The International Polar Year 2007-2008

(http://www.ipy.org/)

An international program of coordinated, interdisciplinary scientific research and observations in the Earth's polar regions

- **To explore new scientific frontiers**
- **To deepen our understanding of polar processes**
- **To increase our ability to detect changes**
- **To attract the next generation of polar scientists**

IPY History & Organization

- First International Polar Year (1882-1883)
- Second International Polar Year (1932-1933)
- The International Geophysical Year (1957-58)
- Third International Polar Year (2007-2008)

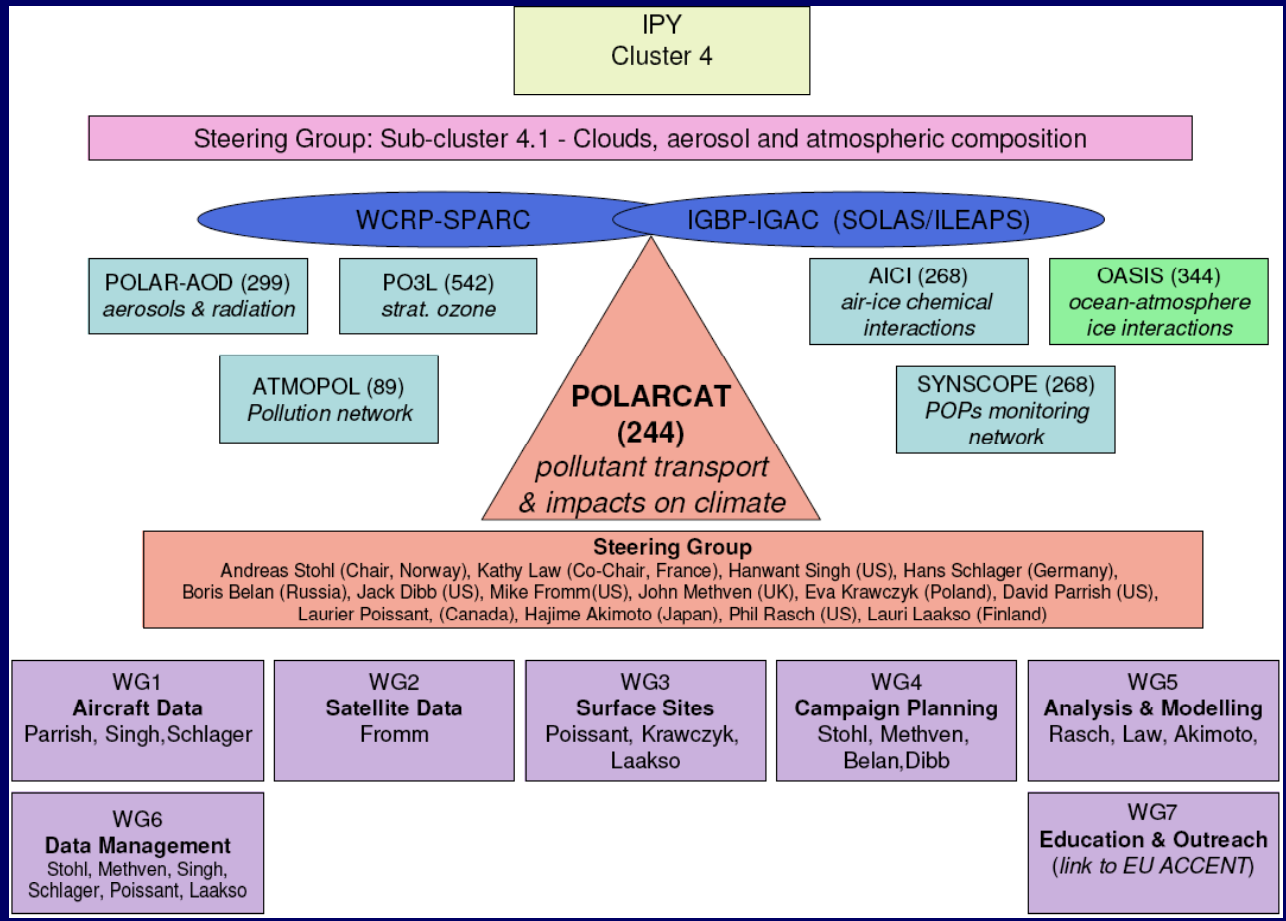
- Secretariat is functioning
- IPY Committee has asked for Expressions of Intent
- Accepted activities will be endorsed by the IPY as the“official”IPY program
- Funding has to be sought nationally

