Note from the Earth Science & Technology Managers

James Graf, Manager

Randall Friedl, Deputy Manager

Challenges abound in these uncertain times, and yet, just like the rest of the Lab, the Earth Science & Technology effort meets adversity with unyielding determination and resolve. These are difficult times for JPL, but the Earth Science community remains focused on the important work and exciting opportunities ahead.

The two JPL-managed Earth System Explorer proposals, Carbon-I and ODYSEA, make up one of the bright constellations in the Earth Science sky. Both proposals are in the site visit phase and are sure to continue to do JPL proud. NISAR, another shining star, successfully launched from India at the end of July. The launch and subsequent deployment went smoothly, and the satellite is already returning high quality radar images. High quality, detailed data is the name of the game here. SWOT, PREFIRE, and AVUELO have also returned data products that provide further understanding of Earth's processes and surface. The Lab is also expanding the technological frontier with its new Quantum Space Innovative Center and associated Quantum Gravity Gradiometer and Rydberg radar effort.

And here in the Earth Science domain, we know the data coming in is being put into practice. The CASI Report reviews local environmental risks to JPL and the surrounding communities. The Western Water Action Office provides resources to western water managers and funds projects that help mitigate the water access challenges affecting various communities.

We hope you enjoy reading about these Earth Science triumphs in this issue of the newsletter. Know that the success stories covered here and the impact of Earth Science & Technology work in general is all due to you. We thank you for your continued commitment and for your willingness to meet the challenges ahead. The horizon is bright!

In This Issue:

Highlights Across Earth Science & Technology

NISAR Launch and Deployment a Roaring Success

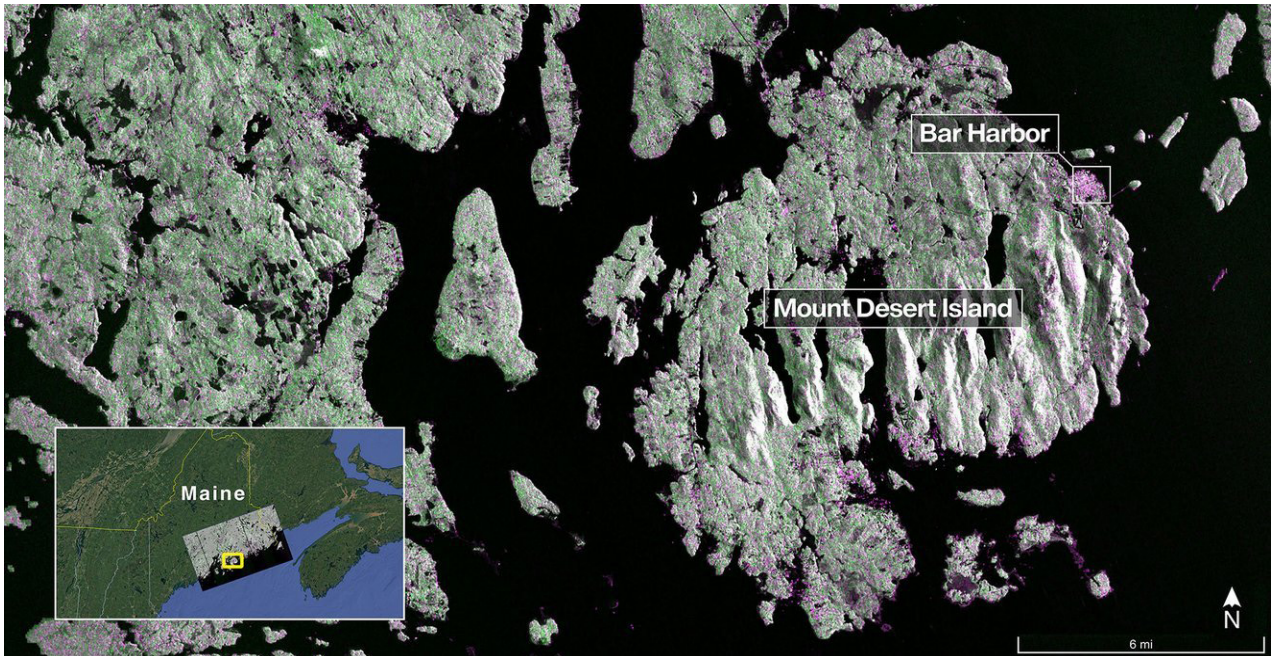


Image from NISAR's L-band radar shows Maine's Mount Desert Island (Photo Credit: NASA/JPL-Catlech)

