



STATE OF THE ARCTIC

16 - 19 March 2010 • Hyatt Regency Miami



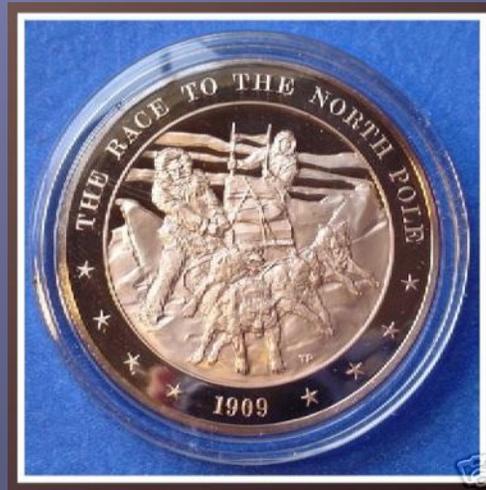
ARDEN BEMENT

Director
National Science Foundation

The U.S. in the Arctic:
from
Taking up the Challenge of “Farthest North”
to
Furthering Our Understanding of a Sustainable Arctic



Barrow, Alaska, signal station,
First International Polar Year 1881
Credit: NOAA



Studying polar bear response to sea-ice loss
Photo by Cristine Galvan - polartrec.com

Remarks by
Arden L. Bement, Jr.
Director,
U.S. National Science Foundation

Evidence of Change

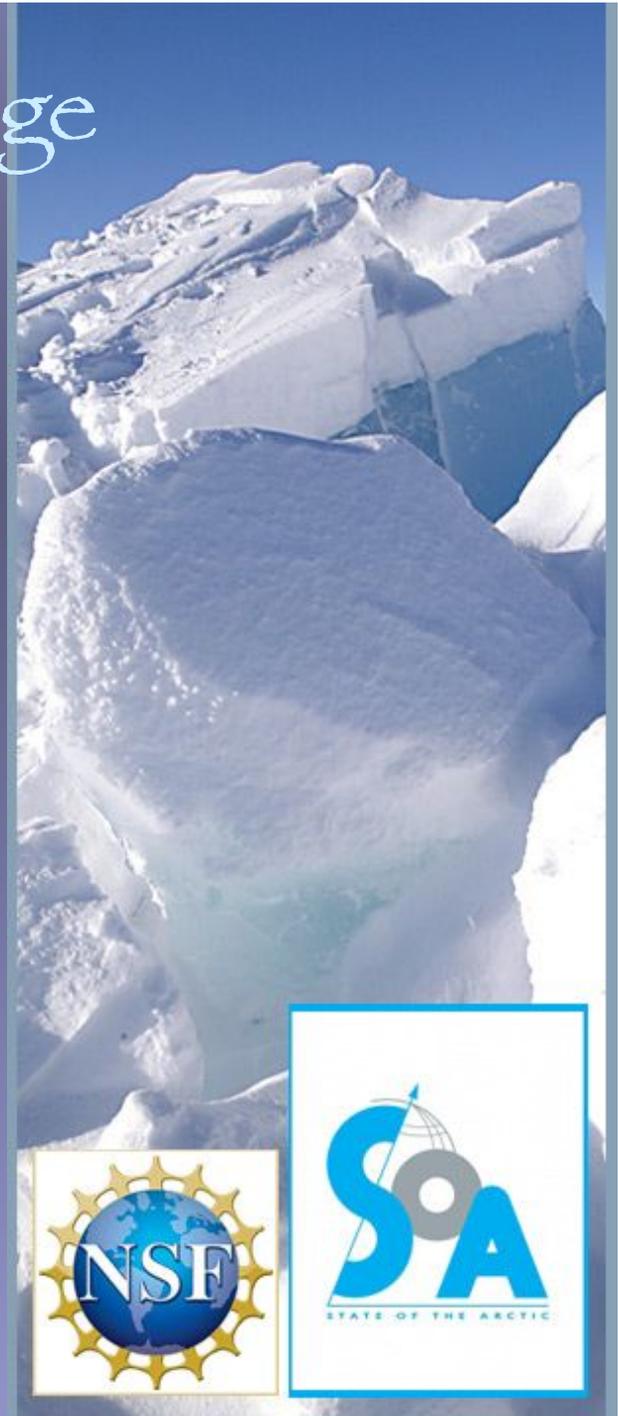


August 1941
Image: William Field



August 2004
Image: Bruce Molnia

Alaska's Muir Glacier



The U.S. as an Arctic Nation

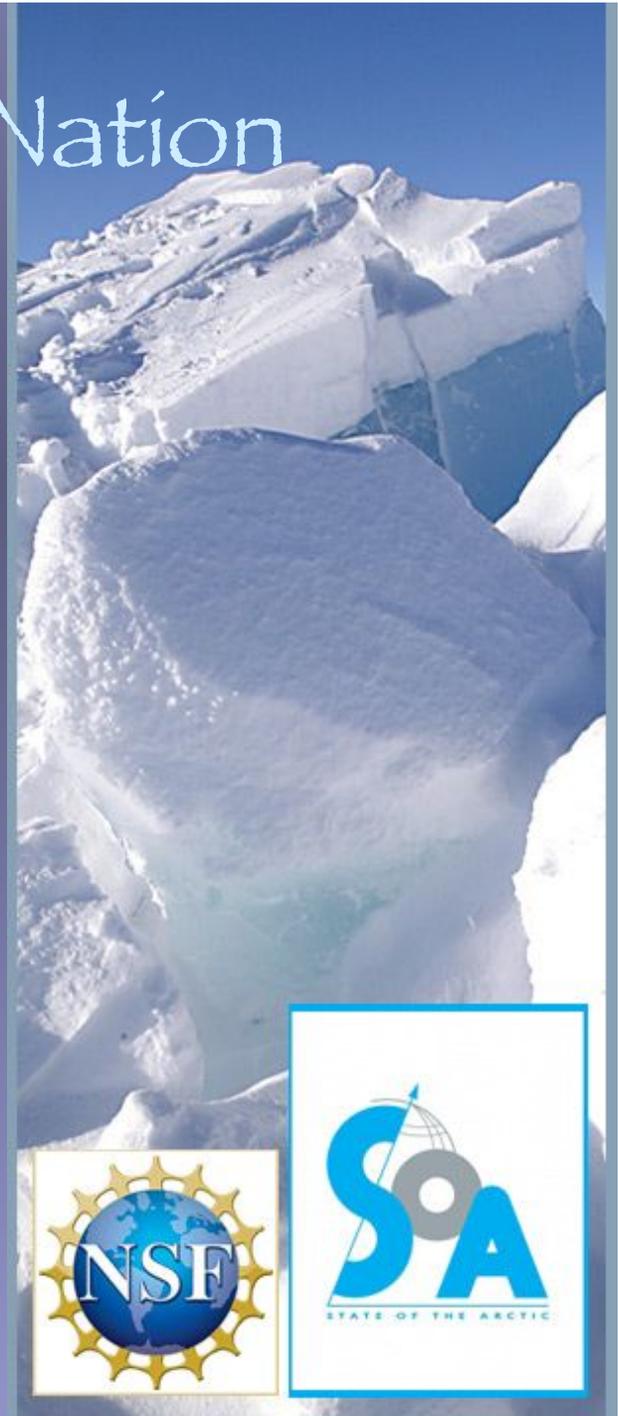
According to a 2009 Presidential Directive:

“The United States is an Arctic nation, with varied and compelling interests in that region. “

Under the Directive, it is the policy of the United States to:

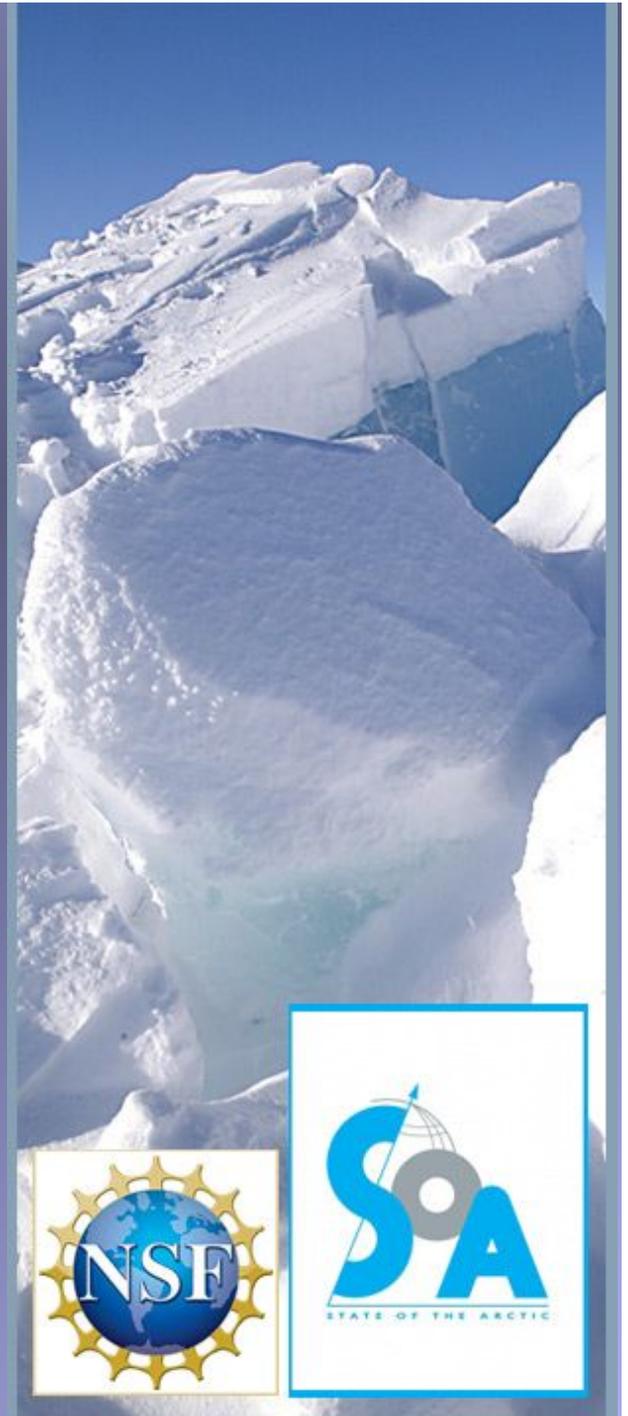
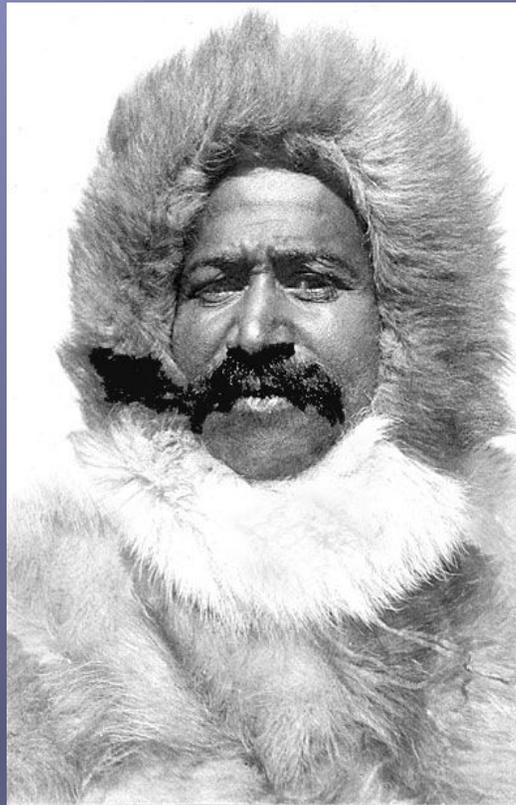
- Protect the Arctic environment and conserve its biological resources;
- Ensure that natural resource management and economic development in the region are environmentally sustainable;
- Strengthen institutions for cooperation among the eight Arctic nations (the United States, Canada, Denmark, Finland, Iceland, Norway, the Russian Federation, and Sweden);
- Involve the Arctic's indigenous communities in decisions that affect them; and
- Enhance scientific monitoring and research into local, regional, and global environmental issues

