National Aeronautics and Space Administration

NASA

EXPLORE
AIRBORNE SCIENCE NEWSLETTER
Spring 2022

Leadership Corner

Summer is nearly here, and the Airborne Science Program (ASP) remains busy, with approximately 900 flight hours flown since the beginning of the year. ASP and its partners, collaborators, and scientists continue to deal with the pandemic and are following all COVID protocols, working safely to execute our mission. We also were fortunate to have Earth Science Leadership participate in our first ever Airborne Science Town Hall. This was a great opportunity for us to brief the community on how we make effective and creative use of available airborne science assets to advance Earth system science and to hear directly from leadership. Major mission highlights to date include the support of the EVS-3 missions, successful test flights of the Lunar irradiance sensor (AirLUSI) on the ER-2, and Carbon Mapper flights over California. One highlight of this newsletter is the section on Aircraft and Airborne Infrastructure activities. In addition, ASP remains invested in leveraging our fleet to provide hands-on opportunities for students and early career professionals to help develop a diverse talent pool of scientist and engineers for NASA. We recently sent out an email to participants of past and present large airborne field campaigns soliciting information on student

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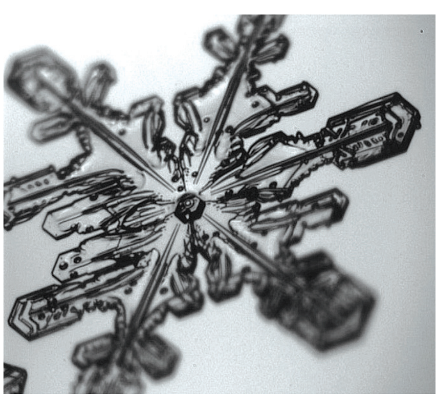
What's Inside

IMPACTS EVS-3 Mission Returns to East Coast Winter Skies

Submitted by Vidal Salazar and Lynn McCardie



The Investigation of Microphysics and Precipitation for Atlantic Coast-Threatening Snowstorms (IMPACTS) is a NASA-sponsored field campaign to study wintertime snowstorms focusing on East Coast cyclones. This large cooperative effort began during the winter of 2020. After a COVID-induced hiatus in 2021, the mission returned to the field in January 2022. A final deployment is planned for 2023. The mission is studying precipitation variability in winter cyclones to improve remote sensing and numerical forecasts of snowfall. Snowfall within these storms is frequently organized in banded structures on multiple scales. The causes for the occurrence and evolution of

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Leadership Corner (cont.)

participation, so please encourage past and present students to complete the survey. Finally, we are delighted that Nature Geoscience chose to highlight our DC-8 work in the ATom mission on the cover of their March issue. See https://www.nature.com/ngeo/volumes/15/issues/3. We look forward to another busy Summer/Year and encourage everyone to continue to take necessary precautions in these uncertain times, take time off when you need it, enjoy your family and friends, and stay safe!

Bruce Tagg
Director, Airborne Science Program

Melissa Yang-Martin
Deputy Airborne Science Program Director - Science

Derek Rutovic
Deputy Airborne Science Program Director - Operations

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a wide spectrum of snowbands remain poorly understood. The goals of IMPACTS are to characterize the spatial and temporal scales and structures of snowbands, understand their dynamical, thermodynamical and microphysical processes, and apply this understanding to improve remote sensing and modeling of snowfall.

The flight campaign utilizes two NASA aircraft flying in coordinated flight patterns to sample a range of storms spanning across the Midwest and East Coast. The satellite-simulating ER-2 aircraft flies above the clouds and carries a suite of remote sensing instruments including cloud and precipitation radars, lidar, and passive microwave radiometers. The P-3 aircraft flies within the clouds and samples environmental and microphysical quantities in situ. Ground-based radar measurements from the National Weather Service network and a suite of radars located on Long Island, NY, along with supplemental soundings and the New York State mesonet ground network provide environmental context for the airborne observations.

Launch of meteorological balloon. Credit: Brian Colle

The coordination between remote sensing and in situ platforms makes this a unique, publicly available dataset applicable to a wide variety of interests.

IMPACTS successful return during the 2022 winter storm season sampled 13 events, timing two with the GPM satellite overpass, during the months of January and February 2022. The P-3 aircraft (with new pylons – see story on page 8) was based out of Wallops Island, Virginia with one suitcase flight from Wright-Patterson Airforce Base in Ohio. The ER-2 was based at Pope Army Airfield in North Carolina. The two aircraft combined for 167.1 flight hours. Mobile ground units were dispersed across multiple locations from the upper Midwest to northern New England. By utilizing these different take off locations the project sampled a variety of storms that occurred in the Midwest, along the Eastern Seaboard and north into Canada and sampled storms at phases of their lifecycles. This wide net allowed

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IMACTS Campaign Team with P-3 at Wallops Flight Facility

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IMPACTS EVS-3 Mission Returns to East Coast Winter Skies

for the sampling of precipitation and snowband structures at different times in a storm's lifecycle, and within different regions of the storm itself. The aircraft observations combined with surface-based radar observations, profiles from mobile sounding teams, data from the GPM overpasses, and the dataset already collected from the 2020 winter storm season, will address the IMPACTS' overall objectives and are currently being analyzed by the science teams.

