

COMMUNICATION - *MEDDELELSE*

A Norwegian Geotraverse Project*

Preliminary results of a geological investigation in West Jotunheimen, Norway

H. BARKEY

The geological results presented at the meeting form part of an engineering geological investigation, carried out for the Norwegian State Hydroelectric Power Organization (NVE, Statskraftverkene).

The geology of the investigated area can be divided into three main groups:

- A. A basement gneiss complex including a metasedimentary rock sequence (supracrustal rocks).
- B. Low metamorphosed Eocambrian-ordovician sedimentary and volcanic rocks.
- C. Charnocitic and other high grade metamorphic assemblages including layered basic and ultra-basic rocks.

These three main groups have major tectonic boundaries, different metamorphic and tectonic patterns, and a common period of vertical faulting and joint set development which is possibly genetically related to a later updoming of parts of the area.

Two main fold phases can be recognized in the basement complex. Parallel and concordant tectonic structures occur both in the gneisses and associated supracrustal rocks. Large scale transposition phenomena seem to occur in these rocks.

The oldest fold phase (F_1) recognized in the area has a NNW-SSE direction and is identified by the structural trends of the supracrustal rocks. Tight isoclinal folds with a highly developed axial-plane schistosity are characteristic for this fold period and related to them is a high grade (almandine-amphibolite facies) metamorphism.

A second fold phase (F_2) with E-W fold trends has refolded (F_1). The tectonic style of this period is given by more open folds. A syn-late kinematic albite-microcline granite seems to be related to this period.

A third fold phase (F_3) with WSW-ENE trends is related to the thrusting of the younger sediments over the basement complex and has only partly affected it. Greenschist facies metamorphic mineral assemblages are char-

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acteristic for this period; they have an increasing intensity of tectonic style towards the SW of the region, where one encounters flakes of basement rocks as 'schupfen' in the metasediments.

The overfolding structures and style of the 'schupfen' tectonites in the SW of the region strongly support a NW direction for the overthrusting movements of the sedimentary and Jotunic rocks for this part of the Jotunheimen region.

An age determination program in cooperation with Prof. Dr. H. N. A. Priem of the Isotopen-Geologie Laboratory in Amsterdam was initiated in order to date the complex history of the basement rocks. Age determinations on samples of the granite associated with the F_2 fold period are in progress at the moment.

A contact between supracrustals and infracrustals in the Basal gneiss region west of Breimsvatn, Sogn and Fjordane

I. BRYHNI AND E. GRIMSTAD

The area west of Breimsvatn in inner Nordfjord may provide a key to the stratigraphic/tectonic position of the gneisses with ultrabasites, eclogites, and anorthosites in the Basal gneiss region of NW South Norway. Reconnaissance geologic mapping has indicated that there are two major rock complexes:

- an upper* with schistose units (supracrustals) of metapsammites, metapelites, and calcareous rocks between gneisses with ultrabasites, amphibolites, and anorthosites, and
- a lower* with mainly two-feldspar gneisses, migmatites, and a gneiss granite which has been mechanically transformed into augengneiss (infracrustals).

The contact surface between these two complexes has been folded on axes (F_2) plunging westwards. It is thus likely that the area belongs to the western flank of a culmination which continues eastwards over Jostedal into the Precambrian basement in inner Sogn. No evidence of structural disconformity has been observed, but the contact is mylonitized at places or characterized by wedging-out of lithologic units within the supracrustals.

The gneisses are amphibolite facies rocks with much biotite and locally also much white mica. Plagioclase is often the only feldspar or that dominating over potash feldspar. Some of the gneisses might represent metamorphosed volcanics like in the Bergsdalen area (Kvale 1946) while others – intimately associated with ultrabasites and anorthosites – are rather phyllonitized plutonites. The age of the rocks is still unknown, but it is likely that the present distribution is related to nappe tectonics similar to those in the central Nappe region of the Caledonides.

