

## ***Interactive comment on “Constraining Chemical Transport PM<sub>2.5</sub> Modeling Using Surface Monitor Measurements and Satellite Retrievals: Application over the San Joaquin Valley” by Mariel D. Friberg et al.***

**Anonymous Referee #2**

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In this paper, the authors conducted a case study for six days over San Joaquin Valley to constrain model simulated PM<sub>2.5</sub> using surface monitor measurements and satellite retrievals. They combined the aerosol products at 275 m spatial resolution from the MISR Research Aerosol retrieval algorithm, ground observations from EPA and the 2 km resolution simulations from WRF/CMAQ to improve the surface estimates of PM<sub>2.5</sub>, its major chemical component species estimates, and related estimates of uncertainty. The optimized results show good agreements with ground observations for both the total PM<sub>2.5</sub> and the species. The method is sound and the results look reliable. I

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recommend considering this paper for publication upon response to the following comments:

Major comments:

1. This work is a case study and the authors selected several days with requirements for the MISR data: (1) relatively cloud-free conditions for more MISR coverage; (2) mid-visible AOD exceeds 0.15. They have mentioned in the manuscript that applying this method in other polluted regions are likely to meet common condition with AOD exceeding 0.15. However, what about the coverage issue? For days with limited MISR coverage, the MAIAC AOD used to fill the gap will also have a lot of missing. Then how will this method be applied? This should be discussed in the manuscript.
2. What are the major advantages of this study compared to previous studies that combined information from the satellite retrieval, CTMs and ground observations together? The optimized results in this study seemed not to take advantage of the full coverage of the CTMs.

Minor comments:

1. Page 1, line 30: Why is that EC have much worse performance compared to other species?
2. Page 4, line 1: 1 km or 275 m?
3. Page 6, line 19-20: Will this interpolation process introduce biases?
4. Page 13, line 23: How is the MAIAC AOD scaled before gap-filling MISR AOD? This seems not to be mentioned in the manuscript.
5. In Section 3.4, there are a lot of sentences (e.g. line 25-27 on page 14) reported the evaluation results, which should not belong to the Method section.
6. Figure 6: Although the OPT results had better agreement with ground observations, it still lacks of spatial coverage, even on the selected days with more MISR coverage.

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