



Understanding Earth's Polar Challenges:  
**International Polar Year  
 2007-2008**

SUMMARY BY THE IPY JOINT COMMITTEE



World  
 Meteorological  
 Organization

Weather • Climate • Water



ICSU

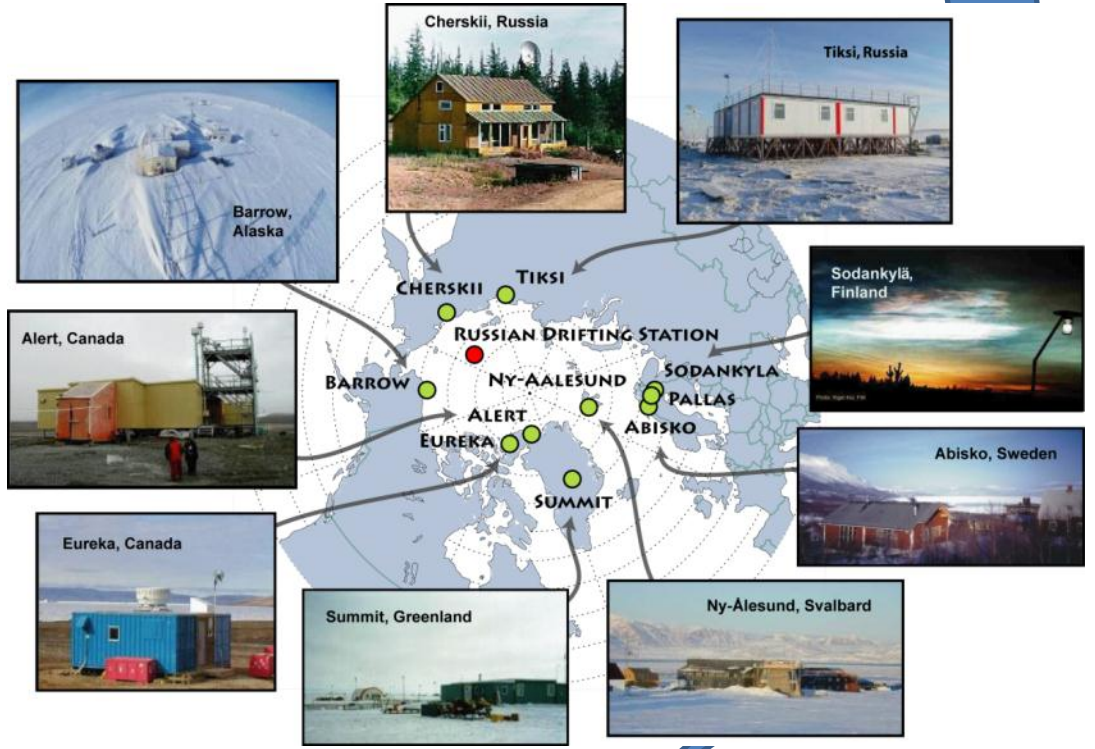
International Council for Science

# International Arctic Systems for Observing the Atmosphere (and Surface)

IASOA(S)

[www.IASOA.org](http://www.IASOA.org)

\*Global Cryosphere Watch



Chapter 3.4 in IPY Observing Systems,  
 Their Legacy and Data Management



\*Russian Drifting Station

# IASOA Scientific Value

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The complexity of the Arctic atmosphere is such that no one nation can provide a comprehensive view on either *how* the Arctic atmosphere is changing or *why*. Nor can any one group address the diverse science and operational needs of stakeholders. IASOA adds scientific value above isolated efforts through providing:

1. A facilitated international approach to relevant ***science themes*** that can be addressed by a sustained Pan-Arctic observational perspective on the atmosphere;
2. An emphasis on ***data sharing*** and ***observational expertise***;
3. With a focus on ***usable science*** from observational data both within and outside the fundamental research community.

