

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

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# Outline

Background

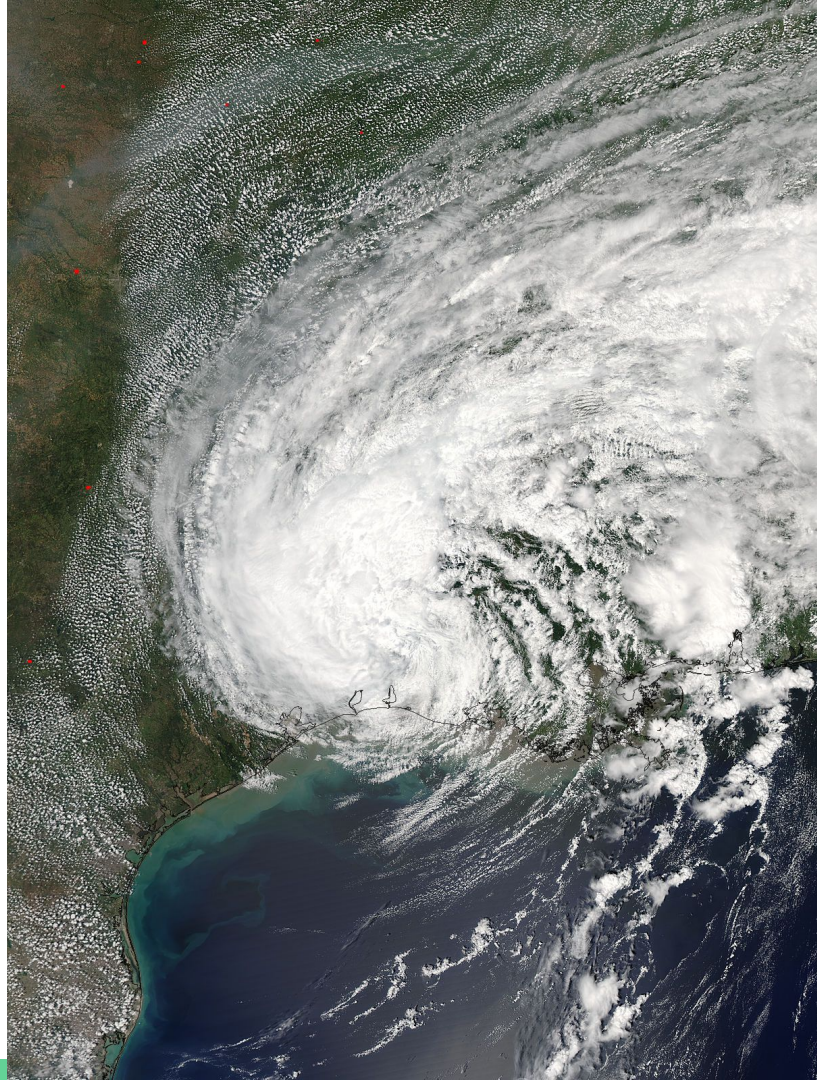
Assessing the damaged areas

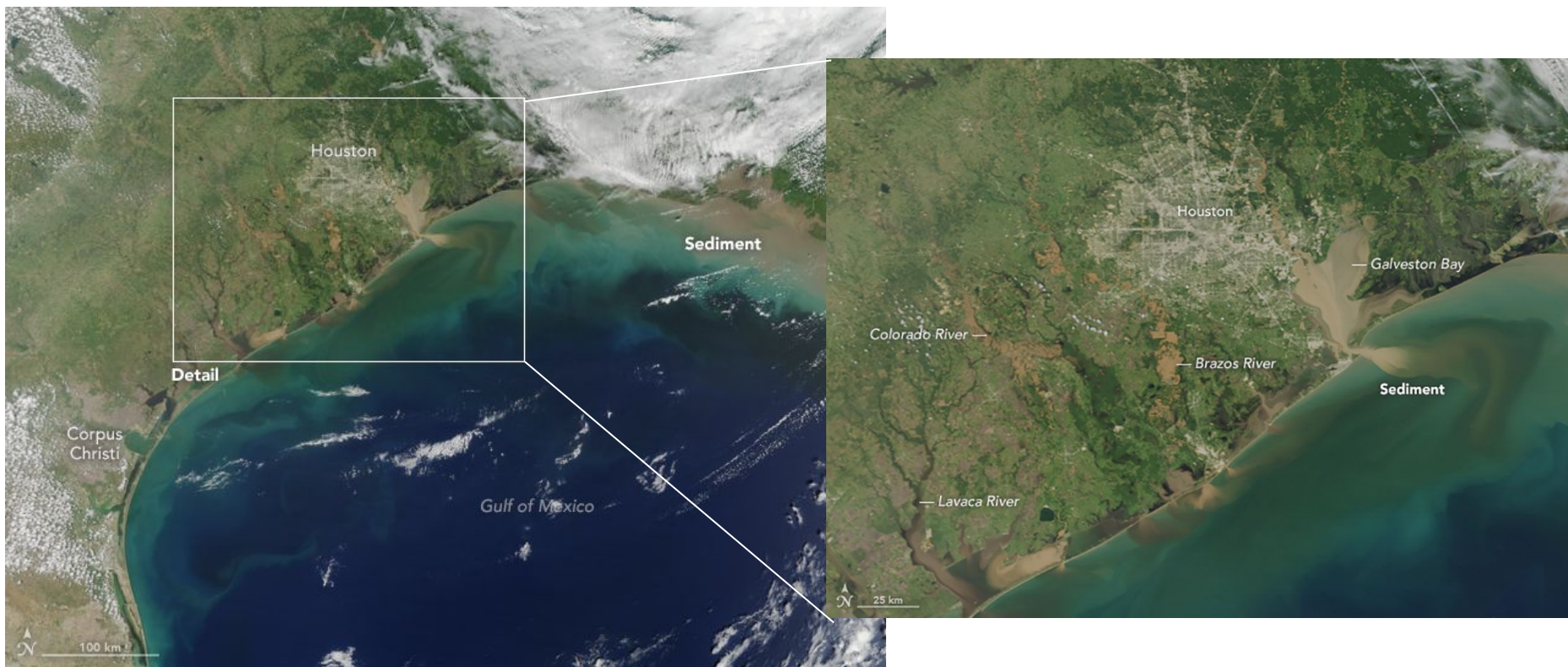
- Social media-generated data
- Spatial assessment using FEMA data

