



Analysis of Snow Cover in the Himalayan Region using remotely Sensed Data

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Abstract

Satellite remote sensing is an effective tool for monitoring snow covered area. However, complex terrain and heterogeneous land cover and the presence of clouds, impose challenges to snow cover mapping. This research analyzes snow cover and glaciers with a perspective of climate change in Himalayan Regions using remote sensing techniques. The remote sensing snow cover data from Moderate Resolution Imaging Spectroradiometer (MODIS) satellite from 2000 to 2008 have been used to analyze some climate change indicators. In particular, the variability in the maximum snow extent with elevations, its temporal variability (8-day, monthly, seasonal and annual), its variation trend and its relation with temperature have been analyzed. The snow products used in this study are the maximum snow extent and fractional snow covers, which come in 8-day temporal and 500m and 0.05 degree spatial resolutions respectively. The results showed a tremendous potential of the MODIS snow product for studying the spatial and temporal variability of snow as well as the study of climate change impact in large and inaccessible regions like the Himalayas. The snow area extent (SAE) (%) time series exhibits similar patterns during seven hydrological years, even though there are some deviations in the accumulation and melt periods. The analysis showed relatively well inverse relation between the daily mean temperature and SAE during the melting period. Some important trends of snow fall are also observed. In particular, the decreasing trend in January and increasing trend in late winter and early spring may be interpreted as a signal of a possible seasonal shift. However, it requires more years of data to verify this conclusion. Significant coverage of lake ice was found in lower elevation zone which is due to flat terrain in this zone.

Key Words: Climate change, Himalayas, MODIS, remote sensing, snow, lake ice.