

SEARCH Project Office Progress Report
February 2003-January 2004
February 8, 2004

Activities and Findings January 2003 – February 2004.

The Study of Environmental Arctic Change (SEARCH) has been conceived as a broad, interdisciplinary, multiscale program with a core aim of understanding the recent and ongoing, decadal, pan-Arctic complex of interrelated changes in the Arctic. These changes include, among other things, a decline in sea level atmospheric pressure, an increase in surface air temperature, cyclonic ocean circulation, and a decrease in sea ice cover. The physical changes are producing changes in the ecosystem and living resources and affecting the human population. The changes are affecting local and hemispheric economic activities such as shipping and fisheries totaling billions of dollars. SEARCH is envisioned as long-term effort of observations, modeling, process studies, and applications devoted to understanding this complex of interrelated changes, its relation to global climate, and its impacts on ecosystems and society. The effort in the investigator community to initiate SEARCH has been lead by the SEARCH Science Steering Committee (SSC). This effort has produced the SEARCH Science Plan. Because the SEARCH effort is broad, it requires a coordinated interagency approach. The Interagency Research Policy Committee has established the Interagency Working Group (IWG), composed of key program managers from the IARPC agencies, to spearhead development of an interagency funding method for SEARCH. The IWG has been developing Funding Implementation Plans. Recent developments have brought these efforts to maturity, and the SSC and IWG are entering a phase of working together on implementation of SEARCH. The SEARCH Project Office has been facilitating the efforts of the SEARCH SSC and investigator community and working with the SSC and IWG continuously to aid in achieving their common aims. Highlights of the Project Office Activities over the last year include the following.

The highlights of 2003 include, the completion of the SEARCH Implementation Strategy, (Revision 1), election of new members of the SEARCH Science Steering Committee, the new SEARCH Brochure, the SEARCH Open Science Meeting, and increasing the international visibility and participation in SEARCH

The SEARCH Implementation Strategy is based on the SEARCH Science Plan and the SEARCH Interagency Working Group's (IWG) FY 2003 Funding Implementation Framework. Community input was critical to the development of the Strategy. We received input from the Hydrology Workshop 2000, and the Atmospheric and Cryospheric Change in the Arctic (ACCA) Workshop 2001. In 2002, input was gathered on physical oceanographic issues through a SEARCH Project Office questionnaire and discussions with the oceanography community at the Arctic Ocean Measurements and Modeling Workshop. Critical gaps in the biological/ecological aspects of the Strategy were filled in by the Bering Sea Workshop, and the SEARCH Terrestrial and Marine Ecosystem Workshop. Simultaneous with the Ecosystem Workshop, the SEARCH Human Dimension Workshop in Seattle addressed the social and economic aspects of implementation. In 2003 the Draft Implementation Strategy was available for review at the

SEARCH Web site (<http://psc.apl.washington.edu/search/index.html>). The comments received were used to refine and add detail to the Strategy, especially Activity Areas portions.

The Project Office held a meeting of the SSC June 4-6, 2003 in Seattle. In addition to making nominations for new SSC membership and discussion of SEARCH organization and leadership generally, the SSC reviewed community comments on the Implementation Strategy and agreed on the final form of the document. The project office then, with continuing input, finished and printed the final version in time for the SEARCH Open Science Meeting. In completing the Strategy substantial material was added in some Activity Areas such as the Detecting and Quantifying Unami and Other Modes of Variability (DQU) as exemplified by Figure 1. Detail was added to the other Activity areas, Distributed Terrestrial Observatories, Large-scale Atmospheric Observatories (LAO), and Distributed Marine Observatories (DMO) [e.g., Figure 2 taken from Figure 4 of the SEARCH Implementation Strategy (Revision 1)],

Growing out of the DMO development, the project office prepared a text for the NOAA Arctic Program planning that described the DMO in detail including station locations and general method. This was presented as a poster at the Climate Observation Program Workshop and as a talk at the Workshop on Marine Science in Alaska, both by co-author Ignatius Rigor. Polar Science Center, University of Washington.

