Reconstructing spatial and temporal patterns of paleoglaciation along the Tian Shan

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Testing and calibrating global climate models require well-constrained information on past climates of key regions around the world. Particularly important are transitional regions that provide a sensitive record of past climate change. Central Asia is an extreme continental location with glaciers and rivers that respond sensitively to temporal variations in the dominance of several major climate systems. As an international team initiative, we are reconstructing the glacial history of the Kyrgyz and Chinese Tian Shan, based on mapping and dating of key localities along the range. Remote-sensing-based geomorphological mapping, building on previous maps produced by Kyrgyz, Russian, Chinese and German scholars, is being augmented with field observations of glacial geomorphology and the maximum distribution of erratics. We are using cosmogenic nuclide (CN) ^{10}Be dating of moraines and other landforms that constrain the former maximum extents of glaciers. Study sites include the Ala-Archa, Ak-Shyrak and Inylchek/Sary-Dzaz areas in Kyrgyzstan and the Urumqi valley (as well as its upland and southern slopes), and the Tumur and Bogeda peak areas in China. Comparing consistently dated glacial histories along and across the range will allow us to examine potential shifts in the dominance patterns of climate systems over time in Central Asia. We are also comparing ages based on CN with optically stimulated luminescence (OSL) and electron spin resonance (ESR) dates. The final stage of this project will use intermediate complexity glacier flow models to examine paleoclimatic implications of the observed spatial and temporal patterns of glacier changes across Central Asia and eastern Tibet, focused in particular on the last glacial cycle.