

Geology of the northernmost part of the Meråker area

By

Anna Siedlecka & Stanislaw Siedlecki.

Abstract

Four lithostratigraphical groups comprising sedimentary and igneous rocks have been distinguished in the mapped area. There are conformities and gradual transitions between all these groups.

The rocks have been subjected to a low grade of metamorphism, being changed to metabasites and metasediments. They are folded, with fold axes trending approximately NNE. The lithological units form narrow elongated zones dipping to the west. In the eastern part of the area an asymmetrical syncline has been observed.

Introduction

During two weeks in July 1966 we mapped an area (ca. 75 km²) situated north from the Kjølhauene mountains, bounded in the west by the Kråkfjell mountain, to the north by the geological map of the Verdalen valley (Wolff, 1960*) and in the east by the border between Norway and Sweden. As the lakes Sulsjøerne occur within the mapped area, the area will here be referred to by this name.

The stratigraphical and lithological units occurring in the Sulsjøerne area correspond to the units distinguished in 1965 in the other parts of Meråker area. Some lithological differences have been observed and these will be emphasized in the descriptions which follow. The structural geology of the Sulsjøerne area is also in general agreement with that demonstrable in the area investigated in 1965. In view of all these similarities, the description of the geology of the Sulsjøerne area will here be very short.

*) Wolff, Fr. Chr. (1960): Foreløpige meddelelser fra kartbladet Verdalen. N.G.U. Arbok, No. 211, Oslo.

Acknowledgements

We wish to express our thanks to Norges Geologiske Undersøkelse, which defrayed the field expenses for this investigation. Furthermore we are especially indebted to Fr. Chr. Wolff for his unceasing help and co-operation, and to Dr. D. Roberts, who kindly corrected the English manuscript.

Stratigraphy and lithology

Within the Sulsjøerne area the following strata occur:

Fundsjø Group

The rocks of the Fundsjø Group occur in the western part of the area where they form the Kråkfjell mountain. They have not been investigated in detail as only a part of the eastern slope of the Kråkfjell mountain has been visited. This slope is underlain by metabasites and by gabbro-dioritic and granitic rocks.

The metabasites are grey-green in colour and they may, or may not, be foliated. Grain-size is usually ca. 1 mm, sometimes up to 3 mm. The metabasites consist of: amphibole (hornblende), relics of feldspar (ca. $An_{40}(?)$), epidote, chlorite and quartz. In addition titanite and iron-oxides are usually present. These rocks are altered lavas and, in part, probably hypabyssal rocks also.

The gabbro-diorite rocks are dark grey in colour; black and pinkish-white minerals, up to 3 mm in size, may be distinguished macroscopically. Thin sections show that the rock consists of amphiboles and saussuritized feldspar, and is essentially similar to the gabbro-diorite observed as sills within the Kjølhaugene Group in the north-eastern part of the Meråker area.

The granitic rock displays granitic or gneissic textures and is light-grey and pinkish in colour. The main constituents of this rock are mosaic quartz and feldspars, the latter comprising orthoclase, albite (An_7), microperthite and microcline. Biotite, chlorite, epidote and iron-oxides occur as accessory minerals.

Sulåmo Group (ca. 3200 m).

The Sulåmo Group in the Sulsjøerne area is represented by two formations.

a) Dark grey and black slates and phyllites with some metasilstone intercalations, — ca. 1200 m.

In the slates and phyllites, apart from quartz and phyllosilicates, pyrite, some iron oxides and carbonaceous matter usually occur. In black slates carbonaceous matter is dominant. Under the microscope a secondary cleavage oblique to the primary bedding may be observed in some specimens of phyllite.

Layers of laminated, calcareous metasilstones occur within the slates and

phyllites. The dark laminae in metasilstones consist of quartz and phyllosilicates, the light bands of quartz and carbonates. Usually both pyrite and iron-oxides are present in these metasilstones.

Features of metamorphism are seen in the textures of the rocks; porphyroblastic minerals have not been observed.

Within this formation, two narrow (max. thickness ca. 400 m) metabasite horizons also occur: 1) a lower horizon, in the middle of the sequence and 2) an upper horizon at the top. Unfortunately, the part of the area where the metabasites occur is covered by vegetation and consequently they are very difficult to trace. Both horizons disappear towards the south (see geological map, pl. II).

The metabasites of the lower horizon are fine-grained, grey-green in colour and usually foliated. They consist of amphibole (hornblende), epidot, quartz, chlorite and plagioclase, and are interpreted as altered lavas.

