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Observations on the late Archaean Qôrqut Granite, Qôrqut, Godthåbsfjord, southern West Greenland

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The Qôrqut Granite is an elongate body, 50 km long and up to 18 km wide, emplaced in the core of a broad NNE–SSW trending antiform (McGregor, 1973; Bridgwater *et al.,* 1976). In the central part of the pluton are large areas of homogeneous granite but elsewhere the body consists of a complex association of granite and migmatised enclaves. The roof zone of the granite consists of gently-dipping sheets of granite and pegmatite separated by rafts of country rock, the latter retaining their original orientation well down into the main body of the granite. In the southern part of the pluton, two phases of granite may be recognised, an early biotite-rich phase and a later, more leucocratic, biotite-poor phase.

This report concerns the northern part of the Qôrqut Granite in the area north of Qôrqut. The main body of the intrusion consists of irregular, interconnected sheets of granite which are separated by sub-rectangular blocks of country rock (dominantly Amîtsoq gneiss). The latter, which may attain lengths of several hundred metres, have sharp margins and normally contain irregular veins and pods of pegmatite. The granite sheets frequently contain small (1–5 m diameter), migmatised enclaves of country rock, the degree of migmatisation decreasing with proximity of the enclave to the margin of the enclosing granite sheet. Schlieren textures are common in these enclaves, ophthalmitic textures rare. Most of the enclaves are of relatively local origin but rare examples occur of biotite-rich, partial melt residues, prob-

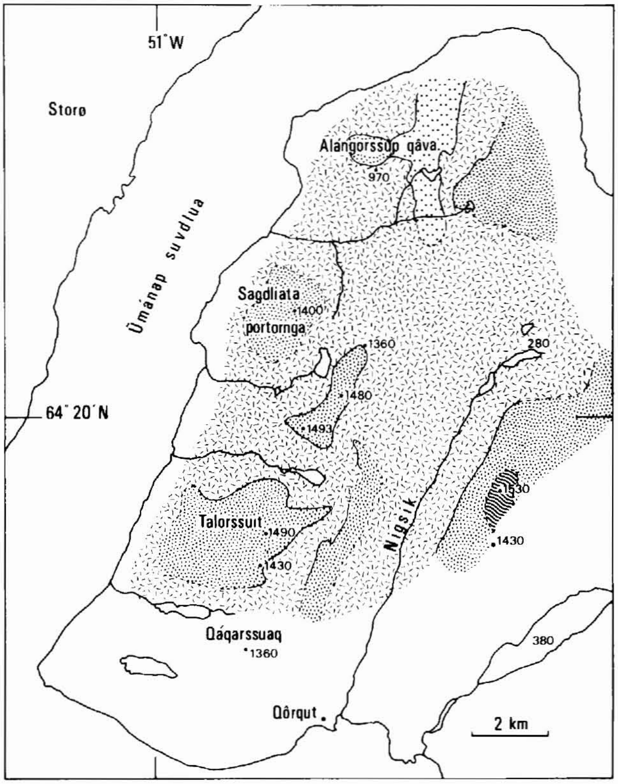

Fig. 27. Location of Qôrqut area. Dashes: dominantly Qôrqut Granite containing enclaves of Amîtsoq gneiss. Paired dots: Nûk gneiss enclaves in granite. Wavy lines: Malene supracrustals cut by granite and granite-pegmatite sheets. Dots: dominantly Amîtsoq gneiss cut by thin granite and granite-pegmatite sheets. Numbers show lake and spot heights in metres.

ably of deep-seated origin. The roof zone of the intrusion, exposed on the peaks west of Nigsik valley (fig. 27), is mainly country rock intruded by sheets (up to 10 m thick) consisting of pegmatite and thin, laterally-discontinuous granitic bands. These sheets represent a more mobile phase of the intrusion which has moved from the main body of the granite into the roof zone.

Qôrqut Granite and pegmatite

The granite is fairly uniform in texture, mineralogy and modal composition. It is medium-grained (1–3 mm grain size), equigranular and consists dominantly of quartz (20–30 per cent), subequal amounts of perthitic microcline and albitic plagioclase (total feldspar 70–80 per cent), and biotite (5–10 per cent). Minor phases are zircon, muscovite, epidote (occasionally with metamict allanite cores), apatite, sphene and opaque minerals (replacing biotite). The rocks may be termed granites *(sensu stricto)* as defined by Streckeisen (1976).

