



National Aeronautics and Space Administration

# Airborne Science Newsletter



Spring 2012

*Editor's note: This edition of the ASP Newsletter debuts the new column, "Transitions," which notes personnel modifications of duty, retirements, deaths, and other significant changes within the ASP community. We encourage your contributions to this column.*

## GCPEX Deployment

**N**ASA's DC-8 airborne science flying laboratory participated in the Global Precipitation Measurement Cold-season Precipitation Experiment (GCPEX) snow study near Toronto, Canada in January and February of this year. The DC-8 completed 13 data-collection missions during 80 hours of flight in cooperation with the University of North Dakota's Citation

and the Canadian National Research Council Convair 580. GCPEX was a field campaign effort designed to provide both new datasets and physical insights related to the snowfall process, especially as they relate to the incorporation of appropriate physics into GPM (Global Precipitation Mission) snowfall retrieval algorithms. GPM is an international satellite mission to provide next-generation observations of rain and snow worldwide every three hours. NASA and the Japan Aerospace Exploration Agency (JAXA) will launch a "Core" satellite in June of 2014 carrying advanced instruments that will set a new standard for precipitation measurements from space.



*The snow-covered city of Barrie, Ontario, Canada, surrounds ice-bound Lake Simcoe in this view from NASA's DC-8 during a flight Feb. 20.*

"The GCPEX mission has been a real success," said Walter Petersen, the Global Precipitation Measurement ground validation scientist at NASA's Wallops Flight Facility in Virginia. "The majority of the mission objectives were accomplished, especially as they pertain to collecting a broad spectrum of snowfall, mixed phase, and even rain precipitation events. All

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### In Brief ...

#### Operation IceBridge

OIB Spring 2012 has begun with another the series of Arctic flights. The WFF P-3 and LaRC Falcon are both basing out of Thule and Kangerlussuaq Greenland. They will survey the arctic sea-ice as well as glacial features on the Greenland ice cap while the UAF Otter surveys and the coastal glaciers in Alaska.

*Contributed by Kent Shiffer*

#### EV UAV SAR Upgrades

JSC's Gulfstream III (N992NA) is being modified to support UAVSAR radars for projects such as AirMOSS. Modifications include installation of a pod pylon, a Platform Precision Autopilot, and equipment racks and operator stations for two operators. Expected completion June 2012.

*Contributed by Jim Alexander*



*Dryden GCPEX deployed team (L-R): Donny Bailes, Joe Niquette, Larry Phillips, Bob Garcia, Jeff Wilson, Larry Larose, Manny Puerta, Bill Brockett, Pat Lloyd, Eric Buzay, Terrance Dilworth, Ron Wilcox.*

## GCPEX

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indications are that the airborne and ground-based instruments worked very well, meaning we expect to have a robust set of data to analyze toward supporting the development of GPM falling-snow retrieval algorithms”.

The mission consisted of instruments on the ground at the Center for Atmospheric Research Experiments site (CARE) north of Toronto measuring the quantity of snow, precipitation rate and water content of storm systems passing over the site. Radar and radiometers at the CARE site got an up-close look at the snow as it fell from clouds to the surface. Meanwhile, two of the three research aircraft, the UND's Citation and the CNRC Convair 580, flew through the clouds measuring cloud and snowflake characteristics to include snowflake sizes, water content, temperature. Above the clouds at 33,000 feet, the third aircraft, NASA's DC-8 airborne science flying laboratory carried a NASA Goddard-developed Conical Scanning Millimeter-wave Imaging Radiometer (CoSMIR) and NASA's Jet Propulsion Laboratory-developed Airborne Precipitation Radar-2 (APR-2). Together these two instruments simulated the instruments that the GPM satellite will carry into orbit.



NASA pilots Dick Ewers and Manny Puerta guide NASA's DC-8 flying laboratory toward landing at Bangor International Airport, Maine, following a science flight.

GCPEX flights included opportunities to collect data over winter storm events at other than the CARE site to include Lake Ontario and the Boston area. The GCPEX datasets will complement current measurements made by radiometers on Earth-observing satellites such as Aqua and Soumi NPP and the Cloud Profiling Radar on CloudSat.

