



# **Ice and No Ice**

## **The Canadian UNCLOS Mapping Program**

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Canadian Hydrographic Conference  
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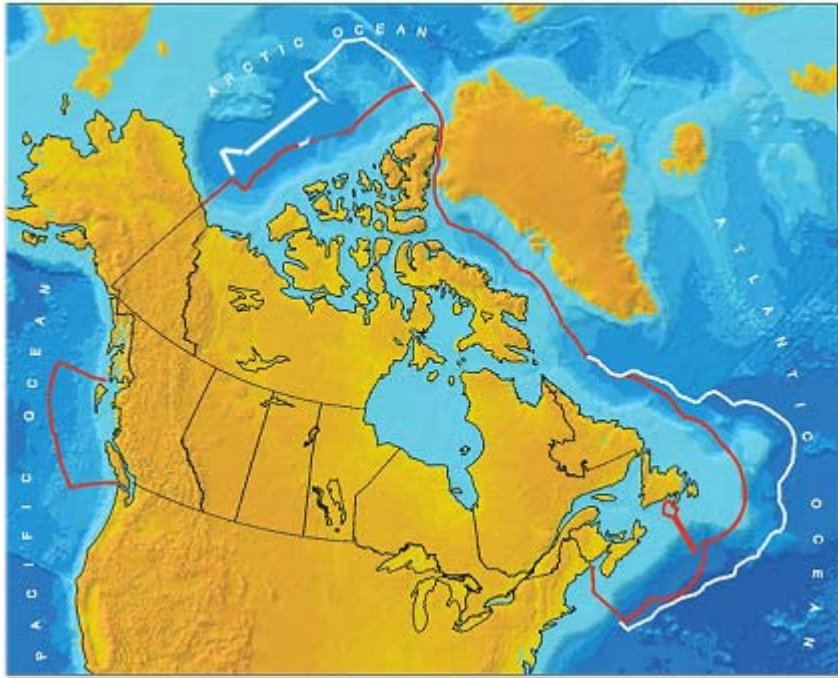
# UNCLOS



- Often called ‘constitution for the oceans’ and divides the sea into zones of national and international jurisdiction
- Recognizes Coastal State’s rights to the **water column** and seabed up to 200 nm and to **the seabed** beyond under special circumstances (**Article 76**)
- Red areas are under the jurisdiction of the Coastal State
- Outer limits of the Continental Shelf over which a Coastal State has sovereign rights beyond 200 nm has to be **actively defined**.
- Proposed limits must be submitted for review to Commission on the Limits of the Continental Shelf (CLCS)



# THE CANADIAN CASE



## Exclusive Economic Zone (red line):

- granted automatically
- jurisdiction over 'all' resources

## Area outside 200 nm (white line):

- jurisdiction only over resources on and below seafloor
- submission of outer limits (within 10 years of ratification; **for Canada: 2013**)

## Desk-top study of Canadian case:

- potential for large area outside 200 nm
- 1.75 million square Km
- based on preliminary data (1995)

**Federal Budget in 2004 announced \$70 million over 10 years for mapping to substantiate the submission . Budget 2008 an additional \$20 million over 2 years**

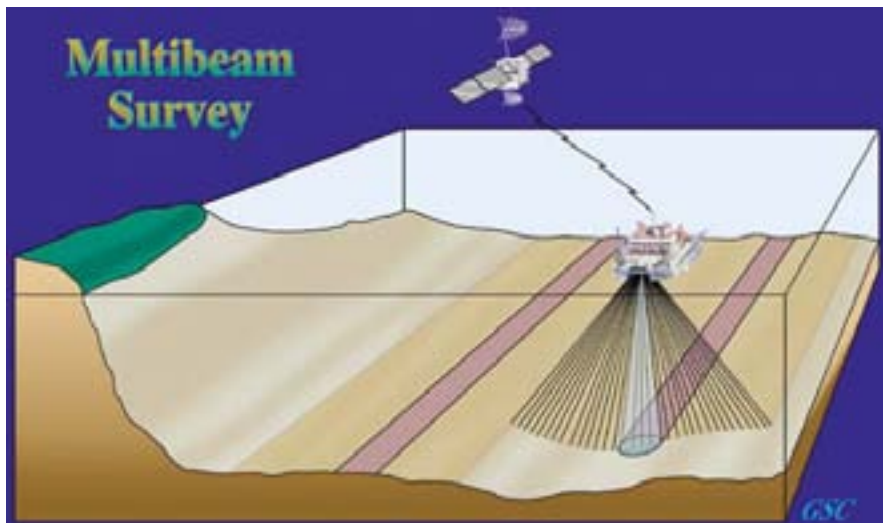
**Tasks: Extend Canadian continental shelf to maximum possible**

# CANADA'S UNCLOS program



- **Foreign Affairs**
  - provide legal advice on UNCLOS, take lead in bilateral negotiations in areas of overlap, present and defend submission to UN
- **NRCan/DFO**
  - responsible for providing technical information (mapping) + technical experts in negotiations with other countries and UN
- **Governance of UNCLOS Program**
  - **ADM Steering Committee** (NRCan, DFO, DFAIT)
    - semi-annual review of progress meetings - weekly updates
  - **Interdepartmental Management Board** (chaired by NRCan)
    - sets work-plans and reports to ADM Steering Committee
  - **Federal Advisory Committee** (chaired by CHS/DFO)
    - advice on broader UNCLOS issues - annual review + role in organizing in-depth reviews in 2007 and 2011

# UNCLOS – data requirements: Bathymetry & Seismic Reflection Surveys

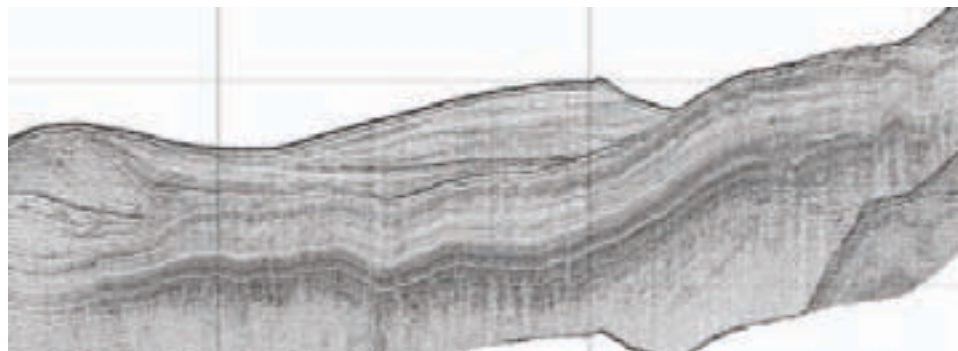
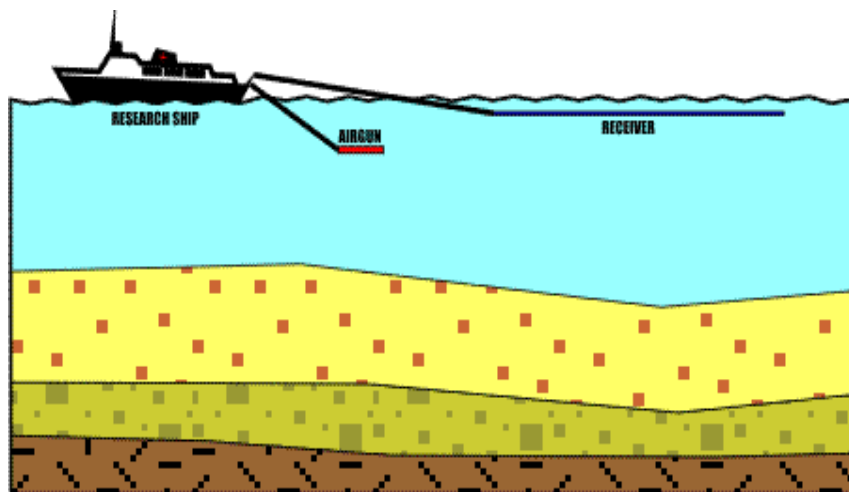


## Bathymetry:

- Foot of Slope – the starting point
- 2500 metre depth contour
- Seabed shape - Natural prolongation

