

**STUBACHER SONNBLICKKEES, HOHE RIFFEL & ALPINZENTRUM
RUDOFLSHÜTTE, AUSTRIA 1:5000**

(Three Image Line Maps)

J. Aschenbrenner and H. Slupetzky, Department of Geography, University of Salzburg

The Stubacher Sonnblick Glacier in the Hohe Tauern Range of the Austrian Alps was mapped in 1991 by J. Aschenbrenner under the glaciological supervision of H. Slupetzky. The main goal was to combine a conventional orthophoto-map with a conventional line map including all of the characteristics of a topographic map. The enclosed map of the Stubacher Sonnblick Glacier represents the preliminary version (“first generation”) of a new type of map (Aschenbrenner 1992).

The maps are based on aerial photographs specially flown on August 29, 1990 by the Austrian Army Remote Sensing Section. The orthophoto projection and geodetic modelling were carried out at the Institute of Photogrammetry and Remote Sensing at the Technical University of Vienna.

The main cartographic elements are depicted using the following colours:

black:	map-frame with coordinates (Austrian Gauss-Krüger System), survey-points, rock edges, names
grey:	orthophoto
sepia:	contour lines in bedrock with altitudes (modulated by the continuous tone photograph), debris (especially morainic ridges)
green:	vegetation
blue-green:	glacier lakes
ice-blue:	glacier orthophoto
cyan:	hydrography, contour lines on glaciers with altitudes (modulated by the continuous tone photograph), glacier routes
red:	trails with the numbering system of the Austrian Alpine Club

Considering some necessary improvements after the development of the innovative prototype map (“first generation”) of Stubacher Sonnblick Glacier two further generations of image line maps were established. First, the number of printing colours was reduced to seven by saving the blue-green for glacier lakes. The printing of the “third generation” revealed that it should be possible to reduce the number of printing colours to a total of six by using only one blue tone for all glaciological and hydrographic features.

Based on the experience gained during the development of the prototype map (“second generation”), technological changes were made. The black plate was lightened up in order to reduce the darkness in the shadow. Three features were additionally depicted by a free-hand line drawing. They were: crevasses, rock and debris. The modulation of con-

tour lines did only work sufficiently on the glacier areas, therefore it was not further used on terrain.

In the “third generation” (sheet Granatspitze, not enclosed) the black plate was reduced to the areas of rock by providing enhancement of the rock drawing. The reproduction of the orthophoto was completely done by digital picture processing. This improved third version of the Granatspitze map was printed in 1993 (Aschenbrenner and Slupetzky 1995). There are still some possibilities for improvements, especially concerning the quality and detail losses between the original air-photo and the processed orthophoto.

In terms of glaciological purposes, the new maps provide a necessary tool for the calculation of the mass balance of the Stubacher Sonnblick Glacier. Furthermore, they are the new basis for further glaciological calculations. The total area of the Stubacher Sonnblick Glacier was 1.772 km² in 1969 compared to 1.504 km² in 1990. The calculations on two other glaciers, the Ödenwinkel Glacier and Riffel Glacier revealed a similar picture. The area was reduced from 2.22 to 2.06 km², respectively 1.496 to 1.404 km². In summary, five sheets of that type of maps were printed (Aschenbrenner and Slupetzky 1994). The total area of 18 glaciers shown on the entire maps was 6.663 km² in 1990 compared to 7.585 km² in 1969. This means a 0.924 km² (or 12%) loss between 1969 and 1990.