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Unravelling the seismic behaviour of slow-slipping faults

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Assessing the seismic behaviour of slow-slipping faults is a difficult task. This is a typical problem in Central Iran where several active strike-slip faults, threatening large cities, slice an area devoid of seismicity and where the available GPS data do not detect resolvable deformation. The two westernmost NNW-striking, right-lateral, faults outside the area subject to current GPS-dextral shear, are the Deshir and Anar faults. The slip-rates and the seismic behaviour of the Deshir and Anar dextral faults have therefore long remained poorly investigated. To estimate the slip-rate of the Anar Fault, we dated cumulative offsets of alluvial fan surfaces and risers with 10Be cosmic ray exposure (CRE) and Optically Stimulated Luminescence (OSL). The comparison between OSL ages, obtained within the latest sediments emplaced during the aggradation of the fans, and CRE ages of pebbles, sampled on the abandoned fan surface, indicates a significant exposure inheritance. Comparison between the surface pebbles with the youngest CRE effective age and the OSL age of the sandy layers collected below the surface implies the fault slips at a minimum rate of 0.8 mm/yr. Ongoing trench studies indicate the Deshir and Anar faults hosted significant (M $\geq$7) paleoearthquakes, with long (several kyrs) recurrence intervals, similar to the fault responsible for the 2003 Bam earthquake.