National Aeronautics and Space Administration

EXPLORE
AIRBORNE SCIENCE NEWSLETTER
Fall 2024

Leadership Corner

NASA Airborne Science never sleeps — ok, we do on down days, but I think you'll agree as you read this newsletter that the Airborne Science community is as active as ever, developing new instruments, and exploring earth system processes all over our home planet. Summer 2024 was a truly historic flight season as we flew the DC-8 flying laboratory for the last time on the ASIA-AQ project. It was a challenging mission technically and logistically and the science and operations teams did a truly incredible job collecting science data. We'll all miss the DC-8, but look forward to bringing the next generation of large science platform, the new NASA B777 into service to support the Earth System Observatory. You'll also get to learn more about Arctic Radiation Cloud Aerosol Surface Interaction Experiment (ARCSIX) that flew the NASA P-3 and G-III over Greenland, several missions conducted by the UAVSAR and C-20A teams, including AfriSAR and ABOVE, and we included some interesting new instruments under development. We also highlight the great work of our Mission Tools Suite team on incorporating GMAO Fluid Animations and other improvements to our planning and visualization tools that serve nearly all flight missions. We're also glad to specifically highlight a few of our excellent staff for their dedication and support to flight projects. Thanks for your interest and support for Airborne Science, and please let us know how we can help move Earth Science forward.

Let's keep flying safely!

Bruce Tagg
Director,
Airborne Science Program

Derek Rutovic
Deputy Airborne Science
Program Director - Operations

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SCIENCE HIGHLIGHTS

Airborne and Satellite Investigation of Asian Air Quality (ASIA-AQ) Studied Air Quality Over Asia

Contributed by Erica Heim (NASA AFRC)

DC-8 aircraft conducts test flights at AFRC Building 703 in Palmdale, CA in preparation for its final mission, ASIA-AQ (Airborne and Satellite Investigation of Asian Air Quality). Credit: Carla Thomas / NASA

The Airborne and Satellite Investigation of Asian Air Quality (ASIA-AQ) mission was an international collaboration that aimed to understand the factors impacting air quality over major metropolitan areas in Asia.

Using models and stations on the ground, instruments on satellites, and airborne measurements from science aircraft, the ASIA-AQ study was a collaborative effort between NASA and many international partners to collect and analyze data samples across multiple locations in Asia. NASA partnered with Korea's National Institute of Environment Research, the Philippines'

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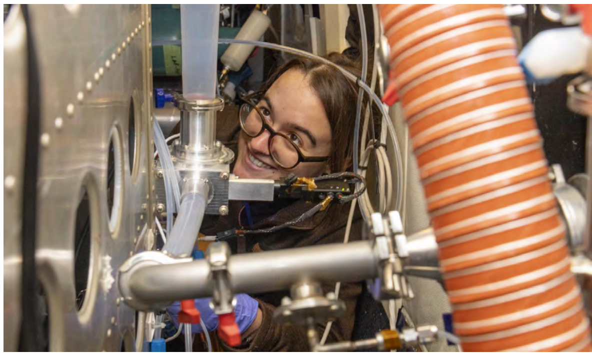
Airborne and Satellite Investigation of Asian Air Quality (ASIA-AQ) Studied Air Quality Over Asia

Department of Environmental and Natural Resources, Thailand's Geo-Informatics and Space Technology Department Agency, Taiwan's Ministry of Environment, Malaysia's University of Kebangsaan, and other local scientists, air quality agencies, and relevant government partners. More than 30 universities and 16 organizations worldwide supported this mission, and a shared-data policy facilitated meaningful scientific discourse throughout all phases of the study.

From February to March 2024, researchers flew onboard the NASA G-III and now-retired NASA DC-8 aircraft outfitted with scientific instruments specific to the ASIA-AQ mission. NASA's G-III aircraft flew 209 flight hours at high altitudes with GEOstationary Coastal and Air Pollution Events (GEO-CAPE) Airborne Simulator (GCAS) and High Spectral Resolution Lidar 2 (HSRL-2), remote sensing instruments which gather information about the column densities of nitrogen dioxide and formaldehyde as well as the profiles of aerosols and ozone. The DC-8 aircraft flew a payload of 26 instruments for 161.5 flight hours at low altitudes measuring in situ parameters related to pollution, including gas-phase and aerosol composition.

Together, the science team gathered comprehensive airborne datasets over the Philippines, South Korea, Thailand, and Taiwan, with the goals of 1) validating and interpreting satellites (including South Korea's Geostationary Environment Monitoring Spectrometer, or GEMS), 2) quantifying and verifying emissions, 3) evaluating models, and 4) understanding regional aerosol and ozone chemistry. The collaborative and international spirit of ASIA-AQ endures, as scientific discussions of these gathered data continue today.



Kat Ball, Chemical Engineering Ph.D. candidate at Caltech, attends to the Chemical Ionization Mass Spectrometer (CIMS) rack onboard the DC-8 aircraft at AFRC Building 703 in Palmdale, CA. Credit: Steve Freeman / NASA

Arctic Radiation-Cloud-aerosol-Surface-Interaction eXperiment (ARCSIX) Takes Flight Over Greenland

Contributed by Patrick Taylor (NASA LaRC), Sebastian Schmidt (LASP), Dan Chirica (NASA ARC)

The role of the Arctic within the global climate system is changing. Over the last 40 years, we have watched the Arctic sea ice pack transformed from a predominantly thick, multi-year sea ice to a predominantly thin, seasonal sea ice, termed the "New Arctic." This transformation of the Arctic sea ice is not only impacting the Arctic climate system but sends ripples across the globe. Substantial uncertainty exists in our understanding of the atmosphere-surface interactions within the Arctic system, and specifically the role and evolution of "goldilocks" clouds, limiting ability to anticipate how the Arctic's role in the global climate system will change in the future.

