Atmos. Chem. Phys. Discuss., 10, C8130–C8132, 2010
www.atmos-chem-phys-discuss.net/10/C8130/2010/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "A decadal regional and global trend analysis of the aerosol optical depth using a data-assimilation grade over-water MODIS and Level 2 MISR aerosol products" *by* J. Zhang and J. S. Reid

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Received and published: 29 September 2010

Review of "A decadal regional and global trend analysis of the aerosol optical depth using a data-assimilation grade overwater MODIS and Level 2 MISR aerosol products"

The manuscript can potentially become useful, but needs a significant revision before it can be considered for publication.

1. The manuscript implies that once an aerosol trend has started, it will continue for ever. This is a highly simplistic view. It is obvious that a decreasing AOT trend cannot

continue for ever (e.g., over Europe) since one can clean the environment only so much. On the other hand, an increasing trend can be much longer as there is virtually no limit to anthropogenic pollution. The aerosol trends reported by Mishchenko et al. (2007) and Zhao et al. (2008) refer to the change between the pre-Pinatubo years and the early 2000s, and so there is no contradiction whatsoever between the new results reported in [1] (see the reference list below) and those in Mishchenko et al. (2007) and Zhao et al. (2008). In fact, Mishchenko et al. (2007) and Zhao et al. (2008) used different and totally independent radiance calibration procedures, which makes the similarity of their final conclusions significant. Also, the analyses performed in [2] and Zhao et al. (2008) show quite plausible regional trends, which gives more credibility to the two AVHRR aerosol products. The authors should give this more thought and present a more balanced account of what was reported in Mishchenko et al. (2007), Zhao et al. (2008), and [2] and whether it has much relevance to the present study.

2. The lack of the global AOT trend over the oceans according to MODIS and MISR is the most important result of this manuscript, but it is not original. This result has been published in [1], along with maps of regional AOT trends, which the authors have failed to acknowledge and cross-analyze.

3. The authors should parallel the comparison of MODIS and MISR AOTs with a similar comparison of Angstrom exponent results and trends (cf. [1]). This looks like an obvious thing to do, which will clearly add to or subtract from the credibility of the MODIS and MISR AOT results/trends.

[1] Mishchenko, M. I., I. V. Geogdzhayev, L. Liu, A. A. Lacis, B. Cairns, and L. D. Travis, 2009: Toward unified satellite climatology of aerosol properties: what do fully compatible MODIS and MISR aerosol pixels tell us? J. Quant. Spectrosc. Radiat. Transfer 110, 402–408.

[2] Mishchenko, M. I., and I. V. Geogdzhayev, 2007: Satellite remote sensing reveals regional tropospheric aerosol trends. Opt. Express 15, 7423–7438.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 18879, 2010.