

Interactive comment on “Saharan dust contribution to the Caribbean summertime boundary layer – A lidar study during SALTRACE” by Silke Groß et al.

Anonymous Referee #1

Received and published: 9 May 2016

The paper by *Groß et al.* investigates the contribution of Saharan dust to the boundary layer over Barbados as observed during SALTRACE. The paper is of interest to the scientific community but major revisions are necessary before further consideration for publication in ACP.

Major points:

- A description of the used instrumentation is completely missing in the text. Section 2 should be revised to Instruments and Methods. There should be at least a table that provides an overview of the used instrumentation. The authors only mention auxiliary measurements with sun photometer and in situ measurements

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when they are already discussing results in Section 3.

- It is not acceptable to use papers in preparation as references. Nothing is known about the status of these papers
- The authors should consider restructuring the paper. It seems more straightforward to first discuss the measured optical properties and later describe the subsequently retrieved parameters. This means that all optical properties should be addressed before Figure 4 is discussed.
- Greater care is necessary with respect to the investigated height range. The authors loosely vary between the terms convective marine boundary layer, convective boundary layer and just boundary layer. Are these meant to be the same things? Later they also discuss the transition layer and the Saharan air layer. It might be worthwhile to properly define all these layers in the example provided in Figure 2.
- Please make sure that the same tense is used throughout the paper.
- Statements of good and very good agreement need to be quantified.

Minor points:

- Check the co-authors' affiliations. I believe it's Leibniz Institute.
- p1,l13: 80% seems like a normal value for RH in marine environment.
- p1,l20: Are the measurements just used to support modelling efforts or rather to validate them?
- p2,l11: Please elaborate on the point of efficient downward mixing.

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- p3,Section 2.2: More background is needed on how the conversion factors have been obtained. Did you apply any constraints for retrieving marine conversion factors from AERONET measurements at Barbados? Why are the factors almost identical for marine aerosol and mineral dust?
- p4,l4: Does this mean that you use the gradient method to find the top height of the CMBL? Do you use the first gradient or the strongest gradient? please provide more information.
- p4,Section 3.2: More details are needed regarding the analysis of the lidar measurements. You could provide those in an Instruments section: What is the averaging time of the lidar measurements? Were the lidar measurements performed during day or night? How did you analyze the data? Which lidar ratio has been used to derive the backscatter profiles?
- p5,l12: Could the differences in lidar and sounding be the result of the two hours time delay between the two?
- p6,Figure 3: What is the general time difference between the lidar measurements and the soundings?
- p7,l3: Please elaborate what is meant with intensive lidar quantities for the unfamiliar reader.
- p7,l12: I don't believe that this paper is the best reference on sea spray production.
- p8,Figure 5: Add mean/median/sd to the figure. Improve the scale in lidar ratio, i.e. 0 to 50 sr.
- p10,l10: More details are needed for the in situ measurements used in the closure study. Which instruments are involved? How have those measurements been

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transformed to mass concentration? What is meant with "match in time"? Such criteria need to be provided in the paper.

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-246, 2016.

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