HURRICANE HARVEY REPORT

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Introduction

In 2017, Hurricane Harvey became one of the costliest hurricanes on record, causing approximately $125 billion in damage. Most of the damage was caused from flooding with some areas receiving over 40 inches (102 cm) of rain.

Hurricanes are large weather events with a specific definition � a rotating low-pressure weather system with sustained winds of 74+ mph (119 km/h). Harvey became a hurricane August 24th, made landfall on the 25th, and was downgraded to a tropical storm on August 26th.

The impact of Harvey was felt over much more than just 3 days. In the 2017 storm events data set, Harvey related events are reported beginning August 17th and end September 3rd as the system moved north and east across the United States. Flooding, thunderstorms, hail, and tornadoes are just a few of the weather events related to Harvey.

Background and Scope

Import the Data

importing Data.

```matlab
opts = delimitedTextImportOptions("NumVariables", 24);

% Specify range and delimiter
opts.DataLines = [2, Inf];
opts.Delimiter = ",";

% Specify column names and types
opts.VariableNames = ["EpisodeID", "Event_ID", "State", "Year", "Month", "Event_Type", "CZ_Name", "Begin_Date_Time", "Timezone", "End_Date
opts.VariableTypes = ["double", "double", "categorical", "double", "categorical", "categorical", "categorical", "datetime", "double", "dat

% Specify file level properties
opts.ExtraColumnsRule = "ignore";
opts.EmptyLineRule = "read";

% Specify variable properties
opts = setvaropts(opts, "Event_Narrative", "WhitespaceRule", "preserve");
opts = setvaropts(opts, ["State", "Month", "Event_Type", "CZ_Name", "Episode_Narrative", "Event_Narrative"], "EmptyFieldRule", "auto");
opts = setvaropts(opts, "Begin_Date_Time", "InputFormat", "yyyy-MM-dd HH:mm:ss");
opts = setvaropts(opts, "End_Date_Time", "InputFormat", "yyyy-MM-dd HH:mm:ss");
opts = setvaropts(opts, ["Timezone", "Damage_Property", "Damage_Crops"], "TrimNonNumeric", true);
opts = setvaropts(opts, ["Timezone", "Damage_Property", "Damage_Crops"], "ThousandsSeparator", ",");

% Import the data
StormEvents2017finalProject2 = readtable("F:\Programming\Practical data science with Matlab\Exploratory Data Analysis\StormEvents\StormEve
```

StormEvents2017finalProject2 = 57005�24 table

	EpisodeID	Event_ID	State	Year	Month	Event_Type	CZ_Name	Begin_Date_Time	Timezone	En
1	113355	678791	NEW JERS…	2017	April	Thunderstorm Wind	GLOUCESTER	2017-04-06 15:09:00	-5	201
2	113459	679228	FLORIDA	2017	April	Tornado	LEE	2017-04-06 09:30:00	-5	201
3	113448	679268	OHIO	2017	April	Thunderstorm Wind	GREENE	2017-04-05 17:49:00	-5	201
4	113697	682042	OHIO	2017	April	Flood	CLERMONT	2017-04-16 17:59:00	-5	201
5	113683	682062	NEBRASKA	2017	April	Hail	CASS	2017-04-15 15:50:00	-6	201
6	114718	688082	INDIANA	2017	April	Flash Flood	SWITZERLAND	2017-04-29 09:15:00	-5	201
7	114834	688895	VIRGINIA	2017	April	Thunderstorm Wind	WESTMOREL…	2017-04-21 19:15:00	-5	201
8	121068	724772	GULF OF …	2017	October	Marine Thundersto…	ATCHAFALAY…	2017-10-22 10:15:00	-6	201
9	114489	686560	OHIO	2017	April	Flash Flood	CLERMONT	2017-04-29 09:45:00	-5	201
10	113683	682156	NEBRASKA	2017	April	Thunderstorm Wind	BURT	2017-04-15 18:55:00	-6	201

