Geophysical Research Abstracts,
Vol. 10, EGU2008-A-08461, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-08461
EGU General Assembly 2008

Glacier volume changes 1871-1998 in Goldberggruppe (Hohe Tauern, Austria) extracted from historic contour maps and digital elevation models

B. Hynek(1), D. Binder(2), E. Brückl(2), R. Böhm(1), C. Kroisleitner(1), W. Schöner(1)

(1) Central Institute for Meteorology and Geodynamics (ZAMG), Vienna (b.hynek@zamg.ac.at), (2) Institute of Geodesy and Geophysics, Vienna Institute of Technology

Contour maps of the three main glaciers of Goldberggruppe in Hohe Tauern (Austria), Goldbergkees, Kleinfleisskees and Wurtenkees have been produced in a different quality several times in the late 19th century and during the 20th century. For example the map of Goldbergkees of 1909 was the result of the first terrestrial photogrammetic survey carried out for glaciological purposes.

Out of the historic contour maps and modern digital elevation models changes in glacier volume have been calculated using different geodetic methods. This study describes the different methods, the advantages and disadvantages of each method and the final results of the glacier volume changes in Goldberggruppe over the past century. As glacier bedrock was acquired by a ground penetrating radar survey (GPR) in 2003, the glacier volumes can be calculated in absolute values. Further we investigate how the volume changes correlate to accumulated mass balance data in the recent periods and how the information of the historic maps can be used as a validation for mass balance models.

The accuracy of the historic maps mainly depends on the scale and quality of the photographs, surface conditions on the glacier and the quality of the geodetic network. Some inaccuracies arise from map compilation, paper shrinkage and drafting. The accuracy of a map can easily be checked by comparing the contour lines of these

maps to modern high quality digital elevation models (DEM's) of the surrounding rock areas, which are assumed to be stable.

This assumption is not valid in case of debris covered marginal parts of the glacier or in case of debris covered dead ice, which can be detected with this method. Within the digitalization of the historic glacier maps it resulted therefore necessary to reinterpret the debris covered areas in the maps after comparison of one map to another and perform a kind of homogenisation of glacier areas before using the maps for calculations of volume changes.