Natural Hazards and Disaster

Lab 10: Tornadoes and Case Study 3

- Tornadoes
- Case Study 3

Case Study 3: Hydro-Meteorological Hazards

See **guidelines** at http://www.mari-odu.org/academics/2018f_disasters/index.php?file=case_study3

Select **one case** of a hydro-meteorological hazard that has happened in the past.
The choice of the case is up to you, but you should select a case for which you can find evidence.

Draft: November 18, 2018 (optional)
Comments: November 24, 2018
Final paper: December 1, 2018, 6:00 PM

Length: 1,500 (not 1,200) words minimum, 2,000 words of text maximum.
Figure captions and reference citations are not included in the word count.

Readership: Non-expert audience.

Format: Typed, please. One-and-a-half line spacing preferred.
Start with the title of your Case Study.
Write you name and the class identifier below the title.

Case Study 3: Hydro-Meteorological Hazards

Contents: The paper should have five sections:

1 Introduction:

- Which type of hazard, which event, where and when.
- What scientific reasoning makes this event relevant to study?
- Is an event of the type and size you selected frequent or of very low probability?
- What are the potential impacts of such an event?

2 The Hazard

- Describe the hazard, it's type, origin, physical/chemical characteristics, as well as the spatial and temporal extent and severity.
- If there is a scale to measure the severity, explain this scale and provide the rating of the event.
- Give details of the event (time, duration, location, etc.).

3 The Resulting Disaster

- What are the main direct impacts and losses?
- What losses occurred subsequently or indirectly?

4 Risk Management

- How was pre-event awareness and preparedness, risk perception?
- Were there any early warnings and did they have effects?
- Did the response made the disaster worse or less pronounced.
- How was recovery?

5 Concluding Remarks

- How is preparedness for a similar event in another region?
- What are the main impacts that could occur in this region?
- What is the awareness for such hazards there?
- Are there published plans to improve awareness and preparedness it in future?

References

Case Study 3: Hydro-Meteorological Hazards

Figures, Diagrams, Tables:

- Include at least one picture relevant to the hazard and/or the disaster caused by the hazard.
- Cite the source of any pictures and include a short captions explaining the figure.
- Place the caption below the figure.
- The caption is not included in the word count.
- If you use a table, place a caption above the table.
- Refer to the figures/tables in the text.

Sources and Citations:

- Use at least three different peer-reviewed sources for your research!
- Citing of web pages without authors/dates is not acceptable.
- If you use Wikipedia pages, go to the original data sources wherever possible.
- If you use newspaper articles, try to locate the scientific papers they often refer to.
- Cite the sources in the text.
- Avoid quotations (unless you quote an eye-witness). If you quote, use quotation marks and cite the source. No more than 20 words in a quote!
- Included in the list of references only sources that were cited in the text.
- Use the Council of Scientific Editors (CSE style) for citations and references.

Send questions to me by email.

If you want to discuss “your” event, send the proposed event to me asap.