	EpisodeID	Event_ID	State	Year	Month	Event_Type	CZ_Name	Begin_Date_Time	Timezone	En
11	115066	690966	ARKANSAS	2017	April	Hail	FRANKLIN	2017-04-26 07:57:00	-6	201
12	121162	725317	OKLAHOMA	2017	October	Hail	KIOWA	2017-10-21 15:20:00	-6	201
13	120474	721817	ATLANTIC …	2017	October	Marine Strong Wind	DE BAY WAT…	2017-10-24 02:24:00	-5	201
14	120474	721818	ATLANTIC …	2017	October	Marine High Wind	DE BAY WAT…	2017-10-24 03:36:00	-5	201
15	112855	675876	PENNSYLV…	2017	March	Winter Weather	MONROE	2017-03-10 08:00:00	-5	201
16	112855	675879	PENNSYLV…	2017	March	Winter Weather	LOWER BUC…	2017-03-10 08:00:00	-5	201
17	112855	675877	PENNSYLV…	2017	March	Winter Weather	WESTERN M…	2017-03-10 08:00:00	-5	201
18	113797	681330	WISCONSIN	2017	February	Winter Weather	ROCK	2017-02-24 16:00:00	-6	201
19	113797	681332	WISCONSIN	2017	February	Winter Weather	WALWORTH	2017-02-24 17:00:00	-6	201
20	115634	694778	GULF OF …	2017	June	Marine Thundersto…	COASTAL WA…	2017-06-06 15:25:00	-5	201
21	115688	695188	FLORIDA	2017	June	Thunderstorm Wind	CHARLOTTE	2017-06-06 15:35:00	-5	201
22	115811	696020	GULF OF …	2017	June	Marine Thundersto…	ENGLEWOO…	2017-06-07 08:12:00	-5	201
23	115811	696023	GULF OF …	2017	June	Marine Thundersto…	ENGLEWOO…	2017-06-07 09:22:00	-5	201
24	115752	695727	MONTANA	2017	June	Hail	CUSTER	2017-06-20 21:20:00	-7	201
25	115752	695729	MONTANA	2017	June	Hail	TREASURE	2017-06-20 20:16:00	-7	201
26	115752	695740	MONTANA	2017	June	Thunderstorm Wind	YELLOWSTO…	2017-06-20 19:00:00	-7	201
27	113797	681331	WISCONSIN	2017	February	Winter Weather	WAUKESHA	2017-02-24 17:00:00	-6	201
28	113797	681333	WISCONSIN	2017	February	Winter Weather	MILWAUKEE	2017-02-24 19:00:00	-6	201
29	113797	681334	WISCONSIN	2017	February	Winter Weather	RACINE	2017-02-24 19:00:00	-6	201
30	113797	681336	WISCONSIN	2017	February	Winter Weather	KENOSHA	2017-02-24 19:00:00	-6	201
31	115176	691471	GULF OF …	2017	June	Waterspout	ENGLEWOO…	2017-06-04 09:02:00	-5	201
32	115176	691472	GULF OF …	2017	June	Waterspout	TAMPA BAY	2017-06-04 11:05:00	-5	201
33	115634	694777	GULF OF …	2017	June	Marine Thundersto…	ENGLEWOO…	2017-06-06 14:35:00	-5	201
34	112855	675883	PENNSYLV…	2017	March	Winter Weather	EASTERN M…	2017-03-10 08:00:00	-5	201
35	113797	681282	WISCONSIN	2017	February	Winter Weather	MARQUETTE	2017-02-24 00:00:00	-6	201
36	115811	696124	GULF OF …	2017	June	Marine Thundersto…	ENGLEWOO…	2017-06-07 08:30:00	-5	201
37	115811	696134	GULF OF …	2017	June	Marine Thundersto…	CHARLOTTE …	2017-06-07 11:25:00	-5	201
38	115811	696176	GULF OF …	2017	June	Marine Thundersto…	COASTAL WA…	2017-06-07 11:17:00	-5	201
39	115811	696179	GULF OF …	2017	June	Marine Thundersto…	CHARLOTTE …	2017-06-07 12:21:00	-5	201
40	115902	696463	FLORIDA	2017	June	Thunderstorm Wind	HILLSBOROU…	2017-06-11 15:30:00	-5	201
41	115904	696474	GULF OF …	2017	June	Marine Thundersto…	CHARLOTTE …	2017-06-11 17:15:00	-5	201
42	115940	696653	GULF OF …	2017	June	Marine Thundersto…	TAMPA BAY	2017-06-14 14:55:00	-5	201
43	116635	701349	FLORIDA	2017	June	Flash Flood	LEON	2017-06-06 12:30:00	-5	201
44	116635	701350	FLORIDA	2017	June	Flash Flood	LEON	2017-06-07 15:55:00	-5	201
45	116635	701351	FLORIDA	2017	June	Flash Flood	LEON	2017-06-07 16:15:00	-5	201
46	116636	701352	FLORIDA	2017	June	Flash Flood	BAY	2017-06-21 09:00:00	-6	201
47	116636	701353	FLORIDA	2017	June	Flash Flood	WASHINGTON	2017-06-21 09:15:00	-6	201
48	116636	701354	FLORIDA	2017	June	Flood	WALTON	2017-06-22 05:00:00	-6	201
49	116636	701355	FLORIDA	2017	June	Flood	WALTON	2017-06-22 05:00:00	-6	201
50	115691	698754	MISSOURI	2017	June	Thunderstorm Wind	CHRISTIAN	2017-06-23 11:42:00	-6	201
51	115691	698756	MISSOURI	2017	June	Thunderstorm Wind	GREENE	2017-06-23 11:26:00	-6	201
52	116224	698777	KANSAS	2017	June	Hail	CRAWFORD	2017-06-17 04:20:00	-6	201
53	116224	698778	KANSAS	2017	June	Hail	CRAWFORD	2017-06-17 05:13:00	-6	201
54	116224	698779	KANSAS	2017	June	Thunderstorm Wind	CRAWFORD	2017-06-17 04:32:00	-6	201
55	116224	698780	KANSAS	2017	June	Thunderstorm Wind	CRAWFORD	2017-06-17 04:30:00	-6	201
56	116224	698781	KANSAS	2017	June	Thunderstorm Wind	CRAWFORD	2017-06-17 04:16:00	-6	201
57	116224	698782	KANSAS	2017	June	Hail	CHEROKEE	2017-06-17 05:39:00	-6	201
58	115691	698760	MISSOURI	2017	June	Thunderstorm Wind	TANEY	2017-06-23 12:25:00	-6	201
59	115691	698761	MISSOURI	2017	June	Thunderstorm Wind	STONE	2017-06-23 12:10:00	-6	201
60	115691	698762	MISSOURI	2017	June	Thunderstorm Wind	TANEY	2017-06-23 12:20:00	-6	201
61	115691	698763	MISSOURI	2017	June	Thunderstorm Wind	TANEY	2017-06-23 12:02:00	-6	201
62	115691	698764	MISSOURI	2017	June	Thunderstorm Wind	HOWELL	2017-06-23 13:10:00	-6	201
63	115691	698765	MISSOURI	2017	June	Heavy Rain	GREENE	2017-06-23 11:30:00	-6	201
64	115691	698766	MISSOURI	2017	June	Heavy Rain	GREENE	2017-06-23 11:49:00	-6	201
65	116222	698768	MISSOURI	2017	June	Flash Flood	GREENE	2017-06-01 18:15:00	-6	201
66	116222	698769	MISSOURI	2017	June	Flash Flood	GREENE	2017-06-01 19:00:00	-6	201
67	116222	698770	MISSOURI	2017	June	Hail	GREENE	2017-06-01 18:16:00	-6	201
68	116636	701356	FLORIDA	2017	June	Flood	WALTON	2017-06-22 05:00:00	-6	201
69	116636	701357	FLORIDA	2017	June	Flood	WALTON	2017-06-22 05:00:00	-6	201
70	115330	692444	ATLANTIC …	2017	June	Marine Thundersto…	VOLUSIA-BR…	2017-06-08 09:58:00	-5	201
71	115330	692448	ATLANTIC …	2017	June	Marine Thundersto…	VOLUSIA-BR…	2017-06-08 11:14:00	-5	201
72	115330	692453	ATLANTIC …	2017	June	Marine Thundersto…	VOLUSIA-BR…	2017-06-08 13:30:00	-5	201
73	115691	698751	MISSOURI	2017	June	Lightning	DOUGLAS	2017-06-23 12:32:00	-6	201
74	115691	698752	MISSOURI	2017	June	Thunderstorm Wind	GREENE	2017-06-23 11:30:00	-6	201
75	115691	698753	MISSOURI	2017	June	Thunderstorm Wind	GREENE	2017-06-23 11:29:00	-6	201

