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Interactive comment on “Comparison of vertical aerosol extinction coefficients from in-situ and LIDAR measurements” by B. Rosati et al.

Anonymous Referee #1

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Dear authors,

After reading the supplement related to the description of the lidar data treatment, I still feel that the lidar analysis is inadequate. I have the following criticism and I will insist on that, especially because the title of the paper is on the “comparison of aerosol extinction from in-situ and lidar measurements”: It is clear that the lidar does not operate a Raman channel in order to “measure” extinction. This is a backscatter/depolarization system, capable of providing aerosol backscatter coefficient and particle linear depolarization ratio. Thus, the title is inappropriate, since this is not an extinction measurement from the lidar point of view. The lidar researchers try to “estimate” the extinction coefficient, but this is a challenging task, especially for the height range between 50 and 800 m, where the Zeppelin was employed. This is because there are two unknowns for

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this region regarding the lidar inversion, namely the lidar ratio within the boundary layer (which may be different from free-tropospheric LR) and the incomplete overlap function. An iterative method for the estimation of the overlap function is used along with assumptions on the lidar ratio based on back-trajectories and a final consistency check against the AOD provided by a sunphotometer (including fine-tuning of the lidar ratio to match the total AOD). However, we will never know if the lidar ratio tuning actually corrects possible biases due to inadequate overlap correction in the boundary layer, or AOD differences in the free-troposphere. To my opinion, the authors have to use the in-situ measurements in the PBL and try to calculate the LR in ambient conditions using Mie scattering codes in order to minimize the assumptions for the lidar inversion. Otherwise, the authors should change the title and alter the language within the manuscript when it comes to the lidar-derived extinction (this is not a measurement but only estimation with lot of assumptions). I insist at this point, since it would be unfair to other closure studies employing lidar and in-situ, to show that this is a simple task that gives us a very good agreement.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 18609, 2015.

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