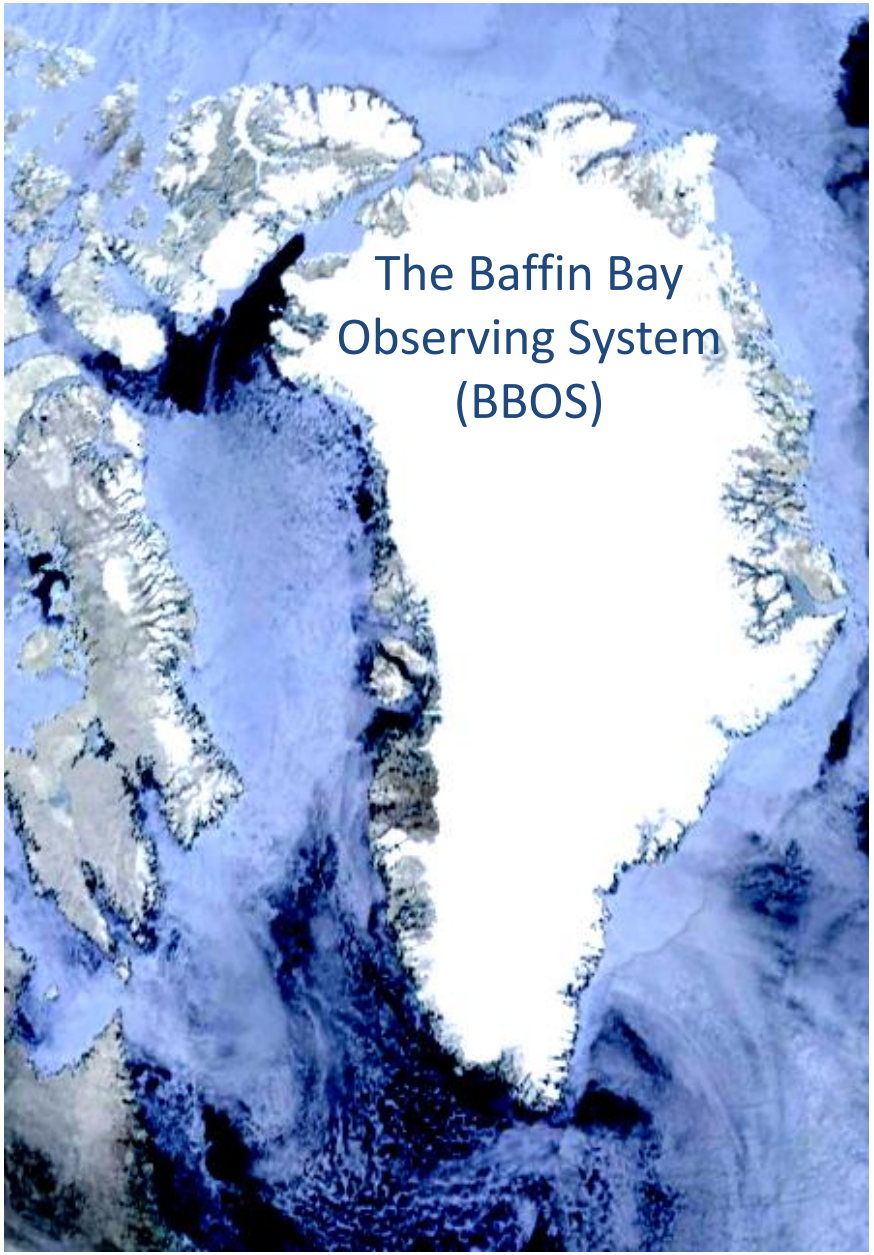
The Baffin Bay Observing System (BBOS)

- An innovative marine observing network led by a Canadian Academic network in collaboration with Inuit, EU and USA partners.

- Designed to examine consequences and impacts of climate change on the freshwater-marine system in Baffin Bay



