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GEOLOGICAL SURVEY OF CANADA
CANADIAN GEOSCIENCE MAP 135
CANADA-NUNAVUT GEOSCIENCE OFFICE
OPEN FILE MAP 2013-1

GEOLOGY

SOUTHERN PART OF HALL PENINSULA

south Baffin Island, Nunavut

Map Information Document

Preliminary

Canadian Geoscience Maps

2013

CANADA-NUNAVUT GEOSCIENCE OFFICE
BUREAU GÉOSCIENTIFIQUE CANADA-NUNAVUT
KANATAMI-NUNAVUMI GEOSCIENCE TITIGAKVIIT

Canada

PUBLICATION

Map Number

Natural Resources Canada, Geological Survey of Canada
Canadian Geoscience Map 135 (Preliminary)

Canada-Nunavut Geoscience Office
Open File Map 2013-1

Title

Geology, Southern Part Of
Hall Peninsula, south Baffin Island, Nunavut

Scale

1:250 000

Catalogue Information

Catalogue No. M183-1/135-2013E-PDF
ISBN 978-1-100-22079-6
doi:10.4095/292443

Recommended Citation

Machado, G., Bilodeau, C., and St-Onge, M.R., 2013. Geology, southern part of Hall Peninsula, south Baffin Island, Nunavut; Geological Survey of Canada, Canadian Geoscience Map 135 (preliminary); Canada-Nunavut Geoscience Office, Open File Map 2013-1, scale 1:250 000. doi:10.4095/292443

Cover Illustration

Folded supracrustal rocks and tonalite gneiss, south Baffin Island, Nunavut. Photograph by C. Bilodeau. 2013-077

ABSTRACT

In 2012, the Canada-Nunavut Geoscience Office initiated a targeted regional bedrock mapping project on Hall Peninsula, southern Baffin Island. During the first field season, mapping focussed on the southern portion of the peninsula covering approximately 20 000 km^2. Mapping defined two lithological domains: an eastern domain comprising a tonalite gneissic basement overlain or imbricated with supracrustal rocks, and intruded by two granitic suites; and a western domain characterized by metasedimentary rocks intruded by a tonalite-granodiorite suite, charnockite and garnet monzogranite.

The discovery of ultramafic rocks points to possibly interesting new sources of carving stone and may also have potential for nickel-copper-PGE mineralization. The large area underlain by orthogneiss basement units could be host to diamond-bearing kimberlites

similar to the ones found in the northern portion of the peninsula. Based on the reported geology, other types of mineralization can also be considered, such as gold associated with iron-formation and VMS deposits associated with supracrustal packages.

RÉSUME

Le Bureau Géoscientifique du Canada-Nunavut a débuté, en 2012, un projet de cartographie régionale du socle rocheux de la péninsule de Hall, située au sud de l'île de Baffin. Au cours de la première saison de terrain, la cartographie a couvert approximativement 20 000 km^2 de la portion sud de la péninsule. Ces travaux ont défini deux domaines lithologiques : Un domaine oriental composé d'un socle de gneiss tonalitique sous jacent ou imbriqué avec des roches supracrustales et de deux suites granitiques intrusives; et un domaine occidental caractérisé par une suite tonalitique-granodioritique, une charnockite et un monzogranite a grenat intrusifs dans des roches métasédimentaires.

La découverte de roches ultramafiques pointent vers de nouvelles sources intéressantes de pierre sculpturales et ont aussi le potentiel de minéralisation en nickel-cuivre-ÉGP. Le secteur couvert par le socle d'orthogneiss pourrait contenir des kimberlites diamantifères similaires à celles retrouvées dans la portion nord de la péninsule. Finalement, la géologie de la péninsule suggère la possibilité de retrouver d'autres types de minéralisation, comme de l'or associé avec les formations de fer et des gisements volcanogènes associés avec les roches supracrustales.

