National Aeronautics and Space Administration

Airborne Science Newsletter

Winter 2013

What's Inside...

In Brief ...

AirMOSS

AirMOSS got busy with science this Fall! Since October 1st, the JSC GIII has flown 92.0 science hours at six sites, plus 13.9 hours UAVSAR engineering/calibration for a total of 105.9 hours. Science flights will resume in February 2013.

Contributed by Jim Alexander

AITT

The Airborne Instrumentation Technology Transition (AITT) mission flew on the WFF P-3 aircraft in support of instrument calibration/verification efforts coordinated with an oceanic research vessel transiting past the Azores Islands off the coast of Portugal. AITT began on 10/11 and completed 58.3 flight hours over 10 days.

Contributed by Kelly Griffin

UAS SAR

NASA's Airborne Science C-20A aircraft recently completed an early October mission to study active volcanoes in Alaska, Aleutian Islands and Japan, completing 10 flights/50 hours in the eight-day campaign. The Uninhabited Aerial Vehicle Synthetic Aperture Radar (UAVSAR), developed and operated by NASA's JPL, collected 60 of 61 planned data lines.

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NASA DC-8 and OIB Antarctic

Operation IceBridge science team conclude fourth year of research of Antarctic glaciers and sea ice using the DC-8.

The NASA DC-8 team and researchers supporting Operation IceBridge recently completed a five-week field campaign based out of Punta Arenas, Chile. This was the fourth year in a row that IceBridge researchers gathered information on Antarctic land based glaciers and sea ice using the DC-8. Antarctic weather is always challenging the team's ability to fly these missions at 1,500 ft AGL altitudes but this year's Antarctic weather presented sufficient opportunities to accomplish 16 science missions in 34 days as opposed to the planned 15 missions during 44 days.

During this year's Antarctic campaign IceBridge scientists added to existing sea ice elevation data in the Bellingshausen and Amundsen Sea areas on the west side of the Antarctic Peninsula and Weddell Sea on the east side of the peninsula. Antarctic ice sheet's altitudes, depths, and grounding lines were studied this year in areas that included the Foundation Ice Stream, Getz, Pine Island (and its expanding crack), Thwaites, Smith, Kohler, Ronnie, and Recovery glaciers.

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HS3 and NASA Global Hawks

Both aircraft used to collect environmental and scientic data of Hurricanes Nadine and Leslie

The Global Hawk AV-6 at Wallops Flight Facility.

The Hurricane and Severe Storm Sentinel (HS3) EV-1 project planned to deploy the two NASA Global Hawks (GH) to study Atlantic Hurricanes this past summer. The goal of the 5-year mission is to improve understanding of the processes that control hurricane formation and intensity change.

One Global Hawk (N872; AV-6) was designated as the environmental aircraft with instruments designed to sample

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HS3

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temperature, humidity, winds, and Saharan dust in the storm environment. The second GH (N871; AV-1) designated the over-storm aircraft, had instruments that measure winds and precipitation within the storm.

AV-6 studied Hurricane Leslie as it ferried to Wallops Flight Facility (WFF) on Sept 6th. It was the first time a NASA GH took off from Dryden Flight Research Center (DFRC) and landed somewhere else (WFF).

Between Sept 11 and Sept 26 AV-6 flew 5 flights to what would become Hurricane Nadine. HS3 was able to take advantage of the GH's long duration and study this storm that was off the coast of Africa near the Azores. Nadine provided a unique opportunity since data was collected as it became a tropical

The AV-6 at Dryden Flight Research Center.

depression, a tropical storm and then a hurricane. As Nadine's winds began to slow, data from HS3 was used by the National Hurricane Center to maintain Nadine as a tropical storm instead of downgrading the storm to post-tropical status.

AV-1 had not previously been used as a science aircraft so numerous changes were made to the GH infrastructure to prepare for this mission. Unfortunately, delays prevented AV-1 from being ready in time to deploy to WFF but it was ready in November. HS3 conducted one test flight and a successful science flight from DFRC between Nov 1 and Nov 6.

HS3 will conduct further studies from WFF with both Global Hawks in the hurricane seasons of 2013 and 2014.

For more information, see http://espo.nasa.gov/missions/hs3/

Contributed by Marilyn Vasques

Director's Corner

Happy New Year!! I hope everyone had a chance to recharge and enjoy some time off with family and friends. As this year begins, I would like to thank everyone for the hard work last year: if you didn't know, it was the most flying the Airborne Science Program has completed in any year, ever! We are still double-checking the numbers, and since it is the season to check it twice,.the total hours flown were at least 3300 hrs in FY12, almost 1000 hrs more than in FY11, which is pretty amazing when you think about it. I'm not sure we will be flying that many in 2013; however, I do know we have another busy year starting with a deployment the first week of January. Please be safe both on and off the job, remember that what you do is important to both NASA and the nation (the world in some cases!); and also remember that I'm always looking for feedback to make the program better. Again, Happy New Year!!!

