National Aeronautics and Space Administration

# THE CRITICAL PATH

A FLIGHT PROJECTS DIRECTORATE PUBLICATION ▪ 2022 SPRING ISSUE

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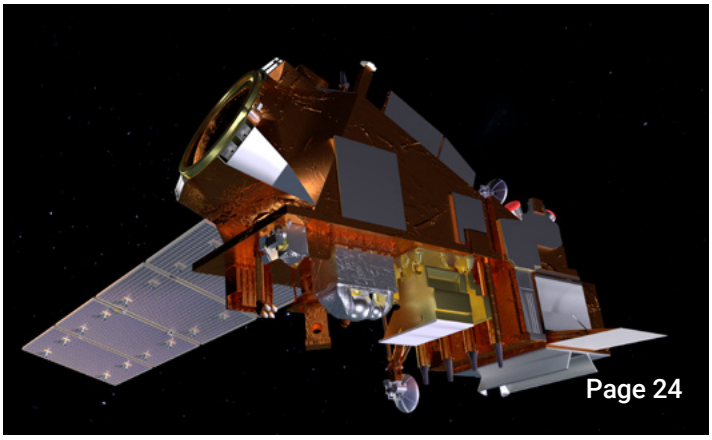
CONGRATULATIONS TO THE
## LCRD Team!

*United Launch Alliance Atlas V rocket, prior to launch of a Department of Defense mission from Space Launch Complex 41 at Cape Canaveral Space Force Station. The mission's Space Test Program Satellite-6 (STPSat-6) spacecraft hosted NASA's Laser Communications Relay Demonstration (LCRD) and the NASA-U.S. Naval Research Laboratory Ultraviolet Spectro-Coronagraph (UVSC) Pathfinder.* CREDIT: ULA





# THE CRITICAL PATH

A FLIGHT PROJECTS DIRECTORATE PUBLICATION ■ 2022 SPRING ISSUE

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# Message from the DIRECTOR

**Cynthia Simmons**

*Director*
Flight Projects

I am incredibly thrilled to have the opportunity to serve as Director of Flight Projects with Cathy Richardson as our Deputy and a new Deputy of Planning & Business Management to come onboard in the coming months. The Flight Projects Directorate (FPD) plays a crucial role on Center. We witnessed several exciting accomplishments over the past two years, despite immense challenges. Even more so, I am excited for the things we have to look forward to.

During this current transitionary period and as we determine what our new work environment looks like, I want to personally express the immense value and appreciation I have for our teams. Each of you has overcome vast challenges in our work environment but also likely in your personal lives. These past couple of years have come at a personal cost to a lot of people, especially as we chased steady progress at work with a different world behind the scenes. Within FPD, our goal is not to look backwards at how we did this pre-pandemic or during the pandemic, but how we look forward and build the future of our Directorate with the perspective of lessons learned during the pandemic. This includes enhancing our workplace with a focus on respect, enabling growth, and thriving in the way that makes each of us feel most proud in our contributions.

We have accomplished so much, yet it is natural to ask, "what's next?" As we chart new paths forward, I hope that the world occurs to us as a world of possibilities. My goal is to create a vision with you that builds upon FPD accomplishments and contributions to date to implement policies, processes, and working groups that engage and empower our staff to take part in building today's solution for tomorrow. I will be calling upon many of you to look within our Directorate and we invite everyone to be open to new ideas. In this effort, one of our focuses will be inclusion and ensuring everyone has a voice and a way to express that voice in a way that makes them most comfortable, recognizing the value and diversity of differing perspectives.

Over the next 18 months our intention is to strengthen our ability for more effective project execution, so project managers can spend more time being project managers with the support of our teams and access to the best tools across the Directorate. These solutions will continue to support and maintain our science mission directorates and the exciting work we have on the horizon. As we move forward into this new hybrid environment, as some of our team members look towards new ventures for their lives and opportunities of retirement, and as we welcome new people into our organization, our hope is to build exciting opportunities for everyone. Personally, my goal is to build on the amazing history of value that FPD has brought to the Center and the Agency as a whole. This will entail

ensuring FPD is more agile as the Agency moves forward with commercialization and the Artemis program. FPD will continue to hold onto its deep-rooted strengths while evolving our practices and approaches to support the future. With the future of work, we will need to manage workload and staffing while balancing shrinking budgets. FPD's strategic planning and its role for the Center and Agency will bring exciting opportunities.

