



# Canada-Nunavut Geoscience Office

## *Overview of Activities 2017*

Linda Ham, Chief Geologist

Canada-Nunavut Geoscience Office



Natural Resources Canada  
Ressources naturelles Canada



Indigenous and Northern Affairs Canada  
Affaires autochtones et du Nord Canada

Canada

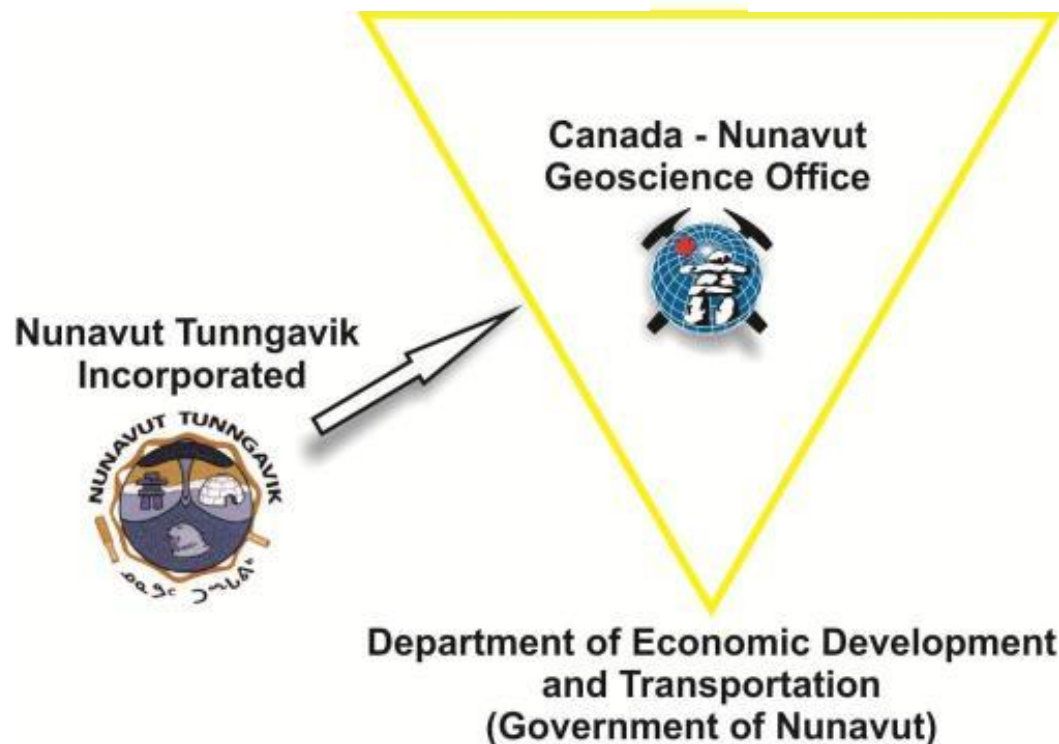


# The Canada-Nunavut Geoscience Office (CNGO)

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

Geological Survey of Canada (Natural Resources  
Canada, Lands and Minerals Sector [LMS])

Indigenous and Northern Affairs  
Canada



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



CNGO was opened in 1999 by Nancy Karetak-Lindell (Liberal MP for Nunavut), Ralph Goodale (federal Minister of Natural Resources) and Peter Kilabuk (Nunavut Minister of then-Department of Sustainable Development)

# The Canada-Nunavut Geoscience Office

Cooperation in support of sustainable (resource) development

## Rationale for the office

- Geoscience will continue to play a key role in sustainable development in Nunavut
- Capacity to generate and utilize geoscience information is needed
- The Canada-Nunavut Geoscience Office is a step towards developing this capacity
- The partnership arrangement by creating the CNGO will be a model for collaborative government program delivery and capacity building



# Canada-Nunavut Geoscience Office

**Mandate:** Provide accessible geoscience information and expertise in Nunavut

## **Six person office**

Chief Geologist (1), Paleozoic geologist (1),  
Bedrock mapper (1), Surficial mapper (1),  
GIS specialist (1) and Data dissemination/  
computer programmer (1)



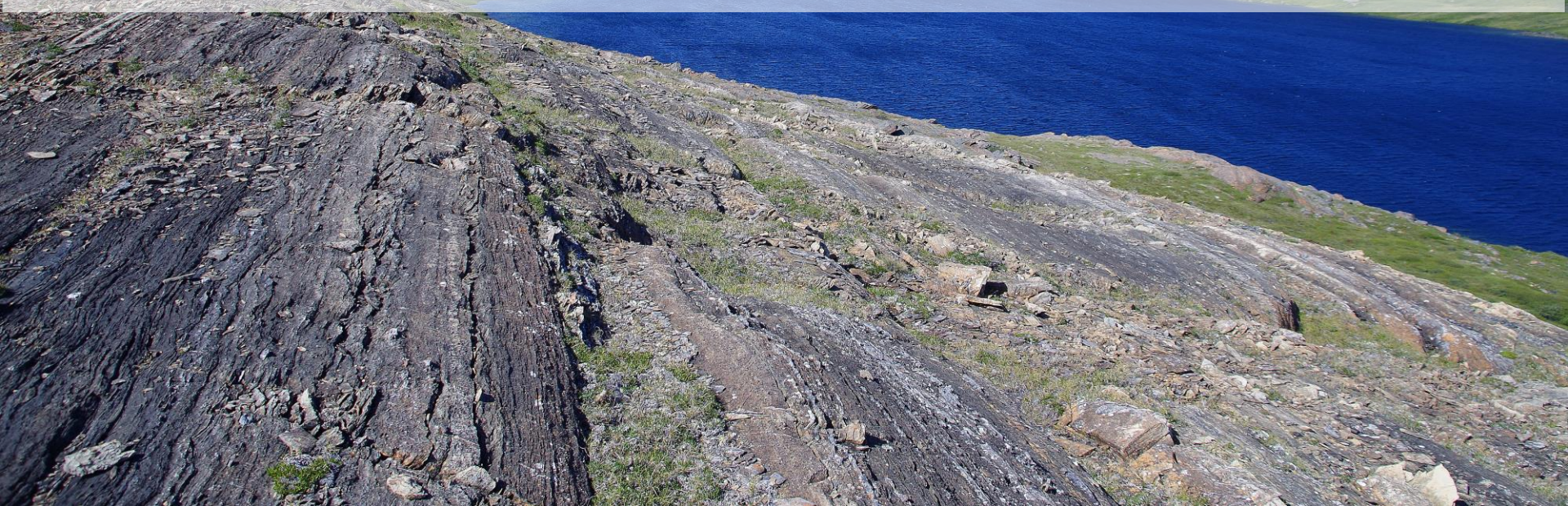
Funding to/for CNGO:

- 1) Office agreement (five-year 2018-2023) between NRCan, INAC and GN provides for salaries, O&M, core mandate research
- 2) Strategic Investments in Northern Economic Development (SINED) annual funding (CanNor) is for 'added-value' geoscience research

# Mandate of the office

To provide Nunavut with accessible geoscience information and expertise to support:

- 1) responsible resource exploration and development
- 2) responsible infrastructure development
- 3) geoscience capacity building
- 4) geoscience education and training, and
- 5) geoscience awareness and outreach



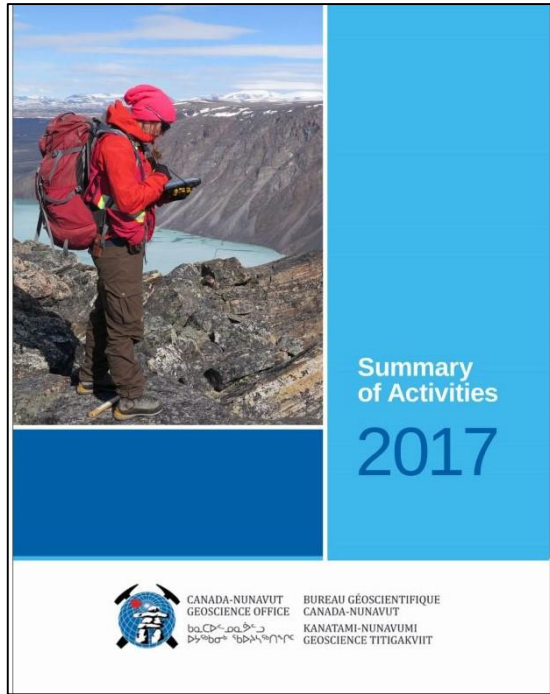
# Mandate of the office

To accomplish these mandates, the CNGO endeavours to:

- Map, interpret and report on the geological features and resources of Nunavut in collaboration with our geoscience partners, and
- Engage the public on key geoscience issues