	EpisodeID	Event_ID	State	Year	Month	Event_Type	CZ_Name	Begin_Date_Time	Timezone	En
76	115691	698757	MISSOURI	2017	June	Thunderstorm Wind	GREENE	2017-06-23 11:36:00	-6	201
77	115691	698758	MISSOURI	2017	June	Thunderstorm Wind	GREENE	2017-06-23 11:25:00	-6	201
78	115691	698759	MISSOURI	2017	June	Thunderstorm Wind	GREENE	2017-06-23 11:45:00	-6	201
79	116222	698771	MISSOURI	2017	June	Thunderstorm Wind	GREENE	2017-06-01 17:53:00	-6	201
80	116222	698772	MISSOURI	2017	June	Thunderstorm Wind	GREENE	2017-06-01 18:13:00	-6	201
81	116222	698773	MISSOURI	2017	June	Thunderstorm Wind	GREENE	2017-06-01 18:10:00	-6	201
82	116222	698774	MISSOURI	2017	June	Thunderstorm Wind	GREENE	2017-06-01 18:15:00	-6	201
83	116224	698775	KANSAS	2017	June	Hail	CRAWFORD	2017-06-17 04:12:00	-6	201
84	116224	698776	KANSAS	2017	June	Hail	CRAWFORD	2017-06-17 04:16:00	-6	201
85	116224	698783	KANSAS	2017	June	Thunderstorm Wind	CHEROKEE	2017-06-17 05:34:00	-6	201
86	116224	698784	KANSAS	2017	June	Thunderstorm Wind	CRAWFORD	2017-06-17 05:10:00	-6	201
87	116224	698785	KANSAS	2017	June	Thunderstorm Wind	BOURBON	2017-06-17 02:38:00	-6	201
88	115940	696657	GULF OF …	2017	June	Waterspout	ENGLEWOO…	2017-06-14 15:30:00	-5	201
89	115968	696991	FLORIDA	2017	June	Thunderstorm Wind	CHARLOTTE	2017-06-19 11:55:00	-5	201
90	115966	697003	GULF OF …	2017	June	Marine Thundersto…	TAMPA BAY	2017-06-19 13:36:00	-5	201
91	115966	697015	GULF OF …	2017	June	Marine Thundersto…	TAMPA BAY	2017-06-19 13:43:00	-5	201
92	115992	697128	GULF OF …	2017	June	Waterspout	ENGLEWOO…	2017-06-27 07:00:00	-5	201
93	116634	701344	ALABAMA	2017	June	Thunderstorm Wind	GENEVA	2017-06-22 00:10:00	-6	201
94	116632	701345	ALABAMA	2017	June	Thunderstorm Wind	GENEVA	2017-06-30 12:42:00	-6	201
95	116224	698786	KANSAS	2017	June	Thunderstorm Wind	CRAWFORD	2017-06-17 05:10:00	-6	201
96	116224	698787	KANSAS	2017	June	Thunderstorm Wind	CRAWFORD	2017-06-17 06:12:00	-6	201
97	116224	698788	KANSAS	2017	June	Thunderstorm Wind	CHEROKEE	2017-06-17 06:29:00	-6	201
98	116224	698789	KANSAS	2017	June	Thunderstorm Wind	CHEROKEE	2017-06-17 06:05:00	-6	201
99	116224	698790	KANSAS	2017	June	Thunderstorm Wind	BOURBON	2017-06-17 22:50:00	-6	201
100	116225	698801	MISSOURI	2017	June	Thunderstorm Wind	VERNON	2017-06-15 01:40:00	-6	201

?

