



Surficial geology activities at the Canada-Nunavut Geoscience Office



Tommy Tremblay, research scientist

Canada-Nunavut Geoscience Office



Summary

- Maps on Hall Peninsula (250, 26B)
- Microprobe data on KIMs, Hall Peninsula
- Seabed project, Frobisher Bay
- Permafrost studies for infrastructures
- Surficial geology compilation, Western Hudson Bay
- Sylvia Grinnell project, geochemical sampling

New maps on Hall Peninsula (250, 26B)

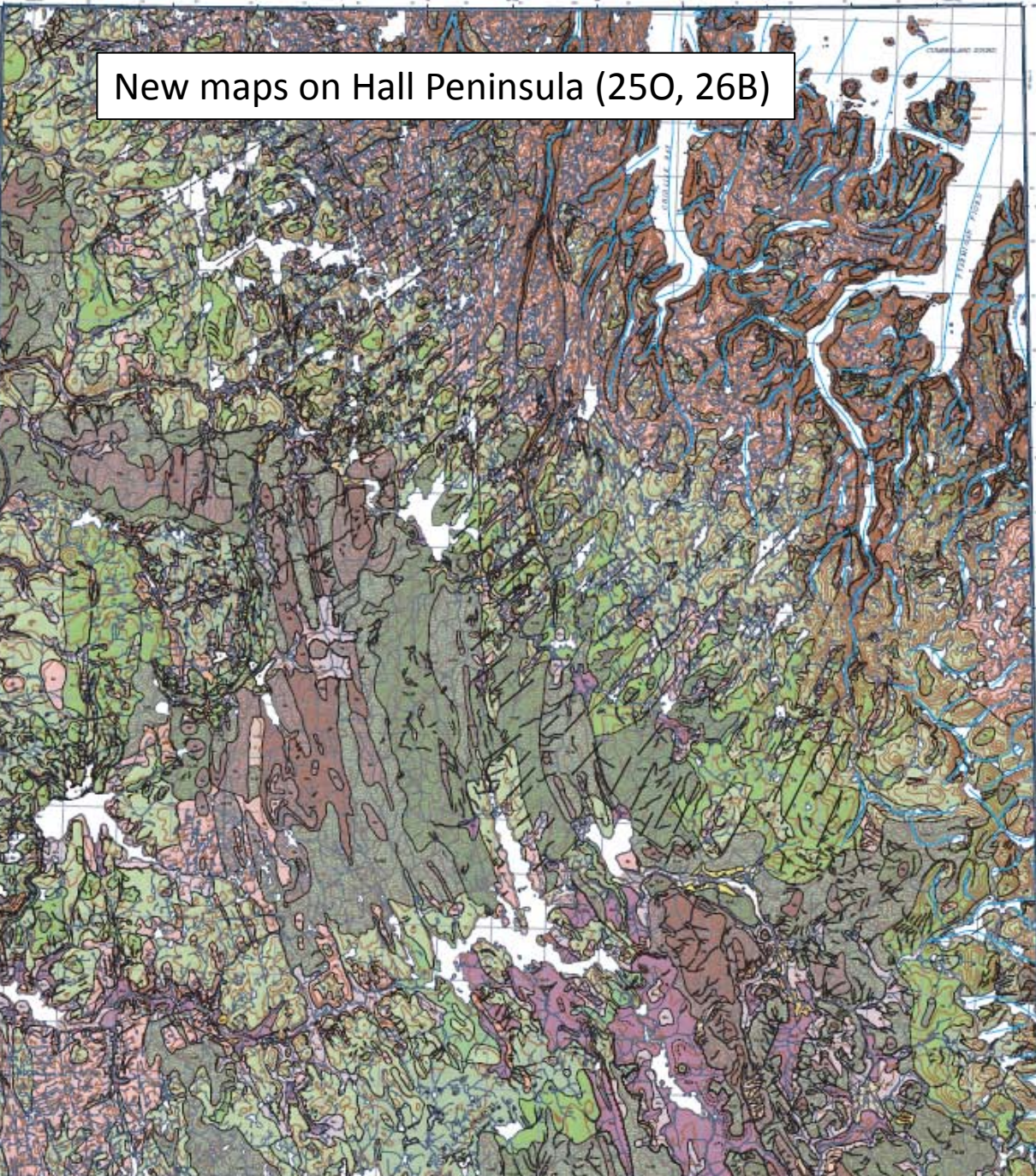


Figure 1: Aerial photographs showing the terrain and features of the study area.

Abstract
 This map of the Hall Peninsula area, north of the GSC station, shows the results of a geological reconnaissance survey. The map displays various geological units, including sedimentary rocks of the Devonian and Carboniferous periods, and igneous rocks of the Paleogene period. The map also shows the locations of the GSC stations and the main drainage system of the area.



Geological Survey of Canada
Canadien du Service Géologique
 1100 Lacombe Avenue
 Ottawa, Ontario K1R 8S4
 Catalogue no. S61-63-01
CHILDIK BAY
 Arctic Slope of Alaska
 1:50,000



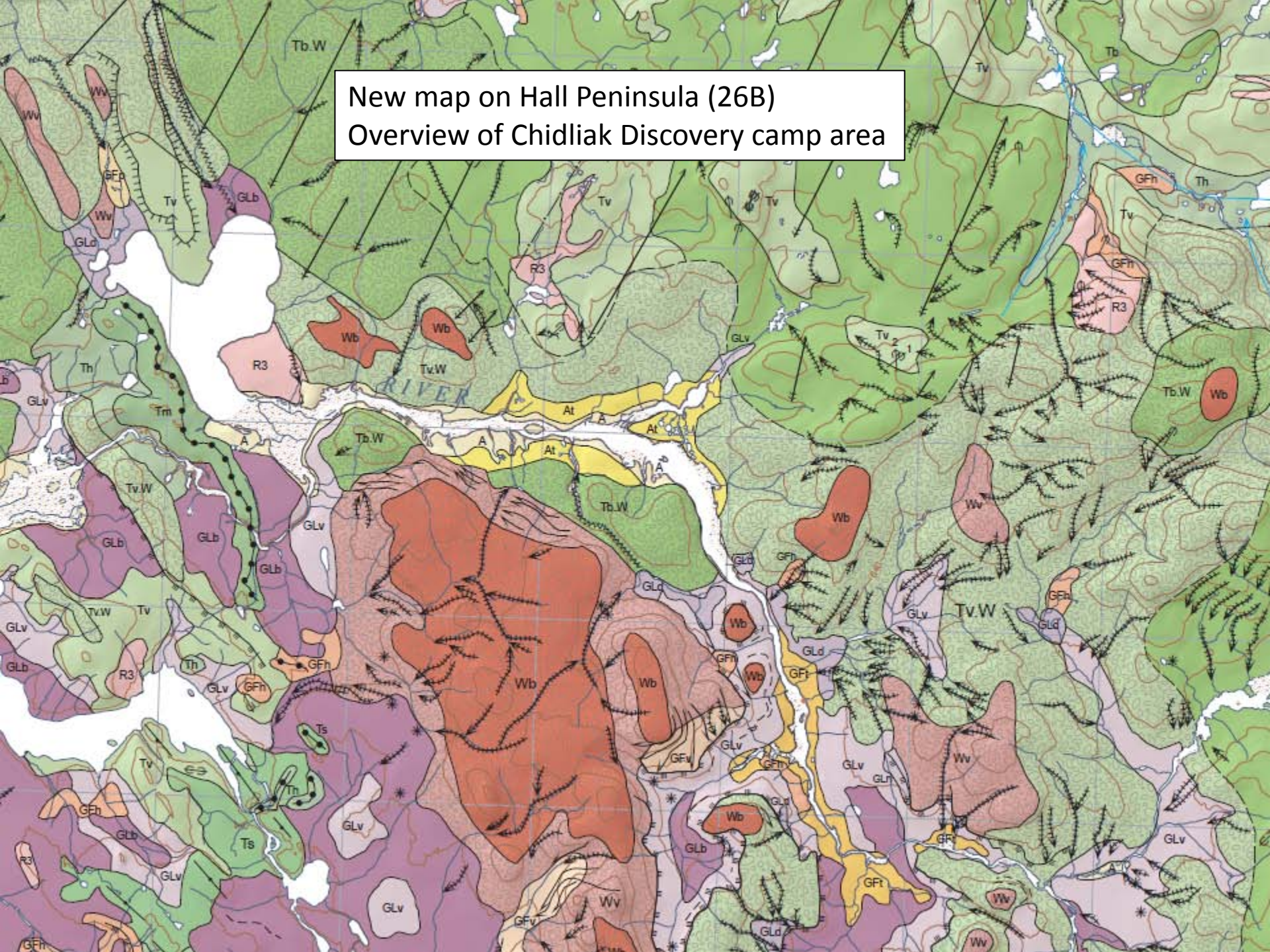
Legend

| | |
|----------|----------------------|
| [Symbol] | Geological units |
| [Symbol] | Drainage system |
| [Symbol] | Topographic contours |
| [Symbol] | Infrastructure |

Scale
 1:50,000

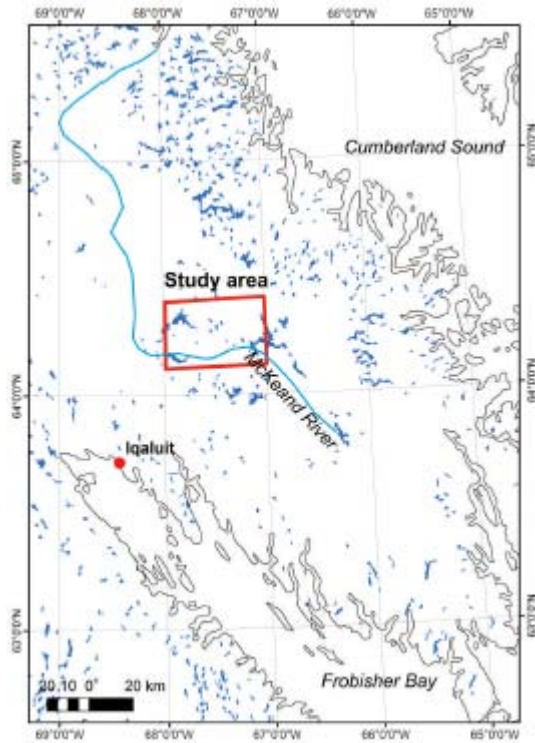
Notes
 This map is a preliminary reconnaissance map and should not be used for engineering or other purposes requiring detailed geological information.

