

Why the Arctic Matters..



United Nations Educational,
Scientific and Cultural Organization

Mead Treadwell, Chair

U.S. Arctic Research Commission

**UNESCO Experts Meeting: Sustainable Development of the Arctic in the face
Global Climate Change: scientific, cultural and educational challenges**

Monaco, 3-6 March 2009



US ARCTIC RESEARCH COMMISSION



Mead Treadwell, Chair



Michele Longo Eder



Helvi Sandvik



Virgil (Buck) Sharpton



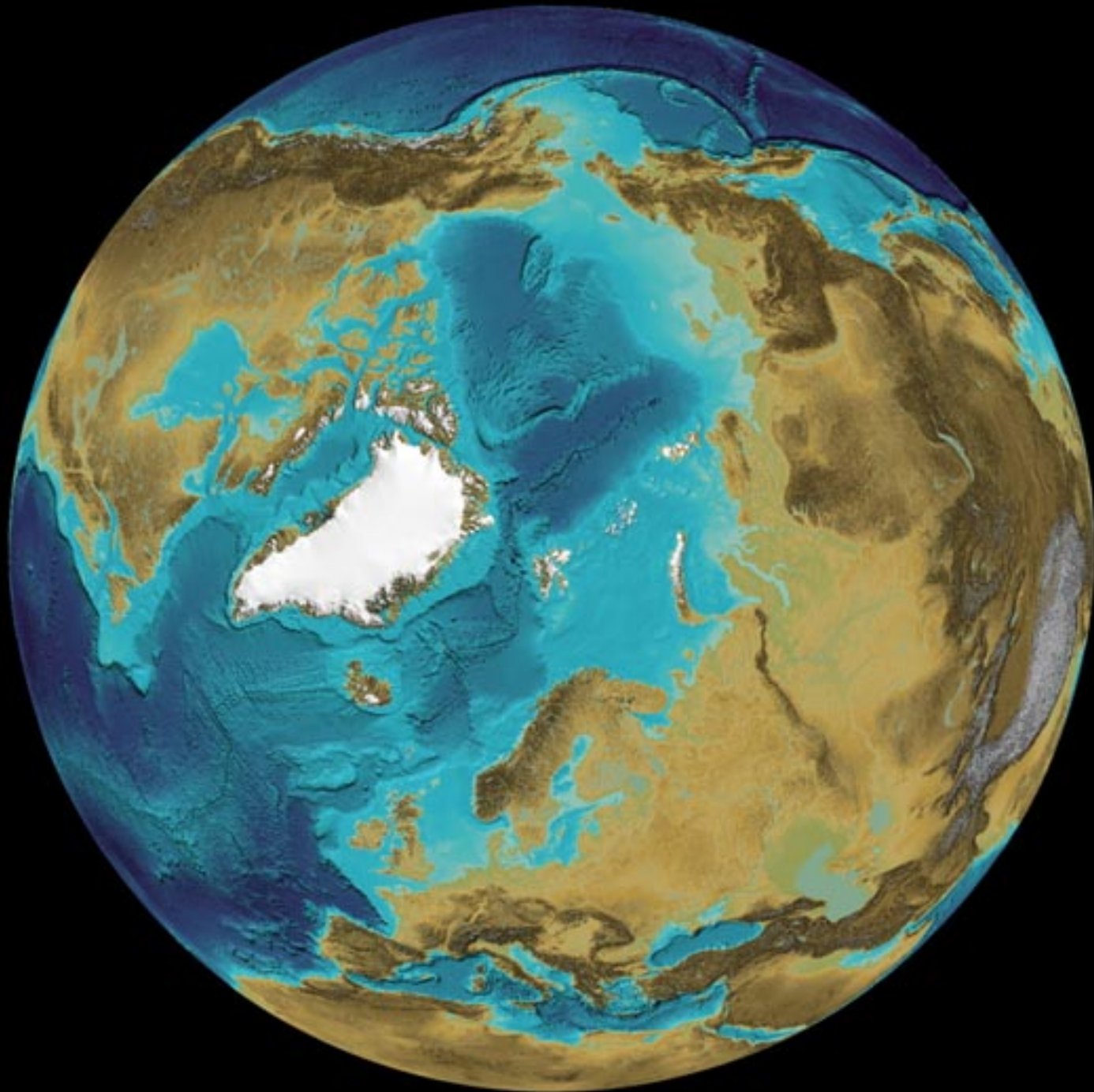
Vera Kingeekuk Metcalf



Warren Zapol



Charles Vörösmarty







*"I'm not sure what I am, but I believe
I'm a product of Norway."*



Arctic Energy



THE
ARCTIC
ENERGY
SUMMIT



AN INTERNATIONAL POLAR YEAR EVENT



ARCTIC ENERGY
Themes



RURAL



EXTRACTIVE



SUSTAINABILITY

PETROLEUM POTENTIAL OF ASSESSMENT UNITS AND PROVINCES IN THE CIRCUM-ARCTIC

In the Circum-Arctic Resource Appraisal (CARA), 33 provinces were examined, of which 25 were judged to have a 10-percent or greater probability of at least one significant undiscovered petroleum accumulation in any continent assessment unit (AU) and were therefore quantitatively assessed. Shown in these three maps are the relative probabilities for all assessment units assessed and the estimated relative potentials for undiscovered oil and gas in the assessed provinces.

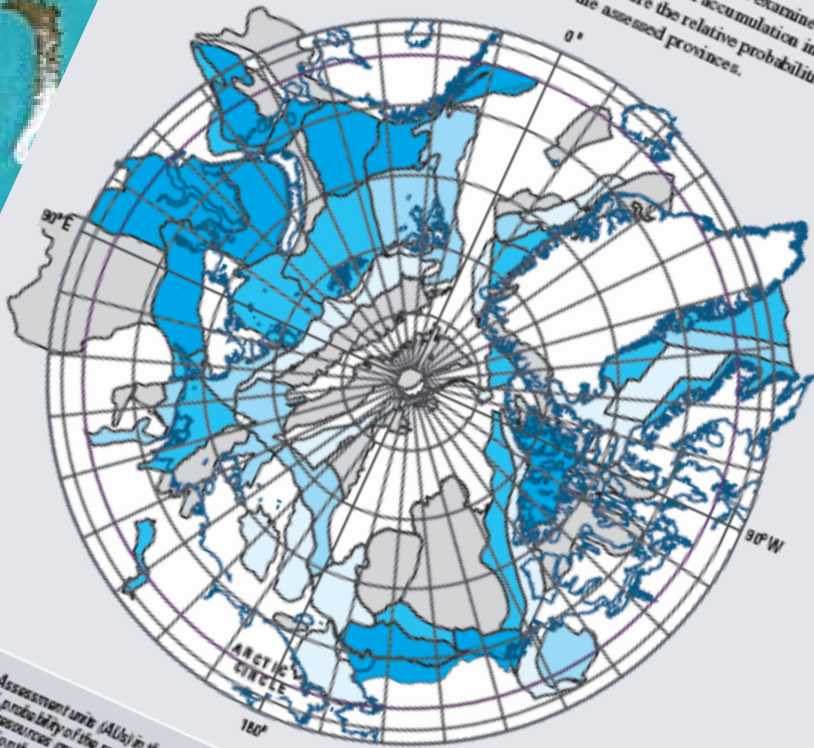
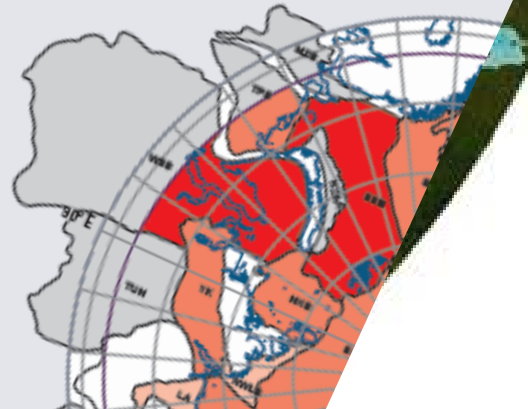


Figure 1. Assessment units (AUs) in the Circum-Arctic Resource Appraisal (CARA) color-coded by assessed probability of the presence of at least one undiscovered oil and/or gas field with recoverable resources greater than 20 million barrels of oil equivalent (MMBOE). Probabilities for AUs are based on the entire area of the AU, including any parts south of the Arctic Circle.

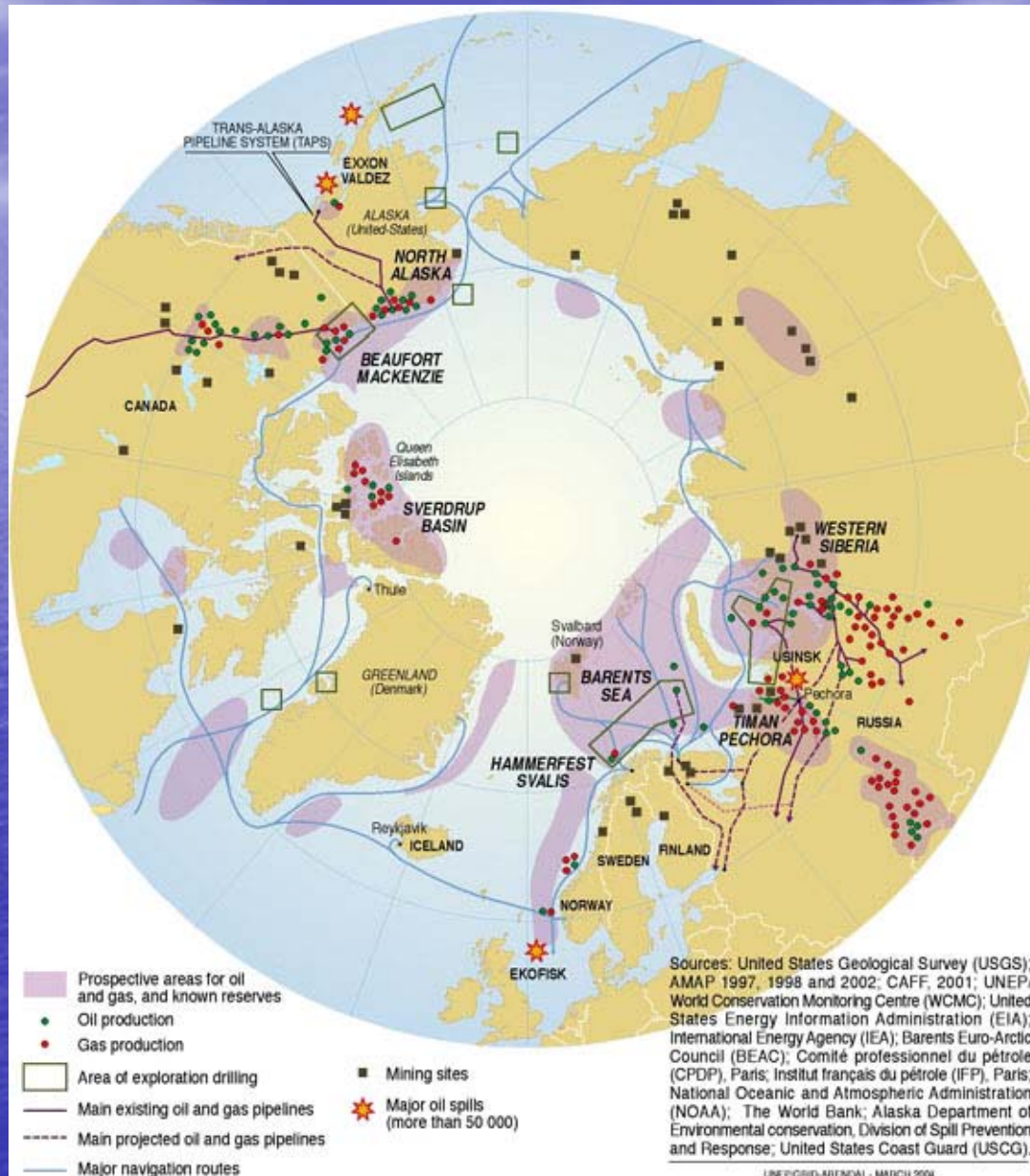
PROBABILITY (percent)

