Aerosol-Cloud Interactions during Extreme Weather

Cheng-Hsiang Chang [1], Farnaz Hosseinpour [1,2], and Eric Wilcox [1,2]

1. University of Nevada, Reno
2. Desert Research Institute, Reno, NV

Abstract. An out-breaking dust plume in June 2020 transported a tremendous number of aerosols and degraded air quality not only in Caribbean islands (Euphrasie-Clotilde et al., 2021) but also in the southeastern United States (Yu et al., 2020; Pu and Jin, 2021). Scientist community dubbed this event the "Godzilla" dust plume because of its scale. Although many studies have focused on the causes and dust transport induced by this exceptional event (Francis et al., 2021; Pu and Jin, 2021), the aspect of aerosol-cloud interactions is not well-understood. In this study, we use remote sensing and reanalysis datasets to assess anomalies of clouds and aerosols during the occurrence of the dust plume. The mineral dust lifted by the plume could heat the Saharan air layer and increase cloud fraction by serving as cloud condensation nuclei. As the value of cloud fraction reached the maximum, the response to aerosol increase would suppress. Our findings that reveal the impacts of unusual loads of aerosols on clouds and the Saharan air layer are critical for improving the understanding of aerosol-cloud interactions associated with extreme weather.