Comment No	From Page	From Line	To Page	To Line	Comment	Response
24306	0	0	0	0	General comment for Chapter 2: It is important to recognize that climate is a component of land. Other components include: soil, biota (flora, fauna), hydrology, physiography etc. While urbanization is rightly discussed in this chapter, it should be presented as an aspect of the "Anthropocene" in relation to climate change and its impact on land degradation. Other aspects of Anthropocene include land use and land use change, fossil fuel combustion and atmospheric chemistry, the terrestrial C stock including the biomass burning (intentional and wildfires), land as a source and sink of GHGs, and policy interventions to create a positive C sink and reverse the degradation/desertification trends. Some specific comments by UNCCD-SPI for detailed revision of the chapter include the following: [Barron Joseph Orr, Germany]	Revised accordingly
24310	0	0	0	0	General comment for Chapter 2: Perhaps there is a categorization issue. The relevant aspects of Anthropocene should include urbanization, land use change, fossil fuel combustion and atmospheric chemistry, the terrestrial C stock including the biomass burning (intentional and wildfires), land as a source and sink of GHGs, and policy interventions to create a positive C sink and reverse the degradation/desertification trends. [Barron Joseph Orr, Germany]	Checked and ensure consistency
24312	0	0	0	0	General comment on chapter 2: The chapter generally discusses land-based climate change mitigation measures. It would be useful to also expand discussions on land-based climate-change adapatation measures/implications. [Barron Joseph Orr, Germany]	Extended assessment on adaptation issues
24314	0	0	0	0	General comment on chapter 2: Throughout the chapter, please spell out an acronym the first time it is used. [Barron Joseph Orr, Germany]	Done
24316	0	0	0	0	General comment on chapter 2: This chapter mentions several knowledge/research gaps. It would be useful to list all identified knowledge gaps emerging from the 7 chapters in an annex to the special report. [Barron Joseph Orr, Germany]	Knowledge gaps differ from chapter to chapter
24318	0	0	0	0	General comment on chapter 2: When considering land and climate it will be important to emphasize the relationship between land, land use, land management, land degradation and drought. While most countries recognize the concept of agricultural drought, the mechnisms in place to which trigger an government response to drought tend to focused on meteorological and hyrdrolgical metrics. This means that changes in land use, changes in land management (e.g., crop choice) and soil degradation, all which can reduce resilience to drought, are not adequately considered. Land and how it is managed and used can greatly influence drought resilience and this is important to capture in this chapter. [Barron Joseph Orr, Germany]	Yes, landuse and land management are important for land-climate interactions
25602	0	0	0	0	Is there any work in how tropical forest regrowth could affect CO2 emissions? Is there interest in understanding how potentially forest regrowth can have an effect on the climate system? Citations: See above. Poorter, L. F. Bongers, T. M. Aide, A. M. Almeyda Zambrano, P. Balvanera, J. Becknell, V. Boukili, P. H. S. Brancalion, E. N. Broadbent, R. L. Chazdon, D. Craven et al. 2016. Biomass resilience of Neotropical secondary forests. Nature 530: 211-214. Chazdon et al., Carbon sequestration potential of second-growth forest regeneration in the Latin American tropics. 2016. Science Advancements, 1-10 [Laura Schneider, United States of America]	We focus on all biomes at global scale
7076	0	0	0	0	General comment on chapter 2: The chapter generally discusses land-based climate change mitigation measures. It would be useful to also expand discussions on land-based climate-change adapatation measures/implications. [Mariam Akhtar-Schuster, Germany]	Extended assessment on adaptation issues

Comment No	From Page	From Line	To Page	To Line	Comment	Response
7078	0	0	0	0	General comment on chapter 2: Throughout the chapter, please spell out an acronym the first time it is used. [Mariam Akhtar-Schuster, Germany]	Done
7080	0	0	0	0	General comment on chapter 2: This chapter mentions several knowledge/research gaps. It would be useful to list all identified knowledge gaps emerging from the 7 chapters in an annex to the special report. [Mariam Akhtar-Schuster, Germany]	Knowledge gaps differ from chaapter to chapter
866	0	0	0	0	The uncertainties in global CO2 fluxes estimates while considering land use change may be depended also on how anthropogenic activities are classified and used, and in which way the GHG emissions associated to certain land use classes are estimated (type of model adopted, as deeply described in the chapter). In the case of forest land (land use, and associated land use changes (afforestation/reforestation)), the gap among Countries in accounting for GHG emissions and removals may be related to several land use change processes that are not detected by current global and national frameworks, such as for example KP or National Forest Inventories. The current frameworks do not detect variations in vegetation or species composition (indirectly human-driven) which may be relevant for GHG emissions accounting purposes, within and between different land use categories (e.g. to/from agricultural lands). These are the cases of natural regrowth on abandoned croplands, trees outside forests (in rural landscapes), and closing forest gaps (in forest lands). This aspect may be explicited in the text. [Matteo Vizzarri, Italy]	This is included in assessment of uncertainty from modeling
20174	0	0	0	0	Increased frequency of climate extremes such as heat waves and droughts may hit vegetation more seriously in some regions. Net primary productivity (NPP) of needleleaf, broadleaf and mixed forests responded strongly to drought and heat waves between 2000 and 2010 (Ersahin et al., 2016). In drought years, the NPP decreased drastically, but following year recovered. If the similar climate extreme repeats annually (or more frequently), several years, the system may not be recovered, degrading irreversibly. Also, the same heat waves were more effective in wetter areas than drier areas. Ersahin, S., B.C. Bilgili, U. Dikmen, and I. Ercanlı. 2016. Net Primary Productivity of Anatolian Forests in Relation to Climate, 2000 –2010. Forest Science 62(6): 698–709. [Sabit Erşahin, Turkey]	We focus on all biomes at global scale
752	0		300		sometimes greenhouse gases are spelled out sometimes the acronym is used (GHG). Should be streamlined. Check also for other such cases. [Rolf Sommer, Kenya]	Checked and changed
16144	0	0			Reference to the Global Soil Organic Crbon Map. For additional citations of importance in Chapter 2, reference to the recent Global Soil Organic Carbon Map prepared by the Global Soil Partnership and through the guidance of the Intergovernmental Technical Panel on Soils should be included. This is the most comprehensive database of soil organic carbon at global levels to date. http://www.fao.org/3/a-i8195e.pdf [Lorenzo Giovanni Bellù, Italy]	Checked and updated
27206	0	0			whole chapter 2: The proliferation of new acronyms of activities (LULCC, HLULCC, FLULCC, LCUM, etc.) of dubious usefulness is disturbing and confusing. They shoudl be dropped and/or simplified. Whatever is retained should be carefully cross-referneced with established terms, such as LULUCF and AFOLU. [Zoltán Rakonczay, Belgium]	Changed for consistency
27208	0	0			Forest management (the GHG impacts of managing forest without the involvement of land-use change) is curiously missing, although it is a very big factor in the overall land GHG balance. [Zoltán Rakonczay, Belgium]	agree, included
23110	0				Multiple occurrences of double parentheses (partly associated with the issue reported in the next row) - use full text search for "((" and "))" [Alexander Graf, Germany]	Corrected

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23112	0				"In-text" citations appear sometimes wrongly in parentheses e.g. "(Smith et al., 2012) found that…" where it should be "Smith et al. (2012) found that…" [Alexander Graf, Germany]	Changed
23114	0				Articles "a" and "the" - sometimes excessive, more often missing, examples will be given below [Alexander Graf, Germany]	Changed
20500	0				1. From the whole arrangement of Chapter 2, I hope to have a clearer framework or logic, such as from heaven to earth to underground, from large scale to small scale, from macro to medium to micro, from astronomy, The sequence of weather, geography, hydrology, plants, animals, humans, and society may more clearly reflect the relationships and processes of the interactions between different systems in climate and land. The advantage of this is that readers, especially interdisciplinary readers, can be interested in reading, and readability will have a deeper understanding of the system's cross-scale role. [Huai Jianjun, China]	Restructured most sections
9774	0				This is an important chapter because i) much new research is published after AR5, ii) it covers aspects across disciplines and working groups and iii) it goes deeper into essential and critical issues from SR1.5. As it is now I find that the chapter does more review than assessment and I find many important elements, but struggle to see the bigger coherent picture. I hope the authors can go beyond summarizing issues and do more real assesment. I understand that much space is needed to describe the processes and science but I hope this can be tightened. I also suggest that you consider useng supplementary material in creative ways. [Jan Fuglestvedt, Norway]	Good point, considered
9776	0				The ES is too long and too much of a summary of issues that could be better connected in the presentation. Much of the ES is desciptive and too little focus is given to findings and conclusions. [Jan Fuglestvedt, Norway]	ES rewritten and more focused
9778	0				I suggest a stronger coordination with AR6 WGI, chapters 1, 6 and 7; i.e. asking for comments on drafts etc. [Jan Fuglestvedt, Norway]	Noted, will strengthen communication
9782	0				The chapter uses CO2-eq emissions. I remember from LAM1 that it was stated and agreed in plenary (at least according to my understanding) that CO2-equivalent emissions should be avoided and that one to the largests possible extent should use mass units for the individual gases. If you find that you have to use CO2-equivalents because several gasser are aggreated (CO2, CH4 and N2O), then you have to say which GWP values that are used - and wich gases that are included. You should also avoid using CO2-eq when only CO2 is included. [Jan Fuglestvedt, Norway]	Revised to ensure consistency
9930	0				Chapter 2 refers to pre-industrial levels. It should be clarified which period this is. I suggest that Chapter 1 does this as part of framing. [Jan Fuglestvedt, Norway]	Yes, we coordinate with Ch.1
9932	0				I think it would be very useful if ch2 can link more closely to what SR1.5 did on carbon budgets; i.e. use and assess this further with the different and very useful approach and perspective that this chapter offers. [Jan Fuglestvedt, Norway]	Good point, we included SR15 in assessment
544	0				This chapter seems to be already in quite good shape. Thanks to the authors for their hard work [Klaus Radunsky, Austria]	Thanks
546	0				BVOCs is introduced first as abbreviation and only later on the reader learns that this means Biogenic Volatile Organic Compounds. It is strongly suggested to establish a table of abbreviations and also to include this term in the glossary. [Klaus Radunsky, Austria]	Revised accordingly

Comment No	From Page	From Line	To Page	To Line	Comment	Response
550	0				The chapter provides an impressive qualitative assessment in the executive summary of the land-climate interaction. It would need detailed analysis by the reader to assess the relevance in quantitative terms of those interactions. It would be very much appreciated if such quatitatvie information could be included in the next iteration to enhance the policy relevance of this chapter/the whole special report. [Klaus Radunsky, Austria]	This is relevant to Ch.7
25702	0				Is there any work in how tropical forest regrowth could affect CO2 emissions? Is there interest in understanding how potentially forest regrowth can have an effect on the climate system? Citations: See above. Poorter, L. F. Bongers, T. M. Aide, A. M. Almeyda Zambrano, P. Balvanera, J. Becknell, V. Boukili, P. H. S. Brancalion, E. N. Broadbent, R. L. Chazdon, D. Craven et al. 2016. Biomass resilience of Neotropical secondary forests. Nature 530: 211-214. Chazdon et al., Carbon sequestration potential of second-growth forest regeneration in the Latin American tropics. 2016. Science Advancements, 1-10 [Laura Schneider, United States of America]	We focus on all biomes at global scale
200	0				It seems in Eastern Africa Elnino is associated with wetness and its associated impacts. Any scientific studies over E. Africa? Refer to Page 43 [Lawrence Aribo, Uganda]	Due to page limit, we focus on glocal scale assessment
274	0				Grammartical corrections are indeed necessary to avoid criticism by pretenders [Lawrence Aribo, Uganda]	Checked
276	0				I suggest use of e.g. Grassi et al. (2017)..... instead of (Grassi et al. 2017).....or vice versa Format at the beginning of a sentence when quoting references for consistency. (Williams and Crutzen, 2010; Bouwman et al. 2013) instead of (Williams and Crutzen, 2010; (Bouwman et al. 2013) at the end or in the middle of a sentence. Mind of openning and clossing brackets. Avoid IPCC critics as much as possible [Lawrence Aribo, Uganda]	Revised accordingly
14324	0				It is important to recognize that climate is a component of land. Other components include: soil, biota (flora, fauna), hydrology, physiography etc. While urbanization is rightly discussed in this chapter, it should be presented as an aspect of the “Anthropocene” in relation to climate change and its impact on land degradation. Other aspects of Anthropocene include land use and land use change, fossil fuel combustion and atmospheric chemistry, the terrestrial C stock including the biomass burning (intentional and wildfires), land as a source and sink of GHGs, and policy interventions to create a positive C sink and reverse the degradation/desertification trends. Some specific comments by UNCCD-SPI for detailed revision of the chapter include the following: [Rattan Lal, United States of America]	agree, included
14326	0				General comment on chapter 2: The chapter generally discusses land-based climate change mitigation measures. It would be useful to also expand discussions on land-based climate-change adapatation measures/implications. [Rattan Lal, United States of America]	Yes, we extended assessment on adaptation issues
14328	0				General comment on chapter 2: Throughout the chapter, please spell out an acronym the first time it is used. [Rattan Lal, United States of America]	Done
14330	0				General comment on chapter 2: This chapter mentions several knowledge/research gaps. It would be useful to list all identified knowledge gaps emerging from the 7 chapters in an annex to the special report. [Rattan Lal, United States of America]	Knowledge gaps differ from chaapter to chapter

Comment No	From Page	From Line	To Page	To Line	Comment	Response
3902	0				Kindly check: The discussion in the following section may be strengthened: biophysical and non-GHG feedback and forcings on climate. Here it is relevant to illustrate the effects of sensible and latent heat, heat flux load on crops and forest, and their feedback to climate. Irrigation practices in agriculture, land use management, land cover types, local microclimate (over and underneath canopy) and drivers have direct influnce in regulating evapotranspiration, phenology of vegetation, stomatal opening and closing, and GPP which, inturn, affect climate. [Suvadip Neogi, India]	Page limit
3904	0				Please check: Opportunity is there to enrich the discussion in the following section: consequences for the climate system of land-based adaptation and mitigation options, including negative emissions. In this context management of mangrove vegetation (and blue carbon), peatland restoration, agricultural soil use management (application of biochar, crop residue, green manuring, soil mulch, integrated nutrient management, NRM, N application as per LCC etc.), judicious agriculture irrigation water management will prove to be helpful for GHGs emissions reductions. Apart from this, approaches for soil carbon sequestration strategies may be strengthened in light of negative emissions from agriculture and low carbon emission resource conservation technology. In this context it is pertinent to discuss the roles and benefits of climate smart agriculture and climate resilient agriculture for judiciously manage natural resources and sustainable land use for agriculture. [Suvadip Neogi, India]	Good point, considered
1012	0				Abbreviations need to be consistens; some abbreviations are used only once, should be avoided; others are introduced multiple time; some are introduced after they have been used already [Tobias Rütting, Sweden]	Checked and changed
11710	1		1		Predominace of CAs are from the global North/developed world. [Debra Roberts, South Africa]	More CAs from the south were invited for SOD
16512	1	1	124	1	This chapter provides an overview of the study advances since AR5 on land-climate interactions. It collects recent literatures relevant to the topics and summarizes the latest understandings of the two-way interactions. Thanks to the authors for their works to contribute the chapter. [Yuanbo Liu, China]	Thanks
16514	1	1	124	1	There are several concerns on the first draft of the chapter. The most unfavorable point is the structure of present version needing careful improvement. On what aspects should each session follow? Composition (elements), configuration (relationship), spatial distribution (local, regional/zonal, global), or their combined sets? Without consistent logistics, the chapter appears fragmentary. Second, some sessions are not well organized but the collection of recent published references. Some of the sessions are lack of the references. Other comments are described as follows. [Yuanbo Liu, China]	Restructured most sections
6260	1	1	185	1	In general for the whole chapter: I know that this is work in progress, but I am a little concerned about that some statements are only supported by a small amount of litterature (1 paper in many cases) and in some cases only litterature that is already quite old. However, in the way the statements are written, it seems like "science has concluded that....". I have marked this in my comments, but only where I myself know the subject/the litterature. So, I think that you could have this in mind as a general point to check on for the second order draft. [Anna Sörensson, Argentina]	Agree, we have rewritten the sentences concerned
27336	1				Chatterjee et al. 2018. Changes in soil carbon stocks across the Forest-Agroforest-Agriculture/Pasture continuum in various agroecological regions: a meta-analysis. Agriculture, Ecosystems and Environment 266:55-67. [Doreen Stabinsky, United States of America]	Add this and relevant assessment in section 2.4

Comment No	From Page	From Line	To Page	To Line	Comment	Response
25844	2	4	2	4	Please refer to AR5 in a way that is understood by people who are not yet familiar with IPCC assessments and products. [Hans Poertner and WGII TSU, Germany]	Sure, rewritten in little more plain language
6914	2	6	2	26	Box 2.1 and 2.3 are missing from the outline [Wilfran Moufouma Okia, France]	Boxes are added in SOD
16432	2	36	2	36	2.3.6 The effect: remove “the” in title [Yuanbo Liu, China]	Removed
14980	2	4	3	12	In the table of contents the format not present a same structure [Fernando Mendez Gaona, Paraguay]	Improved
16640	2	1	9	30	The executive summary is very long and have a lot of information. But still, the main important information is difficult to find among the bullet points. As these bullet points often are used more or less directly into the summary for policymakers, it is important that the most important messages are formulated and written out it the executive summary. [Maria Kvalevag, Norway]	ES rewritten and more focused
27516	2	2			improve table of contents [Abiud Kaswamila, United Republic of Tanzania]	Improved
27518	2	26			remove box 2.2 [Abiud Kaswamila, United Republic of Tanzania]	Removed
15748	2				The Executive Summary is not found in the table of contents. [Thompson Annor, Ghana]	It is stand alone
5288	3	40			The statement "Demand for agricultural commodities is as important as supply for the achievement of sustainable land management, for the reversal of desertification and degradation, the reduction of greenhouse gas emissions and to enhance food security (robust evidence, high/medium agreement)." this exprssion is not clear. Maybe better replaced by "Demand for agricultural products is growing at higher pace than the efforts to reverse land degradtion and land under sustainable management [Daniel Danano Dale, Italy]	Revised accordingly
11712	4	3	4	8	Material better suited for chapter text rather that Executive Summary which should only address most strategic and impactful assessment findings. [Debra Roberts, South Africa]	Accepted. Text revised
9888	4	3	4	8	Important, but does not fit in ES, in my view. Let the findings you present make that clear. [Jan Fuglestvedt, Norway]	Accepted. Text revised
6866	4	3	4	22	Lacking certainty language [Wilfran Moufouma Okia, France]	Accepted. Text revised
16054	4	4	4	12	The Abbreviation AR5 need to put in full, to a reader the question is what is AR5 [Martin Lyambai, Zambia]	Rejected, AR5 is defined in chapter 1
19298	4	7	4	8	It would be interesting to specify new areas (detailed assessments) covered in this report after AR5. [Binaya Raj Shivakoti, Japan]	Accepted. Text revised in the ES and in the key findings below
16944	4	10	4	10	To “spatial and temporal scales”, I would add “multiple different” so to say “multiple different spatial and temporal scales”, in order to stress the interconnections among all those different scales happening simultaneously and also in the long-term. [Vincenza Ferrara, Italy]	Rejected. Text was modified and the sentence was rewritten.
8578	4	17	4	22	Ii is suprising that ectotherm organisms such as insects are not considered in this reflexion. In this case, many aspects of their life and the ecological and evolutionnary processes with which they are associated are highly valuable to "amplify both negative and positive land feedbacks on climate" [Philippe Louapre, France]	Accepted. Text revised
26130	4	18	4	18	short-lived climate forcers or short lived plants? [Hans Poertner and WGII TSU, Germany]	Rejected. Text was modified and the sentence was rewritten.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
25340	4	20	4	22	It would be good to add here, in the end of the para, a sentence that would unpack the implications of not including these processes in climate and earth system models. What is the message for policymakers wanting to apply precautionary principle? [Kaisa Kosonen, Finland]	Rejected, cannot speculate without evidence from the literature
26132	4	24	4	24	what is 'nutrient draw-down regulation' please use terms accessible to wide range of readers in executive summary [Hans Poertner and WGII TSU, Germany]	Accepted. Text revised
3114	4	24	4	25	Variations in land-use trajectories are probably even more uncertain for the prediction of the behaviour of the carbon sinks-sources. The sentence could be reformulated: CO2 fertilization is the key uncertainty related to natural mechanisms, which is not yet fully understood. Or, alternatively, replace "prediction" with "modelling and forecasting capacity". [Karlheinz Erb, Austria]	Accepted. Text revised
25342	4	24	4	30	This paragraph is difficult to read for a climate policy (but not land) expert. [Kaisa Kosonen, Finland]	Accepted. Text revised
5114	4	24	4	30	It is very often, that not the nutrients availability eventually determine the upper limit of plant growth, but more climate relevant parameters: low and high temperatures (high mountains, tundra, deserts), deficite or excess of water (deserts and wetlands) and, of course, extremal weather events, particularly their frequency (storms, floods, snow cover, droughts, hail etc.) [Oksana Lipka, Russian Federation]	Rejected, cannot speculate without evidence from the literature
5606	4	27	4	27	"sequestration to increase CO2"! Should not increase sink! [Sanaz Moghim, Iran]	Accepted. Text revised
1016	4	29	4	30	why is P limitation not mentioned? [Tobias Rütting, Sweden]	Accepted. Text revised
25344	4	34	4	39	What is the consequence of this deficiency of models? [Kaisa Kosonen, Finland]	Rejected. Text was deleted
15250	4	38	4	38	climate events (Add an "e") [Benjamin Quesada, Germany]	Accepted. Text revised
5116	4	38	4	38	Events' [Oksana Lipka, Russian Federation]	Rejected. Text was deleted
596	4	38	4	38	Vents → events [Rafiq Hamdi, Belgium]	Rejected. Text was deleted
20032	4	38	4	38	…..extreme climate events on…. [Sabit Erşahin, Turkey]	Rejected. Text was deleted
26134	4	41	4	41	this bold sentance is very confusing, is the net effect loss or gain of carbon? if unknown please be explicit [Hans Poertner and WGII TSU, Germany]	Rejected, there is no sufficient observational and modeling evidence to assess the sign and magnitude of changes
5608	4	41	4	41	"are warmimg"? [Sanaz Moghim, Iran]	Accepted. Text revised
25346	4	41	4	43	This bolded sentence is difficult to comprehend. [Kaisa Kosonen, Finland]	Accept. Text revised
17050	4	41	4	43	Please descrive these key processes that are warming. Readers may not have the technical knowledge regarding these key processes.. The statement that follows the first talks about key drivers. [Lourdes Tibig, Philippines]	Accept. Text revised
6188	4	42	4	42	", and enhanced by plant growth": to make this a correct sentence "of" should be removed or "enhanced" changed to "enhancement". However, I would also add ", and enhanced plant growth due to carbon fertilization" [Anna Sörensson, Argentina]	Accept. Text revised
3116	4	42	4	43	Is it not C-inputs to soils, which is the key, and which is closely realted to plant growth (but not fully, as society, by harvesting of residues, determines the C-inputs in soils)? Maybe reformulate: ...and C-inputs to soils as a function of plant growht and human harvest" [Karlheinz Erb, Austria]	Accept. Text revised

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16434	4	1	9	1	Executive summary [Yuanbo Liu, China]	checked
9780	4	1	9	3	ES is too long. Too much of a summary of points made. Try to make it more connected / a story. [Jan Fuglestvedt, Norway]	Accepted. Text revised and reduced
7500	4	1	9	30	Not sure if climate impact on land -hydrological processes is (and should be), sufficiently represented in the chapter. For example, climate change leading to higher runoff, affecting green and blue water but also leading to higher soil erosion rates and exporting more sediments and carbon, that will be more easily mineralized during transport. These are issues that are dealt with by SLM climate change adaptation measures. [Joris de Vente, Spain]	Accepted. Text revised in the ES and in Section 2.3 and 2.6 section
17048	4	1	9	30	Excellent Executive Summary-very precise in most of the statements. It is suggested that whenever possible confidence levels (e.g., hih confidence, medium confidence, etc.,) be used. [Lourdes Tibig, Philippines]	Rejected at this stage, will re-evaluate in the next draft
10282	4	3	9	30	The entire chapter contains lots of typographical errors and inconsistencies, which is perhaps to be expected of an early draft. However, the executive summary in particular is replete with typographical errors, inconsistent formatting, spelling mistakes, and broken grammar (individual instances are too numerous to identify an exhaustive list in this review). Given the importance and visibility of this opening section, it needs careful proof-reading at some point before final publication. [Paul Morris, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Text revised
428	4		9		Exec summary has many grammatical errors and typos throughout [Dave Reay, United Kingdom (of Great Britain and Northern Ireland)]	Accept. Text revised
26444	4		9		Inclusion of quantitative aspects in some ES bullet points is highly appreciated. [Hans Poertner and WGII TSU, Germany]	Accept. Text revised
11722	4		123		This chapter tends to present as a "text book" rather than an assessment - the implications of what has been presented still need to be assessed. [Debra Roberts, South Africa]	Changed with in-depth assessment
11724	4		123		This chapter will be very difficult for non-specialists to understand given the level of detail on e.g. biogeochemical cycles. Graphics that could be used to explain the linkages and flows across the systems would be essential. [Debra Roberts, South Africa]	Accept. Text revised and figure was added
11726	4		123		The overlap between Chapter 1 and 2 needs to resolved [Debra Roberts, South Africa]	Accept. Text revised
26124	4	1			Many of the bullet points do not highlight a major finding. The bold sentence(s) should communicate one big picture message and the following sentences supply further information to support or unpack the bold statement [Hans Poertner and WGII TSU, Germany]	Revised accordingly
26126	4	1			Many bullet points are missing a confidence or likelihood statement on the bold sentences [Hans Poertner and WGII TSU, Germany]	Accepted. Text revised
26128	4	1			please refer to guidance note on uncertainty language and supply confidence levels in executive summary unless not appropriate. Also do not mix levels eg assign low or medium agreement not low/medium [Hans Poertner and WGII TSU, Germany]	Accepted. Text revised
23116	4	11			"There is *a* range of coherence levels in understanding *the* response of terrestrial ecosystems ..." [Alexander Graf, Germany]	Accepted. Text revised
1758	4	11			there is need including "The" in the statement before RESPONSE. [Chukwuma Anoruo, Nigeria]	Accepted. Text revised
27520	4	15			consistence use of section or not to use section E.G. SECTION 2.1 [Abiud Kaswamila, United Republic of Tanzania]	Accepted. Text revised
23118	4	17			(Drop "The") "New understanding emerged..." [Alexander Graf, Germany]	Accepted. Text revised

Comment No	From Page	From Line	To Page	To Line	Comment	Response
23254	4	22			include ESM into glossary [Alexander Graf, Germany]	Accepted
26946	4	25			Change "Then nutrients availability..." to "Nutrient availability". [Knute Nadelhoffer, United States of America]	text was modified
1014	4	28			Rather "ecosystem adaptation" than "panat adaptation" [Tobias Rütting, Sweden]	Accepted. Text revised
26948	4	32			Change "enhanced of plant" to "enhanced plant" [Knute Nadelhoffer, United States of America]	Accepted. Text revised
1760	4	33		34	provide evidence to substantiate the claim. Despite the comment appearing in section 2.2.5 line 44-46, there is still need substantiating the comment. The section appended at the end of this paragraph does not only refers to that short statement. Rather, a confidence level could also be appended. Anderegg et al. is still okay. [Chukwuma Anoruo, Nigeria]	Rejected. Text was deleted
23120	4	38			vents means events? [Alexander Graf, Germany]	Rejected. Text was deleted
23122	4	42			" and enhanced (drop "of") plant growth, ..." [Alexander Graf, Germany]	Accept. Text revised
5346	4	42			and enhanced of plant growth. Remove of [Daniel Danano Dale, Italy]	Accept. Text revised
9576	4	42			remove "of" [Eva Falge, Germany]	Accept. Text revised
21198	5	3	5	7	This is no consequence summary point. Cosider deleting this or add some substantial statement as done in earlier points. [Soora Naresh Kumar, India]	Accept. The ES statement may be removed or altered to include this and other perspectives
2662	5	3	5	36	IPCC uncertainty language used incorrectly: a confidence statement (eg, high/medium/low confidence) is made up of 2 clauses (evidence and agreement), which must be used together. Never use only evidence or agreement statements. [Sarah Connors, France]	Accept. Text revised
26136	5	9	5	10	how can you have high confidence on a potentially statement, please leave out potentially and adjust the confidence level accordingly [Hans Poertner and WGII TSU, Germany]	Accept. Text revised
5610	5	12	5	13	if that addition is for irrigation, why the author is talking about "modify energy and moisture balance" what does the author want to indicate! [Sanaz Moghim, Iran]	rejected. The paragraph was eliminated
598	5	13	5	13	modify regional surface energy and moisture balances... [Rafiq Hamdi, Belgium]	rejected. The paragraph was removed
21200	5	17	5	18	Weak summerizay point... consider strengthening it [Soora Naresh Kumar, India]	Accept. The ES statement has been altered to include this and other perspectives
2664	5	21	5	21	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. [Sarah Connors, France]	Accept. Text revised
23124	5	21	5	23	Clarify if new extremes in a global sense are expected (which seems to be suggested later in the full text) or just new extremes for that system which were however already known for other regions [Alexander Graf, Germany]	Accept. The ES statement regarding extremes has been altered to include this and other perspectives.
5852	5	21	5	24	can be written more clearly! [Sanaz Moghim, Iran]	Accept. Text revised
2666	5	27	5	31	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. [Sarah Connors, France]	Accept. Text revised
5966	5	27	5	32	This statement seems contravertial to the greenning trend, although it occurs mainly in high latitude. I recommend to state in the Executive Summary that both greening and browning are onging. [Akihiko Ito, Japan]	Accept. Text revised

Comment No	From Page	From Line	To Page	To Line	Comment	Response
6186	5	27	5	32	I think that it is important as context for the reader to explicit not only how much of total land surface that is projected to be covered by arid land, but also show the current extension of arid lands. [Anna Sörensson, Argentina]	Accept
6190	5	27	5	32	I think that Schlaepfer et al (2017) https://doi.org/10.1038/ncomms14196 could be helpful for this statement and for section 2.3.2. [Anna Sörensson, Argentina]	Accept. Text revised
6184	5	29	5	29	This statement: "...is projected to accelerate in the 21st century such that it is likely 56% and 50% of total land surface will be covered by drylands by 2100 under RCP8.5 and RCP4.5 respectively." comes from only one paper, text in 2.3.2 reads ".....(Huang et al. 2016) estimate 56% and 50% of total land surface will be covered by drylands by 2100 under RCP8.5 and RCP4.5, respectively." I think that for a statement to be judged likely, and in particular when a quantification is given, it should be based on more than one publication. Especially in the Executive summary. [Anna Sörensson, Argentina]	Accept. Text revised
7226	5	29	5	29	The use of 'likely 56% and 50%' is far too precise. The summary gives no information about the sources of those numbers so it is unclear how they might have been derived. Consider rewording to 'likely around 50% of the total land surface will be covered by drylands by 2100 under RCP4.5 with slightly more projected under RCP8.0' [Joe Melton, Canada]	Accept. Text revised
7486	5	30	5	32	please check sentence, seems something wrong [Joris de Vente, Spain]	Accept. Text revised
600	5	31	5	31	and result in decreased agricultural... [Rafiq Hamdi, Belgium]	Accept. Text revised
7488	5	32	5	32	tis argumentation regardig runoff is likely to be over simplistic; climate change in many areas may lead to less annual precipitation, but also to higher precipitation intensity. The latter will result in higher runoff (not necesarily in higher annual discharge); and possibly in more floods and erosion [Joris de Vente, Spain]	Accept. This is mentioned in the ES statement on extremes
5612	5	32	5	32	"result in decreased agricultural yields and runoff", not necessarily, can increase runoff! [Sanaz Moghim, Iran]	Accept. This is mentioned in the ES statement on extremes
7490	5	34	5	34	aggresive mitigation = ambitious mitigation? [Joris de Vente, Spain]	Taken into account in the text of the referred to section
25348	5	34	5	34	Please clarify what is meant by "mean climate change" [Kaisa Kosonen, Finland]	Accept. Text revised
5614	5	34	5	34	"Mean climate change", what does the author mean with "Mean"? [Sanaz Moghim, Iran]	Accept. Text revised
2668	5	34	5	34	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. [Sarah Connors, France]	Accept. Text revised
15252	5	34	5	41	This paragraph should clearly envisage giving the *global* response direction of the climate change effect on agricultural production/crop productivity. Most litterature sources at global scale (e.g Lobell et al., Plant Physiol. 2012; Zhao et al., PNAS 2017) find robust negative relations between temperature changes and crop yield changes. [Benjamin Quesada, Germany]	Accept
8580	5	34	5	41	These conclusions have beeen made too quicky. There are many evidences in the literature that mean climate change negatively impact agricultural production also in middle latitudes. [Philippe Louapre, France]	Accept. Text revised in the ES and in Section 2.3.4 section
25350	5	35	5	35	is the word "may" justified here? Isn't there at least medium certainty that there WILL be impacts? [Kaisa Kosonen, Finland]	Accept. Text revised
23126	5	36	5	37	Does "increases" refer to "changes"? If so, match singular/plural [Alexander Graf, Germany]	Accept. The ES statement regarding food security has been altered to include this and other perspectives

Comment No	From Page	From Line	To Page	To Line	Comment	Response
5616	5	36	5	37	"changes in rainfall variability, drought,..." occurs in all "sub-tropic, tropics, and water-limited environments"! they are completely different regions. [Sanaz Moghim, Iran]	Noted
5618	5	37	5	37	"growing season temperature increases"! [Sanaz Moghim, Iran]	Noted
5620	5	39	5	39	"reduced frost damage, CO2 fertilisation effects"! [Sanaz Moghim, Iran]	Noted
6192	5	41	5	41	I think you refer to 2.3..3 [Anna Sörensson, Argentina]	Accept. Text revised
5118	5	41	5	41	Please use better 'compensate' or 'reduce' climate-related losses [Oksana Lipka, Russian Federation]	Accept. The ES statement regarding food security has been altered to include this and other perspectives
25848	5	42	5	47	Please share information about what these extremes means for ecosystems or societies in case literature about these aspects is available. [Hans Poertner and WGII TSU, Germany]	Accept. The ES statement regarding extremes has been altered to include this and other perspectives
6212	5	43	5	43	"Temperature extremes (very hot days, hot nights, heat waves) have a greater negative impact on terrestrial land functioning than rainfall extremes." I don't think that this statement is useful in the Executive Summary since "greater negative impact" is not (and cannot be) defined. It is neither very well grounded since, reading section 2.3.5.4 it is clear that it only derives from one study (Lesk et al. 2016). This statement in the ES can generate the impression that precipitation extremes are not so important, while in reality the text of 2.3.5.4 shows various examples of how precipitation extremes can have large impact on land functioning. [Anna Sörensson, Argentina]	Accept. The ES statement regarding extremes has been altered
5854	5	43	5	44	how can the author say that! what about flood and drought resulted from rainfall extremes (max and min)! [Sanaz Moghim, Iran]	Accept. The ES statement regarding extremes has been altered
26138	5	43	5	47	The reader is left wondering why temperature has greater impact than rainfall. This needs a supporting sentance to draw out this point [Hans Poertner and WGII TSU, Germany]	Accept. The ES statement regarding extremes has been altered to reflect this
21202	5	43	5	47	Also include cold waves, frost and chilling events as these are also extreme tempertaure events [Soora Naresh Kumar, India]	Accept. The ES statement regarding extremes has been altered to include more of these types of events
8582	5	44	5	45	Be affirmative. This is evidence. [Philippe Louapre, France]	Accept. Text revised
2670	5	44	5	46	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Accept. Text revised
10274	5	45	5	45	Suggest avoiding obscure terms such as "deleterious", which are likely to be unfamiliar to those whose first langauge is not English. [Paul Morris, United Kingdom (of Great Britain and Northern Ireland)]	Accept. Text revised
15254	5	45	5	47	Inaccurate statement ("more likely than not") and sentence for a summary because i) no reason to focus on African regions only and ii) statement is not backed by litterature. SPM 2.2 from IPCC AR5 WGI clearly states that "It is very likely that heat waves will occur more often and last longer". Moreover, recent (Weber et al., Earth's Future 2018), using 10 RCMs-GCMs under 3 different future warming scenarios, clearly show that : "the African continent (...) has to expect an increase in hot nights and longer and more frequent heat waves even if the global temperature will be kept below 2°C" REFERENCE: https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1002/2017EF000714 [Benjamin Quesada, Germany]	Accept. The ES statement regarding extremes has been altered and the provided citation included in the text

Comment No	From Page	From Line	To Page	To Line	Comment	Response
25352	5	45	5	47	Citing only the RCP8.5 scenario here is not relevant for policymakers, because this "no climate policy" scenario is assumably already off the table, given the Paris Agreement. It would be much more relevant to understand how these projections differ for different warming levels (including for 1.5°C) and to not limit the findings for 'some African regions' only. [Kaisa Kosonen, Finland]	Accept. The ES statement regarding extremes has been altered to include this and other perspectives
5622	5	45	5	47	"In a warming climate …. not ….", "not" in that sentence leads to confusion! [Sanaz Moghim, Iran]	Editorial. Noted
16030	5	47	5	47	"Today" is maybe wrong. If it not wrong, the meaning of the sentence is not clear [Tiziana Susca, United Kingdom (of Great Britain and Northern Ireland)]	Accept. Text revised
6214	5	49	5	49	"It is therefore" - erase, because this does not derive from previous statements. [Anna Sörensson, Argentina]	Accept. Text revised
6216	5	49	5	49	It should be "It is more likely than not", like in the section 2.3.6 [Anna Sörensson, Argentina]	Accept. Text revised
15256	5	49	5	49	"therefore" should be removed because there is no relation with previous sentence [Benjamin Quesada, Germany]	Accept. Text revised
15258	5	49	5	49	"more likely"…than unlikely ? [Benjamin Quesada, Germany]	Accept. Text revised
9786	5	49	5	49	Why "therefore" ? [Jan Fuglestvedt, Norway]	Accept. Text revised
25354	5	49	5	49	What is "therefore" referring to? [Kaisa Kosonen, Finland]	Accept. Text revised
25356	5	49	5	49	Please explain "extreme ENSO events" before using the abbreviation for the first time [Kaisa Kosonen, Finland]	Accept. The ES statement regarding extremes has been altered and the provided citation included in the text
17052	5	49	5	50	"it is therefore…? Because of the preceding statement?ENSO events are associated with sea surface temperatures. [Lourdes Tibig, Philippines]	Accept. Text revised
2672	5	50	5	50	IPCC uncertainty language used incorrectly: a confidence statement (eg, high/medium/low confidence) is made up of 2 clauses (evidence and agreement), which must be used together. Never use only evidence or agreement statements. [Sarah Connors, France]	Accept. Text revised
6218	5	49	6	4	The way this statement is redacted is confusing. Even if Christensen et al. (2013) used the expression "any specific projected change" (I have not checked); here I would not use it because now there are evidence that the frequency of the EXTREME El Niño / La Niña will increase (which is an example of "specific change"). So you will have to contrast this with something, for example "although there is low confidence in the change of frequency of ENSO [or whatever you might encounter in the litterature] ... , the ocurrence of extreme ENSO is expected to increase". Also, I would try not to give such precise numbers in the Executive Summary, After all each number (one in 20 years to one in every 10 years for El Niño and one in every 23 years to one in every 13 years for La Niña) is only based on one paper. [Anna Sörensson, Argentina]	Accept. The ES statement regarding ENSO may be removed or altered to include this and other perspectives
17054	5	49	6	4	Revision is in order in this paragraph-contradicting confidence levels.-specifically "more likely" that extreme ENSO events will become more frequent, then "low confidence" in any specific change in ENSO… [Lourdes Tibig, Philippines]	Accept. The ES statement regarding ENSO may be removed or altered to include this and other perspectives
2176	5	49	6	4	Given the large uncertainty of any future changes of ENSO ("low confidence in any projected change"), I am not sure whether this point should be part of the executive summary or not. [Wilhelm May, Denmark]	Accept. The ES statement regarding ENSO may be removed or altered to include this and other perspectives
6496	5	9		15	considerable history of wter management and irrigation - any way to include this? Traditional water managemetn via water meadows in UK for instance? [Hannah Fluck, United Kingdom (of Great Britain and Northern Ireland)]	Rejected at this stage, will reavulate in the next draft

Comment No	From Page	From Line	To Page	To Line	Comment	Response
5138	5	12			"impact agricolture in variability". It is not clear to me if the authors mean that the impact will vary a lot among sitesor species or if they mean variability as biodiverity. [Giovanna Battipaglia, Italy]	Noted.
1762	5	28		30	substantiate with literature [Chukwuma Anoruo, Nigeria]	Reject. This is substantiated in the relevant section
23128	5	49			"more likely": Than what? Than not? Then the opposite (becoming less)? [Alexander Graf, Germany]	Accept. Text revised
602	6	4	6	4	please specify for which time horizon? [Rafiq Hamdi, Belgium]	rejected. The paragraph was removed
5856	6	7	6	8	any reference! [Sanaz Moghim, Iran]	Accept. Text revised, uncertainty language suggested
7228	6	7	6	12	'may even have decreased slightly'. This language attributes more uncertainty to this than I believe to be justified. Andela et al. 2017 (Science – already in the bibilography) clearly shows a decline in burned area based on remote sensing (24 +/- 9% over the 18 year record). The paragraph in the report does not give enough credence to the impact of land use change on fire behaviour. This effect was highlighted by Andela et al. It was also prognostically modelled using a DGVM (Arora, V. K. and Melton, J. R.: Reduction in global area burned and wildfire emissions since 1930s enhances carbon uptake by land, Nat. Commun., 9(1), 1326, 2018.). [Joe Melton, Canada]	Accept. Text revised
9788	6	9	6	9	18.7% indicates a high precision. I suggest rounding off. [Jan Fuglestvedt, Norway]	Accept. Text revised
5858	6	9	6	10	"clear indications"? [Sanaz Moghim, Iran]	Accept. Text revised
19016	6	13	6	13	In North Africa it's quite different ! [Azziz Hirche, Algeria]	Accept. Text revised
2178	6	14	6	16	I wonder whether it is also possible to consider here the impact of LULCC on any regional climate changes in addition to the global changes. [Wilhelm May, Denmark]	Accept. Text revised
25358	6	14	6	21	This "big picture paragraph" should be placed much higher up in the summary [Kaisa Kosonen, Finland]	Accept. Text revised
16638	6	14	6	21	Is it possible to include more information on what kind of land cover change is most important? [Maria Kvalevag, Norway]	Rejected at this stage, will re-evaluate in the next draft
3118	6	15	6	15	"in major ways" is too generic, needs specifications [Karlheinz Erb, Austria]	Accept. Text revised
430	6	16	6	16	Exec summary, 2-6, line 16, check you are happy to state land can be an N2O sink (this is still debated) [Dave Reay, United Kingdom (of Great Britain and Northern Ireland)]	Rejected at this stage, will re-evaluate in the next draft
9790	6	18	6	18	Stating "29%" indicates too much precision - especially given the way that these nubers are calculated (And indeed, given the choices for how methane is weighted by the use of GWPs - which is a choice beyond natural science alone.) [Jan Fuglestvedt, Norway]	Accept. Text revised to include around, will revise furtherin the next draft
25850	6	23	6	23	"According to models' estimate" and "models-based estimate" later in this paragraph are a good way of referring to models when addressing no-expert adiences. Good example for other chapters! [Hans Poertner and WGII TSU, Germany]	Accept. Thank you

Comment No	From Page	From Line	To Page	To Line	Comment	Response
6220	6	23	6	25	I think that you should re consider that a low confidence statement goes into the Executive Summary in this manner. I think that it is not a mayor finding since it has low confidence, but there is a risk that it is read as such the way it stands in bold. Since the scientific information is highly relevant, it could form part of the Executive Summary, but formulated differently, for example "There is low confidence concerning the response of natural lands to changing climate and rising CO2 concentrations, but there are some studies that suggest....." [Anna Sörensson, Argentina]	Accept. Text revised, confidence is re-evaluated
26140	6	23	6	25	Consider whether this low confidence statement is important in the executive summary (it may be). [Hans Poertner and WGII TSU, Germany]	Accept. Text revised, confidence is re-evaluated
23134	6	23	6	27	How do the 2 numbers in the bold title (-11.0) and the text (-6.3) connect? [Alexander Graf, Germany]	Accept. Text revised to clarify what different type of lan fluxes are reported by different method
7494	6	23	6	29	how does the -11 compare to the -6.3 and -5.1. Seems confusing [Joris de Vente, Spain]	Accept. Text revised to clarify what different type of land fluxes are reported by different method
3120	6	23	6	29	Should not also the anthropogenic sources from land use change be mentioned, i.e. deforestation and degradation? Now the paragraph only discusses sinks, first a gross sink, than a net sink, which can potentially be misleading/confusing [Karlheinz Erb, Austria]	Accept. Text revised to clarify what different type of lan fluxes are reported by different method
21204	6	23	6	29	The lad sink is increased then why use -ve sign before the value…it implies reduction in sink…. In the next sentence the -ve sign is missing….it is confusing fro a reader….consider revisiong it and keep consitancy across the chapter as well as report. [Soora Naresh Kumar, India]	Rejected at this stage, will re-evaluate in the next draft, sinks are considered negative into the land.
27210	6	23	6	29	Numbers presented are confusing and seem to be inconsistent with those in Chapter 1 (which presents land as a net source). [Zoltán Rakonczay, Belgium]	Accept. Text revised to clarify what different type of lan fluxes are reported by different method
9792	6	25	6	25	No need to use the confusing unit CO2 -eq here - since you as far as I can see only talk about CO2. [Jan Fuglestvedt, Norway]	Accept. Text revised
7492	6	25	6	27	please check [Joris de Vente, Spain]	accept
18692	6	31	6	31	"CH4"-->CH4 [Hiroaki Kondo, Japan]	Accept. Text revised
26142	6	31	6	38	The executive summaries communicate to decision makers so please keep the detailed numbers in the supporting statements. The second sentance could be combined with the first and the detailed numbers moved to the supporting sentances (and spell out methane rather than chemical symbol), [Hans Poertner and WGII TSU, Germany]	Rejected at this stage, will reavulate in the next draft.
7232	6	33	6	33	Both the landfills and biomass burning numbers should be ranges. A good source would be Table 2 in Saunois et al. ESSD 2016 (already in bibliography) [Joe Melton, Canada]	agreed but did not address yet, will revise in the next draft
7234	6	33	6	33	I am unsure what 'land-related emissions' would mean. Please clarify. Alternative would be oceanic? But that is a small source and also this sentence specifies anthropogenic so it is hard to parse. [Joe Melton, Canada]	Accept. Text revised
604	6	36	6	36	at a slower rate rather... [Rafiq Hamdi, Belgium]	Rejected at this stage, will re-evaluate in the next draft.
4070	6	36	6	36	replace "rather" with "rate" [Reid Detchon, United States of America]	accept
23136	6	37	6	38	"but new evidence points to the importance of atmospheric loss": Difficult to understand, maybe the later described removal by OH is meant? Then rephrase like e.g. "importance of removal processes inside the atmosphere" [Alexander Graf, Germany]	Accept. Text revised

Comment No	From Page	From Line	To Page	To Line	Comment	Response
7236	6	38	6	38	High certainty is not warranted. From Turner et al. 2017 PNAS (in bibilo) “we also demonstrate that the problem of attributing methane trends from the current surface observation network, including iso- topes, is underdetermined and does not allow unambiguous attribution of decadal trends.” The ambiguity of the problem is evident that the same record can be interpreted quite differently (Schaefer et al. 2016 Science, Schwietzke et al. Nature 2016, Rigby et al. 2017 PNAS). All of these studies were looking at the same period, using slightly different tools and technique, and getting somewhat conflicting interpretations. I think this suggests there is not high confidence in the role of OH. Additional ref to look at: Worden, J. R., Bloom, A. A., Pandey, S., Jiang, Z., Worden, H. M., Walker, T. W., Houweling, S. and Röckmann, T.: Reduced biomass burning emissions reconcile conflicting estimates of the post-2006 atmospheric methane budget, Nat. Commun., 8(1), 2227, 2017. [Joe Melton, Canada]	Accept. Text revised
2674	6	38	6	38	IPCC uncertainty language used incorrectly: a confidence statement (eg, high/medium/low confidence) is made up of 2 clauses (evidence and agreement), which must be used together. Never use only evidence or agreement statements. [Sarah Connors, France]	Accept. Text revised
26952	6	40	6	41	Change "due to application of fertiliser and manure management" to "due to fertiliser applicaton and manure management". [Knute Nadelhoffer, United States of America]	Accept. Text revised
5624	6	42	6	44	"Natural sources of N2O …….have DECREASED ….due to tropical DEFORESTATION", is this sentence right? [Sanaz Moghim, Iran]	Rejected at this stage, will re-evaluate in the next draft.
26954	6	46	6	49	Change to "While there was progress in quantifying regional emissions of anthropogenic and natural land aerosols (e.g. mineral dust; black, brown and organic carbon; biogenic volatile organic compounds) considerable uncertainty remains about their historical trends, their interannual and decadal variability, and about any changes in the future" [Knute Nadelhoffer, United States of America]	Accept. Text revised
25852	6	46	7	5	Suggest to drop this paragraph as it may not contain much useful information for the audience addressed with Executive Summaries. [Hans Poertner and WGII TSU, Germany]	Rejected at this stage, will re-evaluate in the next draft, clarified importance.
1764	6	7		9	check statement for readability. Appropriate breaking of the statement will make more clear the paragraph communication [Chukwuma Anoruo, Nigeria]	Accept. Text revised
7230	6	7			(continued) I do agree with the discussion of the changing 'fire weather', which is important regionally, however globally the impact of changing land use (increased cultivation leading to fragmentation of the landscape) is leading to a reduction in global burned area. If the future projections show increases in the amount of land cultivated then global fire will decline. So please consider here the human-fire interaction [Joe Melton, Canada]	Accept. Text revised
3584	6	14			It is not clear what is meant by land cover in the report, and why it is treated differently from land use. It is clear that land cover can change even if land use is the same (e.g., summer vs winter in temperate forests), however, the effect of these changes (or rather cycles) have a short rather than long term effect. I suggest to discuss this and only use land cover change when it is markedly different (if at all) from land use change. - This is also important because the greenhouse gas community has so far talked about land use and land use change. [Zoltán Somogyi, Hungary]	Accept. Text revisions in section 2.6
23130	6	16			"…, high agreement)*.* Land is both *a* source and sink…". Also consider replacing "Land" by "Land use", "The land surface" or whatever best matches the intedned meaning here. [Alexander Graf, Germany]	Accept. Text revised

Comment No	From Page	From Line	To Page	To Line	Comment	Response
23132	6	23			"models estimate" => "model estimates" [Alexander Graf, Germany]	Accept. Text revised to clarify what different type of land fluxes are reported by different method
26950	6	24			Change "models' estimate" to "model estimates" [Knute Nadelhoffer, United States of America]	Reject, the sentence was restructured
9578	6	36			replace "rather" by "rate" [Eva Falge, Germany]	Accept. Text revised
18694	7	2	7	2	"top -down" --> top-down [Hiroaki Kondo, Japan]	accepted
4072	7	5	7	5	replace "model" with "modelling" [Reid Detchon, United States of America]	rejected, sentence was modified
10384	7	7	7	7	"Land cover and uses (e.g. urban expansion, deforestation / afforestation, irrigation – ploughing, conversion to croplands) exert significant influence on atmospheric states". Include infrastrucure, mining [Zitouni Ould-Dada, Italy]	rejected, sentence was modified
26144	7	7	7	14	This bullet overlaps with the bullet starting page 6 line 14 [Hans Poertner and WGII TSU, Germany]	rejected, this bullet was about biophysical interactions and regional climate, the one on page 6 was about biogeichemical interactions and global climate. The bullet was modified
21206	7	7	7	14	Looks pretty known summary point…consider remving or revising with new infromation as the following summary point is giving definitive statement. [Soora Naresh Kumar, India]	Accepted. Text revised
5626	7	8	7	8	"atmospheric states (e.g. temperature, rainfall, wind intensity)", If "state" here is the same as the state function in thermo, I believe rainfall and wind intensity are not state (temperature, humidity, and presuure are). [Sanaz Moghim, Iran]	Accepted. Text revised
2180	7	9	7	9	"phenona (e.g. monsoon)" - I wonder, whether this statement is correct and actuallly reflects the scientific evidence. In my view, the large-scale atmospheric circulation is an imprortant part of the monsoon systems. But I am not sure that there is any robust evidence for impacts of LULCC on monsoon flows. There might, however, be evidence that LULCC affects the monsoon rainfall or even the timing of the monsoon. [Wilhelm May, Denmark]	Accepted. Text revised
5628	7	12	7	12	"with the atmosphere", I believe ocean needs to be added. [Sanaz Moghim, Iran]	Accepted. Text revised
5630	7	12	7	14	what does "gradients" mean with "land cover" and "atmosphere" in that sentence? [Sanaz Moghim, Iran]	Accepted. Text revised
26150	7	16	7	18	over what time period? [Hans Poertner and WGII TSU, Germany]	rejected. The paragraph was removed
5140	7	16	7	24	Woody plant encroachment into grasslands, that is the increase in biomass, density and cover of woody or shrubby plants, leading to conversion of these ecosystems into woodlands , should be considered when talking about change in land cover [Giovanna Battipaglia, Italy]	Rejected at this stage, will reavulate in the next draft
26146	7	16	7	24	suggest just keep the acronym LULCC (and spell out in bold statement) and not complicate by adding historical and future for new acronyms [Hans Poertner and WGII TSU, Germany]	rejected, due to revisions in the sentence
20268	7	16	7	28	Seems to me the statement from lines 16-19 conflicts that from lines 26-28 [Zhang Huqiang, Australia]	accepted, clarified regional vs global implications
6226	7	16	7	30	What is furthermore confusing about these two paragraphs is that they define HLULCC differently. In the first paragraph only biophysical impacts (albedo e.g.) is included in the concept, while in the second, the contribution of land use changes to CO2 increases is included. [Anna Sörensson, Argentina]	accepted, clarified regional vs global implications
21208	7	16	7	30	Conflicting summary points. Consider revising all three points (above two) [Soora Naresh Kumar, India]	accepted, clarified regional vs global implications

Comment No	From Page	From Line	To Page	To Line	Comment	Response
5632	7	21	7	23	"Changes in evapotranspiration …..and often leads to warming", it is better to say reduction in ET instead of changes in ET ..., and then the author can say "leads to warming" [Sanaz Moghim, Iran]	Accepted. Text revised
23140	7	23	7	24	drop "s" ("lead to warming"), insert blank before parenthesis at end, move dot from in-parenthesis to after it. [Alexander Graf, Germany]	Accepted. Text revised
6222	7	23	7	24	Is this whole paragraph about northern lands? I think it could be redacted so that this is clearer. [Anna Sörensson, Argentina]	Accepted. Text revised
6224	7	26	7	27	This paragraph is about global impact of HLULCC on air temperature. This would be easier to understand if it was made clear in the first phrase to differenciate it from the above paragraph on impact of HLULCC on air temperature in northern lands. I would also consider switch place (so that the global statement comes before the northern land statement). [Anna Sörensson, Argentina]	Accepted. Text revised
26148	7	26	7	27	the bullet above states cooling impact in northern hemisphere? [Hans Poertner and WGII TSU, Germany]	Accepted. Text revised
7238	7	26	7	30	This sentence is some what orphaned and out of place with the previous and following paragraphs. Needs to be somehow tied in. [Joe Melton, Canada]	Accepted. Text revised
606	7	26	7	30	Sentence to be formulated, the main message is really not clear [Rafiq Hamdi, Belgium]	Accepted. Text revised
1720	7	26	7	30	This paragraph contradicts a later one (page 8 line 48 onwards): how can we be unsure about the net impact of HLULUCC and at the same time attribute a large mitigation potential to reduced land-use change and carbon sink enhancement? Either we feel certain that the biochemical effect of afforestation or deforestation overrides its biophysical effect and we can consistently attribute a large mitigation potential to these practices or we are uncertain (which seems to be implied by page 7 line 26) and we cannot. [Valentin Bellassen, France]	Accepted. Text revised
6228	7	26	7	34	You say that there is no agreement among HLULCC studies on temperature change, but in FLULCC studies there is medium evidence and medium agreement that the GHG-induced warming is stronger than the biophysical cooling. Why is this? Could it have to do with the sampling of methodologies/models used for the HLULCC versus the FLULCC studies assessed here? Or is there any physical-based reason, like that albedo can not be changed much more than it already has been? Are there any newer studies? The two studies that the FLULCC statement are based on are from 2013 and 2014 respectively page 80 lines 15-27, I would guess that newer literature exist. [Anna Sörensson, Argentina]	Accepted. Text revised
5860	7	28	7	29	"Global annual warming results from the Earth greening" can we say this! [Sanaz Moghim, Iran]	Rejected, there is no sufficient observational and modeling evidence to assess the sign and magnitude of changes
3122	7	32	7	32	reformualte to "are predicted" or "are modelled" instead of "will contribute to enhance"? Furterhmore, I am not convinced that a medium-evidence-medium-agreement level is good enough for an ES entry. Maybe reformulate by stating the major drivers of uncertainty: land use expansion to pristine ecosystems, carbon impacts of managment, etc. And lastly, the paragraph is in contradiction to the paragraph on the options to mitigate CC (pg 8 last para, or pg 12 ln 36ff), which is also part of the FLULCC. [Karlheinz Erb, Austria]	text was revised, low agreement and low evidence reflects on the state of knoledge and has implication for risk assessment of porposed land-base options

Comment No	From Page	From Line	To Page	To Line	Comment	Response
15260	7	32	7	34	This sentence implictly takes into account biochemical effects only. However, due to a large spread in simulated biophysical effects, net effects of FLUCC on global surface temperature is uncertain : with a intermediate complexity model, Sitch et al., 2005 find a net land-use amplifier effect of future global warming by 0.2°K-0.3°K. But, with 4 ESM, (Boysen et al., 2014) estimate a future (RCP8.5, over 2071-2100 period) global annual temperature increase of -0.02°K to +0.23°K due to biochemical effects and -0.47°K to 0.10°K due to biophysical effects, leading to an uncertain range of [-0.35°K;+0.26°K] for approximated net FLULCC effects. These findings should change this summary sentence. [Benjamin Quesada, Germany]	Rejected at this stage, will re-evaluate in the next draft
15262	7	34	7	34	"However" is incorrect here. Not contradictory because if it contributes to more warming (which is unproven given all the ESM simulations, particularly LUCID-CMIP5), it necessarily holds a potential for climate mitgation (which is then unproven as well). [Benjamin Quesada, Germany]	Accepted. Text revised
26152	7	36	7	36	in which areas? Rather than some areas [Hans Poertner and WGII TSU, Germany]	Accepted. Text revised
608	7	37	7	37	Please always specify for which time horizon since land use is very important for policy makers and they are interested more by the near future rather than far future. [Rafiq Hamdi, Belgium]	Rejected, the finding was reformulated
15292	7	39	7	39	Correct by "Whatever the land cover change" [Benjamin Quesada, Germany]	Rejected, the finding was reformulated
8698	7	39	7	40	The sentence should read "Whatever the land change (e.g. afforestation, urbanisation), its location on Earth determines the sign and magnitude of its annual mean impacts on climate", as the impacts can vary in magnitude and sign around the year. [Delphine Deryng, Germany]	Rejected, the finding was reformulated
21210	7	39	7	40	Needs strengthening … to generic [Soora Naresh Kumar, India]	Rejected, the finding was reformulated
6230	7	39	7	48	I would suggest that this paragraph is moved to right after the paragraph on lines 7-14 on the same page (7). Having this information here will facilitate the understanding of the following three paragrapghs about HLULCC and FLULCC. [Anna Sörensson, Argentina]	accepted, text was reaarranged
8700	7	39	7	48	This paragraph should contain a sentence stating that given the time-varying strength of the mentioned mechanisms, the sign and magnitude of impacts on climate also varies along the year (and over the course of the day) for a specific location. [Delphine Deryng, Germany]	Rejected, the finding was reformulated
16652	7	42	7	43	Please check the statement "Deforestation for example cools boreal climate" . This is probably not in general, but depends on snow cover? Please consider to rewrite to for example: "….can cool boreal climate under certain conditions". [Maria Kvalevag, Norway]	Accept: text has been revised
15294	7	45	7	46	Add here : "depends on e.g. the amount and type of final land cover, amount and extent of snow, the amount of incident radiation and soil-moisture" [Benjamin Quesada, Germany]	Accept: text has been revised
5634	7	46	7	48	albedo feedback is a part of hydrological cycle! I believe this is not a good sentence. It seems albedo and hydrological cycle are two separate effects! [Sanaz Moghim, Iran]	Accept: text has been revised
15296	7	50	7	50	Correct by "The impacts of land cover changes" [Benjamin Quesada, Germany]	Accept: text has been revised
9784	7	39	8	7	this is, in my view, too much textbook material. [Jan Fuglestvedt, Norway]	Accept: text has been revised
23138	7	5			"difficulties in properly model" => "difficulties to properly model" or "difficulties in properly modelling" [Alexander Graf, Germany]	rejected, sentence was modified

Comment No	From Page	From Line	To Page	To Line	Comment	Response
5348	7	7			Land cover and uses (e.g. urban expansion, deforestation / afforestation, irrigation – ploughing, conversion to croplands) exert significant influence on atmospheric states. Include infrastrucure, minning,) [Daniel Danano Dale, Italy]	rejected, sentence was modified
9580	7	14			"affects" must say "affect" [Eva Falge, Germany]	Accepted. Text revised
23142	7	28			Really again warming meant or cooling here (see sentence before and after)? If not, explain the process (biophysical/albedo) and extra information needed - the net result (last sentence) or of two warming effects cannot be a small colling effect. [Alexander Graf, Germany]	Accepted. Text revised
9572	7	36			"decrease by -11% to -23%" is a double negation, remove "-" when using the word "decrease" [Eva Falge, Germany]	Accepted. Text revised
1766	7	42		43	substantiate with literature [Chukwuma Anoruo, Nigeria]	Accept: section text has been revised
16516	7	42		43	This is a too simplified sentence. The content of this sentence does only include the biogeophysical effect. Please remove "little annual impact in the temperate regions" since it is not correct. There is evidence from idealized studies that there is strong impact in temperate regions. I agree that there is strong uncertainty about the impact in temperate regions. At least this would be consistent with what is written on page 82 line 31 ff. [Merja Tölle, Germany]	Accept: text has been revised
5862	8	1	8	3	I am not sure about this statement! [Sanaz Moghim, Iran]	Accept: text has been revised
23144	8	5	8	6	"...at the same *temporal* and spatial scales, and b) background climate may evolve through time *,* for example..." [Alexander Graf, Germany]	Accept: text has been revised
5636	8	6	8	6	"background climate"? [Sanaz Moghim, Iran]	Accept: text has been revised
7240	8	7	8	7	How is it possible to have high confience although there is not enough literature yet? [Joe Melton, Canada]	Accept: text has been revised
2676	8	7	8	7	High confidence if there is no robust evidence? The lack of literature should be refelected in the uncertianty language, i.e. limited evidence, high agreement? [Sarah Connors, France]	Accept: text has been revised
5638	8	13	8	13	"asymmetric effect"? [Sanaz Moghim, Iran]	Accept: text has been revised
14978	8	14	8	14	The acronym is wrongly written as "LUCM" at the beginning of a sentence. Instead it should read as "LCUM". [Barnabas Msongaleli, United Republic of Tanzania]	Accept: text has been revised
5640	8	14	8	14	"such as those induced by irrigation", is it good to mention irrigation as an example of reduction temperature! how it can be practical, more irrigation! [Sanaz Moghim, Iran]	Accept: text has been revised
78	8	14	8	19	Inconsistency in use of acronym LUCM vs LCUM [Lawrence Aribo, Uganda]	Accept: text has been revised

Comment No	From Page	From Line	To Page	To Line	Comment	Response
15298	8	16	8	17	The following sentence is inaccurate : "Historical deforestation increased the local magnitude of hot extremes in temperature regions (low confidence)." because of i) lacks of agreement among modelling studies, ii) ambiguity on the "hot extremes" indices actually studied as well as iii) "temperate" (not temperature) regions. For instance, in the multi-model (n=7) intercomparison study, (Pitman et al., 2012) (Figure 4 and 6) found the contrary i.e an ensemble-mean average cooling of the warmest seasonal daily maximum temperature as well as cooling of the highest percentiles of Tmax, in response to historical LULCC. The innovative study cited here (Lejeune et al., 2018) applied reconstruction-based impacts on extreme temperature that supports this statement but is not exempt of criticisms : neglection of large-sclae remote effects of LULCC is one of the caveats. Recent studies (Winckler et al,m 2017; Devaraju et al., 2018; Quesada et al., 2017) tend to prove the existence of remote & indirect large-scale effects of LULCC on temperature. Finally, (Alkama and Cescatti, 2016) or (Lee et al., 2011) show that temperate regions can react opposite to LULCC depending on altitude or on latitude. [Benjamin Quesada, Germany]	Agree, revised and clarified
548	8	17	8	17	The appropriate term should be "temperate regions" (instead of temperature regions). [Klaus Radunsky, Austria]	Revised
80	8	17	8	17	consider Replacing temperature with temperate [Lawrence Aribo, Uganda]	Revised
610	8	17	8	17	temperate instead of temperature [Rafiq Hamdi, Belgium]	Revised
15300	8	22	8	23	Incorrect and inconsensual statement. In a review on urbanization impact on precipitation and storms (Shepherd, 2013) found that : 1) "(...) there is still uncertainty and scientific debate about whether urban environments increase rainfall, decrease rainfall, or have no effect on rainfall. The consensus in the literature suggests that some type of enhancement is the dominant sign change; (...) However, it is worth noting that there is some literature that finds conflicting results, albeit a relative minority of studies." which lowers the confidence and likeliness of the statement ; 2) "Aerosols (e.g., pollutants) have been shown to suppress precipitation. This inverse relationship between aerosol load and precipitation has been summarized in Lin et al. (2011), Stjern et al. (2011), and Rosenfeld et al. (2008)." which contradicts the "stimulation" "due to the presence of aerosols". REF: (Shepherd, 2013) https://www.srs.fs.usda.gov/pubs/ja/2013/ja_2013_shepherd_003.pdf [Benjamin Quesada, Germany]	Revised accordingly
5642	8	22	8	23	not always! [Sanaz Moghim, Iran]	Clarified
21212	8	26	8	27	Needs strengthening … to generic [Soora Naresh Kumar, India]	Revised
2678	8	34	8	34	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Checked and revised
5644	8	34	8	35	"…impact on minimum temperature" why not maximum temperature! I believe it is better to change minimum to extreme temperatures [Sanaz Moghim, Iran]	rejected, due to revisions in the sentence

