Geopolitical Implications of Arctic Warming

Fran Ulmer

Chair, US Arctic Research Commission

4th Int'l Symposium on the Effects of Climate Change on the World's Oceans

Session 16: Climate, Oceans and Security

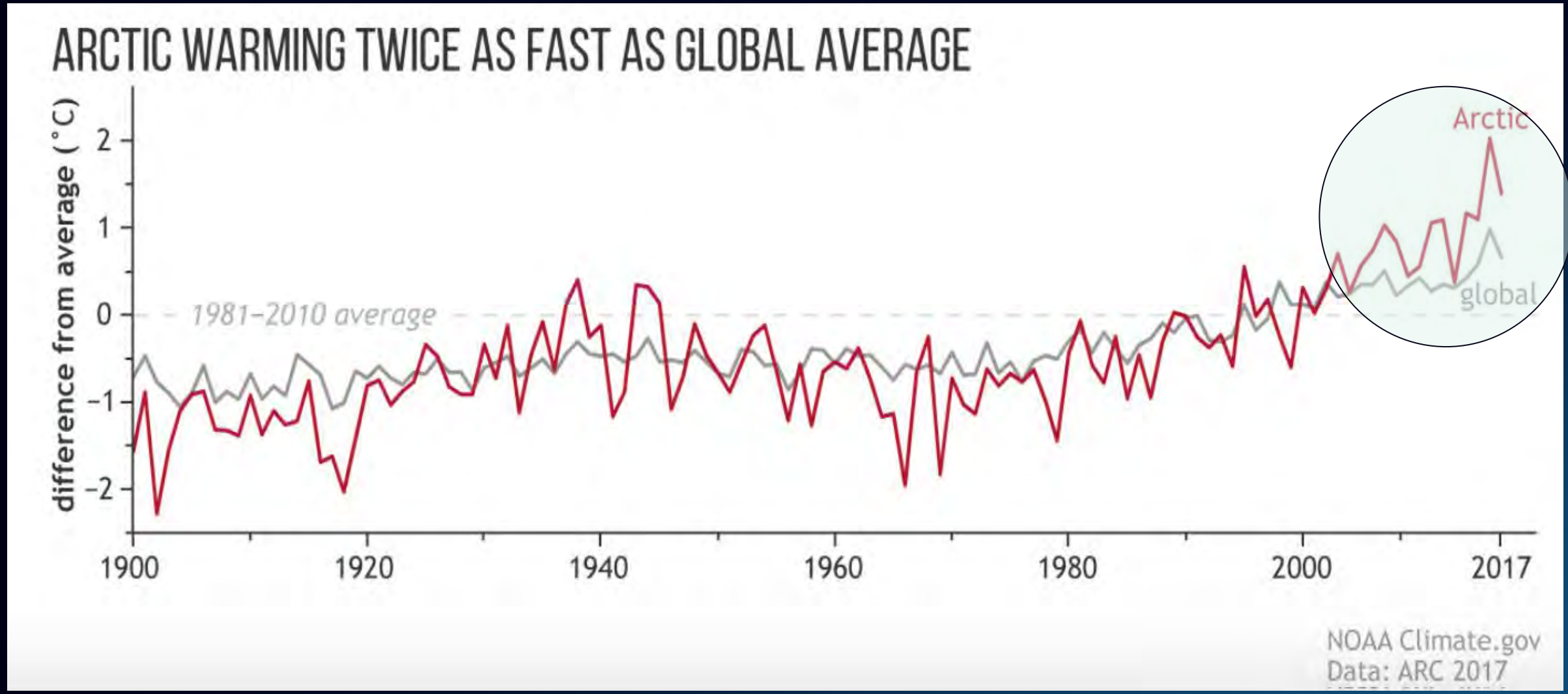
June 4, 2018


1. How is the Arctic changing?
2. How do those changes impact people and societies?
3. What are some of the geopolitical implications?
NSIDC

Arctic change is accelerating

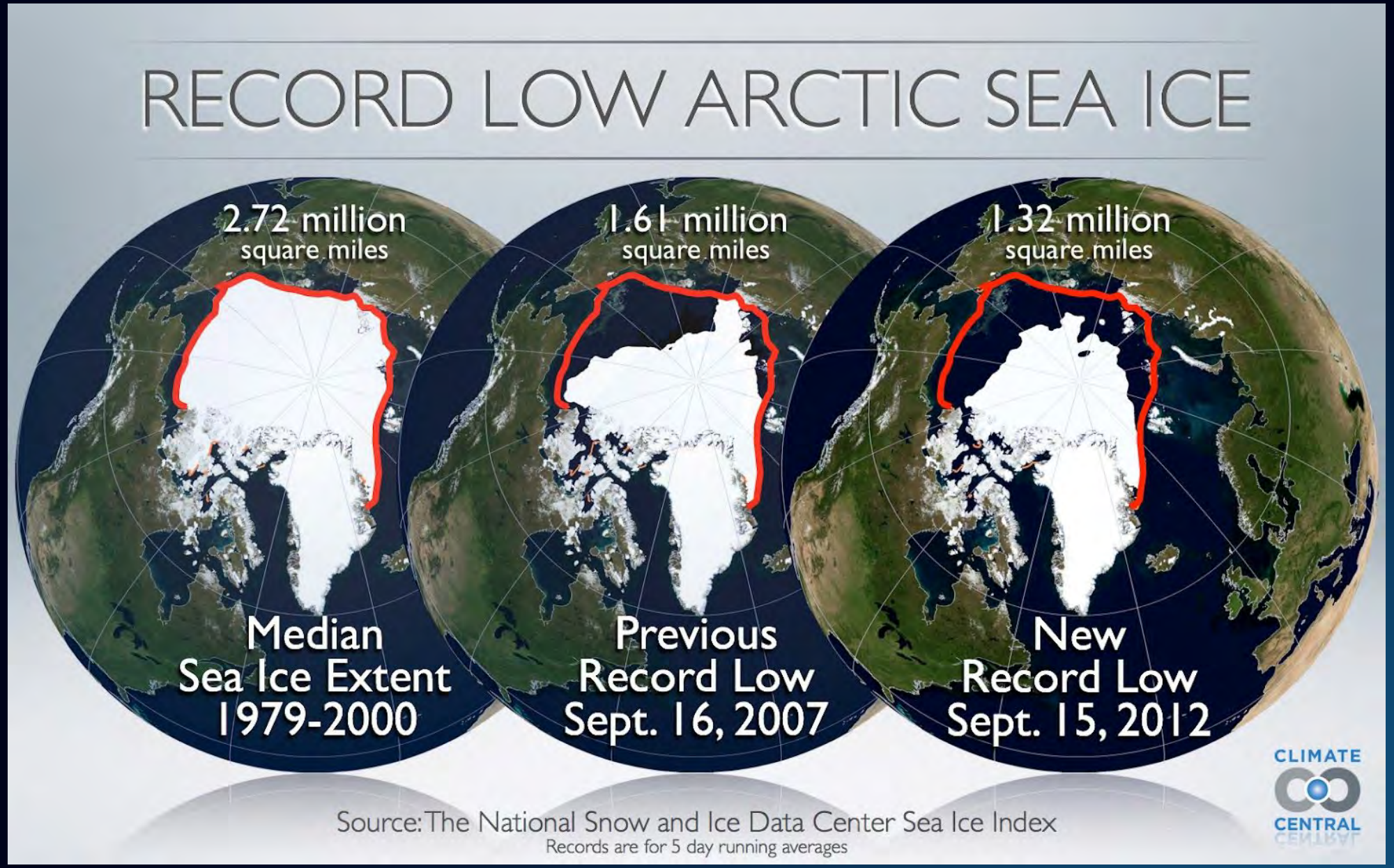
- Warming temperatures
- Retreating land ice & less sea ice
- Changing marine ecosystems
- Thawing permafrost
- Changing ocean chemistry
- Rising sea levels