In the upper horizon the metabasite is in part analogous to that from the lower horizon and in part coarser grained (up to ca. 3 mm in diameter). The coarser grained type consists of amphibole (hornblende), epidote, chlorite, plagioclase, quartz, carbonates and, rarely, biotite. There is presumably a very gradual transition between the fine-grained and the coarser grained metabasites; they seem to be associated with the same volcanic activity, being partly lavas and partly hypabyssal rocks.

Schistose rocks, adjacent to the metabasite horizons are generally greenish in colour and more compact than other rocks in the Sulåmo Group. They consist either of quartz, chlorite and sericite or of quartz, chlorite, muscovite, epidote and carbonates. Although these rocks are shown on the geological map, too little work has been done for a determination of their precise origin; they are probably partly of sedimentary and partly of volcanic origin.

b) Grey slates interbedded with metasilstones and metasandstones (ca. 2000 m). On the geological map (pl. II) these are depicted as, 1) slates with intercalated bands of metasandstone and 2) metasandstones with intercalations of slate.

The uppermost slaty complex could, perhaps, be assigned to the next lithostratigraphical unit, the Kjølhaugene Group; a distinct boundary between the Sulåmo Group and the Kjølhaugene Group is lacking.

Grey slates, consisting of chlorite, biotite, sericite and quartz, usually contain small amounts of carbonates. This lithology grades into calcareous metasilstones and fine-grained calcareous metasandstones. The latter sometimes show traces of primary bedding. A cleavage is not developed in either the metasandstones or metasilstones.

Coarser grained metasandstones occur rather infrequently in this formation. These metasandstones are very poorly sorted, consisting of abundant fine-grained matrix and scattered larger grains (ca. 1—2 mm in size). The matrix is composed of quartz, feldspar and flaky minerals. Small amounts of carbonates are also present; in some layers larger muscovite flakes occur. Quartz and feldspar form the larger grains and, in addition, rounded, isolated chlorite concentrations are present, the size of which is also ca. 1—2 mm. These concentrations are possibly relics after rock fragments. From these various features it would appear that the described sandstones closely resemble graywackes or sub-graywackes.

Kjøllhaugene Group (ca. 2900 m).

The Kjøllhaugene Group is represented by metagraywacke-slate association which can be divided into: a) a lower, ca. 800 m, predominantly metagraywacke formation and, b) an upper, ca. 2100 m, predominantly slaty formation. In the latter, two small occurrences of conglomerate have been found.

Metagraywackes and slates are grey-green in colour and show the same characteristic features as in the north-eastern part of the Meråker area (see p. 22 f.). However, the metagraywackes of the Sulsjøerne area are generally finer grained, and because of this, the identification of rock fragments is difficult to determine. Secondary biotite and epidote are common. Sedimentary markings have not been observed.

Conglomerates have been observed north-west of Mærraskarfjell mountain (see pl. II). These conglomerates form two lenses of maximum thickness ca. 2,2 m and ca. 0,7 m. Pebbles of white, yellowish, grey and greenish quartzite, and of white and grey quartz predominate. Subordinate pebbles of porphyry, and of a fine-crystalline albitic rock are present. The pebbles are rounded and are mainly 2—4 cm, rarely up to 10 cm, in size. Shapes of the pebbles are usually spheroidal and ellipsoidal, the long axes of the ellipsoidal pebbles generally being oriented with the plane of bedding, though not showing any alignment.

The matrix of the conglomerates is abundant and its composition is the same as that of adjacent graywackes and slates.

Slågån Group (ca. 350m in this area).

The Slågån Group consists of black and dark-grey slates corresponding to the black-grey metasiltstone-slate association in the north-eastern and northern parts of the Meråker area.

A characteristic feature of these slates is their weathering into abundant tabular and prolate fragments. The hills developed within the zone of slates are usually covered by the products of disintegration and contrast markedly in morphology with all other hills and mountains in the area, formed out of the previously described rocks, which have relatively little weathering material.

The slates and phyllites of the Slågån Group consist mainly of quartz, carbonaceous matter and chlorite. Biotite porphyroblasts are common.

The Slågån Group is the youngest group in the whole Meråker area.

Remarks concerning the structural geology

All the stratigraphical units form narrow, elongated zones, trending NNE—SSW. The oldest division occurs in the western part of the area and the youngest near the border between Norway and Sweden.