Natural Hazards and Disaster

Lab 10: Tornadoes and Case Study 3

- Tornadoes
- Case Study 3

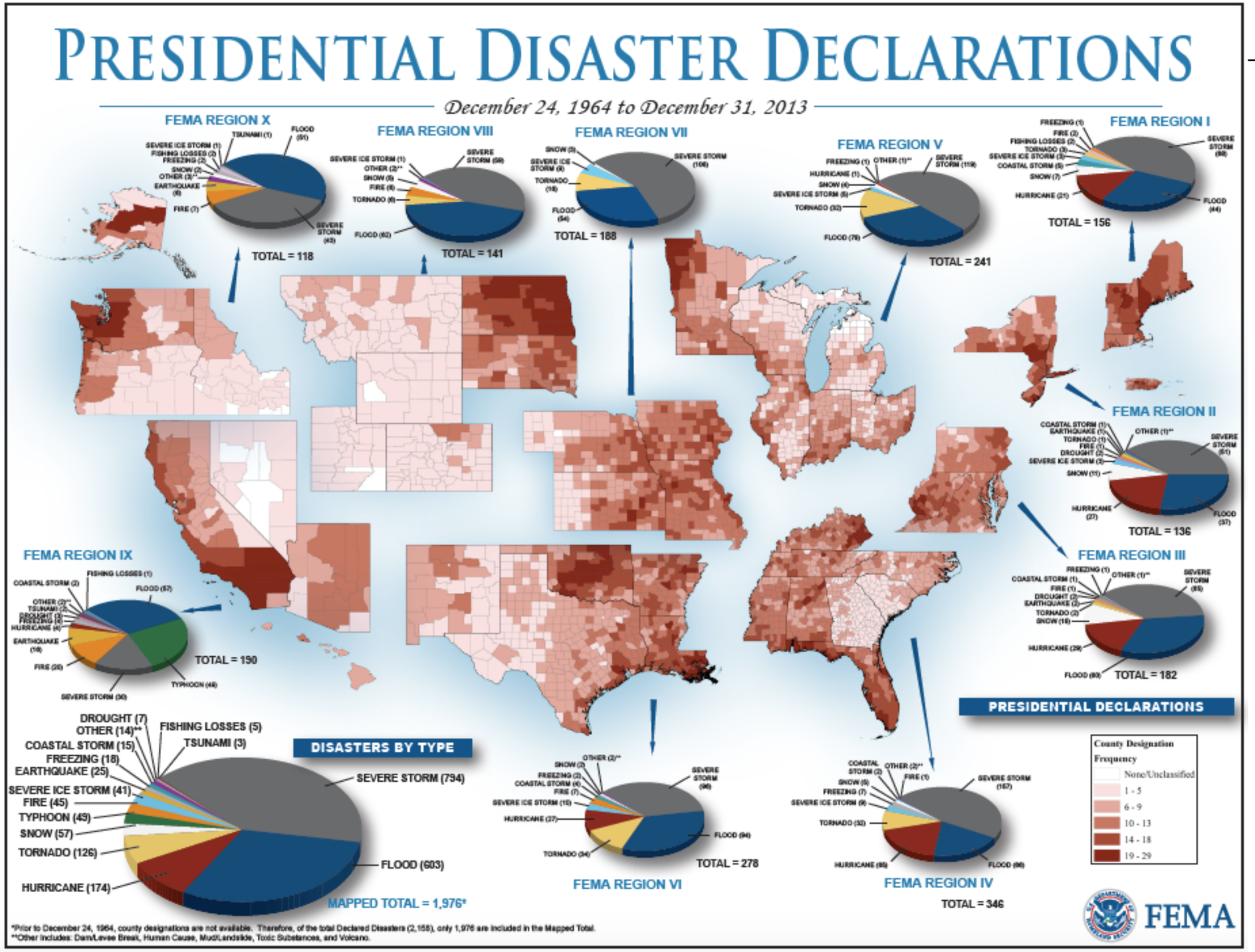
International Disasters

Between 1964 and 2014 there were almost 2,000 disaster declarations in the U.S.A. and thousands more disasters occurred around the world. Some of these events were exceptional in the number of fatalities caused:
2004 - Indian Ocean Tsunami caused 226,408 fatalities
2010 - Haitian earthquake, 222,570
2008 - Cyclone Nargis in Burma (Myanmar), 138,375
2008 - Sichuan earthquake in China, 87,476
2005 - earthquake in Nepal, 74,648
2010 - heatwave in Russia, 55,736

