HIGH RESOLUTION IMAGE OF UPPERMOST MANTLE BENEATH ZAGROS CONTINENTAL COLLISION

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Convergence of Arabian plate towards Eurasia at a rate of ~ 25 mma^{-1} (Vernant et al., 2004) is primarily accommodated across the Iranian Plateau and the surrounding mountain ranges and results in different styles of deformation in various parts of this continental collision zone. About half of this convergence (~10 mm/y) is accommodated by shortening in the Zagros Mountains (Tatar et al., 2002) and the rest is mainly accommodated across the Alborz and Kopeh Dagh Mountains as well as the South Caspian Sea (Vernant et al., 2004).

To investigate deep structures of the Zagros continental zone in NW Iran, we operated 63 broadband seismographs along a profile from Ilam, near the Iran-Iraq border, extending across the Zagros, the Sanandaj–Sirjan Zone (SSZ), the Urumieh–Dokhtar magmatic arc (UDMA), Central Iran and the Alborz Mountains. We picked 4971 teleseismic P arrival times from 106 teleseismic events gathered during the first six months of the network's operation. Events with magnitudes greater than 5 and epicentral distance in the range 20^o - 95^o were used. We calculated P travel time residuals by subtracting theoretical P travel times of the IASP91 travel time model (Kennett and Engdahl, 1991) from the data. The relative travel-time residuals were obtained by subtracting the associated mean for each event from all travel-time residuals.

The P-wave teleseismic relative residuals (4971 picks) were then inverted for crust and upper mantle structures using ACH damped least square inversion method of Aki et al. (1977). The calculated relative P-wave velocity tomogram shows strong velocity contrasts in crust and uppermost mantle (depth: 0-100 km) beneath the Main Zagros Reverse Fault (MZRF); the velocity is higher beneath the Zagros and lower beneath SSZ, UDMA and Central Iran. Moving north-eastward another transition from lower velocity beneath Central Iran to higher velocity beneath Alborz Mountains is clearly observed in depth range of 0-100 km. This transition is almost between UDMA and Central Iran at larger depth (100 – 200 km), showing larger lower velocity region in smaller depths. A deeper strong high velocity anomaly can be observed beneath MZRF extending northward beneath SSZ and UDMA. We interpret this anomaly as a signature of the thickened lithosphere beneath the suture zone between the Arabian Plate and Eurasia in NW Iran.

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