

A VISION FOR INTERNATIONAL POLAR YEAR 2007-2008

U.S. National Committee for the International Polar Year

Photo courtesy Jan Curtis, University of Wyoming

Environmental change and variability are part of the natural pattern on Earth. But environmental changes currently witnessed in the polar regions are in many cases more pronounced than changes observed in the mid-latitudes or tropics. The Arctic sea ice cover is decreasing; some ice shelves in Antarctica are retreating and thinning; glaciers are shrinking; and ecosystems are changing, for instance, with plants flowering at earlier times. These changes are having human impacts: some Alaskan villages have been moved to higher ground in response to rising sea levels, and thawing of permafrost is undermining roads and buildings in northern communities around the world.

Why should the vast majority of us, who live in the warmer regions of the Earth, care? The polar regions, while physically distant, are critical links in the global climate system. The polar oceans play a critical role in maintaining ocean currents that keep coastal Europe much warmer than it would be otherwise, and the sea ice cover modifies Earth's surface temperature by reflecting solar energy. These are just a few of many global connections. The polar regions also hold unique information of Earth's past climate history, and they are growing in economic and geopolitical importance. They are a unique vantage point for studies that will help scientists understand environmental changes in the context of past changes, which in turn will help us make informed choices for our future. The exploration of new

scientific frontiers in the polar regions also will lead to new discoveries, insights, and theories potentially important to all people. To better understand these and other questions, nations around the world are making plans to participate in International Polar Year (IPY) 2007-2008.

IPY 2007-2008: Scope and Objectives

At its most fundamental level, IPY 2007-2008 is envisioned to be an intense, coordinated field campaign of polar observations, research, and analysis that will be multidisciplinary in scope and international in participation. IPY 2007-2008 will provide a framework and impetus to undertake projects that normally could not be achieved by any single nation. It allows us to think beyond traditional borders—whether national borders or disciplinary constraints—toward a new level of integrated, cooperative science. A coordinated international approach maximizes both impact and cost effectiveness, and the international collaborations started today will build relationships and understanding that will bring long-term benefits. Within this context, IPY will seek to galvanize new and innovative observations and research while at the same time building on and enhancing existing relevant initiatives. IPY will serve as a mechanism to attract and develop a new generation of scientists and engineers with the versatility to tackle complex global issues. In addition, IPY is clearly an opportunity to organize an exciting range of



This iceberg, 50 feet high, is located in the Ross Sea, Antarctica. The hole in the center is believed to have been formed by wave action as the iceberg rolls and breaks up in the sea.
Source: Michael Van Woert, NOAA.

education and outreach activities designed to excite and engage the public, with a presence in classrooms around the world and in the media in varied and innovative formats.

The IPY will use today's powerful research tools to better understand the key roles of the polar regions in global processes. Automatic observatories, satellite-based remote sensing, autonomous vehicles, Internet, and genomics are just a few of the innovative approaches for studying previously inaccessible realms. IPY 2007-2008 will be

fundamentally broader than past international years because it will explicitly incorporate multidisciplinary and interdisciplinary studies, including biological, ecological, and social science elements. It will run from March 1, 2007 until March 1, 2009, to allow two field seasons of research in both the Arctic and the Antarctic.

What Will Happen During IPY?

During the window of IPY 2007-2008, scientists from many nations will join together in expeditions and research projects designed to meet the IPY objectives, coordinated at both the national and international levels. They will work both in the Arctic and the Antarctic, and in universities, laboratories, and observatories around the world. The specific research projects have not yet been selected, but we envision teams of researchers collecting coordinated measurements to compile a snapshot of environmental conditions, which can serve as a baseline for understanding future environmental change. There might be an effort to coordinate satellites to gather consistent data on ice extent. Ecologists might mount a massive effort to conduct a census of marine life so that we better understand population trends for important fisheries. Other groups might drill into the ocean floor in search of sediment cores with evidence of past environments.

Scientific Challenges

IPY 2007-2008 is an opportunity to deepen our understanding of the physical, biological, and chemical processes in the polar regions and their global linkages and impacts, and to communicate these insights to the public. Five broad scientific challenges provide a framework for organizing IPY activities:

- Assessing large-scale environmental change in the polar regions, with questions looking at both the physical and human dimensions of change and its impacts.
- Conducting scientific exploration of "new" frontiers, whether these are once inaccessible places such as the seafloor, or areas of inquiry that are now open because of advances in technology, such as how the tools of genomics now allow exploration of previously unanswerable questions about biological adaptation.
- Observing the polar regions in depth, with adequate coverage of the vast and challenging landscape, to provide a description of current conditions and allow for better future understanding of variability and change.
- Understanding human-environmental dynamics in a region where the connections are intimate and where the impacts of change are clear.
- Creating new connections between science and the public, using these regions that are inherently intriguing.