About the Map

General Information

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Geology by C. Bilodeau, M. Young, G. Machado, M. St-Onge, R. Tapkanie, N. Rayner, D. Skipton, R. From, C. MacKay, G. Creason and Z. Braden, 2012;
D.J. Scott, 1996; R.G. Blackadar, 1965

Geological compilation by G. Machado, 2012

Cartography by C. Gilbert

Initiative of the Canada-Nunavut Geoscience Office, conducted under the auspices of the Hall Peninsula Integrated Geoscience Program. Funding support provided by the Canadian Northern Economic Development Agency's Strategic Investment in Northern Economic Development program.
Logistical support provided by the Polar Continental Shelf Program as part of its mandate to promote scientific research in the Canadian North (PCSP-31012).

Map projection Universal Transverse Mercator,
zones 19 and 20
North America Datum 1983

Base map at the scale of 1:250 000 from Natural Resources Canada, with modifications.
Elevations in feet above mean sea level

Mean magnetic declination 2013, 29°28'W, decreasing 24.1' annually. Readings vary from 28°03'W in the SW corner to 30°26'W in the NE corner of the map.

The Geological Survey of Canada and the Canada-Nunavut Geoscience Office welcomes corrections or additional information from users.

This publication is available for free download through GEOSCAN (http://geoscan.ess.nrcan.gc.ca) and the Canada-Nunavut Geoscience Office (http://cngo.ca).

This map is not to be used for navigational purposes.

Preliminary publications in this series have not been scientifically edited.

Map Viewing Files

The published map is distributed as a Portable Document File (PDF), and may contain a subset of the overall geological data for legibility reasons at the publication scale.

ABOUT THE GEOLOGY

Descriptive Notes

INTRODUCTION

In 2012, the Canada-Nunavut Geoscience Office (CNGO) initiated a targeted regional bedrock mapping project (1:250 000 scale) on Hall Peninsula, southern Baffin Island, (NTS map sheets 25-I, part of 25-J, 25-O, 25-P, 26-A and 26-B) as part of the office's long-term objective to upgrade the geoscientific knowledge base for Nunavut (Machado et al., 2013).

The geology of Hall Peninsula remains poorly known, in spite of the first geological observations dating back to Frobisher's 1576 voyage (Hogarth, 1994). The peninsula has only been mapped once, at reconnaissance scale, during the Geological Survey of Canada's (GSC) Operation Amadjuak in the 1960's (Blackadar, 1967). Later, Scott (1996) carried out detailed mapping of a narrow transect in the northern part of NTS map sheet 25-O and sampled the main rock types for geochronology (Scott, 1999). This information was incorporated into a compilation map published in 2006 (St-Onge et al., 2006). Recent work has focused on the

diamondiferous kimberlites and surrounding rocks of the Chidliak kimberlite province in the northern part of the peninsula (Pell et al., 2012; Heaman et al., 2012; Ansdell et al., 2012).

In preparation for field mapping, the CNGO and the GSC flew an aeromagnetic survey in 2009 (Dumont and Dostaler, 2010). Last summer six weeks from the end of June to the beginning of August were devoted to mapping the southern portion of the peninsula (NTS map sheets 25-P, 25-I, parts of 25-O and parts of 25-J) covering approximately 20 000 km^2.

GEOLOGICAL FRAMEWORK

Previous work on Hall Peninsula indicated that it is underlain by Paleoproterozoic plutonic rocks that may be the westward continuation of the Cumberland Batholith, Paleoproterozoic metasedimentary rocks that may be the northeastern continuation of the Lake Harbour Group, and Archean orthogneisses of unknown tectonic affinity (Blackadar 1967; Scott 1996, 1999; St-Onge et al. 2006).

