

Glacial striae, roches moutonnées and ice movements in the southern part of Streymoy and Eysturoy (Faeroe Islands)

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The present paper is part of a work in progress on glacial phenomena in the Faeroe Islands. In previous papers (Jørgensen & Rasmussen, 1977, 1978) these phenomena on Suðuroy and Sandoy have already been discussed.

The area.

The southern part of Streymoy is separated from the southern part of Eysturoy by Sundini—Tangafjørður and from Nólsoy by Nólsoyarfjørður. Toward the west Streymoy is separated from Koltur and Hestur by Hestfjørður. The above-mentioned islands and fiords all trend NW-SE, while the slightly winding fiords Kollafjørður and Kaldbaksfjørður open to the east. Kollafjørður continues westward as the valley Kollfjarðardalur, which extends to the west coast of Streymoy, while Kaldbaksfjørður ends in a cirque, Kaldbaksbotnur. The southern part of Eysturoy is split by Skálafjørður into a western and an eastern part. Around Skálafjørður the slopes are smooth, whereas the east coast of Eysturoy, indented by Lambavík and Rituvík, is rather steep.

The area dealt with in this paper comprises the south-eastern part of Eysturoy south of Lambavík and the south-eastern part of Streymoy south of Hósvík, with the area between Tórshavn and Kaldbaksfjørður as its center. To the west the area is delimited by the elongated hill Kirkjubøreyn and its north-westerly continuation.

Geology.

This entire area is built up mostly of lava flows belonging to the upper basalt series (Rasmussen & Noe-Nygaard, 1969, 1970), with its central area belonging exclusively to the upper series. The lava flows dip toward the SE. The boundary between the middle basalt series and the upper basalt series (the C-horizon) reaches sea level at Kaldbak on Streymoy and at Strendur-Saltnes on Eysturoy, showing the step-like landscape of the upper series above the C-horizon and the smooth landscape form of the middle series below.

The most conspicuous topographic features in the central area of Streymoy are the NW-SE trending landscape elements, e. g. water-courses, lakes, clefts and hills. At the harbour of Tórshavn the protruding foreland trending NW-SE appears to be determined by the tectonic patterns, as is the foreland on the coast at Hoyvík. Very distinct lamellar zones (Rasmussen & Noe-Nygaard, 1969, 1970), mainly running NW-SE and WNW-ESE, are recognizable in the central area, especially between Tórshavn and Kaldbak.

Ice movements.

Earlier observations. Glacial phenomena in the area dealt with here were already recognized by *Robert Chambers* (1856). He spent only a few days on the Faeroes but recognized roches moutonnées in the neighbourhood of Tórshavn and glacial striae in various other places. *James Geikie* (1880) gives a rather comprehensive description of the glacial phenomena of the islands, as does *Amund Helland* (1880), who visited the Faeroe Islands together with Geikie in 1879. Further observations of roches moutonnées and striae in the area dealt with are made by *Grosmann and Lomas* (1895) and *Rudolphi* (1913).

Synopsis of present observations. In the following synopsis roches moutonnées and striae are mentioned for each site. In the case of roches moutonnées the compass direction indicates the direction of the ice movement (see map).



Fig. 1. *Glaciated valley at Hvítanes.*

1. mynd. Ísbrýnd lægd á Hvítanesi.

Streymoy.

Hósvík — Kollafjørður.

- Site 61. Roches moutonnées (SSE).
- Site 62. Roches moutonnées (SSE). Striae (NNW-SSE).
- Site 63. Roches moutonnées (ENE and NE).
- Site 64. Roches moutonnées (NE).

Kaldbak.

- Site 66. Roches moutonnées (SE).
- Site 67. Roches moutonnées (SE). Striae (NW-SE).
- Site 68. Striae (E-W).
- Site 69. Striae (ESE-WNW and E-W).
- Site 70. Roches moutonnées (SE). Striae (NW-SE).
- Site 71. Roches moutonnées (ESE).
- Site 86. Roches moutonnées (SE).

- Site 87. Roches moutonnées (SE).
- Site 88. Roches moutonnées (SE). Striae (NW-SE).
- Site 89. Roches moutonnées (SSE).
- Site 90. Roches moutonnées (SE and SSE).
- Site 91. Striae (NNW-SSE).

The central area.

