National Aeronautics and Space Administration

EXPLORE AIRBORNE SCIENCE
NEWSLETTER
Fall 2019

The ACT-America Earth Venture Mission Successfully Completes its Fifth and Final Measurement Campaign

Contributed by Michael Obland, LaRC

The Atmospheric Carbon and Transport – America (ACT-America) Earth Venture Suborbital 2 (EVS-2) team completed their fifth and final atmospheric measurement campaign at the end of July 2019. The field campaign was conducted between June 17 and July 27, 2019. As with their previous four campaigns, which covered all four seasons, the team used two instrumented NASA aircraft to gather atmospheric measurements of greenhouse gases along with other trace gases and standard meteorological variables by operating out of NASA's Langley Research Center (LaRC), NASA's Wallops Flight Facility (WFF), Shreveport, Louisiana, and Lincoln, Nebraska. The LaRC B-200 aircraft (carrying in-situ sensors) collected 88.5 hours of data and the WFF C-130 aircraft (carrying in-situ and remote sensors) collected 113.6 hours of data during 19 research missions. These missions occurred over the U.S. South, Midwest, and Mid-Atlantic regions, and also during transit flights between regions. In addition to the numerous level leg flights, 244 quasi-vertical profiles of greenhouse gases and meteorological variables were made using spirals or on-route ascents or descents with both the C-130 and B-200. Summer is the most dynamic season of the year for greenhouse gas activity and the 2019 summer campaign obtained data during the beginning of summer, while the first summer campaign in 2016 obtained data later in the summer. The C-130 was also equipped with the LaRC High Altitude Lidar Observatory (HALO) instrument, measuring column-averaged CO_2 as well as cloud and aerosol properties.

Daily flight plans were designed based on prevailing meteorological conditions, synoptic scale settings, and source-sink distributions of different atmospheric tracers in the three regions, and the research flight days were classified into frontal, fair weather, and Gulf inflow; some days were hybrids of these. Additionally, during one fair

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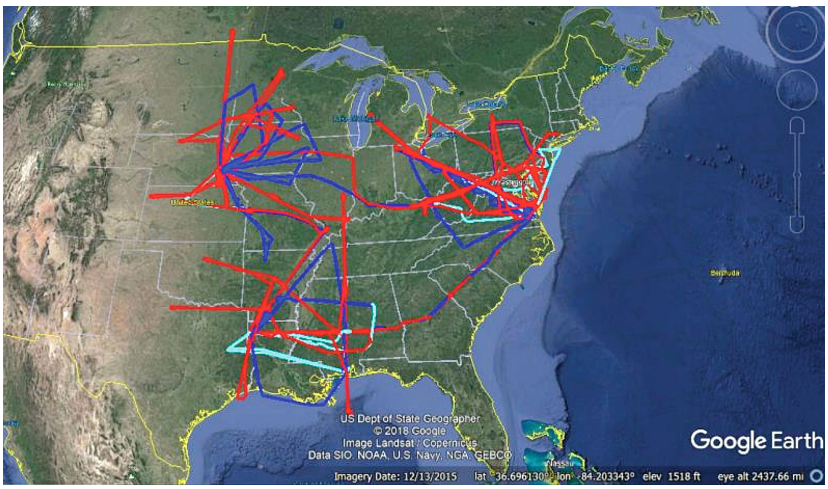

Tracks of B200 and C130 over the three ACT-America regions (Mid-Atlantic, Midwest, and South) collecting high-resolution measurements during the Summer 2019 field campaign. Image is courtesy of Sandip Pal, Texas Tech University.

What's Inside

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weather day, an underflight of the TROPOMI satellite instrument was carried out. Airborne observations also sampled the atmospheric signatures of CO_2 and CH_4 fluxes around oil and gas extraction regions, urban centers, agricultural lands, and forests. We studied the distribution of greenhouse gases around several storms, often referred to as mid-latitude cyclones. In particular, front-relevant greenhouse gas structures in both boundary layer and lower free troposphere were also 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. The summer campaign included several sets of data that are unique to the ACT-America mission including: data suitable for constraining biogenic CO_2 fluxes from south-central U.S. ecosystems in early summer, and Midwestern U.S. agricultural systems impacted by extreme regional flooding; collection of data from one warm conveyor belt case; column-averaged methane number density data collected by the HALO lidar, including good test cases focused on Gulf Coast wetlands (previously unconstrained) and Mid-Atlantic coal and gas emissions. 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.

With the conclusion of the final airborne campaign, the ACT-America team is busy analyzing and archiving data and publishing results from all five campaigns. In total, ACT-America has gathered over 1,140 hours of science data. Dr. Ken Davis from Pennsylvania State University is the principal investigator for this mission. ACT-America includes participation from NASA scientists and engineers at LaRC, WFF, and NASA's Goddard Space Flight Center, as well as scientists from Pennsylvania State University, Colorado State University, University of Colorado, Stanford University, Oklahoma University, the National Oceanic and Atmospheric Administration, Oak Ridge National Laboratory, Clark University, Jet Propulsion Laboratory, Texas Tech University, the German Aerospace Center (DLR), and Harris Corporation.

The ACT-America deployment teams in Lincoln, Nebraska, during the 2019 Summer campaign.

Director's Corner

Welcome to the Fall 2019 ASP newsletter. I hope you enjoy reading about the program. This will be the last one for a while so please enjoy the hard work of those that contributed and I thank everyone for their contributions in the past and for those of you that found it informative and helpful. As always, if you have comments or improvements for the Airborne Science Program please contact me.

