

# Spatial and Temporal Patterns of Past Mountain Glaciation in the Tian Shan, Central Asia

Jon Harbor<sup>1,2</sup>, Arjen P Stroeven<sup>2</sup>, Yingkui Li<sup>3</sup>, Nathaniel A Lifton<sup>1</sup>, Robin Blomdin<sup>1,2</sup>, Casey Robert Beel<sup>1</sup>, Marc W Caffee<sup>1</sup>, Yixin Chen<sup>4</sup>, Natacha Gribenski<sup>2</sup>, Clas Hättestrand<sup>2</sup>, Jakob Heyman<sup>2</sup>, Misha Ivanov<sup>7</sup>, Christine Kassab<sup>1</sup>, Yanan Li<sup>3</sup>, Gengnian Liu<sup>4</sup>, Dmitry Petrakov<sup>7</sup>, Irina Rogozhina<sup>5</sup>, Ryskul Usubaliev<sup>6</sup>, Mei Zhang<sup>4</sup>

1. Purdue University, West Lafayette, IN, United States
2. Stockholm University, Stockholm, Sweden
3. University of Tennessee, Knoxville, TN, United States
4. Peking University, Beijing, China
5. German Research Centre for Geosciences, Potsdam, Germany
6. CAIAG, Bishkek, Kyrgyzstan
7. Moscow State University, Moscow, Russian Federation

Reconstructing chronologies of past glaciation using consistent methods is critical for efforts to examine the timing and spatial patterns of past climate changes. Using remote sensing data for initial mapping of glacial landforms, combined with field investigations to refine the mapping and <sup>10</sup>Be surface exposure dating to constrain ages, we aim to improve understanding of spatial and temporal patterns of past glaciation along the length of the Tian Shan from Kyrgyzstan to China, including valleys with both southerly and northerly aspects. Building on past work by others, we have significantly expanded the range of sites for which data are available and the number of absolute ages to constrain the glacial chronology. This includes over 60 <sup>10</sup>Be surface exposure ages from two valleys with northern (source area of the Urumqi River) and southern aspects centered on the Central Tian Shan, and three sites in the western Tian Shan of Kyrgyzstan. The records of glaciation across the Tian Shan include preservation of fewer glaciations in northerly-trending than in southerly-trending valleys, evidence for glacial advance during MIS 2 throughout the mountain range, advances during MIS 6, 4 and 3 in some southerly-trending valleys, and a Holocene record in the central Tian Shan that is dominated by an extensive LIA advance. The LIA advance presumably destroyed evidence for other Holocene advances that were less extensive than that during the LIA advance. The disparity in records between northerly- and southerly-trending valleys could reflect a difference in the number of events as a result of the difference in aspect between north and south facing valleys, and/or differential preservation.