Examining the extent of Hurricane Harvey through social media-generated data, spatial assessment and network analysis

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Outline

Background

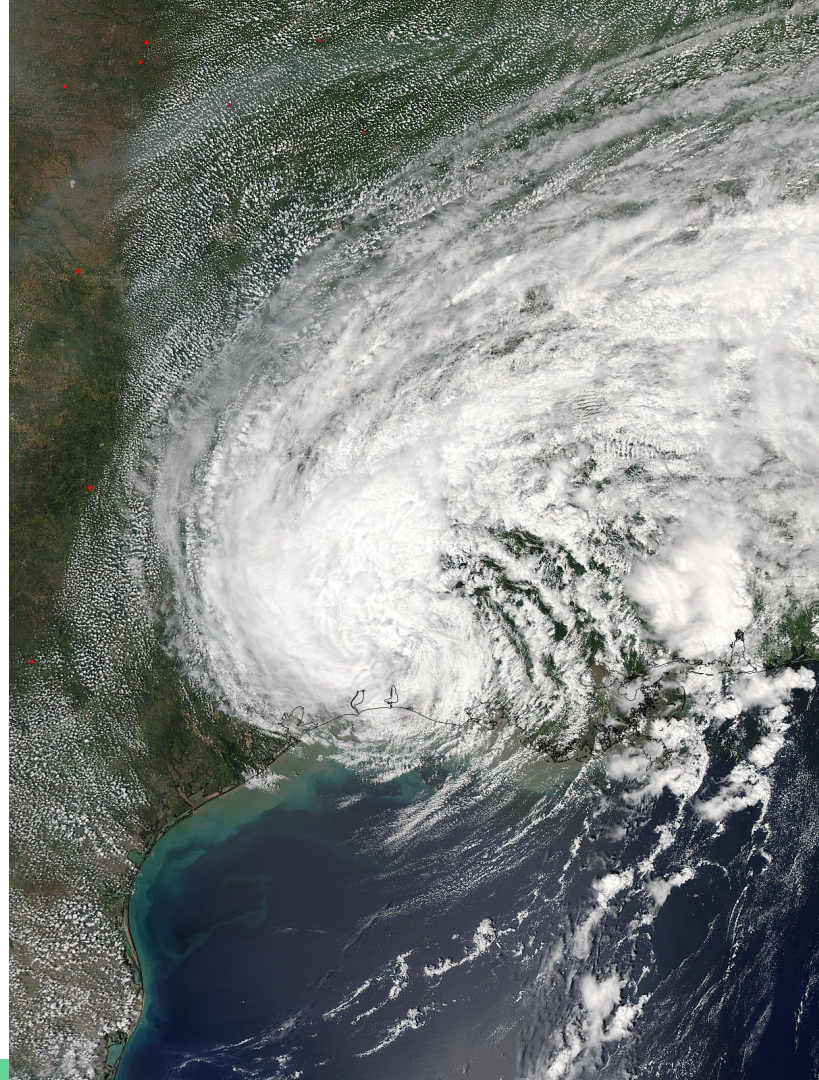
Assessing the damaged areas

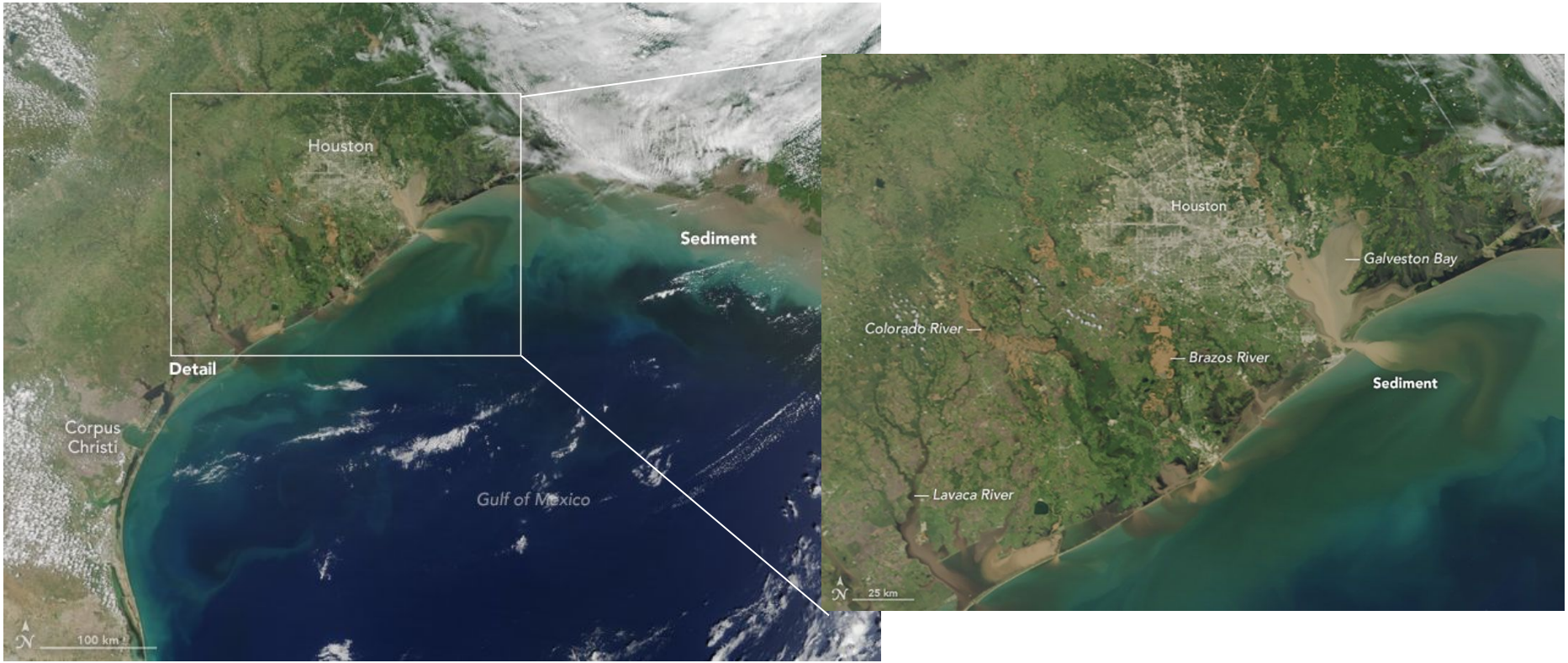
- Social media-generated data
- Spatial assessment using FEMA data