<http://www.fas.org/irp/offdocs/nspd/nspd-66.htm>



*“As I stood there
on the top of the
world and I
thought of the
hundreds of men
who had lost
their lives in the
effort to reach
[the North Pole],
I felt profoundly
grateful that I
had the honor of
representing my
race” ~*

Matthew
Henson



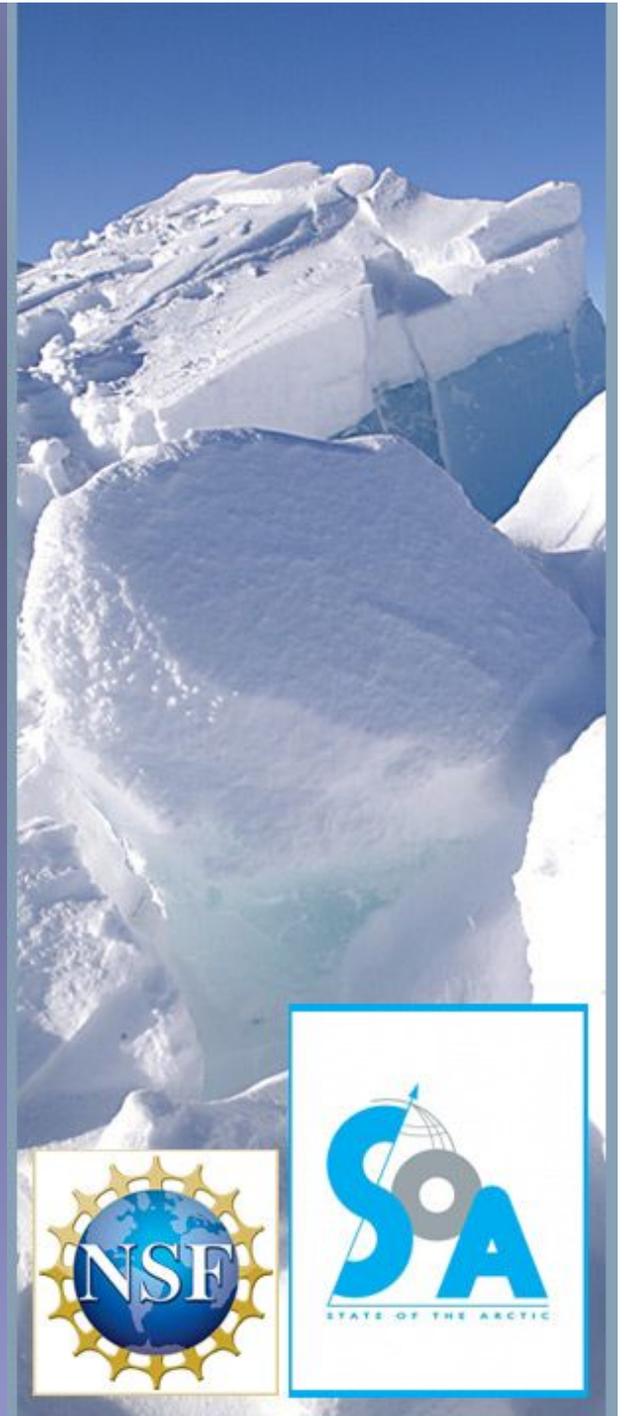
“I believe Inuit can provide the rest of society with useful and timely information because we are at the forefront where the impacts and effects of climate change are felt first and may be the most severe.”

~ Jose A. Kusugak,
president of the Inuit
Tapiriit Kanatami



From the
foreword to
*The Earth is
Faster Now:
Indigenous
Observations of
Arctic
Environmental
Change*

http://www.arcus.org/publications/downloads/earth_faster_front.pdf

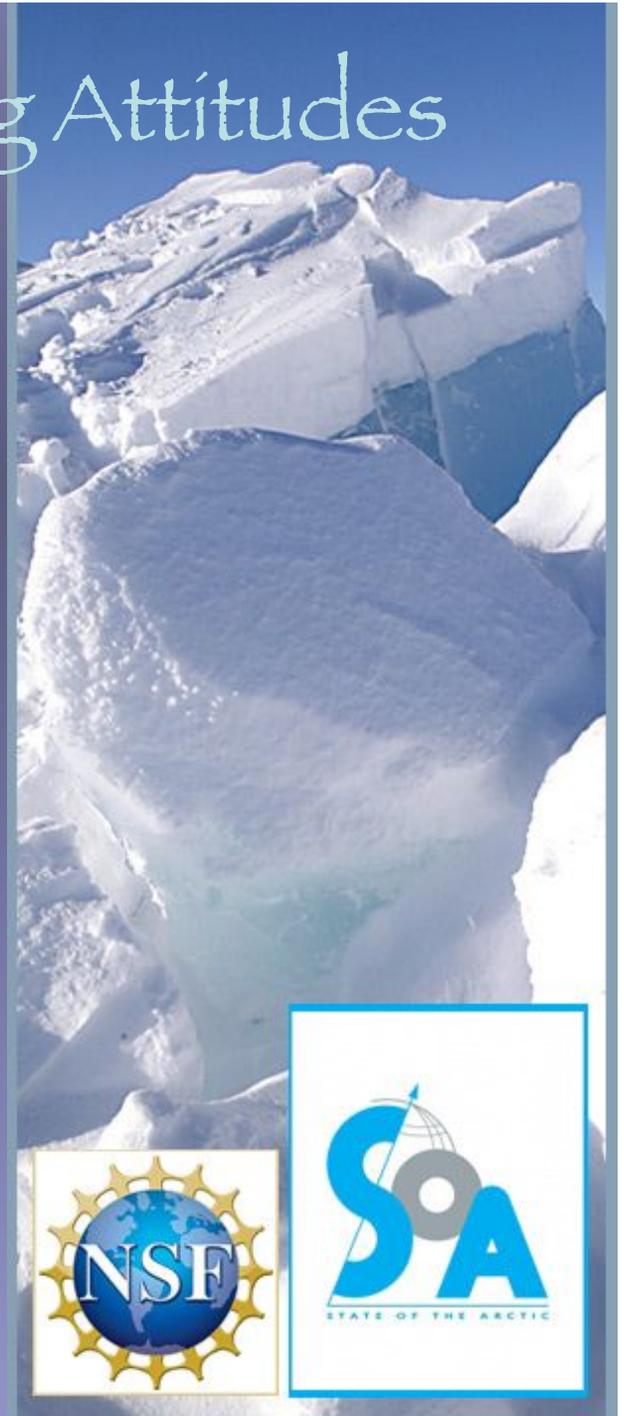


A Changing Arctic, Evolving Attitudes

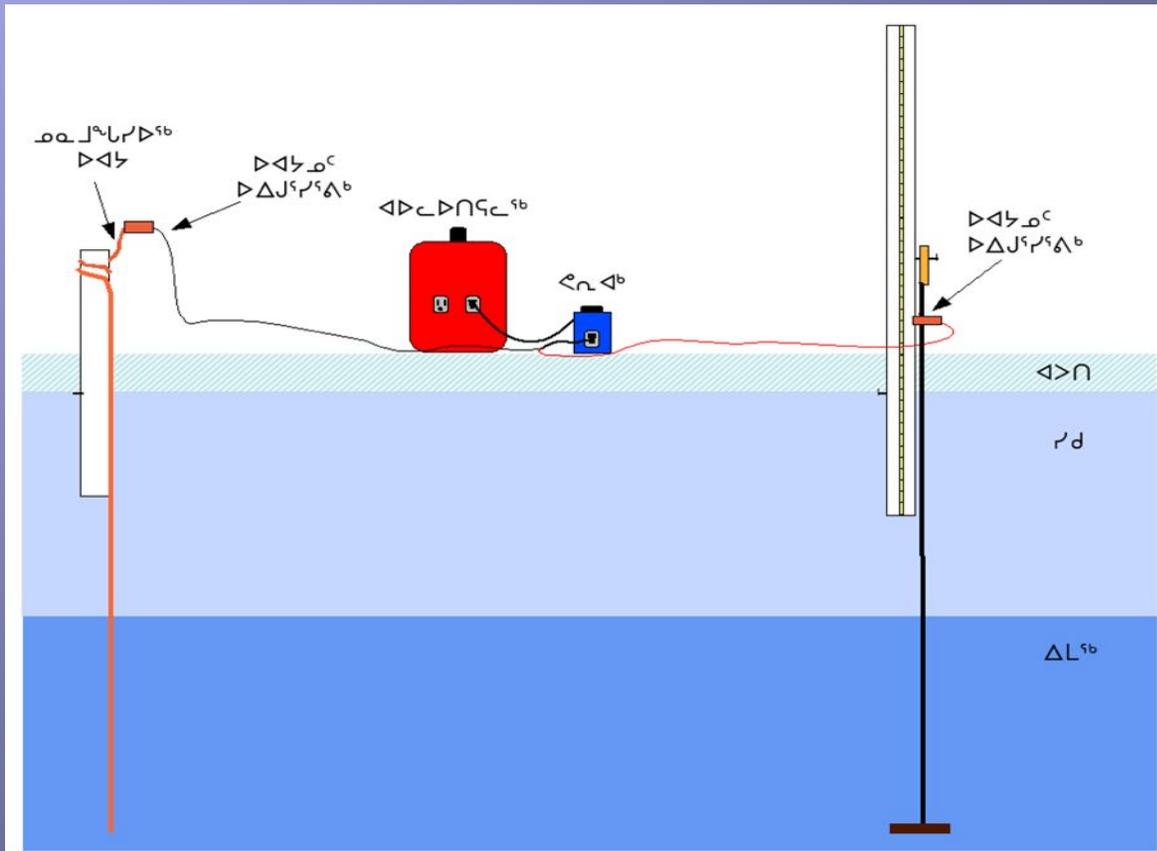
Attitudes toward the Arctic and its peoples have changed from the “conquest of harsh nature” to an emphasis on sustainability and inclusion of Native Peoples in science in projects such as the NSF-funded Exchange for Local Observations and Knowledge of the Arctic.