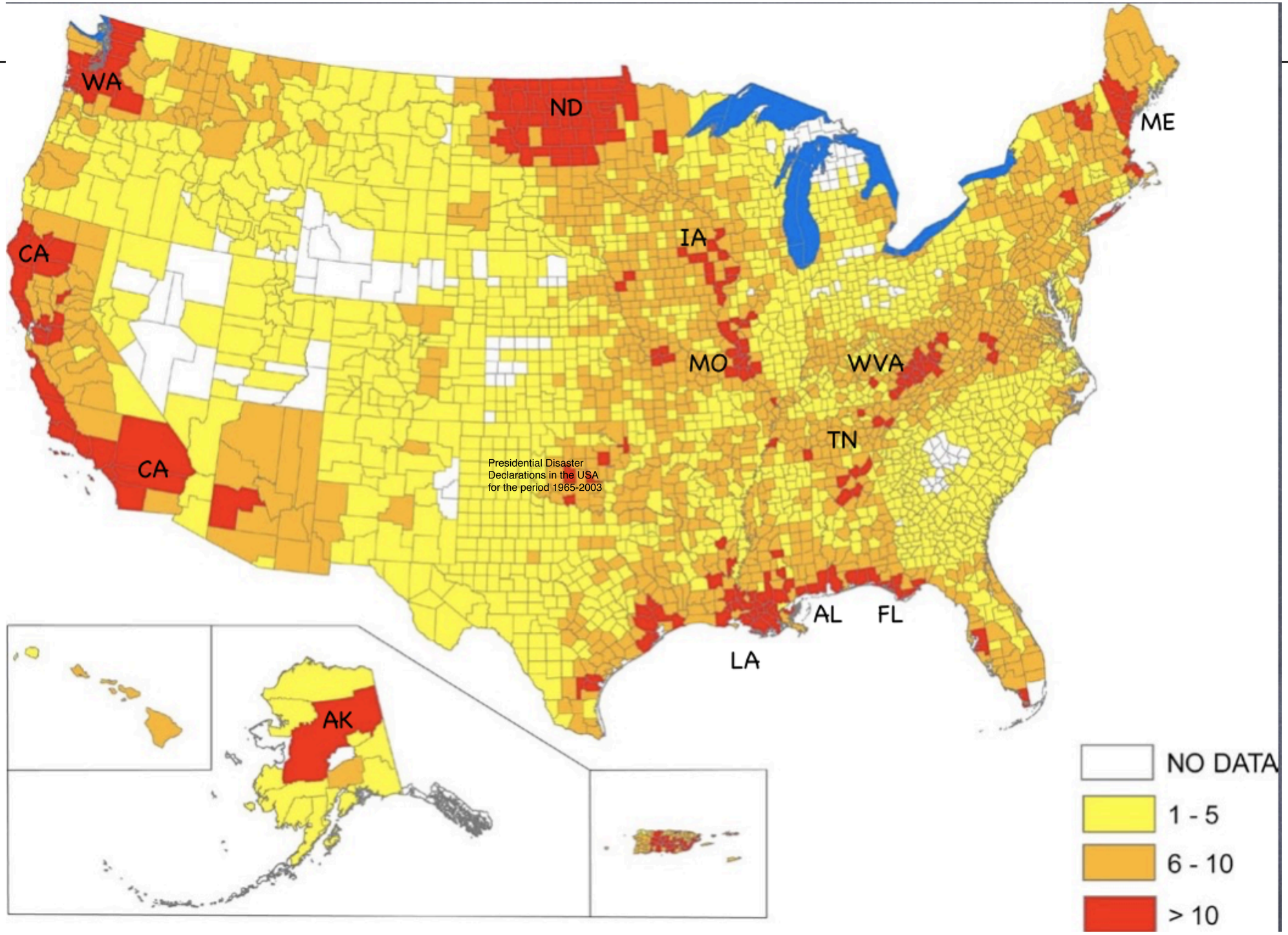
Several different organizations attempt to collect accurate and reproducible data on disasters, but for a variety of reasons the data from different sources never quite agree with one another. However, the general trends are consistent: natural disasters disproportionately affect the lives of people in the poorer areas of underdeveloped nations; flooding remains the most frequently reported disaster annually – both in the USA and internationally; and earthquakes cause the most fatalities per event, especially if earthquake-induced landslides and tsunamis are included. An example of recently compiled data on international natural disasters is in a 2014 report compiled by the International Federation of Red Cross and Red Crescent Societies, which summarizes data for 2013. By their analysis, 2013 had the lowest number of reported disasters related to natural hazards in a decade, totaling 337. The two worst natural disasters that year were Typhoon Haiyan in the Philippines, which caused 7,986 fatalities, and monsoon floods in India, which caused the deaths of 6,064 people.

