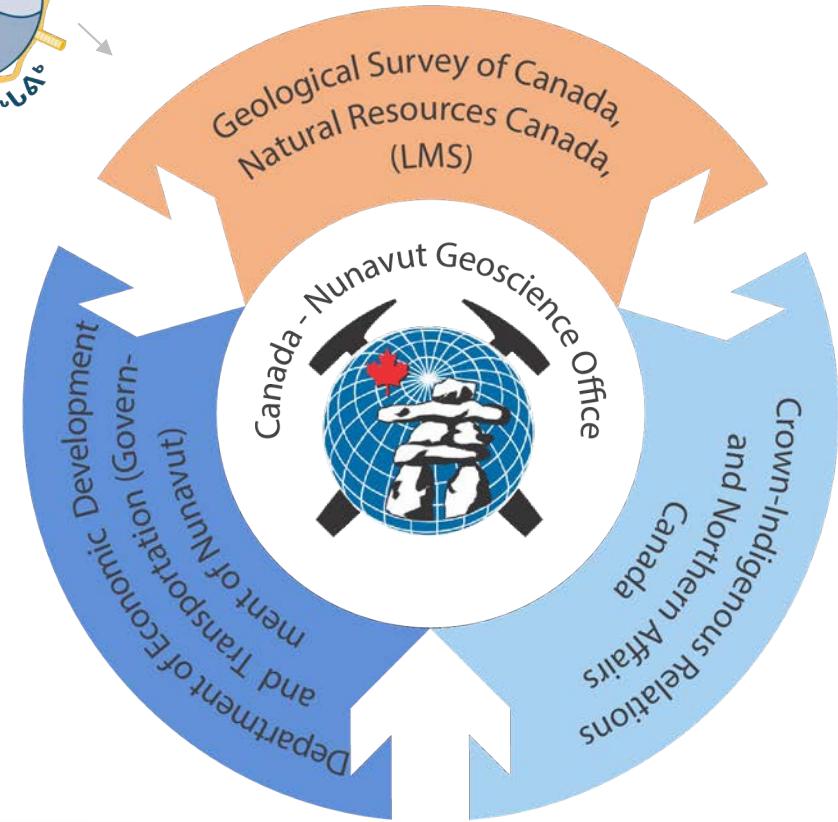


The Canada-Nunavut Geoscience Office (CNGO)

A partnership office, co-managed and co-funded by NRCan (LMS-GSC), CIRNAC and GN-EDT

Management Board – Representatives from the three governments, an ex-officio representative from NTI and the CNGO Chief Geologist



Operational Framework

Currently a four-person office, with two vacancies

A/Chief Geologist; Paleozoic Stratigrapher (paleontologist/energy geologist); Surficial geologist, and GIS specialist

Staffing process has started to fill the other 2 positions (bedrock mapper, economic geologist)

The original Office agreement was signed in 2019 – 25 years old in April.

With devolution agreement signed on January 18, 2024, the CNGO will transition to the GN in April 2027



CNGO Mandate

Source: Canada Nunavut Geoscience Office (CNGO): [2023-2026] Renewal Agreement

2.2 CNGO's mandate is to provide accessible geoscience information and expertise in Nunavut to support:

1. Responsible resource exploration and development
2. Responsible infrastructure development
3. Geoscience capacity building
4. Education and training; and
5. Awareness and outreach.

CNGO Activities 2023-2024

Fury and Hecla Integrated Geoscience Project

Participants: Holly Steenkamp (lead - 2018), Lorraine Lebeau (lead – 2019) C. Gilbert (co-lead), T. Tremblay, S. Zhang, S. Basso (3 Ph.D. students, GSC, others)

Project Objectives: Update geoscience knowledge from 1960's vintage (basement) and 1980's vintage (basin). Using geophysics, bedrock/surficial mapping, biostratigraphy, geochemistry and geochronology to find links with neighbouring basins, possible connections between basement rocks to Rae Domane to east and south and evaluate the potential for economic mineral deposits.

