



National Aeronautics and Space Administration

Airborne Science Newsletter



Fall 2009

What's Inside...

- Note from the Top **2**
- FY09 LaRC King Air Ops **2**
- Earth Venture-1 **3**
- ASP 6-Month Schedule **3**
- ASP Upcoming Events **4**

In Brief ...

ARRA Update

A number of Airborne Science projects have benefited from the American Recovery and Reinvestment Act (ARRA) (aka, the Stimulus Package) of 2009. These include facility upgrades, DC-8 and ER-2 maintenance and parts, developing a Global Hawk Mobile Operations Facility at DFRC, aileron replacement for the WB-57 at JSC, avionics upgrades on the P-3, and sensor upgrades at ARC. Other projects include the Earth Science Technology Office (ESTO) and Research and Analysis funded projects involving various airborne sensors from JPL, LaRC, ARC, and GSFC.

Global Hawk Update

The Global Hawk team continues to address hardware and software challenges as we move closer to first flight. The cause of the brake failure that occurred during taxi testing has been identified and a successful taxi test has been completed. An issue with command and control communications is currently being addressed and is the last remaining open item before flight.

CASIE 09: Arctic Sea Ice study a success

The Characterization of Arctic Sea Ice Experiment (CASIE) mission took place in July 2009 out of Svalbard, Norway and was the first science mission for the SIERRA UAV, operated out of Ames Research Center.

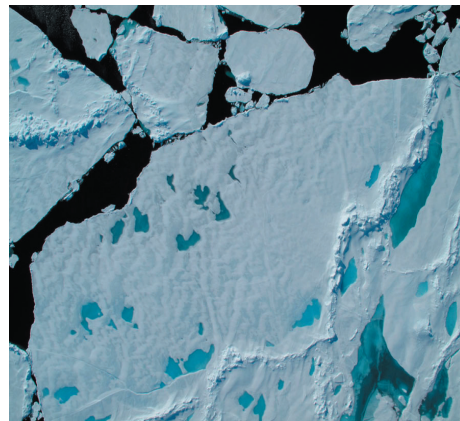


Image from P.I. Jim Maslanik's tracking camera over sea ice.

CASIE is the aircraft campaign portion of the larger, NASA-funded project titled "Sea Ice Roughness as an Indicator of Fundamental Changes in the Arctic Ice Cover: Observations, Monitoring, and Relationships to Environmental Factors." This project is attempting to answer some of the most basic questions regarding the future of the Arctic's sea ice cover. In particular, our work will help us better understand one of the most fundamental changes in sea ice cover in recent years – the loss of the oldest and thickest types of ice from within the Arctic Ocean. This change has been rapid and extreme. For example, our analysis of satellite data shows that the amount of older ice in 2009 is just 12% of what it was in 1988 - a decline of 74%. The oldest ice types now cover only 2% of the Arctic Ocean as compared to 20% during the 1980's. CASIE's role in this project was to provide very detailed information on ice

Continued on page 2

SARP 2009

This summer, 29 advanced under-graduate and graduate students participated in the first Student Airborne Research Program.

During this program, these students were involved in the end-to-end aspects of an airborne science mission. This included a series of lectures given by NASA program managers and mission scientists, two science flights on the DC-8, and three weeks of data analysis and interpretation. The program wrapped up in mid-August with a series of student presentations that focused on data acquired on board the DC-8.



Continued on page 3

CASIE (continued from page 1)

conditions by using a small unmanned aircraft that can fly long distances at low altitudes – a job that can be difficult and dangerous for large, manned aircraft, especially in the harsh Arctic environment. The SIERRA carried a variety of remote sensing instruments (SAR, laser profilers, imagers, temp/humidity probes) that will provide information on ice surface roughness and topography, thickness, reflectance, and age. An advantage of the SIERRA compared to smaller unmanned aircraft systems (UAS) is that the SIERRA is big enough to carry all these sensors at once, yet small enough to not require a large hanger or runway. Because of the risk of aircraft icing, the UAV sent back temperature and humidity data in realtime which could then be plotted in order to determine risk. A mission tracker was implemented using Google Earth and this allowed the aircraft operations team to monitor the aircraft while the science team was able to analyze MODIS, QuickSCAT, and other satellite products for mission planning. Together the team satisfied all mission requirements by flying 60 hours during the course of 11 flights and gathering data over nearly 3000km of sea ice. The CASIE team acknowledges the support of L3/Vertex for maintenance support, H211 LLC for transport, and King's Bay for in-country support. ▲.

Matt Fladeland



CASIE mission team and SIERRA aircraft prior to first flight from Ny-Alesund.

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

Note from the Top



This is the first newsletter since our leader and friend Andy Roberts left NASA and the program. I'm positive that I speak for the team when I say that he'll be missed and that the Airborne Science Program will reflect his leadership and influence well into the future. As with most effective leaders, Andy left the program better than when he arrived. For the team, I wish Andy and his wife Lucy a long and healthy NASA retirement and success in their future endeavors. I'm honored to assume the program's leadership role until a permanent replacement is selected. Although healthier in recent years, the program faces substantial challenges that, when met, will further improve our ability to provide unmatched capabilities to the NASA Earth Science community and the nation. Accomplishing Earth Venture 1, Operation Ice Bridge, and implementing the American Recovery and Reinvestment Act, on top of our normal mission commitments will clearly demonstrate the commitment and professionalism of the Airborne Science team. Within the last 5 years through innovation and perseverance, we've reinvented ourselves to be efficiently lean while increasing our capabilities and international influence. I look forward to working with our team to build on this foundation.

