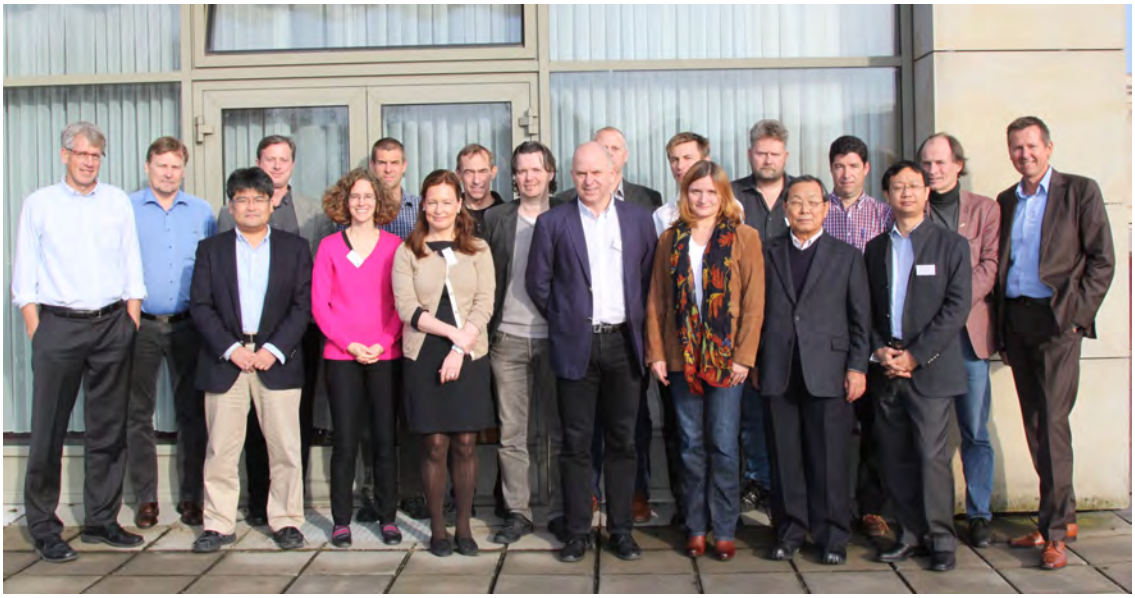
Report of the First Meeting of the Arctic Data Committee



Mercure Hotel Potsdam City
Lange Brücke
14467 Potsdam
Germany

10-11 November 2014

Meeting Details

Meeting: First Meeting of the IASC Data Standing Committee (IDSC) and SAON Committee on Data and Information Services (CDIS)

Time: 10 November 2014, 14:00 – 18:00 ; 11 November 08:30 – 13:00 (CET)

Location:
Mercure Hotel Potsdam City
Lange Brücke
14467 Potsdam
Germany
Room: Studio 1+2.

Attending:

Canada: Julie Friddell (National Representative), David Hik
Finland: Hanna Lappalainen (National Representative)
GEO/GEOSS: Yubao Qiu (GEO Cold Regions)
IASC: Volker Rachold (Executive Secretary)
Iceland: Halldór Jóhannsson (National Representative)
Italy: Paolo Mazzetti
Japan: Hironori Yabuki
Korea: Byon-Kwon Park
Norway: Stein Tronstad (National Representative), Øystein Godøy (Norwegian Meteorological Organization) Helge Sagen (Institute of Marine Research)
Poland Agnieszka Beszczynska-Möller (National Representative)
SAON/AMAP: Jan Rene Larsen, Executive Secretary
Spain: Óscar Bermúdez Molina (National Representative)
Sweden: Ulf Jonsell
United Kingdom: Alex Tate (National Representative)
United States: Peter Pulsifer (Chair, National Representative), Erica Key (National Science Foundation)(Virtual)

Summary of Outcomes

Key motions requiring broad input and decision:

1. The Chair and all meeting participants moved that the IASC Data Standing Committee and the SAON Committee on Data and Information Services be merged to form a single committee. This Committee would be open to interested and engaged individual and organizational participants rather than limited to appointed national representatives. The current working name for this committee is simply the Arctic Data Committee.
2. Confirmation of primary work packages established during the meeting:

Work Package 1. Establishing a map of the arctic data management "ecosystem" or "universe". This will be both a concept map indicating projects, services and relationships as well as a geographic map indicating location. The effort was started during the meeting and will be continued. Peter Pulsifer will be leading this effort.

Task lead: Dr. Peter Pulsifer, ELOKA/NSIDC, USA

Work Package 2. Develop recommendations on a common set of metadata elements relevant across Arctic sciences, to facilitate interoperability and sharing between Arctic data repositories and online portals.. To start, this effort will focus on identifying Arctic data centres or initiatives that have established a metadata template/schema/profile etc.. Initially, a limited set of disciplines or focus areas will be identified to make the scope manageable. Wherever possible and practical, the effort will build on and/or contribute to other related initiatives.

Task lead: Dr. Julie Friddell, Polar Data Catalogue, Canada

Work Package 3. Provide a report and guide on data publication and citation for Arctic researchers. This would provide the Arctic community with a resource to help researchersthem to understand developments in this area, including DOIs (Digital Object Identifiers). . This initiative will be carried out jointly with a project already established under the SCAR Standing Committee on Antarctic Data Management.

Task lead: Alex Tate, British Antarctic Survey, UK

Work Package 4. An interoperability experiment for presentation at the Arctic Science Summit Week / ICARP III meeting in Toyama in April 2015. We will bring together a number of data services under a single interface to address Societal/Science Priority Areas identified under the NSF-led Arctic Observing Assessment and other similar efforts (i.e. GEO/GEOSS etc.). The key focus will be selected areas of societal significance including health and well-being, food security, freshwater security, built infrastructure, coastal and riverine vulnerability, and tele-connections. These are complex areas of interaction between humans and their environment.

Task Lead: Jointly led with early participation interest indicated by Canada, Iceland, Norway, United Kingdom, United States

Detailed Report

1. Introductions

All participants attending the meeting introduced themselves including their name, affiliation and background.

2. Overview and Background of Committees:

    a. Volker Rachold, Executive Secretary, IASC

Dr. Rachold welcomed the group to Potsdam and provided background on the formation of the IASC Data Standing Committee, including reference to the IASC *Statement of Principles and Practices for Arctic Data Management* as a foundational document.

    b. Jan Rene Larsen, Executive Secretary, SAON

Mr. Larsen provided the group with an overview of the formation of the SAON Committee on Data and Information Services in conjunction with the formation of the SAON Committee on Observations and Networks. Both of these committees play important, interrelated roles in moving SAON forward. Key elements of the data strategy include making more data accessible, and establishing long-term funding to maintain this.

    c. David Hik, IASC and SAON Executive, former President, IASC

Dr. Hik started his comments by indicating that both the IASC and SAON executive bodies have discussed the idea of merging IASC DSC and the SAON CDIS. Both Executive bodies agree that merging the committees is desirable in terms of avoiding confusion amongst arctic researchers and the broader Arctic and global community, providing a focus for funders, and strengthening global collaboration. This topic is discussed in Session 5 of Day 1.

    d. Peter Pulsifer, representative for USA, Chair

Dr. Pulsifer started with a brief presentation with a suggested agenda and set of goals for the meeting. See Appendix A.

3. Discussion Session: *Understanding and refining the mandate of, and relationship between, IDSC and CDIS*

Dr. Pulsifer provided a summary of the material distributed before the meeting at http://www.arctichub.net/groups/adcn/wiki/MainPage/IDSCCDISOverview

Following David Hik's statement that the IASC and SAON Executives are open to merging the IDSC and CDIS this discussion was brief. The value of merging the committees was confirmed and a set of follow up tasks was established. See Section 7.

4. Presentation Session: *Identifying and Understanding the Needs of Science and Society*
    a. Presentation: *Identifying and Understanding the Needs of Science and Society*, David Hik. See Appendix B.

Dr. Hik provided an overview of key science and societal priorities. It is critical for us to consider these when taking decisions on priorities, directions, and application development in the context of Arctic data management. As indicated in the presentation, there are many resources to draw on (reports, assessments, etc.).

    b. Presentation: *A roadmap for the future of Arctic research: ICARP III and IPPI* , David Hik. See Appendix C.

An important ongoing initiative to look to for guidance and to which we can contribute.

    c. Presentation: *Societally Significant Observing,* Erica Key, Arctic Observing Network program, National Science Foundation (Virtual). See Appendix D.

5. Discussion Session: *Linking Arctic Data Resources*

Building on an Arctic data resources network map created based on input prior to the meeting, participants collaboratively identified existing, potential or critically important but non-existent relationships between the resources identified. Resources identified were in the form of technology, people, organizations, funding or others. The objective in this session was to go beyond identifying individual resources and to start understanding the current status of Arctic data management resources as a network and the gaps in connectivity. Throughout the process the group associated the discussion with science and societal needs identified earlier in the day. Additionally, the group identified broader relevant initiatives (e.g.,. World Data System, Research Data Alliance). Using concept mapping software, a draft map was created. The map is currently being refined and will be published in draft form soon to continue the process of developing the map. A work package has been defined to manage this effort.

DAY 2

6. Establishing current priorities for Arctic Data Management in the context of IDSC/CDIS

Following the discussion of science and societal priorities and carrying out the preliminary exercise to link Arctic data resources on Day 1, Day 2 started with a discussion of possible priorities for the Committee. Key items of the discussion included the following:

a. The IASC *Statement of Principles and Practices for Arctic Data Management* indicates that the IASC DSC would review data management plans for projects seeking IASC endorsement. When would this activity be expected to start? In theory, this could start immediately, however in practice it will take time to introduce this practice to the broader Arctic research community. Additionally, many projects seeking IASC endorsement do not have data components, so the overall demand is not expected to be large. While the Committee is indicated as the body that will manage the review process, this does not necessarily mean that Committee members will perform the review. They can act in the role of an editor or editorial board and seek qualified reviewers. This process recognizes the state of data in the context of Data Science and the professional processes that entails.
b. Establishing a polar metadata profile in keeping with the SAON Tasks and other initiatives established in the past. A number of questions and concerns were raised: is this really necessary as this is a daunting challenge that may be addressed in other contexts? It was recognized that it is helpful to use the same metadata standards but not absolutely necessary for a base level of interoperability. Brokering technologies were discussed as a method for reducing the need for full standardization. However, there was also recognition that some level of standardization or model development is required to ensure that vocabularies used in metadata can be shared and understood across centers and individuals. There was also recognition that brokering techniques require an understanding of an underlying model to support mediation across metadata collections. The suggestion was made that the scope of the task could be managed by examining existing metadata schemas or profiles being used for Arctic data collections. A number of examples were cited including standards and profiles being used (i.e. DIF, ISO 19115) as well as projects and catalogues (i.e. ADIwg, British Antarctic Survey, IASOA, NSIDC, Polar Data Catalogue). It was agreed that establishing a way forward in this regard, whether it be to develop a recommended set of Arctic or polar metadata elements (for the sake of clarity, we are not using the term

"profile"), or to engage with an existing initiative that will serve the needs of the Arctic/polar community. A work package will be established focusing on this priority. Julie Friddell has offered to coordinate this effort as it fits with ongoing efforts that she has been leading.

c. There was recognition of the increasing importance of data publication and citation. Currently, there are many developments and activities related to this (i.e. Research Data Alliance-World Data System Interest Group on Publishing Data). All participants agreed that this is a critically important area of development in terms of ensuring recognition of data contributions, establishment of provenance, fulfilling new requirements by journals etc.. A work package will be established focusing on this priority and in particular aiming to develop a summary report for the Arctic community that helps to guide people through the emerging data publication process. This work would be carried out in conjunction with efforts already started under the SCADM workplan. Alex Tate has offered to coordinate this effort as it fits with ongoing efforts that he has been leading, thus this initiative will be carried out jointly with a project already established under the SCAR Standing Committee on Antarctic Data Management.
d. The importance of making a wide variety of different data accessible in a meaningful context was highlighted as a priority, particularly for the SAON initiative. There was recognition that many of the science and societal priorities areas highlighted on Day 1 will require data from many different contexts, disciplines, data centers etc. to allow us to come to a better understanding of the issues and necessary responses (e.g. considering food security requires observations and other input from Arctic residents, physical scientists social scientists and others. This establishes a need for interoperability and aligns with previously established priorities (see. meeting background documents). To make progress in this area a"interoperability experiment" will be defined and carried out with the first results of the experiment presented during ASSW/ICARP III/ISAR 4 in Japan at the end of April 2015.

7. Establishing a way forward

The proposed method for addressing the priorities established in the form of action is to develop a core set of work packages (collection of related tasks) that include concrete deliverables on a clear timeline. Each work package will have a lead individual who will coordinate the effort with other interested participants. The agreed upon work packages are outlined in the Summary of Outcomes section and Section 6. Online tools such as Trello.com will be used to facilitate the management of the effort.

8. Understanding and refining the mandate of, and relationship between, IDSC and CDIS : revisited
    a. As indicated, there was agreement that the IDSC and CDIS be merged. To complete the process we need to:
        i. Confirm this with committee members and other stakeholders who are not at meeting
        ii. Establish a new name – proposal is for "Arctic Data Committee"
        iii. Decide on future of the Arctic Data Coordination Network as an entity. Is there still a need for the ADCN?
        iv. Create a statement confirming new name and distribute, ideally at Arctic Change conference in Ottawa, December 2014.
    b. There was recognition of the various other active data initiatives that exist within the Arctic/polar context (e.g. Arctic Spatial Data Infrastructure, SEARCH, GEO/GEOSS, WDS, RDA, etc.). The "Arctic Data Committee" needs to reach out to these bodies to ensure that various efforts are aligned and efficient. This will begin as part of the Committee executive function, but may evolve into a specific Work Package.
    c. The Polar Information Commons (PIC) was (http://www.polarcommons.org/) established during the International Polar Year and beyond. PIC is clearly relevant to the interests of this Committee, however the long-term plans for PIC are unclear. Some of the initial individual champions who drove the initiative have now moved on to other roles and the initial core funding has been used. Additionally, Jonsell of Sweden notes that the PIC-cloud (primary data repository) is off-line and has been for quite some time as he understands it. PIC-cloud needs to be included when the relation CDIS/PIC is discussed. In general, clarity is needed on the status of this particular initiative. If there are plans to continue the effort, then the Committee needs to coordinate appropriately. If not, then the core elements of the PIC can be addressed within the mandate of the Committee . In this case, the PIC can be considered a foundational building block of the Committee.
9. Adjourn meeting.

Meeting was adjourned at 12:50 local time.

10. Informal Working Session

To be reported in a separate document.

