

We would like to thank the referee for her/his insightful comments. After addressing these issues, we think that the paper will improve considerably.

As pointed out in response to the first referee, we will address the criticism “i) by stating more explicitly the scientific goals of the paper, ii) by bringing up more clearly the new scientific findings resulting from this work, iii) by extending our analysis of new particle formation and growth to the resulting cloud condensation nuclei production, and iv) by enhancing the comparison of our results to other studies made in China and elsewhere.” We believe that this should also cover the general concerns of the referee.

Our responses to the specific comments are added below after each comment.

Specific comments:

1. In section 2.2, poor quality data was excluded in further analysis. Please explain how “poor quality” was defined, and how some bad data was excluded (i.e. all day exclusion or just hourly exclusion if bad data is found)..

Poor quality data was identified visually based on the typical signatures that, for example, deposition of dirt in the instrument leaves in the data plots. Full days were excluded. This will be clarified in the revised manuscript.

2. The authors stated the presence of intense construction activities close to the sampling site. While I agree that coarse particles dominate the PM emissions in these activities, the contribution of sub-micron particle should not be neglected, especially at this background site. The authors should do a sensitivity analysis.

We modified the sentence into the following form: “These activities have observed to affect particulate matter concentrations at our site, especially in the coarse particle size range, but their exact contribution is very difficult to quantify. The influence of construction activities on submicron particle number concentrations is expect to be minor.”

3. P.22345, line 6. The comparison between Fig. 3a and d is not fair given the dominance of easterly wind and the absence of standard deviations in the graphs. To suggest a “difference” or anti-correlation, numbers (correlation coefficients, p values, etc.) need to be provided.

Actually, the manuscript also states that this comparison should not be over-interpreted. We admit, however, that our wording of “anti-correlation” is too strong here. As a result, we corrected the sentence on lines 7-9 into the following form: “While the ion cluster concentration did not change much with the wind direction, it appeared to have some inverse relation with the accumulation mode particle number concentration: ...”

4. Figure 5a suggests no new particle formation was observed with the pollution laden air from the cities from 100-130 degree. In Figure 5b, nucleation probability was high in the south and southwesterly direction. The story appears to be contradictory.

This issue was also raised by the first referee. Our comment remains the same: “Fig. 5a shows the retroplume, i.e. a model description of the origin of the air masses (at 100m above ground); and Fig. 5b shows the actual wind directions at the site (at ground level). Fig. 5a shows where the air masses were 24h before the event, while Fig. 5b shows wind directions during the event. Both figures describe the incoming air mass, but they are not describing exactly the same thing. 5a is a regional view of the movement of air masses and 5b shows how this translates into observations on site.

Our revision will highlight the difference between the figures more clearly and point out the different information the figures contain. ”

5. Throughout the paper, no standard deviation or uncertainties are provided. This is especially important given the dominance of easterly wind, and the comparisons of averages/medians in the figures. Therefore, I would recommend a minor revision of this publication.

Actually, uncertainties were given in table 2, table 5, figure 7, figure 8, figure 9. It is true that we have opted in some cases not to add percentiles or such to retain clarity and readability. We will re-evaluate our choices based on this feedback.

We’d like to thank the referee once again. We are confident that our response and modifications address the reviewer’s concerns.