

Coming challenges of the Arctic Region



Mead Treadwell, Chair
U.S. Arctic Research Commission
Senior Fellow, Institute of the North
Naples Council on World Affairs
Naples, Florida - January 11, 2010



Check from U.S. to Purchase Alaska from Russia



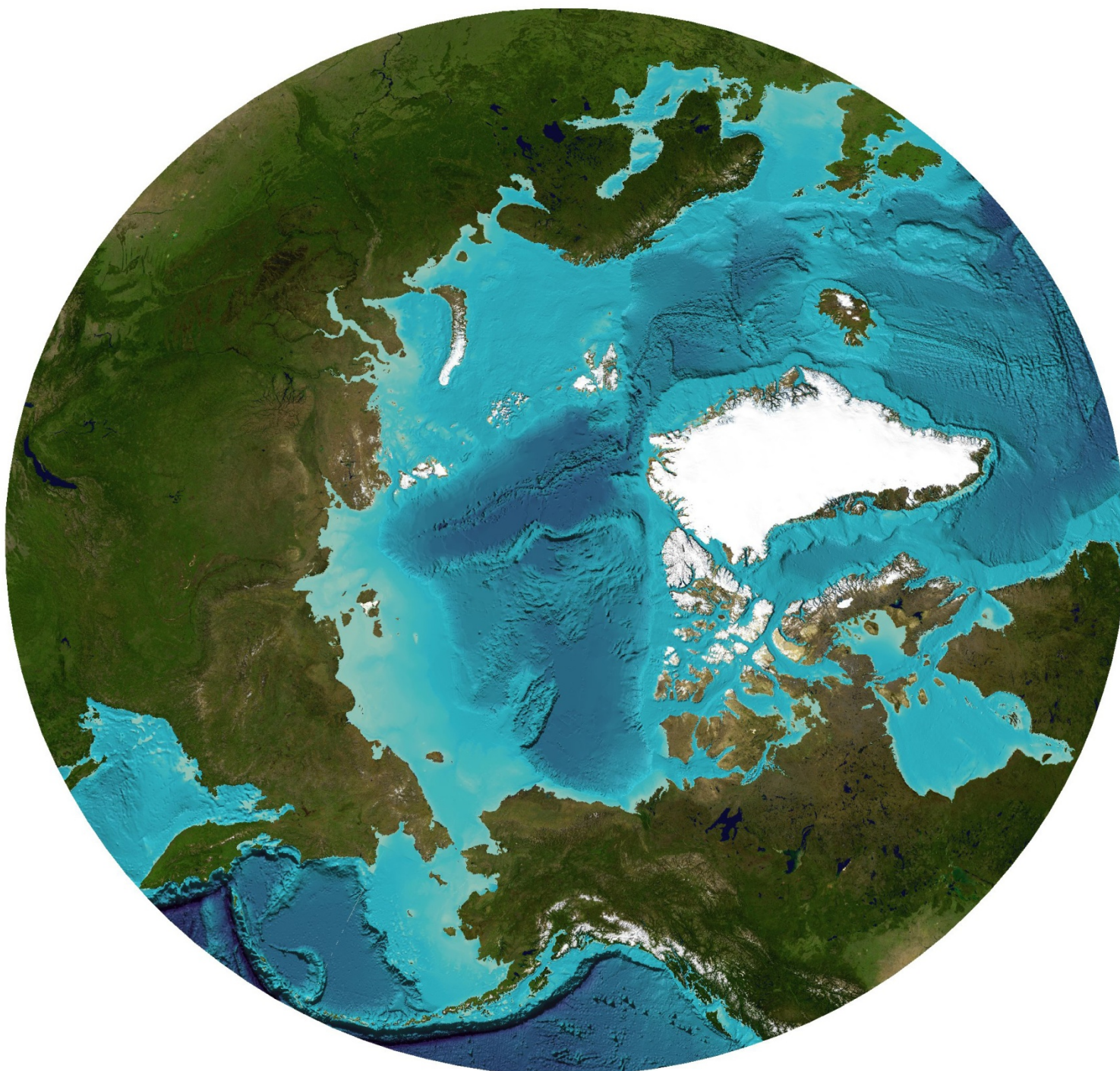
August 1, 1868



Shifting magnetic north pole

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





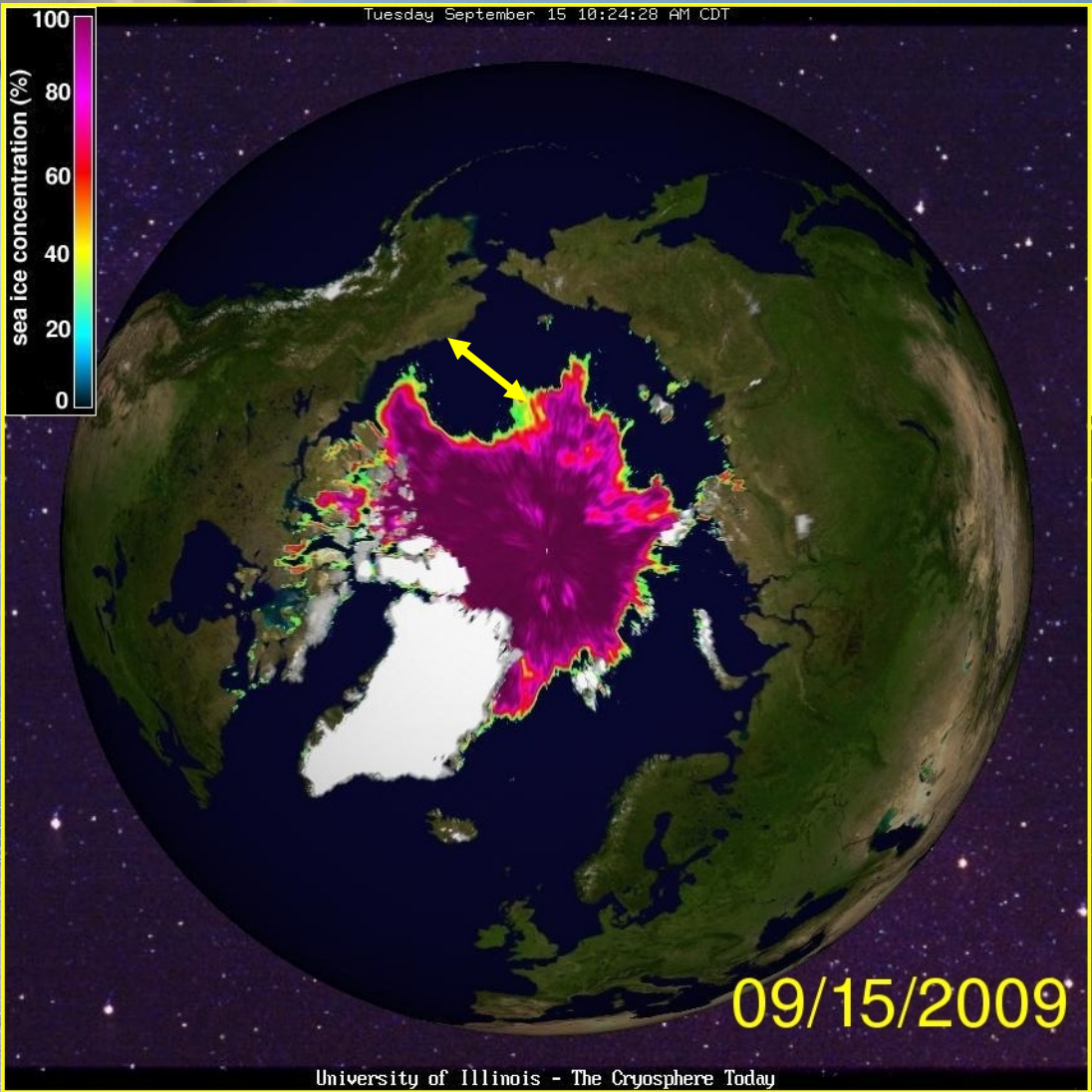


