govt. of Netherlands (Reviewer's comment ID #: 2014-40)]	
SPM-835	A	13:23	13:24	Add the following sentence (based on TS-56, lines 18-20): "The increase in extremes of daily precipitation is very likely in Northern Europe, South Asia, East Asia, Australia and New Zealand -this list in part reflecting uneven geographical coverage in existing published research." [Govt. of European Community (Reviewer's comment ID #: 2008-27)]	
SPM-836	A	13:26	13:28	Strongly suggest separating warming and sea level rise into two separate points. Quite different time scales in the end and relative magnitudes after stabilization eg Delta T after stabilization is a fraction of Delta T before and is reached on multidecadal times scales, whereas SLR after stabilization is likely to be multiples of that before and is reached on multi century time scales. And there is the risk of ice sheet instability adding order of magnitude to SLR, which is very likely not to be the case with Delta T. [Govt. of Germany (Reviewer's comment ID #: 2011-47)]	
SPM-837	A	13:26	13:29	Here we would like to see a statement about the risk for increased rise in sea level due to future melting of ice caps over Greenland/Vest-Antarctica. This is very likely one main question in future research. The report needs such a statement in the end. [Govt. of Norway (Reviewer's comment ID #: 2016-38)]	
SPM-838	A	13:26	13:28	Restructure sentence to read as follows: "Anthropogenic warming and sea-level rise would continue for centuries even if greenhouse gas concentrations were to be stabilized, due to the time scales associated with climate processes and climate feedbacks." [Govt. of United States of America (Reviewer's comment ID #: 2023-88)]	
SPM-839	A	13:29	13:29	One of the robust findings from the AR4 is an increased understanding that future warming will tend to reduce the earth's capacity to absorb CO <sub>2</sub> -this is an important conclusion and should be in the SPM. Suggest that the text from the TS is repeated here "Future warming would tend to reduce the capacity of the Earth system (land and ocean) to absorb anthropogenic carbon dioxide. As a result, an increasingly large fraction of anthropogenic CO <sub>2</sub> would stay airborne in the atmosphere under a warmer climate." [Govt. of Australia (Reviewer's comment ID #: 2002-127)]	

SPM-840	A	13:30	13:32	The first sentence places the dominant emphasis on 'uncertainty' and not on what is known. TS page 45 lines 50-55 characterise a more definite and clear presentation of the issue, which should be reflected here. [Govt. of Australia (Reviewer's comment ID #: 2002-128)]	
SPM-841	A	13:30	13:35	A large number of studies and scientific literature indicate that if average global surface temperature rises by more than 2°C above its pre-industrial level, the risks to ecosystems and human societies increase sharply. Reducing this risk would require that the CO2 concentration be stabilized below 400-450 parts per million. This is notably the basis for the European Union position on long term reduction targets. It would be very helpful that the SPM addresses this question and also clarifies by when such a 2°C increase would be reached under various scenarios . This is all the more important since this is a crosscutting themes of AR4. [Govt. of Belgium (Reviewer's comment ID #: 2003-60)]	
SPM-842	A	13:30	13:35	This bullet is very complex and needs to be simplified, particularly the second sentence. For example, suggest, at line 32, saying "...require additional reductions..." and then also changing line 34 to read "...feedback, of 105 to 300 GtC and of 165 to 510 GtC..." [Govt. of Canada (Reviewer's comment ID #: 2004-57)]	
SPM-843	A	13:30	13:35	Awkwardly written paragraph. Also, it does not address the subject in the bolded heading so it is not clear to the reader why this paragraph is here. IF used, suggest rewording as follows: The magnitude of the positive feedback between climate change and the carbon cycle is uncertain. This leads to uncertainty about how to achieve any particular atmospheric CO2 stabilization level. [Govt. of Canada (Reviewer's comment ID #: 2004-58)]	
SPM-844	A	13:30	13:35	Feedbacks with Climate. This is a very important and critical analysis that should be expanded. Increase risk of positive feedback should be described in terms of ocean vs land feed backs and within the component (ocean/land) an assessment of potential risks of positive (or negative) feed backs should be highlighted. For example in the case of land the role of permafrost melting and increase of soil organic carbon oxydation or increase of fires should be synthetized at least with their uncertainties. [Govt. of Italy (Reviewer's comment ID #: 2012-24)]	
SPM-845	A	13:30	13:35	Line 34 states "450 and 1000ppm", however, a state of "ppm" is not clear to indicate if it is of a unit of CO2 concentration or of a one of GHG concentration in CO2 equivalent. It may confuse policy makers. In order to avoid confusion, please clearly state the unit for instance, ppm(CO2) or ppm(GHG) throughout SPM. [Govt. of Japan (Reviewer's comment ID #: 2013-20)]	
SPM-846	A	13:30	13:35	This paragraph covers some complex concepts. It would be more useful to policy makers if the meaning of the paragraph was clarified. Our suggestion is: "The magnitude of the positive feedback between climate change and the carbon cycle is uncertain. This leads in turn to uncertainty over the atmospheric concentrations that will result from particular emissions scenarios. A number of models suggest that cummulative emissions in the 21st century require to be 105 to 300 Gt lower because of this positive feedback, than without this feedback, to stabilise at 450 ppm. To stabilise at 1000 ppm emissions require to be 165 to 510 Gt lower." [Govt. of New Zealand (Reviewer's comment ID #: 2015-9)]	
SPM-847	A	13:30	13:35	This bullet is hard to read and difficult to understand [Govt. of Norway (Reviewer's comment ID #: 2016-36)]	
SPM-848	A	13:31	13:31	Replace "required" with "included". [Govt. of United States of America (Reviewer's comment ID #: 2023-89)]	