NASA P-3 on the tarmac in Greenland during ARCSIX. Credit: Joseph Schlosser / NASA

To better understand these drastic Arctic changes, an airborne campaign titled "Arctic Radiation-Cloud-aerosol-Surface-Interaction eXperiment," or ARCSIX, took place for approximately 7 weeks during May and August 2024. The campaign, which was based at Greenland's Pituffik Space Base, consisted of two airborne deployments: May 24 to June 16, 2024, and July 22 to August 16, 2024. These two periods were selected to bookend the sea ice melt season and capture sea ice properties and atmospheric characteristics at the beginning and near the end.

ARCSIX science is guided by three broad science questions that encapsulate the key influences of radiation-cloud-aerosol-sea ice

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Arctic Radiation-Cloud-aerosol-Surface-Interaction eXperiment (ARCSIX) Takes Flight over Greenland

coupling and a remote sensing and modeling objective:

- **Science Question 1 (Radiation):** What is the impact of the predominant summer Arctic cloud types on the radiative surface energy budget?
- **Science Question 2 (Cloud Life Cycle):** What processes control the evolution and maintenance of the predominant cloud regimes in the summertime Arctic?
- **Science Question 3 (Sea Ice):** How do the two-way interactions between surface properties and atmospheric forcings affect the sea ice evolution?
- **Remote Sensing and Modeling Objective:** Enhance our long-term space-based monitoring and predictive capabilities of Arctic sea ice, clouds, and aerosols.

ARCSIX Science Team pose in front of the NASA P-3 and NASA G-III in a hangar in Greenland. Credit: Dan Chirica / NASA

The ARCSIX campaign was highly successful and collected a first-of-its-kind dataset that will be used for decades to understand the drivers of Arctic climate. ARCSIX flew the NASA P-3, the NASA G-III, and the SPEC Learjet in coordination. The G-III—the high-flyer—served as a bridge to satellite observations by surveying with remote sensing instruments from above while the P-3—the low-flyer—acquired in situ aerosol, cloud, atmospheric, and surface properties along with radiation below, above, and inside cloud layers. The SPEC Learjet carried a full suite of cloud microphysical measurements and a newly developed cloud radar. In total, the campaign collected approximately 347 science flight hours:

- NASA P-3 completed 19 science flights (179.5 flight hours traversing >47,000 miles)
- NASA G-III completed 15 science flights (127 flight hours traversing >52,000 miles)
- SPEC Learjet completed 10 science flights (>40 flight hours)

Over the course of the campaign, we observed the dramatic change in surface conditions from snow-covered sea ice to widespread melt ponds, a ~0.5 meters (~1.5 feet) loss of sea ice thickness from our sea ice buoys, a major sea ice loss event off the northeast coast of Greenland that extended to the pole, many cases of newly formed ice crystals in "warm" ice clouds (temperatures from -2 to -7°C), and a wide range of atmospheric aerosol types (e.g., dust, smoke, soot, and marine aerosol). ARCSIX brought together scientists from more than 22 different institutions—both domestic and international—and accomplished over a dozen satellite coordination events. Lastly, ARCSIX successfully coordinated all three aircraft on four cloud walls. These unique data will enable the team to quantify the contributions of surface properties, clouds, aerosol particles, and precipitation to the Arctic summer surface radiation budget and sea ice melt, and much more. For the most up-to-date information see our website: *https://espo.nasa.gov/arcsix/content/ARCSIX*

Geological Earth Mapping Experiment (GEMx)

Contributed by Kevin Reath (NASA HQ), Brenna Biggs (NASA ARC / BAERI-NSRC)

The Geological Earth Mapping Experiment (GEMx) is a joint campaign between NASA and the U.S. Geological Survey (USGS) to map portions of the southwest United States for critical minerals using advanced airborne imaging.

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). Many of these critical minerals are used for the development of green infrastructure such as renewable energy generation. The U.S. needs better natural resource

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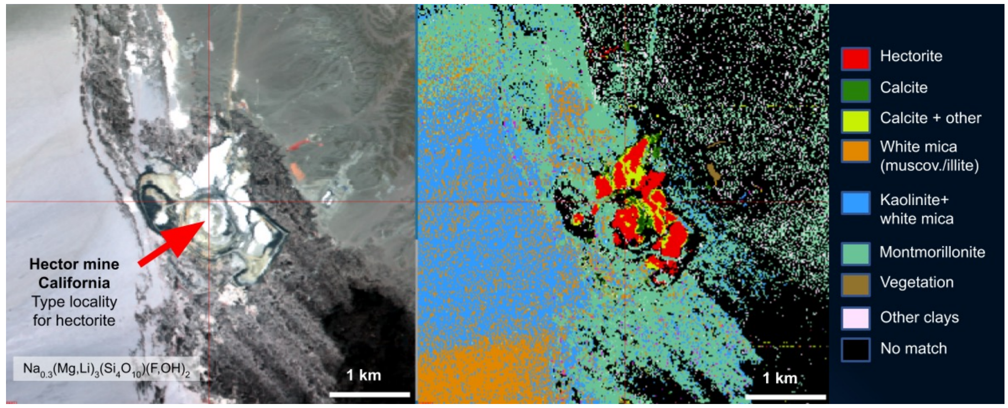
Geological Earth Mapping Experiment (GEMx)

mapping to understand how to best mitigate this risk.