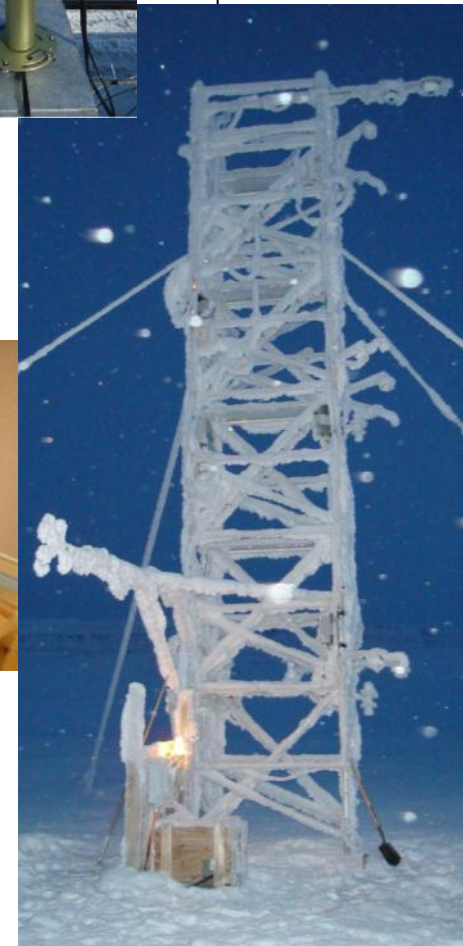
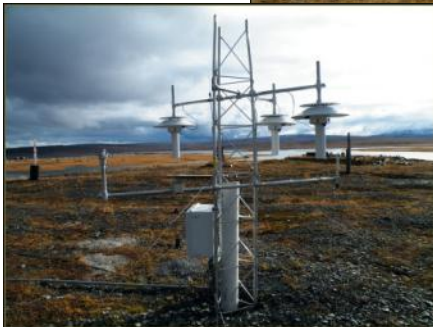
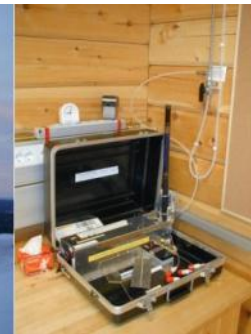
# Mission Statement

*The mission of IASOA is to advance coordinated research objectives from independent pan-Arctic atmospheric observatories through (1) strategically developing comprehensive observational capacity, (2) facilitating data access and usability through a single gateway, and (3) mobilizing contributions to synergistic science and socially-relevant services derived from IASOA assets and expertise.*

