



# Airborne Science Newsletter



Summer 2012

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## In Brief ...

### PRISM Update

Personnel from GRC and JPL participated in the successful integration and initial flight demonstration of the JPL PRISM sensor on the GRC Twin-Otter. The aircraft flew from the DAOF during May 7-11, 2012 collecting data over Ivanpah and Lake Tahoe.

*Contributed by Al Micklewright*

### CARVE

The Carbon in Arctic Reservoirs Vulnerability Experiment (CARVE) deployed on 5/16 using the C-23 Sherpa aircraft based at Wallops Flight Facility. The CARVE mission is a five month mission based from Fairbanks, Alaska and is studying the carbon budget of Arctic ecosystems.

*Contributed by Mike Cropper*

### Ikhana

In June, the Ikhana team completed PDR on a new Generic Science Pod (~ 500 lbs payload capable) that will be first used in support of MIZOPEX. In addition, upgrade of the Ikhana aircraft to functionally compatible USAF "Block 1" configuration got started ahead of schedule in May, and work is progressing well.

*Contributed by Mauricio Rivas*

*Continued on page 2*

## NASA's DC-8 flies in DC3 Campaign

During May and June 2012, NASA's DC-8 Airborne Science laboratory working with the National Science Foundation (NSF)/ National Center for Atmospheric Research (NCAR) Gulfstream-V (GV) and the German Aerospace Center -Deutsches Zentrum für Luft- und Raumfahrt (DLR) Falcon 20 participated in the Deep Convective Clouds and Chemistry (DC3) Project field campaign. DC3 is a NSF project with two key objectives:

- Quantify and characterize the convective transport of fresh emissions and water vapor to the upper troposphere within a few hours of active convection, investigating storm dynamics and physics, lightning and its production of nitrogen oxides, cloud hydrometeor effects on scavenging of species, surface emission variability, and chemistry in the anvil.
- Quantify the changes in chemistry and composition in the upper troposphere (UT) after active convection, focusing on the 12-48 hours after convection and the seasonal transition of the chemical composition of the UT.

The aircraft were based in Salina, Kansas, which facilitated relatively short transit flights to convective weather systems in four key locations. Greeley, CO, Oklahoma City, OK, Lubbock, TX, and Huntsville, AL were chosen as three key areas of study due to extensive ground-based radar networks in those areas used to depict the physical and kinematic characteristics of the storm and provide



*A squall line near Huntsville, Alabama*

input to the aircraft operations. Additionally, those areas provided lightning mapping array facilities allowing an assessment of the impact of lightning on storm outflow composition. Generally the NASA DC-8 and the NCAR GV flew missions cooperatively with the DC-8 flying upwind of the storms and at low altitudes sampling the atmosphere being drawn into the storms and the GV flying at high altitudes downwind from the storms measuring the atmosphere emitted from the top of the storms.

The relatively large DC-8 allowed for the installation of 26 unique atmospheric instruments. Each flight carried a science team of approximately 35 experimenters. Although the flights were preplanned, each mission required real-time flight planning changes in order to position the aircraft appropriately in the proximity of each storm. The versatile DC-8 flew at altitudes ranging from 1,000 feet above ground level to as high as 40,000 feet pressure altitude during each mission.

The DC-8 completed its support of the DC3 project on June 29, 2012 after having flown a total of 26 flights and 140 flight hours.

*Contributed by Frank Cutler*



*The NCAR GV, NASA DC-8, and the DLR Falcon 20.*

# Validating MABEL

## *The ER-2 returns to DFRC from flights over the Arctic*

NASA's high-flying ER-2 Airborne Science aircraft has concluded its four-week deployment to validate data acquired by the Multiple Altimeter Beam Experiment Lidar (MABEL) laser altimeter over the Greenland ice cap and surrounding sea ice fields.

After an almost 10 and one-half hour transit flight from its deployment base in Keflavik, Iceland, NASA ER-2 pilot Stu Broce landed ER-2 806 April 27 at the Dryden Aircraft Operations Facility at Air Force Plant 42 in Palmdale, Calif. The lengthy flight from Iceland included data collection by the MABEL instrument over a portion of broadleaf deciduous forest in Wisconsin. The ground support and science crew that supported the flights returned several days later. Broce reports that the team



*The flight, ground, and science team that supported the MABEL validation flights over Greenland gathered by NASA's ER-2 for a group photo with pilot Stu Broce.*

completed 100 percent of the science flights. Additionally, they were able to acquire data on several additional ad hoc targets that were not in the original plan.

