Geology of the western and north-eastern part of the Meråker area

J. Chaloupský and F. Fediuk.

Abstract

A thick metasedimentary sequence together with a volcanic and hypabyssal intrusive complex is described. While strata dip generally westwards it can be shown that the sucession is, for the most part, inverted; the discovery of a polymict conglomerate stratigraphically above the volcanic series has helped to confirm this view. In the east, the youngest (Silurian) metasediments occupy the core of an asymmetrical syncline, overturned towards the east. Gabbro bodies, mostly sills, occur throughout all except the Silurian rocks: these gabbros are younger than similar basic rocks in the igneous complex. The regional metamorphism of the sequence has been low grade viz. greenschist facies, and is manifested by a well-defined schistosity. Locally, biotite porphyroblastesis post-dates this schistosity.

Introduction

In the summer of 1965, the authors carried out geological investigations and mapping of an area of approx. 250 km², lying 90 km E of Trondheim. For mapping purposes aerial photographs on a scale of about 1:35 000 were used. The area is bounded in the S by the Tevla River (between Meråker and Kopperå), the Kopperå—Fjergen road and the Fjergen lake as far as Halsjøen lake, in the E by the state border to the Storsjø-lake NE of Kjølhaugen, from where northern boundary runs to the Færen-lake. In the W the area extends to the tie-line Fundsjø—Meråker. The south-western part was mapped by F. Fediuk and the eastern sector by J. Chaloupský.

The area belongs to the eastern marginal part of the Caledonides of the Trondheim region, and comprises a folded, weakly metomorphosed sedimentary sequence, accompanied by volcanic series and hypabyssal intrusives.

Fig. 2. Alternation of metabasites and quartz-keratophyres in the outcrop along the the road 2 km SSE from the lake Fundsjø.

Veksling av metabasitter og kvartskeratofyrer i veiskjæring 2 km syd-sydøst for Fundsjøen.

Lithological descriptions

In the several thousand metres thick complex several sedimentary cycles can be differentiated; each of them begins with coarse clastic deposits often with conglomerate at the base and after several repetitions of beds it ends with finer grained pelitic or silty rocks. The earliest deposits occur in the western part of the area, at the contact with the igneous complex.

The igneous complex extends along the western margin of the area, between Meråker and the Færen lake. It consist of alternating basic and acid volcanics. The former show mostly the character of metabasites, viz. greenschist, prasinites and albite-epidote-amphibolites designated by (1) in Plate I. Sporadically, a relict amygdaloidal structure was observed in these rocks. Acid volcanics correspond to quartz-keratophyres (2). The alternation of the two rock types is very rapid, and layering of the order of metres or even decimetres is not exceptional (figure 2). As the layers of both basic and acid volcanics are traceable over a distance of several hundred metres, they can hardly be interpreted

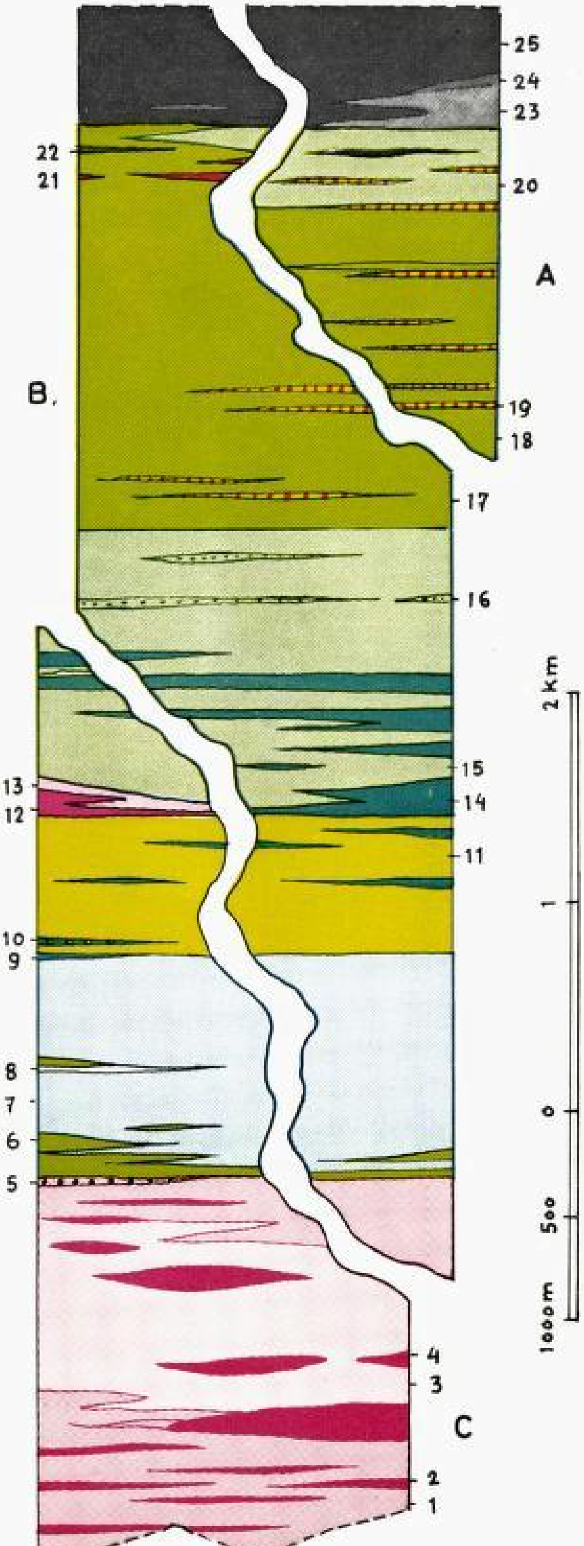

Plate I: Stratigraphical sketch of the mapped area.