SPM-849	A	13:32	13:35	As currently structured this sentence is particularly dense and difficult to understand. Chapter 10 provides a more clear explanation of the possible ramifications of carbon cycle feedbacks. Suggest that the following text is inserted "A number of models suggest that this feedback effect would require reductions in cumulative emissions in the 21st century, for example, stabilizing atmospheric CO <sub>2</sub> at 450ppm, which will likely result in a global equilibrium warming of 1.4 to 3.1°C, with a best guess of about 2.1°C, would require a reduction of current annual GHG emissions by 52 to 90% by 2100. Positive carbon cycle feedbacks reduce the total (cumulative) emissions over the 21st century compatible with a stabilization of CO <sub>2</sub> concentration at 450ppm by 105 to 300 GtC relative to a hypothetical case where the carbon cycle does not respond to temperature." Then a table should be inserted providing the various stabilisation rates, (550, 750, 1000), the best estimated global average warming, and the additional reductions needed. [Govt. of Australia (Reviewer's comment ID #: 2002-129)]	
SPM-850	A	13:32	13:32	In addition, the comment "A number of models suggest that this (carbon cycle) feedback would require reductions..." is ambiguous and seems too weak. This is not a few models but every model run with the carbon cycle to date. The models are unanimous that the carbon cycle will amplify atmospheric CO <sub>2</sub> concentrations (and consequent warming) for given emissions, meaning that more significant cuts are required for given stabilisation. Suggest: "All models run to date ...." [Govt. of Australia (Reviewer's comment ID #: 2002-130)]	
SPM-851	A	13:32	13:35	The sentence is unclear probably because it is too long. It needs to be read several times for understanding its exact meaning. Please indicate the current emissions to compare these numbers, or express them as percentages of the current emissions. G20 [Govt. of France (Reviewer's comment ID #: 2010-56)]	
SPM-852	A	13:32	13:35	A rephrasing based on future emissions relative to current emission might enhance readability. [Govt. of Norway (Reviewer's comment ID #: 2016-37)]	
SPM-853	A	13:34	13:35	It is difficult to evaluate the numbers given without having the same numbers without carbon feedbacks. [Govt. of France (Reviewer's comment ID #: 2010-57)]	
SPM-854	A	13:34	13:35	It would be useful to reference these figures (for the reductions in emissions needed to maintain stabilisation levels in the face of climate change-carbon cycle feedbacks) to the corresponding baseline emissions (unfortunately I cannot access Fig 10.21 to suggest what these should be). [Govt. of New Zealand (Reviewer's comment ID #: 2015-10)]	
SPM-855	A	13:36	13:36	Sentences are needed here on two potentially significant positive feedbacks which are not mentioned elsewhere in the SPM: Methane release from wetlands and permafrost melt and methane release of marine hydrates. [Govt. of Germany (Reviewer's comment ID #: 2011-48)]	
SPM-856	A	13:36	13:36	Methane release from wetlands and permafrost melt. Some model projections indicate substantial additional releases of methane from wetlands and permafrost melting in northern high latitudes and whilst results are not conclusive the existence of this risk warrants mentioning in the SPM. Suggest text such as: "Several model projections indicate that there is a risk of significant additional methane emissions from wetlands and melting permafrost at northern high latitudes if warming is accompanied by increased precipitation in this region". See Chapter 7-42 lines 13-37 section 10.5.1. [Govt. of Germany (Reviewer's comment ID #: 2011-49)]	
SPM-857	A	13:36	13:36	Methane release from marine methane hydrates: This is recognised as a significant long term feedback that is not presently include in coupled model projections (Chapter 7-43) and one possible form of words to describe this risk is "Methane hydrate decomposition induced by warming of the oceans represents an important positive CH <sub>4</sub> feedback yet to be considered in global warming scenarios on longer timescales (centuries to millenia)" (see 7-43 lines 13-27 and Chapter 10 10.5.1). [Govt. of Germany (Reviewer's comment ID #: 2011-50)]	
SPM-858	A	13:37	13:43	"Stabilization of radiative forcing" is confusing for policy makers. Recommend that these 2 bullets reference concentrations rather than radiative forcing to be consistent with chapeau and bullet at lines 30-35. [Govt. of Canada (Reviewer's comment ID #: 2004-59)]	

SPM-859	A	13:37	13:38	For clarification, insert “beyond their 2100 temperatures” after “... to lead to further warming of about 0.5°C” and delete “committed” as “further committed warming” seems inappropriate here. If there is a FURTHER committed warming, what is then the INITIAL COMMITTED warming? [Govt. of Germany (Reviewer’s comment ID #: 2011-51)]	
SPM-860	A	13:37	13:38	Write:“... to lead to further resulting global warming ...” [Govt. of Switzerland (Reviewer’s comment ID #: 2020-28)]	
SPM-861	A	13:38	13:38	It would be clearer to replace the last phrase with "...mostly by 2200". [Govt. of Australia (Reviewer’s comment ID #: 2002-131)]	
SPM-862	A	13:38	13:38	"committed warming" should be changed to "warming" only. [Govt. of China (Reviewer’s comment ID #: 2006-41)]	
SPM-863	A	13:38	13:38	Delete “committed”. It is not needed. [Govt. of United States of America (Reviewer’s comment ID #: 2023-90)]	
SPM-864	A	13:40	13:42	The meaning of "decreasing rates" is not well understood in this statement. Does it refer to decreasing rates of sea level rise as heat mixes into the deep ocean? Assuming this is a correct interpretation, a clearer explanation that the rates which are decreasing are rates of sea level rise is required. Amendment is suggested. [Govt. of Japan (Reviewer’s comment ID #: 2013-19)]	
SPM-865	A	13:43	13:43	Please consider i a diagram, which summarize various anthropogenic forcings between 1750 and 2100. An illustrative example is enclosed in the extra "Figure" sheet. [Govt. of Denmark (Reviewer’s comment ID #: 2007-20)]	
SPM-866	A	14:1	14:4	It would be helpful to clarify whether a global average warming of 1,9 to 4,6°C by 2100 would lead to complete elimination of the Greenland ice sheet by 2100 or only by the year 3000. [Govt. of Belgium (Reviewer’s comment ID #: 2003-61)]	
SPM-867	A	14:1	14:6	Greenland: It is not clear what is really meant by the range 1.9-4.6°C above preindustrial. Logically, it doesn't make sense to give an upper limit as higher temperatures would presumably also cause melting! Actually, this range refers to the range of the threshold global temperature for negative surface mass balance, taken from Gregory & Huybrechts 2006 (see Ch10 sec10.7.4.3 p106). A clearer sentence might be “... above a threshold between 1.9 and 4.6°C would ....”. Note that TS page 47 is equally confusing. Note also that using preindustrial as a baseline differs from the rest of the SPM. [Govt. of Belgium (Reviewer’s comment ID #: 2003-62)]	
SPM-868	A	14:1	14:6	It would be good to know (as in TAR) the time frame when the majority of models and emissions scenarios show that we will be committed to a meltdown of Greenland. [Govt. of United Kingdom (Reviewer’s comment ID #: 2022-44)]	
SPM-869	A	14:2		Same remark as on page 10 line 11, the pre-industrial values are not specified in the SPM. [Govt. of France (Reviewer’s comment ID #: 2010-58)]	
SPM-870	A	14:3	14:6	It is not appropriate to compare the projection with the paleoclimate record directly. The uncertainty of paleoclimate record should be mentioned. [Govt. of China (Reviewer’s comment ID #: 2006-42)]	
SPM-871	A	14:3	14:4	What is the confidence level associated with the complete elimination of the Greenland ice sheet? [Govt. of United States of America (Reviewer’s comment ID #: 2023-91)]	

