DETAILED RESPONSE TO REFEREES

On behalf of my co-authors, I would like to thank the editor for his constructive comments on our manuscript. A detailed description of how we have responded to your comments is provided below.

RESPONSE TO EDITOR

1. Both referees suggest changing the manuscript title, which was not done. The title is too unspecific concerning the land use activities. In addition in my view the study cannot evaluate the long-term effect of burning and grazing on soil dynamics. I agree with the authors stating that burning can have immediately effects on stable pools. However, that the stable pool is not immediately affected does not mean that there are no long-term effects: There were changes in the active and in the resistant pool (change in free LF and occluded LF). How these changes will affect the inert pool on long term is not clear. (In this meaning there were no short term effects on inert pool ……..). Please clarify the title. Please check also L446-448.

Author's response: The manuscript title has been changed to: "The effects of burning and grazing on soil carbon dynamics in managed Peruvian tropical montane grasslands".

2. In addition, regarding the uppers 0-5 cm (Figure 5) there seem to be differences in the fraction of total soil C in the heavy fraction: The control site free LF as the most dominant soil C fraction, while in the grazed burnt plot most carbon is stored in the heavy fraction. The "inert" pool is altered. One explanation may be that the concept of stability of pools does not fit or that there are also effects of burning / grazing on the inert pool. However, differences in the soil C fraction in the first 5cm are not discussed at all. Although it could be assumed the changes due to land use are most pronounced in the upper part of the soil (highest temperature while burning, highest input of SOM). The same trend, less pronounced could be observed in 5-10 cm. Please make a concise interpretation of all the data included in the manuscript.

Author's response: The authors agree with your comment and the results section has now be changed to include a description of the surfaces soil layers for all the C pools. L351-370

3. The authors provided more information about pool concept of different stability in soils. However, the wording is a bit confusing. The three different pools are introduced as active, recalcitrant, inert (L102). The recalcitrant pool is than named resistant pool (L109) or as "slow recalcitrant". Please use stringent definitions.

Author's response: The three different pools have now been changed to be consistently the same throughout the manuscript (active, resistant and inert). L103

4. I do not like the judgemental wording of negative or positive effects / finding throughout the manuscript, e.g. L 46 "the free light fraction was negatively affected". "the free light fraction was reduced" is much more specific without any subjective judgement. E.g. L 47-49; L347, L428. In addition the occluded LF increased, but it is stated that this fraction was not negatively impacted. According to the concept that would meant that the fraction of soil C in a resistant pool increased and thus in the authors sense would be positively affected.

Author's response: The negative and positive wording throughout the manuscript have been amended to be more specific and without subjective judgement (L333-334, L351, L358).

5. L123-124. This sentence is not nicely embedded into paragraph.

Author's response: This sentence has now been incorporated earlier in the paragraph (L119-120).

6. L293: In the results section the unit of soil respiration is adapted to the measuring frame (express per seconds), while during discussion section the unit is still per year (L357) suggesting an annual database (or even a yearly emission). I would prefer to use the measuring frame of seconds throughout the manuscript.

Author's response: The manuscript has now been changed to include the measuring frame in per seconds in the discussion but in parentheses the annual units have been kept, with a disclaimer to inform the reader that that this is purely for a general comparison and that we do not have sufficient data to provide accurate yearly emission estimates (L347-381).

6. L 434: In the discussion of proportion of LF to total soil C, only one reference is given. For a comparison of the dataset, this is insufficient – especially there are reviews available (like Gregorich, E.G., Beare, M.H., Mckim, U.F. & Skjemstad, J.O. 2006. Chemical and biological characteristics of physically uncomplexed organic matter. Soil Science Society of America Journal, 70, 975–985) and more recent original papers. Please expand literature review.

Author's response:

The suggested review paper has been included and additional recent literature has been added into the discussion (L461-464, L468-475).

7. Table 4 and Figure 5: It would be nice to have the same order of fraction of C and Mass recovery

Author's response: The order of fraction of C and Mass recovery has been changed.

9. Table 3 is missing

Author's response: Table 3 has now been included.

10. Figure 3: heading is missing. It would be nice to add the names of the sites to 2003 and 2005.

Author's response: Heading and names of the sites have been added.

11. L656: The reference is not complete.

Author's response: Reference has been completed