

Interactive comment on “Size-resolved aerosol chemistry on Whistler Mountain, Canada with a High-Resolution Aerosol Mass Spectrometer during INTEX-B” by Y. Sun et al.

Anonymous Referee #1

Received and published: 20 March 2009

In "Size-resolved aerosol chemistry on Whistler Mountain, Canada with a High-Resolution Aerosol Mass Spectrometer during INTEX-B" by Sun et al., the authors report measurements of the non-refractory sub-micron aerosol chemical composition, acquired using an Aerodyne HR-ToF-AMS. The paper itself is well written and the technical descriptions are quite thorough. The manuscript in general should be published after the following issues have been addressed by the authors.

The result section is quite short. A more detailed discussion of the results, especially of the comparison between the different events identified by the authors, would definitely increase the value of the manuscript.

A general problem of this manuscript is the way citations are used. Care should be taken to limit references to those strictly necessary for further understanding of the work in the context in which it is mentioned. For example, on page 20754, line 24, the citation of (Zhang et al., 2004a) is not a helpful reference to read to obtain further information describing the characterization of the particle beam collimator and the inlet transmission of the AMS. It mainly makes further reference to the publications of Jayne et al. (2000) and Jimenez et al. (2003), where the original description can be found.

In addition, there are also some inaccurate citations as for Matthew et al. (2008, see also comment below). This paper doesn't highlight the issue of particle acidity, as mentioned by the author, but focuses instead mainly on the relation between particle humidity/ particle water content and the collection efficiency. References should be limited to original publications describing the information of interest in the correct context.

Even more problematic are the frequent references to two papers in preparation, (Sun and Zhang, 2008) and (MacDonald et al., 2008). It is unclear exactly what these papers will describe, and how they will support the discussion of this work. In the opinion of this reviewer, it is essential that all data and work upon which this publication relies to draw its conclusions be either directly presented or previously peer reviewed. Dependence of conclusions on non-reviewed/un-presented work is unacceptable and should be resolved prior to publication. This can be addressed in one of three ways:

- If the citation is essential for this manuscript, and not just a reference advertising an upcoming work, the authors should describe and include the work in the manuscript if possible.
- If it is essential, but is too extensive to be included in this manuscript, the authors should publish the other manuscript(s) prior to the publication of this manuscript.
- If it is not essential for the publication, the citation should be removed from this manuscript.

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Detailed comments:

p. 20751, line 15: "The average size distributions of sulfate and ammonium both showed a large accumulation mode peaking around 500-600 nm ..."

In the abstract, the authors report a maximum between 500-600 nm D_{va} for the average size distribution for sulfate and ammonium, in the conclusion a maximum between 400-500 nm is reported. This is inconsistent and should be corrected or clarified.

p. 20751, line 15: "... peaking around 500-600 nm in D_{va} ..."

Please, introduce new symbols and abbreviations properly, or avoid them completely within the abstract, as suggested by ACP/ACPD. The audience of ACP might be diverse enough to include people not that familiar with AMS specific terms like D_{va} .

p. 20752, line 14: (Akimoto, 2003) is not listed in the reference section.

p. 20753, line 21: "Sun and Zhang, 2008"

This publication is referenced eight or nine times, however, no detailed description about its content is given. This is especially crucial, since this paper is in preparation, at least according to the reference section, and needs to be dealt with prior to publication of this work.

p. 20754, line 9: "Details on the sampling site ... are given by MacDonald et al. (2008)." Even if the sampling site will be described in detail by MacDonald et al. (2008), it would be nice to have a short description within this manuscript, especially since MacDonald et al. (2008) is only in preparation.

p. 20754, line 12: "... at ambient pressure, which varied between 770-790 hPa during this study (see Sect. 3.1)."

Why is there a reference to paragraph 3.1? Also, how did the ambient pressure affect the inlet transmission of the instrument?

p. 20754, line 23: (DeCarlo et. al., 2004) is not listed in the reference section.

p. 20756, line 20: "The HR-ToF-AMS was calibrated for inlet flow at the beginning of

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this study and for ionization efficiency (IE) and particle sizing every 3-5 days ..."

If the instrument was calibrated that extensively, it would be useful if the authors gave a short summary of the results of these calibrations. For instance, how did the IE change during these calibrations. This would give the reader a better sense of the accuracy of the measurements.

p. 20757, line 13 and following: The authors describe why they used collection efficiency factor of $CE = 0.5$. This value seems also to be supported by the measurements of particle acidity. However, Fig. 3 shows clearly that for some periods during the campaign the relative humidity was above 90%. As shown by Matthew et al. (2008), who investigated the dependence of the collection efficiency on particle humidity (and not particle acidity, as mentioned by the authors), a high liquid water content can also increase the collection efficiency of the AMS. Have the authors taken that into account, for example by drying the aerosol prior to sampling?

p. 20757, line 18: "...by nephelometer and PSAP."
Please explain abbreviations!

p. 20761, line 15: "... meteorological input from FNL."
Please explain abbreviations!

p. 20770, paragraph 3.4 - 3.5: This is actually the most interesting part of this paper, but it could be improved. A more detailed comparison between the different events would be very interesting. For example, does the elemental composition of the organic aerosol show changes for the different periods, and if so, how does it change. The trajectories shown in Fig. 9 suggest that for the DE1 and all OE events the air masses could be influenced by local, continental sources, while the DE2 air masses seem to be mostly influenced by the ocean.

p. 20773, line 28: "Sun et al. (2008)"
Is this the publication cited before as Sun and Zhang (2008)? If so, please change accordingly. Otherwise, this publication is missing from the reference section

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p. 20775, References: Please, give the full author list for each reference. This is actually mandatory according to the ACP/ACPD submission guidelines!

Fig. 1: This figure is not needed, especially since DeCarlo et al. (2006) is referenced several times

Fig. 2: In (b) and (c) the label for the 1:1 line is out of the picture.

Fig 6: Why was m/z 28 excluded on the right axis? Please explain.

Fig. 7: How do the authors define "good S/N"?

Fig. 8: Again, how is a "good S/N" defined?

Fig. 11: Axes are not labeled.

Fig. 12: Part of the RH trace is outside the diagram.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 20749, 2008.

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