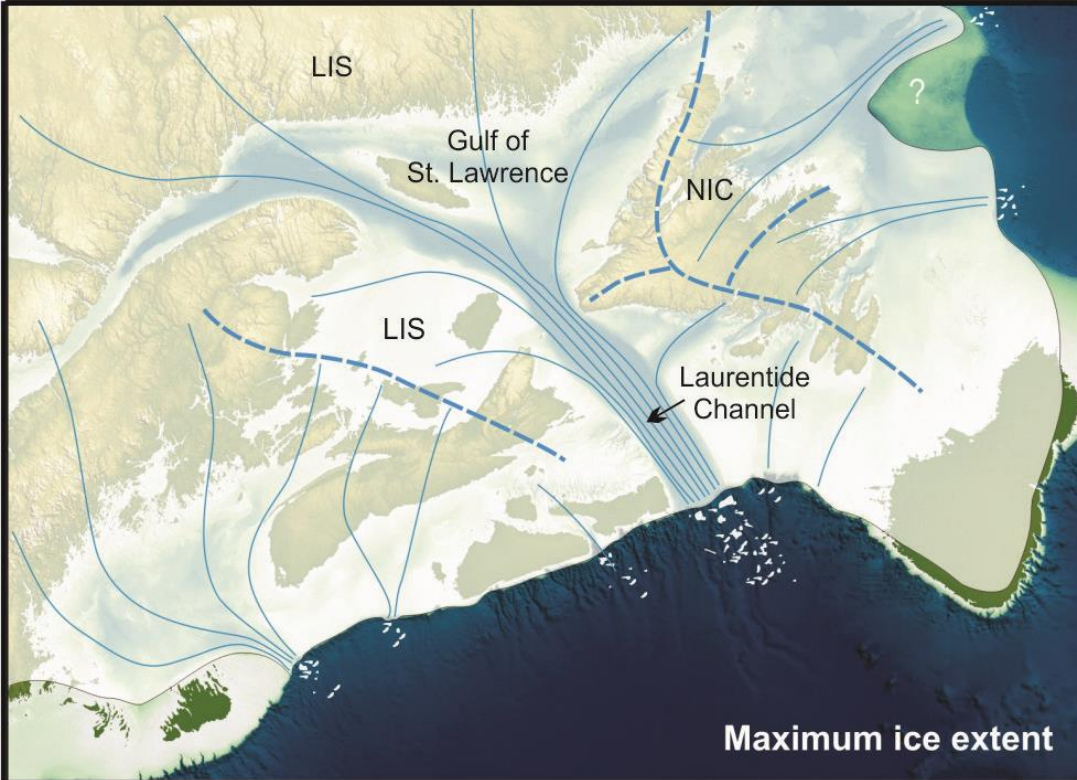




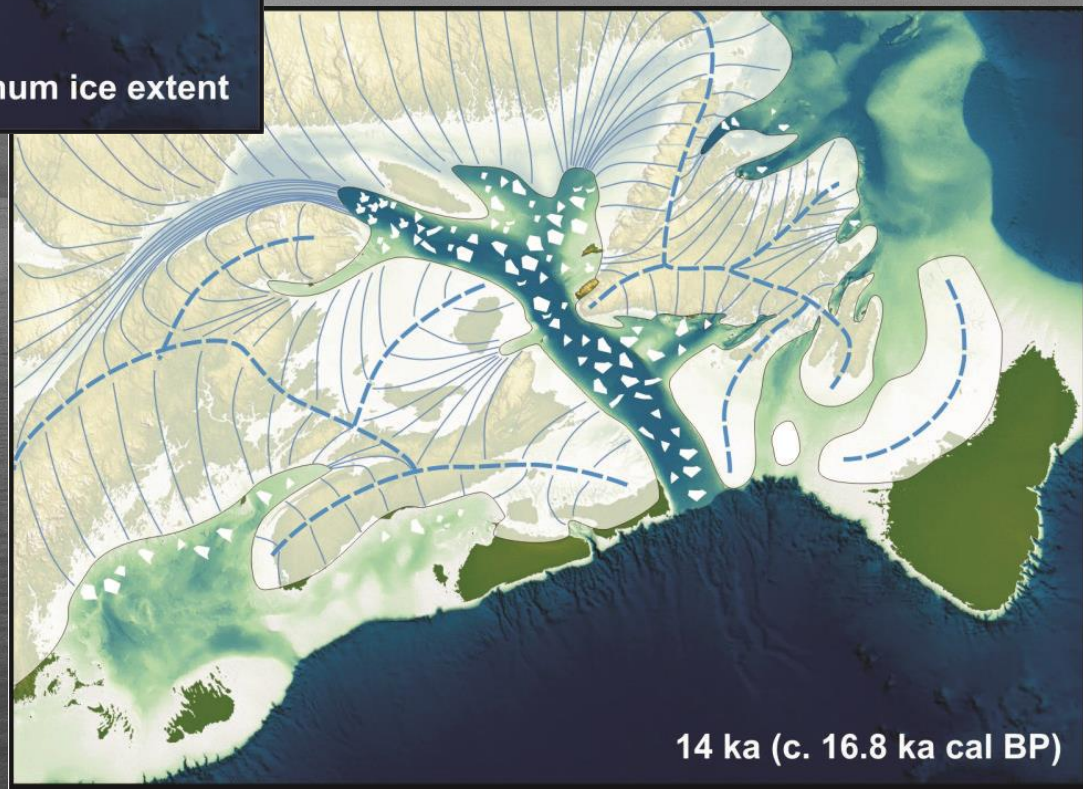
Cruisin' the South Coast -
Bay d'Espoir to Burgeo:

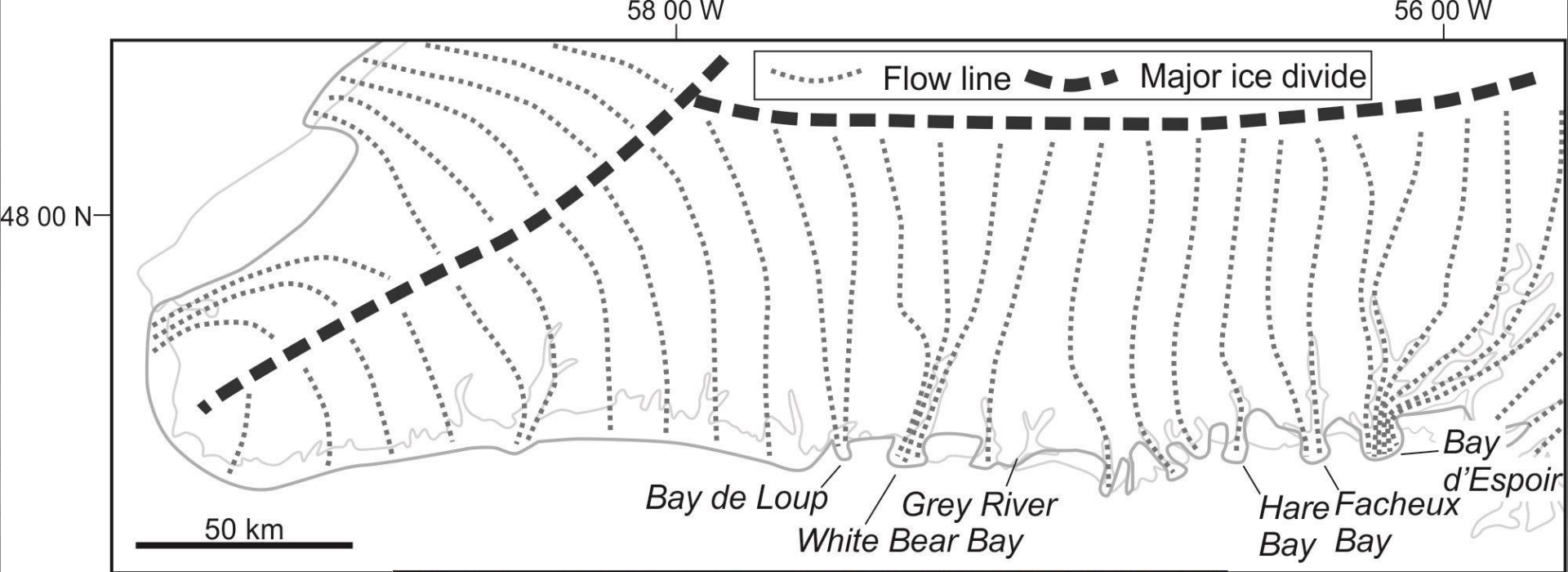
The
Newfoundland Ice Sheet Shelf
(NISS) Survey

