

International Arctic Systems for Observing the Atmosphere (IASOA)

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Climate observatories at Barrow, Alaska, Summit, Greenland, and Tiksi, Russia all lie between 71° and 73° North, a few hundred miles above the Arctic Circle—but the sites are hardly similar otherwise.

At the National Oceanic and Atmospheric Administration's (NOAA) Barrow Observatory in Alaska, 36 feet above sea level, winds sweep across the tundra from the ocean, just 2 miles away. The newly upgraded Tiksi Observatory is at the mouth of the Lena River Delta on the Northern edge of the Eurasian continent and clocks some of the coldest Northern Hemisphere winter temperatures on record. Summit Observatory in Greenland—run by the National Science Foundation and a Danish commission—sits in the middle of a massive ice sheet at more than 10,000 feet altitude, far from the sea.

Climate change processes in the vast Arctic cannot be understood with data collected from standard weather stations alone, said Taneil Uttal, the original activity leader for IASOA. So a few years ago, she began using the organizational mechanisms provided by the International Polar Year committee to contact colleagues around the world to start coordinating activities at the few intensive observatory sites in the Arctic. The result is the International Arctic Systems for Observing the Atmosphere (IASOA), which now includes 10 observatories (see map).

“The challenges are enormous” says Dr. Jim Drummond, the IASOA co-leader and lead researcher at the Eureka, Canada station. “Each observatory is autonomous with separate funding, separate objectives, separate priorities and separate management. Each observatory has unique circumstances; Alert, Canada is a military base, Tiksi is a historical science station that is now being reborn after a hiatus during the Soviet collapse in the 90s, and of all the difficult-to-reach stations, Summit is the winner in a dubious “hard-to-access” contest. IASOA has to serve an ‘integrating’ function, not a ‘controlling function’ between these different observatory entities.”

In much of the Arctic, temperatures are rising far faster than models predicted, and ice and permafrost are thawing. “We need better science on the Arctic atmosphere and how it interacts with the ocean and cryosphere to understand the ‘Why’ behind rising temperatures and other trends,” Uttal says. “What’s the role of greenhouse gases?”

Aerosol loads? Cloud properties? How do things work differently in the Arctic due to cold temperatures and long, dark winters compared to the lower latitudes? How does the Arctic physical system work?”

During December’s American Geophysical Union meeting, about two dozen scientists from around the world presented talks and posters based on measurements taken at IASOA observatories. “The AGU sessions—a first for IASOA—exemplified the data-sharing and collaborations that are the goal of the network” said Lisa Darby, IASOA’s program manager. Research results were presented from the Barrow, Eureka, Summit, Ny-Ålesund, Sodankylä, and Tiksi stations.

One key question for many Arctic scientists is whether or when the region’s warming permafrost will increase releases of the greenhouse gas methane, contributing to a feedback cycle of further warming and melt. “The IASOA observatories will eventually be able to help scientists detect and understand major changes in methane flux,” said Ed Dlugokencky, a researcher from Boulder, Colorado. He collaborated recently with the University of Alaska at Fairbanks to install methane samplers on a tower at Cherskii, Russia to help answer this question. Another example of multi-national collaborations includes the installation of a U.S. radar in Sodankylä, Finland for a year to study detailed cloud processes and characteristics. This radar complements identical systems in Barrow and Eureka to provide a unique data set on the cloudy component of the Arctic system.

One of the current highlights of IASOA is the flurry of activity in Tiksi, Russia where an international effort is in progress to upgrade and rebuild a venerable research station, with contributions from the Russian Federal Service for Hydrometeorology and Environmental Monitoring, U.S. science agencies, and the Finnish Meteorological Institute.

For more information visit our IPY Media Day page at www.iasoa.org

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Map of IASOA stations