- Site 7. Roches moutonnées (ESE).
- Site 8. Roches moutonnées (ESE). Striae (ESE-WNW).
- Site 9. Roches moutonnées (ESE). Striae (ESE-WNW).
- Site 10. Roches moutonnées (ESE). Striae (ESE-WNW).
- Site 11. Roches moutonnées (SE). Striae (NW-SE).
- Site 12. Roches moutonnées (SE).
- Site 13. Roches moutonnées (SE).
- Site 14. Striae (NNW-SSE).
- Site 16. Roches moutonnées (SSE).
- Site 17. Roches moutonnées (SSE and SE).
- Site 18. Striae (NW-SE).
- Site 20. Roches moutonnées (ESE).
- Site 21. Roches moutonnées (E).
- Site 22. Roches moutonnées (E).
- Site 23. Roches moutonnées (SSE and SE).
- Site 24. Roches moutonnées (SSE and SE).
- Site 25. Roches moutonnées (SSE).
- Site 26. Roches moutonnées (SSE).
- Site 27. Roches moutonnées (SE).
- Site 28. Roches moutonnées (SE).
- Site 29. Roches moutonnées (SE).
- Site 30. Roches moutonnées (SE).
- Site 31. Roches moutonnées (SSE).
- Site 32. Roches moutonnées (SSE). Striae (NNW-SSE).
- Site 46. Roches moutonnées (SE). Striae (NW-SE).
- Site 65. Roches moutonnées (E). Striae (E-W).
- Site 75. Roches moutonnées (SE).
- Site 76. Roches moutonnées (E and ESE).
- Site 77. Roches moutonnées (SE and ESE).

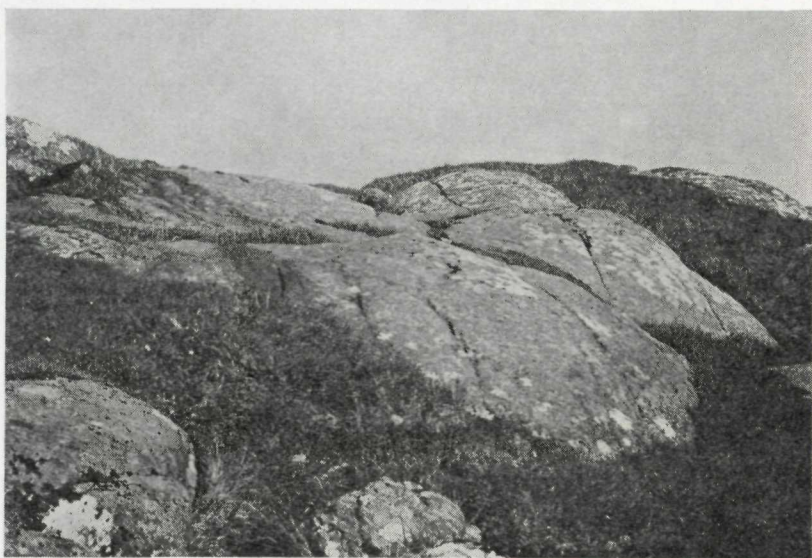


Fig. 2. *Glaciated rock north of Hvítanes.*

2. mynd. *Ísbrynd bella norðan fyri Hvítanes.*

Site 78. Roches moutonnées (E).

Site 79. Roches moutonnées (SE). Striae (ESE-WNW).

Site 80. Striae (ESE-WNW).

Site 85. Roches moutonnées (ESE). Striae (ESE-WNW).

Eysturoy.

West of Skálafjørður.

Site 2. Roches moutonnées (SSE).

Site 3. Roches moutonnées (SSE).

Site 4. Roches moutonnées (SSE).

Site 5. Roches moutonnées (SSE).

Site 17. Striae (NNW-SSE).

Site 18. Striae (N-S).

East of Skálafjørður.

Site 6. Roches moutonnées (SSE).

- Site 7. Striae (NNW-SSE).
- Site 8. Striae (NW-SE).
- Site 9. Striae (NW-SE).
- Site 10. Striae (NW-SE).
- Site 12. Roches moutonnées (E).
- Site 13. Roches moutonnées (E).

Nólsoy.

- Site 1. Roches moutonnées (ESE).
- Site 2. Roches moutonnées (ESE).
- Site 3. Roches moutonnées (ESE).
- Site 4. Roches moutonnées (ESE).
- Site 5. Roches moutonnées (ESE).

Description of localities.

Hósvík — Kollafjörður.

On valley slopes south-west of the village Hósvík, roches moutonnées indicate ice movement toward ENE and NE (sites 63, 64).

