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Quaternary landforms and sediments, and morphogenetic evolution of Treskelen-Hyrnefjellet-Kruseryggen area, Wedel Jarlsberg Land, Spitsbergen

ABSTRACT: Field mapping and analysis of air photos enabled to prepare a photogeological map of Treskelen-Hyrnefjellet-Kruseryggen area in scale of 1:10,000. Slope, glacial and nival landforms and sediments, and ten raised marine beaches were distinguished. Morphogenetic evolution of the area is also presented, with discussion of probable glacier advances and land uplift during the Late Pleistocene and the Holocene.

Key words: Arctic, Spitsbergen, Quaternary, photogeological mapping.

Introduction

The paper presents innermost non-glaciated area of Hornsund in Wedel Jarlsberg Land of South Spitsbergen. Three-and-half kilometer long Treskelen Peninsula (Treskelodden) is the outstanding feature as it closes the glacier bay (Brepollen) in the east, making the fiord to be narrowed to one-third of its ordinary width (Fig. 1). Besides the peninsula, the described area embraces also mountain massifs of Hyrnefjellet, Marietoppen, Urnetoppen, Condevintoppen and Kruseryggen, glaciers: Hyrne (Hyrnebreen), Lorch (Lorchbreen), southern part of Wibe (Wibebreen) and two small nameless cirque glacierets on western slopes of Urnetoppen and Kruseryggen. Finally, it also comprises seashores of Adriabukta and Treskelbukta, and the eastern seashore of Burgerbukta.

The Treskelen Peninsula has focused so far a great interest, either in geology and geomorphology, or morphogenetic evolution and Quaternary chronostratigraphy (Heintz 1953; Birkenmajer 1958, 1959, 1960, 1964a, b, 1977, 1978, 1984, 1987; Grossvald *et al.* 1967; Jahn 1959; Karczewski, Kostrzewski

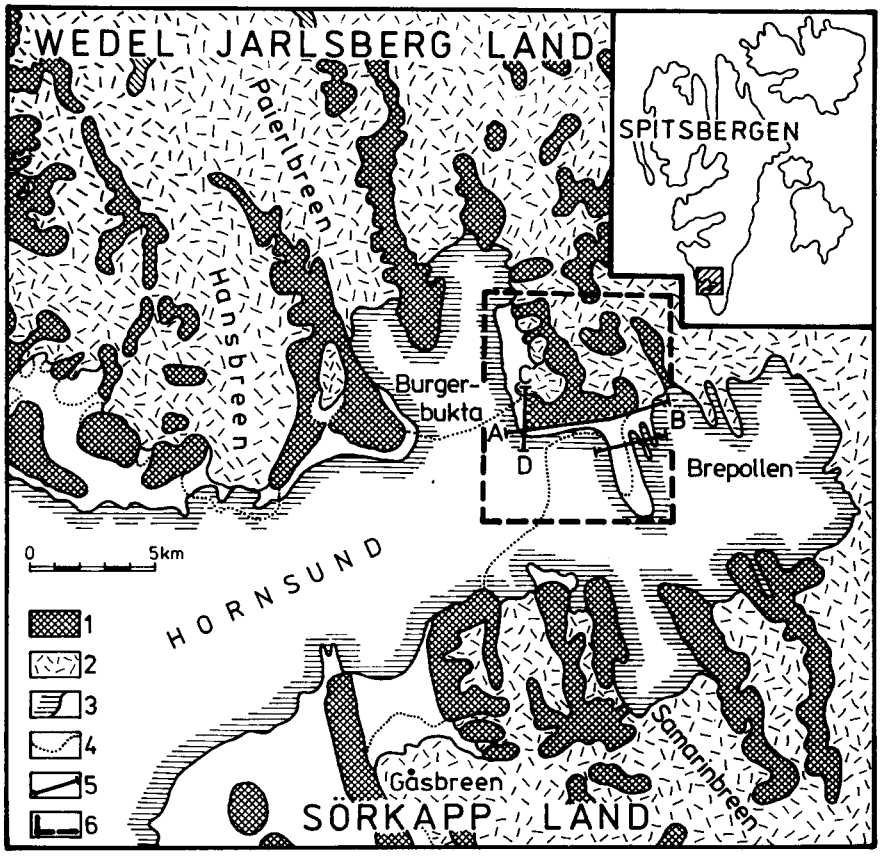

Fig. 1. Location sketch of studied area; 1 — mountains, 2 — glaciers, 3 — shoreline, 4 — maximum glacial extent during the Little Ice Age, 5 — schematic geologic sections (*cf.* Figs. 2 and 3), 6 — borders of the photogeological map of Treskelen-Hyrnefjellet-Kruseryggen area (*cf.* Szczęsny, Lindner and Marks 1989)

