

# Arctic Research Program Summary for FY2009

## Program Goals:

1. Build and maintain a suite of Arctic climate observing networks (ocean, sea ice, atmosphere) in association with national and international partners
2. Support continuing analysis of Arctic climate data derived from the Arctic Research Program and other sources
3. Provide data and analysis to climate assessment activities, and the international science community
4. Participate in public education and outreach

## Current Activities:

Most of the resources of the Arctic Research Program support observing networks. The intent is to maintain the existing set of observing activities for climate-relevant periods, meaning a decade or more. The external science teams conducting this work were selected on a competitive basis, while the NOAA participants were chosen based on a record of performance. The current science teams are expected to continue their efforts as long as quality is maintained. The data analysis tasks are conducted by NOAA and external scientists. The mix of scientists depends on the specific task, although the analysis and modeling work at PMEL and at GLERL is expected to continue indefinitely.

1. Atmospheric Observatories - we support a network of atmospheric climate observatories around the Arctic rim dedicated to improving knowledge of clouds, aerosols, and radiation and their impacts on climate variability and change. We have established an observatory in Eureka Canada in close collaboration with Meteorological Services Canada and the University of Toronto. We are working with Roshydromet of Russia to develop an observatory at Tiksi. In both cases, we have good collaboration and cost-sharing with the US NSF and with agencies of other countries. There are tentative plans to augment an existing observatory in Finland with additional instrumentation in collaboration with the Finnish Meteorological Institute. The NOAA ESRL laboratory is responsible for implementation of this work.
2. Long-term ocean and ecosystem observatory in the Bering and Chukchi Seas - In collaboration with Russia, the Arctic Program has initiated the Russian-American Long-term Census of the Arctic (RUSALCA) Program. Jointly we observe continuously the flow of mass, heat, salt, and nutrients through the Bering Strait and analyze these data in relation to atmospheric dynamics and climate. The US NSF is a funding partner in this effort. Additionally, we conduct periodic campaigns over a broad area of the Northern Bering Sea and Chukchi Sea to evaluate changes in the physical

- "climate" of the ocean, including loss of sea ice, and impacts of physical change on the marine ecosystem. This work is done through peer-reviewed proposals from academia. In FY2008, a new ice-ocean-ecosystem modeling and data assimilation effort was initiated to improve analysis of observational data and provide a means for anticipating future evolution of the marine system in the study region. The modeling effort is lead by NOAA GLERL, with participation of academic partners.
3. Sea ice - The Arctic Research Program is one of several supporters of the International Arctic Buoy Program, which provides the only real-time observations of air temperature and pressure over the Arctic Ocean for weather forecasting purposes. Additionally the IABP collects real-time data on sea ice drift that supports ship operations in the Arctic and modeling of sea ice extent and thickness. This work is conducted by the University of Washington. We also support deployment of a network of ice buoys that provide detailed information on sea ice thickness and both atmospheric and ocean forcing of sea ice melt. Again, the US NSF is a funding partner in this effort. This work is conducted by scientists from the Army Corps of Engineers Cold Regions Research and Engineering Laboratory and academia.
  4. Climate change detection and analysis - The Arctic Research Program supports efforts to acquire and analyze Arctic climate data and model outputs to detect changes in Arctic climate, understand the role of various forcing factors, and to evaluate the utility of various climate models in describing observed changes in the Arctic. In concert with international partners, assessments are conducted of past and potential future trends, and their projected impacts on Arctic human society and ecosystems. This effort is conducted by NOAA PMEL and through various international groups such as the Arctic Monitoring and Assessment Program of the Arctic Council, and the International Arctic Science Committee.
  5. International collaboration – Because the Arctic is mostly “owned” by various countries, an international approach is essential to meet program goals. Staff of the Arctic Research Program play key roles in two international groups, the Arctic Monitoring and Assessment Program of the Arctic Council, and the Pacific Arctic Group. The Arctic Council is a high level intergovernmental forum for discussing science and policy-related issues and seeking common ground on environmental and sustainable development issues. In the past, the ARP was a supporter of the Council’s Arctic Climate Impact Assessment, and recently has begun supporting a new assessment on Climate Change and the Cryosphere in the Arctic. The Pacific Arctic Group (PAG) is an ad hoc forum among China, Japan, South Korea, Russia, Canada and the US designed to foster collaboration in Arctic science. A special effort is being made during the International Polar Year to develop through the Pacific Arctic Group a collaborative field program among three NOAA programs (CPO-ARP-RUSALCA, Ocean Exploration, CPO-ARP-NABOS), the US NSF, the Korean Polar Research Institute and the Chinese Polar Research Institute,

utilizing a Russian icebreaker, and Chinese and Russian research vessels. This field program may occur in summer 2010. Also the PAG has started working on a post-IPY synthesis of knowledge of the oceanography and ecology of the Chukchi Sea and surrounding ocean regions.

6. Arctic Observing Network – The ARP is working through the Interagency Arctic Research Policy Committee to develop and implement an integrated Arctic Observing Network (AON). The NSF has the lead in this development and NOAA's role is to identify and conduct its observing responsibilities and to engage in interagency data sharing and synthesis. Also, the ARP is engaged in a process to extend the AON concept to the international arena through the Sustaining Arctic Observing Networks (SAON) activity. This is an IPY-endorsed activity that will produce a set of recommendations for how the interested governments could act to implement a set of sustained observing networks.