Key Results (mapping/metallogeny):

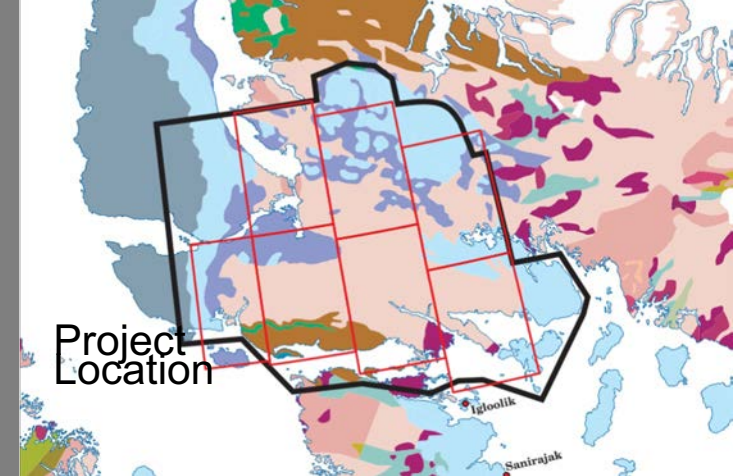
14 papers published

Evidence for local uranium and iron mineralization north of Fury and Hecla Strait, and presence of corundum;
Magmatic mafic-ultramafic basement rocks may have Ni-Cu-PGE+/-Cr potential

Preliminary U-Pb geochronology on basement rocks further constrain the extent of Archean igneous and sedimentary rocks

2023-2024

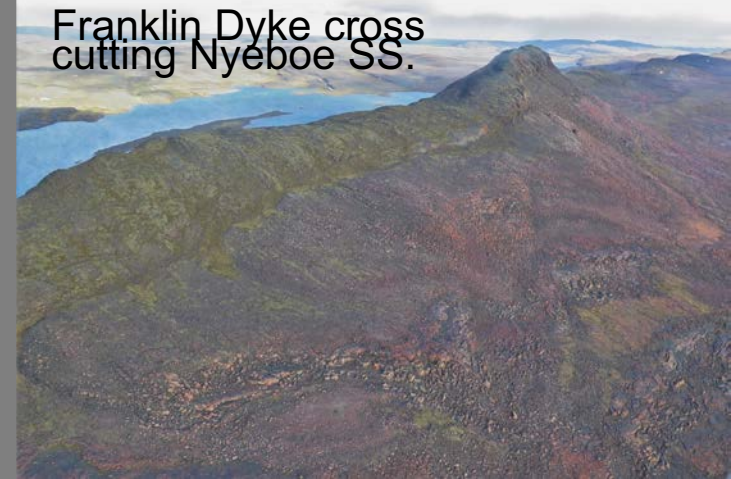
- ESRI Geodatabase (GBD) was revised and cleaned.
- 7 bedrock maps at 100k scale – anticipated Summer/Fall 2024



Archean Iron Formation



Franklin Dyke cross cutting Nyeboe SS.



Fury and Hecla Integrated Geoscience Project

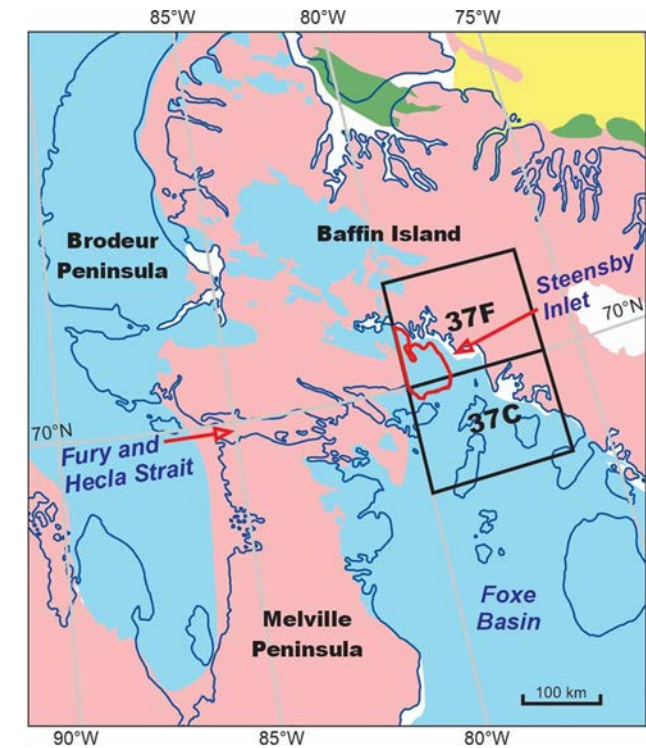
Participants: Holly Steenkamp (lead - 2018), Lorraine Lebeau (lead – 2019) C. Gilbert (co-lead), T. Tremblay, S. Zhang, S. Basso (3 Ph.D. students, GSC, others)

