



National Aeronautics and Space Administration

Airborne Science Newsletter



Summer 2009

What's Inside...

Note from the Top 2

ASP at the ISRSE 2

Space Trak TM Relay 2

IPY 2009 3

ASP 6-Month Schedule 3

ASP Upcoming Events 4

In Brief ...

SIERRA Update

The SIERRA UAV successfully completed cold weather operations testing and payload check-out flights at Dugway proving grounds in April in anticipation for the CASIE mission that will operate from Svalbard, Norway. Follow the mission at www.espo.nasa.gov/casie.

Student Airborne Research Program 2009

SARP 2009 is set to begin July 6. Twenty-nine undergraduate and graduate Earth system science majors from around the country will participate in the program. The six-week program will include two science flights, July 22 and July 24, in which students will operate the WAS and MASTER instrument on board the DC-8.

Global Hawk update

Integration tests for the Northrop-Grumman developed GCS are in progress. The aircraft is flight ready and flight tests should begin in mid-July, following final integration tests. The upload of GloPac instruments is expected to begin end of August, culminating with a combined system test and a range flight by mid September. Weekly GloPac Campaign flights will begin thereafter.

Operation Ice Bridge

The ICESat I satellite is nearing the end of its lifespan and its inoperability is soon anticipated yet the launch of ICESat II is projected for 2014 at the earliest.

With this in mind, the Airborne Science program has stepped up to bridge this data gap with NASA aircraft assets. This campaign is officially named "Operation ICE Bridge" (OIB).

OIB is already well underway: several NASA and commercial entities will provide data for both the Arctic and Antarctic regions. In May, the NASA P-3 successfully concluded the spring portion of OIB out of Thule and Kangerlussuaq, Greenland. The P-3 flew a "new best" for single mission flight hours of 172 hours. Flight lines included sea and land ice with ICESat I under-flights.

Also in late May and early June, the University of Alaska (Chris Larsen) flew an Otter aircraft with a laser altimeter to acquire elevation profiles and compute mass balances of the remote Stikine Glacier and the glaciers surrounding Glacier Bay on the Alaskan peninsula near Juneau. Weather was favorable and the mission was completed on time. The single Otter will re-fly these flight lines in August to determine seasonal changes for ice and snow at these locations.



Ultima Thule Outfitters' Single Otter and the Southeast Alaskan Glaciers.

Looking to the near future, meetings with the greater Cryosphere community are determining the optimal set of flight lines for the Western Antarctic region using the DC-8 aircraft. Currently, the DC-8 is scheduled to operate out of Punta Arenas, Chile, with 18 eleven hour flight lines planned over the Antarctic Peninsula that will cover both sea and land ice. Glaciers in this region are flowing faster into the Southern Ocean than in years past. Preparations call for under-flights of ICESat, providing the satellite's instrument is still operable. The DC-8 will, in any case, fly historical ICESat flight lines to close the data gap between ICESat I and ICESat II. The time

Continued on page 2



(Above) Thorstan Markus, Bill Krabill, John Sonntag and (right) NASA's P-3 in Greenland.



ASP at ISRSE

NASA's Airborne Science Program was well represented at the recent International Society for Photogrammetry and Remote Sensing (ISRSE) conference in Stresa, Italy, May 4-8. Staff presented papers and posters for sessions on airborne platforms, airborne science, UAS platforms and science, as well as a session on airborne science programs. In addition to the conference, side meetings included a joint meeting between the European Fleet For Airborne Research (EUFAR) and the U.S. Interagency Coordinating Committee for Airborne Geosciences Research and Applications (ICCAGRA) to explore partnering opportunities between U.S. agencies and our European colleagues. The Program also organized a kick-off meeting of the ISPRS WG1/I that will focus on airborne observations.



In general, the meeting was very successful in creating interest in the next generation of capabilities and did well to communicate the leadership role that NASA maintains in airborne science. A pre-conference workshop on UASs for remote sensing was a big success. More than 30 people from 6 continents attended. The workshop highlighted features of both large and small UASs, a variety of sensor systems, and a range of applications with a focus on wildfire monitoring. The speakers included NASA and U.S. Forest Service personnel, as well as users/developers from Hungary, Spain, and Italy. The local Italian UAS company, Aermatica, brought a small vertical take-off-and-landing UAS to the exhibit hall. ▲

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).