Jennifer Organ



(Shaw *et al.*, 2006)



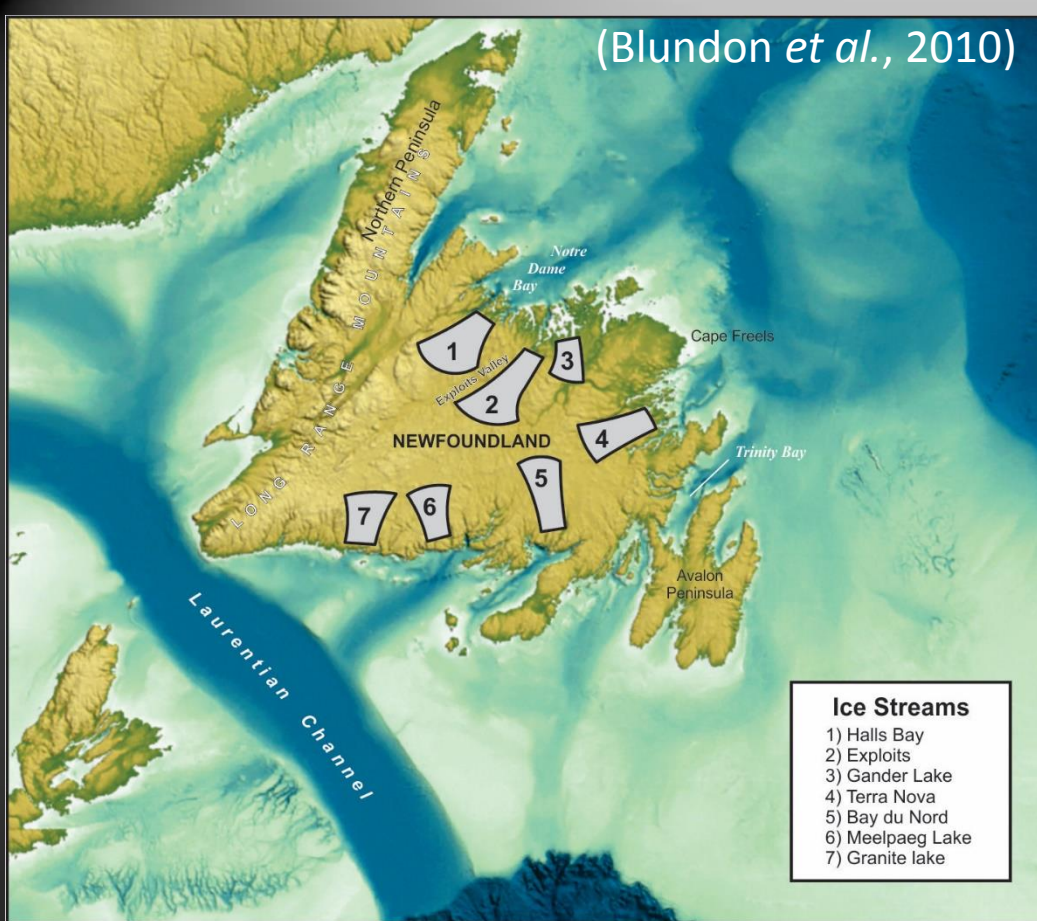


(Shaw, 2003)



(Shaw *et al.*, 2006)

(Blundon *et al.*, 2010)

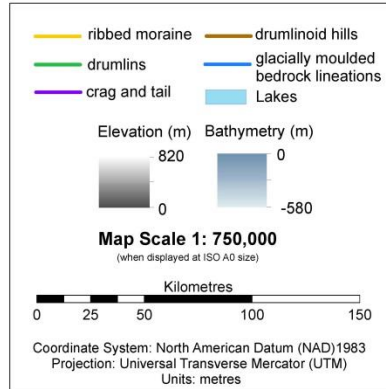
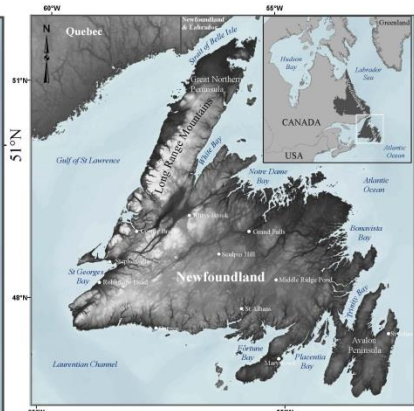
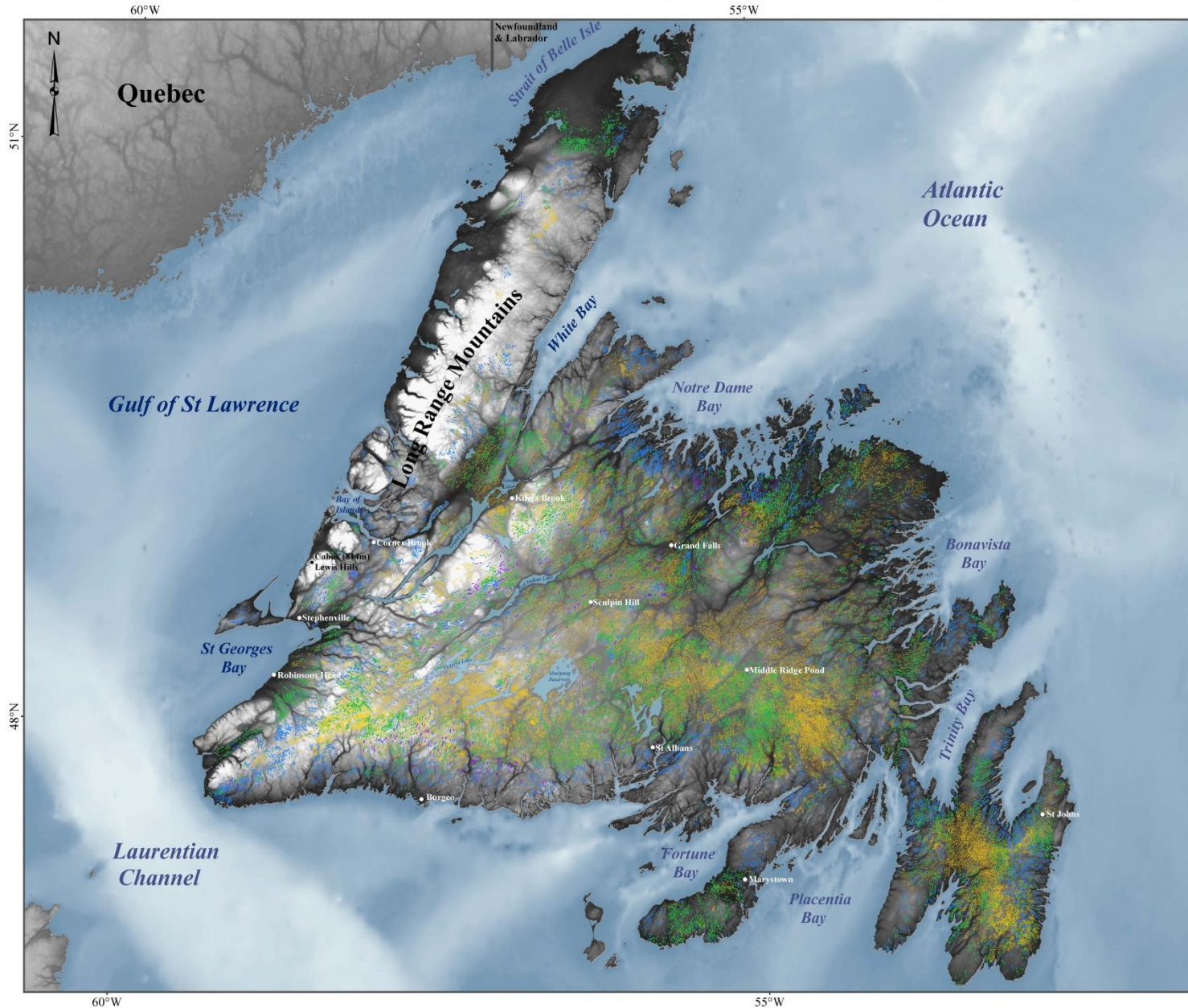