and Marks 1981b; Marks 1981, 1983; Marks and Pękala 1986). There exists a good record of glacier extents in this area since 1899 (Vasiliev 1925; Pillewizer 1939; Heintz 1953), supplemented with geomorphologic or geologic sketches of more recent times (Birkenmajer 1964b; Marks 1981, 1983; Karczewski *et al.* 1984). Some attention has been also paid to debris slope accumulations and rock glaciers of this area (Karczewski, Kostrzewski and Marks 1981a; Lindner and Marks 1985).

Analysis of Norwegian air photos of 1961 and 1970, as well as field investigations in summer 1979 during the scientific expedition organized by the Institute of Geophysics, Polish Academy of Sciences, enabled to prepare a photogeological map of the area in question (App.). The map is in scale of 1:10,000 while methods are presented elsewhere (Lindner *et al.* 1985).

Outline of pre-Quaternary geology

Pre-Quaternary rocks of the described area were presented by Birkenmajer (1964a, 1977, 1978, 1984) and Flood, Nagy and Winsnes (1971). The oldest, strongly upthrusted Eocambrian sandstones of the Gåshamna Series (Hecla Hoek Formation) outcrop together with dolomites of the lowermost Lower Cambrian at Hyrneodden. They contact in the east with Devonian limestones and conglomerates which pass in turn into westwards dipping, folded and faulted limestones, shales, sandstones and conglomerates of Devonian-Triassic age that constitute mountain massifs of Marietoppen, Urnetoppen and Kruseryggen.

The Treskelen Peninsula is composed of steeply dipping Upper Carboniferous to Upper Triassic sandstones, conglomerates, limestones and shales. Strike of these beds is consistent with longitudinal axis of the peninsula; as a matter-of-fact the latter forms eastern limb of immense anticline, the other part of which is to be seen on southern slope of Hyrnefjellet.

Eastern slopes of Marietoppen, Urnetoppen and Kruseryggen, most of Condevintoppen and eastern slope of Strykjernet (to the east of the Hyrne Glacier) are composed of Triassic shales and limestones. They are overlain discordantly by gently folded but intensively faulted sandstones and shales of Middle Jurassic to Lower Cretaceous age.

Quaternary landforms and sediments

Fieldworks and photogeological analysis of the Treskelen-Hyrnefjellet-Kruseryggen area enabled to distinguish 26 geomorphologic-geological features (App.). They are grouped in three main genetic assemblages: (*i*) slope landforms (5 symbols), (*ii*) glacial and nival landforms and sediments (11 symbols), and (*iii*) raised marine beaches (10 symbols). The map is also supplemented with some topographic (nos 27 and 28) and geodetic symbols.

Slope landforms with structural features. The largest part of the described area is occupied by elevations and slopes of Hyrnefjellet (767 m a.s.l.), Marietoppen (480.5 m a.s.l.), Urnetoppen (820 m a.s.l.), Kruseryggen (650 m a.s.l.) and Condevintoppen (600 m a.s.l.), commonly with weathering waste cover (symbol 1). Pre-Quaternary rocks with waste cover are also present at crest of Treskelodden. In its southern part these rocks are thinly mantled with till (symbol 1a). Bare outcrops of pre-Quaternary rocks (symbol 2) from crest of the Sel Peninsula (Selodden) and occur everywhere along the coast of Adriabukta (western side of Treskelodden inclusive) and Burgerbukta—in edges of raised marine beaches and skerries as well as in mountain slopes. The latter are cut by numerous chutes (symbol 3), especially large at steep walls of

glacial cirques and glacial valleys of Wibebreen and Hyrnebreen. Deeply incised chutes cut also steep edges of raised marine beaches of the seashore of Adriabukta.