Two States Most Impacted by Harvey

these are the states worst affected

```
StormEvents2017finalProject1 = StormEvents2017finalProject2(ismember(StormEvents2017finalProject2.State,{'ARKANSAS','KENTUCKY','LOUISIANA'

StormEvents2017finalProject1 = StormEvents2017finalProject1(ismember(StormEvents2017finalProject1.Event_Type,{'Coastal Flood','Flash Floo
StormEvents2017finalProject1 = StormEvents2017finalProject1(StormEvents2017finalProject1.End_Date_Time < '2017-09-04 00:00:01' | ismissing
StormEvents2017finalProject1 = StormEvents2017finalProject1(StormEvents2017finalProject1.Begin_Date_Time >= '2017-08-16 00:00:00' & StormE
groupsummary(StormEvents2017finalProject1,"State","sum","Property_Cost");
ans = sortrows(ans,'sum_Property_Cost','descend')
```

ans = 7�3 table

	State	GroupCount	sum_Property_Cost
1	TEXAS	214	4.7778e+10
2	LOUISIANA	61	75277000
3	NORTH CA…	56	12332000
4	MISSISSIPPI	26	661000
5	KENTUCKY	20	435000
6	TENNESSEE	26	397000
7	ARKANSAS	36	56000

Table of Events for Two Most Impacted States

the two most affected states

```
StormEvents2017finalProject1;

StormEvents2017finalProject1 = StormEvents2017finalProject1(ismember(StormEvents2017finalProject1.State,{'LOUISIANA','TEXAS'}),:)
```

StormEvents2017finalProject1 = 275�24 table

	EpisodeID	Event_ID	State	Year	Month	Event_Type	CZ_Name	Begin_Date_Time	Timezone	En
1	120011	719146	TEXAS	2017	August	Flash Flood	EL PASO	2017-08-23 16:15:00	-7	201
2	120012	719147	TEXAS	2017	August	Thunderstorm Wind	EL PASO	2017-08-25 18:10:00	-7	201
3	120012	719148	TEXAS	2017	August	Flash Flood	EL PASO	2017-08-25 18:48:00	-7	201
4	119746	719493	TEXAS	2017	August	Flash Flood	HARDIN	2017-08-27 12:40:00	-6	201
5	119746	719496	TEXAS	2017	August	Flash Flood	JASPER	2017-08-29 22:29:00	-6	201
6	119746	719497	TEXAS	2017	August	Flash Flood	NEWTON	2017-08-29 22:29:00	-6	201
7	119753	720340	TEXAS	2017	August	Flash Flood	FORT BEND	2017-08-26 00:45:00	-6	201
8	119721	717988	TEXAS	2017	August	Thunderstorm Wind	SCURRY	2017-08-16 17:50:00	-6	201
9	119721	717989	TEXAS	2017	August	Hail	SCURRY	2017-08-16 17:50:00	-6	201
10	119721	717990	TEXAS	2017	August	Thunderstorm Wind	HOWARD	2017-08-16 18:58:00	-6	201
11	119721	717994	TEXAS	2017	August	Hail	MARTIN	2017-08-16 20:15:00	-6	201
12	119826	718436	TEXAS	2017	August	Thunderstorm Wind	MIDLAND	2017-08-22 20:59:00	-6	201

