

## VERNAGTFERNER 1889, AUSTRIA

(Reprinted historical map)

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In 1897 a comprehensive map edition was published on the survey of the Vernagtferner in the years 1888 and 1889 (Finsterwalder 1897, cf. also Blümcke and Hess 1897). The map "Der Vernagt Ferner im Jahre 1889" was annexed to that publication. Sebastian Finsterwalder - being the author - had already succeeded in making maps of glacier tongues of both the Gliederferner and the Gepatschferner (Austria) by tacheometric survey for the purpose of glacier research (see Fluctuations of Glaciers, Volume V, p. 77-78). However, only mapping of glacier tongues could be obtained by this procedure.

From these experiences of glacier mapping, Sebastian Finsterwalder and his collaborators realized the survey of the Vernagtferner by means of plane-table photogrammetry (intersection photogrammetry). At the end of the 19th century the plane-table photogrammetry was the best method for mapping mountain regions: large glacier areas with difficult access could be surveyed by photogrammetric procedures only.

In 1888 and 1889, two photogrammetric campaigns had to be carried out and very difficult conditions with regard to travel and fieldwork mastered (Finsterwalder, 1889). Great efforts had also to be spent on photogrammetric plotting, spanning a period of several years.

The result was the previously mentioned map "Der Vernagt Ferner im Jahre 1889", which was printed in four colours. This is the first precise map of an entire glacier at a large scale of 1:10,000.

This map gives a complete relief representation by contour lines (rock drawing included) with an interval of 10 m. It is a very impressive presentation of glacier surface topography and its ice-free periphery.

Careful investigations have proven the high accuracy of the map (Brunner 1988), i.e., an accuracy of  $\pm 0,4$  m in position of  $\pm 1,2$  m in altitude

for a photogrammetrically determined map point. Pillewizer (1989) gives evidence of the high contour accuracy by a visual comparison with the modern contour line map of 1969.

Because of the accuracy of the map "Der Vernagt Ferner im Jahre 1889" the requirements have been met - in comparison with later mappings of the Vernagtferner by stereophotogrammetric methods - for determining changes in thickness, area and volume (Brunner and Rentsch 1972, cf. also Fluctuations of Glaciers, Volume II, p. 233 and annexed maps).

The remarkable original map "Der Vernagt Ferner im Jahre 1889" is extremely difficult to obtain. For this reason, a facsimile reprint was produced which is included in the present volume.

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