

RESEARCH ON THE HIGH-METAMORPHIC COMPLEXES
OF THE AGTO AREA

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Mapping in the Agto area was started in 1966 as a university research project. The work also forms part of the Survey's mapping programme, and the results will appear on a Survey 1:100 000 sheet. The research is subsidised by the Carlsberg Foundation, while transport and practical assistance is provided by the Survey.

In the 1966 season six senior students under the supervision of the writer mapped in the coastal region between Gieseckes SØ and Fattighusfjord. The main object of the mapping was to elucidate the relations between the Isortoq granulite facies complex in the south and the amphibolite facies gneisses of the Egedesminde complex in the north; these complexes are two of the subdivisions of the Nagssugtoqidian fold belt proposed by Ramberg (1949). Particular interest is being taken in the stratigraphy and structures of the deep-seated rocks.

The rocks of the region are metamorphites in either high amphibolite facies or granulite facies. They comprise biotite and hornblende gneisses, hornblende-hypersthene gneisses, amphibolites and pyribolites. The amphibolites, which are frequently garnet-bearing, show a (presumably) primary banding of graded units, rusty zones rich in pyrite and garnet, as well as zones of ultramafic lenses and bodies of diopside skarn rock. Granulites (*sensu stricto*) also occur and show poorly preserved primary sedimentary structures (grading, current bedding, slumping). Graphite schists and gneisses, mica schists, and marbles occur in the southernmost part of the area around Gieseckes SØ. Inclusions of gabbro-anorthosite of similar appearance to those found in western Greenland (Berthelsen, 1960) occur in banded amphibolites and biotite gneisses from a few localities along southern Simiugaq and Fattighusfjord.

Granitic rocks are found in two structural settings in the area: 1) as zones of coarse grained biotite augen gneiss and fine to medium grained biotite gneiss apparently concentrated in old zones of movement, 2) around and below a basin structure on Agto island. At this locality there is a series of microcline rich biotite granites, augen granites grading into microcline