I have dedicated an immense portion of my career to mentoring and development to help provide exposure and coaching to enable team members to seize opportunities. It has become increasingly more important for us as a Directorate to prioritize this and ensure it is available to all. This includes strengthening our capabilities and core competencies to leverage our talents and expertise. We will place greater emphasis and focus on succession planning and opportunities for those aspiring to leadership positions. Although our development pipeline is experiencing astounding competition from the outside world, our efforts to build our team and reignite passion and excitement for NASA, together with FPD being the organization that launches and manages these phenomenally interesting missions, is something we hope will continue to attract and excite new talent.

To share a little bit about my personal leadership style, my goal is to empower leaders at various levels; for our Divisions and all leaders to look for engagement and new opportunities to formulate paths forward and the opportunity to create and be part of the solution. In this vein, there will be delegation of responsibility and authority to make decisions in new areas to build our organizational leaders, which may be seen as a different model than what we are used to. It is vital that we share our successes and credibility across our team. I strive to be a collaborative leader, which is why I view empowerment to be critical for our management teams.

I realize that for many of us the coming months bring some uncertainty. Please know that we are here to support each of you and will provide as much information as possible throughout this period and beyond. Our focus is the future of our work while acknowledging the very real challenges these times of COVID continue to bring for many of our team members. On a personal level, I am autoimmune compromised, and these past few years have been a scary time as my family and I navigated this pandemic. Especially during these most unusual times, I hope that we remember to be community minded in our interactions with each other, respecting differing perspectives and understanding of fears, regarding one another as valued colleagues and partners bringing openness and honesty as we support our missions while also remaining cognizant of the needs of our staff.

Our goal is to ensure each of you can bring your true selves to work, enabling you and our missions to thrive and contributing to NASA with pride. The Critical Path will continue to celebrate our missions and represent our teams. The value of FPD is the nature of our work and our outstanding project management team, the Agency we work with, and the next generation of missions we implement. It will be an adventure that I am looking forward to making with you! ■

**Cynthia Simmons**
*Director, Flight Projects*
**cynthia.w.simmons@nasa.gov**

**"As NASA moves towards commercialization and human exploration with the Artemis program, FPD will need to become more agile to best support the Agency's strategic objectives and leadership in these areas. Over the next 18 months we have two critical priorities in support of the Center Director's objectives: our people (and pipeline) and project execution. I'm excited to be on this journey with you, and together, build today's solutions for tomorrow."**

**Cynthia Simmons**


# Successful Launch and Deployment of NASA's James Webb Space Telescope

*Liftoff from a tropical rainforest, to the edge of time itself. Webb begins a voyage back to the birth of the universe.*

NASA's James Webb Space Telescope launched aboard Arianespace's Ariane 5 rocket on Saturday, December 25, 2021, from the ELA-3 Launch Zone of Europe's Spaceport at the Guiana Space Centre in Kourou, French Guiana. Webb is an infrared telescope with a 21.3-foot (6.5 meter) primary mirror and is expected to uncover the history of the universe from the Big Bang to distant planet formation and beyond. As a joint effort with the European Space Agency (ESA) and Canadian Space Agency, the Webb mission will explore every phase of cosmic history – from within our solar system to the most distant observable galaxies in the early universe.


*Arianespace's Ariane 5 rocket launches with NASA's James Webb Space Telescope onboard, Saturday, Dec. 25, 2021, from the ELA-3 Launch Zone of Europe's Spaceport at the Guiana Space Centre in Kourou, French Guiana.* CREDIT: NASA/BILL INGALLS

**DECEMBER 25, 2021** Following its historic launch, deployment and commissioning teams at the Mission Operations Center (MOC) at the Space Telescope Science Institute (STScI) in Baltimore, Maryland set to work unfurling and unpacking the world's premier space science telescope.

**Webb's first deployment**, the extension of its solar array, occurred approximately 30 minutes after liftoff, stopping the drain on the observatory's internal battery by supplying nearly 2 kilowatts of power to drive the spacecraft's electrical systems and avionics. To enable the highest data rate communication to the ground through **NASA's Deep Space Network (DSN)**, the onboard medium and high-gain antenna platform was deployed an hour and a half later. At 12 and a half hours after launch, Webb fired its thrusters, performing the first of several critical course corrections that sent the observatory towards its final destination in orbit. The observatory passed the Moon nearly two and a half days after launch, faster than the time it took Apollo astronauts to reach lunar orbit.

