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Hurricane Harvey Report

Importing and data processing

```
events = importfile("StormEvents_2017_finalProject.csv");

% Put months in correct order
monthOrder = ["January", "February", "March", "April", "May", "June",
"July",...
    "August", "September", "October", "November", "December"];
events.Month = reordercats(events.Month, monthOrder);

% Set missing Property and Crop Cost to $0
events.Property_Cost(ismissing(events.Property_Cost)) = 0;
events.Crop_Cost(ismissing(events.Crop_Cost)) = 0;
% Add total damage to the table
events.Total_Damage = events.Property_Cost + events.Crop_Cost;
harveyEvents = events(events.Begin_Date_Time >= "2017-08-17 00:00:00" &
events.End_Date_Time < "2017-09-04 00:00:00", :);
head(harveyEvents)
```

ans = 8×25 table

	EpisodeID	Event_ID	State	Year	Month	Event_Type
1	119542	726661	IOWA	2017	August	Tornado
2	119542	726659	IOWA	2017	August	Tornado
3	119542	726660	IOWA	2017	August	Tornado
4	119542	717362	IOWA	2017	August	Heavy Rain
5	119542	717363	IOWA	2017	August	Heavy Rain
6	119542	717364	IOWA	2017	August	Thunderstorm Wind
7	120232	720731	VIRGINIA	2017	August	Heavy Rain
8	120232	720732	VIRGINIA	2017	August	Heavy Rain

Two States Most Impacted by Harvey

```
groupsummary(harveyEvents,"State","sum","Total_Damage");
ans = sortrows(ans,'sum_Total_Damage','descend');
head(ans)
```

ans = 8×3 table

	State	GroupCount	sum_Total_Damage
1	TEXAS	272	7.7493e+10
2	LOUISIANA	85	75277000
3	NEBRASKA	62	16154000
4	NORTH CAROLINA	59	12338500
5	WASHINGTON	2	4000000
6	FLORIDA	68	2237000
7	MINNESOTA	24	1625000
8	MISSISSIPPI	39	915000

So the most impacted states are Texas and Louisiana.

Table of Events for Two Most Impacted States

```
texasLouisianaevents =
harveyEvents(ismember(harveyEvents.State,{'LOUISIANA','TEXAS'}),:);
head(texasLouisianaevents)
```

ans = 8×25 table

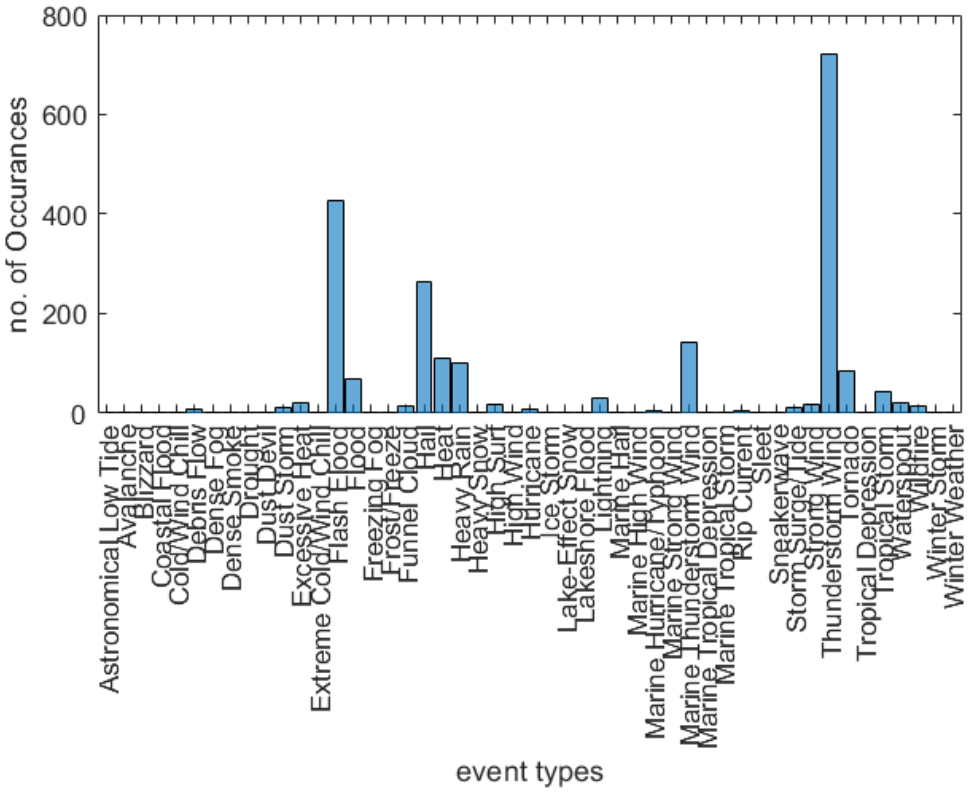
	EpisodeID	Event_ID	State	Year	Month	Event_Type	...
1	119753	723472	TEXAS	2017	August	Tropical Storm	
2	119753	723473	TEXAS	2017	August	Tropical Storm	
3	119753	723449	TEXAS	2017	August	Tropical Storm	
4	119753	723474	TEXAS	2017	August	Tropical Storm	
5	119753	723475	TEXAS	2017	August	Tropical Storm	
6	119753	723648	TEXAS	2017	August	Tropical Storm	
7	120011	719146	TEXAS	2017	August	Flash Flood	
8	120012	719147	TEXAS	2017	August	Thunderstorm Wind	

