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Biogeosciences Discussions

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

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This is a concise and nicely written paper, focusing on fungal and bacterial contributions to potential N2O emissions in an alpine grassland in response to warming and grazing treatments in the field. The authors report several interesting observations, including an increased bacterial enzyme activity and a decreased fungal enzyme activity for N2O emissions under warming. The results have immediate implications for GHG emissions under the scenario of climate change. I have several suggestions for the authors to consider in order to improve the manuscript.

1. Although the authors showed that fungal and bacterial pathways for N2O emissions changed in different directions under warming, the underlying mechanisms or causes

remain unknown. In Line 321-322, it is mentioned that increased NO3-N may inhibit fungal growth. Can you elaborate more? Also, did warming affect soil moisture contents or dynamics compared to the control? If so, how would moisture change affect fungal versus bacterial communities? In the end, I am interested in the driving force leading to the observed changesâĂŤit is direct warming effect or indirect effect mediated by other factors? Unless we know answers to these questions, we can hardly speculate on the future changes.

2. Speaking of future predictions, I think it should be emphasized that measurements made here were potential rather than "real" emissions in the field. A critical requirement for denitrification to occur is anoxic or sub-oxic conditions. Therefore, I would think that N2O emissions more depend on the hydrological or redox conditions of the soil. Observations of fungal and bacterial enzyme activity changes in the lab may or may not apply to the field observations, depending on how warming affects soil moisture.

Some minor points: Line 163: I notice that there was no field replicate for the measurement?

Line 223: N2 not N.

Line 227: Why only three time points for the denitrification measurement versus 5 points for nitrification?

Lines 285 and 292: NEA, DEA, FDEA, BDEA. . .not used in the previous text.

Line 304: I don't think IC is much higher in Haibei soils than some temperate grassland soils in Mongolia. IC contents are dependent on soil pHs. . .

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