



EGUsphere, referee comment RC1  
<https://doi.org/10.5194/egusphere-2022-626-RC1>, 2022  
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## **Comment on egusphere-2022-626**

Anonymous Referee #1

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Referee comment on "Global agricultural ammonia emissions simulated with the ORCHIDEE land surface model" by Maureen Beaudor et al., EGU sphere,  
<https://doi.org/10.5194/egusphere-2022-626-RC1>, 2022

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The paper „Global agricultural ammonia emissions simulated with the ORCHIDEE land surface model“ describes a newly developed module of the ORCHIDEE model used to estimate ammonia emissions from livestock management and fertilizer application. It is well written and takes the reader through all important aspects of this module to understand the processes behind the ammonia emission calculation. The extensive and thoroughly conducted discussion of the model results puts these into perspective of recent literature findings and model/satellite data while also investigating the sensitivity of the results to different parameters. I do think this work will further research on this topic and therefore recommend accepting it with minor revisions.

Specific comments:

Modeling set-up: I think it would be very helpful to have a more detailed description of the model run set-up in the supplementary showing how the tested parameters are integrated in the model.

L672: fertilizer types are available from IFASTAT so I am not sure this statement is true

L328: sensitivity not sensibility

Table 5: time steps

L354: TRENDY (Le Quere et al., 2018)

L347: sheep

L380: Have you compared total C production? Maybe showing this comparison would be helpful when arguing that the C:N ratio is the main difference. And could there also be an issue with legumes in grassland that you cannot represent in ORCHIDEE?

L381: I do not quite understand how your excretion rate can be smaller than the values given by Paustian et al. (2006). Looking at (5), it seems like you took the excretion rate from Paustian et al. (2006).

L385: As far as I understand and as I can see in Table 8, what you describe as manure production (66Tg) is manure application. If this is the case, I would not compare it to global estimates of manure N excretion but rather to estimates of N application as well. If this is really manure application, I would also rephrase this sentence: L384: 'In our calculation the manure produced is directly applied to soil'

L431: agricultural NH<sub>3</sub> emissions

L432: half instead of twice lower

L478: soil pH instead of just pH might be better for clarification

There are question marks where references are supposed to be throughout the paper. Please check and add the respective references.