

CORRELATION OF EARTHQUAKES WITH SEISMOGENIC FAULTS, CENTRAL OKLAHOMA

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Seismicity in Oklahoma has increased in frequency and magnitude since 2008; however, most events have occurred where no known faults are located. The Seismo-Lineament Analysis Method integrates data from earthquake hypocenter locations and focal mechanisms, geomorphology, and geological/geophysical fieldwork to spatially correlate an earthquake with the ground-surface trace of the fault that generated it. We project each nodal plane (NP) from the hypocenter to the ground surface, represented by a digital elevation model, plus or minus the uncertainties in hypocenter location and NP orientation. The result is an uncertainty swath, called a seismo-lineament, within which we might expect to find the trace of the fault that generated the earthquake if (1) the NP is coincident with the fault, (2) the fault is emergent at the ground surface, and (3) the fault is approximately planar. The purpose of this project is to locate the ground surface trace of the fault(s) associated with increased seismicity in Oklahoma, if they are emergent.

Epicenters for 321 $M \geq 2$ events near Oklahoma City form an approximately linear array that trends $\sim 38^\circ$. This trend is sub-parallel to the average strike of one NP from each of 7 $M \geq 4$ events in the array. That NP is tentatively inferred to be the fault plane solution for a given event. These 7 events will be the focus of this study. We hypothesize that these events occurred on a fault that has reached the ground surface at some point in its history, causing identifiable geomorphic expression.

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