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Comment

***Interactive comment on “Highly time-resolved chemical characterization of atmospheric submicron particles during 2008 Beijing Olympic Games using an Aerodyne High-Resolution Aerosol Mass Spectrometer” by X.-F. Huang et al.***

**X.-F. Huang et al.**

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I believe the manuscript is well written. It discusses the results of the observations with enough details and yet in a concise and informative manner. The extent of analysis fits well with the scope of ACP and a multi-dimensional measurement such as HR-ToFAMS. I recommend publishing the manuscript after these minor revisions are made.

1. P13221, From line 25 it sounds like PM1 levels in 2006 were lower than 2008 by 31% with the southerly flows, but it was actually 2008 levels that were lower, right?

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Please rephrase to clarify. Reply: Yes, the sentence should be rephrased to “This result is similar to observations made in the summer of 2006, although the average PM1 concentration level for the southerly air flows in the 2008 campaign is 31% lower than that in the 2006 campaign.” However, this sentence was finally removed from the abstract as suggested by the other reviewer. Please refer to our reply to the relevant comment by the other reviewer for more details.

2. P13227, line 2, CE isn't really a correction for lack of 100% transmission efficiency of the lens at larger sizes. Is it believed that the lens transmission was not good and therefore you need to correct for the transmission as well? If not, I would take that part of the sentence in line 2 out. Reply: The sentence has been revised to “For mass concentration calculations, a particle collection efficiency (CE) factor of 0.5 was used to account for the less than unit detection of particles sampled into the AMS.”

3. P13230, line 12: Contribution of SO<sub>4</sub> to total mass seemed stable all the time, so it can't be related to severe PM1 episodes, but it's rather a more regional pollutant as the authors also mention in the later sections. Please clarify that here as well. Reply: The sentence has been revised to “It is also inferred from Fig. 1e that during severe PM1 pollution periods, the contributions of inorganic aerosol (mainly (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>+NH<sub>4</sub>NO<sub>3</sub>) largely exceeded those of carbonaceous aerosol (OM+BC).”

4. P13231, What is the reason behind having a peak in Chloride at 7-8 am?! If that is strictly temperature related, shouldn't it be higher during at night rather than after sunrise? Reply: The diurnal pattern of ambient temperature during the campaign was that, it reached the highest (ave. 31 °C) at 2~3 pm while reached the lowest (ave. 23 °C) at 5~7 am. So, the peak of chloride at 6~8 am in Fig. 2 was nearly at the time of the lowest ambient temperature. This information has been added into the text as below. “Chloride, in the form of semi-volatile NH<sub>4</sub>Cl, shows a trend that is inversely correlated with ambient temperature, which typically reached the highest at 2~3 pm and the lowest at 5~7 am during the campaign.”

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5. P13233, line 7, add 'have' to "...seemed not to have contributed significantly..."  
Reply: Correction made.
6. P13236, line 3, consider removing 'for a mean situation'. Reply: "for a mean situation" removed.
7. P13237, line 9, isn't OOA-2 similar for DO and AO? Reply: Yes, they are similar. To make this sentence clearer, it has been revised to "All the PM1 components except COA, OOA-1 and OOA-2 had the lowest concentration levels in DO among the three periods, as shown in Fig. 6."
8. P13237, line 23: It was interesting to read that for security reasons somehow the population was decreases BO and DO, so in line 23, do you mean "local" residents began to return AO? Reply: Here, the "non-local residents" mean "the floating population". The term "non-local residents" has been changed to "the floating population such as migrant workers" in the revised paper.
9. Fig 1. Isn't the ratio of AMS mass to TDMPS volume indicative of aerosol density? If so, isn't density of 3 g/cc too high for aerosols of such composition? Is that an artifact of too high of a mass by AMS or too low of a volume by TDMPS? Reply: The scatter plot of the AMS mass vs the TDMPS volume gives their mean relationship as below:  $\text{AMS mass} = 2.07 \times \text{TDMPS volume}$   $R^2 = 0.84$  However, we do not think that this relationship can indicate an aerosol density of 2.07, because what TDMPS measured is between 3~600 nm and what AMS measured is about PM1. So, the higher ratio (2.07) than normal aerosol density could be related to the particles between 600~1000 nm and unmeasured crustal materials. The main purpose of the comparison between AMS and TDMPS is only to confirm their time trends.
10. Fig. 5, It would be nice if Fig 5 can be made with higher resolution. Also, the legend says that the inserted bar graph shows 'composition of BTs', which doesn't sound right. Maybe rephrase it as "...shows the directional variation of BTs before the Olympics, ...". Reply: Fig. 5 has been re-made with higher resolution. Following

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the suggestion, the relevant legend words have been rephrased to “The inserted bar graph shows the directional variation of BTs before the Olympics...”.

Please also note the supplement to this comment:

<http://www.atmos-chem-phys-discuss.net/10/C7360/2010/acpd-10-C7360-2010-supplement.pdf>

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