The map area is underlain by two lithological domains with a Hall Peninsula Block (older rocks, likely of Archean age) domain in the East and a domain in the West (younger rocks, likely of Paleoproterozoic age). The boundary between the eastern and western domains corresponds approximately with a high aeromagnetic anomaly situated close to the limit between NTS map sheets 25-O and 25-P. On the ground, this boundary corresponds to a tonalite-granodiorite suite intrusive into both domains.

DETAILED GEOLOGY

Eastern Lithological Domain

Migmatitic to gneissic tonalite underlies most of NTS map sheets 25-P and 25-I and is the structural (and depositional?) crystalline basement to other rock types in the eastern portion of the peninsula. The tonalite was dated by Scott (1999) at 2920 Ma. It contains numerous partly resorbed amphibolite enclaves. In some areas, the tonalite tends towards a more granodioritic composition. In map sheets 25-P and 25-I sequences of rusty-weathering supracrustal rock either overlie or occur as imbricate panels with the tonalite described above. The supracrustal units mostly comprise psammite, semipelite and pelite alternating with amphibolite and diorite sills and/or equivalent metamorphosed volcanic rocks.

The eastern domain is also characterized by two main intrusive suites. A large, moderately deformed, porphyritic granite pluton, centered on Cornelius Grinnel Bay (NTS 25-P), intrudes the gneissic tonalite and associated supracrustal units. It contains diorite and amphibolite enclaves and is characterised by rapakivi and porphyritic or megacrystic textures. A distinct granitic intrusive suite characterized

by a high aeromagnetic signature that correlates with the presence of magnetite is found in this domain.

Western Lithological Domain

At the boundary between the eastern and western domains, a felsic intrusive suite with a tonalitic to granodioritic composition was mapped. It was dated by Scott (1999) at 1877 Ma. Several thick panels of metasedimentary rocks, which are contiguous with the Lake Harbour Group of southern Baffin Island (St-Onge et al., 2006), characterize the domain. They consist of biotite-garnet-sillimanite semipelite, psammite and pelite, with minor marble, quartzite and silicate-iron-formation.

Those metasedimentary units are intruded by a charnockite and is in turn intruded by a garnet bearing monzogranite. This monzogranite contains up to 20% red-brown to lilac-colored garnet and was initially interpreted by Scott (1996, 1999), to be the product of partial melting of metasedimentary rocks.

STRUCTURAL AND METAMORPHIC PETROLOGY

Three regional deformational events were recognized in some crystalline rock units of Hall Peninsula. The first two deformational events (D1 and D2) are together responsible for the overall northwest-southeast trends in the map pattern, both are characterized by west- to southwest-dipping penetrative foliation and northwest- or southeast-plunging fold axes and mineral lineations and both are accompanied by amphibolite-facies metamorphism (Skipton et al., 2013). Evidence of an older granulite-facies metamorphic event predating both D1 and D2 is locally observed in the Archean gneisses (Skipton et al., 2013).

MINERAL POTENTIAL

Mineral exploration in the area began in 1577, when Martin Frobisher mined “black ores” in the Countess of Warwick Sound area during his second voyage and brought them back to London to be tested for gold and silver (Hogarth and Loop, 1986). In the late 20th century, following GSC Operation Amadjuak, mineral exploration for base and precious metals resumed but was still scarce. At the turn of the 21th century, exploration for diamonds started and resulted in the discovery of diamond-bearing kimberlites in the northern part of the peninsula (Pell et al., 2012).

Considering the overall geological context of Hall Peninsula, the potential for finding new occurrences of mineralization is multifaceted. The discovery of ultramafic rocks within supracrustal packages points to possibly interesting new sources of carving stone and these may have potential for nickel-copper-PGE mineralization. The large area underlain by crystalline basement (eastern domain) could be host to more diamond-bearing kimberlites. Also, marble correlated with the Lake Harbour Group

has potential to host gemstones as is the case in the Kimmirut area. Other possible types of mineralization may include gold associated with iron-formation and VMS deposits associated with supracrustal packages.

