National Aeronautics and Space Administration

Airborne Science Newsletter

Fall 2012

What's Inside...

In Brief ...

SIERRA and Earthquake Hazzards

The SIERRA UAV successfully completed a mission to survey geologic faults and aquifers in northern California using magnetometers on the wing tips. The PI is Jonathan Glen (USGS) and the mission is part of a NASA-funded unmanned aircraft science demonstration.

Contributed by Matt Fladeland

ER-2 Modernizations

By January 2013, both ER-2 aircraft will have completed the NASA Airborne Science Data and Telemetry System (NASDAT) and Experimenter Interface Panel (EIP) upgrade. NASDAT/EIP significantly increases the capability for science teams to remotely monitor, in real-time, instrument health and operations through an Iridium satellite link and upload command and control signals. This added situation awareness and C&C capability will result in increased flight operations efficiency, achieving more science data for less cost.

Contributed by Tim Moes

HS3 Update

HS3: The NASA Global Hawk 872, arrived at WFF Sept 7 for its first deployment. During the transit, data

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CARVE

The NASA C-23 Sherpa aircraft, operated by Goddard Space Flight Center's Wallops Flight Facility (WFF), is participating in the six month long Jet Propulsion Laboratory (JPL) Carbon in Arctic Reservoirs Vulnerability Experiment (CARVE) campaign in Fairbanks, Alaska. CARVE collects detailed measurements of greenhouse gases on local to regional scales in the Alaskan Arctic and demonstrates new remote sensing and improved modeling capabilities to quantify Arctic carbon fluxes and carbon cycle-climate processes. Ultimately, CARVE will provide an integrated set of data that will provide experimental insights into Arctic carbon cycling.

CARVE campaign activities began in April 2012 with scientific equipment installation. The aircraft was modified to include an eight inch aperture to support a nadir viewing spectrometer, atmospheric inlet probes connected to a gas analyzer for greenhouse gas measurements, forward and nadir looking video and infrared cameras as well as several

The NASA C-23 Sherpa taking off from airstrip outside Fairbanks, AK.

instrumentation racks and an experimenter power system. Flight operations began in May with deployment to the Fairbanks International Airport. The CARVE campaign is designed around the yearly freeze/thaw cycle in Alaska to study carbon fluxes during the spring, summer, and fall timeframes. WFF personnel deploy to Alaska on two week rotational duty each month to support CARVE activities. The

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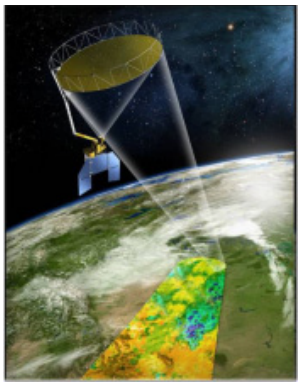
C-23 crew (L-R): Steve Dinardo (PI), Alan Barringer (Pilot), Chip Miller (PI), John Budney (PI), Rachel Chang (PI), Steve Wofsy (PI), Joe Mollahan (Pilot). Absent: Todd Brophy (mechanic).

SMAPVEX



NASA-Dryden's C-20A (NASA502) UAVSAR Project supported the SMAPVEX 2012 Campaign in Grand Forks, North Dakota from June 15th through July 17th. Soil Moisture Active Passive Validation Experiment (SMAPVEX) involved research supporting the SMAP satellite mission which is scheduled for a 2014 launch. SMAP scientists are currently developing and validating algorithms. One of the most critical needs is concurrent active/passive time series radar observations collected in the context of the post-launch validation and the project applications. SMAPVEX was also a rehearsal for the post-launch validation experiment. The aircraft data sets generated from JPL's Synthetic Aperture Radar (SAR) on the C-20A simulate the SMAP L-band observations that are needed.

The UAVSAR instrument was flown over a SMAP Core Validation site near Winnipeg, Canada. Concurrent with the aircraft observations, intensive ground sampling of soil moisture and vegetation parameters was conducted by a team of 70 scientists and students for 55 sites within the study domain. In addition to providing data to support the algorithms, the same sampling facilitates the calibration and scaling of a network of permanent continuous observing stations. The UAVSAR data will also be integrated with another aircraft data set collected with the Passive Active L-band System (PALS) to establish a combined data set with the same ratio of spatial scales as the SMAP satellite, which will support the combined active passive algorithm.

