Atmos. Meas. Tech. Discuss.,
doi:10.5194/amt-2019-77-RC1, 2019

Atmospheric Measurement Techniques Discussions

Interactive comment on "Accuracy Assessment of MODIS Land Aerosol Optical Thickness Algorithms using AERONET Measurements" *by* Hiren Jethva et al.

Alexei Lyapustin (Referee)

alexei.i.lyapustin@nasa.gov

Received and published: 19 April 2019

This paper provides AERONET-based analysis of three aerosol products from DT, DB and MAIAC algorithms using an identical spatio-temporal collocation approach over North America. The study represents Eastern and Western USA separately. While the performance of the DB and DT algorithms has been thoroughly studied over the years, and global analysis of MAIAC has been recently reported in Lyapustin et al., 2018 (with growing number of regional analyses), the simultaneous performance comparison has been largely missing, except for that over the South Asia region published recently by Mhawish et al. The approach is sound, and results are clear. The language in some

Printer-friendly version

Discussion paper

places could be improved to achieve more clarity. My recommendation is to publish with minor revision, after authors address my comments below.

Throughout the paper: I suggest to replace GOES R/S with now standard GOES 16/17.

P. 3, Ln. 20: “The combination of sub-kilometer spatial resolution” It is 500m only in the Red band. Vis-NIR bands are at 1km, and 2.25um is at 2km resolution.

Ln. 28: Replace “Spectrometer” with Spectroradiometer for both MODIS and MISR

P.6, ln.20: Please, replace “061” with 6.0. Also, everywhere through the paper: MODIS DB and DT are Collection 6.1. MAIAC currently is Collection 6.0.

Ln.11: “MAIAC considers two discrete aerosol models”: This is correct for a given location. However, MAIAC has 7 different regional aerosol models for different regions of the world. Besides, the DT algorithm tries to mix the background model with the dust model resulting in the fine mode fraction, whereas MAIAC uses either the background model or the dust model, if the dust has been detected.

Also, since the algorithm has rather significantly changed from 2011 to 2018 publications, I suggest that the initial reference adds the 2018 paper which really represents the MAIAC dataset used in this study.

P.6, ln26: “designed to do aerosol remote sensing”. I suggest you remove this part as it doesn’t sound right. It is ground-based sunphotometry, and "remote sensing" is usually associated with satellites.

Ln.30: What is “radiative” properties?

P.7, Ln.10: Given resolution of DB and DT is for the nadir only, it grows with the scan angle. “While AOT from all three aerosol products corresponds to an area intercepted in their respective spatial grid cells representing the atmospheric conditions over a small region, the direct measurements of the spectral AOT from AERONET sunphotometer are columnar point measurements.” - It is not clear what you are saying, please

re-write.

Table 1 (MAIAC): Replace collection with 6.0, and remove “at nadir”. MAIAC gives 1km2 everywhere.

Table 2: Add +- for the time interval. I don’t understand the name “Spatial Grid km2” – is this the box size? The Figure 1 is very clear, but the name of the column, and also the description of the time-space collocation in the paper are very fuzzy. It will help if you improve the description.

Fig.5, Caption: remove “combinedly”

P.9, Ln.21: “relatively better statistics”: This is a significantly better statistics. How do you define “relatively”?

P.11, Ln.2: The use of “relatively highest” is confusing: it is either highest or not. Also, MAIAC slope 0.87 over Eastern USA seems to be closer to 1 than the slope of DT (1.17) – doesn’t it?

P. 11, Ln.22: The DB algorithm does not “assume” surface reflectance. The monthly surface reflectance database, binned over scattering angles, is derived from the previous years of measurements using the minimum reflectance method. In this sense, MAIAC approach is methodologically similar, though it derives SR spectral ratios via dynamical time series analysis from the latest measurements (on the fly).

P. 12: Just to note that Superczinsky et al. 2017 (JGR) found similar dependence on SR in comparison of VIIRS (a version of DT approach) and MAIAC.

Alexei.

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2019-77, 2019.