Note from the Top



As most of you know, I am retiring from NASA on July 3, 2009 with 32 years of service. I will be moving to Northrop Grumman to establish an operational deployment capability for an advanced communication system supporting DOD requirements. As I write this final installment to the newsletter, I think of the dedication, professionalism, sacrifice, and spirit for adventure that's been demonstrated by those who support this program. I am humbled by the opportunity to lead such a great organization. At the same time,

I leave with pride, knowing your efforts have made possible the collection of great and essential airborne generated science data.

Over the last couple of years we have made significant strides that would not have been possible without several major factors falling into place. One was the recognition that the airborne program is an essential component for performing the national science objectives of which NASA is charged. Second, the ESD and SMD leadership supporting the program because it has demonstrated that it can work across NASA centers and produce results on schedule and within cost. There is the effectiveness of this program to do what is necessary to get our science customers the data they need. We are now looking at having the opportunity to support ESD by continuing to support R&A and ESTO programs, but adding our support to the Venture Class, Ice Bridge, and Decadal Survey programs, as well.

During my two years heading this program, I acknowledge the number of major accomplishments that is a real tribute to all of your efforts, which are too numerous to count in this section. Not only have we stabilized our program we are growing it. The ASP will continue to help scientists make discoveries critical to our understanding of this changing planet and, in turn, give the world's policymakers the information necessary to benefit society.

Thank you all for making my NASA career one where what is imagined can be possible.

*Andy Roberts
Airborne Science Program Director*

SpaceTrak™ Relay

NASA Airborne Science added another new role to its résumé in May when the DC-8 successfully relayed and recorded telemetry transmitted by a Delta II rocket boosting a satellite into orbit. NASA Launch Services Program (LSP) asked the ASP to show that the DC-8 could rendezvous over 1100 miles off the tip of Baja with a rocket launched from Vandenberg AFB and provide real-time data to the launch team back at KSC. The Delta II rocket provided by LSP contractor United Launch Alliance carried an experimental satellite for the Missile Defense Agency. ▲



Ice Bridge (continued from page 1)

line for this mission is mid-October to the end of November. A number of instruments that flew last spring on the P-3 are scheduled to fly on the DC-8. These include LVIS (Laser Vegetation Imaging Sensor), ATM (Airborne Topographic Mapper) and The University of Kansas Snow Radar. In addition to those instruments are the University of Kansas' McCords II ice sounding radar, and the Ku-Band radar, which measures altitude, surface backscatter and depth profiles in snow and ice. Additionally, there are plans to integrate a Gravimeter and a Magnetometer, from Columbia University's Lamont-Doherty Earth Observatory (LDEO) onto the DC-8 platform.

Continued on page 3

Ice Bridge (continued from page 2)



NASA DC-8 in Greenland 2008.

Another Operation Ice Bridge associated platform will be flying off of the Eastern Antarctic, November through December. This platform is designated the Basler (BT)-67 and is an upgraded DC-3 aircraft. Its primary goal for OIB will be to cover the Cook and Totten glaciers. NASA is contracting these flight lines through Don Blankenship of the University of Texas.

For more details on OIB please visit the OIB web site at: <http://www.espo.nasa.gov/oib/> ▲



Basler-67 to fly over the Totten and Cook Glaciers in Antarctica.

IPY 2009: UAV SAR

The NASA Gulfstream III departed Dryden Flight Research Center, May 1, on its first deployment to measure ice dynamics in Greenland and Iceland using a Ka-Band and an L-Band synthetic aperture radar. In 31 sorties of 170+ flight hours, the DFRC/JPL crew collected 6 Tb of radar data, providing the science community with unique views of the dynamics of snow and ice during the Arctic melt, as well as other dynamic environmental processes.

