



Alternative Approaches to Hydrographic Data Collection in the Canadian Arctic

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Iqaluit, Nunavut Canada

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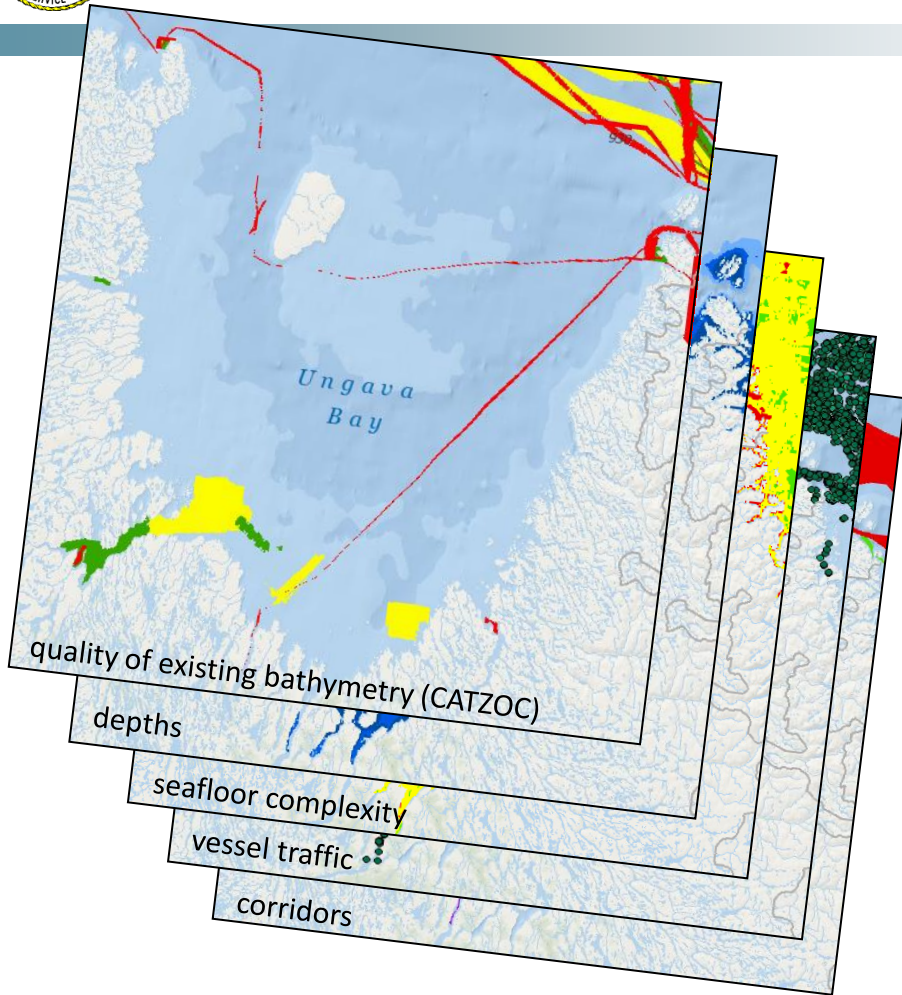
Challenges for CHS in the Canadian Arctic

- Canadian Arctic is BIG; 4.4 million Km² (³/₄ size of Europe)
- Limited annual window for 'wet' operations
- No dedicated vessels upon which to plan / rely
- Logistical constraints due to minimal infrastructure
- Effective response to emerging drivers
- The Arctic is an expensive place to work

