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NASA DC-8 Platform Update **University of North Dakota** and **NASA Airborne Science**

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NSERC DC-8 Recent Activities

- **ARCTAS CARB flights and Cold Lake deployment**
- **AMISA mission integration and deployment to Kiruna, Sweden**
- **ATV re-entry mission integration and deployment to Tahiti**
- **Education and Outreach Activities**

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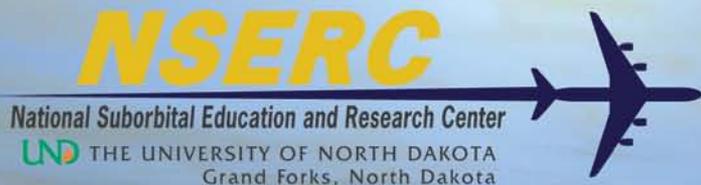
CARB and ARCTAS Summer Phase flights

CARB

June 21-27 from Palmdale, CA
4 flights for a total of 32 hours

ARCTAS Summer Phase

June 29-July 18 from Cold Lake and Thule Greenland
8 flights for a total of 60 hours



CARB Flights from Palmdale, CA

California Air Resources Board flights from Palmdale, CA

4- ~ 8 hours flights to study Asian, livestock, and ship inputs into the California airshed, test existing models, and perform comparisons with existing groundstations.



ARCTAS Summer Phase

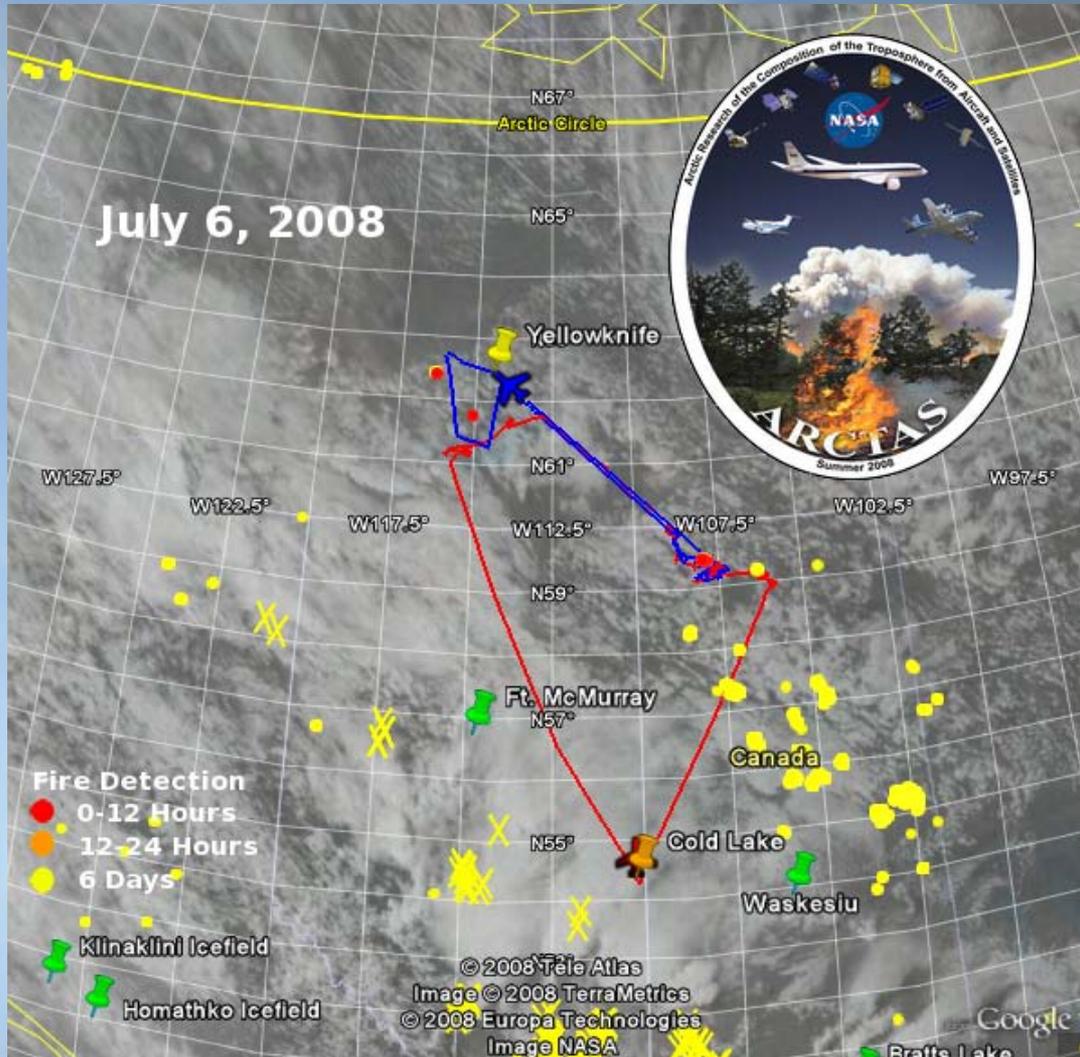
SCIENTIFIC THEMES OF ARCTAS Summer Phase

1. Long range transport of pollution to the Arctic including tropospheric ozone, and persistent pollutants such as mercury
2. Boreal forest fires and their implications for atmospheric composition and climate
3. Aerosol radiative forcing from boreal fires, surface deposited Black carbon, and other perturbations
4. Chemical processes with focus on ozone, aerosols, mercury, and halogens.

