

## ***Interactive comment on “Modeling Atmospheric Ammonia using Agricultural Emissions with Improved Spatial Variability and Temporal Dynamics” by Xinrui Ge et al.***

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Thank you for the time and effort you have devoted to offer valuable feedback on my manuscript.

We have gone through the manuscript and corrected the issues we found. We adjusted the structure of the paper. We moved the temporal allocation of emissions from grazing, animal housing and manure storage to appendix in order to shorten the length.

Multi-year model run can help to test seasonal cycle and inter-annual differences which are caused by inter-annual changes in meteorology and land use. Difference in land

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use caused by crop rotation will affect manure and subsequent ammonia emission distribution. At the moment, INTEGRATOR land use data is only available for 2010. Moreover, meteorology has impact on ammonia emission estimates in two aspects. First, as described in this paper, temperature, precipitation and wind speed shape emission time profile. Second, the same factors also contribute to difference in emission fraction which linearly correlates emission and N applied. Therefore, after the ongoing work on crop mapping and emission fraction modeling, we will then look at multi-year model run.

Germany occupies the majority of grid cells in the area of interest. Therefore, when we described the spatial characteristics of ammonia emission, the changes in Germany were more visible due to its size. However, from the performance assessment by comparing annual averaged total columns in Table 2, one can see that the improvement in Luxembourg is the most significant, followed by that in the Netherlands. Table 3 indicates that the improvement is more apparent in the Netherlands by comparing surface concentrations.

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