Point 5 – Push moraine of the Scott Glacier *77° 33' 36" N, 14° 26' 11" E*

Recession and development of marginal zone of the Scott Glacier

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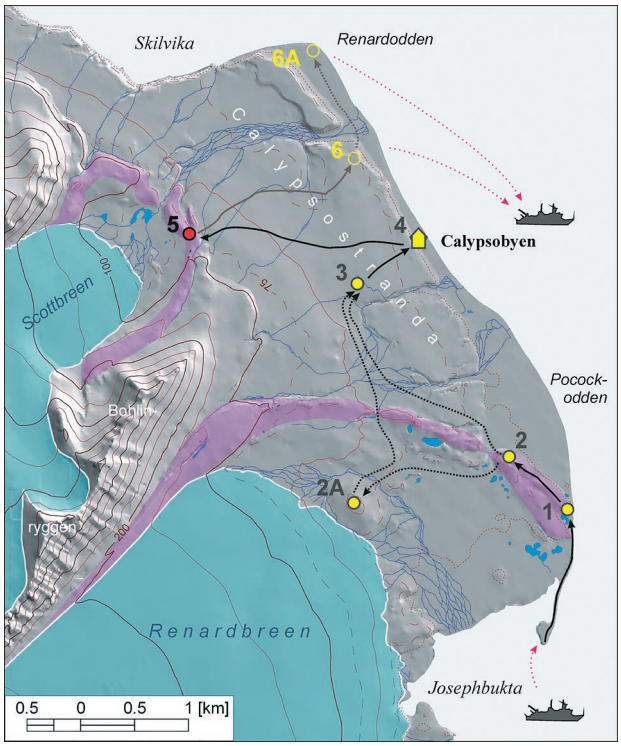

The Scott Glacier filled the valley of NW-SE direction at the lower part and higher – meridional one. From East the Scott Glacier is limited by Bohlinryggen range while from West – Wijkanderberget (Fig. 18). From Southwest, in the zone of low passes it connects with the Blomli Glacier, which fills the upper part of the Blomli Valley. The mouth of the valley of the Scott Glacier closes a few meters' push moraine ridge (ice-cored moraine ridges) cut by the gorge made by outflow of proglacial water. In axial parts its length was about 3.5 km and the wideness at the lower part exceeded 1 km when in the zone of firnfield reached about 1.5 km (Fig. 7).

The Scott Glacier in 2006 included the area of 4.7 km^2, but the largest area was at the end of XIX century (decline of Little Ice Age), and the episode of the surge is dated on 1880 (Liestøl 1993). Within the reach of it was probably all present inside part of the forefield to push moraines, and its area could have been over 6 km^2 (Zagórski, Bartoszewski 2004) (Fig. 19, 20). Since the Little Ice Age till 1936 the average for the whole length of the glacier front the distance of recession was 57 m – maximum 148 m. For the period of 1936–1960 the speed of recession was 1.8 m a^{-1}, as the mean recession – 44 m (maximum 120m – 5 m a^{-1}).

For the period 1960–1987 the mean recession of the glacier front on its whole distance was 162 m, (6–7 m a^{-1}), maximum 400 m (15 m a^{-1}). Those data can be incompleted because according to some archival data (the photo taken in 1963 and published in the book by J.Landvik et el. 1992, page 337), the Scott Glacier was just after the stage of advance (surge type). So in fact since 1960s we can talk about the beginning of the fast recession of the Scott Glacier and revealing inside part of the forefield. The following period 1987–1990 was characterised by the acceleration of the recession for the whole length up to 28 m, what corresponds to 9.3 m a^{-1} (maximum 68 m, 23 m a^{-1}). Since the end of XIX century till 1990 the surface of the Scott Glacier was reduced by 13% of the primary area (Zagórski, Bartoszewski, 2004).

