

The science behind tornados

2011 Kansas Tornado Facts

During 2011, Norton County was the county in Kansas with the most tornadoes, with a total of eight separate events on June 20. The county also experienced the strongest tornado in the state with an EF3 tornado that passed through

Lyon, Graham and Norton County on that day. The first tornado of 2011 in Kansas occurred on Feb. 27 in Cowley County and the last tornado of the year occurred on Oct. 8 in Haskell County. Overall, the state experi-

enced 68 tornadoes in 2011, which is above the average from 1950 to 2010, but 44 fewer than the past 10-year average. From the tornadoes in 2011, there were three fatalities and seven injuries.

EF Scale: What does it mean?

Dr. T. Theodore Fujita developed the Fujita Tornado Damage Scale (F-Scale) to provide estimates of tornado strength based on damage surveys. Since it's practically impossible to make direct measurements of tornado winds, an estimate of the winds based on damage is the best way to classify a tornado. The new Enhanced Fujita Scale (EF-Scale) addresses some of the limitations identified by meteorologists and engineers since the introduction of the Fujita Scale in 1971. The

new scale identifies 28 different free standing structures most affected by tornadoes taking into account construction quality and maintenance. The range of tornado intensities remains as before, zero to five, with 'EF-0' being the weakest, associated with very little damage and 'EF-5' representing complete destruction, which was the case in Greensburg on May 4, 2007, the first tornado classified as 'EF-5'. The EF scale was adopted on Feb. 1, 2007.

EF-SCALE	F-SCALE	DAMAGE
EF-0 65-85 mph	F-0 65-73 mph	Light damage: peels surface from some roofs, some damage to gutters or siding, branches broken from trees, shallow-rooted trees pushed over
EF-1 86-110 mph	F-1 73-112 mph	Moderate damage: roofs severely stripped, mobile homes overturned or badly damaged, loss of exterior doors; windows and glass broken
EF-2 111-135 mph	F-2 113-157 mph	Considerable damage: Roofs torn off houses, foundations shifted, mobile homes destroyed, large trees snapped or uprooted, cars lifted from ground
EF-3 136-165 mph	F-3 158-206 mph	Severe damage: Entire stories of homes destroyed, severe damage to large buildings, trains overturned, trees debarked, cars lifted and thrown
EF-4 166-200 mph	F-4 207-260 mph	Devastating damage: well-constructed houses completely leveled, cars thrown and small missiles generated
EF-5 >200 mph	F-5 261-318 mph	Incredible damage: Strong frame houses leveled and swept away, vehicles fly in excess of 100 yards, high-rise buildings have significant structural damage

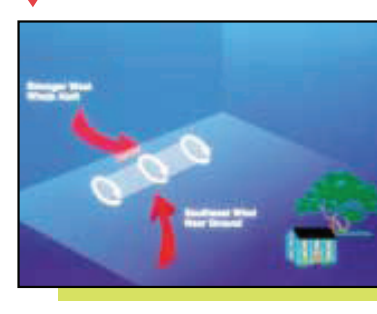


An EF-3 tornado swept through Norton County on June 20, 2011, leaving widespread destruction. This home just northeast of Alma was blown from its foundation and mangled beyond recognition during the storm. No one in the home was injured.

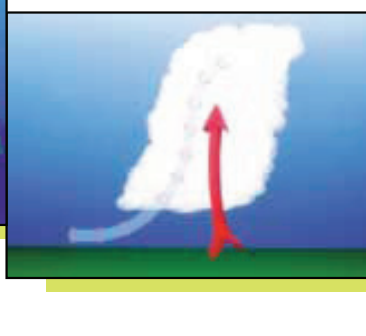
-Telegram photo by Carleen Bell

How do tornadoes form?

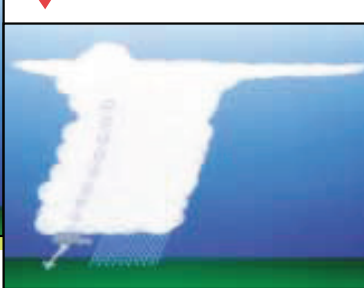
Before thunderstorms develop, a change in wind direction and an increase in wind speed with increasing height creates an invisible, horizontal spinning effect in the lower atmosphere.



Rising air within the thunderstorm updraft tilts the rotating air from horizontal to vertical.



An area of rotation, 2-6 miles wide, now extends through much of the storm. Most strong and violent tornadoes form within this area of strong rotation.



