What's Inside...

Announcements

- The Earth Venture Suborbital-3 (EVS-3) solicitation will be released soon. Please see announcement details for Solicitation: NNH17ZDA001N-EVS3 on NSPIRES at https://nspires.nasaprs.com/external/solicitations/summary.do?method=init&solId={D36BA13F-53FC-BC87-B43D-FB08673CD6EE}&path=open.

- Airborne Instrument Technology Transition (AITT) awards have been announced. The selections are:
  - Liane Guild, ARC, for C-HARRIER on a Twin Otter and DC-8;
  - Kevin Turpie, GSFC, for Air-LUSI on the ER-2;
  - Dave Diner, JPL, for AirMSPI-2 on the ER-2; and
  - Dragana Perkovic-Martin, JPL, for -DopplerScatt on a B-200.

Operation IceBridge in Antarctica

Operation IceBridge wrapped up 2016 with a banner year surveying the Antarctic ice cover from the NASA DC-8. A total of 24 flights were flown which tied the previous record set for most flights during an Antarctic campaign. The campaign completed surveys of 22 out of the 25 highest priority science targets. The campaign also extended previous area covered flying surveys of new areas with rapid changes such as the Getz Ice Shelf and Ruppert Coast. Extensive new surveys in areas such as the Abbott Ice Shelf and Recovery Glacier were also undertaken. Lastly, the campaign continued the now 8-year time series of sea ice measurements in the Weddell and Bellingshausen Seas during a low year for Antarctic sea ice extent. In total, the campaign logged 292 research hours traveling 107,374 nm (equivalent to 5 times around the Earth and half the distance to the Moon).

The campaign was also remarkable for the broad outreach and large numbers of visitors who came to see the campaign in action. More than 30 guest flyers were brought on board including scientists, students, photographers, a visual artist, personnel from the National Snow and Ice Data Center, the State Department and media outlets such as Facebook, Popular Science, and Discover Magazine. VIP guests included then NASA Deputy Administrator Dava Newman, U.S. Ambassador to Chile Carol Perez, filmmaker Rory Kennedy, and NASA AFRC Deputy Director Pat Stoliker. X-Chat sessions conducted with researchers on the plane reached a record 1,819 K-12 students worldwide, and we also talked to more than 200 local students from our basing area in Punta Arenas, Chile. Outreach on social media was also tremendously successful with more than 2 million views of campaign

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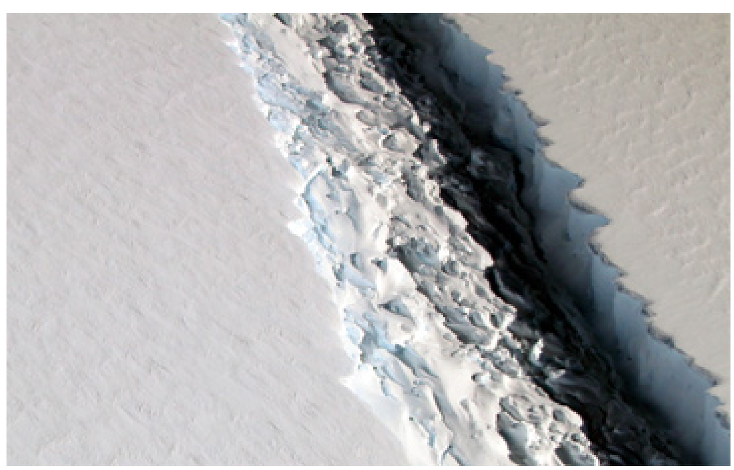


A large rift in the Larsen C Ice Shelf in Antarctica (John Sonntag, NASA GSFC/Wallops)

ATom-2

The second deployment of the Atmospheric Tomography (ATom) Mission began on January 26, as it did for the previous deployment, with a round trip flight from Palmdale, CA to the equator. A few days later, the ATom world tour began again with the team stopping in Anchorage, AK; Kona, HI; Fiji; Christchurch, NZ; Punta Arenas, Chile; Ascension Island; Terceira Island (Azores); Thule, Greenland; Anchorage, AK; and back to Palmdale. All of the ATom science data is collected in transit between these locations – an attempt get a snapshot of the average atmosphere as distant as possible from sources of man-made pollution. The science flights were on average between 8-9 hours in length with over 95 total science flight hours.

Using the NASA DC-8, ATom studies the movement and chemical processes that affect the top three greenhouse agents after carbon dioxide – methane, tropospheric ozone, and black carbon. This series of field campaigns will be the first time scientists will do a comprehensive survey of over 200 gases and aerosol particles all over the world. The majority of the air sampled will be over the Pacific and Atlantic oceans. This winter's deployment was the second of four deployments. ATom-3 is scheduled for Sep-Oct 2017 and ATom-4 is scheduled for Apr-May 2018.

Twenty-two science instruments were onboard the DC-8 for the ATom field campaign, operated by scientists from NASA's Goddard Flight Research Center, Langley Research Center, and Ames Research Center, as well as scientists from NOAA, NCAR, CIRES, Penn State University, University of Vienna, Caltech, Harvard University, Scripps Institution of Oceanography, University of New Hampshire, and UC Irvine. The ATom Principal Investigator, Steve Wofsy, and Deputy Principal Investigator, Michael Prather, hail from Harvard University and UC Irvine respectively. The ATom project management team is from NASA Ames Research Center's Earth Science Project Office (ESPO), while the DC-8 management team is based at NASA Armstrong Flight Research Center.

Contributed by Erin Czech

Directors' Corner

"As always, if you have any feedback about this newsletter or the Program – good or bad – please let Randy and I know." You may be wondering why we're starting with a statement that Randy and I usually use to end our little corner of the newsletter. OK, maybe not…but to the point….does anyone out there actually read this and find it useful? There's a debate within the ASP leadership since we have finished the newsletter with this statement about ten times and we have yet to get any feedback. Don't get us wrong, Susan and Gailynne do a great job with it and it "appears" to have value but is it worth the effort? Maybe it's because we don't make our email readily available so here it is, bruce.a.tagg@nasa.gov, randal.t.albertson@nasa.gov - hit us up if you read this because we're reevaluating the way we get our message out.