Systematic studies and measurements of the Scott Glacier are conducted since 2000 and show that its front during the period of 1990–2006 moved back on

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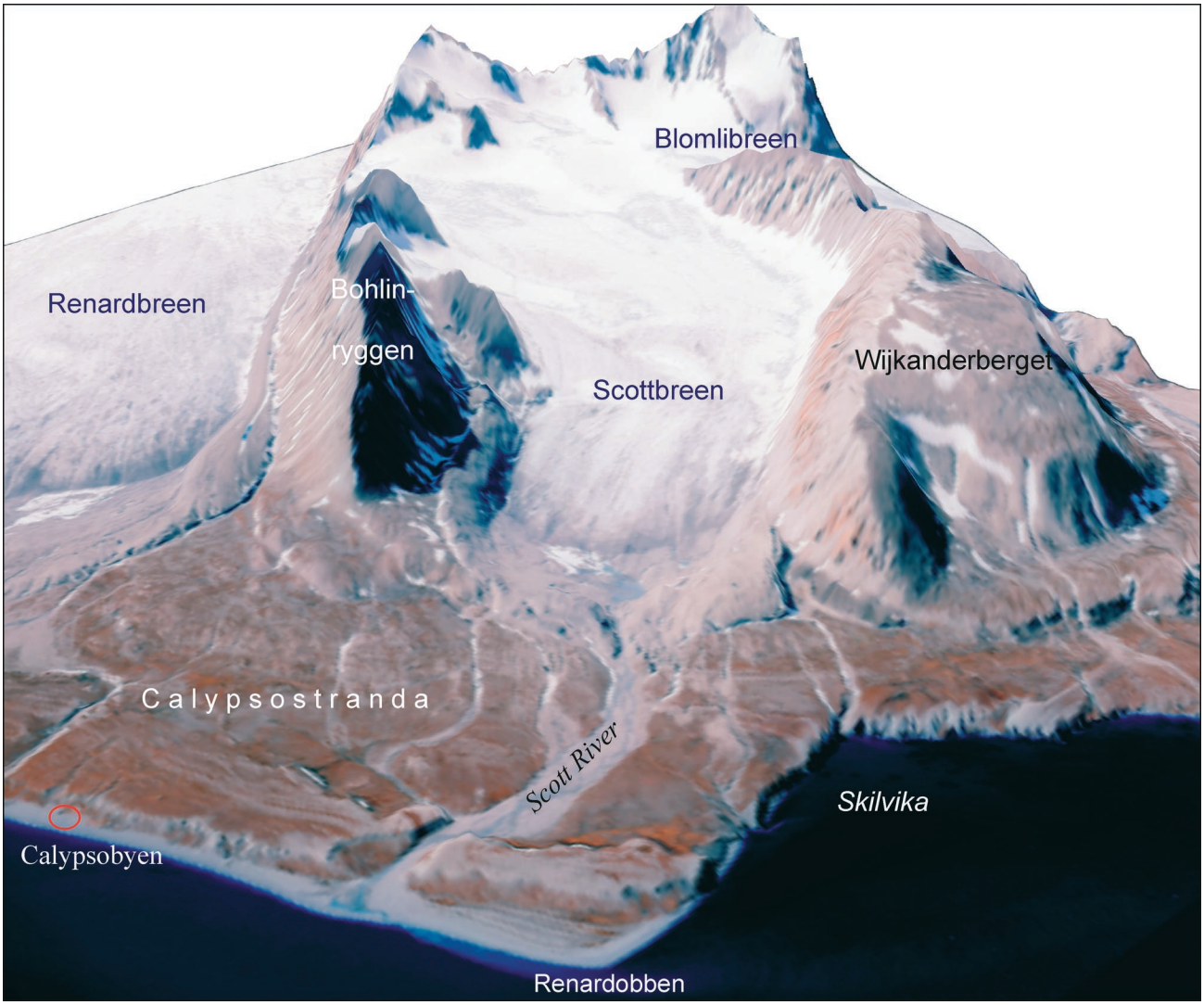