DC-8 payload included 23 instruments from 11 institutions measuring: OH, HO₂, CO, CH₄, N₂O, CO₂, O₃, NO, NO₂, NO_y, H₂O₂, HCN, OVOCs, HC, CFCs, PAN, SO₂, CH₂O, CH₃OH, HNO₃, O₃ profiles, Hg, Black Carbon, Aerosols, Aerosol composition, Aerosol properties, and other atmospheric constituents.



ARCTAS Cold Lake flight of the NASA P-3



Courtesy of RTMM group at Marshall Space Flight Center

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Play ARCTAS DVD

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Arctic Mechanisms of Interaction between the Surface and Atmosphere

GOAL:

To further understand the overall dynamics of the ice-atmosphere interaction process, accurate observations of Arctic sea ice cover and type along with meteorological conditions representative of mesoscale processes are required.

The DC-8 measurements included high resolution microwave imagery of sea ice using the Polarimetric Scanning Radiometer (PSR) system, discrimination of fresh water meltponds using the SLFMR L-band imaging radiometer, and direct sampling of thermodynamic and cloud variables over wide areas using in situ cloud probes, aerosol measurements, dropsondes, and radiometric profiling.



AMISA deployment to Kiruna, Sweden

Deployment to Kiruna August 7-29

Based in Arena Arctica hangar at Kiruna airport

5 Science flights 9-11 hours in duration

Coordination with the Swedish Icebreaker Oden for low level intercomparison legs

New smaller less expensive dropsondes



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Icebreaker Oden in the ice



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DC-8 overflight of Oden



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ATV Re-Entry mission



The Automated Transfer Vehicle (ATV) was developed under ESA contract by a European industrial consortium lead by EADS Space Transportation, in France to ferry supplies to the International Space Station. The first ATV, named the **Jules Verne**, was launched from Russia on March 8, 2008 and docked with the ISS on April 3, 2008.

Approximately every 17 months, an ATV is scheduled to carry 7.7 tons of cargo to the ISS 400 km above the Earth. An onboard high precision navigation system automatically guides ATV on a rendezvous trajectory towards ISS, where it docks with the Station's Russian service module Zvezda.

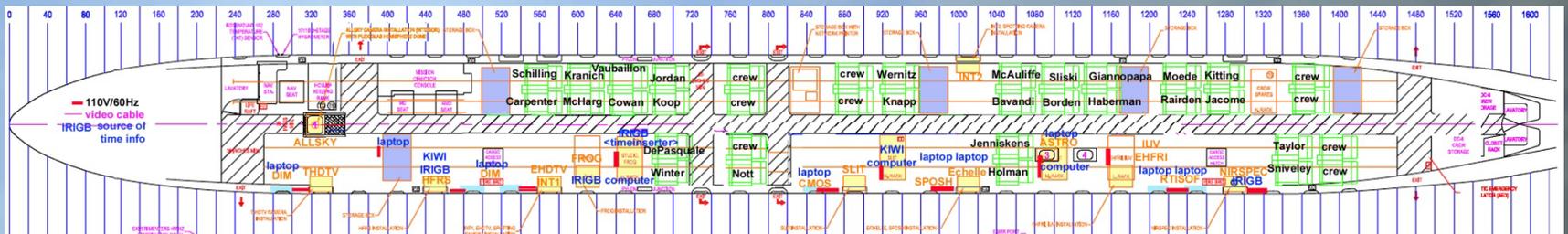
The European Space Agency funded investigators image the re-entry with spectrometers and high resolution cameras to understand the thermal and breakup characteristics of the module.



ATV Re-Entry mission



16 spectrometers and cameras viewing the incoming capsule



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First images received from the DC-8 aircraft which observed the re-entry of Jules Verne ATV over the Pacific Ocean. Credit ESA

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NSERC Education and Outreach Activities

Airborne Science Student Led Mission

Key part in “Building a Better NASA Workforce” activities.

Planned for July 13-31, 2009.

Participation by 30-35 advanced undergraduate and beginning graduate students.

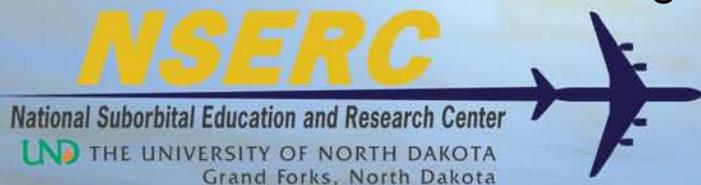
Training in all phases of an airborne science mission including conceptualization, instrument integration, flight planning, science flights and data analysis and reporting.

Lectures by meteorologists, atmospheric chemists, modelers, payload engineers, data system staff, flight planning specialists, and air crew members.

Hands on experience in instrument integration, calibration, flight planning and operations, and data collection.

Outreach

Provide an Airborne Science informational booth at various conferences and meetings including the Fall AGU and other student meetings.



Upcoming NASA ASP/NSERC Activities

- Phase maintenance on the NASA DC-8
- Addition of Air Data Probe to the NASA DC-8
- Fiber based network for data display, 4 channel IRIDIUM for Xchat communication and data up/downlink on the NASA P-3 platform
- INMARSAT systems for the DC-8 and P-3 platforms

Questions?

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