Identifying aid center locations

- Location allocation model

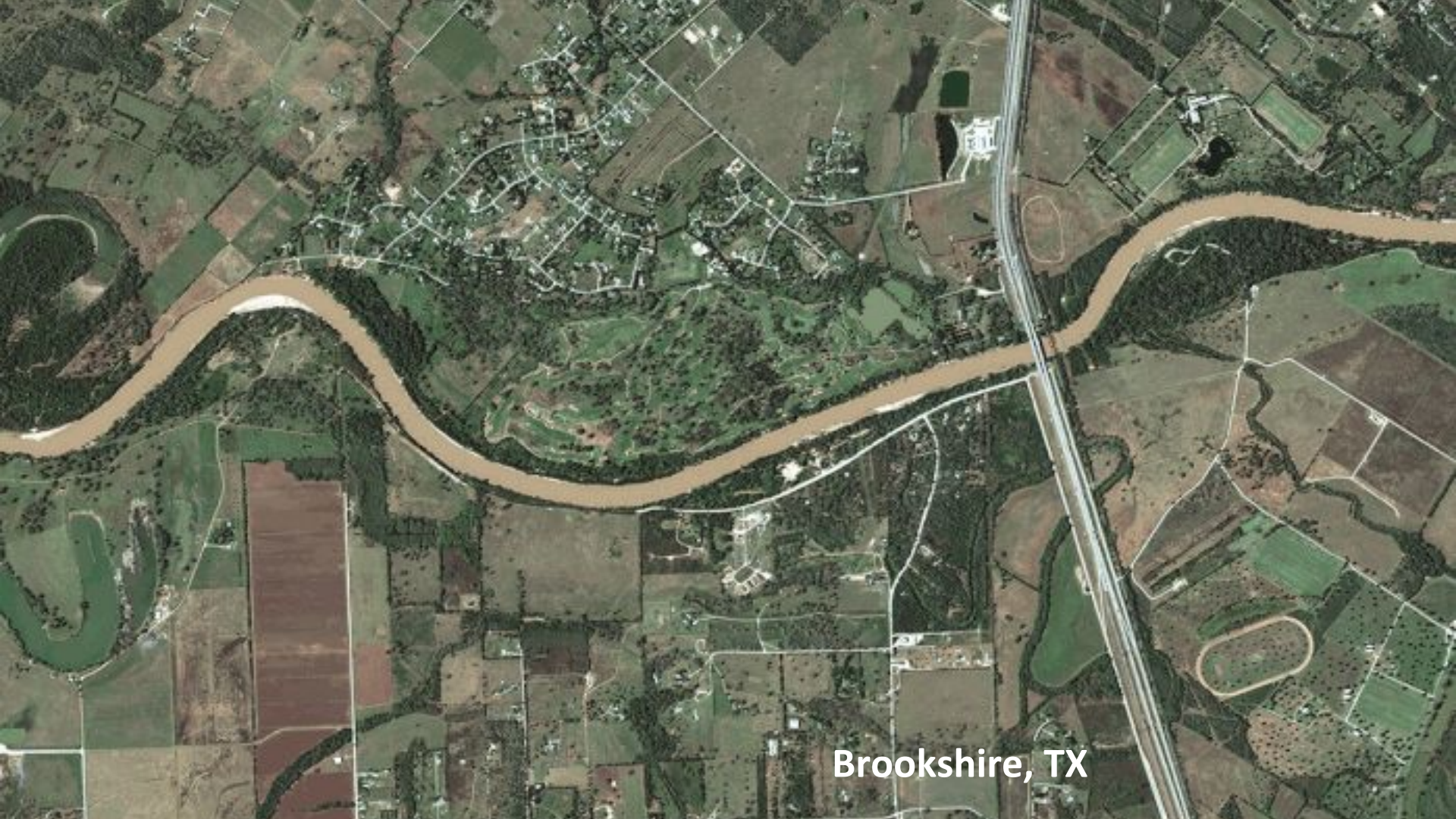
Appendix





NASA Earth Observatory Image Aug 31, 2017


Simonton, TX


Brookshire, TX


Holiday Lakes, TX


Rosenberg, TX

Assessing Damaged Areas

Social Media-Generated Data (Twitter)