Exchange for Local Observations
and Knowledge of the Arctic

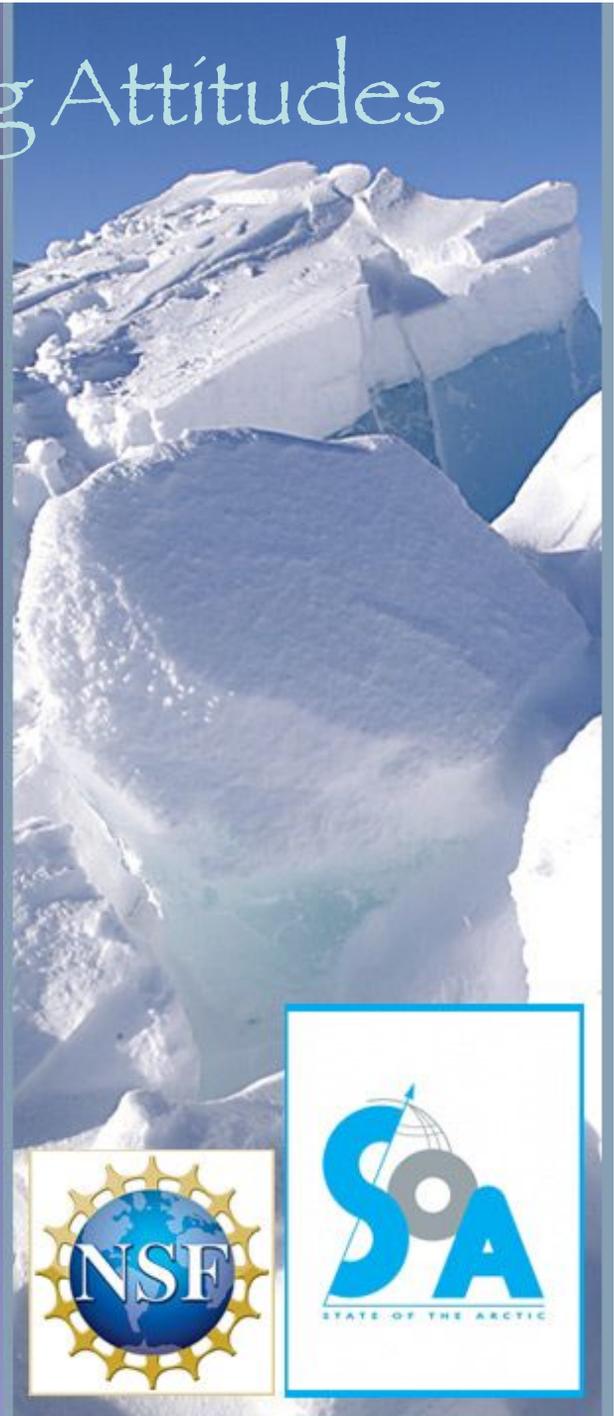


A Changing Arctic, Evolving Attitudes



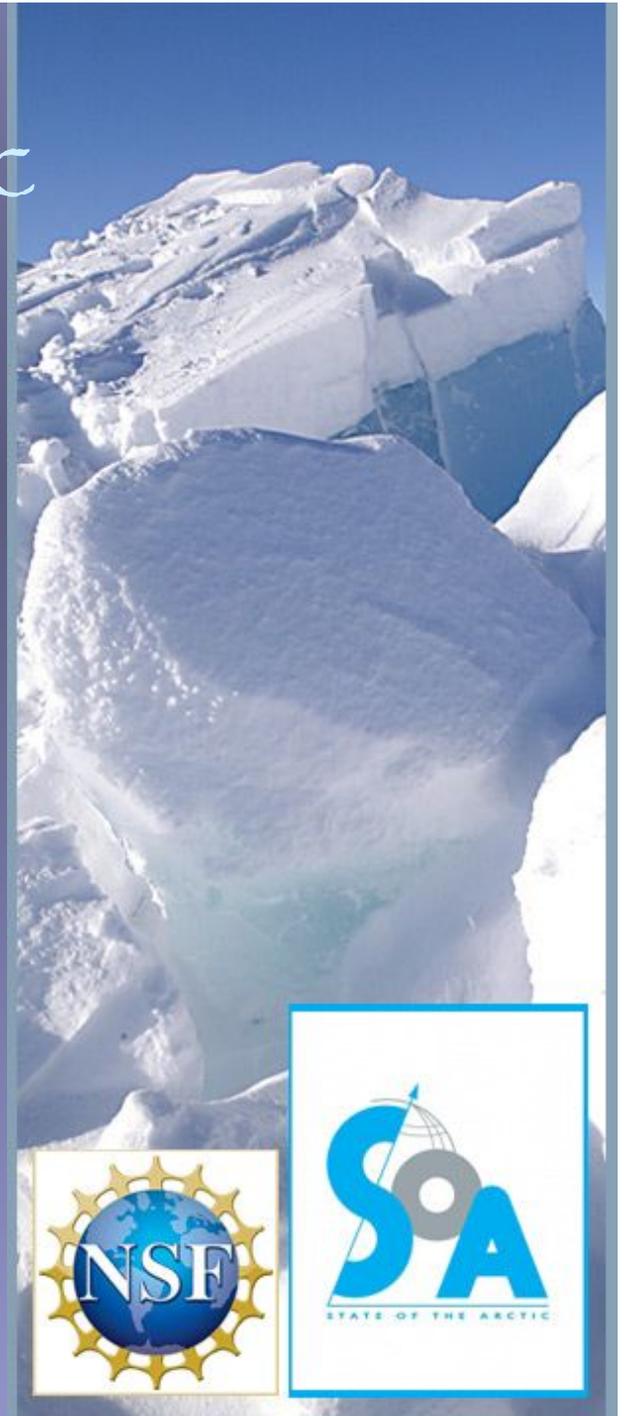
Instructions in Inuktitut for using a generator to facilitate sea ice measurements.

From a handbook on ice measurements developed by researchers Andy Mahoney and Shari Gearheard



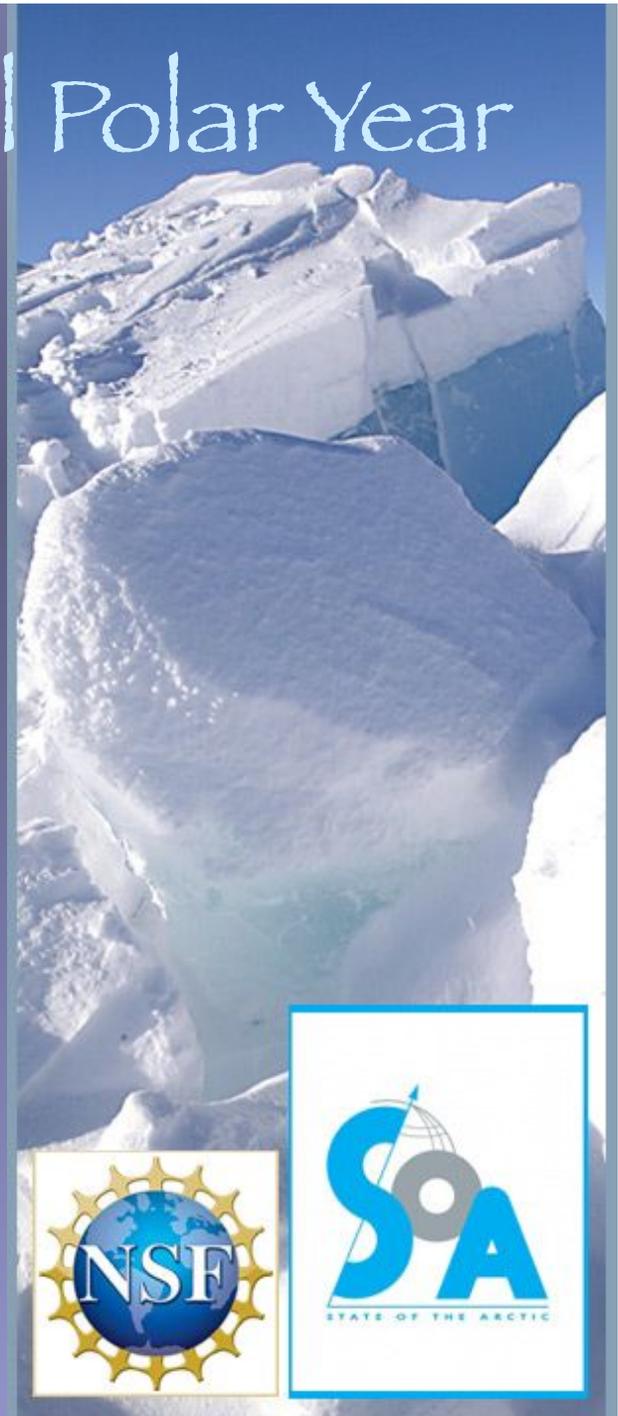
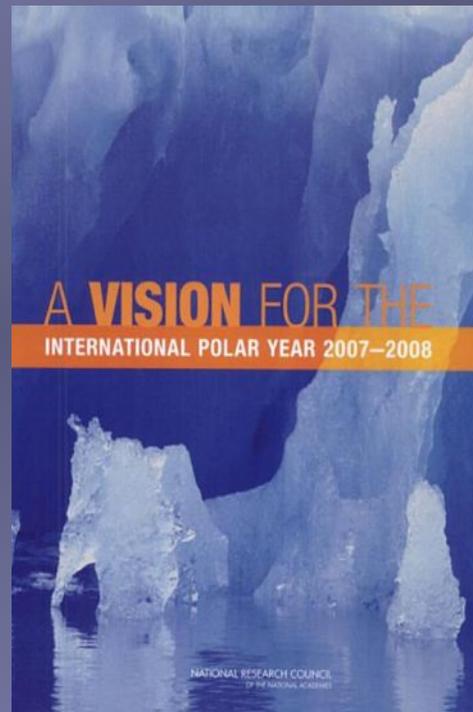
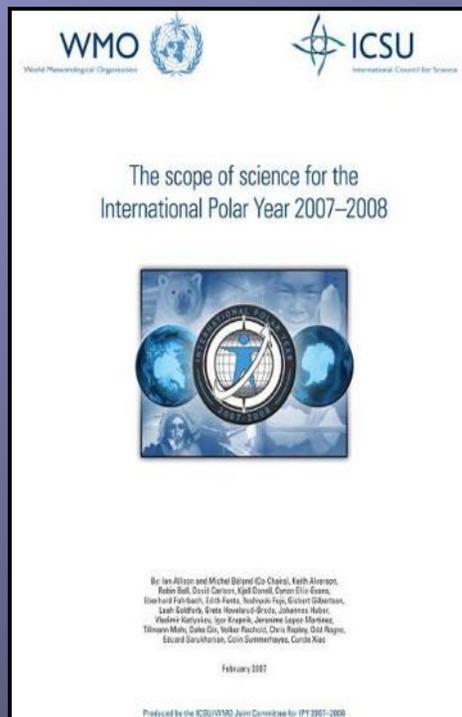
NSF in the Arctic

- Under the terms of the Arctic Research and Policy Act of 1984, NSF is responsible for coordinating the nation's Arctic research policy. NSF's Director chairs the Interagency Arctic Research Policy Committee (IARPC).
- The Division of Arctic Sciences in NSF's Office of Polar Programs manages a \$106 million investment (in FY 2010) in Arctic research, infrastructure and education programs.
- NSF's Arctic research infrastructure includes stations in Alaska, Greenland, Norway, Russia and an automated station at the North Pole itself.



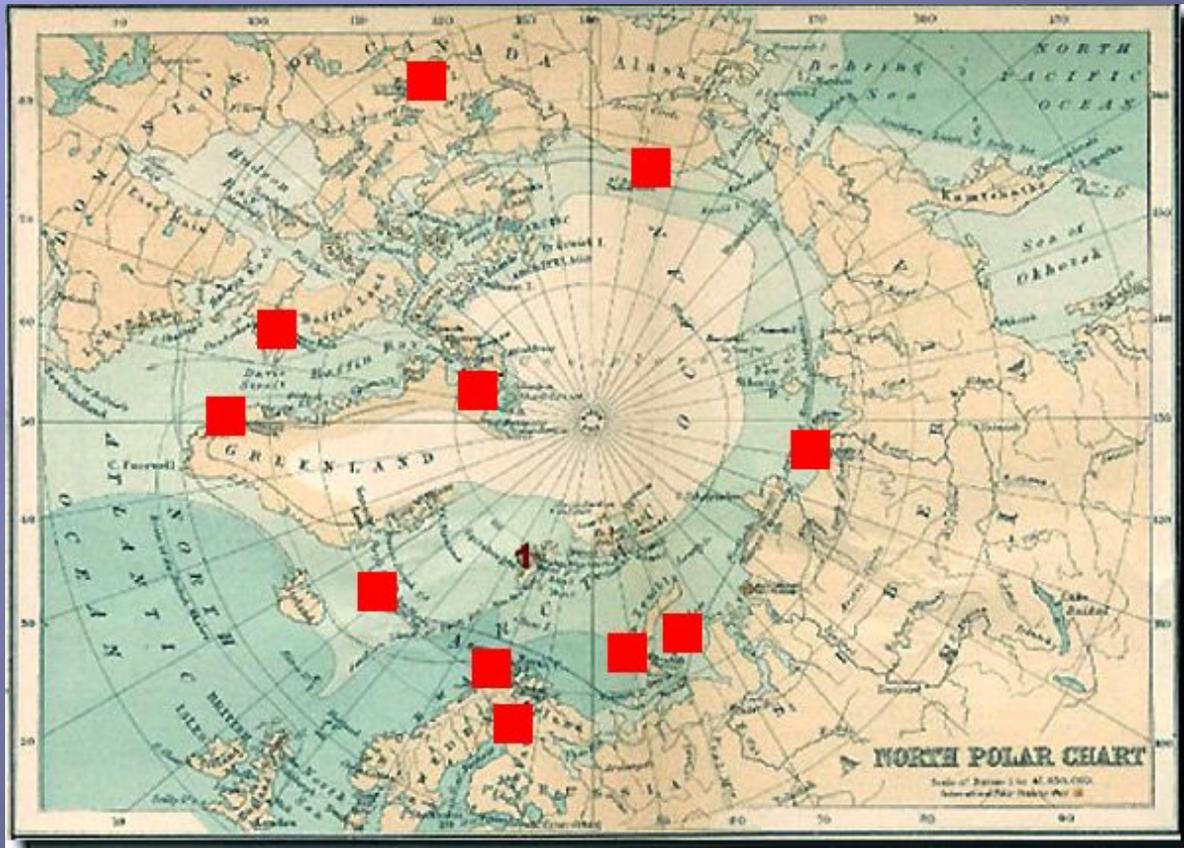
NSF and the International Polar Year

Due to its unique role in U.S. Arctic research, and as the manager of the U.S. Antarctic Program, NSF was chosen as the lead U.S. government agency for the Fourth International Polar Year (2007-2008)