The strike is usually about 025° in the western part, and about 035° in the eastern part of the area. The beds dip 35° — 50° W. In the eastern part of the area beds dipping to the east have been observed but this is only of local occurrence. There is a conformity between all stratigraphical units.

Little work has been done on tectonic structures. In the easternmost part of the area it is possible to trace a syncline with the grey-black slates of the Slågån Group in its core and the grey-green metasediments of the Kjølhaugene Group along the limbs. Minor folds and corrugations are frequently present, more especially in the slates and phyllites, and a secondary cleavage related to these folds is often quite prominent. Faulting has not been observed.

Trondheim, February 1967.

Sammendrag

Sommeren 1966 kartla vi et ca. 75 km² stort område ved Sulsjøerne (se Fig. 1). I området forekommer vulkanske og sedimentære bergarter av Fundsjø-Gruppen, Sulåmo-Gruppen, Kjølhaugene-Gruppen og Slågån-Gruppen. Bergartene viser samme karakteristiske trekk som i andre deler av hele Meråker-området.

I den undersøkte lagserie ble det ikke observert noen hiatus eller diskordans. Strøket er mot NNE med fall mot N. En svak metamorfose forårsaket sekundære forandringer i bergartenes struktur og dannelse av biotitt porfyroblaster.



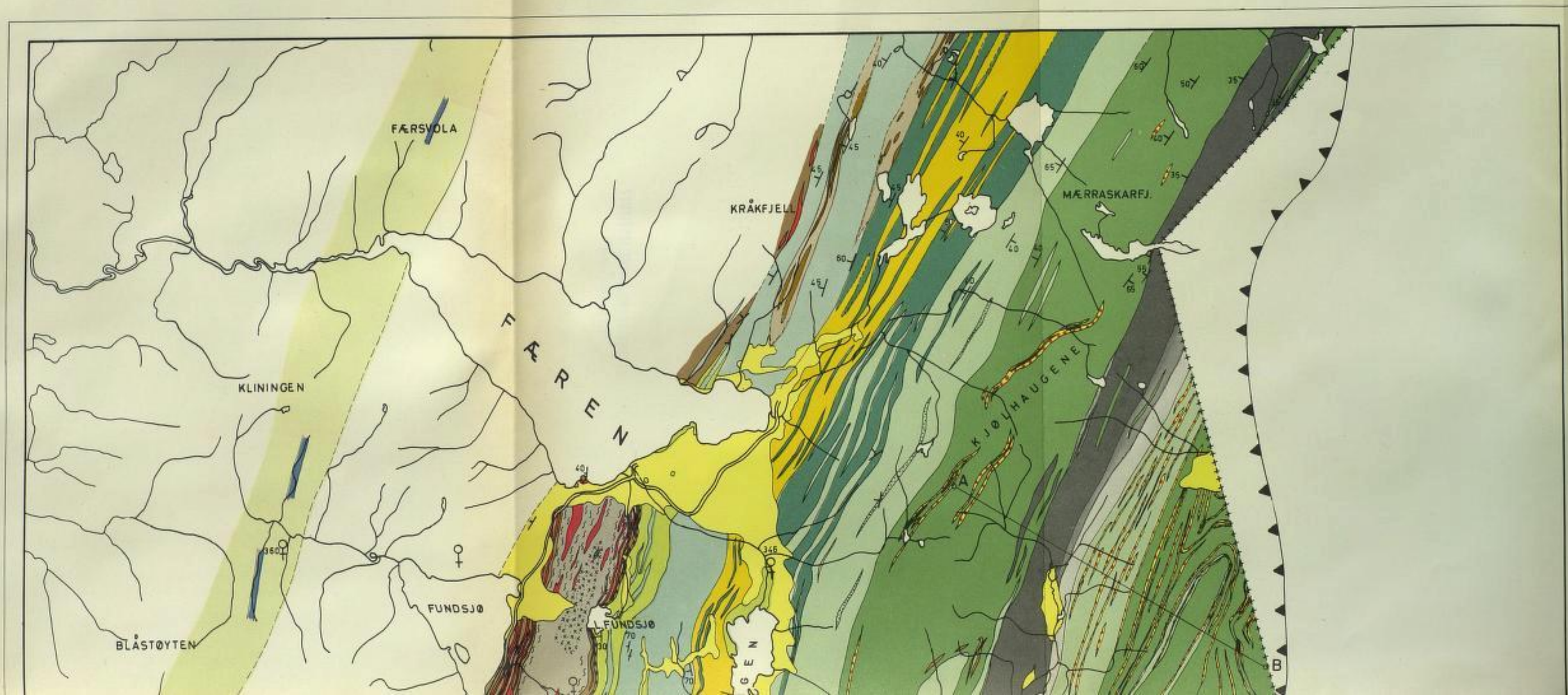
KJØLHAUGENE


















GEOLOGICAL MAP OF THE MERÅKER AREA

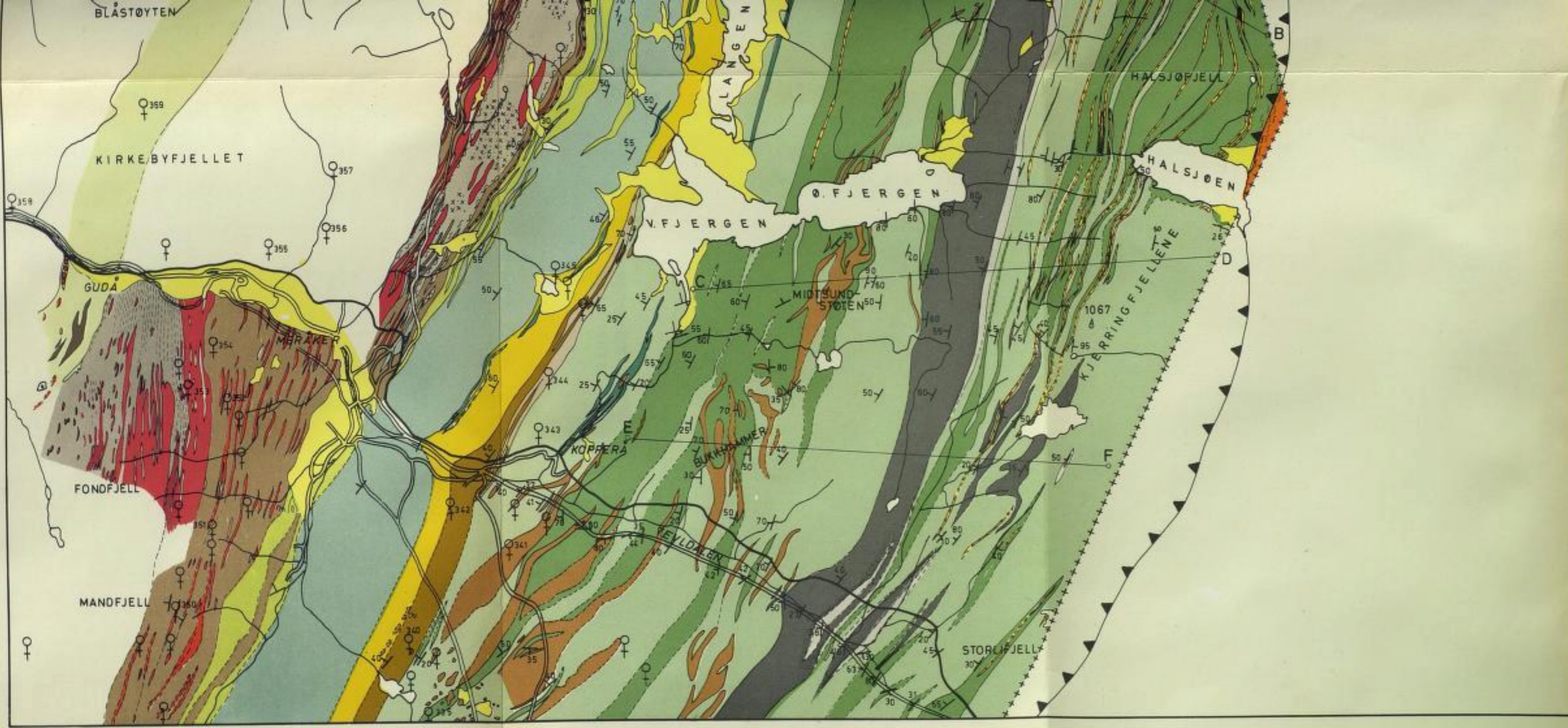
GEOLOGISK KART OVER MERÅKER



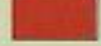

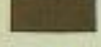



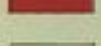

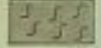




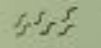
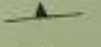

