

Torres-Delgado et al. "Measurement Report: Impact of African Aerosol Particles on Cloud Evolution in a Tropical Montane Cloud Forest in the Caribbean"

Answer to reviewer's reports

Line 16-18, I might be asking a stupid question, but I really want to learn: how did the authors compare/quantify the relative importance of meteorology and transported aerosols on cloud processes? In my understanding, if there are no aerosols, there are no clouds; if there are no supersaturation condition, there are no clouds. How could we determine their relative importance considering that they are totally different variables with different units? May the authors help explain more?

We understand the reviewer's question and already in the manuscript we have explained that we are unable to quantify the relative importance of meteorology compared to aerosols without an additional modeling effort.

Line 102-106, How consistent are the LWC from BCP and hotwire?

The authors have not seen a study that compares both techniques for retrieving LWC. However, our results compared well with the results from other studies in the same area that used optical measurements for retrieving information on cloud properties.

Line 219-221, Description about the results shown in Table 1 is necessary here.

The authors decided to eliminate this table as it was not used in the rest of the manuscript.

Figure 4. Unit for latitude and longitude is necessary. Also, the word in the figure is too blurry.

The figure has been replaced.

Line 305, LWC has been defined earlier in the data section.

Edited.

Figure 9, the unit of temperature seems not right. There is spell error for "relative humidity"

The unit temperature is correct. The typo was corrected.

Review of : acp-2021-88

Measurement Report: Impact of African Aerosol Particles on Cloud Evolution in a Tropical Montane Cloud Forest in the Caribbean

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Comments: this manuscript describes a valuable dataset and as such should be published. It does need some further polish to be acceptable for publication.

Introduction:

Line 29: the authors mention the activity of dust as a CCN is less clear. Some studies the authors may also wish to consider in this vein are Twohy et al., 2009; Denjean et al., 2015 (which suggests the CCN activity of dust is primarily through its size, based on Puerto Rico measurements; the 3rd author is also part of this author list); Edwards et al., 2021, which examined the CCN activity of dust reaching Miami, Florida (and found it minor compared to smoke). References within these papers can also help the authors expand their literature review.

The pertinent references have been included along with a brief explanation of the findings. Indeed, they improved the literature review.

Line 31: "later" -> "latter"

Edited.

Lines 64 & line 73: some repetition here.

These lines were edited to make it easier to read.

Lines 83-84: here we learn that the sampling campaigns were of widely differing lengths. It would be worth including the # of days contained within each campaign within the abstract.

Included.

Something on the climatology on when dust is encountered in Puerto Rico would be nice to see as well, here or elsewhere. Data for Barbados and Miami are available from Zuidema et al 2019.

We are working on a separate manuscript that includes a long-term record of dust properties measured in Puerto Rico.

Table 1, p 8: include the number of days or hours included in the statistical values for each year.

The authors decided to eliminate this table as it was not used in the rest of the manuscript.

Line 234: how is the Sahel differentiated from the Sahara? Is there a latitude line that is invoked near the coastline at about 18W - or further inland? fig. 4b doesn't make clear as the two distributions overlap completely. What is the significance of distinguishing these 2 populations? I might think that air from the Sahel contains biomass-burning aerosol, whereas that from the Sahara doesn't, but the authors do not discuss this.

Plot 4b shows the altitude of the air masses. Plot 4a shows the origin of the air masses. From Plot 4a we can distinguish the different air mass influences.

Fig 5, 6: I would suggest replotting these simply as 'hours since air mass arrival', as there is nothing of meaning in the diurnal cycle according to lines 323-324.

The authors understand that it is important to illustrate that the clouds that formed from different air masses did so at different times of the day. For this reason, the authors decided not to incorporate the suggested change.

Discussion: it's worth mentioning somewhere that the changes in cloud properties also depend on what the properties were before a new air mass moved in. How important of an effect do the authors believe this to be?

In this study we did not find evidence that the cloud properties are being affected by what the conditions were before. On line 188 it is mentioned that there were no trends in the cloud optical properties that could be link to diurnal variations or local emissions.

P. 19: I would suggest placing the discussion on the diurnal cycle earlier, rather than here, as it is relevant to figs 5 and 6.

The authors understand that it is important to have the discussion of the four different air mass histories, as the diurnal cycle is discussed under this scope. Therefore, we decided to leave this section where it is.

Data availability: the data should be made publicly available through a data repository and be associated with a digital object identifier.

The authors prefer to keep data availability upon request.