A short review of the geological investigation in the southern Trondhjem region, central Norwegian Caledonides ('the Røros project')

J. A. W. BUGGE AND I. RUI

The investigations, which are known as 'the Røros project' are carried out by the Institute of Geology, Department of Ore Geology, University of Oslo.

'The Røros project' covers various fields of petrology, mineralogy, sedimentology, stratigraphy, structural geology, and ore geology of the area, and is based on detailed geological mapping.

Main aspects:

1. Cambro-silurian stratigraphy.
2. Tectonic studies of the regional folding and thrusting system in this part of the Caledonides.
3. Mineralogical, structural, and genetic studies of the sulphide ore deposits (Kieslagerstatten type) of the district.
4. Studies on the eugeosynclinal volcanic rocks and the mafic and ultramafic intrusives.

The studies of the mafic and ultramafic intrusives and extrusives have been taken up in cooperation with the 'Norwegian Geotransverse Project'. Last summer 37 samples of gabbroic rocks and 24 samples of greenstones (metabasalts) were carefully taken from different localities within the Røros district. These samples are now prepared for whole rock chemical analyses and microscopical study. A study of the trace elements of these rocks will be taken up later.

Pyropes from orogenic garnet peridotites and kimberlites

H. CARSTENS

Etch channels in garnet crystals produced by etching in hydrofluoric acid are due to preferential solution along dislocations decorated with impurity particles or dislocations with impurity atmospheres.

Grown-in dislocations in naturally undeformed garnets (grossularites, andradites) are straight and the direction is controlled by the growth directions being perpendicular to the growth faces. In contrast, pyrope-rich garnets of orogenic garnet peridotites are characterized by dislocation tangles and cell structures similar to those formed in metals in creep. The dislocations in pyropes of kimberlites and associated xenoliths form loops and helices or appear to have polygonized. The origins of the structures were discussed.

Preliminary results on the geology of Lofoten

T. H. GREEN, W. L. GRIFFIN, AND K. S. HEIER

The basal rocks in Lofoten consist of a metasedimentary veined and/or layered gneiss sequence containing banded iron ore, impure marble, and quartzite. Also a metavolcanic (?) monzonitic-dioritic gneiss sequence occurs, mainly on Moskenesøy. These gneisses are intruded by large, massive, brown mangerite bodies on Flakstadøy, Vestvågøy, Gimsøy, and Austvågøy. In general the mangerites are uniform in composition, and are chemically distinct from the monzonitic gneisses of Moskenesøy, even though they are texturally similar, both often containing characteristic porphyroblasts of mesoperthite. On Austvågøy, however, a grey hornblende mangerite is present, as well as a more mafic mangerite in the north-east of the island (olivine normative and containing ortho-pyroxene-magnetite pseudomorphs after olivine).

A layered norite-troctolite-anorthosite complex intrudes the mangerite on Flakstadøy, while on Moskenesøy a dome-like anorthosite with no associated mafic rocks intrudes the core of an anticline in the layered gneisses.

Small mafic-ultramafic intrusions occur scattered throughout the islands. Also late-stage doleritic dykes are widespread.

All these rocks characteristically exhibit granulite facies mineral assemblages undergoing varying degrees of a secondary retrograde metamorphism ranging from garnet, biotite, amphibole, quartz corona formation to completely recrystallized microcline-plagioclase, hornblende-biotite-epidote assemblages.

The last event recorded is the intrusion of a series of pegmatite dykes. This activity may be related to the secondary retrograde metamorphism.

Metamorphic reactions in Norwegian anorthosites

W. L. GRIFFIN AND K. S. HEIER

Coronas in anorthosites of Indre Sogn have resulted from reactions between plagioclase and olivine. The general types are:

- (I) Olivine-Opx-Cpx II-Gnt-Cpx I+ Spinel
- (II) Olivine-Opx-Cpx II-Hbl-Gnt with inclusions of Cpx I+ Spinel
- (III) Opx-Cpx II-Hbl-Gnt.

