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Analyzing the variability of Atlantic sea surface temperature through the short-wave radiative forcing of aerosols

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It is well known that warming ocean temperatures, especially over the last 10 years, have resulted in an increase in the frequency and intensity of hurricanes in the North Atlantic. However, much disagreement persists as to whether or not these rising temperatures are part of a multidecadal oscillation, or result from long-term trends associated with global warming. Additionally, new associations are being discovered between dust storms over the North Atlantic, which originate in West Africa, and tropical cyclogenesis in that same region. To-date, little work has been done to understand how these aerosols may be altering the long-term trends in hurricane activity.

This presentation will focus on linking sea surface temperature changes in the Atlantic with African dust activity through the radiative forcing associated with these plumes as they traverse the Atlantic. We will demonstrate that periods of cooler ocean temperatures are likely reinforced by radiative feedbacks associated with a coincident increase in dust activity. To do this we analyze 25 years of observations of aerosol optical thickness from the Advanced Very High Resolution Radiometer, climatological maps of mixed layer depths, and cloud diurnal cycles from the International Satellite Cloud Climatology Project. While many factors alter Atlantic ocean temperatures, we aim to demonstrate that quantifying the sea surface temperature forcing by aerosols is needed to fully understand the interannual and multidecadal changes observed across

the basin.