GEMx is a multi-year mission collecting measurements spanning visible through infrared over 500,000 km^2 of the Southwestern United States to identify and map minerals at 15 m^2 resolution. In the 2024 campaign (April to June 2024), the following instruments flew over 311,000 km^2 in 140 science 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)
- MODIS/ASTER Airborne Simulator (MASTER)



An example of data from GEMx showing lithium-bearing minerals in Nevada and California. Credit: Raymond Kokaly / USGS

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) and the upcoming NASA Earth System Observatory.

These data will also be useful for the development and refinement of algorithms for the Surface, Biology, and Geology (SBG) mission recommended by the National Academies of Science, Engineering and Medicine (NASEM).

A photo of the NASA ER-2 high-altitude aircraft with the AVIRIS and HyTES instruments installed. Credit: NASA

Africa Synthetic Aperture Radar (AfriSAR) II 2024 Campaign

Contributed by Yunling Lou (JPL)

Taking place between May and July 2024, the AfriSAR II campaign surveyed forests and wetlands to provide an unprecedented view of tropical ecosystems in Western and Central Africa. The NASA C-20A supported sequential deployments with two Uninhabited Aerial Vehicle Synthetic Aperture Radar (UAVSAR) instruments,

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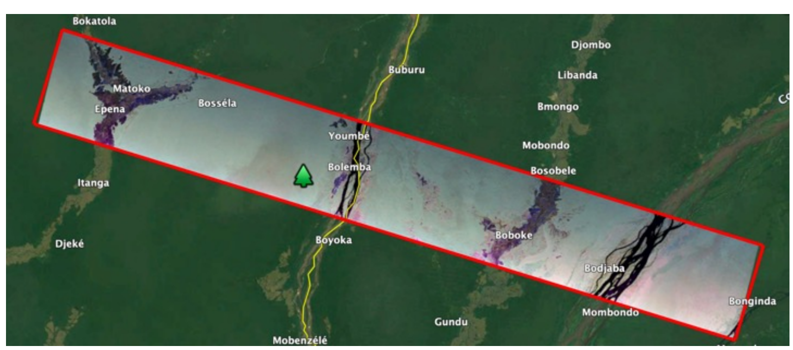

UAVSAR L-band imaging forests and peatlands in DRC and RoC. Credit: Yunling Lou / NASA JPL

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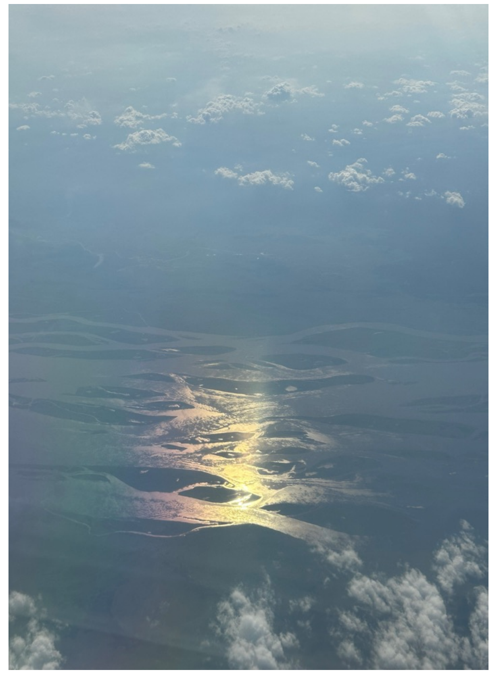
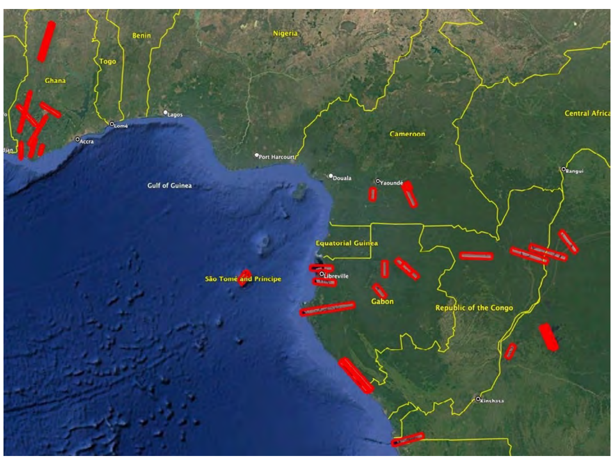
Africa Synthetic Aperture Radar (AfriSAR) II 2024 Campaign

first carrying the P-band UAVSAR (5/20/24 to 6/11/24), then returning to California to pick up the L-band UAVSAR to support a second deployment (6/26/24 to 7/14/24). This effort generated P-band coverage of 18 study sites in Ghana, São Tomé and Príncipe, Cameroon, Gabon, Democratic Republic of Congo (DRC), and Republic of Congo (RoC), collecting a total of 51 flight lines. The L-band also collected 66 L-band datasets covering 16 study sites in Cameroon, Gabon, DRC, and RoC.

The AfriSAR II campaign was designed to complement and augment the airborne observations from the German Aerospace Center's (DLR) Gabon-X 2023 campaign as well as from the Land Vegetation Ice Sensor (LVIS) sensor that flew aboard the NASA G-III in 2023. This joint effort has produced the richest airborne dataset to date of the Congo Basin, filling important knowledge gaps for scientists and fostering collaboration between NASA, the European Space Agency (ESA), DLR, and African institutions. The resulting studies will inform the design of biomass mapping algorithms by the NASA-ISRO SAR (NISAR) and ESA's Biomass missions. Both include spaceborne radars planned to launch in 2025.



A view of the Congo River from the NASA C-20A. Credit: J. Piotrowski / NASA AFRC



During the AfriSAR II 2024 campaign, UAVSAR's P-band and L-band radars imaged 26 study sites in Ghana, São Tomé, Cameroon, Gabon, RoC and DRC.

