Homeland Security

U.S. COAST GUARD

U.S. Coast Guard Polar Icebreaker Program

November 2003

USCG – Polar Ice OPs Program History

1885
Cutter Bear – explores Alaskan waters for 40 years

1900

1936-1941
USCG initiated intensive study of heavy icebreaker design

WWII
USCG/USN Wind class & Mackinaw

1946
Operation High Jump – Admiral Byrd's Antarctic expedition

1950's
DEW stations built - required icebreakers for re-supply

1955-56
First Operation Deep Freeze - permanent US presence on Antarctica

1965-66
Joint study - USN xfers all icebreakers to USCG – 8 icebreakers

1971
Alaskan north slope oil discovered – polar icebreakers receive national interest

Late 1970's
POLAR STAR & POLAR SEA built

1980's
Older icebreakers decommissioned. By 1989, PSEA & PSTAR only 2.

1999/2000
USCGC HEALY: Planned in 80's, funded 90's, operational in 2000

2000

TODAY

Validation of National Polar Icebreaker Requirements

- **1990 Presidential Report on Polar Icebreaker Requirements**

Current effort is to revalidate

Recent Operational Damage: Cause & Effects

Demanding Ice Conditions = High Maintenance costs & High Personnel costs!

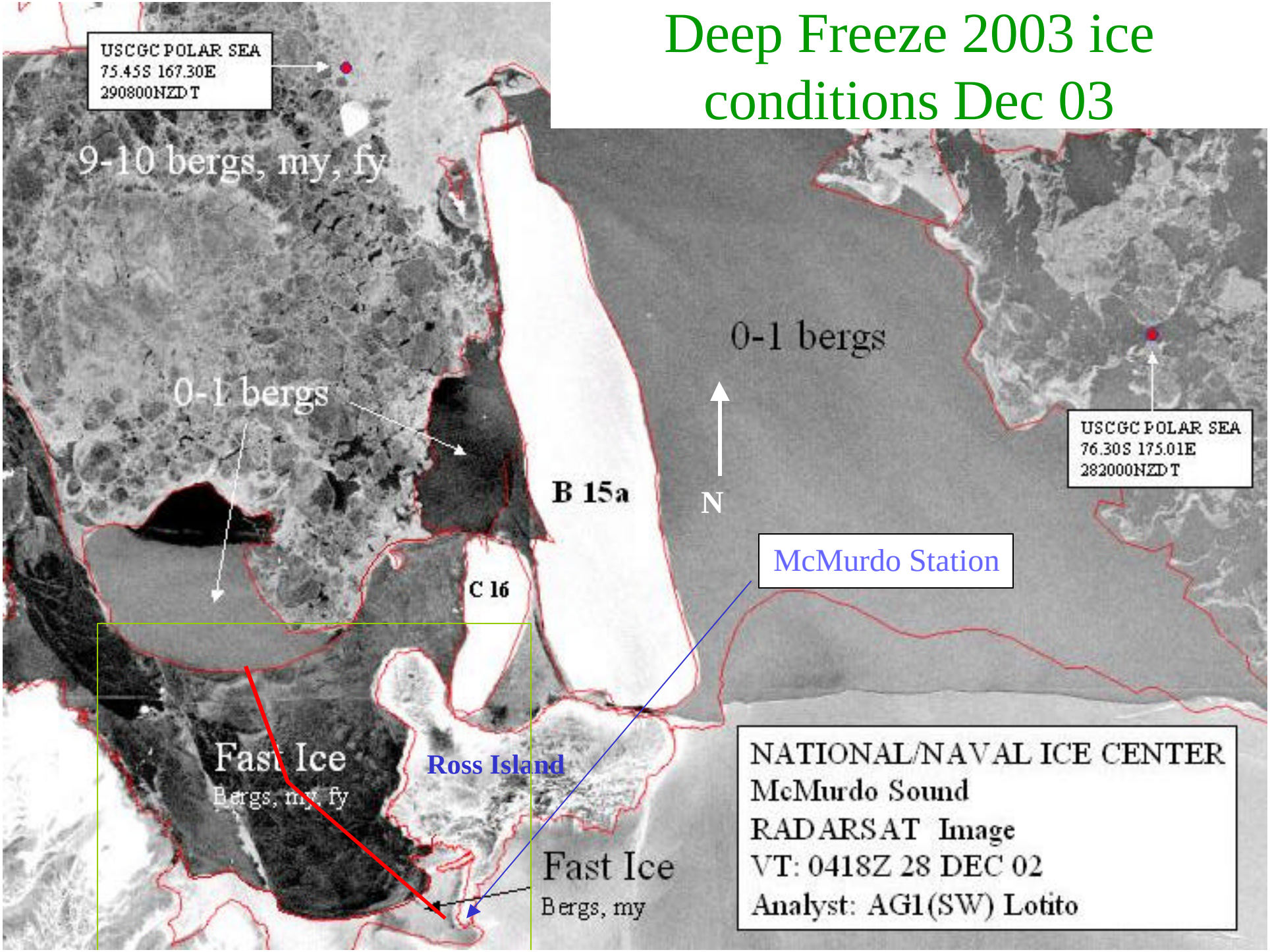
Polar Icebreaker Program issues

1. FY 03 HAPPS $2.5M reduction
2. FY 04 $2.5M additive reduction & HAPPS direction to renegotiate MOA
3. Re-validate or update 1990 Presidential Report on Polar Icebreaker Requirements.
4. Replace or upgrade POLAR SEA & POLAR STAR
   a. Mission analysis, Operational Req'mts – FY04
   b. Major Acquisition process – start FY 06??
   c. Competition with other major acquisition projects.
   d. Removal of one Polar WAGB fm schedule for 1-2 years
      - May need CGC HEALY to assist w/ Operation Deep Freeze, if needed