SPM-872	A	14:4	14:4	"comparable" is incorrect and wording is sloppy. 1.9-4.6 is global mean projection while "those inferred for the last interglacial" are 3-5C for GREENLAND or poles, according to 6.4.1.6. Ch 6 notes that paleo data is too regional to infer global mean temperature during during last interglacial but notes that modelling indicates that global mean was "not notably warmer than at present". It would be better to compare this projected future polar temperature range with interglacial polar temperature. Then one could use "comparable". Alternatively, one could say "These temperatures are generally greater than the global mean inferred for the last interglacial..."The comparison given will only further confuse attempts to use global mean as a signpost for future large changes in the climate system. The difference between forcings (in particular insolation conditions) in the two eras is what causes the problem. [Govt. of Belgium (Reviewer's comment ID #: 2003-63)]	
SPM-873	A	14:6	14:6	Delete "and" and replace with "led to a". [Govt. of Australia (Reviewer's comment ID #: 2002-132)]	
SPM-874	A	14:6	14:6	"polar ice extent" is a poor choice of words since some readers may think sea ice cap is at issue. Why not say exactly what Ch 6 says, namely, that Greenland, other Arctic ice fields, and possibly WAIS contributed to sea level rise (Ch 6 says Antarctica while Ch 10 makes clear that WAIS is the part of the ice sheet that has been pointed to in this context). [Govt. of Belgium (Reviewer's comment ID #: 2003-64)]	
SPM-875	A	14:6	14:6	Add to the end of this sentence, "with significant contributions from the Greenland ice sheet on multi century time scales" [Govt. of Germany (Reviewer's comment ID #: 2011-52)]	
SPM-876	A	14:6	14:6	Add: "Svalbard glaciers are expected to be main contributors of ice melting during the coming decades" Rationale: This is the largest ice mass in the region close to the melting point where the warming is higher than the global average [Govt. of Norway (Reviewer's comment ID #: 2016-46)]	
SPM-877	A	14:6	14:6	Add: "Svalbard glaciers are expected to be main contributors of ice melting during the coming decades" Rationale: This is the largest ice mass in the region close to the melting point where the warming is higher than the global average Govt. of Norway (Reviewer's comment ID #: 2016-48)]	
SPM-878	A	14:8	14:11	This dot point provides no clear assessment and possibly is not worthy for inclusion in the SPM. If it is to be retained it should be as a footnote to the dot point below. [Govt. of Australia (Reviewer's comment ID #: 2002-134)]	
SPM-879	A	14:8	14:11	Replace "vulnerability" with "rate of melting". The present usage of vulnerability is inappropriate by the IPCC TAR definition -as the concept of adaptive capacity is not applicable to physical systems. [Govt. of Canada (Reviewer's comment ID #: 2004-60)]	
SPM-880	A	14:8	14:8	Specify "Dynamical processes related to ice flow ..." (or similar). [Govt. of Denmark (Reviewer's comment ID #: 2007-14)]	
SPM-881	A	14:8	14:9	This sentence should be clarified by rewording to "Dynamical processes not included in current ice sheet models but suggested by recent observations would substantially increase the projected ice sheet response to ocean and atmospheric warming, increasing rate and magnitude of future sea level rise." [Govt. of European Community (Reviewer's comment ID #: 2008-28)]	
SPM-882	A	14:8	14:11	This sentence needs to be strengthened and clarified. The processes exist whether they are in models or not. Suggest rewording to something like. "Presently available thermomechanical ice sheet models do not include processes associated with ice streams or grounding-line migration, which may permit rapid dynamical changes in the ice sheets {8.2.4.1}. The importance of these processes is strongly indicated by recent observations if included models would likely increase the projected rate of ice sheet mass loss in response to oceanic and atmospheric warming, increasing future sea level rise. Understanding of these processes is limited and there is no consensus on their rate and magnitude. {4.6, 10 10.7}, however in the past warming-induced changes have led to rapid shrinkage and loss of ice sheets { 4-30 lines 13-14}. [Govt. of Germany (Reviewer's comment ID #: 2011-53)]	

