



National Aeronautics and Space Administration

Airborne Science Newsletter



Fall 2008

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AMISA

Another NASA DC-8 Success in Arctic Study

The NASA DC-8 has concluded another successful mission focusing on the relationship between the atmosphere and Arctic sea-ice. On the heels of the summer 2008 ARCTAS mission, the DC-8 was deployed to Kiruna, Sweden in early August to participate in the Arctic Mechanisms of Interaction between Surface and Atmosphere (AMISA) mission.

This mission was a collaborative effort involving scientists from the University of Colorado, NOAA, the University of Leeds, University of Stockholm, NASA Goddard Space Flight Center and the University of North Dakota.

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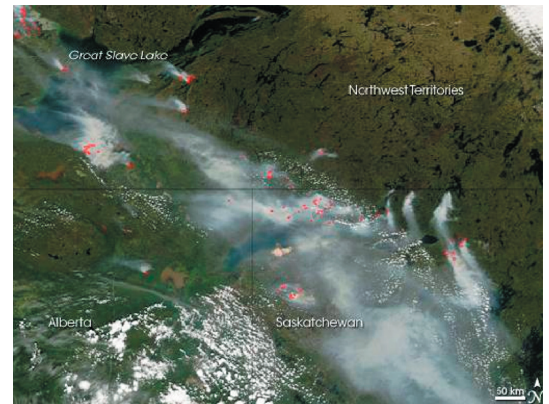


The NASA DC-8 (upper right) flying over the Oden Research Vessel (foreground) during the AMISA mission.

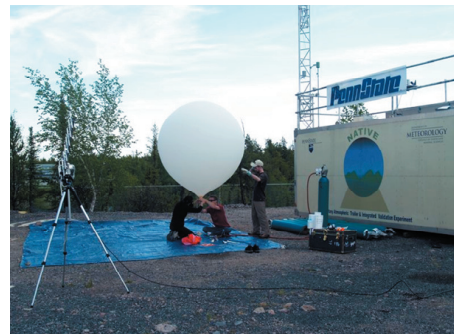
Arctic Research of the Composition of the Troposphere for Aircraft & Satellites Phase II

The second phase of the highly successful ARCTAS mission was completed at the end of July with a three-week deployment in Cold Lake, Alberta, and Yellowknife, Northwest Territories. Three NASA research aircraft, the DC-8, P-3, and B-200, collected science data. Nearly 200 scientists, engineers, technicians, and support personnel made up the deployment team based at the Canadian sites.

NASA aircraft flew about 30 science sorties, logging over 215 flight hours during the summer phase. NASA and Canadian scientists participating in the mission tracked several significant boreal fires plumes across California, Canada, and Siberia. The mission furthered our understanding of fire emissions, their chemistry and transport, and how



MODIS satellite image shows numerous large fires and smoke clouds near Great Slave Lake and parts of Alberta and Saskatchewan on July 26, 2008.



Ozonesonde balloon launch preparation at NATIVE ground station, Yellowknife, Northwest Territories. Photo Credit: Greg Merkes.

aerosol transport mechanisms affect regional and continental climate.

Flight paths covered the entire North American continent and included a "suitcase" flight by the DC-8 to Thule Air Base, Greenland, to measure Siberian smoke plumes, and to conduct an intercomparison flight with the German DLR Falcon aircraft over the Greenland ice sheet. As in the INTEX-B/MILAGRO mission of 2006, many science flights included satellite overpass flight legs, including the B-200 underflew multiple CALIPSO overpasses. Additionally, both the DC-8 and P-3 took and analyzed multiple air samples during flights over California in a joint scientific

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Mark your Calendar: Airborne Science Program Reunion

Plans are underway to hold an Airborne Science Program Reunion at Ames Research Center the weekend of December 13-14, 2008. The Reunion main event will be the get together Sunday at 3:00 until late. All past and present participants are invited. A block of rooms has been reserved at the NASA Lodge for the weekend and discussions are underway with caterers and facilities for the event. As plans solidify they will be posted on the ASP website: <http://airbornescience.nasa.gov/index.html>