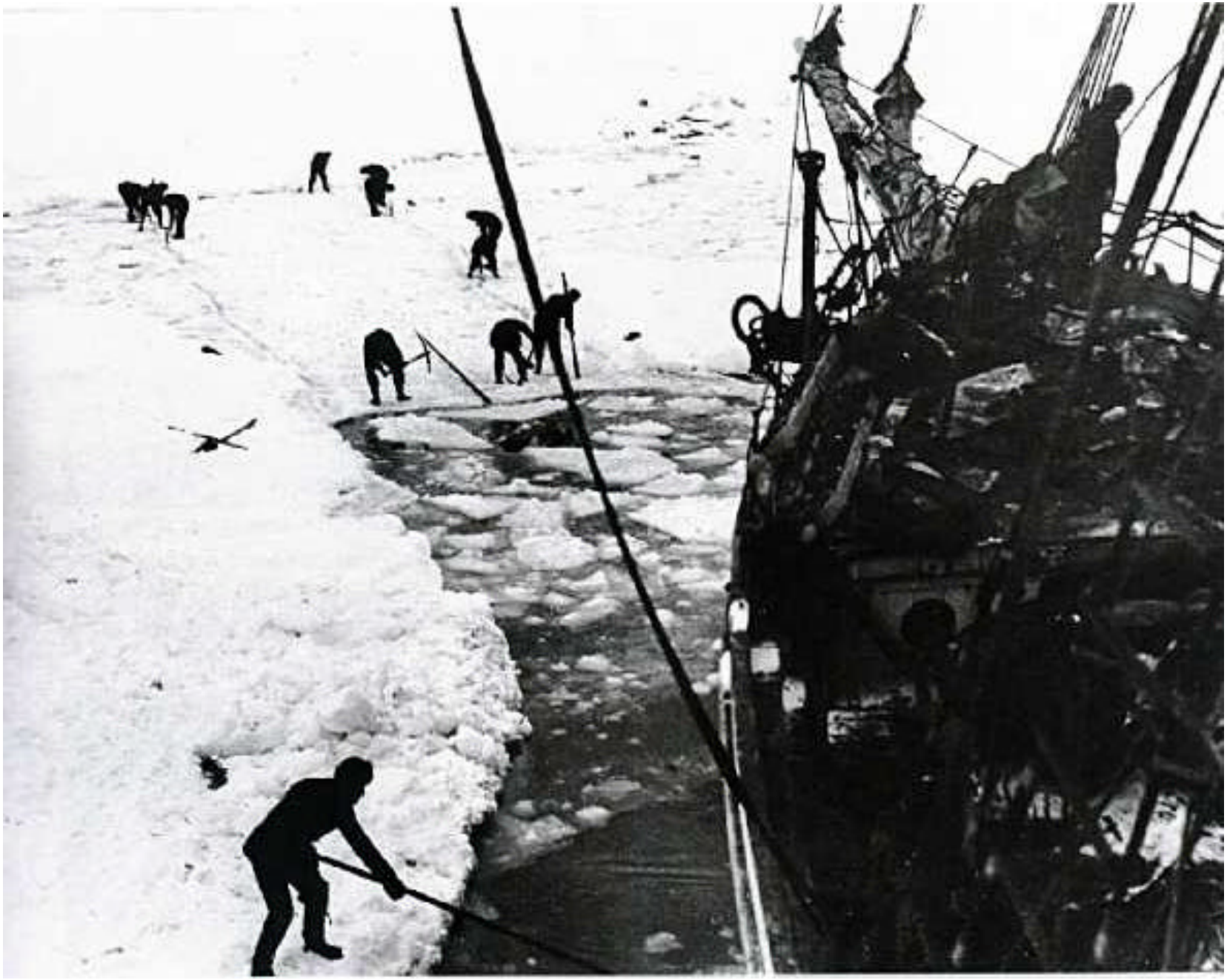
Operation Deep Freeze

Ideal Ice Channel

Deep Freeze 2003 ice conditions Dec 03



Deep Freeze Operations after 16 Jan 03



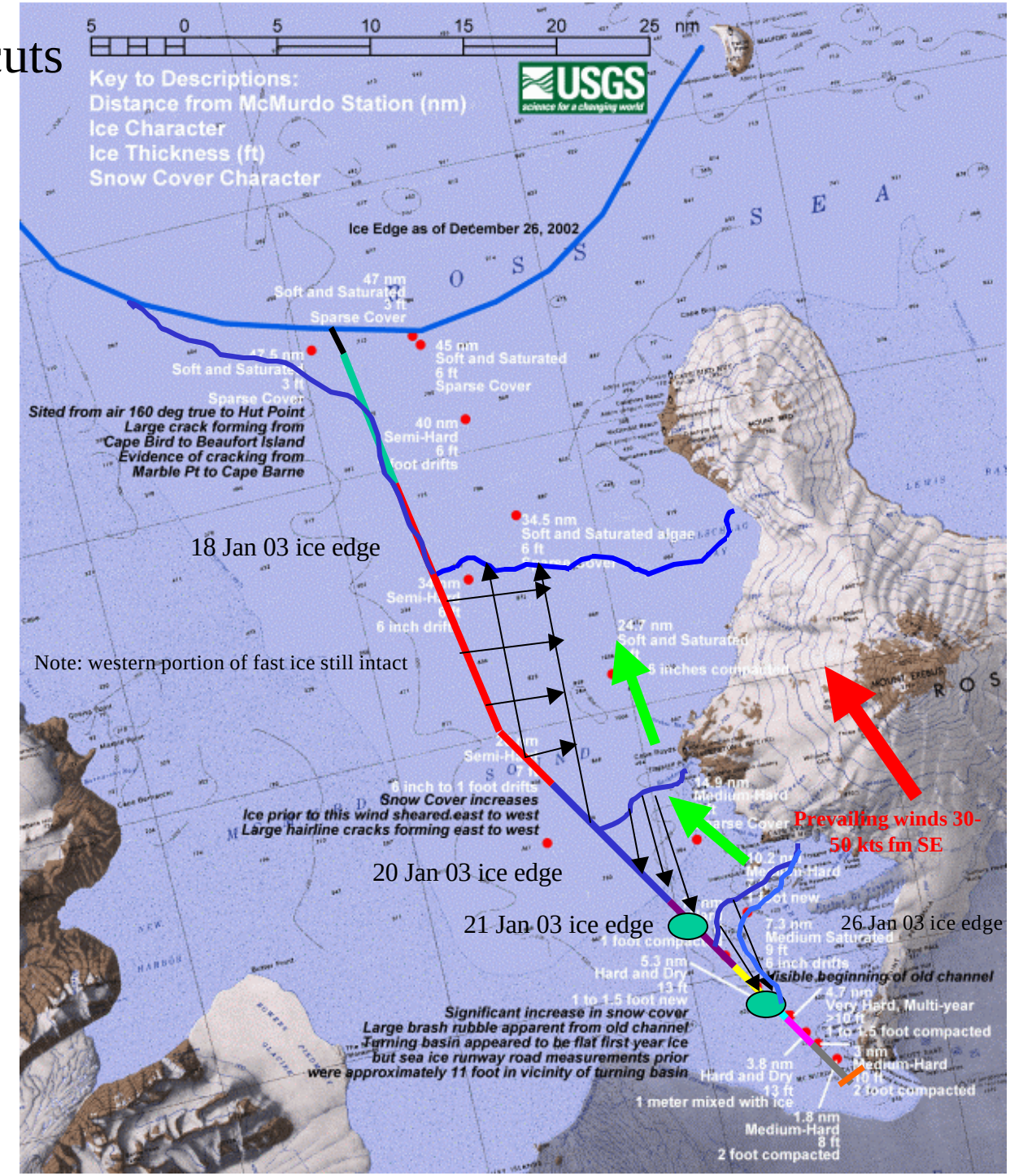
DF 03 Fast ice opening cuts

Started working cuts to open up “pie” slice in fast ice on 18 Jan to take advantage of strong SE winds. On 20 Jan, after completing pie cut, eastern fast ice along west coast of Ross Island breaks free and drifts north

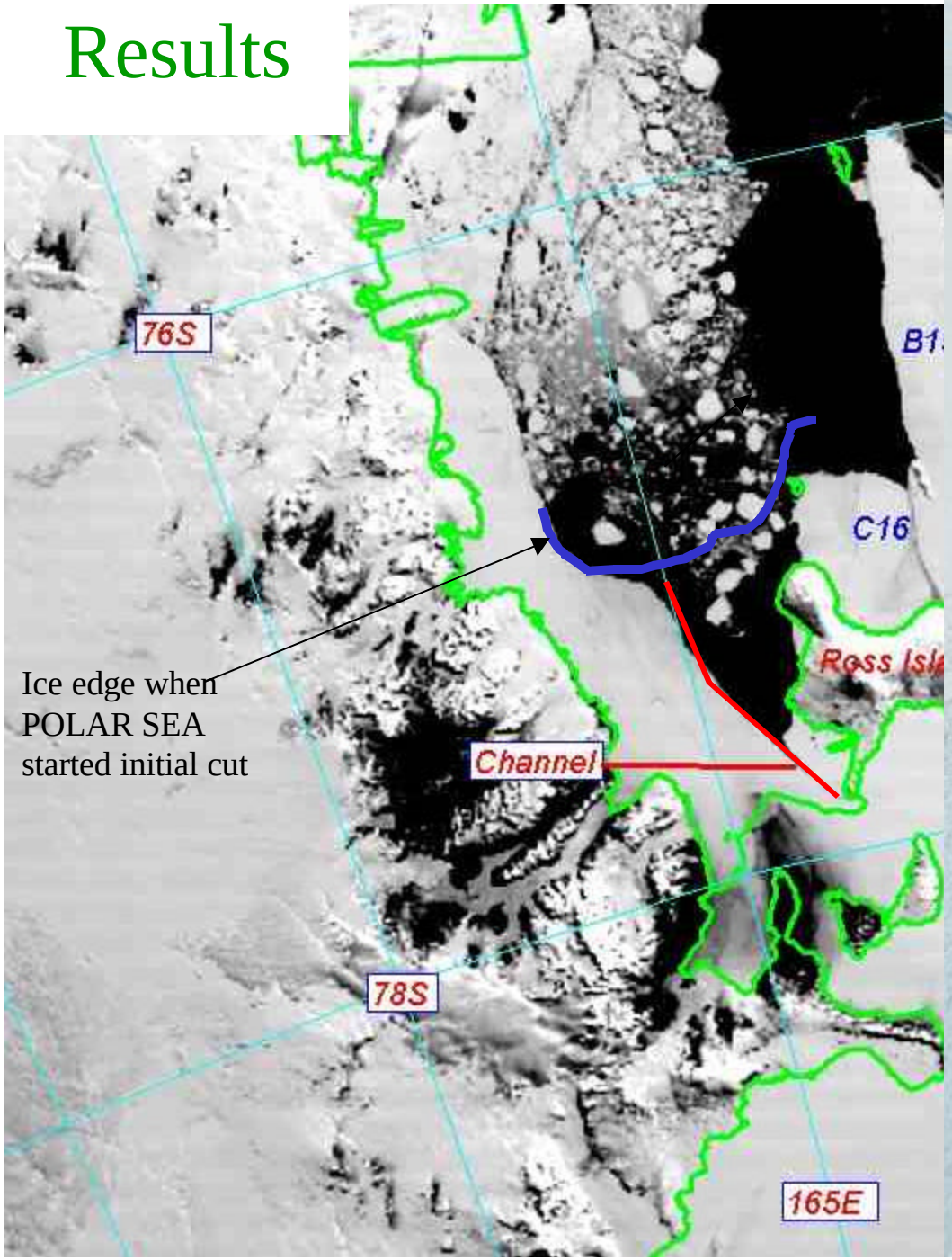
On 20 Jan, POLAR SEA then started working “V” cuts toward 15 nm mid-channel turning basin to allow winds to blow ice out of channel. After completing “V” cuts on 21 Jan, more fast ice breaks free and drifts north.