	EpisodeID	Event_ID	State	Year	Month	Event_Type	CZ_Name	Begin_Date_Time	Timezone	En
13	117836	708282	TEXAS	2017	August	Thunderstorm Wind	BRISCOE	2017-08-20 17:45:00	-6	201
14	119746	719740	TEXAS	2017	August	Thunderstorm Wind	JASPER	2017-08-30 22:45:00	-6	201
15	119746	720010	TEXAS	2017	August	Flood	ORANGE	2017-08-30 16:00:00	-6	201
16	119753	720464	TEXAS	2017	August	Flash Flood	MONTGOME…	2017-08-26 08:00:00	-6	201
17	119853	718515	TEXAS	2017	August	Thunderstorm Wind	ECTOR	2017-08-25 17:20:00	-6	201
18	119746	719342	TEXAS	2017	August	Flash Flood	JEFFERSON	2017-08-27 07:12:00	-6	201
19	119753	720344	TEXAS	2017	August	Flash Flood	GALVESTON	2017-08-26 07:00:00	-6	201
20	118032	709519	TEXAS	2017	August	Thunderstorm Wind	SWISHER	2017-08-22 16:05:00	-6	201
21	118330	711050	TEXAS	2017	August	Flash Flood	ANGELINA	2017-08-30 17:00:00	-6	201
22	118330	711054	TEXAS	2017	August	Flash Flood	ANGELINA	2017-08-29 17:02:00	-6	201
23	118330	711059	TEXAS	2017	August	Flash Flood	ANGELINA	2017-08-29 01:45:00	-6	201
24	118330	711060	TEXAS	2017	August	Flash Flood	ANGELINA	2017-08-29 01:50:00	-6	201
25	119753	721087	TEXAS	2017	August	Flash Flood	SAN JACINTO	2017-08-27 13:00:00	-6	201
26	119753	720859	TEXAS	2017	August	Flash Flood	GALVESTON	2017-08-26 20:45:00	-6	201
27	118032	709521	TEXAS	2017	August	Thunderstorm Wind	LUBBOCK	2017-08-22 18:00:00	-6	201
28	118330	711063	TEXAS	2017	August	Flash Flood	ANGELINA	2017-08-29 05:40:00	-6	201
29	118032	709520	TEXAS	2017	August	Flash Flood	SWISHER	2017-08-22 16:15:00	-6	201
30	118032	709525	TEXAS	2017	August	Thunderstorm Wind	HOCKLEY	2017-08-22 17:45:00	-6	201
31	120132	719823	TEXAS	2017	August	Thunderstorm Wind	CLAY	2017-08-19 15:15:00	-6	201
32	119753	720465	TEXAS	2017	August	Flash Flood	GALVESTON	2017-08-26 10:00:00	-6	201
33	118032	709522	TEXAS	2017	August	Flash Flood	HOCKLEY	2017-08-22 18:14:00	-6	201
34	118032	709523	TEXAS	2017	August	Thunderstorm Wind	LYNN	2017-08-22 18:27:00	-6	201
35	118330	711072	TEXAS	2017	August	Flash Flood	SABINE	2017-08-30 12:05:00	-6	201
36	118330	711078	TEXAS	2017	August	Flash Flood	SAN AUGUST…	2017-08-30 12:12:00	-6	201
37	118330	711079	TEXAS	2017	August	Flash Flood	SABINE	2017-08-30 13:01:00	-6	201
38	118330	711081	TEXAS	2017	August	Flash Flood	SABINE	2017-08-30 14:09:00	-6	201
39	118330	711083	TEXAS	2017	August	Flash Flood	ANGELINA	2017-08-30 15:38:00	-6	201
40	118330	711089	TEXAS	2017	August	Flash Flood	ANGELINA	2017-08-30 18:42:00	-6	201
41	118330	711090	TEXAS	2017	August	Flash Flood	ANGELINA	2017-08-30 18:42:00	-6	201
42	118330	711092	TEXAS	2017	August	Flash Flood	SABINE	2017-08-30 18:42:00	-6	201
43	118330	711405	TEXAS	2017	August	Flash Flood	SABINE	2017-08-30 18:42:00	-6	201
44	118330	711407	TEXAS	2017	August	Flash Flood	SABINE	2017-08-30 18:42:00	-6	201
45	118330	711408	TEXAS	2017	August	Flash Flood	SABINE	2017-08-30 18:42:00	-6	201
46	118330	711409	TEXAS	2017	August	Flash Flood	SABINE	2017-08-30 18:42:00	-6	201
47	118330	711412	TEXAS	2017	August	Flash Flood	ANGELINA	2017-08-30 17:00:00	-6	201
48	119556	717411	TEXAS	2017	August	Hail	SHERMAN	2017-08-17 17:27:00	-6	201
49	119753	720858	TEXAS	2017	August	Flash Flood	HARRIS	2017-08-26 20:15:00	-6	201
50	119753	720860	TEXAS	2017	August	Flash Flood	HARRIS	2017-08-26 20:30:00	-6	201
51	118330	711413	TEXAS	2017	August	Flash Flood	SHELBY	2017-08-30 21:28:00	-6	201
52	118330	711414	TEXAS	2017	August	Flash Flood	SHELBY	2017-08-30 21:30:00	-6	201
53	118330	711415	TEXAS	2017	August	Flash Flood	SABINE	2017-08-30 12:11:00	-6	201
54	118386	711416	LOUISIANA	2017	August	Flash Flood	SABINE	2017-08-30 11:56:00	-6	201
55	118386	711417	LOUISIANA	2017	August	Flash Flood	SABINE	2017-08-30 12:00:00	-6	201
56	118386	711418	LOUISIANA	2017	August	Flash Flood	SABINE	2017-08-30 12:59:00	-6	201
57	118386	711419	LOUISIANA	2017	August	Flash Flood	RED RIVER	2017-08-30 12:59:00	-6	201
58	118386	711420	LOUISIANA	2017	August	Flash Flood	SABINE	2017-08-30 12:59:00	-6	201
59	118386	711421	LOUISIANA	2017	August	Flash Flood	RED RIVER	2017-08-30 13:00:00	-6	201
60	118386	711422	LOUISIANA	2017	August	Flash Flood	SABINE	2017-08-30 13:17:00	-6	201
61	118386	711423	LOUISIANA	2017	August	Flash Flood	NATCHITOCH…	2017-08-30 13:20:00	-6	201
62	118386	711424	LOUISIANA	2017	August	Flash Flood	NATCHITOCH…	2017-08-30 13:23:00	-6	201
63	119556	717412	TEXAS	2017	August	Hail	HUTCHINSON	2017-08-17 18:35:00	-6	201
64	119556	717413	TEXAS	2017	August	Thunderstorm Wind	RANDALL	2017-08-17 18:59:00	-6	201
65	119565	717436	TEXAS	2017	August	Thunderstorm Wind	HARTLEY	2017-08-27 20:27:00	-6	201
66	119753	721098	TEXAS	2017	August	Flash Flood	AUSTIN	2017-08-28 03:30:00	-6	201
67	118386	711425	LOUISIANA	2017	August	Flash Flood	SABINE	2017-08-30 14:00:00	-6	201
68	118386	711426	LOUISIANA	2017	August	Flash Flood	SABINE	2017-08-30 14:20:00	-6	201
69	118386	711427	LOUISIANA	2017	August	Flash Flood	NATCHITOCH…	2017-08-30 14:28:00	-6	201
70	118386	711428	LOUISIANA	2017	August	Flash Flood	NATCHITOCH…	2017-08-30 15:00:00	-6	201
71	118386	711429	LOUISIANA	2017	August	Flash Flood	SABINE	2017-08-30 15:01:00	-6	201
72	118386	711430	LOUISIANA	2017	August	Flash Flood	NATCHITOCH…	2017-08-30 15:30:00	-6	201
73	118386	711431	LOUISIANA	2017	August	Flash Flood	NATCHITOCH…	2017-08-30 15:30:00	-6	201
74	118386	711538	LOUISIANA	2017	August	Flash Flood	DE SOTO	2017-08-30 15:39:00	-6	201
75	118386	711539	LOUISIANA	2017	August	Flash Flood	SABINE	2017-08-30 16:15:00	-6	201
76	118386	711541	LOUISIANA	2017	August	Flash Flood	SABINE	2017-08-30 17:21:00	-6	201
77	119556	717414	TEXAS	2017	August	Hail	OCHILTREE	2017-08-17 22:25:00	-6	201