**USARC/USCG Arctic Domain
Awareness Flight, September 15, 2009**



Red Dog Mine
near
Kivalina, Alaska

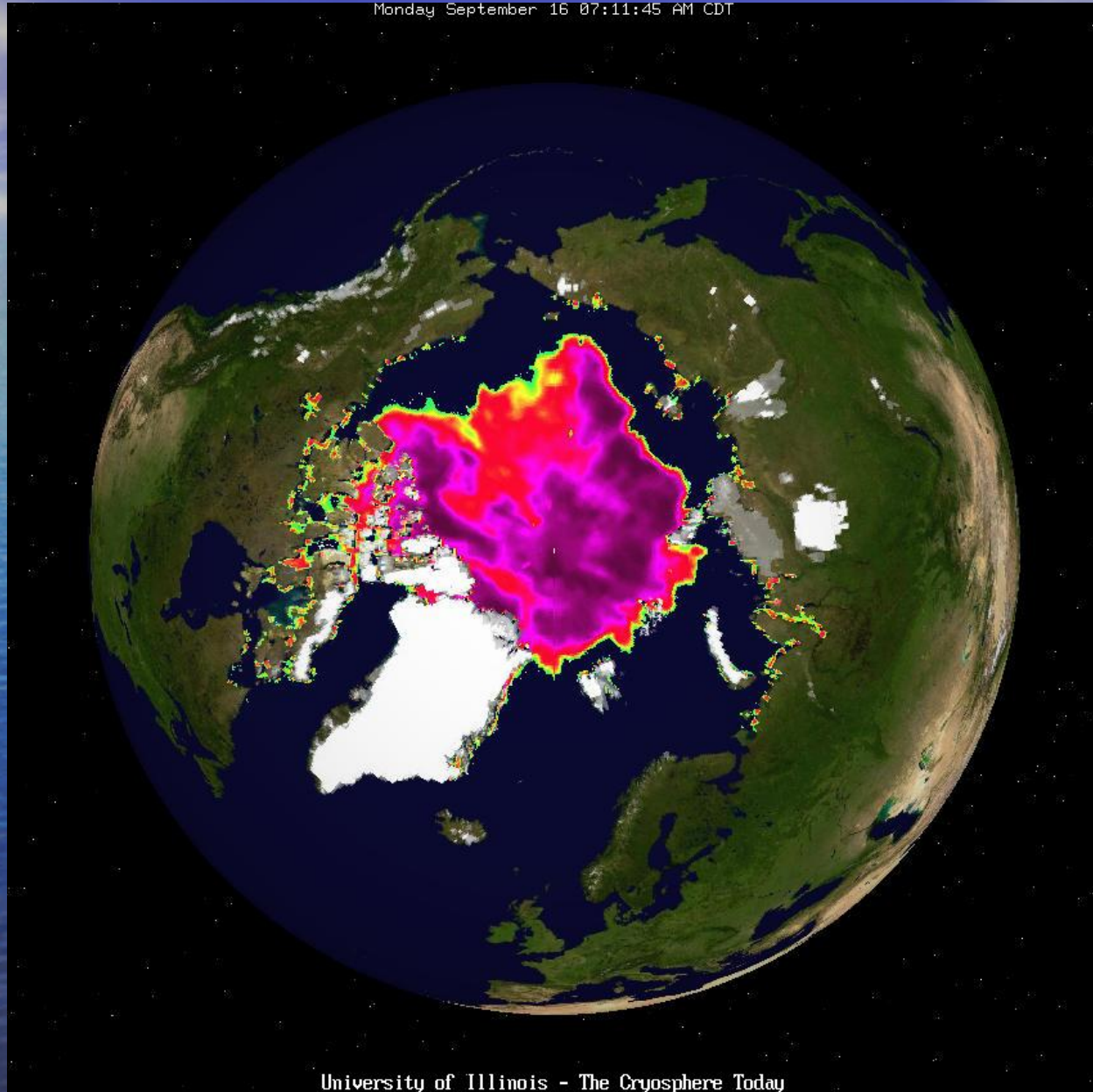






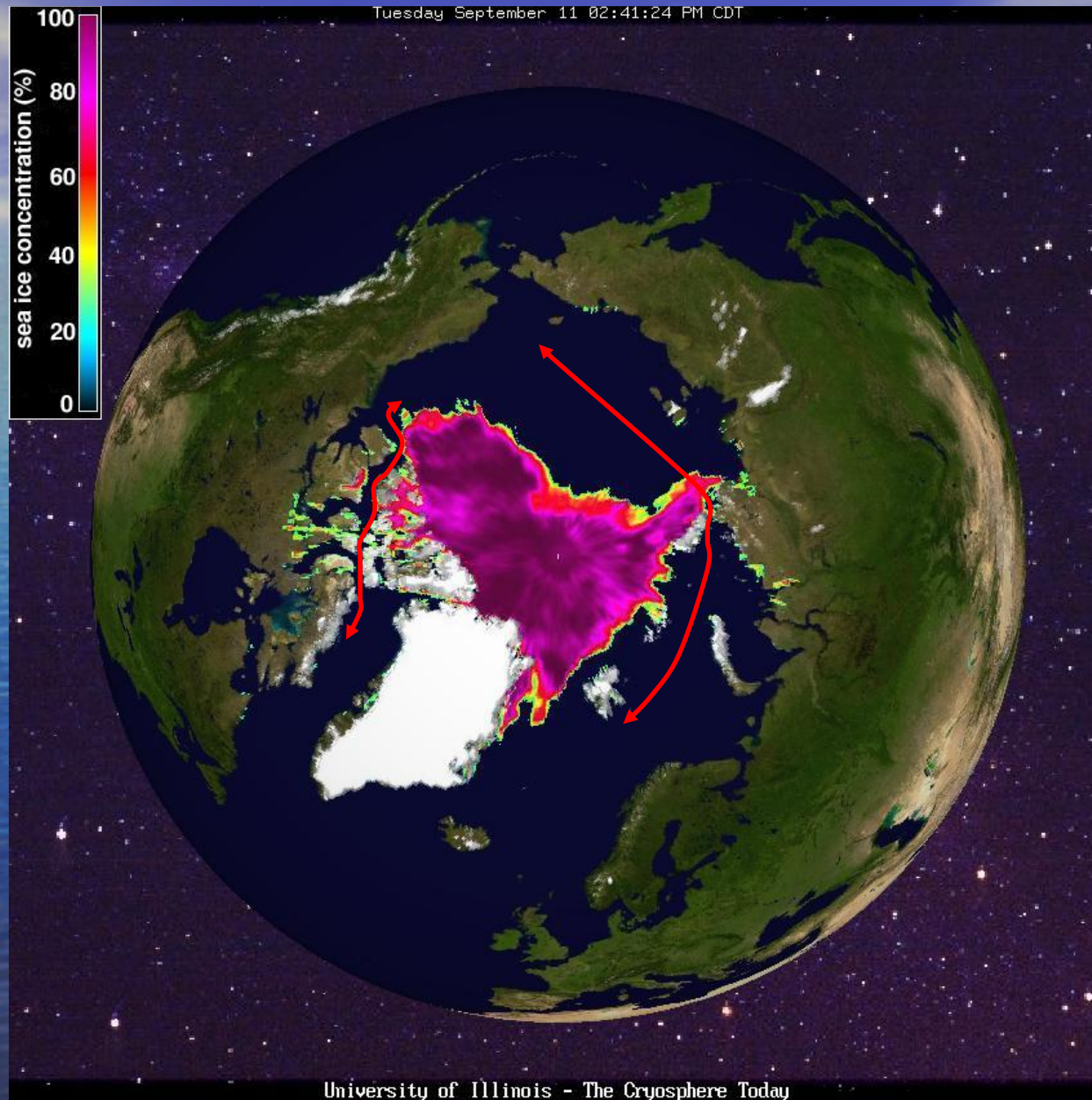
16 September 2002

Monday September 16 07:11:45 AM CDT



