



## Late Miocene - Pliocene deceleration of dextral slip between Pamir and Tarim: Implications for Pamir orogenesis

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The Pamir salient collided with the Tien Shan during the late Cenozoic; however, the timing of this collision is poorly constrained. The northern margin of the Pamir salient indented northward by  $\sim 300$  km during the late Cenozoic, accommodated by south-dipping intracontinental subduction along the Main Pamir Thrust (MPT) linked to shear zones along both the eastern and western flanks of the Pamir, bounding the Tarim and Tadjik depressions, respectively. The Kashgar-Yecheng transfer system (KYTS) is the main dextral shear zone, separating Tarim from the Eastern Pamir; in the field it is comprised of 4 steeply dipping, parallel, brittle strike-slip faults with an estimated cumulative offset of  $\sim 280$  km [1, 2]. [1] suggested that the KYTS initiated between 25-18 Mya and is still active, with an average dextral slip rate of 11–15 mm/a, derived from the 280 km offset and the time since slip initiated. In order to better constrain the slip history of the KYTS, we collected thermochronologic samples along the eastward-flowing, deeply incised, antecedent Tashkorgan-Yarkand River, which crosses the fault system on the eastern flank of the orogen. We performed  $40\text{Ar}/39\text{Ar}$  dating on biotite, (U-Th-Sm)/He dating on apatite and zircon, and AFT analysis. We combine our data with muscovite and biotite  $40\text{Ar}/39\text{Ar}$  data from [3] and AFT data from [2]. To examine different slip rates at the largest KYTS strike-slip offset of the Yarkand river, we calculate the time required to accommodate the observed 7 to 14 km horizontal offset for a range of slip-rates and the corresponding exhumation rate required for the river to incise the observed 740 m relief in this location. We compare these incision rates with long term rates derived from apatite U-Th/He and AFT dating at the same place. This sample was exhumed from 3.7-5.9 km at a long-term exhumation rate of 0.16 to 0.35 mm/a. These long-term incision rates are only compatible with slow horizontal slip rates of 1.7-7.5 mm/a over the past 3 to 5 Ma. Upstream, two strands of the KYTS do not offset the 1000m deep river gorge. Following the same logic, cooling ages there suggest these strands have been inactive for at least 3-5 Ma. These data show that the slip rate of the KYTS decreased substantially during the late Miocene or Pliocene. We suggest that a transition from subducting thinned Alai crust to subducting thickened Tien Shan crust under the Pamir provides a mechanism for slowing motion along the kinematically coupled strike-slip system.

### References

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