



United States Coast Guard

International Ice Patrol

Byron Willeford

April 10, 2015



United States Coast Guard

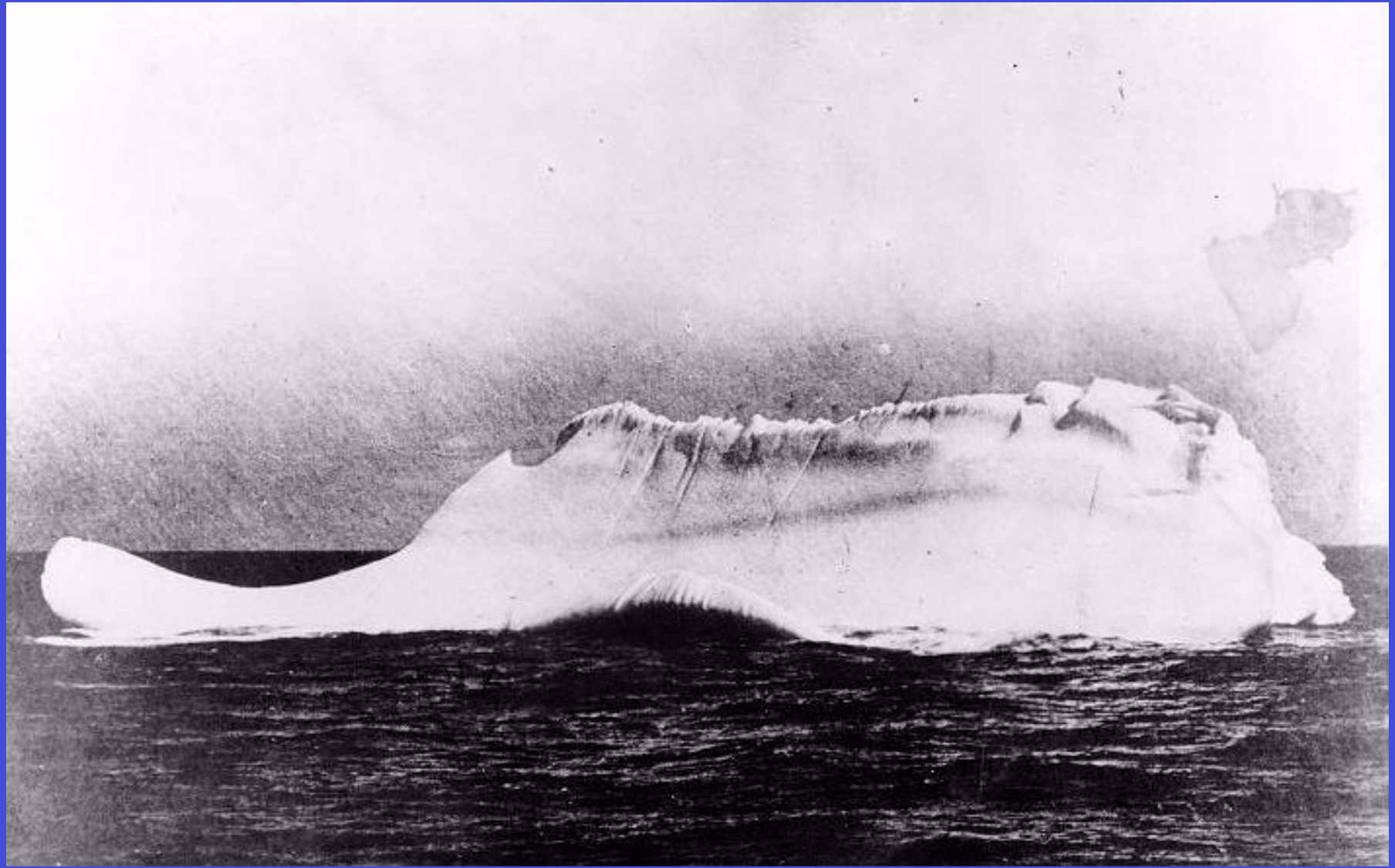
International Ice Patrol

- **4 Officers - MS in Oceanography**
- **Civilian Chief Scientist**
- **Civilian IT for BAPS**

R.M.S. TITANIC 1912



THE ICEBERG SUSPECTED OF SINKING THE TITANIC





TITANIC
SPECIAL COLLECTOR'S EDITION DVD



TITANIC
THE ARTIFACT EXHIBITION
real objects | real stories



ALL NEW!
WEEKLY WORLD NEWS
THE WORLD'S ONLY RELIABLE NEWSPAPER
GHOST OF TITANIC DOCKS!
SHIP PULLS INTO NEW YORK 93 YEARS AFTER IT SANK

...coming April 12th
...ited Engagement!



October 7, 2004

UFO FOUND IN ICEBERG

Alien crew is missing & still at large, warn scientists! The captain of a ship rammed an iceberg in the frigid waters of the Greenland Sea -- and found a perfectly preserved UFO frozen inside. What's more, the alien crew is missing and may still be at large!

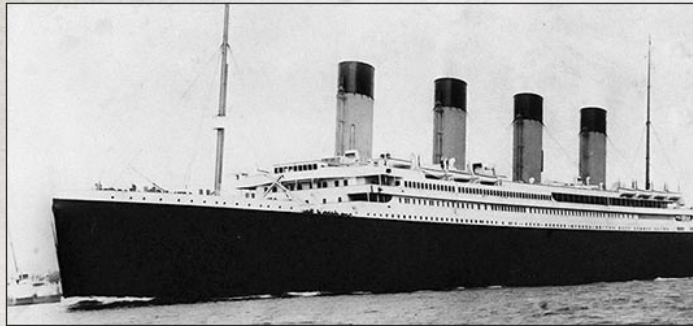


The World's First
Permanent Titanic
Attraction



Titanic Memorial Cruises

100th Anniversary Voyages to Set Sail 2012

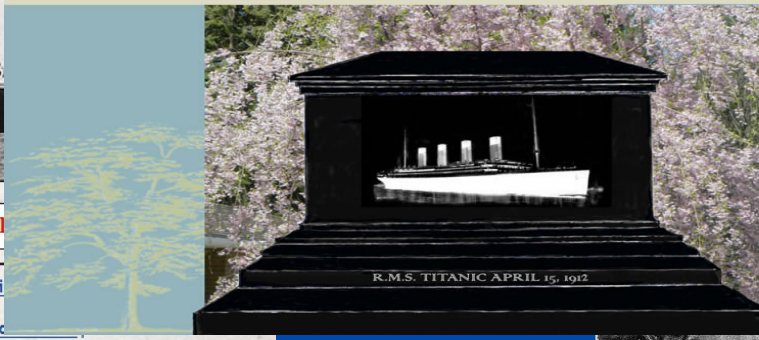


One ship sold out! Don't miss your chance to book your pl

[Memorial Cruise from Southampton](#) | [Anniversary Cruise from New York](#) | [Mini](#)

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Titanic Centennial Memorial Weekend



