

EARTHQUAKE RECURRENCE INTERVALS IN IRAN BASED ON ARCHAEOLOGICAL EVIDENCE

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We use the rich archaeological and historical record in Iran and Turkmenistan to determine earthquake recurrence intervals for faults and areas that have sustained damaging 20th-century earthquakes. In the Dinevar-Nahavand region of the Zagros Mountains, the 1957 Farsinaj and 1958 Firuzabad earthquakes on the Zagros Main Recent fault were preceded by an earthquake cluster in 1008 and 1107 AD and by archaeologically-documented earthquakes in 224-459 AD and 1650-1600 BC, giving return times of 850-950, 500-800, and 1800-2100 years, respectively. In the Iranian Plateau, the Ipak reverse fault ruptured in 1962 and in the late 3rd millennium BC, a return time of 4000 years. The 1990 Rudbar-Tarom earthquake on a strike-slip fault was preceded by a large event near the beginning of the 1st millennium BC, a recurrence interval of 3000 years. Active reverse faults in the area did not rupture in 1990, hence the recurrence interval is for an area source rather than a specific fault. The Kopeh Dagh strike-slip fault in Turkmenistan ruptured in 1948 and previously near the beginning of the Christian era and around 2000 BC, a recurrence interval of 2000 years. Archaeological dating of earthquakes documents shaking damage in layers overlain by undamaged layers. A gap in the archaeological record may mark the abandonment of a site after an earthquake. Other possible origins of cultural gaps by fire or invasion must be considered. Many archaeological sites near active faults remain to be studied, including several near metropolitan Tehran, where the earthquake recurrence intervals on active faults are poorly known.