MODIS, May 29, 2015 merged with Google Earth


FeU_0


CEg_9955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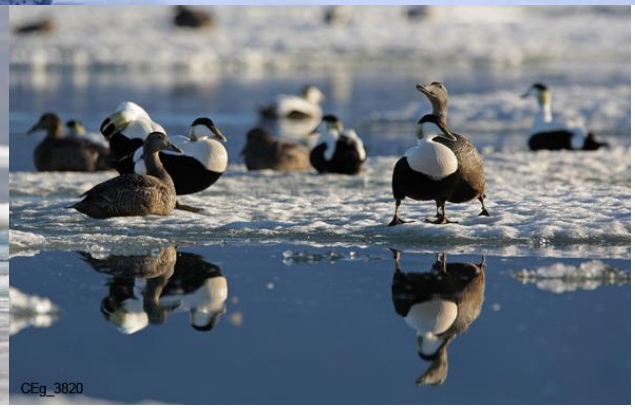
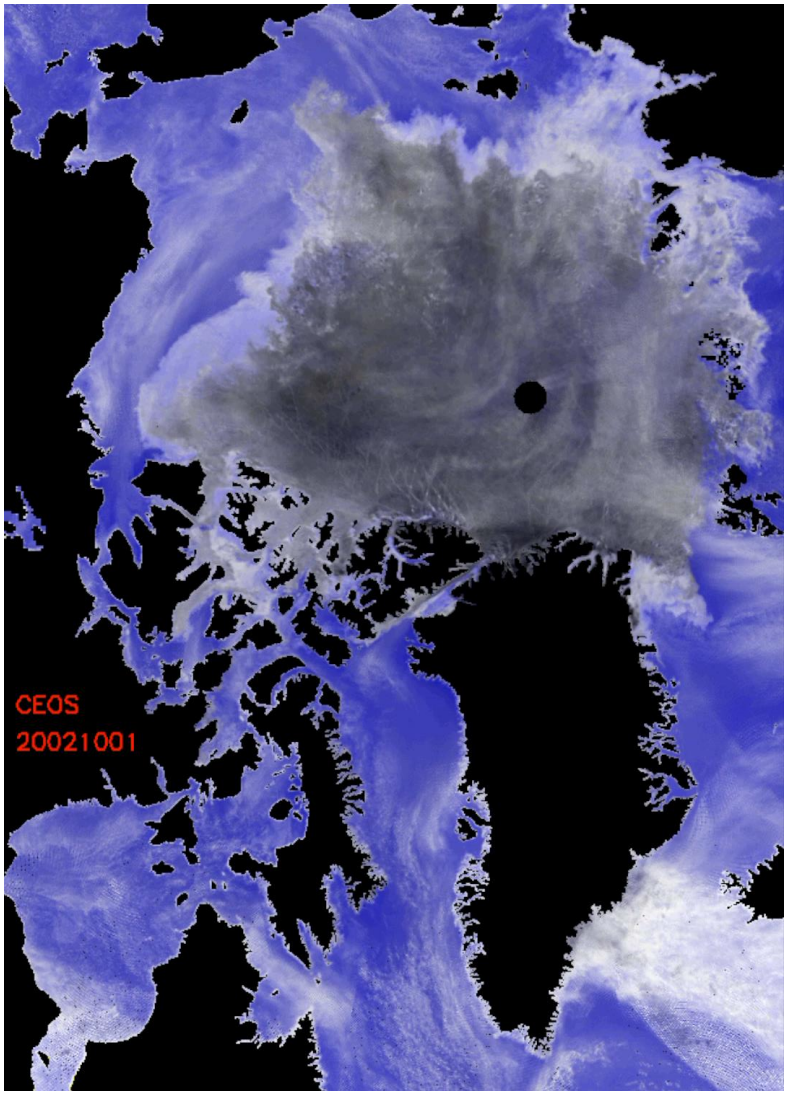
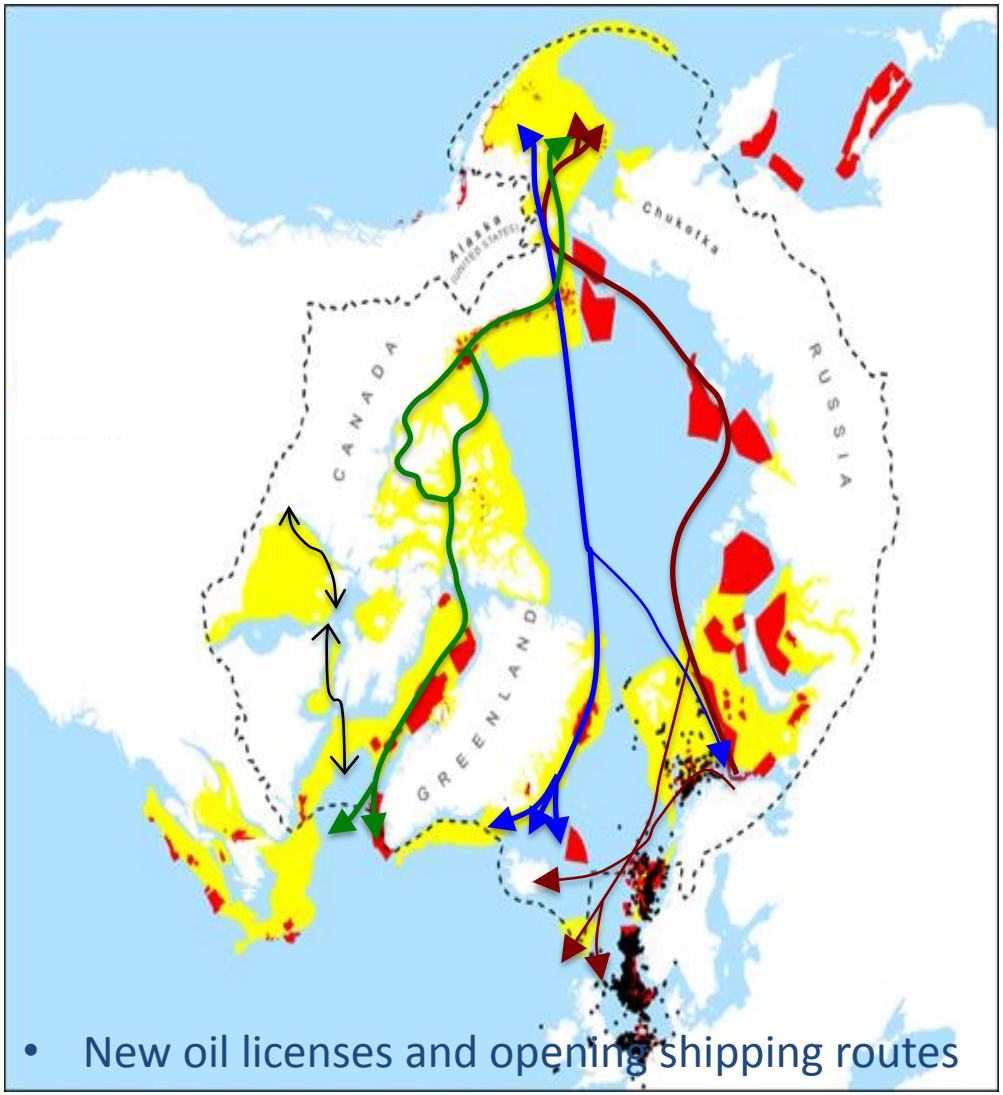