Comment No	From Page	From Line	To Page	To Line	Comment	Response
20838	8	34	8	45	The explicit mention to a few number of cities, can be an issue for government approval. It should be extremely well justified. In this case, the combined effect of global warming and urbanisation has been addressed in the literature in more cities and regions than those mentioned. [Carolina Vera, Argentina]	Agree, revised and clarified
5120	8	34	8	45	Please add also effect of 'hot spots' - temperature warming in Northern cities in winter time on 1 degree or even more. Usually it is connected to heat losses from buildings because of bad thermal isolation, less because of transport. [Oksana Lipka, Russian Federation]	Rejected, the finding was reformulated
15302	8	35	8	40	The executive summary should avoid site-specific or study-specific results [Benjamin Quesada, Germany]	Agree, revised and clarified
8702	8	35	8	40	Can a general statement on global changes be added instead of examples? [Delphine Deryng, Germany]	Agree, revised and clarified
5646	8	41	8	42	"…lower albedo of urban surface …", low compared to what surface or land cover! [Sanaz Moghim, Iran]	Revised and clarified
5648	8	45	8	45	what does " modifies" mean here! [Sanaz Moghim, Iran]	Revised and clarified
21214	8	47	8	48	Needs strengthening … to generic [Soora Naresh Kumar, India]	Agree, revised and clarified
7498	8	48	8	48	..enhancing and stabilizing sinks. [Joris de Vente, Spain]	rejected, due to revisions in the sentence
7242	8	50	8	50	This sentence had my head swimming. Maybe change reduced to reduction in [Joe Melton, Canada]	rejected, due to revisions in the sentence
7496	8	47	9	7	important ot mention that not all soil organic carbon is equal (forexample regarding stability and long term sequestration potential), and add that there is still significant uncertainty regarding the impact of climate change on the stability of soil organic carbon in different environmental contexts [Joris de Vente, Spain]	Added in section, but not in ES
27276	8	47	9	8	All the ranges here are enormous and of little practical utility. While the information is interesting, it does not belong in the SPM [Doreen Stabinsky, United States of America]	Checked and revised
25360	8	47	9	8	Too much important data packed into one paragraph [Kaisa Kosonen, Finland]	Restructured
2680	8	47	9	8	Where is the assessment and uncertainty language in this paragraph? [Sarah Connors, France]	Added
27212	8	47	9	8	It should be clarified to what extent these options can be deployed simultaneously (less likely), and which ones compete which each other (much more likely). [Zoltán Rakonczay, Belgium]	Revised and clarified
26154	8	1			Please review paragraphs paying attention to grammer and word structure [Hans Poertner and WGII TSU, Germany]	Accept: text has been revised
9582	8	6			add comma before "for example" [Eva Falge, Germany]	Accept: text has been revised
23146	8	36			Flanders: Is this dliberately narrowed down to a very specific small region within western europe? Or just because of the available literature evidence (then clarify that it's and example) [Alexander Graf, Germany]	Revised and clarified
26442	8				There is redundancy on urbanisation. [Hans Poertner and WGII TSU, Germany]	Corrected
10382	9	1	9	1	"carbon sink enhancement (afforestation, reforestation, forest management, agroforestry, restoration of peatlands and coastal wetlands, soil carbon sequestration)." Please include consrervation agriculture, water harvesting in the list [Zitouni Ould-Dada, Italy]	Rejected, the finding was reformulated

Comment No	From Page	From Line	To Page	To Line	Comment	Response
26790	9	3	9	3	lower range for BECCS should be 1.0 see Turner et al. cited above in my comment #2 [Daniel Zarin, United States of America]	Revised accordingly
24584	9	3	9	3	Statement that BECCS can provide “2 – 13 GtCO2e yr-1” of mitigation is completely unjustified in light of the problems with BECCS outlined elsewhere in the report. This sentence needs another clause pointing out how speculative this is. [Mary Booth, United States of America]	Revised accordingly
9544	9	4	9	4	"Long-loved wood products" should probably read "long-lived wood products" [Dirk Nemitz, Germany]	Corrected
3124	9	4	9	4	long-loved? [Karlheinz Erb, Austria]	Corrected
4074	9	4	9	4	replace "long-loved" with "long-lived" [Reid Detchon, United States of America]	Corrected
24320	9	10	9	10	What is meant by "unregulated land-based mitigation"? [Barron Joseph Orr, Germany]	Explained in section 2.7
7280	9	10	9	10	Please define "unregulated land-based mitigation". [Mariam Akhtar-Schuster, Germany]	Explained in section 2.7
14332	9	10	9	10	Please define "unregulated land-based mitigation". [Rattan Lal, United States of America]	Explained in section 2.7
27214	9	10	9	10	The expression "unregulated land-based mitigation" seems senseless. Why would an operator engage in land-based mitigation if it is not regulated? Mitigation implies purposeful action, and most mitigatin actions do have a cost. "No-regret measures" do exist, but if deployed for reasons other than mitigation then they cannot be considered mitigation (just a fringe benefit of some profitable economic activity). Land-based mitigation that have "high consequences" are also likely to be costly, which means that they are not likely to appear without being forced by regulation (directly or indirectly). Demand for bioenergy for mitigation will not emerge without regulation. Demand driven by regulation can have bad consequences, but that is not the consequence of unregulated mitigation, but it is a case of mal-mitigation. [Zoltán Rakonczay, Belgium]	Explained in section 2.7
21216	9	10	9	11	Needs strengthening … to generic [Soora Naresh Kumar, India]	Revised and clarified
27278	9	10	9	20	This is an odd framing. There should be some recognition that IAMs provide numbers, based on a number of assumptions. One critical aspect of these IAMs is that the ONLY land-based mitigation options included in the models are BECCS and afforestation. Those CDR technologies then become the only visible solutions, and crazy numbers such as 20 000 Mha of land needed are taken as truth. Those numbers are hugely unreasonable, not least regarding food security, livelihood, and sustainable development impacts. The point is not their "unregulated" nature. The discussion of these IAMs needs to be much more circumspect, with much greater reliance on post-AR5 models that seek to reach climate targets with more land-use options besides BECCS. [Doreen Stabinsky, United States of America]	Revised and clarified
25854	9	10	9	20	Suggest to focus on the "alternative pathways" already in the first sentence as this might be useful information for the reader of the Executive Summaries. [Hans Poertner and WGII TSU, Germany]	Revised and clarified
25362	9	10	9	20	Please make sure to reference here (and correspondingly in the chapter itself) the four scenario archetypes presented in the IPCC 1.5°C Special Report (SR15) ,regarding their implications for land use. The comparison is very important for understanding the substantial land-use trade offs related to the policy (and investment) choices made in energy end-use in the next decade. [Kaisa Kosonen, Finland]	Agree, it is very important, revised accordingly

Comment No	From Page	From Line	To Page	To Line	Comment	Response
9794	9	10	9	30	importat material in these two paragraphs. But check interface with later chapters (6 and 7?) [Jan Fuglestvedt, Norway]	Checked
7244	9	12	9	12	Confusing: 'can change from -500 Mha up to *+-*1000Mha' [Joe Melton, Canada]	Corrected
27216	9	13	9	14	The high rates of bioenergy mentioned are provided by some models, most likely as a result of poor model design. However, such a massive transformation of the Earth's surface, even if it were feasible, woudl probably not result in the expected mitigation benefits. It is wrong to refer to bioenergy unconditionally as "mitigation" just because such policies are politically justified as mitigation, based on rules that ignore best avaiable science. Science makes it clear that biomass is the most carbon intensive fuel, it is also among the least efficient sources of energy, and any mitigation benefits of bioenergy are contingent on strong conditions that are internalised neither in policies, nor in the models that result in such outlandish estimates. Such estimates therefore should not be presented as "mitigation" in a scientific context, only in a political one. [Zoltán Rakonczay, Belgium]	Checked and revised
23148	9	22	9	30	I see that this is outside the power of the authors, but is it really a good idea that land-based mitigation like forest sinks can be pledged by countries as a part of what was originally supposed to be reached by emission reduction (given the uncertainties in a) quantifying and b) maintaining such sinks)? I would much prefer to see such measures as something that is done on top. If the authors share this scepticism, maybe there is at least a chance to rephrase the paragraph in a way that makes clear that they are not fully equivalent to fossil fuel emission reduction, e.g. by referring to the often contrary biogeophysical and biogeochemical aspects of afforestation that are mentioned repeatedly in the chapter, to the dependence of the true carbon balance on the fate of harvested wood, and to the need to maintain established forests forever if they shall be equivalent to fossil fuel emission savings, to mention just a few concerns. [Alexander Graf, Germany]	rejected, due to revisions in the sentence
2182	9	22	9	30	To my understanding, the assessment of the contribution of LULCC to climate mitigation is merely considers the magnitude of the avoided GHG emissions and the avoided global warming caused by the biogeochemical interactions. Biophysical interactions with the LULCC, however, are generally not taken into account. These may actually lead to an additional warming and, hence, counteract the mitigation policy. I am not sure, where exactly in the chapter this point should be made, but it might be good to also mention it in the executive summary. [Wilhelm May, Denmark]	Agree, revised and clarified
25364	9	28	9	30	Please update the facts here. There is no such thing as "the 2 degree target", as the Paris Agreement goal is to aim at well below 2°C, pursuing 1.5°C. And current NDCs would lead to higher than 2.5°C - 3°C warming by 2100 (See the UNEP Emission Gap Report 2017) [Kaisa Kosonen, Finland]	Accept. Ensure consistency with SR1.5
5350	9	1			carbon sink enhancement (afforestation, reforestation, forest management, agroforestry, restoration of peatlands and coastal wetlands, soil carbon sequestration. Please include consrervation agriculture, water harvesting in the list [Daniel Danano Dale, Italy]	Rejected, the finding was reformulated
9584	9	4			"long-loved" must say "long-lived" [Eva Falge, Germany]	Corrected
5352	9	10			Unregulated land-based mitigation can have high consequences for the land system. Hope some strategic directions are discussed here to manage this. [Daniel Danano Dale, Italy]	Details are covered in section 2.7

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9574	9	12			replace "+-" by "+" [Eva Falge, Germany]	Checked and revised
3578	9	22			The sentence is only true with respect to the time (year) of the last survey of the pledges. Pledges keep changing, and this is important to emphasize. [Zoltán Somogyi, Hungary]	Checked
5354	9	28			Overall, the full sector NDCs fall short of the ambition necessary to reach the 2 degree target with current commitments more compatible. Very important point. Any suggestions of what is lacking in the NDCs that should have been addressed in the document. (would be useful) [Daniel Danano Dale, Italy]	Revised and clarified
27522	9	29			Insert centgrade after degrees [Abiud Kaswamila, United Republic of Tanzania]	Revised
5650	10	3	10	3	"Climate determines land covers…" what about human? [Sanaz Moghim, Iran]	Human is important, but here we focus on climate-land interactions
16510	10	3	10	3	General comments: [Yuanbo Liu, China]	No comment found here
7502	10	10	10	19	what about climate impacts on land processes related to runoff and erosion, whihc are main drivers of land degradation? The emphasis is now very much on GHGs. Climate is alos affected indirectly through land degradation that causes vegetation decline, loss of SOC and GHG emissions. [Joris de Vente, Spain]	Good point, added
6868	10	10	10	19	What are the lines 11-19 for and the difference beween important processess and well-recognised processes? [Wilfran Moufouma Okia, France]	Revised and clarified
21270	10	11	10	11	Animal husbandry especailly nomading herding also causes erosion [Erhan Akca, Turkey]	Revised accordingly
16056	10	11	10	19	The bulleting could be replaced with numbers or extended inside for visibility/identification to the readers [Martin Lyambai, Zambia]	Changed
2682	10	16	10	16	SLM is not just in chapter 6 - please check and include callouts to other chapters where necessary (eg ch2 section 2.7) [Sarah Connors, France]	Revised and clarified
27228	10	18	10	18	It appears that "biophysical" effects are considered to be non-GHG in this report. IN that case, "non-GHG" shoudl either be deleted or (if they include more than biophysical) it shoudl say "and other non-GHG" feedbacks. [Zoltán Rakonczay, Belgium]	No, it is not the case. Non-GHGs refer to chemicals that are not greenhouse gas but still affect climate.
2466	10	19	10	19	I suggest that a key issue regarding land-climate interactions is the current state of modelling and observational efforts. I would think these efforts are key to addressing the previous five key issues. I suggest the authors consider adding a sixth bullet point providing a general statement of this current state. I expect discussion of these modelling and observational efforts in Chapter 2, interleaved with discussions of the five key issues identified by the authors. [William Lahoz, Norway]	Thank you for your suggestion
16058	10	21	10	45	This is a repetation of the table of contents, at this point the content of the chapter is supposed to be discussed in details. [Martin Lyambai, Zambia]	Revised
23150	10	22	10	23	"… emerging constraint*s* (Section 2.2), followed by *a* synthesis on the historical and projected responses of land patterns and functioning to climate change and extremes (drop "are assessed" or change sentence before) …" [Alexander Graf, Germany]	Revised accordingly
18696	10	23	10	23	"are assessed in " --> "are assessed" [Hiroaki Kondo, Japan]	Revised accordingly
24322	10	25	10	25	Clarification on "unmanaged and managed land" (cautionary note: it may be useful to separate and define land use and land management. For example, in this case, perhaps the intent more about used and unused land. [Barron Joseph Orr, Germany]	The terms are defined in SRCCL glossary

Comment No	From Page	From Line	To Page	To Line	Comment	Response
7282	10	25	10	25	It is not clear what is meant by "unmanaged and managed land"? Do you mean used and non-use land? [Mariam Akhtar-Schuster, Germany]	The terms are defined in SRCCL glossary
14334	10	25	10	25	It is not clear what is meant by "unmanaged and managed land"? Do you mean used and unused land? [Rattan Lal, United States of America]	The terms are defined in SRCCL glossary
612	10	30	10	30	and biophysical effects [Rafiq Hamdi, Belgium]	Revised accordingly
18698	10	33	10	33	The term "operalisationing" is not popular. [Hiroaki Kondo, Japan]	Revised accordingly
24324	10	38	10	38	Cautionary note when using terms like "so-called" with terms that have operational definitions used by UN agencies and conventions, such as "sustainable land management". (Not to mention that SLM is a term that is the long title of the overall special report.) The UNCCD uses the term SLM as an umbrella term. For the definition used (which builds off the WOCAT definition), see page 7 of https://www.unccd.int/sites/default/files/documents/2017-08/LDN_CF_report_web-english.pdf [Barron Joseph Orr, Germany]	Revised accordingly
7284	10	38	10	38	You may wish to delete the words "so-called". Rationale: this special report has the term sustainable land management in its title. Using the phrase "so-called sustainable land management" therefore sounds rather strange. [Mariam Akhtar-Schuster, Germany]	Revised accordingly
14336	10	38	10	38	You may wish to delete the words "so-called". Rationale: this special report has the term sustainable land management in its title. Using the phrase "so-called sustainable land management" therefore sound strange. [Rattan Lal, United States of America]	Revised accordingly
614	10	43	10	43	relevant to the climate-land interaction. Remove focus [Rafiq Hamdi, Belgium]	Revised accordingly
10078	10	44	10	45	Box 2.1 is on Fire and climate change and Box 2.2 is on Methodological Approaches but there is no Box 2.3 [Joalane Marunye, Lesotho]	Boxes added
9796	10	1	15	12	The intentions behind section 2.1 are very good. But unfortunately, I get a bit confused by the way the section is written and structured now. After a presentatation of key issues, followed by the para ecxplaining the structure (line 21-30, page 10), the storylines are presented on page 11 - and this ends up as confusing for me. [Jan Fuglestvedt, Norway]	2.1 is now shortened and more focused on struture and storyline
2186	10	1	101	7	The chapter is entiled "Land-climate interactions". It seems, however, that the chapter primarilly deals with the land cover, i.e. natural vegetation, different kinds of land use and management practices. But there is also a relatively large body of scientific literature dealing with the interactions between soil moisture and climate. Not at least in the context of the GLACE-1, GLACE-2 and GLACE-CMIP5 experiments. I wonder, whether this part of the land shouldn't fill more in the chapter to cover the full range of land-climate interactions. There is sub-section 2.6.5.3, where this point is mentioned, and a few other places, but the relevance/importance needs to be stressed. [Wilhelm May, Denmark]	Soil moisture is an important land surface parameter, and we cover it in section 2.2 and 2.6. Yes, agree, we need to cover both natural land cover and land-use/management.
18844	10	1	124	4	chapter 2 is too detailed, this chapter should be brief, and some contents related to adaptation and mitigation options may be put into chapter 3,chapter 4 and chapter 5 and chapter 6 [Jianguo Wu, China]	Agree, some details are removed
16436	10	3			There are 32 highlights. It looks too fragmentary, difficult for readers to find the highlights of interest to them. If would be helpful if the highlights are grouped. [Yuanbo Liu, China]	Thank you for your suggestion
16438	10	3			2.1.1 Climate determines land covers & land processes affect climate [Yuanbo Liu, China]	Thank you for your suggestion

Comment No	From Page	From Line	To Page	To Line	Comment	Response
16440	10	3			I get confused with the intention of the subtitle. This sub-chapter does not solely address the interactions between land and climate, but more the chapter structure in a broad sense. Suggest: Chapter organization with two-way interactions as key storylines [Yuanbo Liu, China]	Thank you for your suggestion
16442	10	11			Important processes and mechanisms behand… à Important processes of and mechanisms behind… [Yuanbo Liu, China]	Revised accordingly
19502	10	13			Please, put comma between season and vegetation [Ibouraïma Yabi, Benin]	added
16444	10	23			remove “are assessed in” [Yuanbo Liu, China]	Revised accordingly
5356	10	33			.operalisationing. Oprationalising [Daniel Danano Dale, Italy]	Revised accordingly
6870	11	5	11	6	This is an important statement which should be backed up by literature references [Wilfran Moufouma Okia, France]	References added
26156	11	9	11	9	give examples of modertely wet regions [Hans Poertner and WGII TSU, Germany]	Details are covered in section 2.2
20212	11	10	11	11	It comes as a surprise that dynamics of land-use are largely determined by changing climate. Suggest that direct societal influences would be larger. [Haverd Vanessa, Australia]	Agree, revised and clarified
14918	11	10	11	21	Besides climate change, I think there is need to also include climate variability in explaining the dynamics of terrestrial ecosystems. This is because the recent trends of alternate cycles of droughts and floods e.g. those which occurred in Tanzania in 2016 and 2017 influence LULCC. In Tanzania, after the decision was made to relocate the country's headquatre to Dodoma (a city in the semi-arid zone), efforts are undertaken to "green" the city through planting of trees. However, the efforts are likely to fail due to increase in climate variability. Even though some explanation is given on this by Pugh et al 2016 about the heterogeneity of impacts of climate change across regions and also Lesk et al 2016 on climate extremes, it is worth mentioning the influence of climate variability. [Barnabas Msongaleli, United Republic of Tanzania]	Agree, revised and clarified
26792	11	10	11	21	The bold header is mislieading insofar as lnad use dynamics are largely drivein by a combination of "demand" (market- and/or subsistence-based, and policy/regulatory instruments (and the degree to which they are enforced [Daniel Zarin, United States of America]	Edited
6872	11	16	11	21	Not clear of the rationale for adding "over the globe and geographical areas" in the following sentence: " However, data availability and science understanding on impacts of climate change on ecosystem and land use are highly heteregeneous across regions and biomes over the globe and geographical areas [Wilfran Moufouma Okia, France]	We highlight both global and regional scales
616	11	20	11	20	are increasingly.. [Rafiq Hamdi, Belgium]	Revised
20214	11	20	11	21	Meaning unclear [Haverd Vanessa, Australia]	Revised and clarified
3580	11	22	11	24	Unfortunately, the figure is wrong. In most cases, both natural and anthropogenic processes occur in tandem in all land use types. For example, forests are under the influence of both natural processes AND anthropogenic effects. See the 2006 IPCC Guidelines on National Greenhouse Gas Inventories. [Zoltán Somogyi, Hungary]	Checked and revised

Comment No	From Page	From Line	To Page	To Line	Comment	Response
3126	11	22	11	25	The figure should be revised, to be consistent with terms it should include land management, the biophysical effects are now only listed with deforestation and irrigation, but also relate to (many? Most?) other activities, e.g. reforestation, and some of the arrows need re-consideration, e.g. grazing has no CO2 signal, but grazing can affect SOC and biomass stocks. The two-sided CO2 arrows of forest harvest and Ag. waste burning suggest these activities to create sinks of similar magnitude than sources - maybe change labels e.g. to forest harvest and products. Why is there no CO2 arrow with fertilizer, when increased plant growth leads to more residues on field and thus more SOC, and the production of N fertilizer requires energy (haber bosch) or animals (lulucf)? [Karlheinz Erb, Austria]	Figure and caption edited
27220	11	23	11	23	Forest management is notably missing from the figure. Wood harvest is part of forst management, but forest management is much more than just that. "Reforestation" can also be part of forest management if it is interpreted as regenerating after harvest. However, that is not how it has been interpreted in the climate policy context (under the Kyoto Protocol it is effectively a synonym of afforestation). ALso, if it is interpreted as regeneration, then afforestation is also missng from the figure. If "reforestation" is meant to include both afforestation and post-harvest regeneration, then that shoudl also be stated, and it would be very unfortunate conceptually. [Zoltán Rakonczay, Belgium]	A figure in section 2.2 will cover the issue
2822	11	23	11	25	A very well written FOD. Author team to be congratulated. Figure 2.1.1 provides a conceptual diagram, where forest water inter-relationships are touched upon, but nowhere in the paper there is much discussion on impacts of changing forest covers on water and how this exacerbates climate impacts. There is a lot of new work that links forests with changing precipitation patterns and how forests can change micro-climate, especially in inland areas. A recent report by IUFRO elaborates on these linkages and there is further work by David Allison and others shows significant impacts of forests on rainfall. This is particularly important for section 2.1.1 where you say that land processes affect climate. It may also be out of the scope of the chapter, if so, it is good to mention it upfront. Reference to IUFRO report is Irena F. Creed and Meine van Noordwijk (eds.), 2018. Forest and Water on a Changing Planet: Vulnerability, Adaptation and Governance Opportunities. A Global Assessment Report. IUFRO World Series Volume 38. Vienna. 192 p. ISBN 978-3-902762-95-5 ISSN 1016-3263 Published by: International Union of Forest Research Organizations (IUFRO). [Aditi Mukherji, Nepal]	Figure and caption edited
17596	11	23	11	25	Legend of figure 2 1 1 should be completed: the 1) 2) 3) 4) need to be explained [Guillaume Bertrand, France]	Caption expanded
27218	11	23	11	25	Caption (AFOLU) and heading in the graphic (LULCC) are inconsistent with each other. The beneift of introducing LULCC is doubtful, unless the purpose is to confuse and obfuscate. [Zoltán Rakonczay, Belgium]	Figure and caption edited
7246	11	24	11	24	The image could additionally have an arrow down in the natural environment for forests for CH4 to signify the CH4 soil sink. Also the irrigated agriculture could have an arrow up for rice ag methane emissions. Neither of these points are major but could be considered. [Joe Melton, Canada]	Figure and caption edited
618	11	24	11	24	This figure but more in general a lot of figures are not well described in the text. They are just referenced without any explanation in the body text which make it difficult for the non expert reader to understand what is the main messages in the figure. [Rafiq Hamdi, Belgium]	Figure and caption edited

Comment No	From Page	From Line	To Page	To Line	Comment	Response
432	11		11		Figure 2.1.1 is OK but could be redrawn to include land use impact on wetlands/peatlands (e.g. drianage) too as this is an important factor in determining past and future GHG fluxes from these systems [Dave Reay, United Kingdom (of Great Britain and Northern Ireland)]	Rejected, details are included in later sections
3890	11		85		In general the chapter is very nicely written however I feel I feel that studies on regional level is missing. I would suggest to include more details in the current report. [Pushp Raj Tiwari, United Kingdom (of Great Britain and Northern Ireland)]	Fully agree that we need to strengthen regional scale
16446	11	3			heat is a kind of energy. Change 'heat, energy' into 'heat, radiation' or remove 'heat'. [Yuanbo Liu, China]	Revised and clarified
16448	11	4			I would prefer 'climate status' to 'climate conditions' here. [Yuanbo Liu, China]	Changed
16450	11	5			change into 'transitional between energy and water limits' or 'transitional of energy and water limitation' [Yuanbo Liu, China]	Changed
16452	11	18			remove 'and geographical areas'. Repeated. [Yuanbo Liu, China]	Revised
16454	11	19			change 'reported to alter' to 'reported that alters' [Yuanbo Liu, China]	Revised
16456	11	20			increasingà increasingly [Yuanbo Liu, China]	Corrected
23154	11	23			Fig. 2.1.1: Why is there no effect of irrigation and N fertilizer on CO2 uptake? Shouldn't reforestation have an effect on the "grey arrows" (biogeophysical fluxes) as deforestation and irrigation do? [Alexander Graf, Germany]	Figure and caption edited
16458	11	23			Uppercase preference in title ? be consistent. [Yuanbo Liu, China]	Edited
27524	11	24			Fig 2.1.1 to read 2.1 [Abiud Kaswamila, United Republic of Tanzania]	Figure numbers checked for entire chapter
23152	11	29			increasing*ly* [Alexander Graf, Germany]	Checked
11302	11				Figure: Please define chemical abbreviations and replace LULCC with full term. "(AFOLU)" not required in caption. Please beware of grainy resolution. This figure suggests forests have no effect on GHGs, which can hardly be true. Is the release and uptake of atmospheric CO2 of forests really in complete equilibrium, is there no deep C-storage happening? Is there no uptake by forests of other GHGs? Ideally the size of the arrows should reflect the size of the impact. [Debra Roberts, South Africa]	Figure and caption edited
622	12	9	8	9	Please add references for this statement and also add uncertainty language [Rafiq Hamdi, Belgium]	Added
6874	12	1	12	25	There is a need to further discuss figure 2.1.1 [Wilfran Moufouma Okia, France]	Figure and caption edited, and added text
4104	12	2	12	3	There is a typo: (Pielke et al. 2016; (Alkama and Cescatti 2016), it should be (Pielke et al. 2016; Alkama and Cescatti 2016) [Renata Libonati, Brazil]	Corrected
8704	12	2	12	25	Some of the complexity also lies in the fact that the response to the biophysical processes depend on the considered bioclimatic region, land cover conversion, as well as sometimes the time of the year and time of the day. This should be mentioned here. [Delphine Deryng, Germany]	Agree, revised and clarified
27222	12	2	12	25	This section rightly discusses the impact of land cover changes. However, the impac of forest management (without land cover change) is discussed neither here, nor anywhere else. [Zoltán Rakonczay, Belgium]	Agree, land management is also important, revised
15264	12	3	12	3	Remove bracket "(" before Alkama... [Benjamin Quesada, Germany]	Revised
82	12	3	12	3	Cross check bracketing while referencing [Lawrence Aribo, Uganda]	Checked

Comment No	From Page	From Line	To Page	To Line	Comment	Response
10208	12	3	12	3	before Alkama and Cescatti 2016 there is a parenthesis extra [Vanina Rosa Noemí Cosentino, Argentina]	Corrected
21256	12	3	12	12	sentence needs formating of references [Erhan Akca, Turkey]	Revised
10210	12	5	12	5	before aerosols there is a "and" extra [Vanina Rosa Noemí Cosentino, Argentina]	Changed
18700	12	5	12	8	The last "albedo" is duplicated in this sentence. [Hiroaki Kondo, Japan]	Corrected
84	12	5	12	8	Repetition of Albedo [Lawrence Aribo, Uganda]	Changed
10214	12	5	12	8	the word "albedo" is twice in the same sentence [Vanina Rosa Noemí Cosentino, Argentina]	Changed
20584	12	5	12	10	albedo' named twice in list. [Bettina Weber, Germany]	Changed
10212	12	5	12	10	Confusing redaction. All properties and processes mentioned affect the precipitation, humidity, cloud cover, and the planetary boundary layer at local, regional and global scales? [Vanina Rosa Noemí Cosentino, Argentina]	Changed
15816	12	6	12	7	albedo is cited twice [Jean-Luc Chotte, France]	Corrected
14340	12	6	12	7	Albedo is cited twice [Rattan Lal, United States of America]	Corrected
620	12	8	12	8	which in turn is affecting... [Rafiq Hamdi, Belgium]	Checked and revised
19094	12	10	12	12	Wetland conversions is a key landcover conversion process which is on the increase especailly in areas with high commercial value. [Nkechinyelu Oranye, Nigeria]	This is covered in section 2.2
7286	12	11	12	12	Please provide a reference for further reading on the statement that the "most notable land cover conversions are identified as deforestation and afforestation, agriculture to grassland, desertification, and urbanisation". [Mariam Akhtar-Schuster, Germany]	References added
14338	12	11	12	12	Please provide a reference for further reading on the statement that the "most notable land cover conversions are identified as deforestation and afforestation, agriculture to grassland, desertification, and urbanisation". [Rattan Lal, United States of America]	References added
3128	12	11	12	13	Also management change induced biophysical changes should be mentioned (not only land conversions), with reference to: Luyssaert S, Jammet M, Stoy PC, et al (2014) Land management and land-cover change have impacts of similar magnitude on surface temperature. Nature Clim Change 4:389–393. doi: 10.1038/nclimate2196 and Naudts K, Chen Y, McGrath MJ, et al (2016) Europe's forest management did not mitigate climate warming. Science 351:597–600. doi: 10.1126/science.aad7270. The review by Erb K-H, Luyssaert S, Meyfroidt P, et al (2016) Land management: data availability and process understanding for global change studies. Glob Change Biol 23:512–533. doi: 10.1111/gcb.13443 provides details on biogeochemical and biophysical impacts of land management, and the assessment by [1] Pongratz J, Dolman H, Don A, Erb K-H, Fuchs R, Herold M, Jones C, Kuemmerle T, Luyssaert S, Meyfroidt P and Naudts K 2018 Models meet data: Challenges and opportunities in implementing land management in Earth system models Global Change Biology 24 1470–87 shows ways of implementation in ESMs [Karlheinz Erb, Austria]	Added
7504	12	12	12	12	desertification is not a land use change like afforestation. Deforestation leads to desertification (or land degradation). [Joris de Vente, Spain]	Revised and clarified

Comment No	From Page	From Line	To Page	To Line	Comment	Response
7506	12	12	12	12	agriculture to grassland' and viceversa? [Joris de Vente, Spain]	Revised and clarified
5864	12	12	12	14	"There is an overall consus that ….to complete global deforestation is atmospheric cooling" I believe this sentence needs strong evidence and also it seems it is in contrast with page 7 lines 20-24! [Sanaz Moghim, Iran]	We move this sentence to section 2.6 and revised
26794	12	13	12	35	There is an apparent contradiction between the sentnece beginning on line 12 and the bold header beginning on line 29 insofar as one claims an overall consensus on global biophysical climate response to complete global deforestation and the other claims the biophysical impacts of land use change on climate are only significant locally. [Daniel Zarin, United States of America]	Checked and revised
3048	12	14	12	14	it is worth to note that the response of temperature to land cover changes may be estimated more robustly via frequency analysis of temperature instead of comparing mean values of temperature before and after changing of the land cover. [Seyed Abolfazl Masoodian, Iran]	This is covered in later sesctions
11306	12	14	12	16	If observations indicate 'contrasting results' in temperature regions, how can there be 'general consensus' that deforestation will lead to cooling and drying? [Debra Roberts, South Africa]	Checked and revised
5652	12	24	12	25	"evaporation-driven cooling in arid regions" can we say EVAPORATION in ARID regions (is there water in arid region to evaporate) [Sanaz Moghim, Iran]	Checked and revised
7508	12	28	12	28	what is meant by 'teleconnections'? [Joris de Vente, Spain]	The term is defined in SRCCL glossary
624	12	29	12	35	Sentence already said perhaps please remove this sentence or reformulate [Rafiq Hamdi, Belgium]	Revised and clarified
3130	12	32	12	33	not only land cover changes, but also land management, see qoutes above [Karlheinz Erb, Austria]	Agree, land management is also important, revised
26158	12	36	12	39	what do you mean by natural climate solutions? This conclusion is based on a single study. Please check consistency with the IPCC Special Report on 1.5C warming [Hans Poertner and WGII TSU, Germany]	Checked and revised
912	12	36	12	44	In 2018 a systematic review on negative emission technologies (NETs) was published. It includes some land-based negative emission technologies (biochar, soil carbon sequestration, afforestation and reforestation and BECCS). The revision in divided into three parts. Please, check the references. Part 1: Jan C Minx et al 2018 Environ. Res. Lett. 13 063001. Part 2: Sabine Fuss et al 2018 Environ. Res. Lett. 13 063002. Part 3: Gregory F Nemet et al 2018 Environ. Res. Lett. 13 063003 [Jose Luis Vicente Vicente, Germany]	This is covered in later sesctions
7512	12	37	12	38	what are 'natural climate solutions'? [Joris de Vente, Spain]	Checked and revised
6876	12	37	12	38	What is meant by natural climate solutions? [Wilfran Moufouma Okia, France]	Checked and revised
1018	12	39	12	44	What is the duration of these sink? Only if long-term (e.g. emtury) they are of substance that matter [Tobias Rütting, Sweden]	Checked and revised
15304	12	40	12	40	"land use, and forest in particular," is odd : forest is a land cover, the reader does not know whether it is forests or land that turn from a source to a sink. [Benjamin Quesada, Germany]	Agree, revised and clarified

Comment No	From Page	From Line	To Page	To Line	Comment	Response
27224	12	41	12	42	It is unclear why land would be a "net anthropogenic source". What evidence backs it up? It is clear that LUC is a net source and most LUC can be considered antropogenic (although very significnat LUCs can be considered natural, such a a successional regrowth of forest on abandoned farmland), but LUC cannot be equated with "anthropogenic". The report fails to clearly and consistently state what it considers anthropogenic emissions/removals and how it estimates them. [Zoltán Rakonczay, Belgium]	Checked and revised
9798	12	42	12	42	see earlier comment on the use of CO2-eq. If you need to use this unit it wold be useful to get more info about how calculated. [Jan Fuglestvedt, Norway]	Agree, we have made the unit consistent
27226	12	42	12	42	Land cannot turn into a "net sink" as it already is one. It may turn into a net anthropogenic sink (from the mentioned anthropogenic source), but it is unclear how antropogenic sinks and sources are defined and separated. [Zoltán Rakonczay, Belgium]	Checked and revised
15990	12	43	12	44	How? It should be explained [Tiziana Susca, United Kingdom (of Great Britain and Northern Ireland)]	Extended with explanation
23156	12	3			Check extra opening parenthesis within reference parentheses [Alexander Graf, Germany]	Checked
16460	12	3			remove '(' ahead of 'Alkama'. [Yuanbo Liu, China]	Revised
16462	12	4			what 'it' refers to here? replace 'it' with 'land cover'. [Yuanbo Liu, China]	Changed
16464	12	5		8	feel disordered. Change to 'Plus the nature of the land surface affects several biophysical properties such as surface roughness and albedo and processes such as surface energy fluxes, evapotranspiration, and energy partitioning into sensible and latent heat (Burakowski et al. 2018)'. [Yuanbo Liu, China]	Thank you for your suggestion
23158	12	8			Remove second occurrence of "albedo" in same sentence, drop "ing" from "affecting" [Alexander Graf, Germany]	Corrected
16518	12	8			Please remove "albedo". This word appears twice in the same sentence. [Merja Tölle, Germany]	Corrected
16466	12	8			change 'affecting' to 'affects' [Yuanbo Liu, China]	Changed
11304	12	12			Should it not be "grassland to agriculture"? [Debra Roberts, South Africa]	Checked and revised
1104	12	12			In my opinion desertification is not a land cover conversion. Vegetation is lost but not intentionally [Rosa Francaviglia, Italy]	Changed
16468	12	12			change 'agriculture' to 'agricultural lands' [Yuanbo Liu, China]	Revised
16470	12	13			change 'average global biophysical climate response to…' to 'general biophysical response of global climate to…' [Yuanbo Liu, China]	Revised
16472	12	14			Observed estimates? Observation or estimation, easy to be confused. Change 'Observed' to 'Observation-based'. [Yuanbo Liu, China]	Revised and clarified
23160	12	17			"in *the* past three decades…" [Alexander Graf, Germany]	Revised
23162	12	21			"…of deforestation *are* also found in west Africa*n* rainforests (Klein et al. 2017). Satellite observation*s* also…" [Alexander Graf, Germany]	Revised
23164	12	22			drop "have" after reference [Alexander Graf, Germany]	Revised
16474	12	23			remove 'the' ahead of 'local climates' [Yuanbo Liu, China]	Revised

Comment No	From Page	From Line	To Page	To Line	Comment	Response
16476	12	24			replace ‘an’ with ‘the’. [Yuanbo Liu, China]	Revised
23166	12	29			Use something like "have been previously" to make instead of "are considered" to clarify meaning [Alexander Graf, Germany]	Revised
16478	12	30		36	change ‘evidence’ to ‘evidences’. [Yuanbo Liu, China]	Changed
16480	12	34			change ‘climate’ to ‘’climates’. [Yuanbo Liu, China]	Checked
23168	12	47			"… understanding of *the* land-climate feedback…" (or no "the" but then feedback*s*) [Alexander Graf, Germany]	Changed
15306	13	1	13	4	Reference from LUCID and CMIP5 studies are out of subject in this paragraph. Suggestion to broaden the scope for modelling studies in general : "State-of-the-art climate models (ESMs, GCMs and RCMs) show overall coherent biophysical behaviour in response to land-use and land-cover changes : after tropical deforestation, increased albedo, reduction of evapotranspiration, decreased soil-moisture, increase in incoming radiation, enhanced surface and ground temperatures, wind-strengthening, less precipitaiton and clouds are robustly simulated (Pielke et al., 2011; Mahmood et al., 2014; Lawrence and Vandecar. 2015; Lejeune et al., 2015, 2017; Quesada et al., 2017; Devaraju et al., 2017)" [Benjamin Quesada, Germany]	Agree, revised and clarified
23172	13	14	13	19	Multiple langualge/clarity issues, try something like "…chapter 11. (Drop "Here, ") This chapter brings together land-related issues that cut across all three working groups, it alos builds *on* previous special reports such as the Special report on 1.5 *°C*, the Special report on renewable Energy and touches on the IPCC Good Practice Guidance methodologies for greenhouse gas inventories in the land sector. *However*, this chapter goes beyond *a summary of those since we present additional* knowledge that has *not* been reported in *any* (or has been reported in none) of those previose reports." [Alexander Graf, Germany]	Checked and revised
27230	13	15	13	19	It is good to bring together those findings, but it woudl also be a golden opportunity to try to reconcile the inconsistencies across the various IPCC reports. E.g., the glaring inconsistency between WGI and WGIII of AR5, whereas the LUC flux of WGI is misconstrued in WGIII as the total AFOLU CO2 balance. [Zoltán Rakonczay, Belgium]	Good point, checked reports and reflected here
9800	13	16	13	16	"touches" is a too weak word here, I would think. Perhaps you can say "connects to" ? [Jan Fuglestvedt, Norway]	Changed
19300	13	18	13	19	..we bring here knowledge that has never been reported in none of those previous reports…. What are those knowledge, if possible better to mention that in advance so that readers can assess the content of the report in advance [Binaya Raj Shivakoti, Japan]	Checked and clarified
9802	13	18	13	19	Will you only "bring here knowledge"? I dont think that is enough. The chapter should assess the knowledge. [Jan Fuglestvedt, Norway]	Agree, assessment is key
86	13	18	13	19	Try to revisit the statement [Lawrence Aribo, Uganda]	Checked and revised
7248	13	19	13	19	Never reported in none. Please consider rewording. [Joe Melton, Canada]	Checked and revised
9804	13	23	13	34	AR5 WGI, ch8, and SPM use both abundance- and emisison-based RF. Please specify. [Jan Fuglestvedt, Norway]	Checked and revised

Comment No	From Page	From Line	To Page	To Line	Comment	Response
9806	13	23	13	34	Much of this info is essential, but I think some of it could be reduced. It depends on how much you do on updating concentrations and RF, and if the report (ch2) does that, then some of the old AR5 info is not needed. So please reconsider level of detail in light of what this report (and SR1.5) does on this issue. [Jan Fuglestvedt, Norway]	Agree, removed some details
1020	13	23	13	34	Thi paragraph shpuld also inlcude information on nitrous oxide [Tobias Rütting, Sweden]	Deails covered by section 2.5
23174	13	25	13	27	"…, an increase of 0.165 W m-2 (drop in) relative to AR4 (2005) due to *a* 12 ppm increase (drop s) in atmospheric CO2 mixing ratio. The CH4 radiative forcing in AR5 is 0.48+-0.5 W m-2, an increase of 0.01 W m-2 (drop in) relative to AR4…" [Alexander Graf, Germany]	Checked and revised
20034	13	26	13	26	……..12 ppm increases in atmospheric CO2 mixing ratio….. [Sabit Erşahin, Turkey]	Checked and revised
27232	13	33	13	34	Any evidence why the residual C sink would be in "natural" ecosystems? It is more likely that the bulk of the residual sink is located in managed (previously harvested) forests that are in regrowth. [Zoltán Rakonczay, Belgium]	Checked and revised
23176	13	36	13	37	160+-90PgC: Check number and units. At a glance and when comparing to the carbon cycle figure from AR5, it seems to large for an annual flux and too small for a stock. [Alexander Graf, Germany]	Checked and revised
5866	13	36	13	37	not clear! [Sanaz Moghim, Iran]	Checked and revised
27234	13	36	13	37	What is meant by "almost offset"? Land is a big overall net C sink. If LUC is a net source, then it follows that land not affected by LUC must be a (much) bigger net sink. [Zoltán Rakonczay, Belgium]	Checked and revised
11898	13	41	13	43	Sentence "Thawing permafrost…" seems to be in conflict with what IPCC Cryosphere report is stating, and also contrary to what page 2-69 lines 20-25 are stating. [Burba George, United States of America]	Checked and revised
5868	13	46	13	47	"AR5 ….that anthropogenic land use change has INCREASED the land surface albedo", I believe it is not true everywhere or by all types of land use change (such as in high lat) [Sanaz Moghim, Iran]	It refers global mean
2684	13	6	15	12	This section would benefit from includng callouts/ references to other sections of chapter 2 that update these topics. This would integrate the section more with the rest of the chapter. [Sarah Connors, France]	Agree, rewrote with some key points from subsequent sections
16520	13	1		2	Reduction of mean winter temperatures by afforestation or deforestation? Please be more precise. [Merja Tölle, Germany]	Checked and revised
23170	13	9			"*The* AR5 WGI report assessed…" [Alexander Graf, Germany]	Changed
5434	13	12			whereby dryland populations apply unsustainable agricultural practices leading to desertification. It cannot be generalised they way it is expressed here. There are land users in the drier regions who use the natural resources base in sustaianable manner. Most pastoralist communities do protect the natural resources in a much sensible manner. In the sameway there are other communities in the drier areas that have traditional systems that could be considered the best management (conscious of sustainable use of water, trees and the land) [Daniel Danano Dale, Italy]	Checked and revised
11714	13	16			There should also be a reflection on the key findings of SROCC to determine is any changes in the ocean and cryosphere have impications for land. [Debra Roberts, South Africa]	Agree, checked SROCC and reflected the key points
3582	13	17			The IPCC published the 2006 IPCC Guidelines on National Greenhouse Gas Inventories in 2006 already, and there are other guidances since then. These repleaced the Good Practice Guidance. Please update the text accordingly. [Zoltán Somogyi, Hungary]	Checked and revised

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19504	13	18		19	Please, Quote some aspects of originality or novelty brought by this report pending details. [Ibouraïma Yabi, Benin]	Thank you for your suggestion
5142	13	19			In which sense? The chapter reports an update of the previous knowledge or because it will be presented a different overview of past studies? [Giovanna Battipaglia, Italy]	Checked and clarified
19506	13	36		44	Please, Quote some references to support the affirmations [Ibouraïma Yabi, Benin]	References added
23178	13	42			drop s from sources [Alexander Graf, Germany]	Changed
23180	13	43			Low => low [Alexander Graf, Germany]	Changed
16482	13	43			change 'Low' to 'low' [Yuanbo Liu, China]	Changed
26446	13				Wondering whether the very useful recap of previous assessments should rather be included as a point of departure for the new findings in the respective sections, rather than all in one place? [Hans Poertner and WGII TSU, Germany]	Accepted. Structure changed
5870	14	7	14	9	Land use change ……, but tend to OFFSET the …." I believe we cannot say "offset" generally! [Sanaz Moghim, Iran]	Checked and revised
17598	14	7	14	11	"Hydrologic feedback to climate: Land use change causes additional modifications that are not radiative, but impact the surface temperature, in particular through the hydrologic cycle. These are more uncertain and they are difficult to quantify, but tend to offset the impact of albedo changes. As a consequence, there is low agreement on the sign of the net change in global mean temperature as a result of land use change (Hartmann et al. 2013)." I wonder if it is not the place to mention latent heat transfer change as well? [Guillaume Bertrand, France]	Yes, extended
20216	14	7	14	11	It would be clearer if you specified reduced transpiration as the particular modidication to the hydrological cycle. [Haverd Vanessa, Australia]	Revised and clarified
20036	14	7	14	11	The interlinks between different scaled processes under changing climate should be analyzed across the scales for a more complete understanding of climate land interactions. [Sabit Erşahin, Turkey]	Agree
23182	14	9	14	11	Clarify if the low agreement on the net change refers to the total or only the non-GHG effect of LUC. [Alexander Graf, Germany]	Revised and clarified
7514	14	13	14	20	There is much more to say about the climate change impacts on hydrology, water availability, greenand blue water, soil erosion, etc, all affecting land degradation and food security. Maybe that is covered somewhere else? [Joris de Vente, Spain]	Added
5872	14	15	14	16	"…declining surface wind speed and solar radiation" needs evidence and reference [Sanaz Moghim, Iran]	Added

Comment No	From Page	From Line	To Page	To Line	Comment	Response
21338	14	22	14	25	'Climate-related extremes on land: AR5 reported with very high confidence that impacts from recent climate-related extremes, such as heat waves, droughts, floods, cyclones, and wildfires, reveal significant vulnerability and exposure of some ecosystems and many human systems to current climate variability' It is important here to distinguish climate related extreme (can be considered as an event that leads to a situation where the value of one or more meteorological elements significantly deviate from normal values of this element for the area and time of year) such are heat waves, high temperatures, heavy rainfalls , cyclones, hurricanes etc from impact of such climate extremes including floods, droughts events, wildfire etc. while the social and economic consequences of impacts include alteration of ecosystems, disruption of food production and water supply, damage to infrastructure and settlements, morbidity and mortality, and consequences for mental health and human well-being. Given that, sentence between rows 22-25 need to be reconstructed. [Gordana Grujic, Serbia]	Checked and revised
11308	14	22	14	29	Some factors, like surface temperature, humidity and CO2 may be easier to measure, and thus more can be said about them, but this does not mean they are more important. Ecological changes are nearly impossible (?) to detect remotely but are likely to be far more important, far-reaching and possibly irreversible. The effect of albedo for instance pales against the ecological effects of deforestation. Ecology is still a science in its infancy, because of its complexity, not because it is less important. This needs to come out strongly. Mostly we do not even know what we are dealing with yet, nor how ecosystems truly function, and therefore what level of damage land use changes are wreaking. [Debra Roberts, South Africa]	Suggestions are well taken, and text revised
7068	14	24	14	24	It would be useful to include a definition of "human systems". [Mariam Akhtar-Schuster, Germany]	Replaced the term with a common one
14342	14	24	14	24	It would be useful to include a definition of "human systems". [Rattan Lal, United States of America]	Replaced the term with a common one
19634	14	25	14	27	economic losses should be also cosnidered as consequences of the extremes [Abou Amani, France]	Added
27280	14	31	14	40	The final reference in the paragraph is a 2-page opinion article. Please use an appropriate scientific reference for the data cited. [Doreen Stabinsky, United States of America]	Replaced
18702	14	33	14	33	The unit "GtCO2eq" is written "GtCO2e" in executive sammary. [Hiroaki Kondo, Japan]	Revised to keep consistency
7070	14	50	15	1	You state that "Asia and the Pacific region experience the world's fastest urbanisation". The African Development Bank states that "In the developing world, Africa has experienced the highest urban growth during the last two decades at 3.5% per year and this rate of growth is expected to hold into 2050." (source: https://www.afdb.org/en/blogs/afdb-championing-inclusive-growth-across-africa/post/urbanization-in-africa-10143/). Kindly check that there are no incosistences between both of these statements. [Mariam Akhtar-Schuster, Germany]	Sentence revised by citing a 2018 UNDESA report

Comment No	From Page	From Line	To Page	To Line	Comment	Response
14344	14	50	15	1	You state that "Asia and the Pacific regions experience the world's fastest urbanisation". The African Development Bank states that "In the developing world, Africa has experienced the highest urban growth during the last two decades at 3.5% per year and this rate of growth is expected to hold into 2050." (source: https://www.afdb.org/en/blogs/afdb-championing-inclusive-growth-across-africa/post/urbanization-in-africa-10143/). Kindly check that there are no incosistences between both of these statements. [Rattan Lal, United States of America]	Sentence revised by citing a 2018 UNDESA report
26160	14	50	15	12	The first sentence in bold is misleading. this suggests the entire paragraph is about asia and the Pacific region...which is not the case [Hans Poertner and WGII TSU, Germany]	Revised and clarified
23184	14	16			"decreasing evapotranspiration": Isnn't it just the upward trend in ET (rather than ET itself) that is decreasing? [Alexander Graf, Germany]	Don't understand
1022	14	17			Reduced transpiration applies maimly to the leaf level. Ecosystem/biome level might be unchanged, if enhanced foliage (e.g. Leuzinger et al. (2011)Trends Ecol Evol 26: 236-241) [Tobias Rütting, Sweden]	Assessed with more references
23186	14	19			resulted => resulting [Alexander Graf, Germany]	Changed
16484	14	31			change 'Adaptation' to 'adaptation' [Yuanbo Liu, China]	Changed
23188	14	32			Blank before reference missing [Alexander Graf, Germany]	Added
23190	14	35			drop "been" [Alexander Graf, Germany]	Changed
19508	14	42		48	If my knowledge is correct, the sixth UNDP report on the State of the Environment is not yet published. The process is in progress. [Ibouraïma Yabi, Benin]	We cited its TOD
16522	14	47			Please change "hotpots" to "hotspots". [Merja Tölle, Germany]	Changed
11716	14	50			Need to point out that 2018 Revision of World Urbanization Prospects (UNDESA) indicates that 90% of future urban population growth (by 2050) will take place in Asia and Africa. Update urban figures using UNDESA 2018. [Debra Roberts, South Africa]	Added
14920	15	1	15	12	Even though forest cover in Africa is continually shrinking, afforestation efforts undertaken by some African countries, e.g. Nigeria, Tanzania and others are worth the recognition. [Barnabas Msongaleli, United Republic of Tanzania]	Rejected, this is just recap of GEO-6
26162	15	3	15	4	are mangroves included in 'natural forest areas' it is unclear if these are a subset of the previous sentence or a new focus [Hans Poertner and WGII TSU, Germany]	subsection 2.1.
20738	15	3	15	5	Definition ‘ Biogeochemical interaction encompass exchange of GHG and aerosols between land and atmosphere which are determined by the state of the terrestrial ecosystems, their structure and functioning ’ is also confusing because there is no simple exchange of GHG between land and atmosphere but geochemistry encompass interaction of elements of the minerals from the soil (or rocks on which the soil is formed), hydrosphere and atmosphere. Suggestion is to keep term ‘Biogeochemical cycles’ because it refers to cycle of forming and movement of GHG in the land, terrestrial ecosystem and atmosphere. [Gordana Grujic, Serbia]	Revised and clarified
11900	15	4	15	5	Statement "6-% of the original mangroves..." seems out of place and contrary to rest of the sentence and the argument, or at least not fully clear. Would not reduction in mangroves coverage lead to the reduction in CH4? [Burba George, United States of America]	Checked and clarified

Comment No	From Page	From Line	To Page	To Line	Comment	Response
10386	15	8	15	8	"The key drivers of land degradation are urbanisation, deforestation, over-cultivation and overgrazing." Soil erosion, salinization / sodicicty need to be included [Zitouni Ould-Dada, Italy]	Rejected, sentence changed
10388	15	11	15	11	"forests to agricultural and housing." The list should include mining, infrastructure development [Zitouni Ould-Dada, Italy]	Revised and clarified
19302	15	13	15	13	If relevant, would it be possble to add a sentence stating that 'below sections will update the new findings after AR5' [Binaya Raj Shivakoti, Japan]	Sentence added
20736	15	17	15	27	Definition of term 'Biogeophysical interaction' in the first sentence is confusing. Firstly because the term 'Biogeophysical interaction' is not mentioned further in the text but ' Biophysical interaction' only. Secondly, Geophysics is the scientific discipline that studies the physical properties of the Earth's interior and not land surface as it is refereed further in the text. Geophysics explores physical fields of the Earth (gravity, magnetic, electrical fields), and the interaction between them, as well as the physical properties which condition the movement of the seismic waves, the movement of electric current etc. Therefore suggestion is to keep the term 'Biophysical processes'. [Gordana Grujic, Serbia]	Accepted - "biogeophysical" is changed to" biophysical".
17008	15	19	15	24	The whole sentence sounds like sometimes measurements and associated methodologies stand for measured phenomenons/biogeophysical and biogeochemical interactions: "leaf area index" is presented at the same level than "leaf stomatal opening". I would specifiy it every time a methodology is evoked to assess a phenomenon ("amount of green vegetation (e.g. leaf area index method, LAI" [Romain Courault, France]	Rejected - LAI is not method. It is a clearly defined entity (leaf area per unit area of ground). No longer releant either with text revision
626	15	20	15	20	and roughness length [Rafiq Hamdi, Belgium]	rejected - comment unclear
15266	15	24	15	24	Consider citing here the already-cited-elsewhere reference (Quesada et al., 2017a) for momentum and other biophysical impacts, who quantified the global impact of momentum variable (e.g wap500 or surface wind speed) while the other papers cited here explore biophysical effects on "shortwave and long-wave radiation, turbulent fluxes". [Benjamin Quesada, Germany]	accepted - revised
18704	15	28	15	30	In Fig.2.2.1A, the level of resiters for ra of Latent flux and Sensible heat flux should be put at the same level in the figure. There should be separated arrow line for Stemflow from Throughfall in Fig.2.2.1B. The explanation for thick arrow in Fig.2.2.1B should be added. [Hiroaki Kondo, Japan]	accepted - Fig to be revised
2694	15	14	33	24	Section 2,2 - some subsections that use old citations. If this is because the topics were not covered in AR5 maybe state this either here or in section 2,1. If they have already been covered please provide only updates since AR5. [Sarah Connors, France]	accepted - Section 2.2 text revised
6878	15	14	33	24	This section looks more like a text book and can be shortened [Wilfran Moufouma Okia, France]	accepted -
750	15		33		Including not only the budget but also each component of flux would be insightful. The budget is important but the trends and response vary among components (e.g. photosynthesis and soil respiration). As for soil, not only soil carbon stock and decomposition but also flux from soil would be informative. [Shoji Hashimoto, Japan]	noted - photosynthesis is covered in 2.2 and soil flux is covered in 2.4.
19510	15	1		12	Idem [Ibouraïma Yabi, Benin]	rejected - comment unclear
1768	15	1			substantiate with literature [Chukwuma Anoruo, Nigeria]	rejected - comment unclear

Comment No	From Page	From Line	To Page	To Line	Comment	Response
23192	15	2			is => are, "hundreds of millions" => inappropriately vague language [Alexander Graf, Germany]	Revised and clarified
23194	15	4			has => have [Alexander Graf, Germany]	Revised
1770	15	8			Okay. I think the evidence is from the continuation of page 15 line 1. [Chukwuma Anoruo, Nigeria]	Checked
5358	15	8			The key drivers of land degradation are urbanisation, deforestation, over-cultivation and overgrazing. Soil erosion, salinization / sodicicty need and other land degradation issues need to be included here [Daniel Danano Dale, Italy]	Revised
27526	15	19			fig 2.1.2 to read 2.2 [Abiud Kaswamila, United Republic of Tanzania]	accepted - Fig reference is correct
1106	15	21			"biological processes (e.g. leaf stomatal opening)". I think physiological processes would be more appropriate [Rosa Francaviglia, Italy]	noted - No longer relevant as the sentence in question is revised.
16486	15	25		26	delete 'at regional scales'. Repeated. [Yuanbo Liu, China]	accepted - changed as suggested
23196	15	29			Fig. 2.2.1: For clarity the ra symbol of sensible heat flux should occur at the same height as the one of latent heat flux (rather than aligned with the stomatal resistance to latent heat flux). Maybe for consistency replace the profile of wind speed by a downward arrow indicating the direction of momentum flux). The profile of Tsoil is only valid for daytiem summer situations, consider replacing horizontal axis by "Tsoil amplitude" or omitting the profile if not needed. Soil heat flux should point in both directions. [Alexander Graf, Germany]	accepted - Fig to be revised about ra, but not sure about the momentum flux. Agree on Tsoil - change to Tsoil amplitude
7250	16	3	16	3	Fig 2.1.1 doesn't have biogeochemical interactions [Joe Melton, Canada]	noted - meaning of the comment unclear. Does the reviewer mean that Fig. 2.1.1. shows only biogeochemical flux??
11902	16	5	16	5	Replace "carbon" with "CO2" or "carbon dioxide" [Burba George, United States of America]	accepted - changed as suggested
24814	16	8	16	9	reaching 3.1 PgC .....during 10 years: mention the decade. [Biplab Brahma, India]	accepted - text removed with revision (merged with 2.4)
3134	16	13	16	13	This is shown by Erb K-H, Kastner T, Luyssaert S, et al (2013) Bias in the attribution of forest carbon sinks. Nature Clim Change 3:854–856. doi: 10.1038/nclimate2004. [Karlheinz Erb, Austria]	acceoted - citation added
10280	16	13	16	13	Warming usually means that growing seasons are not only longer, but also more vigorous (peak temperatures increased). [Paul Morris, United Kingdom (of Great Britain and Northern Ireland)]	accepted - revised to read as "lengthening and warmer peak temperature of the growing season"
3076	16	15	16	15	Land use changes should be considered separate than land cover changes, because they may have different cause and different progress. Methodology for control changes may also be different. [Mostafa Jafari, Iran]	noted - in the context of this sentence in this paragraph, there is no need to differentiate.
5874	16	18	16	19	any reference and evidence! [Sanaz Moghim, Iran]	accepted -referring to Subsection 2.5
5654	16	20	16	21	"(e.g., dam construction flow alteration, waste water treatment, wetland management)", why these positives and negatives are together, waste water treatment and wetland management are positive, while I believe dam construction is negative! [Sanaz Moghim, Iran]	taken into account - text revised to read better.
18706	16	21	16	21	”WII" --> "WGII" [Hiroaki Kondo, Japan]	accepted - changed as suggested
24554	16	24	16	27	It is not clear if natural forests are better than managed forests. This issue is heavily debatted see: "Bellassen, V. & Luyssaert, S.: Carbon sequestration: Managing forests in uncertain times; Nature 506, 153–155 (13 February 2014); doi:10.1038/506153a " [Christopher Morhart, Germany]	accepted -text revised and referred to the cross chapter box on AR

Comment No	From Page	From Line	To Page	To Line	Comment	Response
27282	16	24	16	27	As noted in an earlier comment on the entire report, there is a need to include forest restoration when listing afforestation and reforestation. They are not equivalent and so forest restoration should be explicitly added any time these two processes are discussed. [Doreen Stabinsky, United States of America]	accepted - changed as suggested
16654	16	24	16	27	A reference to this statement is definitely needed, and please also consider to make clear that the situation might be different among regions. [Maria Kvalevag, Norway]	accepted -text revised and referred to the cross chapter box on AR
11904	16	26	16	27	This statement seems incorrect or at least should have low confidence comment on it. While soil carbon storage under forest plantation may indeed drop, the sequestration of the carbon in the wood may increase substantial. May be worth double-checking. [Burba George, United States of America]	accepted -text revised and referred to the cross chapter box on AR
24816	16	27	16	27	Suggesting to follow Brahma et al, 2018 (Ecosyatem carbon sequestration through restoration of degraded lands in Northe east india) as reference; where loss of ecosystem carbon was explored due to land use change from natural forest to rubber plantations of India. [Biplab Brahma, India]	noted -referred to 2.4
18708	16	27	16	27	Suggestion of reference: Carbon budget of tropical forests in Southeast Asia and the effects of deforestation: an approach using a process-based model and field measurements, Adachi, M. et al., Biogeosciences/8(9)/pp.2635-2647, 2011-09 [Hiroaki Kondo, Japan]	noted -referred to 2.4
914	16	27	16	27	Some references are needed [Jose Luis Vicente Vicente, Germany]	accepted -text revised and referred to the cross chapter box on AR
628	16	27	16	27	Please add references for this statement and also add uncertainty language [Rafiq Hamdi, Belgium]	accepted -text revised and referred to the cross chapter box on AR
5876	16	27	16	28	"Furthermore, fire suppression may lead to increased ….in man-made forest", is it right? Reference! [Sanaz Moghim, Iran]	accepted -referred to the cross chapter box
630	16	30	16	30	A new paragraph is needed to describe the new surface process that are now included in global and regional model since AR5. A Kind of synthesis paragraph and then all the following sections will be describing process by process [Rafiq Hamdi, Belgium]	noted -to be addressed by chapter-wide revision
26956	16	5			Change "carbon" to "carbon dioxide". [Knute Nadelhoffer, United States of America]	accepted - changed as suggested
1108	16	7		9	"It is widely believed that since 1960s land carbon sink has been increasing (Ballantyne et al. 2012) and reaching 3.1 ± 0.9 PgC net removal of CO2 from the atmosphere during 10 years". Please, specify the period, i.e. 10 years from YY to YY [Rosa Francaviglia, Italy]	noted - the sentence is redundant to 2.4 and thus removed
23198	16	7			"It is widely believed that since *the* 1960s*, the* land carbon…." [Alexander Graf, Germany]	accepted - changed as suggested (but this sentence may be deleted in SOD)
1110	16	16		17	"atmospheric teleconnections". Please provide a very short description just to understand the meaning. At this stage readers do not read yet section 2.6 [Rosa Francaviglia, Italy]	taken into account - text revised to avoid jargon and better reference to 2.6
23200	16	18			"LULCC modulate *the* flux of fresh water, nutrients, and particul*ate(?)* matter (drop s?) from land to ocean, and influence (drop s) productivity and circulation patterns of *the* ocean. [Alexander Graf, Germany]	accepted - changed as suggested
1112	16	18			particular matters [Rosa Francaviglia, Italy]	accepted - changed to "particulate matter"
23202	16	21			"In *the* tropics*,* such…" [Alexander Graf, Germany]	accepted - changed as suggested

