

Atmos. Chem. Phys. Discuss., referee comment RC1  
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## Comment on acp-2020-1277

Anonymous Referee #1

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Referee comment on "Himawari-8-derived diurnal variations in ground-level PM<sub>2.5</sub> pollution across China using the fast space-time Light Gradient Boosting Machine (LightGBM)" by Jing Wei et al., Atmos. Chem. Phys. Discuss.,  
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The authors estimated the ground-level PM<sub>2.5</sub> pollution across China from Himawari-8 data by applying a fast space-time Light Gradient Boosting Machine. As an application study, authors investigated the diurnal variations of ground-level PM<sub>2.5</sub> pollution. It was demonstrated that proposed application method is effective for accurate estimation of surface PM<sub>2.5</sub>.

- it is better to add relative reference (Zhang et al., 2020; Gui et al., 2020) in the introduction section and to describe the characteristics of this study.
- It is better to extended the Section 2.2 into two parts, the first one citing the LightGBM model and its expansibility in PM applications, at the same time the authors should show what's the advantages of LightGBM in terms of other similar machine leaning models. The second part address the modifications that the authors added or modified to the current model, detailing why these modifications are necessary and what kind of inspirations could be taken by readers to remote sensing or more broadly applications.
- It is better to provide references for all models in Table 3.
- Which version of AOD is used from Himawari-8?
- The caption of Figure 1 is not clear enough.
- What would be the possible reason for the large gap in upper diagram in Figure 5, by the way, all the labels should be described in the caption.

Relative reference:

Zhang, T., He, W., Zheng, H., Cui, Y., Song, H., & Fu, S. (2020). Satellite-based ground PM<sub>2.5</sub> estimation using a gradient boosting decision tree. Chemosphere, 128801.

Gui, K., Che, H., Zeng, Z., Wang, Y., Zhai, S., Wang, Z., ... & Zhang, X. (2020). Construction of a virtual PM<sub>2.5</sub> observation network in China based on high-density surface meteorological observations using the Extreme Gradient Boosting model. *Environment International*, 141, 105801.