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Kinematics of active deformation and possible segmentation of seismic slip along the foothills of the Western Kunlun (China).

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The Tibetan Plateau stands as a prominent topographic feature at the Earth's surface, characterized by intense seismic activity, in particular along the mountain ranges that form its bounding edges. To the northwest, the Western Kunlun Range has received increasing attention since the 2015 M_w 6.4 Pishan earthquake but its kinematics of deformation remain to be properly documented. Here, we analyse the terrace record of active deformation along the Karakash River, where it crosses the Hotan anticline. We date terraces using in-situ produced cosmogenic isotopes, and show that terrace incision and uplift are spatially correlated with blind duplex ramps beneath the anticline. From there, we quantify the overall slip rate of the duplex to be 1.2-2.8 mm/yr over the last ~250 kyr. Our data are not able to resolve the detailed kinematics on each blind ramp and we cannot exclude that several of them are active at places along the anticline. By comparison to the data available west of our study area, we propose that the blind structures all along the foothills of the Western Kunlun range have an overall slip rate of ~2 mm/yr. However, the way this slip rate is to be partitioned on one or several blind ramps is expected to vary along strike, generating a certain structural and kinematic segmentation of active deformation, and from there possibly explaining the moderate recorded seismicity in this region. Because this slip is transmitted upward and forward onto the Mazar Tagh wide and geometrically simple frontal thrust sheet, we question the possibility of large – but rare – earthquakes rupturing this structure. From there, we propose the idea of a bimodal seismicity in the region, as a mirror of the structural segmentation of active faults.