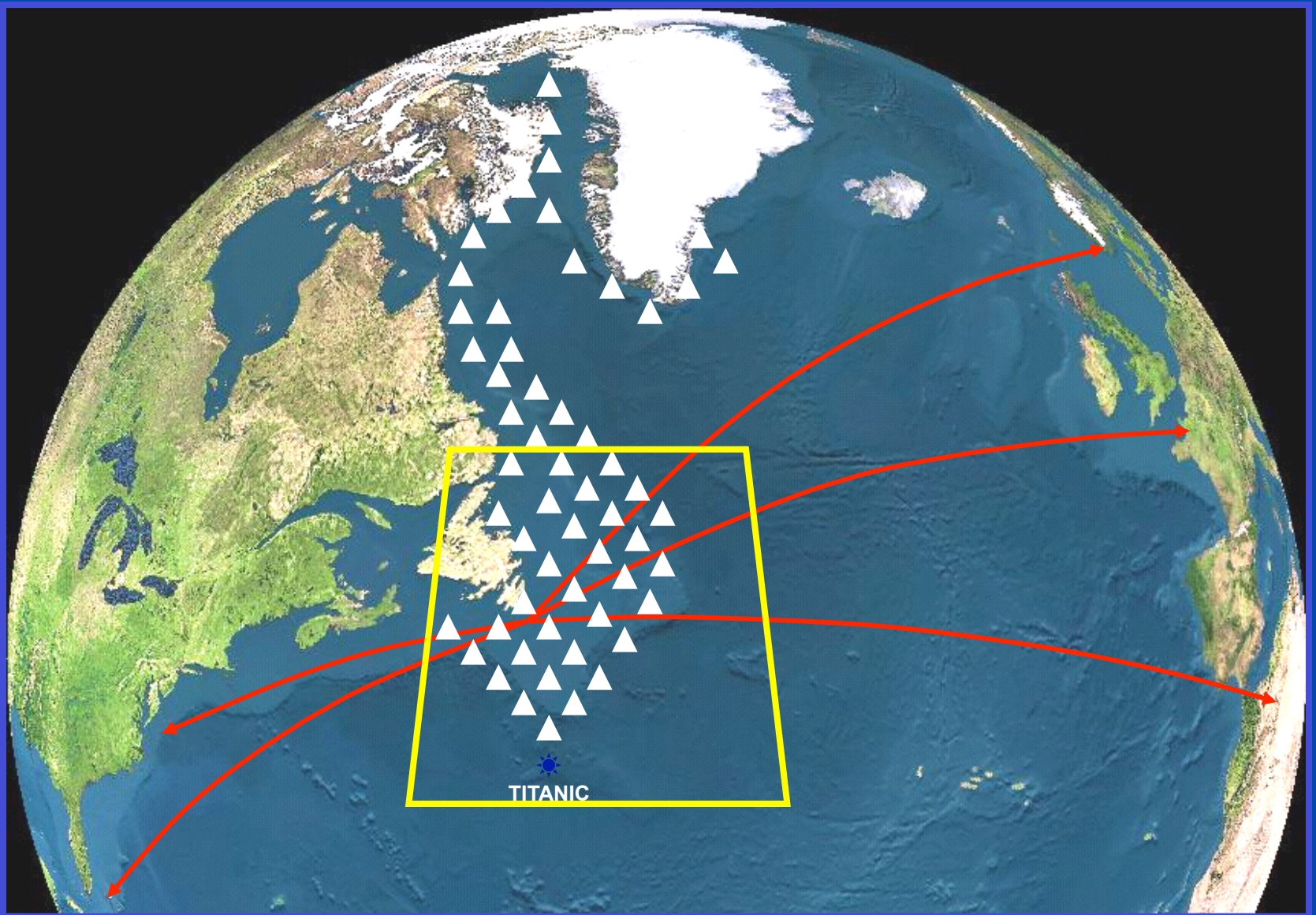
R.M.S. TITANIC APRIL 15, 1912



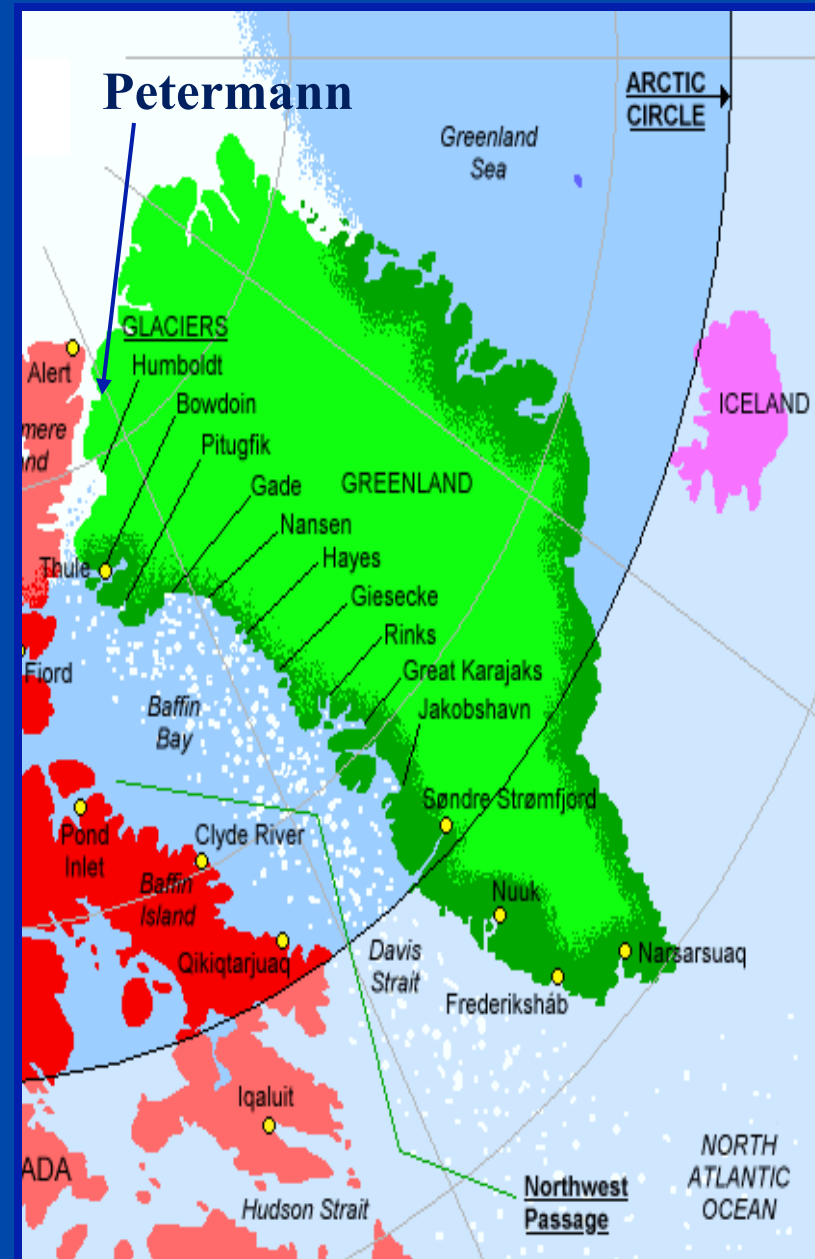
TITANIC SURVIVORS
ALIVE!
- FROZEN IN
ICEBERG
FOUND
FLOATING IN
ATLANTIC!

Significance of the sinking of the TITANIC

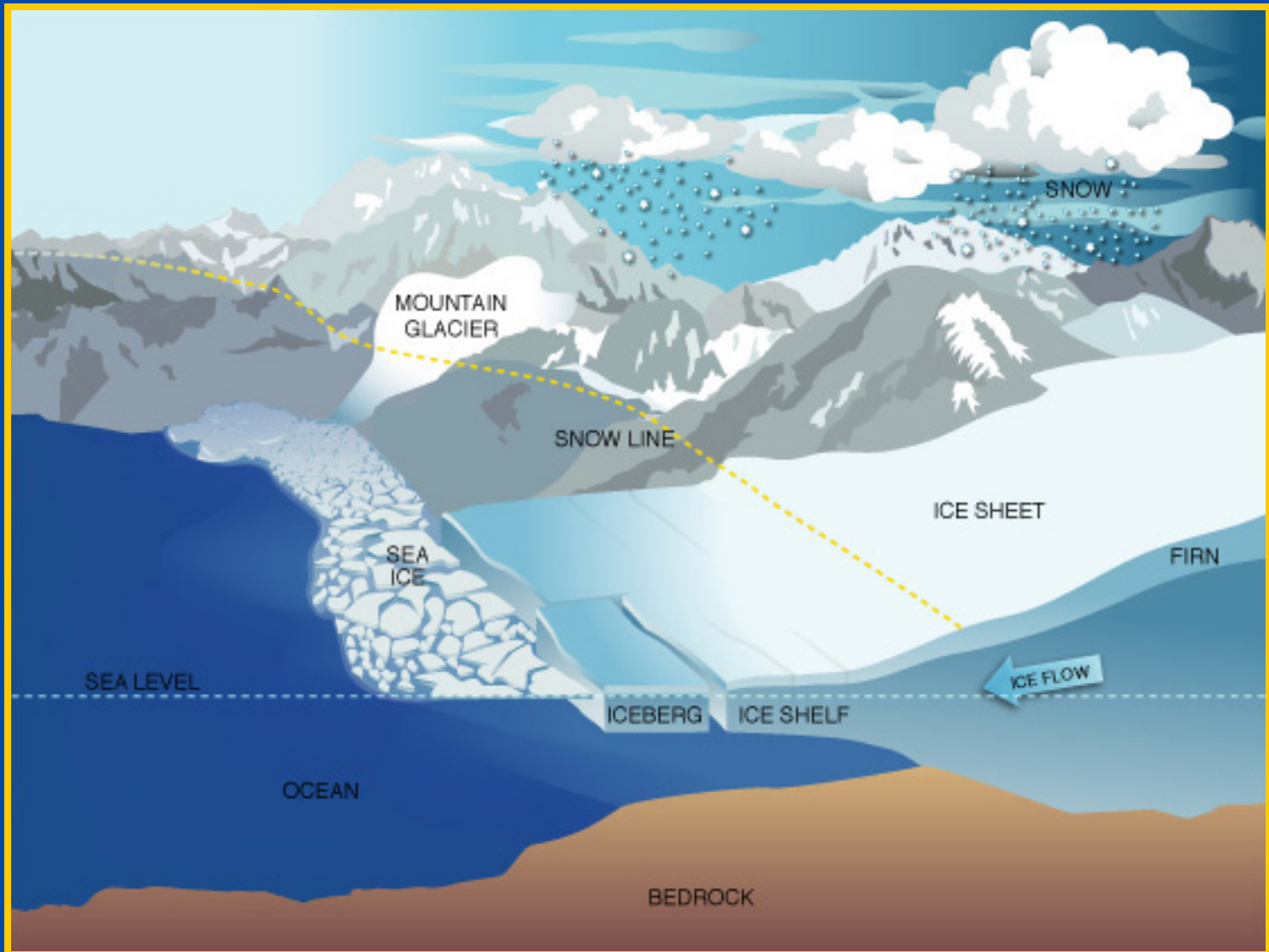
- **Required manned radio watches**
- **Lead to creation of standard SOS message**
- **Number of life rafts dependent on the number of people vice the vessel's tonnage**
- **Formation of the International Ice Patrol**

