

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 #2

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In this manuscript, the authors have investigated aerosol characterization by HR-ToF-AMS at the Whistler Mountain during INTEX-B campaign. Impact of the air masses to the aerosols chemical composition and size distribution are detailed. Authors presented general results and detailed 5 specific cases (OA1, OA2, OA3, DE1 and DE2) correlated to specific air masses.

This manuscript is very interesting and globally well written. The different sampling techniques, data analysis methods and parameterizations used are particularly well documented. This manuscript is suitable to be published in Atmospheric Chemistry and Physics after authors considered the following comments and remarks that should

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be addressed in the revision before the paper being published.

Specific comments:

- Page 20751, Abstract: Authors wrote "the average size distributions of sulfate and ammonium both showed a large accumulation mode peaking around 500-600 nm in D_{va} ", in the conclusion "Sulfate and ammonium appeared to be internally mixed with a large accumulation mode peaking around 400-500 nm" and in the text (section 3.2.2, page 20764, line 6) referred to 500 nm for sulfate and ammonium size distribution. Only one value must be used.

- Page 20753, line 21 "Sun and Zhang, 2008": authors referred 7 times to this work but it is corresponding to a paper in preparation. Authors must give either a more precise reference that reader can refer to or detail a little bit more results of this works.

- Page 20754, line 9 "MacDonald et al. (2008)": same comment.

- Page 20759, line 3: Authors referred to a "good S/N" but did not clearly define it. How did the authors define it?

- Page 20767, line 1: The nominal formula for organic aerosol composition is a very interesting result and it is one of the most important results of this paper. However, more detail interpretations are expected. Indeed, Authors presented in this manuscript, different aerosol events (OA1, OA2, OA3 and DE1) corresponding to different air masses, we can attempt to also have a comparison of the nominal formula for each of these different events. For this reason, I strongly recommend to add this kind of comparisons in the revised manuscript.

Technical comments:

- Page 20752, line14: citation "Akimoto, 2003" is not referred in References.

- Page 20754, line 3: why referred to section 3.1?

- Page 20754, line 23: citation "Decarlo et al., 2004" is not referred in References.

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- Page 20757, line 18: definition of PSAP.
- Page 20761, line 15: definition of FNL.
- Page 20767, line 14: " $\text{H}_2\text{O}^+ = 0.25 \text{CO}_2^+$ ", it should be 0.225 according to Aiken et al, 2008.
- Page 20774, line 9: " m/z 48 (SO^+) and C_4^+)" the bracket after SO^+ must be deleted.
- In Fig 2: reference to line 1:1 appears only in plot a. and d. and seems to be missing in the other. It should be better to add it in the legend box.
- In Fig 4: should be " SO_4^{2-} ", not " SO_4^{2-} ".
- In Fig 6 and 15: it is not so easy to understand the reason of different left and right axis. The authors should explain a little bit more how to read these graphs.
- In Fig 7: it should be a good improvement to add the different periods of interest (i.e. OA1, OA2, OA3, DE1 and DE2) on the graph as done in Figure 3.
- In Fig 11: names of the axes may be helpful for the reader.
- In Fig 13: definition of STP.
- In Fig A2 middle panel: should be " NO_2^+ ", not " NO_2^+ " in the left axis legend.

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