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Comment on acp-2021-457

Anonymous Referee #2

Referee comment on "Measurement report: Vehicle-based multi-lidar observational study of the effect of meteorological elements on the three-dimensional distribution of particles in the western Guangdong–Hong Kong–Macao Greater Bay Area" by Xinqi Xu et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-457-RC2, 2021

General comments:

This manuscript attempts to understand the mechanism of how wind and temperature in the boundary layer affects the horizontal and vertical distribution of particles. The topic is critical, and the method is scientifically sound. I suggest accepting the publication after the following revisions.

Major comments:

- Line 54-60: The introduction part could be improved by providing discussion about the temperature and wind impacts on aerosol distribution, citing relevant work that used multiple lidars to study temperature, wind and aerosol, and discussing their findings.
- Line 99-111: it would be useful if the authors can describe how to keep the different spatial and time resolutions of the three kinds of lidar systems consistent in this study.
- A brief discussion about the uncertainties would be useful.
- Line 170: "Therefore, the value of the extinction coefficient near the ground during the day was generally low…". This is an interesting statement as the surface layer PM2.5 concentrations during daytime are typically higher than nighttime (average). The aforementioned statement seems to give a different perspective. It would be great if the authors can explain this a bit.

Minor comments:

- Line 73: insufficient reference to support line 72: in the past few years, several …
- Line 121: what is the value of the Zc in this study?
- Line 131-136: what is the horizontal resolution of the meteorology data used in HYSPLIT?
- Line 184: It would be useful to describe how to observe the layer of elevated depolarization ratio layer in Fig 3(a)?
- "Wind speed at lower altitudes was relatively low, which was beneficial to regional transport…" should be further elaborated.