Visualizations

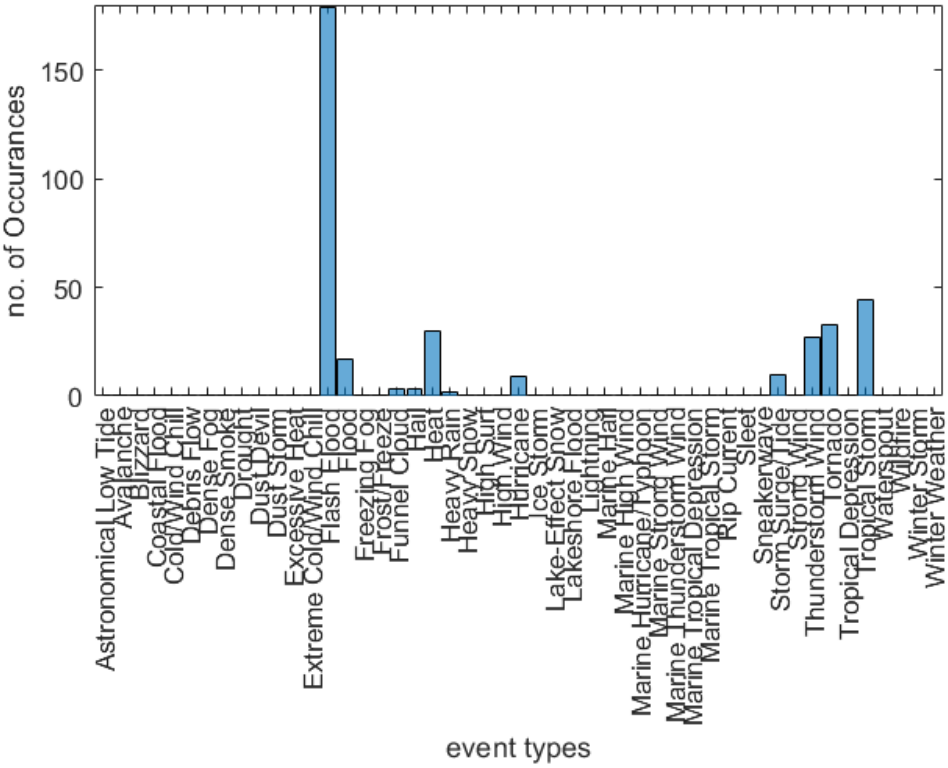
We will use Histograms, Pie Charts and Geographic plots.