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

(http://zardoz.nilu.no/~andreas/POLARCAT/)

- Long-range transport of gases and aerosols in & out of the Arctic region; impact on chemistry & climate
- Two integrated campaigns: winter/spring 2007/8 and summer 2008
- Summer campaign will focus on boreal forest fires influences to the Arctic
- Winter/spring campaign will target arctic haze & anthropogenic pollution from Eurasia
- Investigative tools: Aircrafts, satellites, surface networks, lagrangian balloons, models

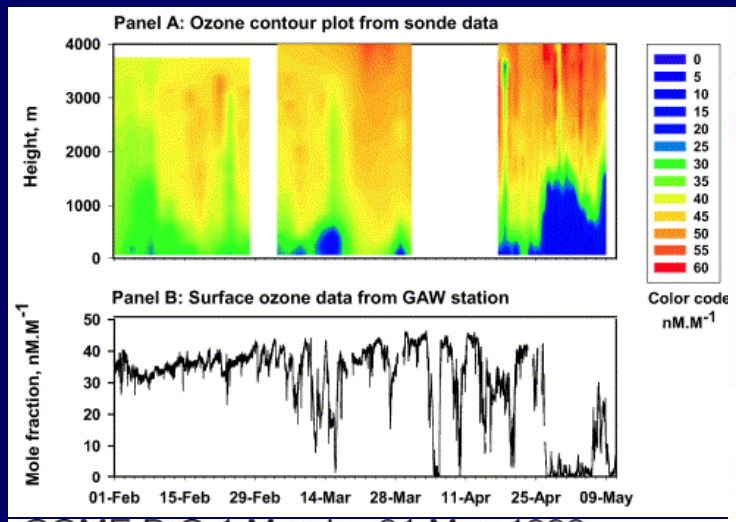
POLARCAT in the IPY cluster "Clouds, aerosol and atmospheric composition"

