International Study of Arctic Change

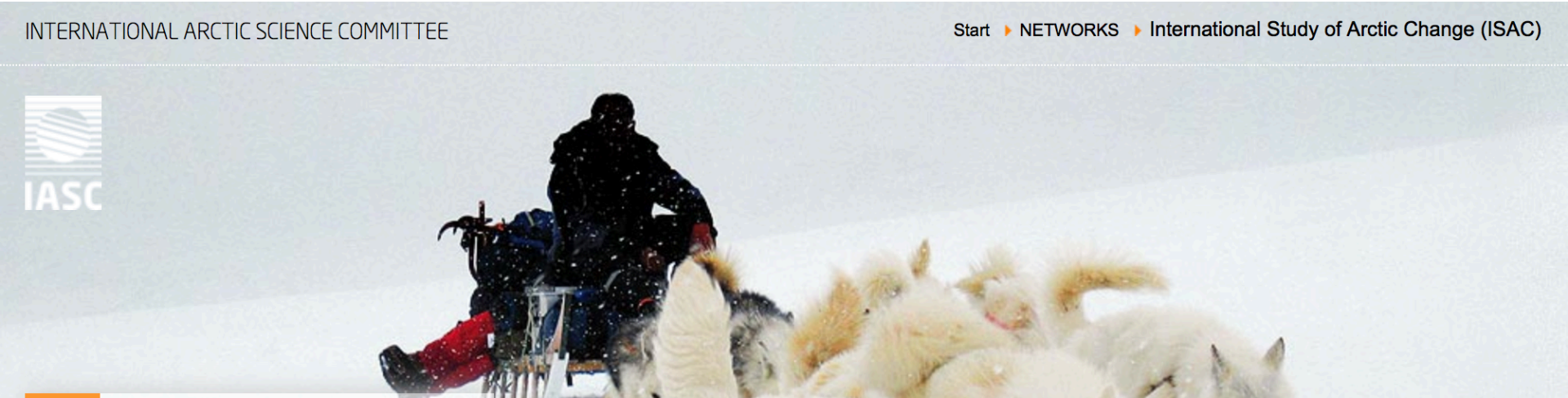
Timely, Relevant and Accessible Scientific Information for Responding to Arctic Change

6th Annual Town Hall – AGU 2014
December 17 2014

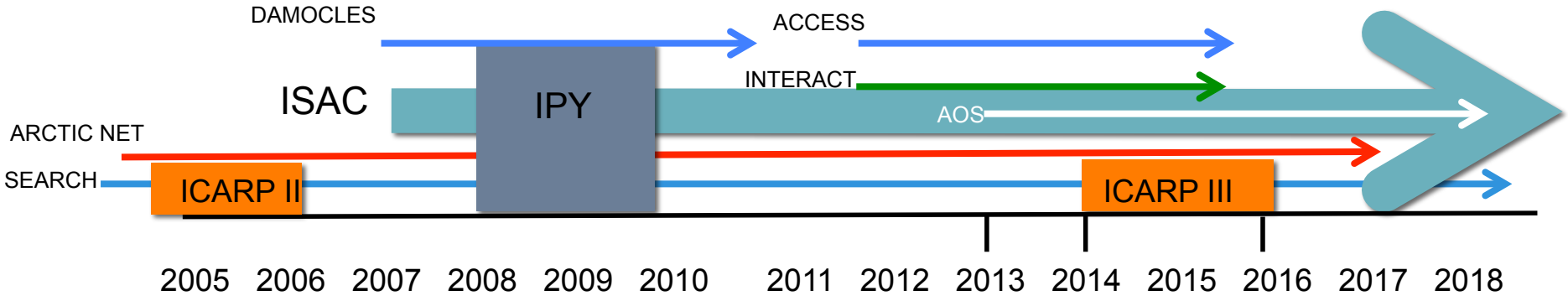
ISAC

Background

- Initiated in 2003 by the International Arctic Science Committee and the Arctic Ocean Sciences Board.
- Prompted by:
  - need for improved collaboration and coordination of research
  - need for an overarching plan that addressed pressing science questions
- A formal ISAC Program Office was created in 2007.
- ISAC is an IASC Network.



ISAC: An IPY Legacy



What is ISAC?

