Geophysical Research Abstracts,
Vol. 10, EGU2008-A-04151, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-04151
EGU General Assembly 2008

Modelling future glacier change south of the Alpine Main Ridge - an inventory based approach

H. Kerschner (1), Ch. Knoll (1), R. Dinale (2)

(1) Institut für Geographie, Universität Innsbruck, (2) Hydrographisches Amt der Autonomen Provinz Bozen - Südtirol (Hanns.Kerschner@uibk.ac.at)

The 1997 glacier inventory for South Tyrol (259 glaciers, 109 km^2) shows a general and pronounced loss of glacier area since 1983 (-26,9 km^2 or 20% from 1983). Estimated glacier volume dimished from 4400 Mio m^3 to 3500 m^3 (20%), which is equivalent to an annual thinning of about 0,5 m. The ELA in 1997 was above the highest peaks ($>$ 3893 m). Compared with a theoretical balanced average ELA glaciers are in a clear imbalance with present-day climate. Simple glacier-climate models are powerful tools for the calculation of glacier change (ELA, area) for future climate scenarios. They indicate that glaciers in an area which is typical for the southern Alps, glacier size will rapidly and nonlinearly decrease with rising summer temperatures, even if winter precipitation would increase. The rate of glacier change will be amplified, if a decrease in precipitation and accumulation, which is likely from a synoptic point of view, will take place. In the case of a vertical ELA shift of +300 m, which is equivalent to a summer temperature rise of 2,4 K, about 50% of the glacier area of South Tyrol will be lost. In the case of a rise of +400 m, 222 glaciers will disappear and only about 20% of the glacier area (37 glaciers) will be left. If a summer temperature rise is accompanied by a drastic reduction in winter precipitation, which is not unlikely under increasingly anticyclonic conditions south of the alpine main ridge, the ELA shift may be even more pronounced and may result in the disappearance of all but a few glaciers, which are confined to the highest areas. An ELA rise by 400 m will expose almost 90 km^2 of (potentially) unstable area to subaerial erosion and may rise the risk for mudflows and small-scale gravitative processes in the valley headwaters.