A New Quaternary Strand of the Karakoram Fault System, Ladakh Himalayas

Wendy M. Bohon[1], Kip V. Hodges[1], J Ramon Arrowsmith[1], Alka K. Tripathy[1]

[1]School of Earth and Space Exploration, Arizona State University, Tempe, AZ 85287, U.S.A., wendy.bohon@asu.edu

The NW-SE striking, dextral Karakoram fault system stretches for more than 1200 km from the Pamirs of Central Asia at least as far southeast as the Kailas area of Tibet. Estimates for the total lateral displacement along the fault system range from 150-1000 km, and estimated Quaternary rates of slip range from 1 to 30 mm/yr. In the Ladakh region of NW India (~ 33°28'N, 78°45'E), the fault system expresses as northern and southern strands bounding the Pangong Range. Studies of ductile deformation fabrics along these strands suggest that slip began in the Miocene, and Brown and others (2002) documented Quaternary right-lateral slip along the northern strand at ~4 mm/yr on the basis of offset geomorphic features. The lack of documented Quaternary offset along the southern strand has led most researchers to assume that Quaternary slip on the Karakoram fault system in this region was partitioned exclusively to the northern strand.

Our summer 2009 field work in the Pangong Range and adjacent Nubra Valley provides the first documentation of significant Quaternary activity along the southern strand. In the valley between the villages of Tangste (34°01' N, 78°10' E) and Durbuk (34°06' N, 78°07'), the fault is visible high on the northeastern mountain side as a break in slope with offset Quaternary paleosurfaces and beheaded and offset stream channels, the largest of which have been displaced by as much as 250 m. Field mapping north of Durbuk, near the town of Tangyar (34°15'N, 77°52'E), shows that the southern strand continues northwest and cuts across the landscape as a sinuous, continuous trace with shutter ridges, offset alluvial fan surfaces, and sag ponds developed along its length. In this region, the northern and southern strands are linked by a Quaternary, east-directed thrust fault that places high-grade metamorphic rocks over poorly consolidated Quaternary alluvium. The partitioning of dextral slip between two strands of the Karakoram system, rather than one strand, suggests that previous estimates of total Karakoram fault system slip rates in this sector of the Himalaya may be too low. Efforts to determine the slip rate on the newly recognized active strand and to better quantify total slip rates are underway. Determining these rates is essential for answering first-order questions about the evolution and behavior of the Karakoram fault system in this region, the late-stage exhumation kinematics of the Pangong Range, and regional seismic hazard potential.

Cite as: Bohon, W.M., Hodges, K.V., Arrowsmith, J.R. and Tripathy, A.K., 2010, A New Quaternary Strand of the Karakoram Fault System, Ladakh Himalayas, *in* Leech, M.L., and others, eds., Proceedings for the 25th Himalaya-Karakoram-Tibet Workshop: U.S. Geological Survey, Open-File Report 2010-1099, 1 p. [http://pubs.usgs.gov/of/2010/1099/bohon/].