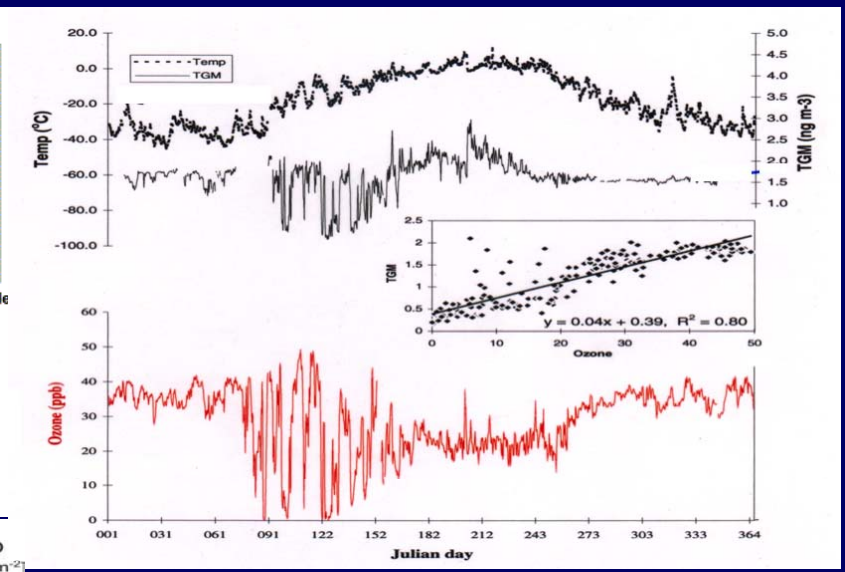


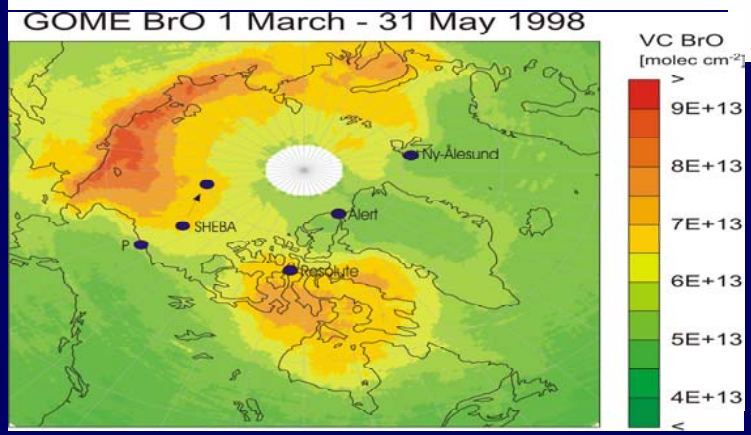
Steering Committee:

H. Akimoto, Japan
B. Belan, Russia
J. Dibb, U.S.A.
M. Fromm, U.S.A.
E. Krawczyk, Poland
L. Laakso, Finland
K. Law, France (co-chair)
J. Methven, U.K.
D. Parrish, U.S.A.
L. Poissant, Canada
P. Rasch, U.S.A.
H. Schlager, Germany
H. Singh, U.S.A.
A. Stohl, Norway (chair)

Ozone and mercury depletion in the Arctic







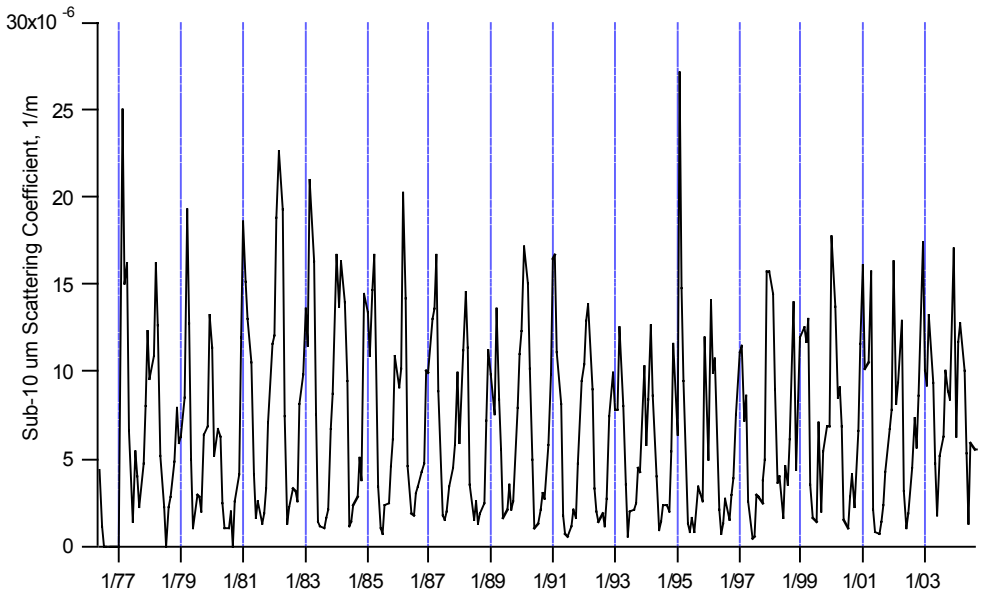
$Br + O_3 \rightarrow BrO + O_2$ (x2)

