

Study finds possible deep faults, possible earthquake source

5 June 2018, by Ken Miller

Scientists may have found previously unmapped faults in Oklahoma that could be contributing to a sharp increase in induced earthquakes in the state, according to a report on a study that used magnetic imaging to explore the rock formations below the earth's surface.

The apparent faults extend from what appeared to be the end of mapped faults directly to areas where many quakes occurred, Oklahoma Geological Survey Director Jeremy Boak said Tuesday.

"This study really gave us some new interesting information about the orientation of faults," Boak said. "You can see something in the grain and structure (of the rock) that continues that fault," it's deeper.

The Oklahoma agency and the U.S. Geological Survey studied areas where four quakes of magnitude 5.0 or stronger have struck since 2011. A report by lead author Anji Shah of the U.S. Geological Survey was published in *Geophysical Research Letters*.

"In Oklahoma, there is a grain (similar to wood grain) to the deep rocks and it is aligned in a way for the stresses to generate a 'slip,'" resulting in an earthquake, Shah told The Associated Press.

The study found types of rock adjacent to each other that contain different minerals, indicating a fault line along which the rock had slid, Shah said.

Oklahoma averaged just one magnitude 3.0 earthquake a year before 2009. That number jumped to 903 in 2015, before declining to 304 last year. Oklahoma has experienced about 80 such earthquakes so far in 2018.

The faults may have been activated by wastewater injection, a process oil and natural gas producers use to dispose of wastewater that has been linked

to many Oklahoma earthquakes in recent years.

The Oklahoma Corporation Commission's Oil and Gas Conservation Division has directed several oil and gas producers in the state to close some injection wells and to reduce volumes in others.

Commission scientists are reviewing the report with the geological agencies and other departments, said spokesman Jim Palmer.

"I hope we learn even more from this. We haven't had time to assimilate it yet and determine which direction we should go next," Palmer said. "The hope is to make sense of what the data is telling us. Anything we can do to reduce the number of earthquakes in Oklahoma is what we want."

Shah said the next step is for scientists to look more closely at areas where the suspected faults were found and try to determine the potential risk of earthquakes.

"We don't think we can predict earthquakes, but we can prepare for them," Shah said.

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