- Multidisciplinary Arctic environmental change research program.
- Engages researchers, community members, managers, and others in research planning, implementation, data-sharing and synthesis.
- Knowledge translation to advance observing and understanding of Arctic change for improved decision making.

Science Steering Group Co-Chairs

Peter Schlosser, USA
Jean Claude Gascard, France

SSG Members

David Atkinson, Canada
Hiroyuki Enomoto, Japan
Christine Cuyler, Denmark/Greenland
Jinping Zhao, China
Michael Tjernström, Sweden

+ 3 New Members in 2015

ISAC International Program Office
Arctic Institute of North America, University of Calgary

Executive Director: Maribeth S. Murray, Ph.D.
Associate Director: Gabriela Ibarguchi, Ph.D.
Research Associate: Vinay Rajdev, MA

Chinese Office: Qingdao

Former Program Office Locations:
SPRS, Stockholm; IARC, UAF Fairbanks

Mission

To provide a **scientific & organizational framework** focused around ISAC Science Questions for pan-Arctic research, including **long term planning & priority setting**.

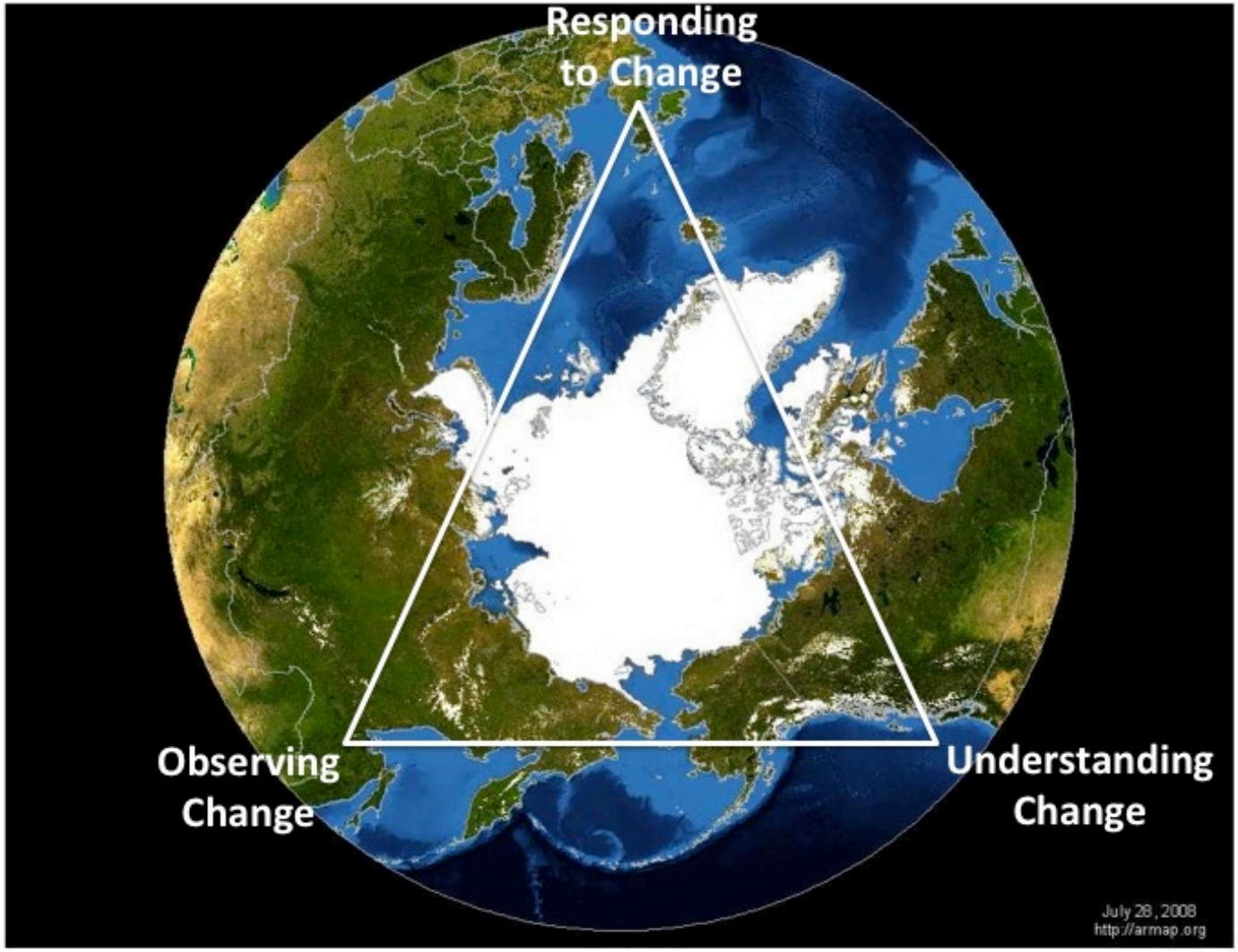
To **establish new & enhance existing synergies** among scientists and stakeholders who are engaged in arctic environmental research & governance.

