

Glaciation in a tectonically active environment: Preliminary observations from the Inylchek and Sary-Dzaz Valleys, Kyrgyz Tian Shan

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The Tian Shan comprises a series of generally east-northeast trending mountain ranges and intermontane basins in Central Asia, formed in response to northward propagation of stresses associated with the India-Asia collision and focused between the Tarim Basin and the Kazakh Shield. These ranges are typically bounded by seismically active reverse or oblique-slip faults occupying reactivated zones of crustal weakness formed during prior deformational episodes. Neogene deformation distributed across the Tian Shan has resulted in some of the world's highest peaks outside the Himalaya, particularly in eastern Kyrgyzstan along the border with China and Kazakhstan. Major glaciers drain these peaks – one of the largest is the glacier that occupies the Inylchek Valley. This glacier is currently the focus of an intensive monitoring effort by Kyrgyz, German and Austrian groups to understand its mass balance in response to climate change, yet not much is known about its response to previous glaciations.

Much of the Inylchek Valley lies along the Atbashi-Inylchek fault (also known as the South Tian Shan Suture), a major left-oblique slip fault that forms the southern boundary of the Sary-Dzaz range. Recent thermochronologic work has shown this range to be uplifting rapidly since ca. 2-3 Ma. This portion of the Inylchek Valley is linear but transitions to a southward-trending releasing bend at its western end, forming what has been mapped as a pull-apart basin. This end of the Inylchek Valley contains a moraine complex that we sampled for surface exposure dating by ¹⁰Be and ²⁶Al in 2011. Results for both nuclides from two large boulders on this moraine indicate a preliminary age of approximately 20 ka (Lal/Stone scaling). The southern slope of the Sary-Dzaz range is characterized by a series of ridges and terraces spanning ca. 800 m in altitude from the present valley bottom, yet glaciers within the range and their associated deposits are restricted to the uppermost sections of the slope. In contrast, the northern slope of this range, draining to the Sary-Dzaz Valley, is characterized by less pronounced relief, yet it exhibits significantly more abundant and pronounced glacial features. Another major left-oblique-slip fault zone, the Nikolaev Line, is thought to intersect the Atbashi-Inylchek fault in the eastern sector of this valley. We are investigating the nature of the asymmetric glacial record on both the north and south faces of this range, with particular interest in the interactions of glaciation and tectonics in the area, and will present preliminary results of our 2012 field investigations.