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

Surficial geology and geomorphology of central Hall Peninsula, Baffin Island, Nunavut: summary of the 2013 field season.

Tommy Tremblay[1], Julie Leblanc-Dumas[2], M. Ross[3], Michel Allard[2], B. McClenaghan[4], C. Johnson[3] and David Mate[1]

(1) Canada-Nunavut Geoscience Office, Iqaluit

(2) Centre d'étude Nordique, Université Laval, Québec

(3) University of Waterloo

(4) Geological survey of Canada, Ottawa

Tommy.Tremblay@nrcan.gc.ca

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

The Hall Peninsula Project

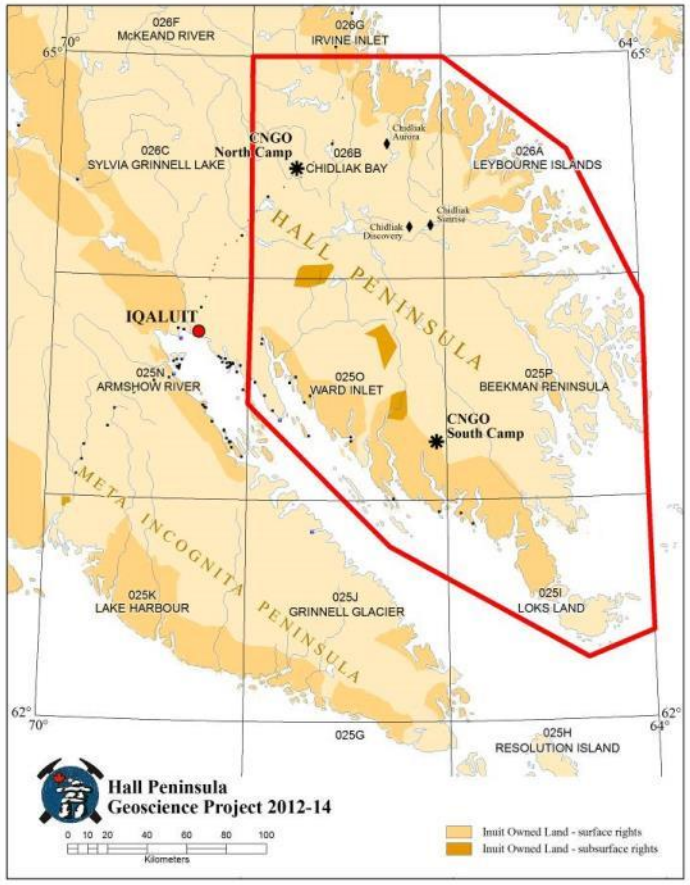
- The Hall Peninsula Integrated Geoscience Program (HPIGP) is being led by the **Canada-Nunavut Geoscience Office** in collaboration with the **Government of Nunavut, Aboriginal Affairs and Northern Development Canada**, Université Laval, University of Waterloo, Dalhousie University, University of Alberta, University of Manitoba, University of Ottawa, University of Saskatchewan, Nunavut Arctic College and the Geological Survey of Canada.

- It is **supported logistically** by several local, Inuit-owned businesses.

- The **study area** comprises all or parts of six 1:250 000 scale National Topographic System map areas north and east of Iqaluit (NTS 026A, B, 025I, J, O, P; Figure 1).

Regional Geoscience

Hall Peninsula Integrated Geoscience Program



Sunrise Camp,
Hall Peninsula, NU

<u>Cooperation with:</u>
Peregrine Diamonds
and DeBeers

<u>Collaboration with:</u>
U of Alberta
U of Ottawa
Dalhousie
Laval
U of Saskatchewan
U of Manitoba
Waterloo
Nunavut Arctic College
GSC

Overview

- **Surficial geology** is the study of the land, the way its been shaped by the action of glaciers, rivers, the sea, and the frost. Most of these events occured during the **Quaternary** period.

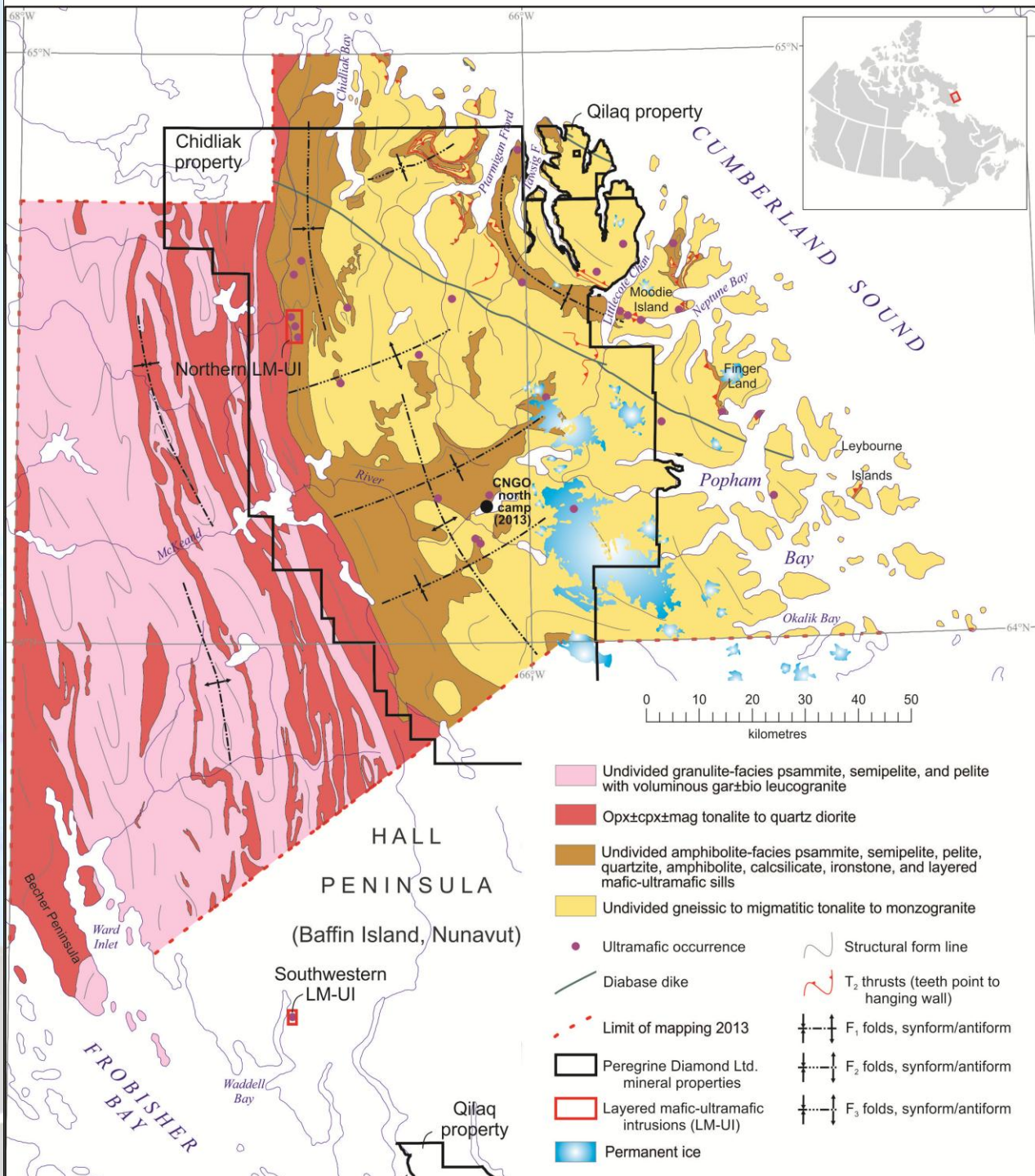
- The main **tools** used are soil sampling, airphotos, satellite images, and field observations.

- The principal **users** for the maps are road building, construction, scientific research, environmental studies and mineral exploration.

- The **maps** are interesting for anyone looking for a geomorphological point of view on the **land**.