22-26 Jan 03: POLAR SEA then started “V” cuts to 7.5 nm mid-channel turning basin to take advantage of still strong SE prevailing winds.

28 Jan to present: POLAR SEA working most difficult portion of channel from 7.5 nm to Hut Point. This is very thick and hard multi-year ice. Winds are no longer a factor, correspondingly progress is much slower.



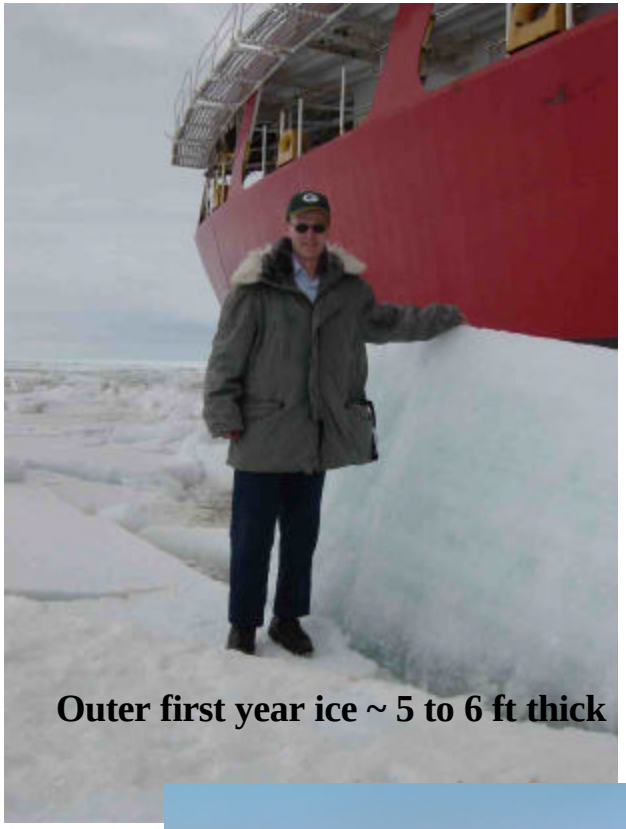
Results



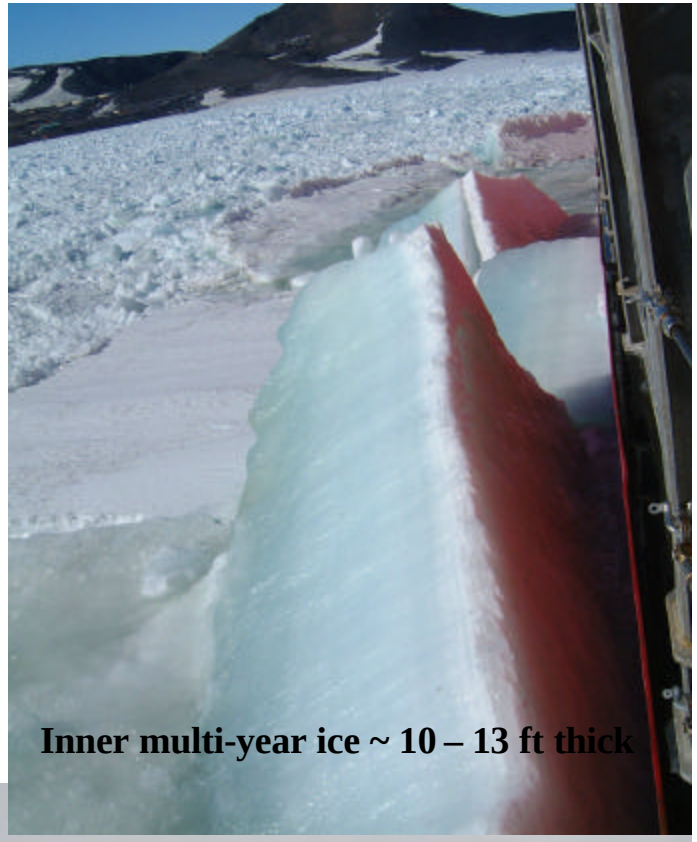
Ice edge when POLAR SEA started initial cut