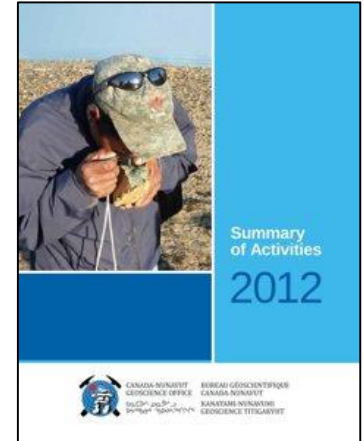
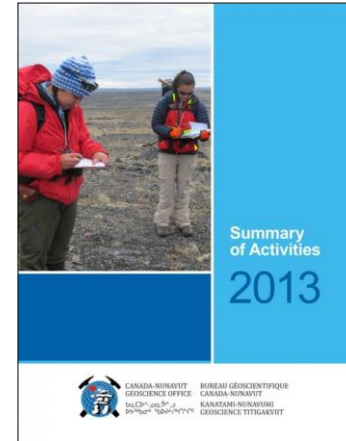
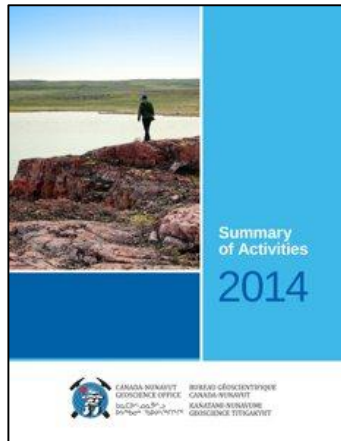
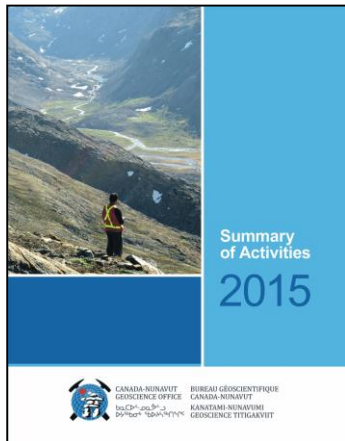
# Summary of Activities



**Publication to disseminate results annually  
First published in 2012**

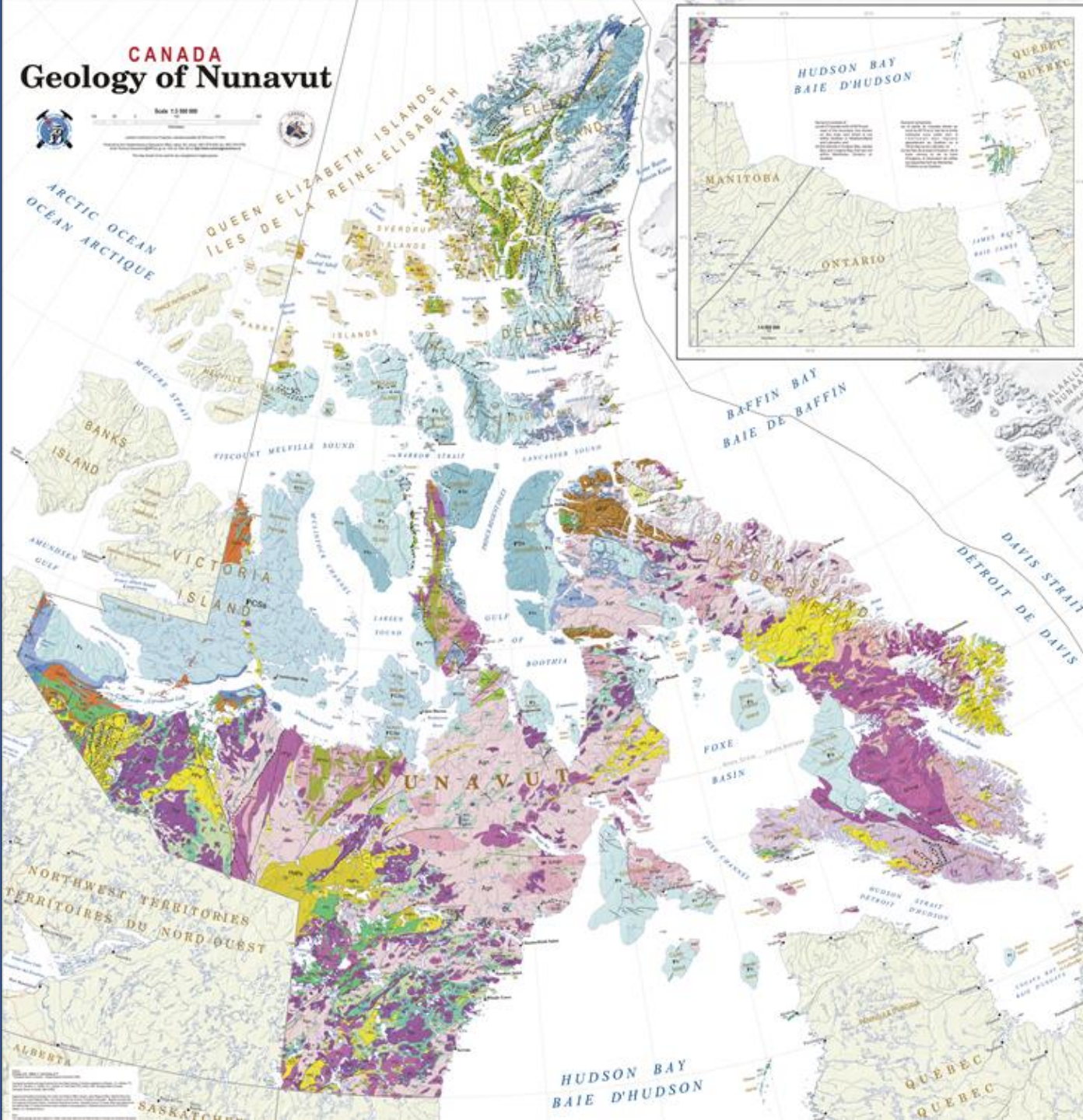
Available on-line December 31; hard copies available at Roundup January  
CNGO also is disseminating data and other products

**Geoscience Data Series released annually  
also, tied in with the SoA**





# CANADA Geology of Nunavut




## CNGO Activities

- Regional geoscience (mapping)
- Geoscience for infrastructure
- Carving stone
- Data dissemination
- Outreach and capacity building

# Regional Geoscience – Mapping



Bedrock and surficial mapping, mineral deposit research  
Completes coverage in areas with inadequate information  
Provides information (geological data), new ideas and answers  
Allows decision-makers to make better decisions for resource development, land-use planning and infrastructure

A photograph showing a field campsite. In the foreground, there are two tents: a white one on the left and a yellow one in the center. The camp is situated on a sandy or dirt bank next to a large, calm blue lake. In the background, there are brown, rocky hills with patches of snow. A small airplane is flying in the sky above the hills.

Airborne geophysical surveys and focussed surveys  
Provides local training and development opportunities

# Regional Geoscience (Bedrock) Mapping – Tehery Lake-Wager Bay



In 2012, GSC led a two week reconnaissance survey in the Tehery Lake-Wager Bay area

2015 and 2016 a collaborative project between GSC (GEM 2) and CNGO (SINED) conducted to map eight NTS map sheets

2017 CNGO project completed the mapping

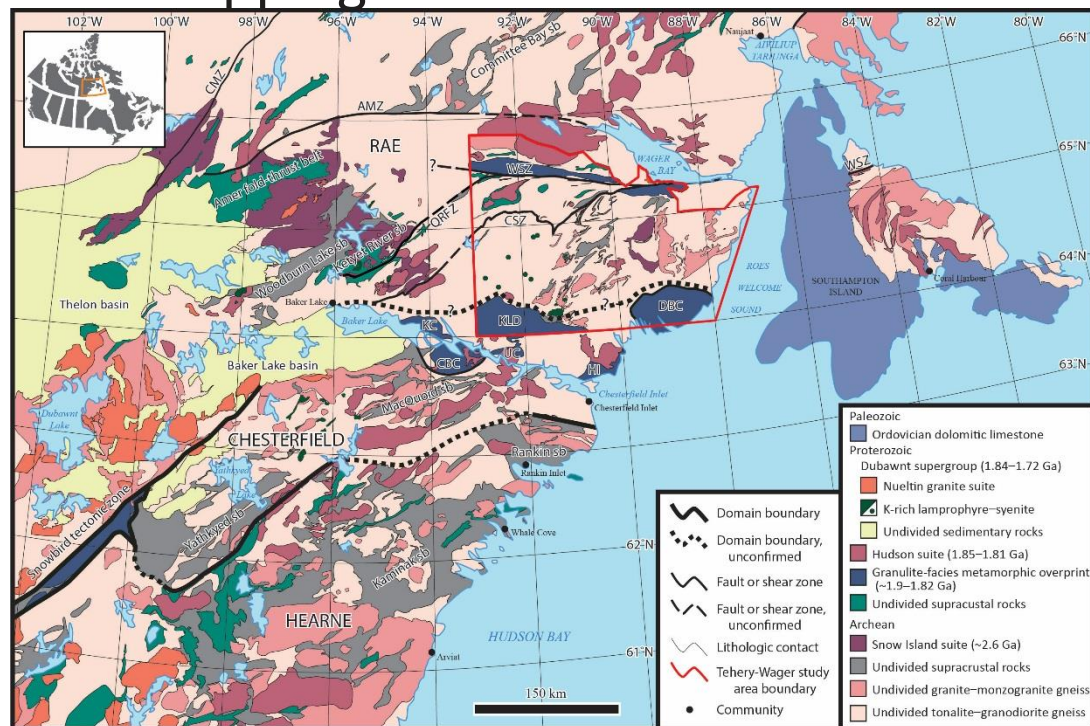
Goals are to:

