



EGUsphere, referee comment RC2  
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## **Comment on egusphere-2022-867**

Anonymous Referee #2

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Referee comment on "Evaluation of open- and closed-path sampling systems for the determination of emission rates of NH<sub>3</sub> and CH<sub>4</sub> with inverse dispersion modeling" by Yolanda Maria Lemes et al., EGU sphere,  
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Lemes et al. evaluated the performance of the inverse dispersion modeling with controlled releases of NH<sub>3</sub> and CH<sub>4</sub> based on both open and closed path atmospheric sampling. The work used one single model, the backward Lagrangian stochastic model, to perform the analysis. Since the deposition of NH<sub>3</sub> on the surface may be significant and that of CH<sub>4</sub> not, the simultaneous measurements could provide a means of evaluating the deposition rates of NH<sub>3</sub>. To this end, this work can be potentially quite interesting to the community. On the other hand, the manuscript can be better structured, and several important aspects should be clarified before the manuscript can be accepted for publication.

General comments:

- Here the recovery rates were used to calculate the deposition velocity of NH<sub>3</sub>. Although the authors are aware that this is not completely correct, and call it "apparent" deposition velocity, the assumptions behind this calculation have not been fully discussed, e.g., what are the sampling biases, the inverse modeling biases, the measurement biases that are related to and not related to sampling line deposition?
- The different causes for the mismatches in the calculated deposition rates have been presented; however, not sufficient efforts have been attempted to disentangle them. For example, the deposition of NH<sub>3</sub> on the sampling line could be directly compared, evaluated, and corrected for. Why has this not been done?
- A thorough analysis (or some sort of analysis) of the uncertainties of the inverse dispersion modeling is lacking. Note that inverse dispersion modeling has already been applied and evaluated in many other studies, e.g., Weller et al., 2018, Caulton et al., 2018, Shah et al., 2020, Andersen et al., 2021, Morales et al., 2022. It is well known that the inverse dispersion estimate based on one single measurement path is very uncertainty, which must be at least acknowledged.

Minor comments:

P48: labor intensive and costly

P97: are adequately met

L106-109: It is not really novel

P129: ...analyzers from Picarro

P133: measures

Table 1: What's the uncertainty of the content of NH<sub>3</sub> of the gas cylinder? The 2% uncertainty for both NH<sub>3</sub> and N<sub>2</sub>?

L176-178: It's confusing here. What's the difference of a single point vs. the rest of the experiments? As is written, they all use PTFE tubes, insulated, and heated, and 40°C. Is 80°C the only difference?

L213: calculated

L258: leaf area index

L306-312: This paragraph belongs to the method section.

L385: These results

L406: Any correlation analysis result here?