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Atmospheric Measurement Techniques Discussions

Interactive comment on "The inter-comparison of major satellite aerosol retrieval algorithms using simulated intensity and polarization characteristics of reflected light" *by* A. A. Kokhanovsky et al.

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General Comments: This is an important paper because it does a blind, but accurate, simulation of reflected radiance and polarization at discrete wavelengths and observation angles that could be observed by various currently-operating satellite sensors. The simulated conditions were over a black surface under clear sky conditions and with perfect instrument 'calibration'. As such, the intent was to assess the accuracy and challenges of various multispectral, multiangular, and polarization sensors in their

capability to retrieve aerosol optical thickness. Six satellite sensors and 10 different algorithms were assessed (two for MODIS, one being over the ocean and the other over land). All authors of this paper were involved in generating the synthetic data or doing these blind intercomparisons and reviewing the conclusions of the study. This is a very constructive and valuable paper that could be improved by further care in describing the results and illustrating the reasons behind them.

Specific Comments: Much attention in the manuscript has been paid to descriptions of the simulations, including the aerosol model that was assumed. A good description of many of the algorithms was also provided, some of which were unfamiliar to me and I had no knowledge of them being applied. Perhaps some of these are research and not available as global products, where others are, and are widely available to the community. Some clarification of this point should be made, as appropriate.

The size and clarity of the very important results figures (Figs. 9-14) are often too small to see the relevant details. It is also essential that the legends be repeated, as it is hard to keep flipping back and forth to diagnose the issues being discussed and which algorithm leads to what biases. Much attention is paid to the inaccurate MODIS land aerosol result for these simulations, which apply to oceanic aerosol over dark ocean surfaces, where MODIS ocean algorithm is the one most likely to be applied in practice. Though this is mentioned, it is underemphasized, it seems to me. As the conditions you are simulating are more relevant to oceanic aerosol applications, the MODIS comparisons that are highlighted should more appropriately be the MODIS ocean aerosol, which could be plotted on the same scale and with the same analysis as MISR, POLDER, ATSR, etc. The MODIS land algorithm is more a special case and outside of the conditions largely simulated in this paper.

This is a very ambitious and thoughtful intercomparison study, and worthy of publication after suitable revisions.

Minor Comments: page 3377, line 11 - change 'Spectrometer' to 'Spectroradiometer'

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which is the new name for MODIS.

page 3377, line 14 - change 41.2 μm to 14.2 μm.

page 3378, line 15 - the altitude of Terra and Aqua (not mentioned) that carry MODIS is 705 km and the swath width is 2330 km. This may not be relevant to the paper.

page 3378, line 1 - add Hsu et al. 2004 reference (can keep 2006 also), as this is the first paper that describes Deep Blue Algorithm, which is not relevant to this paper in any event, as this algorithm is not used or assessed.

page 3378, line 28 - change 'Ahmad et al., 1982' to 'Ahmad and Fraser, 1982'.

page 3379, line 3 - after first reference to AERONET, add reference '(Holben et al., 1998)'. Also add AERONET to acronym list in Table A3.

page 3382, line 10 (and many other places) - change 'least mean square' optimization to simply 'least square'.

page 3384, line 17 - change 'efficient' to 'unique'.

page 3393, line 7 - delete 'the' before 'Koepke's model'.

page 3395, line 9 - change '2007' to '2008' for Dubovik et al. reference (and elsewhere).

page 3395, lines 20-23 - no need to detail APS and Glory for this paper (including Table 1) because it is not currently flying and is not being assessed in this paper at all.

page 3399, line 21 - among the various radiative transfer codes used in satellite algorithms, outlined in this paper, the one missing from this line is 'Gauss-Seidel'.

page 3405, line 17 - delete ', e.g.' in the parentheses.

page 3407, line 29 - correct reference to Dubovik et al to include 'Kaufman, Y. J., King, M. D.' Here and in many other places in the manuscript, the accent egu for Tanré and Deuzé are missing.

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page 3411, line 10 - correct title from ’Precize’ to ’Precise’

Interactive comment on Atmos. Meas. Tech. Discuss., 2, 3369, 2009.

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Interactive Comment