More Mapping Report

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1.0 Introduction

This project is a continuation of previous work in MA 615 about mapping hurricane tracks and their rainfall levels. So, to further develop products from this data, we decided to plot three different hurricanes and create this report, a document, and a shiny application to be able to efficiently present our work and findings to clients, and in this case, to Haviland.

1.1 Goal

The goal for this project is to compare the amount of rainfall of hurricanes in areas in the United States (specifically the east half side) over three years.

1.2 Plan

Because this is a mapping project, we decided to map the three hurricane tracks and their amount of rainfall on three different maps, on the same size scale. This allows us to visually compare the three maps to decide the most damaging hurricane from the least damaging. Here are the steps to get to this point:

- Choosing the three consecutive hurricanes
- Cleaning the data
- Connecting the coordinates with the data
- Mapping the data

Now, we will begin the process.

2.0 Data Cleaning

In this data cleaning section, the idea is to organize the data into smaller datasets in which we will use. This includes variables like rain, hurricane name, coordinates, and more.

2.1 Extracting the Data

We extracted the raw data from the "hurricaneexposuredata" package in which we also extracted the "hurr_tracks" and "rain" data to be able to plot the curve of the hurricane and the rain levels. Also, we chose to look at hurricanes One (2009), Earl (2010), and Irene (2011).

2.2 Rain Data & Fips Organization

We extracted the specific rain data for the three hurricanes along with changing the fips column to numerics rather than characters.

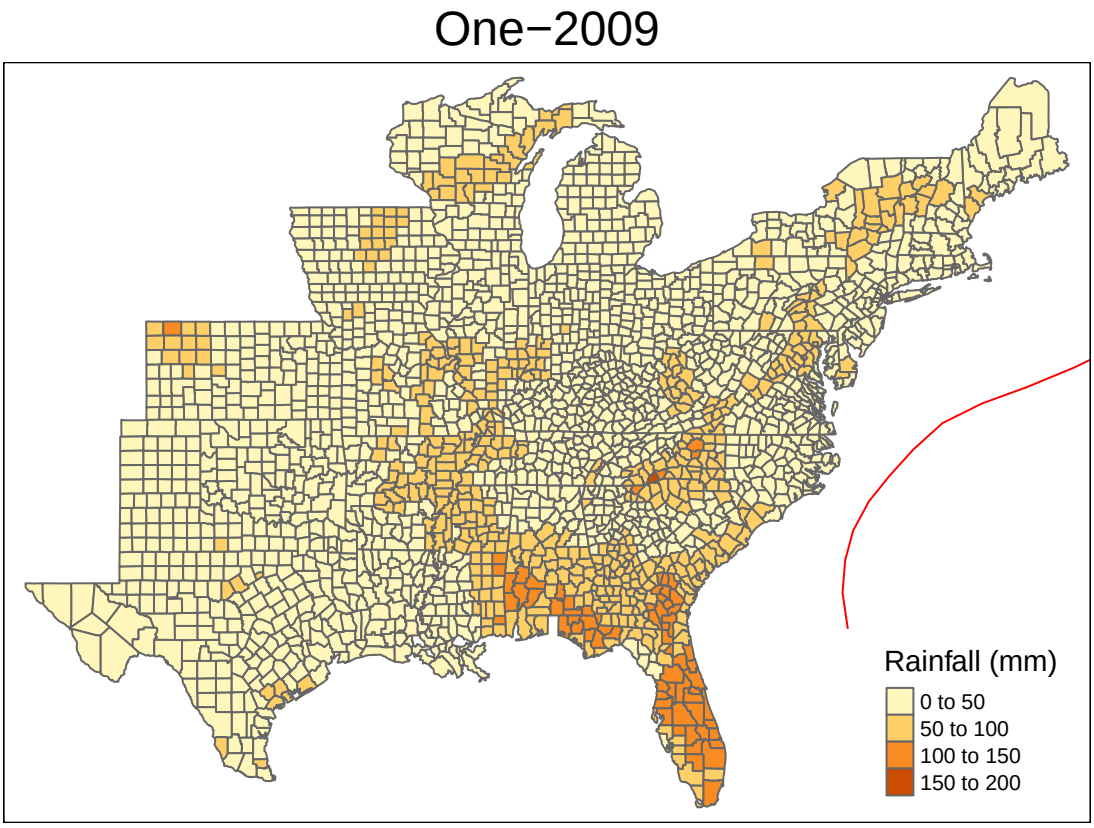
2.3 Coordinate & Map Organization

We combined the data to produce a curve for the hurricane tracks of the three hurricanes using the coordinate data.