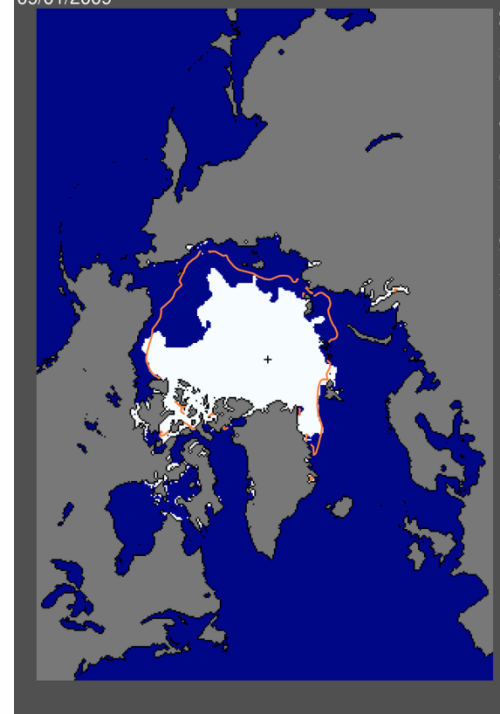
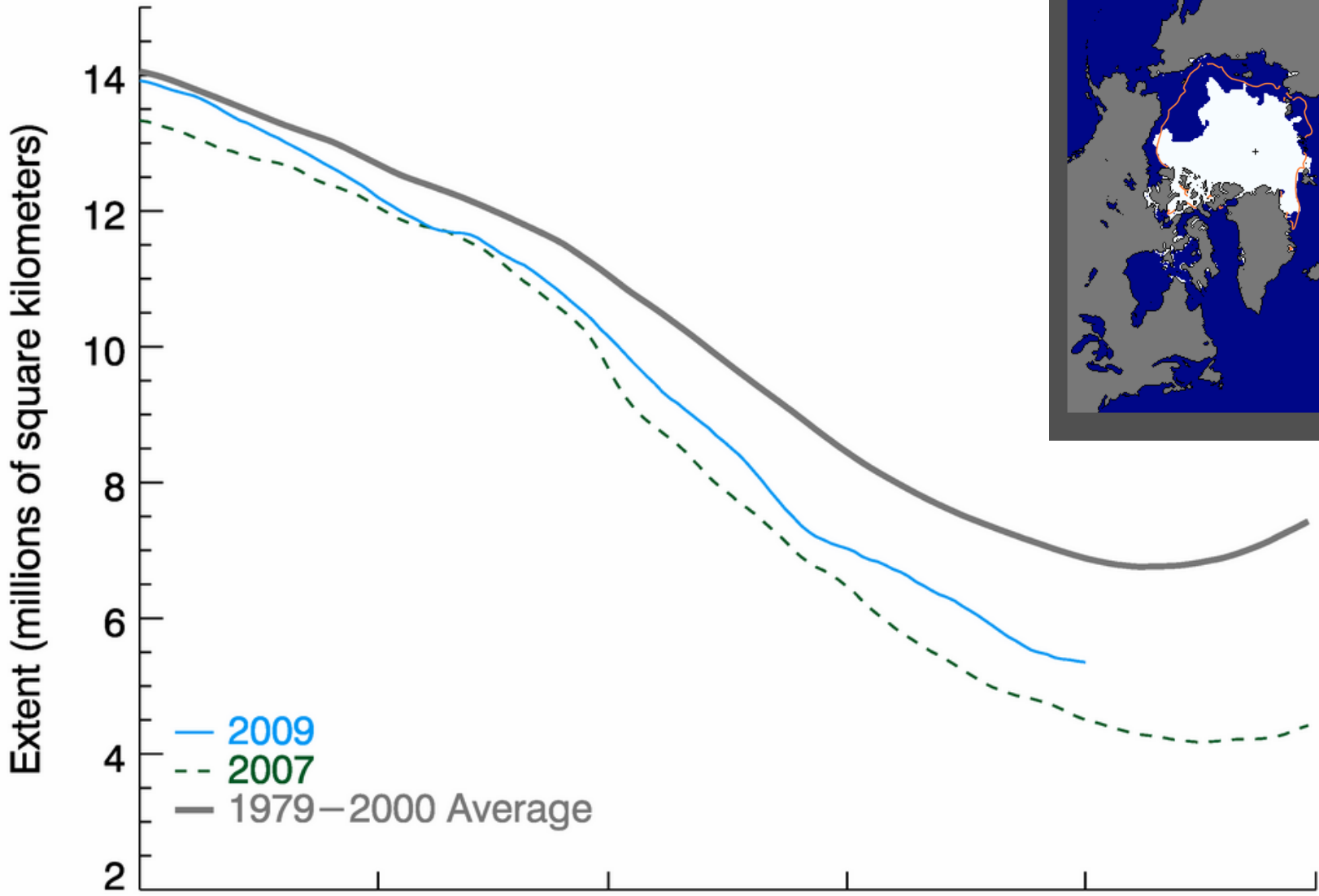
University of Illinois - The Cryosphere Today

11 September 2007



Arctic Sea Ice Extent

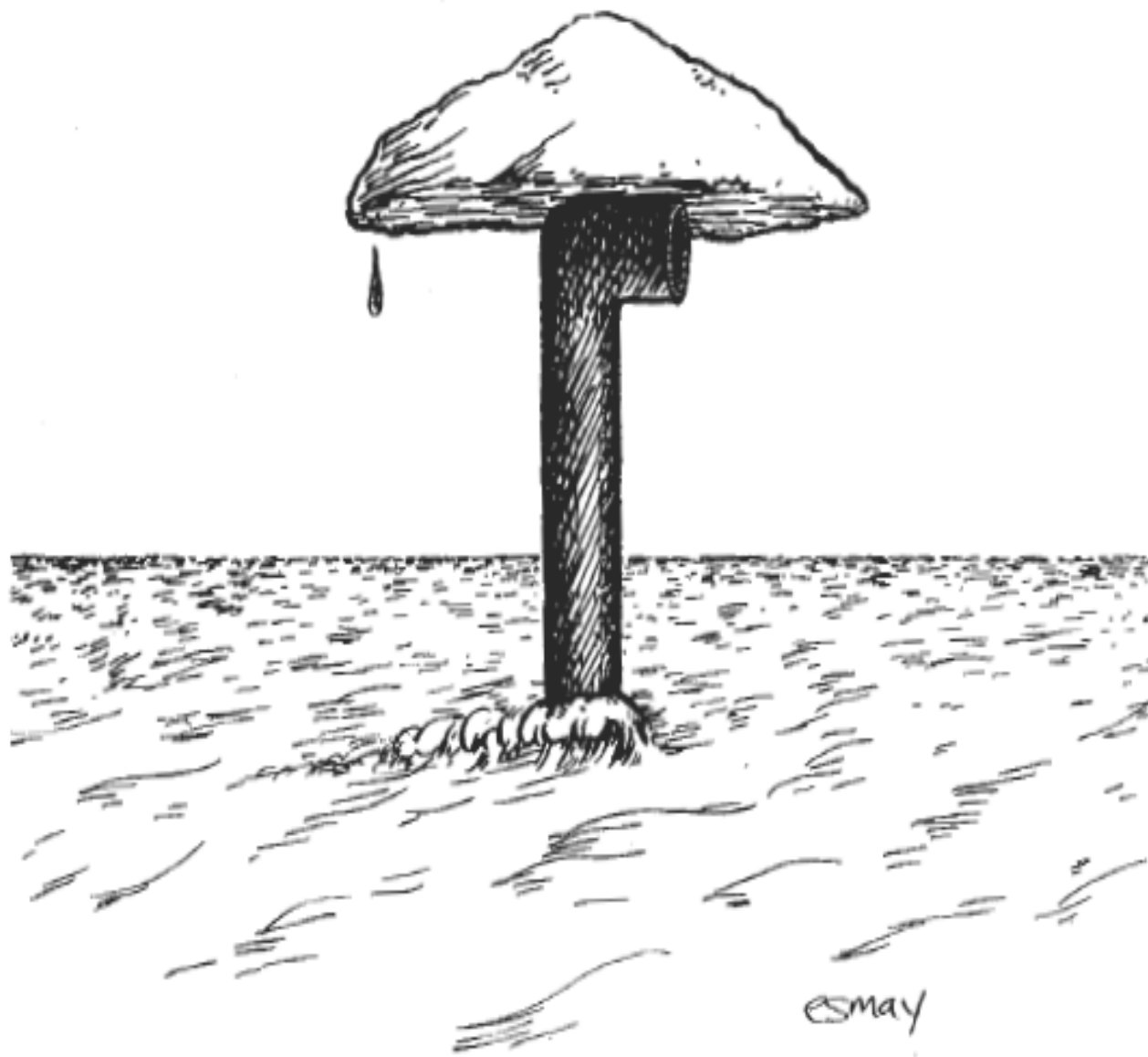
(Area of ocean with at least 15% sea ice)