To **promote observations, synthesis, & modeling activities** to provide an integrated understanding of the past, present and future arctic environment; this understanding is needed for responding to change.

To **foster links** between arctic environmental change initiatives and relevant global programs.

To **provide, in collaboration with partner organizations, authoritative, timely and accessible scientific information** needed for responding to rapid arctic environmental change.

ISAC Components



Implementation Goals

Observing Change:

An international, integrated, comprehensive, and sustained arctic observing system responsive to scientific and societal needs for information on arctic change.

Understanding Change

To improve projections of the arctic system and identify emerging issues.

Responding to Change

Developing and communicating science for problem solving, managing, and adapting to future arctic changes.

Recent Responding to Change Activities

RtoC 1

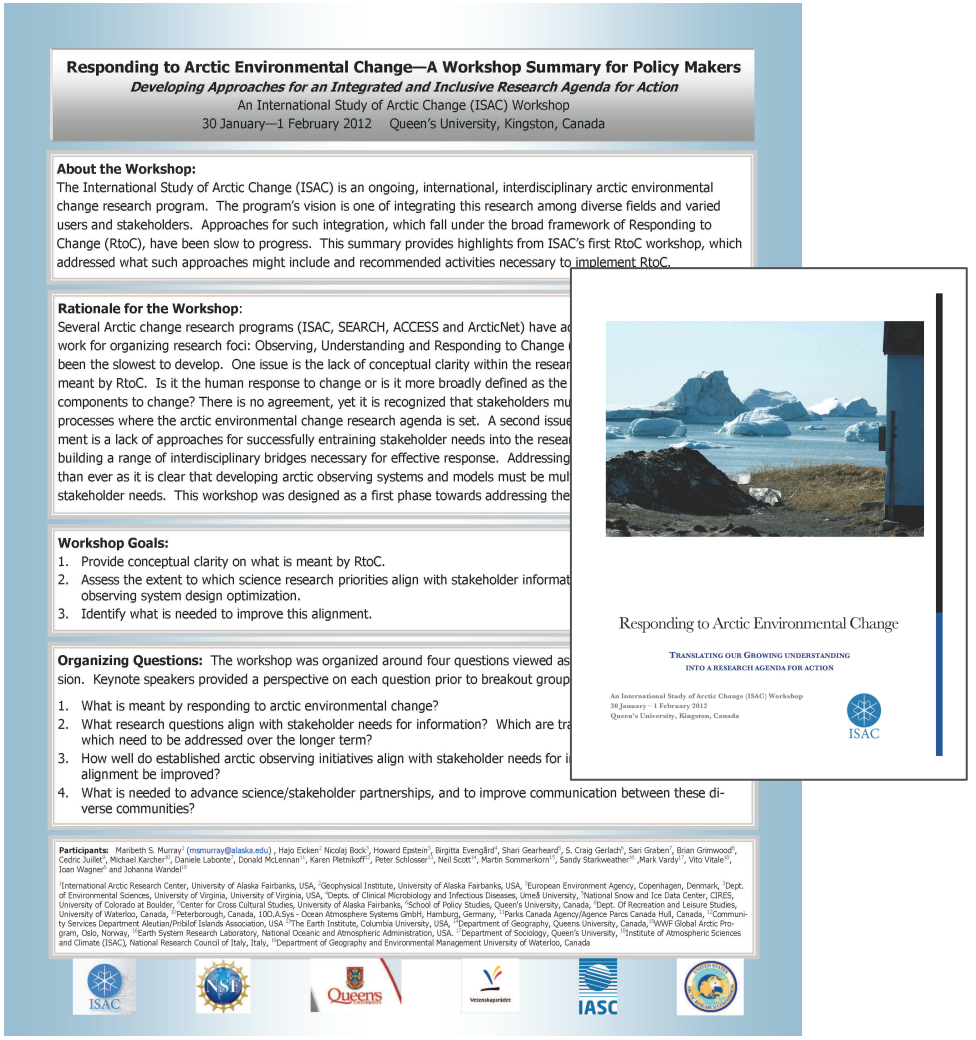
Kingston, Canada 2012,
Workshop report available online.