1st Search

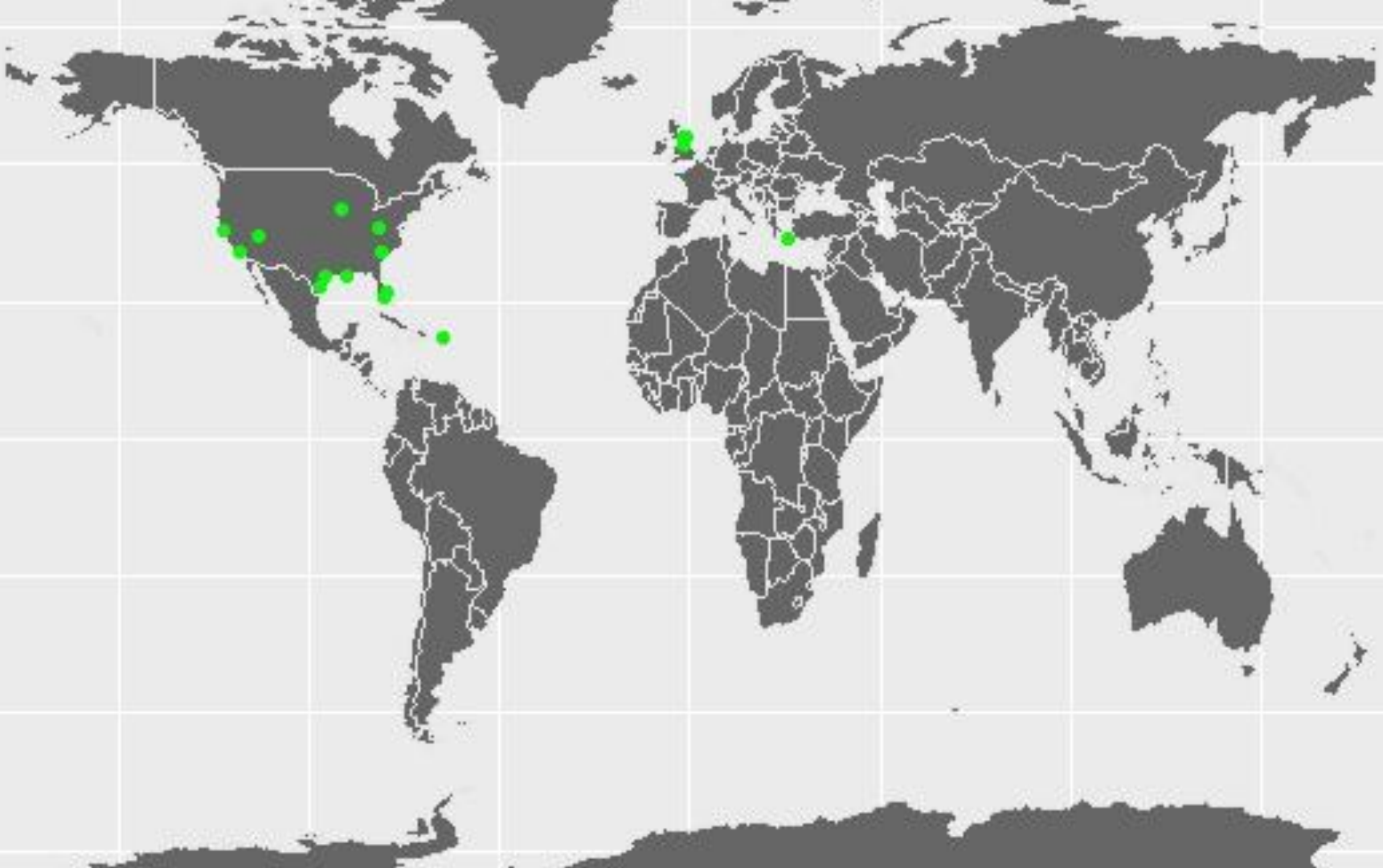
- Key-words “#Harvey”, “#hurricaneharvey”, “#hurricane”
- 10,000 tweets
- Between 8/17/2017-9/3/2017
- 200 miles radius of Houston
- NO results returned

2nd Search

- Key-words “#Harvey”, “#hurricaneharvey”, “#hurricane”
- 15,000 tweets
- 30 had a lat/long attribute associated with it
- 0.2%

Data Organization

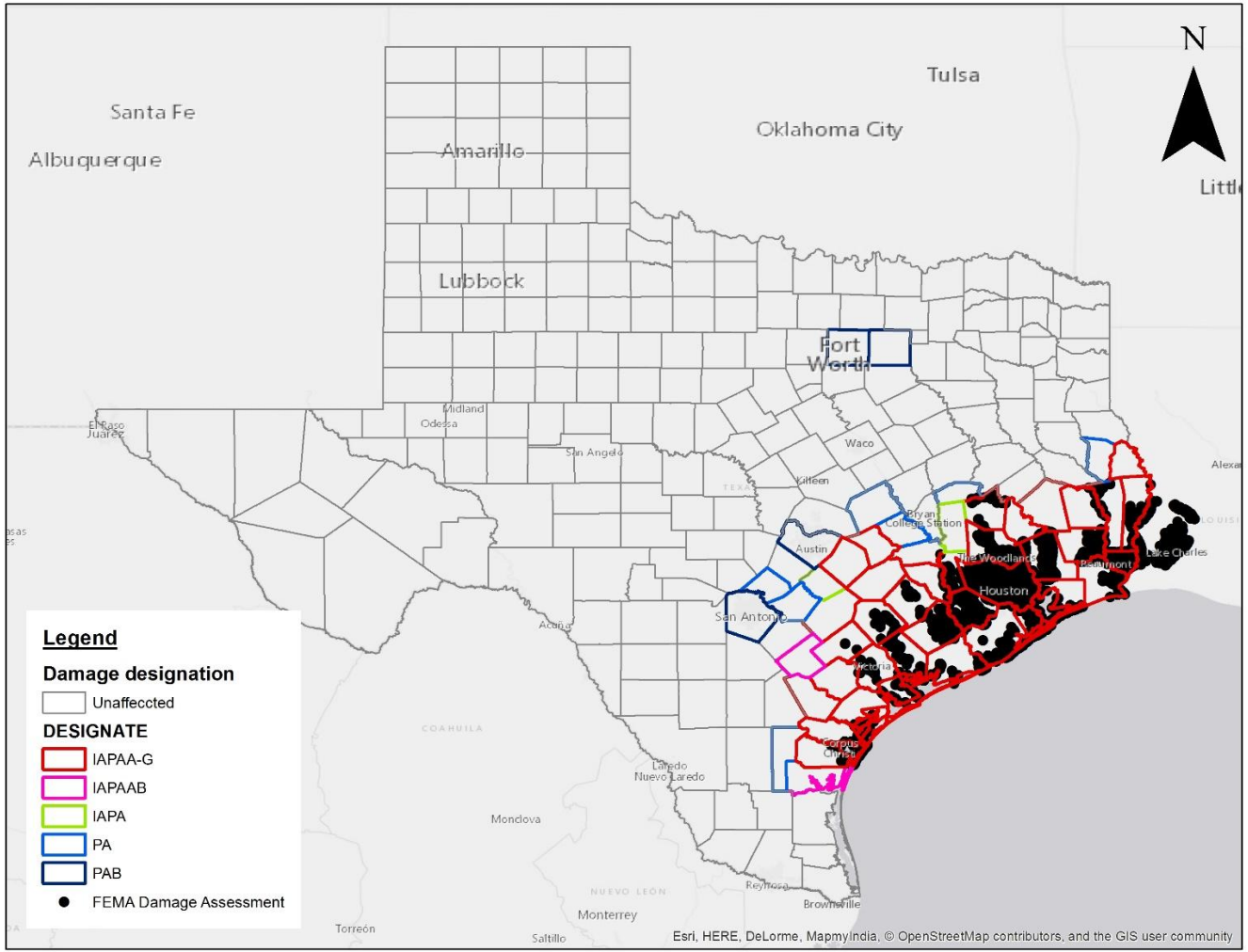
1. Convert the results to R-data frame
2. Convert from data frame to CSV
3. Open in Excel
4. Eliminate results without location
5. Save file with geolocated tweets



