

I. Geology of the Meråker area

Introduction

by Fr. Chr. Wolff.

Aim of study

After several years of geological reconnaissance mapping in the northern part of the Trondheim region, the present writer found the Meråker district to be a rather promising area for a more comprehensive study.

Consequently a very detailed examination has been carried out of a well exposed area wherein the degree of deformation is so low that many of the primary structures have been preserved. The idea has been to apply the results of this work to a more extensive area in an attempt to solve the main stratigraphical and tectonic problems of the entire eastern part of the Trondheim region.

Location of the area investigated

The area studied in detail is located between lat. $63^{\circ}20'$ and $63^{\circ}35'$ N and long. $1^{\circ}0'$ and $1^{\circ}30'$ east of Oslo. The area is bounded on its east side by the Norwegian — Swedish border and in the west by the valleys of Funn and Lille-åen. The southern and northern boundaries are the southern and northern limits of the map-sheet Meråker (Rektangel 47 D). Fig. 1 shows the location of the area, the centre of which lies about 90 km east of Trondheim.

The southern part of the area is traversed across strike by the new E 75 highway from Stjørdal to Sweden, along which a series of roadcuts displaying most of the rock types and sedimentary and tectonic features of the area may be observed. The western and northern parts are accessible by the minor road to Sulåmo, about 20 km north of Meråker village, whereas the north-eastern part of the area can be reached only by foot.

Planning and organization of the work

During the field season 1964 the present writer made a detailed study of the roadcuts from Meråker to the Swedish border. Some reconnaissance mapping

QUADRANGLE MERÅKER

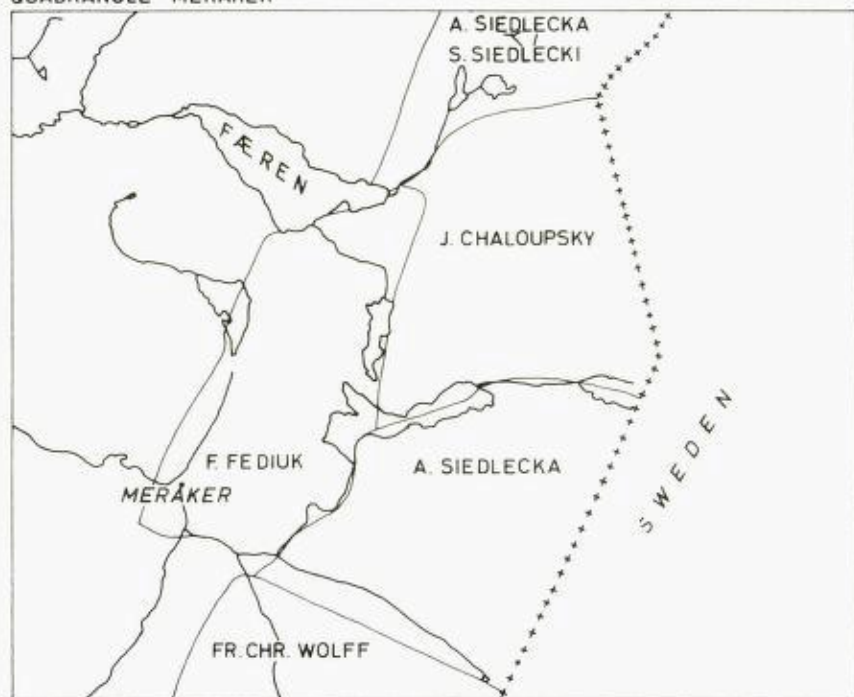


Fig. 1. Map showing the areas mapped by the different members of the team.
 Kart som viser områdene som er kartlagt av de forskjellige medlemmene av gruppen.

to the north of the highway was also carried out. Along the main profile it was possible to distinguish between series of different sedimentary origin and it was obvious that a more detailed mapping programme would prove fruitful.

During a journey to Czechoslovakia in September—October of the same year the idea arose to invite some of my Czech colleagues to participate in a mapping team in the Meråker area in the summer of 1965. The invitations were given to Dr. Josef Chaloupsky from the Geological Survey of Czechoslovakia and to Dr. Ferry Fediuk from the Charles University of Prague, both of whom kindly accepted, and with the amiable co-operation of Dr. J. Svoboda, director of the Geological Survey of Czechoslovakia, and Dr. ing. Jan Gruntorát, Dean of the Faculty of Science at Charles University, their participation in the work was made possible.

