

GEOLOGY OF THE HOPEDALE BLOCK NEWFOUNDLAND, LABRADOR

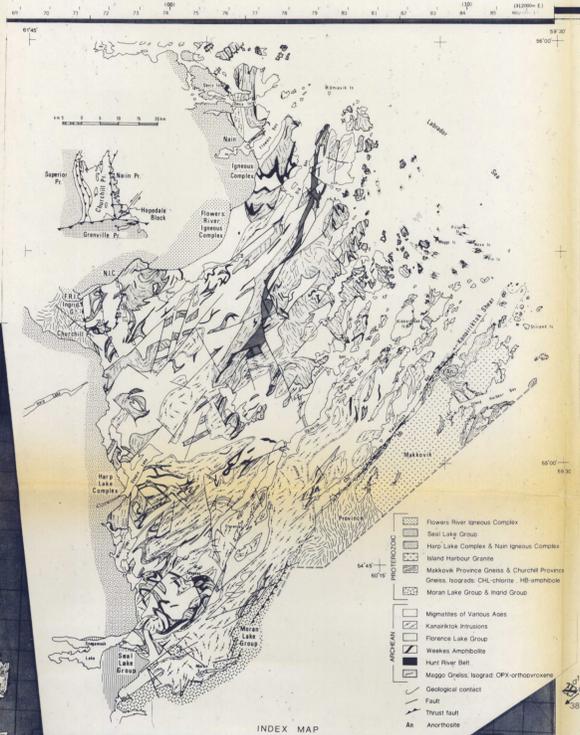
(NTS 13N/9,10,15,16 & 13O/12)

map 1 of 3

Scale 1:100 000

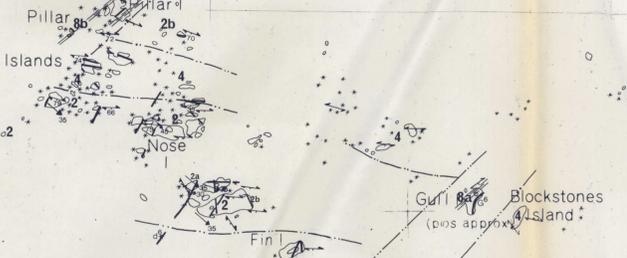
Kilometres 0 2 4 6 8 Kilometres

Universal Transverse Mercator Projection
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- LEGEND**
- Flowers River Igneous Complex
 - Seal Lake Group
 - Harp Lake Complex & Nain Igneous Complex
 - Island Harbour Group
 - Makkovik Province Gneiss & Churchil Province Gneiss, Isograds, ChL, Ironite, Hb, Amphibolite
 - Moran Lake Group & Ingrid Group
 - Migmatites of Various Ages
 - Unconformities
 - Florence Lake Group
 - Weakly Amphibolite
 - Hunt River Belt
 - Magma Gneiss, Inherited Oxy-carbonates
 - Geological contact
 - Fault
 - Thrust fault
 - Axoclimate

Nanuktok
(Farmyard)
Islands



Notes to accompany maps

These maps describe the geology of Hopedale block and part of the adjacent Makkovik Subprovince mapped during 1978-81. Hopedale block is an informal name applied to an area of Archean rocks of southern Main Province. The block is bounded in the east (Hopedale) and north (Davis Inlet) by the Labrador Sea and is intruded also in the north by the Neohelikian Flowers River Igneous Complex and Nain Igneous Complex (Hill, 1982). In the west the block is bounded by the Kanairitok Bay shear zone in tectonic contact(?) with Ingrid Group of Aphebian age (Ermanovics, 1981a), is intruded by the Paleohelikian Harp Lake Complex (Ermanovics, 1980), and is in depositional contact with Seal Lake Group of Neohelikian age. Supracrustal rocks of the Makkovik Subprovince (Central Mineral Belt) of Paleohelikian age (Bruce River Group) and Middle Apehbian age (Moran Lake Group) overlie the Hopedale block along its southern and southeastern boundary (Ryan, 1982). Where supracrustal rocks are absent along the southeastern portion of the block, as along Kanairitok Bay, the Hopedale block is separated from Makkovik Subprovince by the Kanairitok shear zone in metaclastic rocks of Proterozoic greenschist facies grade (Taylor, 1979; Ermanovics, et al., 1982).

