Geophysical Research Abstracts
Vol. 13, EGU2011-9741, 2011
EGU General Assembly 2011


# Multivariat statistical analyses of the south-tyrolean rockglacier inventory

Lorenzo Rieg (1), Erik Bollmann (1), Tobias Huber (1), Karl Krainer (2), Volkmar Mair (3), Rudolf Sailer (1,4), Maximilian Sproß (1), Johann Stötter (1,4)

(1) University of Innsbruck, Institute of Geography, Innsbruck, Austria (lorenzo.rieg@uibk.ac.at), (2) University of Innsbruck, Institute of Geology and Paleontology, Innsbruck, Austria, (3) Amt für Geologie und Baustoffprüfung, Autonome Provinz Bozen Südtirol, (4) alpS - Centre for Climate Change Adaption Technologies, Innsbruck, Austria

During the ProAlp project (mapping and monitoring of permafrost-phenomena in the Alps), a GIS-based rockglacier inventory of the territory of the Autonomous Province of Bolzano-South Tyrol has been created with the use of different methods. Geological maps and mapping based on orthoimages and stereo-orthoimages were used to detect rockglaciers, as well as mapping based on hillshades and digital surface models derived from airborne laserscanning. Active, inactive and fossil rockglaciers have been considered, the status of activity has been determined during field work and with the use of multitemporal remote sensing data such as the interpretation of differential SAR images.
The study area, which contained all terrain above 2000m a.s.l. in the Autonomous Province of Bolzano-South Tyrol has been divided into five sub-areas (Ortlergruppe und Unterengadiner Dolomiten, Ötztaler und Stubaier Alpen, Dolomiten, Zillertaler Alpen und Hohe Tauern and Sarntaler Alpen), in which the distribution patterns of rockglaciers and their lower limits have been analyzed in relation to activity, elevation and exposition.
The correlation between the lower limit of rockglaciers and the exposition has been further investigated, using a polynomial regression which showed good results ($R^2$=0.48), especially after the elimination of the outliers ($R^2$=0.82).
The results ($R^2$=0.34) which were achieved using a linear regression to explain the correlation between the vertical extension of the rockglaciers and the gradient of their flowline could also be improved noticeably by the elimination of the outliers ($R^2$=0.68).
The outliers have been investigated seperately, with special regard for limiting topographic factors that could restrain rockglacier movement, such as steep (steeper than 30°) terrain, or obstacles which could block the movement of a rockglacier, e.g. rock walls or valley floors. Most outliers could be explained using such limiting topographic factors.
Finally, averages of the lower limits of active rockglaciers were used to evaluate the lower boundary of permafrost in different areas and expositions and then set in relation with the averages of the lower limits of fossil rockglaciers. Thus, an estimation of the shift in elevation of the lower limit of permafrost and the necessary change in the mean annual air temperature can be given. The results of this estimation are in the same range as results of similar studies in other regions of the eastern Alps.