Fig. 18. Spatial model of the Scott Glacier and Calypsostranda made on the basis of combined the digital model of the terrain with aerial photo from 1990' (Zagórski 2002)

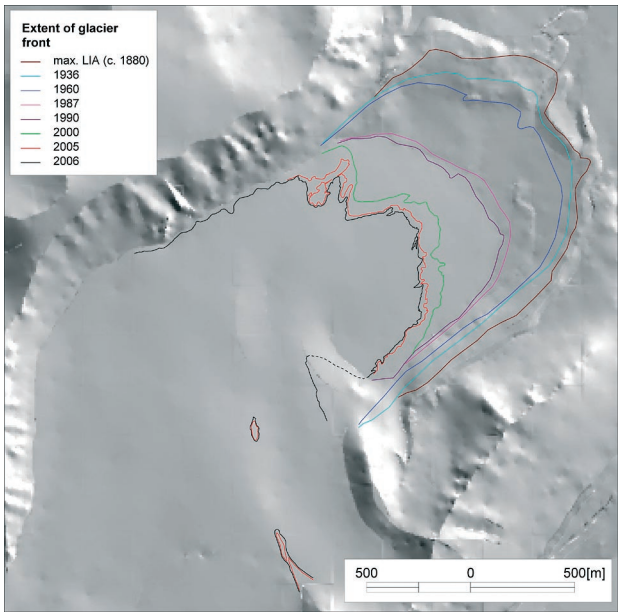

Fig. 19. The extent of the Scott Glacier fronts combined on the basis of archival data and GPS measurements (Szczęsny et al. 1989, Merta et al. 1990, Zagórski, Bartoszewski 2004, Zagórski 2005)

average 230 m on its whole distance, while the maximum was 440 m (28 m a^{-1}). The last measure period is marked especially clearly when the mean speed of recession of the glacier front reached 21 m, and maximum even 140 m. The main reason for quick decrease of the thickness of the glacier ice is the relief of the bedrock with the zone of rocky steps at the bottom of the Wijkanderberget (Fig. 19, 20).

The relief of the forefield of the Scott Glacier is much less diverse than the forefield of the Renard Glacier. The dominant element is frontal moraine ridge (Fig. 18, 21). The material of the moraine is on the bedrock of former denudation-structure layers of roche moutonnée character. The ridge of the lateral moraine accompanying the glacier tongue from southeast rises 60 m above the surface of the glacier.

The frontal moraine, but especially the lateral one deposited along the slopes of Bohlinryggen are compound forms came into being in two different phases