New map on Hall Peninsula (26B)
Overview of Chidliak Discovery camp area



Regolith studies

Julie Leblanc-Dumas, Centre d'étude Nordique

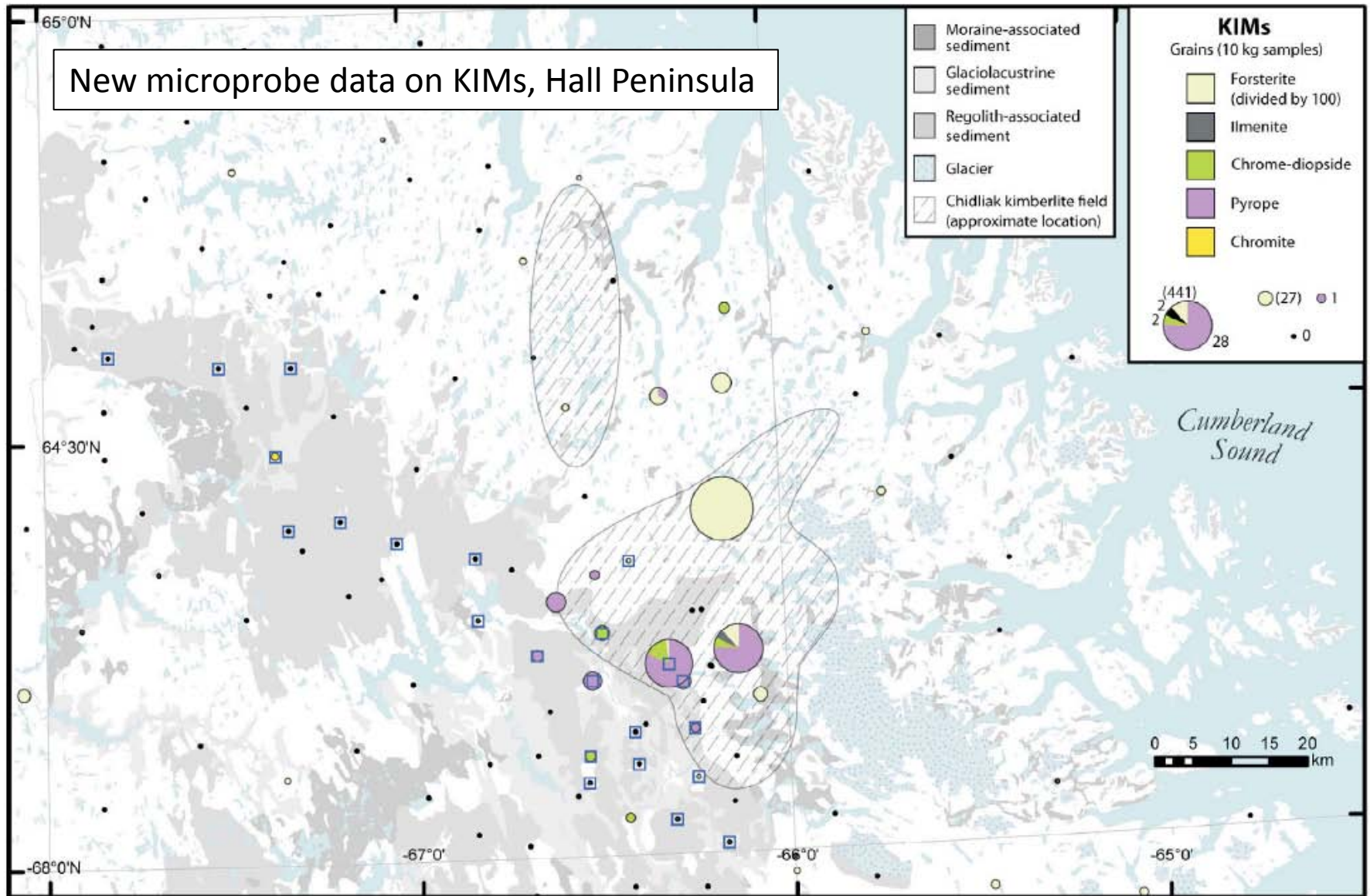


Kaolinite-bearing regolith

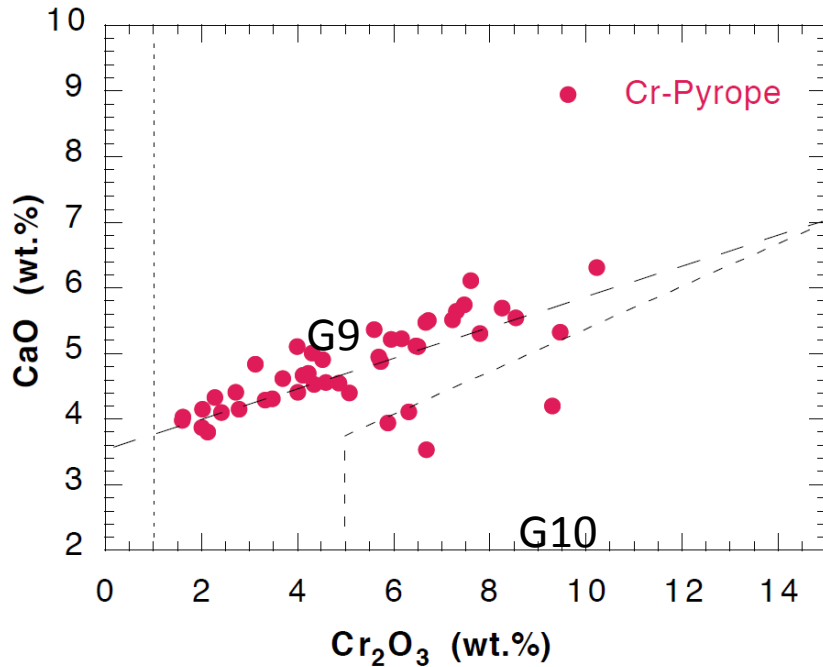


Figure 1. Regolith from layered metasediments (1), partly covered by till (2). Photograph by T. Tremblay 2014-248

Leblanc-Dumas, J., Allard, M. and Tremblay, T. 2015: Characteristics of a preglacial or interglacial regolith preserved under nonerosive ice during the last glacial maximum in central Hall Peninsula, southern Baffin Island, Nunavut; *in* Summary of Activities 2014, Canada-Nunavut Geoscience Office, p. 69–78.