NASA502 flew 14 successful science flights for 43.1 hours over a one month period before landing back home in Palmdale, California. The Campaign fulfilled all science objectives and it was true success.

Contributed by John McGrath

Director's Corner

Welcome to another exciting season of ASP activities as you can see in this edition of the ASP Newsletter. To date, we've flown over 3000 hours of science, which is the busiest year in memory. Of course, my memory is pretty short and some would say failing; however, I have Randy's long and well maintained memory to go by and he says it's the most he remembers! We continue our record breaking year with flights for Earth Venture 1; CARVE in Alaska, AirMOSS in CA and various states within range of the G-III, and the HS3 deployment to WFF. In addition, the ICESat II MABEL instrument, CATS and CPL are at WFF flying on the ER-2; and the DC-8 is getting ready for it's month plus deployment to Chile for Operation IceBridge. With all that going on, it's easy to forget or neglect family and friends with the pressures of work; so make sure that in the upcoming holiday season you take some well deserved time off to enjoy and decompress. As always, feedback is welcome on the newsletter, the website, our performance, etc. Please don't hesitate to contact us with comments and/or concerns. Happy and safe science data collection!

Bruce Tagg and Randy Albertson
Airborne Science Program

In Brief *(continued from page 1)*

was collected from Hurricane Leslie and NASA 872 has subsequently flown two science flights to Hurricane Nadine. HS3 concludes Oct 5.

Contributed by Marilyn Vasques

GLISTIN-A

A newly upgraded Airborne Glacier and Ice Surface Topography Interferometer (GLISTIN-A) flew initial engineering and calibration flights on the DFRC GIII, Aug. 8 and 13. The flights focused on establishing instrument performance, stability and calibration. Thus far, interferograms and imagery verify a successful upgrade. Further GIII flights are anticipated January 2013. GLISTIN-A is currently being transitioned to fly on the GlobalHawk. (GLISTIN-H).

Contriubted by Delwyn Moller

Mission Tools Suite

The ASP Mission Tools Suite (MTS) is a collaboration and situational awareness tool aimed to increase the efficiency and effectiveness of airborne science campaigns. MTS is now available at mts.nasa.gov. The MTS team is currently supporting the HS3 campaign and a complementary MTS-Mini site for Students and Teachers participating in HS3. The MTS team has also recently added support for tracking OIB contract aircraft in the ASP Public tracker.

Contriubted by Aaron Duley

PRISM

In late July, the Portable Remote Imaging Spectrometer (PRISM) instrument, completed with support from the Airborne Science program, underwent evaluation with test flights over Monterey Bay and Elkhorn Slough, CA. The instrument performed very well and the data collected will be used in studies of seagrass and other coastal habitats.

Contriubted by Zakos Mouroulis

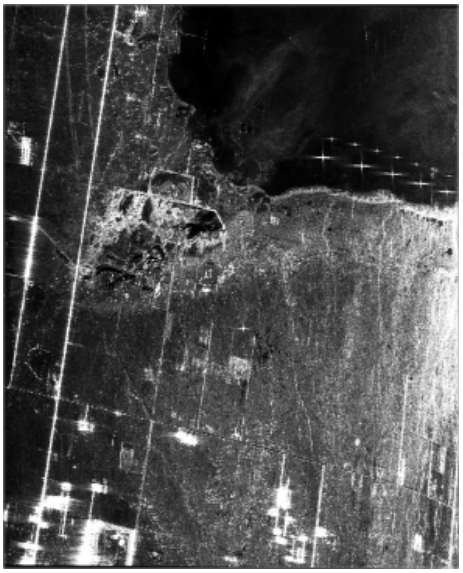
eMAS-IR

The new eMAS-IR system was successfully flight-tested on ER-2 809 in late August. This is a completely re-built version of the legacy MODIS Airborne Simulator (MAS) which has served the NASA Earth Science community for over 15 years. The enhanced MAS (eMAS) includes a new thermal infrared imaging spectrometer built In part by the Utah State Space Dynamics Lab. The system now has 38 spectral bands, covering the visible through long-wave infrared wavelengths.