Comment No	From Page	From Line	To Page	To Line	Comment	Response
10294	16	24			Here, but also throughout the entire chapter: afforestation is portrayed as a route for C sink. However, in (unforested, or open-canopy) northern peatlands, the opposite may be true. Afforestation through drying is thought to lead to a positive feedback loop, whereby increased tree cover generates greater transpiration, and so further lowering of the shallow water tables that previously protected peat from decomposition and allowed genera such as Sphagnum mosses to outcompete higher plants. The result can be runaway drying and replacement of open, wet peatlands with rapidly drying, decomposing peat that serves as a degrading substrate for forest succession. A similar effect has been observed, and may be highly important, through the "shrubbification" of the Arctic. [Paul Morris, United Kingdom (of Great Britain and Northern Ireland)]	taken into account - revised to address afforestation-induced-peatland-drying in boreal-arctic regions
6500	16				is there any scope for including cultural practices and fire risk? [Hannah Fluck, United Kingdom (of Great Britain and Northern Ireland)]	taken into account - revised to address "traditional" and "cultural" fire regimes with additional refs
24556	17	1	17	2	Figure 2.2.2 needs better explanation [Christopher Morhart, Germany]	Noted, revised
16656	17	3	17	6	Figure 2.2.2. Does the figure in panel a) include the interactions between removals and harvest rate or are the numbers only a function of harvested volume? [Maria Kvalevag, Norway]	Noted, revised
2188	17	8	17	8	I think, here it should be something like "The magnitude and sign of the eddects of LULCC...". [Wilhelm May, Denmark]	accepted - changed as suggested (except, the reviewer must mean 'effects' by 'eddects'
8616	17	8	17	13	"The magnitude and sign of LULCC depend on the region." A term is missing in that sentence, it should be specified which impacts this paragraph focuses on. It is also not clear in the third sentence what the two mentioned processes are. [Delphine Deryng, Germany]	accepted - text revised to address the concerns to this paragraph
17600	17	8	17	14	"The magnitude and sign of LULCC depends on the region. In tropical latitudes, deforestation causes decreases of evapotranspiration and latent heat transfer at local scales, and smoother land surface without trees reduces local convective rainfall (Khanna et al. 2017). In the temperate zones, the two processes are expected to be offsetting each other (Findell et al. 2017)" Please precise "the two processes", it is unclear to me (do you mean evapotranspiration and latent heat transfer or evapotranspiration and deforestation?) [Guillaume Bertrand, France]	accepted - text revised to address the concerns to this paragraph
23204	17	10	17	11	unclear/too short: which two processes in which way? I guess you want to say that in the tropics, both the effect on ET and on rainfall tend to "dry" the land surface while in the temperate regions one tends to "dry" and one to "wet" the surface? [Alexander Graf, Germany]	accepted - text revised to address the concerns to this paragraph
7252	17	10	17	11	Confusing. I assume the two are deforestation and smoother land surface? Maybe clarfiy the 'In the temperate zones ...' sentence. [Joe Melton, Canada]	accepted - text revised to address the concerns to this paragraph
5656	17	10	17	11	"the two prpcesses" which two? [Sanaz Moghim, Iran]	accepted - text revised to address the concerns to this paragraph
20840	17	15	17	16	Considering that chapter 1 already introduced the subsection issue in 1.3.3.1, the best places to define "forcing" and "Feedbacks" in this report should be better discussed and agreed with chapter 1. [Carolina Vera, Argentina]	Noted - checked with Chapter 1
10276	17	21	17	21	Permafrost thaws, ice melts. [Paul Morris, United Kingdom (of Great Britain and Northern Ireland)]	accepted - changed as suggested
434	17		18		Here and elsewhere, numerous grammatical errors that should be addressed in SOD [Dave Reay, United Kingdom (of Great Britain and Northern Ireland)]	noted - addressed in SOD
19512	17	0			The figure should be announced above. [Ibouraïma Yabi, Benin]	Noted, revised

Comment No	From Page	From Line	To Page	To Line	Comment	Response
9670	17	3			Figure 2.2.2. is not cited in text in vicinity, almost identical reference Arneth et al. 2017a is listed twice (2017a and 2017b) in references [Eva Falge, Germany]	noted - duplicate reference removed
23206	17	22			delay (drop s) [Alexander Graf, Germany]	accepted - changed as suggested
1114	17				Figure 2.2.2 seems not properly placed within this context. Probably should be moved to page 45 [Rosa Francaviglia, Italy]	Noted, revised
3136	18	1	18	28	The "balancing" of biogeochemical and biophysical should be addressed, as it leads to counterintuitive results, see eg. Naudts K, Chen Y, McGrath M J, Ryder J, Valade A, Otto J and Luyssaert S 2016 Europe's forest management did not mitigate climate warming Science 351 597–60. The advancement of ESMs is outlined in Pongratz J, Dolman H, Don A, Erb K-H, Fuchs R, Herold M, Jones C, Kuemmerle T, Luyssaert S, Meyfroidt P and Naudts K 2018 Models meet data: Challenges and opportunities in implementing land management in Earth system models Global Change Biology 24 1470–87. [Karlheinz Erb, Austria]	noted- balancing of biogeochemical and biophysical, should it be done in wrap up section (2.6 or 2.7)?
632	18	6	18	6	due to structural [Rafiq Hamdi, Belgium]	accepted - changed as suggested
14922	18	6	18	7	……are likely due structural uncertainty…… instead it should read …..are likely due to structural uncertainty….. [Barnabas Msongaleli, United Republic of Tanzania]	accepted - changed as suggested
2686	18	9	18	28	These two paragraphs are a nice summary of AR5 and since. They would benefit from being at the beginning of the section (and possibly some moved into seciton 2.1?). Please correctly reference the previous IPCC report chapters in Mendeley (the first author should be stated in the in-text citation). Finally, include callouts to the specific section mentioned in the end of these two paragraphs. [Sarah Connors, France]	taken in to account
24558	18	13	18	13	"strength" should be subsituted by "resistance and recovery" (see also: Lloret, F. , Keeling, E. G. and Sala, A. (2011), Components of tree resilience: effects of successive low-growth episodes in old ponderosa pine forests. Oikos, 120: 1909-1920. doi:10.1111/j.1600-0706.2011.19372.x) [Christopher Morhart, Germany]	accepted - changed as suggested
5658	18	18	18	19	"often", I believe it is better to replace oftent by mostly. [Sanaz Moghim, Iran]	accepted - changed as suggested
3078	18	32	18	32	The process of CO2 exchange by all plant leaves may share more or less a common physiological mechanism of … [Mostafa Jafari, Iran]	noted - text revised
8584	18	32	18	32	CO2 exchange may ocur in other organs that leaves. [Philippe Louapre, France]	taken into account - rephrase "all plant leaves" to "plants"
634	18	32	18	45	Please add uncertainty language in this section [Rafiq Hamdi, Belgium]	noted - But this paragraph is to explain the funamental basics that are incorporated in model assumptions, and not so much of assessments.
2690	18	44	18	45	references needed to back up this statement [Sarah Connors, France]	accepted - dealt by referring to the subsequent subsections
2688	18	47	18	47	Please format as Subsection 2,2,2,1 which is easier to refer to later on in the report. [Sarah Connors, France]	accepted - changed as suggested

Comment No	From Page	From Line	To Page	To Line	Comment	Response
15308	18	30	21	29	Literature about impacts of land-use and land-cover changes on terrestrial carbon cycle seems to be missing and could be added here in 2.2.2 for their relevance in the Chapter Land-Climate Interactions (e.g "Plant physiological responses and acclimations to LULCC and increases in CO2 and temperature"). In other means, how deforestation/land management impacts carbon stocks, productivity, respiration and carbon residence time of the ecosystems (apart from GHG emissions). See Introduction, Discussion and references in (Quesada et al., ERL 2018) as well as (Haberl et al., PNAS 2007; DeFries et al., 2002) but more recently (Erb et al., 2016) and (Müller et al., 2016). REF: Quesada et al 2018 Environ. Res. Lett. 13 064023, https://doi.org/10.1088/1748-9326/aac4c3. [Benjamin Quesada, Germany]	noted - text to be revised
5146	18		21		Part 2.2.2 It is completely missing a description of recent studies on how Mediterranean forest will respond to warmer conditions but under higher than present CO2. Recent papers (see Penuelas et al 2017 for review) focus on the impact of warming and drought on Mediterranean forest, while Gea-Izquierdo et al paper (GCB, 2017) showed the effect of RCP 2.6 and RCP 8.5 for Mediterranean forest in terms of growth and productivity. The results are interesting since they highlighted the role of elevated CO2 in triggering positive or negative feedbacks. [Giovanna Battipaglia, Italy]	noted and taken into account
23208	18	6			"…likely due *to* structural…" [Alexander Graf, Germany]	accepted - changed as suggested
23210	18	36			move "effects" from before "of water" to before "of atmospheric CO2" [Alexander Graf, Germany]	accepted - changed as suggested
26448	18	39			The affinity of Rubisco for CO2 is diverse across species and species specific and may well differ between climate zones, an aspect not covered? This diversity would need consideration in the writing, at least to indicate whether, how and where modeling has simplified. [Hans Poertner and WGII TSU, Germany]	noted - perhaps too dicipline specific to incorporate this topic.
10284	18				I am a peatland scientist, and I have reviewed the chapter with the primary objective of ensuring that these important, possibly fragile ecosystems, and their large C stocks, have been satisfactorily represented. I have some comments of substance, here and below, that reflect my specific interest in peatlands. Peatlands do not receive any detailed mention in this chapter until page 18, despite the recognition at that point of their valuable role (citing AR5). Most of what precedes concerns forests and agricultural land. Given the large potential importance of peatlands to this debate (one third of all global soil C concentrated into less than 3 % of the land surface), it would be reasonable to have at least a short paragraph dedicated to describing their basic features and functions in the scene-setting material at the beginning of the chapter. [Paul Morris, United Kingdom (of Great Britain and Northern Ireland)]	noted - Peatland to be mentioned earlier in the chapter
21260	19	16	16	18	Something is missing in the sentence. [Erhan Akca, Turkey]	taken into account - improve readability by breaking the long sentence to two.
916	19	1	19	2	Could you, please, add a more modern reference? I think that since 1995 the knowledge about the influence of higher CO2 concentrations in the atmosphere on plant growth and water use has increased. [Jose Luis Vicente Vicente, Germany]	accepted - Swann et al. 2017, PNAS, added
19304	19	4	19	4	A modelling study suggests that it may be possible…', better to change 'may' to 'might' [Binaya Raj Shivakoti, Japan]	Noted
10336	19	8	19	8	the acronym FACE should be defined at first mention [John Devaney, Ireland]	accepted - changed as suggested
11906	19	8	19	20	This paragraph seems out of place and can be removed entirely. [Burba George, United States of America]	noted- it is somewhat redundant to 2.2.3 but is kept for now

Comment No	From Page	From Line	To Page	To Line	Comment	Response
20220	19	22	19	40	Missing lines of evidence here. Over the (1982-2010) period, an 11% increase in foliage cover in warm semi-arid regions may be equated with the CO2-greening effect on GPP (Donohue et al. 2013). In contrast, tropical forest GPP (1982-2010) increases proportionately with ca (both 12%), almost entirely because of the leaf-level CO2 effect, inferred from tropical forest catchment water-balance (Yang et al. 2016). [Haverd Vanessa, Australia]	taken into account - Thomas et al. 2016 cited
20222	19	22	19	40	Donohue, R. J., Roderick, M. L., McVicar, T. R. & Farquhar, G. D. Impact of CO2 fertilization on maximum foliage cover across the globe's warm, arid environments. Geophys. Res. Lett. 40, 3031-3035, https://doi.org/10.1002/grl.50563 (2013). [Haverd Vanessa, Australia]	noted
20224	19	22	19	40	Yang, Y., Donohue, R. J., McVicar, T. R., Roderick, M. L. & Beck, H. E. Long-term CO2 fertilization increases vegetation productivity and has little effect on hydrological partitioning in tropical rainforests. J. Geophys. Res.-Biogeo. 121, 2125-2140, https://doi.org/10.1002/2016JG003475 (2016). [Haverd Vanessa, Australia]	noted
20226	19	22	19	40	Further missing line of evidence. The observed trend in the amplitude of seasonal cycle in the northern hemisphere (56 ± 10% north of 45 °N, 1960-2010) (Graven et al. 2013), is under-estimated by current land-surface models.(Graven et al. 2013, Thomas et al. 2016). Alternate explanations for the observed trend are increasing light-use efficiency (LUE) (Thomas et al. 2016) versus high-latitude warming effects on biome distribution and plant productivity (Forkel et al. 2016). [Haverd Vanessa, Australia]	taken into account - Thomas et al. 2016 cited
20228	19	22	19	40	Graven, H. D. et al. Enhanced seasonal exchange of CO2 by northern ecosystems since 1960. Science 341, 1085 (2013). [Haverd Vanessa, Australia]	noted
20230	19	22	19	40	Thomas, R. T. et al. Increased light-use efficiency in northern terrestrial ecosystems indicated by CO2 and greening observations. Geophys. Res. Lett. 43, 11,339-311,349, https://doi.org/10.1002/2016GL070710 (2016). [Haverd Vanessa, Australia]	noted - now cited in 2.2
20232	19	22	19	40	Forkel, M. et al. Enhanced seasonal CO2 exchange caused by amplified plant productivity in northern ecosystems. Science, https://doi.org/10.1126/science.aac4971 (2016). [Haverd Vanessa, Australia]	noted
2692	19	24	19	24	strong evidence' use IPCC uncertainty language where possible in these assessment statements. [Sarah Connors, France]	accepted - changed as suggested
5660	19	27	19	29	"… enhanced photosynthesis and decreased ET" , I believe those two "enhanced photosynthesis" and "decreased ET" are contradictory! [Sanaz Moghim, Iran]	noted - text revised to avoid confusion
23212	19	5			ameliorate (drop s) [Alexander Graf, Germany]	accepted - text revised
26958	19	5			Change "ameliorates" to "ameliorate". [Knute Nadelhoffer, United States of America]	accepted - text revised
23214	19	8			observed *in* FACE experiments, include FACE (free air carbon enrichment) in Glossary [Alexander Graf, Germany]	accepted - text revised
26960	19	8			Change "observed FACE experiments" to "observed in FACE experiments". [Knute Nadelhoffer, United States of America]	accepted - text revised
1024	19	8			Paschalis et al. is a study on one FACE site only; better using a meta-analysis / review paper on several FACE experiments [Tobias Rütting, Sweden]	accepted - text revised with additional references
3324	19	16			add Penuelas et al 2017 to (Körner 2006). It provides a good perspective o these statements [Josep Penuelas, Spain]	accepted - text revised
23216	19	23			tolerance *to(?)* droughts *of* crop and plants [Alexander Graf, Germany]	accepted - text revised

Comment No	From Page	From Line	To Page	To Line	Comment	Response
23218	19	45			not iWUE itself (which is understood/depending on sign convention of CO2 and H2O flux), but probably ist trend was consistently positive? [Alexander Graf, Germany]	accepted - text revised as "IWUE was consistently increasing"
23220	20	11	20	12	more explanation needed. Given that the net effect of LUC is a source and that the natural pre-industrial land surface was approximately neutral, shouldn't all or almost all of the land carbon sink be due to the CO2 fertilisation effect? Or in different terms: If this accounts for 40% what are the other 60%? [Alexander Graf, Germany]	accepted - text revised
20218	20	15	20	15	TransCom and RECAP are not atmospheric models. TransCom is an ensemble of atmospheric models. [Haverd Vanessa, Australia]	accepted - no longer relevant in the revise d text
5878	20	15	20	16	"also concludes …" more explanation or examples! [Sanaz Moghim, Iran]	accepted - text revised
636	20	21	20	21	why there is only one subsubsection 2.2.2.1? [Rafiq Hamdi, Belgium]	accepted - sub-sub section is renumbered
8586	20	24	20	25	This is true for any living organisms, not plant specific. [Philippe Louapre, France]	accepted -revised the text from "plant growth" to "organismal growth"
5662	20	25	20	26	"Plants can acclimate to …." is it right for all types of plant and in any region? [Sanaz Moghim, Iran]	taken into account -emerging concensus is that plant acclimation is universal.
638	20	27	20	27	please reformulate this sentence it is very ambiguous [Rafiq Hamdi, Belgium]	accepted - text revised
5880	20	27	20	30	not clear! [Sanaz Moghim, Iran]	accepted - text revised
5950	20	27	20	30	language [Sanaz Moghim, Iran]	accepted - text revised
17010	20	27	20	33	Something might be missing, about specifying (or at least making the distinction between) the various vegetation species abilities to respirate and acclimate to annual, decadal temperature variations. [Romain Courault, France]	accepted - text revised
17012	20	35	20	44	The same comment than above. Here respiration and acclimatation at the biomes level, but need to be underlined, and would deserve an entire paragraph/review of various biomes response (respiration, acclimatation) to temperature variation. For example, what about measured acclimation for ecosystems/biomes presenting a high biodiversity? What about biomes with a relatively low level of biodiversity? Are the latter better simulated in models? [Romain Courault, France]	noted - not revised due to limited evidence found
640	20	44	20	44	please reformulate this sentence: model parameterization was difficult [Rafiq Hamdi, Belgium]	accepted - sentence removed
8588	20	21	21	29	If you discuss about acclilatation, you should also discuss about adaptation processes occuring over the course of climate change. [Philippe Louapre, France]	rejected- the scope of this chapter is not a comprehensive overview
1772	20	7		9	substantiate with literature [Chukwuma Anoruo, Nigeria]	accepted - text revised and reference added
5366	20	10			Additionally, regionally degraded agricultural soils could potentially serve as carbon sinks. Remove the word regionally from the sentence as degradation is not bound by region. It is also trans-regional as well [Daniel Danano Dale, Italy]	noted -but this comment appears to be for for a different section
1774	20	22		24	accredit source [Chukwuma Anoruo, Nigeria]	noted -but this comment appears to be for for a different section
1776	20	25		27	the statement should be moved to the top. There is need starting the paragraph with this statement. This will certainly provide a logical linkage of the paragraph. [Chukwuma Anoruo, Nigeria]	accepted - text revised

Comment No	From Page	From Line	To Page	To Line	Comment	Response
23222	20	35			If only reporting on plant / aboveground / leaf respiration here (as suggested by the context), add such a clarifying word before "respiration" to avoid reader conclusions on heterotrophic / soil respiration [Alexander Graf, Germany]	accepted - text revised
1778	20	35			short and long term of what? Make complete this statement and incorporate appropiate use of word. The syntax used in the paragraph is not satisfactory. Also, there is need citing every statement. [Chukwuma Anoruo, Nigeria]	accepted - text revised ("short and long terms" removed)
26962	20	42			Change "ameliorate" to "ameliorates" [Knute Nadelhoffer, United States of America]	accepted - text revised
20502	21	3	21	3	2. "above sea level"is the subtitle, or not? By the way, if we make reader easy, we should add more such key subheader, subtitle, or key sentences at each part or paragraphes. [Huai Jianjun, China]	accepted - copy-paste error is removed
24560	21	5	21	5	Delete line [Christopher Morhart, Germany]	accepted - copy-paste error is removed
18710	21	5	21	5	Why is "above sea level" inserted here? [Hiroaki Kondo, Japan]	accepted - copy-paste error is removed
642	21	5	21	5	above sea level?? [Rafiq Hamdi, Belgium]	accepted - copy-paste error is removed
10216	21	5	21	5	above sea level. Is this fine here? [Vanina Rosa Noemí Cosentino, Argentina]	accepted - copy-paste error is removed
2468	21	5	21	5	I think there is a superfluous “above sea level”. [William Lahoz, Norway]	accepted - copy-paste error is removed
14924	21	6	21	6	……show that that acclimation…….instead it should read……. show that acclimation……. [Barnabas Msongaleli, United Republic of Tanzania]	accepted - text revised
644	21	6	21	6	show that [Rafiq Hamdi, Belgium]	accepted - text revised
286	21	6	21	6	That word has come twice in the sentence: Comparisons of models with and without thermal acclimation of respiration show that that acclimation can halve the increases of plant respiration with predicted temperature increase by the end of 21st century (Vanderwel et al. 2015). [Santosh Kumar Mishra, India]	accepted - text revised
11310	21	6	21	15	Please explain what implications does this model correction have to the conclusions? Does this mean for instance that deforestation has a worse effect than we thought in terms of CO2 emissions, or are things not as bad as we thought? [Debra Roberts, South Africa]	accepted - text revised
5664	21	14	21	15	"with an overall conclusions that whole plant respiration may be about 30% higher than previous estimates", it seems it is in contrast to lines 6 and 7 in this page! [Sanaz Moghim, Iran]	accepted - texts revised and rearranged
646	21	15	21	15	Please add uncertainty language in this section [Rafiq Hamdi, Belgium]	noted
20234	21	17	21	29	However note dominant response of stomatal conductance vs leaf biochemistry in tropical forests (Lloyd and Farqhuar 2008): "Although reductions in photosynthetic rate at leaf temperatures (TL) above 30oC may occur, these are almost entirely accountable for in terms of reductions in stomatal conductance in response to higher leaf to- air vapour pressure deficits.This is as opposed to direct effects of leaf temperature on photosynthetic metabolism." [Haverd Vanessa, Australia]	accepted - text revised
20236	21	17	21	29	Lloyd, J. and Farquhar, G. D.: Effects of rising temperatures and [CO2] on the physiology of tropical forest trees, Philosophical Transactions of the Royal Society B: Biological Sciences, 363, 1811-1817, 2008. [Haverd Vanessa, Australia]	accepted - text revised

Comment No	From Page	From Line	To Page	To Line	Comment	Response
18712	21	18	21	19	The symbol "Topt" shuold be defiined after the words of "optimum temperature for photosynthesis (Topt)" [Hiroaki Kondo, Japan]	accepted - text revised
20504	21	19	21	19	3.TOpt maybe wrong. [Huai Jianjun, China]	accepted - text revised
648	21	19	21	19	What is Topt? [Rafiq Hamdi, Belgium]	accepted - text revised
918	21	19	21	22	Please, define "TOpt" and "RuBP" [Jose Luis Vicente Vicente, Germany]	accepted - text revised
20038	21	24	21	24	Mercado et al. (2018), using… (not italic) [Sabit Erşahin, Turkey]	accepted - text revised
17014	21	24	21	29	Same comments than #7 and #8: if possible better assess (and present) the differences between biomes/vegetal landscapes/species for the physiological responses and further carbon cycle [Romain Courault, France]	noted
1028	21	39	21	41	This statement is highly biases, as these two FACE experiments are rather the exception in terms of PNL. For most FACE expeirments, no PNL has been observed even after decadal long exposure to levated CO2. Feng et al. (2015; Glob Change Biol 21:3152-3168) conducted a meta-analysis on long-term FACE experiments and found overall no general occurence of PNL. This was also found by Liang et al. (2016; Biogeosci 13:2689-2699), who had less stric site selection. But see Andresen et al. (2016; Adv Ecol Res 55:437-473), who reported a more transient growth stimulation under elevated CO2 [Tobias Rütting, Sweden]	accepted - text revised, adding these and additional recent relevant publications (e.g., Du et al. 2019)
5666	21	41	21	43	"longer growing seasons and warmer climate", warmer climate cannot be suitable for all plants. Each plant needs a specific range of temperature for their growth and survival. [Sanaz Moghim, Iran]	noted, but rejected - most Tundra and Boreal forest plants live under below-optimal temperature.
5668	21	43	21	43	"carbon loss", I believe carbon release is a better choice! [Sanaz Moghim, Iran]	accepted - text revised
1030	21	45	22	9	Again, this paragraph is biased towars two FACE expeiments, while most other FACE experiments show a different pattern (Feng et al. 2015 Glob Change Biol 21:3152-3168; Liang et al. 2016 Biogeosci 13:2689-2699; Andresen et al. 2016 Adv Ecol Res 55:437-473) [Tobias Rütting, Sweden]	accepted - text revised
1780	21	4		5	check for sentence error. [Chukwuma Anoruo, Nigeria]	accepted - copy-paste error is removed
23224	21	5			drop /amend line "above sea level"? [Alexander Graf, Germany]	accepted - copy-paste error is removed
23226	21	6			drop second "that" [Alexander Graf, Germany]	accepted - text revised
1782	21	6			convolution of sentence appears. Check for adequate communication. There are double use of conjuction."That" [Chukwuma Anoruo, Nigeria]	accepted - text revised
1784	21	21			use either typically or however. I think both usage constitutes no problem. [Chukwuma Anoruo, Nigeria]	accepted - "however" removed
11312	21	21			The effects of temperature on symbiotic bacteria and other soil organisms are covered later, and could be mentioned here. [Debra Roberts, South Africa]	noted - mentioned in earlier paragraph
23228	21	32			"would eventually determine (drop s)" or "(drop would) eventually determines" [Alexander Graf, Germany]	accepted - text revised
26964	21	32			Change to "The stoichiometry of C:N:P eventually determines the upper limit of growth responses of…" [Knute Nadelhoffer, United States of America]	accepted - text revised
1786	21	33		35	cite appropriately [Chukwuma Anoruo, Nigeria]	accepted - text revised, adding these and additional recent relevant publications (e.g., Du et al. 2019)
1026	21	39			There is still an ongoing debate about the general occurrence of a progressive N limitation as consequence of elevated atmospheric CO2. Hence, there is no "high agreement" on that [Tobias Rütting, Sweden]	accepted - text revised

Comment No	From Page	From Line	To Page	To Line	Comment	Response
1788	21	45		46	okay. [Chukwuma Anoruo, Nigeria]	noted
26450	21	45			There should also be a treatment of the interactions of temperature and CO2 effects on plants across climate zones. [Hans Poertner and WGII TSU, Germany]	noted- without finding supporting literature, we are not addressing in SOD
23230	21	48			"this could *be* explained" [Alexander Graf, Germany]	accepted - text revised
15750	22	2	22	6	The sentence 'When both N ...' is not complete. It is difficult to understand. [Thompson Annor, Ghana]	accepted - text revised
650	22	6	22	9	please reformulate this sentence it is very ambiguous [Rafiq Hamdi, Belgium]	accepted - text revised
1032	22	11	22	22	There are other processes/mechanism that are of impoprtance for N supply, shaping ecosystem responses to elevated CO2, that shuld be mentioned (plus more recent references should be cited). Liang et al. (2016; Biogeosci 13:2689-2699) discussed N2 fixation and N leaching as important mechanims regulating PNL (although the former was questions by Rütting 2017 Biogeosci 14:751-754); N mining has been observed by Iversen et al. (2011; Glob Change Biol 17:1130-1139); stimulated recycling via mineralization ('priming') was discussed by Dijkstra et al (2013; Front Microbiol 4: art 216) and Rütting & Andresen (2015; Nutr Cycl Agroecosyst 101:285-294). Given these multiple processes that might be importance if or if not a PNL develops, a more comprehensie discussion is needed. [Tobias Rütting, Sweden]	accepted - text revised, adding these and additional recent relevant publications (e.g., Du et al. 2019)
23234	22	18	22	29	References Terrer et al. (line22) and Houlton et al (line29) wrongly in-parentheses (also see general comment in row 2 of this sheet) [Alexander Graf, Germany]	accepted - text revised
18714	22	25	22	25	SOM (first appeared) --> soil organic matter (SOM) [Hiroaki Kondo, Japan]	accepted - text revised
20686	22	25	22	27	I am sorry, but I totally desagree on this point, when you unertake a deeper investigations we will be very surprised to find out a lot of Indigenous knowlede which are very specific to a particular climate issues, We run an advanced research on that at AGRHYMET in 2009-2010 on the traditional forecast on the rainy season in Niger, Easthern Burkina and Northern Mali, we got very good findings, unfortunately it is not yet published but the report can be shared, [Mahamadou Laouali Amadou, Niger]	Noted
5670	22	29	22	31	"bedrock weathering", this is a very long process, good to mention it. [Sanaz Moghim, Iran]	noted
20586	22	31	22	31	Perhaps add the following sentence:"Elbert et al. (2012) suggested that cryptogamic covers , incuding biological soil and rock crusts as well as lichen and bryophyte carpets, may account for a biological N fixation of 49 Tg a-1 (27-99 Tg a-1)." [Bettina Weber, Germany]	artially accepted - Elbert et al. (2012) cited in a revised paragraph
20588	22	31	22	31	Reference: Elbert, W., Weber, B., Burrows, S., Steinkamp, J., Büdel, B., Andreae, M.O. & Pöschl, U. (2012): Contribution of cryptogamic covers to the global cycles of carbon and nitrogen. Nature Geosciences 5: 459-462. [Bettina Weber, Germany]	artially accepted - Elbert et al. (2012) cited in a revised paragraph
652	22	34	22	34	Please add references for this statement only one publication is mentioned [Rafiq Hamdi, Belgium]	accepted - text revised
5672	22	35	22	35	"positive effects", always positive effects or they may have negative as well! [Sanaz Moghim, Iran]	accepted - text revised
5674	22	36	22	36	"other nutrients", like what? [Sanaz Moghim, Iran]	accepted - text revised
5676	22	36	22	36	"limiting factor", limiting factor for what and how! [Sanaz Moghim, Iran]	accepted - text deleted and no longer relevant

Comment No	From Page	From Line	To Page	To Line	Comment	Response
654	22	44	22	44	Also in this sentence only one publication is associated to an estimate of uncertainty? [Rafiq Hamdi, Belgium]	accepted - text deleted and no longer relevant
5882	22	47	22	48	Reference! [Sanaz Moghim, Iran]	accepted - text revised with additional references
17106	22	49	22	49	The use of the words "missing" and "lacking" is redundant. [Beata Emoke Madari, Brazil]	accepted - text revised
2696	22	49	22	49	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	accepted - text revised
17108	22	50	22	50	I think that "species-specific-rather than community-specific-nature" should stand as species-specific rather than community-specific nature. [Beata Emoke Madari, Brazil]	accepted - text revised
23232	22	8			"increased *in* C4 grass plots" [Alexander Graf, Germany]	accepted - text revised
26966	22	39			Change "Thus, anthropogenic nitrogen depositions…" to "Thus, anthropogenic nitrogen deposition…" [Knute Nadelhoffer, United States of America]	accepted - text revised
23236	22	49			drop missing or lacking [Alexander Graf, Germany]	accepted - text revised
2698	23	2	23	3	Is 2013 a 'new' study? AR5 came out in 2013/2014 [Sarah Connors, France]	accepted - text revised
5884	23	9	23	11	"from several studies …" references! [Sanaz Moghim, Iran]	accepted - sentence removed and no longer relevant
3080	23	17	23	17	Seasonality of ecosystem based processes relevant for land-atmosphere interactions [Mostafa Jafari, Iran]	the comments unclear
8004	23	18	23	18	Please add 'environmental' before cues, to read "response to environmental cues such as ….." As they are environmental cues that signal changes. [Elohor Freeman Oluowo, Vietnam]	accepted - text revised
8590	23	18	23	21	Is that statement only about plants? Throughout the manuscript, there is a strong issue about which organisms are discussed. [Philippe Louapre, France]	noted-need to find references about non-plant organisms
10278	23	21	23	48	Discussion of greenup here mentions only the Northern Hemisphere, and ignores the Southern Hemisphere - why? Land area is less extensive in the SH than in the NH, but spring greenup still occurs. Are the authors suggesting that its effects are negligible compared to NH? Either way, needs clarifying so that SH is dealt with explicitly. [Paul Morris, United Kingdom (of Great Britain and Northern Ireland)]	noted-need to find references about Southern Hemisphere
8006	23	23	23	24	Please remove 'of.' While on line 24, add 'the' before northern hemisphere on line 25. [Elohor Freeman Oluowo, Vietnam]	accepted - text revised
5678	23	25	23	29	"… a trend of advanced spring recovery of carbon uptake …" ! [Sanaz Moghim, Iran]	accepted - text revised
2700	23	34	23	34	there is good consensus' ? Please use IPCC uncertainty language for assessment statements [Sarah Connors, France]	accepted - text revised
5968	23	38	23	38	Saunois et al. (2016) is on methane synthesis, and so should be removed from this line. [Akihiko Ito, Japan]	accepted - text revised
5970	23	43	23	48	Several studies addressed the increasing trend of seasonal amplitude of atmospheric CO2 and so worth being referred here. Graven, H. D., et al. (2013). "Enhanced seasonal exchange of CO2 by northern ecosystems since 1960." Science 341: 1085–1089. Piao, S., et al. (2018). "On the causes of trends in the seasonal amplitude of atmospheric CO2." Global Change Biology 24: 608–616. [Akihiko Ito, Japan]	accepted - text revised with these references

Comment No	From Page	From Line	To Page	To Line	Comment	Response
2702	23	44	23	44	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	accepted - text revised with these references
23238	23	47	23	48	Difficult to understand though it might be interesting. Is it really about inferring the CO2 level curve phase, or about inferring something from it? What are the consequences for this report? [Alexander Graf, Germany]	noted-revised with new references
3132	23	17	24	25	the importance of dryland for climate variability could be mentioned - and in particular the large uncertainties related to savannah ecosystems (Ahlström A, Raupach MR, Schurgers G, et al (2015) The dominant role of semi-arid ecosystems in the trend and variability of the land CO2 sink. Science 348:895–899. doi: 10.1126/science.aaa1668) [Karlheinz Erb, Austria]	noted - will address if SOD of Chapters 3 & 4 do not mention it
8008	23	44	24	44	I respectfully suggest that, the uncertainity language on line 44, should be "most likely", especially as several studies have documented and asserted similar occurences to be true. As a result, such prominent change to fire season is "most likely" on line 45. [Elohor Freeman Oluowo, Vietnam]	accepted - text revised
26968	23	9			Change "show" to "showed". [Knute Nadelhoffer, United States of America]	editorial - text deleted and no longer relevant
3326	23	21			add Penulas et al 2002 before Gordo and Sanz 2010. Peñuelas J., Filella I., Comas P. 2002. Changed plant and animal life cycles from 1952-2000 in the Mediterranean region. Global Change Biology 8: 531-544. [Josep Penuelas, Spain]	noted-revised with new references
3328	23	21			Also Penuelas and Filella 2001. Peñuelas J., Filella I. 2001. Herbaria century record of increasing eutrophication in Spanish terrestrial ecosystems. Global Change Biology 7: 427-433. [Josep Penuelas, Spain]	noted
1790	23	43		44	provide evidence to the claim [Chukwuma Anoruo, Nigeria]	noted-revised with new references
5680	24	6	24	8	"The seasonal patterns of sensible and latent heat fluxes are also driven by LAI cycle", can we say that! the process is very complex. Those fluxes are mostly driven by humidity, turbulence, Mesoscale circulation! [Sanaz Moghim, Iran]	noted
5682	24	9	24	10	"… surface cooling and ….increase lower atmosphere heat capacity" surface cooling and increases heat capacity! It seems those are contradictory [Sanaz Moghim, Iran]	accepted - text revised
20238	24	22	24	23	"Could be incorporated" is misleading. Stomatal response is included in all (almost all?) ESMs. [Haverd Vanessa, Australia]	accepted - text revised
5886	24	23	24	24	"decreased shortwave transmissivity" and "increased longwave air emissivity" how? [Sanaz Moghim, Iran]	noted - mechanism is too detailed to explain in the text and could be referred to the reference cited.
5684	24	25	24	25	"decreased albedo" it should be surface albedo, it is good to mention, since cloud albedo is uncertain! [Sanaz Moghim, Iran]	accepted-text changed
5686	24	33	24	35	"… is widely recognised" is it right to say "widely recognized", since all involved processes are very complex and uncertain. [Sanaz Moghim, Iran]	The "role" is recognised. The sentence does not say anything about certainty of the processes. Retain
3082	24	34	24	34	… plant water transport through the soil-plant-atmosphere continuum, particularly during high temperature and drought, is … [Mostafa Jafari, Iran]	Accepted and edited
5122	24	40	24	46	Please add examples from other World regions. The similar situation was in 2014 in Russian Altay. Other case: introdused boxmuth in Caucasus almost totally eliminated buxus from wild forests. [Oksana Lipka, Russian Federation]	Unable to include without a specific reference
1792	24	1		2	substantiate with literature [Chukwuma Anoruo, Nigeria]	noted - but the literature is cited in the rest of the paragraph that elaborate this sentence.
16488	24	3			change 'was' to 'were' [Yuanbo Liu, China]	editorial

Comment No	From Page	From Line	To Page	To Line	Comment	Response
23240	24	6			*an* increase with senescence [Alexander Graf, Germany]	editorial
16490	24	7			change 'relevant for' to 'relevant to.' [Yuanbo Liu, China]	editorial
23242	24	12			into => to the? [Alexander Graf, Germany]	editorial
23244	24	23			Why does evapotranspiration cause global cooling? It is elsewhere in this chapter mentioned that ET causes local cooling, but also (at least partly) discussed/suggested that it transports heat into the atmosphere just like sensible heat flux (this is why ET is also referred to as latent heat flux). So basically a pure change in the partitioning of available energy into sensible heat and ET should not substantially change the rate at which the global atmosphere (vertically integrated over its whole thickness) is warmed or cooled. Talking about indirect / later effects, it could even cause warming by the greenhouse effect of water vapour. [Alexander Graf, Germany]	noted - this has to do with the net effects of greater clouds - reflecting short-wave radiation back to the space and reflecting long-wave radiation back to the land surface.
23246	24	35			insert blank before references [Alexander Graf, Germany]	Done
1794	24	35			separate reference from last word. [Chukwuma Anoruo, Nigeria]	Done
20240	25	1	25	11	The role of tree demography (Fisher et al. 2017) is also important here. The dynamical representation of tropical forest responses to drought requires combined representation of plant hydraulics and tree demography(Levine et al. 2016) with differential drought-induced mortality risk linked to tree size and xylem vulnerability (Rowalnd et al. 2015). [Haverd Vanessa, Australia]	Accepted and included in revised text along with several new references
20242	25	1	25	11	Levine, N. M. et al. Proceedings of the National Academy of Sciences 113, 793-–797, 10.1073/pnas.1511344112 (2016). [Haverd Vanessa, Australia]	Included
20244	25	1	25	11	Rowland, L. et al. Nature 528, 119-–122, 10.1038/nature15539 (2015). [Haverd Vanessa, Australia]	Included
20246	25	1	25	11	Fisher, R. A., Koven, C. D., Anderegg, W. R. L., Christoffersen, B. O., Dietze, M. C., Farrior, C. E., Holm, J. A., Hurtt, G. C., Knox, R. G., Lawrence, P. J., Lichstein, J. W., Longo, M., Matheny, A. M., Medvigy, D., Muller-Landau, H. C., Powell, T. L., Serbin, S. P., Sato, H., Shuman, J. K., Smith, B., Trugman, A. T., Viskari, T., Verbeeck, H., Weng, E., Xu, C., Xu, X., Zhang, T., and Moorcroft, P. R.: Vegetation demographics in Earth System Models: A review of progress and priorities, Global Change Biol., doi: 10.1111/gcb.13910, 2017. 10.1111/gcb.13910, 2017. [Haverd Vanessa, Australia]	Included
2742	25	2	25	2	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Text edited
5688	25	11	25	11	"temperature" increased temperature, right! [Sanaz Moghim, Iran]	Edited
2704	25	11	25	11	cross reference to Box 2.1 on Fire? [Sarah Connors, France]	Cross referenced
18614	25	14	25	49	In this section there is very little discussion regarding SOC decomposition within agro-ecosystems. There is a multitude of literature that address this issue that seems to hae been ignored. The publication “Torbert, H.A., S.A. Prior, H.H. Rogers, and C.W. Wood. 2000. Review of elevated atmospheric CO2 effects on agroecosystems: Residue decomposition processes and soil C storage. Plant Soil 224:59-73” gives a overview of this subject that should be included in this section. [Henry Allen Torbert, United States of America]	I think we should add something but the reference provided is quite old
18716	25	17	25	17	"(Todd-Brown et al. 2013)" --> (2013) [Hiroaki Kondo, Japan]	Corrected

Comment No	From Page	From Line	To Page	To Line	Comment	Response
88	25	17	25	17	Duplicate [Lawrence Aribo, Uganda]	Corrected
7516	25	30	25	30	SoiGrids = SoilGrids [Joris de Vente, Spain]	Corrected
8390	25	30	25	30	"SoiGrid" should be "SoilGrid", and "Harmonized World Soil Base" should be "Harmonized World Soil Data Base" [Yusuke Takata, Japan]	Corrected
18718	25	31	25	31	”soil organic carbon stock (SOC)" --> SOC stock? Does the term "SOC" include "stock" or not? [Hiroaki Kondo, Japan]	Corrected
5888	25	32	25	35	Reference [Sanaz Moghim, Iran]	Reference to be inserted
5964	25	32	25	35	Reference is required [Sanaz Moghim, Iran]	Reference to be inserted
26970	25	33	25	34	Change "and represents four to eight times larger than the carbon stock associated with the terrestrial vegetation." to "and is four to eight times greater than the carbon stock associated with the terrestrial vegetation." [Knute Nadelhoffer, United States of America]	Corrected
3138	25	34	25	34	A reference for the carbon stock in vegetation is needed here, or a reference to below [Karlheinz Erb, Austria]	C stock in vegetation has been dealt with elsewhere (2.4)
920	25	39	26	4	SOC decomposition depends not only on temperature but also on soil moisture (i.e. precipitation). For instance, in drylands soil moisture is the key driver of the SOM decomposition and thus of the CO2 emissions from soil. The key role of the temperature is especially true in humid climates. Therefore, I suggest the authors to include a comment about the importance of soil moisture and not only temperature on SOM decomposition. [Jose Luis Vicente Vicente, Germany]	Good point. A paragraph has been added
7518	25	39	26	6	decomposition of SOM is detremined by the combination of temperature and soil humidity; so it is not only temperature changes that are important but alos precipitation (and seasonality) [Joris de Vente, Spain]	Similar point as previous comment. Accepted and text modified
23258	25	14	27	44	section 2.2.6: While topics such as the size of stocks and acclimation are discussed in-depth, the uncertainties on temperature sensitivity of SOC decomposition, which is at least as important for climate-land interactions, is hardly touched. It would be good to compile the sensitivities (e.g. expressed as Q10 values for van t'Hoff-type models and as approximate equivalent Q10 values at a reference temperature for Arrhenius-type models) of the CMIP models and then compare them to what is reported and discussed in the abundant literature about field-, lab- and inversion-based estimates of sensitivities and their variability (e.g. Kirschbaum 2006, Soil Biol Biochem 38:2510; Graf et al. 2008, Biogeosciences 5:1175; Bond-Lamberty 2010, Biogeosciences 7:1915; Bauer et al. 2012, Biogeochemistry 108:119; Mahecha et al. 2010, Science 329:838; Graf et al. 2011, Science 331:1265; Zhang et al. 2018, Agricultural and Forest Meteorology 259:184). [Alexander Graf, Germany]	Accepted partly. Temperature sensitivity of SOC decomposition has been discussed in several paragraphs. Given space constraints we can perhaps add a bit more based on the latest reference.
26974	25	14	27	44	Section 2.2.6. This section nicely captures and summarizes current understanding of the topic "Soil organic matter dynamics and nutrient dynamics". Note, however, that I have change "nutrients" to "nutrient" in the sub-topic title. More substantially, there is an important omission in this section-- Recent work has shown that inorganic nitrogen inputs to soils (whether from atmospherice deposition or fertiliser additions) can function to slow decomposition rates of surface organic horizons (but not litter) and mineral soil organic matter. Two references here are Lajtha et al. (2018, https://doi.org/10.1016/j.scitotenv.2018.05.388) and Frey et al. (2014, Biogeochemisty Letters, 121:305-316, DOI: 10.1007/s10533-014-0004-0). [Knute Nadelhoffer, United States of America]	Section title changed. More text to be added

Comment No	From Page	From Line	To Page	To Line	Comment	Response
10286	25	15	27	44	The place of peatlands in the global "soil" C stock is not clear here. First of all, it is unclear wherther these estimates of stocks and flows are intended to include peat (after all, peat is not a soil type, because it contains no weathered parent material, but consists almost entirely of in situ plant detritus - it is therefore appropriate to include peat as a distinct category of Earth material, not to lump it in with soils or sediments as it is neither of these things). If these numbers are intended to incoporate peat under the banner of "soils" then this should be made clear, and I also suggest identifying the peat-specific components where possible, given the unique nature and highly-concentrated distribution of peat-C compared to true soils. If, on the other hand, these numebrs do not include peat, then this presumably means that the large peat C pool has been omitted. Either way this issue should be clarified and/or remedied as appropriate. [Paul Morris, United Kingdom (of Great Britain and Northern Ireland)]	Noted
10290	25	35	27	32	Unclear on pg 25 what constitutes "deep" soil - connotation here is that this means > 1 m, but pg 27 (ln 32) indicates this threshold is 30 cm. [Paul Morris, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Clarified
27284	25	14			Bond-Lamberty, B., Bailey, V. L., Chen, M., Gough, C. M., & Vargas, R. (2018). Globally rising soil heterotrophic respiration over recent decades. Nature, 560(7716), 80–83. [Doreen Stabinsky, United States of America]	This reference has been inserted in 2.2.6
23248	25	17			Reference wrongly in-parenthesis - see general comment in row 2 of this sheet [Alexander Graf, Germany]	Corrected
11314	25	24			Section on soil: there is no mention of soil insects and earthworms? Termites are mentioned on page 61 as important producers of methane, which shows they are major global actors. But the implication is that they are a nuisance (polluters) whereas in fact termites, together with ants, collembolans and earthworms especially, play a major and vital role in processing and burying organic matter, as well as soil nutrient enrichment through their excrement, corpses and trophic interactions, etc. See FAO report on soils. [Debra Roberts, South Africa]	Fair comment. To be attended to
5360	25	27			The processes involving C sequestration into the soil as well as microbial community responses to warming have to be adequately understood when modelling the global carbon cycle (Singh et al. 2010). But the most widely used models consider temprature as an input variable already and the expected change in microbial community response is taken care of by temprature input into the models [Daniel Danano Dale, Italy]	Noted and checked
8392	25	30			I would recommend you to cite the first ever country-driven global soil organic carbon map (FAO and ITPS, 2018) as estimation of global soil carbon stock for top soil (0-30 cm; 680 Pg). More than one million soil analysis data were used in this global SOC stock estimation. FAO and ITPS. 2018. Global Soil Organic Carbon Map (GSOCmap) Technical Report. Rome. 162 pp. [Yusuke Takata, Japan]	Noted.
23250	25	33			Given this and other updated flux / stock size magnitudes in this report, I wonder whether it wouldn't be nice to present an updated version of the land surface part of the AR's general figure on the global carbon cycle, or at least (if not done already) ensure that such avidence is archived in a to-do-list for the next AR. [Alexander Graf, Germany]	Noted.
23252	25	37			Clarity: Does this refer to the partitioning between soil heterotrophic, and rhizosphere respiration (or otherwise what else are the other 50%)? [Alexander Graf, Germany]	Yes, the rest by autotropic respiration. Has been corrected. The references given are tertiary references. Better to give Singh et al. 2010 (already in this section)
1796	25	40			maintain single fort for referencing [Chukwuma Anoruo, Nigeria]	Noted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
5890	26	3	26	3	"and nutrient mineralisation has proved remarkably difficult", not clear! [Sanaz Moghim, Iran]	This is only a quote from the reference
15818	26	8	26	8	based on a meta-analyse, organic input and the duration of the experiment are the strongest predictors of Soil organic carbon increase in tropical soils (Kenji et al. 2018; Agriculture, Ecosystems and Environment [Jean-Luc Chotte, France]	It is worth adding a sentence as the reference provided is a very recent publication. However, I am unable to locate this reference
14346	26	8	26	8	Based on a meta-analyse, organic input and the duration of the experiment are the strongest predictors of soil organic carbon increase in tropical soils (Kenji et al. 2018; Agriculture, Ecosystems and Envrionment [Rattan Lal, United States of America]	same comments as 15818
16816	26	8	26	8	Based on a meta-analyse, organic input and the duration of the experiment are the strongest predictors of Soil organic carbon increase in tropical soils (Kenji et al. 2018; Agriculture, Ecosystems and Environment [Rattan Lal, United States of America]	same comments as 15818
18616	26	8	26	17	Long term experiments with elevated CO2 in agro-ecosystems have shown that soil C stocks will increase. For example , "Prior, S.A., G.B. Runion, H.H. Rogers, H.A. Torbert, and D.W. Reeves. 2005. Elevated atmospheric CO2 effects on biomass production and soil carbon in conventional and conservation cropping systems. Global Change Biol. 11:657-665" showed increase soil C in both conservation and conventional tillage systems over long term. Some other publications that discuss this subject are as follows: Wood, C.W., H.A. Torbert, H.H. Rogers, G.B. Runion, and S.A. Prior. 1994. Free-air CO2 enrichment effects on soil carbon and nitrogen. Agric. For. Meteorol. 70:103-116. Torbert, H.A., S.A. Prior, and H.H. Rogers. 1995. Elevated atmospheric carbon dioxide effects on cotton plant residue decomposition. Soil Sci. Soc. Am. J. 59:1321-1328. Prior, S.A., H.A. Torbert, G.B. Runion, H.H. Rogers, C.W. Wood, B.A. Kimball, R.L. Lamorte, P.J. Pinter, and G.W. Wall. 1997. Free-air CO2 enrichment of wheat: Soil carbon and nitrogen dynamics. J. Environ. Qual. 26:1161-1166. Torbert, H.A., H.H. Rogers, S.A. Prior, W.H. Schlesinger, and G.B. Runion. 1997. Effects of elevated atmospheric CO2 in agro-ecosystems on soil carbon storage. Global Change Biol. 3:513-521. Torbert, H.A., S.A. Prior, H.H. Rogers, and G.B. Runion. 1998. Crop residue decomposition as affected by growth under elevated atmospheric CO2. Soil Sci. 163:412-419. Booker, F.L., S.A. Prior, H.A. Torbert, E.L. Fiscus, W.A. Pursley, and S. Hu. 2005. Decomposition of soybean grown under elevated concentrations of CO2 and O3. Global Change Biol. 11:685–698. Prior, S.A., G.B. Runion, H.H. Rogers, H.A. Torbert, and D.W. Reeves. 2005. Elevated atmospheric CO2 effects on biomass production and soil carbon in conventional and conservation cropping systems. Global Change Biol. 11:657-665. Prior, S.A., H.A. Torbert, G.B. Runion, H.H. Rogers, D.R. Ort, and R.L. Nelson. 2006. Free-air carbon dioxide enrichment of soybean: Influence of crop variety on residue decomposition. J. Environ. Qual. 35:1470-1477. Prior, S.A., H.A. Torbert, G.B. Runion, H.H. Rogers, and B.A. Kimball. 2008. Free-air CO2 enrichment of sorghum: Soil carbon and nitrogen dynamics. J. Environ. Qual. 37:753-758. [Henry Allen Torbert, United States of America]	This should probably go into 2.2.7 on Agricultural land management. All the references provided however are old references
922	26	8	26	17	Currently there is a high agreement that an increase in the input of organic C leads to an increase in the SOC. Please, check this reference Stewart, C., Paustian, K., Conant, R., Plante, A., Six, J., 2007. Soil carbon saturation: concept, evidence and evaluation. Biochemistry, 86:19–31. [Jose Luis Vicente Vicente, Germany]	Rejected, needs more evidence

Comment No	From Page	From Line	To Page	To Line	Comment	Response
754	26	11	26	12	This sentence could be extended as follows: "...van Groenigen et al. 2014), or even decreases in SOC in humid tropical agro-ecosystems (Sommer et al. 2018)" - cited paper is: Sommer, R. Paul, B.K., Kihara, J. Mukalama, J. 2018. Reducing losses but failing to sequester carbon in soils – the case of Conservation Agriculture and Integrated Soil Fertility Management in the humid tropical agro-ecosystem of Western Kenya. Agriculture, Ecosystems and Environment 254, 82–91.https://doi.org/10.1016/j.agee.2017.11.004 [Rolf Sommer, Kenya]	Can include this recent paper. I am unable to retrieve it
15820	26	41	26	41	i would suggest to add a Box dealing with the Carbon Use Effficiency / to my the CUE is an efficient way to address the impact of environmental (T°C,..) factors on carbon budget at different scales. See 2017 Sinsabaugh , 2016 Geyer 2016 and few other publication [Jean-Luc Chotte, France]	same as 14348
14348	26	41	26	41	A suggestion is to add a Box dealing with the Carbon Use Effficiency-- the CUE is an efficient way to address the impact of environmental (T°C,..) factors on carbon budget at different scales. See Sinsabaugh (2017), Geyer (2016) and few other publications [Rattan Lal, United States of America]	Probably beyond our scope to include a new box
16818	26	41	26	41	I would suggest to add a Box dealing with the Carbon Use Effficiency / to my the CUE is an efficient way to address the impact of environmental (T°C,..) factors on carbon budget at different scales. See 2017 Sinsabaugh , 2016 Geyer 2016 and few other publication [Rattan Lal, United States of America]	same as 14348
20248	27	7	27	7	No disussion of moisture sensitivity of heterotrophic respiration and how this modifies effect T sensitivity (Davidson et al. 2012) [Haverd Vanessa, Australia]	This point has been included in 2.2.6
20250	27	7	27	7	Davidson, E. A., Samanta, S., Caramori, S. S., and Savage, K.: The Dual Arrhenius and Michaelis–Menten kinetics model for decomposition of soil organic matter at hourly to seasonal time scales, Global Change Biol., 18, 371-384, 2012. [Haverd Vanessa, Australia]	Taken into account
17110	27	7	27	24	Here the so called continuum model proposed by Lehmann and Kleber (2016) could be mentioned which is a “consolidated view” of SOM turnover. According to this, SOM is controlled by parallel biotic and abiotic processes, including continuous decomposition of plant and animal debris and oxidation that enables solubilisation, or to the contrary, stabilization through chemical linkage to minerals, depending on the characteristics of the soil ecosystem (SOM stabilization is soil ecosystem specific). Ref.: Lehmann, J. & Kleber, M. 2016. The contentious nature of soil organic matter. Nature 528, 60-68. [Beata Emoke Madari, Brazil]	This is an overarching review of the subject. Should be referred to as it is recent
20040	27	9	27	9	…….Markus et al. 2011;…… [Sabit Erşahin, Turkey]	Corrected
20042	27	14	27	14	…….Markus et al. 2011; Francesca….. [Sabit Erşahin, Turkey]	Corrected
924	27	23	27	24	Since the last years, new studies have studied the relationship between the incoming organic C to the soil and the dynamic of the different SOC pools: Vicente-Vicente, J.L., Gómez-Muñoz, B., Hinojosa-Centeno, M.B., Smith, P., Garcia-Ruiza, R., 2017. Carbon saturation and assessment of soil organic carbon fractions in Mediterranean rainfed olive orchards under plant cover management. Agriculture, Ecosystems and Environment, 245:135-146 [Jose Luis Vicente Vicente, Germany]	This reference is very specific to Mediterranean olive orchards
2706	27	26	27	30	Should this be in the fire Box? Please avoid overlap of content [Sarah Connors, France]	Has been deleted here and transferred to Box on fire. The word "fire" has been included in the previous sentence/paragraph with a reference to the box

Comment No	From Page	From Line	To Page	To Line	Comment	Response
17112	27	32	27	33	'Deep soil layers (below 30 cm) can contain 46-63% of total profile C stocks, making them na important component of global terrestrial C stocks." What is the soil layer below the superficial 30 cm in which the 46-63% soil C stock is present compared to the first 30 cm? Please also include reference. [Beata Emoke Madari, Brazil]	Yes, we have to provide a reference and be clearer in this sentence
8394	27	33	27	34	Based on radiocarbon measurements, the residence time of deep SOC in Andosols is longer than 20,000 years (Okuno and Nakamura 2003) https://linkinghub.elsevier.com/retrieve/pii/S1040618202001507 [Yusuke Takata, Japan]	Yes, included
5972	27	35	27	35	Strey et al. (2017) does not appear in the reference list. [Akihiko Ito, Japan]	Noted
24818	27	35	27	38	21+84= 105% SOC stored with in 3 m of soil depth, which is unjustifiable. Requesting to see the values and incorporate. [Biplab Brahma, India]	No need to correct. The 84% includes the 21% in the top 0.3 m
90	27	36	27	36	UNFCCC guidelines instead of UNFCC [Lawrence Aribo, Uganda]	Corrected
5690	27	40	27	41	"suggest that CO2 production from deep soils can be increased by warming", It should be a long process. I believe "time scale" is required to be mentioned. [Sanaz Moghim, Iran]	The authors have given a "rate". I have included more text for this with reference to Pries et al. 2017
5952	27	42	27	42	"while erosion is not typically modelled as a carbon flux in ESMs, …", Erosion as a carbon flux is a long-term process. Do we need to simulate the long process in these models (e.g., ESMs)? [Sanaz Moghim, Iran]	The last sentence in 2.2.6 is a general statement. The modellers can take a call on whether this is to be elaborated
5124	27	42	27	43	Is it a mistake? Erosion (water or wind) leads much more to release of soil particles тв transmision into air or streams, than to burial. You know effect of ocean acidification near large river deltas because of high carbon concentration in river water from the soil erosion. [Oksana Lipka, Russian Federation]	Someone has to give input to this comment
2744	27	43	27	43	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Okay
16946	27	48	27	48	To “under intensification achieved with new technology”, I would add also "and, on the other hand, through land abandonment". So it becomes "under intensification achieved with new technology and, on the other hand, with land abandonment”, meaning that both agricultural activities but also the absence of them have impacts on land-climate interactions. [Vincenza Ferrara, Italy]	Accepted and edited
27236	27	49	27	49	It shoudl be recognised that much of the increase in crop production has come from the increase of the harvest index. Therefore, total biomass production has not increased near as much as the "crop production" (edible plant parts). [Zoltán Rakonczay, Belgium]	This is only a general statement. At this point there may not be need to expand upon the sentence but perhaps later in 2.2.7 this point can be made
3140	27	47	28	7	should for SOD be reconciled with the introduciton chapter 1 [Karlheinz Erb, Austria]	Noted.
19520	27	46	29	7	I think it is important to mention the management of less degrading farmland as the practice of agroforestry in several developing countries by small farmers [Ibouraïma Yabi, Benin]	The comment is not very clear
2708	27	46	30	4	Can this subsection be refocused to look at this through a SLM lense or at least add text on the implications for SLM - this would help the policy relevance of the text. [Sarah Connors, France]	To be discussed by group and CLAs to take a call
23256	27	9			reference MARKUS et al. 2011 in capitals on purpose (elsewhere too)? [Alexander Graf, Germany]	Corrected
26972	27	38			Change "Dynamics associated with such deeply varied carbon…" to "Dynamics associated with such deeply buried carbon…" [Knute Nadelhoffer, United States of America]	Corrected

Comment No	From Page	From Line	To Page	To Line	Comment	Response
23260	27	48			during *the* 20th sentury [Alexander Graf, Germany]	Corrected to "the 20th century"
18618	27				These seems to be a lack of discussion regarding the positive impacts of elevated CO2 on crop production. The following is a short list of manuscript that description some of these impact that should be included in this discussion. Torbert, H.A., S.A. Prior, H.H. Rogers, W.H. Schlesinger, G.L. Mullins, and G.B. Runion. 1996. Elevated atmospheric carbon dioxide in agroecosystems affects groundwater quality. J. Environ. Qual. 25:720-726. Prior, S.A., H.A. Torbert, G.B. Runion, G.L. Mullins, H.H. Rogers, and J.R. Mauney. 1998. Effects of carbon dioxide enrichment on cotton nutrient dynamics. J. Plant Nutr. 21:1407-1426. Polley, W.H., H.B. Johnson, C.R. Tischler, and H.A. Torbert. 1999. Links between transpiration and plant nitrogen: Variation with atmospheric CO2 concentration and nitrogen availability. Int. J. Plant Sci. 160:535-542. Torbert, H.A., and H.B. Johnson. 2001. Soil of the intensive agriculture biome of Biosphere 2. J. Soil Water Conserv. 56:4-11. Prior, S.A., H.A. Torbert, G.B. Runion, and H.H. Rogers. 2003. Implications of elevated CO2-induced changes in agroecosystems productivity. J. Crop Prod. 8:217-244. Torbert, H.A., S.A. Prior, H.H. Rogers, and G.B. Runion. 2004. Elevated atmospheric CO2 effect on N fertilization in grain sorghum and soybean. Field Crops Res. 88(1):47-57. Prior, S.A., G.B. Runion, H.A. Torbert, and H.H. Rogers. 2005. Elevated atmospheric CO2 in agroecosystems: Soil physical properties. Soil Sci. 169(6):434-439. Prior, S.A., G.B. Runion, H.H. Rogers, and H.A. Torbert. 2008. Effects of atmospheric CO2 enrichment on crop nutrient dynamics under no-till conditions. J. Plant Nutr. 31(4): 758–773. Prior, S.A., G.B. Runion, S.C. Marble, H.H. Rogers, H.A. Torbert, and C.H. Gilliam. 2011. A review of elevated atmospheric CO2 effects on plant growth and water relations: implications for horticulture. HortScience 46(2):158-162. Prior, S.A., H.H. Rogers, G.B. Runion, H.A. Torbert, and D.C. Reicosky. 1997. Carbon dioxide-enriched agroecosystems: Influence of tillage on short-term soil carbon dioxide efflux. J. Environ. Qual. 26:244-252. Smith, K.E., G.B. Runion, S.A. Prior, H.H. Rogers, and H.A. Torbert. 2010. Effect of elevated CO2 and agriculture management on flux of greenhouse gases from soil. Soil Sci. 175:349-356. [Henry Allen Torbert, United States of America]	The comment is relevant. Someone has to write the text. References provided by the referee are mostly old
10292	27				First mention of the role of moisture in peat/soil SOC dynamics. Peatlands are characterised by shallow water tables, and it is this wetness that preserves oprganic C at the Earth's surface. Even small changes in surface wetness/water table position can have large effects on peatland C budgets - worth highlighting. In peatlands, water-table depth may be of similar importance to temperature when it comes to determining the net effects of productiviity and decomposition. [Paul Morris, United Kingdom (of Great Britain and Northern Ireland)]	Noted
15268	28	1	28	10	Figure legend should explain everything displayed e.g color gradient, data & methodology used, time period simulated etc. [Benjamin Quesada, Germany]	Should be done
18720	28	4	28	4	Fig.2.2.2 --> Fig.2.2.3 [Hiroaki Kondo, Japan]	same as above
10080	28	4	28	4	It is Figure 2.2.3 (Extent of crop and pasture areas) instead of Figure 2.2.2 (Differences in LULCC emission flux due to individual processes [Joalane Marunye, Lesotho]	same as above

Comment No	From Page	From Line	To Page	To Line	Comment	Response
92	28	4	28	4	Cross check Figure 2.2.2 against Figure 2.2.3 (of lines 8 -10) [Lawrence Aribo, Uganda]	Should be done
656	28	4	28	4	Figure 2.2.3 [Rafiq Hamdi, Belgium]	Same as above
10288	28	8	28	9	Lots of different land classes (colours) are shown on the map, but only two are indicated in the key. Suggest either redrawing the map for puspose, or including a full key. [Paul Morris, United Kingdom (of Great Britain and Northern Ireland)]	same as above
18722	28	8	28	11	In Fig.2.2.3 the colors other than cropland and pasture should be indicated. [Hiroaki Kondo, Japan]	same as above
14926	28	12	28	12	…….are major drivers agricultural CH4…….. Instead it shoul read …….are major drivers of agricultural CH4…… [Barnabas Msongaleli, United Republic of Tanzania]	Done
23264	28	14	28	16	for the albedo effect of cover crops, see e.g. Ceschia et al. 2018 already cited elsewhere in this chapter (However the reference seems to be slightly wrong as Ceschia is the last author of this study, according to the accessible article on the internet the first author seems to be Carrer)). A particular intersting property of such measures is that while in the case of afforestation the biophysical (albedo) and CO2 effects are often contrary, in the case of cover crops they point in the same direction (cooling). [Alexander Graf, Germany]	To be corrected by the person who wrote this section
3142	28	16	28	16	please refer to and qoute Erb K-H, Luyssaert S, Meyfroidt P, et al (2016) Land management: data availability and process understanding for global change studies. Glob Change Biol 23:512–533. doi: 10.1111/gcb.13443 for details. [Karlheinz Erb, Austria]	There seems to be merit in including this recent reference
27238	28	19	28	20	It is unclear what is meant by "sink strength". Is it actual sink (C accumulation), or increased NPP (higher assimilation without prejudice to chnge in accumulation, i.e. higher throughput). [Zoltán Rakonczay, Belgium]	To be clarified by the person who wrote this section
5892	28	19	28	21	"…land carbon sink strength …by intensifying agricluture …" how intensifying agriculture can result in carbon sink strength! [Sanaz Moghim, Iran]	Good point. To be clarified
3144	28	22	28	24	The intensification - carbon sink feedback should be explained, as increased production in land use mostly leads to increased turnover and not increased carbon stocks (Erb K-H, Fetzel T, Plutzar C, et al (2016) Biomass turnover time in terrestrial ecosystems halved by land use. Nature Geosci 9:674–678. doi: 10.1038/ngeo2782). There is also a feedback between intensification- reduced area demand - return of forests. This reading of the Forest transition is outlined here: Gingrich S, Niedertscheider M, Kastner T, et al (2015) Exploring long-term trends in land use change and aboveground human appropriation of net primary production in nine European countries. Land Use Policy 47:426–438. doi: 10.1016/j.landusepol.2015.04.027 and Erb K-H, Gingrich S, Krausmann F, Haberl H (2008) Industrialization, Fossil Fuels, and the Transformation of Land Use. Journal of Industrial Ecology 12:686–703. doi: 10.1111/j.1530-9290.2008.00076.x [Karlheinz Erb, Austria]	Similar to above comments. Should be clarified
14928	28	26	28	26	……increased increase water use efficiency……it should read as ……increased water use efficiency…….. [Barnabas Msongaleli, United Republic of Tanzania]	Same edit as above
24820	28	26	28	26	Increased increase water use efficiency…: Needs to be checked the sentence. [Biplab Brahma, India]	Same edit as above
94	28	26	28	26	Revisit the statement in line 26 including line 34 - 35 for clarity [Lawrence Aribo, Uganda]	Should be clarified
658	28	26	28	26	increased water use … [Rafiq Hamdi, Belgium]	Yes. Edited

