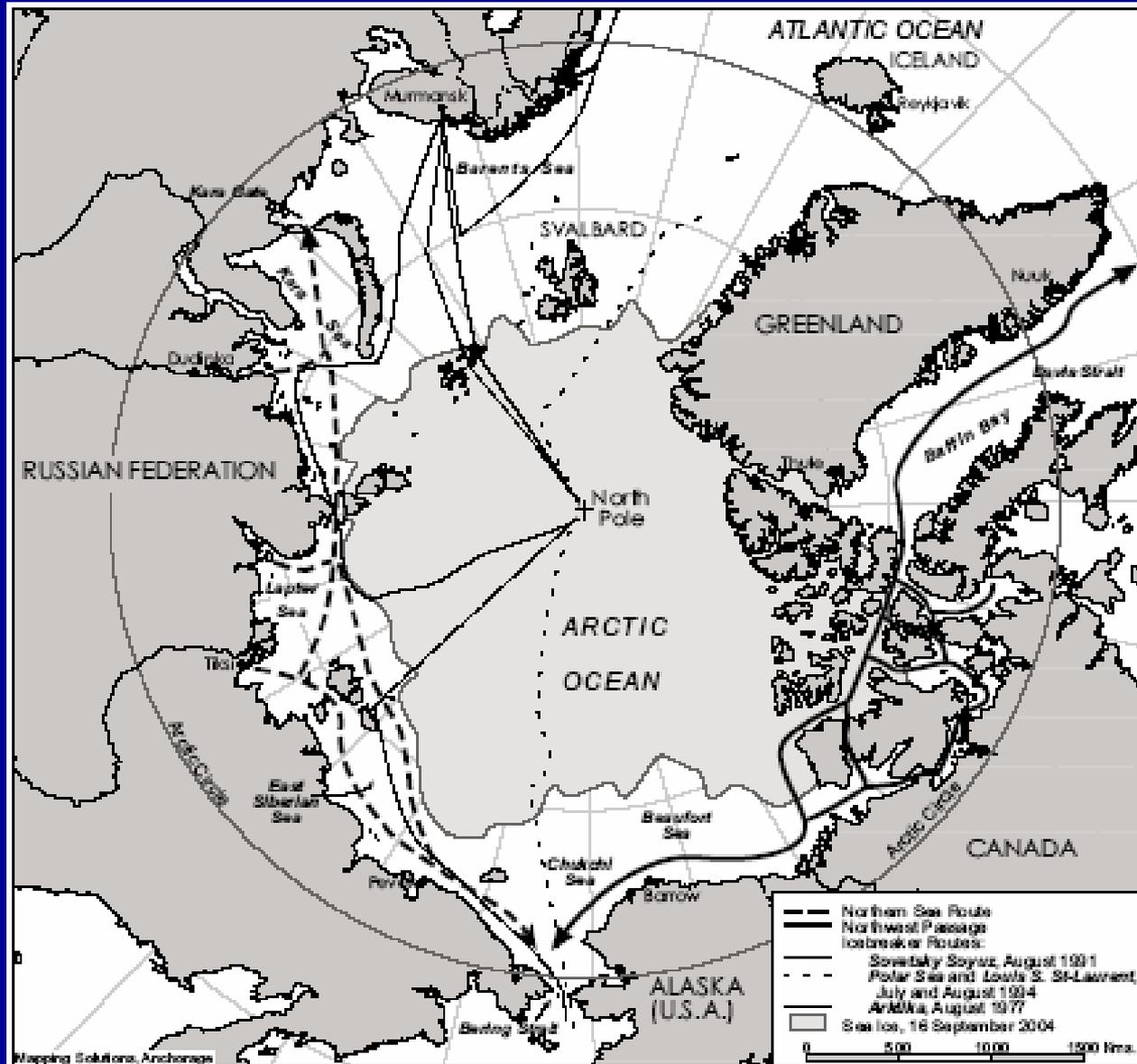


Marine Routes in the Arctic Ocean



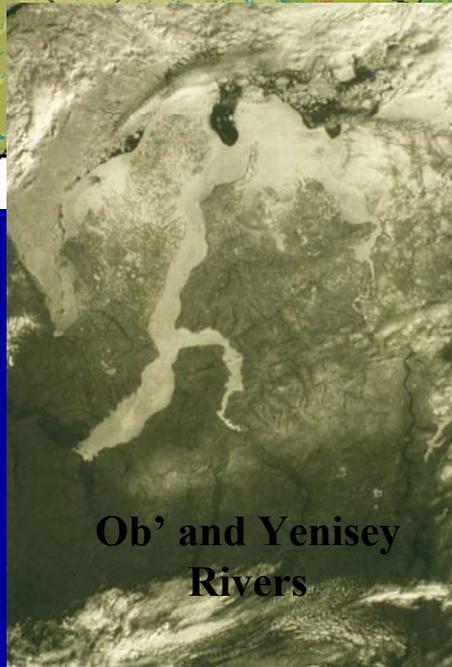