The NASA-ISRO Synthetic Aperture Radar (NISAR) mission, designed to systematically map Earth's surface and capture data on processes ranging from ice-sheet surges and retreats to how earthquakes reshape Earth, launched from the Satish Dhawan Space Centre in India on July 30th, 2025. Both the NISAR Project Scientist, Paul Rosen, and the NISAR Project Manager, Phil Barela, attended the launch in person. "This launch was quite special, having been with the project for 14 years," said Rosen. "Getting to see and then feel and hear the launch—the experience was thrilling."

The excitement continued throughout antenna deployment. Once the ISRO Geosynchronous Satellite Launch Vehicle rocket released the satellite into orbit, the boom and the reflector had to be deployed. "It was 8 days of terror," said Barela, describing the complex, arduous deployment process. The boom was wrapped around the radar instrument structure to fit inside the launch fairing and was deployed in segments. A day went by between each segment slotting into position. "If any segments had deployed incorrectly, it would have been the end of the mission, same with the final reflector deployment," said Barela. Each reflector restraint correlated to a specific command sequence that had to be timed with the satellite's position over grounds stations for uplink. The entire deployment process required the NISAR team to be all hands on deck. "It's a highly choreographed dance between the spacecraft and the JPL and ISRO people on the ground," said Rosen, "and it was picture perfect, exactly as planned."

The satellite has reached its correct Science Orbit and is currently in the commissioning phase. During this

time, additional data is being taken to check the radar, pointing and calibration, and data downlink. To date, everything is working seamlessly. Commissioning takes about 90 days and then NISAR will move into the Science Operations phase. Already, though, the satellite is outperforming expectations: just 20 days after launch, the instrument produced high quality radar images, which bodes well for the data expected down the line.

"All NISAR data products will made available freely and openly at the Alaska Satellite Facility (ASF) Distributed Active Archive Center (DAAC) (https://search.asf.alaska.edu) once the project team is comfortable with the preliminary calibration, which we anticipate in the coming weeks," said Rosen. NISAR is unique among radar missions in that it won't just provide raw imagery to end-users; analysis-ready products with quantities closer to the actual physical processes occurring on Earth will also be provided. "We are still in commissioning and working through detailed calibration of the data," continued Rosen, "but so far the data quality is excellent: sharply focused, high contrast, beautiful. Just like we designed!"

With such a stellar launch in its rearview and a wealth of significant data on the horizon, the NISAR satellite upholds the JPL motto, "Dare Mighty Things," and promises a more complete understanding of our home planet.

JPL ESE Proposals: Status Update

(Photo Credit: NASA-JPL)

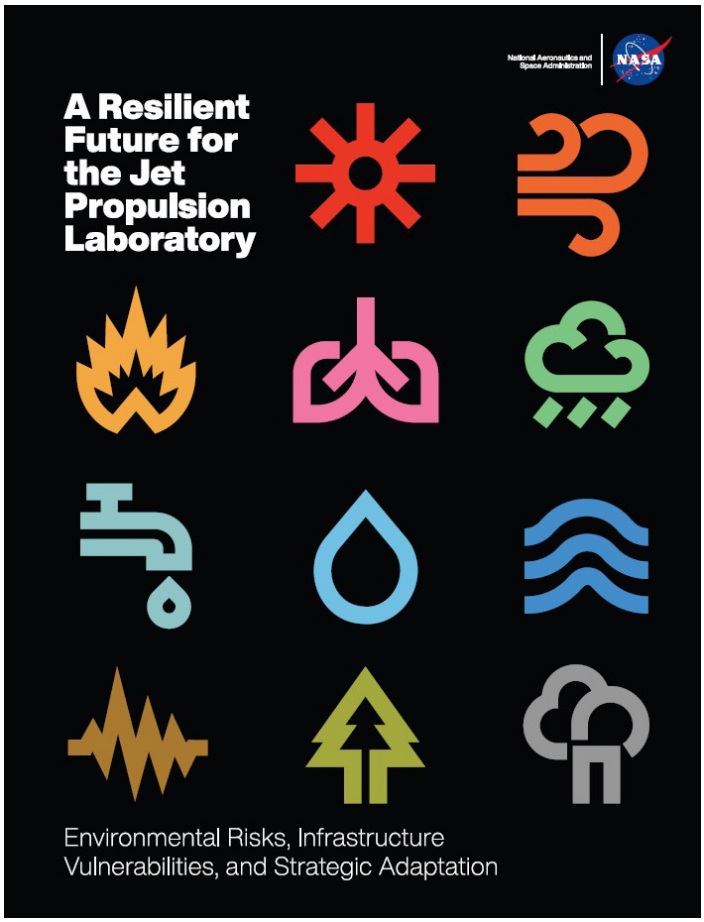
In May of 2024, NASA announced the selection of four proposals for concept studies as part of the Earth System Explorers Program. Two of the four proposals, ODYSEA and Carbon-I, are managed by the PI and the JPL team. Since the selection announcement, both teams have been devoting their time and energy to the Step-2 deliverables.