$BrO + BrO \rightarrow Br_2 + O_2$

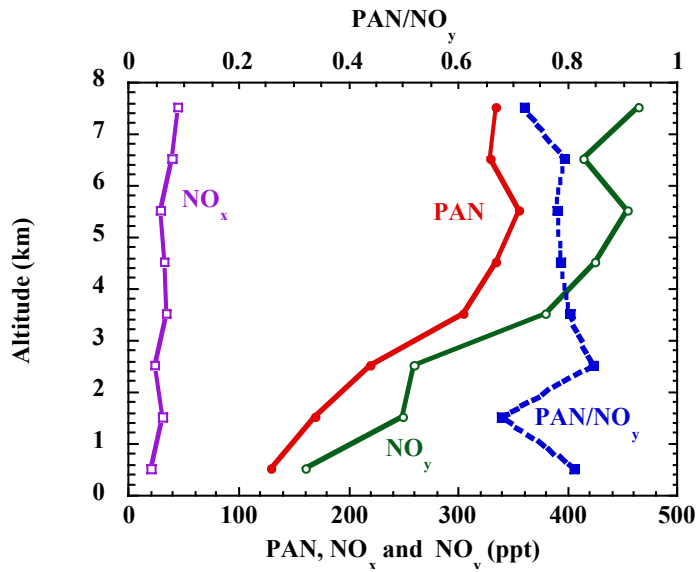
$Br_2 + h\nu \rightarrow 2\ Br$

$2O_3 \rightarrow 3O_2$ (net)

