

## Long Island, New York Buoy 44025: Nor'easters

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### Abstract

*The National Data Buoy Center (NDBC) from the National Oceanic and Atmospheric Administration (NOAA) collects data from a series of buoys located around the United States. From this data collection, we speculated if it was possible to find Nor'easters over the ocean when nor'easters were in proximity to the shore. To do this, Google Colaboratory was used—more specifically Python—to retrieve and graph the data from the buoy. Long Island, New York was selected to be the research target. From the Long Island buoy station 44025, meteorologic and oceanographic data was pulled from the archives and analyzed. The main parameters in question were wind speed and wave height; these parameters are indicative of a storm moving through the region. From the graphs, it is possible to determine when a Nor'easter or other intense weather events pass through the Long Island region. This project focused in on the time between 2010 and 2020. The climate aspect to this project—with research ongoing—would result in data being pulled from 1990 to 2020. The goal of the climate aspect of the project will be to determine if there has been an increase or decrease in storm frequency, as well as an increase or decrease in storm strength.*

At the end of the Fall 2020 semester Dr. Kumar offered the opportunity to work on a project over the winter break. Dr. Kumar is a professor of oceanography at Millersville University who contributed to the project's initiation and expansion. The project would be focused on retrieving data from a buoy along the Long Island coast. The data retrieved was meteorological and oceanographical data collected daily and archived online by the National Data Buoy Center (NDBC). The first step in this project was to learn Python on Google Colaboratory and get familiar with the NDBC. Using the "Introduction to Python" web series blog—created by Dr. Sage Lichtenwalner from

Rutgers University for their Summer 2020 REU—learning Python was not too difficult. The web series blog is a four-part series on the fundamentals of working with Python and how to retrieve and work with data from NDBC.

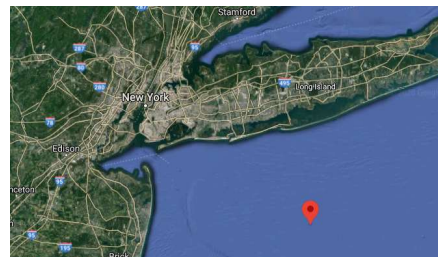


Figure 1 - Location of Buoy 44025 of the coast of New York. (Source: Google Maps)

At first the project was to look at the data from buoys along the east coast of the United States to see if large storms between 2010 and 2020 were identifiable. However, the scope of this project is tracking Nor'easters rather than hurricanes. Through the process of narrowing down the goal, the project turned into determining when Nor'easters went over the Long Island region as referenced in Figure 1.

### Investigating Variables from the Buoys

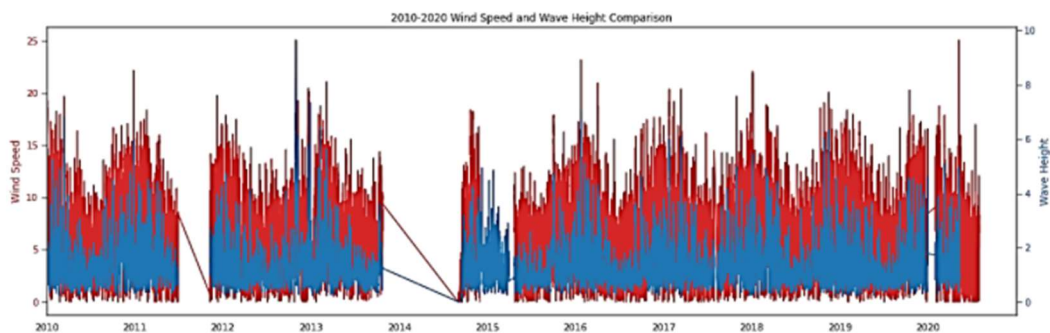
For the project, the main variables under investigation are wind speed and wave height to see if identifying the storms was possible. From the data and graphs, pinpointing Nor'easters was possible to the point of accurately determining the dates the storms hit Long Island. To cross reference if the storms were recorded, the National Weather Service's archive of storms was used. The archive was used to determine if there was a Nor'easter or if it was something else, like a wind event.

Within the scope of this project there are no definitive results. The project goal was determining the possibility of identifying the storms from buoy data. Now knowing this

was a success, the project can go further and evolve more.

On top of the 2010 – 2020 analysis, there is also a climate aspect to this project in the works. The climate aspect would include going back even further in the archives at NDBC. The time frame in question would expand to 2000 – 2020—maybe even as far back as the 1990s. The focus would be looking to see if there have been any significant differences in strength or frequency over time. This part of the project is still a work in progress, so there are no conclusions yet.

While the main part of the project is done, there are ongoing aspects. Looking at the data from 2010 – 2020 was a lot of rewarding work, from learning Python to making the graphs readable. The results for the project were very promising. Being able to locate a Nor'easter over the ocean is amazing; seeing how the waves change will the storm is so fascinating to see. The focus of the project now is working on generating the graphs to indicate storms and the dates they occurred. Then the next step of this project is to finish the climate aspect. The project could possibly change and go in a different direction – but whatever it does it should be fun to work on.



*Figure 2 - This graph shows the comparison of wind speed (kts) and wave height (ft). This is from 2010 - 2020. The gaps are from the buoy not having data for that time. Anytime there is a strong peak in wind speed and wave height at the same time, there is a storm associated with it—most of those associations are Nor'easters.*

### References

Google. (2021). *Google Maps*. Retrieved from Google :

<https://www.google.com/maps/place/40%C2%B015'03.6%22N+73%C2%B009'50.4%22W/@40.2510041,-73.1661887,17z/data=!3m1!4b1!4m5!3m4!1s0x0:0x0!8m2!3d40.251!4d-73.164>.

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#### Recommended Citation

Tripus, M. (2021). Long Island, New York buoy 44025: Nor'easters. *Made in Millersville Journal*, 2021. Retrieved from <https://www.mimjournal.com/paper-19>