

Interactive comment on “The Role of Cloud Contamination, Aerosol Layer Height and Aerosol Model in the Assessment of the OMI near-UV Retrievals over the Ocean” by Santiago Gassó and Omar Torres

Anonymous Referee #2

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The paper presents an analysis of OMI AOD uncertainties due to cloud contamination, aerosol layer height assumption, and aerosol model assumption over the ocean. This paper is interesting as it looks into the uncertainty sources through detailed and thorough analysis with AERONET, CALIOPSO, MODIS, and other datasets. The manuscript can be improved and accepted after the following comments are addressed.

1. It is interesting that this paper, with a purpose to assess global OMI aerosol products, doesn't have a global map. I recommend a figure for multi-year climatology of global

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OMI AOD map be presented with AERONET AOD overlaid. The current Table 1 for AERONET list can be put into the appendix. The second figure can show the map of bias and correlation for each of these AERONET stations. These figures can provide a good overview of how bias and correlation are changing spatially.

2. section 2.1.2. It says that OMAERUV has two different retrieval schemes, depending on the aerosol type defined. This is a bit confusing. Does the algorithm have an internal database to identify OMI pixel as either land or ocean pixel? Given the large footprint of OMI, it is very likely that the OMI pixel corresponding to the coastal or island AERONET maybe also affected by the fraction of land surfaces in that pixel. This level of details should be discussed as it can affect the retrieval accuracy as well. Similarly, MODIS retrieval has land and ocean retrieval algorithms, and the validation of AOD over the ocean can be tricky as well because AERONET sites are on land (coastal or island) and not over open ocean. MODIS AOD from ocean algorithm is more accurate, but coastal AOD has less accuracy. See Anderson et al., 2013, Tellus, for detailed discussion. Anderson et al., 2013, Long-term statistical assessment of Aqua-MODIS aerosol optical depth over coastal regions: bias characteristics and uncertainty sources, Tellus B, doi:10.3402/tellusb.v65i0.20805.

So, at least the manuscript should be clear about: (a) how OMI's two retrieval schemes operate over the coastal and island regions, especially when ocean & land are mixed in the OMI pixel; (b) Is only AOD from MODIS Ocean algorithm used for evaluating OMI AOD?

3. Dust nonspherical effect on AOD. It will be ideal that a scatter plot of AOD bias vs. scattering angle can be presented. So, the analysis from case studies can be more statistically significant. In addition, MODIS algorithm does consider non-spherical effect. Can the MODIS hybrid AOD vs. OMI AOD be in part due to non-sphericity effect? It is also interesting to note that in places downwind of Saharan dust, both spherical and non-spherical particles co-exist, and it is necessary to consider both (e.g., Wang et al., 2003, GRL, doi:10.1029/2003GL018697). In other words, replacing

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non-spherical phase function may improve retrieval in some cases, but not all cases. It is good to discuss no-size-fit-all.

4. Acknowledgements. -): there are many 'x'

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