Stratigrafisk skisse av det kartlagte området.

A. Development of the eastern part of the area.

Utviklingen av den østlige del av feltet.

B. Development in the central part.

Utviklingen i den sentrale del.

C. Development in the south-western part.

Utviklingen i den sydvestre del.

For explanation of numerals at the margin, see the text.

Forklaring til tallene i margen finns i teksten.

Fig. 3. Albite granite with graphic texture. From an outcrop 1,5 km N of Meråker railway station. (Photomicrograph by D. Hejdova, magnification X 18, crossed nicols.)
Albitt-granitt med grafisk tekstur. Fra en blotning 1,5 km nord for Meråker jernbane-stasjon. (Mikrofoto ved D. Hejdova, forstørrelse X 18, x-nicoler.)

as lava sheets, particularly the acid types (due to the high viscosity of acid magmas), and a pyroclastic origin for at least part of the sequence should be postulated. In addition to the above-mentioned types, the igneous complex also comprises substantially coarser grained rocks that can be interpreted as the product of hypabyssal intrusions accompanying the volcanic activity. These rocks have again both acid and basic chemical characteristics. Basic rocks of this group, prevailing greatly over the aid types, are represented in those parts relatively little affected tectonically, by fine- to medium-grained albitized hornblende gabbros ranging up to diorites (3). They frequently pass into more or less schistose varieties. Scarce lenses of ultrabasic rocks (hornblendites) most probably originated by differentiation from gabbros. Acid intrusive rocks (4) are leucocratic and composed of albite and quartz (albite-granite, figure 3), At some places the penetration of acid rocks into basic ones was observed.

Above the igneous complex (structurally below) there is an approximately

Fig. 4. Lille Fundsjø conglomerate — the outcrop on the S. bank of the lake Lille Fundsjø.

Lille Fundsjø-conglomerater — blotning på sydlig bredd av Lille Fundsjøen.

1.000 m thick sequence of folded, grey chlorite — sericite up to biotite — sericite phyllites (7), which frequently display platy or sometimes laminar splitting. Some darker coloured varieties have an increased proportion of graphitic matter. In this lower part of the sequence, beds of graywacke-phyllite and laminated phyllitic graywacke are randomly distributed (6). Their boundary with the underlying igneous complex is sharp; S of the Færen lake it is marked by a conspicuous layer of medium- to coarse-grained polymict conglomerate, called the Lille-Fundsjø-Conglomerate (5). This stratigraphically oldest conglomerate band can be followed from the southern bank of the Faeren lake to the northern environs of Meråker. It is best developed near the Lille-Fundsjø lake (figure 4), where it attains a thickness of 20 metres. Towards the N and S of the lake, the thickness decreases to 1 metre. The conglomerate lies immediately or almost directly upon the igneous complex and much of its pebble material has been unquestionably derived from these igneous rocks. An analysis of pebbles provided the following results:

Basic intrusives (gabbro)	49 %
Greenschists — greenstones	23 %
Quartz-keratophyre	13 %
Albite-granite	4 %
Graywacke	4 %
Hornblendite	3 %
Limestone	3 %
Erlan	1 %.

The mean pebble size is 3—5 cm, but cobbles above 10 cm across can also be found.

At about the middle of the sequence there is another conglomerate band (8); it is not very distinct and has therefore not been well recognized. This fine-grained conglomerate with quartz pebbles is only several decimetres in thickness and tracable for a few hundred metres.

The sericite phyllites are overlain by about 700 m of grey fine-grained, often calcite-rich phyllitic graywacke or subgraywacke (11). In the northern tract of the area investigated, their upper part frequently contains beds of grey sericite phyllite. In the basal part of the sequence thin intercalations of crystalline limestone ("Brenna Limestone") and oligomictic fine- to medium-grained conglomerate, termed the "Brenna Conglomerate", may occasionally be found.

In the limestone (9) a number of quarries are present in the vicinity of Brenna village, where a lenticular, ca. 1 km long and maximum 15 m (on the average 8 m) thick layer is worked. According to DTA results, the admixture of dolomite is negligible so that the rock is almost pure calcitemarble. It is noteworthy that the marble occasionally contains fuchsite; the chromium necessary for its formation was most likely derived from the igneous complex. Near the north-western embayment of the Fjergen lake, another layer of calcite-marble was observed, the maximum thickness of which is however only 3 metres. A third, even thinner carbonate band crops out in the valley of a stream N of the Langen lake. All three carbonate lenses lie nearly at the same, but not quite identical stratigraphical level.

The Brenna Conglomerate (10) can be found in the road cutting S of the limestone quarry near Brenna. It forms several 0,5 m thick bands and contains quartz and subordinate quartzite and grey fine-grained limestone pebbles. The same layer was observed in 1964 by F. Chr. Wolff (personal communication) about 1 km further to the north. The geological position of the Brenna outcrop shows clearly that the conglomerates lie above the Brenna limestone, though not more than 30 m above this horizon.

Fig. 5. Albite granite with graphic texture in a pebble from the Kjølhaugene conglomerate. (Photomicrograph by D. Hejdova, magnification X 18, crossed nicols.)

Albitt-granitt med grafisk tekstur i en bolle på østbredden av Fundsjøen. (Mikrofoto ved D. Hejdova, forstørrelse X 18, x-nicoler.)

