

## 10.8 INTERNATIONAL ARCTIC SYSTEMS FOR OBSERVING THE ATMOSPHERE (IASOA): AN OVERVIEW OF INTERNATIONAL POLAR YEAR ACTIVITIES

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### 1. Introduction

International Arctic Systems for Observing the Atmosphere (IASOA) is an organization developed to enhance Arctic atmospheric research by fostering collaborations among researchers during the International Polar Year (IPY) and beyond. The member stations are Abisko, Sweden; Alert and Eureka, Canada; Barrow, USA; Cherskii and Tiksi, Russian Federation; Ny-Ålesund, Norway; Pallas and Sodankylä, Finland; and Summit, Greenland (Fig. 1). All of these observatories operate year-round, with at least minimal staffing in the winter months, are intensive and permanent. IASOA is one of the few IPY projects focusing on atmospheric research in the Arctic, as shown in the IPY “honeycomb” plot of projects (Fig. 2).

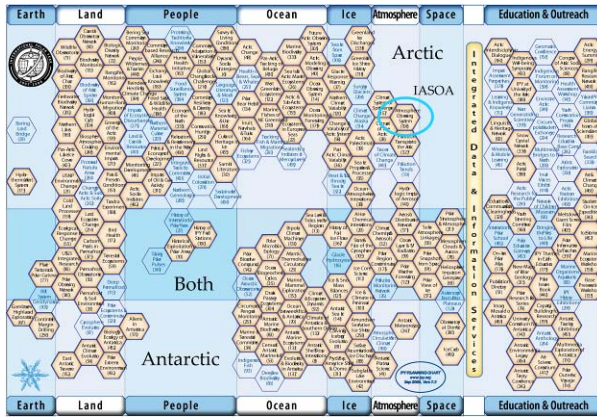


Figure 1: Map of IASOA stations

In this paper we present information about the IASOA project's goals and accomplishments for the International Polar Year (IPY), including our participation in high-profile meetings and conferences, our commitment to supporting long-term atmospheric measurements in the Arctic, the

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**Figure 2** IPY "honeycomb" chart showing all IPY projects

development of a comprehensive web site ([www.iasoa.org](http://www.iasoa.org)) and station upgrades.

## 2. IASOA Outreach and Legacy Activities

### 2.1 Sustaining Arctic Observing Networks (SAON)

Beginning in fall 2007, the Sustaining Arctic Observing Networks (SAON) program began holding meetings to ascertain what would be involved in maintaining Arctic observing networks for the atmosphere, ocean/ice, hydrology/cryosphere, terrestrial ecosystems and human dimension disciplines for the long-term. At these meetings attendees were tasked with identifying what observational networks currently exist, what are the gaps in these networks, how can these gaps be filled, how are Arctic activities coordinated, and what is the best way to achieve a data archive that is current and easily accessed. Throughout this process various networks were identified as potential "building blocks" for the SAON long-term observatories. IASOA, along with WMO observing programs, was identified as a potential building block for the atmospheric component of SAON. To see SAON's "Summary of Key Recommendations," which was submitted to the Arctic Council, or to learn more about SAON, visit [http://www.arcticobserving.org/index.php?option=com\\_frontpage&Itemid=1](http://www.arcticobserving.org/index.php?option=com_frontpage&Itemid=1).

### 2.2 International Polar Year Media Day

During the last few weeks of the IPY, the outreach and education staff at the IPY International Program Office organized a "media blitz" to

showcase IPY projects. As a part of this, IASOA was featured on 10 February 2009 on [www.ipy.org](http://www.ipy.org). For this media day, researchers at each IASOA station were asked to provide up-to-date information on IPY research at their stations and to be available for journalists to interview by phone. On [www.iasoa.org](http://www.iasoa.org) a media day page was created (Fig. 3) which highlighted recent activities at six of the stations ([http://iasoa.org/iasoa/index.php?option=com\\_content&task=blogcategory&id=40&Itemid=147](http://iasoa.org/iasoa/index.php?option=com_content&task=blogcategory&id=40&Itemid=147)).



**Figure 3** Screen shot of media day page

### 2.3 AGU Sessions

In an effort to encourage and support pan-Arctic research, IASOA proposed a session to the 2008 Fall AGU conference. The response to our session was very good, with enough abstracts to have both an oral and a poster session. Authors were encouraged to submit papers on studies using data from two or more IASOA stations. Twenty-seven papers covering a broad range of topics were presented. All abstracts submitted to our AGU session can be found on the IASOA web site science page: [http://iasoa.org/iasoa/index.php?option=com\\_content&task=blogcategory&id=41&Itemid=149](http://iasoa.org/iasoa/index.php?option=com_content&task=blogcategory&id=41&Itemid=149).

