

***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 analyze the aerosol number size distribution data obtained in a long-term field campaign in the North China Plains. A special interest is put to new particle formation events, which govern the total number concentrations at the measurement site according to the authors. The authors also show that the frequent gas-to-particle conversion is also able to produce substantial amount of particulate mass, which affects regional air quality, visibility and most likely cloud processes. This work illustrates

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in an excellent manner, how important long-term measurements are for determining the regional characteristics of the atmospheric aerosol population and its effects on air quality and global climate. The authors present their scientifically relevant results clearly. Thus, I recommend this manuscript to be accepted for publication in Atmos. Chem. Phys. with only minor comments that I list in more detail below.

**General comments:**

The authors should underline their result on the ability of the new particle formation events of eventually producing a substantial amount of mass and the effect in extinction in the conclusions. Currently this important aspect is not even mentioned in the conclusions.

English needs to be revised in particularly in the results section. Check the use of definite articles and prepositions. Some suggestions are listed in the technical comments. I recommend using past tense systematically when discussing the results.

Super-micron number concentration was also measured, but is not discussed at all. The article would benefit from a concise presentation of the super-micron results. It would also complete the picture of the aerosol number size distribution at the measurement site.

**Specific comments:**

Sect 2.2 indicates that the size range is 3 nm to 7.7  $\mu\text{m}$ . Sect 3 presents results from range 3 nm to 10  $\mu\text{m}$ .

Long-term sub-micron data is classified into nucleation, Aitken and accumulation modes with certain limiting sizes, which are different in the case study. Please be consistent.

Differences in the initial nucleation mode size are tentatively attributed to sunrise (pp. 25214, paragraph 1). How much does the sunrise vary? Could they also be formed initially at a different location?

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**Technical comments:**

- pp. 25212, 2. paragraph: past tense
- pp. 25213, 1. paragraph: mean value was
- pp. 25213, 2. paragraph: sentence starting "The freshly..." is incomplete and needs to be revised.
- pp. 25214, 1.paragraph: till is not scientific English.
- pp. 25215, 2. paragraph: Repetition.
- pp. 25215, 3. paragraph: pollution episodes.
- pp. 25216, 2. paragraph: ... and do, however, not take into ...
- pp. 25217, 2. paragraph: Air masses originating from northwest ...
- pp. 25220, 2. paragraph:: However, the formation rate at SDZ is ...
- pp. 25220, 2. paragraph needs to be separated to at least two paragraphs.
- pp. 25221, 2. paragraph: past tense
- pp. 25224, 1. paragraph: Back trajectory analysis ...
- pp. 25224, 1. paragraph: ... inhibited ...

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