Taluses (symbol 4) occur occasionally, usually at outlets of larger chutes on glacial ice. They are especially common in glacial cirques of the mountain complex Hyrnefjellet-Urnetoppen-Kruseryggen. Some of them are also located at outlets of chutes at western side of the Hyrnebreen valley.

Alluvial fans (symbol 5) are much more widespread but they are usually located at lower altitudes (mostly below 200 and only seldom up to 300 m a.s.l.). They develop due to intensive supply with meltwaters which come from snow patches preserved upslope (Fig. 2).

Glacial and nival landforms and sediments. In spite of a small recent glacial cover, the described area (and especially Treskelodden) has numerous glacial landforms and sediments of the past. Ancient lateral moraines (symbol 6) are very small on the northeastern seashore of Adriabukta (Fig. 2). On the other hand they are quite impressive on Treskelodden where run on its eastern slope in the north and go across the peninsula further to the south (App.). These lateral moraines are up to 3 m high and rest directly on pre-Quaternary rocks, or on dead ice mantled with ground moraine (symbol 7) on eastern side of the peninsula. Patches of ground moraine occur also in southern part of the peninsula, cover most of Selodden and the other nameless peninsula to the east. Till on Treskelodden contains numerous mollusc shells (*cf.* Heintz 1953; Birkenmajer 1958, 1960, 1964b, 1987; Marks and Pękala 1986), radiocarbon dates of which can be grouped in three ranges of: 9770—8400, 4280 and about 2000 years BP (Marks and Pękala 1986; Birkenmajer 1987). Glacier-transported driftwood in till at 38 m a.s.l. on eastern side of the peninsula, was radiocarbon dated at 810 ± 70 years BP (Grossvald *et al.* 1967).

Two other patches of ground moraine are noted on shore of Burgerbukta—in front of the Lorch Glacier (App.).

At the foot of Urnetoppen, between Lorchbreen and the other, further to the north located glacieret, there are two kames (symbol 8). They are a dozen or so meters high, almost perfectly round in shape, and accompanied by shallow depressions and small ponds around.

Compact glacier ice (symbol 9) occupies a mountainous part of the area. It forms a vast field-like glacier with nunatak of Condevintoppen in the center, and two tidewater glacial tongues of Wibebreen and Hyrnebreen (in fact the western part of the Hyrnebreen snout rests still on land). Three small and isolated cirque glacierets (among which only Lorchbreen has its own name) are exposed on eastern shore of Burgerbukta. Numerous crevasses cut glacier ice, especially of Hyrnebreen and close to the ice cliff of Wibebreen.

Snouts of cirque glacierets located in the Marietoppen-Urnetoppen-Kruseryggen massif are heavily covered with ablation moraine (symbol 10) and

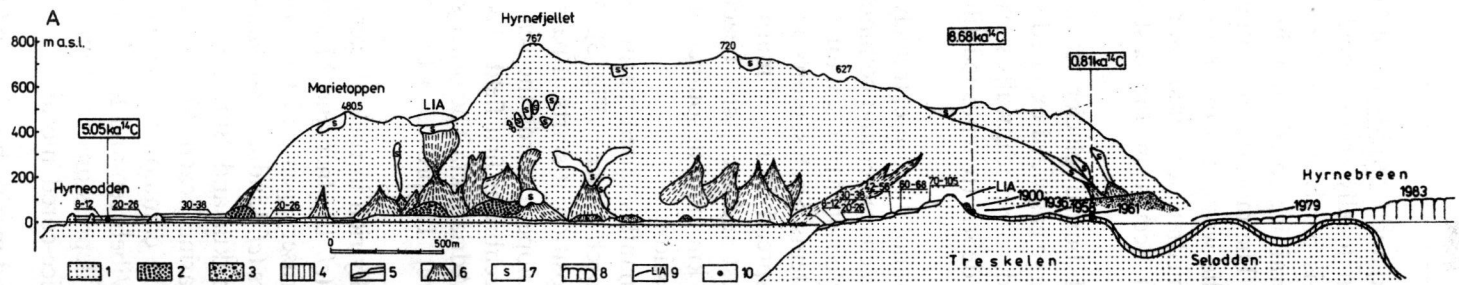

Fig. 2. Schematic geologic section A—B (*cf.* Fig. 1) along southern slope of Marietoppen-Hyrnefjellet and across Treskelen and Sel peninsulas; also after Birkenmajer (1964a); 1 — pre-Quaternary rocks, 2 — debris of rock glaciers, 3 — debris of ancient lateral moraines, 4 — till, 5 — shingle of raised marine beaches (with altitudes in meters a.s.l.), 6 — debris of alluvial fans, 7 — snow patches, 8 — glaciers, 9 — glacier extents and their age, 10 — radiocarbon-dated mollusc shells and driftwood