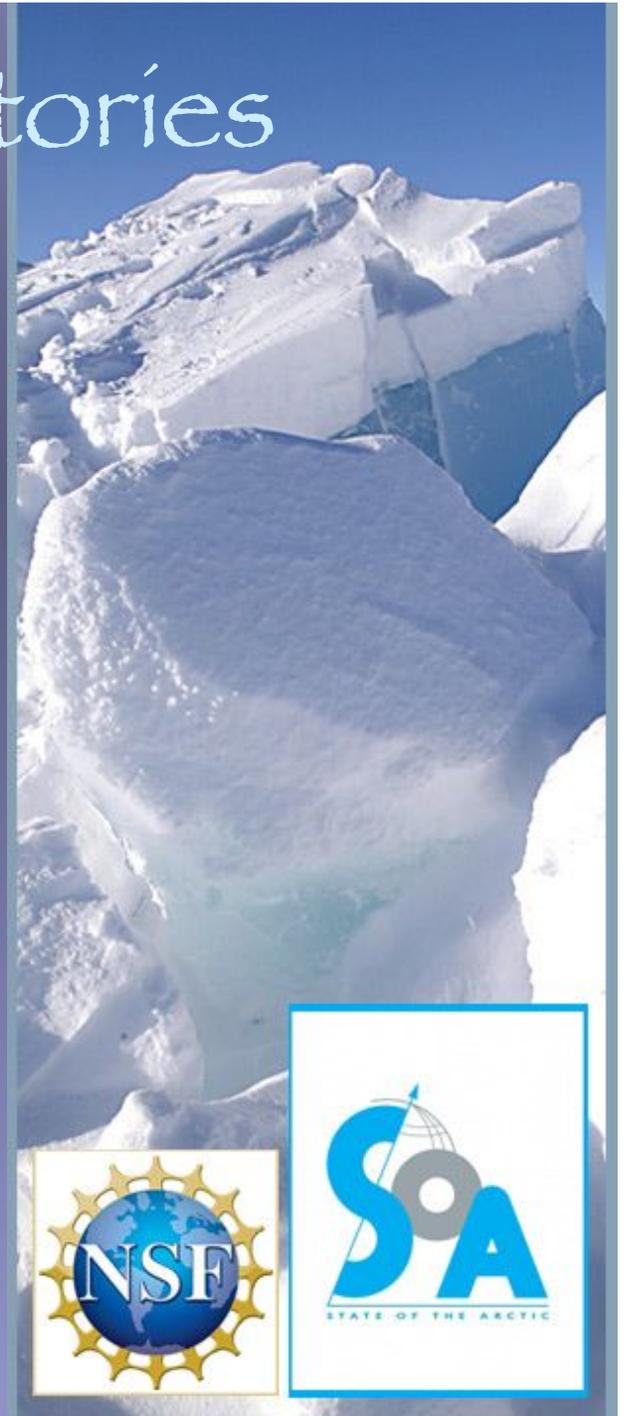


First IPY Observatories

A Sense of Scale

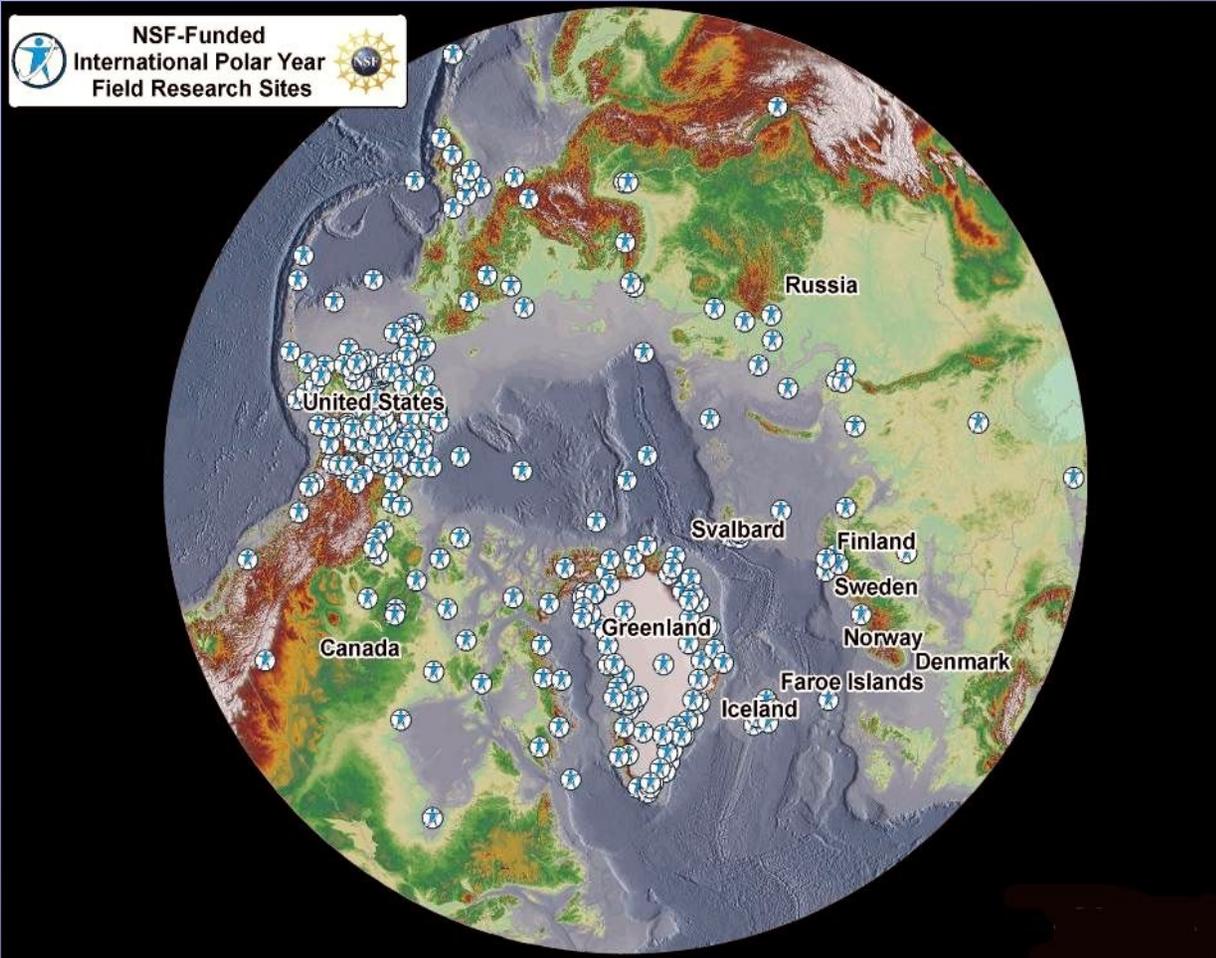


A map of the original network of IPY Arctic observing Stations

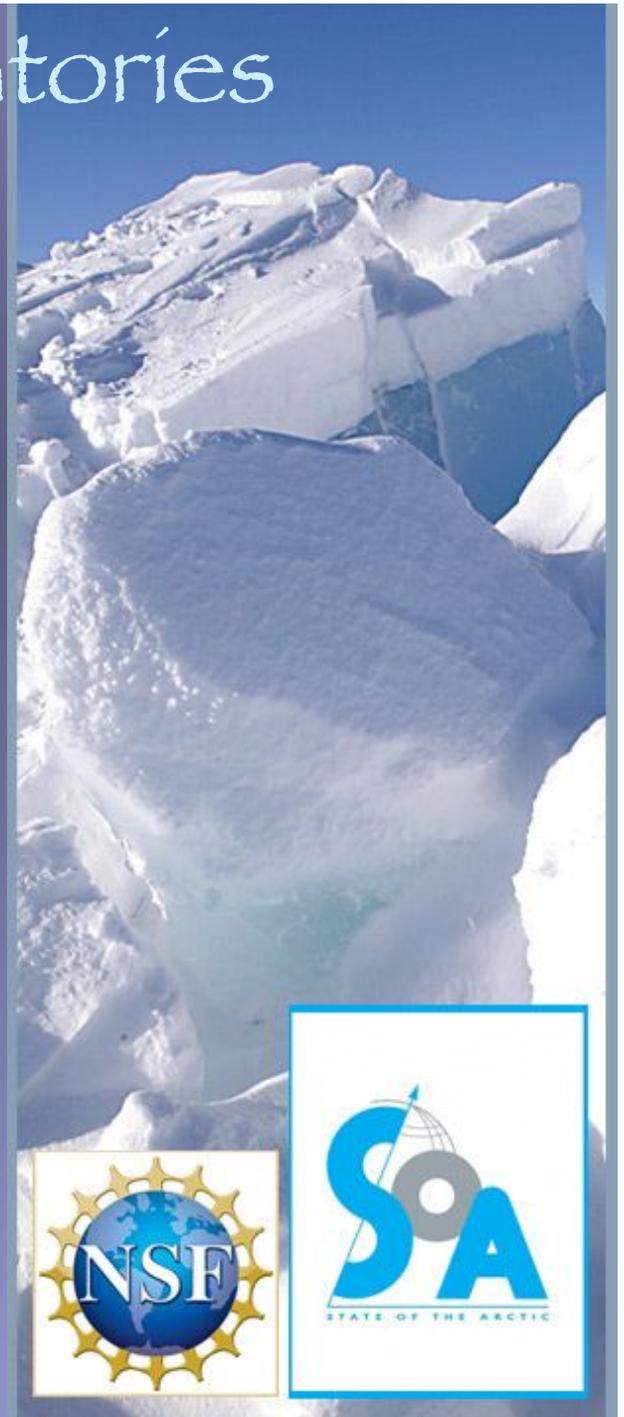


Fourth IPY Observatories

A Sense of Scale



IPY 2007-2008 Arctic research sites

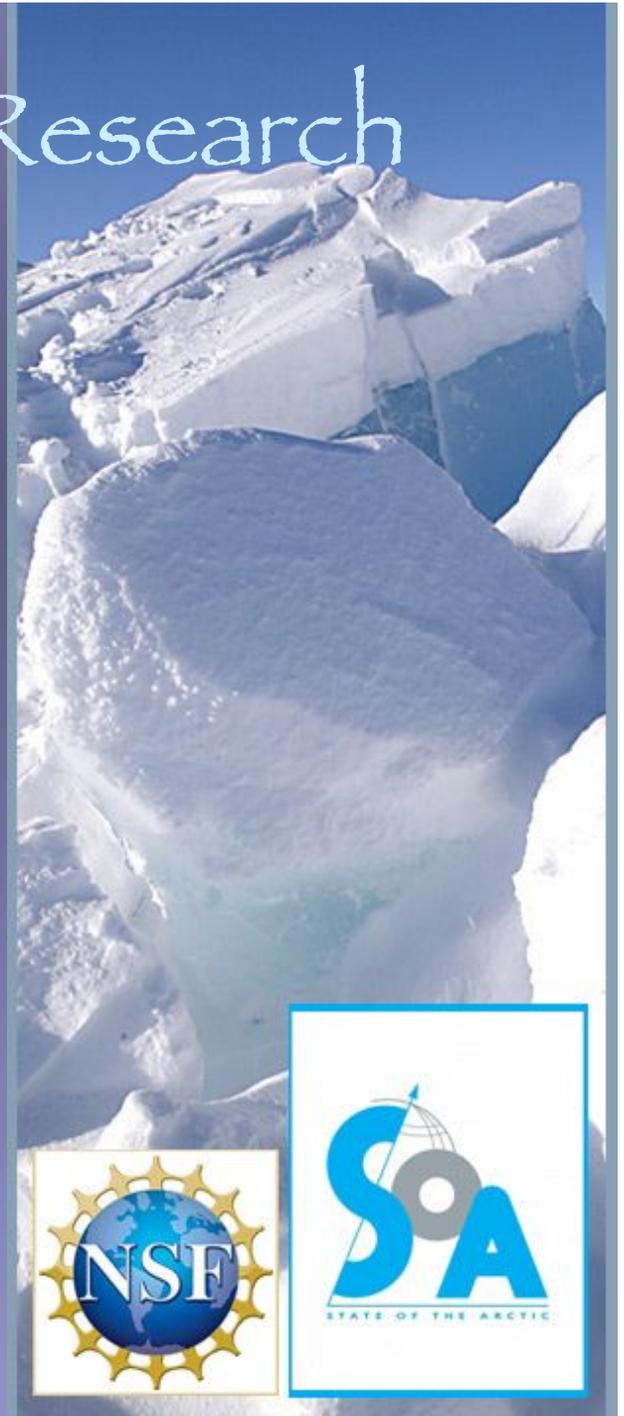


Highlights of NSF IPY Research

- The U.S. collaborated with 27 of the 60 nations involved in IPY

NSF's research IPY research priorities centered around several themes:

