

Interactive comment on “Unusual vertical structure of the Saharan Air Layer and giant dust particles during AER-D” by Franco Marengo et al.

Anonymous Referee #2

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General:

The paper is well written and provides new inside into the microphysical properties of Saharan dust at the beginning of the long range transport across the Atlantic, but still close to Africa. Minor revisions are required.

Details:

Title: The word ‘unusual’ suggests that the findings clearly deviate from typical findings. And this also implies that the authors measured many cases with ‘typical’ conditions so that they can conclude: These findings are unusual. . .! Is that the case? Or does ‘unusual’ only mean: We did not expect what we found.

P1, L12: There are clear definitions for dust particles and sand particles. Sand particles

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have diameters > 60micrometer, smaller ones are dust particles. So, how do you define giant particles?

P1, L12: Latest research on SAL characteristics (lidar based) are presented by Rittmeister et al. (ACP, 2017) and Ansmann et al. (ACP, 2017). Should be cited because they provide some new knowledge on long range transport, removal of dust, mixture of dust with pollution and/or marine particles.

P1, L22: ..may underestimate the size. ... What does that mean? If possible, provide some more insight! Do you mean. . . of the coarse-mode dust particles, or of the fine-mode dust particles, or is that related to the entire size distribution?

P2, L5: Because this a paper is showing a lot of lidar observations, one should provide more references to SAMUM and SALTRACE aerosol lidar observations (Gross et al., Tellus 2011, ACP 2015, Tesche Tellus 2011, Haarig, ACP 2017).

P2, L6-13: Again, please check the SAL-related papers of Rittmeister et al. (ACP 2017) and Ansmann et al. (ACP 2017) for latest information on dust removal aspects and consequences for the size distribution.

P2, L26: Please check the papers of Tesche et al. (2011a, 2011b in Tellus), and also of Veselovskii et al. (ACP, 2016, Senegal lidar observations).

P4, L25-28: Your observations are made in the near-range of the long-range transport regime, please keep that in mind. The findings are fine! But cannot be taken to make clear statements on ... anything about the microphysics in the Barbados, South America and North America regions....

P4, L26: 'Anomalous' again suggests that in most cases (say in 95% out of all cases) you do not find such structures over the Atlantic. Is that the case? Otherwise, the finding could be denoted as surprising

P5, L13: please tell clearly, . . . your write: coarse mode is centered at 5-6 microns (in radius?, diameter?).

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P5, L15: Again: fine-mode peaks at 0.25-0.3 microns... radius? diameter?

P6, L19: Again: 'giant particles' is not a well defined quantity, better use sand particles, or provide clear diameter boundaries.

P8, L20-25: Again, the observations were performed in the near-range of the long-range transport regime... General conclusions (for the entire long range transport regime down to the Americas) cannot be draw.

P10, L8: ... 200-300 km off the coast of West Africa ... this statement corroborates that the observations are quite close to the Sahara dust source., and must thus be carefully discussed, conclusions towards long-range transport consequences cannot be drawn, are just speculative to my opinion.

Check literature: Liu et al, ACPD from 2017, should be ACP now, Mortier et al., 2017. ... journal? Sequence: Ryder et al., 2018, 2013, 2015 should be Ryder et al. 2013, 2015, 2018. ..., Williams et al, journal?, Yorks et al., journal? All in all: a nice paper and a valuable addition to the dust observation literature!

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