Contributed by Frank Cutler

## Director's Corner



I can't believe it's time for the Spring Newsletter already since we really didn't have a winter on the East Coast. Oh well, welcome to the Spring ASP Newsletter! We are off to another busy year with major deployments to the Arctic, Alaska, and the middle of the country. As I write this today, the WFF P-3 is flying low and slow over the sea ice above Greenland, DFRC is prepping one ER-2 to fly missions over Greenland (from Iceland) while the other DFRC crews are hard at work getting the DC-8 ready for DC3, the other ER-2 back up after a year of inspections and maintenance and flying the GH's and the GIII. WFF crews (those not in Greenland) are prepping the new C-23 Sherpa for the CARVE Mission, the JSC folks are taking a well earned break from ASP after doing an outstanding job of modifying their GIII to take a radar pod for the AirMOSS mission. In addition, LaRC crews are working hard to get a lidar integrated on the new HU-25 Falcon and the aircraft up and ready to fly to Greenland. The ARC folks are hard at work on SIERRA, sensors, NASDAT's and EIP's, and the new Web presence. And, last but not least, the GRC crews are getting their Twin Otter ready to fly a new ocean color instrument called PRISM. In the midst of all the hard work and mission pressures, please don't forget your families and loved ones; take the time you need to not burn out and as always be safe since YOU are the reason this program is successful and the best place to work in NASA!

Bruce Tagg  
Airborne Science Program Director

## P-3 Upgrades for OIB

Several P-3 Orion upgrades have been performed over the past several months and are debuting on the Operation IceBridge mission this spring. New single bay experimenter racks, capable of forming double-bay racks, will support larger payloads than the previous experimenter racks. These racks are designed to allow investigators to pre-populate their equipment prior to install and fit through the P-3 cabin door without removing larger items. Installation of refurbished flight station seats and new experimenter seats are located throughout the cabin. The latter replace the previous military style with commercially acquired FAA rated seats that contain a 5-point safety harness. Also, new



New single-bay experimenter racks.

safety equipment for both aircrew and experimenters has been installed on the aircraft. Updated arctic survival wear, oxygen masks, and life rafts are available. Current upgrades to aircraft equipment have increased available payload weight for research flights.



New station and experimenter seats.

New power converters for installation into the P-3 aircraft were purchased. While more efficient, the new converters weigh less than existing units thereby providing future additional payload weight. Also purchased were new galley appliances and lavatory equipment. These items will be installed during maintenance periods throughout 2012.

Contributed by Mike Cropper

2006  
2007  
2008  
2009  
2010  
2011  
**2012**

# TRANSITIONS



**Michael T. Fitzgerald**

It is with great sadness that the MAS instrument team announces the passing of Michael Fitzgerald, one of the original data analysts and a driving force behind the successful development and operation of a number of major NASA airborne instruments, including the MAS, MASTER, and TIMS. For nearly 20 years, from its first deployment to the Azores in 1992, Mike spearheaded MAS data processing, software development, and field operations. His boundless energy, imperturbable optimism, and good spirits will be remembered fondly by all who knew him. He died peacefully at his home in Boulder Creek with family on the 12th of February, 2012. He was only 52 years old and a 4th generation native of San Mateo, California. He died of ALS (Lou Gehrig's disease) seven years after being diagnosed.

Prior to coming to NASA, Mike worked for seven years as a union electrician (IBEW 617) until he suffered several disabling injuries. He then received his BS in Geography from San Francisco State University under a career rehabilitation program, and came to Ames Research Center as a student intern. He quickly became fascinated with Earth science and remote sensing, and over the next 20 years went on to become a leading member of the technical staff at the Airborne Sensor Facility. He led the MAS and MASTER deployment teams on major field experiments from Alaska,

to Brazil, Costa Rica, and South Africa, to name but a few; and his contagious good nature and technical skills together were a big part of their collective success. His motto after being struck down by ALS became "Faith, Not Fear," exemplifying the indomitable spirit that will remain forever an inspiration to friends and colleagues alike.

*Contributed by Jeff Myers*



**Denis Steele appointed Acting Associate Mission Director**

Mike Thomson welcomes a new deputy. Denis Steele, originally of Orlando, FL has accepted a detail position as the Acting

Associate Mission Director for Science to support the Airborne Science Program at the Dryden Flight Research Center.

Denis, a pilot in the Airborne Science Program, currently fly's the programs High Altitude ER-2, Gulfstream III UAVSAR Sensor Platform , DC-8 Airborne Laboratory and B-200 King Air aircraft. He is a former U.S. Air Force pilot, with flight experience in the T-37, T-38, KC-135 and U-2 aircraft.

Denis held the rank of major in the Air Force. He is a graduate of the U.S. Air Force Academy, Colorado Springs, CO, with a Bachelor of Science in Astronautical Engineering

Welcome aboard Denis!

