National Aeronautics and Space Administration

Airborne Science Newsletter

Fall 2011

What's Inside...

In Brief ...

ASP Website update

The ASP website has recently made significant changes. New features include current activities, news articles, aircraft status and calendars, aircraft catalog, and an interactive PI instrument database. Upcoming features will soon tie in SOFRS, flight reports, data archives, aircraft tracking, mission tools, and more. See http://airbornescience.nasa.gov/

Contributed by Erin Justice

SIERRA Update

The SIERRA team supported a JAXA/JPL mission in Railroad Valley, NV in June to provide CO2 concentrations for validating retrievals of column CO2 from GOSAT. These measurements also support the development of retrieval algorithms for the NASA OCO2 mission.

Contributed by Matt Fladeland

GRC Twin Otter

The GRC Twin-Otter completed the nadir port and avionics upgrade modification at the contractor's facility in Murrieta, CA earlier this month. On return from the modification the aircraft/aircrew stopped by the Burbank, CA airport to allow researchers at JPL an opportunity to view the aircraft and recent modifications. The Twin-Otter is now back at the Glenn Research Center in Cleveland undergoing maintenance in preparation for flight campaigns in 2012.

Contributed by Al Mickelwhite

SARP 2011

The third NASA/NSERC Student Airborne Research Program (SARP) was held during June and July at the Dryden Aircraft Operations Facility and the University of California, Irvine. The six-week program was designed to expose advanced undergraduates and early graduate students majoring in the sciences, mathematics, and engineering to all aspects of a NASA Airborne Science research campaign.

The twenty-nine students in the program represented twenty-eight colleges and universities from across the United States. Students attended lectures by university faculty members, NASA scientists and NASA program managers to prepare for their flights on the DC-8. The students were divided into three groups based on their interests to study air pollution in the Los Angeles basin, evapotranspiration from orchards and vineyards in the California Central Valley, and the distribution and abundance of giant kelp in the Santa Barbara Channel.

After the first week of introductory lectures at UC Irvine, the students traveled to Palmdale where they participated in instrument integration and flight planning onboard the DC-8 at the NASA Dryden Aircraft Operations Facility. They flew on one test flight and on four, three-hour science flights on the DC-8. Two of the science flights included planned missed-approaches over LAX. The students developed a new method for rapid sampling with the Whole Air Sampler that enabled them to obtain extremely high spatial resolution air samples over water treatment plants in the Los Angeles basin.

After the DC-8 flights, the students returned to UC Irvine for four weeks of data analysis and interpretation. In addition, all students participated in field trips to obtain ground-truth validation of the airborne measurements. The program culminated with the students' formal

Erica Weathers, a senior at Murray State University in Kentucky, operates the Whole Air Sampler on the NASA DC-8.

SARP students, mentors, and faculty at the DC-8 before the first flight.

SARP 2011

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presentations of their results and conclusions. Airborne Science Program director, Bruce Tagg, deputy director, Randy Albertson, and Earth Science education program manager, Ming-Ying Wei, also attended the final student presentations.

Contributed by Emily Schaller

SARP students talk to Dr. Jack Kaye, Associate Director for Research in the NASA Earth Sciences Division, during the introductory poster session.

ASP Leadership Perspective

Welcome to the Fall 2011, ASP Newsletter. I hope everyone had a great summer and is looking forward to some more exciting Airborne Science flying (Operation Ice Bridge, AVIRIS and Hope Devote flights, to name a few), as well as spending some quality time with family and friends over the holidays. After recently going through budget drills as well as the end of year closeout, I wanted to take this opportunity to share the ASP Vision and Mission, and to remind everyone why we exist: to enable scientists to achieve NASA Earth science objectives and goals that require the use of airborne platforms and infrastructure:

ASP Vision: Building on our Airborne Science Program foundation, to continually improve our relevance and responsiveness to provide airborne access to the Earth Science community.

ASP Mission: ASP enables Earth Science researchers and scientists to improve society's understanding of Earth system science by providing a pre-eminent suite of airborne capabilities that meet NASA Earth science requirements.

Hopefully this reminder of why we exist helps everyone when you are in the heat of the moment dealing with the issues we all face to achieve our mission. I haven't heard much direct feedback on our website or any aspect of the program so again, please feel free to contact me directly with ways we can improve the program for you (or the vision and mission statements!).

Bruce Tagg
Airborne Science Program Director

DISCOVER-AQ

Last July, NASA researchers and partners provided an unprecedented view of air pollution over the Baltimore-DC metropolitan area. This was the first of four field campaigns for a mission called DISCOVER-AQ, and its strategy is articulated by its acronym, Deriving Information on Surface Conditions from Column and Vertically Resolved Observations Relevant to Air Quality. Satellite observations of atmospheric pollutants generally provide "column" amounts, meaning that they can diagnose the total abundance of a constituent from the surface to the top of the atmosphere, but regulators concerned about high levels of ozone and particulate matter are interested in what resides at the surface where populations and ecosystems are exposed to poor air quality. Differentiating between pollution near the surface and aloft is a particularly difficult problem for current satellites.