Later, in the winter 1964—65 during the period of more detailed planning of the mapping programme, another two geologists were involved in the team, namely Anna Siedlecka from the Academy of Mining and Metallurgy, Univer-

sity of Cracow, Poland, who happened to stay in Norway for a period, and Dr. David Roberts from Bedford College, University of London, U.K., who is now an associate member of the staff of NGU.

The locations of the areas mapped by the different members of the group are indicated on the map, fig. 1. Dr. Roberts, while mainly occupied with tectonic studies along Stjørdalen between Hegra and the Swedish border, mapped an area to the north of the valley of Stjørdalen. Since the present writer was the responsible leader of the project, a position involving a lot of administrative work during the field season and also, from time to time, collaboration with his co-workers in the field, the area mapped by him was therefore rather small.

Geological setting

The area investigated is located in the northeastern part of the Trondheim region, Central Norwegian Caledonides. Sedimentary and volcanic rock series found in the area are closely related to rock series in other parts of the Trondheim region. The profile from Stjørdal to the Swedish border near Storlien gives an excellent picture of the general geology across this part of the Caledonian mountain chain, all rock series from the oldest to the youngest being represented. In the east the Cambro-Silurian metasediments overlie a thrust plane east of which rocks of Eocambrian age are found.

Previous investigations

The first reported geological investigations in the Meråker district are those of K. M. Hauan from the years 1867 and 1870. His beautifully handwritten diaries illustrated with drawings of high standard make for worth-while reading. The first printed paper with information on the lithologies and the stratigraphical positions of the different rock series from this area is that of Kjerulf (1883). Kjerulf's observations were supplemented by microscopic descriptions of the rocks by Reusch (1883). Later Reusch (1890) returned to the area and described the profile along the Meråker railway-track. His observations were much more precise than those of Kjerulf (1883) and were accompanied by new petrological studies. Reusch (1890) also commented on the sedimentary environments and emphasized that the facies changes are a great obstacle to the application of the lithostratigraphic method in stratigraphical correlation. An important paper by Getz (1890) shows that the graptolite fauna from Kjølhaugene is of Silurian age. These graptolites are the only fossils of Silurian age in the entire Trondheim region. On the basis of this

graptolite fauna, Törnebohm (1896) established the stratigraphical positions of the so-called "Meråker-gruppen", and "Sul skiffer-gruppen" and correlated them with rocks in the western part of the Trondheim region. Carstens (1920) also worked in the vicinity of Meråker, confirming the observations of earlier geologists and stratigraphically correlating the Meråker profile with other areas in the Trondheim region.

In later papers (e.g. Kiær, 1932, Strand 1960 and Wolff 1964) the geology of the Meråker district based on the observations of earlier writers, and in Wolff's case also on his own investigations, is discussed briefly.

Acknowledgements

The writer is greatly indebted to the director of the Geological Survey of Norway, Professor Harald Bjørlykke, providing a *carte blanche* with regard to the planning and carrying out of the present project, and to Professor Chr. Oftedahl for stimulating discussions.

Most of all I would like to express my thanks to my dear colleagues, the participants of the project: Dr. Anna Siedlecka, Dr. Josef Chaloupsky, Dr. Ferry Fediuk and Dr. David Roberts for their inspiring and friendly company in the field and for the splendid manner in which they executed their various tasks.

Special thanks are also due to Meraker Smelteverk A/S, Kopperå, which provided accommodation in a central part of the area.

The responsibility for the chemical analyses occurring in the present paper rests with cand. real. Per-Reidar Graff, leader of NGU's silicate analysis laboratory; one analysis has been done by P. Povonora of the Charles University of Prague. The maps have been drawn by the NGU cartographers Beret Hemming and Astrid Lund. The manuscript has been typed by Mrs. Gunhild Anderssen.

Thin-sections have been prepared partly by the NGU preparants Tom Jacobsen and Egil Iversen, though for practical reasons some have been made in Czechoslovakia.



