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Atmospheric Measurement Techniques Discussions

Interactive comment on "Quantifying the single scattering albedo for the January 2017 Chile wildfires from simulations of the OMI absorbing aerosol index" *by* Jiyunting Sun et al.

H. Jethva (Editor)

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Dear Author,

Your manuscript # amt-2018-40 has received comments and suggestions from two anonymous reviews for which you have just submitted a response addressing their concerns. Thank you. Along the review process, I have read your paper and gave some thoughts on the research content. As I understood, the concept of the retrieving aerosol SSA in the near-UV region by constraining AOD quite resembles to the methods presented in Satheesh et al. (2008) and Gassó and Torres (2016). Both earlier studies, and the results of your own paper demonstrate that it is possible to retrieve

aerosol SSA and layer height from the color ratio information (UVAI) in the near-UV given the AOD as an a priori and a pre-defined aerosol model. It was a surprise that your paper completely misses to discuss and cite these two papers relevant to the present study.

In this inversion process, your study employs an aerosol model developed using the AERONET data. It was not clear in the Methodology section what kind of spectral dependence is assumed between the two near-UV wavelengths. A number of studies, using laboratory measurements and satellite data, have shown that the carbonaceous aerosols generated from the open field agricultural burning and wildfires exhibit a strong wavelength-dependent of absorption (imaginary part of the refractive index) in the near-UV region. In our earlier study (Jethva and Torres, 2011, ACT), we learned that the relative spectral dependence in the imaginary part of the refractive index needs to be increased to 20% with reference to no spectral dependence (equivalent to black carbon) in order to obtain a better agreement in AOD and SSA between OMI and AERONET. A strong wavelength dependence in aerosol absorption in the UV has been shown as a proxy for the amount of organics in the biomass burning smoke.

The color ratio (UVAI) information in the near-UV strongly varies with the Absorption Angstrom Exponent-a parameter that quantifies the spectral dependence of aerosol absorption. Since your paper lacks to provide this essential information, it is hard to interpret the SSA retrievals presented in the paper. Perhaps, a significant disagreement of $\sim$0.06 in SSA between the OMI retrievals and that of AERONET reflects the issue described above that you should consider while revising your manuscript. Please verify the relative spectral dependence in absorption assumed in the aerosol model and discuss/mention in the revision.

Given below are the citations relevant to your manuscript.

Satheesh, S. K., Torres, O., Remer, L. A., Babu, S. S., Vinoj, V., Eck, T. F., Kleidman, R. G., and Holben, B. N.: Improved assessment of aerosol absorption using OMI-MODIS

joint retrieval, J. Geophys. Res., 114, D05209, doi:10.1029/2008JD011024, 2009.

Jethva, H. and Torres, O.: Satellite-based evidence of wavelength-dependent aerosol absorption in biomass burning smoke inferred from Ozone Monitoring Instrument, Atmos. Chem. Phys., 11, 10541-10551, https://doi.org/10.5194/acp-11-10541-2011, 2011.

Gassó, S. and Torres, O.: The role of cloud contamination, aerosol layer height and aerosol model in the assessment of the OMI near-UV retrievals over the ocean, Atmos. Meas. Tech., 9, 3031-3052, https://doi.org/10.5194/amt-9-3031-2016, 2016.

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