Cr-Pyrope

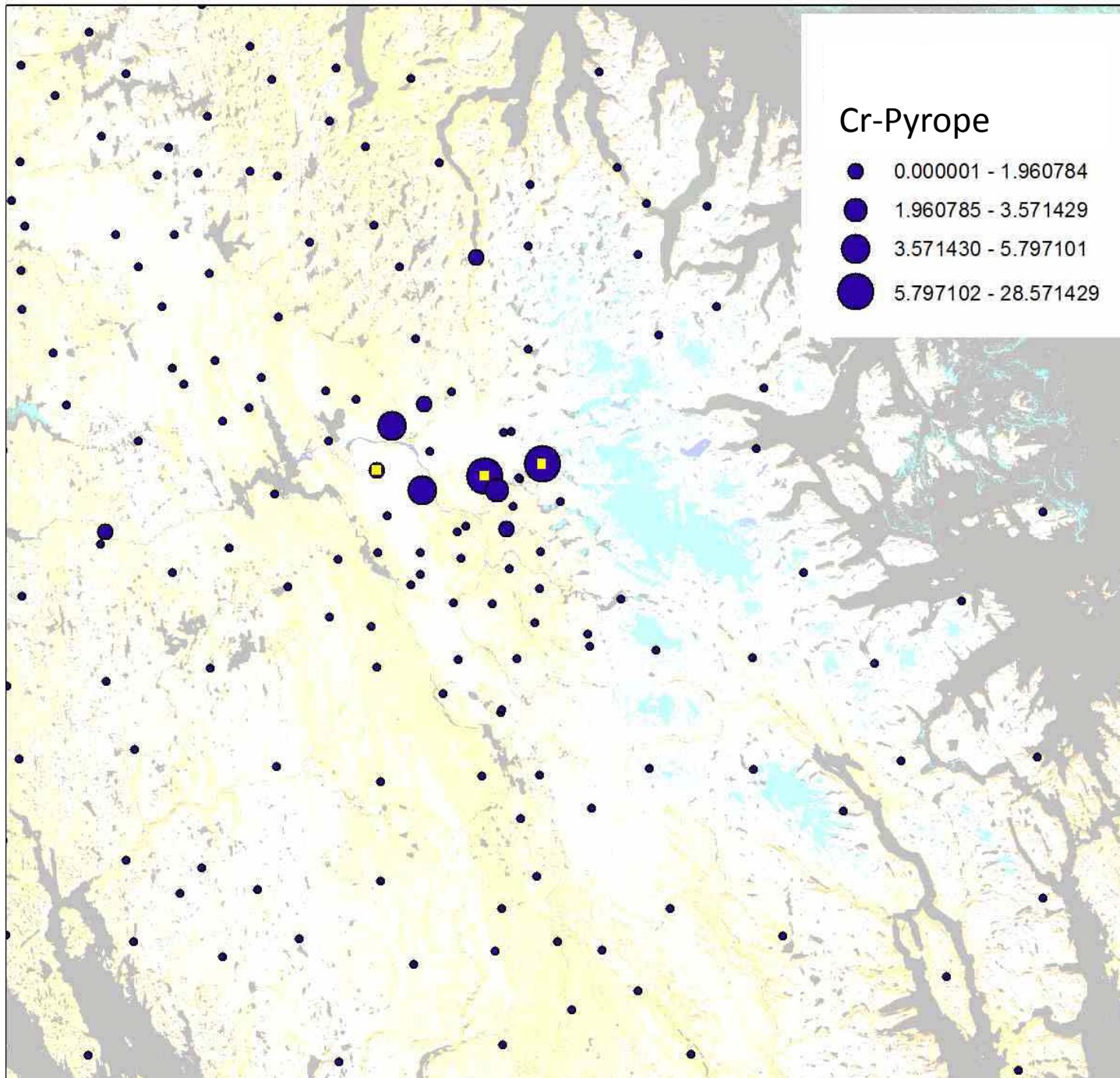


-The presence of Cr-pyrope and abundant olivine with mantle peridotite compositions (Fo from 88 to 93, NiO from 0.25 to 0.40 wt.%) indicates the presence of garnet-peridotitic mantle material carried to the surface by kimberlite or a similar volcanic rock type with deep mantle roots.

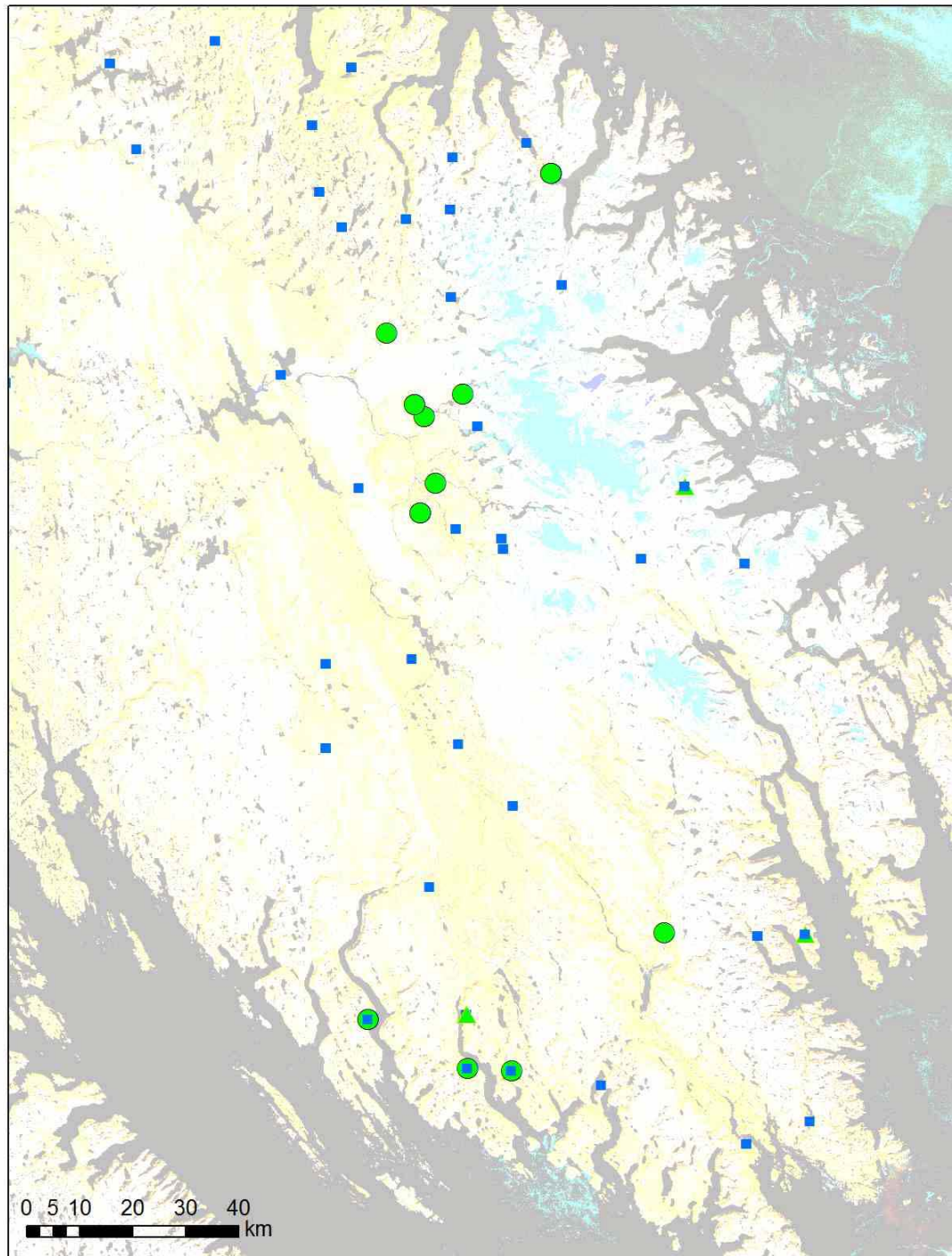
-The composition of the Cr-pyrope garnets shows them being of mostly lherzolitic origin but with a few compositions falling in the field of subcalcic harzburgite, a good sign for (low) diamond potential from this source.

-There were no eclogitic garnets in the samples.

(mineralogical analysis by I. Kjarsgaard, 2015)



G10 garnets
(yellow
squares)



