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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Spatial distribution and occurrence probability of regional new particle formation events in eastern China" *by* Xiaojing Shen et al.

Anonymous Referee #1

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The manuscript deals with the spatial extent of new particle formation based on long-term particle number size distribution (PNSD) measurements in China. The work presented here describes the NPF occurence probability and the possible origin of the nucleating air masses as well. A case study is also performed. The MS is clearly written and formatted. The work gives valuable results on spatial extent of NPF events. The article fits well into the topic of the journal. Thus, after considering the following questions and comments as minor revisions, I recommend the publication of the manuscript.

Comments:

1. Page 4., Line 15.: What is the time resolution of the SMPS measurement? It is not included in the text. How were the different systems compared? Were all the instruments running according to the international working standards (Wiedensohler et al., 2012)?

2. Page 5., Line 18.: Title is misleading, since there is nothing about the classification of NPF events. It should be Dynamic parameters of NPF events or similar.

3. Page 5., Line 24.: Were two lognormal modes enough to fit during nucleation? Is there a missing mode?

4. Page 6., Line 6.: Why was the ending height 1500 m at TS? If GDAS does not 'see' the height, then 500 m could be OK as well as it is for the 2 other sites (since it is agl and not msl). If GDAS does 'see' it, then 1500 m agl is too much. Please clarify and reword this.

5. Page 6., Line 12.: One of the crucial questions is the monthly nucleation frequency. There is no data neither in the MS nor the cited paper (Shen et al., 2016b). Do all the 3 sites have the same monthly (annual) nucleation frequency curve? If they do not, it substantially and essentially modifies the whole picture present here. Please provide a paragraph regarding this topic.

6. Page 6., Line 12.: What is the slight difference? Specify and/or explain this with data.

7. Page 18., Fig 4.: On the probability plot: moving from SDZ trough TS to LAN sites, it seems so, that SDZ had N, LAN had NW influence, while TS was a mixed case both from N and NW directions. At the end of Section 3.3 a couple of sentences should be added to highlight (better) the main message of these plots.

Technical requests:

1. Page 2., Line 25.: Sentence should be reworded, in that form it is not well understandable.

2. Page 5., Line 16.: "was be" should be reworded.

3. Table 1.: Missing days should be added with the measurement time interval for specific sites.

4. Figure 6.a: This graph is also explained in the text and it does not provide extra info. I recommend to discard this plot.

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