Line numbers refer to the latest revised, marked up document with tracking, not the earlier revised document reviewed or the version without tracking.

Editor's comment

30 May 2022
Editor decision: Publish subject to minor revisions (review by editor)
by Nikos Hatzianastassiou
Comments to the author:
Dear authors,

thank you for the revised manuscript. The reviewer rightfully pointed out that there are data available to test the effective radii of the sub-micron aerosols, and in response to this comment, you added text (lines 267-283 in the revised manuscript). Notably, however, you only cite size data from CLARIFY, for which all observations were near Ascension Island, and retrievals of aerosol size from the 2016 ORACLES mission, using HSRL-2 and RSP remote sensing instruments. Indeed, the sizes from both of these studies are consistent with the sizes you use in the analysis. Nevertheless, you didn't include in the discussion the results shown by Shinozuka et al. (2020), which are from in-situ measurements of sub-micron aerosol size during ORACLES and show larger aerosol sizes. Not including these data in the discussion gives the impression that you are avoiding them because they don't agree as well with the sizes used in your study. So, please make reference to them as well.

Best regards

Lines 267-283. As requested, text has been added to compare our results with Shinozuka et al. (2020) who reported on airborne aerosol sizes measured during ORACLES by an Ultra-High-Sensitivity-Aerosol Spectrometer (UHSAS) deployed on the NASA P-3 aircraft. The dry aerosol reported in the publication is actually smaller, not larger. Figure 9a of Shinozuka et al. (2020) shows dry volumetric mean diameter of 0.2 μm for aerosol in the 3-6 km altitude range so the dry volumetric mean radius is half, around 0.1 μm. Based on the size distributions derived from the UHSAS and remote sensing instruments reported by Xu et al. (2021), this translates to a dry effective radius of about 0.09-0.10 μm. Shinozuka et al. (2020) mentioned that the UHSAS sizes had to be adjusted to account for significant under-sizing of the particles. The explanation for the discrepancy in particle size derived from the UHSAS and HSRL-2 retrievals is that the UHSAS measurements are for dry aerosol whereas HSRL-retrieved size is for ambient aerosol which tends to be 15-20% larger at 70-80% RH.

Lines 370-372. A reference under review has been updated to the published version.