Atmos. Chem. Phys. Discuss., 9, C9570–C9572, 2010
www.atmos-chem-phys-discuss.net/9/C9570/2010/
© Author(s) 2010. This work is distributed under
the Creative Commons Attribute 3.0 License.

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Size-resolved aerosol water-soluble ionic compositions in the summer of Beijing: implication of regional secondary formation" *by* S. Guo et al.

S. Guo et al.

guosong0129@gmail.com

Received and published: 11 January 2010

Comment:

The use of English language should check throughout the text. Although the manuscript is in general well written, there are some sentences that are difficult to understand. Sometimes the reason is missing words.

Response:

We thank the reviewer for pointing out this. English was checked again throughout the whole text.

Comment:

The authors report that the mass median diameter of the second droplet mode found in PKU is around 1.4 um. The quite large diameter of this mode rises a question, if it could be related to small crustal or soil particles. The authors also report that large amount of calcium was found in fine particles in PKU.

Response:

We agree with the reviewer's comments. Thanks for pointing out this. There may be some Ca(NO3)2 in the stage of 1-1.8 um, and this should be clearly stated in the text. However, this was not the important explanation, because only 14% of the fine mode nitrate was as the form of Ca(NO3)2 (see Line 437 in revised manuscript). And at night time, this fraction was only 7%. Thus, this point was added in the text (Line 295-297) as following:

"Another source of this bigger size droplet mode may be from the reaction of gaseous HNO3 with small crustal particles. However, this was not an important source, and will be discussed in the following section (3.2.2)."

Then detailed explanation was added in the section 3.2.2 (see Line 431-439) as following:

"Assuming the resolved coarse mode nitrate was as the form of Ca(NO3)2 by the reaction of HNO3 with crustal particles. Thus, the model results showed that 13%, 30% and 7% of nitrate in PM1.8 was as the form of Ca(NO3)2 at PKU site in the morning, afternoon and night, respectively. The corresponding fractions at Yufa were 5%, 12% and 3%. As mentioned above, theses Ca(NO3)2 may the one reason for the peak "shift" at PKU. However, this was not an important reason, because an average of only 14% of the nitrate was formed as Ca(NO3)2 in fine particles, and the fraction was the lowest at night when the fine mode peak "shifted" to lager size."

Comment:

ACPD

9, C9570–C9572, 2010

CC BY

The authors mentioned the use of the Steam Jet Aerosol Collection, but there is no mention about it in the experimental section. Information on the measurement device should be added (used flow rate and cut size, detection limits etc.). Was this device used in both measurement site? Also intercomparison of SJAC and MOUDI should added to the text, at least for the used ions, nitrate and ammonium.

Response:

We thank the reviewer to point out this. The description for measurements by a steam jet aerosol collector was added in the experimental section as following:

"2.2 Online instrument

Online instrument Wet Denuder-SJAC (Steam Jet Aerosol Collector) system (Slanina, et al., 2001) was also used in this study to measure particle compositions SO42-, NO3-, NH4+ and gaseous NH3, HNO3. A wet denuder system is used to scavenge interfering gaseous nitrogen compounds, in this case ammonia and nitric and nitrous acid. The absorption solution is a 10-5 M carbonate solution which effectively retains all gaseous interferences. Then particles can go through the wet denuder and are captured by steam which is generated by SJAC. The solution is finally analyzed by ion chromatogram. The sampling flow rate was 16.7 L/min and the time resolution was 30 min."

Because the SJAC system measured the particle compositions of PM2.5, but MOUDI has no 2.5 um cutoff point, intercomparison of SJAC and MOUDI cannot be done in this study. However, this does not affect the purpose of this study very much, because the calculation in this study is only to classify the cases by meteorological conditions (in this case RH). The equilibrium constant Ke is only decided by temperature and relative humidity. The data of SJAC system in this study is important because it can offer gaseous HNO3 and NH3 data.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 23955, 2009.