

Interactive comment on “Sun photometer retrievals of Saharan dust properties over Barbados during SALTRACE” by Carlos Toledano et al.

Anonymous Referee #2

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Comment on “Sun Photometer retrievals of Saharan dust properties over Barbados during SALTRACE” by Carlos Todelano et al

The SALTRACE measurement campaign presents a significant opportunity to characterize dust properties before and after trans-Atlantic transport. In this paper, Todelano et al combine sun photometer and lidar measurements from ground-based platforms in Barbados with established inversion techniques to determine aged dust properties. The analysis is extensive and contains many useful measurements that can be used for climate model validation and comparison with future measurements. I also appreciate the many useful comparisons with previous campaigns such as SAMUM which put

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the measurements in context.

The manuscript would benefit from (many) grammatical corrections but these do not impact the overall quality of the analysis and the paper deserves to be published in ACP after a few minor (mostly grammatical) issues are dealt with. I also acknowledge and agree with the General Comments from Reviewer 1.

Specific comments [P1 L10] “The sun photometer ... was used in the retrieval to investigate possible improvements ” – add “to aerosol size retrievals2=” [P1 L13] “However the comparison of size distributions” – comparison -> differences [P2 L8] Remove “so called” from the sentence [P2 L9] “can only be tackled with a combination of long-term observations of key variables using ground-based, airborne and satellite techniques” – or similar amendment [P2 L19] Reword the last sentence of paragraph 3 – it currently reads that the AERONET data resulted in typical dust conditions during SALTRACE, rather than it demonstrating that typical dust conditions were observed [P3 L7] Sentence ending “relate them to the co-located measurements” – co-located measurements of what? [P4 L13] “Similar uncertainty is found for SSARA-P” provide a suitable reference or evidence [P4 L19] Grammatical change – “The use of version 2 AOD is needed” should be “The use of version 2 is chosen” or selected [P5 L22] “Moreover, all the instruments co-located at CIMH agree within the nominal AOD uncertainty (0.02)” – This statement does not seem to be true on a day-to-day basis from looking at Fig. 1a. For instance on the 29/30th June SSARA-P suggests AOD of 0.15 with the Cimel measurements much above this [P6 L2] “We used the 1% percentile of AOD within each month” – why did you chose this rather arbitrary value? What happens if you select the 5% percentile etc. The AOD threshold of 0.04 does not agree with the 0.2 threshold you use to for Table 2 – I don’t understand why you used two different thresholds [P6 L22] Sentence beginning “The AE of dust seems to be lower in SAMUM-2 and SALTRACE than SAMUM-1” – This is my only real qualm with the methodology – the failure to delineate successfully between the different forms of aerosol present during the observation period. The authors use a tenuous threshold of AOD = 0.15

(again different to the previous thresholds of 0.2 and 0.04) to delineate marine from dust aerosol, but ultimately there will be some marine aerosol present in the dust retrievals. This should perhaps be added as a caveat here and in the conclusions – that the measurements in Table 2 represent a mixture of dust (pre-dominant) with some marine aerosol contamination [P8 L31] “get facilitated” -> “become similar”

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