

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 #2

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This paper describes the development and application of an oxygen anion chemical ionization mass spectrometry approach for directly measuring the flux of ozone and nitrogen dioxide. Of particular note, is the successful application of this technique in the marine boundary layer where the magnitude of O₃ and NO₂ fluxes is low. The authors describe thoughtful and extensive laboratory characterization, comparison with traditional measurements in the field, initial deployment for flux measurements, and data analysis and correction. The paper is well organized and clearly written. The comments and suggestions below are meant to improve an already very good paper.

C1

Specific Comments:

L35-39: Is there any experimental evidence that $\nu d\text{-O}_3$ depends on factors beyond wind speed and SST? e.g., surface ocean composition? Could such factors contribute to the order of magnitude range noted in L35? Do any measurements exist over snow ice? Or freshwater versus seawater?

L53: Is it worth pointing out explicitly here, for the non-expert reader, that UV photometric detection of O₃ doesn't provide fast enough time response for flux measurements?

L110-111: Which type of ToFwerk ToF is used here? e.g., HToF or CToF?

L126-127: Any reference for “a wide class of molecules”? Or, can the authors be slightly more specific? e.g., hydrocarbons/oxygenates/S-containing/N-containing etc

L181-189 (and elsewhere): Is ions/s used equivalently with counts/s? Does one quantity rely on the calibration of the single ion signal? A clear definition would be helpful.

L187: Does this mean that signals are normalized to a fixed value? Or normalized to the variable signal for a reagent ion? Or, does this refer to the signal/pptv you would obtain for a reagent ion signal of 1e6 ions/s? Clarification would be helpful.

L223-224: Reference or supplemental data for this statement?

L292-293: Are signals only normalized to the reagent ion when the reagent ion is lower than the analyte signal?

L331 (section 3.1): The next section (3.2) contains quite a lot of detail on instrument set up in the field (temperatures, inlet etc.), but relatively little information is given here. More detail would be useful.

L339-341: Somewhat more detail on this scaling and how it is assessed/applied is warranted here, rather than relying heavily on the Vermeuel reference.

L356-358: How do these temperatures impact instrument performance? Is it species

C2

dependent?

L429: Does 84

L431: How does 'despiking' impact the results?

L520-521: For the non-expert reader it may be useful to clarify whether this bias is specific to O3 measurement with Ox-CIMS, or to CIMS measurements of trace gases in general.

L766-767: incomplete citation to Vermeuel 2019. doi?

Technical Corrections:

L194: "was seen to have" to "had"

L223: "analytes analyzed" to "analytes detected/measured"

L305: Repeated section title? (Same as 2.9)

L527: Repeated phrase "which is removed by active heating of the inlet"

L528: semicolon use

L590: validation to validate

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