The evolutionary sequence appears to be Type I→II→III. Cpx I has $Jd/Ts < 2/3$, whereas Cpx II has lower Al and $Jd/Ts > 2/3$. The orthopyroxenes are low in Al and appear to be in equilibrium with Cpx II. The garnets resemble those of eclogites; the amphibole is pargasite.

A two-stage reaction sequence is suggested:

- (1) Oliv + Plag → Al—Opx + Al—Cpx + Spin
- (2) Al—Opx + Al—Cpx + Spin + Plag → Gnt + low—Al
Opx + low—Al Cpx.

Formation of amphibole followed reaction (2) in all cases.

Comparisons of the mineralogy with experimental work suggest that the anorthosites crystallized below ~ 8 KB, and that pressure increased to at least 10 KB during slow cooling. Symplectitic breakdown of garnet to orthopyroxene + plagioclase + spinel \pm clinopyroxene indicates rapid drop in P at relatively high T. This decompression is probably related to the formation of the Jotun Nappes.

Contacts between olivine-rich and plagioclase-rich layers in Visdalen, Jotunheimen, show a reaction zone consisting of two pyroxenes and spinel, but garnet is absent. The clinopyroxenes show symplectitic breakdown to pyroxene, plagioclase, and unidentified minerals. This rock has passed through reaction (1) during cooling, but the lack of garnet implies that reaction ceased at a higher T or lower P than that reached by the Sognefjord anorthosites. The symplectites again suggest rapid decompression.

Orthopyroxene-clinopyroxene-garnet coronas in the Bergen anorthosites can be shown to have evolved from olivine pods through the reaction sequence observed in Indre Sogn. Evidence includes 1) a series of samples showing continuous transition from olivine pods to typical Opx-Cpx-Gnt coronas, 2) the different nature of the reaction zones around primary Opx, 3) relicts of high-alumina Cpx I in the garnet shell. Higher Al_2O_3 contents, and higher Jd/Ts ratios, in the clinopyroxene of the Bergen rocks suggest a history of higher P and/or lower T than the Sognefjord rocks. This is supported by the abundance in the Bergen anorthosites of eclogites and primary S-rich scapolite. Lack of symplectitic breakdown of the garnets in the Bergen coronas implies that no rapid decompression has affected these rocks, and suggests that the Bergen anorthosites may not have been erupted as nappes.

Geochemical aspects of the Lofoten rocks

K. S. HEIER

Ninety-one chemical analyses of granulite and amphibolite facies rocks are discussed. The analyses include the major elements and the trace elements Rb, Sr, Ba, Zr, Pb, Th, and U. It is shown that rock units in amphibolite and granulite facies of comparable range in major element chemistries are significantly different in trace element contents. The granulite facies rocks are characterized by low Rb, Th, and U concentrations and have high Rb ratios. Thus, Pb concentration also tends to be significantly lower than in compar-

able amphibolite facies rocks. Sr and Ba concentrations are high in granulite facies rocks. Subsequent, retrograde metamorphism does not noticeably affect the trace element concentrations of the rocks.

Marine-geological investigations on the continental shelf off the coast of Møre-Trøndelag, South Norway

H. HOLTEDAHL

During 1968 and 1969 three cruises were carried out on the Continental Shelf off the coast of Møre and Trøndelag, South Norway, with the purpose of studying the sediments and general geology.

The present results show the presence of Pleistocene deposits on the entire shelf area right out to the continental slope. The main type of deposit is till. On the relatively shallow and narrow shelf off the coast of Møre, the till has to a great extent been winnowed out, leaving lag deposits mainly of sand and gravel. In the somewhat deeper shelf area off the coast of Trøndelag the till is less altered by winnowing, with the exception of the banks Haltenbanken and Frøyabanken.