Comment No	From Page	From Line	To Page	To Line	Comment	Response
17602	28	26	28	30	"CO2 fertilisation effects may also have increased increase water use efficiency and thus reduced agricultural water per unit amount of crop produced (Deryng et al. 2016; Nazemi and Wheater 2015; Elliott et al. 2014) (medium confidence, medium evidence)" Increased increase? [Guillaume Bertrand, France]	Same edit as above
16948	28	35	28	35	“to include”: it is not clear to mean what the whole sentence means. [Vincenza Ferrara, Italy]	Edited
17120	28	34	29	1	Instead of "have exhibited" have suffered would be more adequate to use. The use of "ploughing" and "tillage" seems to be redundant. Besides, tillage includes ploughing and other practices. Please be more specific. [Beata Emoke Madari, Brazil]	Yes. Sentence and grammar corrected
23270	28	34	29	4	for more evidence on this (and in fact even best-practice agriculture being a CO2 source or even subject to soil C loss) see e.g. the Agriculture, Ecosystems and Environment special issue "The carbon balance of European croplands", in particular the article by Kutsch et al.; and Wiesmeier et al. 2016, Nature SREP 6:32525. [Alexander Graf, Germany]	Yes. Some of this can be included
11316	28	3			Re "large expansions and land conversions across the developing world" - please give figures of land already converted by region/continent. [Debra Roberts, South Africa]	Additional data to be provided
19514	28	4			Figure 2.2.3 ??? [Ibouraïma Yabi, Benin]	To be edited
19516	28	8			The legend of the figure seems to me imcmplete [Ibouraïma Yabi, Benin]	To be edited
23262	28	12			are major drivers *of* agricultural CH4 emissions [Alexander Graf, Germany]	Edited
23266	28	23			more stud*ies are* needed to… [Alexander Graf, Germany]	Edited
23268	28	26			remove 2nd "increase" [Alexander Graf, Germany]	Edited
1118	28	35			due to include ploughing and tillage [Rosa Francaviglia, Italy]	Edited
11318	28				Figure: The legend only defines green and brown. What is the meaning of the other colours on the map? It would be great to see a map with only the two categories in the legend, not confused by other land use categories. Due to resolution issues, it would also be informative to see a map showing the proportion of land area under cultivation/pasture in each grid cell. [Debra Roberts, South Africa]	To be edited
1116	28				Figure numbers in lines 4 and 10 do not match [Rosa Francaviglia, Italy]	Editing issue
10390	29	5	29	7	"The removal of organic matters can also impact the soil’s capacity to store and filter water throughout the column and within the root zone (Amundson et al. 2015), but the magnitudes of these effects on climate processes remain uncertain (Minasny and McBratney 2018a)." Is the magnitude important as such at this moment in climate change accounting? what is important seems that the change affects soils structure and that leads to reduced soil water holding cpacaity [Zitouni Ould-Dada, Italy]	Important point. Authors of this subsection to clarify.
10392	29	7	29	8	"Emerging land management options for mitigation of climate impacts include deliberately planned crop rotations, timing, and water/irrigation." These are not emerging options but have been practiced for long. Conservation agriculture, use of varying fertility enhancement measures etc could be mentioned in this case [Zitouni Ould-Dada, Italy]	Important point. Authors of this subsection to clarify.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
7520	29	9	29	9	mitigation of climate impacts' replace by 'climate change mitigation' (mitigation of climate impacts would refer ot climate cange adaptation) [Joris de Vente, Spain]	noted and taken into account
24562	29	9	29	10	Here also mixed management systems like agroforestry should be mentioned [Christopher Morhart, Germany]	Noted
18724	29	17	29	19	Figure 2.2.4 reminds me a competetion of aquifer with CCS. [Hiroaki Kondo, Japan]	Not clear
96	29	18	29	18	Where is Figure 2.2.4 refered to in the text? [Lawrence Aribo, Uganda]	To be edited
19604	29	18	29	18	foot print [sadegh ziayan, Iran]	Copy edit
10082	29	31	29	32	what are highly productive agricultural crops? [Joalane Marunye, Lesotho]	Authors to clarify
2824	29	21	30	4	It may be worthwhile to refer to some of the GRACE studies on gorundwater, In addtion, there is new evidence emerging that intensive irrigation in South Asia is affecting winter fog formation and in turn affecting micro-climates. Authors might want to look up that particular body of literature. [Aditi Mukherji, Nepal]	Noted.
11908	29	21	30	4	This section does not explain if increased ET results in the cooling or warming, or the net effects are not yet determined. It may be nice to clarify this to the reader. [Burba George, United States of America]	Important point. Authors of this subsection to clarify.
8386	29		30		"Irrigation potentially exerts a strong climate forcing" I completely agree. I believe it should be added the need of developing measurement techniques for obtaining accurate measturements of irrigation over large regions (at high spatial resolution) and time periods. [Luca Brocca, Italy]	I think that proper referencing is needed for line 30 onward until the end of the paragraph
5362	29	5			The removal of organic matters can also impact the soil's capacity to store and filter water throughout the column and within the root zone (Amundson et al. 2015), but the magnitudes of these effects on climate processes remain uncertain (Minasny and McBratney 2018a). Is the magnitude important as such at this moment in climate change accounting? what is important seems that the change affects soils structure and that it leads to reduced soil water holding cpacaity [Daniel Danano Dale, Italy]	Important point. Authors of this subsection to clarify.
1120	29	9			"deliberately". Can crop rotations be deliberately planned. [Rosa Francaviglia, Italy]	To be clarified
1122	29	10			"timing". It is unclear. What does timing refers to? [Rosa Francaviglia, Italy]	To be clarified
19518	29	17			The figure should be announced above. [Ibouraïma Yabi, Benin]	Editorial
660	30	4	30	4	What about RCMs? [Rafiq Hamdi, Belgium]	the intention of the comment is unclear
19606	30	7	30	49	The physical development of cities in developing countries is due to population growth, migration and job change from agriculture to services and industry which this issue is affected by climate change, drought and the slowdown of agricultural activity, to a large extent. This can lead to further climate change. Because cities are also the cause of climate change. One of the important solutions to deal with this problem is to create a climate and city interaction using urban comprehensive programs in various sectors, such as urban planning and architecture compatible with the climate. This plan should be presented and implemented for different climatic regions of the world. [sadegh ziayan, Iran]	noted, but beyond the scope of this section

Comment No	From Page	From Line	To Page	To Line	Comment	Response
4106	30	19	30	21	I suggest to include the following reference about the increase of SUHI in the megacity of Rio de Janeiro, Brazil from 1984 to 2015: Peres, L., de Lucena, A. J., Rotunno Filho, O. C., & de Almeida França, J. R. (2018). The urban heat island in Rio de Janeiro, Brazil, in the last 30 years using remote sensing data. International Journal of Applied Earth Observation and Geoinformation, 64, 104-116. [Renata Libonati, Brazil]	noted - to be addressed in restructured document
18726	30	23	30	23	Zheng et al.(2017) is not listed in reference. [Hiroaki Kondo, Japan]	noted - to be addressed in restructured document
15826	30	28	30	28	Overall, carbon densities ….. Meaning of densities not clear [Jean-Luc Chotte, France]	noted - to be addressed in restructured document
14350	30	28	30	28	Overall, carbon densities ….. Meaning of densities not clear [Rattan Lal, United States of America]	noted - to be addressed in restructured document
24304	30	29	30	29	should read "land degradation" not "degradation" [Barron Joseph Orr, Germany]	noted - to be addressed in restructured document
98	30	29	30	32	Revisit the sentence [Lawrence Aribo, Uganda]	noted - to be addressed in restructured document
5694	30	32	30	33	example! [Sanaz Moghim, Iran]	noted - to be addressed in restructured document
5696	30	43	30	45	"… formation of convective clouds over urban areas", in the case of water availability! [Sanaz Moghim, Iran]	noted - to be addressed in restructured document
11320	30	47	30	48	The meaning of this sentence is not clear. Are the observed increases in comparison to historic trends, but that rural areas show the same increases? [Debra Roberts, South Africa]	noted - to be addressed in restructured document
662	30	41	31	5	This paragraph should merged with section 2.6.2.4. [Rafiq Hamdi, Belgium]	noted - to be addressed in restructured document
10296	30	48	31	1	Confusing redaction [Vanina Rosa Noemí Cosentino, Argentina]	noted - to be addressed in restructured document
5692	30	17	39	17	"Negative SUHI", meaning reducing warming? if yes, how! [Sanaz Moghim, Iran]	noted - to be addressed in restructured document
1798	30	4			okay. [Chukwuma Anoruo, Nigeria]	the intention of the comment is unclear
6502	30	27		39	many, if not most, urban green spaces are also rich in cultural heritage such as parks and gardesn. Understanding and vlauing their cultural characteristics is important for understanding their management through time and why they are so important for SOC, and learning from them. [Hannah Fluck, United Kingdom (of Great Britain and Northern Ireland)]	noted - to be addressed in restructured document
20590	31	1	31	1	remove "into" [Bettina Weber, Germany]	noted - to be addressed in restructured document
5894	31	4	31	5	How! more explanation. [Sanaz Moghim, Iran]	noted - to be addressed in restructured document
664	31	6	31	6	A new paragraph should be added about how the urban areas are parameterized in GCMs and RCMs. So more about the urban process in play as it is done in the previous sections [Rafiq Hamdi, Belgium]	noted - to be addressed in restructured document
666	31	6	31	6	Why a box is dedicated to Fire since already the two subsequent subsections are deling with fire and present and future climate [Rafiq Hamdi, Belgium]	noted - to be addressed in restructured document
1034	31	6	31	7	Maybe "Biochar formation" should be mentioned in the last sentence of Bax 2.1 [Tobias Rütting, Sweden]	noted - to be addressed in restructured document
2710	31	6	31	8	Please check this is all updates from AR5. WG1 Chapter 6 Section 6,3,2,2 dealt with fires and their total emissions [Sarah Connors, France]	noted - to be addressed in restructured document

Comment No	From Page	From Line	To Page	To Line	Comment	Response
7254	31	11	31	17	There has been quite a bit of work done in the charcoal community that could inform this paragraph.A possible ref: Marlon, J. R., Kelly, R., Daniau, A.-L., Vannière, B., Power, M. J., Bartlein, P., Higuera, P., Blarquez, O., Brewer, S., Brücher, T., Feurdean, A., Romera, G. G., Iglesias, V., Maezumi, S. Y., Magi, B., Courtney Mustaphi, C. J. and Zhihai, T.: Reconstructions of biomass burning from sediment-charcoal records to improve data–model comparisons, Biogeosciences, 13(11), 3225–3244, 2016. [Joe Melton, Canada]	Included
4120	31	11	31	17	I suggest to cite the following study: Earl N, Simmonds I. Spatial and Temporal Variability and Trends in 2001-2016 Global Fire Activity. J Geophys Res Atmos. 2018;123(5):2524-2536. doi:10.1002/2017JD027749. [Renata Libonati, Brazil]	A number of references have already adequately dealt with this issue
5698	31	15	31	15	"due to land use change in the tropics", How about wildfire? [Sanaz Moghim, Iran]	This sentence has been removed in the new text
5896	31	15	31	17	not clear what is the message! [Sanaz Moghim, Iran]	Edited in the new text
4122	31	23	31	24	Similar results were found over Brazil in: Silva P, Bastos A, DaCamara CC, Libonati R. Future projections of fire occurrence in Brazil using EC-Earth climate model. Rev Bras Meteorol. 2016;31(3). doi:10.1590/0102-778631320150142. [Renata Libonati, Brazil]	Sentence deleted in the new text
20044	31	24	31	25	.....moisture decrease (Pechony and Shindell 2010; Aldersley et al. 2011; Abatzoglou and Williams 2016;..... [Sabit Erşahin, Turkey]	Sentence edited but now shifted
926	31	25	31	25	Please, remove one fo the references of Fernandes et al. 2017. [Jose Luis Vicente Vicente, Germany]	Done
1036	31	9	33	24	Unclear why these sections are under "Urban ecosystems" [Tobias Rütting, Sweden]	noted - to be addressed in restructured document
3586	31	6			Last paragraph in boksz: it would be nice if you also cited data from reported national greenhouse gas inventories [Zoltán Somogyi, Hungary]	noted - to be addressed in restructured document
1800	31	7			use comma after recently [Chukwuma Anoruo, Nigeria]	noted - to be addressed in restructured document
7256	31	11			(continued) Figure 4 of Marlon et al. would seem to contradict the statement attributed to Doerr and Santin 2016 [Joe Melton, Canada]	Doerr and Santin is for the globe. The Marlon et al. figure is for eastern N America. Anyhow, the text has been overall revised
11322	31	24			Suggest to reword "temperature increase and decrease in soil moisture". [Debra Roberts, South Africa]	Sentence edited
5144	31				Box 2.1 I don't completely agree that climate is major determinant of fire regime. Climate cahnge is not the cause of a single fire event, it is a predisposing factor that favors the onset and the propagation of fire. It can not be considered a determinant of the fire since the start of each process of burning takes place after the fuel has reached the preheating phase with the loss of water at 100 ° C. Therefore, climate can influence fire severity and the propagation but can not be considered the main triggering factor. Other conditions are determinant for fire (i.e. fuel, oxygen, and a heat source). Further an important factor, influencing fire frequency, in Europe is land abandonement, that should be included. [Giovanna Battipaglia, Italy]	Revised text mentions other factors
5126	32	1	32	12	Please add information about forest fires in Russia. Every year several millions of hectares burn by anthropogenic fires in Russian mixed and boreal forests - more than forest loss from loggin [Oksana Lipka, Russian Federation]	The box on fire is only a general overview
5700	32	10	32	10	"net reduction …was -24.3…" is negative sign reqired since reduction is mentioned! [Sanaz Moghim, Iran]	Accepted. The - sign should be in brackets
20046	32	13	32	14	Fig.2.2.5: Please check the unit of “burned area trend”, yr-2??? [Sabit Erşahin, Turkey]	Figure deleted in the revised text
5702	32	22	32	24	"…wildfire …increasing significantly in …." it seems that this sentence is in contrast to line 10 in this page! [Sanaz Moghim, Iran]	Text edited

Comment No	From Page	From Line	To Page	To Line	Comment	Response
7258	32	24	32	24	This statement of emerging evidence is in direct conflict with p. 32 line 10 (the results of the Andela et al. study). How can there be recent surges in wildland fires given the remote sensing record is showing a large decline? It is important to disentangle the difference between local changes in fire weather and global changes in actual area burned. Fire weather is changing to be more amenable to fire but globally fire is down because of land use patterns. [Joe Melton, Canada]	Revised text makes this more clear
1038	32	5			an increse of 2.5 % seem rather not to be "slightly" [Tobias Rütting, Sweden]	Taken from the paper cited. It is relative to other regions
5704	33	2	33	2	"future fire meteorology"? [Sanaz Moghim, Iran]	Comment not clear
5898	33	3	33	5	not well-written! [Sanaz Moghim, Iran]	Overall text revised
5954	33	3	33	5	needs tobe adjusted [Sanaz Moghim, Iran]	Done
668	33	11	33	11	fire trend under the climate scenario [Rafiq Hamdi, Belgium]	Text overall revised
19522	33	20			The figure should be announced above. Make the effort to correctly resume the seizure of the title. [Ibouraïma Yabi, Benin]	Okay
15752	33				It is very difficult to read the caption for Figure 2.2.6. [Thompson Annor, Ghana]	This is only a place holder
20506	34	3	34	3	4. the subhead titled by "2.3" is too long to unserstand [Huai Jianjun, China]	Accept: Subheading altered to "The effect of climate variability and change on land"
2198	34	11	34	12	Biomes also feedback on regional climate [Andrea Fabiana Carril, Argentina]	Sentence altered to reflect this and Section 2.7 referenced.
8592	34	11	34	13	Please nuance: Regional climate and land caracteristics interact together, one is not responsible for another. [Philippe Louapre, France]	Accept. Sentence altered to reflect this and Section 2.7 referenced.
5706	34	17	34	17	"This variability", what does "This" refer to in the new paragraph? [Sanaz Moghim, Iran]	Accept. Clarified in the text
5974	34	17	34	20	Arctic Oscillation (AO) would be added as a prevailing teleconnection. [Akihiko Ito, Japan]	Accept. Added
2200	34	17	34	25	I agree that variablity is driven by the phenomena cited, nevertheless it is also modulated by local forcings (it must be mentioned). Climate change also impacts on local feedbacks . [Andrea Fabiana Carril, Argentina]	Accept. Clarified in the text
5708	34	18	34	18	I believe there is no need for "respectively"! [Sanaz Moghim, Iran]	Accept. Word removed
20592	34	24	34	24	replace "consequent" by "subsequent" [Bettina Weber, Germany]	Accept. Word replaced
17016	34	25	34	25	DI LORENZO, Emanuele, SCHNEIDER, Niklas, COBB, Kim M., et al. North Pacific Gyre Oscillation links ocean climate and ecosystem change. Geophysical Research Letters, 2008, vol. 35, no 8. LAU, William K.-M. et WALISER, Duane E. Intraseasonal variability in the atmosphere-ocean climate system. Springer Science & Business Media, 2011. [Romain Courault, France]	Accept. Citation added
2746	34	27	34	27	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Noted
2202	34	33	34	35	Considerations about South America are missing… Aridity index: see figures 7 and 8 in Zaninelli et al (2018, Clim. Dyn.; DOI: 10.1007/s00382-018-4225-0); Temperature: López-Franca et al 2016 (Climate Research, DOI 10.3354/cr01393); Hydrological cycle and temperature: Menéndez et al. (2016, Climate Research. DOI 10.3354/cr01373) [Andrea Fabiana Carril, Argentina]	Noted. Thanks for the citations, however, It is not the point here to consider particular regions. Reference to specific regions have been removed.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19306	34	34	34	34	...projected to warm and shrink…., the meaning of shrink is not clear [Binaya Raj Shivakoti, Japan]	Noted. Shrink means to become smaller; opposite of expand
17018	34	43	34	43	"however this is not without problems (Maraun et al., 2017)." => maybe a short listing of these problems would reinforce the comment [Romain Courault, France]	Accept. Sentence altered to reflect this.
6880	34	1	44	20	This section looks more like a text book and can be shortened [Wilfran Moufouma Okia, France]	Noted. The section will be shortened. Some textbook elements are necessary, however, the section will focus on assessing the knowledge base.
19524	34	1		3	The title of the section seems too long [Ibouraïma Yabi, Benin]	Accept: Subheading altered to "The effect of climate on land"
16492	34	11		12	I believe many readers would feel it arguable to use 'determine' describing the impacts of climate on regional land features and function. For example, geological and topographic features are the most fundamental to lands that climate cannot determine. This also applies to other places in the chapter context. If you prefer to use the words like 'determine' and 'determinant', use 'land surface characteristics' instead of 'land characteristics' [Yuanbo Liu, China]	Accept. Sentence altered to reflect this.
16494	34	17			it is illogical to say that 'This variability is driven by …phenomena'. Change 'phenomena' to 'motion' or 'oscillation'. [Yuanbo Liu, China]	Accept. Sentence altered to reflect this.
19526	34	18		23	We should also mention the monsoon [Ibouraïma Yabi, Benin]	Accept. Sentence altered to reflect this.
16524	34	41		43	The last sentence does not read well. It seems that there are many more sentences to come, but are not. Please revise and expand a little bit further what are the problems. Maybe you want to state that current arising convection-permitting models with high horizontal resolution might overcome the problem with bias-correction in the future. [Merja Tölle, Germany]	Accept. Sentence altered to reflect this.
17020	35	1	35	1	Figure 2.3.1. : "Global biomes with historical changes in biological components of the environment" => Very interesting planisphere, but dots (displaying changes in the biological components of the environment) does not seem to be fully exploited (within the figure, as well as in the text). For geographical distribution, have the observations been published? Otherwise, considering the exploitation of the figure and it location within the part 2.3, I would recommand, if possible, to solely display global biomes with actual distribution, and/or shifts at regional scale. Otherwise, indicating the whole temporal scale of the displayed punctual changes (since 1980? pre-industrial period? neolithic?) would be beneficial [Romain Courault, France]	Noted. The online platform from which the figure was derived ha been discontinued and is therefore untraceable. A new figure has been implemented
20048	35	1	35	1	Fig.2.3.1: the grey color is missing in the figure legend. [Sabit Erşahin, Turkey]	Noted. The online platform from which the figure was derived ha been discontinued and is therefore untraceable. A new figure has been implemented
24326	35	8	35	8	If the intent is the use the UNCCD definition, please replace "IPCC" with "UNCCD" (The definatin quoted is from UNCCD but not IPCC.) Reference: UNCCD 1994, Article 1, a), [Barron Joseph Orr, Germany]	Noted. We have referred the reader to Chapter 3 for the definition
7072	35	8	35	9	Please clarifiy: The definition of desertification provided here sounds like the definition used by the UNCCD. The IPCC would thus be using/applying the definition of desertification as defined by the UNCCD? [Mariam Akhtar-Schuster, Germany]	Noted. We have referred the reader to Chapter 3 for the definition
14352	35	8	35	9	Please clarifiy: The definition of desertification provided here sounds like the definition used by the UNCCD. The IPCC would thus be using/applying the definition of desertification as defined by the UNCCD? [Rattan Lal, United States of America]	Noted. We have referred the reader to Chapter 3 for the definition

Comment No	From Page	From Line	To Page	To Line	Comment	Response
20842	35	8	35	17	Notice that section 1.3.3.2 of chapter 1 presents the "Land Degradation" definition of this report and discusses in section 1.3.3.3 Desertification definition without explicitely defining which one is used in this report. Cross-chapter work seems to be needed to agree how these two definitions are introduced and presented along the report. [Carolina Vera, Argentina]	Noted. We have referred the reader to Chapters 3 and 4 for the definitions
15822	35	8	35	17	the definition of "land degradation" is confusing climatic variations are one factor (L 9) but L17 are a background stressor.. Use the UNCCD definition. Moreover the definition in the glossary is not adequate [Jean-Luc Chotte, France]	Noted. We have referred the reader to Chapter 3 for the definition
14354	35	8	35	17	The definition of "land degradation" is confusing climatic variations are one factor (L 9) but L17 are a background stressor.. Use the UNCCD definition. Moreover the definition in the glossary is not adequate. [Rattan Lal, United States of America]	Noted. We have referred the reader to Chapter 4 for the definition
16820	35	8	35	17	The definition of "land degradation" is confusing climatic variations are one factor (L 9) but L17 are a background stressor.. Use the UNCCD definition. Moreover the definition in the glossary is not adequate [Rattan Lal, United States of America]	Noted. We have referred the reader to Chapter 3 for the definition
2712	35	8	35	17	Definition is also stated in chapter 3. This section could just refer to ch3 and the glossary here instead of repeating text. No reference is currently given. [Sarah Connors, France]	Noted. We have referred the reader to Chapter 3 for the definition
24328	35	10	35	17	After " " reference should be added in" ()"35. The defination on land degradation is quoted form the article 1 (f) of the UNCCD convention text , adopted in 1994. Also be sure the definition used here, used elsewhere in the report and in the glossary are all consistent. [Barron Joseph Orr, Germany]	Noted. We have referred the reader to Chapter 4 for the definition
24330	35	19	35	20	One approach to keeping consisitent with the definition of desertification would be using the definition given in the UNCCD convention text: article 1. g) , suggested wording as : "according to UNCCD, the dryland mianly refers to the 'area of arid, semiarid and dry sub-humid areas other than polar and sub-polar regions in which the ration of annual precipitation to potential evapotrasportantion falls within the range from 0.0.5-0.65'" [Barron Joseph Orr, Germany]	Noted. We have referred the reader to Chapter 3 for the definition
20594	35	22	35	24	There are drylands with winter and summer rainfall. Thus I think "summer" at the end of line 23 has to be deleted. [Bettina Weber, Germany]	Accept: Deleted
5128	35	22	35	25	Many authors suggest Mediterranean woodlands and shrublands as drylands, as well as the wide steppe belt in Eurasia. The climate is characterised by winter maximum of precipitation and very small amount in summer. Please rephrase your statement. [Oksana Lipka, Russian Federation]	Noted. We have referred the reader to Chapter 3 for the definition
26452	35	1		5	Figure insufficiently explained and colours in dots hardly visible. [Hans Poertner and WGII TSU, Germany]	Noted. The online platform from which the figure was derived ha been discontinued and is therefore untraceable. A new figure has been implemented
23272	35	1			Fig. 2.3.1: Grey areas missing in legend - are those regions without data? Fore some it is hard to believe that no studies exist. Or are those regions without significant changes? [Alexander Graf, Germany]	Noted. The online platform from which the figure was derived ha been discontinued and is therefore untraceable. A new figure has been implemented
9080	35	8		41	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Noted. Final formatting to be undertaken during copy-editing phase
19528	35	8			Recall the year of the IPPC report that includes the definition [Ibouraïma Yabi, Benin]	Noted. We have referred the reader to Chapter 3 for the definition

Comment No	From Page	From Line	To Page	To Line	Comment	Response
11324	35				Figure 2.3.1 Unfortunately the coloured markers are not at all identifiable. Use different marker styles instead of colours. The different greens are too similar to be distinguishable on the map. Do the dots represent reported observed changes from different studies? Why are some countries shaded grey? [Debra Roberts, South Africa]	Noted. The online platform from which the figure was derived ha been discontinued and is therefore untraceable. A new figure has been implemented
5148	35				Figure 2.3.1. The colours of the circles are difficult to distinguish [Giovanna Battipaglia, Italy]	Noted. The online platform from which the figure was derived ha been discontinued and is therefore untraceable. A new figure has been implemented
670	36	4	36	12	A map is perhaps better to show the extent of global dryland [Rafiq Hamdi, Belgium]	Noted. See Chapter 3 for map
18728	36	11	36	11	(Huang et al. 2016) --> Huang et al. (2016) [Hiroaki Kondo, Japan]	Accept. Corrected
14930	36	14	36	19	There is a need to explain on this paragraph the underlying uncertainty in dryland expansion brought by or influenced by climate variability and/or climate extremes [Barnabas Msongaleli, United Republic of Tanzania]	Noted. This is mentioned two paragraphs above which considers current uncertainties. Text here has been modified to more clearly describe this.
2716	36	14	36	19	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Noted
2748	36	15	36	17	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Noted
27286	36	17	36	19	This is a quite significant statement. It is extremely important to include practices that REVERSE land degradation into modelling analysis of mitigation possibilities in the land sector. [Doreen Stabinsky, United States of America]	Noted
20596	36	19	36	19	Please consider adding the following content: "Dryland soils are widely covered by biological soil crusts, i.e. photoautotrophic communities of cyanobacteria, algae, lichens, and bryophytes, co-occurring with heterotrophic fungi, bacteria and archaea. These soil surface communities provide essential ecosystem functions, as they stabilize dryland soils, influence the water cycle and vegetation growth, and contribute to the biogeochemical cycles of carbon and nitrogen (Elbert et al., 2012; Weber et al., 2016; Rodriguez-Caballero et al., 2018). Currently, biological soil crusts cover ~18 million km2, corresponding to ~12% of the global terrestrial surface area. However, according to the RCP scenarios presented withing the Fifth Assessment Report, biological soil crusts are expected to shrink by 27-39% until 2070 with negative effects on soil stability and overall dryland fertility (Rodriguez-Caballero et al., 2018). Despite their relevance in dryland fertility and stability, biological soil crusts are not yet considered as a relevant parameter in ESM." [Bettina Weber, Germany]	Noted. Thank you. Content has been summarised and added.
20598	36	19	36	19	literature of citations given above: Elbert, W., Weber, B., Burrows, S., Steinkamp, J., Büdel, B., Andreae, M.O. & Pöschl, U. (2012): Contribution of cryptogamic covers to the global cycles of carbon and nitrogen. Nature Geosciences 5: 459-462. Rodríguez-Caballero, E., Belnap, J., Büdel, B., Crutzen, P., Andreae, M.O., Pöschl, U., Weber, B. (2018) Microbial surface communities on dryland soils endangered by global change. Nature Geoscience 11: 185-189. Weber, B., Belnap, J., Büdel, B. (2016): Biological soil crusts: an organizing principle in drylands, Ecological Studies 226. Springer International Publishing, Switzerland. [Bettina Weber, Germany]	Noted. Thank you
15824	36	22	36	25	harmonize the Food security to that presented in Chapter 5 P 9 L 11-15 [Jean-Luc Chotte, France]	Accept. Referred to Ch 5

Comment No	From Page	From Line	To Page	To Line	Comment	Response
14356	36	22	36	25	Harmonize the Food Security to that presented in Chapter 5 P 9 L 11-15 [Rattan Lal, United States of America]	Accept. Referred to Ch 5
2714	36	22	36	30	Definition is also stated in chapter 5. This section could just refer to ch3 and the glossary here instead of repeating text. [Sarah Connors, France]	Accept. Referred to Ch 5
2364	36	25	36	30	Availibility (linked to agricultural productivity) being only one of the four pillars of food security and climate change having effects on the four pillars (especially on access), "the overall impact of climate on food security is complex, being greater than impacts on agricultural productivity alone" (and not being POTENTIALLY greater). Consistency with chapter 5 table 5.1 (5-10) to address. Also consistency to address with chapter 5 (5-87) lines 15 to 17: "the impacts of climate change are expected to be worse for food security than for food availibility or crop productivity alone." [Anne-Laure Sablé, France]	Taken into account. Text for Section 2.3.3 has been revised here per the Reviewers suggestion (taking out the word "potentially", and also to be more consistent with Chapter 5 and the references cited in Table 5.1 We now have added descriptions that highlight how CC will impact all four pillars of food security throughout 2.3.3.
9890	36	25	36	30	Long and difficult sentence [Jan Fuglestvedt, Norway]	Accept. Rewritten for clarity
5900	36	35	36	37	can be written more clearly! [Sanaz Moghim, Iran]	Accept. Rewritten for clarity
5902	36	40	36	42	more clarification! [Sanaz Moghim, Iran]	Accept. Rewritten for clarity with additional clarifications
27288	36	43	36	44	Pugh, T. A. M., Müller, C., Elliott, J., Deryng, D., Folberth, C., Olin, S., ... & Arneth, A. (2016). Climate analogues suggest limited potential for intensification of production on current croplands under climate change. Nature communications, 7, 12608. [Doreen Stabinsky, United States of America]	Accept. Added
5904	36	46	36	47	I am not sure about this sentence" Elsewhere in ……, change in rainfall variability,…, and growing season temperature increases …NEGATIVELY impact agriculture.." [Sanaz Moghim, Iran]	Accept: rephrased for clarity
8594	36	46	36	49	Same com as Page4 These conclusions have beeen made too quicky. There are many evidences in the literature that mean climate change negatively impact agricultural production also in middle latitudes. [Philippe Louapre, France]	Taken into account. We have revised the text to warn that the negative climate impacts on agricultural production may outweigh any potential gains at mid to high latitudes, to better reflect the cited workd. Additionally, we have now more explicitly stated that negative climate effects may outweigh potential benefits in all areas, and that key mid to high latitude crops have and likely will experience declines. Page 36, Line 32 - Page 36, Line 47
100	36	48	36	49	Refine the last sentence [Lawrence Aribo, Uganda]	Accept: rephrased for clarity
20600	36	49	36	49	…quantifying the magnitude OF regional impacts [Bettina Weber, Germany]	Accept: rephrased for clarity
1470	36	21	39	25	My comments include only three issues: 2.3.3 The influence of climate on food security, 2.3.4 Climate-driven changes in terrestrial ecosystems, 2.35 Climate extremes that impact on land type and functioning, and 2.7 Climate consequences of land-based mitigation and adaptation. [Md Moazzem Hossain, Australia]	Noted
23274	36	41			"…to be more common…": something is wrong with the sentence grammar [Alexander Graf, Germany]	Accept: rephrased for clarity
2826	37	3	37	4	The statement that 60% of agricultural land is under three major crops of wheat, rice and maize is also repeated in section 2.2.7 -- think of reducing redundancy. [Aditi Mukherji, Nepal]	Noted. While we agree it is mentioned earlier this line is important to set up the message of the parahraph and is retained.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
1040	37	3	37	15	The is missing a discussion on the quality (e.g. protein content) in addition to the yield, partuculalry as there are trade-offs between those (e.g. Pleijel & Uddling 2012 Glob Change Biol 18:596-605) [Tobias Rütting, Sweden]	Taken into account. Added a paragraph with up-to-date references to include impacts on quality and micro-nutrients. "In addition to adverse yield impacts, emerging study indicates that climate change (alongside other environmental changes, such as air pollution and tropospheric ozone) may also negatively affect crop nutrient content (medium evidence). Higher atmospheric CO2 concentrations may negatively impact protein accumulation in wheat (Pleijel and Uddling 2012); as well as micronutrients, such as zinc and iron, in many key grain and legume crops (Myers et al. 2014; Scheelbeek et al. 2018). " Page 37, Line 37 - Page 37, Line 41
9808	37	6	37	7	I suggest you reconsdider the wording "there is agreement". [Jan Fuglestvedt, Norway]	Taken into account. Text has been revised
8596	37	6	37	10	Adaptation is a evolutionary process occuring in nature. When talking about crops, you should involve evolution of crop characteristics through experimental selection. [Philippe Louapre, France]	Taken into account. Now included is a statement on the selective breeding and emering biotechnology applications which may help to address regional climate changes and aid in agricultural adaptation. Page 39, Line 7 - Page 39, Line 10
9810	37	10	37	10	A new paer by Tebaldi and Lobell may be of relevance here: "Differences, or lack thereof, in wheat and maize yields under three low-warming scenarios", ERL. See: http://iopscience.iop.org/article/10.1088/1748-9326/aaba48 [Jan Fuglestvedt, Norway]	Taken into account. Thank you for this reference. Text has been added to reflect these CO2 fertilization effects, and their importance particularly under ambitious climate climate mitigation scenarios. Page 37, Line 14 - Page 37, Line 20
2718	37	10	37	14	IPCC uncertainty language used incorrectly: a confidence statement (eg, high/medium/low confidence) is made up of 2 clauses (evidence and agreement), which must be used together. Never use only evidence or agreement statements. [Sarah Connors, France]	Noted
8598	37	13	37	13	Replace 'controlling' by 'constraining' [Philippe Louapre, France]	Accept: Text altered as requested.
8600	37	17	37	24	This paragraph should be deleted, as it presents no usefull information. The paragraph L26-36 must be largelly developped ias it is a key aspect of the evolution of crops yield under climate changes. [Philippe Louapre, France]	Reject. However, comment has been taken into account and this section has now been heavily revised and developed, per the Revewer's comments. In particular, text/citations have now been added to address the variety of impacts food systems face - and all four pillars of food security. As such, this section has been considerably expanded to capture all the "indirect"effects of climate, including repercussions for cold chain storage. Notes have also been added on selective breeding and crop development which can aid in adaptation.
5150	37	20	37	24	this sentence sounds strange and difficult to read. I would reword [Giovanna Battipaglia, Italy]	Accept: text has been heavily revised
6194	37	23	37	24	Reads: "….however, the use of multiple crop models in agricultural studies is relatively rare (Koehler et al.2013)." This reference is quite old for making this statement. Please look at newer litterature, for example realized within the framework of AGMIP http://www.agmip.org/ [Anna Sörensson, Argentina]	Taken into account. Agreed here - many intercomparisons have now been undertaken and/or are in progress. Citaitons have been included, along with others, and language has been revised. Page 37, Lines 43-49

Comment No	From Page	From Line	To Page	To Line	Comment	Response
15184	37	23	37	24	As for the descrition that "the use of multiple crop models in agricultural studies is relatively rare", this may not be true nowadays. Studies using a multi-crop model ensemble has increasingly become available (e.g., Hasegawa et al., 2017). Müller et al. (2015) shows that the uncertainty in projected yield impacts associated with different crop models are larger than the uncertainties due to different GCMs and RCPs when CO2 fertilization is considered. Hasegawa, T. et al. (2017) Causes of variation among rice models in yield response to CO2 examined with Free-Air CO2 Enrichment and growth chamber experiments. Scientific Reports, 7, 14858, doi:10.1038/s41598-017-13582-y. Müller, C., Elliott, J., Chryssanthacopoulos, J., Deryng, D., Folberth, C., Pugh, T.A.M. and Schmid, E. (2015) Implications of climate mitigation for future agricultural production. Environ. Res. Lett. 10 (2015) 125004 doi:10.1088/1748-9326/10/12/125004. [Toshichika Iizumi, Japan]	Taken into account. Agreed here - many intercomparisons have now been undertaken and/or are in progress. Citations have been included, along with others, and language has been revised to remove the previous clause and acknowledge the references the Reviewer provided and others
436	37	26	37	36	These indirect impact are important to note. I would suggest a mention of post-harvest impacts too (e.g. increased spoilage rates due to higher temp, pests and precip change, damage to supply chains and infrastructure and resulting food loss and waste in the system. Also an issue here for the cold chain for many commodities and increased energy use and emission of refrigerants [Dave Reay, United Kingdom (of Great Britain and Northern Ireland)]	Taken into account. Text/citations have now been added to address each of the Reviewer's noted impacts, and this section has been considerably expanded to capture all the "indirect"effects of climate, including repercussions for cold chain storage. Thank you for this valuable input. Page 38, Line 18 - Page 39 Line 14 now provides details of the impacts cited by the Reviewer
8602	37	27	37	27	What do you mean by 'weeds' in this sentence? Obscure. [Philippe Louapre, France]	Taken into account. Text has been revised to specify "agricultural" weeds, or competitive, non-crop C3 plant species. Page 37, Lines 27-35
17022	37	38	37	38	Something on livestock (herding, fishing) impacted by anthropogenic climate change would be great [Romain Courault, France]	Taken into account. Agreed the livestock component was indeed missing, and now has been added to capture several important impacts. Text/paragraph has been added to this effect. Page 37, Line 51 - Page 38, Line 16
7962	37	47	37	49	Line 47 to 49 is too long for a single sentence and can be revised to adequately buttress the connection of past events to present and linked to CC, and to provide more clarity please. For example, add 'composition' after earth biota, strongly qualifies the impact and can be re-written as "affected strongly'. especially line 48. Line 47 to 49 can be "There is high confidence that the earth's biota composition and ecosystem processes have been affected strongly by past changes in global climate, at a climate change rate lower than those projected for the 21st century under the high warming scenerios like RCP8.5." [Elohor Freeman Oluowo, Vietnam]	Accept. Line clarified
7964	37	49	37	49	I suggest a full stop after RCP8.5 and begin with Sadly to convey the worse conditions for ecosystems, to read "Sadly, most ecosystems are vulnerable, even at a climate change projection under low-to-medium warming scenerios (reference)." [Elohor Freeman Oluowo, Vietnam]	The text has been altered but we could not use the word "sadly"
5976	37	46	38	29	In this section (2.3.4), it is worth referring to ISI-MIP (Inter-Sectoral Impact Model Intercomparison Project), in which climate-driven impacts on terrestrial ecosystems were assessed using multiple scenarions, climate projections, and biome models: e.g. Friend, A. D., et al. (2014). "Carbon residence time dominates uncertainty in terrestrial vegetation responses to future climate and atmospheric CO2." Proceedings of the National Academy of Science U.S.A. 111(9): 3280–3285. [Akihiko Ito, Japan]	Noted. We will review this and other ISIMIP output

Comment No	From Page	From Line	To Page	To Line	Comment	Response
26976	37	47	38	4	Change existing text to, "There is high confidence that the earth's biota and ecosystem processes have been strongly affected in the past at rates of climate change than are lower than those projected during the 21st century under high warming scenarios like RCP8.5. Moreover, most ecosystems are vulnerable to climate change through the end of the current century at rates of climate change projected under even low- to medium-range warming 1 scenarios (Settele et al. 2015). There is high confidence that climate changes over recent decades many plant and animal species have experienced changes in sizes and locations of ranges, altered abundances, and shifts in seasonal activities." [Knute Nadelhoffer, United States of America]	Accept: Text altered as requested.
23276	37	9			insert blank before references [Alexander Graf, Germany]	Noted
9084	37	16		35	correct format (Author, year) and (author et al., year) in whole document please, [Amanullah Amanullah, Pakistan]	Noted. Formatting will be completed during copy-editing phase
1124	37	20		24	I would suggest a further reading, where both crop models and GCMc ensemble were compared. In this study, authors evaluated the uncertainty in the projection of winter wheat yields at seven sites in the PNW using five crop growth simulation models (CropSyst, APSIM, DSSAT, STICS, and EPIC) and daily weather data downscaled from 14 GCMs for 2 representative concentration pathways (RCP) of atmospheric CO2 (RCP4.5 and 8.5). Ahmed M, Stöckle CO, Nelson R and Higgins S (2017) Assessment of Climate Change and Atmospheric CO2 Impact on Winter Wheat in the Pacific Northwest Using a Multimodel Ensemble. Front. Ecol. Evol. 5:51. doi: 10.3389/fevo.2017.00051 [Rosa Francaviglia, Italy]	Accept: text has been heavily revised
23278	37	31			by => on [Alexander Graf, Germany]	Noted. However we could not find the requested editorial on P37L31
6196	38	2	38	4	It is not clear from the text on what litterature you base this high confidence statement. Is it a result from Settele et al. (2015)? If all first 7 lines of section 2.3.4 is from Settele et al. (2015), this should be better indicated. [Anna Sörensson, Argentina]	Noted. This is a summary of information in the AR5 report (WG2, CH4) and has been clarified in the text. The sentence has also been rewritten for clarity.
7966	38	2	38	4	Please revise Line 2 to 4 after the reference, for more clarity please. Remove 'that' after high confidence and replace with a comma. Also on line 4, please remove 'many' and replace with 'Lots of', and also'will be' with 'are' to provide better clarity [Elohor Freeman Oluowo, Vietnam]	Accept. (1) The section has been rewritten for clarity. (2) The Warszawski et al. 2013 paper deals with future changes so the tense must remain future tense, ie, "will be".
8604	38	4	38	6	Especially tropical species as their temrpal optimum is already near current temperature. Please indicate this nuance. [Philippe Louapre, France]	Accept. This has been indicated.
8606	38	6	38	7	For manu plant species, climate change will be responsible of extended range of distribution, especially in muntains (see Steinbauer 2018, Rumpf 2018) [Philippe Louapre, France]	Accept. These citation will be included in the sentence starting on line 9.
7968	38	9	38	9	Not all forest expansion result from climate change, and for this reason, I will suggest you say "and those due to climate change" [Elohor Freeman Oluowo, Vietnam]	Noted. The line specifically mentions land abandonment as a factor in forest expansion, not only climate change and is particular to high elevation forests, not all forests.
7970	38	10	38	12	On line 10, I suggest you replace 'however' with "nonetheless', for it is a somewhat positive sway from the former. And on Line 11, replace 'this with 'these' in its pluralized form. On line 11 to 12, you could say "frequent draught conditions, which can accelerate the rate of taxonomic changes" [Elohor Freeman Oluowo, Vietnam]	Accept. Text altered as requested
7972	38	12	38	12	I suggest you replace "would be" with "what is" as it more affirmative and true for the statement. [Elohor Freeman Oluowo, Vietnam]	Accept. Text altered as requested
7974	38	15	38	16	Please remove 'a' before direct. On line 16, the sentence looks uncompleted "through vegetation". For example, "through vegetation loss" or something. [Elohor Freeman Oluowo, Vietnam]	Accept. Text altered as requested

Comment No	From Page	From Line	To Page	To Line	Comment	Response
5152	38	15	38	29	I would suggest to discuss how CO2 could influence also the vegetation biodiversity, influencing differently C3, C4 and CAM plants [Giovanna Battipaglia, Italy]	Noted. Brief discussion added
2720	38	15	38	29	Include a cross-reference/call out to Section 2,2,X on CO2 fertilisation? [Sarah Connors, France]	Accepted: Linked to sections 2.2.2 and 2.2.3
7976	38	21	38	21	Please I suggest you revise line 21 as "In grasslands for example, projected elevated CO2 concentrations was observed to compensate for the negative" since you are providing a case for elevated CO2 in a reported statement. [Elohor Freeman Oluowo, Vietnam]	Accept. Text altered as requested
7978	38	23	38	23	On line 23, you can change 'increased' to 'increasing'. This is important for changing levels in several reports. [Elohor Freeman Oluowo, Vietnam]	Accept. Text altered as requested
20844	38	23	38	24	Why just ENSO? ENSO is just one (important) manifestation of natural climate variability on interannual timescales. Morevoer, rainfall is not independent from ENSO. Reference is missed. [Carolina Vera, Argentina]	Accept. Sentence has been shortened to summarise the main point of the cited paper. Teleconnections no longer mentioned
5906	38	23	38	24	"Increased flowering …..is associated with INCREASED atmospheric CO2 …., SOLAR Radiation and ENSO.." Is this sentence right? [Sanaz Moghim, Iran]	Accept. Sentence has been shortened to summarise the main point of the cited paper
20050	38	24	38	24	In recent decades, flowering……. [Sabit Erşahin, Turkey]	Accept. Corrected
7980	38	24	38	25	Please revise from "in recent decades" and add comma after concentrations. Since no references was provided but scientifically true, you could say, " In recent studies flowering …. " and on line 25, you could say "to increase with increasing CO2 concentrations, but". This will drive you point better. [Elohor Freeman Oluowo, Vietnam]	Accept. Sentence has been shortened to summarise the main point of the cited paper.
5908	38	26	38	29	not well-written! [Sanaz Moghim, Iran]	Accept. Sentence has been shortened to summarise the main point of the cited paper
5956	38	26	38	29	need agjustment [Sanaz Moghim, Iran]	Accept. Sentence has been shortened to summarise the main point of the cited paper
1802	38	15		16	substantiate with literature [Chukwuma Anoruo, Nigeria]	Accept. The cited paper substantiates this. Other citations will be listed also.
26978	38	15			Change to "Increased CO2 in the atmosphere has both direct and indirect effects on terrestrial ecosystems…" [Knute Nadelhoffer, United States of America]	Accept. Text altered as requested
23280	38	27			"checked" is correct but hard to understand due to the word's ambiguity - maybe "limited" or "halted" instead? [Alexander Graf, Germany]	Accept. Used limited, thank you
23282	38	28			climate factor*s* [Alexander Graf, Germany]	Accept. Corrected
9812	39	2	39	2	the wording "may be taken" is rather vague. I also suggest that you coordinate formulations and definitions across IPCC reports. [Jan Fuglestvedt, Norway]	Noted. Wording altered to reflect SREX framing of extremes.
5710	39	2	39	3	Extreme … upper or lower ends of the OBSERVED range of values ….", ? extreme can be occurred for the first time withought being observed before! [Sanaz Moghim, Iran]	Noted. However, bounds must be be defined within the observed envelope, which may expand.
5712	39	4	39	6	"an accumulation of extreme climate events" what does "accumulation" mean here? [Sanaz Moghim, Iran]	Accept. Sentence reworded for clarity
14982	39	8	39	8	some vignette would be missing [Fernando Mendez Gaona, Paraguay]	Noted. The description of events at different space-time scales is found in the referred figure.Also examples of combinations of variables that lead to extreme citations in Line 10 have examples.
7982	39	11	39	13	Please replace "is" by "are", as the subject of the auxicilliary verb is 'combinatory processes.' [Elohor Freeman Oluowo, Vietnam]	Accept. Corrected

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19096	39	17	39	25	Figure 2.3.2 gives detailed representation of the changes in typical extreme climatic events (ECE), nevertheless, I believe the figure could be easily understood if the legend could be stated as 'changes in frequencyor intensity of extreme climatic events (ECE) in a warming climate classified according to their spatial and temporal scale' [Nkechinyelu Oranye, Nigeria]	Reject. The current text is necessary as the figure needs to be self explanitory, which it would not be with the suggested text.
2750	39	24	39	24	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Noted
5714	39	30	39	30	"Blocking anticyclones …" what does "blocking" mean here? [Sanaz Moghim, Iran]	Accept. The phenonenom described in the previous sentence. Text altered to make this a bit clearer.
11718	39	27			Definition of the term "extra-tropics"? [Debra Roberts, South Africa]	Accept: "(mid-latitude)" added
11326	39				Figure 2.3.2 Is there a particular reason to set the Y axis on 2s rather than 1s? 1m-10m… [Debra Roberts, South Africa]	Noted:The figure is taken as is from Ummenhofer and Meehl, 2017 and is reproduced accordingly.
5716	40	1	40	1	"heat event time", what does "time" mean here? [Sanaz Moghim, Iran]	Accept. Phrase altered for clarity
4110	40	3	40	4	I suggest to include the following four (4) references about the interactions between the mechanisms responsible for the HW feedbacks sucha as intense dryness of the soil and strong regional subsidence of air: Lemordant, Léo, et al. "Modification of land-atmosphere interactions by CO2 effects: Implications for summer dryness and heat wave amplitude." Geophysical Research Letters 43.19 (2016). Miralles, Diego G., et al. "Mega-heatwave temperatures due to combined soil desiccation and atmospheric heat accumulation." Nature Geoscience 7.5 (2014): 345. Sousa, Pedro M., et al. "European temperature responses to blocking and ridge regional patterns." Climate Dynamics 50.1-2 (2018): 457-477. Geirinhas, João L., et al. "Climatic and synoptic characterization of heat waves in Brazil." International Journal of Climatology 38.4 (2018): 1760-1776. [Renata Libonati, Brazil]	Accept. Added, thank you
2722	40	7	40	8	SR1.5°C glassary for heat wave is 'A period of abnormally hot weather. Heat waves and warm spells have various and in some cases overlapping definitions.' [Sarah Connors, France]	Noted. Added into the sentence
14984	40	10	40	11	some words are in bold [Fernando Mendez Gaona, Paraguay]	Accept. Bold removed
2724	40	11	40	11	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Noted
7984	40	13	40	14	To provide some clarity after the reference, you could say. "Globally, the increasing trend in the unsual hot nights and the extremely hot daytime temperature ……." [Elohor Freeman Oluowo, Vietnam]	Noted. The suggested text does not mean the same thing as the written text. Thefore we retain the current version of the text
7986	40	17	40	18	The statement after the reference on line 17, will need further clarity and be revised please. [Elohor Freeman Oluowo, Vietnam]	Accept. This sentence has been removed as it detracts from the message above it and for brevity.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
4108	40	17	40	18	I do not agree with the sentence: "Over Africa and South America confidence remains low to medium confidence and varies regionally as a consequence of a poor observational record." In fact, In South America, and particularly in Brazil, an increase in the frequency and intensity of extreme heat events has also been observed since the second half of the twentieth century (Bitencourt et al., 2016; Ceccherini et al., 2016; Cerne and Vera, 2011; Geirinhas et al., 2017; Hannart et al., 2015; Renom et al., 2011; Rusticucci, 2012; Rusticucci et al., 2017, 2016). [Renata Libonati, Brazil]	Noted. Thank you for the clarification and citations. However, this sentence has been removed as it detracts from the message above it and for brevity.
6198	40	20	40	20	This statement is very strange. I have read the abstract of the three papers cited to support "Temperature means and extremes tend to be underestimated at the regional level" and I don't find that they treat this issue. Who/what is underestimating "means and extremes"? Climate models? This is not true, in particular not related to mean temperature which is over- and under estimated depending on region. Perhaps this is just a redactional error? [Anna Sörensson, Argentina]	Accept. This is a redaction error and was attributed to an earlier version concerning rainfall. Sentence has been altered to correct this.
7988	40	20	40	20	Temperature "means" can be misunderstood by readers, as such you could add "mean value" or revise to clarity it from being a definition. [Elohor Freeman Oluowo, Vietnam]	Noted. However, "temperature means" is a common term and in this sentence is linked to extremes so we retain the current phrase
7990	40	22	40	22	You can add than "than ever before" after the references. To clarify the comparism with the environmental changes. [Elohor Freeman Oluowo, Vietnam]	Noted. We include the phrase "than historically recorded"
14986	40	23	40	23	some words are in bold [Fernando Mendez Gaona, Paraguay]	Accept. Bold type removed
6200	40	24	40	26	Since you have stated that the quantification of heat waves is highly dependent on the definition of heat wave, here you should explicit the definition for these particular studies since you explicit the duration of future heatwaves. It would also be relevant to explicit the length of the heatwaves in present/recent past climate. Withoout none of these two elements the magnitud of the change/the implicances are difficult to appreciate. [Anna Sörensson, Argentina]	Noted. We agree. However, for reasons of space we have had to generalise and rely on the citations to provide the specific information. The two paragraphs (lines 8 - 32) have now been reordered, summarised further and merged.
6202	40	27	40	27	Is Russo et al. (2016) also about Africa / Arabian Peninsula? [Anna Sörensson, Argentina]	Noted. Yes
10218	40	27	40	27	there is an extra parenthesis before Russo et al. 2016 [Vanina Rosa Noemí Cosentino, Argentina]	Accept. Corrected
6204	40	28	40	28	You say that "Therefore, confidence in the increased number and duration of heat waves in recent decades is medium….", but you have not assessed any litterature about past heat waves so what is this based on? [Anna Sörensson, Argentina]	Accept. Only the Smith 2013 citation is included, others have been added to justify the assessment
7992	40	28	40	29	The statement did not connect the previous as it should. As such, I suggest you begin line 28, to read "There is therefore, high confidence in the increasing numbers and duration of heat waves….." Please change 'is' before "medium' to 'at' and say "at medium scale". And on line 29, add substantially' after 'increase.' please replace 'there is' with 'is of' to reflect "is of high confidence" [Elohor Freeman Oluowo, Vietnam]	Editorial note. This sentence uses IPCC calibrated language (itallics) to convey the assement of the literature so this must be retained. However, we have altered the paragraph for flow and brevity.
2726	40	30	40	30	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Noted
2728	40	33	40	36	Drought was not included in the SR1.5°C, please check if any updates occur for this defintion when it is included in the SRCCL. [Sarah Connors, France]	Noted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
7994	40	36	40	38	remove the 'a' before normal. And on line 38, the activity should be pluralized as "regional activities" [Elohor Freeman Oluowo, Vietnam]	Accept. "Are" changed to "is" for clarity; activity changed to "activities"
5718	40	50	40	50	"ENSO, which biases the land precipitation towards WETTER CONDITIONS", is it right! [Sanaz Moghim, Iran]	Accept. This is a finding from Trenberth et al 2014 that was not included in AR5. However, we remove this part of the sentence as it does not add to the main idea being posited.
26840	40	51	40	51	Add here this key piece of evidence "Anthropogenic climate change has intensified droughts in the arid southwestern U.S. as higher temperatures due to climate change have coincided with low periods of precipitation due to inter-annual variability (Udall and Overpeck 2017, Williams et al. 2015)." Udall, B. and J. Overpeck. 2017. The twenty-first century Colorado River hot drought and implications for the future. Water Resources Research 53: 2404-2418. Williams, A.P., R. Seager, J.T. Abatzoglou, B.I. Cook, J.E. Smerdon, and E.R. Cook. 2015. Contribution of anthropogenic warming to California drought during 2012–2014. Geophysical Research Letters 42: 6819-6828. [Patrick Gonzalez, United States of America]	Accept: These and other cotations added
14988	40	51	40	52	some words are in bold [Fernando Mendez Gaona, Paraguay]	Accept. Bold removed
6206	40	47	41	6	In the executive summary you say that "The extent of global drylands has increased over the last 60 years". It is not clear for me how this can be certain at the same time that the past drought trends are not clear. Is this because the definition of drought changes with time so that a drought condition that becomes more frequent in a region, at some point is not longer called a drought condition, but the region is called "arid land"? I think that this needs more clarification because it is confusing. [Anna Sörensson, Argentina]	Accept. This is clarified further in the text
20846	40	51	41	1	It is not clear whether it is a key finding from AR5 or it is a new one. If it is the latter, references published after AR5 should be included and assessed. [Carolina Vera, Argentina]	Noted. This is a finding from Trenberth et al 2014 that was not included in AR5. However, we remove this part of the sentence as it does not add to the main idea being posited.
27290	40	51	41	1	Link with chapter 7. There are emergent risks linked with more widespread and increased GLOBAL aridity, and possible contemporaneous impacts on multiple bread-baskets. [Doreen Stabinsky, United States of America]	Accept: Linked to Ch 7.3.3
27292	41	1	41	2	Tigchelaar, M., Battisti, D. S., Naylor, R. L., & Ray, D. K. (2018). Future warming increases probability of globally synchronized maize production shocks. Proceedings of the National Academy of Sciences, 201718031. [Doreen Stabinsky, United States of America]	Reject: This does not apply to the text
5720	41	2	41	3	"… increases ….to present day", future compares with present or present with past! [Sanaz Moghim, Iran]	Noted. The tenses are correct, sentence altered for clarity.
5722	41	4	41	4	"…here"? [Sanaz Moghim, Iran]	Accept. "Here" removed
26842	41	5	41	6	This statement, which has no scientific reference in the current draft, does not seem to be correct. The text should say “Projections under RCP4.5 and RCP8.5 indicate risks of drought in the southwestern U.S. potentially more severe than droughts since 1100 AD (Cook et al. 2015).” Cook, B.I., T.R. Ault, J.E. Smerdon. 2015. Unprecedented 21st century drought risk in the American Southwest and Central Plains. Science Advances 1: e1400082. doi:10.1126/sciadv.1400082. [Patrick Gonzalez, United States of America]	Accept. These review comments seem to refer to page 41 lines 1,2,3. Text has been reviewed and additional citations added.
5910	41	5	41	6	why? Reference [Sanaz Moghim, Iran]	Accept. These review comments seem to refer to page 41 lines 1,2,3. Text has been reviewed and additional citations added.
2730	41	5	41	6	Reference needed for this statement [Sarah Connors, France]	Accept. These review comments seem to refer to page 41 lines 1,2,3. Text has been reviewed and additional citations added.
17024	41	8	41	23	A small introduction on the different landtypes and their functioning would improve readability by showing us what is listed and documented by authors, and what is not [Romain Courault, France]	Accept: Introductory text added

Comment No	From Page	From Line	To Page	To Line	Comment	Response
17026	41	8	41	23	Something about livestock and socioecosystems related to herding/breeding might be missing [Romain Courault, France]	Accept. This has been included as requested
20052	41	8	41	23	Increased frequency of climate extremes such as heat waves and droughts may hit vegetation more seriously in some regions. Net primary productivity (NPP) of needleaf, broadleaf and mixed forests responded strongly to drought and heat waves between 2000 and 2010 (Ersahin et al., 2016). In drought years, the NPP decreased drastically, but following year recovered. If the similar climate extreme repeats annually, several years, the system may not be recovered, degrading irreversibly. Also, the same heat waves were more effective in wetter areas than drier areas. Ersahin, S., B.C. Bilgili, U. Dikmen, and I. Ercanlı. 2016. Net Primary Productivity of Anatolian Forests in Relation to Climate, 2000 –2010. Forest Science 62(6): 698–709. [Sabit Erşahin, Turkey]	Accept. This is now mentioned in the following paragrapgh that deals with trees
5912	41	9	41	9	"In agriculture areas they have become more common", why, reference! [Sanaz Moghim, Iran]	Accept. Sentence altered to be more clear.
7996	41	9	41	10	The statement after functioning on line 9 to period will need further clarity, and I suggest you should revise it please. [Elohor Freeman Oluowo, Vietnam]	Accept. A short introduction is now included
17604	41	9	41	23	May be an indirect effect to be mentionned is the irrigation which modify sensitive and latent heat fluxes, and/or refer to above paragraph informing these aspects? [Guillaume Bertrand, France]	Noted. This is mentioned in the last line of the paragraph
7998	41	12	41	12	I suggest you change 'globe' on line 12 to 'World' please [Elohor Freeman Oluowo, Vietnam]	Accept. Changed
8608	41	13	41	13	What do you mean by 'adaptive interventions'? Please clarify. [Philippe Louapre, France]	Accept. Changed phrase to "adaptation" and could include e.g. the adoption of heat tolerent crops.
6208	41	17	41	19	Need of a refence to the statement on heat stress on wheat. [Anna Sörensson, Argentina]	Reject. Has already been provided - Zampieri et al 2017
8000	41	18	41	19	Please revise after mid-1990s to crop yield, for more clarity please. [Elohor Freeman Oluowo, Vietnam]	Accept. Sentence revised for clarity
5724	41	19	41	19	"as drought a predictor of ….crop yield", can we say "drought" as "a predictor of crop yield"? [Sanaz Moghim, Iran]	Accept. Sentence revised for clarity
5726	41	22	41	23	"Heat stress ….is overestimated ,,,,", I believe the author needs to specify the regions, where this sentence is right (tropic, mid lat or …) [Sanaz Moghim, Iran]	Accept. Europe; this is clarified
6210	41	23	41	23	Why is it overestimated (what is overestimated? Heat stress overestimated by models)? Because the models do not include irrigation? [Anna Sörensson, Argentina]	Accept. Models referred to in Siebert 2017 are crop models, not climate models, sentence altered to reflect this
8002	41	25	41	27	I respectfully suggest you delete "decrease" on line 27 after leaves, while "decrease growth" can probably be "decreased growth" and "shift biomass allocation" need to be corrected. [Elohor Freeman Oluowo, Vietnam]	Accept. Sentence revised for clarity
194	41	25	41	27	Remove duplicate e.g. decreased [Lawrence Aribo, Uganda]	Accept. Removed
8610	41	25	41	28	This paragraph/sentence is useless. Delet it or move elsewhere. [Philippe Louapre, France]	Accept. Further information has been added to highlight that although trees/forests may be more resilient to temperature extremes and drought, they may not survive repeated occurences of these events
5728	41	42	41	44	"… especially in the humid tropics", why? why, I think especially in dry grass land or savanna [Sanaz Moghim, Iran]	Noted. This is a finding of Fernandes et al, 2017.
2734	41	45	41	45	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Noted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
288	41	46	41	49	After end of line 49 of page 41, following sentence can be added: Here, it is pertinent to note that extreme heat events are increasing in duration, frequency and intensity. [Santosh Kumar Mishra, India]	Noted: This will be mentioned in Section 2.3.5.
2732	41	46	41	49	Reference needed for this statement [Sarah Connors, France]	Noted. We think this comment refers to P41L43-45
5730	41	48	41	48	"blocking highs and variables"? [Sanaz Moghim, Iran]	Noted. See section 2.3.5.1 for blocking. Sentence altered for clarity
5368	41	9			Heat extremes impact land type and functioning. What does this imply? Not clear here. If it is to mean different types of use on land such as crop, livestock or range types then would heat alone affect that? [Daniel Danano Dale, Italy]	A short introduction is now included
5456	41	22			Despite the ingenuity, innovation and collective action by dryland agricultural populations, their adoption of SLM practices remains low. This may hold true in some cases but in general the adoption of SLM is higher in drier areas as compared to in subhumid areas and araes receiving adequate rains. Since most SLM parctices tend to favour rainwater harvesting (increase soil moisture) agricultural production increases.This is observd in countries such as Ethiopia, Kenya and also in other several African countries (SLM - Terrafrica, and World Bank reports of 2010 and 2011). SLM database in WOCAT.net also provides such information [Daniel Danano Dale, Italy]	Noted. However, we are not sure how this comment on sustainable land managament relates to the indicated line in the text, which is about heat waves
15754	41	30			Is the first sentence a sub title or a sentence? If it is a sentence then it should be rewritten for a clearer meaning. [Thompson Annor, Ghana]	Accept. This is a sentence. It is altered for clarity
6506	41				2.3.5.2 - include impact upon heritage - e.g. dessication of wetland archaeology and loss of cultural heritage (Star Carr in yorkshire, England good example of this, as result of wetland managemnt and drainage btu also vulnerable through natural processes).e.g. Brown, A. Dr C. Bradley, Dr I. Boomer & Dr T. Grapes. 2010. HYDROLOGICAL ASSESSMENT OF STAR CARR CATCHMENT, YORKSHIRE (5822). Grey literature report for English Heritage. [Hannah Fluck, United Kingdom (of Great Britain and Northern Ireland)]	Reject: The requested addition lies beyond the scope of the review.
20848	42	1	42	29	The title referst to "flooding" but the text does not assess flooding changes. Instead the issue is partially covered in 2.3.5.4 [Carolina Vera, Argentina]	"Flooding" removed from title to reflect the focus of this small section is extreme rainfall
7522	42	11	42	20	OK, but that is not the topic of this chapter; here is shoud be about how increased precipitation intensity affects land processes (erosion, flooding and redistribution between green and blue water; see for example: https://www.hydrol-earth-syst-sci-discuss.net/hess-2018-161/#discussion [Joris de Vente, Spain]	Noted: This section briefly describes historical and projected changes in extreme rainfall. Section 2.3.5.4 addresses impacts and the suggested citation and others stemming from the comment are included here
852	42	12	42	15	introduce acronym C-C on the first instance of Clausius-Clapeyron relationship [Christophe Cudennec, France]	Corrected
2736	42	23	42	23	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Noted
672	42	27	42	27	Which regions? Please specify. [Rafiq Hamdi, Belgium]	Accept. Regions specified
7524	42	32	42	43	yes, the discussion about increased exposure is valid, but there is very strong evidence about the physical basis that increased precipitation intensity will lead to higher runoff, which in many cases is reflected in higher peak discharge and flood occurence causing often also more soil erosion. [Joris de Vente, Spain]	Noted. Further evidence has been listed.
5914	42	50	42	50	"the impact of extreme rainfall on crops is less than that of temperature extremes", why?extreme rain and flood can destroy crops. [Sanaz Moghim, Iran]	Noted. The point here is though both temperatureand rainfall extremes destroy crops, temperature extremes have the larger impact.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
23284	42	15			"CC-relationship is an approximation": As far as I know the problem is not whether the relationship is an approximation, but rather that it's original intention is only computing the maximung amount of water vapour air can contain due to ist temperature, such that any prediction of precipitation extremes from it must be a crude estimate. [Alexander Graf, Germany]	Noted. Text clarified.
854	42	23			no need to say "as a result of anthropogenic greenhouse gas emissions" here, all the more this is simplifying the actual feedback loops of vapour in the atmosphere [Christophe Cudennec, France]	We thing ths comment refers to P42L18, it is not found in P42L23. Reject. The anthropgenic signal is important in the statement so we keep the current text
6508	42	31			2.3.5.4 - include cultural heritage wtithin this - archaeological remains and bulidings both vulnerable to the impcts of precipitation extremes - erosion or archaeological sites, damage to buildings and structures, shrink swell fo geological deposits affecting structures on clay geology (see BGS research on the topic - http://www.bgs.ac.uk/research/engineeringGeology/shallowGeohazardsAndRisks/hazardPotentialMapping.html [Hannah Fluck, United Kingdom (of Great Britain and Northern Ireland)]	Reject: The requested addition lies beyond the scope of the review.
5370	42	50			the impact of extreme rainfall on crops is less than that of temperature extremes. By how much? Too much or too less rainfall affects seriously crop production? Impact of rainfall ius even high in tropical areas than temprature [Daniel Danano Dale, Italy]	Noted: The context, however is extreme rainfall and extreme temperatures, not means in temperature and rainfall. The sentence is therefore unchanged
20054	43	1	43	11	The flooding may have co-benefits in saline soils, as the excess salts are washed away by floodwater. [Sabit Erşahin, Turkey]	Noted. Papers describing this will be assessed
7526	43	9	43	11	repeated flooding, or increased runoff and erosion by higher rainfall intensity will cause soil erosion, loss of nutrients and general land degradation. So there are both on-site (loss of soil quality and productivity) and off-site (inundations, reservoir sedimentation, damage to infrastrcture) effects to consider. [Joris de Vente, Spain]	Noted. This is now mentioned in an earlier paragraph
5732	43	21	43	24	"Grassland ecosystem …", why just grassland ecosystem, I believe statement is valid for almost all kinds of ecosystems. [Sanaz Moghim, Iran]	Noted. Other ecosystems are mentioned in other parts of the text. This section is particular to grasslands
2752	43	21	43	24	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Noted
20850	43	33	43	42	The description of the ENSO influence in influencing precipitation and temperature variability at regional levels is quite poor. There are more regions affected by ENSO than those mentioned. [Carolina Vera, Argentina]	Noted. This is a brief summary of ENSO influence in regions of the globe so must be short. However, it will be improved to include all regions.
196	43	37	43	38	Confirm, during Elnino rainfall is generally below normal in Tropical and subtropical land areas [Lawrence Aribo, Uganda]	Noted. ENSO efect in the tropics and subtropics is variable, e.g. El Nino causes wetter and drier than normal conditions in different parts of East Africa
19636	43	31	44	3	the reference made to South Africa shouldn't be Southern Africa regarding area impacted by ENSO? [Abou Amani, France]	Accept. Corrected to southern Africa
17676	43	31	44	20	could be relevant to mention the need to develop more research about the possible direct and indirect effects of climate pattern changes over ENSO phenomenon [Maria del Pilar Salazar Vargas, Mexico]	Noted. If literature suggests this it will be assessed
23286	43	9			soils tend *to* recover [Alexander Graf, Germany]	Accept. Text added, thank you
9096	43	30			what is TWh yr-1 [Amanullah Amanullah, Pakistan]	Reject: This unit is not found in the Chapter 2 text.
23288	43	33			variability *in* the tropical [Alexander Graf, Germany]	Accept. Altered
20252	44	4	44	4	Many more refs to support c-cycle interannual variability associated with sei-arid ecosystems [Haverd Vanessa, Australia]	Noted. The discussion on ENSO as a section has been removed and integrated into the text. The citations listed have been listed as appropriate.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
20254	44	4	44	4	Ahlström, A., Raupach, M. R., Schurgers, G., Smith, B., Arneth, A., Jung, M., Reichstein, M., Canadell, J. G., Friedlingstein, P., Jain, A. K., Kato, E., Poulter, B., Sitch, S., Stocker, B. D., Viovy, N., Wang, Y. P., Wiltshire, A., Zaehle, S., and Zeng, N.: The dominant role of semi-arid ecosystems in the trend and variability of the land CO2 sink, Science, 348, 895-899, 2015. [Haverd Vanessa, Australia]	Noted. The discussion on ENSO as a section has been removed and integrated into the text. The citations listed have been listed as appropriate.
20256	44	4	44	4	Poulter, B., Frank, D., Ciais, P., Myneni, R. B., Andela, N., Bi, J., Broquet, G., Canadell, J. G., Chevallier, F., Liu, Y. Y., Running, S. W., Sitch, S., and van der Werf, G. R.: Contribution of semi-arid ecosystems to interannual variability of the global carbon cycle, Nature, 509, 600-603, 2014. [Haverd Vanessa, Australia]	Noted. The discussion on ENSO as a section has been removed and integrated into the text. The citations listed have been listed as appropriate.
20258	44	4	44	4	Haverd, V., Smith, B., and Trudinger, C.: Dryland vegetation response to wet episode, not inherent shift in sensitivity to rainfall, behind Australia's role in 2011 global carbon sink anomaly, Global Change Biol., doi: 10.1111/gcb.13202, 2016. [Haverd Vanessa, Australia]	Noted. The discussion on ENSO as a section has been removed and integrated into the text. The citations listed have been listed as appropriate.
4112	44	7	44	7	There are many new and recent references about ENSO-related drougts in Amazon rainforest, in particular for the 2015 El Nino event: Panisset JS, Libonati R, Gouveia CMP, et al. Contrasting patterns of most extreme drought episodes of 2005, 2010 and 2015 in the Amazon Basin. Int J Climatol. 2017;DOI 10.100. doi:10.1002/joc.5224. Jiménez-Muñoz JC, Mattar C, Barichivich J, et al. Record-breaking warming and extreme drought in the Amazon rainforest during the course of El Niño 2015–2016. Sci Rep. 2016;6. Erfanian A, Wang G, Fomenko L. Unprecedented drought over tropical South America in 2016: Significantly under-predicted by tropical SST. Sci Rep. 2017;7(1):22-24. doi:10.1038/s41598-017-05373-2. [Renata Libonati, Brazil]	Noted. Further citations included
674	44	10	44	10	CMIP5 models are model???please reformulate [Rafiq Hamdi, Belgium]	Accept. Sentence revised
20602	44	10	44	12	please check wording [Bettina Weber, Germany]	Accept. Sentence revised
198	44	10	44	12	The sentence is not clear (please revisit) [Lawrence Aribo, Uganda]	Accept. Sentence revised
5734	44	13	44	13	"robust modeled increase", robust? [Sanaz Moghim, Iran]	Accept. Sentence revised
5736	44	18	44	20	needs modification! [Sanaz Moghim, Iran]	Accept. Sentence revised
2738	44	20	44	20	IPCC uncertainty language used incorrectly: a confidence statement (eg, high/medium/low confidence) is made up of 2 clauses (evidence and agreement), which must be used together. Never use only evidence or agreement statements. [Sarah Connors, France]	Noted. The discussion on ENSO as a section has been removed and integrated into the text and the text commented on has been removed.
2740	44	20	44	20	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Noted. The discussion on ENSO as a section has been removed and integrated into the text and the text commented on has been removed.
24822	44	28	44	28	Creating both……..activities: Suggersting to replace with "generating both the sorces and sinks of different GHG gases depending on managemnt activities". [Biplab Brahma, India]	Rejected, the sentence rewritten
9816	44	29	44	29	25% is dependent on how CO2-eq emissions are calculated. Some more info should be given. [Jan Fuglestvedt, Norway]	this is a result from AR5
9814	44	32	44	33	This sentence does not give enough information. [Jan Fuglestvedt, Norway]	acccept
24824	44	35	44	35	IPCC (2010). [Biplab Brahma, India]	acccept

