

Interactive comment on “Vertical aerosol distribution in the Southern hemispheric Midlatitudes as observed with lidar at Punta Arenas, Chile (53.2° S and 70.9° W) during ALPACA” by Andreas Foth et al.

Anonymous Referee #2

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The authors present continuous Raman Lidar measurements of the aerosol backscatter and extinction from Punta Arenas, Chile that cover four months of the southern summer of 2009-2010. Data from a nearby AERONET site, and the CALIOP remote lidar are used to provide context. From this dataset the authors identify eight periods with aerosol layers aloft. Two such cases are presented in detail with back trajectories indicating the sources of primary particles as Australian biomass burning in one case and Patagonian dust in the other. The authors also report the average aerosol profile for the whole measurement period, relate it to the back trajectories, and compare the

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PBL from lidar profiles and a few other sources. Generally, the aerosol concentrations are low and are near the detection limit of the lidar in free troposphere.

This manuscript mainly reports the measurements and performs basic analyses and seems to be written in anticipation of future measurements. The authors confirm the conclusion of other studies that aerosol over southern Chile is representative of “pristine, pre-industrial” conditions. The authors could do a better in connecting the analyses to this conclusion. How do the case studies affect this conclusion? Why is PBL height discussed in detail and compared from four different measurements? The manuscript has several figure that are only briefly described in the text. Are all the figures necessary?

Specific Comments: P3L1: There were eight cases of aerosol layers aloft but only 2 cases were presented. Could you add sentence or two describing the other cases (similar? Closer to detection limit?) and why they were not presented?

P3L29: I'm confused because the Raman signal is from molecular backscatter and not related to the aerosol content.

P4L7: This sentence is confusing because is switches between level 3 and version 4.10.

P4L19: Could you add the distance between the two sites?

P5 L19: replace “locally exceeded 0.14 and 0.02 in the area of Punta” with “regionally peaked at 0.14 and was 0.02 in the area of Punta”

P6L21: This comparison is not very useful in that the AOT from a biomass burning event is an extensive property depends on the size and fire intensity and its subsequent dispersion in the atmosphere. Why are two very different events being compared?

P7L28: ‘numbers’ should be singular

P9L13-15: I infer this conclusion is that Polly and CALIOP PBL height are determined by a decrease in aerosol backscatter, and the radiosonde and GDAS1 PBL heights

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are determined by the potential temperature profile. The fact that they agree mean the aerosol top of the aerosol layer coincides with the temperature inflection; hence the aerosol is in the PBL. The author may want to state this reasoning more explicitly rather than having the reader infer it.

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2018-1124>, 2018.

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