

## Scientists investigate twisters like detectives

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A recreational vehicle is overturned and flattened in Rainsville, Ala., Thursday, April, 28, 2011. A least 32 people died when a tornado struck Dekalb County Wednesday. (AP Photo/ Birmingham News, Mark Almond)

(AP) -- Weather scientists are retracing the footprints of this week's monstrous tornadoes the way detectives would investigate a crime scene: talking to witnesses, watching surveillance video and even taking the measurements of the trees ripped from the ground.

The result will be a meteorological autopsy report on the disaster, revealing once and for all how many twisters developed and how powerful they were.

"First priority is finding the dead and taking care of the injured and getting utilities back up," said John Snow, dean emeritus of the College

of Atmospheric and Geographic Sciences at the University of Oklahoma. "But in parallel to that, we want to get as much data and find as much data as we can."

Researchers have to be on the scene fast - usually within days - to keep the scientific evidence as fresh as possible, Snow said.

In one of its first official assessments of the tornadoes' strength, the [National Weather Service](#) on Friday gave the worst possible rating to the one that raked Mississippi and said it was the strongest to hit the state since 1966.

With at least 318 confirmed dead, Wednesday's outbreak surpassed a series of [tornadoes](#) in 1974 to become the deadliest day for twisters since 1932. The storm eight decades ago was also in Alabama.

As they survey damage from the ground and air, researchers from the weather service and the national Storm Prediction Center are asking questions about the buildings that were destroyed. Were they brick or wood or a combination? Were they secured to a slab or set on concrete blocks? What type of roofs did they have?

Answers to those questions will help explain how the strong the twisters were. For example, a mobile home will be completely demolished by winds of 110 to 135 mph. But a well-built home can withstand much stronger winds.

Scientists might even ask families if they left the garage door open. An open door lets wind inside, where it can push on walls and the roof with tremendous pressure.

Walt Zaleski, a warning coordination meteorologist for the weather service's southern regional headquarters in Fort Worth, Texas, likened a

roof with a large overhang to a baseball cap with a brim: Wind blowing in your face will press on the brim and lift the hat off. The same can happen with a house.

In Tuscaloosa's ruined Cedar Crest neighborhood, the storm uprooted massive oaks and Scotch pines, exposing root systems the size of small swimming pools. A refrigerator landed in the crook of a broken tree, 10 feet off the ground.

Justin Johnson, a college student at the University of Alabama, was showering when he heard the twister approaching. He ran out of the shower and yelled to a housemate, "What do we do? What do we do?"

But there wasn't enough time to do anything except lie down on the living room floor as the tornado ripped off part of the back end of the house. Three people who lived next door perished. All that remained of their house was a foundation.

Like others here, Johnson was not surprised to hear scientists saying it could be one of the most powerful tornadoes on record, possibly an EF-5, the highest category on a scale for measuring wind intensity.

"If this isn't an EF-5 tornado," he said Friday, "I would hate to see what an EF-5 tornado looks like."

As of Friday, weather service teams had not found any tornado paths that were rated less than an EF-3, with winds of 140 to 150 mph.

Jim Stefkovich, the meteorologist in charge of the agency's Birmingham office, said he believes there are pockets of greater damage yet to be examined.

Zaleski compared the scientific investigation of the storms to assembling

a million-piece puzzle.

"It's very complex," said Zaleski, who has been participating in such analyses since the 1970s. "We will try to reconstruct and determine the intensity of the tornedoes," along with their width, path and other details.

The task is so big, he said, that he is calling fellow meteorologists out of retirement to help, hoping their 30 or 40 years of experience will provide an extra level of expertise.

Assessing damage becomes more complicated as investigators move along the track of a tornado. Once structures start to break apart, the wind collects debris "and you have a moving grinder that impacts all downstream structures," he said.

Investigators will also try to determine whether the storms that hit Tuscaloosa and other places were a single tornado crisscrossing the entire state of Alabama or more than one.

If it was a single twister, it would be one of the longest on record, rivaling a 1925 tornado that raged for 219 miles.

Sometimes one tornado follows into areas where an earlier twister has already passed, making it hard to determine which damage was caused by which tornado.

In addition, a large disaster tends to produce duplicate reports of the same twisters, which can be further complicated by tornadoes with multiple funnels.

People associate the most severe damage with tornados, but thunderstorms can generate two kinds of damaging winds, the straight-line downburst and the more sensational twisting tornado, Zaleski

explained.

A downburst will often cause the same damage as a tornado, he said, with winds of 100 to 120 mph.

When their assessment is complete, scientists will combine on-the-ground data with the atmospheric conditions to build databases that connect individual tornado reports with the storms that may have produced them. Then they look at how the storms were affected by environmental conditions such as moisture levels.

The picture that emerges will help forecasters better understand how killer systems develop. The final report on the disaster will become a part of the National Climate Database - a vast historical record of the nation's most severe weather.

The last time a storm of this magnitude happened - in 1974 - researchers had much cruder technology. Now they are equipped with Doppler radar, sophisticated computer models and weather satellites taking pictures from above.

"To have an event of this magnitude with a modern integrated observing system like we have now is unique in the history of meteorology for a tornado forecaster," said Russell Schneider, director of the Storm Prediction Center in Norman, Okla., which is run by the National Oceanic and Atmospheric Administration.

Snow said researchers would be studying this storm for a long time. Scientists studied the 1974 disaster for 15 years.

"More than one Ph.D. thesis will come out of this," he said.

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