**Atmospheric
Measurement
Techniques
Discussions**

Interactive comment on "Aerosol retrieval experiments in the ESA Aerosol_cci project" by T. Holzer-Popp et al.

Anonymous Referee #2

Received and published: 15 April 2013

This is an important paper that should appear in a journal-of-record in this field, such as AMT. It describes the first of three satellite aerosol retrieval algorithm comparison experiments, covering eight major algorithms. They examine in detail aerosol type and cloud masking assumptions. My "quick" review before posting was fairly detailed, and the authors already addressed most of the suggestions. So here are just a few additional notes and suggestions.

1. Section 3.3, P2364, line 15. Might reword: "...highly conservative experiment to minimize cloud contamination."

2. Section 3.3, P2365, line 5. So what was used for the PARASOL cloud mask? (I now see you mention in Section 4.8 that the standard PARASOL mask is used, but it might be worth stating that here.)

3. Section 4, P2365, lines 8-10. Is there a reference for the ENVISAT instrument cross-calibration?

4. Section 4, P2365, line 13, Table 2. Table 2 might be augmented to include some additional, abbreviated information about each algorithm, such as the particles assumed, parameters retrieved, cloud mask used, etc. Section 4 describing the algorithms is nearly half the entire text; a tabular summary of key attributes would make it easier to grasp the algorithm differences, and if possible, might allow for shortening Section 4 in places.

5. Section 4.1, P2366, line 20. Might read: "...determined by propagating the measurement error..."

6. Section 4.7, P2375, lines 15-16. Is there a reference for the ALAMO algorithm?

7. Section 5.1, P2377, line 24. You might provide a reference for the AeroCom tools.

8. Section 5.1, P2378, lines 2-6. Although the sun photometer AOD retrievals are not very sensitive to background radiance (see, however, Sinyuk et al., Remt. Sens. Env. 2007) or aerosol absorption, particle property retrievals do require significant assumptions; for example, AERONET assumes the same refractive indices apply to both the fine and coarse modes.

9. Section 5.2, P2379, line 23-25. Did the algorithms that improve in the biomass burning regions assume less absorbing particles before adopting the Aerosol_cci particle types?

10. Section 5.2, P2379, line 27. "... although the features still do not agree everywhere."

11. Section 5.2, P2381, lines 2-3. "... the wider swath of MERIS provides larger numbers..."

12. Section 6, P2383, lines 19-22. Could issues with the common climatology con-

tribute to the reduction in performance, rather than just issues with the algorithms?

13. Section 6, P2384, lines 24-26. This seems important, but I did not notice a critical discussion of the surface parameterization in Section 5. If this is covered in another paper, it would be worth referencing, and if not, it might be worth including an overview in Section 5.