Identifying aid center locations

- Location allocation model

Appendix





NASA Earth Observatory Image Aug 31, 2017





Simonton, TX





Brookshire, TX





**Holiday Lakes, TX**





Rosenberg, TX

## Social Media-Generated Data (Twitter)

### 1<sup>st</sup> Search

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

### 2<sup>nd</sup> 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

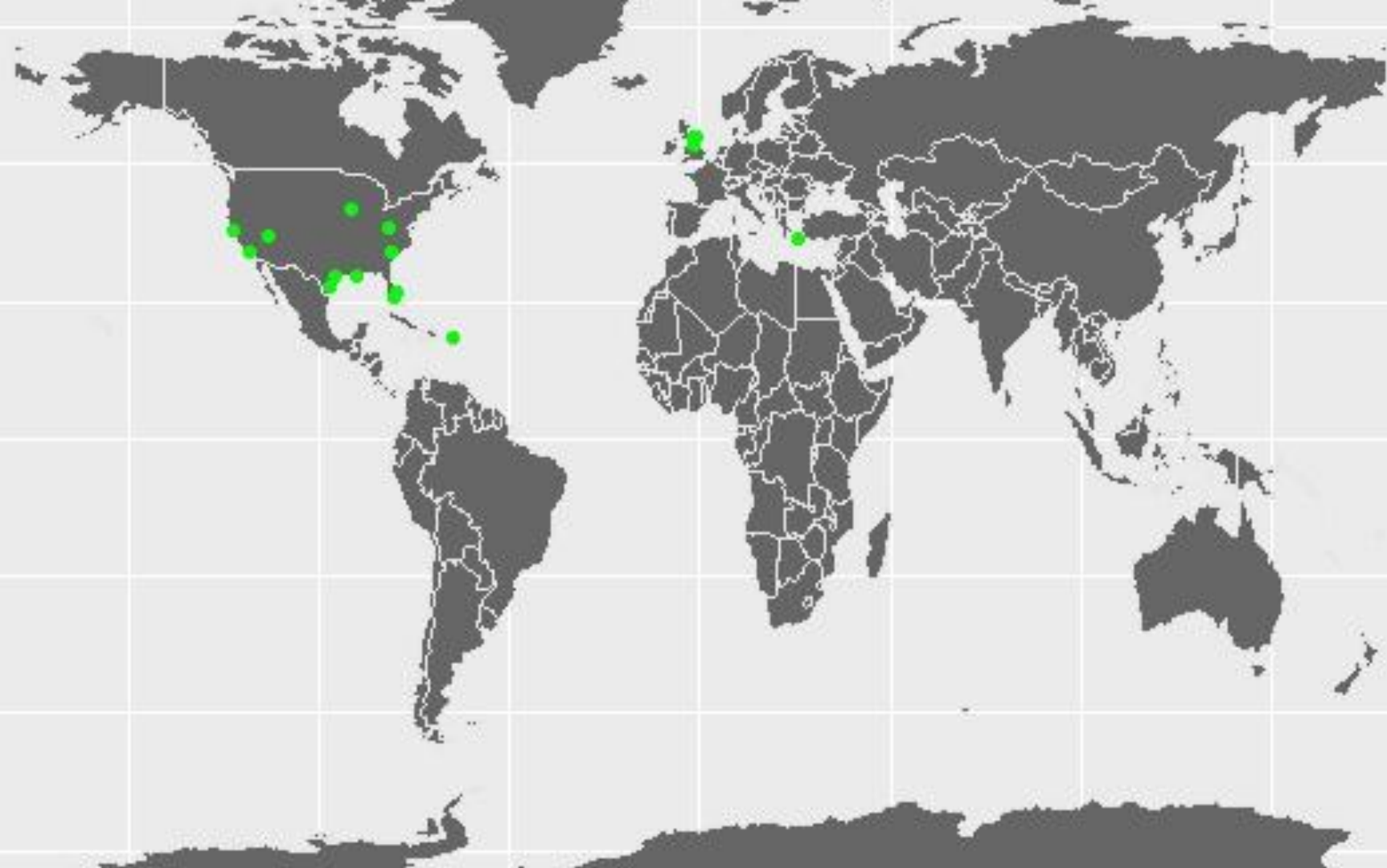
Open in Excel

4

Eliminate  
results  
without  
location

5

Save file with  
geolocated  
tweets

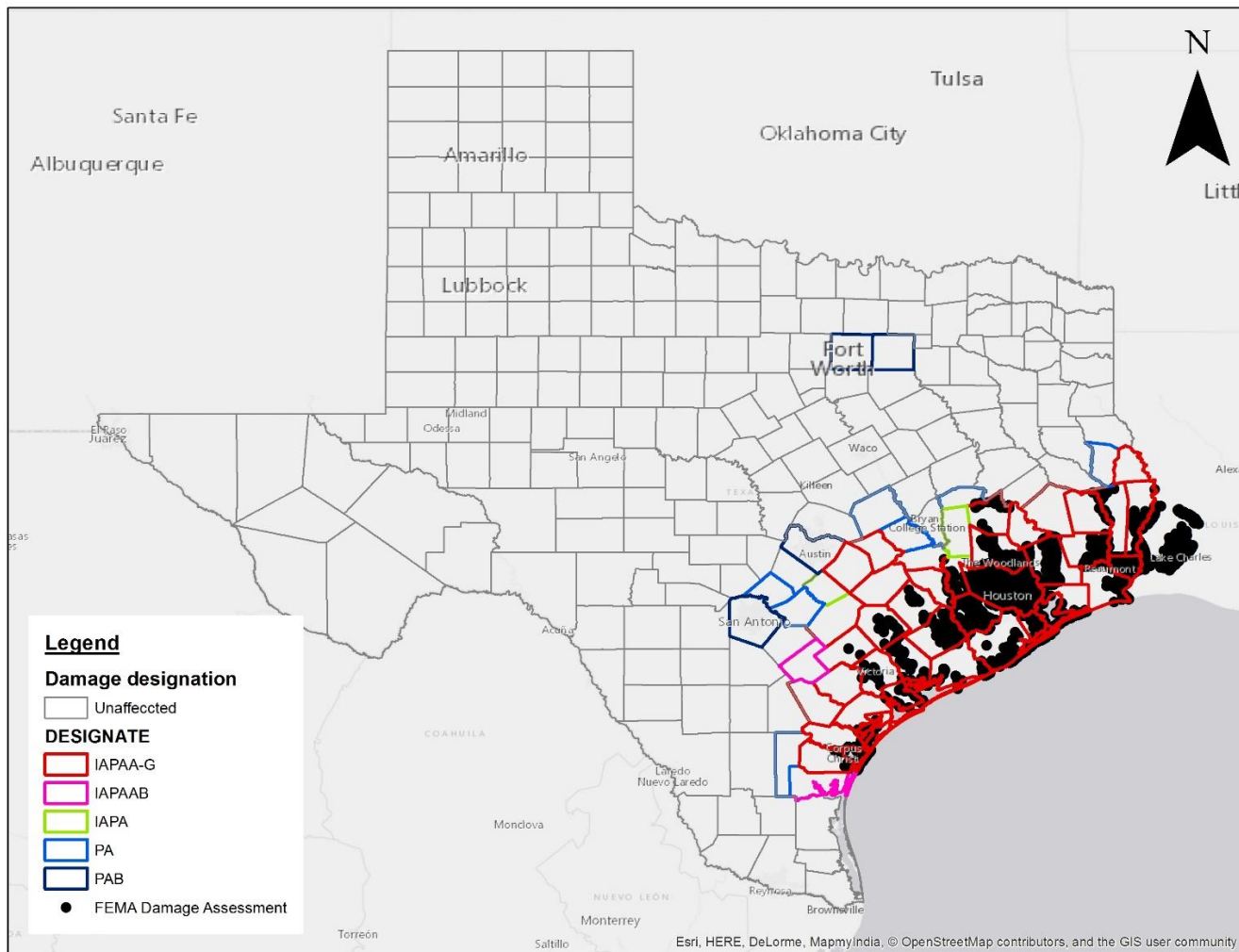




