



NSF-Duke-NCSU-UNC

**Interdisciplinary Workshop for Undergraduate Students**

**May 28 - June 2, 2019**

**PROJECT ABSTRACT**

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**Project I – Tropical Cyclones**

*“Predictive Modeling for Tropical Cyclones with Historical Storm Data”*

**Abstract:**

Tropical cyclones are among the most destructive natural phenomena that lead to severe damage to life and property. Much of our understanding of tropical cyclones is derived from data. IBTrACS (International Best Track Archive for Climate Stewardship, <https://www.ncdc.noaa.gov/ibtracs/>) provides global tropical cyclone best track data with two key climate variables maximum sustained wind speed and minimum central pressure. These datasets have spatial resolution about 10km and temporal resolution of 6 hours. The main objective in this project is to use statistics and machine learning to build predictive models for the maximum sustained wind speed using the IBTrACS data. The preliminary plan is to perform exploratory data analysis and to model the maximum sustained wind speed with linear models or generalized linear models using statistical software R. As the maximum sustained wind speed is spatially and temporally correlated, a more realistic way to improve the predictability is to incorporate spatial and spatio-temporal dependence structure using time-series models, spatial/spatio-temporal process models, and machine learning techniques such as neural networks. If time permits, students can also build predictive models for minimum central pressure.