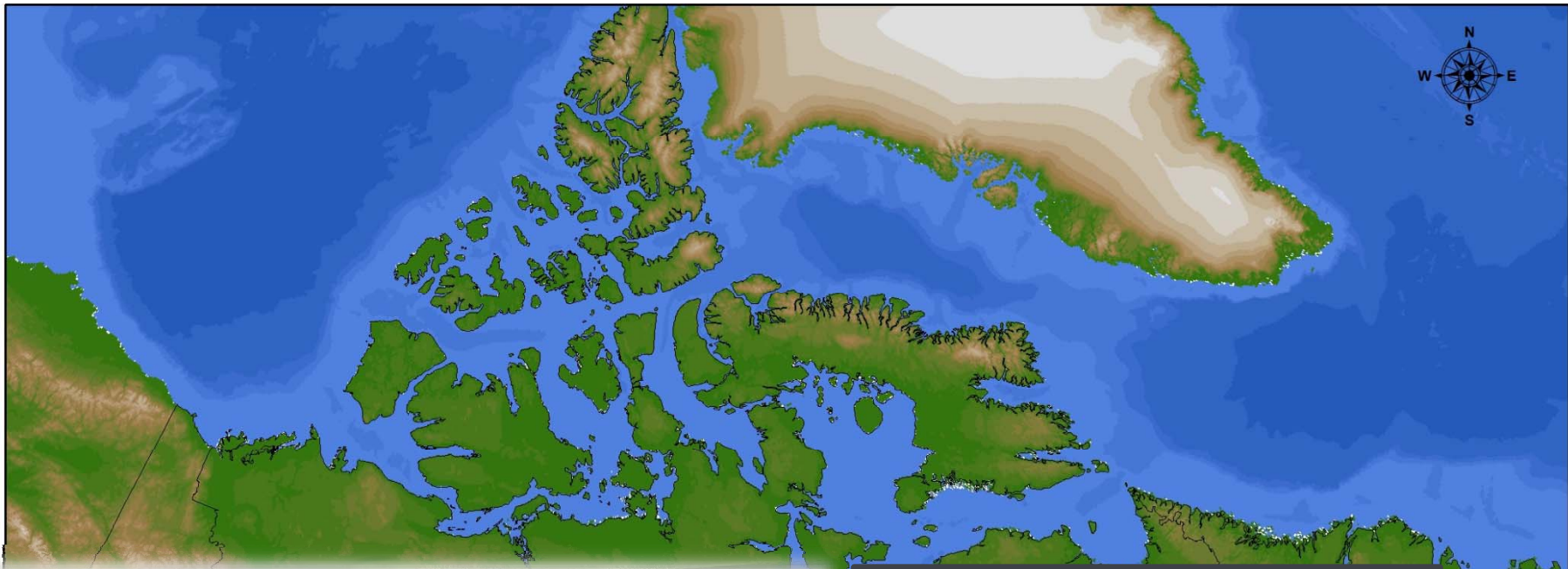# Mapping within the Canadian Arctic Archipelago

Ian Church[1], John Hughes Clarke[1], Doug Cartwright[1], Steve Brucker[1], James Muggah[1], and Steve Blasco[2]

[1]Ocean Mapping Group, University of New Brunswick, Fredericton, NB, Canada
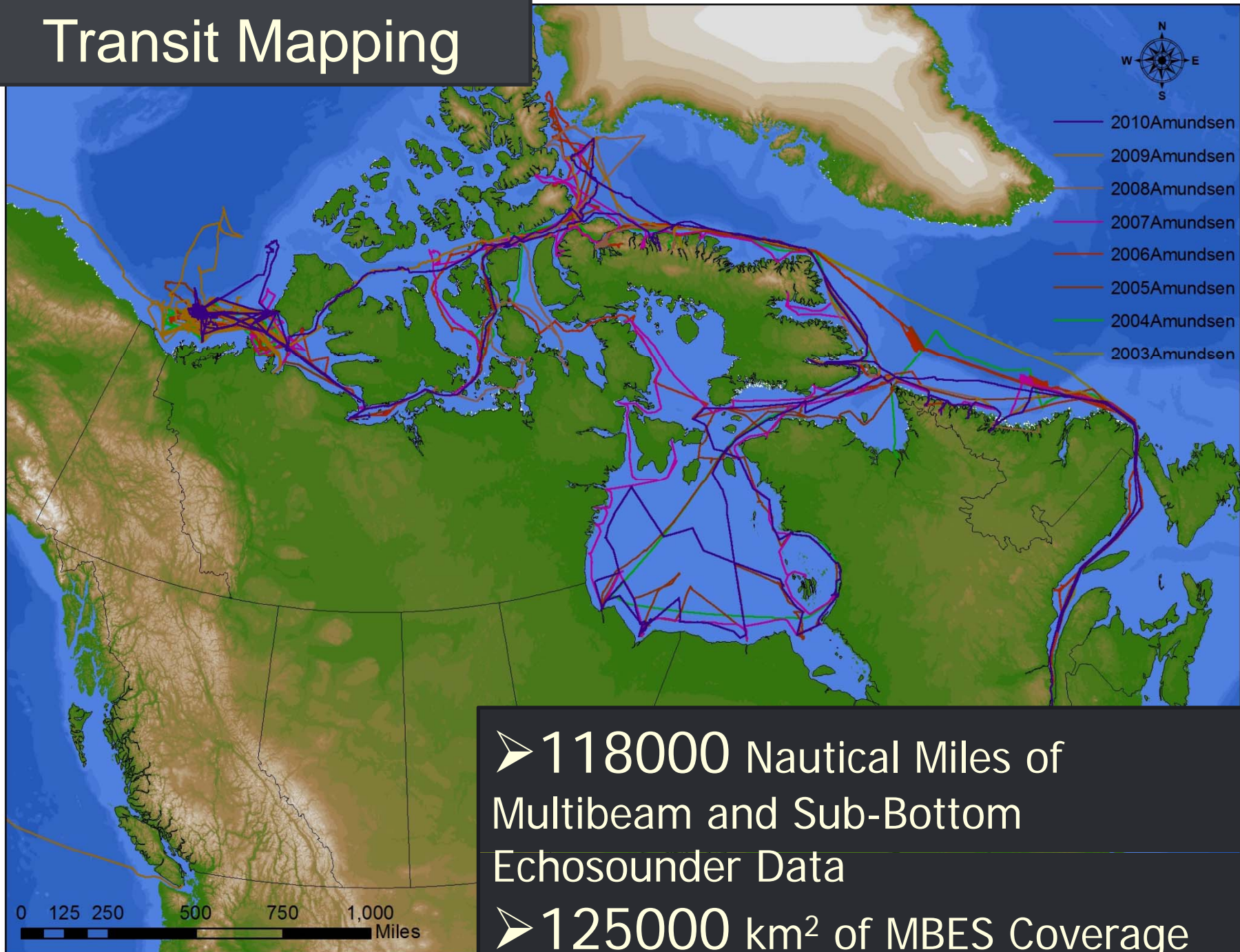[2]Geological Survey of Canada, Dartmouth, NS, Canada

