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Interactive comment on "Variations of Cloud Condensation Nuclei (CCN) and aerosol activity during fog-haze episode: a case study from Shanghai" *by* C. Leng et al.

Anonymous Referee #2

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General comments

The paper "Variations of cloud condensation nuclei (CCN) and aerosol activity during fog-haze episode: a case study from Shanghai" by Leng et al. presents CCN and related measurement and analysis of a fog-haze case in Shanghai. The dataset is short which weakens somewhat the value of the conclusions. The authors do not make it clear if the campaign period was only for the 4 days presented in a paper or a longer period. Tools used in the analysis are common to the scientific community. There are some technical scientific issues that should be considered and explained in more detail before publication. Detailed comments are listed below.

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Specific comments

-The language could be improved by a native English speaker in many parts.

-The presented data period is too short to give any general statements of the effects of fog/haze. Please, check and modify this throuout the text.

-Due to the short data period it is bit misleading to talk about "hazy days", "clean days" etc. I strongly recommend to replace all "day(s)" -words with "case" throughout the paper and to strengthen this fact in all analysis.

-Related to the short period, the authors could also speculate what effect the diurnal variation has on their results (e.g. foggy-haze case at night/in the morning other during the day)

Methods

-Section 2.1: Please specify the time period instruments were on the site and also the time period used in this paper, if different.

-Section 2.2: The authors could add a sentence to justify the selection of SS 0.2% for the further analysis.

-Section 2.2: The instrumentation needs more specific introduction: WPS (operating principle, number of size bins, time resolution, flows, calibration), AE-31 (flow, calibration), MARGA (time resolution, flow, calibration), PM2.5 & Hydromet (time resolution).

-Section 2.2, lidar methods: What is the overlap, time resolution and range of the lidar? How is the PBL defined? How is the extinction retrieved? What is the effect of the overlap on the comparison to ground-based measurements, if any?

-Section 2.3: Trajectories are calculated in 12h-interval and 24h hours backward. Why these selections, why not more frequent nand longer? Later in line 21 you mention that air mass changed at 8am on Nov 7, how is this defined?

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-Section 2.3: Are trajectories calculated at 500m AGL or ASL? Why at 500m? Sometimes the PBL is said to be lower than 500m (see page 17006, line 10), does this cause any potential uncertainties?

Results

-Page 17005, line 21: The PBL is not presented from 6 to 9 Nov. Why?

-Section 3.2: For explaining the differences in the aerosol physical properties between the cases, I strongly recommend to plot average size distributions for all the three cases (hazy, fog/haze, clear). This would make it very visible to to reader what is the difference between these.

-Page 17007, lines 3-5: Could you explain and justify more the use of surface and length distribution and retrieving the morphology. What is the benefit here?

-Page 17010, lines 16-18: More BC particles arrive but the extinction coefficient shows reduction. I would generally expect the opposite.

-Page 17013, lines 6-7: Where are the closure calculations?

Conclusions

-Page 17013, lines 15-17: Is the great influence of ws, wd and temperature shown somewhere in the results section?

-Page 17014, line 12: Was the CCN closure presented in the results section?

Tables

-Table 1: What is the origin of the different PBL heights for the cases? Could it be that the cases happen in different time of the day? Or does the PBL detection suffer from the fog?

-Table 3 would benefit of some references.

Figures

-Please mention the meaning of the red and black boxes of the plots in the Figure captions.

-Figure 3: Why is the PBL not for the whole period? The values near the end of the "red-box period" are unreal and the PBL values are not true. One can see that there is something below the plotted 300m line that blocks the beam (the fog probably) and there is no signal from above. How about the other PBL values, could it be that some other of the low values are due to instrumental limitations.

-Figure 5: Is this figure needed, what is the information?

Technical corrections

-Page 17010, line 24: "R2 are listed", maybe "presented" fits better.

-Page 17012, Equation 2: Define Dd.

-Figure 9: Define which subplot is a), b), ...

-Figure 10: 1:1 line would be informative.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 16997, 2014.

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