

# GEOG606 Final Project

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## Abstract

At NOAA, I work on hurricane modeling. Namely, my job description is to help build capacity for NOAA to quantify uncertainty in modeled storm surge caused by a hurricane. In the months following a hurricane event, the project seeks to provide a confidence level of uncertainty using a combination of operational models of the storm state and observational data from sensors taken during the storm. To this effect, I build ensembles of synthetic storms by perturbing initial variables, run the ensemble through operational models, and then build a polynomial surrogate model via a regressive learning algorithm that can be queried for sensitivities of each variable. For my final project, I plan to explore spatial correlation along the ensemble space by comparing inundation levels within each modeled outcome. I can likely do this via cross-validation along the space of ensembles, and / or by extracting spatial autocorrelation metrics of water elevations in each perturbed example.

## 1 Data

The coupled model, called ADCIRC (Advanced Circulation) works along an unstructured mesh, comprised of points linked by triangular (and sometimes quadrangular) cells. ADCIRC can output a time series of surface fields, or alternatively individual time series at selected points (“stations”), of various output variables including water elevation and water velocity. Meanwhile, the data sources involved in the observational data comparison include water elevation, water velocity, water salinity, water temperature, etc. There are surface field observations (from remote sensing imagery) that span the entire extent, as well as time series data from individual stations, which have relatively high temporal resolution.

I think that the simplest option for analysis, and the best option for this project, would be to focus on several defined selected station output points that have observational data (namely, NOAA CO-OPS tidal stations) and compare the water elevation data from the tidal stations and the water elevations distribution in the spatial analysis.

## 2 Analysis

I expect that the analysis for this project will comprise of two parts; firstly cross-validation across the ensemble space (utilizing the typical 1:10 fold strategy), and secondly a spatial autocorrelation analysis across the spatial extent.