Karakorum fault slip-rate seems to be constant along strike over the last 200 ka

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Determining the slip-rate history along the Karakorum Fault is fundamental to understanding its present-day kinematic role in the deformation of Tibet. InSAR data suggest that the Karakorum Fault is barely active (1±3 mm/yr) while field observations and high-resolution satellite images inferred a slip-rate of ~30 mm/yr. Geodetic and Quaternary geologic studies suggest slip-rates between 3.4±5 mm/yr and 11±4 mm/yr (GPS), and 4±1 mm/yr and 10.7±0.7 mm/yr (cosmogenic ^{10}Be), respectively. Whether slip-rate variability exists along strike and/or time, or simply results from different techniques/timescales, remains unknown. We present new ^{10}Be cosmic-ray surface exposure ages for 127 quartz-rich samples collected on 3 lateral moraines and 3 alluvial sites along the southern segment of the right-lateral Karakorum fault (the Menshi-Kailas basin) and along the normal fault in the Pulan graben in western Tibet. These dates constrain the age of fluvial and glacial geomorphic features right-laterally or vertically offset by the fault by varying amounts from 7±1 m to 430±30 m (right-lateral) and up to 53±5 m (vertical). From the 30° Karakorum Fault bend at Baer (80.5°E), to Mount Kailas, the slip-rate along the Karakorum fault varies from 5.7±3.4 - 9.4±2.5 mm/yr to >8.2 – 15.1 mm/yr (total slip on two parallel fault strands). In the Pulan graben, the normal fault slip-rate is >1.5±0.3 mm/yr. Our data suggest that the Quaternary slip-rate in the Menshi-Kailas Basin is at least 2 to 10 times faster than the geodetic InSAR rate and the slowest GPS rate. It is also consistent with our previous rate obtained further north (10.7±0.7 mm/yr) and with the highest GPS rate. Therefore, it might suggest that the Karakorum fault slip-rate is constant along strike.