Earth Venture Suborbital (EVS) UPDATE

Submitted by Melissa Yang Martin

In addition to IMPACTS (highlighted above), the four other EVS-3 missions are in various states of progress, as shown in the Table below.

Mission	Aircraft (Instruments)	Progress Status
Delta-X	G-III (UAVSAR), B-200 (AirSWOT), B-200 (AVIRIS-ng)	Flight campaign completed in 2021, with a total of 266.9 flight hours. Imagery before and after Hurricane Ida was separately funded from ESD. Data analysis currently underway.
ACTIVATE	HU-25A (In situ platform), UC-12B / B-200 (dropsondes and remote sensing platform)	Deployments 1-5 have been completed for a total of 1004.3 flight hours. The final deployment (#6) will be completed in June. Data analysis currently underway.
DCOTSS	ER-2 (Atmospheric chemistry spectrometers, particle probes, and meteorological instruments)	Deployment 1 completed in summer 2021, with a total of 97.5 flight hours. Data analysis from intercomparison flight with ACCLIP test flight currently underway. Deployment 2 will be from April through July 2022.
S-MODE	2021 Test flights and Pilot on B-200 (DopplerScatt), Twin Otter (Mass); 2022 and 2023 campaigns: G-III (PRISM), B-200 (DopplerScatt), Twin Otter (MASS)	2021 Test flights and Pilot campaign out of ARC completed with 82.8 hours. Science IOP #1 scheduled to begin in September 2022 and science IOP #2 in 2023.

NOTICE: The Earth Ventures Suborbital-4 (EVS-4) opportunity will be released in 2023.

Convective Processes Experiment (CPEX)
Transitions from St. Croix to Cape Verde

Contributed by by Vidal Salazar

CPEX is a joint effort between NASA and the European Space Agency (ESA), with the primary goal of conducting post-launch calibration/validation activities for the Atmospheric Dynamics Mission-Aeolus (ADM-AEOLUS) Earth observation wind lidar satellite, an ESA satellite launched in 2018. The 2021 campaign, called CPEX-Aerosols and Wind (CPEX-AW), took place in St. Croix, U.S. Virgin Islands during August – September 2021. NASA's DC-8 carried DAWN, HALO, APR-3, HAMSR, AIRO, and dropsondes and flew 7 missions for a total of 48.5 science flight hours. The original plan to fly in coordination with ESA from Cape Verde (Cabo Verde) off the coast of Africa was postponed to 2022 because of COVID-19 restrictions. The campaign to Cape Verde (CPEX-CV) is now scheduled for August to September 2022. The DC-8 will carry the same payload of atmospheric and wind instruments to enable further study of tropical convection and associated processes. The campaign may extend into new areas of inquiry beyond those of CPEX-AW.

The CPEX team in St. Croix

SHIFT Campaign Providing Data for Upcoming SBG Mission

Contributed by Ryan Pavlick

The Surface Biology and Geology High-Frequency Time Series campaign (SHIFT) is collecting a first-of-its-kind months-long weekly time series of airborne imaging spectroscopy measurements over a vast 640 square mile study area in Santa Barbara County, California and the nearby coastal ocean. SHIFT is jointly led by NASA's Jet Propulsion Laboratory (JPL), The Nature Conservancy, and the University of California Santa Barbara (UCSB).

The SHIFT flight domain stretches from The Nature Conservancy's Jack and Laura Dangermond Preserve near Point Conception, north and east through the Santa Ynez valley including the Sedgwick Reserve of the University of California Natural Reserve System (UCNRS), up in to the Los Padres National Forest in the San Rafael mountains. SHIFT flight lines also cover most of the Santa Barbara County coast and adjacent kelp forests from the southern portion of Vandenberg Space Force Base east to the UCNRS Carpinteria Salt Marsh Reserve. (See map)

SHIFT campaign flight area off the coast of Santa Barbara, California

Since late February 2022, SHIFT has been collecting weekly high spatial (~5 meter) and high spectral (5 nm) resolution visible to shortwave infrared (VSWIR) measurements with the NASA Airborne Visible/Infrared Imaging Spectrometer – Next Generation (AVIRIS-NG) instrument. The flights will continue through late May 2022 to capture the dynamic spring green-up and summer-dry down of California Mediterranean ecosystems. After each flight, the AVIRIS-NG measurements are rapidly calibrated, atmospherically corrected, and made available to researchers. In May, the SHIFT campaign will also attempt to collect AVIRIS-NG spectral imagery

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SHIFT Campaign Providing Data for Upcoming SBG Mission (cont.)

coincident with a UCSB-led Plumes and Blooms research cruise in the Santa Barbara channel.

Data from the hundreds of vegetation plots collected over the course of the campaign will be combined with weekly AVIRIS-NG imagery to make dynamic maps of nearly two dozen functional traits of plant communities, such as the nitrogen and sugar content of the plant leaves. These maps will help researchers understand how ecosystems function and can aide conservation organizations in protecting the flora and fauna that we all depend upon for a variety of ecosystem goods and services.

