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Researchers getting clearer picture of region's seismicity

By [Mella McEwen](#), MRT.com/Midland Reporter-Telegram Published 10:41 pm CST, Saturday, February 22, 2020



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Dr. Peter Hennings, with the Center for Integrated Seismicity Research, Texas Bureau of Economic Geology, University of Texas, speaks about earthquakes in the Permian Basin during the third annual Permian Basin

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Immediately after earthquakes had shaken up Mentone and Gardendale last week, a top researcher at the Bureau of Economic Geology's Center for Integrated Seismicity Research offered an update on the center's progress.

Peter Hennings, research scientist and lecturer and principal investigator at the center, told attendees at the Permian Basin Water in Energy Conference that the Delaware Basin is one of three West Texas clusters the center is studying.

He said the three are located around Snyder, around the Midland-Odessa area in the Midland Basin and in the Delaware Basin.

With the increasing amounts of data the center is receiving from the equipment deployed in the region, researchers are getting a better understanding of what is happening under the Earth's surface, he said.

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For example, Hennings told the audience that data from seismometers deployed in the Snyder cluster have enabled researchers to determine there are two large faults connected by a transfault that lie under producing reservoir intervals.

He said the Delaware Basin is the most naturally and anthropomorphically active region. Before 2009, earthquakes

occurred "24 hours a day that were not related to drilling activity," Hennings said.

But there was a change in rates of earthquake occurrences beginning in 2009-2010 as drilling activity increased and accelerated in 2014 and occurrences increased again in 2017, alongside drilling activity, he said. They have accelerated to the point there are now several thousand quakes a year.

Henning listed possible causes, including saltwater disposal wells in the Delaware Mountain Group, deep saltwater disposal wells, oil and natural gas production and stimulation activity in shale units – known as "frac quakes."

It is conceivable the rise in seismic activity is linked not only to disposal wells but to hydraulic fracturing activity, he said. Through 2009, most anomalous earthquakes in the Delaware were linked to disposal wells, he said. The link between earthquakes and hydraulic fracturing is stronger in the southwestern area, Hennings told the gathering.

"We will follow the research, and the story will become clear as the data gets better," he said.

Craig Pearson, former seismologist with the Railroad Commission, said it's not known why the ground is moving.

"But I do believe, given the data (Hennings) presented, earthquake activity has increased since we started injecting so much water," he said.

John Kimberly, president of Grand Banks Energy, wondered about the cost of the earthquakes occurring around the region.

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"I don't think there's been any real physical damage. But the damage done in terms of instilling fear is very costly," he said. "It prevents people from doing things and getting on with their lives."

In researching the role pore pressure can play in seismicity, the center is building an extensive geomechanical database and is carrying out a Delaware Basin fault mapping project with both 2D and 3D surveys, according to Hennings..

Understanding stress sensitivity will also help tell the story, he said.

The challenge that lies ahead is knowing that billions of barrels of produced water will need to be disposed of, Hennings said, giving rise to the need to mitigate seismicity while also accommodating that need to dispose of water economically.

The next step, Pearson said, will be to gather residents, regulators, academics and industry representatives to discuss how to respond to the increased activity.

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