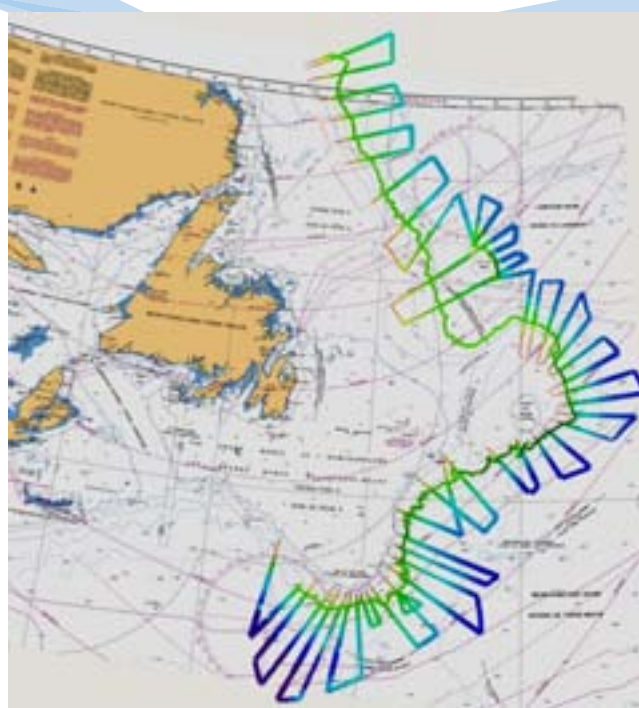
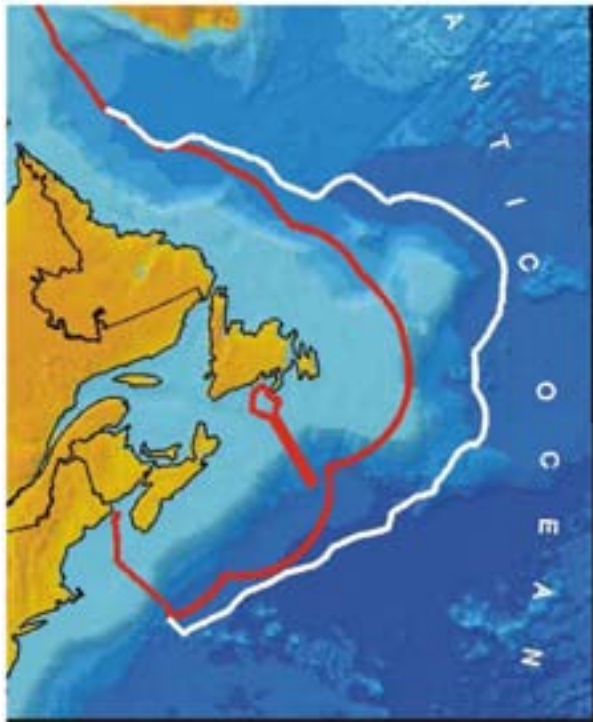
## Seismic:

- Sediment thickness
- Natural prolongation
- Evidence to the contrary





# ATLANTIC PROGRAM



## Bathymetry data collection

- Survey off Grand Banks in 2006

## Seismic data collection

- 2007: offshore Nova Scotia
- 2009: offshore Labrador and Grand Banks

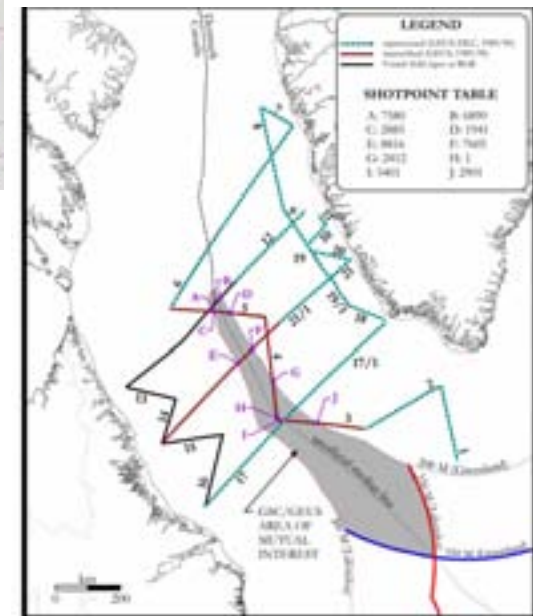
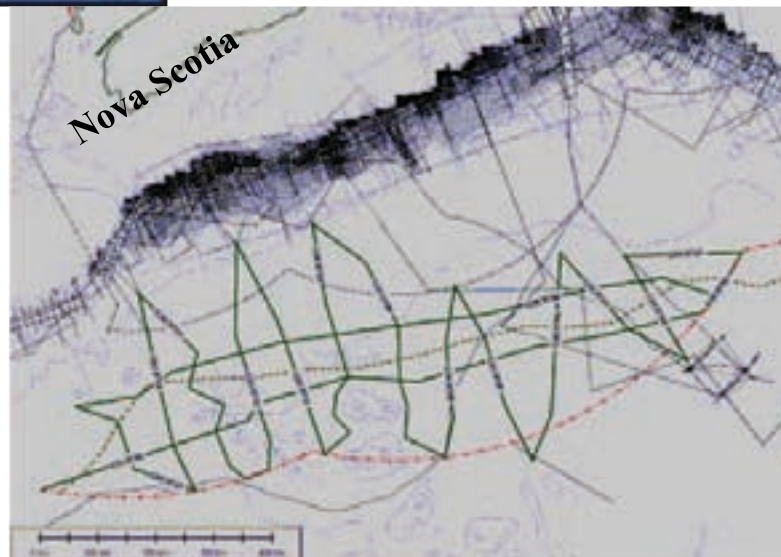


Figure 1. Possible definition of area of mutual interest in co-operation agreement between GSC and GRLS for transcription and reprocessing of the RGR 1977 survey.

# ARCTIC OCEAN



**Complicated seafloor geology and  
difficult data collection**

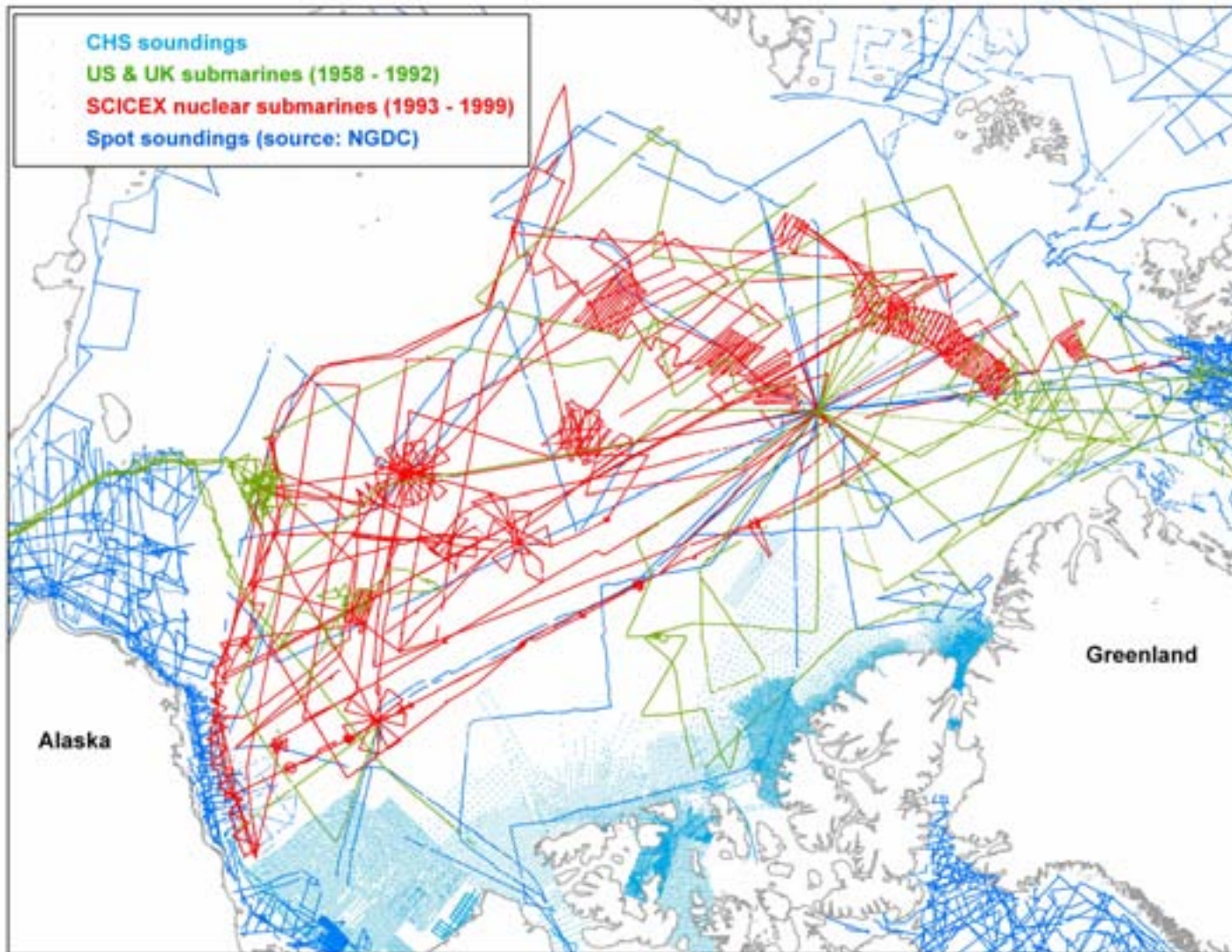


- **Eastern Arctic (start in 2006)**
- **Western Arctic (start in 2006)**
- **Possible overlaps with USA, Russia and Denmark: need negotiations**
- **Program requires at least 5 field seasons of data collection**
- **Concerns: weather and ice conditions/icebreaker capability**