Scale 1:100 000

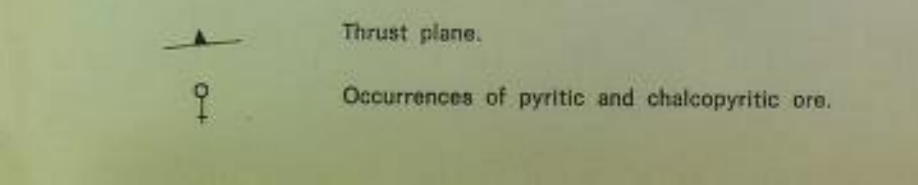
LEGEND



-  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

1:500000

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

T. BIRKELAND, C.W. CARSTENS, H. CARSTENS, J. CHALOUPSKY, G. GRAMMELTVEDT, F. FEDIUK,
M. FIŠERA, S. FOSLIE, J. FÆRDEN, A. HAUGEN, H. HEIM, P. HOLMSEN, H.J. KISCH, CHR. OFTEDAHL,
J. PEACEY, Z. PELC, D. ROBERTS, I.J. RUI, G. SCHAAR, A. SIEDLECKA, S. SIEDLECKI,
T. STRAND, TH. VOGT, FR. CHR. WOLFF.

LEGEND TEGNFORKLARING

BORÅGEN BEDS (DEVONIAN) BORÅGENFELTET (DEVON)

CONGLOMERATE AND SHALE
KONGLOMERAT OG SKIFER

SLÅGAN GROUP - HORG GROUP (SILURIAN) SLÅGANGRUPPEN - HORGGRUPPEN (SILUR)

DARK SHALE AND SANDSTONE
MØRK SKIFER OG SANDSTEIN

KJØLHAUGEN GROUP - BØROS GROUP - UPPER HOVIN GROUP (UPPER ORDOVICIAN) KJØLHAUGENGRUPPEN - BØROSGRUPPEN - ØVRE HOVINGRUPPEN (ØVRE ORDOVICIUM)

PHYLLITE, METAGRAYWACKES, WITH INCREASING AMOUNTS OF BIOTITE,
HORNBLEND AND GARNET TOWARDS THE SOUTHEAST, PARTLY CONGLOMERATIC
Fyllitt, metagråvakkert med økende mengder av biotitt,
hornblende og granat mot sydøst, delvis konglomeratisk

POLYGENOUS CONGLOMERATE
POLYMIKT KONGLOMERAT

SULAMO GROUP - LOWER HOVIN GROUP (MIDDLE ORDOVICIAN) SULAMOGRUPPEN - UNDERE HOVINGRUPPEN (MIDTRE ORDOVICIUM)