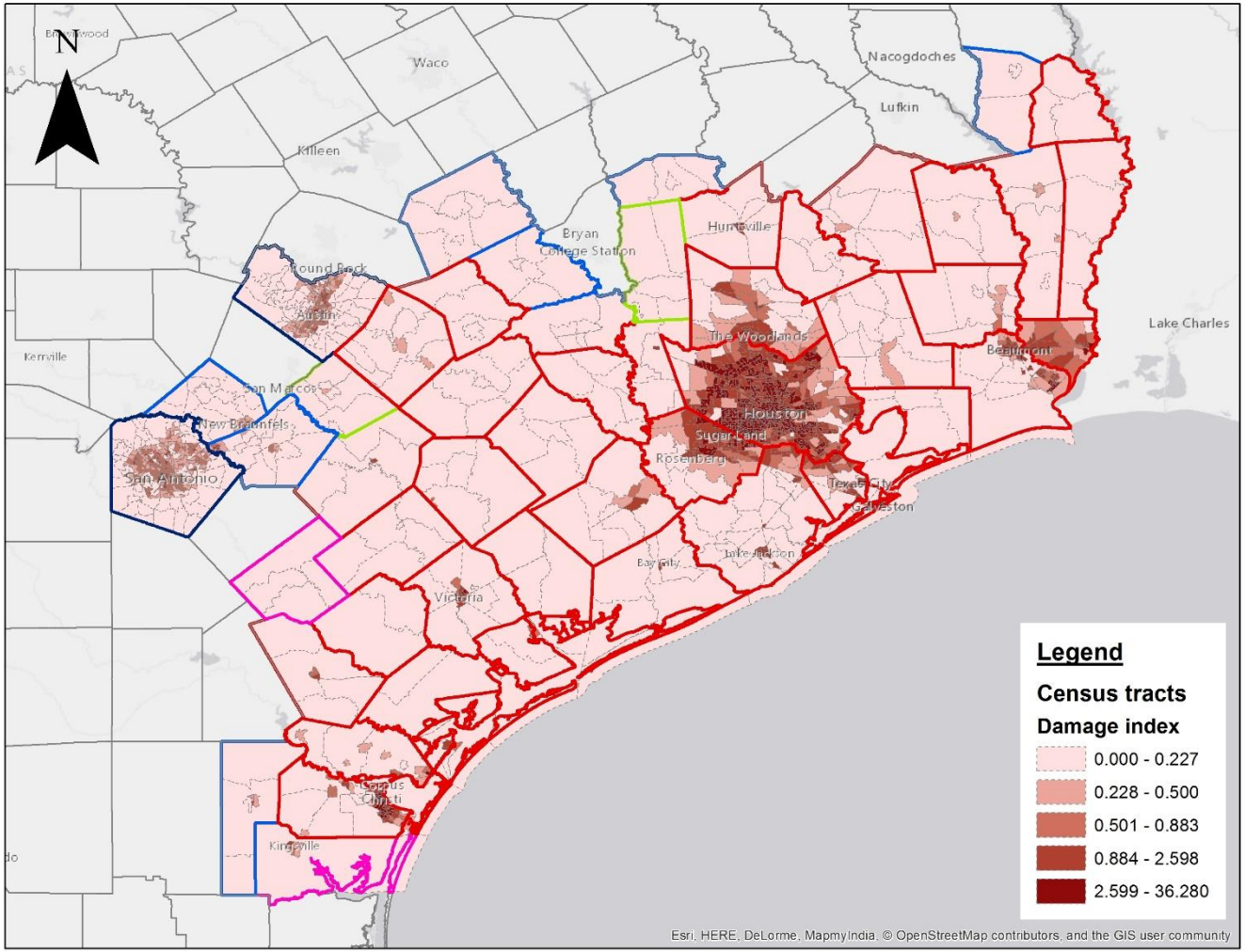
Spatial assessment using FEMA data

Data sources

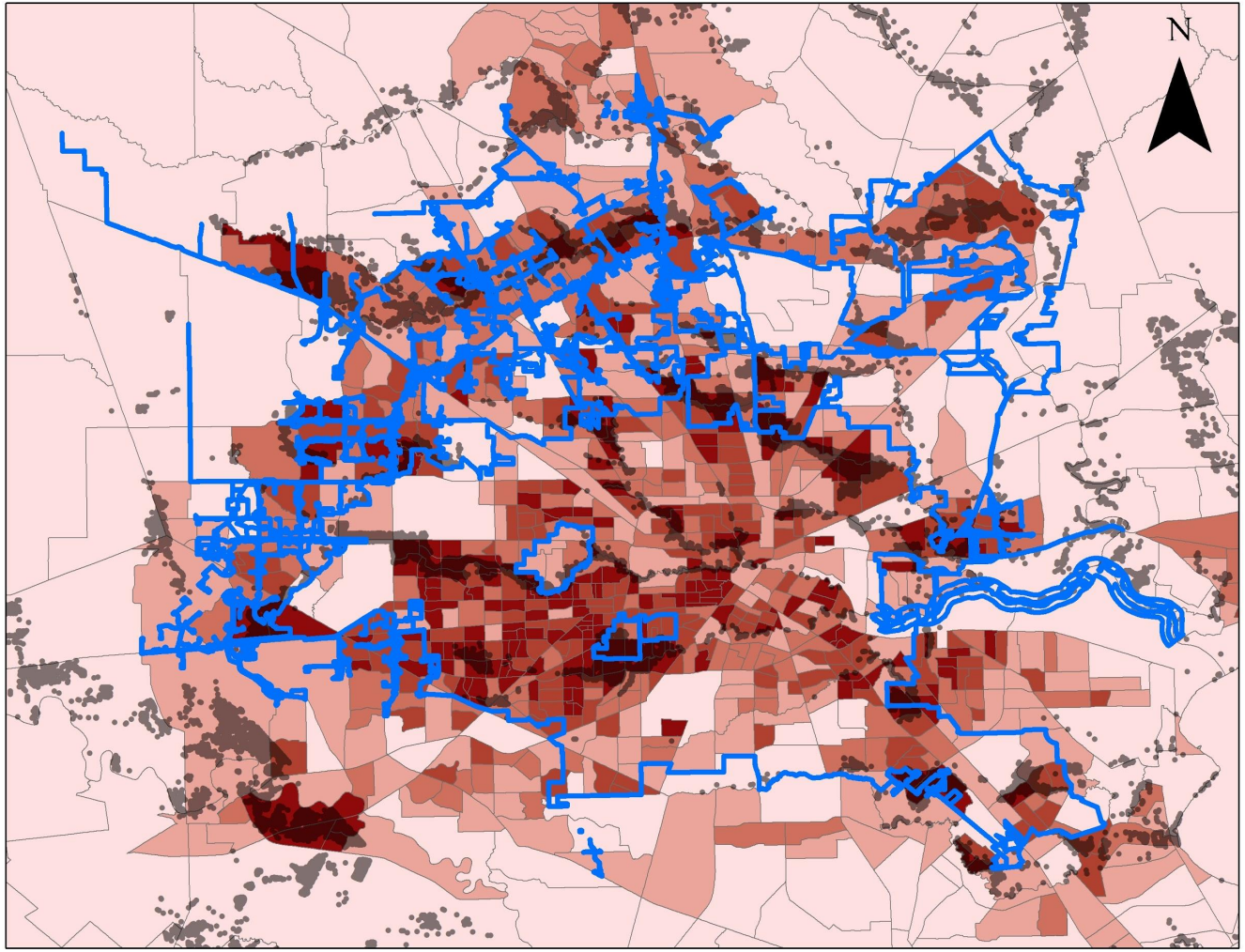
- FEMA
  - Damage designation by county
  - Points of incidence
- Census Bureau
  - Population by census tract
- Texas Natural Resources Information System
  - Census tract shapefile



- Levels of damage designated by FEMA:
  - IAPAA-G
