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Significant differences between upper mantle models for tectonically active and stable part of North America

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The seismic structure of the mantle beneath North America has been discussed many times. Nowadays, we have an opportunity to compare previous results with the new high resolution data from the EarthScope USArray project. Based on the recording of the Transportable Array of the USArray, we discuss the P- and S-wave velocity models of the tectonically active western part and the stable central part of the North America. We use travel time data from natural earthquakes recorded in the far-regional distance range up to 3000 km. The observed differences in the Vp/Vs ratios for models from various azimuths correlate with tectonic regions of different thermal regimes. We derive an updated P-wave velocity model down to the depths of the transition zone for both mentioned regions (MP-1). Significant differences in the first-arrival travel times observed for distances between 800-1800 km (up to 5 s) suggest that the distribution of P-wave velocities has an influence on the travel times and distribution of main discontinuities located below 100 km depth. For the tectonically active region, we observe a discontinuity at ca. 300 km depth, characterized by a refracted wave with velocity of 8.7-8.9 km/s and clearly observed reflected wave. For the stable part of the continent, the arrivals from 300-km discontinuity are obscured by shallower events. For the western part of the US, we found also a low-velocity zone close to 400 km depth and a significant depression of the 410-km discontinuity. We compare out results with mechanical mixture model (Xu et. al. 2008). We discuss seismological data with petrological model, especially regarding the origin of the 300-km discontinuity.