CEg_3820

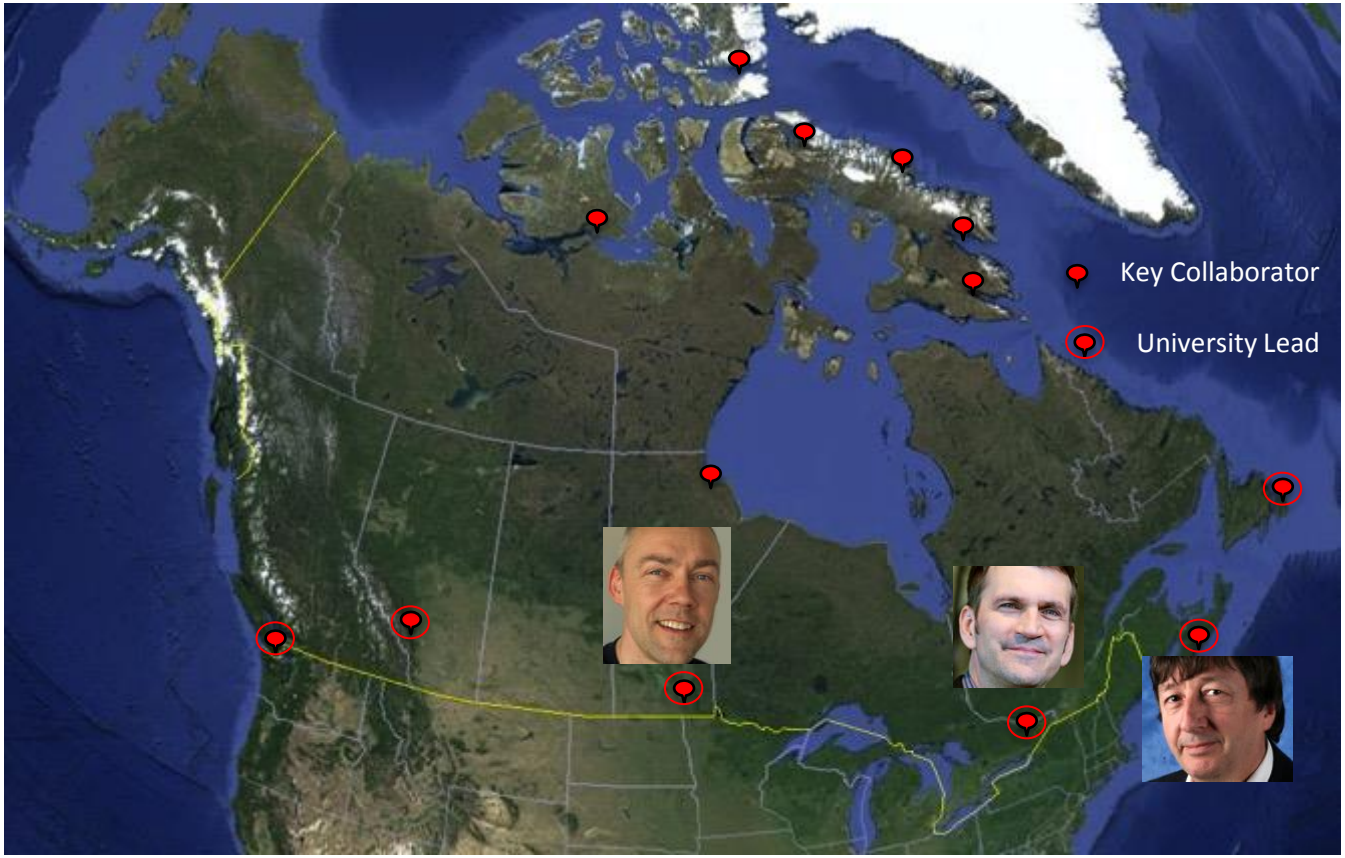
Opportunities and vulnerabilities





- New oil licenses and opening shipping routes

Looking forward – CERC new initiatives



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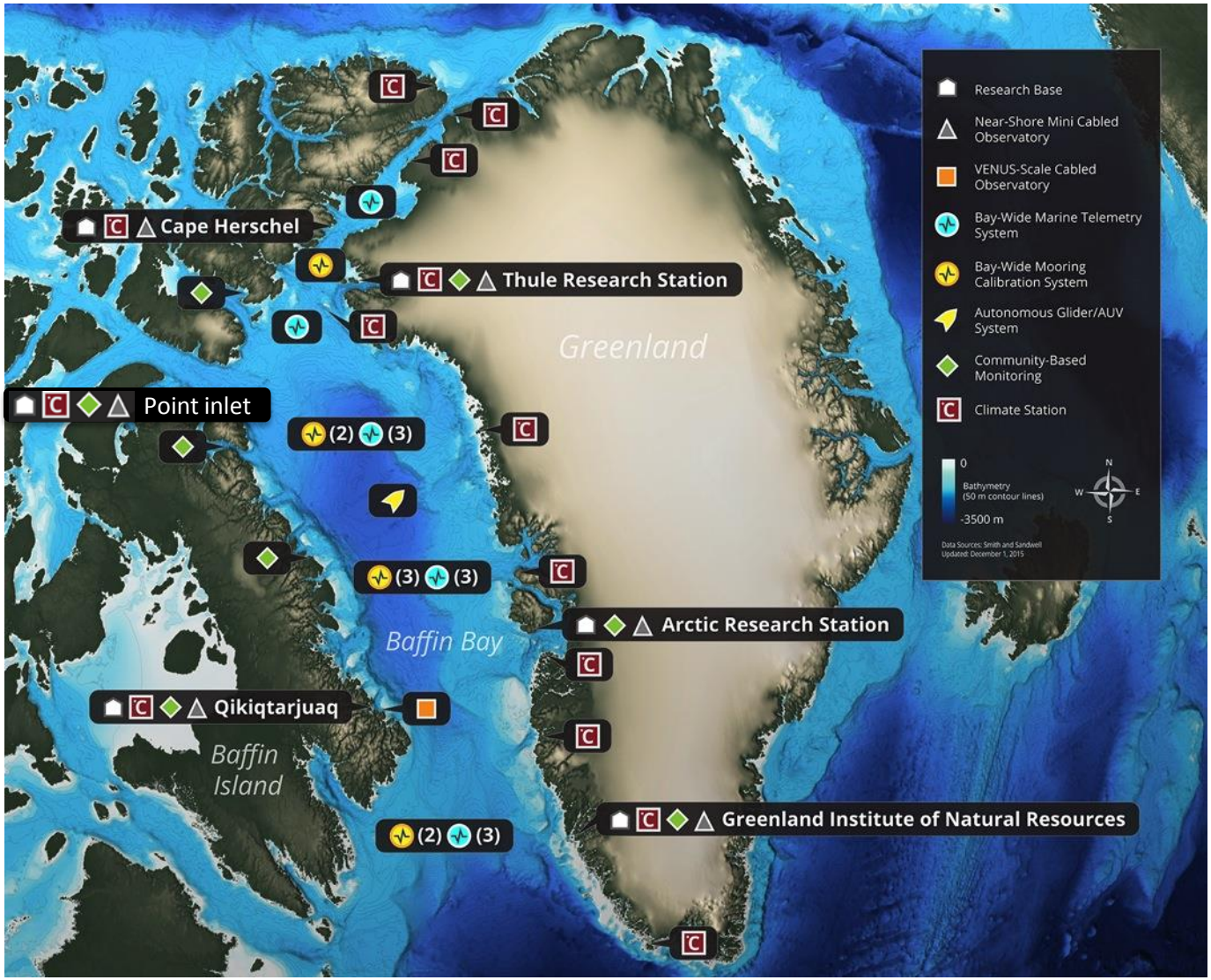
UNIVERSITÉ LAVAL