encircled by terminal (symbol 11a) and lateral (symbol 11b) ice-cored moraines (*cf.* Fig. 3). The latter have been locally transformed into rock glaciers (*cf.* Lindner and Marks 1985) what is partly expressed by soliflucted mantle on their surface (symbol 12). Lateral ice-cored moraines run also aside the downglacier part of Hyrnebreen. The moraine at southeastern foot of Hyrnefjellet consists of two ramparts: the western is exceptionally large whereas the other passes southwards into median ice-cored moraine. Another median ice-cored moraine (symbol 11c) occurs in the eastern, tidewater part of Hyrnebreen.

Due to intensive melting of buried glacier ice at eastern seashore of Treskelodden (*cf.* Marks 1983), large eastward-exposed solifluction depressions and niches (symbol 13) are formed. Their headwalls start many a time at about 50—80 m a.s.l. while soliflucted debris (redeposited till) reaches occasionally a sea of Brepollen.

Sandurs and sandur fans (symbol 14) are extremely rare in the described area, both due to its mountainous character and common tidewater glaciers or glacier snouts ending at the very coast. Most sandur features have developed during previous greater glacial extents. Such sandurs are particularly abundant on Treskelodden. They are widespread on raised marine beaches at outlets of ravines that cut the peninsula crest and successive beach edges. A particularly well developed sandur valley (1.5 km long) in southern part of Treskelodden is located within a bedrock depression.

A small inactive sandur fan mantles raised marine beaches to the south of the ice-cored moraines of the Lorch Glacier (Fig. 3). Another sandur of this glacier occurs in quite unusual position: it starts at pass between Marietoppen and Hyrnefjellet and runs downslope towards the sea. This sandur fan must have been formed when the Lorchbreen firn field was larger and developed a small hanging glacier towards Adriabukta.The other sandur fan is formed in front of the Urnetoppen glacieret. It spreads between the lateral ice-cored moraine and the present beach.

The described area is especially rich in rock glaciers (symbol 15). Amongst them the moraine rock glaciers (*cf.* Lindner and Marks 1985) are the largest ones. They occur in fronts of Kruseryggen and Urnetoppen cirque glacierets. The smaller protalus rock glaciers (*cf.* Lindner and Marks 1985) are at the foot of Marietoppen towards Adriabukta and Burgerbukta. In the Hyrneodden area they rest on the raised marine beach 30—38 m a.s.l. (Fig. 3).

Snow patches (symbol 16) are common in the whole area. Snow covers most firn fields of Hyrnebreen, Wibebreen and Lorchbreen. Smaller patches of snow are preserved in numerous depressions on mountain slopes (*cf.* Fig. 2) or other landforms, especially on ice-cored moraines.

Raised marine beaches. Nine raised marine beaches and the present beach were distinguished (App.). Higher beaches are noted only on Treskelodden but their