Ice Conditions & Mechanical Problems

Sea Ice thickness, age & hardness



Outer first year ice ~ 5 to 6 ft thick

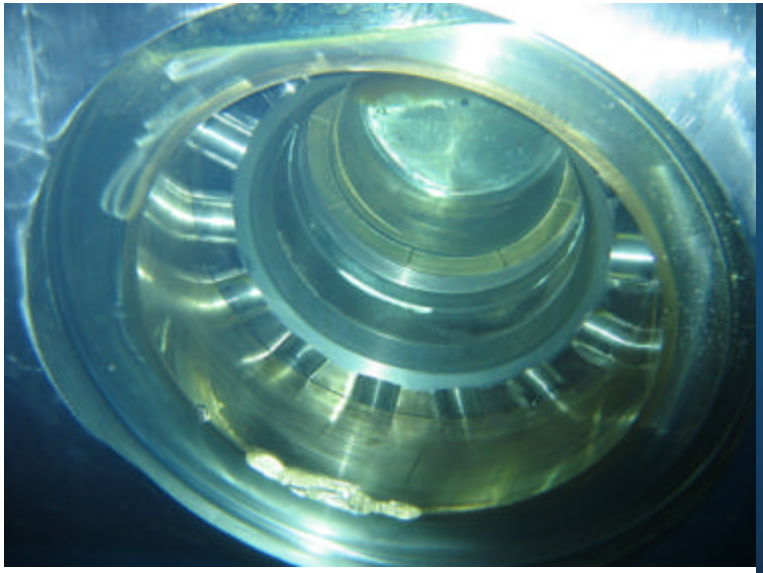


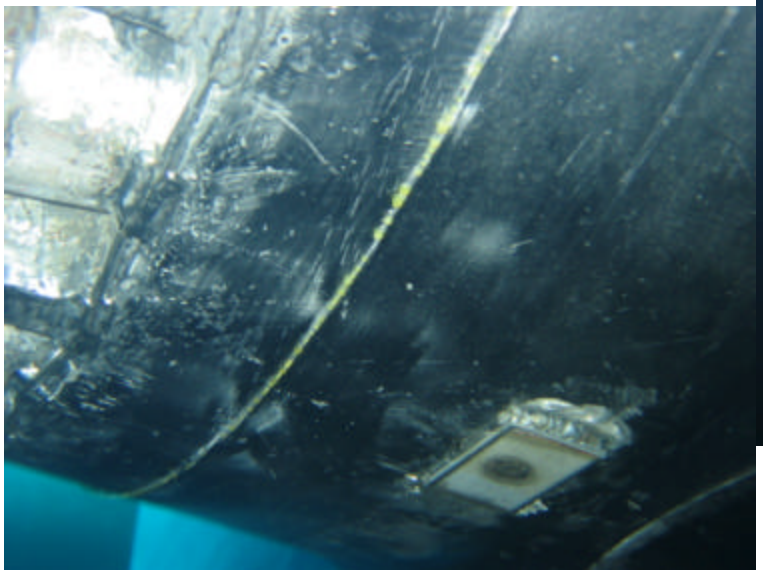
Inner multi-year ice ~ 10 – 13 ft thick

Multi-year ice. Note color - mostly fresh, very hard

Multi-year ice with ~ 18 “ snow

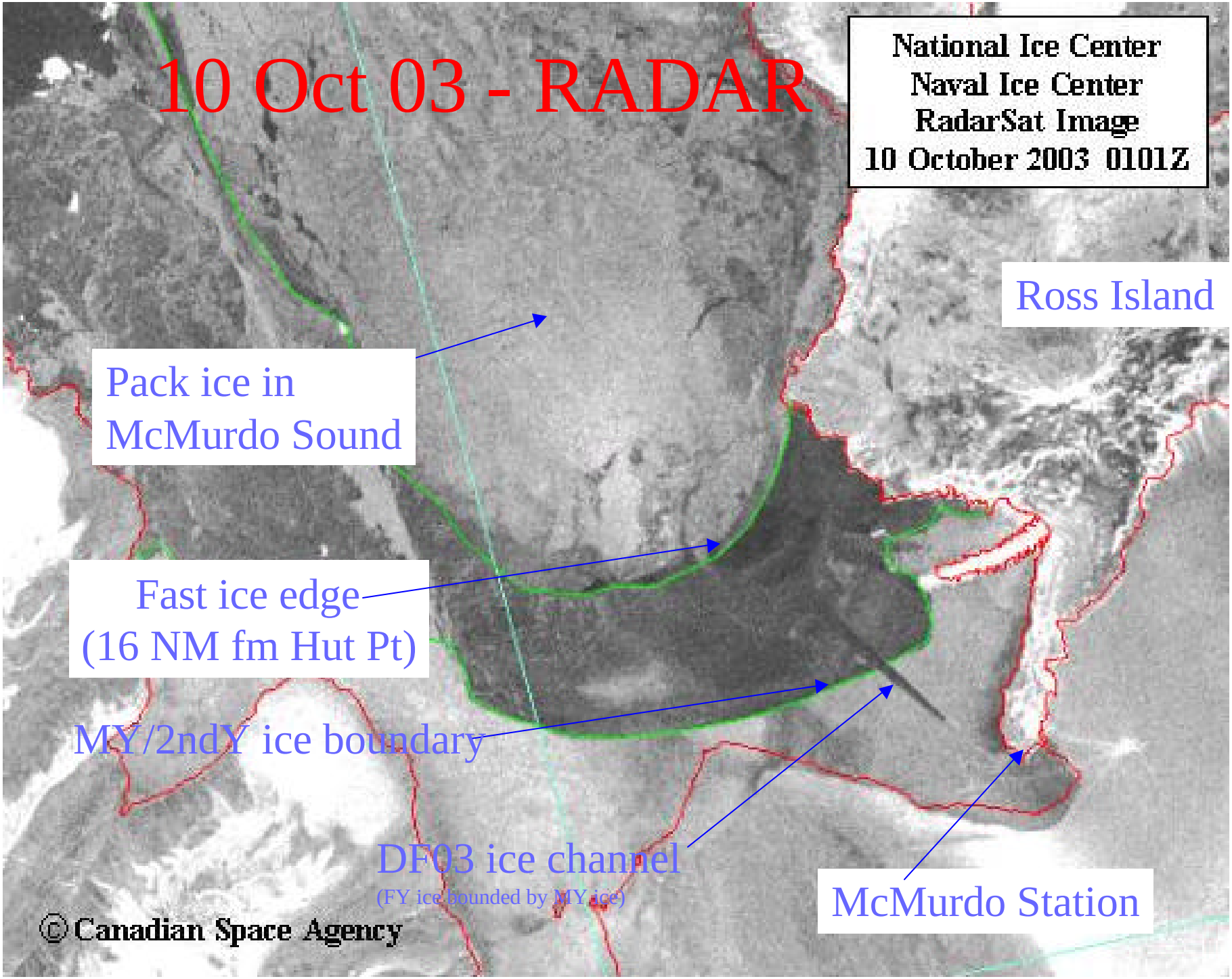
Cause - Milling

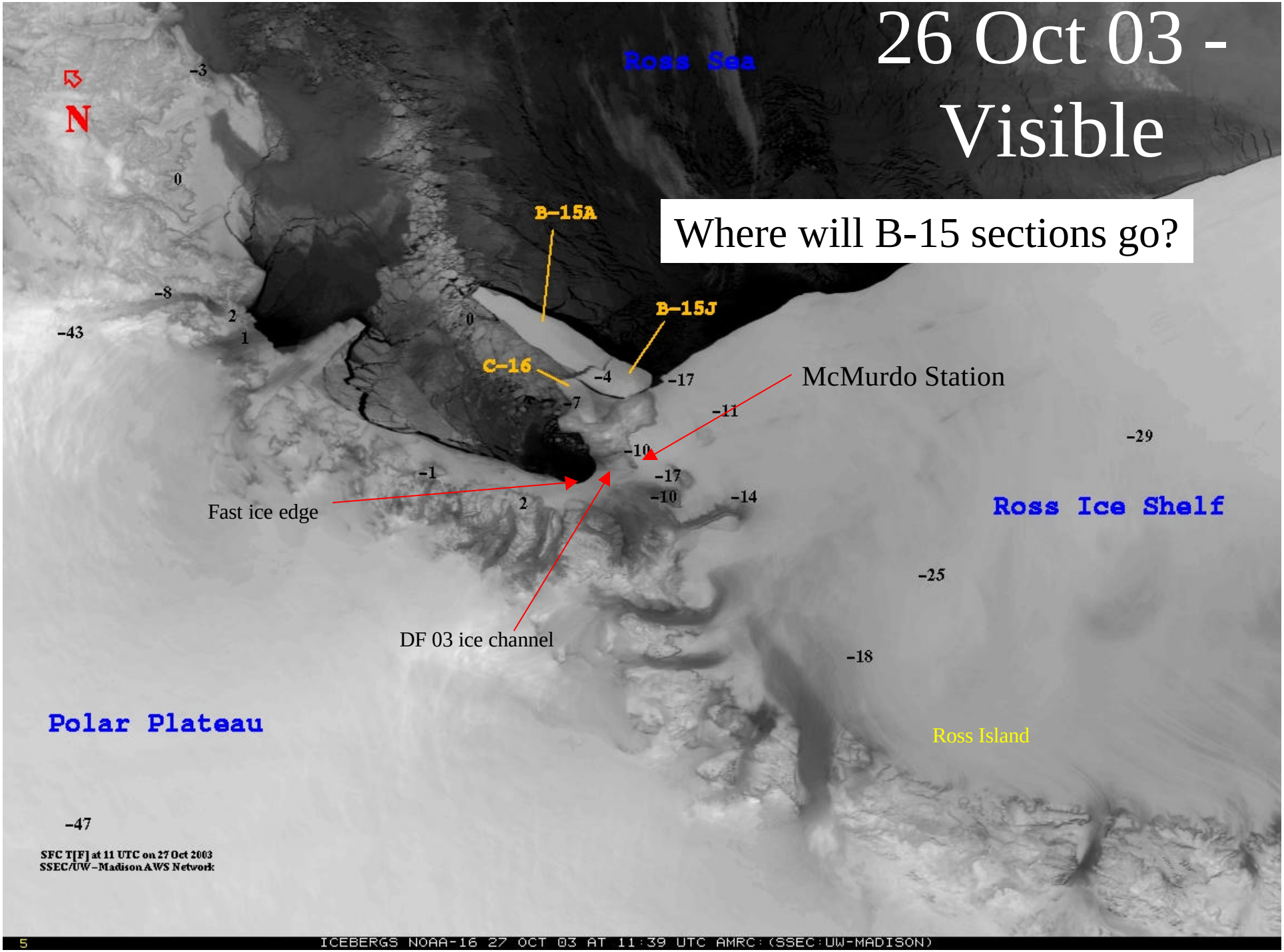




Effect – CPP damage

Current Deep Freeze Ice conditions


10 Oct 03 - RADAR
National Ice Center
Naval Ice Center
RadarSat Image
10 October 2003 0101Z
Ross Island
Pack ice in
McMurdo Sound
Fast ice edge
(16 NM fm Hut Pt)
MY/2ndY ice boundary
DF03 ice channel
(FY ice bounded by MY ice)
McMurdo Station
© Canadian Space Agency


26 Oct 03 - Visible
Where will B-15 sections go?
Ross Sea
N
B-15A
B-15J
C-16
McMurdo Station
Fast ice edge
DF 03 ice channel
Ross Ice Shelf
Polar Plateau
Ross Island
-3
0
-8
2
-43
1
0
-4
-17
-7
-11
-29
-10
-1
-17
-10
-14
2
-25
-18
-47
SFC T[F] at 11 UTC on 27 Oct 2003
SSEC/UW-Madison AWS Network
5
ICEBERGS NOAA-16 27 OCT 03 AT 11:39 UTC AMRC:(SSEC:UW-MADISON)

CCGS AMUNDSEN

CANADIAN RESEARCH ICEBREAKER

Canadian consortium of 27 PIs from 12 Canadian universities and 27 PIs from 5 Federal departments. 66 Arctic experts from 44 institutions in 9 foreign countries. Co-management with Canadian Coast Guard-DFO.

