

Pan-Arctic Surface Radiation Measurements for Analysis of Arctic Climate Change

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Recent changes in the Arctic climate involve surface-atmosphere energy exchange processes and feedbacks associated with clouds, aerosols, surface albedo, and the atmospheric state. The Arctic is comprised of regional climate regimes, which exhibit unique sensitivities and responses to climate change.

The surface radiation budget is regularly monitored from several stations in the pan-Arctic region. Thus far, most studies have focused on individual locations, reporting significant changes in the surface radiation budget. Climatologies and spatial analyses are lacking and a coordinated analysis of these measurements is needed to improve understanding of the processes involved in the changing Arctic climate. With this objective, the International Arctic Systems for Observing the Atmosphere (IASOA) (<http://www.iasoa.org>) Radiation Working Group is now working to collectively analyze the pan-Arctic surface observations. The focus observatories (Figure 1) are Tiksi (Siberia), Summit (Greenland), Ny-Ålesund (Svalbard), Barrow (Alaska), and Alert (Canadian Archipelago). These stations have long records of quality measurements, enabling spatial and temporal analyses to be conducted that focus on variability in the surface radiation budget over the past 10 to 20 years, a time period during which the Arctic has experienced dramatic changes.

In addition to direct observations from broadband radiometers, the Radiative Flux Analysis (RFA) value-added product will be used. The RFA provides quality control and higher order metrics, such as cloud radiative forcing, cloud fraction, and optical depth. The RFA product will be available to interested researchers, including those engaged in validation of satellite observations, reanalysis, and model data sets, which have spatial coverage over the sea ice where continuous monitoring from the surface is impractical.



Figure 1. Map showing the Arctic observatories that are part of the International Arctic Systems for Observing the Atmosphere (IASOA) network. Stars on the map indicate the five observatories that will be the focus of the study. NOAA/GMD stations are located at Summit and Barrow. (image from <http://iasoa.org>)