SEARCH SSC Meeting, Washington DC, 13-15 Feb 2012

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Chair, SEARCH Science Steering Committee

• Brief introduction to the SEARCH context & structure
• SEARCH Vision & Mission
• SEARCH Goals & Objectives
• Activities: (i) Observing Network & AON Design & Implementation Task Force; (ii) Understanding Arctic Change Task Force, (iii) Responding to Change (iv) Sea Ice Outlook & SIWO
A changing Arctic

Regime shifts in climate and the environment that are about to exceed range of past variability and change

Sweeping impacts of change on Northern populations and cultures

Increasing interdependence between the Arctic region and global processes

Expansion of global geopolitical and economic interests into the North

Barrow hunting camp (Photo: Bill Hess)

NSIDC

ACIA

BP Northstar

Photo: BP
What is SEARCH?

- Collaborative scientific program
- Works with academic and government agency scientists to prioritize, plan, conduct, and synthesize research focused on Arctic environmental change
- Guided by Science Steering Committee and several panels and working groups with broad representation of the research community
- Response of the research community Arctic change
Vision & Mission (Draft)

**Vision:** Scientific understanding of arctic environmental change to help society understand and respond to a rapidly changing Arctic.

**Mission:** To provide a foundation of arctic change science through collaboration with the research community, funding agencies, and other stakeholders.
Mission specifics

• Generate & synthesize research findings, promote arctic science & scientific discovery across disciplines & among agencies
• Identify emerging issues in arctic environmental change
• Provide information resources to arctic stakeholders, policy-makers & the public to help them understand & respond to arctic environmental change
• Coordinate with national and international arctic science programs integral to SEARCH goals
• Facilitate research activities across local-to-global scales, emphasizing incorporation of stakeholder concerns from the start of the planning process
• Collaborate with the U.S. arctic environmental change science community in international and global change research initiatives
SEARCH
Key Documents & Milestones

- 2001 SEARCH Science Plan
- 2003 SEARCH Implementation Strategy Document
- 2005 SEARCH Implementation Workshop Report
- 2008 SEARCH/DAMOCLES Arctic Observation Integration Workshops & Report
- 2009 SEARCH State of the Arctic Observing Network (AON) Workshop & Report
- 2010 Interagency AON Working Group Meeting
Strategic Planning Timeline

1. Develop Draft Vision and Mission
   \((Winter/\text{Spring} \, 2011)\)

2. Develop Draft 5-Year Goals & Objectives
   \((Summer/\text{Fall} \, 2011)\)

3. Develop Implementation Plan & Structure
   \((Winter \, 2011/2012)\)

4. Annual Review
   \((first \, review \, \text{Fall} \, 2012)\)
SEARCH Strategy & Organization

Science Plan & Implementation Strategy at:
http://arcus.org/SEARCH/index.php

Observing system
Focus of AON

Understanding Change
SEARCH/ARCSS Task Force

Responding to Change; To be implemented

OBSERVATIONS
Long-term and Pan-Arctic

MODELING
Data Assimilation

PROCESS STUDIES
Understanding Specific Links

APPLICATION
Impact on Ecosystem and Society
SEARCH’s Tripartite Approach to Arctic Change

**Understanding**
- Process & scenario modeling
- Prediction

**Responding**
- Adaptation
- Mitigation
- Sustainability
- Decision support
- Education

**Observing**
- AON data & information
- AON design/optimiz’n
- Cross-sector/int’l coordination
Draft 5-Year Goals

1. Improve Understanding and Prediction of Sea Ice Changes and the Consequences for Ecosystems, Human Activities, and Climate

2. Understand the Consequences of the Loss of Shallow Permafrost on Arctic and Global Systems

3. Improve Predictions of Future Land-Ice Loss and Impacts on Sea Level

4. Analyze Societal and Policy Implications of Arctic Environmental Change
SEARCH
5-Year Goals & Objectives

Understanding

Responding

Societal & policy implications

Land-ice loss & sealevel

Impacts of sea-ice loss

Permafrost warming & landscape change

Observing
Observing Change

Understanding

Responding

Observing
Observing Change Panel

- Co-chaired by Craig Lee & Taneil Uttal
- New members (with a number from federal agencies) joining
- Data Working Group
- Arctic Observing Coordination Workshop (OC co-chaired by John Payne & Don Perovich)
- Leadership of Arctic Observing Summit
Arctic Observing Network (AON)

- Roughly 50 NSF-supported AON projects
- Data dissemination and archival at Coop Arctic Data & Information Service www.aoncadis.org
- State of AON:
  - Scientific community, federal/state/local agencies, stakeholders and general public all with a vision for an Arctic observing system
  - Action toward improved networking & coordination getting underway
Arctic Observing Network (AON)

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Data Support Services for the NSF Arctic Program - we started with CADIS....