DARK SHALE AND RHYOLITE TUFF IN WEST, GREENSTONE IN EAST
MØRK SKIFER OG RHYOLITT TUFF I VEST, GRØNNSTEN I ØST

GREY CALCAREOUS SANDSTONE AND GREY TO DARK PHYLLITE
GRÅ KALKHOLDIG SANDSTEIN OG GRÅ TIL MØRK FYLLITT

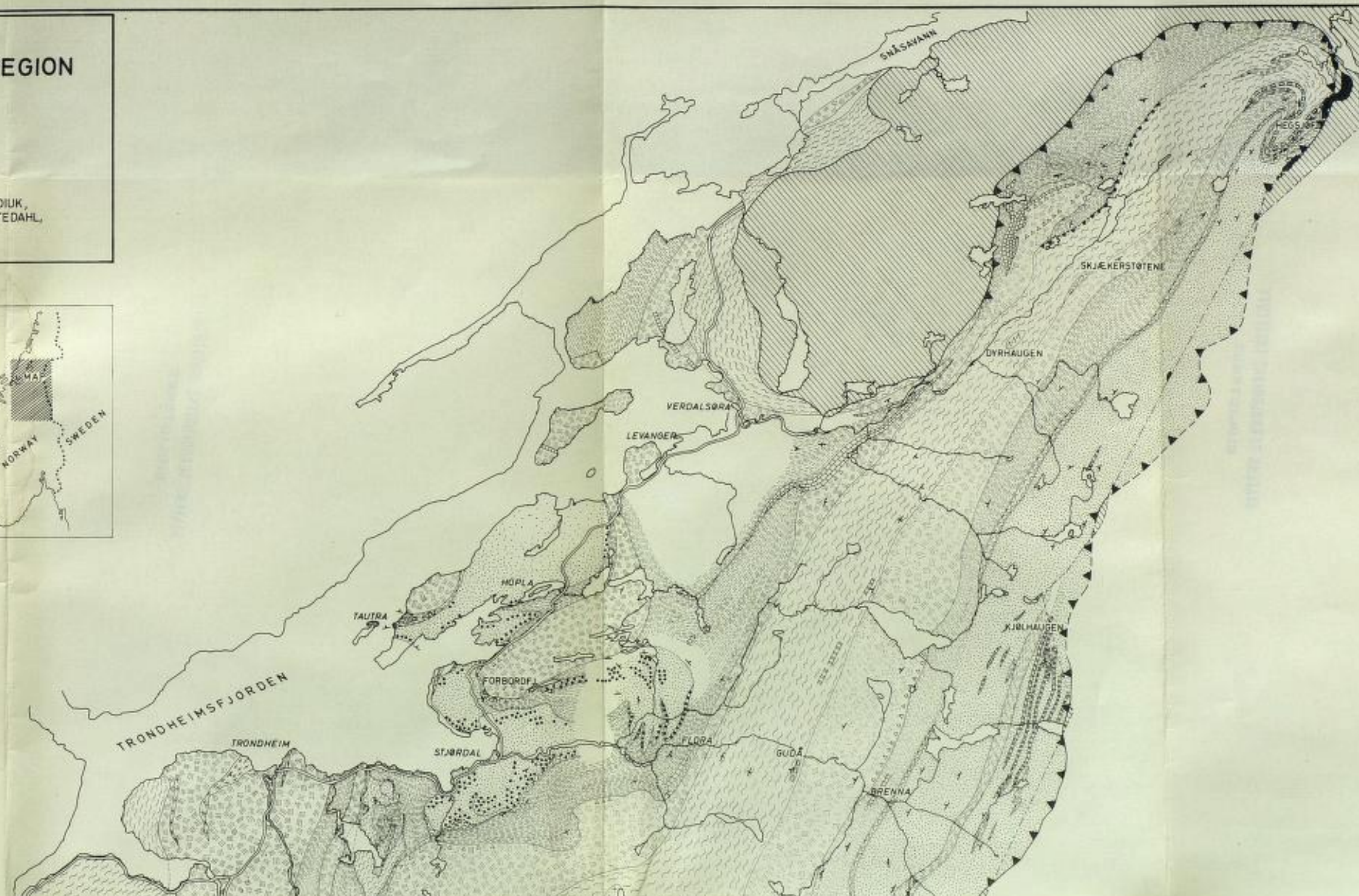
HØLONDA, TROMSDALEN, BRENNÅ AND SIMILAR LIMESTONES
HØLONDA, TROMSDALEN, BRENNÅ OG LIGNENDE KALKSTEINER

VENNÅ, STOKKVOLA, LILLE FUNDSJØ AND SIMILAR CONGLOMERATES
VENNÅ, STOKKVOLA, LILLE FUNDSJØ OG LIGNENDE KONGLOMERATER

FUNDSJØ GROUP - STØREN GROUP (LOWER ORDOVICIAN) FUNDSJØGRUPPEN - STØRENGRUPPEN (UNDERE ORDOVICIUM)

GREENSTONES AND QUARTZKERATOPHYRES
GRØNNSTENER OG KVARTSKERATOPFYRER

GRANDIORITIC GNEISS
GRANDIORITISK GNEISS



GRANDIODORITIC GNEISS
GRANDIODORITISK GNEISS

SÖNVAEN GROUP - GULA SCHIST GROUP (CAMBRIAN)
SÖNVAENGRUPPEN - GULASKIFERGRUPPEN (KAMBRJUM)

MICA SCHISTS, OFTEN WITH GARNET
GLIMMERSKIFER, OFTE MED GRANAT

CONGLOMERATES OF THE GUDA CONGLOMERATE ZONE
KONGLOMERATER TILHÖRENDE GUDÅKONGLOMERATSONEN

LIMESTONE
KALKSTEIN

CALEDONIAN INTRUSIVES
KALEDONISKE INTRUSIVER

LARGER BODIES OF TRONDHEMITE
STÖRRE LEGEMER AV TRONDHEMITT

LARGER BODIES OF GABBRO
STÖRRE LEGEMER AV GABBRO

NORITE
NORITT (DYRHAUGEN)

SERPENTINITES
SERPENTINER

UNDIFFERENTIATED ROCKS BELOW THE TRONDHEIM NAPPE
UNDIFFERENSJERTE 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