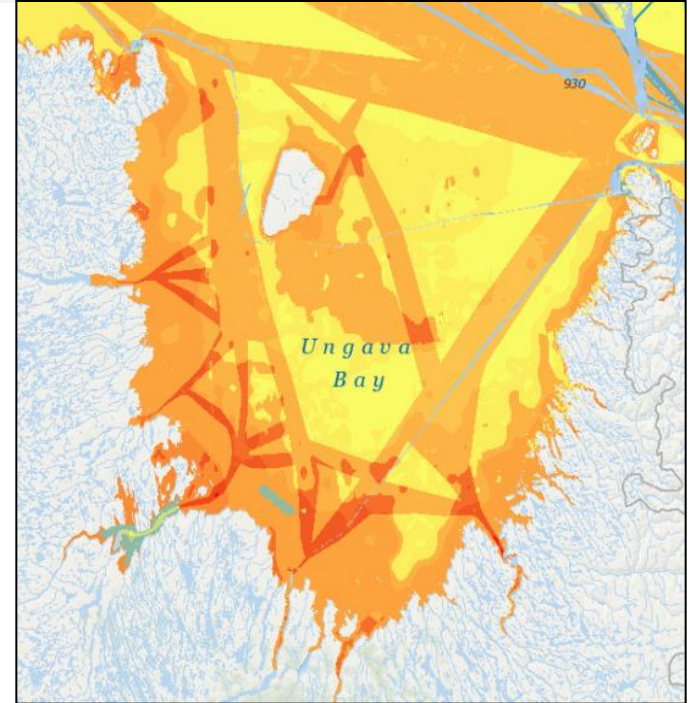




Establishment of Priorities for Hydrography



=



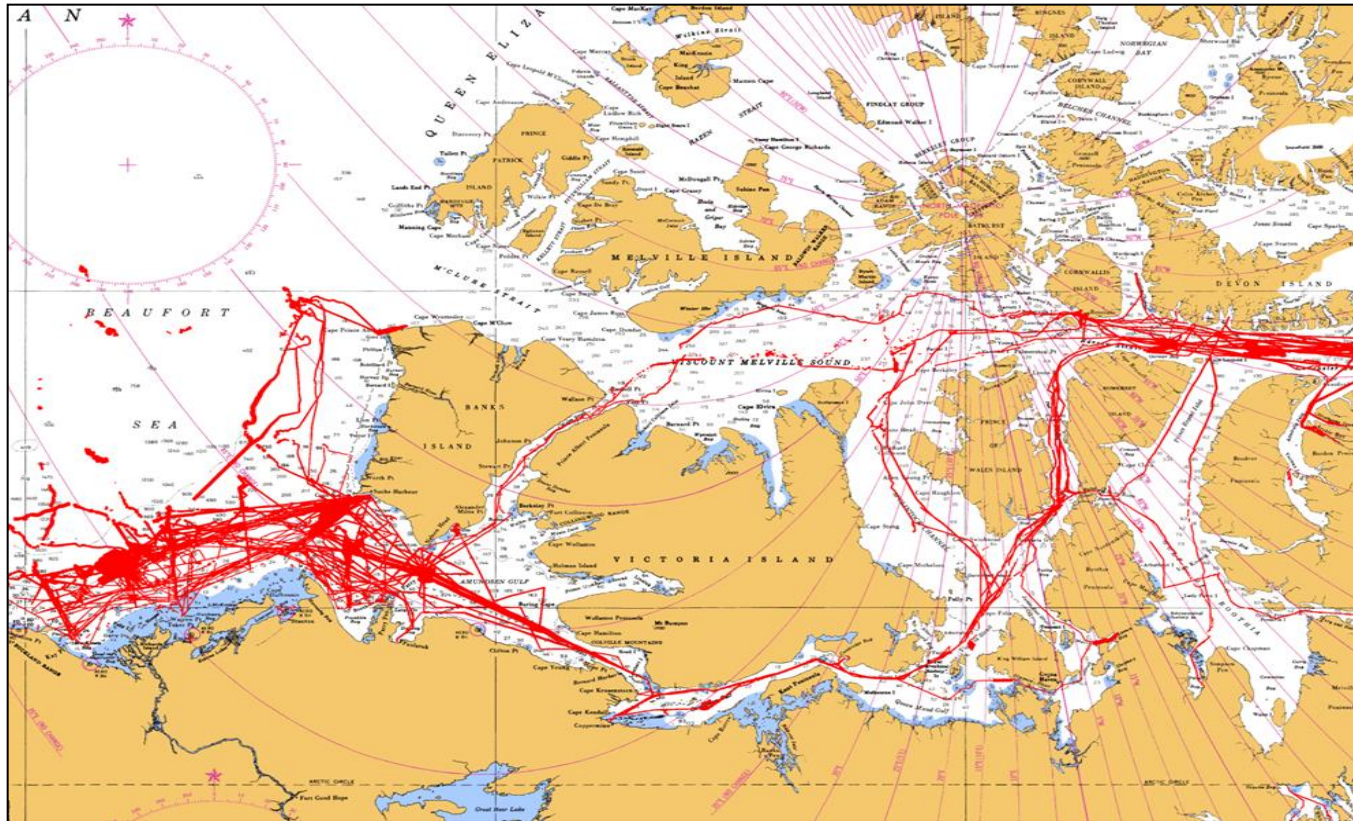
Darker within corridors = higher priority

