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Atmospheric
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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.

Anonymous Referee #2

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In the submitted paper Lopes et al. use ground-based lidar and sun photometer data acquired in the Southern Hemisphere for assessing CALIOP lidar data. This study fills a gap in the CALIOP validation field: until now there are no validation studies in the Southern Hemisphere . The methodology proposed for the validation approach is really interesting: using back and forward trajectory for matching air volume sampled by satellite borne and ground based measurements. The application of this kind of approach to a series of measurements (here 40 and 75 cases of lidar and sunphotometer measurements are considered respectively) is completely new. This approach would lead to the reduction of the differences in observations due to atmospheric variability and therefore to a better assessment of satellite data. Although these 2 important strengths, I

consider necessary a major revision of the paper. The main aim of the paper in its current version is to assess the CALIOP version 3 lidar ratio models, but authors do that using AERONET data and elastic lidar data. There is a vicious in this, because the CALIOP lidar ratio model is mainly based on AERONET lidar ratio estimations. Caliop lidar ratio values are estimated by authors using AOD from AERONET and backscatter from CALIOP. On the other side the lidar ratio values retrieved by the ground based elastic backscatter lidar are AERONET dependent and evaluated in a similar way. The datasets here compared are therefore interconnected and not independent. This cannot provide a real assessment of CALIOP lidar ratio models. Because of this reason, I suggest to the authors to focus their comparison on backscatter profiles that are the primary product of elastic lidars (as CALIOP and MSP-lidar are). In addition, I agree with the anonymous referee #1, the vertical inhomogeneity is a crucial point. I do not know the typical layering in Brazil, but I suspect that different types of aerosol can coexist in the vertical column and this should be taken into account and discussed in the text.

In the following other more specific comments are reported.

Specific comments:

Page 1154, lines 5-7: aerosol profiles from the ground-based lidar are retrieved constraining the profile to the AERONET measured AOD. How do authors treat cases with different types of aerosol within the column?

Page 1162, line 7-12: previous literature about the variability in the aerosol field (the cited Anderson and Kovacs for example) are related to columnar quantities. It is correct that authors start from this reference point for designing their validation methodology. In this study vertical profiles are considered and this means that larger variability is expected. Maybe the authors could provide more info about the aerosol variability thanks to their measurements and analysis.

Page 1165, section 3.2: CALIOP could identify also more than 1 layer and maybe

of different types. Mixing all together these layers would result in a mean lidar ratio estimation.

Page 1168, fig 5: besides the main comment on this comparison (see above), this comparison is questionable because the CALIOP values are almost discrete and the AC one is in principle continuous. The following comparison type by type is more valuable.

Section 5: the comparison with lidar ratio values measured by HSRL and Raman lidars is completely missing.

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