International Collaboration Nets Results

SEARCH: A Letter from Dr. Rita Colwell—Chair, IARPC

Interagency Leadership

The Interagency Arctic Research Policy Committee (IARPC) is comprised of senior officials from nine U.S. government agencies that conduct Arctic science activities. The Committee is chaired by Rita Colwell, Director, National Science Foundation.

In March 2000, the IARPC reorganized its FY2000-04 plan for Arctic research. The shifting emphasis of recent changes in the Arctic environment prompted the IARPC to initiate an ambitious, multi-agency approach for addressing these issues. The Interagency Steering Group for SEARCH was created in March 2000.

SEARCH is commendable. Nine federal agencies and organizations, with support from a tenth, the Coast Guard, are working together in an unprecedented collaborative effort, and we are seeing results and new voices on our ocean.

This program is critical—the potential impacts to people described in the science plan could cost the United States and the world enormously as we adapt to or try to mitigate the environmental changes that are possible. An investment of $2 million per year in the SEARCH science plan could cost the United States and the world many times each winter. Low pressure over the Arctic causes strong westerly winds that keep cold ocean water in the Arctic and push warmer air south. The Arctic’s climate can shift a bit in the past decade toward lower pressures over the Arctic. But now has reached record warm winters in Europe and the eastern U.S. and allowed warm ocean water to push further into the Arctic Ocean than usual.

SEARCH is documenting environmental changes across the Arctic, such as the flip-flop between the El Niño and La Niña cycles, and the Arctic Oscillation. "The thing that I notice when I walk out the lundine—is I can hear it crackle when I walk on it, and it’s dry. Whatever is out there is dried up. We didn’t get blueberries this year, last year, and the year before. I used to be able to find blackberries too, last year, and the year before. I used to be able to find blackberries. I love to eat them, and I’ve got to really search."

—Hannah Mendenhall, Kotzebue

"About fifteen years ago, it started getting warmer. The snow melts faster and faster. Eventually I was surprised how fast the ice broke up. A lot of this changes are making me say the ice conditions weren’t really good for the little baby walrus and seals."

—Benjamin Pungowiyi, Savoonga

The Arctic Oscillation flips back and forth from one extreme to the other, and affects sea ice north of the Arctic, which is made of thick, multi-year ice. When the Arctic is colder, more sea ice forms; when it is warmer, less. Whatever sea ice is formed is thin and breaks into ice floes, which can be pushed farther south by the atmospheric pressure over the Arctic. Low pressure over the Arctic causes strong westerly winds that keep cold ocean water cold enough to push further south.

The Arctic Oscillation: The Northern Hemisphere’s El Niño?

The Arctic Oscillation (AO) is a pattern of variability in pressure differences between the Arctic and the mid-latitude Pacific ocean. It is a long-term, large-scale climate oscillation that affects the atmosphere and ocean worldwide. The AO is characterized by an anomalous (above or below average) atmospheric pressure difference between the Arctic and the mid-latitude Pacific. Positive AO phases are associated with above-average pressure over the Arctic and below-average pressure over the mid-latitude Pacific, while negative AO phases are associated with below-average pressure over the Arctic and above-average pressure over the mid-latitude Pacific. The AO has been shown to influence weather and climate patterns across the globe, including changes in temperature, precipitation, and storm activity. The AO also plays a role in shaping sea ice and ocean circulation patterns in the Arctic. Changes in the AO can have significant impacts on human activities and ecosystems in the Arctic and beyond.
Scientists investigating the arctic environment have been able to collect significant new data in recent years because of improved access to the Arctic. New technologies have been developed, and better assistance is now available, rather than just theoretical. With these new data, researchers sponsored by several federal agencies have noted a number of unexpected changes in the Arctic. These include:

- Lower sea-level atmospheric pressure
- Increased air temperature over most of the Arctic, but lower temperatures over Northern Alaska and Eastern Canada
- Changed ocean circulation and rising coastal sea level
- Warmer Atlantic water penetrating farther in the Arctic Ocean
- Reduced sea ice cover
- Altered precipitation and terrestrial vegetation
- Tipping points

These changes are due to natural environmental variability. A number of studies predict, however, that the lower pressure mode of the AO will accompany warming in the Arctic, and that the changes may indicate a long-term, human-driven shift in climate. An innovative research effort, aimed at understanding the complex of arctic environmental changes, is needed to complement existing agency research programs.

We know very little about how the AO and climate change will interact, but these changes have important implications for both climate and society. We need to know:

- How are ocean circulation changes interacting with one another and how they affect ecosystems and industries?
- What is the scope of the changes going on in the Arctic?
- What is needed to understand the changes in the Arctic, their relation to the continuing cooling in northeastern Scandinavia, and Siberia?
- What is the evidence of climate warming in the Arctic?
- Will there be a change in the polar regions that is unlike anything measured in the past 100 years, and the changes are part of the Arctic’s long-term shift in the environment?
- Can we predict, however, that the lower pressure mode of the AO will accompany warming in the Arctic, and that the changes may indicate a long-term, human-driven shift in climate?
- An innovative research effort is needed to complement existing agency research programs.

The nine SEARCH agencies agree that a large-scale, long-term perspective on the arctic environment is needed to evaluate the potentially grave regional and global impacts of the continuing changes. Each agency is contributing to this perspective in keeping with its particular mandate, relevant research strategies, and specific scientific capabilities.

What is SEARCH?

SEARCH, the Study of Environmental Arctic Change, is a new research program on the changes occurring in the Arctic and their potential impacts on the Earth, including its social and economic well being. Nine U.S. government agencies have agreed to work together and support from a tenth, the Coast Guard, are collaborating for SEARCH, which extends across scientific disciplines and agency boundaries.

Through SEARCH, agencies will cooperate to understand the full scope of the changes going on in the Arctic—to learn exactly how the observed changes relate to the Arctic’s long-term shift, and if the changes indicate the start of a major climate shift in the North. This information will enable the agencies to predict how the changes are interacting, and to develop the intellectual resources to achieve this goal.

SEARCH agencies will combine their financial and intellectual resources to accomplish SEARCH in three stages:

FY2001: coordinate activities already planned by individual agencies.
FY2002: identify new efforts by individual agencies that relate directly to SEARCH.
FY2003: jointly plan and execute their activities that support SEARCH.

SEARCH reporting and science plan can be found at: http://psc.apo.usgs.gov/search/