National Snow and Ice Data Center, Boulder, CO

median
1979-2000

National Snow and Ice Data Center,



Last Trip Under the Polar Ice Cap

Challenges of an Accessible Arctic

Why the Arctic Matters:

1. National security/sovereignty

2. Economics: energy, trade, transport

3. Environment: climate, critters, sustainability

2007



LAURA KIPNIS ON THE NEW FEMALE PRIDES

HARPER'S

HARPER'S MAGAZINE / SEPTEMBER 2007 \$6.95



COLD RUSH

The Coming Fight for the Melting North
By McKenzie Fink

Fifty Ye

Joe Klein on Hillary's New Health-Care Plan
Why it's better this time

Is There Really A Case Against The Polygamist Prophet?

Ride 'Em Cowboy: Why The Western Won't Die

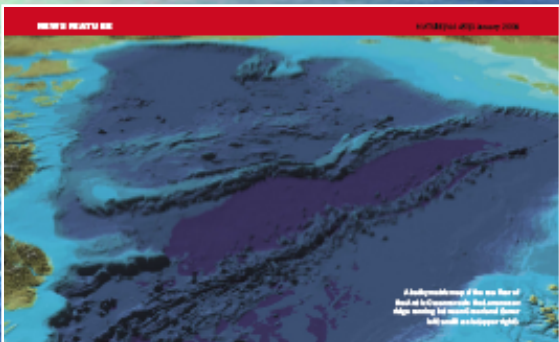
TIME

Who Owns the Arctic?

As global warming shrinks the ice to record lows, the global battle for resources heats up



A 5-to-6-in. piece of printing has been on the shore of Booth Island, Foul Bay, Nunavut, Canada



The next land rush

As countries race to file claims to areas of the sea floor before a United Nations deadline, geo logist and geophysicist are getting caught up in the frenzy. Daniel Conway reports.

Rapidly melting glaciers are opening up a new, unexplored landscape of the sea floor. The next 100 years could see the opening of 100,000 square miles of new sea floor. The next 100 years could see the opening of 100,000 square miles of new sea floor. The next 100 years could see the opening of 100,000 square miles of new sea floor.

Threat of the Arctic oil charge as a result of the Arctic oil charge

—Frank Macrae

The next 100 years could see the opening of 100,000 square miles of new sea floor. The next 100 years could see the opening of 100,000 square miles of new sea floor.

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MARAD'S NEW GATEWAY / SPECIAL REPORT: U.S. NAVY PROGRAM REVIEW

October 2007 \$4.50
NAVY LEAGUE OF THE UNITED STATES
www.navyleague.us

Sovereign Rights and Jurisdiction



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

Where Is Our ECS?



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





USARC ECUMENICAL BELIEF



- The United States must maintain its global maritime capability—as a government AND as a Nation
- If the U.S. does not exercise its visible maritime presence in the Arctic Ocean—we cede it to whomever wants it!

Challenges of an Accessible Arctic

Why the Arctic Matters:

