



Airborne Science Newsletter

Spring 2011

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In Brief ...

OIB Update

Operation IceBridge 2011 is once again in the Arctic. With Thule, Greenland, serving as the home base the NASA P-3 has successfully flown sea-ice missions near the North Pole and transited to Fairbanks to overfly the floating ICES camp north of Barrow Alaska. The P-3 will be flying science flights out of Kangerlussuaq Greenland starting April 1, soon to be joined by the NASA LaRC B-200 flying the LVIS instrument over southern Greenland glaciers.

UAS (A.40) ROSES Call

ROSES 2010 Appendix A.40, Airborne Science UAS Enabled Earth Science, is a solicitation asking for proposals to conduct a UAS-enabled Earth science/remote sensing campaign. Funded at \$7.5M through ARMD, the solicitation requires using 2 UAS, one being a NASA aircraft. Over 58 notices of intent were received for A.40, which closed March 22.

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Earth Venture Projects

Status and Highlights

The five EV-1 projects selected in 2010 are all underway. The list of projects and the aircraft to be used are:

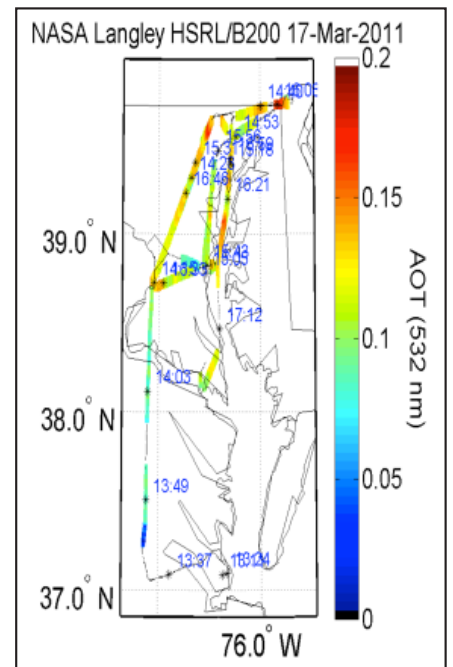
Airborne Microwave Observatory of Subcanopy and Subsurface (AirMOSS)
 PI Institution: Univ. of Michigan/JPL
 Aircraft: G-III

- Airborne Tropical Tropopause Experiment (ATTREX)
 PI Institution: Ames Research Center
 Aircraft: Global Hawk
- Carbon in Arctic Reservoirs Vulnerability Experiment (CARVE)
 PI Institution: JPL
 Aircraft: Twin Otter
- Deriving Information on Surface Conditions from Column and Vertically Resolved Observations Relevant to Air Quality (DISCOVER-AQ)
 PI Institution: LaRC
 Aircraft: B-200 and P-3
- Hurricane and Severe Storm Sentinel (HS3) – GSFC/ARC
 PI Institution: GSFC / ARC
 Aircraft: 2 Global Hawks

Two projects highlighted by the Earth System Science Pathfinder (ESSP) program in this timeframe are CARVE, which has passed Initial Concept Review (ICR) / Initial Design Review (IDR), Confirmation Review, and DISCOVER-AQ, which has passed ICR.

Focused on the measurement of air quality DISCOVER-AQ, flew two successful test flights on the B-200 from LaRC on March 17. Preliminary data from the HSRL instrument are shown below. In a flight coordinated with the FAA through the busy Washington / Baltimore corridor, there were no delays or deviations.

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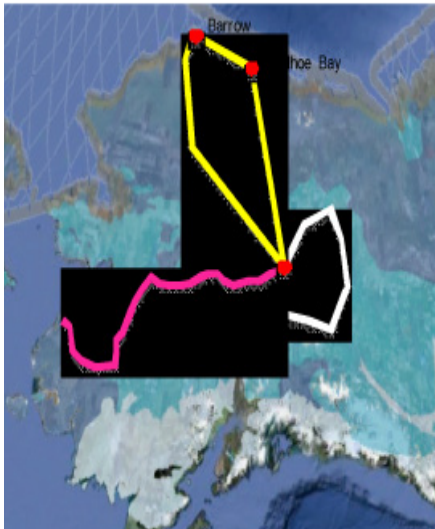


HSRL data from LaRC B-200, Washington, D.C. to Baltimore.

EV Projects

(continued from page 1)

The CARVE mission is investigating Arctic carbon cycling and the release of greenhouse gases from permafrost. The mission team is preparing for April 2011 engineering test flights from Fairbanks, AK, as depicted below. The payload for the Twin Otter includes PALS, Picarro (CO₂ and CH₄), and sample flasks.



Planned flight paths for CARVE engineering test flights.

Additional upcoming 2011 flights include:

- July, August - DISCOVER-AQ science flights in Baltimore/Washington
- August, September - HS3 test/preliminary science flights at Dryden
- November, December – ATTREX test/preliminary science flights at Dryden

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).

