EXAMINATION OF HURRICANE-RELATIVE TORNADO LOCATION

GEOG 596A CAPSTONE PROPOSAL

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Cover animation by NOAA
CONTENT

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• Methodology
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• Project Timeline
• Possible Presentation Venue

https://giphy.com/gifs/mRTXRsd3sL9Mk
BACKGROUND
WHAT CAUSES HURRICANES

- Warm, moist air
- This is why they form only over warm ocean waters near the equator, but not too close
- Moist air rises and condenses
- Air converges near the Earth’s surface
- Air continues to rise; the converging air begins to rotate (spin)

<table>
<thead>
<tr>
<th>Category</th>
<th>Wind Speed (mph)</th>
<th>Damage at Landfall</th>
<th>Storm Surge (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>74-95</td>
<td>Minimal</td>
<td>4-5</td>
</tr>
<tr>
<td>2</td>
<td>96-110</td>
<td>Moderate</td>
<td>6-8</td>
</tr>
<tr>
<td>3</td>
<td>111-129</td>
<td>Extensive</td>
<td>9-12</td>
</tr>
<tr>
<td>4</td>
<td>130-156</td>
<td>Extreme</td>
<td>13-18</td>
</tr>
<tr>
<td>5</td>
<td>157 or higher</td>
<td>Catastrophic</td>
<td>19+</td>
</tr>
</tbody>
</table>
**WHAT CAUSES TORNADOES**

- **Supercell (Large Thunderstorms)**
- Warm, humid air rises forming a strong updraft
- **Mesocycle** – The updraft gets rotation from the wind changes (Jet Stream) in the environment
- Processes within the storm outflow create rotation near the ground
- This rotation near the ground is amplified when it converges beneath the updraft
OBJECTIVES
LOCATIONAL RELATIONSHIP

- How far from the hurricane
- Which side of the hurricane
- When does this happen
- Strength of tornadoes

I have no idea
METHODOLOGY
DATA (GIS)

- International Best Track Archive for Climate Stewardship (IBTrACS) Version 4 (.shp) (Hurricane)
- Storm Prediction Center 1950-2018 All Tornadoes Initial Points and Tracks (.CSV)
- U.S. Census Bureau 2019 TIGER/Line® Shapefiles: States (and equivalent)

https://www.ncdc.noaa.gov/ibtracs/index.php?name=ib-v4-access

https://www.spc.noaa.gov/wcm/

https://www.census.gov/cgi-bin/geo/shapefiles/index.php?year=2019&layergroup=States+%28and+equivalent%29
Focuses on the area known as Tornado Alley

Historical Hurricane events have gone through the Gulf of Mexico and along the Eastern Sideboard of the United States.
SOFTWARE

- ESRI (Environmental Systems Research Institute) Product Suite
  - ArcMap
  - ArcGIS Pro
ANALYSIS

- Breaking down the raw datasets
- Organize Hurricane data by events and match up the timelines with the Tornado data (create .shp)
- Identify patterns of tornado clusters along the hurricane paths.
- Create Buffers
- Kernel Density Estimation on points and lines. (locations and strength)
ANTICIPATED RESULTS
2005 HURRICANE KATRINA
PROJECT TIMELINE
CAPSTONE TIMELINE

July 2020
• Complete GEOG 596A

August 2020
• Submit Abstract to the 101st American Meteorological Society Annual Meeting.

August – December 2020
• Gather Data
• Conduct Analysis
• Derive Results

January 2021
• Deliver findings at the AMS conference in New Orleans

Spring Semester 2 2021
• Submission of final written project
POSSIBLE PRESENTATION VENUE

101ST AMERICAN METEOROLOGICAL SOCIETY
ANNUAL MEETING, NEW ORLEANS
10 TO 14 JANUARY 2021
(STUDENT CONFERENCE)
QUESTIONS

THE END

ANY QUESTIONS?
REFERENCES

- Content Slide received from: www.giphy.com (https://giphy.com/gifs/mRTXRsd3sL9Mk)