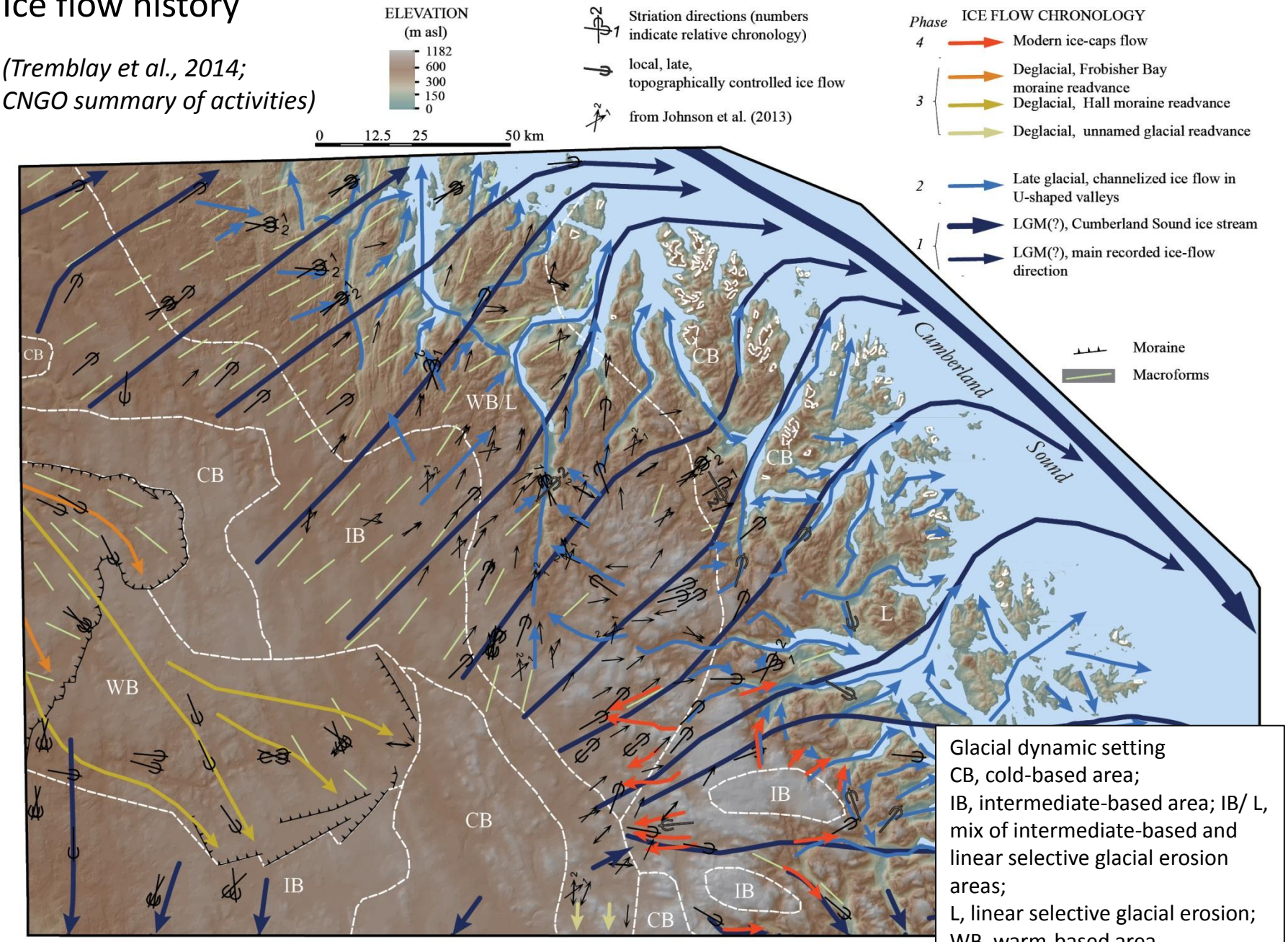
Hall Peninsula - Bedrock

(Steenkamp et al., 2014; CNGO summary of activities)



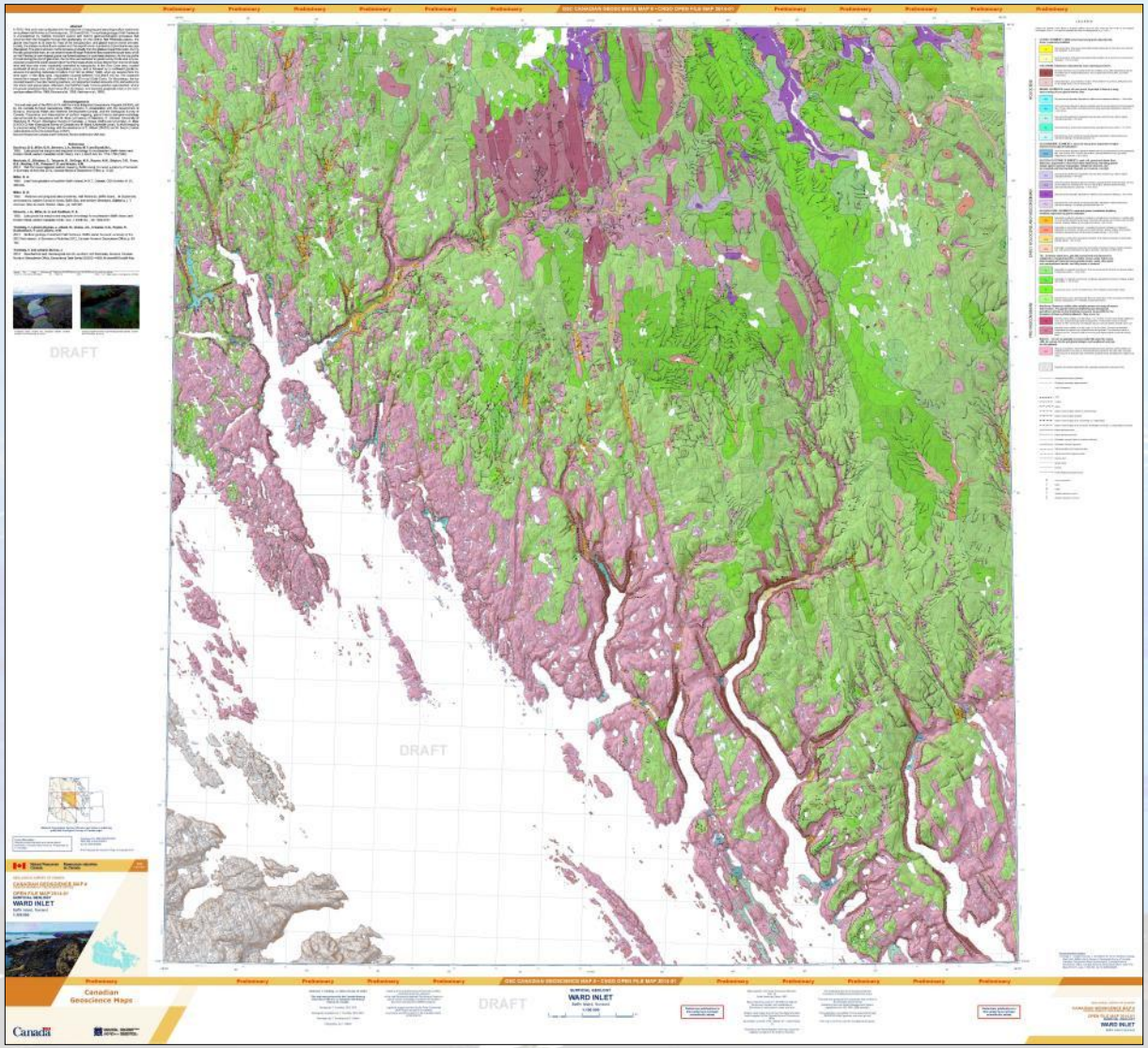
Ice flow history

(Tremblay et al., 2014;
CNGO summary of activities)

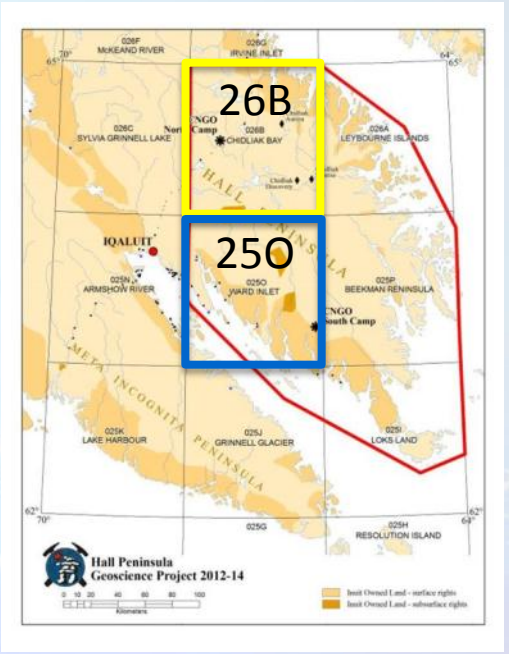


Glacial dynamic setting
CB, cold-based area;
IB, intermediate-based area; IB/ L, mix of intermediate-based and linear selective glacial erosion areas;
L, linear selective glacial erosion;
WB, warm-based area.