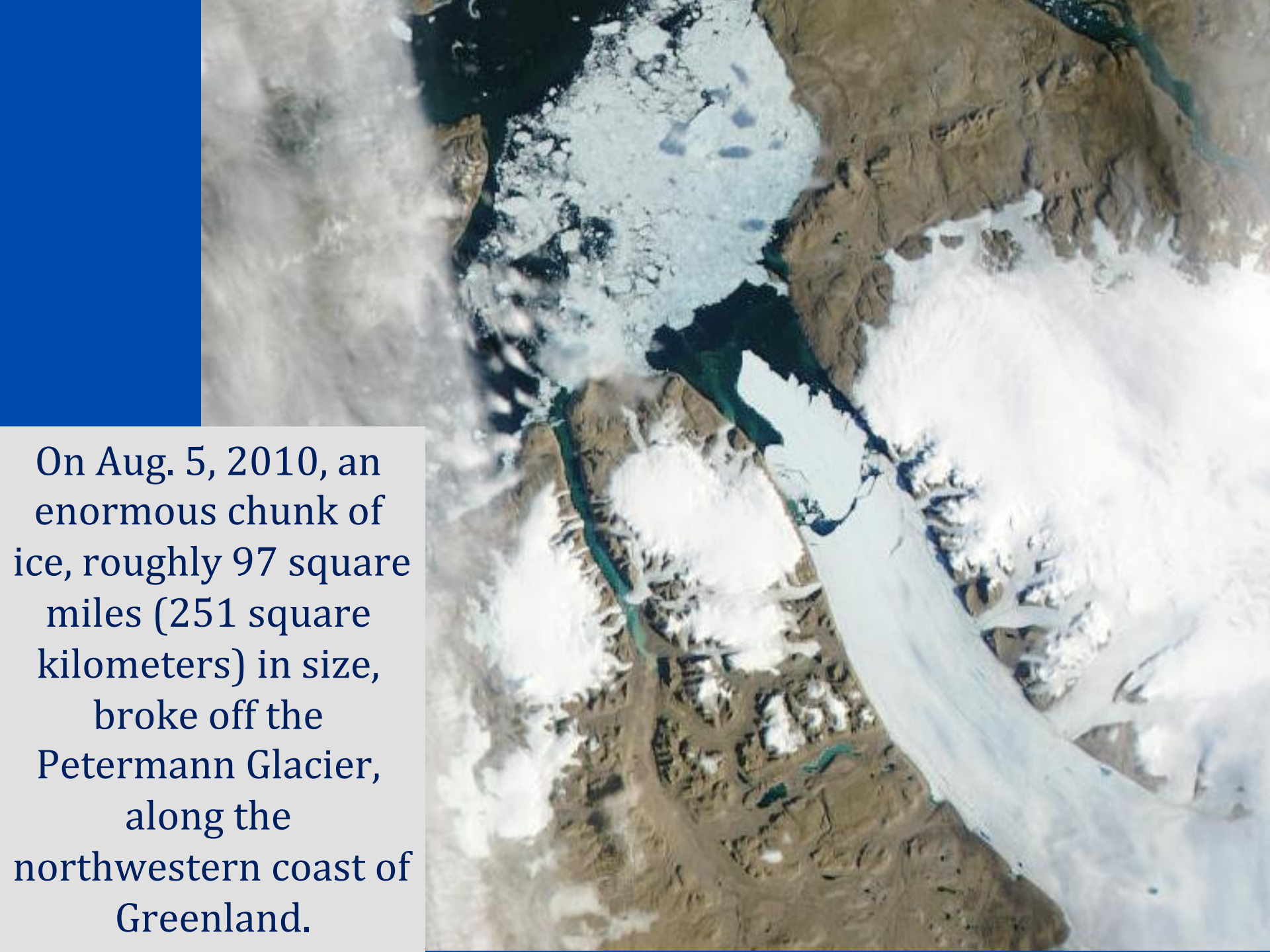


MOST OF THE ICEBERGS IIP ENCOUNTERS ARE FROM THE TIDEWATER GLACIERS OF WEST GREENLAND



Iceberg Formation



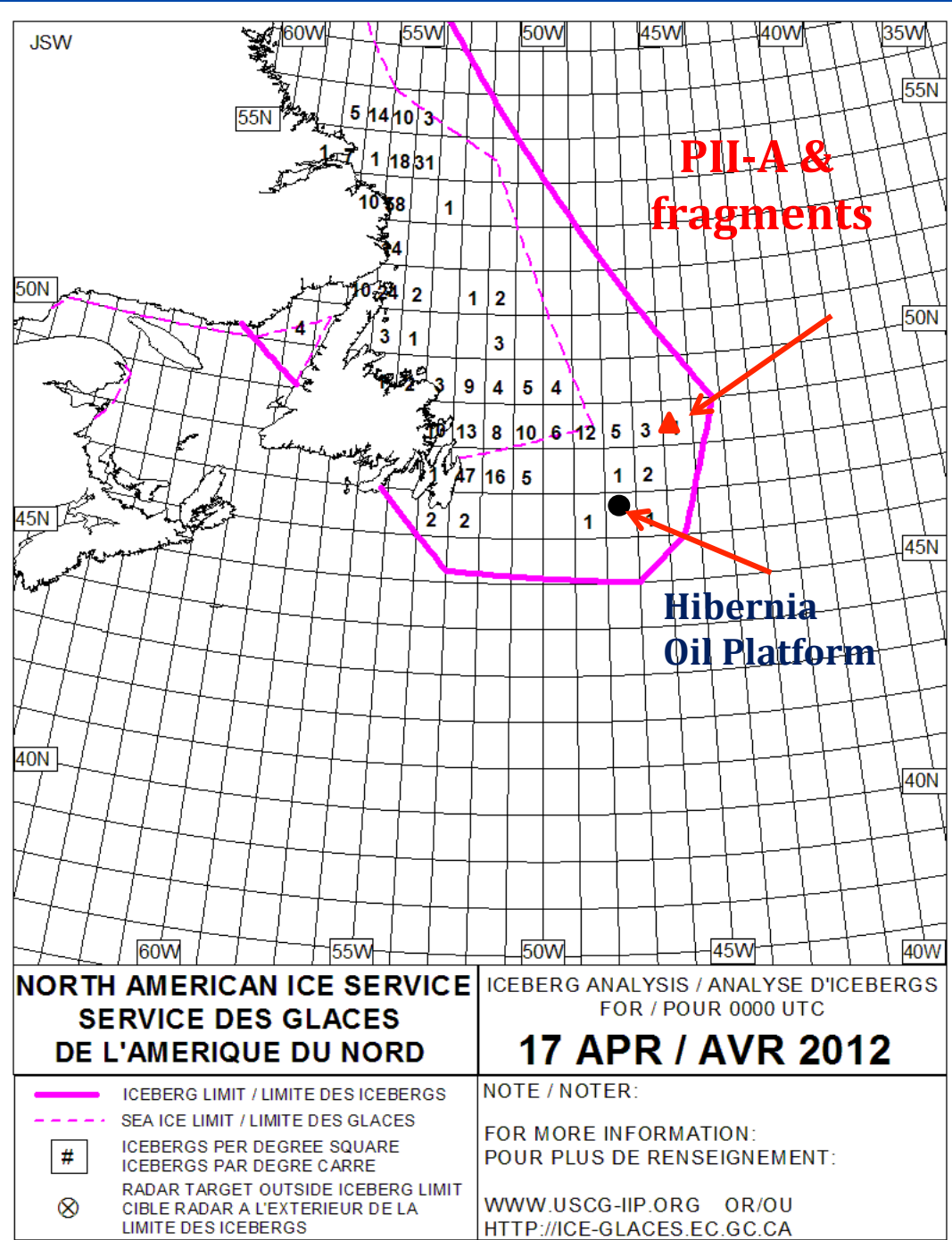
An aerial photograph showing a large, white, rectangular ice chunk floating in the dark blue ocean. The ice chunk is surrounded by smaller ice floes and is positioned near a rugged, brown, rocky coastline. The sky is a clear, pale blue. The text is overlaid on the left side of the image.

On Aug. 5, 2010, an enormous chunk of ice, roughly 97 square miles (251 square kilometers) in size, broke off the Petermann Glacier, along the northwestern coast of Greenland.

