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Interactive comment on "How deep do we dig for surface soil? A comparison of patterns of microbial C : N : P stoichiometry between topsoil and subsoil along an aridity gradient" *by* Yuqing Liu et al.

Anonymous Referee #1

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General comments: This manuscript (MS) examined soil microbial C:N:P stoichiometry along a large aridity gradient across different temperate grassland biomes, using 58 plots sampled from a 2100-km transect in Inner Mongolian, China. The dataset is good not only in that studies of soil microbial stoichiometry along great aridity gradient is still limited, and also because they examined difference in patterns and potential drivers between top and subsoil. The MS is generally well written, though there were some clear typewriting flaws and some sentences not easy to understand. I suggest a minor revision, mainly on the improving of the statistical analyses, and clarity and

readability of the MS.

Specific comments: The title: from the title I have first thought that you have sampled much deeper than 10 cm. However, I then realized that you have sampled to a depth of 20 cm. I would suggest to revise the title and delete "How deep do we dig for surface soil?". The rest part of the title is good enough.

Methods: In 2.2, how the above-ground biomass data was obtained was not clarified, but this data was used in statistical analyses. In addition, the method to calculate aridity index need to be introduced. Though the data was extracted from database, the Equation needs to be introduced for readers to better understand the biological meanings. Further, there were several different indices for aridity.

Statistical analyses: The plots were sampled from a northeast to southwest transect, which include variations in both temperature and aridity. It remains unclear how temperature contribute to the geographic patterns reported here. Considering the large difference in aridity from typical steppe to desert steppe, personally I agree with your results on the role of aridity on microbial stoichiometry. However, you may consider to include temperature as a predictor, at least in bivariate analyses, to make your conclusions more robust.

Results and Discussion: The SEM showed that climate have indirect effects through AGB, SOC and F:B. These are also interesting results, but was not mentioned in results. I also suggest to added some discussions of these indirect effects, though some of them were mentioned in discussion implicitly. Anyway, these indirect effects are part of the full picture how climate affects soil microbial stoichiometry.

By the way, the MS used many abbreviations, which markedly decrease the readability. Please try to remove unnecessary ones (e.g. MS, TS, DS in Table 1)

Minor comments: L45: meaning not very clear.

L58: A few studies. You have listed some studies along latitudinal and environmental

gradients in the subsequent text.

L62, 63: with higher latitude?

L64: replace values with patterns

L142: and at a depth of 10 cm, what does this mean?

L 171: aridity index (AI)

L217: "were well constrained (Fig. A2)". It needs to be explained.

L219: larger->higher

L223: the microbial C:N ratio in the subsoil was significantly higher than that in the topsoil (Fig. 2b). This result can not be found in Fig 2b. I guess it was in Table2.

L238 (and elsewhere) Effects of potential driving factors

L303: microbial C:N:P stoichiometry impacted the microbial community structure as a result of the F:B ratio. Do you mean that C:N:P stoichiometry affects microbial community structure? This seems you be conflict with the SEM. In SEM (and the sentence in line 300ïïj■303), the logic is that C:N:P stoichiometry changes as a result of community structure.

Fig. 1 Where are the difference among the biomes here? In the caption (also in that of Table 1), you mentioned: MS, meadow steppe; TS, typical steppe; DS, desert steppe. But you did not show the results at all.

Table 2: across 404 the Inner Mongolian grassland at ??? Biome: soil depth? You did not compared biomes here in the Table.

Fig. 3: Why the figures of F:B were different from others? It seems many plots have a same F:B value.