- The Dynamics of Ice Sheets
- Development of the Arctic Observing Network
- Human and Biotic Systems in Polar Regions
- Adaptations to Life and Extreme Cold and prolonged Darkness
- Understanding Environmental Change in the Polar Regions
- Education and Outreach



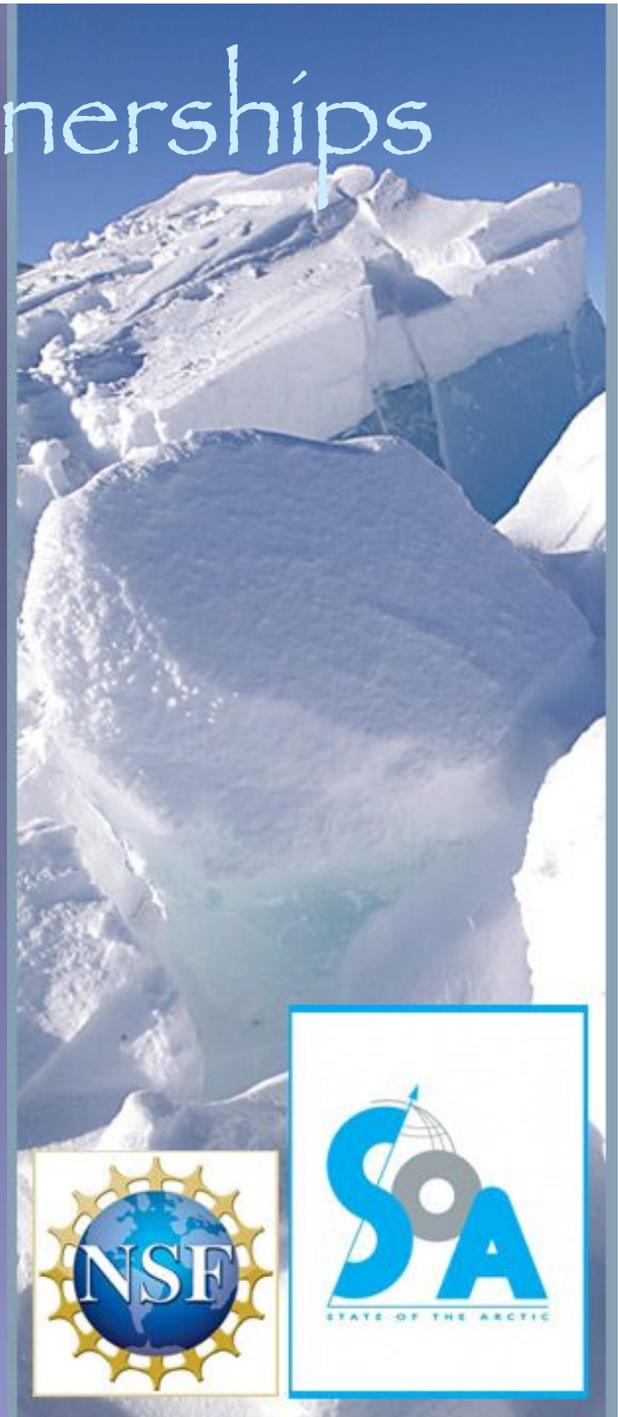
Large-Scale IPY Partnerships



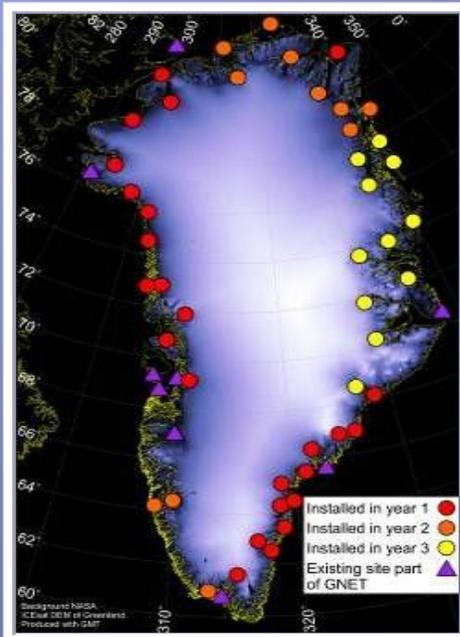
Top: Lake El'gygytgyn (El-gee-git-kin) Sediment Coring: a 3.6-million-year climate record. Roughly 400 meters of sediment core recovered in 2009.

Bottom: The North Eemian (NEEM) ice core drilling project sampled a warm period 130,000-115,000 years in the past

Involved international partnerships with Austria, Belgium, Canada, China, Denmark, France, Germany, Iceland, Japan, the Netherlands, Russia, Sweden, South Korea, and the United Kingdom.



Major IPY Partnership Projects

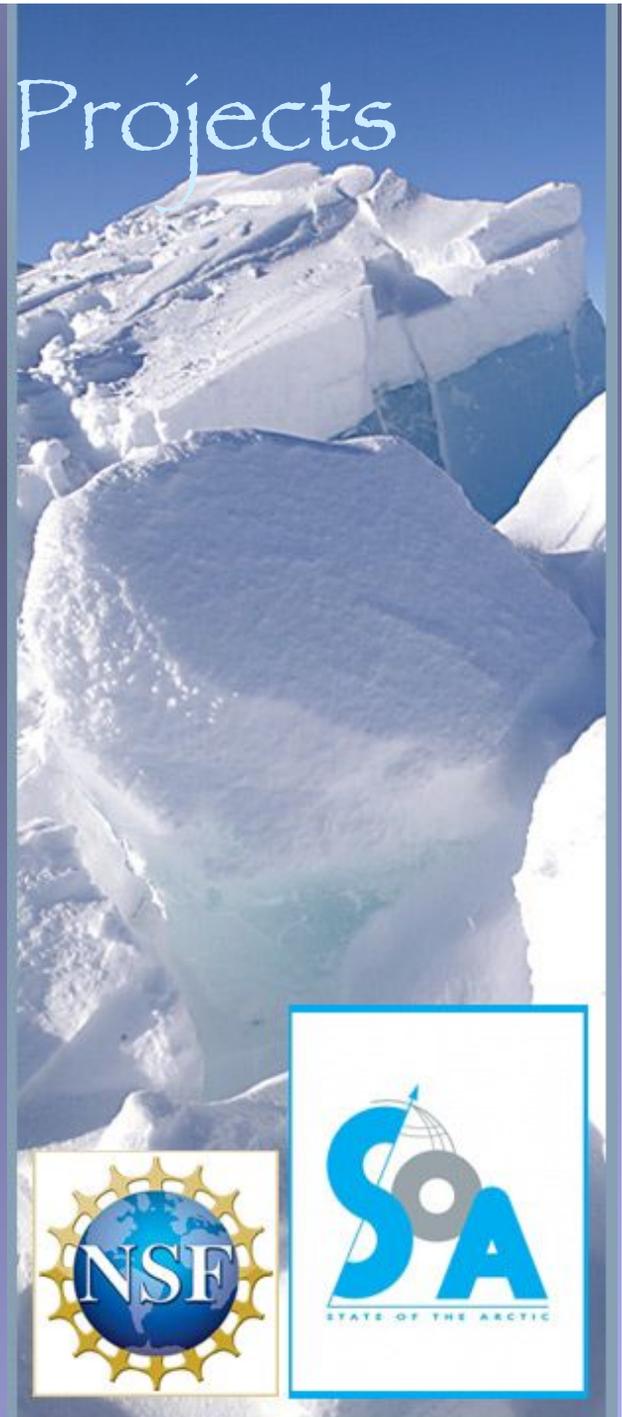


POLEnet sensors
in Greenland

The Polar Earth Observing Network (POLEnet) is an Arctic and Antarctic network of GPS stations that measures crustal uplift from loss of ice-sheet mass.

POLEnet data, combined with satellite measurements, will help predict sea-level rise.

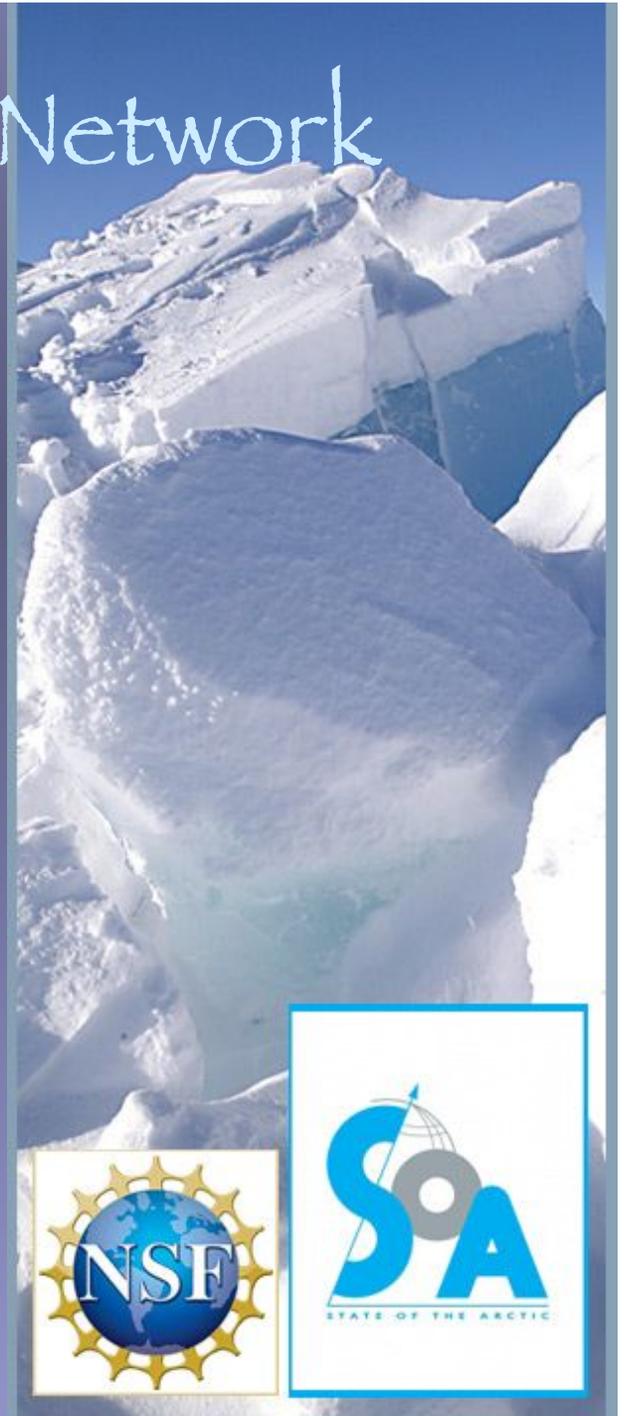
A joint project of 28 countries, including Australia, Canada, China, Denmark, Germany, Italy, Japan, Sweden, Ukraine, and the U.S.



The Arctic Observing Network



The AON Network measurement locations on a polar projection as of the end of 2009. Observation sites, moorings, and the general region of drifting buoys are assigned a symbol unique to each investigator.