  - IAPAAB
  - IAPA
  - PA
  - PAB
- Black points represent reported incidents
- We'll mostly focus on the Houston area



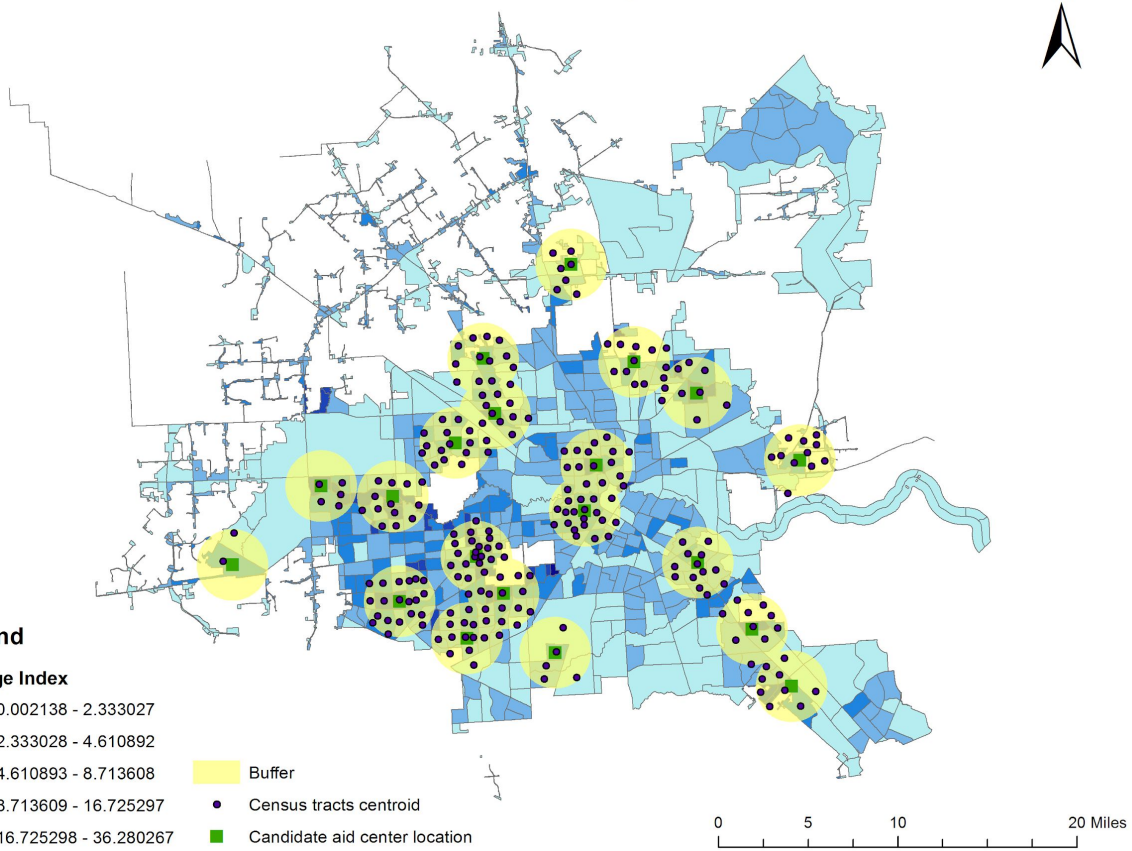
- Index calculated by weighing population density and number of reported incidents per census tract
- Multiple areas along the coast have a high index but Houston shows some of the highest values