Olivines

Green circle: hi-Ni, hi Fo

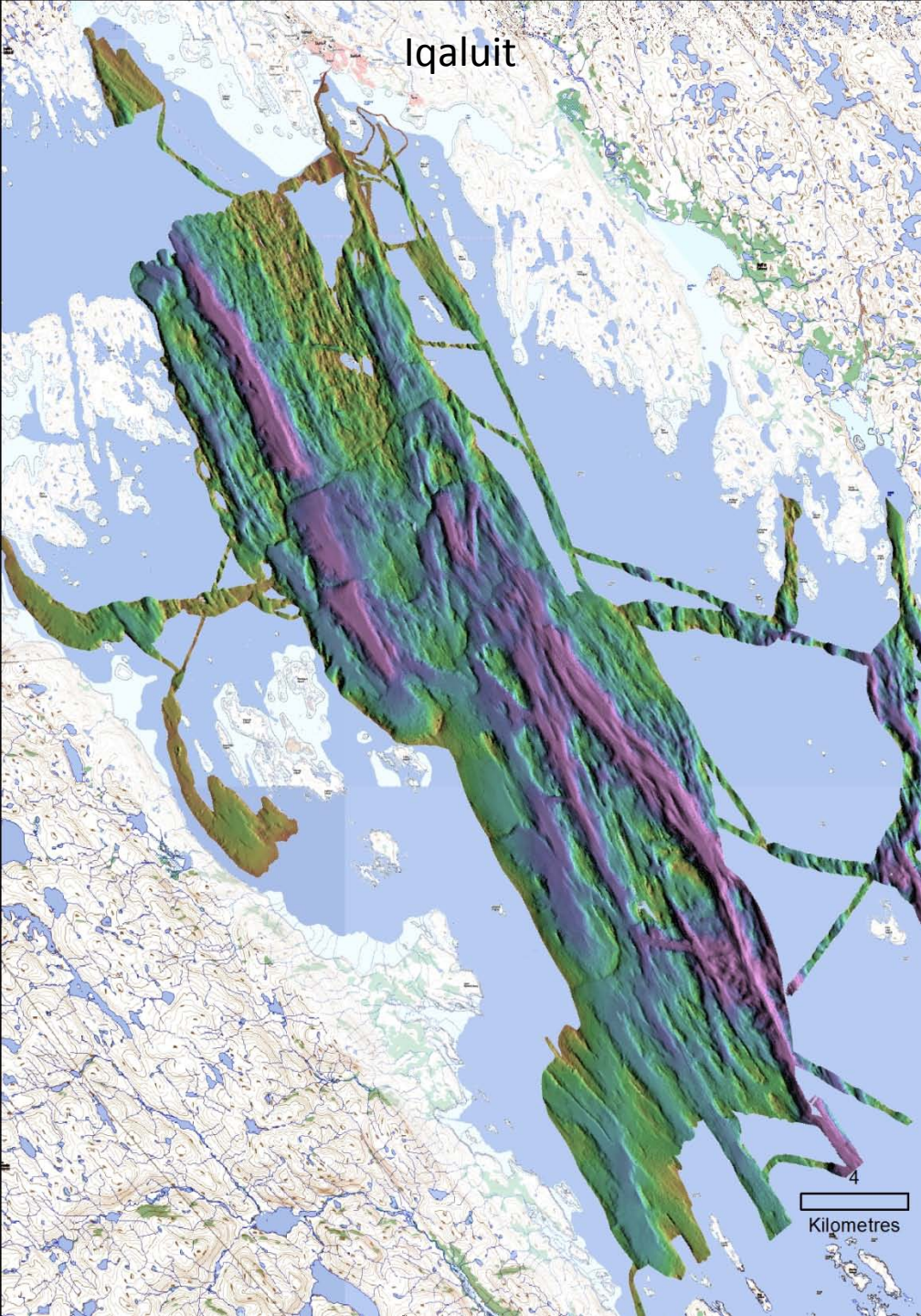
Blue square: low-Ni, low Fo

(Fo is fosterite, Mg-rich olivine)

Seabed project, Frobisher Bay

(C. Campbell, GSC-Halifax)

- 1) Seabed mapping of potential approaches and areas suitable for port and submarine cable development within Frobisher Bay.
- 2) Evaluation of potential marine geological hazards, including seabed sediment dynamics and seabed stability, which may impact public safety and Arctic port development.
- 3) Confirmation and/or identification of natural petroleum seeps at the mouth of Frobisher Bay.
- 4) Correlation of bedrock exposures at the seabed to the bedrock geology on land between the Hall Peninsula and Meta Incognita in order to define the geological setting and mineral potential.

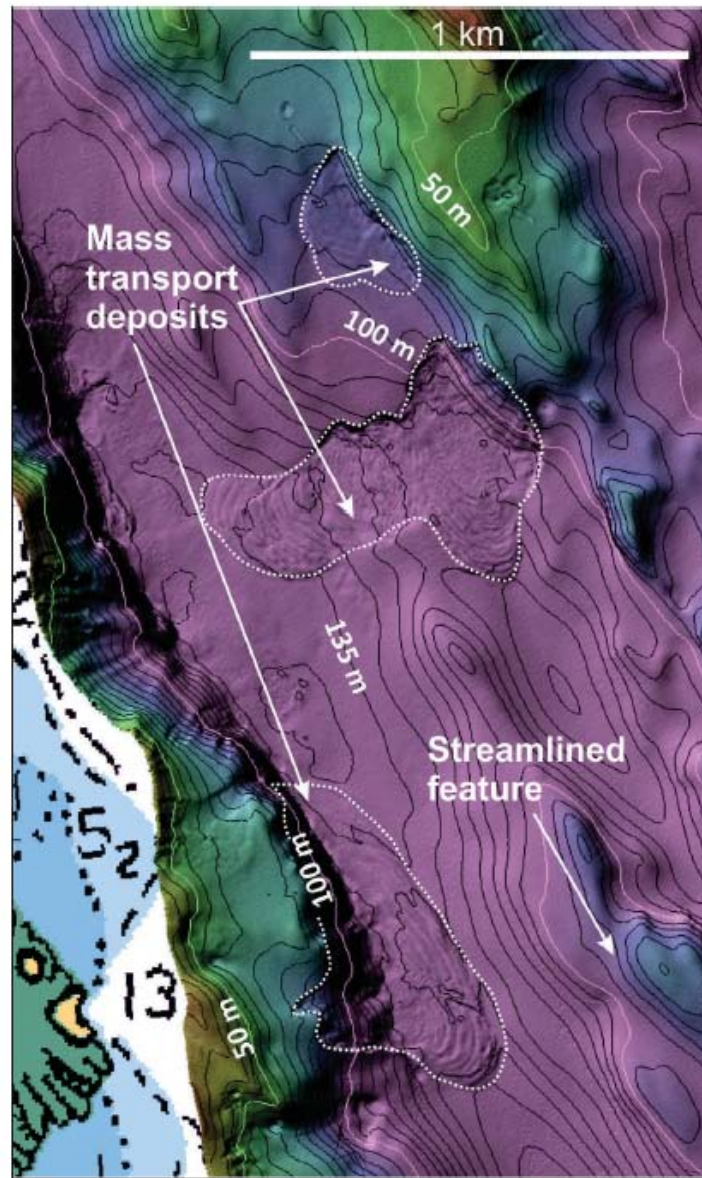


Inner Frobisher Bay

Data coverage at end of 2014 season

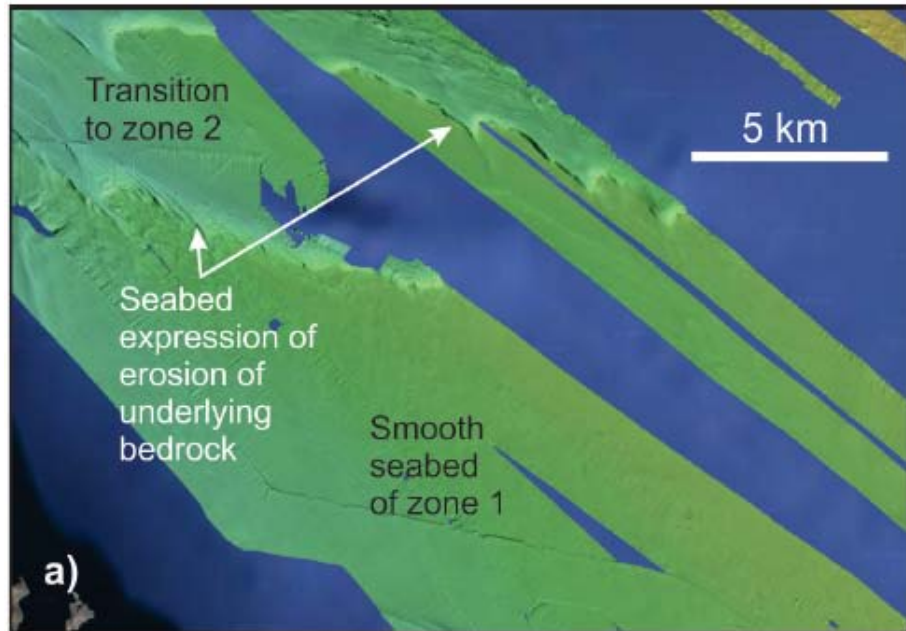


RV Nuliajuk- Nunavut Research Vessel

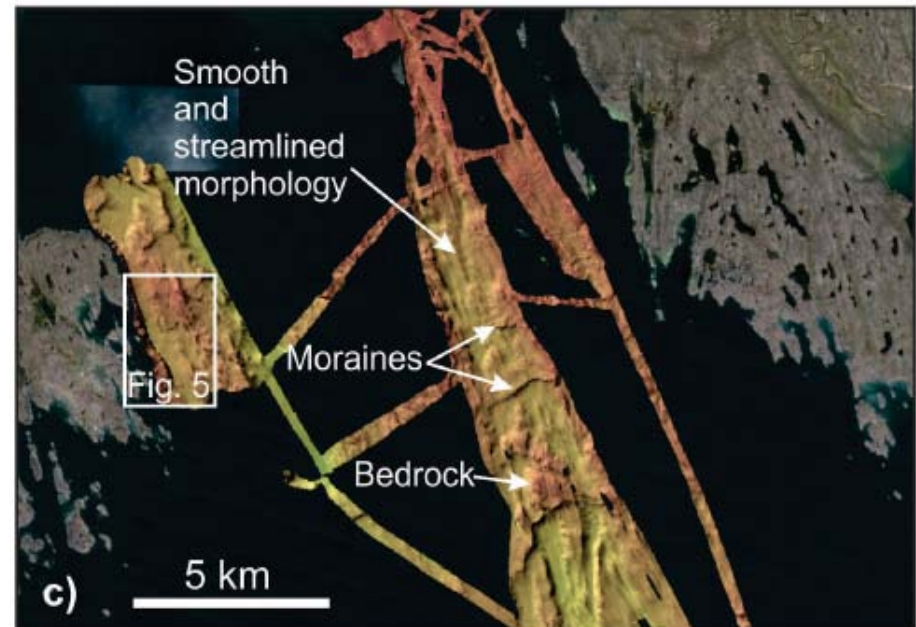
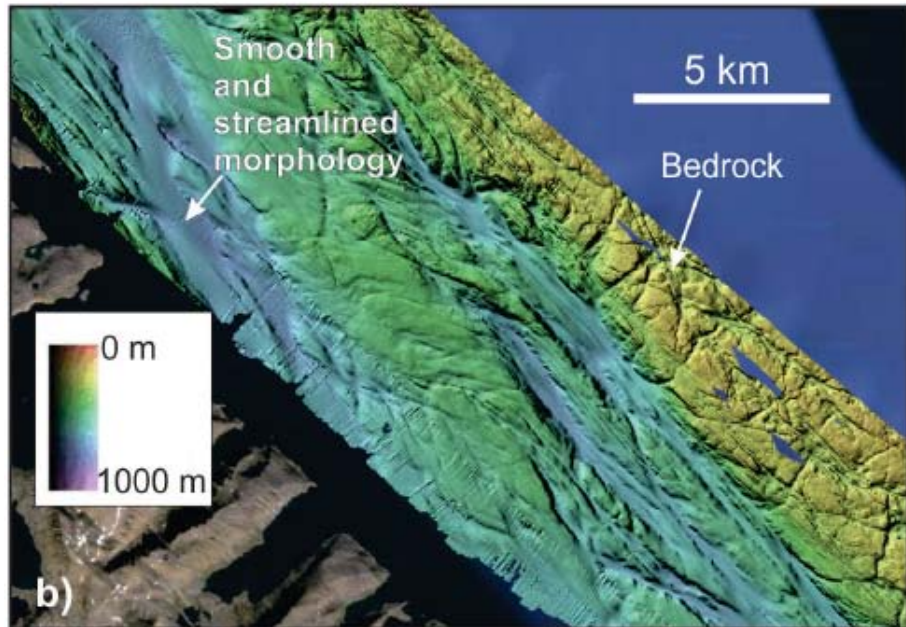


