

**STATEMENT FOR THE RECORD
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE**

**HEARING ON
“INTERNATIONAL POLAR YEAR”**

**BEFORE THE
COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION
UNITED STATES SENATE**

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This Statement for the Record will provide a brief background on International Polar Year (IPY), and discuss how the National Oceanic and Atmospheric Administration (NOAA) supports this important research opportunity. IPY is an excellent opportunity to advance science and earth observations in the polar regions. Our statement summarizes our initial plans and provides an update to expected IPY activities during FY 2007 to FY 2009.

IPY has been declared by the International Council of Science (ICSU) and the U.S. National Academies to extend from March 2007 through March 2009. The objectives of IPY are to explore new frontiers in polar sciences; improve our understanding of the critical role of the Earth's polar regions in global processes; create a legacy of infrastructure and data for future generations of scientists; expand international cooperation; engage the public in polar discovery; and help attract and educate the next generation of scientists and engineers.

NOAA began planning for IPY activities in the fall of 2004. NOAA's Office of Oceanic and Atmospheric Research and programs across NOAA are using existing resources to conduct IPY-related activities. Our statement highlights work on 11 NOAA IPY-related projects. Each of these projects is associated with a formal International Council for Science-World Meteorological Organization (ICSU-WMO) IPY endorsed project. These projects will contribute new data to Earth observing efforts, such as the Global Earth Observation System of Systems (GEOSS), and will advance understanding and predictability of the polar environment in NOAA's mission areas.

IPY ACTIVITIES:

Ocean Exploration in Polar Regions

NOAA's Office of Ocean Exploration (OE) solicited specific projects for IPY via Federal Register announcements in calendar years 2005 and 2006. OE also expects to solicit IPY-related projects during the calendar year 2007 Federal Register notice. OE, together with the NOAA Arctic Research Program and the Russian Academy of Sciences, plans to facilitate an expedition to the Arctic Ocean in 2008, as part of the ongoing RUSALCA

(Russian American Long-term Census of the Arctic) program. The expedition will carry out a census of life in the unknown waters of the Arctic north of the United States and Russia, from the sea ice to the seafloor below. This information provides background observations necessary for the monitoring of changing ecosystems in the Pacific Region of the Arctic.

Causes and Impacts of Recent Changes in the Arctic Ocean

Unprecedented minima of sea ice area have occurred in the Arctic Ocean during the four most recent summers. Summer 2003 and 2004 brought record forest fires and drought to eastern Siberia and Alaska after a decade of warm springtime temperature anomalies. In surrounding seas there has been a northward shift of ice-dependent marine animals. Changes in the Arctic Ocean are continuing, despite the observation that climate indices such as the Arctic Oscillation were negative or neutral for six of the last nine years. The Arctic Ocean may have a larger role in shaping the persistence of Arctic change than has been previously recognized. We will work with our partners to carry out observations in this area to measure movement of water through the Bering Strait, gather observations about physical change in the state of the ocean in the Bering and Chukchi Seas, and study impacts of physical change on marine ecosystems in this region. Bering Strait mooring programs will be conducted, as well as mooring and ship-board studies in the eastern Bering Sea. Limited ship-board studies will be made in ice-free areas in the vicinity of Bering Strait and Chukchi Sea in association with mooring cruises. (For more information, see www.arctic.noaa.gov.)

Polar Atmospheric Observatories and Field Campaigns

As part of the IPY project “International Arctic System for Observing the Atmosphere,” a system of strategically located, long-term atmospheric observatories will be developed around the Arctic to carry out both routine measurements made at meteorological stations and intensive measurements at the surface and through the depth of the atmosphere. Measured quantities can include solar radiation, aerosols, air chemistry, trace gases, cloud properties, water vapor, ozone, temperatures, winds, precipitation, surface albedo and stratospheric properties. These measurements are essential to calibrate and validate satellite sensors and to improve the reliability of climate models. The atmospheric observatory partnership includes the United States, Canada, Russia, Norway, Finland, and China. NOAA’s existing baseline observatories at Barrow Alaska and South Pole will continue to focus on measurements of trace gases and aerosols.

