



# An Analysis of the Memphis County Warning Area Tornado Climatology and its Implications on Local Emergency Preparedness

## Objectives

- **Main objective: build a tornado climatology for the Memphis County Warning Area and analyze trends in tornado and tornado day frequencies from 1970-2020.**
- How can this climatology be used by Warning Coordination Meteorologists in the area?
- How can this climatology be used by emergency managers in the area?
- Are there gaps in hazard mitigation plans that do not address potential changes in tornado frequency in this area?

## Background

- Scientific studies have determined that there is an increasing trend in the number of tornadoes occurring annually across the United States.
- Upward trend in tornado days defined by at least 4 tornadoes.
- Most states in the Southeast display an increasing trend in tornado frequency.
- Studies have also found evidence for spatial shifting of the frequency of tornadoes across the United States.
- Statistically significant downward trend across the central and southern Great Plains, and a large upward trend in portions of the Southeast, Midwest, and Northeast in tornado frequency.

## Data Methodology

1. **Using the Mississippi State University NWS Tornado Database, climatological sets were made for the number of tornadoes and tornado days occurring by month and by year from 1970-2020.**
  - a) For each month and year, the total and average number of tornadoes/tornado days were calculated.
  - b) The percentage of occurrence for each month was also calculated.
2. **A separate climatology was developed to analyze the annual frequency of tornadoes by scale using NOAA SPC data.**
  - a) The total number of tornadoes and the average number of tornadoes were calculated for each scale rating for the period of 1970-2020.
3. **Data for the Memphis CWA and national data were compared to determine how regional trends were similar to national trends.**

## Memphis CWA Conclusions

- The highest number of tornadoes and tornado days occurred in the month of April, closely followed by May.
- April – 20% yearly contribution
- May – 18% yearly contribution
- **November data has consistently ranked fifth for the most active month of tornado and tornado day occurrences, and January was the third most active month for tornado frequency.**
- The average annual number of tornadoes has shown an increasing trend from 1970-2020, while the annual average of tornado days has shown a decreasing trend.
- This could point to the more frequent occurrence of active singular tornado days.

## National Comparison Conclusions

- Both Memphis CWA data and national data indicate EF0 and EF1 ratings are the most common tornado category.
- There is a relative correlation between the total number of tornadoes annually in the Memphis CWA and the United States.
- Not a definitive correspondence – a significantly high tornado year on a national scale does not necessarily mean a significantly high tornado year on the regional scale.

## What changes should be made to improve tornado safety in the Memphis CWA?

- **Each state in the Memphis CWA should re-evaluate their potential tornado threats.**
- Arkansas and Tennessee – tornadoes ranked low on the list of natural hazards even though they have high probabilities of risk and impacts.
- The hazard mitigation plans generally only identify tornadoes as mostly occurring during the spring months, however the data indicates notable tornado occurrences in January and November.
- **This climatological data should be easily accessible to emergency managers and the general public.**
- During data collection, there was not a specific source that this information could be easily accessed.
- Beneficial for key information for the Memphis CWA to be made available on a site that can be used by decision-makers and other stake-holders.

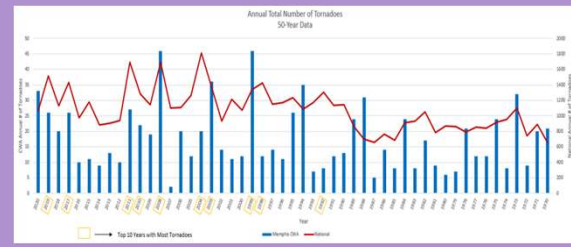
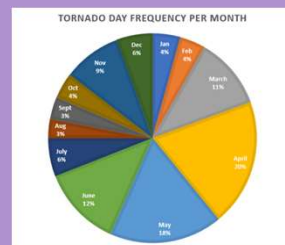
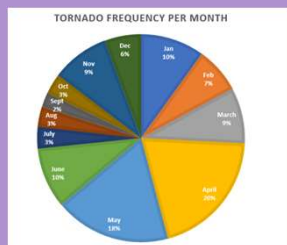


Photo: Calhoun County, MS Sheriff's Office