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# Assessment of Glacial mass balance using ASTER data and comparison with in-situ measurements: Chota Shingri Glacier, India

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Mass balance of alpine glaciers is considered important indicator of climatic variability and change. Deglaciation because of climatic variability is considered a worldwide problem and is particularly significant in Indian Himalayas where the glacier and snow cover provides up to eighty percent of the dry season flow to the Indus-Ganges-Brahmaputra river system .In India, Chota Shingri glacier in Himachal Himalayas has been identified as benchmark glacier for long term monitoring of mass balance. Chota Shingri is influenced by Asian monsoon during summer and also by the westerlies in the winter and offers a complex accumulation/ablation regime. The aim of this study is assessment of mass balance related glaciological parameters of Chota Shingri using ASTER data and its comparison with the published results of in situ measurements carried out using stakes and snow pack observations. Three atmospherically corrected surface reflectance products of ASTER of end of ablation season period (2002, 2003 and 2004) were used in order to classify the glacier into zones of snow, firn and ice. An ASTER DEM product was used for topographic correction of the images. Results of two different methods of topographic correction have been compared. A combination of thermal mask and NDSI mask has been examined to delineate the glacier. The ASTER thermal band was found to be effective means to separate glacier and surroundings and also removing clouds. The hypsography of the glacier was calculated by incorporating the elevation information of DEM. Glacier borders were delineated

and the glacier surface was classified for assessment of snowline and AAR (accumulation area ratio). Models have been developed by relating AAR and annual mass balance and ELA and mass balance. The model results were compared to in situ net balance measurements of years 2002-2003 and 2003-2004. An attempt has also been made to relate the mass balance with glacial hypsography. A good fit between the mass balance measurements and accessed snow line and AAR was found. The results show that careful preprocessing would increase the value of the data. The results support the high potential of ASTER images for operational monitoring of alpine glaciers.