Thanks, be safe and enjoy!

Bruce Tagg
Director, Airborne Science Program

Final Operation **IceBridge Arctic Spring Campaign** Onboard NASA's P-3

Contributed by Joe MacGregor, Linette Boisvert, Brooke Medley and Eugenia De Marco

In April and May of 2019, NASA's Operation IceBridge (OIB) completed its final Arctic spring airborne campaign onboard Wallops Flight Facility's (WFF) P-3 Orion aircraft (N426NA). More than 35 personnel – mostly from WFF, Goddard Space Flight Center, The University of Kansas and the U.S. Navy – participated in this campaign to survey changing ice across the Greenland Ice Sheet, ice caps in the Canadian Arctic Archipelago and sea ice in the Arctic Ocean. This was also OIB's final campaign onboard the P-3, which OIB recruited for nine Arctic and two Antarctic campaigns since 2009, adding to the remarkable legacy of more than twenty NASA P-3 campaigns since 1992 that surveyed Earth's changing polar ice.

This airborne campaign was the first in the Arctic to underfly the next-generation Ice, Cloud and land Elevation Satellite (ICESat-2), NASA's newest satellite laser altimeter, following its launch in September 2018. A key focus of this

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An early start to the 2019 melt season during early May in southwestern Greenland was evidenced by bright blue meltwater ponds between crevasses. Photo credit: Brooke Medley

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campaign was to underfly ICESat-2's six-laser-beam instrument, so that its performance and geolocation could be assessed relative to heritage OIB instruments, including WFF's Airborne Topographic Mapper laser altimeter. This campaign included numerous zero- and low-latency underflights of the satellite, which required daily re-planning of many missions. In the case of sea ice, which can drift hundreds of meters per hour in parts of the Arctic Ocean, we again measured local winds to correct for drift between the time of the satellite overflight and our underpass, so that the same ice floes could be surveyed. In total, we flew more than 21,000 kilometers of ICESat-2 ground tracks with latencies of seconds to hours between the aircraft and satellite over fast-drifting sea ice, and hours to weeks over the slow-moving ice-sheet interior. The instrument suite included the usual OIB contingent of laser altimeters, radar sounders and nadir imagers, with nearly all instruments reporting excellent data collection throughout the campaign.

Although shorter than previous Arctic spring campaigns, the OIB team nevertheless completed 24 science missions in less than 7 weeks, again basing out of Thule Air Base in northwestern Greenland and later in Kangerlussuaq in southwestern Greenland. Weather primarily favored surveys of northeastern and southwestern Greenland. Cloudy conditions were more often prevalent in the Arctic Ocean, making for challenging mission selection over sea ice. The weather even conspired to force OIB's first-ever divert, from Thule Air Base to Kangerlussuaq, but we were able to return to Thule Air Base after only a single overnight.

This last OIB campaign onboard a large aircraft included our last major media visit, which was from a BBC video production crew filming Frozen Planet II while based in Kangerlussuaq. We also again corresponded with K-12 students from around the world, reaching nearly 500 during the course of the campaign.

Following the launch of ICESat-2, OIB has now nearly completed its overarching objective to bridge the gap in laser altimetry of polar ice between ICESat-2 and its predecessor, ICESat. The final two OIB campaigns will take place onboard Johnson Space Center's G-V aircraft in the Arctic (Greenland, August–September 2019) and the Antarctic (based out of Hobart, Australia, October–November 2019).

The OIB team in Kangerlussuaq along with the BBC Frozen Planet II crew. Photo credit: Michael Studinger

Earth Venture Suborbital – 3 (EVS-3): **UPDATE**

Five EVS-3 missions, selected late in 2018, are moving toward implementation. Several have completed their Initial Confirmation Review (ICR), with the remainder scheduled in the near future. Flights for the Investigation of Microphysics and Precipitation for Atlantic Coast-Threatening Snowstorms (IMPACTS) mission, involving both the P-3 and ER-2 based at Warner Robins AFB, will begin as early as January 2020. The Submesoscale Ocean Dynamics and Vertical Transport (S-MODE) mission, involving the G-V, B-200 and Twin Otter aircraft will be based at Ames Research Center.

More Arctic Research: **ABoVE**, **OMG**, and **ICESat-2 Cal/Val**

2019 ABoVE Airborne Campaign Monitors Arctic Ecosystem Change

Contributed by Chip Miller, JPL

The Arctic Boreal Vulnerability Experiment (ABoVE) Science Team continued airborne activities in 2019 with the objective of creating interannual time series to monitor Arctic ecosystem change.

Photograph of Utqiagvik (Barrow) Alaska taken on 12 July 2019 during AVIRIS-NG/N53W observations Conditions were ideal, with no clouds and unlimited visibility. The land surface was in its early greening phase with many areas still relatively brown. Note the complete lack of sea ice near the coast despite the relatively early date.