The OYDSEA mission, which stands for Ocean Dynamics and Surface Exchange with the Atmosphere, is led by PI Dr. Sarah Gille of UCSD and will use Ka-band Doppler scatterometry to provide simultaneous measurements of ocean surface currents and winds. The Carbon Investigation (Carbon-I) mission is led by PI Dr. Christian Frankenberg of Caltech and will provide simultaneous, multi-species measurements of greenhouse gases. Both concepts are responding to targeted observables identified in the 2017 Decadal Survey.

After submitting their Concept Study Reports in June, ODYSEA and Carbon-I moved on to the next critical phase in the Step-2 campaign: site visits. At these visits, teams addressed review board queries and findings directly. The ODYSEA team completed their site visit on the 11th of September, and the Carbon-I team completed their site visit on the 30th of September. Next, the PI for each concept will personally brief the NASA selecting official. The plan is NASA will make the final selection announcement by the end of CY 2025.

Groundbreaking Collaborative Report Helps JPL Prepare for the Future

JPL's instruments study Earth's changing environments and help people prepare for evolving risks, and a May 2025 collaborative report from Earth Science & Technology and JPL Facilities focuses these capabilities on JPL's home and work environments. "A Resilient Future for the Jet Propulsion Laboratory: Environmental Risks, Infrastructure Vulnerabilities, and Strategic Adaptation" draws upon both scientific data and the work of JPL's Facilities team to identify and address the Lab's environmental vulnerabilities.



The report reveals 11 environmental risks in the region and how the Lab can adapt to face them. (Photo Credit: NASA-JPL)

An initiative of NASA's Risk Analysis Science Innovators (RASI) Program, it is the first comprehensive report to focus on the resilience of a NASA center and the area where its workforce lives. Duane Waliser, JPL Research Fellow, says that the authors are distributing the report at JPL and at other NASA centers. "We are excited to show off the value of our NASA data and how it can help JPL, and also support the region we call home, safeguard against future challenges," he says.

The report is also the first collaboration between JPL's Earth Science & Technology and Facilities division. Diana Chen, Environmental Sustainability Administrator, says that "the report shows how JPL's own Earth science data can help improve and add resilience to our built environment, but it has also helped to break down the barriers between directorates and divisions." With this trailblazing cross-discipline approach, the report and its authors aim to strengthen the Lab as a whole.

The report can be downloaded here.