The next approximately 1.300 m thick sequence of strata is characterized by a monotonous alternation of green-grey phyllitic graywackes to subgraywackes (several metres to a few tens of metres thick) with chlorite-sericite phyllites (15). In the basal part intercalations of sericite phyllite (14) are still abundant. The upper boundary of the sequence is marked by the last thicker bed of feldspathic sandstone (16). To the SSW of Langen lake, a layer of metabasites (12), (13) resembling some varieties of the underlying igneous complex, intervenes between the above-described greenish feldspathic sandstones and the subjacent grey sandstones. This layer attains a thickness of several hundred metres in the S, near Kopperå, but thins out northwards and disappears in the proximity of the Fjergen lake. The rocks of this volcanic horizon show a massive and banded structure. In our opinion, the rocks of the former type (12) originated from diabase effusives and those of the latter type (13) were derived from tuffs.

The sequence of greenish-grey graywackes and subgraywackes is connected

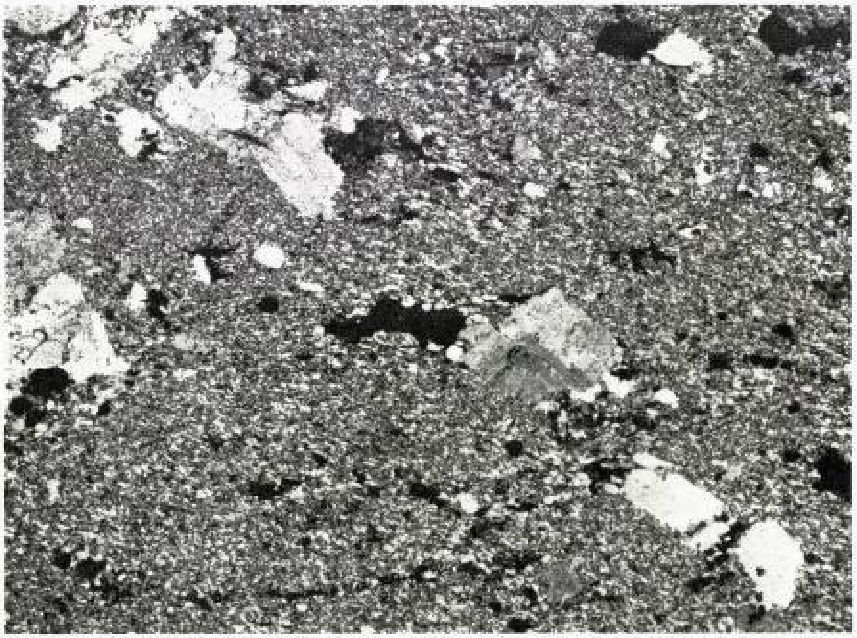

Fig 6a. Quartz-keratophyre from the igneous complex on the E bank of the lake Fundsjø. (Photomicrograph by D. Hejdova, magnification X 18, crossed nicols.)
Kvartskeratofyr fra eruptivkompleks på østbredden av Fundsjøen. (Mikrofoto ved D. Hejdova, forstørrelse X 18, x-nicoler.)

by gradual transitions with an almost 2.000 m thick monotonous sequence of greyish-green, fine-grained phyllitic siltstones and chlorite-sericite phyllites (17 and 18). This complex constitutes the main ridges of Kjølhaugene and Blåbergene and in a somewhat altered lithological facies crops out in the eastern part of the studied area in the mountain ranges Liefjeldene and Halsjøfjeld. Typical of the sequence are coarse-grained polymictic conglomerates (19) containing several metres-thick intercalations of graywacke and slate. The pebbles of this conglomerate are well rounded, of elliptical form and, on average, a few cm across. Exceptionally, 40 cm-sized pebbles are found. The pebbles consist prevalently of whitish-grey to grey quartzite and quartz, with lesser quantities of grey and bluish-grey quartz-keratophyre, fine- to medium-grained, more or less schistose leucocratic albite-granite, granite-porphyry and aplite; graywackes, keratophyre greenschists and limestone are subordinate. Most of the pebble material of the Kjølhaugene Conglomerate was undoubtedly derived from the older Ordovician, in particular the igneous complex (e.g. albite-granite

Fig. 6b. Quartz-keratophyre pebble from the Kjølhaugene conglomerate. (Photomicrograph by D. Hejdova, magnification X 18, crossed nicols.)

Kvartskeratofyrbolle fra Kjølhaugenes konglomerat. (Mikrofoto ved D. Hejdova, forstørrelse X 18, x-nicoler.)

and quartz-keratophyre, see figures 3, 5, 6a and 6b). North-east of the Fjergen lake, in the uppermost part of the sequence of grey-green chlorite-sericite phyllites to siltstones, the sequence of greenish-grey feldspathic sandstone (20) reappears with gabbro-diabase sills (21) directly above.

Similar beds to those of the Kjølhaugene mountain massif occur in the eastern part of the area, NE of the Skalsvatnet lake. These, however, are the product of a coarser clastic sedimentation and contain numerous intercalations of graywacke to subgraywacke and of conglomerate with nearly the same pebble content as that described above. The younger sequence of green-grey graywacke to subgraywacke (20) is developed in a substantially greater thickness. From this it follows that the source area for the sedimentation was situated to the East.