# Strategically developing comprehensive observational capacity

## Northward advancement of global observing networks

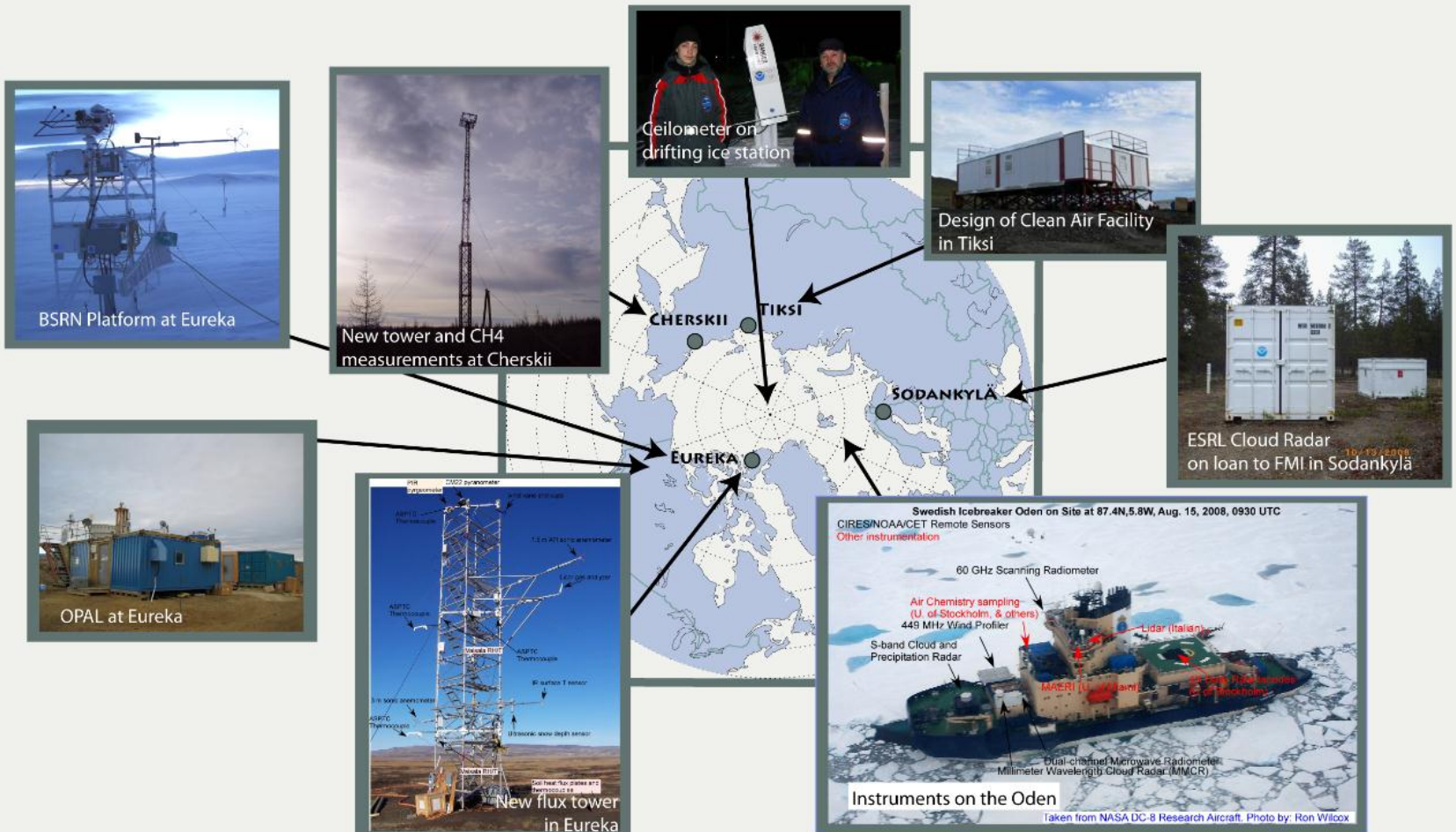
- Baseline Surface Radiation Network (BSRN)
- Global Atmosphere Watch (GAW)
- AeroNET
- International Permafrost Association (IPA)
- Support for Arctic Monitoring and Assessment Program (AMAP)
- Climate Reference Network (CRN)
- UVNET
- **Arctic Flux Net**



# Strategically developing comprehensive observational capacity

Sponsoring new measurements where there are data “gaps”

25



# *Strategically developing comprehensive observational capacity*

## The Tiksi Observatory





# facilitating data access and usability through a single gateway

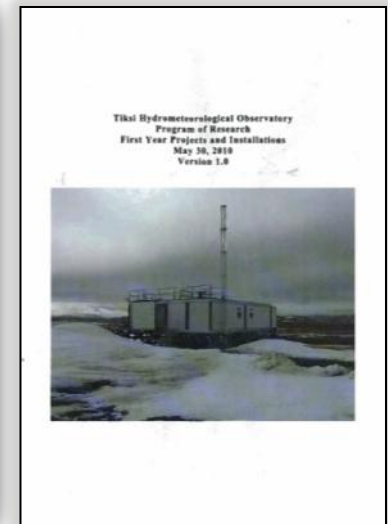
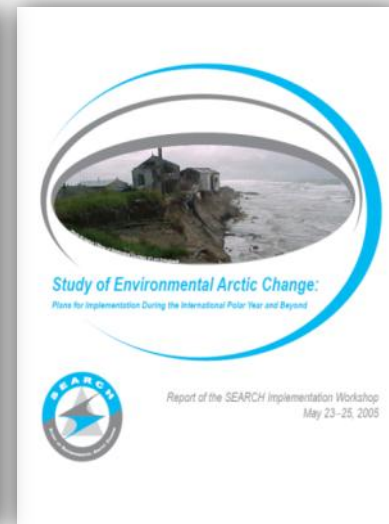
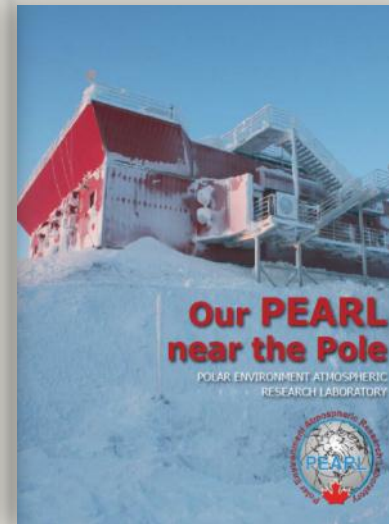
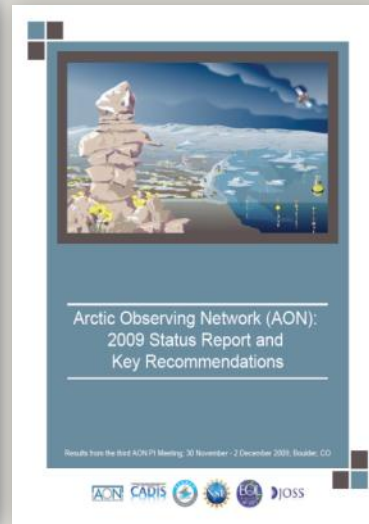
## The Developing IASOA data portal

