

***Interactive comment on* “Short-term grazing exclusion has no impact on soil properties and nutrients of degraded alpine grassland in Tibet, China” by X. Lu et al.**

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We are appreciative very much for two reviewers' comments about our discussion paper. Those comments are all valuable and very helpful for revising and improving our paper. We have revised our manuscript according to those comments, especially for the Introduction and Discussion sections which pointed out by both of them. Detailed responses to reviewer's comments are addressed below.

Response to Referee #1:

Comments: -Authors indicate that a period of 6-8 years is considered as a short-term period in the Tibet plateau. However, this number of years can be considered

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as medium-term or even long-term in other environments. So, it is recommended to explain better this assumption.

Responses: Restoration of vegetation and soil quality status of degraded grassland is a long term evolutionary process, especial in extreme harsh natural environment, such as alpine and tundra ecosystems. So grazing exclusion for 6-8 years could still be thought as a short-term period in the Tibetan Plateau. The similar period was also used in grasslands of other region, short-term grazing exclusion were considered as 7 years in high-altitude grasslands of the Central Alps (Basic and Applied Ecology, 2009, 10: 447–455), in an upland grassland northern England (Agriculture, Ecosystems and Environment, 2012, 149: 118– 123), and 6-7 years in an Inner Mongolian steppe (Acta Ecologica Sinica, 2012, 32: 180–183).

Comments: -Introduction should be slightly shortened and better focused on the related topic of the paper.

Responses: The Introduction section has been shortened and improved (Page 2-4).

Comments: -Last paragraph of introduction should be rewritten. Authors should state clearer their hypothesis as well as the objectives (i, ii, iii...).

Responses: Last paragraph of introduction has been rewritten. It clearly addresses two questions and two hypotheses of our paper now (Page 4, Line 14-25).

Comments: -Please, write "Climate data" instead of "Climates data". Subsection 2.4.

Responses: This has been corrected (Page 7, Line 11).

Comments: -Discussion. This section should be rewritten completely. Authors must avoid including again references to results, tables or figures already mentioned in the Result section. Please, just discuss your results, go further and look for the explanations. It is not only a process of comparing your results with others from other investigations.

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Responses: We have revised the discussion section thoroughly, especially for 4.1 and 4.2 sections (Page 10-13). Some sentences with repeating results have been deleted from Discussion. Now we focus more on the mechanism explanations of how grazing exclusion effect on soil properties and nutrients in alpine grasslands.

Comments: -Conclusions. This section is currently more a summary of the study than real conclusions. So, it should be rewritten being very concise and replying to the addressed objectives in the introduction: i, ii, iii,...

Responses: The conclusions section has been shortened and rewritten (Page14, Line1-22). First, we addressed objectives and answered those questions we raised in the introduction, then we addressed implications for practices when recommend any policies designed for the degraded soil restoration of alpine grasslands in the future.

Comments: In general, authors should make an effort to highlight better their findings and their contribution to the knowledge of alpine grassland degradation.

Responses: We have revised the Discussions and Conclusions sections thoroughly which mentioned above. Hope it could contribution to the knowledge of alpine grassland degradation now.

Comments: -Figures can be colored drawn.

Responses: Figures have been colored drawn now (Page 27-28).

Comments: -Figure 1 is not referenced in the text. Responses: Figure 1 has been referenced in the text now (Page 5, Line 27). We are sorry for our negligence.

Comments: -Figure 2 is not necessary. Authors should delete it and, if so, put in a table the soil particle distribution data.

Responses: Figure 2 has been deleted from the paper.

Response to Referee #2:

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Comments: Generally, I think you did a good job in examining the effects of short-term grazing exclusion on soil properties and nutrients in the Tibetan Plateau. However, I encountered with many small linguistic errors in articles (“a”, “an” and “the”), prepositions (“in” and “of”) as well as some adverbs when going throughout it. I think, you should also pay attention to the agreement of the subject and the predicate. For example, in the first sentence in the “Introduction” section, the word “contribute” should be replaced by “contributes” because the subject “soil” is uncountable. There are too many small errors of English to correct here and I think the best option would be to run this manuscript past a fluent/native speaker or to have it edited by a language editor for phrasing, grammar, tense, voice and punctuation once the technical issues detailed below have been dealt with before your resubmission.

Responses: Thank you very much for your comments. We are sorry for bringing you so much trouble due to many small linguistic errors in our paper. The revised manuscript has been edited by a native speaker thoroughly to eliminate small linguistic errors for phrasing, grammar, tense, voice and punctuation.

Comments: Introduction- The introduction is poor organized in its current version. First, it is too short to provide enough background information on the questions you aimed to answer. In addition, you have referenced some studies outside the Qinghai-Tibetan Plateau, which might be not well related with your research region. What I suggest is that first the references should be updated and limited within the Tibetan Plateau and other alpine biomes on the earth. Then you should better focus on the topic of your paper when revise the introduction and other sections with clear logical loops. For example, the sentences about sampling sites in the last paragraph, I think, can be moved to the M & M section. Then you can rewrite this part with clear hypotheses to test or questions to answer.

