

Interactive comment on “Characterization and mitigation of water vapor effects in the measurement of ozone by chemiluminescence with nitric oxide” by P. Boylan et al.

Anonymous Referee #1

Received and published: 20 December 2013

The manuscript describes the H₂O cross-sensitivity of gas-phase CI detectors measuring ozone. It is well-written and straightforward and I suggest publication in AMT after some minor revisions.

As the instrument will largely be used for fast eddy covariance measurements, which requires highly accurate determination of the exact sampling time, i.e. of the time when the sample air entered the inlet tip, a paragraph describing the sampling and the consequences by adding a Nafion dryer should be added. For instance, Zahn et al (AMT, 2012) nicely describes the effect of mixing in the sampling line which certainly increases with additional Nafion dryer and which makes the instrument slower. Thus,

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add information on the travel time between inlet tip and detector and on the response time, with and without dryer.

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p.9264, l.3 “gas-phase” before chemiluminescence

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p.9264, l.9 “flushed with ???” after Nafion dryer

p.9264, l.20 References are missing

p.9266, l.16 Shift the following sentence to the beginning of the introduction. “A benefit of the fast response time and high sampling frequency of a chemiluminescence ozone instrument is the ability to define surface fluxes in combination with a sonic anemometer by the eddy covariance technique.”

p.9266, l.20 Delete “total”

p.9266, l.24 Give references that explain “reynolds averaging”

p.9267, l.4 The claim “(1) no water vapor flux, no correction for the ozone flux is needed” is not entirely true (due to the term α^*r), i.e. FO_3 is still not equal to FO_{3m}

p.9269, l.7 Give explanation where the background comes from

p.9269, l.20 Give type of PMT

p.9270, l.2 Delete “high precision”

p.9272, l.2 “At all tested water vapor levels at and above 0.4 mmol mol^{-1} , while the MFC reported that the flow remained constant at 7.98 L min^{-1} , the flow rate determined with the bubble meter was 7.93 L min^{-1} , a drop of 2.3 %.” Hard to believe that with dry air the bubble meter showed 8.12 and suddenly a higher and constant value of 7.93 l/min is seen with continuously wetter air

p.9273, l.22 Why again a new parameter? Please further use O_3m or even O_3r . “Despite their reaction chamber being half the size of ours at 17 cm^3 with a sensitivity of 2000 counts $\text{s}^{-1} \text{ ppbv}^{-1}$ it yielded a similar response to our instrument”. Where shown

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or based on what figure . . ., this conclusion was derived?

p.9274, l.28f I don't see the values given in the text (12.2, <5, 4.6 mmol mol⁻¹)

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