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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The regime of aerosol asymmetry parameter over Europe, Mediterranean and Middle East based on MODIS satellite data: evaluation against surface AERONET measurements" *by* M. B. Korras-Carraca et al.

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I wanted to make a few points about the MODIS data used in this analysis, specifically relating to trends and Terra/Aqua differences.

Since the analysis was done with Collection 5 data, I expect that the trend in Terra data will be influenced (possibly quite strongly) by the calibration drift in that sensor. The differences between Terra and Aqua may likewise be a result of calibration differences

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(combination of different absolute calibrations, and different drifts in various spectral channels in the two sensors). It is known that Collection 5 has an offset between Terra and Aqua in AOD, which changes through the mission. The asymmetry parameter information essentially depends on which aerosol modes are picked by the solution, and the relative weights between the two (i.e. it is more a derived quantity than the retrieved quantity). As this is largely a function of the spectral shape of reflectance, it is likely to be even more sensitive than AOD to calibration uncertainties.

I expect the new Collection 6 data will have resolved some of these issues, thanks to the work of the MODIS Calibration Science Team and Ocean Biology Processing Group in improving and maintaining the quality of MODIS calibration (both absolute and correction of drifts). Because of this, I would not try to interpret the Collection 5 Terra (and possibly Aqua, given the possibility of drift in later years) for trends, or to assign an Earth-related basis for differences between Terra and Aqua. My feeling is that calibration effects cannot be discounted here; repetition of the analysis with Collection 6 may be better (although I can't say for sure if calibration effects can be discounted entirely in C6).

Some further relevant information can be found in the following papers:

Levy et al., ACP (2010). See Section 6.
http://www.atmos-chem-phys.net/10/10399/2010/acp-10-10399-2010.html

Levy et al., AMT (2013). See Figure 15 for Ångström exponent changes between MODIS C5 and C6 (which, as it is also size-related information, may indicate changes in asymmetry parameter, although I don't know if anyone has looked at this in C6 yet). Note this is for Aqua data.

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http://www.atmos-meas-tech.net/6/2989/2013/amt-6-2989-2013.html

Lyapustin et al., AMTD (2014). This paper provides a reference for some of the calibration drift issues in Collection 5 MODIS Level 1 data, as well as discussing their resolution in Collection 6 data and subsequent efforts to bring Terra and Aqua into line with one another.
http://www.atmos-meas-tech-discuss.net/7/7281/2014/amtd-7-7281-2014.html

I also would not place much importance on correlation coefficient between asymmetry parameter from MODIS and AERONET. The data range is quite small and the uncertainties on both datasets (AERONET too) can be non-negligible in this case. So I would not expect a high degree of correlation. I think bias and RMS are probably more useful metrics to emphasise.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 22677, 2014.