APPENDIX A

Introduction: First Meeting of the IASC Data Standing Committee (IDSC) and SAON Committee on Data and Information Services (CDIS)

Mercure Hotel, Potsdam, Germany
10-11 November 2014

Welcome

- Background: http://www.arctichub.net/groups/adcn/wiki/MainPage/IDSCCDISOverview
- Agenda: http://www.arctichub.net/groups/adcn/wiki/MainPage/IDSCCDISOverview/IDSCCDISMeeting1DraftAgenda
- Supporting Document:

http://www.arctichub.net/groups/adcn/wiki/MainPage/ArcticandRelatedDataManagementDirectoriesandInitiatives

What We Have

- Foundation, mandate and momentum coming out of IPY and other initiatives
- Data
- Metadata
- Services
- Applications
- *** Talented, dedicated people ***
- Support of international organizations such as IASC, SAON

What We Need

- Stronger international coordination that will help us to focus these resources at a global scale to address the needs of science and society
- A base level of standards, specifications, vocabularies that allow linking of network nodes
- Additional resources to facilitate network development

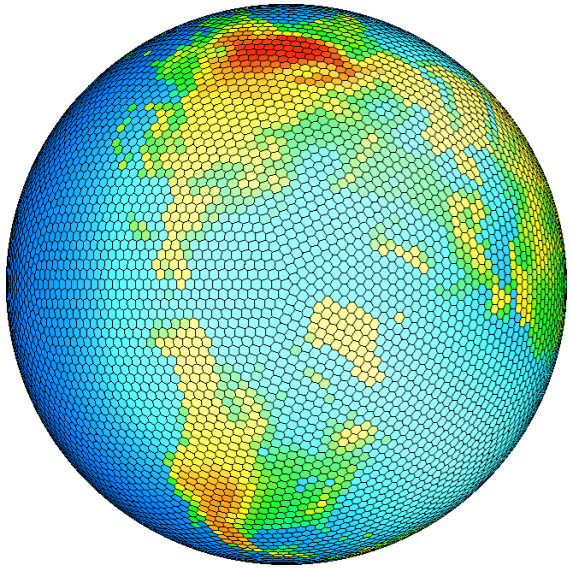
Challenge to Group

- By end of meeting identify one or more achievable objectives to move us forward
- By end of month, commit to achieving at least one objective on a specific timeline
- Establish a clear plan by end of this year
- Deliver something tangible, even if it is only a small part of a larger objective, by ASSW/ISAR-4/ICARP-III end of April 2014.

APPENDIX B

Identifying and Understanding the Needs of Science and Society

an overview of priorities established for and by the science community and society

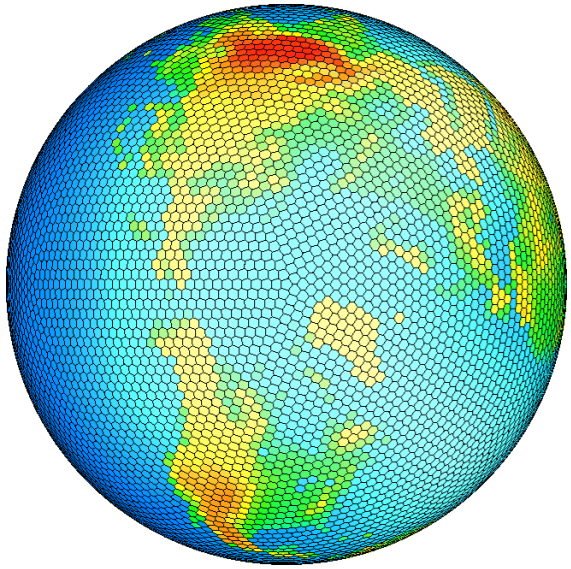


David Hik
Chair, ICARP III
Vice-Chair, SAON

10-11 November 2014, Potsdam

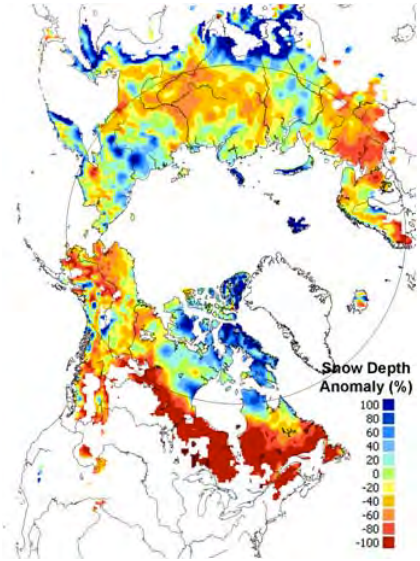
Why are we observing the Arctic?

and how do we make this data accessible?

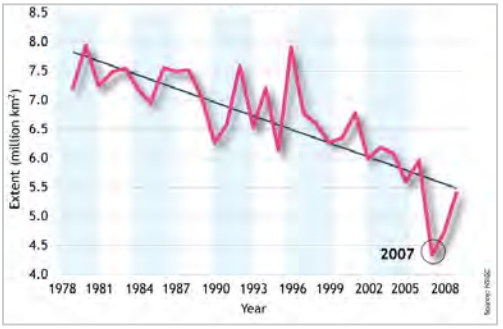


Rapid Arctic Change

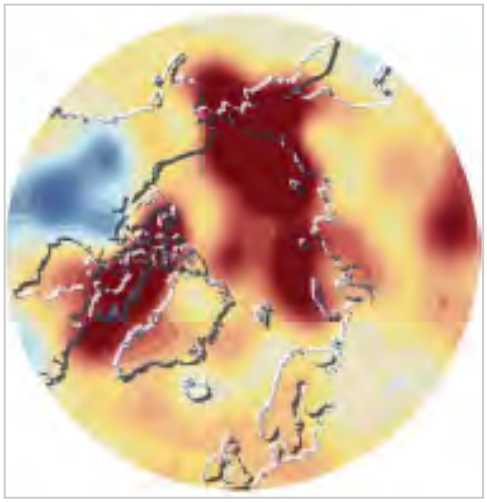
Greenland ice sheet melting



Loss of spring snow

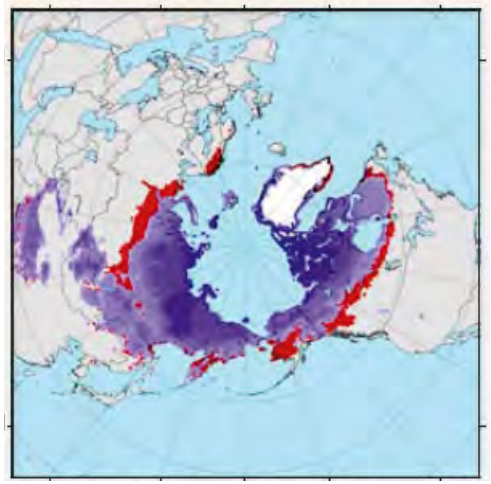


Arctic sea ice melting



Air temperature increasing

Resource development



Thawing permafrost and gas hydrates

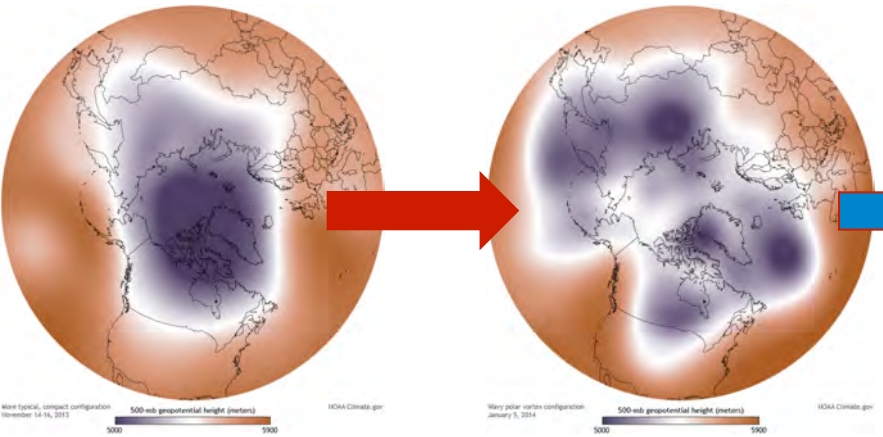
”Greening”, biodiversity changing

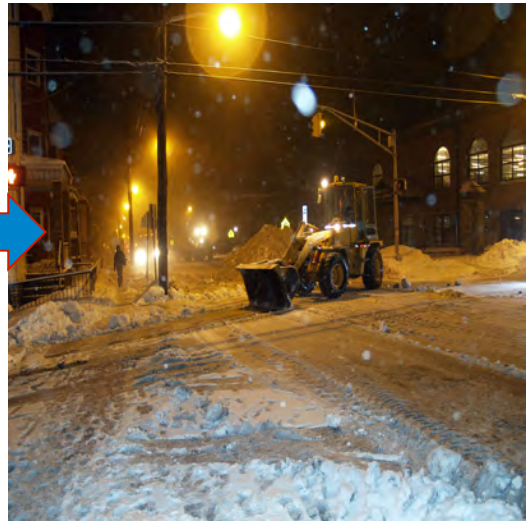
More shipping

…and the Arctic is a region of global importance

teleconnections

Black carbon





Polar vortex

Research and observational activities in the Arctic region must lead to predictive skill for:

- Integrated real-time ice-ocean-atmosphere-hydrosphere forecasts for present and future residents and users;
- Ecosystem status and change as the best indicator of overall Arctic health and as the basis for material and cultural wealth;
- Economic and social factors and trends, local and distant, that will require and constrain local, regional and global responses;
- Individual and community health and well-being;
- Impact of a rapidly changing Arctic and global climate on all of the above.

from SAON reports (2008)

Scientific Curiousity

Economic Development

Social, Cultural and Community Sustainability

Photo:

”Knowledge to Action”

Many recent regional, national and international programs, initiatives and assessments

Many interests and players…

Common theme is access to reliable, timely information

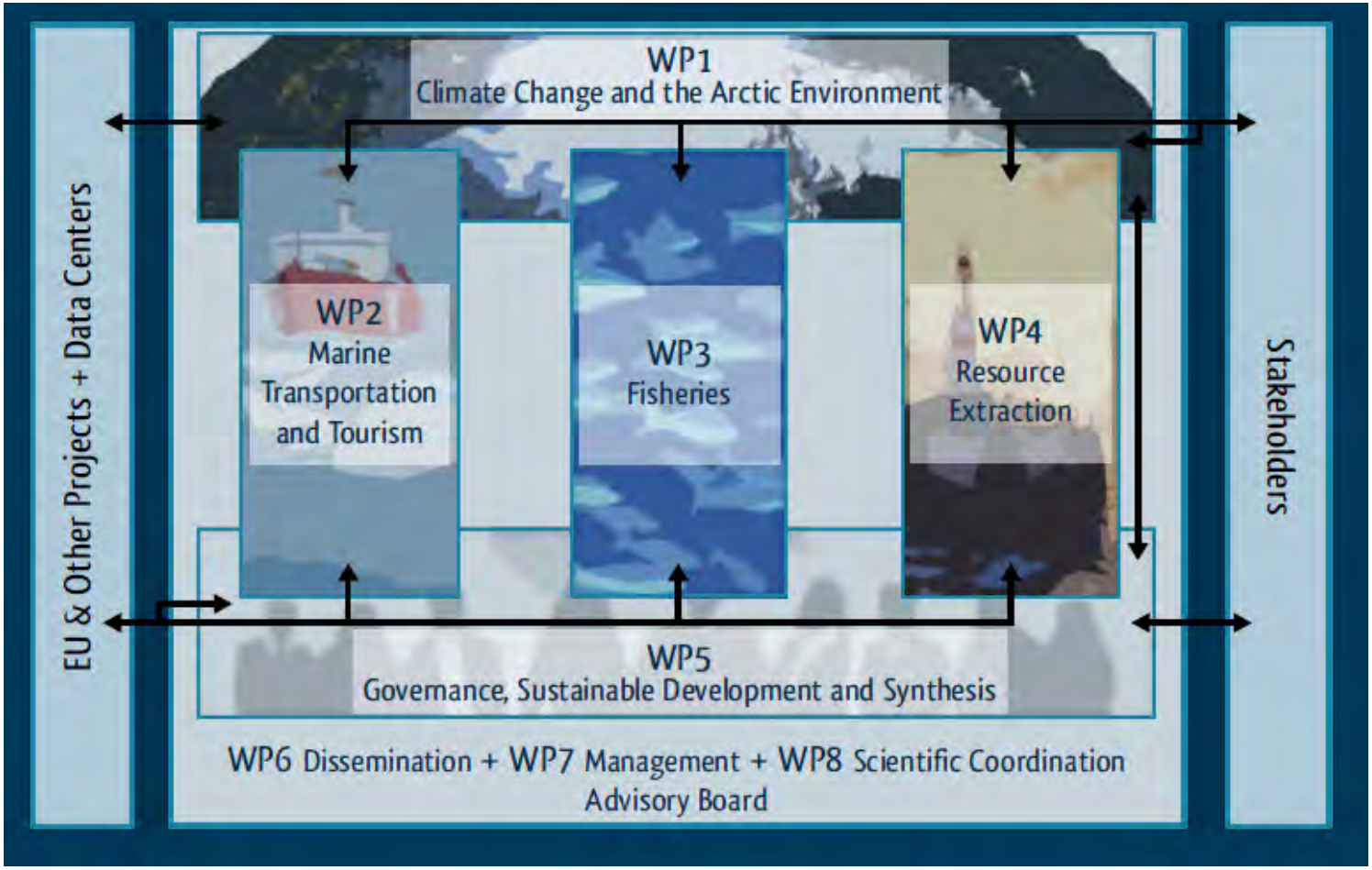
EU Framework programs and scientific cooperation in the Arctic:

ACCESS: 'Arctic Climate Change, Economy and Society'
and
ICE-ARC: 'Ice, Climate, Economics - Arctic Research on Change