Arctic is warming faster than global average

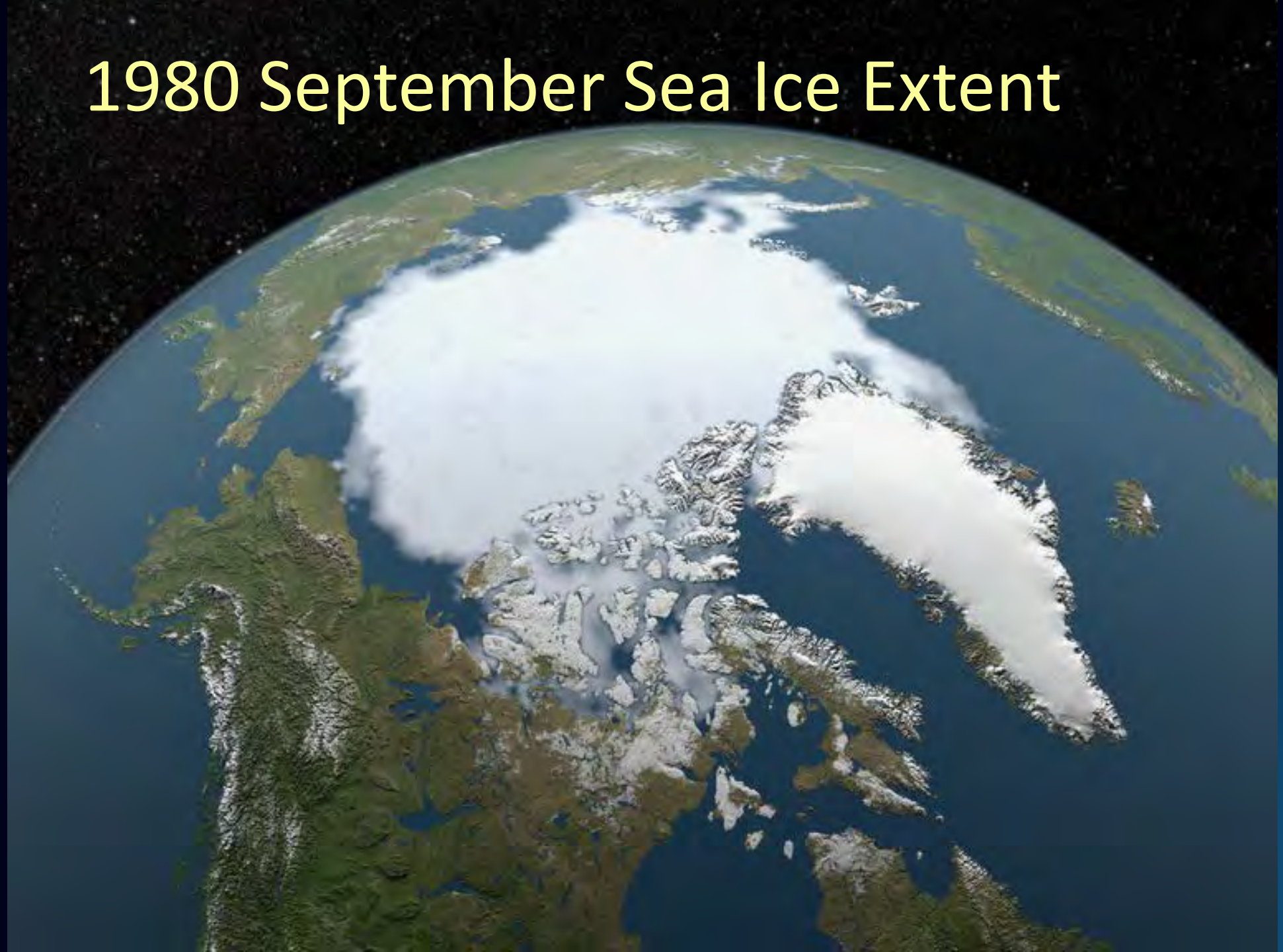


NOAA climate.gov

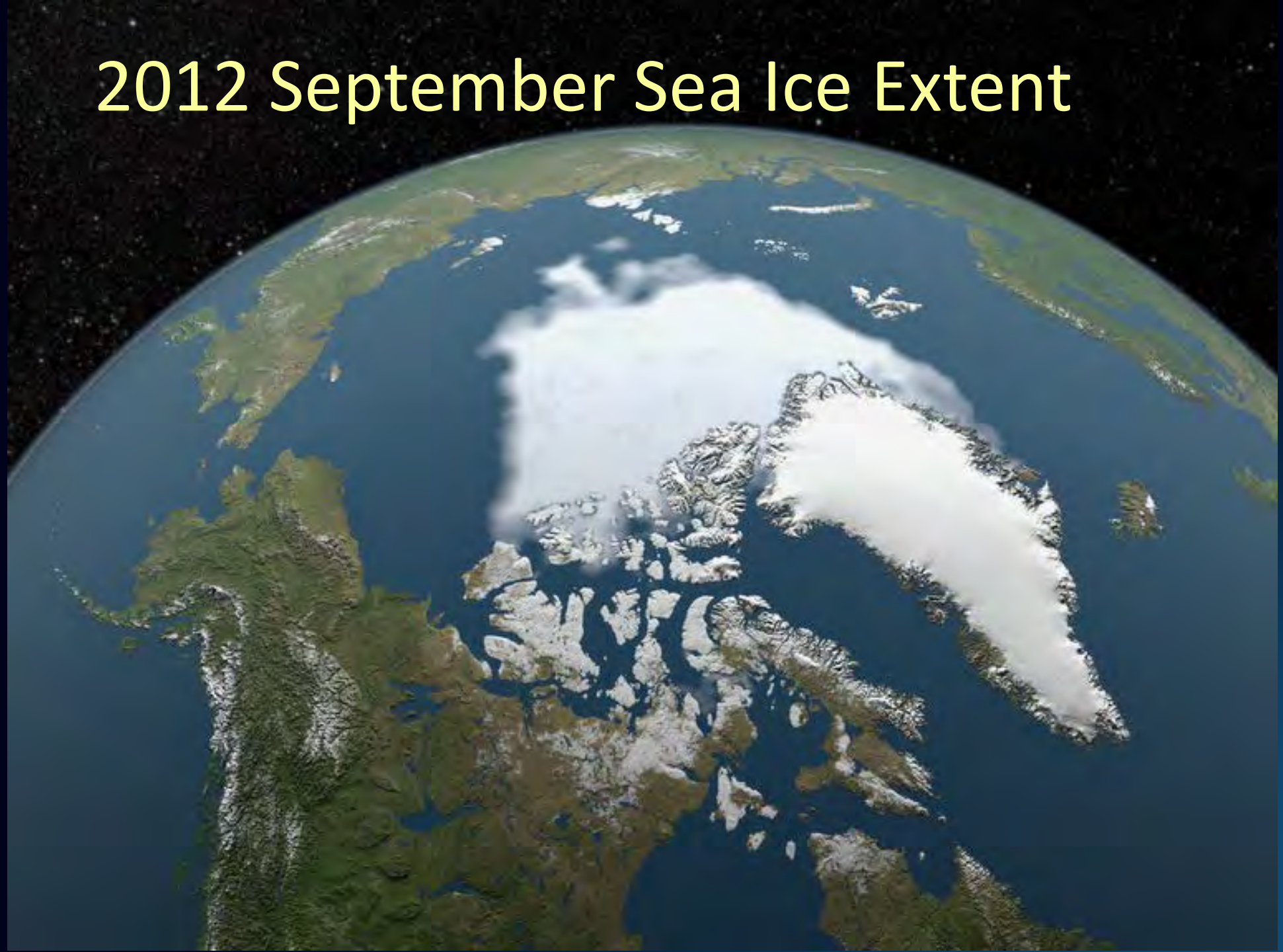
Sea ice retreat is dramatic



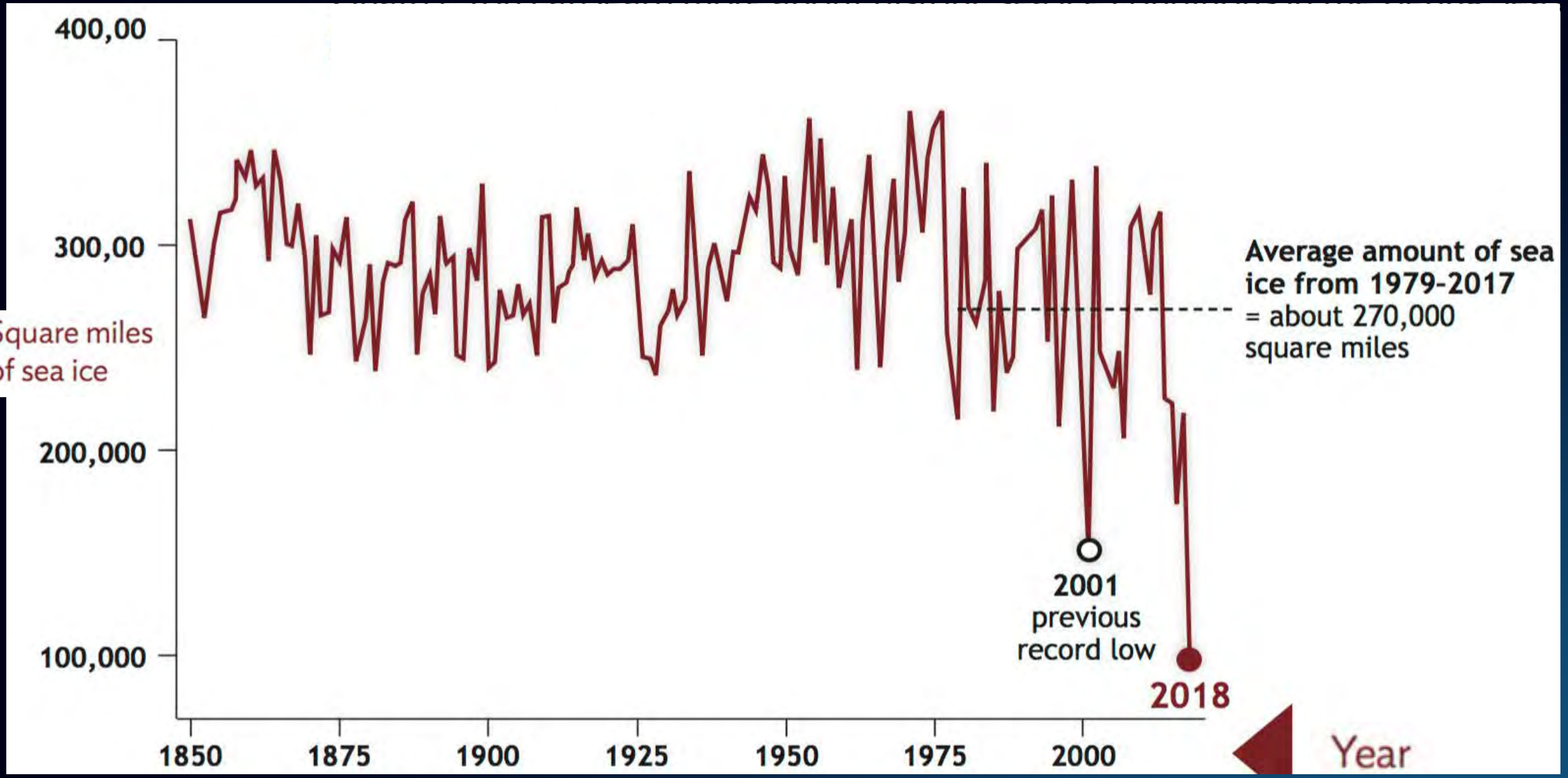
1980 September Sea Ice Extent



2012 September Sea Ice Extent



2018: lowest amount of sea ice in Bering Sea since 1850



April 29, 2013

April 29, 2018

Ocean chemistry changing

- Acidification: Arctic Ocean is particularly sensitive
- Impacts shell formation of salmon prey

Actively swimming pteropod in seawater with low surface CO_2 conditions that preserve the shell with no dissolution

Pteropod showing swimming difficulties and partially dissolved shell after exposure to elevated CO_2 conditions (1600 ppm) for 2 weeks

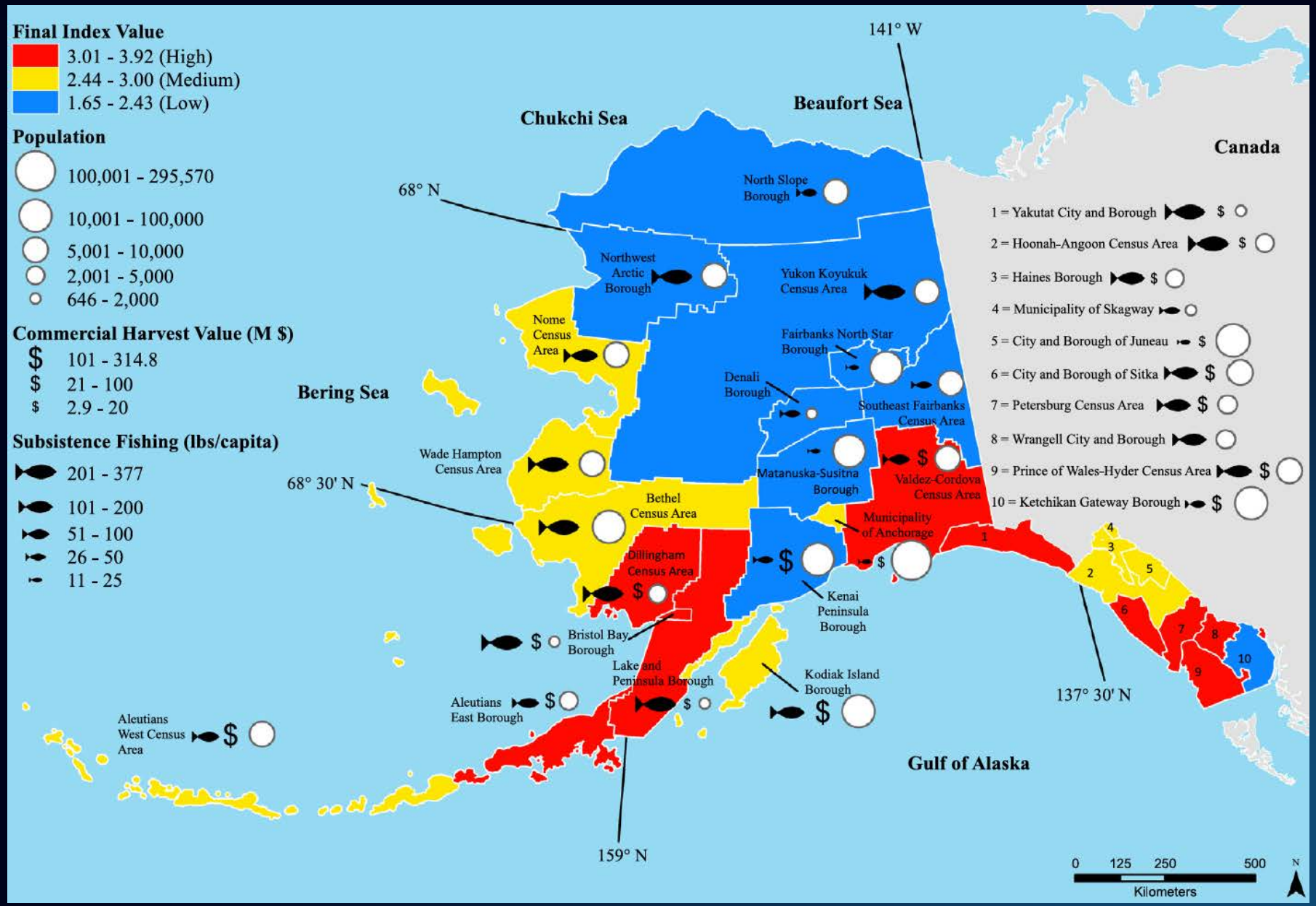
Energy and Environment

Scientists just measured a rapid growth in acidity in the Arctic ocean, linked to climate change

By Chelsea Harvey February 27

Ice floes in Baffin Bay above the Arctic Circle, seen from the Canadian Coast Guard icebreaker Louis S. St-Laurent, in July 2008. (Jonathan Hayward/Canadian Press via AP)

Ocean acidification risk assessment for Alaska's fisheries



Arctic sea ice is a unique habitat and a global climate "driver" -- ice-associated Arctic species are at risk











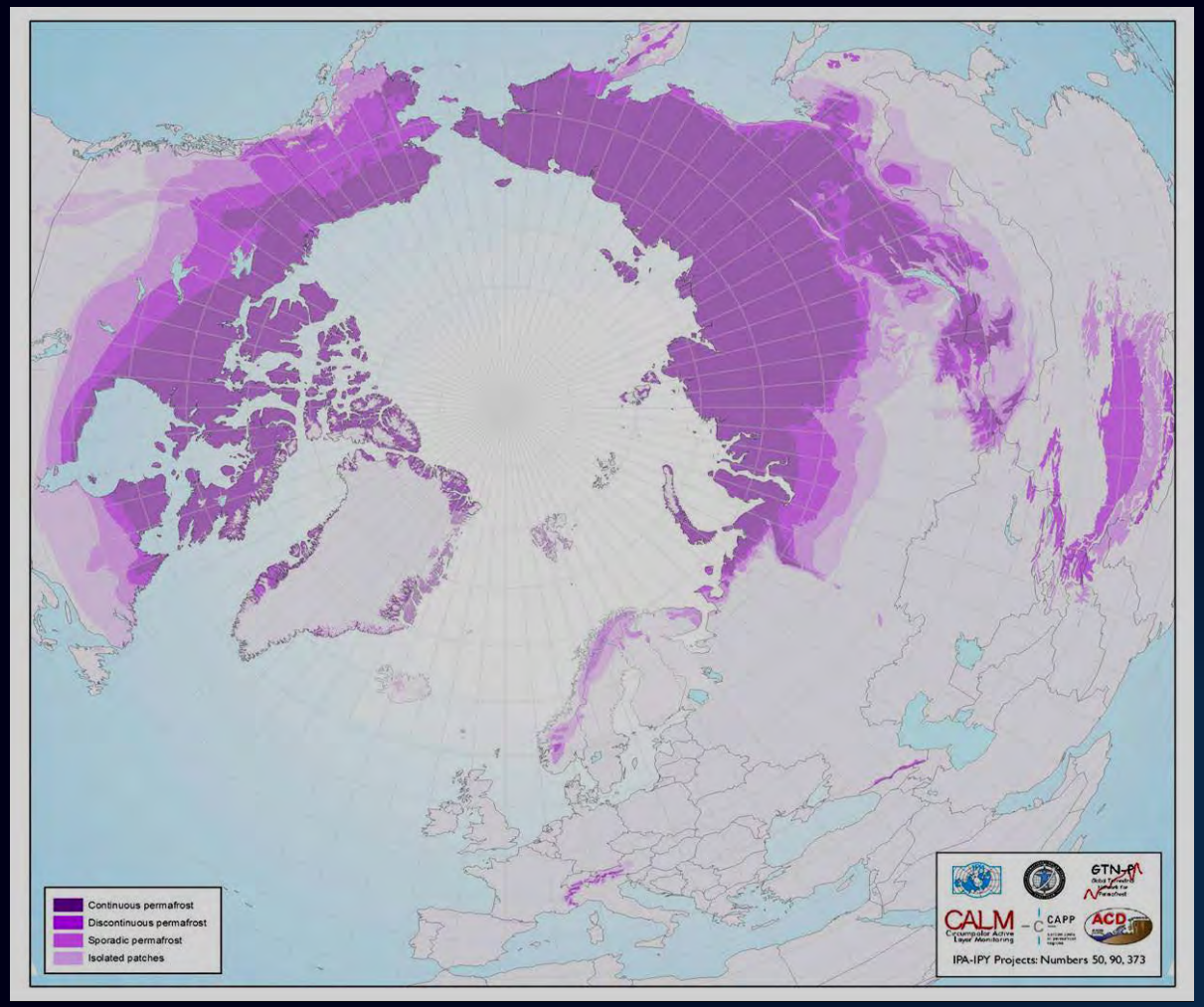


“2/3 Polar bear population decline by middle-century”

(if business-as-usual greenhouse gas emissions continue)

USGS, 2007

Of the 19 recognized polar bear subpopulations, 3 are declining, 6 are stable, 1 is increasing, and 9 have insufficient data, as of 2014.