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Key Results (Biostratigraphy):

The biostratigraphy activity focused on six sections on an unnamed peninsula west of Steensby Inlet, which resulted in one publication:

Zhang, S. 2024: Ordovician conodont biostratigraphy of northwestern Baffin Island, Nunavut, Canada, with new insights into the age and diachronism of the Ship Point Formation in the Foxe Basin. Canadian Journal of Earth Sciences, Vol. 61, p. 355-376.



Location



Lower and Upper Ordovician Biostratigraphy Boothia Peninsula

Dr. Shunxin Zhang

Originally part of GEM-2 project: Integrated Geoscience of the Northwest Passage: Boothia Peninsula–Somerset Island Project 2018; M. Sanborn-Barrie et al.

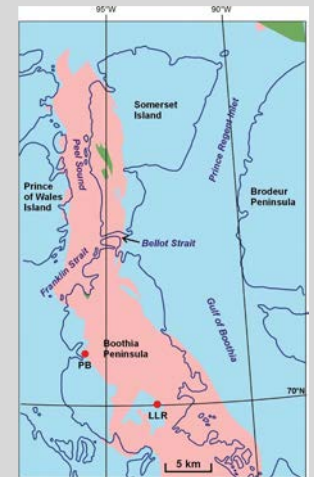
Objective: Use fossil evidence to better understand the Paleozoic stratigraphy on the Boothia Peninsula.

Results (2023-2024)

The project focused on two areas: Lord Lindsay River (undeformed) and Pasley Bay (deformed), which resulted in one publication:

In undeformed area, enables a new understanding of the age and stratigraphic position of the Netsilik and Turner Cliffs formations and fills a gap in upper Cambrian to Lower Ordovician biostratigraphy on Boothia Peninsula. Data provides stratigraphic support for the tectonic model that advocates the Boothia Uplift to be a deep-seated, east-dipping thrust block.

Zhang, S. 2023: Lower and Upper Ordovician conodont biostratigraphy and revised lithostratigraphy in the fault and fold zones of the Boothia Uplift, south-western Boothia Peninsula, Nunavut



Location

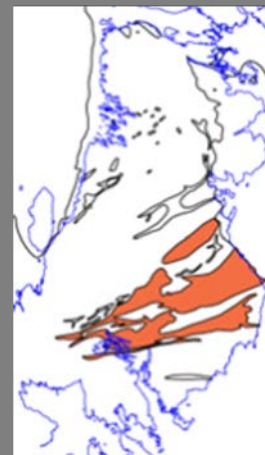
Surficial Geochemistry and Glacial Transport Modelling – Melville Peninsula.