CFI Canadian Icebreaker Project ($27,7M)

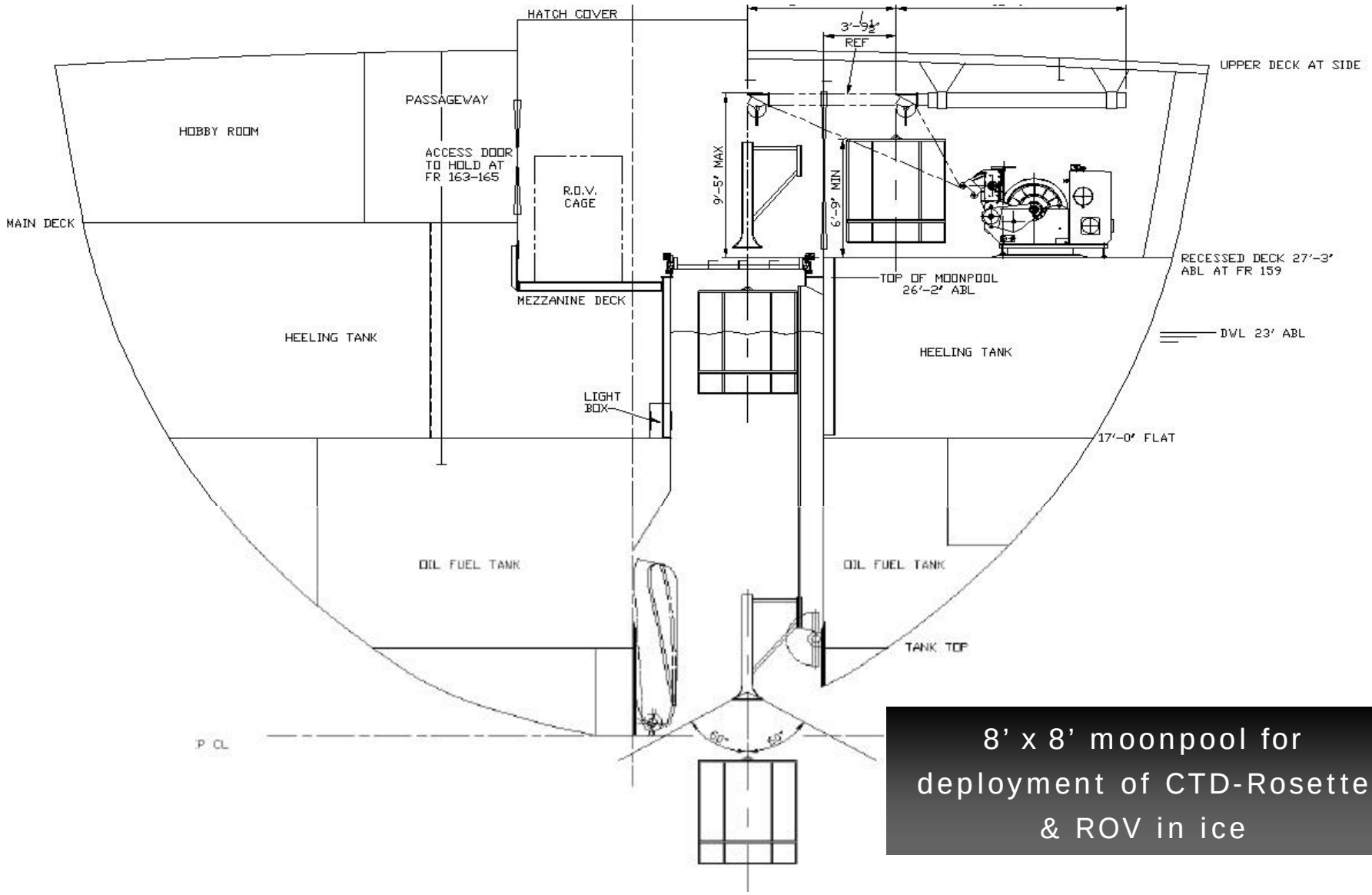
1. **Reactivation** ($2,8M) + $2,8M from DFO-CG
   - Engines, boilers, navigation, cranes, electric …..
2. Scientific modifications ($12,77M)
   - Moon pool, Dynamic positioning, Internal communications, laboratories, winches, A-frames … …
3. Scientific equipment pool ($8,76M)
   - EM300 Multibeam, EK60 echosounder, Shipborne ADCP, mooring equipment (ADCPs, current meters, traps), lab equipment, ROV, plankton nets, ice camp support..
4. Operation costs ($5,55M)
   - Part of shiptime cost for scientific projects conducted on ship

