THE TERTIARY BASALTS OF SCORESBY SUND, A PRELIMINARY REPORT

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During the summer of 1968 the Tertiary basalts of Scoresby Sund were examined at five localities (see fig. 3. The stars mark the position of the sections examined). Sections covering 1800 m of the upper part of the basalt succession were examined from sea level at Sydbræ to 1800 m altitude on the southern side of Milne Land. The uppermost basalt flows above 1800 m occurring on Milne Land were not reached.

Section	Altitude in m from	to
Sydbræ	0	1480
Kap Stevenson	0	1000
SE Gaaseland	500	1400
nunatak	910	1515
S Milne Land	1470	1820

The basalts overlie an older peneplain sloping south-eastwards. To the south the base of the basalts descends rapidly from 1400 m on Milne Land to sea level at Sydbræ, dipping 3 to 4° southwards across eastern Gaaseland. Eastwards the basalts descend less rapidly. At the eastern end of Gaaseland the basalts lie on coarse, arkosic sandstone, probably Mesozoic.

Pre-basalt relief is best seen at the eastern end of Gaaseland where there are basalt-filled valleys 270 m deep in the older peneplain (fig. 4). The lavas have flowed along the north-south-trending pre-basaltic valleys. There is little indication of flow direction but occasional bending of the pipe-amygdales may indicate a flow direction from the south or south-west.

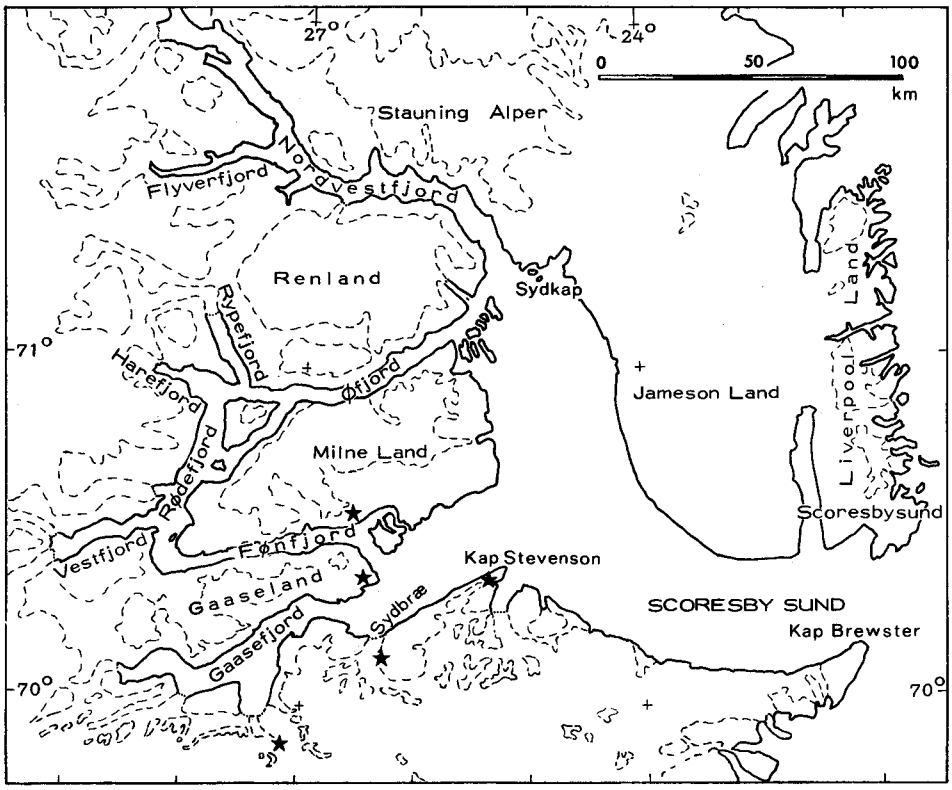

Fig. 3. Sketch map of the Scoresby Sund fjord complex showing the investigated basalt sections (marked by stars). The south-westernmost section is referred to as the nunatak section in the text.

The basalts have a slight regional dip southwards varying from 0.5 to 1.5°. On the southern part of Milne Land there are local variations from horizontal to 2°. On the southern side of Gaasefjord, about half-way up the fjord, the east-west component of dip varies; the lower flows dip west while the upper flows seem to dip east.

The individual flows vary considerably in thickness. At Kap Stevenson there are several prominent flows up to 70 m in thickness, some well developed columnar jointing. The columns are normally vertical but in several places they form chevrons overlying short, vertical "organ pipes". Individual columns may vary from 80 cm in diameter at the bottom to 30 cm at the top of a chevron. They are generally pentagonal in cross-section.

