macropetrography of the seams suggests a dominance of vitrain with clarain and durain occurring in relatively minor amounts. Fusain has been observed only in a few instances. The intrusives have not greatly affected the coal seams. However, some increase in the rank of the coal is observed within a few metres from the intrusive margins.

Washouts in coal seams due to channelling and infilling have also been observed in the Atâ and Pautût areas. In most cases the dips of the sequences are shallow (less than 5°). No major structural disturbance could be observed in the exposed sequences. But there is a distinct steepening of dips in the SE Pautût area. The possibility of faults with several metres of throw cannot be ruled out in this area. In the NW Pautût area several normal faults with throws of a few metres were observed.

In upper Sarqaqdalen, outcrops of several thick seams were located and a few seams could be traced laterally for several hundred metres. There is a lateral variation in thickness of these seams but no splitting or pinching out was observed. Coal seam outcrops in outer Sarqaqdalen are few and thin.

The preliminary observations and results indicate potential areas for coal exploration in Atâ, Pautût, Auvfarssuaq and Sarqaqdalen. This conclusion is largely based on a broad two dimensional perspective and it would involve a phased subsurface exploration through drilling, supported by geophysical surveys to assess the total reserves and economics of the deposit.

Acknowledgements

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Field work in central west Disko, 1979

Asger Ken Pedersen and Finn Ulff-Møller

Field work in the summer 1979 was concentrated in the area between 69°45'N and 70°00'N from the west coast into central Disko (fig. 15). Transport facilities were provided by the GGU cutter *J. F. Johnstrup* and by a helicopter. Two field teams led by A.K.P. and F.U.-M. completed extensive field investigations which together with work reported by

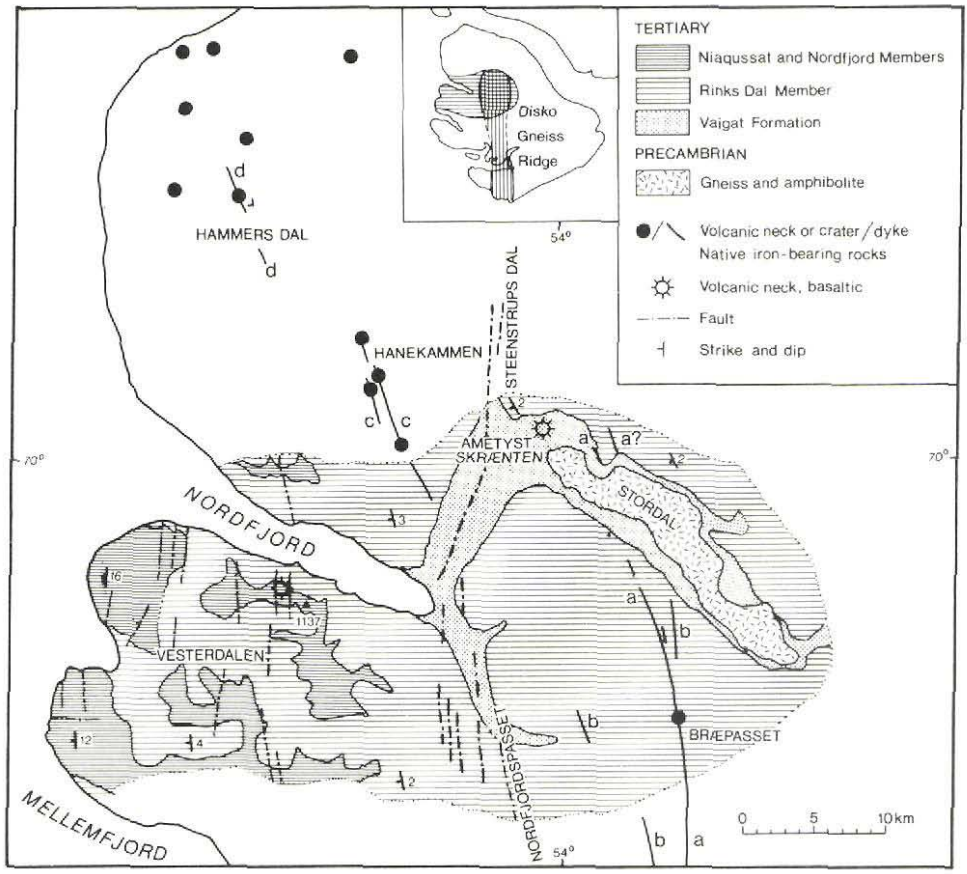

Fig. 15. Map showing the areas investigated in central west Disko 1979. Contaminated intrusives are also shown; a: the Kitdlît dyke; b: a slightly contaminated basalt dyke; c: the Hanekammen Complex; d: the Hammers Dal Complex (Ulff-Møller, 1977).