Ocean Mapping Group
University of New Brunswick
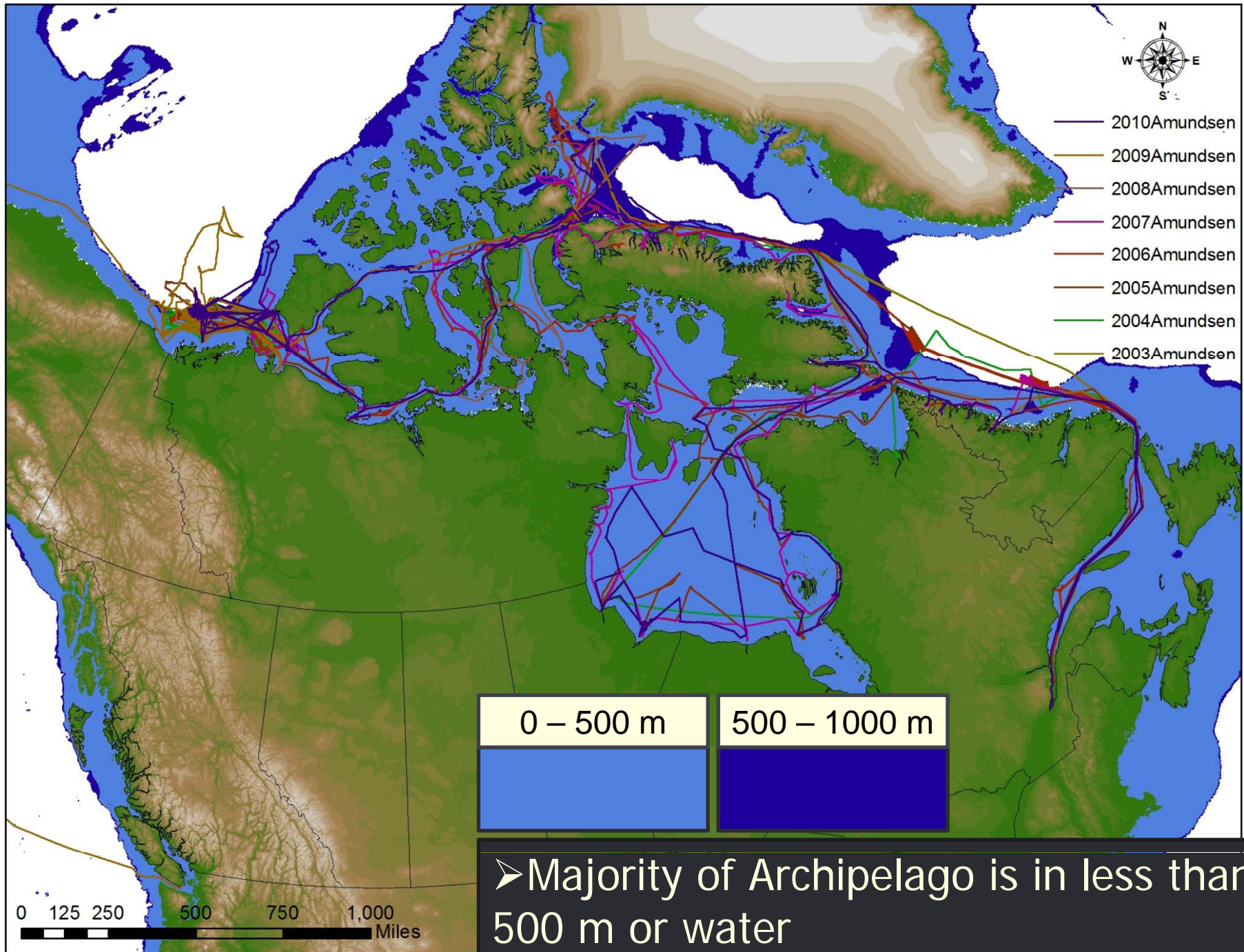CANADA

CCGS Amundsen
Since 2003

EM302 Multibeam and K320R Sub-Bottom
24 hours a day
4 months a year

Transit Mapping

2010Amundsen
2009Amundsen
2008Amundsen
2007Amundsen
2006Amundsen
2005Amundsen
2004Amundsen
2003Amundsen

➤ 118000 Nautical Miles of Multibeam and Sub-Bottom Echosounder Data
➤ 125000 km² of MBES Coverage

0 125 250   500   750   1,000
Miles

2010Amundsen
2009Amundsen
2008Amundsen
2007Amundsen
2006Amundsen
2005Amundsen
2004Amundsen
2003Amundsen

0 – 500 m
500 – 1000 m

➢Majority of Archipelago is in less than 500 m or water

0 125 250 500 750 1,000 Miles

ArcticNet
ᐅᑭᐅᖅᑕᖅᑑᒥᒃ ᑐᑭᓯᓂᐊᖅᑎᒌᑦ

Ocean Mapping Group
University of New Brunswick
CANADA

ArcticNet Science Program

- 110 researchers
  - 27 Canadian Universities, 8 federal and 11 provincial agencies and departments
- Study the impacts of climate change in the coastal Canadian Arctic

Ocean Mapping Group

- Operate, Process, Manage and Distribute Multibeam Bathymetry and Backscatter and Sub-Bottom Data

CCGS Amundsen

Since 2003

- EM302 (30kHz) with Watercolumn Imaging

- ● EM302 Multibeam
- ● K320BR Sub-bottom
- ● POSMv 320 IMU
- ● CNav & POSMv Antennas
- ● MVP-300
- ● Acquisition Room