**The white zone, or part of it, may be  
Canada continental shelf under Article 76**



# BATHYMETRIC DATA COVERAGE

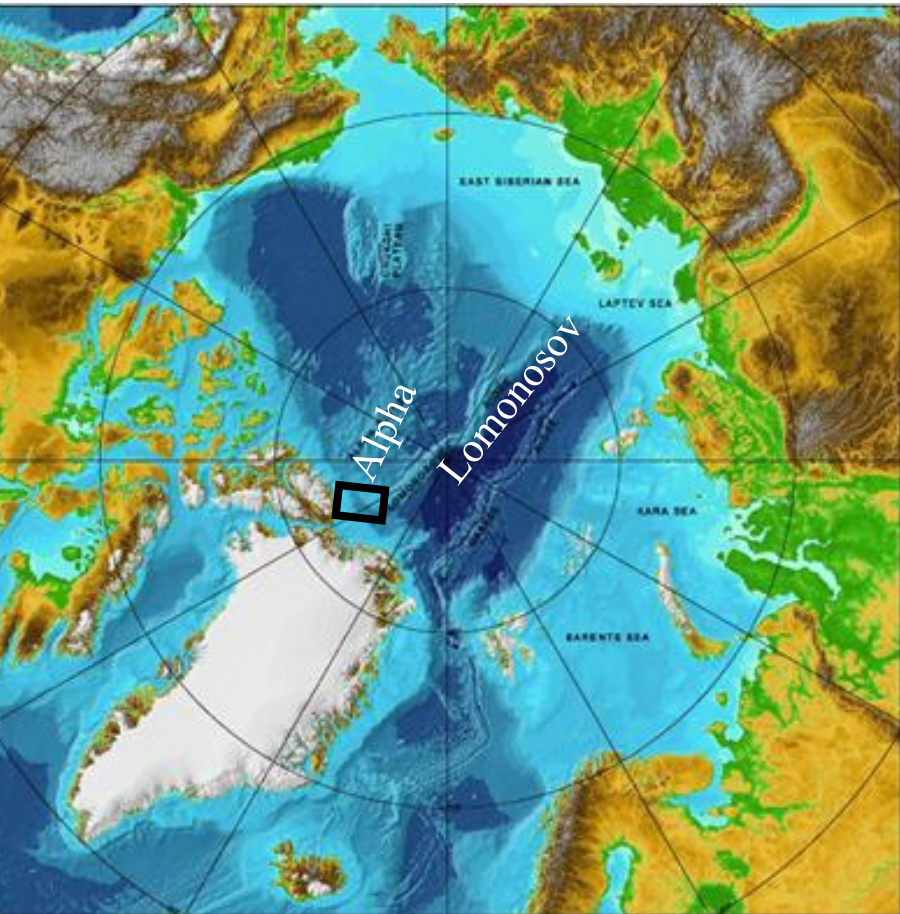


Large  
areas  
no data  
for 50-  
100  
Miles



# EASTERN ARCTIC

## Natural prolongation of submarine Ridges



### Collaboration with Denmark

MOU with Denmark (June 2005) for joint surveying in area north of Greenland/ Ellesmere Island