ACCESS
Arctic Climate Change
Economy and Society

Michael Karcher,
Jean Claude Cascard,
Jeremy Wilkinson

ACCESS



SEVENTH FRAMEWORK PROGRAMME

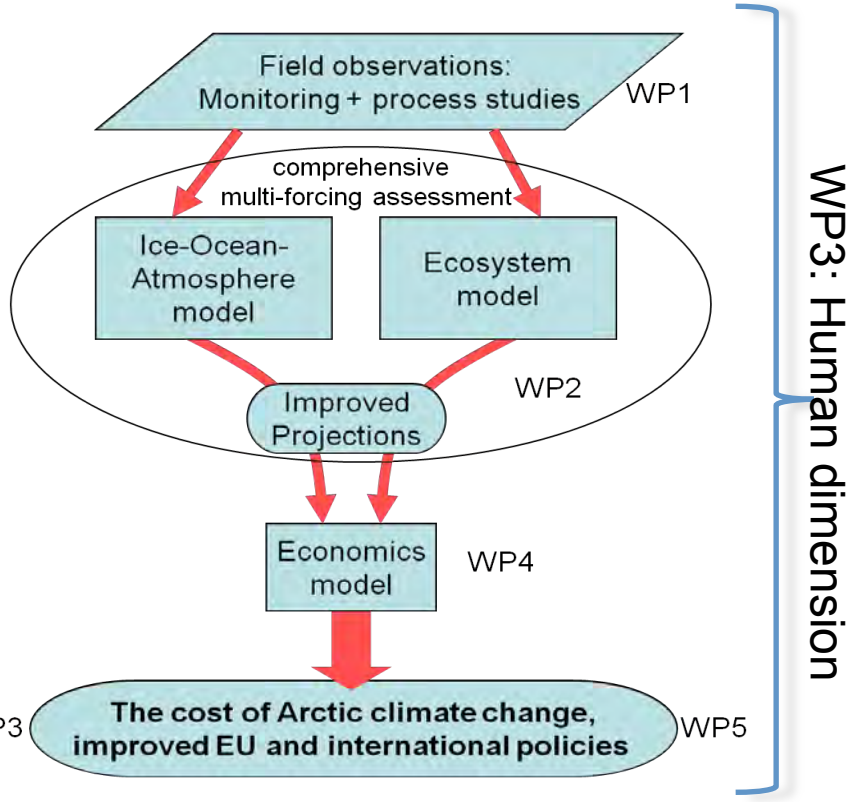
Ocean of Tomorrow call of the European Commission Seventh Framework Programme

ACCESS
Arctic Climate Change Economy and Society

ICE-ARC

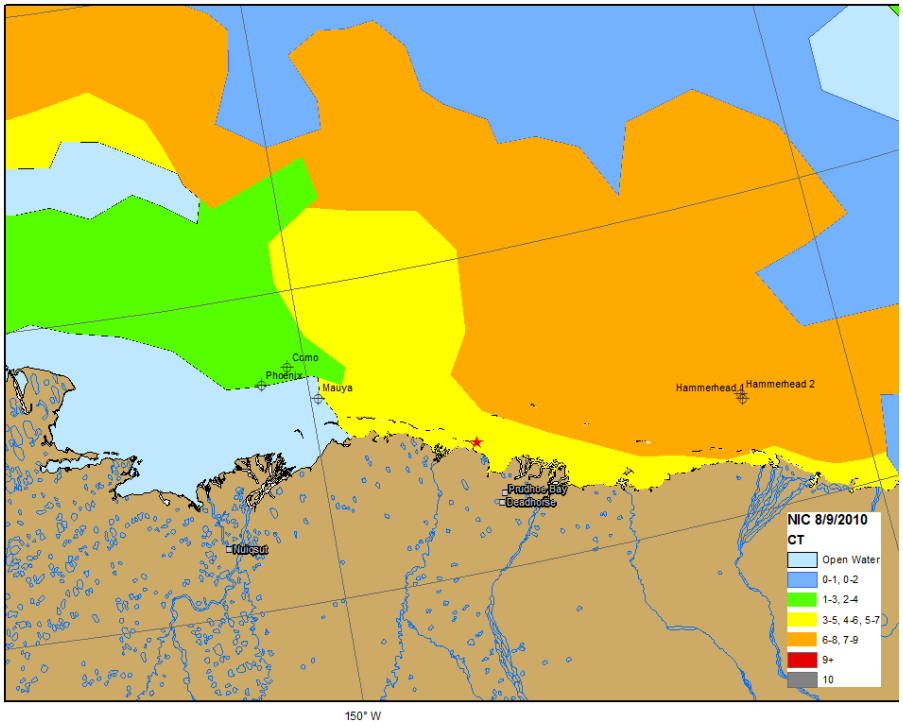
Four interconnected objectives:

- Reduce uncertainties in Arctic marine climate predictions.
- Elucidate the impact Arctic marine change has on the ecosystem and human communities.
- Understand the global socio-economic impact of Arctic marine change.
- Provide concrete evidence-based policy measures in response to change in the Arctic marine system.

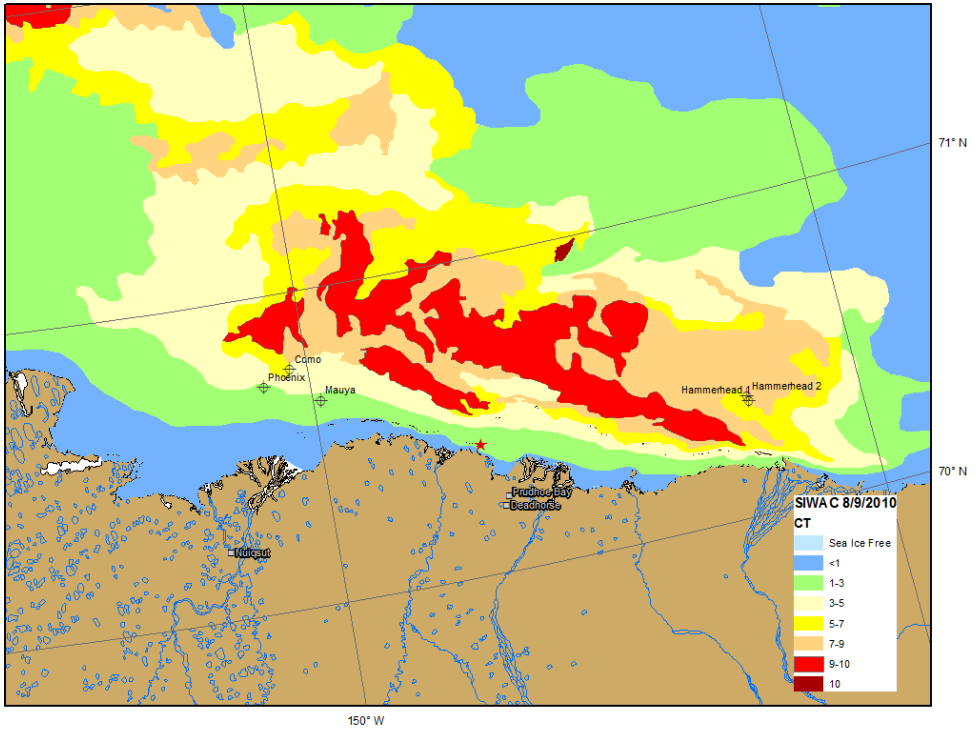


Industry operational requirements lead to product development and tools…

Publically available chart from
The NOAA National Ice Center



Highly detailed charts produced by the
Shell Ice and Weather Advisory Center



Shell developed and manages a fit-for-purpose operational ice and weather forecasting service to fill the gaps left by commercial and national services.

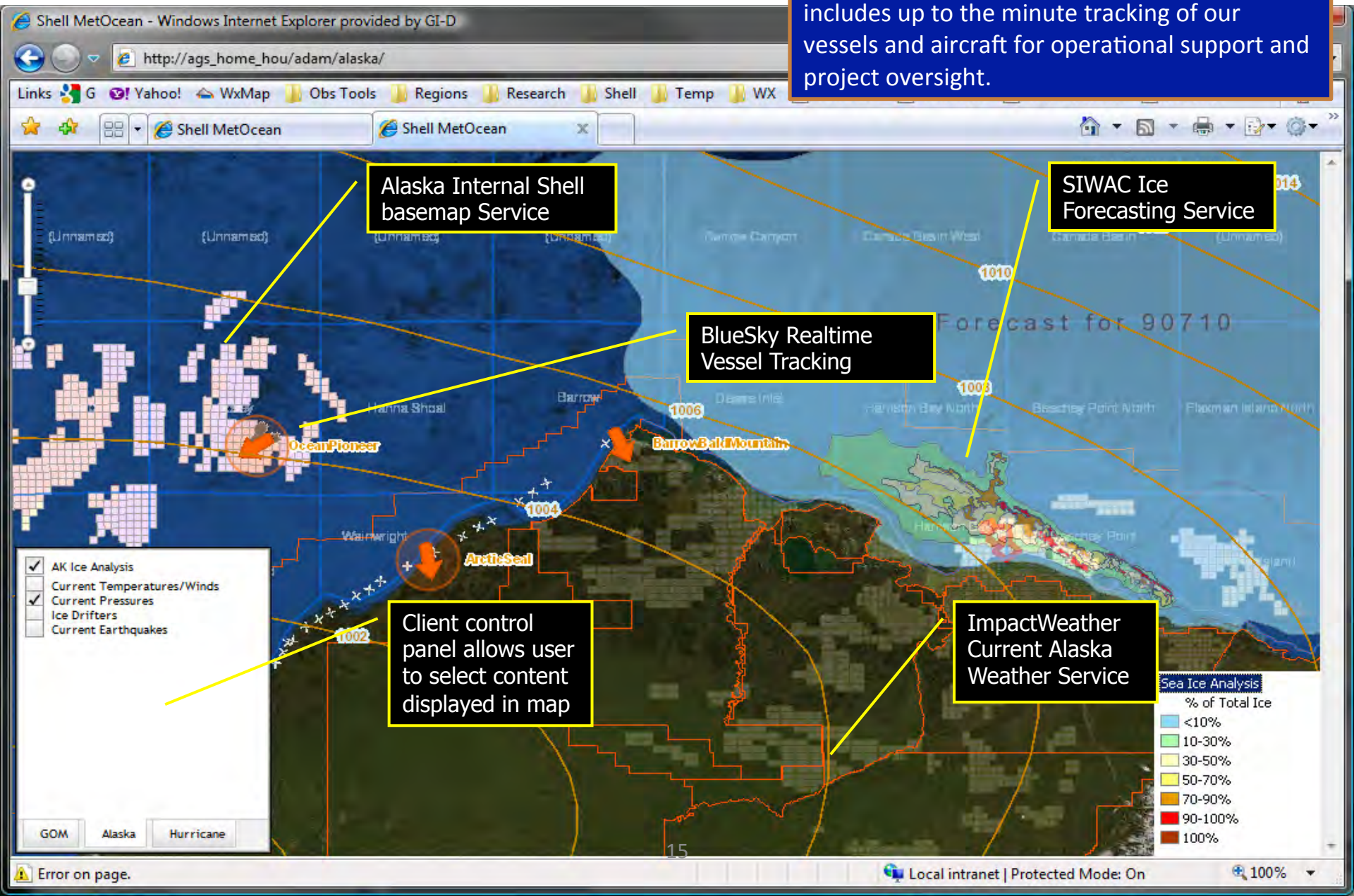
SIWAC (Shell Ice and Weather Advisory Center) produces **focused and operation-driven forecasts** and provides advisory services for planning managers.

Forecasts are communicated to operations through several methods, including the siwac.com website.

Michael Macrander - Science Lead, Shell Alaska
Robert Raye - Metocean & Ice

Pulling it all tog

Internally, Shell integrates the ice and weather forecasts into a mapping web service that includes up to the minute tracking of our vessels and aircraft for operational support and project oversight.



- All data shared with National Oceanographic & Atmospheric Administration (NOAA)
  - Ocean & Weather buoy data shared real time through the National Data Buoy Center (NIC)
  - Ice maps shared with National Ice Center with a 48 hour moratorium on further release
  - All data housed and served by AOOS.org
- Twice weekly meeting/telecon with NIC
  - Collaborative forecasts
- Through AOOS data can be utilized by third parties for research purposes.
- Net result – Improved forecasts

Societally Significant Observing

Meeting Needs Now for a More Resilient Future

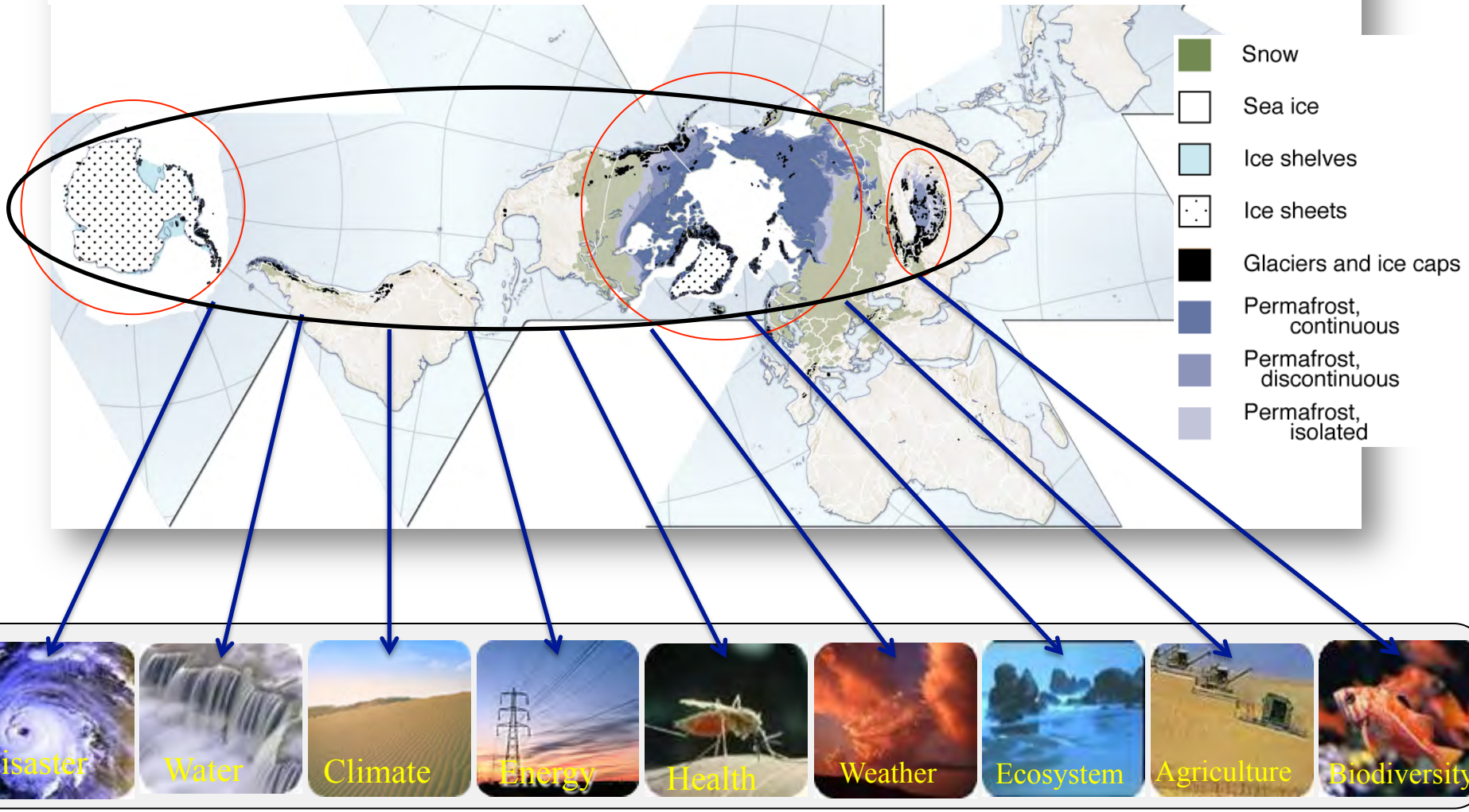
Erica Key
National Science Foundation
Arctic Observing Network Program