Permafrost is thawing (24% of land in Northern Hemisphere has permafrost)

Permafrost thaw impacts coastlines, infrastructure, communities, health and safety

(See Diana Bull's poster)

Arctic people are impacted by these changes

- Subsistence foods and cultural practices
- Coastal villages and basic infrastructure

- Arctic human health
- Safety
- Food security
- Language and culture

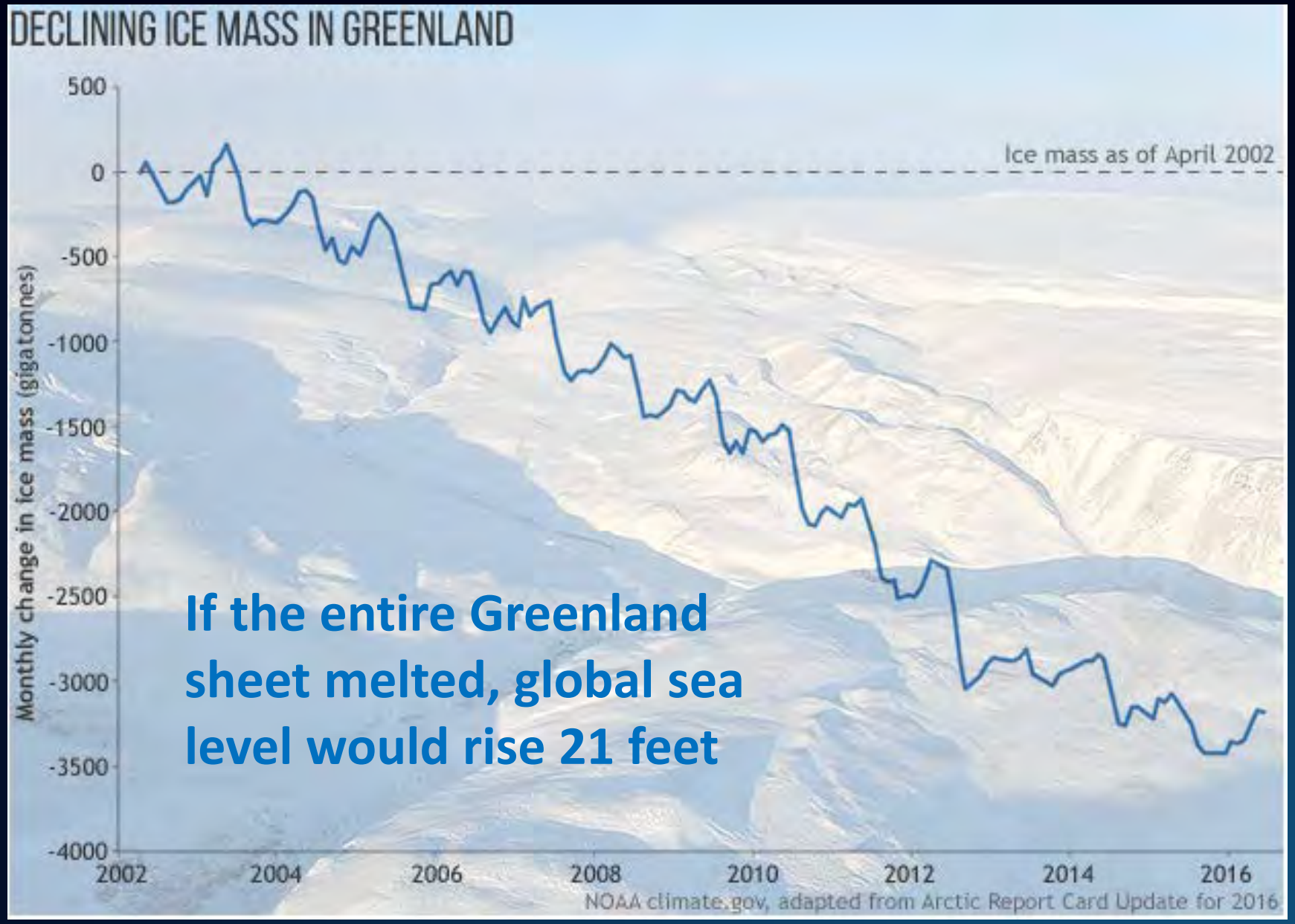
Community instability & village relocations

Shishmaref

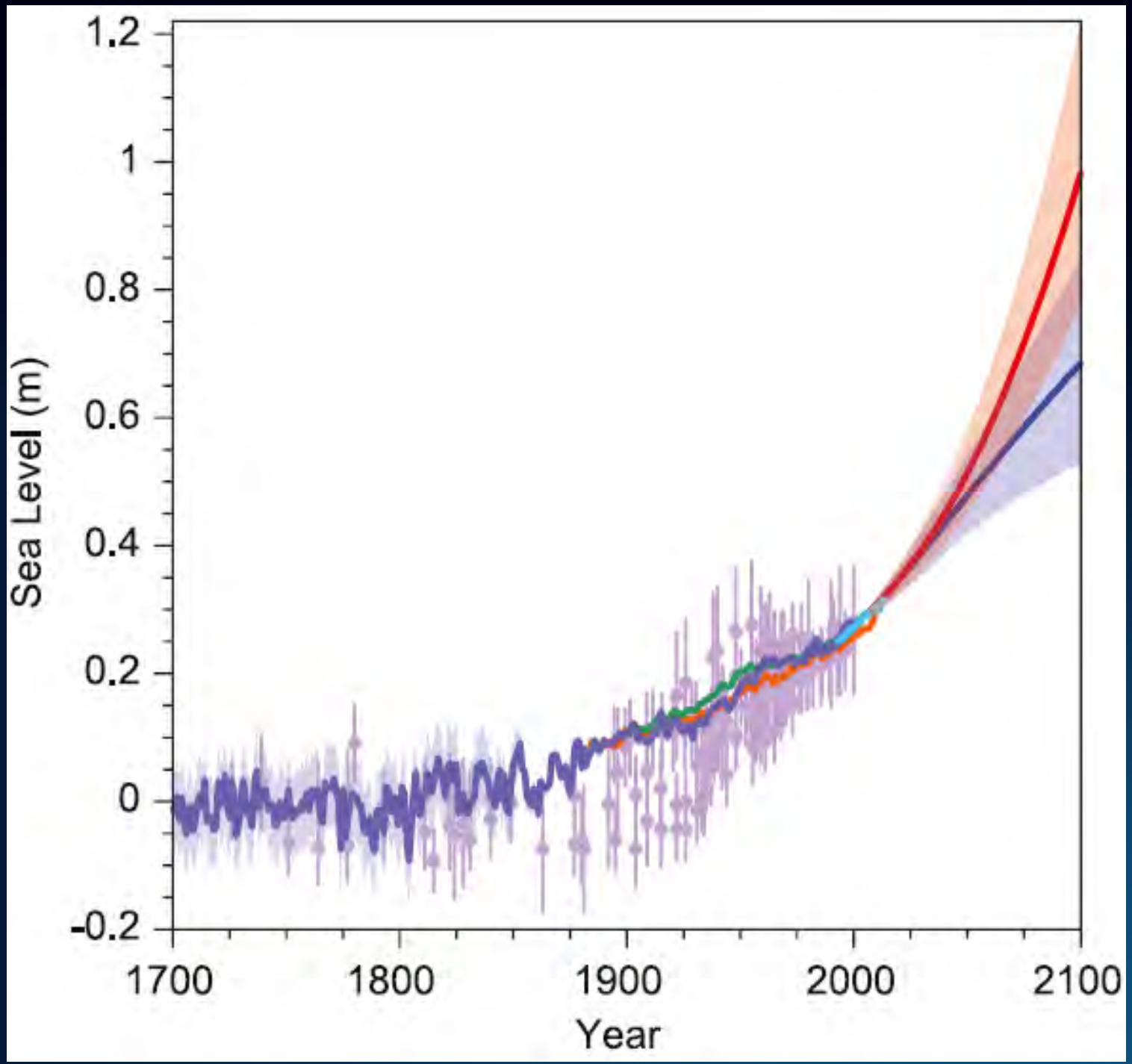
1 of 31 villages threatened by flooding or erosion: GAO & USACE

- Increased storms, unpredictable weather, extreme events
- Less sea ice to act as a blanket on ocean means bigger waves
- Impact on infrastructure from erosion, thawing permafrost, rising sea level

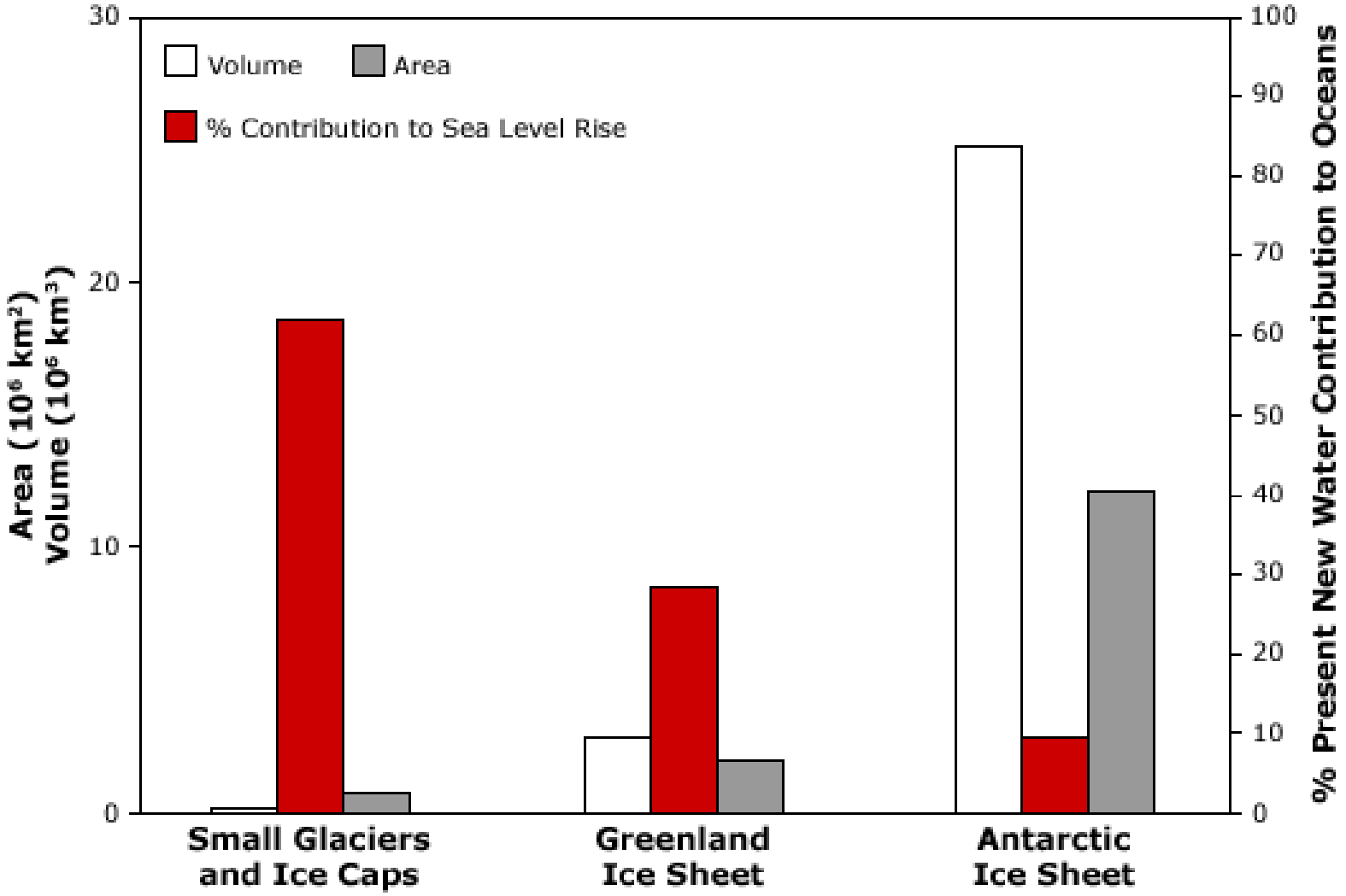
People beyond the region are also impacted by a warmer Arctic: melting glaciers contribute to sea level rise