The SIERRA UAS

In mid-August of 2008, the SIERRA Unmanned Aircraft System (UAS) successfully completed a second series of check-out flights at Crow's Landing in California with a total of 15 flight hours logged. This medium class UAS, designed by NRL and developed at Ames Research Center, will provide a platform for remote sensing and atmospheric sampling in remote regions such as the arctic and open ocean or where conditions are dangerous to pilot or aircraft. The aircraft performed very well in flight and the pilots reported exceptional handling that will make it well suited for precise and accurate remote sensing missions. The next series of flights planned for October will include the first science payload consisting of a multi-instrument suite including a hyperspectral imager, a laser altimeter, and an ocean color microspectrometer and pyranometer suite. ▲



The SIERRA during check-out flights at Crow's Landing, CA.

AMISA (continued from page 1)

The Principal Investigator of the project was Dr. Al Gasiewski who worked with his team of engineers and students from the Center for Environmental Technology at the University of Colorado, along with mission scientist Dr. Ola Persson of NOAA and the University of Colorado/CIRES and Co-Investigator Dr. Donald Cavalieri of NASA Goddard Space Flight Center. The investigators were able to use the DC-8 as a robust platform for a variety of instruments used in detecting both atmospheric processes and sea-ice surface characteristics.

The mission involved five science flights throughout the month of August. Measurements taken during these flights included atmospheric temperature and humidity profiles, sea-ice surface imagery and measurements of

Note from the Top



Summer is over and we are entering fall, yet the Airborne Science Program is not slowing down. We just finished the highly successful international ARCT AS (DC-8, B-200, P-3) and AMISA (DC-8) missions in Canada, Greenland, and Sweden. The ER-2 flew 100% of its AVIRIS sites throughout Canada and the US. The Ikhana's support of the Fire Missions in California was cited in the New Avengers comic book and was a hit at HQ. Gov. Schwarzenegger credited one of these flights saving the town of Paradise. Currently the WB-57 is flying the NOVICE mission despite the constant threat of hurricanes. The B-200 is conducting post-fire missions over areas burned by last year's wildfires in Southern California. The SIERRA UAS is completing test flights in preparation for its payload flights. The G-III completed its UAVSAR development and ORR. The Global Hawks have all of their contracts in place and are on track to fly the first science mission in April 2009. On behalf of Goddard researchers, crews are installing a new radar system on the P-3 that will, among other applications, help monitor polar region ice loss. The Twin Otter is flying low altitude AVIRIS missions, while the B-200s are flying LVIS, MASTER, HSRL and ACCLAIM on both coasts. The WB-57 is supporting Planetary Science with a CDC mission in England and the DC-8 is supporting Europe Space Agency with the ATV re-entry from Tahiti. New systems are under development such as NASDAT, Telepresence, and the standardization programs between aircraft and centers. In addition the Program is building the international Airborne Science Working Group, participating heavily in the Aviation Rulemaking Committee for UAS, making great improvements with our interagency airborne community through ICCAGRA and having this agency work more closely with our European counterparts. November 1 is the due date for abstracts to the ISRSE Conference next May. It is important for us to be strongly represented: we are the biggest airborne science program in the world and our leadership in this area should be demonstrated at this conference. Again, all of you have made this a banner year for the program. Let's be sure to enjoy our success together at the ASP reunion at ARC on the afternoon of Sunday, Dec. 14, prior to AGU. More than the hardware, it has been the people that overcame much adversity at times to give us the success we have had. Many times it came down to one individual who was at the right or wrong spot but made the right decision using judgment based on experience. Continue to look out for and back each other up no matter what center you are affiliated with. Thank you for the great work. Your achievements make the program successful.

*Andy Roberts
Airborne Science Program Director*

atmospheric aerosol particle properties and their size distribution. These data will be used directly to further the understanding of the relationship between cloud processes, atmospheric radiation and the Arctic climate; they will also be used to test and validate similar measurements taken by NASA satellites.

The AMISA mission is an International Polar Year (IPY) project organized in conjunction with a related European IPY project, the Arctic Summer Cloud Ocean Study (ASCOS).

