Anonymous Referee #2

Comment: The manuscript provides an extensive evaluation of the impact of quality assurance of MODIS Dark Target (DT), MISR, and CALIPSO aerosol products on surface-to-column representativeness on the PM2.5/satellite AOD relationship for the Continental United States. Authors demonstrate that, as expected, improving the quality of satellite retrievals results in a better regression statistics with PM 2.5 data. The paper indicates that CALIOP near-surface extinction data may provide better PM2.5 estimates. The paper brings up the important topic of the potential use of satellite aerosol data for PM 2.5 monitoring. The paper is well written, the motivations are clear, and it is relevant for publication in ACP. The authors demonstrate good understanding of satellite data and potential retrieval artifacts. The study results are useful for environmental monitoring community.

Response: We thank the reviewer for his/her comments and warm encouragement.

Comment: General comments:

1. *I think that the better way is to address the issue of data quality is to regress PM2.5 data against nearly collocated AERONET AOD data to obtain benchmarking regressions for the East and West US coast for booth hourly and daily datasets, and then evaluate how well satellite datasets with different quality flags reproduce these regressions. The AOD-PM2.5 regressions are not necessarily had to be linear.*

Response: We thank the reviewer for these comments. We have completed an AERONET AOD/hourly $PM_{2.5}$ analysis for the continental US and each time zone, the results of which are found in the new Table 4. The following discussion was added at the end of Section 3:

"As a final step for Section 3, we examine the hourly $PM_{2.5}$/AERONET AOD relationship for the CONUS. AERONET AOD (0.670 μm) measurements found within 0.3° latitude/longitude and the hour of an hourly $PM_{2.5}$ observation were first averaged, and hourly $PM_{2.5}$/AERONET AOD correlations and data counts were then computed (Table 4). Similar to the results from the $PM_{2.5}$/satellite AOD analyses, a higher correlation is found for the Eastern Time zone (0.57) compared to the Pacific Time zone (0.47). Also, the hourly $PM_{2.5}$/AERONET AOD correlations are generally higher than those between hourly $PM_{2.5}$/satellite AOD (Table 1). These findings are not surprising, as AERONET is considered the benchmark for validation of satellite AOD retrievals."

The following text was added in the datasets section:

"2.4 AERONET AOD

AERONET is a worldwide ground-based network of sun photometers that provides measurements of aerosol optical properties, and is currently used as the benchmark for

validation of satellite AOD retrievals. AERONET AOD is reported at eight channels (0.34 to 1.64 μm), and has an uncertainty of 0.01 to 0.015 [Holben et al. 1998]. For the purposes of this study, AOD derived at 0.67 μm is used."

Also, the following paper was added to the reference list:

"Holben, B.N., Eck, T.F., Slutsker, I., Tanré, D., Buis, J.P., Setzer, A., Vermote, E., Reagan, J. A., Kaufman, Y., Nakajima, T., Lavenu, F., Jankowiak, I., and Smirnov, A.: AERONET - A federated instrument network and data archive for aerosol characterization, Rem. Sens. Environ., 66, 1-16, 1998."

As for the comments related to a comparison between $PM_{2.5}$ and satellite AOD datasets of varying quality, currently there are no hourly DA quality data for us to perform this analysis. Thus, we leave this topic for a future study.

Comment: 2. I agree with the previous reviewer that the recommendation part is missing; however it might be beyond the scope of this study. The take home message seems to be the need of synergistic use of satellite data combined with chemical transport model. The authors need to reinforce this message.

Response: We thank the reviewer for these comments. We have mentioned the need for the synergistic use of satellite data combined with a chemical transport model in the conclusion section. However, modeling is not the focus of this study, and thus we did not add new sentences to highlight its importance.

Comment: I recommend this paper for the publication.