Seafloor geomorphology

Mate, D.J., Campbell, D.C, Barrie, J.V., Hughes Clarke, J.E., Muggah, J., Bell, T. and Forbes, D.L. 2015: Integrated seabed mapping of Frobisher Bay, southern Baffin Island, Nunavut to support infrastructure development, exploration and natural-hazard assessment, *in* Summary of Activities 2014, Canada-Nunavut Geoscience Office, p. 145–152.



Seafloor geomorphology



Near Armshow River mouth

Mass transport
deposits

0.2
Kilometres

20m



Frobisher Bay Mapping Project: Next Steps

- Sampling surveys in summer 2015 (**CCGS Hudson and Amundsen**) with the goal of producing a preliminary map by March 2016. Work will be focused on sampling (cores, grab samples, photography, ROV) that is needed to produce a marine surficial geology map.
- New multibeam acquisition with Transport Canada-funded Climate Change project (**Nuliajuk and Amundsen**)
- Recent announcement of successful ArcticNet proposal “*Integrated marine geoscience to guide environmental impact assessment and sustainable development in Frobisher Bay, Nunavut*” .
- There will be active seabed research in Frobisher until at least 2018.

Permafrost studies for infrastructures at the Iqaluit airport (A.M. Leblanc, G. Oldenborger)

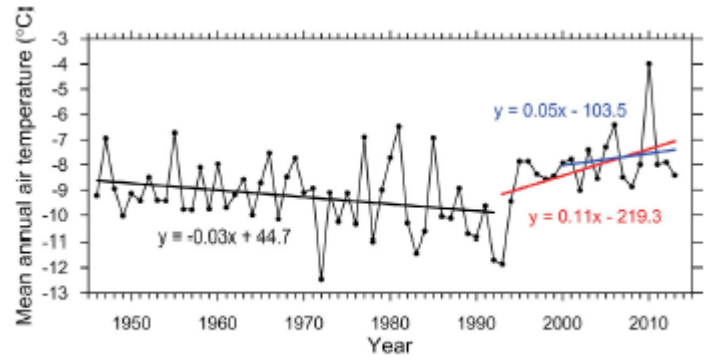
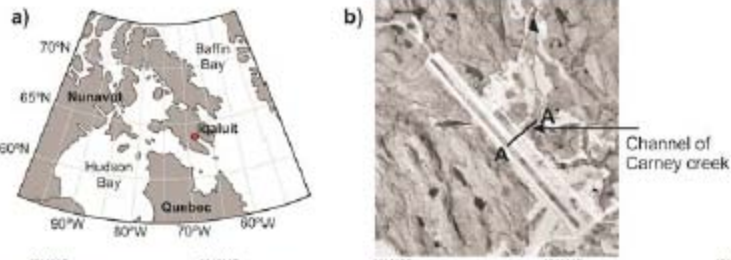
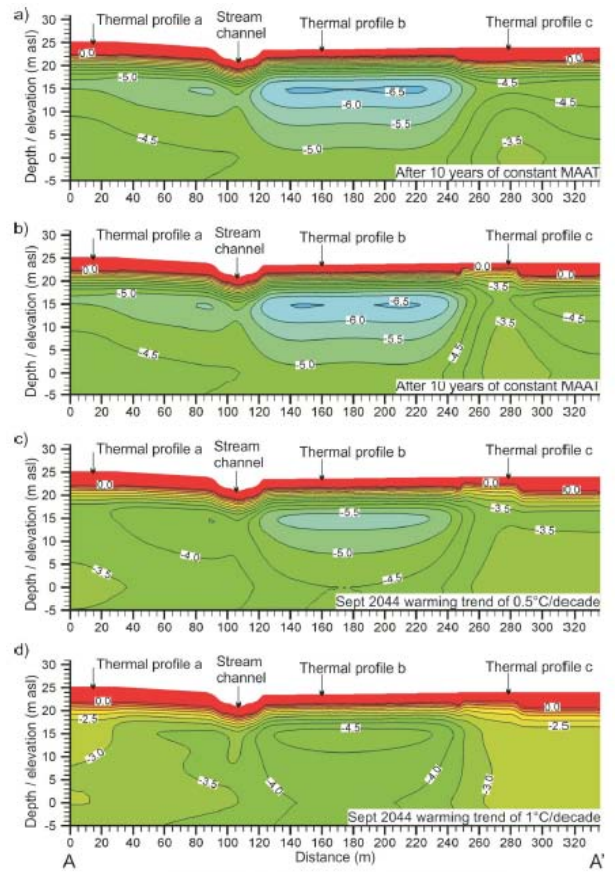
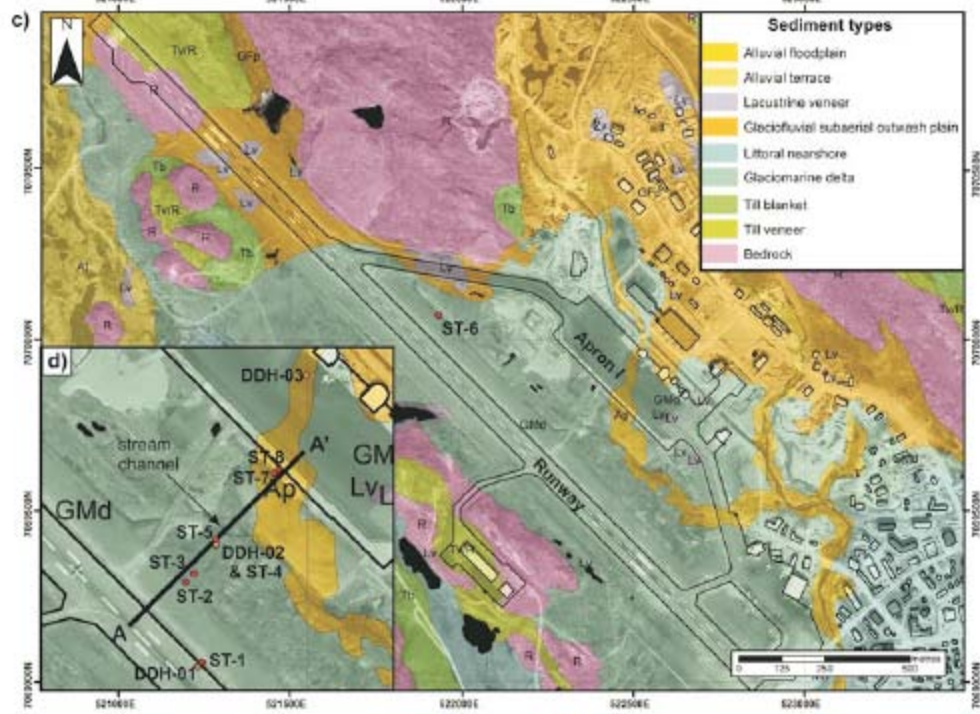
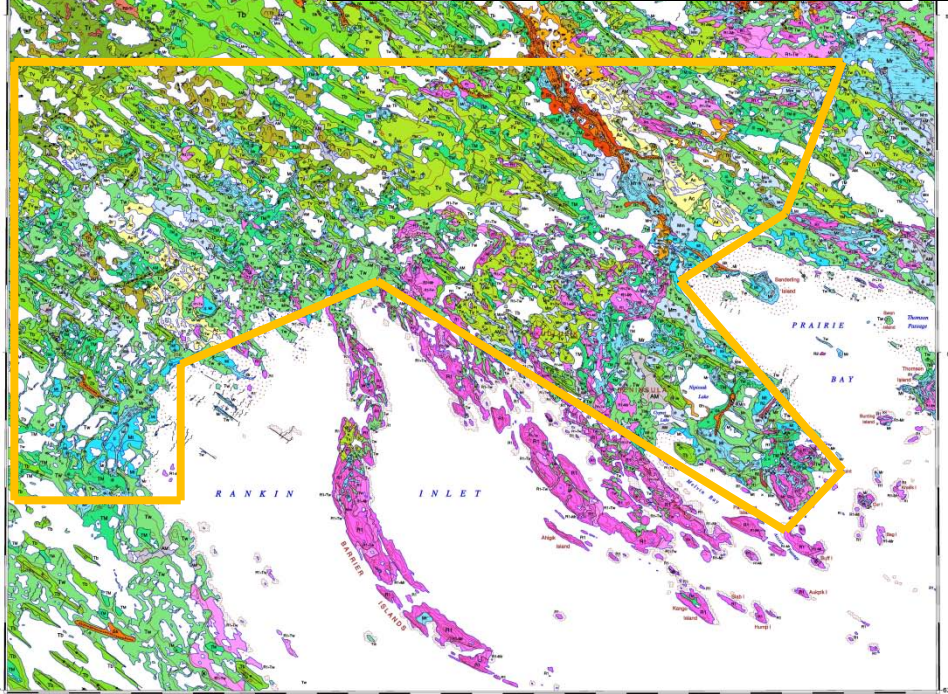
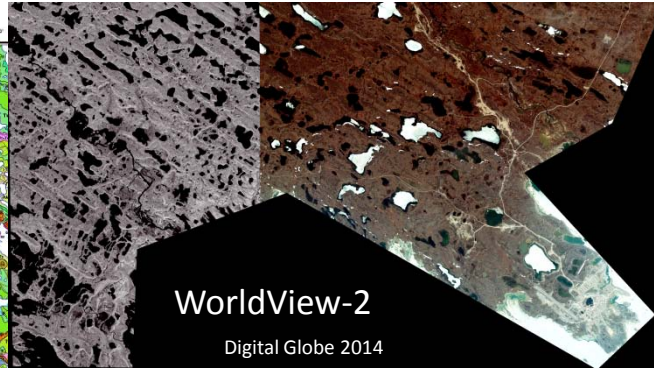