	EpisodeID	Event_ID	State	Year	Month	Event_Type	CZ_Name	Begin_Date_Time	Timezone	En
78	119556	717415	TEXAS	2017	August	Thunderstorm Wind	OCHILTREE	2017-08-17 22:25:00	-6	201
79	119878	718603	TEXAS	2017	August	Thunderstorm Wind	TOM GREEN	2017-08-17 15:40:00	-6	201
80	119753	721099	TEXAS	2017	August	Flash Flood	GALVESTON	2017-08-28 08:50:00	-6	201
81	119753	721115	TEXAS	2017	August	Flash Flood	GALVESTON	2017-08-28 18:30:00	-6	201
82	118325	711038	TEXAS	2017	August	Thunderstorm Wind	ANGELINA	2017-08-26 15:30:00	-6	201
83	120129	719821	TEXAS	2017	August	Hail	HARDEMAN	2017-08-16 19:02:00	-6	201
84	120129	719822	TEXAS	2017	August	Thunderstorm Wind	HARDEMAN	2017-08-16 19:15:00	-6	201
85	118732	713266	LOUISIANA	2017	August	Flash Flood	ST. CHARLES	2017-08-29 08:00:00	-6	201
86	120120	719742	LOUISIANA	2017	August	Flood	CAMERON	2017-08-30 12:00:00	-6	201
87	120120	719749	LOUISIANA	2017	August	Flash Flood	CALCASIEU	2017-08-27 11:17:00	-6	201
88	118386	711542	LOUISIANA	2017	August	Flash Flood	SABINE	2017-08-30 17:30:00	-6	201
89	118386	711543	LOUISIANA	2017	August	Flash Flood	SABINE	2017-08-30 17:30:00	-6	201
90	118386	711544	LOUISIANA	2017	August	Flash Flood	SABINE	2017-08-30 17:42:00	-6	201
91	118386	711546	LOUISIANA	2017	August	Flash Flood	NATCHITOCH…	2017-08-30 18:09:00	-6	201
92	118386	711547	LOUISIANA	2017	August	Flash Flood	NATCHITOCH…	2017-08-30 18:10:00	-6	201
93	118386	711548	LOUISIANA	2017	August	Flash Flood	WINN	2017-08-30 18:30:00	-6	201
94	118386	711549	LOUISIANA	2017	August	Flash Flood	DE SOTO	2017-08-30 19:00:00	-6	201
95	118386	711550	LOUISIANA	2017	August	Flash Flood	NATCHITOCH…	2017-08-30 19:00:00	-6	201
96	118386	711551	LOUISIANA	2017	August	Flash Flood	RED RIVER	2017-08-30 19:30:00	-6	201
97	118386	711553	LOUISIANA	2017	August	Flash Flood	WINN	2017-08-31 01:00:00	-6	201
98	118386	711554	LOUISIANA	2017	August	Flash Flood	WINN	2017-08-31 01:00:00	-6	201
99	118386	711555	LOUISIANA	2017	August	Flash Flood	WINN	2017-08-31 01:00:00	-6	201
100	118386	711556	LOUISIANA	2017	August	Flash Flood	WINN	2017-08-31 03:05:00	-6	201

?

