National Aeronautics and Space Administration

Airborne Science Newsletter

Summer 2008

What's Inside...

In Brief ...

* In late June, NASA partnered with the California Air Resources Board to conduct air quality research flights in California with the DC-8, P-3, and ER-2 in conjunction with ARCTAS.

* In partnership with USFS, NASA will again fly the Ikhana and AMS in support of wildfire response activities in the Western United States.

Mark your calendars: 33rd ISRSE

The Airborne Science Program will continue hightlighting our science and applications contributions to remote sensing through support and participation in the 33rd International Symposium on Remote Sensing of Environment, May 4-8, 2009, Stresa, Lago Maggiore, Italy (www.stresacongressi.it)

The overall theme of the symposium is the use of Earth Observation systems and airborne techniques for understanding and managing the Earth environment. http://www.symposia.org/33ISRSEMYC.pdf ▲

NASA Launches Airborne Study of Arctic Atmosphere

NASA is conducting a major science field campaign in 2008 to study the atmosphere in the Arctic and the high northern latitudes. The Arctic Research of the Composition of the Troposphere from Aircraft and Satellites (ARCTAS) mission is being conducted as part of the International Polar Year (IPY), a major international scientific research effort. The purpose of the ARCTAS mission is to improve understanding of how the composition of the Arctic atmosphere is influenced by long-range transport of pollution from lower latitudes as well as local emissions from boreal wildfires and their impact on Arctic air quality and climate. Validation of NASA satellites that continuously monitor the global atmosphere will also be a major focus in this mission.

The Airborne Science Program is deploying three NASA research aircraft during ARCTAS, including the DC-8, P-3B and a B-200, all of which carry over 35 scientific instruments. Many of the scientific instruments on the NASA aircraft are one-of-a-kind and are built to measure the properties and amounts of specific atmospheric constituents including greenhouse gases, pollutant gases, and particulate matter, or aerosols. Those aircraft in conjunction with ground stations, weather balloons, and modeling and forecast teams have come together to collect science data in two campaign phases.

The first phase of ARCTAS was based in Fairbanks and Barrow, Alaska with two flights to Thule, Greenland. It focused on thick aerosol layers known as "arctic haze" and was successfully completed in April. Over 200 participants in Fairbanks alone contributed to the Spring portion

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NOAA WP-3, NASA P-3, NASA DC-8 in Fairbanks
Photo Courtesy of Kent Shiffer

UAVSAR "First Light"

The UAVSAR is a pod-mounted L-Band (1210-1290 MHz) fully polarimetric synthetic aperture radar designed and built by the Jet Propulsion Laboratory and flown aboard the Dryden Flight Research Center's Gulfstream-III aircraft. The G-III has been specially modified to carry the UAVSAR pod and equipped with a precision autopilot, capable of consistently flying the aircraft within a prescribed 10-meter tube. This enables the UAVSAR to obtain repeat-pass interferometric imagery to both characterize the surface topography and to map centimeter-level surface deformation over time. Support for the development and early flights have been provided by the Airborne Science Program and the Earth Science Technology Office.

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ARCTAS (continued from page 1)

of the ARCTAS mission. There was strong collaboration with NOAA and DOE, who had aircraft in Fairbanks, as well. The NOAA WP-3 aircraft and the DOE leased Convair 580 research aircraft and flew inter-comparison flights with both the NASA DC-8 and P-3. The NASA B-200 acted as a scout for atmospheric anomalies for all of the agencies aircraft providing a LIDAR curtain searching for aerosols consistent with pollution plums.

The second phase, now in the final planning stages, will follow in July based from Cold Lake, Alberta and the Northwest Territories focusing on the emissions from large boreal forest fires in northwest Canada. The NASA DC-8 and P-3 will both base operations in Cold Lake while the NASA B-200 will again provide LIDAR coverage with the HSRL instrument from Yellowknife, Northwest Territory. The fire season, with uncontrolled fires in the Northern latitudes, begins in earnest in mid-June with fires burning for several weeks. Aerosols from these fires are expected to make their way up to the extreme Northern latitudes depositing carbon in the polar region. One of the goals of this experiment is measuring solar radiation absorption on the Earth and its reflection back into space, a major variable in detecting climate change. For more information about the ARCTAS mission, please visit the web site at www.espo.nasa.gov/arctas. ▲

