

How to recognize tornadoes

Is a tornado coming?

Tornados can form very rapidly from any large Severe Storm cell. This means there may not be time to receive a warning so it is important to know the natural signs of a Tornado, this will put you on alert if conditions merit, even if no warning is given.

Some signs of a possible tornado:

- A dark or green-colored sky
- A large, dark, low-hanging cloud (A Wall Cloud)
- A funnel cloud (A Tornado that has not yet touched the ground)
- Large hail
- A loud roar that sounds like a freight train.

If a funnel cloud is close take cover, it may touch the ground in an instant. If the funnel cloud is far away then report it to local authorities or a news room of a local radio or TV station, be alert and ready to take cover if needed. Evacuate dangerous areas immediately.

What would you like to know?

How do you forecast tornadoes?

When predicting severe weather (including tornadoes) a day or two in advance, we look for the development of temperature and wind flow patterns in the atmosphere which can cause enough moisture, instability, lift and wind shear for tornadic thunderstorms. Those are the four needed ingredients.

But it is not as easy as it sounds. "How much is enough" of those is not a hard fast number, but varies a lot from situation to situation, and sometimes is unknown. A large variety of weather patterns can lead to tornadoes; and often, similar patterns may produce no severe weather at all.

To further complicate it, the various computer models we use days in advance can have major biases and flaws when the forecaster tries to interpret them on the scale of thunderstorms. As the event gets closer, the forecast usually (but not always) loses some uncertainty and narrows down to a more precise threat area.

Real-time weather observations from satellites, weather stations, balloon packages, airplanes, wind profilers and radar-derived winds become more and more critical the sooner the thunderstorms are expected; and the models become less important.

Figure out the moisture and temperatures, both near ground and aloft, which will help storms form and stay alive in this situation. Find the wind structures in the atmosphere which can make a thunderstorm rotate as a supercell, then produce tornadoes. Make an educated guess where the most favorable combination of ingredients will be and when; then draw the areas and type the forecast.

What hardware and soft-

ware tools do you use to help you forecast tornadoes?

The most important hardware for forecasting at the Storm Prediction Center is the human hand. Numerous hand-drawn analyses of surface and upper-air data are still performed every day so forecasters can be intimately familiar with the weather features.

Forecasters also use high-performance computer workstations with a huge variety of software to display the things we need to help us forecast severe weather. The variety of those things is enormous: many kinds of computer model displays, satellite image loops, radar displays, wind profiler and radar-wind plots, data from surface weather stations, upper air data from balloons and planes, lightning strike plots, weather data tables, multiple-source overlays and more.

What is needed to be a good tornado forecaster?

Motivation: Almost all severe storms forecasters are passionate about violent weather, with an intense desire to learn about and become better at predicting it.

Education: Consistently good severe storms forecasters have a solid educational background in atmospheric science which allows them to understand "text-book" concepts of thunderstorm formation. They don't

stop with their college education, either. They constantly re-educate themselves in the latest discoveries about severe thunderstorms and tornadoes, reading scientific journal articles on cutting-edge research, perhaps doing some research themselves. The understanding of storms which results lets the forecaster think of "conceptual models"--visualizations of what the storms will do and how.

Flexibility: Because the atmosphere doesn't read textbooks or science journals, the forecaster must adapt those "classroom" ideas to an endless variety of day-to-day situations which may look a lot different. He or she also should be able to recognize when and why a forecast is not working out, and make the right adjustments.

Experience: In meteorology, history never repeats itself exactly. But certain types of situations do recur, allowing the forecaster to set a mental benchmark for what to expect.

From there, he or she can better decide what data will be most important to examine, and what data will not be as relevant to the situation.

What is the role of Doppler radar in tornado forecasting?

Each forecast office uses output from at least one Doppler radar in the area to help to determine if a warning is needed.

These dangers often accompany thunderstorms:

- **Flash Floods:** Number one weather killer
- **Lightning:** Kills 75-100 people each year
- **Damaging Straight-line Winds:** Can reach 140 mph
- **Large Hail:** Can reach the size of a grapefruit, causes several hundred million dollars in damage annually to property and crops

Do you know these terms?

When severe weather approaches an area, weather professionals will often issue severe weather warnings, watches and advisories. Though each term requires attention, it is important to distinguish what each term means and the danger associated with the vocabulary.

Warning

A warning is issued when a hazardous weather or hydrologic event is occurring, imminent or likely. A warning means weather conditions pose a threat to life or property. People in the path of the storm need to take protective action.

Watch

A watch is used when the risk of a hazardous weather or hydrologic event has increased significantly, but its occurrence, location or timing is still uncertain. It is intended to provide enough lead time so those who need to set their plans in motion can do so. A watch means that hazardous weather is possible. People should have a plan of action in case a storm threatens and they should listen for later information and possible warnings especially when planning travel or outdoor activities.

Advisory

An advisory is issued when a hazardous weather or hydrologic event is occurring, imminent or likely. Advisories are for less serious conditions than warnings, that cause significant inconvenience and if caution is not exercised, could lead to situations that may threaten life or property.

Think you're prepared for the storm?

Before the storm

Reconsider your coverage:

- Not all policies cover water damage, debris or tree removal, sewer backup due to flooding, sump pump failure or the costs of having to stay somewhere while your home is repaired.
- Do you have comprehensive coverage on your vehicle in case of hail?
- Did you add flood insurance (a FEMA-run program) to your homeowners' policy?
 - Have you updated your home inventory?



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