The youngest member of the sedimentary complex is represented by grey to blackish-grey graywackes in a 1 km to 1,5 km wide belt (in the syncline core) in the depression of the Nordelven River. The basal part of the complex consists of grey fine-gained phyllitic graywackes or subgraywackes, in places calcite-bearing (23, 24), which alternate with dm- to m- intercalations of grey sericite phyllitic slates increasing upwards in number. These rocks occur at the eastern margin of the belt, being strongly reduced or althogether absent from the western border. The upper parts is mostly composed of finely schistose graphitic phyllitic slates, grey-black in colour, which carry thin intercalations of dark siltstones (25).

In many places, sedimentary rocks of nearly all stratigraphical levels, except for the youngest sequence of grey-black phyllitic slates and siltstones, are penetrated by minor bodies, generally sills, of igneous rocks. Their thickness varies from several metres to a few tens of metres, while they may be several hundred metres in length. The rocks correspond in structure to gabbro and gabbro-diabase; mineralogically, they are composed of 50 per cent of a mafic mineral (invariably common green hornblende, never pyroxene) and 50 per cent of fully de-anorthitized plagioclase. During this process a large amount of minerals of the epidote group was generated. The grain-size varies greatly, depending on the distance from the contact and the thickness of the body. With regard to their age, these basic rocks are clearly younger than similar rocks of the igneous complex underlying the Lille-Fundsjø Conglomerate and probably older than the youngest member of the sedimentary complex.

Notes on stratigraphy, tectonics and metamorphism

The stratigraphical positions of the above-described complexes are very difficult to assess in the absence of fossils. The only recorded ocurrence of fossils (Silurian graptolites) was described from the youngest sequence of greyish-black graphitic phyllitic slates on the eastern slope of Kjølhaugene (A. Getz 1890). All search for other biostratigraphical evidence has unfortunately been fruitless. Thus, the chronological assignment of the complexes can be based only on lithostratigraphical correlation with the analogous, paleontologically proved units of the Trondheim area. The detailed stratigraphical arrangement may be solved from a broad analysis of major areal wholes. Our investigation of a relatively small area permits only to state that the oldest member there — the igneous complex — is most probably comparable with the Lower Ordovician Støren Group. From this presumption an approximate dating of the voluminous sedimentary sequences, extending between the igneous complex and the fossiliferous Silurian phyllitic slates above, can be derived.

At first sight it would appear that proceeding eastwards one is moving down the stratigraphical sequence, but our investigation has corroborated F. Chr. Wolff's conception (1964) that in this area the beds are overturned, so that

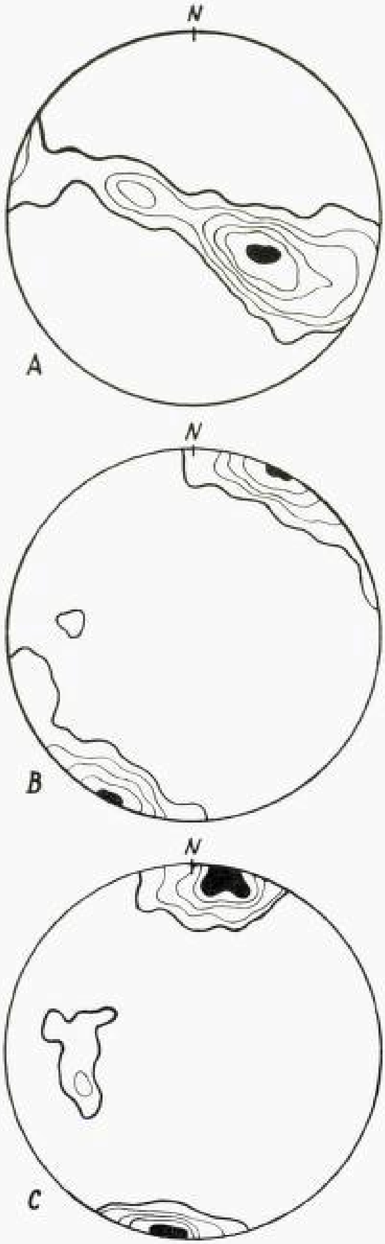

Fig. 7. Structural diagram.

A) — schistosity in the central and eastern parts of the area. (poles of planes). — Isolines: 50—30—20—10—5—2 %, 305 measurements.

B) — lineation in the central and eastern parts of the area. — Isolines: 30—20—10—5—2 %, 135 measurements.

C) — lineation in the south-western part of the area. — Isolines: 20—15—10—5—2 %, 88 measurements.

Equal-area projection,lower hemisphere.

Strukturdiagram.

A) Skifrighet i de sentrale og østlige deler av området, (poler til plan). — Konturer: 50—30—20—10—5—2 %. 305 målinger.

B) Lineasjon i de sentrale og østlige deler av området. — Konturer: 30—20—10—5—2 %, 135 målinger.

C) Lineasjon i den sydvestlige del av området. Konturer: 20—15—10—5—2 %, 88 målinger. Schmidt-nett, undre halvkule.

the structurally highest members in the west are stratigraphically the lowest. This opinion has been unmistakably confirmed by the study of conglomerate pebbles, in which rocks typical of the apparently (structurally) overlying sequence have been identified. The observation that, in the west the sedimentary cycles always begin with a coarser clastic sedimentation, is also consistent with the above assumption.

Foliation planes, interpretable as schistosity planes developed from the bedding, strike with a few exceptions at about 010°—040°; in the western and central areas they dip uniformly to the W (strictly to WNW), usually at about 50° (figure 7a). In the eastern part of the area investigated, in the proximity of the Swedish border (SSW of Skalsvatnet lake), the tectonic style is somewhat different. The dip of beds is not only to the west but also to the east at varying angles. From the geological section showing the structure of this sector (Plane II, A-B), it is apparent that the zone of youngest Silurian sediments is followed again by older rock complexes that form the eastern limb of a large assymmetrical syncline.