The ER-2 flew more than 100 hours on 16 flights in the MABEL validation campaign, including 14 data collection flights over Greenland and surrounding sea ice areas and two transit flights between Keflavik and its home base in Palmdale. Several of the flights were conducted concurrently and on the same flight tracks as flights of other NASA environmental science aircraft involved in the Operation IceBridge campaign in order to

## Director's Corner



Randy and I would like to start this summer's ASP Newsletter with a short safety message and to say that I hope everyone gets a chance to enjoy some time off with family and friends. Now to the message: **Make sure you take safety seriously at all times, both on and off the job.** I especially want to stress any personal time off the job with summer sun and fun and July 4th coming up. Stay safe around the charcoal (or gas or deep fryer, if you prefer), refreshments, water, put on the sunscreen (Yes, dear!) while out on your dirt bike or hiking in the middle of nowhere. Our program depends on you so be smart and safe. We've got a lot going on as usual, including flights in Alaska for CARVE, one of five Earth Venture 1 missions. The GIII/UAVSAR just got back from Iceland and, instead of going home, they joined the SMAPvex12 campaign in North Dakota. The P-3 is flying for our Student Airborne Research Program, just to name a few of its upcoming flights. In addition to mission support, we are as always working to improve our infrastructure and web presence. Please take a minute to review the website and let us know if it's helpful or, more important, how we can make it better. As always, feel free to contact us directly with any comments, concerns, and ideas about the Airborne Science Program. Have a great summer!

*Bruce Tagg and Randy Albertson  
Airborne Science Program*

compare data recorded by the MABEL with instruments on the other aircraft.

Targets of the flights included wide areas of Greenland's ice sheets and surrounding sea ice fields, the Jacobshavn, Svalbard and East Glaciers, and a volcano in Iceland. More than 5.5 terabytes of data was collected by the MABEL laser

altimeter, the Cloud Physics Lidar, and other instruments on board the ER-2 during the mission.

MABEL was developed at NASA's Goddard Space Flight Center to simulate a similar instrument planned for NASA's IceSat-2 environmental satellite that is scheduled for launch in 2016. Scientists consider laser altimetry from satellites or aircraft to be the most accurate method of gauging changing elevations over a period of time, and thus determine the thickening or thinning of Arctic or Antarctic ice fields and sea ice related to climate change.

Flight and science team members participated in a number of public and educational outreach activities during their stay in Iceland, including briefings on MABEL and IceSAT-2 during a speech on climate by Iceland's president, to the U.S. ambassador and embassy personnel, and to middle- and high-school students, the University of Reykjavik and the Keiler Aviation Academy in Keflavik.

*(Editor's note: The above is taken from the press release written by Alan Brown and Beth Hagenauer of NASA DFRC'S Public Affairs Office. For the complete text, see [http://www.nasa.gov/centers/dryden/Features/ER-2\\_completes\\_MABEL\\_deployment.html](http://www.nasa.gov/centers/dryden/Features/ER-2_completes_MABEL_deployment.html))*

## In Brief (continued from page 1)

### NASA Langley HU-25C in OIB 2012

The NASA Langley HU-25C aircraft flew a total of 25 flights in Operation IceBridge 2012, resulting in 75.3 flight hours. Approximately 54,000 km<sup>2</sup> of the Greenland ice sheet and adjacent sea ice were mapped with the NASA Goddard Land, Vegetation and Ice Sensor (LVIS). The aircraft was deployed between April 27 and May 14, 2012.

*Contributed by Bruce Fisher*



# The Earth Science Project Office

*The team behind SMD's successful field campaigns*

The Ames Earth Science Project Office (ESPO) is a small group of success-oriented individuals providing project management for NASA's Science Mission Directorate field research. They provide planning, implementation and post mission support for large, complex, multi-agency, national and international field campaigns. The HQ programs supported includes: Airborne Science, Atmospheric Radiation, Upper Atmosphere Research, Tropospheric Chemistry, Atmospheric Composition Modeling & Analysis, Atmospheric Dynamics, and Ocean Biology and Biogeochemistry.

The ESPO office was formed in 1987 and has now supported more than 40 domestic and international campaigns. ESPO currently provides Project Management to two of the 5-year Earth Venture Projects (Hurricane and Severe Storm Sentinel and Airborne Tropical Tropopause Experiment) that will use the unmanned Global Hawks. ESPO is also supporting Operation IceBridge (OIB), which involves studying the Arctic from Greenland and the Antarctic from Punta Arenas, Chile.

The ESPO team investigates locations for deployment site selection, coordinates with the science and aircraft teams and facilitates communications among all parties. They oversee site preparations and provide support throughout the missions.

