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Atmospheric Measurement Techniques Discussions

Interactive comment on "Eddy covariance flux measurements of ammonia by electron transfer reaction-mass spectrometry" *by* J. Sintermann et al.

Anonymous Referee #2

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General Comments

The paper "Eddy covariance flux measurements of ammonia by electron transfer reaction-mass spectrometry" presents ammonia flux measurements by eddy covariance with a PTR-MS using previously describe O2+ ion chemistry. The paper is of interest to the scientific community because NH3 is an important aerosol precursor and understanding the flux of NH3 from fertilizer to the atmosphere is necessary to model aerosol formation and growth and to develop policy pertaining to agricultural practices.

This paper is well written and organized. The title and abstract adequately describe the content of the text. The scientific approach and applied methods are appropriate and valid. The scientific results and conclusions presented are clear and sufficiently supported. In particular the discussion section very nicely ties together the previous sections, which can be difficult for those not as familiar with flux measurements. It is a bit on the long side so some of the tables and figures (such as tables 2 and 3 and figures 2, 6, and 9) could be placed in supplemental material but that could be left to author/editor discretion

The results show that improvement in instrument time response by heating the instrument inlet and drift to high temperatures than possible in the previous instrument design make it possible to measure eddy covariance fluxes under conditions of high NH3 emissions.

This paper is of good quality and, as such, I have mainly minor comments, suggestions, and clarifications.

Introduction

The introduction is does a nice job of briefly summarizing previous NH3 studies addressing sampling issues in the literature. Lines 23-24 appear to be a typo or misprint.

Methods

2.1.3 page 4714 lines 21-22 Was there any loss of NH3 from the standard in running it through the mass flow controller? Was the mixing ratio coming out of the mass flow controller calibrated or verified as the output of the permeation system as described on page 4175 lines 34-35? I understand that the system was until the signals stabilized but value could be less than calculated by the dilution if NH3 was lost to the surfaces in the mass flow controller.

2.2.2 It is unclear to me if the whole 23 m sample was ever calibrated by adding NH3 at the tip and the reevaluating the time response and if not why not? This should be

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stated clearly in the text as not to confuse the reader with the characterization of the PEEK instrument inlet. While reading the description of the 23 m sample line I became very concerned about the influence of ammonium nitrate decomposition affecting the measurements. The potential of this is discussed nicely in section 4.4 but a line stating that the potential of affects of ammonium nitrate decomposition is discussed in detail in section 4.4 would be appropriate and helpful to the reader.

Results

3.1 page 4721 and Fig. 4 The curves in Fig 4 appear to be just connecting the dots. The actual fits to equation 5 should be plotted instead.

Figures

Fig. 4. As mentioned before I think the fits to the equation 5 should be plotted.

Fig. 5. Which H2O is plotted?

Fig. 12. What are the tick increments on the positive side of the NH3 flux axis? Are the major ticks increments of 20 as with the negative side of the axis or are they in increments of 5 as the opposite axis?

Interactive comment on Atmos. Meas. Tech. Discuss., 3, 4707, 2010.