• The Cooperative Arctic Data and Information System

• CADIS mandate
  – For the Arctic Observing Network
  – Serve NSF-funded AON investigators by archiving AON data
What CADIS looks like

Appreciated features of the current (A)CADIS

- Metadata authoring by data contributors
- Data are available right away
- Catalog sharing
Transition to Advanced CADIS (ACADIS)

• A new mandate
  – For all NSF programs that collect Arctic data
  – Serve NSF-funded Arctic investigators by archiving data from many field programs

• Other changes:
  – An advisory group
  – Value-added products
  – Two full time Data Curators
  – New data types – biological, social, terrestrial, ecological
AON Design & Implementation (ADI) Task Force

- **Evaluate** status of AON relative to science questions
- **Aid design & adaptation** of AON components through rigorous, quantitative approaches
- **Synthesize** information from current AON & design studies to guide optimization and implementation
- **Coordinate** between national & international efforts

- Membership: 14 experts representing Arctic (8) and lower-latitude (6) perspectives
- Workshops, community survey (n = 119) & proof-of-concept studies, report in 2012
- Resources and status information available at: [http://www.arcus.org/search/aon/](http://www.arcus.org/search/aon/)
US Arctic Observing Coordination Meeting

- **Goals:** Interagency coordination of long-term environmental observations at the national level; formulation of national strategy for Arctic Observing Summit
- **20-22 March 2012, Anchorage, AK** (invitation-based, with potential openings for self-nomination)
- **Participants:** Agency scientists, AON PIs, and others
Arctic Observing Summit 2013

• Pan-Arctic coordination of observing efforts
• Data sharing & distribution
  – Access & logistics
  – Network design & optimization
• Current planning (led by International Study of Arctic Change – ISAC)
  – Organizing committee (co-led by Lee, Jakobsson, Zhao) in place
  – Identify core themes & manageable tasks
  – SAON task
Understanding Change

Understanding

Responding

Observing
Understanding Change Panel

- Co-chaired by John Walsh & Matt Berman
- Understanding Arctic Change Task Force co-chaired by John Walsh & Josh Shimel
- Assessment of the state of the AON relative to SEARCH & ISAC science questions
- Understanding Arctic Change Task Force & Report
Understanding Arctic Change (UAC) Task Force

• Establish a long-term vision & provide scientific framework for modern effort of understanding the arctic system
• Collaboration between SEARCH & ARCSS programs
• Identify key unknowns & key science questions for understanding arctic system change
• Identify the next steps in synthesis activities, methodologies, mechanisms, and approaches to address the identified key science questions
• Co-chaired by Josh Schimel & John Walsh, 18 members
• Workshop & white paper, to be concluded in 2011
• Information available at: http://www.arcus.org/search/understanding/
Science questions: UAC 2012

1. How Predictable are Different Aspects of the Arctic System? How Can Improved Understanding of Predictability Help Planning, Mitigation & Adaptation?
2. What Tipping Points & Abrupt Changes are Most Consequential for Ecosystems & Humans?
3. How Will the Critical Intersections Between Human & Natural Systems in the Arctic Change Over the Next Several Decades?
4. What are the Critical Linkages Between the Arctic System and the Global System?
5. How will Cryospheric Changes Drive Changes the Economic, Social, and Environmental Components of the Arctic System?
Digest: UAC 2012

• Approaches
  1. Inter/transdisciplinary research
  2. Utilize place-based science
  3. Intensive science retreats
  4. Focus on down-scaled predictions & projections
  5. Synthesis activities
  6. On-line sharing and public engagement

• Program management
• Capacity-building
• Communication
• Partnership & coordination
• Data & information sharing
Responding to Change

Understanding

Responding

Observing
Responding to Change Panel

• Chaired by Jack Kruse
• Prepared guiding document out of 2005 SEARCH Implementation Workshop; presently inactive pending further guidance from SSC