Note from the Top

Wow, we have had quite a year! We received two NASA Group Achievement Awards for the TC4 and WSFM missions, had great success on our recent missions including the first part of ARCTAS, received much notice from our senior management and under Dr Freilich's leadership we've restored much of the budget that was lost in FY03. This new increase was about 22% over the next 5 years. At the same time we have added the Palmdale facility and brought in the Global Hawks, stabilized the WB-57, DC-8 and P-3 programs and made the G-III UAVSAR program a long term operation from an instrument development. We have also been able to get the ER-2 program additional missions. We are including LaRC and GRC as members in our airborne program. As we build our international ties we will have a real opportunity for our aircraft, programs, and people to get international recognition at the ISRSE conference in May 2009, so please consider submitting papers to this conference and joining us in Stressa, Italy.

The real success of this program is you folks who are out there working the long hours operating the aircraft all over the world. Many give you credit, as they should, for making the program work. In the management world, the program managers/center leads get a lot of the credit for the work that is done in their areas. But one group of folks that rarely gets the credit they deserve are the deputies. They are the implementers and problem solvers who are the life blood of the ASP program. They keep our funding in check, make sure the manpower we need is there, are the first line in solving the problems and telling the bosses what can/cannot be done, and are the ones who back us all up. They are essential to our success and work as many hours if not more than any group in this organization, usually with little or no recognition. So please thank Randy Albertson, Jacques Vachon, Matt Fladeland, Anthony Guillory and Kevin Lesenski next time you see them. Keep up the great work all of you are doing. Fly safe and be productive!

Andy Roberts
Airborne Science Program Director

Airborne Science Newsletter

It's your newsletter!

Working on something interesting, or have an idea for a story? Please let us know, we'd love to put it in print.

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or

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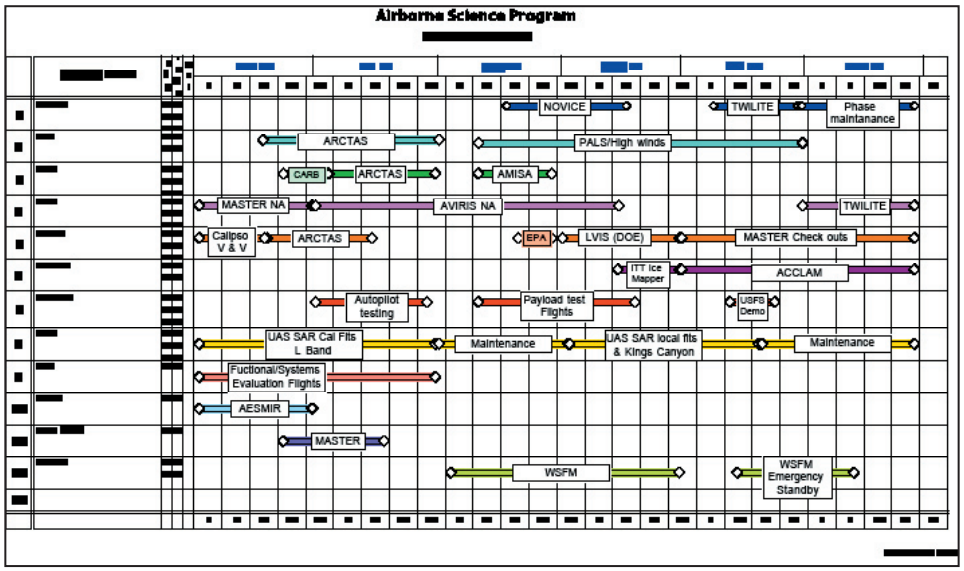


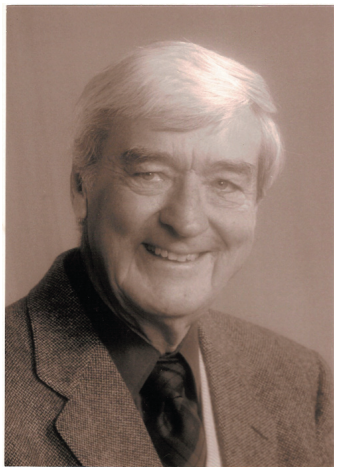
The Airborne Science Program: A Historical Perspective

The NASA Airborne Science Program has supported the study of Earth from space since the time of the Gemini program and continues to do so today in support of ongoing and planned Earth observing satellite missions. Over the years, airborne science measurements have provided humanity with a better understanding of our ozone layer, high-resolution maps of land resources, and measurements within evolving air masses to understand the chemistry and dynamics of our changing atmosphere.