Did you know...?

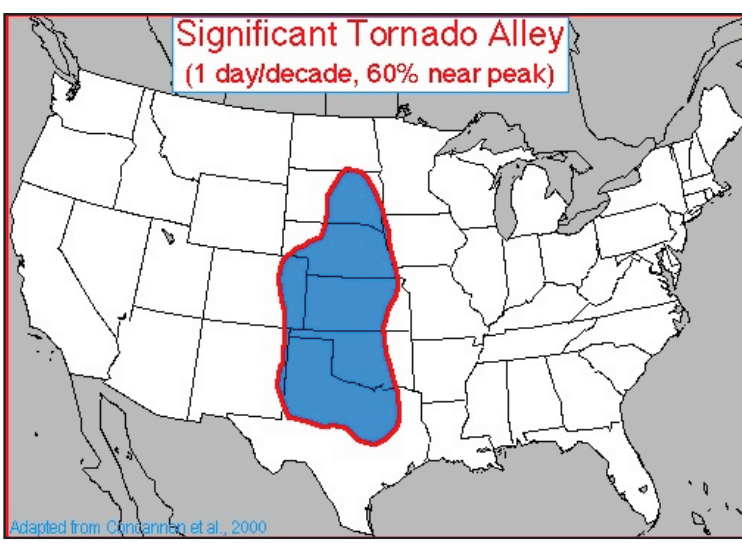
- Each year, about a thousand tornadoes touch down in the United States, far more than any other country
- Waterspouts are tornadoes that form over a body of water
- A strong tornado can pick up a house and move it down the block
- Nebraska, South Dakota, Oklahoma, Texas and Kansas make up Tornado alley, where tornadoes strike regularly in the spring and early summer
- Many houses in tornado alley have strong basement shelters
- Some people have seen inside a tornado with their own eyes and lived to tell about it
- Knives and forks have been found embedded

- in tree trunks flung from a tornado
- Usually a tornado starts off as a white or gray cloud but if it stays around for a while, the dirt and debris it sucks up eventually turns it black
- The average tornado moves Southwest to Northeast, but tornadoes have been known to move in any direction
- The average forward speed of a tornado is 30 MPH, but may vary from stationary to 70 MPH
- Peak tornado season in the southern states is March through May; in the northern states, it is late spring through early summer
- Tornadoes are most likely to occur between 3 p.m. and 9 p.m., but can occur at any time

What makes Kansas "Tornado Alley?"

In the United States, there are two regions with a disproportionately high frequency of tornadoes.

Florida is one and "Tornado Alley" in the south-central U.S. is the other. Florida has numerous tornadoes simply due to the high frequency of almost daily thunderstorms. In addition, several tropical storms or hurricanes often impact the Florida peninsula each year.



When these tropical systems move ashore, the embedded convective storms in the rain bands often produce tornadoes. However, despite the violent nature of a tropical storm or hurricane, the tornadoes they spawn (some as water spouts) tend to be weaker than those produced by non-tropical thunderstorms.

Tornado Alley is a nickname given to an area in the southern plains of the central U.S. that consistently experiences a high frequency of tornadoes each year.

Tornadoes in this region typically happen in late spring and occasionally the early fall.

The Gulf Coast area has a separate tornado maximum nicknamed "Dixie Alley" with a relatively high frequency of tornadoes occurring in the late fall (October

through December).

Strong to violent tornadoes (those of EF3 or stronger on the Enhanced Fujita Tornado Damage Intensity Scale), are relatively rare, and do not typically occur outside the United States.

Although the boundaries of Tornado Alley are debatable (depending on which criteria you use - frequency, intensity, or events per unit area), the region from central Texas, northward to northern Iowa, and from central Kansas and Nebraska east to western Ohio is often collectively known as Tornado Alley.

Meteorologically, the region known as Tornado Alley is ideally situated for the formation of supercell thunderstorms, often the producers of violent (EF2 or greater)

tornadoes.

Overall, most tornadoes (around 77 percent) in the U.S. are considered weak (EF0 or EF1) and about 95 percent of all U.S. tornadoes are below EF3 intensity.

The remaining small percentage of tornadoes are categorized as violent (EF3 and above).

Of these violent twisters, only a few (0.1 percent of all tornadoes) achieve EF5 status, with estimated winds over 200 mph and nearly complete destruction.

However, given that on average over 1,000 tornadoes hit the U.S. each year, that means that 20 can be expected to be violent and possibly one might be incredible (EF5).

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