Saved Canada about \$ 1.5 million

Other advantages:  
joint data collection and interpretation

**Project LORITA (March 2006)**  
(Lomonosov Ridge Test of Appurtenance)

- On ice experiment

# LORITA experiment



Ice Camp



Lorita team – CFS Alert



Seismic recorders and coolers



Pentolite: 570 charges of 17.5 kg

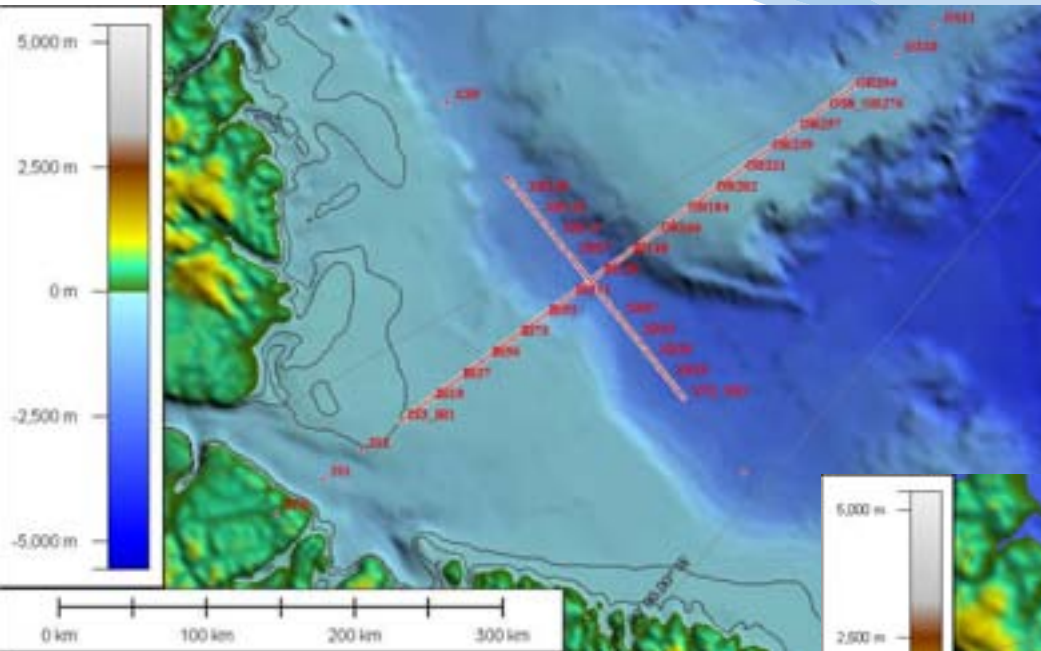




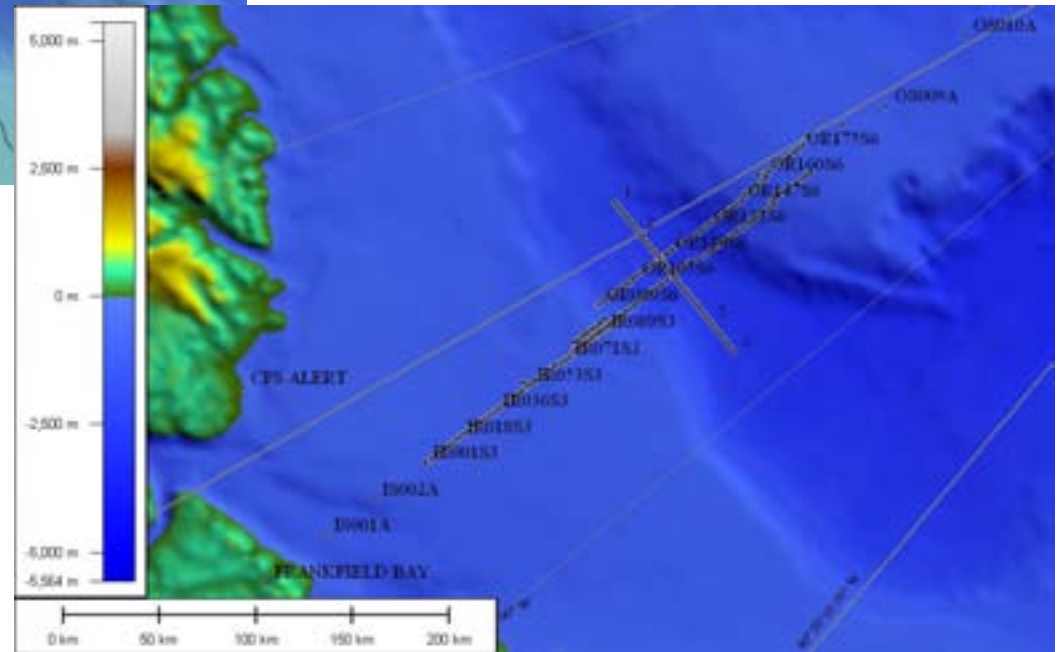
# LORITA



**PLANNED**

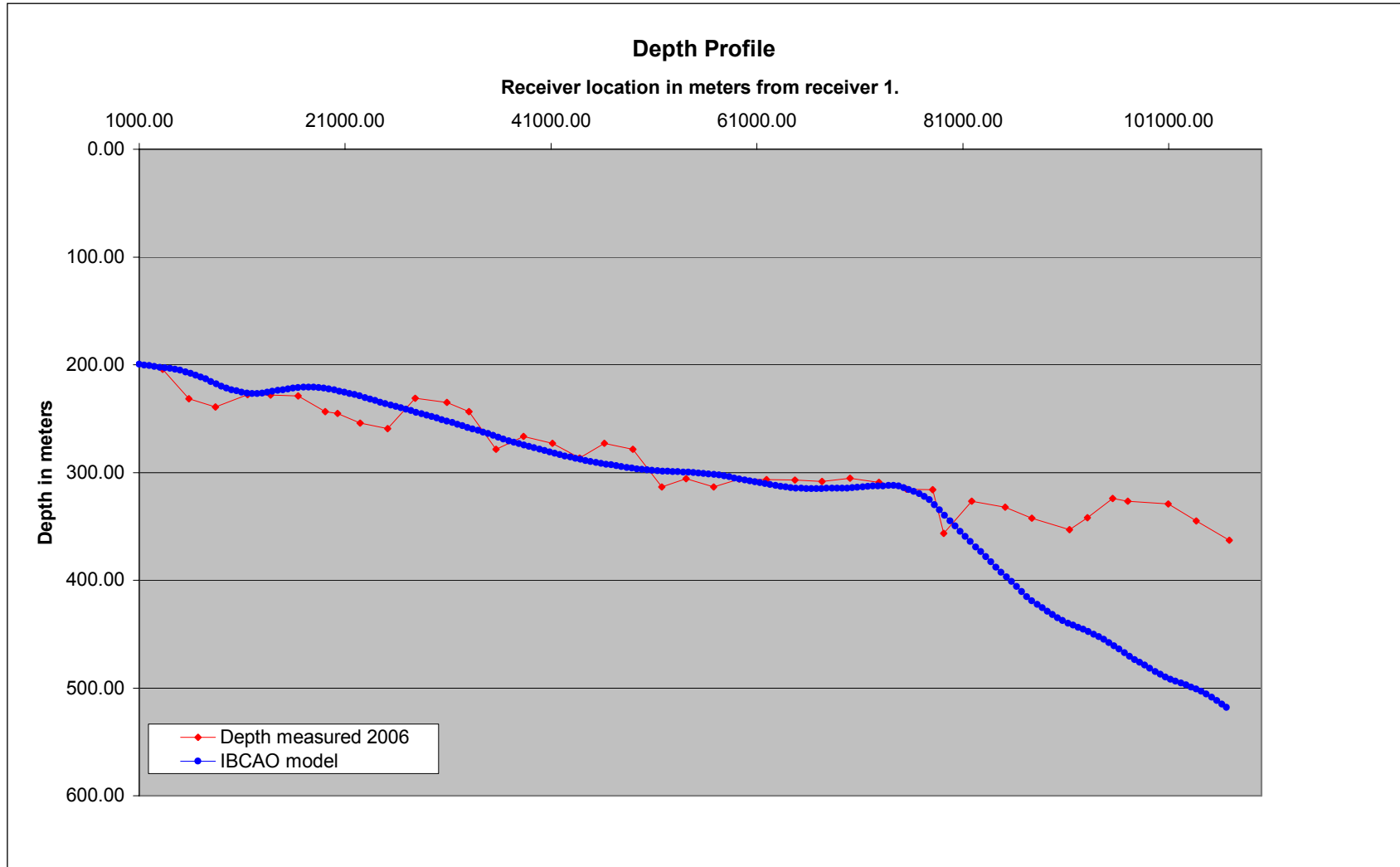


**ACHIEVED**



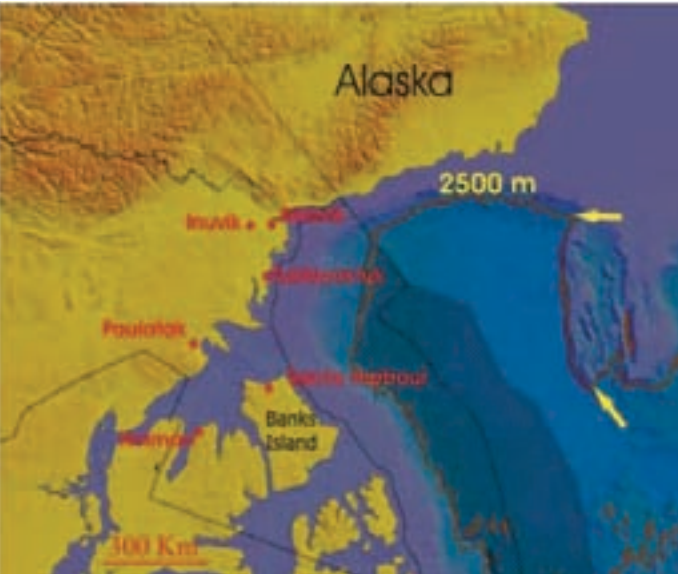


# New Bathymetry Data (2006 Lorita experiment)



# WESTERN ARCTIC

## Seismic survey area and coastal communities



### **Require seismic profiles:**

- every 60 nm (preferably 30 nm)
- at least 1-2 km of sediment needed
- large airguns required

### **Community consultation**

(Feb. 2006 + repeat annually)

