



Glacier flow velocities in the Bhutan Himalayas derived from repeat ASTER data and the SRTM DEM

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Repeat imagery of the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) onboard the TERRA satellite and a DEM from the Shuttle Radar Topography Mission (SRTM) were used to analyze present geometry, surface characteristics, surface velocities and retreat rates of glaciers on the northern and southern slope of the Bhutanese Himalaya main ridge. The study area consists of high elevation glaciers draining through the rough topography of the Bhutan Himalayas. It turned out that the north- and southbound glaciers show a striking asymmetry in many respects. The glacier tongues north of the Himalayan main ridge, which enter the Tibet plateau, show maximum surface velocities in the order of 100-200 m per year. In contrast, the ice within the glacier tongues south of the main ridge flows with a few tens of meters per year. Most glaciers flowing north have little debris coverage and terminate in moraine lakes at roughly 5,000 m asl. These findings have a number of implications, among others for glacier dynamics, glacier lake development, or glacial erosion. The study in particular helps to understand the potential processes of glacier response to climate change in the region.