

## Executive Summary

In April 2007 the US Interagency Research Policy Committee (IARPC) called for the development of an Arctic Observing Network (AON) to understand the causes and consequences of Arctic change. Under the joint leadership of NOAA and NSF, Committee staff prepared *Arctic Observing Network (AON): Toward a US Contribution to Pan-Arctic Observing*, a summary of ongoing and future Federal Arctic observing activities with a strategy for enhanced coordination and integration of these activities. This document constitutes the biennial update of the US Arctic Research Plan, focusing on observing needs. Enhanced coordination and integration of observing activities, and data and information management, will enable the agencies to respond with increased agility to the science questions posed by the Study of Environmental Arctic Change (SEARCH) program:

1. Is the Arctic system moving to a new state?
2. To what extent is the Arctic system predictable, i.e., what are the potential accuracies and/or uncertainties in predictions of relevant Arctic variables over different time scales?
3. To what extent can recent and ongoing climate changes be attributed to anthropogenic forcing rather than to natural modes of variability?
4. What is the direction and relative importance of system feedbacks?
5. How are terrestrial and marine ecosystems and ecosystem services affected by environmental change and its interactions with human activities?
6. How do cultural and socio-economic systems interact with Arctic environmental change?
7. What are the most consequential links between the Arctic and Earth systems?

Federal agencies are contributing many important observations that enrich our knowledge of the physical, biological and human dimensions of the changing land, atmosphere, ice and ocean components of the Arctic environmental system. The agencies also recognize the importance of working with the State of Alaska, Arctic residents, maritime users and other

stakeholders to support community-based research and knowledge systems in which Arctic societies are able to collect, preserve and exchange relevant and timely information. Agencies also recognize the need, in some cases, for near-real-time data and products.

To further the goal of a coordinated and integrated AON, IARPC has identified ten action items:

**Action item 1.** IARPC will continue to meet on a regular basis to examine ways to improve coordination and integration of agencies' Arctic observing activities in partnership with the academic community, northern residents, maritime users and other stakeholders, in order to answer the SEARCH questions and address the SEARCH priorities described in the SEARCH Implementation Plan.

**Action item 2.** IARPC will assess the integrated Arctic observing and research activities to determine the extent to which they are answering the SEARCH questions and addressing SEARCH priorities. Agencies will strive to align their Arctic observing and research activities with the SEARCH questions and priorities, while meeting their mission goals and evolving user needs, including the need for easy access to near-real-time data.

**Action item 3.** IARPC will enable the application of quantitative, objective tools, e.g., OSSEs (Observing System Simulation Experiments, also known as OSEs, Observing System Experiments), to guide the development of AON through system design exercises that identify optimal in-situ observing site locations and satellite observing networks, required measurement accuracy and frequency, and acceptable levels of uncertainty.

**Action item 4.** IARPC will also investigate the use of a Collaborative Observation and REsearch (CORE) strategy for optimization as well as coordination and integration of observing activities. In applying CORE, measurement frequency, accuracy and uncertainty would also be documented.

**Action item 5.** In consultation with related Federal interagency activities, such as the Climate Change Science Program and the US Group on Earth Observations (GEO), IARPC will explore the development of a user-friendly online portal, i.e., a single point-of-entry, to Federal Arctic data and information. A portal would have many advantages for IARPC and for users and stakeholders – it would raise the visibility of the data and information holdings, making them more openly and freely accessible to a broader audience and increasing their use, thereby maximizing the value-added services and societal benefits to be derived from AON. An Arctic data portal can also play a valuable role in the coordination and integration of AON.

**Action item 6.** As IARPC collaborates in the development AON, it will strive to maximize the use of cyberinfrastructure for coordination and integration from the moment of data acquisition through data discovery, analysis, synthesis and modeling, to the realization of Arctic and global value-added services and societal benefits.

**Action item 7.** IARPC will endeavor to increase engagement with northern people and communities to identify local observing needs as well as create mutually beneficial observing partnerships that build human and physical capacity. All observing activities will be guided by the Principles for the Conduct of Research in the Arctic (<http://www.nsf.gov/od/opp/arctic/conduct.jsp>) that were created at the direction of IARPC.

**Action item 8.** As part of the coordination and integration necessary to the development of AON, IARPC will discuss the issue of sustaining the entire program over the long-term, and explore ways for the effective transfer of research observing activities to the operational observing realm. Policy and strategy for the transition of research observing to operational observing will need to be developed. ‘Transition’ will require criteria for the identification of which research observing activities will cross over into operational observing, and processes to effect the transition.

**Action item 9.** NSF, representing IARPC and AON, will remain engaged internationally, working with regional partners to achieve a multinational, pan-Arctic

observing network that is coordinated, integrated and sustained over the long-term. IARPC, in turn, will engage with GEO and the Global Earth Observing System of Systems (GEOSS) to ensure that the Arctic is represented at domestic and international planning and policy forums, and involved in the transition to implementation of coordinated national and international Earth observation efforts to benefit society.

**Action item 10.** The US contribution to a coordinated, integrated and sustained multinational, pan-Arctic observing network will be based on an intellectual framework that reflects the scientific goals, priorities and recommendations of the SEARCH and the International Study of Arctic Change (ISAC) programs.

## *Foreword*

At the April 2007 IARPC meeting the Principals unanimously agreed to charge the Staff with the development of AON as part of the implementation of SEARCH (Study of Environmental Arctic Change) and as a US contribution to the legacy of the International Polar Year (IPY). The full text of the charge is:

The next biennial revision of the 5-year Arctic Research Plan is due in FY 2007. At the last Principals meeting in 2005, the Study of Environmental Arctic Change (SEARCH) was presented as an interagency IPY activity. As part of SEARCH implementation and a US contribution to the IPY legacy, the Principals of the Interagency Arctic Research Policy Committee charge the Committee staff with the development of the Arctic Observing Network. This activity should be the primary focus of the next biennial revision of the Arctic Research Plan. In developing the Arctic Observing Network, the staff should coordinate with other interagency groups, such as the US Group on Earth Observations, the US Climate Change Science Program's Observation Interagency Working Group, and the Interagency Committee on Ocean Science and Resource Management Integration. The staff should also reach out to local-State-Federal partnerships involved in Arctic research. Staff should prepare a draft for Principals' review by September 1, 2007.

NSF and NOAA assumed joint-leadership in responding to the IARPC Principals' charge, and the result of their efforts, in partnership with numerous IARPC staff members and others, is this report. It is presented as the 2007 biennial revision of Arctic Research Plan, and the first step in inter-agency collaboration in the development of AON and achieving the goals of SEARCH.