Point 1 – The frontal moraine of the Renard Glacier *77° 32' 22" N, 14° 34' 06" E*

The role of the Renard Glacier in forming of shore zone

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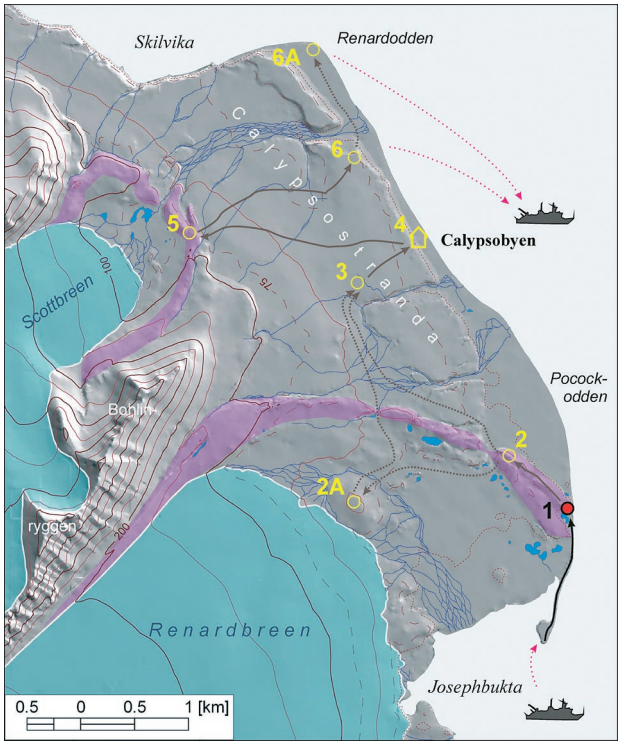

The coast of NW part of the Wedel Jarlsberg Land is exposed to various morphogenetical factors. One of the most important can be numbered among glaciers that can influence directly (destruction and transform of existing forms of relief, accumulation of moraine covers) and indirectly (with the cooperation of different factors: tectonic, fluvial, marine).

The present relief shown at point 1 was shaped fundamentally at the end of XIX and at the beginning of XX century, but the ridge of frontal moraine is built of some moraine layers of different age, that show the advance of glacier of the surge type during Holocene (Pękala, Repelewska-Pękalowa 1990, Reder 1996) (Fig. 2). The direct influence of the Renard Glacier, correlated with the advance during the Little Ice Age, caused for example redeposition of sediments and fossil flora which was dated on 660 ± 80, 1 040 ± 80 and 1 130 ± 80 BP with ^{14}C method (Dzierżek et al. 1990) (Fig. 2). Those layers are disturbed glaciotectonically and contain some fragments of woollen fabric, whalebone, animal's bones and wood – archaeological site Renardbreen 1 (Krawczyk, Reder 1989, Jasinski, Starkov 1993, Jasinski 1994). Furthermore, under the moraine, there were found some fragments of buildings from XVI century, which constitution remained intact by glacier, they were 20 cm under present sea level (Fig. 3, 4, 5). This site was studied in 1986–1993 and it is the only one in Spitsbergen where the leftovers of whale fishing buildings were covered with till. It allows us to date the activity of glaciers and changes of sea level at historical time. The terrace I was also aggradated, and the marine materials of fossil storm ridge were dated on 6.2 ± 0.9 ka BP with TL method (Pękala, Repelewska-Pękalowa 1990) (Fig. 2).

