

Interactive comment on “Fungi regulate response of N₂O production to warming and grazing in a Tibetan grassland” by Lei Zhong et al.

Anonymous Referee #5

Received and published: 8 April 2018

I have some major concerns as shown below: 1. The experimental design is not acceptable. Firstly, why did you choose “winter grazing”? There seems no explanation. The temperature should be too low to let the animal grazing out of the field in winter. Additionally, the grassland is expected to be covered by snow and the grasses should be withered in winter. Secondly, the description of the treatment is really confusing. Winter grazing should be used in the current study, but “For grazing treatments, the grazing treatments in this site were used for summer grazing treatments until 2010, from 2011 to 2015, there was no grazing during the summer, and grazing was replaced by cutting and removing about 50% of the litter biomass in October and the following March each year to simulate winter grazing” (lines 153-156). To be honest, I can’t understand the experimental design at all. In addition, grazing can’t be simulated by

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cutting or mowing, since grazing involves tread and urine/dung deposition. Even the land is very hard due to freezing in winter, tread by animals would result in different effects on the plant communities. 2. I can't see how you can jump from nitrification or denitrification potentials to assessing the contributions of bacterial and fungi to potential N₂O emissions. Nitrification or denitrification potentials should not be regarded as N₂O productions especially emissions by nitrification or denitrification. From this sense, the discussion section should be rewritten thoroughly. 3. The manuscript is not well prepared. There are lots of writing issues throughout the manuscript. I only presented few of them since there are too many.

Abstract Lines 44-46: The treatments should be described briefly in the abstract to increase the readability. Additionally, some key information about the method should be presented. Lines 46-52: The values should be presented with uncertainties, e.g., standard error, standard deviation or 95% confidence interval. Similarly, the relevant values in the text should be presented with uncertainties. Lines 46-47: Were these values got from the control? Lines 49-52: Suggest rephrase these sentences in such way: "However, warming significantly increased the enzyme activity of bacterial nitrification and denitrification to 53% and 55%, respectively, but decreased enzyme activity of fungal nitrification and denitrification to 47% and 45%, respectively. Winter grazing had no such effects." Lines 52-54: How could you make this conclusion? Under what conditions do soil fungi contribute more to N₂O production? This sentence is of course not clear. If the conclusion is obtained based on results from the control, it should be put somewhere after lines 46-47. Additionally, can you make such a strong conclusion based on an incubation experiment? Lines 56-58: This should not be put in the abstract as a key implication since it should be regarded as a fact. Line 59-60: This sentence should be rephrased since some grammar issue exists. For example, "lead to refine..." is not correct. Overall, the abstract needs substantial revision.

Introduction Line 66: not clear what does "it" refer to. Lines 67-69: This sentence needs substantial revision. Line 122: Why did you choose "winter grazing"? There seems no

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explanation. The temperature should be too low to let the animal grazing out of the field in winter. Additionally, the grassland is expected to be covered by snow and the grasses should be withered in winter.

M & M Lines 130-131: The symbol °C is not correctly used. Lines 131-132: over 80% of which? Lines 133-134: Please clearly present the soil classification systems and the references. Lines 134: There should be a space between the word and the parentheses here and in other sentences or Figures (Please check the figures as well). Line 139: The indent here is not consistent with other paragraphs. Please keep consistency. Line 146: delete was. Lines 153-156: The description is really confusing. According to the above paragraph, winter grazing was used in the current study, but “For grazing treatments, the grazing treatments in this site were used for summer grazing treatments until 2010, from 2011 to 2015, there was no grazing during the summer, and grazing was replaced by cutting and removing about 50% of the litter biomass in October and the following March each year to simulate winter grazing”. To be honest, I can’t understand the experimental design at all. In addition, grazing can’t be simulated by cutting or mowing, since grazing involves tread and urine/dung deposition. Lines 195-196: Please revise this title. Line 201 and line 235: The monthly mean temperature was 9.7 °C in August, but the slurry was incubated under 28 °C. The incubation temperature is nearly two times greater than the mean temperature. How would this artificial effect modulate the responses of the measured indices? Line 203: What “them” stands for? Line 220: nitrification again?

3. Results and Discussion

Lines 286-291: I can’t see how you can jump from nitrification or denitrification potentials to assessing the contributions of bacterial and fungi to potential N₂O emissions. Nitrification or denitrification potentials should not be regarded as N₂O productions especially emissions by nitrification or denitrification. From this sense, the discussion section should be rewritten thoroughly.

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