Pedersen (1977) and Ulff-Møller (1979) will enable a final photogrammetric compilation of the geological map sheet 69 V. 1 N to be made. A.K.P. studied the Vaigat Formation and the Nordfjord and Niaqussat members of the Maligât Formation. F.U.-M. studied the Rinks Dal member of the Maligât Formation and dyke intrusions with native iron bearing rocks contaminated by sediment.

Structure

A N–S trending complex fault zone extends through Steenstrups Dal, outer Stordal and Nordfjordspasset, forming a major hinge zone along the western margin of the Disko gneiss ridge. East of the hinge zone the Disko gneiss ridge is covered by a subhorizontal sequence of Tertiary volcanics which has been affected by slow basin movements during its formation. Apart from a regional uplift, this sequence is relatively undisturbed by later tectonic activity.

West of the hinge zone only Tertiary lavas and subordinate tuffs are found, but abundant shale and sandstone fragments in some of the lavas attest to the existence of a sedimentary sequence below the present level of exposure. The lavas show increasingly westerly dips towards the west coast of Disko, where extensive block faulting has accompanied a general collapse of the coast zone. Vertical movements of more than 2 km relative to the stable platform on the gneiss are recorded.

The Disko gneiss ridge

Prior to its burial by volcanics this ridge formed a number of rounded hills, showing a palaeorelief of several hundred metres. The gneisses are (1) silicic to intermediate, red to grey amphibolite facies gneisses (dominant), (2) amphibolites varying in grain size and deformation from strongly deformed fine-grained masses to distinctly meta-igneous coarse-grained amphibolitic agmatite (widespread), and (3) lenses of ultramafic rocks, sometimes with reaction zones of talc-like masses. A deep (5 to 10 m thick) pre-burial weathered cap is preserved at a few localities.

The Vaigat Formation

Thickness: more than 900 m. The Vaigat Formation lavas and hyaloclastites gradually covered the gneiss hills. In the inner part of Stordal locally derived sandstones and coarse conglomerates composed of metre-sized blocks of gneiss and lavas are interlayered with lavas close to the contacts of the lava flow with the gneiss. Locally sandstones and mudstones with plant fossils occur at the base of one of the hyaloclastite sequences.

The volcanic lithology is complex and includes tholeiitic picrites, slightly olivine and feldsparphyric tholeiitic basalts, together with a range of olivine microphyric, aphyric, orthopyroxene microphyric and feldsparphyric basalts, which show evidence of reaction with crustal rocks. Native iron has been found in two sequences of contaminated lavas. A semicylindrical volcanic neck, about 60 m in diameter, occurs associated with petrographically similar olivine microphyric basalt lavas in Stordal.

Alkaline olivine basalts with phenocrysts of olivine and salite are found on Ametystskrænten. The lavas flowed in a southerly direction and were dammed up against a sequence of contaminated feldsparphyric lavas.

The discovery of picrite xenoliths in lavas of the Maligât Formation south-west of Vesterdalen shows that the Vaigat Formation extends considerably further south-west of its present level of exposure.

The Maligât Formation

Rinks Dal Member

Thickness: 12–1500 m. Rinks Dal Member is composed of an apparently monotonous sequence of voluminous, mostly feldsparphyric, tholeiitic plateau basalts. They cover a weathered surface of picritic Vaigat Formation lavas over most of the area. In the easternmost part of Stordal, basin movements produced a humid, partly subaqueous environment and the lowermost lavas are strongly columnar jointed with prominent entablature zones and hyaloclastite beds on top.

The lower part of this member is dominated by plagioclase and olivine glomeroporphyritic basalts in the south, while in the Nordfjord and Stordal area macroscopically aphyric and olivine microporphyritic lavas are important. In the middle of the member dark brownish weathered Fe-Ti-enriched basalts form a useful marker horizon (Ulff-Møller, 1979) which has now been mapped over a large part of the map sheet. The number of these flows seems to increase towards the north-west and north. Two eruption sites were recognized west of Bræpasset.