See http://www.ifrc.org/world-disasters-report-2014/data. See also http://www.ifrc.org/world-disasters-report-2015.

U.S. Disasters



U.S. Disasters



U.S. Disasters

EXERCISE: Natural Disasters in the USA
The map summarizes the Presidential Disaster Declarations for the period 1964 to 2013. The pie charts adjacent to each sub-region show the proportion of disasters caused by the different natural hazards. These maps are updated annually, but are always a year or two behind the current year. The map on the next slide (in mainly yellow colors) is a summary of disaster declarations for the period 1965-2003 and includes earthquakes, tsunamis, floods, hurricanes, landslides, volcanic eruptions, and wildfires, but does not break out the individual phenomena.

Examine and compare the two maps, and use them to answer the following questions:

A. Which have been the top 3 FEMA regions for disaster declarations for the entire period of
record (1964-2013)?
i. _____ ii. _____
iii. _____

B. Has the additional information for the period 2003 to 2013 made any significant change to the geographic distribution of declared disasters? It so, state specifically where you see any increase (or decrease) in disaster declarations.

C. With few exceptions, the disaster declarations are not equally distributed by county within the FEMA regions. Why does FEMA Region VIII show such a marked difference between counties on the western and southern areas and counties in the northeast of the region, when the most frequently reported disaster types for the Region are not very different to those of its neighboring region. Hint: sketch the Mississippi River and its major tributaries onto the 1965-2003 map.

D. The top two disaster types for all FEMA Regions are obvious from the pie charts on the 1964-2013 map. What are the next most reported disaster types, after Severe Storms and Floods, for (i) the eastern half of the country, and (ii) the northwest (Region X)?

i. 3rd most reported disaster type for Regions I, II and III

_____

ii. 3rd most reported disaster type for Region X _____

E. Compare Regions IX and X. What are the main differences between the two regions in terms of (a) disaster type and (b) number and proportion of each disaster type, and why are there such differences?

F. California and Nevada are neighboring states, yet they have very different disaster declaration histories. What are some of the reasons why California has so many disasters and Nevada has so few?

Tornadoes

EXERCISE: Tornado Disasters
See Chapter on Tornadoes

Although tornadoes can occur anywhere in the world, the vast majority of them occur annually in North America. The 3 maps on the next slide show tornado occurrences in 2014, 2015, and 2016 (but only up to mid-September 2016). Below each map is a histogram of tornado occurrences by date.

A. Compare the 2014 and 2015 maps and histograms. If you only had the data for these two years, and no other data, what would you infer about the most active time of year for tornadoes?