Over 60 researchers from institutions around the country are using SHIFT data. Along the coast, for example, researchers from UCLA and UCSB are using SHIFT data together with drones, autonomous vessels, and scuba divers to understand the health and dynamics of giant kelp and phytoplankton, two important keystone organisms affected by human-caused climate change.

SHIFT is a pathfinder campaign for the Surface Biology and Geology (SBG) satellite mission, which is part of NASA's Earth System Observatory, a set of future Earth-focused missions aimed at addressing climate change and its consequences for health, natural resources, hazards, and food security. SBG is expected to launch no earlier than 2028. The data from the SHIFT campaign will help SBG scientists to understand the costs and benefits associated with collecting frequent data from a future SBG satellite. It will also allow the SBG team to design and test the algorithms and data systems needed to turn SBG's raw spectral data in to usable information for multiple science and applications communities.

PEOPLE of Airborne Science

MEET Gary Ash, new NSRC Director, and Brenna Biggs, new SARP Manager

Gary joined NSRC as Director in October of 2021. He has over 40 years of experience in working with the aerospace and science communities, including the last 28 years with aircraft operations at NASA's Johnson Space Center. While at JSC, he led activities in engineering, aircraft maintenance and quality assurance, program and project management, and contract acquisitions and management, in addition to worldwide agency and scientific flight operations. Gary supported the execution of several JSC programs to modify multiple aircraft from turboprop to heavy jet aircraft for specialized scientific and agency missions. Prior to working for NASA, he held positions at Lockheed Martin, Rockwell International, Sikorski Helicopter, and Vought Aerospace working on multiple space and defense systems. In addition to B.S. and M.S. degrees in Aerospace Engineering, he is licensed by the FAA as an aircraft mechanic and maintenance inspector as well as a commercial pilot.

Gary Ash, NSRC Director

Brenda Biggs, SARP Manager

Dr. Brenna Biggs joined NSRC in June 2021 and coordinates science and educational outreach programs for the NASA Airborne Science Program. She is also the project manager for the annual

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MEET Gary Ash, new NSRC Director, and Brenna Biggs, new SARP Manager (cont.)

NASA Student Airborne Research Program (SARP) summer internship. NASA SARP invites extraordinary undergraduate students pursuing STEM degrees to participate in an 8-week long internship. Interns collect data aboard NASA aircraft and develop their own research projects throughout the course of the summer, culminating in a formal presentation to their colleagues, faculty mentors, and NASA personnel at the end of the program.

Dr. Brenna Biggs (she/her) received a Chemistry Ph.D. from the University of California, Irvine (UCI) in 2021, an M.S. in Chemistry from UCI in 2020, and a B.S. in Chemistry from California State University, Fullerton in 2015. Dr. Biggs has nearly a decade of professional experience in chemistry research and outreach, culminating in over 40 scientific presentations and nearly 200 hours of flight time on NASA airborne science projects. As a graduate student, she was an experimenter for the Whole Air Sampling (WAS) team during several NASA airborne projects, including OWLETS, SARP, ATom, and FIREX-AQ.

Congratulate Chuck Irving and Chris Jennison on Years of Service to NASA

Contributed by Mike Thomson

In December 2021, two major contributors to the Airborne Science Program retired from Armstrong Flight Research Center. We thank them for their years of service.

Charles (Chuck) Irving

Chuck Irving joined the Airborne Science group at AFRC in 2013 and had an impact on the people and projects. His welcoming demeanor and reassuring leadership style made him a trusted partner for science projects. Upon joining NASA from his previous time at the Air Force Test Center, Chuck took on the role of Deputy Branch Chief for Science Projects. He took over budgetary responsibilities for the AFRC ASP portfolio and maintained a strong relationship with the NASA HQ sponsor by building trust through transparency. Chuck repeatedly demonstrated a commitment to the Center by stepping up when needed. When the DC-8 Project Manager retired in 2019, the project was at a critical juncture, and Chuck volunteered to take on that role. He led a successful FIREX campaign, which had the airplane deployed to two locations chasing wildfires and controlled burns. When serious engine damage was found upon the airplane's return from the campaign, Chuck led the effort to advocate for and obtain funding to make the necessary repairs. These critical maintenance actions effectively restored NASA's large, extended-duration airborne science workhorse in time to support the 2021 CPEX-AW deployment to St. Croix, as well as being ready for future missions through 2025 before heavy maintenance is required again in 2026. Chuck's outstanding abilities, commitment, and contributions made him a worthy candidate for NASA's Exceptional Service Medal.

