The Northern Mississippi Embayment Sediments: P and S Wave-Velocity Model

MOSTAFANEJAD, A., LANGSTON, Charles A., Center for Earthquake Research and Information, Memphis, TN
mstfnjad@memphis.edu., clangstn@memphis.edu

Taking advantage of the opportunity created by the passage of the USArray Transportable array, deployment of the Northern Embayment Lithospheric Experiment (NELE), and using the existing broadband components of the New Madrid Seismic Network, we are modeling shear and compressional wave velocity structure of Mississippi embayment sediments. We are constructing this velocity model following two approaches: 1) Forward modeling and producing a series of synthetic vertical and radial transfer functions from an input linear 1D gradient velocity model under each station and assuming a wide range of velocity nodes for each model. Maximizing the fit, and minimizing the difference in the radial-to-vertical amplitude ratios of the observed and synthetic vertical and radial transfer functions gives the best model realization. 2) Directly inverting for the velocity parameters. We constrained our forward and inverse modeling with the existing geological and well log data for sediment thickness and velocity, as well as average P and S wave velocities obtained from teleseismic H/V - V/H spectral ratios and H/V spectral ratios from ambient noise. This velocity model will be useful for local earthquake ground motion simulations. However, its primary purpose is for correcting the sediment effect in the downward continuation of the teleseismic P wave field to examine Ps conversions from crust and mantle interfaces. In addition to the scientific results, NELE has created an important educational bridge: we have given multiple lectures and instrument demonstrations for K-12 students and introduced them to the work of seismologists and importance of earthquake awareness in the New Madrid Seismic Zone.

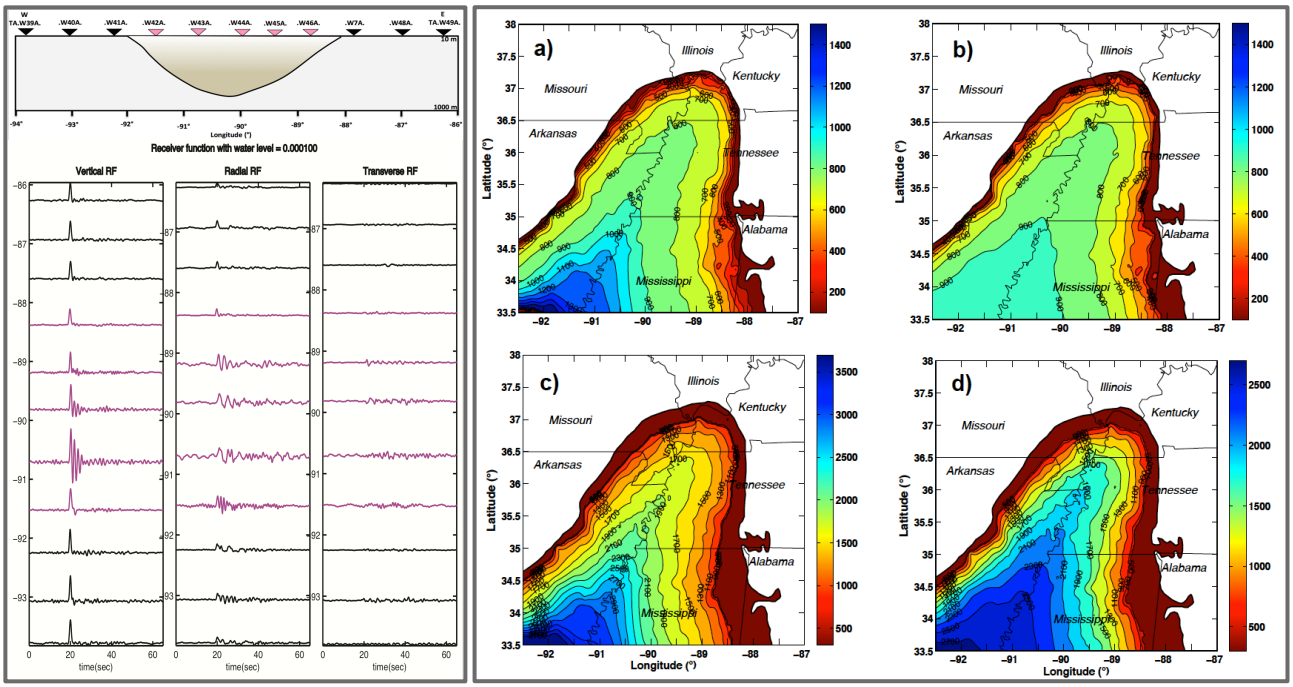

Figure- Left: Receiver functions along from TA.W39A to TA.W49A in Mississippi Embayment. Large amplification due to sediment effect is clearly seen on waveforms inside the embayment. **Right:** Average Vs (a, b) and Vp (c, d) model obtained from H/V and V/H studies of the teleseismic earthquakes.