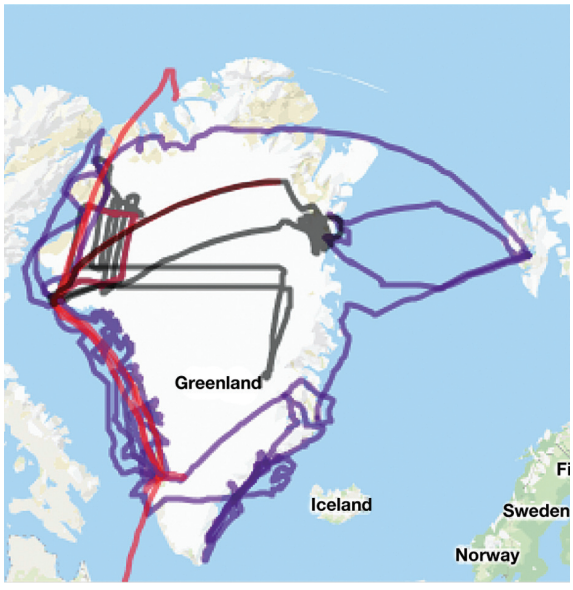
Airborne remote sensing in the ABoVE domain during 2019 included observations by NASA's Next Generation Airborne Visible InfraRed Imaging Spectrometer (AVIRIS-NG) imaging spectrometer, the Land, Vegetation and Ice Sensor (LVIS) full waveform lidar, and L-band synthetic aperture radar (SAR). These flights followed on the 2017 and 2018 ABoVE Airborne Campaigns, providing revisits of key locations and additional ground-truth calibration-validation data. 2019 flights emphasized acquisitions for ABoVE's new Phase 2 research investigations. AVIRIS-NG flights from July to early-August characterized Arctic-boreal vegetation near peak greenness, as well as wetlands, inland waters and methane emissions hot spots. AVIRIS-NG flights targeted the tundra sites on the Seward Peninsula (in conjunction with ground and UAS measurements from NGEE-Arctic), Alaska's North Slope, the Mackenzie Delta, and the Canadian High Arctic Research Site near Cambridge Bay, NU. The LVIS sensor deployed aboard NASA's new G-V exploited the extended range of that platform to acquire numerous long transects and underflights of ICESat-2 lines. LVIS acquisitions characterized tundra degradation, boreal forest biomass and structure, and the key tundra-taiga ecotone. Mapping of the Peace-Athabasca Delta was performed in conjunction with in situ water surface elevation measurements. L-band SAR flights on a NASA G-III occurred in early September and revisited lines flown in 2017 and 2018 to enable accurate interferometric differencing and comparisons of interannual variability in permafrost active layer thickness, thermokarst, post-fire permafrost degradation and boreal forest structure. The L-band SAR flights provide key precursor data for NASA's upcoming NISAR satellite mission.

OMG Provides Climate News

The Oceans Melting Greenland (OMG) EVS-2 mission also spent several weeks in the Arctic, continuing the dropsonde portion of this mission on a DC-3 aircraft flown by AirTec. The mission dropped several hundred Aircraft eXpendable Conductivity Temperature Depth (AXCTD) probes around the coasts of Greenland to measure ocean temperature and salinity. The mission and its team were highlighted in interviews and news articles repeatedly during the August mission because of the significant degree of ice melting. According to PI Josh Willis, "There's evidence of the ice sheet disappearing all around the edges." "I can see it clearly from our plane. I see big scars in the rock where glaciers used to extend a mile or two downstream, but recently retreated and left a canyon behind," Willis said.

ICESat-2 Cal/Val Teamed with OIB First Flight on G-V

Following ABoVE, the AVIRIS-ng system was flown to Greenland in an initial ICESat-2 dedicated cal/val mission. AVIRIS-NG was used to determine snow-grain size, and ultimately, to determine how grain size affects the propagation of green-wavelength light, which is the wavelength of the satellite laser instrument. AVIRIS-ng collected 26 hours of science data. In a coordinated effort, the NASA G-V carrying the OIB lidar package, flew similar flight lines, collecting 58 hours of science data.



Summer missions in the Arctic: Purple is OMG, Red is AVIRIS-ng, Black is OIB on the G-V. Note several coordinated flights of AVIRIS-ng with OIB in support of ICESat-2.

2019 NASA Student Airborne Research Program (**SARP**)

Contributed by Emily Shaller, NSRC

The eleventh annual NASA Student Airborne Research Program (SARP) took place June 16-August 9 at the NASA Armstrong Flight Research Center and the University of California, Irvine. SARP provides a unique opportunity for rising senior undergraduate students majoring in science, mathematics or engineering fields to participate in a NASA Airborne Science research campaign. SARP's goal is to stimulate interest in NASA's Earth Science research and aid in the recruitment and training of the next generation of scientists and engineers, many of whom had their first hands-on research experience during this program.

The 28 SARP 2019 participants came from 28 different colleges and universities in 20 different states. They were competitively selected based on their outstanding academic performance, future career plans, and interest in Earth system science.

The students flew onboard the NASA DC-8 where they sampled and measured atmospheric gases to study pollution and air quality. The DC-8 overflew dairies, oil fields and wineries in the San Joaquin Valley and the Los Angeles basin, as well as the Salton Sea at altitudes as low as 1,000 feet in order to collect air samples and measure atmospheric gases.

During the SARP flights, the DC-8 was preparing for the FIREX-AQ campaign, which is studying the impacts of U.S. wildfires and agricultural fires on air quality and climate. The DC-8 carried the full scientific payload for FIREX-AQ for the SARP flights, providing a multi-benefit opportunity for the science team to test their instruments, collect data over a variety of sources and topography, and to mentor students at the same time.

Students also used data from a remote-sensing instrument (AVIRIS-NG) on a King Air B-200, owned and operated by Dynamic Aviation, to study drought, fire burn scars and post-fire mudflows in Southern California, along with ocean biology along the California coast. In addition to airborne data collection, students took measurements at field sites near Santa Barbara, Fresno and the Salton Sea.