En route to Grand Forks, ND, the Ka-Band radar collected data over prairie potholes, wetlands, and levees along the Red and Missouri rivers. Once at Thule, Greenland, the Ka-Band collected data over pack ice. For the next two weeks, Ka-Band data were collected that allowed observations of a variety of snow and ice conditions, including revelations that the Jacobshaven glacier calved approximately 1.5km over a 6-day interval.

Flights with the L-Band UAVSAR began May 15. An inverter failure on one flight necessitated re-deployment to Bangor, Maine, for repairs. After returning to Thule, flights continued from the “Top of the World” over the Greenland glaciers and ice sheet.

On June 8, the crew transited to Keflavik, Iceland, for a series of flights over Lanjokull and Hofsjokull glaciers. P.I. Marc Simons was enthusiastic that these data would be the first 3-D vector measurements of these rapidly changing glaciers. On its journey home, the G-III collected repeat pass UAVSAR data in the Florida everglades (vegetation structure), the Louisiana gulf coast (subsidence characterization), and the Mississippi River (levee assessment).

Science teams face months of analysis before this volume of data yields the anticipated results. However, scientists are enthusiastic over the opportunity presented by this unique collection. This was an ambitious undertaking, especially for a first deployment. Despite the challenges of operating in an extreme environment with new systems, all the requested data were collected. It’s a testimony to the excellent design of the JPL radars and the DFRC Precision Autopilot, the robustness of the G-III as a platform aircraft, and the perseverance of the crew. This deployment, and the ones to come, will provide new tools for environmental science, as well as pathfinders for the new instruments recommended by the NRC Decadal Study. ▲

NASA SMD ESD Airborne Science Program 6-Month Schedule

	June	July	August	September	October	November
WB-57				GWI & Superpods test		HIWRAP/HIRAD
P-3			Maintenance			
DC-8		SARP		Operation Ice Bridge		
ER-2	LAASCES	LAC		AVIRIS		
B-200	RACORO		CALIPSO Caribbean	CALIPSO CONUS 2	Glory Validation	
UC-12	AID for ASCENDS		AID for ASCENDS	Biomass burning		
G-III	UAV IPY	UAVSAR - Volcanos/Veg Dynamics				
Lear 25						CO2 Laser Sounder
SIERRA	Testflights	UAV IPY Arctic Ice			Ocean Optics	
GHawk			GloPac			
Cessna		AK LIDAR				
T-34			Testflights		HSI - Puerto Rico	

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
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

- * IGARSS 2009
July 12-17, 2009
Cape Town, South Africa
<http://www.igarss09.org/>
- * ACE Science Workshop
August 5-7, 2009
Santa Fe, NM
Registration and hotel information
<http://jplweb.jpl.nasa.gov/ace/>
- * HYSPIRI Science Workshop
August 11-13, 2009
Pasadena, CA
Call for papers / posters
<http://hyspiri.jpl.nasa.gov>
- * AUVSI North America 2009
August 10-13, 2009; Washington, D.C.
Registration and Accommodations pages now open
<http://symposium.auvsi.org/>
- * SMAP Applications Workshop
September 9-10, 2009
Silver Spring, MD
<http://smap.jpl.nasa.gov/events/index.cfm?FuseAction=ShowNews&NewsID=12>
- * Third Intl. Workshop, "The Future of Remote Sensing"
October 20-21, 2009
Antwerp, Belgium
Call for papers and registration open
<http://isprs.vgt.vito.be/cms/>
- * UVS Canada 2009
November 2-5, 2009; Victoria, BC
Call for papers open
www.uvscanada.org
- * ASPRS/MAPPS 2009 Fall Conference
November 16-19, 2009
San Antonio, TX
- Registration open
<http://www.asprs.org/sanantonio09/>
- * TAAC 2009 Conference
December 8-10, 2009
Albuquerque, NM
<http://www.psl.nmsu.edu/uav/conferences/2009/>
- * AGU Fall Meeting 2009
December 14-18, 2009
San Francisco
Call for papers open
<http://www.agu.org/meetings/fm09/>
- * AIAA Infotech@Aerospace 2010
April 20-22, 2010
Atlanta, GA
Call for papers open
<http://www.aiaa.org/content.cfm?pageid=230&lumeetingid=2358>