

## ***Interactive comment on “Simultaneous Detection of Ozone and Nitrogen Dioxide by Oxygen Anion Chemical Ionization Mass Spectrometry: A Fast Time Response Sensor Suitable for Eddy Covariance Measurements” by G. A. Novak et al.***

**Anonymous Referee #3**

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General comments:

A novel method of measuring O<sub>3</sub> and NO<sub>2</sub> based on chemical ionization time-of-flight mass spectrometry with oxygen anion (O<sub>2</sub><sup>-</sup>) as the reagent ion (Ox-CIMS) is developed. This new method is able to measure O<sub>3</sub> and NO<sub>2</sub> at fast time response and low mixing ratios, which is applicable to eddy covariance flux measurements. The authors conducted thorough characterization of the sensitivity, ion chemistry, inlet, calibration in the laboratory. They also used the instrument for the measurement of O<sub>3</sub> vertical fluxes over the coastal ocean, via eddy covariance. Their measured flux is in good

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agreement with prior studies of O<sub>3</sub> ocean-atmosphere exchange. Potentially, fluxes for multiple species can be obtained with one measurement with the Ox-CIMS. During the same campaign, they also used a 2B ozone monitor to measure ozone, which agreed well with the Ox-CIMS measurement. The paper is well written, and I suggest publishing this work after addressing the following specific comments.

Specific comments:

Around line 138 to 153 on the discussion of CO<sub>3</sub><sup>-</sup> ion formation, do other chemicals also form CO<sub>3</sub><sup>-</sup>? It was mentioned early on line 119 that SO<sub>2</sub> also forms CO<sub>3</sub><sup>-</sup>? How to rule out that CO<sub>3</sub><sup>-</sup> detected are not from other chemicals? Similarly, on line 215, would CO<sub>3</sub><sup>-</sup> come from other species, rather than O<sub>3</sub>+CO<sub>2</sub>+O<sub>2</sub>-chemistry?

Line 154: Are there other interfering species that will end up as NO<sub>2</sub><sup>-</sup> in the CIMS? Do HNO<sub>3</sub>, HONO, PAN or Organ-NO<sub>2</sub> form NO<sub>2</sub><sup>-</sup> with the ion chemistry? For example, on line 282, the authors mention that “A possible source of this background is from degradation of other species such as nitric acid or alkyl nitrates on the inlet walls.” Did the authors do any test for interfering species?

Line 189, can the authors specify what the normalized counts are? Is it normalized to the reagent ion counts?

Section 2.8: The authors mentioned that background measurement influences the detection limit. Do they have any recommendation in improving the detection limit?

Line 572: It might be easier for readers to include the equation in the paper and cite Bariteau et al., so readers won't need to download Bariteau et al.

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Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2019-445, 2019.

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