## **Spatial assessment using FEMA data**

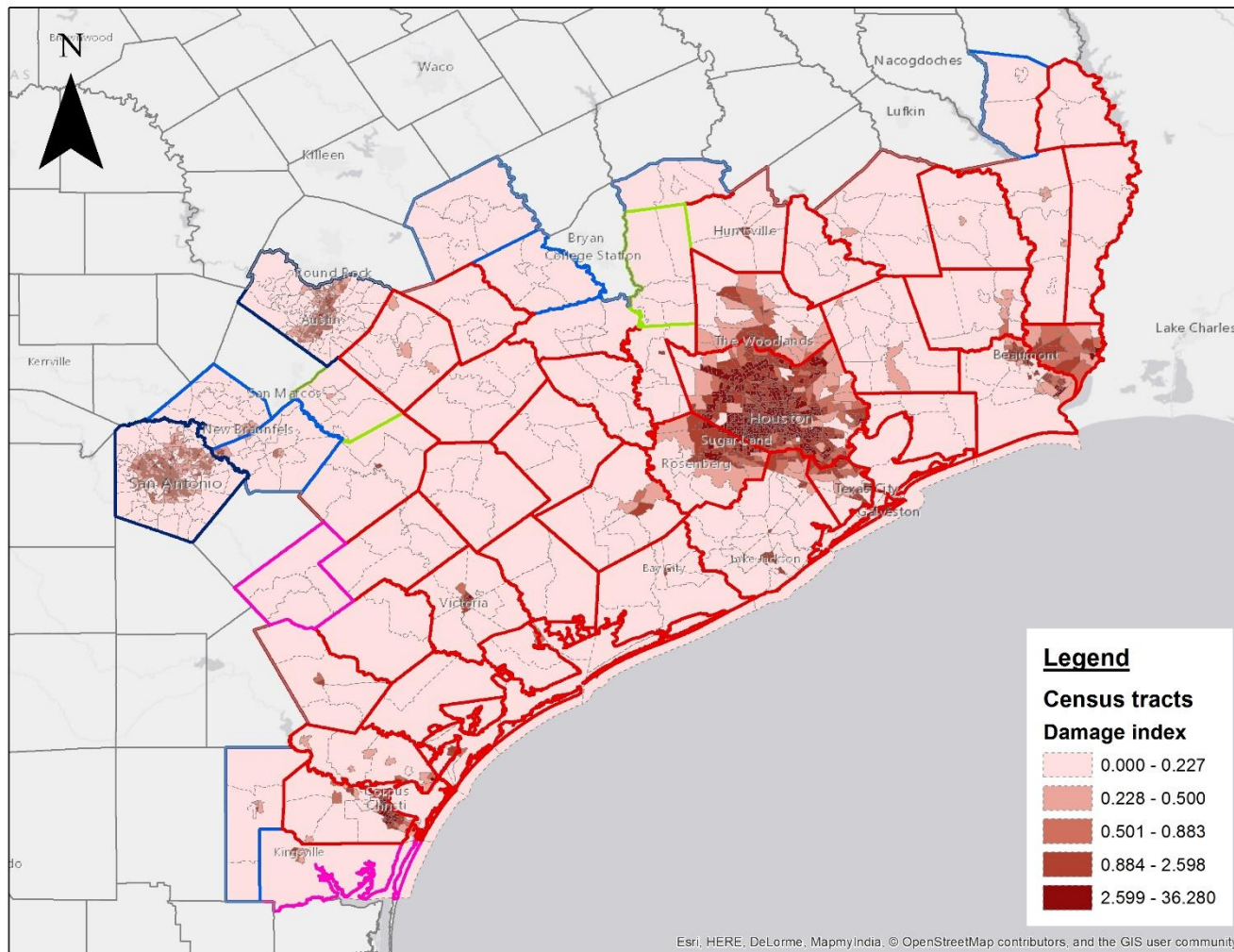
### Data sources

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

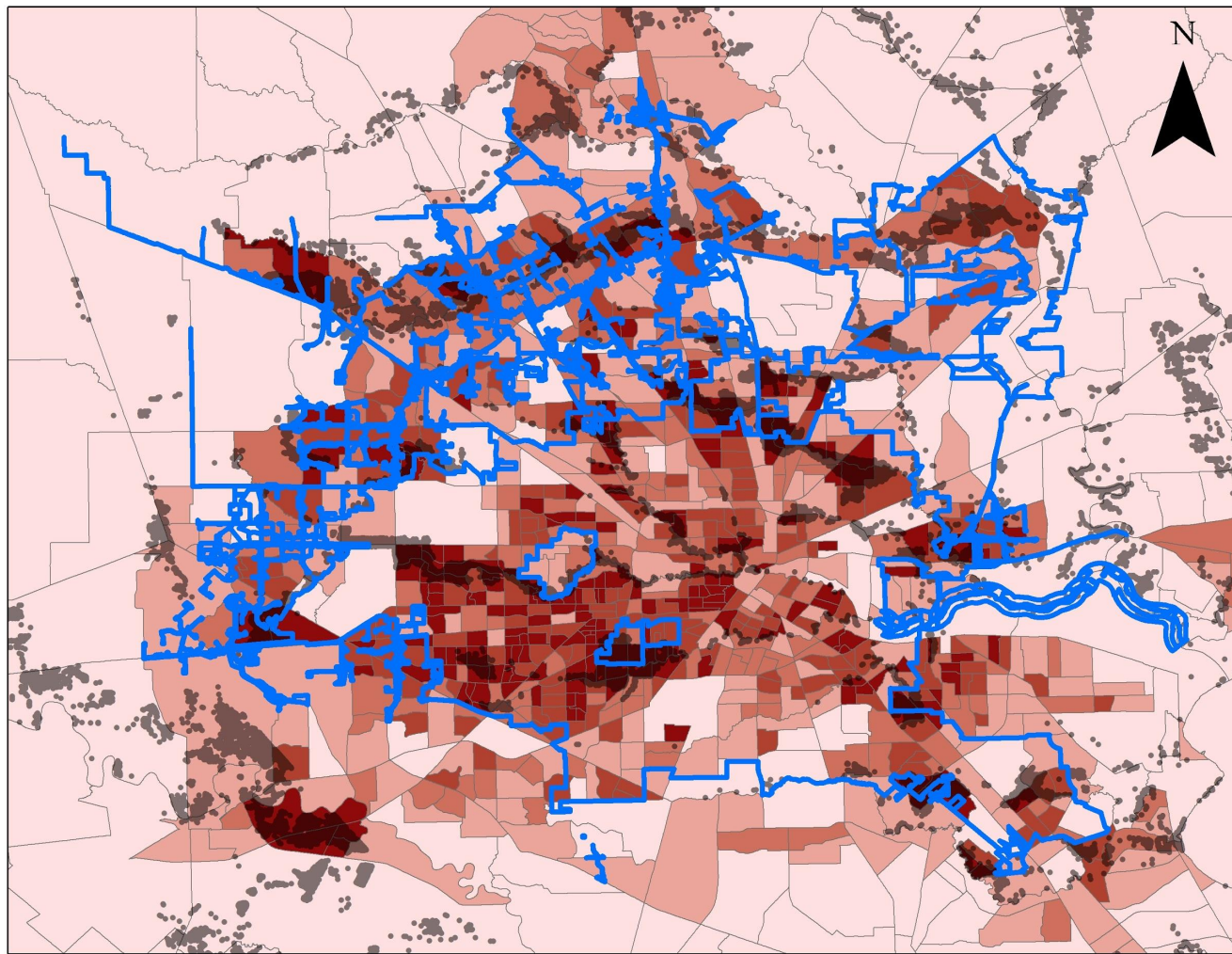


- Levels of damage designated by FEMA:
  - IAPAA-G
  - IAPAAB
  - IAPA
  - PA
  - PAB