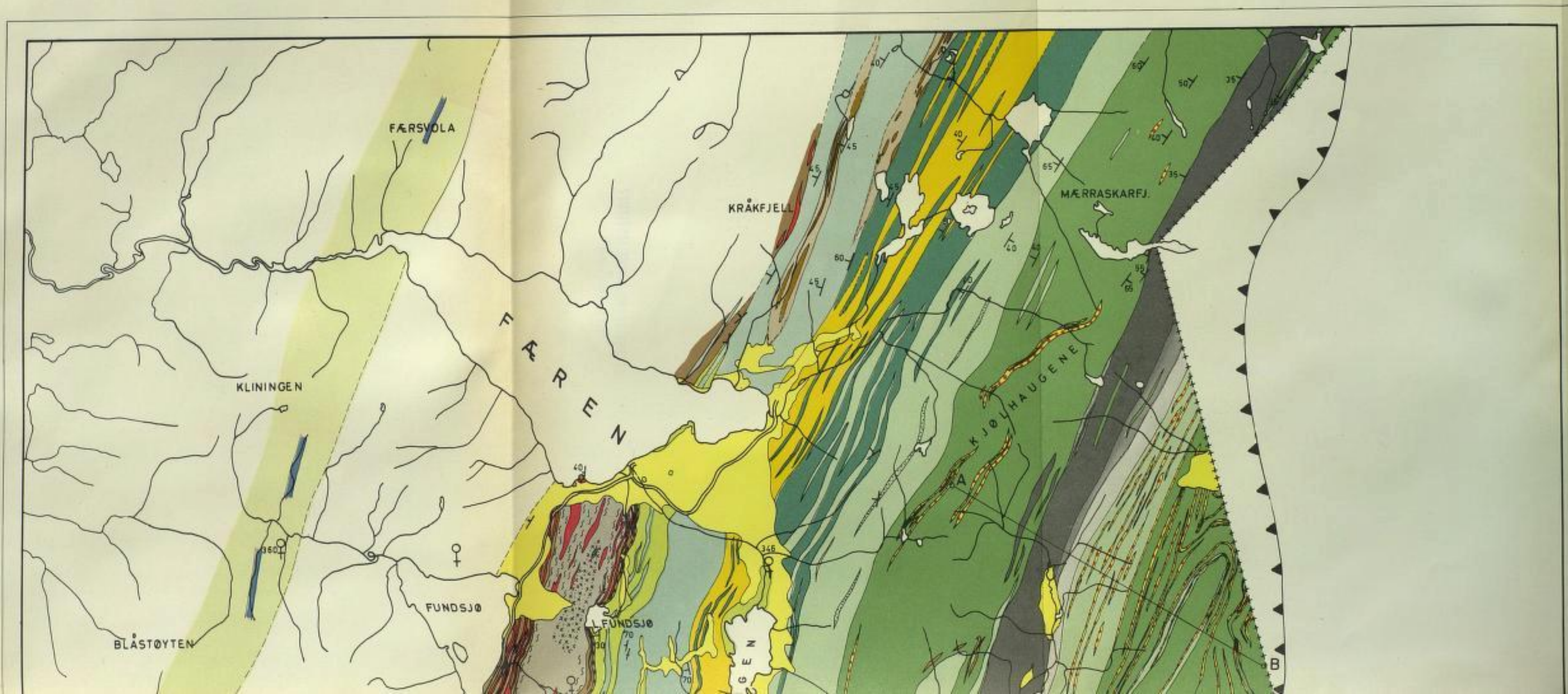
KJØLHAUGENE

















GEOLOGICAL MAP OF THE MERÅKER AREA

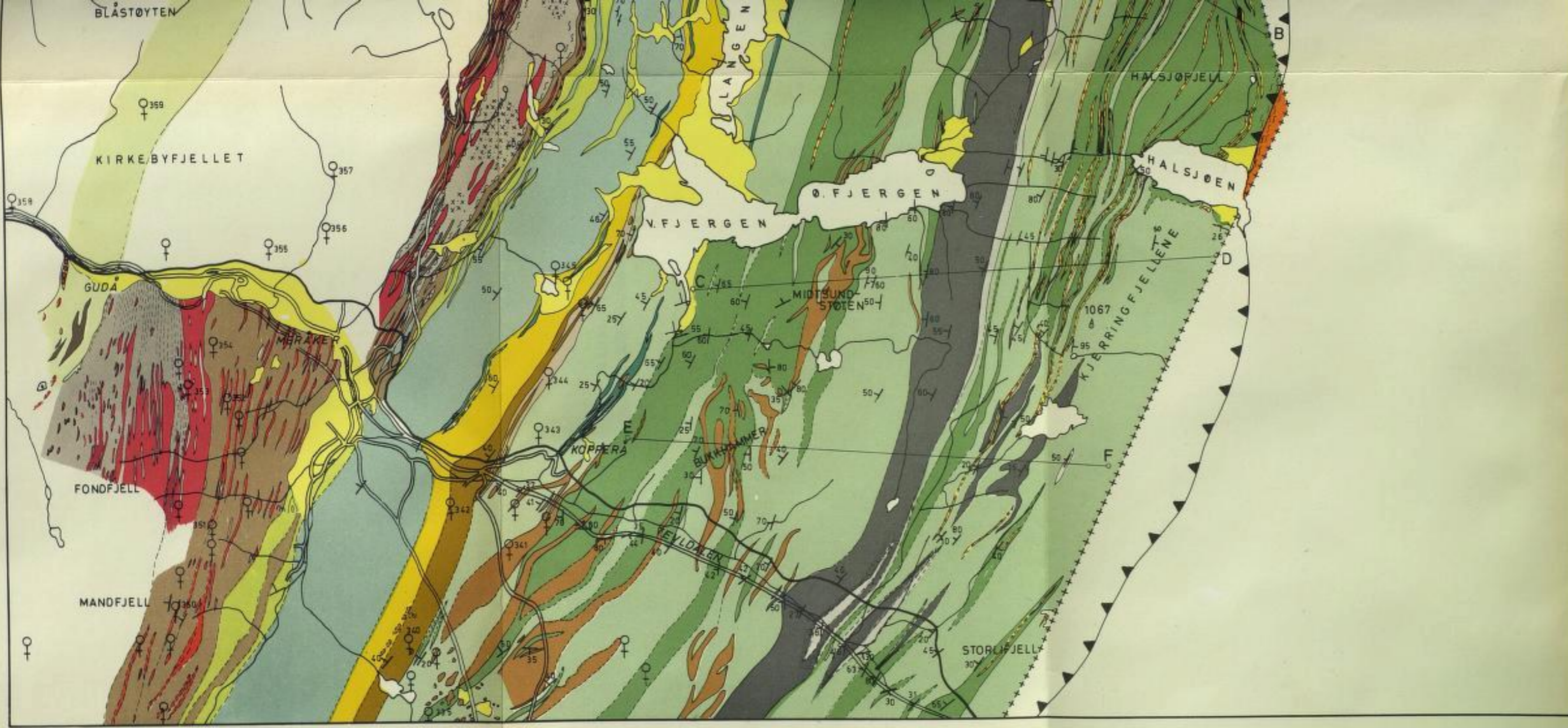
GEOLOGISK KART OVER MERÅKER




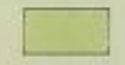


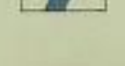
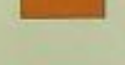


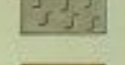


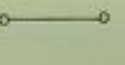


Scale 1:100 000

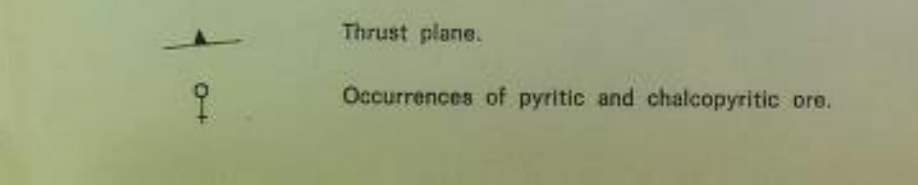
LEGEND



-  Quaternary.
- Slågan 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,
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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

