

Exploring Extreme Weather Events in the US

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Extreme Weather Analysis

Client:

The National Oceanic and Atmospheric Administration, in partnership with NASA seeks to better understand the effects of extreme weather in the United States.

Goal:

Produce a dashboard to enable easy visualization of extreme weather impacts.



Data was pulled from the NOAA Storm Events database.

Each row represents a weather event with associated date, location, the number of direct and indirect deaths, crop damage and property damage associated with the event.

Includes 1.2 million weather events.

Missing data for 2016, 2018.

Tools Used:

- Numpy & Pandas
- Geopandas & Geopy
- Plotly, Streamlit

Data



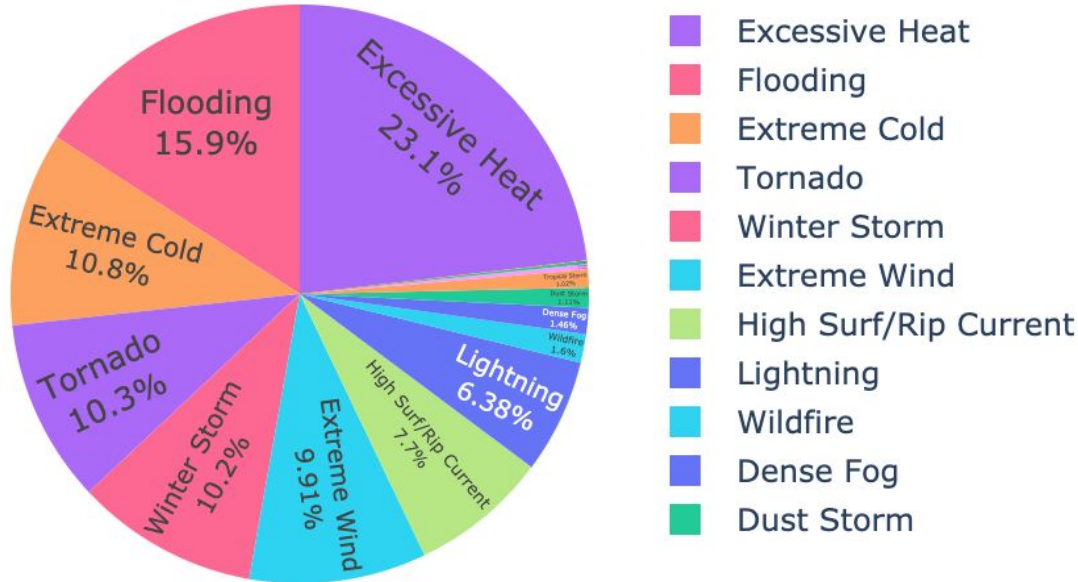
Pacific Northwest fires smother region in fire and ash.

Data Cleaning & EDA

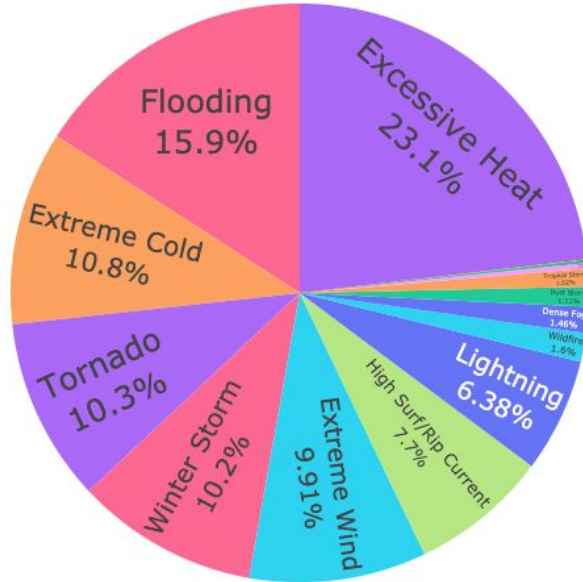
- Restrict to US states, exclude marine zones
- Format money columns (e.g. '300K' = 300,000)
- Map weather events into smaller category space
- Convert **forecast weather zones** to **county-based FIPS codes**