**Webb's first large deployment**, the extension of its sunshield frame known as a **unitized pallet structure**, folded down nearly three days after launch, opening the observatory up to continue expanding. This represented the start of all major deployments and took approximately five hours for both front and back pallets to fold down completely.

**DECEMBER 29, 2021** Four days after launch, a **deployable tower** extended to separate the telescope mirrors and instruments from the spacecraft bus. This separation effectively isolated the telescope from vibrations and conducted heat coming from the spacecraft bus. Additionally, this extension allowed for the rest of Webb's larger deployable components, like its sunshield and primary mirror, to have enough room to make their own sequence of complex movements afterwards.

**DECEMBER 30, 2021** **Sunshield membrane deployments** formally began approximately five days after launch, as special covers that protect the sunshield during ascent were commanded to roll out of the way. Next, a critical juncture in the mission occurred when all of the **107 sunshield release mechanisms**, or special pins that keep the five sunshield layers locked into place, needed to fire on cue and pull themselves out to free the membranes. After all sunshield pins were successfully removed, two wings, known as mid-booms, extended to pull each of the sunshield layers out into their characteristic diamond formation nearly a day later. Following full deployment, each of the five layers was tensioned and separated using special pulleys and motor systems. Sunshield deployments and tensioning concluded nearly eight days after liftoff but were designed to be slowed down to circumvent any unforeseen issues if they arose. Notably, no issues with Webb's deployment occurred throughout its entire deployment sequence. The world's most complex spacecraft ever built and launched to orbit performed flawlessly.

"The Webb international partnerships are the perfect example of what can be accomplished when we, as a human race, work together to attain a common

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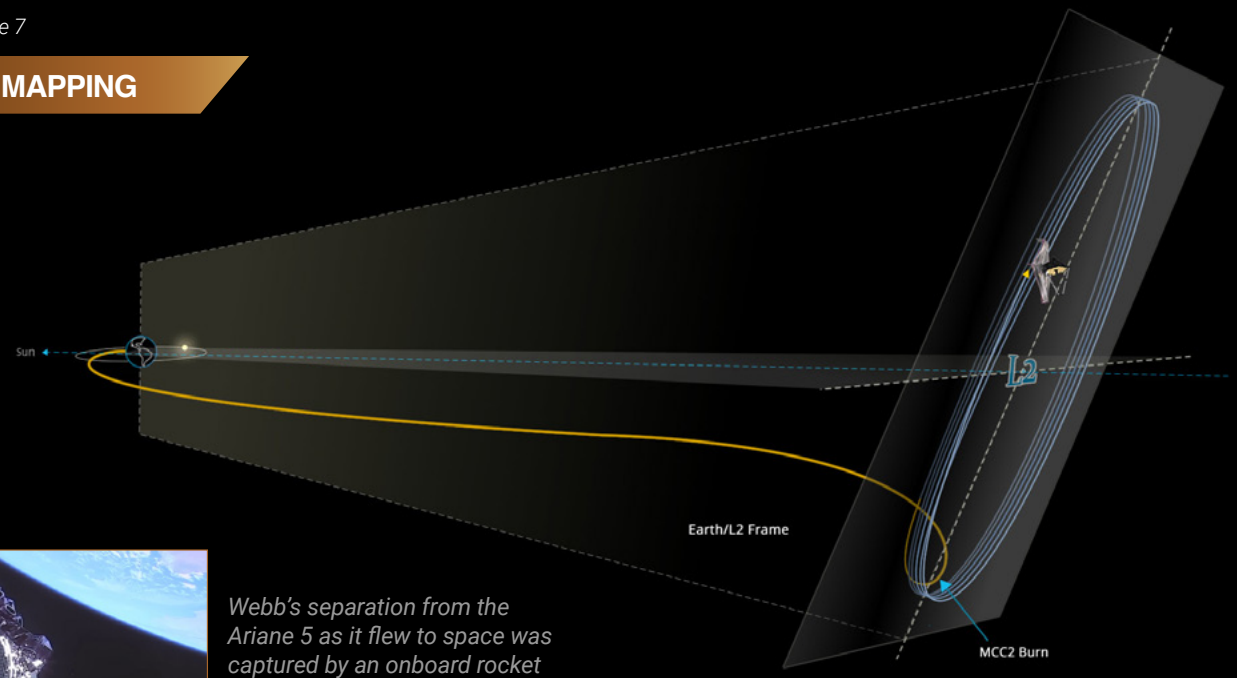
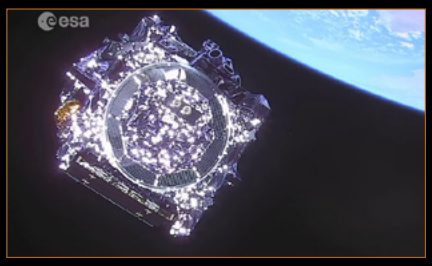
## TRAJECTORY MAPPING




