



Recurrence time of major earthquakes along the Doruneh fault system, eastern Iran, determined using geologic and geomorphic features

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The ESE-WNW to WSW-ESE striking Doruneh fault system, extending ~ 900 km, is one of the largest strike-slip faults in eastern Iran. As a major strike-slip fault, it plays an important role on the rotation of central Iranian blocks in accommodating northeastward shortening caused by the Arabia-Eurasia convergence. In spite of pristine Holocene fault scarps and prominent neotectonics features, very few earthquakes are known to have occurred in the region. This low level of seismicity is assigned to more than 1000 years recurrence time of destructive earthquakes or low population density of this arid, desert region. In this research, the Pliocene-Pleistocene offset and long-term slip-rate of the Doruneh fault system is used in estimating potential seismic hazard and understanding regional tectonics. We document displaced basement rocks and recent geomorphological features along the Doruneh fault system, based on tectono-geomorphic interpretation of high-resolution satellite remote sensing images and fieldwork studies. Realignment of offset bed-rocks and structural features, and the reconstruction of the Pliocene-Pleistocene alluvial fans and drainage systems displaced by the fault imply a total cumulative slip of ~ 3 km, suggesting a slip-rate of ~ 1.6 - 3.7 mm/year if the faulting initiated at 1.8 Ma. At this estimated slip-rates, the average recurrence time of major earthquakes ($M \geq 6.7$) along the Doruneh fault system is ~ 200 - 500 years.