Geophysical Research Abstracts, Vol. 8, 07711, 2006
SRef-ID: 1607-7962/gra/EGU06-A-07711

Slip rate gradients and the termination of the eastern Kunlun Fault: Implications for the mechanics of intracontinental deformation in Eurasia

E. Kirby
(ekirby@geosc.psu.edu / Phone: +1 814-8650732)

Ascertaining whether intracontinental strike-slip faults within Eurasia are responsible for wholesale eastward expulsion of Tibetan lithosphere requires understanding to what degree faults pass slip beyond the eastern margin of the Tibetan Plateau. Despite an expectation from global scaling relationships between fault length and displacement that non-plate boundary faults should exhibit displacement gradients along strike, data documenting this behavior are rare for strike-slip systems. The Kunlun fault, in north-central Tibet, with its great strike length ($\sim$1500km), high slip rate ($\sim$10 mm/yr), and recent large earthquakes plays a central role in models for extrusion of Tibetan lithosphere. Moreover, recent work has documented uniform Holocene slip rates along much of its length. To test whether such high slip rates persist along the eastern segments of the Kunlun fault, we determined displacements of millennial-scale geomorphic markers from multiple sites between $\sim$100° and 102° E latitude. Displaced fluvial terrace risers along tributaries of the Yellow River, coupled with ^{14}C ages of terrace deposits, provide precise constraints on slip rates over Late Pleistocene to Holocene time. Results indicate that slip rates decrease systematically eastward from $>$ 10 mm/yr to $<$ 2 mm/yr, reflecting the presence of a process zone near the fault tip analogous to those observed in normal fault arrays. These data challenge the view that slip along the Kunlun fault remains uniform along strike. Rather, it appears that the fault system terminates within the thickened crust of the plateau. We infer that displacement gradients must therefore be accommodated by distributed deformation within the plateau itself. Thus, our results support models linking fault displacement to internal velocity variations within Tibet and emphasize the view that fault slip is not expected to remain uniform along Eurasian strike-slip faults. Our results demonstrate that slip on the Kunlun fault does not accomplish extrusion of central Tibet.