*Webb's separation from the Ariane 5 as it flew to space was captured by an onboard rocket camera. Thanks to Ariane 5's highly precise launch trajectory Webb's solar array was able to deploy soon after separation.*

*The James Webb Space Telescope will not be in orbit around the Earth, like the Hubble Space Telescope is - it will actually orbit the Sun, 1.5 million kilometers (1 million miles) away from the Earth at what is called the second Lagrange point or L2.*
CREDIT: NASA

goal," said Bill Ochs, the Webb project manager at NASA's Goddard Space Flight Center. "I am so filled with pride for our team. The deployments could not have gone more perfectly. After the last wing deployment, more than one person made comments like, 'it seemed so simple; did we overstate the complexity and difficulty of the deployments?' The perfection of the deployment execution and the subsequent activities reflects directly on how hard everyone worked and the diligence and sacrifice it took on the part of so many people. The fact that it looked simple is a tribute to all those over the years who have worked towards Webb mission success."

**JANUARY 4, 2022**

Following the conclusion of sunshield tensioning, a special radiator behind the primary mirror was deployed to help cool down the **scientific instruments**. Next, Webb's optics, and NASA's new eye on the cosmos, opened up. **Telescope deployment** began by unfolding and latching into place the tripod holding the **secondary mirror**, and was scheduled to conclude two hours into the 10th day after liftoff. The secondary mirror is one of the most important pieces of equipment on the telescope, essential to the success of the mission. This **smaller circular mirror** plays an important role in collecting light from Webb's 18 primary mirrors into a focused beam. Deployment of Webb's iconic **primary mirror** began the 12th day, with the mirror's side panels, each holding three primary mirror segments, taking nearly three hours to extend out and latch into place.

**JANUARY 7, 2022**

At 13 days in, Webb's large-scale deployments concluded with the latching of its starboard primary mirror wings, revealing the telescope in all its glory. A 10-day, multi-step process to move all 18 primary mirror segments out of their launch configuration began after the mirror wings were latched in and concluded on day 25. To begin fine-tuning the mirrors, 126 extremely precise actuators on the back side of the mirrors were designed to position and subtly bend or flex each mirror into a specific prescription, a process that took months, but is now formally complete. On January 8, 2022 at 1:17 p.m. EST, NASA's James Webb Space Telescope completed all of its large-scale deployments with the extension and latching of its starboard primary mirror wing.

*JWST Project Manager (PM) Bill Ochs (front left), Deputy PM John Durning (front right) and the engineering teams celebrate at the Space Telescope Science Institute in Baltimore as the second primary mirror wing of NASA's James Webb Space Telescope unfolds, before beginning the process of latching the mirror wing into place, Saturday, Jan. 8, 2022.* CREDIT: NASA /BILL INGALLS


*This "selfie" was created using a specialized pupil imaging lens inside of the NIRCam instrument that was designed to take images of the primary mirror segments instead of images of the sky. This configuration is not used during scientific operations and is used strictly for engineering and alignment purposes. In this image, all of Webb's 18 primary mirror segments are shown collecting light from the same star in unison.* CREDIT: NASA/STSCI

**JANUARY 23, 2022**

On the 29th day, Webb fired its thrusters once again to insert itself into its **prescribed orbit** at the second Lagrange point, or L2, nearly one million miles away from Earth, formally concluding the most difficult and complex deployment sequence ever attempted in space. Webb is home.

