Even now, tornadoes tough to forecast

By Tim De Chant
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In a time of increasingly reliable 10-day weather forecasts, the 12-minute advance warning that a troop of Boy Scouts received before Wednesday's tornado in Iowa seems like the blink of an eye. But that brief span is close to the limit of modern tornado prediction.

Most modern forecasting models have advanced roughly in step with computing power, yet tornadoes remain elusive. In fact, the decision to issue a tornado warning still relies in part on old-fashioned human observations.

The complexity and fast tempo of the weather changes that go into creating a tornado make predictions notoriously difficult. Tornadoes are often less than a quarter-mile wide, too small for the current radar system used by the National Weather Service to detect in any detail. The radar can spot larger cloud movements that are often linked with tornadoes, but it's nearly impossible to predict precisely when and where an individual tornado will emerge.

Tornadoes are "very small scale, both in space and time," said Greg Carbin, warning coordination meteorologist with the National Weather Service's Storm Prediction Center in Norman, Okla.

The essential ingredients needed for a tornado are well understood. Winds that cross at different altitudes roll a section of air into a rotating, horizontal tube. By themselves, these formations are not dangerous. If thunderstorms shove them into a more threatening vertical position, tornadoes can form.

Meteorologists rely on three types of information to issue a tornado warning, said Gino Izzi, a weather service meteorologist. The first is radar imagery that reveals cross-sections of the rotating columns of air. Another piece comes from storm spotters, individuals trained by the weather service. Specialists also analyze conditions reported at weather stations, including wind speed and direction, temperature, and humidity.

Both meteorologists and storm spotters are trained to recognize features that could lead to funnel clouds. About 1,000 volunteers attend weather service training each year in the Chicago area alone, Izzi said.

The radar imagery fuels computer algorithms that can alert meteorologists to conditions known to spawn tornadoes. Such programs are not foolproof, but they help as a backup if meteorologists are overwhelmed with monitoring multiple storms, said Kevin Manross, research associate at the Storm Prediction Center.

Issuing a warning still comes down to a judgment call. "You get to a certain point, and it tips you over the edge and you think that the threat is great enough that you need to issue a tornado warning," Izzi said.

tdechant@tribune.com