National Aeronautics and Space Administration

EXPLORE AIRBORNE SCIENCE NEWSLETTER

Fall 2026

Leadership Corner

Thank you for taking the time to reconnect with NASA's Earth Science Division Airborne Science Program (ASP). ASP continues to advance Earth science through the development and flight-testing of innovative instruments, support for space-based missions, and ongoing efforts to deepen our understanding of Earth's dynamic processes. Over the past 6 months, we have supported NASA teams working on current and future spaceborne missions including NISAR, EMIT, and STV, through calibration, validation, and complimentary data collection during airborne missions like INSPYRE, FireSense, ASCENT, and UAVSAR. We also collaborated with external agencies on SABRE (NOAA) and GEMx (USGS). Summer 2026 was especially busy – for example, during one summer month, we flew 8 aircraft and balanced several missions at once!

Over the past several months, the ASP team has made significant advances in a multi-year effort to modernize operations by replacing aging platforms with newer, more capable aircraft. Science modifications to the B777 and the GV are progressing smoothly, with both aircraft expected to be ready for their inaugural missions next year. In addition, the program has procured Starlink hardware for the B777; the installation of the system will provide the best possible satellite communications for Earth Science on the world's largest airborne research platform. After roughly 18 years of NASA Earth Science research, the UAVSAR C-20A aircraft team at AFRC completed their final science missions this year, paving the way for the G-IV aircraft to serve as a dedicated platform for AIRSAR-NG, a multi-frequency platform with modern equipment and backend electronics.

Thank you for your continued interest in and support of Airborne Science! We're grateful for your partnership and would love to stay connected. Please don't hesitate to reach out and let us know how we can support your efforts. We look forward to continuing to work together to advance Earth Science!



Derek Rutovic
Program Director,
Airborne Science Program

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INjected Smoke and PYRocumulonimbus Experiment (INSPYRE) and FireSense

Contributed by David Peterson (US NRL), Jen Fowler (NASA LaRC)

NASA ASP supported 2 fire-related missions this summer – INSPYRE and FireSense. INjected Smoke and PYRocumulonimbus Experiment (INSPYRE) is an Earth Venture Suborbital-4 mission using the NASA ER-2 and NSF-NCAR GV aircraft to study the role of pyrocumulonimbus (pyroCb) clouds in the Earth system, better characterizing their relationship with extreme wildfire behavior. This summer, INSPYRE flew ~120 flight hours on both platforms across several States and parts of Canada. NASA FireSense used ~ 42 flight hours on the NASA B-200 as part of a coordinated effort with INSPYRE. Two flights were also coordinated between FireSense G-III and INSPYRE ER-2 flights.

The NSF-NCAR GV flew 103.2 hours with the following payload: Fast 2DS, CDP, PUTLS, SP2, TILDAS, Picarro, BBR, Gust Probe, Nevzorov, VSCEL Hygrometer. The NASA ER-2 flew 103.8 flight hours with the following payload: MASTER, CRS / EXRAD, CPL, BBR, LIP, AirHARP-2, MVIS, S-HIS.

INSPYRE's hypothesis is that increasing wildfire size and intensity will amplify pyroCb-driven smoke injection into the stratosphere, resulting in measurable changes in Earth's radiative balance. The mission aims to answer the following questions:

- Which fires produce pyroCbs and why?
- What mechanisms determine if a pyroCb will directly inject smoke into the stratosphere, and how much smoke is directly injected?
- How do pyroCb-injected smoke plumes modify Upper Troposphere – Lower Stratosphere (UTLS) composition and radiation budget?

INSPYRE will continue next year, with 100 flight hours planned on the NASA ER-2 throughout CONUS and OCONUS from July to September 2027. More information about INSPYRE can be found here: https://espo.nasa.gov/inspyre

The objective of the FireSense flights were to better understand fire formation, development, and impacts from an operational perspective. FireSense supports operational agencies in meeting the challenges of wildland fire management across the United States over four use-cases: pre-fire fuels, active fire dynamics, post-fire and threats, and air quality forecasting. These use-cases are co-developed with wildland fire management agency stakeholders to support decision-making before, during, and after wildland fires.



Figure 1: *The G-III takes a pit stop in Provo, Utah before a night flight during FireSense 2026. Credit: Ryan Wade*



Figure 2: *The Border 2 Fire as seen from the NCAR GV during Research Flight #8 during INSPYRE 2026. Credit: Chris Kruse / NSF-NCAR*

More specifically, the 2026 campaign focused on the following goals:

- Flying new observing technologies and validating performance against reference measurements,
- Advancing airborne methods to characterize forest sub-canopy, and
- Characterizing wildland fire fuel conditions in the Southwest United States.



Figure 3: *Risaku Toda (PIRS JPL) arriving on the NASA LaRC B-200 in Boise, Idaho during FireSense 2026. Credit: Gage Taylor / NASA*

FireSense flew from July 27th to August 14th and focused on different aircraft, payloads, and locations:

- NASA B-200 out of Boise, ID: Pyro-Atmosphere Infrared Sounder (PIRS) to measure temperature profiles, atmospheric moisture, carbon monoxide, fire weather; this was coordinated with INSPYRE for calibration purposes (41.9 flight hours)
- NASA ER-2 out of Great Falls, MT (technically for INSPYRE and funded by FireSense): Compact Fire Imager (CFI) to measure flaming and smoldering fires, burn severity, and near-real-time fire mapping
- NASA G-III out of Boise, ID (two flights coordinated with INSPYRE): Compact Fire Infrared Radiance Spectral Tracker (C-FIRST) mid-wave infrared sensor to measure fire temperature, fire radiative power, and high-temperature thermal imagery (55.3 flight hours)