The rock content of the glacial deposits off the coast of Møre is mainly of types known from the adjacent coast, to a great extent granites and gneisses, and pointing to a deposition by glaciers from land. An admixture of exotic rocks (Oslo rocks, flint, etc.) is supposed to have been transported and dropped by drifting icebergs.

Off the coast of Trøndelag the rock content of the glacial material is also clearly derived from the adjacent coast, as well as from the Oslofjord-Skagerrak area. In an area between Haltenbanken and Frøyabanken, however, the rock material sampled is distinctly higher in content of non-crystalline, slightly consolidated sedimentary rocks (calcareous sandstone, sandstone, claystone, etc.), which are not known from the mainland, and which, owing to their fragility, are not supposed to have travelled far by ice transport. These rocks are known in some cases to make up 30 per cent of the total sample.

The same area is also characterized by fossils of Mesozoic age, mostly fragments of belemnites, but also ammonites (Hoplitacea), present in sandstone (I. Nagy pers. comm.), and claystones with a foraminifera-fauna from Danien (R. Feyling-Hanssen, pers. comm.).

The relatively high content of rocks with a presumably Mesozoic age in the samples from a fairly restricted area between Frøyabanken and Haltenbanken, strongly suggests bedrock of Mesozoic age occurring in the area. This supposition is strongly supported by the seismic profiling records, which suggest a very thin or possibly non-existing cover of Pleistocene material in the same area, and the outcropping of slightly seawards-sloping beds.

Preliminary interpretation of a seismic refraction profile through southeastern Norway

R. KANESTRØM

In the Scandinavian Seismic Deep Sounding Project, carried out in June 1969, the Seismological Observatory, University of Bergen, was responsible for the recording along a profile running from Trøndelag to Oslofjord west of Bohuslän.

Two charges were fired at each end of the profile. Seven portable recording stations were used along the profile, and the stations were moved to new positions after each explosion. Together with the instruments in operation in the NORSAR system, this gave a total of 50 recording points.

A preliminary interpretation of the refraction profile gives a P_n -velocity of 8.15 km/sec. The apparent velocities in the north-south and south-north directions were 8.35 and 7.95 km/sec respectively.

With the assumption of a mean P-velocity of 6.35 km/sec in the crust, the difference in the apparent P_n -velocities corresponds to an apparent dip of Moho of 1.7 degrees to the north.

The observed variations in the travel times of the P_n -phases are explained by undulations of the order of 2 - 3 km in the crust/mantle interface. The thickness of the crust is about 40 km under Trøndelag and 30 km under Oslofjord.

Some remarks on terrain correction

P. MOEN

Terrain corrections are based upon Hammer's method, supplied by a graphic interpolation. It takes 1 - 1½ hours to compute corrections for a station in rough surroundings. The convenience of using an electronic computer in districts of few gravity stations is questionable since the terrain has not yet been successfully represented by the computer.

Notes on the quaternary sediments of the Norwegian Continental Shelf between 62° and 67°N

E. NYSÆTHER

This paper deals with the distribution and thickness of the quaternary sediments on the Norwegian Continental Shelf between 62° and 67° N. An isopach map of the sediments and a structural map of the underlying uncon-

formity is presented for the area between Smøla and Vestfjorden. In this area there is a distinct difference in the distribution of the sediments between the inner and the outer part of the shelf, the distribution being partly a function of the shape of the pre-Quaternary unconformity.

The three lava types of the southern Oslo Region

C. OFTEDAHL

The existence of two different lava types obviously originating from two different environments has long been known (Oftedahl 1952), the basaltic ones (including latite-basalts and latite-andesites) originating in the Upper Mantle and the rhomb porphyries with subordinate amounts of trachytic to rhyolitic lavas, most likely originating in the crust.

