Fisheries and Oceans Canada
Bedford Institute of Oceanography

Pêches et Océans Canada

Offshore Environmental Factors POL

1.2.1 POL: Ice and Iceberg Activity

Project Number: New 2005/06

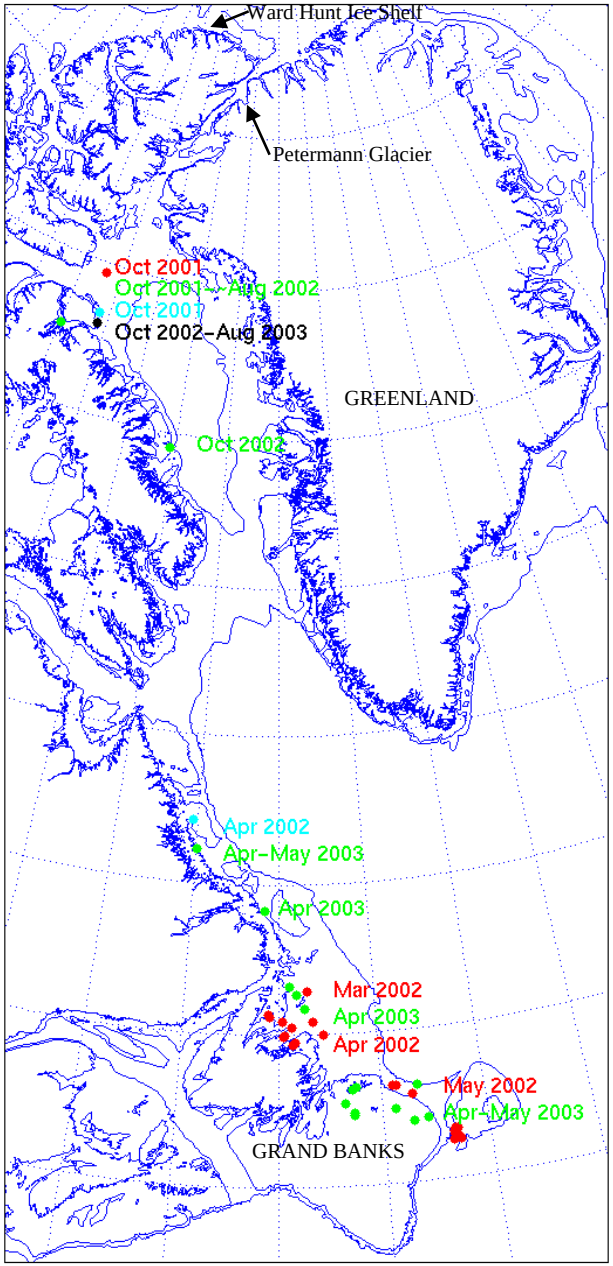
Large Tabular Icebergs

-DFO I. Peterson/BIO

- **Make existing data available as an aid to identifying the source of tabular icebergs and ice islands:**
  - **collect available information/photos of very large tabular icebergs or ice islands off Eastern Canada, and near calving fronts of glaciers or ice shelves that are likely sources**
  - **convert information to digital format, archive information and make data available on CD**
  - **relate surface pattern and other information such as dimensions of icebergs/ice islands, to Greenland glaciers and Ellesmere Island ice shelves/glaciers to determine possible origin**

Data/Photo Sources to Date

- ***Luc Desjardins (CIS) – 2001-2003 Large tabular icebergs/Ice islands/fragments: Lancaster Sound to Newfoundland***
- ***Pip Rudkin (PAL) – 2002-2003 Large tabular icebergs/Ice island fragments off Newfoundland: up to 20 million tonnes, 65-80m draft***
- ***Don Murphy (IIP) – Greenland glaciers 1945-1970+***
- ***Dave Forcucci (USCG) – Petermann glacier 2003***
- ***Marcos Zentilli (DAL) – Debris-covered iceberg, Nares Strait, 2001***
- ***Denny Christian/Don King (C-CORE) – Debris-covered iceberg, Conception Bay 2002***