AOA
ARCTIC OBSERVING ASSESSMENT

http://www.arctichub.net

GROUP ON EARTH OBSERVATIONS | Cold Regions

The **Cryosphere** includes snow, sea ice, lake and river ice, glaciers, ice caps, ice sheets, permafrost and seasonally frozen ground, and solid precipitation



GEO nine Societal Benefit Areas

Building relationships between users and implementers

> a living assessment of user needs relevant to shared priorities and the observing and information science capability available to meet those needs

> focusing on 13 areas of societal significance:

- Food Security
- Freshwater Security
- Health and Well-Being
- Sustainable Economic Development
- Regulatory and Organizational Change
- Built Infrastructure
- Coastal and Riverine Vulnerability
- Environmental Safety
- Ecosystem Health
- Information Access and Security
- Environmental Awareness
- Climate Change Adaptation and Mitigation
- Teleconnections

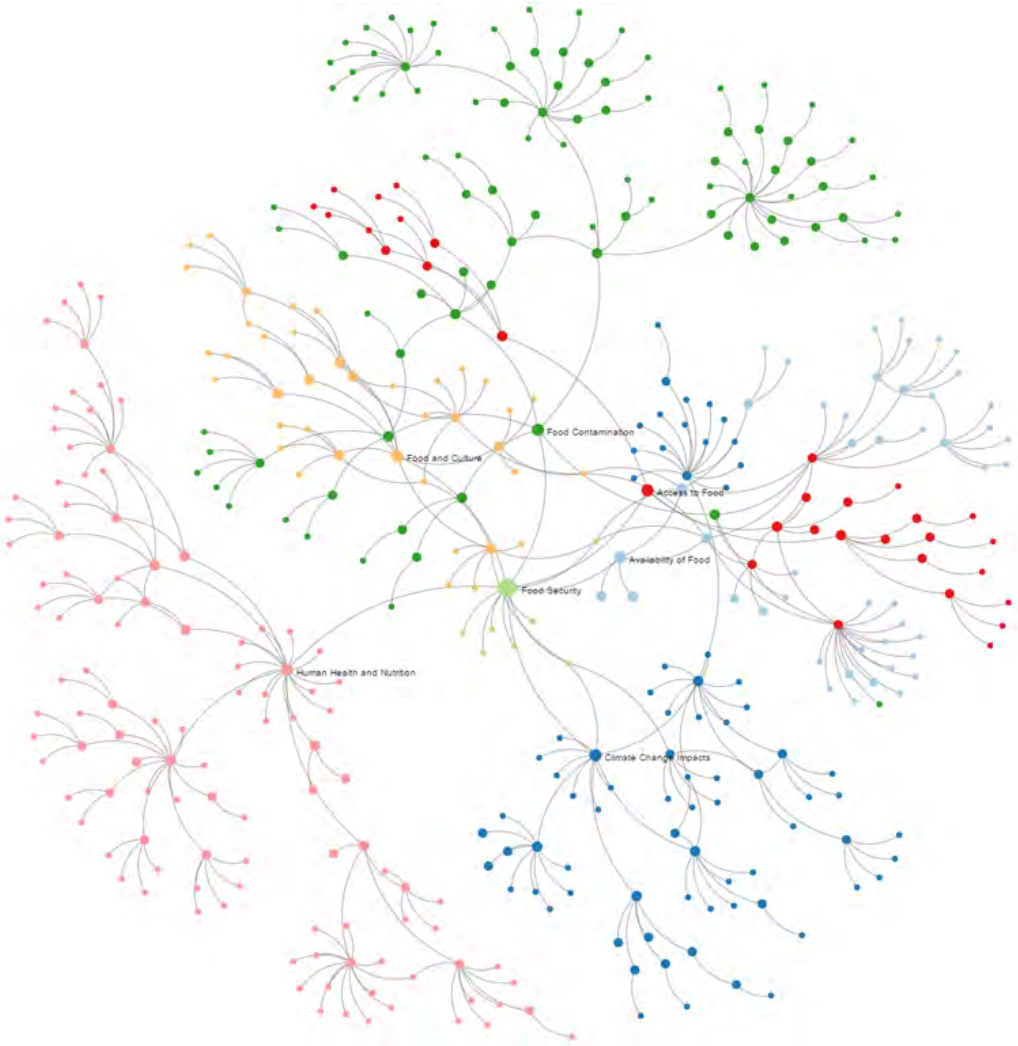
> user need documents, resources, products, and information sources will be searchable, exportable, with visualization support

Networking the observations

An example from
Food Security

> Key nodes
> Supporting docs
> Information streams

Coming soon:
> Cross-cuts
> Crowdsourcing



Arctic Observing Assessment

Click and drag to recenter.
Use your mouse's scroll wheel or the buttons at the bottom of the page to zoom in or out.
Click any node to view additional information.

Legend:

- Nodes represent categories or resources
- Lines between nodes represent related concepts

Search:

Mercury

Search Results:

Mercury in fishes of Alaska with emphasis on subsistence species

Mercury

2001-2012 Total Mercury in Alaskan Fish

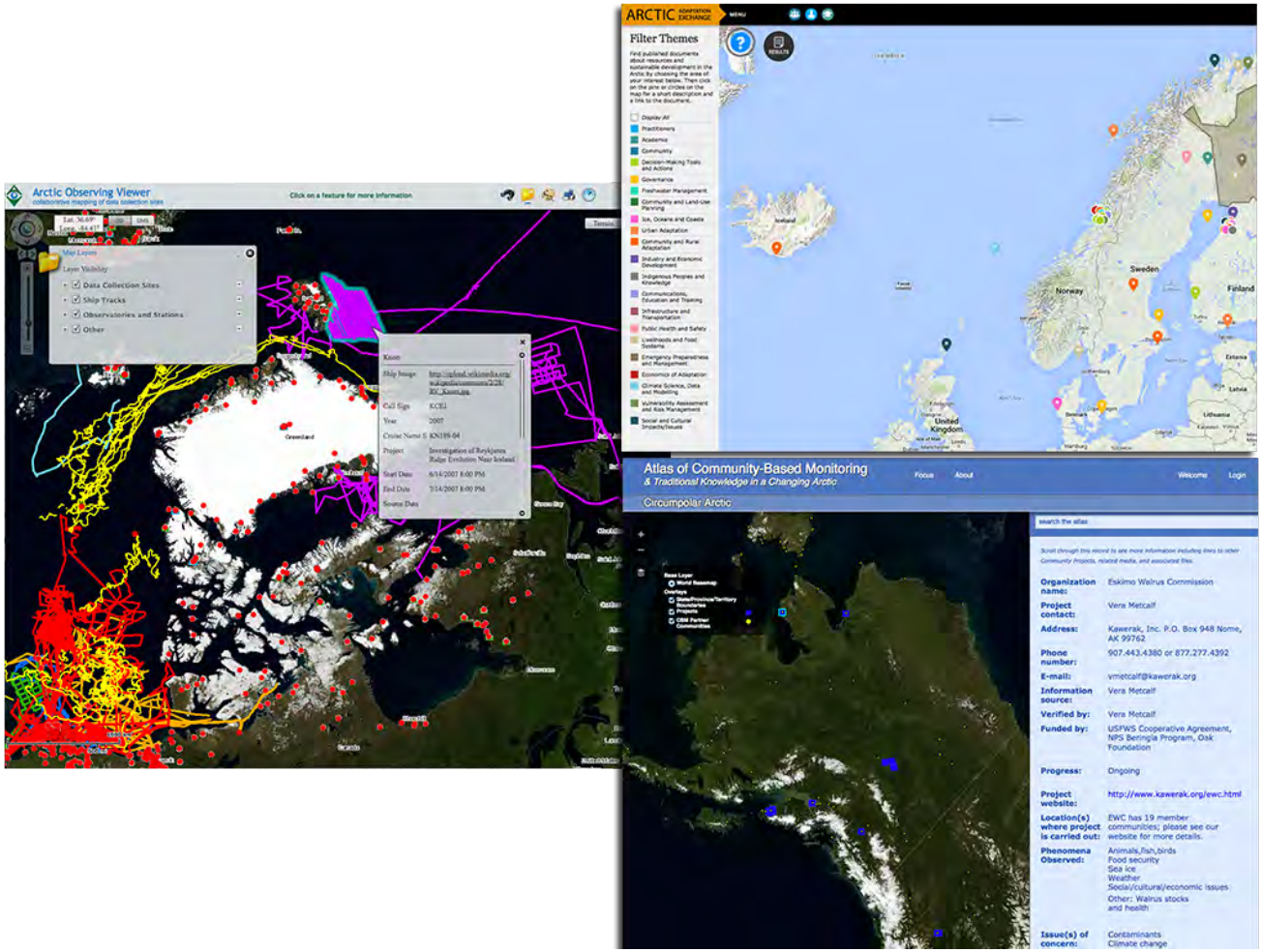
Total Mercury Concentrations in Alaskan Fish

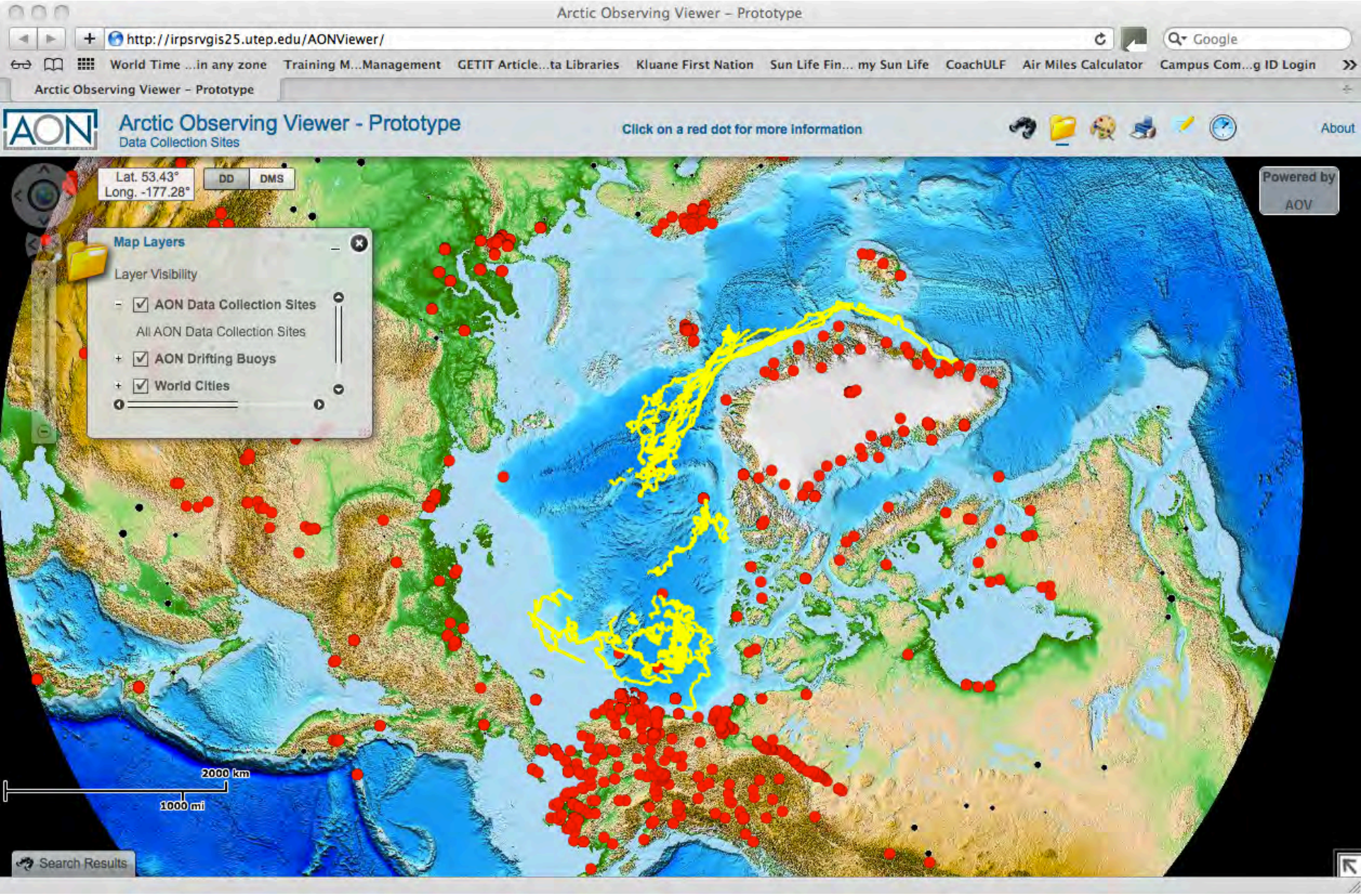
Mercury in the Arctic

Technical Background Report for the Global Mercury Assessment 2013

Mercury in Northern Pike from Koyukuk Nowitna and Innoko National Wildlife Refuges

Connecting *visually* with stakeholders in observing for awareness, collaboration, integration, and access

