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GEOLOGICAL SURVEY OF CANADA | COMMISSION GÉOLOGIQUE DU CANADA

DESCRIPTIVE NOTES

INTRODUCTION

This map is one of a set of three colour Open File maps (St-Onge et al., 1998a, b, c) which present the results of 1:100 000 scale bedrock mapping undertaken by the Geological Survey of Canada in 1997 in the McKellar Bay (EF 3537) and Wight Inlet (EF 3538) map areas, Meta Incognita Peninsula, Baffin Island (Figs. 1 and 2). An overview of the principal supracrustal and plutonic units mapped in 1997, and an outline of the deformation-metamorphism history for the Hudson Strait region are presented in St-Onge et al. (1998d). Bedrock geological investigations from two previous field seasons (St-Onge et al., 1998a, 1997a, b, c; Harmer et al., 1996; Scott et al., 1997; Jackson and Taylor, 1997; Scott and Wodicka, 1997; Wodicka and Scott, 1997; Scott, in press) in the Wodicka (in press) present recent U/Pb geochronological results for the Meta Incognita Peninsula and highlight the distinct and/or common tectonic histories of different tectonostratigraphic assemblages. Examination of the surficial deposits at 1:250 000 scale and the identification of ice flow domains from the last (late Foxe) glaciation are outlined in Hodgson (1997) with field observations presented in Hodgson (in prep.). Geological work on southern Baffin Island was part of a graduate research project in Blackadar (1967). With rock exposures, bedrock exposure throughout the area mapped in 1997 is excellent.

GEOLOGICAL FRAMEWORK

The metasedimentary rocks and orthogneisses of the project area (Fig. 1, 2) are part of the northeastern (Laurentian) segment of the Archean Churchill Province (Hoffman, 1988, 1990). Archean rocks record distinct tectonostratigraphic assemblages accumulated on, or adjacent to, the northern margin of the Archean Superior Province during > 200 Ma of tectonic activity (Lucas and St-Onge, 1992; Lucas et al., 1992; Scott et al., 1992, 1997; St-Onge et al., 1997, 1998b, in press; Scott, 1997, in press). Southern Baffin Island is characterized by three orogen-scale, stacked tectonic elements (St-Onge et al., 1997d; Wodicka and Scott, 1997). From lowest to highest, these are: Level 1 - Archean basement; Level 2 - Neoarchean to Paleoproterozoic Piling Group and Narsajuaq arc; Level 3 - Paleoproterozoic Cumberland batholith (see below; Fig. 2) in the Frobisher Bay area. These in turn are correlated with metaplutonic gneisses mapped on the northeastern limb of the antiform (Scott et al., 1997) and dated by Scott and Wodicka (in press) at ca. 1.99 Ga. Archean basement is exposed in the Meta Incognita Peninsula as a heterogeneous assemblage of granitoid gneisses, boudinaged and discontinuous layers of quartz diorite. All components of the gneiss are crossed by white to pink biotite monzogranite and syenogranite veins that range from well-foliated to relatively massive, and from a few centimetres to more than ten metres thick. Similarities in rock type, mineral assemblage and strain state suggest that the monzogranite and syenogranite veins are related and possibly co-magmatic with the plutons of the Cumberland batholith (see below) which intrude the unit in the Wight Inlet area (EF 3538).

The orthogneiss may represent the stratigraphic basement to the Lake Harbour Group (1.93-1.86 Ga; Table 1). However, the Archean rocks may also be the result of Paleoproterozoic reworking of older supracrustal and plutonic rocks. The age of the orthogneiss and its spatial association with the younger Lake Harbour Group, both restricted to Level 3 (Fig. 2), suggest that a primary stratigraphic link is possible.