SPM-883	A	14:8	14:8	Insert 'ice sheets' between 'Dynamical' and ' processes'. [Govt. of Netherlands (Reviewer's comment ID #: 2014-41)]
SPM-884	A	14:8	14:11	This paragraph in the SPM needs to be strengthened. While there may be a lack of understanding of ice sheet processes that are leading to mass loss and a related lack of consensus on the magnitude of their contribution to global sea level rise, there does appear to be a consensus on the sign of this contribution, at least for Antarctica. The published literature referenced in the body of the report, supported fairly unequivocally by more recent observations make it clear that mass loss in Antarctica is occurring faster than the models would suggest. The models are therefore likely to be underestimating sea level rise and the SPM needs to make this very clear. Sea level rise is an important factor for many countries. We suggest adding to the end of the paragraph the sentence: "However if the recent results are confirmed by research currently underway, this report is likely to be under-estimating future sea level rise" [Govt. of New Zealand (Reviewer's comment ID #: 2015-11)]
SPM-885	A	14:8	14:10	It should be mentioned which those dynamical processes are that are not included in current models. [Govt. of Sweden (Reviewer's comment ID #: 2019-27)]
SPM-886	A	14:8	14:8	It would be helpful to add some examples of important "dynamical processes not included in current models". [Govt. of United Kingdom (Reviewer's comment ID #: 2022-45)]
SPM-887	A	14:8	14:8	Explain "dynamical process". Vector displacement of ice sheets? [Govt. of United States of America (Reviewer's comment ID #: 2023-92)]
SPM-888	A	14:11	14:11	The problem with models is much bigger than just the recent observations. Antarctic models can't even reproduce the ice streams that control the mass balance of WAIS. The SPM needs to underscore the profound shortcoming of models, ie, we have no credible tool for projecting the ice sheet contribution to SLR. We need to communicate very clearly on the reasons why the SLR range in this assessment is smaller than in the TAR. [Govt. of Belgium (Reviewer's comment ID #: 2003-65)]
SPM-889	A	14:12	14:12	The authors need to include a dot point explaining the uncertainties about the feedback caused by ice albedo effect in the Arctic [Govt. of Australia (Reviewer's comment ID #: 2002-133)]
SPM-890	A	14:13	14:15	The two sentences on Antarctica and sea level rise needs to be expanded as they give no indication of the uncertainty in present continental ice sheet models. Suggest change to something like: "Present continental ice sheet models have projected that the Antarctic ice sheet will remain too cold for widespread surface melting and there would be a gain in mass due to increased snowfall. Dynamical processes not included in these models would likely change this assessment as a net loss of ice mass could occur if dynamical ice discharge dominates the ice sheet mass balance. In the recent decade 1993-2003 for Antarctica these models estimated a take of ice with a sea level fall of $-0.2 \pm 0.4$ mm/yr whilst observations indicated a loss due likely to the kinds of fast ice dynamics not included in the models of $0.21 \pm 0.35$ mm/yr. At the present time little confidence can be placed in the sign or magnitude of the projections by continental ice sheet models of the response of Antarctica to global warming." [Govt. of Germany (Reviewer's comment ID #: 2011-54)]
SPM-891	A	14:13	14:15	See point 10 above. (SPM page 8, lines 42-45. -TSU Edit) [Govt. of Italy (Reviewer's comment ID #: 2012-50)]
SPM-892	A	14:13	14:15	Please rephrase the first sentence as follows: "Current global model studies project that the Antarctic ice sheet will remain too cold for widespread surface melting and increased snowfall will represent a positive input to the mass balance." The current wording could be misinterpreted to suggest confidence that there will be a net mass gain. [Govt. of New Zealand (Reviewer's comment ID #: 2015-12)]
SPM-893	A	14:13	14:15	We would suggest the second sentence in this paragraph include a reference to observations, as follows: "However, net loss of icemass will occur if dynamical ice discharge dominates the ice sheet mass balance, as recent observations suggest. [Govt. of New Zealand (Reviewer's comment ID #: 2015-13)]

SPM-894	A	14:13	14:15	What confidence levels are attached to the statements in this bullet? How likely is it that the Antarctic ice sheet will remain too cold for widespread melting? How likely is it that Antarctica will make a net positive contribution to sea level rise over the 21st century? [Govt. of United Kingdom (Reviewer's comment ID #: 2022-46)]	
SPM-895	A	14:13	14:15	Model projections of mass gain over Antarctica remains a concern. The statement is unclear with respect to time scale, but apparently refers to projections to 2100. There is current evidence for mass loss, and while this may not continue, it does give rise for concern over how much confidence should be ascribed to current model projections. The previous bullet (SPM-14, lines 8-11) states that current models are inadequate for representing potentially significant processes in ice sheet dynamics. Given this stated uncertainty, the authors should consider whether inclusion of the second-to-last bullet is still warranted as a major finding. At minimum, reverse the order of bullets and move lines 13-15 before 8-11, and note that currently Antarctica appears to be losing mass and contributing to sea-level rise. And add Chapter 4 to the curly brackets. [Govt. of United States of America (Reviewer's comment ID #: 2023-93)]	
SPM-896	A	14:15	14:15	Also, the recent observations showing no increase in Antarctic accumulation for the past fifty years should be noted since this undercuts credibility of models from yet another perspective (Monaghan et al Science 2006...published too late for WGI?) [Govt. of Belgium (Reviewer's comment ID #: 2003-66)]	
SPM-897	A	14:17	14:18	Suggest that a more dynamic statement be used to conclude the substantive findings of the SPM, along the following lines "It is now evident that due to the long lifetime of atmospheric carbon and the long timescales on which the deep ocean adjusts to climate change, 21st century anthropogenic carbon dioxide emissions will contribute to global warming and sea level rise for more than a millennium." [Govt. of Australia (Reviewer's comment ID #: 2002-135)]	
SPM-898	A	14:17	14:19	Suggest deleting this bullet as it says nothing new from the chapeau. [Govt. of Canada (Reviewer's comment ID #: 2004-61)]	
SPM-899	A	14:17	14:18	It is not proper to only mention "21st century" here. Change "21st century anthropogenic carbon dioxide emissions" into "The anthropogenic carbon dioxide emissions since the pre-industrial era". [Govt. of China (Reviewer's comment ID #: 2006-43)]	
SPM-900	A	14:17	14:17	Write:"Historic and additional anthropogenic greenhouse emissions will contribute to global warming and ...". Rationale: global warming results from both the new emissions in the 21st century and also the GHG already in the atmosphere [Govt. of Switzerland (Reviewer's comment ID #: 2020-29)]	
SPM-901	A	14:17	14:18	We propose the following rephrasing: "... ...for more than a millennium thereafter, due to..." [Govt. of Norway (Reviewer's comment ID #: 2016-39)]	
SPM-902	A	14:19	14:19	Suggest to add a passage to address the uncertainty in the projections of future climate change, and some further actions to take, such as in TAR (Further action in required to address remaining gaps in information and understanding.) [Govt. of China (Reviewer's comment ID #: 2006-44)]	
SPM-903	A	14:19	14:19	What is missing in these future visions is the fact that much of the CO2 stays forever, and that stabilization requires nearly zero emissions. This is already known, but perhaps a brief sentence summarizing it would help. [Govt. of United States of America (Reviewer's comment ID #: 2023-94)]	
SPM-904	A	14:21	14:55	Box on SRES scenarios. Having a visual presentation of what these different scenarios mean in terms of emissions, concentrations, projections would be FAR more useful than having this Box, if only one or the other can be included. If both can be included, then the Box does provide some useful info. [Govt. of Canada (Reviewer's comment ID #: 2004-62)]	
SPM-905	A	14:21	14:55	It is not said if these emission scenarios take into account any policies and measures of mitigation. This description should give some information on this aspect, as it is a frequently asked question. [Govt. of France (Reviewer's comment ID #: 2010-59)]	