CCGS AMUNDSEN

CANADIAN RESEARCH ICEBREAKER

CCGS AMUNDSEN
CANADIAN RESEARCH ICEBREAKER

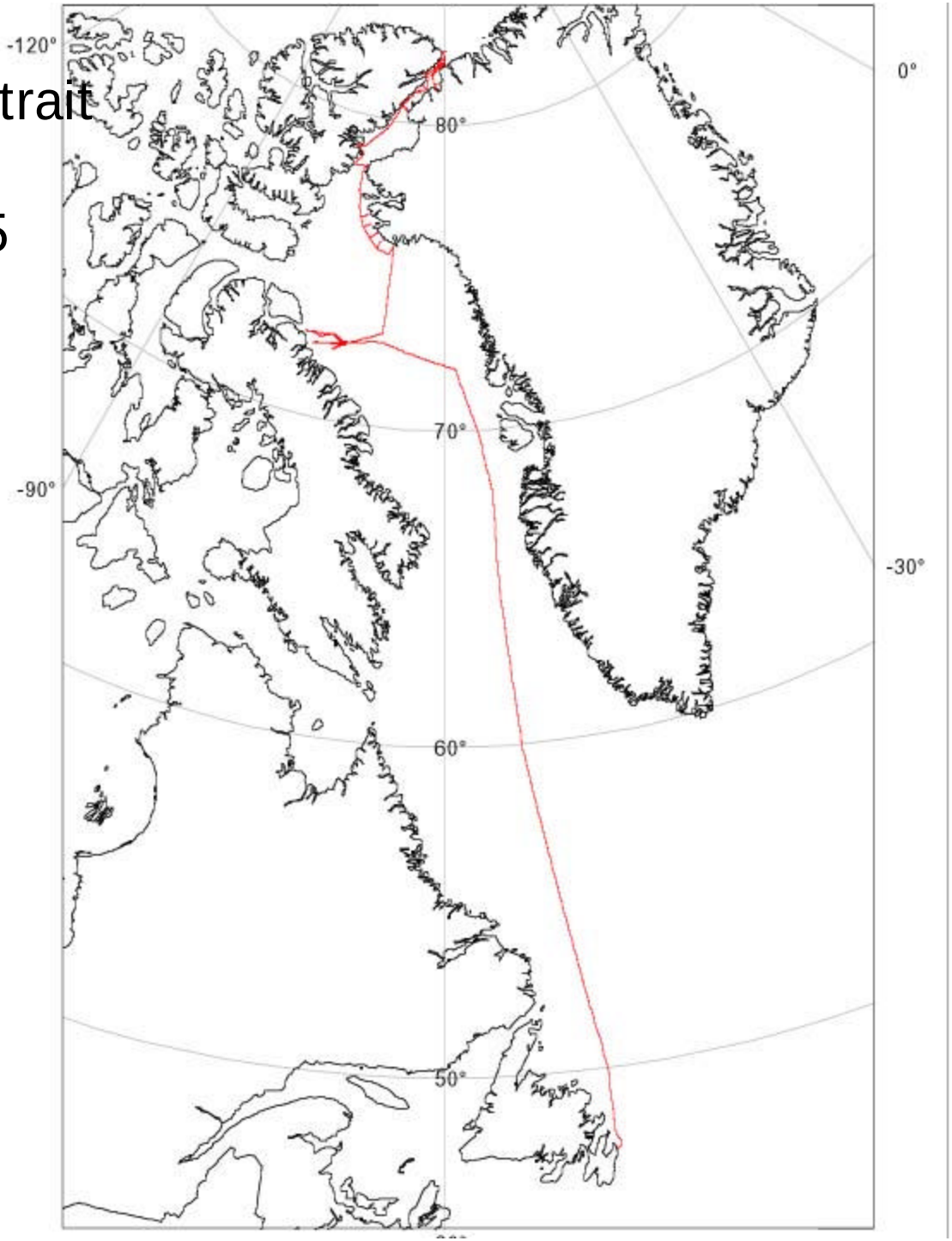
Scientific modifications

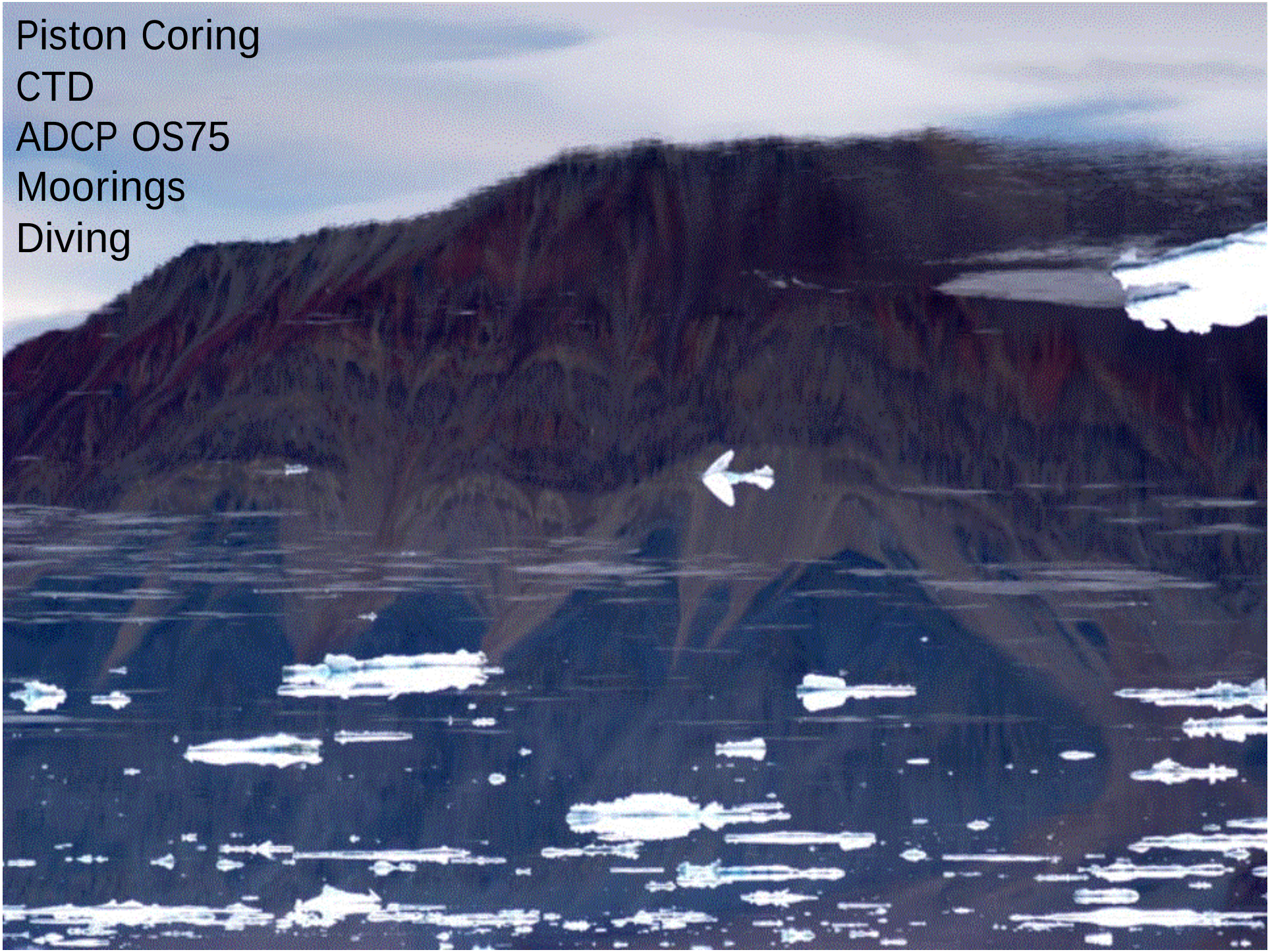