OK, now that that's over with, on with the news. ASP is off to another great start and it seems the scientists just wanted to study in some nice warm weather locations since there's been a lot of interest in Hawaii so far this year. Although not quite, since the P-3 is waking up this morning to 19 degrees F in Longyearbryn Norway, although it is sunny! We'd like to make a call out to our program's maintainers. As an example, during the ACT-America winter 2017 campaign the C-130 suffered a bird strike to the leading edge of the wing resulting in about a 10" hole causing significant internal damage. Within 5 days the repair was completed by the WFF maintenance team. In another instance, a foreign-object-damaged C-130 engine was replaced in the field by the WFF maintenance team within 3 days of the spare engine delivery. Both of these issues were quickly resolved and the ACT-America campaign continued to collect science data and had a successful mission. The maintenance and logistical support personnel in the field and located at each center are unsung heroes of our Airborne Science Program. Their dedicated and tireless support late at night, over the weekends and on holidays keeps our aircraft flying worldwide all through the year. Thank you for your support. Enjoy the newsletter and be safe out there in all you do.

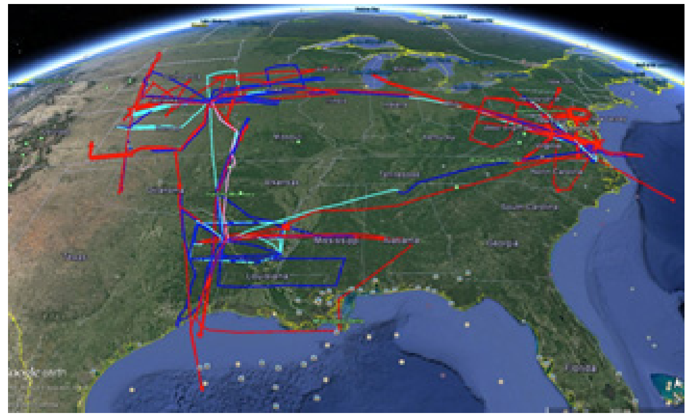
Bruce Tagg and Randy Albertson

NASA DC-8 Landing in Thule, Greenland for ATom-2 (Feb 18, 2017)

ACT-America

The Atmospheric Carbon and Transport – America (ACT-America) EVS-2 winter field campaign was recently conducted for a six-week period between January 30 and March 10, 2017. Two instrumented NASA aircraft gathered atmospheric measurements of greenhouse gases along with other trace gases and meteorological variables by operating out of NASA's Langley Research Center, NASA's Wallops Flight Facility, Shreveport, Louisiana, and Lincoln, Nebraska. The Langley B-200 aircraft (carrying in-situ sensors) collected 106.0 hours of data and the Wallops C-130 aircraft (carrying in-situ and remote sensors) collected 109.6 hours of data during 27 research missions. Seven of these missions occurred over the U.S. Southern region, nine over the Mid-West, eight over the Mid-Atlantic, and three during transit flights between regions. In addition to the numerous level-leg flights (Figure 1), more than 245 vertical profiles of greenhouse gases and meteorological variables were made using spirals or en route ascents or descents with both the C-130 and B-200.

Daily flight plans were designed based on prevailing meteorological conditions and source-sink distributions of carbon dioxide and methane in the three regions, and the research flight days were classified into frontal or fair weather; some days were hybrids of these. Additionally, during three fair weather days, under-flights of the Orbiting Carbon Observatory-2 (OCO-2) satellite were carried out to investigate the sensitivity of CO2-column measurements to tropospheric CO2 variability. Airborne observations also sampled the atmospheric signatures of CO2 and CH4 fluxes around oil and gas extraction regions, urban centers, agricultural lands, and forests. The distribution of greenhouse gases around eight winter storms was also measured. Greenhouse gas structures in both the boundary layer and the lower free troposphere were examined for two to three days in a row so that the impact of frontal propagation and associated greenhouse gas transport mechanisms could be revealed.



Tracks of the B200 and C130 over the three ACT-America regions (Mid-Atlantic, Mid-West, and South) collecting high-resolution measurements during the Winter-2017 field campaign.

During fair-weather flight days, the complexity in the greenhouse gases variability inside the boundary layer (up to 5 ppm CO2 and 50 ppb CH4 gradient) presented opportunities to test our understanding of transport processes and fluxes of these gases. On February 23, just before the arrival of winter storm "Quid," a research flight around the low pressure center yielded CO2 and CH4 variability of more than 25 ppm and 250 ppb, respectively, inside the boundary layer. "Quid" hit the upper Midwest the next day, bringing blizzard conditions to parts of the Northern Great Plains and Midwest, and dumping over a foot of snow in areas. All the measurements collected during the campaign will be used to improve numerical models of greenhouse gas fluxes and atmospheric transport, one of the most compelling issues in carbon cycle science.

A picture of the ACT-America C-130 team at Wallops Flight Facility following a research flight

ACT-America will continue with its third campaign, scheduled to begin October 2, 2017. The ACT-America team will again operate two instrumented aircraft in the same regions of the U.S., complementing the already-completed summer and winter campaigns with measurements from the fall season. Kenneth J. Davis from Pennsylvania State University is the principal investigator for this mission. ACT-America includes participation from NASA scientists and engineers at NASA's Langley Research Center, NASA's Wallops Flight Facility, and NASA's Goddard Space Flight Center, as well as scientists from The Pennsylvania State University, Colorado State University, the University of Colorado, Clark University, the Carnegie Institute at Stanford, the University of Oklahoma, the National Oceanic and Atmospheric Administration (NOAA), Oak Ridge National Laboratory (ORNL), and Harris Corporation.