The decisive role in forming of a section of accumulative shore located on the south of abrasively cut frontal moraine of the Renard Glacier plays longshore currents (Fig. 6). At the region of the Pocockodden, there are distinguished two longshore currents; one flows northwest and the other south (Harasimiuk, Jezierski 1988, 1991). The other one is supplied with the material from conversion of sandur fans and influences the origin and remodelling of the spit developing in the shade of shore ledge – moraine ridge of the Renard Glacier (Fig. 6). Its development was also enabled in the presence of glacial sediments of marginal zone of the Renard Glacier at that part of the shore. The shape and geometry of widen, final

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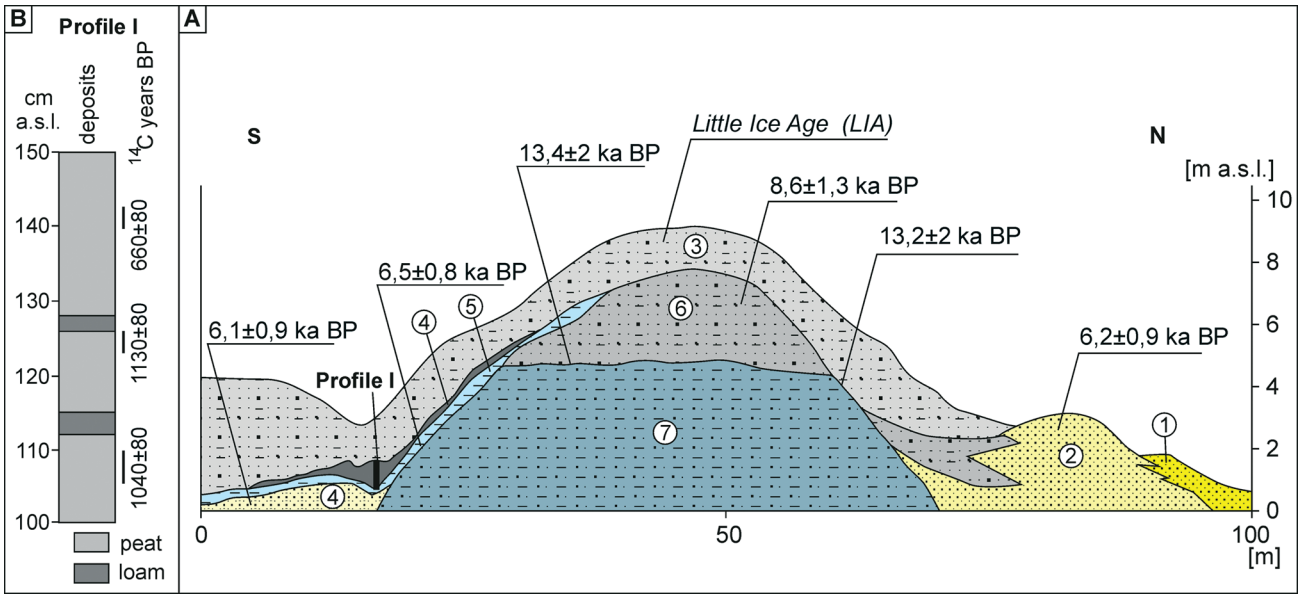

Fig. 2. The geological structure of frontal moraine of the Renard Glacier (Pękala, Repelewska-Pękalowa 1990)
A: 1 – present storm ridge 2 – fossil storm ridge, 3 – glacial till (Little Ice Age), 4 – pushed occupation level of whale settlement with fossil flora (profile 1), 5 – clay, 6 – glacial till, 7 – glacio-marine sediments; B – profile of organic sediments of the Renardbreen site (Dzierżek et al. 1990).

Fig. 3. Archaeological works at Renardbreen site 1. (photo Kazimierz Pękala, 1991)

Fig. 4. The occupation layer still visible in the northern margin of the trench (photo Kazimierz Pękala, 1991)

part of spit was and is still changing quickly. It is supported by the analysis of available cartographical materials and GPS measurements (Zagórski 2007) (Fig. 6).