Arctic composition:Haze & Chemistry

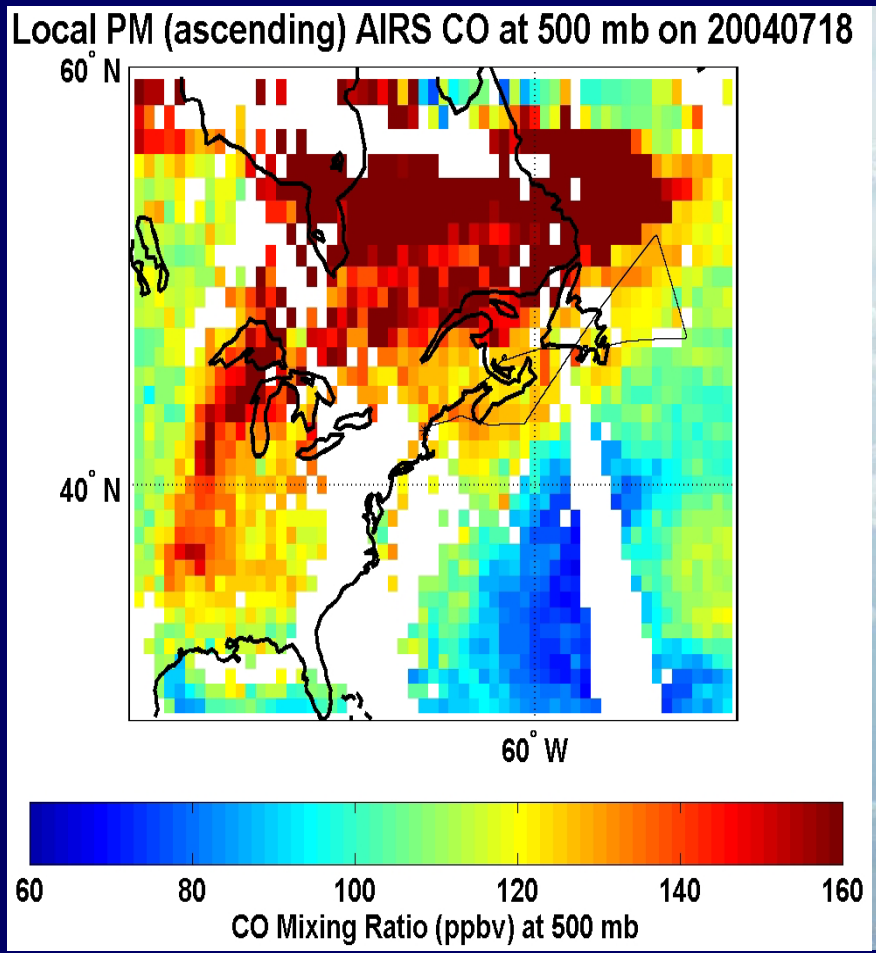


Light scattering at Barrow Alaska



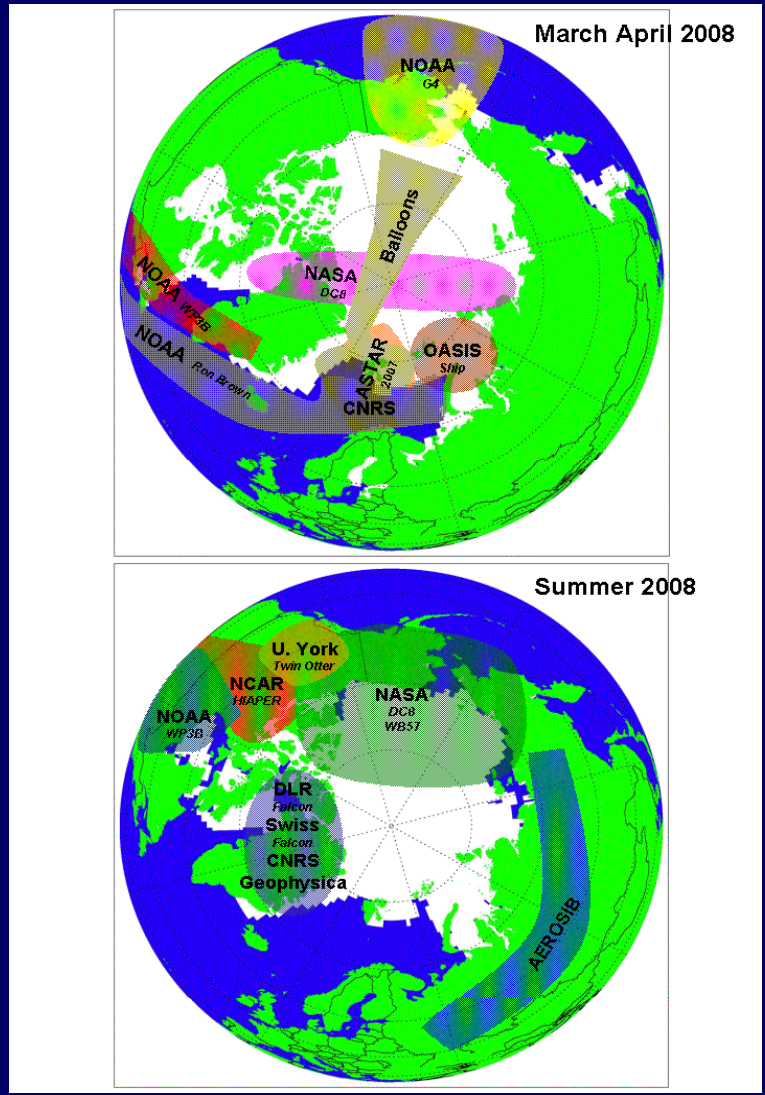
Reactive Nitrogen in Arctic

High latitudue fires: Advection & deep convection

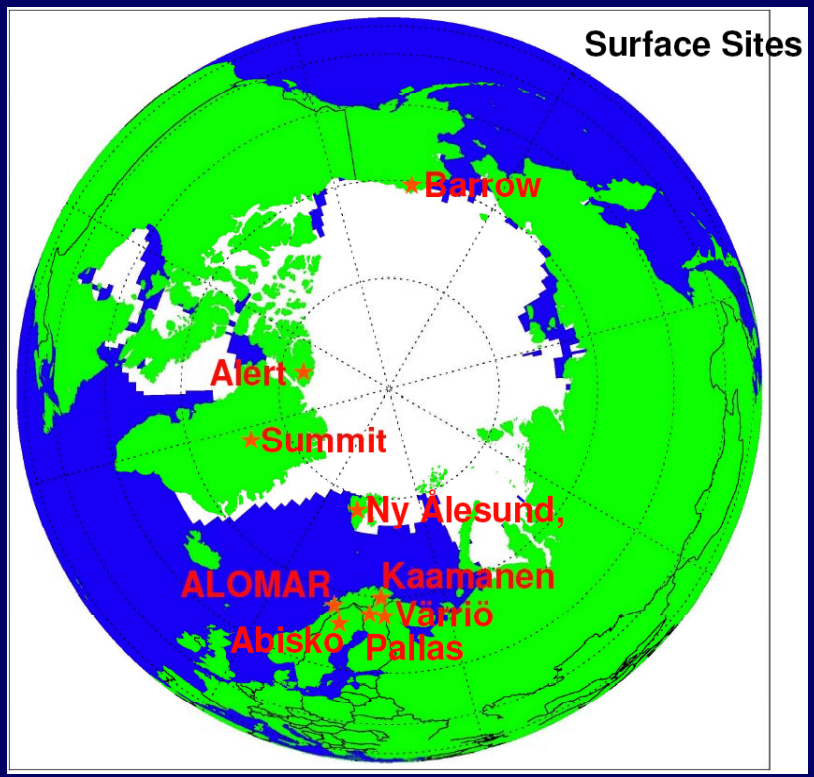


Polarcat field plans: Mobile platforms

- Aircrafts
  - NASA DC-8
  - NASA WB-57
  - UK BAe-146
  - NOAA P3
  - Swiss Learjet
  - Russian Antonov-30
  - Russian Geophysica
  - French ATR
  - German Falcon
- Satellites
  - AURA
  - ACE
  - ENVISAT