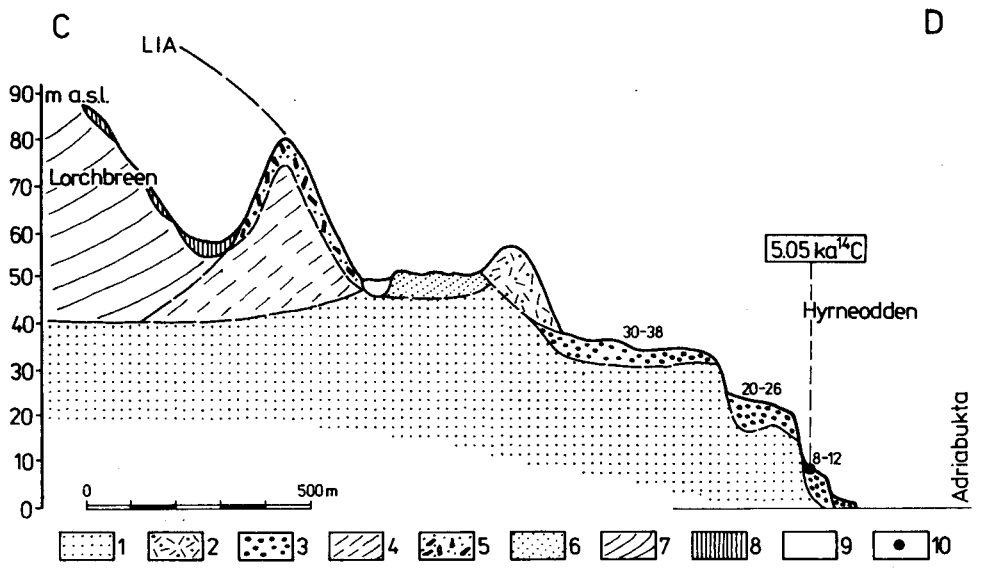

Fig. 3. Schematic geologic section C—D (*cf.* Fig. 1) along western slope of Marietoppen; 1 — pre-Quaternary rocks, 2 — debris of rock glaciers, 3 — shingle of raised marine beaches (with altitudes in meters a.s.l.), 4 — dead glacial ice, 5 — debris of ice-cored moraines, 6 — sandur gravels and sands, 7 — compact glacial ice, 8 — ablation till, 9 — alluvia, 10 — radiocarbon-dated driftwood

marine origin is however controversial due to shelf-like structure of the bedrock. In southern part of the peninsula these raised beaches are highly obliterated and masked by glacier-derived landforms and sediments. Inner-fiord position of the area and shallow bedrock result in lack of storm ridges — the features that are so common on seashores of Spitsbergen.

Raised marine beaches 70—105 m (symbol 17), 60—68 m (symbol 18) and 42—56 m (symbol 19) a.s.l. occur only on Treskelodden. The highest beach (70—105 m a.s.l.) adheres to the peninsula crest and is mantled to the south by lateral moraines of Hyrnebreen, marking its maximum extent during the Little Ice Age (*cf.* Heintz 1953; Birkenmajer 1964b; Marks 1981, 1983). Marine origin of this beach is most controversial due to steep grade of its surface; this feature can also result from step-like structure of the bedrock. The lowest of the mentioned beaches (42—56 m a.s.l.) and the next lower one i.e. 30—38 m a.s.l. (symbol 20), occupy a very limited area on Treskelodden. The beach 30—38 m a.s.l. is however the highest one at Hyrneodden (Figs. 2 and 3).

The raised marine beach 20—26 m a.s.l. (symbol 21) is the most widespread one on Treskelodden and in Hyrneodden area. It forms also the highest beach on the eastern side of Treskelodden where its southern end is mantled with till of the Little Ice Age.

The beach 15—18 m a.s.l. (symbol 22) is noted only on Treskelodden and even there it occupies a very limited area although on both slopes of the peninsula. The beach 8—12 m a.s.l. (symbol 23) forms narrow shelves on shores of Adriabukta close to Hyrneodden and it is also present on both sides of Treskelodden. A driftwoood found in surface sediments of this beach at Hyrneodden was radiocarbon dated at 5050±60 years BP (Chmal 1987). The beaches 5—8 m (symbol 24) and 2 m (symbol 25) a.s.l. are noted only on Treskelodden. The beach 5—8 m a.s.l. occupies a very limited area at the southwestern end of the peninsula. The lower beach (2 m a.s.l.) occurs at both sides of the peninsula and occupies exceptionally larger area on its eastern than on western shore. The present beach (symbol 26) is the youngest marine feature in the described area. It occurs occasionally along the coast of Treskelodden but is more common in Burgerbukta.

Morphogenetic evolution of the area

Morphogenetic evolution of the Treskelen Peninsula during the Little Ice Age has been already several times presented (*cf.* Heintz 1953; Birkenmajer 1964b; Marks 1983). Recent radiocarbon datings of mollusc shells (Marks and Pękala 1986; Birkenmajer 1987) throw however more light on history of Holocene glacier advances in this area.

