

BRIEF COMMENTS ON THE MAP

The compilation of this glacier map, covering one of the valley glaciers in the central part of Jostedalheimen — an area of the highest mountains in South-Central Norway — was based upon vertical air photographs taken for this purpose on 26 September 1980 by Fjellanger Widerøe A/S (Sorte No. 8555). This special air photography was made at the end of an unusually long summer after a winter of little snow accumulation. Consequently, most of the glacier was uncovered from last winter's snow, but during the days just before the photography some new snow fell on the upper part of the glacier. This made it difficult to construct contour lines there.

The photography and the compilation of this map was made entirely to produce a glacier map, thus it was possible to emphasize glaciological features such as crevasses, surface drainage pattern, moulines, etc. The scale (1:10 000) and the contour interval (10 m on the glacier, 10 and 50 m elsewhere) were selected according to a recommendation made at the International Symposium on Glacier Mapping held in Ottawa, Canada, in 1965. The Universal Transverse Mercator Grid (The UTM net, Zone 32) is drawn on the map for each kilometre. Geographical coordinates are marked with reference to the Greenwich meridian. The local Norwegian coordinate system is also indicated by tick marks.

A number of triangulation points were used in the construction of this map. Some of them has been established by the Norwegian Geographical Survey (NGU). All these ground control points were used for the orientation of the stereo models in the Wild A 7 plotter.

Due to the fact that this glacier has been mapped several times before, both by terrestrial photogrammetry (1941), plane table mapping (1962) and aerial photogrammetry (1965), it has been possible to determine the variations in glacier thickness (or, more correctly, the surface elevation) along a longitudinal profile. The work was done by Liestøl already in 1929 (Høel & Werenkiöld, 1962 p. 130) when he published profiles based upon measurements performed in 1929, 1937, 1944, and 1948. By the additional information obtained from the present map and the maps from 1962 and 1968 he has continued this work, and the result is shown in the diagram below.

A comparison between the photogrammetric map from 1941 and the present map demonstrates a drastic change of the tongue and of the cirque glacier south of Hellstugubreen. It has been completely separated from the main glacier body — see the map near the upper right corner.

It is assumed that the plotting accuracy on this map is better than 0.2 m for single points in the horizontal direction and in the order of 0.5 m in the vertical direction on the lower part of the glacier, whereas — due to the new-fallen snow — it may be a vertical error up to 5 m on the uppermost part of the glacier. However, the existence of many crevasses and short distances to bedrock makes it probable that the contours on the larger part of the map area show the height with an accuracy which is better than 1–2 metres.

The location of the present map as well as the location of previously produced glacier maps are shown in the upper right corner.

The production of this map was a result of a team-work between Norsk Polarinstitutt and the Glaciology Section within the Norwegian Water Resources and Electricity Board (NVE).

