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Seasonal forecast of Atlantic tropical cyclones during intense ENSO events

Constantin Andronache
Boston College, Chestnut Hill, 02467, MA, United States (andronac@bc.edu)

The forecast of genesis, development and evolution of Atlantic tropical cyclones (TC) present significant scientific and societal interest. Advances in the observing systems and dynamic models continue to improve the short-term forecast of individual TC. At seasonal time scale, two methods are employed: a) use Global Circulation Models (GCMs) to simulate TC and understand the physical interactions between ocean and atmosphere in the North Atlantic region, and b) utilize statistical methods to forecast TC frequency and intensity based on large scale predictors such as: sea surface temperature anomalies (SSTA), vertical wind shear, Quasi-Biennial Oscillation (QBO), El Nino - Southern Oscillation (ENSO), and the phase of Atlantic Multidecadal Oscillation (AMO). Operational schemes for the TC seasonal outlook have established the important role of ENSO events. In this study we use the NOAA SSTA data, the NCEP/NCAR Reanalysis and TC data from the National Hurricane Center to investigate the statistical relationship between significant ENSO events and Atlantic TC during the hurricane season. The statistical model has predictive capability during intense ENSO events. Many recent studies confirm that intense ENSO events are predictable with increasing degree of accuracy by a range of dynamic and statistical methods. We illustrate a statistical method to forecast ENSO SSTA a few months in advance the peak of Atlantic hurricane season. Forecasted ENSO SSTA can be used as predictors of TC in North Atlantic region, with significant skill. Potential uncertainties and model limitations are discussed, particularly due to possible alterations of ENSO, AMO, and TC activity caused by global warming. The results are presented and illustrated in the context of current efforts to understand climate predictability relevant to North Atlantic tropical storms.