



The long-term and short-term slip rates of the Moshafault, central Alborz, Iran: a major active strike-slip fault system

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The Alborz mountain range accommodates the overall oblique left-lateral shortening between the southern Caspian basin and central Iran within the broad Arabia–Eurasia collision zone. The Alborz range, a roughly 600 km long and 60–120 km across, involve left-lateral and right-lateral strike–slip faulting on active ENE- and WNW-trending faults, respectively. Showing strong historical and instrumental seismicity in the central Alborz, Moshafault extends ~ 150 km long with an ENE- to NW-trending at the vicinity of Tehran. This fault represents an important potential seismic source that threatens the Iranian metropolis. This region has been affected by destructive earthquakes in AD 958 (X, 7.7), AD 1177 (IX, 7.2), AD 1665 (VIII, 6.5), AD 1830 (IX, 7.1), and 1930 (VI, 5.2).

To estimate the long-term and short-term slip rates along the different segments of the fault, we undertook a combination of tectonic geomorphology and GPS studies. Our preliminary investigations show a present day left-lateral displacement, which is consistent with the geodetic and geologic slip rates observed along the Moshafault. The studies indicate a geodetic slip rate of $\sim 4 \pm 2$ mm yr⁻¹ as the left-lateral shear of the overall belt along the Moshafault. The preliminary geomorphological and paleoseismological works on the the fault indicates a minimum left-lateral component of 2.7 ± 0.5 mm yr⁻¹ over a period of 5 My, although the Holocene offset along the fault corresponds to a slip rate of ~ 7 mm yr⁻¹.