Map summarizing sightings of ice islands and their fragments in 2001-2003

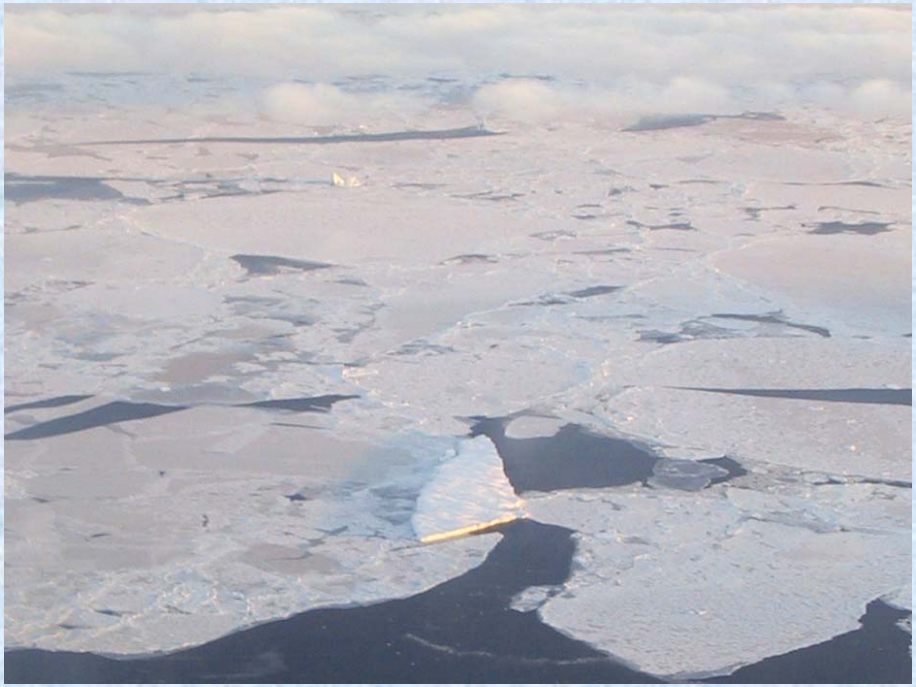
•Sightings with same colour likely originated from same ice island.

Very large tabular iceberg off Newfoundland (48˚N), May 2002.
- 500m L x 300m W x 9m H, 75m draft.
- Photo courtesy of Pip Rudkin (PAL)

Very large tabular iceberg off Newfoundland (47˚N), Apr 2003.

- 480m L x 230m W x 10m H
- Photo courtesy of Pip Rudkin (PAL)

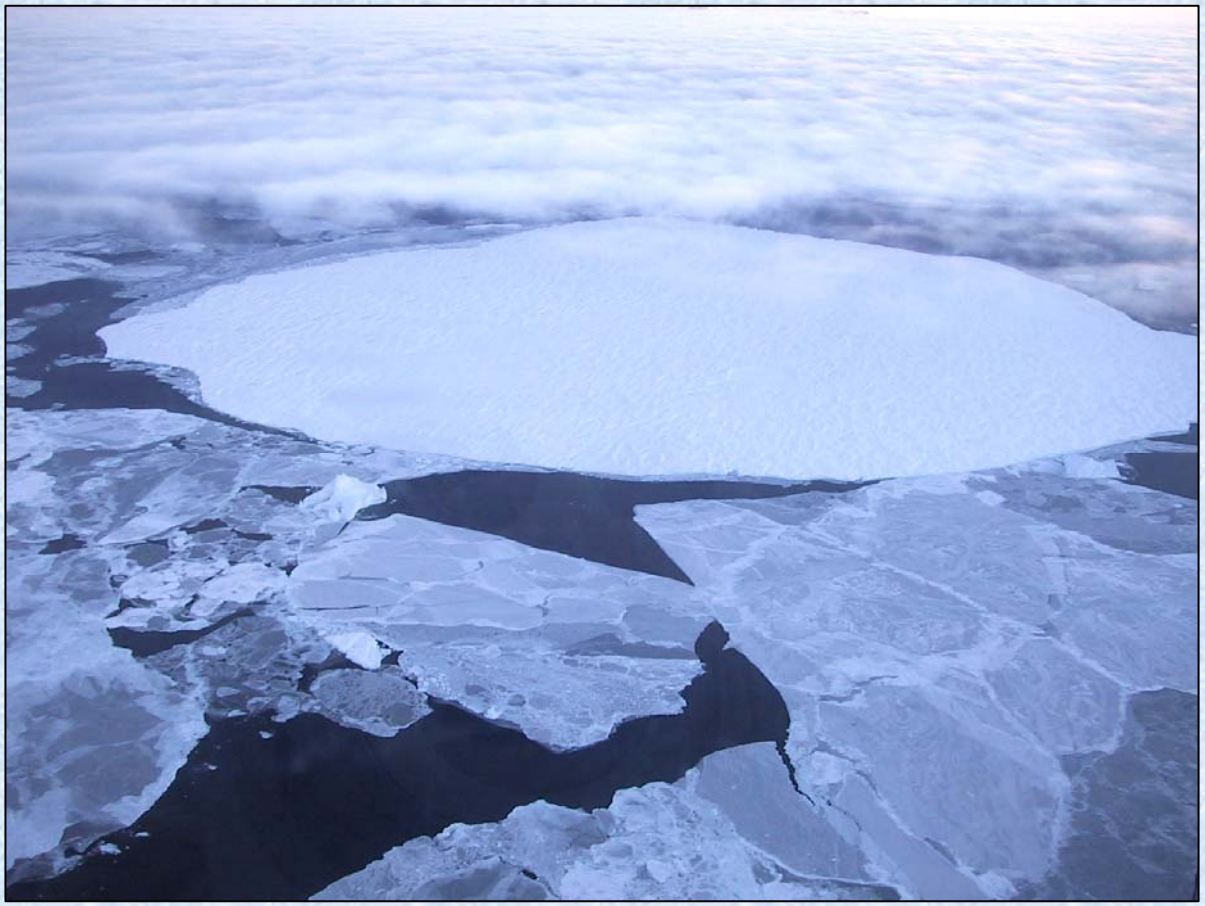
Ice island #1 off Lancaster Sound (75˚N), 27 Oct 2001.
•Photo courtesy of CIS