... but *knowing* where to work and working where you should can be very different ...





Opportunistic Hydrography



- Canadian Coast Guard icebreaker *Amundsen* has collected MBES track-lines through the Canadian Arctic since 2003.
- Qualified multi-beam operators (CHS or academia).
- Data represents **64%** of the MBES coverage in the Canadian Arctic.
- ***Amundsen* data now reflected on 68 ENCs and 17 Paper Charts to date.**
- Plans underway to install MBES on 5 more Canadian icebreakers by 2020.





Opportunistic Hydrography via Partnerships and Collaboration



Royal Canadian Navy vessel
HMCS *Moncton*



Canadian Coast Guard icebreaker
CCGS *Sir Wilfrid Laurier* (no longer simply
logistical support)

Portable
multi-beam

Two yellow arrows originate from the text "Portable multi-beam". One arrow points towards the HMCS Moncton, and the other points towards the CCGS Sir Wilfrid Laurier.

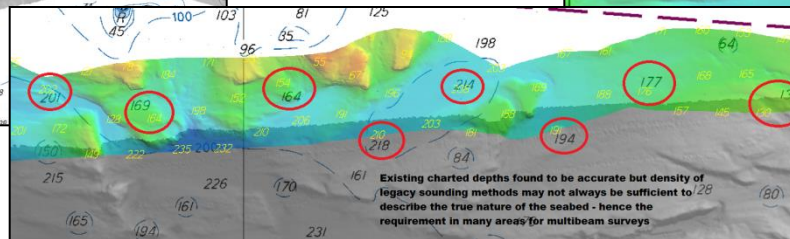
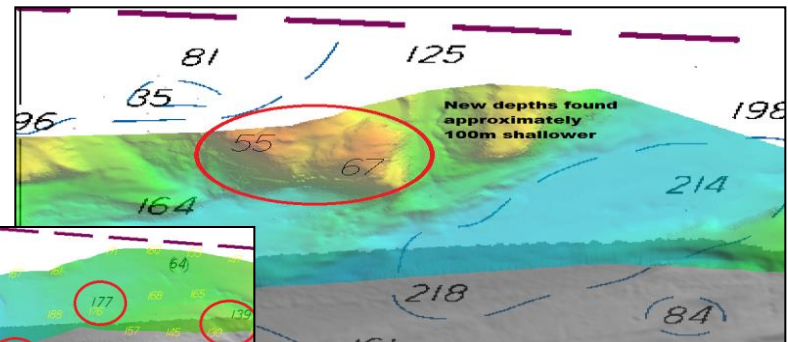
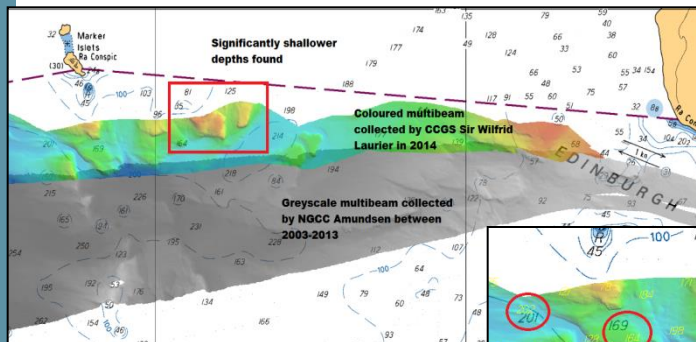
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Opportunistic Hydrography via Collaboration

