

Project Abstract

In 1811-1812, a series of three major earthquakes struck the Central United States in the New Madrid Seismic Zone. Having magnitudes near 7.5 and being located within the relatively stable interior of the North American Continent, these events produced widespread strong shaking. If these events were to occur today, there would be substantial devastation to people, buildings and transportation and communication infrastructure. To better understand this threat and in preparation for the upcoming bicentennial, the US Geological Survey is planning to produce and support sophisticated numerical simulations of earthquake rupture and seismic wave propagation due to a repeat of these events. To kick off this effort, the USGS began the development and construction of a community seismic velocity model for use in these numerical simulations. We have collected existing research regarding the p- and s-wave velocities, impedance contrasts and densities of the lithosphere in the New Madrid region and synthesized these results into a single model that can be used in earthquake simulations. We have identified areas of missing or incomplete information for further study. The region covers an area of approximately 600,000 square km from Little Rock, Arkansas across to Nashville Tennessee, up to St Louis, Missouri. The model has currently been gridded at 3 km lateral resolution and from 5-m resolution near the surface to 10-km resolution at 100 km depth. Less but still substantial uncertainty exists for the Mississippi Embayment where a majority of the research has been done. Newer regional models such as those by van der Lee and others and Liang and Langston have improved regional resolution beyond a 1-dimensional model, but for ground motion simulations, greater resolution outside the Embayment is desired.