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Interactive comment on "Revisiting the Relationship between Atlantic Dust and Tropical Cyclone Activity using Aerosol Optical Depth Reanalyses: 2003–2018" *by* Peng Xian et al.

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Thank you very much for the comment, which helps to improve the readability and flow of the manuscript. In response, and to describe the strategy for the data analysis, we have added a "Methods" subsection under section 2. Besides adding the data analysis strategy, we have moved the original subsection "2.7 Statistical correlation calculations and significance tests" to the end of this "method" subsection, as it fits better here. We have also moved the few sentences describing the study regions from the introduction section to the new "Methods" subsection for the same reason. With the added description of the strategy for data analysis and method, we feel that a cohesive

and overarching interpretation of the results is also achieved. Thank you again for the helpful comment. The new subsection reads as follows

"2.1 Methods

Regardless of the underlying mechanisms, as there are contradicting mechanisms proposed in different studies, the goal of this study is to examine if there is a robust and statistically significant relationship between African dust and Atlantic TC activity on seasonal to interannual time scales. We also examine if there are confounding factors, for example, meteorological conditions and climate modes that co-vary with dust and hence influence TC activity.

We use dust AOD (DAOD) to represent Atlantic dust levels. Three aerosol reanalysis products, and their consensus DAOD are used in order to increase the fidelity of the analysis result, given that multi-model-consensus typically has been shown to have better data quality in prior assessments (Sessions et al., 2016; Xian et al., 2019). Various TC count indices and Accumulated Cyclone Energy (ACE) (Bell et al. 2000), defined in the next section, are utilized to represent TC activity.

The Atlantic Main Development Region (MDR) (e.g., Goldenberg et al., 2001), including the Caribbean (10-20°N, 85-60°W) and the tropical North Atlantic (10-20°N, 60-20°W), are the focus regions for this study (see also Figure 2 for a spatial representation of the two subregions). Most previous studies of dust impacts on TC activity have focused on the tropical North Atlantic or regions closer to the African continent (e.g., Karyampudi and Pierce, 2002; Bretl et al. 2015; Pan et al., 2018) where DAOD is relatively high. However significant dust pulses can also be transported into the Caribbean. We therefore expand our study area to explore the potential impacts of high levels of dust in the Caribbean on Atlantic TC activity. This allows us to explore regional differences in the dust-TC relationship. Statistical relationships between DAOD and TC activity over the MDR are investigated using the three aerosol reanalyses and multi-reanalysis-consensus (MRC). The results obtained herein also help us assess the potential of using DAOD to aid in future Atlantic seasonal hurricane forecasts.

The correlations between variables of interest are based on the Pearson correlation coefficient. Statistical significance is assessed at the 95% level using a two-tailed Student's t-test. Correlations >= 0.51 are statistically significant given that a 16-year time period (e.g., 2003-2018) is investigated here. For partial correlation analysis, partial correlations >=0.55 are statistically significant at the 95% level with 13 degrees of freedom. The criteria for statistical significance with various degrees of freedom can also be obtained at: https://www.esrl.noaa.gov/psd/data/correlation/significance.html."

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