Contributed by Michael Obland and Sandip Pal

HyspIRI Airborne Mission

From California to Hawaii

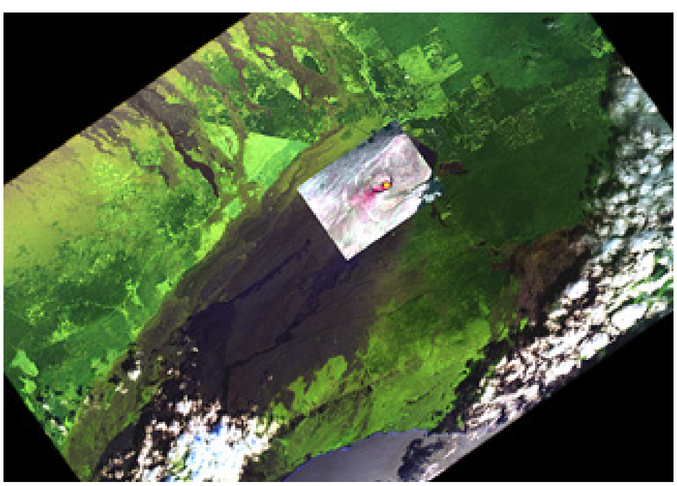
Over the past four years, NASA has flown a series of research flights over California, carrying airborne prototypes of instruments in preparation for a future satellite mission called the Hyperspectral Infrared Imager (HyspIRI), now in the conceptual design phase. The Golden State has many diverse landscapes to obtain precursor data, but not coral reefs or erupting volcanoes. This winter's HyspIRI Hawaii field campaign filled that gap.

ER-2 at Kaneohe Bay, HI

In January through March, a NASA-led science team explored Kilauea volcano on the island of Hawaii, and the adjacent volcano Mauna Loa from the air, ground and space. Their goal: to better understand volcanic processes and hazards.

The HyspIRI Hawaii campaign concluded after six weeks of data collection. The ER-2, based at Marine Corps Base Hawaii (MCBH) – Kaneohe Bay on Oahu, flew 18 science missions. Two of the missions included transit flights from Palmdale to the MCBH and return to Palmdale. The transit flights included obtaining science data over the Mauna Loa and Kilauea volcanoes, as well as the coral reefs of Gardner Pinnacles and Nihau. The ER-2 airplane flew a total of 65.3 hours during the 18 missions.

The ER-2 carried the Airborne Visible and Infrared Imaging Spectrometer (AVIRIS), developed by NASA's Jet Propulsion Laboratory, and the MODIS-ASTER Airborne Simulator (MASTER), developed by NASA's Ames Research Center. To fly the ER-2 airplane with the AVIRIS-C and MASTER instruments, a weather requirement of no more than 25 percent cloud coverage was required at the target. Working within these cloud constraints was a challenge, but "Despite challenging weather in Hawaii, the airborne campaign was quite successful with multiple images obtained of most of the coral reef and volcano phenomena targeted for observation. There is a wealth of data for use by basic and applied researchers," according to Program Scientist Woody Turner.



Composite MASTER image of Kilauea crater

The MASTER image (at left) of Hawaii Volcanoes National Park is a color composite of shortwave and thermal infrared bands. It highlights Kilauea's lava lake as well as the sulphur dioxide plume (portrayed in pink).

In addition, monitoring of miles of coral reefs was undertaken using sensors that provide better spatial and spectral resolution than currently available from NASA satellite systems. According to Turner, "We have an urgent need to get a handle now on how reefs are changing."

Six coral reef projects and six volcano projects were selected for this winter's mission. Two of the volcano projects, GLISTIN-A and the DragonEye flights are also described in this newsletter.

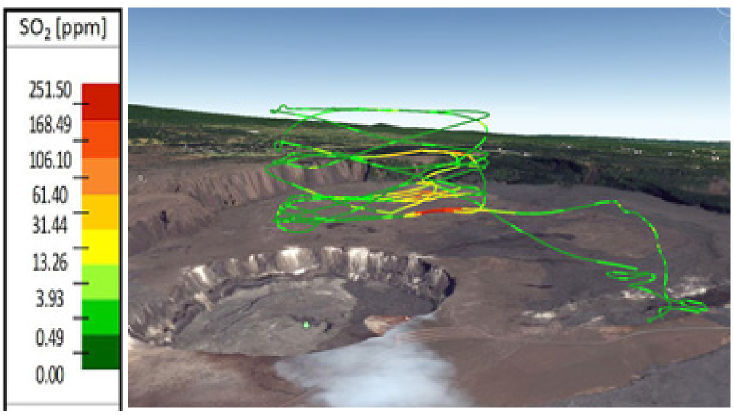
Contributed by Kevin Walsh, Rose Dominguez and Carol Rasmussen

Successful UAS Mission complements HyspIRI Hawaii Campaign

As the ER-2 flew AVIRIS and MASTER over Hawaii, small DragonEye UAVs flew over the Big Island to make insitu measurements of SO_2 and CO_2 at the volcano caldera to assist in the development of retrieval algorithms for HyspIRI. The DragonEyes had flown previously in Costa Rica making similar SO_2 measurement, but the CO_2 measurements were a first. There were 10 flights for a total flight time of 4.5 hours: 5 flights over Halemaumau Crater, Kilauea, Big Island, Hawaii (three flights with SO_2 payload, two flights with CO_2 payload); five flights over Kapapala Ranch, Big Island, Hawaii (all with SO_2 payload). The figure below shows the flight path and sample measurements in one flight over Kilauea.

This mission highlights the unique role that UAVs can play in making measurements that cannot be made any other way.

