Preliminary Report
The Study of Environmental Arctic Change (SEARCH) Workshop
June 30 - July 2, 1999
Polar Science Center, University of Washington
Seattle, Washington

Jamie Morison for the SEARCH SSC

This is a preliminary report on the Study of Environmental Arctic Change (SEARCH) Workshop held June 30 - July 2, 1999 here at the University of Washington. The workshop was held with the support of NSF grant OPP-9978390. Its objective was to gather input for the SEARCH Science Plan, which will guide an interdisciplinary research program to investigate recent and ongoing changes in the arctic environment. The plan for the workshop was made at an April 22-23 meeting of the SEARCH Science Steering Committee (SSC). An initial outline for the science plan was written by the SSC and candidate invitees to the workshop were nominated. Modifications to the outline and additions to the invitee list were also made prior to the workshop. The working outline is given as Attachment 1. The invitees included experts from many fields: atmosphere, ocean, ice hydrology and frozen ground, paleo and glaciology, chemistry, biology, and the human dimension. A list of the invited attendees is given as Attachment 4. Several invitees that couldn't attend will remain on our mailing list.

The agenda (Attachment 2) was organized around the Outline and special working groups (Attachment 3). In the morning session (Wed I), Wednesday, June 30, the working groups were formed by discipline. These working groups spent the morning describing the changes in the Arctic that had been observed in their disciplines. This was to provide material for the Background sections of the Science Plan, 3.a.i-iii and 3.b.iii (based on the results of the workshop part of 3.b.iii will become 3.a.iv in future drafts). Session Wed II in the afternoon was formed around multidisciplinary working groups focused on the relevance issues of the Background (3.b) and the corresponding hypotheses (outline section 4). These groups focused on, the relation of the arctic environmental changes to climate change, the physical feedbacks that might cause the arctic environmental changes to self-amplify or dampen, the long-term biological relevance of the physical changes, and the long-term societal relevance of the changes.

On the morning of Thursday, July 1 we again broke into disciplinary groups and tackled objectives and strategy mainly with respect to observations (5.a-b, 6.a). In the afternoon of Thursday, July 1 we broke into multidisciplinary groups and tackled objectives with respect to understanding and prediction (5.c-d). The groups also discussed strategy relative to modeling, data synthesis, process studies, and assessment.

The working groups reported their results in plenary and their notes were collected. The notes are being organized and edited as draft material for most portions of the Science Plan.

In addition to working group sessions we had plenary presentations on the Arctic Oscillation by Mike Wallace and David Thompson. Our representatives from Britain, Canada, Germany, Japan, and Russia described

their national programs. Discussions were also devoted to large related programs such as PARCS, VEINS, and CLIVAR.

The morning of Friday, July 2 deviated from the agenda and we remained in plenary to review our discussions and come to grips with key philosophical issues about the program. These were mainly related to the scope of SEARCH. Scope was a prime concern at the workshop. Because the increase in the Arctic Oscillation index appears to be so intertwined with the other environmental changes, there was some concern that SEARCH was being narrowed down to a study of the AO, with less consideration for the whole complex of atmosphere, ice, ocean and ecosystem changes. Most felt that a study of change in general would be much too broad. Several suggestions were made to limit SEARCH to particular time or length scales, but time and space scales of the observed changes are not known.

In Friday morning's session the workshop resolved the scope issue in two ways. First, it was agreed that we would not limit SEARCH to a particular set of disciplines or scales; the discussions at the workshop suggest these boundaries are unknown. Instead, the scope of SEARCH will be defined by focusing on phenomena directly related to the air-ice-ocean variations we have been observing and which appear connected to the Arctic Oscillation.

Second, we concluded that we needed a name for the AO-ocean-land complex that we agreed is at the heart of present changes. In many ways it is similar to the ENSO- El Nino phenomenon. Like El Nino, the AO-ocean-land complex is a climate-scale, multi-environment phenomenon with important effects for the ecosystem and society. We agree roughly on what is included in this complex, but we needed a name for it. Caleb Pungowiy suggested "Onami", which means "tomorrow" in the Inuit language (Caleb felt the word for "change" was to long and complicated). This fits the observed complex on several levels.

The focus of SEARCH will be to understand Onami and its implications. The physical science effort will try to identify and elucidate the feedbacks between land, air, ice, and ocean that drive the Onami complex and couple it to the rest of the globe. The ultimate benefit will be the ability to predict the course of Onami and hopefully adapt to its consequences. The biological science effort will look for the ecosystem changes that are driven by the physical changes, and the social science efforts will examine the human impact of the Onami. In drafting the Science Plan the SSC will use this as the guiding focus. We think this will give SEARCH a strong, cohesive backbone from which the subjects may vary by discipline and scale as broadly as appropriate to understand Onami.