1. National security/sovereignty

2. Economics: energy, trade, transport

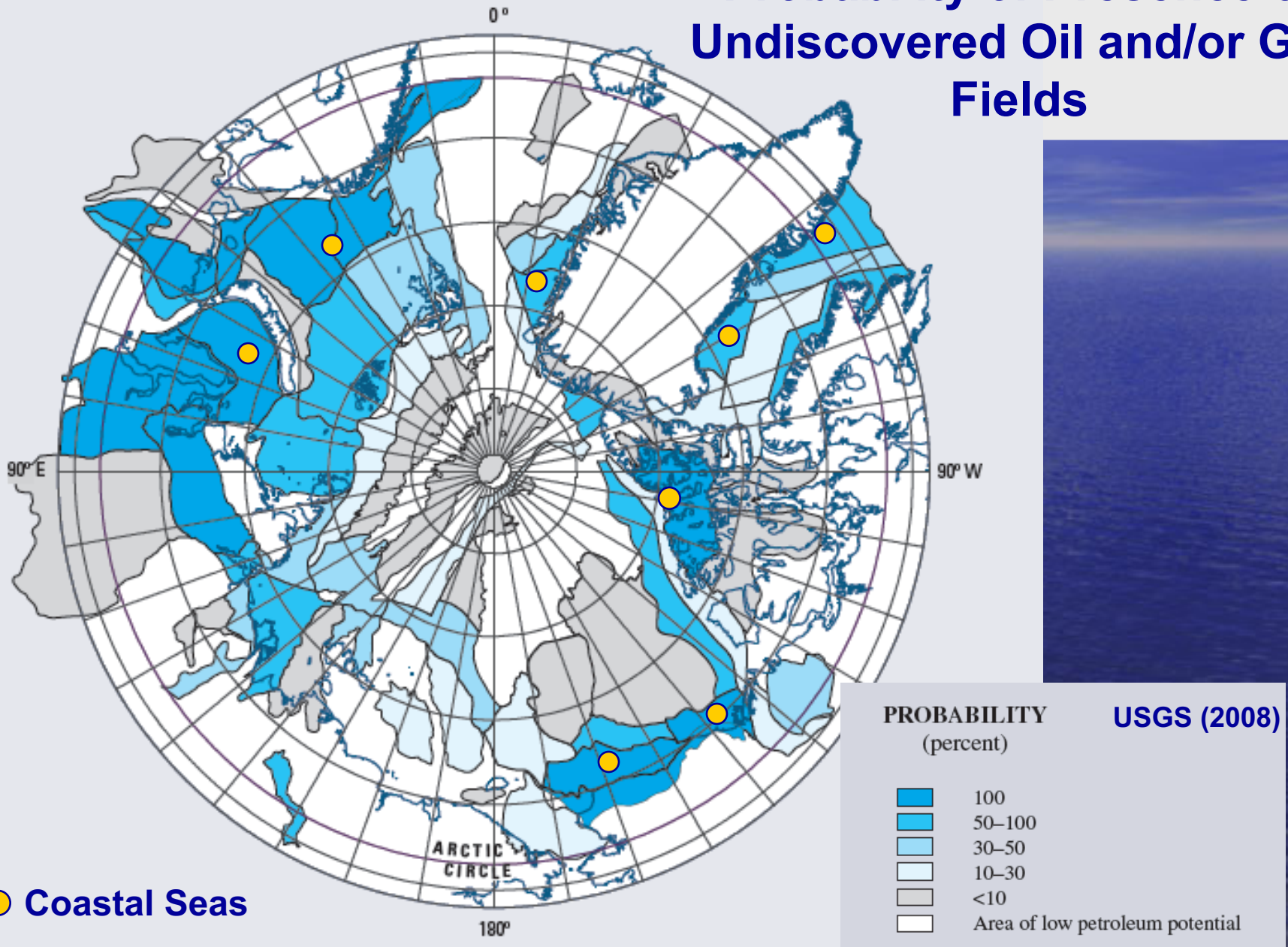
3. Environment: climate, critters, sustainability

Oil and Gas: Resources of the North



Source: AMAP

Probability of Presence of Undiscovered Oil and/or Gas Fields



'Wild Card' Issue ~ New Resource Discoveries

U.S. Geological Survey Report ~ July 2008



Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle

The U.S. Geological Survey (USGS) has completed an assessment of undiscovered conventional oil and gas resources in all areas north of the Arctic Circle, using a geologic approach and probabilistic methodology. The USGS estimates the occurrence of undiscovered oil and gas in 33 geologic provinces thought to be prospective for petroleum. The sum of the mean estimates for each province indicates that 59 billion barrels of oil, 1,669 trillion cubic feet of natural gas, and 44 billion barrels of natural gas liquids may remain to be found in the Arctic, of which approximately 84 percent is expected to occur in offshore areas.



Overcasted mountainside of the Laramie Group under a midlight rainbow near Galbraith Lake, Alaska, summer 2007. USGS photo by David Stockman.

Introduction

In May 2008, a team of U.S. Geological Survey (USGS) scientists completed an appraisal of possible future additions to world oil and gas reserves from new field discoveries in the Arctic. This Circum-Arctic Resource Appraisal (CARA) evaluated the petroleum potential of all areas north of the Arctic Circle (66.5° north latitude); quantitative assessments were conducted in those geologic areas considered to have at least a 10-percent chance of one or more significant oil or gas accumulations. For the purposes of the study, a significant accumulation contains recoverable volumes of at least 50 million barrels of oil and/or oil-equivalent natural gas. The study included only those resources believed to be recoverable using existing technology but with the important assumption for offshore areas that the resources would be recoverable even in the presence of permanent sea ice and oceanic water depth. No economic considerations are included in these initial estimates; results are presented without reference to costs of exploration and devel-

opment, which will be important in many of the assessed areas. So-called unconventional resources, such as coal bed methane, gas hydrates, oil shales, and tar sand, were explicitly excluded from the study. Full details of the CARA study will be published later.

A number of offshore areas in Canada, Russia, and Alaska already have been explored for petroleum, resulting in the discovery of more than 400 oil and gas fields north of the Arctic Circle. These fields account for approximately 240 billion barrels (BBOE) of oil and oil-equivalent natural gas, which is about 10 percent of the world's known conventional petroleum resources (conventional production and remaining proved reserves). Nevertheless, most of the Arctic, especially offshore, is essentially unexplored with respect to petroleum. The Arctic Circle encompasses about 6 percent of the Earth's surface, an area of more than 21 million km² (8.1 million mi²), of which about 8 million km² (3.1 million mi²) is offshore and more than 7 million km² (2.7 million mi²) is on continental shelves under less than 500 m of water. The extensive Arctic continental shelves may constitute the

geographically largest unexplored prospective area for petroleum remaining on Earth.

Methodology

A newly compiled map of Arctic sedimentary basins (Arthur Grant and others, unpublished work) was used to define geologic provinces, each containing more than 3 km³ of sedimentary strata. Assessment units (AUs)—suspectible volumes of rock with common geologic traits—were identified within each province and quantitatively assessed for petroleum potential. Because of the sparse seismic and drilling data in much of the Arctic, the usual tools and techniques used in USGS resource assessments, such as discovery process modeling, prospect delineation, and deposit simulation, were not generally applicable. Therefore, the CARA relied on a probabilistic methodology of geologic analysis and analog modeling. A world analog database (Chapman and others, 2006) was developed using the AUs defined in the USGS World Petroleum Assessment 2000 (USGS World Assessment Team, 2000). (Continued on back page)

“Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle”

- 13% Undiscovered Oil
- 30% Undiscovered Natural Gas
- 20% Undiscovered Natural Gas Liquids

<http://pubs.usgs.gov/fs/2008/3049/>

Potential Arctic Shipping Routes



Future Convoy Requirements?