AON in the International Context

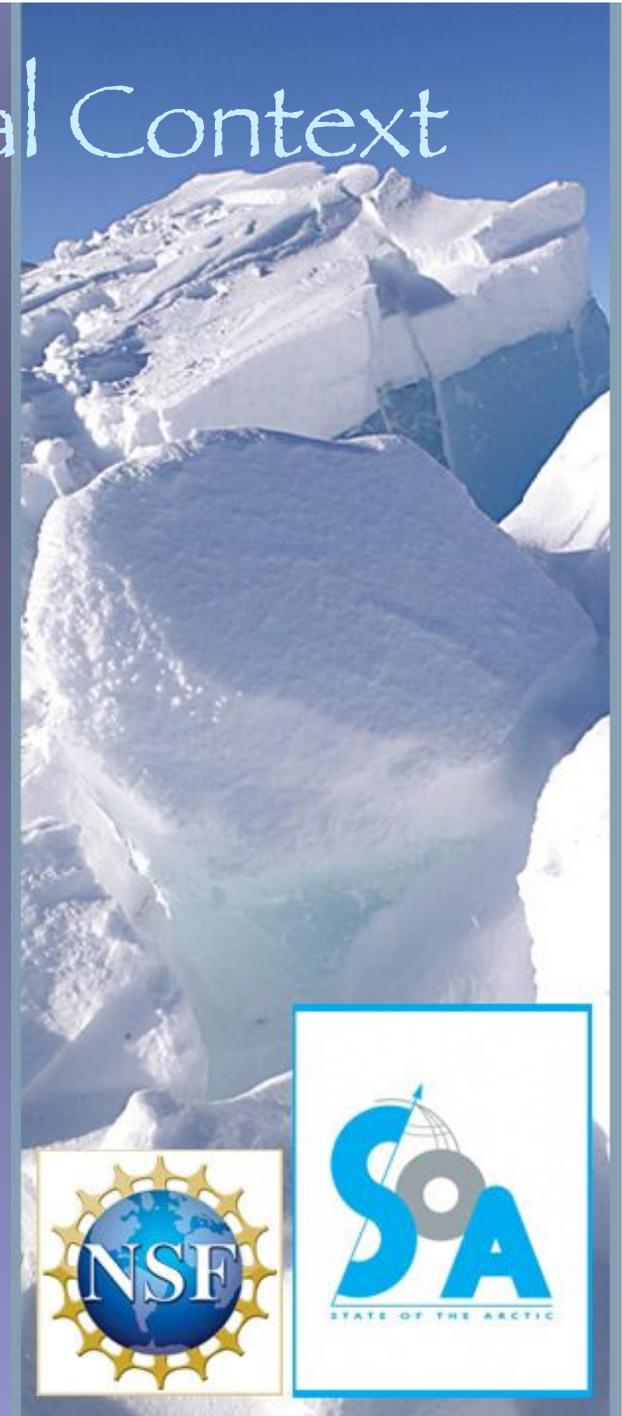


Top: Talea Mayo, a graduate student makes atmospheric chemistry measurements at Barrow, Alaska as part of the Atmosphere- Sea Ice- Snowpack (OASIS) project.



Left: Matthew Sturm and colleague with magnaprobos for measuring snow dep as part of the SNOWnet project.

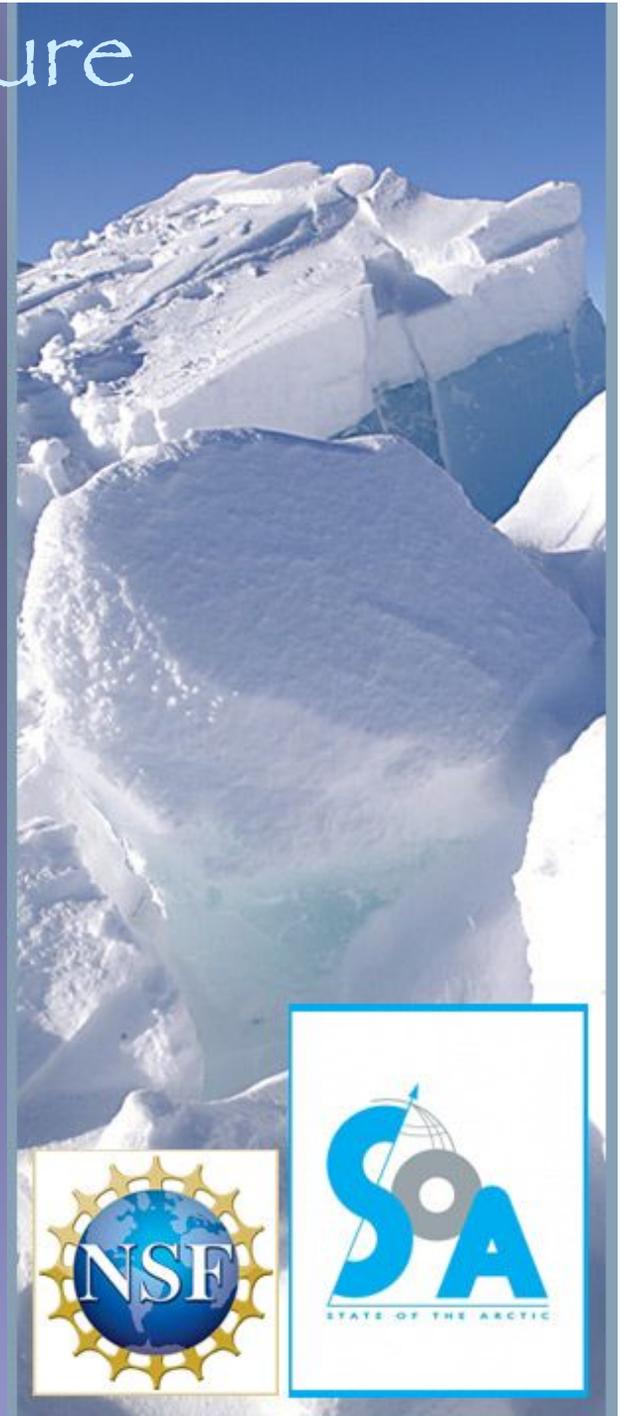
AON projects and the data they obtain will contribute to the international Sustaining Arctic Observing Networks (SAON) effort that is underway in response to the Arctic Council's Tromsø Declaration.



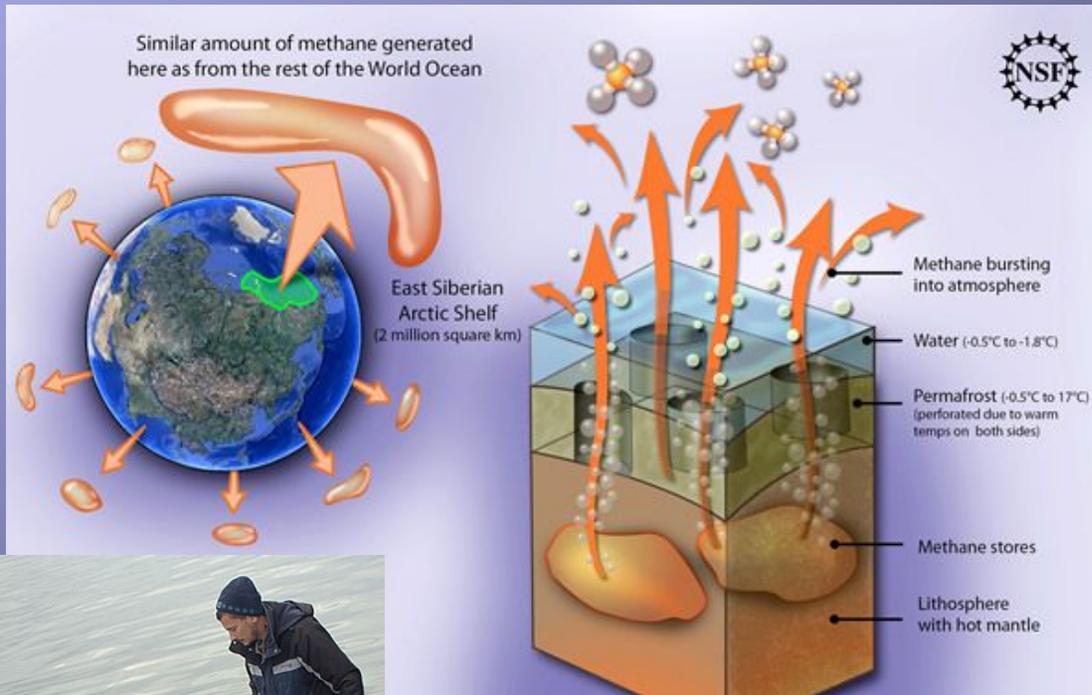
Arctic Research Infrastructure Investment



Scheduled for deployment in 2014, the 254-foot *Sikuliaq* will be one of the most advanced university research vessels in the world, capable of breaking ice up to 2.5 feet thick.

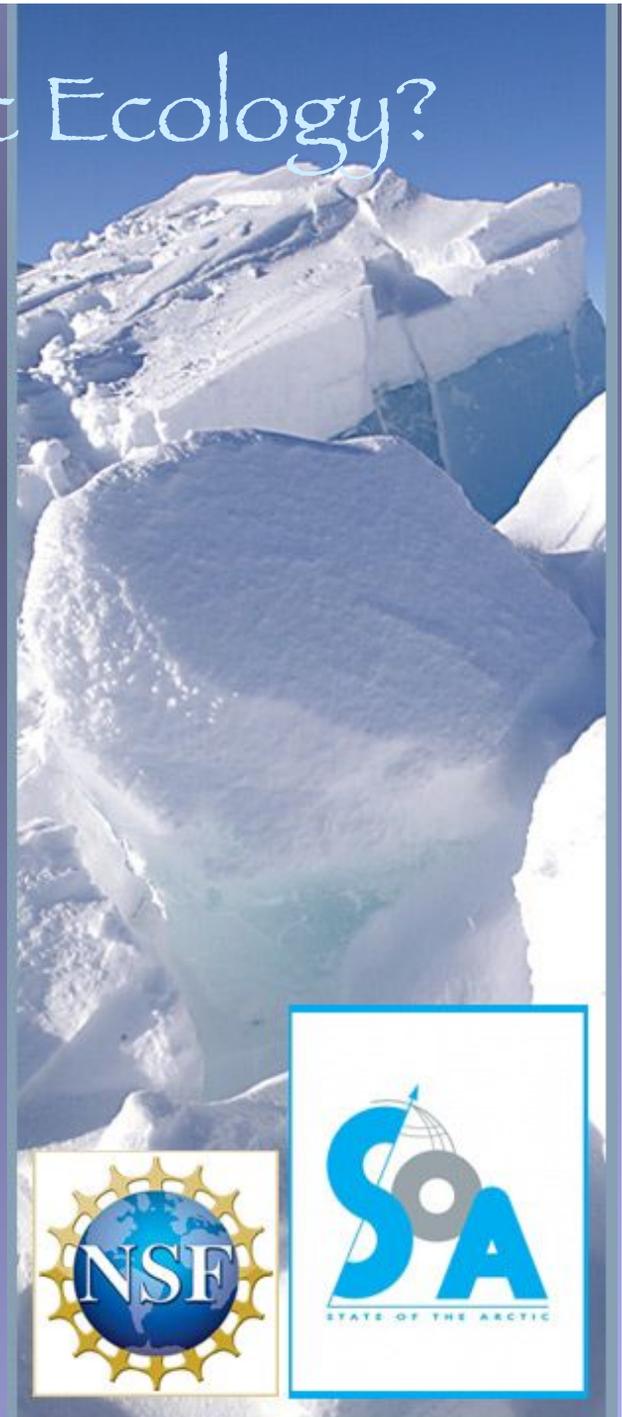


A Movement to a New Arctic Ecology?