Chris Jennison

Chris built a proven track record as an outstanding and dedicated mission manager for the Airborne Science Program. He led or assisted in the planning and executing ASP missions for both the DC-8 and ER-2 aircraft platforms. Employed by NASA since 1990, Chris began his career as a research engineer in rotorcraft flight projects office at Ames. After joining the ASP in 1994, Chris conducted science missions worldwide on the C-130, DC-8, and ER-2 aircraft. When NASA consolidated the Ames aircraft at Dryden in 1997, Chris chose to stay with the ASP and transfer to Dryden. With Chris came his extensive airborne science experience in the planning and execution of science missions. This

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Congratulate Chuck Irving and **Chris Jennison** on Years of Service to NASA

experience made Chris a natural selection when NASA began to utilize UAS to conduct science. With the return of the DC-8 to Dryden, Chris re-engaged with the piloted aircraft leading numerous DC-8 and ER-2 missions. With a superb understanding of both the flight operations and science aspects of the missions, he ensured the safety of not only the scientists, but the air crew, ground crew and public as well. His ability to manage the total mission including the payload integration, technical briefings, operational planning and systems checkout were invaluable. His excellent performance day-in and day-out, highlighting his dedication to NASA's mission, earned him an Exceptional Service Award.the total mission including the payload integration, technical briefings, operational planning and systems checkout led to the on-time deployment of nearly all the missions he led. His continual excellent performance day-in and day-out, highlighting his dedication to NASA's mission earned him an exceptional service award.

Summer Student Program Returns In-Person

Contributed by Brenna Biggs

The NASA Student Airborne Research Program (SARP) is returning this summer for its fourteenth year after a successful round of flights in December 2021. In December, the program hosted 53 students and 7 mentors from SARP 2020 and SARP 2021 to participate in 6 science flights around California on the NASA DC-8 aircraft. These students had done their summer lessons and experiments (collecting whole air samples) from home due to COVID-19 restrictions.

SARP classes of 2020 and 2021 were finally able to fly in December 2021

Now, SARP 2022 returns to Armstrong Flight Research Center with 28 new undergraduate students and 5 mentors from nearly 20 different states and Puerto Rico. Students will spend two weeks in Palmdale, California engaging with scientists, engineers, and faculty from NASA and various academic institutions. Students will have the opportunity to collect data onboard the NASA DC-8 during 5 science flights using instruments from various NASA centers and universities including NASA LaRC, NASA GSFC, NASA JPL, University of California – Irvine (UCI), and Princeton University. Students will also have the opportunity to launch ozonesondes with the University of Houston.

These instruments will provide students access to data about the greenhouse gases (e.g., methane, carbon monoxide, ozone), aerosols, water vapor, formaldehyde, ammonia, and one hundred additional volatile compounds at different altitudes and regions of our atmosphere. SARP will collect data in atmospherically important areas, such as the Salton Sea, the Central Valley, and the Los Angeles Basin. The data collected this year can be compared to previous years using the rich dataset that SARP has collected from over a decade of science flights.

The students will also have access to data collected for them using the AVIRIS-ng on another aircraft. This instrument collects multi-spectral imaging data primarily over the land and ocean for the Terrestrial Ecology and Oceans Remote Sensing groups to use. This allows students to analyze things like fire scars, kelp health, and vegetation coverage.

Students will then spend the remainder of summer at UCI, where they will develop and complete individual research projects under the guidance of their assigned graduate student mentors and faculty. At the end of the program, students will present their findings to their peers, mentors, and NASA personnel.

Aircraft and Airborne Infrastructure NEWS

Engineering and infrastructure teams at NASA's airborne science centers have been busy innovating and providing improved capabilities available for the Earth Science community. The Airborne Science Program (ASP) has been an Agency leader in the promotion of cross-center cooperation for engineering design, structural analysis, and maintenance in support of NASA research aircraft. Whereas an individual center would previously complete a payload installation for only their aircraft, that center is now designing the sensor installation simultaneously on multiple platforms across the Agency. Whereas an individual center would automatically seek vendor support for aircraft engineering and maintenance services at a premium cost, available talent from across the Agency is being used to solve problems. Today, the Earth Science community is achieving more capability than ever before to conduct airborne research within the existing budget through the strong, cross-center cooperation, and ASP intends to build on this model of efficiency into the future.

P-3 Extended Pylon Project Shows Successful Teamwork

Contributed by Glenn Jamison

The P-3 Pylon Team was brought together as an inter-center, multidisciplinary engineering team to develop an aerodynamically faired pylon for underwing carriage of custom payloads supporting Airborne Science. To meet researchers' requests for the ability to position science instruments further forward of the wing leading edge to reduce aerodynamic influences on airmass sampling, the team used an existing extended-pylon design that had prevously been developed for the 2017 ORACLES campaign. Two of these extended-pylons were used on the NASA Wallops Flight Facility (WFF) P-3B aircraft between 2017 and 2020 to support the ORACLES, CAMP2EX, and IMPACTS projects. This earlier design was retired from use in 2020 after it was determined that its bluff design and unfavorable aerodynamic characteristics were a cause of cracking in the P-3B wing trailing edge skin structure. The task of the Pylon Project Team was to design, fabricate, and test an aerodynamic fairing for the extended-pylon that would significantly improve airflow characteristics on a timeline to support use for the 2022 IMPACTS campaign.

