



## **Seismic imaging of the North American upper mantle structures for California – Virginia profile.**

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The EarthScope USArray project provides a unique opportunity to verify previous seismological models and improve our understanding of the upper mantle structure beneath the United States. This study employs the data recorded from the Transportable Array of the USArray and from the ISC bulletin (for the events before 2004). For imaging of the upper mantle down to about 500 km depth we use the travel time data from the earthquakes recorded at a distance up to 3500 km. As a result, the P-wave velocity models are obtained for the tectonically stable central part of US and for the active western part. The models have been verified by synthetic seismograms calculated using the reflectivity method. Based on these models of the upper mantle structure in North America, a 2D model along the California – Virginia profile has been calculated using an inversion approach. This provides a possibility to update the previous MP-1 model. Additionally, the 1D models are constructed based on the events located along the profiles in California, Colorado or Virginia. The most interesting part of the studied area is the marginal part of North American Craton, which separates two tectonically different areas. The obtained models show significant differences in the first-arrivals observed at the 800-1800 km epicentral distance range. In the Western, tectonically active region, the 300- km discontinuity is observed. It is interpreted based on the refracted phases with the apparent velocity of 8.7-8.9 km/s and clearly observed reflections. In this area, a low-velocity zone at the bottom of the upper mantle significantly deepens the 410-km discontinuity. The stable North American Craton is characterized by blurred arrivals from the 300-km discontinuity. The modelling results are compared with the lithospheric strength and elastic thickness distribution.