Figures of Event Types

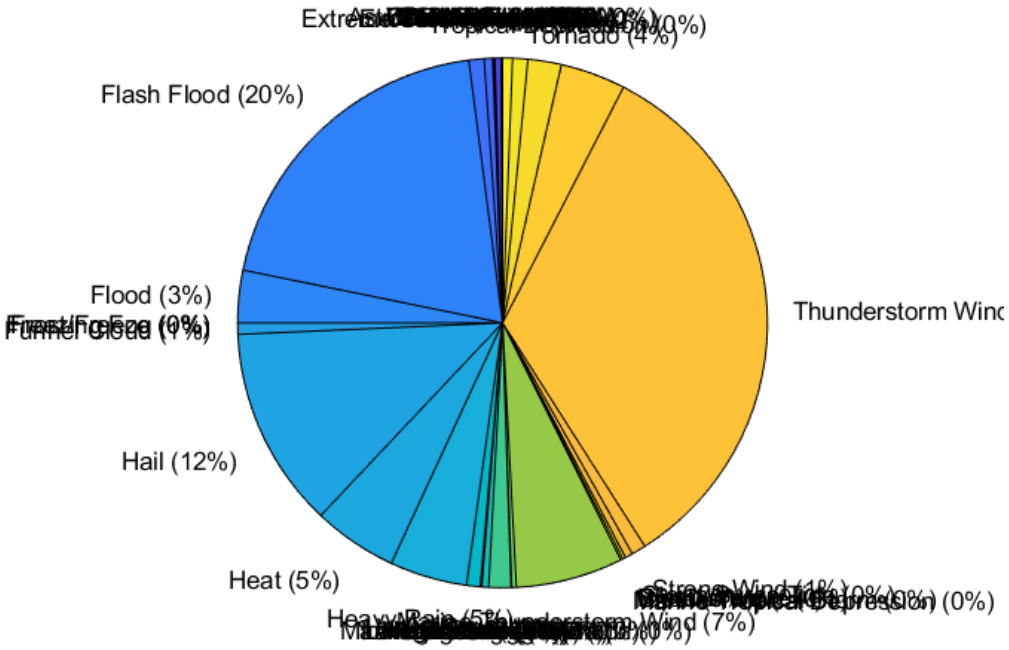
```
% Histogram of Event Types distribution due to the Hurricane - Harvey,
% in all of USA
histogram(harveyEvents.Event_Type)
xlabel('event types')
ylabel('no. of Occurances')
```




```
% Histogram of Event Types distribution due to the Hurricane - Harvey,
% in the states of Texas and Louisiana
histogram(texasLouisianaevents.Event_Type)
xlabel('event types')
ylabel('no. of Occurances')
```

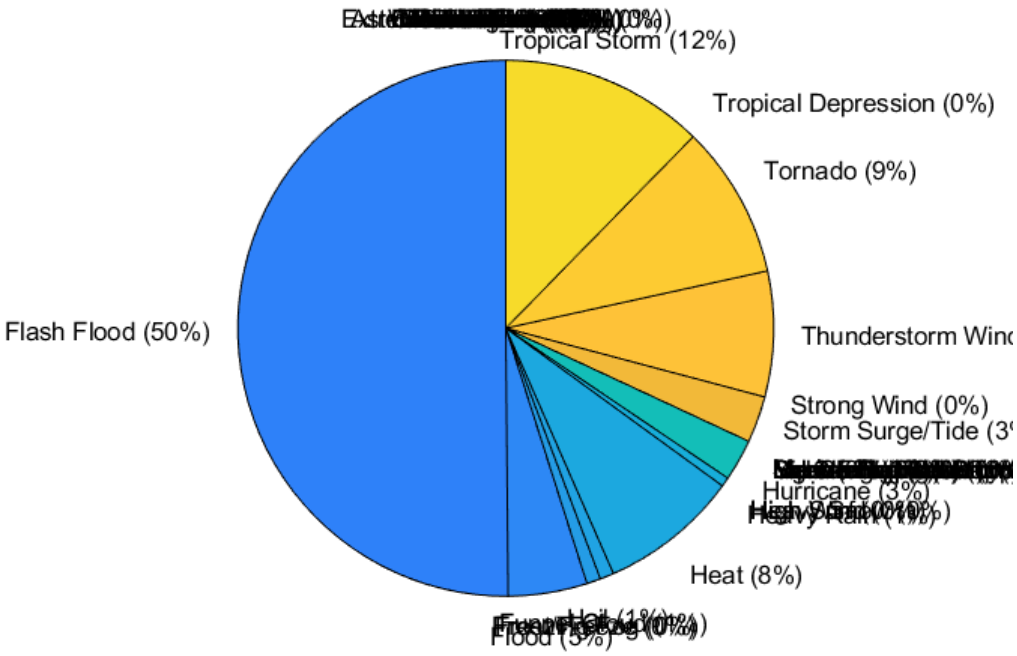



```
% Pie Chart on the distribution of event types due to Hurricane - Harvey,
% in all of USA
pie(harveyEvents.Event_Type)
```



The overall effect of the hurricane must have been thunderstorms and winds.

