

Scientists detect seismic signals from tornado

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An Indiana University geophysical experiment detected unusual seismic signals associated with tornadoes that struck regions across the Midwest last week -- information that may have value for meteorologists studying the atmospheric activity that precedes tornado disasters.

The experiment by IU researchers involves deployment of more than 100 state-of-the-art digital seismographs in a broad swath of the U.S. midcontinent. One of the twisters that struck southeastern Missouri and southern Illinois on Feb. 29 passed through the [seismic detection](#) array.

"In examining the seismograms, we recorded unusual [seismic signals](#) on three of our stations in southern Illinois," said Michael Hamburger, professor in the department of [geological sciences](#) at IU Bloomington and one of the researchers conducting the experiment.

"The seismograms show a strong, low-frequency pulse beginning around 4:45 a.m. on Feb. 29. Our preliminary interpretation, based on other seismic records of tornadoes, suggests that we were recording not the tornado itself, but a large [atmospheric pressure](#) transient related to the large thunderstorms that spawned the tornadoes."

The seismographs that detected the pulse are near Harrisburg, Ill., a town of 9,000 where a pre-dawn twister caused extensive damage, killed six people and injured about 100 more.

IU researchers initially feared that some of the instruments might be damaged by the storm, setting back a National Science Foundation-

funded project that included the investment of hundreds of thousands of dollars and months of effort. But when principal investigator Gary Pavlis, an IU professor of geological sciences, checked the digital recordings of the Illinois stations on Feb. 29, he found they were still alive and streaming data. As he checked further, he discovered the strange "tornado seismograms" that were recorded on seismographs near Harrisburg.

Hamburger said a seismic [pressure gradient](#) associated with the tornado produced a slow, minute tilting of the seismograph that lasted for several minutes. He said this sort of pressure-related signal may help scientists better understand atmospheric activity that takes place right before tornadoes touch down. The IU researchers are working with colleagues at the University of California San Diego to try to compare recordings with other tornado-related signals and to dig deeper into the analysis.

While seismographs have been known to detect seismic activity related to tornadoes, it is highly unusual to have state-of-the-art digital instruments recording information in such close proximity to a tornado, the researchers say.

The IU seismic experiment, dubbed "OIINK" for its geographic coverage in parts of the Ozarks, Illinois, Indiana and Kentucky, includes the positioning of 120 seismometers to study earthquakes and geological structure in a key area of North America. Installation of the instruments began last summer. They are recording thousands of earthquakes from the study area and around the world, as well as nearby mining and quarry explosions.

The \$1.3 million, four-year undertaking is part of the NSF's EarthScope program, which seeks to cover the entire U.S. with a grid of detection devices for the purpose of better understanding seismic activity and predicting earthquakes. Researchers liken EarthScope to "an upside-

down telescope" that allows them to look into the Earth and gain a better understanding of seismic forces.

Provided by Indiana University

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