Understanding Severe Precipitation Characteristics in Puerto Rico Using Historical Data

Said A. Mejia-Manrique, Doctoral Student
Ana M. Mejia-Manrique, Doctoral Student
Dr. Reza Khanbilvardi, Advisor
The City College Of New York

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Background

- In the last two decades, Several extreme precipitation events such as tropical storms and Hurricanes have passed through Puerto Rico affecting the island with different power outages and flooding

- Regarding to Flooding, the Federal Emergency Management Agency (FEMA) has published the 2 flooded maps for Puerto Rico for 100 and 500 years of return period

*Flooded area during Hurricane Maria[1]*

Flooded area based on a precipitation return precipitation of 500 yrs.

[1] https://www.washingtonpost.com/news/post-nation/wp/2017/09/22/at-least-6-dead-in-puerto-rico-due-to-hurricane-maria-officials-say/

Background

- Depth-Duration-Frequency (DDF) curves can be used to estimate the precipitation depth or volume for different durations and frequencies (return periods)

- DDF curves are commonly used in hydrological modeling, flood forecasting, and water resources management.

- NOAA created DDF curves for Puerto Rico using data recorded by rain gauges until 2004 (traditional)
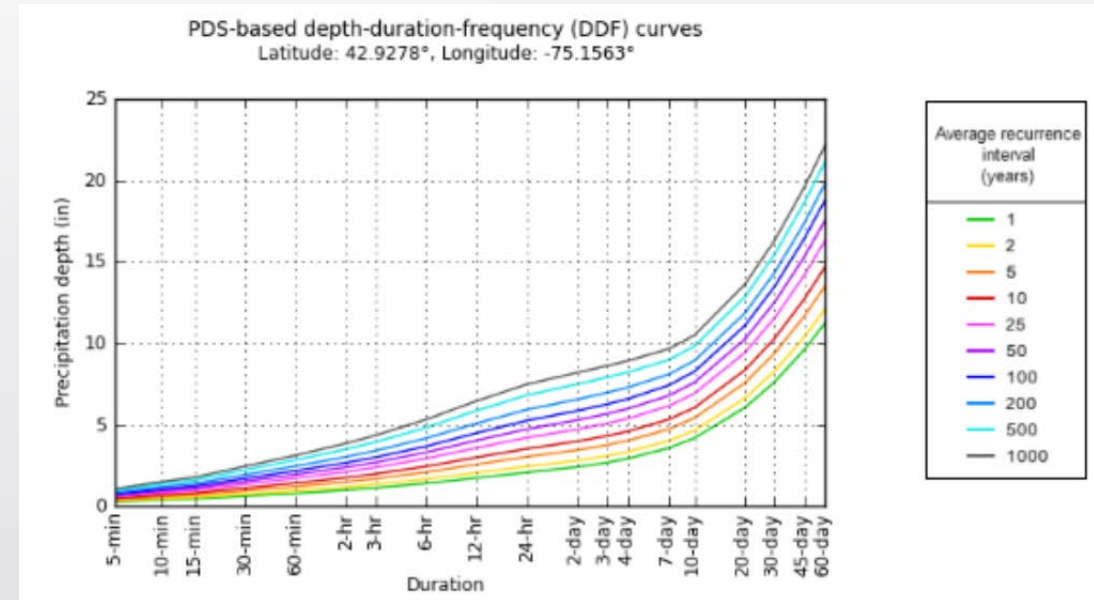
Source: Precipitation Frequency Data Server - NOAA

Research Questions

- Have the peaks of precipitation frequency increased over the past two decades over Puerto Rico?

- Are there any difference between the traditional DDF and the updated DDF with new data up to 2022, due to the precipitation events occurred over the recent decades?
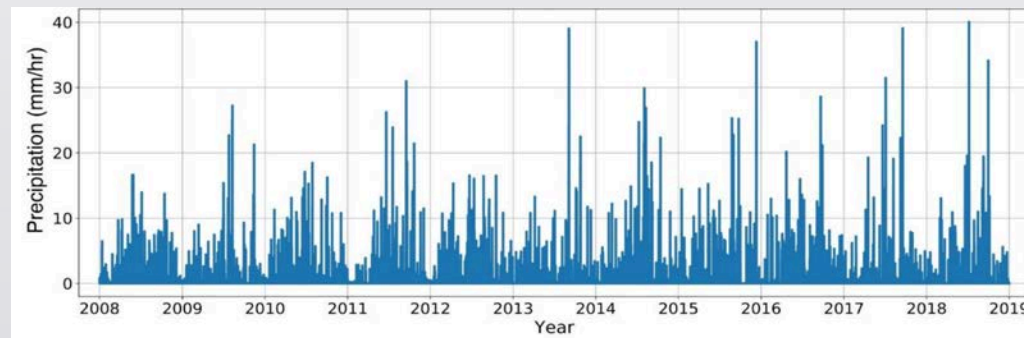
Precipitation Time Series for a specific rain gauge