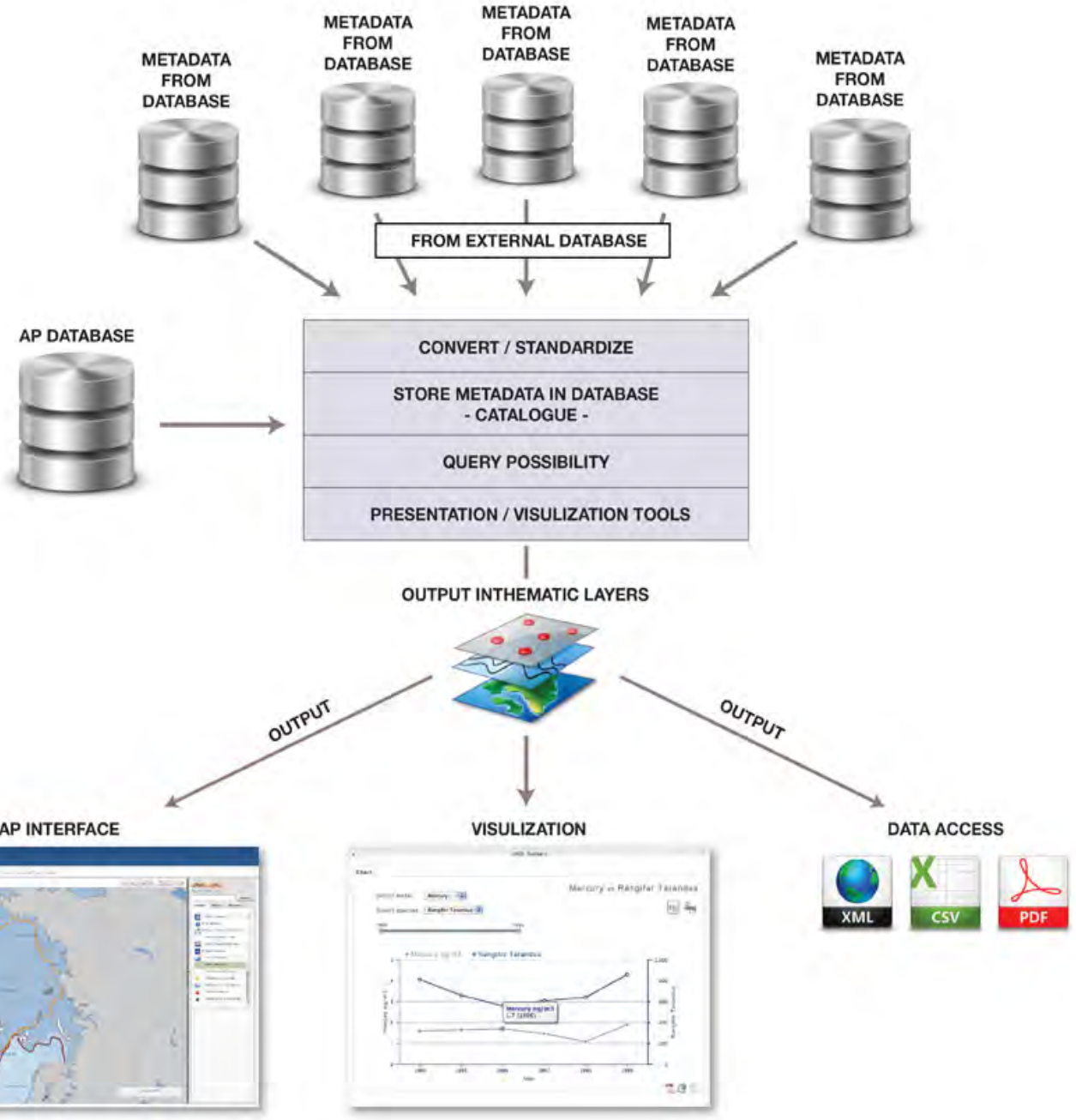



Arctic Observing Viewer – Prototype
http://irpsrvgis25.utep.edu/AONViewer/
Google
World Time ...in any zone
Training M...Management
GETIT Article...ta Libraries
Kluane First Nation
Sun Life Fin... my Sun Life
CoachULF
Air Miles Calculator
Campus Com...g ID Login
Arctic Observing Viewer – Prototype
AON
Arctic Observing Viewer - Prototype
Data Collection Sites
Click on a red dot for more information
About
Lat. 53.43°
Long. -177.28°
DD
DMS
Powered by
AOV
Map Layers
Layer Visibility
AON Data Collection Sites
All AON Data Collection Sites
AON Drifting Buoys
World Cities
2000 km
1000 mi
Search Results

SAON
SUSTAINING ARCTIC OBSERVING NETWORKS

Arctic Data Interface (ADI): An Information Data Square

(in development by the Arctic Portal)



Circumpolar Health Observatory | An international collaborative health information system serving the northern regions of all circumpolar countries

http://circhob.circumpolarhealth.org/

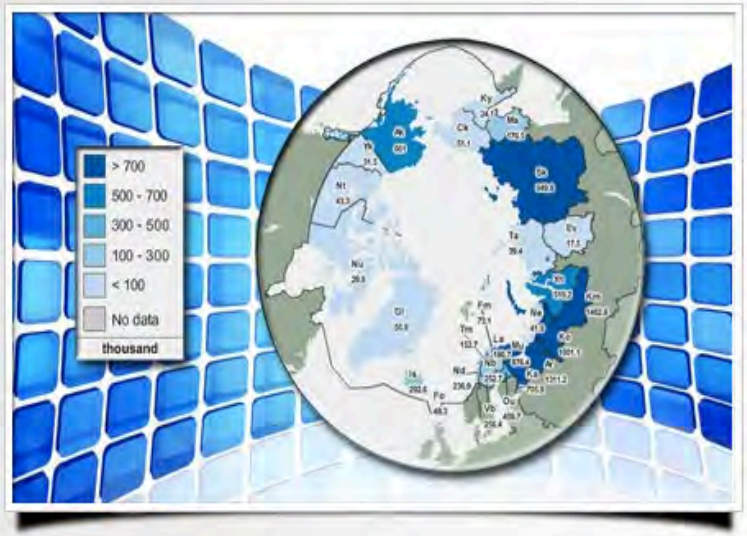
Reader

Google

ArcticNet -...sion-Making | ABS-Airbag....nche Airbag | Online Banking | Volkswagen ... Questions | Global Carbon Index | Welcome to ...agenplus.ca | Pronounce N...nce a name

Circumpolar Health Observatory |...

About | Data » | Visualization » | Facility » | Publications » | Contact



Visualize the Data

Browse population health indicators through interactive thematic maps

- Population
- Fertility
- Mortality
- Reproductive Outcomes
- Disease Incidence
- Socioeconomic Conditions
- Health-Related Behaviours
- Health Care Resources

ABOUT
Our Objectives

PUBLICATIONS
Our Reports

LOCATION
Our Facility

ACE

Arctic Collaborative Environment

http://acedemo.itsc.uah.edu/

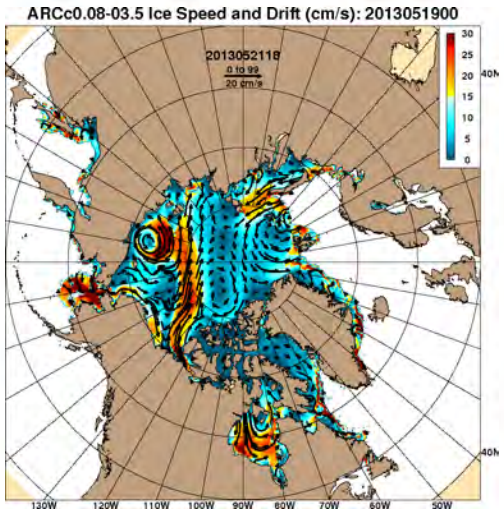
Home Groups Catalog Workspace Help

About

About

Arctic Collaborative Environment (ACE) Joint Capability Technology Demonstration (JCTD) is an internet-based, open-access, Arctic-focused, environmental research and decision support system that integrates data from existing remote sensing assets with products from existing and new environmental models to provide monitoring, analysis, and visualization based on earth observation data and modeling. With an initial focus on the Arctic region, researchers, students, search-and-rescue operators, native hunters, etc can draw from the open-access data.

Arctic Cap Nowcast/Forecast Model Animation



Getting Started

Welcome to the Arctic Collaborative Environment

This page will help you get more comfortable with navigating ACE.

Q: I've just created my user account in ACE. What's next?

A: Watch a general overview video on ACE (Click here)

Read more

General: ACE Overview Video (mp4)

Submitted by Gina Wade on Mon, 11/26/2012 - 15:11

The training video shows how users can utilize ACE.

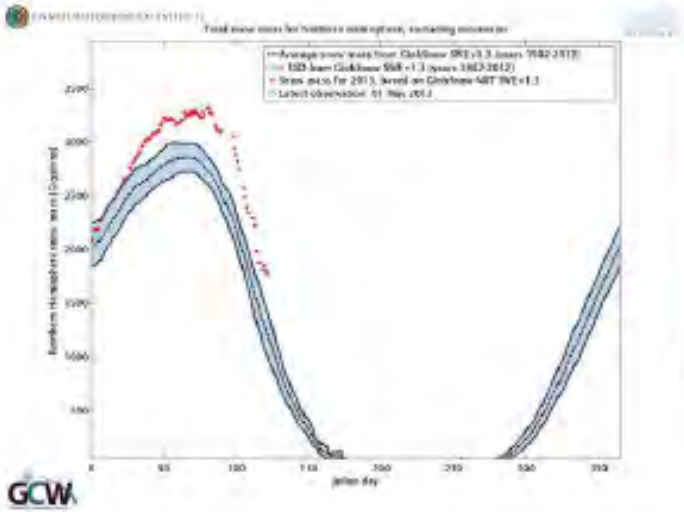
Read more

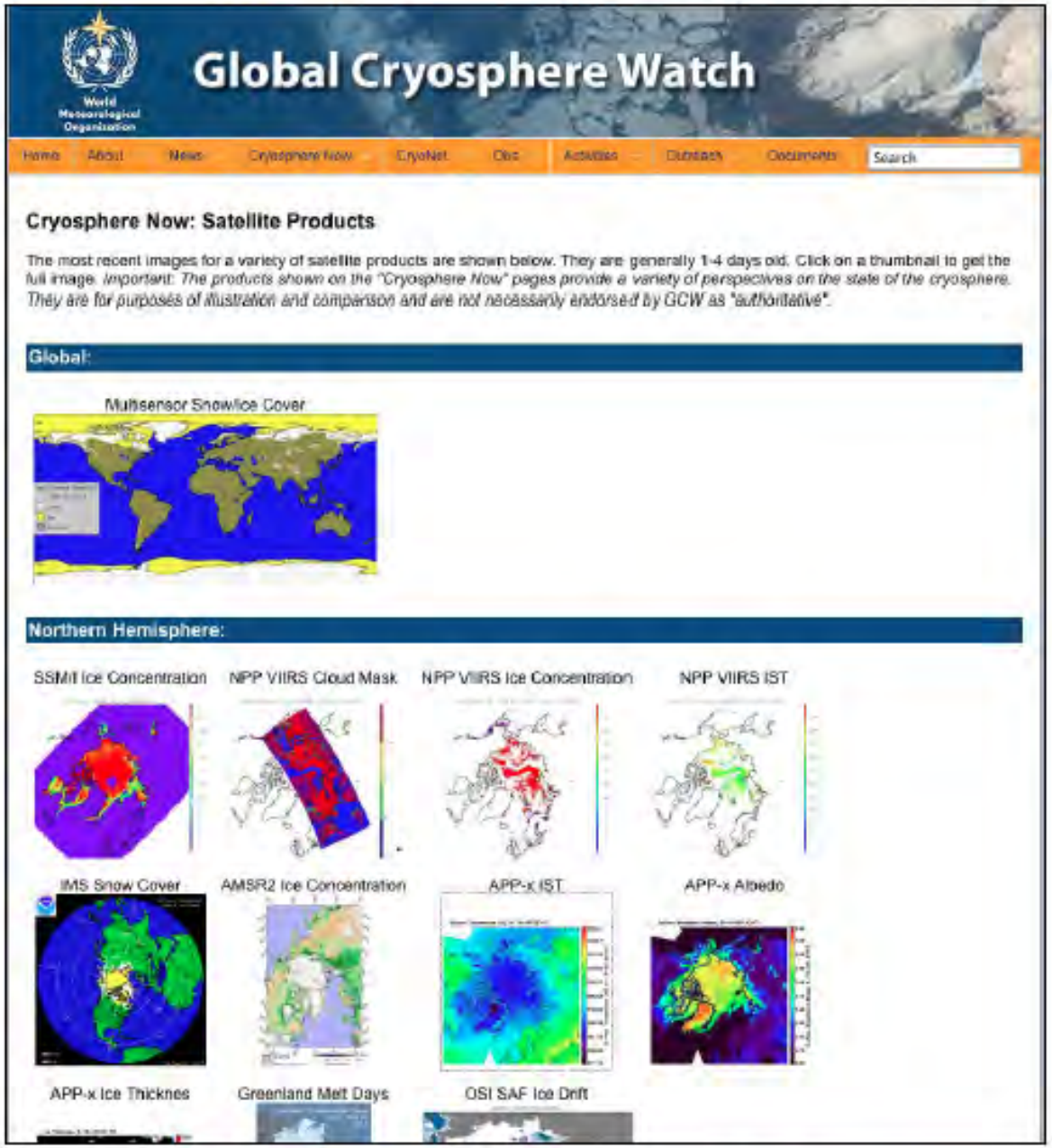
Social Networks

Follow ACE on Twitter Follow ACE on Facebook

Recommend satellite products for “Cryosphere Now” on GCW website.