IIP Reconnaissance 16 April 2012



Approximate position of PII-A and fragments 17 April 2012

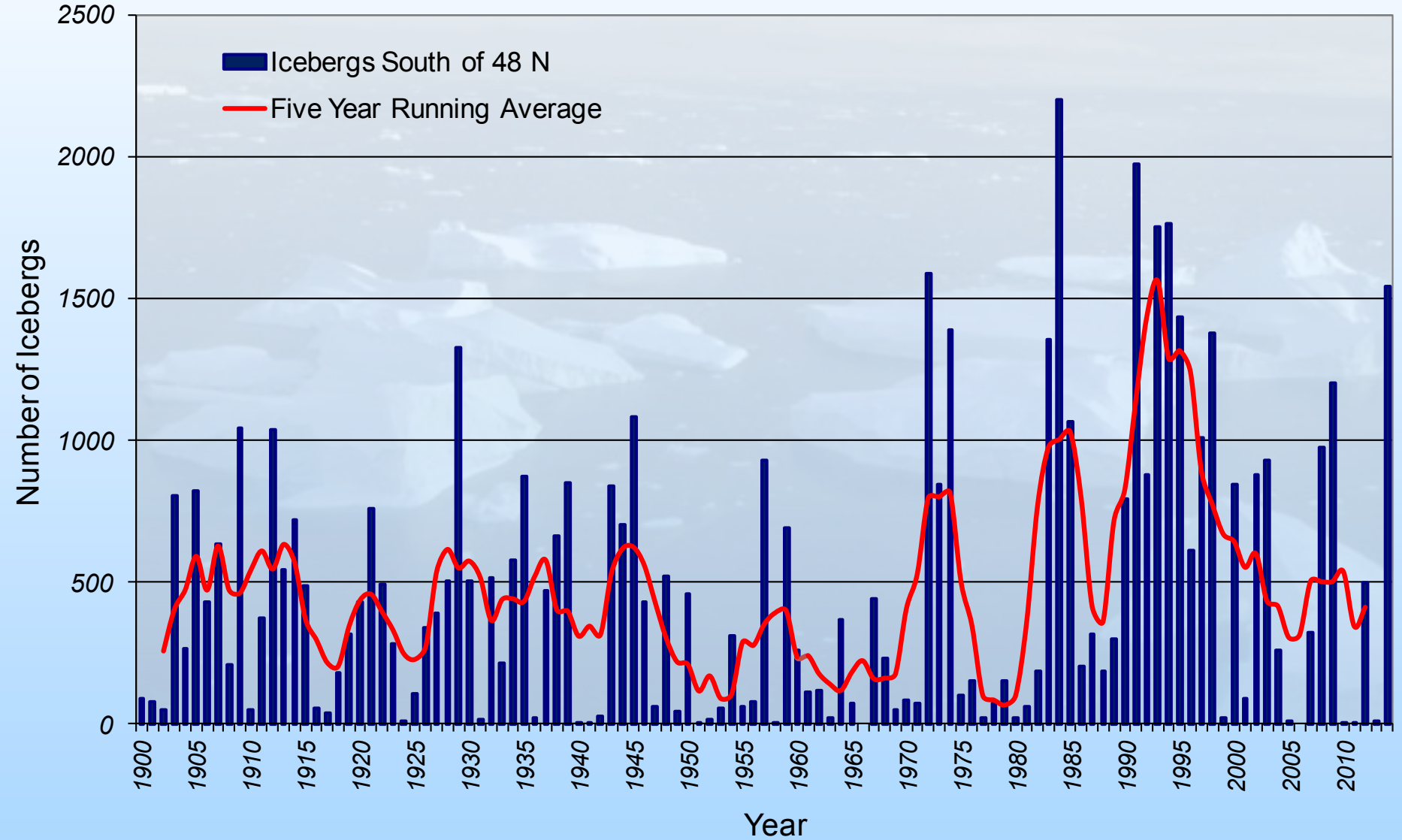


GROWLER





Interannual Variability



ALBATROSS DURING BOMBING RUN



**1959-1960 DEMOLITION
EXPERIMENTS**

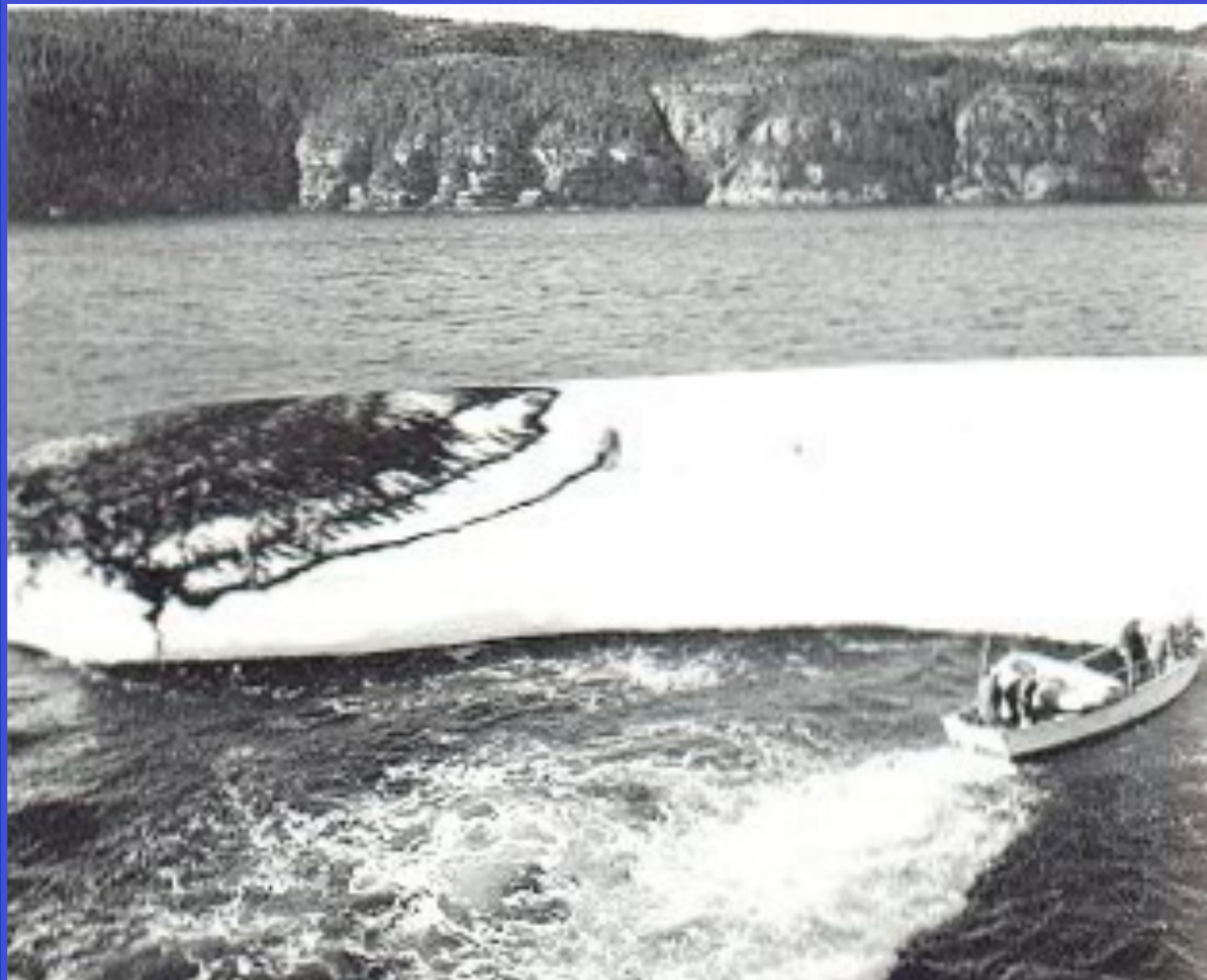
RESULTS OF BOMBING



DESTRUCTION USING THERMITE



COVER THE ICEBERG WITH CARBON-BLACK





Aerial Reconnaissance



HC-130J

USCG Air Station Elizabeth City, NC

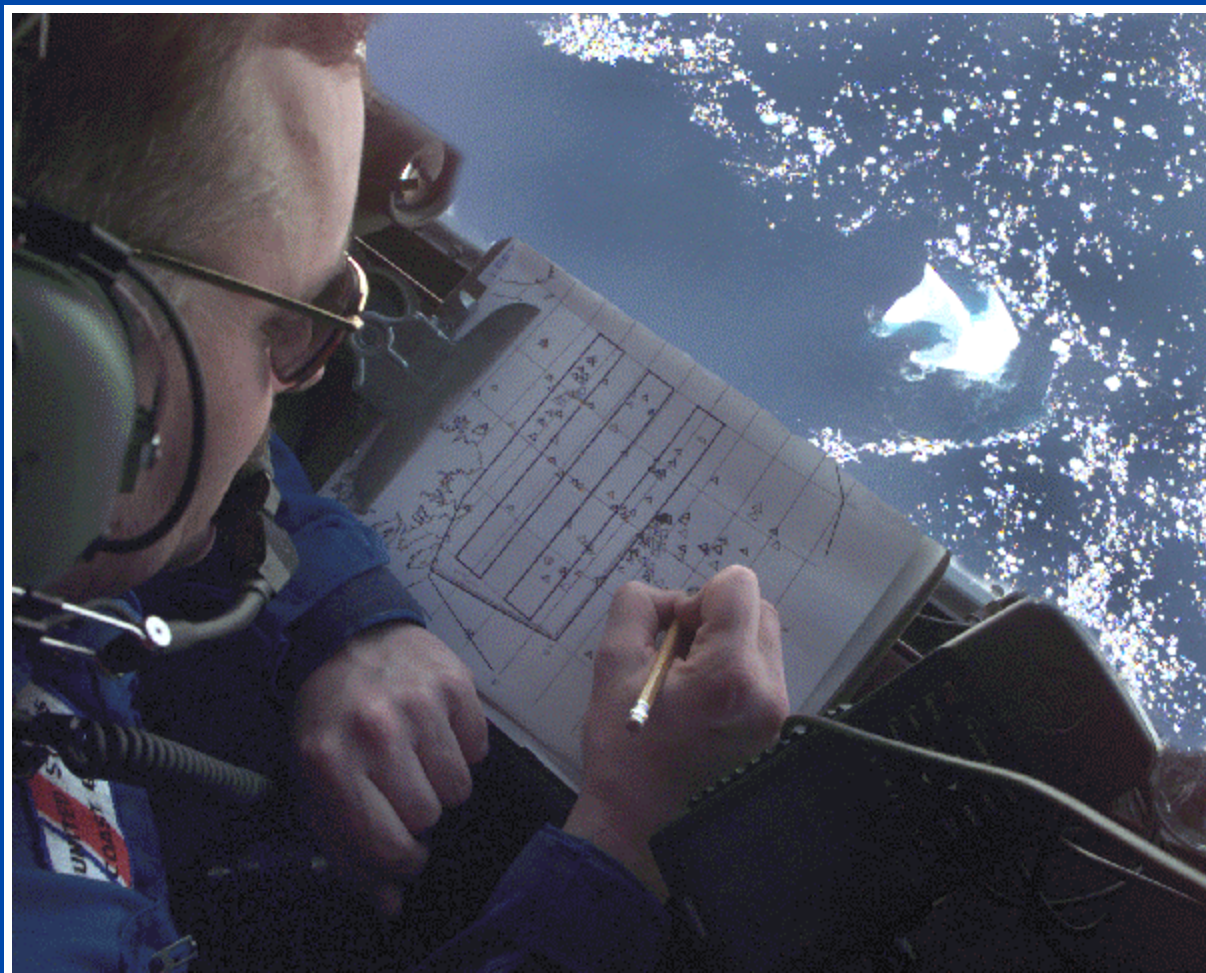


Methods of finding and reporting icebergs

- IIP Aerial Reconnaissance
- Canadian Ice Service
- Ship Reports
- Offshore Oil Industry
- Satellites