Contributed by David Pieri



SnowEx

SnowEx is a multi-year airborne snow campaign supported by NASA's Terrestrial Hydrology Program with the primary goal of addressing the question: How much water is stored in Earth's terrestrial seasonally snow-covered regions? Year 1 (2016-17) focuses on the distribution of snow-water equivalent (SWE) and the snow energy balance in a forested environment. The year 1 primary site is Grand Mesa and the secondary site is the Senator Beck Basin, both in western, Colorado, USA. Nine sensors on five aircraft made observations using a broad suite of airborne sensors including active and passive microwave, and active and passive optical/infrared/thermal sensing techniques to determine the sensitivity and accuracy of potential satellite remote sensing techniques, along with models, to measure snow under a range of forest conditions. The main winter campaign took place Feb 5-26, 2017. In addition to the airborne component, SnowEx included an extensive range of ground truth measurements—in-situ samples, snow pits, ground based remote sensing measurements,

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OIB *(continued from page 1)*

content. News stories from the campaign were published in media outlets from The Atlantic and National Geographic. A photograph of the large rift in the Larsen C ice shelf by mission scientist John Sonntag became an iconic feature of numerous news stories, including a photo feature in Time Magazine. It was also highlighted by the Washington Post as one of the most memorable photos of the year.

As of this writing, the Arctic spring campaign is underway. OIB is back aboard the NASA P-3 after a lengthy absence while the plane was fitted with new wings. Major improvements have been made to the IceBridge instrument suite since it was last onboard the P-3 in 2014, including upgraded laser, radar, and visible and IR imagery instruments. To date the campaign has conducted flights over Greenland and the Arctic Ocean, and also plans to expand coverage in the eastern Arctic through flights based out of Svalbard.

An iceberg in the process of calving from the Getz Ice Shelf. (Jeremy Harbeck, NASA/GSFC)

Contributed by Nathan Kurtz

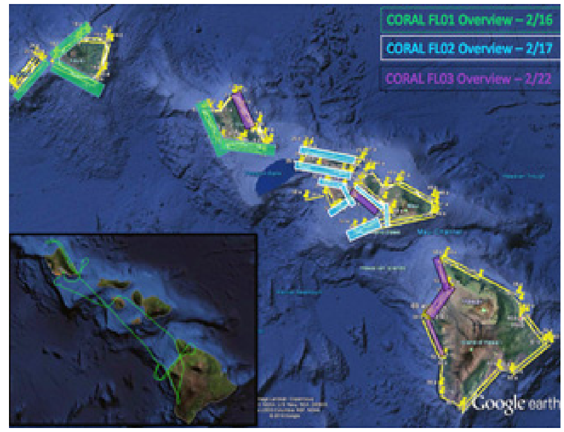
CORAL Mission in Hawaii

The COral Reef Airborne Laboratory (CORAL) mission began year 2 of study in Hawaii in February. With a goal of mapping as much coral reef as possible, this EVS-2 mission is well underway. A map of the February flight lines and data collection areas is shown in Figure x. The JPL PRISM instrument used for this mission is being flown on a Tempus G-IV aircraft.

The science team also continued in-water operations in Kanehoe Bay, Oahu. The team is based at the Hawaii Institute of Marine Biology (HIMB) on Coconut Island. Flights were scheduled when cloud cover conditions allowed for good imagery. On a good day, February 22 for example, the aircraft team conducted flight FL03, collecting 7 lines over Kaneohe Bay and parts of the Big Island and Maui.

Immediately following the flight, the PRISM data was transferred to a field server. Five (5)-band image subsets were generated and loaded on the shared drive, in record time, prior to the afternoon weather call. Use of the imaging system and data processing approach have become well established. Indeed, following the success of year 1, communications between the airborne and field teams have been streamlined, field operations and equipment deployments have been refined, while team members have gained valuable experience working with both equipment and each other.

Contributed by Bill Mateer



Flight lines and PRISM collection areas for CORAL in February 2017

SNOWEX *(continued from page 5)*

terrestrial lidar scans, and other sophisticated new techniques—made by nearly 100 participants from North America and Europe.

The snow community consensus is that a multi-sensor approach is needed to adequately address global snow, combined with modeling and data assimilation. What remains at issue, then, is how best to combine and use the various sensors in an optimal way. That requires field measurements, and SnowEx was designed to do exactly that.

A list of the nine sensors is as follows. All are from NASA unless otherwise noted.

- Radar (volume scattering): European Space Agency's SnowSAR, operated by MetaSensing
- Lidar & hyperspectral imager: Airborne Snow Observatory (ASO from JPL)
- Bi-directional Reflectance Function (BRDF): the Cloud Absorption Radiometer (CAR from GSFC)

SnowEx ground truth training, Grand Mesa, CO

- Thermal Infrared imager (QWIP from GSFC)
- Thermal infrared non-imager from U. Washington
- Video camera from GSFC

The ASO suite flew on a King Air from Dynamic Aviation, and the other sensors flew on a Naval Research Lab P-3.

In addition, two NASA radars flew on the JSC and AFRC G-III aircraft to test more experimental retrieval techniques:

- InSAR altimetry: Glacier and Ice Surface Topography Interferometer (GLISTIN-A)
- Radar phase delay: Uninhabited Aerial Vehicle Synthetic Aperture Radar, (UAVSAR)

And the new WISM SAR and passive microwave system (Harris Corp) flew on a Twin Otter from Twin Otter International.

The February campaign was successful despite unusually warm/wet conditions (challenging for microwave sensors), clouds (challenging for optical sensors), record high snow amounts, extremely strong winds aloft on multiple days, and having only a year to prepare everything. The unique SnowEx Year 1 dataset will answer key questions for developing future snow mission concepts and form a powerful legacy science dataset for years to come.