Indirect role of the Renard Glacier in remodelling the shore with the help of fluvial and marine processes has been appeared fully in the section between Pocockodden and ridges of the frontal moraine of the Renard Glacier (Fig. 6). At the time of maximum range of the Renard Glacier at the Little Ice Age, the glacier waters caused the origin of gorge in the mouth where plain fluvioglacial sandur fans were developed that aggradated terrace I. Thanks to that, slightly slanting area of semi-circular outline was arisen. It is closed in the shore zone by the storm ridge. The origin of such a form shows clearly considerable advantage of fluvioglacial accumulation over the possibilities of spreading the material by waving and longshore current. Broad surfaces of fluvioglacial cones, after the recession of the Renard Glacier from the push moraine lines, became the fossil forms. Disappearance of delivery of the terrestrial material caused the increase of activity of marine processes that as an effect made gravel ridge that brought to a stop the destruction of the cone.

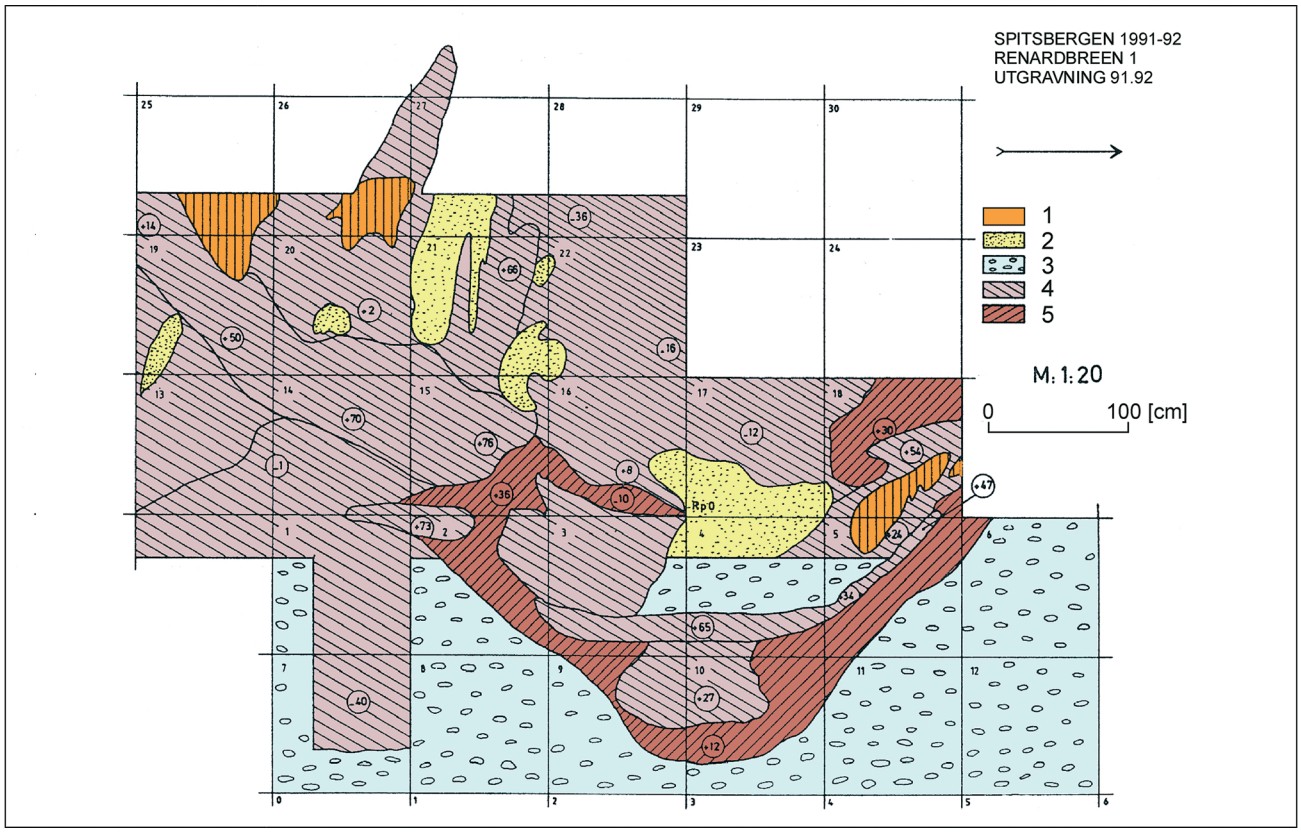

Fig. 5. The archaeological site Renardbreen 1. Excavations 1991–1992
1 – marine sediments, 2 – sand, 3 – marine gravel, 4 – brown/black occupation layer, 5 – the wall-like construction (after Jasinski, Starkov 1993)