2019 NASA Student Airborne Research Program (SARP) students, mentors and faculty pose in front of the NASA DC-8 airborne laboratory. Photo Credit: Megan Schill / NASA SARP

The final six weeks of the program took place at the University of California Irvine where students analyzed and interpreted data collected aboard the aircraft and in the field. From this data analysis, each student developed a research project based on his or her individual area of interest. In addition to the new data collected during the program, students had the opportunity to use data gathered by SARP participants in previous years, as well as data from other NASA aircraft and satellite missions. Four students plan to submit conference abstracts to present the results of their SARP research at a future American Geophysical Union Fall Meeting.

HyTES Europe 2019 Campaign

Contributed by Bjorn Eng, JPL

HyTES and Twin Otter Team from JPL, KCL and BAS. Photo credit Maria Eng.

The Hyper-Spectral Thermal Emission Spectrometer (HyTES) recently completed its first international deployment. The campaign was a collaboration with King's College, London (KCL) and the European Space Agency (ESA). HyTES was shipped from JPL to the UK and installed on a British Antarctic Survey (BAS) Twin Otter aircraft, together with an AsiaFENIX visible through shortwave-infrared (VSWIR) instrument provided by KCL. *(continued on Pg. 6)*

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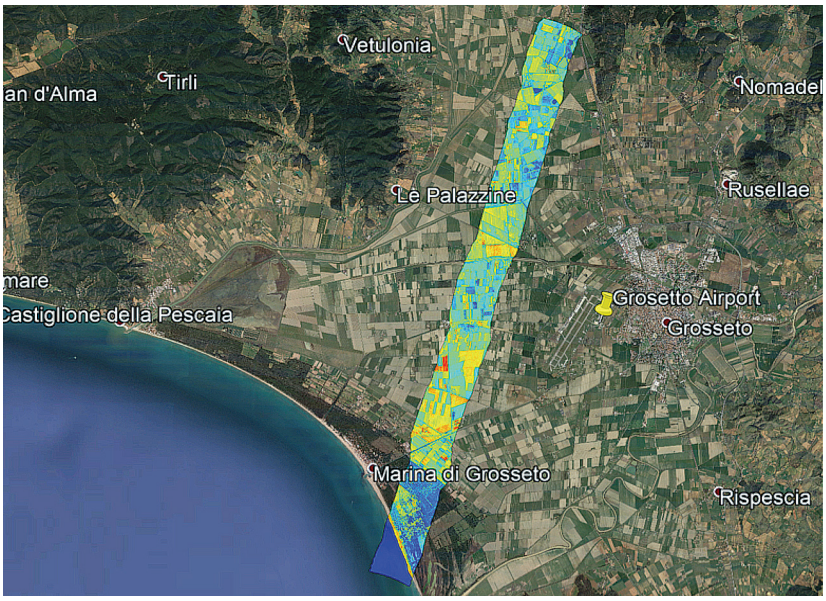
The campaign was conducted in Italy, near Grosetto and at several sites in the UK. Specific areas of study in Italy included daily flights over an instrumented drought-test with varying watering across the site, a geo-thermal area (Monte Leoni) and a time-series of images of a controlled fire from start to finish. There were also several underflights of satellite instrument tracks, including ECOSTRESS, ASTER, LANDSAT and SENTINEL3B. Targets in the UK included urban areas, agricultural sites and water bodies. Preliminary analysis indicates the detection of ammonia plume from a dairy and also from a fire.



Surface Temperature quicklook image from HyTES underflight of ECOSTRESS track near Grosseto, Italy.

The data from the campaign are available on the HyTES website (http://hytes.jpl.nasa.gov).

FIREX-AQ Monitors Idaho and Montana Fires

Contributed by the ESPO team

FIREX-AQ (Fire Influence on Regional to global Environments eXperiment– Air Quality), a joint NASA / NOAA mission, took place during August. The overarching objectives of FIREX-AQ are to provide measurements of trace gas and aerosol emissions from fires in great detail, relate them to fuel and fire conditions at the point of emission, characterize the conditions relating to plume rise, follow plumes downwind to understand chemical transformation and air quality impacts, and assess the efficacy of satellite detections for estimating the emissions from sampled fires.

Two NASA aircraft participated in the mission – the DC-8 and ER-2. The first phase of the mission was based in Boise, Idaho, which turned out to be an ideal location from which to observe fires burning in northern Idaho and Montana. After 14 successful science flights out of Boise, the DC-8 moved on to the second phase of the mission, flying out of Salina, Kansas, to monitor agricultural burns. Three hundred people attended the Salina media day on August 20. Other assets participating in FIREX-AQ included two NOAA Twin Otter platforms and

ground-based mobile laboratories from NOAA and NASA LaRC.

Above: Image of the Castle Fire from the DC-8.

Bottom Left: The ER-2 flew back and forth from Palmdale for the FIREX mission.

Bottom Right: Daily FIREX-AQ Science Meeting in Boise

CAMP2EX Contributed by the ESPO Team

CAMP2Ex (Cloud, Aerosol, Monsoonal Processes – Philippines Experiment) - The NASA P-3 (N426NA) and SPEC Lear are flying the CAMP2EX mission from a Clark Airport in the Philippines. The P-3 science flights began in August. The P-3 is carrying 14 instruments, primarily for aerosol and radiation measurements, while the Lear is carrying cloud probes. The mission is scheduled through October 10. Media day is scheduled for 9/23.