Apparent most active period for North American tornadoes

_____

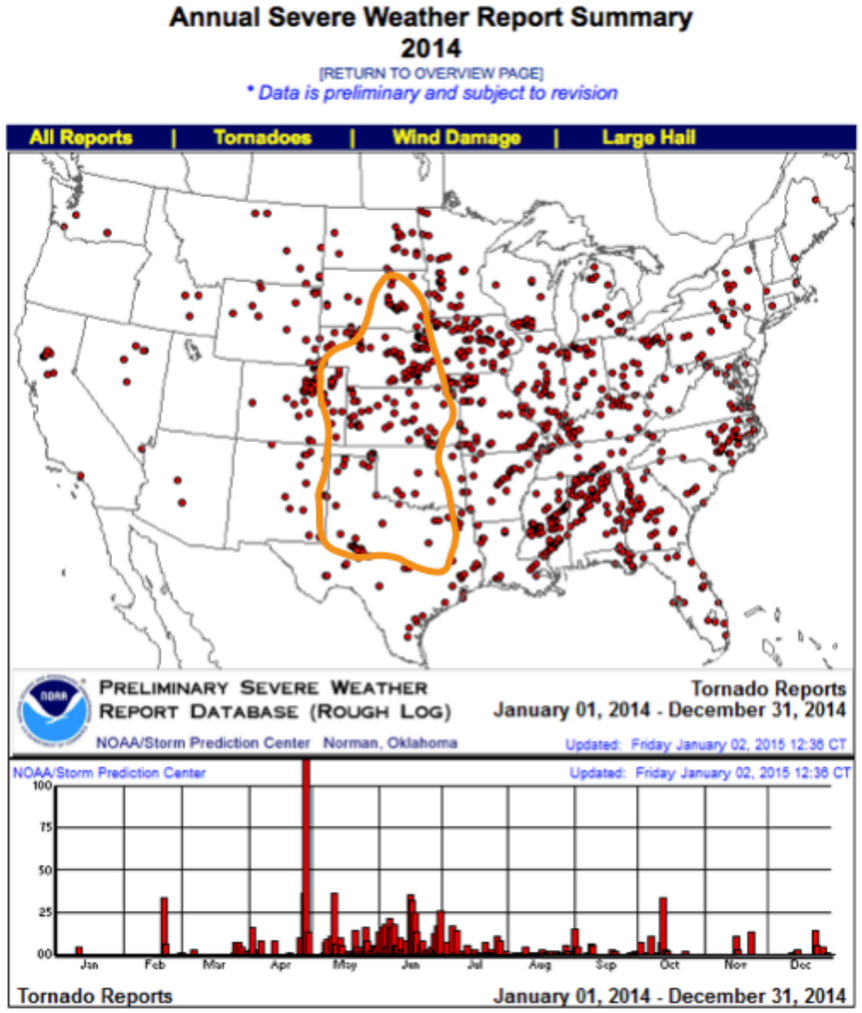
B. Now compare with the 2016 histogram. Did the same activity pattern as 2014/2015 hold true for 2016? What differences do you see?

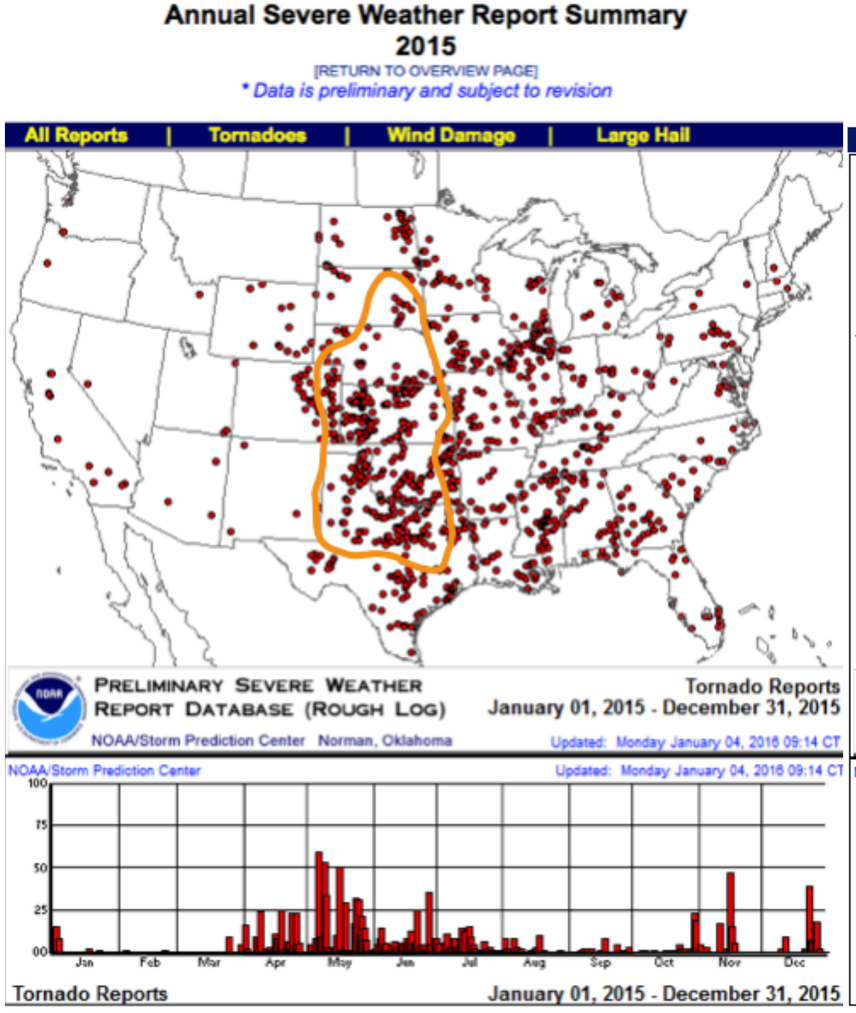
C. The region known as ‘tornado alley’ is marked onto the 2014 and 2015 maps. From the distribution of tornados in the past 3 years, where would you consider the most active region(s) to be? Outline your own version of ‘tornado alley’ (or ‘alleys’ if you think there are more than one) onto the 2016 map.

