Biogeosciences Discuss.,
https://doi.org/10.5194/bg-2019-167-RC2, 2019

Biogeosciences Discussions

Interactive comment on "Past aridity's effect on carbon mineralization potentials in grassland soils" *by* Zhenjiao Cao et al.

Anonymous Referee #2

Received and published: 16 July 2019

The manuscript bg-2019-167 reported results from a 91-day soil incubation experiment using top and deep soils from six grassland sites in China. The authors showed different controls of native SOC and added litter decomposition (i.e. potential mineralization rate) by different microbial variables (biomass vs. enzyme) by statistical analyses (regression and SEM). Overall, the topic is relevant to Biogeosciences, the writing is clear, and the analysis and interpretation are mostly robust and reasonable. I have a few suggestions or concerns for the authors to consider in revision.

1. A key point in the original design is the comparison between top vs. deep soils. For example, how the potential decomposition rate of native SOC vs. added litter and the priming effect of litter on native SOC differ between top vs. deep soils in these six sites. However, the analysis and comparison between soil layers are not adequate

enough. I suggest the authors to show more direct results (mixed-effects models) on this comparison, and analyze data (e.g. regression, SEM) separately for top vs. deep soils.

2. The results of priming effect were not shown. Even if they were statistically neutral, some illustrations (figures or tables) and analyses (mixed-effects model, regression) can be helpful for readers to understand how the priming effect vary with depth and site (and what are the driving variables of PE across these depth intervals and sites).

3. The depth intervals for deep soils were not consistent across sties. Some explanation and justification is needed.

4. More information on the 13C-labeled litter is needed. How were they labeled? Were they uniformly labeled (with data to support this)?

5. The rate of litter addition need more explanation and justification. What criteria was used? How were these rates determined? What were the rates (gram litter C) per gram soil, per gram SOC, and per gram MBC for all 12 soils?

6. PLFA, normally the unit is nmol. How did you go from nmol to mg? A table with all detected markers and their assigned groups used in this study would be helpful.

7. CUE, the value was extremely low, because of the method used in this study (91-day incubation, conversion from PLFA to biomass C). Probably, it is more appropriate to use another term for this study.

8. Enzyme activities were sensitive to the pH of buffer. As different soils had different pH, did you control buffer pH for each soil?

Specific comments

Table 5: the results (most were n.s.) were a little surprising. Do results change if you analyze the two soil layers separately?

Figure 1: what were the results of priming effect?

Figure 2 and 3: Do results change if you analyze the two soil layers separately?

Interactive comment on Biogeosciences Discuss., https://doi.org/10.5194/bg-2019-167, 2019.