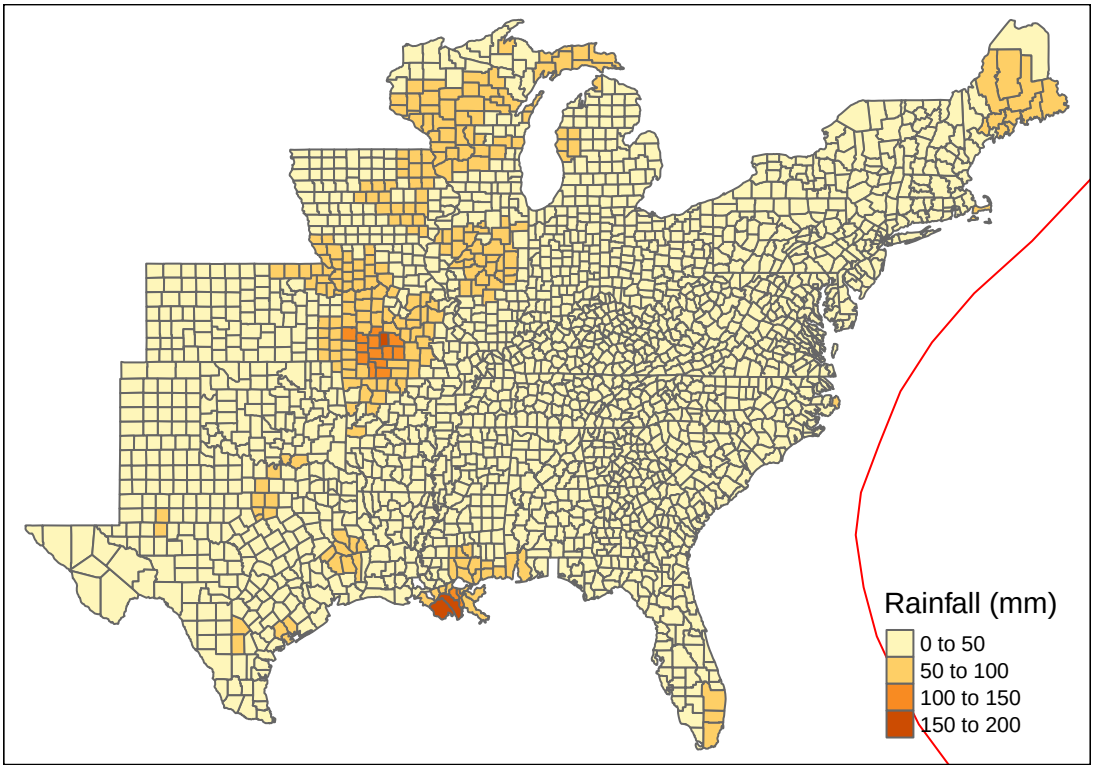
2.4 Plotting the maps

Now, we plotted the maps. Here, we used the tmap method because we were able to tailor the maps exactly how we wanted it to look.

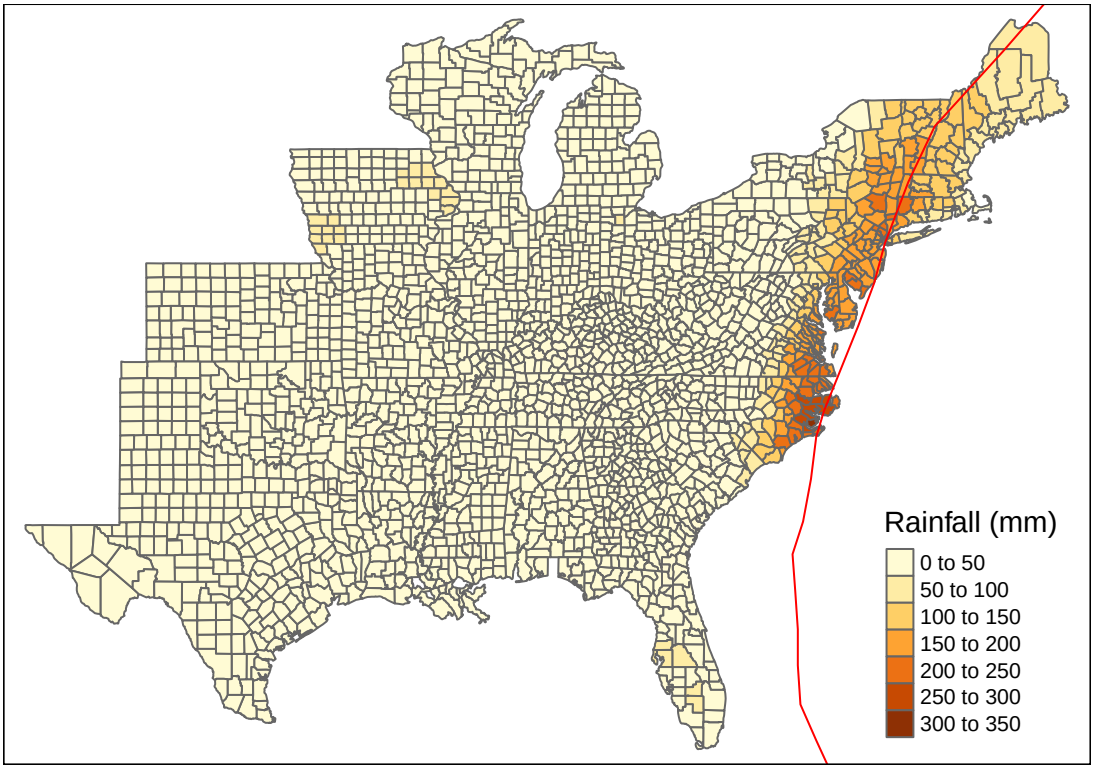
Plotting all three hurricane tracks and amount of rainfall



Earl−2010



Irene−2011



3.0 Problems

Problem: Our client, Haviland Wright, gave us the FEMA website to help us decide which hurricanes to use. Our initial idea was to pick a state (Massachusetts) and look at three consecutive years. We would then pick one hurricane for each year. However, the FEMA platform had recorded hurricanes that were not in the "hurricaneexposuredata" package.

Solution: To fix this problem, we disregarded the FEMA data and found one hurricane for each year in 2009-2011 for the whole east side of the United States.

4.0 Conclusion

We found that because Hurricane Irene made direct contact with land and that the precipitation levels were generally higher than the other two hurricanes.

In addition, it is difficult, just from the maps, to decide if either Hurricane Earl or One has done the most water damage. Hurricane Earl has a lot less effected land but hit a part in Louisiana. Hurricane One effected much more of the land but at less precipitation levels. We would conclude that Hurricane Irene had the most rain, Hurricane One had the middle amount of rain, and Hurricane Earl had the least about of rain.

We made the code this way (organized this way but also with many comments) because we wanted to allow more data and more hurricanes to be easily added or subtracted.