Biogeosciences

Discussions

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Interactive comment on "Quantifying Global N_2O Emissions from Natural Ecosystem Soils Using Trait-Based Biogeochemistry Models" *by* Tong Yu and Qianlai Zhuang

Anonymous Referee #2

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Yu and Zhuang improved the N2O emission processes in one existing land ecosystem model by using trait-based biogeochemistry models. Trait-based modeling is a new direction for model development. This could potentially improve model. However, I think this paper has some deficits and drawbacks need to be addressed.

1. The authors modified model nitrification process. As I know, most of soil N2O emission is from denitrification process, in which NO3- is converted to N2, N2O, and NO. Only a small part of N2O is from the nitrification process. I don't think the improvement in nitrification process could substantially improve the simulated N2O. I would suggest the authors use trait-based approach to represent denitrification as well.

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2. The equations in original TEM should be described.

3. The authors claim the nitrification process was improved. However, nitrification rate was not validated.

4. For model sensitivity, authors examined model sensitivity to climate and soil C/N. It is correct that N2O emission is sensitive to climate change (particularly temperature). However, N2O emissions in the natural ecosystems could be very sensitive to the atmospheric N deposition. In recent years, there is a debate on how soil N2O emissions response to CO2 concentration. I would see some results about N2O sensitivity to N deposition and CO2.

5. what is the date sources of atmospheric CO2 and nitrogen deposition?

6. Recently, a global N2O model comparison has been initiated to run models from 1860 to 2016 (Tian et al., 2018). Ten land models were included in this project. The participating models include both natural system and cropland soils. I would suggest the authors to justify why this paper only included natural soils but ignored the more important N fertilizer in cropland.

Interactive comment on Biogeosciences Discuss., https://doi.org/10.5194/bg-2018-377, 2018.