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REFERENCES

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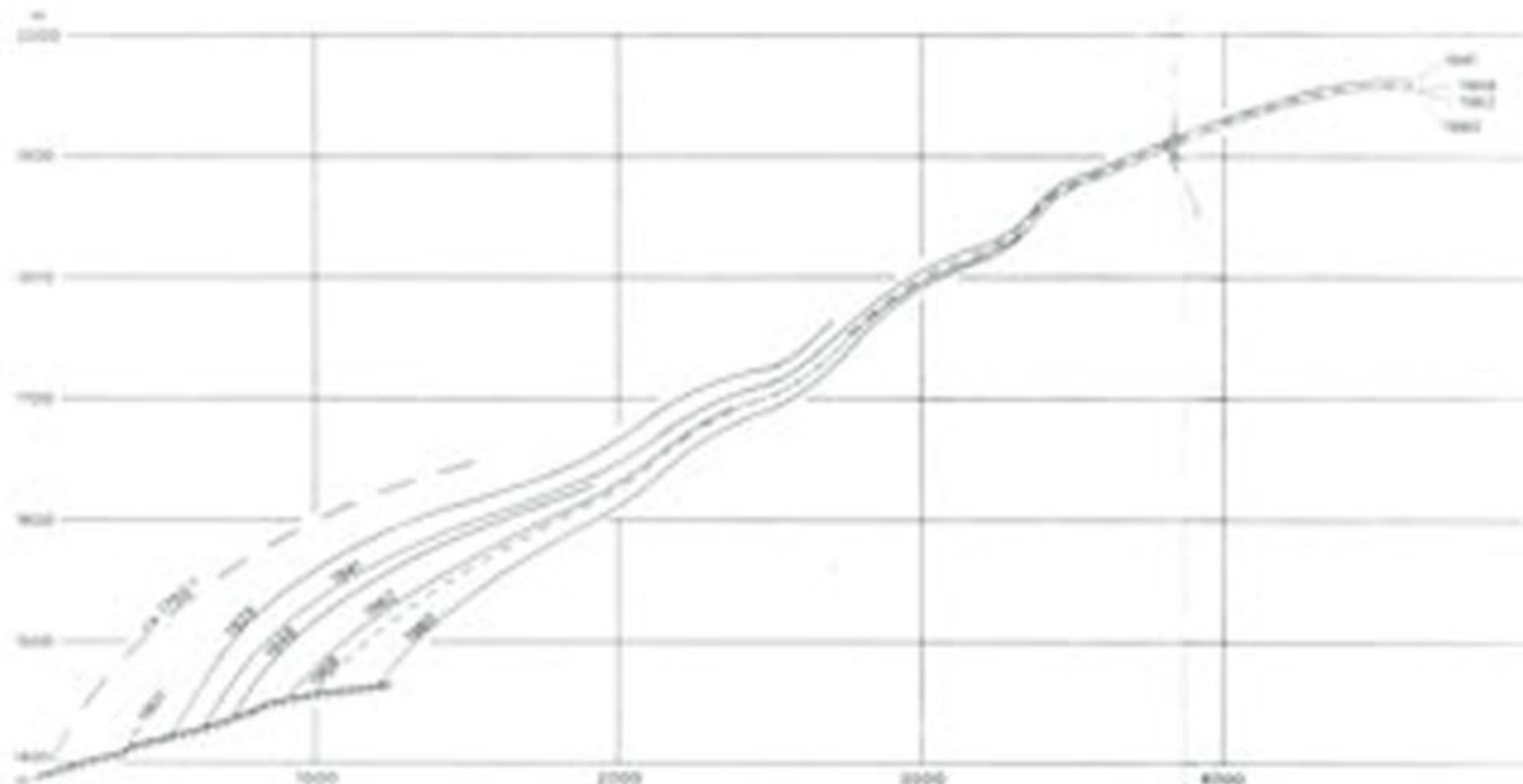
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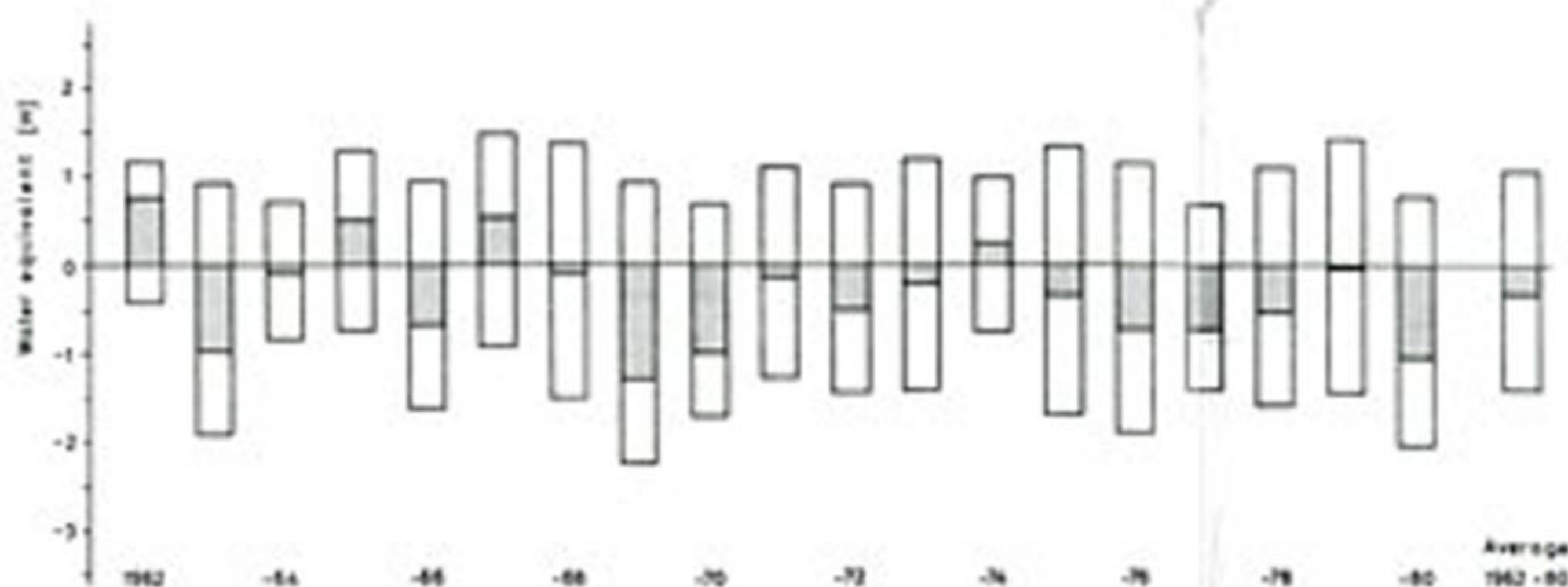


When Høel and Werenkiöld (1962) started a glaciological program in Jostedalheimen in 1927, a great number of glacier scenes were taken with photogrammetric cameras. Two of these pictures are reproduced here.



Longitudinal profile along the centreline of Hellstugubreen showing the height (in m a.s.l.) of the glacier surface at selected intervals. The maximum extent of this glacier occurred probably about 1750. This stage is reconstructed in the diagram from the outermost moraine ridges which are clearly visible in the valley. Note that the glacier increased in thickness on its upper part between 1962 and 1968.

HELLSTUGUBREEN, Norway Mass balance 1962-1980



Hellstugubreen has been selected as a representative for the Mid-Jostedalheimen glaciers on an East-West profile, running from the continental Gråsbreen, via Jostedalbreen to the extreme maritime Ålptubreen. These glaciers are included in a long-term mass balance observation program. The general trend of negative glacier mass balance since 1960 was broken in the beginning of the 1960-ies, when strongly negative years were exchanged by less negative or even positive balance years, particularly at the westernmost glaciers in the profile. Hellstugubreen has experienced a total net loss of about 7 m water equivalent during the period 1962–1980.

The upper picture was taken on 26 August 1929 by A. Koller, the next picture was taken on 12 September 1942 by W. Schöberl. The air photographs were taken by Norsk Polarinstitutt, in August 1955 by B. Lunche. Only four vertical air photographs are available from 1980, taken by Fjellanger Widerøe A/S, Oslo, on 26 September.