

## ***Interactive comment on “Relationships between submicrometer particulate air pollution and air mass history in Beijing, China, 2004–2006” by B. Wehner et al.***

### **Anonymous Referee #3**

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#### General comments:

The authors present a large set of aerosol number-size distribution data from the Chinese capital city, Beijing. The data set consists of two years of continuous measurements of particles in the size range 3 - 10 000 nm in diameter. The long time period combined with the large size range and the fact that no long-time number-size-distribution measurements have been conducted in this area make this data set very valuable for further analyzing. The data set is large and comprehensive enough for statistical analysis, covering roughly 80% of the time period from the start to the end of the measurements. Besides number-size-distribution data, there were also meteorologi-

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cal, trajectory- and boundary layer height data included. The focus of the manuscript is in the effect of air mass history to the aerosol conditions in Beijing.

The English language used in the manuscript is good and clear. All main points and conclusions are stated clearly making the manuscript easy to read. Previous work has been acknowledged properly, except for a few individual points. (See technical corrections)

Specific comments:

The air mass history data was classified in two different ways, one being manual sector analysis and the other being cluster analysis of the back trajectories. Both approaches give roughly the same results, the latter being more quantitative and giving somewhat more information than the first one. I would like the authors to give reasons why the sector analysis should be included in the manuscript, as the cluster analysis gives all the same information, and more. Now most of the results are presented twice.

On page 11330, line 6, the authors state: "For the following analysis, measurement days have been classified according to the direction of their 72-hour back trajectories." This leaves open whether there were one or several trajectories/day, and what arrival time to Beijing do these trajectories correspond to. If there is only one trajectory per day, is that enough to represent the situation.

Page 11339, lines 12-13: "The analysis suggests that variations of aerosol parameters along with the air mass history are more significant than the seasonal, weekly or even diurnal cycles." I can not make such a conclusion from the results presented in the manuscript. The diurnal cycle was very clear in most of the air masses, and seasonal or weekly cycles were not analyzed in depth in the manuscript. There should be more information given about those cycles before such conclusion can be made.

Comments regarding the figures:

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There are several comments about the figures in the manuscript.

I did not find any significant new information in figure 9 that wasn't already in figure 7. The same applies for figures 11 and 12, respectively.

If figure 9 is to be kept in the manuscript, it might be better to present it in the same way as figure 11. I would also like to remind the authors, that some 8% of the world's male population has a decreased ability to distinguish thin red and green lines (or small dots) from each other. (This is most problematic in figures 11 and 15.)

The information given in figures 2 and 15 is given in the text in sufficient detail. The figures do not bring much new information to the general picture.

Figure 14 might be better to present as a table, with the correlation coefficients.

Technical corrections:

Page 11327, lines 10-11: The assumption of this density is based on previous measurements of particle chemical composition at Beijing; A reference in this is needed.

Page 11338, line 24: The unit of surface area should be square micrometers/cm<sup>3</sup>, not square meters/cm<sup>3</sup>.

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Interactive comment on Atmos. Chem. Phys. Discuss., 8, 11321, 2008.

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