Atmos. Chem. Phys. Discuss., 13, C7138–C7140, 2013
www.atmos-chem-phys-discuss.net/13/C7138/2013/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Aerosols optical and physical characteristics and direct radiative forcing during a "Shamal" dust storm, a case study" *by* T. M. Saeed et al.

A. M. Sayer

andrew.sayer@nasa.gov

Received and published: 9 December 2013

It looks like the authors have an interesting case of a pretty intense dust storm here. I have a few brief comments which the authors and reviewers may wish to consider about this study. My comments relate to the MODIS aerosol retrieval products used in the analysis.

The authors state (p.23904, lines 24-26) that the limited data coverage is "most likely due to the over bright signal of dust retrieved by MODIS which was discarded by the applied algorithm as it was confused by the bright signal of clouds." This is not the

case. In fact, the algorithm for the land part of the dataset the authors appear to be using (MODIS Dark Target) is specifically designed not to perform retrievals over bright land surfaces (e.g. deserts, snow) as the assumptions built into the retrieval algorithm are not appropriate for these cases. This was one of the motivations for the original development of the Deep Blue algorithm, provided in the same MODIS product files, which does provide retrievals over some of these surfaces, and so is able to fill in some of the gaps in Dark Target coverage in these regions. The authors may therefore wish to look at the Deep Blue data for additional insight into aerosol loading over the Arabian Peninsula. Deep Blue is also available through the Giovanni portal, and, having just checked, happily there is some coverage on those days. Unfortunately the present version of Giovanni does not, to my knowledge, allow a 'fusion' of Deep Blue and Dark Target/ocean data directly, so you'd have to go back to the source data files to create one (rather than use Giovanni).

Additionally, the mass concentration product in Figure 9 is not validated and is probably not quantitatively reliable (I believe it will be removed in the next MODIS version), so I would suggest the authors remove it. The only quantitative aerosol property retrieved in this version of the datasets is the AOD, and (in some cases over ocean) the Angstrom exponent, so I would suggest that sticking to AOD only is probably the most sensibly.

It looks like this figure is more illustrative for the paper than crucial to the main analysis, but I thought these points worth mentioning, to aid the authors in this and future studies, and avoid possible overinterpretation of/misconceptions about the data. Here are some recommended key references for the current and forthcoming MODIS aerosol products:

Hsu, N. C., S. C. Tsay, M. D. King, and J. R. Herman (2004), Aerosol properties over bright-reflecting source regions, IEEE Trans. Geosci. Remote Sens., 42, 557–569.

Hsu, N. C., M.-J. Jeong, C. Bettenhausen, A. M. Sayer, R. Hansell, C. S. Seftor, J. Huang, and S.-C. Tsay (2013), Enhanced Deep Blue aerosol retrieval algorithm: The second generation, J. Geophys. Res. Atmos., 118, 9296–9315,

ACPD

13, C7138–C7140, 2013

doi:10.1002/jgrd.50712.

Levy, R. C., L. A. Remer, S. Mattoo, E. F. Vermote, and Y. J. Kaufman (2007), Second-generation operational algorithm: Retrieval of aerosol properties over land from inversion of Moderate Resolution Imaging Spectroradiometer spectral reflectance, J. Geophys. Res., 112, D13211, doi:10.1029/2006JD007811.

Levy, R. C., Remer, L. A., Kleidman, R. G., Mattoo, S., Ichoku, C., Kahn, R., and Eck, T. F.: Global evaluation of the Collection 5 MODIS dark-target aerosol products over land, Atmos. Chem. Phys., 10, 10399-10420, doi:10.5194/acp-10-10399-2010, 2010.

Levy, R. C., Mattoo, S., Munchak, L. A., Remer, L. A., Sayer, A. M., and Hsu, N. C.: The Collection 6 MODIS aerosol products over land and ocean, Atmos. Meas. Tech. Discuss., 6, 159-259, doi:10.5194/amtd-6-159-2013, 2013.

Remer, L. A., and Coauthors, 2005: The MODIS Aerosol Algorithm, Products, and Validation. J. Atmos. Sci., 62, 947–973. doi: http://dx.doi.org/10.1175/JAS3385.1

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 23895, 2013.