Anthropogenic causes of intraplate earthquakes in Oklahoma, USA

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Statistical and physical models indicated the evolution of events in the country depends on the human actions. In this analysis, we divided the USA conterminous in three regions seismological active and by Earth's crust thickness variation as western (25 km), central (45km) and eastern (~ 25km). Oklahoma is in the mid-continent and the region is one of the thickest crust in the country. In ancient times was supposed to be an inner ocean now covered by the Great Plains. Fracking in this area increasing since 2009 and nowadays more than 4000 wastewater wells are active in the state, most at the Mississippi Lime are in the Oklahoma/ Kansas border. Wastewater disposal wells typically operate for longer duration and inject much more fluid than hydraulic fracturing, making them more likely to induce earthquakes. Enhanced oil recovery, injects fluid into rock layers where oil and gas have been extracted, while wastewater injection occurs in never-before- touched rocks and beneath surface areas. This study around Oklahoma pointed out that most of the area is situated in a former inner sea. In this location most of the fracking occurring with an extraordinary enhancement of earthquakes. Reviewing the entire system, we found that stratigraphy and tectonic may explain the improvement of the events due to the increasing of oil/gas exploration. Injection rate and the total volume of wastewater injected allied to the unknown presence of faults; fractures will trigger earthquakes which magnitude increased. The human action as liquid/ injection, hydraulic fracturing, enhancement of oil recovery, all together will boost earthquakes in a higher rate. The explanation associates the unevenness of the earth's crust and the lack of information for investigators about the earth's structure. The continuity of stress and exploration in the region by humans will rise the magnitude of earthquakes observed since the inner earth's structure is included with an eventual collapse. The last observations pointed out an M6 earthquake and the increasing in depth around Perry with two occurrences one in 2014 (23.2 km) and 2015 (56.2km).