Point 5b – Waldemarbreen *78° 40' 30" N 11° 59' 28" E*

Summer balance of Waldemarbreen

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Waldemarbreen is located in the northern part of the Oscar II Land, Kaffiøyra, north-western Spitsbergen. Waldemarbreen is about 3.5 km long and has an area of 2.6 km^2. The ice originates in one cirque and flows from an elevation of more than 500 m to the present terminus at 130 m a.s.l..

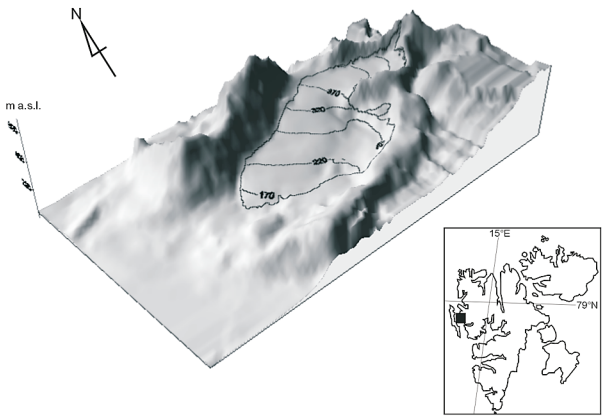

Fig. 1. Topographical draft of Waldemarbreen

The measurements of surface ablation of Waldemarbreen were made every 5 days from July to September each year for the period 1996–2006. The measurements were taken at 22 points of glacier. This is a large number if compared to the area of glacier. Such a dense network of the poles enabled us to estimate precisely the value of ablation at a given altitude, as well as the influence of the local conditions on its size. All the ablation poles were drilled 10 m deep with a steam driven Heucke Ice Drill . Snow, firn and ice ablation were converted into water equivalent (w.e.). The ice density of 0.9 g cm^{-3} was used to convert ablation thickness to water equivalent. Where snow was found on glacier the appropriate snow density was applied to the computations.

Time changeability of ablation processes of Waldemarbreen at various latitudes was significantly diverse. With the growing altitude the fluctuations decrease. There is a large difference in the ablation

Fig. 2. Waldemarbreen during summer time (photo I. Sobota)

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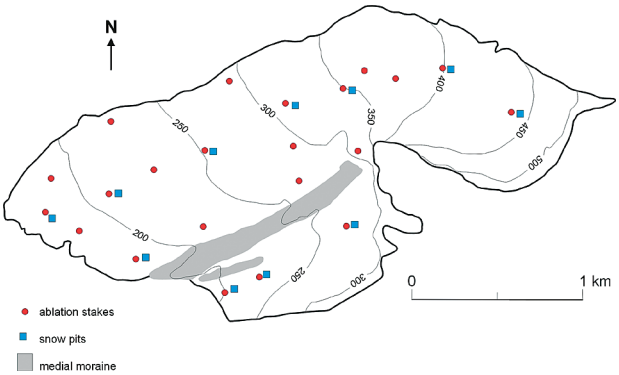

Fig. 3. Map of ablation stakes and snow pits on Waldemarbreen

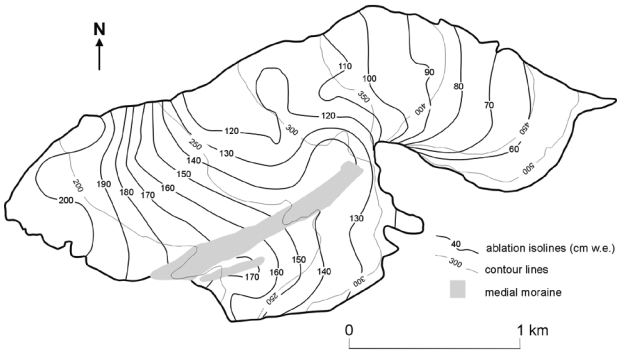

Fig. 4. Map of ablation of Waldemarbreen in 2006

intensity between the ablation part of the glacier and its accumulation part. This is mainly connected with the diverse weather conditions in these parts of the glacier. As far as Waldemarbreen is concerned, the highest ablation level throughout the studied period was found at the altitude of up to 250 m a.s.l. Above that level ablation decreases.

Spatial diversity of the ablation processes of Waldemarbreen was large. It was mainly caused by weather conditions in the individual parts of the glacier, as well as by the relief. Waldemarbreen is strongly inclined not only in its frontal part but also towards the medial moraine. Such a situation means a larger area of the glacier has southern exposition; additionally, the system of supraglacial streams develops and the amount of the moraine material on the glacier's surface increases. As a result, ablation processes in this part of glacier intensify.

The most negative mean summer balance of the glacier was –120 cm w.e. in 1998 and –130 cm w.e. in 2006, while the least negative was –63 cm w.e. in 2000. The average ablation of Waldemarbreen amounted to –104 cm w.e. for the period of 1996–2006. In the years 1996–2006 the cumulated total ablation of Waldemarbreen was about –1148 cm w.e.