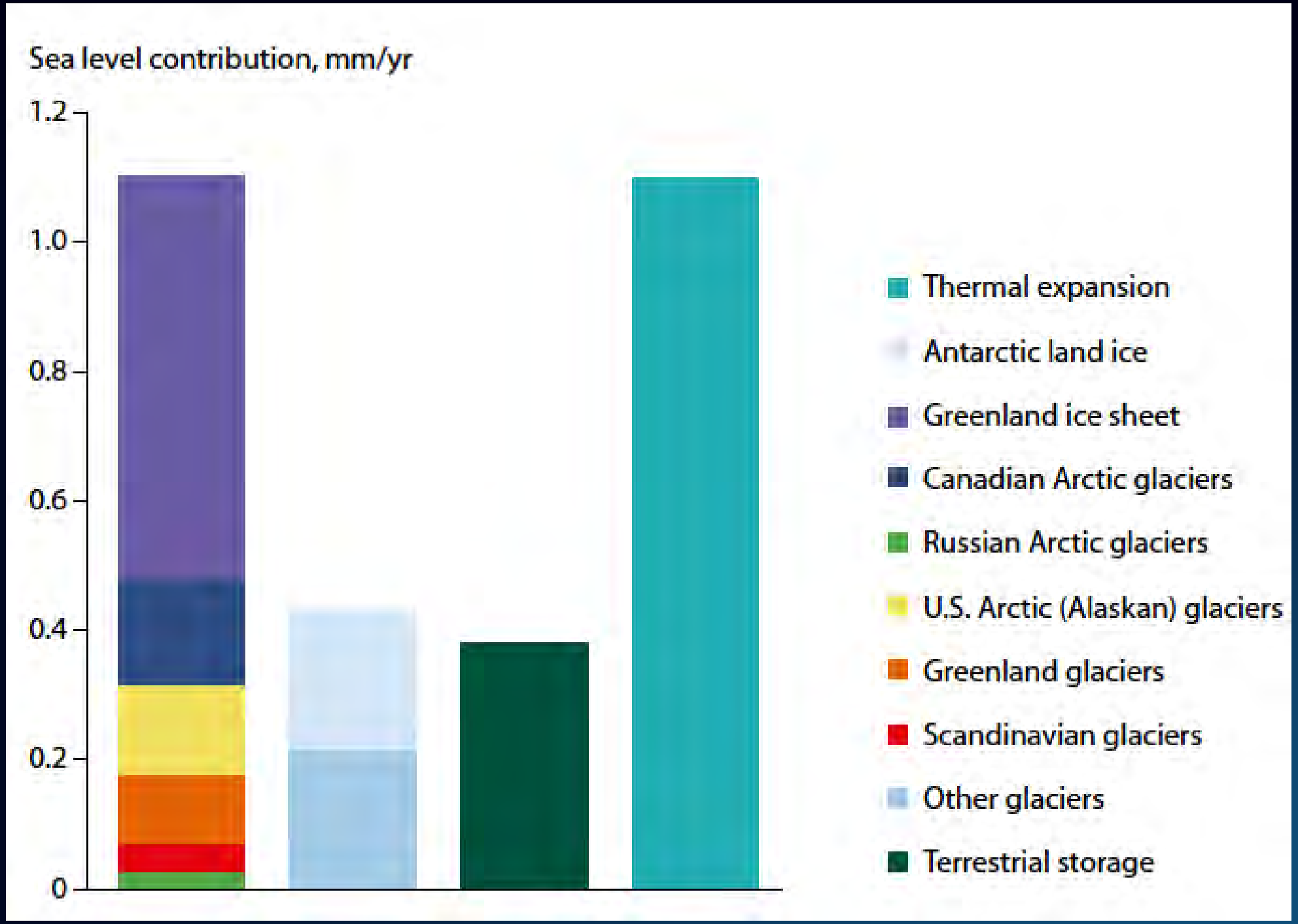
The rate of sea level rise is increasing



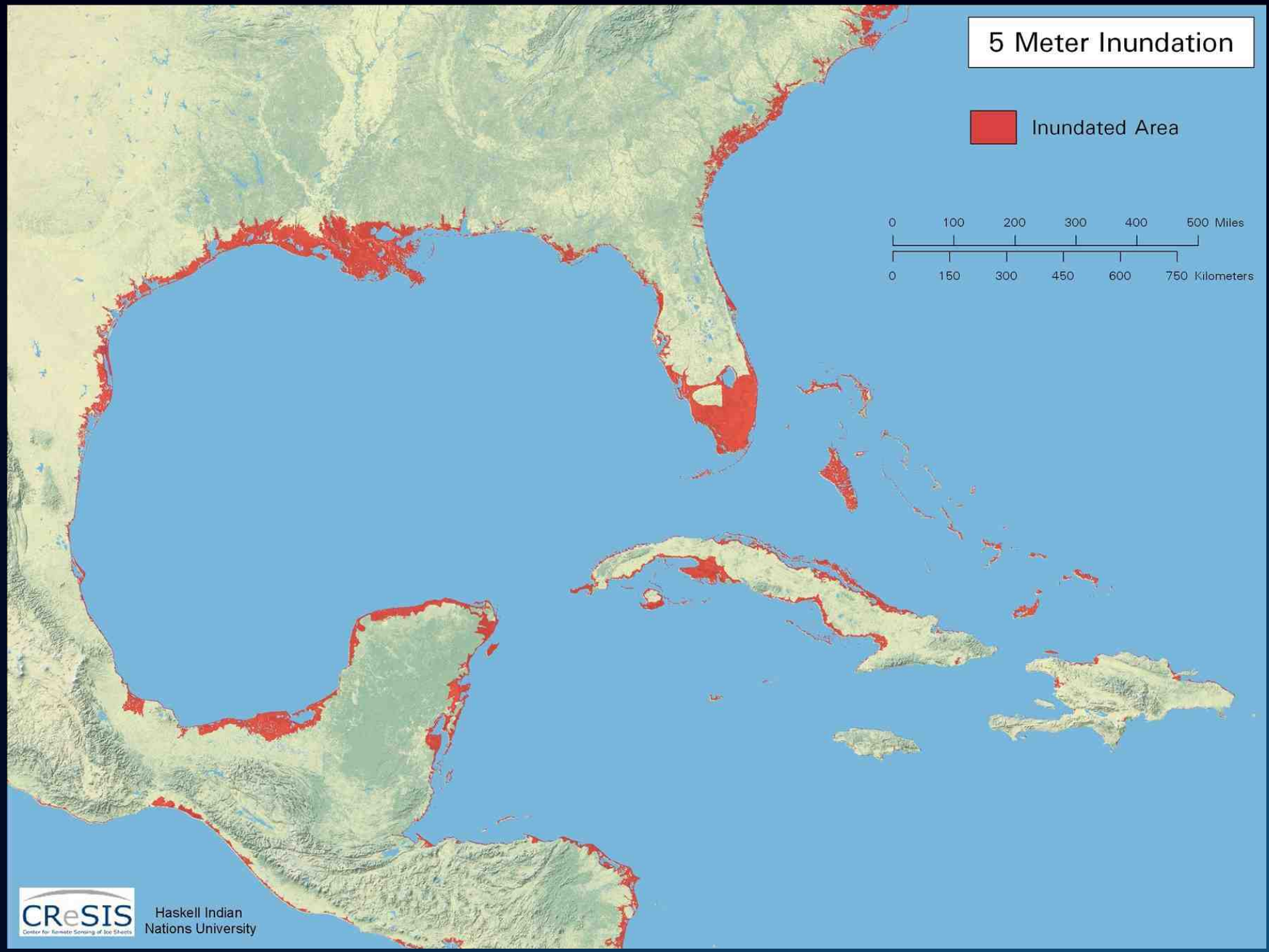
A decade ago, glaciers were greatest contributors to sea level rise…



Now Greenland melt surpasses glaciers

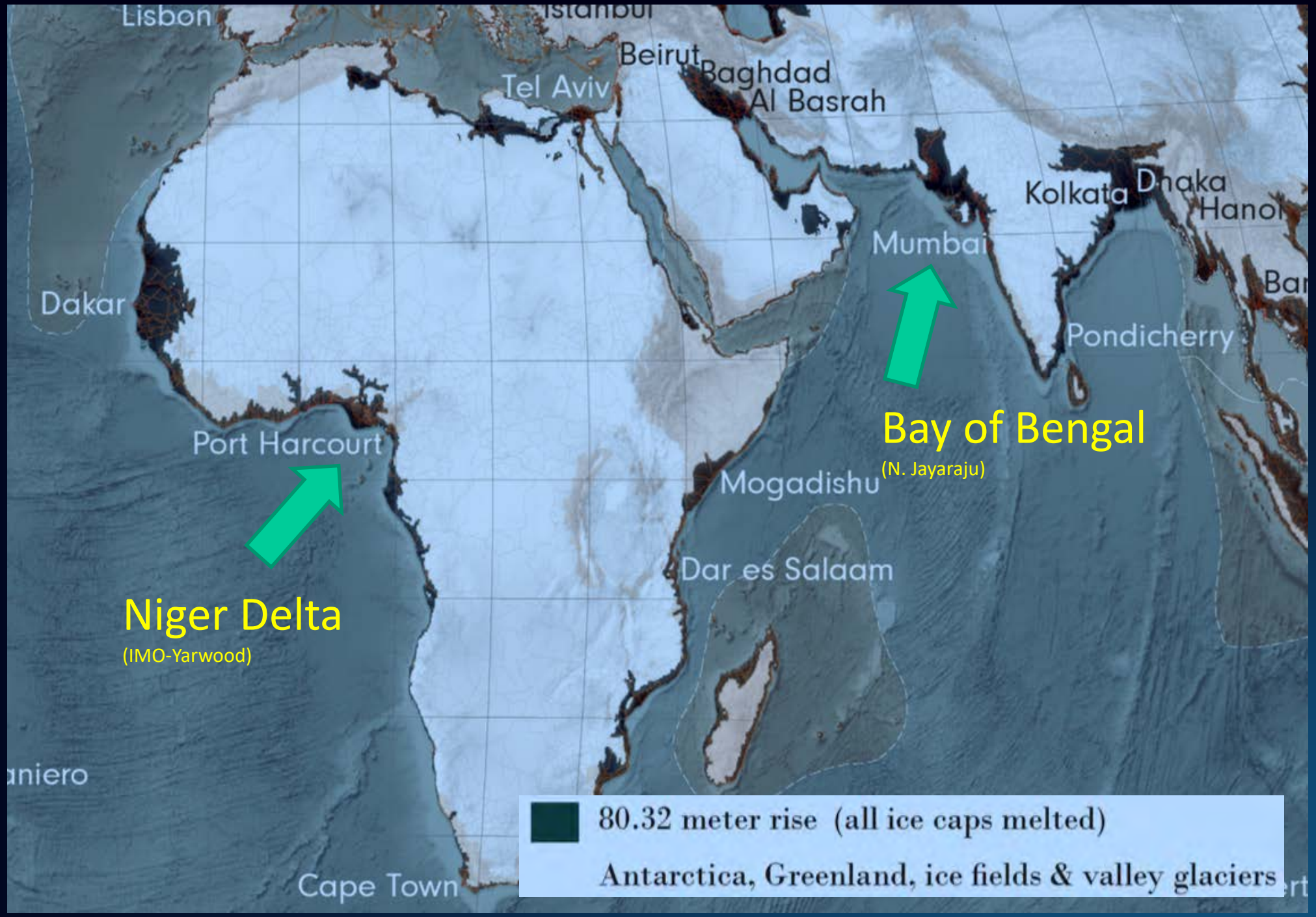


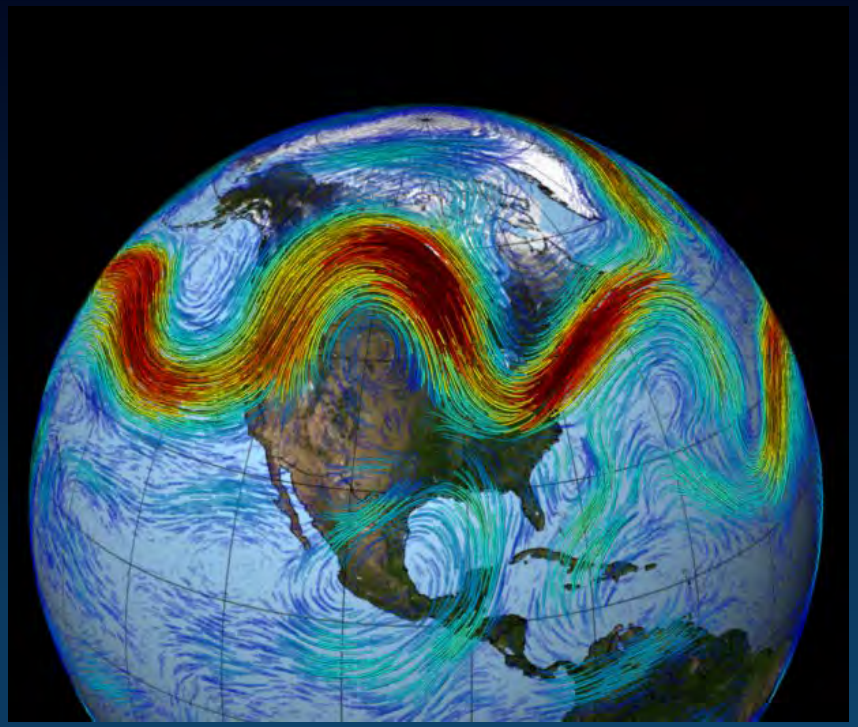
What a 5 m rise in sea level looks like in the Gulf of Mexico