Contribute “trackers”.





globalcryospherewatch.org

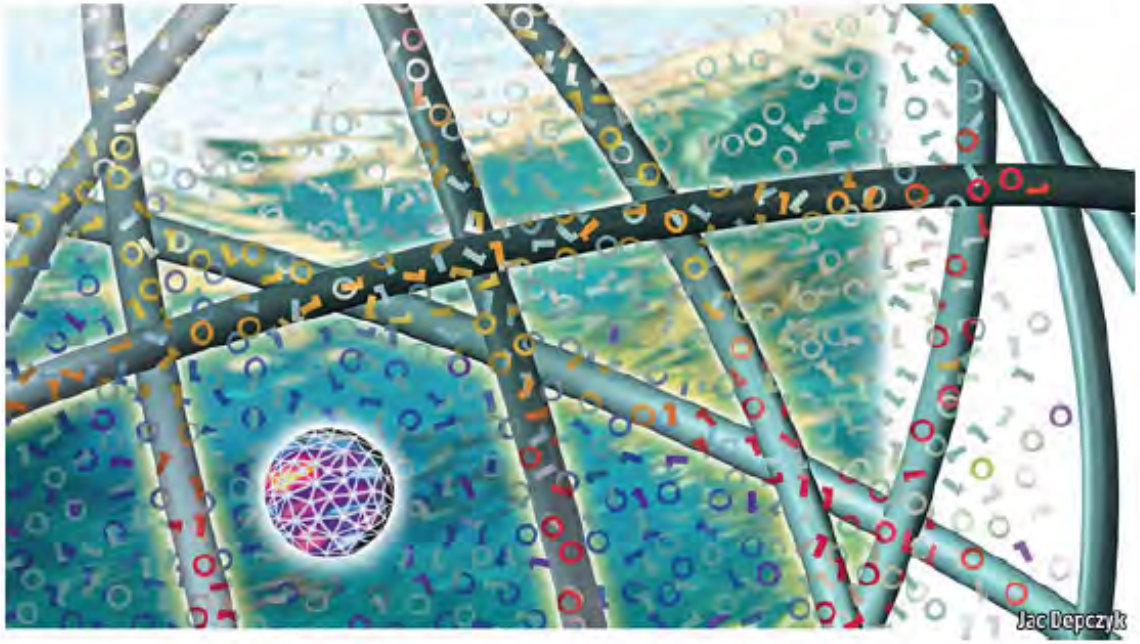
Data, data everywhere

Information has gone from scarce to superabundant. That brings huge new benefits, says Kenneth Cukier (interviewed here)—but also big headaches

Feb 25th 2010 | From the print edition

Timekeeper

Tweet 298



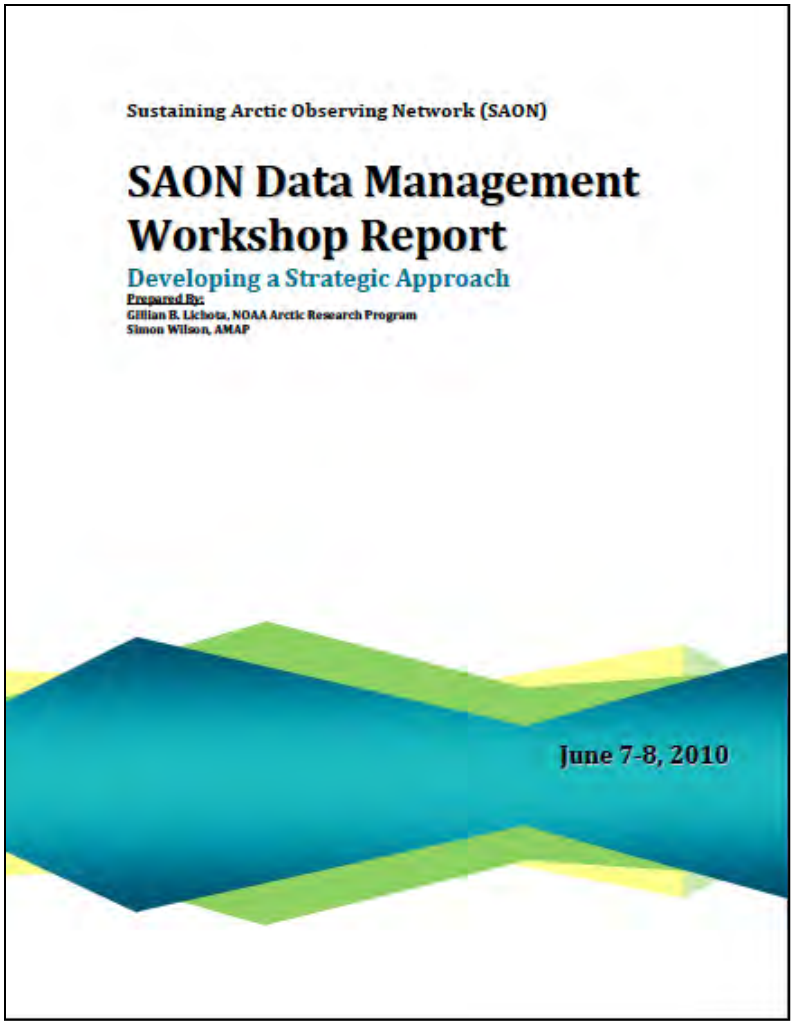
WHEN the Sloan Digital Sky Survey started work in 2000, its telescope in New Mexico collected more data in its first few weeks than had been amassed in the entire history of astronomy. Now, a decade later, its archive contains a whopping 140 terabytes of information. A successor, the Large Synoptic Survey Telescope, due to come on stream in Chile in 2016, will acquire that quantity of data every five days.

The ‘Normalization’ of Data Sharing

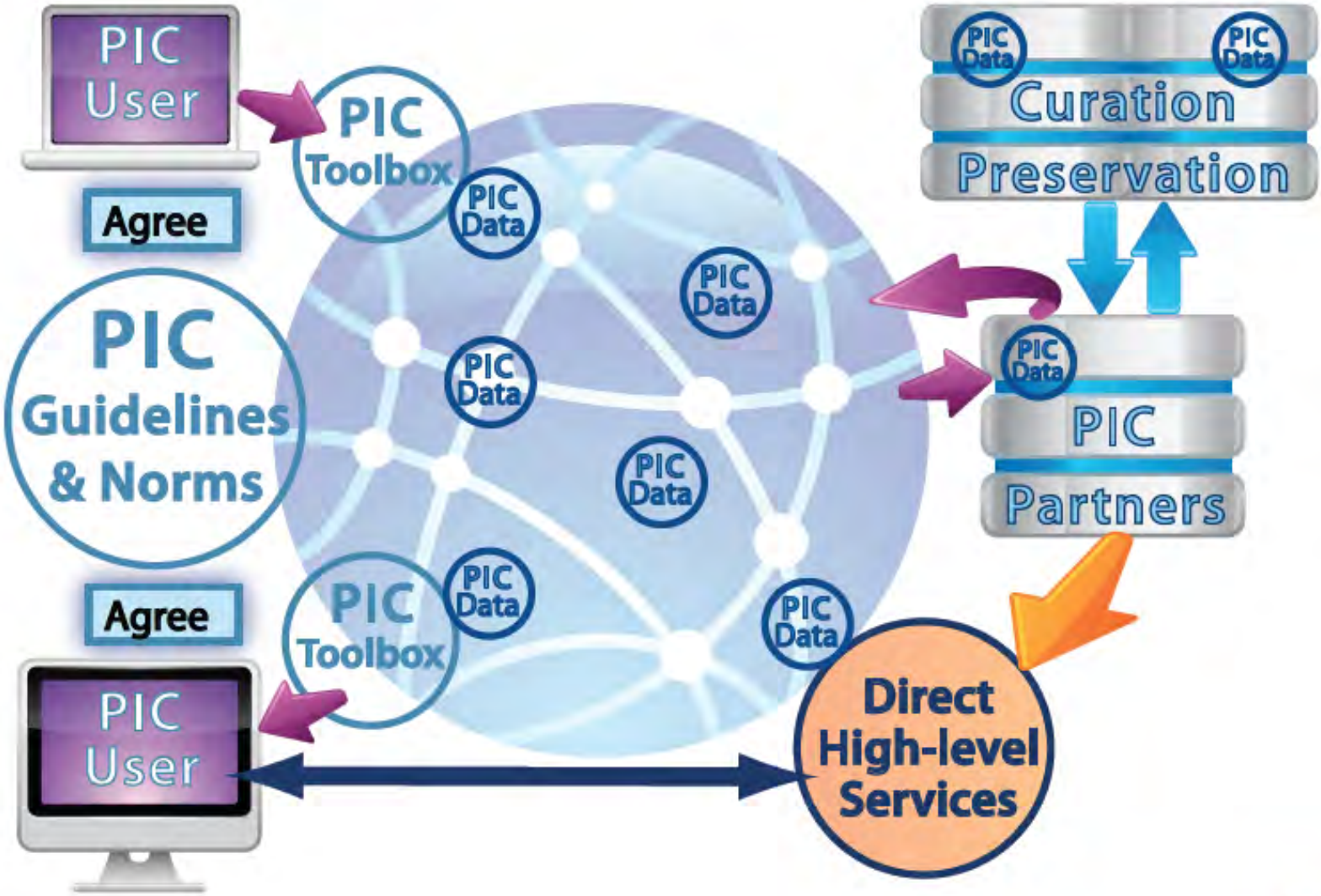
- IPY experience
- post-IPY initiatives

www.polarcommons.org

SAON
SUSTAINING ARCTIC OBSERVING NETWORKS



- **Promote interoperability** of observing and and data management systems and identify improvements;
- **Identify useful approach** for developing “union catalog” of data sets (e.g. Polar Information Commons, ICSU, CODATA Task Group, WMO Information System, CBMP, etc).



A Conceptual Architecture for the Polar Information Commons

PIC

Statement of Principles and Practices for Arctic Data Management
April 16, 2013

All IASC-endorsed scientific results shall be verifiable and reproducible through ethically open access to all data necessary to produce those results. Data shall be preserved, accessible, and used in accordance with scientific norms of fair attribution and use.

To this end, IASC Council approves the following actions:

1. Endorsement of the Statement of Principles and Practices for Arctic Data Management;
2. Establishment of an IASC Data Standing Committee;
3. To undertake measures towards adoption of national data policies consistent with the principles and practices described below.

International Forum on

Polar Data Activities in Global Data Systems Communiqué

Recommendations & Observations Arising From the 'International Polar Data Forum'

15–16 October 2013, Tokyo (Japan)

Participants in the International Polar Data Forum (comprising of data managers, scientists, and research coordinators) share their observations about the current state of polar data activities and their recommendations for enhancing and sustaining core data services into the future.

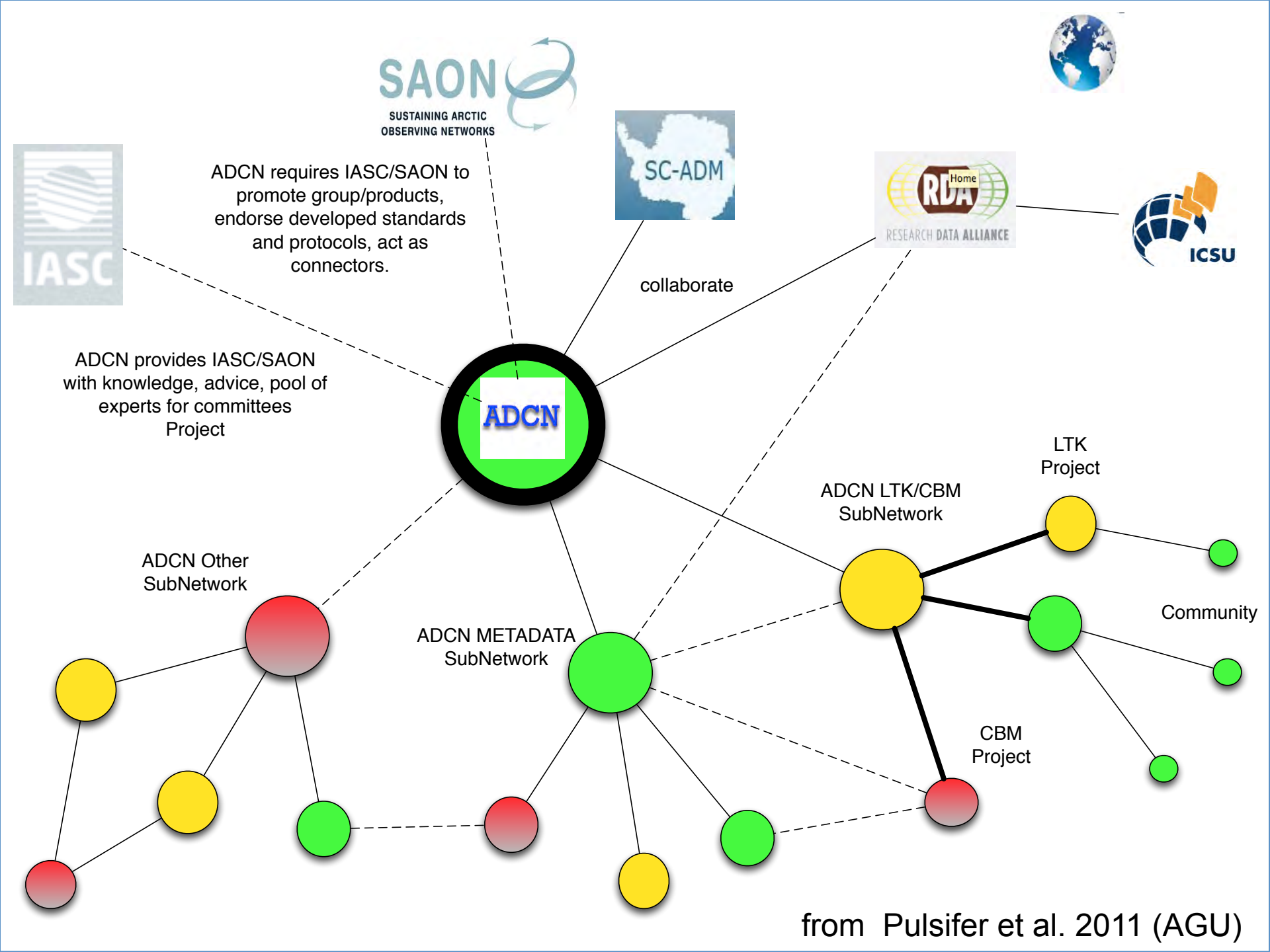
General Remarks

Despite the focus generated by the International Polar Year 2007–2008 (http://www.ipy.org/) there are still unresolved deficiencies in the way polar data are managed. These shortcomings continue to hamper our ability to discover and reuse existing and new data assets. The significant public investment in polar science made through national and international research programs is accompanied by an expectation that data should be preserved and be openly available for reuse and verification purposes. This is the responsibility of both scientists and science funders supported by data managers. Achieving these goals requires implementation of open data policies, development of long-term funding strategies to support data repositories, and a change in scientific practices to require the sharing and citation of data. In addition, the ideas and interpretations that have traditionally underpinned research publication need to be updated accordingly. Scientists must factor the costs of managing and publishing data in their research/monitoring funding proposals, and explicitly address these tasks in research/observing system plans.

The Scientific Committee on Antarctic Research (SCAR) and the International Arctic Science Committee (IASC), the two lead non-governmental organizations coordinating international polar research, are now embarking on long-term science planning activities (i.e., the SCAR Science Horizon Scan and the 3rd International Conference on Arctic Research Planning). Both organizations are committed to recommending—through their strategic-direction setting initiatives—not only that the development of robust polar data networks is seen as a science-funded activity but also that this activity has visibility in IASC- and SCAR-sponsored science plans and strategies. Through their policies and actions, IASC and SCAR member countries are encouraged to promote the funding of data management as an integral part of science implementation and to contribute to the design and development of shared global data infrastructure. Participation in the ICSU World Data System (ICSU-WDS; a global system of accredited scientific repositories and data service providers) is one mechanism for member countries to engage in such collaborative infrastructure and capability development.

