

## A point-by-point reply

Dear Associate Editor and Anonymous Referee #3:

Thank you for your comments and the reviewers' comments concerning our manuscript entitled "Different responses of ecosystem CO<sub>2</sub> and N<sub>2</sub>O emissions and CH<sub>4</sub> uptake to seasonally asymmetric warming in an alpine grassland of the Tianshan Mountains" (MS No.: bg-2020-396). Those comments are all valuable and very helpful for revising and improving our paper, as well as the important guiding significance to our researches. We have studied those comments carefully and have made a point to point reply and correction. Revised portions are marked in red color in this manuscript. Specific corrections and responses to the Referee's comments are listed as follows:

Associate Editor Decision: Publish subject to technical corrections (28 Apr 2021) by Ben Bond-Lamberty

Comments to the Author:

This manuscript was re-read by the reviewers, and both find it significantly improved. I agree—thanks for your careful revisions, which have dramatically improved the clarity of the text and strengthened the overall study.

There do remain a few changes that could be made to further clarify and improve the text; these are all optional, but I strongly recommend them. See short list below. Regardless, I am pleased to recommend this ms for acceptance.

Minor comments

1. Line 14: Be concise, i.e. "The annual mean..." (no need for "Our results indicated that")

**Response:** Thank you for your precise comment. We revised as "The annual mean...", see Line 14 in the revised manuscript.

2. L. 101-104: for clarity, would be good to start new paragraph with “In this study, we... [describe in a single sentence].” Then “we hypothesized that Re, CH<sub>4</sub> update, and N<sub>2</sub>O emissions would be simulated by warming, but gradually attenuated...”

**Response:** Thank you for your precise comment. We revised as “In this study, we hypothesize the stimulatory effect of warming...”. See Line 102.

3. L. 104-107: could remove

**Response:** Thank you for your precise comment. We removed this sentence.

4. L. 187: start new paragraph

**Response:** Thank you for your comment. We revised this paragraph.

5. L. 206: “Re exhibited exponential growth”

**Response:** Thank you for your comment. We revised this sentence. See Line 212.

6. L. 212: “were not”

**Response:** Thank you for your comment. We revised as “...were not...”. See Line 217.

7. L. 216: see #1 above, same comment here (also in line 267)

**Response:** Thank you for your comment. We revised the sentences. See Line 221, 273 and 275.

8. L. 241: “In this study, warming increased...”

**Response:** Thank you for your comment. We revised as “In this study, warming increased...” See Line 248,249.

9. L. 292: what about availability of analysis code? Please include in Zenodo!

**Response:** Thank you for your precise comment. All statistical analyses were conducted using SPSS (version 20.0) (IBM, Armonk, NY, USA) with the statistically significant difference threshold set at  $P < 0.05$ . Our statistical analysis of the data did

not use any code.

### **Report #1 from Anonymous Referee #3**

The manuscript titled “Different responses of ecosystem CO<sub>2</sub> and N<sub>2</sub>O emissions and CH<sub>4</sub> uptake to seasonally asymmetric warming in an alpine grassland of the Tianshan Mountains”

by Gong et al. may be accepted after the following minor edits:

1. The authors, in this revision, state that they measured humidity (line no. 136). The variations in humidity (I assume relative humidity) under warming as given for other parameters should be provided in supplementary. Alternatively, I suggest that humidity may be removed as it is not discussed further in the manuscript.

**Response:** Thank you for your precise comment. We removed “...and humidity...”. See Line 140 in the revised manuscript.

2. In line no. 138 correct “OCTs” to “OTCs”

**Response:** Thank you for your comment. We revised it. See Line 142.

3. In figure 3, If you provide correlation (r value) instead of regression (r<sup>2</sup> value) then in line no. 476 (figure 3) correct “presented by linear regression” to “presented by linear correlation”.

**Response:** Thank you for your precise comment. We revised this sentence. See Line 470-474.

4. My earlier suggestion regarding figure 2 was to add additional boxes to represent overall variations in GHG fluxes (entire sampling period from 2016-2019). It will read as (in X-axis): GS 2017 GS 2018 GS 2019 GS Mean Do the same for NGS. Mean lines (shown in red) are not required.

**Response:** Thank you for your precise comment. We removed the Mean lines (shown in red) in the Figure 2.