- Bode A-90 out of Boise, ID: Logos FireKite WAMI sensor to measure fire spread, fire perimeter, and persistent wide-area imagery (25.4 flight hours)
- Urban Sky stratospheric balloon out of Boulder, CO: Hot Spot long-wave infrared uncooled microbolometer to measure early fire detection, continuous active fire monitoring, communications relay (over 66 flight hours)
- Dynamic Aviation B-200 in the SW United States: AVIRIS hyperspectral sensor, which can identify, measure, and monitor constituents of the Earth's surface and atmosphere based on molecular absorption and particle scattering signatures (48.5 flight hours)
- Dynamic Aviation A-90 in the SW United States: G-LiHT LiDAR hyperspectral and thermal imager to measure 3D information about the distribution of foliage and canopy elements, imaging spectroscopy to discern species composition and variations in biophysical variables, and thermal measurements to quantify surface temperatures and detect heat and moisture stress (64.5 flight hours)

The FireSense mission will continue in 2027. More information about the mission can be found here: https://cce.nasa.gov/firesense/



Figure 4: *Sarath Gunapala (JPL) makes adjustments while installing C-FIRST on the NASA G-III. Credit: Gage Taylor / NASA*

Student Airborne Research Program (SARP) 2026

Contributed by Yaítza Luna-Cruz (NASA HQ)

In August 2026, 48 students from NASA's Student Airborne Research Program (SARP) Program completed an immersive research experience by presenting their projects to an audience of mentors, professors, family, friends, and NASA personnel.



Figure 5: *Students participating in the 2026 Student Airborne Research Program (SARP) welcomed NASA Administrator Jared Isaacman, Deputy Administrator Matt Anderson, and Nicola Fox, Associate Administrator for NASA's Science Mission Directorate, to the SARP deployment at Ellington Field in Houston, Texas. Credit: NASA*

SARP is a summer research experience for undergraduate students, hosted in two cohorts:

- SARP West in Southern California at San Diego State University (SDSU)
- SARP East operated in Virginia at Virginia Commonwealth University (VCU).

Prior to splitting into two cohorts, all of the students came together at NASA Johnson Space Center's Ellington Field, to immerse themselves in the full lifecycle of a science flight campaign. Over the course of two weeks, students learned more about NASA's Earth Science Division, NASA's Airborne Science Program, remote sensing, and workforce development through lectures led by SARP faculty and guest speakers from NASA and the Earth Science community. They engaged in Earth science data collection while flying nearly 200 flight hours onboard the NASA GV, NASA C-20A, NASA G-III, NOAA WP-3D, and Dynamic Aviation B-200; in addition, they performed ground sampling fieldwork, launching high altitude balloons, collecting air and terrestrial samples, and acquiring ship-based data. The ground-based and airborne data often were collected during NASA satellite overpass for integration and validation.

SARP randomly assigns students into different Earth system science research disciplines to encourage interdisciplinary collaboration and give them the opportunity to work outside their comfort zone. Each discipline is led by a faculty researcher who is an expert in their field and supported by a graduate mentor. This year, SARP research topics spanned four spheres: atmosphere, biosphere, geosphere, and hydrosphere, covered across the two cohorts.

Students attended introductory programming sessions and received hands-on support from a coding mentor to develop and strengthen their experience with code and incorporate code in their research project.

The SARP research experience culminated in a series of student-led presentations, which can be viewed within the Early Career Research Playlist on NASA Science's YouTube site.

For more information about early career research opportunities in Earth Science visit: https://science.nasa.gov/earth-science/early-career-opportunities/



Figure 6: *The NASA G-III with the GCAS and AWP payload, which measure trace gases and winds, landing at Ellington Field during SARP 2026. Credit: NASA*

Stratospheric Aerosol processes, Budget and Radiative Effects (SABRE) Tropics and Solar Eclipse

Contributed by Troy Thornberry (NOAA)

With our unique aircraft, NASA ASP is often called on by other Agencies to assist with their science or operational objectives. The SABRE project (https://csl.noaa.gov/projects/sabre/), a component of the NOAA Earth's Radiation Budget (ERB) research initiative (https://csl.noaa.gov/research/erb/), is a multi-year airborne science campaign to study the processes controlling the formation, transport, chemistry, microphysics and radiative properties of aerosols in the upper troposphere and lower stratosphere (UTLS).

A series of high-altitude research aircraft deployments to different regions and in different seasons will provide extensive detailed in situ measurements to characterize UTLS aerosol processes. These observations are critical for improving the ability of global models to accurately simulate the radiative, dynamical, chemical and climate impacts of natural and anthropogenic changes in stratospheric aerosol loading.



Figure 7: *NASA WB-57 arrives in Panama for SABRE Tropics. Credit: Troy Thornberry / NOAA*

The SABRE 2026 science payload included eighteen instruments (NMASS, UHSAS, CMASS, SOAP, SP2, PALMS-NG, Mini-MOUDI, CAPS, jNO2 Radiometers, MMS, LIF-SO2, LIF-NOy, Strat-CIMS, ACOS, UASO3, DLH, UCATS, RASTA) measuring aerosol size distribution and composition as well as trace gas species relevant for analysis of both dynamics and photochemical processes. This highlights the unique capability of the NASA WB-57 to carry such a large variety of high-mass instruments into the stratosphere at once to answer key questions about upper atmospheric processes.

SABRE 2026 (SABRE-Tropics) field operations began in mid-July with installation of the science instruments onto a NASA WB-57F at JSC Ellington Field in Houston, Texas. Following payload integration, four science flights were conducted between July 28 – August 6 from Ellington Field flying north to sample the midlatitude stratosphere, including a smoke plume intercepted in coordination with a flight of the NASA INSPYRE project.



Figure 8: *SABRE 2026 participants with the NASA WB-57. Panama Pacifico Airport, Panama City, 18 September 2026. Credit: Chelsea Thompson / NOAA*

Following the fourth science flight, the SABRE instruments were de-integrated and the WB-57 team executed an extremely quick turnaround to install the SAMI nose camera and send the plane to Iceland on August 9th to support the 2026 Total Solar Eclipse measurements. After successfully imaging the eclipse on August 12th, the WB-57 returned to Houston on August 14th for re-integration of the SABRE science instruments.

This miraculous efficiency was made possible by the efforts of the amazing WB-57 team and support staff. Following instrument re-integration and an instrument check flight, the WB-57 deployed to Panamá Pacífico International Airport on August 25th to continue the SABRE-Tropics mission. Fourteen local science flights were flown from Panamá over the next four weeks, with the final SABRE-Tropics science flight on the WB-57 return to JSC Ellington Field on September 24th.