Measurement or Instrument	<u>Abisko, Sweden</u>	<u>Alert, Canada</u>	<u>Barrow, U.S.A.</u>	<u>Cherskii, Russia</u>	<u>Eureka, Canada</u>	<u>Ny-Ålesund, Norway</u>	<u>Pallas/Sodankylä, Finland</u>	<u>Summit, Greenland</u>	<u>Tiksi, Russia</u>
<u>NCDC ISH Meteorology - surface (T, Td, P)</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>
<u>Meteorology - surface (T, Td, P, Ws, Wd)</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>
<u>Meteorology - upper air</u>		<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>
<u>Precipitation</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>
<u>Snow depth</u>		<u>Y</u>	<u>Y</u>		<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>
<u>Micrometeorology tower</u>			<u>Y</u>		<u>Y</u>		<u>Y</u>	<u>Y</u>	<u>Y</u>
<u>Surface energy balance</u>		<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	
<u>Radiation</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	
<u>(NEW) Black Carbon</u>		<u>Y</u>	<u>Y</u>			<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>
<u>Aerosol (surface and upper air)</u>		<u>Y</u>	<u>Y</u>		<u>Y</u>	<u>Y</u>	<u>Y</u>		



# *mobilizing synergistic science and socially-relevant services derived from IASOA assets and expertise*

## Capitalizing off of existing science plans



*mobilizing synergistic science and socially-relevant services  
derived from IASOA assets and expertise*

Does this sound familiar? Hint: Section 3.3

IASOA recognizes that progress on the following activities will benefit from a ***facilitated international approach***.

- Improve understanding of the source regions and radiative forcing effects of short-lived climate forcers (black carbon, ozone, methane) and their role in Arctic amplification;
- Improve understanding of processes controlling the formation, longevity, and physical properties of Arctic clouds, including the effects of, and sensitivities to, aerosols;
- Develop an integrated understanding of Arctic atmospheric processes, their impact on the surface energy budget, and their linkages with oceanic, terrestrial, and cryospheric systems.

# mobilizing synergistic science and socially-relevant services derived from IASOA assets and expertise

## The Concept of “Usable Science”

### Investigating Factors Influencing Usable Black Carbon Science from the IASOA Network

actionable assessment themes, which include: understanding the role of black carbon (BC) and other short lived climate forcers (SLCF's) on regional warming.

Figure 1: The International Arctic Systems for Observing the Atmosphere (IASOA) member observatories. Blue dots indicate current locations of relevant black carbon observations.

use factors for 3 case studies in order to identify opportunities for and barriers to BC science use for these stakeholders from the IASOA network.

