

Atmos. Chem. Phys. Discuss., referee comment RC2
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Comment on acp-2020-1269

Anonymous Referee #1

Referee comment on "Measurement Report: Spatial and vertical variability of aerosol optical properties during MOABAI mobile on-road campaign in North China Plain" by Ioana Elisabeta Popovici et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2020-1269-RC2>, 2021

This paper reports spatial and vertical distribution of optical and microphysical properties of aerosols derived from mobile vehicle measurements using a lidar, a sun-photometer, and in-situ instruments in the NCP, China during the MOABAI campaign (5 May to 23 May 2017). The observation using a vehicle and its data analysis are carried out based on the reliable methods established in the previous studies. On the other hand, new findings regarding the analysis results are unclear in this paper, and it is not enough as the "substantial new results" required for the "Measurement Report". Therefore, a significant improvement in this point is necessary and it is not recommended to be published at this time.

Major Comments

- What are the new findings in this paper compared to previous aerosol observation studies in the NCP region?
- What are the characteristics of aerosols (spatial variability of optical properties, etc.) that could not be obtained by conventional fixed-point observations but could be obtained only by conducting vehicle observations in this research? For example, Fig. 2 can be a diagram that clearly shows the feature of this study, but the discussion in Section 3.1.1 described about it seems to be something that can be stated from the results of fixed-point observations.

Specific comments

- Fig. 4: In this figure, the place (close to or far from the sea) seems to be more important information than the time. Therefore, it is helpful for the readers to describe the location over time in Figs. (a) and (b) (e.g., 9:00-9:30 in Area A, 9:30-10:00 Area B, etc.)
- Section 3. 2.2 discusses the three peaks seen in fine mode. This peak is seen on the inland side (e.g., 9:00-9:30) and on the coast side (e.g., 12:30-13:00) for exactly the same particle size. It seems that the peak will change if the area changes, but is this reasonable?
- Line 334: "which shows that the two major aerosol contributions in the fine mode were sulphate and black carbon and nitrates in the coarse mode." In this paper, there are no observations regarding the chemical composition, and previous studies are referred to. Therefore, it is definitive but an analogy. Therefore, "which implies" rather than "which shows" is considered valid.
- Conclusion: The findings obtained in this observational study should be clearly stated.