SPM-906	A	14:21		The footnote 13 on the SRES scenarios should end with "...exactly as used in the TAR". [Govt. of Norway (Reviewer's comment ID #: 2016-40)]
SPM-907	A	14:55	14:55	This footnote should be deleted and be placed in the WG1 Chair's briefing for the Plenary. That the box summarising the SRES was previously used in the TAR does not provide a reason for why it should not once again go through line-by-line approval, in the light of new analysis of the SRES. [Govt. of Australia (Reviewer's comment ID #: 2002-136)]

### Comments from Organizations

No.	Batch	Page:line		Comment
		From		
SPM-2001	A	0:0	0:0	Presentation of the material needs to be improved in terms of the use of shaded boxes and bold text. It is not intuitively clear to the reader what the shaded boxes are for (are they background information to the respective section heading? do they contain the main result of this section?). Shaded boxes next to bold text, e.g. at the beginning of each section, tend to confuse, since these are two kinds of mark-ups competing with each other. Further, we assume the bold text provides a summarized result that is then followed by evidence in bullet point format? This seems logical, but may not be immediately clear to the average reader. Some layout improvement may do the job (coloured bars linking the bold summary to the individual results? arrows instead of bullets?). [ Global Climate Observing System Secretariat (Reviewer's comment ID #: 1-1)]
SPM-2002	A	0:0	0:0	We note the absence of a section that highlights the deficiencies in observations, data bases and modelling capabilities, which suggests that these deficiencies no longer exist. This is clearly NOT the case, and I am confident that this has not been the intention here. Policymakers need to know about these deficiencies in order to take appropriate action. Please add a paragraph along the lines of TAR SPM p. 17; it is very important to have a statement like this, even if it is not quantitative, to keep the ball rolling in improving the information basis for climate science. IPCC, WCRP and GCOS are planning a meeting in the 3rd quarter of 2007 where the lessons learnt from the AR4 with respect to these issues shall be detailed out. [ Global Climate Observing System Secretariat (Reviewer's comment ID #: 1-8)]
SPM-2003	A	0:0	0:0	The projected sea-level rise is of widespread concern to policymakers, and an illustration thereof should be included in the SPM, comparable to the lower-right panel on TAR SPM p.14 . [ Global Climate Observing System Secretariat (Reviewer's comment ID #: 1-9)]
SPM-2004	A	0:0	0:0	Please mention the notion of positive feedback loops in the climate system, for example between some components of the biosphere and the atmosphere, which may lead to an amplification of currently simulated climate variability and change. It is also important to mention the aspect of the inherent non-linearity of the climate system, which by itself may lead to rapid and irreversible climate change, not only in relation to the MOC (see chapter 10 of WG I report). These phenomena have been demonstrated by paleoclimatic studies. As a corollary to this comment, the content of section TS.6.2.4 on page TS-51 (paleoclimate) is not well reflected in the SPM (page SPM-7, line 16 and thereafter). [ Global Climate Observing System Secretariat (Reviewer's comment ID #: 1-10)]
SPM-2005	A	0:0	0:0	West Antarctica Ice Sheet (WAIS) risk of instability: Past IPCC reports have commented on this issue and the AR4 needs to considering observed changes and model developments since the TAR [ Greenpeace International (Reviewer's comment ID #: 2-1)]
SPM-2006	A	0:0	0:0	The risks of abrupt or rapid climate changes are not well developed in the SPM and it would be useful to summarise material from the TS in it [ Greenpeace International (Reviewer's comment ID #: 2-2)]

