**Atmospheric
Chemistry
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Discussions

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Interactive comment on "One year of Raman lidar observations of free tropospheric aerosol layers over South Africa" *by* E. Giannakaki et al.

Anonymous Referee #1

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The paper entitled "One year of Raman lidar observations of free tropospheric aerosol layers over South Africa" by E. Giannakaki et al. describes the results of Raman lidar measurements in South Africa over a 1-year period.

This paper is of scientific significance because systematic observations of the vertical layering of aerosol properties in this region were missing so far. The scientific approaches and applied methods are valid. The results are presented in a well structured and organized way. There are only minor comments and suggestions for improvement.

page 1347, line 24: Do you really mean VOLUME extinction coefficients? Usually this term describes the sum of particle plus molecular extinction coefficients. From this measure, it would be difficult to derive the Angström exponent and information on

particle size.

page 1348, line 13: The lidar measurement site at South Africa was located ... in the Highveld region.

page 1350, line 18 campaigns -> campaign

page 1351, line 2: are derived -> is derived

page 1352, line 27: percentage relative to the number of performed measurements or relative to the number of possible measurements?

Figure2: The PBL top heights seems to be highly variable, also on short term scale. Please, discuss this behavior. It would be helpful to present a height-time plot of backscatter coefficient and derived PBL to heights for a period of 2-3 days for illustration.

page 1354, line 15: Monthly averaged lidar measurements analyzed... > This formulation implies that you first averaged the lidar profiles and then analyzed the averaged profiles for the layering. I assume, that you first derived the layer properties of the individual 1-hour profiles and then averaged? If this is the case, pleas, use a better formulation. If you really applied the averaging first, please repeat the analysis with layer detection prior to averaging.

Figure 6, caption: better: free tropospheric contribution TO TOTAL AOD ?

General comment on sections 3.1 and 3.2: It is not clearly written in the text, but it seems that you have analyzed the origin of each individual layer by means of trajectories, satellite retrievals etc. If this is the case, the value of the paper could significantly increased if you discuss the layer properties (especially lidar ratios and Angström exponents) not only by month and season, but also grouped by aerosol type. It seems from the manuscript that most of the layers originated from local industries or biomass and solid fuel burning. But, it seems that there were also few layers from desert regions or from the ocean. How many layers of each of these types have been found? What

are typical values of intensive properties of these aerosol types?

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