The Effect of Sea Surface Temperature on the Wind Speeds of Major Hurricanes of the 2005 Atlantic Hurricanes season; A Reexamination of Satellite Remote sensing Data.

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***Abstract* – The effects of sea surface temperature (SST) on the strength of hurricanes is controversial. Theoretical considerations and atmospheric models all predicted to a stronger hurricane at higher sea surface temperature. However, analysis of field observations of sea surface temperature and wind speed yielded inconclusive or contradictory results. Unfortunately, the field of observation is sporadic; therefore, these analyses could not disapprove model predictions. Here, we conducted an analysis of remotely sensed sea surface temperature for several hurricanes in 2005. Sea surface wind speed was determined by Quick SCAT sensor and sea surface temperature was determined by MODIS sensor. Initially, sea surface wind speed was used to locate the eye of hurricanes. The SST and wind speed of the region near the eye were then obtained from NASA website. For each hurricane, daily wind speed and temperature was obtained for the entire period during the Atlantic hurricane season. For a particular day, the pixel with the maxima pixel was indentified. The correlation between wind speed and temperature at the eye were then used to analyze the relation between the strength of hurricane and SST.**

I. INTRODUCTION

In 2005, storms ripped through the Atlantic Region, making it the most active Hurricane Season yet to date. Not only was it the most energetic but also the most devastating, creating damages of over a billion dollars, and deaths estimated over 3 thousand. Hurricane Katrina demonstrated one of 2005's most hazardous happenings. After it's passing, New Orleans of Louisiana was left 80 percent under water. The pattern of this hurricane season showed an enormous jump in storm intensity. The season initially began on June 1, 2005, and lasted until November 30. However, some activity continued to January 6, 2006.

II. DATA COLLECTION

A. NASA Website

The process of collecting data was fairly simple. We used the NASA hurricane satellite website (http://Poet.jpl.NASA.gov) in order to pinpoint hurricane locations and gather data according to the set parameters. We were looking for hurricane wind speed as well as ocean temperature. The website allowed us to choose the date ranges of given hurricanes and select the region in which we wanted to view. We did each parameter separately, however this did not affect the selected region so we were able to obtain data for the same exact region under both parameters.

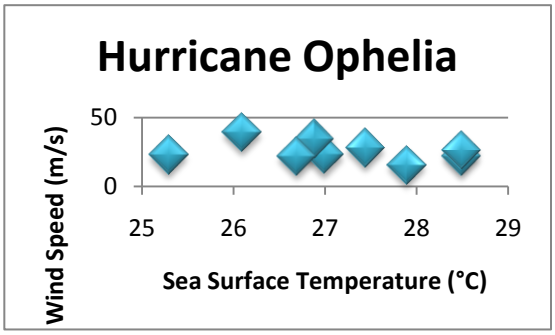
B. Data Viewer

Once the guidelines were set, we were directed to what was called the "Poet Data View." This is where the data was separated into ASCII (American Standard Code for Information Interchange) charts for specific days along with images of specific days. We went through and selected each day individually and moved the data from the ASCII chart into Microsoft Excel via copy and paste. Also we saved images in order to get a better understanding of what the numbers meant.

