



IASOA circumpolar observations in service for research of atmospheric transports into and out of the Arctic

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The International Arctic Systems for Observing the Atmosphere (IASOA) is an International Polar Year legacy consortium that focuses on coordinating measurements of the Arctic atmosphere collected at ten observatories in the U.S., Canada, Russia, Norway, Finland, and Greenland. The IASOA data portal and collaborative process support thematic expert groups that work towards common goals for utilizing interoperable data products across the observatories. In addition to detailed surface observations and upper-air radiosonde program, some of the IASOA observatories collect information on the vertical profiles of moisture, cloud boundaries, cloud water/ice contents, and aerosols using radars, lidars ceilometers and radiometers. Collectively the IASOA network provides a unique source of information that can be utilized in order to provide the best possible empirical estimates of the horizontal atmospheric transports of momentum, heat, moisture, cloud water, cloud ice, and aerosols into and out of the Arctic Ocean region. These can be used in turn to support the evaluation of atmospheric reanalyses, weather and climate models, and satellite remote sensing products, and subsequently studies on the interaction between the Arctic and lower latitudes including the role of mid- and low-latitude forcing on the Arctic amplification of climate warming and the effects of Arctic changes on mid-latitude weather and climate. In addition, the IASOA data are valuable for the evaluation of gridded products (reanalyses, models, and satellite data) with respect to Earth surface variables, such as snow depth, soil moisture, surface temperature, radiative fluxes, albedo, as well as turbulent fluxes of sensible heat, latent heat, CO₂, and CH₄. Evaluation of surface fluxes is a vital to complement the evaluation of horizontal transports. These together will yield a comprehensive assessment of the quality of available gridded products in representing atmospheric budgets of heat, moisture, greenhouse gases, and aerosols in the Arctic. The IASOA thematic study will be a unique approach as Arctic transport studies have so far been addressed without full utilization of direct observations; it is expected that this activity will directly support the objectives of global initiatives such as the WMO Year of Polar Prediction (YOPP).