The next SABRE science mission is planned for FY28 with the WB-57 platform and will be deploying to southern South America for measurements in the Southern Hemisphere mid- to high latitude stratosphere.



Figure 9. *The 2026 SABRE Tropics aircrew loading up for the instrument check flight on the WB-57. Credit: Mike Lawler / NOAA*



Figure 10. *The WB-57 cockpit showing off the Freedom 250 livery during SABRE 2026 in Panama. Credit: NASA*

Geological Earth Mapping Experiment (GEMx)

Contributed by Brenna Biggs (BAERI / NASA ARC)

The Geological Earth Mapping Experiment (GEMx) USGS-funded joint campaign between with NASA to map portions of the southwest United States for critical minerals using advanced airborne imaging unique to the Agency.

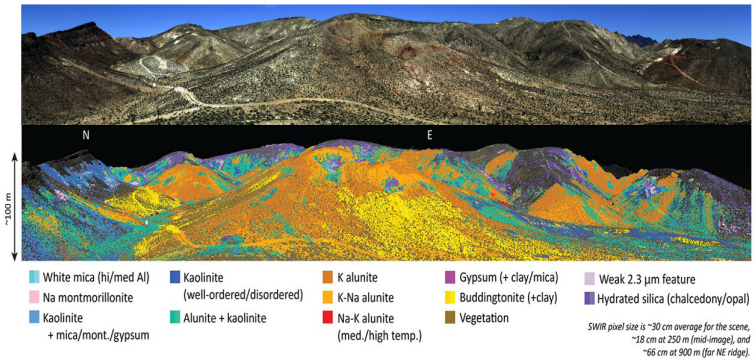


Figure 11. *Various minerals are revealed in vibrant detail in this sample mineral map of Cuprite, Nevada, following processing of AVIRIS data. Credit: USGS*

In 2022, the U.S. was 100% dependent on imports for 10 critical mineral commodities (e.g., arsenic, asbestos, cesium, graphite) and was at least 50% dependent on imports for another 33 critical mineral commodities (e.g., peat, tin, cobalt, zinc, nickel, aluminum). The U.S. needs better natural resource mapping to understand how to best mitigate this risk.

GEMx is a multi-year mission collecting measurements spanning visible through infrared throughout the U.S. to identify and map minerals at 15 m2 resolution. In the 2026 campaign, the following instruments flew over 470,000 km2 in 36 flights (200 flight hours) on the NASA ER-2, collecting new information about Earth's surface and atmosphere to help scientists understand Earth's geology:

- NASA's Airborne Visible/Infrared Imaging Spectrometer (AVIRIS-C and AVIRIS-5)
- MODIS/ASTER Airborne Simulator (MASTER)

In 2026, GEMx flew over 125 flight hours around California, Nevada, Utah, New Mexico, Colorado, and Arizona, collecting new information about Earth's surface to help scientists better understand Earth's geology and bringing the GEMx flight hour total to 476.1 hours from 2024 – 2026. This project will complement data from several of NASA's instruments on the International Space Station (ISS), including the Earth Surface Mineral Dust Source Investigation (EMIT), which maps the mineral dust source composition of Earth's arid regions to better understand mineral dust's role in climate change, as well as other instruments and missions like ECOsystem Spaceborne Thermal Radiometer Experiment on Space Station (ECOSTRESS).

TropiSAR 2026

Contributed by Brenna Biggs (BAERI / NASA ARC)

The NASA-ISRO Synthetic Aperture Radar (NISAR) satellite began collecting data in July 2025 to better track changes in Earth's surface, especially in remote regions like tropical forests and high mountain environments.

To validate NISAR's measurements, NASA is collaborating with Peru's SERNANP (Servicio Nacional de Áreas Naturales Protegidas por el Estado) and INAIGEM (Instituto Nacional de Investigación en Glaciares y Ecosistemas de Montaña) on fieldwork and airborne observations known as TropiSAR. During May 2026, the NASA C-20A aircraft flew 12 flights over Peru and Panama with UAVSAR, focusing on Pacaya Samiria National Reserve, Huascarán National Park, and Los Amigos Reserve.

These flights, which were coordinated with NISAR overpasses, will help researchers validate the satellite's measurements of forest biomass mapping and glacier movements, improving estimates of carbon storage and ecosystem health. Additional TropiSAR flights are planned for 2027 on the NASA G-IV.

More information about TropiSAR can be found here: https://uavsar.jpl.nasa.gov/cgi-bin/deployment.pl?id=L20260501

More information about NISAR can be found here: https://science.nasa.gov/mission/nisar/



Figure 12. *The 2026 radar operations team for TropiSAR flights on the NASA C-20A. Credit: NASA*

UAVSAR images the Florida Everglades for NISAR Cal/Val

Contributed by Bruce Chapman (Jet Propulsion Laboratory, California Institute of Technology)

The NASA ISRO Synthetic Aperture Radar (NISAR) satellite launched on July 30, 2025, from the Satish Dhawan Space Centre in Sriharikota, India. It carries an L-band radar (meaning it uses a relatively long radio wavelength) that is now imaging most of Earth's land surfaces twice every 12 days. This radar was designed years ago around specific science objectives of interest to NASA. Now that NISAR is in orbit, scientists can check whether the instrument meets the measurement requirements needed to reach those goals.

One objective was to map flooding dynamics in wetlands. L-band radar is one of the few remote sensing instruments that can detect water beneath vegetation (and through clouds!). Its radio waves pass through plants and tree canopies and can detect the water beneath. However, because of the logistical difficulty of measuring inundation extent on the ground in vegetated areas, collecting "truth" data for evaluating NISAR's accuracy can be a challenge.