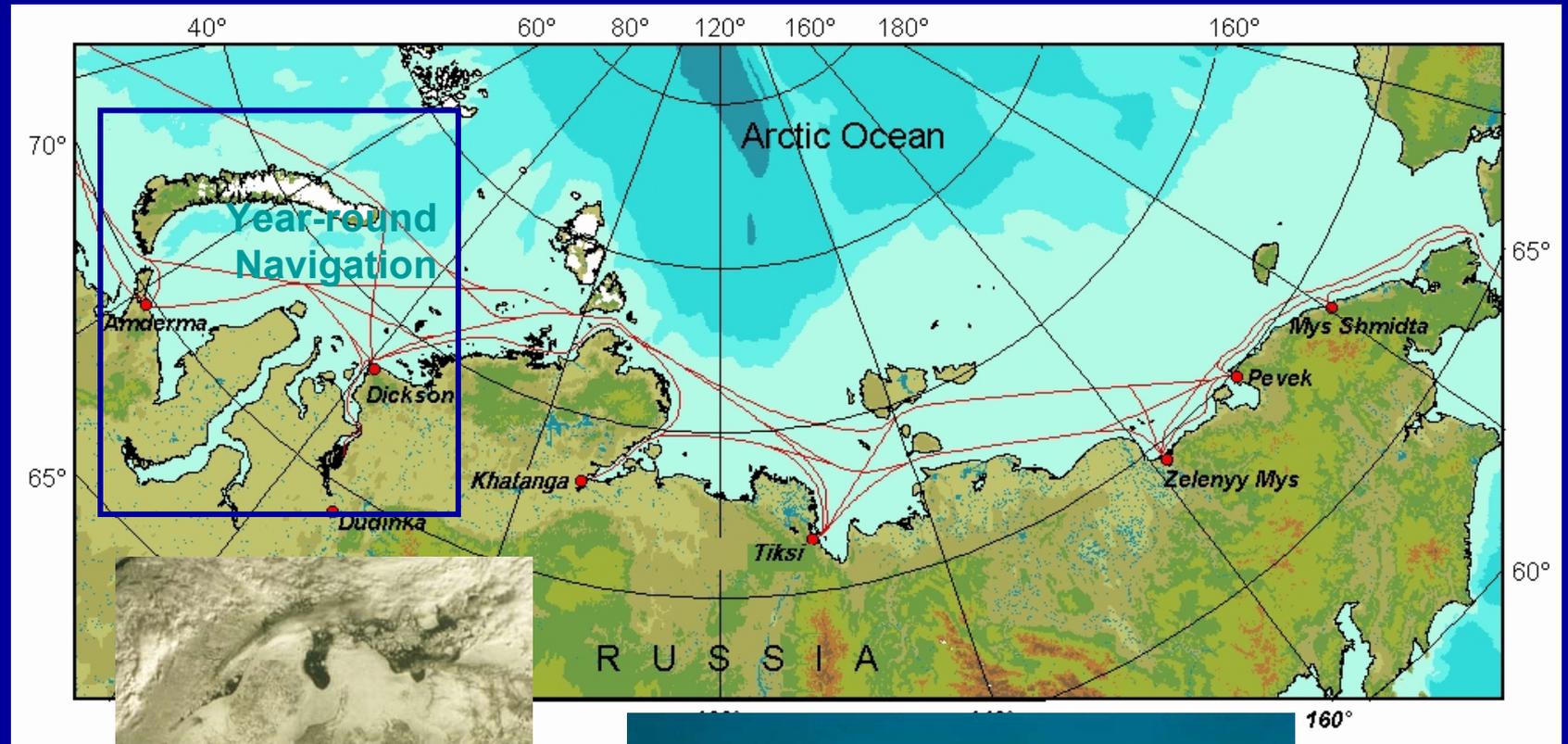
Significant Summer 2004 Arctic Marine Operations