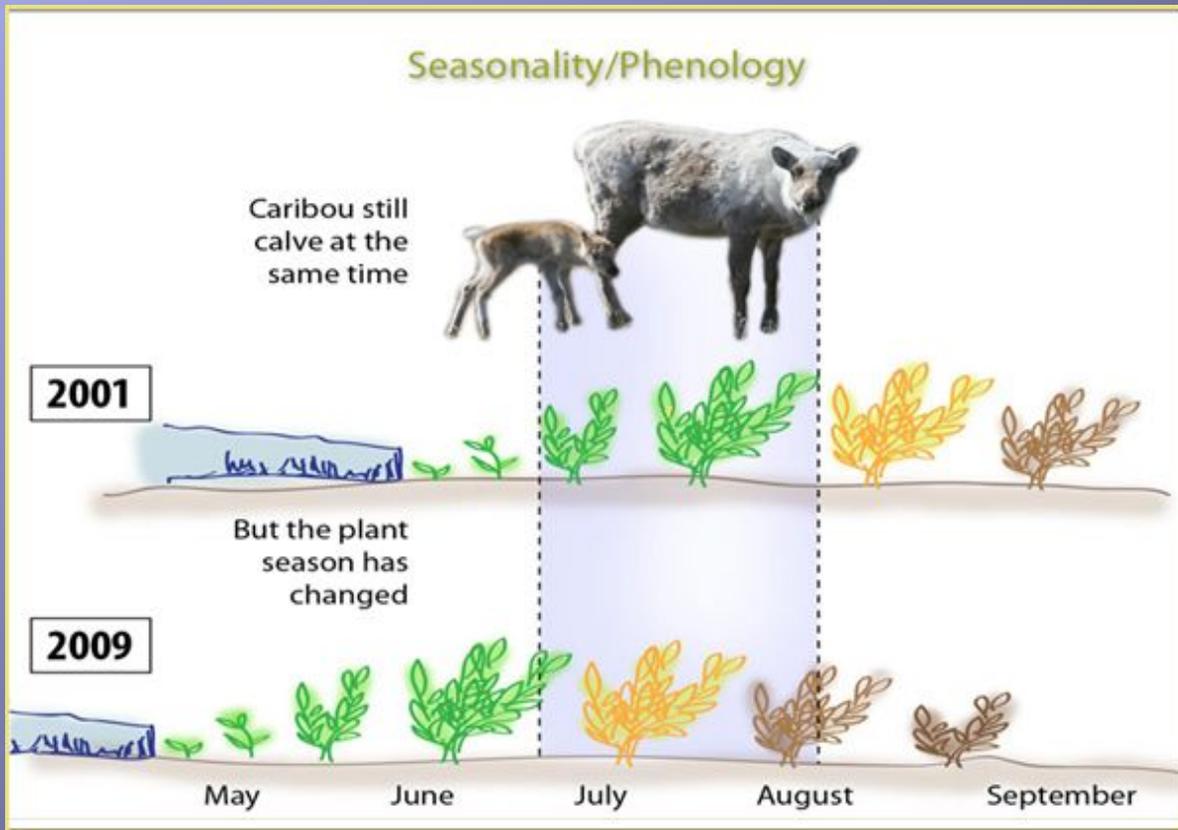


Zina Deretsky / National Science Foundation

Recently published NSF-funded research indicates that a section of the Arctic Ocean seafloor that stores vast amounts of frozen methane shows signs of instability.



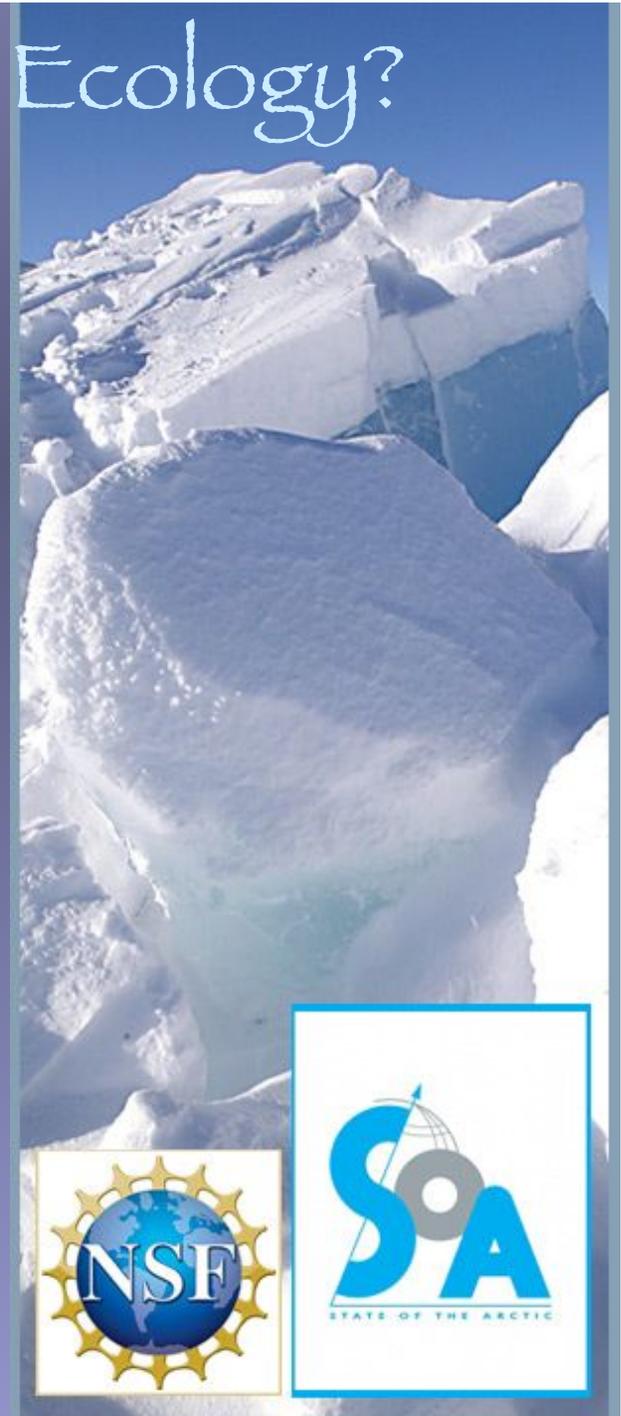
A Movement to a New Arctic Ecology?



Zina Deretsky / National Science Foundation

Changes are already being observed that will disturb existing ecological balances, such as those between Greenland's caribou calving and vegetation peaks

Collaborators: E. Post, M. Forchhammer, S. Rysgaard



A Movement to a New Arctic Ecology?

Jeremy Mathis
takes samples



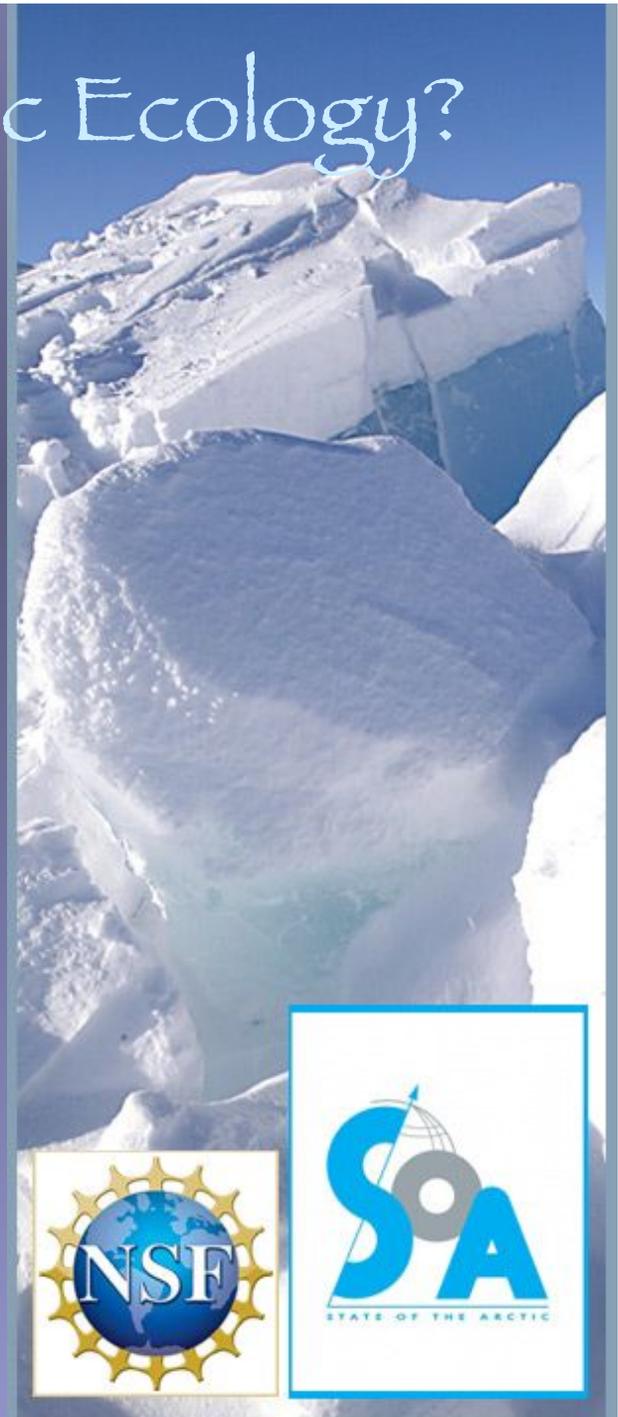
Acidification affects creatures like this sea butterfly on which salmon feed.



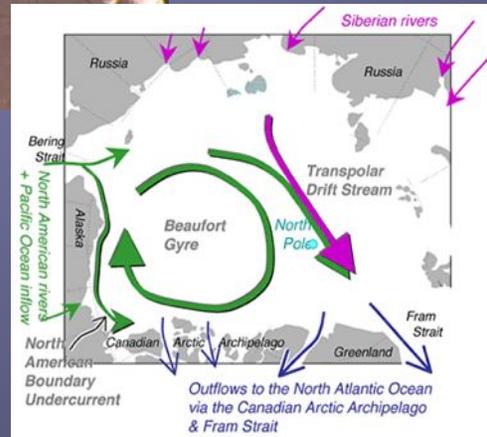
Photo: Russ Hopcroft,
UAF School of Fisheries
and Ocean Sciences.

NSF has issued a cross-directorate solicitation to help understand the processes and effects of ocean acidification, including acidification of the Arctic Ocean.

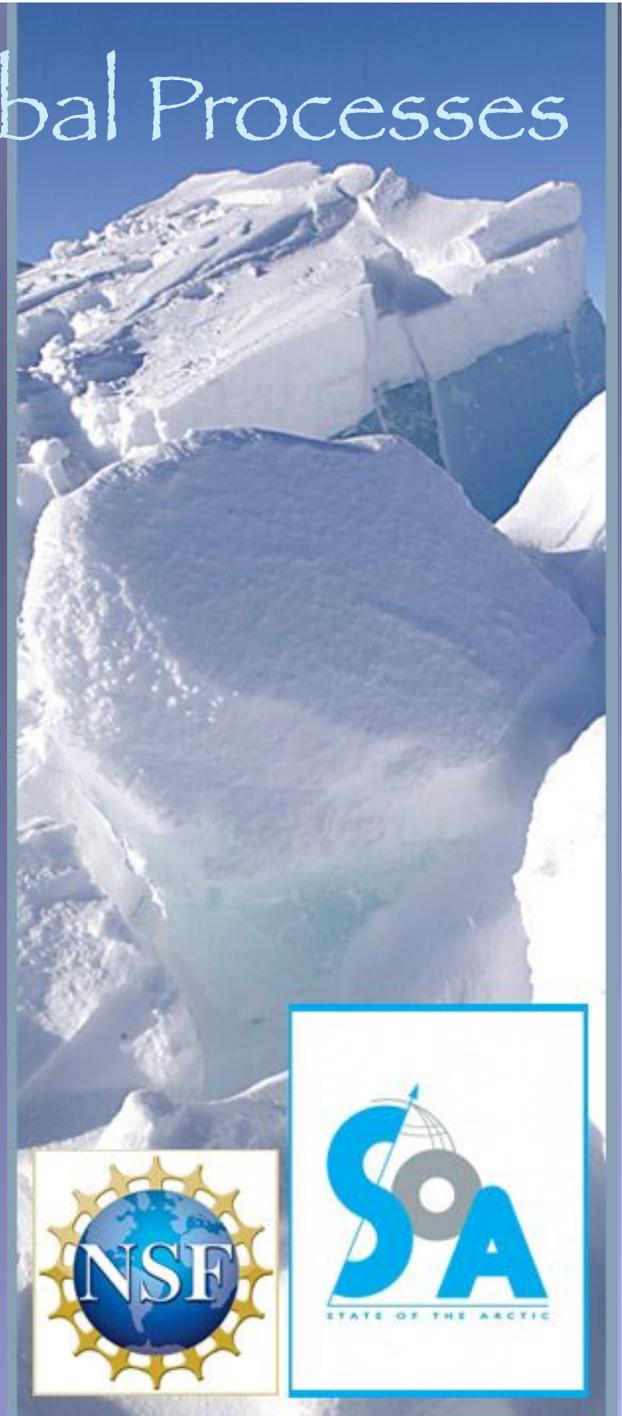
http://www.sfos.uaf.edu/newsletter/fall09/ocean_acidification.html



