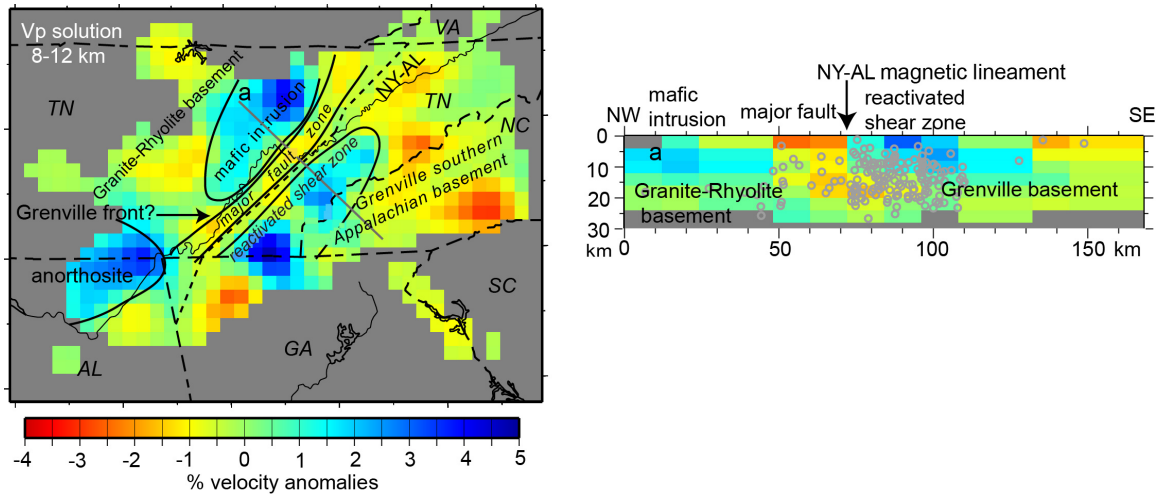
Distinct zones of intraplate seismicity are active tectonic features that offer the opportunity to investigate deformation processes far from plate boundaries. The driving mechanisms are enigmatic and pose interesting scientific challenges involving investigation of structural features in the crust, characterization of the regional and local stress fields, and knowledge of mantle velocity perturbations and flow patterns. Intraplate seismic zones also provide information about the formation of the continent because they are commonly associated with crustal structure produced by major tectonic events of the past. The eastern Tennessee seismic zone (ETSZ) extending from northeastern Tennessee into Alabama serves as an excellent example. In a recent study, the seismic activity is attributed to reactivation of a major shear zone accommodating along-strike migration of the Amazon craton relative to Laurentia during the formation of the super continent Rodinia. The ETSZ seismotectonic model is based on P- and S-wave velocity models and hypocenter relocations determined using local earthquake tomography and is compatible with a diverse set of geophysical and geological observations. This includes paleomagnetic and isotopic constraints on the growth of southeastern Laurentia during the Grenville orogeny. Extension of the basement shear zone north of the ETSZ is suggested by SKS splitting observations and source parameters for earthquakes in eastern Kentucky earthquake and western Virginia. The full extent of the preserved shear zone can be mapped using splitting observations from the TA stations deployed in the eastern U.S. The ETSZ seismotectonic model has important implications for hazard assessment in the central and eastern U.S. The model can be used to educate the general public about why the ETSZ exists and can be incorporated into educational material at all grade levels to illustrate the fascinating history of the continent that is preserved in the rock record.




ETSZ seismotectonic model. Earthquakes occur in the “reactivated shear zone” bounded to the NW by the New York-Alabama magnetic lineament. The major basement fault extends to at least 24 km depth and is interpreted as a preserved portion of a transform fault accommodating along-strike migration of the Amazon craton relative to Laurentia during the Grenville orogeny.