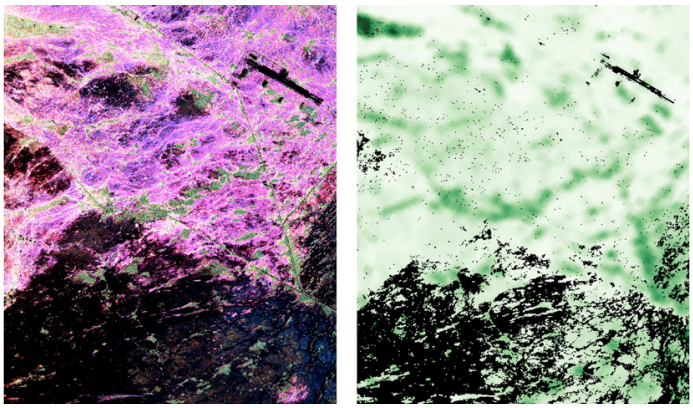


Figure 13. *Left, a UAVSAR color composite (HH, HV, and VV polarizations shown as red, green, and blue). Black indicates open water (and also airport runways, as can be seen in the upper right), pink indicates flooded vegetation, and green and yellow indicate dry vegetation. Right, the NISAR product showing open water (black), flooded vegetation (white and light green), and dry land (darker green). The imagery shown spans about 20 x 25 km, and the image is rotated 30 deg - North is to the upper right. Credit: Bruce Chapman / NASA JPL*

To address this gap, the NISAR project has been using UAVSAR, NASA's airborne L-band radar, to collect high-resolution, fully polarimetric data over wetlands. UAVSAR was built by and is operated by personnel from the NASA Jet Propulsion Laboratory and flies on a C-20a Gulfstream aircraft operated by the Armstrong Flight Research Center. Polarimetric radar sends and receives waves in different orientations, which reveals how the signal scattered off the ground. Flooded vegetation produces a distinctive scattering signature that can be used to identify flooded areas.

This year, UAVSAR has flown over several wetland sites, often within hours of NISAR observations. One site are the areas surrounding Everglades National Park in Florida, where UAVSAR completed two flights 12 days apart roughly coincident with NISAR. The data are still being processed and analyzed, but early comparisons with NISAR products are already underway. The figure below shows a UAVSAR color image beside a NISAR map from the same date showing where there is open water, flooded vegetation, and dry land.

ASCENT NASA Airborne Campaign Helps Map a Changing Earth

Contributed by David Siple (Purdue University), Andrea Donnellan (Purdue University), Anthony Wendel (Purdue University)

Often, NASA platforms are used to evaluate how different types of sensing modalities can be combined for future satellite constellations. NASA ASCENT flights over California are testing how radar, lidar and stereo-imaging could work together in a future spaceborne observing system.

Before scientists can develop a new way to map Earth from space, they first must prove the pieces can work together from the air.

That was the goal of NASA's Airborne Surface, Cryosphere, Ecosystem, and Nearshore Topography, or ASCENT, campaign, which sent two NASA aircraft over California in late June. The flights collected measurements of forests, mountains, faults, snow, lakes, coastlines and other landscapes to help researchers test technologies that could one day measure Earth's changing surface from space.

Andrea Donnellan, professor in Purdue University's Department of Earth, Atmospheric, and Planetary Sciences, or EAPS, leads NASA's Surface Topography and Vegetation, or STV, study, of which ASCENT is a part. Donnellan coordinated the campaign with the STV team, the STV technology Co-lead Craig Glennie from the University of Houston, Yunling Lou at NASA's Jet Propulsion Laboratory and Michelle Hofton at NASA's Goddard Space Flight Center. Purdue graduate student Anthony Wendel also participated in the campaign as an operator of the SAR-Fusion instrument alongside JPL operators.



Figure 14. *Andrea Donnellan, professor in Purdue University's Department of Earth, Atmospheric, and Planetary Sciences, stands in front of the NASA Gulfstream V used during the 2026 ASCENT campaign. Credit: Andrea Donnellan / Purdue University*

The ASCENT airborne campaign is providing test data researchers can use to develop the technologies and algorithms needed for a future spaceborne observing system. One of the main goals is to determine how measurements from radar, lidar and stereoimaging can be combined to distinguish vegetation structure from bare ground topography, separate shallow water from underlying terrain and produce a more complete picture of Earth's surface.

"No single instrument can measure everything we want to know about Earth's surface structure," Donnellan said. "The point of ASCENT is to figure out how these different instruments can work together, because ultimately that is what we would want to do from space."

The campaign used two aircraft carrying complementary instruments. A NASA Gulfstream V carried the Laser Vegetation Imaging Sensor, or LVIS, and Donnellan's QUAKES stereoimaging instrument. A Gulfstream III carried NASA's UAVSAR radar instrument and SAR-Fusion, another stereoimaging instrument led by Donnellan.

"We're using several different technologies to look at the same landscape and tell us different parts of the story. The real power comes when we can combine those views into a comprehensive product of what is happening at Earth's surface structure," says Donnellan.

Radar, lidar and stereo-imaging each observe the surface differently. Together, they can provide information about



Figure 15. *Purdue graduate student Anthony Wendel works with the SAR-Fusion instrument aboard the NASA Gulfstream III during the ASCENT campaign. Credit: Ian Elkin / NASA*

vegetation structure, surface elevation and the shape of the land, giving scientists several views of the same landscape.

California provided a useful proving ground because the campaign could sample different environments within one region. Flight targets included coastlines and even Mars analogs. The campaign also collected measurements over the San Andreas Fault and several areas where previous data were available for comparison.

For Donnellan, the campaign builds on a career focused on using remote sensing to better understand earthquakes and changes at Earth's surface. Her research uses measurements of crustal deformation and topography to improve understanding of earthquake hazards.

The broader STV effort expands that approach across several parts of the Earth system. Detailed and repeated measurements of the surface could help scientists study earthquakes, landslides, volcanoes and coastal change while also monitoring forests, glaciers, snow, and water resources.

Early results from the California flights already show how each instrument adds a different piece of the puzzle. UAVSAR can pick up changes in vegetation, while QUAKES images and LVIS can be combined to build detailed 3D maps of the ground. The campaign gathered data over areas burned by the Caldor Fire, with LVIS and QUAKES collecting downward looking data, while SAR-Fusion collected side-view images that line up with the side looking UAVSAR data.