Coastal flooding if all land ice melts

(80 m sea level rise)





Reduced Arctic Sea ice impacts jet stream…
…bringing cold air south, and
warm air north...impacting global weather

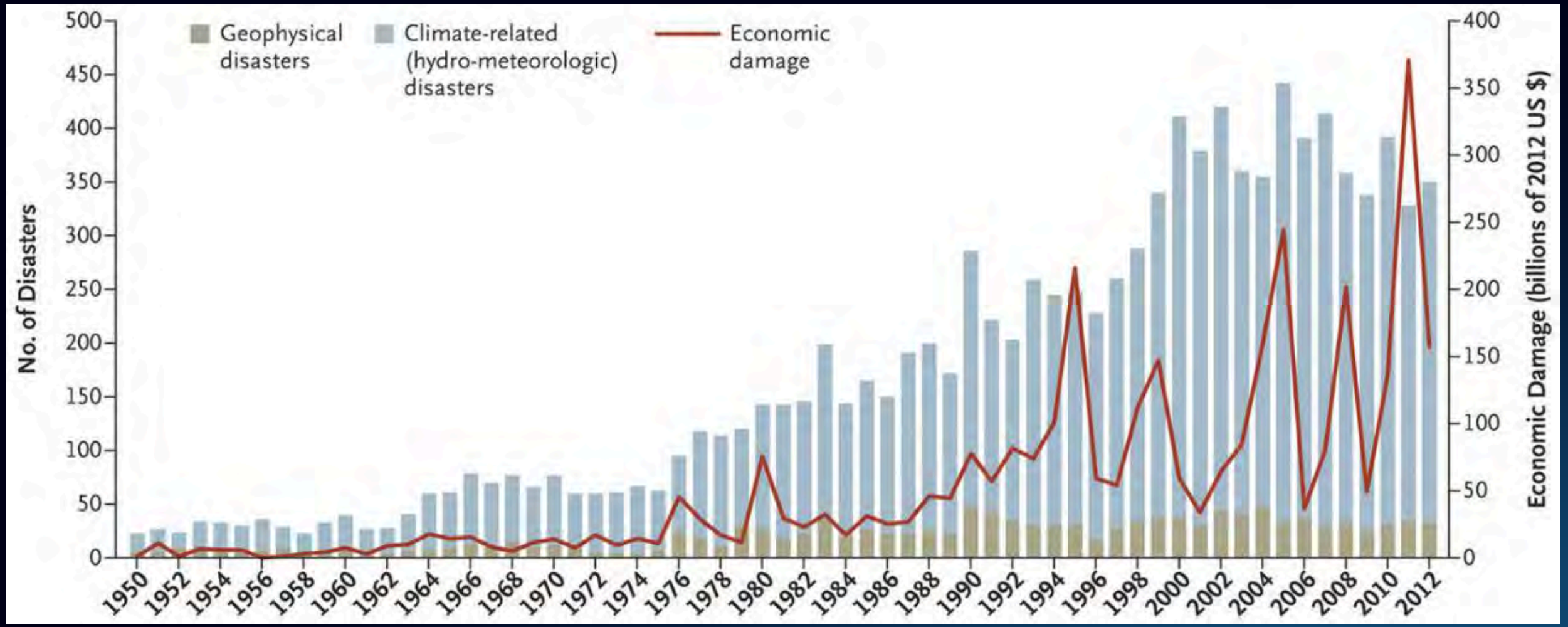
Storms are increasing in intensity and frequency

Montecito, CA
mudslides
Jan. ‘18

“Beast from the East” storm, UK
March ‘18

New England, US, Winter 2018

Increasing economic damage from climate-related disasters



Since 1990, natural disasters have affected ~217 million people annually.

Note that the number of geophysical disasters has remained fairly stable since the 1970's, while the number of climate-related disasters has greatly increased.

Less ice in the Arctic = a new ocean of opportunities

“The opening of the ‘fifth ocean,” the Arctic, for longer periods of time, will provide new access to resources, migration of fishing stocks and eventually new trade routes, that can’t be overstated.”

Former Chief of Naval Operations
Adm. Gary Roughead (retired)

Potential economic development in the Arctic is attracting international interest

- Increasing global demand for resources
- Arctic is resource rich
- Region increasingly accessible less ice and technology advances

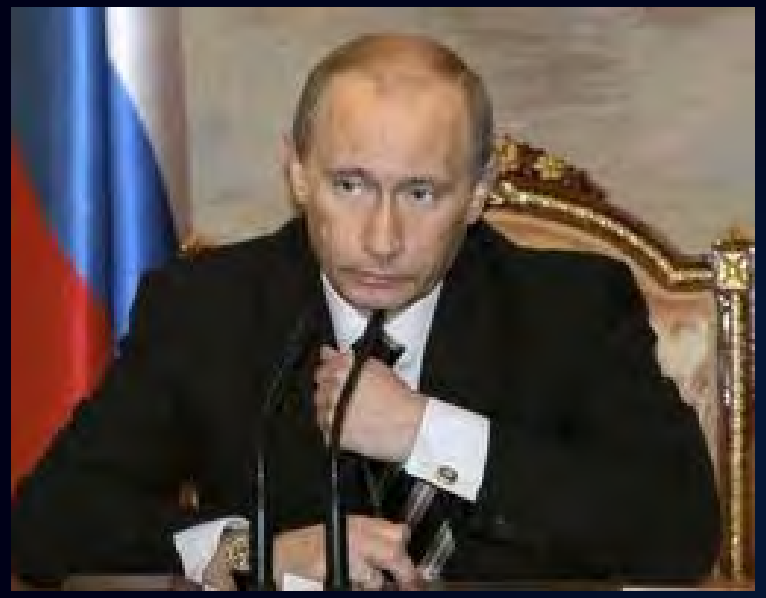
Chinese Snow Dragon (China's 1st ice breaker) visited the the Arctic in 2017 and 2018. China is currently building its 2nd ice breaker (nuclear).

China adopts Arctic Policy (2018) declares "near Arctic State" and introduces concept of Polar Silk Road. Goals: "…to understand, protect, develop and participate in the governance of the Arctic."

The Araon, South Korea's 1st ice breaking vessel, has completed multiple trips to the North Pole. The Korean Polar Research Institute has done Arctic research for decades.

Korea adopted an Arctic Policy in 2013, emphasizing research and shipping.

Potential Arctic Shipping Routes



"Putin has issued a demand that the amount of traffic flowing through the N. Sea Route reach 80 million tons a year by 2024, a figure that exceeds even the most ambitious projections of his government's ministries."

5/16/18 Bellona

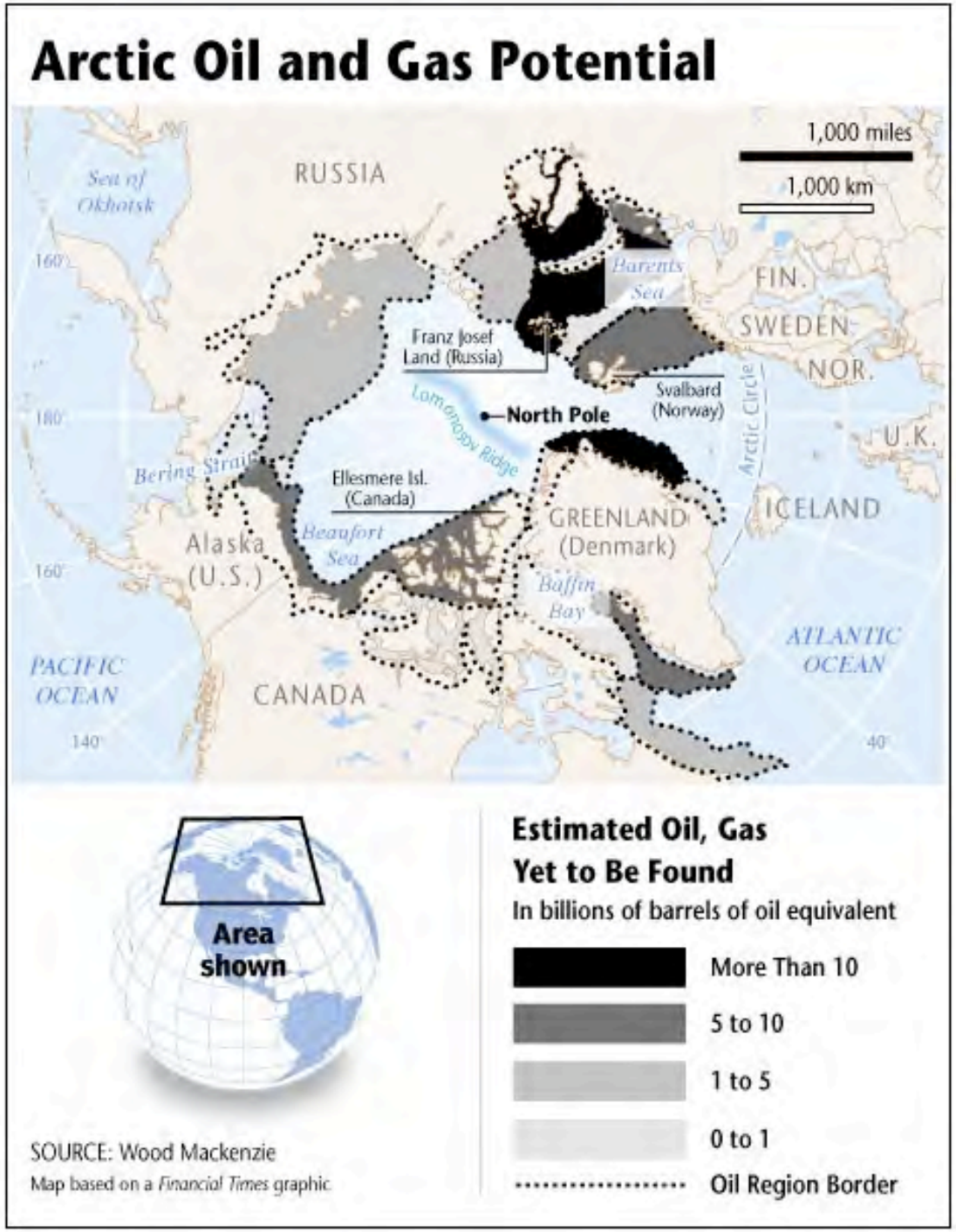
Increased access = economic activity

- Shipping
- Fisheries
- Tourism
- Mining
- Oil and gas

Arctic has much of the world's remaining "undiscovered" fossil fuel

- 13% oil
- 30% natural gas
- 20% natural gas liquids

2009 USGS CARA report



To drill or not to drill?
tension between risk and revenues

Challenges of working in extreme environments

- High cost and high risk to develop reserves
- Severe & cold weather requires specially designed equipment & vessels & training for employees
- Protection of structures and wells from ice
- Short summer installation windows
- Inadequate marine charts & navigation aides
- Poor soil conditions (permafrost) & changing ice timing and strength
- Limited infrastructure like ports; long supply lines & extensive transport
- Limited emergency response capacity

Canadian Prime Minister Bans Arctic Drilling… For Now

By Irina Slav - Feb 15, 2017, 2:35 PM CST

Norway Arctic shelf drilling expands

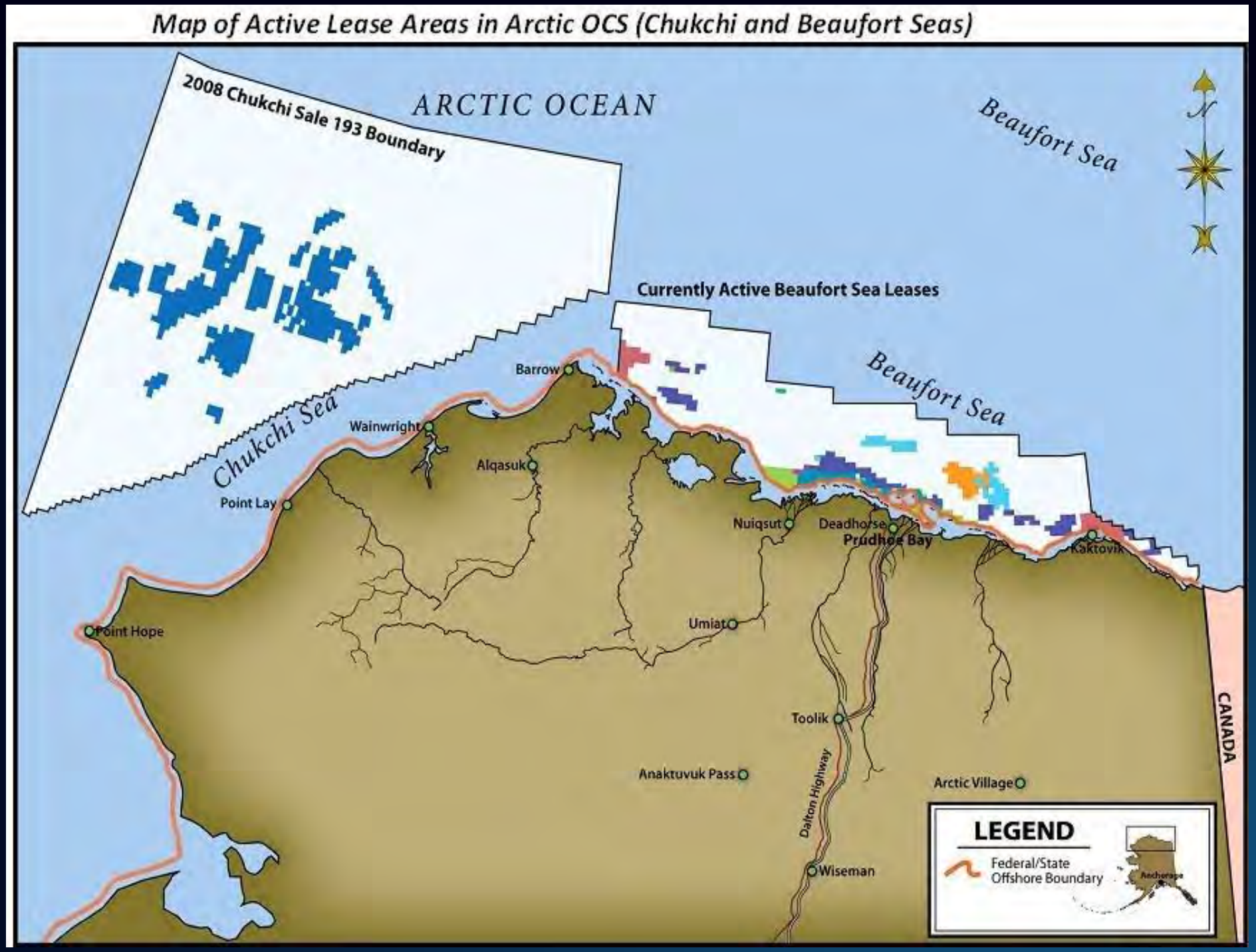
2017 *Barents Observer*

Harald Pettersen / Statoil

EU lawmakers adopt ban on drilling in ”icy waters”