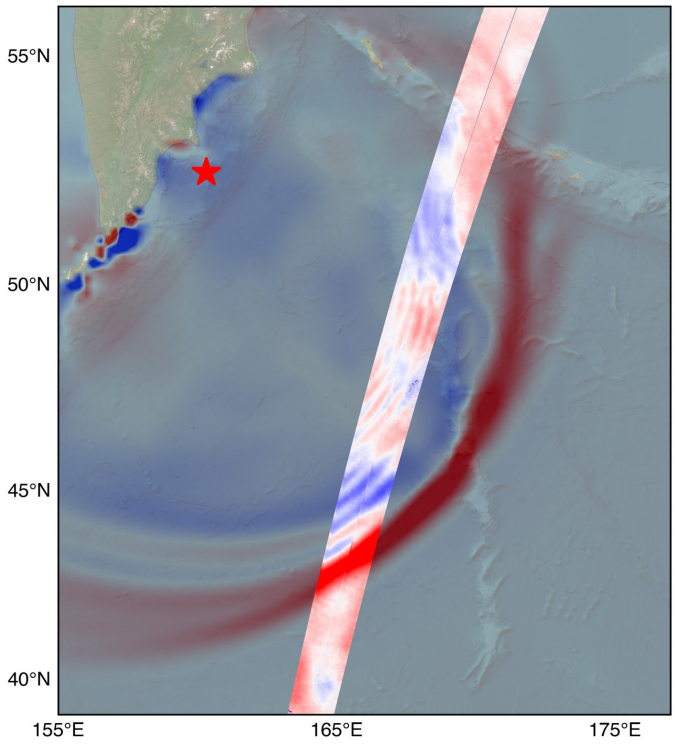
Science & Applications

Earth's Hydrosphere Has Met Its Match With SWOT

On December 16, 2022, the Surface Water and Ocean Topography (SWOT) satellite launched into Earth orbit. Initial work focused on calibration and validation of the on-board instrument measurements and associated science data products. Then attention turned towards a key mission goal: creating the first global survey of Earth's water.

While SWOT is adding important, detailed data to the 30-year record of ocean surfaces, the mission is really making history by measuring Earth's many flowing freshwater surfaces, a truly first-of-a-kind critical global variable: "That kind of measurement had never been done from space," said Parag Vaze, project manager of SWOT. It requires higher resolution data and development of new algorithms used to process that data. Initial results show that SWOT is exceeding expectations when it comes to measuring global hydrology.

"Water is in every aspect of our lives," said Vaze. "SWOT's data can impact daily lives and have economic benefits as new science applications of the data are still on the horizon." Adding to SWOT's achievements is a growing list of unexpected results too. The mission is helping to map ocean floors, track changes along coastlines, observe extreme weather events such as hurricanes and tsunamis, and potentially measure sea ice thickness at unprecedented spatiotemporal scales (learn more here). "SWOT wide-swath altimetry can, for the first time, address the needs of sea ice applications that require higher spatial coverage and temporal sampling, such as process studies, seasonal



The US-French SWOT satellite caught the leading edge of a tsunami wave (red) after a massive earthquake near Russia on July 30. The basemap is the prediction by NOAA of the tsunami. (Photo Credit: NASA/JPL-Caltech)

forecasts, and navigation," said SWOT scientist Sahra Kacimi. These results are expanding scientific capabilities and our understanding of our planet.

Readers can access SWOT data here.

AVUELO Campaign Collects Data on Tropical Rainforests

The AVUELO campaign logo is a harpy eagle, the national bird of Panama. The eagle's shape mimics the contours of Costa Rica coming down into Panama. (Photo Credit: NASA/JPL)

This past February, the Airborne Validation Unified Experiment: Land to Ocean (AVUELO) campaign collected data on tropical vegetation in Panama and Costa Rica. The month-long, multi-disciplinary effort involved simultaneous airborne and in situ data collection and was supported by NASA, the Smithsonian Tropical Research Institute (STRI), the University of Wisconsin-Madison, the Panama Ministry of Environment, and other universities and organizations.

AVUELO fills a gap in the coverage provided in the Arctic (ABoVE), the mediterranean systems (SHIFT), the unique Cape Floristic Province (South Africa), and the diverse North American systems (NSF's NEON observatory, which uses JPL-built instruments). Prior to AVUELO, no other campaign collected airborne hyperspectral and in situ plant trait data contemporaneously with space-based data, and the data that had been collected on tropical vegetation wasn't openly available.

AVUELO addressed this gap and the need for openly available data by combining airborne imaging spectroscopy with a field campaign to collect vegetation following NASA's open science procedures. The AVUELO team collected 949 samples of 464 distinct species of vegetation from lowland forest, montane forest, and mangrove forests. The vast majority of tree diversity is in the tropical forest biome, and AVUELO provides a first pass at global pan-tropical vegetation analyses.

The significance of AVUELO extends beyond the sheer biodiversity sampled. Local collaborators were able to make requests to study areas outside of the core regions of interest identified by STRI. For example, the Panama Ministry of Environment expressed interest in a number of national parks, and the data AVUELO collected will empower the ministry to continue protecting, preserving, and managing those biodiverse regions.

Looking ahead, the AVUELO team hopes to return to Panama once the campaign data has been analyzed to continue their outreach efforts and teach workshops on how to analyze and use the data from these areas of biological and cultural importance.

You can read more about the AVUELO campaign in the Notes from the Field blog.