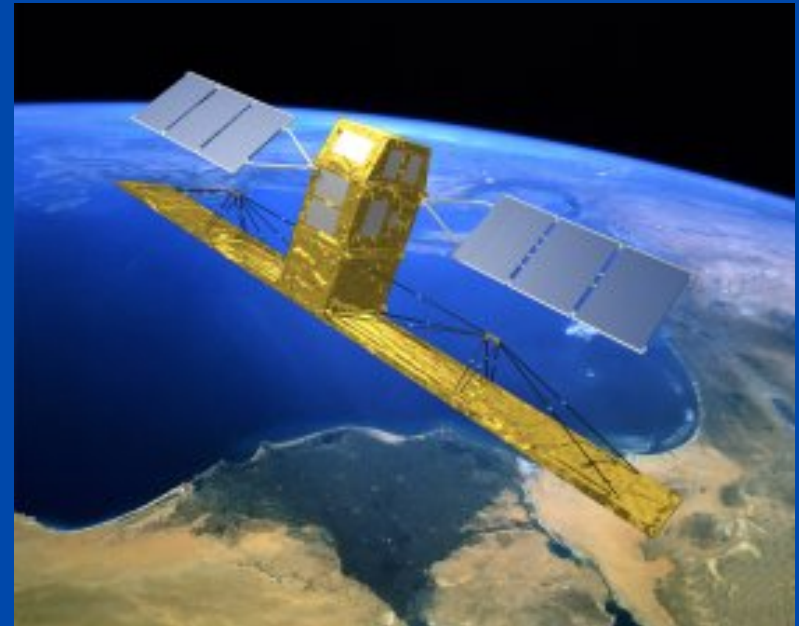
AERIAL RECONNAISSANCE



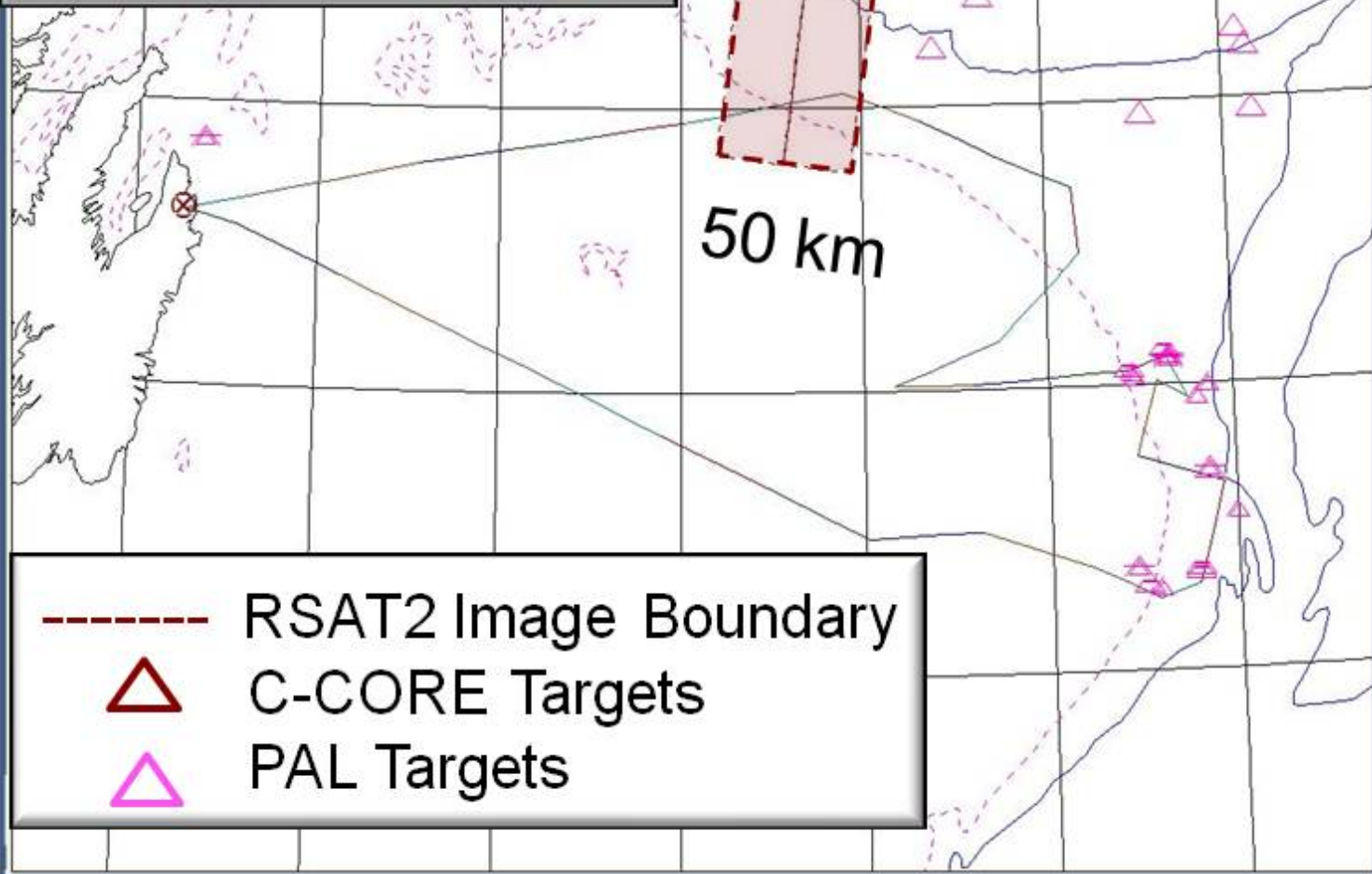
Satellite Remote Sensing of Icebergs



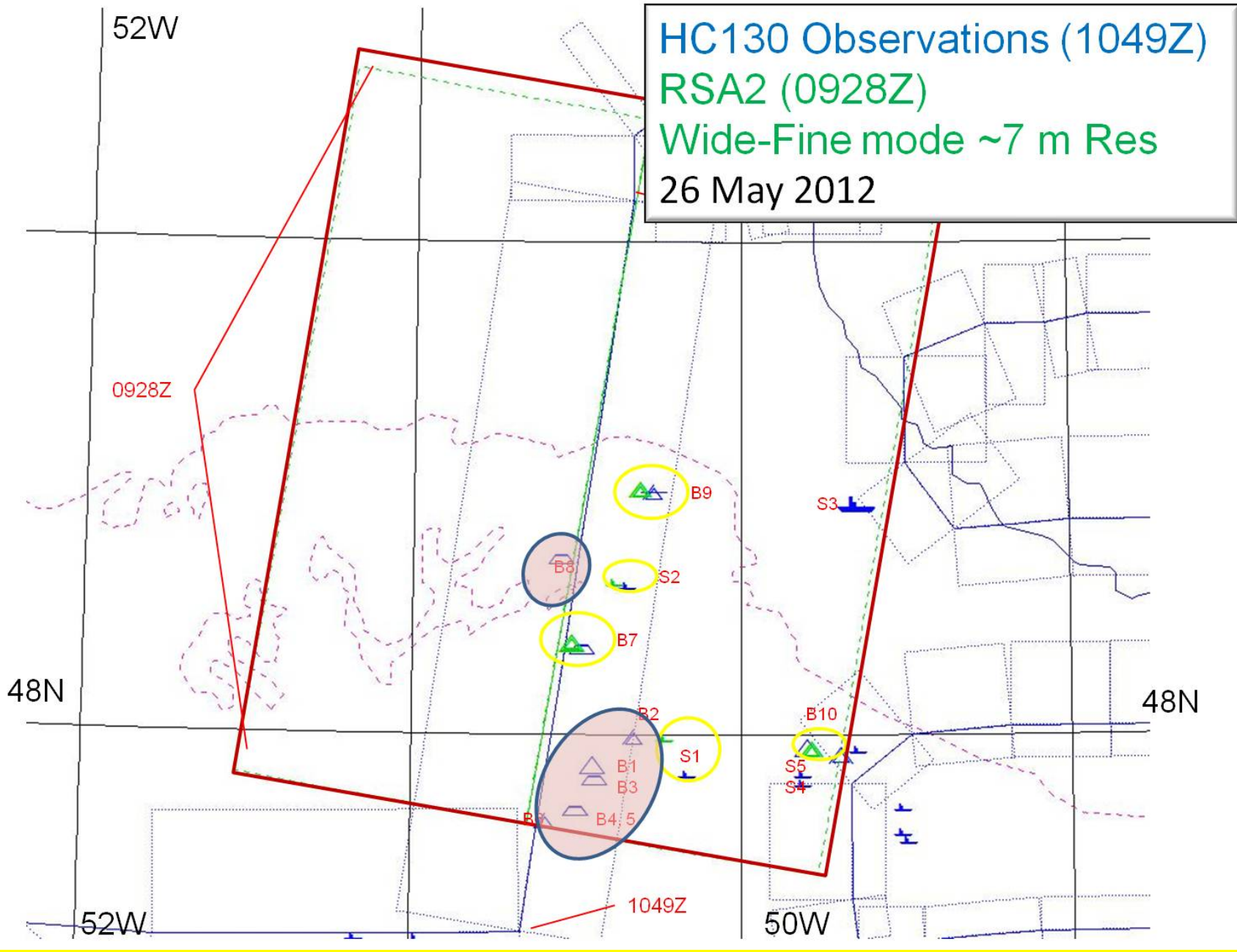
- Resolution and Coverage
- Detection and Identification
- Availability and Timeliness
- Access and Cost

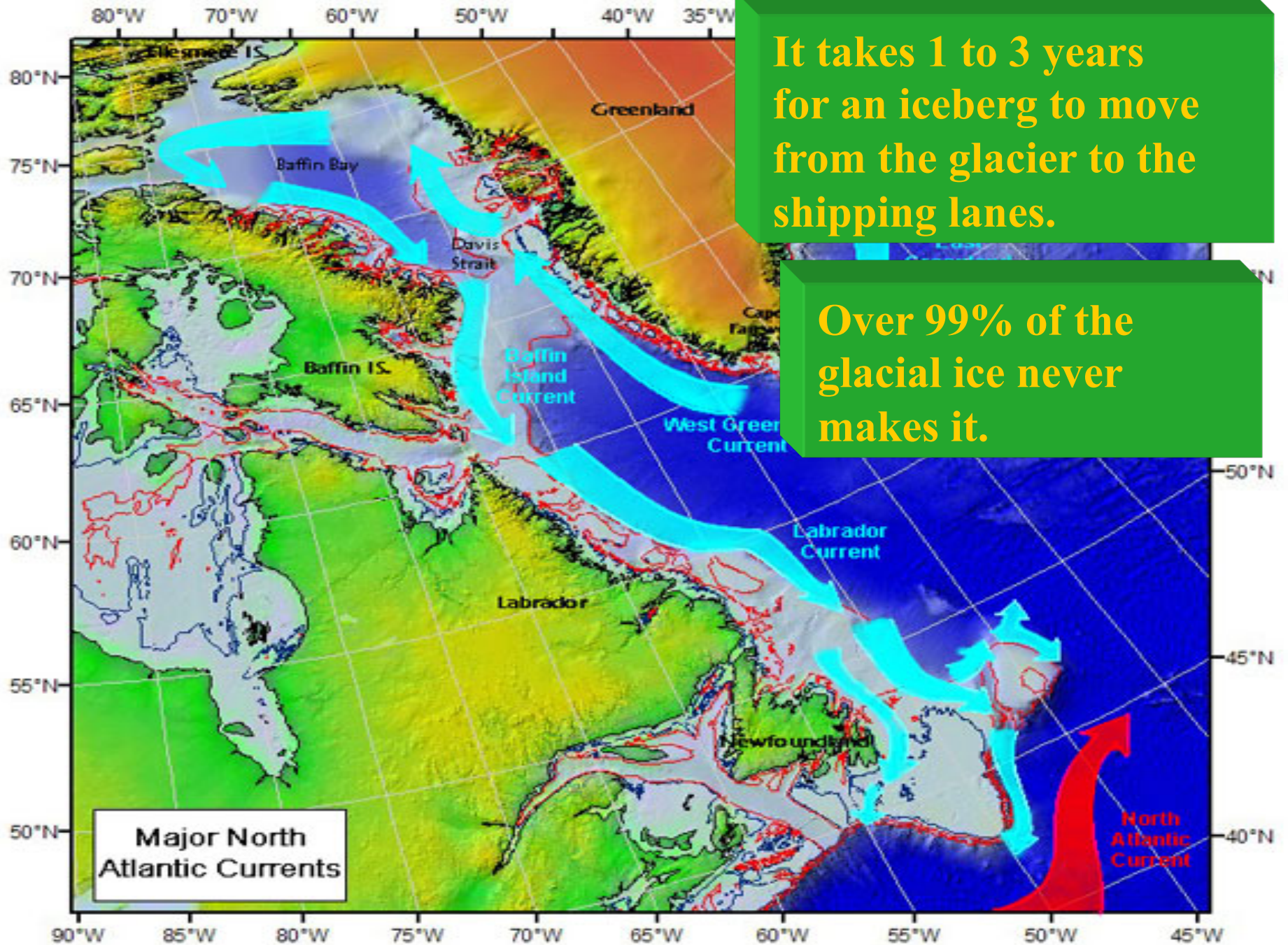


29 April 2012
C-CORE / RSAT2
(Fine Mode ~7 m res)
and PAL berg Reports



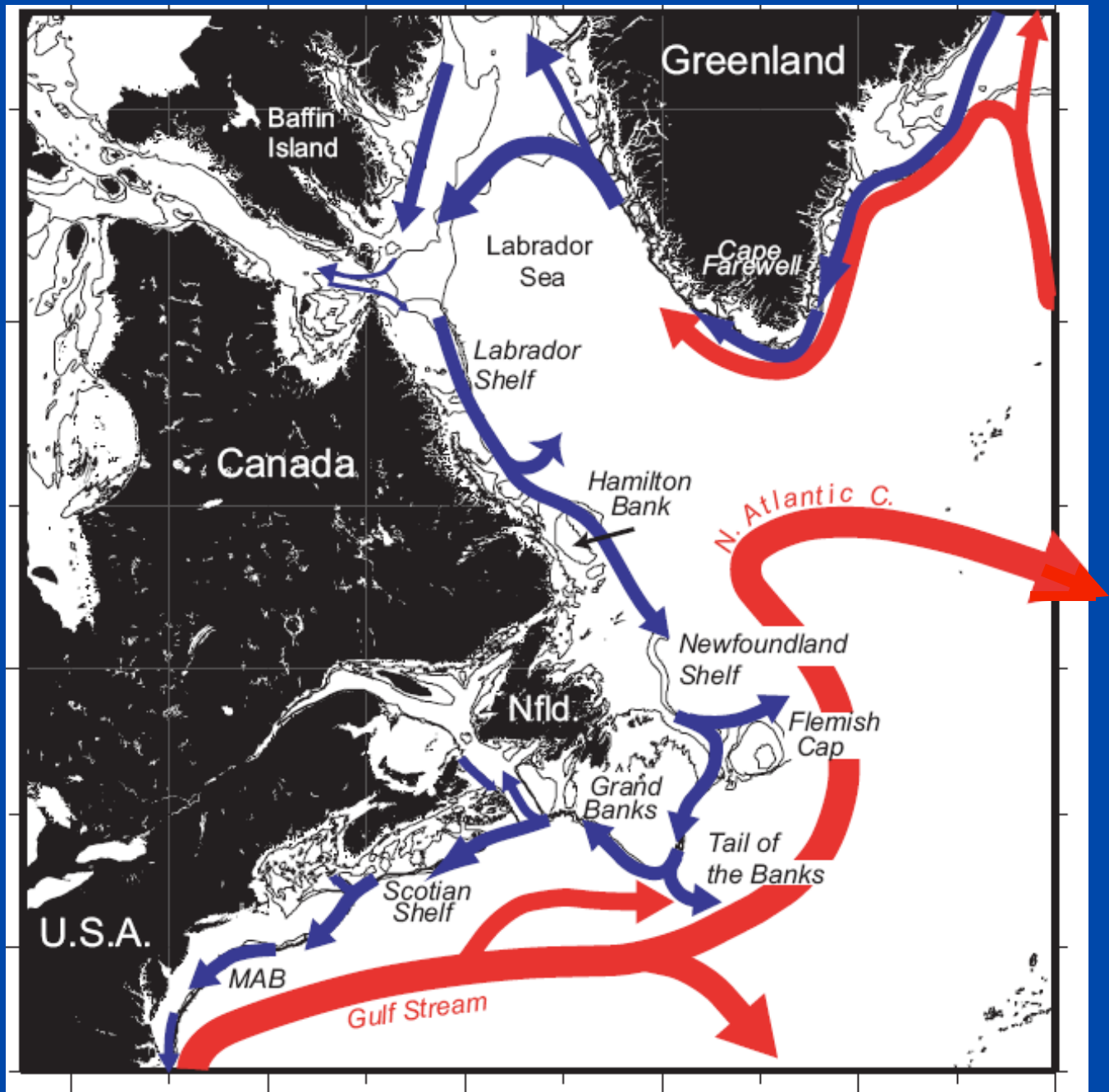
HC130 Observations (1049Z)
RSA2 (0928Z)
Wide-Fine mode ~7 m Res
26 May 2012