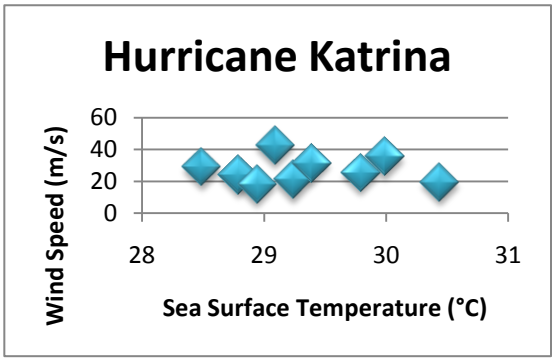
III. EXCEL

A. Placing Values

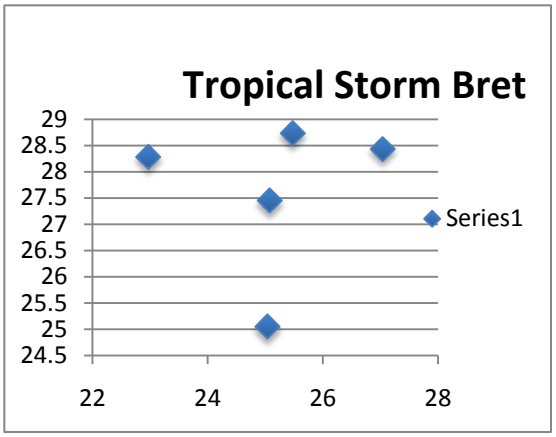
Values from the ASCII charts were separated into three columns, Longitude, Latitude, and wind speed or ocean temperature. Placing the values from the ASCII charts into Excel was a very time consuming process in regards to the ocean temperature values. The reason for this was that the ocean temperature parameter came with about 300,000 lines of data, which took a lot of memory for the computers to process. When the data finished pasting into Excel, we sorted the third column to get the void data, which was represented by 255, at the top and preceded to delete it. We repeated this process for wind speed as well, which did not take nearly as long. We did this for all hurricanes in the 2005 Atlantic hurricane season. (Below is an example of a few storms of the 2005 Atlantic Hurricane season.)



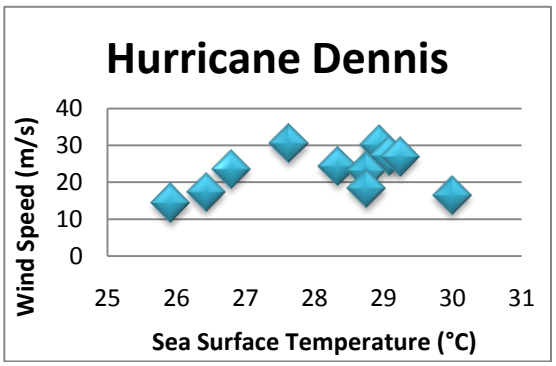
(Hurricane Ophelia wind and SST)



(Hurricane Katrina wind and SST)



(Tropical Storm Bret wind and SST)



(Hurricane Ophelia wind and SST)

B. Spread Sheet Insertion

Upon completion of the ASCII data, we placed wind speed data and ocean temperature data of a given day on the same spreadsheet. What we wanted to find was the highest wind speed and the ocean temperature of the closest location. In order to do this we had to find a distance function that would allow us to find the closest spot. The formula we found and used was:

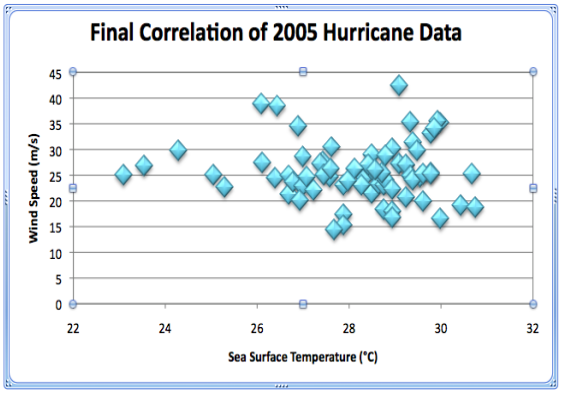
=Sqrt ((x2-x1)^2+(y2-y1)^2)

Due to void data, we did not find any ocean temperature location with the exact longitude and latitude as the wind speed location. We just took the ocean temperature closest to the highest wind speed and created a point for our graphs. There were a different amount of days for each hurricane so each graph had a different amount of points.

IV. CONCLUSION

A. Results

Although each hurricane had its own individual graph, there was no correlation due to the scarcity of points. In order to obtain the correlation we were looking for, all graphs had to be placed into one graph, accommodating all points.



As seen above, there was no real positive or negative correlation, but we did find that the highest wind speed occurred at a high temperature and concluded that high wind speeds will not occur during low temperatures. However, we did find that ocean temperature is not the only contributor to wind speed of hurricanes therefore stating that ocean temperature is not the primary factor.

V. FUTURE WORK

A. Plans

As far as future works, we need to find out other factors in hurricane formation and strength and conduct research on those areas. Also, researching hurricanes from other seasons and regions may yield better conclusions.

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