

Interactive comment on “Soil carbon release responses to long-term versus short-term climatic warming in an arid ecosystem” by Hongying Yu et al.

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C: the original comments; R: the responses to the comments. General Comments:
C: This paper specifically addresses our lack of knowledge on climate change within desert grassland ecosystems. While there have been many studies within boreal and temperate ecosystems, warming experiments focused on soil microbial community function and C stock assessments in arid systems are rare. Therefore, this study fills an important gap. The sampling design appears robust and is accompanied with a clear presentation of data. The methods for analyses are valid and informative enough for readers that might not be familiar with these techniques to understand, or where

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to read more, if desired. The authors further supported their hypotheses succinctly that warming reduced microbial respiration while wetting events enhanced respiration. However, my one concern is that 0.5 – 1.0 degree (Line 244) warming is not enough of a difference to define two treatments of warming (long-term, moderate and short-term, acute). Although, when moisture became limiting in August, there was a greater separation of the warming treatments which does highlight seemingly subtle differences. Perhaps a more direct addressing of the miniscule differences in the warming treatments until SWC becomes the greatest inhibitor to respiratory rates. Overall, I find this study well conducted and clearly presented. I would recommend for publication. R: Thank for the positive comments. The larger differences occur between the two warming treatments and the control (i.e., ambient condition). Yes, acute warming treatments may not reach a higher level. However, it gradually induced a decline in soil moisture, finally limiting soil respiration. The major revision had made carefully as kindly suggested (see detail below).

Specific Comments: C: Line 12: Can examples of severe impacts be included here? R: We have listed examples of severe impacts: the changes in litter decomposition and soil respiration in lines 12-13 in the new revised version (red font). Thank you.

C: Lines 16-17: Since many readers do not get past an abstract, it would be useful to list treatment pressures in parantheses following long-term (ex.), short-term, etc. R: Thanks. We have added the relevant information concerning the warming treatments in lines 16-17.

C: Line 19: Give the percentage of substantial water input treatment? R: We fully irrigated the soil to field capacity and we have added it to this sentence lines 20-21. Many thanks.

C: Line 55: Use a more updated IPCC statistics (this one is 2014) R: Thank you very much. But we are sorry about that because this information is from the last version (AR5 report of IPCC) that we can find from IPCC. The future AR6 report has not been

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published (www.ipcc.ch/).

C: Warming treatment pressures were only applied during the growing season (June-Aug) of each year. In many temperate ecosystems, there has been evidence of seasonal extensions. Has there been any evidence that the growing season is becoming extended (earlier springs, later falls) at this site? If so, should this warrant extending warming treatments beyond June – August? R: Thank you for your helpful advice. The growing season was not extended in our experimental site, an arid area, during our experiment. The warming-induced drought may limit the seasonal extensions. This may need to be explored in the future study in the arid ecosystem.

C: Line 774: If outlier point does not change equations, why not remove it completely? R: Because it is the actual values that we measured; and the data have been included when the equations and their parameters were analyzed. Thus, it could be better that the points were shown. Additionally, we also presented the results excluded outlier points in Supplementary Figure S2.

Technical Comments: C: Figure 2 line 769: Linear line is blue and not black as stated R: Many thanks, we have corrected it accordingly.

C: Line 773: Typo? What does “soil animal” refer to? R: Thanks for the kind comments. This is an improper phrase, and we have deleted it accordingly. Thank you again for the valuable suggestions. Please see the Manuscript-Revised-with supplement as Supplement (pdf).

Please also note the supplement to this comment:

<https://www.biogeosciences-discuss.net/bg-2019-236/bg-2019-236-AC2-supplement.pdf>

Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2019-236>, 2019.