ASP Leadership Perspective



In this addition of the ASP Newsletter, I'd like to say hello from Thule, Greenland where I'm with the Operation Ice Bridge Team for a small part of their deployment. So far we've flown three successful science flights and were set to fly again today; however, the weather didn't cooperate. We are currently in storm condition Delta, which means no one moves on base, including emergency personnel. It's the reason I came up, to see firsthand what the Airborne Science Program personnel and scientists go through. I've spent the days flying, watching the professionals in action, and being truly impressed with the hard work and dedication of all involved. The

scientists work long and hard and so do our Airborne Science Program personnel. I keep reminding myself how lucky I am to be a part of a program with great people - at all our Centers- from those who just finished WISPAR's to those getting ready for MACPEX and EV-1, and those currently in the Arctic. And I especially want to say, "Thank you," to the P-3 ground crew: Brain Yates, John Doyle, Mike Terrell, and Bill McGrory for braving -20F to take care of the P-3. My hats off to you: well, not in this wind chill (about -38F), but when I get back to Virginia.

Bruce Tagg
Airborne Science Program Director

Instrument Incubator Program

Sixteen new awards

The Earth Science Technology Office (ESTO) announced 16 new awards in late 2010 for 3-year Instrument Incubator Program (IIP) projects to support second and third-tier NRC Decadal Survey-recommended satellite missions. Half of these IIP awards will plan flight-testing in the future, mostly 2012 and 2013. The relevant awards are listed below.

For the Active Sensing of CO₂ Emissions over Nights, Days and Seasons (ASCENDS) mission:

- James Abshire (GSFC) flying ASCENDS lidar on the Learjet 25 (likely)
- Narasimha Prasad (LaRC) developing the CarbonHawk Experiment Simulator for the Global Hawk.

For the Aerosol Cloud-Ecosystem (ACE) mission:

- Dave Diner (JPL) flying a UV-SWIR Multiangle Spectropolarimetric Imager on the ER-2.
- Paul Racette (GSFC) flying antennas for wide swath Radar, also on the ER-2.

Flying on the P-3:

- Tim Durham (Harris Corp) developing a Wideband Instrument for Snow Measurements for the Snow and Cold Land Processes (SCLP) mission.

Flying on the DC-8:

- James Leitch (Ball Aerospace) is developing a prototype sensor for Geostationary Coastal and Air Pollution Events (GEO-CAPE).

Steve Reising (Colorado State University) is developing a radiometer for the Surface Water and Ocean Topography (SWOT) mission. The aircraft is yet to be identified.

DC-8 and GLORY

On Saturday, February 26, the DC-8 project team was requested to support the launch of the GLORY Earth Science Satellite from Vandenberg Air Base. Although the airplane was undergoing maintenance activities, the project team dropped everything to bring it back into flight status, integrate telemetry equipment, develop flight plans, and commit to the mission. The launch team was faced with a very constrained window for lift-off and as the availability of the primary telemetry aircraft became uncertain, the DC-8's quick response may have saved up to a million dollars in delay costs.

While the satellite failed to reach orbit, the DC-8 operation proceeded as planned and the airplane was able to recover good telemetry data which may prove to be valuable to the mishap investigation.



GLORY satellite awaiting launch at Vandenberg AFB, California, Feb. 26, 2011.

In Brief (continued from page 1)

Global Hawk and Drospondes

Global Hawk recently completed the integration and operational checkout of the new NOAA/NCAR dropsonde system. The system was demonstrated during NOAA Winter Storms and Atmospheric Rivers (WISPAR) with over 175 sondes deployed during three science flights over the Pacific and Arctic.

NASA SMD ESD Airborne Science Program 6-Month Schedule

FY11		Mar	Apr	May	Jun	Jul	Aug
ER-2	806	HIWRAP, CoSSIR & AMPR			Reimbursable		
	809	BAS		LAC		Maintenance	
G-III	30502	Maint.	Various UAVSAR Flights (Costa Rica, San Andreas, Gulf of Mexico, Cascades/AK)				
GH	871	Mods for science	APCS	EV-1 HS3 Integration	Reimbursable Mods		
	872	HS3/ATTREX Int.	UAVSAR pods	Reimbursable Mods			
	873	Non-flyable Storage					
P-3	426	OIB Int.	OIB - Arctic Deployment		Integration: DISCOVER	DISCOVER-AQ	DBSARInt DBSAR
DC-8	817	SweepSAR	IIP		SARP	ASCENDS II	
WB-57	926	MACPEX		Reimbursable Flight Missions			
	928	Reimbursable Flight Missions					

CATALOG		Mar	Apr	May	Jun	Jul	Aug	
Ilkjana (DFRC)	870				Upload			
B200 (LaRC)	529	Aircraft Mods for DEVOTE		Upload OIB	Dwnld Reimb. Reimb.			
UC-12B (LaRC)	528	Int. DISCVR-AQ Dwnld	AID for ASCENDS	Dwnld	Upload DISCOV-AQ	DISCOVER-AQ		
Cessna 206H (LaRC)	504	Integrate G-LIHT	G-LIHT	EPA Joint Sensors				
SIERRA (ARC)	707	Picarro/MMS Integ.	Picarro/MMS test		GOSAT/OCO2 cal/val			
S-3B	601	Maint. AFRL	Dwnld			AFRL		
LJ25 (GRC)	616	Maintenance and Upgrades		ALIST	Dwnld			
T-34C	606	Maintenance	Auto-Pilot modification		Auto-Pilot modification			
Twin Otter (GRC)	607	NADIR PORT MODIFICATION						
Viking 300 UAS (WFF)	Catalog							
BT-67 (WFF)	Contract							
Twin Otter (WFF)	Catalog	AVIRIS Flights						