RtoC 2

Tromsø, Norway 2014
In partnership with ACCESS

"How can the science of Arctic Change connect to responding on arctic change?"

Short report coming in 2015 with larger (100+ participants) planned for the next 16 months.



Responding to Arctic Environmental Change—A Workshop Summary for Policy Makers

Developing Approaches for an Integrated and Inclusive Research Agenda for Action

An International Study of Arctic Change (ISAC) Workshop
30 January—1 February 2012 Queen's University, Kingston, Canada

About the Workshop:
The International Study of Arctic Change (ISAC) is an ongoing, international, interdisciplinary arctic environmental change research program. The program's vision is one of integrating this research among diverse fields and varied users and stakeholders. Approaches for such integration, which fall under the broad framework of Responding to Change (RtoC), have been slow to progress. This summary provides highlights from ISAC's first RtoC workshop, which addressed what such approaches might include and recommended activities necessary to implement RtoC.

Rationale for the Workshop:
Several Arctic change research programs (ISAC, SEARCH, ACCESS and ArcticNet) have a
work for organizing research foci: Observing, Understanding and Responding to Change
been the slowest to develop. One issue is the lack of conceptual clarity within the resear
meant by RtoC. Is it the human response to change or is it more broadly defined as the
components to change? There is no agreement, yet it is recognized that stakeholders mu
processes where the arctic environmental change research agenda is set. A second issue
ment is a lack of approaches for successfully entraining stakeholder needs into the resea
building a range of interdisciplinary bridges necessary for effective response. Addressing
than ever as it is clear that developing arctic observing systems and models must be mul
stakeholder needs. This workshop was designed as a first phase towards addressing the

Workshop Goals:
1. Provide conceptual clarity on what is meant by RtoC.
2. Assess the extent to which science research priorities align with stakeholder informat
observing system design optimization.
3. Identify what is needed to improve this alignment.

Organizing Questions: The workshop was organized around four questions viewed as
sion. Keynote speakers provided a perspective on each question prior to breakout group

1. What is meant by responding to arctic environmental change?
2. What research questions align with stakeholder needs for information? Which are tra
which need to be addressed over the longer term?
3. How well do established arctic observing initiatives align with stakeholder needs for i
alignment be improved?
4. What is needed to advance science/stakeholder partnerships, and to improve communication between these di-
verse communities?

Participants: Maribeth S. Murray[1] (msmurray@alaska.edu) , Hajo Eicken[2] Nicolaj Bock[3], Howard Epstein[4], Birgitta Evengård[5], Shari Gearheard[6], S. Craig Gerlach[7], Sari Graben[7], Brian Grimwood[8], Cedric Juillet[9], Michael Karcher[10], Danielle Labonte[11], Donald McLennan[12], Karen Pletnikoff[13], Peter Schlosser[14], Neil Scott[15], Martin Sommerkorn[16], Sandy Starkweather[17] ,Mark Vardy[18], Vito Vitale[19], Ioan Wagner[20] and Johanna Wandel[21]

[1]International Arctic Research Center, University of Alaska Fairbanks, USA, [2]Geophysical Institute, University of Alaska Fairbanks, USA, [3]European Environment Agency, Copenhagen, Denmark, [4]Dept. of Environmental Sciences, University of Virginia, University of Virginia, USA, [5]Depts. of Clinical Microbiology and Infectious Diseases, Umeå University, [6]National Snow and Ice Data Center, CIRES, University of Colorado at Boulder, [7]Center for Cross Cultural Studies, University of Alaska Fairbanks, [8]School of Policy Studies, Queen's University, Canada, [9]Dept. Of Recreation and Leisure Studies, University of Waterloo, Canada, [10]Peterborough, Canada, 100.A.Sys - Ocean Atmosphere Systems GmbH, Hamburg, Germany, [12]Parks Canada Agency/Agence Parcs Canada Hull, Canada, [13]Community Services Department Aleutian/Pribilof Islands Association, USA [14]The Earth Institute, Columbia University, USA, [15]Department of Geography, Queens University, Canada,[16]WWF Global Arctic Program, Oslo, Norway, [17]Earth System Research Laboratory, National Oceanic and Atmospheric Administration, USA. [18]Department of Sociology, Queen's University, [19]Institute of Atmospheric Sciences and Climate (ISAC), National Research Council of Italy, Italy, [20]Department of Geography and Environmental Management University of Waterloo, Canada

