Biogeosciences Discuss.,
https://doi.org/10.5194/bg-2017-552-AC5, 2018


Biogeosciences Discussions
Open Access
EGU



# *Interactive comment on* "Fungi regulate response of $N_2O$ production to warming and grazing in a Tibetan grassland" *by* Lei Zhong et al.

**Lei Zhong et al.**

mawc916@tju.edu.cn

Received and published: 30 April 2018

Thank you for you suggestions. We have revised our manuscript "Fungi regulate response of N2O production to warming and grazing in a Tibetan grassland", based on your comments. We have carefully addressed each comment and our responses to these comments are listed the below. The attachments are the manuscript which had improved as your suggestions. We hope that all necessary revisions have been made. However, we would be prepared to make further revisions and modifications if required.

Responses to the Reviewer's comments:

[Comments] (1) The statistical analysis and reporting are weak. Is there any real field replication, excluding any pseudo replication? What was the power of the statistical



Printer-friendly version

Discussion paper

test? Statistical differences among different treatments were not reported for all the sub-plots. Additionally, along with p values, standard Error of the mean difference may need to be reported in the plots to understand the differences between the treatment means better.

[Responses] Yes, we had real field replication, our site is a two-way factorial design (warming and grazing) was used with four replicates of each of four treatments. In total, 16 plots of 3-m diameter were fully randomized throughout the study site. We had shown it in our manuscript, please see the lines 144-148.

About the statistical differences among different treatments, it was also mentioned by other reviewer, as his suggestion, we removed the different letters from the Figs. 1b and 4e to avoid the misunderstandings. We also showed the two-way ANOVA results in Table 1 to give more details of statistical analysis in our manuscript. Please see lines 581-643.

[Comments] (2) It was not clear how were the relative contributions of bacteria and fungi in nitrification, denitrification and total N2O production derived from the total respective measurements? The methods need to be clear and reproducible.

[Response] For the contribution of bacteria and fungi to total nitrification enzyme activity was calculated it by the ratio of BNEA or FNEA to BNEA+FNEA; the contribution of bacteria and fungi to total potential of N2O production from denitrification was calculated it by the ratio of BDEA or FDEA to BDEA+FDEA. In the new version, we added the description in Materials and Methods". Please see the lines 255-258.

[Comments] (3) In addition to the present results of the relative contribution of bacteria and fungi in nitrification and denitrification, the definite mechanisms for bacterial and fungal pathways of nitrification and denitrification need to present to demonstrate the change in the pathway of N2O production under the warming treatment. A definite mechanism of shifting in the relative contribution of bacteria and fungi in N2O production would help the reader to understand the present results in a systematic

way, particularly under the warming treatment. This would also help to explain and understand the underline reasons of changing the pathway of N2O production between bacteria and fungi under warming.

[Responses] It is the two reasons that lead to the changes of fungal and bacterial pathways for N2O emissions by warming. Firstly, the increased of soil temperature directly reduce fungal activity but increase bacterial activity, because fungi prefer the cold environment compared with bacteria. Secondly, warming indirectly reduce fungal activity but increase bacterial activity through increased soil inorganic N and decreased soil organic N in our site, please see lines 358-363, because fungi prefer higher organic N environment while bacteria prefer higher inorganic N environment. All these changes caused the fungal and bacterial pathways for N2O emissions changed in different directions under warming. We have improved the manuscript and make sure the underlying mechanisms is clearly, please see lines 352-365.

[Comments] (4) It was also not clear why the effects of warming on relative contribution of bacteria and fungi on nitrification, denitrification were diluted when warming treatment was combined with grazing, for example in fig 5?

[Responses] Yes, the effects of warming on relative contribution of bacteria and fungi on nitrification, denitrification were diluted when warming treatment was combined with grazing in our results. We had discussed in above that warming changed the pathway of N2O production potential mainly through alter the soil temperature and the soil inorganic and organic N content. In our results, (WG) also reduced the positive effect of (W) on the soil temperature (Fig. 1b), and showed the trend of reduced the negative effect of (W) on the TC, TN and NO3- content although the statistical analysis were not significantly (Fig. 2), moreover, the soil dissolved organic nitrogen content was significantly diluted when warming treatment was combined with grazing (data not shown), so the effect of (WG) on soil temperature and the substrate concentration caused the effects of warming on relative contribution of bacteria and fungi on nitrification, denitrification were diluted when warming treatment was combined with grazing.

Please also note the supplement to this comment:
https://www.biogeosciences-discuss.net/bg-2017-552/bg-2017-552-AC5-supplement.pdf

Interactive comment on Biogeosciences Discuss., https://doi.org/10.5194/bg-2017-552, 2018.





Printer-friendly version

Discussion paper