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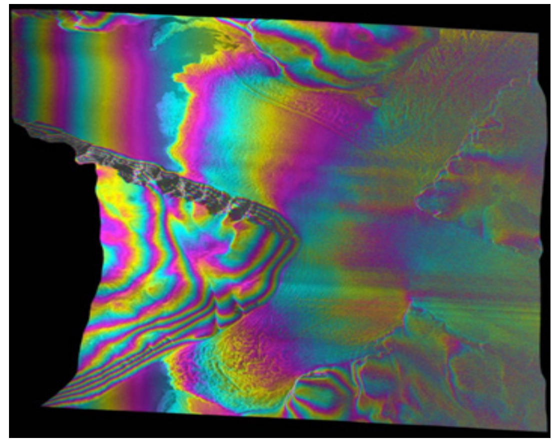
GLISTIN-A in Full Operation in early 2017

The GLISTIN-A radar is a Ka-band single pass interferometer, operated as part of the UAVSAR suite of instruments. Developed initially for swath ice-surface topography mapping, GLISTIN-A is expanding its utility to support new fields of science. Flights so far this year have covered six separate missions over sites ranging from Hawaii to Greenland and for science applications that, in addition to ice topography, now include solid-Earth, snow-mapping and flood hydrology. A total of 139 flight hours over 26 flight days were all carried out on the NASA JSC G-III.

In February, GLISTIN-A participated in NASA's SnowEx campaign, collecting snow-topography measurements to complement last year's snow-free acquisition. The purpose is to characterize GLISTIN-A's ability to map snow-volume efficiently with minimal attenuation into the snow-pack. GLISTIN-A will be compared with data collected by the Airborne Snow Observatory (ASO). Using Ka-band interferometry for snow-volume measurement is of particular interest because it is relatively robust to local topography, impervious to cloud cover and efficient in its swath coverage.

Interlaced with the SnowEx acquisitions, GLISTIN-A flew to Hawaii to measure changes in lava flow volume. High-resolution topography data was acquired over active Kilauea lava flows. More accurate tracking of changes in lava flow volume will improve models used to understand characteristics of active eruptions, such as changes in eruption rate.

In March, GLISTIN-A departed Palmdale for Greenland for the Ocean Melting Greenland (OMG) EVS-2 mission. With a series of aircraft and ship-based observations, OMG is characterizing the most fundamental and unknown aspects of ocean thermal forcing around Greenland and the subsequent response of its marine-terminating outlet glaciers. GLISTIN-A's role is to survey marine-terminating glaciers to observe yearly changes in the volume within 10 km of their termini. The 2017 campaign marks the second year of observations circumnavigating Greenland, mapping over 90% of its marine terminating glaciers. The image above shows a quick-look digital elevation map (DEM) recently collected in Northwest Greenland.



Quick look field DEM image from OMG 2017 of Marie Gletscher (image credit Ron Muellerschoen).

At the conclusion of the OMG flights, GLISTIN-A imaged a sea-ice line with an underpass of CryoSAT 2, and coincident with Operation IceBridge. The goal of this acquisition was not only to validate GLISTIN-A freeboard measurements and mapping, but also to complement other planned observations for analysis of penetration into snow-cover on the ice, and detailed free-board mapping.

En route to and from Greenland, GLISTIN-A imaged regions of the Red River of the North basin (RRB) in North Dakota. GLISTIN-A data was collected to enhance the North Central River Forecast Center's (NCRFC) snowmelt flood predictions capacity. On return from Greenland, the RRB was again imaged revisiting regions mapped a year ago. The flood-plain topography of 2016 will be used to improve flood model and forecasting fidelity. The repeat imaging presented the opportunity to acquire validating data with inundation present.

Contributed by Delwyn Moller

SNOWEX *(continued from page 6)*

Participants in SNOWEX hail from NASA Goddard Space Flight Center, USRA, Michigan State University, ATA Aerospace, US Forest Service, Boise State University, USACE/CRREL, Univ. of Maryland, and JPL For more information, see snow.nasa.gov/snowex.

Contributed by Ed Kim

NRL P-3 (VXS-1 squadron, Pax River) deployed at Peterson AFB for SnowEx. Visible are NASA P-3's nose housing CAR and the tail & nadir housings for the SnowSAR.

Aircraft News

Modified Global Hawk to join ASP Fleet

The NASA ASP Global Hawk project, teamed with its partner Northrop Grumman, has been working part time for the past two years to make an Airborne Science Program Block 10 Global Hawk a reality. The aircraft was received from the Air Force in late 2010 and has gone through extensive upgrade and conversion to make it ready for science. The Block 10 is easier to support logistically and has flight operations advantages beyond the pre-production Advanced Concept Technology Demonstration (ACTD) Global Hawk (AV-6) that is currently flying for ASP.

Modifications have consisted of adding airframe strengthening and mountings required to support payload component and instrument integration. Payload-related integration components have been installed to support science instruments, identical or similar to the 30 that have flown already on Global Hawk. All NASA related systems (power, communications, NASDAT) were moved from AV-1 to the Block 10 aircraft. Initial electrical power up of the newly configured Block 10 Global Hawk is on track to occur imminently.

In parallel with the touch labor work on Block 10 Northrop Grumman has been busy developing and testing the new Ground Control Station, simulator, and Block 10 aircraft IMMC (flight control computers) software. Software quality checks, with NASA observers, were completed at Northrop Grumman's Rancho Bernardo facility earlier in March.

The Global Hawk team will soon refocus its attention on upcoming missions, NASA SMD HOPE EPOCH and DoD's TM Demo, and will stop most work on the Block 10 Global Hawk until these programs are completed in early November. The Block 10 Global Hawk is planned to return to flight in

January 2018 with a functional flight check, and then be ready to support science mission operations.

