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Research Area

The research examined rainfall in the state of Texas from 2015. The National Weather Service recorded that, in 2015 Texas suffered from severe rain and flash floods that caused an estimated 35 trillion gallons of water to fall on Texas, which is enough to cover the entire state in eight inches of water. The study encompassed the entire state of Texas.

Motivation or Background

The purpose of the study is to compile a detailed record of the extreme rainfall over Texas during the year of 2015. It was a year that broke many records and caused a great deal of flooding in Central Texas. The 35 trillion gallons of water that fell that year is enough to supply the world's drinking water for 27 years. The purpose of the study is to give people the information they need to create better water management techniques. Texas suffers from periodic droughts and floods> improved water management techniques will reduce the severity of both.

Objectives

- Compile a record of rainfall data for the year of 2015.
- Create accurate data representation.
- Understand the rainfall data from 2015 in relation to other data. Compare maximums and minimums, means, and overall trends.
- Develop maps to demonstrate the rainfall patterns of 2015.

Methodology

- Data was recorded using 13 WSR-88D (Weather Surveillance Radar-1988 Doppler) Next Generation Weather Radar (NEXRAD) systems across Texas. The quality controlled rainfall produced by these radar is named Multi-sensor Precipitation Estimator (MPE). The MPE data is available at the National Center for Atmospheric Research website. The radar data is available for 4x4 km grids covering all of Texas at hourly time scale (a total of 152,366 grid values for every hour).
- Develop maps of rainfall over Texas based of radar estimates.