Bruce Tagg
Airborne Science Program

OIB Antarctica

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IceBridge also achieved key milestones in educational outreach and science diplomacy by providing flight opportunities to two Chilean teachers, personnel from the U.S. Embassy in Santiago (including U.S. Ambassador to Chile Alejandro Wolff), and researchers from the Chilean Antarctic Institute. U.S. classrooms from across the nation tied into many of the flights via Xchat where experimenters and flight crew answered numerous questions asked by the students in real-time using the DC-8's satellite communication system.

New instruments measuring surface topography were also assessed during this campaign. Airborne Topographic Mapper (ATM) Sigma Lidar was operated during most missions. ATM 3 and ATM 4 were assessed for their ability to make surface altitude measurements during high altitude transit segments.

Contributed by Frank Cutler

In Brief *(continued from page 1)*

In late October, we completed a Central USA Deployment that supported the Soil Moisture Active Passive (SMAP) research and Gulf Coast Subsidence research, flying over SMAP locations in 12 states. UAVSAR flew 7 flights for a total of 32.2 hours

Contributed by John McGrath

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).

SIERRA and Seagrass-Coral Reef Biomes Mission

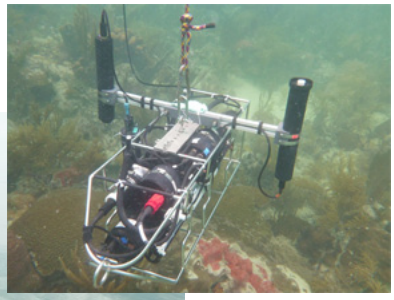
n 2011, NASA selected three Earth Science missions to test the utility of unmanned aerial vehicles (UAVs). One of the selected projects, titled "High Resolution Assessment of Carbon Dynamics in Seagrass and Coral Reef Biomes," is led by Stanley Herwitz, Director of the UAV Collaborative. Dr. Herwitz is working with his team of co-Investigators who specialize in coastal biology, marine remote sensing and optical oceanography. Their goal is to collect high-resolution spectral data using UAV-based hyperspectral and multispectral sensors to characterize current biological conditions and aid in the detection and quantification of possible future changes. Increased sea surface temperature and ocean acidification are expected to cause significant changes in the composition and distribution of shallow water species. Detailed airborne and water-based datasets are currently being assembled from representative seagrass and coral reef sites in Florida.

The water-based data acquisition effort has involved the use of leading-edge instrumentation combined with field sampling. Processes that increase our understanding of the spatial distribution and vigor of seagrass and coral are of particular interest. Attention has been directed to light-water interactions, the biogeochemical properties of the water column, benthic O2 and CO2 gas exchange, and biological productivity.

The SIERRA UAV, operated by NASA Ames, was flown to collect hyperspectral data. The Bat-4 UAV, operated by MLB Company, was flown to collect multispectral imagery. Three UAV Deployments have led to the completion of 14 UAV flight sequences to date. The SIERRA will continue to operate from the Key West Naval Air Station under an agreement with the U.S. Navy. In the October 2012 Deployment of the SIERRA, more than 320 gigabytes of hyperspectral data were collected. The final UAV Deployment scheduled for May 2013 will be followed by analysis of the extensive database, and the publication of the results in peer-reviewed science journals.

Contributed by Matt Fladeland and Stan Herwitz

Nose of aircraft removed to inspect payload.



Launching optical profiler where it will collect gas emission data from the ocean floor.

The SIERRA team at Key West Naval Air Station.

TRANSITIONS

Tom Mace Retires

Dr Thomas H. Mace retired from NASA in December after 12 years of service with the Airborne Science Program. He was NASA Dryden Flight Research Center's Senior Scientific Advisor for the Science Mission Directorate. His latest effort for Interdisciplinary Science Climate Change was working with California State University Bakersfield scientists to test a theory about how weather patterns affect the valley fever fungus. Under that theory, a drier climate with occasional bouts of worsening storm patterns could spur more valley fever cases, turning the regional epidemic into a national one.

While at NASA Dryden Flight Research Center (DFRC), Edwards, California. Dr Mace served as acting Director of the Test Systems Directorate, as well as Deputy Director and, later, Director of the Airborne Science Directorate.

The Test Systems Directorate operates the major flight test facilities at Dryden. This includes the Flight Simulation Laboratory, the Western Aeronautical Test Range, and the Flight Loads Laboratory. The Airborne Science Directorate used several specialized aircraft to fly a wide variety of global airborne experiments in support of projects developed by the world scientific community.