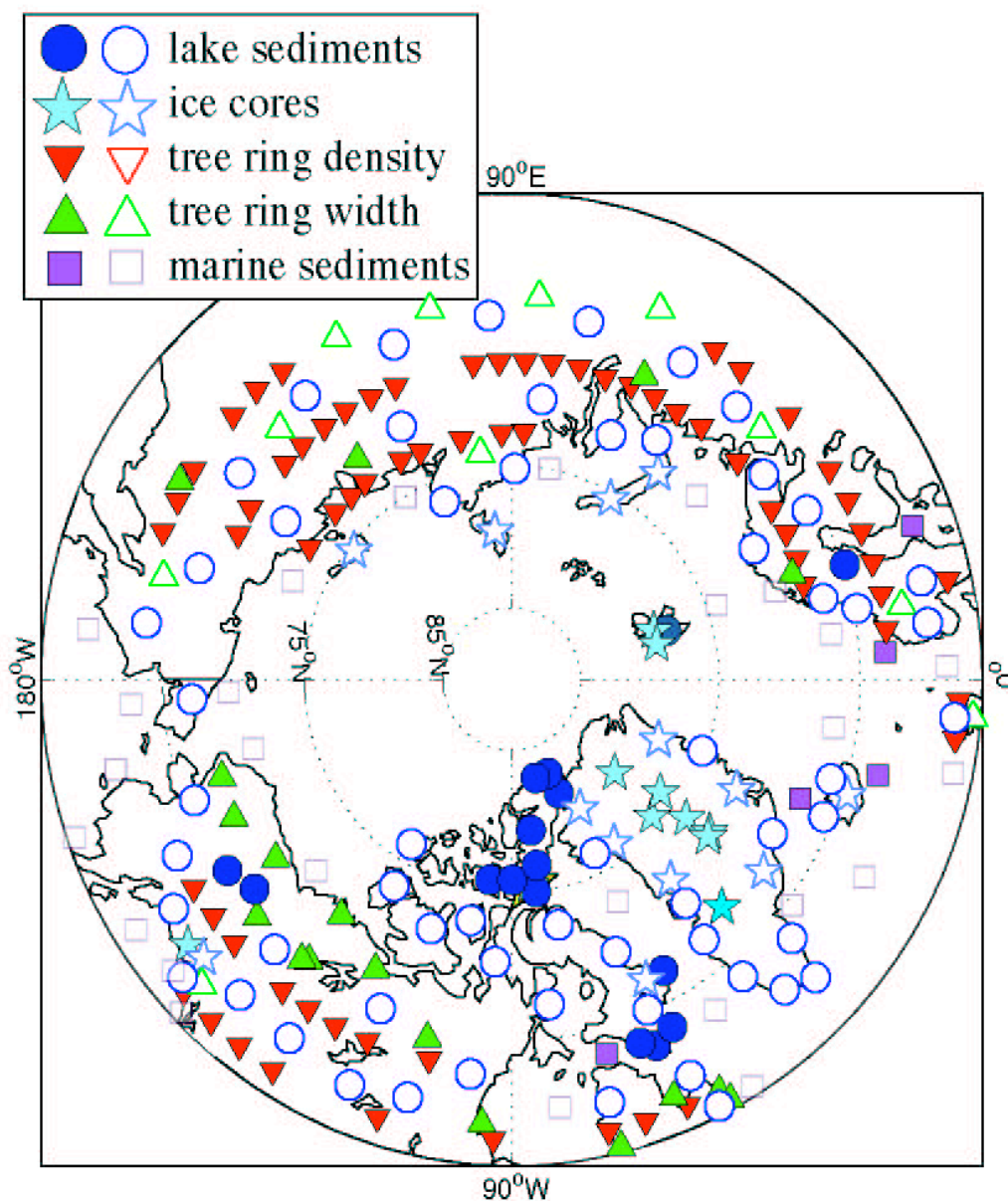


Figure 1. SEARCH High-Resolution Proxy Array. Existing records are shown with filled symbols according to the type of proxy archive (tree rings, lake sediments, ice cores, marine sediments, etc.). Proposed additional records showing idealized proxy distributions and spatial densities are indicated with lighter open symbols. Note that these proposed future records are not intended to convey specific locations or specific proxy types, but are shown instead to represent the spatial density and proxy overlap necessary for confident multi-proxy assessment of past natural climate variability. From Figure 4 of the *SEARCH Implementation Strategy Revision 1*.