Increase the level of geoscience knowledge

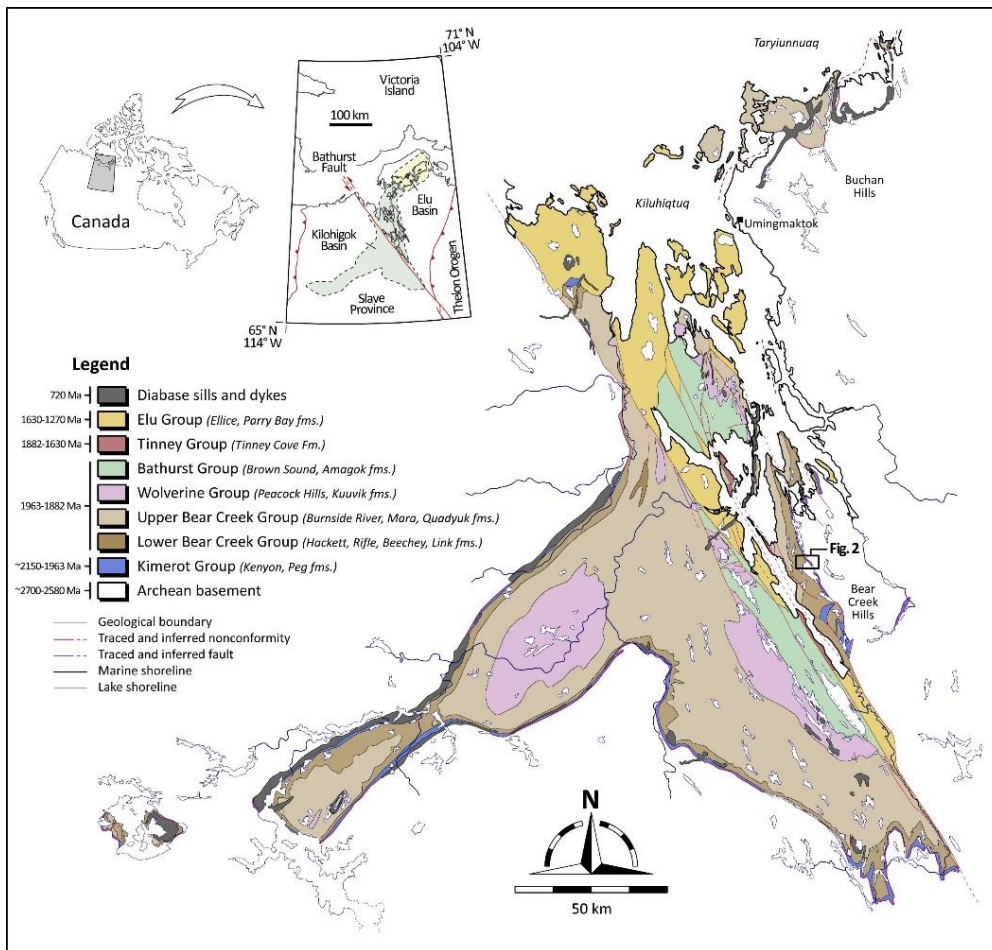
Evaluate the mineral potential

Increase the geological understanding

**Holly Steenkamp**



# Regional Geoscience (Bedrock) mapping and mineral deposit studies

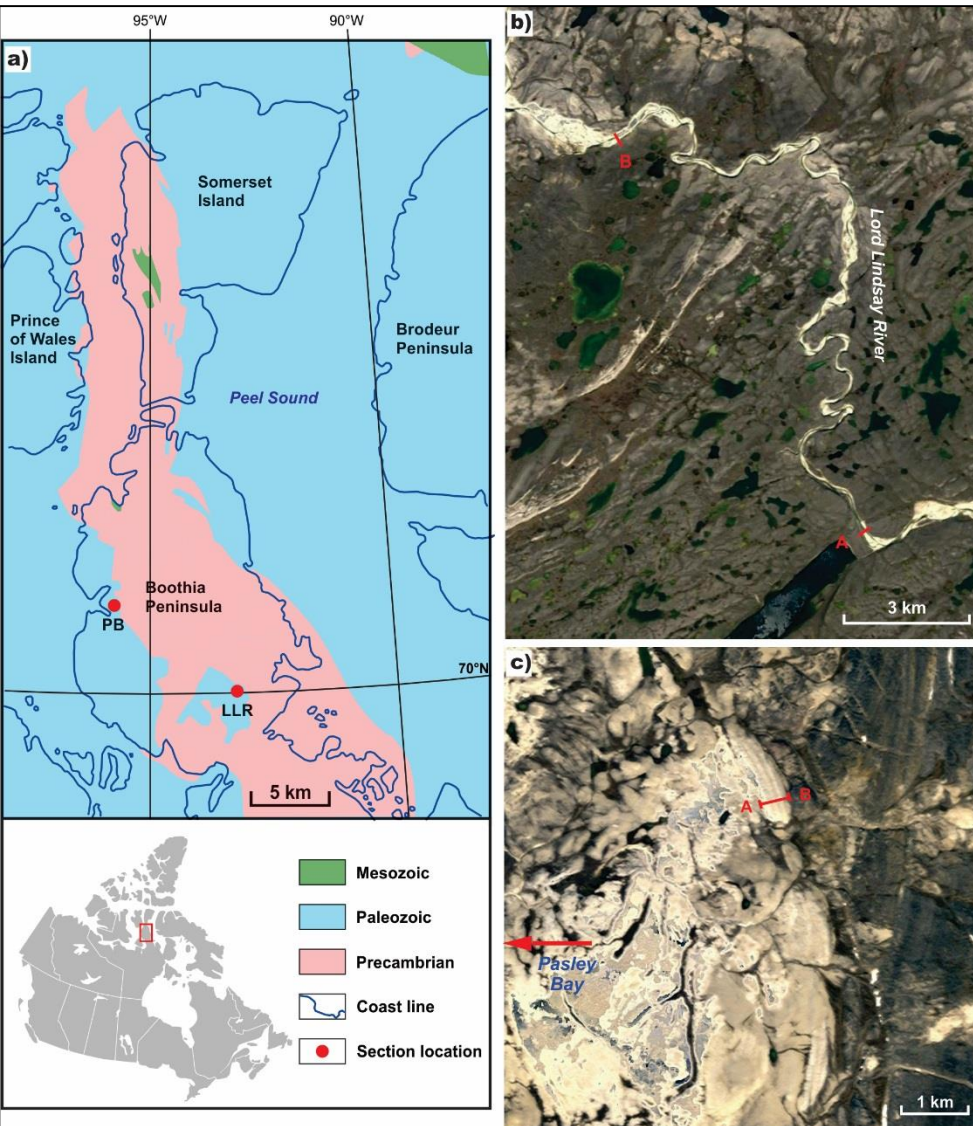


Collaborative project: CNGO (SINED funds) and Laurentian University (Dr. Alessandro Ielpi)

This study, part of the Kilohigok Basin Geoscience Project, focused on a part of this sedimentary basin, roughly 300 km southwest of Cambridge Bay. Field work focused on where the contact between sedimentary and metamorphic rocks is exposed.

Results to date suggest the area could hold potential for uranium mineralization.

# Regional Geoscience (Bedrock) mapping Ordovician stratigraphy, Boothia Peninsula



1 of 3 components of the GSC  
GEM 2 Boothia-Somerset  
Integrated Geoscience Project

This work will provide essential  
data for:

- detailed stratigraphic division
- evaluating age of different stratigraphic units, and
- making stratigraphic correlation with other Arctic islands.