Contributed by Frank Cutler

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ER-2 receiving CARE

The first ER-2 aircraft is scheduled to begin the Cabin Altitude Reduction Effort (CARE) modification in June of this year. The modification reduces the cabin altitude pressure inside the cockpit from 29,000 feet to 15,000 feet, significantly mitigating the likelihood of decompression sickness (DCS), risk of permanent neurological injury and pilot fatigue, a safety factor during long duration missions. The CARE project modifies the ER-2 canopy, windscreen, instrument panel and aircraft structure to maintain the lower cabin altitude pressure. The single-piece windscreen greatly enhances forward visibility improving safety and lowers maintenance man-hours required to replace windscreen. The second ER-2 is scheduled to begin modification in July 2018, after the first ER-2 returns to service, and will return to service in the summer of 2019.

Contributed by Brian Hobbs

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A New GV for Science Missions

JSC procured a Gulfstream V (GV) aircraft from the Nike Corporation on 28 SEP 2016, following nine months of planning, business development, and procurement effort. The aircraft is a later model GV aircraft manufactured in 2002 with just a little over 7,000 flight hours on the frame. The procurement of this aircraft was completed as part of a collaboration between the Human Exploration and Operations Mission Directorate and the Science Mission Directorates Earth Science Division, a collaboration built on the foundation of the successful cost and mission sharing arrangement implemented on JSC's

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Aircraft News

(continued from page 8)

Gulfstream-III (G-III), N992NA. As was the case for the G-III, the GV's primary mission will be to support the astronaut direct return missions both from Kazakhstan and from domestic locations when the Commercial Crew Program begins transportation to and from the International Space Station. The aircraft will then be available to be used by the airborne science community around these regularly scheduled direct return missions. On average, JSC was able to fly up to four direct return missions on the G-III while still managing to fly 350 to 400 flight hours per year conducting UAVSAR and sonobuoy launch operations. Per the business plan developed to support this procurement, the G-III will remain at JSC to complete scheduled UAVSAR and sonobuoy launch missions on the books through at least the end of the decade.

Given that the GV is "people-mover" with no modifications to support airborne science and research, JSC is in the process of completing the engineering, design, analysis, and modification to support a variety of instruments. Near term, the team has been tasked with installing two, centerline, nadir-facing optical viewports that could also be used to accommodate air sampling probes, making provisions for at least 8 EIA-310B standard racks/seat cabin positions, providing the infrastructure for 21 kVA of 115 VAC 60 Hz, 20 kVA of 115 VAC 400 Hz, and 10 kW of 28 VDC power via NEMA, SAE AS6129, or NASA Mk I/III EIP interfaces, installing Inmarsat and Iridium satcom, and providing an experimenter data system that includes 10GBASE-T, OM1 and OM3 fiber rack-to-rack connections, NASDAT capability, Network and Precision Time Protocols, GPS/GLONASS L1/L2 RF distribution, and legacy data like weight-on-wheels and aircraft ARINC 429. JSC will modify the aircraft for all of the above except the nadir-window ports by the end of June 2017. JSC has been in conversations with Gulfstream, NCAR, and other vendors to piece together the engineering design to meet the science community's requirements.

It should be noted that the above is just the first round of modifications to implement the high priority requirements that the community has communicated to JSC. As missions and funds dictate, the airborne science community can work with JSC to modify the aircraft to meet their needs and execute missions.

Contributed by Derek Rutovic

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 Susan Schoenung (650/329-0845, susan.m.schoenung@nasa.gov) or Matt Fladeland (650/604-3325, matthew.m.fladeland@nasa.gov).

Upcoming Events

* A-Train Symposium 2017
  April 19-21, 2017, Pasadena, California
  https://atrain2017.org/

* XPONENTIAL 2017 (Annual AUVSI Conference and Exhibit)
  May 8-12, 2017; Dallas, TX
  http://www.xponential.org

* NASA Biodiversity and Ecological Forecasting Team meeting
  May 23-25, 2017; Washington D.C.
  www.regonline.com\bef2017

* AIAA AVIATION 2017
  Demand for Unmanned
  June 5-9, 2017; Denver, Colorado
  http://www.aiaa-aviation.org

* ESTO Earth Science Technology Forum 2017
  June 13-15, 2017; Pasadena, CA
  https://esto.nasa.gov/forum/estf2017/index.html

* SMAP Cal/Val Workshop #8
  June 20-22, 2017; Amhurst, MA
  https://smap.jpl.nasa.gov/events/50/

* IGARRS 2017
  July 23-28, 2017; Ft Worth, Texas
  http://www.igarss2017.org

* 2017 HyspIRI Science Team Meeting
  October 17-18, 2017; CalTech
  https://hyspiri.jpl.nasa.gov/events/2017-hyspiri-science-team-meeting

Airborne Science People in the News

David Long
Headquarters

David Long is a program analyst in the Resource Management Division at Headquarters. In his capacity, he supports the Airborne Science Program in planning and executing the budget. Prior to his current role, Long served for over 10 years at the Goddard Space Flight Center with the Flight Projects Directorate Business Management Office and with the Earth Science Technology Office (ESTO) as a resource analyst.

Charles Juenger
WFF

Our Pathway's Engineering Intern, Charles Juenger, transitioned from intern program is full time employment in February. Charles is an Aerospace Engineering major and will graduate from Old Dominion University in May 2017. Charles is currently supporting various aircraft engineering efforts and most recently was deployed with the C-130 ACT-America mission as a Mission Manager in training.

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New Staff at the National Suborbital Research Center

Sebastian Rainer

Sebastian Rainer joined NSRC in August 2016 as a Software Engineer supporting the development of programs and tools for aircraft data systems. He will assist with the design, installation, operation, and maintenance of Airborne Science data systems.

Sebastian received a B.S. in Aerospace Engineering with a minor in Computer Science from the Florida Institute of Technology in Melbourne, FL. Prior to joining NSRC, Sebastian worked for Belcan Corporation in Palm Beach Gardens, Florida as an Engineer to develop engine health monitoring and analysis systems for test and production turbofan engines.