7m
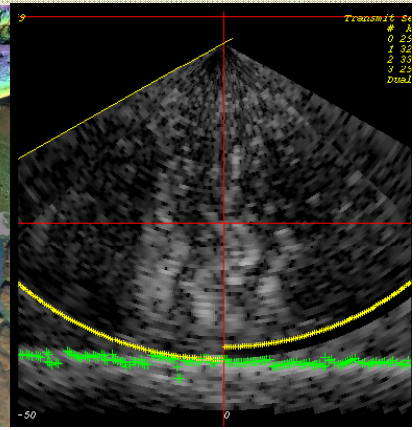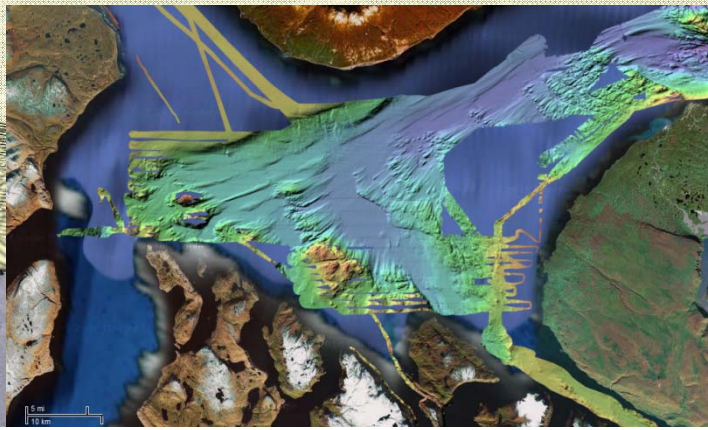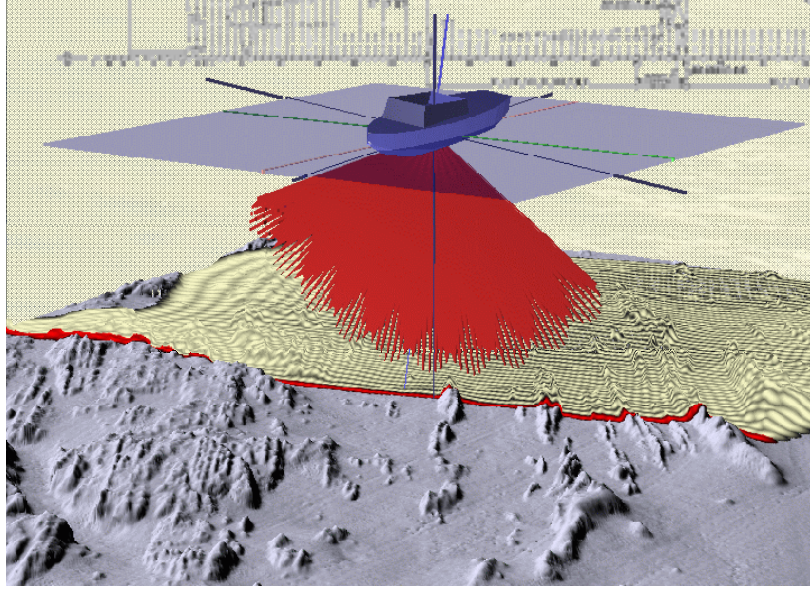
Amundsen and Launches
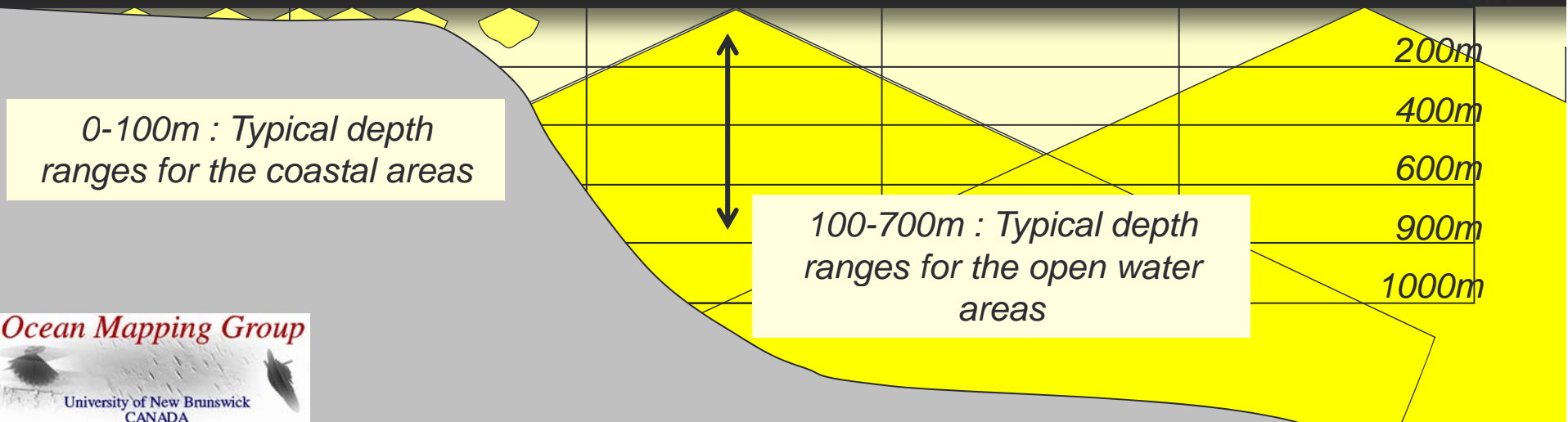## a complimentary pair for Mapping the Arctic Archipelago

2006

2010

Barge or Heron
- *EM3002 – 300 kHz*
- *Depth/Width: **3-160m** – 4xWD*
- *Draft: 0.6 m*