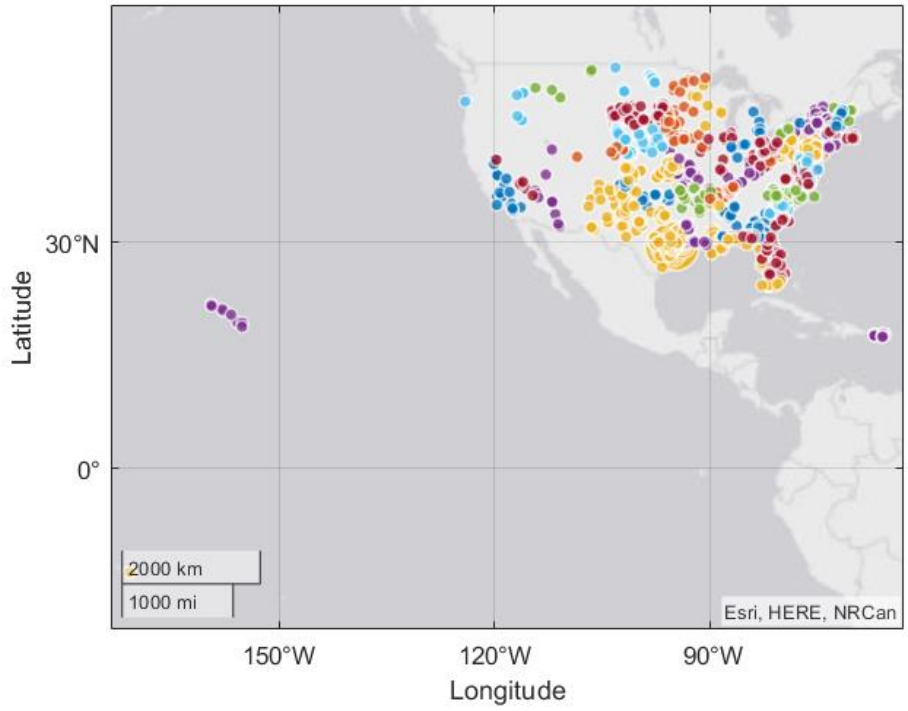
```
% Pie Chart on the distribution of event types due to Hurricane - Harvey,
% in the states of Texas and Louisiana
pie(texasLouisianaevents.Event_Type)
```



So most of the damage in Texas and Louisiana must have been due to floods.

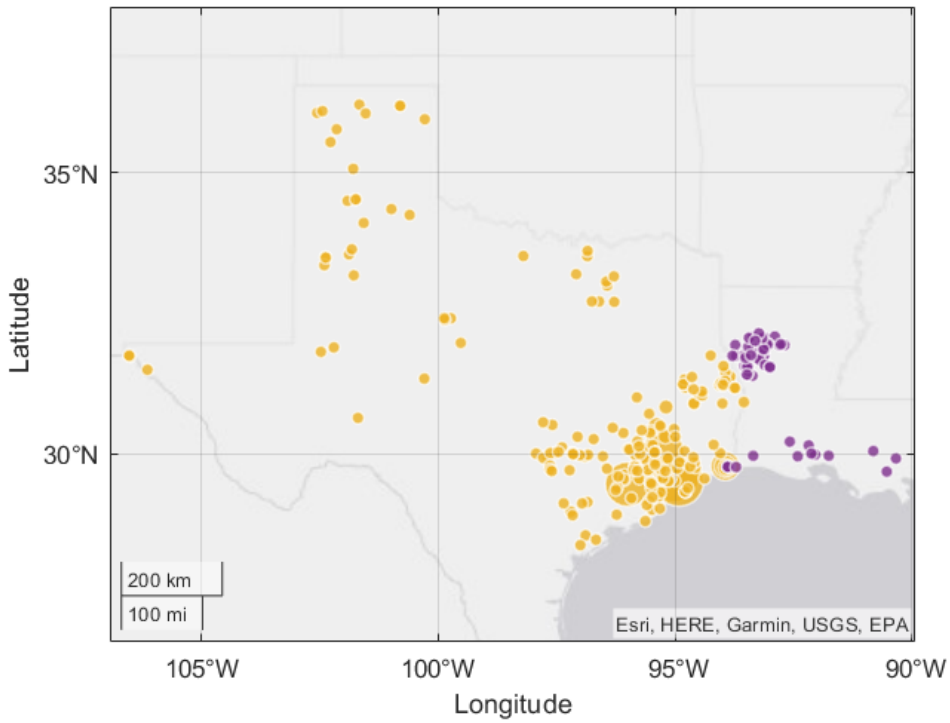
Figures of Event Locations

```
 % Geographic plot of the event START locations
 % due to the Hurricane - Harvey,
 % in all of USA
 geobubble(harveyEvents.Begin_Lat,harveyEvents.Begin_Lon,harveyEvents.Total_Dama
ge,harveyEvents.State);
```