For more information about the AMISA mission, please visit NSERC's website at www.nserc.und.edu. ▲



Picture of Oden Research Vessel taken from the NASA DC-8 during an AMISA mission flight.

ARCTAS (continued from page 1)

collaboration with the California Air Resources Board (CARB).

“The combination of an extensive experimental payload, and the operational complexities flying in and around the vicinity of wide-ranging fires, made this one of the most challenging missions ever for the DC-8,” said Bill Brockett, DC-8 Chief Pilot. The DC-8 flew with over 22 instrument packages on board, including a nominal crew and scientific complement of 45 people. Other highlights for the DC-8 included a first-ever intercomparison flight with the NSF HIAPER aircraft.

An amazing aspect of this mission was the enhanced communication capabilities on the three aircraft. Using the NASA-developed REVEAL and RTMM technology, with upgraded Iridium



An ARCTAS team photo in front of NASA P-3, Cold Lake, Alberta.

satellite communications, the planes were able to transmit data taken in flight both to the ground and to other aircraft. This allowed the P-3, for example, to receive updated GOES cloud cover imagery from the ground during its flight, along with high spectral resolution lidar data transmitted from the B-200. It also allowed the science teams on the ground to simultaneously track the position and progress of each aircraft.

“Excellent communications between flight planning teams on the ground and the mission scientists in the air, together with our highly skilled NASA pilots, contributed greatly to the success of this mission,” according to Dr. Hanwant Singh, project scientist for ARCTAS.

Like most recent major airborne science campaigns, media coverage during ARCTAS was considerable, and included television, radio, internet, and newspaper stories, not to mention several blogs and the now-ubiquitous ‘You Tube’ videos posted of each aircraft. Due to the concern regarding fires and the importance for protection of people and property, coverage by the Canadian Broadcasting Corporation (CBC), was especially extensive.

The Tropospheric Chemistry and Radiation Sciences programs at NASA Headquarters, which sponsored the ARCTAS mission, are planning the first mission science workshop for January 2009.

NOVICE

The Newly-Operating and Validated Instruments Comparison Experiment (NOVICE), conducted in early September, provided flight opportunities to airborne instruments that 1) required initial flight performance assessment after construction; 2) required additional flight performance assessment after modification; or 3) had flown in one or more previous science campaigns and could provide “validated” measurements of chemical species with which the instruments in the first two categories can compare. The comparison component of NOVICE was intended to elucidate anomalous instrument behaviors, such as offsets, drifts, and transient phenomena, rather than to serve as a rigorous double blind intercomparison of stable, well characterized, fully calibrated instruments.

The flight platform was the NASA WB-57F, flying out of Ellington Field, Texas. The project scientist was Jim Podolske (NASA Ames) with support from Mike Craig and Marilyn Vasques (ESPO) and Shelley Baccus (JSC), and funding from ASP. Fourteen instruments from NASA Ames, Dryden, Goddard, JPL, Langley, as well as NOAA ESRL and Harvard University participated. ▲

Airborne Science Program
Aircraft Schedule

Activity Name	Sept 08				Oct 08				Nov 08					Dec 08				Jan 09				Feb 09				Mar 09						
	7	14	21	28	5	12	19	26	2	9	16	23	30	6	13	20	27	3	10	17	24	31	7	14	21	28	7	14	21	28		
1 WB-57	NOVICE																															
2 P-3																																
3 DC-8																																
4 ER-2																																
5 B200																																
6 UC-12B																																
7 SIERRA																																
8 G-III																																
9 Ikhana																																
10 Lear 25																																
11 Twin Otter																																