The upper part of the member is composed of plagioclase and augite glomeroporphyritic basalts which do not show noticeable lateral variations, apart from in the Mellemfjord area where a significant proportion of 'aphyric' to plagioclase microphyric tholeiitic basalts are present as well.

Nordfjord Member

Thickness: 100–150 m. This member contains in its lower part a range of sediment contaminated rocks ranging in composition from basalts to andesites. In most cases the parental magmas were Fe-Ti-enriched basalts which reacted with sediments to produce moderately reduced rocks with very minor native iron. In the north-western part of the area are found several horizons with rhyolitic pumice tuffs. Feldsparphyric tholeiitic basalts dominate the upper part of the member. A volcanic neck which is a feeder to some of these basalts has been found around point 1137 on the south coast of Nordfjord.

Niaqussat Member

Thickness: 300 m preserved. Over most of the area this member is composed of basaltic lavas, the exception being around Mellemfjord where a large composite iron-bearing lava has been mapped in detail (Pedersen, 1977). At the base of the member are found voluminous olivine microphyric contaminated basalts which often display evidence of mixing with various fractions of sediment contaminated magmas. These are covered by sequences of olivine microphyric basaltic pahoehoe lavas which have their most extensive development in the outer Vesterdalen – outer Nordfjord area. Higher in the sequence nearly aphyric and plagioclase-phyric tholeiitic basalts predominate. Some of these appear to be chemically inhomogeneous and are probably contaminated by crustal rocks.

Intrusions with native iron

Continued mapping of the Kitdlît dyke (Ulff-Møller, 1979) located this dyke in the area east of Bræpasset and in central Stordal (fig. 15). The dyke is now known to extend for more than 85 km. In the Bræpasset area strong vesiculation and fragmentation in the uppermost part of the dyke was found at one site and indicates a former crater structure. The dyke is here distinctly composite with a basaltic margin and an andesitic core. The andesitic proportion of the dyke increases northwards to Stordal. Here several cumulus zones with native iron occur in the basaltic part of the dyke. White cast iron dominates and may form up to 10 cm sized bodies. Cumulus zones with modified sediment xenoliths are found at several localities.

A slightly contaminated basalt dyke mapped from the settlement Diskofjord was followed northwards to Stordal and thus extends for more than 50 km.

The Hanekammen Complex (Pedersen, 1975) is a central volcanic neck composed of an olivine porphyritic, iron-bearing, intermediate rock. From this neck a dyke system can be

traced for at least 13 km towards the south-south-east. The dykes are up to 20 m thick and widen upwards to develop into vesiculated brecciated bodies at several sites. Obviously the present level of exposure is just below former craters. These intrusions are composite with marginal dolerites and cores of andesite. Igneous cumulates of native iron are sparsely developed. About 1 km south-west of this dyke system a volcanic neck occurs from which tube-shaped, subhorizontal intrusions protrude towards the south-south-east. These are composed of contaminated basalt with some native iron.

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Developments in petroleum exploration offshore West Greenland

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The West Greenland shelf south of 72°N has been the subject of petroleum exploration since 1970. A preliminary prospecting phase from 1970 to 1973 led to the granting of 13 exclusive concessions in April 1975. In 1975, 1976 and 1977 the exploration activity on the shelf was intensified and five exploratory wells were drilled. These five wells all proved to be dry and therefore the preliminary evaluation of the area was negative. As a result of this all concessions were relinquished by 31st December 1978.

Some of the geophysical data from the preliminary prospecting phase were released from confidentiality in 1977 (Henderson, 1978), Summary information from the first well drilled in 1976, Kangâmiut 1, was released in August 1978 and from the four wells drilled in 1977 in the autumn of 1979 (Geological Survey of Greenland, 1979). Fig. 16 shows the location of the five wells on a generalised map of depth in two-way travel time to acoustic basement (Henderson *et al.,* in press).

A brief description of the Total Group well Kangâmiut 1 was given by Henderson (1979), and a short lithological summary of the four other wells is given here. A Tertiary sedimentary section down to strata of Paleocene age was encountered in all wells, and only the Ikermiut 1 well drilled by the Chevron Group reached sediments of probable Cretaceous age (fig. 17).