

Interactive comment on “Performance of an open-path near infrared measurement system for measurements of CO₂ and CH₄ during extended field trials” by Nicholas M. Deutscher et al.

Anonymous Referee #2

Received and published: 21 December 2020

This manuscript clearly presented the improvement of the instrumental system and setup on the measurement of CO₂ and CH₄, which are important to the global climate changes. In the introduction, authors did well in summarizing and comparing open-path measurement techniques, and at the end clearly pointed out that this work is an improvement of Griffith et al. (2018). In Section 2, it is also clear that what has been improved. This work also compared the open-path measurements with the in-situ CRDS measurements, quantified the difference, and provided potential reasons of the difference. The “Future Directions” nicely highlighted the potential their system of quantifying CO and N₂O to apply to other environments. This content of this work is closely relevant to atmospheric trace gases observation techniques and GHG long term mon-

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itoring, and suitable for publishing in AMT. The manuscript content is well organized. I would recommend publish after addressing some minor questions/revisions.

Line 99, about HITRAN database. Have you tried HITRAN2016 in your retrieval? Do you expect using HITRAN2016 will further improve your results?

Line 137 and Figure 2: the refitted black trace is also after excluding some poor measurements due to weather. . .as described in line 152-155, correct? So the difference between red and black is NOT purely due to the refit process, right? Since there are some low spikes in the “original”, and they are gone in the “refitted”. So please clarify this here in the text.

Line 140 and Figure 3: please include scale in the map, so readers know how far your site is from Sydney urban area.

Table 2 and Table 3 could merge into a single table. As the first time reader, I had a hard time remembering the difference between different periods, when reading Table 3.

Figure 4: It seems that there is some step change in N₂O right before 2018-10. Do you know the reason? Did the retrieval of other gases changed at the same time of this step change in N₂O?

Line 183, “a small improvement”. Can you please put the percentage change after “a small improvement”?

Figure 7: although you have written the info in the text and figure caption, please label the Picarro, CSG, and the stock in Figure 7 to help readers and help your discussion on the following polar plot.

Line 220: “ A polar bivariate plot of CH₄. . .” you are talking about open-path measurement, correct? Here could be an confusion, since you just talked about Picarro measurement. So maybe include “from open-path measurement” after “CH₄”.

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Figure 9: in the text, it is interesting to see the discussion of the enhancement of CH₄ could relate to the cattle to the North, but the Figure 9 is very hard to tell if there is any enhancement to the North. So is it possible to further tune your color scale and somehow more clearly show the enhancement to the North.

Line 235: “There is much more scatter in the relationship,” of what? I think it is also helpful to include r value of each fit in the text of this paragraph.

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2020-276, 2020.

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