Ice Streams

- 1) Halls Bay
- 2) Exploits
- 3) Gander Lake
- 4) Terra Nova
- 5) Bay du Nord
- 6) Meelpaeg Lake
- 7) Granite lake

The subglacial imprint of the Last Newfoundland Ice Sheet, Canada

Maureen McHenry and Paul Dunlop, School of Environmental Sciences, Ulster University, Coleraine



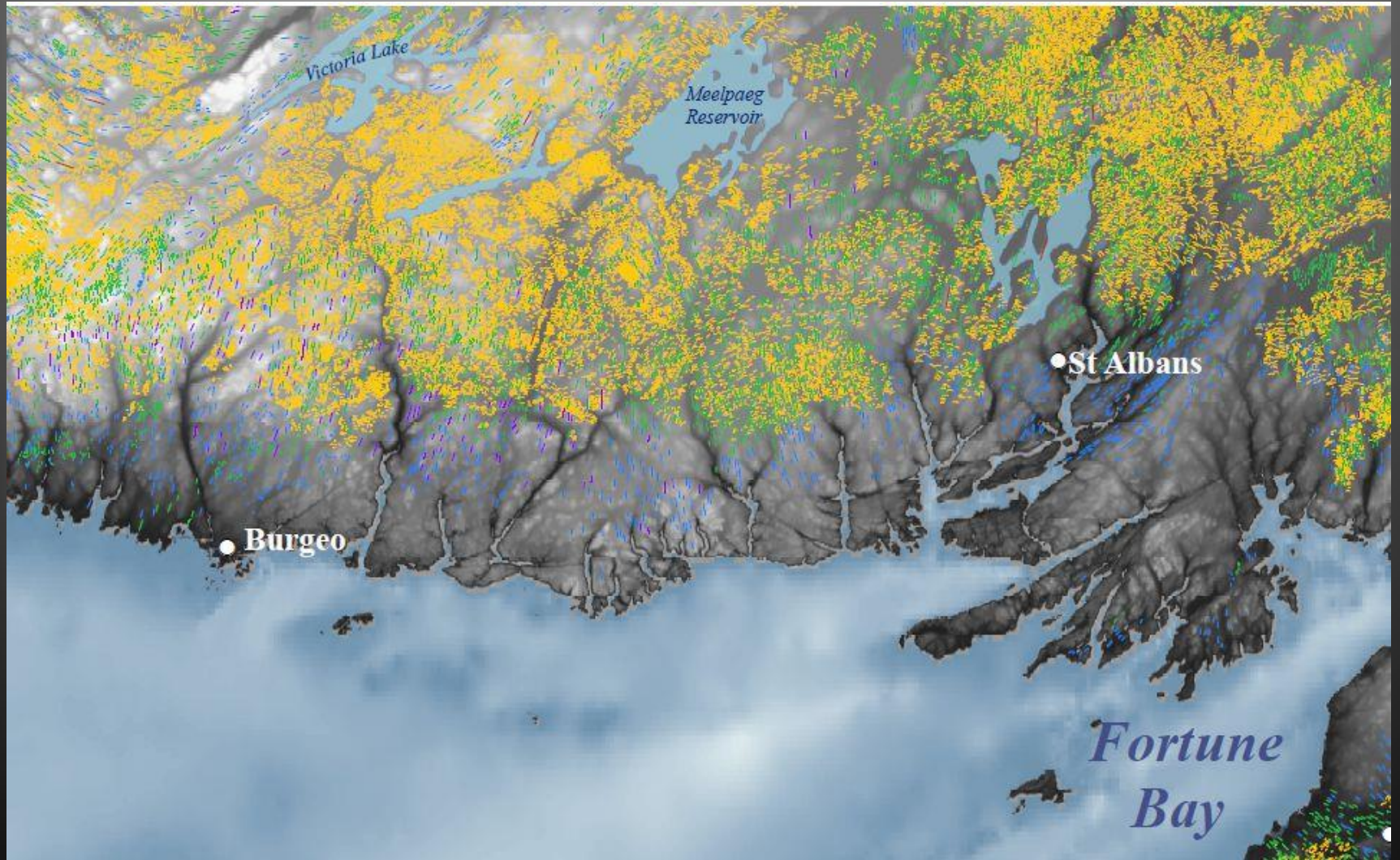
Explanatory Notes

All landforms were mapped by M. McHenry (2012-2013) using 10m pan-sharpened SPOT 4/5 Satellite Imagery, Canadian Digital Elevation Data (CDED) and Shuttle Radar Topography Mission (SRTM) DEMs. The map displays digitised landforms as vector layers on top of CDED DEMs of the island of Newfoundland. All areas outside of this are displayed using 30 arc second grid data reproduced from GEBCO 08 terrain and ocean data. Projected coordinate system NAD 1983 UTM Zone 21 North was used for the entire island of Newfoundland.

SPOT 4/5 and CDED imagery was supplied by the Government of Canada, Natural Resources of Canada, Earth Sciences Sector, Centre for Topographic Information (<http://www.geobase.ca/geobase/en/>); SRTM data was supplied by the United States Geological Survey Earth Resources Observation Science (EROS) Center (<https://eros.usgs.gov/>). GEBCO data was obtained from the British Oceanographic Data Centre (<http://www.bodc.ac.uk/>).

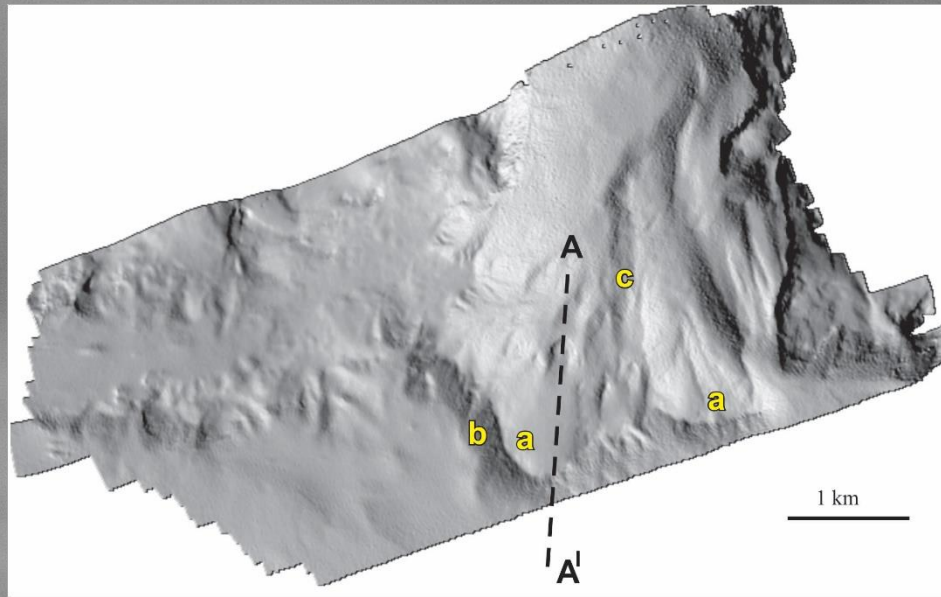
This map was produced as part of PhD research by M. McHenry, "Reconstructing the Newfoundland Ice Sheet through the last glacial cycle". For a full description of the map and methods employed in its construction refer to the accompanying paper, McHenry, M. and Dunlop, P. (2015). The subglacial imprint of the last Newfoundland Ice Sheet, Canada. *Journal of Maps*.