Around Kjalnestangi the low-lying coastal area is distinctly glaciated. Immediately north of Kjalnestangi some roches moutonnées indicate ice movement toward SSE (site 61). Further north (site 62), both roches moutonnées and glacial striae show movement in the same direction. The southerly flow of ice was already noticed by *Helland* (1880) and by *Geikie* (1880), who states that the upper strata of the »mer de glace« flowed across Kollafjörður and Kaldbaksfjörður.

Kaldbak.

The description of Kaldbak encompasses the area between Kollafjörður and Kaldbaksfjörður. The coastal slopes are steep, except at the village Kaldbak on the south coast. From the village Kaldbak a NW-SE trending valley runs up to 300 m a. s. l., bordered to the north by Kaldbakskambur, the highest point in the area (587 m a. s. l.). This valley contains a number of small lakes and numerous ridges, some of which are elongated NW-SE. Some watercourses as well as large scale ridges located east and west of the valley run in

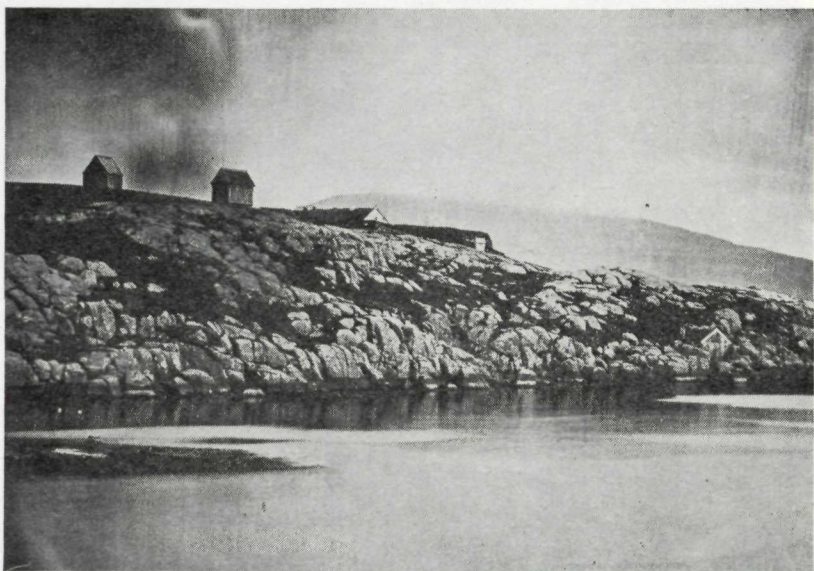


Fig. 3. Glaciated rock at the fort before the present harbour was built.

3. mynd. Ísbrýnt lendi úti á skansa sum nú er burtursprongt.

the same direction. Numerous glaciated exposures can be seen on the slopes east and west of Høgadalsá; striae, roches moutonnées and elongated hillocks indicate ice movements toward SE (sites 66, 67, 86, 87).

The high-lying valley of Týggjará is also characterized by the presence of elongated, heavily glaciated hills (roches moutonnées), clearly indicating ice movement toward SE (sites 88, 89, 90). Some exposures show glacial striae running NW-SE (site 88). Two larger lakes (the largest a little more than 500 m long) and some smaller ones (many elongated NW-SE) can be seen in the valley at about 260 m a. s. l. The lakes are situated in rock basins.

Along the coast north of Kaldbaksfjørður roches moutonnées and striae have been observed only to the east, between the village Kaldbak and Kaldbaksnes. At Kaldbak roches moutonnées indicate ice movement in an ESE direction (site 71). On Mógvanes, a little flat, rocky foreland situated where the NW-SE trending valley of

Høgadalsá opens into the fiord, both roches moutonnées, SE, and striae, NW-SE, can be seen (site 70). Around Kaldbaksnes striae run E-W and ESE-WNW (sites 68, 69). On the east coast north of Kaldbaksnes glacial striae running NNW-SSE were observed at site 91.

The central area.

The terrain between Tórshavn and Kaldbaksfjørður is uneven, marked by NW-SE trending topographic features such as water-courses, gullies and elongated hillocks. From the coastal slopes the terrain rises westward to the hills Gellingarklettur (343 m a. s. l.) and Húsareyn (347 m a. s. l.) which are aligned in north-west south-easterly direction.

The hillocks are clearly glaciated, but those in the interior of the area lack for the most part the typical shape of roches moutonnées. Larger areas covered with gravel produced by weathering can be seen in several places.