Comment No	From Page	From Line	To Page	To Line	Comment	Response
928	44	35	44	35	Please, correct the reference to "IPCC (2010)" [Jose Luis Vicente Vicente, Germany]	acccept
20056	44	35	44	35	IPCC (2010) have…….. [Sabit Erşahin, Turkey]	acccept
25006	44	36	44	40	Such apportioning of causes of emissions and removals cannot be done. Although it is reconized that components can ve aggregated in 3 categories (natural, direct human, indirect human), it is not possible to assign an event e.g. fires to one and only one of those causes. Fires have indeed a natural component (fires are appeared on the planet well before the human beings), however there are fires of direct-human origin and (as explained in this report) indirect impacts of human actions (e.g. climate change) have an impact on the frequency and intensity of fires occurrences. So, So, I suggest to add such explanation, or you should delete the following bracketed text "(e.g. fire, windrow, disease)". [Sandro Federici, Italy]	accept will look t text
20604	44	47	44	47	definition for UNFCCC not given, yet (only further down in the text) [Bettina Weber, Germany]	acccept
9818	44	50	44	50	The reference to Serrano-Cinca seems misplaced. [Jan Fuglestvedt, Norway]	Accepted
6882	44	23	71	6	This section is long and lacks a clear narrative, and looks more like a text book [Wilfran Moufouma Okia, France]	Accepted, section revised and more focused on assessment
11330	44	5			Replace hyphen with a full stop / colon after 'compound' for clarity. [Debra Roberts, South Africa]	Noted. The discussion on ENSO as a section has been removed and integrated into the text and the text commented on has been removed.
23290	44	10			something is wrong with the sentence grammar [Alexander Graf, Germany]	Noted. The discussion on ENSO as a section has been removed and integrated into the text and the text commented on has been removed.
11328	44	10			Is there a word missing? …CMIP5 models are model….?" Somehow this sentence is not clear. [Debra Roberts, South Africa]	Accept - editorial
19470	44	10			The sentence "The IPCC AR5 report future changes in El Niño intensity in CMIP5 models are model and not significantly" does not make sense and needs to be restructured. [Francis Sundresh Mani, Fiji]	Noted. The discussion on ENSO as a section has been removed and integrated into the text and the text commented on has been removed.
16526	44	20		18	This paragraph needs more substantial evidence with more references. For example, Tölle et al. 2017 analysed the impact of ENSO combined with land-use changes and discussed consequences for agriculture based on regional model studies. (Tölle, M. H., S. Engler, H.-J. Panitz, 2017: Impact of abrupt land cover changes by tropical deforestation on South-East Asian climate and agriculture, Journal of Climate, 30, 2587-2600, DOI: 10.1175/JCLI-D-16-0131.1) [Merja Tölle, Germany]	Noted. The discussion on ENSO as a section has been removed and integrated into the text and the text commented on has been removed.
1804	44	25			substantiate with literature [Chukwuma Anoruo, Nigeria]	accept
23292	44	26			since *the* preindustrial period [Alexander Graf, Germany]	Editorial
27294	44	50			This reference has nothing to do with the Paris Agreement. [Doreen Stabinsky, United States of America]	Accepted
930	45	3	45	4	Please, add a ")" at the end of the sentence. [Jose Luis Vicente Vicente, Germany]	accept
18730	45	7	45	7	"consistent to" --> consistent, to [Hiroaki Kondo, Japan]	accept
27296	45	8	45	10	The rulebook is set to be agreed this December so I assume this text is a placeholder for what will be agreed. [Doreen Stabinsky, United States of America]	accept - make clear text and check for outcome

Comment No	From Page	From Line	To Page	To Line	Comment	Response
2366	45	12	45	12	What is the source of the following assumption: "The terrestrial biosphere absorbs about 20% of fossil-fuel C02 emissions."? [Anne-Laure Sablé, France]	Noted, text removed
26796	45	12	45	12	Elsewhere the figure of 30% of anthropognic emissions removed by terrestrial biosphere is used, citing Global Carbon Project, hence 20% used here refering solely to fossil fuel emissions seems erroneous. [Daniel Zarin, United States of America]	Noted. it coflicts and is out of place, will remove.
2780	45	12	45	29	Are these quantities based on multiple lines of evidence or from one source? Are uncertianty ranges available? Can they be assessed? [Sarah Connors, France]	Noted, text removed
21092	45	14	45	16	Tree harvesting is not necessarily only emissions, but may also be a way of maintaining or strengthening the long term carbon sink. [Maria Kvalevag, Norway]	Accepted
10084	45	17	45	17	The rate of net biome productivity has significantly accelerated from -0.007 plus minus 0.065 PgC per year squared' but the magnitude of error far exceeds the actual measurement. [Joalane Marunye, Lesotho]	Noted.
3148	45	17	45	22	In the work Erb et al., 2018 10.1038/nature25138 we show that- owing to the large difference between actual and current potential biomass stocks- either a large fraction of the emissions (115–425 PgC of the total difference of 375–525 PgC) are emitted before the industrialization period, OR, the finding of Almuth et al. on the underestimated C-emissions from land use and management are corroborated, or both. In my feeling this is an important addition to the statement on ln 17) [Karlheinz Erb, Austria]	Accepted. Revised in text.
5738	45	18	45	18	"over the warming hiatus (1998-2012", is it right? [Sanaz Moghim, Iran]	Accepted. Text revised.
23298	45	22	45	29	vegetation AND SOIL STORAGE TOGETHER must show a positive trend to match the land sink. This is a godd opportunity to either summarize what we know now beyond AR5 (where stock chamges of soil and vegetation were either not given or with large buncertainties) or to identify urgendt future reseacrh need if we don't know much more. See also row 85 of this sheet and the next row. [Alexander Graf, Germany]	Accepted. Soils added to statement.
3146	45	23	45	23	Add the reference to Erb et al., 2018 10.1038/nature25138 after the sentence. [Karlheinz Erb, Austria]	accept
21094	45	25	45	27	Check if "potential biomass stock" is compatible with the long term goal of the Paris agreement. Old forests typically have large carbon stocks but reduced removals compared to sustainably managed forests and offers less renewable biomass that can displace fossil emissions. [Maria Kvalevag, Norway]	Noted
7260	45	31	45	34	I would question the high confidence here. The Van Marle et al. product BB4CMIP is based on remote sensing, proxies and where both are absent (a large amount both temporally and spatially), the results of models from FireMIP. However, the FireMIP models have been found to be unable to match the remote sensing trend in burned area (Fig 3 in Andela et al. 2017 Science). A separate paper using a DGVM (CLASS-CTEM) is able to replicate the GFED4s trend and shows a peak in burning around the 1930s (Arora, V. K. and Melton, J. R.: Reduction in global area burned and wildfire emissions since 1930s enhances carbon uptake by land, Nat. Commun., 9(1), 1326, 2018.). Given the FireMIP models difficulty with the burned area trend and their reliance in the creation of the B4CMIP product, the confidence level in this paragraph seems overstated. (Also the Van Marle paper is not listed in the biblio) [Joe Melton, Canada]	Noted. it coflicts and is out of place, will remove.
2782	45	33	45	34	Can this be quantified? [Sarah Connors, France]	Noted, text removed

Comment No	From Page	From Line	To Page	To Line	Comment	Response
23294	45	4			closing parenthesis missing [Alexander Graf, Germany]	editorial
23296	45	19			see also Keenan et al. 2016, Nature Communications 7:13428. [Alexander Graf, Germany]	Accepted. Reference added.
11332	45				Figure: does "Atmospheric growth" mean the increase of CO2 in the atmosphere? It sounds like the atmosphere is getting thicker. [Debra Roberts, South Africa]	accept but think how to deal with as this is a GCP figure
2786	46	3	46	4	In what way? By how much? What references shoudl accompany this statement? [Sarah Connors, France]	accept - check text
15828	46	5	46	6	figure 2.4.1 presents result in gigatonnes of carbon dioxide per year… results in equivalent C would have been pertinent to adjust to result expressed for C stored in the biomass (see P 45 line 23-25 (450 Petagram of Carbon) [Jean-Luc Chotte, France]	reject, - we agreed to use CO2 as more policy relevant, te conversion should be provided somewhere but we can provide here, we could think of adding some additional text but carbon storage so large compared to the flux I am not sure it is so relevant, discuss
14358	46	5	46	6	Figure 2.4.1 presents result in gigatonnes of carbon dioxide per year… results in equivalent C would have been pertinent to adjust to result expressed for C strored in the biomass (see P 45 line 23-25 (450 Petagram of Carbon) [Rattan Lal, United States of America]	reject, - we agreed to use CO2 as more policy relevant, te conversion should be provided somewhere but we can provide here, we could think of adding some additional text but carbon storage so large compared to the flux I am not sure it is so relevant, discuss
16822	46	5	46	6	Figure 2.4.1 presents result in gigatonnes of carbon dioxide per year… results in equivalent C would have been pertinent to adjust to result expressed for C stored in the biomass (see P 45 line 23-25 (450 Petagram of Carbon) [Rattan Lal, United States of America]	reject, - we agreed to use CO2 as more policy relevant, te conversion should be provided somewhere but we can provide here, we could think of adding some additional text but carbon storage so large compared to the flux I am not sure it is so relevant, discuss
3150	46	5	46	8	I was first confuesed by the apparently too large number - but then just realized it is CO2, not C. Please insert a note that the unit is CO2/yr, not C/yr, as the original data always refer to C fluxes, and give the conversion factor of 3,667 [Karlheinz Erb, Austria]	accept - this should be somewhere in the framing but we could add a not, but really as a scientist this should be obvious, and is usual for IPCC WGIII
18734	46	19	46	19	"bookeepng" --> "bookkeeping" [Hiroaki Kondo, Japan]	editorial
15270	46	22	46	22	Not TRNEDY but TRENDY [Benjamin Quesada, Germany]	editorial
2784	46	22	46	22	TYPO: Land use change, not is [Sarah Connors, France]	editorial
18732	46	23	46	23	Foot note "land is change" --> "land use change" [Hiroaki Kondo, Japan]	editorial
23300	46	5			Fig. 2.4.1: See also row 85 of this sheet: This might be a good starting point to quantify current knowledge not only on the fluxes that are already in the figure, but also on all land-related stocks estimated in the AR5 global carbon cycle figure. [Alexander Graf, Germany]	Accepted. Figure deleted in SOD.
1042	46	19			misspelling: "bookkeeping" [Tobias Rütting, Sweden]	editorial
23302	46	21			"mean very similar to mean": grammer, meaning unclear [Alexander Graf, Germany]	editorial
15756	46				Some texts of Figure 2.4.1 cannot be read. [Thompson Annor, Ghana]	editorial
3152	47	5	47	5	There is some evidence that this is also - at least partly - driven by management changes, not only by indirect env. Changes, see eg. Erb et al. 2013 doi: 10.1038/nclimate2004 [Karlheinz Erb, Austria]	Noted.
18736	47	6	47	6	"land-both" --> "land both" [Hiroaki Kondo, Japan]	editorial

Comment No	From Page	From Line	To Page	To Line	Comment	Response
5740	47	8	47	9	"while longer growing seasons allow for higher photosynthesis", not necessarily, it depends on range of temperature in the growing season, if temperature increases more than range of requirement, plant wilts. [Sanaz Moghim, Iran]	accept -adapt text, add "typically" or qualify further as important point, can link back to 2.3
5742	47	12	47	14	"residual" is not clear. [Sanaz Moghim, Iran]	accpet - explain better
5744	47	14	47	14	"(including the atmosphere)"? [Sanaz Moghim, Iran]	editorial
18738	47	18	47	18	"budget-a" --> "budget a" [Hiroaki Kondo, Japan]	editorial
5746	47	18	47	19	"… indirect effects of environmental change", like what? [Sanaz Moghim, Iran]	accept- explain better
202	47	26	47	30	Consider rearranging the statement so that Gross versus Net comes out clearly [Lawrence Aribo, Uganda]	accept
15830	47	28	47	29	add carbon accumulation if soils in the sentence [Jean-Luc Chotte, France]	accept
14360	47	28	47	29	Add carbon accumulation in soils in the sentence [Rattan Lal, United States of America]	accept
16824	47	28	47	29	Add carbon accumulation if soils in the sentence [Rattan Lal, United States of America]	accept
18740	47	35	47	35	by (Tyukavina et al. 2015) had --> by Tyukavina et al. (2015) had There are similar mistakes for reference in this page. [Hiroaki Kondo, Japan]	editorial
10220	47	37	47	37	there is an extra parenthesis [Vanina Rosa Noemí Cosentino, Argentina]	editorial
23312	47	44	47	47	If I don't miss something or it is considered elsewhere, it is not just the delayed decay of carbon left on-site but also the fate of exported wood that makes the committed emissions an upper envelope [Alexander Graf, Germany]	Accepted. Revised in text.
2788	47	49	47	49	Suggest to make 'Carbon Emissions from fires' a sub sub section with referencable numbering (easier to find / reference to). [Sarah Connors, France]	Accept
23304	47	1			insert blank before reference [Alexander Graf, Germany]	editorial
1044	47	2			Box 2.2 (?) [Tobias Rütting, Sweden]	editorial
1806	47	4		5	substantiate with literature [Chukwuma Anoruo, Nigeria]	accept
23306	47	7			"..effects*,* e.g. rising temperature" [Alexander Graf, Germany]	editorial
23308	47	24			could not find Box 2.1, but maybe it is the Box now (wrongly?) numbered 2.2? [Alexander Graf, Germany]	editorial
23310	47	37			remove blank before except, references wrongly in parentheses [Alexander Graf, Germany]	editorial
3154	49	1	49	6	figure: the wording of the labels is ambiguous (land use change and land sink) and is potentially confusing. Maybe * direct land-use change (net) * indirect land-use induced and natural sink should be in line with terms in Fig 2.4.5 [Karlheinz Erb, Austria]	partly acccept - figure is from another source but could change, could put e.g Land sink = "indirect anthropogenic and natural effects" is a bit more in line with the IPCC definitions
18742	49	2	49	2	What means by green processes over "Fossil fuels and Industry" around 1905, 1930, and 1945 in Fig.2.4.2? [Hiroaki Kondo, Japan]	accept - need to explain in the figure, although this will be updated so may change
17678	49	2	49	2	complete the last date on the year axis, "2016" instead of only "16" [Maria del Pilar Salazar Vargas, Mexico]	editorial

Comment No	From Page	From Line	To Page	To Line	Comment	Response
7262	49	8	49	31	This whole section is very opaque. Please consder revising for clarity. [Joe Melton, Canada]	editorial
10086	49	13	49	13	It is figure 2.2.2 instead of figure 2.2.3 [Joalane Marunye, Lesotho]	editorial
5748	49	13	49	13	"… over this period", which period? [Sanaz Moghim, Iran]	editorial
10088	49	13	49	14	It is figure 2.2.2 instead of figure 2.2.3 [Joalane Marunye, Lesotho]	editorial
2790	49	14	49	14	IPCC uncertainty language used incorrectly: a confidence statement (eg, high/medium/low confidence) is made up of 2 clauses (evidence and agreement), which must be used together. Never use only evidence or agreement statements. [Sarah Connors, France]	Accept
27298	49	17	49	26	Remove Conway 2012a in both places where it appears on this page. It's irrelevant. [Doreen Stabinsky, United States of America]	check
18744	49	18	49	18	The closing parenthesis for "(" just before HYDDE is missing. [Hiroaki Kondo, Japan]	editorial
10222	49	18	49	18	there is an extra parenthesis [Vanina Rosa Noemí Cosentino, Argentina]	editorial
18746	49	21	49	21	(Houghton and Nassikas 2017) also --> Houghton and Nassikas (2017) Similar mstake appears in line 28. [Hiroaki Kondo, Japan]	editorial
10090	49	26	49	26	This is more related to Box 2.2 [Joalane Marunye, Lesotho]	discuss - in box or here, box mainly on methods and this is on data, but could consider putting in the box
15832	49	29	49	29	meaning of carbon density ? [Jean-Luc Chotte, France]	Accepted. Defined in text
14362	49	29	49	29	Meaning of carbon density [Rattan Lal, United States of America]	Accepted. Defined in text.
16826	49	29	49	29	Meaning of carbon density ? [Rattan Lal, United States of America]	Accepted. Defined in text
10394	49	29	49	29	AFOLU was responsible for approximately 25% of GHG emissions. In some places it is mentioned 20% and here 25%. Please chck for consistency [Zitouni Ould-Dada, Italy]	Accepted
23314	49	21			"this has net change" - reword [Alexander Graf, Germany]	accept
1046	49	26			Box 2.2 (?) [Tobias Rütting, Sweden]	check final numbering
5372	49	29			AFOLU was responsible for approximately 25% of GHG emissions. In some places it is mentioned 20% and here 25%. Please cross check for consistency [Daniel Danano Dale, Italy]	accepted
11334	49				Figure 2.4.2 There are green peaks sticking out behind the grey fossil fuels. If there is variability in the different curves, this should be clearly visible. Consider removing the colour fill. [Debra Roberts, South Africa]	accept - need to explain in figure better
3156	50	3	50	3	Add reference to Pongratz et al., 2018 doi 10.1111/gcb.13988 [Karlheinz Erb, Austria]	accpeted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
3588	50	5	50	7	The discussion below and the figures compare two groups of estimates: that of various "global models" and that of GHGI. Model intercomparison within a group makes sense as long as models use similar approaches and databases. However, comparing models of the two groups just does not make sense. This is because - as partly detailed in the text - the groups have very different scope, assumptions, and databases. For example: the GHGI estimate the effects of converting unmanaged forests to managed land, i.e., they have a "moving target", whereras the other models always cover the same (terrestrial) areas. If one group aims at modelling apples, while the other, pears, it is not only no wonder that the modelled estimates will be different, but that comparing the two is meaningless. What is more, it is misleading. I suggest to delete all quantitative discussion (including charts) from the text. [Zoltán Somogyi, Hungary]	Accept with modification, have revised text to make justification more clear, have discussed with the reviewer directly to ensure he accepts the changes
9820	50	5	50	8	This is important and needs coordination with the report from TFI on updates of guidelines. [Jan Fuglestvedt, Norway]	Accpet, author also on TFI report, but note the TFI report refinement does not change the methods and will not change the trend
5750	50	10	50	11	is this sentence right?, increase in land sink with increase in climate change and CO2 concentration! [Sanaz Moghim, Iran]	Accpeted, yes it is right
5916	50	12	50	13	any reference! [Sanaz Moghim, Iran]	accepted refernce added
20606	50	14	50	14	replace "fund" by "found" [Bettina Weber, Germany]	acccept
204	50	14	50	14	Replace fund by found [Lawrence Aribo, Uganda]	acccept
18748	50	15	50	15	Should this trend be negative? [Hiroaki Kondo, Japan]	Accepte removals negative, emissions possitive
10092	50	15	50	15	climate's source contribution of 0.497 plus minus 0.523 PgC per year; the magnitude of the error exceeds the actual measurement. [Joalane Marunye, Lesotho]	Noted
17680	50	18	51	3	add below the sources of these graphs [Maria del Pilar Salazar Vargas, Mexico]	accept with modificationgraph deleted
3590	50	18	52	2	In addidition to the above, FAOSTAT is also different from the GHGI data as submitted by countries in a number of ways. First, considering forests, it only reports on biomass, while countries may also report on the other carbon pools. Also, FAO's method is based on IPCC's Tier1 methodology, whereas many countries use Tier 2 or even Tier 3 which are deemed as more accurate. Third, countries may apply more detailed activity data that is available for FAO (by land use subcategories, species, spatially, over time etc.). Fourth, the box on page 52 also reports that "The carbon flux is estimated due to forest cover change (assuming instantaneous emissions in the year of forest area loss) and change in carbon stock in extant forests, but without distinguishing “managed” and “unmanaged” forest areas (Federici et al. 2015)." All these represent considerable differences from all other methods; and all of these (and probably other) differences should be reported in the box on page 52.. [Zoltán Somogyi, Hungary]	Accepted with modification. Some of these differences are included in the revised text.
11336	50	14			spelling "found that" [Debra Roberts, South Africa]	acccept
19472	50	15			"The units are wrong the trend should be reported as 0.121 ± 0.055 PgC yr-1 and not PgC yr-2 [Francis Sundresh Mani, Fiji]	Rejected. Trend should be PgC yr-2.
10224	51	12	51	12	the parenthesis is missing [Vanina Rosa Noemí Cosentino, Argentina]	Accepted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
3158	51	16	51	16	Box, first para: bookkeeping models do also refer only to major management activities, such as timber harvest Secondary forest uses such as pruning, litter raking or forest grazing are not taken into account, but these activities also affect carbon stocks. Also the omission of these activities leads to the same potential overestimate of Carbon stocks in the past (Erb et al. 2013 doi: 10.1038/nclimate2004) [Karlheinz Erb, Austria]	Accepted.
11910	51	16	52	1	Box 2.2 seems to be missing Micrometeorological flux measurements. These are the only direct measurements available for verification of the other listed methods at the ecosystem scale level. Global and regional Flux Networks - FluxNet (Global), AsiaFlux, Ameriflux (North America), ICOS (EU), NEON (USA), etc. - all contributed to the global flux database which is broadly used to verify the results of the modeling, inventory and remote sensing methodologies. It would make sense to mention all of this information in the Box 2.2 [Burba George, United States of America]	Accepted. The method has been added to the Box.
9822	51	16	52	1	Useful box. [Jan Fuglestvedt, Norway]	noted
9824	51	16	52	1	mention use of information from isotopes? [Jan Fuglestvedt, Norway]	Accepted.
2792	51	16	52	1	This box is really useful for readers who are not familar with all the model types assessed in this report - thanks for the addition. The section on Bookkeeping models is missing references (compared to the other paragraphs). ESM and IAMs are very different models and so could be treated separately, rather than in one paragraph together. Could these differences and similarities be summaried visually somehow? Coudl cross-refering the subsections where these models are assessed withing chapter 2 be included in the text? Although a bit technical, perhaps an explaintion of these techniques and the information they give could be rephrased into a FAQ for chapter 2? [Sarah Connors, France]	Accepted with modification.
3592	51	6			The reference to the FAO database is poor. [Zoltán Somogyi, Hungary]	Accepted
3594	51	16			The methodology of the GHGI is not summarized in the box. [Zoltán Somogyi, Hungary]	Accepted, now included

Comment No	From Page	From Line	To Page	To Line	Comment	Response
15248	51	52			Box 2.2. There are currently no references for the atmospheric inversion. The last phrase, "However, inversions give only the net flux of CO2 from land, they cannot separate natural and anthropogenic fluxes." Is not entirely true. Multi-constituent inversions using CO2, CO, and Solar Induced Fluorescence, have been used to separate natural processes and in cases of fires, anthropogenic as well. This was done in J. Liu, K. W. Bowman, D. S. Schimel, N. C. Parazoo, Z. Jiang, M. Lee, A. A. Bloom, D. Wunch, C. Frankenberg, Y. Sun, C. W. O'Dell, K. R. Gurney, D. Menemenlis, M. Gierach, D. Crisp, and A. Eldering, "Contrasting carbon cycle responses of the tropical continents to the 2015–2016 El Niñ˜o," Science, vol. 358, 10 2017. K. W. Bowman, J. Liu, A. A. Bloom, N. C. Parazoo, M. Lee, Z. Jiang, D. Menemenlis, M. M. Gierach, G. J. Collatz, K. R. Gurney, and D. Wunch, "Global and Brazilian carbon response to El Niñ˜o Modoki 2011-2010," Earth and Space Science, vol. 4, 2017. L. V. Gatti, M. Gloor, J. B. Miller, C. E. Doughty, Y. Malhi, L. G. Domingues, L. S. Basso, A. Martinewski, C. S. C. Correia, V. F. Borges, S. Freitas, R. Braz, L. O. Anderson, H. Rocha, J. Grace, O. L. Phillips, and J. Lloyd, "Drought sensitivity of amazonian carbon balance revealed by atmospheric measurements," Nature, vol. 506, pp. 76–80, 02 2014. I. T. van der Laan-Luijkx, I. R. van der Velde, M. C. Krol, L. V. Gatti, L. G. Domingues, C. S. C. Correia, J. B. Miller, M. Gloor, T. T. van Leeuwen, J. W. Kaiser, C. Wiedinmyer, S. Basu, C. Clerbaux, and W. Peters, "Response of the amazon carbon balance to the 2010 drought derived with carbontracker south america," Global Biogeochemical Cycles, vol. 29, no. 7, pp. 1092–1108, 2015. [Kevin Bowman, United States of America]	Noted.
3160	52	1	52	1	Box, third para: please mention the significant uncertainties and lack of agreement, among satellite products/model results and with ground data: Avitabile V, Herold M, Heuvelink GBM, et al (2016) An integrated pan-tropical biomass map using multiple reference datasets. Global Change Biology 22:1406–1420. doi: 10.1111/gcb.13139 Mitchard ET, Saatchi SS, Baccini A, et al (2013) Uncertainty in the spatial distribution of tropical forest biomass: a comparison of pan-tropical maps. Carbon Balance and Management 8:10. doi: 10.1186/1750-0680-8-10 Mitchard ETA, Feldpausch TR, Brienen RJW, et al (2014) Markedly divergent estimates of Amazon forest carbon density from ground plots and satellites. Global Ecology and Biogeography 23:935–946. doi: 10.1111/geb.12168 Saatchi S, Mascaro J, Xu L, et al (2015) Seeing the forest beyond the trees. Global Ecology and Biogeography 24:606–610. doi: 10.1111/geb.12256 [Karlheinz Erb, Austria]	Accepted with modification. Text revised if not in the Box itself.
23316	52	1			Box 2.2: The increasing (although so far mostly indirect by use as validation for models) importance of the eddy-covariance flux tower network is not reflected, and the sole place where it is hinted at ("flux towers network" in paragraph "Atmospheric Inverions") might be wrong, because most atmospheric inversions prefer to use high-accuracy CO2 concentration measurements from tall towers, rather than the concentrations of flux towers. [Alexander Graf, Germany]	Accepted with modification.
19474	52	16			the word "belowground" should be written as below-ground so that it is consistent with the rest of the text in the chapter. [Francis Sundresh Mani, Fiji]	Accepted.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
2470	53	3	53	3	Perhaps the authors could include a discussion of the significance of the trends in the caption of Fig. 2.4.4 and in the text. Similarly, for other mention of trends in the chapter. [William Lahoz, Norway]	Accepted with modification. The Figure referred to has been deleted, but the text has been mofified.
24826	53	9	53	11	Suggesting to incorporate the sink values for tropical regions and emission values for outside the tropical regions. [Biplab Brahma, India]	Accepted with modification. The text now includes a discussion of gross emissions and removals.
26798	53	12	53	13	Clarification is needed here, since the term "rates" seems to be used in reference to an annual percentage loss, whereas it could be interpreted to mean an annual rate of area loss - in which case the statement would be false. Rate just means change over time, so please clarify accordingly. [Daniel Zarin, United States of America]	accepted with modification - text now deleted
7410	53	19	53	19	Maybe it could be useful to report some figures about global soil pool (1.500 +/- 230 Gt in the first meter of soil, according to Le Qéré et. al. 2016) and loss (according to FAO, 2017, roughly 33% of the world's soils are degraded with a loss of 25-75% of their original SOC pool. This amounts to 42-78 Gt of carbon but can also provide an opportunity: the recoverable carbon reserve capacity of the world's agricultural and degraded soils is estimated to be between 21 to 51 Gt of carbon) [Stefano BRENNA, Italy]	Accepted with modification. Global changes in soil carbon are in the revised text.
2472	53	19	53	19	What is the meaning of the word “significant”? In the statistical sense, or in the sense of a large amount? Perhaps, here and elsewhere, the authors could clarify this. Another example is P. 2-60, L. 36. [William Lahoz, Norway]	accepted with modification - text now deleted
20058	53	20	53	20	.....amount of soil organic carbon..... [Sabit Erşahin, Turkey]	editorial
20060	53	21	53	21	.....land (Recha et al. 2013; Poeplau et al. 2011). [Sabit Erşahin, Turkey]	editorial
15834	53	22	53	22	What is the difference between "sequestered carbon and SOC" this needs clarification [Jean-Luc Chotte, France]	accepted with modification - text now deleted
14364	53	22	53	22	What is the difference between "sequestered carbon and SOC" this needs clarification [Rattan Lal, United States of America]	accepted with modification - text now deleted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
1722	53	22	53	24	This sentence is misleading. SOC stocks - let alone carbon stocks which would include tree biomass - are not generally higher in grassland than in forests. SOC inventories in many countries do eiter find no significant difference between forests and grassland SOC stocks or find forest SOC stocks to be higher (Lettens et al., 2005; Reynolds et al., 2013). Moreover, the most complete meta-analysis of actual forest <-> grassland transitions find no significant difference in total SOC before and after the transition (Poeplau et al., 2011; Poeplau and Don, 2013). I would therefore replace the sentence with "In a given set of pedo-climatic conditions, SOC stocks are generally similar in forests and grasslands." Lettens, S., Orshoven, J., Wesemael, B., Muys, B., Perrin, D., 2005. Soil organic carbon changes in landscape units of Belgium between 1960 and 2000 with reference to 1990. Global Change Biology 11, 2128–2140. https://doi.org/10.1111/j.1365-2486.2005.001074.x Poeplau, C., Don, A., 2013. Sensitivity of soil organic carbon stocks and fractions to different land-use changes across Europe. Geoderma 192, 189–201. https://doi.org/10.1016/j.geoderma.2012.08.003 Poeplau, C., Don, A., Vesterdal, L., Leifeld, J., van Wesemael, B., Schumacher, J., Gensior, A., 2011. Temporal dynamics of soil organic carbon after land-use change in the temperate zone – carbon response functions as a model approach. Global Change Biology 17, 2415–2427. https://doi.org/10.1111/j.1365-2486.2011.02408.x Reynolds, B., Chamberlain, P.M., Poskitt, J., Woods, C., Scott, W.A., Rowe, E.C., Robinson, D.A., Frogbrook, Z.L., Keith, A.M., Henrys, P.A., Black, H.I.J., Emmett, B.A., 2013. Countryside Survey: National "Soil Change" 1978–2007 for Topsoils in Great Britain—Acidity, Carbon, and Total Nitrogen Status. Vadose Zone Journal 12, 0. https://doi.org/10.2136/vzj2012.0114 [Valentin Bellassen, France]	accepted with modification - text now deleted
18750	53	23	53	23	What means by "(re-)"? [Hiroaki Kondo, Japan]	accepted with modification - text now deleted
23318	53	19			lose *a* significant amount [Alexander Graf, Germany]	editorial
11340	53	30			Please clarify "store up to …% of the world's terrestrial biological carbon pool", that this does not mean all biological carbon as in biomass, but… exactly what? [Debra Roberts, South Africa]	accepted with modification - text now deleted
11338	53				Figure: please define region acronyms on X-axis [Debra Roberts, South Africa]	accepted with modification - figure now replaced
10334	54	2	54	2	I'm not sure wetlands are defined just as "mangroves, tidal marshes, and seagrasses". Should be coastal wetlands [John Devaney, Ireland]	Accepted. There is a Box on wetlands in the revised text.
7264	54	2	54	3	Please add 'coastal' in front of wetlands here. It otherwise is confusing. [Joe Melton, Canada]	Accepted. There is a Box on wetlands in the revised text.
19098	54	2	54	5	Sand-filling of waterbodies has also contributed greatly to the loss of wetlands globally in the last 50-100years. These sand-fillings are done to make provision for economic developments. [Nkechinyelu Oranye, Nigeria]	Accepted. There is a Box on wetlands in the revised text.
2754	54	14	54	14	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Accepted. Liklihood deleted.
10298	54	19	54	24	Confused prayer. Should not the country you are talking about be specified? Or some geographical tendency? [Vanina Rosa Noemí Cosentino, Argentina]	Accepted. Text revised.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
676	54		56		The reference to Grassi et al. Is cited many times, perhaps is better to see what other groups in the world are doing. [Rafiq Hamdi, Belgium]	Accepted, there is no other referenc that has done this assessment to date, although Fuglestvedt et al., 2018 also calls for reconciliation and is added to text
9826	54	22	58	7	The issue discussed here (i.e. reconciling the estimates) is very improtant and I hope the SRCCL can significntly contribute to improvement here. [Jan Fuglestvedt, Norway]	J. Liu, K. W. Bowman, D. S. Schimel, N. C. Parazoo, Z. Jiang, M. Lee, A. A. Bloom, D. Wunch, C. Frankenberg, Y. Sun, C. W. O'Dell, K. R. Gurney, D. Menemenlis, M. Gierach, D. Crisp, and A. Eldering, "Contrasting carbon cycle responses of the tropical continents to the 2015–2016 El Niñ̃o," Science, vol. 358, 10 2017.
9828	54	22	58	7	The issue of reconciling estimates is also discussed in Fuglestvedt et al., 2018 in the context of achieving greenhouse gas balance according to the Paris Agreement. [Jan Fuglestvedt, Norway]	L. V. Gatti, M. Gloor, J. B. Miller, C. E. Doughty, Y. Malhi, L. G. Domingues, L. S. Basso, A. Mar- tinewski, C. S. C. Correia, V. F. Borges, S. Freitas, R. Braz, L. O. Anderson, H. Rocha, J. Grace, O. L. Phillips, and J. Lloyd, "Drought sensitivity of amazonian carbon balance revealed by atmospheric measurements," Nature, vol. 506, pp. 76–80, 02 2014.
9830	54	22	58	7	The issue discussed here (i.e. reconciling the estimates) is very important and I hope this will be taken to the SPM level. [Jan Fuglestvedt, Norway]	K. W. Bowman, J. Liu, A. A. Bloom, N. C. Parazoo, M. Lee, Z. Jiang, D. Menemenlis, M. M. Gierach, G. J. Collatz, K. R. Gurney, and D. Wunch, "Global and Brazilian carbon response to El Niñ̃o Modoki 2011-2010," Earth and Space Science, vol. 4, 2017.
1048	54	2			suggest "Coastal wetlands" [Tobias Rütting, Sweden]	Accepted. There is a Box on wetlands in the revised text.
3596	54	22			The section is only able to provide "conceptual" analysis of differences. This must clearly be stated. Also, as with other papers, only the substance should be summarized in the chapter [Zoltán Somogyi, Hungary]	I. T. van der Laan-Luijkx, I. R. van der Velde, M. C. Krol, L. V. Gatti, L. G. Domingues, C. S. C. Correia, J. B. Miller, M. Gloor, T. T. van Leeuwen, J. W. Kaiser, C. Wiedinmyer, S. Basu, C. Clerbaux, and W. Peters, "Response of the amazon carbon balance to the 2010 drought derived with carbontracker south america," Global Biogeochemical Cycles, vol. 29, no. 7, pp. 1092–1108, 2015.
15836	55	1	55	1	Figure 2.4.5 not very clear ! [Jean-Luc Chotte, France]	editorial
14366	55	1	55	1	Figure 2.4.5 not very clear [Rattan Lal, United States of America]	editorial
16828	55	1	55	1	Figure 2.4.5 not very clear ! [Rattan Lal, United States of America]	editorial
3162	55	1	55	10	nice and helpful figure!! The plates below to the right are empty, need a revision [Karlheinz Erb, Austria]	Accpeted, figure refined
18752	55	12	55	12	"removal" --> "removals." [Hiroaki Kondo, Japan]	editorial
2794	55	12	55	27	This slightly overlaps with chapter 1's text on the GS and the PA. Perhaps this can be condence or combined with Chapter 1? [Sarah Connors, France]	Accept with modification -we need the text for the narrative of this section whichhhas a focus on GHG flux.
24828	55	14	55	14	Grassi et al. (year???). [Biplab Brahma, India]	editorial
18754	55	18	55	18	"Figure 2" is ambiguous. There is no figure named as "Figure 2". [Hiroaki Kondo, Japan]	editorial
23320	55	1			Fig. 2.4.5: last (colorful but empty) 3 subpanels are placeholders? [Alexander Graf, Germany]	Accpeted, figure refined

Comment No	From Page	From Line	To Page	To Line	Comment	Response
3598	55				Figure 2.4.5: redundant and unclear figure with poor heading. What is ARD and FM? (FM is a term under the Kyoto Protocol.) What is LASC? What is full and what is partial colouring? Why is the heading (Direct HI, indirect HI, "Natural effects") repeaded in figure b (and, inconsistently, not in all others)? Why do "natural effects" do not list natural effects such as species composition, growth and decomposition rate, climate etc.? ("Natural interannual variability" is, well, the variability of the data but not effects that affect emission levels.) 3. Bookkepping: what is the difference between ARD+wood harvest and ARD and Mgmt.? What are the three last boxes in the lower row? The figure does not say, either, that LUC can happen within the managed land, but also from unmanaged to managed land. [Zoltán Somogyi, Hungary]	Accepted, figure substantially revised
20062	56	3	56	3	……increased policy ambition (Grassi et al. 2018). [Sabit Erşahin, Turkey]	accept, text now deleted
24830	56	7	56	7	IPCC(2006; 2013). [Biplab Brahma, India]	acccept
2796	56	7	56	7	Incorrect reference of previous IPCC report. The 2006 guidelines shoudl be cited as: IPCC 2006, 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Prepared by the National Greenhouse Gas Inventories Programme, Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). Published: IGES, Japan. [Sarah Connors, France]	acccept
20064	56	28	56	28	….forest age-related dynamics (Canadell et al. 2007; Grassi et al. 2018). [Sabit Erşahin, Turkey]	acccept
10226	56	41	56	51	the appointments have different format [Vanina Rosa Noemí Cosentino, Argentina]	editorial
23322	56	43	56	45	the bookkeeping model directly model*s* land management [Alexander Graf, Germany]	editorial
20066	56	47	56	48	Grassi et al. (2018) use a……. [Sabit Erşahin, Turkey]	editorial
19476	56	17			"Ipcc 2003 should be written as IPCC 2003" [Francis Sundresh Mani, Fiji]	acccept
6510	56	43			what impact cultural practices such as coppicing? 'management' covers too many things. [Hannah Fluck, United Kingdom (of Great Britain and Northern Ireland)]	Noted - the Managed land proxy includes all fluxes on managd alnd and the country defines managed land.
3604	57	2	57	3	" It is possible for GHGIs to provide more transparent and complete information on managed forests" - it is certainly the aim of the GHGI community to achieve this goal. However, if "managed land" will remain the focus - which it will for some time -, then the "reconciliation" with other models that cover unmanaged land is illusion. Also, the "managed land proxy" may be replaced in the future in which case the focus of the GHGI will remain the "anthropogenic" component while that of other models will remain anthropogenic + natural. [Zoltán Somogyi, Hungary]	noted - The reconciliation, or at least udnerstanding as far as possible of differences, is necessary to the global stocktake. Have clarified this in the text and discussed direct with the reviewer
20068	57	5	57	5	Since the bookkeeping model (Houghton and Nassikas 2017)……. [Sabit Erşahin, Turkey]	editorial
20070	57	6	57	6	……which currently is not always the case (Frederici et al., 2017). [Sabit Erşahin, Turkey]	editorial
10228	57	7	57	7	the end point is missing [Vanina Rosa Noemí Cosentino, Argentina]	editorial
20072	57	12	57	12	…….used for developing mitigation pathways (2.7). [Sabit Erşahin, Turkey]	editorial
18756	57	28	57	38	In Fig.2.4.6b the patterns for primary forest for bookkeeping model, primary forest DGVMs and Unmanaged forest GHGIs extend over the boundary of each box and the areas are detriorated. [Hiroaki Kondo, Japan]	accpted, figure now revised

Comment No	From Page	From Line	To Page	To Line	Comment	Response
10230	57	56	57	56	missing a point between 2018) and Estimates [Vanina Rosa Noemí Cosentino, Argentina]	editorial
26456	57	2			Any assessment of what works best for global stocktake? [Hans Poertner and WGII TSU, Germany]	Noted
3602	57	2			"Reconciliation of the differences would enable a more credible Global Stocktake." - this is simply NOT TRUE. Also, the Global Stocktake is not aimed at managing all natural processes. For example, according to the Global Carbon Budget, there are huge natural fluxes into both directions in the terrestrial bioms (much larger than the net anthropogenic effect), and humanity cannot really affect these. The aim of the PA (Art. 4) is" to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century". What is relevant for the PA is not all emissions and removals, but only those antrhopogenic. Therefore, while scientific studies of all emissions and removals are important, the development of that methodology (i.e., the national greenhouse gas inventories) that will be used for mitigation projects and the PA should get priority, and this method should not be mixed with methodologies for different purposes. Also, without a full exploration of the differences between models, the reconciliation is just not possible. [Zoltán Somogyi, Hungary]	accepted with modification , the PA agreement requires comparing progress (inventories) with targets (Iam pathways) as these are coenptually different ther eis a need to understand and reconcile . Tried to clarify in the text and discussed direct with review4r
11342	57				Figure 2.4.6 This section is extremely technical. A figure should help a non-specialist understand. Is it possible to use this figure (and/or the previous figure) to explain in simple terms what this section tries to convey? Right now the figure is also extremely technical and difficult to understand. [Debra Roberts, South Africa]	accpted, figure now revised
3600	57				Figure 2.4.6 is not only meaningless but misleading, and should be deleted. Estimates using very differrent models with different scopes (trying to estimate different kinds of fruits) should not be compared. [Zoltán Somogyi, Hungary]	accpted with modification figure now revised
18758	58	7	58	7	"(see Methods)" Which methods does this mean? The reference point is ambiguous. [Hiroaki Kondo, Japan]	Accepted, we have added a reference to the atmospheric inversoin method.
11912	58	10	58	29	This section seems to be missing Micrometeorological flux measurements. These are the only direct measurements available for verification of the other listed methods for CH4 fluxes at the ecosystem scale level. [Burba George, United States of America]	Rejected, this section deals with global estimates. Micromet methods are appropriate for field scale estimation. We have modified the text to reflect the scale that we are addressing.
9834	58	23	58	23	The reference to Taraborreli et al seems odd and very narrow in this context. Broader studies like Prather et al are more relevant here. You could also refer to AR5 WGI, ch 8 and 2. [Jan Fuglestvedt, Norway]	Rejected, we cited Prather. Taraborelli explains the mechanism by which OH is recycled in the atmosphere and how recycling is nonlinear and dependent on precursors. We pick up this theme later and discuss new findings on atmospheric trends of OH. We did not cite AR5 because new understanding is emerging.
2798	58	24	58	24	Is there a citation for ACCMIP? Rather than using the weblink [Sarah Connors, France]	Accepted, weblink changed for the reference.
7266	58	32	58	32	The 1843 ppb needs a reference. [Joe Melton, Canada]	Accepted
9832	58	9	60	43	I think this section needs use of more recent references. [Jan Fuglestvedt, Norway]	Accepted, we have focused on literature since 2013 that would not have been included in AR5. We will work newer literature into the text.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
426	58	31	60	46	In the discussion of recent atmospheric trend, this reference should be included: Worden, J. R., Bloom, A. A., Pandey, S., Jiang, Z., Worden, H. M., Walker, T. W., Houweling, S., and Röckmann, T.: Reduced biomass burning emissions reconcile conflicting estimates of the post-2006 atmospheric methane budget, Nature Communications, 8,2227, 10.1038/s41467-017-02246-0, 2017. [Ragnhild Bieltvedt Skeie, Norway]	Accepted
11344	58	21			Please explain the relevance of OH. [Debra Roberts, South Africa]	Accepted, an explanation has been added.
9836	59	6	59	17	The material presented here is old. Try to use more recent. [Jan Fuglestvedt, Norway]	Accepted: Removed the Frankenberger reference, but the Bergamaschi analysis is was published after the AR5 was written, so it is appropriate to include here.
2474	59	9	59	9	Typo: SCIAMACHY. Check typos in text. [William Lahoz, Norway]	Accepted
17682	59	13	59	13	If is the first time that EDGAR is mentioned, is necessary to describe it: "EDAGAR (Emissions Database for Global Atmospheric Research)". This description only apperars until page 62 [Maria del Pilar Salazar Vargas, Mexico]	Accepted
424	59	13	59	13	Here numbers for EDGAR v4.2 is used. These emissions for China is updated in EDGAR v4.3.2. Should include these updated emission numbers in the text. [Ragnhild Bieltvedt Skeie, Norway]	Accepted, the numbers have been updated.
19478	60	11	60	18	"the unit is written as Tg y-1 wheeras in the rest of document it is written as Tg yr-1" [Francis Sundresh Mani, Fiji]	Accepted
2476	60	12	60	12	An editorial point: The authors write here “Northern Hemisphere” capitalized, and not capitalized in the previous page. [William Lahoz, Norway]	Accepted, it should be capitalized
24832	60	16	60	17	Statement seems to be incomplete/ not clear. [Biplab Brahma, India]	Accepted, the sentence has been clarified.
5978	60	16	60	24	Patra et al. (2016) conducted another analyses on the historical change (inclduing the rise after 2007) in atmospheric methane. Patra, P. K., et al. (2016). "Regional methane emission estimation based on observed atmospheric concentrations (2002–2012)." Journal of the Meteorological Society of Japan 94: 91–113. [Akihiko Ito, Japan]	Accepted
2756	60	17	60	18	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Accepted, changed to probable.
7272	60	17	60	19	It would be easier to compare and understand if the methane emissions are given also in a percent since the OH change is given in that manner. [Joe Melton, Canada]	Rejected (regretfully): The authors did not present the full budget in the paper and only reported the emissions change. I could infer a change using a comparable budget by another author. Note that I am not sure that this would be helpful as the relationshp between the gases is not 1:1 since OH reacts with many species in the atmosphere.
7270	60	26	60	34	Also see the Worden paper (Worden, J. R., Bloom, A. A., Pandey, S., Jiang, Z., Worden, H. M., Walker, T. W., Houweling, S. and Röckmann, T.: Reduced biomass burning emissions reconcile conflicting estimates of the post-2006 atmospheric methane budget, Nat. Commun., 8(1), 2227, 2017.) [Joe Melton, Canada]	Accepted
24834	60	28	60	28	Schaefer et al. (2016). [Biplab Brahma, India]	Accepted
24836	60	31	60	31	tropics north of the equator: suggesting to change with " northern tropics". [Biplab Brahma, India]	Accepted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
2758	60	33	60	33	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Accepted
11346	60	36	60	43	Please expand this concluding paragraph significantly. The text in the section 2.4.2 is too technical for a non-specialist to understand, and the most important findings should be summarised here in plain English, including the sources of CH4, and the implications of the findings. 2.4 "GHG fluxes from unmanaged and managed land" is the title of this section. [Debra Roberts, South Africa]	Accepted
18760	60	36	60	43	It is unclear why this conclusion is obtained from the previous paragraphs. Previous paragraphs seems to show that there are many uncertainties, however the contents of this paragraph seems to be more deterministic. [Hiroaki Kondo, Japan]	Rejected: IPCC has calibrated levels of certainty for assessment reports. The terminology is consistent with IPCC guidelines.
5980	60	37	60	38	Poulter et al. (2017) provide another modle-based evidence on the quasi-stable methane emission from wetlands. Poulter, B., et al. (2017). "Global wetland contribution to 2000–2012 atmospheric methane growth rate dynamics." Environmental Research Letters 12(094013): doi:10.1088/1748-9326/aa8391. [Akihiko Ito, Japan]	Accepted
7268	60	39	60	39	The medium confidence here is more appropriate than the high confidence given for the same point in the Executive Summary (p 6 line 38). They should be made consistent. [Joe Melton, Canada]	We have adjusted several of the confidence levels in light of new papers included in the review and we will make these consistent in the executive summary.
2800	60	41	60	43	The inclusion of this conclusion paragraph is very useful but is the assessment that there is 'medium confidence' that tropical sources MAY be playing a role or ARE playing a role? If possible, this section could be summarised more consisely as it currently reads quite long. [Sarah Connors, France]	Rejected: another reviewer has asked that we flesh the conclusion out more for the nonspecialist reader.
7274	60	45	60	45	It seems that this whole section should be placed before 2.4.2.2. It would read better and it is a bit strange to talk about trends before budget. [Joe Melton, Canada]	Rejected: the logic of trends before budget makes sense to us.
9838	60	45	62	1	Very good that there is a section on budget, but this needs more assessment - not just showing what the studies have found. In addition to asssessing the published budget, you may consider deriving your own by modifying or adjusting the published ones. [Jan Fuglestvedt, Norway]	Rejected. The point here is to assess the literatrure. Each budget presented uses a different time frame, so there is no point trying to construct a composite budget. The interesting thing is to compare bottom up and top down approaches which is what we do.
21096	60	45	64	17	Methane from biogenic sources are different from fossil sources e.g. the effect on radiative forcing, as only methane from fossil fuels result in a net addition of CO2 to the atmosphere following atmospheric oxidation. Consider to add some text about this under paragraph 2.4.2.3 [Maria Kvalevag, Norway]	Rejected: We really did not discuss indirect CO2 contributions from CH4 oxidation and there are no new findings on this in the literature.
19482	60	28			The sentence begings with a reference and should be written as "Schaefer et al. (2016)" and not as (Schaefer et al., 2016) [Francis Sundresh Mani, Fiji]	Accepted
19480	60				The major sink is OH radical but there is some stratospheric sink as well. Would it possible to quantify the transport and quantify this loss? [Francis Sundresh Mani, Fiji]	The point of this SR is on the interactions between land and the climate system. AR will revise the atmospheric chemistry of the CH4 cycle. We included the discussion of the OH sink because that is what allows us to conclude that wetlands are not responsible for the reprise of growth.
23324	61	6	61	14	check aligment (redundancies / contradictions) with previous subsections [Alexander Graf, Germany]	Accepted
18762	61	16	61	16	"Table 0.4.1" --> Table 2.4.1 [Hiroaki Kondo, Japan]	Accepted
678	61	16	61	16	Table 2.4.1? [Rafiq Hamdi, Belgium]	Accepted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
10232	61	16	62	3	in the table after non land-based there is a parenthesis of more [Vanina Rosa Noemí Cosentino, Argentina]	Comment is unclear
10234	61	16	62	3	Format incompatibility. It is difficult to see to which category some of the values belong. [Vanina Rosa Noemí Cosentino, Argentina]	We have reduced the font size to improve the formatting.
3606	61	16			While this table, too, is usefule to see how scientific estimates compare, what would be important for mitigation and the PA is an analysis of the current status of data from GHGIs. [Zoltán Somogyi, Hungary]	Accepted, we received the GHGI data in the final days of writing this section and will expand the treatment of those data.
18764	62	11	62	12	It seems to be the same color for FAO (Non-Annex 1) and EDGAR (Annex 1) in Fig.2.4.8. [Hiroaki Kondo, Japan]	Accepted, the color has been changed
17684	62	11	62	14	Figure 2.4.8 has two bars with the same gray color (FAO (Non-Annex 1) and EDGAR (Annex 1)), it isnt possible to distinguish them. It´s the same comment for Figure 2.4.11 [Maria del Pilar Salazar Vargas, Mexico]	Accepted, the color has been changed
11348	62	16	62	26	In this paragraph it would be extremely informative if the total agricultural emissions were divided by the total population, to highlight the regional differences of per capita emissions, and also if some attention were paid to consumption patterns, as in all the cattle - where is the meat being consumed? This is highly relevant information that mitigation sections needs to be able to refer to. It is not appropriate simply to conclude that "most of the livestock emissions are from developing countries". [Debra Roberts, South Africa]	Rejected, given the international trade in agricultural products, I am not sure what this would tell us.
2368	62	19	62	19	The fact that most of the livestock emissions are from developing countries does not give any information on dynamics around trade: there is a need to specify the % of exported livestock from developing countries to developed countries. [Anne-Laure Sablé, France]	Accepted. A sentence has been added above.
24838	62	26	62	26	These trends are predicted to be continued …….. [Biplab Brahma, India]	Rejected.
10236	62	26	62	26	The appointment is not in the bibliography [Vanina Rosa Noemí Cosentino, Argentina]	Accepted. It was listed as EPA, not USEPA. This has been corrected.
5374	62	4			for tracking emissions for agriculture, forestry and other land use (AFOLU). Please replace for with from [Daniel Danano Dale, Italy]	Accepted
20608	63	2	63	13	Legend of Figure 2.4.9 and figure do not really fit together, as methanogenic processes, which are expleined in the legend, are not shown in the figure. On the other hand, "enteric fermentation" which is shown as a major parameter in the figure, is not explained at all in the legend. [Bettina Weber, Germany]	Accepted
24564	63	2	63	13	Shorten figure caption [Christopher Morhart, Germany]	Accepted
11350	63	2	63	13	Figure 2.4.9 Currently the legend is a paragraph that explains CH3 processes in the soil, and belongs in the text. The figure legend should briefly explain the four categories of CH3 emissions shown in the figure, starting with the largest (enteric fermentation). [Debra Roberts, South Africa]	Accepted: there was a formatting error in compiling the section.
24840	63	22	63	22	it is expected to be continued to increase…….. [Biplab Brahma, India]	Rejected: the expression is correct as originally written.
20074	63	23	63	23	……..much as 1 Tg in the 21st century. [Sabit Erşahin, Turkey]	Accepted
1050	63	31	64	2	What is the time-frame of these resposnes? The change in emissions aftre rewetting or drianage probbaly changes with time. So the questions is if altered emissions are long-lasting or not. [Tobias Rütting, Sweden]	Acceted: The authors did not analyze time effects and the site to site varaibility would likely have swamped any time effect. We have added the results of another study that has a more temporal approach.
6512	63	25			Northern peatlands also often contain cultural rich archaeological deposits - e.g. Star Carr, Yorkshire (see above for refs) [Hannah Fluck, United Kingdom (of Great Britain and Northern Ireland)]	Rejected: this is not within the scope of this chapter

Comment No	From Page	From Line	To Page	To Line	Comment	Response
1126	63	32		33	drainage can reduce CH4 emissions, but CO2 emissions increase due to enhanced SOC degradation [Rosa Francaviglia, Italy]	Rejected: I agree, but this section is focused on CH4.
1052	64	5	64	9	The altered CO2 emissions should also be mentioned (even though this paragraph is about CH4) [Tobias Rütting, Sweden]	Rejected: CO2 emissions from peatlands are treated elsewhere.
20076	64	22	64	22	.....2016 (Dlugokencky 2003) (Figure 2.4.10). [Sabit Erşahin, Turkey]	Accepted
10238	64	22	64	22	there is an extra parenthesis [Vanina Rosa Noemí Cosentino, Argentina]	Accepted
9840	64	28	64	28	Re "approximately 6%": Where is this taken from? For which year? [Jan Fuglestvedt, Norway]	Accepted, the year and the reference to AR5 has been added.
9842	64	30	64	31	This statement needs to be checked with WMO/UNEP Ozone Assessment and the authors there. [Jan Fuglestvedt, Norway]	Noted: indeed with the decline of atmospheric CFC's N2O is the dominant O3 depletor. The 2014 WMO Ozone Assessment has now been cited here
20078	64	33	64	34	Fig.2.4.10: Legend is missing [Sabit Erşahin, Turkey]	Noted: ths was a formatting error when the section was compiled.
19484	64	14	65	17	Units should be consistent. Sometimes it is written as y-1, yr-1 or year-1. Please be consistent and I suggest use yr-1 [Francis Sundresh Mani, Fiji]	Accepted
23326	64	5			Drained peatlands which *are* usually… [Alexander Graf, Germany]	Accepted
23328	64	7			percent*age* [Alexander Graf, Germany]	Accepted
23330	64	9			natural one*s* [Alexander Graf, Germany]	Accepted
3608	64	34			All figures of similar kind (e.g., concentration levels) should look similar (e.g. N2O and CH4). [Zoltán Somogyi, Hungary]	Accepted
5982	65	5	65	20	Tian et al. (2018) show the results of N2O model intercomaprison. Tian, H., et al. (2018). "The global N2O Model Intercomparison Project." Bulletin of the American Meteorological Society 99(6): 1231–1251. [Akihiko Ito, Japan]	Accepted: This reference has now been added
10240	65	9	65	9	there is an extra parenthesis [Vanina Rosa Noemí Cosentino, Argentina]	Accepted
20610	65	10	65	10	I would like to suggest the following sentence to be inserted here: "Recently, also cryptogamic communities, comprising cyanobacteria, lichens, and bryophytes, have been newly described as a natural N2O source (0.32-0.59 Tg a-1; Lenhart et al., 2015; 0.27 (0.19-0.35) Tg a-1; Porada et al., 2017)." [Bettina Weber, Germany]	Rejected: given space constraints,we suggest that the description on p.65 Lines 14-15 of natural emissions having "terrestrial, marine and atmopsheric sources" covers cryptogamic communities.
20612	65	10	65	10	citations: Lenhart, K., Weber, B., Elbert, W., Steinkamp, J., Clough, T., Crutzen, P., Pöschl, U. & Keppler, F. (2015) Nitrous oxide and methane emissions from cryptogamic covers. Global Change Biology 21(10): 3889-3900. Porada, P., Pöschl, U., Kleidon, A., Beer, C., Weber, B. (2017) Estimating global nitrous oxide emissions by lichens and bryophytes with a process-based model. Biogeosciences 14: 1593-1602. [Bettina Weber, Germany]	See above
20614	65	22	65	24	I am not sure if this legend is correct. I would think that the table shows "Annual N2O emissions by sector, all units in Tg a-1". [Bettina Weber, Germany]	Accepted
18766	65	23	65	24	Why are there two "Manure"s in Table 2.4.2? [Hiroaki Kondo, Japan]	Accepted: The second mention of manure should be manure management. This is a different mechanism for N2O emissions.
9844	65	4	66	4	this section needs more assessment. [Jan Fuglestvedt, Norway]	Accepted: We have now added a short paragraph assessing the findings described earlier in the section.
23332	65	14	67	14	Table 2.4.2 and surrounding text: Clarify. The text and common sense suggest that rows 2 (Fertiliser) to at least 10 (manure) should be parts of row 1 (Agriculture), but in the table the numbers are additive [Alexander Graf, Germany]	Accepted: Formatting error when putting together the table. The "4.2" (third number down in the EDGAR column) should be moved one column to the right. And the 2.8 figure should be deleted.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
3610	65	22			This table, too, should at least include data from GHGIs. [Zoltán Somogyi, Hungary]	Accepted
20080	66	4	66	4	…..(Davidson 2009). [Sabit Erşahin, Turkey]	Accepted
206	66	11	66	11	confirm biological nitrogen fixation or denitrification as source of nitrous oxide [Lawrence Aribo, Uganda]	Rejected: It is important to distinguish between sources of anthropogenic emissions (such as biological nitrogen fixation from the cultivation of legumes etc.) and mechanisms underpinning these emissions (i.e. denitrification). We discuss mechanisms above, but this passage is about anthropgoenic sources, which explains why denitrification is not mentioned here.
2760	66	17	66	17	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Accepted
23334	66	20	66	29	similar to freeze-thaw cycles, rewetting of dried soils appears to be another "hot moment" (Liu et al. 2018, European Journal of Soil Science, https://doi.org/10.1111/ejss.12683). [Alexander Graf, Germany]	Accepted: Text added to take this into account
18768	66	30	66	30	It seems to be the same color for FAO (Non-Annex 1) and EDGAR (Annex 1) in Fig.2.4.11. [Hiroaki Kondo, Japan]	Accepted, colors have been adjusted
9846	66	6	67	14	this section needs more assessment. [Jan Fuglestvedt, Norway]	Accepted: We have now added a short paragraph assessing the findings described in the section.
10094	66	34	67	1	Non-agricultural source of anthropogenic Nitrous Oxide emissions are 0.9 Tg…… but this falls outside the range of 3.8-6.8 Tg... [Joalane Marunye, Lesotho]	Accepted: The range has been updated to 0.7-1.6 Tg N yr-1
1808	66	7			substantiate with literature [Chukwuma Anoruo, Nigeria]	Accepted: Two references have been added refering to the EDGAR and US EPA GHG inventories.
18770	67	1	67	1	0.9 Tg may not be median or average of 3.8 - 6.8 in the parenthesis. [Hiroaki Kondo, Japan]	Accepted: Uncertainty range has now been corrected to read 0.7-1.6 Tg N2O yr-1
10096	67	5	67	5	This is more related to what appears in Table 2.4.2 instead of a Box [Joalane Marunye, Lesotho]	Accepted: Reference to a Box has now been deleted
9848	67	16	67	44	why a separate section on uncertainties for N2O and not for CH4? [Jan Fuglestvedt, Norway]	Accepted, change has been made
9850	67	16	67	44	I suggest you coordinate this closely with TFI and the new guidlines report. [Jan Fuglestvedt, Norway]	Noted
2802	67	16	67	44	Uncertainties subsection is helpful addition to to this section. Could a similar subsection be written for CH4 or an overall section of uncertaintines for section 2.4 be included.? [Sarah Connors, France]	Accepted, change has been made
2478	67	21	67	26	An editorial point: spelling “nonlinear” and “non-linear” in the same paragraph. [William Lahoz, Norway]	Accepted
2762	67	22	67	22	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Accepted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
17114	67	32	67	34	There is still substancial uncertainty and also lack of sufficient data to describe the driving forces for N2O emission in soils formed under tropical climate. Often, soil parameters, such as pH, Corg, and clay content emerged as poor predictors for N2O fluxes. This could be a result of the formation of micro-aggregates, which strongly affect the hydraulic properties of the soil, and consequently define nitrification and denitrification potentials (e.g. Meurer et al. 2016). Ref.: Meurer et al. 2016. Direct nitrous oxide (N2O) fluxes from soils under different land use in Brazil — a critical review. Environ.Res.Lett.11(2016)023001 doi:10.1088/1748-9326/11/2/023001 [Beata Emoke Madari, Brazil]	Noted, no change required
208	67	49	67	49	C4MIP exhibit or CMIP4?, confirm [Lawrence Aribo, Uganda]	Rejected: C4MIP
1058	67	46	68	4	What about experimental results? Models can indicate changes and mechanism, but ultimately we need expeiriments to confirm this. Van Groenigen et al. (2011; Nature 475:214-216) as well as Dijsktra et al. (2012; Front Ecol Environ 10:520-527) reviewed the effect of elevated CO2 and warming on the emissions of N2O and CH4. These empirical results need to be included in the discussion [Tobias Rütting, Sweden]	Noted, we can only report on what is in the literature
18772	67	45	71	6	Because the contents of section 2.4.3.5 is not limited to N2O, this part should be section 2.4.4. [Hiroaki Kondo, Japan]	Accepted
1054	67	1			Range of emission seems wrong (as average is outside the range) [Tobias Rütting, Sweden]	Accepted: Uncertainty range has now been corrected to read 0.7-1.6 Tg N2O yr-1
11352	67	5			"see Box" - which box? [Debra Roberts, South Africa]	Accepted: Reference to a Box has now been deleted
1128	67	32		44	I would suggest a further reading, where Emissions coefficients for N2O emissions were derived from a meta-analysis of field measurements in Mediterranean climate. Cayuela et al. 2017. Direct nitrous oxide emissions in Mediterranean climate cropping systems: Emission factors based on a meta-analysis of available measurement data. Agriculture, Ecosystems and Environment 238 (2017) 25–35 [Rosa Francaviglia, Italy]	Noted, but this does not change the statement.
19486	67	33			" the factors affecting N2O emissions should also include rainfall or soil moisture as this is an important factor" [Francis Sundresh Mani, Fiji]	Accepted
1056	67	45			suggest this paragraph to be 2.4.4 (should not be under 2.3.3 Nitrous Oxide) [Tobias Rütting, Sweden]	Accepted
3612	67	45			This section lacks the definition of sustainability. This term is thought to be defined and understood, however, in my experience, it is not. See Somogyi, Z. 2016. A framework to quantify environmental sustainability. Ecologial indicators Volume 61, Part 2, Pages 338-345 https://doi.org/10.1016/j.ecolind.2015.09.034 [Zoltán Somogyi, Hungary]	Noted, I think this comment is misplaced as this section does not deal with sustainability. I will try to find where we need to insert a definition in the chapter.
11356	67				Whole page: EF is not defined. A two-letter acronym should be spelled out. [Debra Roberts, South Africa]	Rejected: this was defined on page 65.
1060	68	8	68	11	As already commented earlier, there is no good experimental evidence so far that nitrogen progressively limiting ecosystem responses to climate change (Feng et al. 2015 Glob Change Biol 21:3152-3168; Liang et al. 2016 Biogeosci 13:2689-2699; Andresen et al. 2016 Adv Ecol Res 55:437-473) [Tobias Rütting, Sweden]	Accepted, but this does show up in the models
2764	68	11	68	11	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Accepted, text has been amended