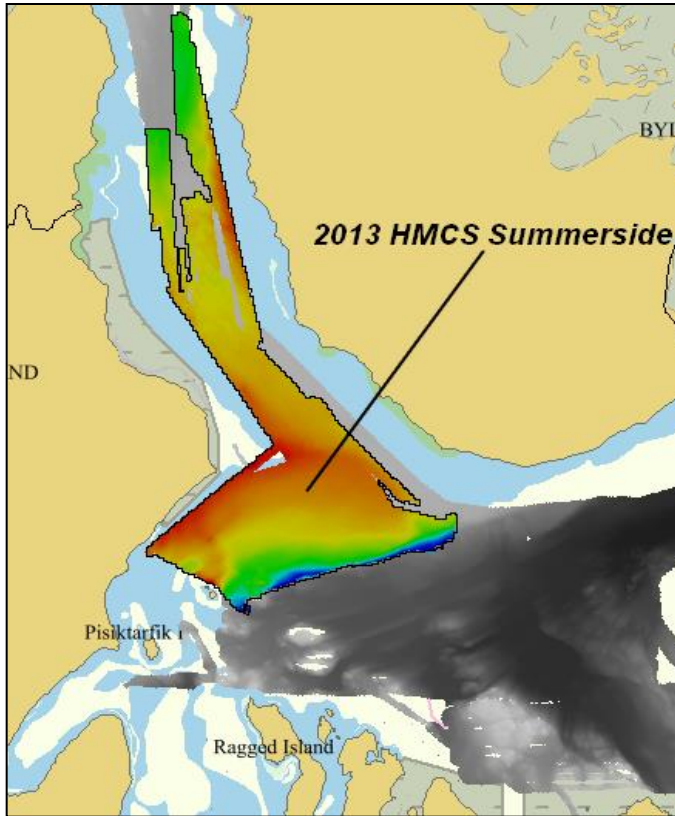
- In 2014 and 2015, MBES data was collected whenever possible from icebreaker CCGS *Sir Wilfrid Laurier* during Coast Guard's Aids Maintenance Program (through night, transiting and while Aids are being maintained).
- Pole retracted when in presence of ice.