Much less is known about the Pleistocene glaciations although some conclusions can already be drawn. First of all the northwestern part of the Treskelen Peninsula, including its crest (above 90 m a.s.l.) and raised marine beaches, does not seem to have been occupied by Pleistocene glaciers as neither glacial sediments nor landforms have been found there. This part of the peninsula is high enough to have formed considerable obstacle for glacial ice streams, flow of which concentrated entirely further to the south. Ice streams flow also over southern end of the peninsula but mainly to the south of it, through the narrowed pass of the fiord. Extreme depths of the latter (to 113 m) as well as of Brepollen towards the Horn Glacier (to 140 m), prove intensive glacial erosion and acted as main route for a glacial stream.

After reaching Adriabukta, a glacier could however occupy the whole width of the fiord and thus its erosive capacity considerably decreased as indicated by shallower depth and flat bottom surface of this fiord area (*cf.* Karczewski *et al.* 1984).

Glacial episodes in the Treskelen Peninsula are strictly related to rates of land uplift and development of raised marine beaches. Steep grades of the latter (especially of the beach 42—56 and 70—105 m a.s.l.) suggest extremely rapid uplift of the area during their formation *i.e.* following quick glacier retreat.

The only dating of raised marine beaches in this area comes from driftwood buried in sediments of the beach 8—12 m a.s.l. at Hyrneodden and equals

5050±60 BP (Chmal 1987). Fifteen kilometers further to the west, in Fuglebergsletta, a similar raised beach is however older, ascribed to about 9000 years BP (*cf.* Birkenmajer and Olsson 1970). This fact indicates more intensive uplifting of innermost Hornsund and also, makes hypsometric correlation of raised marine beaches unreliable due to varying glacioisostatic rebound (*cf.* Lindner, Marks and Szczęsny 1986).

Absence of raised marine terraces in northeastern Adriabukta (at foot of Hyrnefjellet) and strong undercut of the shore there seem to be due to glacial erosion when a glacier filled up this area after passing across the southern tip of the Treskelen Peninsula. Such glacial extent was previously ascribed to the maximum of the Little Ice Age (*cf.* Vasiliev 1925; Pillewizer 1939) but seems now improbable (*cf.* Heintz 1953; Birkenmajer 1964b). On the other hand, correlation with raised marine beaches in other parts of South Spitsbergen (*cf.* Birkenmajer and Olsson 1970; Karczewski, Kostrzewski and Marks 1981b; Butrym *et al.* 1987) but with consideration of possible hypsometric variation, suggest that the beach 30—38 m a.s.l. corresponds or even precedes maximum extent of the last Pleistocene glaciation in this area. Such conclusion is supported by symptoms of glacial erosion of the beach at foot of Marietoppen and at northwestern side of the Treskelen Peninsula (App.).

Summing up the above considerations, the raised marine beaches 70—105, 60—68, 42—56 and 30—38 m a.s.l. were formed presumably during the Sörkapp Land Glaciation (*cf.* Lindner, Marks and Pękala 1987). The Late Pleistocene glacier could occupy the whole Adriabukta and it was probably the one that deposited lateral moraines at foot of Hyrnefjellet (App.).

Groups of radiocarbon dates from glacier-redeposited mollusc shells (9770—8400, 4280 and about 2000 BP) and driftwood (810 BP) on the Treskelen Peninsula, define free water conditions in Brepollen. The shells could be therefore derived from there during successive glacier advances which could in turn occur about 8—6 ka, 3—2 ka and 0.7—0,1 ka (the latter value corresponds with the well-known Little Ice Age). These age values agree with the already known Holocene glacier advances in Spitsbergen (*cf.* Lindner and Marks 1990). Their extents were presumably similar to the one during the Little Ice Age (*cf.* App.). In this time a glacier adhered to eastern slope of the Treskelen Peninsula, passing it across in the very place where the crest drops below 90 m a.s.l. Lateral moraine along the peninsula and at its crest in mid-south demarcates a glacier maximum extent during the Little Ice Age. Ravines at western slope of the peninsula and shell-rich till could be formed in the same time too (*cf.* Heintz 1953; Birkenmajer 1964b; Marks 1983), although radiocarbon dates of the latter indicate a recurrent redeposition of the till during the Holocene.