8' x 8' moonpool for deployment of CTD-Rosette & ROV in ice

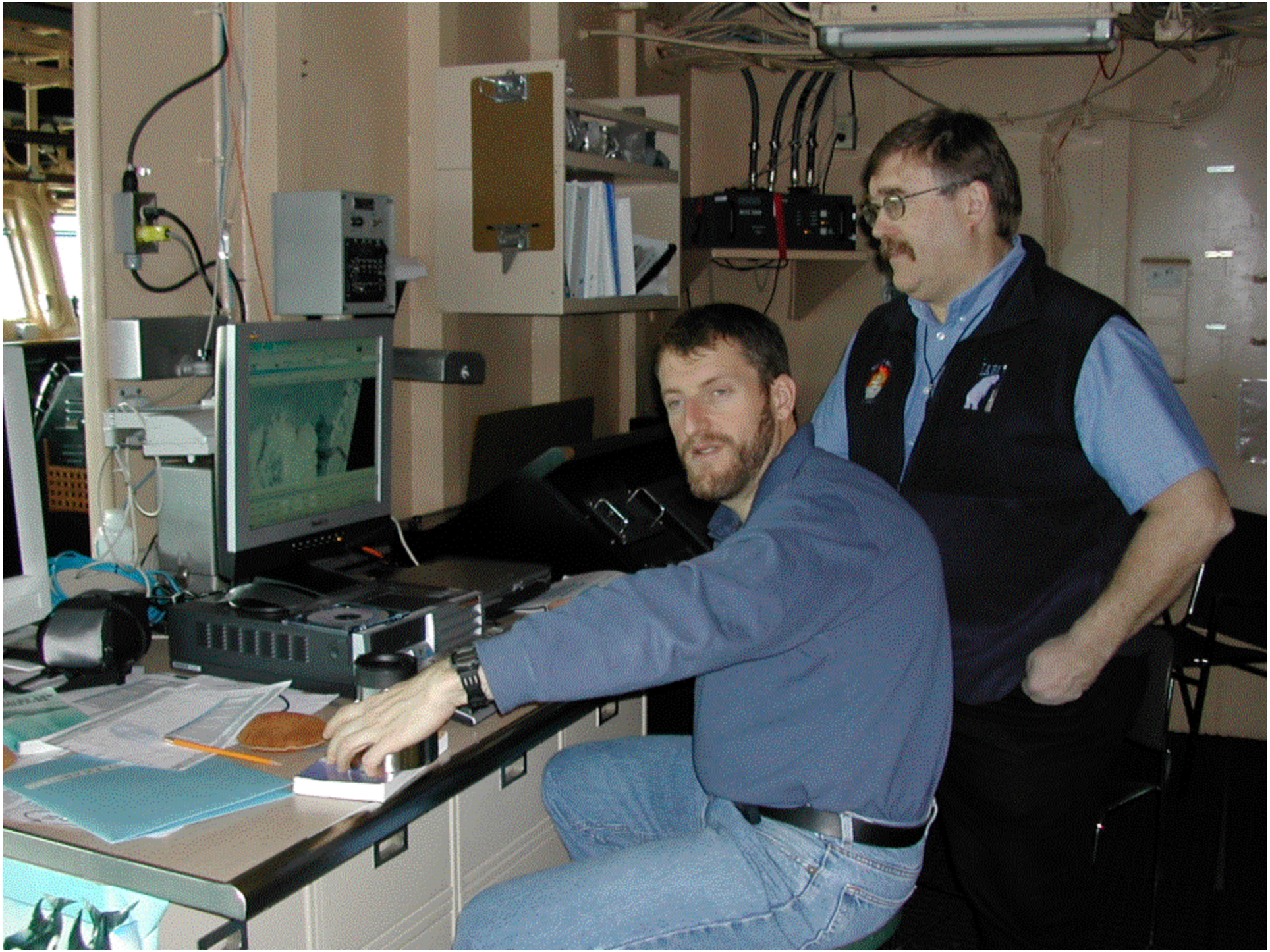

20
U. S. COAST GUARD

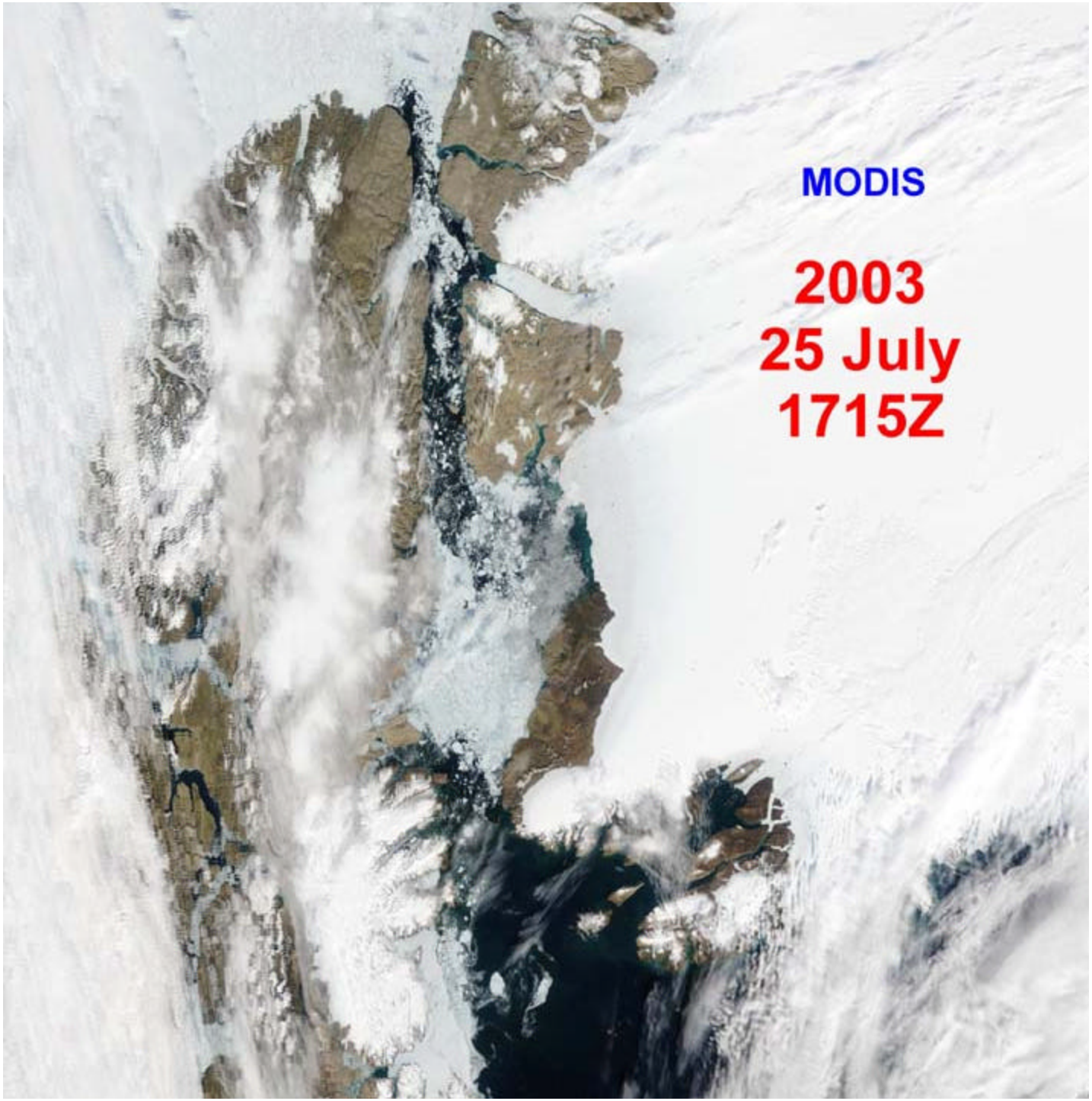
Healy Nares Strait
NSF cruise
Jul 21- Aug 15