2017 *Offshore Europe*

U.S. offshore oil and gas drilling policy shifts



Russian oil & gas production expands in Arctic

LNG project in the Yamal Peninsula. Russia aims to increase share of world LNG market from 5% to 15%.

Sergei Fadeichev/ gettyimages

Russian submarine fleet to expand Arctic presence

The nuclear-powered K-535 Yuri Dolgoruky submarine, armed with Bulava ballistic missiles, is an element of the Russian nuclear triad. *5/16/18 Pravda*

Russia builds Arctic air defense shield

- Covers “from Novaya Zemlya to Chukotka”
- “Capable of discovering and destroying enemy aircrafts, cruise missiles & drones”
- In 2015, Russia introduced the S-400 Triumph anti-aircraft weapon to the Arctic.
- In 2016, Russia deployed Bastion mobile coastal missile systems

Россия развернет новую дивизию ПВО в Арктике

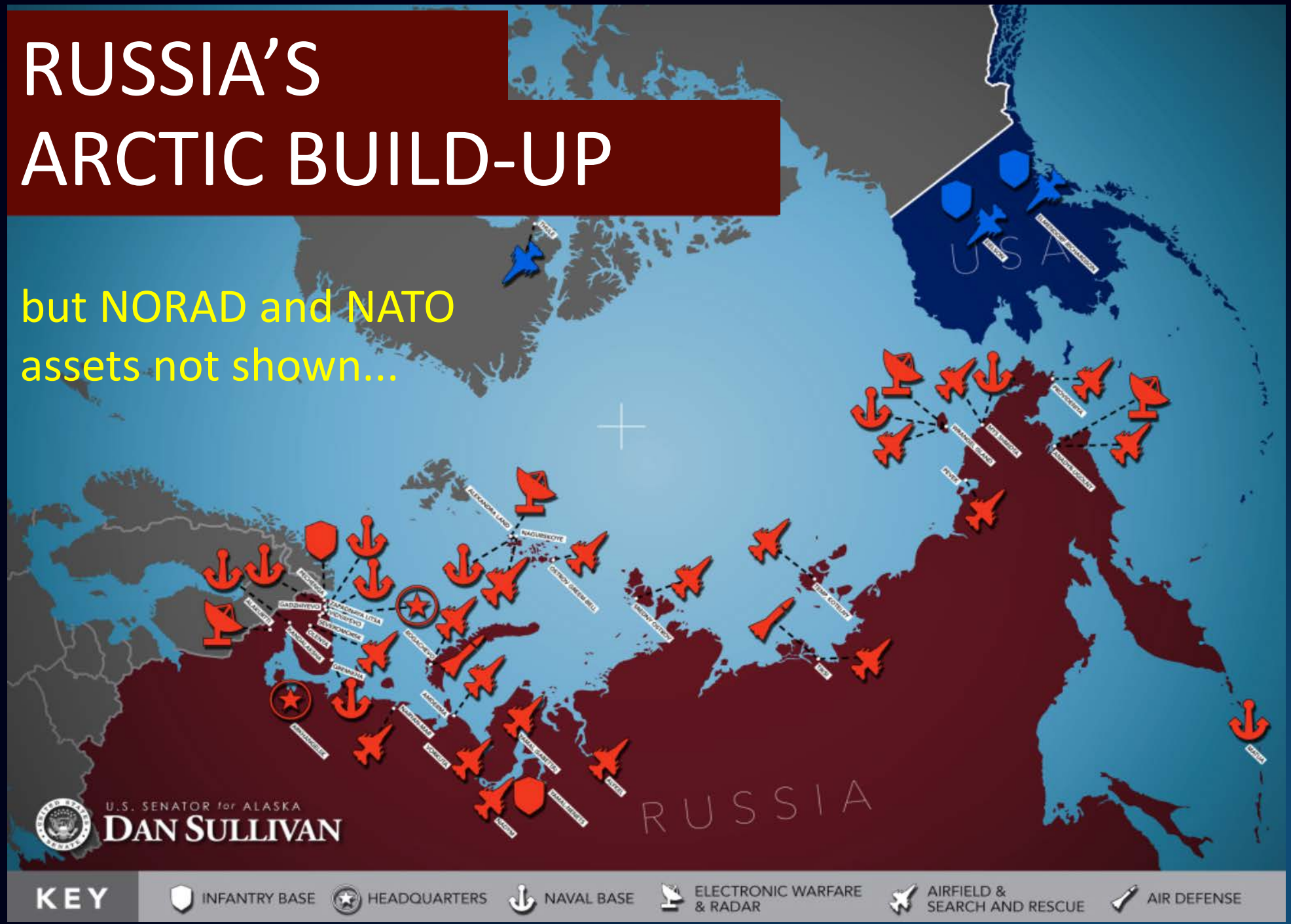
Подразделение закроет Москву и Урал от удара со стороны Северного полюса

Фото: РИА НОВОСТИ/Михаил Воскресенский

Uncertainty about motives

RUSSIA'S ARCTIC BUILD-UP

but NORAD and NATO assets not shown...



Climate change recognized as a security threat

"Climate change is impacting stability in areas of the world where our troops are operating today. It is appropriate for the Combatant Commands to incorporate drivers of instability that impact the security environment in their areas into their planning."

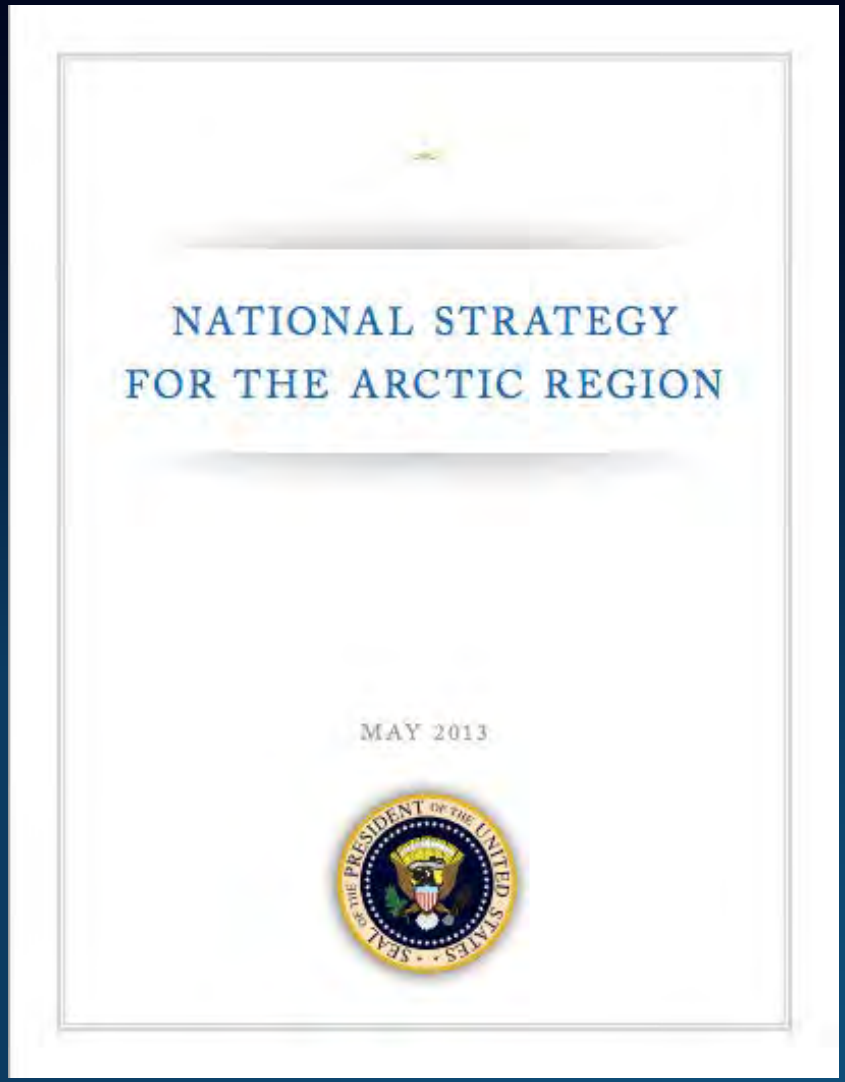
"The Arctic is key strategic terrain. Russia is taking aggressive steps to increase its presence there. I will prioritize the development of an integrated strategy for the Arctic."

Secretary of Defense James Mattis

in written responses after confirmation hearing

US National Strategy for the Arctic

- Advance United States Security Interests
- Pursue Responsible Arctic Region Stewardship
- Strengthen International Cooperation



Recent changes in Alaska/Arctic military assets

- >100 5th-generation fighter jets in Alaska, highest concentration in US
  - 47 F-22 Raptor fighter jets now in Alaska
  - 54 F-35A Lightening II fighter jets will be at Eielson AFB by 2020
    - …and >5,000 people to support the two squadrons
    - …will bring $1.3B/yr revenue for the Fairbanks N. Star Borough
  - $900M, mostly in construction, to install the F-35s
  - $47M to repair runway erosion at Cape Lisburn

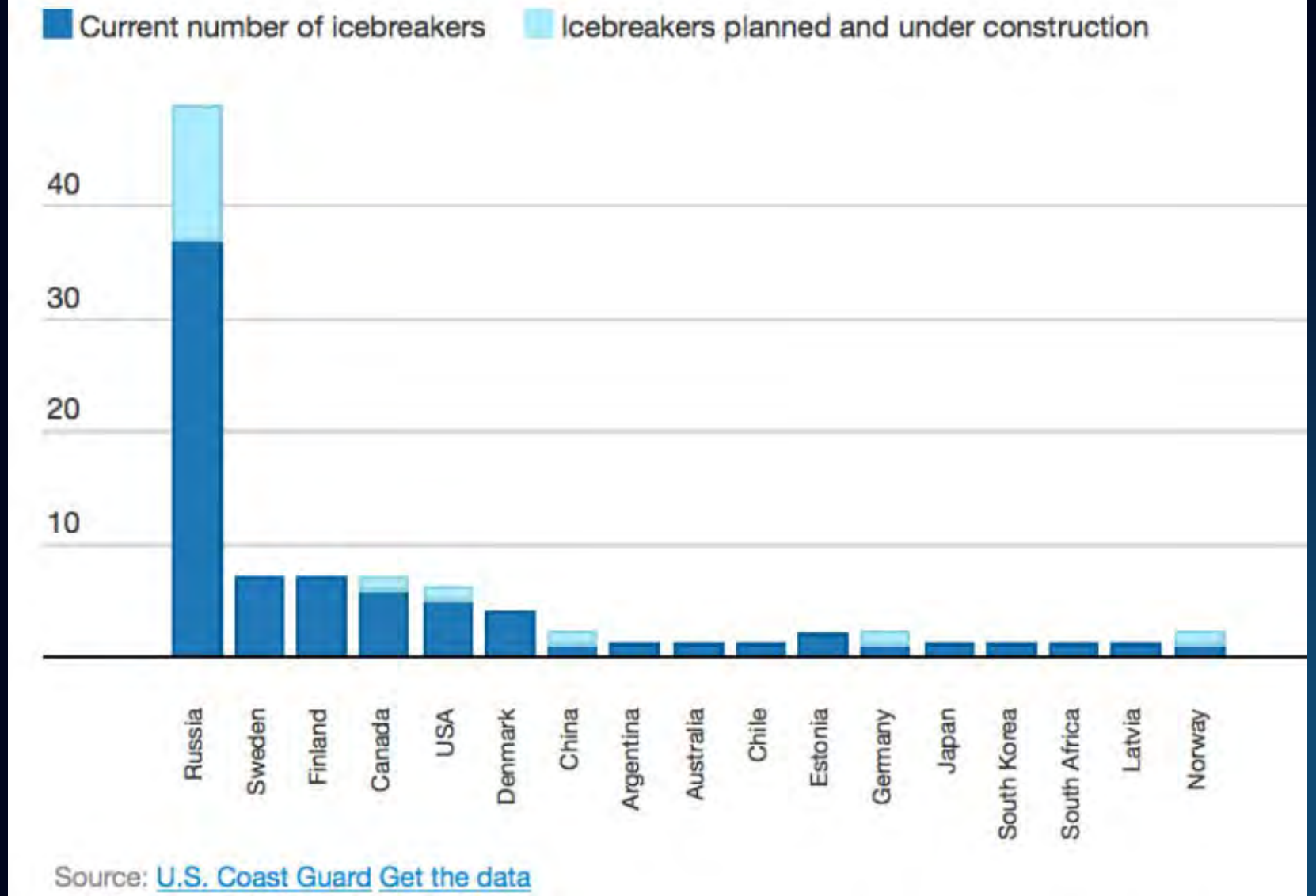

F-35 at Eielson AFB

- Missile Defense Agency paid Boeing $6.6B as part of
- 6-yr contract to build a new underground silo field of
- 20 more anti-ballistic missiles at Ft. Greely