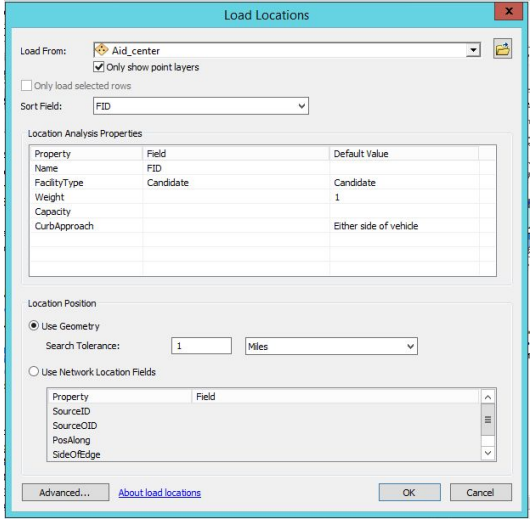


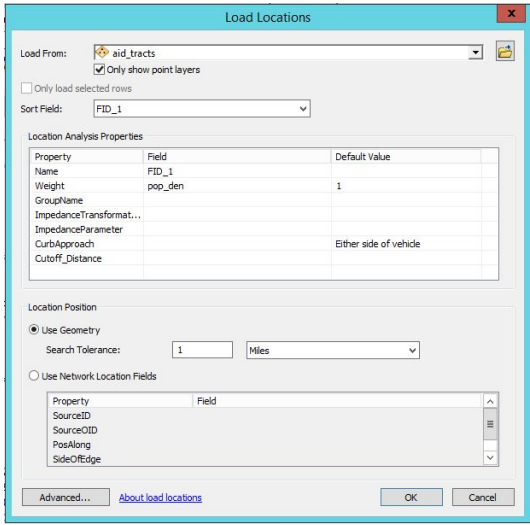
- Worst affected
- Areas of high damage distributed sporadically
- FEMA damage assessment outweighed by population density

