



## Can We Use the North Texas Earthquake History to Predict the Next Earthquake?

Brian Rader

6046 FM 2920 #133, Spring, Texas 77379, U.S.A.

### ABSTRACT

Since about 1860, there were no reported earthquakes in North Texas until the Dallas, Texas area began to shake in 2008 with the first felt earthquake (magnitude 3 or larger). Earthquakes of magnitude 3 (M3) and larger are significant because they can be felt by residents and can cause injuries plus property damage, so this report will focus on M3 and larger earthquakes. The first earthquake to be felt within the Fort Worth Basin occurred near the Dallas-Fort Worth International (DFW) airport just weeks after wastewater injection began at a salt water disposal (SWD) well on the DFW airport property. This correlation has led many researchers to look to oil industry practices relating to wastewater injection for an explanation of the seismicity in the Dallas area. Practices such as horizontal drilling and hydrofracturing are used to increase production from unconventional resource plays. SWD wells have long been used to dispose of hydrofracturing flow back water and brine water (a byproduct of hydrocarbon production). Studies have shown that an earthquake can be triggered if fluid injection occurs near a critically stressed fault. The subsurface pore pressure changes caused by wastewater injection can result in induced seismicity of various magnitudes. Wastewater injection in the Fort Worth Basin and the associated seismicity continued from October 2008 through May 2018. During this period there were times of seismic activity and times when few to no earthquakes were felt in the North Texas area despite ongoing wastewater injection. Until now there is no explanation for these seismically quiet periods. The Dallas area experienced a heavy rainfall in May 2015, creating floods and filling area lakes. After this event, no earthquakes were felt in 2016. Recently, the DFW area has received normal rainfall and earthquake occurrence has dramatically decreased. Conversely, during extreme drought conditions in 2014 and early 2015 the number of monthly M3+ earthquakes increased to as many as five per month. The results of this

study suggest that subsurface moisture content reflected in lake levels might relate to the earthquake occurrence, magnitude and possibly help to predict when to expect the next North Texas earthquake.

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