DALHOUSIE UNIVERSITY

MEMORIAL UNIVERSITY

Baffin Bay Observatory System (BBOS)



QIK OBSERVATORY

- 35km cable to 500m depth
- Three nodes 100m, 500m, 550m
- Vertical profiler and benthic instrument suite
- Assume power and network connection from Qik Base

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COMMUNITY OBSERVATORIES

- Kangiqtugaapik - Clyde River
- Mittimatalik - Pond Inlet
- Aujuittuq - Grise Fiord
- Cape Herschel Base
- Pituffik - Thule Research Station
- Qeqertarsuaq - Arctic Research Station
- Nuuk - Greenland Institute

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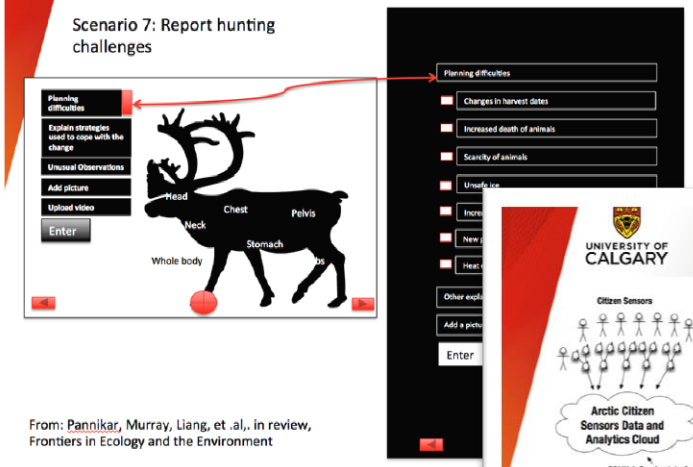
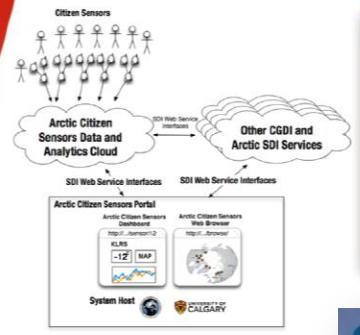
Example of Local NWT Monitoring Priorities Embedded in Arctic BioMap

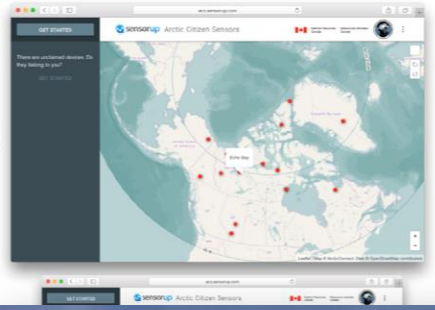
Scenario 7: Report hunting challenges



From: Pannikar, Murray, Liang, et .al,. in review, Frontiers in Ecology and the Environment

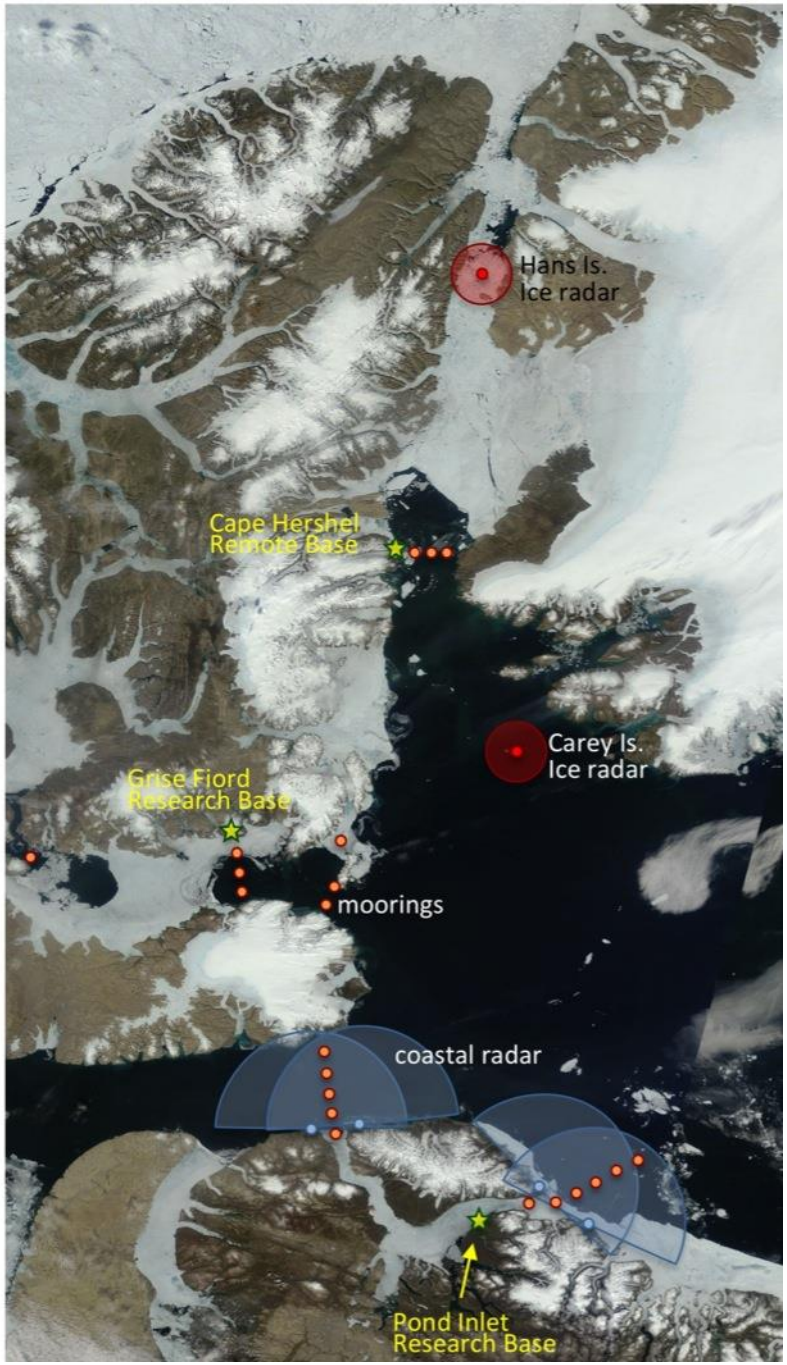
Other Technologies for CBM





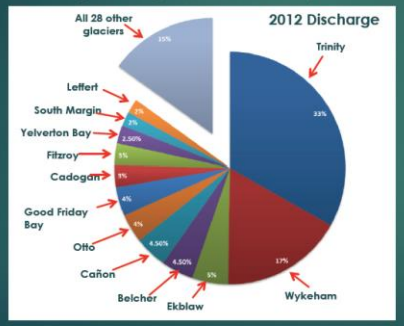
For example:
Dust
Light
Air Temp
Air Pressure