Figure 2: Mean annual air temperature for Iqaluit, Nunavut, between 1946 and 2013 (Vincent et al., 2012; Environment Canada, 2014).



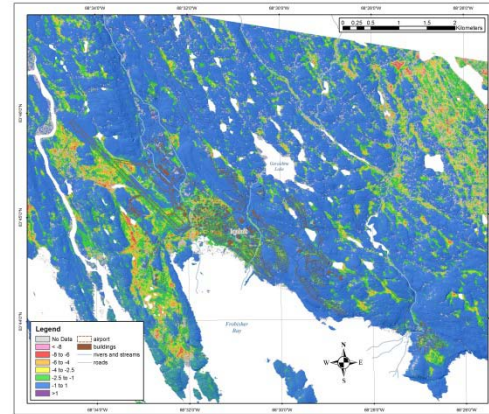
Understanding permafrost conditions along the western Hudson coast (A.M. Leblanc, G. Oldenborger)

Rankin Inlet
study area

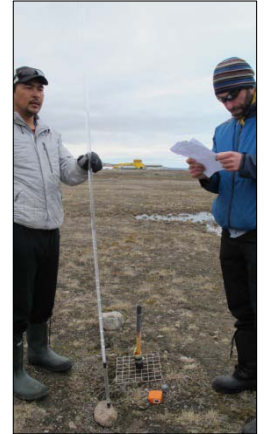


(Surficial geology: McMartin, 2002)

Methodology

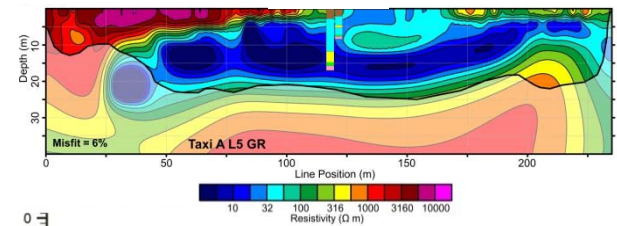


Remote sensing (InSAR)