The scientific questions to be addressed by CAMP2EX are:

- *To what extent are aerosol particles responsible for modulating warm and mixed phase precipitation in tropical environments?*
- *How does the aerosol and cloud influence on radiation co-vary and interact?*
- *To what extent do aerosol-induced changes in clouds and precipitation feedback into aerosol lifecycle? How does land use change affect cloud and precipitation change? Is land use change a confounder for aerosol impacts?*

CAMP2EX team in the Philippines

CAMP2EX Forecasting team

Aircraft News

New G-V Flies LVIS in Support of GEDI and ABoVE

Contributed by Bryan Blair and Derek Rutovic

Two versions of NASA's Land Vegetation and Ice Sensor (LVIS) full-waveform laser altimeters were installed on the NASA JSC Gulfstream V (NASA5/N95NA) for the first time early this spring and subsequently flown on two science campaigns from May through early August 2019. These missions each utilized two sensors, the original LVIS-"Classic" instrument with larger footprints (20-25 m diameter) to better simulate GEDI and historical larger footprint lidar data, and the newer LVIS Facility sensor that has smaller diameter footprints (7-10m) and shorter pulsewidth (5 nsec) for better horizontal and vertical resolution. Each sensor also includes a co-boresighted 50 Megapixel camera.

These are the first NASA sensors installed on the G-V platform. The high altitude and long-range capability of the G-V are ideal for maximizing spatial coverage from the high-altitude optimized LVIS sensors.

The first campaign included a number of underflights of the International Space Station to provide calibration and validation of measurements for the recently launched Global Ecosystem Dynamics Investigation (GEDI) lidar. LVIS measures surface topography and the vertical structure of forests using a waveform lidar technique and these data are used to calibrate the GEDI measurements and validate their geolocation. This initial campaign was based at the aircraft's home in Houston, TX, and covered a number of long transects along GEDI reference ground tracks in the US and Costa Rica. Two large area maps were also completed covering a 16 by 120 km area in Costa Rica and a 17 by 160 km area in Tennessee and North Carolina. The G-V's long range meant that

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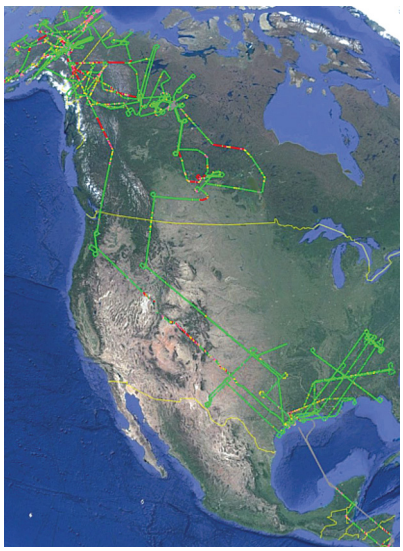

LVIS data collected along these G-V tracks. Map credit: Michelle Hofton (GSFC)

Aircraft News (continued)

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the LVIS team was able to complete its mapping over Costa Rica on a flight based out of Houston and did not have to relocate to Costa Rica and wait for the weather to clear to collect critical data.

Image Right: LVIS lidars installed over the nadir optical ports along the centerline of the G-V, along with LVIS Engineer Shane Hendry. Photo credit: David Rabine

The team was able to complete several science missions over the continental United States, and then when the weather permitted LVIS data collection, JSC and the LVIS operations team executed an 11.2-hour "local flight" over Costa Rica. Approximately 50,000 km2 of LVIS data was collected during this campaign.

Following an astronaut direct return mission at the end of June, the LVIS sensors were reinstalled for a July science campaign to collect topography and vegetation structure data over Canada and Alaska in support of the Arctic Boreal Vulnerability Experiment (ABoVE) project. Twelve dedicated science flights were flown from bases in Yellowknife, Canada and Fairbanks, Alaska. Data were collected over numerous ABoVE ground sites including InSAR, TomoSAR, lidar maps, burn scars, wildfire study sites, and along multiple ICESat-2 tracks. Although there were challenging weather conditions, the team was able to map almost all of the desired targets. Including transits, approximately 120,00km2 of data were collected during the second campaign. In total for both campaigns, the G-V flew 139.4 flight hours for these successful campaigns with the LVIS instruments.

G-V on the ramp at the airport in Fairbanks, Alaska for ABoVE Photo credit: Rob Switzer (GSFC)

ER-2 Returns to the fleet after Cabin Upgrade

Contributed by Brian Hobbs, AFRC

ER-2 #809 is back in the Airborne Science business! Aircraft 809 returned to flight in July after completing the Cabin Altitude Reduction Effort (CARE) modification. This modification significantly reduces the likelihood of decompression sickness (DCS), risk of permanent neurological injury and pilot fatigue, a safety factor during long duration missions. The effort required a six-month structural modification by Lockheed Martin at Palmdale, Site 2. In conjunction with the CARE modification, the NASA Armstrong Avionics and Instrumentation Branch rewired the entire cockpit, replacing all Kapton insulated wiring. Kapton insulated wiring is prone to cracking, which can lead to arcing and electrical failures. Technicians replaced 10,000+ wires totaling 11+ miles! This modification significantly enhances aircrew safety and aircraft reliability. Aircraft #809 went back to work flying the FIREX-AQ mission, followed by a full schedule of instrument test flights.

The second aircraft, ER-2 #806, is well on its way back to flight readiness as well. Lockheed Martin completed the structural modification in May and technicians are currently working to install new wiring.