Visualizations

Figure of Event Types

the type and number of occurances for events related to Harvey in the two states

```
StormEvents2017finalProject1L = StormEvents2017finalProject1(StormEvents2017finalProject1.State ~= 'TEXAS',:);

StormEvents2017finalProject1L.Event_Type = removecats(StormEvents2017finalProject1L.Event_Type,{'Astronomical Low Tide','Avalanche','Bliza
 histogram(StormEvents2017finalProject1L.Event_Type)
 hold on
StormEvents2017finalProject1T = StormEvents2017finalProject1(StormEvents2017finalProject1.State ~= 'LOUISIANA',:);

StormEvents2017finalProject1T.Event_Type = removecats(StormEvents2017finalProject1T.Event_Type,{'Avalanche','Astronomical Low Tide','Bliza
 histogram(StormEvents2017finalProject1T.Event_Type)
 hold off
grid on
legend({'LOUISIANA','TEXAS'})

title('EVENT DISTRIBUTION IN TWO STATES')
xlabel('EVENT TYPE')
ylabel('NUMBER OF EVENTS')
```
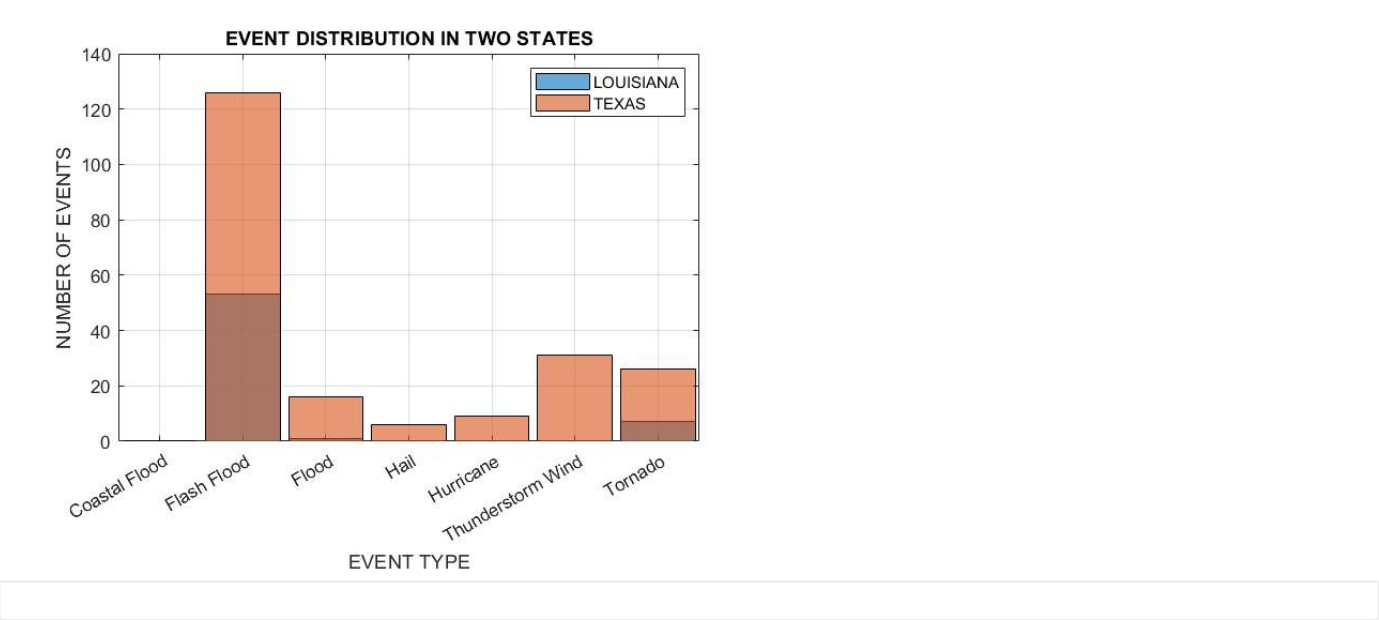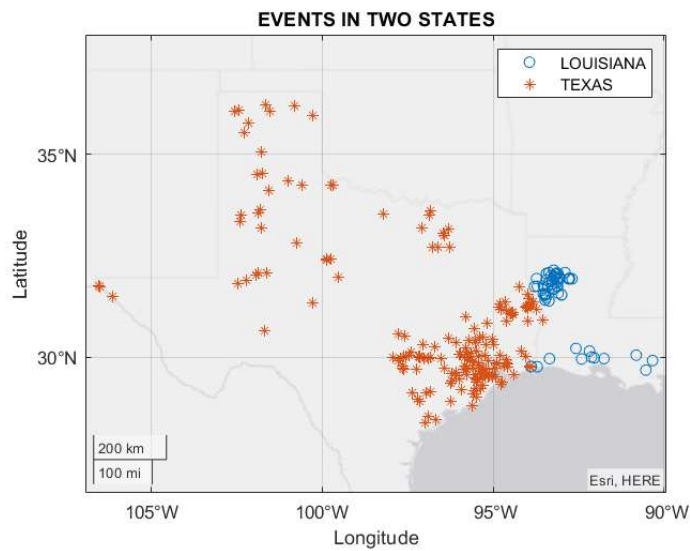

Figure of Event Locations

the location of events in the two states.

```
geoscatter(StormEvents2017finalProject1L.Begin_Lat,StormEvents2017finalProject1L.Begin_Lon)
hold on
geoscatter(StormEvents2017finalProject1T.Begin_Lat,StormEvents2017finalProject1T.Begin_Lon,"Marker","*")
hold off

legend({'LOUISIANA','TEXAS'})

title('EVENTS IN TWO STATES')
```


Analysis

Three Counties with Most Events in State 1

three counties with the most events in state 1.

```
groupsummary(StormEvents2017finalProject1T,"CZ_Name");

ans = sortrows(ans,'GroupCount','descend')
```

ans = 80⬚2 table

	CZ_Name	GroupCount
1	HARRIS	19
2	GALVESTON	14
3	FORT BEND	12
4	ANGELINA	10
5	BRAZORIA	10
6	SABINE	10
7	BASTROP	8
8	CHAMBERS	7
9	CALDWELL	6
10	MONTGOME…	5
11	MATAGORDA	4
12	WHARTON	4
13	CALHOUN	3
14	EL PASO	3
15	FAYETTE	3
16	LIBERTY	3
17	TAYLOR	3
18	VICTORIA	3
19	WALKER	3
20	WALLER	3
21	AUSTIN	2
22	COLLIN	2
23	DALLAS	2
24	DE WITT	2
25	GRAYSON	2
26	GRIMES	2
27	HARDEMAN	2
28	HOCKLEY	2

	CZ_Name	GroupCount
29	JACKSON	2
30	JASPER	2
31	JEFFERSON	2
32	LUBBOCK	2
33	MIDLAND	2
34	OCHILTREE	2
35	ORANGE	2
36	REFUGIO	2
37	SAN JACINTO	2
38	SCURRY	2
39	SHELBY	2
40	SWISHER	2
41	WILLIAMSON	2
42	ARANSAS	1
43	BEE	1
44	BRAZOS	1
45	BRISCOE	1
46	CLAY	1
47	COLEMAN	1
48	COLORADO	1
49	CROCKETT	1
50	DALLAM	1
51	DENTON	1
52	ECTOR	1
53	GOLIAD	1
54	GONZALES	1
55	HALE	1
56	HARDIN	1
57	HARTLEY	1
58	HAYS	1
59	HEMPHILL	1
60	HOWARD	1
61	HUNT	1
62	HUTCHINSON	1
63	KAUFMAN	1
64	LEE	1
65	LYNN	1
66	MADISON	1
67	MARTIN	1
68	MOORE	1
69	MOTLEY	1
70	NEWTON	1
71	NUECES	1
72	OLDHAM	1
73	POLK	1
74	RANDALL	1
75	SAN AUGUST…	1
76	SAN PATRICIO	1
77	SHERMAN	1
78	TOM GREEN	1
79	TYLER	1
80	WASHINGTON	1