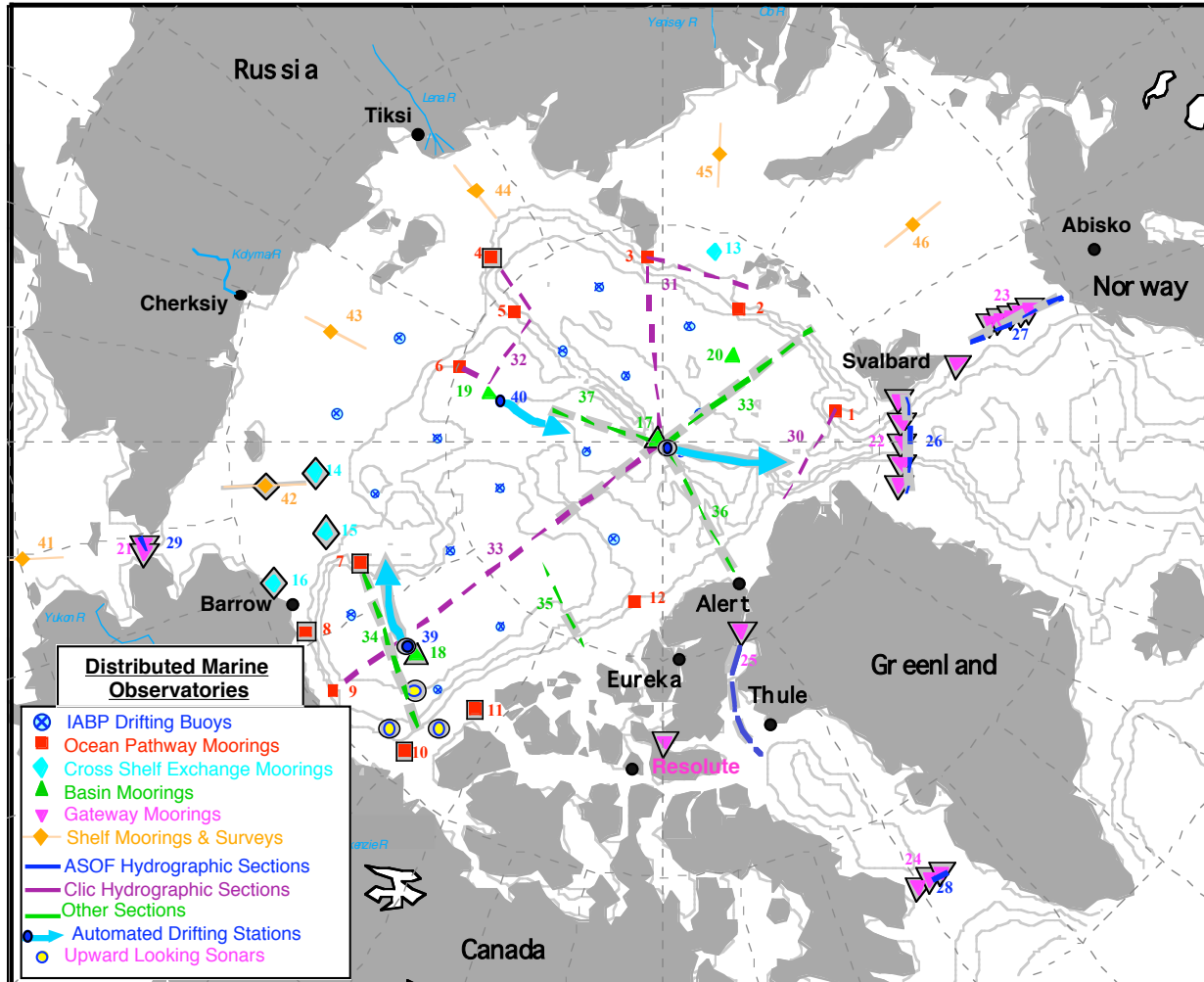


Figure 2. SEARCH Distributed Marine Observatories. The DMO includes moorings on key Arctic Ocean pathways, in the interior of major basins, and in the major gateways between the Arctic Ocean and subarctic seas. For clarity, the exact number and location of the gateway moorings are not shown here but are described in the SEARCH-ASOF Implementation Plan. The CliC Implementation Plan hydrographic sections are shown and are components of the SEARCH hydrographic sections. NPEO sections cover some of the CliC sections and provide stations in the northern Makarov Basin. The JWACS section crosses the Beaufort Sea in an east-west direction. Automated stations in the Arctic Ocean measure atmospheric conditions including radiative conditions, ice mass balance, upper ocean conditions, and ocean surface heat flux. The IABP buoys provide ice drift data as well as atmospheric pressure and temperature. Not all the existing buoys are shown, but the distribution is more uniform than is usual, SEARCH should strive to fill the deep basin gaps that sometimes develop. Installations that are in place or partial in place as part of SEARCH or other programs as of Fall, 2003 are indicated by a gray and black "halo" around the measurement symbol. From Figure 4 of the SEARCH Implementation Strategy Revision 1.