Ice island fragment #2 in Baffin Bay (73˚N), 27 Oct 2001

Believed to be same ice island fragment 6 months later off Nain (57˚N), 19 Apr 2002

Photos courtesy of CIS



Ice island #3 in Navy Board Inlet (74°N), 23 Oct 2001

- ~2.6km L x 2.3km W
- trapped within Navy Board Inlet/ Eclipse Sound from Oct 2001-Aug 2002.
- Photo courtesy Canadian Ice Service

Ice island #3 one year later off Baffin Island (70˚N) on 26 Oct 2002, with CCG Icebreaker Louis St. Laurent

• ~2.4km L x 2.0km W x >9m H

Photo courtesy of Dan Crosbie (CIS)

Debris-covered iceberg in Kane Basin (80˚N), after being side-bumped by CCG Icebreaker Louis St. Laurent on 17 August 2001 (iceberg was undetected by ship radar)

•90m L x 70m W x 5-18m H

•From sediment analysis, Petermann glacier is the most probable source (Zentilli et al., 2003).

Photo from Zentilli et al. (2003).

Debris-covered tabular iceberg in Conception Bay (48˚N), 26 May 2002

- 250-300m L x 50-60m W x 6-7m H
- Photo courtesy of Denny Christian (C-CORE).

Petermann Glacier

- ***Height of glacier front is 8-10m for eastern margin (1.3km wide), 4-6m for central region (12km wide) and 2-7m for western margin (2.2km wide): height for eastern margin is consistent with height of ice islands/large tabular icebergs (9-10m)***

- ***Width of glacier front is about 16km, with a speed of about 0.9km/year***

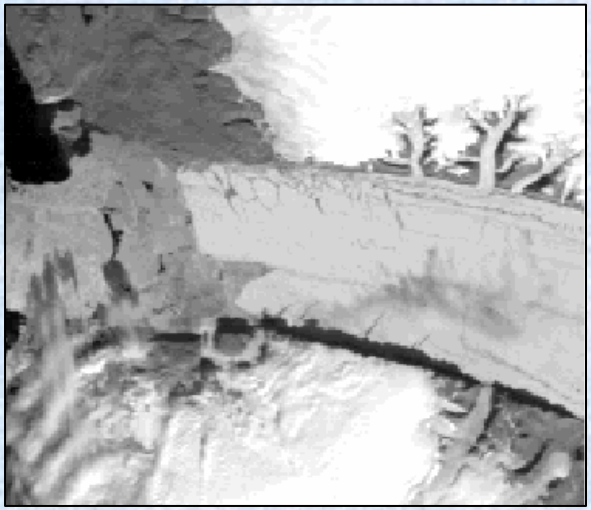
- ***Glacier produces an average mass of 530 million tonnes of calf ice per year, or an area of 14km^2 per year***

- ***Segments up to 12km x 10 km break away at intervals of 5-10 years or more (Higgins, 1991)***

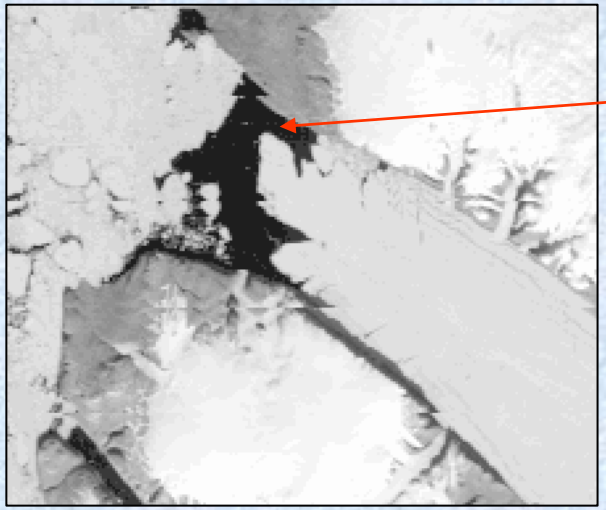
Petermann Glacier looking toward western side, 10 Aug 2003.
• Photo courtesy Dave Forcucci (USCG).

Steep valley walls on eastern side of Petermann Glacier (Hall Land), 10 Aug 2003.
• Photo courtesy Dave Forcucci (USCG).

MODIS Imagery: Petermann Glacier



31 Jul 2000



Large area missing

21 Aug 2000

Large segment broken off

03 Aug 2001

13 Aug 2001

Planned outputs

- *document all material on CD*
- *verify source(s) of 2002-2003 tabular icebergs/ice islands*
- *study variability of position of calving front, and frequency of occurrence of large calving events: Are they related to changes in air temperature or wind patterns, and are they being affected by climate warming?*
- *study feasibility of forecast (about 1-2 years in advance) of appearance of large tabular icebergs on Grand Banks, using satellite observations at iceberg source*
- *study existing capability of identifying them in satellite imagery (see iceberg identification project 12100B02: Dean Flett) and tracking them using iceberg drift model (project 12100B01: Tom Carrieres)*