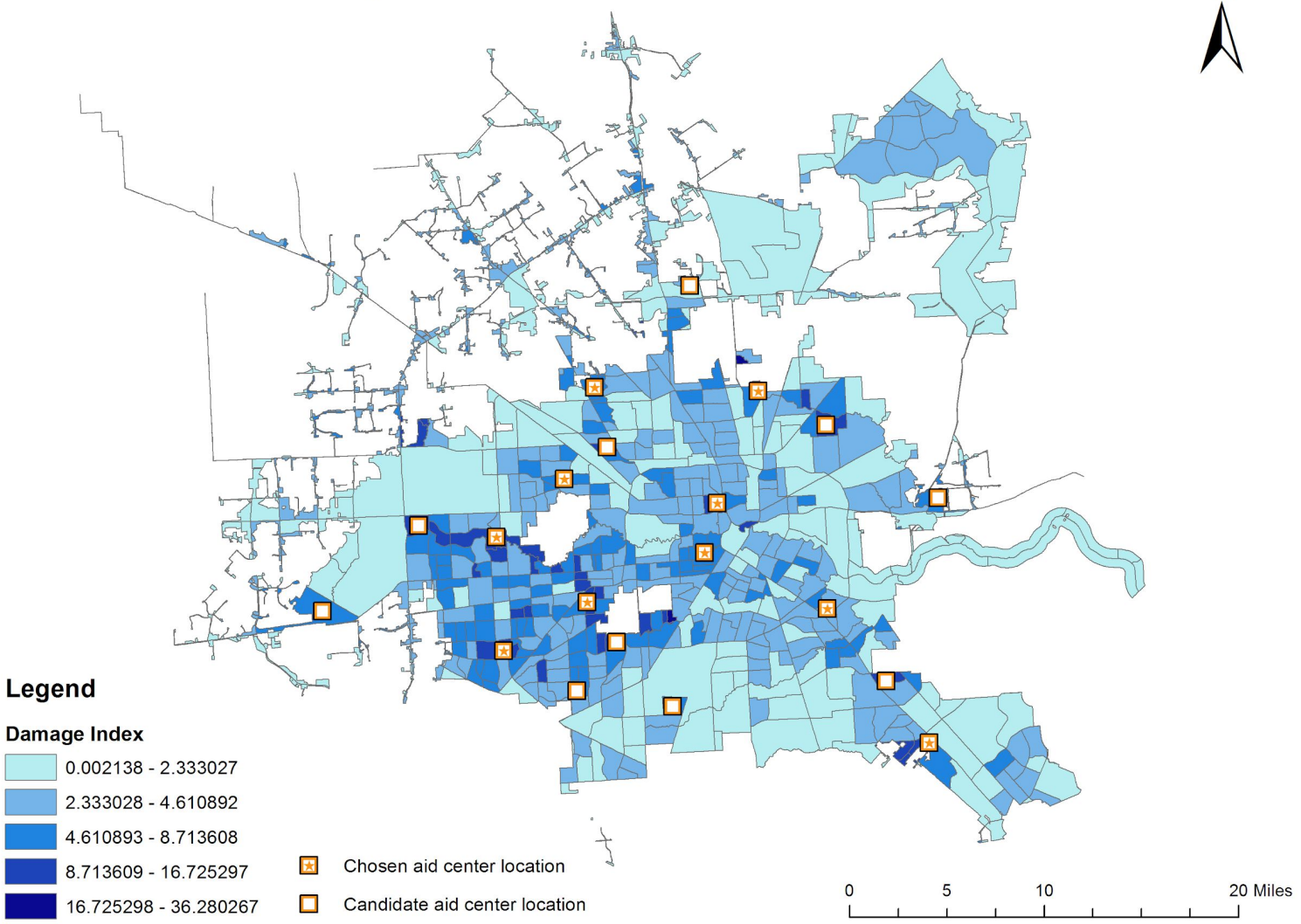
Identifying aid center locations

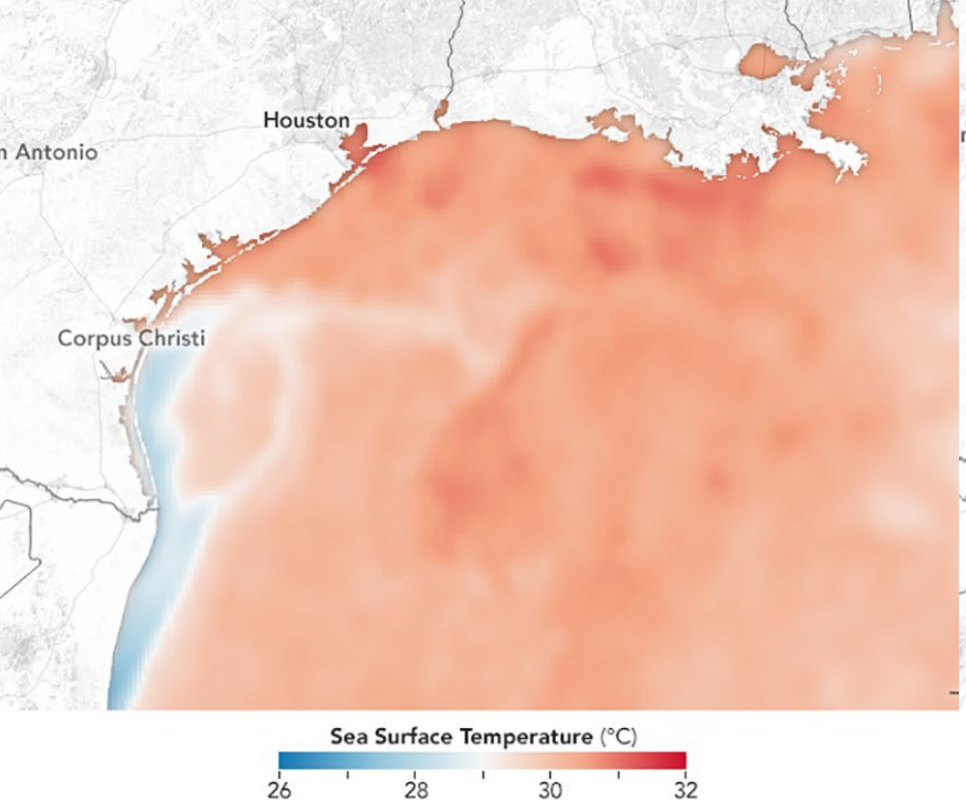
Location-allocation model



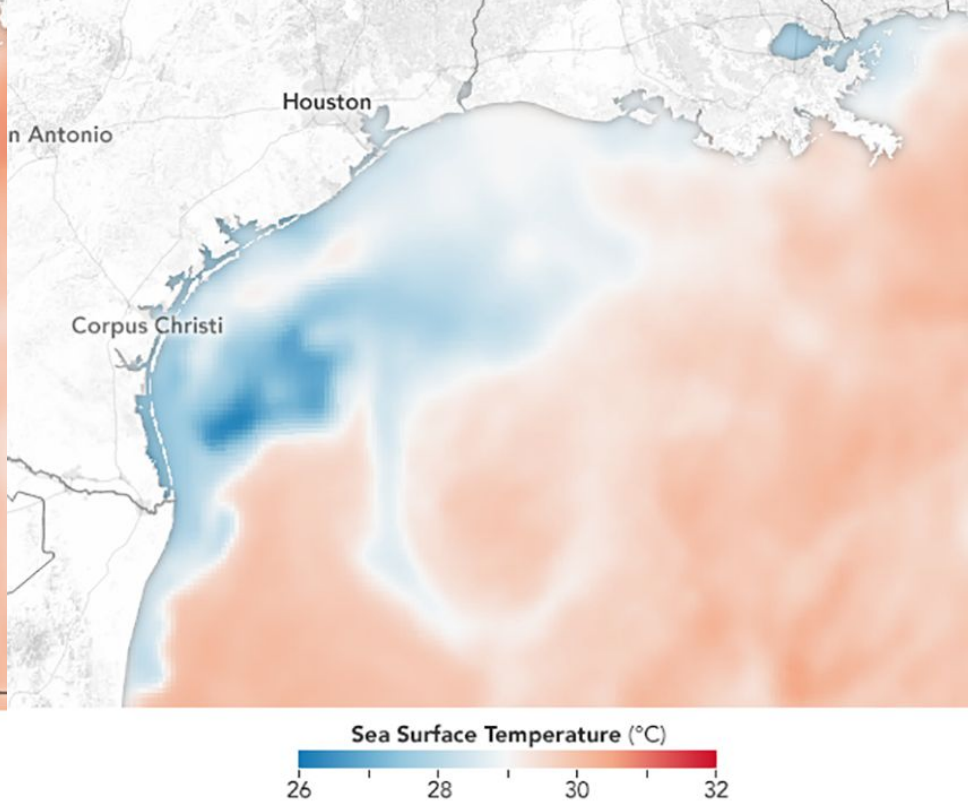





Legend
Damage Index
0.002138 - 2.333027
2.333028 - 4.610892
4.610893 - 8.713608
8.713609 - 16.725297
16.725298 - 36.280267
Chosen aid center location
Candidate aid center location
0
5
10
20 Miles