### **Seismic test survey in September 2006**

- on board the Louis St. Laurent

### **Seismic survey in western Arctic 2007**

- 3000 km seismic
- 7800 km bathymetry
- 180 Spot depths from Helicopter

# Deploying Air gun array (weight: 4400 pounds)

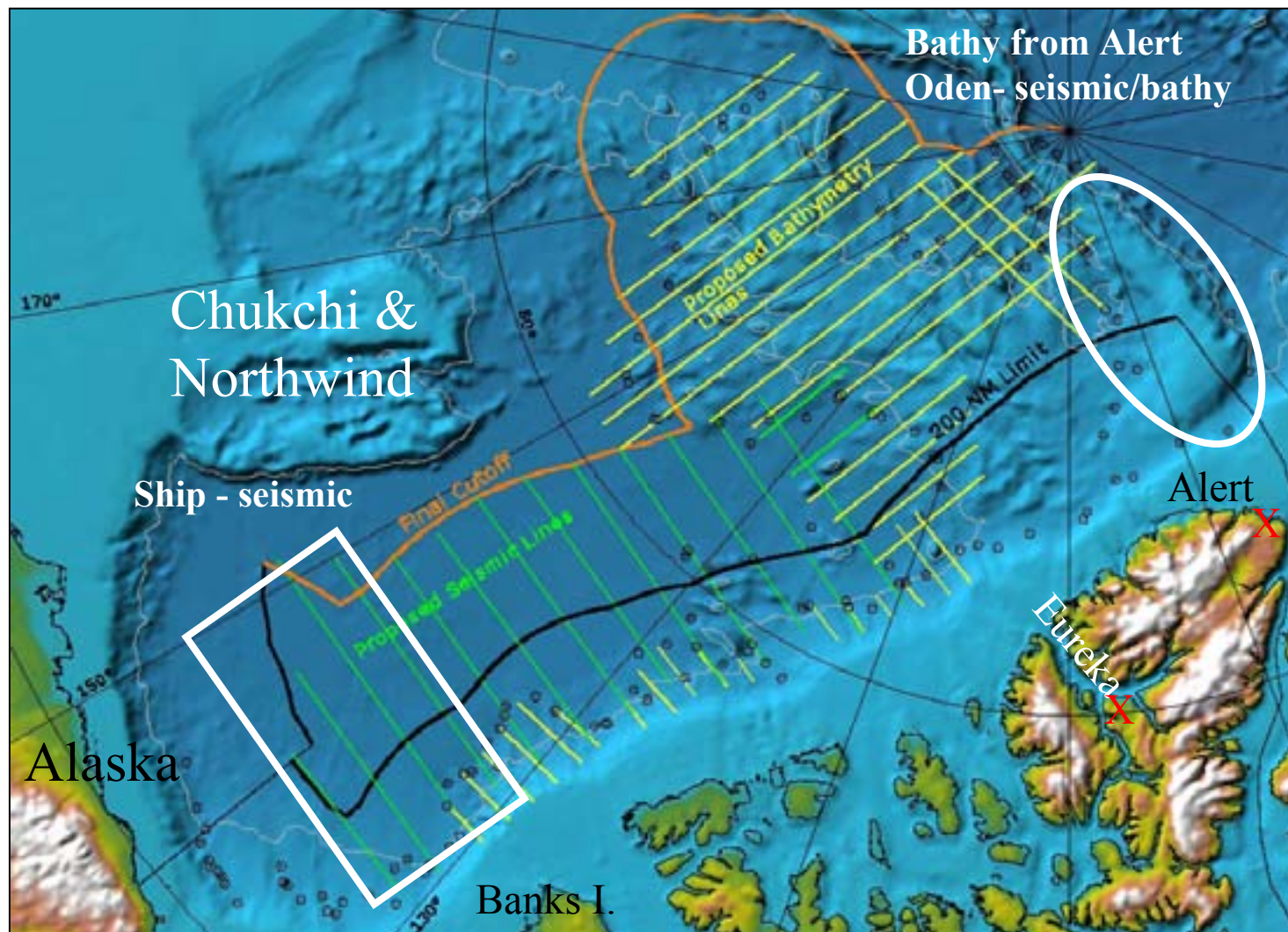




# Using the airgun array on CCGS Louis S. St-Laurent (with ice)



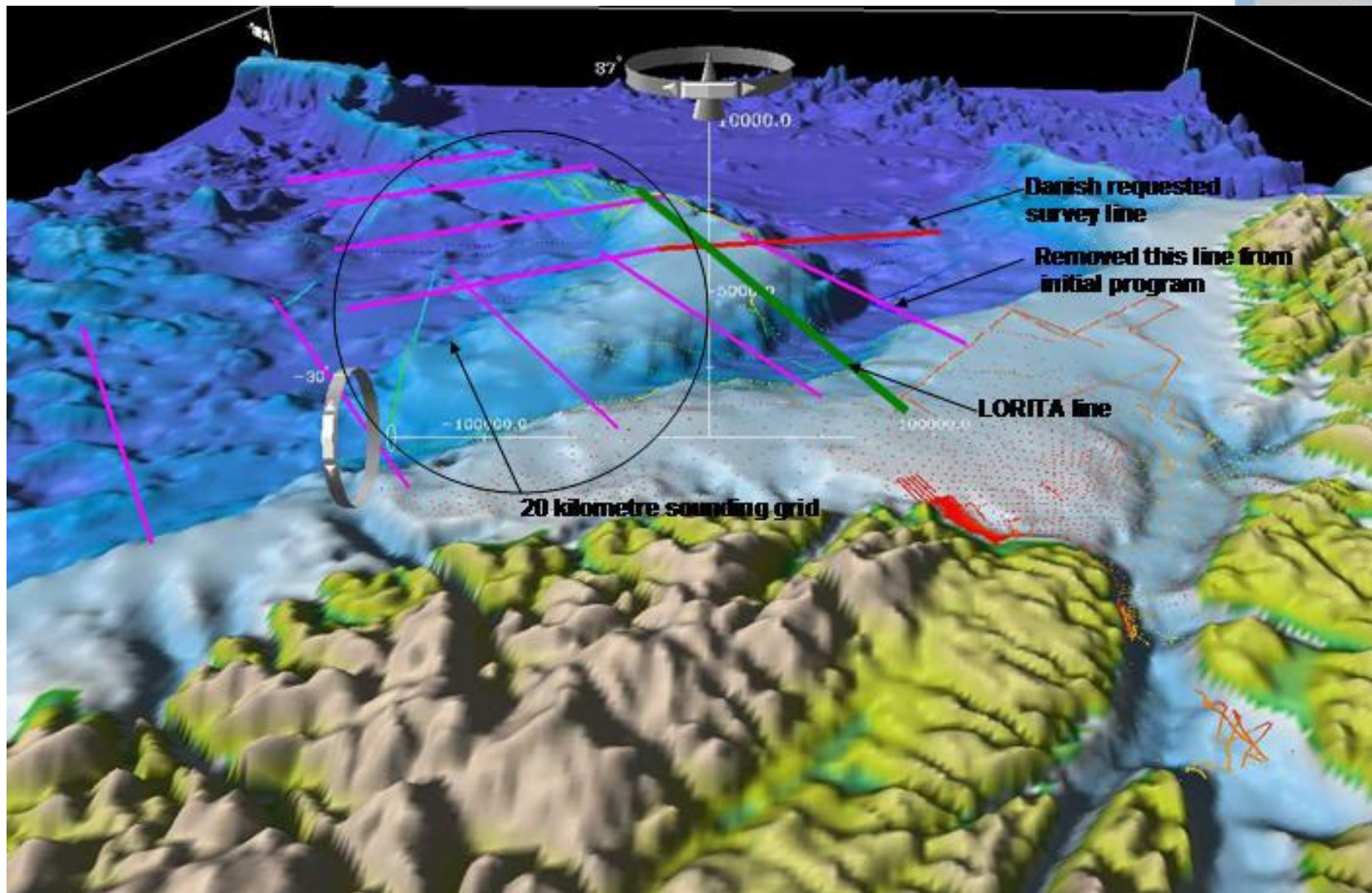
## 2007



400 nm  
(720 km)



