
Shallow Seismic Reflection Profiling of the Bluff Line Lineament in Northwest Mississippi

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ABSTRACT

Recent geological and geophysical studies have identified Quaternary faults south of the dense zone of microseismicity centered on New Madrid, Missouri (the most seismically active area in the central and eastern United States). Continuing work in southwest Tennessee, eastern Arkansas, and northwest Mississippi is aimed at determining previously unrecognized seismic hazards in the Lower Mississippi Valley (LMV). The northeast-trending Big Creek Fault Zone (BCFZ) was recognized over 60 years ago, although little detailed work regarding its geologic framework and potential earthquake hazard has been done. In the LMV, the BCFZ coincides with the bluff line of the Mississippi River, and several anomalously straight sections of the bluff line have been identified as possibly fault controlled. One such linear section is located in Tate County, Mississippi, 35-40 km (21-24 mi) south of Memphis, Tennessee. A 0.5 km (0.3 mi) long shear (S) wave seismic reflection profile was collected across the bluff line near Prichard, Mississippi. The seismic data were acquired using a 12-channel landstreamer and a sledgehammer/I-beam seismic energy source. The reflection profile displays coherent reflections from the deeper Tertiary section, as well as numerous shallow reflections from within the Quaternary deposits. Further interpretation of this data set will provide valuable information for evaluating earthquake hazards and guiding future paleoseismologic investigations.