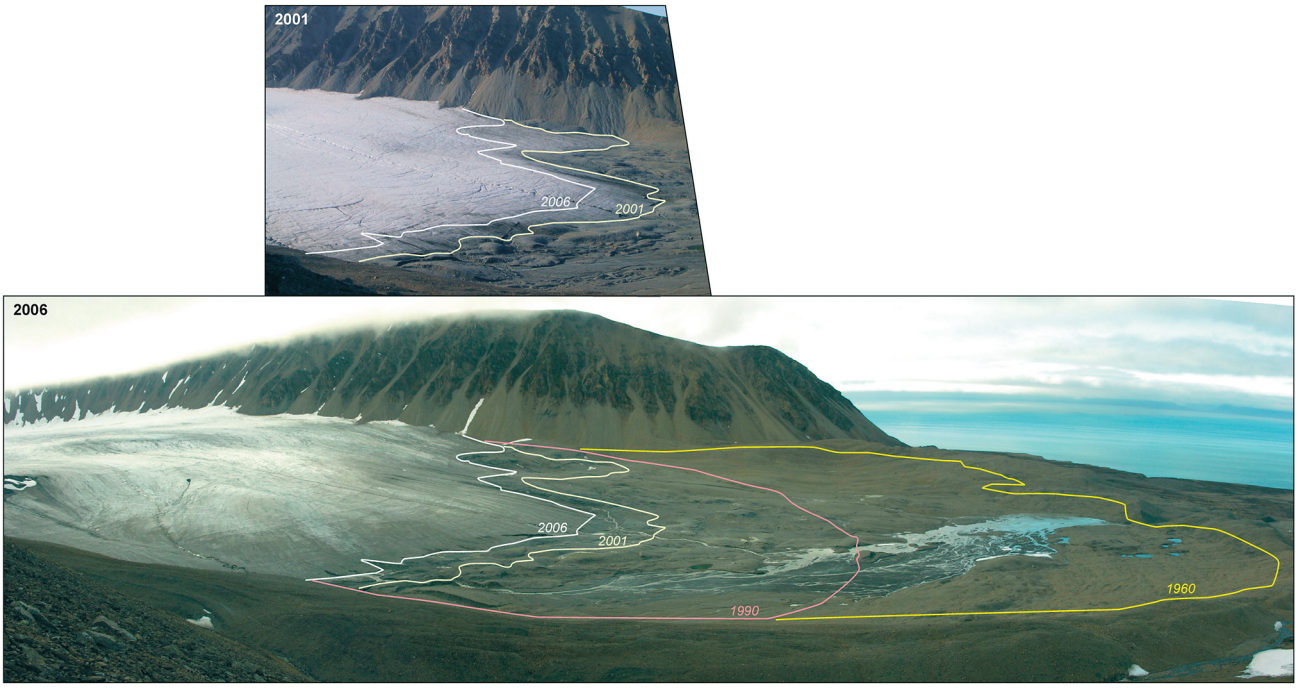

Fig. 20. The forefield of the Scott Glacier. The view from Bohlinryggen (photo Stefan Bartoszewski 2001, Piotr Zagórski 2006)

of the glacier transgression. The young ice-moraine sediments, partially pushed, were accumulated during the fast advance of the glacier onto its forefield in XIX century. They cover here a bit older moraine series, which probably arose during the advance of the Scott Glacier in the earlier phase of the Little Ice Age (Fig. 20). The frontal moraine from inside gradually and softly came onto the ground moraine with the traces of flow in the direction of the only active gorge. The more distinct element of the relief here is only the course of little hills that marks one of stages of the glacier recession (Fig. 21).

The internal marginal zone looks like a hollow: south-east part of the area is lower and a lot of it is flooded with water, north-east part is some meters higher from about the line of the gorge (Fig. 21, 22). This zone is made of mainly ground moraine, locally distinctly fluted. Some active riverbeds of the 2–4 m

