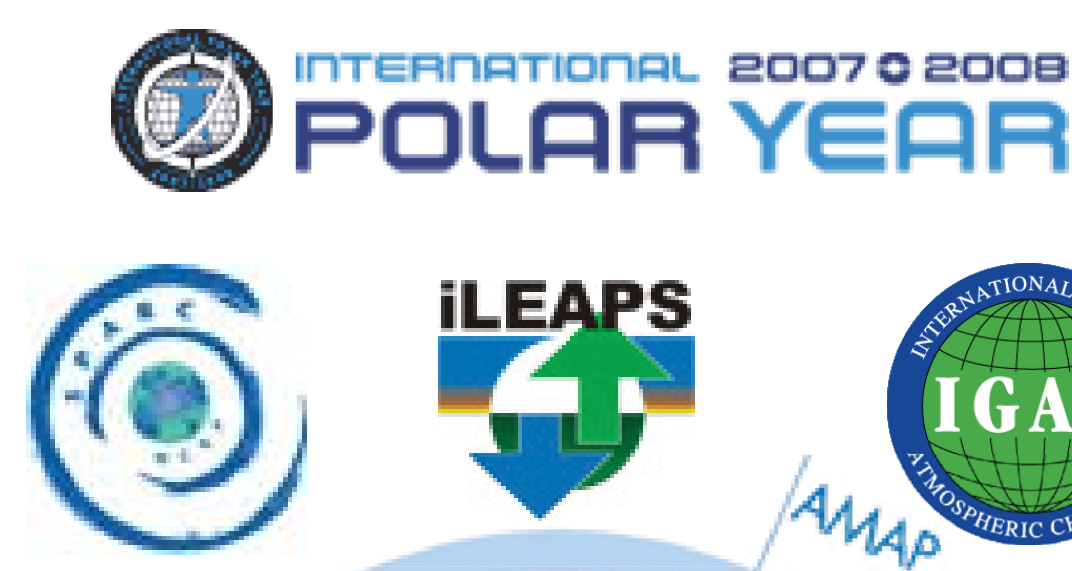


POLARCAT: Polar Study using Aircraft, Remote Sensing, Surface Measurements and Models, of Climate, Chemistry, Aerosols, and Transport

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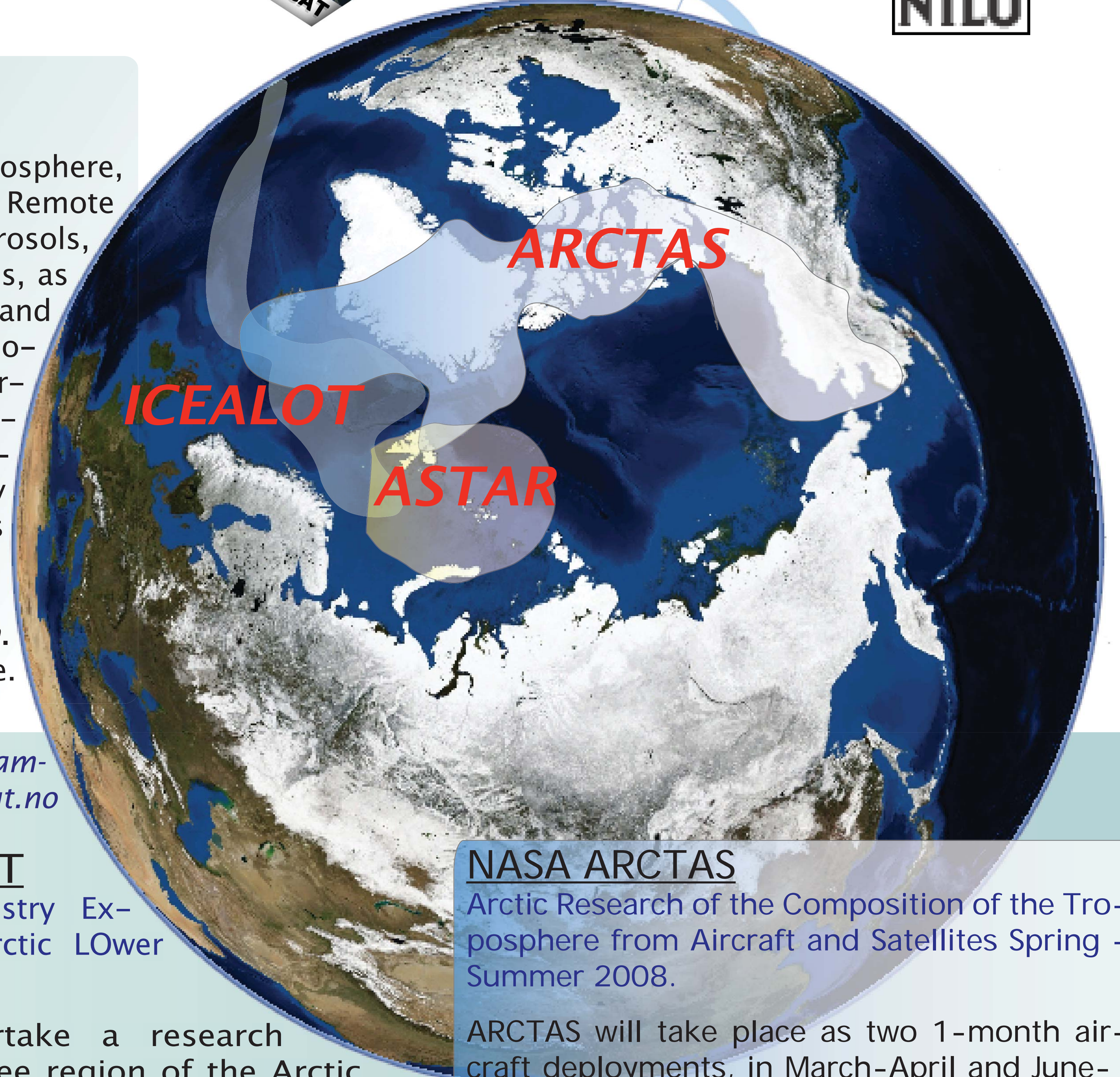
1) The Norwegian Institute for Air Research (NILU), Kjeller, Norway
 2) Service d'Aéronomie / CNRS, Paris, France



