**Atmospheric
Measurement
Techniques**
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Discussions

Interactive comment on "Evaluation of the performance of a particle concentrator for on-line instrumentation" *by* S. Saarikoski et al.

Anonymous Referee #1

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This paper shows the critical evaluation of the mVACES particle concentrator in the lab and field using an SP-AMS. This paper is relevant because particle concentrators such as this could be useful when used in conjunction with online instrumentation for the purposes of increasing signal levels and lowering detection limits.

The paper is a refreshingly honest take on the performance that identifies both strengths and weaknesses of the technique. This will aid in both the further development of such concentrators but also the interpretation of the data when they are used. In particular, it shows that the technique may aid in the detection of trace metals, but it also has the capacity to distort PMF outputs. The characterisation is far from complete (see comments below), which is mainly owing to the limited ambient dataset used. However, I feel that in spite of this, it contains enough technical merit to warrant

publication subject to the following comments:

General comments:

Rather than originating from the cellulose substrate, I would venture that the ammonia is dissolved in the recirculating water in the mVACES, as it is a highly soluble gas that tends to accumulate in water held in indoor environments. It would make sense if it was released in the saturator as the temperature increased.

I would also venture that the enhanced organics too are possibly not originating from the cellulose, as they could be introduced in the gas phase in the sample. Various chemical species that favour the gas phase (due to a low molecular weight and/or polarity) will partition into the particle phase at higher humidities (e.g. doi:10.1038/ngeo1809) and these may not be completely released upon drying.

I do not find myself convinced by any of the discussion regarding chloride. If the ambient aerosol is acidic, NH_4Cl should not exist in the particle phase at all, with thermodynamics dictating that the chloride instead favouring gas phase HCl. Chloride is also missing from figure 5 due to low signal-to-noise and is supposedly only 1% according to figure 6. Under these circumstances, I would strongly doubt the reliability of this data product, as there are a number of potential interferences (from organics or rBC), or it could be a signal from NaCl, which is detected with a very low sensitivity by the AMS due to its refractory nature and is not generally regarded as quantitative. As such, I would recommend removing this entire line of discussion. Ultimately, if the data is of too poor a quality to be presented in a figure, then it is probably too poor a quality to form the basis of any conclusions.

Specific/technical comments:

Rather than refer to cation to anions, it would be more appropriate to refer to cationic to anionic charge.

Page 2744, line 2: Surely the mVACES temperature is higher, not lower, than VACES?

Figure S8: The Q/Qexp for the ambient dataset is much lower that what would be expected (less than 0.1), which may suggest there is a problem with the data (normally error estimates being too high). This is important, because one might only expect an increase in Q/Qexp of around 5, based on the improvement to signal-to-noise. Can the authors comment on this?

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 2737, 2014.

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