Study Area
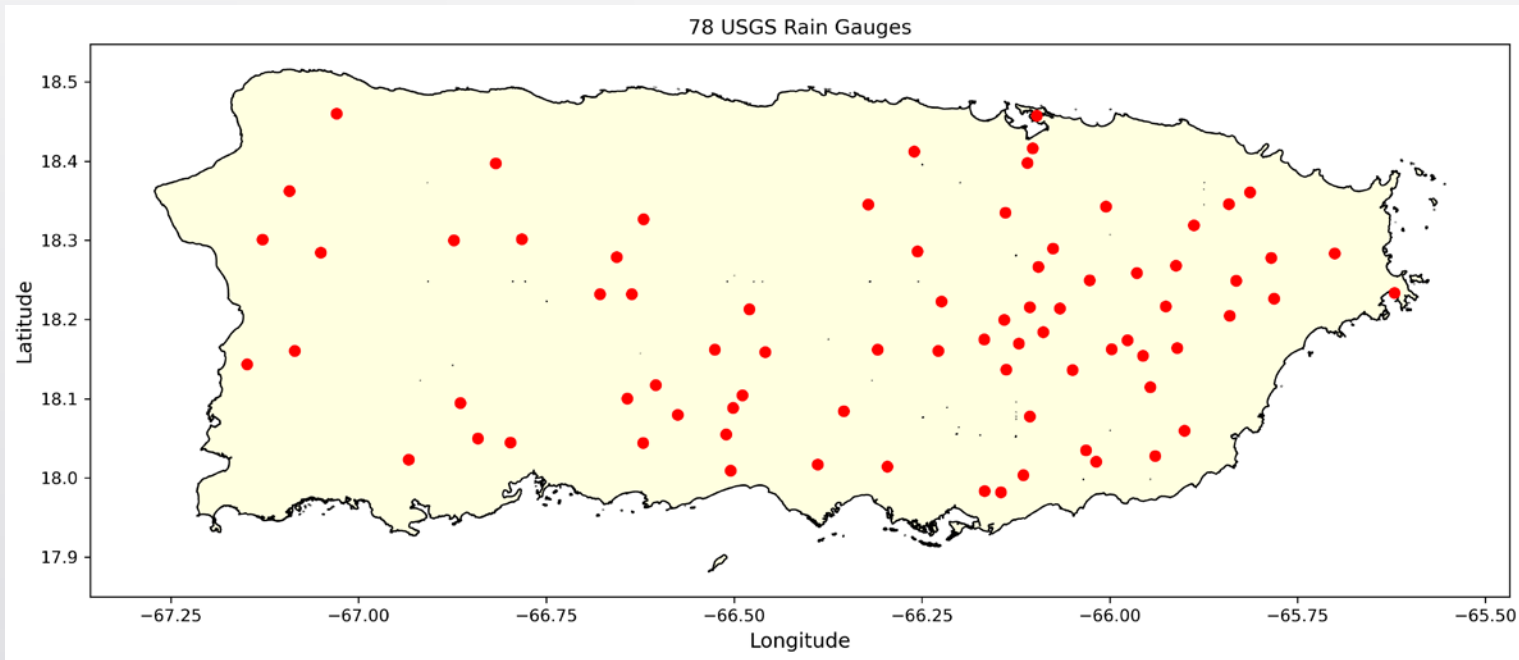
United States Geological Survey (USGS) Rain Gauge

Computer skills

Software

Programming
Language

Some Python
Packages:

Research Outcomes

- Create a python script that downloads precipitation data from the USGS website
- Perform a data analysis on the downloaded precipitation data and create different type of plots
- Create and understanding of DDF curves
- Develop some research skills such as:
  - Working with spatial and temporal data
  - Data analysis
  - How to fix probability functions into dataset
  - Visualization (maps and time series data)
  - Understanding of precipitation frequencies

THANK YOU!!