CloudSat Advanced Our Understanding of Clouds and More

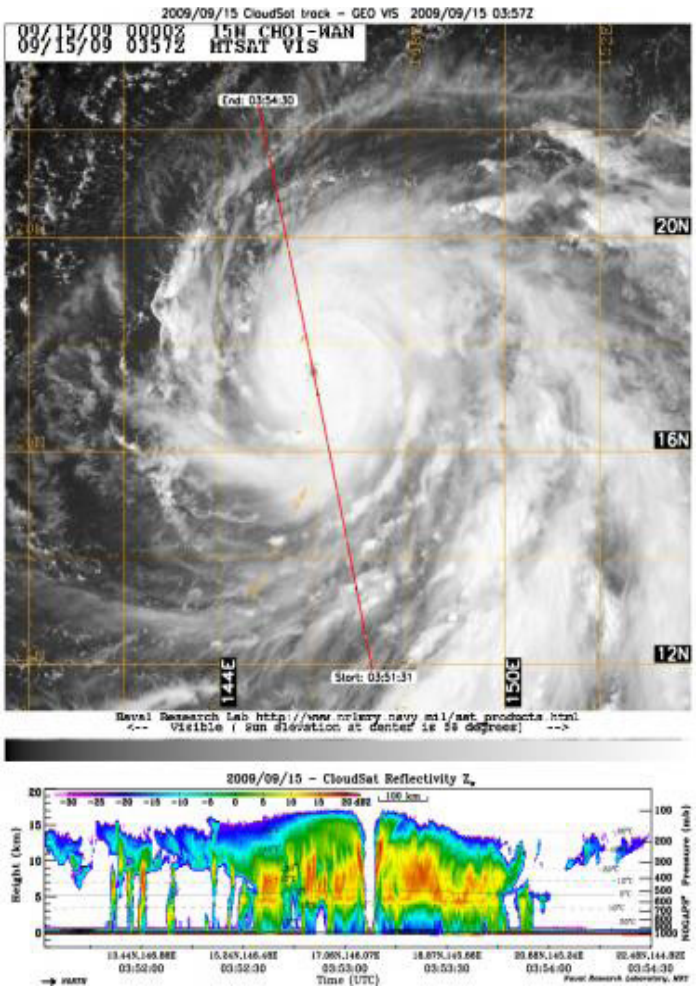
Launched on April 28, 2006, CloudSat, a joint endeavor between NASA JPL and the Canadian Space Agency, aimed to study Earth's clouds. To do that, the CloudSat team needed to put a radar in space that measured at 94 gigahertz.

"Before we launched, we would have been happy if the instrument worked for a year, because it was so new and had never flown in space before," said Deborah Vane, operations project manager of CloudSat. "But it worked beautifully for nearly 18 years."

From the beginning, the mission was full of firsts: It was the first time that two satellites, CloudSat and CALIPSO, flew in a tight formation. The first observations of global condensed water and ice in the atmosphere. The first measurements of lighter precipitation, including snowfall, and of the vertical profile of clouds around hurricanes that advanced research on rapid intensification of hurricanes.

But for Deborah Vane, the biggest achievement was the teamwork. "The whole team was so creative and worked hard to find ways to keep CloudSat going, even when there was a major battery failure five years into operation," said Vane. "Every single time we managed to come back to life."

Due to limited fuel, CloudSat ended its operations in April 2024 but left a legacy that will continue for decades.



CloudSat flew over Typhoon Choi-wan on September 15, 2009 (top). It measured a cross-section of cloud reflectivity showing the typhoon's vertical cloud structure (bottom).
(Photo Credit: NASA/JPL)

NASA's Western Water Action Office Provides Valuable Water Data to Communities Across the Western U.S.

"Water is Life" art on tribal lands. (Photo Credit: NASA)

The Western Water Action Office (WWAO) is a NASA program office located at JPL. The cross-center effort reports directly to the NASA Water Resources program and aims to accelerate the use of NASA Earth science information and research for water management decisions in the western U.S.