	100
	50-100
	30-50
	10-30
	<10

Area of low petroleum potential



Oil and Gas: Resources of the North



Source: AMAP





Ice-dependent seals

Ringed seals



Pups in under-snow lairs in coastal fast ice:
feeds in water column/under ice

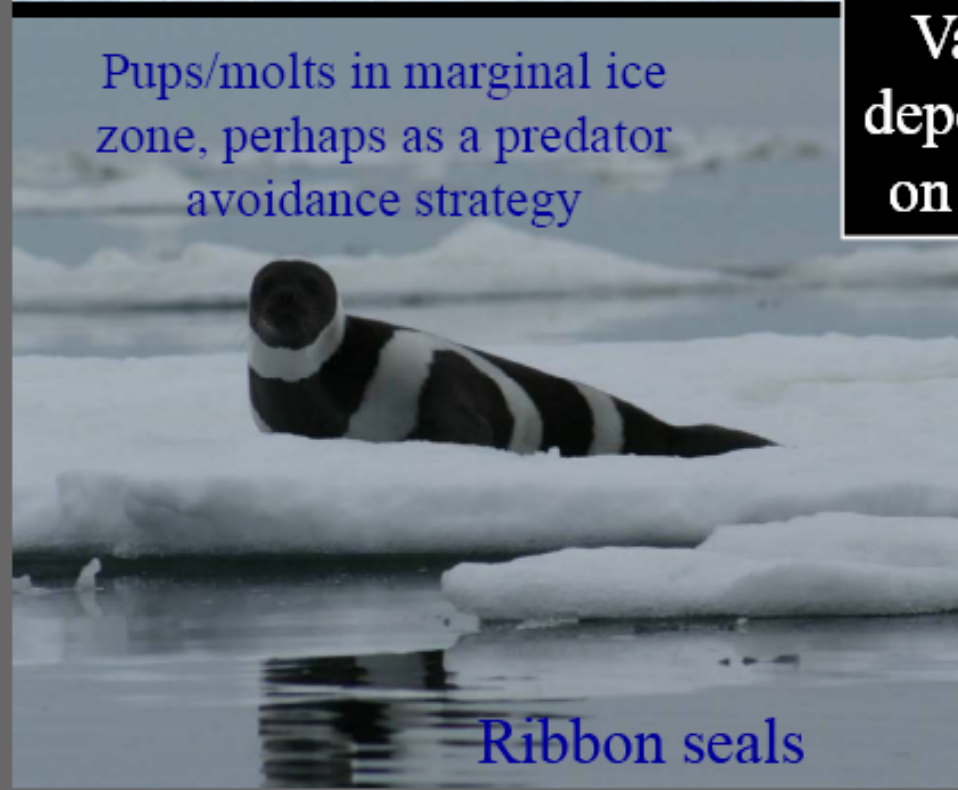
Bearded seals



Pups/feeds in pack ice zone over shelf,
in areas of rich benthic productivity

Varying dependence on sea ice

Pups/molts in marginal ice
zone, perhaps as a predator
avoidance strategy



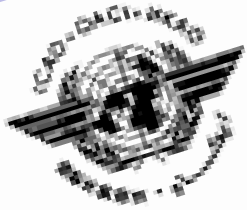
Ribbon seals

Pups in
pack ice –
uses land
haulout
sites during
summer



Spotted seals





FOR IMMEDIATE RELEASE

NEW POLAR AIR ROUTES CUT FLIGHT TIMES BETWEEN NORTH AMERICA/EUROPE AND ASIA/PACIFIC REGIONS

MONTREAL, 24 January 2001 - A formal agreement was reached today on a new air route structure over the North Pole that will considerably cut distances on flights linking North America and Europe to Asia and the Pacific Region. This will result in significantly shorter flight times, more convenient flight schedules and environmental benefits due to reduced fuel burn, and considerable economic advantages to airlines and flying public.

The announcement was made by the International Civil Aviation Organization (ICAO), Dr. Assioma Nyaupane, Director of the ICAO's Informal Trans-Asia/Trans-Europe Working Group (ITASPEWG), which was set up in Paris in 1998 to study the economic and operational soundness of polar routes.

