

## ***Interactive comment on “Collocation Mismatch Uncertainties in Satellite Aerosol Retrieval Validation” by Timo H. Virtanen et al.***

**Anonymous Referee #1**

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This paper systematically investigates the effect of spatial and temporal collocation windows between satellite and ground observations on the evaluation of satellite AOD. It shows that spatial and temporal variability exhibited in AOD may exert significant impact on the comparison results, and accounting for the collocation mismatch uncertainty will improve the agreement. This topical is critical in satellite data validation and the finding of the current study provides important reference and guidance for future satellite-ground intercomparisons. The paper is also well written and easy to follow. I only have a few minor comments:

Specific comments:

1. The paper focuses on the DRAGON campaign area and mostly provides composite results for all sites. I wonder if how different is the CMU for different sites, especially

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between urban and rural sites?

2. The “collocated area” between satellite and ground measurements is defined as a symmetric circle around the AERONET site. I understand this is conventional practice for satellite data evaluation. But due to factors such as aerosol transport, cloud and topography, etc, the distribution of AOD spatial variability is usually not symmetric. I wonder if the authors have examined the specific AOD spatial variability for each site?

3. In this work and in all collocation works the CMU actually combines both spatial and temporal variability, as both a space and time window is needed. It would be more precise if the space and time CMU could be separated. I understand this is a difficult practice, but could the authors offer some discussion?

4. The results indicate some difference between the CMU estimated using AATSR and MODIS data. Since AATSR is not as popular a dataset as MODIS. It would be helpful to offer some intercomparison results between these two datasets, e.g., any disagreements in their absolute magnitudes and spatial variability.

5. Figures 4, 6, and 7-9 seem a bit difficult to read. I suggest increase the line weights and font sizes a little bit for clearer presentation.

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