- USCG Comm. Zukunft: “We need to reserve space, weight and power if we need to strap a cruise missile package on it” (new icebreaker)

US icebreakers…

Who's Breaking All The Ice



Source: U.S. Coast Guard Get the data

International Cooperation in the Arctic

1. Arctic Council
2. Three Agreements under Arctic Council
3. IMO’s Polar Shipping Code
4. Fisheries Moratorium in Central Arctic Ocean
5. Arctic Coast Guard Forum
6. Arctic Economic Council
7. Arctic International Science Collaboration
8. Law of the Sea Treaty and border resolutions

Member States:

Canada

Greenland/Denmark

Iceland

Finland

Norway

Sweden

Russia

USA

Permanent Participants:

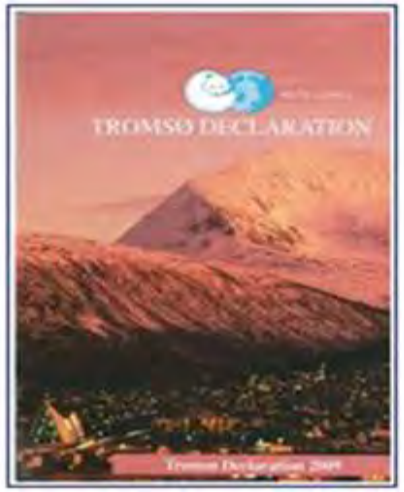
Aleut Int'l Assoc.; Arctic Athabaskan Council; Gwich'in Council Int'l; Inuit Circumpolar Council; Russian Assoc. of Indigenous Peoples of the North (RAIPON); Saami Council

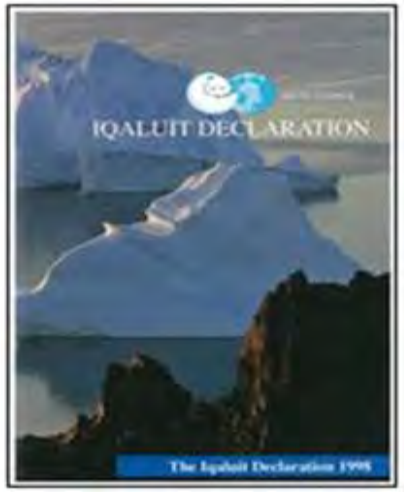
Observers:

France, Germany, Netherlands, Poland, Spain, UK, China, Italy, Japan, Korea, Singapore, India, Switzerland, EU(?), plus NGOs

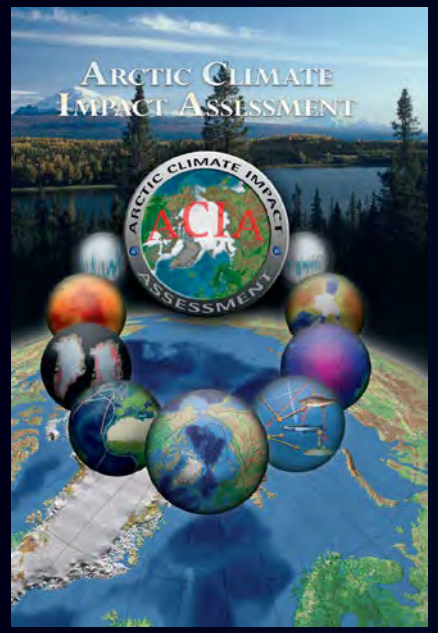
Arctic Council Mandate

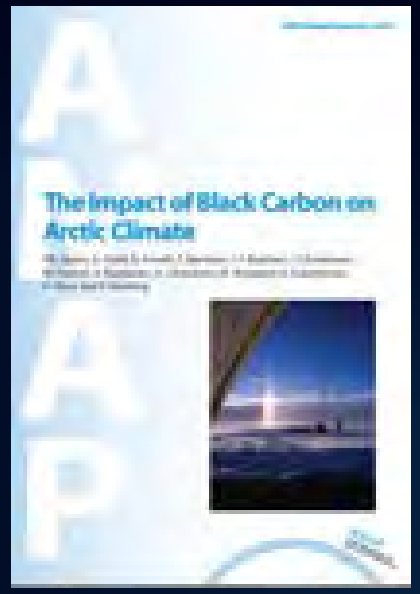
Promote cooperation, coordination and interaction among the Arctic States, with the involvement of Arctic indigenous communities and other Arctic inhabitants on common arctic issues, in particular sustainable development and environmental protection in the Arctic.

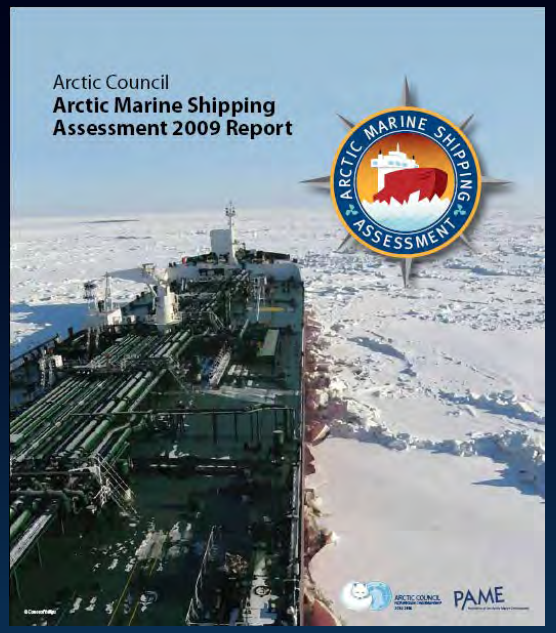




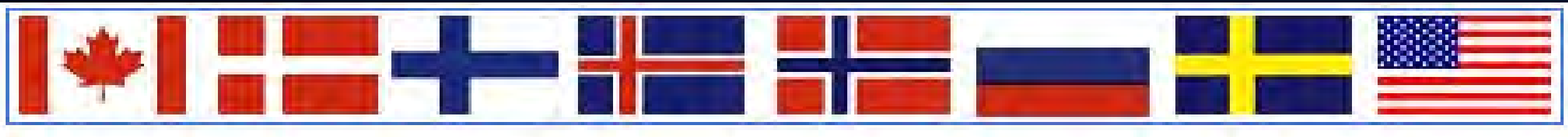
Council assessments, based on international science







Arctic multilateral agreements adopted



- Cooperation on Aeronautical and Maritime **Search and Rescue**
- Cooperation on Marine **Oil Pollution Preparedness and Response**
- International Cooperation on **Scientific Research** (May 2017)

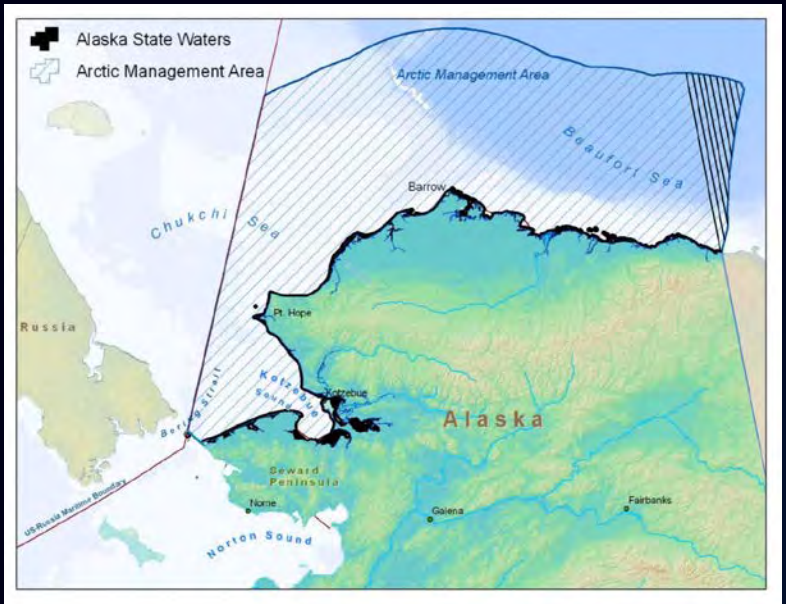
Arctic states create “Arctic Coast Guard Forum”

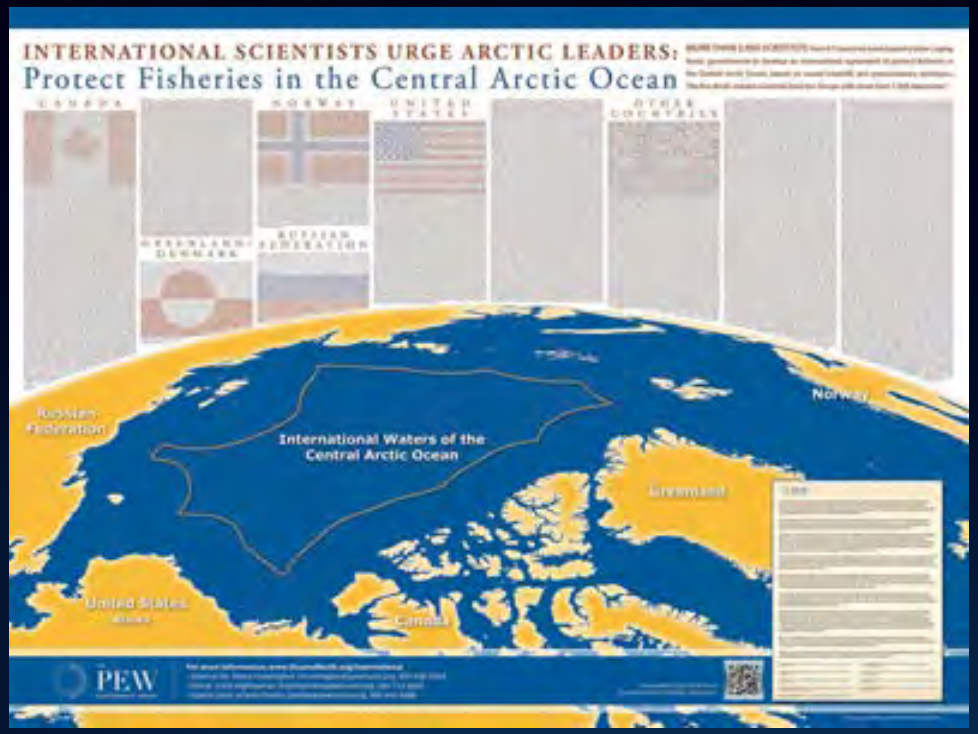
Polar Code adopted by Int'l Maritime Organization

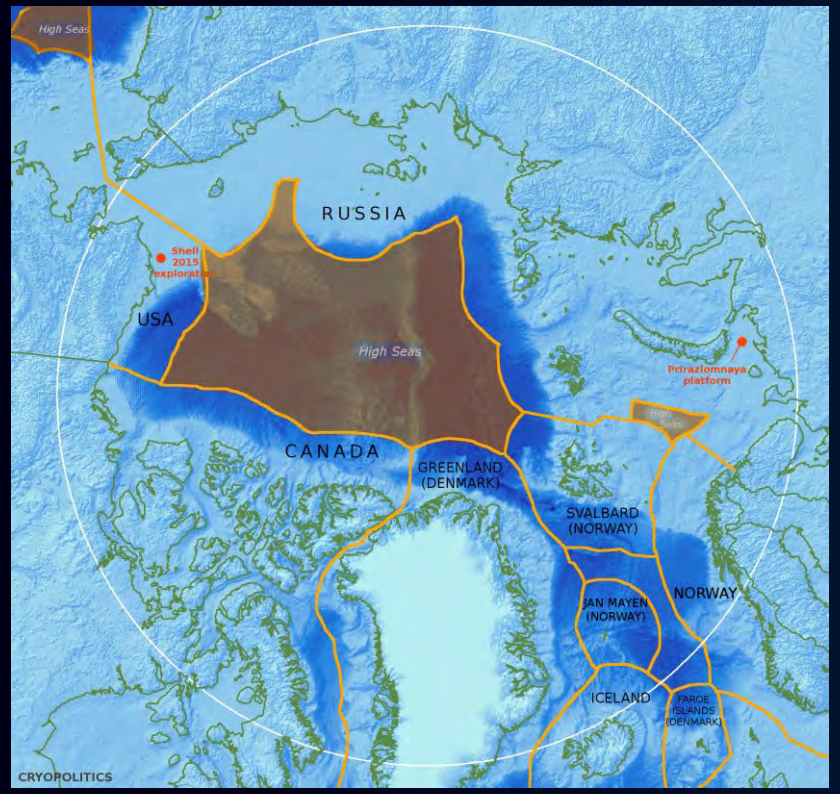
-mandatory under Int'l Convention for the Prevention of Pollution from Ships (MARPOL) and Int'l Convention for the Safety of Life at Sea (SOLAS);

-covers design, construction, equipment, operational & training, search & rescue, and environmental protection matters relevant to ships operating in polar waters;

-IMO considering imposing a ban on the use of heavy fuel oil in the Arctic (one currently exists for the Antarctic).