Engineers from NASA Langley Research Center (LaRC) Research Directorate (RD) Configuration Aerodynamics Branch developed a full-aircraft Computational Fluid Dynamics (CFD) model for analyzing aerodynamic loads at specific P-3B flight conditions. In parallel, team members from LaRC's Engineering Directorate's Mechanical Systems and Structural-&-Thermal branches iterated with the RD aerodynamicists in developing the fairing outer mold line, pylon tie-in structure, and wing interface hardware. Team engineers at WFF helped develop extended-pylon design requirements and provided on-aircraft design support. The detailed wing mapping data they provided were integral to correcting incidence angle errors identified in the original wing-pylon interface.

Pylon assembly at the LaRC Research Aircraft Integration Laboratory. From left to right: K. Wayne Denny, Bobby F. Martin, Al Coffey Photo credit: Glenn Jamison

Once the fairing outer mold line was established, it was added to the CFD model and run through 11 load cases provided by WFF. Aerodynamic forces and moments were summed for extended-pylon regions of interest and individual instruments to be flown during the 2022 IMPACTS campaign. They were subsequently mapped to finite element models for structural analyses and additional design iteration. With 80-percent drawings complete, the team turned to LaRC's Manufacturing Applica-

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tions Branch to commence fairing and hardware fabrication. Through a steady communication drumbeat, the pylon team was able to incorporate additional design modifications during fabrication as the stress analyses were worked in a parallel effort. Final fitting and machining were completed at WFF and an airworthiness review was completed in early December, 2021.

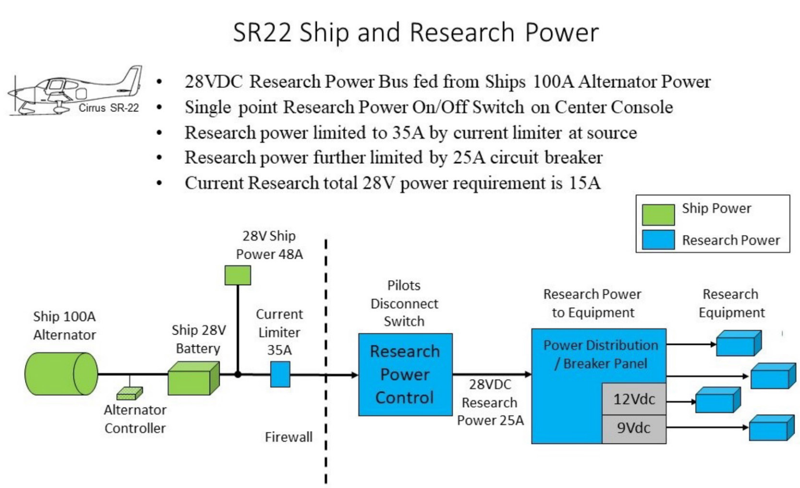
Two of the newly designed extended-pylons were successfully flight tested on the P-3B on December 14, 2021. The flight test plan was jointly developed by LaRC and WFF research pilots, with LaRC flying its G-III (N520NA) for photo/chase of the P-3B. Wing and pylon tufting on the P-3B was performed by WFF personnel while inflight high-speed video and stills were provided by LaRC photographers from the chase aircraft. After validating flight test results, the extended-pylons were cleared for full research use on the P-3B to enable the 2022 IMPACTS campaign to commence on schedule in January 2022. The IMPACTS campaign concluded successfully.

Tufts are attached on the wing and pylon for aerodynamic observation during test flights

LaRC Offers New SR22 Pod Capability for Airborne Science

Contributed by Bruce Fisher

LaRC purchased a new Cirrus SR22 general aviation (GA) aircraft (N501NA) in 2001 to support aeronautics-funded research. The Cirrus SR22 is an unpressurized GA aircraft with a wingspan of 38.3 ft, length of 26 ft, and a height of 8.8 ft to the top of the vertical tail. The aircraft is powered by a non-turbocharged internal combustion Teledyne Continental engine with a three-bladed propeller. After arrival, the Research Services Directorate (RSD) designed, fabricated and installed its General Aviation Baseline Research System (GABRS) in the aircraft. The principal attributes of the GABRS are: Research Data Acquisition System; researcher workstation in the aft right seat (flat-panel display, keyboard and mouse); research computers, redundant VHF data links; Rockwell-Collins Air Data and Heading Reference System (ADAHRS); production and research autopilots; high-definition video system; research GPS system; C/S-band telemetry; air data boom on the right wingtip (total and static pressures and angles of attack and sideslip); engine data; control surface positions (aileron, rudder, flap and elevator); and a research power system. The research power system can provide 25 A of 28 VDC power as shown in the schematic. To enable the aircraft to perform as



Schematic of vehicle and research power on the NASA SR22 aircraft.

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a surrogate Uncrewed Aerial Vehicle (UAV), a two-axis autopilot system (pitch and roll) with auto-throttle was also designed and installed.