Tommy Tremblay

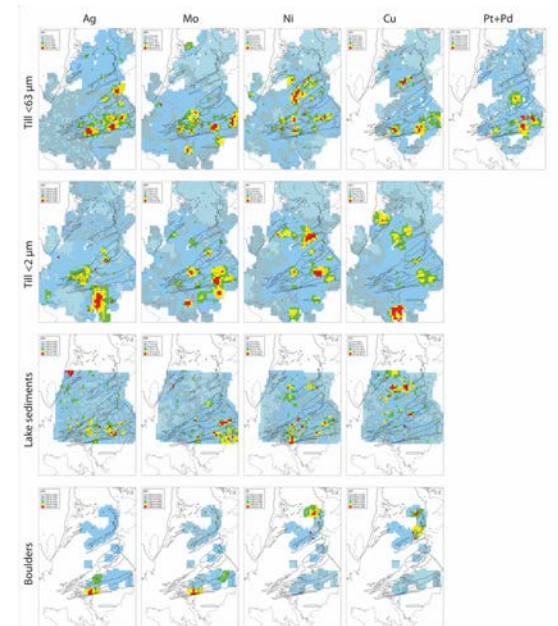
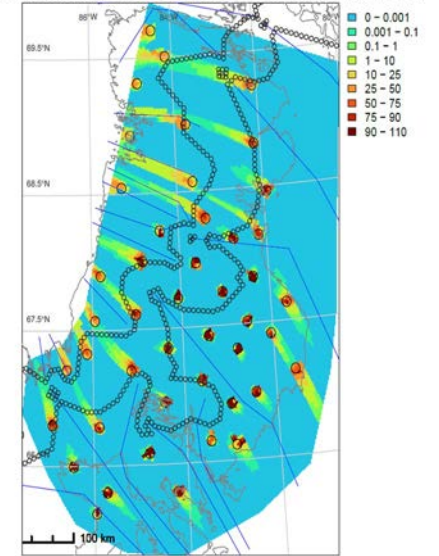
2023-2024 Surficial Materials Activities:

Using geochemistry from various surficial materials (till, lake sediments and boulders) to identify geochemical anomalies for multi-metallic deposits for the Penrhyn Group Rocks, S. Melville Peninsula. Developing a glacial transport numerical model to simulate the effect of glacial transport of material eroded from bedrock during successive ice flow episodes. Publication anticipated 2024.

Penrhyn Group



O2 concentration in till (pct) mosaic, with ice flow features, phase 03b



CNGO and GEM-GeoNorth Activities

GEM-GeoNorth

(Geological Survey of Canada – Northern Canada Division)

Purpose: deliver innovative, cutting-edge and relevant **geoscientific research in Northern Canada**, focusing on the unique challenges and opportunities facing economic development in the north

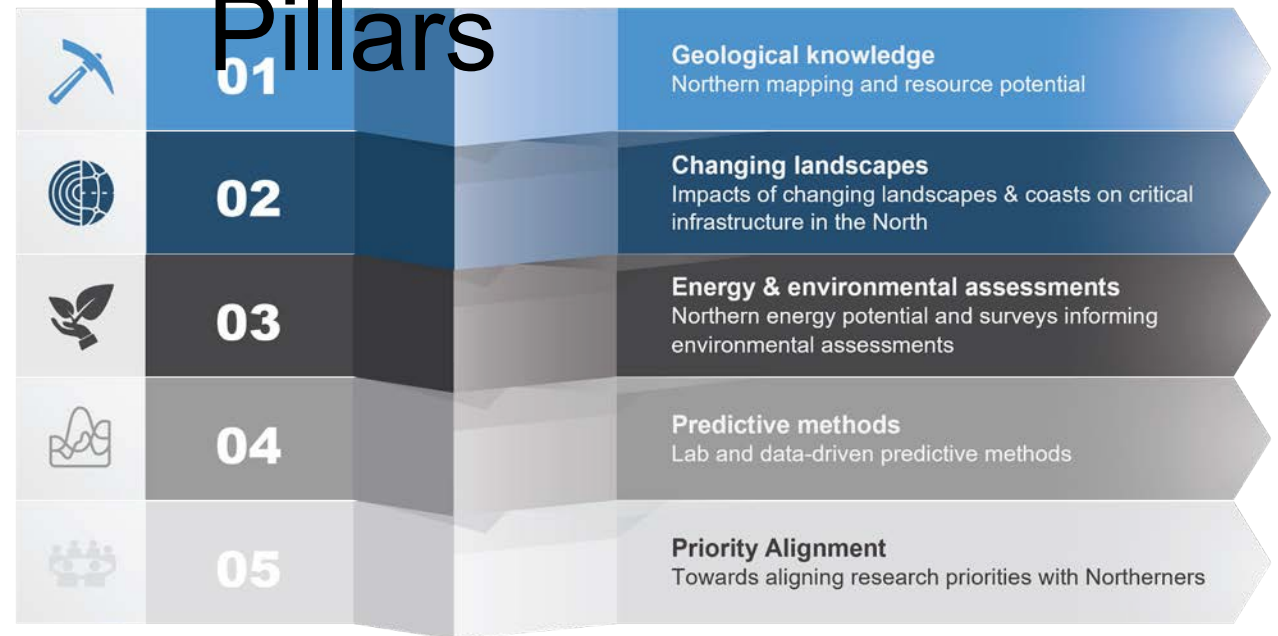
Renewed for \$100M - 2020-2027

Third iteration – 2008-2013 GEM, 2013-2020 GEM 2

Beginning initial steps for renewal in 2027 (for another 7 years, a permanent program?)