Linear structures are represented chiefly by the axes of folds of various size, ranging from several hundred metre-folds to phyllitic crumpling. Whereas the axes of large folds trend invariably in one direction, essentially consistent with that of foliation, minor fold axes display two widely different strikes. The predominant lineation system conforms in strike and plunge with large fold axes: in the eastern and central parts of the area it is subhorizontal and strikes at 030° (fig. 7 b); in the SW the strikes change from 030° and the mean plunge varies between 5—10° (fig. 7 c). The maximum of this lineation is nearly identical with the maximum of fold-axes established by graphical construction (fig. 7 a). The apparently monoclinal dip of foliation planes is partly caused by the presence of isoclinal folds (figure 8).

In the area studied, fault tectonics are not very pronounced, although a rather intensive fault activity might be presumed from an examination of the aerial photographs. In addition to a few longitudinal faults, several cross faults of minor importance were ascertained. Of special significance for the geological structure of the area is the reverse fault running along the state border near the Halsjøen lake, along which the Early Palæozoic beds contact the presumed Pre-Cambrian higher-metamorphosed rocks (mainly garnetiferous two-mica gneiss). It is accompanied by a mylonite and phyllonite zone, several tens of metres thick. In truncating a major part of the older complexes, this regional fault produced the assymmetry of the above-mentioned structure.

The joint tectonics are closely connected with the main lineation system.

Fig. 8. The characteristic type of faulting in the graywacke phyllites on the bank of the lake Lille Tjern.

Den karakteristiske type av forkastning i gråvakkefyllitten på bredden av Lilletjern.

The greater proportion of joints have the character of ac-planes in relation to the b-axis defined by this lineation.

The regional metamorpism of the Early Palæozoic complexes in the area studied is very weak, not exceeding the grade of greenschist facies viz. the quartz-albite-epidote-biotite subfacies. In metabasites it is distinguished by the assemblage albite-actinolite (common green hornblende or barroisite) epidote-chlorite(or biotite) and in the pelitic-psammitic rocks by that of sericite-chlorite (± biotite) -quartz (± calcite).

The alteration is of a markedly kinetic character, manifested by well-defined schistosity and folding. The intensity of metamorphic crystallization is somewhat higher in the older Early Palæozoic complexes. The youngest (Silurian) sequence occurring in the core of the syncline suffered the lowest-grade metamorphism.

One of the common mineral components is biotite, which in places forms numerous, large porphyroblasts up to several millimetres across. Unlike the remaining minerals, it is almost unaffected by deformation. It is present cheifly in greenish-grey graywackes, subgraywackes, siltstones and chlorite-sericite phyllites, particularly E of the tie-line Kopperå — Langen. Biotite porphyroblasts indicate adequately that their development took place under relatively tranquil kinetic conditions.

Sammendrag

En tykk lagpakke av metasedimenter med et kompleks av vulkanske og hypabyssiske intrusiver er beskrevet i denne artikkelen. Til tross for at lagene stort sett faller mot vest, kan det påvises at lagfølgen, de fleste steder, er invertert. Funnet av et polymikt konglomerat, ved Lille Fundsjø, som påviselig ligger stratigrafisk over den vulkanske serien har bestyrket dette syn. I øst opptar de yngste (siluriske) metasedimentene kjernen av en assymmetrisk synklinal som er veltet over mot øst. Gabbrolegemer, for det meste lagerganger, opptrer i alle bergartene unntatt de siluriske. Disse gabbroene er yngre enn lignende basiske bergarter i det eruptive komplekset. Regionalmetamorfosen i lagpakken har vært svak, dvs. grønnskiferfacies, og er uttrykt ved en veldefinert skifrighet. Lokalt fins biotittporfyroblaster yngre enn skifrigheten.

