**Atmospheric
Measurement
Techniques
Discussions**

Interactive comment on "Statistically optimized inversion algorithm for enhanced retrieval of aerosol properties from spectral multi-angle polarimetric satellite observations" *by* O. Dubovik et al.

Anonymous Referee #4

Received and published: 10 January 2011

This paper describes a new developed algorithm for the retrieval of aerosol properties from PARASOL multi-angle observations. I highly appreciate the presented work, it was a pleasure to read the paper. The algorithm builds further on AERONET heritage and is definitely state-of-the-art. In particular the multi-pixel approach is highly original and, as demonstrated by the authors, a promising way to improve aerosol retrievals. This could also be important to improve the retrievals from sounders with more limited information content.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

Below I suggest some minor revisions to include in the final version of the paper:

-The paper is quite long, I see some possibilities to shorten the manuscript. First, the method to include spheroids in the retrieval is extensively described in Dubovik et al, 2002b; 2006, so a shorter description would be sufficient here. Also, to my opinion the description on p 4979-4980 of the single scattering solution is not really necessary. Condensing these parts of the paper would put more focus on the key aspects of presented work.

-The authors include the PARASOL 443 nm channel, while the PARASOL home-page (http://smsc.cnes.fr/PARASOL/A_calibration.htm) states that the use of these is "strongly not recommended". Is the information on the PARASOL-page outdated, are the problems not as severe as stated there, or did the authors apply an extra calibration step?

-The results of the synthetic study in Fig.7 indicate that the errors in the single pixel retrievals all correspond to an underestimation, which is very unlikely for random noise. It seems the same noise realization was used for all retrievals (e.g. same initialization of random generator) in this figure. If so, it would be much better to put a truly random noise on the measurements. In Fig. 11 the results look more random, so maybe there is another explanation?

-The paper focuses on retrieval of aerosol properties over land (which is the most challenging problem), but also mention that the algorithm is suitable for retrievals over the ocean. Here, it is mentioned that the reflection matrix of the ocean is modeled using the windspeed dependent model of Cox and Munk (1954). So, I assume that the contribution of underlight is not taken into account, which introduces significant errors at the shorter wavelengths (in particular 443 and 490 nm). Do the authors exclude these shorter wavelengths for retrievals over the ocean? Is the algorithm tested over the ocean? Please clarify.

-I am not a native speaker, but the term 'enhanced retrieval' appears a bit strange to

me. Further, it seems that at a number of places adverbs are missing or not at the correct position. I suggest to carefully go through the manuscript while preparing the final version.

Interactive comment on Atmos. Meas. Tech. Discuss., 3, 4967, 2010.