A number of successful...
...ical via

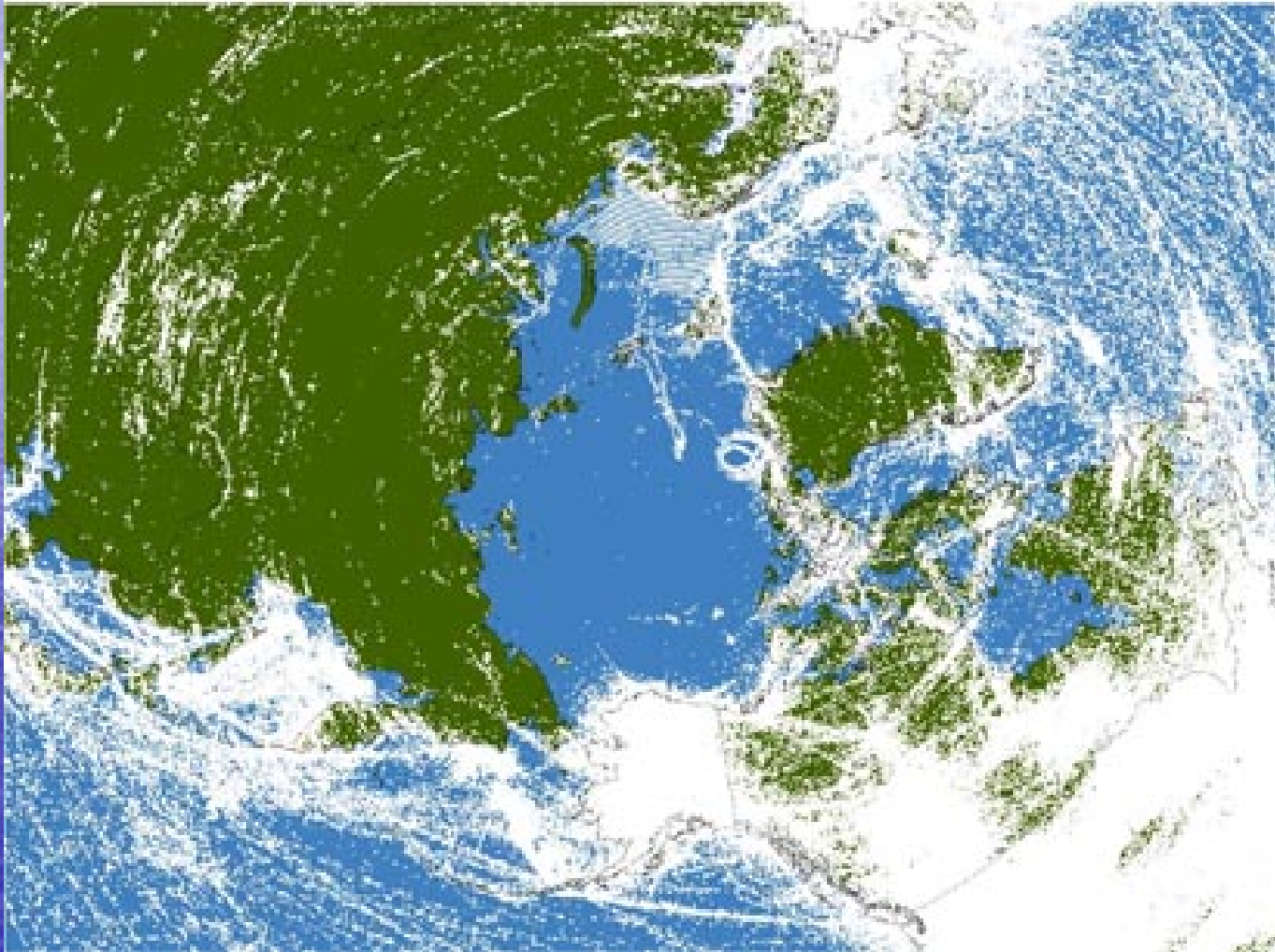


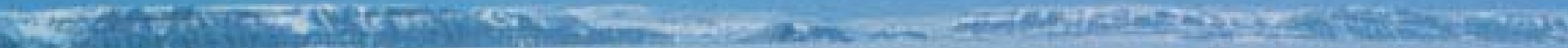
July 2001

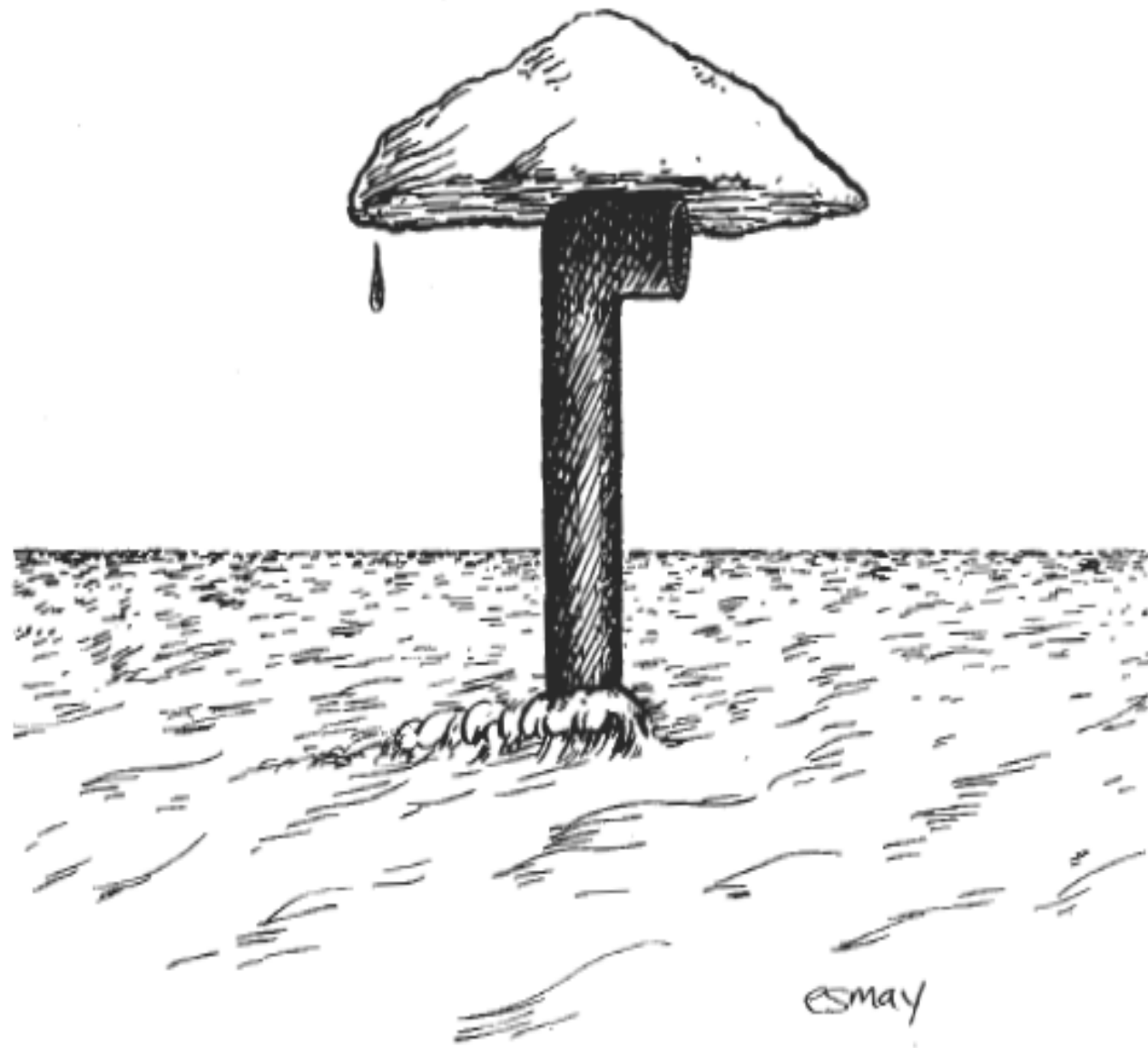
Arctic Voice and Data



July 2006 Arctic Voice and Data



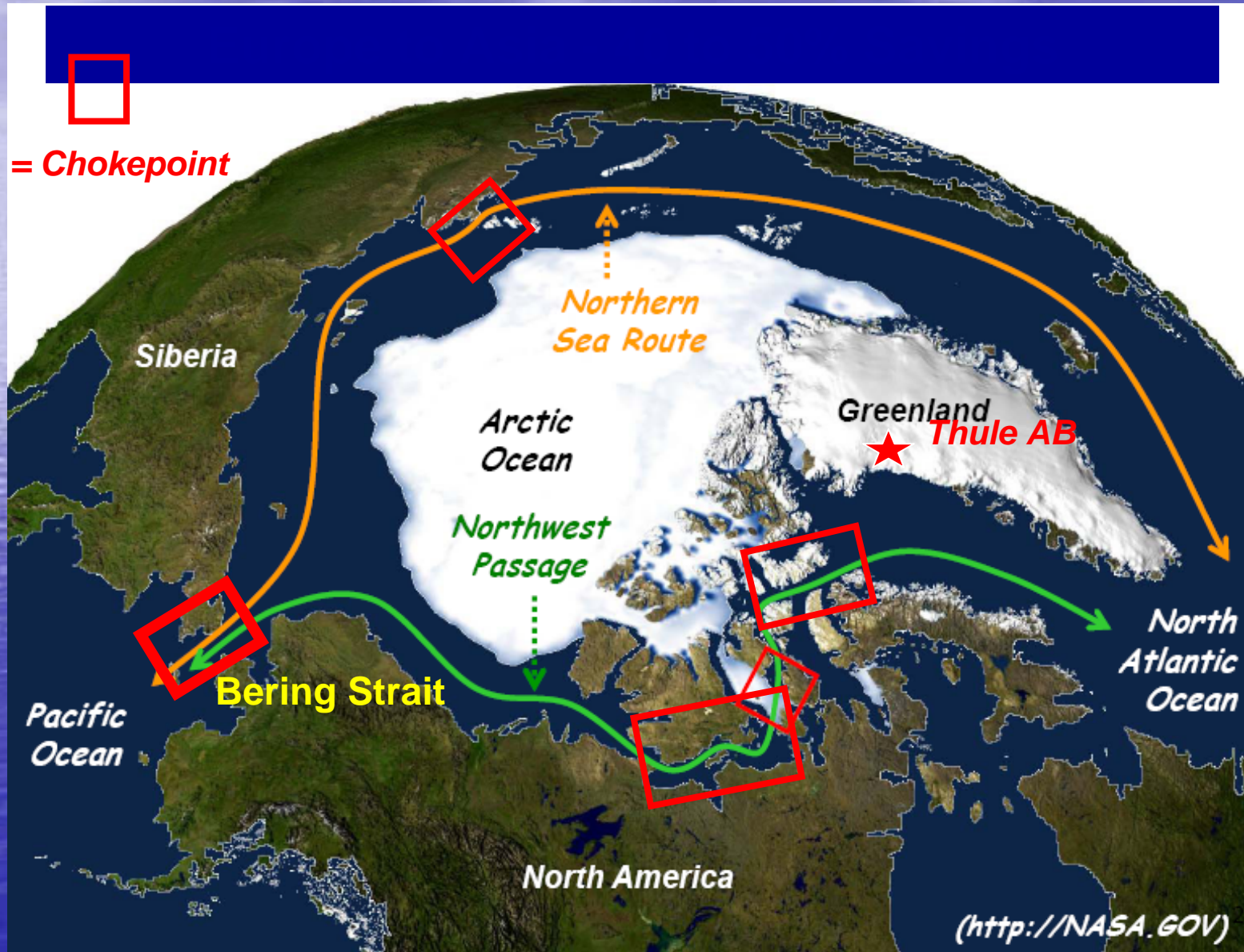




Last Trip Under the Polar Ice Cap

National Security

Potential Future Arctic Shipping Routes



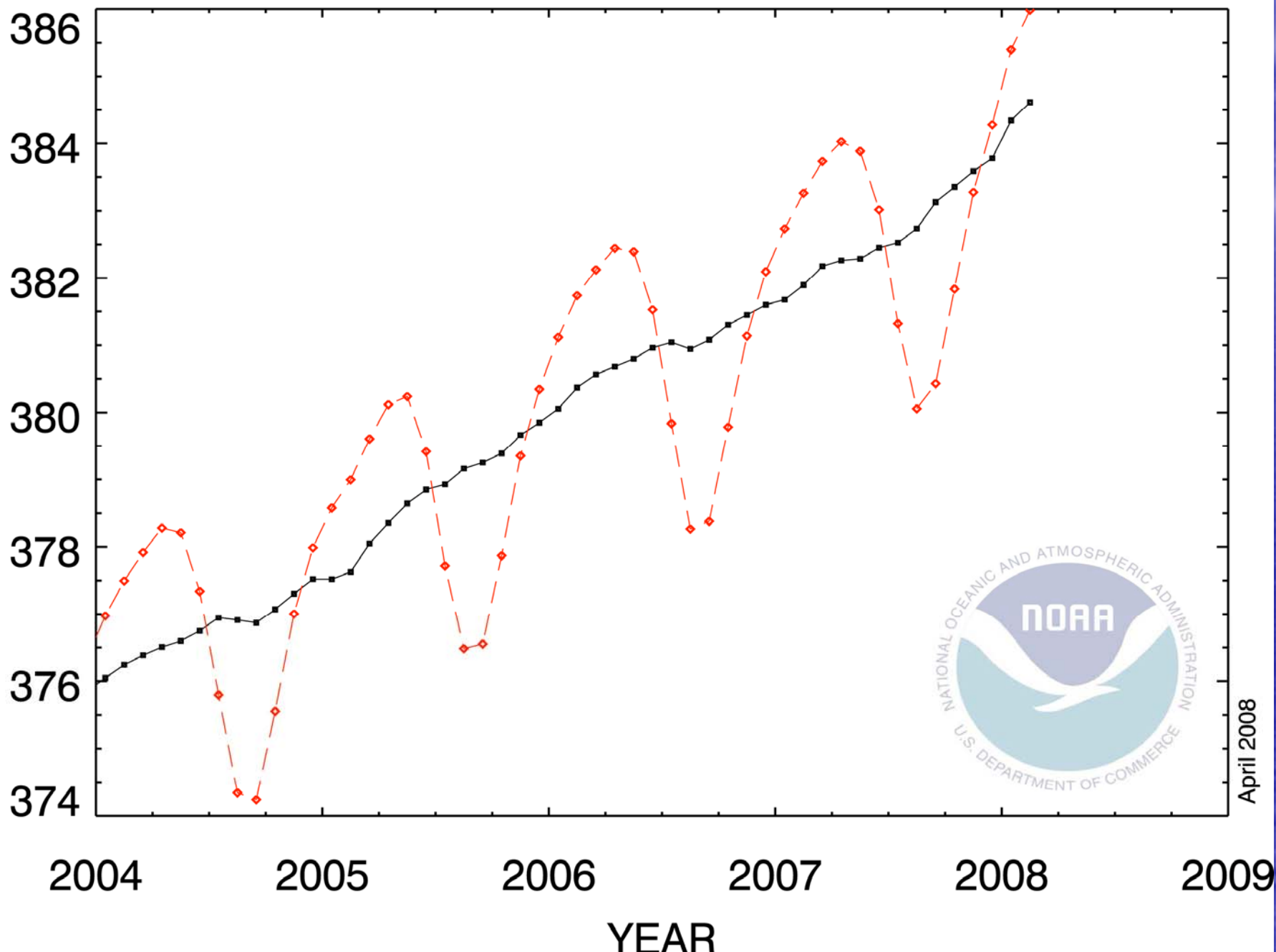


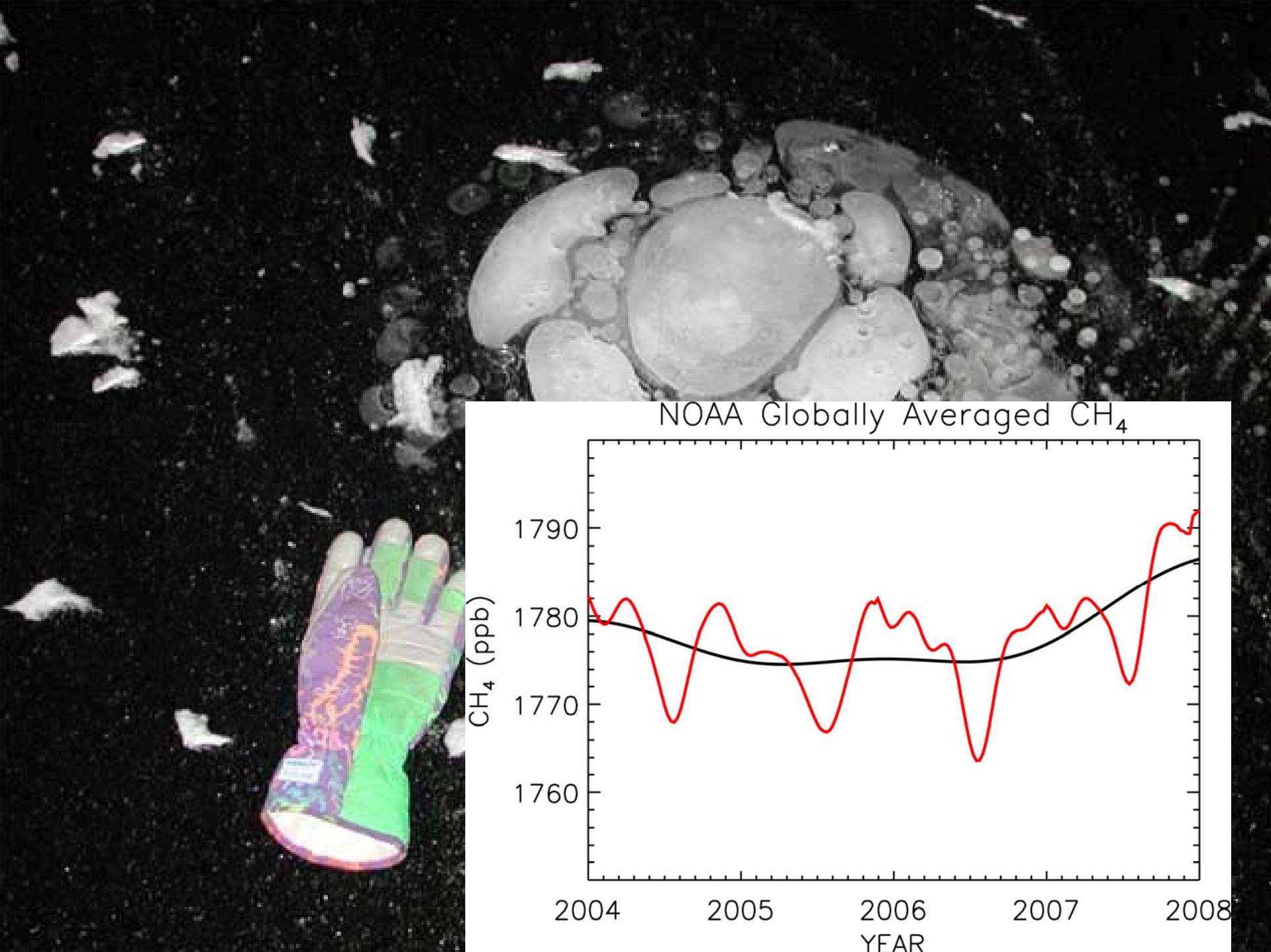
Permafrost degradation - NPRA, Alaska



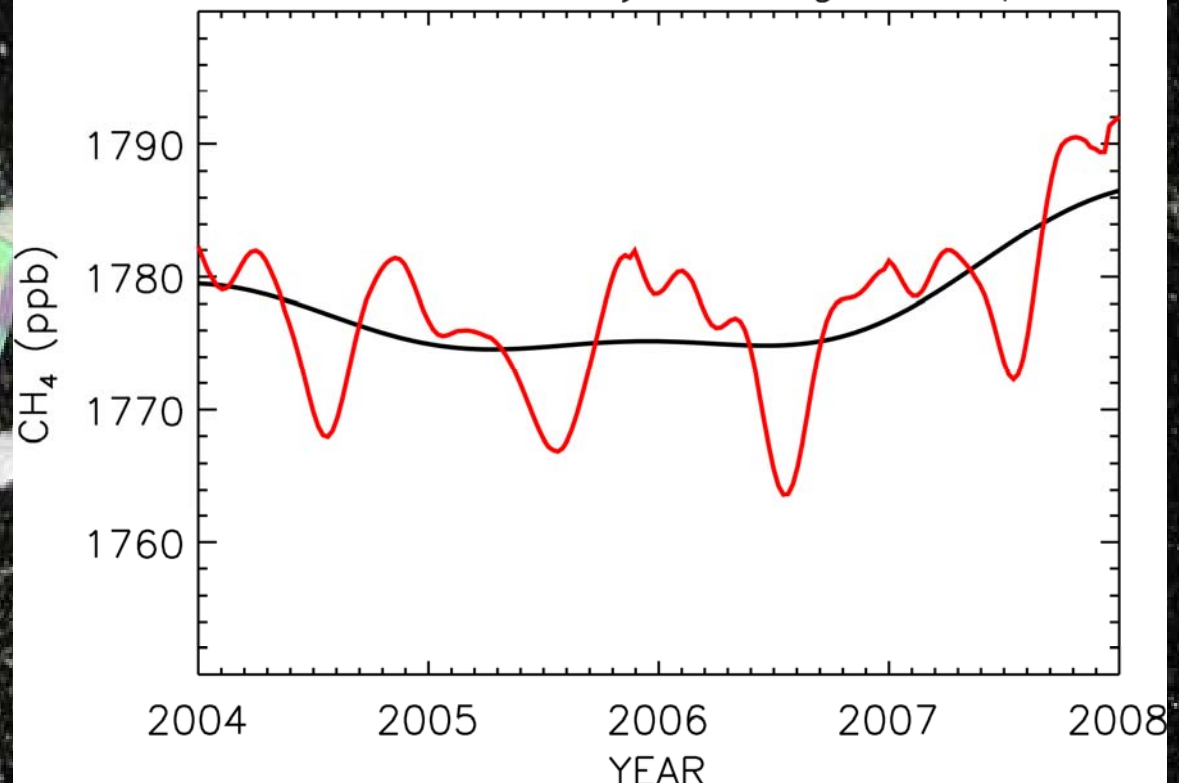
RECENT GLOBAL MONTHLY MEAN CO₂