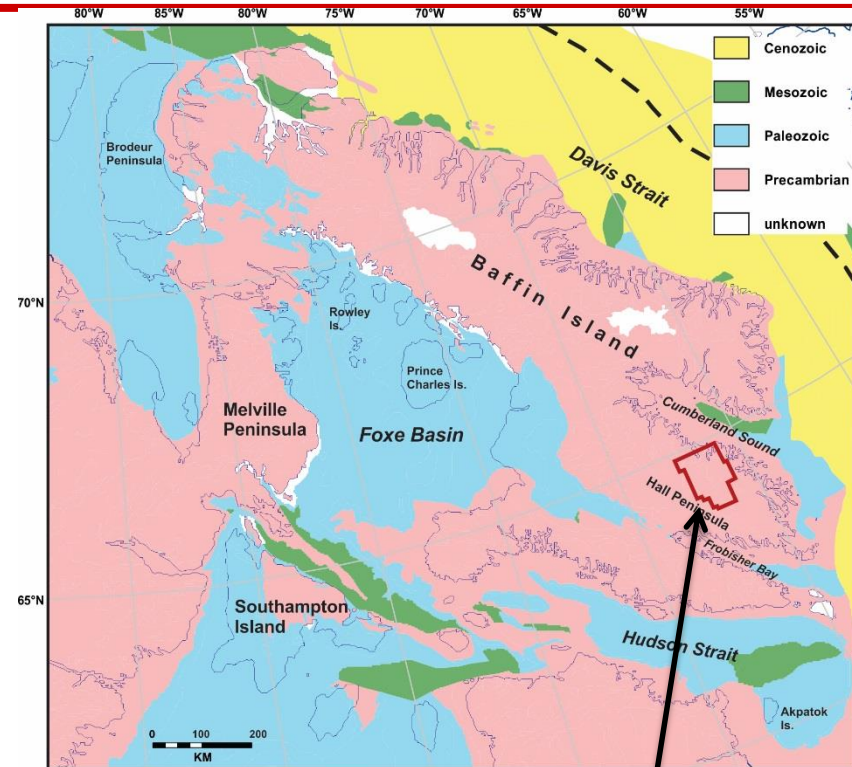
*Dr. Shunxin Zhang*

# Research studies – Hall Peninsula



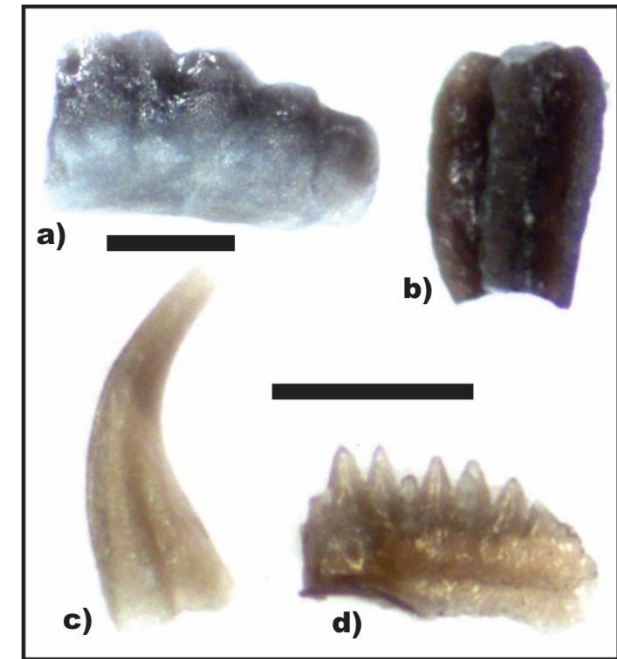
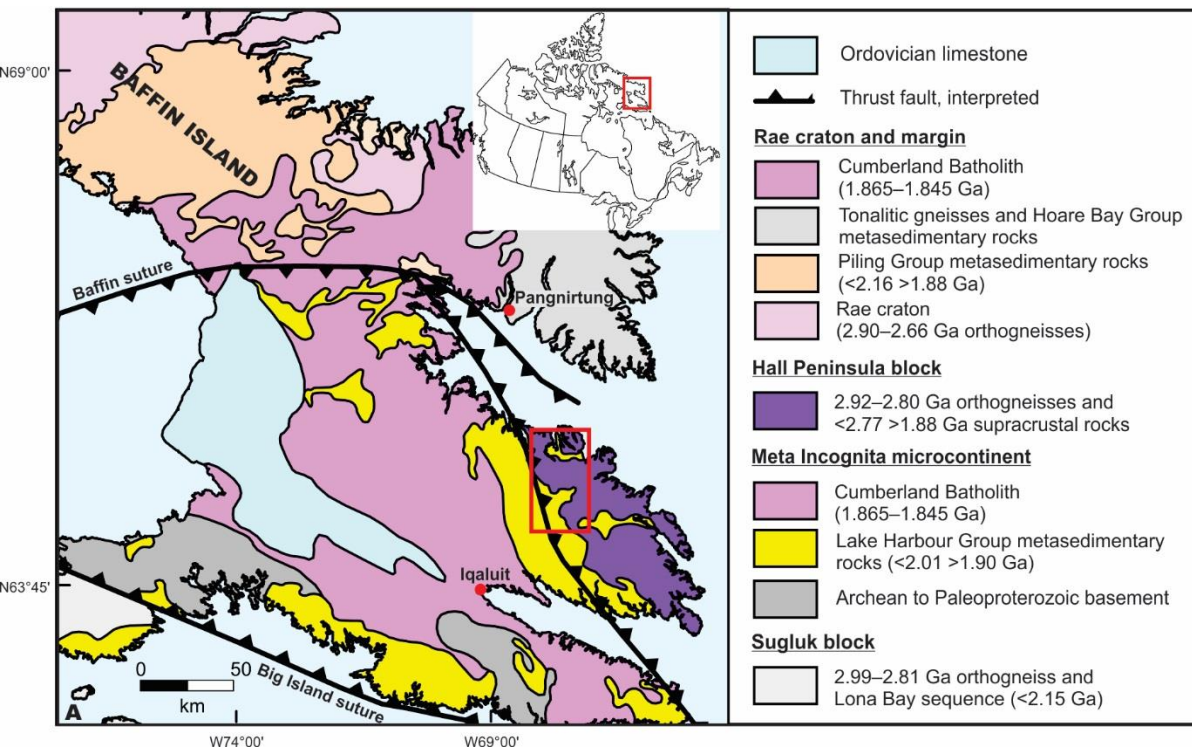
Chidliak kimberlites discovered on Hall Peninsula, southern Baffin Island  
Exposed rocks are Precambrian metamorphic rocks  
Original Paleozoic cover rock/soil have been removed by erosion  
However, numerous carbonate xenoliths discovered within the Chidliak kimberlites  
These record the presence of Paleozoic sedimentary (carbonate) rocks  
Many of these xenoliths contain numerous microfossils (conodonts)