Bobby Henderson, Avionics Technician with Vertex, verifying wire installation with drawing for ER-2 809 CARE modification. Photo Credit: Brian Hobbs

SOFRS Corner

Contributed by Vidal Salazar

Science Operations Flight Request System (SOFRS) Corner
SOFRS Website: https://airbornescience.nasa.gov/sofr NASA Operation IceBridge Project Science Office

In this edition: 3 Frequently Asked Questions

Why do I get so many emails from SOFRS?

SOFRS is designed as a notification and tracking tool, so yes, you probably get a lot of emails. One of the notifications is related to cost estimates. The default cost estimate due date is two weeks after the flight request is submitted. If the estimate is not complete, you will receive multiple emails indicating that the estimate is overdue. Solution: enter a cost estimate or set an appropriate due date and you will receive notification emails 2 weeks after the set date.

My deployment starts in September and ends in October, why do I see multiple flight requests for a single deployment?

SOFRS tracking and reporting is generated in fiscal year increments, so if your campaign spans two fiscal years (end of fiscal year is September 30) you are required to have two separate flight requests. Each flight request will have a unique log number with cost estimates and cost actuals that will reflect the actual flight hours flown.

What is a log number?

The log number is the unique SOFRS identifier for a flight request. The elements of a log number are: Fiscal year (FY), single digit Aircraft identifier (X) followed by a three-digit sequential number (###). It will be in the form FYX###. Example 21P007. This log number is for a flight request for the fiscal year 2021, using the P-3 (Aircraft identifier P) and it is the 7th request for the P-3 for that fiscal year. Other aircraft identifiers are: DC-8 (8), ER-2 (2), C-20A(G), G-V (5) and Other Aircraft (M).

Remember, send your SOFRS questions to:
curators@sofrs.espo.nasa.gov

Airborne Science – Great News!
Projects and People Win Awards

Three Airborne projects have won Group Achievement awards in 2019: ATom, ORACLES and SARP. The citations are as follows

ATom: For outstanding accomplishments by the Atmospheric Tomography (ATom) Mission in exploring the remote atmosphere to better understand how atmospheric chemistry across the globe controls the greenhouse gases and aerosols that drive climate change today.

ORACLES: In recognition of the outstanding scientific achievements of the ObseRvations of Aerosols above CLouds and their intEractionS (ORACLES) airborne Earth science mission team, who succeeded in acquiring detailed measurements of aerosol and cloud properties over a broad swath of the Southeast Atlantic.

SARP: For its sustained, highly successful engagement of a diverse group of college and university students in hands-on Earth system science through experiential learning using NASA's airborne assets.

Emily Shaller (NSRC / BAERI), Communications Lead and Student Airborne Research Program Manager, was awarded an **Exceptional Public Service Meda**l. The citation reads: For preparing the next generation of engineers and scientists with her Student Airborne Research Program leadership and exceptional communication and outreach efforts.

ASP Survey

We are in the process of updating the Airborne Science Program Requirements document. **We would very much appreciate if you complete the survey** and send it to Susan Schoenung and Matt Fladeland to have your needs considered.

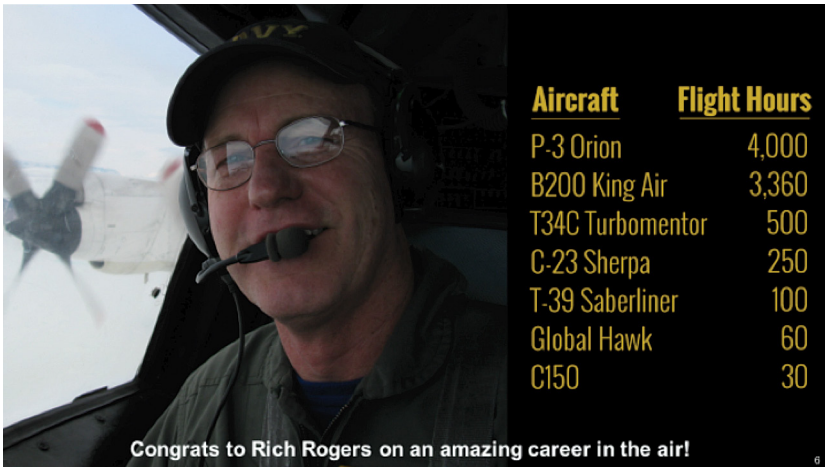
https://airbornescience.nasa.gov/content/ASP_Requirements_Survey_-_2019

Emily Shaller

Transitions

Caitlin Barnes has left the ASF lab at Palmdale, to join the Airforce Global Hawk support team at AFRC. Since joining the Airborne Sensor Facility staff in 2010, she was heavily involved in the design and fabrication of the NASDAT payload support systems, which are now in routine use on the core ASP platforms. She also had a key role in the development of the Global Hawk Payload Control System, for both the aircraft and ground station elements. Caitlin worked tirelessly on the GLOPAC, ATTREX, HS3, and other science campaigns with that aircraft; while also supporting ER-2 sensor network operations. Her positive attitude and dedication to mission success will always be remembered, and although she will be missed, we know that she will excel in her new position. Caitlin had also recently received the Airborne Science Program Award for Sustained Excellence.

Dorothy "Dodie" Patterson has announced her retirement, effective in mid-October. She has been on the ASF staff for 9 years, assigned to the AFRC Global Hawk project, where she led the development and operation of the various satellite communications systems on that unique aircraft. Among other innovations, she developed a Voice-Over-Internet system that allows the Global Hawk pilots on the ground to communicate with air traffic controllers in real-time through a transmitter onboard the aircraft. Dodie has worked for 35 years in the field, and is looking forward to the next phase in her life, and we all wish her well.that drive climate change today.



