Reanalysis of Climate Influences on Atlantic Tropical Cyclone Activity using Cluster Analysis

The well-known scientific publication Journal of Geophysical Research. Atmospheres has recently published the paper titled Reanalysis of Climate Influences on Atlantic Tropical Cyclone Activity using Cluster Analysis

This paper, whose co-author is the BSC researcher Louis Philippe Caron, shows that hurricanes forming in different regions of the Atlantic basin are influenced by different climate factors and also highlights which factors are most important to consider for landfalling storms.

Abstract

We analyze, using Poisson regressions, the main climate influences on North Atlantic tropical cyclone activity. The analysis is performed using various time series of basin-wide storm counts, but also various series of regional clusters, taking into account shortcomings of the hurricane database through estimates of missing storms. The analysis confirms that tropical cyclones forming in different regions of the Atlantic are susceptible to different climate influences. We also investigate the presence of trends in these various time series, both at the basin-wide and cluster levels, and show that, even after accounting for possible missing storms, there remains an upward trend in the eastern part of the basin and a downward trend in the western part. Using model selection algorithms, we show that the best model of Atlantic tropical cyclone activity for the recent past is constructed using Atlantic sea surface temperature and upper-tropospheric temperature

while for the 1878-2015 period, the chosen covariates are Atlantic sea surface temperature and ENSO. We also note that the presence of these artificial trends can impact the selection of the best covariates. If the underlying series shows an upward trend, then the mean Atlantic sea surface temperature captures both interannual variability and the upward trend, artificial or not. The relative sea surface temperature is chosen instead for stationary counts. Finally, we show that the predictive capability of the statistical models investigated is low for U.S. landfalling hurricanes but can be considerably improved when forecasting combinations of clusters whose hurricanes are most likely to make landfall.

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(Caption: NASA)

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