On the south coast of Kaldbaksfjørður the striae and roches moutonnées are aligned according to the winding course of the fiord: north-west of the village Sund they indicate ice movement toward ESE (sites 80, 85), and at Sund, toward E (sites 65, 78). Immediately before the coast line at the mouth of Kaldbaksfjørður turns toward south-east, the lee sides of the roches moutonnées face E and ESE (site 76), farther south the direction is ESE (sites 7—10), and at Hvítanes SE (sites 11—13). (Fig. 1, 2).

East of Sund (sites 75, 77, 79) heavily glaciated gullies can be seen in vertical section through the basalt benches on the north-west slope. At site 75 roches moutonnées show ice movement toward SE. Site 77 comprises a gully through three glaciated basalt benches (roches moutonnées) showing ice movement toward SE and ESE. At site 79 roches moutonnées run SE and striae ESE-WNW. Between Hvítanes and Hoyvík (site 14) striae running NNW-SSE were observed, and at Hoyvík (sites 24, 25) roches moutonnées indicate that the ice here moved toward SSE.

Glacial striae and roches moutonnées within the boundaries of the oldest part of the capital Tórshavn have been observed by

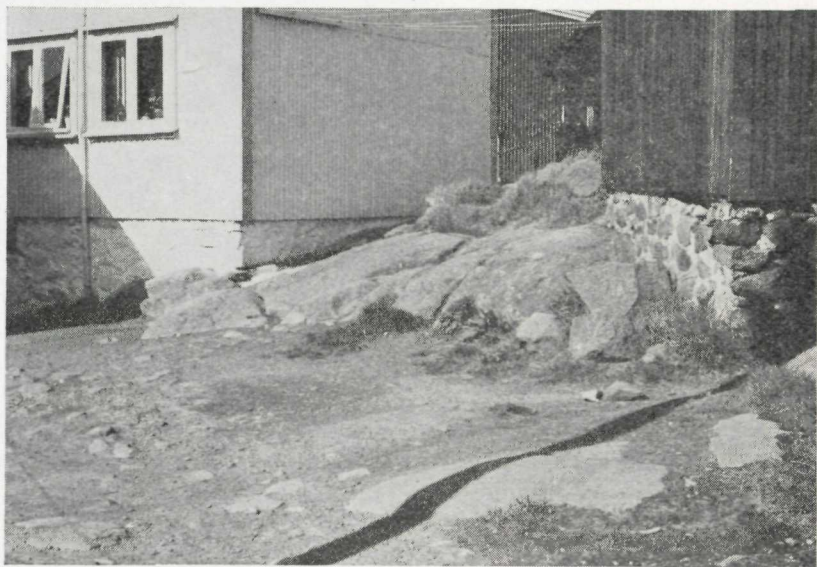


Fig. 4. Glaciated rock forming the foundations of an old house in Tórshavn.

4. mynd. Ísbrýnd bella í húsagrund úti á Reyni.

earlier writers: *Chambers* (1856), *Geikie* (1880), *Helland* (1880), *Grosman & Lomas* (1895) and *Rudolphi* (1913). Chambers noticed glaciated rocks; Geikie and Helland described roches moutonnées and striae by the harbour, at the fort, near the rectory and at the outskirts of the town. They found that the ice flowed toward SE. (Fig. 3).

In the outskirts of Tórshavn, where bedrock has been blasted in order to make way for the expanding town, a great number of glaciated exposures have now been destroyed, but in the oldest part of the town there are several well-preserved roches moutonnées left, some of them forming the foundations of the old houses. (Fig. 4).

Fine roches moutonnées are to be seen at the ancient fort (site 17), indicating ice movement toward SSE and SE. In the middle of the harbour (sites 18, 29) a little peninsula showing roches moutonnées and striae NW-SE indicates ice movement toward SE. The old town is situated on the peninsula, where the houses are clustered together. Behind the church large roches moutonnées indicate ice movement

toward SSE (site 26). In the narrow, winding passages south of the church (sites 27, 28) other roches moutonnées point SE.

In the middle of the town, roches moutonnées indicate ice movement toward SE (site 30), and in the northern part, east of the plantation, roches moutonnées and striae show that here the ice moved toward SSE (sites 31, 32). On the coast north of the fort roches moutonnées indicate ice movement toward SE and SSE (site 23).

In Havnardalur roches moutonnées show ice movements in south-east (sites 16, 20) and easterly directions (sites 21, 22); south of Argir striae are oriented NW-SE (site 46).

West of Skálafjörður.

The glaciers which overflowed southern Streymoy in a south-easterly direction also affected southern Eysturoy. West of Strendur the glaciers left their stamp on the bedrock. South of Strendur roches moutonnées (sites 2—5) and striae (site 17) indicate that the direction of ice movement was toward SSE. Striae with a N-S orientation are found at site 18.