Correspondence address: School of Environmental Sciences, Ulster University, Coleraine, BT52 1SA. Email: mc_henry_m@email.ulster.ac.uk

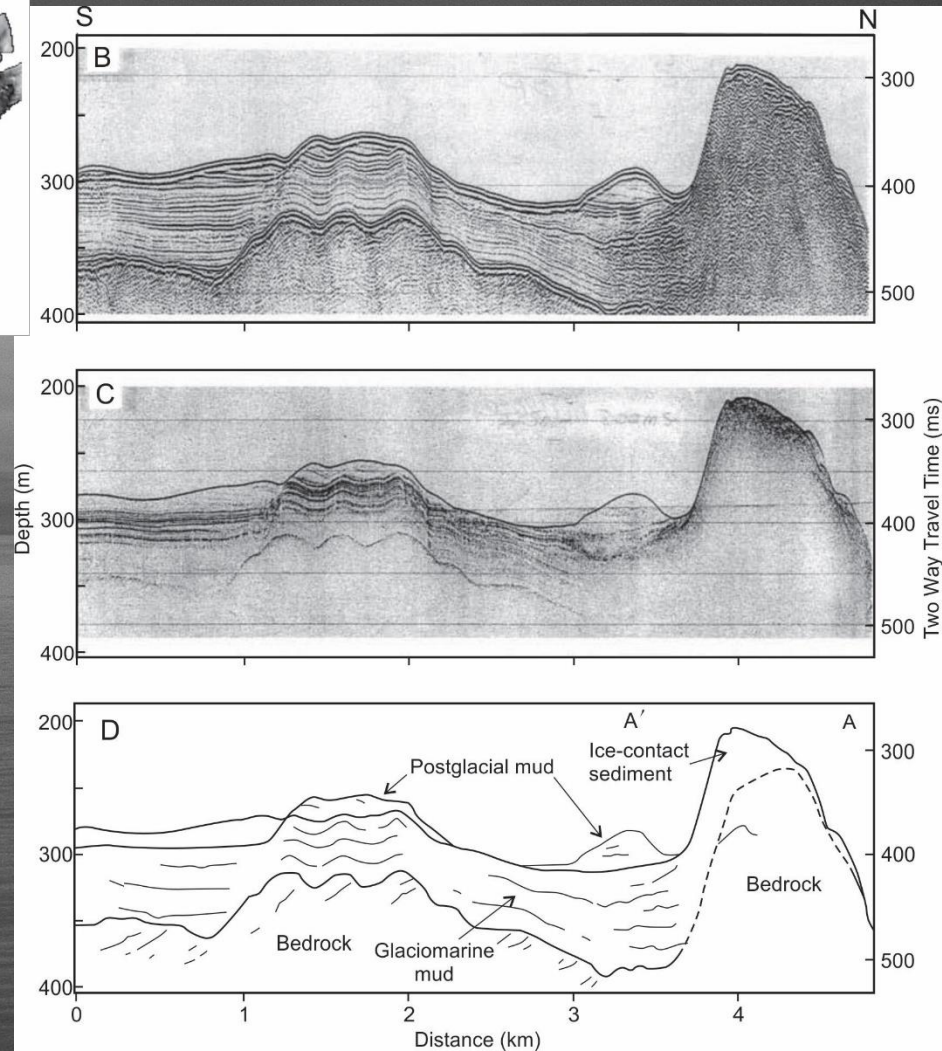


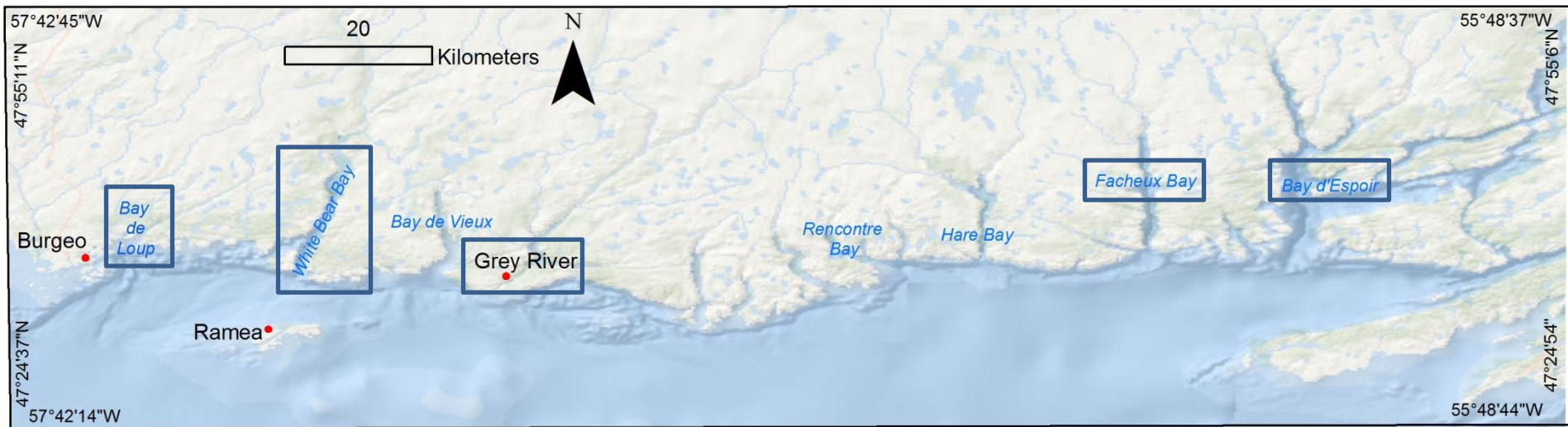
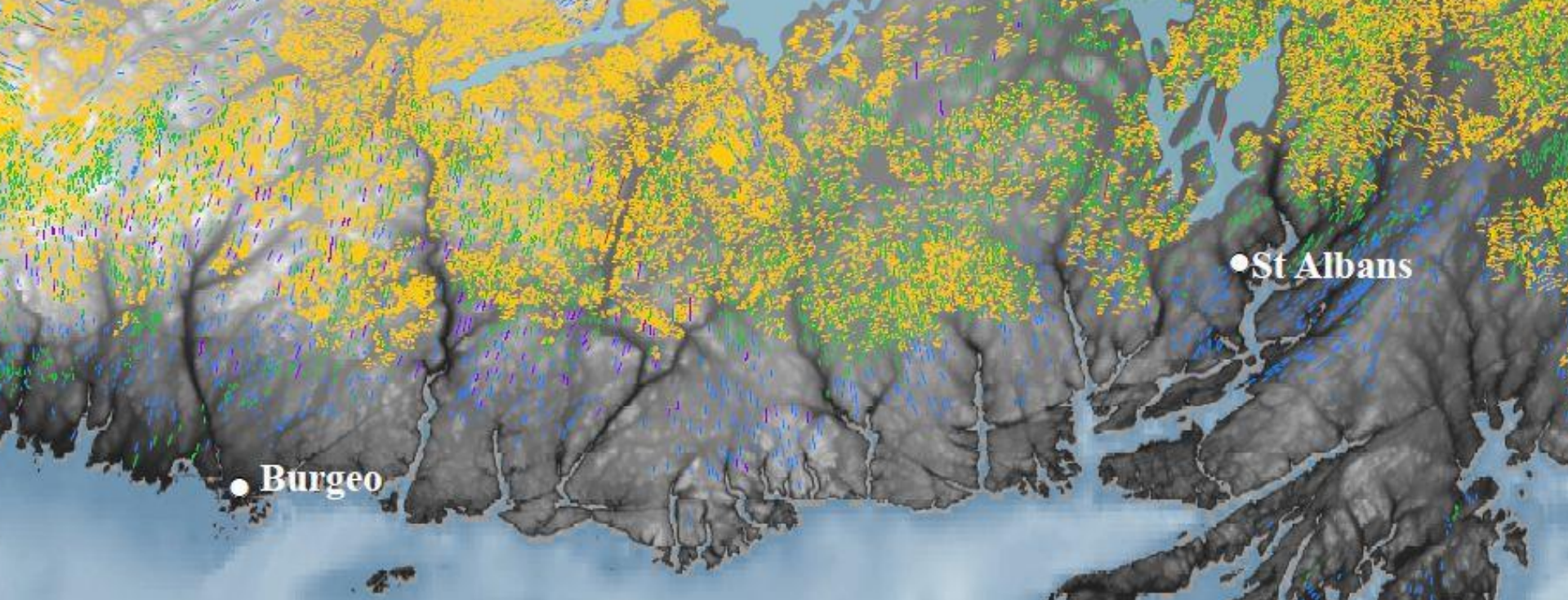


Bay d'Espoir



(Shaw *et al.*, 2000)





Project Objectives

- **Collect new multibeam and seismic data across fjord-mouth submarine moraines**
 - Contributes to:
 - Knowledge of Atlantic Ocean under Atlantic Ocean Research Alliance Umbrella,
 - Bathymetric data for Atlantic Sea Bed Mapping Initiative
- **Collect sediment cores from submarine moraines for sedimentological and geochronological analyses**
 - Better understanding of the deglaciation history of the NIC
 - May provide a useful analogue to understanding contemporary marine-influenced ice sheets
- **GSNL – interested in the geochemistry of offshore vs onshore sediment samples to the north (St Alban's, Burnt Lake)**