Maps, with marginal notes, of supracrustal rocks in Hopedale block at scales 1:50 000 and 1:12 500 have been published as follows: Florence Lake Group, Open File 380; Ermanovics, 1979; Hunt River Group, Open File 778; Ermanovics, 1981b; Ingrid Group, Open File 755; Ermanovics, 1981a.

Previous reports (Ermanovics and Raudsepp, 1979; Ermanovics, 1980; Ermanovics and Korstgaard, 1981; Ermanovics et al., 1982; Grant et al., 1983) give the results and show the progress made in gaining an understanding of the geology of the study area since 1978. A simplified chronology of events in Archean Hopedale block and adjacent Proterozoic terranes is as follows:

- (7) Deposition of Hunt River Group (map unit 3); mainly tholeiitic flows (3a), ultramafic and mafic sheets and dykes (3b); minor gneisses (3c) and rare Al-rich sediments (3c).
- Intrusion of anorthositic, gabbroic and dioritic rocks, and minor ultramafic rocks (map units 3c and 3d).
- (7) Intrusion of Maggo gneiss (map unit 2) associated with Weakly amphibolite (map unit 1) that may represent remnants of Hunt River Group or remnants of rocks of unknown derivation or both. The contact between Maggo gneiss and Hunt River Group is sharp and tectonic. However, an increase in mafic enclaves in Maggo gneiss toward this contact suggests that Maggo gneisses intruded the Group.
- Deformation and metamorphism.
- Intrusion of diabase dykes (Hopedale dykes); tholeiitic dykes intrude deformed Maggo gneisses and define these early tonalitic rocks.
- Deformation and metamorphism (map unit 4). Upper amphibolite facies metamorphism accompanied by migmatization. Deeper levels are meta-zoned to granulite facies either in this event or in event 4. Development of north-west-trending planar and east-west-plunging linear trends defined as Hopedale, A, B, C, whole-rock age of either this or earlier metamorphism is about 2320 Ma (Grant et al., 1983). However, some preliminary data also suggest that Maggo gneisses have components that may be as old as 3400 Ma (C. Finn, Memorial University of Newfoundland, personal communication, 1984).
- Deposition of Florence Lake Group (map unit 5); 30% mafic to intermediate lavas (5d) and 60% intermediate to felsic volcanoclastic sediments (5c, 5b); minor serpentinites (5a) and limestone (5c).
- Intrusion of Kanairitok Plutonic Suite (map unit 6) about 2330 Ma ago (Rb-Sr whole-rock age, Grant et al.; U-Pb zircon concordia age, D. Loveridge, C.C.C. personal communication, 1981). Contact metamorphism and migmatization over large areas (map unit 6a). Intrusions may be in part coeval with deformation of event 5.
- Deformation and metamorphism. Hopedale structures are deformed into a northeast-trending planar and northeast-plunging linear trend defined as Flordian. Where such reformed rocks have retained much of the textural and chemical (mineralogical) characteristics of Maggo gneiss they were mapped as unit 7. Evidence of chemical inheritance from Maggo gneisses in unit 7 is afforded by grey gneisses (unit 7) immediately west of Hunt River Group where a Rb-Sr whole-rock age indicated 2320 ± 101 Ma (Grant et al., 1983).

Maggo gneisses were altered chemically by allochthonous mobilization derived during intrusion of the Kanairitok Plutonic Suite and by autochthonous mobilization derived during lower amphibolite facies metamorphism during 'Flordian' deformation. These rocks are mapped as units 8a and 8b, respectively. The age of this migmatite (unit 8) and Flordian structure is about 2760 ± 120 Ma (Rb-Sr whole-rock age, Grant et al., 1983; B. Fryer, Memorial University of Newfoundland, personal communication, 1984).

Intrusion of Kikkertavak diabasic and gabbroic dykes of several ages. Two generations of dykes have been detected and yield Rb-Sr whole-rock ages of 2220 Ma (B. Fryer, personal communication, 1984) and 1206 ± 120 Ma (Harp dykes) (Grant et al., 1983). The early generation of dykes are metamorphosed on approaching Churchill and Makkovik Provinces.

Deposition of Moran Lake Group (unit M) and Ingrid Group (unit 9); the former is a succession of marginal basin deposits overlain by basalts; the latter is a succession of subaerial mafic lavas and polytonic conglomerates.