The eastern coastal states have had more effect than the rest of USA.

```
 % Geographic plot of the event START locations
 % due to the Hurricane - Harvey,
 % in the states of Texas and Louisiana
 geobubble(texasLouisianaevents.Begin_Lat,texasLouisianaevents.Begin_Lon,texasLo
uisianaevents.Total_Damage,texasLouisianaevents.State);
```



And inside the most affected states, their eastern coast have had the most casualities.

Analysis

We will use tables to analyse the follwing.

Three Counties with Most Events in Texas

```
texasEvents = texasLouisianaevents(texasLouisianaevents.State ~=
'LOUISIANA',:);
groupsummary(texasEvents,"CZ_Name");
ans = sortrows(ans,'GroupCount','descend');
head(ans)
```

ans = 8×2 table

	CZ_Name	GroupCount
1	HARRIS	21
2	GALVESTON	17
3	FORT BEND	13
4	ANGELINA	12
5	BRAZORIA	12
6	SABINE	12
7	BASTROP	9
8	CHAMBERS	8

Harris, Galveston, Fort Bend have had the most events in Texas due to the Hurricane - Harvey.

Three Counties with Most Events in Louisiana

```
louisianaEvents = texasLouisianaevents(texasLouisianaevents.State ~=
'TEXAS',:);
groupsummary(louisianaEvents,"CZ_Name");
ans = sortrows(ans,'GroupCount','descend');
head(ans)
```

ans = 8×2 table

	CZ_Name	GroupCount
1	NATCHITOCHES	21
2	SABINE	15
3	RED RIVER	9
4	WINN	6
5	VERMILION	4
6	CAMERON	3
7	DE SOTO	3

	CZ_Name	GroupCount
8	UNION	2

Natchitoches, Sabine and Red River have had the most events in Louisiana due to the Hurricane - Harvey.

Three Counties with Highest Property Cost in Texas

```
groupsummary(texasEvents,"CZ_Name","sum","Property_Cost");
ans = sortrows(ans,'sum_Property_Cost','descend');
head(ans)
```

ans = 8×3 table

	CZ_Name	GroupCount	sum_Property_Cost
1	GALVESTON	17	2.0000e+10
2	FORT BEND	13	1.6004e+10
3	MONTGOMERY	6	1.4000e+10
4	HARRIS	21	1.0001e+10
5	JEFFERSON	4	3.0000e+09
6	BRAZORIA	12	2.0008e+09
7	ARANSAS	2	1.9500e+09
8	ORANGE	2	1.5000e+09

Galveston, Fort Bend and Montgomery have had the highest reported property costs in the state of Texas due to the Hurricane - Harvey. The costs being $20B, $16004M and $14B respectively.

Three Counties with Highest Property Cost in Louisiana

```
groupsummary(louisianaEvents,"CZ_Name","sum","Property_Cost");
ans = sortrows(ans,'sum_Property_Cost','descend');
head(ans)
```

ans = 8×3 table

	CZ_Name	GroupCount	sum_Property_Cost
1	CALCASIEU	1	60000000
2	BEAUREGARD	1	15000000
3	ACADIA	1	200000
4	CAMERON	3	72000
5	VERMILION	4	5000
6	BIENVILLE	1	0

	CZ_Name	GroupCount	sum_Property_Cost
7	BOSSIER	1	0
8	CADDO	1	0

Calcasieu, Beauregard and Acadia have had the highest reported property costs in the state of Louisiana due to the Hurricane - Harvey. The costs being $60M, $15M and $200K respectively.

Conclusions and Recommendations

Hence from the above analysis we can say that the south eastern coast has had the maximum casualities due to the Hurricane - Harvey. The resources can be allocated to the countries of Galveston, Fort Bend and Montgomery in Texas, and to the countries of Calcasieu, Beauregard and Acadia in Louisiana in top priority. And then to Harris in Texas and Natchitoches, Sabine and Red River in Louisiana next. There after to other parts of these two states and other states.

THANK YOU