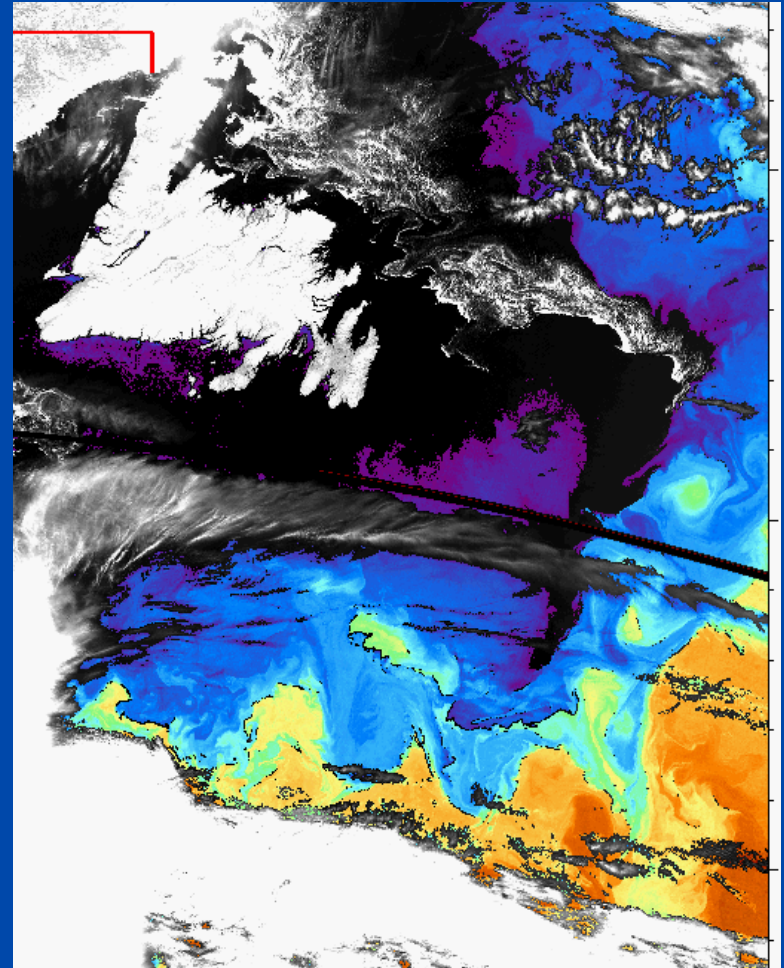
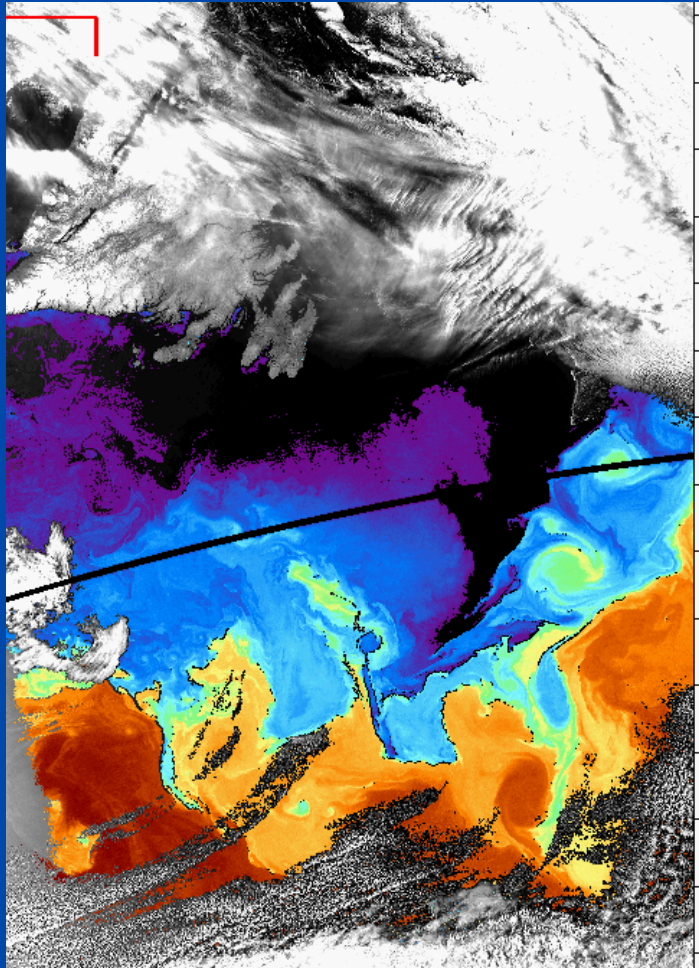


It takes 1 to 3 years for an iceberg to move from the glacier to the shipping lanes.

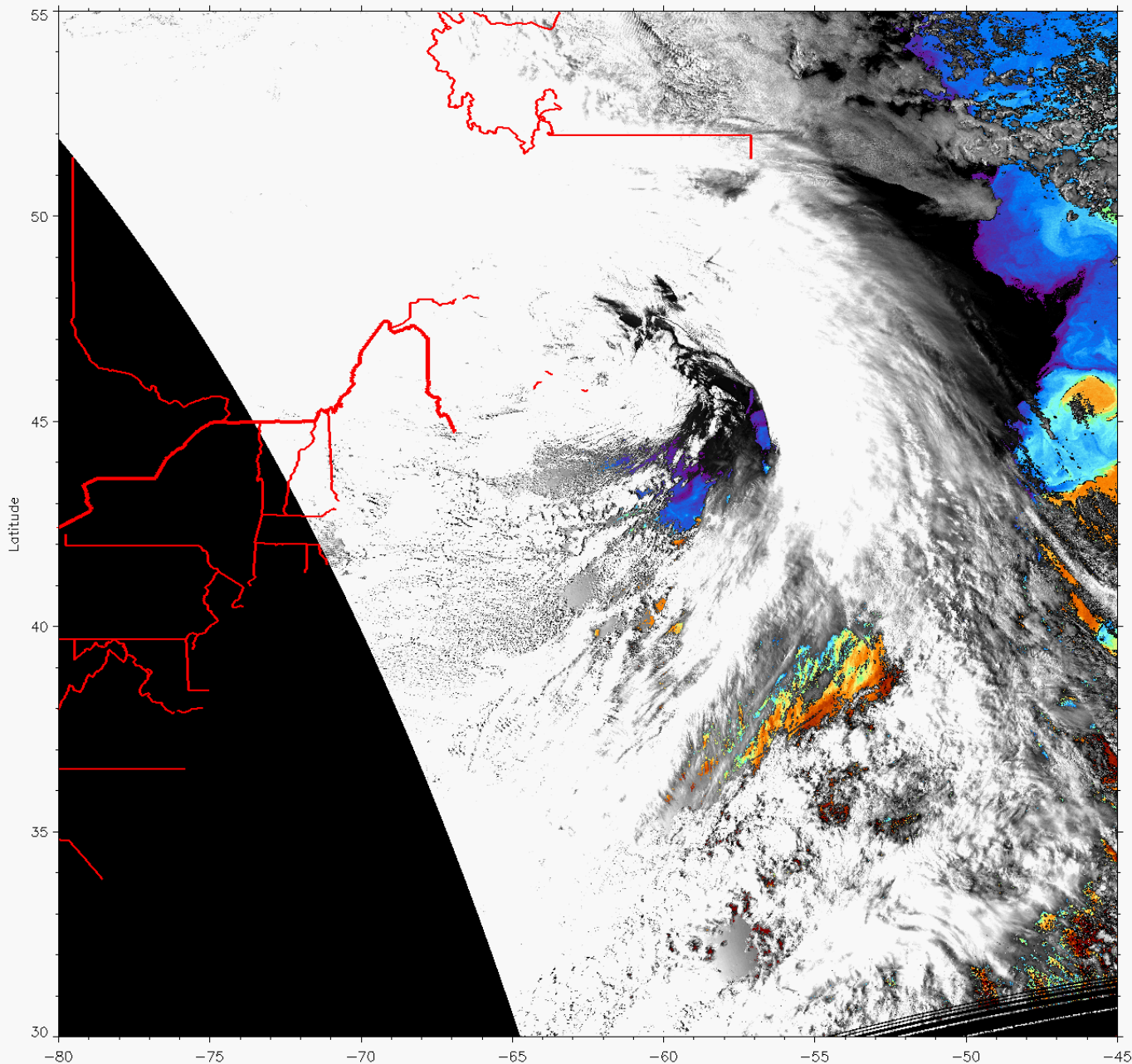
Over 99% of the glacial ice never makes it.