# 2007 CHS Bathy Plan March-April 2007





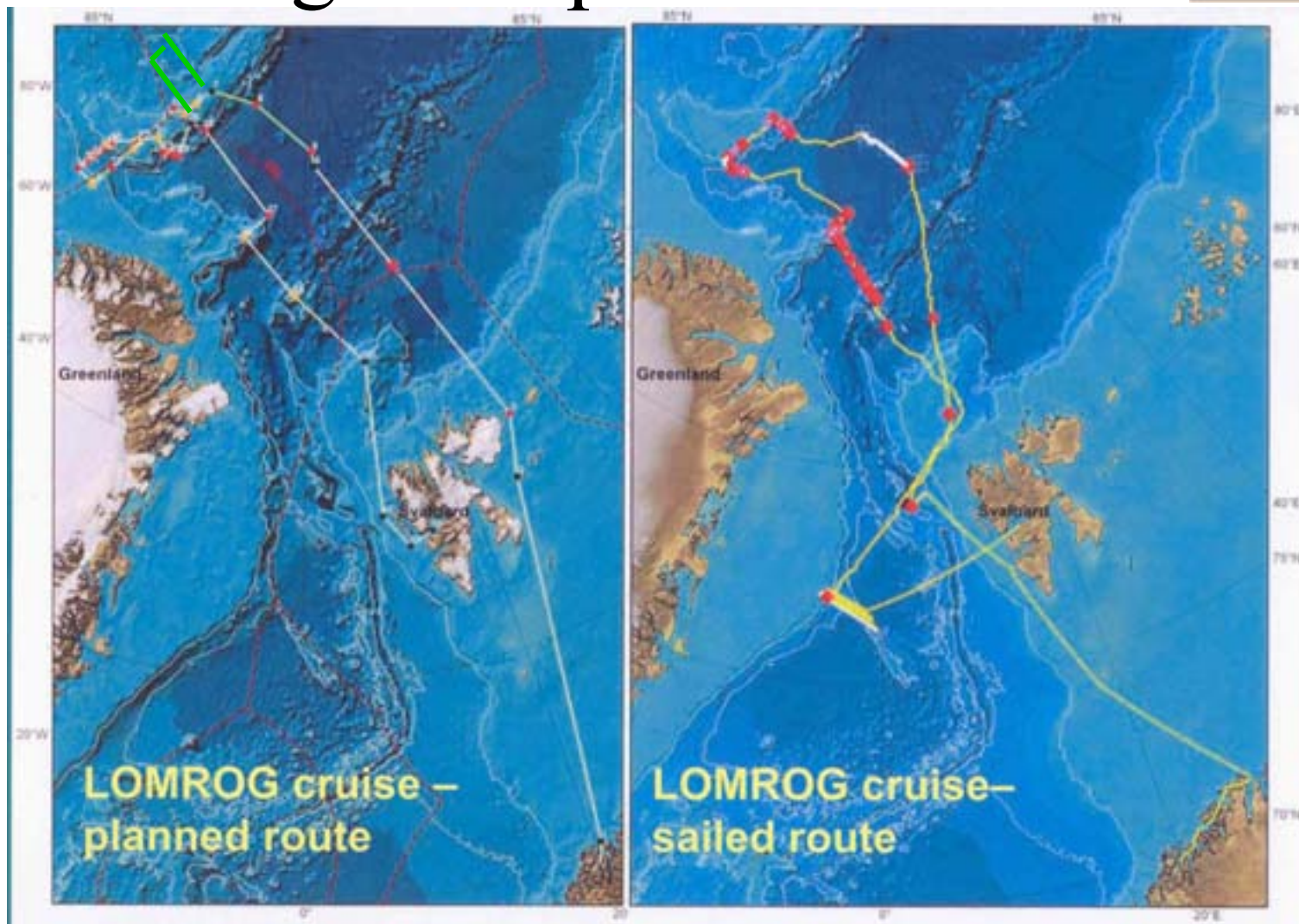
# Alert



Flying Weather

Alert – March-April – little data – open water

# ODEN - Plan - Achieved August-September





# Ice Escort 50 Let Pobedy-Oden

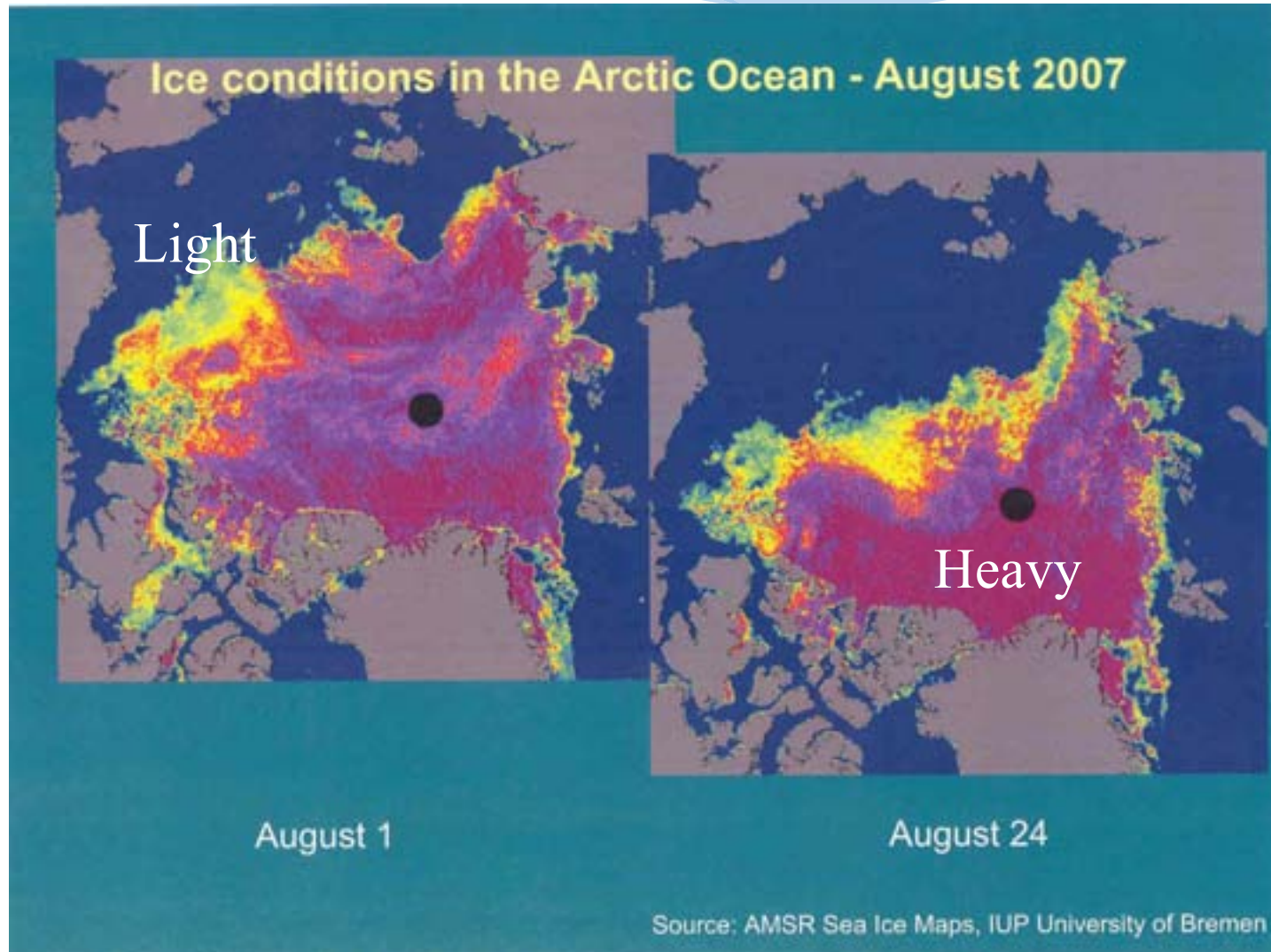




# The Occasional Snag



# Ice Conditions 2006

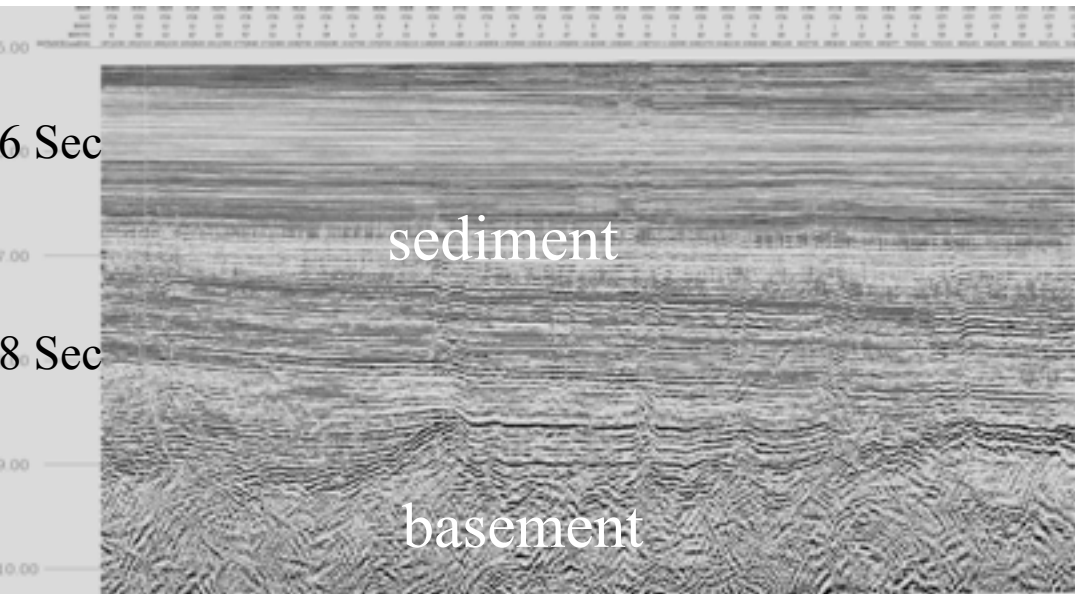