STATENS TEKNOLOGISKE INSTITUTT
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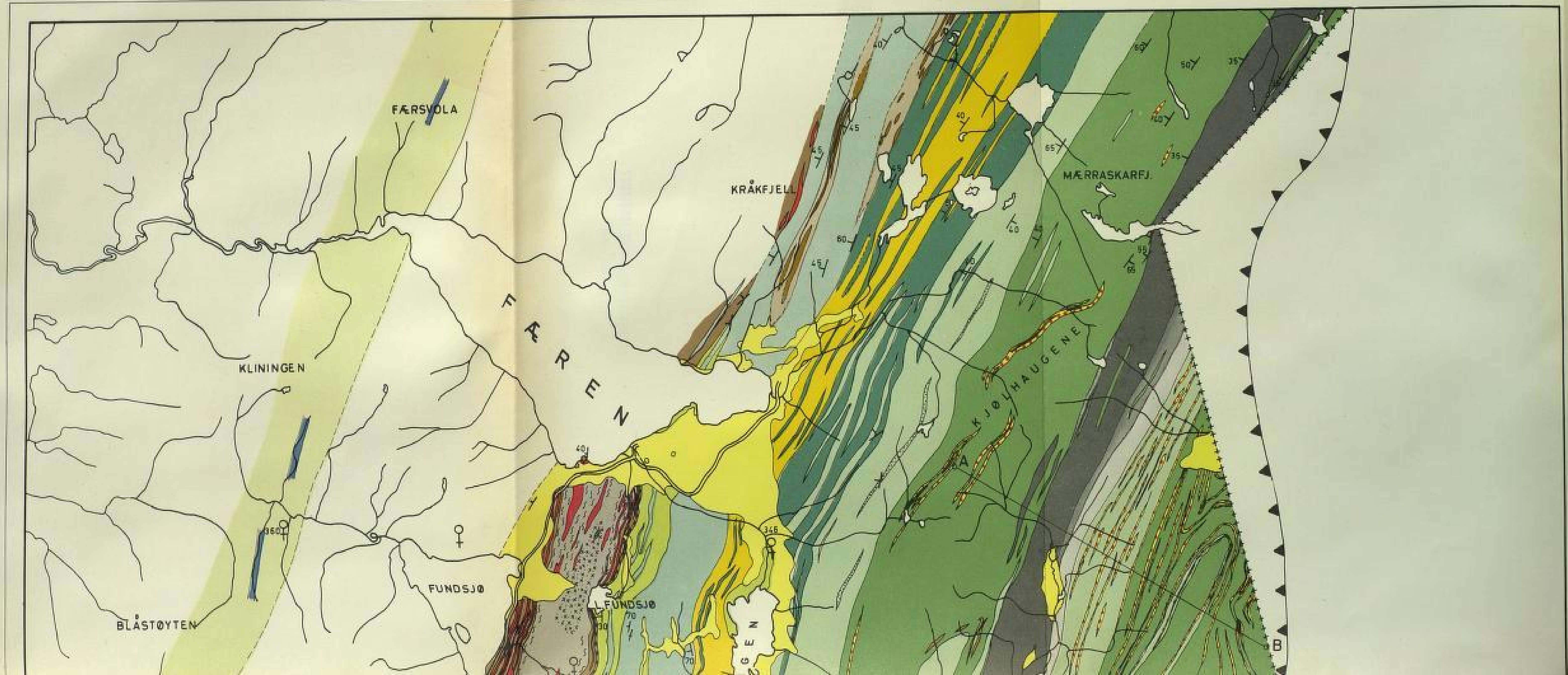
KJØLHAUGENE

GEOLOGICAL MAP OF THE MERÅKER AREA

GEOLOGISK KART OVER MERÅKER

Scale 1:100 000



LEGEND

Quaternary.

Slågån Group (Silurian).

Grey to grey-black phyllite, slate and metasiltstone.

Grey slates with intercalations of metasandstone.

Grey metasandstone with intercalations of slate.

Kjølhaugen Group (Upper Ordovician).

Grey-green slates and phyllites with intercalations of metagraywacke.

The Kjølhaugene quartzite conglomerate.

Grey-green metagraywackes with intercalations of slate (dotted: thicker beds of subgraywacke).

Grey phyllite.

Sulåmo Group (Middle Ordovician).

Metabasite with banded structure.

Metabasite of massive structure.

Grey phyllite.

Grey calcareous metasandstone.

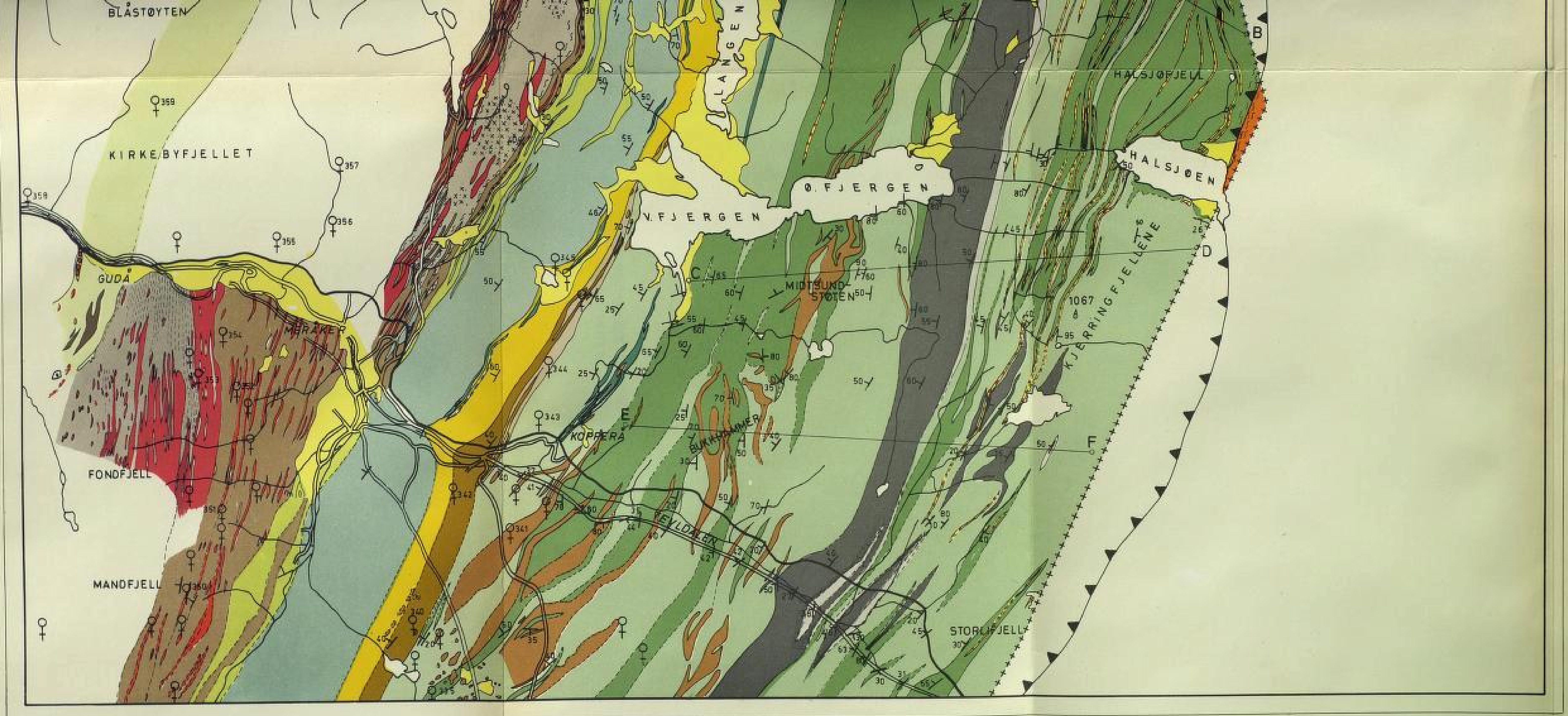
The Brenna conglomerate.

