

TORNADOES and CLIMATE CHANGE

What do we know?

Yearly Number of Tornadoes

The average annual number of EF-1+ tornadoes is **STABLE**^{2,6,7}

Large Tornado Outbreaks

The frequency of tornado outbreaks with 16 or more EF-1+ tornadoes is **INCREASING**^{1,7}. Before 1980, on average, there were about 3.5 days per year with 16+ tornadoes. Since 2000, this number has doubled to 7 days per year.

Seasonal Tornado Changes

The number of EF-1+ tornadoes is **DECREASING** in the Spring and Summer, but **INCREASING** in the Fall and Winter². There is a significant decline in tornadoes in the summer months (JJA), with downward trends (not statistically significant) also noted in the spring months (MAM). Upward trends (not statistically significant) were seen in the fall (SON) and winter months (DJF).

Annual Tornado Days

The number of days where at least one EF-1+ tornado occurs is **DECREASING**^{2,6,7}. On average, 146 tornado days per year were observed from 1954-1974 compared to 104 tornado days per year from 1996-2016.

Number of Tornadoes Per Tornado Day

The number of EF-1+ tornadoes that occur on tornado days is **INCREASING**^{1,2,6,7}. On average, 3.6 tornadoes per tornado day were observed in 1954-1974 compared to 4.4 tornadoes per tornado day in 1996-2016.

How are tornadoes expected to change in the future?

Research suggests there is a greater risk of more off-season tornadoes in a warmer future climate. This could mean more tornadic activity at a time of year when people are least expecting it. Results are inconclusive for whether tornadoes could become more or less frequent during the traditional severe weather season^{8,9}.

Did a Warming Climate Cause This?

Unlike temperature or precipitation trends, the influence of climate change on tornadoes is far more difficult to discern. Numerous complex atmospheric conditions combine to generate a tornado, and researchers are still developing tools to help discern potential human influence from natural variability.

So far, the majority of research stops short of connecting historical changes in tornado behavior to a warming climate.

In addition to the physical complexities of tornado formation, tornado trends can be affected by increasing city footprints (more things for tornadoes to damage), improving technology (modern radar can better identify tornadoes), and changes in tornado reporting and surveying methods over time. The large majority of “extra” tornadoes identified by improved technology are weak, which is why EF-0 tornadoes are commonly excluded in historical trend analysis.



MRCC
Midwestern Regional Climate Center

Contact Information

Melissa Widhalm

Associate Director Midwestern
Regional Climate Center
mwidhalm@purdue.edu

Kevin Deitsch

Warning Coordination Meteorologist
National Weather Service St. Louis
Kevin.Deitsch@noaa.gov

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