

Interactive comment on “From the Caribbean to West Africa: Four weeks of continuous dust and marine aerosol profiling with shipborne polarization/Raman lidar – a contribution to SALTRACE” by Franziska Rittmeister et al.

Anonymous Referee #2

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The authors analyzed 4-weeks of lidar observations onboard of a scientific cruise to study Saharan dust transport across the Atlantic. The manuscript is extremely well written, and I have only a minor comments on the writing. I enjoyed reading the manuscript; particularly because of the nice discussion/review the authors did about previous papers on the subject. Methods applied are mostly well justified and valid, and I only have a few points I would like to discuss below. The annotated PDF attached to this response, hopefully, will help the authors to improve the manuscript.

1) The authors talked a lot about the MBL and MAL, and how marine aerosols intrude

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Discussion paper



into the SAL, but nothing is said about how they actually measured the height of the boundary layer.

2) Most of the trajectories they showed go over biomass burning regions before they actually pass over the desert, where dust would come from. They claim that the analysis showed that marine+dust prevailed (page 6, L 5) but this is definitely not clear from their results alone. It would be necessary to give further evidence for that or point the reader to the figures in other papers that show this is the case.

3) My last point is about the vertical downward mixing mechanism that the authors propose on page 10, L-10-20. I do not think that they can make this conclusion by looking at the trajectories alone. Particularly, if they only compared 2 trajectories, 250m higher and lower than the boundary of SAL. The wind shear could just happen to be a couple of tenths or hundreds of meters higher or lower for that location and time in the GDAS data. One should keep in mind that we are talking about a reanalysis with 50km horizontal resolution over a region where there is no radiosondes or surface meteorology to be assimilated (middle of the ocean). They should compare their own radiosondes against GDAS in the first place to prove that you could use hysplit to distinguish between the trajectories separated by just +/-250m. Moreover, for all the hysplit analysis, they could have run hysplit into the ensemble mode, or even in the dispersion mode, so that they would have a much better idea of the probability that the trajectories are point (or not) into the right direction (because they would look into density maps of trajectories, instead of single realisations). This is important as they are following the trajectories for more than 5 days, so the uncertainty is huge.

Please also note the supplement to this comment:

<http://www.atmos-chem-phys-discuss.net/acp-2017-130/acp-2017-130-RC2-supplement.pdf>

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2017-130, 2017.