PARTS PER MILLION





NOAA Globally Averaged CH₄



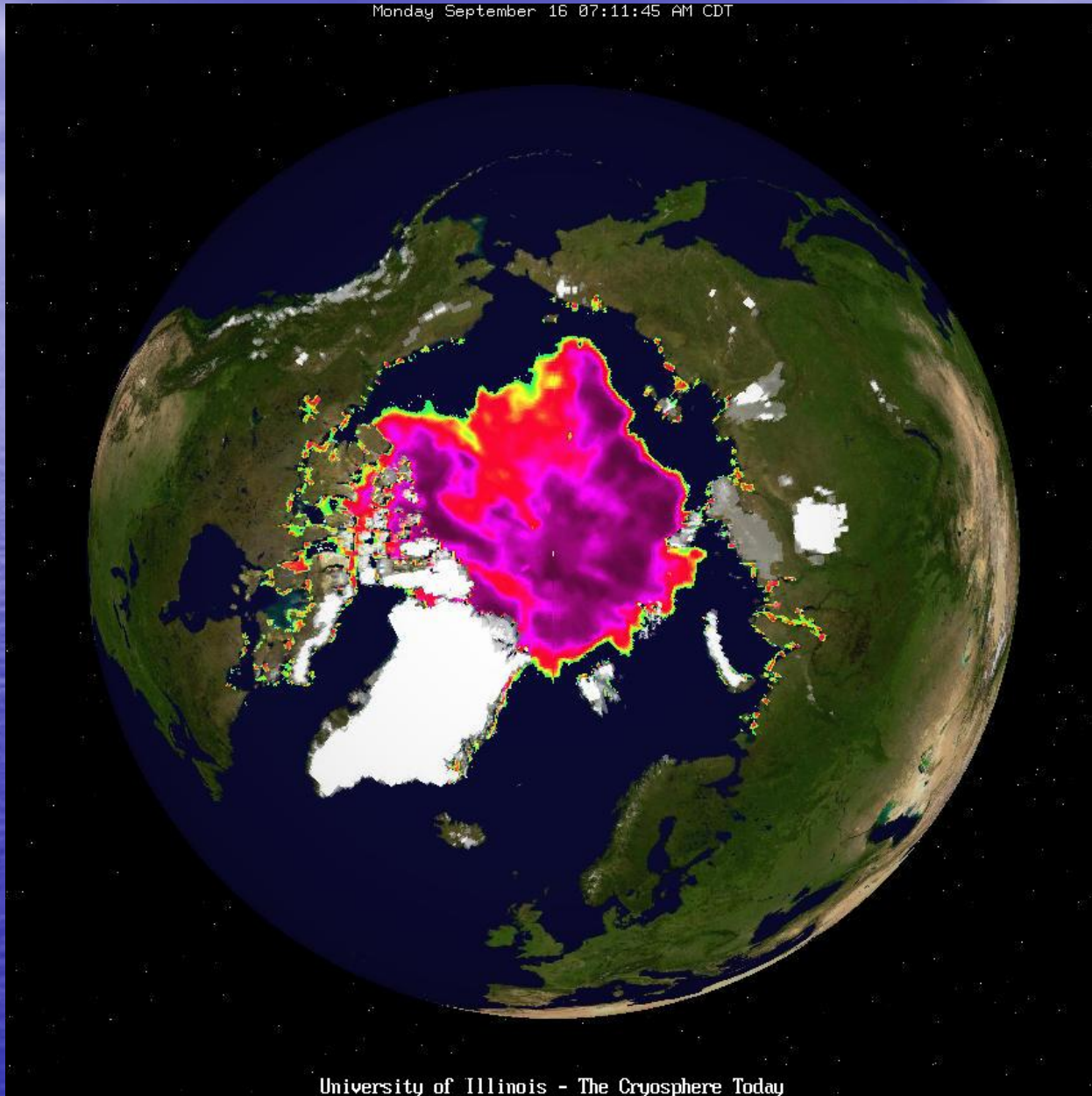
Summer Sea Ice Retreat



Barrow

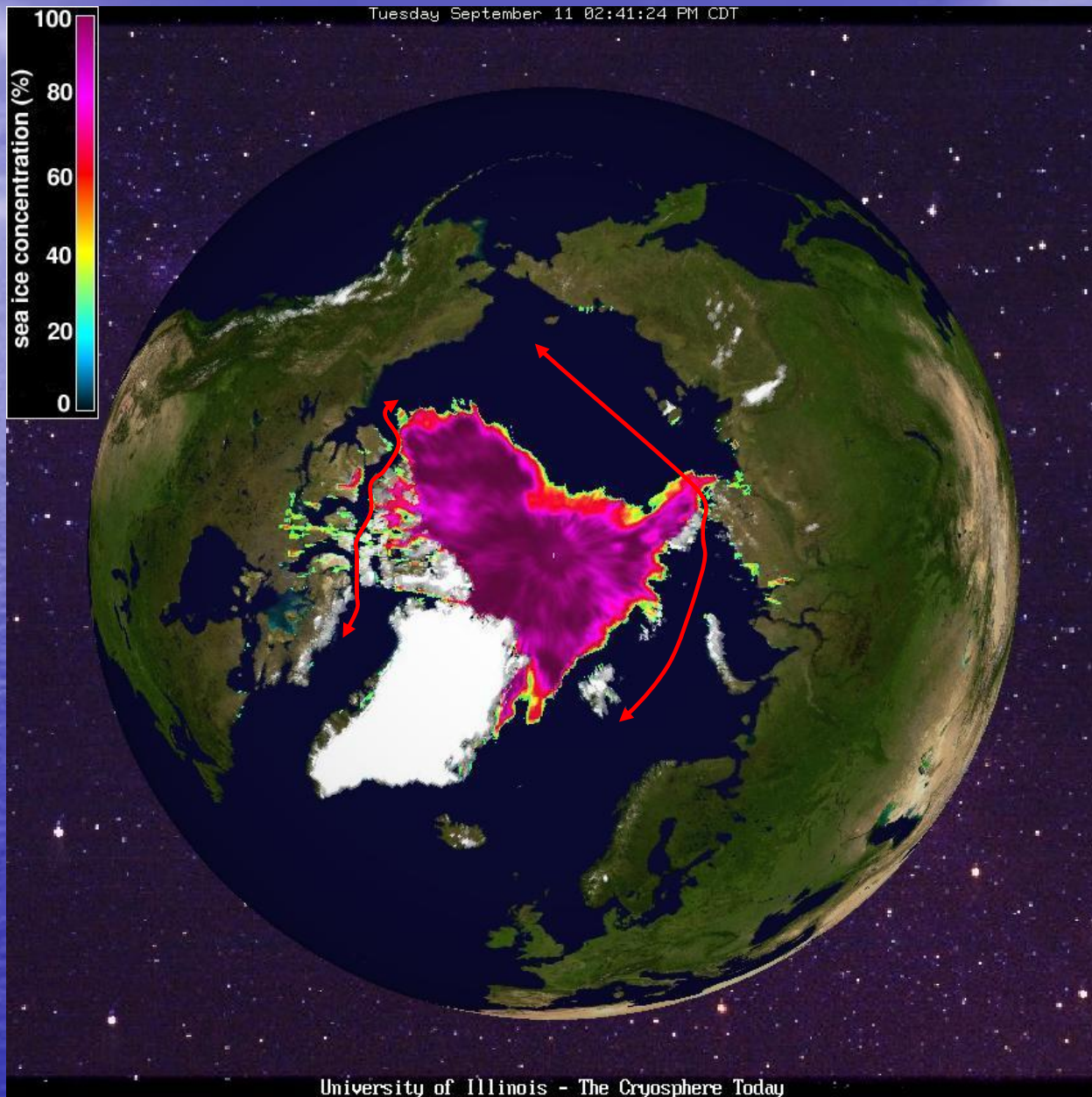
16 September 2002

Monday September 16 07:11:45 AM CDT



University of Illinois - The Cryosphere Today

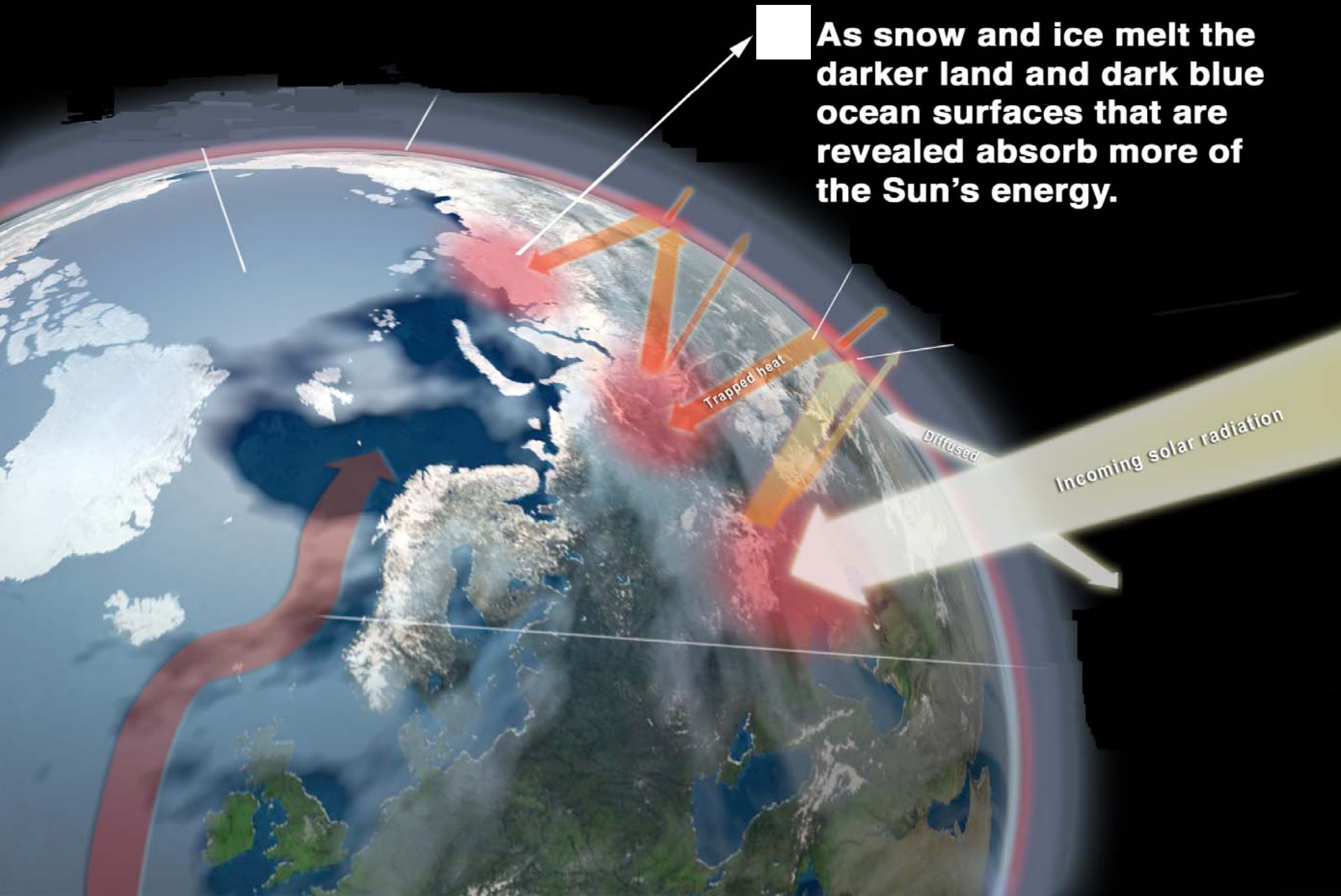
11 September 2007

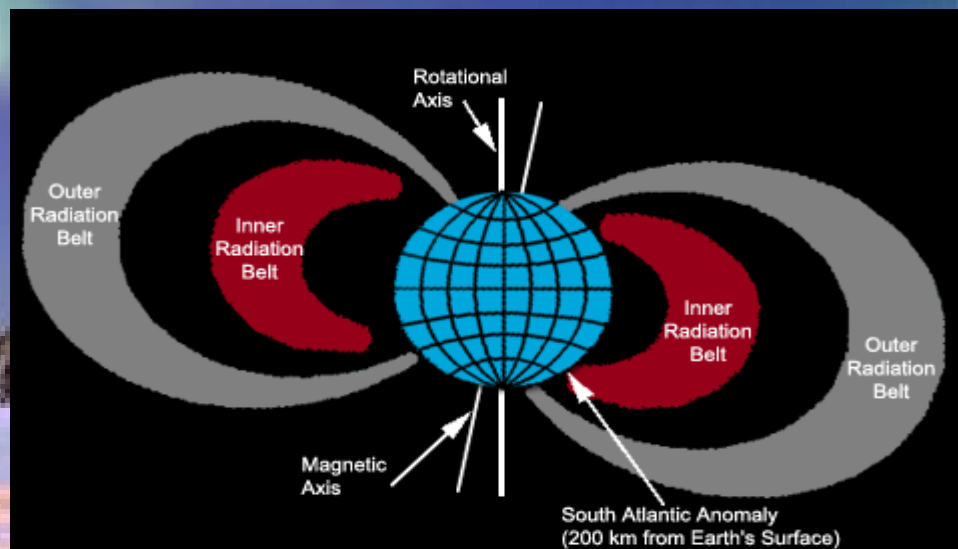
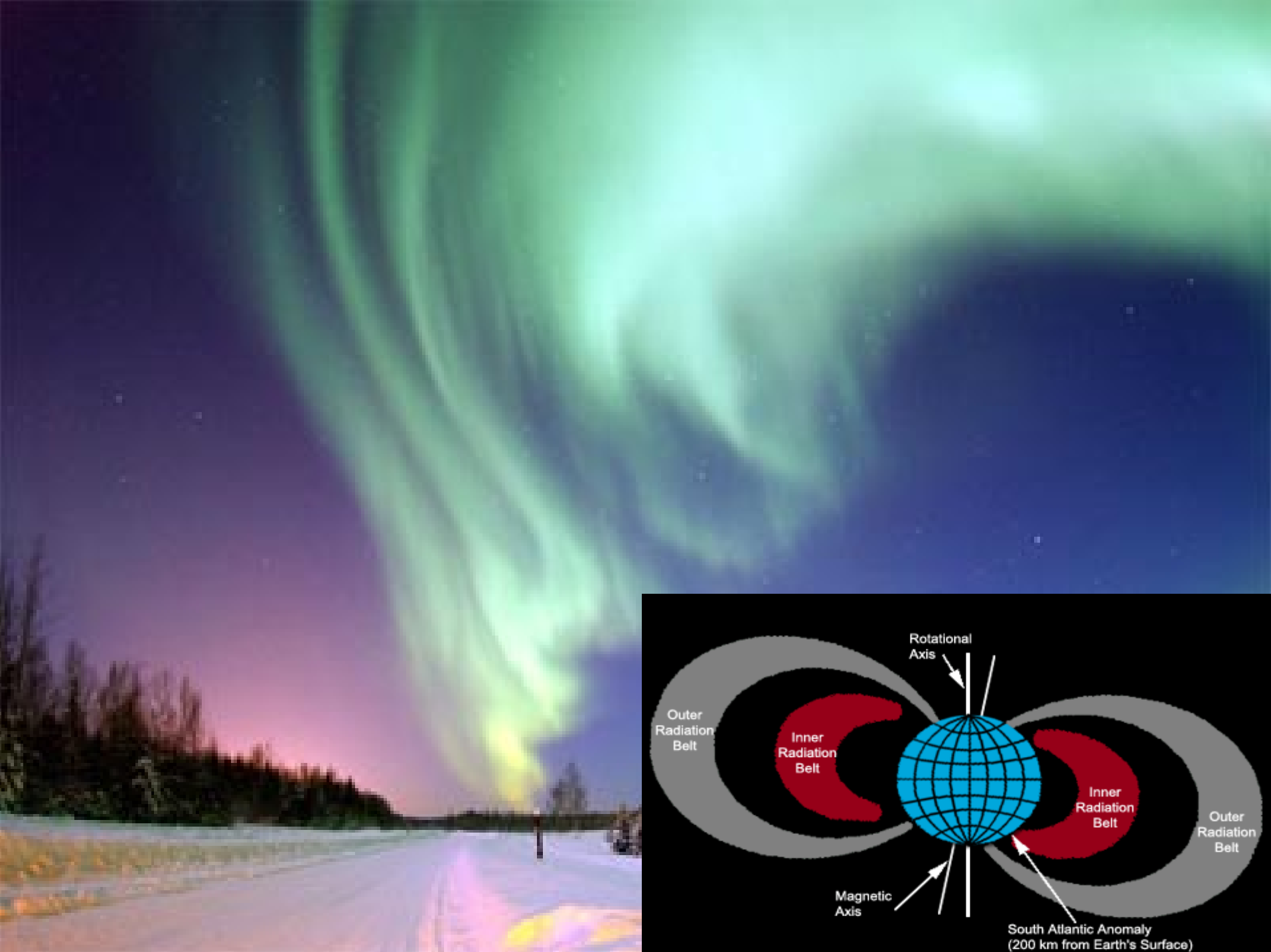


Why the Arctic Warms Faster

A Critical Reason is that:

As snow and ice melt the darker land and dark blue ocean surfaces that are revealed absorb more of the Sun's energy.