SPM-2007	A	0:0	0:0	The sea level rise projections are lower than in the TAR, which would be very good news if it can be believed. This SPM does not explain this reduction properly, how exactly this differs from the TAR and why and further hides the large gap between modelled and observed SLR. It also does not give any real indication of to what extent the ice sheet models can be trusted. If this lowering is not soundly based and solidly justified so that it can in the judgement of the authors stand the likely tests in the next few years, it will come to discredit this working group as whole. No where are the implications of the observed fast ice stream responses observed described and certainly not in relation to projections. The temperature scaling used for ice dynamics is almost absurd. These projections appear flawed and need to be fixed. [ Greenpeace International (Reviewer's comment ID #: 2-3)]
SPM-2008	A	0:0	0:0	More specific information on the available regional projections for the 21st century in the geopolitical context, even with the current levels of uncertainty, will be of considerable interest. [ World Meteorological Organization (Reviewer's comment ID #: 4-16)]
SPM-2009	A	0:0	0:0	Uniformity may be maintained across the summary in specifying the assessed likelihood. There are some statements without any indication of the assessed likelihood, and it is not clear how much confidence is associated with them. [ World Meteorological Organization (Reviewer's comment ID #: 4-17)]
SPM-2010	A	1:27	1:27	Suggest replacing "a pre-industrial value of about 280 ppm" to "about 280 ppm in 1750". Shorter and more precise. [ IPIECA (Reviewer's comment ID #: 3-1)]
SPM-2011	A	1:28	1:29	Suggest that error bounds on fossil emissions estimates be checked. There is an apparent error in the footnote statement that the bracketed ranges are 90% confidence intervals. In chapter 7-20 line 5 it states that these are one-sigma and not 90% confidence intervals. Furthermore, the chapter asserts the error bound without justification, and in contrast to previous assessments (SAR and TAR) which used an error of 10% for the 90% confidence interval (SAR) and a corresponding 6% for a one-sigma confidence interval (TAR). [ IPIECA (Reviewer's comment ID #: 3-2)]
SPM-2012	A	1:28	1:29	Suggest that either recent data on energy statistics be considered for the 2000-2005 fossil emission estimate (or that only published emission estimates (2000-2003) be considered). The existing estimate is based on an extrapolation and not on data for recent (2004 and 2005) years. Examination of recent data (e.g. BP 2006) would show that there have been revisions to energy statistics for all of the years that would bring the 2000-2005 estimate up to 7.3 or 7.4 GtC/yr instead of the 7.2 stated in the final draft SPM. Suggest that extrapolation not be used in lieu of current data. [ IPIECA (Reviewer's comment ID #: 3-3)]
SPM-2013	A	1:32	1:33	Suggest replacing "a pre-industrial value of about 715 ppb" to "about 715 ppb in 1750". Shorter and more precise. [ IPIECA (Reviewer's comment ID #: 3-4)]
SPM-2014	A	2:1	2:1	Suggest replacing "a pre-industrial value of about 270 ppb" to "about 270 ppb in 1750". Shorter and more precise. [ IPIECA (Reviewer's comment ID #: 3-5)]
SPM-2015	A	3:17	3:18	It is good that the additional effects of aerosols mentioned in the last sentence have not been lost. To make it clearer that these effects are in addition to the aerosol radiative forcing effects in the Figure, suggest revising the sentence to "In addition to aerosol radiative forcing effects, aerosols also influence the climate system through their effects on cloud lifetime and precipitation." [ IPIECA (Reviewer's comment ID #: 3-6)]
SPM-2016	A	4:8	6:46	The SPM needs to make clear how these relate to expected change and this is not always done [ Greenpeace International (Reviewer's comment ID #: 2-4)]
SPM-2017	A	4:8	8:9	This section presents evidence for climate change based on direct observations of physical variables, indices, etc. The individual results do not seem to come in any particular order, which makes this section hard to read and understand (e.g., results related to sea ice are given next to permafrost next to precipitation next to ocean salinity...). Except for line 34, the bold sub-headings do not particularly help solving this issue. The suggestion is to improve this section by ordering the results into domains: results related to observations (1) in the atmosphere, (2) in the oceans, (3) on land, possibly (4) in the cryosphere. The TAR SPM was also much clearer in this regard, e.g. on pp. 12, 13, 16. Consider using the 44 Essential

				Climate Variables (ECVs) for additional guidance. [ Global Climate Observing System Secretariat (Reviewer’s comment ID #: 1-2)]
SPM-2018	A	4:17	4:17	Suggest adding “over the past 50 years” or “over the past century” after “system”. There have been decade-long periods of cooling that would otherwise be important exceptions to the general headline statement. [ IPIECA (Reviewer’s comment ID #: 3-7)]
SPM-2019	A	5:1	5:4	Above preindustrial comparison would help relate to earlier reports. [ Greenpeace International (Reviewer’s comment ID #: 2-5)]
SPM-2020	A	5:1	5:7	The description of temperature trends could be rather confusing for non-technical audience. The core message here is clearly the rapid acceleration of warming in the past decade, which is effectively conveyed by the first sentence itself. Confusion may arise primarily due to the mix of the terms "100-year linear trend" and "linear rate of warming" measured in degrees Celsius per decade. There is also the confusion of too many reference periods in one paragraph: "since 1850", "1906-2005", "1901-2000", "last 50 years". Efforts may be made to simplify this key message. [ World Meteorological Organization (Reviewer’s comment ID #: 4-1)]
SPM-2021	A	5:10	5:11	Suggest removing “and consistent within their respective uncertainties” since the comparison of models and data are always consistent within their uncertainties (the phrase is a tautology). [ IPIECA (Reviewer’s comment ID #: 3-8)]
SPM-2022	A	5:17	5:17	Suggest that “over the past 50 years” be added after “Observations”. Observations exhibit variability in ocean heat uptake central estimates on decadal time scales. The lead statement should have some time scale associated with it to be meaningful. [ IPIECA (Reviewer’s comment ID #: 3-9)]
SPM-2023	A	5:28	5:29	Has there not been an observed acceleration in SLR? [ Greenpeace International (Reviewer’s comment ID #: 2-6)]
SPM-2024	A	5:35	5:37	Add "temperature" to the list of parameters. The "aspects" of extreme weather may be more clearly specified, e.g., frequency and/or intensity. [ World Meteorological Organization (Reviewer’s comment ID #: 4-2)]
SPM-2025	A	5:39	6:31	It is not clear why continental-scale temperature trends over regions other than the polar ice caps/permafrost are not considered, as done in the case of precipitation. [ World Meteorological Organization (Reviewer’s comment ID #: 4-3)]
SPM-2026	A	5:40	5:42	Suggest that this sentence be replaced by “Average Arctic temperature trends exhibited warming from xx (insert year) to xx, cooling from xx to xx, and warming from xx to present reaching its maximum temperature in xx.” In the existing sentence it is not clear what is the relevance of spatial pattern nor whether the 1925-1945 period reached warmer temperatures than present. [ IPIECA (Reviewer’s comment ID #: 3-10)]
SPM-2027	A	5:47	5:49	Move to line 26 so that this is together with all of the SLR terms [ Greenpeace International (Reviewer’s comment ID #: 2-7)]
SPM-2028	A	5:47	5:48	Each ice sheet is different in important respects and the mass balances of each need to be shown separately [ Greenpeace International (Reviewer’s comment ID #: 2-8)]
SPM-2029	A	5:48	5:49	Since the TAR there have been observed rapid acceleration in ice dynamics in the West Antarctic and Greenland and a shift to a negative mass balance. This needs to be reflected here in the SPM. [ Greenpeace International (Reviewer’s comment ID #: 2-9)]
SPM-2030	A	6:1	6:2	Suggest replacing end of first sentence from “have..” onward with “...have generally increased with changes from below – 1 to +3 deg. C measured at Arctic locations since the 1980s.” This statement would reflect the diversity of measured changes evident in Table 4.5. [ IPIECA (Reviewer’s comment ID #: 3-11)]