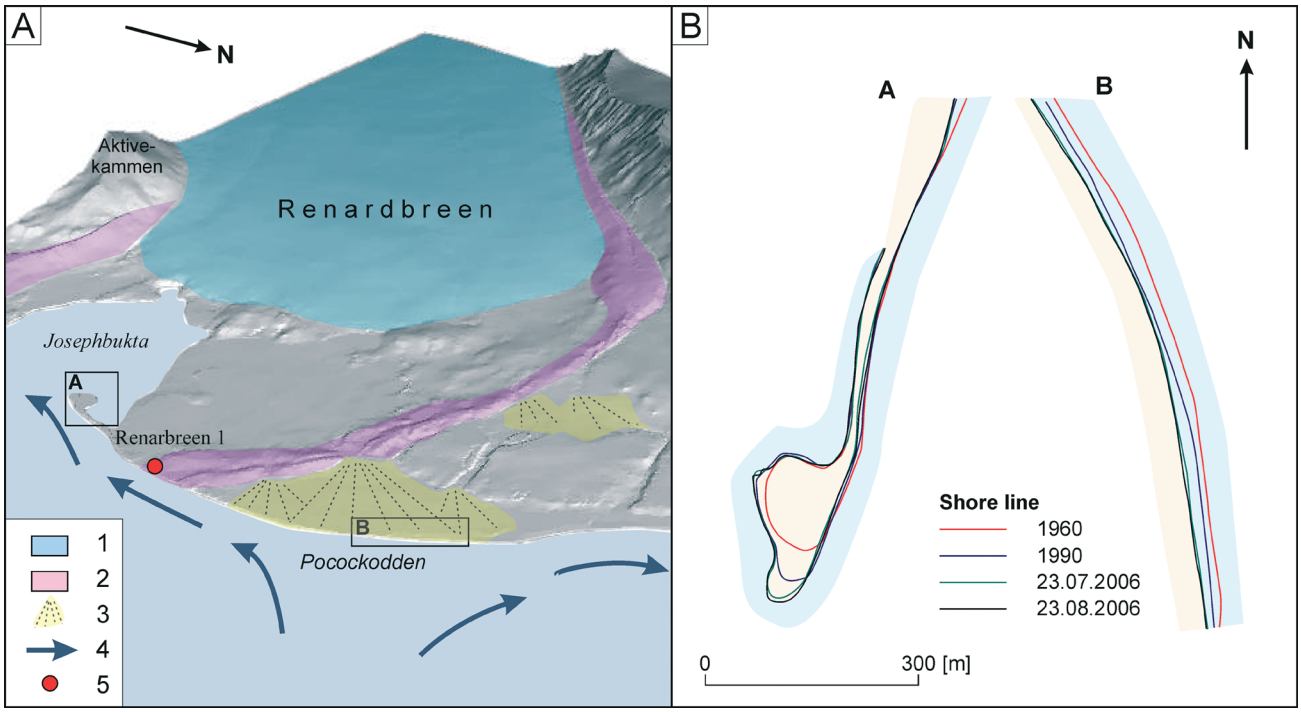

Fig. 6. A – Main factors that influence the shape of the shore in the section from Pocockodden to Josephbukta
1 – glacier surface, from 1990, 2 – frontal moraine ridge, 3 – extramarginal sandur fans, 4 – directions of the longshore currents (after Harasimiuk, Jezierski 1988, 1991), 5 – location of archaeological site Renardbreen 1. B – Changes of geometry of the shoreline made on the basis of analysis of cartographical materials and GPS measurement (Zagórski 2007).