**CCGS Amundsen**
- *EM302- 30 kHz*
- *Depth/Width: **30-3000m**- 4xWD*
- *Draft 7.0m*

0-100m : Typical depth ranges for the coastal areas

100-700m : Typical depth ranges for the open water areas

200m

400m

600m

900m

1000m

Ocean Mapping Group
University of New Brunswick
CANADA

Navigating Sparsely Charted Arctic Waters

ArcticNet science program → CCGS Amundsen needs to operate outside the existing shipping lanes.
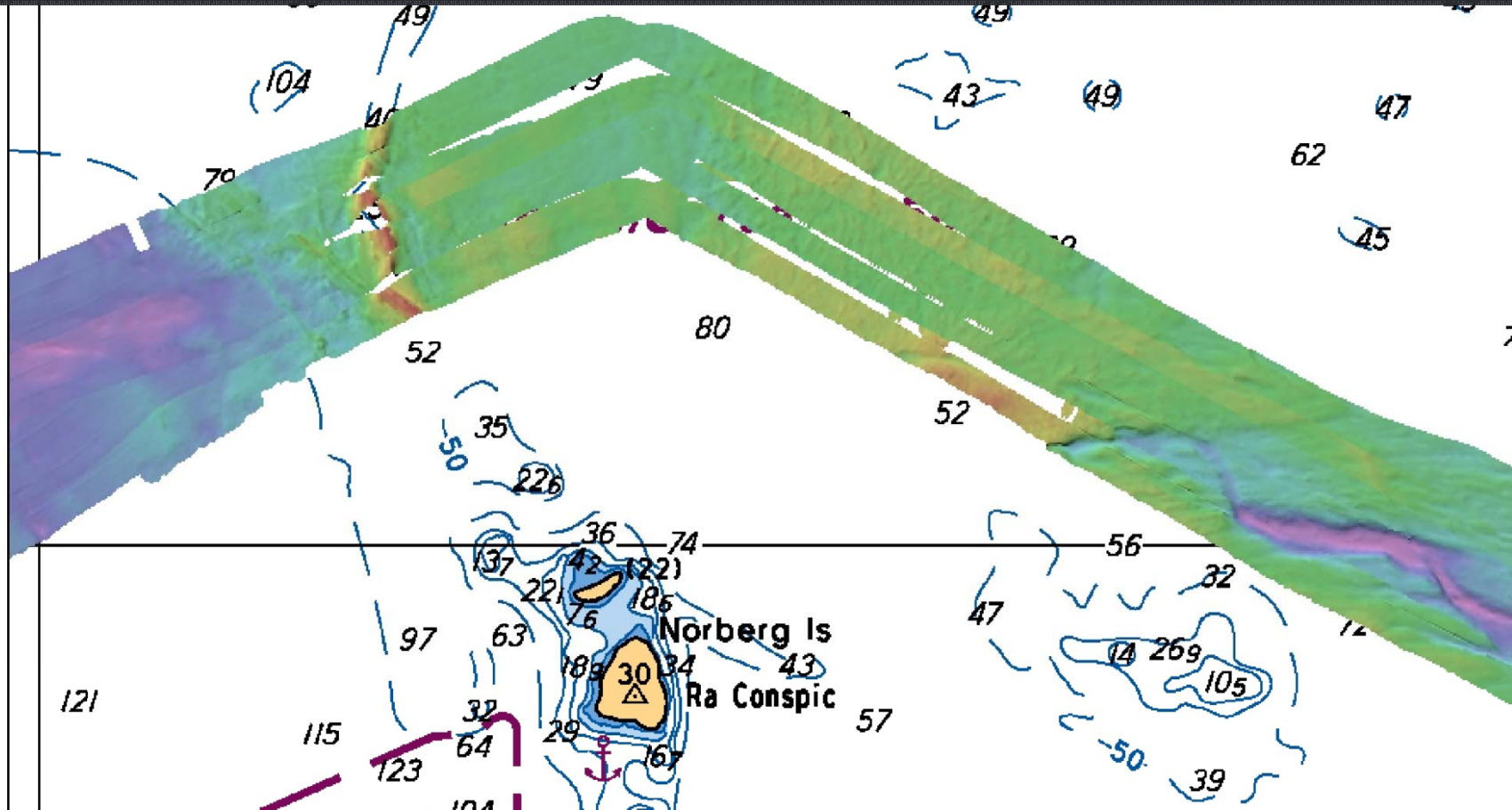
Shipping Lanes

