**Final Project**

MUSA 550 Geospatial Data Science in Python

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**INTRODUCTION**

For my final project I will be using NOAA’s tide and current dataset. The data is available from 1920 to 2020 and is updated every few hours. Using this data, I will like to map the increase in sea levels along the east and west coast and also compare the two edges.

The final project will be similar to Reuter’s research from 2014 - <https://www.reuters.com/investigates/special-report/waters-edge-the-crisis-of-rising-sea-levels/#gauges-interactive>

The cities I wish to map are a part of the resilient by cities design proposals and the Rockefeller 100 resilient cities. The list is a start but not exhaustive.

* Greater Miami and the Beaches
* Washington, DC
* Seattle
* Honolulu
* Minneapolis
* San Francisco
* Los Angeles
* New Orleans
* Cape May
* Alaska
* Boston
* New York
* Philadelphia
* Chicago (lake levels)
* Galveston Pier 21
* Puerto Rico
* Sewells Point
* Atlantic City
* Baltimore

The dashboard will have the following visuals:

* Location of state/city with station on the US map
* Individual line graphs for change over time – dropdown menu to select city
* A chance for comparative study by different cities
* A comparative study of the west coast and east coast
* Study both yearly and monthly trends

The data for tides and currents can be found here - <https://api.tidesandcurrents.noaa.gov/api/prod/>

The data for natural disasters can be found here - <https://www.emdat.be/>

And the package allows to get the data - <https://github.com/GClunies/noaa_coops>

**METHODOLOGY**

To study and analyze the data I used many methods of grouping data by mean and other filtering methods. The data is collected every 6 minutes so there is a large and very detailed trend that can be generated.

* Create a list of all the stations ID – used to get data
* Import data from NOAA’s website - use noaa\_coops package
  + Make sure to install the package first through the anaconda prompt
  + Use NAVD datum to be able to create comparative water levels
* Clean the data – the date format is different and use pandas date to get year and month of each entry.
* Use high-water and low-water level data to generate mean sea level rates
* Initially I first grouped them by year and find the mean of all the three water levels.
* Next, I group them by year and month to calculate monthly trends over the years.
* All the above processes are repeated for each of the stations
* Create comparative plots for different stations
* Associate the station to the coast it belongs to
* Generate plots to understand coast trends.

For all the plots, I mainly used altair but some of them are hvplots. Using altairs brush, I was able to create plots that are interactive and allows for isolation of line plots making it easy to understand.

Finally, as a lot of these maps are dependent on user input, I used panel to create 3 apps which can be reached using the following links :

- <http://localhost:5006/SeaLevelRise-app>

- <http://localhost:5006/SeaLevelRise-app2>

- <http://localhost:5006/SeaLevelRise-app3>

**RESULTS**

The results are as expected where you see a regular trend of increasing which is spiked around the 2000s.

The main concern and hope from the dashboards, was to reduce the technical data from NOAA and make it available for public in simple, easy and intriguing visualizations as a way of imparting knowledge and increasing awareness. The dashboards have a lot of user-input which allows for more interaction.