Aerosol drivers of Atlantic SST variability.

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A key component of the climate system that prediction systems aim to capture are the variations in North Atlantic SSTs. Historical changes in these temperatures are strongly linked with rainfall and other climate impacts, not least with changes in North Atlantic Hurricanes; Sahel Rainfall drought; Amazon and Indian Monsoon rainfall. Here we ask the question to what extent have Earth System components, specifically anthropogenic and volcanic aerosol emissions, influenced past Atlantic temperatures.

We present results from HadGEM2ES, a CMIP5 generation coupled model, that captures much of the historical N. Atlantic variability. We find a common signal across 4 ensemble members, initiated from very different phases in the control AMO. This points towards an external driver within these simulations. We demonstrate how in HadGEM2ES volcanic and anthropogenic aerosol changes account for 76% of the observed multi-decadal variance, and look at the mechanisms via which this occurs.

We step back and discuss this result within the context of CMIP5, implications of this result for projection systems and future forcing representation.