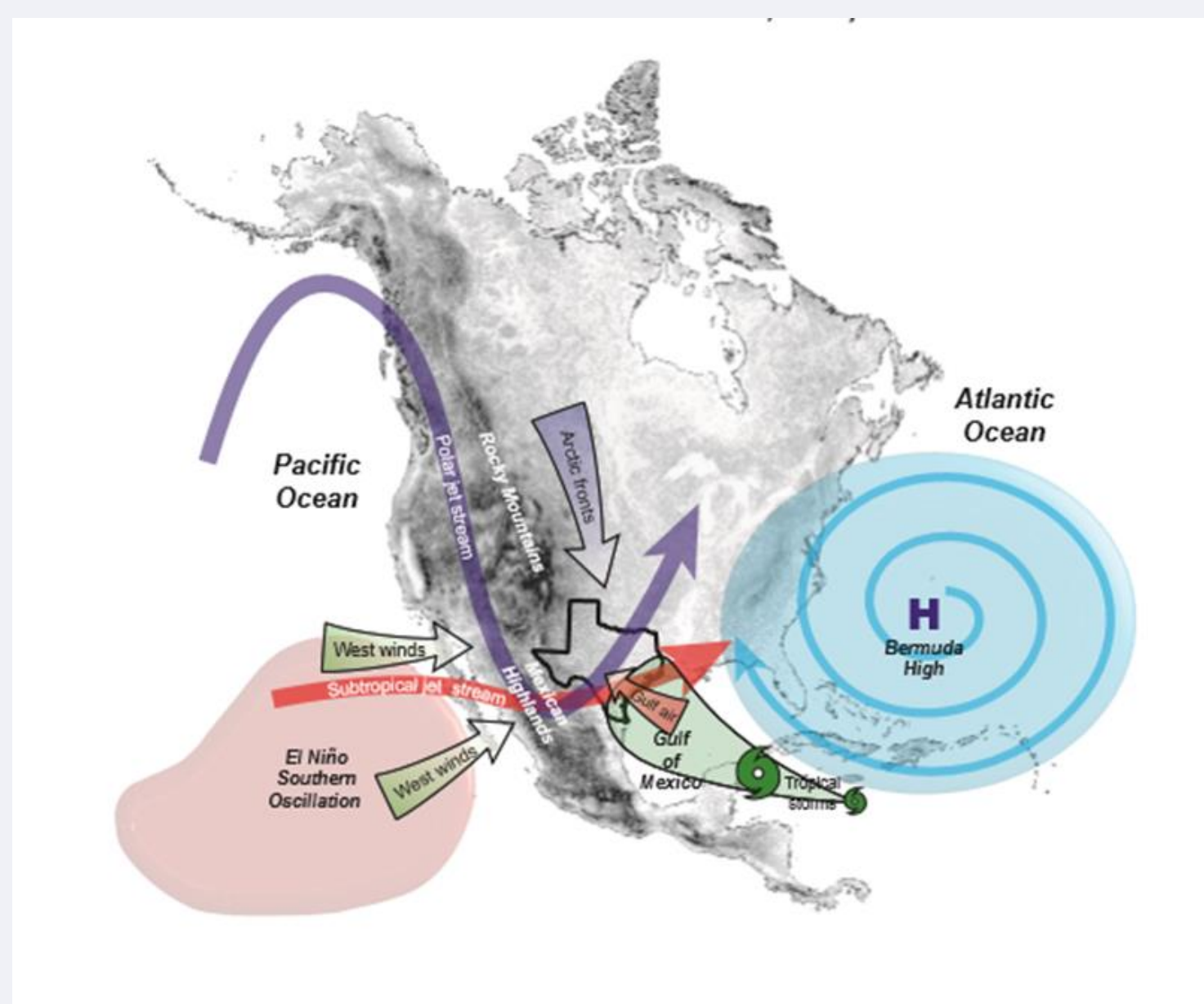


Figure 1 The geographic location of Texas within North America and its interaction with seasonal air masses affects the state's unique climate variability.