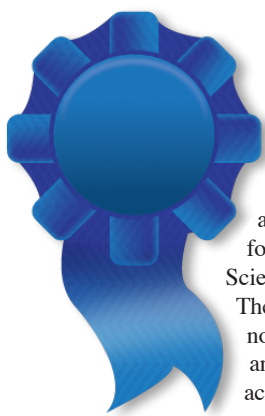


*The ESPO team from left to right: (Back row) Jhony Zavaletta, Marshall Chaidez, Erin Czech, Quincy Allison, Dave Jordan, Susan McFadden, Michaela Herman. (Middle row) Dan Chirica, Bernadette Luna, Marilyn Vasquez, Kent Shiffer, Erin Justice. (Bottom row) Sue Tolley, Katja Drdla, Mike Craig.*

The Airborne Science and Science Operations Flight Request System website development and maintenance is a new addition to ESPO's scope over the past few years. The tools created for these websites have improved the user interfaces as well as policies and products.

The ESPO team is widely recognized for their successes in both Project Management and website development. See <http://www.espo.nasa.gov>.

*Contributed by Mike Craig*



## ASP Awards

The Airborne Science Program recently held its annual awards board for a variety of Airborne Science Program awards. These awards recognize notable contributions and achievements made across the program's six centers. Representatives

of each center and HQ's reviewed and rated the inputs. The ones selected were not only singularly notable, but also very

representative of the professionalism exhibited by team members across the program.

The winners of the 2012 ASP Awards are:

- **Team Achievement: DEVOTE**  
"For outstanding achievements in designing, fabricating, certifying, installing and flying the DEVOTE Hands on Project Experience Flight Project."
- **Leadership: Shane Dover**  
"For sustained leadership that continues to provide significant benefit across the Airborne Science Program."

- **Outstanding Achievement: Mike Singer**  
"For success in flight planning and piloting skills which were crucial in making the 2011 DISCOVER-AQ a success."
- **Sustained Excellence: John Barrick**  
"For the years of dedication and support that Mr. Barrick has devoted to the success of NASA GSFC/WFF aircraft projects."
- **Engineering: Richard Hang**  
"For successfully designing and implementing the DCAPS (Data Collection and Processing System) onboard the UAVSAR, while simultaneously supporting SOFIA."

*Continued on page 6*



# TRANSITIONS

## Project Management Changes at Dryden



*Tim Moes*

Tim Moes is now the Project Manager on the High Altitude ER-2. Formerly the Project Manager on the Gulfstream III UAVSAR Sensor Platform, Tim began his career 20 years ago as a co-op student. After graduation, Tim was hired full-time as a flight research engineer in the aerodynamics branch. His areas of expertise include air data, trajectory reconstruction, and flight mechanics. During the early part of his career, he worked many projects including the F-18 High Alpha Research Vehicle, F-18 Active Aero-elastic Wing, F-104 and F-15 aero and propulsion flight test fixtures, F-15 Intelligent Flight Controls, SR-71 Linear AeroSpike Experiment, X-29 Forward Swept Wing and X-43A Scramjet experiments. As Tim's career began to transition from technical work to project management, he accepted a career broadening detail to NASA HQ to work in the Aeronautics Research Mission Directorate. After a year at HQ, Tim spent three months at the Office of Management and Budget. When Tim returned to Dryden, he accepted a position in Project Management in the Aeronautics Mission Directorate. After a few years there, Tim transitioned to the Science Mission Directorate, where he was assigned as the Project Manager for the Gulfstream III UAVSAR Sensor Platform. After a successful stint on the G-III, I asked Tim to take over ER-2 in February, 2012. Tim stepped up and has done a great job the managing a very dynamic project in a very busy year.

Filling the void left by Tim Moes is John McGrath. John is currently wearing two hats at Dryden; one as the Chief Engineer for the Science Mission Directorate and the other as the acting Project Manager of the Gulfstream III/C-20A UAVSAR Sensor Platform in the Science Mission Directorate. John began his career back in June 1992 in the Research Instrumentation Branch as an Instrument Engineer. Over his 20 year career, John



*John McGrath*

supported and was the Lead Instrumentation Engineer on the following flight vehicles: SR71, F16, F18-845, DC-8 and the C-20A. During his time on the C-20A, John spent four years as the vehicles' Chief Engineer and was an integral part in the aircraft's structural modification to accept and carry a centerline pylon, and in the development of the UAVSAR pods, that are currently flying on the C-20A. Back in 2007, John stepped away from aircraft specific duties to become the Branch Chief for Research Instrumentation. After his 4+ year stint as Branch Chief, John stepped aside to work directly for the Research Engineering Director as the Chief Engineer of the Science Mission Directorate.

Welcome Aboard!

## From ESTO to DSCVR, Bob Smith has new duties

Bob Smith has left the Earth Science Technology Office (ESTO) to become the Deputy Project Manager for the Deep Space Climate Observatory (DSCOVER), a NOAA funded project set to launch in 2014, thereby providing a space weather outpost at the first LaGrange point (L1). Bob joined ESTO in 2006 as the UAVSAR program manager working with Dryden and JPL on the development of the Radar and the GIII platform. Following the transition of the GIII to operations, Bob managed stimulus-funded efforts, including the transition of the UAVSAR-GH, LVIS-GH and GOLD to the Global Hawk, and the development of PRISM, AVIRISng and E-MAS. Prior to leaving ESTO, Bob managed the solicitation and award of the Airborne Instrument Technology Transition (AITT-09) and oversaw the progress of the DIAL/HSRL, modification of the HSRL and RSP, EXTRAD, CATS, GLISTEN-A, a leveling platform for the ER-2 Solar Spectral Radiant Flux experiment, and the ESFL. Eduardo Torres-Martinez has replaced Bob at ESTO..