Collaborators:



Paul Dunlop, Sara Benetti, John Shaw and Trevor Bell



Funded By: Irish National research Vessel's 2016 Ship-time Programme



GSNL's Role

- Gain experience conducting an offshore survey
 - Sediment collection, recording and storing
 - Multibeam data
 - Seismic data
- Collaborate with other researchers

Outline

- Requirements – Training
- The Boat – Celtic Explorer
- Coring
- Collection of multibeam, backscatter and seismic-profile data
- Results
- Future plans

We had to get our ducks in a row:



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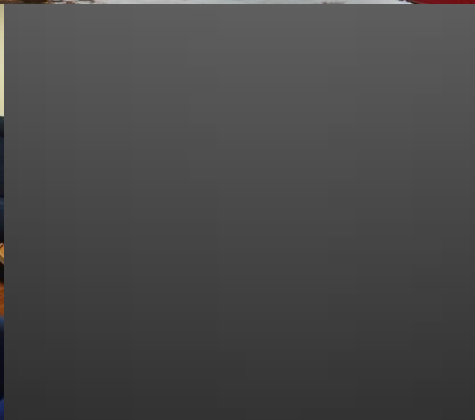


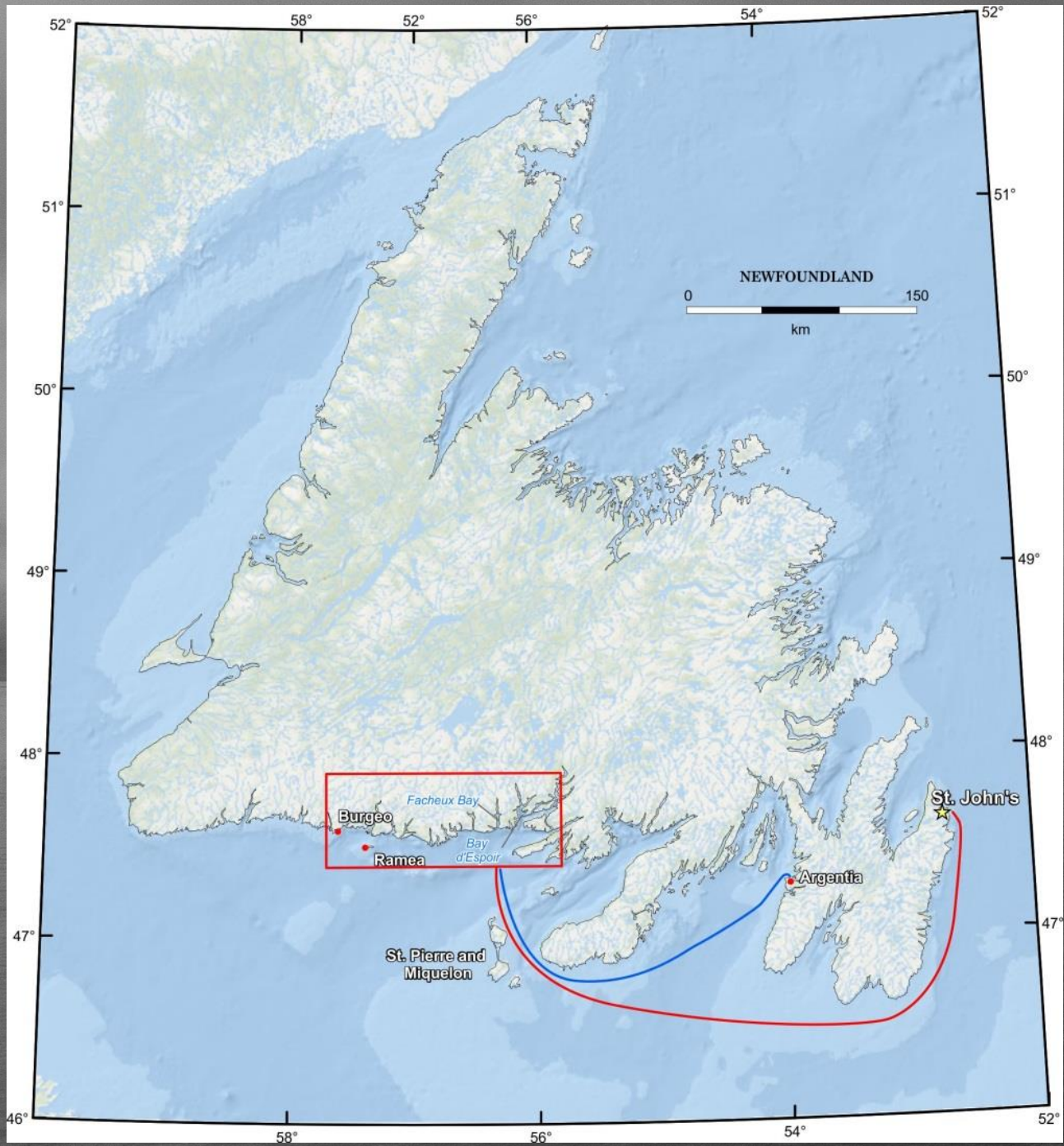


















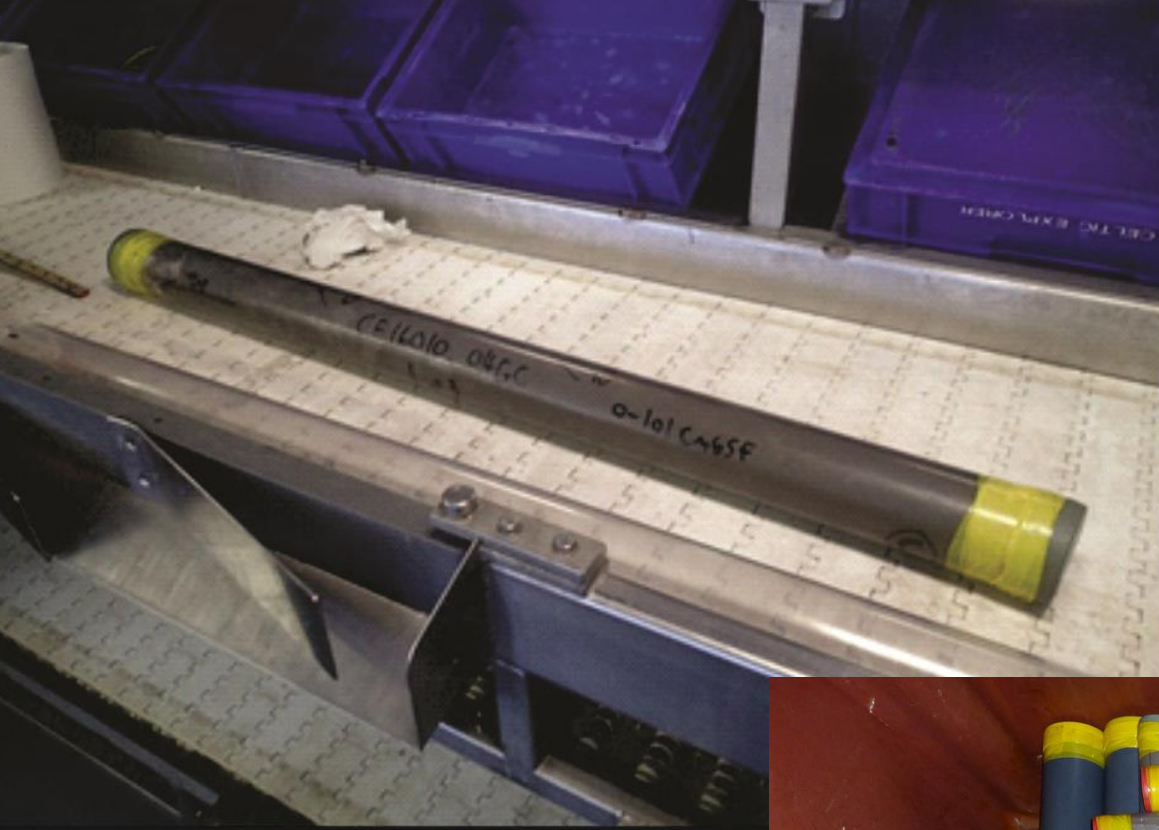




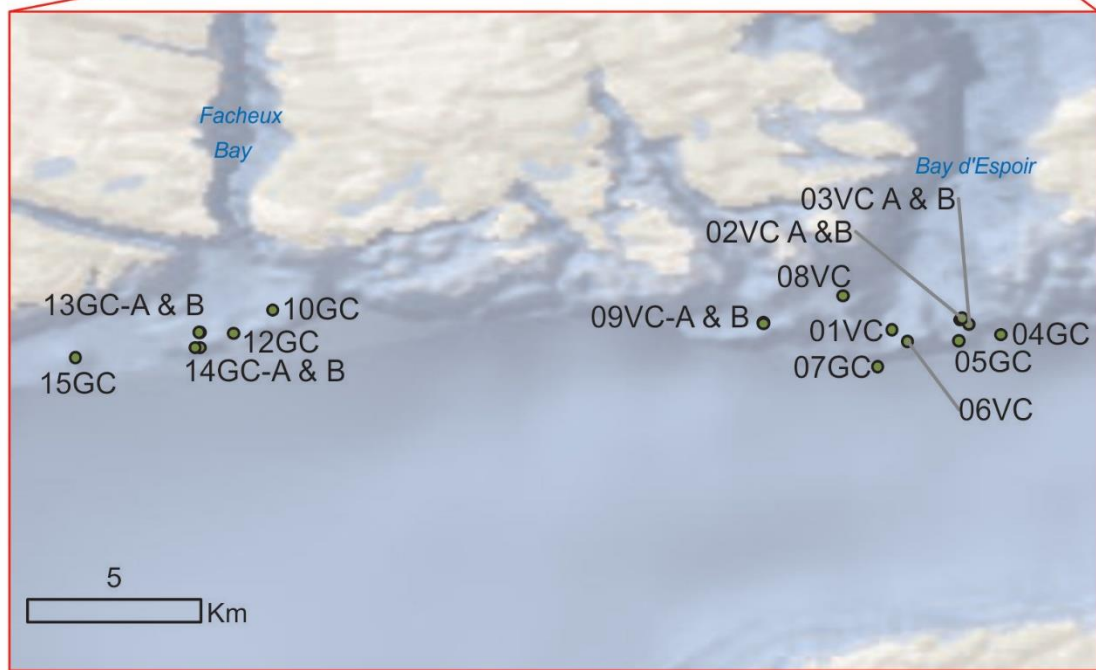
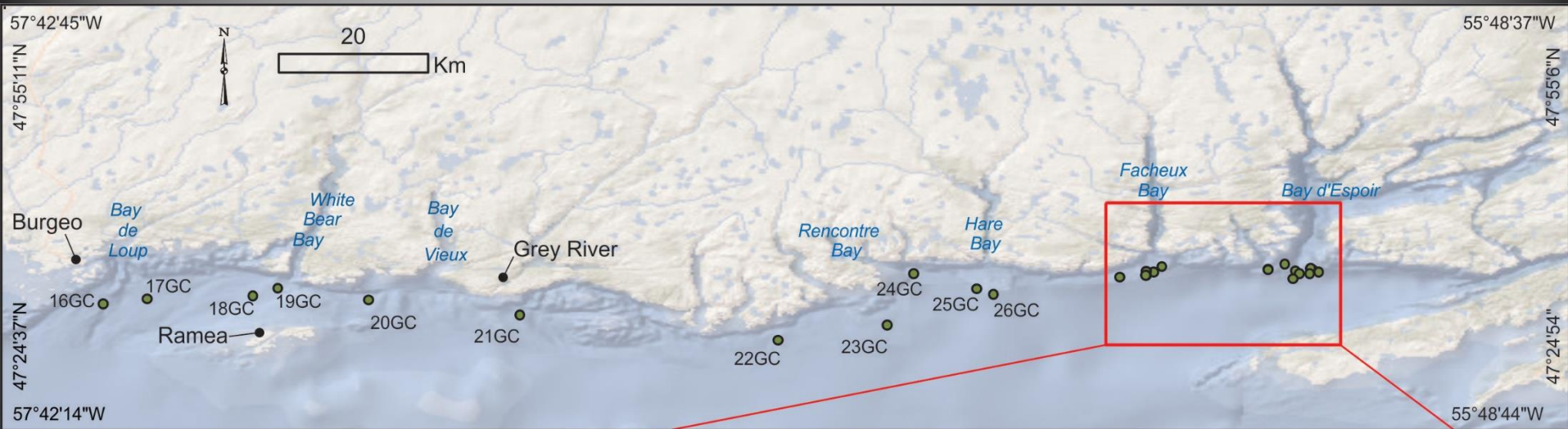


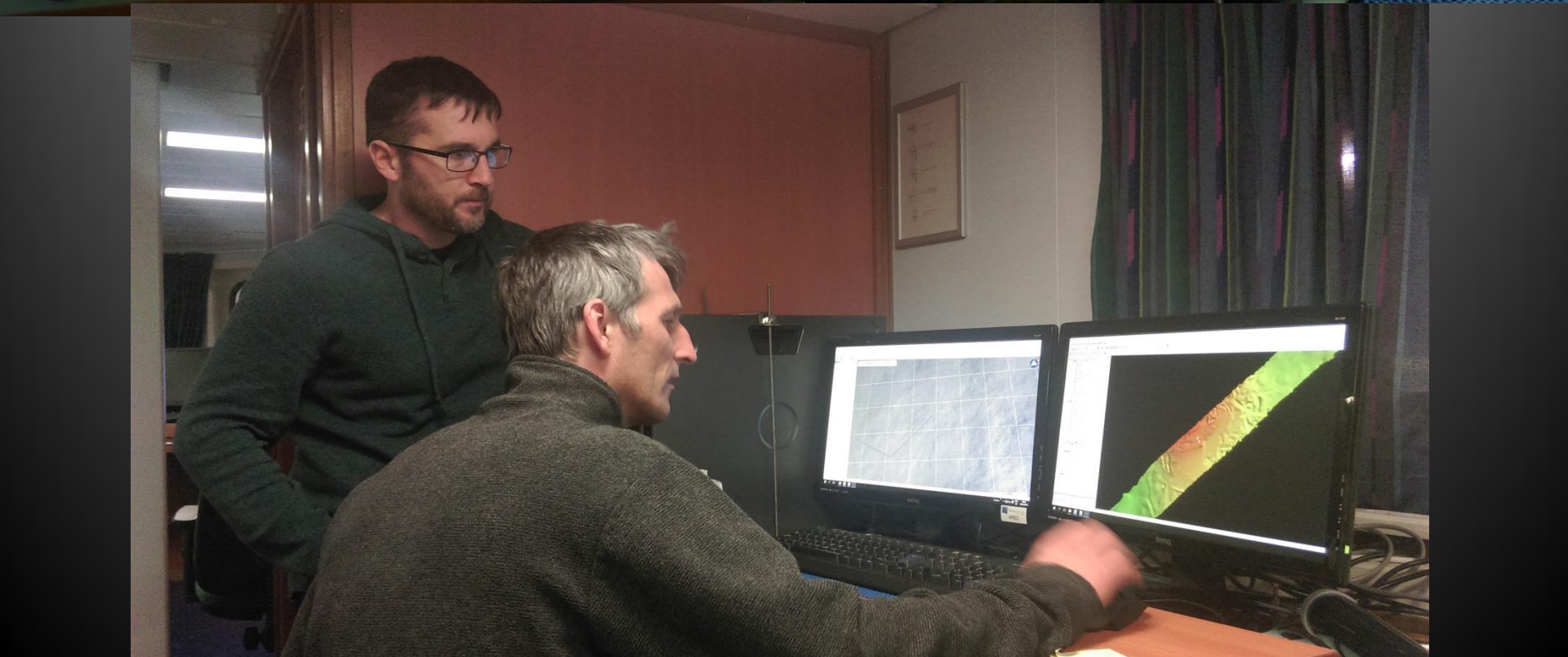
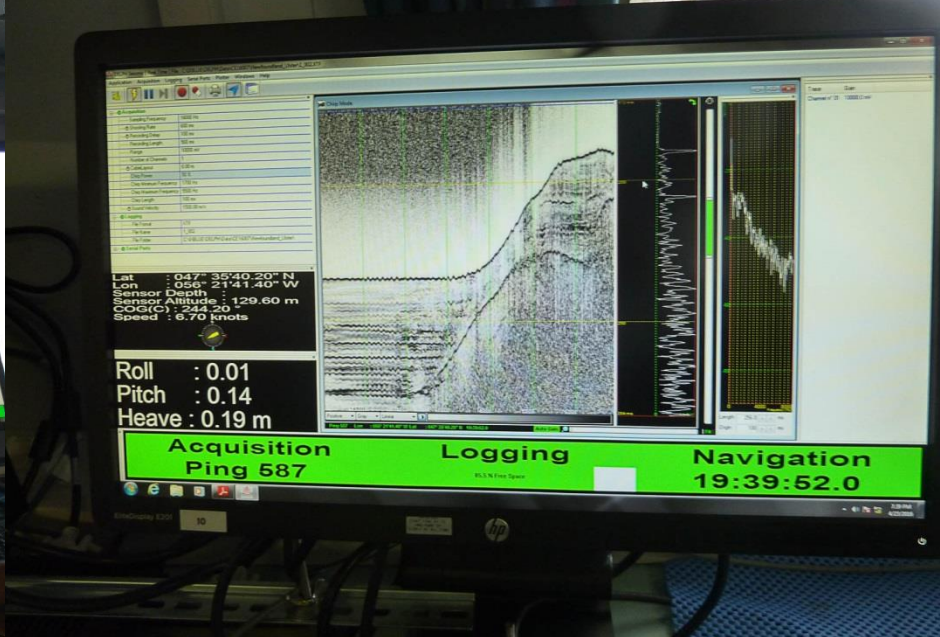