"NASA achieved another engineering milestone decades in the making. While the journey is not complete, I join the Webb team in breathing a little easier and imagining the future breakthroughs bound to inspire the world," said NASA Administrator Bill Nelson. "The James Webb Space Telescope is an unprecedented mission that is on the precipice of seeing the light from the first galaxies and discovering the mysteries of our universe. Each feat already achieved and future accomplishment is a testament to the thousands of innovators who poured their life's passion into this mission."

**JANUARY 24, 2022**

Following Webb's **arrival at its orbital destination** around L2 on January 24, the mission operations team began working its way through a critical series of steps: powering on all the science instruments, turning off heaters to begin a long cooldown process, and ultimately capturing the first photons on Webb's primary camera to enable a months-long alignment of the telescope. This complex alignment phase has formally concluded, and all of Webb's scientific instruments have been aligned to near-perfect focus with all of the observatory's mirrors.

"As a general rule, the commissioning process starts with coarse corrections and then moves into fine corrections. The early secondary mirror coarse corrections, however, were so successful that the fine corrections in the first iteration of Phase Six were unnecessary," said Chanda Walker, Webb wavefront sensing and control scientist, Ball Aerospace. "This accomplishment was due to many years of planning and great teamwork among the wavefront sensing team."

Throughout the majority of the alignment process, Webb's 18 hexagonal mirrors and secondary mirror were focused into alignment to the **Near-Infrared Camera (NIRCam)** instrument only. Upon completing recent alignment efforts, the observatory is now aligned to all of the instruments, which include the **Mid-Infrared Instrument (MIRI)**, the **Fine Guidance Sensor (FGS)**, the **Near-Infrared Slitless Spectrograph (NIRISS)**, and the **Near-Infrared Spectrometer (NIRSpec)** as well as NIRCam.

On March 11, the Webb team completed the stage of alignment known as "**fine phasing**." At this key stage in the commissioning of Webb's **Optical Telescope Element**, every optical parameter that has been checked and tested

*Continued on page 10*

*Continued from page 9*

is performing at, or above, expectations. The team also found no critical issues and no measurable contamination or blockages to Webb's optical path. The observatory is able to successfully gather light from distant objects and deliver it to its instruments without issue. Although there are months to go before Webb ultimately delivers its new view of the cosmos, achieving this milestone means the team is confident that Webb's first-of-its-kind optical system is working as well as possible.

The first scientific images are expected to be delivered to the world in the summer. There is much ahead to be done in the coming months to prepare the observatory for full scientific operations using all four of its instruments. Now that the observatory and its instruments have been brought into alignment, the next phase is to continue commissioning and preparing each individual instrument for service. ■

**Thaddeus Cesari / Code 443**
***Webb Strategic Communications Specialist***

**BREAKING NEWS**

**Webb has completed alignment and is ready for instrument commissioning.**

○ **Read the article**

*NASA Deputy Administrator Pam Melroy, left, NASA Associate Administrator Bob Cabana, and NASA Administrator Bill Nelson are shown an early JWST mirror alignment image by Optical Telescope Element Manager, Lee Feinberg, as NASA JWST Program Director, Greg Robinson, right, looks on, Monday, Feb. 7, 2022. CREDITS: NASA/Bill Ingalls*


*While the purpose of this image was to focus on the bright star at the center for alignment evaluation, Webb's optics and NIRCam are so sensitive that the galaxies and stars seen in the background show up. At this stage of Webb's mirror alignment, known as "fine phasing," each of the primary mirror segments have been adjusted to produce one unified image of the same star using only the NIRCam instrument. CREDITS: NASA/STScI*

LAUNCHED!