Following the sale of the Center's Cessna 206H aircraft (N504NA) via the General Services Administration earlier in 2022, the RSD purchased a commercially available unpressurized belly pod for the SR22 aircraft (a typical installation is shown), allowing it to carry up to 200 lbs of nadir viewing instruments. The approximate dimensions of the pod are: width of 25 in.; length of 50 in.; and height of 12 in. Any instruments installed in the belly pod can be interconnected into the GABRS, including the researcher's workstation. With the belly pod installed, the aircraft can accommodate one pilot and two researchers. In this configuration, the SR22 aircraft will have a nominal cruise speed of 170 KIAS at an altitude of 10,000 ft (supplemental oxygen is required by NASA at altitudes above 12,500 ft) with a range of 970 nmi and a duration of 6.1 hr. The SR22/belly pod configuration is scheduled to be available for research in mid-summer 2022.

LEFT: NASA Cirrus SR22 prior to belly pod installation

RIGHT: Cirrus SR22 aircraft with belly pod installed (example). NASA installation will incorporate nadir portals in the pod.

Cross-center Cooperative Engineering Accelerates Aircraft Maintenance

Contributed by Matthew Elder

As the NASA LaRC Gulfstream III research aircraft (N520NA) prepares for the NASA Submesoscale Ocean Dynamics and Vertical Transport (S-MODE) project in the Fall of 2022, it is a currently undergoing a 72-month maintenance inspection at NASA JSC. This inspection is a depot level maintenance event that will provide a mission-ready aircraft for six more years of scientific research. In the spirit of collaboration between the NASA centers, JSC's Gulfstream depot maintenance facility is conducting this maintenance for the LaRC aircraft. This task is one of many opportunities to share resources across the NASA Gulfstream aircraft fleet. This sharing of resources includes maintenance workforce, spare parts inventory, engineering capability, and flight crews, all of which directly contribute to greater efficiency, lower logistics and administrative costs, and an increase in Gulfstream fleet mission readiness. The NASA Gulfstream fleet includes three G-IIIs (NASA AFRC, NASA JSC and NASA LaRC), one Gulfstream IV (LaRC), and one Gulfstream V (JSC) aircraft. For the S-MODE Fall 2022 campaign, N520NA will carry the JPL PRISM instrument.

LaRC and JSC G-III Aircraft in Maintenance at JSC. Photo credit: Derek Rutovic.

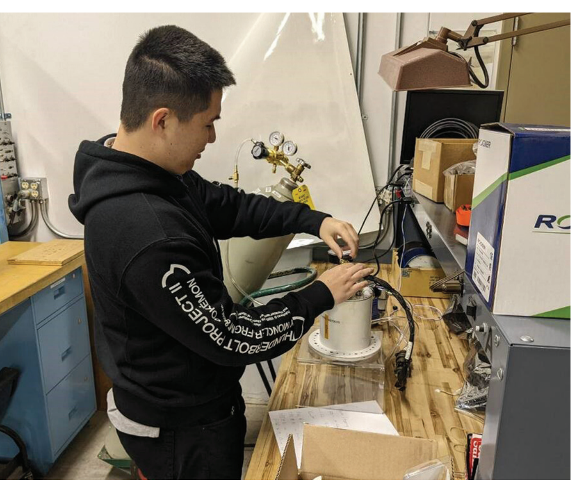
An update on the National Suborbital Research Center (NSRC)

Contributed by Gary Ash

NSRC is the product of a cooperative agreement between NASA and the Bay Area Environmental Research Institute. NSRC is part of the Ames Cooperative for Research in Earth Science and Technology (ARC-CREST).

NSRC supports science mission operations and aircraft deployments for earth science research campaigns conducted by the NASA Airborne Science Program (ASP). NSRC provides payload integration engineering, data display and networking, and facility instrumentation for NASA's fleet of research aircraft, including the DC-8, P-3B, Gulfstream III and V, and the ER-2 high altitude platform among others.

NSRC is also responsible for education and outreach activities for ASP, including organization and operation of the Student Airborne Research Program (SARP), a college-level summer internship that provides hands-on research experience in airborne science using NASA's flying laboratories.



Terry Hu

NSRC is working to expand and enhance the legacy of the NSRC within ASP. Primary technical leadership and direction come from two experienced team leads, Adam Webster and David Van Gilst, who not only provide continuity in NSRC performance but in mentoring other team members as well. Adam Webster joined NSRC in December 2005 as the DC-8 Airborne Laboratory Payload Integration Engineer. In this capacity, his primary responsibilities are to plan the physical experimental layout of the aircraft for various scientific missions and to design, structurally analyze, and fabricate aircraft hardware to integrate new scientific instruments onto the DC-8 and other ASP platforms. In addition to scientific instrument installations, Adam has had an integral role in the implementation of numerous aircraft platform upgrades. He also serves as mission director during the science flights onboard the DC-8. David Van Gilst is the team lead for the data systems personnel at NSRC, providing SATCOM, networking and other data system support to several aircraft programs at NASA. In addition to providing operational support for dozens of aircraft campaigns and flight activities since 2007, David has designed and implemented much of the data systems infrastructure in use aboard the aircraft supported by NSRC, including software development, design of onboard systems, and build-up of groundside telemetry interfaces.