The California flights are just the first step in a larger series of ASCENT tests in different parts of the world. Next up are planned campaigns along the East Coast, where scientists will study forests, wetlands, and shallow coastal waters, and in Central America, where they'll face the added complexity of dense tropical forests and volcanic landscapes.

Each new flight helps the team get closer to figuring out how all these tools would work together from space. "The aircraft data let us mature the technology and science for a spaceborne observing system," Donnellan said. "Space is where we can ultimately use it to study the whole planet."



Figure 16. *Photos of the two NASA aircraft with labels of instruments on each. The plane on the left uses LVIS (Lidar) and QUAKES (Vis Stereoimager). The plane on the right uses UAVSAR (L-band SAR) and SAR-Fusion (vis/SWIR Stereoimager). Credit: NASA BAERI*

Spotlight on the Engineering Team Behind NASA's B777 Airborne Laboratory

Contributed by Kirsten Boogaard (NASA LaRC) and Martin Nowicki (NASA LaRC)

NASA's effort to transform a Boeing 777 into its newest flagship airborne science platform has been one of the most ambitious aircraft modification efforts the agency has undertaken in decades. At the center of this work is a team of engineers with cross-center collaboration essential to shaping the aircraft into a world-class research asset.

Airborne science engineering demands deep expertise in flight systems, payload integration, and mission operations. To meet those needs for the B777, the Airborne Science Program assembled a distributed engineering team drawing talent from across NASA.

The group first convened in October 2022, and over the next four years navigated workforce transitions, shifting priorities, and the challenge of balancing multiple high visibility

projects. Through persistence and teamwork, they carried the aircraft from early concept through structural and electrical modifications and now toward preparation for its first science campaign.

Leading the modification engineering effort is Martin Nowicki of Langley Research Center (LaRC), supported by Deputy Lead Tyler Thompson of the National Suborbital Research Center (NSRC) at Johnson Space Center (JSC). Together, they guided the project's technical direction and maintained alignment across multiple NASA centers.



Figure 17. *Underbelly of the NASA B777 showing the NASA "worm" logo. Credit: Michael Vincent / NASA*

Power systems were designed by electrical engineer Mike Vandewalle at JSC, with mechanical engineer Michael Buttigieg at Armstrong Flight Research Center (AFRC) contributing to the aircraft power architecture needed to support advanced payloads.

Communications systems were developed by Ted Wilz of LaRC and Robert Martin at NASA Headquarters (HQ), providing onboard communications capacity for up to 200 science personnel. Robert Martin also designed the aircraft's dropsonde system and cargo bay hatch, both critical for atmospheric sampling and payload access.

The data system architecture was created by David Van Gilst of NASA Ames National Suborbital Research Center (NSRC), with mechanical engineering support from Tu Phan (NSRC / ARC). Their work includes the large internal monuments that will house mission planning tools and high capacity data networks. Nadir and window viewport requirements were shaped by Adam Webster (NSRC / ARC), drawing on his extensive DC-8 experience to ensure safe, high quality optical access for research instruments. To advance aerodynamic understanding and support structural and systems integration decisions, the project relied on modern computational tools and expert analysis. LaRC aero analysts Tausif "TJ" Jamal and Craig Hunter provided Computational Fluid Dynamics (CFD) support throughout modifications, helping the team evaluate impacts, validate assumptions, and optimize design choices throughout the development process.

Gary Ash, NSRC Director at ARC, ensured alignment across airborne science operations. Additional engineering expertise came from Allen Teasley and JL Champion at Wallops Flight Facility (WFF), Daniel West (JSC), Ryan Bennett (NSRC / ARC), as well as Tyler Keppel and Dan Nolan from AFRC, each contributing to aircraft level design, integration, and analysis.

While these individuals formed the core engineering backbone of the B777 modifications, the aircraft's transformation was only possible through the combined efforts of many others. Technicians, analysts, systems integrators, structural teams, safety personnel, airworthiness boards, management, partner organizations, and support staff across NASA centers all played indispensable roles in moving the aircraft from concept to reality.

As the B777 prepares to integrate its first research payloads, the achievements of this engineering team, and the broad community supporting them, stand as a testament to the power of cross center collaboration in advancing the future of airborne science.



Figure 18. *NASA B777 with updated livery. Credit: James Blair / NASA*

NASA GV Modification Progress

Contributed by Paul Martinez (NASA AFRC)

NASA's Gulfstream V (GV) aircraft continues to make steady progress through its modification phase as it advances toward full mission readiness. After its arrival at the modification facility on September 16, the maintenance team began interior removals to prepare the airframe for upcoming structural work. A major component of the modification effort is the installation of two nadir portals, which will be cut into the lower fuselage to accommodate high precision remote sensing instruments central to upcoming Earth science missions.

The GV engineering team has completed both the Preliminary Design Review (PDR) and Critical Design Review (CDR) covering structural and electrical modifications, confirming that the planned design changes meet all technical and operational requirements. In parallel with hardware procurement, the team is finalizing mechanical design tasks that will support updates to the aircraft's power distribution system. These upgrades will ensure adequate electrical capacity and integration flexibility for future instrument payloads, maintaining alignment with lessons learned from previous aircraft modification programs.

Looking ahead, structural modifications are scheduled for completion in late February or early March 2027. Once this phase is finished, the aircraft will return to AFRC for systems integration, functional testing, and mission specific configuration. These final preparations will position the GV to support its inaugural deployment for the LVIS/GEDI mission in Indonesia during April–May 2027, marking its transition from modification to operational use in NASA's global remote sensing portfolio.

Farewell to NASA C-20A

Contributed by Paul Martinez (NASA AFRC)

After eighteen years of remarkable service, the NASA C-20A UAVSAR platform (N802NA) concludes its operational journey, closing a chapter defined by scientific achievement, technical innovation, and dedicated teamwork across the Airborne Science Program. Since becoming operational in 2008, the aircraft has completed an exceptional 1,330 dedicated science flights and 1,510 total sorties. Over nearly two decades, the C-20A has supported Earth science investigations around the globe, ranging from polar regions and coastlines to forests, fault systems, volcanoes, and agricultural landscapes. Its stable, repeat pass L band radar capability has played a critical role in advancing our understanding of tectonic deformation, volcanic activity, hydrologic processes, ecosystem change, biomass evolution, and cryosphere dynamics.