- **8 icebreakers to the North Pole**
 - (5-tourism, 3-science)
- **International Arctic Ocean Drilling Program**
 - (3 icebreakers~ Central Arctic Ocean)
- **Canadian Arctic Voyages (107)**
 - Canadian Vessels – 62
 - Foreign Vessels – 32
 - Canadian Government Vessels - 8
 - Northwest Passage Transits: Canadian Coast Guard - 2
 - Northwest Passage Transits: Foreign Cruise Ship – 1
 - Northwest Passage Transits: Foreign Yachts - 2

Significant Summer 2004 Arctic Marine Operations (continued)

- **Northern Sea Route Voyages
(estimated)**
 - 52 Vessels ~ 165 Voyages
 - 1.75 million tonnes of cargo
 - No NSR Transits
- **Large Cruise Ships ~ Greenland – 27**
- **Icebreaking Research Vessel
Operations - 6**

International Northern Sea Route Programme



(1993 – 1999)

Alternative Shipping Routes to Ports in the Atlantic and Pacific

(nautical miles)

Hamburg to:	Vancouver	Yokohama	Hong Kong	Singapore
NSR	6,635	6,920	8,320	9,730
Suez Canal	15,377	11,073	9,360	8,377
Cape of Good Hope	18,846	14,542	13,109	11,846
Panama Canal	8,741	12,420	12,920	15,208

International Activities

- International Maritime Organization (IMO)
 - Guidelines for Ships Navigating in Arctic Ice-covered Waters (1993-2000)
- Ship Classification Societies (1980's to Present)
 - Developing hull structure & machinery standards for Arctic ships
- Arctic Council
 - Protection of the Arctic Marine Environment (PAME) WG
 - **Arctic Marine Strategic Plan (2004)**
 - **Arctic Shipping Assessment (2005 - 2007) (US, Canada & Finland)**
 - Arctic Monitoring and Assessment Programme (AMAP) WG
 - **Arctic Oil and Gas Assessment (2004 - 2006): Marine Systems**
 - Arctic Climate Impact Assessment

Cambridge Arctic Marine Transport Workshop

- 28 – 30 Sept 2004, Scott Polar Research Institute
- 65 Experts (Government, Industry & Academe)
- Key issues and research agenda
- Studies required (selected):
 - Trade cost-benefit analyses
 - Risk assessments
 - Environmental impact assessments
 - Comparative security analyses (world shipping routes)
 - Regional sea ice analyses

- Issues:
 - Many challenges for year-round, trans-Arctic navigation
 - More probable regional traffic (destination)
 - Lack of infrastructure & basic navigation information
 - No certainty and predictability for passage making & regulations
 - Marine environmental protection is paramount concern
 - Future use – NSR, Central Arctic & NWP