Acknowledgments

The authors thank D. Mate, C. Gilbert, S. Basso, R. Tapkanie, D. Skipton, M. Young, R. From, C. MacKay, G. Creason, Z. Braden and P. Peyton for their help in making this project possible. Lively discussion in the field with A. Camacho, D. Schneider, D.J. Scott and K. Ansdell improved our understanding of the area. Expert air support was provided by Universal Helicopters while Qikiqtaalik Logistics skilfully handled all our transport, shipping and equipment arrangements. Cook and first aid services were provided by 1984 Group of Companies and Nunavut Services provided expert camp management support. A stimulating collaboration with the Hamlet of Pangnirtung provided camp and community engagement support. A thoughtful review of this map by D.J. Scott was greatly appreciated.

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Coordinate System

Projection: Universal Transverse Mercator
Units: metres
Zone: 19 and 20
Horizontal Datum: NAD83
Vertical Datum: mean sea level

Bounding Coordinates

Western longitude: 67°30'00" W
Eastern longitude: 63°52'00" W
Northern latitude: 64°00'00" N
Southern latitude: 62°15'00" N

Data Model Information

Surface bedrock data are organized into feature classes and themes consistent with logical groupings of geological features. All field observation point data are related through the Station_ID property of the Station theme. These feature attribute names and definitions are identical in the shapefiles and the XML files.

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2. At the end of the first term, this Agreement shall automatically be extended for successive one (1) year terms, subject to section 6.0 below.

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   ii upon written notice of termination by the Licensee at any time, and such termination shall take effect thirty (30) days after the receipt by Canada of such notice; or

   iii upon mutual agreement of the parties.

2. Upon the termination for whatever reason of this Agreement, the Licensee's obligations under section 4.0 shall survive; and the Licensee's rights under section 2.0 shall immediately cease.

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   This Agreement shall be construed and enforced in accordance with, and the rights of the parties shall be governed by, the laws of Ontario and Canada as applicable. The parties hereto attorn to the jurisdiction of the Superior Court of the Province of Ontario.

2. **Entire Agreement**
   This Agreement constitutes the entire agreement between the parties with respect to its subject matter. This Agreement may only be amended in writing, signed by both parties, which expressly states the intention to amend this Agreement.

3. **Dispute Resolution**
   If a dispute arises concerning this Agreement, the parties shall attempt to resolve the matter by negotiation.

ACCORD DE LICENCE

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1. Cet Accord entre en vigueur à partir de la date et de l'heure d'acceptation des modalités de l'Accord (Heure de l'Est) et restera en vigueur pour une période d'un (1) an, en vertu de la sous-section 5.2 et de la section 6.0 qui suivent.

2. À la fin du premier terme, cet Accord sera automatiquement renouvelé pour des termes successifs d'un (1) an, en vertu de la section 6.0 qui suit.

6.0 RÉSILIATION

1. 6.1 Nonobstant la section 5.0, cet Accord peut être résilié :

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   iii. par consentement mutuel des parties.

2. Lors de la résiliation de cet Accord, pour quelque raison que ce soit, les obligations qui incombent au Détenteur de licence en vertu de la section 4.0 continueront de s'appliquer et les droits du Détenteur de licence en vertu de la section 2.0 cesseront immédiatement.

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7.0 GÉNÉRAL

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   Le présent Accord est régi et interprété en vertu des lois en vigueur dans la province de l'Ontario. Les parties acceptent de tomber sous la juridiction de la Cour supérieure de la Province de l'Ontario.

2. **Totalité de l'Accord**
   Le présent Accord constitue l'intégralité de l'entente conclue entre les parties relativement à l'objet du présent Accord. Toute modification à cet Accord ne peut être que par écrit, doit porter la signature de chaque partie et exprimer clairement l'intention de modifier cet Accord.

3. **Solution des litiges**
   Si un litige survient à propos de cet Accord, les parties tenteront de le résoudre par des négociations de bonne foi.