*Dr. Shunxin Zhang*



Peregrine's Chidliak kimberlite property

# Conodonts and their Colour Alteration Index values from xenoliths from Chidliak kimberlites

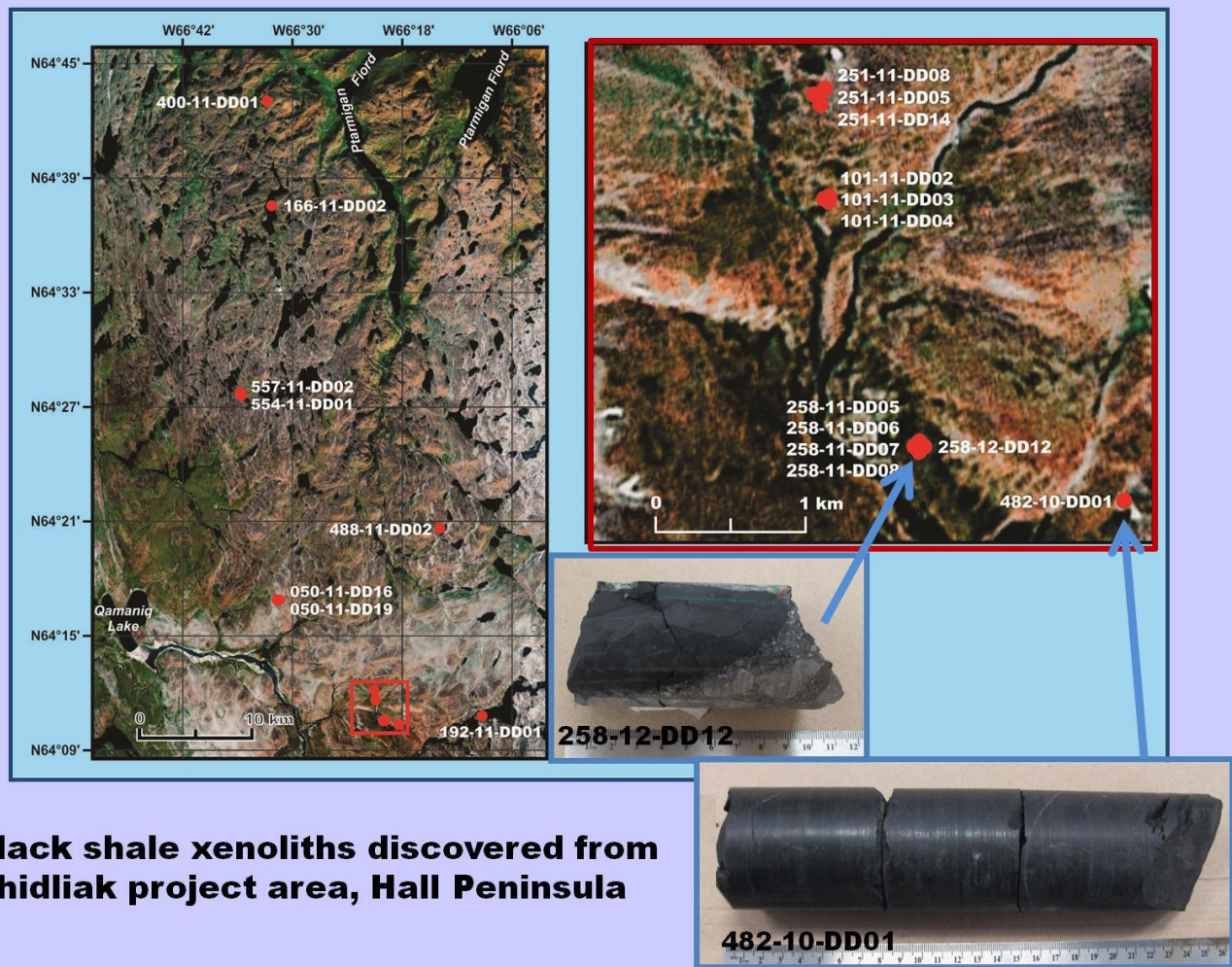


*Conodonts*

*Simplified geology of southern Baffin Island, showing major tectonostratigraphic assemblages*

By determining the Colour Alteration Index of microfossils, this data can be used to understand the kimberlite emplacement processes and cooling history of Chidliak kimberlites

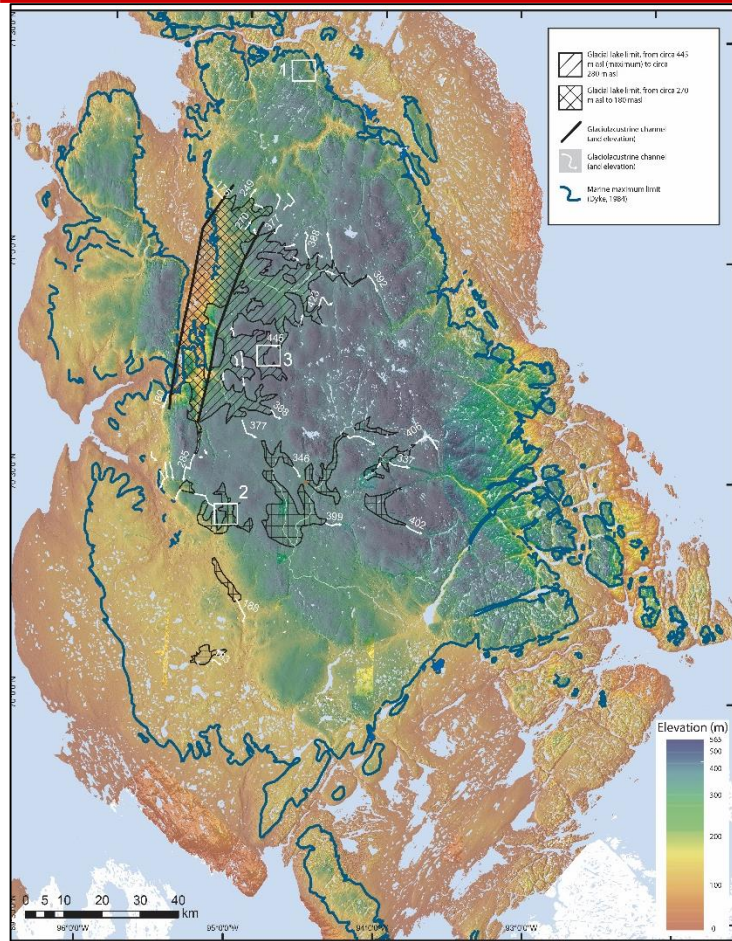
# Research: Hudson Bay – Foxe Basin Energy



Three samples analyzed from the black shale xenoliths within the Chidliak kimberlites indicate that the xenoliths represent rocks that are excellent Paleozoic oil-prone source rocks



# Regional Geoscience (Surficial) mapping – Boothia Peninsula



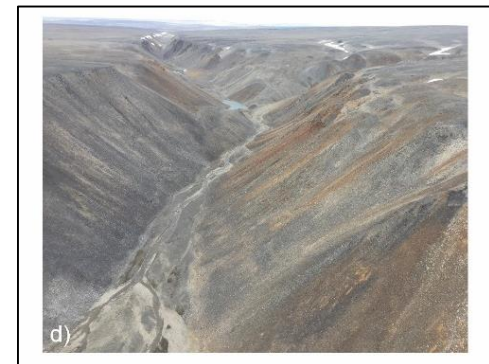
**Tommy Tremblay**

1 of 3 components of the GEM 2 Boothia-Somerset Integrated Geoscience Project

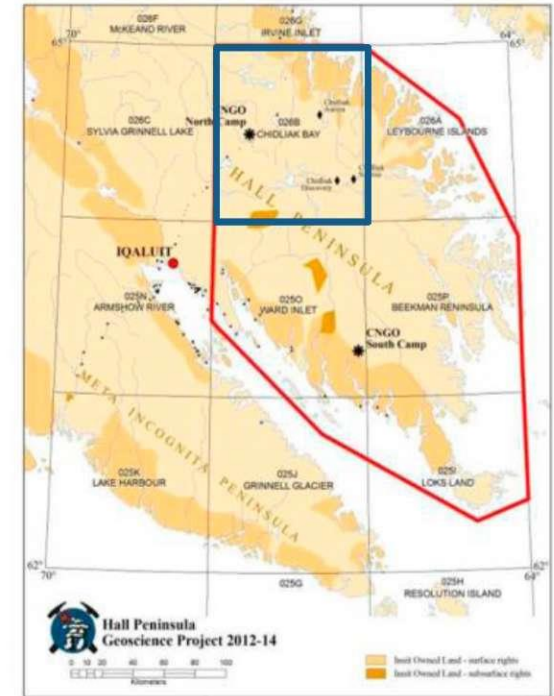
Surficial work included:

- Field observations on surficial sediments and geomorphological processes
- Samples of glacial sediments (till) settings
- Glaciodynamic settings mapped as cold-based, intermediate cold-based and warm-based zones from field observations and remote sensing work
- Mapping of glacial lakes and iceberg scours identified on drumlines

The ice-flow history from last glaciation divided into three broad phases.

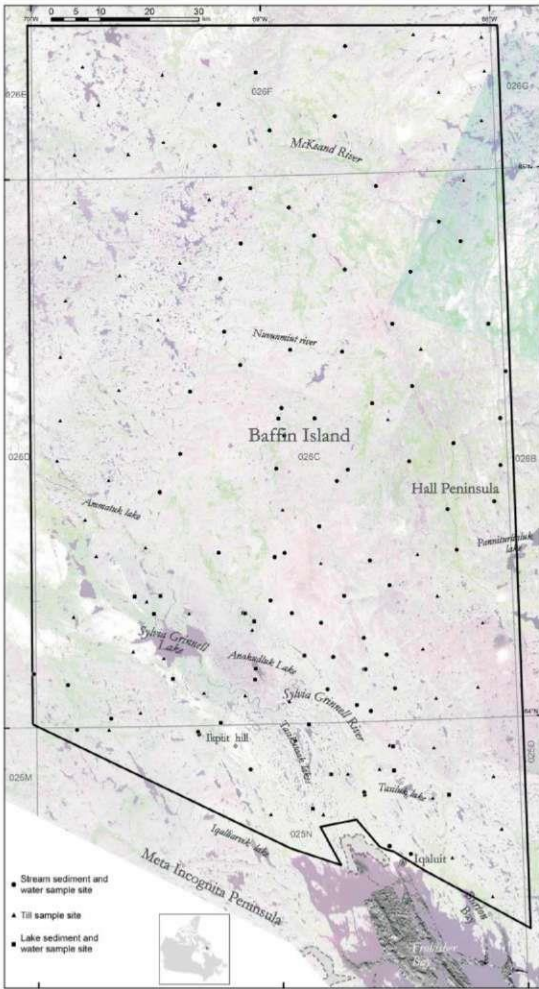
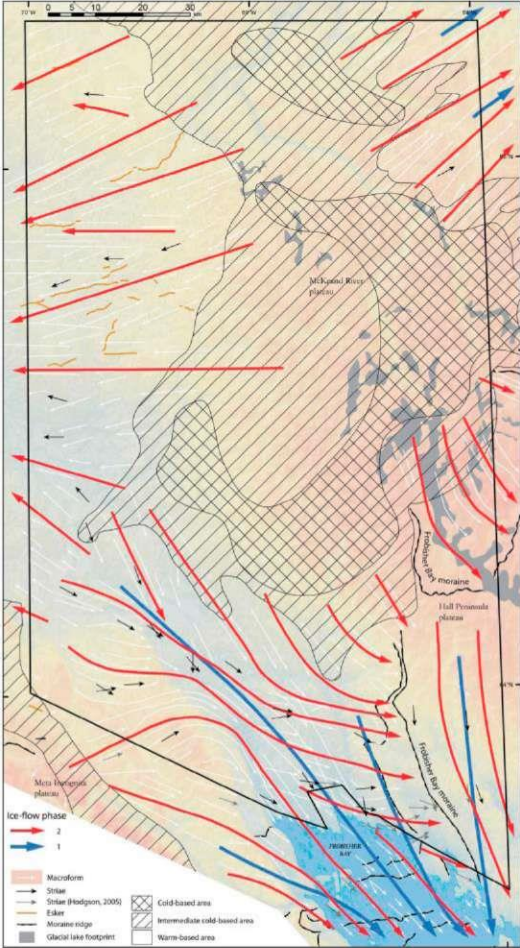


# Geoscience for Infrastructure – Surficial Mapping



Surficial maps include till geochemistry, ice flow and glacial erosion studies 26B (1:10,000; outlined in blue) has been released Three sheets – 25I, 25P and 26A – are in production.