Spotlight On

The NASA Ames Research Center's Airborne Sensor Facility

The Ames Airborne Sensor Facility supports the NASA Airborne Science Program and the EOS Project Science Office with sensor operations, data systems development, and payload engineering services. It also maintains and operates a suite of facility remote sensing instruments that are used for earth science research, satellite program support and disaster response. The ASF includes permanent staff at Dryden, the Palmdale DAOF, and Ellington Field at JSC, providing direct support for ASP operations.

Recent accomplishments include the design and fabrication of the primary payload support systems for the new Global Hawk UAS platform, including the instrument power

distribution and control systems, airborne Ethernet network equipment, and interface and control systems for the Ku-band and Iridium telemetry hardware, in addition to two video camera systems. Prototypes of the next-generation of Experimenter Interface Panels (EIP) and REVEAL system (NASDAT) have also been installed on the Global Hawk. ASF personnel also worked closely with NSERC and IT engineers at Ames to develop the software architecture for the ground-based GHOC payload interface segments. This heavily leverages data synthesis and visualization work previously done for the DC-8 and Ikhana UAS/Western States Fire Mission projects.

Ongoing projects include the operation of the DMS Camera/POS-AV systems for Operation IceBridge on the DC-8 and P-3 aircraft, with, to-date, collections of nearly 700,000 images of Antarctica and Greenland. FY10/11 ARRA projects include building the production EIP and NASDAT boxes for the ASP, as well as a major re-build of the MODIS Airborne Simulator sensor system (MAS).

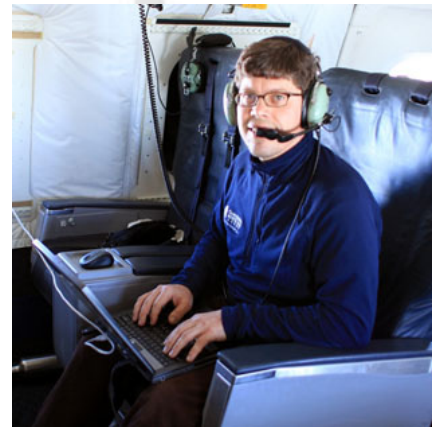
The ASF is staffed by UC Santa Cruz personnel, under the Ames University Affiliated Research Center (UARC), and is jointly managed by the Airborne Science Program and the EOS Project Science Office.



Ted Hildum working on the AMS sensor in the Ames Cal Lab.



Dennis Gearhart (DAOF staff) on the flight line in Costa Rica.



Eric Frain on the DC-8, somewhere over Greenland during Operation IceBridge.



Pat Grant (left) and Bob Billings (right) preparing the WB-57 CARTA-2 payload.



Kent Dunwoody (DFRC staff) preparing the ER-2 MVIS camera.

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
	Global Hawk	NASA-DFRC	31	1500	25,600	65,000	335	11,000	http://airbornescience.nasa.gov/platforms/aircraft/globalhawk.html
	NASA Catalog Aircraft	King Air B-200 AND UC-12B	NASA-LARC	6.2	4,100	12,500	35,000	260	1250
	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
	SIERRA	NASA-ARC	11	100	445	12,000	60	550	http://airbornescience.nasa.gov/platforms/aircraft/sierra.html

ASP Upcoming Events

- * ASPRS 2011 Annual Meeting
May 1-5, 2011
Milwaukee, WI
www.asprs.org/meetings/upmeeting.html
- * SMAP Cal/Val Workshop #2
May 3-5, 2011
Oxnard, CA
<http://smap.jpl.nasa.gov/science/workshops/>
- * GEO-CAPE Science Workshop
May 11-13, Boulder, CO
<http://geo-cape.larc.nasa.gov/events-MAY-2011CW.html>
- * HYSPIRI Symposium
May 17-18, 2011; Greenbelt, MD
<http://hyspiri.jpl.nasa.gov/events>
- * Earth Science Technology Forum – ESTF2011
June 21-23, 2011; Pasadena, CA
<http://esto.nasa.gov/events.html>
- * IGARSS 2011
July 31 - Aug. 5, 2011
Sendai, Japan
<http://igarss11.org>
Meeting will proceed as scheduled.
- * AUVSI's Unmanned Systems North America 2011
August 16-19, 2011; Washington DC
<http://symposium.auvsi.org/auvsi11/public/enter.aspx>
- * SPIE Remote Sensing Conference
September 19-21, 2011
Prague, Czechoslovakia
<http://spie.org/x6262.xml>
- * AGU Joint Assembly
Sept. 27-30, 2011
Marseilles, France
<http://www.agu.org/meetings/>
- * ASRPS 2011 Fall Pecora Conference
Nov. 14-17, 2011
Hilton Hotel at Washington Dulles Airport
Herndon, VA*