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

## Anonymous Referee #3

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This study presents extensive validation of AATSR AOD against AERONET observations made during the DRAGON 2011 campaign, which was held in the Baltimore-Washington metropolitan area. Comparisons between AATSR-retrieved and AERONET-observed AOD are performed as functions of various spatiotemporal sampling parameters and for different thresholds. The authors found that the spatial variability of AATSR (and possibly other similar sensors) AOD can be used as proxy of collocation mismatch uncertainty (CMU) to better characterize the uncertainty of satellite-retrieved AOD. Although some portion of the study (changes in comparison statistics as functions of spatiotemporal sampling parameters) has already been published elsewhere, the use of densely distributed DRAGON campaign data allows a new perspective to look at the issue, so I recommend this paper for publication with minor revision.

General comment

The DRAGON data set allows quantification of 'real' spatial and temporal variabilities of AOD, thus quantification of 'real' CMU (as opposed to the simple standard deviation of AOD shown in this paper). I believe that adding discussions on the real CMU and potential limitation of the satellite-derived CMU will improve the quality of the paper.

Specific comments

Page 1, line 13: the local AOD variability values correlate only weakly for short distance → the spatial variability correlates only weakly with that of AERONET for short distances

Page 1, line 18: the total uncertainty estimates → the total uncertainty estimates including the CMU

Page 2, line 14: based on the them → based on them

Page 3, line 10: and conclude that → and concluded that

Page 3, line 21 and some other places: on the average → on average

Page 7, lines 12-19: It is recommended to move this paragraph to the end of the section and modify to reflect connections between the statistics of this paragraph (number of data points, mean, standard deviation, etc.) and those of the following paragraphs (N-AATSR, N-AERO, sigma-AATSR, sigma-AERO, etc.).

Page 9, line 4 and other places: effect . . . to → effect . . . on

Page 16, line 9: sampling distance increases → sampling distance increases further