Level 2 is characterized by the Piling Group, a heterogeneous assemblage of metasedimentary and metavolcanic rocks (Fig. 2) that is exposed in the Meta Incognita Peninsula and in the Hall Peninsula (EF 3537). Metasedimentary rocks are dominated by pelite, psammite and semipelite, with lesser amounts of quartzite, calc-silicate rocks (Fyles) "Kimmirut sequence" of Scott et al., 1997), marble (EF 3537), and iron formation. Metavolcanic rocks are restricted to a single, 1 km thick unit in the Wight Inlet area (EF 3538). Metamorphic grade ranges from greenschist facies in the northwest to upper amphibolite facies in the southeast. Pelite, psammite and semipelite are commonly interlayered with amphibolite and gneissic equivalents. Amphibolite layers are typically 10-100 m thick, and commonly have strike lengths of up to several kilometres. Relict compositional layering, defined by variations in modal composition, has been observed in both ultramafic and mafic rocks. The contacts of these bodies with the host siliciclastic rocks are conformable, and the igneous rocks rarely preserve chilled margins. Primary sedimentary features such as cross-bedding are rare, but have been locally preserved. Relict phenocrysts of clinopyroxene have been observed in both mafic and ultramafic sills. Finally, the presence of clastic/lava mafic and ultramafic sills in rocks of both the Lake Harbour Group and Blandford Bay assemblage suggests that they were in close proximity to one another at the time of sill emplacement.

Cumberland batholith (Proterozoic)

Coarse- to medium-grained, massive to foliated metaplutonic rocks in the northern portion of the Hidden Bay area (EF 3536) and eastern portions of the Wodicka Bay (EF 3537) and Wight Inlet (EF 3538) map areas occur along strike from and are continuous with extensive regions underlain by the Cumberland batholith (Fig. 2; Blackadar, 1967; Jackson and Taylor, 1972; Scott et al., 1997; St-Onge et al., 1997b,c). The continuity of plutonic rocks suggest that the Cumberland batholith underlies much of the area between the two areas and part of the 1:86 Ga Batholith (Jackson et al., 1990; Wodicka and Scott, 1997; Scott, in press).

The early Proterozoic trans-Hudson Orogen in North America; Geological Association of Canada, Special Paper, v. 37, 505p.

The early Proterozoic magmatic record and crustal architecture of an arc-continent collision zone: new views from the Ungava-Baffin segment of the Paleoproterozoic Trans-Hudson Orogen, Canada; Terra Nova, v. 9, p.304

Geology of the Meta Incognita Peninsula, south Baffin Island, Northwest Territories; Geological Survey of Canada, p. 63-72

Geology, Hidden Bay, District of Franklin, Northwest Territories; Geological Survey of Canada, Open File 3537, scale 1:100 000

Geology, McKellar Bay, District of Franklin, Northwest Territories; Geological Survey of Canada, Open File 3537, scale 1:100 000

Geology, Wight Inlet, District of Franklin, Northwest Territories; Geological Survey of Canada, Open File 3538, scale 1:100 000

Geology of the Meta Incognita Peninsula, south Baffin Island, Northwest Territories; Geological Survey of Canada, p. 43-53

Wheeler, J.O., Hoffman, P.F., Card, K.D., Davidson, A., Sanford, B.V., Okulitch, A.V. and Roest, W.R.

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ECONOMIC POTENTIAL

The presence of mafic and ultramafic sills in siliciclastic rocks of the Lake Harbour Group may present conditions favourable for the formation of magmatic Cu-Ni sulphide mineralization. The largest sills are indicated on the companion 1:100 000-scale maps (EF 3536, EF 3537, EF 3538). Serpentinized ultramafic rocks have been identified at a number of localities in the map area, some of which may provide material suitable for stone carving.