# 2007- Western Arctic

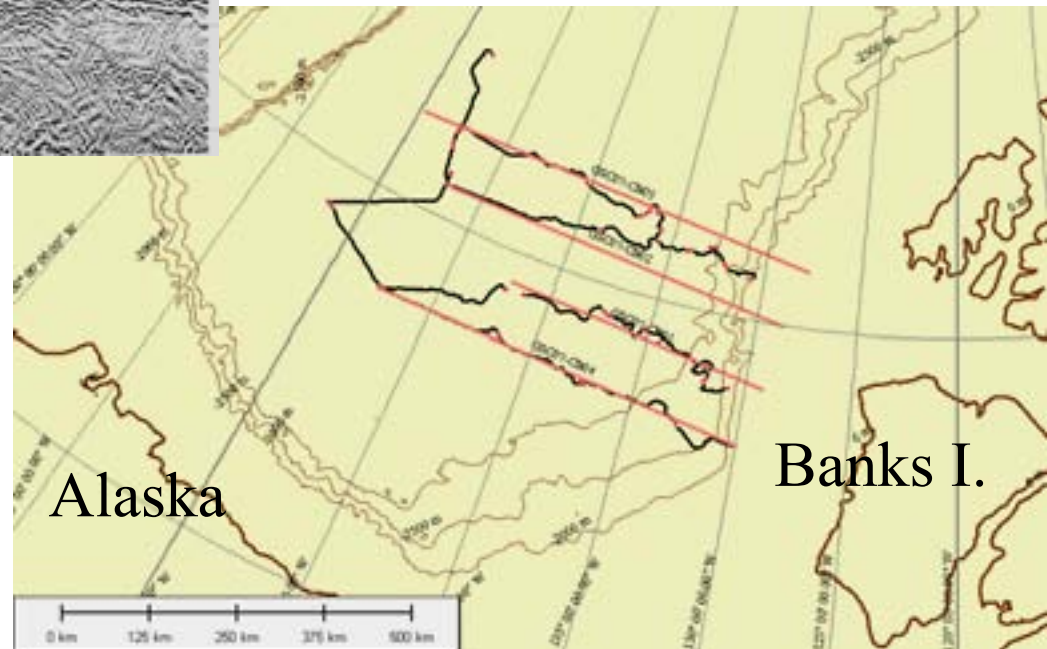




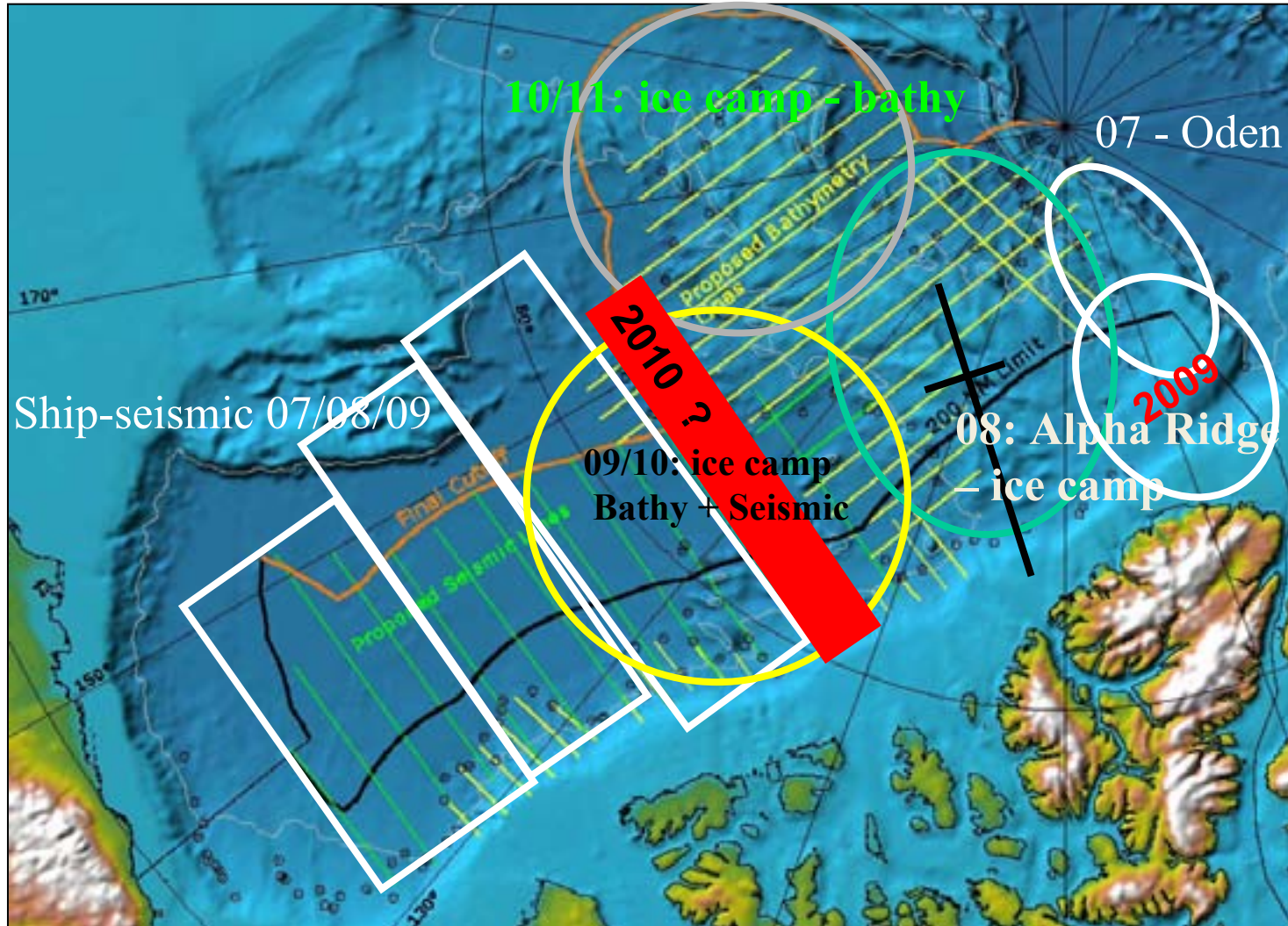
# 2007 SEISMIC SURVEY PLAN - ACHIEVED



3000 km excellent seismic data  
7800 km Bathymetric data



# DRAFT SURVEY PLAN 2007-2011



400 nm  
(720 km)

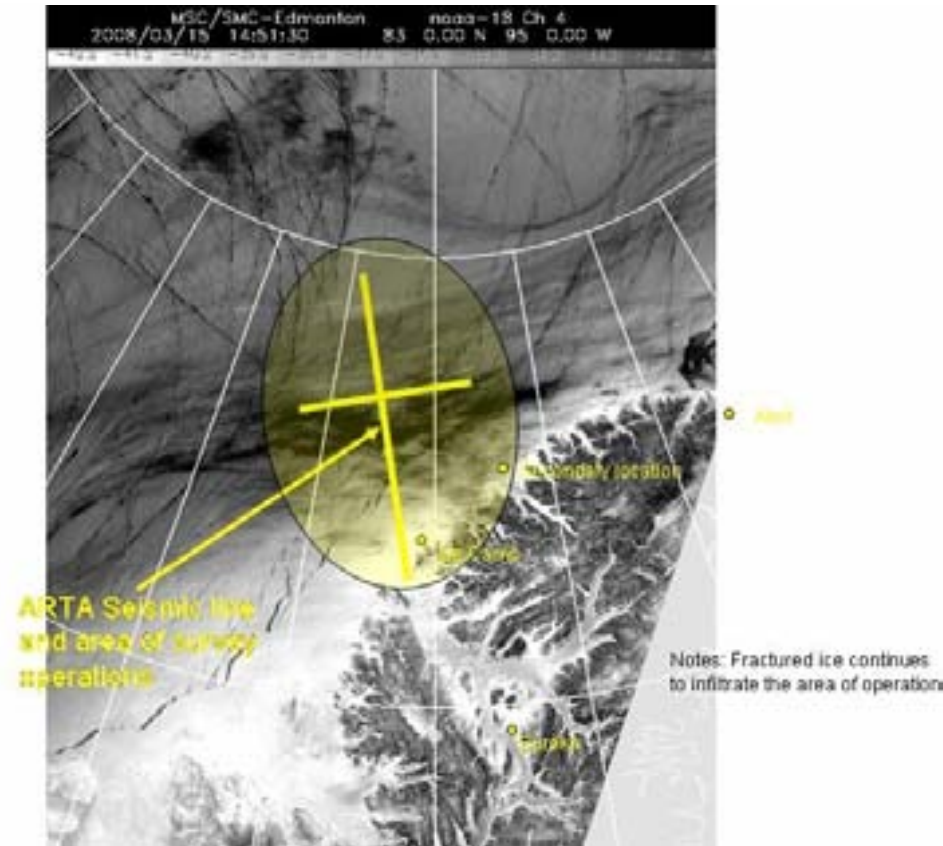
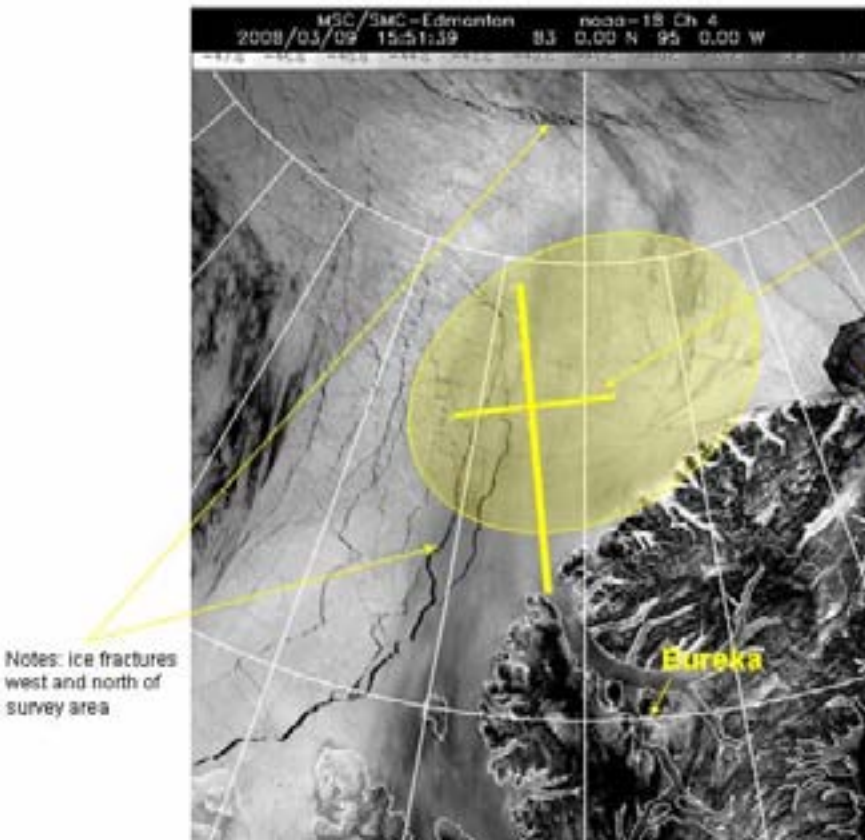


