

Beaufort Gyre Exploration Project: Current Research Activities (21st century)

In addition to the Beaufort Gyre Exploration Project, these Arctic Ocean research efforts are also currently in progress.

A Study of Environmental Arctic Change (SEARCH)

SEARCH is an interagency effort to understand the nature, extent, and future development of the system-scale change presently seen in the Arctic. These changes are occurring across terrestrial, oceanic, atmospheric and human systems, including:

- increased air temperatures over most of the Arctic
- changing ocean circulation and rising coastal sea level
- reduced sea ice cover
- thawing permafrost

The core aim of SEARCH is to understand the recent and ongoing complex of interrelated pan-arctic changes. These changes are affecting ecosystems, living resources, and the human population, and are impacting local and global economic activities.

Currently nearly 70 projects are funded as SEARCH activities by U.S. agencies. Many more SEARCH-related projects are supported through other programs.

Reference:

On the web: [SEARCH website](#)

Arctic Community-wide Hydrological Analysis and Monitoring Program (Arctic-CHAMP)

The Arctic Community-wide Hydrological Analysis and Monitoring Program (CHAMP) is a new initiative aimed at understanding the physical, biological, and biogeochemical controls on the components of the integrated arctic hydrologic cycle, and addressing linkages between the land and ocean.

Reference:

On the web: [CHAMP website](#)

North Pole Environmental Observatory (NPEO)

Beginning in spring 2000, an international research team supported by the National Science Foundation (NSF) has conducted annual expeditions each April to the North Pole to take the pulse of the Arctic Ocean and learn how the world's northernmost sea helps regulate global climate. The team establishes a group of un-manned scientific platforms, collectively called an observatory, to record data throughout the remainder of the year on everything from the salinity of the water to the thickness and temperature of the ice cover. With the experience gained from early versions of the Observatory, the number of research projects has begun to expand covering an even broader range of sciences.

Reference:

On the web: [NPEO website](#)

Russian-American Long-Term Census of the Arctic (RUSALCA)

July 23, 2004 marked an historic day in Arctic research and exploration as well as Russian-U.S. relations. On this date the Russian research ship, the Professor Khromov, left Vladivostok, Russia packed with U.S. and Russian, funded scientists to begin a 45-day collaborative journey of exploration and research in the Arctic. The Initial Expedition to the Bering and Chukchi Seas (Arctic Ocean), was conducted July 23 – September 6, 2004. This initial cruise was a collaborative U.S – Russian Federation oceanographic expedition to the Arctic seas regions shared by both countries: the Bering and Chukchi Seas.

Reference:

On the web: [RUSALCA website](#)

Nansen and Amundsen Basins Observational System (NABOS) and the Canadian Basin Observational System (CABOS)

The overall purpose of the project is to provide a quantitative observationally based assessment of circulation, water mass transformations, and transformation mechanisms in the Eurasian (NABOS) and Canadian (CABOS) Basins of the Arctic Ocean. The major objectives of this project are the following:

- To quantify the structure and variability of the circulation in the upper, intermediate, and lower layers of the Eurasian and Canadian Basins;
- To evaluate mechanisms by which the Atlantic Water is transformed on its pathway along the slope of the Eurasian and Canadian Basins;
- To evaluate the impact of heat transport from the Atlantic Water on ice;
- To investigate the strength and variability of the Fram Strait and the Barents Sea branches of the Atlantic Water;
- To estimate the rate of exchange between the arctic shelves and the interior in order to clarify mechanisms of the arctic halocline formation;
- To evaluate the storage and variability of heat and fresh water, particularly within the halocline of the Canada Basin;
- To quantify Pacific water transport, variability, and water-mass transformation mechanisms from the Chukchi Sea shelf toward the Eurasian Basin.