The SEARCH SSC will be working to pull a solid draft Science Plan together in time for the ARCSS-OAII meeting in October 1999. At the workshop we listed many observations the will be needed as part of SEARCH. Some of these are most critical, and in some cases we are in danger of interrupting important time series if critical stopgap measurements aren't begun soon. As prescribed in the workshop grant, from the meeting discussions we are forming a first list of critical stopgap measurements, which we will forward to you soon.

ATTACHMENT 1

Strawman
SEARCH Science Plan Outline
6/25/99

1. Executive Summary
2. Introduction
    a. Brief description of change and importance
    b. Community reaction, organizational efforts to date
    c. Agency / Logistical context, present and future
    d. This plan and future requirements
3. Background
    a. Complete description of the physical change so far
        i. Atmosphere
        ii. Ice/ocean
        iii. Terrestrial ice / frozen ground
    b. Relevance
        i. Relation to climate change
        ii. Potential feedbacks
        iii. Observed biological / human impact
4. Hypotheses
5. Objectives
    a. Track the changes
    b. Gain historical perspective
    c. Understand the changes
    d. Predict future changes /consequences
6. Strategy
    a. Long-term measurements
        i. Future observations
        ii. Historical/paleo
    b. Modeling and Data Synthesis
    c. Process Studies
    d. Assessment for stakeholders and non-phys disciplines
7. Relation to other programs

    (PARCS, LAII, HARC, NSF Atmos Sci, GOOS?)
8. Recommended Action & Organization
    a. Science Steering Committee
    b. Project Office
        i. Program coordination
        ii. Information dissemination
        iii. Logistics coordination

ATTACHMENT 2

Agenda for SEARCH Science Plan Workshop
June 30, July 1& 2, 1999
Hardisty Conference Center
The Applied Physics Laboratory, University of Washington
1013 NE 40th St
Seattle, WA.

Day 1: Wednesday, June 30, 1999

0800-0830	Registration / Pastries, Fruit, Juice, Coffee and Tea
0830-0835	Welcome - Moritz, Chair Polar Science Center
0835-0910	Agenda, SEARCH Background and Update - Morison
0910-0930	NSF Perspective on SEARCH - Christensen
0930-1000	Science Plan Outline, Background, Hypotheses, Discuss
1000-1020	Break
1020-1200	Working Groups - Background, Hypotheses
1200-1300	Pizza Lunch at APL
1300-1320	TBD
1320-1500	Working Groups - Background, Hypotheses
1500-1520	Break
1520-1630	Working Group Reports
1630-1730	Discussion

Dinner on your own

Day 2: Thursday, July 1, 1999)

0800-0830	Continental Breakfast
0830-0845	SEARCH Outline, Objectives & Strategy - Morison
0845-0915	Science Plan Outline, Objectives & Strategy, Discuss
0915-1000	Working Groups - Objectives & Strategy
1000-1020	Break
1020-1105	Working Groups - Objectives & Strategy
1105-1200	Short Reports on International Programs
1200-1300	Lunch at APL
1300-1320	TBD
1320-1500	Working Groups - Objectives & Strategy
1500-1520	Break
1520-1630	Working Group Reports - Objectives & Strategy
1630-1730	Discussion
1830	Dinner at Ivar's

Day 3: Friday, July 2, 1999

0800-0830	Continental Breakfast
0830-0930	SEARCH Science Plan, Assessment - Discussion
0930-1000	SEARCH Organization - Discuss
1000-1020	Break
1020-1130	Working Groups, Organization
1130-1200	Working Group Reports
1200	Adjourn, SSC Discussions at lunch, afternoon

ATTACHMENT 3

WED I

Groups for Section 3a, Description of Change so Far, Wed Part I

Note: Names in bold are SSC. Underlined names are Group Leaders

Atmosphere/Ice Observations of Change

Overland, Jim
Mike Wallace
John Walsh
Jennifer Francis
Battisti, Dave
David Bromwich
Bob Dickson
Jim Maslanik

Ocean Observations of Change

Schlosser, Peter
Knut Aagaard
Jim Swift
Miles McPhee
Mike Steele
Tom Dellworth
Toshi Takazawa
Leo Timokhov
Ursula Schauer
Drew Rothrock
Jinlun Zhang

Terrestrial, Glaciological, Paleo Evidence of Change

Serreze, Mark
Marc Steiglitz
Pat Anderson
Linda Brubaker
Morison, Jamie

Biological Observations of Change

Jackie Grebmeier,
Codispoti, Lou
Kim Petersen
Igor Melnikov
Caleb Pungowiyi
Sue Moore

Human Dimension Observations of Change

Jack Kruse
Dolly Garza
Larry Hamilton
Sergei Pryamikov

WED II

Groups for Sections 3b and 4, Relevance and Hypotheses, Wednesday Part II

Relation to Climate Change

Battisti, Dave
Serreze, Mark
Mike Wallace
John Walsh
Jim Swift
Drew Rothrock
Bob Dickson
Tom Dellworth
Pat Anderson
Toshi Takazawa
Ursula Schauer
Schlosser, Peter