Kelly Edmond

Kelly Edmond joined NSRC in June 2016 as a Mechanical Design Engineer, where he is involved with the design and analysis of science instrument and aircraft installations on multiple airborne science platforms. He ensures the designs adhere to airworthiness standards and also coordinates fabrication and assembly of the installations.

Kelly received a B.S. in Mechanical Engineering from the University of Portland in Portland, OR and an M.S. in Mechanical Engineering from King Abdullah University of Science and Technology in Thuwal, Saudi Arabia. While at graduate school, he concentrated in solid mechanics with coursework in composite homogenization techniques and composite laminates, as well as conducted research in a material analysis laboratory. He has engineering experience in the centrifugal pump industry and has worked in the intellectual property field.

Steven Schill

Steven Schill joined NSRC in March 2017 as Instrumentation Engineer. Steven is responsible for the calibration, repair, and modification of housekeeping instruments for various NASA airborne research platforms, including the DC-8, P-3, and C-130.

Steven received a Ph.D. (2017) and M.S. (2014) in Analytical/Atmospheric Chemistry from University of California, San Diego, and a B.S. in Chemistry with a minor in Mathematics (2012) from California State University, Fullerton. Prior to working for

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Airborne Science People in the News

(continued from page 10)

NSRC, he was a part of the Center for Aerosol Impacts on Climate and the Environment (CAICE), where he studied the cloud forming potential of marine sea-spray aerosols and developed novel methodologies for measuring aerosol composition and mixing state. Steven also served as a graduate student mentor for the NASA Student Airborne Research Program (2014-2015), where he operated the ultra-high sensitivity aerosol spectrometer (UHSAS) on the DC-8 as a part of the science team.

Ryan Bennett

Ryan Bennett joined NSRC in February 2017 as Data Manager. Ryan will be responsible for the development of new software code for data retrieval, reduction, analysis, quality control and archival. Ryan will ensure that quality-checked preliminary and final data sets are provided for the NSRC aircraft parameter data archive which will be available for use by the scientific community.

Ryan graduated with a B.S. in Meteorology from Florida State University in 2012. He is currently finishing the requirements for his Masters degree in Meteorology. While in graduate school, his research concentrated on rainfall analysis and tropical convective complexes in arid regions. Prior to joining NSRC, Ryan taught honors physics and mathematics at the high school level, and volunteered with the National Weather Service office in Tallahassee, FL.

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New Earth Science Project Office Employees

Vidal Salazar

Vidal Salazar comes from NCAR where he worked as a Scientific Project Specialist for more than 17 years. He joins the ESPO team as a Deputy Project Manager and will take over the lead of the SOFRS project.

Erin Czech

Erin Czech has been a member of the ESPO team for the past six years as Project Coordinator and Deputy Project Manager. He has now become a civil servant Deputy Project Manager in ESPO.

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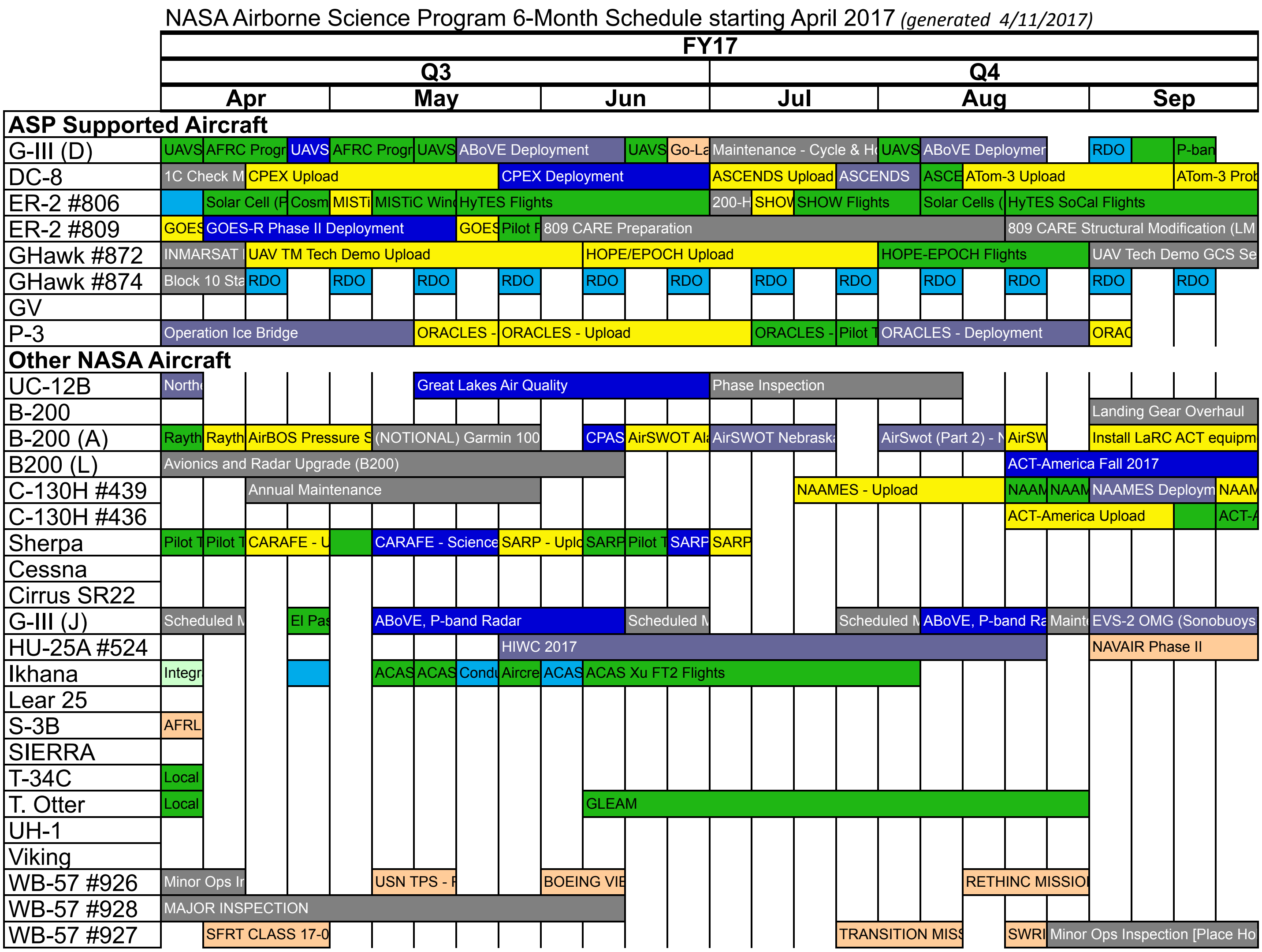
Karen Richards Receives AFRC Contractor Safety Award