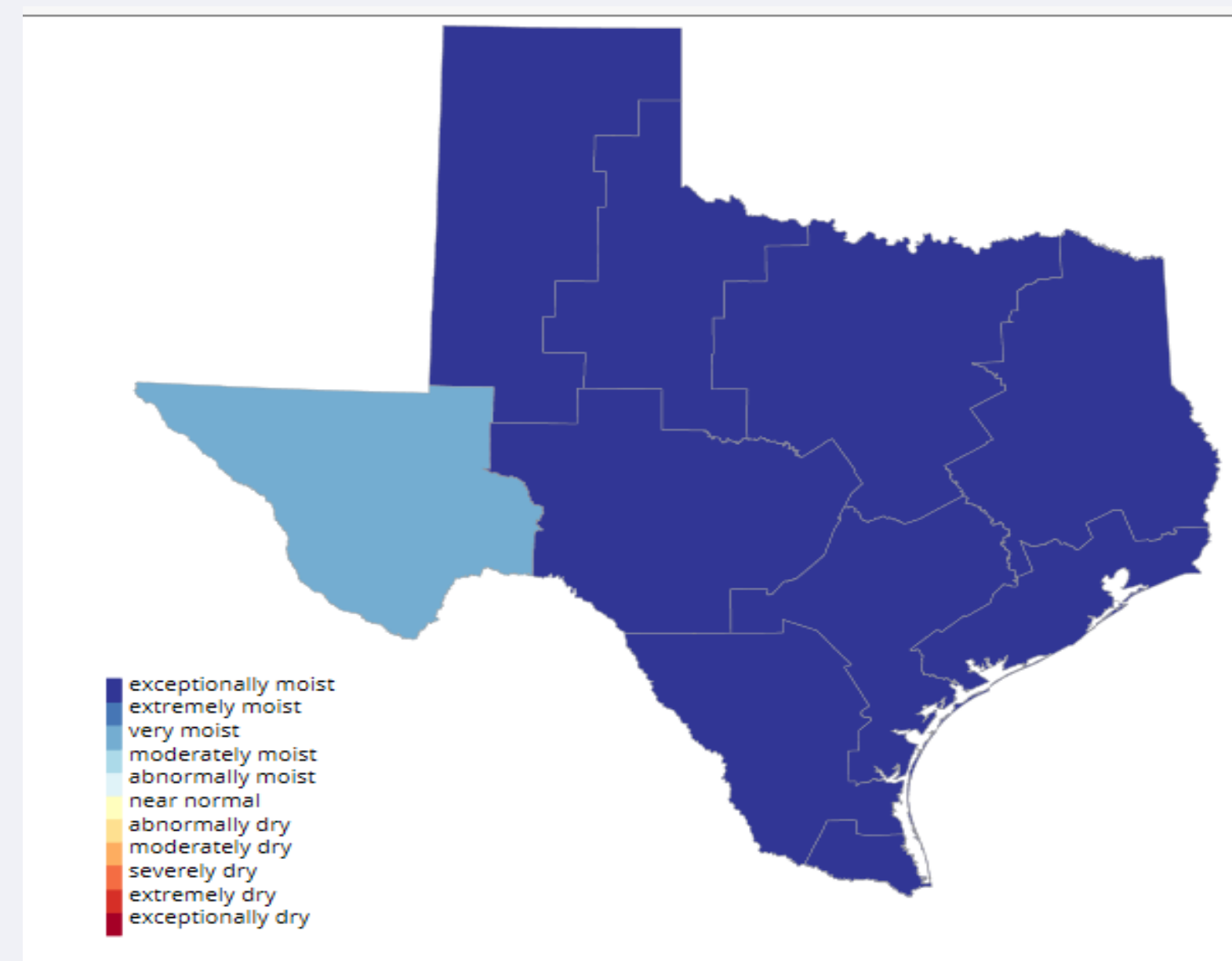


Figure 2 Standardized Precipitation Index – Texas May, 2015 as an example

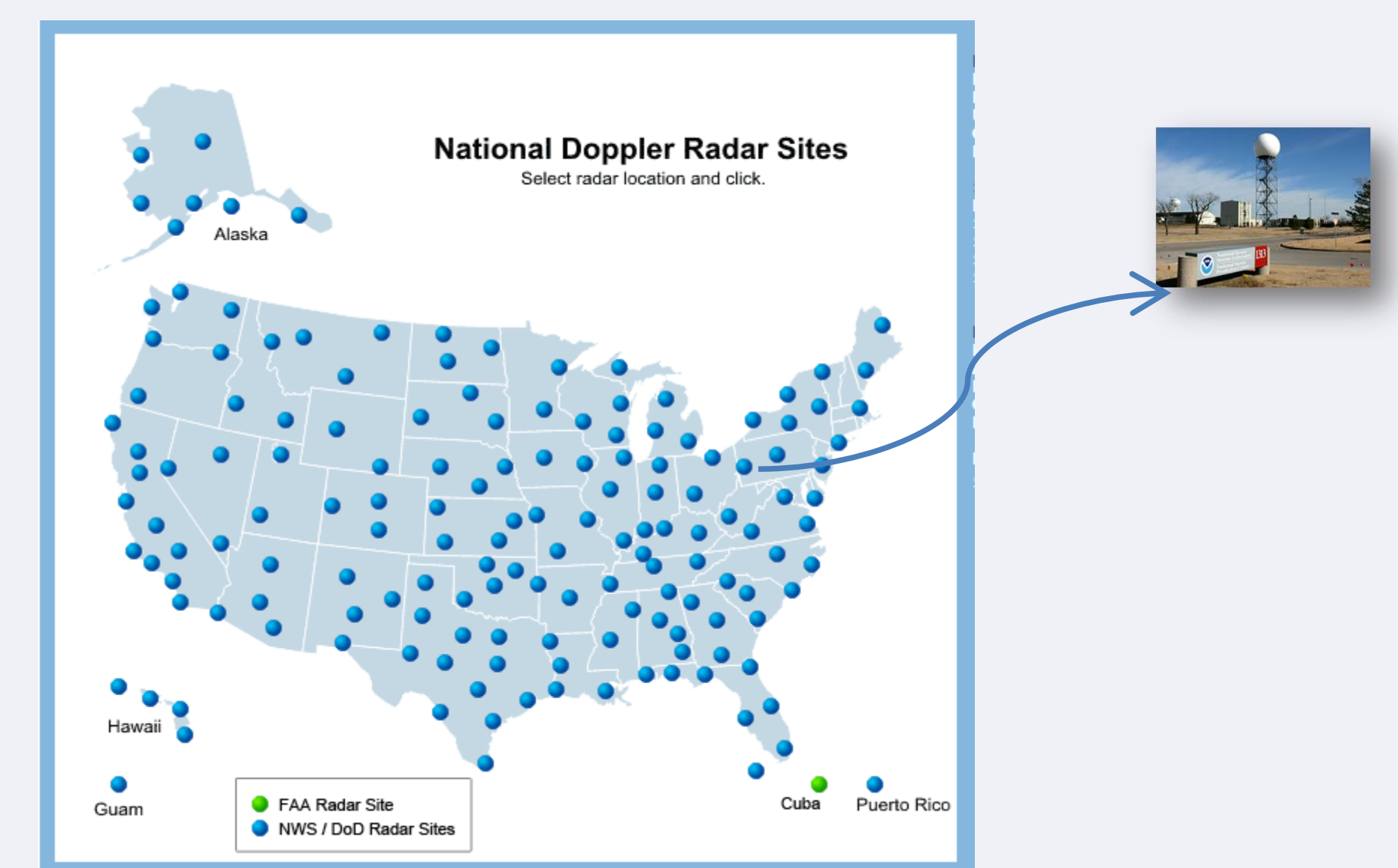


Figure 3 Locations of NEXRAD radars over the United States

Results

Generally, the stations located in Texas recorded that the rainfall in 2015 was the heaviest in state records. The results from rain gauges show that May and October were the wettest months in 2015, while the months with the least rainfall were April, June, and November.