SPM-2031	A	6:3	6:3	CH4 losses from melting permafrost and degrading peatland are being observed around the northern high latitudes and should be reported here eg Chapter 7 page 7-42 [ Greenpeace International (Reviewer's comment ID #: 2-10)]
SPM-2032	A	6:8	6:10	The sentence "Precipitation is highly.....large regions" does not seem to serve any meaningful purpose. May be deleted. [ World Meteorological Organization (Reviewer's comment ID #: 4-4)]
SPM-2033	A	6:36	6:37	This is a significant deviation from TAR conclusions. A sentence in explanation is warranted. [ World Meteorological Organization (Reviewer's comment ID #: 4-5)]
SPM-2034	A	6:39	6:41	This statement indicating lack of trends in Antarctic sea ice extent and air temperature seems to be at variance with the "shrinkage of the ice sheets of Greenland and Antarctica" alluded to on page 5, lines 47-49. Mixing continental and oceanic changes may have led to this impression. [ World Meteorological Organization (Reviewer's comment ID #: 4-6)]
SPM-2035	A	7:6	7:6	It is not clear what was the origin of the "virtually certain" conclusions. Suggest listing the associated underlying section with each conclusion. Does this conclusion (99% confidence) imply that future natural forcing is less than likely to overwhelm anthropogenic forcing over a hundred realizations of the next century (10,000 years)? The underlying assessment and supporting model runs did not focus on future natural forcing. [ IPIECA (Reviewer's comment ID #: 3-12)]
SPM-2036	A	7:6	7:6	Phenomena and conclusions in Table SPM-1 have been changed in such a way as to make it difficult to tell exactly what is the difference between conclusions summarized in this table and the similar one in the TAR. For example, in the TAR it was noted that many of the conclusions were over most or some areas; is this still true for conclusions in this table or is it for the average or for every region. Suggest considering how the table can be improved to indicate any significant changes since the TAR. [ IPIECA (Reviewer's comment ID #: 3-13)]
SPM-2037	A	7:16	7:16	Add Figure TS-20 as this confirms the results from the TAR [ Greenpeace International (Reviewer's comment ID #: 2-11)]
SPM-2038	A	7:27	7:28	The summary statement can be made more assertive, taking into account the details given thereunder. For example, it can read "Paleoclimatic information indicates that the recent warming has likely been unprecedented over the past millenium, and that warming episodes further back in the past led to large-scale ice sheet retreat and sea level rise". [ World Meteorological Organization (Reviewer's comment ID #: 4-7)]
SPM-2039	A	7:32	7:32	Suggest removing the sentence starting with "Warmer..." and adding the phrase "Taking into account recent studies" to the start of the next sentence. The uncertainty range given in the TAR was a confidence interval, therefore, the true extent of warming may or may not fall within this interval and so it cannot be said that warmer periods are within the range (only with some level of confidence attached). If it was meant that the central estimate of temperatures from recent studies was within the interval, the uncertainty range based on the new studies would not fully overlap and so again the "Warmer..." statement as is at a minimum unclear. [ IPIECA (Reviewer's comment ID #: 3-14)]
SPM-2040	A	8:8	8:9	Please clarify the role of the West Antarctic and/or Antarctic ice sheets in this period [ Greenpeace International (Reviewer's comment ID #: 2-12)]
SPM-2041	A	8:8	8:9	In the earlier draft of this chapter it was said "The rate of sea level rise leading to this high-stand may have exceeded 1 m/century" Was this not correct? If it is correct please include it here [ Greenpeace International (Reviewer's comment ID #: 2-13)]