Reference:

On the web: [NABOS/CABOS website](#)

NASA Impacts of Climate change on the Eco-Systems and Chemistry of the Arctic Pacific Environment (ICESCAPE)

Impacts of Climate change on the Eco-Systems and Chemistry of the Arctic Pacific Environment (ICESCAPE) is a multi-year NASA shipborne project. The bulk of the research will take place in the Beaufort and Chukchi Seas in summer of 2010 and fall of 2011. The Arctic sea ice cover is in decline. The retreat of the summer ice cover, a general thinning, and a transition to a younger, a more vulnerable ice pack have been well documented. Melt seasons are starting earlier and lasting longer. These changes can profoundly impact the physical, biological, and geochemical state of the Arctic Ocean region. Climate models project that changes in the ice cover may accelerate in the future, with a possible transition to ice free summers later this century. These changes are quite pronounced in the Chukchi and Beaufort Sea and have consequences for the Arctic Ocean ecosystem, potentially affecting everything from sea ice algae to polar bears.

The central science question of this program is, "What is the impact of climate change (natural and anthropogenic) on the biogeochemistry and ecology of the Chukchi and Beaufort seas?" While both of these regions are experiencing significant changes in the ice cover, their biogeochemical response will likely be quite different due to their distinct physical, chemical, and biological differences. ICESCAPE will pursue the above central science question and associated issues through an interdisciplinary, cross cutting approach integrating field expeditions, modeling, and satellite remote sensing.

Reference:

On the web: [NASA ICESCAPE](#)

CADIS - The Cooperative Arctic Data and Information Service - supports the Arctic Observing Network (AON)

AON is an NSF initiative for the International Polar Year (IPY) to improve observational capabilities in the Arctic and leave a long-term legacy for the benefit of science and society. AON data will contribute to scientific research leading to (1) increased knowledge and understanding of the regional and global causes and consequences of present-day environmental Arctic Change, (2) scenarios for and prediction of the course of future Arctic Change and its regional and global consequences, and (3) the development of adaptive responses to Arctic Change. AON is integral to the Study of Environmental Arctic Change (SEARCH). AON currently consists of > 35 projects funded by the NSF Office of Polar Programs. The AON projects fall into the following SEARCH Implementation Plan categories: Atmosphere; Ocean and Sea Ice; Hydrology/Cryosphere; Terrestrial Ecosystems; and Human Dimensions. CADIS will support all these projects, as well as the IASOA (International Arctic Systems for Observing the Atmosphere) program.

Reference:

On the web: [AON CADIS](#)

Understanding Ecosystem Processes in the Bering Sea (BEST-BSIERP)

The Bering Sea Project, a \$52 million partnership between the North Pacific Research Board and the National Science Foundation, seeks to understand the impacts of climate change and dynamic sea ice cover on the eastern Bering Sea ecosystem. More than one hundred scientists are engaged in field research and ecosystem modeling to link climate, physical oceanography, plankton, fishes, seabirds, marine mammals, humans, traditional knowledge and economic outcomes to better understand the mechanisms that sustain this highly productive region. The Bering Sea Project is a collaborative team effort, led by an elected group of six scientists working together with NPRB and NSF program managers.

References:

On the web: [BEST-BSIERP website](#)

On the web: [Polar Discovery website](#)

Arctic Regional Ocean Observing System (Arctic-ROOS)

An Arctic Regional Ocean Observing System (Arctic ROOS) has been established by a group of 14 member institutions from nine European countries working actively with ocean observation and modelling systems for the Arctic Ocean and adjacent seas. Arctic ROOS will promote, develop and maintain operational monitoring and forecasting of ocean circulation, water masses, ocean surface conditions, sea ice and biological/chemical constituents.

Reference:

On the web: [Arctic-ROOS website](#)

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Mail: Woods Hole Oceanographic Institution, 266 Woods Hole Road, Woods Hole, MA 02543, USA.

E-Contact: info@whoi.edu; press relations: media@whoi.edu, tel. (508) 457-2000

Problems or questions about the site, please contact webdev@whoi.edu