- Black points represent reported incidents
- We'll mostly focus on the Houston area





- 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

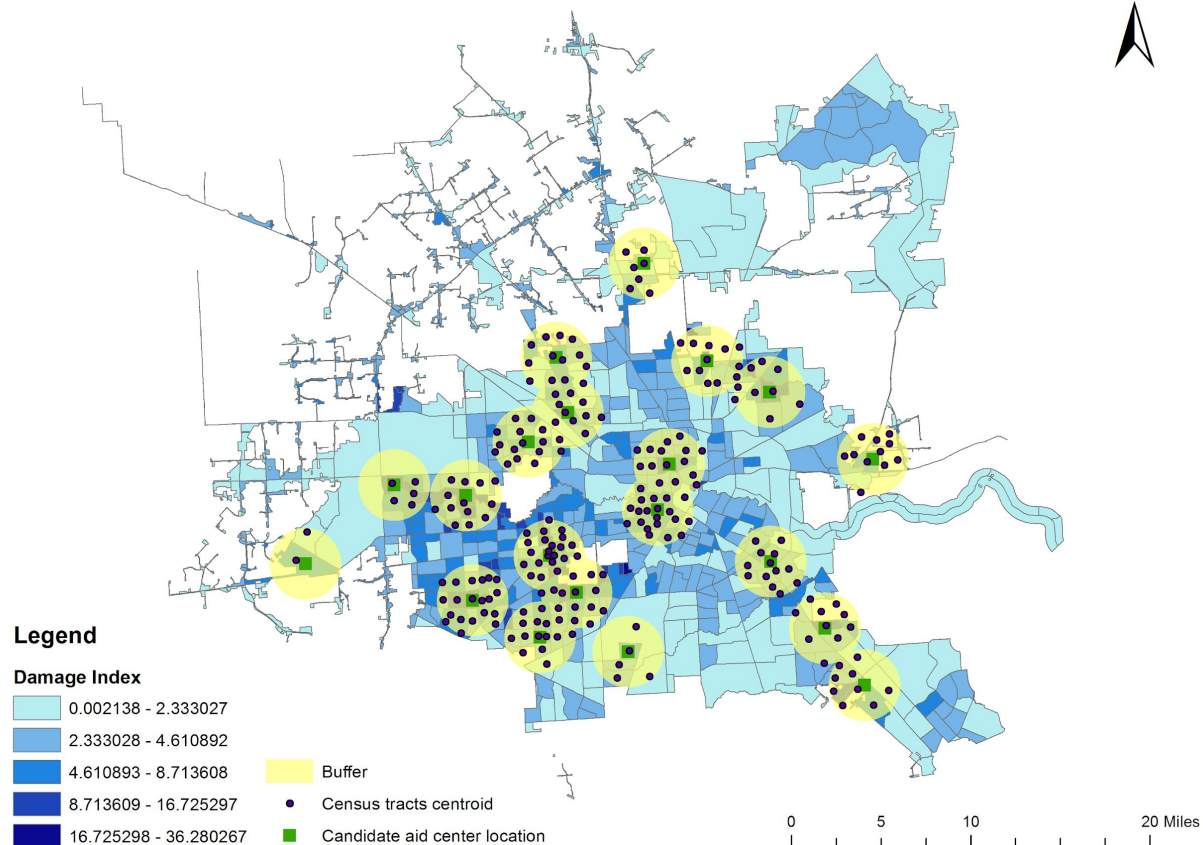


- Worst affected
- Areas of high damage distributed sporadically
- FEMA damage assessment outweighed by population density