Contriubted by Jeff Myers

AirMOSS

August 2012 was a busy month for the Airborne Microwave Observatory of Subcanopy and Subsurface (AirMOSS) project, a joint effort between the NASA Jet Propulsion Laboratory (JPL), Johnson Space Center (JSC), and Dryden Flight Research Center (DFRC). JSC's Gulfstream III aircraft (N992NA) deployed to Palmdale, California on August 6th to complete final integration and testing of JPL's new Uninhabited Aerial Vehicle Synthetic Aperture Radar (UAVSAR) P-band pod, which will be used to study root-zone soil moisture in North America over the next three years. After a successful checkout of the Platform Precision Autopilot (PPA), used to maintain precise aircraft position for data collection, the P-band radar had its' maiden flight on August 20th. It performed "impressively well" according to Dr. Mahta Moghaddam, AirMOSS Principal Investigator, and was followed by several additional test flights before 992 returned to JSC on August 31st. Science missions are scheduled to begin around October 1st in Canada and Washington state, with additional missions to follow.



First image from UAVSAR P-band pod, Rosamond Dry Lake, CA, August 20th, 2012.

Members of the AirMOSS team following the first successful flight of the UAVSAR P-band radar, August 20th, 2012. L-R: Jim Alexander, Mike Vandewalle, Sean Clarke, Elaine Chapin, Tim Miller, Roger Chao, Brandon Heavey, Johnny Scott, Tom Ryan, Ken Cockrell, Terry Lee.

Contributed by Jim Alexander

CARVE

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C-23 aircraft has remained in Alaska since the beginning of the campaign.

CARVE flights have occurred over the northern and southwestern portions of Alaska. Flight altitudes range from 500 to 17,500 feet with a typical daily science mission lasting 6-8 hours in duration. The CARVE mission is the longest continuous single mission ever flown by WFF personnel or aircraft.

To date 182.4 hours have been flown with 117.6 hour remaining. Phase 5, the final CARVE flight deployment of 2012, began on 9/17. The aircraft is scheduled to return to WFF on 10/12. CARVE is a multi-year C-23 aircraft campaign extending to 2014. The JPL Passive/ Active L-Band Sensor (PALS) is slated for installation on the C-23 for the 2013 CARVE campaign. The next CARVE deployment is scheduled for April-September 2013.

View from the Sherpa aircraft.

Loading C-23 Sherpa at Wallops.

Contributed by Mike Cropper

Spotlight On

Congratulations to the ground crews on both coasts for making the ER-2 MABEL-Wallops deployment a success! And some of the many people inolved in HS3.

Kudos to NASA ground crews on both coasts for making the ER-2 MABLE-Wallops deployment a great success after a difficult beginning. Early problems with the primary science sensor resulted in long-hours of troubleshooting for the aircraft and science teams. Once the sensor was successfully repaired, the aircraft decided to not cooperate with a faulty landing gear indication. This required a quick trip back to the West Coast for repair, checkout, and launch back East to enable capture of the required MABEL data before the allotted deployment time ran out. As of this writing, with a few targets remaining, the MABEL deployment can be declared a success which also included excellent science data from CATS and CPL carried along for the entire deployment. Of particular note, on Sept 23, ER-2 and Global Hawk missions were coordinated to get a first ever direct inter-comparison of CPL sensor data from both aircraft. The successful deployment all came together thanks to the dedication and persistence under challenging schedule deadlines of ground and flight crews and science teams and excellent support from the team at Wallops.

Contributed by Tim Moes

Don Sullivan and Dorothy Patterson in the Global Hawk Payload Mobile Operations Facility at Wallops. Photo credit: Scott Braun.

HS3 Project Managers at the May Science Meeting. (L-R) Marilyn Vasques, Bernie Luna, Ron Walsh.

Forecasting meeting with Mission Scientist Scott Braun. Photo credit: Susan McFadden.

The Wallops ER-2 ground crew: (L-R) Paul Everhart, Bryan Gerber, Jim Mills, Jeremy Bridges, Randy Button, Dan Heckel, Kevin Kraft, Monte Cook, and Chris Jennison.

Global Hawk pilots Phil Hall and Jon Neuhaus with N872 after ferry flight. Photo credit: Chris Naftel.