Responding to Arctic Environmental Change

TRANSLATING OUR GROWING UNDERSTANDING INTO A RESEARCH AGENDA FOR ACTION

An International Study of Arctic Change (ISAC) Workshop
30 January – 1 February 2012
Queen's University, Kingston, Canada

ISAC

Responding to Change: Future Activities

New Partnerships for Science to Improve RtoC

Arctic Observing Summit 2016

INTERACT – partnership for community engagement

CBMP – how to integrate this and other AC activities

Future Earth – connecting with new Arctic initiative

The Arctic Observing Summit 2013, 2014, 2016

Progress Towards an Integrated, Multipurpose, International Arctic Observing System

The biennial **Arctic Observing Summit (AOS)** is key to implementation of the observing component of the ISAC Science Plan (Murray 2010). The AOS is coordinated by the ISAC Program Office, the ISAC Science Steering Group and ISAC partners.

A Pan-Arctic Observing System must be:

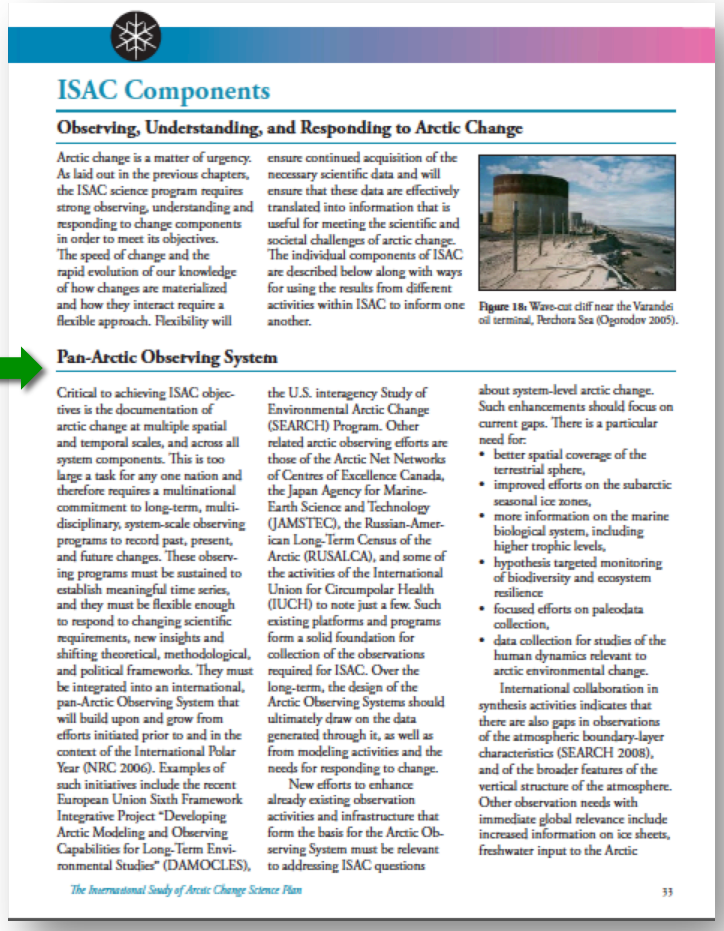
- **integrated** one allowing for merging of data streams
- **focused** around central science questions and societal needs
- **relevant** to people's lives, decision making and policy

Observing System Design:

- is **critical**
- the system should be **responsive** to arctic system change
- responsive to needs for improved **understanding** and **adaptation** to and **mitigation** of change.

The AOS must be **connected** with global observing systems.