Deformation and metamorphism after emplacement of the early generation of Kikkertavak dykes. Flordian structures are transformed initially to poorly defined NE-SW planar and well defined subvertical linear trends, and subsequently to narrow NNE-trending transcurrent shear zones. Metamorphism is at amphibolite facies outside the shears (e.g. the Kanairitok shear zone). Rocks with this structural trend (under Harp gneiss, unit 11) define Proterozoic Makkovik Subprovince southeast of Kanairitok Bay. Deformation southeast of Island Harbour Bay becomes dominantly planar (Ryan et al., 1983). A N-S planar and as yet unspecified linear trend defines Churchill Province from Ingrid Group westward (units 9 and 10).

Deformed outliers of Moran Lake Group rocks sit on Kanairitok granitoids, regional lower greenschist retrograde metamorphism accompanied by shearing throughout the Hopedale block, orochron ages of Kanairitok granitoids (e.g. 2433 ± 232 Ma, Grant et al., 1983), and locally updated K-Ar biotite ages all point to modest rejuvenation of the Hopedale block during tectonic activity in adjacent Churchill and Makkovik Provinces during early Proterozoic time.

Intrusion of the Island Harbour Plutonic Suite (unit 12) in Makkovik Subprovince. Early phases are syntectonic to event 12. The main and later phases are postkinematic and yield a Rb-Sr whole-rock age of about 1800 Ma (Grant et al., 1983).

Intrusion of Striped Island dykes subhorizontal dioritic sills and dykes in Makkovik Subprovince and in Archean terranes immediately west of Kanairitok Bay. Rb-Sr whole-rock ages for these dykes from Striped Island are 1635 ± 47 Ma and 1640 ± 39 Ma (Grant et al., 1983; B. Fryer, personal communication, 1983).

Deposition of Bruce River Group (map unit 8); coarse fan-conglomerate, volcanoclastic sandstone and upper mafic and felsic volcanics lie unconformably on Bruce River Group (Ryan, 1981).

Intrusion of Harp Lake Complex (unit PH; Emalie, 1980) and Nain Igneous Complex (unit P; Hill, 1982); these are members of a group of 'Eonian' plutonic complexes. A U-Pb zircon age of associated olivine-bearing granites is 1850 Ma for the Harp Lake Complex. The intrusions produce a 2-pyroxene hornfels contact metamorphic zone a few hundred metres wide in wall rocks off the Hopedale block.

Deposition of Seal Lake Group (SN); anorogenic, subaerial plateau basalts and sediments deposited unconformably on Bruce River Group and on the Harp Lake Complex 1320-Ma ago (Baragar, 1981).

Intrusion of the peralkaline Flowers River Igneous Complex (N) 1270 Ma ago (U-Pb zircon age in Hill, 1982).

Intrusion of Harp diabase dykes. These are recognized in Hopedale block as fresh olivine and titaniferous augite-bearing members of the Kikkertavak swarm of dykes. They can be readily distinguished from early members of the Kikkertavak swarm only within a few kilometres of the Makkovik or Churchill boundaries where fresh Harp dykes occur among metamorphosed, early members of the Kikkertavak swarm.

Recent mineral assessment work in the map area included U and sulphides along the Bruce River Group unconformity and in the Florence Lake Group. The results of this work are available from the Mineral Development Division of the Department of Mines and Energy, Newfoundland. Geochemical investigations of uranium anomalies in the Hopedale block and Island Harbour Plutonic Suite showed that none of the anomalies were underlain by significant concentrations of uranium (Boyle, 1982).

References

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Key to symbols

- Geological boundary (defined, approximate, assumed).....
- (gradational, gradational assumed).....
- Unconformable contact (defined, approximate, assumed).....
- Bedding (top known, overturned, tops unknown).....
- Gneissic layering (dip inclined, vertical, unknown).....
- Gneissosity (dip inclined, vertical, unknown).....
- Foliation, unspecified (dip inclined, vertical, unknown).....
- Mineral lineation (plunge indicated).....
- Mesoscopic fold (plunge indicated).....
- Fault or shear zone.....
- Zone of intense shearing.....

Geology by I. Ermanovics and field assistants during 1978-81. Geology in Hopedale block in part after Taylor (1979) and Jezeau (1976). Geology in areas peripheral to Hopedale block in part after Taylor (1979), Ryan (1982), Emalie (1980), and Hill (1982). Geological cartography (1983-84) by C. Hamlin, R. Knight, L. McIntyre, and I. Ermanovics.

NOTE: Positions of islands north of latitude 55°30' are not precisely fixed.

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