Comment No	From Page	From Line	To Page	To Line	Comment	Response
2766	68	21	68	21	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Accepted, text has been amended
17606	68	23	68	24	"Sensitivity analyses of the models lead to an upward revision in the 100-yr GWP estimate to 32". I am not sure to understan dthis sentence. Reword [Guillaume Bertrand, France]	Accepted and text revised to clarify
9854	68	24	68	24	If you use GWP100 as a way to inform about changes in "strength" then you need to say more than just this. Change to 32 from what? And more importantly, this is just one of the changes reported in the literature for CH4. Other chnages in GWP100 for methane have been reported (e.g. Gasser et al., ESD) and if you start refelcting these it should be done more systematically. There are also papers discussing how the GWP100 can be used in a different way (Allen et al., 2016, NCC and Allen et al., 2018 npj) [Jan Fuglestvedt, Norway]	Noted, but we do not really want to get wrappted up in a discussion of GWP in this report.
2768	68	40	68	40	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Accepted
2770	68	50	68	51	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Accepted
20082	68	52	68	52	…..(Trost et al. 2013; Fowler et al. 2015). [Sabit Erşahin, Turkey]	Accepted
18620	68	8			plants do not have a fixed C;N ratio. In addition to being impacted by plant and soil type, studies have shown that plant C:N ratio is generally increased under elevated atmospheric CO2 levels. [Henry Allen Torbert, United States of America]	Accepted, the text has been amended
23336	68	13			why "may encourage" for a process that is already recognized (already in previous ARs respiration losses were reported to have increased simultaneously with the increase in CO2 uptake)? [Alexander Graf, Germany]	Accepted, text has been amended
11358	69	13	69	14	This is a very important conclusion for policy makers. Implications such as this should receive a more detailed discussion. Currently most of the text in this entire section focusses on technical details re how to measure GHGs, how the systems work, uncertainties etc with not enough attention given to important take-home messages that can be picked up by Mitigation. [Debra Roberts, South Africa]	Accepted
9856	69	18	69	44	There is a recent paper by Comyn-Platt et al in Nature Geosciences that should be taken into account here. [Jan Fuglestvedt, Norway]	Accepted, permafrost has been integrated into the different sections
1062	69	24	69	25	Is this confirmed bu experimental results? Dijsktra et al. (2012; Front Ecol Environ 10:520-527) reported enhanced cH4 emission from wetlands with elevated CO2, but warming had inconsisten effects. [Tobias Rütting, Sweden]	Accepted, permafrost has been integrated into the different sections
20084	69	35	69	35	……..some degree (Koven et al. 2015; Abbott et al. 2016). [Sabit Erşahin, Turkey]	Accepted, permafrost has been integrated into the different sections
11362	69	38	69	40	This text suggests that for now, emissions (is that of NOx? or CO2 - since you mention carbon sink) are balanced by plant uptake. Or is this only for peatlands and wetlands? This text is not clear. [Debra Roberts, South Africa]	Accepted, permafrost has been integrated into the different sections
10242	69	40	69	40	the end point is missing [Vanina Rosa Noemí Cosentino, Argentina]	Accepted, permafrost has been integrated into the different sections

Comment No	From Page	From Line	To Page	To Line	Comment	Response
5984	69	46	71	6	Yamagata et al. (2018) show that extensive conversion of natural vegetation to biofuel croplands would lead to increased soil loss by water erosion. Yamagata, Y., et al. (2018). "Estimating water-food-ecosystem trade-offs for global negative emission scenario (IPCC-RCP2.6)." Sustainability Science 13: 301–313. [Akihiko Ito, Japan]	Accepted, bioenergy has beeen integrated into a box
23338	69	2			"*An* analysis or alays*e*s by…" [Alexander Graf, Germany]	Accepted
11360	69	27			Cross-reference SROCC here. [Debra Roberts, South Africa]	Accepted, permafrost has been integrated into the different sections
23340	69	39			add comma before "some that" [Alexander Graf, Germany]	Accepted, permafrost has been integrated into the different sections
11364	70	1	70	4	Very important conclusions. Please expand text on 'outgassing' issue. [Debra Roberts, South Africa]	Accepted, we will integrate material from the 1.5 report
16664	70	8	70	9	Table 2.4.3 Consider to replace "Land use" with "land use change" in the headline? [Maria Kvalevag, Norway]	Rejected, we made a different change in response to another comment
11720	70	2			The "rebound" effect is an important message potentially for the Executive Summary [Debra Roberts, South Africa]	Accepted, we will integrate material from the 1.5 report
23342	70	8			Table 2.4.3: The title says emissions and removals but the table only seems to contain emissions [Alexander Graf, Germany]	Accepted
23344	70	18			Table 2.4.3 instead 2.3.4? [Alexander Graf, Germany]	Accepted
9858	71	1	71	1	The 24% number needs more explanation wrt how calculated. [Jan Fuglestvedt, Norway]	Rejected, I don't understand the confusion. Re report total land use emissions and total anthropogenic emissions and then we give the ratio.
21994	71	13	71	13	Aerosols affect both global and regional climate, as well as, air quality - the latter being peprhaps the most important reason for their inclusion in mitigation strategies. [Marianne Tronstad Lund, Norway]	YES, in agreement with the text.
21992	71	16	71	16	There has been a large amount of research and literature on aerosols since 2013. More up to date references needed. [Marianne Tronstad Lund, Norway]	Done in the revised version
210	71	20	71	20	Explain how biogeochemical cycling such as nitrogen and phosphorus deposition inluences reflectance as explanation was provided in line 17-19. [Lawrence Aribo, Uganda]	text changed to explain the point raise.
20616	71	21	71	23	In the enumuration, also bioaerosols should be mentioned as one type of aerosols. In the subsequent text, I don't think that it is adequate to have bioaerosols ignored or only as one type of carbonaceous aerosols. In my opinion they should be treated separately with an own sub-chapter on them. [Bettina Weber, Germany]	Noted. The new version treats bioaerosols in a more detailed way. We focused on anthropogenic changes of aerosols in the terrestrial ecosystems, and this means all types of aerosols, so space is limited to discuss all characteristics of bioaerosols
21998	71	23	71	23	unclear, the subsequent chapters has several mentions of SOA. [Marianne Tronstad Lund, Norway]	The treatmento of SOA has change a lot in the new version, with more details on the production and changes in the processng of SOA
20086	71	25	71	25	…….2017). [Sabit Erşahin, Turkey]	Noted and corrected
2804	71	28	71	36	High confidence assessment but only 2 articles cited (one from 2001); please update with recent litrature and double check assessment conclusion. [Sarah Connors, France]	We changed signficantly the treatment of soil dust with new references and assessment.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19608	71	28	71	48	In addition to drought, exploitation of surface water resources by countries regardless of water rights of downstream countries and the lack of consideration of the natural contribution of these rivers water (other phases of the environment and ecosystems) is one of the big challenges in the Middle East. For example, the construction of many large dams on the Tigris and Euphrates rivers by Turkey caused the drying of the southwest Iran and southern Iraq wetlands. This has caused the formation of dust centers and undesirable effects in western Iran. Continuing this process could cause a lot of problems among the countries of the region. Therefore, the adoption of water policies by the United Nations is imperative. [sadegh ziayan, Iran]	Yes, we totally agree with your points, but the adoption of wayer policies by UN is out of our scope.
18774	71	45	71	45	The right paranthesis before "(e.g." is missing. [Hiroaki Kondo, Japan]	Noted and corrected
2806	71	26	72	29	There is overlap in content in this subsection with Section 3,4,1 on sand and dust aerosols. [Sarah Connors, France]	Accepted, the overlap with dust aerosols on other sections were removed.
21996	71	26	74	38	Ch.2.5 should, according to its title, include future non-GHGs, which I think could be better incorporated. E.g., more assessment of studies of fire emissions and climate change, land-use change and BVOC (e.g., Arneth et al. 2015, Szogs et al. 2017, etc), projected decline in anthropogenic emissions in scenarios - any implications for the relative importance of natural and anthropogenic sources? etc. Recent literature on emission inventories of anthropogenic dust could be better included (e.g., Paul et al. 2012, Galloza et al. 2018) [Marianne Tronstad Lund, Norway]	We improved the assessment component of the text, and reduced the review part. The references on Hosely et al., and Samset et al., and new biomass burnign emissions are also included in the revised version.
22000	71	26	74	38	In general, this section has a lot of review, but little assessment. In the carbonaceous aerosol section, there are key citations missing, e.g., Hosely et al. 2018 (CEDS emission inventory). The mix of different emission estimates is confusing to follow, with unclear mixing of total BC emissions and biomass only estimates. The section could benefit from a better assessment of recent progress and status of knowledge about biomass burning emissions, including comparisons of emission inventories, uncertainty sources, anthropogenic fractions and work using satellites. In the carbonaceous aerosol section description of radiative and optical effects, there is not assessment of the large uncertainties in e.g., aerosol absorption and brown carbon. The recent paper by Samset et al. 2018 provides an up to date review. The CCN and IN activity of carboneaceous aerosols, in particular EC, is poorly constrained and source of a large uncertainty in modeled distributions and climate impacts. Moreover, the description from line 40-48 could perhaps be saved for Sect. 2.5.3 in order to clearly separate the emission fluxes and climatic effects. [Marianne Tronstad Lund, Norway]	We have rewritten the whole 2.5 section, adding many of the aspects you mentioned, including BVOCs, fire emissions, etc. But we have important size restrictions.
9860	71	8	77	24	I think section 2.5 should make use of more recent literature. You may also consult the meeting report from IPCC Expert Meeting on SLCF that will be published in late august. [Jan Fuglestvedt, Norway]	The whole Section 2.5 was completelly rewritten with more recent literature.
9862	71	8	77	24	I think section 2.5 also would benefit from consulting some of the authors of AR6 WGI and participants at the SLCF Expert meeting and ask for their comments. That would help to imporve consistency across IPCC reports. [Jan Fuglestvedt, Norway]	This was done in the new revision.
22016	71	8	77	24	In general, Ch. 2.5 would benefit from inclusion of more up to date references. E.g., line 44 page 76 refers to a 2009 paper as recent. [Marianne Tronstad Lund, Norway]	Done in the revised version
22018	71	8	77	24	In general, I believe Ch.2.5 could benefit from a somewhat more clearly defined scope and focus. [Marianne Tronstad Lund, Norway]	The whole Section 2.5 was completelly rewritten to be more focused and objective

Comment No	From Page	From Line	To Page	To Line	Comment	Response
7010	71	8	77	24	This section is very aerosol-focussed with little or no discussion of the effects on ozone. [William Collins, United Kingdom (of Great Britain and Northern Ireland)]	We added in the revised version a discussion of ozone effects on NPP and other issues pooely covered in the ZOD.
7014	71	8	77	24	This section also needs to describe the impact of the land surface on removal of reactive gases and aerosols. Land cover changes can affect the deposition of ozone, NOx, SO2 … , and the effect on ozone and aerosols from deposition changes can be as large as from biogenic emission changes. Here's a reference, but I'm sure there are many more: Impact of climate and land cover changes on tropospheric ozone air quality and public health in East Asia between 1980 and 2010 By: Fu, Y.; Tai, A. P. K. ATMOSPHERIC CHEMISTRY AND PHYSICS Volume: 15 Issue: 17 Pages: 10093-10106 Published: 2015 [William Collins, United Kingdom (of Great Britain and Northern Ireland)]	Yes, we agree. We included a section on ozone deposition and effects on NPP.To include discussions on SO2, Nox deposition we would need much more space than we have right now.
23346	71	1			24%: clarify if this is the net effect after negative land use emissions, or the gross effect of positive land use emissions only [Alexander Graf, Germany]	Rejected, I don't understand the confusion. Re report total land use emissions and total anthropogenic emissions and then we give the ratio.
10244	72	2	72	2	there is an extra parenthesis [Vanina Rosa Noemí Cosentino, Argentina]	Corrected
10246	72	11	72	11	there is an extra parenthesis [Vanina Rosa Noemí Cosentino, Argentina]	Corrected
10248	72	20	72	20	the end point is missing [Vanina Rosa Noemí Cosentino, Argentina]	Corrected
18778	72	46	72	46	"(BrC)" --> "(BC)" [Hiroaki Kondo, Japan]	Figures are being improved
21098	72	31	74	8	Carbonaceous aerosols are composed of both light-absorbing black carbon (BC) and light-scattering organic carbon (OC). Please consider to add more text about the different BC/OC ratios between fossil fuels and energy from biomass and the interaction between BC as a warming, and OC as a cooling agent [Maria Kvalevag, Norway]	YES, Done.We included a more detailed discussion on BC, OC and also Brown Carbon
23348	72	20			add dot after references [Alexander Graf, Germany]	Corrected
23350	72	21			produce*d* [Alexander Graf, Germany]	Corrected
1064	72	26			iii) [Tobias Rütting, Sweden]	Corrected
1814	72	31			what difference does this page make when compared with page 76 line 24. [Chukwuma Anoruo, Nigeria]	The whole section was rewritten to remove duplicated discussions
1810	72	33		34	substantiate with literature [Chukwuma Anoruo, Nigeria]	Done
932	73	5	73	10	Please, add information about the X axsis in the figure 2.5.1 [Jose Luis Vicente Vicente, Germany]	Figures are being improved
20618	73	6	73	7	Legend of x-axis missing in figure 2.5.1 [Bettina Weber, Germany]	Figures are being improved
18776	73	6	73	10	The label and unit on horizontal axis are mising in Fig. 2.5.1. [Hiroaki Kondo, Japan]	Figures are being improved
5986	73	7	73	7	Show the numbers (years?) of x-axis. [Akihiko Ito, Japan]	Figures are being improved
20088	73	8	73	9	…….estimated by Lamarque et al. (2010), in red, developed for CMIP5 and Van Marle et al. (2017), in black,……. [Sabit Erşahin, Turkey]	Corrected
10250	73	12	73	12	the acronym BC have not been previously introduced [Vanina Rosa Noemí Cosentino, Argentina]	Corrected
10252	73	13	73	13	there is an extra parenthesis [Vanina Rosa Noemí Cosentino, Argentina]	Corrected

Comment No	From Page	From Line	To Page	To Line	Comment	Response
20090	73	14	73	14	Bond et al. (2013) estimated….. [Sabit Erşahin, Turkey]	Corrected
10254	73	14	73	14	format of the appointment [Vanina Rosa Noemí Cosentino, Argentina]	Corrected
20620	73	14	73	17	Better use Tg in text, as also Tg is used in figure. In line 16-17, a discrepancy is named, which has not been clearly described before. Thus, content is difficult to comprehend. [Bettina Weber, Germany]	Text in this section was rewritten
10256	73	15	73	15	replace black carbon with BC [Vanina Rosa Noemí Cosentino, Argentina]	Accept
22014	73	16	73	16	what discrepancy? The differences between different estimates? [Marianne Tronstad Lund, Norway]	Text completelly rewritten
10258	73	17	73	17	format of the appointment [Vanina Rosa Noemí Cosentino, Argentina]	Accept
10300	73	20	73	22	Figure 2.5.2 is not explained in the text. His contribution is not entirely clear. [Vanina Rosa Noemí Cosentino, Argentina]	Text was rewritten in this section
20092	73	22	73	22	……from Wang (2014). [Sabit Erşahin, Turkey]	Corrected
10260	73	27	73	27	the year should not be in parentheses? [Vanina Rosa Noemí Cosentino, Argentina]	Corrected
23352	73	7			Fig. 2.5.1: Add x axis (title and numbers) [Alexander Graf, Germany]	Figures are being improved
1066	73	7			X-axis missing [Tobias Rütting, Sweden]	Figures are being improved
23354	73	26			*The* Cohen and Wang 2014 estimate… [Alexander Graf, Germany]	Corrected
11366	73				Figure 2.5.1 X-axis needs to be defined [Debra Roberts, South Africa]	Noted
934	74	3	74	3	Please, put the reference of Giglio et al. 2013 in the correct form [Jose Luis Vicente Vicente, Germany]	OK Corrected
20094	74	3	74	3	Giglio et al. (2013) found a gradual fire area decrease……. [Sabit Erşahin, Turkey]	OK Corrected
10262	74	3	74	3	format of the appointment [Vanina Rosa Noemí Cosentino, Argentina]	Noted
9864	74	10	74	39	A Nature CC paper by Unger, 2014, is relevant here. DOI: 10.1038/NCLIMATE2347 [Jan Fuglestvedt, Norway]	Reference included in the new section 2.5
10098	74	15	74	15	but could exceed 100 g C per square meter per year….. Instead of 100 g per square meter per year [Joalane Marunye, Lesotho]	OK Corrected
2772	74	33	74	33	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	The uncertainty language was revised for the whole section 2.5
22002	74	41	75	13	This section is limited to ESM and hence neglects the large amount of studies carried out using chemistry-transport models, with subsequent radiative transfer calculations. Much of our knowledge about the composition of atmospheric aerosol comes from CTM studies and the work within e.g., the AeroCom initiative form important input to the best estimates of aerosol RF in IPCC AR5. For instance, Tsigaridis et al. (2014) provides a comprehensive multi-model comparison, including discussions of the impact of different OA schemes on model performance. Several multi-model studies investigate the modeled distributions of carbonaceous aerosols compared with observations, including biomass burning aerosol. Presumably such work would be a key part of the assessment. [Marianne Tronstad Lund, Norway]	For sure AEROCOM initiative is key also in this section. Tsigardis is included in the new version of the 2.5 section.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
11368	74	10			Please give some more background information. Why do plants produce and release these substances? Is their presence in the air problematic? [Debra Roberts, South Africa]	Text was rewritten in this section, specially the BVOC section
23356	74	37			"The same with cloud condensation nuclei": unclear/language [Alexander Graf, Germany]	The paragraph was completely changed.
23358	74	41			*The* Coupled Model Intercomparison... [Alexander Graf, Germany]	OK Corrected
23360	74	45			difficulties in properly model*ing* [Alexander Graf, Germany]	OK Corrected
10264	75	8	75	8	point and space are missing [Vanina Rosa Noemí Cosentino, Argentina]	Corrected
18780	75	17	75	17	It is nesseary to give more detailed explanation for pannel a and b in Fig.2.5.3. [Hiroaki Kondo, Japan]	Added
20096	75	17	75	17	……from Evan et al. (2014). [Sabit Erşahin, Turkey]	Revised
11370	75	23	75	29	It might be good to move this explanatory introduction to dust to the previous section, where dust gets discussed without any introduction. Or possibly swap the sections. [Debra Roberts, South Africa]	Moved and reorganized
20098	75	25	75	25	Stanelle et al. (2014) used…….. [Sabit Erşahin, Turkey]	Changed
10266	75	25	75	25	format of the appointment [Vanina Rosa Noemí Cosentino, Argentina]	Checked
10100	75	28	75	28	conversion of of natural lands to agricultural lands. [Joalane Marunye, Lesotho]	Rejected, we made a different change in response to another comment
212	75	30	75	35	The facts and figures have no references to be convinsive enough/believable similar to line 4-9 page 76, Does it mean all is coming from Cowie et al. 2013? [Lawrence Aribo, Uganda]	Checked and clarified
17608	75	33	75	35	"Between pre-industrial and present-day the overall effect of changes in dust is - 0.14 Wm-2 cooling of clear sky net radiative forcing on top of the atmosphere, with -0.05 W m-2 form land use and -0.083 W m-2 from changes in climate => replace by from [Guillaume Bertrand, France]	Revised
18836	75	19	76	36	Clear distinshing and linkage should be given with chapter 3 Desertification Feedbacks to Climate. [Jianguo Wu, China]	Revised to make it consistent with Ch3
22010	75	19	77	24	Several of the RF estimates are missing references in this section. The section should also make it clear that the assessment is limited to impacts in terms of RF, as I believe there are no studies cited of temperature impacts or precipitation. [Marianne Tronstad Lund, Norway]	Revised and clarified
1812	75	30		31	substantiate with literature [Chukwuma Anoruo, Nigeria]	Literature is provided right after this introductory sentence!
23362	75	35			form => from? [Alexander Graf, Germany]	Corrected
2480	76	3	76	3	An example of typographical errors that need looking at. I think the text should read: "…effects from changes in … and changes in the large-scale circulation…". [William Lahoz, Norway]	Corrected
214	76	11	76	23	Make the statement/sentenses clear and change steam area index in line 15 to Stem area index [Lawrence Aribo, Uganda]	Corrected
10268	76	13	76	13	the acronym AOD have not been previously introduced [Vanina Rosa Noemí Cosentino, Argentina]	added details
9866	76	24	76	36	I find this sub section incomplete and lacking more recent references. I suggest more contact with WGI and relevant authors there. [Jan Fuglestvedt, Norway]	Further assessment added

Comment No	From Page	From Line	To Page	To Line	Comment	Response
22006	76	24	76	36	This section lacks estimates of RF/climate effects, as well as the status of knowledge of composition and spatial distribution, and needs improvement. A number of studies exist that characterize the relative contribution of various aerosols species in different regions (e.g., from the IMPROVE and CAWNET networks, or using AMS measuremnets), but none are cited here. [Marianne Tronstad Lund, Norway]	Further assessment added
22004	76	26	76	26	Should be clear that this is secondary organic aerosols. [Marianne Tronstad Lund, Norway]	Added details
9868	76	44	76	44	I find this sub section incomplete and lacking more recent references. A study from 2009 is referred to as "recent". Please consider new literature. [Jan Fuglestvedt, Norway]	References extended
9870	76	37	77	24	A Nature CC paper by Unger, 2014, is relevant here. DOI: 10.1038/NCLIMATE2347 [Jan Fuglestvedt, Norway]	Accept-Unger et al. 2014 is cited
18838	76	37	77	24	Recently,there are a lot of studies about linkage climate change and BVOC ,SOA, old lteratures in the section of this chapter have been referenced,and new findings have not been given. [Jianguo Wu, China]	References extended
22008	76	37	77	24	I may have missed it, but there seem to be no mention of the impact of BVOC on ozone and potential subsequent effects on vegetation through deposition, which would seem to be an important thing to include. Similarly, I don't see any information about aerosols, diffuse radiation and impacts on vegetation. [Marianne Tronstad Lund, Norway]	Rejected, beyond the scope of this chapter
22012	76	38	77	24	Key studies of the impact of vegetation changes on RF from non-GHGs are missing, e.g., Unger et al. 2014, Scott et al 2018. An important factor of understanding the aerosol pre-industrial to present-day RF (aerosol-cloud interactions) is the composition of the pre-industrial atmosphere, where natural aerosols are key, as discussed in a recent study by Carlslaw et al. 2017. [Marianne Tronstad Lund, Norway]	Assessment extended
23364	76	14			dust emission(s) models *are* now able… [Alexander Graf, Germany]	Revised
23366	76	22			as it been => as has been? [Alexander Graf, Germany]	Revised
23368	76	26			move "being" from before to after "isoprene and terpenes" [Alexander Graf, Germany]	Revised
10270	77	3	77	3	format of the appointment [Vanina Rosa Noemí Cosentino, Argentina]	Checked and clarified
7016	77	10	77	13	There is considerable literature on the impacts of BVOCs on ozone and the methane lifetime so this discussion needs to be expanded greatly with some quantitative impacts on ozone and methane. [William Collins, United Kingdom (of Great Britain and Northern Ireland)]	Extended
7018	77	19	77	19	There needs to be a reference for this 0.17 W/m2 value. [William Collins, United Kingdom (of Great Britain and Northern Ireland)]	Reference added
7020	77	20	77	23	There have been laboratory experiments, global climate modelling and extensive international measurement campaigns! Such literature needs to be cited and assessed here. [William Collins, United Kingdom (of Great Britain and Northern Ireland)]	References extended
18782	77	26	77	26	The title of section 2.6 is unclear. [Hiroaki Kondo, Japan]	Accepted. Title has been revised
2808	77	26	77	27	A simplified title would help readers quickly understand what is being assessed in this section [Sarah Connors, France]	Accepted. Title has been revised

Comment No	From Page	From Line	To Page	To Line	Comment	Response
21078	77	28	77	43	Introduction paragraphs needs a strong backup through no. of references to feel confident on the substance reported. Just 2 references are not enough. Latest literature would be better. [Devaraju Narayanappa, France]	Accepted. References are provided in the explanatory text that follow. However there has not been substantial new literature to support those earlier findings as paleoclimatologists concentrated on other time periods. But the objective of this introduction is not to make a statement but just to say that questioning the role of land in the climate system is not new. It thus does not need substantial literature.
20100	77	36	77	37	…….(De Noblet-Ducoudré et al. 2000). [Sabit Erşahin, Turkey]	Editorial
16536	77	26	91		Sub-chater 2.6 is biased towards referencesfrom the European community and results regarding the European region. There is much more to say and references from the American and Asian community are missing. Dirmeyer is cited once, but there are many more important authors regarding the land use/cover change issues. Refering to other authors and regions would strengthen the conclusions made. I would also include a paragraph including land-atmosphere interactions since there is a whole working group dealing with this. [Merja Tölle, Germany]	Rejected. Many analysis of what happens in Africa, Asia, South America are presented. Moreover the entire chapter is about land/atmosphere interactions!
7022	77	26	101	7	Section 2.6 needs a subsection on the chemical/aerosols effects of historical land cover. Here are some references, but there are many more: Sensitivity of midnineteenth century tropospheric ozone to atmospheric chemistry-vegetation interactions Hollaway, M. J.; Arnold, S. R.; Collins, W. J.; et al. JOURNAL OF GEOPHYSICAL RESEARCH-ATMOSPHERES Volume: 122 Issue: 4 Pages: 2452-2473 Published: FEB 27 2017 Impact on short-lived climate forcers (SLCFs) from a realistic land-use change scenario via changes in biogenic emissions C. E. Scott, S. A. Monks, D. V. Spracklen, S. R. Arnold, P. M. Forster, A. Rap, K. S. Carslaw, M. P. Chipperfield, C. L. S. Reddington and C. Wilson Faraday Discuss., 2017,200, 101-120 http://dx.doi.org/10.1039/C7FD00028F Human land-use-driven reduction of forest volatiles cools global climate Unger, N NATURE CLIMATE CHANGE Volume: 4 Issue: 10 Pages: 907-910 DOI: 10.1038/nclimate2347 [William Collins, United Kingdom (of Great Britain and Northern Ireland)]	Accepted. Substantial text has been added, however not in section 2.6 but in section 2.5. Historical and future changes in climate through BOVC emission changes have been considered. Section 2.6 now focuses on both bioophysical effects and on effects via changes in the net emissions of CO2 from land.
25008	77	26	101	12	The studies quoted to estimate the physical impact of a change in land cover provide net estimates that mix elements with low uncertainty, i.e. the albedo impact, with others that have larger uncertainty as the evapotranspiration. Further they mix effects which impacts can be mesured instantaneously at each single point in time. i.e. the albedo, with others that propagate their effects across time, i.e. the evapotranspiration, so that their estimate should be averaged across the time period of their impact or across a standard time period e.g. 100-years of the GWP. The cooling effect of evapotranspiration doesn't end in the instant when it occurs since the water vapour is precursor of rain and subsequent evapotranspiration and so on, so that it has a multiplicative effect across time that has to be integrated in the estimates. It is therefore recommended to provide an analysis of each single element, of its impact across time and of the uncertainty associated. [Sandro Federici, Italy]	Rejected. This is not a scientific paper that disentangles all effects, but an assessment based on existing literature that reports on the robust messages. Most results reported come from modelling studies that intrisically account from those time scales you talk about, and thus your comment does not hold for those. Observations are used to see whether the response of climate to land cover and land use perturbations are correctly represented in models.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
25010	77	26	101	12	Although it is desirable to have a description of impacts of land cover changes on the radiative balance of the planet, the impression reading this chapter is that a land would be cooler if desertified than if forested, and that therefore desertification/deforestation is a better mitigation option, than a forest. And indeed a desertified planet would have a lower average temperature than a vegetated planet. However, this is of course a bizzarre conclusion. Recall that the scope of this report is the life on the planet and the byo-physical variations that may alter the carrying capacity for life of the planet. The warming/cooling effect at ground level should be assessed in its two components: the warming/cooling during daylight time and the colling during nightime and discuss its impact on life (vegetation/animal/human) and on socio-economic systems. This is the way to show that vegetation/forest is more desirable for life on the planet than deforesttaion/desertification. [Sandro Federici, Italy]	Accepted. We have made clear now that deforestation-induced cooling is via biophysical processes while biogeochemical effect is warming. The net effect is most often warming globally, and very different per region. Now regarding night/day contrasts ... we only report on what is available in the literature and there is still a limited amount of available papers on such issues
25012	77	26	101	12	In this section the warming effects associated with the increase of atmospheric GHG concentration caused by the release of terrestrial Carbon stocks (e.g. deforestation, land degradation, forest degradation etc), which are factual -i.e. they are measured- are added to cooling effects associated with the land clearing (i.e. higher albedo, lower roughness of surface, less evapotranspiration) which are estimated through modelling. Although the discussion of the two components is appropriate the algebric operation to assess the "mitigation" impact of a land cover change isn't correct. Indeed: - the cooling effect is subject to large uncertainties and possible biases; - the removal of vegetation is an absurd option in dealing with climate chnage, as it would be the elimination of the human beings or of a fraction of it. Thus, it is recommended to remove all references to cooling associated with the removal of vegetation/forest. [Sandro Federici, Italy]	Rejected & Accepted. The entire section 2.6 has been revised and spends less time discussing extreme deforestation. However, the section discusses the literature that is available and sensitivity studies that discuss idealized of more realistic changes in land cover. They allow to measure the sensitivity of the climate to those changes. They are indicative of how Human may influence local, regional or global climate via such changes.
16496	77	26		27	The subtitle is too long to understand. This section also uses many long sentences, somewhere wordy, difficult to read. For example, 'studies in the literature'. Removal of some sentences does not change the main context, for example, page 2-84 line 22-23. Please be clear, concise and critical. Be shorten. [Yuanbo Liu, China]	Accepted. Title has been revised and text has hopefully been improved
1816	77	28		29	substantiate with literature [Chukwuma Anoruo, Nigeria]	Accepted. Literature is already provided in the following lines but this is now clarified.
23370	77	28			(Drop the) Evidence that land cover matters for the climate system *has* long been known [Alexander Graf, Germany]	Editorial
6504	77	31			check the dates - I think you mean 11,500 years ago not 115,000 [Hannah Fluck, United Kingdom (of Great Britain and Northern Ireland)]	Rejected. Last glacial inception is indeed 115 kyears ago!
11372	77	38			This paragraph seems to be suggesting that overgrazing caused the greener Sahara from 6000 years ago to dry up. [Debra Roberts, South Africa]	Accepted. Overgrazing relates to recent climate change, not to mid-Holocene. We hope the revised text makes this clear now
2482	78	1	78	1	Perhaps authors could mention the potential use of reanalyses data (e.g., from ERA-Interim Land and successors) and of ESA CCI datasets to assess land-induced climate impacts, e.g., by evaluation of models and associated hypothesis testing experiments; by monitoring of changes in the characteristics of the land surface. [William Lahoz, Norway]	Rejected. This would be new science as no literature (as far as we know) discusses that
15838	78	1	78	2	(e.g. Forzieri et al. 20017b) delete one) [Jean-Luc Chotte, France]	Editorial
14368	78	1	78	2	(e.g. Forzieri et al. 20017b) delete one [Rattan Lal, United States of America]	Editorial
16830	78	1	78	2	(e.g. Forzieri et al. 20017b) delete one) [Rattan Lal, United States of America]	Editorial

Comment No	From Page	From Line	To Page	To Line	Comment	Response
21080	78	3	78	5	Rewriting necessary here. I am bit confused, does this chapter focuses on only biophysical LULCC effects on climate? But then where are biochemical effects of LULCC discussed? Section 2.4 and 2.5 seem to discuss mostly emissions if I am not wrong. [Devaraju Narayanappa, France]	Accepted. The section has now been complemented with processes other than biophysical ones.
21082	78	9	78	9	Section title:-- How about “Land induced changes on regional and global climate”. You seem to discuss also regional changes not only global changes/means. Eg. figure 2.6.1 is about regional mean changes! It would be really nice to show a Table that lists the global/regional mean surface air temperature (another table for rainfall??) simulated by different models for different forcings (eg. Holocene deforestation, Historical LULCC, Future LULCC, Idealized deforestation scenarios). See Table 4 of Devaraju et al 2015 (Plant Cell & Environment). This will also give an idea of the no. of studies/models (may also classify fully coupled or fixed SST simulations) agree and disagree on the sign of change. Eventually and hopefully that helps to understand the high agreement and robust evidence/ no agreement and low confidence of LULCC impacts. [Devaraju Narayanappa, France]	Accepted. Rewriting done and title changed. Substantial changes in section 2.6
21084	78	32	78	33	Are there any studies that report the idealized simulations simulate the changes above the natural variability? [Devaraju Narayanappa, France]	Noted. Not that I know of
20622	78	37	78	37	I would change the wording of the header into "Impact of global historical land use changes on climate" [Bettina Weber, Germany]	Accepted. Most titles of section 2.6 have been revised, some following reviewers' comments
10272	78	40	78	40	there is an extra parenthesis [Vanina Rosa Noemí Cosentino, Argentina]	Editorial
8656	78	37	79	22	Part of the assessment of the effect of HLULCC on temperature relies on the analysis of the multi-model comparison project LUCID by de Noblet-Ducoudré (2012), from which Fig. 2.6.1 is extracted. This analysis concluded to a cooling effect for all seasons over affected mid-latitude regions, which is why this paragraph emphasises the regional cooling effect of HLULCC. However, recent multi-model analyses have been conducted using CMIP5 models and should be cited (e.g. Kumar et al. 2013, "Land use/cover changeimpacts in CMIP5 climate simulations: A new methodology and 21st century challenges", J. Geophys. Res. Atmos., 118,6337–6353, doi:10.1002/jgrd.50463; Lejeune et al. 2017, "Historical Land-Cover Change Impacts on Climate: Comparative Assessment of LUCID and CMIP5 Multimodel Experiment",. J. Climate). Fig. 2.6.1 should be updated with results from CMIP5 accordinly. [Delphine Deryng, Germany]	Accepted. Not all suggested papers are cited but there are more evidences than those from LUCID
8706	78	37	79	22	The way regional changes in temperature due to HLULCC are described is problematic. It should be made clearer that the annual mean cooling effect reported over regions most affected by HLULCC is due to the fact that these regions are mostly located in the mid-latitudes. The overall temperature effect over affected regions would have been very different if HLULCC had happened over the tropics (for example), and therefore the regions corresponding to the reported regional coolings should be mentioned. To facilitate understanding of the origin of the reported regional coolings, the current Section 2.6.1 could be moved after the current 2.6.2, which explains the potential changes in climate due to LULCC over each bioclimatic region, and thus regional specificites in that respect. The explanation of global-scale and regional-scale historical climate changes (currently in 2.6.1.1) could then rely on this explanation to make a clearer link between modelled regional temperature changes associated to HLULCC and historical patterns of LULCC. [Delphine Deryng, Germany]	Accepted. Section 2.6 has substantially been revised and hopefully makes clear that the same land cover or land use change can have different climate impact depending on the background climate

Comment No	From Page	From Line	To Page	To Line	Comment	Response
8654	78	9	90	1	Need to relate the varying patterns of the modelled global and/or regional temperature changes following LULCC to their respecting main drivers, based on, e.g., Bright, R. et al. (2017) Local temperature response to land cover and management change driven by non-radiative processes, Nature Climate Change; Duveiller et al. (2018) The mark of vegetation change on Earth's surface energy balance, Nature Communication; Alkama and Cescatti (2016) Biophysical climate impacts of recent changes in global forest cover. Science. 351(6273):600-4. doi:10.1126/science.aac8083. [Delphine Deryng, Germany]	Accepted. The references have now been included to support conclusions derived from models. The structure of section 2.6 has substantially changed
16498	78	38			please confine clearly the period and land cover types for Historical land use induced cover land cover changes (HLULCC) and Future land use induced land cover changes (FLULCC). [Yuanbo Liu, China]	Accepted. We hope that the revised version of the text now makes more clear what time periods are reported [Historical essentially means since pre-industrial times, i.e. ~1850]
24566	79	3	79	3	Delete original figure caption and include the content in the new one [Christopher Morhart, Germany]	Accepted. All figures have been checked, and legends have been re-written
15840	79	4	79	4	Figure 2.6.1. Modelled….. [Jean-Luc Chotte, France]	Editorial
14370	79	4	79	4	Figure 2.6.1. Modelled….. [Rattan Lal, United States of America]	Editorial
20102	79	5	79	5	Figure from De Noblet-Ducoudré et al. (2012). [Sabit Erşahin, Turkey]	Editorial
8708	79	11	79	13	Specify which regions and seasons [Delphine Deryng, Germany]	Rejected. The text has been revised and the way we write "depending on the model and the season" does not call for detailed information.
8710	79	14	79	16	Mention other greening factors, such as CO2/N fertilisation effects. [Delphine Deryng, Germany]	Rejected. The objective here is only to focus on the warming-induced greening
14204	79	20	79	21	there are extra parenthesis [Vanina Rosa Noemí Cosentino, Argentina]	Editorial
20106	79	24	79	24	2.6.1.2 Impacts of climate on global future land use scenarios???? [Sabit Erşahin, Turkey]	Accepted. Title has been changed
20624	79	25	79	25	SRES mentioned for the first time -> explanation of abbreviation missing [Bettina Weber, Germany]	Accepted. Definition introduced
21088	79	24	80	36	Its bit confusing whether the discussion is on biophysical or biochemical effects at some places. [Devaraju Narayanappa, France]	Accepted. Careful re-writing has been done
14206	80	2	80	2	there are extra parenthesis [Vanina Rosa Noemí Cosentino, Argentina]	Editorial
8658	80	3	80	5	The analysis of the importance of the oceanic feedbacks was done in another study by Davin and de Noblet-Ducoudré (2010) [Delphine Deryng, Germany]	Noted. This is correct. However the paragraph has been restructured and specifically discusses the study cited, and not oceanic feedbacks in general.
14208	80	16	80	16	format of the appointment [Vanina Rosa Noemí Cosentino, Argentina]	Editorial
8618	80	18	80	18	Typo: HLULCC should read "FLULCC" [Delphine Deryng, Germany]	Accepted. Yes thanks. But HLULCC and FLULCC have been removed from all text. We now only refer to land cover change, land use change, or AFOLU
680	80	18	80	18	HLULCC to be replaced by FLULCC? [Rafiq Hamdi, Belgium]	Accepted. Yes thanks. But HLULCC and FLULCC have been removed from all text. We now only refer to land cover change, land use change, or AFOLU
21086	80	18	80	19	FLULCC instead of HLULCC right?? [Devaraju Narayanappa, France]	Rejected. No it is indeed HLULCC. However HLULCC and FLULCC have been removed from all text. We now only refer to land cover change, land use change, or AFOLU
14216	80	19	80	19	there is an extra parenthesis [Vanina Rosa Noemí Cosentino, Argentina]	Editorial
14218	80	27	80	27	there are extra parenthesis [Vanina Rosa Noemí Cosentino, Argentina]	Editorial

Comment No	From Page	From Line	To Page	To Line	Comment	Response
14210	80	30	80	30	format of the appointment [Vanina Rosa Noemí Cosentino, Argentina]	Editorial
15272	80	31	80	31	Please add "Under the RCP8.5 FLULCC scenario," at the beginning of the sentence [Benjamin Quesada, Germany]	Accepted. The entire section has been re-written and is hopefully clearer.
15274	80	32	80	32	Please replace "systematic" (not all models display it) by "significant" (pass significativy test). [Benjamin Quesada, Germany]	Accepted. The entire section has been re-written and is hopefully clearer
18784	80	32	80	32	"(Figure 2)" --> "(Figure 2.6.2)" [Hiroaki Kondo, Japan]	Editorial. Figures and numbering have been updated
14212	80	32	80	32	Is the figure number correct? [Vanina Rosa Noemí Cosentino, Argentina]	Editorial. Figures and numbering have been updated
15276	80	33	80	34	Please replace this sentence by "This dampens by about 9% to 41% the projected rainfall increase in those same regions in response to all forcings (particularly increased atmospheric GHG)". [Benjamin Quesada, Germany]	Accepted. The entire section has been re-written and is hopefully clearer
11374	80		81		Re the discussion of deforestation causing climate cooling: The over-emphasis of land-climate interaction in climate models distracts from the big picture, and ends up being a circular argument. One of the biggest dangers of climate warming is its devastating effect on biodiversity. Deforestation also devastates biodiversity. And yet in this text deforestation and its cooling effect are said to 'dampen' the effect of overall warming, which implies (to a non-modeller) that deforestation has a mitigating effect on climate change. That is like discussing the positive effects of theft, because it injects finances into the local economy. It should be made clear that the only relevance of this deforestation-cooling relationship is in regard to getting climate models to produce more accurate results and nothing else i.e. drawin the conclusion that cutting down forests will buy us time in terms of climate change. The same caution applies to the entire section: to what extend are the topics relevant to modelling (only) and to what extent do they hold implications for life on earth and for mitigation/adaptation solutions? For example, on pg 81 para 1 the impact studies mentioned are probably all modelling studies and not on-the-ground studies of impacts on ecosystems, correct? The 'experiments' mentioned in para 2 are modelling experiments, not experiments in the real world. p 81, line 24: "land cover changes are invisible at the global scale" is nonsense except in the modelling sense. Pg 83 line 25: "the impacts of afforestation on climate were tested" - in modelling studies, not in real life. line 31: "the choice of trees used to afforest" should have everything to do with biological considerations and nothing with their modelled effect on models of atmospheric temperature. line 38: "importance of accounting for oceanic feedbacks" applies only to modellers, not to decision makers on the ground. pg 84, line 49: "similar experiment" - modelling experiment. Page 86, line 12 "large local cooling...was obtained" should read "was predicted". And so on. The entire Section is called "Evidence..." . Modelling outputs are not evidence, especially considering the high level of uncertainty in the many complex interactions. Extreme caution is advised when discussing "climate warming mitigation potential of land changes (pg 87 line 15) to ensure this is not the world viewed by a modeller on a computer screen, as opposed to the real world with real people and real species at real risk of extinction. [Debra Roberts, South Africa]	Accepted. Careful re-writting has been done. Yes most studies reported are through modeling and do not include land effects of deforestation (i.e. loss of biodiversity). However the goal here is to discuss effects on the atmosphere, not on land …
24568	81	1	81	1	Delete original figure caption and include the content in the new one + better resolution [Christopher Morhart, Germany]	Accepted. All FOD figures were provisional. Efforts have been made to improve the quality of figures and the legends
20110	81	1	81	1	Fig.2.6.2: Remove the previous figure caption (Fig.1) [Sabit Erşahin, Turkey]	Accepted. All FOD figures were provisional. Efforts have been made to improve the quality of figures and the legends

Comment No	From Page	From Line	To Page	To Line	Comment	Response
14214	81	1	81	1	Would it be possible to improve the quality of the figure ?. it does not read clearly [Vanina Rosa Noemí Cosentino, Argentina]	Accepted. All FOD figures were provisional. Efforts have been made to improve the quality of figures and the legends
17334	81	6	82	6	LCC(land cover change) impacts on future regional projection needs to be extended since Earth System Model includes dynamic vegetation model. Therefore, in addition to interaction process in Fig.2.6.11, aerosol direct effect due to LCC on climate should be included. Recently Cho et al (2015) shows future change precipitation in East Asia due to LCC. In global warming, bare soil fraction change in dust-producing regions, accompanies additional direct radiative effect by dust loading change. In future climate, anticyclonic circulation reduces future precipitation in South China Sea and increase in Korea. Cho MH, KY Boo, GM Martin, J Lee, GH Lim, 2015: The impact of land cover generated by dynamic vegetation model on present and future climate over East Asia, Earth Syst. Dynam., 6, 147–160, 2015 doi:10.5194/esd-6-147-2015 [Kyung-On Boo, Republic of Korea]	Accepted. Point well taken. Influences via dynamic vegetation were already included but have hopefully been made clearer. Influences via changes in organic aerosols issued from land changes are also now accounted for. However changes via mineral aerosols (dusts for example) have not been included. Many are discussed in chapter 3 that discusses desertification
6244	81	6	91	30	I am not convinced by the division in on the one hand "2.6.2 Land-induced changes in regional climate and weather" and on the other hand "2.6.3 Land-induced changes in extreme weather events." I would treat all changes that deals with e.g. land management in one place. With the current division I felt that things were left out from 2.6.2 and when getting to 2.6.3 I understood why (because of this separation). In particular, for page 90 I don't think it is correct to talk about "seasonal and diurnal temperature variations" as changes in extreme events, I would expect this to form part of 2.6.2, and I think it would be benificial to be able to explain that the processes behind mean changes involves also changes in "extremes". For example irrigation and changes in albedo due to suppressed tillage mitigates hot extremes because they influence more on the daily maximum temperature than on the daily minimum temperature, which is a feature of the "mean" climate. This can be easily explained and the text more fluent if you treat "mean" changes and "extreme" changes together. However, if you want to keep the separation, I suggest that you at least rename "2.6.2.Land-induced changes in mean regional climate and weather". [Anna Sörensson, Argentina]	Accepted. Good suggestion. The section is now organized by land change and within each subsection global, regional and extreme changes are grouped.
16500	81	7		14	provide references for the context. [Yuanbo Liu, China]	Accepted. All references were already provided in the discussion below. However the text has been substantially revised
16572	81	11			References are missing for this statement. [Merja Tölle, Germany]	Accepted. All references were already provided in the discussion below. However the text has been substantially revised
23372	81	18			exact*ly* [Alexander Graf, Germany]	Editorial
15758	81				Some texts of Figure 2.6.2 cannot be read. [Thompson Annor, Ghana]	Accepted. All FOD figures were provisional. Efforts have been made to improve the quality of figures and the legends
26800	82	8	82	18	Because line 9 begins "Deforestation (or afforestation)..." it's not self evident that paragraphs 2 and 3 in this subsection are about deforestation only [Daniel Zarin, United States of America]	Accepted. The section has been re-written and we've tried to make clear what come from deforestation or afforestation
24586	82	8	82	26	This section, “the impacts of afforestation/deforestation” is hard to understand because it is not clear which is being talked about. [Mary Booth, United States of America]	Accepted. The entire section has been re-written and we hope the statements do not appear clearly

Comment No	From Page	From Line	To Page	To Line	Comment	Response
8712	82	9	82	40	This section should also describe the differential impact of deforestation/afforestation on daytime and nighttime temperature, as done for changes in land management in the subsequent section. This assessment can be based on numerous observation-based studies (e.g. Duveiller et al., 2018; Li et al., 2015; Alkama ad Cescatti, 2016; Lee et al., 2011). [Delphine Deryng, Germany]	Accepted. We now include discussion on seasonal and diurnal changes
20104	82	12	82	12	……occurs (Pitman et al. 2011b; Hagos et al. 2014) there are recent……. [Sabit Erşahin, Turkey]	Accepted. Text has been revised
23378	82	14	82	15	sentence unclear ("law"?), time consistentcy (deepened vs. increases) [Alexander Graf, Germany]	Accepted. It was not 'law' but 'low' (thermal low = depression). The entire section has however been revised
24842	82	21	82	22	where the deforestation occurs (references) {give a stop here}. [Biplab Brahma, India]	Editorial
24844	82	22	82	22	suggesting to replace the reference with a published reference. [Biplab Brahma, India]	Rejected. The reference will be removed only if the paper is not published by April 7 2019 which is the cut-off date for accepted papers
14220	82	22	82	22	the space is missing [Vanina Rosa Noemí Cosentino, Argentina]	Editorial
20508	82	23	82	23	5. co2 should be wrong. [Huai Jianjun, China]	Editorial
24588	82	27	82	37	this discussion, and other places where albedo effects are discussed, should make clear within the paragraph what the effect on “climate” really means. Does this mean climate as air temperature measured above the ground, averaged over the year; or the lived, sensed environment on the ground, as it changes over the seasons? Also, the statement in the first paragraph that “boreal deforestation has a cooling effect” is contradicted by the statement below it that “temperate and boreal deforestation both lead to moderate summer warming.” [Mary Booth, United States of America]	Accepted. We've tried, early in section 2.6, to explain what we mean by 'climate' in the section. Moreover we've tried to make clear that the same land cover change (e.g. deforestation) can have opposite effect on climate depending where it occurs
24846	82	30	82	30	Reference paranthesis. [Biplab Brahma, India]	Editorial
8660	82	31	82	37	The mentioned "rising agreement" should be illustrated by more citations, such as Duveiller et al. (2018), Alkama and Cescatti (2016) [Delphine Deryng, Germany]	Accepted. Citations were updated. Text has been substantially revised
14222	82	36	82	37	there are extra parenthesis [Vanina Rosa Noemí Cosentino, Argentina]	Editorial
6232	82	45	82	45	From the abstract of Butt et al. (2011): "O has significantly shifted to, on average, 11 days (and up to 18 days) later inthe year over the last three decades", so this is erroneously cited here. [Anna Sörensson, Argentina]	Accepted. Butt is not cited for those numbers any more as the text has been substantially revised and shortened
17610	82	45	82	46	"Observed deforestation in Rondonia" Localize this state [Guillaume Bertrand, France]	Rejected. Would be difficult to localize all states cited. Easy to look at a map (go on google)
4114	82	42	83	4	For historical deforestation over Brazil, I suggest the following references: Ometto JP, Sousa-Neto ER, Tejada G. Land Use, Land Cover and Land Use Change in the Brazilian Amazon (1960–2013). In: Springer, Berlin, Heidelberg; 2016:369-383. doi:10.1007/978-3-662-49902-3_15; Lapola DM, Martinelli LA, Peres CA, et al. Pervasive transition of the Brazilian land-use system. Nat Clim Chang. 2014;4(1):27-35. doi:10.1038/nclimate2056. [Renata Libonati, Brazil]	Noted. However there is no specific focus on specific regions anymore so the amount of literature cited for each is now limited
8794	82	45	84	20	The described examples are case-studies derived from a single study. Robustness statements should therefore explicitly state that the described results are very likely model-dependent. [Delphine Deryng, Germany]	Accepted. The updated text tries to provide assessment and specific case studies are only used as examples, or when they refer to isolated studies that show important new pocesses that need to be accounted for
1818	82	9		10	substantiate with literature [Chukwuma Anoruo, Nigeria]	Accepted. However all references were provided in text following the introduction. The text has been substantially revised.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
16502	82	11		18	provide references for the context. [Yuanbo Liu, China]	Accepted. However all references were provided in text following the introduction. The text has been substantially revised.
23374	82	22			this is not so much a subject to "recent evidence" but to logics: A hypothetical land surface with a time-constant albedo and sink strength will have a time-constant biophysical radiative forcing and a cumulating biogeochemical one. This knowledge has already been used before, e.g. by Betts (2000), Nature 408:187 and Rothenberger and Yakir (2010), Science 327:451) and as a result comparisons between the albedo and CO2 effect of a land use change are quantified either for a certain time horizon, or as the number of years after which the one will overcompensate the other. [Alexander Graf, Germany]	Accepted. We have however removed that piece of text as it was not substantiated by literature yet
16528	82	34		37	This statement has not enough evidence. Other studies show strong summertime warming in temperate regions due to deforestation. [Merja Tölle, Germany]	Accepted. We have now included seasonal and diurnal changes, substantiated with literature, and made clear when reported changes are annual. The text has been substantially revised
23376	82	45			Maybe add "Brazilian state Rondonia" [Alexander Graf, Germany]	Noted. We are not referring to this paper in the same terms
11376	82				Sections 2.6.1&2 could be combined. [Debra Roberts, South Africa]	Accepted. Now sections are per land change and combine global-regional-local impacts on climate
21090	83	1	83	49	Sometimes the abbreviations like AEJ, NW, SE abruptly appear. Care is needed. [Devaraju Narayanappa, France]	Accepted. Text has been substantially revised
14224	83	5	83	5	there are extra parenthesis [Vanina Rosa Noemí Cosentino, Argentina]	Editorial
6234	83	6	83	11	While I do not question that the findings of Wu et al. (2017b) are correctly described here, I would like to raise the issue of how the information is presented. I think that it gives the reader an impression that the results of Wu et al. are very robust and that they derive from a large ensemble ("the evapotranspiration-induced warming during the dry season, is enhanced by reduced cloudiness"; "moisture flux (and therefore rainfall) is reduced over the NW Amazon"). But looking at the paper, Wu et al. only used one model, RCA-GUESS. Since I have worked quite a lot with the atmospheric part (RCA) over South America and in particular with the interaction surface-atmosphere I know that this model has a lot of biases and other problems (as many other models of course....I30). So I think that it should be highlighted that the results here are only from one model and phrased differently "The results suggest that... could be" or similar. [Anna Sörensson, Argentina]	Accepted. Text has been substantially revised and turned into an assessment. Case studies are sometimes cited but just as examples
8662	83	9	83	11	The changes in oceanic influx after Amazon deforestation, as well as the spatial pattern of rainfall changes, are model-dependent features (Lejeune et al. 2015, "Influence of Amazonian deforestation on the future evolution of regional surface fluxes, circulation, surface temperatureand precipitation" https://doi.org/10.1007/s00382-014-2203-8). [Delphine Deryng, Germany]	Accepted. It is true that they are model dependent, but it is also true that there is high agreement that advection changes following deforestation (or afforestationà. We've tried to make the assessment clear
278	83	15	83	15	thermal law or thermal low. Confirm reading the sentence starting on line 14 [Lawrence Aribo, Uganda]	Accepted. 'Low' thanks. However the sentence has been removed as the text has been shortened
18786	83	16	83	16	"saherian" --> "Saherian" [Hiroaki Kondo, Japan]	Editorial
14226	83	17	83	17	there are extra parenthesis [Vanina Rosa Noemí Cosentino, Argentina]	Editorial
9674	83	20	83	23	Sultan et al, 2001 ; Courrel, 1992 ; Janicot, 1990 [Nadji Tellro Wai, Chad]	Rejected. The references were not provided thus we could not see whether they were relevant for this report
20626	83	22	83	22	write abbreviation (AEJ) in brackets after "African easterly jet, as abbreviation is used in following sentence. [Bettina Weber, Germany]	Accepted. Howevere the text has been substantially reduced and AEJ does not appear anymore

Comment No	From Page	From Line	To Page	To Line	Comment	Response
682	83	22	83	22	please explain AEJ? [Rafiq Hamdi, Belgium]	Accepted. Howevere the text has been substantially reduced and AEJ does not appear anymore
18788	83	28	83	39	The contents of this paragraph are doubtful, particularly in second half (reference should be shown.). The temperature is not determined by the difference of roughness (that is turbulent flux), but multiple reflection of radiation is also important. [Hiroaki Kondo, Japan]	Noted. The text has been substantially changed. However the reviewer may not be aware that changes surface roughness impacts the magnitude of turbulent fluxes (latent and sensible heat) that take energy away from the land. Thus reduced roughness means less energy taken away and therefore warming. Multiple reflection is also important but generally not accounted for in models.
2484	83	29	83	29	What do you mean by “numerically”? Do you mean by checking the forest types by counting them? [William Lahoz, Norway]	Noted. it means the study has been done using a numerical model and not through in situ experimental design
2486	83	36	83	36	Why is this remarkable? I suggest avoidance of subjective terms. [William Lahoz, Norway]	Accepted. Terminology has been checked and the text as been substantially revised
6236	83	46	83	48	It is not clear to what areas yo refer at the end of this phrase: "drying in those adjacent areas.", please revise the redaction of the phrase. [Anna Sörensson, Argentina]	Accepted. The text has been substantially revised and wording has been checked carefully. However 'adjacent' means neighbours.
6238	83	49	83	49	I think that "afforestation" would be more correct than "reforestation" here (see Gálos et al. 2011 title, also, reforestation would imply that Hungary recently has been deforestated). [Anna Sörensson, Argentina]	Noted. Afforestation or Reforestation means the same action in a climate model. It implies adding trees where there were no tree originally
1664	83	25	84	20	No information is provided on the afforestation methodologies, while afforestation, as defined by the UNFCCC, can vary from the regeneration of -historically - diverse forest ecosystems to the establlishment of monoculture tree plantations, and this has significantly diversified impacts. [Simone Lovera-Bilderbeek, Paraguay]	Rejected. The studies reported here are very simple set-up for climate models where deforestation only means 'remove trees'. But we've tried to make the text more explicit about that.
7074	83	40	84	9	You outline how afforestation scenarios in West Africa and in Europe show consequences "outside the afforested areas and lead to warming and drying in those adjacent areas". Does this also include reforestation? Please do expand on how this could affect the development of measures to reduce or reverse land degradation / desertification. [Mariam Akhtar-Schuster, Germany]	Noted. Yes those are simplified modelling studies where afforestation / reforestation means adding trees in our land model. There is no complexity in climate models regarding the afforestation/reforestation methods.
14372	83	40	84	9	You outline how afforestation scenarios in West Africa and in Europe show consequences "outside the afforested areas and lead to warming and drying in those adjacent areas". Does this also include reforestation? Please do expand on what projections could / should have on developing measures to reduce or reverse land degradation / desertification. [Rattan Lal, United States of America]	Noted. Yes those are simplified modelling studies where afforestation / reforestation means adding trees in our land model. There is no complexity in climate models regarding the afforestation/reforestation methods.
16530	83	49	84	2	There are references missing. For example, Tölle et al. 2014 reforested part of the country of Germany. Please revise to "Similar experiment has been carried out in Hungary and Germany where reforesting the entire or partly country under SRES" and add the referecne: Tölle, M. H., O. Gutjahr, J. Thiele, G. Busch, 2014: Increasing bioenergy production on arable land: Does the regional and local climate respond? Germany as a case study, Journal of Geophysical Research Atmospheres, 119(6): 2711–2724, DOI: 10.1002/2013JD020877 [Merja Tölle, Germany]	Noted. Bioenergy is not discussed anymore in section 2.6 and has been passed to section 2.7 together with the suggested reference

Comment No	From Page	From Line	To Page	To Line	Comment	Response
6240	83	49	84	9	A bit similar to the comment regarding RCA-GUESS (Wu et al. 2017b) above: These results are only from one study with one regional model (REMO). My personal opinion is that very detailed information from such a study (see for example the last phrase of this paragraph: "+45 compared to -36mm, +36 versus -69 mm, +18 versus -39 mm respectively in three different locations"), is not very helpful in the context of an IPCC report. I think that if numbers are given they should be supported by more than one study by one model. If not, it can give the reader an erroneous picture of how robust the results are. [Anna Sörensson, Argentina]	Accepted. Literature has been turned into an assessment, the text hs substantially changed, and specific studies are sometimes cited but only as illustrations
11378	83	48			What "adjacent areas"? North of the Sahel is desert, south is tropical. Or does this imply that within the Sahel, areas that are not afforested will become drier? But this is talking about the monsoon? This section is not very clear. Same comment applies to pg 101 line 45ff - which adjacent countries? North or South? [Debra Roberts, South Africa]	Accepted. The entire section has been revised and, hopefully is more clear now.
27300	83				Include section on forest restoration [Doreen Stabinsky, United States of America]	Rejected. There is no literature available of the effects of restoration on the atmospheric variables (as far as we know).
14228	84	5	84	5	there are extra parenthesis [Vanina Rosa Noemí Cosentino, Argentina]	Editorial
684	84	9	84	9	Which locations? [Rafiq Hamdi, Belgium]	Noted. It means 'where afforestation occurs'. The entire section has been substantially revised
14230	84	11	84	11	there are extra parenthesis [Vanina Rosa Noemí Cosentino, Argentina]	Editorial
6242	84	22	84	24	In the introduction to 2.6.2.2 you say that with respect to land management you will only treat irrigation and forest management. But please note that section 2.6.3 also takes into account tillage suppression and other forms of conservation agriculture practices: "The suppression of tillage as in conservation agriculture, or the use of cover crops, was also shown to provide local cooling effect due to surface albedo increase (Davin et al. 2014; Ceschia 2018). This cooling effect increases with increasing maximum temperature and is therefore more intense during hot summer days (Figure 2.6.7). The cooling effect from conservation agriculture was found to be potentially more pronounced in dry regions (Hirsch et al. 2017)." [Anna Sörensson, Argentina]	Accepted. This entire section about agriculture management has been substantially revised and is hopefully clearer
3164	84	22	84	24	please refer to Pongratz et al 2018 doi 10.1111/gcb.13988 who discuss implementation of LM in ESMs [Karlheinz Erb, Austria]	Rejected as the exact reference is not provided. We thus cannot see whether the paper is relevant or not
6246	84	29	84	29	I think that this is editorial: I think that you probably want to say -0.007°C and not -0.007°C/decade. [Anna Sörensson, Argentina]	Rejected. This paper refers to trends in temperature variables. Units are thus °C/decade
14232	84	29	84	29	there are extra parenthesis [Vanina Rosa Noemí Cosentino, Argentina]	Editorial
23380	84	29	84	30	consistency: Is the second value (-0.25°C) also per decade or for a certain time period? [Alexander Graf, Germany]	Accepted. Changes are also per decade, thank you. The text has been revised
18790	84	30	84	30	"-0.25oC" --> "-0.25oC/decade" [Hiroaki Kondo, Japan]	Accepted. Yes you're right. The text has been revised
686	84	38	84	38	Which regions? Please specify. [Rafiq Hamdi, Belgium]	Noted. The text has been substantially revised to be turned into an assessment. However in the version you read the message was that the magnitude of the impact irrigation has on climate depends on where irrigation is turned on. The same amount of irrigation in Sahelian Africa will not have the same effect as in India for example
23382	84	37			Drop "however", consider replacing "but" by "however" or "though" [Alexander Graf, Germany]	Noted. Wording in second order draft is more carefully chosen (hopefully)
24570	85	1	85	1	Delete original figure caption and include the content in the new one [Christopher Morhart, Germany]	Accepted. All figures have been checked, and legends have been re-written