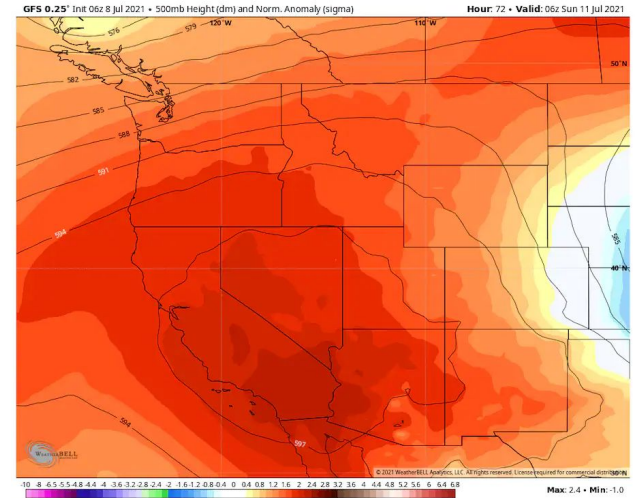
Weather-Related Deaths in the US



Weather-Related Deaths in the US

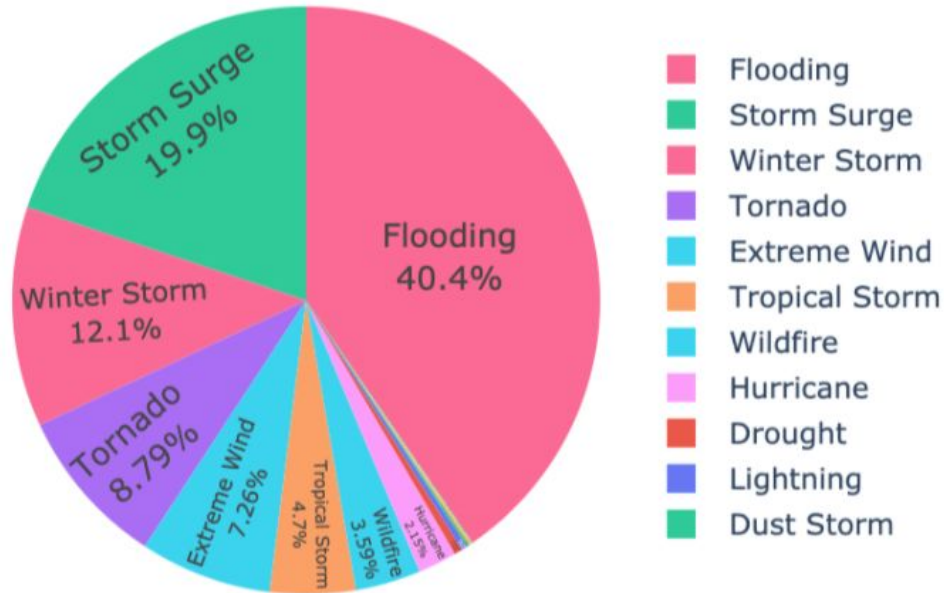


- Excessive Heat
- Flooding
- Extreme Cold
- Tornado
- Winter Storm
- Extreme Wind
- High Surf/Rip Current
- Lightning
- Wildfire
- Dense Fog
- Dust Storm

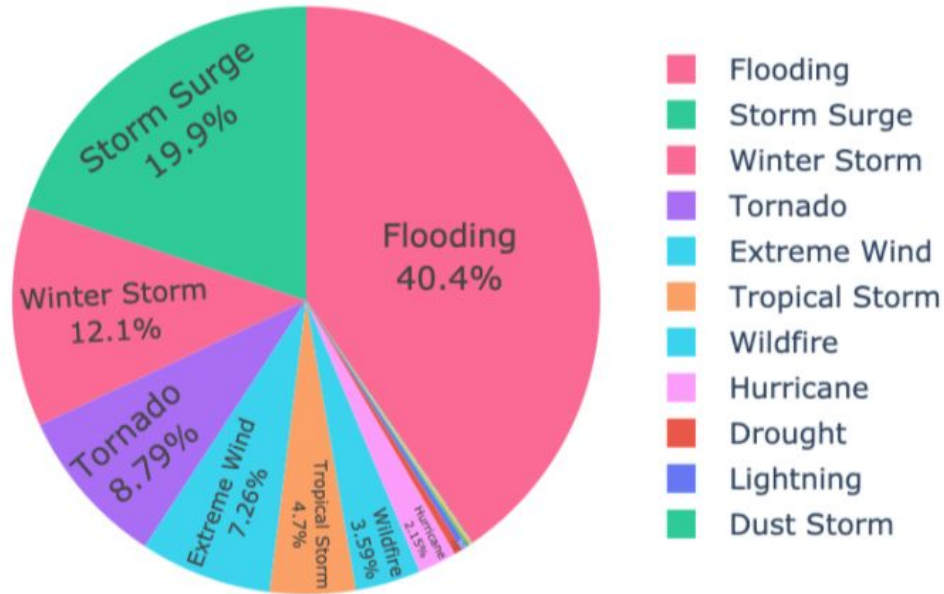


Over 31 million people are under excessive heat warnings or heat advisories in July, 2021.