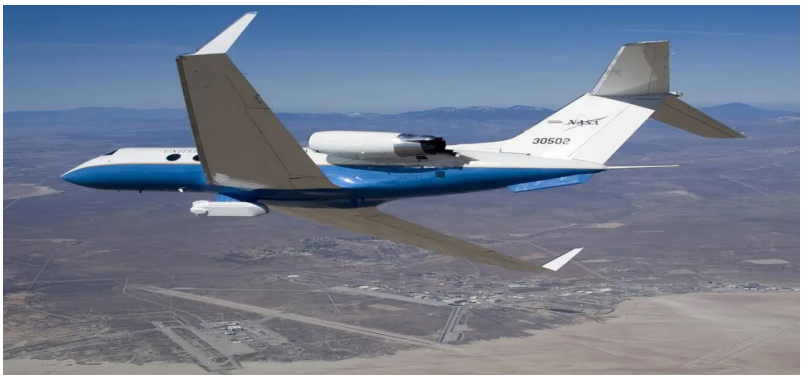


Figure 19. *The UAVSAR underbelly pod is in clear view as NASA's Gulfstream C-20A research aircraft banks away over Edwards AFB during aerodynamic clearance flights on March 6, 2007. Credit: Lori Losey / NASA*

The science contributions made possible by UAVSAR have been far-reaching. Its high precision deformation measurements have enabled researchers to characterize subtle ground motion along major fault zones, supporting hazard science and seismic modeling. The instrument's fully polarimetric data have been essential for mapping forest structure, wetland inundation, and biomass across large and diverse regions, directly informing carbon cycle research and improving the accuracy of climate models. UAVSAR's ability to support rapid response operations has also made it indispensable in disaster scenarios, including monitoring flood extent, wildfire burn scars, and landslide deformation. These datasets have strengthened partnerships across NASA centers, universities, and international research organizations and contributed to the design, calibration, and validation of major satellite missions, most notably NISAR.

The C-20A's success has always been a reflection of the people behind it. Engineers, technicians, pilots, mission planners, scientists, project managers, schedulers, and support personnel have worked tirelessly to keep the aircraft flying and the science flowing.

Their collaboration extended across Armstrong, JPL, and multiple domestic and international partners who trusted UAVSAR for its reliability and precision. Each deployment, underpass flight, student program, calibration campaign, and long range mission represented countless hours of preparation and coordination. The dedication shown by the teams—whether preparing aircraft systems, troubleshooting instrumentation, analyzing radar performance, or coordinating global operations—has defined the program's identity and ensured its long term success.

As we celebrate the legacy of the C-20A, we also look forward to the next phase in airborne radar science: AIRSAR-NG aboard the NASA Gulfstream IV (N814NA). AIRSAR-NG represents the evolution of the capabilities pioneered by UAVSAR, featuring enhanced instrument stability, expanded science modes, and improved calibration systems. The G IV platform will provide endurance and operational range, enabling the next generation of Earth-observing radar campaigns. AIRSAR-NG's advancements will support a broader class of science missions, provide more flexibility for global deployments, and strengthen NASA's role in precision radar remote sensing for years to come.

The retirement of the C-20A is both a moment of reflection and a moment of celebration. Its legacy will endure through the vast archive of data it produced, the discoveries it enabled, and the generations of scientists, engineers, and students it supported. The aircraft's contributions will continue to inform research, strengthen climate assessments, refine hazard monitoring, and inspire new airborne radar techniques that build on its foundational work. As AIRSAR-NG takes flight, it does so on the shoulders of an instrument and aircraft that set the standard for airborne repeat pass interferometry and established a model of excellence across NASA's airborne science fleet.

We extend our deepest appreciation to all who contributed to the C-20A UAVSAR mission over the past eighteen years. Your expertise, hard work, and dedication have shaped a legacy that will be felt for decades. While the aircraft's operational role has reached its conclusion, the spirit of innovation it represented carries forward into the next generation of airborne radar science.

SOFRS Corner

Contributed by Sommer Nicholas (NASA ARC)

The Airborne Science Program (ASP) Detailed Calendar has recently undergone significant enhancements to streamline platform availability and operational awareness for research teams. Users now have the flexibility to select custom ranges of dates for improved visibility, rather than being restricted to a month-by-month view. By default, the Detailed Calendar opens displaying scheduled activities starting from the current date and extending six weeks out.

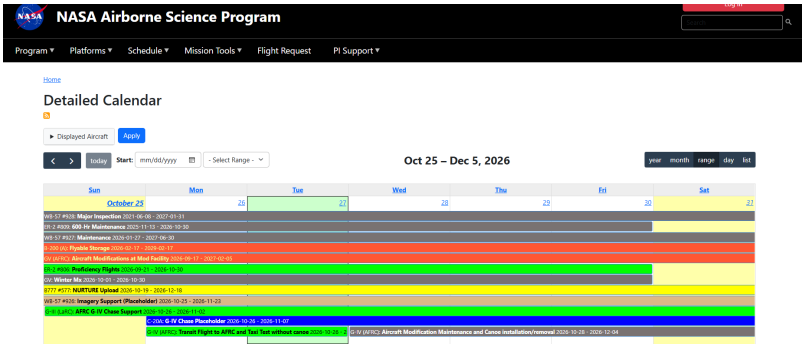


Figure 20. *The updated Detailed Calendar page showing how a range of dates can be selected. Credit: NASA*

Additionally, for multi-year strategy and long-term mission planning, investigators can utilize the Overview Calendar to review projected platform availability in future years.

In recent months, the ASP website has incorporated specialized capabilities, such as the Commercial Aviation Services (CAS) Vendor List and calendar updates, to better assist research teams. Looking ahead, the focus shifts to comprehensive efforts focused on improving, modernizing, and streamlining the SOFRS Flight Request Form to further optimize the request and submission workflow for future airborne campaigns. Stay tuned for more details and upcoming feature updates!