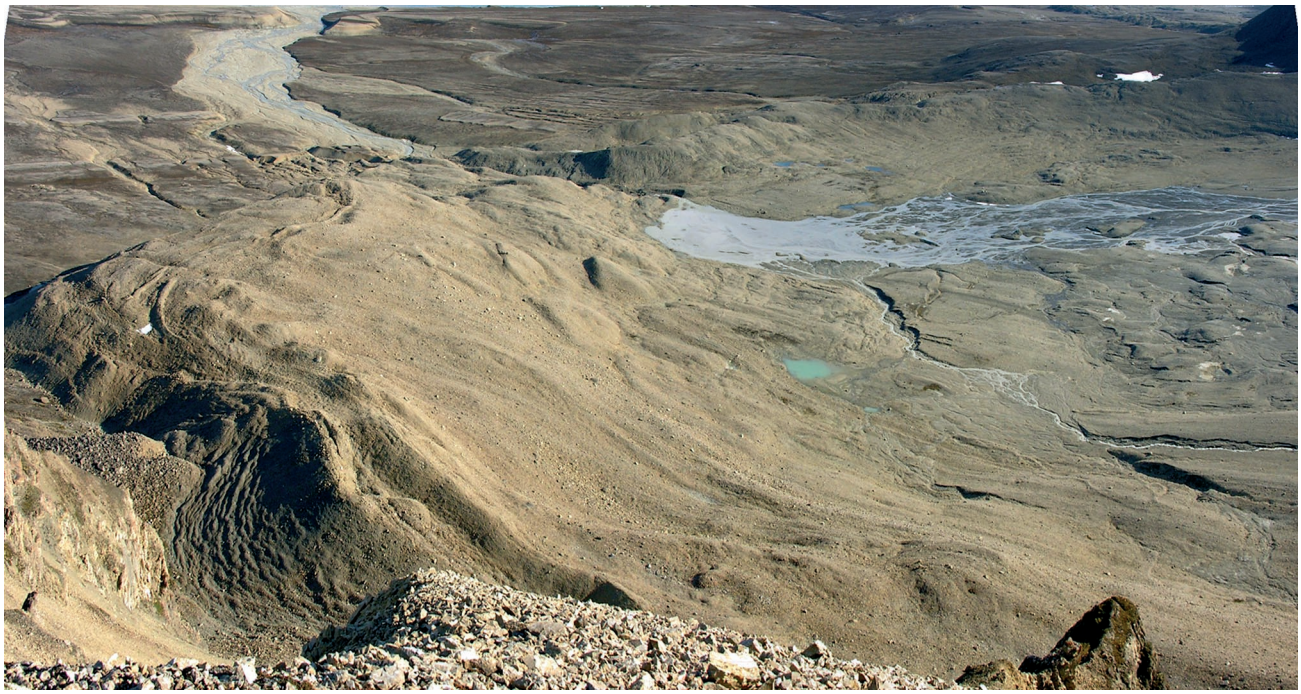

Fig. 21. The forefield of the Scott Glacier – the view from Wijkanderberget. Varied zone of the push moraine and the area of contemporary forming inner sandur (photo Piotr Zagórski 2006)

Fig. 22. The marginal zone of the Scott Glacier (photo Piotr Zagórski 2006)

depth cut it. The grooves of fluted moraine in this region are of different character than those observed on the forefield of the Renard Glacier. They are much bigger, and the height of single ridges reaches 50–60 cm. The orientation of the grooves follows the axis of the valley and the main direction of the glacier recession. The orientation, material layout and size can show that in that forefield Renard Glacier region they came into being as the result of filling former supraglacial troughs with material from ablation moraine. The depressions on the surface of the moraine are filled with stagnating water, which is the result of melt out phase. Sometimes the thin layer of silt is accumulated. The other fragments of moraine do not have signs of washout.

In the central part of the forefield, in the axial part of the valley the floodwaters exist where fine-grained material is sedimented. In the zone between frontal moraine and the glacier the typical sandur has not been developed yet (Fig. 20, 21). This is rather the zone of cut and washout of the ground moraine and sand little cons.

At the final part of the glacier tongue some ridges were observed. They are large and accumulative, similar to kame, made of fluvioglacial material and deposited on ice that melts out slowly. They are transverse to the axis and movement of the glacier. Their height is from some centimetres to about 2 m. They are built with fine-grained, irregular stratified material originated from the washout of the ablation moraine. They have significant asymmetric structure: proximal slope is a very gentle continuation of the slope, the distal slope is steep and falls at the angle of 30°–45° into the direction of the inside sandur. The similar set of forms of similar topographic layout due to glacier front is observed on the distance of some tens of metres on the northwest from the present edge of ice. Their origin should be connected with some phenomena that are noticed only sporadically. It is probable they are of extreme character as the result of unusually dynamic and efficient morphologically water flow on the surface of the glacier. It accompanies the beginning stage of ablation during Spring and early Summer. The steep distal slope could arise as the result of damming the outside part of the ridge against the thick cover of naledi or thick cover of snow on the glacier forefield.

As it was marked earlier the main outflow from the glacier takes place from the SE side. Between the glacier and the lateral moraine the kame terrace was made. In the middle part of the forefield, there is a large sandur fan located aslant to the glacier front and only periodically active. The flowing river in the edge zone of the cone cut into the moraine sediments and now the cone rises 40–50 cm higher than the level of the ground moraine.