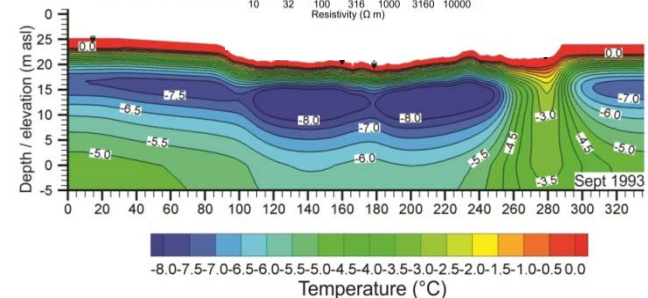


Field observation,
drilling,
and instrumentation

Geophysical
characterisation

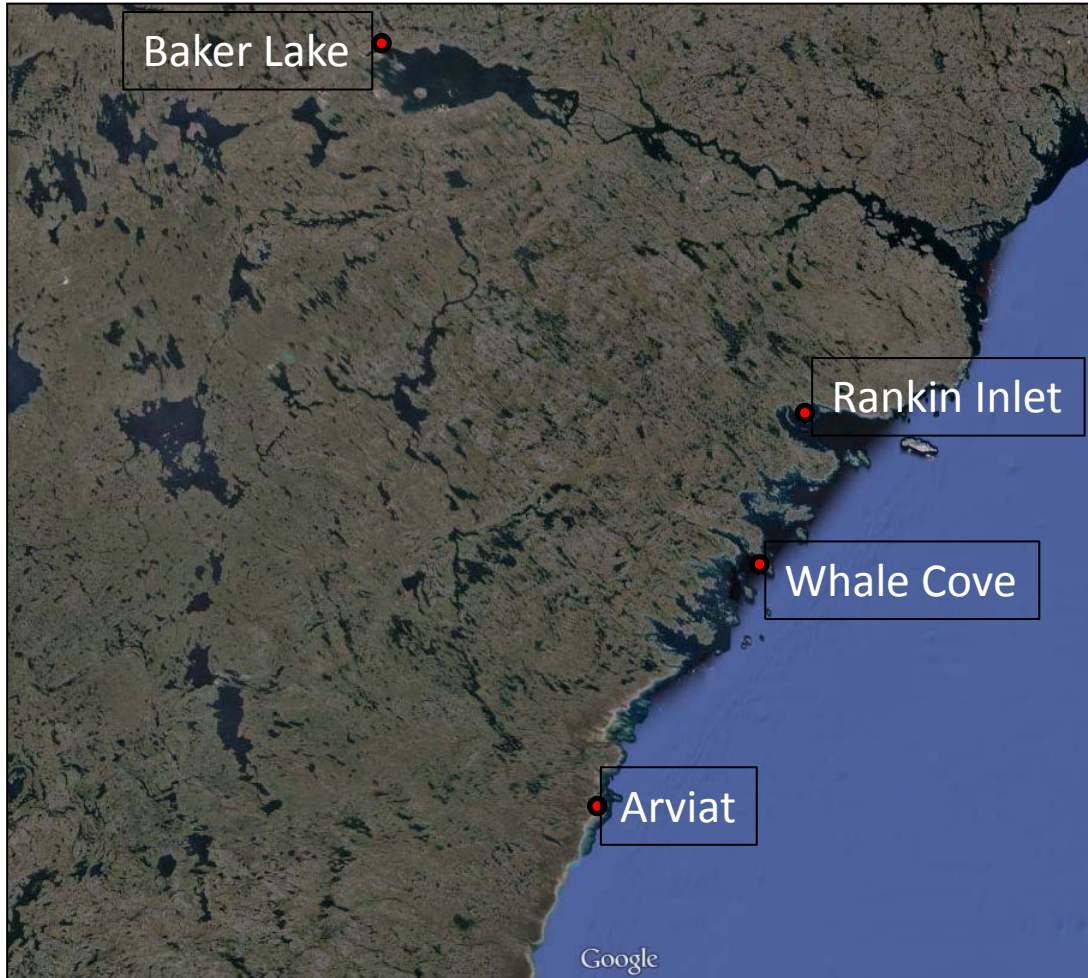


Thermal
modeling



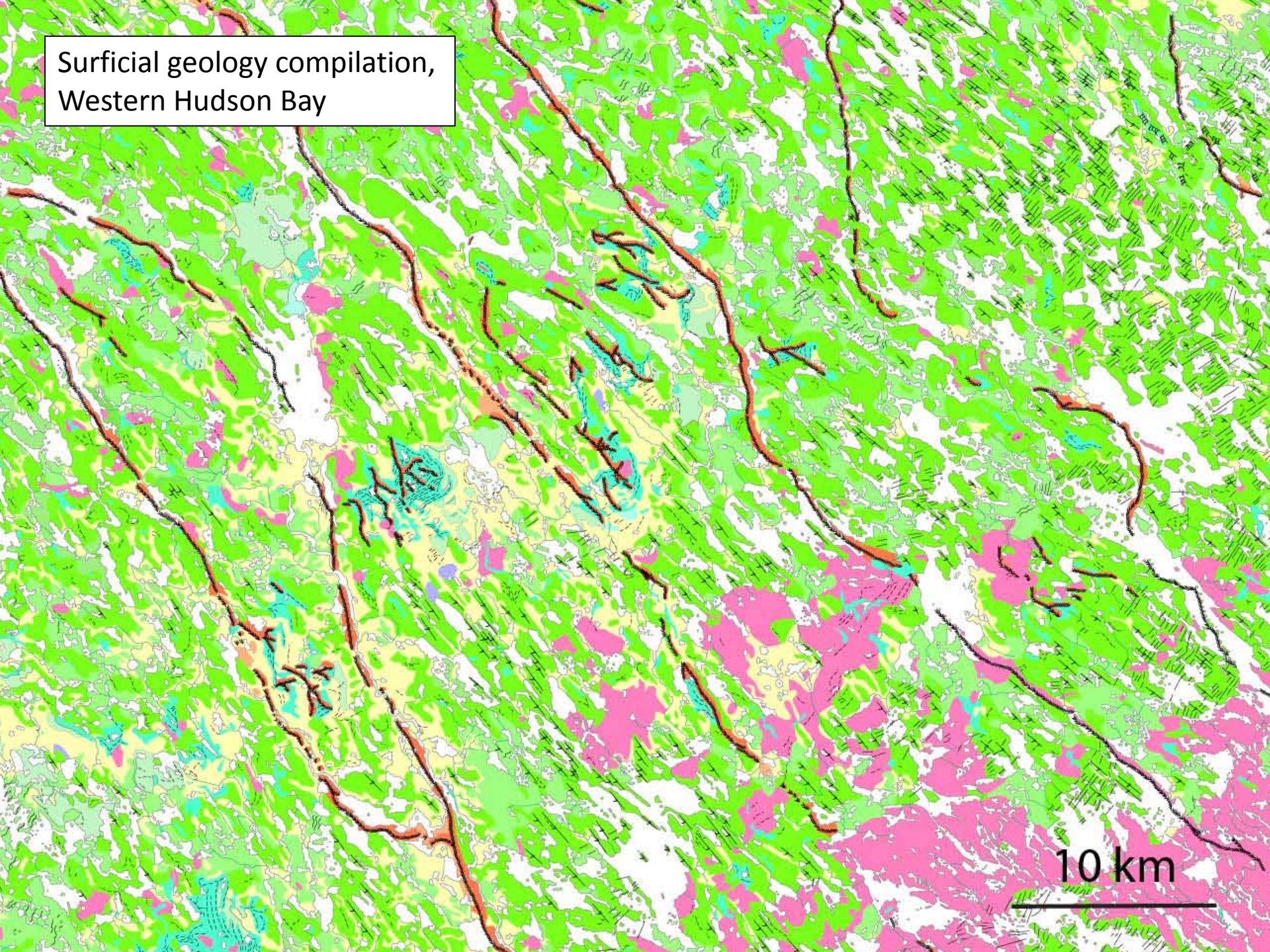
Western Hudson coast

Community ground thermal monitoring

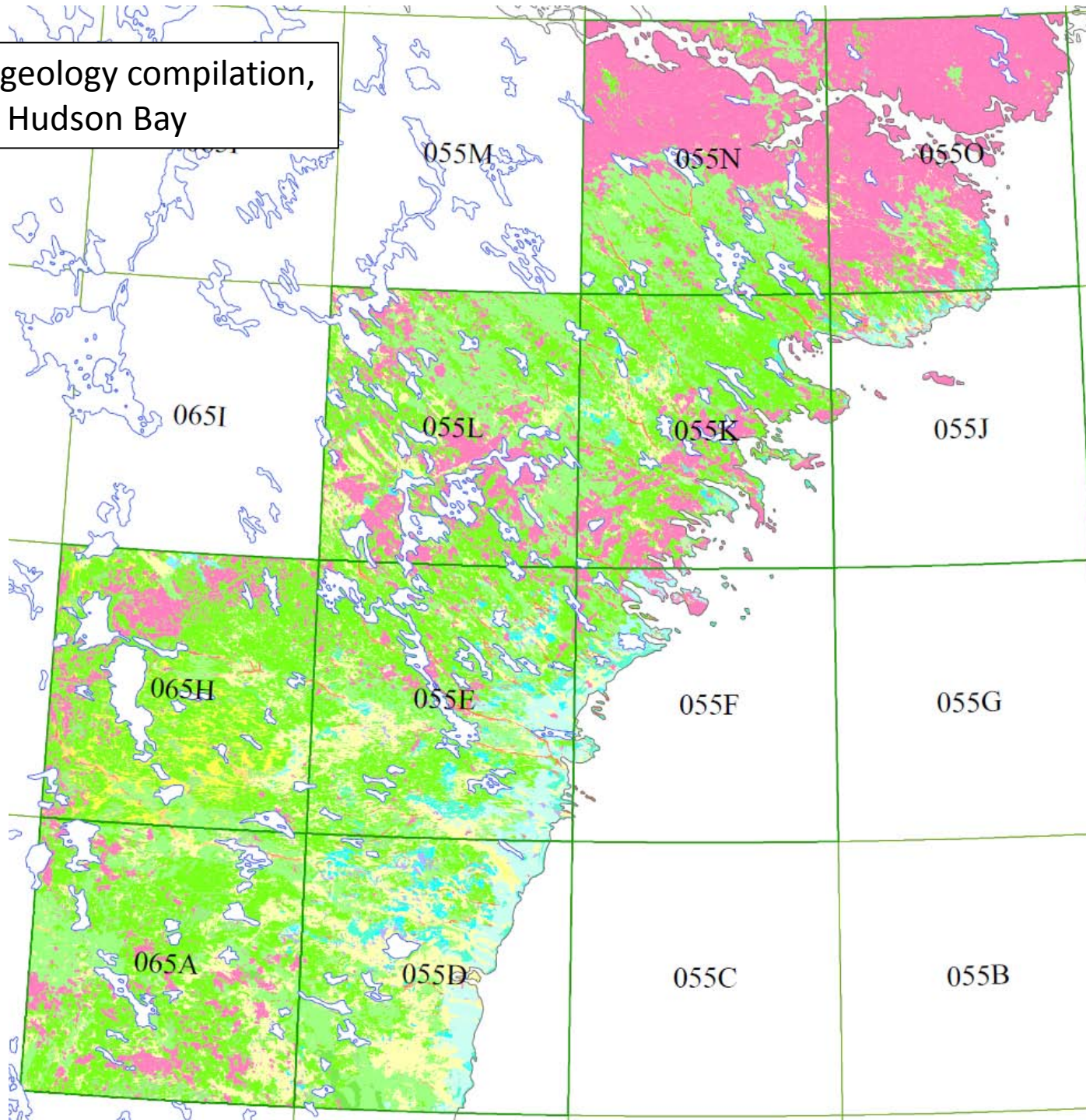


Drilling, coring,
and
instrumentation

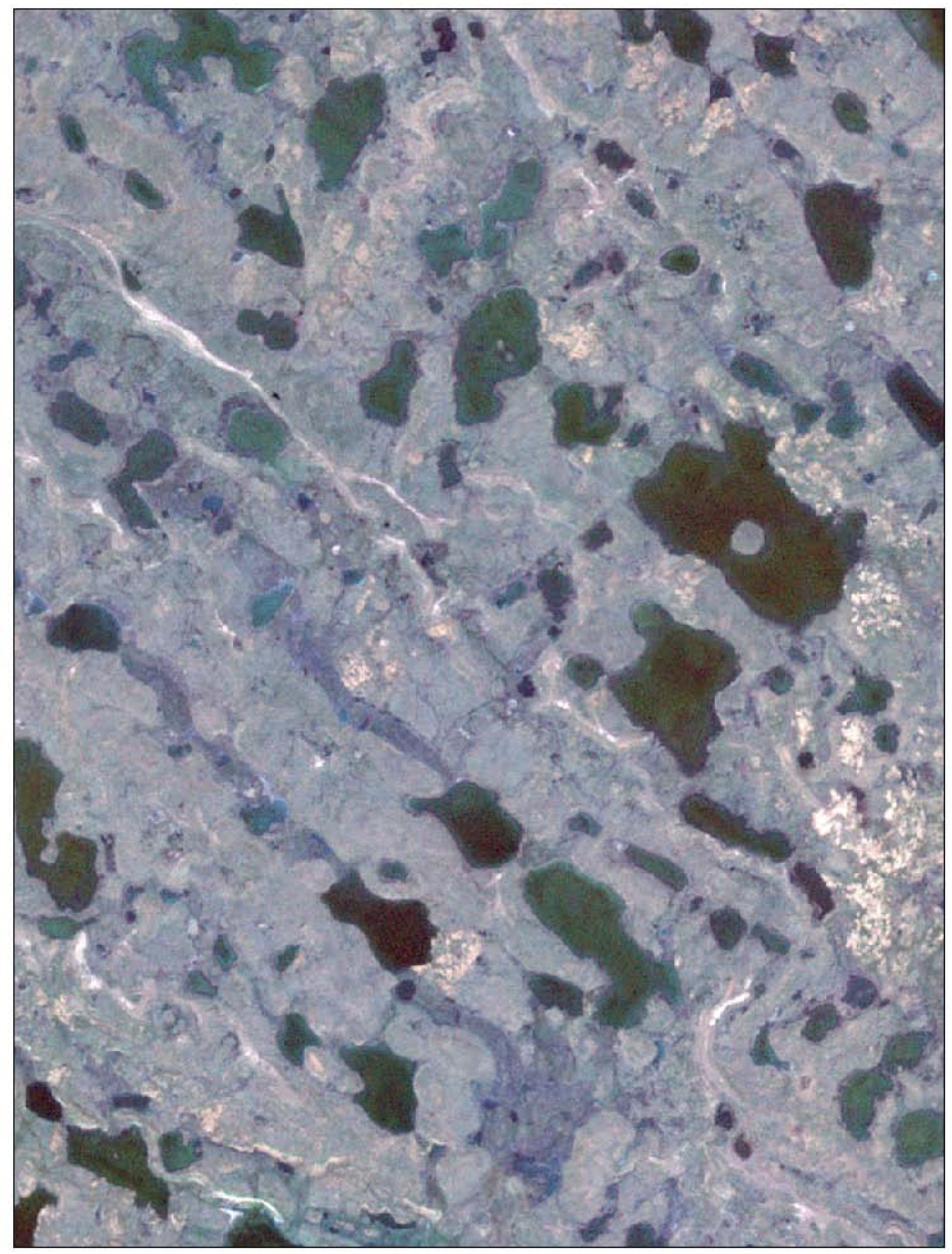
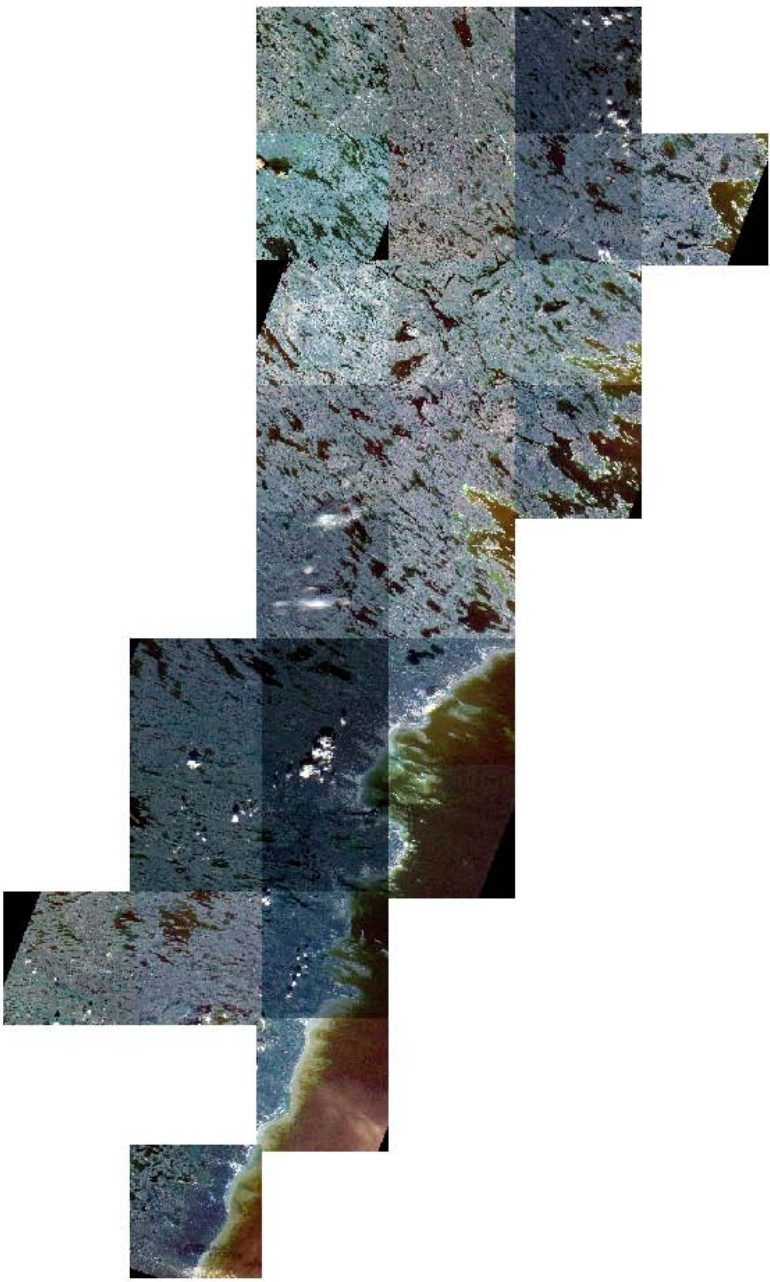
Surficial geology compilation,
