

Responses to Reviewer #1 comments:

1. *This manuscript explores how the biocrust influence the hydrological features in meadow ecosystems in the Qinghai-Tibet Plateau, and the authors found that the presence of a biocrust community is a signal of degradation of the meadow ecosystems due to reducing the soil water retention and soil infiltration compared to typical Kobresia meadow. The finding is vital empirical evidence for making management policies for maintaining the sustainability of meadow ecosystems in the long run, especially under dramatic climate changes during the anthropocene. However, some minor errors still need to be improved before a formal publication.*

***Response:** Thank you for your positive comment. We would like to express our great appreciation to the anonymous reviewers for their valuable suggestions and comments on the previous version of the manuscript. We have revised manuscript substantially based on reviewer's constructive advices. Our responses to the reviewers' comments and modifications made are detailed in following pages. We hope that the revised version is satisfactory to your journal.*

2. *After going through the whole ms, the "which" at line 29 refers to biocrust but not infiltration. So, this sentence needs to be rewritten.*

***Response:** Thank you for your remind, we have revised these sentences.*

3. *At the beginning of the introduction, the ms only depict the imperative functions of biocrust. However, a clear definition of biocrust may make the ms more general to large audiences.*

***Response:** Thank you for your good comment, we have added the clear definition of biocrust in revised MS, such as "Biocrusts are composed of living non-vascular plants (mosses,lichen and green algae) and microorganisms (such as cyanobacteria, fungi and bacteria) associated with their bonding soil particles that occur in the uppermost few millimeters or even centimeters of surface soil"*

4. *Line 42, please explain why arid and semi-arid ecosystems differ from meadow ecosystems.*

***Response:** Thank you for your comment, we have explain the rid and semi-arid*

ecosystems differ from meadow ecosystems, such as “most previous studies were conducted in arid and semi-arid ecosystems, such as the Tengger Desert, Negev Deserts, and Loess Plateau hydrological processes where plant are limited by soil moisture. Very few studies have focused on the role of biocrust on hydrological processes (i.e., soil water content, soil water retention, and soil infiltration) in alpine ecosystems where plant are limited by soil temperature.

5. Line 43, What "display a positive effect on soil hydrological properties"? Consider splitting the sentence from 40-44, " However,.... hydrological properties." into two sentences.

Response: Thank you for your comment, we have revised.

6. As the alpine already contains information about high altitude, there is no need to use the expression of "high-altitude alpine ecosystem." For instance, in line 45.

Response: Thank you for your comment, we have deleted the high-altitude.

7. Try to unify the expressions between "hydrological processes" and "hydrological properties."

Response: we have made it consistent.

8. Line 48, same grammar error as in the abstract, the "which" refers to the alpine meadow, not QTP.

Response: Thank you for your comment, the "which" refers to the alpine meadow in our meaning.

9. Line 61, the first half of the sentence, is unrelated to this ms; the second half repeats the meaning at line 41.

Response: Thank you for your comment, we have deleted this unrelated sentence and repeat sentence.

10. A typo between lines 103 to 105..

Response: revised.

11. Line 67, compared to what "biocrust could increase soil water infiltration.....". Similarly, there are expressions like this; the author needs to clarify the reference object when comparing biocrust and other reference objects.

Response: good comment, we have added the reference object.

12. Please explain the meaning of "disturbed" and "undisturbed" in lines 103 and

109.

Response: Thank you for your comment, we have added the meaning of "disturbed" and "undisturbed" in our revised MS, such as "We obtained the disturbed soil samples (i.e. non-ring knife soil sample) in NM and BM" and Undisturbed cylindrical ring samples (i.e. ring knife soil sample) were also obtained in each treatment.

13. The abbreviation "CMC" stands for soil capillary water capacity, but there is no letter "M" within this terminology.

Response: Thank you for your careful check, we have revised the CMC into CWC (capillary water capacity).

14. . Line 142, to keep consistency with the first sentence of the paragraph, replace "crust and NM" with "BM and NM."

Response: Thank you for your comment, we have revised.

15. Because there are many types of biocrust, mainly composed of different kingdoms of organisms, hence biocrust is a very broad concept. Therefore, I suggest the authors clarify the type of biocrust when mentioning it in the discussion. Moreover, the same issue mentioned in comment-8, the author needs to make the reference object clear when comparing biocrust and other reference objects.

Response: Thank you for your comment, we have clarified the type of biocrust when mentioning it in the discussion, such as "In this study, however, we found that the presence of cyanobacteria crust could improve topsoil texture compared with normal meadow, but not that of deep soil....." .

16. Line 238, the conclusion is just speculation by authors but not proved by the data of this study. Hence, the word "conclude" is too strong.

Response: Thank you for your comment, we have revised our conclusion just based on our data results.

17. Line 449 lacks a legend of "(b)" in correspondence with the right panel of Fig. 6..

Response: Thank you for your comment, we have revised.

18. In Fig. 8, the arrows are overlaid with the numbers.

Response: Thank you for your comment, we have revised.

19. The authors need to upload Table 1.

Response: Thank you for your remind, we have upload Table 1.

20. For Fig. 7, did the authors generate this figure using the combination of the NM and BM datasets? This needs to be clarified.

Response: Thank you for your good comment, the figure by both the datasets of NM and BM, we have clarified in revised Figure caption such as “Pearson correlation between soil water retention and soil properties (a) among two surface soil types, and the relative influence of soil properties on soil water retention (b)”

21. Line 455 lacks a legend of "(b)" in correspondence with the right panel of Fig. 7..

Response: Thank you for your remind, we have revised

22. For Fig. 8, the same issue as Fig. 7, did the authors generate the figure by both the datasets of NM and BM?

Response: Thank you for your remind, the figure by both the datasets of NM and BM, we have clarified in revised Figure caption such as “Structural equation modeling of the direct and indirect effects of soil properties on soil water retention capacity (SWRC) among two surface soil types”