The Subsurface Anatomy of the Northwest Tennessee's Sand Blows: Remnants of the New Madrid Earthquakes

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ABSTRACT

Earthquakes have repeatedly shattered the alluvial landforms about the Missouri Bootheel and Northwest Tennessee-most recently the 1811-1812 New Madrid earthquakes. During four of the most severe earthquakes, long fissures opened across the surface and volcanic-like sand blows erupted, venting subterranean sands onto the surface. Remaining embedded within the subsurface were sand-filled vents channeling between the water table and surface. Today, these vents have the potential to influence the interaction and movement of ground and surface waters. Nearly a century of mechanized agriculture and erosion has all but masked the evident surface features of the past great earthquakes. Fields significantly impacted by past seismic shocks appear today as normal. The objectives of this project were to: (1) establish a rapid geophysical mapping protocol for a spatial mapping of the continuity of the gleyed horizon over large acreages; (2) obtain a ground-truth for selected sites using soil morphology and classification studies; (3) establish pattern signatures for sand blows occurring unseen beneath the surface. A non-intrusive survey methodology was developed for precisely mapping the locales of seismic features across large acreages using mobile ground-penetrating radar combined with precision satellite-positioning technologies. This methodology was tested on leaking wildlife ponds in MLRA 131. Located seismic features were either earmarked for remediation or the impacted area was recommended for exclusion from flooding and irrigation practices. A cross-section examination of a fissure was used as a ground truth for assessing soil variations along the New Madrid Fault Zone.

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