Fisheries moratorium

12 parties, including all Arctic nations, the EU, and others, have provisionally agreed to a 16-year moratorium on commercial fishing in the Central Arctic Ocean

”Precautionary Approach”

Agreement on Enhancing International Arctic Scientific Cooperation

- Goal: enhance int'l coop. in sci. activities to increase effectiveness & efficiency in developing scientific knowledge about the Arctic
- Facilitates access (people, equipment, samples, data)
- Specific articles on non-parties, and traditional and local knowledge encouraging use, communication, and participation
- USARC designated as US "competent authority"

Effective as of May 23, 2018

AGREEMENT ON ENHANCING INTERNATIONAL ARCTIC SCIENTIFIC COOPERATION

ANNEX 1: Identified Geographic Areas

This map shows the approximate extent of the Identified Geographic Areas described in Annex 1 of the Agreement on Enhancing International Arctic Scientific Cooperation. It is intended for illustrative purposes only.

Approximate Extent of Identified Geographic Areas

62°N

Arctic Circle

Continental shelf areas are not depicted.

U.S. Department of State, OES/OPA, 10/2017

Area where agreement applies

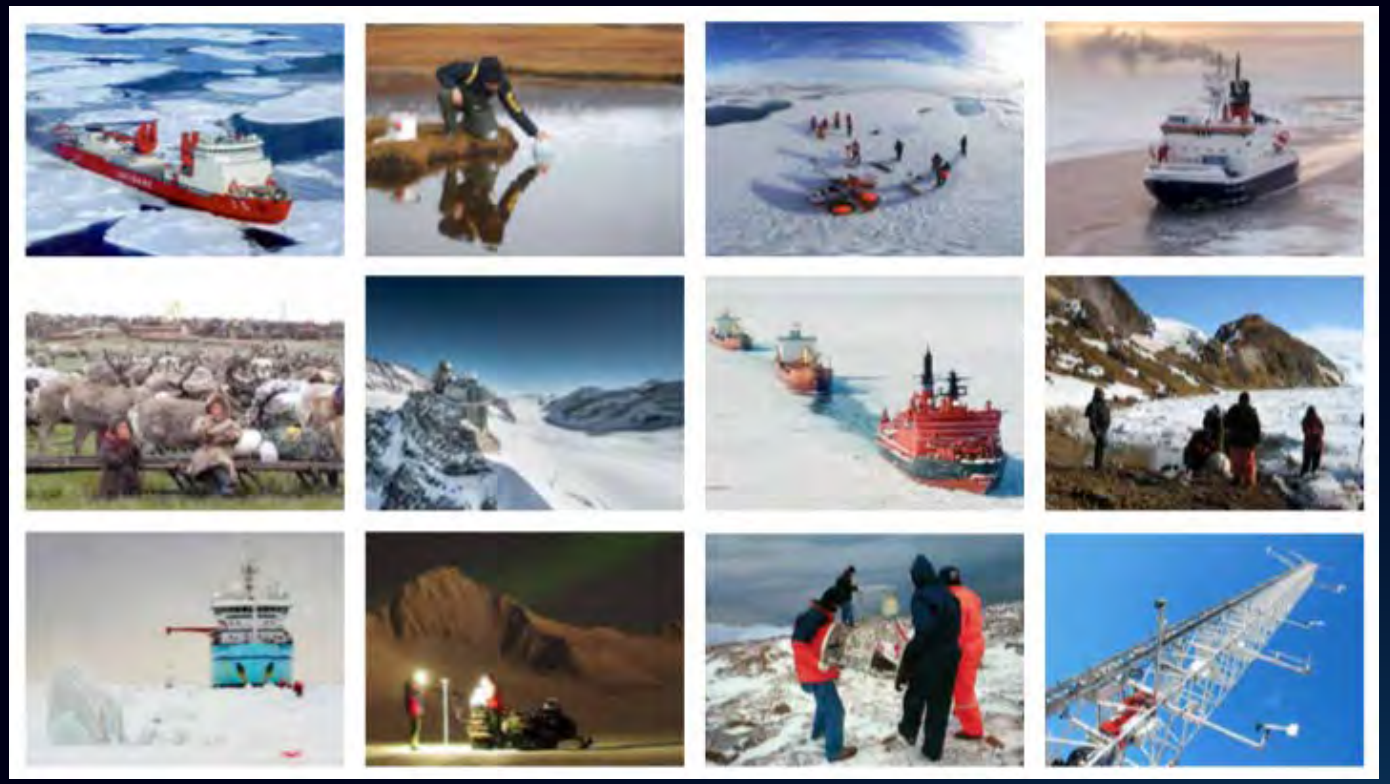
International scientific cooperation

Arctic Science Ministerials: September 2016 & October 2018

1) Arctic Science Challenges and their Regional and Global Implications

2) Strengthening and Integrating Arctic Observations and Data Sharing

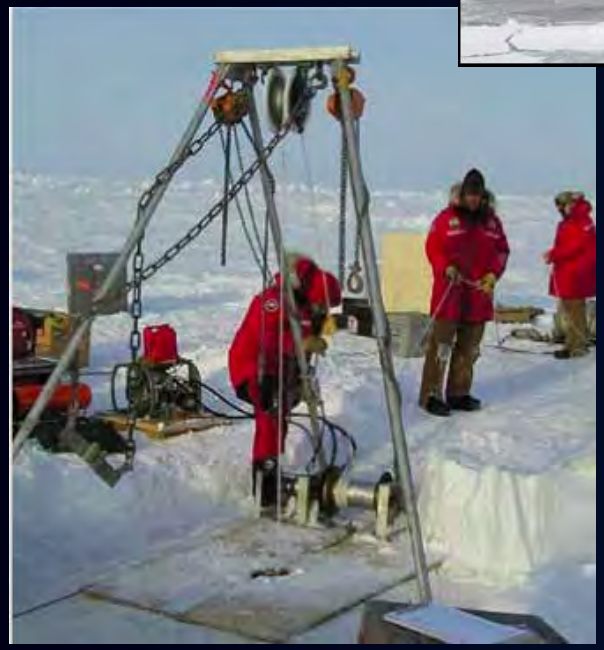
3) Applying Expanded Scientific Understanding of the Arctic to Build Regional Resilience



Arctic science program synopses from 24 governments & the EU

2nd Arctic science ministerial, October 2018, Berlin, hosted by EU, Germany, Finland

Increasing research and investment in infrastructure is essential



Arctic development needs science-based information and understanding to:

- Identify and assess resource potential
- Assess the impacts of resource development
- Determine sustainability & consequences of development (locally & globally)
- Create and implement smart practices for development
- Determine means to assess risk, prevent problems & respond to emergencies
- Develop new technologies for research
- Address the needs of Arctic residents, from food security to adaptation of climate-impacted infrastructure

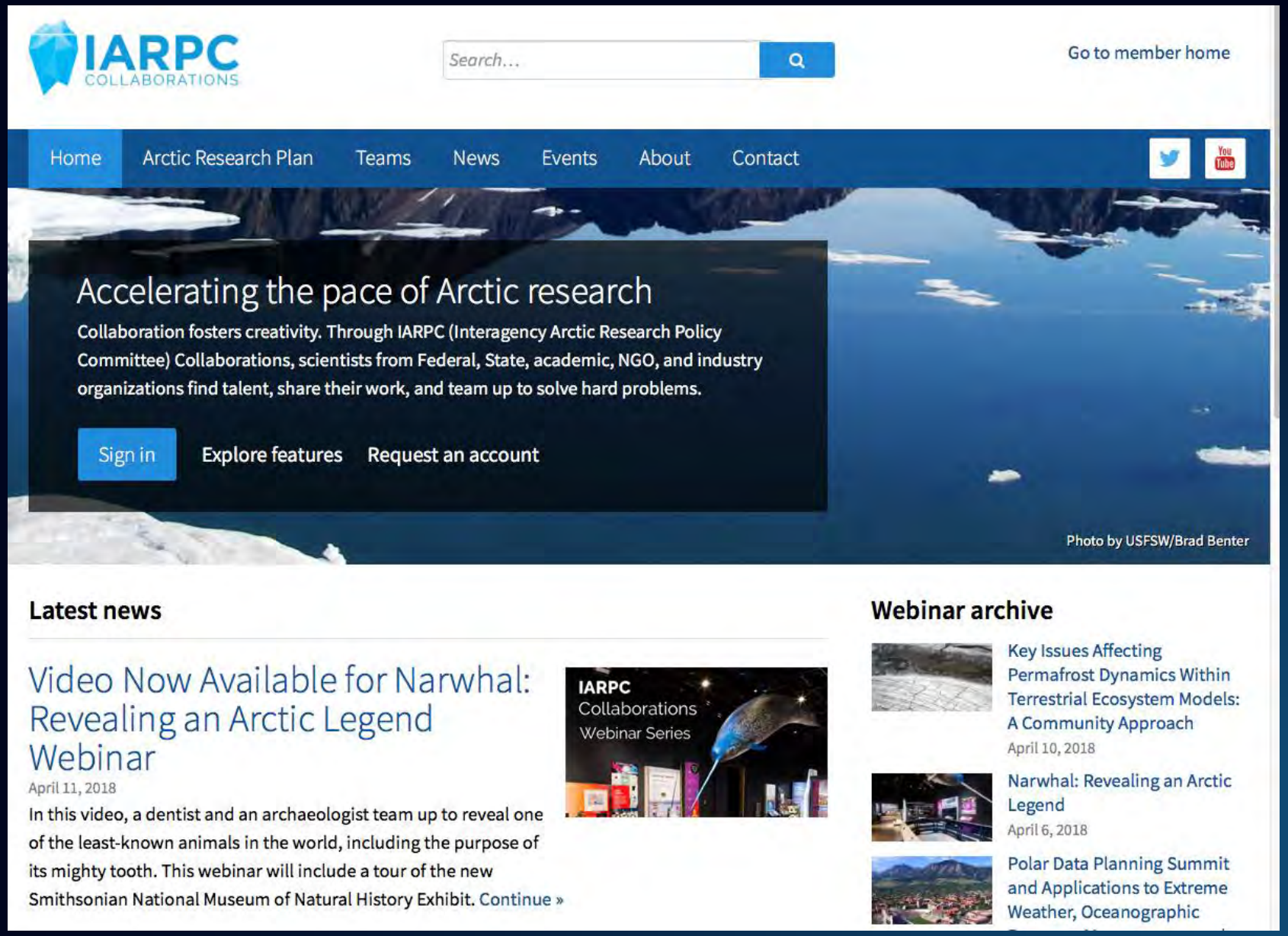
US Arctic Research Commission

- Develop, recommend, and assist in implementing a national Arctic research policy
- Facilitate Arctic research cooperation among Federal, State and local governments
- Recommend improvements for data sharing among Arctic research entities
- Facilitate international scientific cooperation in the Arctic

Five Year Arctic Research Plan Priorities

1) Better understand **health determinants** & improve well-being of Arctic residents.
2) Advance process and system understanding of the changing Arctic **atmospheric composition and dynamics** and the resulting changes to surface energy budgets.
3) Enhance understanding & improve predictions of the changing Arctic **sea ice cover**.
4) Increase understanding of the structure and function of Arctic **marine ecosystems** and their role in the climate system and advance predictive capabilities.
5) Understand and project the mass balance of **glaciers, ice caps and the Greenland Ice Sheet**, and their consequences for sea level.

www.iarpccollaborations.org



ARCTIC UPDATE

THE US ARCTIC RESEARCH COMMISSION DAILY EMAIL NEWSLETTER

May 22, 2018

Today's Events:

** New this week ** **Lightening Talks on Arctic Research. May 22, 2018 (Webinar).** **IARPC Collaborations** hosts an online science communication training program for early career scientists. In this webinar, seven scientists who recently completed the program will present "lightning talks" (5-minute presentations which require speakers to articulate in a quick, insightful and clear manner) on a variety of Arctic science topics. Join us to see examples of effective science communication, to learn about a wide variety of Arctic topics, and to learn about future opportunities for science communication training through IARPC Collaborations

Media

UAF Hosts 4-Day Alaska Native Language Institute to Help Preserve Knowledge. Alaska Native languages are the focus of a four-day institute at the University of Alaska Fairbanks this week. The Alaska Native Language Revitalization Institute is hosted by the UAF College of Rural and Community Development. College director of Indigenous programs Sandra Kowalski says the conference reflects a new urgency to preserve Alaska's diversity of Native languages. Alaska Public Media

UNE Launches Institute for Study of North Atlantic, Arctic. The University of New England on Monday launched a new institute dedicated to education and research in the North Atlantic and Arctic regions. The Institute for North Atlantic Studies of the University of New England, referred to as UNE North, will be based in Portland, officials said. U.S. Sen. Angus

USARC's daily "Arctic Update" Newsletter

www.arctic.gov