Hall Peninsula – Surficial geology mapping



Surficial geology map of Ward Inlet, NTS 25O



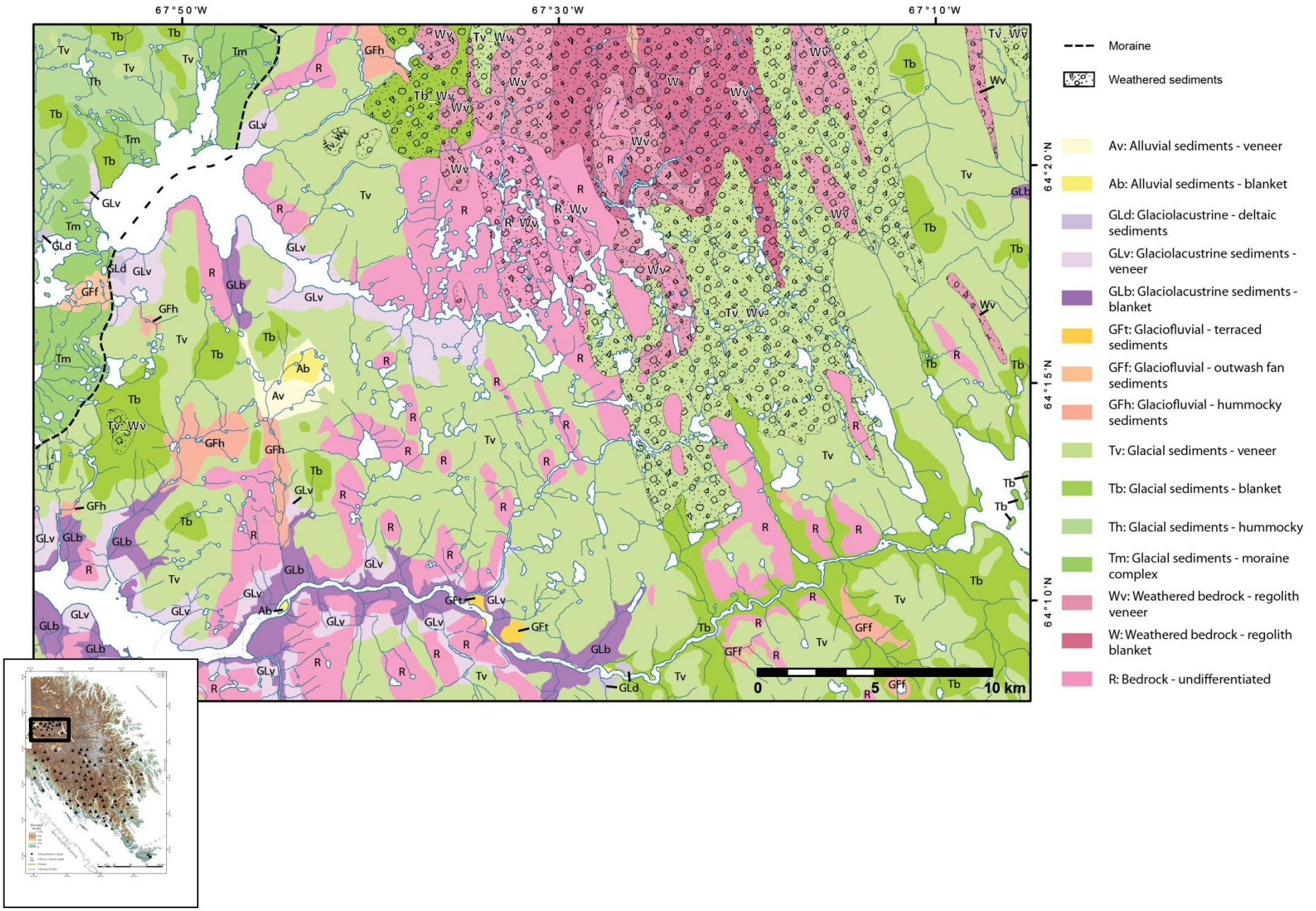
1:100 000 scale mapping:

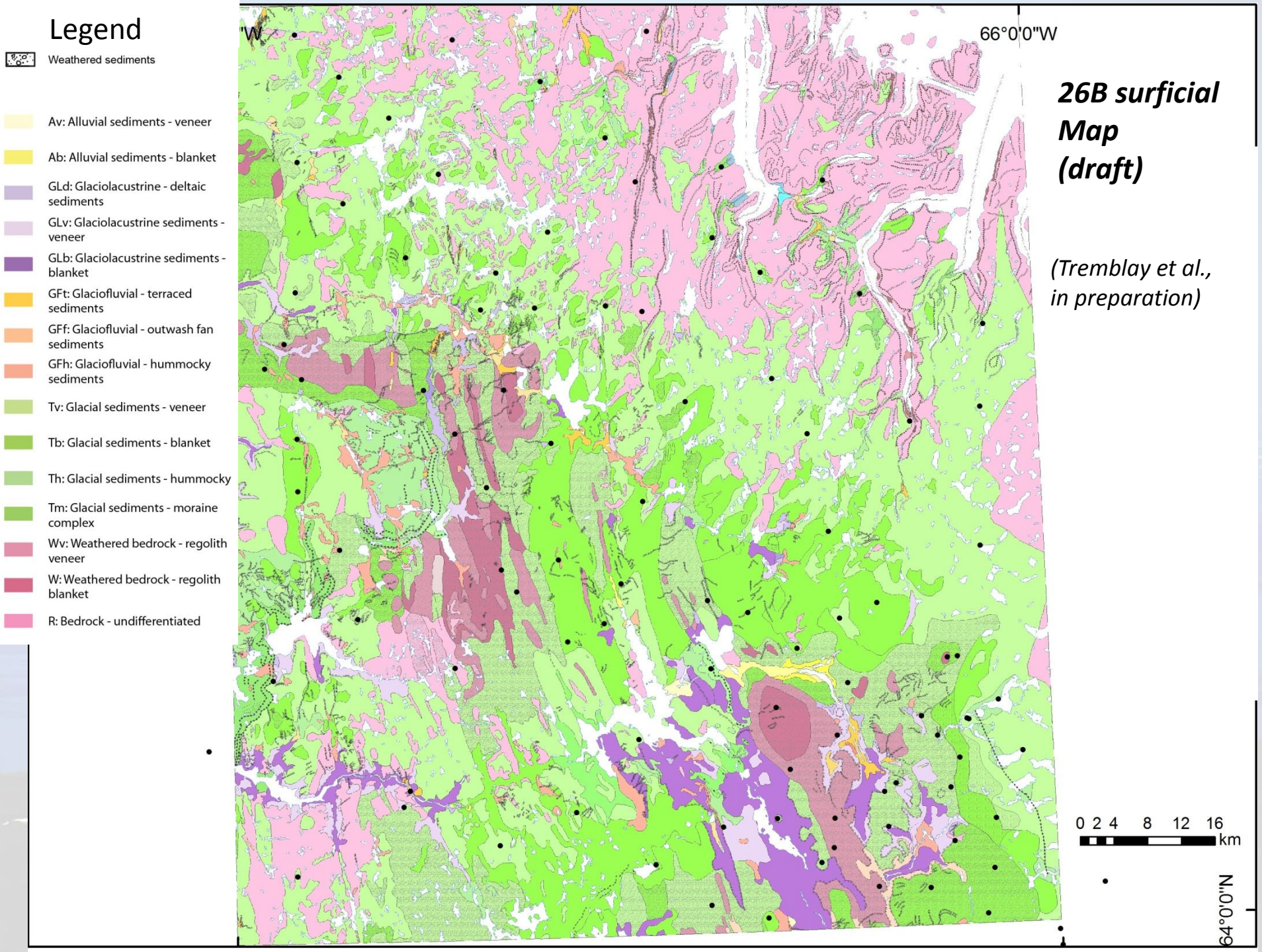
First sheet completed is 25O.

Preliminary version of 26B is available.

