Atmos. Chem. Phys. Discuss., 10, C6208–C6209, 2010
www.atmos-chem-phys-discuss.net/10/C6208/2010/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Observation operator for the assimilation of aerosol type resolving satellite measurements into a chemical transport model" *by* M. Schroedter-Homscheidt et al.

Anonymous Referee #1

Received and published: 9 August 2010

Review of "Observation operator for the assimilation . . ." by Schroedter-Homscheidt et al.

This paper describes the methods to define an assimilation observation operator for aerosol observations from satellite. This is a well-written paper which provides considerable information. I have the following comments and questions.

1) Page 13857, line 10: dust is usually not using databases for emissions but instead takes modeled winds to define the emission rate 2) Page 13860, line 25: what if "the uniqueness test" is not passed? 3) Page 13862, line 21: the statement "not further described" does not quite make sense to me. 4) Page 13863, line 4: why are the 1995

emission used? There has been many studies with updated emissions. Even over Europe, emissions have drastically changed since then. 5) Page 13867, Equation (4): nothing on the right-hand side depends on "j". Please check all indices and correct. 6) Page 13868, line 17: is it "adopted" or "adapted"? 7) Page 23870, line 3: why is that assumption made? It seems to me unnecessary since the amount of aerosols above that level is probably quite small and contributes little to the AOD. 8) Page 13870, line 13: could you provide an estimate and a reference for the SOA yields used? 9) Page 13870, line 19: "known with" is better than "known by" 10) Page 13872, line 23: what do you mean by "relevant"? 11) Page 13874, Equation (11): it looks like the indices on the right-hand side should be "i", not "l". By the way, those are somewhat difficult to differentiate. It might be easier to use "m" for example. 12) Page 13876, line 8: change "which is might be" to "which might be" 13) Page 13876, line 9-10: it seems to me that there should be studies (regional or global) available to substantiate the degree to which dust emissions will affect AOD over Europe. It would be nice to include some. 14) Page 13876, line 20: a 0.3 error will only get you so far to remove the 100% or so bias that the model has. Why so low? By the way, a systematic bias might be more easily removed by the use of a bias estimated such as Dee's papers

âĂć Dee, D. P., and A. M. da Silva (1998), Data assimilation in the presence of forecast bias, Q. J. R. Meterol. Soc., 124, 269– 295. âĂć Dee, D. P., and R. Todling (2000), Data assimilation in the presence offorecast bias: The GEOS moisture analysis, Mon. Weather Rev., 128,3268– 3282.

15) Section 4.1: why is MODIS (or other AOD measurements from satellite) not used here?

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 13855, 2010.