## New Acquisitions to ASP Fleet

*LaRC Falcon 20G*

The NASA Langley Research Center acquired a Dassault HU-25C Guardian (Falcon 20G) aircraft from the U.S. Coast Guard in 2011. The HU-25C is a twin-engine business jet with a service ceiling of 37,000 ft. At a best range speed of 415 KTAS, the estimated aircraft range is 2075 n.mi. with an endurance of 5 hr. The estimated maximum payload is 4150 lbs. The aircraft is equipped with one set of under-wing hard points on each wing,

oversize observation windows on each side of the aircraft, nadir portal (19.7 x 32 in.), unpressurized compartments in the nose and tail, provisions for a nadir FLIR turret, and structural provisions to mount an external pod on the right side of the fuselage. Currently, the NASA Goddard Land, Vegetation and Ice Sensor is being installed in the cabin over the nadir portal for Operation IceBridge missions in Greenland.



*The LaRC HU-25C Guardian (Falcon 20G)*

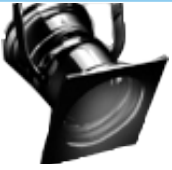
*Contributed by Bruce Fisher*



*C-23 Sherpa Acquisition*

A C-23 Sherpa aircraft was acquired by the Wallops Flight Facility to support the CARVE mission starting in 2012. The C-23 is an unpressurized,

*Continued on page 6*



## Spotlight On

*The maintenance crew for the DC-8 during GCPEX, as well as some enthusiastic young visitors*



*Enrique Hernandez inspects turbine blades of DC-8 engine.*



*DC-8 maintenance crew at work in a hangar at Bangor International Airport, ME.*



*Mission Director Walter Klein (left) poses with Challenger Learning Center of Maine students, staff, and chaperones next to the NASA DC-8 (Image Credit: Susan Jonason).*



*Future pilot in the cockpit of the DC-8 (Image Credit: Jennifer Therrien).*



*Inside the DC-8, students learn about the aircraft and its scientific missions all over the world (Image Credit: Jennifer Therrien).*

# NASA SMD ESD Airborne Science Program 6-Month Schedule

NASA Airborne Science Program 6-month schedule from March 1, 2012						
Core	Mar	Apr	May	Jun	Jul	Aug
DC-8	B Check	DC3 & SEAC4RS urf	DC3		Avionics	SEAC4RS
ER-2		MABEL		LAC/Twillite		
ER-2		PACSI/AVIRIS		SEAC4RS		SEAC4RS
GIII(D)		CA Faults		Iceland/ND		
GIII(J)			AirMOSS			
GHawk	KQ-X					HS3 U/L
Ghawk	KQ-X					HS3 U/L
P-3	OIB			SARP		
<b>Other</b>						
B-200(D)	AMD				AirSWOT	
B-200(L)		OIB			TCAP	
C-23		CARVE	CARVE			
HU-25C	OIB	OIB				
Ikhana	A40					
S-3			ARMU UAS	ARMU UAS		
SIERRA	A40	A40	A40	PRCI		A40
T. Otter		AFRL	PRISM		PRISM	
UC-12						
WB-57	OCONUS					
WB-57					MDA	MDA

■ = Maintenance  
■ = Science Mission  
■ = Reimbursable Mission  
■ = Upload/download

For an up-to-date schedule, see [http://airbornescience.nasa.gov/aircraft\\_detailed\\_cal](http://airbornescience.nasa.gov/aircraft_detailed_cal)

## ASP Upcoming Events

- \* NASA LCLUC Science Team Meeting  
April 3–5, 2012, Rockville, Maryland  
<http://lcluc.umd.edu/meetings.php?mid=37>
- \* 2012 HyspIRI Symposium  
May 16-17, 2012; GSFC, Maryland,  
<http://hyspiri.jpl.nasa.gov/events/2012-hyspiri-symposium>
- \* 2012 UAS Summit: “Hovering over Grand Forks”  
May 22 – 23, 2012; Grand Forks, North Dakota  
<http://www.auvsi.org>
- \* Infotech@Aerospace 2012  
June 19-21, 2012, Garden Grove, California  
<http://www.aiaa.org/content.cfm?pageid=230&lumeetingid=2607>
- \* ESTF 2012  
NASA Earth Science Technology Office  
10th Annual Conference  
June 26-28, 2012; Baltimore, MD  
<http://esto.nasa.gov/forum/estf2012/>
- \* IGARSS 2012  
July 22-27, Munich, Germany  
<http://www.igarss12.org/CallForPapers.asp>
- \* AUVSI North America  
August 6-9, 2012; Las Vegas, NV  
<http://www.auvsishow.org/auvsi12/public/content.aspx?ID=786&sortMenu=103001>
- \* XXII Congress, International Society for Photogrammetry and Remote Sensing (ISPRS)  
Aug. 25 – Sept. 1, 2012  
Melbourne, Australia  
[www.isprs2012.org](http://www.isprs2012.org)
- \* ForestSAT 2012  
Sept. 11-14, Oregon State University  
Corvallis, Oregon, USA  
<http://www.forestsat2012.com/>
- \* SPIE 2012 Remote Sensing Conference  
Sept. 24-27, 2012; Edinburgh, UK  
[http://spie.org/x6262.xml?WT.mc\\_id=RERS12CE](http://spie.org/x6262.xml?WT.mc_id=RERS12CE)