NASA SMD ESD Airborne Science Program 6-Month Schedule

CORE	Sept	Oct	Nov	Dec	Jan	Feb
DC-8	OIB	OIB (Chile)				ASCENDS ASCENDS
ER-2	600hr Phase Inspection	SensorNet install				
ER-2		TWILITE	LAC EXRAD, NAST-I, -M, S-HIS, eMAS		PODEX	AVIRIS
G-III (D)	Japan CA	NOLA	CA		Hawaii	Iceland
G-III (J)	AirMOSS					AirMOSS
G. Hawk	HS-3	ABIRS				ABIRS
G. Hawk	HS-3	UAVSAR/LVIS		UAVSAR, LVIS	ATTREX	
P-3	HSRL/RSP3	AITT		DISCOVER-AQ	DISCOVER-AQ	

CATALOG	Sept	Oct	Nov	Dec	Jan	Feb
B200 (D)			AirSWOT			
B200 (D)					DISCOVER-AQ	
C-23 Sherpa	CARVE	Annual Maintenance				
Falcon/HU-25C						
Ikhana	Block 1 upgrade				A40 MIZOPEX	
Lear 25	NAIMS		NAIMS		A40	
S-3	ARD UAS Surrogate	ARD				
SIERRA	A40 USGS	Minor Insp Seagrass	ASTER Volcano	FWS	ASTER Volcano	
UC-12					DISCOVER-AQ	
WB-57	OCONUS			Major Inspection		
WB-57	CONUS			Minor Inspection	FWS	

= Maintenance = Science Mission = Reimbursable Mission = Upload/Download

For an up-to-date schedule, see http://airbornescience.nasa.gov/aircraft_detailed_cal

ASP Upcoming Events

* 2012 HYSPIRI WORKSHOP
  Holiday Inn Capitol, Washington DC
  October 16-18, 2012
  http://hyspiri.jpl.nasa.gov/events/2012-hyspiri-workshop

* SMAP/GPM/GRACE-FO/SWOT Joint Mission Tutorial Workshop
  USGS National Center, Reston, VA
  October 17 and 18, 2012
  http://smap.jpl.nasa.gov/science/workshops/index.cfm

* MAPPS/ASPRS 2012 Specialty Conference
  Emerging Mapping and Geospatial Technologies: "Ground to Cloud Revolution," Tampa, FL
  October 29 – November 1, 2012
  http://www.asprs.org/Conferences/Tampa-2012/blog

* Unmanned Systems Canada 2012
  Ottawa, Canada, November 6-9, 2012
  http://www.unmannedsystems.ca/content.php?doc=182

* 3rd SMAP Cal/Val Workshop
  Oxnard, CA, November 14-16, 2012
  http://smap.jpl.nasa.gov/science/workshops/

* AGU Fall meeting
  REGISTRATION OPEN
  San Francisco, CA, December 3-7, 2012
  http://fallmeeting.agu.org/2012/

* UAS TAAC 2012 Conference
  Albuquerque, NM, December 4-6;
  http://taac.psl.nmsu.edu/

* 93rd AMS Annual Meeting
  Austin, TX, January 6-10, 2013
  http://annual.ametsoc.org/2013/

* 51st AIAA Aerospace Sciences Meeting
  Dallas / Ft. Worth, TX, January 7-10, 2013
  www.aiaa.org/asm2013/

* AUVSI's Unmanned Systems Program Review 2013
  Tysons Corner, VA February 12-14, 2013
  http://www.auvsi.org/AUVSI/Events/AUVSIEvents/

* 2013 IEEE Aerospace Conference
  Big Sky, Montana, March 2-9, 2013
  http://www.aeroconf.org/

* AGU Ocean Sciences Meeting
  Meeting of the Americas
  Cancun, Mexico, May 14-17, 2013
  Session proposals due October 17, 2012
  moa.agu.org/2013/

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
ASP Supported 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	7,200	72,000	65,000	410	2,500	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
	Gulfstream III (G-III)	NASA-JSC	7	2,610	69,700	45,000	459	3,400	http://airbornescience.nasa.gov/aircraft/G-III_-_JSC
	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
	Cessna 206H	NASA-LARC	5.7	1,175	3600	15,700	150	700	http://www.nasa.gov/centers/langley/pdf/70892main_FS-2004-07-92-LaRC.pdf
	HU-25C Falcon	NASA-LARC	5	3,000	32,000	42,000	430	1,900	http://airbornescience.nasa.gov/aircraft/HU-25C_Falcon
	C-23 Sherpa	NASA-GSFC	7	7,000	27,000	20,000	190	1,800	http://airbornescience.nasa.gov/aircraft/C-23_Sherpa

Call for Content

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

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