

Pan-Arctic Measurements and Arctic Regional Climate Model Simulations (PAMARCMIP) 2012

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Project Location:

The airborne research project PAMARCMIP-2012 will study the meteorology, air quality, and sea ice thickness in the Arctic. The German research aircraft POLAR-5 will travel from Longyearbyen, to Station Nord, to **Alert**, to **Eureka**, to **Resolute Bay**, and finally to Toronto. The research flights within Nunavut will be conducted over the sea-ice out of the Alert and Eureka airports, and on the transits from Station Nord to Alert, Alert to Eureka, and Eureka to Resolute Bay. The flight routes and stations for activities within Nunavut are shown on the attached map.

Timeframe:

Alert: 28 March 2012 – 5 April 2012
Eureka: 5–8 April 2012
Eureka – Resolute Bay : ~8-10 April 2012

Project Description:

This is one of a series of PAMARCMIP airborne projects designed to collect detailed measurements of the Arctic atmosphere and sea-ice, and trace the evolution of such changes from year to year. Measurements will address objectives related to atmospheric studies and sea ice changes:

Atmospheric Studies: The main aim of the meteorological and atmospheric air quality studies is to improve the understanding of physical processes in the Arctic atmosphere, and to use these measurements to improve the performance of regional and global climate models of the Arctic. Over the Arctic, little information is available on aerosol particles, and specifically those containing soot. The impact of these particles on the incoming solar and outgoing terrestrial radiation is also not well known. This study will measure soot and its particle size distribution to help understand the radiative impact of aerosols in the Arctic.

Sea Ice Studies: The rate of the Arctic summer sea ice decline is much faster than predicted by any of the Intergovernmental Panel of Climate Change model scenarios. The PAMARCMIP aircraft study will provide a unique snapshot of ice thickness across a vast region of the Arctic, and generate an inventory of Arctic sea ice volume. It will also provide ground-truthing for observations of the recently launched European CryoSat satellite, which is dedicated to the retrieval of sea ice thicknesses in the Arctic Ocean.

Methodology: A map showing the planned Polar 5 research flights is attached to this application. The aircraft will be equipped with instruments that measure aerosols, soot, particle size distribution, particle concentration, radiation, and winds and turbulence. Remote sensing instrumentation includes an atmospheric Lidar, a towed electromagnetic induction bird (sea ice thickness)-and digital video cameras. For the offshore ice thickness surveys, the plane will fly at an altitude of 100 m above the ice.

Data: All data will be stored locally. For long term needs, data will be stored at Environment Canada, the Polar Data Catalogue, and in the database PANGAEA, a Publishing Network of Geoscientific & Environmental Data which is run by the Alfred Wegener Institute, Bremerhaven, Germany.

Reporting: Nunavut Research Institute will have permission to publish information on the project in local communities. The study will result in scientific publications which will be provided to the Nunavut Research Institute.