White Chart

Tracks and Helicopter Spot Soundings
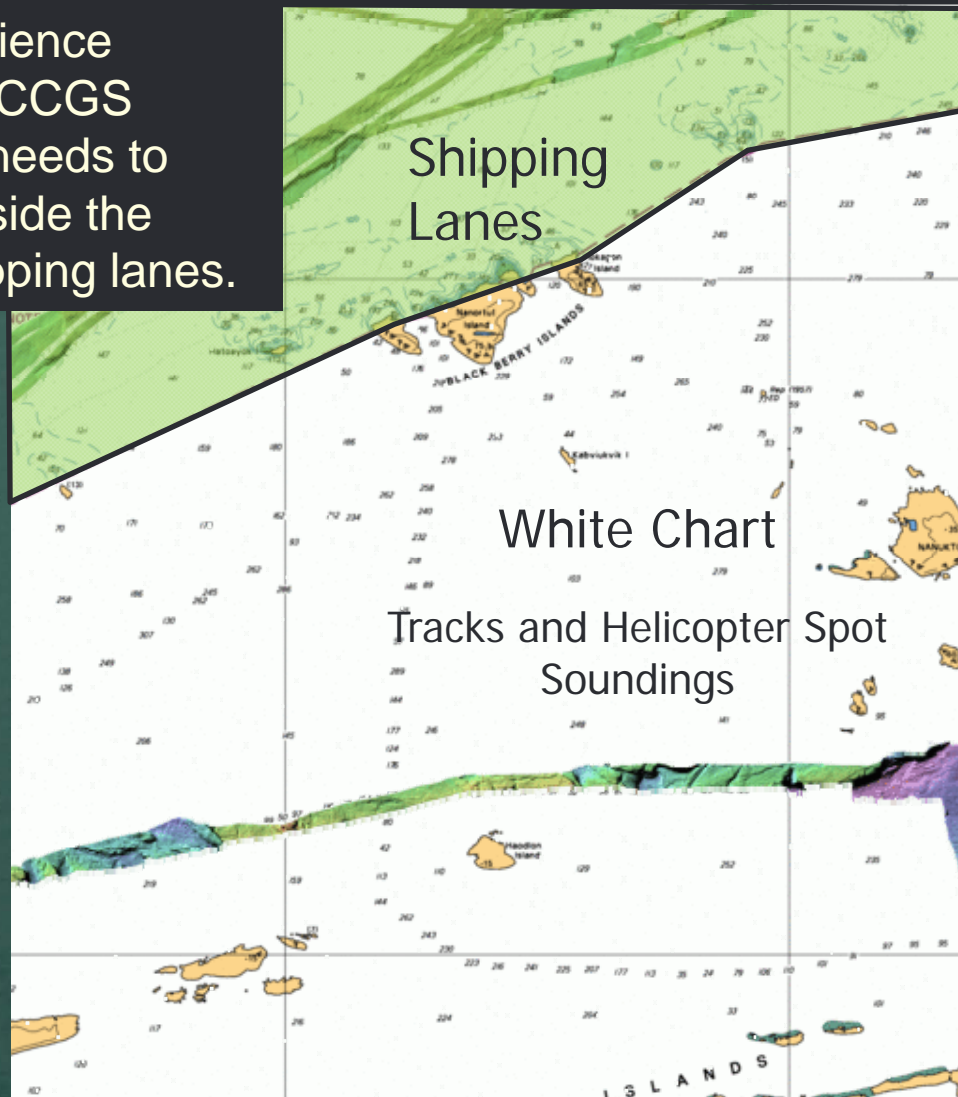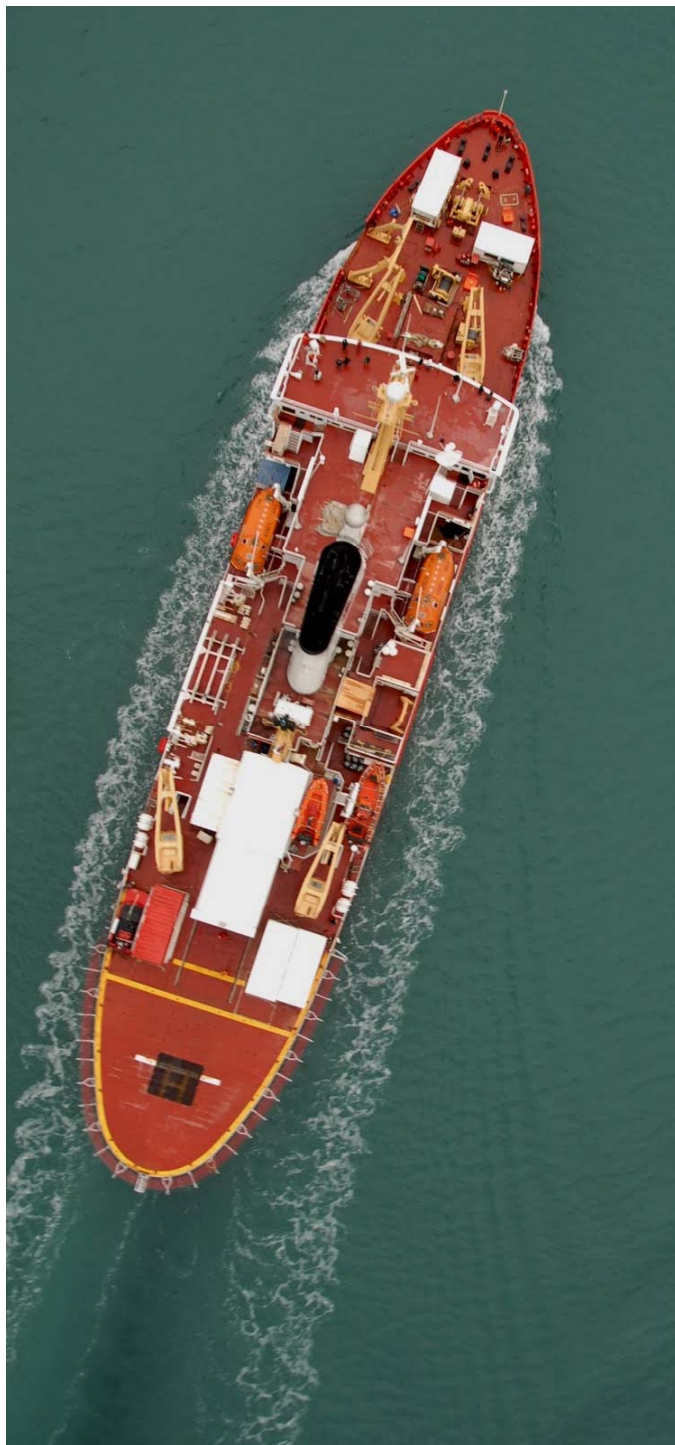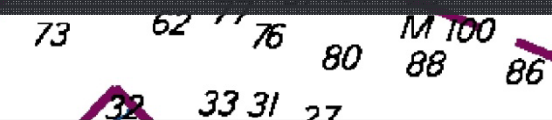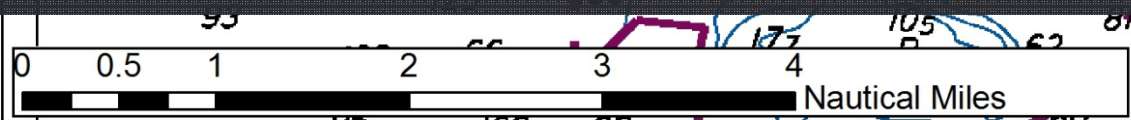
Transit Mapping