Polar Stratospheric Ozone Depletion Observations

As a part of the International Geophysical Year in 1957, column ozone measurements were initiated at South Pole, Antarctica using Dobson spectrometers. NOAA scientist, Susan Solomon, was the leading scientist in identifying the cause of the annual stratospheric ozone depletion over Antarctic known as the ozone hole, first observed in the early 1980s. Solomon and her colleagues suggested that chemical reactions involving man-made chlorine from chlorofluorocarbons (CFCs) interacting with icy clouds in the cold polar stratosphere could be responsible for the unprecedented losses of ozone during the Antarctic springtime. She then led two U.S. scientific expeditions to Antarctica in 1986 and 1987 that succeeded in providing key observations confirming the theory. The

Arctic stratospheric ozone changes, though lesser in magnitude than the Antarctic ozone hole, are by no means of lesser importance. Key studies will be undertaken in the Arctic to monitor these changes. Routine observations of ozone will continue at Barrow and South Pole during IPY. These projects are continuations of NOAA's ongoing stratospheric ozone depletion measurement programs.

Antarctic Living Marine Resource Survey

The principal objective of the NOAA Antarctic Living Marine Resource research program is to collect the scientific information needed to detect, monitor, and predict the effects of harvesting and associated activities on target, dependent, and related species and populations of the Antarctic marine living resources and the ecosystem(s) of which they are a part. A 35-day ship-based research program is planned for FY 2007.

Short-term Arctic Predictability

A scientific study in short-term Arctic predictability will explore the variability, and associated predictability of weather, sea ice, ocean wave, and land surface processes in the Arctic region in the 3-90 days time range, with special emphasis on improving forecast guidance for high impact events in the 3-14 day lead time range. NOAA will complete a study of northwest Alaskan coastal waves during the IPY. NOAA will also participate in sea ice studies at both poles aimed at improving measurement of ice thickness and forecasting. The NOAA THORPEX program will make observations and introduce forecast products to improve weather and intraseasonal forecasts for the Arctic.

Advances in Satellite Products and Their Use in Numerical Weather Prediction

Spatially comprehensive observations of the atmosphere in the data-sparse polar regions significantly and positively impact high latitude numerical weather predictions. In addition, errors in model forecasts for the high latitudes often propagate to the mid-latitudes, implying that improvements to high latitude forecasts will result in better mid-latitude forecasts. These findings provide the motivation to improve our ability to measure the state of the polar regions with satellites and to expand the use of these data in numerical weather prediction systems. NOAA will participate in IPY projects to improve the application of satellite sensors to environmental problems in the polar regions.

Arctic Climate Modeling

The general goal of the Arctic climate modeling project is to improve predictions of the Arctic environment on timescales ranging from seasonal to decadal. Thus, our research will focus on analyzing and modeling the physical processes and connections between the Arctic and the rest of the globe. NOAA will continue to improve global climate models that including polar processes.

Arctic System Reanalysis

A concerted effort during IPY to construct pan-Arctic atmosphere-ocean-ice-land data sets, and to assimilate and enhance these with a high-resolution (coupled) reanalysis system optimized for the Arctic region, will provide researchers with an unprecedented description of the Arctic environment over the past several decades. The operational analysis system (post 2008) expected to be a legacy of this activity should provide

constantly updated depictions of the Arctic environment, and foster improved short- and medium-range weather forecasts as well as seasonal climate outlooks. Improved understanding of Arctic climate processes resulting from development of the Arctic System Reanalysis (ASR) will lead to better global climate models, in turn reducing uncertainty in projected future climate states of the Arctic. The ASR will also serve as a vehicle for diagnostic evaluation of ongoing changes in the Arctic system.

NOAA's Data, Information, and Change Detection Strategy for IPY

NOAA's fundamental data management responsibilities will be to securely archive IPY datasets and ensure that these and relevant polar data are easily accessible for current and future users. NOAA will utilize the existing World Data Center (WDC) System and NOAA's National Data Centers in order to serve as a clearinghouse and facilitator for data-management issues and will work with IPY participants to ensure that International Council of Scientific Unions/World Meteorological Organization (ICSU/WMO) IPY Data Committee guidelines are followed. NOAA will also ensure that international standards such as the Open Archival Information System Reference Model and the ISO19115 metadata standards are met.

