Atmospheric
Measurement
Techniques

Open Access

EGU

Discussions

Interactive comment on "A 12-Year Long Global Record of Optical Depth of Absorbing Aerosols above the Clouds Derived from OMI/OMACA Algorithm" *by* Hiren Jethva et al.

Anonymous Referee #1

Received and published: 4 July 2018

In this paper, the authors discussed a new above cloud absorbing aerosol optical depth product. Uncertainty analysis and preliminary validations are provided. Spatial distributions of ACAOD as well as 12 year trends are also included. The authors did a nice job presenting their new ACAOD product, still I have some comments that I hope the authors could address.

Both ACAOD and aerosol corrected COD are derived from their retrieval algorithm. However, no validation effort is provided for the derived aerosol corrected COD values. I understand that this is a paper that focuses on ACAOD, but the authors shall at least discuss how the uncertainties in the derived aerosol corrected COD would affect the

derived ACAOD and vise versa.

For this product to have a board user community, and especially for modelers, the uncertainties in retrieved properties (such as aerosol corrected COD and ACAOD) shall be provided at the individual retrieval level. Uncertainties are not included in the current data fields as shown in Appendix I. Given the uncertainty in SSA of +-0.03, an uncertainty in ACAOD could be introduced on the order of 20-50% (Table 3). I wonder how much the uncertainties in their regional and global time series of ACAOD are attributed to uncertainties in SSA, or are a direct reflection of temporal variations in SSA. Other comments:

Page 5, lines 32-33, I am not really sure what the authors mean by this sentence "These two components the OMACA algorithm is identical to the ones adopted in the operational cloud-free OMI/OMAERUV two-channel algorithm."

Page 5, line 24, The ALH dataset ,which was derived using 30 months of collocated CALIOP and OMI data, is used for aerosol vertical profiles. Was this ALH dataset derived using aerosol above cloud scenes only? If the ALH dataset was derived using cloud free scenes, how representative is the ALH dataset for aerosol above cloud cases?

Page 6, lines 29-30, "Observations of aerosols above cloud found outside the boundaries of these 14 pre-selected regions are assigned a fixed SSA of 0.89 and 0.9 for the smoke and dust aerosol types, respectively." Justifications or references are needed for values mentioned here.

Page 8, lines 23-25, "Notice that the current OMACA product does not use the OMMYDCLD product while making above-cloud aerosol retrieval. Instead, we use the information on the geometric cloud fraction derived from OMMYCLD in the post-retrieval analysis." I wonder why the OMMYDCLD product is not used in the retrieval process. The authors seem to use LER > 0.2 to distinguish clear from cloudy scenes. But wouldn't the use of OMMYCLD result in a more accurate estimation of cloud coverage

C2

over a given scene? How do the authors deal with partially cloudy scenes?

Page 10, lines 20-21, "53% (AOD>0.7, UVAI>1.0) of the total OMAERUV-AERONET SSA (440 nm) retrievals are found to agree within their estimated uncertainties of ±0.03." This means 47% (AOD>0.7, UVAI>1.0) of SSA retrievals are outside of the uncertainty range of +-0.03. I am not sure how the authors could come up with this statement "Therefore, we expect that the above-cloud SSA values assigned in the OMACA algorithm over different regions should be accurate within ±0.03."