### 2.4 Cooperative Arctic Data and Information Service (CADIS)

The Cooperative Arctic Data and Information Service (CADIS) is an IPY data management and archival project, primarily for Arctic Observing Network (AON) and Study of Environmental Arctic Change (SEARCH) principal investigators. The

National Science Foundation (NSF) supports CADIS, which is a joint project of the University Corporation for Atmospheric Research (UCAR), the National Center for Atmospheric Research (NCAR), and the National Snow and Ice Data Center (NSIDC). IASOA is currently in the exploration phase of supplying metadata and data links to CADIS (Fig. 4).



Figure 4 Screen shot of CADIS web site showing IASOA/Eureka page

## 2.5 IASOA post-IPY Legacy Plans

Now that the IPY is over, we are planning for IASOA's future. As part of the process of establishing a legacy of operations for IASOA after the IPY, IASOA has requested that the International Arctic Science Committee (IASC) consider endorsing IASOA.

We are also currently in the planning stages for establishing a scientific steering committee that will oversee the continuation of the promotion of pan-Arctic research utilizing measurements obtained at the IASOA stations. Ideally we would like to have two representatives from each station participate. Additionally, we will organize science meetings focusing on atmospheric measurements from IASOA stations.

## 3. IASOA Web Site

The IASOA website (Fig. 5) has a page for each IASOA observatory, with each page including a general overview of the observatory, a listing of available measurements and principle investigators, links to data bases, and station contacts (Fig. 6). These pages help Arctic researchers find the data they need for their research. The development of these observatory web pages, plus an "observatories-at-a-glance" page (Fig. 7), has allowed us to identify gaps in

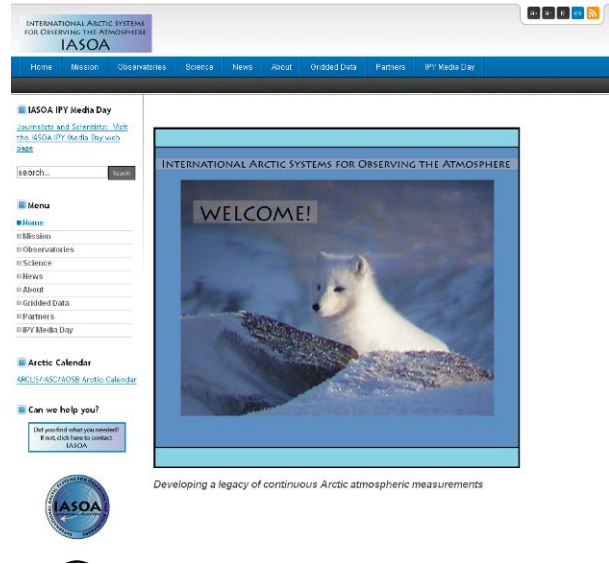


Figure 5 IASOA home page

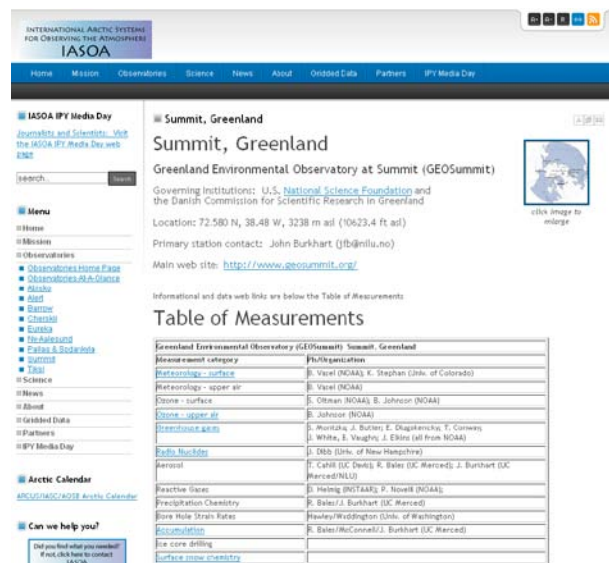


Figure 6 Summit page

atmospheric measurements in the Arctic. We welcome information from researchers to post on the web site, particularly links to data bases and news stories.

## 4. Observatory Upgrades

Numerous instrument upgrades, new instrument installations, and new programs occurred over the course of the IPY at several of the IASOA observatories. A few examples of the upgrades follow:



INTERNATIONAL ARCTIC SYSTEM FOR CREATING THE KNOWLEDGE IASOA

HOME Mission Observatories Science News About Global Data Partners IPY Media Day

IASOA IPY Media Day  
 Journalists and Scientists Visit the IASOA IPY Media Day web site

search:

Home

News

Observatories

Observatories-Home Page

Observatories-At-A-Glance

Energy

Cherskii

Eureka

High-Arctic

Caleta de Gubik

Summit

Science

Partners

IPY Media Day

Arctic Calendar

Can we help you?

Observatories-At-A-Glance

Welcome to the IASOA Observatories at a Glance page. This page has been designed to give you a quick look at what measurements & specialized instruments are available at the IASOA observatories.

For more detailed information regarding instrumentation at the individual observatories, click on the observatory's name.