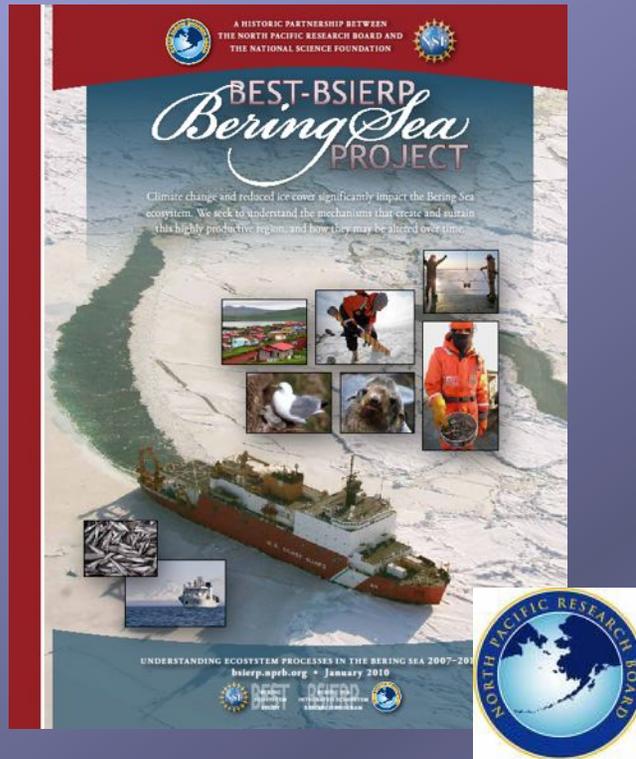
The Arctic as a Driver of Global Processes



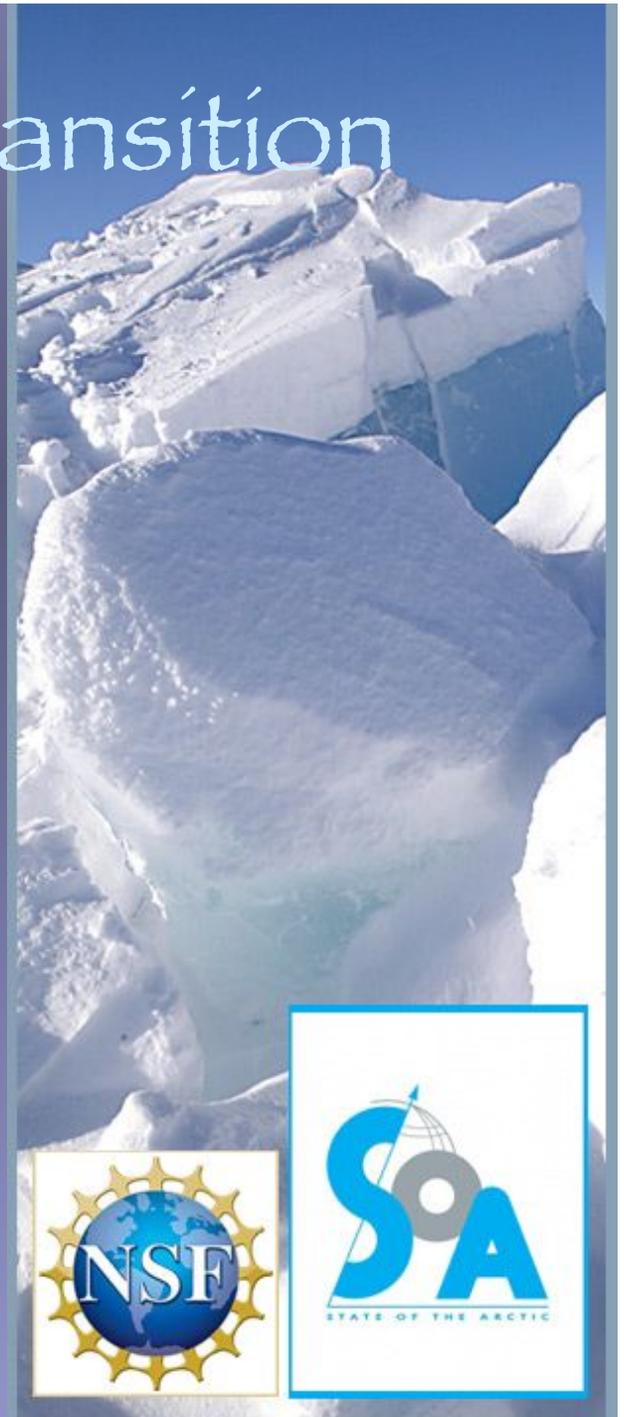
NSF's Freshwater Switchyard of the Arctic Ocean project studies outflows of Russian and U.S. Rivers and how an increasing southward flow of "light" arctic water might stop the sinking of North Atlantic waters that drive the global ocean circulation.



Action in a Time of Transition



The Bering Ecosystem Study (BEST), is a partnership between NSF and the North Pacific Research Board (NPRB) to support a comprehensive and vertically integrated investigation of the Bering Sea ecosystem during 2007-2012.



Making Sustainability an NSF Priority



NSF is poised to develop in the 2011 fiscal year, an investment portfolio called Science, Engineering, and Education for Sustainability (SEES)

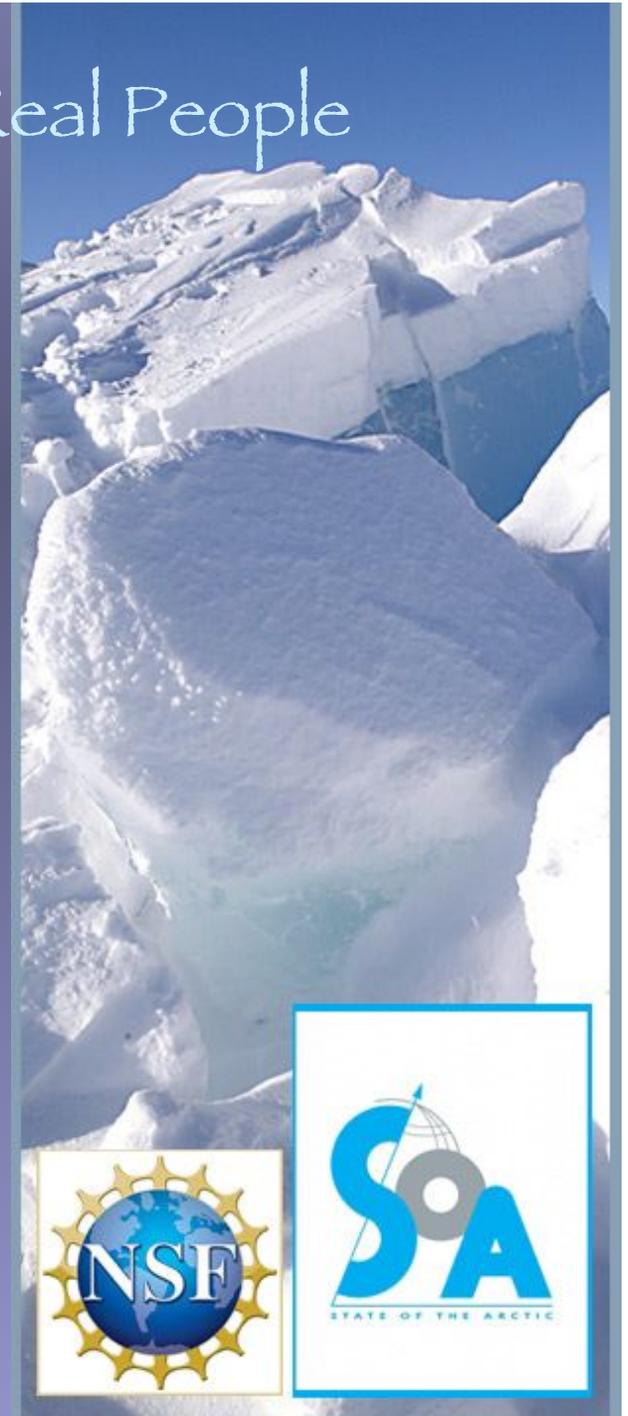
SEES is designed to generate the discoveries and capabilities in climate and energy science and engineering needed to inform societal actions that lead to environmental and economic sustainability.

SEES will support research and education programs that span ten NSF directorates and offices.



Real problems, Real Science, Real People

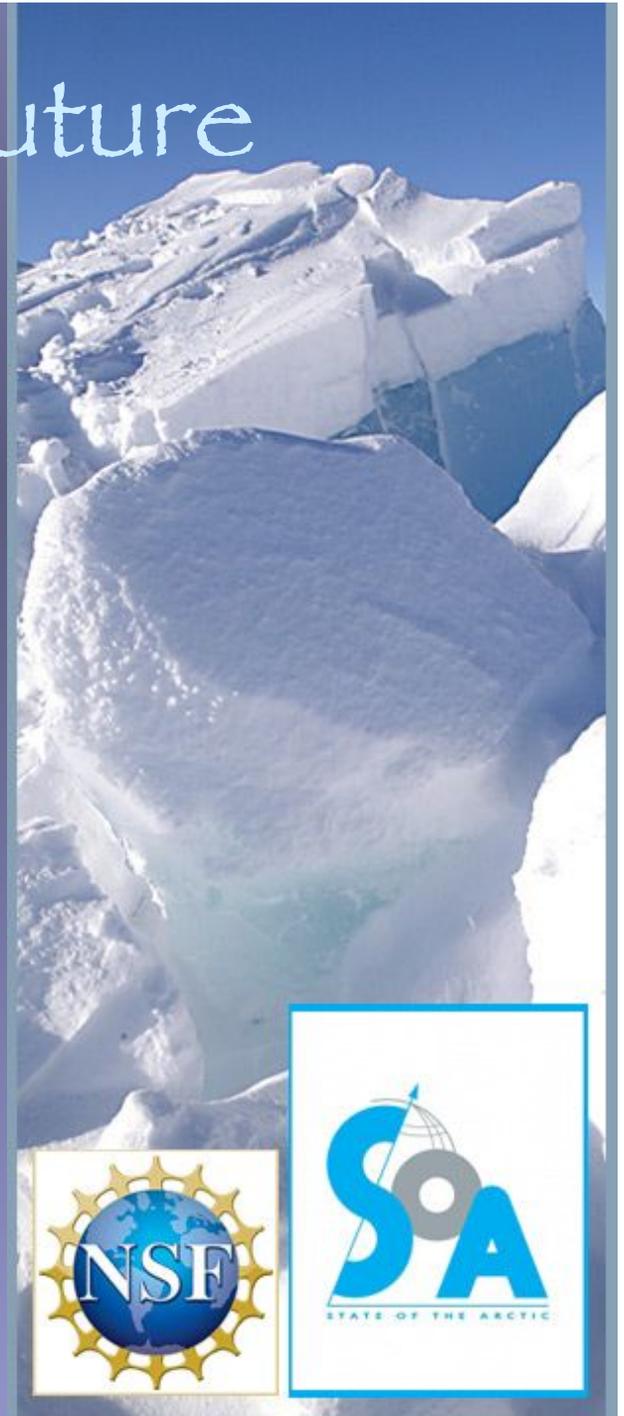
“Climate change is not just a theory to us” - Aqqaluk Lynge, former president Inuit Circumpolar Council.



Change and the Future



Change isn't limited to environmental systems. As the world becomes more connected and technologically based, Arctic people also become more connected, with all kinds of potential ramifications.



Thank You / Quyaana