With two NASA aircraft and an extensive ground network, DISCOVER-AQ operated as a complex observing system, providing multiple perspectives on the factors that control air quality and influence our ability to monitor pollution events from space. NASA's UC-12 King Air flying at an altitude of 27,000 feet was used to collect remote sensing observations of particulate matter and gaseous pollutants. Profiling underneath, NASA's P-3B used in situ sampling to provide detailed information on the distribution of pollutants from 1000 to 10,000 feet where most pollution resides. These flights were anchored to a network of ground sites where particulate and trace gas pollutants were measured at the surface with in situ instruments, from the surface to 1000 feet with tethered balloons, and for the atmospheric column with lidars, passive remote sensors, and ozonesondes.

During the month of July, aircraft took to the skies on 14 flight days, sampling repeatedly over the ground sites to observe the distribution and diurnal evolution of pollutants. Low altitude flight by the P-3B provided the biggest challenge as profiling over ground sites was conducted in some of the nation's busiest airspace and transects at 1000 feet over the I-95 traffic corridor were highly visible to commuters. FAA support through air traffic control and public announcement of flights was critical to the mission's success.

As one of NASA's Earth Venture missions in the Earth Science System Pathfinder program, DISCOVER-AQ will visit three other metropolitan areas in subsequent years to explore similarities and differences in the factors controlling air quality and their impact on the interpretation of satellite observations.

For more information on DISCOVER-AQ, please visit the mission web site at: http://discover-aq.larc.nasa.gov

Contributed by Jim Crawford

AITT09

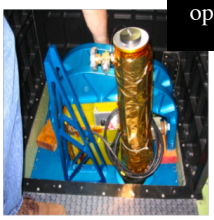
Transiting ESTO-developed instruments into facility class airborne systems

The Airborne Instrument Technology Transition (AITT) program transitions existing instruments, developed under the Earth Science Technology Office (ESTO) Instrument Incubator Program (IIP) or similar programs, into facility class airborne systems for regular science data collection. AITT09 is the second group of awarded projects and includes seven tasks of eight instruments for the DC-8, P-3, G-III, ER-2 and Twin Otter. When completed, the AITT09 airborne instruments will operate routinely, from remote bases with minimal operator input for field experiments and satellite calibration / validation.

Contributed by Bob Smith

High Spectral Resolution Lidar (HSRL) and Research Scanning Polarimeter (RSP), PI: Chris Hostetler (LaRC)

HSRL-1 detector and data system upgrades will increase the vertical resolution of ocean surface/subsurface and in-cloud measurements. Upgrade the RSP instrument data acquisition and operating systems.



Differential Absorption Lidar (DIAL), PI: John Hair (LaRC)

Upgrade the Airborne Ozone DIAL system with new HSRL technology for measurements of aerosol and cloud optical properties.

Electronically Steerable Flash Lidar (ESFL), PI:Carl Weimer (Ball)

Higher-altitude imaging with upgraded optics and focal plane will provide 3-D volume visualization methods supporting biomass measurements.

Airborne Glacier and Land Ice Surface Topography Interferometer (GLISTIN-A), PI: Delwyn Moller (Remote Sensing Solutions)

UAVSAR will provide ice surface topography swath mapping capability to support cryo-spheric science.

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AITT

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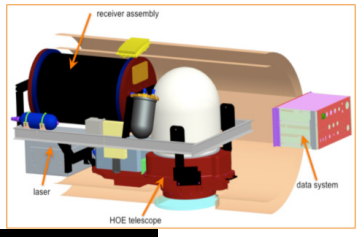


Solar Spectral Flux Radiometer (SSFR), PI: Sebastian Schmidt (CU/LASP)

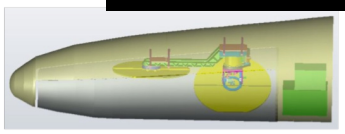
Zenith and nadir (E and Q bays) stabilizing platforms will correct measurements and avoid data loss from aircraft pitch and roll.

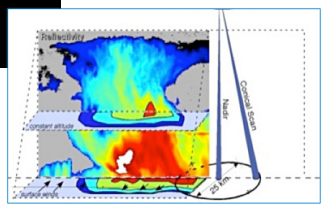
Cloud Aerosol Transport System (CATS), PI: Matt McGill (GSFC)

Mounted in the Super pod, CATS will provide information about cloud and aerosol height, internal structure, and derive wind motion for studies of aerosol transport and cloud motion.