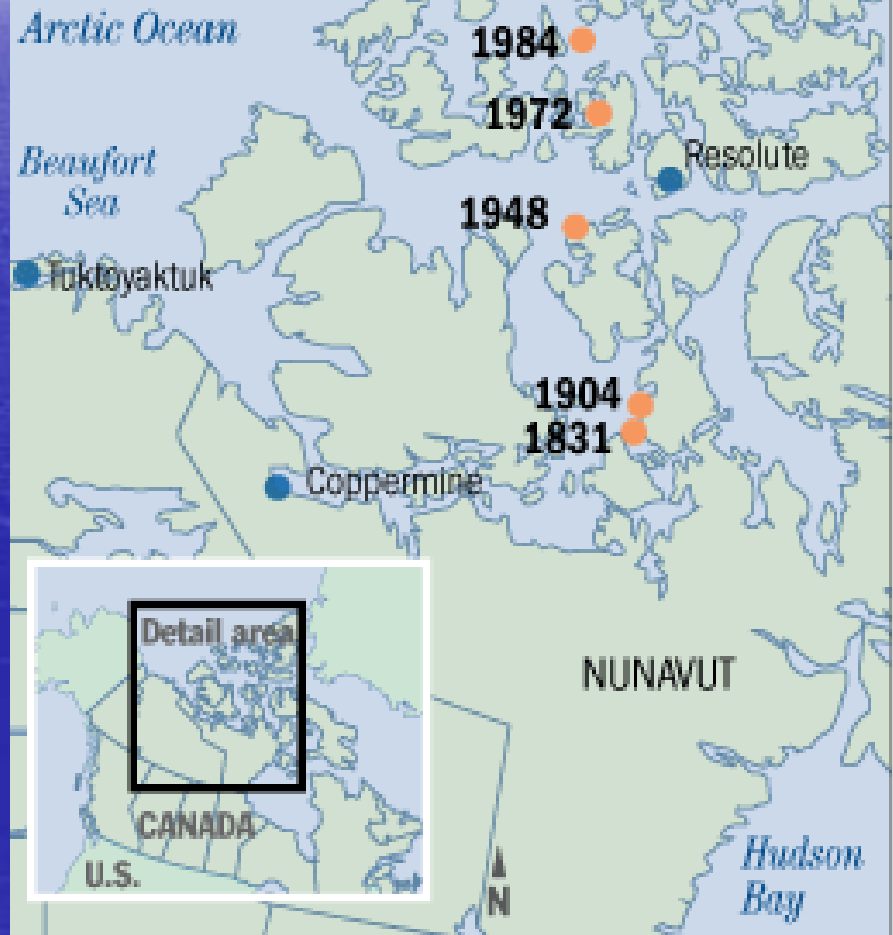






Shifting magnetic north pole

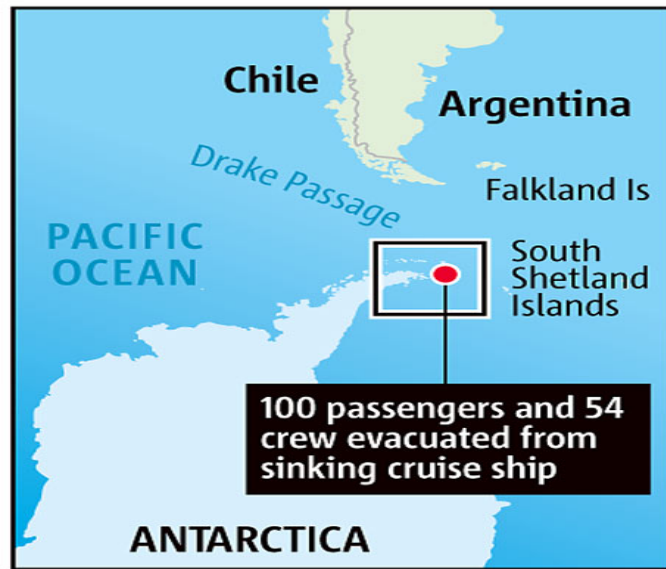
Magnetic north pole has been moving at an increasing rate across the Arctic Ocean towards Russia.



New US Arctic Policy

- National security/homeland security needs
- Protect environment/conserve biological resources
- Environmentally sustainable resource management and development
- Strengthen institutions for international cooperation; ratify Law of the Sea
- Involve indigenous communities in decisions
- Enhance scientific monitoring and research into local, regional and global environmental issues

"Stricken cruise ship off Antarctica evacuated" MSNBC-11/23/07



Arctic Changes Drive Coast Guard Mission Expansion North



All Coast Guard missions in Southern Alaska must be expanded to Northern Alaska

United States SAR Assets Capable of Response in the Arctic



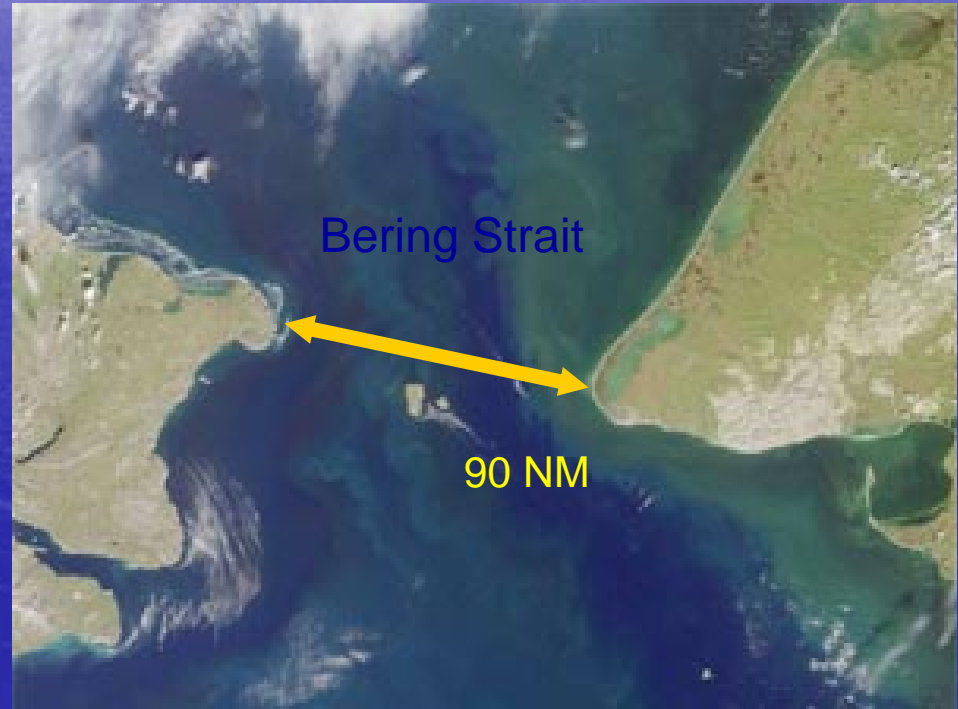
United States SAR Assets Capable of Response in the Arctic



Homeland Security

Bering Strait Summer Transits 2008

- **Bering Strait transits on the U.S. side**
~73 vessels with ~104 transits through
(mostly research vessels)
- **Kivalina/Red Dog Mine**
~ 30 round trips
(bulk carriers & tugs)
- **Russian transits**
30+ vessels with over 80 transits
(mostly cargo carriers)
- **Total Bering Strait transits**
130+ vessels making over 245 transits.



TOWARD AN INTEGRATED

ARCTIC OBSERVING NETWORK



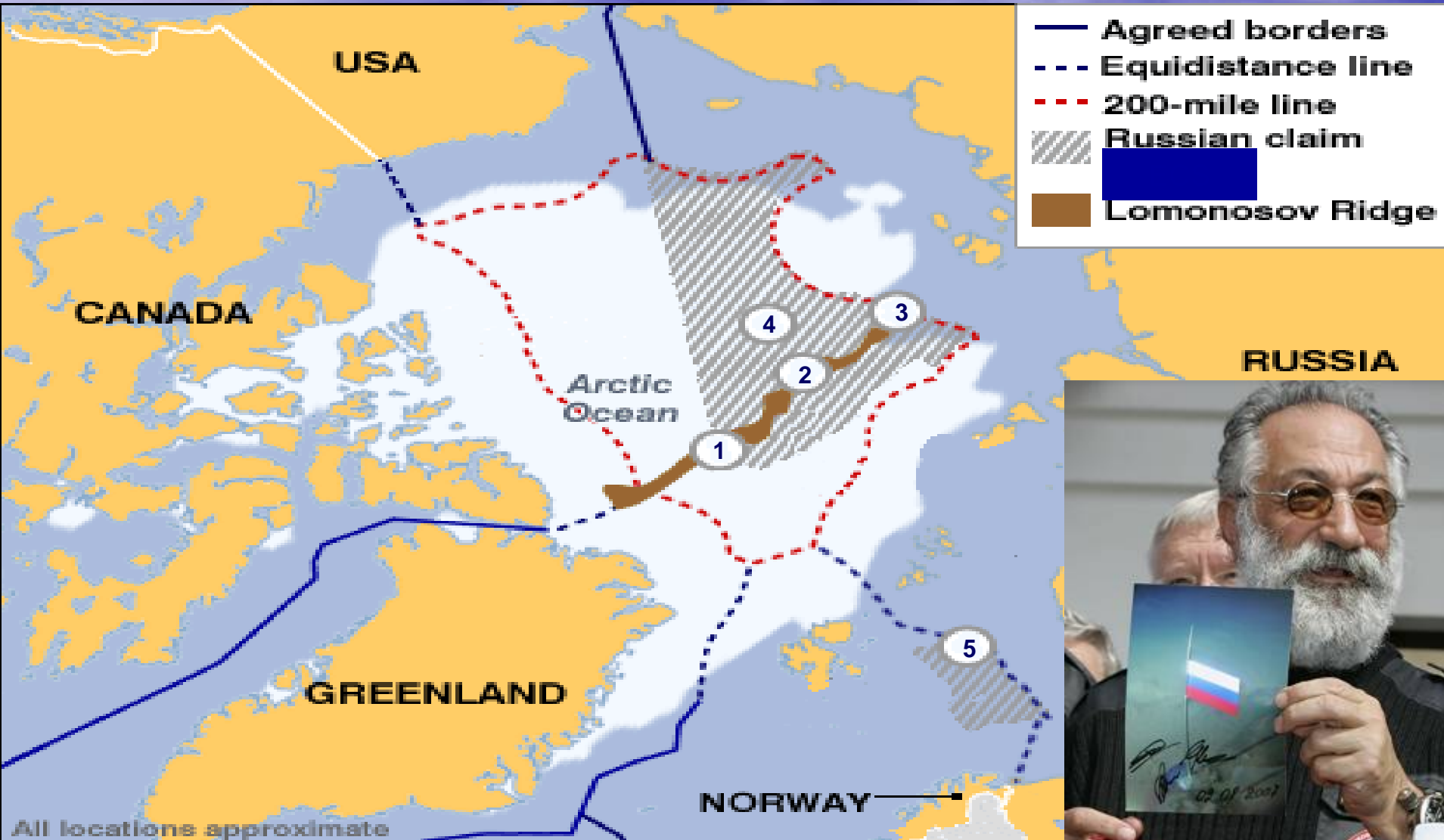
For PDF version,
google "PRB AON"

Polar Research Board

THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

Sovereign Rights and Jurisdiction



- 1) North Pole
- 2) Lomonosov Ridge
- 3) 200 nautical mile line
- 4) Russian-claimed ECS
- 5) EEZ & CS Dispute

Four forces of Arctic change...

- Climate
- Technologies: transport, satellite communication, navigation, remote sensing
- Global demand for Arctic resources
- Arctic residents reaching to improve life

... leading to an “accessible Arctic”



REPORT ON
GOALS AND
OBJECTIVES FOR
ARCTIC RESEARCH
2009



Research Themes

- **Environmental Change of the Arctic & Bering Seas**
- **Arctic Human Health**
- **Civil Infrastructure**
- **Natural Resource Assessment & Earth Science**
- **Indigenous Languages, Identities, Cultures**



Icebreaker Design for Greater Efficiency

Future Convoy Requirements?