QUATERNARY

Quaternary deposits (Q) comprise till, except for outwash along south-flowing river valleys (e.g. Soper River, EF 3536, EF 3537). Till is a clast-supported silty sand; clasts are granule to large boulder size, entirely of Precambrian lithologies except for rare Paleozoic carbonates below marine limit (100 m elevation) on Hudson Strait shores (EF 3537, EF 3538). The till forms a blanket > 2 m thick, locally much thicker in end moraines marking readvances during overall retreat of the Laurentide Ice Sheet. Striations and ice flow indicators record a dominant ice flow direction to the SE during the last (late Foxe) glaciation. The ice sheet divide lay north of the present Meta Incognita Peninsula watershed. Late deglacial events included a readvance over the present watershed, and reversals of flow over the Frobisher Bay/Amadjuak Lake lowland. Outwash is sand, minor silt and gravel, derived from till during late stages of deglaciation. Kettle fluvial terraces are 2-10 m thick, locally thicker where coalesced with (few) eskers.

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1998b: Geology, McKellar Bay, District of Franklin, Northwest Territories; Geological Survey of Canada, Open File 3537, scale 1:100 000

1998c: Geology, Wight Inlet, District of Franklin, Northwest Territories; Geological Survey of Canada, Open File 3538, scale 1:100 000

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1997: A preliminary report on the U-Pb geochronology of the Meta Incognita Peninsula, southern Baffin Island, Northwest Territories; (i) Current Research 1997-C; Geological Survey of Canada, p. 167-178

LEGEND

This legend is common to OF 3536, OF 3537, and OF 3538. All units and symbols may not appear on this map

QUATERNARY

- **Q** — *Till, outwash, deltaic gravel and sandy alluvium*

ORDOVICIAN

- **Ol** — *Limestone*

PALEOPROTEROZOIC
NARSAJUAQ ARC

- **Pva** — *Hornblende ± clinopyroxene amphibolite; orthopyroxene-biotite ± hornblende monzogranite to syenogranite veins*
- **Pnm** — *Orthopyroxene-biotite ± hornblende monzogranite, layered orthopyroxene-biotite ± hornblende ± garnet ± clinopyroxene tonalite, granodiorite and quartz diorite gneiss; hornblende amphibolite layers; amphibolite, hornblende and metapyroxenite enclaves; orthopyroxene-biotite ± hornblende monzogranite to syenogranite veins*
- **Phd** — *Hornblende-orthopyroxene ± clinopyroxene quartz diorite; orthopyroxene-biotite ± hornblende monzogranite and hornblende-biotite tonalite veins*

CUMBERLAND BATHOLITH

- **Pcd** — *Hornblende-orthopyroxene-clinopyroxene quartz diorite; locally layered with compositions ranging from leucodiorite to anorthosite*
- **Pcme** — *Epidote-biotite monzogranite*
- **Pcmb** — *Biotite ± orthopyroxene monzogranite; with garnet ± cordierite*
- **Pcmg** — *Biotite-garnet monzogranite; commonly contains inclusions of metasedimentary rocks*
- **Pcmo** — *Orthopyroxene-biotite monzogranite to syenogranite; locally with K-feldspar megacrysts*

BLANDFORD BAY ASSEMBLAGE

- **Pbbm** — *Metapelorites, metagabbro, layered metapelorite-metagabbro, metapyroxenite*
- **Pbbq** — *Feldspathic quartzite, pelite, semipelite*

LAKE HARBOUR GROUP

- **PLHw** — *White biotite-garnet monzogranite; commonly interlayered with metasedimentary rocks*
- **PLHd** — *Metakeucodiorite, metatonalite*
- **PLHm** — *Metagabbro, amphibolite*
- **PLHu** — *Metapelorites, metapyroxenite, metadunite*
- **PLHc** — *Marble, calc-silicate; minor siliciclastic layers; white biotite-garnet monzogranite pods and seams*
- **PLHp** — *Dominantly psammitic; semipelitic, orthoquartzite, pelitic, minor marble and calc-silicate; minor amphibolite, monzogranite pods and seams*

RAMSAY RIVER ORTHOGNEISS

- **Prm** — *Orthopyroxene-biotite ± hornblende monzogranite-tonalite gneiss; hornblende-orthopyroxene-biotite monzogranite-tonalite gneiss; hornblende-biotite monzogranite to syenogranite veins*

Geological boundary (defined, approximate)