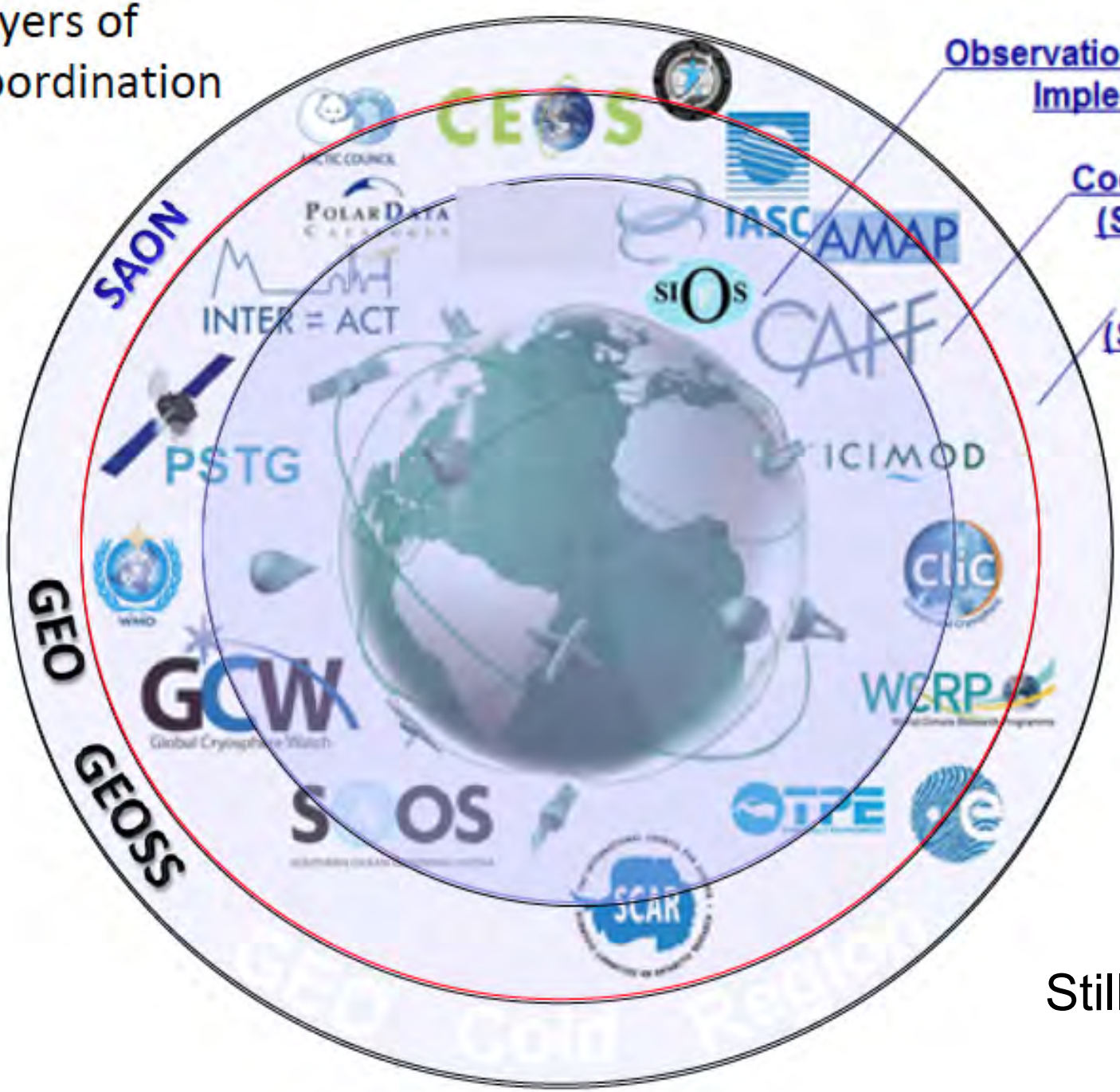
Forum Observations & Recommendations

Improving polar data discovery, data preservation, and reusability relies in part on building more pervasive systems interoperability. This interoperability is now a commonly stated goal for polar research organizations, but it is recognized that interoperability needs to be addressed at a number of different levels and covers both social and technical aspects; the combination of which is difficult to address. Considerable investment



from Pulsifer et al. 2011 (AGU)

Layers of Coordination



Still a mess!

Challenges for Arctic Observing and Data

- 'Forecasting' (daily to seasonal scale)
  - Observations (atmosphere, ice thickness, ocean)
  - Modelling (predictability)
  - Education on realistic capabilities (→ natural variability)

- Increasing societal demand for Arctic research
- Basic research to applied research
- From interdisciplinary to cross-sectoral
  → needs Training & Time to work across sectors
- Guidelines for public research cooperation with industry
- Improved access to data for all users (preservation, interoperability)

- Funding (e.g. observing networks, cross-sectoral and idea-driven projects)

thanks to Michael Karcher

APPEDIX C

A roadmap for the future of Arctic research: ICARP III and the IPPI

David Hik
Chair, ICARP III

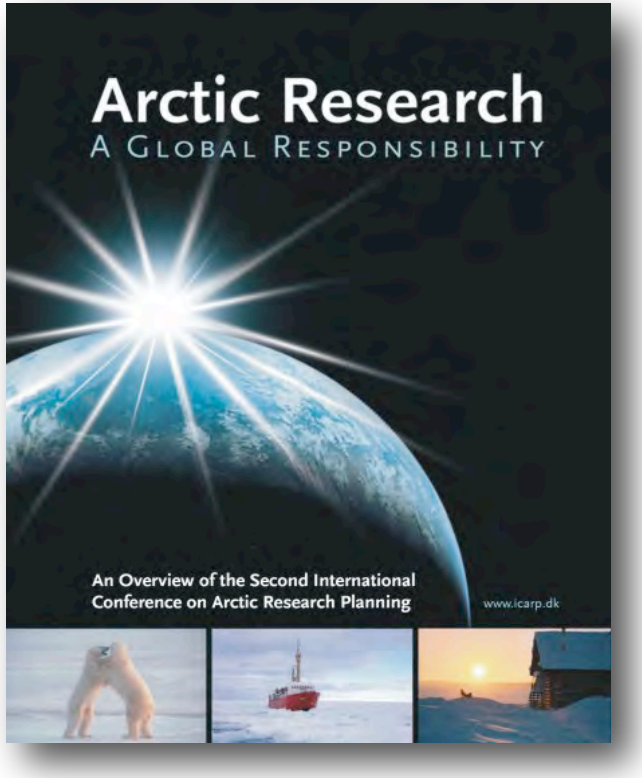
ICARP III Steering Group Meeting
11-12 November 2014, Potsdam

International Conference on Arctic Research Planning (ICARP)

Convened periodically by IASC and its partners to identify key scientific questions and issues:

- **ICARP I, Hanover NH 1995**
- Reviewed the state of Arctic science and resulted in a series of IASC-supported research projects.

- **ICARP II, Copenhagen 2005**
- Twelve forward-looking science plans - resulted in many international projects and programs, especially within the framework of the International Polar Year.



ICARP III, 2014-2105 - underway

The outcome will be a 'roadmap' for the next decade of Arctic research.

ICARP III
3RD INTERNATIONAL CONFERENCE ON ARCTIC RESEARCH PLANNING

Integrating Arctic Research
a Roadmap for the Future

- **identify** Arctic research **priorities** for the next decade;
- improve **coordination** of various Arctic research agendas;
- **inform** policy makers, people who live in or near the Arctic and the global community;
- **build constructive relationships** between producers and users of knowledge.

ICARP III
3RD INTERNATIONAL CONFERENCE ON ARCTIC RESEARCH PLANNING

current ICARP III partners

AMAP
Arctic Monitoring and Assessment Programme

IASSA
INTERNATIONAL ARCTIC SOCIAL SCIENCES ASSOCIATION

CliC
Climate and Cryosphere

ICES
International Council for the Exploration of the Sea
CIEM
Conseil International pour l'Exploration de la Mer

UArctic

ARCUS

Arctic Council
Indigenous Peoples' Secretariat

CAFF
Conservation of Arctic Flora and Fauna

APECS
Association of Polar Early Career Scientists

ISAC

IASC

THE INTERNATIONAL COUNCIL FOR SCIENCE
SCAR
SCIENTIFIC COMMITTEE ON ANTARCTIC RESEARCH

IACS

FARO

EUROPEAN POLAR BOARD
EPB/ESF

POLAR EDUCATORS INTERNATIONAL

IPA

79° N
NySMAC

nrf
Northern Research Forum

PAG

ICARP III
3RD INTERNATIONAL CONFERENCE ON ARCTIC RESEARCH PLANNING

The program

- **formal launch** at the **Arctic Science Summit Week (ASSW) 2014** in Helsinki, Finland;
- **many meetings and events during 2014/15;**
- culminating in a **final conference** during **ASSW 2015** in Toyama, Japan

Call for Abstracts open until 10 November
http://www.assw2015.org/

ICARP III
3RD INTERNATIONAL CONFERENCE ON ARCTIC RESEARCH PLANNING

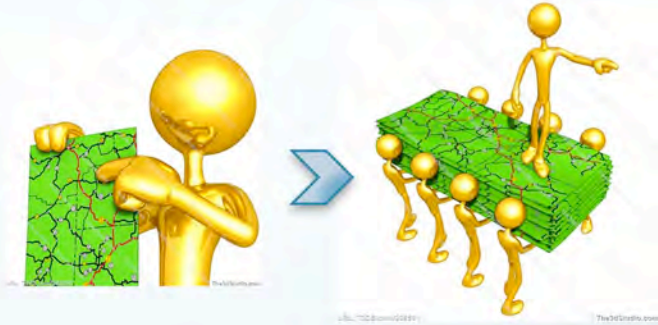
What will be the outcomes of ICARP III?

All ICARP III partners will play a role in shaping the future of Arctic research needs:

Activity Summaries & Reports

Consensus Statement

Roadmap



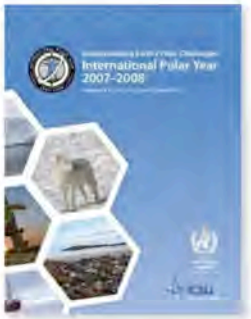
Contributions to a potential **International Polar Partnership Initiative (IPPI)**

International Polar Partnership Initiative

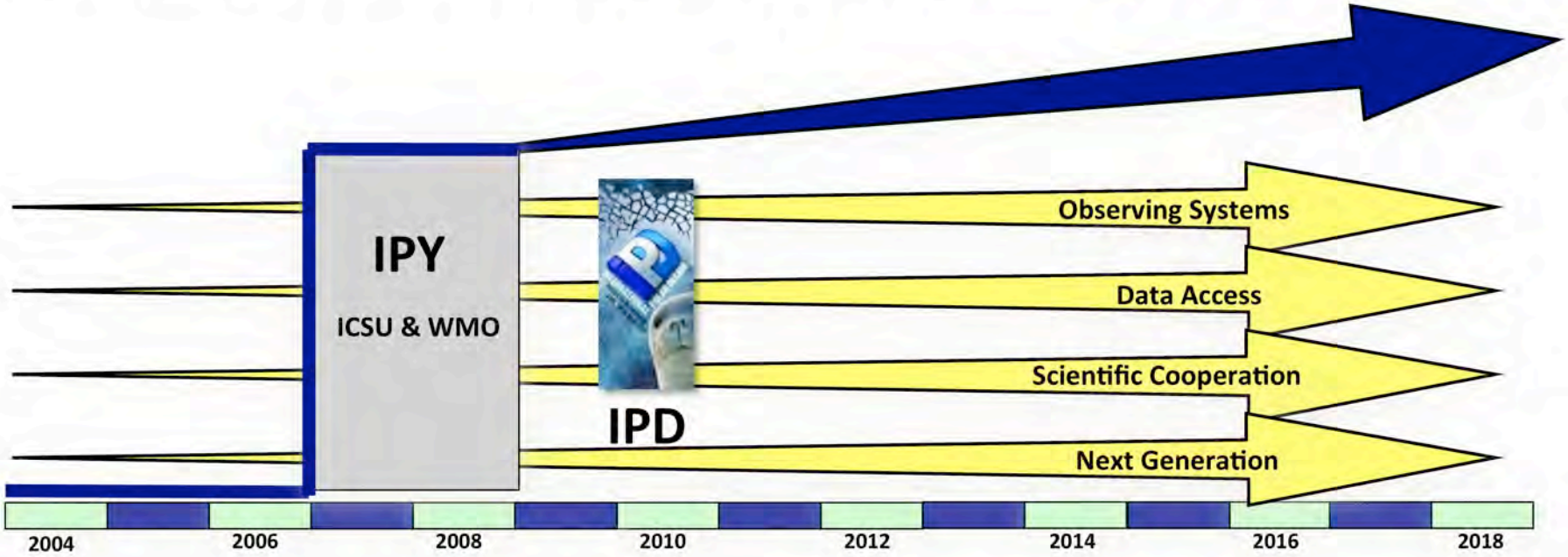
INTERNATIONAL POLAR PARTNERSHIP INITIATIVE (IPPI)

Co-Chairs: D. Hik, J.-G. Winther; Vice-Chair: Ø. Hov

IPY Legacies



- **Scientific legacy:** prototypes of observational systems and networks; technologies; baseline data sets; deeper understanding of the Earth System
- **Collaborative Legacy:** enhanced collaboration and joint funding; information sharing
- **Human Legacy:** next generation of researchers and leaders; involvement of Arctic residents; public awareness and interest

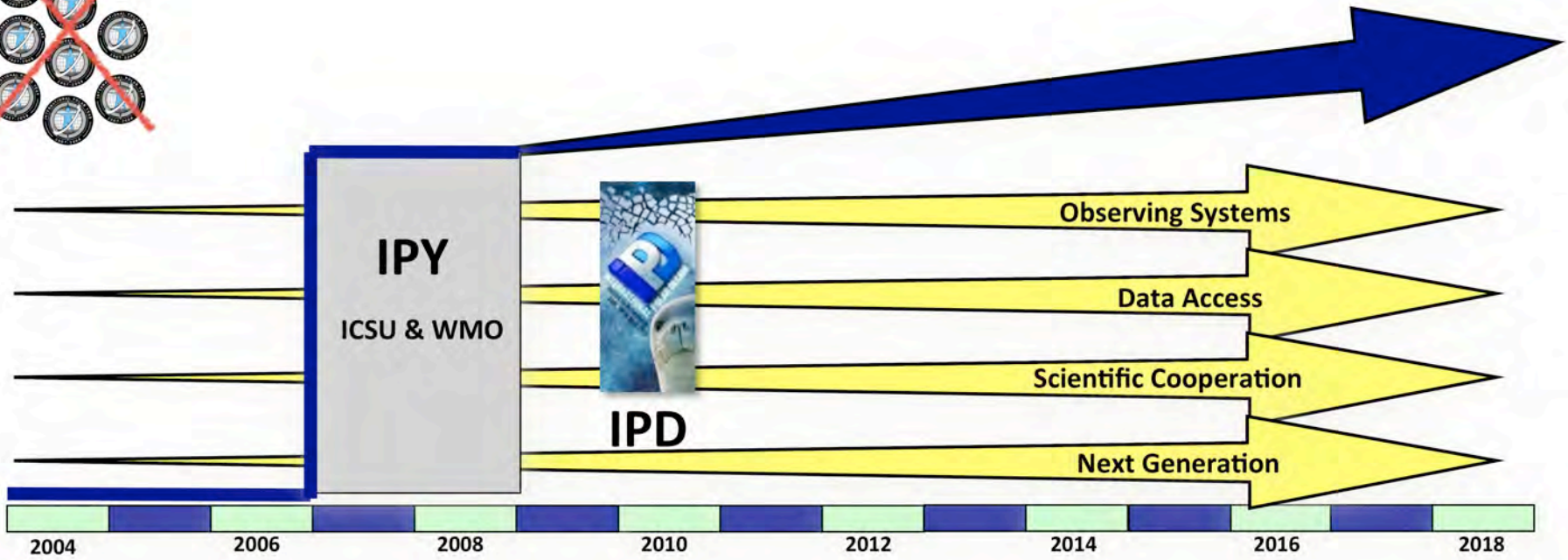


St. Petersburg, April 2011

Initial idea for a Polar Decade…

A new and novel framework for long-term cooperation in the Polar Regions

- ➢ addressing the emerging challenges identified within the IPY;
- ➢ optimizing and better coordinating existing resources and facilities;
- ➢ developing mechanisms for concerted investments in areas where activities are lacking.