SPM-2042	A	8:14	8:15	This statement may have its origins in existing documentation, but we wonder if it is true?? What if observed changes have occurred solely due to human intervention? Is that not a detection of climate change? In any case, we stumbled over this phrase. Consider using the definition in the Glossary: "Detection of climate change is the process of demonstrating that climate has changed in some defined statistical sense, without providing a reason for that change." Alternatively, use the first phrases in the TAR SPM p.5 right column. [ Global Climate Observing System Secretariat (Reviewer's comment ID #: 1-3)]
SPM-2043	A	8:15	8:17	Having read this phrase several times, we think we now understand what it means, but would the same be true for an "average policymaker" or the broad public that is likely to read only the SPM of the AR4? This definition of attribution (again, maybe it has been defined elsewhere and is cast in stone) should be made clearer. For example, as given by the Glossary: "Attribution of causes of climate change is the process of establishing the most likely causes for the detected change with some defined level of confidence." [ Global Climate Observing System Secretariat (Reviewer's comment ID #: 1-4)]
SPM-2044	A	8:23	8:26	This is a core statement of the AR4 WG I and warrants some extra highlighting. [ Global Climate Observing System Secretariat (Reviewer's comment ID #: 1-5)]
SPM-2045	A	8:34	8:34	"...was caused by unforced variability alone."--probably too technical. [ World Meteorological Organization (Reviewer's comment ID #: 4-8)]
SPM-2046	A	8:36	8:36	Suggest that confidence be given for each of the stated conclusions or that the statement be changed so that confidence is not necessary. In the underlying text (e.g. Ch 9, page 7, lines 47-54) makes it clear that detection and attribution claims are made with some level of confidence, and that "unequivocal attribution...is not possible". The draft SPM statement that "Warming of the climate system has been detected and attributed to anthropogenic forcing..." is therefore incomplete without a statement of confidence, since unequivocal attribution is not possible. [ IPIECA (Reviewer's comment ID #: 3-15)]
SPM-2047	A	8:45	8:45	The later part of the sentence may be changed to "...by models only when they include anthropogenic forcing in addition to natural forcing". [ World Meteorological Organization (Reviewer's comment ID #: 4-9)]
SPM-2048	A	9:9	9:9	The clause "...where spatial coverage is less than 50%." lacks precision. We assume, coverage by historical in-situ observations? But then, how is coverage in terms of representativity of a particular station for a particular area defined here? In other words, which station network would lead to 100% coverage? [ Global Climate Observing System Secretariat (Reviewer's comment ID #: 1-11)]
SPM-2049	A	9:23	9:24	The intended purpose or implications of the sentence, "However, the observed....larger than simulated", are not clear. [ World Meteorological Organization (Reviewer's comment ID #: 4-10)]
SPM-2050	A	10:1	10:3	What about hot days ? Table SPM-1 indicates increases in hot days as well. [ World Meteorological Organization (Reviewer's comment ID #: 4-11)]
SPM-2051	A	10:9	10:11	This sentence is unclear about the roles of other forcings (aerosols, non-CO2, etc.) for the 550 ppm example stated. Furthermore, since the results quoted are for climate sensitivity for a doubling of CO2 and the pre-industrial CO2 concentration quoted earlier in the SPM is 280 (and not 275), the statement is an approximation underlying conclusions. Suggest replacing with a statement about equilibrium climate sensitivity for a doubling of CO2 concentration. [ IPIECA (Reviewer's comment ID #: 3-16)]
SPM-2052	A	10:13	10:13	"...but agreement of models with observations is not as good for those values."; this may need some rephrasing to more clearly indicate that the higher values are from models with low skills in representing observations. [ World Meteorological Organization (Reviewer's comment ID #: 4-12)]
SPM-2053	A	10:14	10:14	Suggest changing "dominates the feedbacks" to "is the largest magnitude feedback" as it is more precise. [ IPIECA (Reviewer's comment ID #: 3-17)]

SPM-2054	A	10:25	10:25	This shows no information on the effects of mitigation scenarios and is main gap in this report. Please include. [ Greenpeace International (Reviewer's comment ID #: 2-14)]
SPM-2055	A	10:25	14:55	In this section 1) Information on the emissions for each scenario need to be included here. 2) Please include Figure TS-33 from the Second Order Draft which shows cumulative emissions and climate changes. [ Greenpeace International (Reviewer's comment ID #: 2-15)]
SPM-2056	A	11:1	11:1	It may be useful to spell out what exactly the "climate initiatives" are alluding to. [ World Meteorological Organization (Reviewer's comment ID #: 4-13)]
SPM-2057	A	11:14	11:14	Delete "in deg.C"; redundant. [ IPIECA (Reviewer's comment ID #: 3-18)]
SPM-2058	A	11:23	11:26	These estimates are not believable and the methodology, if it can be called that (sorry but what is described in the Appendix to Chapter 10 in relation to ice dynamic is not really science), does not provide an assessment of the risk of much more rapid ice sheet dynamics [ Greenpeace International (Reviewer's comment ID #: 2-16)]
SPM-2059	A	11:23	11:31	How can these projections be compared to the TAR? Much more explanation is needed here for such a substantial change in the assesment? How is one supposed to believe that the present rate of SLR observed over the last 10-15 years is going to reduce (a lot!) so that the lower limit of the scenarios shown here are realized? [ Greenpeace International (Reviewer's comment ID #: 2-17)]
SPM-2060	A	11:26	11:26	Suggest changing "contributes..." to "of seawater is responsible for about 60 to 70% of these estimates." to make it clear that thermal expansion is included in the estimates. [ IPIECA (Reviewer's comment ID #: 3-19)]
SPM-2061	A	11:36	11:40	The paragraph on ocean acidification needs to say what the effects are. [ Greenpeace International (Reviewer's comment ID #: 2-18)]
SPM-2062	A	11:37	11:37	Suggest adding "surface water" before "pH" since these changes in pH do not penetrate to the deep ocean until long after provided amospheric CO2 concentration remains enhanced. [ IPIECA (Reviewer's comment ID #: 3-20)]
SPM-2063	A	11:38	11:38	Suggest replacing "the present decrease of 0.1 units since pre-industrial times." With "the decrease of 0.1 units that has already occurred since 1750." This would be more precise since there were significant changes in CO2 (180 to 280ppm since the LGM) over the more distant past that are not being referred to here. [ IPIECA (Reviewer's comment ID #: 3-21)]
SPM-2064	A	11:39	11:39	Suggest deleting "shallow-water" since acidification would also eventually affect deeper-water sediments. [ IPIECA (Reviewer's comment ID #: 3-22)]
SPM-2065	A	12:3	12:3	Spell out "AOGCM" somewhere [ Global Climate Observing System Secretariat (Reviewer's comment ID #: 1-7)]
SPM-2066	A	12:12	12:12	"several different studies" does not read scientifically sound. Add a footnote with a reference. [ Global Climate Observing System Secretariat (Reviewer's comment ID #: 1-6)]
SPM-2067	A	12:23	12:23	The distinction between "hot extremes" and "heat waves" is not clear. How are heat waves defined here in a global sense ? [ World Meteorological Organization (Reviewer's comment ID #: 4-14)]
SPM-2068	A	13:1	13:4	Some indication of projections for tropical precipitation may be provided here. [ World Meteorological Organization (Reviewer's comment ID #: 4-15)]
SPM-2069	A	13:36	13:36	The SPM should mention the risk of methane release from wetlands and permafrost and from clathrates (Chapter 7) [ Greenpeace International (Reviewer's comment ID #: 2-19)]

SPM-2070	A	14:17	14:17	Suggest replacing “warming” with “radiative forcing” since a pulse (or a century-long pulse) of CO2 to the atmosphere will (in models) lead to a peak in its contribution to pCO2 and temperature well within a century (warming followed by cooling). This type of result can be found in the analysis of overshoot scenarios. [ IPIECA (Reviewer’s comment ID #: 3-23)]
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