

Preliminary Seismic Investigation of the Bliss Creek Lineament near Edwards, Mississippi

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ABSTRACT

In evaluating neotectonic deformation in the Mississippi Embayment (ME), anomalous surface features (topographic scarps, lineaments, and drainage pattern irregularities) have often been targeted for investigation. Remote sensing and geomorphic analysis has identified the Bliss Creek Lineament (BCL) and associated it with an anomalous straight reach of the Big Black River in west-central Mississippi. The study further proposed a tectonic influence on the river anomaly and identified a suspected fault coincident with the BCL. Subsequent work investigated the tectonic geomorphology of the Big Black River system in the vicinity of the anomalous reach by analyzing drainage basin asymmetry. Our work is focused on evaluating the use of shallow seismic reflection methods, emphasizing the high-resolution potential of shear-wave (S-wave) propagation in unconsolidated sediments, to image the shallow subsurface of the Big Black River valley in the vicinity of the BCL near Edwards, Mississippi. Preliminary tests using a 12-channel S-wave landstreamer acquisition system and a sledge hammer/I-beam energy source have identified a strong target reflection (~15–20 m deep) in the near surface. Correlation with a local well log indicates that the reflection is likely from the Glendon Limestone member of the Vicksburg Group (Oligocene). The next phase of our study will focus on collecting an S-wave seismic reflection profile across the surface trace of the BCL to evaluate the existence of, and interpret near-surface structural deformation associated with the suspected fault.

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