

Interactive comment on “High-precision measurements of nitrous oxide and methane in air with cavity ring-down spectroscopy at 7.6 μm ” by Jing Tang et al.

Anonymous Referee #3

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The author's present a cavity ringdown spectrometer operating in the mid-infrared for measurement of CH₄ and N₂O. Applications for urban air and breath analysis were demonstrated. Detection limits presented for temperature-corrected measurements of target species are lower than values previously reported for MIR-CRDS in this wavelength region in literature or commercially available.

Specific Comments:

1) A more detailed discussion of the drying procedure and the impact of water vapor on the data is necessary. It would be beneficial to provide data before and after the drying procedure and to discuss in detail how data could be influenced by water vapor

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(in the various spectral regions discussed here), if it is not successfully removed. Does the data analysis approach look for interferences and flag spectra if necessary?

2) Additionally, providing more information regarding the protocol for human breath analysis would be beneficial. Some questions that come to mind: what volume of sample is required to fill the cavity and how long must a participant exhale to achieve this sample volume?

3) Page 11, Line 13: Since you show that the temperature correction improves your overall detection limit, why wouldn't you implement the corrections for all scenarios? Although you indicate the system achieves sensitivity necessary without correcting for temperature fluctuations, it would be useful to state if there is a quantitative difference between uncorrected and corrected data under all experimental conditions.

4) When making assumptions or inferences regarding the cause related to your observations, include supporting literature. Two points stick out as needing further explanation or support: page 10, line 8 regarding the effect of rain on N₂O retrievals and page 11, line 4 pertaining to ventilation system impacts on N₂O.

Technical Corrections:

There are numerous grammar errors throughout the paper that need to be addressed. A few are listed here:

- 1) Page 2, Lines 4 and 9: Remove “On the other hand”
- 2) Page 2, Line 27: Remove “in” after 16 μW
- 3) Page 3, Line 5: The word “details” should be corrected to read “detail.”
- 4) Page 3, Line 12: The word “agreements” should be corrected to read “agreement.”
- 5) Page 4, Line 9: The phrase “is occurred and recorded” should be corrected to read “occurs and is recorded.”

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6) Page 5, Line 29: Consider rewording this sentence

In addition to grammar, consider the following structural changes:

1) Adding subheadings within the results and discussion section

2) Page 8, Line 20 to Page 9, Line 5: Consider using a table to describe the spectral regions. It would be easier for the reader to digest.

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