*Randy Albertson
Acting Airborne Science Program Director*

NASA Langley King Air Operations in FY09

The B200 deployed on two field projects in FY09. The first was a series of eleven CALIPSO underflights to verify the calibration of the CALIOP lidar before and after the switch from the primary to the backup CALIOP laser transmitter. The High Spectral Resolution Lidar (HSRL) was deployed on the B200 from January - April. The data proved conclusively that the calibration of the satellite instrument was not affected by the change in lasers. The second project was a deployment to Oklahoma for a mission sponsored by the Department of Energy. The B200 deployed the HSRL and the Research Scanning Polarimeter. The B200 flew coordinated patterns with the CIRPAS Twin Otter.

The UC-12B participated in four coordinated CO2 laser flights over the DOE ARM Central Facility (CF) in July and August 2009. The flights utilized the UC-12B, NASA Glenn Lear-25, Twin Otter International's Twin Otter, and the DOE Cessna covering altitudes from near the surface to 40-kft altitude. DOE



Installation of the IIT ACCLAIM instrument already installed its associated pallet into the NASA Langley UC-12B aircraft prior to AID for ASCENDS.

in situ CO2 measurements were made on the tower at the ARM CF, and DOE radiosondes also were launched. Two additional flights were conducted from NASA Langley with the Glenn Lear-25 and Langley UC-12B. ▲

Bruce Fisher

SARP (continued from page 1)



SARP students.

The student's projects focused on one of three topics that they chose at the beginning of the program: atmospheric sampling of dairy farm emissions using the Whole Air Sampler, remote sensing of agricultural processes in the Central Valley using MASTER or remote sensing of ocean processes in Monterey Bay, also using MASTER. Some of the important lessons learned during the program were the challenges – like sudden changes in flight

plans – and the multi-disciplinary environment associated with airborne science.

A video of the program is currently in production and will be available at the NASA Airborne Science Program booth during the AGU 2009 Fall Meeting in San Francisco, CA. A SARP overview and presentations by SARP students will also be given at the NASA booth. Videos of the pre-mission lectures and the student presentations are available on the NSERC website at <http://www.nserc.und.edu/learning/SARPmm.html>. ▲

Alexandra Novak



Presentations and posters of research results, Aug. 12, 2009.



The Earth Venture solicitation, EV-1 for suborbital missions, was released in July. The Airborne Science Program expects to support a significant number of proposals and likely several awarded projects. A pre-solicitation meeting took place in Washington, D.C. on August 26. Matt Fladeland presented for the Airborne Science Program and Marilyn Vasques for ESPO. All presentations and Q&A are available on the EV-1 website (link available on the ASP website). Proposals are due November 6, 2009.

NASA SMD ESD Airborne Science Program 6-Month Schedule

	September	October	November	December	January	February
WB-57	◆◆◆◆◆◆◆◆◆◆		GWI & Superpods test	HIWRAP/HIPAD	◆◆◆◆◆◆◆◆◆◆	◆◆◆◆◆◆◆◆◆◆
P-3	◆◆◆◆◆◆◆◆◆◆	Maintenance	◆◆◆◆◆◆◆◆◆◆			
DC-8	Northrop-Grum	Operation Ice Bridge				Northrop-Grum
ER-2	CoSSIR		◆◆◆◆◆◆◆◆◆◆	SANDIA MASTER	SANDIA	
B-200	CALIPSO CONUS 2	Glory Validation				
UC-12	Biomass burning					
G-III	UAVSAR - Volcanos/Veg Dynamics/Local Science					
Lear 25			CO2 Laser Sounder			
T-34						HSI Puerto Rico
SIERRA				USGS GPSAR		
GHawk	◆◆ Testflights ◆◆		GloPac	◆◆ Testflights ◆◆	GloPac	
T Otter			MASTER			

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

- * Third International Workshop “The Future of Remote Sensing”
Antwerp, Belgium
POSTPONED TO 2010
<http://isprs.vgt.vito.be/cms/>
- * UVS Canada 2009
November 2-5, 2009; Victoria, BC
Registration 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
Registration open
- * <http://www.psl.nmsu.edu/uav/conferences/2009/>
- * AGU Fall Meeting 2009
December 14-18, 2009
San Francisco, CA
Registration 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&lummeetingid=2358>
- * American Meteorology Society (AMS)
90th Annual Meeting, “Weather, Climate, and Society: New Demands on Science and Services”
January 17–21, 2010
Atlanta, GA
- Call for papers is open
<http://www.ametsoc.org/MEET/annual/call.html>
- * AUVSI’s Unmanned Systems Asia-Pacific 2010 Conference
January 31 - February 1, 2010
Pan Pacific Singapore, Singapore
- * AUVSI’s Unmanned Systems Program Review 2010
February 2-4, 2010
Mandarin Oriental Washington DC
Washington, DC, USA
- * AUVSI’s Unmanned Systems North America 2010
August 24-27, 2010
Colorado Convention Center
Denver, CO, USA
Conference and Exhibition
<http://www.auvsi.org/events/>