Geophysical Research Abstracts, Vol. 9, 09372, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-09372

Glacier area changes 1978 - 2002 in the central Southern Alps, New Zealand, from ASTER satellite data, field survey and existing inventory data

E.F. Gjermundsen (1), R. Mathieu (2), A. Kääb (1), J.O. Hagen (1), T. Chinn (3), B. Fitzharris (4)

(1) Department of Geosciences, University of Oslo, (2) School of Surveying, University of Otago, (3) Institute of Geological and Nuclear Sciences, Dunedin, (4) Department of Geography, University of Otago

In this study we compile glacier outlines over the central Southern Alps of New Zealand from an ASTER satellite scene of February 2002. Several automatic segmentation and classification methods are performed, namely band ratios, normalized difference snow index, and supervised classification, and their results compared to manual digitizing based on the satellite data, and to GPS-aided field mapping of some test glaciers. As already suggested by other authors, a band ratio of the near-infrared band 3 and the short-wave infrared band 4 of ASTER revealed the best results out of the automatic image analysis methods applied. However, not surprisingly the multispectral methods failed to map debris-covered parts of the glaciers sufficiently. It was therefore decided to base the further analysis of glacier changes on the manual digitizing.

The manually digitized glacier outlines of 2002 were compared to the 1978 glacier inventory which was based on nadir and oblique airphotos. In sum, our results suggest a reduction of glacier area in the study area of about 17 % between 1978 and 2002. This value is in good agreement with studies on glacier area changes in many other parts of the world. However, in contrast to some other studies, mainly the large glaciers have contributed to this loss in glaciated area. Surprisingly and despite the large climatic gradients from west to east, glaciers on both sides of the main divide of the central Southern Alps have in total lost similar percentages of area, except from Franz-Josef and Fox glaciers.