

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.

Line 31: “later” -> “latter”

Lines 64 & line 73: some repetition here.

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. 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.

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

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.

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.

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?

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.

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

References:

Twohy, C. H., et al. (2009), Saharan dust particles nucleate droplets in eastern Atlantic clouds, *Geophys. Res. Lett.*, 36, L01807, doi:10.1029/2008GL035846.

Denjean, C., S. Caquineau, K. Desboeufs, B. Laurent, M. Maille, M. Quiñones Rosado, P. Vallejo, O. L. Mayol-Bracero, and P. Formenti (2015), Long-range transport across the Atlantic in summertime does not enhance the hygroscopicity of African mineral dust, *Geophys. Res. Lett.*, 42, 7835–7843, doi:10.1002/2015GL065693.

Edwards, E.-L., A. Corral, H. Dadashazar, A. Barkley, C. Gaston, P. Zuidema, A. Sorooshian, 2021: Impact of various air mass types on cloud condensation nuclei concentrations along coastal southeast Florida. *Atmos. Env.*, doi:10.1016/j.atmosenv.2021.118371

Zuidema, P., C. Alvarez, S. J. Kramer, L. Custals, M. Izaguirre, P. Sealy, J. M. Prospero, E. Blades, 2019: Is summer African dust arriving earlier to Barbados? The updated long-term in-situ dust mass concentration records from Ragged Point, Barbados and Miami, Florida. *Bull. Am. Meteor. Soc.*, **100**, p. 1981-1986, doi:[BAMS-D-18-0083.1](https://doi.org/10.1175/BAMS-D-18-0083.1)