Very little is known about glacier episodes in eastern Burgerbukta area. The glaciers must have considerably advanced there but no details are known yet. Only the maximum extent during the Little Ice Age can be defined with

greater accuracy as delimited by outer borders of ice-cored moraines on eastern shore of Burgerbukta. Thicker ice body of the Lorch Glacier produced in this time a hanging glacier toungue and accompanied sandur train towards Adriabukta (*cf.* Fig. 2).

After the Little Ice Age the glaciers of Brepollen retreated extremely rapidly due to their tidewater character. This process has been already remoted in detail (App.).

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References

Birkenmajer K. 1958. Preliminary report on the raised marine features in Hornsund, Vestspitsbergen. — Bull. Acad. Polon. Sci., Sér. Sci. Chim. Géol. Géogr., 6: 151—157.

Birkenmajer K. 1959. Report on the geological investigations of the Hornsund area, Vestspitsbergen, in 1958, part III: The Quaternary geology. — Bull. Acad. Polon. Sci., Sér. Sci. Chim. Géol. Géogr., 7: 197—202.

Birkenmajer K. 1960. Raised marine features of the Hornsund area, Vestspitsbergen. — Studia Geol. Polon., 5: 3—95.

Birkenmajer K. 1964a. Devonian, Carboniferous and Permian formations of Hornsund, Vestspitsbergen. — Studia Geol. Polon., 11: 47—123.

Birkenmajer K. 1964b. Quaternary geology of Treskelen, Hornsund, Vestspitsbergen. — Studia Geol. Polon., 11: 185—196.

Birkenmajer K. 1977. Triasssic sedimentary formations of the Hornsund area, Spitsbergen. — Studia Geol. Polon., 51: 7—74.

Birkenmajer K. 1978. Ordovician succession in South Spitsbergen. — Studia Geol. Polon., 59: 47—82.

Birkenmajer K. 1984. Cyclic sedimentation in mixed alluvial to marginal-marine conditions: the Treskelodden Formation (?Upper Carboniferous and Lower Permian) at Hornsund, South Spitsbergen. — Studia Geol. Polon., 80: 25—46.

Birkenmajer K. 1987. Pleistocene-Holocene boundary events in South Spitsbergen. — Workshop "Late Cenozoic paleoenvironments and geology of the Arctic", Spidsbergeter Fjellstue, Norway, Program: p. 14.

Birkenmajer K. and Olsson I. U. 1970. Radiocarbon dating of raised marine terraces at Hornsund, Spitsbergen, and the problem of land uplift. — Norsk Polarinst. Årb., 1969: 17—43.

Butrym J., Lindner L., Marks L. and Szczęsny R. 1987. First thermoluminescence datings of Pleistocene sediments from Sörkapp Land, Spitsbergen. — Pol. Polar Res., 8: 217—229.

Chmal H. 1987. Pleistocene sea level changes and glacial history of the Hornsund area, Svalbard. — Polar Res., 5 n.s.: 269—270.

Flood B., Nagy J. and Winsnes T. S. 1971. Geological map of Svalbard 1:500,000, sheet 1G, Spitsbergen southern part. — Norsk Polarinst. Skr., 154A.

Grossvald M. G., Devirts A. L., Dobkina E. J. and Semevsky D. V. 1967. Dvizhenya zemnoi koryi y vozrost lednikovykh stadyi v rayonye Spitsbergena. — Geokhim., 1: 51—56.

Heintz A. 1953. Non iakktagelser over isbreenes tilbakegang i Hornsund. — Norsk Geol. Tidsskr., 31: 7—36.

