Extreme Precipitation Analysis over the New York Metropolitan Area.

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Abstract

Flash Flood advisories are essential to sustaining life, in that they provide the public with information to ensure their safe evacuation ahead of time. Therefore, my research project will aim to compare precipitation estimates from rain gauges with radar data that coincide in time periods. I have chosen to concentrate on the New York Metropolitan Area for my research project and I have also gathered data form the National Climatic Data Center. With the data compiled from the NCDC I will examine extreme and average rainfall in the New York Metropolitan area. I can then proceed to make graphs of the average and max precipitation values, which will give me the opportunity to determine the patterns easily. Finally, this data will then be utilized to help predict future storms that may result in similar cases of extreme precipitation or lack there of in the New York Metropolitan area.

Introduction

- Of the many different factors that can affect one's life, rain is rarely ever thought of. However, extreme rainfall occurrences, mostly from tropical storms, have resulted in many deaths especially within the northeast. The New York Metropolitan area has been plagued with such storms as Hurricane Sandy which plagued the area with power outages, massive flooding. These are several of the many reasons why it is essential that these occurrences be recorded, monitored, and observed to find possible correlations that may help to warn the inhabitants of these areas that may be in danger. This is why I have collected data from NCDC to observe both rain gauge and radar data.
- Radar is an important component in the arsenal of forecaster tools to understand both the current state of the atmosphere as well as what might happen in the near future. While satellite data gives a forecaster a sense of the "big picture", radar provides more detail at smaller scales of weather.

How It Works

- - Radars operate by sending out energy from a source and "listening" to the amount that is reflected (scattered) from targets.
- - Targets can be trees, cloud, bumblebees or anything else the radar pulse intercepts.
- - Weather radars utilize frequency of ~ 3000 MHz(10 cm wavelength) - radio waves.
- - The radar transmits short pulses of these radio waves at rate of 1000 pulses/s.
- - Each pulse is very short, lasting only about 1/1,000,000 s.
- Reference - http://www.cocorahs.org/media/docs/radar_basics.pdf

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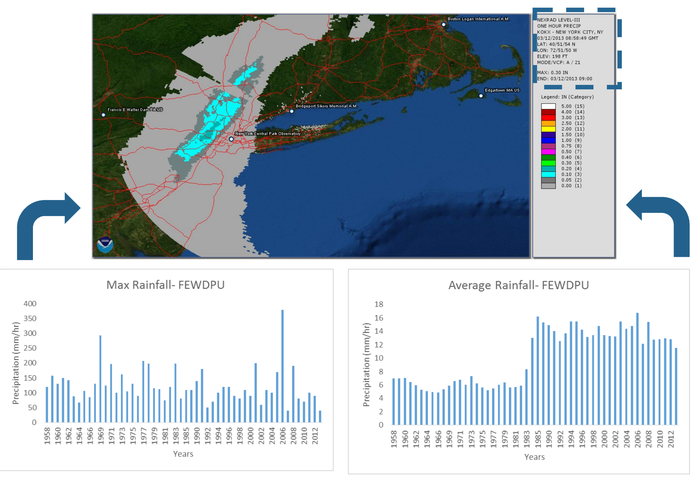
Methods

- First I ordered data through the National Climatic Data Center.
- I then designated my data between latitude 39 N, 43N and longitude 76W, 68W which gave me close to 300 stations.
- I then selected data that ranged within 1948 and 2013.
- Once the data orders were collected, I downloaded them from my email and transferred them into a Microsoft Excel.
- Then I created a separate Excel file to separate the years from the date, in order to run the file through a MATLAB code previously created by my mentor.
- After creating and running the file on MATLAB I received the mean and maximum of each station from 1948 to 2013.
- Upon receiving the mean and maximum from MATLAB, I chose 4 stations with data that exceeded a 20 year span.
- Finally, I transferred the results to Excel and created two bar graphs based on the average and max rainfall of my five stations.

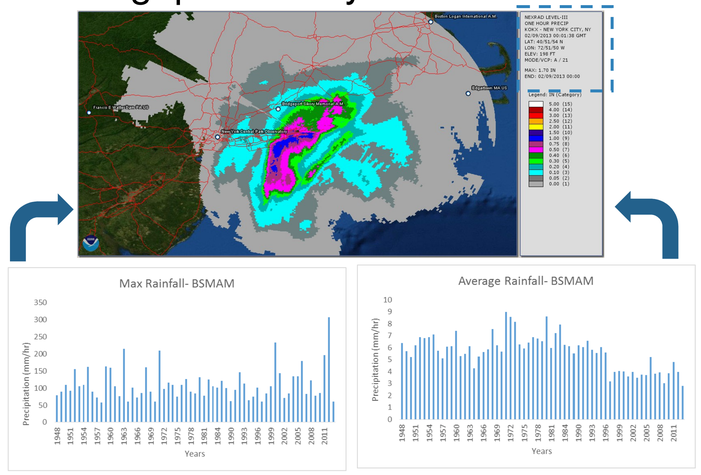
Results

Edgartown MA US

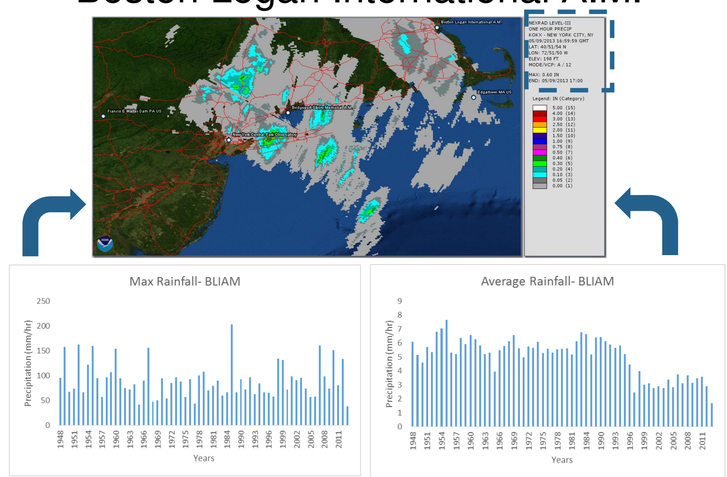
Francis E Walter Dam PA US



Bridgeport Sikory Memorial A.M.



Boston Logan International A.M.



Site Name	Latitude	Longitude
Boston Logan International A.M.	42.36667	-71
Bridgeport Sikory Memorial A.M.	41.16667	-73.133
Francis E Walter Dam PA US	41.11667	-75.73333
Edgartown MA US	41.38333	-70.51667

Conclusions

- After compiling and analyzing my data, I observed great fluctuation patterns to be common in all the graphs of extreme rainfall.
- In contrast, I observed little to no fluctuation patterns in all the graphs of average rainfall.
- Edgartown MA US has **23** years of data. Francis E Walter Dam PA US has **52** years of data. Bridgeport Sikory Memorial A.M. has **62** years of data. New York Central Park Observatory has **66** years of data (not displayed). Boston Logan International A.M. has **63** years of data.
- As one rain gauge station has the maximum amount of rainfall of that year, I observed that many of the other stations had either experienced, were experiencing, or were going to experience similar measurements of rainfall. (New York Metropolitan Area)
- Comparing rain gauge records with radar data shows that the storm has moved from the stations that we are examining. It may be because of a difference in time zone (EDT & GMT). However, we have storms in areas close to the stations with values close to the rain gauge records.
- Radar rainfall measurements from these images were observed to be slightly less than the rainfall measurements observed from the rain gauge bar graphs.