Karen Richards received the "AFRC Contractor Safety Award for 2017" for her work as the primary liaison between science, platform, facility and safety/health teams. She was recognized for making the pre-flight ground work at the Palmdale facility run smoothly by ensuring documentation and permits are all in place and facilitating safety controls and training for work in the labs and access to the hangar. Her efforts substantially contributed to a safe and effective work environment.

NASA SMD ESD Airborne Science Program 6-Month Schedule



Foreign Deployment
Stateside Deployment
Flight
Reimbursable
Aircraft Modifications
Maintenance
Aircraft Configuration

Source: ASP website calendar at https://airbornescience.nasa.gov/aircraft_overview_cal

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

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*	DC-8	NASA-AFRC	12	30,000	340,000	41,000	450	5,400	http://airbornescience.nasa.gov/aircraft/DC-8
	ER-2 (2)	NASA-AFRC	12	2,900	40,000	>70,000	410	>5,000	http://airbornescience.nasa.gov/aircraft/ER-2
	Gulfstream III (G-III) (C-20A)	NASA-AFRC	7	2,610	69,700	45,000	460	3,400	http://airbornescience.nasa.gov/aircraft/G-III_C-20A_-_Armstrong
	Global Hawk (2)	NASA-AFRC	30	1900	25,600	65,000	345	11,000	http://airbornescience.nasa.gov/aircraft/Global_Hawk
	P-3	NASA-WFF	14	14,700	135,000	32,000	400	3,800	http://airbornescience.nasa.gov/aircraft/P-3_Orion
Other NASA Aircraft	B-200 (UC-12B)	NASA-LARC	6.2	4,100	13,500	31,000	260	1,250	http://airbornescience.nasa.gov/aircraft/B-200_UC-12B_-_LARC
	B-200	NASA-AFRC	6	1,850	12,500	30,000	272	1,490	http://airbornescience.nasa.gov/aircraft/B-200_-_AFRC
	B-200	NASA-LARC	6.2	4,100	13,500	35,000	260	1,250	http://airbornescience.nasa.gov/aircraft/B-200_-_LARC
	B-200 King Air	NASA-WFF	6.0	1,800	12,500	32,000	275	1,800	https://airbornescience.nasa.gov/aircraft/B-200_King_Air_-_WFF
	C-130 (2)	NASA-WFF	12	36,500	155,000	33,000	290	3,000	https://airbornescience.nasa.gov/aircraft/C-130_Hercules
	C-23 Sherpa	NASA-WFF	6	7,000	27,100	20,000	190	1,000	http://airbornescience.nasa.gov/aircraft/C-23_Sherpa
	Cessna 206H	NASA-LARC	5.7	1,175	3,600	15,700	150	700	http://airbornescience.nasa.gov/aircraft/Cessna_206H
	Cirrus SR22	NASA-LARC	6.1	932	3,400	10,000	150	700	http://airbornescience.nasa.gov/aircraft/Cirrus_Design_SR22
	Dragon Eye	NASA-ARC	1	1	6	500+	34	3	http://airbornescience.nasa.gov/aircraft/B-200_-_LARC
	Gulfstream III (G-III)	NASA-JSC	7	2,610	69,700	45,000	460	3,400	http://airbornescience.nasa.gov/aircraft/G-III_-_JSC
	Gulfstream V (G-V)	NASA-JSC	10	8,000	91,000	51,000	500	>5,000nm	
	HU-25A Falcon	NASA-LARC	5	3,000	32,000	42,000	430	1,900	http://airbornescience.nasa.gov/aircraft/HU-25A_Falcon
	Ikhana	NASA-AFRC	24	2,000	10,000	40,000	171	3,500	http://airbornescience.nasa.gov/aircraft/Ikhana
	S-3B Viking	NASA/GRC	6	12,000	52,500	40,000	350	2,300	http://airbornescience.nasa.gov/aircraft/S-3B
	SIERRA	NASA-ARC	10	100	400	12,000	60	600	http://airbornescience.nasa.gov/platforms/aircraft/sierra.html
	T-34C	NASA-GRC	3	100	4,400	25,000	150	700	http://airbornescience.nasa.gov/aircraft/T-34C
	Twin Otter	NASA-GRC	3	3,600	11,000	25,000	140	450	http://airbornescience.nasa.gov/aircraft/Twin_Otter_-_GRC
	UH-1	NASA-GSFC	2	3,880	9,040	12,000	108	275	https://airbornescience.nasa.gov/aircraft/UH-1_Huey
	Viking-400 (4)	NASA-ARC	11	100	520	15,000	60	600	https://airbornescience.nasa.gov/aircraft/Viking-400
	WB-57 (3)	NASA-JSC	6.5	8,800	72,000	60,000+	410	2,500	http://airbornescience.nasa.gov/aircraft/WB-57