

***Interactive comment on “First long-term study of  
particle number size distributions and new particle  
formation events of regional aerosol in the North  
China Plain” by X. J. Shen et al.***

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Statement

The authors present one and half years of aerosol data from Shangdianzi measurement site in the North China Plain. This is enough to get good statistics and seasonal variation out from the data. The measured size range extends from 3 nm to 10 000 nm in particle diameter, covering the whole size range of climatologically important particles. These two properties of the data, combined with the general lack of long term aerosol measurements in the area, make this data set extremely valuable. The analysis

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of the data is comprehensive and well explained. The results show not only the general characteristics of aerosol population and new particle formation (NPF) at the site, but also the ability of newly formed particles to grow into sizes where they can have significant effect on radiation and cloud formation. I highly recommend this manuscript to be published in Atmospheric Chemistry and Physics, with minor revisions listed below.

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General comments

The Shangdianzi station is described first time in this manuscript. (If not, a reference to a more detailed description should be made.) The description lacks some information on the station location, such as longitude, latitude and height above sea level. These would be useful to add. Also more detailed description of the hill landscape could be added, such as typical hill height (from bottom to top). The mountains surrounding the site in east and north-west should also be mentioned, as they affect the air mass transport routes. A brief description of the seasonal climate (temperature, precipitation, wind or air mass pattern) would also benefit the paper.

Both season and air mass had an effect on particle number-size distribution, on diurnal evolution of the particle population and on new particle formation. These two effects are not separated in the analysis of the data. Is there a seasonal air mass pattern or are all three air mass types present similarly during all seasons? Is the seasonal pattern in new particle formation simply a result of seasonal air mass pattern? This issue should be addressed in the data analysis and results.

A brief discussion on the supermicron particles and their variability would benefit the paper.

The effect of new particle formation events was studied as a case study only. A more general estimate on the effect of NPF on the aerosol loading and ccn-concentration would be good to include in the results, as well as in the conclusions.

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The English language needs to be revised through the manuscript. Currently there are only a few typos, but a variety of sentences with odd or overcomplicated structure. Wrong words and incomplete sentences were also found, as well as mixing between singular and plural, and past and present tense. This paper would clearly benefit from a language check done by a native English speaking person.

The font size in many of the figures is too small, making the figures difficult to read.

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Specific comments

P25207, L24-27: Background sites could also be mentioned.

P25209, L24-25: Why is the national highway mentioned, as it opened after the end of measurements period?

P25211, L5-6: An estimate of the difference between particle concentrations in ambient and STP conditions would be nice to have here.

P25212, L8-9: Are the  $\pm$  errors standard deviation or something else?

P25212, L21: It could be mentioned here that the Mount Waliguan global GAW site is a background site.

P25213, L1-2: Did the location change affect the measured particle number-size distributions?

P25215, L7-16: Are the mode parameters calculated by first taking a median size distribution and then fitting the parameters, or by fitting the parameters to each size distribution and then taking a median of each parameter? This is left in the manuscript.

P21217, L1-2: The weighting factors for horizontal and vertical distance should be presented.

P25222, L7-8: One should not refer to results not shown in the manuscript, unless a

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reference is used.

P25223, L19-20: Again, what does the  $\pm$  error stand for?

P25224, L14: A reference to the cluster analysis in Beijing should be given.

Table 1: The length of measurement period at each study should be mentioned to highlight the value of the long data set used in this study.

Figure 1: The projection of the larger map is weird. The arrows put the magnified pseudo color map in wrong location. The colors of the magnified map are not explained.

Figure 3: The left panel is classified by season, and the right by aerosol size class. This makes it quite non-intuitive. Classifying the right size by season would help a lot. The only relevant information (that can not be seen from other figures) on the left panel is the NPF day fraction of all days. Are these plots necessary?

Figure 4: Flipping the lower picture so that the station is in the right end would make the figure more readable.

Figure 6: Could this be done for NPF-days and non-NPF-days separately? I would also start the vertical-axis from zero in plot a.

Figure 7: The vertical axis is not explained well enough.

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Technical comments

Figures: Font size in figures 1, (2), 3, 5, 6, 8, 9 and 10 are too small.

Language: The English language needs to be revised through the manuscript. (See: General comments)

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Interactive comment on Atmos. Chem. Phys. Discuss., 10, 25205, 2010.

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