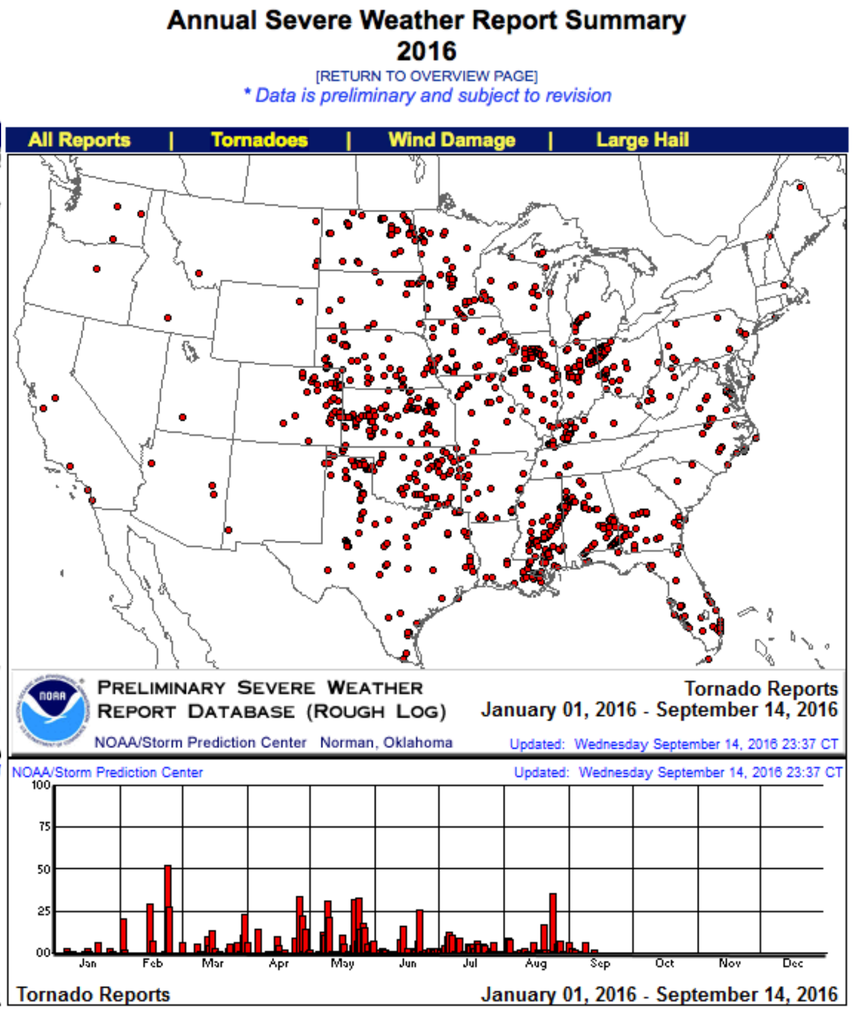
D. Is there any US State that has not had a tornado in the past 3 years? If so, which?

