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Late Quaternary Arc-parallel Extension of the Kongur Extensional System (KES), Chinese Pamir

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Active deformation in the Chinese Pamir plateau is dominated by east-west extension along the active Kongur extensional system (KES). The KES lies along the northeastern margin of the Pamir at the western end of the Himalayan–Tibetan orogenic belt, and is part of a regional fault system which accommodates east–west extension in the hanging wall of the active Main Pamir Thrust (MPT). Previous work has shown that the MPT has been active since at least the Late Oligocene and accommodates northward motion of the Pamir salient over the Tarim and Tajik basins. It has been proposed that North-directed thrusting along the Main Pamir thrust has been interpreted to be related to east–west extension in the northern Pamir by either extensional collapse of over-thickened crust, or radial thrusting, or oroclinal bending along the Main Pamir Thrust. Alternatively, the east–west extension is related to northward propagation of the right-slip Karakoram fault. A newer model relates the extension to gravitational collapse of the Pamir into the Tadjik depression. Clearly the precise driver remains poorly understood. To better understand the nature of extension in the Pamir and to test the existing models, late Quaternary slip rate along the KES need to be defined using geomorphic mapping, geodetic surveying, Be-10 surface exposure and depth profile dating to quantify rates of fault slip using multiple landforms as strain markers such as offset outwash terraces, lateral moraines, and landslides at five sites, to identify spatial patterns in deformation rates. The preliminary results show that the overall extension direction is subhorizontal, is oriented E-W, and occurs at a high rate of about 7 mm/yr along the Muji and Qimugan faults to the north and deceased to about 1 mm/yr at Kuzigan to the south near Tashkurgan town, which matches the pattern of GPS data. A regional compilation from this study and existing data shows that recent extension along the KES is arc-parallel extension rather than radial thrusting, and is likley related to the collision between the Pamir and Tian Shan along longitude 74.4E and the clockwise rotation of Tarim. The presence of thrust faults (the MPT and Pamir Frontal thrust) in the frontal Pamir and an arc-parallel strike-slip Muji fault farther inboard, as well as normal faults (e.g. the KES) striking perpendicular to the arc, all suggest that strain in the Pamir is partitioned into fairly pure arc-normal shortening and arc-parallel extension and translation along discrete fault systems.