



National Aeronautics and Space Administration

Airborne Science Newsletter



Winter 2010

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In Brief ...

Airborne Science ARRA

ASP ARRA activities are moving forward. The ER-2 life support modifications are underway at the DAOF. The contract was awarded to modify the DFRC B-200 for science capability. The procurement solicitation for the P-3 Avionics upgrade is due in early December. More NASA HQ reviews of ASP projects are slated in December.

B-200

After battling the stimulus funding labyrinth, the King Air B-200 underwent its modification exercise at AVCON in November. Final configuration of the ports are in the documentation process. Expected completion of the modifications is May, 2010.

SIERRA

In mid-December the SIERRA UAV team at Ames supported a Shell Oil flight demonstration at Camp Roberts, CA for search & rescue and mammal monitoring capabilities. The payloads consisted of digital cameras and a C-band SAR.

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Operation Ice Bridge

Two thousand-nine was a very successful first year for Operation Ice Bridge (OIB). OIB science requirements for Greenland and Antarctica set the bar very high for the NASA P-3 and the DC-8. The P-3 flew over Greenland in the Spring while the DC-8 conducted science over Antarctica this fall. Several other NASA sponsored entities are collaborating with OIB objectives. The University of Alaska-Fairbanks enlisted a Thule Outfitters single-engine Otter as the platform to measure Alaskan glacial elevations and movement near Juno. Also participating, the University of Texas-Austin used the Ken Borak BT-67, a converted DC-3, to flying over the Totten and the Cook glaciers in Antarctica.



"Hello" from Palmer Station, Antarctica (Photo taken with the DMS camera on the DC-8).

This fall the NASA DC-8 conducted 21 science flights over Antarctica from Punta Arenas, Chile. These 21 flights represent nearly 124% of the initially planned 17 flights. This overwhelming success will provide data for some never before measured areas of Antarctica. Ice and snow penetrating RADARs measured glacial mass balance of the height and movement of some of the most crucial areas on the continent.

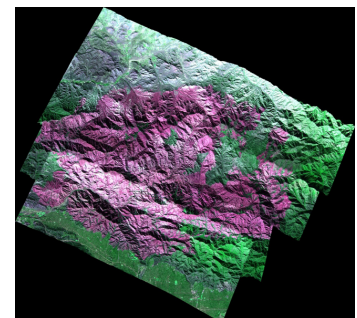
In addition to the Antarctic science flights over land and sea ice, there was a total of 247+ flight hours including transit, science, and test flights. The transit flight from Punta Arenas back to

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Airborne Sensor Facility

On November 19, 2009 the NASA Ikhana flew from Dryden Flight Research Center to support the Wildfire Research and Applications Partnership (WRAP). The Airborne Sensor Facility (ASF) supported the operation with installation, operation and data processing of the Autonomous Modular Sensor (AMS). AMS data were acquired onboard the Ikhana over the Station wildfire scar in the Angeles National Forest and the Piute wildfire scar in the Sequoia National Forest. The Station fire burned for over a month and consumed 160,000+ acres. These data will be used to assess fire intensity and

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Station Fire Burned Area Emergency Rehabilitation (BAER) AMS image mosaic.

Operation Ice Bridge (continued from page 1)

Santiago provided the perfect opportunity for atmospheric chemistry measurements over specific Southern Chile targets.

Cryospheric instruments onboard the NASA DC-8 included the ATM and LVIS instruments previously flown on the NASA P-3, the Multichannel Coherent Radar Depth Sounder/Imager (MCoRDS/I) ice sounder and KU band snow depth sounder from the University of Kansas, as well as an airborne gravimeter supplied by Lamont-Doherty Earth Observatory of Columbia University. Also included in the instrument mix was the Digital Mapping System (DMS) provided by John Arvesen of Cirrus Systems. This combination of instruments will provide an extremely valuable data set to the earth science community. The NASA DC-8 platform has an extended range envelope that provides a substantial increase in time over the glacial and sea ice target areas when deployed for remote locations such as Punta Arenas, Chile.



Antarctica near Pine Island Glacier (Photo take by Kent Shiffer)

Atmospheric Chemistry instruments were added to the DC-8 payload as piggyback flyers to try to gain some experience over the rarely measured Antarctic atmosphere. These in situ measurement instruments included AVOCET to measure CO₂; Diode Laser Hygrometer (DLH); Differential Absorption CO Measurement (DACOM) measuring the trace gases CO, CH₄, N₂O, CO₂, and H₂O(v); and Whole Air Sampler (WAS) from the U.C. Irvine.