Pilots K. Stallings and C. Worth flying the NASA C-20A. Credit: J. Piotrowski / NASA AFRC

The AfriSAR II team celebrates July 4th in São Tomé (L-R: K. Stallings, E. Torres, T. Renfro, J. Piotrowski, I. Mata, C. Worth, T. Miller, A. Vaccaro, and R. Applegate). Credit: J. Piotrowski / NASA AFRC

The **Conical Scanning Millimeter-wave Imaging Radiometer – Hyperspectral** (CoSMIR-H) and the **Microwave Barometric Radar and Sounder** (MBARS): Testing New Instrument Technology

Contributed by Rachael Kroodsma (NASA GSFC)

The ER-2 lands at Edwards Air Force Base after completing a flight. Credit: Carla Thomas / NASA

Engineering check flights are an essential step when operationalizing new airborne instruments. Two new instruments, the Conical Scanning Millimeter-wave Imaging Radiometer – Hyperspectral (CoSMIR-H) and the Microwave Barometric Radar and Sounder (MBARS), flew on the NASA ER-2 out of NASA AFRC in July 2024 for the first time. Both instruments were funded by the NASA Earth Science Technology Office. They performed extremely well throughout the brief campaign, and observations collected from the five check flights provided valuable information to the instrument teams to further optimize instrument performance prior to flying again in the Westcoast & Heartland Hyperspectral Microwave Sensor Intensive Experiment (WH^{2}yMSIE) campaign in late 2024.

Modified from the well-established CoSMIR sensor, CoSMIR-H is a passive hyperspectral microwave (HMW) sounder developed at NASA GSFC. It uses new digital spectrometer technology to provide thousands of channels at high spectral resolution around the oxygen absorption lines at 50-58 GHz and the water vapor absorption line at 183 GHz. Observations from CoSMIR-H will advise on current knowledge gaps in HMW sounding and inform decisions on future space-borne HMW sensors.

MBARS, jointly developed by NASA GSFC and NASA LaRC, is a combined active/passive microwave sensor in the absorption V-band (64-70 GHz). It consists of an innovative scanning multi-channel differential absorption radar (DAR) to estimate column oxygen and dry air surface pressure over the ocean. Observations from MBARS will demonstrate the technology to retrieve atmospheric surface pressure from aircraft and satellites, enabling key remote sensing data over the world's oceans.

The ER-2 flight plans were focused on providing calibration and validation for the new instruments. The flight tracks included observations over buoys and pressure gradients for MBARS, and a MetOp-B satellite overpass and water vapor gradient mapping for CoSMIR-H. The National Airborne Sounder Testbed – Interferometer (NAST-I) from LaRC also flew as a piggyback instrument to test a new installation location on the ER-2. All three instruments will be part of a larger payload on the ER-2 in Oct-Nov 2024 for WH^{2}yMSIE, which will serve as a future NASA Planetary Boundary Layer (PBL) mission prototype.

CoSMIR-H and MBARS teams perform instrument checkouts prior to the first campaign flight. Credit: Steve Freeman / NASA

ABoVE 2024 L-band SAR Airborne Campaign

Contributed by Charles Miller (NASA JPL) and Milan Loiacono (NASA ARC)

The ABoVE team conducted airborne L-band SAR surveys across northwestern Canada, Alaska, and British Columbia from August 13-26, 2024. They hosted Canadian First Nations VIPs, graduate students, and ABoVE colleagues. They also held open house events in Yellowknife, Northwest Territories (NT), attended by approximately 200 members of the public, and Fairbanks, Alaska, attended by approximately 150 people.

Visitors queued up to tour NASA-802 in Yellowknife, NT on 15 August 2024. More than 200 people attended the ABoVE open house. Credit: NASA

Canadian students being interviewed by CBC Radio after their flight with the ABoVE L-band SAR team on 15 August 2024. Credit: NASA

The 2024 airborne campaign covered approximately 75 transects that had been flown for repeat pass interferometry since 2017. The flights in 2024 used the L-Band UAVSAR instrument on the NASA C-20A and focused on areas that were devastated by the record-setting 2023 Canadian fires, particularly the transect extending over Enterprise, NT and Hay River, NT. This was also the first opportunity to observe the damage to the Scotty Creek Research Station caused by the October 2022 fires.

The airborne team coordinated flights with the field teams to make simultaneous on-the-ground measurements to validate their data products. Additionally, the teams coordinated flights over the Fort Yukon, AK area with members of the Surface Water Ocean Topography (SWOT) science team, validating the SWOT lake and river water surface elevation products.

More information about the ABoVE mission can be found at *https://doi.org/10.5194/essd-16-2605-2024*

The contrail of NASA C-20A casts its shadow onto Kluane Lake, Yukon, Canada. Credit: Peter Griffith / GSFC

The ABoVE L-band SAR team after completing a survey of the Mackenzie Valley and northeastern Alaska on August 18, 2024. Credit: NASA

Another legendary ABoVE logistics office BBQ. Credit: Peter Griffith / GSFC

Uncrewed Systems Study Fires in Missoula for FireSense

Contributed by Jennifer Fowler (NASA LaRC) and Jackie Schuman (NASA ARC)

Over the past 30 years, only 2% of fires in the United States have escalated into large fires, yet these account for most of the fire-related costs, acres burned, and public threats. Preventing new fires from becoming large or effectively managing existing large fires is crucial for improving wildland fire outcomes. One effective approach is to improve weather forecasts focusing on wind.