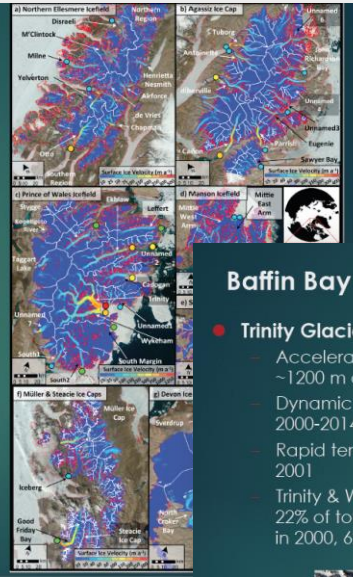
Some early planning concepts



University of Ottawa: glacier velocities

- Velocity of all QEI & Baffin glaciers mapped annually 2000-2015
- Average QEI iceberg discharge 2.21 ± 0.68 Gt a^{-1}
  - ~7.0% of pan-Arctic total outside Greenland
- >80% QEI iceberg discharge enters Baffin Bay

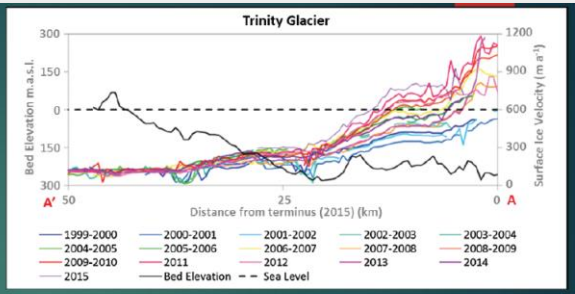


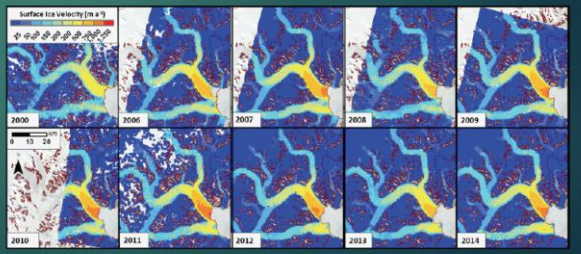


Van Wychen, W., Davis, J., Burgess, D.O., Copland, L., Gray, L., Sharp, M. and Mortimer, C. 2016. Characterizing interannual variability of glacier dynamics and dynamic discharge (1999-2015) for the ice masses of Ellesmere and Axel Heiberg Islands, Nunavut, Canada. *Journal of Geophysical Research – Earth Surface*, 121

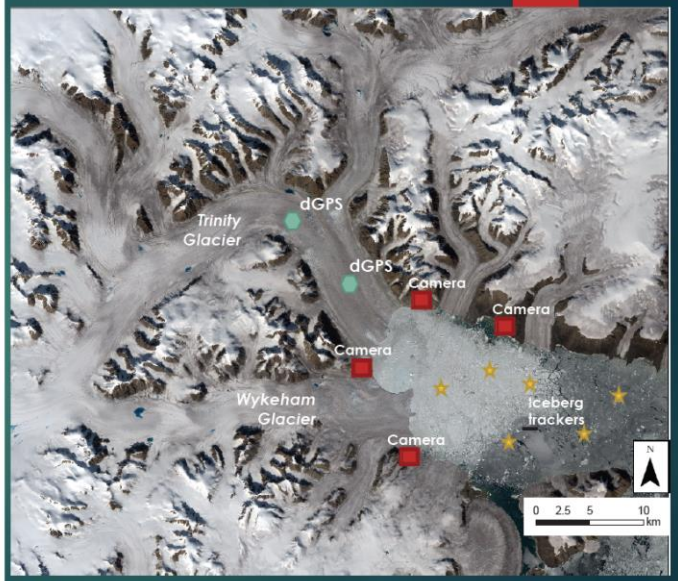
Baffin Bay Glacier Monitoring

- **Trinity Glacier**
  - Acceleration from ~500 m a^{-1} in 2000 to ~1200 m a^{-1} in 2015
  - Dynamic thinning: ~3.5 m a^{-1} from 2000-2014, only approx. half due to melt
  - Rapid terminus retreat, particularly since 2001
  - Trinity & Wykeham glaciers accounted for 22% of total Canadian iceberg discharge in 2000, 62% in 2015





- **Field plans 2016 (from Amundsen):**
  - Install two dGPS systems on Trinity Glacier (1 Iridium connected for real-time data)
    - Also cameras & RH/temp sensors on each station
    - Automated snow depth sounders
  - ~4 timelapse cameras at terminus to monitor iceberg calving
  - ~6-10 iceberg/ice island trackers: both in Trinity Fiord & Baffin Bay
  - Bathymetry survey of fiord
- **Future field plans (BBOS?)**
  - Install Iridium-connected dGPS stations and cameras on all major tidewater glaciers
  - Regular iceberg tracking (collaboration with Canadian Ice Service: improve operational detection of icebergs in SAR imagery)
- **Remote sensing**
  - Continued acquisition of Radarsat-2 fine wide fine imagery for glacier velocities
  - Analysis of >5000 ScanSAR scenes for all QEI glaciers to understand controls on iceberg calving processes