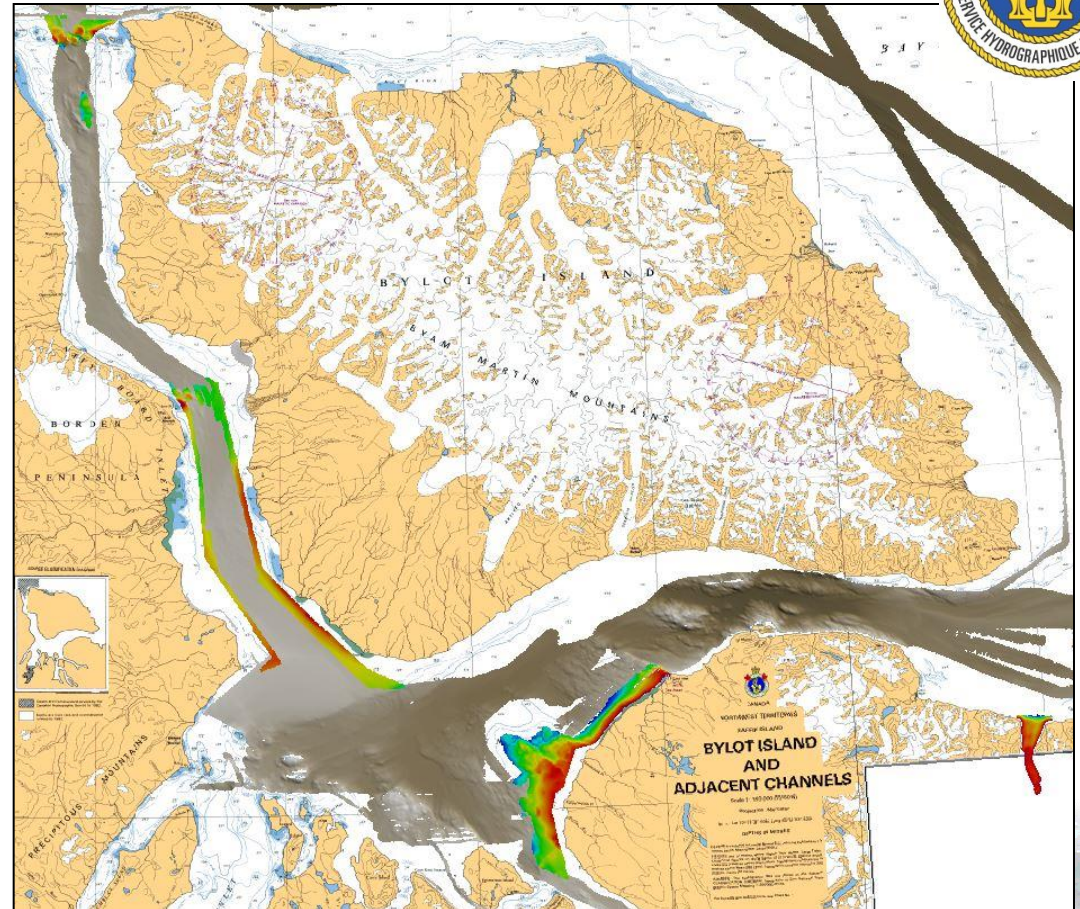


Opportunistic Hydrography via Partnerships

2013 – HMCS *Summerside*



2014 – HMCS *Kingston*





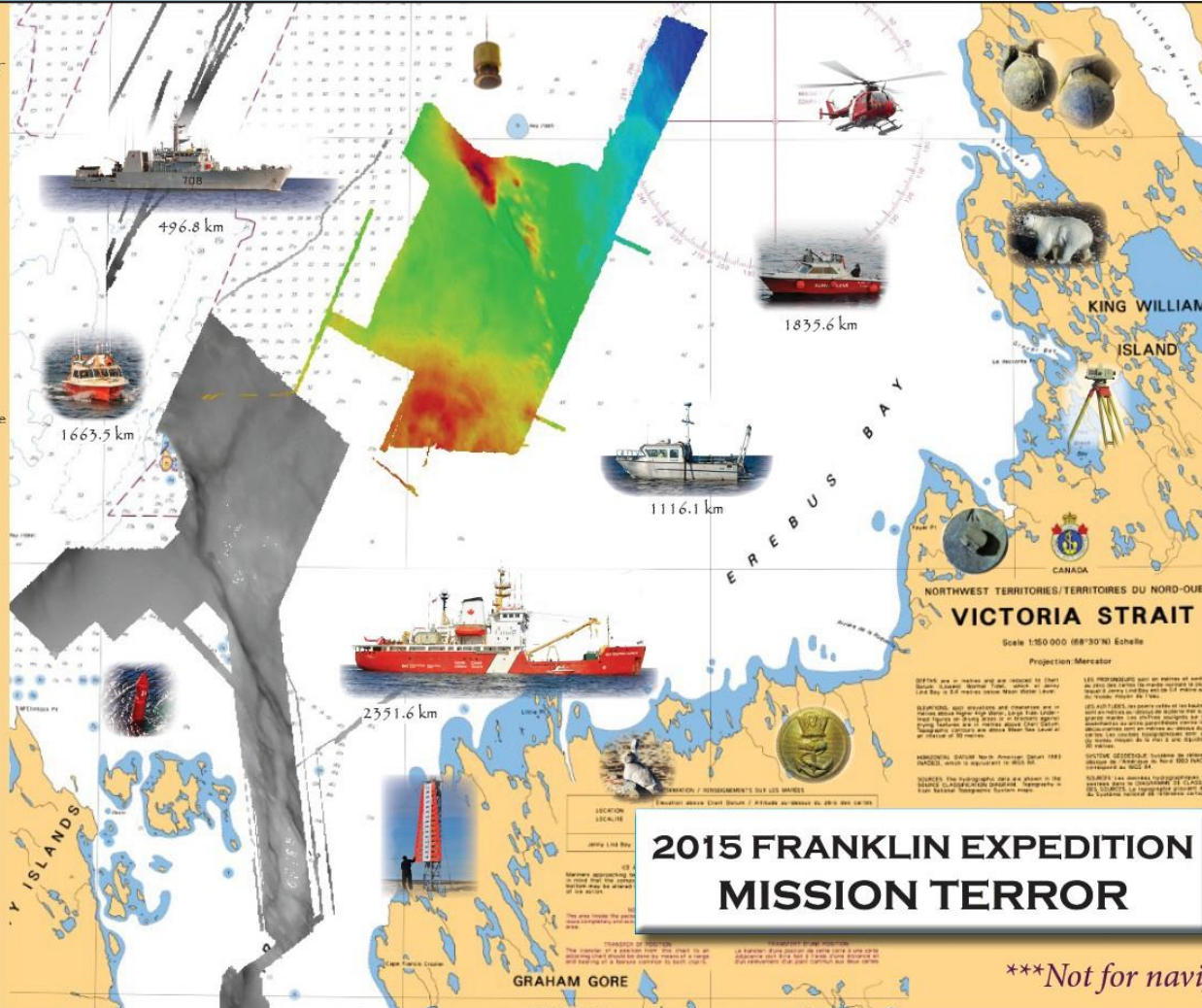
Leveraging Opportunities via Partnerships and Collaboration