**Icebreaking (Double Acting) Container Ship
Norilskiy Nickel in the Kara Sea
March 2006**

Aker Arctic



Aker Arctic
Technology

ARCTIC MARINE SHIPPING ASSESSMENT

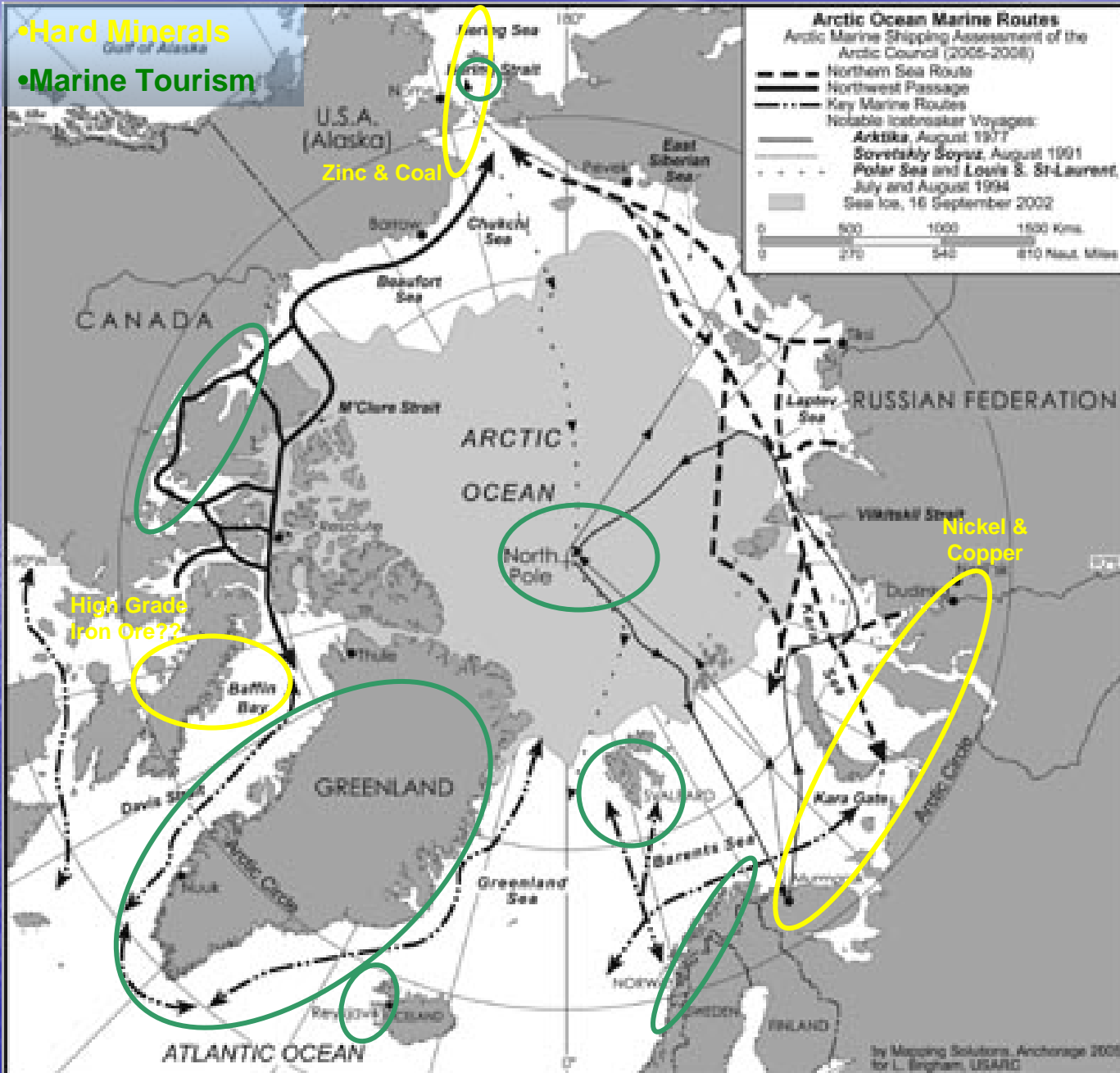
Scenarios of the Future



© Arctic-Beckley

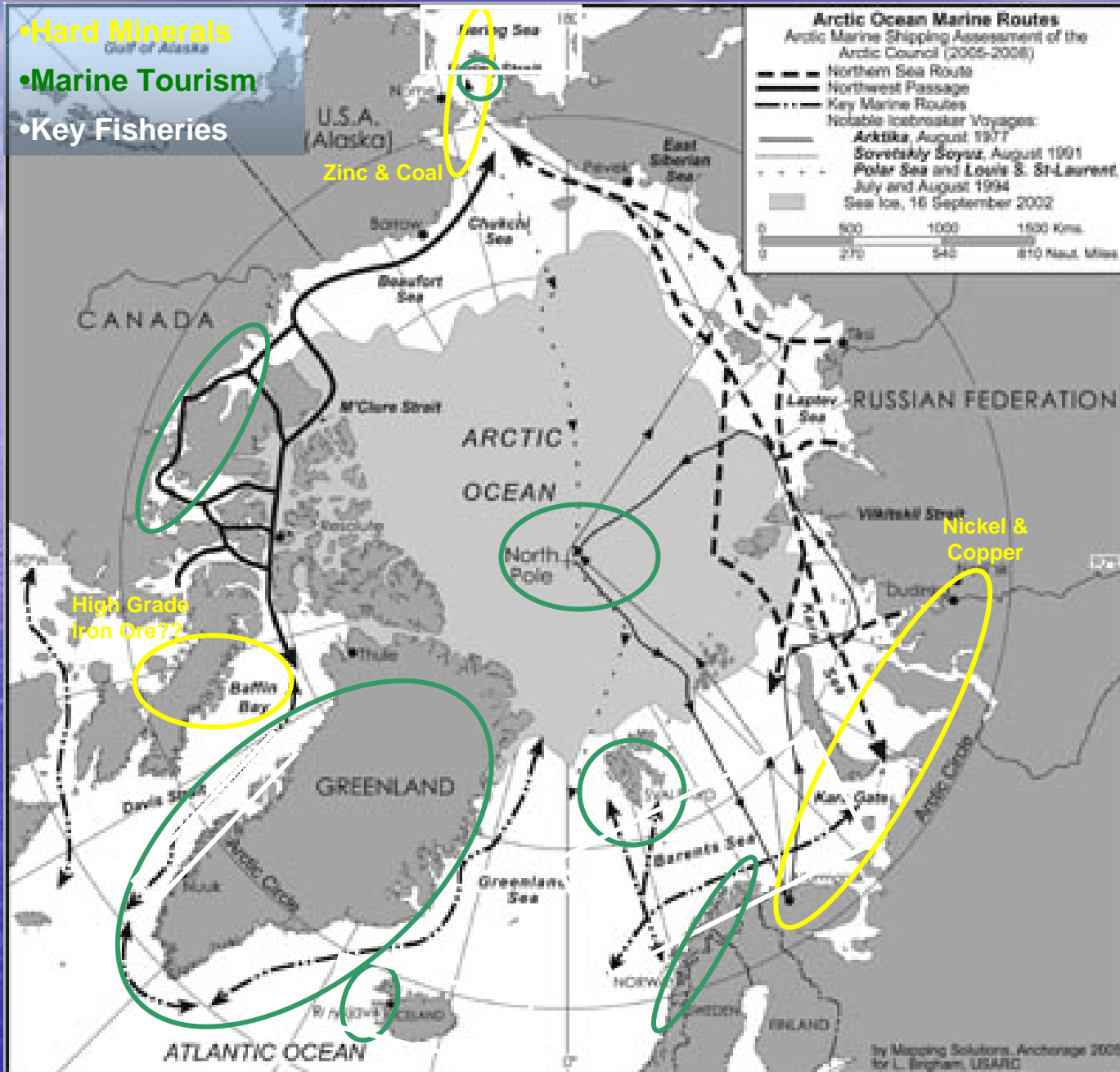
An Assessment Undertaken by the Protection of Arctic Marine Environment Working Group of the Arctic Council