Paris, February 2014

- concise (3 page) concept
- timetable for the way forward

- new partners, e.g. Future Earth, Mountain Research Initiative, International Hydrographic Organization
- understanding that the initiative is 100% compatible with and/or builds on ongoing research planning undertaken by IASC (ICARP III), SCAR (Horizon Scan) and others
- clear understanding of highly economical nature of the initiative (e.g. "microsecretariat")

International Polar Partnership Initiative (IPPI)

➡ Agreement to cooperate

➡ Implementation Plan for common activities

IPPI *Concept*

Promote **cooperation in research on human and natural processes** in the poles and help **to identify synergies** and **effectively use existing** resources to address important polar **issues of common interest**.

Engage multiple **stakeholders** and support the activities that are relevant to societal issues and benefit from enhanced collaboration and coordination.

Specifically, IPPI aims to:

- Create, upgrade, and maintain necessary polar components of **observing assessment, prediction, and services** systems;
- Strengthen interdisciplinary/multiplatform **data** collection, search and rescue, exchange, archival and access, and related interoperability;
- Build **long-term capacity** in the communities of polar scientists and practitioners providing services; and
- Develop a common language and cooperative synergistic relations between **local peoples, social and natural scientists, and practitioners**.

IPPI *Timetable*

(1) 2014: seek comments at following meetings

WMO EC-PORS - February 2014
Arctic Council Task Force - April 2014, June 2014 and October 2014
IASC - April 2014 (ASSW 2014)
IASSA - May 2014 (ICASS VIII)
UNEP - June 2014
WMO - June 2014 (EC-66)
IOC/UNESCO - July 2014 (EC-47)
SCAR - August 2014 (SCAR 2014)
Arctic Parliamentarians - September 2014

(2) update of IPPI concept and submission of formal proposal for endorsement by end of 2014

(3) 2015: final endorsement of the concept for IPPI

ASSW 2015 and **ICARP III**
Arctic Council Ministerial Meeting
WMO Congress-17
IOC/UNESCO Assembly-28

Comments on and input to the IPPI concept are welcome

Development of the IPPI Implementation Plan, documenting the benefits of IPPI to its stakeholders and participants, is underway.

APPENDIX D

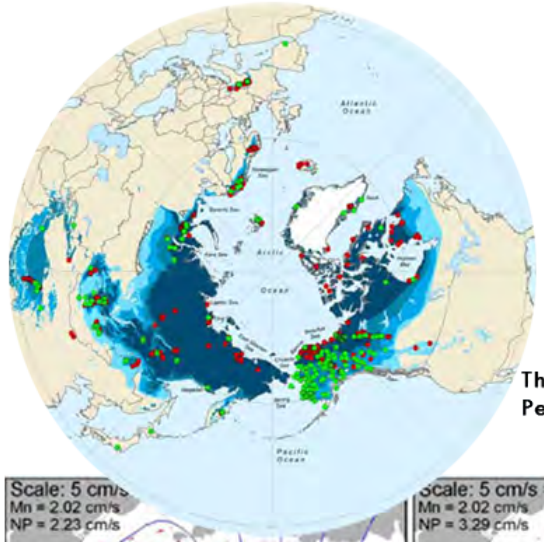
Societally Significant Observing

Meeting Needs Now for a More Resilient Future

Erica Key
National Science Foundation
Arctic Observing Network Program

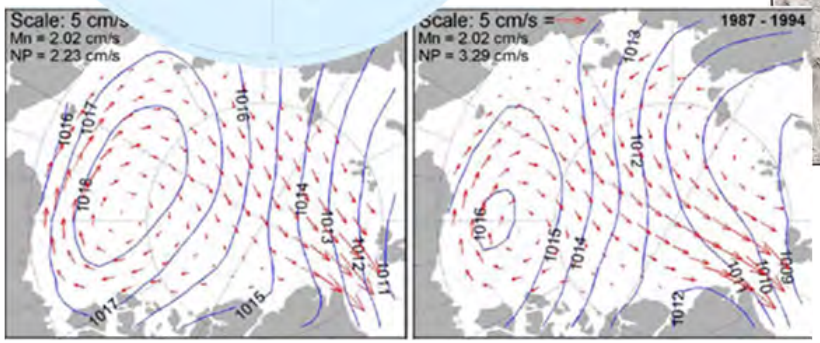
Resilience is at the nexus of need and knowing

Ideum, Vancouver Aquarium



Thermal State of Permafrost

Sea Ice for Walrus Outlook

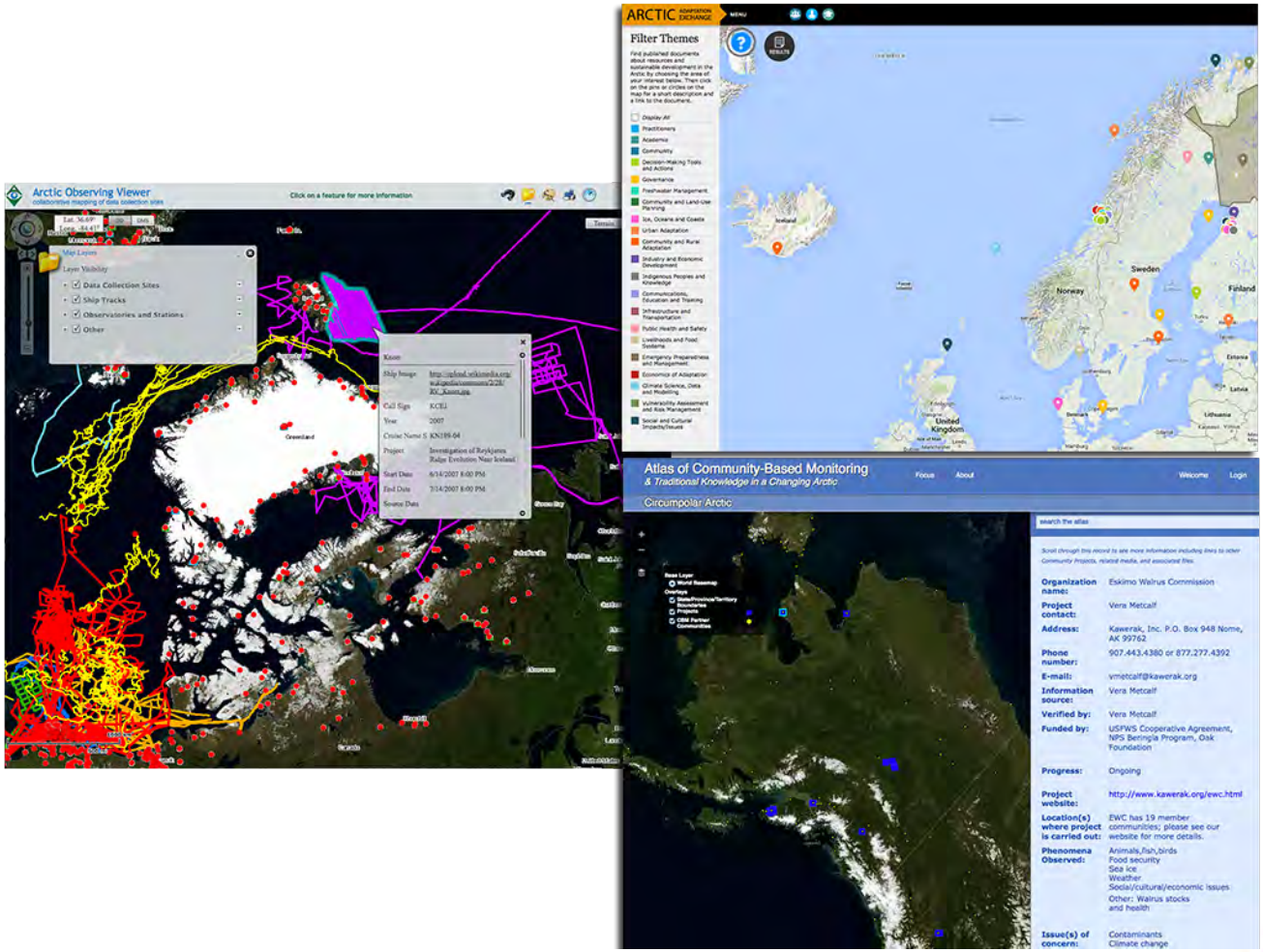


International Arctic Buoy Program

Information for
> Understanding
> Decision-making
> Planning

AOA
ARCTIC OBSERVING ASSESSMENT

Connecting *visually* with stakeholders in observing for awareness, collaboration, integration, and access



AOA
ARCTIC OBSERVING ASSESSMENT

Building relationships between users and implementers

> a living assessment of user needs relevant to shared priorities and the observing and information science capability available to meet those needs

> focusing on 13 areas of societal significance:

- Food Security
- Freshwater Security
- Health and Well-Being
- Sustainable Economic Development
- Regulatory and Organizational Change
- Built Infrastructure
- Coastal and Riverine Vulnerability
- Environmental Safety
- Ecosystem Health
- Information Access and Security
- Environmental Awareness
- Climate Change Adaptation and Mitigation
- Teleconnections

> user need documents, resources, products, and information sources will be searchable, exportable, with visualization support

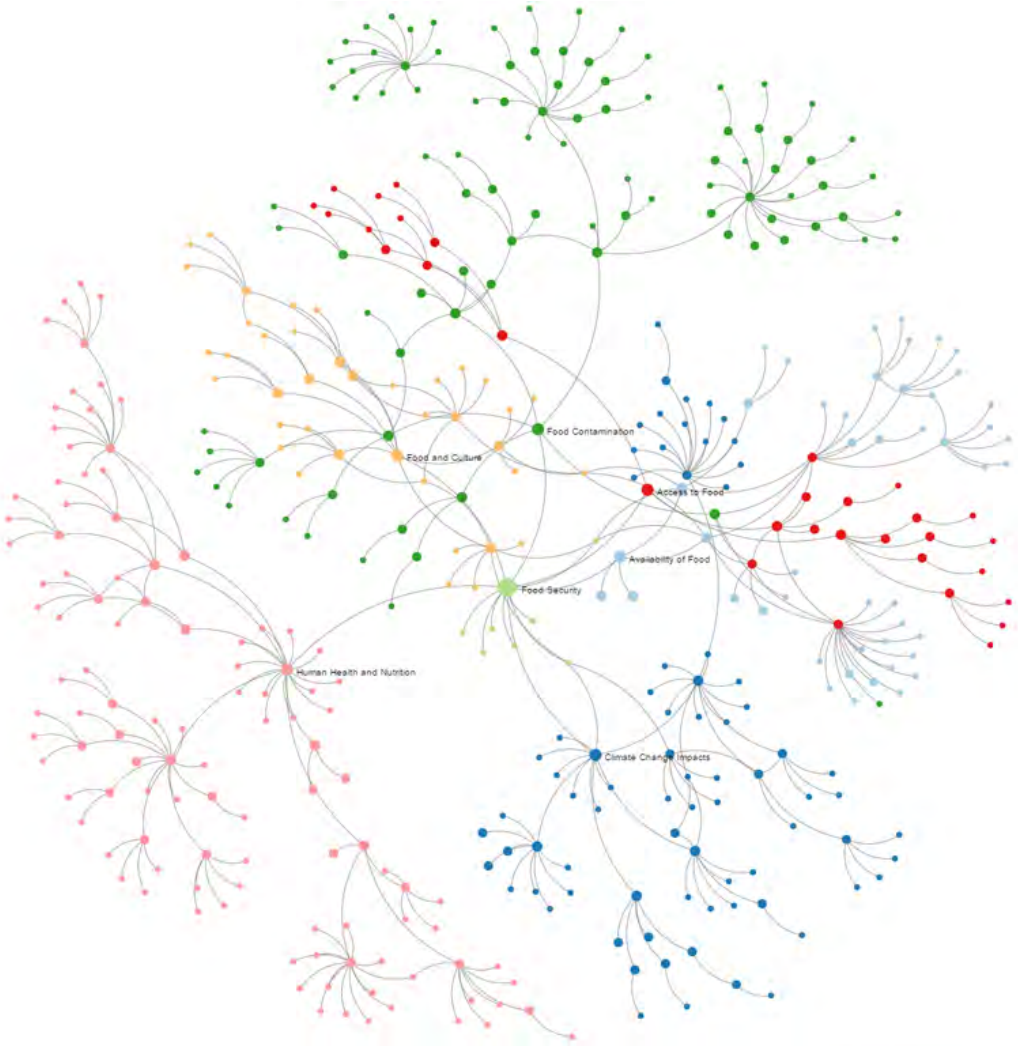
AOA
ARCTIC OBSERVING ASSESSMENT

Networking the observations

An example from
Food Security

> Key nodes
> Supporting docs
> Information streams

Coming soon:
> Cross-cuts
> Crowdsourcing



AOA
ARCTIC OBSERVING ASSESSMENT

Arctic Observing Assessment

Click and drag to recenter.
Use your mouse's scroll wheel or the buttons at the bottom of the page to zoom in or out.
Click any node to view additional information.

Legend:

- Nodes represent categories or resources
- Lines between nodes represent related concepts

Search:

Mercury

Search Results:

Mercury in fishes of Alaska with emphasis on subsistence species

Mercury

2001-2012 Total Mercury in Alaskan Fish

Total Mercury Concentrations in Alaskan Fish

Mercury in the Arctic

Technical Background Report for the Global Mercury Assessment 2013

Mercury in Northern Pike from Koyukuk Nowitna and Innoko National Wildlife Refuges

Linking to documents and resources

Become a node in the network.
Contribute your information to the AOA

http://www.arctichub.net