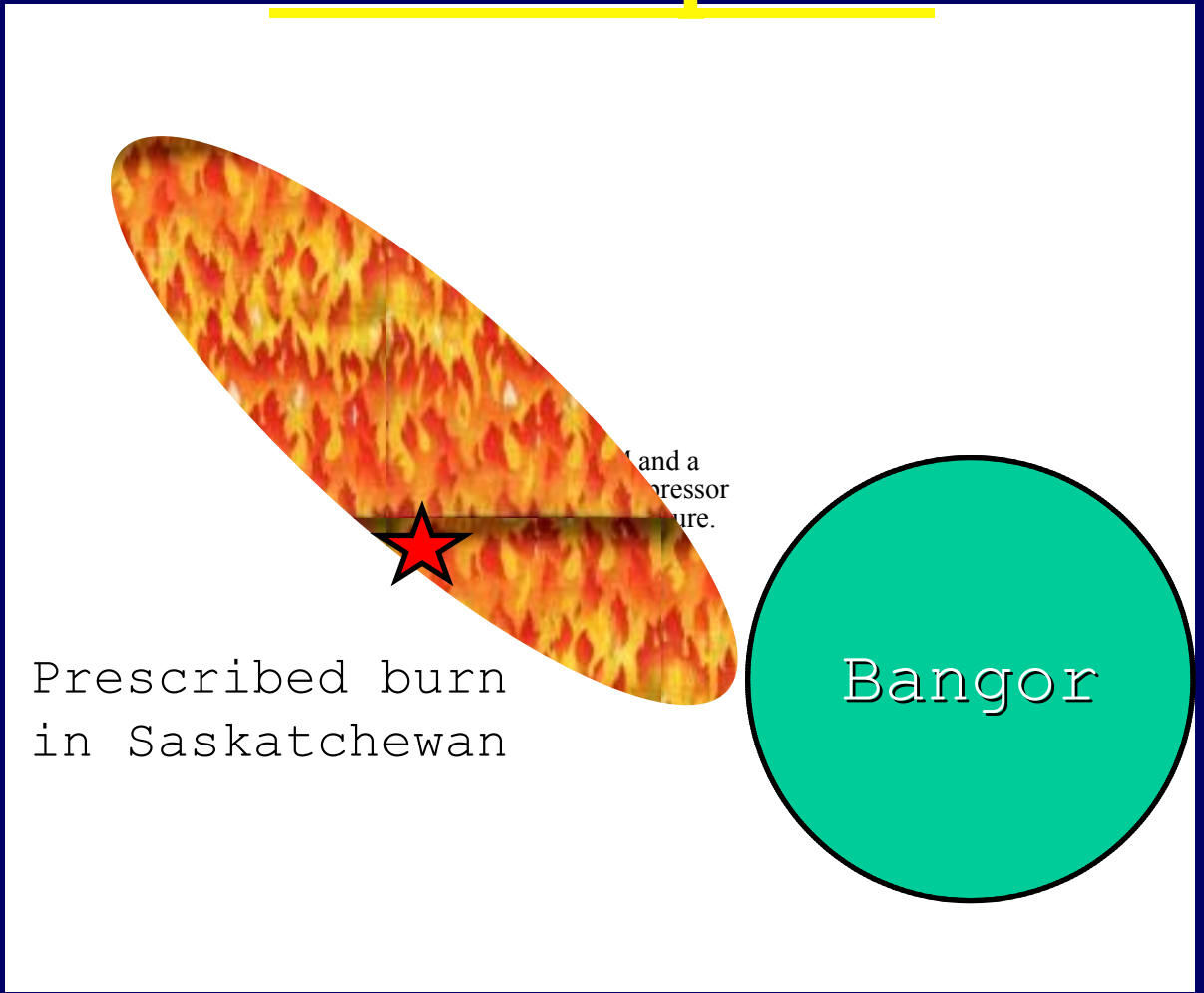


POLARCAT field plans-Surface



- Summit, Greenland - baseline composition
- Prescribed burn in Saskatchewan
- Ny-Ålesund- Aerosol properties
- Hornsund, Svalbard- radionuclides
- POLAP - precipitation samples
- HgCanEurasia- mercury
- GRAMM- Carbon fluxes
- SMEAR - Trace gases
- Abisko station in Sweden - CO2
- ALOMAR, Andoya - Lidars
- Siberian Sites- O3 and CO2
- Pico-NARE- Trace gases
- NOAA Ron Brown

Prescribed burns & deployment location options



Canadian Forest Fires, Stocks et al,

Suggested payloads

A. DC-8

Gas Phase/in-situ:

Nitrogen - NO, NO_2, PANs, HNO_3, HNO_4, $RONO_2$, NO_y, NH_3

Carbon - CO_2, CO, CH_4, C_2-C_{10} NMHCs

Oxidants - O_3, $OH/HO_2/RO_2$, H_2O_2, ROOH

Oxidized organics - CH_2O, CH_3CHO, $(CH_3)_2CO$, CH_3OH, others

Sulfur - SO_2, DMS

Halogens Š ClO/BrO/IO, Cl_2/Br_2 (?)

Others- H_2O, VOCs, Halocarbon tracers, organic acids, mercury, POPs

Aerosol/in-situ:

Fine/ultra-fine CN : CN- volatile (>3 nm), CN- nonvolatile (>10 nm)

Size distribution (3-20,000 nm), surface area etc.

Black carbon

Aerosol bulk composition (SO_4, NO_3, organic)

Scattering, absorption, extinction

Remote: O_3 lidar, aerosol lidar, optical depth, T

Physical: Spectral irradiances, MMS (T, P, u, v, w), DP, RH, albedo

B. WB-57

Gas Phase/in-situ:

Carbon- CO, CO_2, CH_4

Nitrogen- $NO/HNO_3/NO_y$

Other- , H_2O (total and vapor), O_3, PAN, CFCs

Aerosol/in-situ: Black carbon, aerosol size and shape, aerosol bulk and single particle composition

Remote Sensing: Cloud Lidar, Temperature Profile

What Next?

- A joint IGAC/SPARC task initiative covering IPY has agreed to sponsor POLARCAT
- Development of interest & resources from institutions in several countries is underway
- A more specific NASA/US-centric White paper may be necessary
- IPY Still considering ways to encourage joint activities e. g. POLARCAT & OASIS