Property Damage in the US



Property Damage in the US



Although elevated, this house in North Carolina could not withstand the 15 ft (4.5 m) of storm surge that came with Hurricane Floyd (1999)

Explore Extreme Weather Events in US ([Live Demo](#))

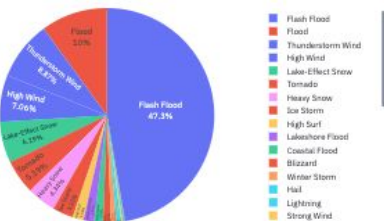
Select a state

New York

Select measure of climate impact

- ☐ deaths
☒ damage_property
☐ damage_crops

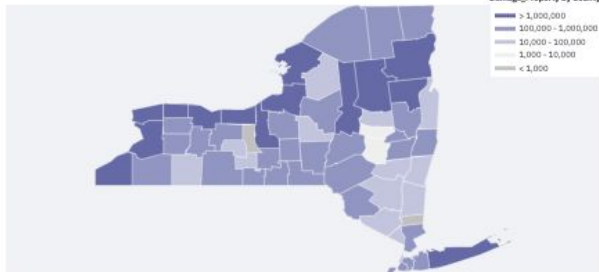
Damage_Property caused by extreme weather in New York



Year

1997 2019

NEW YORK, 2019



Results are derived from the National Oceanic and Atmospheric Administration's [Storm Events Database](#).

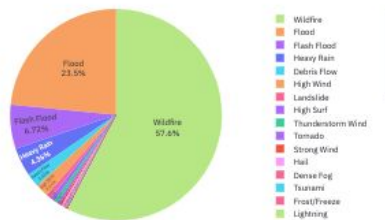
Select a state

California

Select measure of climate impact

- ☐ deaths
☒ damage_property
☐ damage_crops

Damage_Property caused by extreme weather in California



Year

1997 2019

CALIFORNIA, 2019



Results are derived from the National Oceanic and Atmospheric Administration's [Storm Events Database](#).

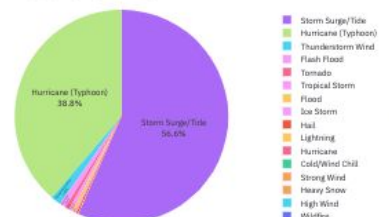
Select a state

Louisiana

Select measure of climate impact

- ☐ deaths
☒ damage_property
☐ damage_crops

Damage_Property caused by extreme weather in Louisiana



Year

1997 2019

LOUISIANA, 2005



Results are derived from the National Oceanic and Atmospheric Administration's [Storm Events Database](#).

Conclusions

Flooding causes more property damage than any other weather event, second highest cause of weather-related deaths.

- Coastal cities should begin planning managed retreats

State-specific outreach and education can save lives.

Public Education



Over half of all flood-related drownings occur when a vehicle is driven into hazardous flood water. It takes just 12 inches of rushing water to carry away most cars.

LA's homeless communities are avoiding cooling centers, and it's not just because of COVID-19

Pinned between the climate crisis, COVID, and street sweeps, homeless people in L.A. are struggling to keep cool.



Try to freeze (not just chill) bottled water before handing it out. The ice will melt slowly for drinking, but can also be used for general cooling.

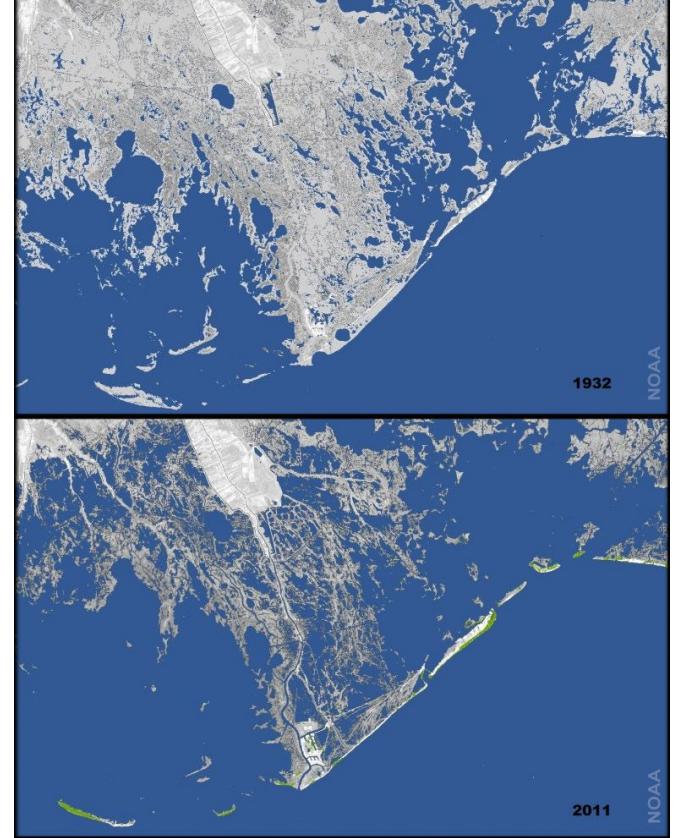
Future Work

Fill in data for missing years.

Develop dashboard to allow regional, national analyses.

Clean up geospatial analysis -- incorporate lat/long.

Add live update capabilities.



The people of the Isle de Jean Charles are Louisiana's first climate refugees -- but they won't be the last.