Ryan Bennett

Current and new team members expand NSRC's traditional roll and capabilities by bringing new skills beyond what they were initially brought on to accomplish. Ryan Bennett is responsible for definition and implementation of procedures for on-board and ground data storage and backups. Responsibilities also include quality control of multiple measurements along with troubleshooting instrumentation. He has since expanded his contributions to include mission meteorologist for the SARP campaign and data systems operator for multiple P-3B and DC-8 missions. This allows for the opportunity to not only contribute to mission science flight objectives, but to also engage with students on both the plane and remotely to highlight the NSRC data system and capabilities. Terry Hu, software engineer, and Patrick Finch, IT systems engineer, are also performing data systems operator roles for local and deployed operations in addition to aircraft instrumentation improvements and checkout. NSRC looks forward to continuing work with ASP on future missions.

SOFRS Corner

Contributed by Vidal Salazar

Science Operations Flight Request System (SOFRS) Corner
SOFRS Website: https://airbornescience.nasa.gov/sofrs

The FY23 Call Letter will be released in June, requesting new flight requests and including instructions. Flight requests can be made at any time in the Science Operations Flight Request System (https://airbornescience.nasa.gov/sofrs), including placeholders for future years. If you need help submitting a flight request, please contact Vidal Salazar (vidal.salazar@nasa.gov) or Sommer Nichols (sommer.nichols@nasa.gov) or SOFRS_curators@airbornescience.nasa.gov.

Calendar of Events

AGU Fall 2022 Meeting *(In person and online)*
December 12-16, 2022
Chicago, IL
https://www.agu.org/Fall-Meeting
SAVE the Date

ABoVE 8th Science Team Meeting
May 9-13, 2022
Fairbanks, AK & Virtual
https://above.nasa.gov/meeting_2022/index.html

PACE Air Quality & Applied Atmospheric Sciences Focus Session
May 11, 2022 - 10:00 AM EDT
https://pace.oceansciences.org/events_more.htm?id=51

8th SBG Community Webinar
May 17th - 0800-0930 PDT/1100-1230 EDT
Contact: Ryan Pavlick *(ryan.p.pavlick@jpl.nasa.gov)*

TFRSAC 2022 Spring Meeting *(Virtual)*
May 18-19,2022
Contact: Everett Hinkley (e*hinkley@fs.fed.us)* or Vince Ambrosia *(Vincent.g.ambrosia@nasa.gov)*

Biodiversity/Ecological Forecasting Team Meeting
May 31–June 3, 2022
https://cce.nasa.gov/biodiversity/index.html

ESTF2022 (NASA ESTO FORUM) *(Hybrid)*
June 14-16, 2022
Caltech Beckman Institute, Pasadena, California
https://esto.nasa.gov/forum/estf2022test/

AIAA 2021 Aviation Forum *(Hybrid)*
June 27 – July 1, 2022
Chicago, IL
https://www.aiaa.org/aviation/

The 18th International Workshop on Greenhouse Gas Measurements from Space (IWGGMS18)
July 12-14, 2022
Takamatsu, Japan
https://www.nies.go.jp/soc/en/events/iwggms18/

IGARSS 2022 *(Hybrid)*
July 17-22, 2022
Kuala Lumpur
Malaysialgarss2022.org

NASA PACE Applications Water Quality & Resources Focus Session *(Virtual)*
July 28, 2021
https://pace.oceansciences.org/events_more.htm?id=49

16th AMS Conference on Atmospheric Radiation
August 8-12, 2022
Madison, Wisconsin
https://www.ametsoc.org/index.cfm/ams/meetings-events/ams-meetings/collective-madison-meeting/

APOLO (Advancement in POLarimetric Observations) Conference
August 9-12, 2022
Silver Spring, Maryland
https://pikesmeetings.wixsite.com/apolo-2022