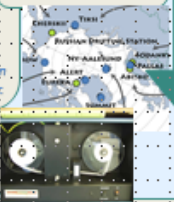
#### Production Factors

Station	Year	BC	AE	PSAP	Other
Alert	1990				
Alert	1991				
Alert	1992				
Alert	1993				
Alert	1994				
Alert	1995				
Alert	1996				
Alert	1997				
Alert	1998				
Alert	1999				
Alert	2000				
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Alert	2016				
Alert	2017				
Alert	2018				
Alert	2019				
Alert	2020				
Alert	2021				
Alert	2022				
Alert	2023				
Alert	2024				

Because IASOA is an international consortium, any harmonization in data acquisition, processing, formatting and publishing is voluntary. Organizations like Global Atmosphere Watch (GAW) can promote common standards, but have not reached accord on such a standard for black carbon.

- Sources of Error in Filter-Based (PSAP & AE) Measurements:
1. False absorption measured from scattering particles.
  2. Artificially enhanced absorption due to filter media.
  3. Non-linearities from filter loading.
  4. Inaccuracies in flow (V) and spot size measurement (A).
  5. The effect of particle coatings on the above.
  6. The effect of particle size distribution on the above.
- Complicated calibration schemes can constrain usability (even simple averaging) if end user is not an expert data processor.

Spatial Density constrains usability, but can be enhanced for compelling reasons.



#### Findings

- Respondents identified confidence issues that limit their use of observations & information
- Disagreements on BC measurements practices contributes to this lack of confidence
- Scientists in other applications (e.g. modeling) find observational data interpretation a barrier to use.
- Increased emphasis on speciation measures will support all applications (esp. regulatory)
- An international consortium supports multi-national access to hard-to-find data
- The process of surveying stakeholders has already resulted in an informal knowledge network

#### Knowledge to Action

**Case Study 1, Aerosol Modelling Intercomparison Project:**

- Monthly average, corrected BC concentrations (AE) and absorption coefficients (PSAP) can be used to evaluate gridded emissions inventories.
- Investigate potential for vertically resolved obs.

**Case Study 2, U.S. BC Mitigation in Russian Arctic:**

- Hourly BC concentrations (AE) and absorption coefficients (PSAP) from Tiksi, Alert and Barrow can be applied to receptor analysis model to determine BC transport from Russia.
- Investigating potential of adding speciation observations to key observatories to separate fossil and agricultural sources.

**Case Study 3, IMO BC Regulatory Initiative:**

- This group is still assessing needs. IASOA experts can get involved now to inform monitoring efforts.

#### Potential Usable BC Science from IASOA

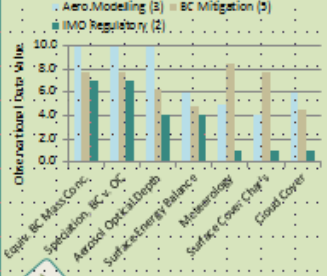
#### Next...

- Develop coherent practices and recommendations for IASOA on BC measurement and calibration schemes; harmonize data formats; work with GAW on the same.
- Process-oriented tools like focus groups could be useful for drawing out more information on barriers like confidence and data access issues.
- Identify new stakeholders and opportunities; potentially broaden the survey and formalize an Arctic BC knowledge network to bridge gaps.
- Continue to iterate with these groups to refine & deliver usable BC science.

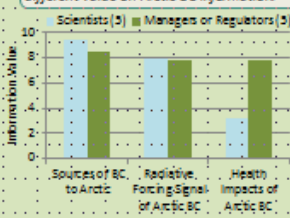
#### Use Factors

We asked 10 respondents spanning 3 Case Studies, to rank the relative value of different types of Arctic BC data and information. Ranking from 10 = Essential Value to 0 = No Value.

Applications affected the relative value of different observations.



Scientists and regulators surveyed placed different value on Arctic BC information.