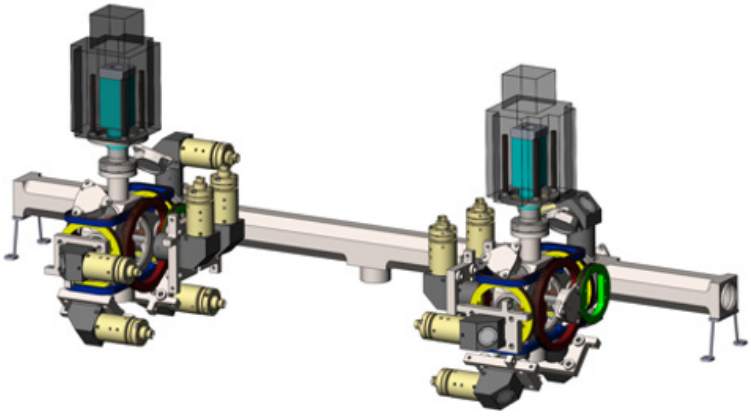
WWAO has a three-pronged approach: 1) develop trusted, collaborative relationships with western water managers at the federal, state, and municipal levels; 2) understand the unique challenges facing these communities and fund projects to address their most critical needs; and 3) transition the successful projects to sustained, long-term use.

To date, WWAO has funded over 30 projects that address a wide range of issues—from impacts to water supply post wildfires in the Pacific Northwest to groundwater depletion. Historically, these projects relied heavily on Landsat, but, over time, WWAO has broadened their end-users' horizons by bringing in data from a wider variety of NASA sensors and models, like the Land Data Assimilation System at NASA Goddard.

The positive impact of WWAO's efforts are a direct result of the partnerships with western water managers. One such success story can be found in WWAO's collaboration with the Navajo Nation. The Navajo Nation is located in the southwestern U.S., and water access in that region can be highly variable. Working together, NASA and the Navajo Nation developed the Drought Severity Evaluation Tool, which provides satellite data, modeled inputs, and in-situ data at fine resolution, allowing emergency drought relief resources to be distributed more equitably across the Navajo Nation. The positive reception for this tool was such that NOAA has picked up the project to implement with the Chickasaw Nation.

Looking ahead, WWAO will continue homing in on the biggest water problems facing the western U.S. and applying observations from multiple sources—GRACE-FO and NISAR promise data on high-plains aquifers, while SWOT and other sensors can be used for drought and flood modeling. WWAO's work is critical to ensuring communities are best equipped to meet their water needs.

JPL's QSIC Lays Groundwork for a Spaceborne Quantum Demonstration



A conceptual design of Atom Interferometer for QGG. (Photo Credit: NASA/JPL)

The Quantum Space Innovative Center (QSIC) is a virtual center focused on developing, maturing, and testing quantum technologies that have the potential to streamline the technical aspects of space exploration and reduce budget. Two quantum technologies for quantum remote sensing currently in development stand out.

The first is the Quantum Gravity Gradiometer (QGG) funded by NASA ESTO. The QGG offers high precision mass change measurements using a cold atom cloud. This kind of technology would be valuable for a range of missions, from earth science to other planetary ocean worlds to ice giants. It also eliminates the need for a second spacecraft (like in the GRACE mission) and because QGG can be housed on the same spacecraft. The goal is to demonstrate this technology in flight by 2031.

The second technology is the Quantum Rydberg Radar (QRR). One of the current challenges in radar technology is that you need multiple bands for penetration and resolution of 3-D structures (e.g., vegetation on the Earth's surface.) It can be costly and cumbersome to have multiple instruments to account for all bands. The QRR allows you to detect all frequencies with a single receiver by auto-tuning to different microwave signals.

In addition to developing these and other technologies, QSIC is also holding workshops to attract new talent with support from the Quantum Hub whose members consist of 8 universities. QSIC's efforts help ensure JPL is best positioned to lead spaceborne missions in the future.

Spotlight on Talent

Sina Hasheminassab (329J)

What do you do at JPL?

I'm an air quality scientist in the Aerosols and Clouds Group, where I lead the development and coordination of a global ground-based particulate air pollution monitoring network for NASA's Multi-Angle Imager for Aerosols (MAIA) mission. My background spans both academic research and regulatory air quality work, which has shaped how I approach science today. I always try to think about how the research I'm working on can meaningfully address real-world needs. A big part of my role is collaborating with partners, ranging from local air districts to international agencies, to make sure the data and tools we build are not only scientifically robust but also useful for decision-making and, ultimately, for improving people's lives.

Who had the biggest influence on your career?

I've been fortunate to have great mentors, but the most influential has been Dave Diner, MAIA's Principal Investigator. Dave's thoughtful mentorship and collaborative spirit have meaningfully shaped my approach to science, especially the importance of conducting research that can make a real difference beyond the research itself.

What brought you into Earth Science?

