

# How tornadoes form and why they're so unpredictable

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Pictured are two tornadoes that approached Pilger, Nebraska in June 2014. Photo by: AP Photo/Eric Anderson

Tornadoes can be very dangerous. The powerful, whirling winds can knock over buildings and throw railroad cars. They can even kill humans and animals.

Tornadoes can happen at any time of year. In North America, they are most common in May and June. This is when conditions in the air tend to be most right for tornadoes to form. Scientists have made many advancements in weather science. However, tornadoes are still deadly. They are difficult to predict.

## Supercell Thunderstorms

A tornado is a spinning column of air. It spins very fast. A tornado extends between the Earth's surface and a cloud. Most tornadoes last for less than 10 minutes, says Harold Brooks. He is a scientist with the National Oceanic and Atmospheric Administration (NOAA).



Large tornadoes usually last around 30 minutes, Brooks says. The most powerful ones have wind speeds of more than 300 miles an hour. That is more than three times as fast as the fastest roller coasters! A tornado this powerful can rip buildings off the ground. They can spin across the ground for dozens of miles.

Tornadoes kill about 60 people a year in the United States. Most people are killed by flying or falling wreckage.

The strongest tornadoes develop from what are called supercell thunderstorms. For such a storm to form, you need certain ingredients. First, you need all the ingredients of a regular thunderstorm. Those include warm air near the ground and cold, dry air above.

A supercell thunderstorm requires even more. It needs winds that get stronger and change direction with height. Then the upward current of air tends to rotate, producing a supercell storm.

The supercell churns high in the air. In about 3 out of 10 cases, a tornado forms below it. This happens when air descending from the supercell rotates near the ground. Even then, scientists still don't know why some storms create tornadoes while others don't.



## When Conditions Are Just Right

Brooks says scientists believe that strong changes in winds are important for the formation of tornadoes. Conditions have to be just right. The air must be cold but not too cold. It should be a few degrees colder than the surrounding air.

Tornadoes have been observed on every continent except Antarctica. They have been most documented in North America. About 1,200 tornadoes strike the United States each year. However, they often appear in many other countries as well.

The most affected region in the United States is called "Tornado Alley." It includes Kansas, Nebraska, the Dakotas and parts of Texas.

Tornadoes are much harder to predict than hurricanes. The average amount of time between a tornado warning and the arrival of a storm is about 13 minutes. A tornado warning means a twister has been sighted. A tornado watch means one is possible.

The National Severe Weather Laboratory is trying to improve tornado forecasting. However, the work is coming along slowly.



## **Making Severe Weather Predictions**

The group runs a research project called Warn-on-Forecast. It uses computer programs to study data on temperatures and other weather conditions. Sometimes the system makes really good predictions, Brooks says. At other times it doesn't.

Predicting the path of a tornado can also be challenging. Brooks says tornadoes tend to follow the thunderstorm they are associated with. The route can be unpredictable, though.

"It's kind of like walking a dog," he says. "You get down the block, but in the middle the dog goes back and forth."

## Quiz

- 1 Which detail shows that there are parts of the United States that experience tornadoes more often than others?
- (A) In North America, they are most common in May and June. This is when conditions in the air tend to be most right for tornadoes to form.
  - (B) Tornadoes kill about 60 people a year in the United States. Most people are killed by flying or falling wreckage.
  - (C) About 1,200 tornadoes strike the United States each year. However, they often appear in many other countries as well.
  - (D) The most affected region in the United States is called "Tornado Alley." It includes Kansas, Nebraska, the Dakotas and parts of Texas.

- 2 Read the following paragraph from the section "When Conditions Are Just Right."

*Tornadoes are much harder to predict than hurricanes. The average amount of time between a tornado warning and the arrival of a storm is about 13 minutes. A tornado warning means a twister has been sighted. A tornado watch means one is possible*

What inference can the reader make based on this paragraph?

- (A) People have more time to prepare before a hurricane than they do before a tornado.
- (B) People have more time to prepare before a tornado than they do before a hurricane.
- (C) Tornadoes cause more death and damage than hurricanes because they are harder to predict.
- (D) Hurricanes cause more death and damage than tornadoes because they are harder to predict.



- 3 Read the following selection from the section "Supercell Thunderstorms."

*A supercell thunderstorm requires even more. It needs winds that get stronger and change direction with height. Then the upward current of air tends to rotate, producing a supercell storm.*

What does the author mean by "rotate"?

- (A) turn in a circle
  - (B) move back and forth
  - (C) jump up and down
  - (D) shoot straight up
- 4 Read the following selection from the section "When Conditions Are Just Right."

*The National Severe Weather Laboratory is trying to improve tornado forecasting. However, the work is coming along slowly.*

What does "forecasting" refer to?

- (A) the damage that is caused by tornadoes as they move down their path
- (B) the ways that people respond when they learn that a tornado is in their area
- (C) the guesses that scientists try to make about when and where tornadoes will hit
- (D) the actions experts are taking to figure out a way to stop tornadoes from forming