ER-2 X-Band Radar (EXRAD), PI: Lihua Li (GSFC)

The nosecone-mounted radar provides high-resolution measurements of clouds, precipitation, and ocean surfaces for studying clouds, deep convection, and tropical storms.





NASA SMD ESD Airborne Science Program 6-Month Schedule

FY12		Oct	Nov	Dec	Jan	Feb	Mar
ER-2	806	UpIds, AVIRIS/MASTER, SMAP, RSP/ICE, MR-TCDL	MR-TCDL	MR-TCDL	MR-TCDL	MR-TCDL, Boeing	BAS
	809				Maintenance		
G-III	30502	Various UAVSAR Flights (Sacto Delta, SMAP, Tidal)		Sacto Delta	Sacto Delta		
GH	871	R'sable Mods, R'sable Mission					
	872	ATTREX Upids, ATTREX			HS3 Flts, ATTREX Upld	ATTREX Flights	
	873	Non-flyable Storage					
P-3	426	Annual Maintenance			DBSAR, DBSAR, DBSAR	OIB	OIB
DC-8	817	OIB Upload, OIB - Chile		OIB D'load, FMS/Data Mgmt	GCPEX	GCPEX - Maine	GCPEX, Maintenance
WB-57	926	Reimbursable Flight Missions	N926 Deploy		MX Inspection	OCONUS	
	928	N928 Minor Ops Inspection				Aircraft Engineering Mods	

CATALOG		Oct	Nov	Dec	Jan	Feb	Mar
Ikhana (DFRC)	870						
B200 (DFRC)		Western States Fires					
B200 (LaRC)	529	DEVOTE					OIB
UC-12B (LaRC)	528	DEVOTE					
Cessna 206H (LaRC)	504	G-LiHT & AMIGA					
SIERRA (ARC)	707	Maintenance	Seagrass test			Seagrass payload test	
S-3B	601	NAIMS ferry flt	NAIMS				
LJ25 (GRC)	616	NAIMS	NAIMS	NAIMS Dnld, Maintenance		ALIST	NAIMS Integ, NAIMS
T-34C	606						
Twin Otter (GRC)	607	CASH Flt Test					
Viking 300 UAS (WFF)	Catalog						
Twin Otter (WFF)	Contract	CARVE Flights					
Twin Otter (JPL)	Catalog	AVIRIS Flights					

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
	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	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
	SIERRA	NASA-ARC	11	100	445	12,000	60	550	http://airbornescience.nasa.gov/platforms/aircraft/sierra.html

ASP Upcoming Events

* OSTST 2011 Ocean Surface Topography Science Team Meeting
October 16-21, 2011, San Diego, CA
October 17, SWOT Science Team Meeting
http://depts.washington.edu/uwconf/ostst2011/

* UVS-Canada
November 7-10, 2011, Halifax, Canada
http://www.unmannedsystems.ca/content.php?doc=155

* ASRPS 2011 Fall Pecora Conference
Nov. 14-17, 2011
Hilton Hotel at Washington Dulles Airport
Herndon, VA

* UAS TAAC Symposium
December 6-8, 2011,Albuquerque, NM
http://taac.psl.nmsu.edu/
Registration Open

* AGU Fall Meeting
December 5-9, 2011, San Francisco, CA
http://www.agu.org/meetings/

* UAS TAAC Symposium
December 6-8, 2011,Albuquerque, NM
Includes UAS demo
http://taac.psl.nmsu.edu/
Registration open.

* 50th AIAA Aerospace Sciences Meeting
January 9-12, 2012; Nashville, TN
http://aiaa.org/content.cfm?pageid=230&lumeetingid=1964

* 92nd American Meteorological Society Annual Meeting
22-26 January 2012; New Orleans, LA
http://annual.ametsoc.org/2012/

* AUVSI Unmanned Systems Program Review 2012
February 7-9, 2012; Washington, DC
http://www.auvsi.org/

* AGU Chapman Conference
February 19-22, 2012; Hawaii
http://www.agu.org/meetings/chapman/2012/acall/

* 2012 Ocean Sciences Meeting
20-24 February 2012; Salt Lake City, UT
http://www.sgmeet.com/osm2012/

* IEEE Aerospace Conference
March 3-10, Big Sky Montana
http://www.aeroconf.org/
Call for papers OPEN

* ASPRS Annual Meeting
March 19-23, 2012; Sacramento, CA
http://www.asprs.org/Annual-Conferences/Sacramento-2012/

* 2012 National Hurricane Conference
26-29 March, 2012; Orlando, FL
http://www.hurricanemeeting.com/default.htm

* Infotech@Aerospace 2012
19-21 June 2012
Call for papers OPEN
http://www.aiaa.org/content.cfm?pageid=230&lumeetingid=2607