Today's Marine Use

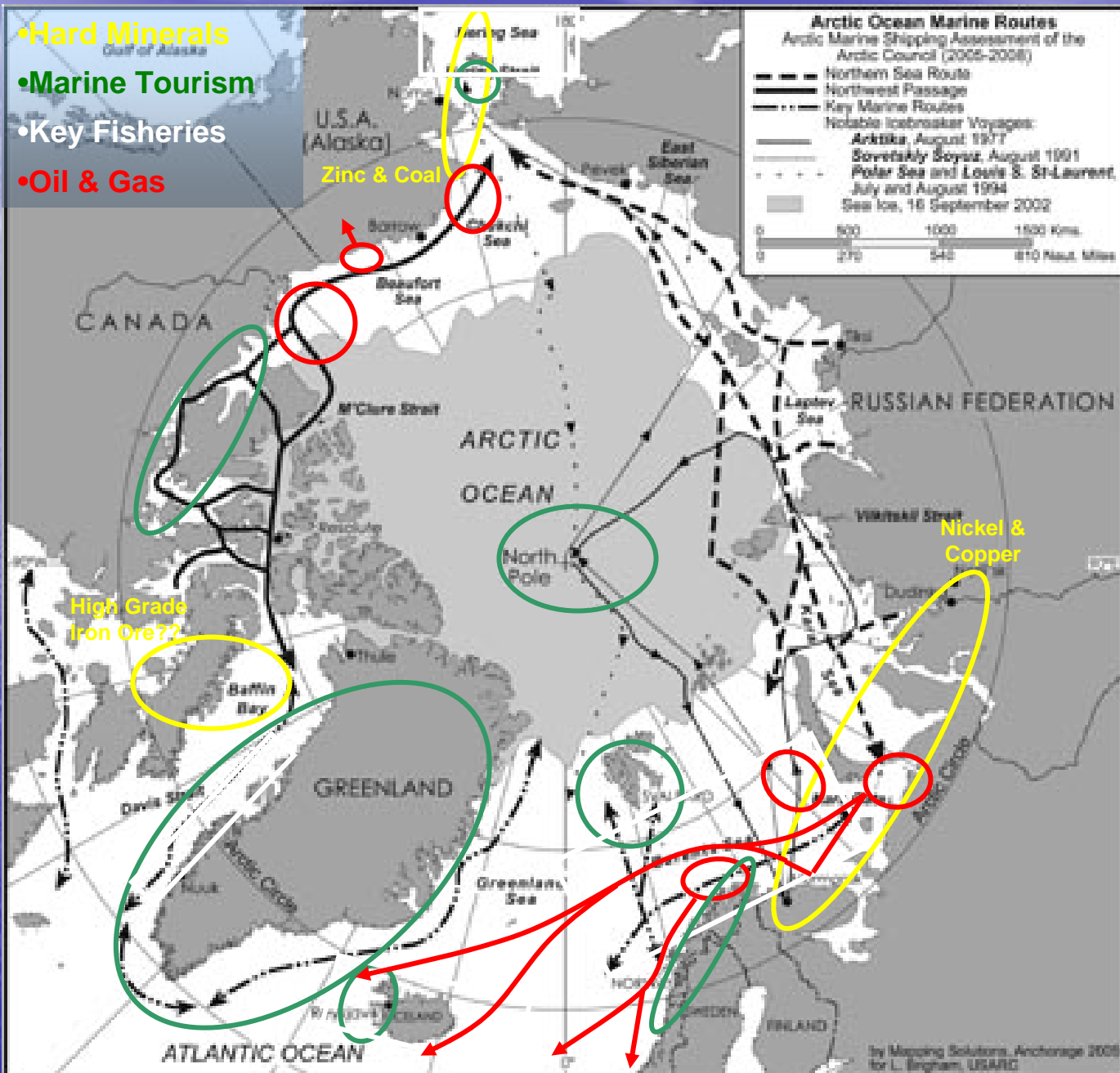


Today's Marine Use

- Hard Minerals
- Marine Tourism
- Key Fisheries



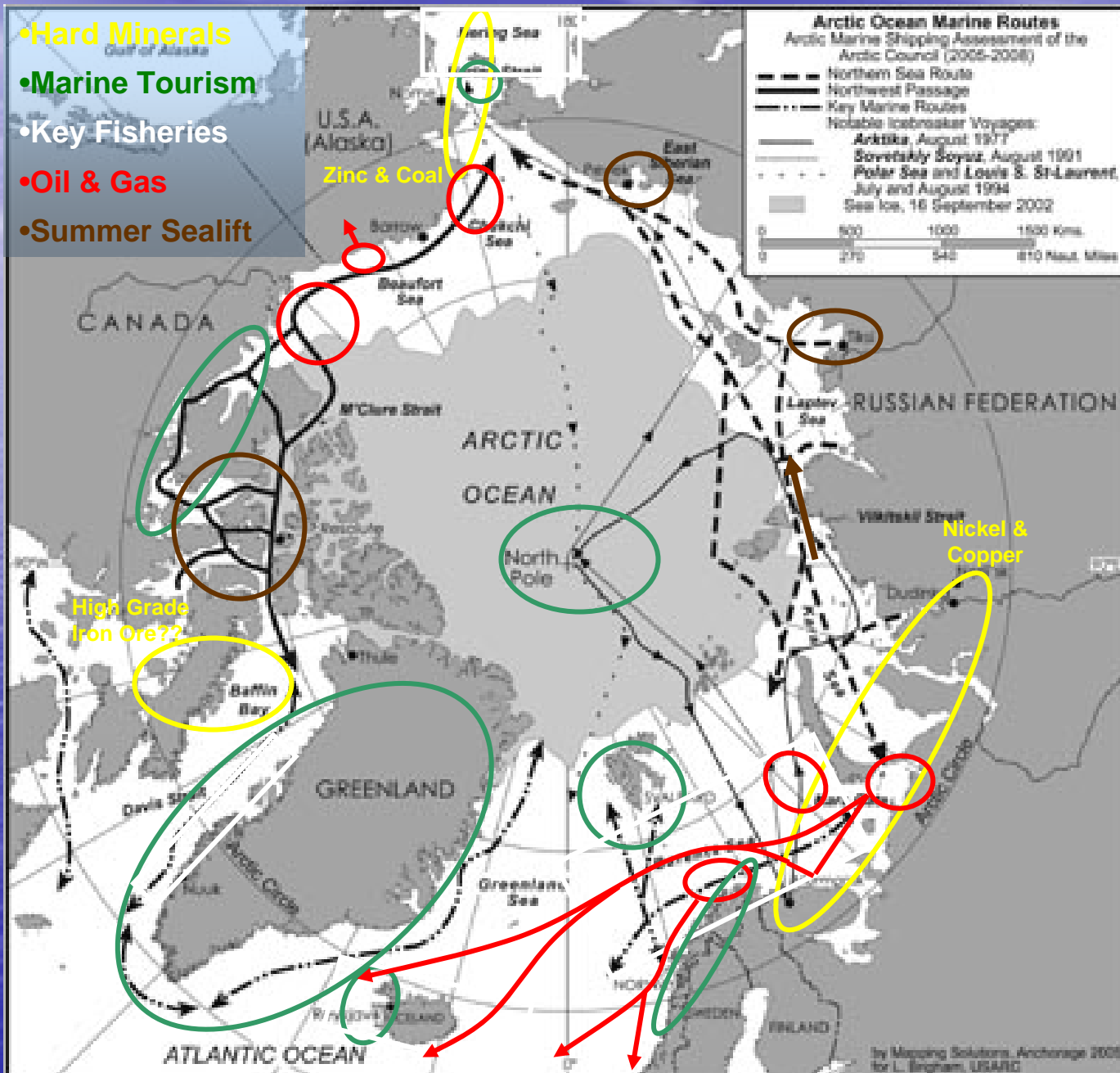
Today's Marine Use



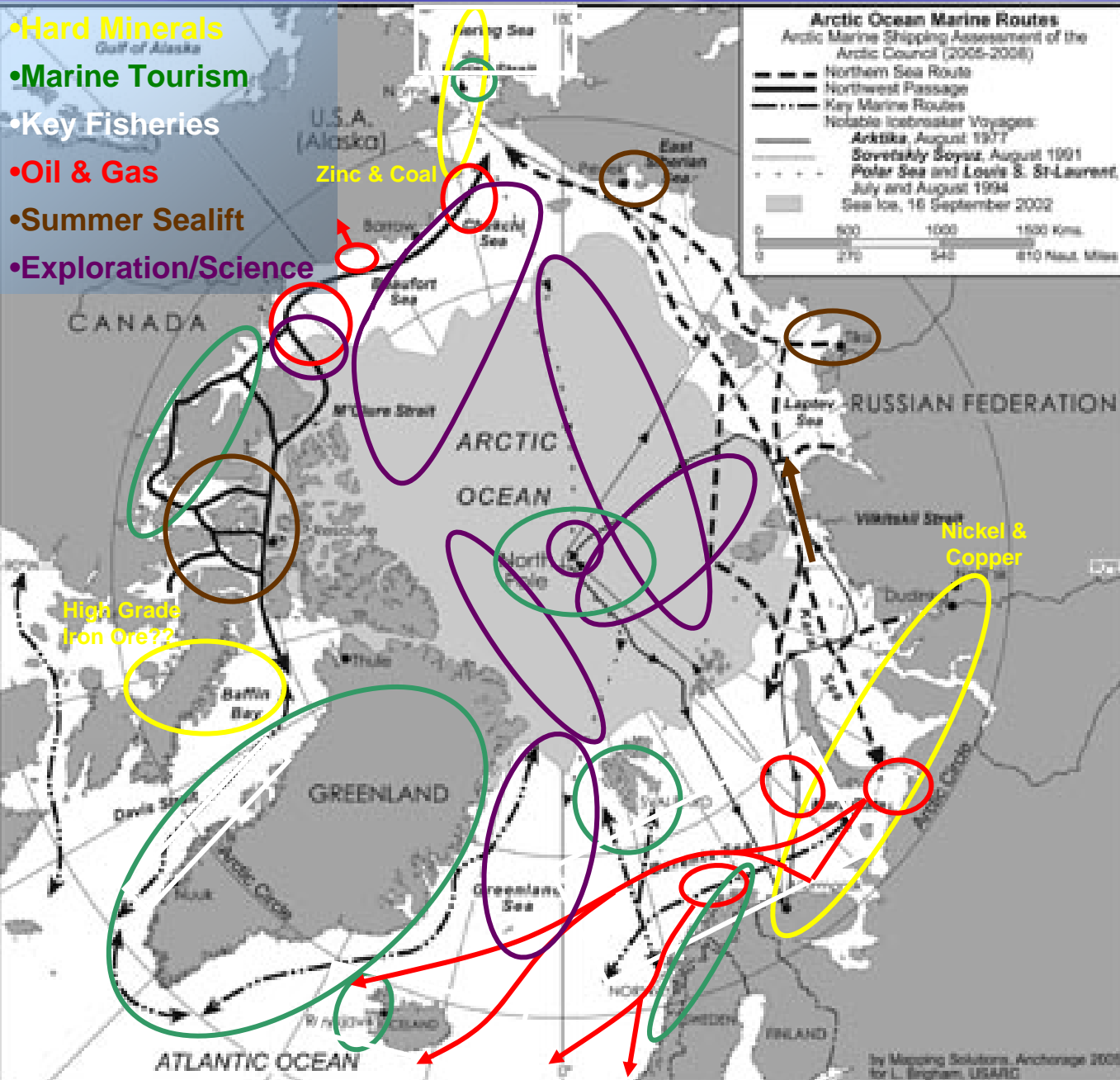
by Mapping Solutions, Anchorage 2005 for L. Brigham, USARC

Today's Marine Use

- Hard Minerals
- Marine Tourism
- Key Fisheries
- Oil & Gas
- Summer Sealift



Today's Marine Use

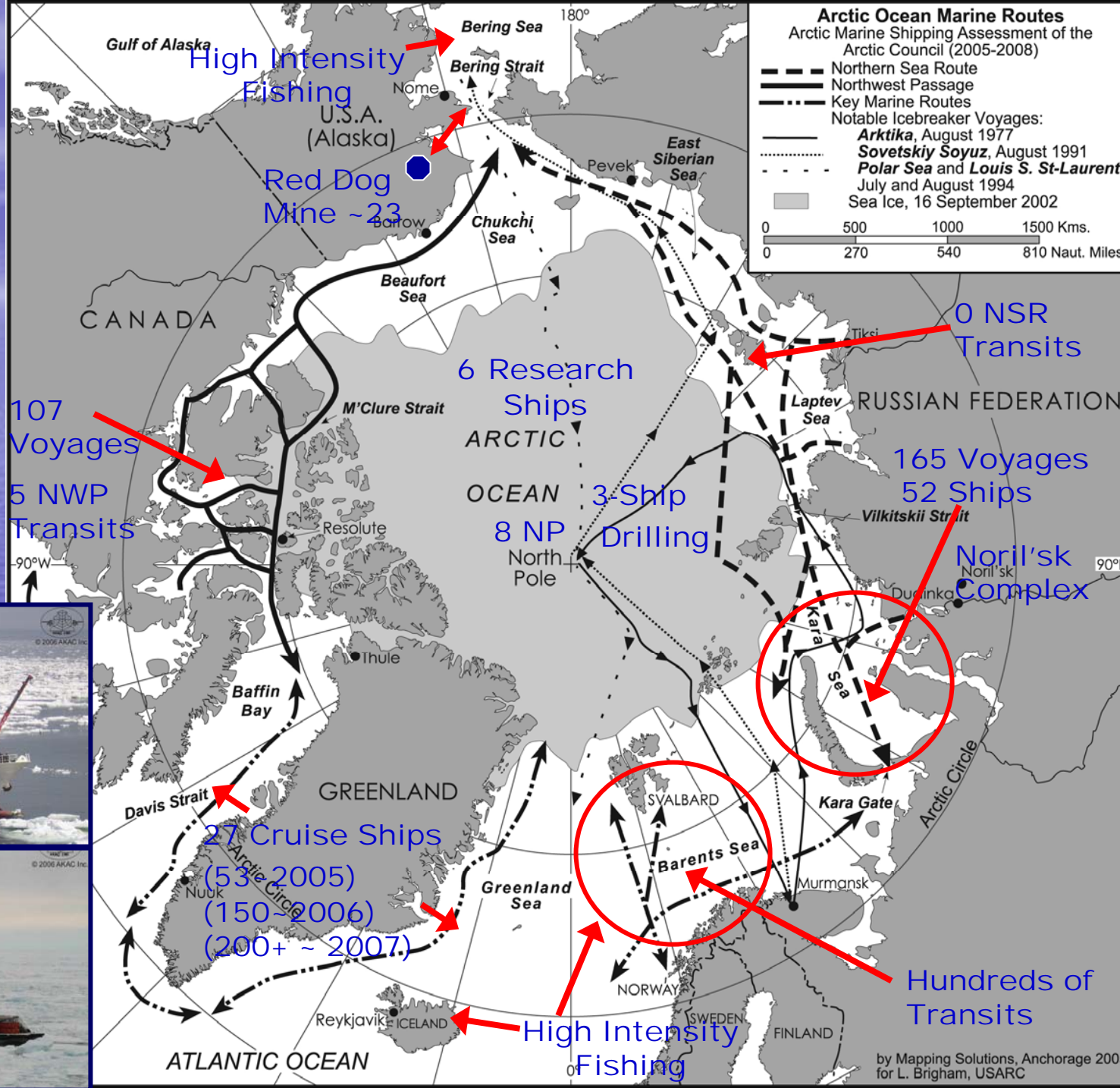


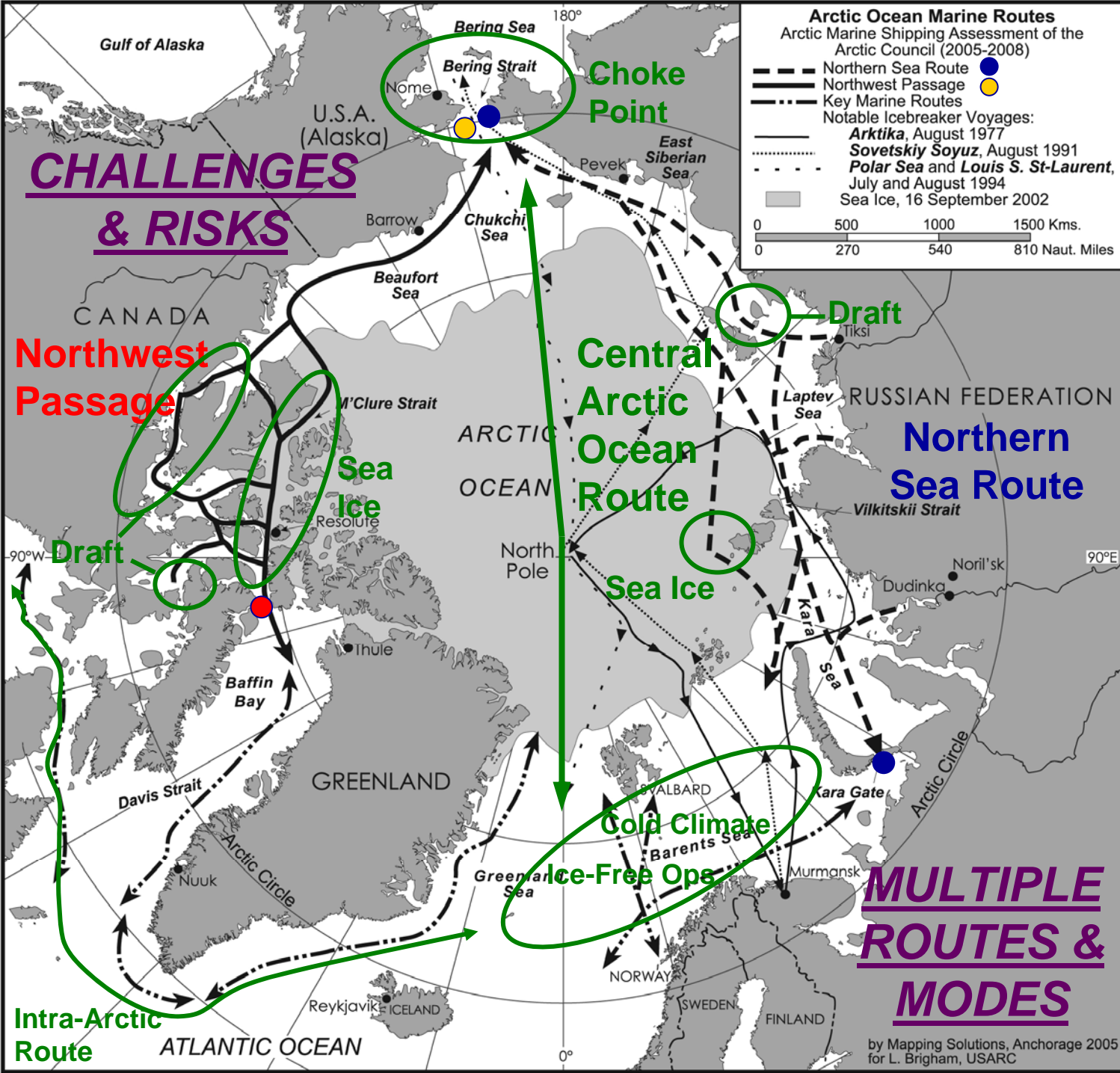
The Maritime Arctic of Today

Snapshot of Summer 2004 Traffic:
~ 5475 Ships

Modes of Arctic Marine Transport

- Destinational & Regional
- Trans-Arctic
- Trans-Arctic with Transshipment
- Intra-Arctic