## 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	<a href="http://www.nasa.gov/centers/dryden/research/AirSci/ER-2/">http://www.nasa.gov/centers/dryden/research/AirSci/ER-2/</a>
	WB-57	NASA-JSC	6	6,000	63,000	65,000	410	2,172	<a href="http://jsc-aircraft-ops.jsc.nasa.gov/wb57/">http://jsc-aircraft-ops.jsc.nasa.gov/wb57/</a>
	DC-8	NASA-DFRC	12	30,000	340,000	41,000	450	5,400	<a href="http://www.nasa.gov/centers/dryden/research/AirSci/DC-8/">http://www.nasa.gov/centers/dryden/research/AirSci/DC-8/</a>
	P-3B	NASA-WFF	12	16,000	135,000	30,000	330	3,800	<a href="http://wacop/wff.nasa.gov">http://wacop/wff.nasa.gov</a>
	Gulfstream III (G-III) (mil: C-20A)	NASA-DFRC	7	2,610	45,000	45,000	459	3,400	<a href="http://airbornescience.nasa.gov/platforms/aircraft/g3.html">http://airbornescience.nasa.gov/platforms/aircraft/g3.html</a>
	Global Hawk	NASA-DFRC	31	1500	25,600	65,000	335	11,000	<a href="http://airbornescience.nasa.gov/platforms/aircraft/globalhawk.html">http://airbornescience.nasa.gov/platforms/aircraft/globalhawk.html</a>
NASA Catalog Aircraft	King Air B-200 AND UC-12B	NASA-LARC	6.2	4,100	12,500	35,000	260	1250	<a href="http://airbornescience.nasa.gov/platforms/aircraft/b-200.html">http://airbornescience.nasa.gov/platforms/aircraft/b-200.html</a>
	DHC-6 Twin Otter	NASA-GRC	3.5	3,600	11,000	25,000	140	450	<a href="http://www.grc.nasa.gov/WWW/AircraftOps/">http://www.grc.nasa.gov/WWW/AircraftOps/</a>
	Learjet 25	NASA-GRC	3	3,200	15,000	45,000	350/.81 Mach	1,200	<a href="http://www.grc.nasa.gov/WWW/AircraftOps/">http://www.grc.nasa.gov/WWW/AircraftOps/</a>
	S-3B Viking	NASA/GRC	>6	12,000	52,500	40,000	450	2,300	<a href="http://www.grc.nasa.gov/WWW/AircraftOps/">http://www.grc.nasa.gov/WWW/AircraftOps/</a>
	Ikhana (Predator-B)	NASA-DFRC	30	3,000	10,000	52,000	171	3,500	<a href="http://airbornescience.nasa.gov/platforms/aircraft/predator-b.html">http://airbornescience.nasa.gov/platforms/aircraft/predator-b.html</a>
	SIERRA	NASA-ARC	11	100	445	12,000	60	550	<a href="http://airbornescience.nasa.gov/platforms/aircraft/sierra.html">http://airbornescience.nasa.gov/platforms/aircraft/sierra.html</a>
	Cessna 206H	NASA-LARC	5.7	1,175	3600	15,700	150	700	<a href="http://www.nasa.gov/centers/langley/pdf/70892main_FS-2004-07-92-LaRC.pdf">http://www.nasa.gov/centers/langley/pdf/70892main_FS-2004-07-92-LaRC.pdf</a>

## ASP Acquisitions

(continued from page 3)

short field operating, twin-engine turboprop aircraft capable of a maximum payload of 7,000 pounds, altitudes up to 20,000 feet, and airspeeds up to 196 knots. A forward cargo and rear ramp door are available to install large installations in the aircraft. The rectangular shaped fuselage has 22 removable

cabin windows available for instrument mounting locations. The nose of the aircraft is capable of holding 400 pounds of equipment internally. Experimenter seats and lavatory were also acquired with this aircraft. The aircraft is currently being modified to include 115V 60Hz experimenter power, various

experimenter antennas and probes, and an 8 inch diameter nadir port. Previously, the aircraft supported U.S. Army logistical and paratrooper operations along with various other activities via the National Guard.



The WFF 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](mailto:steven.s.wegener@nasa.gov)) or Matt Fladeland (650/604-3325, [matthew.m.fladeland@nasa.gov](mailto:matthew.m.fladeland@nasa.gov)).