Comment No	From Page	From Line	To Page	To Line	Comment	Response
20112	85	2	85	2	Fig.2.6.3: Remove the previous figure caption (Fig.1) [Sabit Erşahin, Turkey]	Accepted. All figures have been checked, and legends have been re-written
20108	85	3	85	3	……observations in many regions of the world (Chen and Jeong 2018). [Sabit Erşahin, Turkey]	Editorial
6248	85	4	85	10	I suggest that you include the following studies to this paragraph: "Cook et al. (2014) Irrigation as an historical climate forcing, 10.1007/s00382-014-2204-7"; "Saeed et al. (2013) Influence of mid-latitude circulation on upper Indus basin precipitation: the explicit role of irrigation, 10.1007/s00382-012-1480-3"; "de Vrese et al. (2016) Asian irrigation, African rain: Remote impacts of irrigation, 10.1002/2016GL068146". [Anna Sörensson, Argentina]	Accepted. The suggested references were included
688	85	6	85	6	Please explain what is in this figure, it is more difficult for the non-expert reader to understand all the process and their interlink. [Rafiq Hamdi, Belgium]	Accepted. All figures have been checked, and legends have been re-written
24572	85	11	85	11	Delete original figure caption and include the content in the new one [Christopher Morhart, Germany]	Accepted. All figures have been checked, and legends have been re-written
20114	85	11	85	12	Fig.2.6.4: Remove the previous figure caption (Fig.1) [Sabit Erşahin, Turkey]	Accepted. All figures have been checked, and legends have been re-written
16060	85	5	87	19	IPCC could increase its efforts to facilitate the contribution of expertise from developing countries with less regard to where the experts are currently base [Youssouph Sane, Senegal]	Noted. I do not understand the message with respect to the text. The text has been substantially revised and we're hoping the reviewer will like it better
19530	85	0			Make the effort to correctly resume the seizure of the title. [Ibouraïma Yabi, Benin]	Accepted. Titles have been updated and section restructure
23384	85	4			are many => is much [Alexander Graf, Germany]	Editorial
16504	85	4			change 'evidence' to 'evidences' [Yuanbo Liu, China]	Editorial
6250	86	2	86	5	I think that this result fits better under the section: "2.6.2.1 The impacts of afforestation / deforestation", not under 2.6.2.2 The impacts of land management. Futhermore it seems to partly contradict the Gálos et al. afforestation studies over Europe (Gálos afforestation results partially in cooling while the Wilfert et al. 2016 cited here warming), perhaps having to change some conclusion from the section 2.6.2.1. [Anna Sörensson, Argentina]	Accepted. The suggestion was interesting. Ornsteing studies have been moved where suggested, while Ellison ones have now been moved to the section that discusses teleconnections
2184	86	3	86	3	Is "Wilfert et al. 2016" the correct reference here? [Wilhelm May, Denmark]	Accepted .The right citation is Naudts et al. 2016
15182	86	6	86	6	Although this may not be agricultural land "management", we find a study assessing the impacts of historical land-use changes from 1987 to 2006 on surface warming rates and rice yields on the island of Shikoku, Japan. In this region, the extent of rice paddy has decreased markedly to be converted into building lots and roads. These land-use changes cause warming rates in and around rice paddies that were five times those in and around other land uses, and decrease regional mean rice yield by 0.27% (0.012 t/ha), relative to the yield without land-use change (Yoshida et al., 2012). Yoshida, R., T. Iizumi, M. Nishimori and M. Yokozawa (2012), Impacts of land-use changes on surface warming rates and rice yield in Shikoku, western Japan, Geophys. Res. Lett., 39, L22401, doi:10.1029/2012GL053711. [Toshichika Iizumi, Japan]	Noted. Thank you for this interesting paper. However as the text has been substantially revised and shortened, agricultural management only discusses irrrigation and albedo
20510	86	8	86	8	6. the impacts of deploying bio-energy crops, or geo-engineering land, or on the land? [Huai Jianjun, China]	Editorial
2810	86	8	86	9	Would recommend to use 5 point subsection here to make it easier for reader/ authors to cross-reference to, if needed. [Sarah Connors, France]	Noted. The section has been substantially revised with as many sub-sections as necessary

Comment No	From Page	From Line	To Page	To Line	Comment	Response
24590	86	16	86	21	For this discussion of afforestation effects on water availability, you should read and cite Filoso, S.; Bezerra, M. O.; Weiss, K. C. B.; Palmer, M. A., Impacts of forest restoration on water yield: A systematic review. PLOS ONE 2017, 12, (8), e0183210. Abstract: ackground Enhancing water provision services is a common target in forest restoration projects worldwide due to growing concerns over freshwater scarcity. However, whether or not forest cover expansion or restoration can improve water provision services is still unclear and highly disputed. Purpose The goal of this review is to provide a balanced and impartial assessment of the impacts of forest restoration and forest cover expansion on water yields as informed by the scientific literature. Potential sources of bias on the results of papers published are also examined. Data sources English, Spanish and Portuguese peer-review articles in Agricola, CAB Abstracts, ISI Web of Science, JSTOR, Google Scholar, and SciELO. Databases were searched through 2015. Search terms Intervention terms included forest restoration, regeneration/regrowth, forest second-growth, forestation/afforestation, and forestry. Target terms included water yield/quantity, streamflow, discharge, channel runoff, and annual flow. Study selection and eligibility criteria Articles were pre-selected based on key words in the title, abstract or text. Eligible articles addressed relevant interventions and targets and included quantitative information. Results Most studies reported decreases in water yields following the intervention, while other hydrological benefits have been observed. However, relatively few studies focused specifically on forest restoration, especially with native species, and/or on projects done at large spatial or temporal scales. Information is especially limited for the humid tropics and subtropics. Conclusions and implications of key findings While most studies reported a decrease in water yields, meta-analyses from a sub-set of studies suggest the potential influence of temporal and/or spatial scales on the outcomes of forest cover expansion or restoration projects. Given the many other benefits of forest restoration, improving our understanding of when and why forest restoration can lead to recovery of water yields is crucial to help improve positive outcomes and prevent unintended consequences. Our study identifies the critical types of studies and associated measurements needed. [Mary Booth, United States of America]	Noted. Thank you for this interesting paper. However the section on afforestation and deforestation has undergone substantial revision and focuses on their impacts on atmopsheric states and dynamics
6252	86	17	86	17	I would not say that these references question the role of forest on precipitation, on the contrary they suggest that forests have a crucial role in precipitation recycling. Perhaps it is only a redactional issue and "questioned" should be changed to "addressed" or similar. [Anna Sörensson, Argentina]	Accepted, thanks
18792	86	21	86	22	Schematic illustration of the upper panel of Figure 2.6.5 requires a condition of relevant prevailing wind from bottom of mountain to top of mountain, and this condition not always hold in any place in the world. [Hiroaki Kondo, Japan]	Noted. You are right this is very specific to California Los Angeles as discussed in the text and legend
20116	86	21	86	22	The Fig.4. stands here unrelated to the text and Fig.2.6.5. The bottom and top figures are not related. [Sabit Erşahin, Turkey]	Accepted. All figures have been checked, and legends have been re-written
24574	86	22	86	22	Unclear what the picture is showing; figure captipon only refers to illustration [Christopher Morhart, Germany]	Accepted. All figures have been checked, and legends have been re-written
23386	86	3			drew CO2 down from => withdrew CO2 from [Alexander Graf, Germany]	Editorial
16506	86	8			Some words missing in the subtitle. [Yuanbo Liu, China]	Editorial
1068	86	12			The cooling is expected, but not "obtained" [Tobias Rütting, Sweden]	Editorial

Comment No	From Page	From Line	To Page	To Line	Comment	Response
19532	86	21			Please, delete : Fig. 4. The virtuous ….. In the Figure 2.6.5 [Ibouraïma Yabi, Benin]	Accepted. All figures have been checked, and legends have been re-written
23388	86	22			Consider only using the upper part of the figure (removing the photo since it is unclear what it shows, definitely not the whole effect, maybe the upwind valley) afforestation?) [Alexander Graf, Germany]	Accepted. All figures have been checked, and legends have been re-written
462	87	1	87	3	In Loarie the conversion was from crop/PASTURE to cane. Crop/pasture instead of cropland in line 2. Around 64% of the sugarcane expansion in Brazil from 2006-2012 was over pasture, especially in the region were this study was conducted, just 34% was over agriculture (soybeans) (Bordonal et al. 2015, Renew.Sust.Energy Rev.) The benefits are mostly from pasture to cane than from annual crop to cane, especially when it is from a degraded pasture. This is reinforced in one of the conclusions of Bordonal et al., which takes into account soil and biomass carbon balance in LUC, from several crop/pasture systems to cane in Brazil. [Newton La Scala Jr., Brazil]	Noted. Bioenergy is not discussed anymore in section 2.6 and has been passed to section 2.7 together with the suggested reference
690	87	38	87	38	Bader et al., 2018 [Rafiq Hamdi, Belgium]	Accepted. References have hopefully been carefully checked
1070	87	44	87	45	so far °C has been used (not K) [Tobias Rütting, Sweden]	Accepted. °C is used everywhere now
16532	87	17		24	In a modeling study carried out under future climate conditions based on SRES A1B (Tölle et al. 2014) tested the effects of replacing existing cropland by bioenergy crop (maize, poplar, irrigated poplar) and pointed to large seasonal variations impacting the energy and hydrological cycle. Maize as summer crop induces first a warming of air temperature (as large as 1°C) during its start of the growing season, essentially in response to lower albedo. However, during its main growing season, the increase in evapotranspiration induces atmospheric cooling of about -1°C. Irrigated poplar induces a cooling by about 2°C in maximum temperature over its growing season. This shows how important the vegetation type can be on seasonal climate and its extremes with its vegetation characteristics (eg. leaf area index, plant coverage, etc.). Tölle, M. H., O. Gutjahr, J. Thiele, G. Busch, 2014: Increasing bioenergy production on arable land: Does the regional and local climate respond? Germany as a case study, Journal of Geophysical Research Atmospheres, 119(6): 2711–2724, DOI: 10.1002/2013JD020877 [Merja Tölle, Germany]	Accepted. The effects of land cover and land use changes in seasonal variables have now been carefully included
1820	87	27		28	substantiate with literature [Chukwuma Anoruo, Nigeria]	Rejected. This introductory sentence is further developed and substantiated with literature. Howebver the text has been revised to be turned into an assessment
23390	87	35			urban dryness island: However in terms of ABSOLUTE humidity / mixing ratio / vapour pressure, cities even in humid regions can often be moister during occurence of the UHI due to the CC-law, see e.g. Kuttler et al. 2007, International Journal of Climatology 27:2005. [Alexander Graf, Germany]	Rejected. The sentence only refers to relative humidity (to further compute heat stress related indices)

Comment No	From Page	From Line	To Page	To Line	Comment	Response
17332	88	1	88	6	Contribution of the urbanization effect to the local warming trends is also important issue in Korea. Separation of global warming and Urban impact has been studied. Previous studies results are various, since the result is sensitive to classification and analysis period to compare between rural and urban warming trend. Recently, Park et al (2016) summarizes previous results and address the quantities is estimated as 22-45% in long term warming trend in Korea. Warming magnitude should be modified in the range based on Park et al (2016). Park BJ, YH Kim, SK Min, MK Kim, Y Choi, KO Boo, S Shim , 2017: Long-Term Warming Trends in Korea and Contribution of Urbanization: An Updated Assessment, J Geophy Res, https://doi.org/10.1002/2017JD027167 [Kyung-On Boo, Republic of Korea]	Noted. This report is not a review and the suggested paper did not provide additional specific information
6254	88	1	88	19	I find the results of Sun et al. (2016) outstanding in comparison with similar studies for other regions (US, Europe, Japan, Puerto Rico are mentioned in the text). Sun et al. (2016) find a trend of approximately 0.10 degrees of mean temperature per decade attibutable to urbanization for the whole chinese territory, while the study of Hausfather et al. 2013 found a trend of 0.2°C and 0.6°C of minimum temperatures per century for the same period and we know that minimum temperature increase more than mean. Also: "Over Europe, (Chrysanthou et al. 2014) show that urbanisation explains 0.0026 °C/decade" (of mean temperature). I am not an expert on the fingerprint method used by Sun et al. (2016), but perhaps you should consider if their methodology really isolates the effect of urbanization given that most station are located in urban areas. I think that you should at least address the big difference between Sun et al. and other studies and discuss possible reasons why they differ so much. Are the differences methodological or are the urbanization distinct in China? And please consider not reproducing the Sun et al. (2016) figure in the chapter, since this study is clearly an outlier, unless you find that there is some very good reason for why their results are more representative than the studies from the rest of the world. [Anna Sörensson, Argentina]	Accepted. In the new version of the text that has been substantially shortened, this sentence has been modified. The updated assessement style does not particularly focus on this study. The original figurehas been removed and replaced by a new one.
4116	88	1	88	37	I suggest to include the following reference about the increase of SUHI in the megacity of Rio de Janeiro, Brazil from 1984 to 2015: Peres, L., de Lucena, A. J., Rotunno Filho, O. C., & de Almeida França, J. R. (2018). The urban heat island in Rio de Janeiro, Brazil, in the last 30 years using remote sensing data. International Journal of Applied Earth Observation and Geoinformation, 64, 104-116. [Renata Libonati, Brazil]	Rejected. This is an interesting paper but it discusses changes in surface temperature (surface urban heat island) while all other papers are consistent in that they refer to ambient air temperature (canopy urban heat island)
5154	88	6	97	22	Delete parentheses in several cases such as (Haufather et al 2013) or P 93 L 21 (De Vrese et l 2016) or pag 95 L 8 (Ciais et al 2013), Pag 96 L 20 (Strengers et al 2010), Pag 96 L 23 (Port et al 2012) [Giovanna Battipaglia, Italy]	Editorial
23392	88	11			*A* similar effect was found… [Alexander Graf, Germany]	Editorial
20512	89	33	89	33	7. rural areas warm more and reduce then ,(maybe than?)the urban to rual contrast [Huai Jianjun, China]	Accepted. However this sentence has been removed in the new shortened version
23394	89	15			*A* similar effect was found… [Alexander Graf, Germany]	Editorial
23396	89	17			"small urban" what? [Alexander Graf, Germany]	Accepted. However this sentence has been removed in the new shortened version

Comment No	From Page	From Line	To Page	To Line	Comment	Response
27302	90	29	90	30	conservation agriculture is a range of practices. It would be much more analytically useful to talk specifically about which practices are associated with the cooling effect. [Doreen Stabinsky, United States of America]	Noted. The study is a modeling study, idealized and thus does not exactly refer to 'true' conservation agriculture. However the specific section that dealt with extreme events has been removed. Text has been transferred where appropriate and reference to conservation agriculture does not exist in this version.
11382	90	12			"no direct observational evidence" - does this mean no data or no studies that analysed the data? The former is unlikely, the latter would point to a crucial research gap. There should be hundreds of thousands of long term local weather station data series in areas of all kinds of places where land cover has changed. [Debra Roberts, South Africa]	Noted. To be able to have direct observational evidence that historical land use changes had effects on extreme weather events would mean having 2 planet Earth in parallel, one with changes, one without. It is thus not a research gap, just an impossible observation
16534	90	24		26	Tölle et al. 2014 showed that irrigated poplar fields can reduce temperature extremes by evporative cooling. Tölle, M. H., O. Gutjahr, J. Thiele, G. Busch, 2014: Increasing bioenergy production on arable land: Does the regional and local climate respond? Germany as a case study, Journal of Geophysical Research Atmospheres, 119(6): 2711–2724, DOI: 10.1002/2013JD020877 [Merja Tölle, Germany]	Noted. Thanks for the reference. We have a number of studies accounted for that help us make an assessment
20118	91	2	91	3	Figure 2.6.7: Changes in daily maximum temperature resulting from suppressed pl 2 oughing in Europe (Davin et al. 2014). [Sabit Erşahin, Turkey]	Editorial
11386	91	6	91	15	Perhaps it is worth commenting that the problem is not so much urbanization itself (which is unstoppable) but largely what gets done in cities in terms of land cover, planning etc which would point to clear mitigation options. [Debra Roberts, South Africa]	Rejected. The suggestion would lead us to go beyond the mandate of our section that is not about urban planning, but more on the biophysical impact of urbanization on climate
18794	91	14	91	15	This is doubtful and controversial to the contents written in line 28 of page 89 to line 1 of page 90. Large heat capacity of urban area dampens extreme high temperature if the heat wave is limited to short period. At least this is not so high confidence and the phenomena are not so simple. [Hiroaki Kondo, Japan]	Accepted. There was a problem when assembling texts. Now the text has been cleared.
25742	91	14	91	15	It is necessary to addthat during heat waves the difference in minimum temperaturesis much higher than in maxmum temperatures. Daily maxima in the urban and rural environments differ only slightly, whereas daily minima and considerably higher in the urban than rural environments (Schluenzen KH, Hoffmann P, Rosenhagen G, Riecke W. 2010. Longterm changes and regional differences in temperature and precipitation in the metropolitan area of Hamburg. International Journal of Climatology 30: 1121–1136. DOI:10.1002/joc.1968., Wilby RL. 2003. Past and projected trends in London's urban heat island. Weather 58: 251–260.) [Joanna Wibig, Poland]	Accepted. The suggested papers are now cited
4118	91	22	91	25	I suggest to include the following four (4) recent references about the interactions between the mechanisms responsible for the HW feedbacks sucha as intense dryness of the soil and strong regional subsidence of air: Lemordant, Léo, et al. "Modification of land-atmosphere interactions by CO2 effects: Implications for summer dryness and heat wave amplitude." Geophysical Research Letters 43.19 (2016). Miralles, Diego G., et al. "Mega-heatwave temperatures due to combined soil desiccation and atmospheric heat accumulation." Nature Geoscience 7.5 (2014): 345. Sousa, Pedro M., et al. "European temperature responses to blocking and ridge regional patterns." Climate Dynamics 50.1-2 (2018): 457-477. Geirinhas, João L., et al. "Climatic and synoptic characterization of heat waves in Brazil." International Journal of Climatology 38.4 (2018): 1760-1776. [Renata Libonati, Brazil]	Accepted but only partially. We are now citingthe Miralles paper. However the other 2 are not relevant for what we discusss herein.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
15278	91	24	91	25	If "robust evidence" has to be shown, more recent papers with different methodologies should be added : Miralles et al. 2018, Quesada et al., 2012; Seneviratne et al. 2013 - REF: - Miralles, D. G., Gentine, P. , Seneviratne, S. I. and Teuling, A. J. (2018), Land–atmospheric feedbacks during droughts and heatwaves: state of the science and current challenges. Ann. N.Y. Acad. Sci.. . doi:10.1111/nyas.13912; - Quesada B, Vautard R et al (2012) Asymmetric European summer heat predictability from wet and dry southern winters and springs. Nature Clim Change volume 2, pages 736–741 (2012), doi: 10.1038/nclimate1536 - S.I. Seneviratne, M. Wilhelm, T. Stanelle, B. Hurk, S. Hagemann, A. Berg, B. Smith Impact of soil moisture-climate feedbacks on CMIP5 projections: First results from the GLACE-CMIP5 experiment Geophys. Res. Lett., 40 (19) (2013), pp. 5212-5217, 10.1002/grl.50956... [Benjamin Quesada, Germany]	Accepted. The references have been included
15280	91	25	91	25	Replace "in" by "is" [Benjamin Quesada, Germany]	Editorial
23398	91	25			in => is [Alexander Graf, Germany]	Editorial
11384	91				Figure legend: please expand, define x-axis and acronyms, different plots, etc. Are these observed or modelled data? [Debra Roberts, South Africa]	Accepted. All figures have been checked, and legends have been re-written
1724	92	8	92	12	There is a strong need for clarifying the message on the net effect of aforestation and reforestation on radiative forcing, and of pulling it together in a single place of the chapter (see comment no 1). Here afforestation is said to have a net warming effect whereas above it is said to have an uncertain effect. Moreover, this effect is discussed in 4-5 different sections of the chapter (eg. pages 7, 78, 92, 100, ...), which doesn't help consistency. And below (p107) the biophysical effect is said to be negligible compared to the biogeochemical effect: "However global effects are quite small when compared to CO2-induced changes in temperature"! An effort on consistency is really needed. [Valentin Bellassen, France]	Accepted. The specific section on afforestation/deforestation has been re-written (now 2.6.2) while in the section devoted to teleconnections (now 2.6.5) we only focus on the impacts those land cover changes have outside the regions where they are applied
15286	92	8	92	17	Please contrast with Perugini et al. ERL 2017 meta-analysis review and section 2.6.5.4 for harmonization. [Benjamin Quesada, Germany]	Rejected. This specific section on teleconnections talks about the effects land cover changes have outside the regions where they occur. Perugini et al. do not cover that part. However they are cited in other sections.
24576	93	1	93	1	Delete blue bar (incl. text) above figure [Christopher Morhart, Germany]	Editorial
692	93	2	93	2	Please link the references mentioned in the figure with the one in the bibliography and explain the meaning of the colors and symbols. [Rafiq Hamdi, Belgium]	Editorial
20120	93	2	93	3	Figure 2.6.8: Evidences of extra-tropical influences of tropical deforestation 2 as reviewed by (Lawrence and Vandecar 2015b). [Sabit Erşahin, Turkey]	Editorial
20122	93	5	93	5	Lorenz et al. (2016b) however warned…….. [Sabit Erşahin, Turkey]	Editorial
8620	93	5	93	8	Move this discussion on the limitations of the methodology to the end of this section, together with the paragraph starting on page 93, line 28. [Delphine Deryng, Germany]	Accepted. Text has been moved adequately
15290	93	8	93	8	It is worth mentioning here that (Quesada et al., 2017a) attempted to tackle the two caveats mentionned here by (Lorenz et al., 2016b) using 1) realistic LULCC scenario (RCP8.5, projected reduction in deforestation rates compared to actual reates) and 2) using several ESMs to get intermodel robustness and significance. [Benjamin Quesada, Germany]	Accepted. Text has been revised

Comment No	From Page	From Line	To Page	To Line	Comment	Response
15288	93	27	93	27	Suggestion : In order to review more studies, add a sentence like: "Single model studies found that LULCC could affect large-scale circulations through complex modifications of atmospheric winds, strength of Hadley and Ferrel cells [e.g.,Claussen et al.,2001;Bathiany et al., 2010;Davin and de Noblet-Ducoudré, 2010;Snyder, 2010;DevarajuQ13et al., 2015]." [Benjamin Quesada, Germany]	Accepted. The entire section has been substantially revised and turned into an assessment
2812	93	29	93	32	IPCC uncertainty language used incorrectly: a confidence statement (eg, high/medium/low confidence) is made up of 2 clauses (evidence and agreement), which must be used together. Never use only evidence or agreement statements. [Sarah Connors, France]	Accepted. IPCC language has been included
23400	93	25			finding*s* impl*y* (or such *a* finding implies) [Alexander Graf, Germany]	Editorial
23402	94	9	94	11	sentence hard to understand [Alexander Graf, Germany]	Accepted. Some parts of this text have been removed as the literature was not abundant enough for an assessment. The entire section has been rewritten
24592	94	9	94	12	There are a lot of places where the paper needs heavy editing to standardize and clarify. This sentence struck me as a good example of the need for someone with strong editing skills. [Mary Booth, United States of America]	Editorial
2488	94	10	94	10	Perhaps the authors should quantify “recent”. [William Lahoz, Norway]	Noted. The sentence has been removed
312	94	11	94	11	edit as: increase the persistence of dry and wet events or increase the persistent dry and wet events [Lawrence Aribo, Uganda]	Editorial
9920	94	23	94	23	I think more recent references should be added here to support this important statement. [Jan Fuglestvedt, Norway]	Noted. Mitigation strategies are not discussed anymore in section 2.6 and have been passed to section 2.7
9922	94	28	94	30	To me this is an odd sentence. It says that the authors find the robustness of the findings questionable, but that the modellers strongly agree. Instead of saying that it is questionable in general terms I think the chapter should assess the findings. (I may misunderstand the sentence which may indicate that it is unclear.) [Jan Fuglestvedt, Norway]	Noted. The text has been substantially revised. However what it says is that despite the limited amount of literature, all results agree and other studies help us being confident in the statement
9924	94	5	101	7	Section 2.6.5 covers important issues for the SRCLL and is generally well written. But it needs strengthening since it is now too much of a summary referring to single studies and not enough assessment with conclusions building on several studies assessed together. This may partly be due to lack of literature. I hope more literature will be found / published and that the assessment aspect will be given more weight in next draft. [Jan Fuglestvedt, Norway]	Accepted. The entire section has been rewritten and hopefully now looks like an assessment.
16508	94	11			persistent, presence or persistence? [Yuanbo Liu, China]	Editorial
23404	94	17			illustrated *in* Figure… [Alexander Graf, Germany]	Editorial
23406	94	25			pixel => grid cell? [Alexander Graf, Germany]	Noted. The entire sentence has been removed and the update version tries to avoid jargon
23408	95	1	95	11	Fig. 2.6.9 and text in line 8-12: The box "Reduced Land sink" is misleading. First of all, the existence of a land sink caused by CO2 fertilization means that more atmospheric CO2 also leads to more (in absolute numbers) land CO2 uptake. However, it is correct that the efficiency of this sink (the amount of extra CO2 taken up per amount of extra CO2 released elsewhere) slowly decreases (and that on a very long perspective the sink might become a source). But apart from that the schemes (particularly the following ones related to specific regions) are a very good idea. [Alexander Graf, Germany]	Accepted. Message has been clarified

Comment No	From Page	From Line	To Page	To Line	Comment	Response
24594	95	8	95	12	what is the mechanism for a “reduced” land sink “caused” by rising CO2? The land sink in absolute terms is what it is; perhaps what is meant here is that it is decreasing in a relative sense, compared to CO2 flux? This needs clarification. [Mary Booth, United States of America]	Accepted. This entire section has been rewritten and is hopefully more clear now. The initial message was that under a warmer climate and enhanced CO2 there are evidences that the land will not absord as much CO2 as it does now (reduced net ecosystem productivity), thereby leaving more of the anthropogenic CO2 in the atmosphere which would aggravate warming
24596	95	21	95	23	this sentence does not make sense. And “reduces” is used incorrectly here. This whole section needs a really strong edit by someone with excellent editing skills. [Mary Booth, United States of America]	Editorial
3614	95	6			This section does not discuss the future risks of drought-related forest mortality (Allen, 2010, Forest Ecology and Management, 259:660–684.; Somogyi, 2016, DOI: https://doi.org/10.1515/forj-2016-0001). These risks are extremely high and could lead to very high emissions, potentially offsetting all mitigation efforts, and with potentially large feedback. A key mission of the entire report should be to convey this message. The title of 2.7 can be "Climate consequences of land-based mitigation and adaptation", but what if adaptation is not successful enough and huge forest losses are unavoidable?? [Zoltán Somogyi, Hungary]	Noted. You are correct. In this section we only report of literature that assesses and quantifies the know feedbacks: global warming ==> land change ==> enhanced or reduced warming. Although the process you refer to is important there is yet no paper that discusses this loop with a fully coupled climate model. However the importance of this process is discussed section 2.2 of our chapter
1072	95	11			One could argue if this is really a "positive feedback" or rather a decrease in a "negative feedback". Land sink today is a negative feedback, and this migh decrease in strength. [Tobias Rütting, Sweden]	Rejected. There is a strict definition of positive and negative feedbacks. It starts from the atmopsheric forcing (here warming), and looks at what amplifies the warming (positive feedback) or dampens it (negative feedback)
26462	95	25		27	This text is an example where a disciplinary description is offered but it remains completely unclear what it means and what potentially policy-relevant implications are for ecosystems and humans systems. [Hans Poertner and WGII TSU, Germany]	Noted. This section does not go up to the implications for decision making. It assesses the literature on the feedbacks that have been studied up to now
23410	95	27			dampen*ing* [Alexander Graf, Germany]	Editorial
11388	95				Figure: where is the Global South in this diagram? Global South likewise missing from discussion on rest of page and the next page. [Debra Roberts, South Africa]	Noted. Poleward movement of vegetation in the Global South has not really been studied in the literature with respect to such issues (as far as we know)
23412	96	14	96	16	either hard to understand or wrong. First a dampening of warming is mentioned, then 3 processes claimed to cause warming are introduced by "of this increase" (which one?), then "cooling-induced" (is this really meant or is it meant that albedo induces cooling) is introduced. Possibly warming and cooling confused? Even so, try to reword the sentence(s) more clearly. [Alexander Graf, Germany]	Accepted. This entire subsection has been rewritten to avoid confusion and clarifies the assessment
5988	96	23	96	23	GLP should be GLG. Please check. [Akihiko Ito, Japan]	Noted. The acronym is not used anymore. It was GLG and not GLP (Global Land Greening)
6256	96	23	96	23	GLP should probably be GLG [Anna Sörensson, Argentina]	Noted. The acronym is not used anymore. It was GLG and not GLP (Global Land Greening)
20628	96	23	96	23	GLP mentioned for the first time -> explanation of abbreviation missing [Bettina Weber, Germany]	Noted. The acronym is not used anymore. It was GLG and not GLP (Global Land Greening)
694	96	23	96	23	please explain what is GLP? [Rafiq Hamdi, Belgium]	Noted. The acronym is not used anymore. It was GLG and not GLP (Global Land Greening)
8714	96	12	97	3	State more clearly that the biophysical impact of greening on global mean temperature is debated. [Delphine Deryng, Germany]	Noted. We have better assessed the effects of greening on climate.
1074	96	14			uncler which "increase" [Tobias Rütting, Sweden]	Noted. The entire sub-section has been rewritten
23414	96	24			draws down = withdraws [Alexander Graf, Germany]	Editorial

Comment No	From Page	From Line	To Page	To Line	Comment	Response
23416	96	25			Greening is no*t* realised [Alexander Graf, Germany]	Editorial
2490	97	31	97	31	Why is this interesting? I suggest avoidance of subjective terms. [William Lahoz, Norway]	Accepted. "Interestingly" is indeed a subjective judgment that should not be here. However, the complete part of the sentence after "interestingly" has been cut because it does not focus on high latitudes
314	97	35	97	43	Consider breaking the statement into two because its lengthy hence not easily comprehended [Lawrence Aribo, Uganda]	Accepted. This entire paragraph has been cut as there was a need to shorten the section and this was not found sufficiently relevant to be maintained
1076	97	38	97	43	very difficult to read sentence [Tobias Rütting, Sweden]	Accepted. This entire paragraph has been cut as there was a need to shorten the section and this was not found sufficiently relevant to be maintained
11390	97	38	97	46	There is an unfortunate preoccupation with temperature and insufficient consideration of other factors, e.g. "arctic greening" and its impact on temperature is "compensated by local arctic browning induced by climate extremes and perturbations such as fire" can only mean something in a climate modelling sense. Likewise, considering deforestation and afforestation and other anthropogenic land use changes only (or mainly) in relation to temperature without considering all other factors again is only correct in the modelling sense. This should come out more clearly in the text. [Debra Roberts, South Africa]	Accepted. This entire paragraph has disappeared. But with respect to the worry about temperature … It is generally the sole variable that is reported in most papers. There is generally not sufficient literature on other variables
23420	97	24			biased weak*ly*? [Alexander Graf, Germany]	Accepted. The formulation was ambiguous, thanks. It is now "biased low"
23424	97	39			*is* (?) an important aspect of… [Alexander Graf, Germany]	Accepted. The sentence was indeed long and complicated, but the entire paragraph has now been removed
23428	97	42			why is this effect not (over)compensated by a slowing down of thawingd due to the better insulation in summer? [Alexander Graf, Germany]	Noted. There can be partial compensation indeed, but effects in summer are much more unclear than in winter. Snow in forst and shrub areas tends to be much less compressed, thus a better insulator, and this effect is quite consistently observed. However the entire paragraph has been removed
1078	97	45			positive or negatiove feedback? [Tobias Rütting, Sweden]	Noted. This was unclear indeed. But the entire paragraph has been cut.
2774	98	12	98	12	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	Accepted. Text revised appropriately
17612	98	17	98	18	"because of slow carbon decomposition at depth and compensation by vegetation growth; however, currently neglected abrupt processes such as thermokarst formation might induce faster changes (Schuur et al. 2015)" May be explain why thermokarst may induce changes. [Guillaume Bertrand, France]	Accepted. Thermokarst formation leads to rapid erosion and dissolution of soil material. The entire section has been shortened and thermokarst are not central anymore.
23432	98	30	98	31	if the abbreviations Pdec and Einc are not used elsewhere, consider dropping them [Alexander Graf, Germany]	Accepted. Abbreviations have been removed
1822	98	26		27	provide evidence to substantiate the claim [Chukwuma Anoruo, Nigeria]	Noted. The entire section has been rewritten and turned into an assessment with literature
23436	98	34			Such feature is => These findings are? [Alexander Graf, Germany]	Editorial
18796	99	1	99	1	Figure 2.6.11 : Where has the water vavor that removed from in this figure gone? The figure should satisfy the conservation law of mass. [Hiroaki Kondo, Japan]	Rejected. Water vapor comes from local evpotranspiration. The idea here is not to close a loop.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
6258	99	2	99	7	The issue of how the Amazon forest will react in a changing climate (e.g. the question of "Amazon dieback") is not resolved yet (see e.g. Marengo and Espinoza 2016, DOI: 10.1002/joc.4420), however, here you say "In the Amazon, despite the CO2 fertilisation effects, future tropical warming and reduced precipitation will provoke decreases in tree cover and shortened growing season (Figure 2.6.12; (Port et al. 2012))", that is, only based on one reference from 2012. A lot of newer research has been done on this subject, see for example (not meant to be extensive): "B. Sakschewski, W. von Bloh, A. Boit, L. Poorter, M. Peña-Claros, J. Joshi, J. Heinke, K. Thonicke (2016): Resilience of Amazon forests emerges from plant trait diversity. Nature Climate Change. doi:10.1038/nclimate3109"; "Levine et al. (2016): Ecosystem heterogeneity determines the ecological resilience of the Amazon to climate change, https://doi.org/10.1073/pnas.1511344112"; "Boulton CA, Booth BBB, Good P. Exploring uncertainty of Amazon dieback in a perturbed parameter Earth system ensemble. Glob Change Biol. 2017;23:5032–5044. https://doi.org/10.1111/gcb.13733" [Anna Sörensson, Argentina]	Noted. The discussion was appreciated. However there is no more focus on the Amazon nor in any particular area anymore. The section has been substantially revised
2776	100	1	100	1	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. No references have been included in this figure caption - making the traceability of the uncertianty language hard to track. [Sarah Connors, France]	Accepted.
20126	100	3	100	3	…….feedbacks. [Sabit Erşahin, Turkey]	Editorial
18798	100	13	100	13	african --> African [Hiroaki Kondo, Japan]	Editorial
15284	100	37	100	41	The sentence about the RCP4.5 scenario is odd in the context of this RCP8.5 discussion. Consider removing this sentence or indicate the amount of forest area adde under RCP8.5. [Benjamin Quesada, Germany]	Accepted. Text has been updated and clarified
15282	100	25	101	12	In this paragraph, results from multi-model experiments or meta-analysis should be given high priority. Individual model results from (Arora and Montenegro, 2011) have to be constrasted with e.g 1) LULCC-biophysical effects meta-analysis review (Perugini et al., ERL 2017). Collecting all existing comparable modelling deforestation/forestation experiments, their Table 3 indicates that tropical forestation leads to a annual biophysical surface cooling (-0.07°K) while boreal and temperate forestation lead to a warming (0.13°K and 0.04°K, respectively); 2) observation-based study from (Li et al., 2016) who found that tropical afforestation (Table 1) decrease surface mean temperature by 0.28°K/decade, while boreal and temperate afforestation lead to small cooling (-0.10°K/dec) and warming (+0.28°K/dec) respectively and 3) Page 92 lines 8-17 for harmonization. Those findings tend to challenge the strong statement about the 3-fold finding (based on the 0.0°K change due to biophysical effect). [Benjamin Quesada, Germany]	Noted. The entire section has been rewritten
1666	100	25	101	12	Here again, it would be good to clarify which afforestation methodologies are being used, as the impacts vary significantly. [Simone Lovera-Bilderbeek, Paraguay]	Rejected. This is a modelling study that take trees in or out but with no details about which trees. This is an idealized study. However this section does not exist anymore and some text has disappeared, others moved elsewhere
23442	100	6			and lead (drop s) to [Alexander Graf, Germany]	Editorial
23446	100	44			Last sentence in parentheses: Reword and elaborate. [Alexander Graf, Germany]	Editorial

Comment No	From Page	From Line	To Page	To Line	Comment	Response
27570	100				Evidences Which Have Not Been Highlighted but Would Be Considered a Serious Omission If Left Out Of the Report Yohannes H, "A Review on Relationship between Climate Change and Agriculture ", Earth Sci Clim Change 2016, 7:2 "Modified precipitation patterns will enhance water scarcity and associated drought stress for crops and alter irrigation water supplies. They also reduce the predictability for farmers' planning" compare with " In moisture limited regions (e.g. at the margin of desertic regions) CO2 fertilisation increases water use efficiency and therefore the growth of vegetation. If this is accompanied with GHG-induced changes in precipitation, positive feedbacks are activated and leads to both enhanced rainfall and greening ((Port et al. 2012))". [Omoyemen Lucia Odigie-Emmanuel, Nigeria]	Rejected. The section has been substantially revised and the suggested paper concentrates on impacts on crops while section 2.6 focuses on impacts on climate (atmospheric physics and dynamics)
24578	101	9	101	9	Figures should be larger + figure caption of original figure should be deleted [Christopher Morhart, Germany]	Accepted. All figures have been checked, and legends have been re-written
20128	101	12	101	12	….2013). [Sabit Erşahin, Turkey]	Editorial
7528	101	21	101	23	in my understanding climate adaptation is not limited to agricultural productivity. It includes also general drought resilience, increased water availability, and prevention of natural hazards like floods, erosion and forest fires. [Joris de Vente, Spain]	accepted, text revised
466	101	21	101	23	Vegetation cover produces other effects, in long-term reduces the need of synthetic fertilizers, and N2O emission associated to that is also reduced. The presence of vegetation cover has also the benefit of adapting the crops to drought and severe periods, without rain precipitation event [Newton La Scala Jr., Brazil]	Accepted, text revised
27308	101	22	101	23	The relationship between productivity and agricultural expansion is complex and complicated, to say the least. A facile equivalency should be avoided. Add nuance here. [Doreen Stabinsky, United States of America]	accepted, text revised
24848	101	27	101	28	need to close the paranthesis. [Biplab Brahma, India]	editorial
24662	101	28	101	28	There is a missing parenthesis after "reducing waste" [Carlos Matias Figueroa, Mexico]	editorial
20740	101	30	101	32	The geological storage of carbon dioxide (possible injection of huge amount of carbon dioxide) in deep geological porous layers above which are impermeable rocks (primarily compacted clays) is not sufficiently explained. [Gordana Grujic, Serbia]	Accepted with modification, have suggested this to the cross chapter box on bioenergy. CCS technology is not really the focus o this chapter, rather the land mitigation aspects, chapter 7 should also cover risks including this
26774	101	30	101	32	As a general comment, there seems to be inconsistency in chapter 1-7 on terminology regarding CDR, GGR, NET etc. The short overview on the terminology presented here could be expanded with an overview of technologies, and technologies could be expanded further. SCS effects could also be included in the terminology. [Knud Christensen, Denmark]	Accepted - Text is expanded slightly,. Technologies are included in options below, SRCCL agreed to use CDR terminology consistently
5998	101	15	102	2	This chapter and section assessed the impacts of EBCCS deployment on terrestrial ecosystems. However, little statement is found about another procedure of climate engineering, that is, solar radiation management (SRM). Because SRM affects radiation budget at the land surface, its impacts should be considered. Indeed, several studies have assessed the SRM impacts on ecosystems: Xia, L., et al. (2016). "Stratospheric sulfate geoengineering could enhance the terrestrial photosynthesis rate." Atmospheric Chemistry and Physics 16: 1479–1489. Ito, A. (2017). "Solar radiation management and ecosystem functional responses " Climatic Change 142: 53–66. [Akihiko Ito, Japan]	reject- SRM is outside the scope of the SRCCL, this is about how managing the land can affect mitigation and how climate affects land, but not about other (non-agri or land sector) mitigation options

Comment No	From Page	From Line	To Page	To Line	Comment	Response
7024	101	13	124	4	Section 2.7 needs a subsection on the chemical/aerosols effects of future land cover. Here are some references, but there are many more: Impacts of near-future cultivation of biofuel feedstocks on atmospheric composition and local air quality Ashworth, K.; Folberth, G.; Hewitt, C. N.; et al. ATMOSPHERIC CHEMISTRY AND PHYSICS Volume: 12 Issue: 2 Pages: 919-939 Published: 2012 Impact of Biofuel Poplar Cultivation on Ground-Level Ozone and Premature Human Mortality Depends on Cultivar Selection and Planting Location Ashworth, Kirsti; Wild, Oliver; Eller, Allyson S. D.; et al. ENVIRONMENTAL SCIENCE & TECHNOLOGY Volume: 49 Issue: 14 Pages: 8566-8575 Published: JUL 21 2015 Impact of future land use and land cover changes on atmospheric chemistry-climate interactions Ganzeveld, Laurens; Bouwman, Lex; Stehfest, Elke; et al. JOURNAL OF GEOPHYSICAL RESEARCH-ATMOSPHERES Volume: 115 Article Number: D23301 Published: DEC 2 2010 [William Collins, United Kingdom (of Great Britain and Northern	Assessment extended
23450	101	5			& => and the [Alexander Graf, Germany]	Editorial
23454	101	9			Fig. 2.6.13: Remove frames around figures, improve readability / size [Alexander Graf, Germany]	Accepted. All figures have been checked, and legends have been re-written
27306	101	20			The word "net" is unnecessary. [Doreen Stabinsky, United States of America]	Accept - the word 'net' has been excluded from the text.
23458	101	22			productivity*,* thereby decreasing… [Alexander Graf, Germany]	Editorial
23462	101	36			reword double "of" [Alexander Graf, Germany]	editorial
15760	101				Figure 2.6.13 has very poor texts. It's not readable. [Thompson Annor, Ghana]	editorial
17688	102	5	102	7	known as safeguards [Maria del Pilar Salazar Vargas, Mexico]	Noted - these are sometimes called safeguards but no need to invoke the term here
316	102	5	102	11	Revisit the sentence to make its content clear [Lawrence Aribo, Uganda]	Accepted - The sentence has been revisited and modified.
9540	102	11	102	11	Reference to "REDD+ projects" is inappropriate, as REDD+ is a national-level implementation approach as defined by UNFCCC under which "projects" can't qualify. Easiest solution would be to delete the brackets. [Dirk Nemitz, Germany]	Accepted
23470	102	20	102	24	Permanence is a key uncertainty regarding longevity of land based mitigation and adaptation options*,* as carbon stored in biomass and soils *is* at risk of climate change (e.g. increase*d* soil decomposition at higher temperature) and natural disturbances, which may increase in future due to climate change*,* e.g. fire, disease*s*, windthrow, *and* drought (section 3, 2.4). Furthermore, management may change in the future*,* e.g. harvesting of forests. [Alexander Graf, Germany]	Accepted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
25014	102	20	102	24	Permanence is key for any kind of mitigation and adaptation option. The avoided use of e.g. coal is permanent if there is a transformational change, otherwise the coal not burned now will be burned in the future. The use of air conditioning is an adaptation measure so far as the system is mantained working (and it is a mitigation option until is powered with renewable energy otherwise when using fossil energy it wouldn't be anymore a mitigation option. Therefore, I recommend to deete those rows. Having said that a ton of CO2 emissions caused by harvest isn't permanent so far as the forest regrows as well as a ton of CO2 removals isn't permenently sequestered if it will be harvested in the futture. For such reason the mitigation impact of a change in the carbon stored in terrestrial pools should be quantified in terms of change in the average long term C stock. You may consider to replace the current text on permanence with this notation. [Sandro Federici, Italy]	Accepted with modification, it is important to discuss issues of permanence in relation to land and also in other sectors (although not the place for that here). This is something policy makers are aware of, but text changed to be more balanced and included suggested text on long-term stocks
936	102	27	102	39	In 2018 a systematic review on negative emission technologies (NETs) was published. It includes some land-based negative emission technologies (biochar, soil carbon sequestration, afforestation and reforestation and BECCS). The revision in divided into three parts. Please, check the references. Part 1: Jan C Minx et al 2018 Environ. Res. Lett. 13 063001. Part 2: Sabine Fuss et al 2018 Environ. Res. Lett. 13 063002. Part 3: Gregory F Nemet et al 2018 Environ. Res. Lett. 13 063003. I suggest the authors to read this systematic review in order to complete this paragraph and also for the figure 2.7.2 and the following sections [Jose Luis Vicente Vicente, Germany]	Accepted - the systematic review has been taken into account for this chapter
18840	102	4	104	2	In this section,land-based mitigation and adaptation progess have been given,2.7.1 Land management options for climate mitigation,but sub-section 2.7.1.1 Forestry-based mitigation 1 and adaptation options, there is no clear distinguishe for the mitigation and adaptation options. In addition, combat desertification and controlling land degradation options are important to mitigation and adaptation ,food security and SLM. [Jianguo Wu, China]	Accept with modification the treatment of adaptation and mitigation has been aligned between chapters 2 and 6, we do not discuss these as separate response options, but rather discuss response options broadly and their effect on climate. Response options without climate impact are not discussed. Text revised to clarify this
7530	102	4	112	47	Implementation of SLM practices is a huge social challenge. To trigger wide scale adoption of practices requires (short-term) benefits for farmers such as yield increase or stabilization and resistance to drought. Co-benefits of SLM and carbon sequestration to human well-being include the protection of ecosystem services and functions, including provisioning, regulating, supporting and cultural services, and biodiversity. However, most farmers and land managers are most likely to contribute to SLM and increasing carbon sequestration if they are convinced it contributes to production and food security, if there are economic benefits or other incentives. It is crucial to consider that there is no one size fits all solution for mitigation or adaptation through SLM. Selection of management practices have to be site specific, as local environmental, socioeconomic and institutional conditions, as well as local farming systems determine their effectiveness. In general, combinations of practices, including afforestation, re-vegetation, soil and water conservation practices and diversification of cropping systems are most effective. Therefore, evaluations and feasibility studies of alternative management practices should include socioeconomic aspects through stakeholder engagement, and indicate pathways to foster wide scale adoption including public and private initiatives. I miss the whole aspect of stakeholder engagement and how to achieve acceptance and upscaling in the chapter. We can have huge amount of technicla knowledge, but it will be of little help if it is not applied-implemented. [Joris de Vente, Spain]	Accepted - these issues are dealt with in chapter 6 and 7, this chapter just deals with technical potential, we clarified in the introduction

Comment No	From Page	From Line	To Page	To Line	Comment	Response
18842	102	4	113	50	There is no linkage to chapter 3, chapter 4 ,chapter 5 and chapter6 [Jianguo Wu, China]	Accepted - more work has been done to align with all chapters of the report
23466	102	1			deals *with* further… [Alexander Graf, Germany]	editorial
27310	102	8			It would be useful to include some comment on how "available" is defined. There are similar complexities with the definition of "marginal" land. What is marginal to someone looking to plant bioenergy crops is not necessarily marginal to the small farmer whose livelihood depends on the land. [Doreen Stabinsky, United States of America]	Accepted modified text to include marginal and alternative uses of land example
23474	102	27			assess (drop es) [Alexander Graf, Germany]	Accepted - changed accordingly
23478	102	31			focused *on* land-based… [Alexander Graf, Germany]	Accepted - changed accordingly
23482	102	35			prices*:* [Alexander Graf, Germany]	Accepted - changed accordingly
23486	103	1	104	18	Figures 2.7.1 and 2.7.2: Does reforestation include biophysical (albedo) effects? How doe the two figures and their subpanels relate to each other, e.g. "Reduce deforestation" in 2.7.2 to "Avoided forest conv." in 2.7.1? Is the lower part of 2.7.2 a more detailed partitioning of the "land use change" issue in the upper part of 2.7.1? Add reference numbers used in the figure to the references in the caption, or remove these numbers altogether. [Alexander Graf, Germany]	Accepted with modification the two panels are from different sources, but 2.7.1 will be deleted and a new 2.7.2 will be produced to incorporate more recent literature
11396	103				Figure: Conservation Agriculture should have a biodiversity bar, as well as an air bar (reduced fertilizer and insecticide/herbicide use and CO2 emission) see http://www.fao.org/3/a-i7480e.pdf It is also important pointing out that the biodiversity value of forests depend on them being indigenous (and not monoculture) eg Eucalyptus forests in Africa reduce biodiversity and have a vastly negative effect on water security. [Debra Roberts, South Africa]	Accepted with modification, this is from a published source, but the figure is now deleted
1668	104	1	104	18	The figure combines a lot of different data derived from different studies, but does not make clear whether all studies have taken the same approach as far as counterfactual scenarios are concerned. This is a major omission, especially as the impact of activities like afforestration through monoculture tree plantations and bioenergy production in the context of BECCS is negative if it replaces carbon-rich natural ecosystems. The figure is thus misleading and I recommend it to be removed. [Simone Lovera-Bilderbeek, Paraguay]	Accept the general comment, but not to remove the figure, instead the issue of calculation and counterfactuals is discussed in the text
756	104	3	104	18	Number of references in the figure and caption references would still need to be aligned [Rolf Sommer, Kenya]	Accept , modified
26466	104	4			Including adaptation in title 2.7.1 appears justified [Hans Poertner and WGII TSU, Germany]	accept with modification, this figure has been deleted
9546	105	5	105	8	Very confusing treatment of REDD+ concept, reducing it to the first two activities only (reducing emissions from deforestation and forest degradation), ignoring the other three activities. At the same time, activities that would fall under "enhancement of forest carbon stocks" like afforestation and reforestation or "sustainable management of forests" like FM are shown separately. To avoid confusing the reader it would be important to have a valid and clear presentation of REDD+. Alternatively, all relevant activities could be described, with a hint to REDD+ being a framework that allows developing countries to seek results-based payments for the action that falls under any of the five REDD+ activities (which would include almost any mitigation action in the forest sector). [Dirk Nemitz, Germany]	Accept with modification - removed reference to REDD+ here as that is an enabling policy and dealt with in chapter 7.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
27312	105	5	105	10	Include forest restoration [Doreen Stabinsky, United States of America]	Accept with modification, the list is gone but it is in the text
24598	105	5	105	10	mitigation from forestry: list includes all kinds of things that increase forest carbon stocks, then lists BIOENERGY – which liquidates forest carbon into the atmosphere – along with these other things. Bioenergy should be taken OUT of the list – it does not belong on the same list as “restoring or replanting” forests. It is the opposite of that. [Mary Booth, United States of America]	accepted text deleted
1670	105	5	105	10	Here again, it is necessary to specify and diversify the different afforestation and reforestation methodologies, as the current definition of afforestration/reforestation includes a broad range of activities with very diverse impacts on the climate. [Simone Lovera-Bilderbeek, Paraguay]	Reject: there is limited space in t his chapter to list all details, more details can be found in chapter 4, now referenced
9542	105	6	105	6	Standardize reference to either "REDD" or "REDD+", as the difference is purely historical, and in fact doesn't exist nowadays (see also comment on glossary). [Dirk Nemitz, Germany]	Accept with modification - removed reference to REDD+ here as that is an enabling policy and dealt with in chapter 7.
24850	105	8	105	8	(c) should be (d) using wood-based products……. [Biplab Brahma, India]	editorial - text now deleted
24664	105	8	105	8	"(c)" should be "(d)" [Carlos Matias Figueroa, Mexico]	editorial - text now deleted
18800	105	8	105	8	(c) --> (d) [Hiroaki Kondo, Japan]	editorial - text now deleted
19308	105	13	105	14	suggested deleting 'finance is often needed to compensate for loss of alternative income', I do not think IPCC should worry about the losses. Better to focus on only on mitigation options without thinking much on the cost-benefits. [Binaya Raj Shivakoti, Japan]	Accepted, text deleted
1672	105	13	105	14	There is low agreement on whether fnance is needed to compensate for loss of income due to halting deforestation. [Simone Lovera-Bilderbeek, Paraguay]	Accepted, text deleted
19310	105	16	105	16	The maximum potential for reduced deforestation and degradation is equal to current net emissions' it could be reframed as 'The maximum mitigation potential for reduced for reduced deforestation and degradation is equal to current net emission xxx GtCO2 yr-1 from deforestation and degradation' [Binaya Raj Shivakoti, Japan]	Accept, whole text reframed
3170	105	22	105	23	Erb et al., 2018 (10.1038/nature25138) calculate a potential of 100-147 PgC if all forests were to be restored to 100%, and around 73 PgC if all Other Wooded Land were to be restored to 100% of the potential (in sum 173-220PgC). As this is not realistic, because it would mean the cessation of uses, other variants are presented in this paper. These more realistical potentials range around 60-100PgC, and include, for instance, partial restoration of cropland or a more modest reduction of tree-bearing ecosystems. This and the feedback between harvest and biomass stocks should be discussed here, too. [Karlheinz Erb, Austria]	accept with modification: text on total carbon stocks and losses is in section 2.4 where this paper is referenced. Here we focus on technical potentials. Not theoretical potentials
24600	105	24	105	27	Incorrect use of term “offsetting” here. “Once plants grow to maturity, they can be 25 harvested and used for bioenergy offsetting fossil fuels.” No! offsetting fossil fuels is accomplished by planting trees and ensuring they are permanently storing carbon – with bioenergy, you are burning trees and sending the carbon into the atmosphere. This is NOT an offset. [Mary Booth, United States of America]	Accept; use "substituting" instead
1674	105	24	105	27	There is low agreement on the mitigation potential of bioenergy and wooden products, as the relative mitigation potential depends entirely on counterfactal scenarios, including efficiency measures in the energy and building sectors, as well as counterfactual land use scenarios. [Simone Lovera-Bilderbeek, Paraguay]	Accept, the importance of counterfactuals is better reflected in the text and the uncertainty in bioenergy and details on numbers are discussed later in the relevant section

Comment No	From Page	From Line	To Page	To Line	Comment	Response
24852	105	29	105	30	……soils by 1.5-11 GtCO2 yr-1 in…? Incomplete sentence. [Biplab Brahma, India]	accept
938	105	29	105	30	Soil organic carbon sequestration is supposed to follow a saturation behaviour. Therefore, it would be interesting that the authors highligh or give some soil carbon sequestration rates according to the period of time since the change in the management. This advise is also valid for the rest of the paragraphs assessing soil organic carbon sequestration. There are some evidences of a decrease in the soil carbon sequestration over time (e.g. Vicente-Vicente, J.L., García-Ruiz, R., Francaviglia, R., Aguilera, E., Smith, P., 2016. Soil carbon sequestration rates under Mediterranean woody crops using recommended management practices: A meta-analysis. Agriculture, Ecosystems and Environment, 235:204 – 214). [Jose Luis Vicente Vicente, Germany]	Accept with modification, the suggestion is too detailed for this text although it is noted later that carbon uptake slows as forests reaches maturity.
9872	105	29	105	47	I think the use of both CO2 and CO2-eq emissions is confusing. More clarity is needed on this. [Jan Fuglestvedt, Norway]	accept, standardized across SRCCL
1676	105	29	105	47	Here again, a comparison with counterfactual scenarios and a diversification between different afforestation methodologies is required to provide the correct information. It is unhelpful to combine the impacts of natural forest regeneration and monoculture tree plantation establishment in one paragraph. [Simone Lovera-Bilderbeek, Paraguay]	accept with modification, it is too detailed to give examples of all cases as uptake is also variable based on location an d many other factors. Text o counterfactuals as source of uncertainty added at the beginning of this section
19312	105	45	105	47	Would be interesting to add proportion or year (if 161 Ma by 2030 and the time required at the rate of 27Mha/year) with respect to the required 1300 Mha by 2100 [Binaya Raj Shivakoti, Japan]	Reject - agree it would be interesting, too detailed for the text here to give this type of information on each scenario, but also the scenarios in the paper do not institute biomass plantations until 2030 or 2050
24666	105	45	105	47	The Bonn Challenge should be included [Carlos Matias Figueroa, Mexico]	Accept with modification: policy and governance issues are in chapter 7, the text here on policy has been deleted
3166	105	1	106	12	The text is now entirely about forests. It should be mentioned that it is aventually unclear and ambiguous what forests "really" are (Putz FE, Redford KH (2010) The Importance of Defining 'Forest': Tropical Forest Degradation, Deforestation, Long-term Phase Shifts, and Further Transitions. Biotropica 42:10–20. doi: 10.1111/j.1744-7429.2009.00567.x, Chazdon RL, Brancalion PHS, Laestadius L, et al (2016) When is a forest a forest? Forest concepts and definitions in the era of forest and landscape restoration. Ambio 45:538–550. doi: 10.1007/s13280-016-0772-y). Furthermore, and in this vein: discussing other wooded land (OWL) and their contribution etc. is important in my view here. OWL store large amounts of carbon, not per unit area, but because the areas are so large (Searchinger TD, Estes L, Thornton PK, et al (2015) High carbon and biodiversity costs from converting Africa's wet savannahs to cropland. Nature Clim Change 5:481–486. doi: 10.1038/nclimate2584; Erb et al., 2018 doi 10.1038/nature25138). Futhermore, uncertainties for OWL are massive which should be discussed, too. [Karlheinz Erb, Austria]	Accept with modification. we agree forest definition is ambiguous, but here is not the pace to open that debate in detail, however the text is modified to make clear in includes wooded land. There is discussion of forest definition uncertainty in 2.4

Comment No	From Page	From Line	To Page	To Line	Comment	Response
3168	105	1	106	12	The systemic link of biomass harvest - carbon stocks is net well enough explored in this chapter. It is Important to note that an increase of productivity (management or naturally induced) results in higher stocks only when turnover rates remain unaltered. But management alters turnoverrates, globally it results in an acceleration by a factor of 1,9. (Erb et al., 10.1038/ngeo2782; Malhi Y (2012) The productivity, metabolism and carbon cycle of tropical forest vegetation. Journal of Ecology 100:65–75. doi: 10.1111/j.1365-2745.2011.01916.x Malhi Y, Doughty CE, Goldsmith GR, et al (2015) The linkages between photosynthesis, productivity, growth and biomass in lowland Amazonian forests. Glob Change Biol 21:2283–2295. doi: 10.1111/gcb.12859) [Karlheinz Erb, Austria]	Accept: modified text but did use specific refs on acceleration of turnover rates or tropical forests as too specific for this section
18820	105	1	113		Although the title says mitigation and adaptation, the section focuses more heavily on mitigation, so it would be good to have a better balance, also highlighting that some of the options listed serve for both mitigation and adaptation goals. Otherwise, as adaptation is explained further in other chapters, perhaps remove adaptation from the sub-section title as it can be misleading. [Debora Ley, Guatemala]	Accepted, aligned with chapter 6 we now discuss response options that may be for mitigation or adaption and only discuss those here that have an impact on climate. Intro text and section text modified
23490	105	6			though => through? [Alexander Graf, Germany]	editorial - text now deleted
23494	105	8			(c) was already used, is this meant to be (d)? [Alexander Graf, Germany]	editorial - text now deleted
23498	105	16			equal to current net emissions: from these? [Alexander Graf, Germany]	Accept, clarified
1080	105	51			somewhere the potential negative effects (e.g. N2O emission) of forest fertilisation need to be discussed in out into context of the potential benefits [Tobias Rütting, Sweden]	accept
24854	106	1	106	1	.....also include other A/R interventions. Requesting to clearify the other factors. [Biplab Brahma, India]	accept
24580	106	2	106	4	Delete "new", because the study is from 2007! [Christopher Morhart, Germany]	accept
3172	106	4	106	4	The potentials calculated by Nabuurs et al are calculated on very simple approaches (e.g. an assumed annual increase of increment by 1 m^3 / ha without specific time frame for large areas) and do not take current uses rigidly into account. Furthermore, it remains unclear to if the individual activities are additive, or synergistic. For instance to which degree feedbacks of increased use on carbon stocks are taken into account remains unclear; thus, some caveats are warranted to this overly optimistic paper. [Karlheinz Erb, Austria]	accept with modification, deleted this estimate as its specific to Europe and this section focuses on global potentials
20130	106	4	106	4	……..management climate mitigation potential by 2050 (Nabuurs et al. 2007). [Sabit Erşahin, Turkey]	editorial
24856	106	6	106	12	This paragraph is devoited only ablut biomass sink of agroforestry. However, agroforestry systems are been recognised as a potential C sink in the soil, comparable to the natural forests of tropical zones. Therefore, requesting to incorporate a brief on SOC sink potentiality of tropical agroforestry systems. [Biplab Brahma, India]	accept: included soil, but also note agroforestry is mentioned in soil carbon sequestration section.
940	106	6	106	12	From my point of view, this paragraph is too short, since the importance of the Agroforestry is really high. Agroforestry is widely known by small and indigenous farmers. Their management practices are based on the agroecology techniques, leading to achieve a resilient agroecosystem. Therefore, I suggest the authors to include a paragraph assessing the importance of the agroecology techniques implementation on land-climate interactions. [Jose Luis Vicente Vicente, Germany]	Accept with modification: some text added but space limited, more info is in chapter 5, now referenced

Comment No	From Page	From Line	To Page	To Line	Comment	Response
20132	106	12	106	12	……management climate mitigation potential by 2050 (Nabuurs et al. 2007). [Sabit Erşahin, Turkey]	editorial
24602	106	14	106	14	Again, incorrect use of term “offsetting.” Offsets have to be additional and permanent. Making products out of wood does not represent “additional” carbon storage. [Mary Booth, United States of America]	Accept, use "substitution"
1678	106	15	106	37	The assumption that harvested wood products would store carbon for 100 years is based on a rather unrealistic best case scenario. Most buildings are demolished in a shorter time period and sadly the wood is seldom re-used. Moreover, the suggestion that wood would replace steel and cement needs to be accompanied by a qualification that other counterfactual scenarios like increased efficiency in the building sector or the use of more sustainable materials like bamboo or stone would deliver more favorable impacts, especially taking into account the broader impacts of logging on forest ecosystems. [Simone Lovera-Bilderbeek, Paraguay]	accept with modification. Text now says decades to over 100 years and is more balanced in general. Text on counterfactuals is added at the beginning of the section.
24858	106	18	106	19	"If biomass harvest followed by regrowth, then net …….zero over time" this statement is a compromised statement. Because, after harvesting if regrowth occur the biomass C sequestration rate of new saplings will never be equal to the already harvested trees. However, if selective logging of trees have been done with a logging pause period then also a fraction of systems biomass C sequestration will be compromised. Therefore, requesting to change/modify the statement. [Biplab Brahma, India]	accept, text modified
3174	106	19	106	19	The "zero over time" formulation suggest that this is somewhat negligible. But it is key for mitigation strategies, because it influences the timing of costs and benefits (emissions and net reductions), and renders due to too long payback times some options or strategies unfeasible. A more specific formulation seems neccessary. [Karlheinz Erb, Austria]	accept, text modified
3176	106	34	106	35	The "however" and the following argument do not fit together. Please argue that more funds for management improve carbon stocks or mitigate the effects described in the sentence before. The emission-first absorption-later concern needs to be mentioned explicitly at this point, as management effects will ony materialize after some time, but impacts on C-stocks are immediate (fast-out slow in). Also missing is a reference to the biogeophysical effects of management that can be substantial, even offsetting biogeochemical sinks (Naudts et al., 2016). [Karlheinz Erb, Austria]	accept, text deleted
7026	106	41	106	42	There are many studies determining the overall mitigation offffects of forests accounting for reactive gases and aerosols. E.g. Human land-use-driven reduction of forest volatiles cools global climate: Unger, N: NATURE CLIMATE CHANGE Volume: 4 Issue: 10 Pages: 907-910 DOI: 10.1038/nclimate2347 [William Collins, United Kingdom (of Great Britain and Northern Ireland)]	accepted, text added briefly but will need more work for next round
24668	106	46	106	46	"afforestation" instead of "afforeestation" [Carlos Matias Figueroa, Mexico]	Editorial
18802	106	46	106	46	aforeestation --> aforestation [Hiroaki Kondo, Japan]	Editorial
1082	106	49	106	51	references needed [Tobias Rütting, Sweden]	accepted, text updated
27314	106	12			Hawken 2017 is a popular book for a general audience written by a non-scientist. It's not an appropriate source. Please find the underlying scientific evidence and present that instead. [Doreen Stabinsky, United States of America]	accepted
9378	106	35			TO BE ADDED: There are tradeoffs and synergies between enhancing the carbon sinks of existing managed forests and [Kim Pingoud, Finland]	accept discussion of such tradeoffs included in text although not in the exact wording suggested here