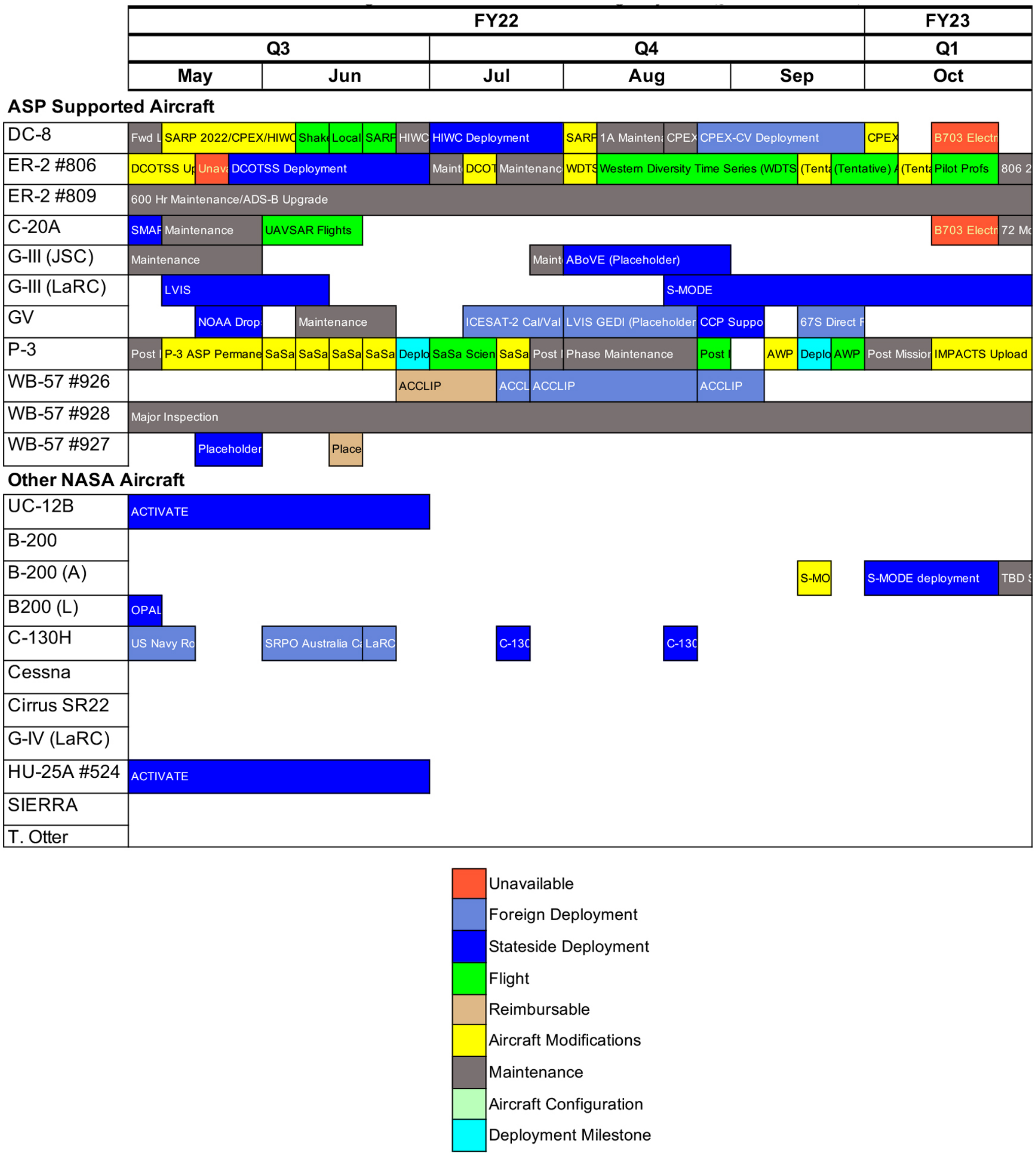
NISAR Science Community Workshop
August 30 – September 1, 2022
Pasadena Convention Center, Pasadena, California
http://nisarscience2022.org

NASA PACE Applications Workshop *(Virtual)*
September 15-16, 2021
https://pace.oceansciences.org/applications.htm

SBG Community Workshop
October 12-14, 2022
Washington DC area
Contact: Ryan Pavlick *(ryan.p.pavlick@jpl.nasa.gov)*

NASA ESI 2022 Solid Earth Team Meeting
November 7-10, 2022
Scripps Seaside Forum, La Jolla, California
Contact: Kevin Reath *(kevin.reath@nasa.gov)*

NASA Airborne Science Program 6 Month Schedule Starting May 2022 *(generated 4/26/2022)*



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	50,000	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
G-III/C-20A	NASA-AFRC	UAVSAR pod	7	2,610	45,000	460	3,000
G-III	NASA-JSC	UAVSAR pod, Sonobuoy launch tube	7	2,610	45,000	460	3,000
G-III	NASA-LaRC	2 nadir ports	7	2,610	45,000	460	3,000
GV	NASA-JSC	2 nadir ports	12	8,000	51,000	500	5,500
P-3	NASA-WFF	1 large and 3 small zenith ports, 3 fuselage 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
WB-57 (3)	NASA-JSC	Nose cone, 12 ft of pallets for either 3 ft or 6 ft pallets, 2 Spearpods, 2 Superpods, 14 Wing Hatch Panels	6.5	8,800	>60,000	410	2,500
Other NASA Aircraft							
B-200 (UC-12B)	NASA-LaRC	2 nadir ports, 1 nose port, 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	10	36,500	33,000	290	3,200
Cessna 206H	NASA-WFF	Wing pod, belly pod, modified rear window for zenith ports	5.7	1,175	15,700	150	700
Dragon Eye (UAS)	NASA-ARC	*In situ* sampling ports	1	1	>500	34	3
HU-25A Guardian	NASA-LaRC	1 nadir port, wing hard points, crown probes	6	3,000	42,000	430	2,075
Matrice 600 (UAS)	NASA-ARC	Imager gimbal	1	6	8,000	35	3
SIERRA-B (UAS)	NASA-ARC	Interchangeable nose pod for remote sensing and sampling, 1 nadir port	10	100	12,000	60	600
WB-57 (3)	NASA-JSC	Nose cone, 12ft of pallets for 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**