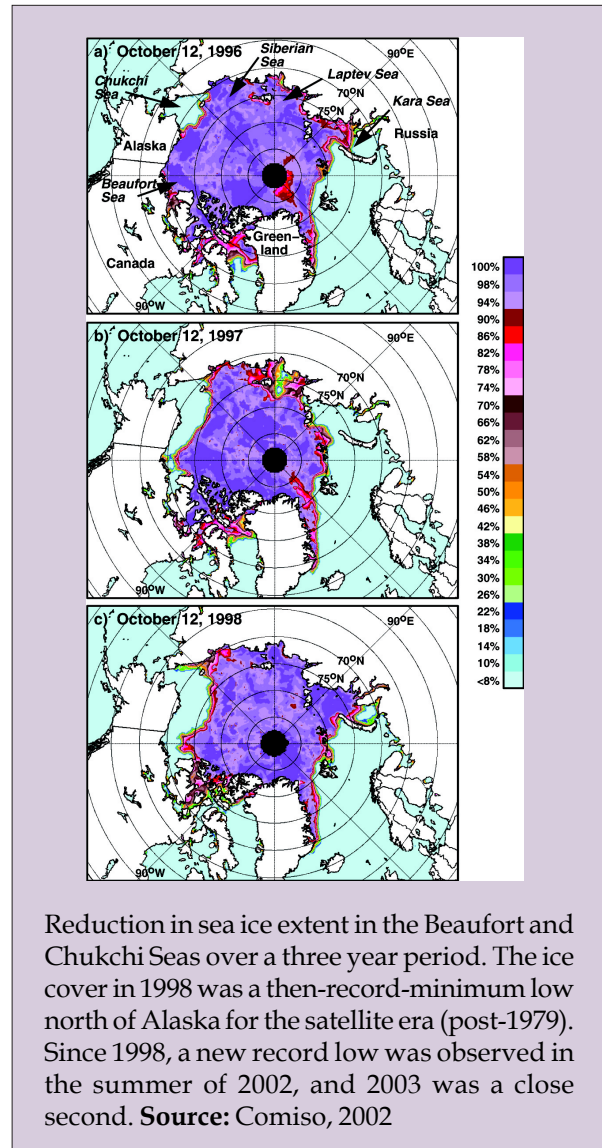
Multidisciplinary teams might document ecosystem changes in far northern communities where traditional subsistence foods are important to the local lifestyle and try to understand how changes are affecting the people of those communities. The next year is very important to IPY planning, because it is time to sort through the many ideas that have been suggested and see which are best to pursue.

Who's Involved in the IPY?

Enthusiasm for IPY 2007-2008 is strong and growing. In barely more than a year, the science community has progressed from its earliest discussions of possibilities for new international science endeavors to serious planning of what an IPY might accomplish and what resources are needed. More than 25 nations have formally declared the intent to participate and many more have discussions in progress. Here in the United States, scientists have been presenting talks and holding open forums at professional meetings and using an interactive website to brainstorm ideas where U.S. leadership might ensure significant contributions. A call to the science community for ideas about what science themes to pursue brought forward hundreds of ideas, and this input has been crucial in the IPY planning.

The U.S. Committee for the International Polar Year 2007-2008 was formed by the Polar Research Board of the National Academies to articulate a vision for U.S. participation in IPY 2007-2008 in coordination with and on behalf of our nation's scientific communities. The committee has worked closely with the U.S. science community using a variety of mechanisms. It has worked with our international colleagues, especially the International Council for Science's IPY 2007-2008 Planning Group, to identify the important science themes and develop the detailed information needed to implement its many contributing activities.

When IPY 2007-2008 gets underway, it will involve far more than scientists. The hope is that many people—scout leaders, teachers, museum directors, filmmakers, journalists, parents, and students of all ages—will be involved. Some of the participation will be hands-on; other involvement will take full advantage of the tremendous opportunities for instantaneous communication offered by modern technologies.



What Should We Do To Make IPY a Success?

The committee recommends the following actions for ensuring a successful IPY 2007-2008:

- The U.S. scientific community and agencies should use the IPY to initiate a sustained effort aimed at assessing large-scale environmental change and variability in the polar regions.
- The U.S. scientific community and agencies should include studies of coupled human-natural systems critical to societal, economic, and strategic interests in the IPY.

- The U.S. IPY effort should explore new scientific frontiers from the molecular to the planetary scale.
- The International Polar Year should be used as an opportunity to design and implement multidisciplinary polar observing networks that will provide a long-term perspective.
- The United States should invest in critical infrastructure (both physical and human) and technology to guarantee that IPY 2007-2008 leaves enduring benefits for the nation and for the residents of northern regions.
- The U.S. IPY program should excite and engage the public, with the goal of increasing understanding of the importance of polar regions in the global system and, at the same time, advance general science literacy in the nation.
- The U.S. scientific community and agencies should participate as leaders in International Polar Year 2007-2008.

Previous International Years

International Polar Year 2007-2008 is an ambitious program following in the footsteps of some past campaigns. There have been three similar programs over the last 125 years. During the first International Polar Year in 1882-1883, 12 countries launched 15 expeditions (13 in the Arctic and 2 in the Antarctic). As part of its contribution, the United States established our northernmost scientific station at Point Barrow, Alaska. The second International Polar Year in 1932-1933, even in the midst of the Great Depression, included participants from 40 nations and brought advances in meteorology, atmospheric sciences, geomagnetism, and the “mapping” of ionospheric phenomena that advanced radioscience and technology. The United States established the first year-round research station inland from the Antarctic coast.

The International Geophysical Year (IGY) in 1957-1958, in which 67 nations participated, was conceived as an effort to use technology developed during World War II, such as rockets and radar, for scientific research. IGY brought many “firsts,” such as the launch of the world’s first satellites. IGY had a strong polar component, especially in the Antarctic: research stations were established and the experience in international collaboration, even in tense political times, led to ratification of the Antarctic Treaty in 1961. Each of these campaigns produced unprecedented exploration of Earth and space and led to discoveries in many fields of science. IPY 2007-2008 is expected to leave a similar legacy of accomplishments.

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This brief was prepared by the National Research Council based on the committee’s report. For more information, contact the Polar Research Board at 202-334-3479. *A Vision for International Polar Year 2007-2008* is available from the National Academies Press, 500 Fifth Street, NW, Washington, DC 20001; 800-624-6242 or 202-334-3313 (in the Washington area); www.nap.edu.

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