(from: ISAC Science Plan 2010)



ISAC Components

Observing, Understanding, and Responding to Arctic Change

Arctic change is a matter of urgency. As laid out in the previous chapters, the ISAC science program requires strong observing, understanding and responding to change components in order to meet its objectives. The speed of change and the rapid evolution of our knowledge of how changes are materialized and how they interact require a flexible approach. Flexibility will ensure continued acquisition of the necessary scientific data and will ensure that these data are effectively translated into information that is useful for meeting the scientific and societal challenges of arctic change. The individual components of ISAC are described below along with ways for using the results from different activities within ISAC to inform one another.

Figure 18: Wave-cut cliff near the Varandei oil terminal, Pechora Sea (Ogorodov 2005).

Pan-Arctic Observing System

Critical to achieving ISAC objectives is the documentation of arctic change at multiple spatial and temporal scales, and across all system components. This is too large a task for any one nation and therefore requires a multinational commitment to long-term, multi-disciplinary, system-scale observing programs to record past, present, and future changes. These observing programs must be sustained to establish meaningful time series, and they must be flexible enough to respond to changing scientific requirements, new insights and shifting theoretical, methodological, and political frameworks. They must be integrated into an international, pan-Arctic Observing System that will build upon and grow from efforts initiated prior to and in the context of the International Polar Year (NRC 2006). Examples of such initiatives include the recent European Union Sixth Framework Integrative Project "Developing Arctic Modeling and Observing Capabilities for Long-Term Environmental Studies" (DAMOCLES), the U.S. interagency Study of Environmental Arctic Change (SEARCH) Program. Other related arctic observing efforts are those of the Arctic Net Networks of Centres of Excellence Canada, the Japan Agency for Marine-Earth Science and Technology (JAMSTEC), the Russian-American Long-Term Census of the Arctic (RUSALCA), and some of the activities of the International Union for Circumpolar Health (IUCH) to note just a few. Such existing platforms and programs form a solid foundation for collection of the observations required for ISAC. Over the long-term, the design of the Arctic Observing Systems should ultimately draw on the data generated through it, as well as from modeling activities and the needs for responding to change.

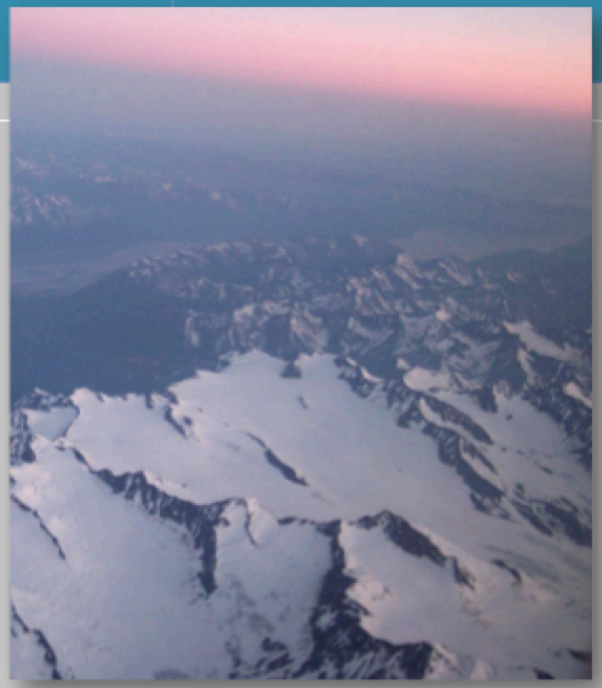
New efforts to enhance already existing observation activities and infrastructure that form the basis for the Arctic Observing System must be relevant to addressing ISAC questions about system-level arctic change. Such enhancements should focus on current gaps. There is a particular need for:

- better spatial coverage of the terrestrial sphere,
- improved efforts on the subarctic seasonal ice zones,
- more information on the marine biological system, including higher trophic levels,
- hypothesis targeted monitoring of biodiversity and ecosystem resilience
- focused efforts on paleodata collection,
- data collection for studies of the human dynamics relevant to arctic environmental change.