_____

Tornadoes


Annual Severe Weather Report Summary
2014
[RETURN TO OVERVIEW PAGE]
* Data is preliminary and subject to revision
All Reports | Tornadoes | Wind Damage | Large Hail
PRELIMINARY SEVERE WEATHER REPORT DATABASE (ROUGH LOG)
NOAA/Storm Prediction Center Norman, Oklahoma
Tornado Reports
January 01, 2014 - December 31, 2014
Updated: Friday January 02, 2015 12:36 CT
NOAA/Storm Prediction Center
Updated: Friday January 02, 2015 12:36 CT
100
75
50
25
00
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Tornado Reports
January 01, 2014 - December 31, 2014


Annual Severe Weather Report Summary
2015
[RETURN TO OVERVIEW PAGE]
* Data is preliminary and subject to revision
All Reports | Tornadoes | Wind Damage | Large Hail
PRELIMINARY SEVERE WEATHER REPORT DATABASE (ROUGH LOG)
NOAA/Storm Prediction Center Norman, Oklahoma
Tornado Reports
January 01, 2015 - December 31, 2015
Updated: Monday January 04, 2016 09:14 CT
NOAA/Storm Prediction Center
Updated: Monday January 04, 2016 09:14 CT
100
75
50
25
00
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Tornado Reports
January 01, 2015 - December 31, 2015


Annual Severe Weather Report Summary
2016
[RETURN TO OVERVIEW PAGE]
* Data is preliminary and subject to revision
All Reports | Tornadoes | Wind Damage | Large Hail
PRELIMINARY SEVERE WEATHER REPORT DATABASE (ROUGH LOG)
NOAA/Storm Prediction Center Norman, Oklahoma
Tornado Reports
January 01, 2016 - September 14, 2016
Updated: Wednesday September 14, 2016 23:37 CT
NOAA/Storm Prediction Center
Updated: Wednesday September 14, 2016 23:37 CT
100
75
50
25
00
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Tornado Reports
January 01, 2016 - September 14, 2016

Tornadoes

EXERCISE: Estimating a tornado's EF scale

The four images on the next slide show some of the damage from a severe tornado outbreak in 1999.

In (a), a wood-framed home lost its roof, but its outer walls were left standing. Almost all surrounding trees were blown down. Rated as EF2

In (b), the tornado's path though a mobile home park completely destroyed the mobile homes. Tree branches were stripped and some were blown down. Rated as EF2.

In (c), the wood-framed home was destroyed, but not scattered very far. Rated as EF3.

A. Assume that the roads in (d) are aligned north-south with south at lower right. Estimate the EF scale and corresponding wind speed range for the houses in each quadrant:
(i) West-southwest quadrant = EF___ Wind speeds in the range _____ to _____ km/h
(ii) West-northwest quadrant = EF___ Wind speeds in the range _____ to _____ km/h
(iii) Northwest quadrant = EF _____ Wind speeds in the range _____ to _____ km/h
(iv) Northeast quadrant = EF _____ Wind speeds in the range _____ to _____ km/h

B. Explain why the house at lower right was relatively unaffected when the other houses on the street were so severely damaged.

Tornadoes

a)

b)

c)

d)

Tornadoes

EXERCISE: What should you do in a tornado outbreak?

The National Institute for Safety (NIST) has issued an online resource help communities build resilience to tornadoes and other natural disasters.

https://www.nist.gov/topics/disaster-resilience/helping-build-nation-resilient-communities

As part of its own resilience planning, ODU has a tornado warning siren system in place.

Have you (or someone in your group) heard the siren?

If so, where were you at the time and how easy or difficult was it to hear the announcement, if there was one?

What would you do if you were in class, or crossing campus, or in the neighborhood, and a tornado warning occurred?

What would you recommend to ODU to further improve its tornado warning system.