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Atmospheric Measurement Techniques Discussions

Interactive comment on "Interferences on Aerosol Acidity Quantification due to Gas-phase Ammonia Uptake onto Acidic Sulfate Filter Samples" *by* Benjamin A. Nault et al.

Anonymous Referee #2

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This manuscript provides a detailed analysis and discussion on artefacts related to filter handling and analysis during atmospheric measurements. For this discussion, the authors grouped together six different airborne measurement campaigns where both offline filters and online aerosol mass spectrometry were used to measure aerosol chemical composition. The authors highlight discrepancies in measurements that are thought to be largely related to handling artefacts and exposures of filters samples to ambient ammonia from the laboratory environment and from human interference. This work illustrates how artefacts related to sampling and handling of offline measurements can result in observations that can lead to the misinterpretation of atmospheric measurements, which will then inherently lead to discrepancies when comparing with global

transport models. The authors recommend that the limit of detection of ammonia on filters is increased and that when possible a denuder is used for filter sampling.

This manuscript is well written with well-illustrated figures and detailed supplementary information, and I recommend this manuscript for publication. I have a small number of remarks below related to additional information that could be included in the discussion.

Minor comments: Line 176: The AMS samples behind the NCAR inlet (HIMIL); the upper size cut of this inlet is not mentioned. (Line 216:The SAGA inlet is stated to have an aerodynamic diameter cut of 4.1 microns). Can the author include the upper size cut of the HIMIL inlet and that it was isokinetic sampling?

What was the flow rate of the SAGA inlet?

What is the lower size cut of these two inlets? Given that discrepancies between the two methods were highest as lowest mass concentrations, could they be a result of different sampling efficiencies for particles with diameters < 80 nm?

In section 2.2.2 Aerosol filters. There was no mention of filter blanks. Can the authors state how blank filter measurements were made (each flight or every couple of flights)?

There were several instruments operating together on the plane. Was a mass closure check performed on the AMS measurements to illustrate that this instrument was measuring all the NR-PM1? How did this mass closure change with altitude?

If measured, how did the OC/OM concentrations measured on the filters compare to the organic mass measured by the AMS instrument? Was the PILS instrument available on any of the flights? How did the PILS data compare with offline filters?

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