

## ***Interactive comment on “Measurement of ambient NO<sub>3</sub> reactivity: Design, characterization and first deployment of a new instrument” by Jonathan M. Liebmann et al.***

**Anonymous Referee #1**

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General Comments:

Liebmann et al. describe the development and first deployment of a cavity-ring-down instrument to measure total reactivity of NO<sub>3</sub>. The authors provide a detailed overview of the methodology used to develop and characterize the instrument. The necessity of generating a stable NO<sub>3</sub>/N<sub>2</sub>O<sub>5</sub> source is described, along with descriptions of several possible interferences and the steps taken to address them. In particular, several methods are used to derive the reaction time of NO<sub>3</sub> in the flow tube system, taking into account the production and loss pathways of NO<sub>3</sub>. NO<sub>3</sub> reactivity is then derived by iterating numerical simulations. The experiment was validated using an isoprene standard, and there was good agreement between experimental and calculated results.

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The authors also describe the dynamic range, limit of detection, and uncertainties of the experiment.

Finally, the authors describe the first field deployment of the instrument during the NOTOMO campaign in 2015. The experimental setup used during the campaign is described, along with potential interferences present in the sampled air. The authors note a broken thermostat during the measurement period that may have impacted their reactivity measurements and describe other challenges to effective measurements in ambient air.

There is clearly more to learn and I look forward to reports of field measurements using this technique.

This manuscript should be published in AMT after attention to the minor issues below.

The color schemes utilized in several of the figures are difficult to see when printed and nearly impossible to interpret in greyscale.

References should be listed in a consistent manner. I prefer chronologically or reverse chronologically.

Line 30 (and throughout): a hyphen is not needed in the word daytime.

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Lines 60-80: The paragraph could be clearer in its description of the competition for NO<sub>3</sub> between reaction with NO<sub>2</sub> and reaction with VOC.

Line 248: “ln([NO<sub>3</sub>]<sup>t</sup>)” is missing a right parenthesis.

Line 340: “In Fig. 7a. . .” The word “in” does not need to be capitalized.

Lines 456-461: Could simulations or modeling be done to indicate that the decision to neglect temperature dependence of reactivity with NO<sub>3</sub> is reasonable?

Figure 5: The 1:1 line is not solid, it is dashed.

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