2003   2004   2005   2006   2007   2008

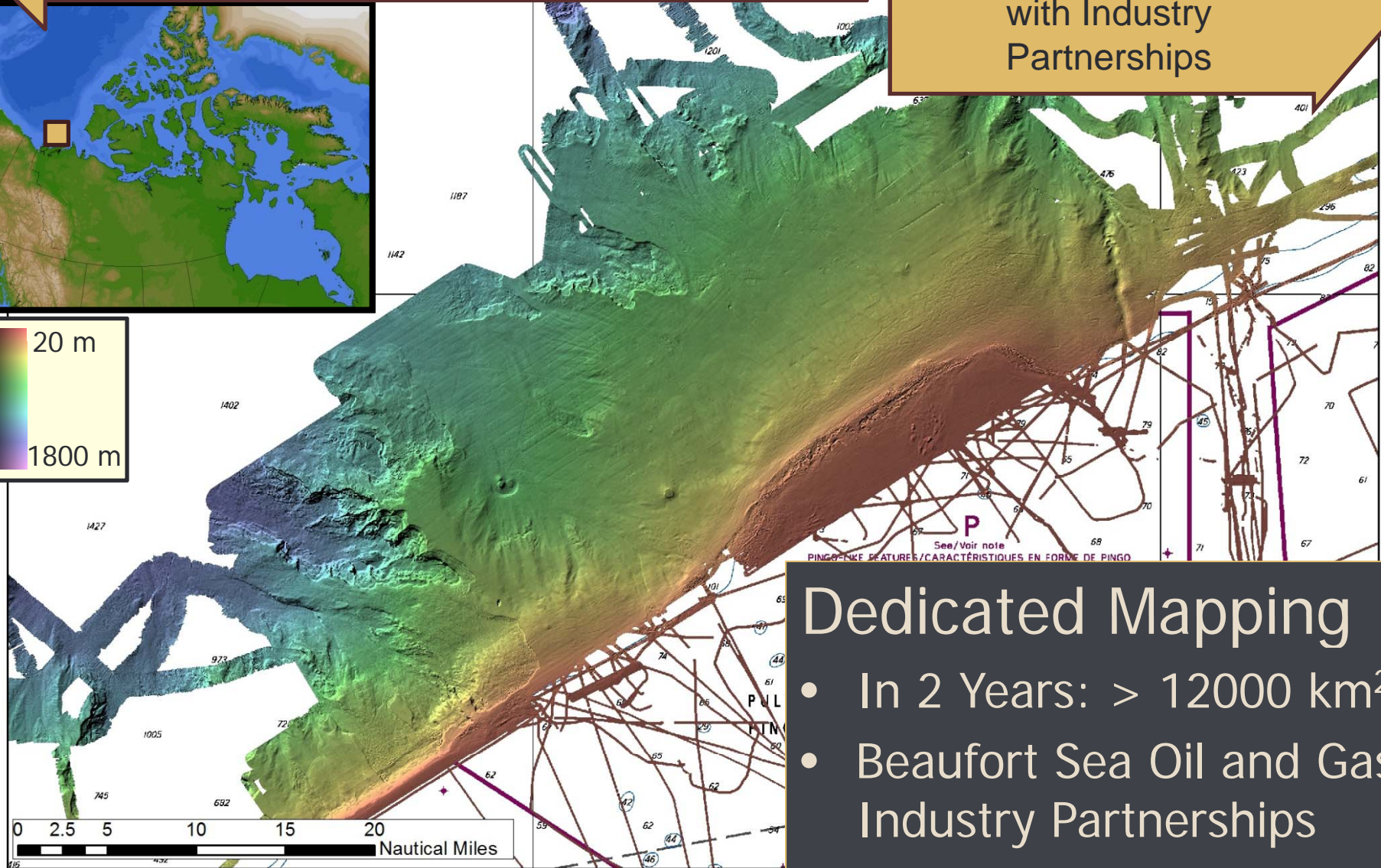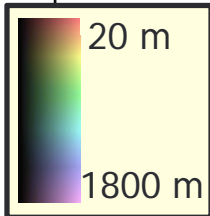2003   2004   2005   2006   2007   2008   2009   2010   2011

← Mapping limited to 48 hours or less
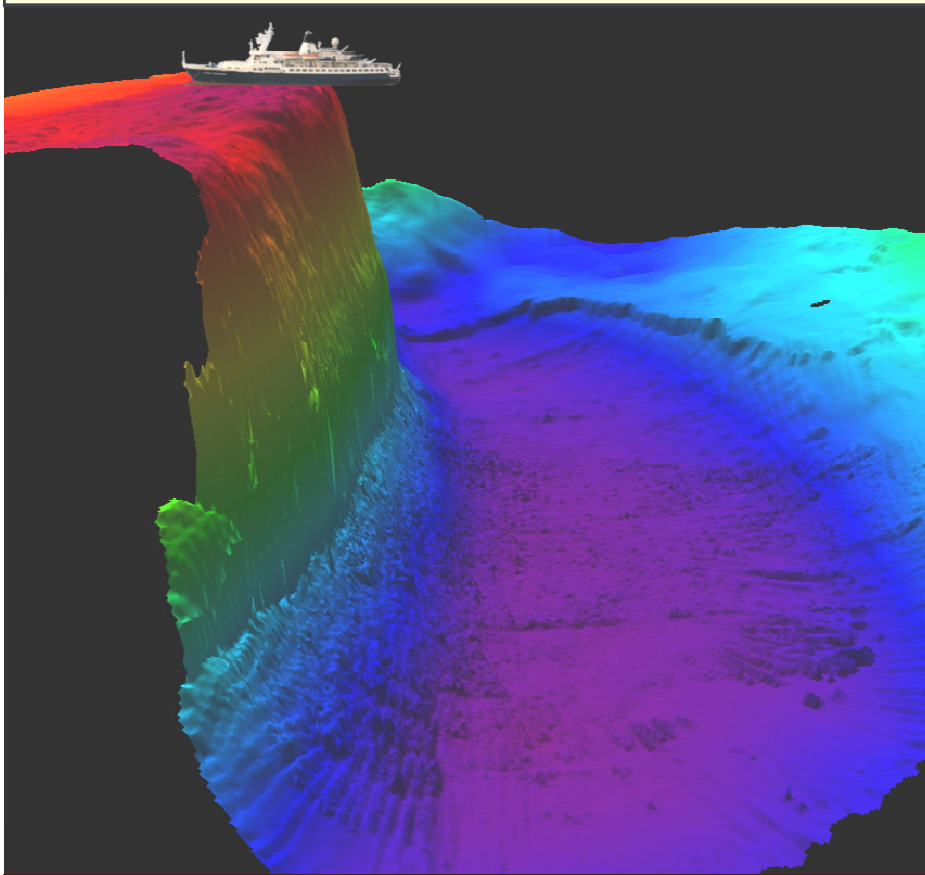
Large Scale Mapping with Industry Partnerships →

20 m

1800 m

Dedicated Mapping
- In 2 Years: > 12000 km^2
- Beaufort Sea Oil and Gas Industry Partnerships