Jahn A. 1959. The raised shorelines and beaches in Hornsund and the problem of postglacial vertical movements of Spitsbergen. — Przeg. Geogr., 31 (Suppl.): 143—178.
Karczewski A., Kostrzewski A. and Marks L. 1981a. Morphogenesis of subslope ridges to the west of Hornsund, Spitsbergen. — Pol. Polar Res., 2: 29—38.
Karczewski A., Kostrzewski A. and Marks L. 1981b. Raised marine terraces of Hornsund area (northern part), Spitsbergen. — Pol. Polar Res., 2: 39—50.
Karczewski A., Andrzejewski L., Chmal H., Jania J., Kłysz P., Kostrzewski A., Lindner L., Marks L., Pękala K., Pulina M., Rudowski S., Stankowski W., Szczypek T. and Wiśniewski E. 1984. Hornsund, Spitsbergen — geomorphology, scale 1:75,000. — Silesian Univ., Katowice.
Lindner L. and Marks L. 1985. Types of debris slope accumulations and rock glaciers in South Spitsbergen. — Boreas, 14: 139—153.
Lindner L. and Marks L. 1990. Geodynamic aspects of studies of Quaternary inland sediments in South Spitsbergen (attempt to synthesis). — Pol. Polar Res., 11.
Lindner L., Marks L., Ostaficzuk S., Pękala K. and Szczęsny R. 1985. Application of photogeological mapping to studies of glacial history of South Spitsbergen. — Earth Surf. Processes, Landf., 10: 387—399.
Lindner L., Marks L. and Pękala K. 1987. Quaternary chronostratigraphy of South Spitsbergen. — Polar Res., 5 n.s.: 273—274.
Lindner L., Marks L. and Szczęsny R. 1986. Late Quaternary tectonics in western Sörkapp Land, Spitsbergen. — Acta Geol. Polon., 36 (1—3): 281—288.
Marks L. 1981. Last deglaciation of Treskelen Peninsula (Hornsund, Svalbard). — 8 Symp. Polarne, Sosnowiec, Mat. Ref., Komunikaty, 1: 129—138.
Marks L. 1983. Late Holocene evolution of the Treskelen Peninsula (Hornsund, Spitsbergen). — Acta Geol. Polon., 33: 159—168.
Marks L. and Pękala K. 1986. New datings of Quaternary sediments from Bogstranda and Treskelodden, southern Spitsbergen. — Bull. Pol. Ac.: Earth Sci., 34: 419—425.
Pillewizer W. 1939. Die Kartographischen und Gletscherkundlichen Ergebnisse der Deutschen Spitsbergenexpedition 1938. — Petermanns Geogr. Mitteil., 238: 1—46.
Szczęsny R., Lindner L. and Marks L. 1989. Photogeological map of Treskelen-Hyrnefjellet-Kruseryggen area (Wedel Jarlsberg Land, Spitsbergen), scale 1:10,000. — Wyd. Geol., Warszawa.
Vasiliev A. S. 1925. Spitsberg III, Feuille du Sud, 1:200,000. Missions scientifique pour la mesure d'un arc de meridien au Spitsberg. Miss. Russé, Acad. Sci. Russie.

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Streszczenie

Na podstawie badań terenowych oraz zdjęć lotniczych opracowano mapę fotogeologiczną rejonu Treskelen-Hyrnefjellet-Kruseryggen w południowym Spitsbergenie w skali 1:10 000 (fig. 1 i zał. mapa). Na tej mapie oraz przekrojach geologicznych (fig. 2 i 3) pokazano rozprzestrzenienie osadów i form lodowcowych, niwalnych i zboczowych oraz wyniesionych tarasów morskich.

W oparciu o rozmieszczenie osadów lodowcowych i wyniesionych tarasów morskich oraz o istniejące datowania metodą radiowęgla muszli mieczaków morskich i drewna dryftowego przedstawiono próbę odtworzenia rozwoju morfogenetycznego tego rejonu. Stwierdzono, że

północna część półwyspu Treskelen położona powyżej 90 m n.p.m. nie była zlodowacona, przynajmniej w młodszej części czwartorzędu. Ruch lodowców odbywał się w poprzek południowej, niższej części półwyspu oraz w przesmyku łączącym Brepollen z zasadniczą, zachodnią częścią Hornsundu.

Lodowce w rejonie półwyspu Treskelen transgredowały około 8—6 ka, 3—2 ka i 0,7—0,1 ka (Mała Epoka Lodowa). Ten ostatni okres znaczniejszego rozprzestrzenienia lodowców posiada już dość szczegółową dokumentację (por. Heintz 1953; Birkenmajer 1964b; Marks 1983; i zał. mapa).

Porównanie wieku wyniesionych tarasów morskich w omawianym obszarze oraz bardziej na W (w rejonie polskiej stacji polarnej) wskazuje, że rejon półwyspu Treskelen podlegał w holocenie prawie dwukrotnie szybszemu wypiętrzeniu glaciizostatycznemu.

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