Biogeosciences Discussions

Biogeosciences Discuss., referee comment RC1
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Comment on bg-2021-341

Anonymous Referee #1

Referee comment on "Update of a biogeochemical model with process-based algorithms to predict ammonia volatilization from fertilized cultivated uplands and rice paddy fields" by Siqi Li et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2021-341-RC1, 2022

1. Does the paper address relevant scientific questions within the scope of BG?
The paper present results of a modified version of DNDC-CMMM to better represent the NH3 volatilisation of paddy rice field and upland crop. Considering the importance of N cycles in soil biogeochemistry and of NH3 emissions in global change the paper seems within the scope of BG.
2. Does the paper present novel concepts, ideas, tools, or data?
The paper improve existing model of N emissions for two types of cultivation and performed sensitivity analysis to several environmental factors. In this way, tools and findings are novel.
3. Are substantial conclusions reached?
Yes, however it is a bit difficult to follow wich simulations are considered as valid and which one are considered as non relevant. Maybe a table or few clear sentences to sum up might be helpful.
4. Are the scientific methods and assumptions valid and clearly outlined?
The methods are well detailed, however the authors combined 3 different models (DNDC, CNMM and Jayaweera-Mikkelsen) while only Jayaweera-Mikkelsen model is accompagnied by a schema. In my opinion, taking into account the numerous processes involved in each model and the successiv optimisations performed by the authors, a complete scheme of the full model including the parameters used by default or optimized could be helpful.
5. Are the results sufficient to support the interpretations and conclusions ?
The results are well detailled but the difference in the fig 3 to 5 is not very clear for me. Also, a comparison of the NH3 volatilisation sensitvity to environmental factor between rice paddy field and upland crops might be interesting. I found that the 4.1 title does not precisely correspond to the paragraph and that the 4.3 is a bit long and difficult to follow
6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)?
I think all the data and results are provided, however, as noticed above the numerous processes and step involved in modelisation make it difficult to evaluate without a complete scheme (especially because several parameters were took from other model). Also, it is not very clear if the data of re-calibration was the same than used in the last version of DNDC of Li et al., 2019 (l.117). Several parameters have been recalibrated (l. 168 to l.176) without mentioning how they were recalibrated (algorithms and data). Also, I don’t understand why the time conversion factor is 0.75 (so not a ratio of the two initial models time step) while one model is based on 3 hours and the other on 24 hours.
7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution?

For the major parts of the manuscript their is enough references, however the 4.4 lack of some references

8. Does the title clearly reflect the contents of the paper?

Yes

9. Does the abstract provide a concise and complete summary?

Yes but maybe the description of the sensitivity analysis could have been a bit more longer. Also, the validation part is presented after the sensitivity analysis in the abstract while in the results it came aftewards.

10. Is the overall presentation well structured and clear?

The results are relatively clear except that in my opinion the fig 6 should be citted earlier in the text while comparing the model performance.. Also, large part of the results focused on ABC treatment which is only 2 sites, in my opinion the results for others amendment are more robusts. The material and methods part is long and, as mentionned above the model and model parameter fitting is complicated to follow. The material and methods sections on data analysis are much clearer.

Is the language fluent and precise?

yes

11. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used?

Yes

12. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated?

As mentionned above the fig 3 and 5 are similar and a conjungated presentation of these two figures would be easier. Also, I there is several subplot in each of them but the whole figures seems somehow similar. Also, the text police is not the same in the whole manuscrit, please adjust.

13. Are the number and quality of references appropriate?

yes

14. Is the amount and quality of supplementary material appropriate?

I would have appreciated if the model the authors build was available for re-use