CCGS
Sir Wilfrid Laurier

CANADIAN
COAST GUARD
Stuart Aldridge
James Garrett
Scott MacColl
Austin Zin
Piper Harris
Peter Lange
Joseph Dashin
Kristoffer Mantta
Jordan Barca
Skye McEwan
Spencer Weisgerber
Devin Ramos
Sophie Slakov-Crombie
Randolph Morford
Tavis Nordstrom
Nicholas Stubbington
Jordan Forrest
Brett Williams
David Florbas
James Houlihan
Dylan Tremere
Miles Taylor
Harold Steed
Nathaniel Vaandering
Herbert Lynch
Mathew Lindner
Edward Frisch
David Spinks
Melanie Gendreau
Xenia Wiens

FISHERIES &
OCEANS
Theresa Nichols
Heloise Ferron

HEALTH
CANADA
Katherine Murphy



CCGS
Sir Wilfrid Laurier

CANADIAN
HYDROGRAPHIC
SERVICE
Timothy Janzen
Arthur Wickens
Adam Zamperin
Christine Delbridge
Rudolfo Cutillo
Benoit Thibault
Michael Black

GOVERNMENT
OF NUUNAVUT
Douglas Stenton
Robert Park

PARKS CANADA
Ryan Harris
Francesco Manganiello
Christian Ludin
Michel Brissette
Thierry Boyer

TRANSPORT
CANADA
David Ferguson
Glen Wesanko

NATIONAL
DEFENCE
Ronnie Kinnie



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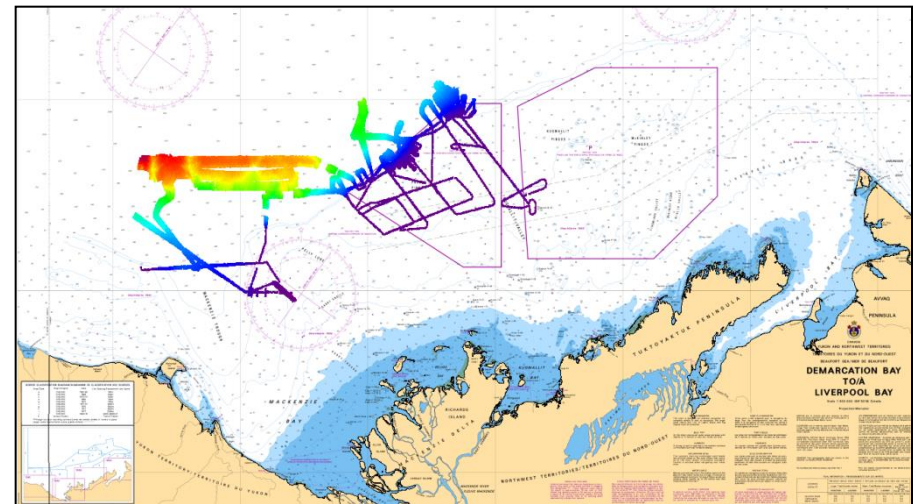
Opportunistic Hydrography via Regulatory Controls

