



Orbital Monitoring of Afghanistan's Glaciers

P.E. Geissler, E. Lee and B. Molnia, U.S. Geological Survey.

Correspondence: pgeissler@usgs.gov

We have completed a preliminary inventory of the present day (2000-2006) distribution of glaciers and ice fields in Afghanistan, based on spectral mapping of visible and infrared images from the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) instrument on the Terra spacecraft. We selected 37 cloud-free summertime images from more than 3500 available and mapped snow, clean ice, debris-covered ice, lakes, vegetation, and rocks and soils using level-slice classification of multispectral images and band ratios. The class boundaries were optimized for each individual scene, guided by visual examination of the stereo coverage afforded by the backward-looking telescope on the ASTER VNIR subsystem. The resulting maps have a spatial resolution of 15 m/pixel. We next imported the maps into the ESRI ArcGIS software package for coanalysis with elevation, land use, and population density data.

The fundamental objective of this study is to provide an accurate picture of the current distribution of ice fields and glaciers in Afghanistan. We expect that the results will find numerous applications for water resource assessment, hazard mitigation, and long term planning purposes. Our next step will be to compare the modern distribution of glaciers to the historical record provided by LANDSAT data in order to monitor decadal variations in glacial ice extent. This comparison will help identify the areas where climate or weather changes have the greatest impact on water resources, human development, and potential hazards posed by the encroachment or recession of glacial ice.