

Atmos. Meas. Tech. Discuss., referee comment RC1
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Comment on amt-2021-347

Anonymous Referee #2

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-RC1>, 2022

Performance of open-path lasers and FTIR spectroscopic systems in agriculture emissions research – Bai et al., 2022

General:

The authors quality the applicability and performance of the CH₄, N₂O, and NH₃ flux measurements of the open-path laser (OPL) and the open-path Fourier transform infrared (OP-FTIR) spectroscopic techniques. This study is interesting for scientists who would like to apply these kinds of measurements in the field, and such techniques are of great importance to GHG flux measurements. In general, the manuscript is concise and easy to understand, the topic fits well in the journal, the method is logical, and the uncertainties are estimated. However, some aspects are missing/or not clear in the text. I would consider recommending it to AMT after addressing the following comments.

Major comments:

- The introduction lacks the typical emission ratios of CH₄, N₂O, NH₃, etc, in the agricultural fields. The authors use several cylinders to release these gases at known fluxes, but are these fluxes reasonable compared to the real cases?

- It would be very useful to add one section to use the measured VMR from two OP systems to calculate the emission rates. The potential readers are more interested in the fluxes calculation instead of VMR measurements.

- Since the experiments were carried out in 2005, which is 16 years ago. The authors should add discussions about the development of the OP system during the last ~15 years. For example, is that any improvement since then? Can we have a better measurement uncertainty using an advanced OP system?

Minor comments:

Line 31: NH₃ is an important atmospheric gas, but it is not GHG

Line42: "relies on" -> reply on

Line 99: add information on why there are two pathlengths for some experiments

Line 107: "and 1 atm pressure" -> and 1 atm

Line 120: "the measurement path was 137 and 125 m (two-way path) for path 1 and 2, respectively." - > the measurement pathlengths were 137 and 125 m (two-way path) for paths 1 and 2, respectively.

Line 136: "wind conditions were such poor". Do you have the wind information? The poor wind means the wind direction is opposite? Or the wind speed is too fast?

Line 120. "above ground level". Other places use above the ground, please be consistent throughout the whole manuscript.

Line 145-146 (The layout of the experiment is not shown here): Please add it too.

Line 156. First time mentioning CO₂ here. It might be better to add some introduction in Section 1.

Line 174: "a 25 × 25 m or 40 × 15 m" -> a 25 × 25 m² or 40 × 15 m²

Line 205: which HITRAN version? Do you test different HITRAN versions?

Line 210: First time mentioning CO here. Same as CO₂, it is good to add more information in Section 1.

Line 209-210: the three spectral ranges are recorded simultaneously or individually with specific optical filters?

Line 234 : "14:45- 16:30" the time is local time or UTC?

Line 235: "From 14:45-15:10" -> Between 14:45 and 15:10

Line 310: (data not shown). Please show it.

Line 322: what is "in stable conditions"?

Lien 323: "Carbon dioxide results from both FTIRs were lower than those of air samples by approximately 15%." Do you have a reason for that?