Form lines

D_2 thrust fault (defined, approximate), ornament on hanging wall

D_3 thrust fault (defined, approximate), ornament on hanging wall

Oblique-slip fault (defined)

Normal fault (defined), ornament on hanging wall

Compositional layering — 70 / 30 / 90

Foliation — 70 / 30 / 90

Extension lineation — 30 / 30

Fold axis — 30 / 30

Intersection lineation — 30 / 30

D_1 synform (upright, overturned)

D_2 antiform (upright, overturned)

D_2 synform (upright, overturned)

D_3 antiform (upright, overturned)

D_3 synform (upright, overturned)

D_4 antiform (upright, overturned)

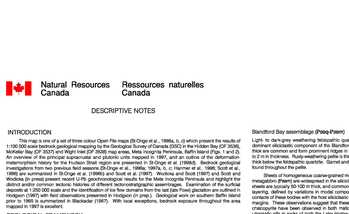

Figure 1. Location of the project area on the Meta Incognita Peninsula (modified after Wheeler et al., 1996). Abbreviations: CB - Cumberland batholith, CS - Cumberland Sound, CSB - Cape Smith Belt, FB - Frobisher Bay, NA - Narsajuaq arc

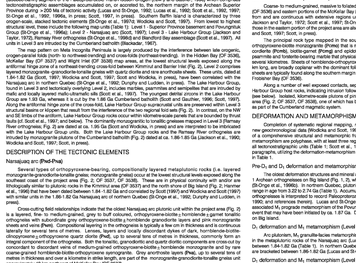

Figure 2. Generalized geology of the project area. Abbreviations: BB - Blandford Bay, BI - Barrier Inlet, McB - McKellar Bay, WI - Wight Inlet

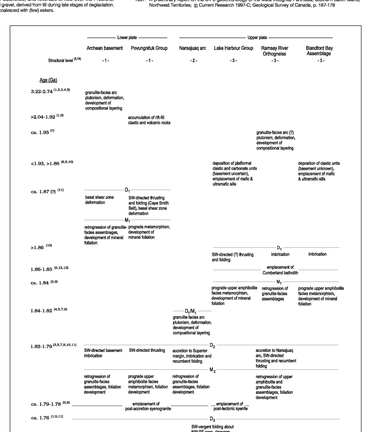

Table 1. Deformation-metamorphism framework for project area

Copies of this map may be obtained from the Geological Survey of Canada 601 Booth Street, Ottawa, Ontario K1A 0E8

Geology by M.R. St-Onge, D.J. Scott, N. Wodicka, E. Piper, J. Robillard, E. Turner, G. Brown, S. McMullen, D. Ijewliw, and S. Lucas (1997); Geological Survey of Canada

Geological compilation and notes by M.R. St Onge, 1997

Digital cartography by E. Everett, Geoscience Information Division

Electrostatic plot produced by the Geoscience Information Division

Any revisions or additional geological information known to the user would be welcomed by the Geological Survey of Canada

OPEN FILE 3538

GEOLOGY

WIGHT INLET

DISTRICT OF FRANKLIN

NORTHWEST TERRITORIES

Scale 1:100 000 - Échelle 1/100 000

Kilometres 2 0 2 4 6 8 Kilómetres

Universal Transverse Mercator Projection
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Projection transverse universelle de Mercator
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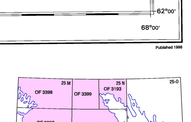
Digital base map from data compiled by Geomatics Canada, modified by the Geoscience Information Division

Copies of the topographic map for this area may be obtained from the Canada Map Office, Natural Resources Canada, Ottawa, Ontario K1A 0E9

Mean magnetic declination 1998, 34°40'E, decreasing 14.3' annually. Readings vary from 34°06'W in the SW corner to 35°19'W in the NE corner of the map.

Elevations in feet above mean sea level



OPEN FILE
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3538
GEOLOGICAL SURVEY OF CANADA
COMMISSION GÉOLOGIQUE DU CANADA
01/1998

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