# ARTA

## (Alpha Ridge Test Appurtenance)

### March 9

### March 15





# ARTA Camp



# Ice



# Sounding & Gravity





# Seismic

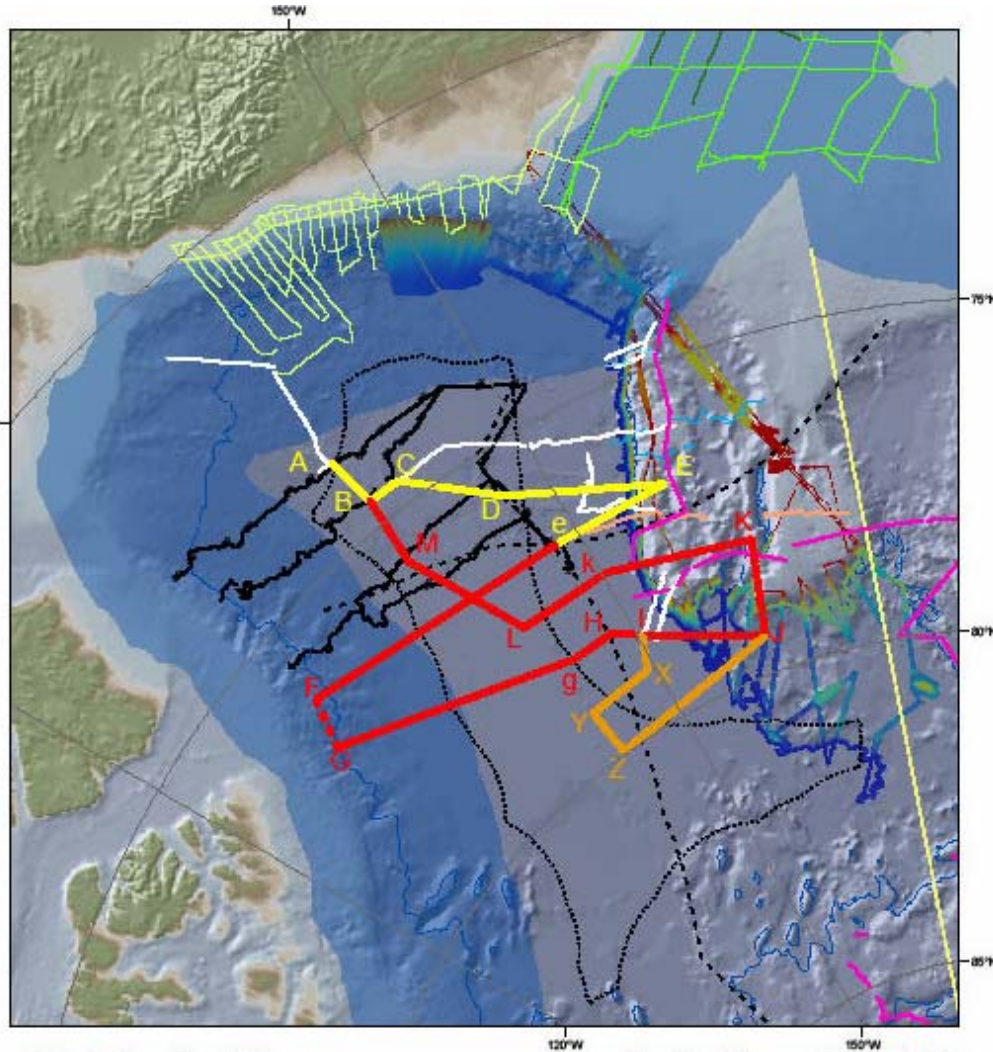


# Accomplished to Date



- Excellent collaboration among 3 Departments:
  - DFAIT, DFO, NRCan
- Excellent Support – Coast Guard
- UNCLOS office and Team in Place
- Initiated data collection:
  - Arctic: 2006 and 2007
  - Atlantic: 2006 (bathymetry), 2007 (seismic)
- International collaboration:
  - MOU with Denmark - cooperative surveys & interpretation
  - discussions with USA (joint survey in 2008)
  - discussions with Russia re- Arctic data
  - discussion on CLCS process with nations who have submitted

# 2008 Joint Canada-USA Survey



CCGS Louis S. St-Laurent



USCGC Healy





# Conclusions



## **Challenges continue**

- **Rising costs of surveys (Fuel, Vessel Charters, Aircraft)**
- Uncertainty of Weather & ice in Arctic
- Icebreaker Availability and Capability

## **Mitigation steps are in place:**

- Budget 2008 addresses rising costs & Legal Costs for next 2 years
- Results of 2008 Formative Evaluation will identify risks and mitigation options, including budget constraints.
- Alternatives – e.g. ice pick Sono Buoy / Unmanned Underwater Vehicles / Additional Surveys to recover lost season
- Help from a higher power – ideal conditions: cold winters with stable ice and warm summers with unstable ice
- **Consequence:**
  - On track for 2013 submission

# Thank You



## Acknowledgements:

Co-Authors: Wendell Sanford & Jacob Verhoef  
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Ruth Jackson – Chief Scientist & her teams  
Tim Janzen – ODEN  
GEUS – images from ODEN trip  
Ron Verrall – ARTA images

# Extra slide





# Formulae



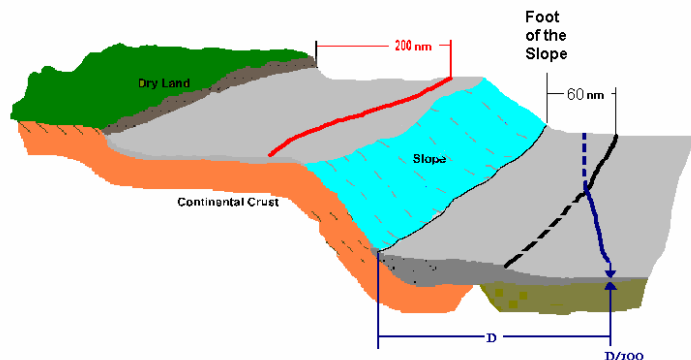
## ARTICLE 76

allows extension of  
continental shelf beyond 200 nm  
(to be claimed within 10 years of ratification;  
for Canada: December 2013)

### Outer Limit

measured from the “Foot of the Slope”  
options:

- a) a distance of 60nm, or
- b) to a point where thickness of  
sedimentary rocks is 1% of the  
distance to the foot of the slope



### Constraints

Continental Shelves are constrained by:

- the most seaward of a line 350nm from the  
baselines or
- a line 100nm seawards of the 2500m depth  
contour



# Summary of Canadian UNCLOS program



2003	designing plan and costing
2005	Initiate program and start data compilation
2006	Initiate data collection in Atlantic Initiate data collection in Arctic (with Denmark)

**Nov 2007      Review: Change direction/funding?**

2008	Finalize data collection and analysis in Atlantic Initiate preparing of submission Continue data collection in Arctic
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**Nov 2010      Review: Atlantic OK?; Arctic issues/funding?**

2011	Finalize Arctic data collection Finalize submission preparation
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**Nov 2013      Submission to UN**