Detailed mapping of the lava flows in the Vestfold lava plateau of the southern Oslo Region with up to 100 chemical analyses and thin section petrography has shown that one can distinguish between three types. The first group comprises basalts, latite-basalts, and latite-andesites with porphyric varieties in the B₁-complex, and with non-porphyric flows as in B₂ - B₅. The second group contains the traditional rhomb porphyries, most of which are latites, but which grade into ordinary trachyte composition. They all contain phenocrysts of plagioclase with rhomb shape. The third group is characterized by phenocryst of acidic plagioclase with rectangular outlines and small sizes (1 - 5 mm mostly).

The main group is of trachytic chemistry, but starts with latites and grades into ordinary rhyolites, often ignimbrites. Although there may be some transitional cases, for most lava flows one may with certainty distinguish between rhomb porphyries and those with small rectangular feldspar phenocrysts. This clearly points to two different sources for the intermediate to acidic magmas, associated with rhomb feldspars and another with feldspars bounded by conventional crystal phases like (001), (010), and (201).

Gravity investigations on the Norwegian Continental Shelf between 62° and 69°N

I. B. RAMBERG AND G. GRØNLIE

Gravity data from the Vøring Plateau and the Norwegian Continental Shelf from Møre to Lofoten are analysed and give strong indications of large sedimentary basins outside the Norwegian coast. Two extreme assumptions are presented and discussed:

1. no isostatic compensation is present, the Bouguer anomaly lows are all due to sedimentary deposits,
2. isostatic compensation is a fact.

The computed models from Bouguer and isostatic residuals along five profiles indicate a NNE-trending basin with axis about 200 km from the coast, and with sedimentary thickness up to at least 7000 m west of Vikna. Another basin axis west of and parallel to the first is found, this basin having a maximum filling of more than 5000 m. On the Vøring marginal plateau there are indications of a third sedimentary basin bordered by a seaward basement ridge. The outline of the basins seems related to the occurrence of ridges parallel to the Caledonian direction.

Stratigraphical, tectonial, and petrological investigations in the Kristiansund area

A. RÅHEIM

About 600 km² have been mapped. The primary supracrustal rocks are divided into 3 groups: Frei, Kristiansund (Rausand), and Sandvik (Tingvoll).

The drag folds and the dip of the axial plane indicate that the area lies in the northern part of a greater anticlinorium (the Halså anticlinorium). In all the groups there are found two phases of folding ($f_1 = 70^\circ$, $f_2 = 130^\circ$).

Genetically the rocks of the Frei group are interpreted as the result of a clay, sand, and lime sedimentation, together with an extensive dacitic/ryodacitic and basaltic vulcanism (rocks belonging to the eclogite-garnet amphibolite rock series). The origin of the rocks of the Kristiansund group seems to lie in a dacitic/ryodacitic vulcanism (resulting in the gray gneiss) mixed up with other material (resulting in the granitic gneiss). The granitic gneisses could also be explained as primary arkoses. In the Sandvik group a basaltic vulcanism, weathered basic material mixed up with terrigenous sediments, and arcose deposition together with lime and clay sedimentation seems to have been in evidence.

Metaperidotites, metapyroxenites, and especially metadolerites occur frequently in the Frei group. In the Kristiansund group there also occur metadolerites and metapyroxenites.

Generally the metamorphism (related to f_1) seems to decrease from south to north in the Frei group (high pressure variant of upper almandine amphibolite facies) and northwards through the Kristiansund group (upper/middle almandine amphibolite facies) to the Sandvik group (middle/lower almandine amphibolite facies). The anhydrous mineral paragenesis of the Frei group's metadolerites, the presence of eclogites, and the existence of the garnet-kyanite-biotite (+ muscovite)-potash feldspar-plagioclase-quartz association together with a granitic melt, do not only indicate high P and T (about $700 \pm 20^\circ\text{C}/10 \pm 1 \text{ kb}$) for the Frei group, but also $P_{\text{H}_2\text{O}} < P_{\text{load}}$.