# Geoscience for Infrastructure – Surficial Mapping



Samples (till, stream water and sediment, lake water and sediment) collected

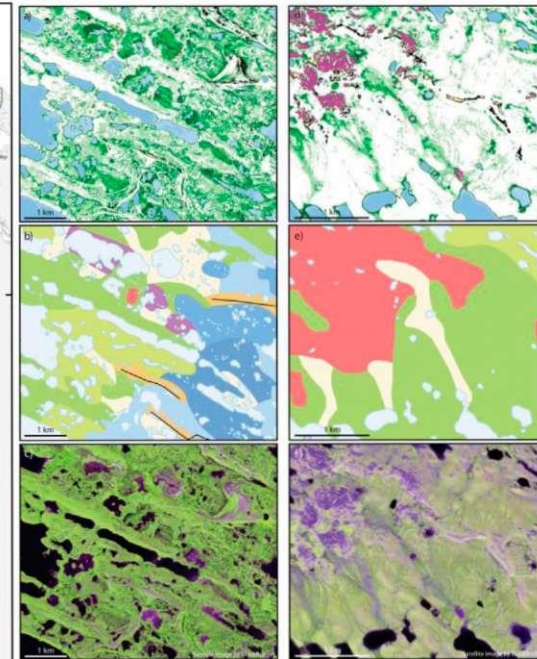
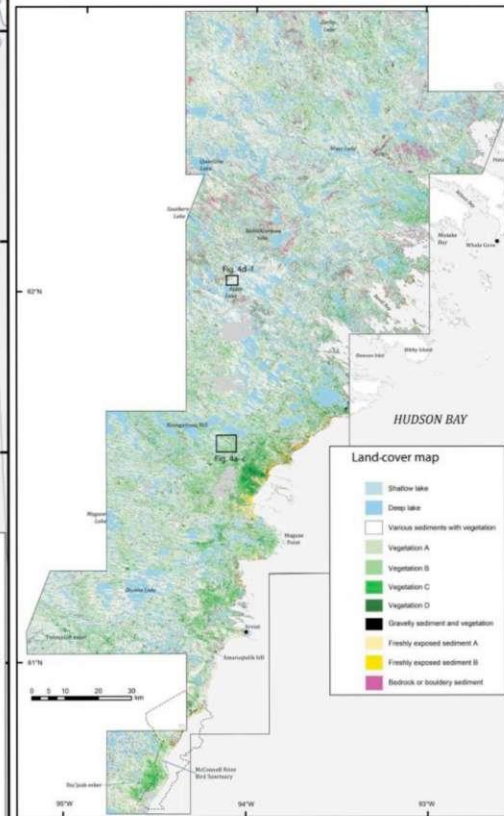
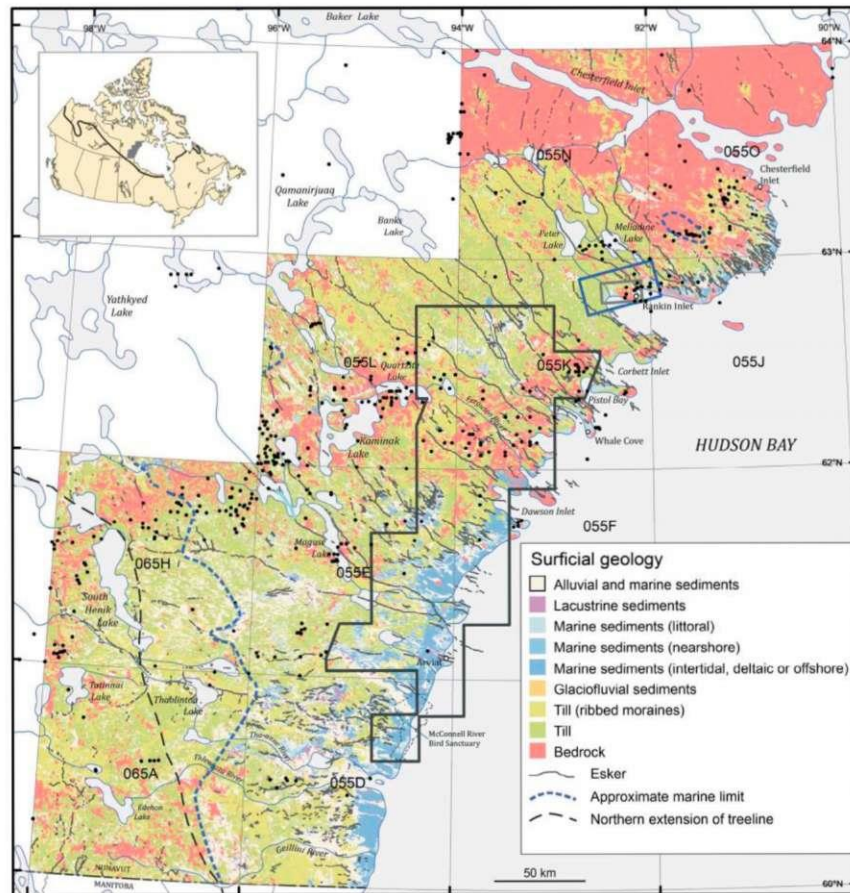
Field observations made of surficial sediments and geomorphological features (glacial macroforms, proglacial lakes, eskers)