Comment No	From Page	From Line	To Page	To Line	Comment	Response
9380	106	35			using wood products. According to a Nordic study (Soimakallio et al. 2016) it would be unlikely that [Kim Pingoud, Finland]	Part of same comment, see response to comment # 9378
9382	106	35			wood utilization would provide significant reductions in net carbon emissions within the upcoming 100 [Kim Pingoud, Finland]	Part of same comment, see response to comment # 9378
9384	106	35			years, thereby implicitly suggesting to maximize the carbon sink option into the existing managed boreal [Kim Pingoud, Finland]	Part of same comment, see response to comment # 9378
9386	106	35			forests. However, overstocking of forests could then pose problems. The carbon sink saturates in longer [Kim Pingoud, Finland]	Part of same comment, see response to comment # 9378
9388	106	35			run and the permanence of higher biomass stocks is not guaranteed due to natural disturbances [Kim Pingoud, Finland]	Part of same comment, see response to comment # 9378
9390	106	35			induced especially by warming climate. From the long-term perspective of sustainable forestry a feasible [Kim Pingoud, Finland]	Part of same comment, see response to comment # 9378
9392	106	35			balance between biomass stocks at the landscape level and continuous wood production to displace [Kim Pingoud, Finland]	Part of same comment, see response to comment # 9378
9394	106	35			fossil carbon emissions should be achieved. The estimated tradeoffs between biomass stocks and wood [Kim Pingoud, Finland]	Part of same comment, see response to comment # 9378
9396	106	35			production in Nordic conditions indicated (Pingoud et al. 2018) that win-win forest-management [Kim Pingoud, Finland]	Part of same comment, see response to comment # 9378
9398	106	35			strategies yielding both higher stocks and higher wood production – compared to the existing [Kim Pingoud, Finland]	Part of same comment, see response to comment # 9378
9400	106	35			management practices – could be found. [Kim Pingoud, Finland]	Part of same comment, see response to comment # 9378
24860	107	12	107	12	Kreidenweis et al. (2016). [Biplab Brahma, India]	Added
24604	107	12	107	15	This sentence is hard to interpret. "Kreidenweis et al. 2016) showed that excluding boreal regions from afforestation does not affect carbon dioxide removal significantly. Even restricting afforestation only to tropical regions would still allow 60% of carbon sequestration in comparison to a scenario not accounting for albedo effects in boreal and temperate regions." [Mary Booth, United States of America]	accepted, text deleted
24862	107	16	107	16	Soil organic…….and other soils: Resuesting to replce the "soils" with "landuses". "soil organic carbon management in agriculture and other land uses". [Biplab Brahma, India]	accepted
18622	107	16	107	31	The concept that SOC increases due to conservation tillage system would not be significant if soil depths down to 60 cm are included is not logical. The preponderance of soil C will reside in the top 30 cm were the bulk of the plant rooting and above ground plant residues exist. Soil C content drops quickly below the main root zone and with cropping system it will converge to similar levels. For this concept to be true, changes seen in the top will be lost if deeper soil layers are included requires that the deeper depths would have to increase soil C levels in the to levels that exceeds th observed increase in the surface. There is no biological explanation as to how plowing would increase the level of soil C well below the level that was plowed compared to those system where increase C inputs and no plowing was used. This discussion should be deleted. [Henry Allen Torbert, United States of America]	Accept with modification: it is difficult to fully understand this comment; some sentences don't make sense grammatically/logically. It is true that tillage generally affects the top ~30cm of the soil and some studies suggest that apparent increases from no-till are negated if deeper horizons are sampled (i.e. no-till redistributes rather than sequesters SOC). Elements of the discussion on conservation ag/reduced tillage have been re-written to clarify them and to better reflect the balance of evidence.
24670	107	17	107	18	This sentence is confusing "provided that sufficient organic matter 18 (including plant litter, residues and manure) is retained or added to allow for balancing losses of soil organic…" rephrasing is advisable [Carlos Matias Figueroa, Mexico]	Accepted - rephrased

Comment No	From Page	From Line	To Page	To Line	Comment	Response
2370	107	17	107	21	There are too few studies from tropical regions while hopes of carbon sequestration are highest there. It remains unclear to what extent additional biomass inputs contribute to carbon sequestration. (de Rowe A. et Al. 2010. p.149) Source: De Rouw A., Huon S., Soulileuth B., Jouquet P., Pierret A., Ribolzi O., Valentin C., Bourdon E., Chantharath B. 2010. Possibilities of carbon and nitrogen sequestration under conventional tillage and no-till cover crop farming (Mekong valley, Laos). Agriculture, Ecosystems and Environment 136 [Anne-Laure Sablé, France]	Accept with modification: Seems to be two comments in one. The comment regarding the dearth of tropical SCS studies is valid, in re-writing we have tried to reflect a global evidence base as much as possible. Second part - we agree that SCS is always context specific, but biomass availability is only one element of promoting SCS, on the whole we feel it is quite well understood. We have rewritten and updated references in this section, and added this reference later n the text
2374	107	17	107	31	Due to the lack of knowledge on the mechanisms impacted by agricultural practices, it is hard to predict their effects on soil C stocks. Agricultural practices, which increase soil OM inputs, are often considered to have a positive impact on C storage. However, their impact on mechanisms that contribute to the storage/destocking of soil C are not yet clearly understood. Meta-analyses and long-term field studies showed that the relative intensity of mechanisms contributing to storage and those contributing to destocking may change over time. (Dignac M.-F. et al. 2017. p.15) Source: Dignac M.-F. et al. 7 april 2017. Increasing soil carbon storage: mechanisms, effects of agricultural practices and proxies. A Review. Agron. Sustain. Dev. Doi:10.1007/s13593-017-0421-2 [Anne-Laure Sablé, France]	Accept with modification; text rewritten to be more clear about uncertainties with respect to ability of additional OM to increase carbon stocks.
468	107	20	107	20	low or NO tillage....no-till, important option. [Newton La Scala Jr., Brazil]	Accept: adjusted to include reference to no-till.
20742	107	21	107	25	In the text is not sufficiently explained the use of clay minerals in the sequestration of carbon under specific geochemical conditions due to its peculiar crystallographic and mineralogical features, structure, high cation exchange capacities etc. Besides, there are some scientific findings from Japanese research whereby carbonate ions ($CO32-$) in a clay mineral called "hydrotalcite" are repeatedly exchanged with carbon dioxide ($CO2$) in the air, quickly over just several days. [Gordana Grujic, Serbia]	Reject: this is too detailed for the space available to this report.
20744	107	25	107	25	the role of rocks consisted of CO3 (socalled "carbonate rocks") in storage of the large amount of carbon on the Earth is not mentioned. [Gordana Grujic, Serbia]	Accept: acknowledged the potential for carbonate formation in the soil as a more permanent soil C sink but also see section on enhanced weathering.
20746	107	25	107	25	The effect of bio-coal on the storage of $CH4$, $N2O$ and $CO2$ in the soil is also missing in the chapter Soil Organic Carbon Management in agriculture and other soils [Gordana Grujic, Serbia]	Accept with modification: There is already a section on biochar in this chapter
2372	107	26	107	28	Despite the equal contribution of inputs and the absence of erosion, the conventional system stored significantly carbon, whereas the no-till system lost carbon, and above that, the difference in storage between the two systems was significant. (de Rowe A. et Al. 2010. p.158) Source: De Rouw A., Huon S., Soulileuth B., Jouquet P., Pierret A., Ribolzi O., Valentin C., Bourdon E., Chantharath B. 2010. Possibilities of carbon and nitrogen sequestration under conventional tillage and no-till cover crop farming (Mekong valley, Laos). Agriculture, Ecosystems and Environment 136 [Anne-Laure Sablé, France]	Accept: Almost all SOC processes are highly context specific. We have clarified the text with revisions, added the reference
942	107	28	107	31	Please, be careful when talking about equilibrium and saturation. Equilibrium is reached after a few decades after the change in the management, whereas the saturation depends on the management practices and some soil properties (e.g. clay content). I think in the text you mean "saturation" when saying "equilibrium". I suggest to change "equilibrium" with "saturation". [Jose Luis Vicente Vicente, Germany]	Accept: The sentence is rephrased to be more clear.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
944	107	33	107	34	I do not agree with authors saying "medium evidence", since at least after the first years in the change of the management there are a lot of meta-analysis suggesting a clear increase in the SOC content (i.e. C sequestration). Maybe the authors should change the sentence and distinguish between the evidence after the first years and the evidence in medium and long-term periods of time. [Jose Luis Vicente Vicente, Germany]	Accept: added long-term as in introduction to this section we also revised text to clarify its long-term storage that matters for mitigation
23508	107	33	107	47	Although I unfortunately do not have a reference at hand, I remember it has been suggested that very deep tillage (moving part of SOC out of the topsoil and thus stabilizing it), which was sometimes historically used for different reasons, might also help to increade total soil C stocks. [Alexander Graf, Germany]	Accept with modification: this is a little detailed for the space available, the references cover different tillage results.
2376	107	36	107	39	Part 2.7.1.3 on Soil Organic Carbon Management in agriculture and other soils forgets to mention additional knowledge on conservation agriculture such as the technology package used in many areas. For instance, "the apparent success of Sasakawa Global 2000 in promoting CA (Ito et al., 2007) appears largely to have been due to its promotion within a technology package including inputs of fertilizers, pesticides and herbicides." (Giller K. E. 2009. p. 7) Source: Giller K. E., Witter E., Corbeels M., Tittonell P. 1 October 2009. Conservation agriculture and smallholder farming in Africa: The heretics' view. Field Crops Res. doi:10.1016/j.fcr.2009.06.017 [Anne-Laure Sablé, France]	Reject: not relevant to our chapter that focuses on mitigation potential and not on management/governance issues better addressed in chapters 5 and 7
27316	107	36	107	39	conservation agriculture is a range of practices. It is not surprising that there are a range of results with respect to a broad and varying category of practices.It would be much more analytically useful to disaggregate results from specific practices. [Doreen Stabinsky, United States of America]	Reject: we have limited space to go in to those details, but see chapter 5.
2380	107	38	107	39	Powlson D. S. et al. 2014. Limited potential of no-till agriculture for climate change mitigation. Nature Climate Change. DOI: 10.1038/NCLIMATE2292 [Anne-Laure Sablé, France]	Accepted: The gist of this ref is that no-till alters vertical distribution of SOC rather than sequestering. This is discussed already, but I've added this ref to the relevant place.
946	107	41	107	42	It is well known that the effect of the tillage and other management practices on SOC are more visible in the top layer of the soil, and when increasing in depth this effect is hidden. The key point is that the effect is hidden but it does not mean that it does not exist. [Jose Luis Vicente Vicente, Germany]	Accept; text rewritten to provide balance.
24672	107	42	107	44	Since the base information for a meta-analysis is other publication and without rigorous control the methods used in those publication will vary significatly rendering the meta-analysis mute. Also it should be considered that the result will differ due to different pedological conditions in different locations. [Carlos Matias Figueroa, Mexico]	Reject: Meta analyses are a peer reviewed means of bringing together different data in a useful way. It's already acknowledged that soil properties strongly mediate SCS.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
17116	107	42	107	47	I suggest that it should not be generalised that conservation agriculture practices, like zero tillage, do not have positive effect on Corg accumulation. Corbeels at al. (2016), examining data from several farms in the Brazilian Cerrado found that zero-tillage enhanced Corg stocks over 8 and 11 years. However, this work was done using data for the surface 40 cm soil layer. Ref.: Corbeels et al. (2016) Evidence of limited carbon sequestration in soils under no-tillage systems in the Cerrado of Brazil. Scientific RepoRts | 6:21450 | DOI: 10.1038/srep21450 On the other hand, Sisti et al. (2004) measured significantly higher Corg stock (corrected for equivalent soil mass) under zero tillage (ZT) compared to conventional tillage (CT) in a 1 m layer of an Oxisol in Southern Brazil when leguminous cover crop (vetch) was included in the rotation. The differences between the cropping systems could be attributed to the 30-85 cm depth. They suggested that the contribution of N2fixation by the leguminous green manure (vetch) in the cropping system was the principal factor responsible for the observed C accumulation in the soil under ZT, and that most accumulated C was derived from crop roots. Ref.: Sisti et al. (2004) Change in carbon and nitrogen stocks in soil under 13 years of conventional or zero tillage in southern Brazil. Soil & Tillage Research 76 (2004) 39–58. doi:10.1016/j.still.2003.08.007 Jantalia et al. (2007) measured, in a 1 m depth soil layer, reduced Corg loss in the Brazilian Cerrado, compared to native vegetation, under zero-tillage vs conventional tillage. Ref.: Jantalia et al. (2007) Tillage effect on C stocks of a clayey Oxisol under a soybean-based crop rotation in the Brazilian Cerrado region. Soil & Tillage Research 95 (2007) 97–109. doi:10.1016/j.still.2006.11.005 The potential of zero tillage and other conservation practices to accumulate Corg is important and relevant for tropical regions where the Corg is also important for sustainable soil fertility management, which is relevant for the mitigation and adaptation capacity of the agricultural systems. The success of these systems and practices in accumulating Corg however greatly depends on the use of the right soil management / crop rotation, and these combination for a given (specific) agroecosystem and how continouosly the good management practices are carried out in time and without interruption (Oliveira et al. 2018). Ref.: Oliveira et al. (2018) Integrated farming systems for improving soil carbon balance in the southern Amazon of Brazil. Reg Environ Change (2018) 18:105–116. doi:10.1007/s10113-017-1146-0 [Beata Emoke Madari, Brazil]	Accepted. This section has been re-written to better reflect the balance of evidence in this regard.
476	107	42	107	47	Be sure of this, there are plenty of literature showing increase in soil carbon stocks once no-till is adopted in place of conventional tillage. By the way, In chapter 4 of this special report, several citations in the other way around, no till in place of conventional tillage increasing soil carbon, avoiding land degradation. If you need two: reduced tillage + crop residues on soil surface, please, be especific, pointing also the need of surface cover. [Newton La Scala Jr., Brazil]	Accept; text rewritten to provide balance.
470	107	50	107	50	11.4 GtCO2 pa ....3.6 and 6.9 GtCO2 pa.....pa ? Or per year (py)? [Newton La Scala Jr., Brazil]	accept
952	107	16	108	14	I think that in the future papers about SOC will distinguish between different SOC pools. I mean that not all the SOC is actually sequestered, since a relatively high proportion (30-40%) corresponds to fresh organic matter, which is easily accesible for soil microorganisms. Therefore, I suggest to include a brief paragraph talking about it and the need for including this assessment in the future analysis. [Jose Luis Vicente Vicente, Germany]	Accept with modification: due to limited space a sentence has been added to that effect.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
7412	107	33	108	8	Wiesmeier et al., 2016 (Projected loss of soil organic carbon in temperate agricultural soils in the 21th Century: effects of climate change and carbon input ternds, Scientific Reports 2016; 6; 32525) simulated the future SOC development in cropland of Bavaria finding that C inputs have to increase by 29% to maintain present SOC stock in agrucultural soils; moreover, according to J.M. Holland, 2004 (The environmental consequences of adopting conservation tillage in Europe: reviewing the evidence, Agric., Ecosys. and Env. 103(2014) 1-25) conservation tillage can improve soil structure and stability thereby facilitating better drainage and water holding capacity that reduces extremes of water logging and drought. Conservation agriculture also lowers energy consumption [Stefano BRENNA, Italy]	Reject: agree with the reviewer, but the Bavaria study is too site specific for this global assessment, the co-benefits are dealt with in chapters 4,5 and 6.
18804	107	49	108	8	The unit 'pa' and 'yr-1' are written together. Unified unit may be better. [Hiroaki Kondo, Japan]	accept
1824	107	1			substantiate with literature [Chukwuma Anoruo, Nigeria]	accepted, text updated
23502	107	17			It is important to note that currently agricultural soils are probably a source (see row 95 of this sheet), so moderate efforts will first result in a weakened source rather than in a sink [Alexander Graf, Germany]	Accept: added in a caveat at the very first line to acknowledge that SOC is likely to decrease under 'typical' agricultural use.
11398	107	27			Insects need to be mentioned somewhere. They bury, convert and break down organic matter so fungi and bacteria have access to it. [Debra Roberts, South Africa]	Reject: while this is true, insects are part of ecological processes and it is not clear what the response option would be, we are not aware of literature treating it as a significant mitigation option in any review.
27318	108	1	108	2	conservation agriculture is a range of practices. It would be much more analytically useful to give numbers associated with specific practices. [Doreen Stabinsky, United States of America]	Reject: we have limited space to go in to those details, but see chapter 5.
472	108	1	108	2	again, mention no-till or no tillage. [Newton La Scala Jr., Brazil]	Accepted
24674	108	10	108	11	additional incurred costs should be mentioned [Carlos Matias Figueroa, Mexico]	Reject; this chapter deals with mitigation potential. See chapter 6 for costs

Comment No	From Page	From Line	To Page	To Line	Comment	Response
17118	108	10	108	14	I suggest that it should not be generalised that conservation agriculture practices like reduced tillage or zero tillage that result in increased soil cover (mulch) will lead to higher N2O emissions. Depending on the ecosystem properties, conservation agriculture systems may have reduced N2O emissions compared to conventional management, so it is more an ecosystem specific reaction. As soil pH, Corg, and clay content are often not reliable predictors of N2O fluxes (Meurer et al. 2016) in the Brazilian savannah ecosystem for example, where N2O emissions are naturally low, conservation agriculture practices that include soil management that affects soil properties (Corg, soil humidity etc) will not necessarily increase N2O emissions. Ref.: Meurer et al. 2016. Direct nitrous oxide (N2O) fluxes from soils under different land use in Brazil — a critical review. Environ.Res.Lett.11(2016)023001 doi:10.1088/1748-9326/11/2/023001 According to Santos et al (2016) cumulative N2O emissions are affected by rainfall patterns, soil management (zero tillage - ZT vs conventional tillage - CT), crop rotation and the combination of these factors. They concluded that NT systems with crop rotation were more efficient to reduce N2O emissions compared to a CT soybean in monoculture. There were differences also among the N2O emissions of crop rotations. The definition of cropping/management systems should be bazed on crop type and maximized use of available N in the system. Ref.: Santos et al. (2016) Soil N2O emissions from long-term agroecosystems: Interactive effects of rainfall seasonality and crop rotation in the Brazilian Cerrado. Agric. Ecosyst. Environ. 233:111-120. doi: 10.1016/j.agee.2016.08.027 Sato et al. (2017) also observed lower N2O emissions in conservation egriculture systems in the Brazilian Cerrado (continuous cropping with conventional tilage vs continuous cropping with zero tillage and integrated crop-livestock systems). The integrated crop-livestock system where grass species are present emitted the least N2O. Ref.: Sato et al. (2017) Nitrous oxide fluxes in a Brazilian clayey oxisol after 24 years of integrated crop-livestock management. Nutr. Cycl. Agroecosyst. doi: 10.1007/s10705-017-9822-5 [Beata Emoke Madari, Brazil]	Accepted: rewritten this section to balance the discussion.
24866	108	10	108	14	Traditional agroforestry systems are also recognised as a viable option for SOC management. Requesting to incorporate a paragraph on SOC under traditionally managed agroforestry systems. Suggesting to follow Brahma et al., 2018 (Ecosyatem carbon sequestration through restoration of degraded lands in Northe East India). [Biplab Brahma, India]	Accepted - implemented. We don't have room for a paragraph but now included it with references as a potential SCS practice.
24864	108	11	108	11	".....other aspects of lad management": shall be "..... Other aspects of land management". [Biplab Brahma, India]	accept
948	108	11	108	11	Please, correct "lad" with "land" [Jose Luis Vicente Vicente, Germany]	accept
318	108	11	108	11	consider land management instead of lad management [Lawrence Aribo, Uganda]	accept
474	108	11	108	11	land instead of lad (management) [Newton La Scala Jr., Brazil]	accept
950	108	13	108	14	Please, add recent references about the current discussion on increasing N2O emissions in SOC sequestration. White R E, Davidson B, Lam S K, Chen D (2017). Letter to the Editor – A critique of the paper 'Soil carbon 4 per mille' by Minasny et al. 2017. Geoderma http://dx.doi.org/10.1016/j.geoderma.2017.05.025 Paustian et al (2016) Climate-smart soils. Nature Vol. 532: 49-56. [Jose Luis Vicente Vicente, Germany]	Accepted: Relevant references have been added to this discussion.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
20134	108	16	108	16	Indent left [Sabit Erşahin, Turkey]	editorial
27304	108	16	108	28	This discussion on biochar is rather unbalanced and does not reflect the broad range of scientific studies on the technology, particularly those that are more circumspect and nuanced about the technology's potential. The treatment in chapter 1 is much more balanced. Please do a more thorough literature review and clearly outline uncertainties, regional and local contingencies, etc. [Doreen Stabinsky, United States of America]	Accept with modification. To avoid repetition, text has not been added, but instead a cross-reference to chapter 4, where these points are discussed, has been inserted.
17686	108	16	108	28	Mention this technology is in a early stage and needs more research, mainly regarding to feedstock availability, biochar handling, and biochar system deployment (Bracmort , 2010, Biochar: Examination of an Emerging Concept to Mitigate Climate Change) [Maria del Pilar Salazar Vargas, Mexico]	Accept with modification. To avoid repetition, text has not been added, but instead a cross-reference to chapter 4, where limitations of feedstock availability are discussed, has been inserted. Recent research and development has identified and deployed successful handling and application methods, for example, in China, where at least 20 large plants are operating.
26714	108	16	108	29	Positive effects on biochar as "soil improver" mentioned. Challenge with nutrient loss should be mentioned. [Knud Christensen, Denmark]	Accepted: text reworded to neutral language.
954	108	18	108	28	From my point of view, biochar is a very important and feasible management practice leading to increase not only C sequestration but also crop yields. I suggest the authors to include some data about the increase in crop yields. On the other hand, since the last years it has been clearer that biochar application can reduce N20 emissions. As in the case of the SOC sequestration the authors pointed out the increase in N2O emissions I suggest that the authors highligh in this paragraph the benefits of the biochar on decreasing N2O emissions (there are wide literature, including meta-analysis about it). Cayuela, M. L. et al. Biochar and denitrification in soils: when, how much and why does biochar reduce N2O emissions? Sci Rep-Uk 3, doi:Artn 173210.1038/Srep01732 (2013). Cayuela, M. L. et al. Biochar's role in mitigating soil nitrous oxide emissions: A review and meta-analysis. Agr Ecosyst Environ 191, 5–16, doi:10.1016/j.agee.2013.10.009 (2014). Furthermore, I suggest the authors to include a comment about the high permanence of the C into the biochar (decades to centuries). Recent studies have shown that only about 5% of the C would be released to the atmosphere from biochar during the first 100 years. [Jose Luis Vicente Vicente, Germany]	Accept with modification. To avoid repetition, text has not been added, but instead a cross-reference to chapter 4, where these points are discussed, has been inserted.
1680	108	21	108	24	It is not clear whether the estimates on biochar mitigation potential take into account counterfactural scenarios (e.g. replacement of natural ecosystems by biochar crops). [Simone Lovera-Bilderbeek, Paraguay]	accepted. Estimates of potential assume biomass is obtained from residues and biomass crops grown on abandoned land. Natural systems are not replaced with biochar crops. Point added.
24676	108	24	108	24	"biochar used for soil" instead of "biochar to use for soil" [Carlos Matias Figueroa, Mexico]	accepted: text modified as proposed
9874	108	34	108	36	A better basis for and way of presenting all these contributions is needed. And are all the numbers used across the chapter consistent? [Jan Fuglestvedt, Norway]	accepted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
956	108	34	108	52	Again, I miss a paragraph talking about the agroecology techniques. The authors finish the paragraph saying that the intensification process have some important trade-offs (e.g. increase in inorganic fertilizer consumption or pollution), but they do not provide a solution. It is known that the increase in crop diversity, the nutrient managment, agroforestry and other agroecology techniques have clear benefits on ecosystem's resilience. An resilient ecosystem would be suitable for fighting against future climate change impacts and to ensure food security. On the other hand, the maintenance of indigenous and ancient knowledge and crop varieties are such a very important natural a social capital. Therefore, I encourage the authors to add some lines talking about agroecology and indigenous management practices. Altieri, M.A., P. R osset and L.A. Thrupp.1998. The potential of agroecology to combat hunger in the developing world. 2020 Brief. IFPRI, Washington, DC. Altieri, M.A. 1999. Applying agroecology to enhance productivity of peasant farming systems in Latin America. Environment, Development and Sustainability 1: 197-¬217. Altieri, M.A. and P. Koohafkan. 2008. Enduring Farms: Climate Change, Smallholders and Traditional farming Communities. Environment and Development Series6. Malaysia: Third World Network [Jose Luis Vicente Vicente, Germany]	accept with modification, more details is given in chapter 5
9878	108	38	108	40	This statement needs more nuances and also some recent referencs. For example there is a paper by Collins et al in ERL https://doi.org/10.1088/1748-9326/aab89c. Some references from economic/mitigation modelling are also needed here. [Jan Fuglestvedt, Norway]	accept with modification, txt deleted
9876	108	39	108	39	The 2011 paper referred to here is not among the most recent ones. Newer studies should be added here. [Jan Fuglestvedt, Norway]	Accept, text updated an aligned with chapter 5
27322	108	42	108	47	This is a useful listing of practices and strategies which are some would consider are elements of sustainable intensification strategies. Many of these practices / strategies are also included under the terms agroecology or climate-smart agriculture or SLM or... The point is that all these different labels can be confusing, confounding, and analytically unhelpful. Some standardization in the report is absolutely required. It would be quite valuable if sustainable land management would be used as the overall catch term, and other practices described as relevant. If a term such as climate-smart agriculture or sustainable intensification is used, there should be a very obvious and well-stated reason why that's a more appropriate term, and its analytical utility explained. The term "sustainable intensification" suffers in particular from tautological thinking. Measures to increase productivity, that are sustainable, are labelled sustainable intensification. It is really not a useful term, particularly in a scientific assessment which should be able to clearly explain the contributions of particular practices. [Doreen Stabinsky, United States of America]	Accepted, text deleted and content aligned with chapter 5
16950	108	29	109	52	I think in this paragraph might be mentioned the positive role played by small-scale land management schemes and the importance to their further connection at a landscape level for the mitigation of climate change. [Vincenza Ferrara, Italy]	accept with modification, more details is given in chapter 5
27320	108	5			Hawken 2017 is a popular book for a general audience written by a non-scientist. It's not an appropriate source. Please find the underlying scientific evidence and present that instead. [Doreen Stabinsky, United States of America]	Accepted
23512	108	6			add dot after references [Alexander Graf, Germany]	Noted - editorial
23516	108	11			lad => land [Alexander Graf, Germany]	accept

Comment No	From Page	From Line	To Page	To Line	Comment	Response
23518	108	26			"the higher end of the estimate": unclear in this context, clarify [Alexander Graf, Germany]	Accepted, text clarified
23524	108	29			Title of subsection 2.7.1.4 awkward since it actually overlaps with content of 2.7.1.3 [Alexander Graf, Germany]	accepted but unavoidable, clarify in introduction that response options overlap
23530	108	38			etra => extra [Alexander Graf, Germany]	Editorial
23534	109	1	109	4	content overlaps with section 2.7.1.3 [Alexander Graf, Germany]	Accepted, noted in the introductory text that there is overlap between cropland and soil management
17614	109	11	109	15	"Most livestock production systems in highly developed countries (e.g., the U.S., E.U.,Australia, and Canada) have intensified systems and thus have lower mitigation potential per unit compared to developing countries with large livestock herds managed at low productivity levels, suboptimal diets, nutrition and herd structure (e.g., India, Latin America and Sub-Saharan Africa). These developing countries have higher mitigation potential gains from sustainable intensification.". I guess that a reference is needed for such an important insight [Guillaume Bertrand, France]	Accept with modification text deleted
11400	109	12	109	15	This statement is misleading. The total environmental cost, and total emissions associated with them, of different forms of cattle farming needs to be considered. [Debra Roberts, South Africa]	Accept with modification text deleted
26716	109	17	109	25	Control on the P cycle is an important property for proper manure management, reducing eutrofication and maximizing the use of the ressource. Manure management through AD is also used as a base for recycling straw and other agricultural (true) residues and organic waste - closing the hole in the nutrients loop. AD technologies can also bet NET (BioGrace). [Knud Christensen, Denmark]	Noted, comment is true but too detailed for this section with a focus on GHG emissions.
11830	109	22	109	23	There are other manure processing options, such as solid-liquid separation, that have shown potential to reduce GHG emissions by 20% without the added negative trade-offs (e.g. ammonia emission increments) that should be part of these strategies [Horacio Aguirre-Villegas, United States of America]	Noted, comment is true but too detailed for this section with a focus on GHG emissions.
21984	109	38	109	43	At least even if agro-ecology is not modelled, in this para on GHG from fertilizers and mitigations options, the introduction of legumes should be discussed, with a potential of mitigation. [Valerie Dermaux, France]	accept with modification text largely cut and more detail is in chapter 5
2378	109	45	109	52	For more clarity, it would be better to move line 45 to line 52 of page 109 right after line 47 of page 108 [Anne-Laure Sablé, France]	editorial
2778	109	49	109	49	Check IPCC uncertainty language use. Liklihood is a quantifiable term: phrases like likely and very likely have quantifiable probabilities associated with it. Please check it has been used correctly here. More likely is not an IPCC uncertainty term. [Sarah Connors, France]	accept
23538	109	27			11 % of total or of CH4 emissions? [Alexander Graf, Germany]	accept with modification text deleted as covered in 2.4
3330	109	34			Add Wang, W., Zeng, C., Sardans, J., Zeng, D., Wang, C., Bartrons, M., Peñuelas, J. 2017. Industrial and agricultural wastes decreased greenhouse-gas emissions and increased rice grain yield in a subtropical paddy field. Experimental agriculture (2018), volume 54 (4), 623–640. , doi: 10.1017/S001447971700031X. [Josep Penuelas, Spain]	accept
23542	109	40			"as they have" => reword, maybe "since in this region older, less efficient plants are operated" [Alexander Graf, Germany]	editorial
23548	109	46			especially *of* smallholders [Alexander Graf, Germany]	editorial
17616	110	1	110	1	"Protection and restoration of wetlands, peatlands and coastal habitats (such as Manrove forests…." => Mangrove [Guillaume Bertrand, France]	editorial

Comment No	From Page	From Line	To Page	To Line	Comment	Response
10332	110	6	110	9	Complex invader-ecosystem interactions and seasonality mediate the impact of non-native Phragmites on CH4 emissions - Modzer 2016, may be a valuable reference here [John Devaney, Ireland]	reject, too specialist for this more general text that focuses on global mitigation potentials
9880	110	8	110	8	GHX --> GHG [Jan Fuglestvedt, Norway]	editorial
25016	110	9	110	10	The sentence is wrong. Halting drainage of organic soils reduces N2O emissions; in a rewetted land those emissions are negligible. The sum of CO2 and N2O emissions in a drained land, as well as of the CH4 emissions from drainage ditches, it is always a larger net emission than the CH4 emissions and the CO2 sink of a rewetted land. Further, CH4 emissions in a rewetted land are part of the natural biogeochemical cycles so that shouldn't be accounted for in a mitigation scenario. Please delete the sentence. [Sandro Federici, Italy]	accepted
25018	110	11	110	12	Again Permanence is an issue for all non-transformational mitigtaion actions, not only for single specific actions. Furthermore, the impact of natural disturbances isn't a valid reason to label unpermenent a mitigation action. For instance, strong climate extreme (e.g. hail thunderstorm) may destroy photovoltaic panels, however climate extrees are not a reason for labeling as a not-permanent mitigtaion the installation of photovoltaic panels. Please delete the sentence [Sandro Federici, Italy]	accepted, text moderated and "permanence" removed but still noted that peatlands are vuln4rable to future climate change
1682	110	40	110	42	The comment on the climate mitigation potential of bioenergy lacks any scientific basis as there are many renewable energy production options available that require far less GHG emissions than bioenergy. Most sources of bioenergy are more harmful from a climate perspective than coal. [Simone Lovera-Bilderbeek, Paraguay]	Accept with modification: Sentence is revised. The caveats of bioenergy are discussed in the following sentences, and all the aspects are supported by references.
24606	110	40	110	43	The sentence “Bioenergy production mitigates climate change by delivering an energy service, therefore avoiding combustion of fossil energy” is misleading. Since bioenergy emits more CO2 per unit energy than fossil fuels, it is not the displacement of fossil fuels that provides the supposed benefit of bioenergy – it is the assumption that biomass fuels can be regrown. [Mary Booth, United States of America]	Accepted: Sentence is revised.
24608	110	43	110	43	The sentence “Bioenergy is produced from dedicated forest or agricultural systems and residues or municipal solid waste” is misleading. Biomass is harvested from native and intact forests, not just “dedicated” forests, which implies plantations. Please, get familiar with what is actually happening in the world and don’t just write about idealized situations. [Mary Booth, United States of America]	Accept with modification: Sentence is revised and additional descriptions are given.
27326	110	47	110	50	Include comment on the assumptions made in the models that contribute to these numbers. You don't get 20 000 Mt of demand without assumptions about land availability and existence (or not) of alternative technologies. [Doreen Stabinsky, United States of America]	Accept with modification: Some explanations are added, but here we focus on the key emerging insights (details are available in the cited references)
26718	110	39	111	50	"The demand for 2nd generation bioenergy crops" in line 48 does not make sence? Bioenergy crops are per definition not 2nd generation. Explanation needed. [Knud Christensen, Denmark]	Accept with modification: By definition, 2nd generation bioenergy crops include non-food and non-feed biomass sources (including crops like switchgrass). A clear classification of 1st and 2nd generation bioenergy is now provided in the SOD
3178	110	39	112	13	The timing issues needs a discussion in this section. To avoid overshoot in reaching the 1.5 or 2° targets, strategies are needed that have immediate mitigation effects. Most biomass systems that follow fast out slow in (like using perennial biomass fractions) have a disadvantage in this context, as they result in emissions first and acellerate overshoot, even if they balance positively after some decades. Figure 2.7.3 illustrates this intricacy very nicely [Karlheinz Erb, Austria]	Accept with modification: Timing issues are discussed in the paragraph right after (page 110, lines 14-35)

Comment No	From Page	From Line	To Page	To Line	Comment	Response
26720	110	39	112	47	This chapter would benefit significantly with a strong definition and subseqent destinction between 1st generation (crop based), 2nd generation (agricultural residues) - and possibly alsp advanced biofuels (lignocellulosic or other in a tightened waste definition) as practised by EU. Implications and subsequent conclusions are very different for various types of biomasses, and it does not make sence to discuss them as a single entity. [Knud Christensen, Denmark]	Accepted. This definition is now provided, on the basis of land-derived products (which is the focus of this report)
23552	110	3			continue*d* [Alexander Graf, Germany]	editorial
27324	110	44			Include some comment here about limited options found in many cost-optimization scenarios and how that might skew which options may or may not be "key." [Doreen Stabinsky, United States of America]	Accepted: Sentence is revised, and cost-optimization is specified.
24610	111	8	111	9	You need to explain OFTEN that the actual emissions from burning biomass are generally not counted, which is what leads to the false conclusion that bioenergy produces a benefit relative to fossil fuels. You are perpetuating the myth of carbon benefits from bioenergy with this sentence: “However, direct life-cycle emissions of most bioenergy 9 alternatives still constitute net savings in comparison to fossil fuels” because you have failed to remind the reader that the biggest source of CO2 emissions from bioenergy – the combustion emissions – is simply not counted. [Mary Booth, United States of America]	Rejected: Here we are speaking about the vast literature on life-cycle studies, and not about the carbon neutrality assumption (see cross Chapter box on bioenergy). Other aspects related to LUC are dealt with in the following paragraphs
1684	111	8	111	9	This assumption has been convincingly contested by more recent scientific research, even the European Academies Science Advisory Council has cautioned against the carbon neutrality assumption of bioenergy. The literature base in this chapter is too limited for such a controversial issue. More in general, the regrowth assumption that is used to defend the carbon neutrality of bioenergy is not in line with the evidence provided by many other chapters about the vulnerability of forest and other ecosystems in times of climate change. The risks of a negative feedback loop should be highlighted in this respect. [Simone Lovera-Bilderbeek, Paraguay]	Rejected: Here we are speaking about life-cycle emissions, and not the carbon neutrality assumption of bioenergy (discussed in the cross Chapter box on bioenergy).
26722	111	10	111	12	Biomethane is a biofuel broadly utilised in the transport sector - particularly in the heavy transport that is notoriously hard to get off fossil fuels. Biomethane from AD of manure and wastewater present a netto negative emissions as recognised in eg the European RED directive. [Knud Christensen, Denmark]	This is correct, but focus is not placed on the individual biofuel alternatives, but on the land implications for biomass to energy supply
23556	111	14	111	15	This claim is not quite true. It depends on the former land use that was replaced by the bioenergy; if it continuously stored a higher amount of carbon there is a perturbation (net carbon release). Much later (starting line 41) this seems to be recognized. [Alexander Graf, Germany]	Accepted. It is now made explicit that the role of former land use is extensively discussed in the following paragraphs.
16668	111	14	111	35	Consider to add some text about how this will affect the stabilized CO2 concentration in the atmosphere in a climate relevant timescale, and differences between the short and the long domain of the carbon cycle. [Maria Kvalevag, Norway]	Accepted. This is mentioned before the paragraph on direct land use change.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
24612	111	14	111	35	It's good that there is a discussion here of the effect of bioenergy on net carbon emissions. However, the section needs to explain that bioenergy is treated in most carbon models as having ZERO emissions, which is undoubtedly causing those models to treat bioenergy as mitigation to a far greater degree than it deserves. You need to add a couple more citations, especially the paper I just published on how even burning forestry residues causes a net increase in emissions – in contrast to the common assumption that bioenergy from residues can safely be treated as having zero emissions. Booth, M. S., Not carbon neutral: Assessing the net emissions impact of residues burned for bioenergy. Environmental Research Letters 2018, 13, (3), 035001. At http://iopscience.iop.org/article/10.1088/1748-9326/aaac88 [Mary Booth, United States of America]	Accept with modification: This is not always the case, as changes in stocks are sometimes accounted for instead of emissions from the energy sector. Further details on this aspect are given in the bioenergy X-chapter box
25020	111	15	111	19	However, in case of woody plantations for bioenergy use such debit is just equal to the antecedent credit sue to the C sequestration and accumulation in the woody biomass. Therefore, it is not relevant. In case of managed forest which wood use is converted from wood products to bioenergy such intial debit is indeed relevant and it is amplified by the decay of the HWP previously produced and not offset by the accumulation of new HWP. I recommend to clarify this point. [Sandro Federici, Italy]	Accepted: This is now clarified in the text.
24614	111	23	111	23	Guest et al 2013b is missing from reference list. [Mary Booth, United States of America]	Accepted.
24616	111	35	111	35	Guest et al 2013a is missing from reference list. [Mary Booth, United States of America]	Accepted
16670	111	37	111	49	Consider more discussion on climate relevant time-scales under this paragraph. Can the GHG concentration in the atmosphere be stabilized (confer article 2 in the climate convention) as long as the land ecosystem is not? [Maria Kvalevag, Norway]	Rejected: There are always variations in carbon exchanges from vegetation (e.g., forest aging)
3180	111	48	111	48	please spell AR and D out [Karlheinz Erb, Austria]	Accepted
26776	111	48	111	49	"and AR and D were found.." Please exlain AR and D. [Knud Christensen, Denmark]	Accepted
11402	111	42			One does not want to read "removal of forests to establish bioenergy crops" without immediate reference to other highly important factors. This would be taking the demand for green energy completely out of context. Again, climate change is only a problem because earth teems with life that is vulnerable, so considering options that mitigate against climate change but destroy life is circular logic. The entire topic of how mitigation can conflict with biodiversity and environmental considerations needs a dedicated section somewhere in this report. It gets mentioned often, later in the report, but never explained in detail. [Debra Roberts, South Africa]	Accepted: Sentence is revised to prevent ambiguity
26802	112	4	112	7	N-fertilizers also have large energy input requirements, and can also incur significant transport-related emissions. [Daniel Zarin, United States of America]	Accepted: Sentence is revised to prevent ambiguity
26804	112	9	112	10	lower range for BECCS should be 1.0 see Turner et al. cited above in my comment #2 [Daniel Zarin, United States of America]	Accepted: Corrected in the text.
26778	112	9	112	15	Only relevant for 1G crop based biofuels. Please destinguish between 1st generation and 2nd generation. [Knud Christensen, Denmark]	Accepted: Distinction among 1st and 2nd generation is now clear
23560	112	17	112	19	"while this is true of (better for?) many ….(*it*) is a concern most commonly raised in relation to bioenergy": The reason for this concern is that a bioenergy-centered policy (as opposed to other renewable energy sources or energy-saving) must (keeping demand for food prescribed) lead to an increase in the total amount of C withdrawn from the land surface (vegetation + soils). [Alexander Graf, Germany]	Accepted. The text is revised

Comment No	From Page	From Line	To Page	To Line	Comment	Response
464	112	27	112	27	No reference presented in chapter 2 for Ahlgren and Di Lucia 2014 [Newton La Scala Jr., Brazil]	Accepted
26724	112	33	112	36	"Landuse due to future bofuel scenarios ... show nearly neutral" This not valid as a generic conclusion, please specify into various biofuels. E.g. Globiom shows very high variation between different biofuels - also for biodiesel. Palm oil does for instance have higher climate emissions than fossil diesel, according to Globiom. [Knud Christensen, Denmark]	Accepted: It is now clarified in the text that this refers to annual means, with variations
23564	112	20			"than": a "more" or something seems to be missing somewhere in this sentence [Alexander Graf, Germany]	Accepted: Corrected in the text.
23568	112	36			"When the differences in GHG emissions are eliminated": unclear, clarify [Alexander Graf, Germany]	Accepted. This is now clarified
26806	113	6	113	7	"meat" is a rather generic term to use here - the main measure is reducing ruminant comnsumption, primarily beef. [Daniel Zarin, United States of America]	Accepted - the importance of especially ruminant meat has been highlighted.
9882	113	16	113	22	The statements and findings here are sensitive to how methane is weighted, and that should be noted somewhere. [Jan Fuglestvedt, Norway]	Accept with modification, CH4 is discussed in 2.4, more detail on agricultural mitigation response options is in chapter 5
1686	113	16	113	45	Important paragraph, but it needs some editing as there are duplications in the text. It would also be good to mention the impact of reduced dairy consumption, and other positive co-benefits of reduced meat and dairy consumption like the positive impacts on animal welfare. [Simone Lovera-Bilderbeek, Paraguay]	Accept with modification - the importance of especially ruminant meet and dairy has been highlighted. Additional co-benefits of demand changes are discussed in chapter 6.
3182	113	20	113	22	please refer to the analysis by Muller A, Schader C, Scialabba NE-H, et al (2017) Strategies for feeding the world more sustainably with organic agriculture. Nature Communications 8:1290. doi: 10.1038/s41467-017-01410-w that provide quantitative figures [Karlheinz Erb, Austria]	Reject - this section is about demand changes and not about organic farming, but more d4tails of different agricultural approaches is in chapter 5
24868	113	28	113	30	Duplication of L16-18 of the same page. [Biplab Brahma, India]	Accepted - the text has been modified accordingly
1084	113	28	113	30	repetition from lines 16-18 same page [Tobias Rütting, Sweden]	Accepted - the text has been modified accordingly
23578	113	28	113	33	This text is redundant (and partly identical) to the one in the paragraph above (line 16-22) [Alexander Graf, Germany]	Accepted - the text has been modified accordingly
23572	113	3			has => have [Alexander Graf, Germany]	editorial
11404	113	24			There is some repetition in the paragraph from the previous paragraph. [Debra Roberts, South Africa]	Accepted - the text has been modified accordingly
19314	114	1	114	1	In the subtitle '2.7.2 Integrated transformation pathways for climate change mitigation' , transformation pathways is probably not appropriate better to change to Integrated Pathways...., else clarify what is meant by transformative pathways [Binaya Raj Shivakoti, Japan]	Accepted - the title of this subchapter has been changed to 'Integrated pathways for climate change mitigation'
20186	114	15	114	17	include reference if its still Krey 2014 then I suggest it comes at the end of the sentence [Elizabeth Diego, Kenya]	Accepted - the reference has been moved to the end of the sentence
27330	114	29	114	30	This seems to be not the correct reference. [Doreen Stabinsky, United States of America]	Accepted - the reference has been changed to Riahi et al. 2017
23582	114	13			language: land => land use? the land surface? [Alexander Graf, Germany]	Accepted - changed to land use
27328	114	25			Explain what underlying assumptions might be and how they can be used to incorporate demand-side options in models. [Doreen Stabinsky, United States of America]	Accepted - we added a section on underlying assumptions for demand (such as healthy and sustainable diets, food waste reduction).
23586	114	29			SSP does not yet seem to be in Glossary [Alexander Graf, Germany]	Accepted - now included
20188	115	20	115	30	the IAM should include an illustration of a case in one of the countries where it has been successfully used . Its articulation on the chapter is not very clear [Elizabeth Diego, Kenya]	Rejected - the IAM result are only shown at the global level to space restrictions.

Comment No	From Page	From Line	To Page	To Line	Comment	Response
23590	115	1			Fig. 2.7.3: Yellow (with apparently the same meaning) occurs twice in the legend (line and area signature), but only once (line) in the figure. [Alexander Graf, Germany]	Noted - this figure is only a placeholder and will be exchanged.
26780	116	4	116	6	Please explain "2nd generation bioenergy crops". Bioenergy crops and 2nd generation biomass are contradictions. [Knud Christensen, Denmark]	Rejected - the expression 2nd generation bioenergy covers all kind of biomass feedstocks (including dedicated cellulosic crops) and not only residues.
9884	116	13	116	14	Would be good if this can follow directly up on what was done in SR1.5 and take that further. [Jan Fuglestvedt, Norway]	Accepted - this section has used SR1.5 (chapter2) as a starting point.
23594	116	8			drop one of the 2 closing parentheses [Alexander Graf, Germany]	Accepted - the first closing parenthesis has been dropped.
20136	118	6	118	6	……..et al. 2018; McCollum et al. 2017). [Sabit Erşahin, Turkey]	Accepted - the second opening parenthesis has been dropped.
23598	118	5			drop one of the two opening parentheses [Alexander Graf, Germany]	Accepted - the first opening parenthesis has been dropped.
2492	119	23	119	23	Perhaps the authors could discuss the impact on land sector mitigation of the withdrawal of the USA from the Paris Agreement. [William Lahoz, Norway]	reject - this could be construed as policy prescriptive comment, also there is. Lack of peer reviewed published literature to assess. The USA cannot withdraw officially until 202, but then the policy may have changed
25366	119	23	119	24	Please reference the Article 2 in full, to include the commitment to pursue efforts to limit the temperature increase to 1.5°C [Kaisa Kosonen, Finland]	Accept with modification text deleted to now the 2 degree target is not mentioned either
124	119	28	119	28	Significant statement - does not appear strongy enough in Ch 1 Framing. Land sector is responsbile for 1/4 of all anthropogenic emissions, and is 22% of the total sink. [Elizabeth Penelope Davies, United States of America]	Noted
3868	119	31	119	36	Some of the world's largest forested areas span across national boundaries. Accordingly, many of the most ambitious conservation programmes are implemented across borders. To date, the bulk of these programmes are funded from bilateral and multilateral aid budgets (Norman and Nakhooda, 2015). Nonetheless, as national climate change funds are increasingly adopted to finance domestic climate change policy efforts (CPI, 2017), it is likely that an increasingly larger share of forest conservation programmes in developing countries will be funded from national budgets, possibly involving transboundary forests. While data for developing countries are lacking, new evidence from developed countries suggests that not only distance to the resources, but also - and especially - nationality may influence people's willingness to commit funding to conservation measures administered by a neighbouring country (Bakhtiari et al. 2017). This could have non-negligible implications for the effectiveness of future forest conservation programmes in transboundary settings and, by extension, for the long-term mitigation potential that can actually be attributed to transboundary forest conservation in developing countries. Norman, M. and Nakhooda, S. (2015): The state of REDD+ finance. Center for Global Development Working Paper No. 378. CPI (2017): The global landscape of climate finance. Climate Policy Initiative. London. Bakhtiari, F., Jacobsen, J.B., Jellesmark, B., Lundhede, T.H., Strange, N., Boman, M. (2017): Disentangling distance and country effects on the value of conservation across national borders. Ecological Economics (147), 11-20. [Fatemeh Bakhtiari, Denmark]	Noted, but this is not relevant to our chapter which focuses on mitigation potential, not governance, see chapter 7

Comment No	From Page	From Line	To Page	To Line	Comment	Response
9886	119	22	120	37	The sections in the end are really relevant and useful for policymakers and I look forward to seeing them improved in SOD. I hope this report can give a substantial contribution on these issues. I would expect that some of this will be discussed in ch6 and 7 and I encourage strong coordination across chapters on these issues. [Jan Fuglestvedt, Norway]	accepted
9892	119	22	120	37	These sections could also adress the conecpt of GHG balance as given in the Paris Agreement. There are some relevant papers published on this: Wigley, 2018, Cimatic Change, https://doi.org/10.1007/s10584-017-2119-5; Tanaka and O'Neill, 2018, https://doi.org/10.1038/s41558-018-0097-x; Fuglestvedt et al., 2018 (in ref list already); Mengel et al., Nat Comms | DOI: 10.1038/s41467-018-02985-8. The Wigley paper has some reflections on balance in the last section. Mengel et al does not adress balance as the main issue, but compares a pure CO2 balance and a GHG balance. [Jan Fuglestvedt, Norway]	accept -discussion of balance added
23608	119	23	120	19	Although I'm a bit sceptical about it (not the valuable measures it suggests but ist optimism), shouldn't the "4 per mil" initiative also be mentioned in this framework? [Alexander Graf, Germany]	Reject, it is more of an imitative than a Paris Policy, it is more relevant to chapter 7 or chapter 5
19316	119	23	120	19	Could be shortened and moved at the end(if possible) or safely deleted (but retaining lines 27-29, p119) [Binaya Raj Shivakoti, Japan]	Accepted, much text now deleted
23604	119	23			add dot after reference [Alexander Graf, Germany]	editorial
25022	120	13	120	19	This text doesn't match the scope of the report. Please delete. Further, the main problem in including the land sink in the UNFCCC mitigation accounting has been the opposition of all actors interested in using the UNFCCC accounting framework mainly for subsidising their low-energy technologies as well as for enhancing their energy security through convertion from fossil fuel to renevable energies. Although both interests are legitimate and contribute to fighting climate chnage their implementation at the extreme consequences materialized in a refusal of any alternative mitigation actions. Especially of those mitigation actions associated with terrestrial sinks since their lower costs and therefore their convenience. Finally, leakage and permanence are 2 issues completely addressed through the inclusion of nDC within the natioal GHG inventory, so that any emissions and removals is accounted when and where it actually occurs; further natural disturbances accounting has been addressed by specific methodologies. [Sandro Federici, Italy]	Accepted, text deleted
18806	120	21	120	37	Please check spell of the words and parentheses. [Hiroaki Kondo, Japan]	Editorial
20190	120	22	120	22	indicate and "the" type instead of and "they" type [Elizabeth Diego, Kenya]	Accepted
21100	120	21	122	17	The assessments of the land sector in the INDCs must be seen in connection with mitigation efforts in other sectors and a longer time scale than the period connected to the NDCs. A temporal reduced land sink (as in figure 2.7.7) due to increased deployment of biomass as substitute for fossil emissions, can be a good long term mitigation strategy and in line with the Paris agreement. Also clarify which NDCs are assessed e.g. by indicating a year since there will be new NDCs later on. [Maria Kvalevag, Norway]	Accept clarified the date of NDCs. Fig 2.7.7 does not show a reduced land sink due to bio9energym but this is made clear in the text
23612	120	22			they type => the type [Alexander Graf, Germany]	Accepted
23616	120	23			ambitions => ambitious? [Alexander Graf, Germany]	Accepted
23620	120	24			finalize sentence starting "Compared to land sector emissions 2010, …" [Alexander Graf, Germany]	Accepted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
11406	121	26	122	17	Where does US fit in, since it is by far the greatest emitter per person (# 2 after China with a fraction of the population)? And what about Europe, Russia and Australia? Line 27: Brazil and Indonesia are # 17 and 20 respectively re per country total emissions, and of the other countries listed in line 28ff Ethiopia, Gabon, DRC, Guyana and Madagascar are so low on the list they as good as emit nothing. Some critical assessment here would be good. Especially in the light of the comments on page 123 line 4, that more ambitious targets are necessary – by whom? By everyone equally? The figures should speak for themselves. [Debra Roberts, South Africa]	Accept with modification - some of the country specific examples was actually deleted, since this section focuses on land based mitigation the US does not feature so strongly, however we highlight the countries that 4xpect the most mitigation from LULUCF. The paper can be referred to for all countries, we will put the data in an annex
23622	122	3	122	14	I know there is little you as authors can do about it, but some of these country statements (especially Russia) sound rather like the countries hope they can argue with their land surfaces to avoid changing their fossil fuel emissions, rather than ambitious on-top measures to improve land surface management (see row 34 of this sheet) [Alexander Graf, Germany]	Noted
17690	122	10	122	10	"Mexico: 0% deforestation, afforestation for wetland protection" is imprecise, I suggest to change to: "Mexico: Meet 0% deforestation rate target by the year 2030, • Improve forestry management, recuperation of grassland" [Maria del Pilar Salazar Vargas, Mexico]	Accepted
20138	123	9	123	9	…..analysis and include other data in the assessment for the SOD). [Sabit Erşahin, Turkey]	Editorial
126	123	18	123	18	Here it says land sector makes up 33% of total needed mitigation. Not sure I understand the difference beteen needed mitigation figure here and the25% + 22% figures on page 119 line 28 . Important given either of these figures should be one of the headlines for the framing exec summary or the overall synthesis [Elizabeth Penelope Davies, United States of America]	Accepted, the needed mitigation is the mitigation necessary to reach the 2 degree target, the other figures are the current anthropogenic emission per year and natural sinks per year. Text clarified
11408	123	20			"The table details…" is there a table missing? [Debra Roberts, South Africa]	Accepted text modified
27332	123	20			table is missing. [Doreen Stabinsky, United States of America]	Accepted text modified
5990	124	25	124	26	Remove URL and access date. [Akihiko Ito, Japan]	Noted. References will be harmonised across the report
4102	124	0	185	0	Several citations along the document are shown as a or b. However this is a typo, since there is several repetead references in the Reference List. For instance:Baccini et al., 2017a and Baccini et al., 2017b correspond to the same reference (which is duplicated at the Reference List - pag 126). The same for Tyukavina et al., 2017a and 2017b and for many others citations. Please check. [Renata Libonati, Brazil]	Accepted
27528	124	8			coauthors be replaced by names [Abiud Kaswamila, United Republic of Tanzania]	Accepte
5992	126	31	126	33	Many duplicates are found in the current list: e.g. Baccini et al. (2017b), Lajtha et al. (2014b), Lal (2011b), Rogelj et al. (2018b) [Akihiko Ito, Japan]	Corrected
5994	135	17	135	21	Van Dijk et al. (2913) should be move to page 176, to V items. [Akihiko Ito, Japan]	Moved
9548	152	9	152	12	Looks like the references for 2017a and 2017b area actually the same document [Dirk Nemitz, Germany]	Accepted. The reference list is updated.
9402	162	47			Kim Pingoud, Tommi Ekholm, Risto Sievänen, Saija Huuskonen, Jari Hynynen. 2018. Trade-offs between [Kim Pingoud, Finland]	Accepted - corrected
9404	162	47			forest carbon stocks and harvests in a steady state. A multi-criteria analysis. Journal of Environmental [Kim Pingoud, Finland]	Accepted - corrected
9406	162	47			Management 210 (2018) 96-103. https://doi.org/10.1016/j.jenvman.2017.12.076 [Kim Pingoud, Finland]	Accepted - corrected
9408	172	6			Sampo Soimakallio, Laura Saikku, Lauri Valsta, and Kim Pingoud. 2016. Climate Change Mitigation [Kim Pingoud, Finland]	Noted

Comment No	From Page	From Line	To Page	To Line	Comment	Response
9410	172	6			Challenge for Wood Utilization. The Case of Finland. Environmental Science & Technology. 50, [Kim Pingoud, Finland]	Noted
9412	172	6			5127−5134. DOI: 10.1021/acs.est.6b00122. [Kim Pingoud, Finland]	Noted
5996	178	13	178	26	References starting from 'V' should be moved to page 176, to V items. [Akihiko Ito, Japan]	Accept-References are updated.
16052		1	3	38	There is need to be consistent in alignment of the table of contents, panctuation, numbering [Martin Lyambai, Zambia]	We have edited the entire chapter accordingly
856			42	14	the challenge is not only for changes in extreme precipitation events and subsequent floods but also the general hydroclimatic regime - see Cudennec C., Gelfan A., Ren L., Slimani M., 2016. Hydrometeorology and Hydroclimate. Advances in Meteorology, ID 1487890, 4 p, http://dx.doi.org/10.1155/2016/1487890 ; as well as McMillan H. Montanari A. Cudennec C., Savenije H., Kreibich H., Krueger T., Liu J., Meija A., van Loon A., Aksoy H., Di Baldassarre, G., Huang Y., Mazvimavi D., Rogger M., Sivakumar B., Bibikova T. Castellarin A., Chen Y., Finger D., Gelfan A., Hannah D., Hoekstra A., Li H., Maskey S., Mathevet T., Mijic A., Acuña A., Polo M., Rosales S., Smith P., Viglione A., Srinivasan V., Toth E., van Nooijen R., Xia J., 2016. Panta Rhei 2013-2015: Global perspectives on hydrology, society and change. Hydrological Sciences Journal, 61, 7, 1174-1191, http://dx.doi.org/10.1080/02626667.2016.1159308. I can elaborate if needed/wished - cudennec@agrocampus-ouest.fr [Christophe Cudennec, France]	Agree, we have revised and covered changes of hydrological regime
6498					some oportunity for inclusiong of traditional building materials - use and production? [Hannah Fluck, United Kingdom (of Great Britain and Northern Ireland)]	This could be included in chapter 7 as mitigation option
6514					what impact of landuse on marine? [Hannah Fluck, United Kingdom (of Great Britain and Northern Ireland)]	It is important, but is beyond the scope of this report
25846					Please reducde the number of acronyms that policy advisors and policymakers are not familiar with, such as LULCC, HLULLC, FLULCC, SOC [Hans Poertner and WGII TSU, Germany]	Agree, revised with full names
26440					Writing is rather technical and full of jargon including in executive summary. Please emphasize the use of clear understandable language. The treatment of plant responses is great, I wonder how the presence of animals, e.g. ungulates and their physiological responses to climate modify the emerging picture. This is a clear gap. [Hans Poertner and WGII TSU, Germany]	Yes, revised by considering ecosystem components of plants, animal, and microbials
26454					The writing is rather complex with a lot of detail, jargon and abbreviations, focus on policy-relevant key findings, with a clear storyline and a concluding assessment would make the chapter more palatable and help shortening the lengthy executive summary. Text on key disciplinary aspects relevant for the assessment should be moved to supplementary material. Integration of text across working groups is a key aspect of AR6 special reports. Redundancies should be minimized, e.g. repeated mentioning of cooling by deforestation. [Hans Poertner and WGII TSU, Germany]	Agree, rewritten with plain language
24632					Flodding and its impact on agriculture will form part of the studies. [Lizzy Igbine, Nigeria]	Not relevant

Comment No	From Page	From Line	To Page	To Line	Comment	Response
27568					Evidences Which Have Not Been Highlighted but Would Be Considered a Serious Omission If Left Out Of the Report Fengyi Guo et al, The report investigates how Land-use change interacts with climate to determine elevational species redistribution. It also examines published data on 2798 elevational range shifts from 43 study sites to assess the confounding effect of land-use change on climate-driven species redistribution. We show that baseline forest cover and recent forest cover change are critical predictors in determining the magnitude of elevational range shifts. Forest loss positively interacts with baseline temperature conditions, such that forest loss in warmer regions tends to accelerate species' upslope movement. [Omoyemen Lucia Odigie-Emmanuel, Nigeria]	We have covered additional references
26562					2.7.1.3 states re biochar that "Although it is an established technology is is not widely practiced." This is an overstatement. Production of charcoal is an ancient technology practiced the world over, and uses a form of pyrolysis (limiting oxygen supply during combustion). Charcoal production is a cause of deforestation and air pollution. Biochar production is essentially the same. (In fact many studies of "biochar" are in fact studies of charcoal residues from wildfires etc). The term biochar is intended to refer to "modern" commercial scale pyrolysis which would be undertaken with various controls, use of the resulting syngas (theoretically) for energy production and the application of the resulting char to soils rather than as fuel. It is not appropriate to refer to biochar production as an established technology, and methods of production vary widely. [Rachel Smolker, United States of America]	Double checked
26564					Biochar production, using commercial scale pyrolysis is far from established technology. In fact there are serious ongoing technical concerns over the feasibility of commercial/industrial scale pyrolysis. Products from pyrolysis can include bio-oils and syngas (which can be refined into liquid fuels) or char, depending on the temperatures and length of exposure to heat). However where it has been attempted on commercial scales technical problems have been prohibitive. [Rachel Smolker, United States of America]	Double checked
26566					http://www.biofuelwatch.org.uk/wp-content/uploads/Biomass-gasification-and-pyrolysis-formatted-full-report.pdf [Rachel Smolker, United States of America]	Double checked
26568					Claims of stability of biochar soil carbon for decades or even thousands of years (4.11.10.1) are highly premature given there have been few studies of biochar lasting more than a few years in duration. Those claims date back to observation of Terra Preta, ancient soils containing charcoal, the production method for which is not known) Extrapolation based on short term studies has limited utility. Some charcoal remains from fires etc can be traced back in time having remained stable for centuries, but those also are transported via water flows etc and do not necessarily remain in situ. Factors determining long term stability are numerous and current knowledge does not permit reliable control. Understanding of the stability of SOM generally is best considered to be a function not just of the molecular structure of the material, but rather a function of environmental and biological parameters, which can change over time. [Rachel Smolker, United States of America]	Double checked
26570					Schmidt et al 2011, Persistence of soil organic matter as an ecosystem property, Nature vol 478, pp 49-56 [Rachel Smolker, United States of America]	Double checked

Comment No	From Page	From Line	To Page	To Line	Comment	Response
26572					Many studies of biochar stability and effects are based on laboratory soil incubation studies, which do not adequately reflect “real world” conditions. As of a 2011 study done by Biofuelwatch, found only 13 peer reviewed field studies based on 11 different trials, none of which lasted longer than 2 years and results from which were highly variable. No doubt there have been more field studies since that time, but results from lab incubation studies should be identified as such and their interpretation limited, not automatically considered pertinent to real world field conditions. [Rachel Smolker, United States of America]	Double checked
26574					Biochar: a Critical Review of Science and Policy http://www.biofuelwatch.org.uk/docs/Biochar-Report3.pdf [Rachel Smolker, United States of America]	Double checked
2654					Summary and knowledge gaps: Each section could benefit from a summary section and a summary of the current knowledge gaps. [Sarah Connors, France]	agree, included
2656					Use of old literature: In the beginning of chapter 2 it is stated that some literature older than AR5 will be assessed as it was missed in the previous cycle, but there are some sections that use very old citations so be careful to update citations where possible. Additionally, it would be useful to state which topics were missed and callout to which subsections correspond to these topics so reviewers are more aware of where they are in the report. [Sarah Connors, France]	Old references replaced
2658					There’s a lack of consistency in the format of chapter 2: Some subsections go down to 4 point numbering (e.g., 2.4.1.1) whereas others do not have this and just have the header in bold or italic font. I would strongly recommend to carry on using 4 or even 5 point subsections- it makes it much easier to refer to in other section/ chapters of the report (so it is easier for reviewers to quickly find a subsection. [Sarah Connors, France]	Entired chapter now formatted with four level subtitles
2660					Length: overall chapter 2 is too long.A rough estimate which came out at ~62 IPCC pages (not including space for figures). The outline for ch2 is only 50 IPCC pages and there were several placeholders still in the FOD. Please ensure the SOD is more to the expected length of the report chapter. [Sarah Connors, France]	Size reduced
1728					share of emissions from animal products [Valentin Bellassen, France]	We follow ecosystem approach
20270					Significant uncertainty on modelling land-use impacts on regional climate comes from some poor simulations of detailed climatic features at local and regional spatial scales from global models. This needs to be more thoroughly discussed in this chapter. For instance, the work of Zhang and Gao (2009) (Zhang H. and X. Gao 2009: On the physical and dynamical processes of land-use impacts on E. Asian monsoon climate, Climate Dynamics, 33, 409-426, DOI. 10.1007/s00382-008-0472-9) demonstrated that the same land-use changes could result in very different climatic impacts between regional and global model simulations. This was largely caused by poor monsoon simulations in course resolution global climate model. Note that climate models still own significant errors in the monsoon regions (such as Indian monsoon dry bias), therefore the modelled impacts of land-use on monsoons are largely uncertain. [Zhang Huqiang, Australia]	Discussion on uncertainty with regional modeling is extended
20272					My main comment on this chapter is that throughout this chapter it is unclear how different levels of confidence and different levels of robustness are scientifically defined. [Zhang Huqiang, Australia]	We follow IPCC guidelines on confidence