Don Blankenship (Univ. Texas), PI, is currently flying over Antarctica. Don has been funded to provide science data using the Basler BT-67 aircraft over Antarctic glaciers that the DC-8 cannot reach from Punta Arenas. The focus work for the BT-67 is measuring the Cook and Totten glaciers surface elevation and observation

Note from the Top



For me, December is the time I reflect on what's been accomplished as well as look forward to the near future. In 2009 we flew most of our International Polar Year missions and completed the first two Operation Ice Bridge campaigns (far exceeding expectations). We saw the superpods attached to the WB-57's wings and had the first full season of UAVSAR missions. 2009 also saw the first flights of NASA's Global Hawk. Our program showed leadership within the international airborne science community by engaging the Europeans and Chinese, as well as in the science and engineering education community with the Student Airborne Research Program. Yet with our successes, we also had an inauspicious start to implementing the American Recovery and Reinvestment Act. This year was a testament to what we can accomplish together because to meet the challenges we had, each program element not only had to perform at a high level but also sacrificed together for the mission. 2010 will be no less challenging. We have an even bigger UAVSAR as well as Ice Bridge campaigns. We'll have firsts with Global Hawk science flights in the Global Hawk Pacific mission and WB-57 flights with superpods, both things our science community has been looking forward to. We also have a Genesis and Rapid Intensification Processes campaign and another SARP. On top of that we'll have the opportunity to fully implement ARRA, start Earth Venture Initiative 1 and welcome the next Program Director. NASA and the science community are entrusting us with an awesome responsibility, one I'm positive we're up to. Thanks for a great 2009 and best wishes for 2010.

Randy Albertson
Acting Airborne Science Program Director

of East Antarctica. The instrumentation suite on board the BT-67 includes an Ice Penetrating Radar, Magnetometer, Laser Altimeter, and a Gravity Meter. Basic data from the instrumentation suite consists of profiles of ice thickness, ice-surface elevation, free-air gravity, and magnetic field intensity.

More information can be found on the OIB web site at: <http://www.espo.nasa.gov/oib/>

Antarctica 2009 - Mission Blog sites
<http://www.nserc.und.edu/blogs/>
<http://blogs.nasa.gov/cm/blog/icebridge>

Kent Shiffer

Call for Content

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

Contact Steve Wegener (650/604-6278, steven.s.wegener@nasa.gov) or Matt Fladeland (650/604-3325, matthew.m.fladeland@nasa.gov).

In Brief (continued from page 1)

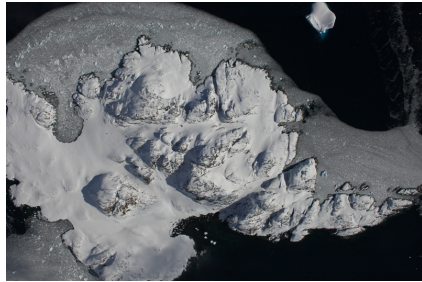
G-III/UAVSAR Update

The G-III/UAVSAR team is looking forward to operational deployments to Hawaii and Costa Rica in Jan. and Feb., 2010. Deployment objectives include volcano and ground deformation, coastline subsidence, 3D-vegetation structure, and Mayan archeology. Radar imaging of California fault lines and Sacramento Delta levees also continues on flights based out of Palmdale, CA.

Western States Fire Mission

The 2009 Western States Fire Mission series completed one fire mission over the Station Fire (Los Angeles County), Nov. 19. The flight supported both post-fire burn and small hot-spot detection assessments for the USFS partners. The 2009 fire season was light with no major wildfires that would require NASA's assistance. Also, the AMS scanner was committed to integration tests on the Global Hawk during most of the fire season prior to late September 2009. The team is preparing for fire support missions and experiments in 2010 on the Ikhana and the DFRC B-200 aircraft.

Airborne Sensor Facility (continued from page 1)



Litchfield Island, Antarctica – Operation Ice Bridge Cirrus® Digital Camera.

long-term rehabilitation of the vegetation and soils of the burned area.

The ASF supported Operation Ice Bridge with the onboard operation of an Applanix Position Orientation System (POS) during each of the DC-8 missions over the Antarctic, October 16 to November 16. POS data are provided in real time to the science teams and their instruments during data flights. These data are critical to researchers determining platform orientation and processing georeferenced imagery with high precision. The ASF also supported the operation and data processing of the 21-megapixel Cirrus® digital camera flown onboard the DC-8 during the Ice Bridge flights. Over 200,000 frames of imagery were collected during the Ice Bridge

missions in Antarctica. They will be used to study the surface texture and topology within coincident lidar and radar data sets.

Working in conjunction with the Global Hawk team at Dryden Flight Research Center, we've nearly completed the design and implementation of the payload communications infrastructure for this major new science platform. A number of custom flight hardware modules have been developed and tested, including a Master Payload Control System/Power Distribution Unit (MPCS/PDU) that allows the mission pilot to remotely monitor and control the power and basic function of each payload instrument. A new standard Experimenter Interface Panel was developed for fleet-wide use. Flown on the DC-8 and P-3, the panel provides electrical power and data communications and serves as a prototype of the new NASDAT system (NASA Airborne Science Data and Telemetry module). Initially a modified REVEAL system, this will be the standard airborne network host for the larger science platforms. A Telemetry Link Module was also developed as a peripheral on the Global Hawk airborne network, which will host a database of the mission science data, and respond to download queries across the high-speed Ku-band sat-com system