Identifying aid center locations

# Location-allocation model



**Load Locations**

Load From: **Aid\_center**

☒ Only show point layers

Sort Field: **FID**

**Location Analysis Properties**

Property	Field	Default Value
Name	FID	
FacilityType	Candidate	Candidate
Weight		1
Capacity		
CurbApproach		Either side of vehicle

**Location Position**

☒ Use Geometry

Search Tolerance: **1** Miles

☐ Use Network Location Fields

Property	Field
SourceID	
SourceOID	
PosAlong	
SideOfEdge	

Advanced... [About load locations](#) OK Cancel

**Load Locations**

Load From: **aid\_tracts**

☒ Only show point layers

Sort Field: **FID\_1**

**Location Analysis Properties**

Property	Field	Default Value
Name	FID_1	
Weight	pop_den	1
GroupName		
ImpedanceTransformat...		
ImpedanceParameter		
CurbApproach		Either side of vehicle
Cutoff_Distance		

**Location Position**

☒ Use Geometry

Search Tolerance: **1** Miles

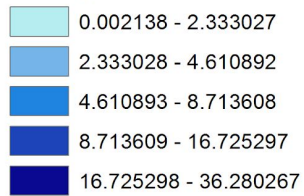
☐ Use Network Location Fields

Property	Field
SourceID	
