

Interactive comment on “Impacts of Long-range Transport of Aerosols on Marine Boundary Layer Clouds in the Eastern North Atlantic” by Yuan Wang et al.

Anonymous Referee #1

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This study characterizes the properties of long-range transport aerosols observed by analyzing in-situ measurements from the ACE-ENA field campaigns and ECMWF-CAMS aerosol reanalysis data. Cloud-resolving WRF simulations are used to assess the possible influence of long-range transport aerosols on marine boundary-layer clouds. Results show that long-range transport biomass burning aerosols from U.S. continent and dust plumes from Sahara are observed during the field campaign. In-situ measurements show that long-range transport aerosol layer is some distance away from the cloud top for one case and adjacent to the cloud top for another case. A series of WRF simulations suggest that the aerosol plume cannot affect underlying MBL cloud properties when the center of the plume is over 100 m higher than cloud top.

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Noticeable effect of aerosol on cloud properties is found if the aerosol layer is right on top of the stratified MBL cloud deck. The manuscript is well written and the results and conclusions are clearly presented. I think the manuscript is suitable for publication in ACP after minor revision.

1. Line 188: “July 18 and 12 presents the typical high- and low-plume cases...” The signal is clear from Figure 3 (in-situ measurements), but not clear in Figure 1. In fact, based on Figure 1 (reanalysis product), I think July 18 is likely to be low-plume case, while July 12 is high-plume case. Please comment on the difference and add some explanations/clarifications in the manuscript.

2. Figure 6&7: Results are horizontally average in domain d04 or from one column where ENA site located? I guess it is averaged. Please clearly state it in the text and caption.

3. Figure 9: Caption is not completed. b), d), f) are case with the aerosol plume removed?

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