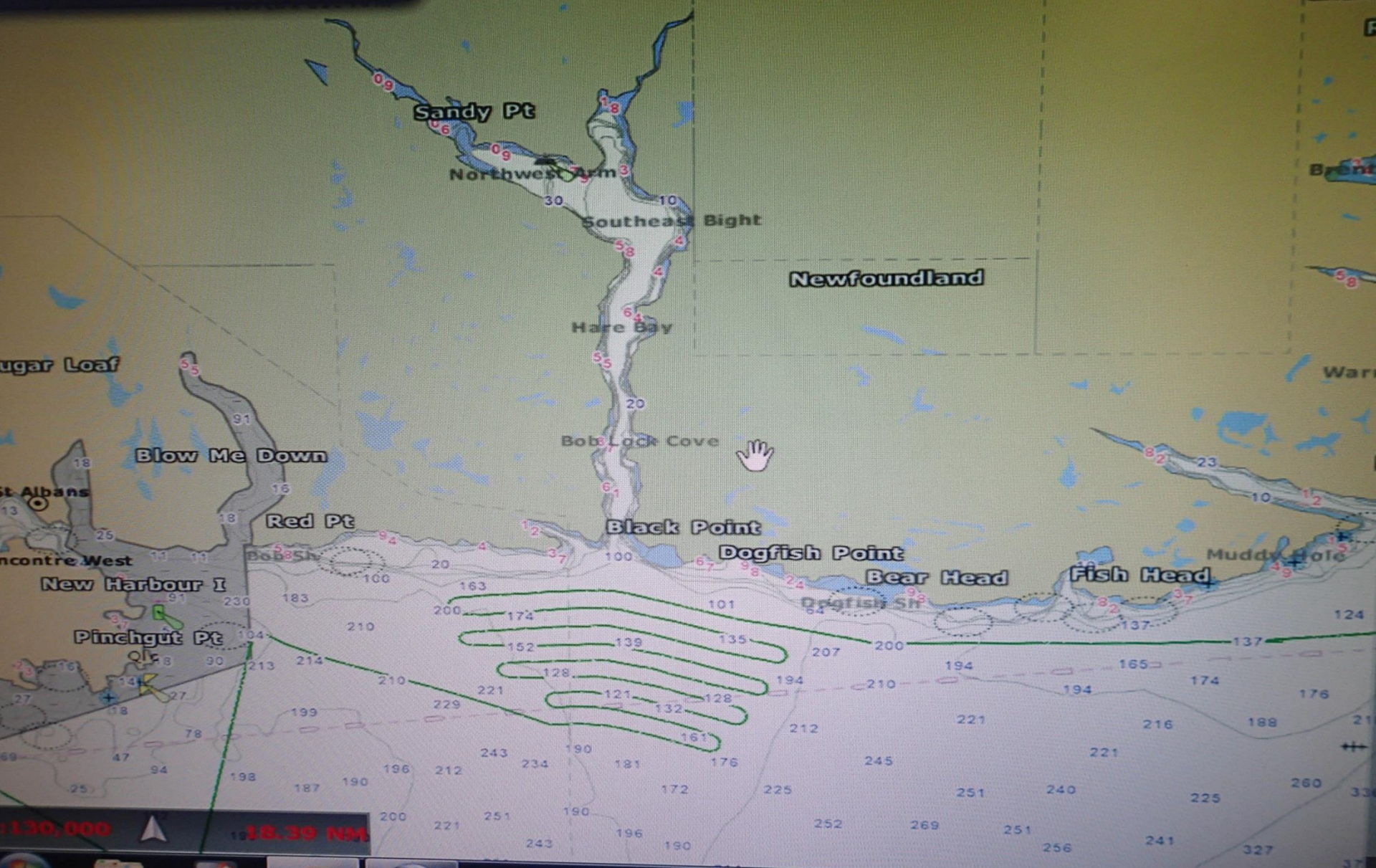


CORES					CORE DESCRIPTION																	
CRUISE NUMBER CE16010	STATION NUMBER MS-GC.	DAY OF YEAR 23/04/16	VESSEL NAME CELTIC EXPLORER	CHIEF SCIENTIST PAUL DUNNEP.	Section # Top/Bottom (type T or B)	DESCRIPTION FAIRLY BAY GROUP																
UTC time Arrival Time 18 42	On station	LATITUDE 47.356838	LONGITUDE 56.215795																			
Departure Time	Core on deck	47.3568	56.21.59																			
Wire out (m)	Winch tension (kN)	Water Depth (m) 142	Depth Method: WHITE SCREEN.																			
TRIGGER CORE	Apparent Penetration (cm)	Total Length (cm)	Cutter																			
			Catcher / Cutter sample present? <input checked="" type="checkbox"/> Enter Y or N																			
Description/Comments: THIN GREY-BROWN MUD COVERING CORE BARREL TO TOP.																						
CORE	Piston	Gravity	Vibro:	Gravity 1 m, Gravity 2 m, Geo-corer 3000+6000, Geo-piston, ...																		
Number of sections 3	Total Length (m) 2.51	Catcher / Cutter present?	<input checked="" type="checkbox"/> Enter Y or N																			
<table border="0"> <tr> <td></td> <td></td> <td></td> <td>0</td> <td>5l</td> <td>5lcm</td> <td>15lcm</td> <td>25lcm</td> </tr> <tr> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td></td> <td></td> <td></td> </tr> </table>										0	5l	5lcm	15lcm	25lcm				1				
			0	5l	5lcm	15lcm	25lcm															
			1																			
Bagged? <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> C <input type="checkbox"/> B <input type="checkbox"/> A <input type="checkbox"/>																						
Comments: V. COMPACT. → HOMOGENEOUS.																						
PERFORMANCE				Is there damage to any of the items below?																		
Corer Length (circle) 1/2/3 6/12 m	Apparent Penetration (m) 3/3m			Cutter Barrel Catcher																		
				Is there Damage to the liner? what type?																		
				Cracked Imploded Shattered																		
					(A) B	COMPACTED GREY MUD AS IN CC.																
					(B) B	✓ COMPACT GREY MUD & SOME GRIT + PEBBLES																
					(C) B	0.5cm RECOVERED SIMILAR MATERIAL																
						3mm-10mm - CM SIZE CLASTS IN LARGELY UNIFORM CLAY+SILT MATRIX - CLASTS ARE TRIANGULAR																



