

Atmos. Meas. Tech. Discuss., referee comment RC2
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Comment on amt-2021-347

Anonymous Referee #1

Referee comment on "Performance of open-path lasers and Fourier transform infrared spectroscopic systems in agriculture emissions research" by Mei Bai et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2021-347-RC2>, 2022

The authors have performed a series of experiments to compare two open path optical techniques, namely laser-based (OPL) and FTIR, in application to CH₄, N₂O, and NH₃ flux measurements. An attempt has been made to estimate the accuracy and precision of the OPL and FTIR system for the measurements of the above-mentioned trace gases, however, a full uncertainty budget is not clearly presented in the manuscript. Although, assessment of accuracy and precision is stated as one of the objectives in the abstract. In the designed experiment, the OPL and OP-FTIR setups do not share the common optical path, therefore, the direct comparison of the spectroscopic techniques can not be performed without detailed consideration of this difference, as mentioned in the footnote on p 14. The manuscript would benefit, if the full uncertainty budget will be calculated, using the type B sources of uncertainty mentioned in sub-sections 2.1 - 2.5.

I agree with the first referee, that the paper lacks a discussion on the typical emission rates of CH₄, N₂O, and NH₃ in agriculture. Thus, it remains unclear for the potential readers of AMT, if the presented gas release experiments are representative of real-case scenarios.

The manuscript certainly suits the scope of AMT and can be considered for publication after addressing the point mentioned above.

Few minor suggestions:

1) please show the layout of the experiments at three experimental sights.

2) measurement data of CO and CO₂ is presented in e.g. 2.4.2, however, it is out of the scope of the paper. Please remove or elaborate more.

3) L272, not shown data is important for the discussion on the instrument precision, please include in the main text

4) L310 (data not shown), data can be included in the supplement.

5) Figures 3-5, please include the Y - error bars.