The ESPO team constantly strives for improvements to the ASP website and SOFRS system to offer investigators a comprehensive resource for the research community. If you have suggestions, please contact sofrs_curators@airbornescience.nasa.gov.

Calendar of Upcoming Events

Southwestern US Weather & Water Resilience Across Timescales
November 18–19, 2026, Tucson, AZ
https://water-climate.engin.umich.edu/sw/

American Geophysical Union (AGU)
December 7-11, 2026, San Francisco, CA
https://www.agu.org/annual-meeting

Congo Basin Science Initiative (CBSI) 2027*
**Relevant to PANGAEA community*
January 13-15, 2027, Yaoundé, Cameroon
https://congobasinscience.net/fr/nouvelles/deuxieme-conference-annuelle-du-cbsi-du-13-au-15-janvier-2027/

Commodity Classic
March 3-5, 2027, New Orleans, LA
https://commodityclassic.com/

7th Federal UxS Workshop
March 15-19, 2027, MSU, MS
https://www.usgs.gov/centers/national-innovation-center/science/7th-federal-uxs-workshop

National Science Teaching Association (NSTA)
March 17-20, 2027, Boston, MA
https://www.nsta.org/

American Library Association (ALA)
June 24-28, 2027, New Orleans, LA
https://www.ala.org/

Air and Waste Management 120th Annual Conference and Exhibition
June 28- July 1, 2027, Long Beach, CA
https://www.awma.org/ace2027

International Geoscience and Remote Sensing Society (IGARSS)
July 11-16, 2027, Reykjavik, Iceland
https://2027.ieeeigarss.org/

21st Annual Electric Aircraft Symposium
July 24–25, 2027, OshKosh, Wisconsin
https://electric-aircraft.aero/

Ecological Society of America (ESA)
July 25-30, 2027, Toronto, Canada
https://esa.org/toronto2027/

EAA AirVenture OshKosh 2027
July 26, 2027 - August 1, 2027, OshKosh, WI
https://www.eaa.org/airventure

Small Satellite Conference
August 1-4, 2027, Salt Lake City, UT
https://smallsat.org/

XIV Biology Symposium 2027
August 7-13, 2027, Park City, UT
https://scar.org/scar-events/scar-biology-2027-date-to-be-confirmed

Future Farmers of America
October 27-30, 2027, Indianapolis, IN
https://convention.ffa.org/schedule/

American Public Health Association (APHA)
November 7-10, 2027, Philadelphia, PA
https://www.apha.org/events-and-meetings/annual/about/past-and-future-annual-meetings

Supercomputing
November 14-19, 2027, Denver, CO
https://supercomputing.org/

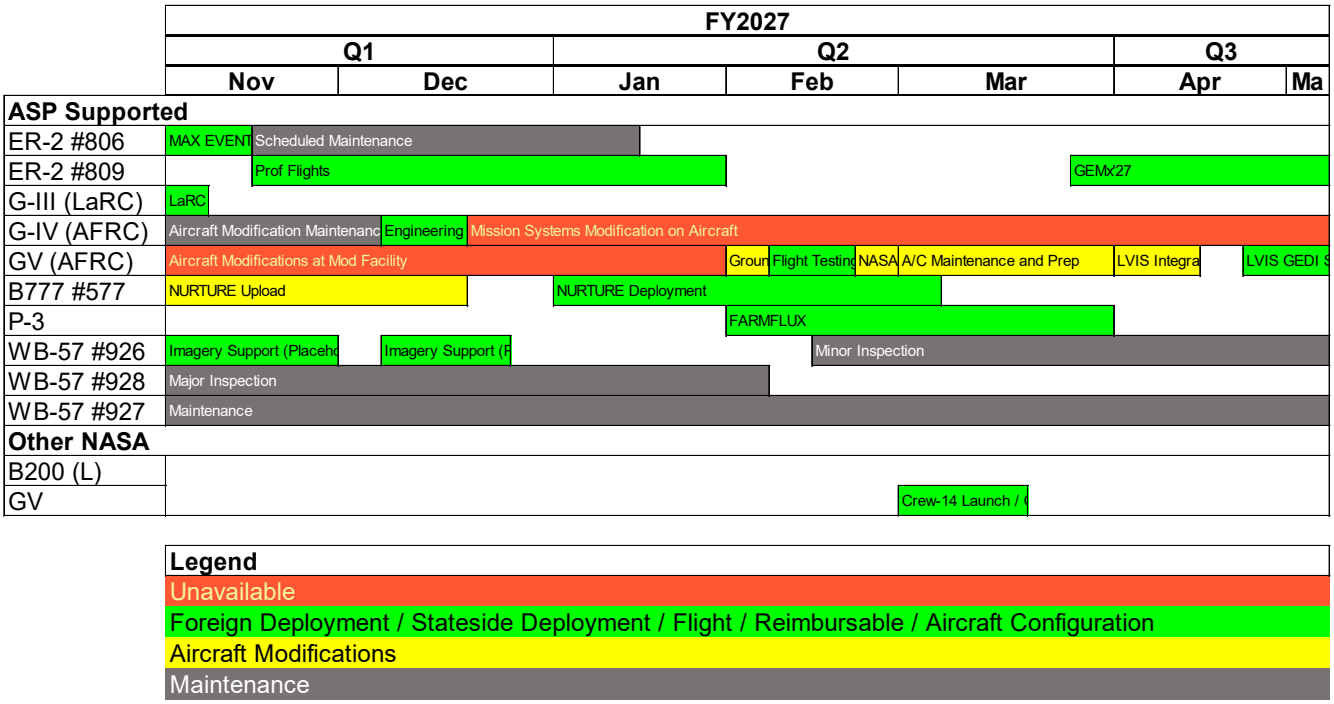
American Geophysical Union (AGU)
December 13-17, 2027, Washington, D.C.
https://www.agu.org/meetings/all-meetings/agu27