• Challenge of Responding to Change benefits from international collaboration
• SEARCH contributing to International Study of Arctic Change Workshop
• Partnering with EU ACCESS program
ISAC Responding to Change Workshop

• International workshop:

  Responding to Arctic Environmental Change: Translating Our Growing Understanding into a Research Agenda for Action

  30 Jan – 1 Feb, 2012
  Queen’s University, Kingston, ON, Canada

• Information available at:
  http://www.arcticchange.org
Observing

Respon-
ding

Understanding

Stake-
holders

Desirable
Outcomes

Arctic
System
Services
SEARCH Arctic Sea Ice Outlook

- International effort (led by SEARCH & DAMOCLES programs) to anticipate, track & evaluate Arctic seasonal ice evolution starting in the summer of 2008 with contributions by more than 20 international expert groups

- Regional outlook: Regional ice development important to stakeholders & decision-makers

- www.arcus.org/search/seaiceoutlook
Sea Ice Outlook Survey (n=77)

- By having the outlook, it provides a look at the why the ice looks as it does. It provides analysts an idea of the whole picture and what to look for. [National Ice Center]

- We use it at NPS to watch what might happen to park shores with sea ice retreat and adjacent area communities. Sea ice also impacts marine mammals and subsistence uses of them. [National Park Service]

- As a Meteorological Technician in Barrow, Alaska, I use the outlook in helping the community plan for hunting and fishing and it adds a level of safety. [National Weather Service]

- I've used Outlooks over the past couple of years to better understand where uncertainties lie (within the various approaches). [Oil & Gas Industry]
Sea Ice for Walrus Outlook (SIWO): www.arcus.org/search/siwo

Overview

The Sea Ice for Walrus Outlook (SIWO), an activity of the SEARCH Sea Ice Outlook, is a resource for Alaska Native subsistence hunters, coastal communities, and others interested in sea ice and walruses.

The SIWO is updated weekly with information on sea ice conditions relevant to walrus in the Northern Bering Sea and southern Chukchi Sea regions of Alaska. SIWO updates will be released every Friday through late June.

The SIWO webpage includes: (1) An assessment of current ice conditions relevant to distribution and access of walrus, (2) a 10-day outlook of wind conditions, (3) up-to-date satellite imagery for the Bering Strait and St. Lawrence Island, which are two regions of interest to coastal communities engaging in the walrus hunt, (4) written observations of ice development from Alaska Native hunters, sea-ice experts, or NOAA or University researchers, (5) additional data and resources on ice conditions, and (6) additional comments provided by local experts and other contributors.

If you are a local hunter, expert, or a scientist with observations on either the development of sea ice or any other aspect of walrus and sea ice, please send your comments to Helen Wiggins at the Sea Ice Outlook Central Office at ARCUS, your comments will be posted to this page.

This collaboration includes weather and ice forecasters, climate scientists and sea-ice researchers at NOAA, the National Weather Service, and the University of Alaska who are teaming up with Alaska Native sea-ice experts and the Eskimo Walrus Commission. Key contacts are:

Kristina Craig, Ronne Owens, Helen Wiggins - Sea Ice Outlook Central Office, ARCUS
Vera Kingisuk Metcalfe - Eskimo Walrus Commission
Hoa Eicken - University of Alaska Fairbanks
Gary Hufford, Don Moors - National Weather Service
Jim Overland, Nancy Sorensen, Tracey Nakamura, Nick Bond - National Oceanic and Atmospheric Administration
SEARCH 5-Year Goals & Objectives

Understanding
- Societal & policy implications
- Land-ice loss & sea-level

Responding
- Impacts of sea-ice loss
- Permafrost warming & landscape change

Observing
Responding to Change: A Definition*

Given the nature of the system responding to change is actors jointly developing an iterative and integrative process and options for navigating change.

*From the ISAC Responding to Change Workshop

- large range of spatial & temporal scales
- complexity
- uncertainty, change is certain
Responding to Change: A Definition*

Given the nature of the system responding to change is actors jointly developing an iterative and integrative process and options for navigating change.

- across all scales (local to international)
- bridging science-policy-management-public

*From the ISAC Responding to Change Workshop
Responding to Change: A Definition*

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*From the ISAC Responding to Change Workshop

- capacity building
- policy issues
- coordination
- integration (incl. management plans)