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

Aker Arctic

Build a shipping regime that is
“safe, secure, and reliable.”



**Arctic Ministers' Approval 29 April 2009 ~
Negotiated Text**

**Arctic Council
Arctic Marine Shipping
Assessment 2009 Report**



ARCTIC COUNCIL
IN COOPERATION WITH
2012/2011

PAME
Partnership of the Arctic Marine Environment

Icebreaker Transits to the North Pole & Trans-Arctic Voyages (1977-2008):

- 77 Transits to the North Pole (65 Russia, 5 Sweden, 3 USA, 2 Germany, 1 Canada, 1 Norway)
- 33 Ship Transits to the NP in 2004-2008
- 7 Trans-Arctic Voyages (1991, 1994, 1996, 2005)
- Single Non-summer NP Voyage (*Sibir* Voyage May-June 1987)

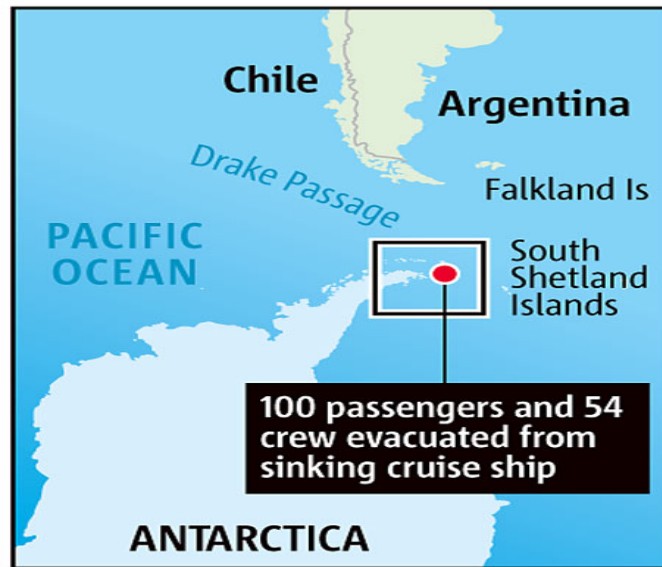


**‘Clear Evidence of
Central Arctic Ocean
Navigation’**

**25 May 1987 ~ North Pole
Soviet Nuclear Icebreaker *Sibir*
‘A Walk Around the World!’**

"Stricken cruise ship off Antarctic evacuated"

MSNBC- 11/23/07





for a living planet®



Oil Spill

Response Challenges
in Arctic Waters

- Oil industry pays eight cents a barrel to response fund
- Interagency committee seldom meets
- US spill research program is way behind promise of Oil Pollution Act of 1990

Challenges of an Accessible Arctic

Why the Arctic Matters:

- 1. National security/sovereignty**
- 2. Economics: energy, trade, transport**
- 3. Environment: climate, critters, sustainability**