NASA Airborne Science Program
Platform Capabilities

Platform	NASA Center	Payload Accommodations	Max Altitude (ft)	Useful Payload (lbs)	Range (Nmi)	Duration (Hours)	Airspeed (knots)
B777	LaRC	nadir ports, dropsondes, in situ sampling	43,000	75,000	9,000	18	500
ER-2 (2)	AFRC	Q-bay (2 nadir ports), nose), 1 nadir port), wing pods (4 nadir, 3 zenith ports), centerline pod (1 nadir port)	70,000	2,900	5,000	8	410
G-IV	LaRC	AIRSAR-NG	45,000	5,610	3,500	8	459
GV	AFRC	2 nadir portals	51,000	8,000	5,500	13	500
P-3	LaRC	1 large and 3 small zenith ports, 3 fuselage nadir ports, 4 P-3 window ports, 3 DC-8 window ports, nose radome, aft tailcone, 10 wing mounting points, dropsondes	32,000	18,000	3,800	12	405
WB-57	JSC	Payload integration in the nose, bomb bay, wing pods (ER-2 and spear), upper pressurized section, tail compartment	63,000	8,800	2,500	6.5	410

NASA Airborne Science Program 6-Month Schedule

Starting November 2026 (generated 10/27/26)



Source: "Aircraft Calendar - Overview" at https://airbornescience.nasa.gov/aircraft_overview_cal

Acronym List

ACOS	Airborne Carbon Oxide Sulfide Spectrometer
AFRC	Armstrong Flight Research Center
AGU	American Geophysical Union
AirHARP-2	Airborne Hyper Angular Rainbow Polarimeter-2
ALA	American Library Association
APHA	American Public Health Association
ARC	Ames Reseach Center
ASCENT	Airborne Surface, Cryosphere, Ecosystem, and Nearshore Topography
ASP	Airborne Science Progam
ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer
AVIRIS	Airborne Visible / Infrared Imaging Spectrometer
AWP	Aerosol Wind Profiler
BAERI	Bay Area Environmental Research Institute
BBR	BroadBand Radiometer
CAPS	Cloud Aerosol and Precipitation Spectrometer
CAS	Commercial Aviation Services
CBSI	Congo Basin Science Initiative
CDP	Cloud Droplet Probe
CDR	Critical Design Review
CFD	Computational Fluid Dynamics
CFI	Compact Fire Imager
C-FIRST	Compact Fire Infrared Radiance Spectral Tracker
CIMS	Chemical Ionization Mass Spectrometer
CMASS	Chemical Ionization Mass Spectrometer
CONUS	Contiguous United States
CPL	Cloud Physics Lidar
CRS	Cloud Radar System
DLH	Diode Laser Hygrometer
EAA	Experimental Aircraft Association
ECOSTRESS	ECOsystem Spaceborne Thermal Radiometer Experiment on Space Station
EMIT	Earth Surface Mineral Dust Source Investigation
ERB	Earth Radiation Budget
ESA	Ecological Society of America
EXRAD	ER 2 X band Doppler Radar
Fast 2DS	Fast Two-Dimensional Stereo
GCAS	GEOstationary Coastal and Air Pollution Events Airborne Simulator
GEDI	Global Ecosystem Dynamics Investigation
GEMx	Geological Earth Mapping Experiment
G-LiHT	Goddard's LiDAR, Hyperspectral & Thermal Imager
HQ	Headquarters
IGARSS	International Geoscience and Remote Sensing Society
INAIGEM	Instituto Nacional de Investigación en Glaciares y Ecosistemas de Montaña
INSPYRE	Njected Smoke and PYRocumulonimbus Experiment
IR	Infrared
ISRO	Indian Space Research Organisation
ISS	International Space Station
JPL	Jet Propulsion Laboratory
JSC	Johnson Space Center
LaRC	Langley Research Center
LiDAR	Light Detection And Ranging
LIF	Laser Induced Fluorescence
LIP	Lightning Instrument Package
LVIS	Laser Vegetation Imaging Sensor
MASTER	MODIS/ASTER Airborne Simulator
MMS	Meteorological Measurement System

Acronym List

MODIS	Moderate Resolution Imaging Spectroradiometer
MOUDI	Microorifice Uniform Deposit Impactor
MVIS	Miniature Video Imaging System
NASA	National Aeronautics and Space Administration
NCAR	National Center for Atmospheric Research
NISAR	NASA-ISRO Synthetic Aperture Radar
NMASS	Nucleation Mode Aerosol Size Spectrometer
NOAA	National Oceanic and Atmospheric Administration
NSRC	National Suborbital Research Center
NSTA	National Science Teaching Association
OCONUS	Outside the Contiguous United States
PALMS-NG	Particle Analysis By Laser Mass Spectrometry – Next Generation
PDR	Preliminary Design Review
PIRS	Pyro-Atmosphere Infrared Sounder
PUTLS	Particles in the Upper Troposphere/Lower Stratosphere
pyroCb	pyrocumulonimbus
RASTA	Radar Airborne System Tool for Atmosphere
SABRE	Stratospheric Aerosol processes, Budget and Radiative Effects
SAMI	SCIFLI Airborne Multispectral Imager
SAR	Synthetic Aperture Radar
SARP	Student Airborne Research Program
SCIFLI	Scientifically Calibrated In Flight Imagery
SDSU	San Diego State University
SERNANP	Servicio Nacional de Áreas Naturales Protegidas por el Estado
S-HIS	Scanning High Resolution Interferometer Sounder
SOAP	Spectrometers for Optical Aerosol Properties
SOFRS	Science Operations Flight Request System
SP2	Single Particle Soot Photometer
STV	Surface Topography and Vegetation
SWIR	Shortwave Infrared
TILDAS	Tunable Infrared Laser Direct Absorption Spectrometer
UAS	Uncrewed Aerial Systems
UASO3	UAS Ozone Photometer
UAVSAR	Uninhabited Aerial Vehicle Synthetic Aperture Radar
UCATS	Unmanned Aircraft Systems Chromatograph for Atmospheric Trace Species
UHSAS	Ultra High Sensitivity Aerosol Spectrometer
US	United States
USGS	U.S. Geological Survey
UTLS	Upper Troposphere - Lower Stratosphere
UxS	Uncrewed Systems
VCU	Virginia Commonwealth University
VSCEL	Vertical Cavity Surface Emitting Laser
WAMI	Wide-Area Motion Imaging
WFF	Wallops Flight Facility