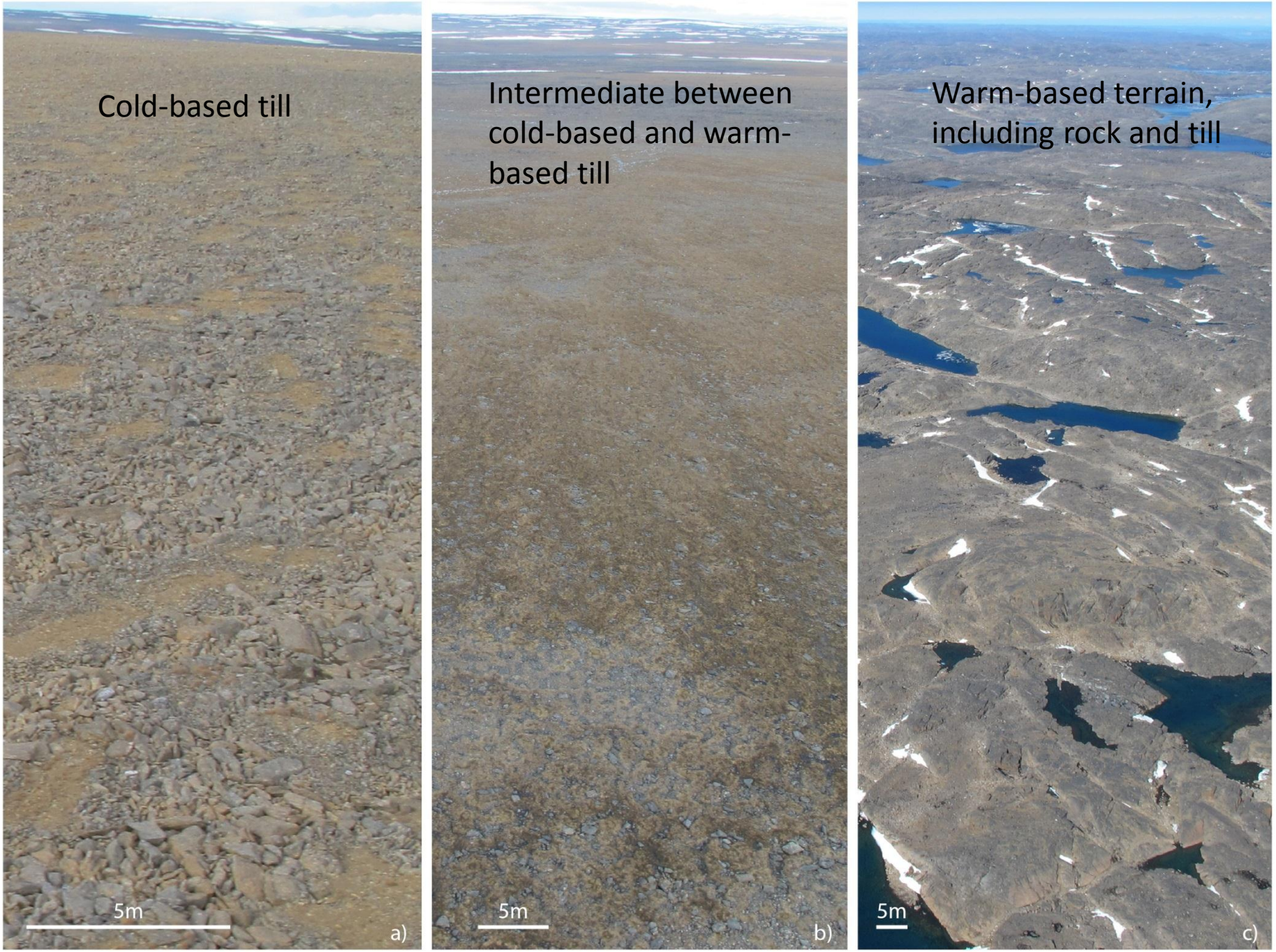
(Tremblay et al., in press)

Surficial geology maps (Julie Leblanc-Dumas, M. Sc. Students from Université Laval)




Legend
Weathered sediments
Av: Alluvial sediments - veneer
Ab: Alluvial sediments - blanket
GLd: Glaciolacustrine - deltaic sediments
GLv: Glaciolacustrine sediments - veneer
GLb: Glaciolacustrine sediments - blanket
GFt: Glaciofluvial - terraced sediments
GFf: Glaciofluvial - outwash fan sediments
GFh: Glaciofluvial - hummocky sediments
Tv: Glacial sediments - veneer
Tb: Glacial sediments - blanket
Th: Glacial sediments - hummocky
Tm: Glacial sediments - moraine complex
Wv: Weathered bedrock - regolith veneer
W: Weathered bedrock - regolith blanket
R: Bedrock - undifferentiated
66°0'0"W
26B surficial Map (draft)
(Tremblay et al., in preparation)
0 2 4 8 12 16
km
64°0'0"N


Weathering of bedrock (regolith)


Cold-based till
5m
a)
Intermediate between cold-based and warm-based till
5m
b)
Warm-based terrain, including rock and till
5m
c)

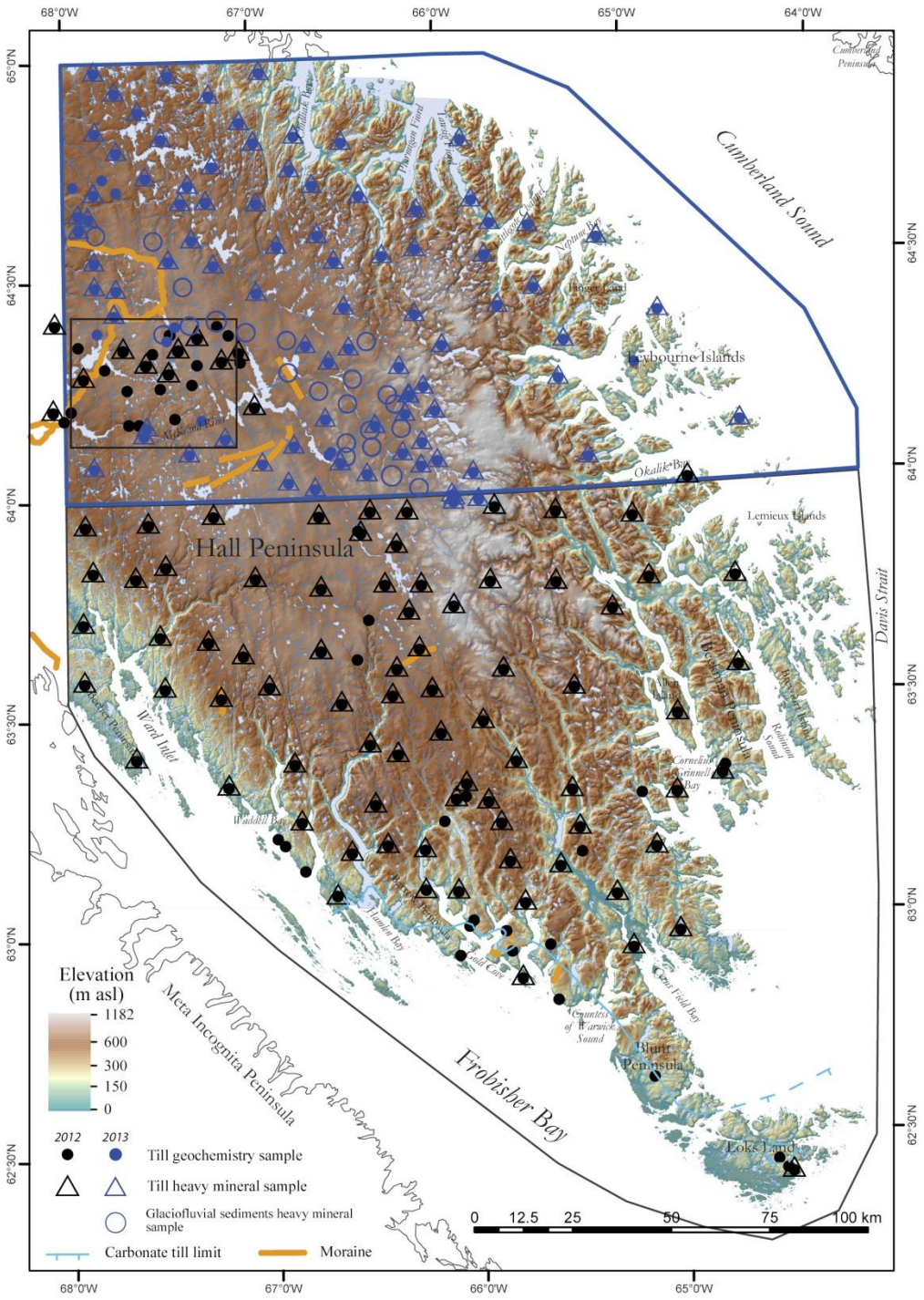
Economic considerations

-The scientific results stemming from the surficial geology studies of CNGO's HPIGP will contribute to helping Nunavumiut and Canadians make better decisions concerning the management of their natural resources.

