

Tomographic upper-mantle velocity structure beneath the Iranian Plateau

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Abstract

The Iranian plateau is one of the most structurally complex and tectonically inhomogeneous regions in the world. In this study, we analyze Pn arrival-times from regional seismicity in order to resolve lateral velocity variations within the uppermost-mantle under the Iranian Plateau. More than 48,000 Pn first arrival times selected from the EHB catalog were used with epicentral distances of 200 to 1600 km. We used regularized isotropic and anisotropic damped least-squares inversion to image lateral velocity variations in the upper mantle. Our velocity model, with high lateral resolution, shows positive anomalies in the Zagros mountain belt with a distinct transition approximately along the Main Zagros Thrust to the lower mantle velocity zone of Central Iran. Anomalously low velocities are observed predominantly beneath NW Iran and eastern Turkey, suggesting a zone of relatively weak mantle. Low velocity region under the Damavand volcano reveals the hot upper mantle beneath the central Alborz mountains.