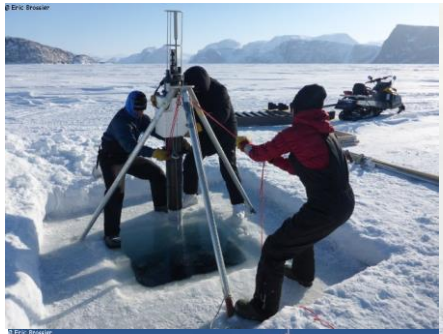


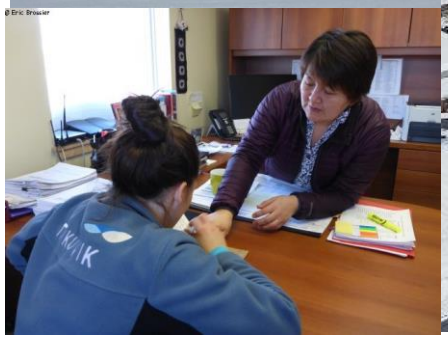
Landsat 8, July 29, 2015

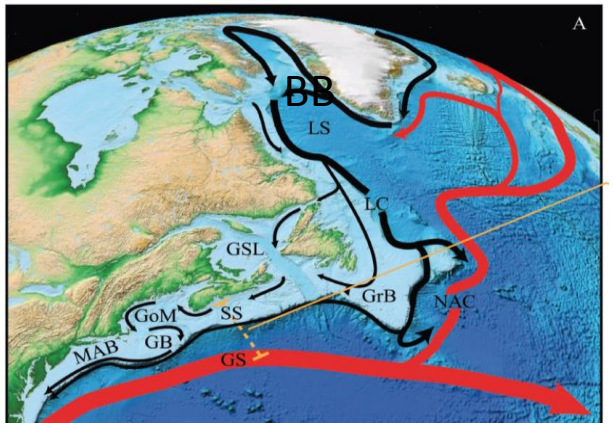
Research station in Qikiqtarjuaq

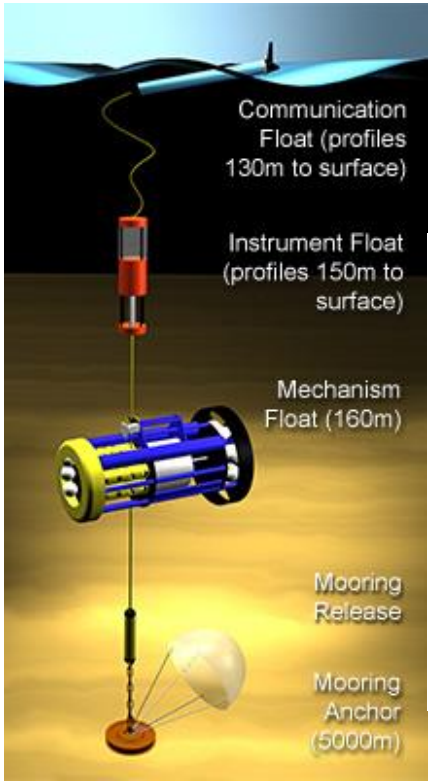
- Under development with the community; NRI in the loop
- Lot of lab space
- Lodging (25 p.)
- Space shared with community
- Technical training of the community

