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Atmospheric Measurement Techniques Discussions

Interactive comment on "Comparison of AERONET and SKYRAD4.2 inversion products retrieved from a Cimel CE318 sunphotometer" *by* V. Estellés et al.

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We thank the reviewer for some useful suggestions that will be taken into account in the current study, and also during future developments. Below we answer to the reviewer questions.

Reviewer comment: In Section 3.1.1 and 3.1.2, and other sections, the authors should include the dependence on wavelength for all parameters affected in equations and symbols, as example, as subscript.

Authors response: We declined to explicitly include the spectral dependence because

the subindexes make the equations hard to read. This has been a common practice in all the cited references. However, we have added in the text that these variables are monochromatic, and are implicitly dependent on the wavelength.

Reviewer comment: In Section 3.1.3 the authors should include information about the sensitivity of the refractive index and the asymmetry parameter, or % of errors. Sensitivity information similar to lines 342-357 (AERONET algorithm) for the Skyrad.pack algorithm is interesting to interpret the results.

Authors response: In the paper we already included the available sensitivity studies for the Skyrad version 4.2, including the effects and % errors for single scattering albedo and volume distribution, based on Kim et al. (2004) study. However, no information is available for version 4.2 in respect to asymmetry parameter or refractive index. Thus we expect to perform a complete sensitivity analysis in the future, although it is still not ready for inclusion in this article.

Reviewer comment: As the authors stated in Section 3.2, the errors of the AERONET inversion algorithm "were mainly dependent of the aerosol optical depth and the scattering angle available range, being largers for the low aerosol burden conditions", and lines 350-357; but the authors use the inversion results for all the analyzed period, including AOD values <0.2. In AERONET 2.0 level data the inversion parameters (single scattering albedo, refraction index,. . .) for low AOD values are cleaned. It makes sense to compare in paper the results for these AOD values?

Authors response: Although AERONET does not consider retrievals obtained under low AOD conditions for level 2.0 data, they are still available in level 1.5. As these retrievals are processed and made available for the community, it makes sense to compare both algorithms even in no favorable conditions, as the results can be useful for developers to improve the relative performance. In any case, in the paper it has been highlighted the effect of the AOD level in the results.

Reviewer comment: In lines 520-523 the authors stated "To our knowledge, no previ-

ous comparisons of this parameter (g) has been published". Olmo et al. (2006) shows comparisons of the asymmetry parameter and other optical and microphysical parameters using the AERONET and Skyrad.pack for different atmospheric events at Granada (non-spherical approximation).

Authors response: The reviewer is right. Therefore, we have removed this sentence. The suggested paper was referenced in our manuscript.

Reviewer comment: Lines 624-634. Olmo et al. (2006) also show trimodal size distributions using the non-sphericity effects. Probably, these differences in codes are due to the different approximations used in the size distribution shapes. The size distribution tails in AERONET code tend to 0 each time close to 10-20 microms interval, but Molero et al. (2005, Proc of SPIE Vol. 5979 59790O-1), comparing with size distributions measured at ground level (well-mixed boundary layer), show distributions tails open close to 10 microms.

Authors response: We thank the reviewer for this comment. We agree that the coarse mode differences found in this and previous studies are probably related with the different approaches taken by the inversion algorithms. In fact, one of the points of our study was to avoid any effect introduced by instruments and configurations when using two different instruments, as in the case of previous Cimel-Prede comparison; therefore, the differences found lay on different approaches from the algorithms. As the reviewer suggests, AERONET retrieves "closed" coarse modes; but on the contrary, Skyrad often retrieves open coarse modes. Possibly the real distributions lay in between these algorithm solutions. Therefore, more work has to be done to improve and validate both methodologies. Is our intention to extend this study by comparing the AERONET and Skyrad.pack version 4.2 or later algorithms with in situ size distributions measured at ground and in the atmospheric column.

Interactive comment on Atmos. Meas. Tech. Discuss., 4, 6883, 2011.