International collaboration in synthesis activities indicates that there are also gaps in observations of the atmospheric boundary-layer characteristics (SEARCH 2008), and of the broader features of the vertical structure of the atmosphere. Other observation needs with immediate global relevance include increased information on ice sheets, freshwater input to the Arctic

Arctic Observing Summit

Report on Outcomes 2013 and 2014



Comprehensive, Adaptive
and Sustained Arctic Observing

Arctic Observing Summit 2013 and 2014
Report on Outcomes

The Arctic Observing Summit: A Sustaining Arctic Observing Networks Task led by the International Study of Arctic Change

PARTNERS

International Study of Arctic Change (ISAC)

Sustaining Arctic Observing Networks (SAON)

International Arctic Science Committee (IASC)

Study of Environmental Arctic Change (SEARCH)

ArcticNet Network of Centres of Excellence Canada

World Meteorological Organization (WMO)

International Arctic Research Centre, University of Alaska Fairbanks (IARC)

Arctic Institute of North America, University of Calgary (AINA)

Finnish Meteorological Institute (FMI)

Swedish Polar Research Secretariat (SPRS)

Inuit Circumpolar Council, Canada (ICC Canada)

Arctic Climate Change, Economy and Society

(ACCESS)

International Network for Terrestrial Research and Monitoring in the Arctic (INTERACT)

European Environment Agency (EEA)

Snowchange Cooperative

National Institute for Polar Research, Japan (NIPR)

Citation: Murray, M.S., Ibarguchi, G., Van der Watt, S.M.E., Schlosser and the AOS Executive Committees 2013 and 2014. 2014 *Arctic Observing Summit: Report on Outcomes 2013 and 2014*. International Study of Arctic Change, International Program Office, Arctic Institute of North America, Calgary, Canada.

AOS Themes 2013/2014

The inaugural AOS, Vancouver, Canada 2013. In advance, participants contributed perspectives and white papers on issues related to Arctic observation. White papers served as the foundation for developing themes for the Summit, focusing discussion and recommending next steps for 2014.

The AOS 2014 (Helsinki, Finland) continued and expanded 2013 themes and recommendations. Participation increased both with respect to both nations and sectors engaged and areas of expertise.

AOS 2013 THEMES

1. State of the current observing system
2. System design and coordination
3. Stakeholder needs and perspectives
4. Coordination, support, sustainability, operation

AOS 2014 THEMES

1. Stakeholder engagement
2. Coordination
3. Technology and innovation
4. Remote sensing solutions
5. Data management, accessibility, and interoperability

Results

1. Whitepapers prepared for the AOS 2013 are being published as a special issue of *Arctic* and a report on AOS achievements is forthcoming.

2. Progress identifying Arctic observing needs and capacities, and priority areas for future attention.

3. Progress toward international consensus on coordination including a collaborative, international funding mechanism.

The AOS illustrates that circumpolar nations, as well as non-Arctic countries, are ready and willing participants to contribute to a sustained, coordinated Arctic observing system.

Recommendations (100+)

- Support for a body to **coordinate cyber-infrastructure**, data accessibility and products.
- Improve **interoperability** among systems and projects.
- Improve **international site accessibility** and data collection.
- Ensure **coverage and continuity** of programs, identify temporal/spatial gaps; improve coverage of the Eurasian sector.
- Improve the **diversity** of participants and develop **inventory** of CBM programs.
- **Link efforts**, standards, methods, variables and indicators in use (e.g. Arctic Council, SAON, GEOSS, WMO, GCW, etc.).
- **Engage stakeholders** at all stages, from assessing needs to the creation of solutions-based, useful products.
- Incorporate **technology** for real-time data capture and accessibility; invest in data rescue and baselines.

Planning for 2016: 3rd Biennial AOS March 15-18, UAF, Fairbanks, Ak.

Exec Committee

Peter Schlosser, ISAC
Hajo Eicken, SEARCH
Eva Krummell, ICC
Larry Hinzman, UAF
Jan Rene Larsen, AMAP

Ex. Officio
Maribeth Murray, ISAC
Volker Rachold, IASC

Preparation of background materials to inform the Summit around these topical areas.

Possible themes with working groups to take these on:

- **Stakeholder Integration**: Indigenous and Private Sector (incl. improved integration of CBM and use of CBM data and TK)
- **Observing needs for improving living conditions**
- **Advancing technology**: e.g., what kind of sensor platforms can be developed to meet societal and scientific needs (northerners shaping observational infrastructure)
- **Dialogue with decision makers**: how to really advance this
- **Funding** building a collaborative and truly integrated international funding mechanism
- Input on **Obs. System definition** with long-term goal of addressing design options

Partners and Support for ISAC Activities
www.arcticchange.org

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