ARCTIC
NORWEGIAN
2006-2009



Ministerial Meeting
Tromsø, Norway
9 April 2006

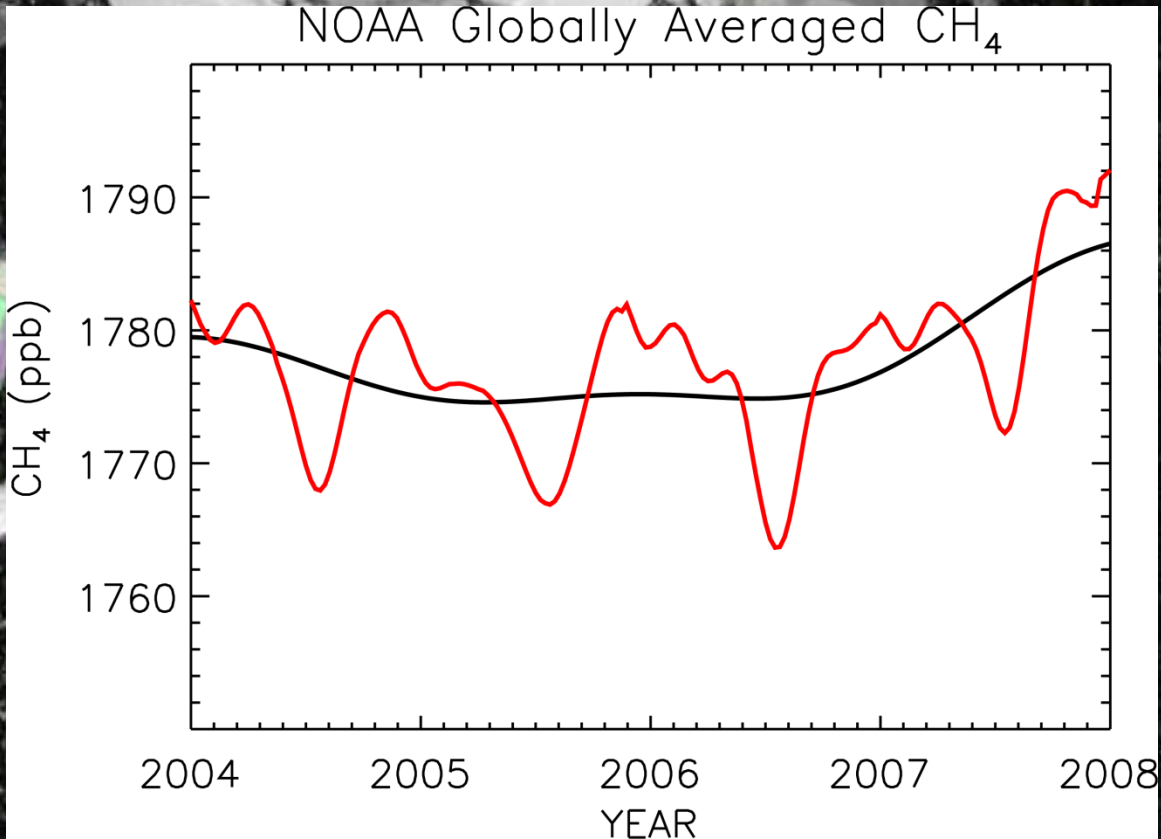
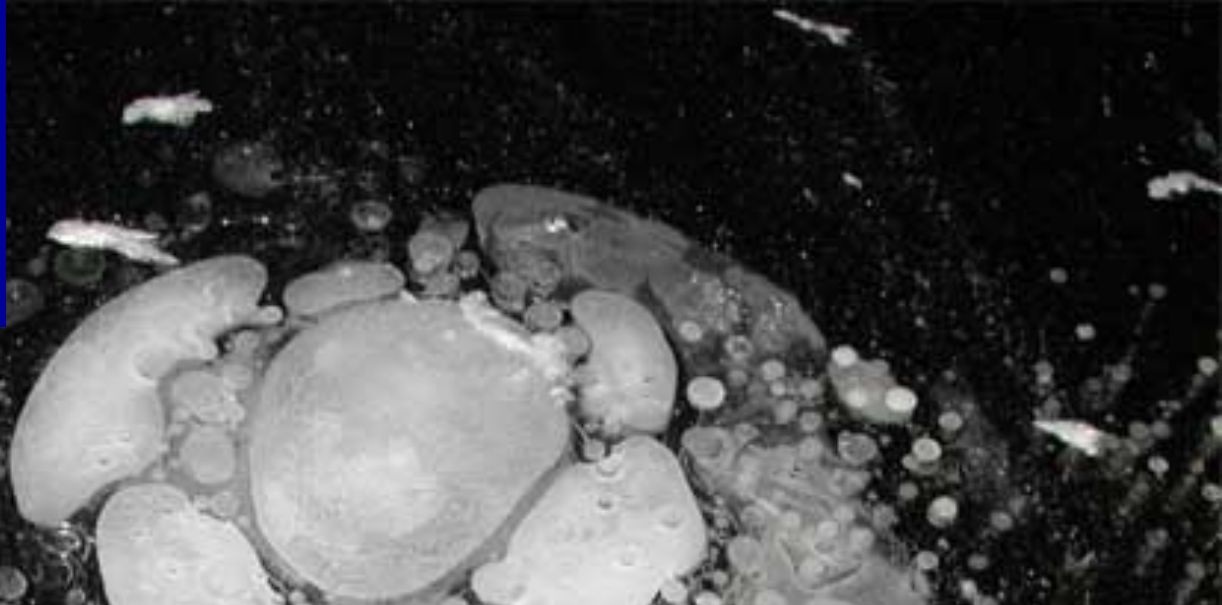
Permafrost degradation - NPRA, Alaska



Beaches
erode...



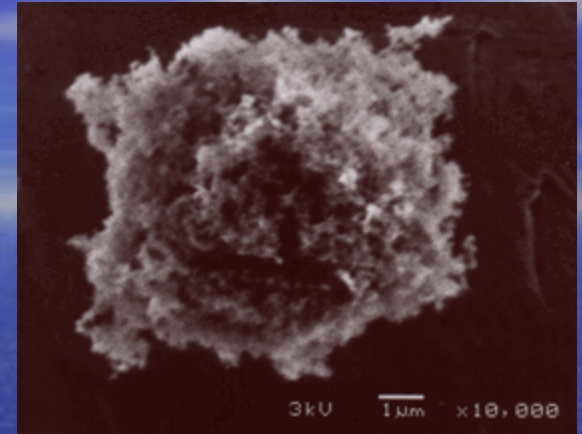
Methane spikes...





<http://www.youtube.com/watch?v=HvhhsGnC1-c>

Is soot causing Arctic amplification?



Arctic Council
Black Carbon Task
Force, 2009



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





Ice-dependent seals

Ringed seals



Bearded seals



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

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

“People, people’s needs, and nature...”

Resource /
biological
sustainability



Economic
sustainability



Social equity



THE RULING POWERS IN THE EARLY AZTEC EMPIRE BELIEVED THEY COULD AFFECT THE WEATHER BY RIPPING OUT A FEW HEARTS!

WE MUST HELP THE SUN GROW HOTTER!



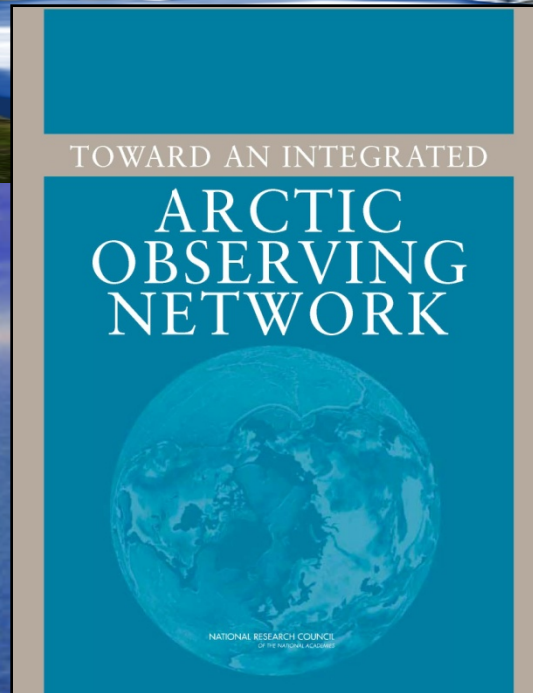
ASAY 5-96 COLORADO SPRINGS GAZETTE TELEGRAPH

IN TODAY'S ADVANCED SOCIETY, WE NOW UNDERSTAND ALL IT TAKES IS A LOT OF BILFOLDS!

WE MUST STOP GLOBAL WARMING!



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Challenges of an Accessible Arctic

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www.arctic.gov

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www.institutenorth.org