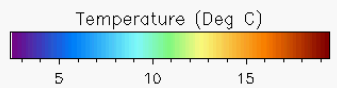
EDDIES AND MEANDERS NEAR THE TAIL EFFECT

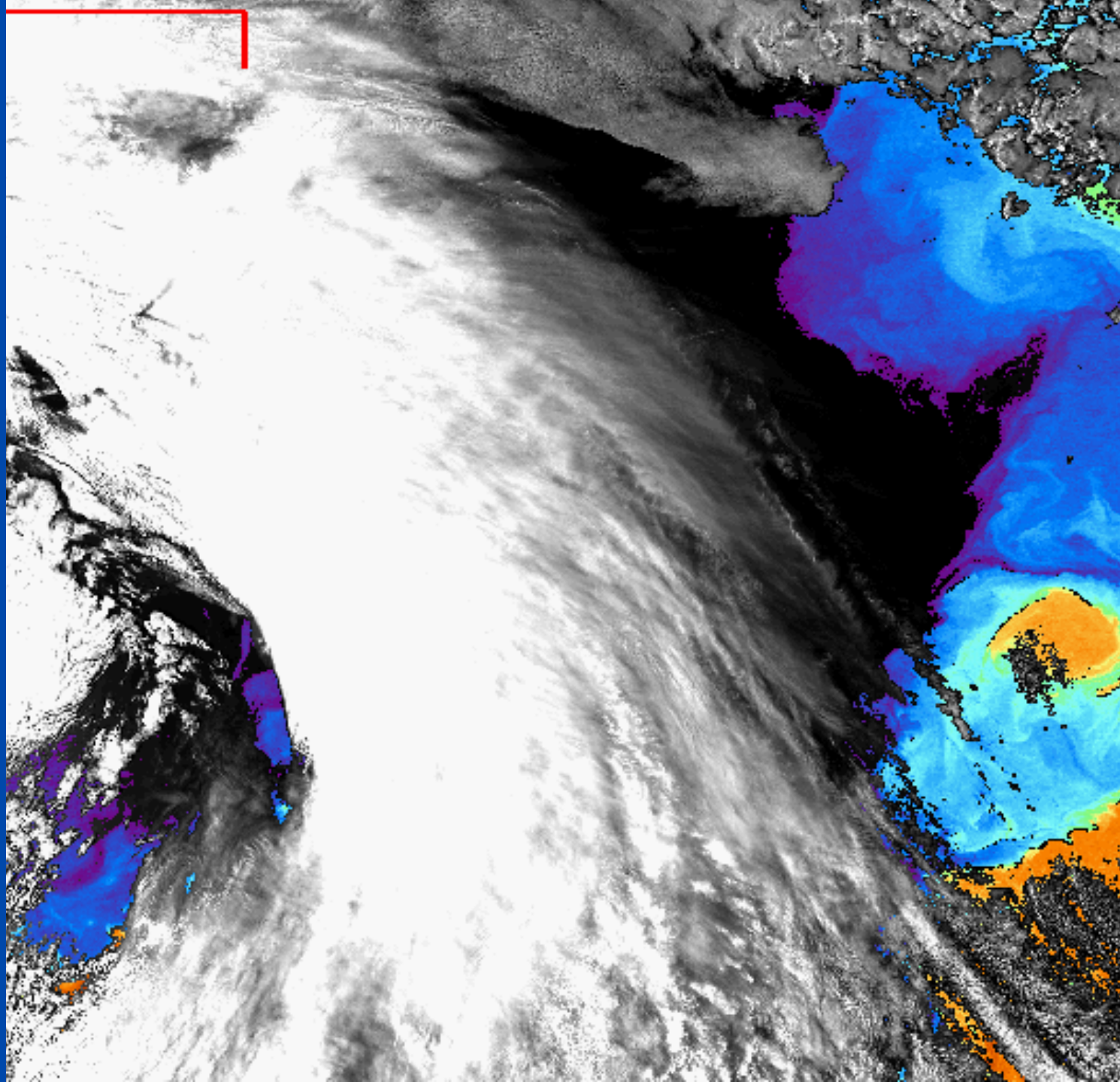


April 2008



WATER SURFACE TEMPERATURE
Land and Clouds from Channel 2
NOAA-15 AVHRR 2013 Mar 20 19:46 UT





WATER SURFACE TEMPERATURE
Land and Clouds from Channel 2
NOAA-15 AVHRR 2014 Apr 08 19:50 UT

← St. John's

Group of
88 icebergs

Cold water
filament

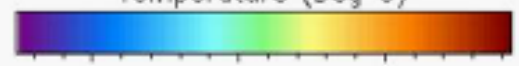
45N

40N

50W

45W

Temperature (Deg C)



5 10 15

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50°0'0"W

Iceberg from IIP Flight
14 May 2014

Iceberg drift model position
23 May 2014

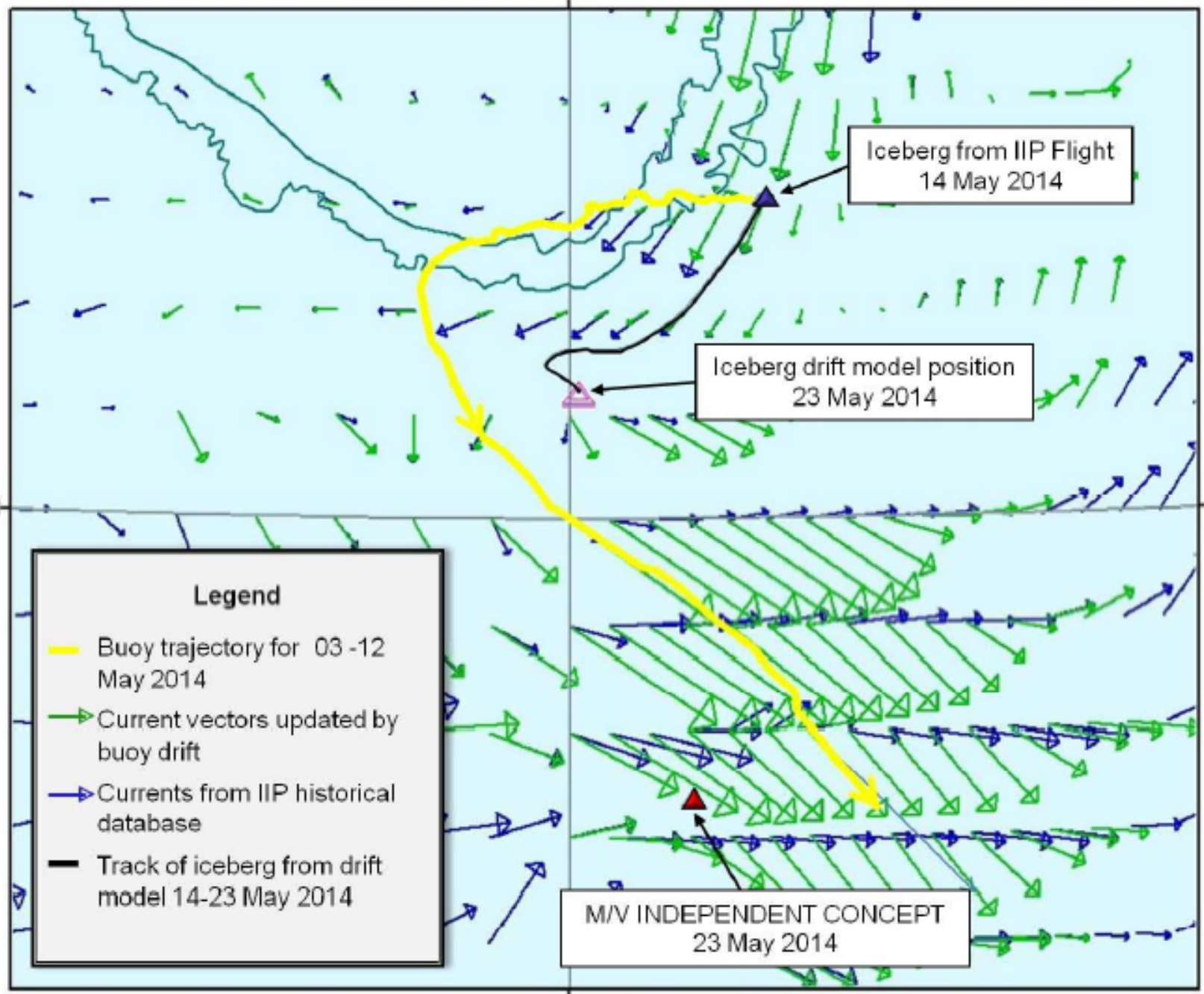
Legend

- Buoy trajectory for 03 -12 May 2014
- Current vectors updated by buoy drift
- Currents from IIP historical database
- Track of iceberg from drift model 14-23 May 2014

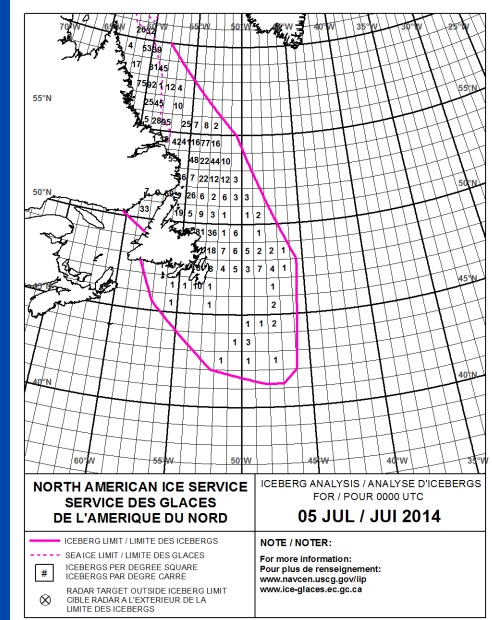
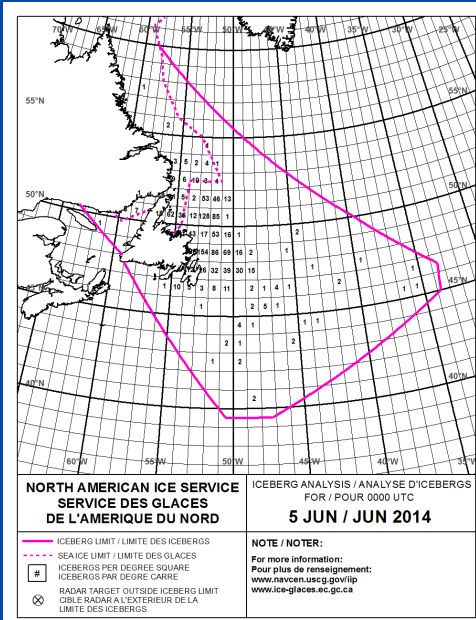
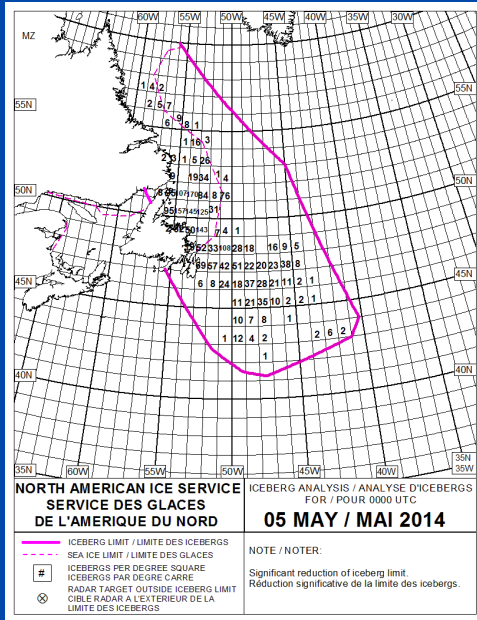
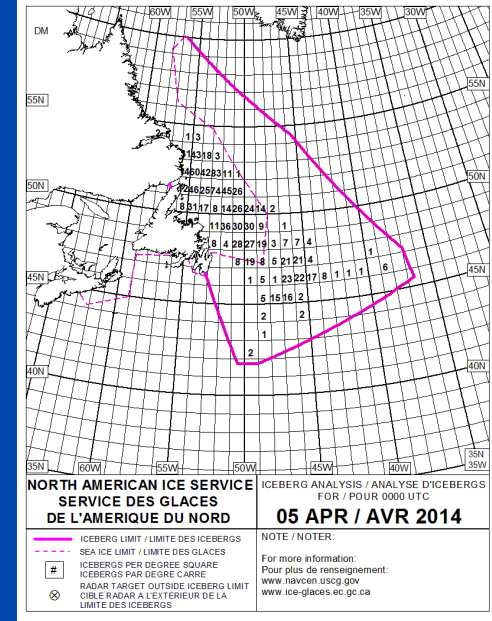
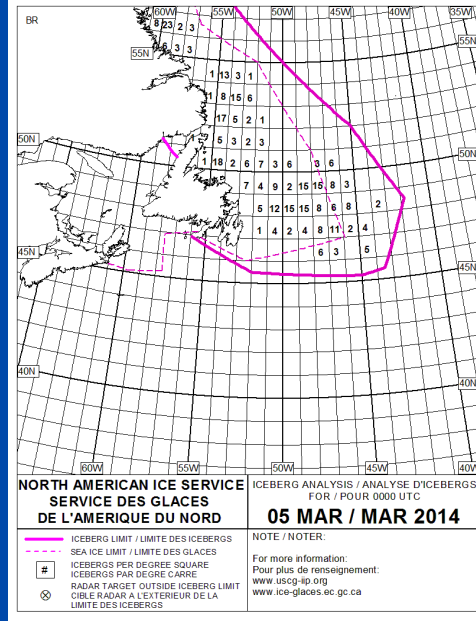
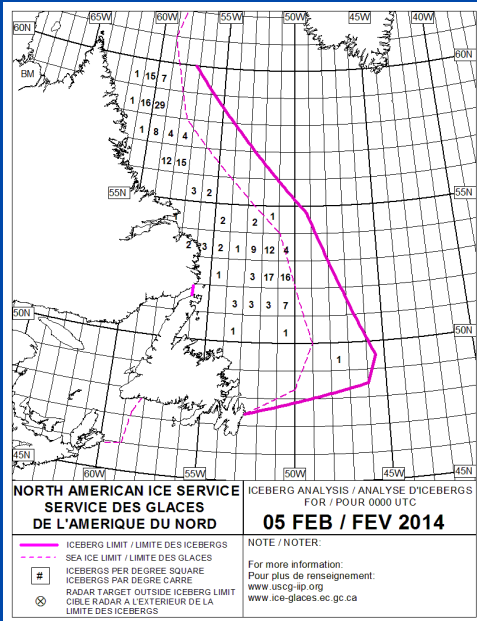
M/V INDEPENDENT CONCEPT
23 May 2014

