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Paleoseismic recurrence on the geometrically simple section of the Altyn Tagh Fault, Northern Tibet

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It has been hypothesized that semi-periodic recurrence of earthquakes is more likely to occur on geometrically simple faults or fault sections. Paleoseismology provides geological evidence of the timing and slip at a point due to recurring major earthquakes on a fault, enabling a test of general models of earthquake recurrence behavior. In this study, we document a long paleoseismic record on the geometrically simple Xorkoli segment of the Altyn Tagh fault (ATF). Eight and probably nine earthquakes are identified through event evidence in the form of open fissures, folds, unconformities, and upward fault terminations, with modeled mean (95% confidence) ages of A.D. 1598 (1491-1741) yr (event A), A.D. 797 (676-926) yr (B), B.C. 668 (732-589) yr (C), B.C. 956 (1206-715) yr (D), B.C. 1301 (1369-1235) yr (E), B.C. 2105 (2233-1987) yr (F, probable), B.C. 2663 (2731-2601) yr (G), B.C. 2818 (2878-2742) yr (H), B.C. 3396 (3522-3205) yr (I). The mean recurrence interval is 620±410 years, with individual intervals ranging from as short as 150 years to as long as 1460 years. The coefficient of variation (COV) of intervals is 0.67±0.04 (1σ). This level of irregularity in recurrence pattern appears to be inconsistent with the hypothesis that the remarkable straightness of the Xorkoli segment, bounded by restraining bends, should produce regular events. The significant variation of recurrence interval suggests that the Xorkoli segment does not produce highly periodic earthquakes. A global compilation of 35 strike-slip paleoseismic sites, with long ($n \geq 5$) earthquake records, located on thirteen different strike-slip fault; the mean COV of all the sites is 0.69 and COVs at 21 sites are between 0.4 and 0.8, indicating that quasi-periodicity is common for strike-slip faults.