Three Counties with Most Events in State 2

Either type out, show in a table, or show in a clear visualization the three counties with the most events in state 2.

```
groupsummary(StormEvents2017finalProject1L,"CZ_Name");

ans = sortrows(ans,'GroupCount','descend')
```

ans = 15⊠2 table

	CZ_Name	GroupCount
1	NATCHITOCH…	19
2	SABINE	13
3	RED RIVER	8
4	WINN	5
5	CAMERON	3

	CZ_Name	GroupCount
6	VERMILION	3
7	DE SOTO	2
8	ACADIA	1
9	BEAUREGARD	1
10	CALCASIEU	1
11	IBERIA	1
12	LAFAYETTE	1
13	LAFOURCHE	1
14	ST. CHARLES	1
15	ST. JAMES	1

Three Counties with Highest Property Cost in State 1

Either type out, show in a table, or show in a clear visualization the three counties with the highest property damage in state 1. *Be sure to include the dollar amount.*

```
groupsummary(StormEvents2017finalProject1T,"CZ_Name","sum","Property_Cost");

ans = sortrows(ans,'sum_Property_Cost','descend')
```

ans = 80�3 table

	CZ_Name	GroupCount	sum_Property_Cost
1	HARRIS	19	1.0001e+10
2	GALVESTON	14	1.0000e+10
3	FORT BEND	12	8.0043e+09
4	MONTGOME…	5	7.0000e+09
5	JEFFERSON	2	3.0000e+09
6	BRAZORIA	10	2.0008e+09
7	ARANSAS	1	1.7500e+09
8	ORANGE	2	1.5000e+09
9	NUECES	1	1.0000e+09
10	HARDIN	1	600000000
11	WALKER	3	600000000
12	REFUGIO	2	500000000
13	SAN PATRICIO	1	500000000
14	SAN JACINTO	2	350000000
15	POLK	1	300000000
16	CALHOUN	3	251010000
17	VICTORIA	3	160000000
18	JASPER	2	85005000
19	TYLER	1	60000000
20	FAYETTE	3	50000000
21	NEWTON	1	45000000
22	CALDWELL	6	12850000
23	DE WITT	2	3100000
24	BASTROP	8	1500000
25	GOLIAD	1	1000000
26	WALLER	3	700000
27	MATAGORDA	4	500000
28	WHARTON	4	350000
29	LEE	1	250000
30	JACKSON	2	200000
31	AUSTIN	2	100000
32	HAYS	1	100000
33	HOCKLEY	2	42000
34	BEE	1	10000
35	BRISCOE	1	10000
36	ECTOR	1	8000
37	LUBBOCK	2	500
38	ANGELINA	10	0
39	BRAZOS	1	0
40	CHAMBERS	7	0
41	CLAY	1	0
42	COLEMAN	1	0
43	COLLIN	2	0
44	COLORADO	1	0
45	CROCKETT	1	0
46	DALLAM	1	0
47	DALLAS	2	0

	CZ_Name	GroupCount	sum_Property_Cost
48	DENTON	1	0
49	EL PASO	3	0
50	GONZALES	1	0
51	GRAYSON	2	0
52	GRIMES	2	0
53	HALE	1	0
54	HARDEMAN	2	0
55	HARTLEY	1	0
56	HEMPHILL	1	0
57	HOWARD	1	0
58	HUNT	1	0
59	HUTCHINSON	1	0
60	KAUFMAN	1	0
61	LIBERTY	3	0
62	LYNN	1	0
63	MADISON	1	0
64	MARTIN	1	0
65	MIDLAND	2	0
66	MOORE	1	0
67	MOTLEY	1	0
68	OCHILTREE	2	0
69	OLDHAM	1	0
70	RANDALL	1	0
71	SABINE	10	0
72	SAN AUGUST…	1	0
73	SCURRY	2	0
74	SHELBY	2	0
75	SHERMAN	1	0
76	SWISHER	2	0
77	TAYLOR	3	0
78	TOM GREEN	1	0
79	WASHINGTON	1	0
80	WILLIAMSON	2	0

Three Counties with Highest Property Cost in State 2

Either type out, show in a table, or show in a clear visualization the three counties with the highest property damage in state 2. *Be sure to include the dollar amount*.

```
groupsummary(StormEvents2017finalProject1L,"CZ_Name","sum","Property_Cost");

ans = sortrows(ans,'sum_Property_Cost','descend')
```

ans = 15⬚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	3	5000
6	DE SOTO	2	0
7	IBERIA	1	0
8	LAFAYETTE	1	0
9	LAFOURCHE	1	0
10	NATCHITOCH…	19	0
11	RED RIVER	8	0
12	SABINE	13	0
13	ST. CHARLES	1	0
14	ST. JAMES	1	0
15	WINN	5	0

Conclusions and Recommendations

The insurance company should send people to the state of TEXAS and LOUISIANA. coming to counties, as seen by the above summary table ACADIA, BEAUREGARD and CALCASIEU are most affected in LOUISIANA. HARRIS, GALVISTON and FORT BEND are worst hit by TEXAS.these results are validating also about the geoplot shown.