\*Y means that the station does have the measurement or instrument listed in the left hand column, to the best of our knowledge.

We welcome your comments - if you have any additions or corrections that apply to this page, please forward them to [iasa@nrc.ca](mailto:iasa@nrc.ca).

Measurement or Instrument	Alaska Summit	Alert Canada	Barrow U.S.A.	Cherskii Russia	Eureka Canada	High-Arctic Russia	Caleta/Gubik Greenland	Summit Greenland	ES-11 Russia
Microbiology									
surface (T, RH, P, SW, NW)	Y	Y	Y	Y	Y	Y	Y	Y	Y
Microbiology Upper air	Y	Y	Y	Y	Y	Y	Y	Y	Y
Precipitation	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ice depth	Y	Y	Y	Y	Y	Y	Y	Y	Y
Accumulation									
Meteorology Power						Y	Y		
Surface energy balance		Y		Y	Y	Y			
Surface radiance	Y	Y	Y	Y	Y	Y	Y	Y	Y
Surface upward flux						Y	Y		
Radiation	Y	Y	Y	Y	Y	Y	Y	Y	Y
Radio wind profile			Y						
Cloud radar			Y		Y				
Sea-ice radar			Y						

Figure 7 Screen shot of Observatories-at-a-Glance page

- Eureka
  - A new flux tower (Fig. 8)
  - Several CIMEL sunphotometers for the Aeronet Network
  - A Baseline Surface Radiation Network (BSRN) station
  - Starphotometer
  - Precipitation sensor suite
  - VHF wind tracking radar
  - All sky imager
  - Spectral airlow temperature imager
  - The CANDAC MMCR replaced the NOAA/SEARCH MMCR
  - Rayleigh-Mie-Raman lidar and a tropospheric ozone lidar
  - With IPY funding the level of technical support at the site was increased to provide more reliable data collection and transmission.
  - In addition to equipment upgrades, Eureka scientists hosted visiting diplomats as part of the "Northern Diplomatic Tour," as well as Grade 11-12 students and teachers as part of the Northern Experience Program.
- Summit
  - Summit observatory released a strategic plan highlighting climate sensitive year-round observations, innovative research platforms and operational plans to increase renewable energy to maintain the pristine platform. Summit also has a new multi-channel GC for

- continuous measurement of trace halocarbon and CFC gas concentrations.
- A CO<sub>2</sub> and NO<sub>x</sub> flux facility went online in summer 2008. The flux facility was built underground and covered with snow, with only the flux tower exposed.
- The new Temporary Atmospheric Watch Observatory was constructed.



Figure 8 New flux tower at Eureka (photo courtesy of Rob Albee)

- Cherskii
  - A collaboration between the University of Alaska Fairbanks (UAF) and NOAA has resulted in tower measurements of CO<sub>2</sub> and CH<sub>4</sub>. The CH<sub>4</sub> measurements will be combined with new modeling methods developed at NOAA to infer regional-scale CH<sub>4</sub> fluxes. These estimates will complement CH<sub>4</sub> fluxes

determined by UAF using a flux gradient method. This work is timely and important due to the large carbon stores, mostly CH<sub>4</sub>, that could be released from permafrost regions in response to Arctic warming.

- The researchers at Cherskii also partnered with The Polaris Project (<http://www.thepolarisproject.org/>), providing undergraduate students with the chance to do field work in the Siberian Arctic
  - Scientists at Cherskii are comparing disturbed and undisturbed areas of permafrost to determine the effects of thawing permafrost
- **Barrow**
    - Barrow observatory has two new systems for aerosol size and chemistry composition, as well as new persistent organic pollutant (POPs) measurements. The meteorology measurement and data system has been completely upgraded.
    - Barrow provided ground services and lodging for the Polarcat campaign.
  - **Tiksi**
    - The Logistics Team Meeting was held in St. Petersburg in March 2009, resulting in a construction plan for finishing the site and Clean Air Facility improvements in August 2009 (Fig. 9).
    - A Science Team Meeting was held in Boulder in May 2009, resulting in the finalization of a current science plan with 14 identified joint science projects
    - In August 2009 construction will be completed at the site and data transfer will be initialized
    - Operations Team will meet in September 2009 to work out the details of continuing operations, including how to incorporate new projects from the NSF, the Russian Academy of science, other agencies (e.g., the National Aeronautics and Space Administration) and other countries



**Figure 9** The signing of the Tiksi observatory planning documents

## 5. Summary

The International Polar Year 2007-2008 was a fantastic opportunity to harness the immense interest in Arctic meteorology during this time of rapid change. There is still much work to do for IASOA to reach its full potential and we look forward to serving the Arctic atmospheric community. If you would like to become more involved in IASOA, contact the IASOA Program Manager, Lisa Darby ([lisa.darby@noaa.gov](mailto:lisa.darby@noaa.gov)) or the IASOA Project Lead, Taneil Uttal ([taneil.uttal@noaa.gov](mailto:taneil.uttal@noaa.gov)).