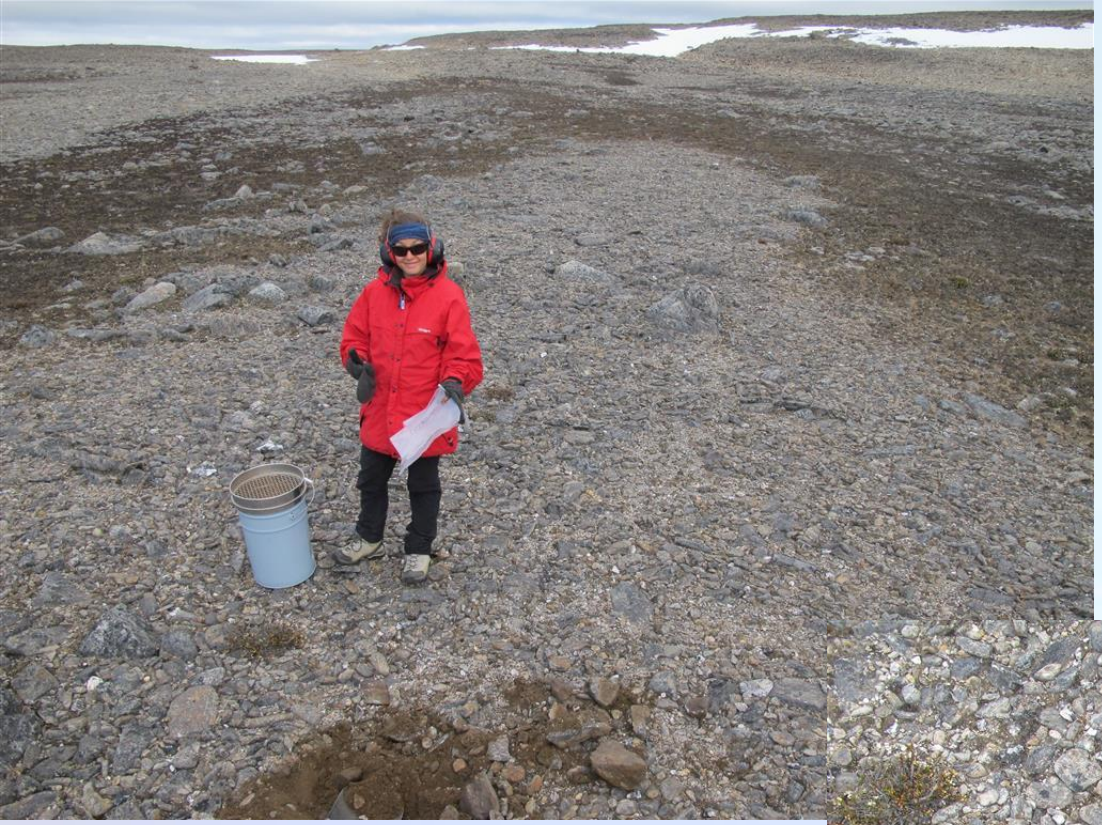
-The surficial maps and geomorphological studies (glaciodynamic mapping, permafrost, satellite images and uplift history) will help to minimize risk associated with mineral exploration in glaciated terrain and optimize the design of infrastructure projects.

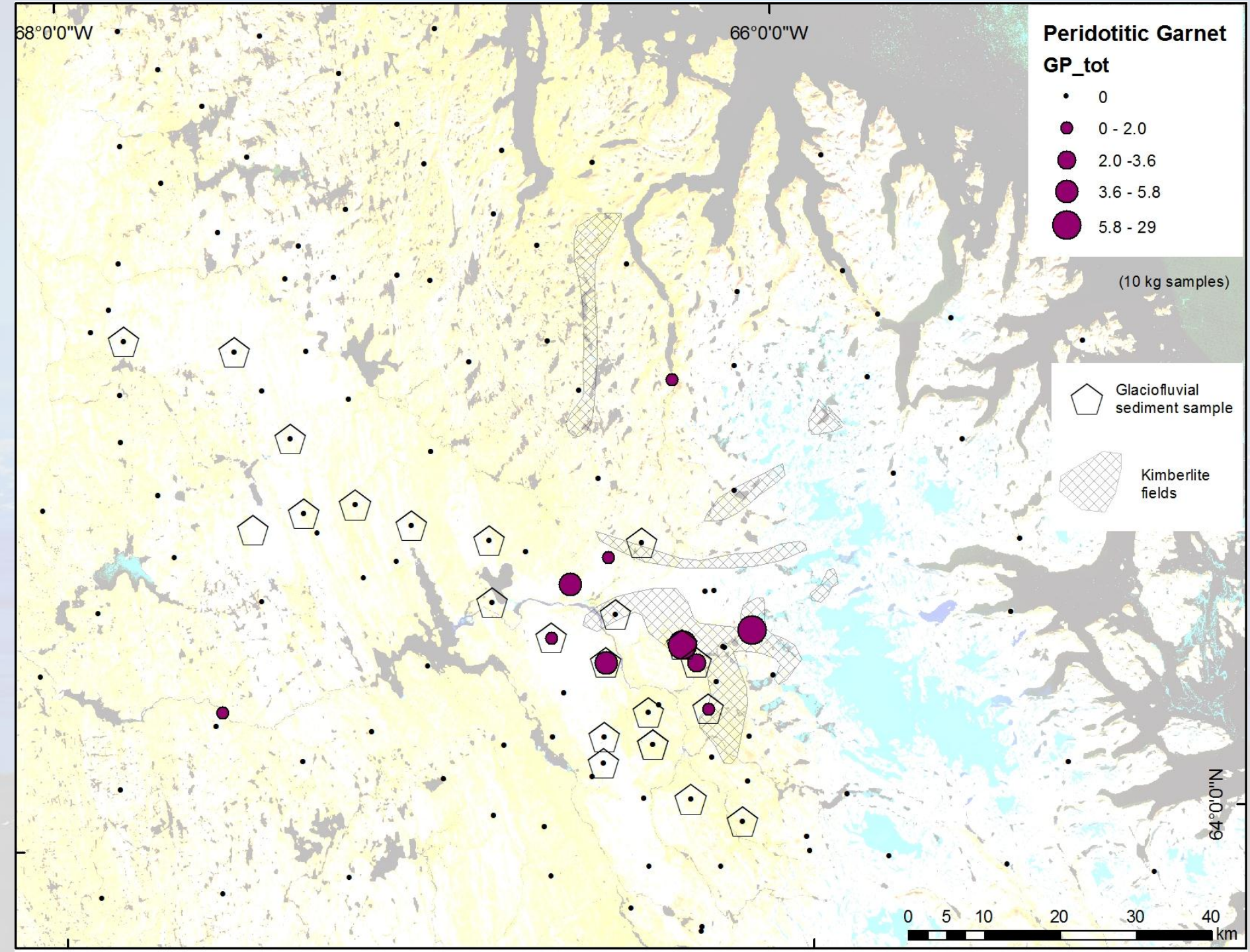
-Till geochemical (ICP-MS, on less than 63um fraction) and mineralogical data (treated at ODM, Nepean, Ontario) will contribute to more efficient mineral exploration and assessment of environmental and geotechnical characteristics of soil.