0   2.5   5   10   15   20
Nautical Miles

Collecting Data 24 Hours a day with the Canadian Coast Guard

1 *Clipper Adventurer* Cruise Ship Rescue

2 Eclipse Sound Search and Rescue

0 m

800 m

ArcticNet

20 NM

Ocean Mapping Group
University of New Brunswick

Result: Mapping Uncharted Areas & Improved Safety of Navigation
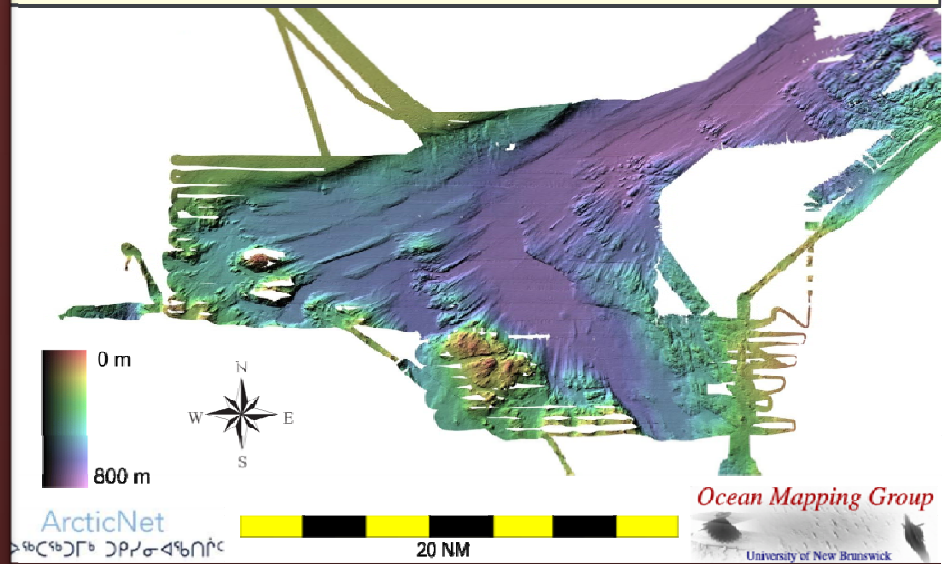
Result: Improved Geological understanding of Eclipse Sound

Collaboration

Temperature
High : 13.0604
Low : -1.34968

- Tides:
  - Limited Tide Gauge Network
  - Hydrodynamic Models
- Sound Speed:
  - Global Climatologies – World Ocean Atlas
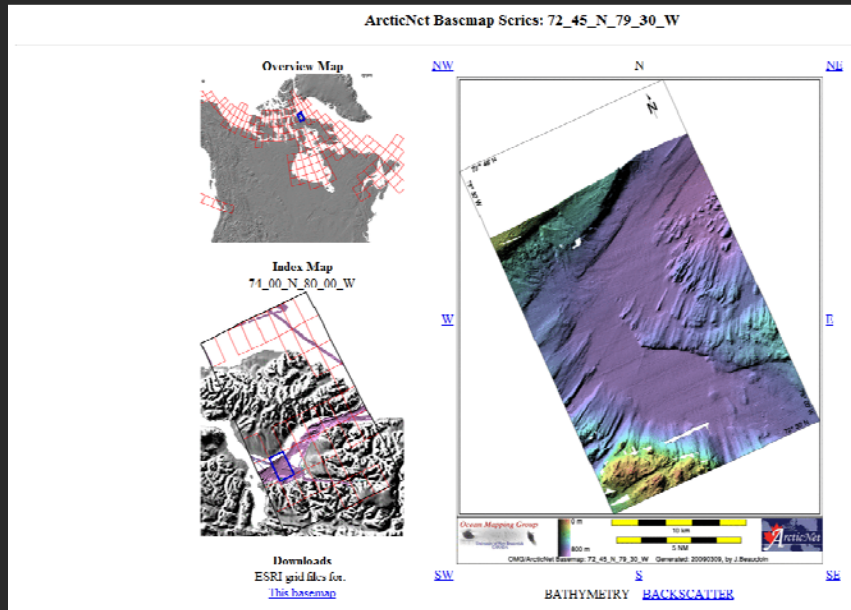
0 55 110   220   330   440
Nautical Miles
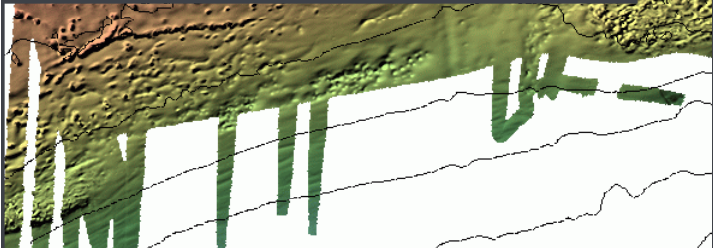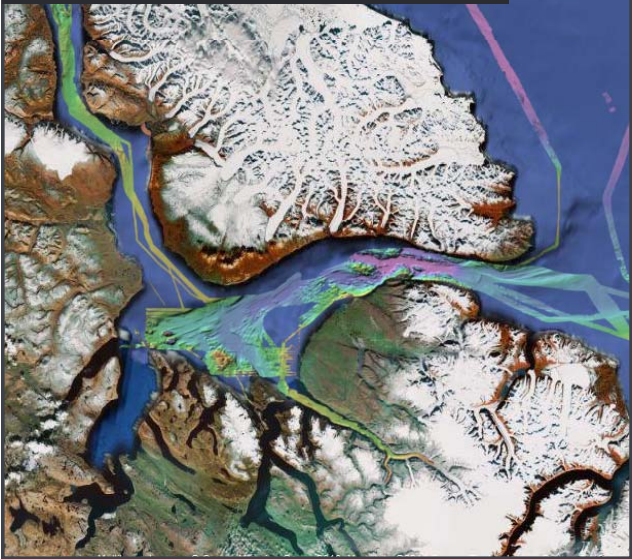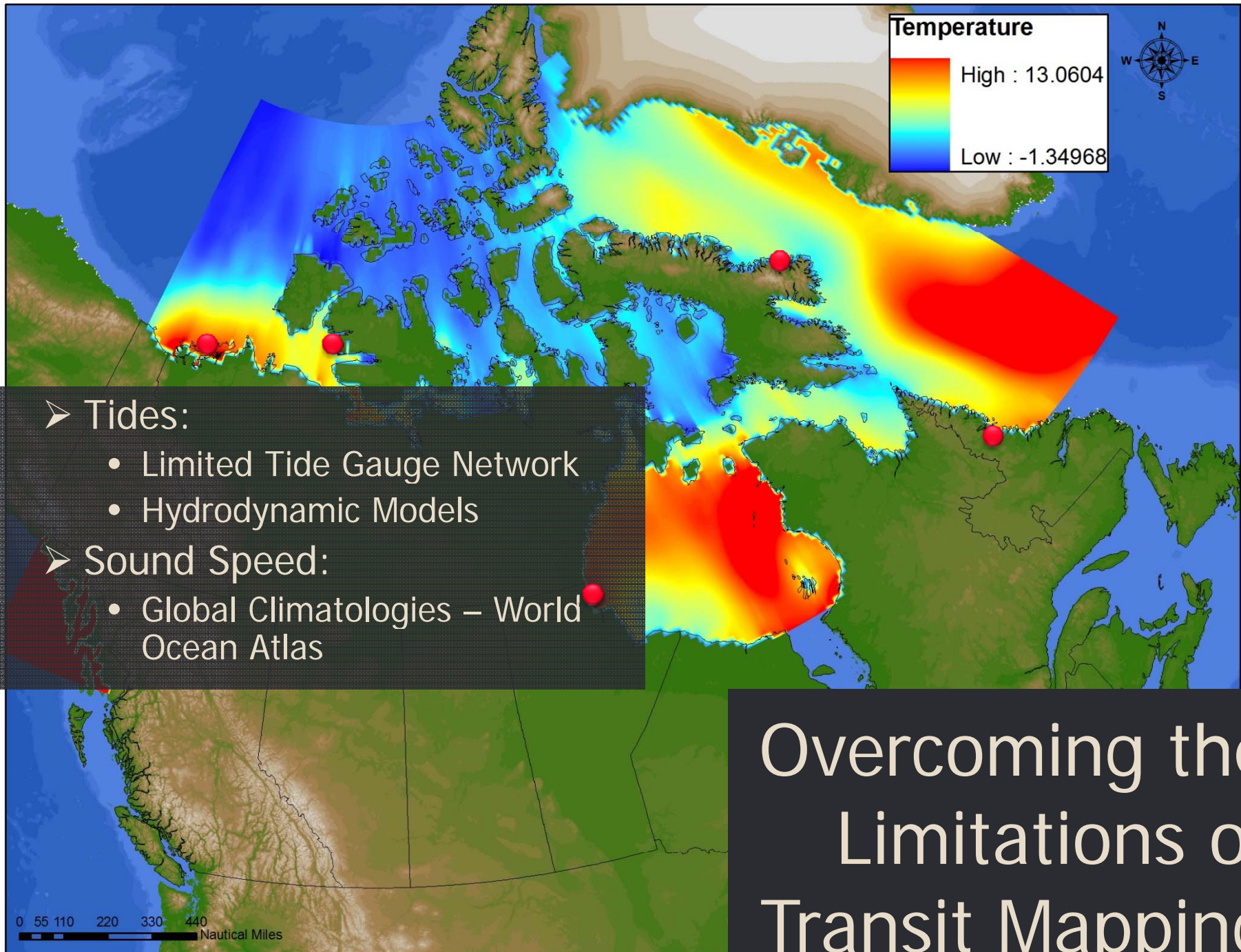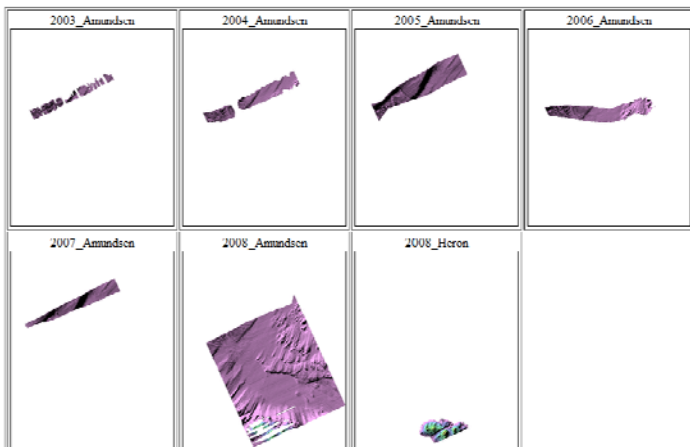
Overcoming the Limitations of Transit Mapping

