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Atmos. Chem. Phys. Discuss., referee comment RC1
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# Comment on acp-2021-907

Anonymous Referee #1

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Referee comment on "Assessing the representativity of $NH_3$ measurements influenced by boundary-layer dynamics and the turbulent dispersion of a nearby emission source" by Ruben B. Schulte et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-907-RC1, 2021

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The manuscript "Assessing representativity of NH3 measurements influenced by boundary-layer dynamics and turbulent dispersion of a nearby emission source" feeds in an actual scientific debate on new ammonia emission methods which encompass precision and sensitivity. Several key drivers were consider in the simulation work and the introduction of new variables such as blending-distance represent a valuable contribution to the study.

A general shortcoming of this submission is, that a short period of time was considered in a very specific context were orography plays no role in the analysis. This study limitation is mentioned in discussion section but it would be interesting discuss a little bit further the representativeness of the conclusions achieved in a different orographic context, the variability throughout 24 hours due to atmospheric estability changes and the potential effect of this variables in blending-distance variability. This study is limited to 3 hours with 30 minute $NH_3$ flux input (6 values) during the central hours of the day which seems a little bit restricted. It would be interesting for future works to extend this analysis period.

It is kind of mention in the study but it results a little bit confusing the mixture between local emission sources and regional emission in a densely agricultural area. Distances over 1 km are not easily achievable without any ammonia emission sources in this areas. The study uses farms as emission sources, but in this areas crop fields are also diffusion emission sources that may deeply influence the monitoring grid design and conclusions achieved in relation to minimum distances required in this work and alter plume behaviour significantly specially in fertilizing season. It would be nice to see any impression regarding point sources and non-point sources of emission when applying this model.

It would be useful a figure showing the different spatial configuration (emission sources and measuring sites) tested in the simulation with the model, as well as information about the weather conditions (temperature, wind speed, wind direction, etc.) at which the simulations were performed during the experimental period (15:00 to 17:00 hours).

I find especially interesting the analysis of the effect of the impact of the emitted plume in the average ammonia values testing different values. The analysys of the effect of background NH3 concentration in the blending-distance it provides valuable information from a regional perspective. Further discussion on this may be interesting.

The study state the relevance of the distance needed from the measurement sites to the emission source in order to avoid bias but it would be advisable to mention how the orography of the area and changes in wind direction (not only wind speed) may affect to this parameter. It would be also interesting to establish the any minimum requirements that should be accomplish or delimit the specific physical context of the site in which the starting hypothesis and study conclusions are valid. If the models do not take into account this aspect it should be mentioned. The replicable capacity of the model and the validity of the minimum distance recommendations concluded may requires much more consideration in the discussion of the results.

Results and discussion sections are a little bit mixed. The result section contains discussion that may be reallocated in section 4 (i.e lines from 324 to 349).

**Typing errors:**

L43. Agricultuural --> agricultural

L144 intermittenct --> intermittence

L429. Virutal --> Virtual