Fig. 4. A pre-basalt valley 270 m deep filled with lava. SE Gaaseland. W.S.W. 01.09.1968.

Many flows are separated by characteristic dense, brick-red, lateritic horizons ranging on average from 1 to 5 cm in thickness. Ropy tops (pahoehoe) were seen on the nunatak section and at Kap Stevenson. The upper parts of the flows are commonly speckled, often thickly, with vesicles of globular, sub-globular or completely irregular shape. In some of the thicker flows the vesicular zone, normally purplish in colour, can be several metres in thickness. Zeolites and other late minerals are on the whole confined to the vesicular top, usually in the more irregular cavities. Occasionally they are seen filling cracks in the more massive parts or cementing a breccia on the top of the flows. Where vesicles occur in the massive part of a flow they are commonly flattened horizontally and mostly empty.

A typical flow, as seen at Sydbræ, consists of a lower, light-brown weathering, massive part followed by a thin columnar area in the centre of the flow. Above this follows again a massive part gradually

changing into a black-weathering zone with small and highly irregular columns. The uppermost part of the flow is vesicular. Breccias are common in certain places and appear to level out the tops of the flows so that succeeding flows lie on a flat surface.

Pyroclastics were seen in two places at Kap Stevenson and at one place at the bottom of the Milne Land section. They appear as yellow-brown weathering deposits, and in all three localities they appear to be of local occurrence rather than forming a stratigraphical horizon. At 410 m altitude at Kap Stevenson a pyroclastic horizon contains bombs measuring up to 1 m, though the average size is only about 10 cm. The presence of bombs of 40 cm to 1 m across probably indicates that there was an explosive vent in the area.

No pillow lavas were seen in any of these sections.

A sedimentary horizon was seen only on a 1450 m ridge on the Sydbræ section. In the surrounding mountains there are a number of ridges at approximately the same height which could imply that this horizon is of more than local occurrence. The sediment is a grey sandstone about 10 m thick overlain by a thin red sandstone. The overlying red sandstone is definitely of very restricted occurrence and can only be traced in the vertical wall for 20 m from the outcrop on the ridge. The sandstone contains remains of wood, both silicified and burnt pieces. Pieces of blackened wood were also collected from the moraine at Kap Stevenson but the horizon from which they came was not reached. The pieces are fairly fragile though and cannot have been transported over long distances in the moraine.

Dykes within the basalt are practically unknown; the only example seen was a 2 m dyke at Kap Stevenson with an ENE trend. Abundant sills and dykes are reported from the Mesozoic sediments in northern Jameson Land (see this report p. 32) and dykes with an E-W trend cut the sediments on eastern Milne Land. In the gneisses dykes are reported (see p. 17) as common in the inner part of Nordvestfjord with a N-S to NNW trend.

Porphyritic and non-porphyritic lavas appear to be approximately equally distributed throughout the sections. The porphyritic flows have small, scattered plagioclase phenocrysts which form a maximum of 2 % of the rock. The plagioclase phenocrysts are normally tabular and average

0.5 cm in length. In the Sydbræ section small pyroxene phenocrysts were recognised in hand samples. Only rarely may plagioclase phenocrysts be as long as 2 cm, and in a couple of flows these have agglutinised into a star shape. Only two of the flows examined in the area could be called feldspar-phyric. Phenocrysts of olivine were never seen. Black and devitrified glass filling small vesicles was seen only at Kap Stevenson.

How the different sections can be correlated is not known with certainty. The lower parts of the Sydbræ, Kap Stevenson and Gaaseland sections have chalcedony/agate as a prominent amygdale mineral while the higher parts of the sections are dominated by chabazite. On Milne Land and the nunatak sections the prominent amygdale assemblage is chabazite-thomsonite. Levynite occurs near the top of both the Milne Land and the nunatak sections. Additional minerals in the Milne Land section are heulandite, stilbite and calcite. Empty amygdales are comparatively common on the nunatak section and here the zeolites occur mostly in local "pockets", being absent elsewhere.

If Walker's (1960) zeolite zones based on the basalts in the Reydarfjördur area of eastern Iceland are applied on the Scoresby Sund basalts the implication is that the lower sections, from sea level up to about 850 m altitude, consist of olivine-free or olivine-poor basalts. Above this altitude there should be olivine-bearing basalts. The transition is gradual with a zone of about 250 m where the basalt types alternate (according to their amygdale mineral content). This interpretation is supported by the presence of pahoehoe and the red-brown spheroidal weathering of the flows at higher altitudes, features suggestive of olivine-bearing basalts.

Reference

Walker, G.P.L. (1960) Zeolite zones and dike distribution in relation to the structure of the basalts of eastern Iceland. J.Geol., Vol. 68, 515-528.