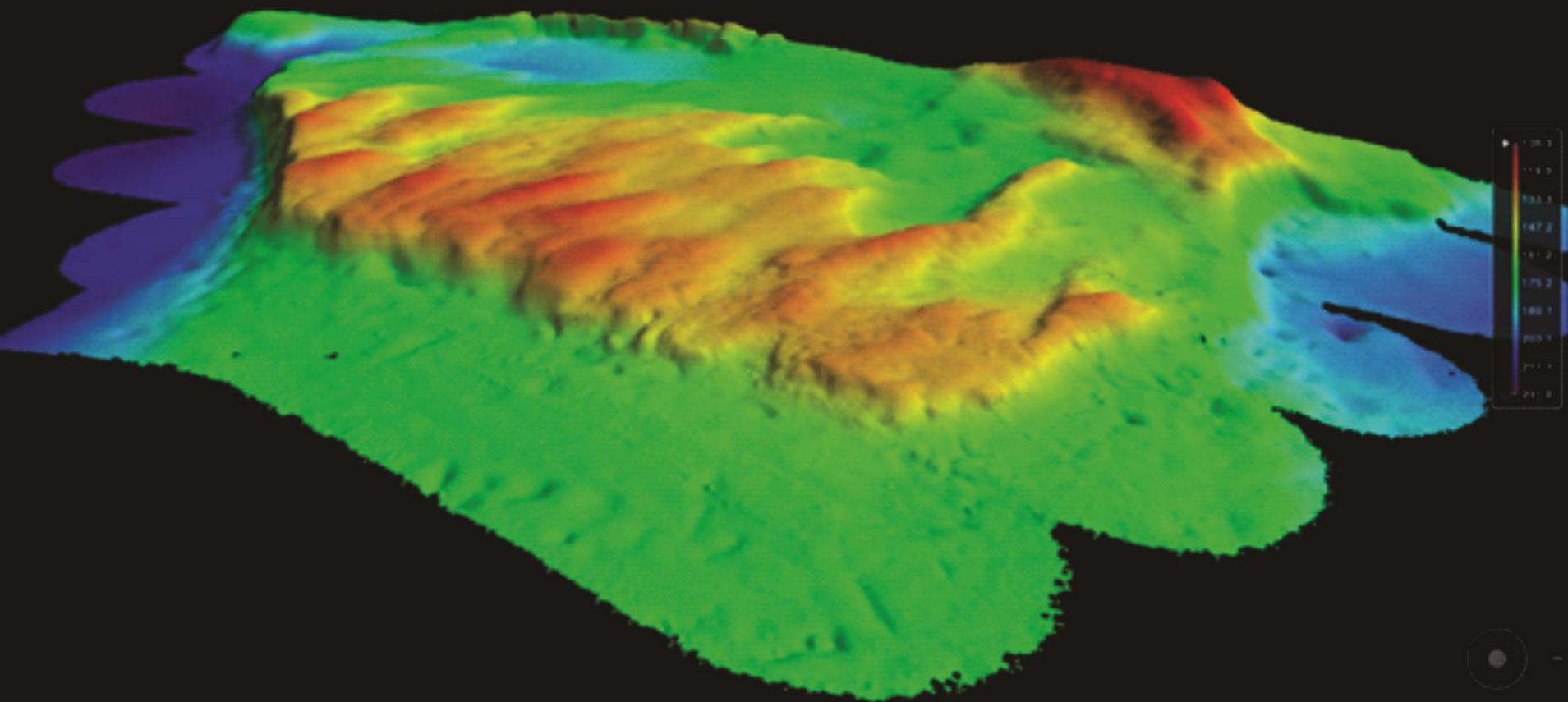
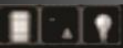


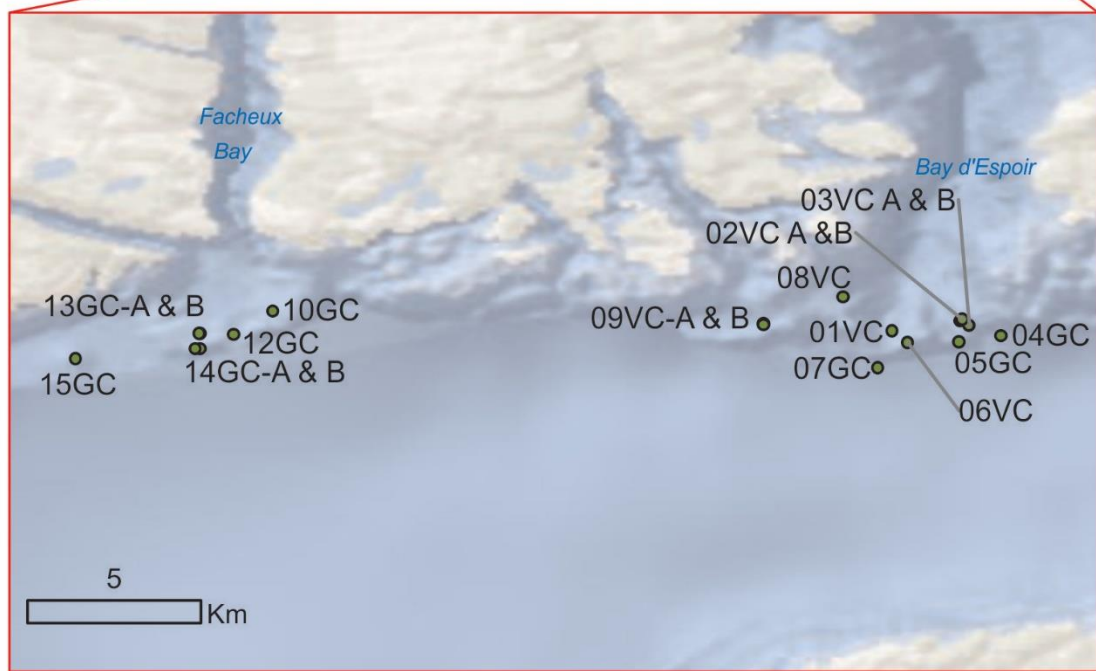
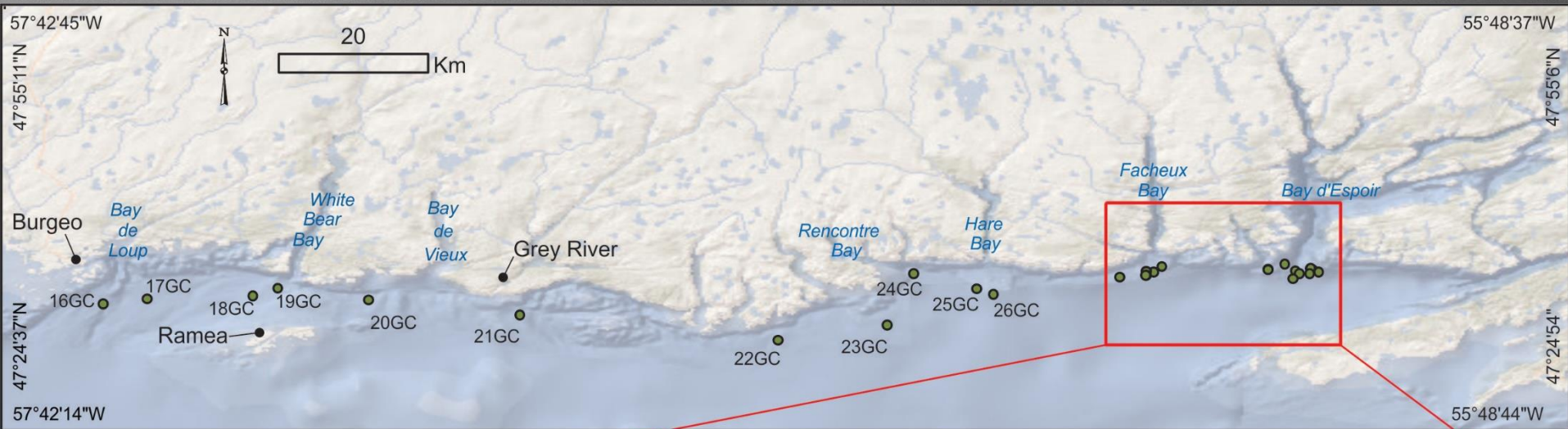




1:30,000 18.39 NM







Conclusions

- 37 m of sediment cores
- Over 100 nautical miles of multibeam seabed bathymetry, backscatter and seismic data
- Until cores are split and glacial diamicton identified, we won't know if there is enough to complete geochemical analysis

Future Work

- X-radiographs, physical properties, shear strength, grain size, micropalaentological and AMS radiocarbon dating
- Undergraduate/graduate dissertations
- Will contribute to:
 - Atlantic seabed mapping initiative
 - Timing and pattern of retreat of the Newfoundland Ice Cap

Acknowledgements

- Irish National Research Vessels 2016 Ship-time Programme
- RV Celtic Explorer's Crew
- Scientific Crew:
 - Serena Tarlati, Denise McCullagh, Oisín McManus, Heather Campbell, and Robert Deering