Around Alángorssûp qâva (fig. 27), four separate facies of granite, emplaced within a relatively short time interval, may be distinguished on the basis of slight textural and compositional differences. There is no evidence for an early, pervasive phase of biotite-rich granite such as occurs in the southern part of the Qôrqut Granite (Bridgwater *et al.,* 1976). Apart from the injection of thin pegmatite veins, the latest phase of igneous activity was the emplacement of thin, biotite-rich microgranite sheets. These probably correspond to late tonalite dykes recognised elsewhere in the Qôrqut Granite and surrounding rocks (McGregor, personal communication).

Banding and foliation occur sporadically in the granite. Banding is due to the basal concentration of biotite in layers 5–10 cm thick. The development of banding appears to involve multiple injection of magma with mineral segregation arising through either gravity settling or flow differentiation. Foliation, due to alignment of biotite crystals, is both flow-induced (particularly in granite sheets) and locally of tectonic origin.

Pegmatite (grain size up to 15 cm) is similar in mineralogy to the granite but allanite and magnetite are locally more abundant. It occurs as pods within the granite and as sheets up to 2 m thick. The abundance of pegmatite pods increases upwards within individual granite sheets. Pegmatite sheets are rare below 500 m but increase markedly in abundance above 700 m. These features result from the upward concentration of water in both individual sheets and the overall plutonic body.

Structure

The preservation of pre-existing foliation in the large enclaves of country rock indicates that the granitic magma was intruded passively. Analysis of the foliation data and field observations suggest that the pre-granite structure is a major SSE-plunging synform with, locally asymmetric, parasitic folds. The lack of a consistent orientation to the granite sheets suggests that they have not been significantly influenced by pre-existing structure or tectonic forces. In contrast, the development of joints within the granite was partially tectonically controlled. Stereographic analysis of the joint data reveals four sets; two symmetrically disposed about the SSW-trending antiformal axis of the granite body, one parallel to the profile of this fold and one which is gently-dipping and randomly orientated. The latter are probably cooling joints developed parallel to the margins of the randomly-orientated granite sheets.

Most pegmatite sheets have a low to moderate westerly dip but on the peaks to the east of the Nigsik valley they have an easterly dip. The attitudes of the pegmatite sheets reflect those of the roof of the granite body across the area. The roof of the body occurs at approximately 1200 m above sea level on the west side of the Nigsik valley where granite passes upwards into country rock cut by granite-pegmatite sheets. Similar relationships exist at lower heights to the east of the Nigsik valley and on Storø (McGregor, personal communication). The roof of the granite in this area therefore has a broad antiformal nature (McGregor, 1973; Bridgwater *et al.,* 1976).

Conclusions

The Qôrqut Granite in the area north of Qôrqut, which occupies a broad antiformal structure, has been passively emplaced into terrain dominated by Amîtsoq gneiss. Within the main body of the granite, irregular, interconnected granite sheets are separated by rafts of country rock. In the roof zone of the granite, the sheets become less numerous and more pegmatitic. The granite is essentially post-tectonic, however, the sporadic development of foliation and the symmetrical disposition of the joint orientations about the axial direction of the antiform suggest some residual tectonic influence in the crystallisation stage of the body.

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Geological, geochemical and ecological studies in the Ilímaussaq area, South Greenland

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In 1978 field work was concentrated on the augite syenites, the lujavrites and the kakortokites in the southern part of the area and on the environmental geochemistry and the ecology of the Narssaq area. Some preliminary results of the field and laboratory investigations are reported below.

Rare-earth elements in the waters of the Narssaq area (Carsten Langtofte Larsen)

As part of the investigations of the exogenous geochemistry of the region (Bohse *et al.*, 1975; Nielsen *et al.*, 1976; Rose-Hansen & Sørensen, 1977, 1978) a method of preconcentration of rare-earth elements, thorium and hafnium from water has been developed by H. A. van der Sloot and C. L. Larsen. One litre of water is forced by a pressure column through a 0.4 μm filter. The filtered water is mixed with sodium oxalate and activated carbon. After thorough shaking the carbon is separated from the water in a radiochemical chimney on a 0.8 μm filter and is studied by neutron activation analysis. Samples have been collected in three main rivers, Narssaq Elv, Lilleelv and Lakseelv, their tributaries and adjoining lakes; in rivers and lakes of a reference area in Julianehåb granite; and in the