- Easy access to deep and coastal ocean, glaciers, ice cap, …

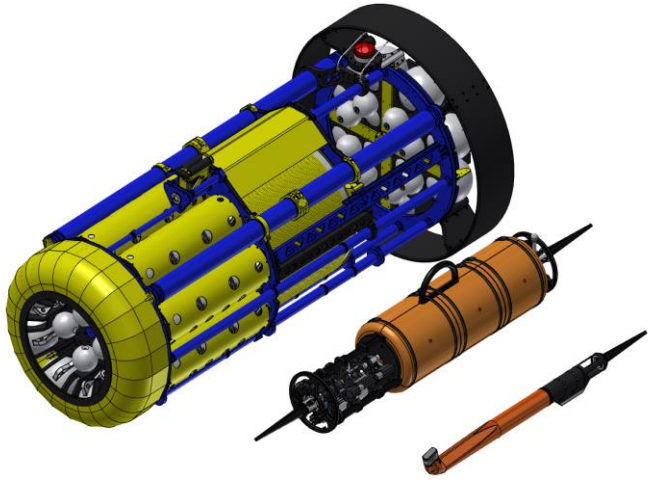


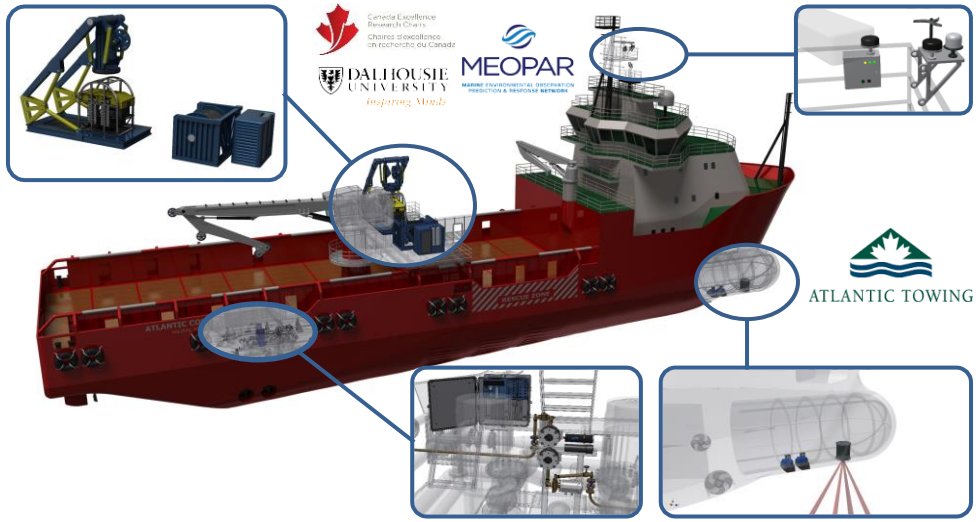






DALHOUSIE UNIVERSITY
Inspiring Minds



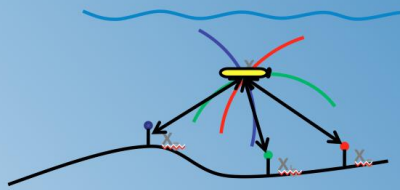


Memorial objectives

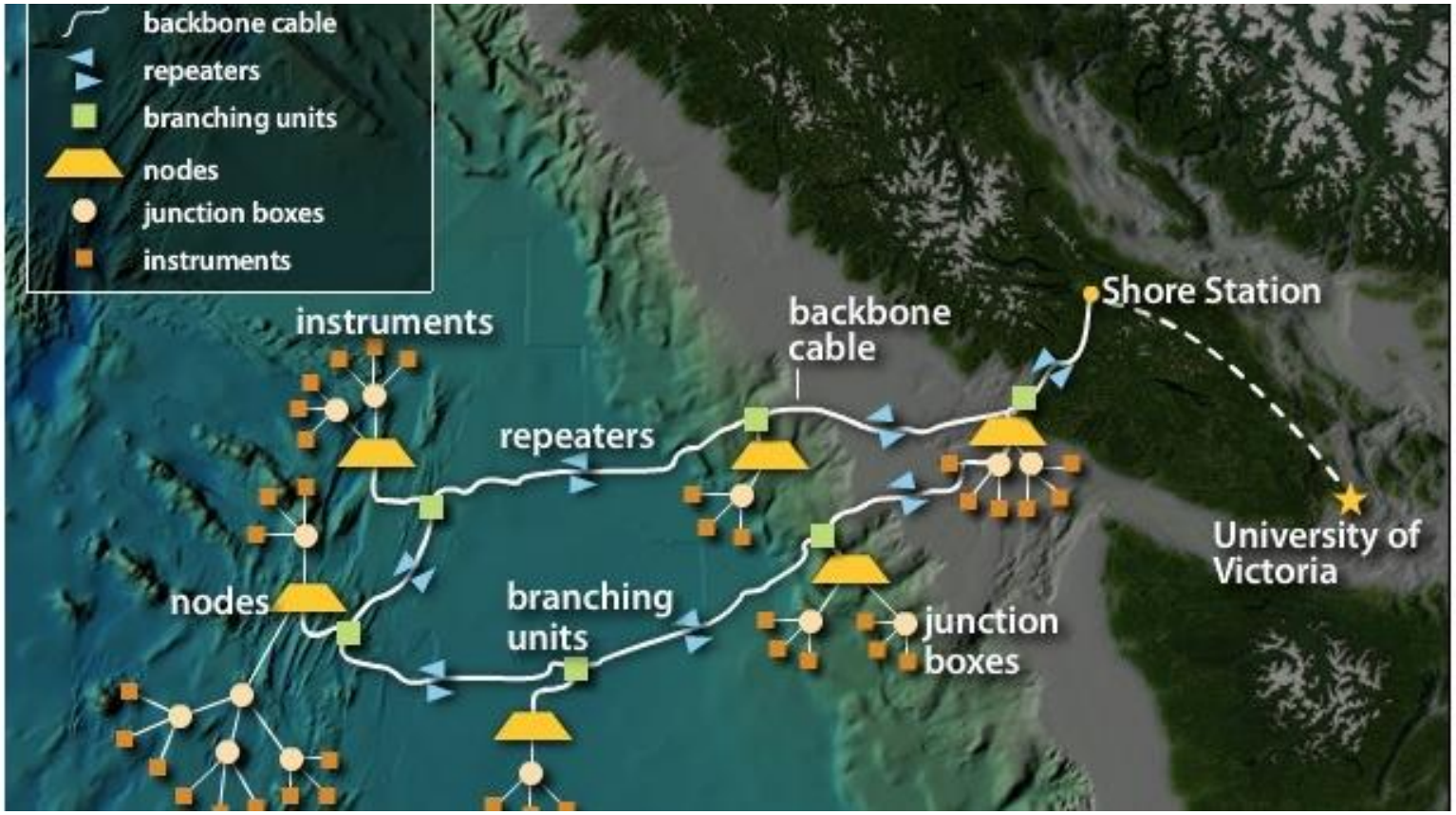
- *Developing autonomous capability for persistent ocean and ice sampling*
- *Applying ocean gliders in ice-infested regions*
- *Develop new autonomous craft for making both surface measurements and underwater profiles*

Memorial objectives

- *Develop techniques for under-ice navigation*
- *Developing and applying new sensors for ice and iceberg studies*
- *Integrating new ocean observations with ocean models*