Responses: The Introduction section has been reorganized and improved to provide enough background information and to focus on the topic of the paper with clear logical loops (Page 2-4). Just as you said, we referenced some studies outside the Qinghai-

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Tibetan Plateau, even though they were not well related with our research region. That is because that we want to build background information concerning on how grazing exclusion affects soil properties and nutrients from international perspectives, based on related references from grassland ecosystems all over the world. Some sentences about sampling sites in the last paragraph have been moved to the M & M section, and last paragraph of introduction has been rewritten. It clearly addresses two questions and two hypotheses of our paper now (Page 4, Line 14-25).

Comments: Page 2414 Line23: In academic writing, “unreasonable management” is preferable to the word “mismanagement”. Page 2414 Line 25: How soil loses its structure? Please explain it. Page 2415 Line 10: Pastoralists? I think you mean “herdsmen” here. Page 2415 Line 15: “retain” can be taken placed by “recover” or “sustain” here. Page 2416 Line 19: Wetting and drying cycles are not biological activities. Page 2417 Line 19: Add “to” before “prevent”.

Responses: All the unsuitable words have been corrected. “loss of soil structure” means the removal of the pore space between the soil solids, or the detachment of solid particles from their matrix. Just as you said, wetting and drying cycles are not biological activities. However, we mean biological activity caused by the wetting and drying cycles in our paper (Page 3, Line 9-11).

Comments: M&M- I think the texts in this section should be revised for clarity. It should be clearly stated how many sites were surveyed in total in the nine counties you chose. Only nine sites, right? You just said that three quadrats at GE or FG plots were laid out and five soil samples were taken from each quadrat. But we do not know how many GE sites and FG sites have been surveyed in this work.

Responses: We conducted a multi-site survey at nine counties which represented three of the main natural grassland vegetation types in Tibet. One FG plot and one GE plot were chosen within 800 m from the enclosure edges in each county. Then three pairs of 0.5 m × 0.5 m quadrats at each GE and FG treatment sample plots were laid out

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collinearly at intervals of approximately 20 m. So in total, 54 quadrats of alpine grassland in Tibet were sampled with 27 quadrats (9 plots \times 3 quadrats) for FG treatments and 27 quadrats for GE treatments, respectively. The related information has been added in M&M section (Page 6, Line 7-13).

Comments: Page 2418 Line 11: total land surface of China. Page 2419 Line 09: Please give the reference of the data you cited in this sentence. Page 2419 Lines 20-21: Here you referenced Wu et al. (2014a) for the averaged stocking rate for your study region. I searched his group's articles and found that Wu et al. (2013) first reported average stocking rates across the Northern Tibetan Plateau in another work, which was published in Rangeland Ecology and Management. Please update this reference here. Wu, J. S., et al. (2013). "Grazing-Exclusion Effects on Aboveground Biomass and Water-Use Efficiency of Alpine Grasslands on the Northern Tibetan Plateau." Rangeland Ecology & Management 66(4): 454-461.

Responses: All these have been revised according to reviewer's comments (Page 4, Line 30; Page 5, Line 23-24; Page 6, Line 4; Page 22, Line 9-11).

Comments: Section 2.4 Climate data- The spatial resolution for meteorological datasets, $0.5^\circ \times 0.5^\circ$ (approximately 50 km² * 50 km²), might be too coarse for analysis. In addition, were these gridded climate surfaces downloaded from SMDSSS or produced by yourselves using ANUSPLIN software? Please clarify in this section. If you produced them, I think, you had better to reset up the grid resolution in ANUSPLIN.

Responses: Monthly meteorological datasets used in this paper were downloaded from the China Meteorological Data Sharing Service System (CMDSSS, <http://data.cma.gov.cn>), not produced by ourselves. Just as you said, these meteorological datasets were coarse due to with spatial resolutions of 0.5° . However, we think these data could still be used for analysis because Tibet is a relatively large region. In addition, a goodness of fit of the interpolated values was validated by CMDSSS (Journal of Geophysical Research: Atmospheres, 2014, 119: 10702–10719).

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Comments: Discussion-This section should be revised throughout. In the text, authors repeated their results too often. In addition to comparisons with previous investigations in other biomes, authors should provide more mechanical explanations for their findings, why short-term grazing exclusion on Tibetan Plateau did not significantly change soil properties and nutrients in the three zonal alpine grassland communities.

Responses: We have revised the discussion section thoroughly, especially for 4.1 and 4.2 sections (Page 10-13). Some sentences with repeating results have been deleted from Discussion. Now we focus more on the mechanism explanations of how grazing exclusion effect on soil properties and nutrients in alpine grasslands.

Comments: Conclusions-In the conclusion section, you should briefly summarize your scientific findings in this work to answer those questions you raised. If necessary, implications for practices sometimes can also be expressed in this section.

Responses: The conclusions section has been shortened and rewritten (Page14, Line1-22). First, we addressed objectives and answered those questions we raised in the introduction, then we addressed implications for practices when recommend any policies designed for the degraded soil restoration of alpine grasslands in the future.

Comments: Table 2. You should clarify what G, D and G*D stand for. Figure 3 should be reproduced with a higher DPI. How did you compare the differences among alpine meadows? The analysis procedure should be clarified in its legend.

Responses: Table and Figure has been revised according your comments (Page 25, Table 2; Page 28, Figure 2).

Please also note the supplement to this comment:

<http://www.solid-earth-discuss.net/7/C1240/2015/sed-7-C1240-2015-supplement.pdf>

Interactive comment on Solid Earth Discuss., 7, 2413, 2015.

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