Mace was employed with the Environmental Protection Agency from 1987 through 2000. From 1992-2000 he held the position of special assistant within the Office of Environmental Information where he was also a senior environmental scientist for remote sensing, advanced scientific computing and information systems science. As the senior environmental scientist, Mace was the liaison to NASA for the Earth Observing System, an adjunct team member for the Moderate Resolution Imaging Spectrometer (MODIS) and the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) science teams, and was the chair of the U.S. Global Change Research Program's Data and Information Management Committee. From 1987-1992, he served as branch chief for remote sensing and geographic information systems research within the Office of Research and Development.

Prior to joining the EPA, Mace held positions with Lockheed Engineering and Management Services Corp., Las Vegas. During Mace's employment with Lockheed, his responsibilities included senior scientist, principal scientist, and engineering supervisor for the Electronic Data Systems Laboratory. He also served as scientific manager of the Remote Sensing Department under contract to the EPA Environmental Monitoring Systems Laboratory, Las Vegas.

Mace was an airphoto interpreter for Spectral Data Corporation, Culiacan, Mexico, from 1976 through 1977. He was the supervisor of photo interpretation and cartography for the Mexican Opium Poppy Surveillance Program. He served in the U.S. Air Force from 1969 though 1974 as a KC-135 pilot.

Mace graduated in 1969 from Ripon College, Ripon, Wis., with a Bachelor of Arts in psychology. In 1976, he earned an interdisciplinary Master of Science in Environmental Monitoring from the University of Wisconsin-Madison. He received a doctorate degree in Environmental Monitoring from the same university in 1980.

(Above) Tom assisting with taking soil samples during Valley Fever field trip. (Right) On board the G-III, Tom conducts a tour for visiting teachers.

NASA SMD ESD Airborne Science Program 6-Month Schedule

SUPPORTED	Jan	Feb	Mar	Apr	May	Jun
DC-8	B-Check	ASCENDS / ASCENDS	ACCESS		IRIS	SEAC4RS / SARP
ER-2	EXRAD		AVIRIS/MASTER		AVIRIS, MASTER	
ER-2	PODEX / PODEX	HSRL			eMAS, NAST-1, M/K, S-HIS	LAC
G-III (D)	Hawaii / GLISTEN		Cent. & South America		CA Fault lines	
G-III (J)		AirMOSS	DRM	AirMOSS	DRM	AirMOSS
G. Hawk		UAVSAR/LVIS	UAVSAR, LVIS			
G. Hawk	ATTREX					
P-3	DISCOVER-AQ		OIB - Greenland		Annual Maint. & Upgrades	

OTHER	Jan	Feb	Mar	Apr	May	Jun
B200 (D)	CONUS			AirSWOT Pacific Ocean		AirSWOT Arctic
B200 (D)	DISCOVER-AQ					
C-23 Sherpa		CARVE		CARVE	CARVE	CARVE / RMOTC
Falcon/HU-25C	ACCESS		OIB Arctic			
Ikhana	A40 MIZOPEX					MIZOPEX
Lear 25						
S-3	ACCESS				Seagrass	
SIERRA	ASTER Volcano		ASTER Volcano C. Rica			
UC-12	DISCOVER-AQ					
WB-57	Major Inspection					
WB-57		OCONUS				

= Maintenance = Science Mission = Non-ASP Mission = Upload/Download

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

ASP Upcoming Events

* 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/

* SWOT meeting
  January 31, 2013
  JPL, Pasadena

* 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/

* SMAP Science Definition Team (SDT) Meeting #10
  March 5-7, 2013
  JPL, Pasadena
  http://smap.jpl.nasa.gov/science/workshops/

* ASPRS Annual Conference
  Mar 24 – 28, 2013
  Baltimore, MD
  www.asprs.org/ASPRS-Conferences/

* NASA Carbon Cycle and Ecosystem (CCE) program - Terrestrial Ecology Science Team Meeting
  April 30 through May 2, 2013
  Scripps Seaside Forum, San Diego, CA

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

* GEO-CAPE community meeting
  Week of May 20 - TBD

* Alaska Unmanned Aircraft Systems (UAS) Interest Group Annual Meeting:
  May 1–2 2013 in Anchorage, Alaska
  Now accepting presentation proposals
  Leonard.ligon@ataero.com

* IGARSS 2013
  Sun, July 21, 2013– Sat, July 27, 2013
  Melbourne, Australia
  www.igarss2013.org/

* SPIE Remote Sensing 2013
  23-26 September 2013
  Dresden, Germany
  Call for papers is open: Abstracts due April 1, 2013
  http://spie.org/x6262.xml?WT.mc_id=RERS13CE

Airborne Science Program

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://jsc-aircraft-ops.jsc.nasa.gov/GIII/index.html
	Gulfstream III (G-III)	NASA-JSC	7	2,610	69,700	45,000	459	3,400	http://jsc-aircraft-ops.jsc.nasa.gov/GIII/index.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
	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