NOAA intends to build and maintain a pan-Arctic view of climate variability and change that will serve decision makers with information products. These range from baseline atlases against which future assessments can be carried out, to the Near Real-time Arctic Change Indicator website (<http://www.arctic.noaa.gov/detect/>), where information on the present state of Arctic ecosystems and climate is given in historical context. NOAA data centers will assist NOAA scientists to archive their IPY data. NOAA will continue to acquire historical data and present it on the Arctic Change Indicator website to describe the state of the Arctic climate over the past 150 years, allowing a better context for new data collected during IPY.

Decision support for increasing adaptive capacity to climate change and variability in Alaska and the Arctic.

The cornerstone of NOAA's Regional Climate Decision Support program for Alaska and the Arctic is to establish an integrated program spanning stakeholder-influenced research and development of decision-support tools for the sustained delivery of customer services. This includes establishing in Alaska a Regional Integrated Sciences & Assessments (RISA) to foster growth of climate services. NOAA plans to initiate the Alaska RISA in 2006 through the University of Alaska. The Alaska RISA is a 5-year program designed to address regionally important climate issues to aid policy- and decision-making. The Alaska RISA program could contribute significant results to our understanding of key climate related challenges facing the state and would allow for innovative partnerships with neighboring countries.

NOAA is part of the U.S. presence in the Arctic Council. The Arctic Council plans to conduct several assessments during the IPY period, including the Arctic Marine Shipping Assessment, an assessment of the Arctic carbon cycle, and others. NOAA will provide expertise and financial support within available resources. NOAA expects to contribute to the Arctic Council climate-related assessment tasks during IPY.

OTHER ACTIVITIES:

Ice Services

The National Ice Center (NIC) is a U.S. government agency that brings together elements from NOAA, the U.S. Navy, and the U.S. Coast Guard to support coastal and marine sea ice operations and research globally. The mission of the NIC is to provide the highest quality strategic and tactical ice services tailored to meet operational requirements of U.S. national interests. Over the Arctic, particularly, the NIC provides operational strategic basin-scale sea ice charting. The NIC products include a hemispheric and over 30 individual regional charts, sea ice tactical ice navigation support, Chukchi Sea and Beaufort Sea ice seasonal forecasts. In addition, the NIC supports the development of sea ice climatology for the Arctic, and manages the U.S. Interagency Arctic Buoy Program (USIABP). The NIC is participating directly or indirectly in an increased number of research and application cooperative projects with other national and international groups as part of IPY activities throughout 2007 and 2008.

Snow and Ice Data

NOAA's National Data Centers handle a wide variety of Arctic data. An affiliated data center, the National Snow and Ice Data Center (NSIDC), part of the Cooperative Institute for Research in Environmental Sciences (CIRES) at the University of Colorado, Boulder, has a NOAA NESDIS supported program (<http://nsidc.org/noaa/>) to produce and manage selected data sets. Significant data sets are the Online Glacier Photograph Collection of over 3000 photographs dating to the late 1800s; upward looking sonar data from submarines, providing estimates of sea ice thickness; and the Sea Ice Index, a site that shows, with graphical products, trends and anomalies in sea ice cover. Overall, the NOAA team at the NSIDC emphasizes data rescue and in situ data. This emphasis helps collect and maintain the long time series with broad spatial coverage that is necessary to track and attribute arctic change. The program complements the activities of the Distributed Active Archive Center, a NASA funded center at NSIDC that supports the bulk of NSIDC's activities.

Education

NOAA's Climate Program Office is leading a NOAA-wide effort with respect to the IPY. The Climate Literacy Working Group, based at the Climate Program Office, is coordinating NOAA-wide IPY education and outreach activities with the NOAA Office of Education. The NOAA IPY effort is part of the NSF-led interagency IPY education effort and will collaborate and coordinate their efforts with agencies participating in the IPY. Several formal and informal education initiatives are focusing primarily on teacher professional and science center or museum exhibitions. In addition, several formal lesson plans will be developed as part of our IPY efforts.