- All foreign Marine Scientific Research Vessel Requests are now routed through the CHS as part of the approval process. If the platform intends to collect multi-beam data, CHS may request it along with specific meta-data deliverables.

Examples:



German icebreaker *RV Maria S. Merian*
2151 Km² surveyed in 2015
Depth range: 586 to 2000m



Korean icebreaker *RV Araon*
4484 Km² surveyed in 2013
Depth range: 30 to 1700m





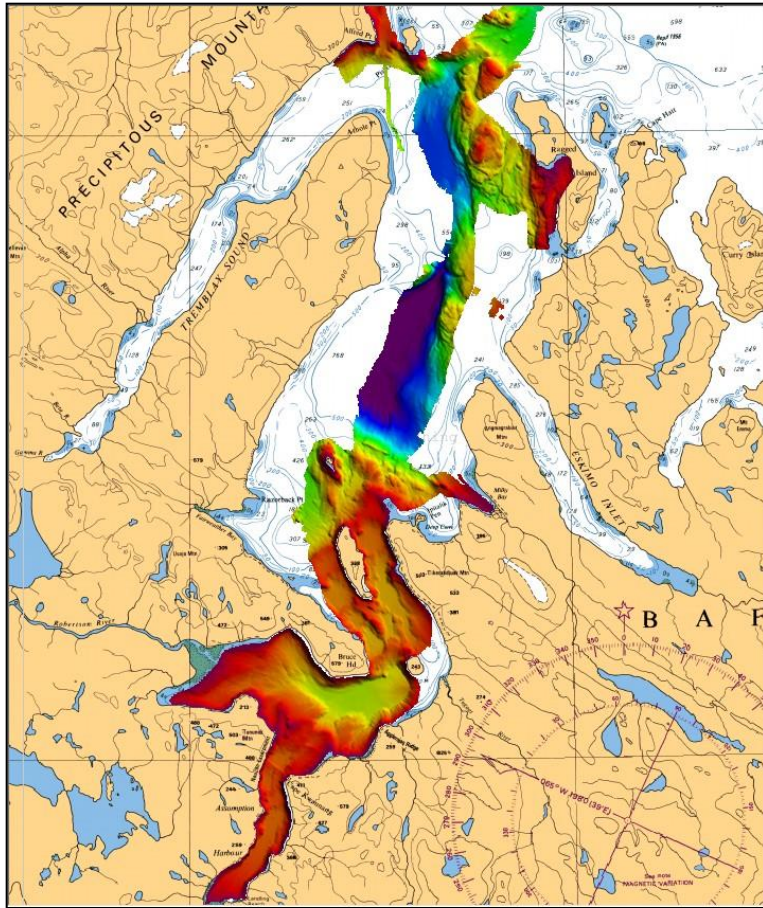
Opportunistic Hydrography via Regulatory Controls

- Presently no formal process in place for industry, however initiatives as per Phase 3 (right) present excellent opportunities for the CHS – and perhaps Greenland - to incrementally expand their bathymetric data holdings. (NOAA in receipt of Phase 1 data).