Wind is a major factor in fire fatalities, public threats, and unexpected fire growth. To better predict and respond to extreme fire behavior, wind shear, and superheated gases, there is a need for enhanced tactical microclimate wind forecasting. Additionally, wildfire flame fronts and convection columns containing superheated gases can impair aircraft performance and safety during wildland fire operations. Collecting real-time or near-real-time three-dimensional atmospheric data during wildland fire operations is vital for both ground activities and aviation safety. Traditionally, weather balloons have been used for vertical soundings to identify boundaries signifying changes in the atmosphere, but their use is now restricted due to aircraft operations. New technologies are needed to fill this critical measurement gap.

Preparing the Alta-X for takeoff in Missoula, MT on August 27, 2024. Credit: Milan Loiacono / NASA ARC

The NASA FireSense project is focused on delivering NASA's unique Earth science and technological capabilities to operational agencies, striving to address challenges in U.S. wildland fire management. We are focusing on four use-cases to support decisions before, during, and after wildland fires. These include the measurement of pre-fire fuels conditions, active fire dynamics, post-fire impacts and threats, as well as air quality forecasting, each co-developed with identified wildland fire management agency stakeholders.

Addressing the need for enhanced tactical microclimate wind forecasting aligns with the FireSense use cases. Using a holistic approach, technology transfer also pairs with understanding what data to collect, where, and when it will lead to better forecasts. Further exploration into artificial intelligence (AI) computing, along with airborne weather sensors and data links is required.

In collaboration with MITRE Corporation and Environmental Systems Research Institute, Inc. (Esri), a technology demonstration of Uninhabited Aerial Systems (UAS) for atmospheric vertical soundings was held in Missoula, MT, from August 27 to 29, 2024. This demonstration featured a NASA-designed payload on an Alta-X drone—consistent with current United States Forest Service (USFS) UAS operational platforms—and included co-located balloon soundings for data validation.

The Alta-X UAS taking off in Missoula, MT, on August 27, 2024. Credit: Milan Loiacono / NASA ARC

THE MISSOULA CAMPAIGN

Robert McSwain, the FireSense UAS Lead, described Missoula as an "alignment of stars" for the campaign: the complex mountain terrain produces erratic, historically unpredictable wind behavior, and nearby fires created the smoke-impacted environment that this technology is being developed to analyze.

Over the course of the three-day campaign, a UAS team from NASA LaRC conducted eight UAS flights to collect data. Before each drone flight, student teams from the University of Idaho and

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Uncrewed Systems Study Fires in Missoula for FireSense

Salish Kootenai College launched a weather balloon carrying the same type of sensor as the drone. "Meteorologists aren't going to immediately trust drone data," said Jennifer Fowler, FireSense Project Manager. "Balloon data are the standard. We need to validate our data against balloon data to prove that we are meeting the same data quality."

As data were gathered from both the balloon and the drone platforms, they were sent to two on-site data teams. MITRE tested high-resolution AI meteorological models and Esri created comprehensive visualizations of flight paths, temperature, and wind.

"When we talk about who's going to use the data, the meteorologists are used to the numbers," Fowler said. "But you move this onto a fire, and you have an incident commander: they don't want to see a skew-t plot. That doesn't mean anything to them. They need the data in a form that allows them to see what conditions are changing, and how. That's where MITRE and Esri come in."

Zach Holder, program manager for the USFS Incident Awareness and Assessment program observed, "this was an organized, cohesive field demonstration highlighting promising technology"—which speaks to the strength of the collaborations displayed during the deployment.

WHAT'S NEXT:
Developing this technology didn't begin in Missoula, and it won't end there. "This campaign leveraged almost a decade of research, development, engineering, and testing," said McSwain. "We have built up UAS flight capability that can now be used across NASA and will continue to innovate and improve."

Preparing for a weather balloon launch in Missoula, MT, on August 27, 2024. Credit: Milan Loiacono / NASA ARC

The NASA Alta-X and its sensor payload will head to the Southeastern United States in Spring 2025, incorporating improvements identified in Montana, where it will perform another sounding demonstration in active fire conditions, in front of practitioners in a different region who may employ this technology in the near future.

PEOPLE of Airborne Science

Two Engineers that Contributed to DC-8 Success: **Adam Webster** and **David Van Gilst**

Contributed by Gary Ash

David Van Gilst on the NASA DC-8 flying laboratory during its final mission, ASIA-AQ, in early 2024. Credit: NASA

The Airborne Science Program's DC-8 aircraft finished up its long history of science support this year. For almost two decades, two of the National Suborbital Research Center's (NSRC) engineers—Adam Webster and David Van Gilst—have been dedicated to DC-8 science, missions, and customer success amongst the other ASP platforms as well.

Having flown all over the world with the aircraft for such a long period of time, there are many stories that could be told. Adam and David spent months in Chile with Operation IceBridge (OIB) from 2010 onwards, where they perfected the art of push-starting rental cars in Patagonia. Adam had an appendectomy in Sweden. When the DC-8 recently experienced a mechanical failure during ASIA-AQ, he personally hand-carried the necessary part to Thailand with virtually no advanced notice; he has also marshalled the aircraft at remote locations when the ground crew was not available. There are many other stories that perhaps should not be written down.

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Two Engineers that Contributed to DC-8 Success: **Adam Webster** and **David Van Gilst**

Adam Webster joined NSRC in December 2005 as the Payload Integration Engineer for the NASA DC-8 Airborne Laboratory. His primary responsibilities were to plan the physical experimental layout of the aircraft for various scientific missions and to design, structurally analyze, and fabricate aircraft hardware to integrate unique scientific instruments onto the plane. Over the years, this has included 70+ unique instruments and 60+ science campaigns.