42°0'0"N

42°0'0"N



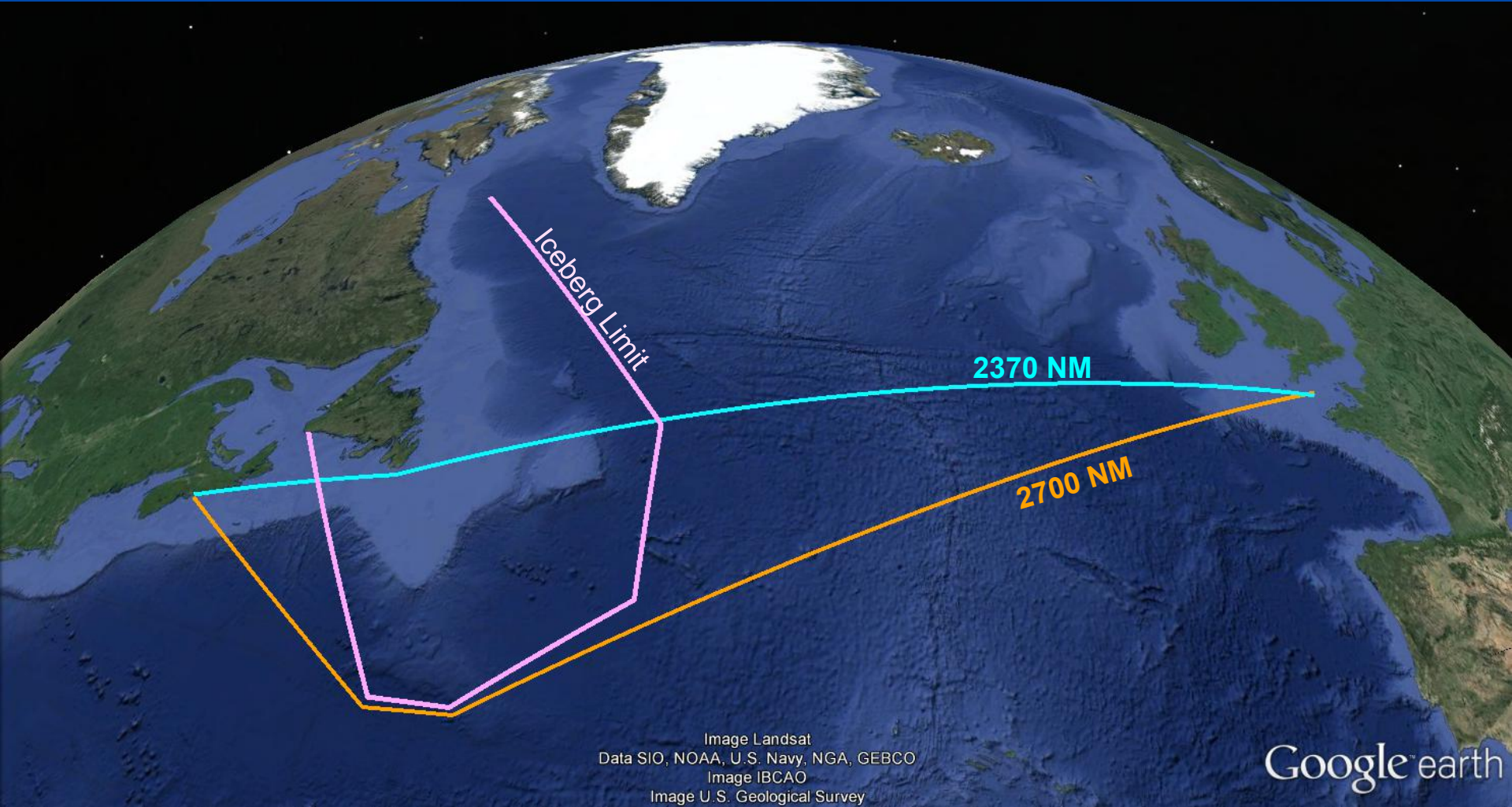
2014 Ice Season Summary



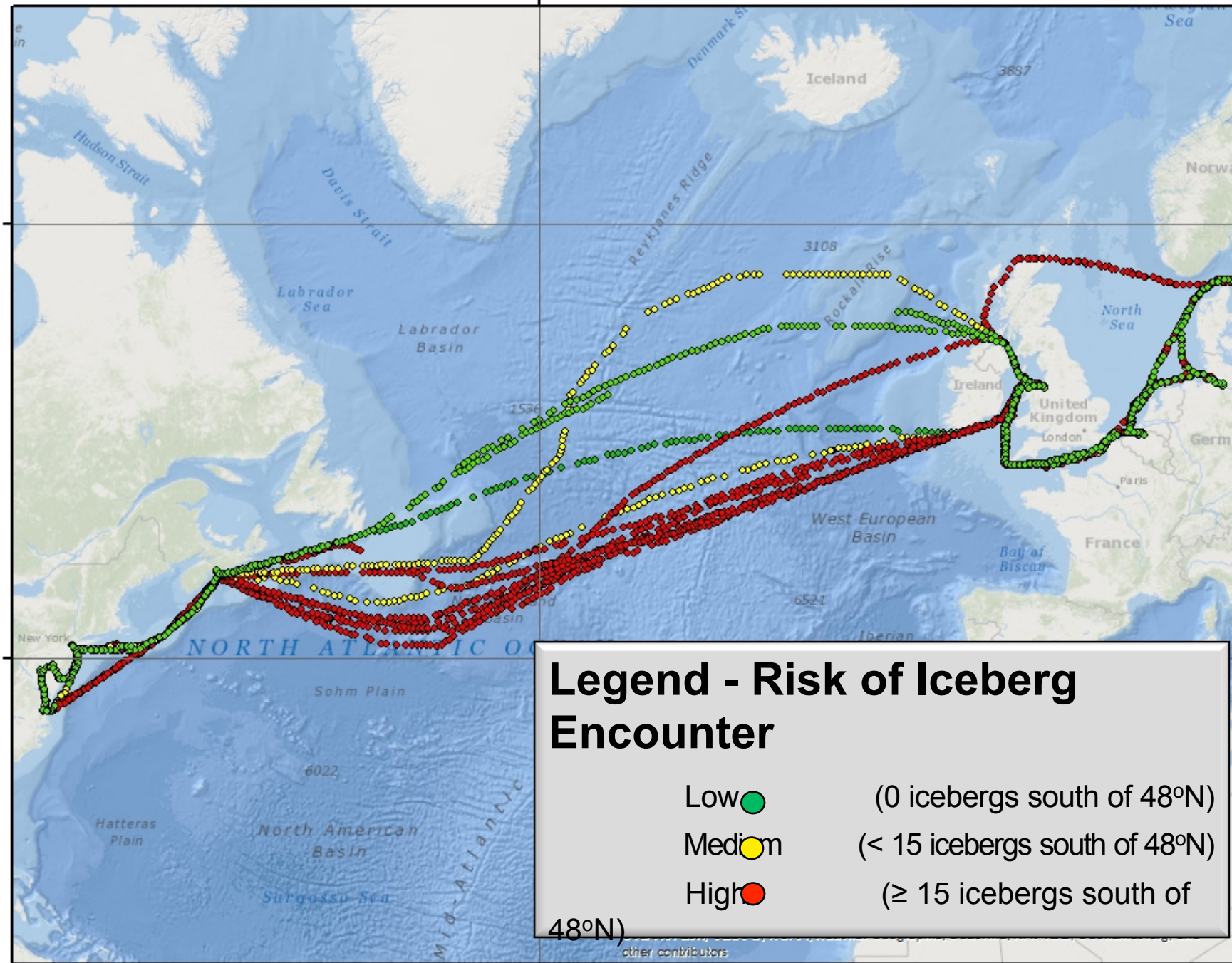
Modern Collisions



Safety vs. Mobility



40° W



60° N

40° N

Legend - Risk of Iceberg Encounter

- Low ● (0 icebergs south of 48°N)
- Medium ● (< 15 icebergs south of 48°N)
- High ● (≥ 15 icebergs south of 48°N)

48°N)

other contributors