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Interactive comment on "Assessment of the CALIPSO Lidar 532 nm version 3 lidar ratio models using a ground-based lidar and AERONET sun photometers in Brazil" *by* F. J. S. Lopes et al.

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Received and published: 19 February 2013

Title : Assessment of the CALIPSO lidar 532nm version 3 lidar ratio models using a ground based lidar and Aeronet sun photometers in Brazil.

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The paper presents results of a validation exercise of CALIPSO data. The validation is based on comparisons with sunphotometer and a ground based lidar data. The originality of the validation technique resides in the use of back and forward trajectories of air masses (provided by HYPSPLIT). Instead of considering the closest CALIPSO data, the back and forward trajectories are considered so as to select the CALIPSO data on

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the orbit that correspond to the same air mass as the one probed by the ground based station. The article shows that the agreement between ground based and space borne data is thus greatly improved. The interesting result is the mean departure between CALIPSO, CALIPSO/AERONET, and MSP lidar ratios are about the same (-2%). The article is well written and clear. The results are interesting. However, one point deserves more elaborations. AERONET optical depths are representative of the optical extinction from the top to the bottom of the atmosphere. They thus mix the extinction from possibly different aerosol layers with different lidar ratios. The result is thus some kind of column averaged lidar ratio. With CALIPSO, the lidar ratio postulated for the Klett inversion is representative of an aerosol layer. How can it be compared to the CALIPSO/AERONET lidar ratio (equation 16)? Likewise, the lidar inversion technique used for the MSP lidar assumes a constant lidar ratio, as if the aerosols are of the same type throughout the depth of the atmosphere. The lidar ratio that is hence derived from the MPSL is thus also a vertical average of the true lidar ratio. Again, how can it be compared to the CALIPSO, layer averaged value? A discussion of the impact of the possible presence of different aerosol layers (pollution in the PBL and a layer of dust above, for instance) should be discussed. This is all the more relevant that back and forward trajectories may be very different as a function of the altitude of the aerosol layers. The aerosols seen by CALIPSO at 500m above the surface may well come from a totally different place than at 4000m.

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 1143, 2013.

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