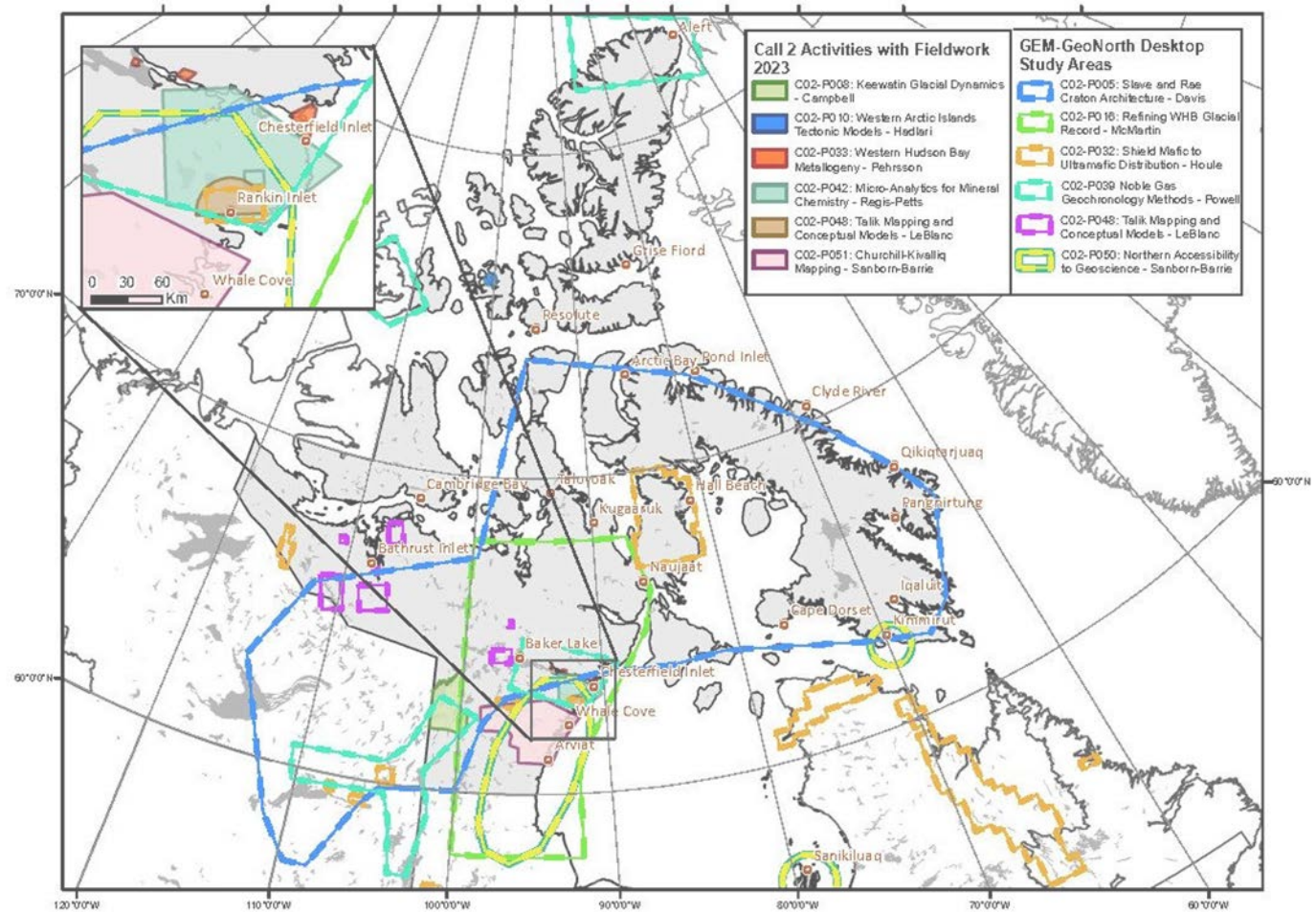
Current Program

Pillars



GEM-GeoNorth Projects Active in Nunavut 2023- 2024

GEM-GeoNorth Nunavut Research Activities 2023



Why GEM-GeoNorth and CNGO?