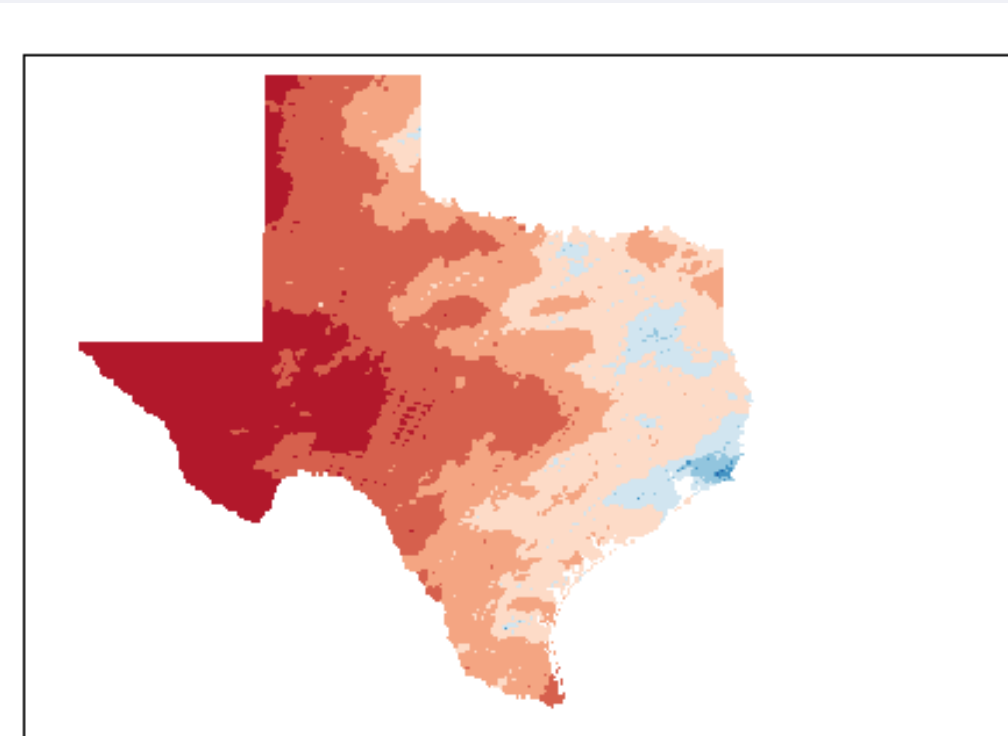


Figure 4 NEXRAD weather radar rainfall estimates over Texas for April 2015

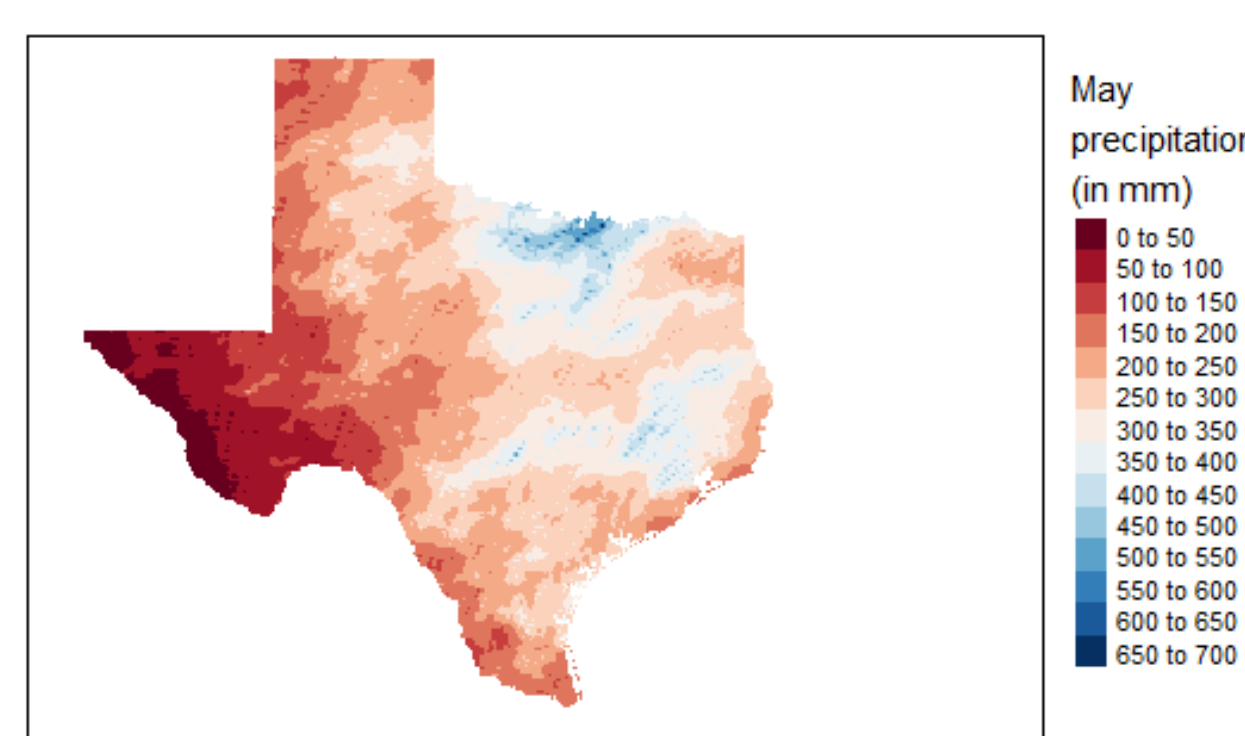


Figure 5 NEXRAD weather radar rainfall estimates over Texas for May 2015

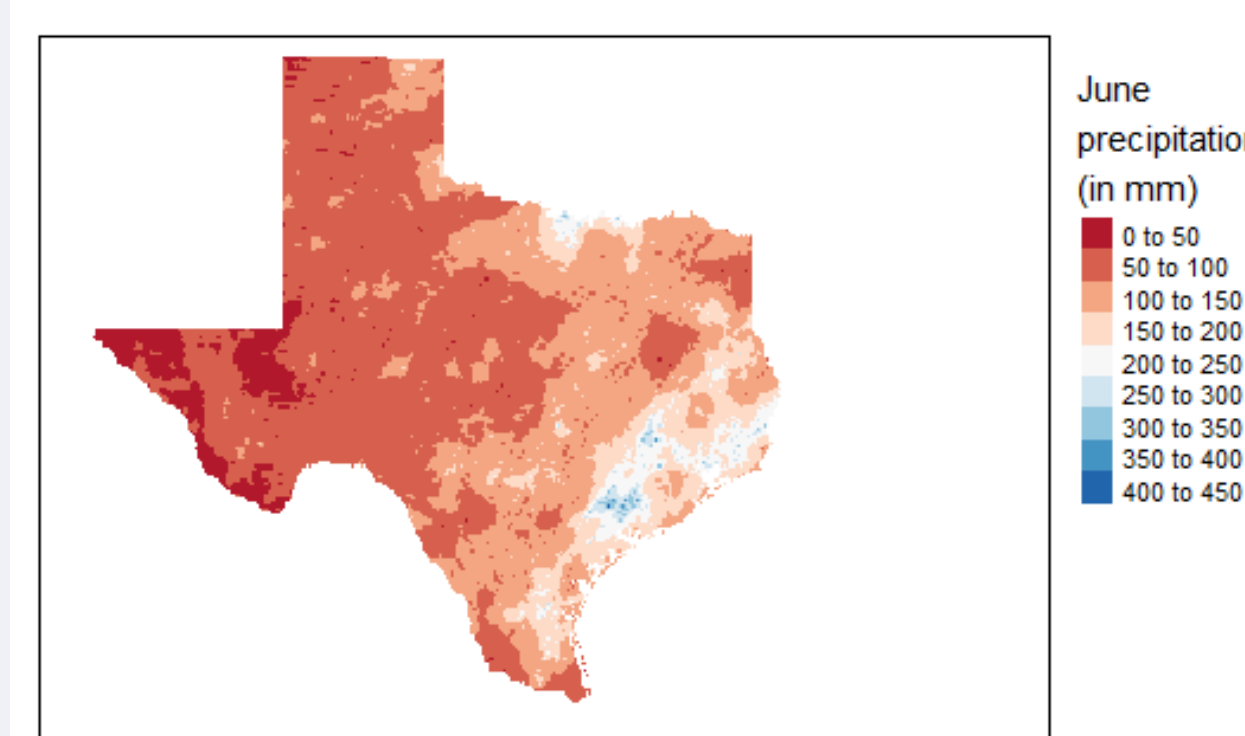


Figure 6 NEXRAD weather radar rainfall estimates over Texas for June 2015

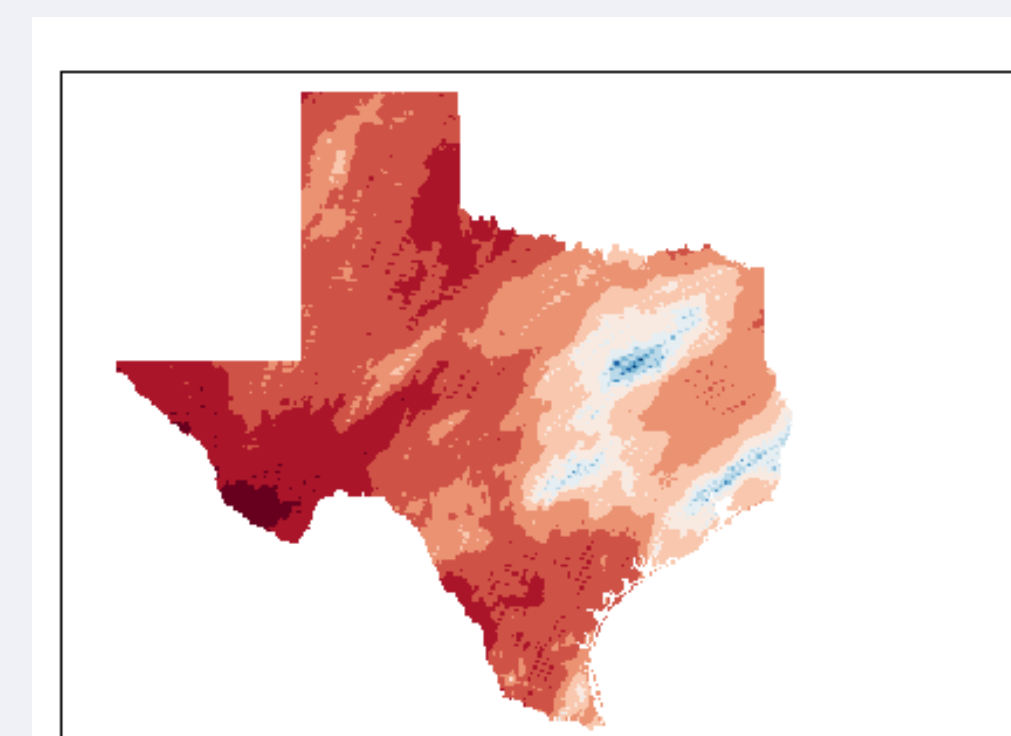


Figure 7 NEXRAD weather radar rainfall estimates over Texas for October 2015

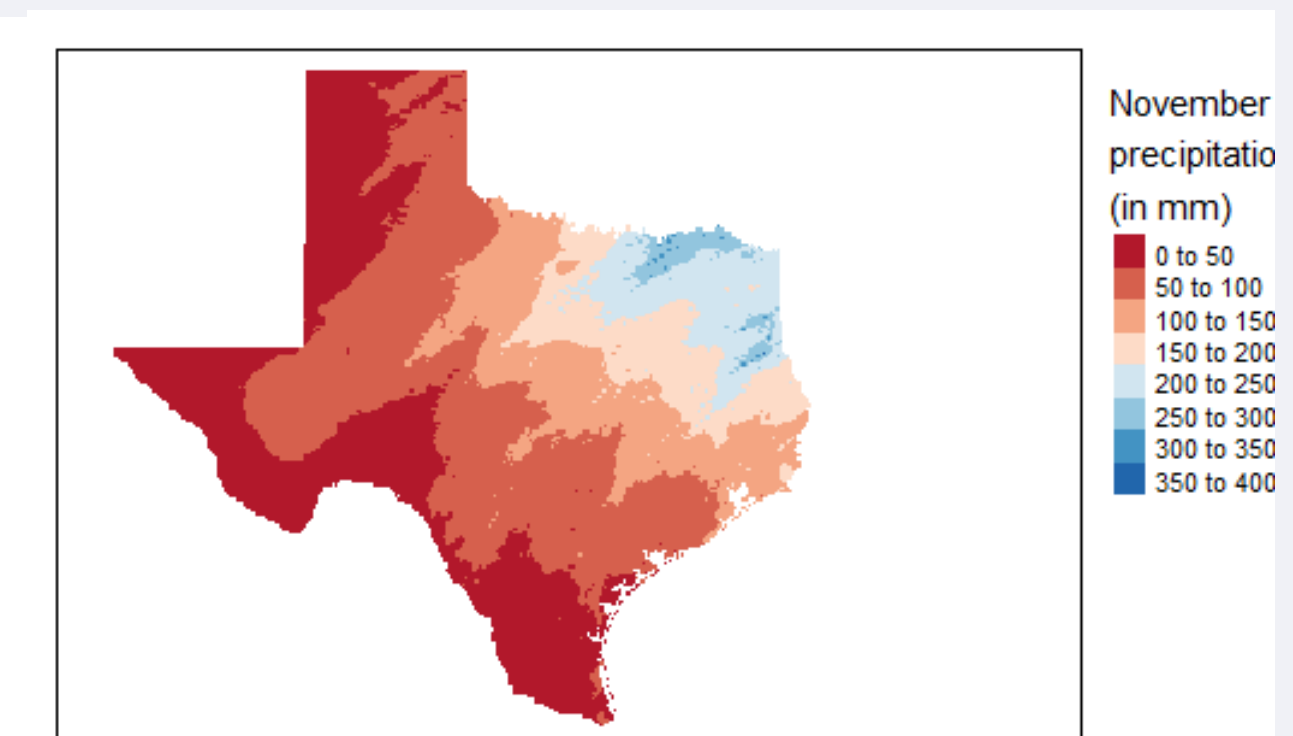


Figure 8 NEXRAD weather radar rainfall estimates over Texas for November 2015

Future Plans

Rainfall data was also recorded by more than 2,000 rain gauges across Texas. These rain gauges are operated by the National Oceanic and Atmospheric Administration (NOAA) and the United States Geological Survey (USGS). Rain gauges are more accurate than radar but their coverage is limited. Rain gauge have a record going back to the 1800s but radars started in the mid 1990s. A combination of rain gauge and radar data will provide the best rainfall product. The rain gauge data will be used in a future study of the extreme precipitation of the year 2015.

Acknowledgments

- Dr. Hatim Sharif
- Dr. Krystel Castillo
- UTSA Engineering Undergraduate Research
- This work is supported by the USDA National Institute of Food and Agriculture, Interdisciplinary Hands-on Research Traineeship and Extension Experiential Learning in Bioenergy/Natural Resources/Economics/Rural project, U-GREAT (UnderGraduate Research, Education And Training) program (2016-67032-24984).