In addition to scientific instrument installations, Adam has had an integral role in the implementation of numerous aircraft platform upgrades to the DC-8 and other NASA ASP platforms including the P-3, ER-2, C-130, B-200, C-23, and multiple Gulfstream aircraft. Among other things, these upgrades included updated avionics installations and completely new aircraft onboard data/Satcom systems. Adam also maintains an extensive electronic documentation database of all the aircraft modifications and installations. In addition to his engineering roles, he was also qualified and served as Mission Director during science flights onboard the DC-8. He is currently supporting the modification effort of NASA's B777 aircraft to support future ASP science missions.

One critical lynch pin between these flying laboratories and their payloads is the onboard computer networks that allow scientists on the ground to monitor their systems and to collect data from the aircraft to process their data correctly. David Van Gilst has been the networking lead for NASA ASP over a decade and in this time has played a pivotal role as flight crew on more than 20 airborne science missions by ensuring payloads are optimally connected to the network, providing mission management, and troubleshooting during missions.

From the moment a team is notified of their flight opportunity, Dave and the NSRC team begin the engineering process of physical, electrical, and IT integration. For an aircraft like the DC-8, this could mean integrating 20 or more instruments. And with a Program as active as ASP, Dave is usually juggling several different projects during all phases of implementation, from feasibility studies and Satcom estimates for real-time data to integration and flight testing.

David started working for the Program when the DC-8 was moved temporarily to the University of North Dakota. His hard work and forward thinking were recognized immediately, and he became a critical engineer for both the DC-8 and P-3, supporting such keystone missions as OIB and numerous Earth Venture Suborbital missions, including DISCOVER-AQ, IMPACTS, and ATom.

When not working on core duties aboard the DC-8 and P-3, David has helped to develop and support networking and Satcom services for a number of aircraft in the past and present ASP fleet past, including the ER-2s and NASA Global Hawk, where he has worked with ASP personnel to develop tools, standards, and ground infrastructure to enable experimenters to new levels of access to their instruments in flight.

Adam Webster on the DC-8's final science flight over Thailand for the ASIA-AQ campaign. Credit: David Van Gilst

Recently, David has worked to replace legacy multichannel Satcom systems throughout the fleet with newer Iridium satellite network-based systems based on Certus Midband, enabling improved reliability, greater bandwidth, improved security, and considerable cost savings throughout the fleet. These upgrades, along with smaller packaging developed for deployment on aircraft outside the ASP program, have proven to be key to enabling communications in several recent campaigns including ASIA-AQ and ARCSIX. With the DC-8 retiring and being replaced by the B777, he has been tasked with supporting NASA LaRC in leading the design for the meteorological sensors, payload IT, and operator control systems.

Adam and David's dedication to NASA's mission is evident in their work ethics and positive can-do attitudes that they bring to every mission and every challenge.

Making the 'Impossible' Possible: **Meet Ansley** and **Jared from AFRC Logistics**

Contributed by Taylor Mcquain (NASA AFRC)

Photo of Ansley K. Vincent. Credit: AFRC Photolab / NASA

Photo of Jared A. Barnes. Credit: AFRC Photolab / NASA

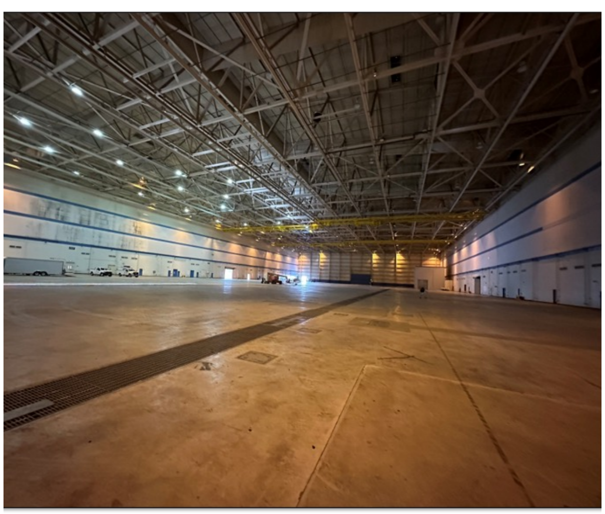
In the monumental task of exiting the NASA AFRC Building 703 (B703) hangar in Palmdale, CA, AFRC's Logistics Team achieved what some were calling "impossible." For years, NASA was leasing B703 from Los Angeles World Airports (LAWA). With SOFIA and the DC-8 Programs sunsetting, NASA no longer required the hangar and so an expedited exit was planned in order to conserve budget. B703 was once home to 5 aircraft, over 200,000 spare aircraft parts, over 80 CONEX boxes, and long hallways filled with shelves, property, and hardware. After much deliberation, AFRC was officially tasked with exiting Building 703 by September 30, 2024, a year earlier than planned.

On September 13th, 2024, NASA successfully transferred the B703 Palmdale hangar back to the possession of LAWA. While this feat required unparalleled leadership and coordination from multiple entities, ASP would like to officially recognize the AFRC Logistics Team. Previously, the AFRC Logistics Team consisted of 3 Full Time Employees (FTEs). AFRC's Chief of Logistics, Tracy J. Edmonson, coordinated with Headquarters' Logistics Management Division (LMD) to surge to build a larger team. AFRC's Logistics Team now has the following:

- 25 term surge contractors to conduct disposition on the remaining spares of two sunsetting aircraft
- 2 new permanent AFRC logistics FTEs: **Ansley K. Vincent and Jared A. Barnes.**

Ansley and Jared set a new standard for government asset management and efficiency.

