

Atmos. Chem. Phys. Discuss., referee comment RC2
<https://doi.org/10.5194/acp-2021-88-RC2>, 2021
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Comment on acp-2021-88

Anonymous Referee #3

Referee comment on "Measurement report: Impact of African aerosol particles on cloud evolution in a tropical montane cloud forest in the Caribbean" by Elvis Torres-Delgado et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-88-RC2>, 2021

The paper reports on three summers of measurements of aerosol optical properties and nss calcium at a coastal site (CSJ) and cloud properties at a mountain site (PDE) on Puerto Rico. These data are coupled with HYSPLIT back trajectories to assess the impacts of aerosols transported across the Atlantic on cloud properties and evolution at PDE. The bulk of the conclusions relies on meteorological parameters derived along the trajectories that are based on meteorological fields used when the HYSPLIT model is run. The end result is a study with provocative but speculative conclusions. The paper should be published as it provides information on the role of aerosol properties vs. atmospheric dynamics in cloud formation and evolution. It would be helpful to include a more detailed discussion of a follow-up study that could validate or inform the results presented here.

Lines 124 – 127: The accuracy of the position of the trajectories is discussed but, other than a brief mention of deriving precipitation from in situ and satellite observations (Lines 480 – 482), no mention is made of the uncertainty in deriving meteorological parameters along the trajectories. It would be helpful to add this information.

Figure 2: Please state in the caption what the black horizontal lines (solid and dashed) represent.

Figure 3: Is the nss calcium shown in the figure in the aerosol or cloud phase? Please clarify in the caption.

Table 3: Please clarify exactly what sampling periods are represented in the table in the caption. Are these statistics for the combined low and high dust periods?

Figure 4: What are the units of accumulated precipitation?

Line 294: Please add "size distributions of CLOUD DROP number concentration" for clarification.

Line 389: What is meant here by "cloud concentration"? Cloud drop concentration? Cloud fraction?

Line 421: Should this be "...acting as cloud condensation nuclei and thus BE THE MAIN AEROSOL COMPONENT responsible..."?

Lines 555 – 558: The conclusions are, indeed, highly speculative. What additional

information is required to reach conclusions with more certainty? It would be helpful to have that information rather than the generic statement that "...a much more detailed and long-term measurement program..." is required. What measurements should be included both at PDE and CSJ? Add more specifics about the required cloud and chemistry models needed to validate the results presented here.