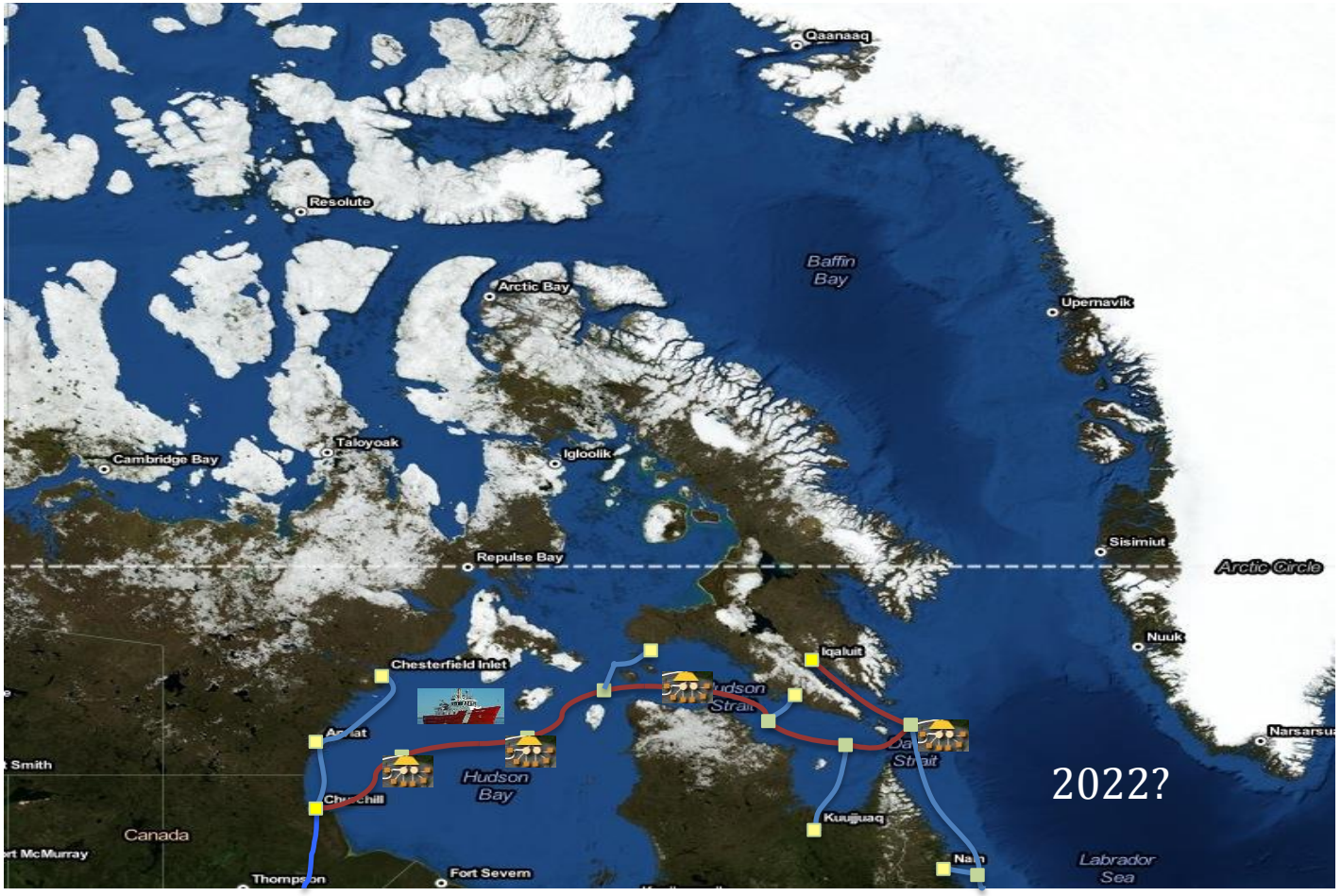


Underwater Cabled Observatory reality



Ocean Networks Canada's **NEPTUNE Observatory,** established in 2006

Phase 2: Combined additional communications + persistent observing functionality



Incremental connectivity growth, and Hudson Bay Observatory

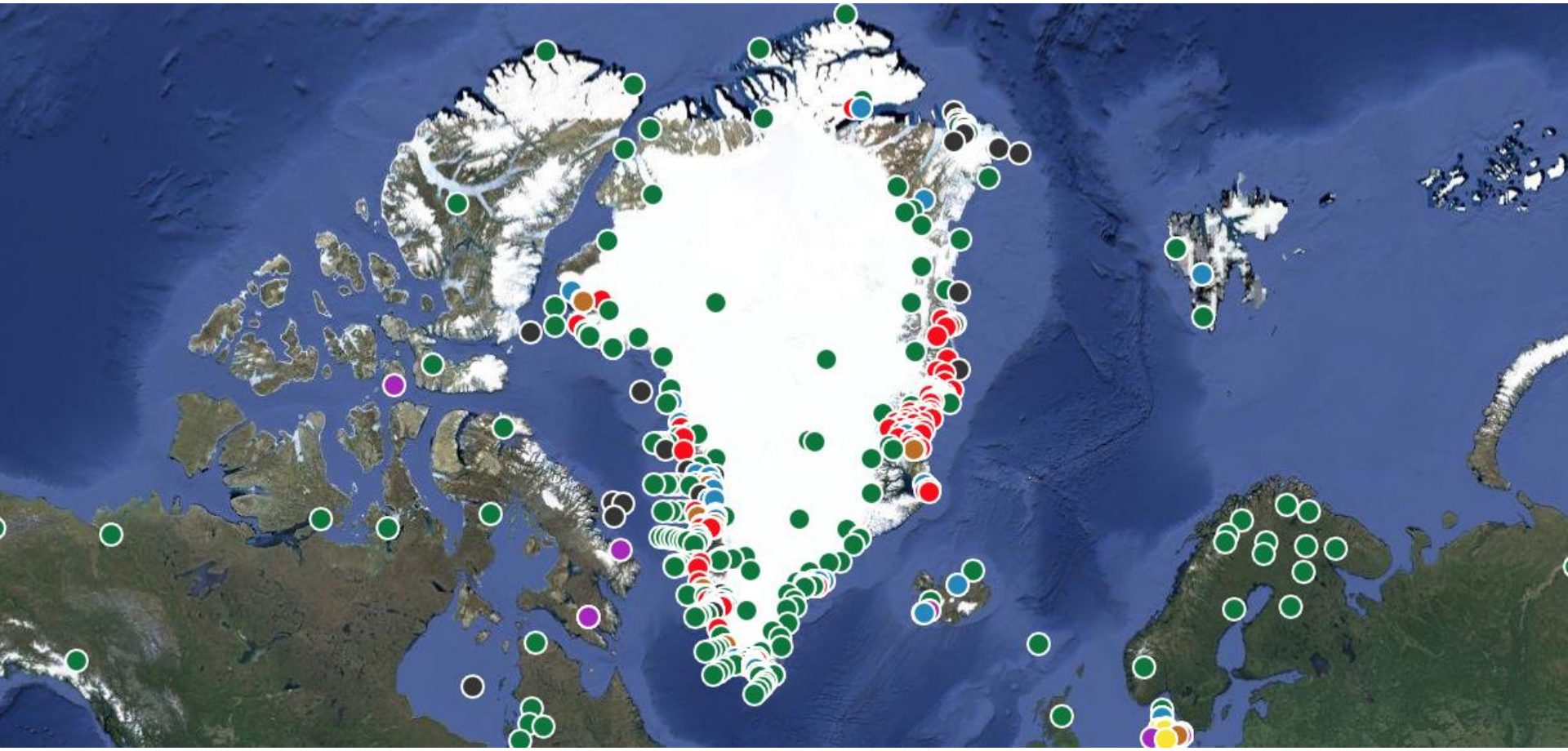
Phase 3: Combined additional communications + persistent observing functionality

Further connectivity growth, including Greenland; new Foxe Basin and Baffin Bay observatories,

Menu

ISAAFFIK

Map



Aerial photoplane available in Greenland - Asiaq, Greenland Survey	Mid July until end of August 2016	Mid W Greenland	Aerial photo plane	Idea
NW Greenland KNUD-CLASS	1/8 - 26/9 2016	NW Greenland	Naval ship	Open

Show more

http://www.isaaffik.org

EU-PolarNet

CONNECTING SCIENCE WITH SOCIETY

European research objectives in polar research

1. Polar climate systems
2. Cryosphere
3. Solid earth and its interactions
4. Paleoclimate and paleoenvironment
5. Astronomy, astrophysics and space
6. Human impacts
7. Polar ecosystems and biodiversity
8. Sustainable management of resources
9. People, societies and cultures
10. Human health and wellbeing
11. International relations and legal dimension
12. New technologies

Examples of benefits to Canada

- Technology – benefit companies and users
- Better data – communities, managers, users
- Improved knowledge – safer operations, better economies (transport, fisheries, industry)
- Employment – better opportunities
- Capacity building and Training – better opportunities
- International – sharing and coordinating leading to a more efficient return on observing investment
- Global – better understanding of climate change in the Arctic
- Situation awareness – security aspects