

Dear Reviewer,

Thank you very much for your effort and comments. We addressed them one by one below. Hope you find our revisions useful. Thank you again.

Yours faithfully,

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The authors investigated the spatiotemporal relationship between ground-level PM_{2.5} measurements and satellite derived AOD data over China for the year of 2019. Compared with previous research with similar topic, this study used high-spatial-resolution AOD data with combination of AERONET data which provide high-temporal-resolution aerosol data, which is important for understanding the relationship of PM_{2.5}-AOD and useful for ground-level PM_{2.5} estimation, especially when deriving PM_{2.5} from satellite remote sensing data is becomes more popular. The findings of this study are worth of publication in the journal after minor revision as followings:

(1) My major concern is the way that you matched PM_{2.5} and AOD in space, that is what is the radius of buffer zone around the site for AOD average? please clarify it in detail.

Response: Thanks for your question. we used the 1-km grid of AOD to match the in-situ PM_{2.5} measurements and averaged those PM_{2.5} observations from multiple monitors located within a 1-km grid cell. We have clarified the data integration method at the first paragraph of Section 2.3.

(2) Line 39-44: A long sentence. Please rewrite it.

Response: This long sentence has been replaced with two short sentences in the revised manuscript.

(3) Line 108: It seems no Fig. A1 in supporting document. May be Fig. S1?

Response: It has been updated by “Figure S1” in the revised version.

(4) Line 125-128: Please clarify which level of AERONET data were used in this study.

Response: AERONET Level 2.0 data were used in this study. We have clarified it in the revised version.

(5) 1 and 2: Please explicitly describe the two equations. What is the meaning for each variable?

Response: We have provided the explanation for each variable in the two equations.

(6) Line 344: “pollutant acumination”? May be “accumulation”.

Response: Yes, it is correct. We have revised this word in the revised manuscript.

(7) Table 1: Why there is no value for NTS in winter?

Response: In Northern Tianshan in winter, PM2.5-AOD pairs are not available. This is partly due to cloud contamination and the limitation of retrieval algorithm such that a few of AOD retrievals have been provided during that season. In addition, it is also partly because there is a limited number of monitoring sites over this region.

(8) Figure 2: the text of “hour” legend is a little small.

Response: We have enlarged the texts of legends for this figure.

(9) In figure 5, suggest that the count is replaced by frequency, which can be easily compared among different regions, due to their different samples.

Response: We have replotted this figure as per your suggestion.

(10) Figure 6: The text for latitude and longitude is a little small. Please replot it.

Response: We have redrawn Figure 6 in the revised version.

(11) Figure S9: it should be “elevation”?

Response: Yes, it is correct. We have revised this word in the revised manuscript.