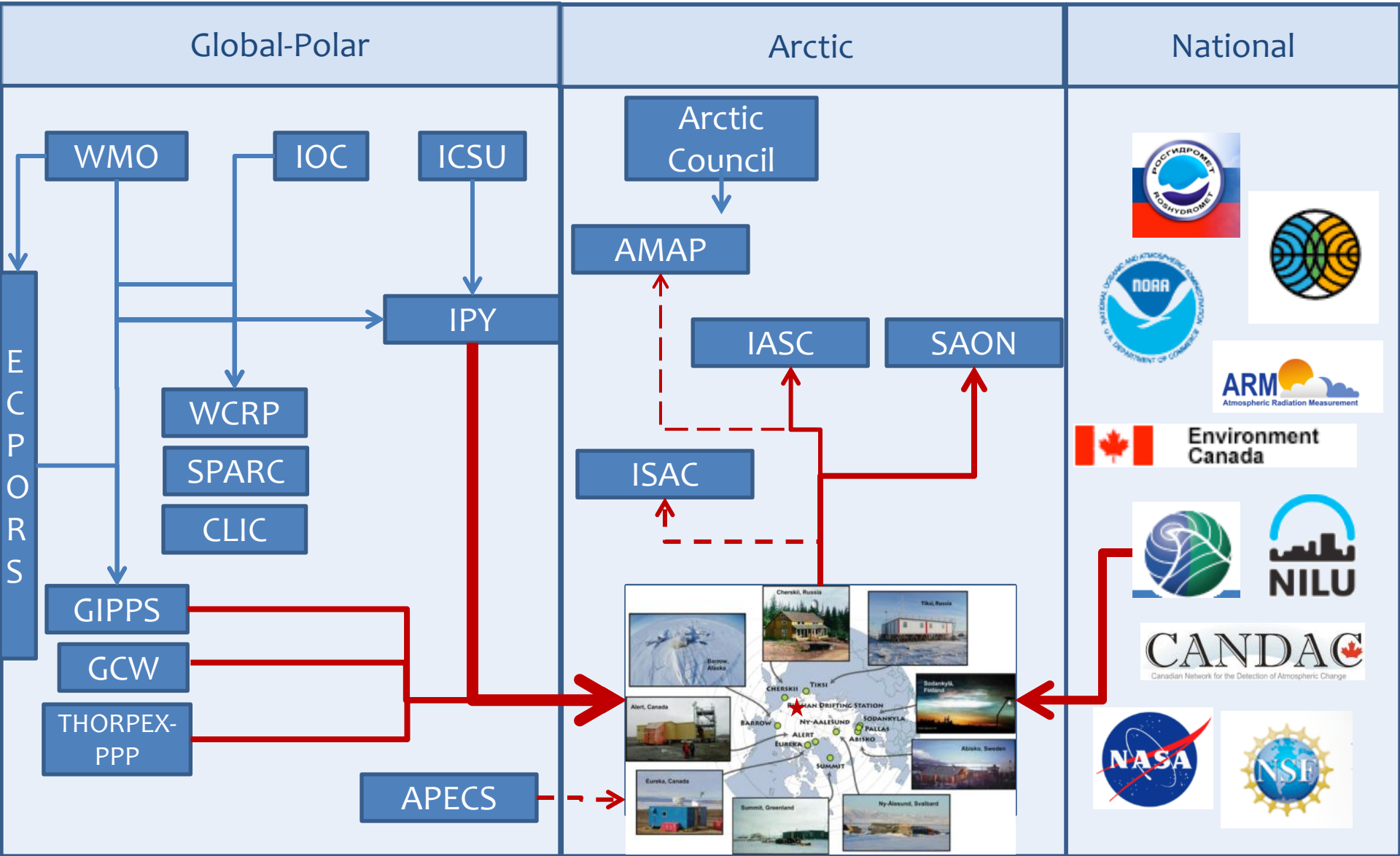
#### Barriers (e.g.)

"As a global aerosol modeler, I am generally looking for a long-term and monthly... average BC observation ... for the model evaluation. However, I tend to avoid using it if the data is not available as monthly or annual average. I am not confident to do this conversion without deeply understanding this observation..." ACCMIP Respondent.