Distribution

- Basemaps
  - Compilation of all years
  - Source Data for Each Year
- Stripmaps
  - Observe Temporal Changes
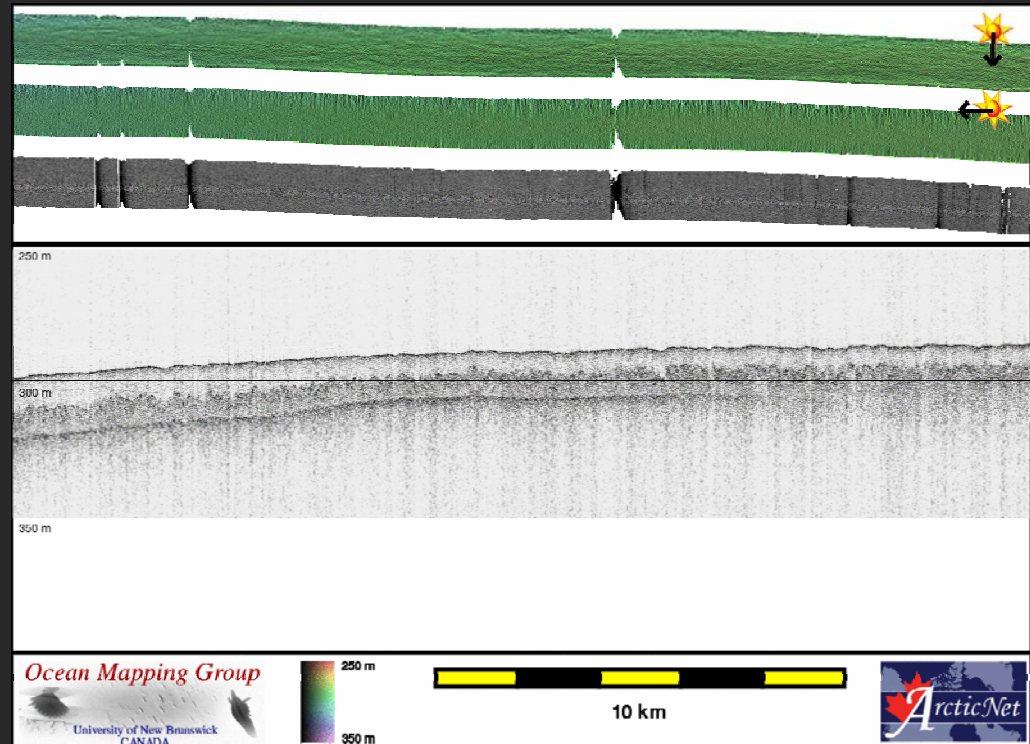 - Sub-Bottom + Bathymetry

Google Maps

- MBES Bathymetry and Backscatter Tile Overlay
- Overview → 2 m resolution
- Links back to Corresponding Basemap for Download

Future Distribution

- Where we're going
  - Incorporating Other Layers in WebGIS
    - Sub-Bottom
    - CTD Observations
    - Hydrodynamic Model Output
  - Improved metadata
    - Automated Generation and Multiple Levels
  - Automated server side map generation
    - WebGIS PHP interface to Unix MBES Processing

Questions?