1. Leverage small budget and limited human resources to maximize amount of accessible geoscience generated to help realize its mandate.
2. Participating in projects helps to incorporate objectives specific to Nunavut's/CNGO interests
3. Helps build geoscience expertise and develop potential future HR capacity.
4. Helps CNGO to stay aware of what significant additional geoscience is happening in Nunavut (that we can help make clients aware of) .

Synthesis of the glacial dynamics of the Laurentide Ice Sheet in the west-central Keewatin

Etienne Brouard (GSC), Janet Campbell (GSC), Philippe Normandeau (NTGS), and Tommy Tremblay (CNGO).

Address critical gaps in understanding the glacial history and dynamics in West-central Keewatin, Nunavut.

Key Science Accomplishments

Attendance at the XXI INQUA Congress in Rome, Italy, to share preliminary results from the GEM-GeoNorth Keewatin Glacial Dynamics Activity

Summer fieldwork as part of the GEM-GeoNorth program, focused on investigating glacial dynamics in West-central Keewatin, Nunavut

Etienne Brouard and colleagues authored a report detailing field activities conducted in 2023 as part of the GEM-GeoNorth program



Sampling for cosmogenic dating

Result: Lay the foundation for the creation of open files, maps, and journal articles focusing on regional glacial geology, further contributing to scientific knowledge and the geological framework of Northern Canada.

Refining tectonic models and mineral resources in the Western Arctic Islands

Thomas Hadlari, Keith Dewing, Jennifer Galloway, Bill Davis, Nicole Rayner, Jeremy Powell, and Manuel Bringué.

A metallogenic study exploring continent-margin sequences using stratigraphic, sedimentological, geochemical and isotopic tools to provide a framework for exploration for lead-zinc-silver and other sediment and volcanic-hosted commodities.

Successfully completed fieldwork on Bathurst Island, NU (Dewing)

Developing U-Pb geochronological methods using carbonate samples from Polaris Pb-Zn mine

Completed community engagement trip to Grise Fiord, Oct 1-6 (Hadlari and Clark)

Developed strategy for 2024 fieldwork on Ellesmere Island, including permitting and planning (see map)

9 peer reviewed scientific publications

Study area for 2024 fieldwork



Result: Apply these methods to mineralized samples collected during new fieldwork in the western Arctic and use fault ages calibrate geological models for future mineral exploration.

Western Hudson Bay Architecture and Metallogeny study

Sally Pehrsson (GSC), Joshua Laughton (GSC), Kelsey Krossa (SFU), Dan Gibson (SFU), Brendan Dyck (UBC).

Test the geometry of the proposed new architecture for the Rankin Inlet Belt and address its implication for fluid pathways and mineralization.

CNGO Connection: Lorraine Lebeau – regional bedrock mapper. Characterized stratigraphy above the BIF-gold found in region.

New lithogeochemistry study for Cu occurrences in Rankin Inlet demonstrate they are volcanic-hosted massive sulphide-related and not linked to the Rankin Ni mine

First ever geochronology of the Hanbury Island high grade complex shows it comprises Paleoproterozoic magmatic rocks from an arc system, similar age and affinity to Daly Bay. Also unmapped metamorphosed greenstone belts were found in the complex between Hanbury Island and Winchester Inlet

New data from the Thirty Mile domain south of Baker Lake shows both Archean and Proterozoic volcano-sedimentary belt and Paleoproterozoic regional deformation

New data for the host rocks to the 1.9 Ga



Alfredo Camacho and Ph.D. student Derek Drayson examine sheared tonalites on a new discovered fault.

Result: Key accomplishments radically change the geologic models and the mineral potential for the area.

Geological Mapping the Churchill-Kivalliq corridor

Mary Sanborn-Barrie (GSC), Nicole Rayner (GSC), and Angela Ford (GSC).