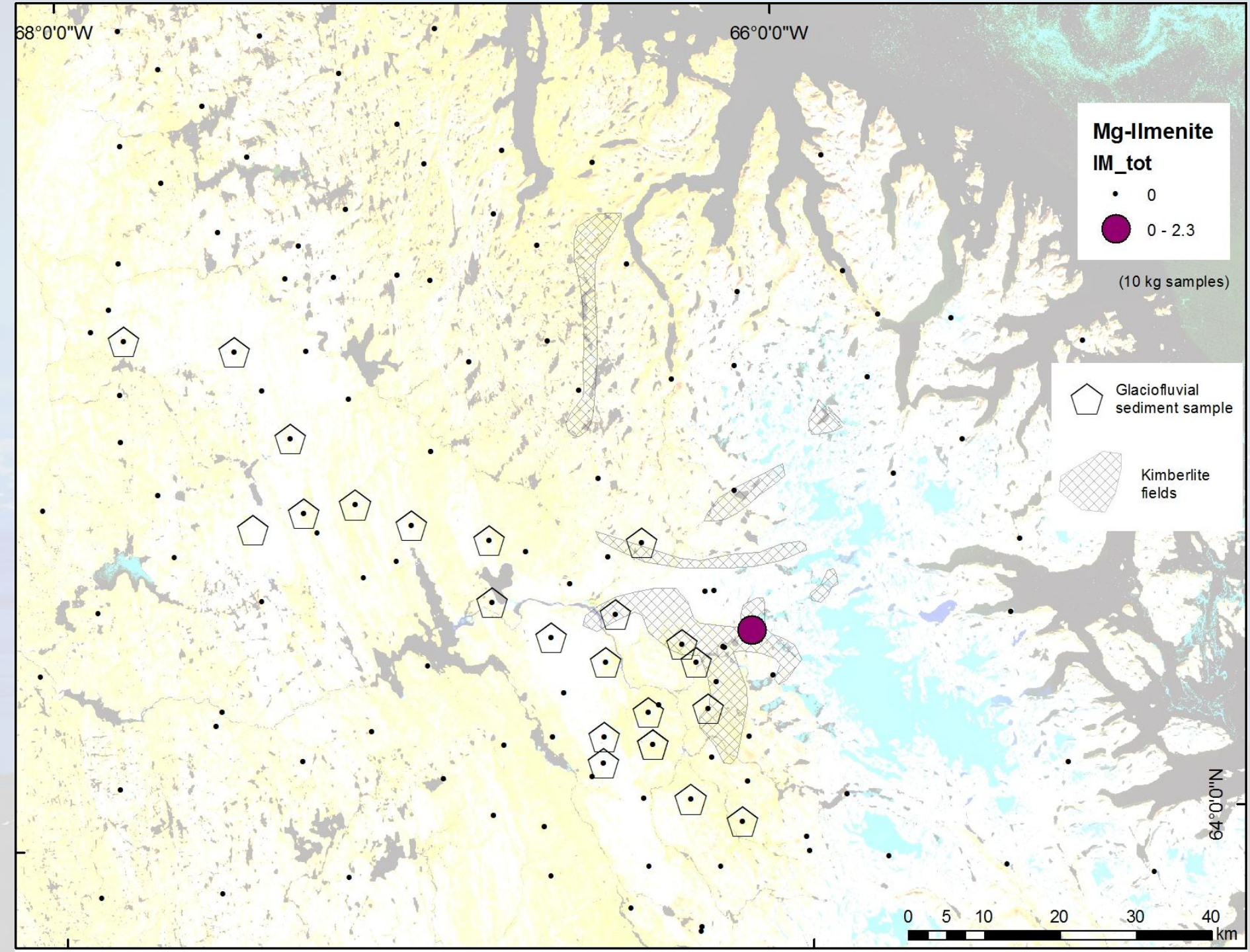
Study area and location of till samples

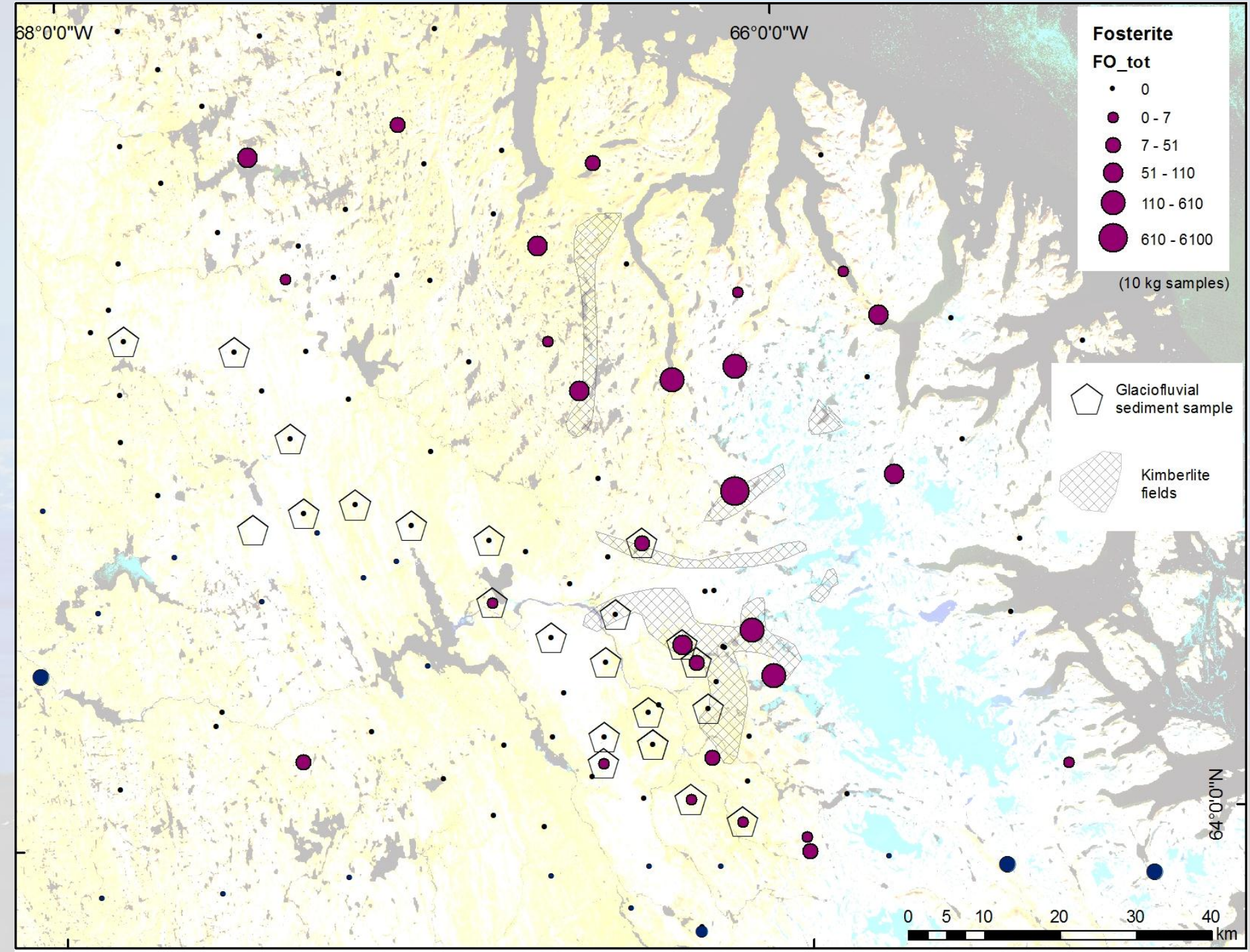


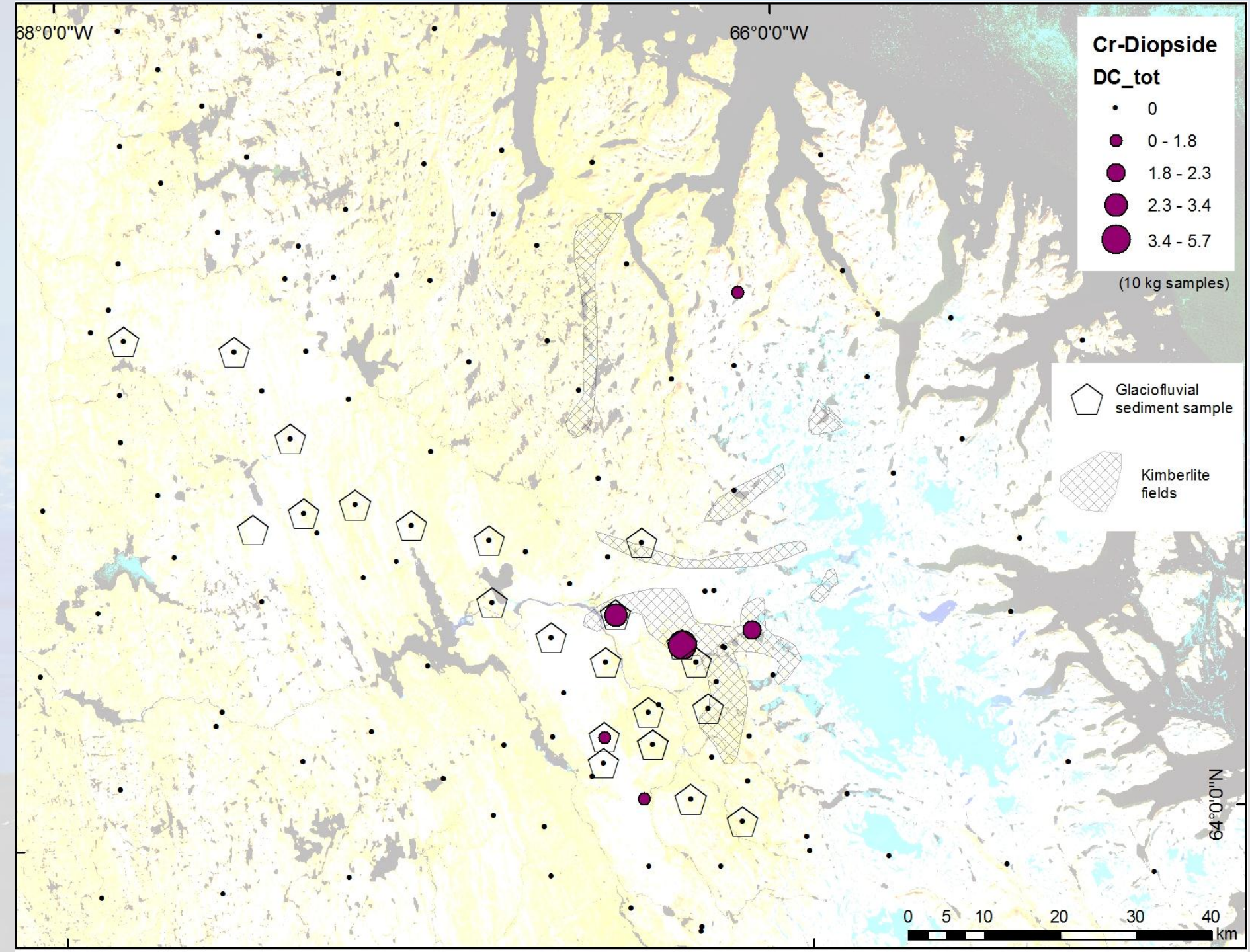
Glaciofluvial sediments sampling

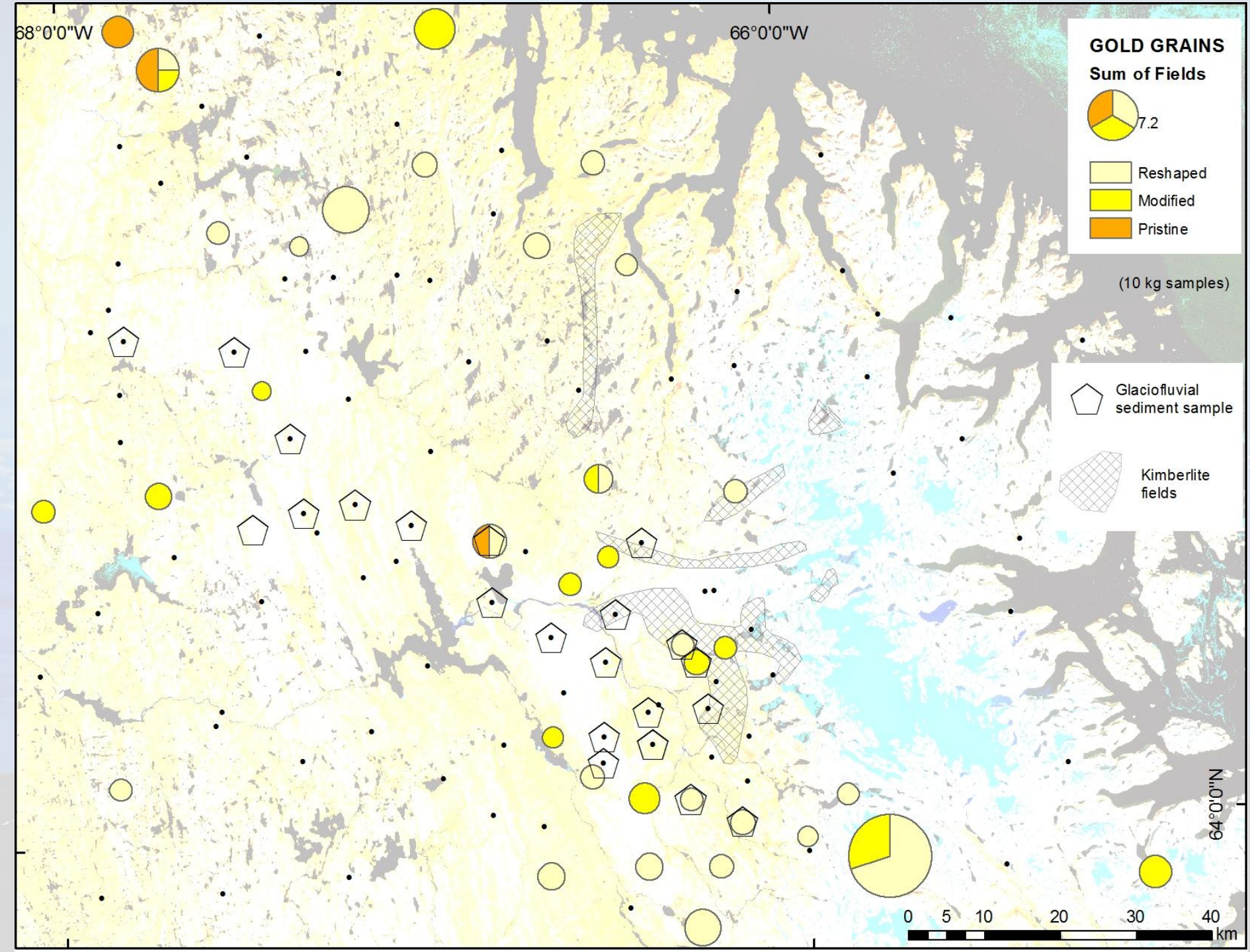


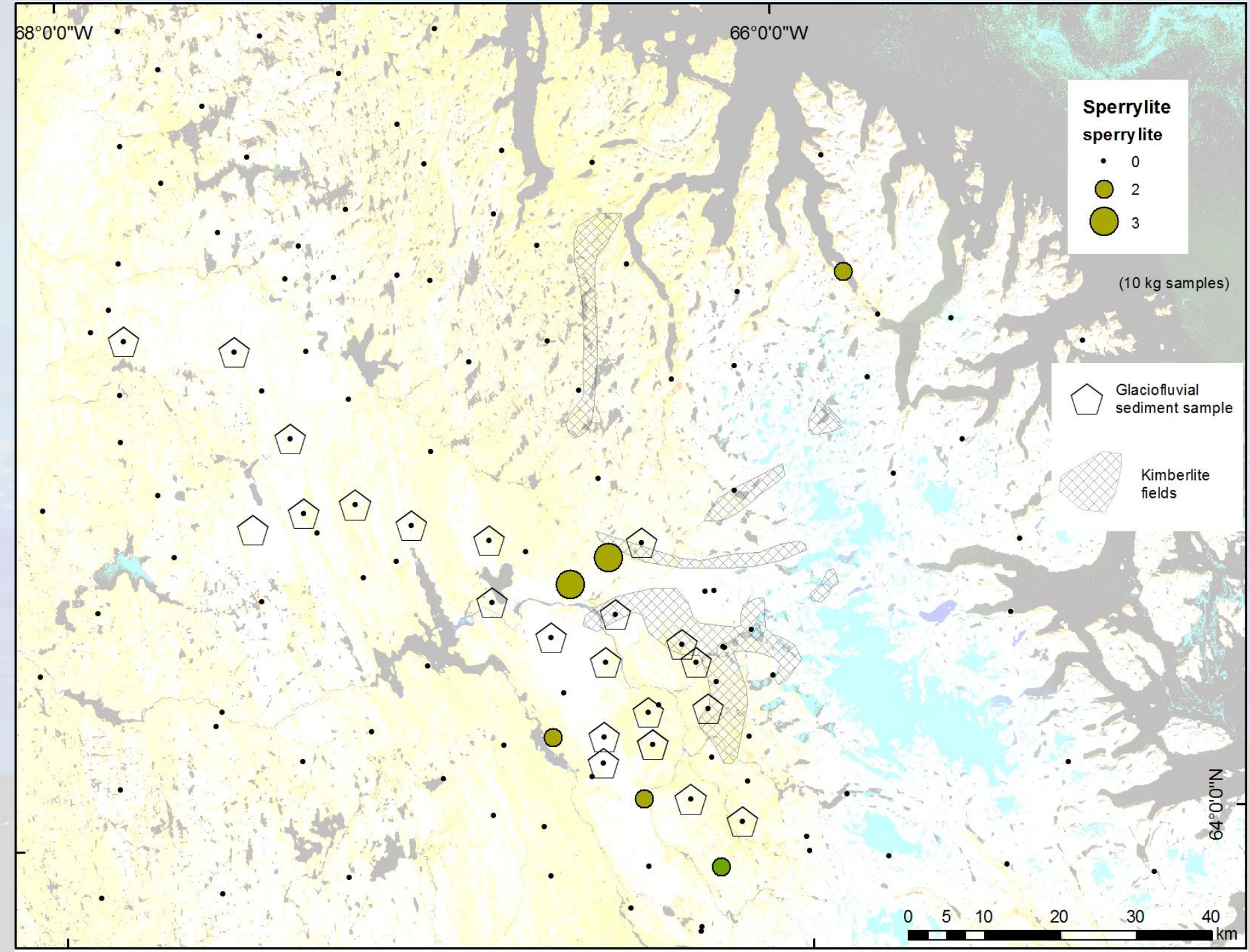

68°0'0"W
66°0'0"W
Peridotitic Garnet
GP_tot
0
0 - 2.0
2.0 -3.6
3.6 - 5.8
5.8 - 29
(10 kg samples)
Glaciofluvial sediment sample
Kimberlite fields
64°0'0"N
0 5 10 20 30 40
km


68°0'0"W
66°0'0"W
Mg-Ilmenite
IM_tot
0
0 - 2.3
(10 kg samples)
Glaciofluvial sediment sample
Kimberlite fields
64°0'0"N
0 5 10 20 30 40
km


68°0'0"W
66°0'0"W
Fosterite
FO_tot
0
0 - 7
7 - 51
51 - 110
110 - 610
610 - 6100
(10 kg samples)
Glaciofluvial sediment sample
Kimberlite fields
64°0'0"N
0 5 10 20 30 40
km


68°0'0"W
66°0'0"W
Cr-Diopside
DC_tot
0
0 - 1.8
1.8 - 2.3
2.3 - 3.4
3.4 - 5.7
(10 kg samples)
Glaciofluvial sediment sample
Kimberlite fields
64°0'0"N
0 5 10 20 30 40
km


68°0'0"W
66°0'0"W
GOLD GRAINS
Sum of Fields
7.2
Reshaped
Modified
Pristine
(10 kg samples)
Glaciofluvial sediment sample
Kimberlite fields
64°0'0"N
0 5 10 20 30 40
km