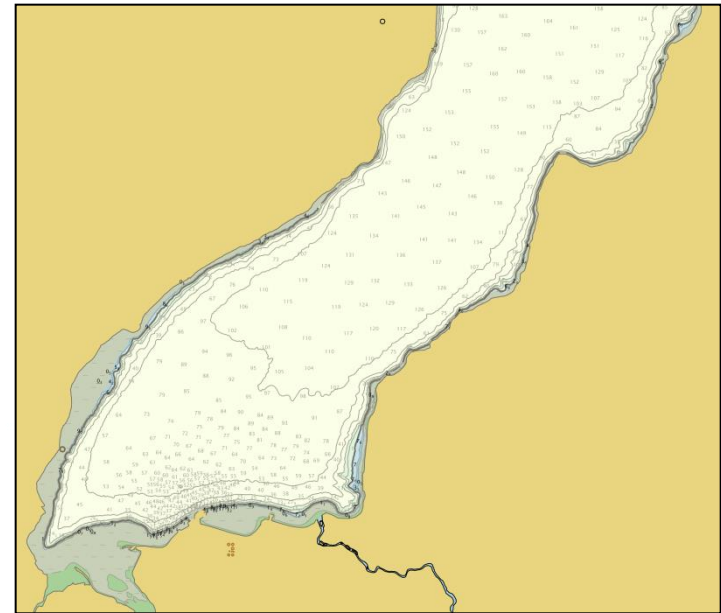




Hydrography via Collaborative Agreements with the Private Sector



2014 MBES Coverage in Milne Inlet



2014 Large-scale ENC made from 2014 data



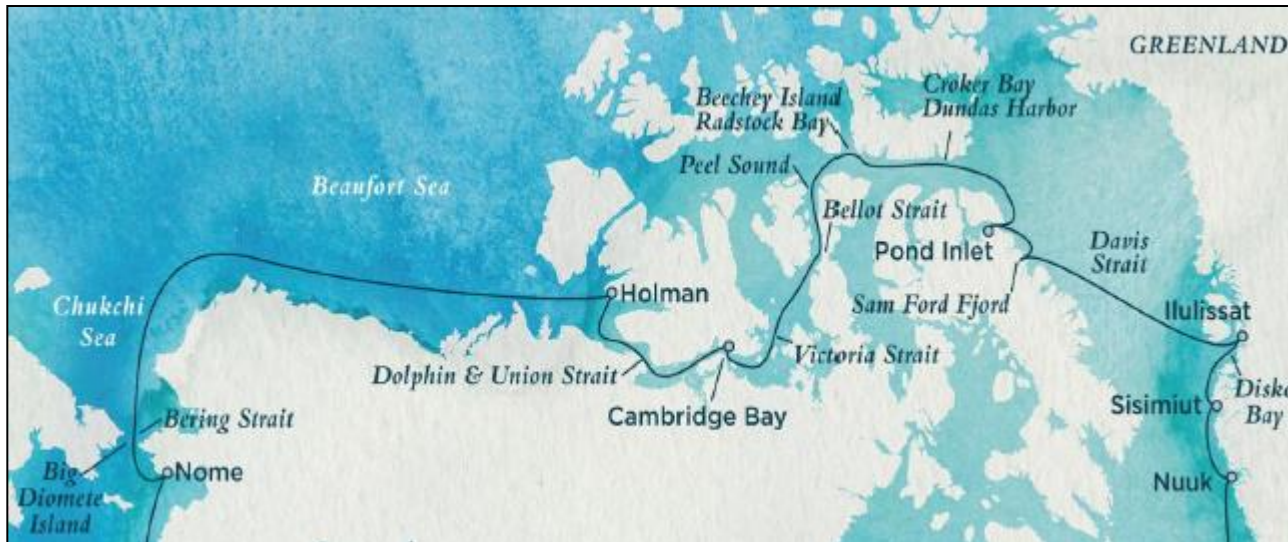
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New and Emerging Developments

- 5 more MBES on Coast Guard icebreakers by 2020
- Hydrographic Survey Supply Arrangement now in place
- Remote Sensing and Satellite-Derived Bathymetry
- Capacity building and Northern Communities involvement by engagement
- Crowd Sourced Bathymetry



Cruise Liner *Crystal Serenity*

2016 transit of Cruise Liner *Crystal Serenity* and her icebreaker escort MV *Shackleton*



Questions?



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13 of 13 Oct. 6, 2016

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