Western Hudson Bay

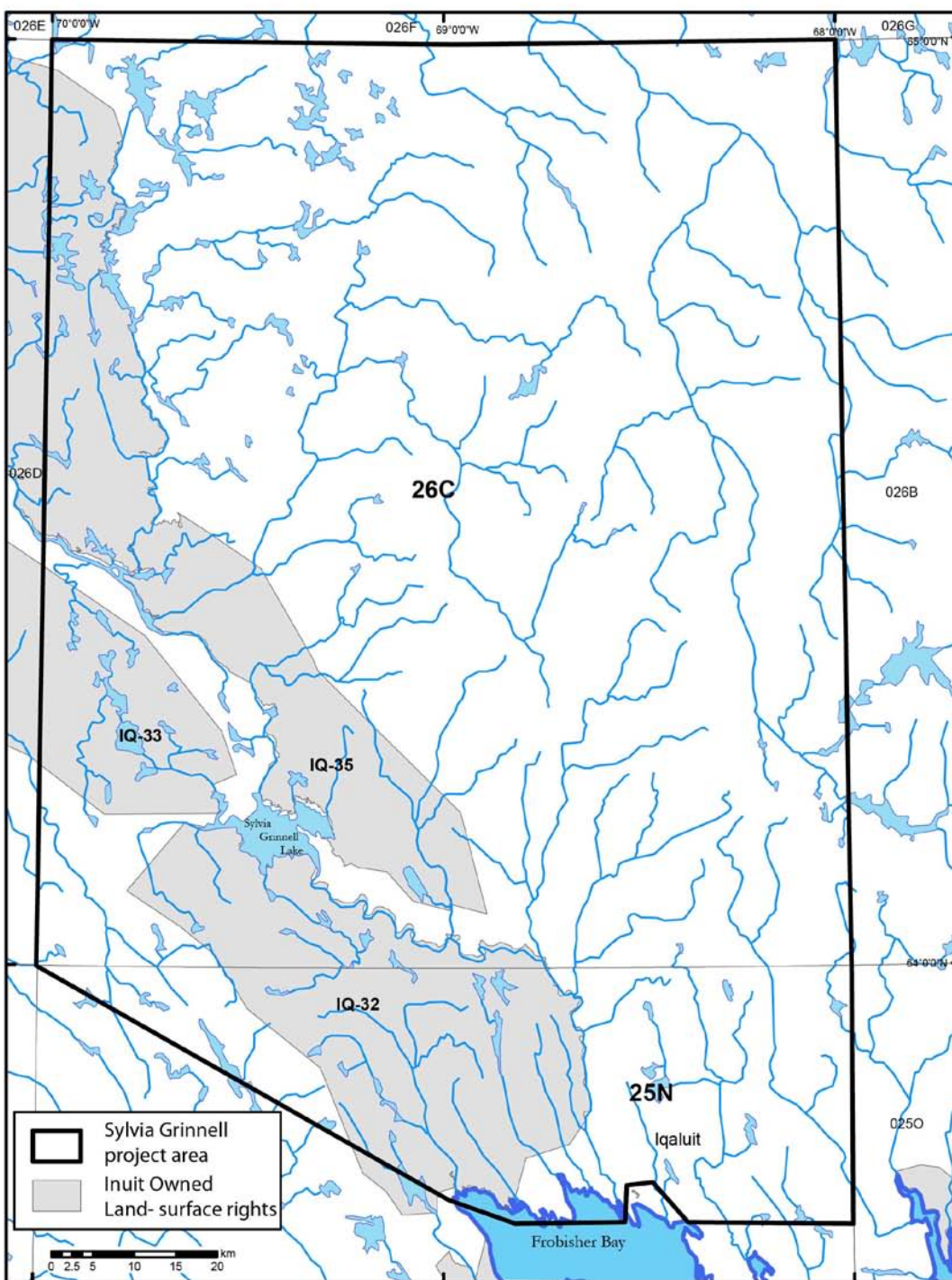


Surficial geology compilation,
Western Hudson Bay



Rapid Eye satellite images,
Western Hudson Bay





Field work for this summer:
Sylvia Grinnell project
geochemical sampling

-20 days of field work

-Lake sediments

-Stream sediments

-Till

-Water



Thanks for attending to : Surficial geology activities at the Canada-Nunavut Geoscience Office

Tommy Tremblay, research scientist

Canada-Nunavut Geoscience Office