Overview

Aerosols have a large effect on radiation transmission in the Arctic troposphere, both directly and indirectly via clouds. The Polar Study using Aircraft, Remote Sensing, Surface Measurements and Models, of Climate, Chemistry, Aerosols, and Transport (POLARCAT) will study transport to the Arctic of aerosols, as well as of air pollution more generally, from anthropogenic sources and boreal forest fires. It will address the effects of this pollution on atmospheric chemistry and climate. POLARCAT will use a large number of aircraft, a ship, a train, surface stations, as well as satellite data and numerical models. The first campaign, from 26 March - 19 April will use two aircraft based in Longyearbyen, Spitsbergen. Other campaigns in February 2008 and summer 2008 will follow with aircraft being based at various locations throughout the Arctic and in the boreal region.

POLARCAT is a bottom-up project that *will remain open for others to join*. Therefore, the following description of activities reflects the current stage.



Example Campaigns *This is a listing of a few of the campaigns. Full listing at: www.polarcat.no*

ASTAR 2007

Arctic Study of Tropospheric Aerosols, Clouds and Radiation - 2007.

An intensive aircraft campaign based out of Svalbard, Norway will be conducted from 24 March through 17 April. The program will focus on physical, chemical and optical properties of tropospheric aerosol and cloud micro-physical properties. The main focus of the project is to improve the assessment of the aerosol direct and indirect effects on the Arctic radiative balance.



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NOAA ICEALOT

International Chemistry Experiment in the Arctic Lower Troposphere

NOAA will undertake a research cruise in an ice-free region of the Arctic during March and April of 2008. The study area will include the Greenland, Norwegian, and Barents Seas. Scientific issues to be addressed include springtime sources and transport of pollutants to the Arctic, evolution of aerosols and gases into and within the Arctic, and climate impacts of haze and ozone in the Arctic. Planned measurements include a full complement of relevant gas phase species as well as aerosol physical, chemical, and optical properties.

Contact:
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NASA ARCTAS

Arctic Research of the Composition of the Troposphere from Aircraft and Satellites Spring - Summer 2008.

ARCTAS will take place as two 1-month aircraft deployments, in March-April and June-July 2008. The NASA DC-8 is the primary platform, other possible platforms include the smaller J-31 and B-200 aircraft as specialized secondary platforms. The spring deployment will target arctic haze, anthropogenic pollution in general, stratosphere-troposphere exchange, and sunrise photochemistry. The summer deployment will target boreal forest fires, stratosphere-troposphere exchange, and summertime photochemistry.

Contact:
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Overall Project Objectives

As a core International Polar Year project POLARCAT will address numerous scientific questions relying on the extensive multidisciplinary and international resources provided by this unique opportunity.

Tropospheric Composition and Chemistry

The objective is to investigate the composition and chemistry of the entire Arctic troposphere in two seasons (spring and summer) with the goal of understanding the reactive nitrogen, reactive hydrogen, reactive halogen, and ozone cycles. An integrated approach that links surface, free tropospheric, and satellite observations with models of chemistry and climate is envisioned.

Aerosol Radiative Effects

- Improved understanding of Arctic Haze
- Radiative Effects in polluted air masses
- characterize albedo effects of black carbon

Transport Processes

- Quantify transport and residence times of pollution
- Measure Polar dome gradients and mixing
- Identify pollutant source regions and pathways
- Measure vertical stratification of pollution

Boreal Forest Fires

- Quantify impact of emissions on Arctic troposphere
- Identify pathways for boreal and biomass fires
- Characterize pyroCBs, examine ozone related processes

Tools

- Coordinated Mobile Platform Measurements
 - Aircraft
 - Ships
 - Balloons
 - Train
- Station Based Measurements
 - Summit
 - Zeppelin
 - Barrow
 - Alert & Others
- Transport & Chemical Modeling
 - e.g FLEXPART
 - GEOS-CHEM
- Satellite Measurements / Observations