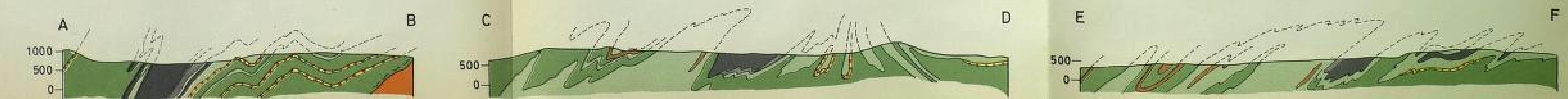
The Brenna limestone.

Grey and black phyllite.

Grey phyllites and graywackes.

The Lille Fundsjø conglomerate.





Grey phyllites and graywackes.

The Lille Fundsjø conglomerate.

Fundsjø Group (Lower Ordovician).

Metabasites.

Quartz-keratophyre.

Sonvatn Group (Cambrian)

Mica schists, often with garnet.

Alternating amphibolites and schists.

The Gudå quartzite conglomerate.

Limestone.

? Eocambrian.

Schists and gneisses.

Caledonian intrusives.

Granitic rocks.

Fine- to medium-grained gabbro.

Fine- to medium-grained gabbro, without preferred orientation.

Fine- to medium-grained gabbro, strongly schistose.

Hornblende gabbro.

Structures.

Strike and dip.

Lines of section.

Foliation, lineation.

Mylonite zone.

Thrust plane.

Occurrences of pyritic and chalcopyritic ore.

GEOLOGICAL MAP OF THE TRONDHEIM REGION

GEOLOGISK KART OVER TRONDHEIMSFELTET

1: 500 000

COMPILED BY FR. CHR. WOLFF AFTER:
SAMMENTEGNET AV FR. CHR. WOLFF ETTER:

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LEGEND
TEGNFORKLARING

RÖRAGEN BEDS (DEVONIAN)
RÖRAGENFELTET (DEVON)

CONGLOMERATE AND SHALE
KONGLOMERAT OG SKIFER

SLÅGÅN GROUP – HORG GROUP (SILURIAN)
SLÅGÅNGRUPPEN – HORGGRUPPEN (SILUR)

DARK SHALE AND SANDSTONE
MÖRK SKIFER OG SANDSTEIN

KJÖLHAUGEN GROUP – RÖROS GROUP – UPPER HOVIN GROUP (UPPER ORDOVICIAN)
KJÖLHAUGGRUPPEN RÖROSGRUPPEN ÖVRE HOVINGRUPPEN (ÖVRE ORDOVICIUM)

PHYLLITE, METAGRAYWACKES, WITH INCREASING AMOUNTS OF BIOTITE, HORNBLEND AND GARNET TOWARDS THE SOUTHEAST, PARTLY CONGLOMERATIC
FYLLITT, METAGRÅVAKKER MED ÖKENDE MENGDER AV BIOTITT, HORNBLENDE OG GRANAT MOT SYDÖST, DELVIS KONGLOMERATISK

POLYGENOUS CONGLOMERATE
POLYMIKT KONGLOMERAT

SULÅMO GROUP – LOWER HOVIN GROUP (MIDDLE ORDOVICIAN)
SULÅMOGRUPPEN UNDRE HOVINGRUPPEN (MIDTRE ORDOVICIUM)