# IASOA Organization Linkages

KEY:

Formalized IASOA Link  IASOA Link to Formalize  Other Org 



# What is cooking in the IASOA Kitchen NOW

## Reorganization of the Web Site

INTERNATIONAL ARCTIC SYSTEMS FOR OBSERVING THE ATMOSPHERE  
**IASOA**

Home | Mission | Observatories | News | Science | Data | Partners | IPY Media Day | Weather-A-I-Glance | Travel Blog | Tiksi

**IASOA's New Newsletter**  
IASOA distributed its first quarterly newsletter to 200 contacts last week. Click [here](#) to see the newsletter and subscribe today!

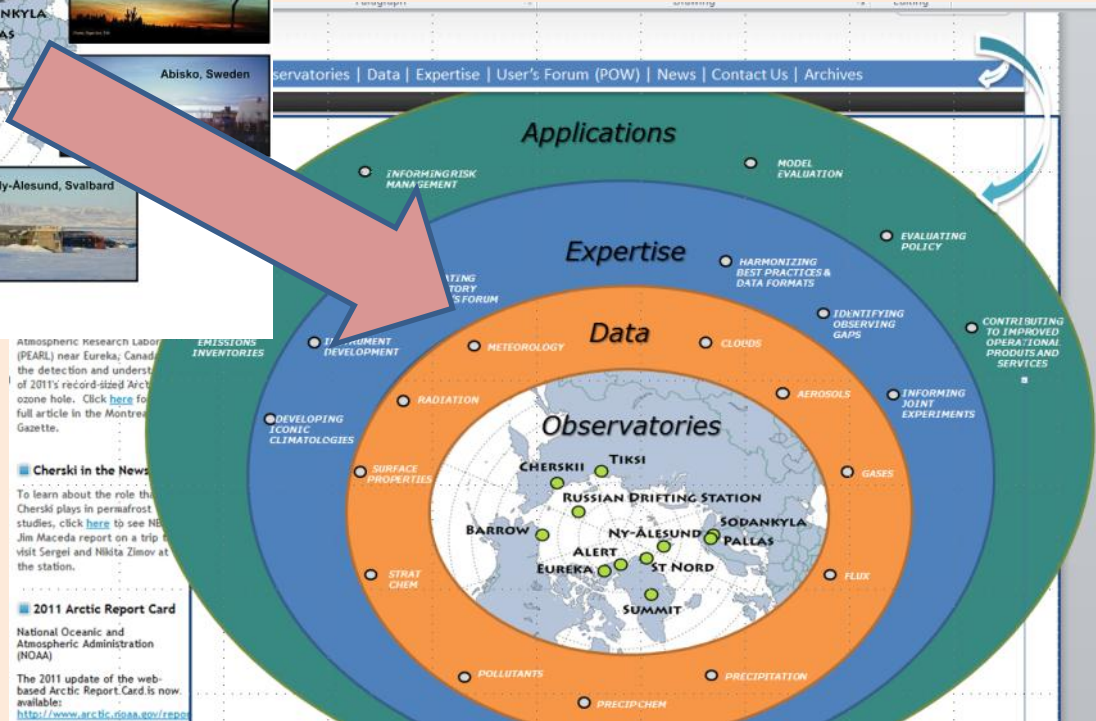
**Ozone News, BROMEX Blog**  
Click [here](#) to read about Paul Shepson's work in the news. And click [here](#) for a link to the Barrow-based March BROMEX campaign blog.

**Update - CREATE 2012**  
NSERC's CREATE Training Program in Arctic Atmospheric Science has announced new opportunities for 2012 graduate and undergraduate programs. Click [HERE](#) for more information.

**PEARL in the News**  
Researchers Jim Drummond and Kim Strong discuss the role of Canada's Polar Environment Atmospheric Research Laboratory (PEARL) near Eureka, Canada in the detection and understanding of 2011's record-sized Arctic ozone hole. Click [here](#) for the full article in the Montreal Gazette.

**Cherski in the News**  
To learn about the role that Cherski plays in permafrost studies, click [here](#) to see NBC's

Developing a legacy of continuous Arctic atmospheric measurements  
Visit the [IASOA Arctic Data Portal](#). We welcome your feedback!



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**2011 Arctic Report Card**  
National Oceanic and Atmospheric Administration (NOAA)  
The 2011 update of the web-based Arctic Report Card is now available:  
<http://www.arctic.noaa.gov/reports>