Compiling and drafting new 1:100,000 surficial geology maps

Tommy Tremblay

Sylvia Grinnell

# Geoscience for Infrastructure Western Hudson Bay – Surficial mapping



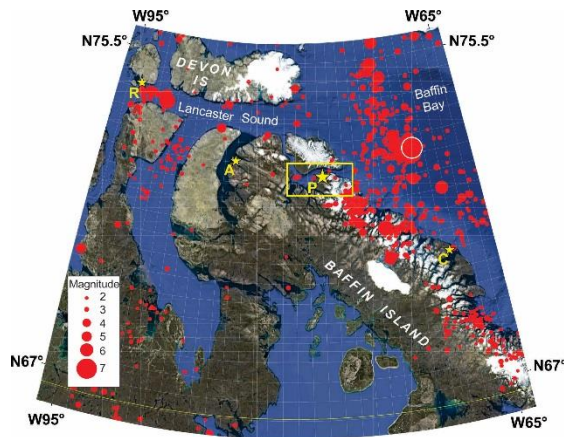
*Tommy Tremblay*

Digital compilation of surficial geology

Maps were refined by the use of RapidEye image land-cover interpretation

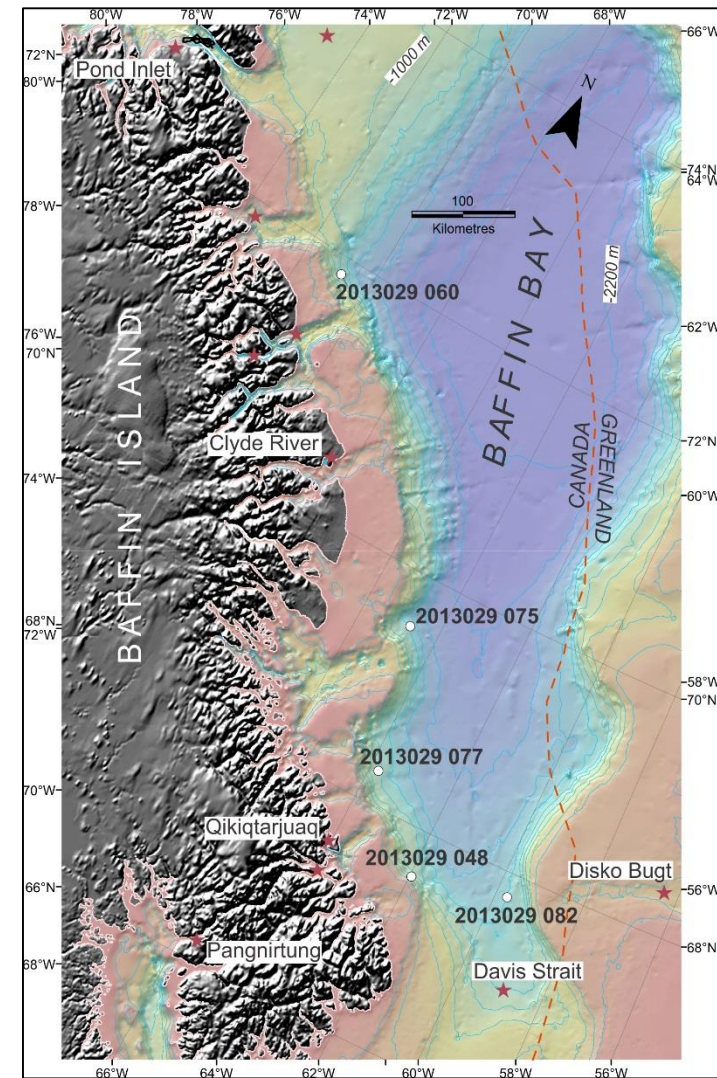
Gravel deposits, bedrock outcrops, bouldery tills, freshly eroded sediments and vegetation were identified

# Marine Geological Hazards in Baffin Bay



Since 2012, GSC-A and ArcticNet, supported in part by CNGO (SINED funds), have studied marine geological hazards in Baffin Bay using CCGS *Hudson* and *Amundsen* Seabed shape, shallow subsurface geology, and engineering properties of the seabed can help delimit the extent of hazards and likelihood of future events

Researchers (Dalhousie University) have determined that underwater landslides have occurred in the Pond Inlet fjord in northern Baffin Bay

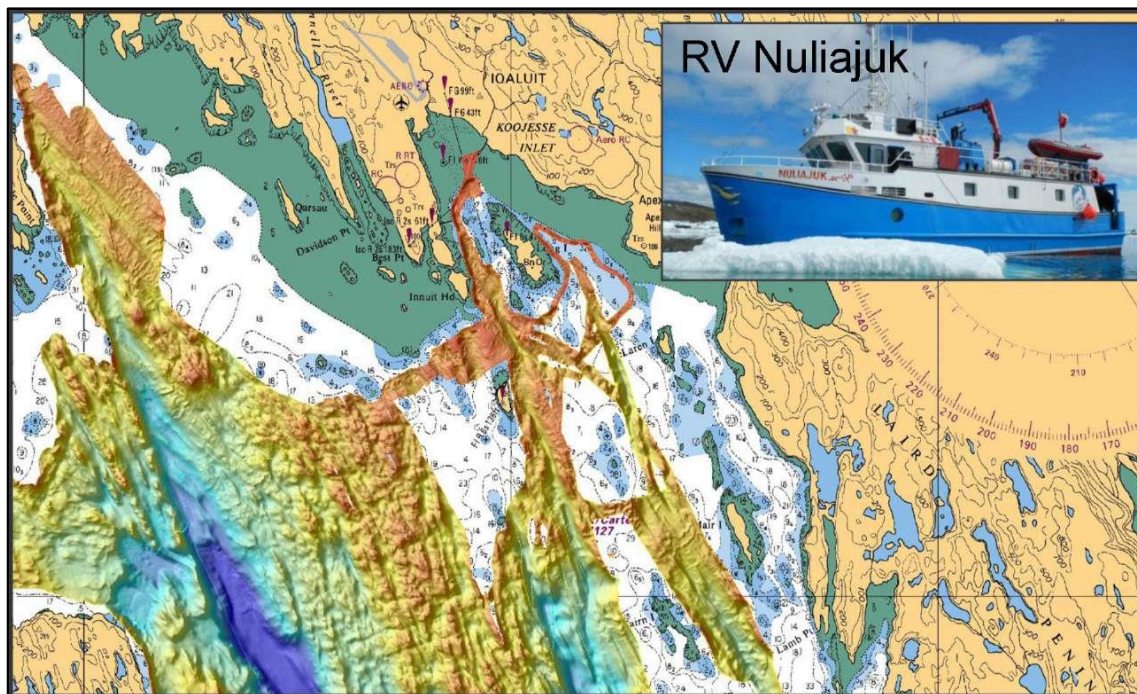


# Geoscience for Infrastructure – Mapping the bottom of Frobisher Bay

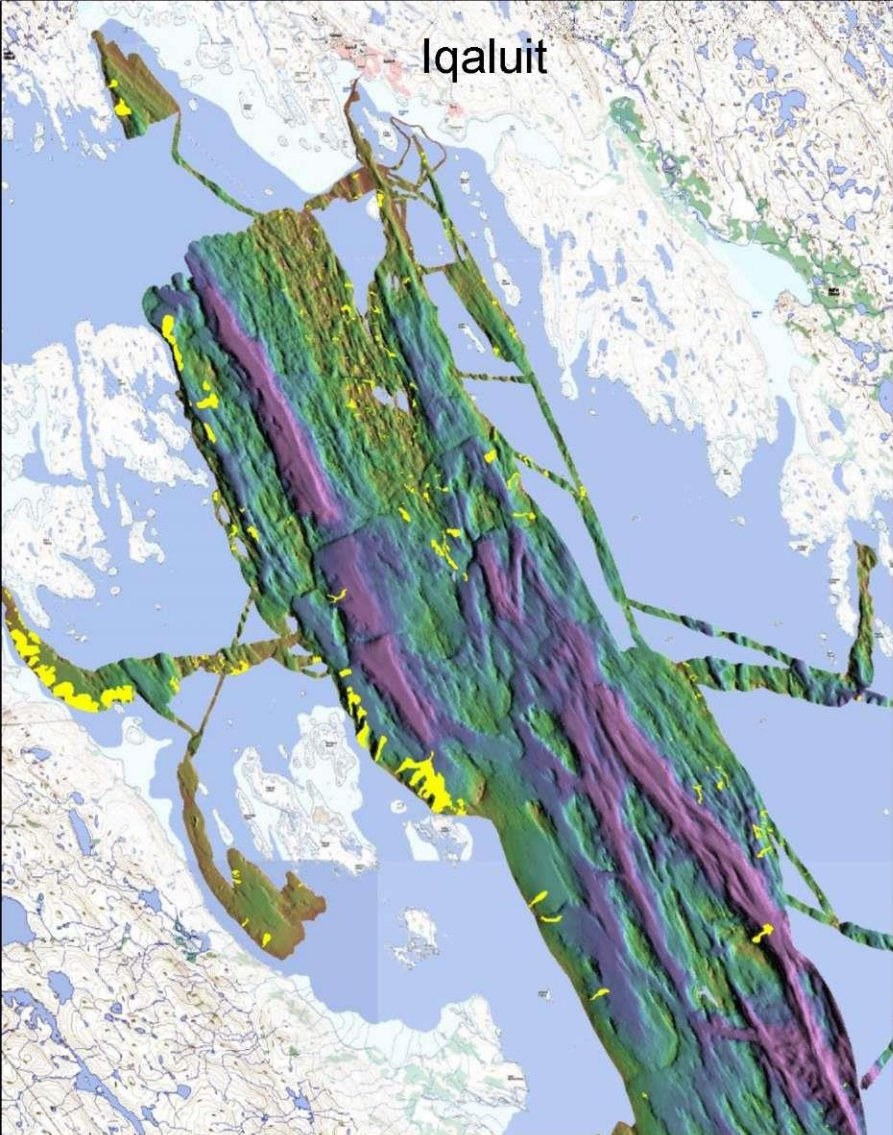


Mapping of the seabed geology for:

