



## **Co-seismic and cumulative offsets of the recent earthquakes along the Karakax left-lateral strike-slip fault in western Tibet**

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The 400 km-long Karakax left-lateral strike-slip fault is the westernmost segment of the Altyn Tagh fault. It separates northwestern Tibet to the south from the Tarim basin to the north. The western section of the Karakax fault exhibits clear co-seismic surface ruptures of past large earthquakes. Geomorphic offset measurements from the field and high-resolution Ikonos images along 1.5 km across the Sanshiliyingfang fan and along 55 km of the fault, range from 3 to 28 m, with distinct clusters at  $6 \pm 2(3)$ ,  $14 \pm 2$ ,  $19 \pm 2$  and  $24 \pm 3$  m. The cluster of the smallest offsets around 6 m (full range from 3 to 10 m) distributed over a minimum length of 55 km, is attributed to the last largest surface rupturing event that testifies of the occurrence of a magnitude  $M_w$  7.4-7.6 earthquake along the Karakax fault. We interpret the other offset clusters as the possible repetition of similarly sized events thus favoring a characteristic slip model for the Karakax fault. In a 3 m-deep trench dug across the active trace of the fault we can identify the main rupture strands of the last and penultimate events. The penultimate event horizon, a silty-sand layer, has been radiocarbon dated at 975-1020 A.D. (AMS 14C age). It is proposed that large  $M_w$  7.4-7.6 events with co-seismic slip of about 6 m rupture the Karakax fault with a return time of about 900 years implying an average slip-rate of about 6-7 mm/yr during the late Holocene. These results suggest that the Karakax fault is the largest left-lateral strike-slip fault at the rim of northwestern Tibet accommodating eastward movement of Tibet due to the India-Eurasia collision.