

# EXECUTIVE SUMMARY

from the  
workshop to promote the development of

**Instrumentation for Arctic Ocean Exploration**  
Technology for accessing the water column and seafloor

Sponsored by

The National Science Foundation  
Monterey Bay Aquarium Research Institute  
Woods Hole Oceanographic Institution

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Moss Landing, CA

## Executive Summary

An NSF-sponsored workshop entitled, “Instrumentation for Arctic Ocean Exploration: Technology for accessing the water column and seafloor” was held at the Monterey Bay Aquarium Research Institute in Moss Landing, CA from October 16-18, 2002. The workshop was convened in response to the fact that; (1) the Arctic Ocean is a high-priority target for a diverse set of scientific investigations including key topics such as global climate change, life in extreme environments, and the origin of life on Earth, (2) virtually all Arctic oceanography, regardless of discipline, is limited by a small set of common technological barriers, (3) a number of recent technological developments present opportunities to overcome these barriers and truly revolutionize the conduct of Arctic oceanography, and (4) the aggregate national funding for Arctic operations, research, and instrumentation is at alarmingly low levels after being in steady decline for nearly a decade.

There are five over-arching technical challenges that presently limit most types of Arctic research;

- wire and cable management within a dynamic ice pack
- recovery of free-vehicles within ice-covered waters
- under-ice navigation at high latitudes
- remote monitoring of the water column and seafloor
- maintaining an observational presence outside of the short (summer) Arctic field season.

An important outcome of the workshop was the development of a coherent vision for the future of Arctic research that would fundamentally change the way observations are made in the Arctic by exploiting the potential of new technologies to solve these technical challenges and create a new paradigm for Arctic oceanography. The three components of this vision are; (1) expeditions with enhanced capabilities, (2) a basin-wide, mobile network of ice-mounted buoys and free-vehicles (i.e., gliders, drifters, autonomous underwater vehicles), and (3) cabled oceanographic observatories with real-time data and power connections to shore.

All of the technologies required to realize this vision and advance Arctic oceanography are either mature or rapidly maturing, but applying them to the Arctic will require a significant and focused national effort that is beyond the funding presently available through NSF’s Office of Polar Programs. Therefore a key recommendation from the workshop is that a mechanism for securing a long-term source of funding for Arctic instrumentation development be identified and pursued, with potentially relevant programs including the NSF Major Research Instrumentation and Science and Technology Center programs, the ONR Physical Oceanography Program, the Climate Change Research Initiative, and the NASA EOS program. New initiatives may also need to be considered, and potential cooperation between federal agencies should be explored. A complete list of recommendations from the workshop is presented in the body of the report.

The workshop concluded with a plenary session where support for a national commitment to Arctic instrumentation was unanimous and strong. An *ad hoc* steering committee was formed, and a follow-up workshop to revisit key topics is envisioned for 2005.