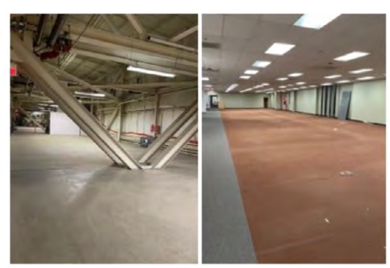
They successfully managed the clearing of a combined asset footprint spanning 19,200 ft^2 across 71 NASA-owned containers and vacated 70,860 ft^2 of fully occupied indoor warehouse space. This colossal endeavor not only freed NASA from substantial leasing costs but also set a new standard for large-scale asset management and operational efficiency. Kudos to Ansley and Jared and special thanks to the rest of the AFRC Logistics Team including Tracy J. Edmonson, Daniel R. Bartlett, and Peter C. Llanes.



NASA AFRC B703 before (Middle) and after (Left, Right) it was cleaned out. Credit: Taylor Mcquain / NASA AFRC

BEFORE

AFTER

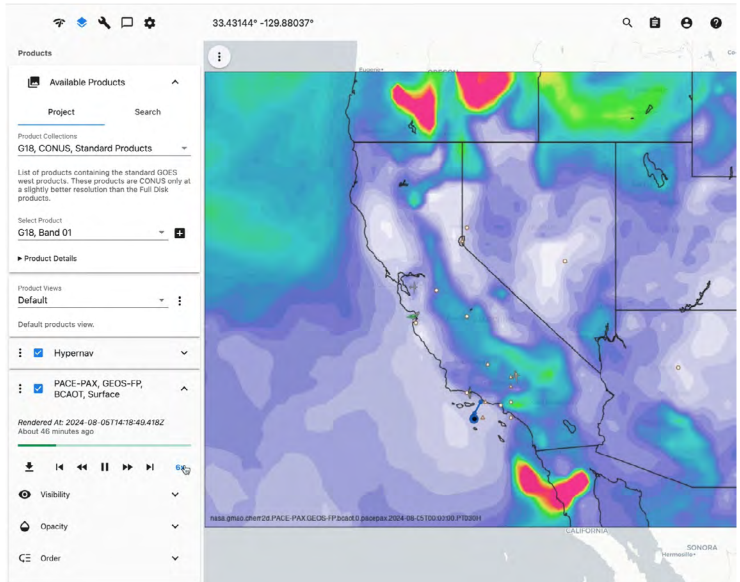


Embedding Global Modeling and Assimilation Office (GMAO) Fluid Animations in Mission Tools Suite (MTS)

Contributed by Aaron Duley (NASA ARC)

The NASA Mission Tools Suite (MTS) is a browser-based interface to NASA aircraft and payload data that enables realtime collaboration before, during, and after Airborne Science Flight projects. MTS users can now view Global Modeling and Assimilation Office (GMAO) Fluid model runs as animated layers within the MTS monitor upon request. With support from the GMAO team, individual model runs for specific fields, configured for a campaign domain, are converted into geo-rectified animated layers that can be viewed alongside other mission operational layers. These products also support real-time integration into the mission monitor display.

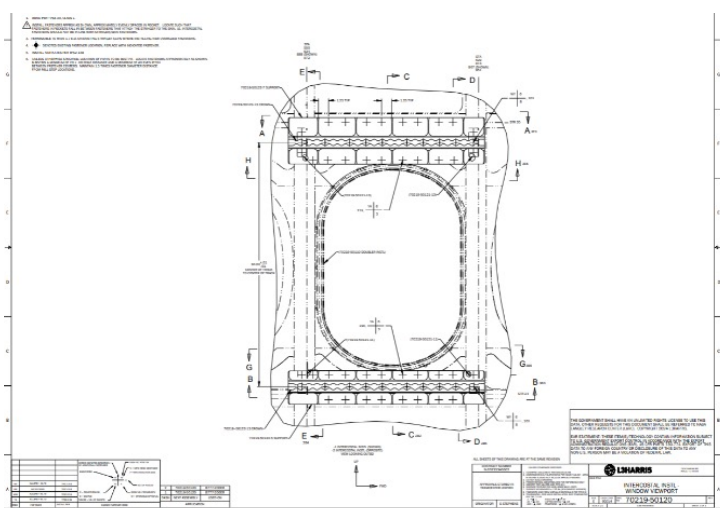
Additionally, fluid animations can be downloaded for archival purposes or integrated into other tools. As demonstrated in 2024 for both the Airborne and Satellite Investigation of Asian Air Quality (ASIA-AQ) and Plankton, Aerosol, Cloud, ocean Ecosystem Postlaunch Airborne eXperiment (PACE-PAX) missions, the fluid animation layer allows users to step through individual frames, with playback support at various speeds. Colorbars are also included as part of the layer display. The MTS team extends special thanks to Joe Ardizzone (NASA GSFC) for his collaboration in enabling this capability.



MTS interface with GMAO Fluid model run overlaid during the PACE-PAX mission in September 2024. Credit: Aaron Duley / NASA

Progress and Updates for NASA B777

Contributed Derek Rutovic (NASA HQ)



Large window viewport drawing for the B777 modifications. Credit: NASA LaRC

This past fiscal year has seen several significant achievements in the transformation of the B777 from a passenger aircraft into an airborne research laboratory, both inside and out of NASA. Progress with the modification has not transpired as quickly as anticipated due to contracting delays for the structural portals. However, the NASA team and L3Harris hit the ground running once the design contract was awarded in January 2024, reaching the Preliminary Design

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(continued from Pg. 12)

Progress and Updates for **NASA B777**

Review (PDR) milestone by May 2024, a significant achievement given the scope of this structural modification.

Substantial efforts will be required to shore the aircraft and ensure that it retains its shape to install major structural reinforcement for nadir portals and window viewports:

- Two large nadir portals (44" x 40")
- Four small nadir portals (28" x 20")
- Four large window viewports (24 x 17")

The new experimenter interface panel installed on the NASA B777. Credit: Derek Rutovic / NASA

New landing gear installed on the NASA B777 at Citadel Completions in Lake Charles, LA. Credit: Derek Rutovic / NASA

L-3 Harris is nearing completion of its design work, releasing technical drawings like the one shown above. The final contract has not been awarded for the actual modification effort; this is anticipated to occur during the first quarter of Fiscal Year 2025.