Feedbacks

Knut Aagaard
Overland, Jim
Miles McPhee
Mike Steele
Jennifer Francis
Jinlun Zhang
Jim Maslanik
David Bromwich
Marc Steiglitz
Linda Brubaker
Leo Timokhov

Long-term Biological Relevance

Codispoti, Lou
Jackie Grebmeier,
Kim Petersen
Igor Melnikov
Caleb Pungowiyi

Long-term Social Relevance

Jack Kruse
Dolly Garza
Larry Hamilton
Sergei Pryamikov
Sue Moore
James Morison

THURS I

Groups for Sections 5a,b & 6a, Objectives and Strategy
Tracking Change, History, Long-term Measurements, Thurs. Part I

Tracking Atmosphere/Ice Change

Overland, Jim
Mike Wallace
John Walsh
Jennifer Francis
Battisti, Dave
David Bromwich
Bob Dickson
Jim Maslanik

Tracking Ice/Ocean Change

Schlosser, Peter
Knut Aagaard
Jim Swift
Miles McPhee
Mike Steele
Tom Dellworth
Toshi Takazawa
Leo Timokhov
Ursula Schauer
Drew Rothrock
Jinlun Zhang

History and Tracking Terrestrial, Glaciological Change

Serreze, Mark

Marc Steiglitz

Pat Anderson

Linda Brubaker

Morison, Jamie

Tracking Biological Change

Jackie Grebmeier,

Codispoti, Lou

Kim Petersen

Igor Melnikov

Caleb Pungowiyi

Sue Moore

Tracking Changes in the Human Dimension

Jack Kruse

Dolly Garza

Larry Hamilton

Sergei Pryamikov

THURS II

Groups for Sections 5c,d and 6b,c,d, Understand/Predict the Changes ➔ Modeling, Data Synthesis, Process Studies, and Assessment, Thurs, Part II

Modeling

Battisti, Dave

David Bromwich

Jinlun Zhang

Tom Dellworth

Marc Steiglitz

Miles McPhee

Mike Steele

Drew Rothrock

Data Synthesis

Serreze, Mark

Mike Wallace

Overland, Jim

John Walsh

Jennifer Francis

Bob Dickson

Jim Maslanik

Linda Brubaker

Schlosser, Peter

Jim Swift

Toshi Takazawa

Leo Timokhov

Ursula Schauer

Process Studies

James Morison

Knut Aagaard

Jackie Grebmeier,

Dolly Garza

Larry Hamilton

Igor Melnikov

Assessment

Codispoti, Lou

Jack Kruse

Kim Petersen

Caleb Pungowiyi

Sergei Pryamikov

Sue Moore

Pat Anderson

ATTACHMENT 4

Knut Aagaard
Univ. of Washington
Seattle WA

David Battisti
Univ. of Washington
Seattle WA

David Bromwich
Byrd Polar Research Center
Columbus OH

Linda Brubaker
College of Forest Resources
Univ. of Washington
Seattle WA

John Christensen
Office of Polar Programs
National Science Foundation
Arlington

Lou Codispoti
Horn Point Env. Lab
Cambridge MD

Tom Delworth
GFDL/NOAA/Princeton Univ.
Princeton NJ

Bob Dickson
Centre for Environment
Suffolk UK

Jennifer Francis
Rutgers Univ.
New Brunswick NJ

Dolly Garza
Marine Advisory Prgm
Sitka AK

Jackie Grebmeier
University of Tennessee

Lawrence Hamilton
Univ. of New Hampshire
Durham NH

Jack Kruse
Univ. of Massachusetts
Leverett MA

Jim Maslanik
Univ. of Colorado
Boulder CO

Miles McPhee
McPhee Research
Naches WA

Humfrey Melling
Inst. of Ocean Sciences
Sidney BC Canada

Igor Melnikov
Russian Academy of Sciences
Moscow Russia

Sue Moore
National Marine Mammal Laboratory
NOAA/NMFS?APSC
Seattle WA

Jamie Morison
Univ. of Washington
Seattle WA

Jim Overland
NOAA/Pacific Marine Env. Lab
Seattle WA

Jonathan Overpeck
NOAA Paleoclimatology Prgm
Boulder CO

Don Perovich
CRREL
Hanover NH

Kim Peterson
Univ. of Alaska
Anchorage AK

Andrey Proshutinsky
Univ. of Alaska
Fairbanks AK

Sergei Pryamikov
Arctic and Antarctic Res. Inst.
St. Petersburg Russia

Caleb Pungowiti
Nome AK

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Univ of Washington
Seattle WA

Ursula Schauer
Alfred Wegener Inst.
Bremerhaven Germany

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Palisades NY

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Boulder CO

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Seattle WA

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Lamont-Doherty Earth Obs.
Palisades NY

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La Jolla CA

Takatosh Takizawa
JAMSTEC
Yokosuka Japan

Leo Timikhov
Arctic and Antarctic Res. Inst.
St. Petersburg Russia

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