68°0'0"W
66°0'0"W
Sperrylite
sperrylite
0
2
3
(10 kg samples)
Glaciofluvial sediment sample
Kimberlite fields
64°0'0"N
0 5 10 20 30 40
km

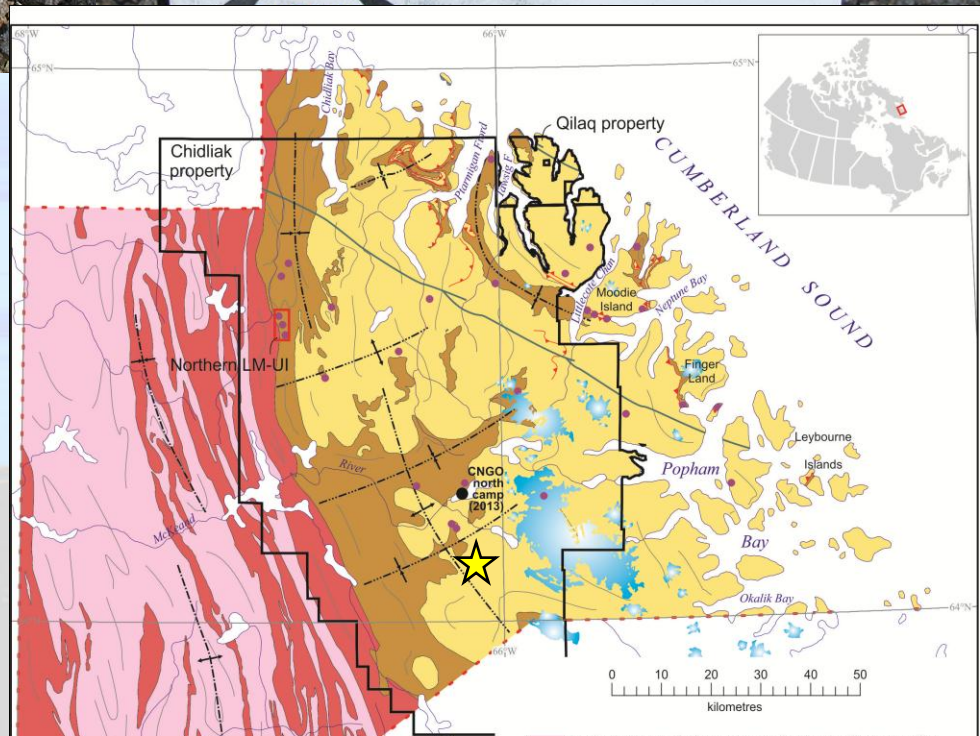
New kimberlite dike discovered (CH-64)

KIMs from crushed sample (381g)

0.5 to 1.0 mm						0.25 to 0.5 mm						
GP	GO	DC	IM	CR	FO	GP	GO	DC	IM	CR	FO	Total KIMs
0	0	0	0	0	3	0	0	2	1	17	21	44

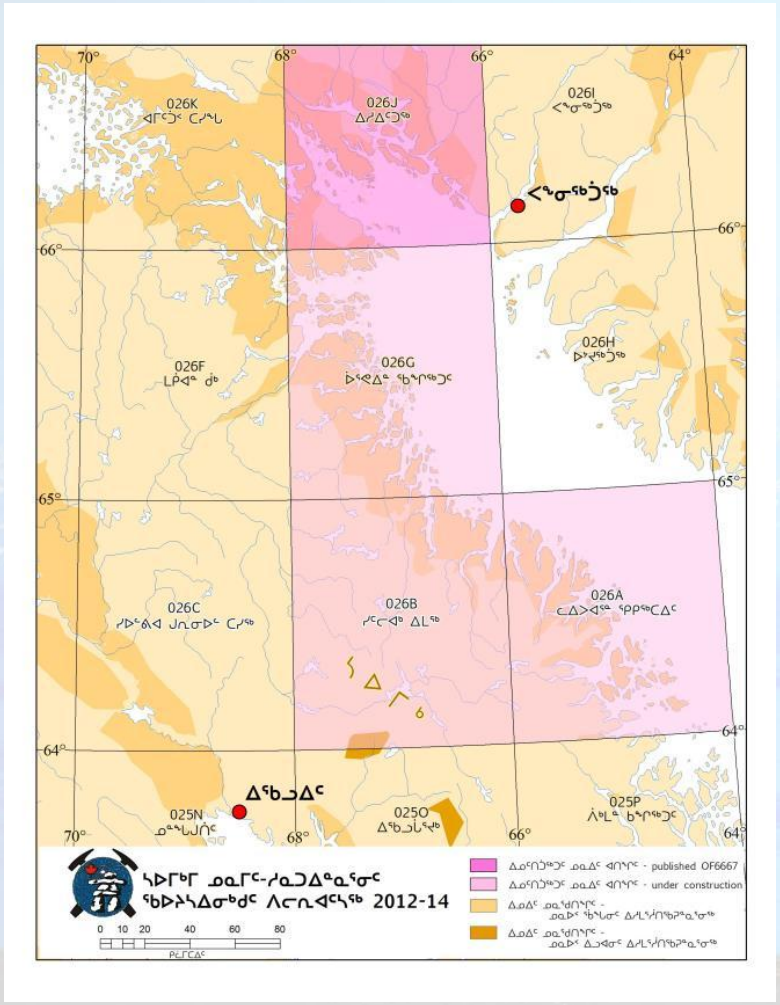
Sample description

Subangular 9 cm, 0.4 kg cobble. Grey-beige, massive, fractured, weakly magnetic hypabyssal facies kimberlite consisting of 25%, 0.5-1.0 mm (rarely to 4 mm) euhedral to rounded serpentinized and calcite altered olivine macrocrysts in an aphanitic matrix of soft serpentine and minor calcite and a trace of magnetite and very fine (<0.1 mm) picroilmenite (SEM confirmed). No crustal xenoliths, mantle xenoliths or pelletal autoliths observed. No kimberlite indicator minerals, other than IM observed.

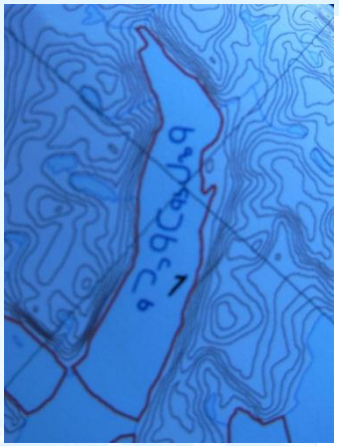


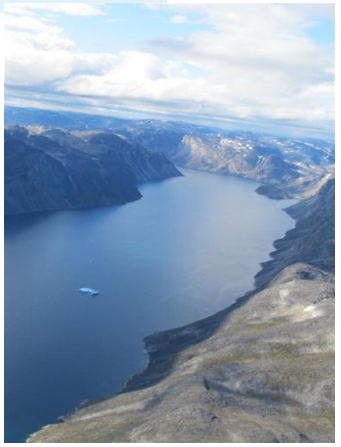
Permafrost studies

Traditional place names project



Inuit Heritage Trust





Patricia Peyton

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

Publications

Tremblay, T., Leblanc-Dumas, J., Allard, M., Gosse, J.C., Creason, C.G., Peyton, P., Budkewitsch, P. and LeBlanc, A-M.

2013: Surficial geology of southern Hall Peninsula, Baffin Island, Nunavut: summary of the 2012 field season. *in* Summary of Activities 2012, Canada- Nunavut Geoscience Office, p. 93-100.

Tremblay, T., Leblanc-Dumas, J., Allard, M., Ross, M. and Johnson, C.

2014: Surficial geology of central Hall Peninsula, Baffin Island, Nunavut: summary of the 2013 field season. *in* Summary of Activities 2013, Canada-Nunavut Geoscience Office, p. 103-114.

Tremblay, T. and Leblanc-Dumas, J.

2014: Geochemical and mineralogical data for southern Hall Peninsula, Nunavut. Canada-Nunavut Geoscience Office, Geoscience Data Series GDS2014-003, Microsoft® Excel® files.

Tremblay, T. and Leblanc-Dumas, J.

In press: Surficial geology, Ward Inlet, NTS 25O, Nunavut. Geological Survey of Canada, CGM map.

Summary

- Surficial geology map of NTS 25O is completed, and NTS 26A, B and 25P are under way, and at a scale of 1:100 000 on Hall Peninsula.
- Ice flow regional study (striations measurements) surficial maps are available.
- Heavy fraction mineralogy of till highlights includes KIMs, gold grains and sperrylite.
- Permafrost studies will be helpful to future infrastructure project design.
- Inuktitut place-names project will link known with field pictures and geomorphological and geological description.

Mannasie Qillaq – (1966 – 2013)

Barnes glacier Camp 1970s
(Photo: Roger LeB. Hooke)