NASA Pilot Rich Rogers Retires from Flying after 29 Years

P-3 pilot **Rich Rogers** has reached the NASA pilot retirement age (65), having flown some 5500 hours for NASA science. He's continuing at Wallops as aircraft administrator. During his time flying for NASA, he has travelled all over the world on Earth Science missions.

Calendar of events – Fall 2019 ASP

DECADAL SURVEY – DESIGNATED OBSERVABLES ANNUAL REVIEW
SEPT 24 - 25, 2019;
NASA Headquarters, Washington, DC
Contact: Amy Treat; amy.a.treat@nasa.gov

TERRESTRIAL ECOLOGY SCIENCE TEAM MEETING
SEPT 23 - 25, 2019; *College Park, MD*
https://cce.nasa.gov/meeting_te_2019/index.html

PECORA / INTERNATIONAL SYMPOSIUM ON REMOTE SENSING OF THE ENVIRONMENT
OCT 6 - 11, 2019; *Baltimore, MD*
https://pecora.asprs.org/

UNMANNED SYSTEMS CANADA
OCT 3 0- NOV 1, 2019;
Ottawa, Canada
uc19.unmannedsystems.ca

SOLID EARTH TEAM MEETING
NOV 4 -6, 2019; *Scripps Institute of Oceanography, La Jolla, CA*
SET-Meeting_Support@espo.nasa.gov

CARBON MONITORING SYSTEM SCIENCE TEAM MEETING AND APPLICATIONS WORKSHOP
NOV 12 - 14, 2019;
Scripps Seaside Forum, La Jolla, CA
carbon.nasa.gov/meeting_2019/indes.html

TFRSAC FALL MEETING
NOV 14, 2019
National Interagency Fire Center, Boise, ID
Contact: Everett Hinkley [ehinkley@fs.fed.us] or Vince Ambrosia [Vincent.g.ambrosia@nasa.gov]

AGU FALL 2019 MEETING
December 9-13, 2019; *San Francisco, CA*
https://www.agu.org/fall-meeting
REGISTRATION and HOUSING OPEN

2019 UAS TAAC
December 10-12, 2019;
Las Cruces, NM, https://taac.nmsu.edu/

AIAA SCIENCE AND TECHNOLOGY FORUM
January 6-10, 2020;
Orlando, FL, www.aiaa.org
https://scitech.aiaa.org/Register/

100TH ANNUAL MEETING AMERICAN METEOROLOGICAL SOCIETY 2020 ANNUAL MEETING
JAN 6-10, 2019; *Boston, MA*
https://annual.ametsoc.org/index.cfm/2020/
REGISTRATION and HOUSING OPEN

PROGRAM FOR ARCTIC REGIONAL CLIMATE ASSESSMENT (PARCA) MEETING
JAN. 30, 2020
OIB Science Team Meeting, Jan. 31, 2020
NASA GSFC; contact Brooke Medley, brooke.c.medley@nasa.gov

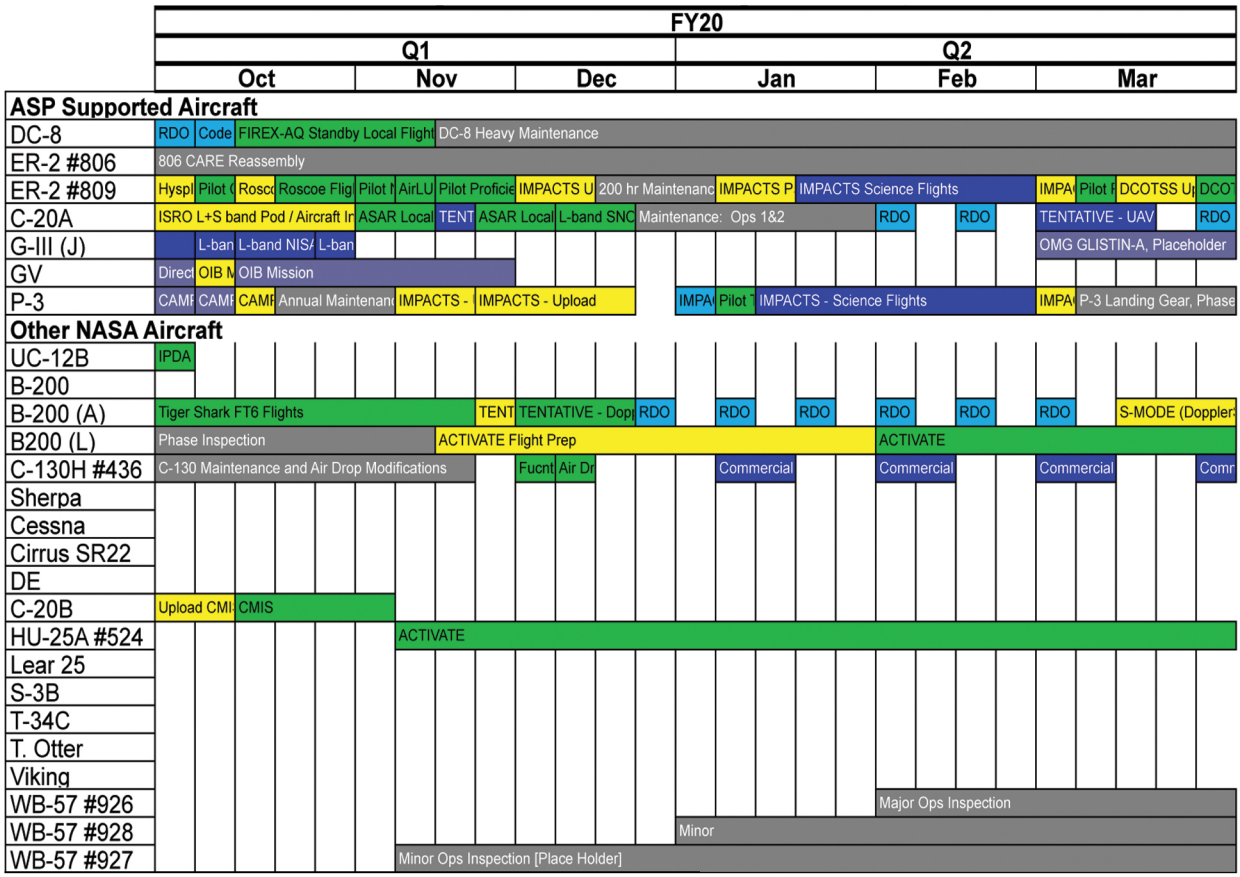
OCEAN SCIENCES MEETING
FEB 16-21, 2020; *San Diego, CA*
https://www.agu.org/ocean-sciences-meeting