Platform Capabilities

Available aircraft and specs

Airborne Science Program Resources	Platform Name	Center	Duration (Hours)	Useful Payload (lbs.)	GTOW (lbs.)	Max Altitude (ft.)	Airspeed (knots)	Range (Nmi)	Internet and Document References
Core Aircraft	ER-2	NASA-DFRC	12	2,900	40,000	>70,000	410	>5,000	http://www.nasa.gov/centers/dryden/research/AirSci/ER-2/
	WB-57	NASA-JSC	6	6,000	63,000	65,000	410	2,172	http://jsc-aircraft-ops.jsc.nasa.gov/wb57/
	DC-8	NASA-DFRC	12	30,000	340,000	41,000	450	5,400	http://www.nasa.gov/centers/dryden/research/AirSci/DC-8/
	P-3B	NASA-WFF	12	16,000	135,000	30,000	330	3,800	http://wacop/wff.nasa.gov
NASA Catalog Aircraft	DHC-6 Twin Otter	NASA-GSFS-WFF	7	5,000	12,000	25,000	160	500	http://www.twinotter.com
	Gulfstream III (G-III) (mil: C-20A)	NASA-DFRC	7	2,610	45,000	45,000	459	3,400	http://airbornescience.nasa.gov/platforms/aircraft/g3.html
	King Air B-200 AND UC-12B	NASA-LARC	6.2	4,100	12,500	35,000	260	1250	http://airbornescience.nasa.gov/platforms/aircraft/b-200.html
	DHC-6 Twin Otter	NASA-GRC	3.5	3,600	11,000	25,000	140	450	http://www.grc.nasa.gov/WWW/AircraftOps/
	Learjet 25	NASA-GRC	3	3,200	15,000	45,000	350/.81 Mach	1,200	http://www.grc.nasa.gov/WWW/AircraftOps/
	S-3B Viking	NASA/GRC	>6	12,000	52,500	40,000	450	2,300	http://www.grc.nasa.gov/WWW/AircraftOps/
UAS	Global Hawk	NASA-DFRC	31	1500	25,600	65,000	335	11,000	http://airbornescience.nasa.gov/platforms/aircraft/globalhawk.html
	Ikhana (Predator-B)	NASA-DFRC	30	3,000	10,000	52,000	171	3,500	http://airbornescience.nasa.gov/platforms/aircraft/predator-b.html
	SIERRA	NASA-ARC	11	100	445	12,000	60	650	http://airbornescience.nasa.gov/platforms/aircraft/sierra.html

ASP Upcoming Events

* DESDynI Applications Workshop
October 29-31, 2008
UC Sacramento Conference Center
<http://desdyni.jpl.nasa.gov/events/>

* HYSPIRI - Imaging Spectrometer and Infrared Imager - Science Workshop
October 21-23, 2008, Monrovia, California
<http://hyspiri.jpl.nasa.gov/workshop>

* Pecora 17 Conference
November 17-20, 2008
Denver, CO
http://www.asprs.org/Pecora17/conference_overview.php

* AGU Fall Meeting
San Francisco, CA
December 15 – 19, 2008
<http://www.agu.org>

* UVS Canada
November 4-7, 2008; Ottawa Ontario
<http://www.uvscanada.org/>

* TAAC Conference
Dec 9-12, 2008
Santa Ana Pueblo, NM
<http://www.psl.nmsu.edu/uav/conferences/2008/>

* AIAA Unmanned Unlimited & Infotech@Aerospace
April 6-9, 2009; Seattle, WA
http://aiaa.org/content.cfm?pageid=230&lu_meetingid=2070

Meetings accepting abstracts:

* 33rd International Symposium on Remote Sensing of Environment
(See update, this page)
4-9 May 2009; Stresa, Italy
<http://www.symposia.org/>

* American Society for Photogrammetry and Remote Sensing (ASPRS) 2009 Annual Conference -75th Anniversary
March 9-13, 2009

Marriott Waterfront Hotel
Baltimore, MD
<http://www.asprs.org/baltimore09/index.html>

International Symposium on Remote Sensing of the Environment (ISRSE) update

The Airborne Science Program will support the 33rd International Symposium on Remote Sensing of Environment (ISRSE) to be held on May 4-8, 2009 in Stresa, Italy. The overall theme of the symposium is the use of Earth Observation systems and airborne techniques for understanding and managing the Earth environment and natural resources. The ASP is planning a UAS workshop and demo, and highlighting our activities in exhibits, and conference presentations. Submit your abstracts ASAP!