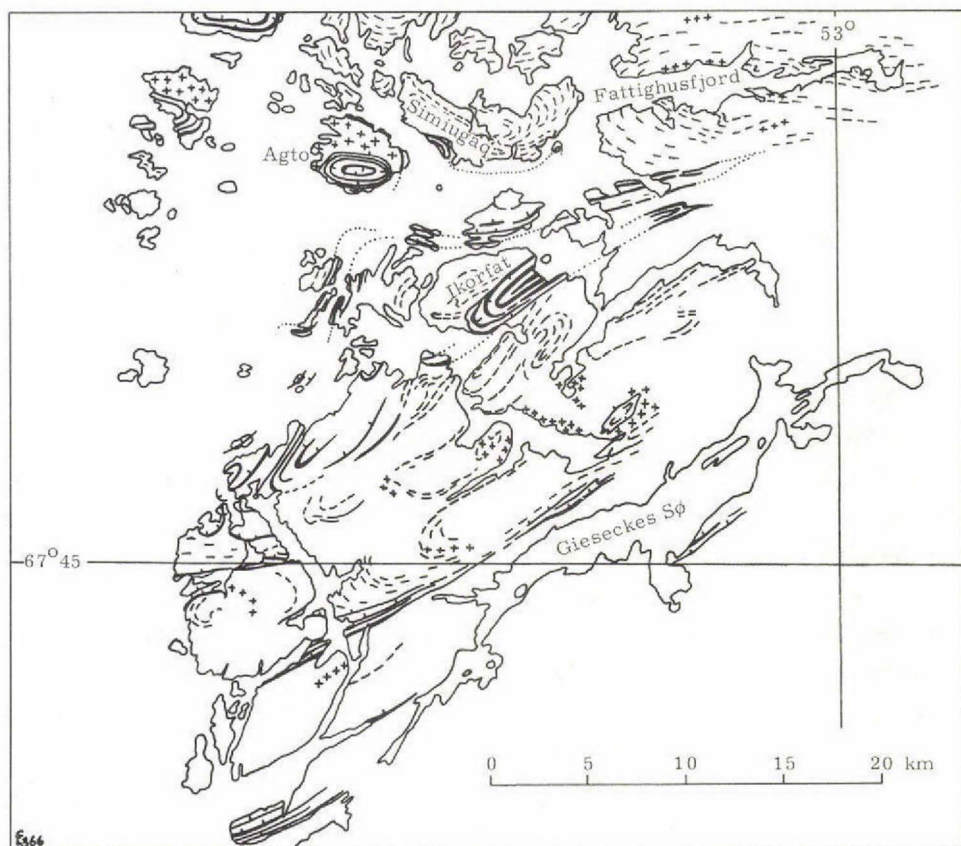


Fig. 4. Structural sketch map of the Agto region. Solid lines are structure lines of the upper structural level with direction of dip indicated. Dashed lines are structure lines of the lower structural level. Crosses indicate areas of granitic rocks and discordant rock types.

veined granitic rocks, and hornblende-garnet granites. Fine grained foliated biotite granites show occasional relic fold structures and nebulitic pattern.

Neither the regional structure nor the structural history of the area have been solved by the first season's mapping. The general structural pattern of the area is controlled by ENE trending fold axes, which correspond to the main trends of the Nagssugtoqidian fold belt. However complex super-imposed structures are thought to be present judging from the attitude of minor structures and the geometric arrangement of lineations. The large scale structures are masked to a great extent by agmatites which make it difficult to trace marker horizons in the less well exposed areas.

Although there is so far no conclusive evidence, the general structural picture emerging from the area suggests that there are two structural levels (stockwerke) present. The upper level is thought to be represented by a belt of synformal structures. These are either open oblong basins with complex internal structures in which thrusting and "concentric" folding are common, or more compressed synformal structures. The rocks in the upper structural level consist of well defined units forming stratigraphical successions of granulite (*sensu stricto*), hypersthene gneisses, amphibolites, mica schists, marbles and graphitic rocks. The sedimentary origin of the majority of the units in these successions is clear. So far it has not proved possible to correlate the stratigraphical successions in different synformal belts although it is hoped that this may finally be possible.

The lower structural level appears to occupy culminations between the synformal belts of the upper structural level. It is particularly well seen in the northern part of the area. The structures found in these culminations are complex. Steeply plunging isoclinal folds with irregular, steep axial planes can be traced by means of amphibolite horizons. They are interrupted by homogeneous "discordant" masses of hypersthene gneiss, pyroxene-hornblende diorite, amphibolite and ultrabasic rocks. The granitic rocks described earlier also appear to be related to these culmination zones and are thought to have been remobilised to some extent. In some areas original intrusive relationships are preserved between different rock units forming parts of the lower structural level.

Small metamorphosed and deformed dyke-like bodies have been noted. The chronological significance of these is not clear; however it is thought that some were intruded into solid agmatized gneissic rocks. Agmatite zones themselves are in some cases apparently discordant to the general structure and could represent deformed relics of basic intrusions. It is possible that these might be deformed relics of the pre-Nagssugtoqidian Kangamiut dyke swarm (Ramberg, 1949).

Several generations of pegmatite occur in the area; the youngest are microcline-rich and rectilinear.

The area is cut by late zones of cataclasis along which retrograde metamorphism of the gneisses took place. Little movement can be detected along these zones.

The metamorphic history of the area shows several interesting features. Areas of granulite facies metamorphism, which stand out because of the distinctive colouration of particularly the high grade acid gneisses, occur

in patches cutting the regional structural pattern. The field evidence suggests that the lower structural level consists of a polymetamorphic complex partly in amphibolite facies and partly in granulite facies. It appears that the upper structural level has only been subjected to one progressive metamorphism which over most of the area is thought to have reached the boundary between almandine-amphibolite facies and hornblende-granulite facies (Winkler, 1965).

Extensive fossiliferous Quaternary marine deposits occur in the area up to 100 m above sea level.

The chronological history of the area is still uncertain; however as a working hypothesis it is suggested that an older basement, represented by the lower structural level, and a younger cover, represented by the high grade metasedimentary sequence, exists in the area. It is not yet clear to what extent - if at all - these levels correspond to the Egedesminde and Isortoq complexes; these complexes were originally distinguished mainly by differences in metamorphic facies.

References

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