



Mapping of clean and debris covered glaciers in western Himalaya using regional scale dataset

Pritha Chakravarti, Vikrant Jain, and Vimal Mishra

Indian Institute of Technology Gandhinagar, Gandhinagar, India (pritha.c@iitgn.ac.in)

Mapping of clean glacier is one of an important research problem in remote sensing studies. Previous studies have been mainly focused on single glacier / small scale data. However, these remote sensing approaches to map clean and debris covered glaciers at regional or basin scales are limited, which is a major hindrance to include glacial processes in basin scale hydrological analysis. Regional scale analysis offers major challenges because larger heterogeneity can cause misclassification of different classes in the glacierized terrain. A comprehensive methodology has been suggested for mapping of all components in a glacierized terrain in a medium to large scale area having hundreds of glaciers. The new methodology considers all relevant aspects namely relief, shadows, clouds, snow cover on the glaciers and supraglacial debris cover. In this study a method is built on spectral, thermal and geomorphic information to differentiate between snow, ice, and supraglacial debris. We propose that this study will help in understanding regional scale or basin scale variability in glacial processes, which will have direct application in hydrological studies. The study was carried in the North Western part of the Himalaya using cloud free scenes of Landsat 8-OLI (Operational Land Imager) sensor and TIR (Thermal Infrared) sensor scenes. Along with the spectral data, the 2000 Shuttle Radar Topography Mission (SRTM) digital elevation model (DEM) of 30m spatial resolution was used to extract elevation and slope information. Validation was done using the glacier polygons of GLIMS (Global Land Ice Measurements from Space). This approach is able to map glacier cover even though it is characterized by extensive supraglacial debris cover in a larger dataset. This study can be further extended to other areas for other regional or hydrological analysis.