Bedrock mapping activity uses a community-based approach to engage and involve interested residents of Whale Cove and Arviat, Nunavut, in the planning and execution of fieldwork required to collect observations and bedrock samples.

A new appreciation by community members of the insights that local rocks provide

Provided employment opportunities while strengthening interest, expertise, and capacity in geoscience within the western Hudson Bay region

Training in helicopter safety, how to use a map and compass, and increased understanding of the relevance of rocks added to residents' resumes to increase opportunities for more meaningful work with Agnico-Eagle mines in the region

Carving stone was collected and brought into Arviat for carving and selling



Community mapping, Whale Cove

Result: a modern, plain-language, illustrated geological map of the region, in both English and Inuktitut, which will provide geo-information for future land-use decision-making by these communities.

Refining the glacial record along western Hudson Bay, Nunavut and Manitoba

Isabelle McMartin, Amaris Page, Pierre-Marc Godbout, Tommy Tremblay (CNGO), Janet Campbell, Etienne Brouard.

Estimate the inland extent of the marine water invasion that occurred after the last ice sheet disappeared in northern Canada.

The newly mapped marine limit is contributing to additional science with an impact on major infrastructure projects in the region:

Used to assess ice content in glacial materials above and below the areas affected by the marine inundation for a 450-km all season road and along the proposed Kivalliq Hydro-Fibre Link corridor, which will bring clean, renewable energy and broadband internet to the communities of the region

Used to assess the effects on the composition of glacial materials used in scientific research and by the mineral exploration industry to understand the transport paths of



A series of raised beaches, indicating successive shorelines as the sea water retreated.

Result: accessible outputs, including derived maps, plain language posters in English and Inuktitut and digital products provided to northern groups for their own use.

Data Dissemination

2.2 CNGO's mandate is to provide accessible geoscience information....

Supported Publications

Challenges:

Last SoA was in 2021

Translation requirements for publications to be CNGO website
Broken website for 4 months requiring technology upgrades
COVID and staff departures
Procurement for publication contract

Summary of Activities was developed to present preliminary, interim, and final results from projects supported by the Canada-Nunavut Geoscience Office, as well as invited key-research papers from our partners and collaborators, in an annual volume.

CNGO Geoscience Data Series (GDS) represents a release of digital data. It is published as supplied by the author and has not been edited or formatted. In some cases a GDS may be directly associated with a Summary of Activities paper or other similar publication.

CNGO Open File Map series represents preliminary work and is produced to expedite the release of information. Each Open File Map is reviewed by at least one specialist.

Exploration Overview (CIRNAC)

Posters Presentations Maps

Available through CNGO Website:
CNGO.ca



Summary
of Activities
2021



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



Summary
of Activities
2012



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

Geodiversity Day

CNGO Mandate 5: Support awareness and outreach (Increase awareness of the importance of Earth Science for Nunavummiut.)

International Geodiversity Day – Pond Inlet October 7, 2023

Mission Statement:

“Increase awareness of the importance of Earth Science for Nunavummiut.”

Over 265 people from the community of Pond Inlet came to the event. Participants could participate in activities related to Geodiversity that included a Landscape Photo Contest, naming landscape features shown on a large poster (Inuktitut Language encouraged) and a Best Rock Contest CNGO, Parks Canada, GN and Baffinland had booths featuring rock, mineral and fossil specimens, pictures and maps from the area and around Nunavut. Baffinland did a mineral/rock identification course



Looking Forward

- Staff 2 vacant geoscience positions (bedrock mapper, economic geologist)
- Engage with industry, Indigenous Communities and Government to develop clear geoscience strategy that allows CNGO meet its mandate. Expect this to include collaborating with larger geoscience programs like GEM-Geonorth
- Fully engage in the devolution implementation plan to prepare for a smooth transition to GN in April 2027



Thank You!

Questions

Danny Wright, Ph.D.

Chief Geologist

Canada-Nunavut Geoscience Office
PO Box 2319, 1106 Inuksugait Plaza
Iqaluit, Nunavut X0A 0H0

danny.wright@nrca-nrcan.gc.ca 613-323-
2504