The geological models are:

1. All the groups belong to one eugeosynclinal complex.

2. The difference in metamorphism between the Frei group and the Kristiansund-Sandvik group may indicate two supracrustal complexes of different ages with the Frei group being the older.
3. A basal gneiss complex (Kristiansund (Rausand) and Frei group) folded and caledonized together with eocambrian and younger deposits Sandvik (Tingvoll) group).

Model 1 is preferred.

Models 2 and 3 are difficult to accept, as the very persistent supracrustal rocks, which among themselves are concordant, interlayered, or with gradual transitions, are also parallel to the borders of the groups. All the groups also have the same structural elements. The apparent difference in metamorphism between the Frei group and the Kristiansund group (which is easily seen when comparing the dolerites of the groups) could be explained by the predominance of granitic gneisses in the Kristiansund group. During the metamorphism these gneisses have produced large amounts of anatexic melts. These water-saturated melts have probably, when they solidified, amphibolitized the basic rocks of the Kristiansund group.

Seismic refraction investigation on the Norwegian Continental Shelf north of 62°N

M. A. SELLEVOLL

The Seismological Observatory, University of Bergen, has during the years 1967 - 69 carried out 6500 km seismic continuous profilings on the Norwegian Shelf between 62° and 68° N and two seismic refraction programs on the shelf between 62° and 65°N and 69° and 71°N. The present report deals with the results from the two refraction programs.

The results obtained from ten short-range refraction profiles on the Norwegian Continental Shelf in the area between 62° and 65°N show that the shelf is covered with a considerable thickness of layered sediments. The maximum total thickness measured is 4.1 km. Average velocities are 1.9, 2.2, 2.6, and 3.6 km/sec, representing unconsolidated, semiconsolidated, and consolidated sediments, and 5.2 km/sec representing a basement which is probably a continuation of the continental crystalline rocks. On the sea floor the surface expression of the sediment-basement interface separates a region of exposed basement from the typical sediment-covered shelf. The sediment-basement interface dips towards the shelf edge with its maximum gradient near the coast. The sediments may be of Cenozoic and Mesozoic age.

Nine short-range seismic refraction profiles (10 - 15 km) between 69° N and 71° N have been investigated. All profiles, except two, have been reversed. The following average velocities are obtained: 1.85, 2.20, 2.55, 3.25, 3.90, and 5.24 km/sec. The maximum depth to basement being calculated is 5.1 km.

The lack of geological information about the Norwegian Continental Shelf has made it difficult to correlate the 'seismic structures' with geological structures. No area of Tertiary sediments has been found in Norway. The only occurrence of Mesozoic rocks is a little area on the east coast of Andøya. By dredging along the continental slope NW of Andøya, rocks probably from Upper Cretaceous have been found (Manum, 1966). The coastal areas inside the investigated profiles consist of metamorphic rocks having velocities from 5.0 to 5.5 km/sec. Therefore, the lowest interface found is assumed as a basement which is probably a continuation of the landward rocks. The first refractor probably consists of unconsolidated sediments of Quarternary age. The average velocity of 2.20 km/sec, represented by the next layer, is a well established velocity in rocks of Tertiary age. The velocities 2.55, 3.25, and 3.90 km/sec indicate consolidated deposits of Mesozoic age.

The Continental Shelf program is sponsored by the Royal Norwegian Council for Scientific and Industrial Research.

A gravimetric profile across the dunite at Raudalsvatn

A. SINDRE

A 550 m long gravimetric profile was measured across the 280 m wide and 800 m long exposure of the dunite at Raudalsvatn. The dunite is surrounded by gneiss, density contrast 0.45. The topographic corrections were calculated by the use of Hammer's diagram and are very large. The profile is short because good topographic maps cover only the dunite and a small area around it.

Gravity anomalies were calculated for models, and the forms of the anomaly curves were compared with the measured one. The calculated anomaly curve for a vertical model 1300 m deep and with a rectangular cross section fits very well with the observed data.

If the density contrast 0.45 is the same all the way down, these measurements show that the dunite at Raudalsvatn has a considerable vertical extension, probably a depth of the order of 1000 m or more.