The NASA team has attempted to mitigate contracting delays by pulling forward certain activities, like scheduled maintenance, and completing them earlier than anticipated. NASA's first B777 flight was to Citadel Completions in Lake Charles, LA, where the aircraft remained for nearly four months. Over this time, Citadel completed significant maintenance: overdue inspections, FAA airworthiness directives, and a complete replacement of the landing gear.

The NASA team is also using this time to install science payload interfaces, like the experimenter interface panel shown in the figure above, connecting with the previously installed wire harnesses.

Initial Operating Capability for the B777 is slated for June 2026.

SOFRS Corner

Contributed by Vidal Salazar and Marilyn Vasques

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

Airborne Science **Website Gets Modernized**

We invite you to visit the newly revamped Airborne Science Program website! The initial migration to the new platform has been completed and additional features are on the way. Designed with a fresh, modern look and enhanced user experience, the updated site offers streamlined navigation, improved access to mission resources, and the latest updates on our cutting-edge research campaigns. When you visit the website, you'll find a few items that are still in progress

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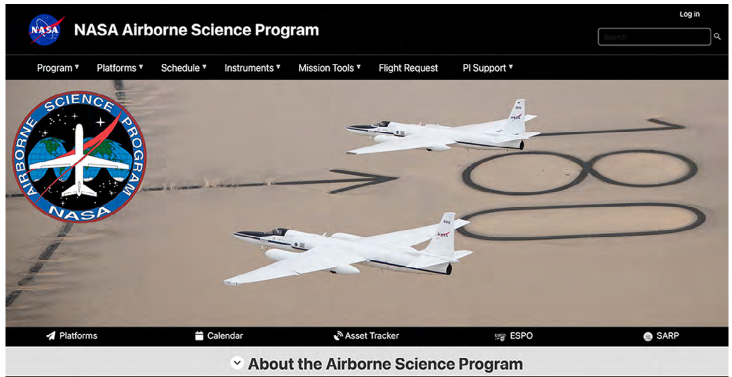
(continued from Pg. 13)

SOFRS Corner: Airborne Science **Website Gets Modernized**

(your log in will take you to your user page and some aspects of the calendar are still in progress).

Please note that access to the SOFRS side of the platform remains unchanged. Explore the new site and discover how we're contributing to NASA Earth Science.



New Airborne Science Program website home page. Credit: NASA

Calendar of Events

American Geophysical Union (AGU) Annual Meeting
December 9-13, 2024
Washington, D.C.
https://www.agu.org/annual-meeting

American Meteorological Society (AMS) Annual Meeting
January 12-16, 2025
New Orleans, LA
https://annual.ametsoc.org/index.cfm/2025/

All Scientists Meeting: Celebrating 50 Years of Toolik Research
January 16-18, 2025
Santa Barbara, CA
https://www.uaf.edu/toolik/news/all-scientists-meetings/index.php

Institute of Electrical and Electronics Engineers (IEEE) Aerospace Conference
March 1-8, 2025
Big Sky, MT
https://www.aeroconf.org/

European Geosciences Union (EGU)
April 27–May 2, 2025
Vienna, Austria
https://www.egu25.eu/

AUVSI XPONENTIAL 2025
May 19-22, 2025
Houston, TX
https://www.auvsi.org/events/xponential-2025

Japan Geosciences Union (JpGU)
May 25–30, 2025
Makuhari, Chiba, Japan
https://www.jpgu.org/meeting_e2025/

Living Planet Symposium
June 23-27, 2025
Vienna, Austria
https://lps25.esa.int/

2025 IEEE International Geoscience and Remote Sensing Symposium (IGARSS)
August 3-8, 2025
Brisbane, Australia
https://2025.ieeeigarss.org/index.php

Ecological Society of America (ESA) Annual Meeting 2025
August 10-15, 2025
Baltimore, MD
https://www.esa.org/baltimore2025/

Airborne Science Program
Platform Capabilities

Available aircraft and specs

Platform Name	NASA Center	Payload Accommodations	Duration (Hours)	Useful Payload (lbs)	Max Altitude (ft)	Airspeed (knots)	Range (Nmi)
ASP Supported Aircraft							
B777	LaRC	nadir ports, dropsondes, in situ sampling	18	75,000	43,000	500	9,000
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)	12	2,900	>70.000	410	5,000
G-III/C-20A	AFRC	UAVSAR pod	7	2,610	45,000	460	3,000
G-III	LaRC	2 nadir ports, dropsonde / sonobuoy	7	2,610	45,000	460	3,000
G-IV	LaRC	AirSAR next gen (future)	7.5	5,610	45,000	459	5,130
P-3	WFF	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, dropsonde	14	14,700	32,000	400	3,800
WB-57	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	4,100	35,000	275	1,250
Other NASA Aircraft							
B-200	AFRC	2 nadir ports	6	1,850	30,000	272	1,490
B-200	LaRC	2 nadir ports, wing tip pylons, zenith site for aerosol inlet, lateral ports	6.2	4,100	35,000	275	1,250
Cirrus SR22	LaRC	Unpressurized belly pod	6	932	17,500	175	970
Freefly Alta X (UAS)	ARC, AFRC, LaRC	Imager gimbal	1	6	8,000	35	3
SIERRA-B (UAS)	ARC	Interchangeable nose pod for remote sensing and sampling, 1 nadir port	10	100	12,000	60	600