SourceOID	
PosAlong	
SideOfEdge	

Advanced... [About load locations](#) OK Cancel

## Legend

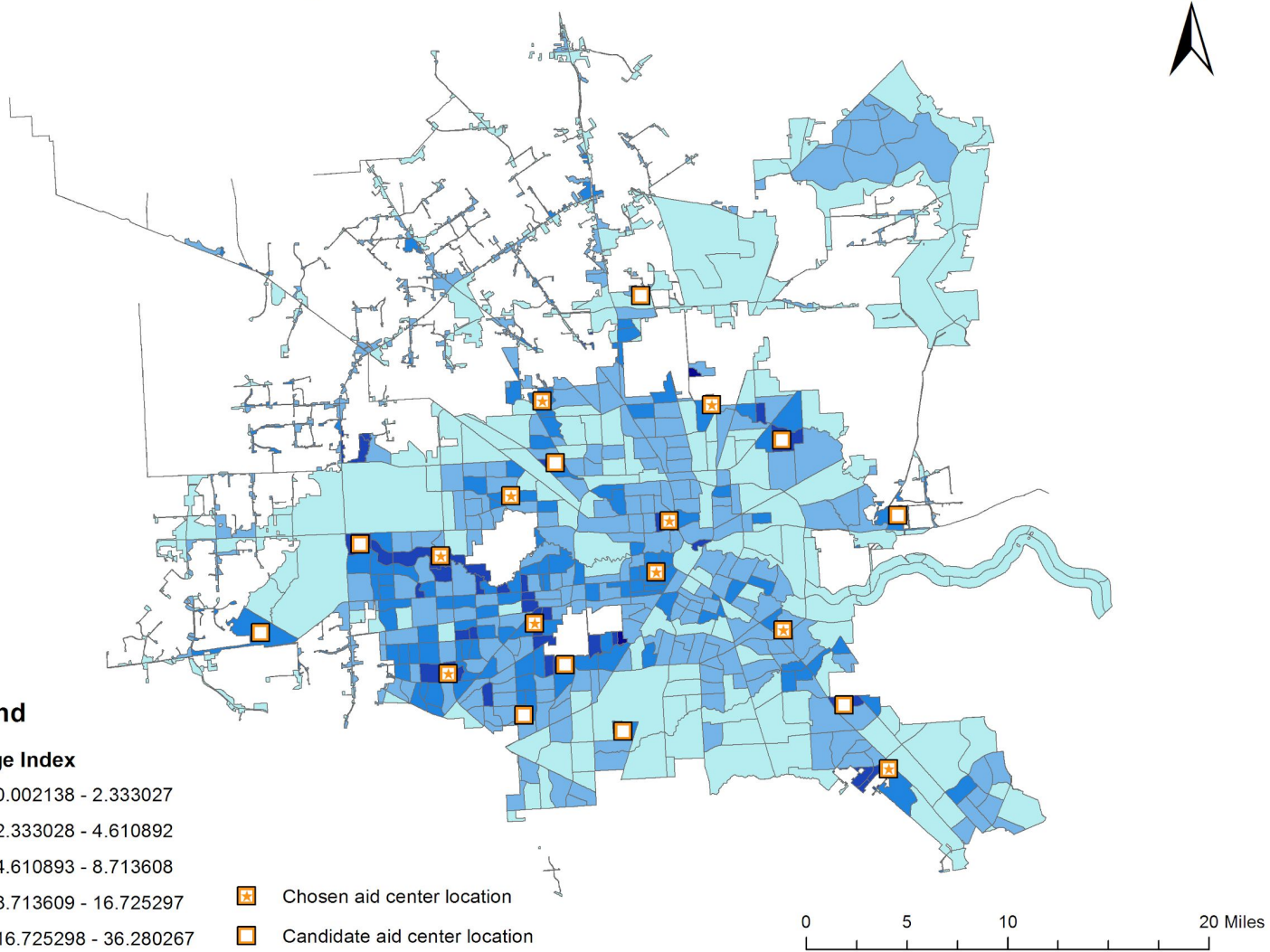
### Damage Index

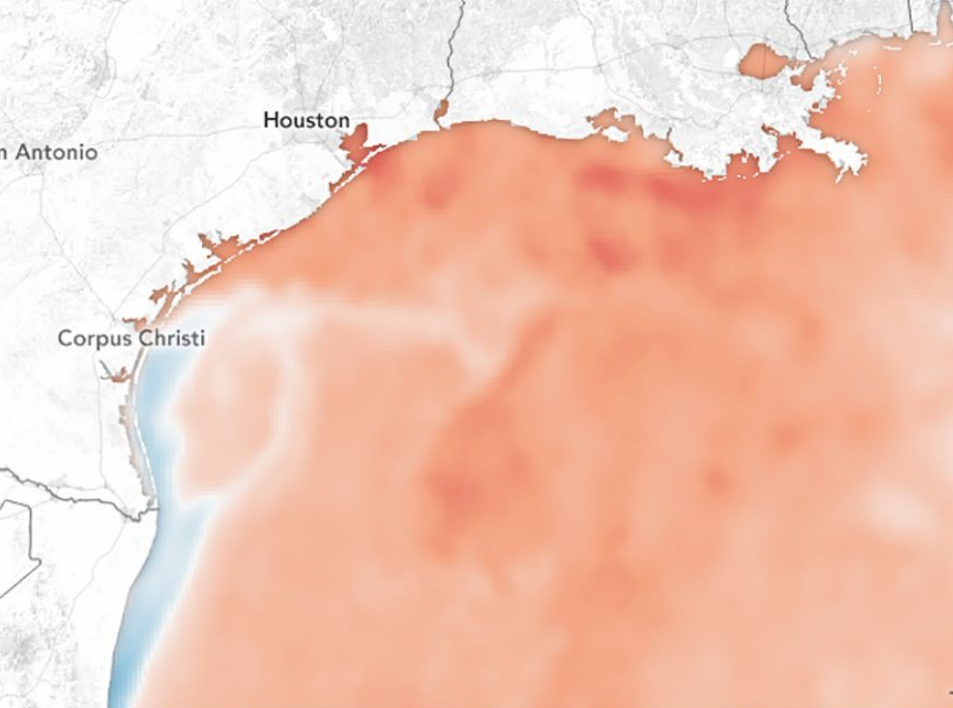


Chosen aid center location

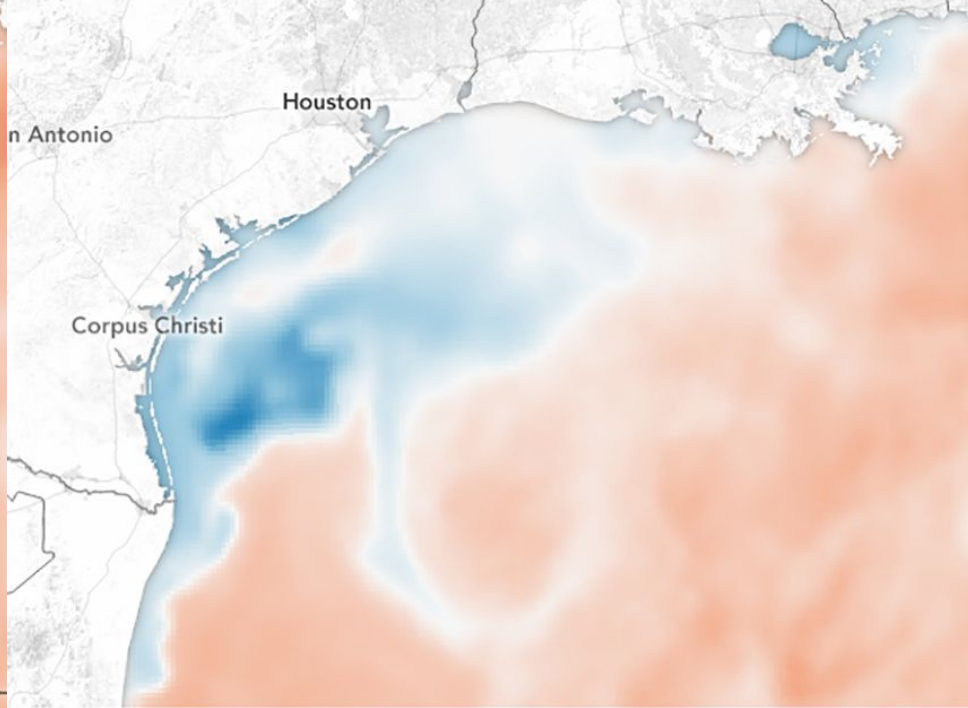


Candidate aid center location





**After Aug 30, 2017**



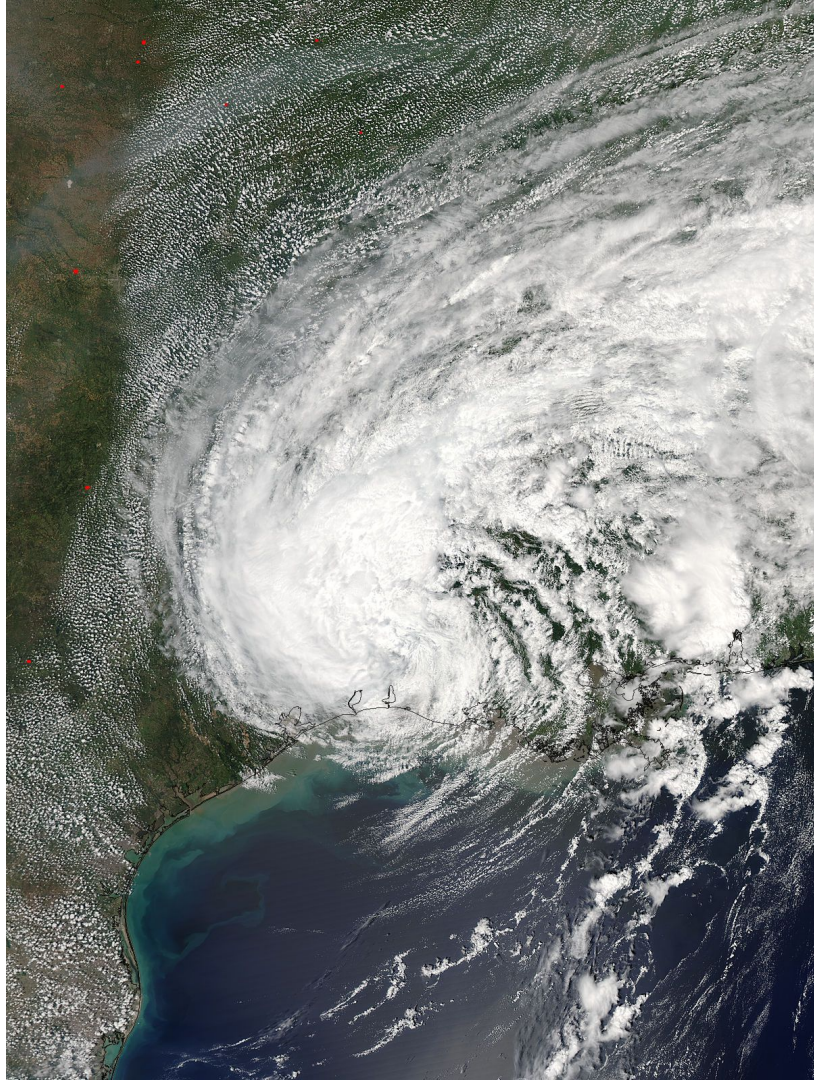
**Before Aug 23, 2017**



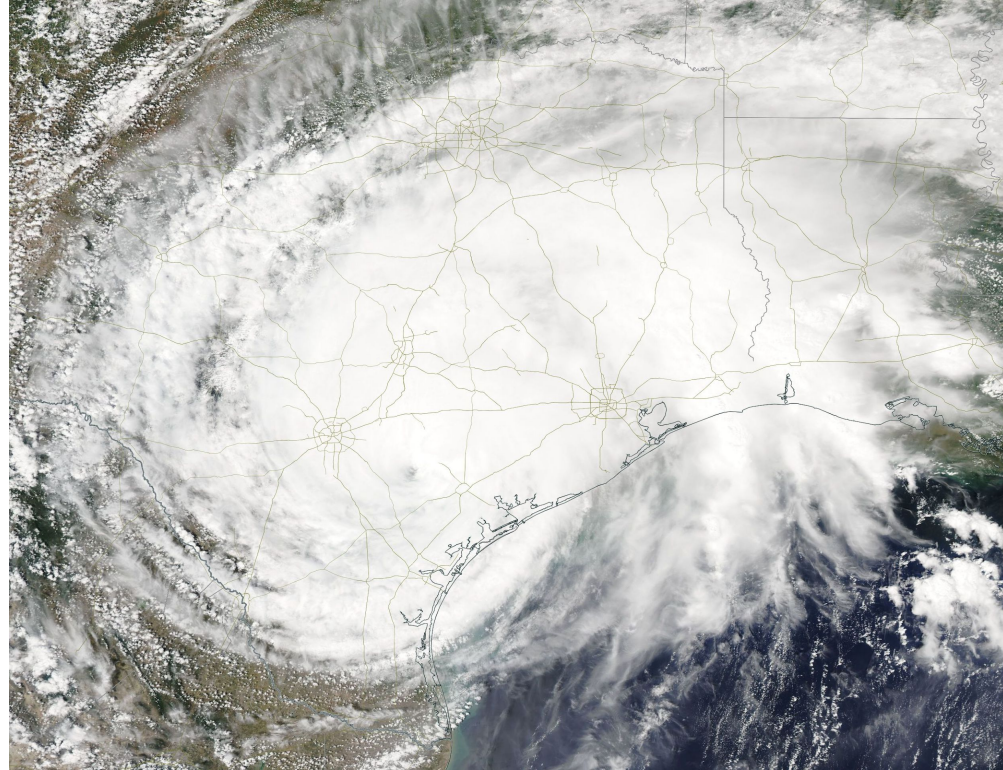


Aug 25, 2017





After Aug 26, 2017



After Aug 31, 2017