DARK SHALE AND RHYOLITE TUFF IN WEST, GREENSTONE IN EAST
MÖRK SKIFER OG RHYOLITT TUFF I VEST, GRÖNNSTEN I ÖST

GREY CALCAROUS SANDSTONE AND GREY TO DARK PHYLLITE
GRÅ KALKHOLDIG SANDSTEIN OG GRÅ TIL MÖRK FYLLITT

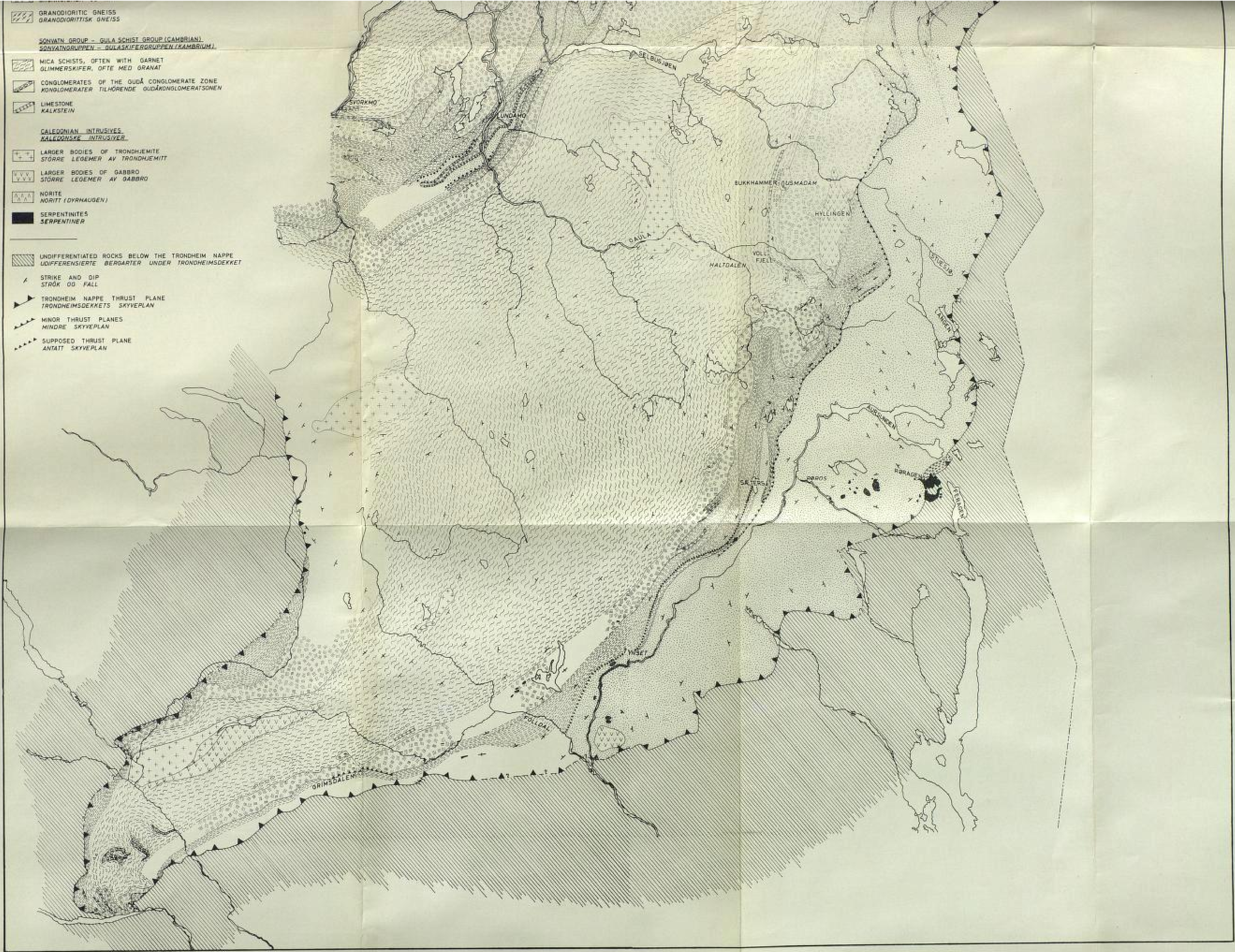
HÖLONDA, TROMSDALEN, BRENNA AND SIMILAR LIMESTONES
HÖLONDA, TROMSDALEN, BRENNA OG LIGNENDE KALKSTEINER

VENNA, STOKKVOLA, LILLE FUNDSJÖ AND SIMILAR CONGLOMERATES
VENNA, STOKKVOLA, LILLE FUNDSJÖ OG LIGNENDE KONGLOMERATER

FUNDSJÖ GROUP – STÖREN GROUP (LOWER ORDOVICIAN)
FUNDSJÖGRUPPEN – STÖRENGRUPPEN (UNDRE ORDOVICIUM)

GREENSTONES AND QUARTZKERATOPHYRES
GRÖNNSTENER OG KVARTSKERATOFYRER

GRANODIORITIC GNEISS
GRANODIORITTISK GNEISS


GRANODIORITIC GNEISS
GRANODIORITTISK GNEISS
SONVATN GROUP – GULA SCHIST GROUP (CAMBRIAN)
SONVATNGRUPPEN – GULASKIFERGRUPPEN (KAMBRIUM)
MICA SCHISTS, OFTEN WITH GARNET
GLIMMERSKIFER, OFTE MED GRANAT
CONGLOMERATES OF THE GUDÅ CONGLOMERATE ZONE
KONGLOMERATER TILHÖRENDE GUDÅKONGLOMERATSONEN
LIMESTONE
KALKSTEIN
CALEDONIAN INTRUSIVES
KALEDONSKE INTRUSIVER
LARGER BODIES OF TRONDHJEMITE
STÖRRE LEGEMER AV TRONDHJEMITT
LARGER BODIES OF GABBRO
STÖRRE LEGEMER AV GABBRO
NORITE
NORITT (DYRHAUGEN)
SERPENTINITES
SERPENTINER
UNDIFFERENTIATED ROCKS BELOW THE TRONDHEIM NAPPE
UDIFFERENSIERTE BERGARTER UNDER TRONDHEIMSDEKKET
STRIKE AND DIP
STRÖK OG FALL
TRONDHEIM NAPPE THRUST PLANE
TRONDHEIMSDEKKETS SKYVEPLAN
MINOR THRUST PLANES
MINDRE SKYVEPLAN
SUPPOSED THRUST PLANE
ANTATT SKYVEPLAN
SELBUSJØEN
SVORKMO
LUNDAMO
BUKKHAMMER
USMADAM
HYLLINGEN
GAULA
HALTDALEN
VOLL
FJELL
STUESJØ
ARGEN
AURSUNDEN
RØRAGEN
RØROS
FERAGEN
SÅTERSJ
FOLLDAL
GRIMSDALEN
VIGET