

## ***Interactive comment on “Satellite-based Estimation of the Impacts of Summertime Wildfires on Particulate Matter Air Quality in United States” by Zhixin Xue et al.***

### **Anonymous Referee #2**

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In the manuscript, the authors compared the satellite-derived PM<sub>2.5</sub> in two different periods to see the impacts of wildfires on air quality in the US. Although the study presented some valuable results, it is relatively simple which lacks in-depth analysis, and the scientific innovation is not clear. In addition, I am mainly concerned about the used method for PM<sub>2.5</sub> retrieval, and also a lot of important information is missing. Below are my specific comments: Line 54-70: The authors should carefully summarize the methods of PM<sub>2.5</sub> estimations according to different categories, and the cited reference is too old and need to be updated by adding more recent studies. Line 86: The authors need clearly clarify the novelty of the study and the difference with previous related studies. Line 107: What's the accuracy of MAIAC AOD products in your study

region? I suggest adding a preliminary validation by comparing the AERONET ground-based measurements. Line 109-110: How do the authors deal with such a big cloud missing situation in such a short study period in summer? In this way, ground-based observations could be more suitable than satellite retrievals due to a large number of missing data. In addition, cloud and smoke are difficult to be distinguished during the AOD retrieval, resulting in the smoke areas are often masked as clouds? Line 117: Why not use the ERA5-Land meteorological data at a finer resolution of 0.1 degrees? Line 146: 0.1° or 0.01°? MAIAC AOD is 1 km. Section 3.3: The reviewer doesn't know why the authors choose the GWR model since there are many existed more accurate statistical regression (e.g., GTWR) or machine learning (e.g., random forest) models that have been proved in previous studies. The author should clearly clarify this. Line 177: What is the LOOCV method and how does it work? Table 2: Should be improved (a line or bar chart might be better), in addition, state abbreviations are hard to read. The result analysis is very simple, which seems like an article about the PM<sub>2.5</sub> retrieval algorithm. More in-depth analysis of the impacts of wildfires on air quality is needed.

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