The new SEARCH Science Steering committee, nominated at the June SSC meeting and appointed by the SEARCH Interagency Working Group, is as follows:

SEARCH SSC as of January 1, 2004

Bob Dickson
CEFAS
Lowestoft, England

Jim Maslanik
CIRES
University of Colorado
Boulder, CO

Jennifer Francis
Institute of Marine & Coastal Science
Rutgers University
New Brunswick, NJ

Dave McGuire
Institute of Arctic Biology
University of Alaska
Fairbanks, AK

Jackie Grebmeier
Dept. of Ecology & Evolutionary Biology
University of Tennessee
Knoxville, TN

Jamie Morison (Past Chair)
Polar Science Center - APL
University of Washington
Seattle, WA

Larry Hamilton (Vice Chair)
Sociology Dept.
University of New Hampshire
Durham, NH

Peter Rhines
School of Oceanography
University of Washington
Seattle, WA

George Hunt
Dept. of Ecology and Evolutionary Biology
University of California-Irvine
Irvine, CA

Peter Schlosser (Chair)
Lamont Doherty Earth Observatory
Columbia University
Palisades, NY

Konrad A. Hughen
Marine Chemistry and Geochemistry
Woods Hole Oceanographic Institution
Woods Hole, MA

Gus Shaver
Marine Biological Laboratory
The Ecosystems Center
Woods Hole, MA

Dennis Lettenmaier
Civil and Environmental Engineering
University of Washington
Seattle, WA

Konnie Steffen
CIRES
University of Colorado
Boulder, CO

John Walsh
International Arctic Research Center
Fairbanks, Alaska

The PI served on the SEARCH Open Science Meeting Organizing Committee. This committee met regularly in 2003 to develop the OSM themes, lists of speakers, schedule, and logistics. The meeting was held Oct. 27-30 in Seattle WA. As an indication of the success of the meeting, we expected 300 participants, but had over 400. More can be learned about the OSM from the SEARCH Web Site <http://psc.apl.washington.edu/search/Workshops/1stOpenScienceMtg.html> and the ARCUS SEARCH OSM Web Site <http://www.arcus.org/SEARCH/search.html>. The Project Office took particular concern for a SEARCH Implementation Workshop on the last day of the OSM (more below), and organized a short SEARCH SSC-IWG meeting in order to introduce the new SSC members and discuss the meeting outcomes.

The Project Office has increasingly been turning attention to the international connections of SEARCH. We have continued to work with the Climate in the Cryosphere Program (CliC) leadership to develop a memorandum of agreement with SEARCH and this was signed before the end of the final ACSYS meeting November 14, 2003. We have maintained our ties with the U.S. and Atlantic Climate Variability (CLIVAR) programs. The Project Office continued to support the Arctic and Sub-arctic Ocean Flux (ASOF) component of SEARCH through a subcontract to the Centre for Environment, Fisheries and Aquaculture Science (CEFAS), Britain. This contract has been renewed. Dr. Robert Dickson is the Principal Investigator for the ASOF subcontract. We also have funding from NOAA and ONR to support Roberta Boscolo as part of the ASOF project office. She is providing scientific support to ASOF, and she works directly with Dr. Robert Dickson. She also helped us in developing the new SEARCH brochure for the SEARCH OSM.

As a means of furthering international awareness and enthusiasm for SEARCH, the PI has given presentations (all but one were invited) at Bjerkenes Centre (Bergen, Norway), Canadian Foundation for Climate and Atmospheric Sciences Meeting (Ottawa), Arctic Science Summit Week (Kiruna, Sweden), IUGG 2003 Meeting (Sapporo, Japan), International Conference on Research of Climate Change in the Arctic (Longyearbyen, Svalbard, Norway), Ocean Observations Panel for Climate (Ottawa, Canada), NOClim / ProClim / AIO Meeting (Bergen, Norway), International Polar Year Session at Fall 2003 AGU Meeting (San Francisco), SEARCH Presentation at First Institute of Oceanography (Qingdao, China), Chinese Polar Institute (Shanghai, China), and International Polar Year 2007-2008 Planning Meeting (St. Petersburg, Russia).

The Implementation Workshop on the last day of the OSM gave individuals opportunity to describe their interests in SEARCH implementation, with a particular emphasis on international participation in SEARCH. Canada, the U.K., Norway, Japan, Germany, France, Russia, and China were among those countries represented. At the SEARCH SSC-IWG meeting at the close of the OSM, the SSC asked Pat Webber, President of the International Arctic Science Committee (IASC) to contact the Arctic Ocean Studies Board, and with the AOSB, establish an organizing committee to develop a suitable organization for international coordination of SEARCH and SEARCH-compatible activities. With this as a higher level structure, and continuing efforts to promote participation in SEARCH at the investigator level, 2004 promises to be a year of increased international SEARCH activity.