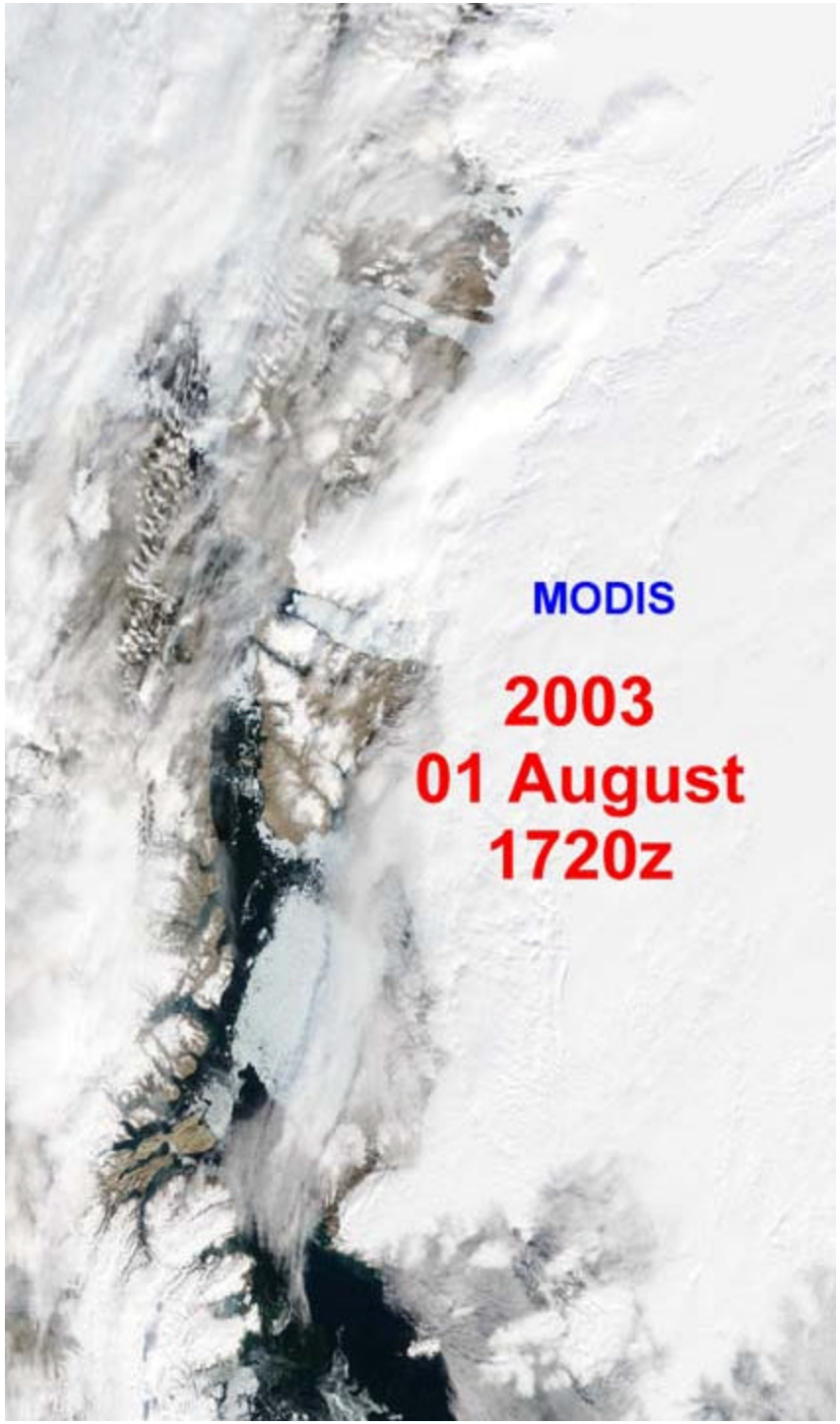


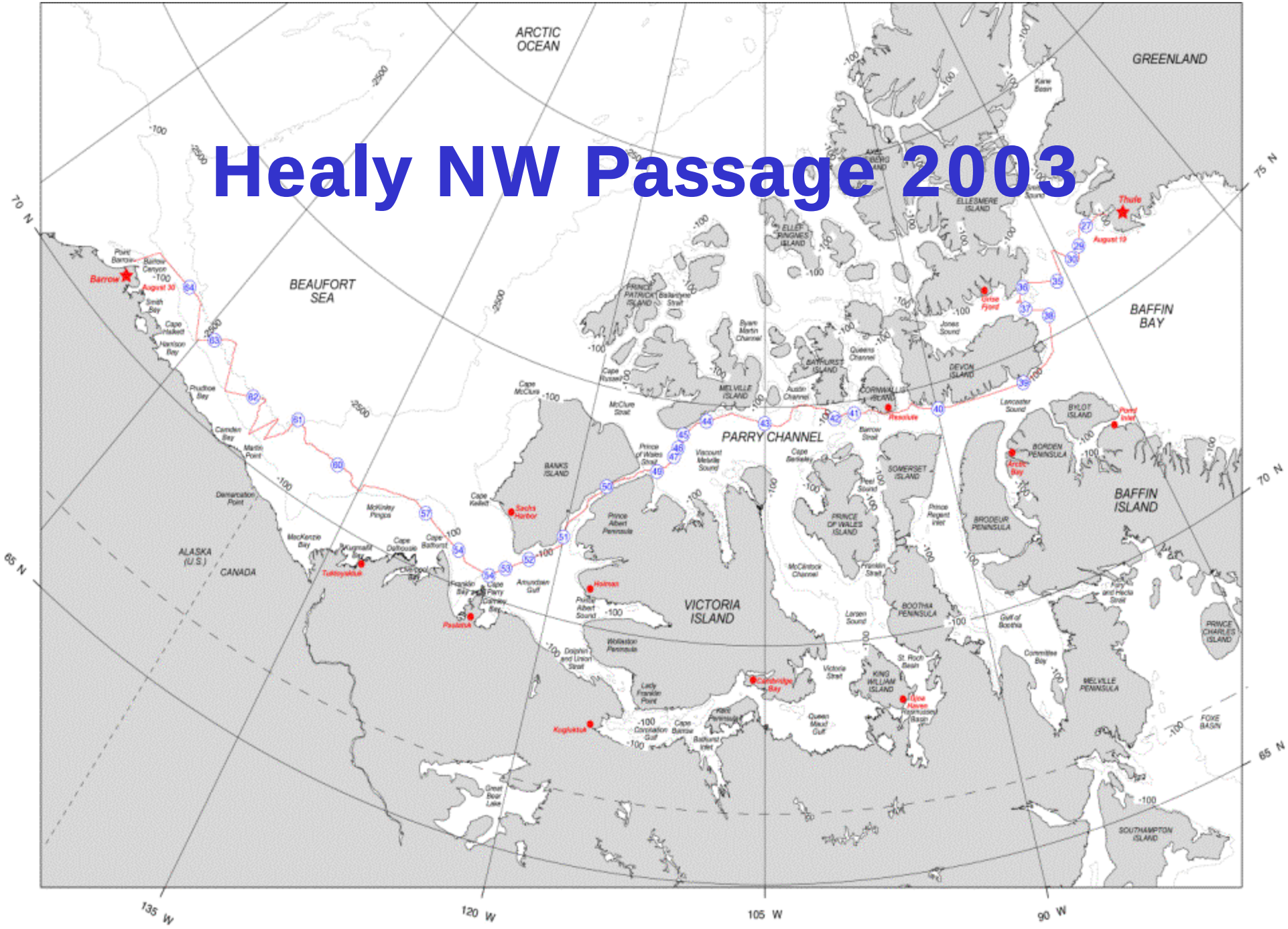

Piston Coring
CTD
ADCP OS75
Moorings
Diving

Iridium- Voice/Data High Latitude communications

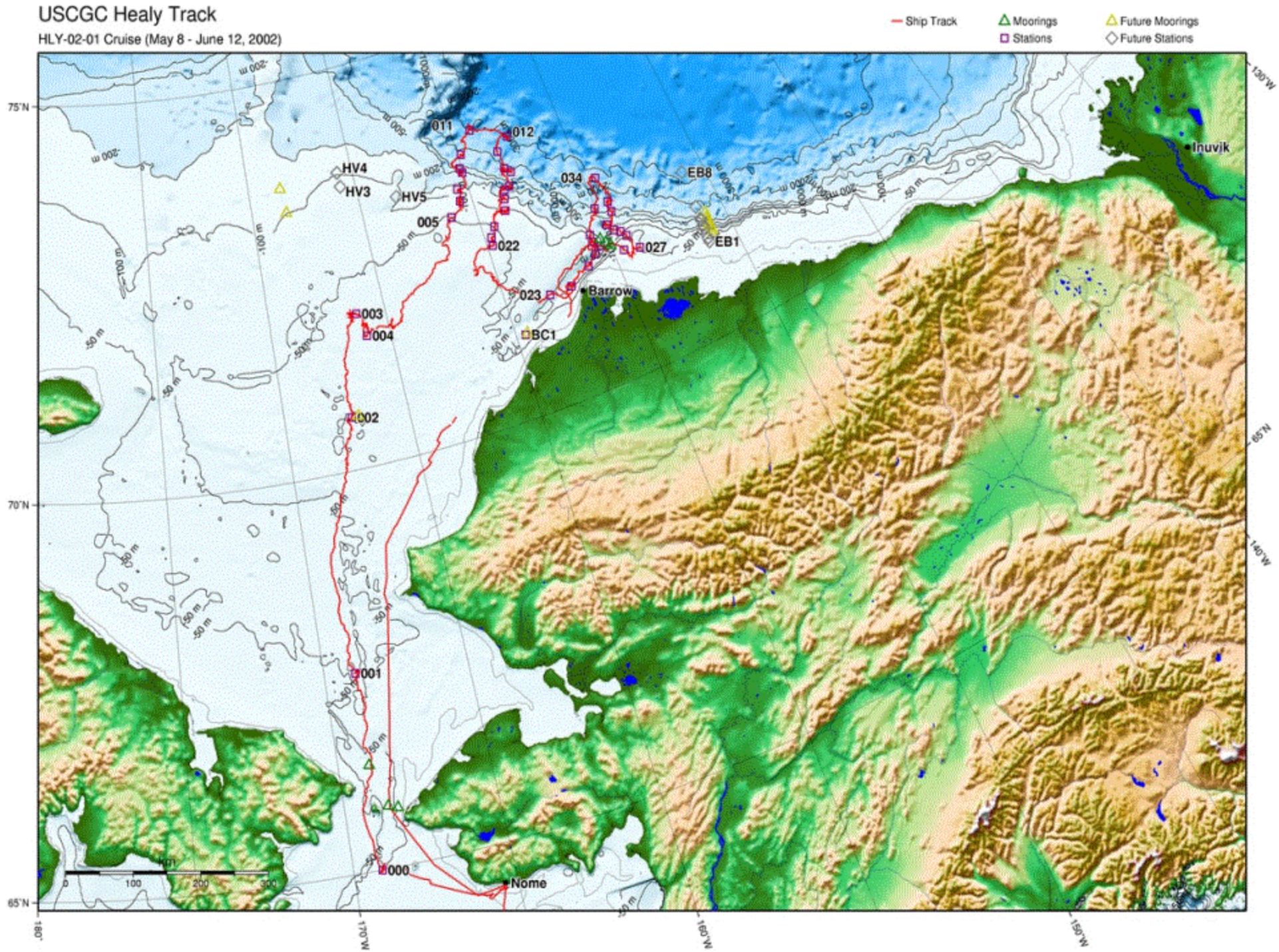



MODIS
2003
25 July
1715Z


MODIS
2003
01 August
1720z


Healy NW Passage 2003
ARCTIC OCEAN
GREENLAND
BEAUFORT SEA
BAFFIN BAY
PARRY CHANNEL
VICTORIA ISLAND
BAFFIN ISLAND
ALASKA (U.S.)
CANADA
Barrow
August 30
Thule
August 19
Resolute
Grise Fjord
Arctic Bay
Pond Inlet
Sachs Harbor
Holman
Paulatuk
Tuktoyaktuk
Kugluktuk
Cambridge Bay
Cape Parry
Cape Bathurst
Cape Dalhousie
Cape Kellett
Cape McClure
Cape Barrow
Point Barrow
Barrow Canyon
Prudhoe Bay
Camden Bay
Demarcation Point
Martin Point
Harrison Bay
Smith Bay
Cape Halkett
MacKenzie Bay
McKinley Pingos
Kugmallit Bay
Franklin Bay
Darnley Bay
Amundsen Gulf
Prince Albert Sound
Prince Albert Peninsula
Wollaston Peninsula
Dolphin and Union Strait
Lady Franklin Point
Victoria Strait
Queen Maud Gulf
Coronation Gulf
Bathurst Inlet
Great Bear Lake
Banks Island
Prince of Wales Strait
Vicount Melville Sound
McClure Strait
Barrow Strait
Peel Sound
Franklin Strait
McClintock Channel
Larsen Sound
Prince Regent Inlet
Somerset Island
Prince of Wales Island
Boothia Peninsula
Gulf of Boothia
Committee Bay
King William Island
St. Roch Basin
Melville Peninsula
Foxe Basin
Southampton Island
Prince Charles Island
Lancaster Sound
Jones Sound
Queens Channel
Austin Channel
Byam Martin Channel
Prince Patrick Island
Ballantyne Strait
Melville Island
Bathurst Island
Cornwallis Island
Devon Island
Ellesmere Island
Ellef Ringnes Island
Axel Heiberg Island
Kane Basin
Borden Peninsula
Brodeur Peninsula
Byot Island
Hecla and Griper Bay
Eclipse Sound
Navy Board Inlet
Milne Inlet
Resolute Passage
Foxe Basin
70 N
65 N
75 N
135 W
120 W
105 W
90 W
-100
-2500
GMT
HLY-03-Td
Lambert Conformal Conic Projection (origin 105W/70N scale 1:12500000 parallels 60N,80N) with GSHHS Coastline and GEBCO Bathymetry
XCTD DROP


HEALY
20


USCGC Healy Track
HLY-02-01 Cruise (May 8 - June 12, 2002)
Ship Track
Moorings
Stations
Future Moorings
Future Stations
011
012
034
HV4
HV3
HV5
005
022
027
EB8
EB1
023
003
004
BC1
002
001
000
Barrow
Inuvik
Nome
75°N
70°N
65°N
180°
170°W
160°W
150°W
130°W
65°N
140°W
0
100
200
300