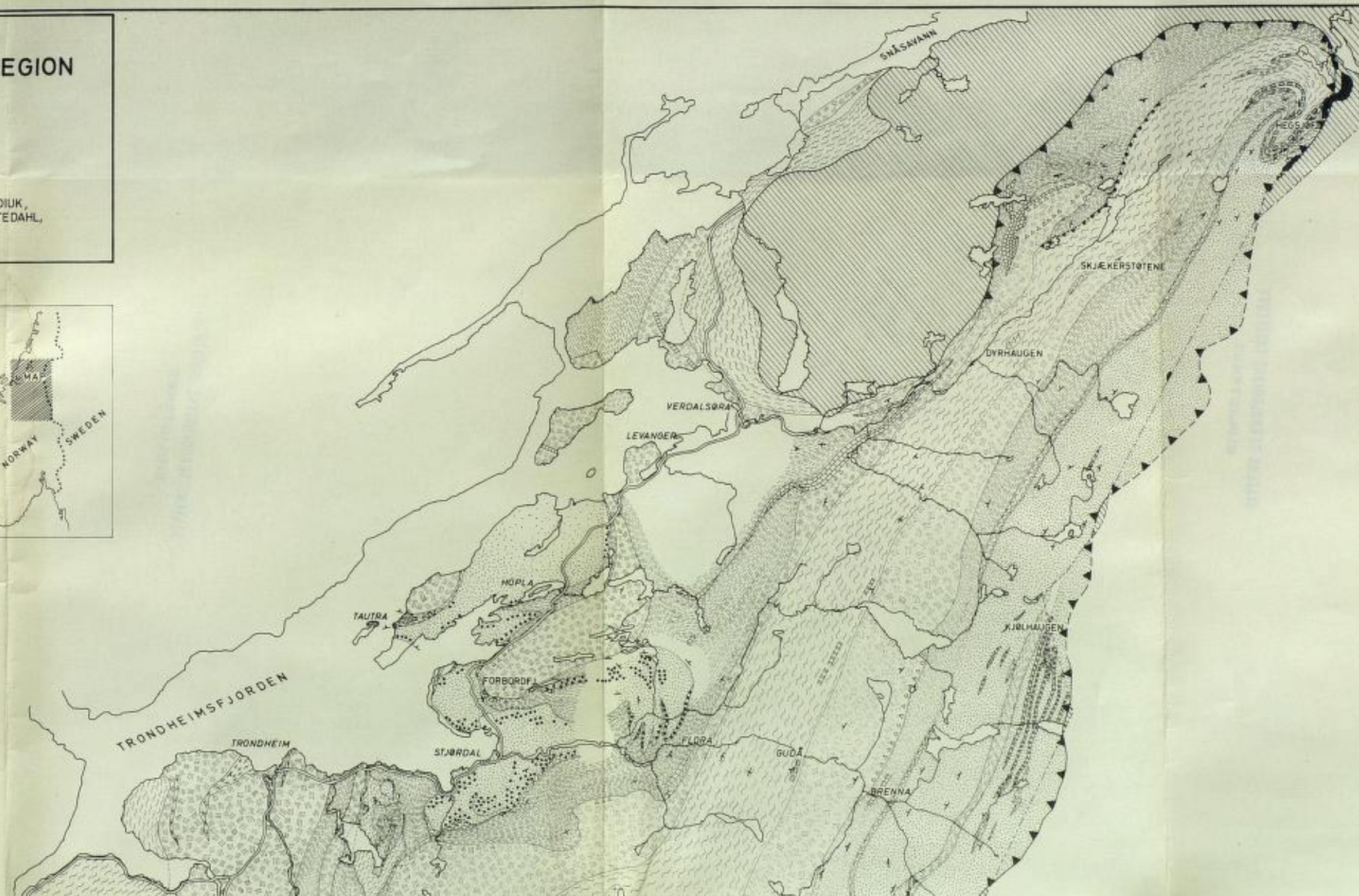
HØLONDA, TROMSDALEN, BRENNÅ AND SIMILAR LIMESTONES
HØLONDA, TROMSDALEN, BRENNÅ OG LIGNENDE KALKSTEINER

VENNA, STOKKVOLA, LILLE FUNDSJØ AND SIMILAR CONGLOMERATES
VENNA, 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



GRANDIORTIG GNEISS
GRANDIORTTISK GNEISS

SÖNVAVN GRUPE - GULA SCHIST GRUPE (CAMBRIAN)
SÖNVAVNGRUPPEN - GULASKIFERGRUPPEN (KAMBRJUM)

MICA SCHISTS, OFTEN WITH GARNET
GLIMMERSKIFER, OFTE MED GRANAT

CONGLOMERATES OF THE GUDA CONGLOMERATE ZONE
KONGLOMERATER TILHØRENDE GUDÅKONGLOMERATSONEN

LIMESTONE
KALKSTEIN

CALEDONIAN INTRUSIVES
KALEDONISKE INTRUSIVER

LARGER BODIES OF TRONDHEMITE
STØRRE LEGEMER AV TRONDHEMITT

LARGER BODIES OF GABBRO
STØRRE LEGEMER AV GABBRO

NORITE
NORITT (DYRHAUGEN)

SERPENTINITES
SERPENTINER

UNDIFFERENTIATED ROCKS BELOW THE TRONDHEIM NAPPE
UNDIFFERENSJERTE BERGARTER UNDER TRONDHEIMSDEKKE

STRIKE AND DIP
STRØK OG FALL

TRONDHEIM NAPPE THRUST PLANE
TRONDHEIMSDEKKE'S SKYVEPLAN

MINOR THRUST PLANES
MINDRE SKYVEPLAN

SUPPOSED THRUST PLANE
ANTATT SKYVEPLAN

