Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., referee comment RC3
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Comment on amt-2020-520

Anonymous Referee #3

Referee comment on "Thermal dissociation cavity-enhanced absorption spectrometer for measuring NO_2, RO_2NO_2, and $RONO_2$ in the atmosphere" by Chunmeng Li et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2020-520-RC3, 2021

This paper describes a newly developed measurement system of NO_2, PNs and ANs in the atmosphere based on a thermal dissociation cavity enhanced absorption spectroscopy method (TD-CEAS). The authors evaluate characterization of this instrument and confirm the performance in field observations.

In an NO_2, PNs and ANs measurement system based on TD followed by NO_2 analyzer, NOx in the atmosphere interfere measured values of PNs and ANs. In this paper, in-depth evaluations for the interference were performed. As a result, TD-CEAS can measure ambient PNs and ANs concentrations using precise "correction factors". I recommend the manuscript to be published in AMT. However, I found several concerns to be published in the present form, so the authors should perform appropriate revisions sufficiently.

NO_2 detection: The use of a CEAS method would be novel. But advantages of the use of a CEAS are unclear, so the authors should state the advantages of a CEAS. What are the advantages of CEAS over LIF, CRDS and CAPS?

Interference: The authors performed in-depth evaluations for the interference of NOx with PAN. But I could not find the evaluations for the interference with ANs. The authors should state the evaluations for the interference with ANs as well as PNs.

Other minor and technical comments:

lines 26-27, "alkyl nitrates (ANs, $RONO_2$)": There are many kinds of $RONO_2$ other than "alkyl" nitrates.

Line 64, “and cavity enhanced spectroscopy”: Did the authors forget to delete?

Line 175: The authors should define MCM. (Master Chemical Mechanism?)

First paragraph on page 10: The authors explain that the reason for the insufficient decomposition efficiency of PAN at 180 â□□ is due to the recombination of PAN. I think the effect of the PAN recombination can be reduced by increasing the pyrolysis time. What is the reason for not doing that (and making corrections)?

Figure 7: Which is correct, CH3O2NO2 in the legend or HNO3 in the caption?

Line 465: Fig. 9a □ Fig. 11a

Line 467: Fig. 9b □ Fig. 11b