

Atmos. Chem. Phys. Discuss., referee comment RC1  
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## Comment on acp-2021-143

Anonymous Referee #1

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Referee comment on "The spatiotemporal relationship between PM<sub>2.5</sub> and AOD in China: Influencing factors and Implications for satellite PM<sub>2.5</sub> estimations by MAIAC AOD" by Qingqing He et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-143-RC1>, 2021

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This manuscript studied the relationship between surface PM<sub>2.5</sub> and AOD, and also the influence of meteorology and topography on the relationship in high spatial resolution. The topic is critical the improved knowledge can contribute to the research field, enhancing air pollution research using satellite-retrieval technology. I suggest to accept this work for publication after revisions.

Title: AOD should be replaced by aerosol optical depth.

Line 159: the word "vs." should be revised.

Table 1: Why the result is missing in Northern Tianshan in winter? Is it because cloudy weather over there during the season?

Figure 1: the texts in the legends are small. They should be enlarged.

Line 623: The figure should be the spatial distribution of annual mean ground-level PM<sub>2.5</sub> and satellite AOD in China in 2019. It is better to add "annual mean" to make the meaning clearer.

Figure 2: the texts of the legend are too small.

Line 174: What is the reason about the U-shape trend? Why is the PM<sub>2.5</sub> concentration lower during Jun-Aug?

Line 188: the sum of the stations (559+519+50) is not equal to 1494. Please check the number of the stations.

Line 171: It should be explicitly mentioned Figure S3 is shown in supplementary information.

Figure S9 in supplementary information: the word of "elevatior" should be "elevation"

The caption of Figure S9: the second sentence should be revised: Note that the asterisk after r values represent statistically insignificance ( $p > 0.05$ ).