East of Skálafjörður.

On Eysturoy east of Skálafjörður a valley crosses the island almost E-W at Lambi. The western coastal slope facing Skálafjörður is 50 m high. From here the valley slopes gently toward the east coast. From the roches moutonnées it can be seen that the ice from Skálafjörður moved eastward along this valley (sites 12, 13).

At Runavík well-preserved striae NW-SE are visible on abraded bedrock (site 10), and at Rituvík on the east coast roches moutonnées and striae indicate movement in south-easterly direction (sites 6—9).

Nólsoy.

In the northern part of Nólsoy (site 5), on the isthmus (site 1) and in the southern part (sites 2, 3, 4), heavily glaciated roches moutonnées showing ice movement in an ESE direction were observed.

Conclusion.

Striae and rochés moutonnées show that glacier ice during an early stage of the glaciation covered the entire area discussed.

In the south-eastern part of Streymoy and in the south-western part of Eysturoy striae and rochés moutonnées show a south-easterly direction. In the south-eastern part of Eysturoy the ice from Skálafjørður turned east and overflowed the rather high lying valleys in the direction of Lambavík and Rituvík. It is most likely that the ice from eastern Eysturoy passed east of Nólsoy.

The ice direction in eastern Havnardalur on Streymoy (sites 21, 22) is toward east, the ice direction on Nólsoy (sites 1—5) toward east-southeast, the ice, probably at an early stage of the glaciation, overwhelmed Nólsoy flowing in an east-southeasterly direction.

The ice masses moving south-east from the highest part of Kaldbakskambur passed Kaldbaksfjørður and the central area between Kaldbaksfjørður and Tórshavn.

In Kaldbaksfjørður striae and rochés moutonnées follow the fiord direction, but between Sund and Hvítanes some of them turn southward.

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ÚRTAK

Í Fróðskaparriti 25. og 26. bók var sagt frá ísgongdini í Suðuroy og í Sandoyinni (Jørgensen & Rasmussen 1977, 1978). Í hesari greinini verður sagt frá ísgongdini í Suðurstreymoy, Nólsoy og sunnasta parti av Eysturoynni, sunnan fyri Lambavík.

Hóast ikki sjálvur jarðfrøðingur so var Bretin Robert Chambers longu í 1855 varðugur við ísmerkt landslag ymsastaðni í Føroyum, m. a. í Suðurstreymoy nærindis Havnini (Chambers 1856). Seinri, í 1879, gjørdur jarðfrøðingarnir James Geikie og Amund Helland gjølligari kanningar av glersetingini víða hvar í landinum og merktu á kort tær ísskøvur og tað seyðagrót (*roches moutonnées*) sum teir bóru eyga við. Eins og aðrir seinri, t. d. Grossmann & Lomas (1895), siga teir at ísurin suðuri á Streymoyinni og Eysturoynni gekk í landsynning.

Eygleiðingar okkara av ísskøvum og seyðagróti cru í greinini settar upp í røð, talmerktar, talið sipar til hjálagað kort, og sundurbýttar í bólkar sum hvør sær er gjøllari umrøddur í greinini.

Hesar eygleiðingar vísa, at ísurin, tá hann lá víðastur, huldi alt økið sum her er røtt um, at høvuðsgongdin var í landsynning, men at frávik vóru.

Ísskøurnar og ísbrýningarnar vísa at ísurin gekk út eftir Kollafirði og Kaldbaksfirði, men úti við fjarðarmunnarnar snaraði hann suðurá og helt fram í landsynning saman við ísinum úr Sundalagnum. Hetta sæst skilliga á ísbrýningini inni á fjørðunum og við fjarðarmunnarnar, m. a. vestan fyri Hvítanes.

Ikki fyrr enn ísurin minkaði í sundinum slapp ísurin úr Kollafirði og Kaldbaksfirði út í Sundalagið og Tangafjørð.

Eystantil á Skálafirði gekk ísurin upp um Lambareiði og út av Lambavík, eisini gekk hann upp um hálsin sunnari og út av Rituvík.

Vestan fyri Kirkjubøreyn og røðina norður eftir gekk ísurin í útsynning.

Í Nólsoy vísa ísskøvur og seyðagrót norðuri á Stongini, á Eiðinum og upp eftir Høgoyggj, at ísurin er gingin í landsynning eystan. Eftir ísbrýningini at døma er líkt til at Nólsoyggjin øll sum hon er hevur verið huld av ísi.