Gravity measurements on the island of Smøla

A. SINDRE

A preliminary Bouguer anomaly map with a contour interval of 1 milligal has been made of the island of Smøla. The map is based on 167 observations on the main island and the surrounding islets.

Some local positive and negative anomalies have been found. The gravity values increase rapidly off the north coast of the main island, reaching the value of +74 mgal on the northernmost islet. This indicates a strong gravity high with its maximum somewhere in the sea just north of Smøla.

Assumed contact between Precambrian and younger supracrustals around Grotli

T. STRAND

The supracrustals at Grotli, recently described by the writer and assumed to be of about Eocambrian age, border in the west towards strongly pegmatite-veined gneisses, probably representing an old Precambrian basement ($\sim 10^9$ years according to investigations by Brueckner, Wheeler, and Armstrong on rocks farther north). The work was continued by Grimstad and the author last summer. Grimstad mapped the contact between assumed younger supracrustals and basement south of Grotli, while the author found the contact east of Grotli.

Gneisses within the Grotli supracrustals are not fully devoid of feldspar veins, but the assumed basement gneisses often have cross-cutting dykes of coarse-grained pegmatite up to $\frac{1}{2}$ m thick. The fact that the contact between the two rock units can be mapped indicates that the gneiss as well as the pegmatite belong to an old Precambrian basement.

The same contact has been mapped farther north by Brueckner. North-east of Grotli the contact is still unmapped. The synclinorium of younger supracrustals ends towards the south in a NE-SW directed synformal structure east of Liavatn, mapped by Elliot & Shouls.

Magnetic investigations on the Continental Shelf of Norway, Stadlandet - Lofoten (62-69°N)

I. AALSTAD AND K. ÅM

Aeromagnetic measurements on the Continental Shelf of Norway have been conducted by Norges geologiske undersøkelse (geophysical department) since 1963. A residual magnetic isogam map based on measurements from the years 1965 - 1967 and the 'IGRF - 1965' normal field is presented. The map is specified as follows: 1 : 1,500,000 scale, 20 gammas contour interval, 5 km flightline spacing, 600' barometric altitude, Elsec 592 magnetometer, and Loran A navigation.

The map shows several interesting features like the continuation of the Lofoten granulites to the south, and similar strong magnetic anomalies to the west indicating another mass of charnockitic rocks lying parallel to Lofoten and having approximately the same size. A major NW-trending break is indicated in both topography and magnetometry along Trøndjupet (10°E , 67°N), cutting the Lofoten anomalies to the south. The westernmost mass seems to continue on the southern side of the break. Another feature is the change in magnetic pattern from narrow to broader anomalies at or near the 'marginal channels' parallelling the coastline. More detailed work is required to prove or disprove the existence of faulting along these depressions.

The original magnetometer data, together with data from the U.S. Naval Oceanographic Office, Project Magnet, have been interpreted in terms of depth of magnetic basement. This interpretation shows the existence of a large basin being parallel to the coast, with its axis 120 - 150 km from the coastline. Along Nordland ($65 - 67^{\circ}\text{N}$) the axis is situated not far from the centre of the shelf with maximum depths exceeding 9 km. A culmination (7 - 8 km depths) is indicated outside Trøndelag (64°N). Outside Møre (63°N) the basin deepens again reaching depth of more than 10 km with the axis on the continental rise about 60 km off the shelf. The outer part of the Vøring Plateau (4°E , 67.5°N) is characterized by shallow 'volcanic' anomalies masking completely the basement anomalies, while the inner half is magnetically quiet and similar in magnetic pattern to the shelf-area inside. The magnetic basement reaches depths of about 6 km along the edge of the shelf, and seems to be at least 5 km deep on the inner part of the Vøring Plateau. On the outer part nothing can be said about basement depths due to the above-mentioned shallow effects. Where seismic control is available, the agreement is striking.