Environmental Secur



M/V Selendang Ayu



M/V Sea bulk Pride

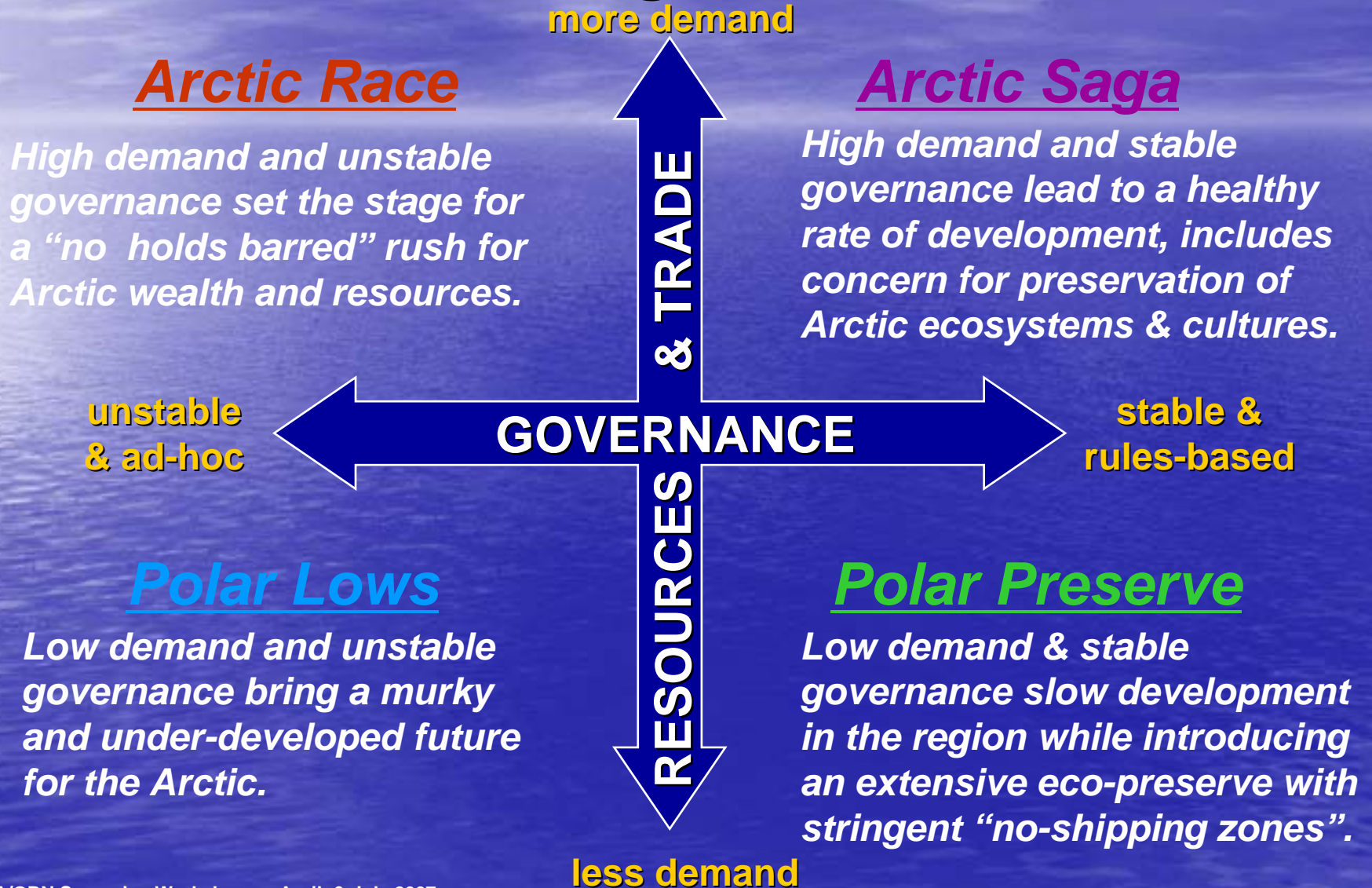


Endangered Species



M/S Explorer

Scenarios on the Future of Arctic Marine Navigation in 2050



Great Lakes St. Lawrence Seaway

- PORTS
- CANADIAN LOCKS
- UNITED STATES LOCKS

- LOCKS
- 1 St. Lambert
 - 2 Cote Ste. Catherine
 - 3 Lower Beauharnois
 - 4 Upper Beauharnois
 - 5 Snell
 - 6 Eisenhower
 - 7 Iroquois
 - 8 Welland Canal (8 locks)
 - 9 Soo Locks





WWF for a living planet®

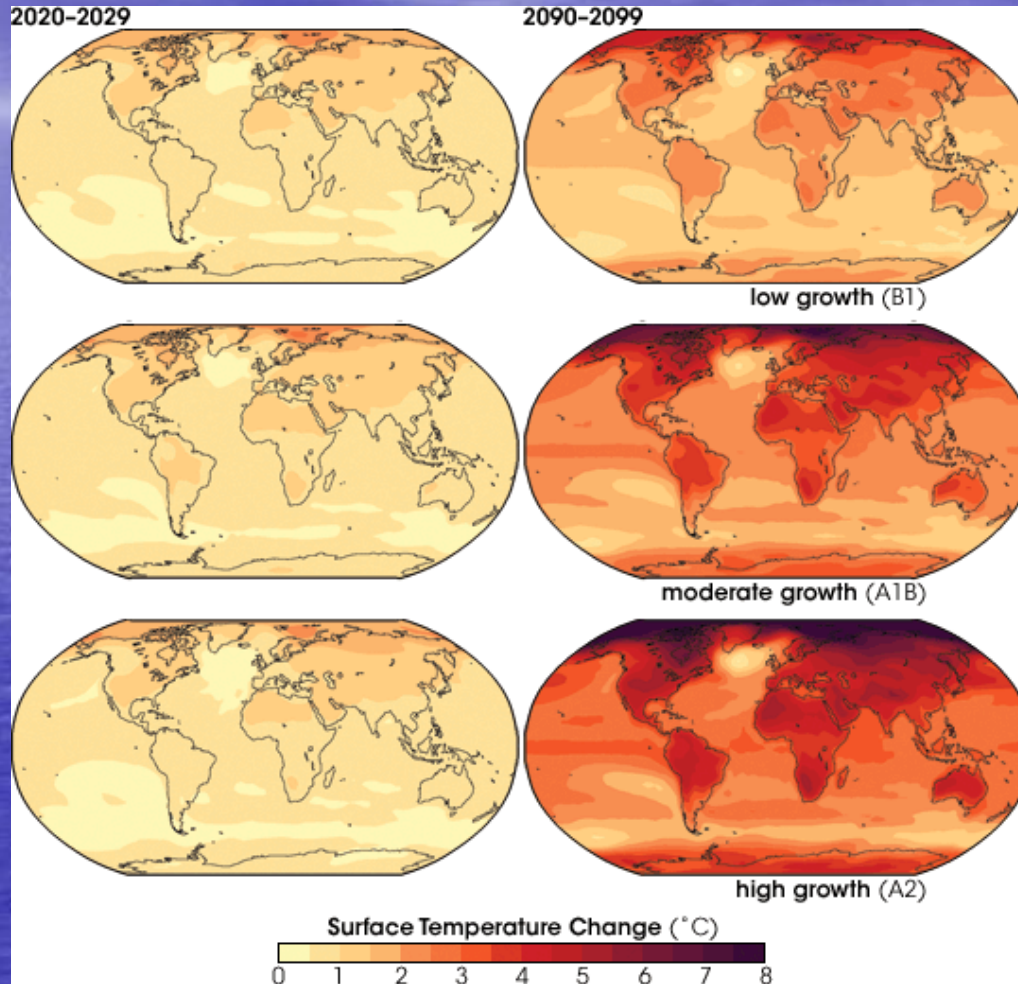


Oil Spill

Response Challenges
in Arctic Waters

- Federally supported oil in ice research continues, in international programs, supported by several agencies

The plot thickens...



Projected increase of surface temperatures in Arctic: +4 to 8 °C

Ocean Acidification - Potential Fishery Effect

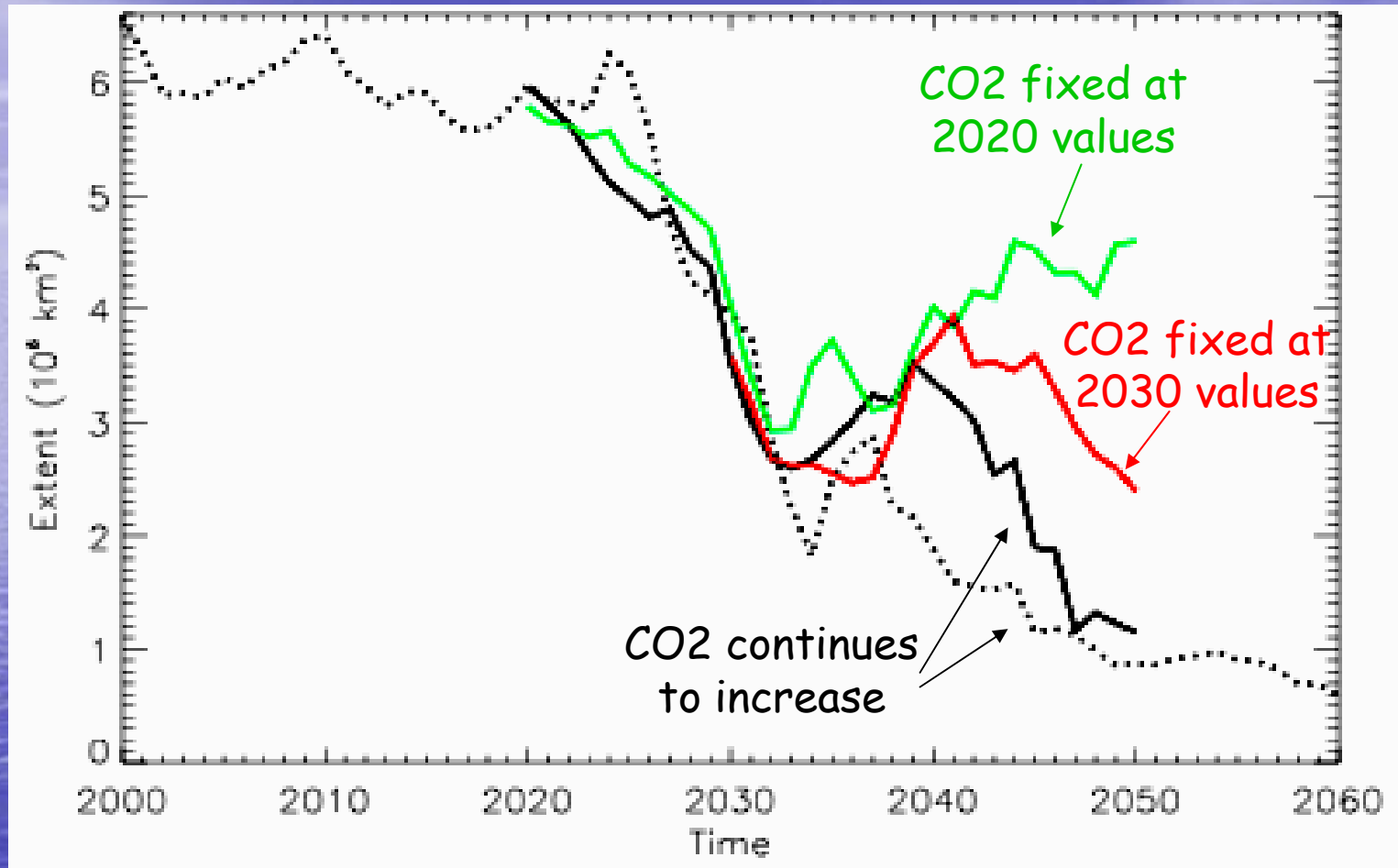
- Larval blue king crab, Kodiak Alaska, pilot experiment
- Tested range of projected global ocean pH change over the current century.
- ~15% reduction in growth and ~67% reduction in survival when pH was reduced 0.5 units.



M. Litzow and J. Short, AFSC



Have we passed a point of no return?



Preliminary model results suggest

- that sea ice can recover if CO_2 levels fixed/decline
- that a seasonally ice-free Arctic might be avoidable.
- May depend on when/for what ice state this occurs.



28 May 2008



THE ILULISSAT DECLARATION
ARCTIC OCEAN CONFERENCE
ILULISSAT, GREENLAND, 27 – 29 MAY 2008

British Minister for Foreign Affairs and the Premier of
five coastal States bordering on the Arctic Ocean –
Federation and the United States of America
2008 in Ilulissat, Greenland, to hold
Climate change and
the livelihoods
of

Trillion Dollar Issues

- Arctic ownership, sovereignty
- Arctic resources (fish, O&G, minerals)
- Global Trade: Trans-Arctic Shipping
- Climate Change Mitigation/Adaptation
- Protecting shared values – culture & conservation





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