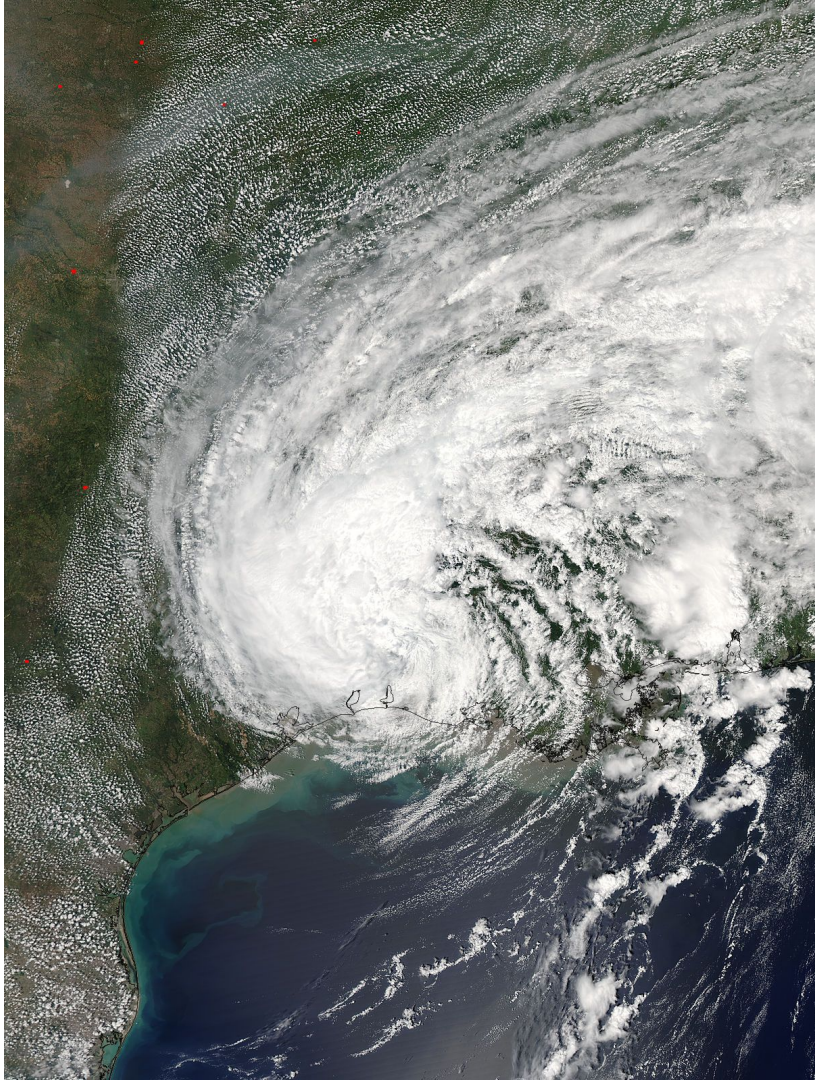


After Aug 30, 2017

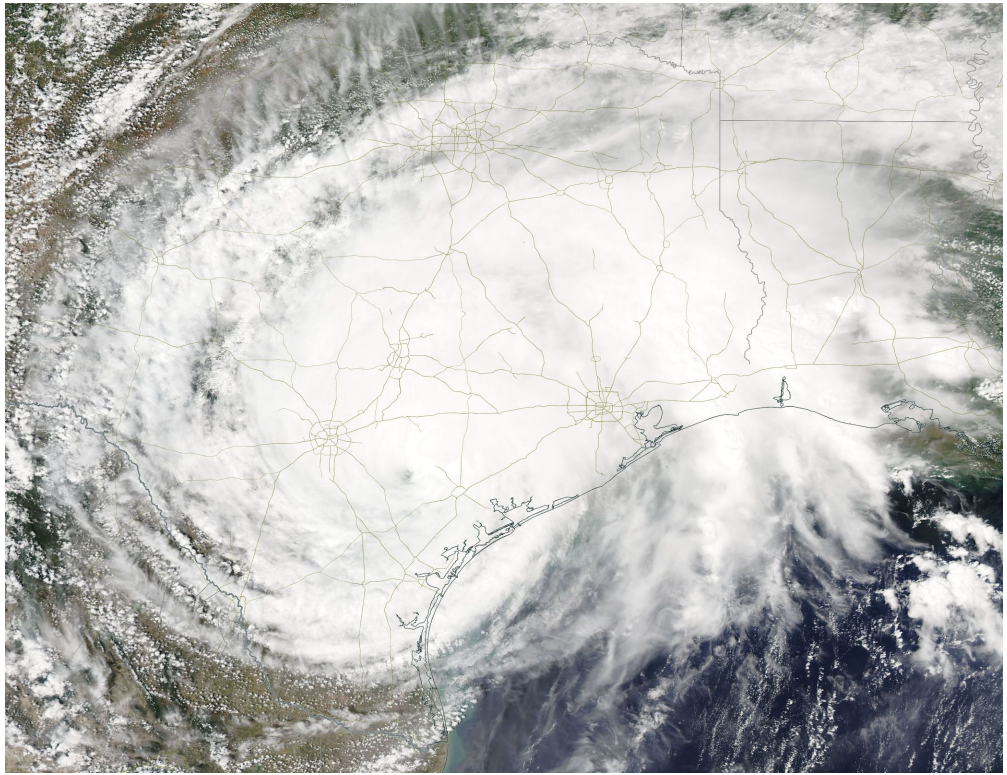


Before Aug 23, 2017


Aug 25, 2017



After Aug 26, 2017



After Aug 31, 2017