ASP Upcoming Events

- * Third International Workshop “The Future of Remote Sensing”
Antwerp, Belgium
POSTPONED TO 2010
<http://isprs.vgt.vito.be/cms/>
- * AIAA 48th Aerospace Science Meeting
Jan. 4-7 2010
Orlando World Center Marriott, Orlando, Florida
<http://www.aiaa.org/content.cfm?pageid=230&lummeetingid=1812>
- * AIAA Infotech@Aerospace 2010
April 20-22, 2010; Atlanta, GA
<http://www.aiaa.org/content.cfm?pageid=230&lummeetingid=2358>
- * American Meteorology Society (AMS) 90th Annual Meeting
“Weather, Climate, and Society: New Demands on Science and Services”
Atlanta, GA, Jan. 17–21, 2010
<http://www.ametsoc.org/MEET/annual/call.html>
- * AUVSI's Unmanned Systems Asia-Pacific 2010 Conference
Jan. 31 - 1 Feb. 1, 2010
Pan Pacific Singapore, Singapore
<http://www.auvsi.org/events/>

Jeff Myers

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NASA SMD ESD Airborne Science Program 6-Month Schedule

	December	January	February	March	April	May
WB-57	◆◆◆◆◆ GWI & Superpods test	◆◆◆◆◆ HIWRAP/HIRAD	◆◆◆◆◆			MACPEX
P-3	◆◆◆◆◆			Operation Ice Bridge		
DC-8	LVIS	Northrop-Grumman				Hayabusa
ER-2		AirMSPI	SANDIA			
B-200			Cleveland/EPA	MASTER	MASTER	LAC
UC-12	Biomass burning					AVIRIS
G-III	Local Science	Hawaii/Volcanos	Veg Dyn - Costa Rica		Local Science	
Lear 25		◆◆◆◆◆	CO2 Laser Sounder			
T-34			HSI Puerto Rico			
SIERRA	Shell S&R demo			GPSAR/USFS/USGS		
GHawk	◆◆◆◆◆ Testflights	◆◆◆◆◆	GloPac		HAMSR	Pre-GRIP
Cessna				EMVIS & RESEPP/EPA		

WB-57 ER-2 UC-12 ◆◆◆◆◆ Maintenance
P-3 B-200 G-III GHawk Cessna
DC-8 Lear25 T-34 SIERRA T-34

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
	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
NASA Catalog Aircraft	DHC-6 Twin Otter	NASA-GSFS-WFF	7	5,000	12,000	25,000	160	500	http://www.twinotter.com
	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/
	Ikhana (Predator-B)	NASA-DFRC	30	3,000	10,000	52,000	171	3,500	http://airbornescience.nasa.gov/platforms/aircraft/predator-b.html
New Technology	Global Hawk	NASA-DFRC	31	1500	25,600	65,000	335	11,000	http://airbornescience.nasa.gov/platforms/aircraft/globalhawk.html
	SIERRA	NASA-ARC	11	100	445	12,000	60	550	http://airbornescience.nasa.gov/platforms/aircraft/sierra.html

ASP Upcoming Events

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- * AUVSI's Unmanned Systems Program Review 2010
Feb. 2-4, 2010
Mandarin Oriental Washington DC
Washington, DC, USA
Registration open: <http://www.auvsi.org/AUVSI/AUVSI/Events/AUVSIEvents/AUVSIsUnmannedSystemsProgramReview/Default.aspx>
- * AUVSI's Unmanned Systems North America 2010
Aug. 24-27, 2010
Colorado Convention Center
Denver, CO, USA
<http://www.auvsi.org/events/>
Call for papers open, abstracts due Jan. 20, 2010
http://symposium.auvsi.org/auvsi10/public/CFP_ProposalSubmission.aspx
- * AGU 2010 Ocean Sciences Meeting
Feb. 22-26, 2010
Oregon Convention Center
- 777 N.E. Martin Luther King Jr. Blvd.;
Portland, Oregon
<http://www.agu.org/meetings/os10/>
- * AGU 2010 The Meeting of the Americas
Aug. 8-13, 2010
Rafain Hotel and Convention Center
Av. Olímpio Rafagnin, 2357
Foz do Iguaçu - PR, 85862-210, Brazil
Session proposals OPEN
<http://www.agu.org/meetings/ja10/>
- * IEEE IGARSS 2010
July 25-30, 2010
Honolulu, Hawaii
Call for papers closed December 11, 2009
<http://www.igarss10.org/>
- * SPIE Remote Sensing 2010
Sept. 20-23, 2010
Centre de Congrès Pierre Baudis
Toulouse, France
Call for papers is open
<http://spie.org/x6262.xml>
- * IEEE Aerospace Conference 2010
March 6-13, 2010; Big Sky, Montana
Call for papers is open
<http://www.aeroconf.org/>
- * 2010 NASA Science Technology Conference (NSTC2010)
June 15-17, 2010; College Park, MD
<http://www.esdswg.org/softwarereuse/Resources/events/nstc2010>
- * NASA EOS Applications Seminar (includes Decadal Survey)
Feb. 1-3, 2010
Colorado
Details TBD
- * ISPRS Technical Commission I Symposium 2010
WG I/1: Standardization of Airborne Platform Interface
June 16-18, 2010