*Bob Smith*

# NASA SMD ESD Airborne Science Program 6-Month Schedule

CORE	July	Aug	Sept	Oct	Nov	Dec
ER-2						
	SEAC4RS	SEAC4RS				
G-III (D)	Iceland/ND					
G-III (J)						
GH	KQ-X	HS3 U/L	HS3		ABIRS Mods & U/L	
	KQ-X	HS3 U/L	HS3		UAVSAR/LVIS	
P-3				HSRL		
DC-8	Avionics	SEAC4RS		OIB U/L	OIB	DIAL?

CATALOG	July	Aug	Sept	Oct	Nov	Dec
Ikhana (DFRC)						
B200 (DFRC)		AirSWOT			AirSWOT	
B200 (LaRC)	TCAP					
C-23 Sherpa		CARVE				
Cessna 206H (LaRC)						
SIERRA (ARC)			A40	A40		A40
S-3B	AMD					
LJ25 (GRC)						
T-34C						
Twin Otter (GRC)						
Viking 300 UAS (WFF)						
Twin Otter (WFF)						
Twin Otter (JPL)						
WB-57	MDA	MDA		OCONUS		OCONUS

■ = 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

- \* IGARSS 2012  
July 22-27, Munich, Germany  
<http://www.igarss12.org/CallForPapers.asp>
- \* 97th Annual Meeting of the Ecological Society of America  
August 5-10, 2012; Portland, OR  
<http://www.esa.org/portland> 97th Annual Meeting of the Ecological Society of America  
August 5-10, 2012; Portland, OR  
<http://www.esa.org/portland>
- \* AUVSI North America  
August 6-9, 2012; Las Vegas, NV  
<http://www.auvsihow.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)
- \* Fifth Annual Alaska UAS Interest Group Conference  
September 25-27, 2012; Anchorage, AK  
Contact Harry Kielling: [harry\\_kielling@nbc.gov](mailto:harry_kielling@nbc.gov)
- \* MAPPS/ASPRS 2012 Specialty Conference  
Emerging Mapping and Geospatial Technologies: “Ground to Cloud Revolution”  
October 29 – November 1, 2012; Tampa, FL  
<http://www.asprs.org/Conferences/Tampa-2012/blog>
- \* Unmanned Systems Canada 2012  
November 6-9, 2012; Ottawa, Canada  
<http://www.unmannedsystems.ca/content.php?doc=182>
- \* AGU Fall meeting  
NOTE EARLY DATE  
December 3-7, 2012; San Francisco, CA  
<http://fallmeeting.agu.org/2012/>
- \* UAS TAAC 2012 Conference  
December 4-6; Albuquerque, NM  
<http://taac.psl.nmsu.edu/>



## 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	<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	7,200	72,000	65,000	410	2,500	<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>
	Gulfstream III (G-III)	NASA-JSC	7	2,610	69,700	45,000	459	3,400	<a href="http://airbornescience.nasa.gov/aircraft/G-III_-_JSC">http://airbornescience.nasa.gov/aircraft/G-III_-_JSC</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>
	HU-25C Falcon	NASA-LARC	5	3,000	32,000	42,000	430	1,900	<a href="http://airbornescience.nasa.gov/aircraft/HU-25C_Falcon">http://airbornescience.nasa.gov/aircraft/HU-25C_Falcon</a>
	C-23 Sherpa	NASA-GSFC	7	7,000	27,000	20,000	190	1,800	<a href="http://airbornescience.nasa.gov/aircraft/C-23_Sherpa">http://airbornescience.nasa.gov/aircraft/C-23_Sherpa</a>

### ASP Awards

(continued from page 3)

- Project Management: James Alexander**  
 “James Alexander displayed exemplary leadership and management skills as Project Manager and Mission Manager for the MACPEX airborne science campaign. He successfully integrated 24 instruments to the WB-57 then managed daily flight operations for 6 weeks.”
- Outstanding Project Management: Derek Rutovic**  
 “For his work to successfully achieving the modification of the JSC GIII for AirMOSS.”  
 Congratulations to all for a job well done.
- Administrative: Glenda Almeida**  
 “Superior support to the Airborne Science Program at Dryden Flight Research Center in not only analyzing finances, but working devotedly to improve the speed and accuracy in reporting to her team.”

Contributed by Chris Scofield

### 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)).