2020 IEEE AEROSPACE CONFERENCE
MAR 7-14, 2020; *Big Sky, MT*
https://www.aeroconf.org/

6TH ABOVE SCIENCE TEAM MEETING
MAY 11-14, 2020; *Fairbanks, AK*
ABoVE.nasa.gov

ALASKA UAS INTEREST GROUP - RESCHEDULED
SEPT 2020; *Fairbanks, Alaska*
http://uasalaska.org/

NASA Airborne Science Program 6-Month Schedule Starting October 2019 (generated 9/19/2019)



Foreign Deployment
Stateside Deployment
Flight
Aircraft Modifications
Maintenance
Deployment Milestone

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

Airborne Science Program
Platform Capabilities
Available aircraft and specs

Platform Name	Center	Payload Accommodations	Duration (Hours)	Useful Payload (lbs)	Max Altitude (ft)	Airspeed (knots)	Range (Nmi)
ASP Supported Aircraft							
DC-8	NASA-AFRC	4 nadir ports, 1 zenith port, 14 additional view ports	12	30,000	41,000	450	5,400
ER-2 (2)	NASA-AFRC	Q-bay (2 nadir ports), nose (1 nadir port), wing pods (4 nadir, 3 zenith ports), centerline pod (1 nadir port	12	2,900	>70,000	410	>5,000
Gulfstream III (G-III)(C-20A)	NASA-AFRC	UAVSAR pod	7	2,610	45,000	460	3,400
Gulfstream III (G-III)	NASA-JSC	UAVSAR pod, Sonobuoy launch tube	7	2,610	45,000	460	3,400
Gulfstream V (G-V)	NASA-JSC	2 nadir ports	10	8,000	51,000	500	>5,000
P-3	NASA-WFF	1 large and 3 small zenith ports, 3 fuselage nadir ports, 2 bomb bay nadir ports, 4 P-3 aircraft window ports, 3 DC-8 aircraft window ports, nose radome, aft tailcone, 10 wing mounting points, dropsonde capable	14	14,700	32,000	400	3,800
Other NASA Aircraft							
B-200 (UC-12B)	NASA-LARC	2 nadir ports, aft pressure dome with dropsonde tube, cargo door	6.2	4,100	31,000	260	1,250
B-200	NASA-AFRC	2 nadir ports	6	1,850	30,000	272	1,490
B-200	NASA-LARC	2 nadir ports, wing tip pylons, zenith site for aerosol inlet, lateral ports	6.2	4,100	35,000	275	1,250
C-130	NASA-WFF	3 nadir ports, 1 zenith port, 2 rectangular windows, wing mount for instrument canisters, dropsonde capable, cargo carrying capable	12	36,500	33,000	290	3,000
Cessna 206H	NASA-LARC	Wing pod, belly pod, modified rear window for zenith ports	5.7	1,175	15,700	150	700
C-23 Sherpa	NASA-WFF	22 windows, nose cargo area, standard cargo carrying capable	6	7,000	20,000	190	1,000
Dragon Eye	NASA-ARC	In situ sampling ports	1	1	500+	34	3
Gulfstream III (G-III)	NASA-LARC	2 nadir ports	7	2,610	45,000	460	3,400
HU-25A Guardian	NASA-LARC	1 nadir port, wing hard points, crown probes	5	3,000	42,000	430	1,900
Matrice 600	NASA-ARC	Imager gimbal	1	6	8,000	35	3
SIERRA-B	NASA-ARC	Interchangeable nose pod for remote sensing and sampling	10	100	12,000	60	600
Twin Otter	NASA-GRC	Zenith port, nadir port, 5 wing hard points, 6 small instrument mounts, Cargo door opening (49" X 48")	3	3,600	25,000	140	450
WB-57 (3)	NASA-JSC	Nose cone, 12ft of pallets using either 3ft or 6ft pallets, 2 Spearpods 2 Superpods, 14 Wing Hatch Panels	6.5	8,800	60,000+	410	2,500

More information available at: **https://airbornescience.nasa.gov/aircraft**