My work sits at the intersection of Earth science and applications, which naturally aligns with Earth Science & Technology's mission. Over the years, I've had the chance to collaborate with Earth Science colleagues on projects that turn science into something tangible and useful, and those experiences have strengthened my drive to keep bridging the gap between research and application.

What is your most exciting career moment?

Joining JPL has been one of the most exciting moments in my career. Since then, seeing the impacts of the projects I'm involved in and how they are reaching communities locally in Southern California and globally, especially in underserved areas, continues to be a source of motivation and excitement for me.

What's your favorite non-work activity?

I enjoy exploring new places with my family and learning about local cultures. Lately, I've found myself drawn to contemporary art, and visiting galleries and meeting local artists has become an inspiring way to experience each place we go.

Antonio Ferraz (398P)

What do you do at JPL?

I am a Science Systems Engineer in the Applied Science Systems Engineering Group at JPL. My role is to bridge Earth Science and Applied Science with the technologies we develop at JPL and with external partners. I focus on monitoring ecosystem biodiversity using spaceborne and airborne observations. With new missions such as GEDI, HLS, EMIT, ECOSTRESS, and NISAR, we now have unprecedented amounts of environmental data. My work leverages cutting-edge AI methods—including Deep Learning and Foundation Models—to interpret large-scale ecosystem patterns across space and time. I also integrate these satellite observations with in situ data, such as vegetation inventories, bioacoustics, and animal movement datasets. This enables advancing Biodiversity Science to produce reliable data products and ensures that this information directly informs the decision-making of landscape and seascape managers, wildlife managers, and conservation practitioners.

Who had the biggest influence on your career?

My family and local community. I grew up in a rural area of Portugal that experienced dramatic changes due to agricultural abandonment, rural migration, and increasingly frequent wildfires. We lost habitats and wildlife. Watching the landscape transform from my childhood through high school shaped my determination to act. After five years of uncertainty, I pursued remote sensing in college as a way to make a tangible impact. Looking back, it was a romantic vision, but it gave me direction—and I've come a long way since.

What brought you into Earth Science?

I was invited to lead an SRTD on Biodiversity Change after a colleague moved to Europe. I also serve as Project Scientist for the NASA Internet of Animals, which is scoping the next-generation animal movement tracking systems from space to monitor biodiversity globally. In addition, I'm a member of the NASA's FIRESENSE team, which has given me opportunities to engage with other Earth scientists more often as well.

What is your most exciting career moment?

First, when my PhD project was selected by a University in Paris, France, allowing me to work with airborne laser scanning—a technology I had long aspired to learn but was not available in my country. Second, when NASA awarded me a Postdoctoral Fellowship in 2014, which brought me to JPL.

What's your favorite non-work activity?

Traveling with my family—whether locally or abroad. I love sharing places, food, languages, and cultures with my son and family. We often coordinate gatherings with extended family back in Europe or elsewhere. And I remain a loyal fan of my soccer team: Sporting Clube de Portugal.

Personnel Announcements

Dr. Bill Klipstein

Project Manager, GRACE-C

Effective August 18, 2025

Dr. Kerry Cawse-Nicholson

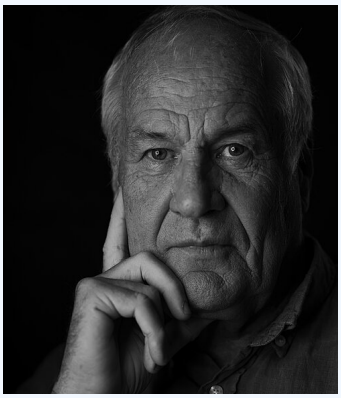
Deputy Principal Investigator, ECOSTRESS

Effective August 20, 2025

Dr. Derek Posselt

Deputy Principal Investigator, INCUS

Effective August 20, 2025



Dr. Graeme Stephens

Companion of the Order of Australia (AC)

Effective June 9, 2025

Looking Ahead

Sentinel 6-B Launch
November 2025

More Info

Inside Earth Science & Technology at JPL

Find our current org chart, integrated schedule and links to upcoming events here:
https://earth.jpl.nasa.gov

Note: Full VPN Access Required

Inside NASA ESD

For information about the Earth Science Division at NASA, including key documents available to the public, visit:
https://science.nasa.gov/earth-science

More related links:

https://earth.jpl.nasa.gov/resources/related-links/