Tropical storm variability and its relationship to large-scale modes of climate variability

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Tropical storm activity is influenced by large-scale modes of climate variability, such as ENSO and MJO, through associated changes in sea surface temperature (SST), vertical wind shear, and humidity. Here, these relationships are examined in a five member ensemble of atmospheric model simulations forced with observed SST and cover the period 1870-2007. The model horizontal resolution is approximately 1 degree. Tropical Storms are identified and tracked using vorticity at 850hPa with an objective tracking algorithm.

The model reproduce well the observed climatology and variability of Tropical Storms. Regions where Tropical Storms are strongly influenced by SST are identified using analysis of the variance. The Tropical Storms in the Western Pacific exhibit the highest degree of predictability (80%). Regression analysis and other statistical techniques are used to relate the patterns of SST variability with fluctuations in Tropical Storms. Apart from the influence of the El Nino, the impact of decadal modes of variability in the Pacific and Atlantic are also investigated.