In an effort to recognize the past giants of this program, upon whose shoulders the current team now stands, ASP has begun a process of contacting and interviewing past managers and leaders in the program in order to document and better understand the history of the program. To date we have interviewed Olav Smistad, Marty Knutsen, James Huning, and Bernard Nolan.

The first installment of this historical record can be found in the FY2007 Annual Report, which is available in the documents section of the ASP website.

We thank Bernard (Barney) Nolan for contributing to this first installment of the history of the airborne science program at NASA. He was the first NASA HQ manager for airborne science in 1970. Before taking the helm as NASA airborne science manager, Nolan was chief of program review for Office of Space Science and Applications (OSSA), with a background as an Air Force pilot and experience in aircraft accident investigations. His past work included work on a string of Delta launch vehicle failures. During this period he worked with Vince Johnson, Deputy of Engineering for OSSA, as a member of the Delta Failure Review Board, which he chaired. Johnson later became Chief of Engineering and asked Nolan to be the first manager of the geophysical research aircraft programs at NASA centers.



Bernard "Barney" Nolan

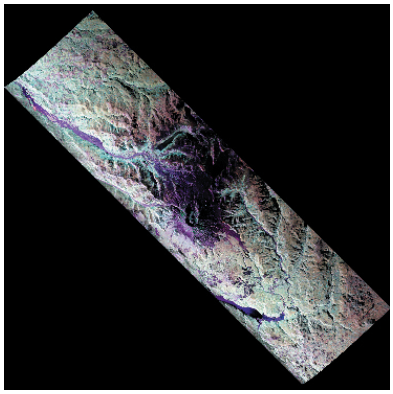
If you have information that you think would be useful to this effort and are interested in being participating, please contact Matt Fladeland (650-604-3325). ▲

"First Light" (continued from page 1)

First UAVSAR image obtained September 27, 2007 over Rosamond dry lake, California.

Testing and calibration will continue through July 2008, producing spectacular high resolution (~2M) imagery over sites in the western United States, such as Mt. St. Helens, in Washington.

The instrument is designed to be used from unmanned aerial systems (UASs), such as the Global Hawk, and can support a variety of applications in the Earth sciences, including crustal deformation, glaciology, carbon studies, and disaster monitoring. The UAVSAR is expected to complete calibration and enter into service for the Earth science community in July, 2008. It is also an important pathfinder for both the DESTynI and SMAP Decadal Study missions. GIII with UAVSAR will fly two IPY missions in Greenland in 2009.



High resolution imagery of Mt. St. Helens, Washington.

More information on the UAVSAR can be found at http://uavsar.jpl.nasa.gov/. DFRC contact for GIII is Tom Mace, 661-276-5823. ▲

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:///.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	550	http://airbornescience.nasa.gov/platforms/aircraft/sierra.html

ASP Upcoming Events

* IEEE International Geoscience & Remote Sensing Symposium (IGARSS)
  July 6-11, 2008
  Boston, MA.
  http://www.igarss08.org/

* NASA ASCENDS Science Definition and Planning Workshop
  July 23 - 25, 2008
  Univ. of Michigan, Ann Arbor, MI
  http://cce.nasa.gov/ascends/index.htm

* AMS Summer Community Meeting "The intersection of weather and climate"
  Aug 11-13, 2008
  Boulder, CO
  http://www.ametsoc.org/meet/fainst/2008summercommunity.html

* 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/

Meetings accepting abstracts:

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

* 33rd International Symposium on Remote Sensing of Environment
  4-9 May 2009; Stresa, Italy
  http://www.symposia.org/