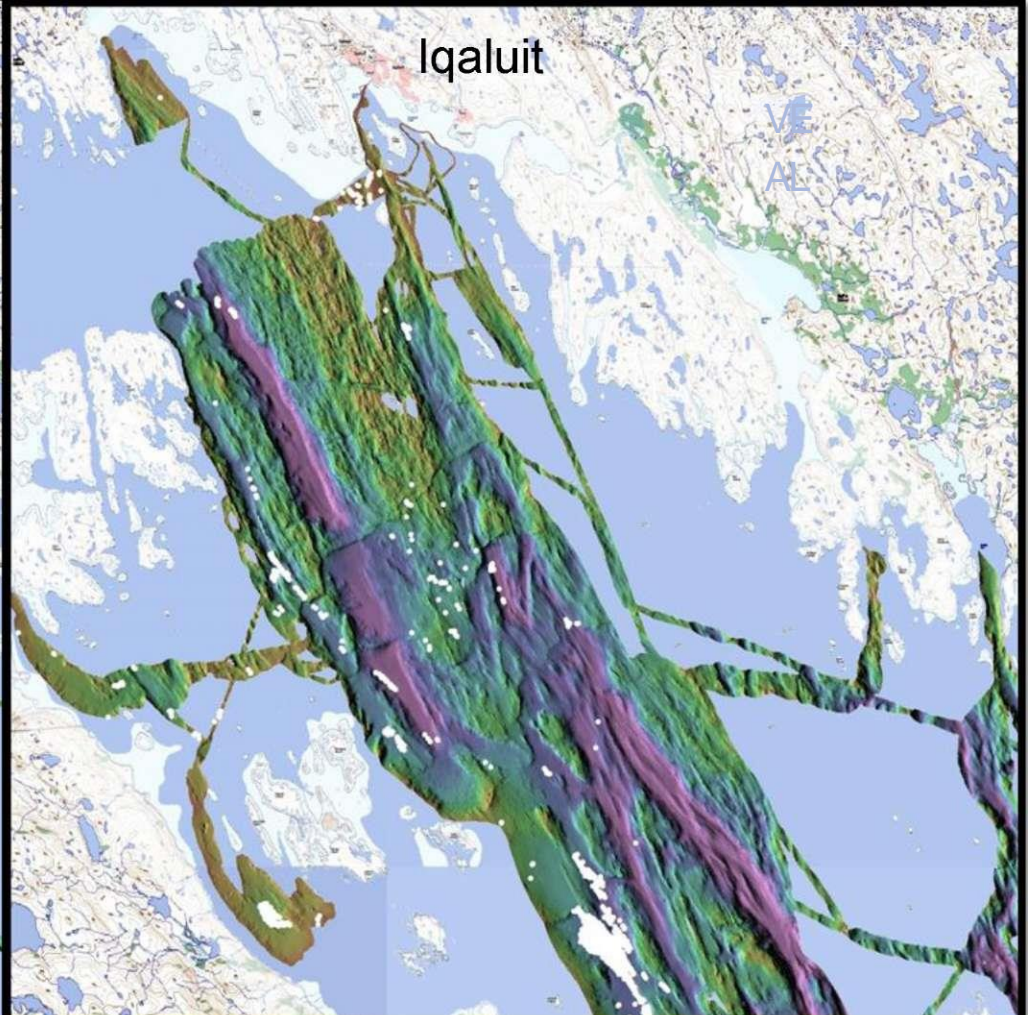
- Areas suitable for port and seabed infrastructure
- Evaluation of potential marine geological hazards
- Confirmation and/or identification of natural petroleum seeps
- Correlation of seabed bedrock exposures to exposures on land help define the geological setting and mineral potential of the seabed



***Two projects collaborative with CNGO, GN-DoE, GSC-Atlantic, Dalhousie University and ArcticNet***



Preliminary Geological Hazard  
Mapping Results  
246 submarine landslides identified Mainly  
located along the western side of the bay  
and along the central trough



Preliminary Geological Hazard  
Mapping Results  
2348 gas/fluid escape craters (pockmarks)  
Mainly located in the basins within the central  
trough  
Possible relationship with underlying bedrock

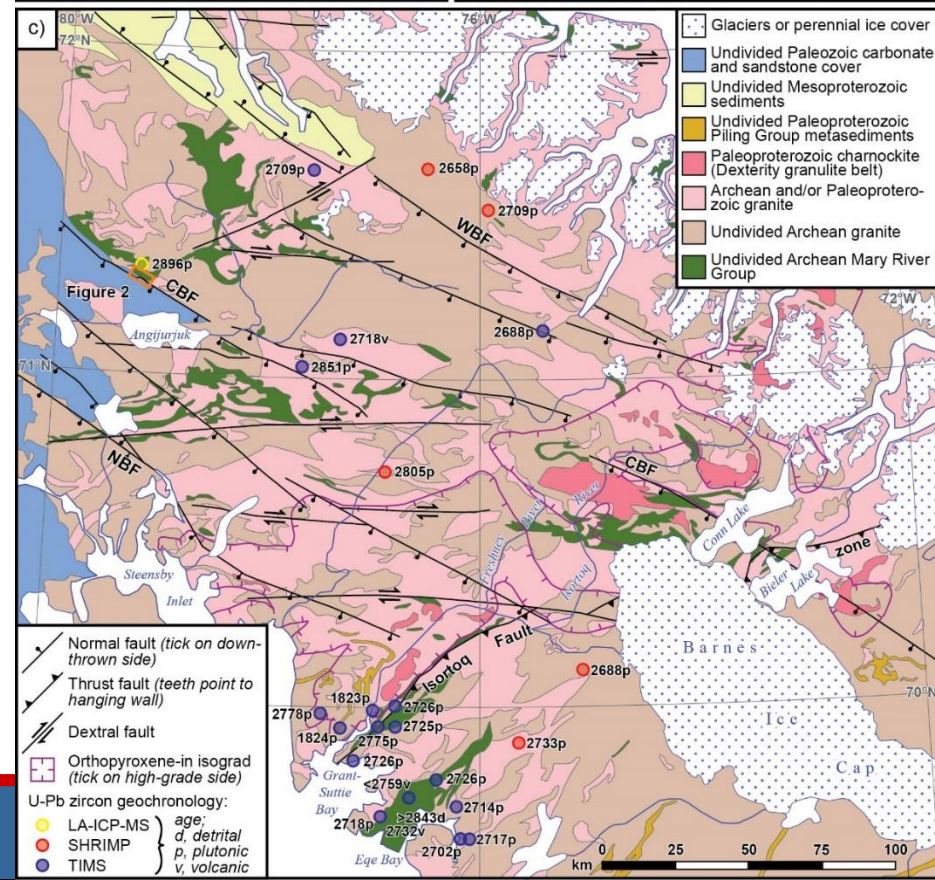
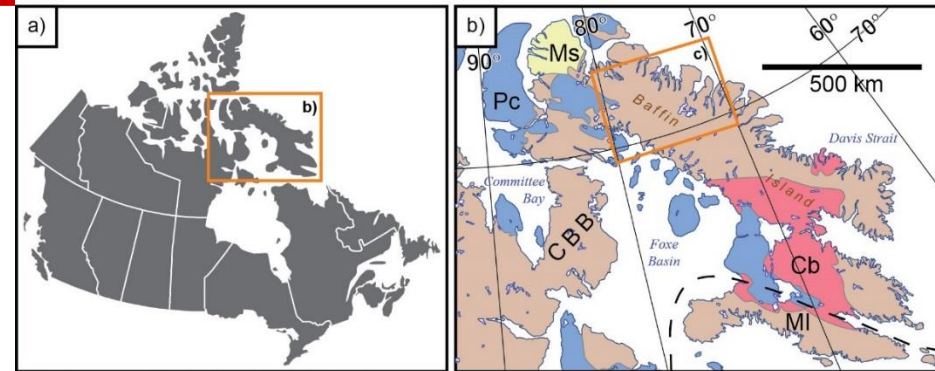
1 kilometre

# Carvings stone research – Koonark carving stone deposit, northern Baffin Island, Nunavut



CNGO and Qikiqtani Inuit Association (QIA) collaborative mapping project to determine characteristics of carving stone deposits in Qikiqtaaluk region (including the Belcher Islands) Follows on the GN-EDT Carving Stone Deposit Evaluation Program (2010-2015)

At the Koonark deposits, four areas recognized; stone from each site has a unique texture, mineral content and polished appearance





# Multi-year Regional Geoscience Mapping Fury-Hecla Project 2017-2020



2017 CNGO SINED-funded project  
Airborne geophysical survey flown  
Sept-early Nov; concluded in Feb-  
March 2018

Mapping to start in 2018

Airborne survey to be flown in 2018

Mapping proposed for 2019

Collaboration in 2018 and 2019 with  
NSERC Strategic Partnership Grant  
provided to three universities (McGill,  
Laurentian, and UQaM)

# Fury-Hecla Project

## Community information sessions



January, February 2017 – visits to Igloolik and Arctic Bay  
Talked with community elders, HTO, Hamlet Council to exchange information



Communities appreciate information at three stages:

1. Before the project begins
2. Mid-way through the project, to report on results
3. After the project is complete, to understand the data collected and to view the resulting products

CNGO will be returning to both communities

# Data Dissemination

[www.cngo.ca](http://www.cngo.ca), [Nunavutgeoscience.ca](http://Nunavutgeoscience.ca), NUMIN



NunavutGeoscience.ca:

- An initiative started in 2006
- An open-access data portal to public geoscience information available for Nunavut
- A partnership between the CNGO, INAC, GN, NRCAN, and NTI



**Contact us on the CNGO website for questions or downloads: [www.cngo.ca](http://www.cngo.ca)**



# Closing Thoughts

The Canada-Nunavut Geoscience Office, Nunavut's 'de-facto' geological survey, is co-funded and co-managed (overseen by three government departments) and conducts an ambitious geoscience program

The collaborations between the CNGO and many researchers (other governments, organizations, academia) are key to the success of the CNGO