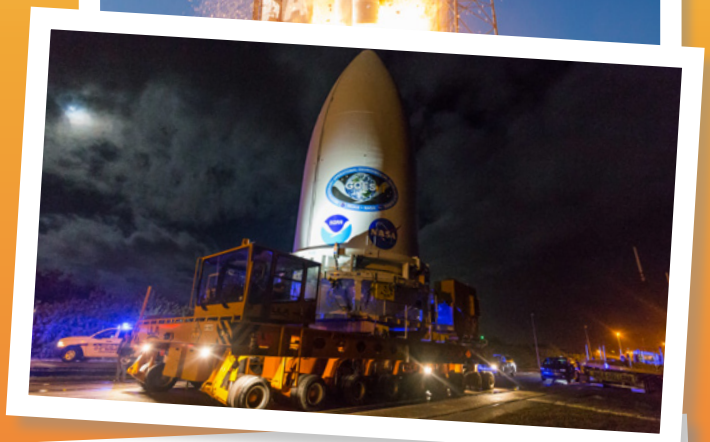
MARCH 1ST

# CONGRATULATIONS TO THE GOES-T Team!

Congratulations to the GOES team on the successful launch of GOES-T, the third in a series of four advanced geostationary weather satellites, which blasted into orbit aboard a United Launch Alliance Atlas V 541 rocket at 4:38 p.m. ET, Tuesday, March 1, 2022 from Cape Canaveral, Florida.

On March 14, GOES-T executed its final engine burn, placing the satellite in geostationary orbit 22,236 miles above Earth. Upon reaching this milestone, GOES-T was renamed GOES-18. GOES satellites are designated with a letter prior to launch and a number once they achieve geostationary orbit.

GOES-18 will replace GOES-17 as NOAA's operational GOES-West satellite in early 2023, to track storm systems, lightning, wildfires, dense fog and other hazards that threaten the western U.S.



CREDITS: NASA/BEN SMEGELSKY AND UNITED LAUNCH ALLIANCE

### More on GOES-T

For more information on GOES-T, see the article from the Winter 2021 edition of The Critical Path

- Winter 2021

# Insights within the Directorate

## Adam Matuszeski: A Personal Journey

**Adam Matuszeski**

*JPSS Flight Project*
Deputy Project Manager

**Adam Matuszeski is the Deputy Project Manager for JPSS Flight Project. A graduate of the Massachusetts Institute of Technology (MIT), with a BS in Aero/Astro Engineering, he recently shared his journey to Goddard, to his interest in diversity and inclusion initiatives, and to the Flight Projects Development Program.**

My first day at NASA, I brought only my brain. Fresh out of the intellectual boot camp that was MIT, it was all I thought I had of value as a new flight test engineer at Dryden, on the aeronautics wonder that is Edwards. According to my freshly-minted diploma, that's what I was getting paid for, right?

Wrong. I had more to bring; I just didn't know it yet. My first baby steps into volunteering beyond engineering was applying my graphic design hobby to some new project patches. As I began to really contribute, the projects moved beyond my brain to capture my heart. I loved the smell of Jet-A, and the sounds of jets spooling up, and the cameras zooming in on brightly-painted and unique aircraft as they sliced the skies of the test range. I gave it my all and welcomed the camaraderie of the project team.

As a liberal Yankee in a court filled with ex-Air Force conservatives, it took a while to learn how to bring more of myself to work. I started asking about people's weekends, and kids' soccer games, and doors opened up for me. Becoming more myself at work also pushed me to let my engineering geek off-center a bit, mentoring Lancaster High's robotics team and representing Dryden at other centers.

Despite my success, I began to notice those that couldn't bring their full selves to work. This was the mid-2000s, and NASA policies had only recently brought inappropriate posters down off the cubicle walls. Women and minorities struggled to get the same respect in the machine shop and hangers that I received. And a middle-school-level discomfort with LGBTQ was evident in this blue-collar environment. There was a senior leader who opened my eyes, but only as I was leaving to come to Goddard. Marta was smart, ambitious, assertive and was both vilified and venerated at Dryden. She terrified me for 6 years and then gave me a hug when I left. She died tragically a year later flying her aerobatic plane. She still sets the bar for me as I strive to show up authentically and make my workplace my own.

Switching centers is hard. You forget what it's like to have to build new friendships. When I came to Goddard, I was more confident, so my efforts to bring my whole self to work were more intentional. Having grown up in DC attending a public elementary school that would come out to Goddard to fire model rockets with a Goddard greybeard named Ed, it felt like a homecoming. In addition, my liberal worldview was more welcome. While engineering aircraft to fly further and turn faster was cool, the obvious military applications didn't align with my deepest values. Goddard's missions enabled me to be excited AND satisfied with the missions I was working on. At Goddard, I have been a part of paving the way for lunar settlement, building instruments to understand the Big Bang, viewing the universe through x-ray polarimetry, and, most-importantly, viewing Earth to understand what we are doing to it. My soul is now here at work, and it is soothed by that fact that I'm doing something to help understand climate change, the greatest challenge of our lifetime.

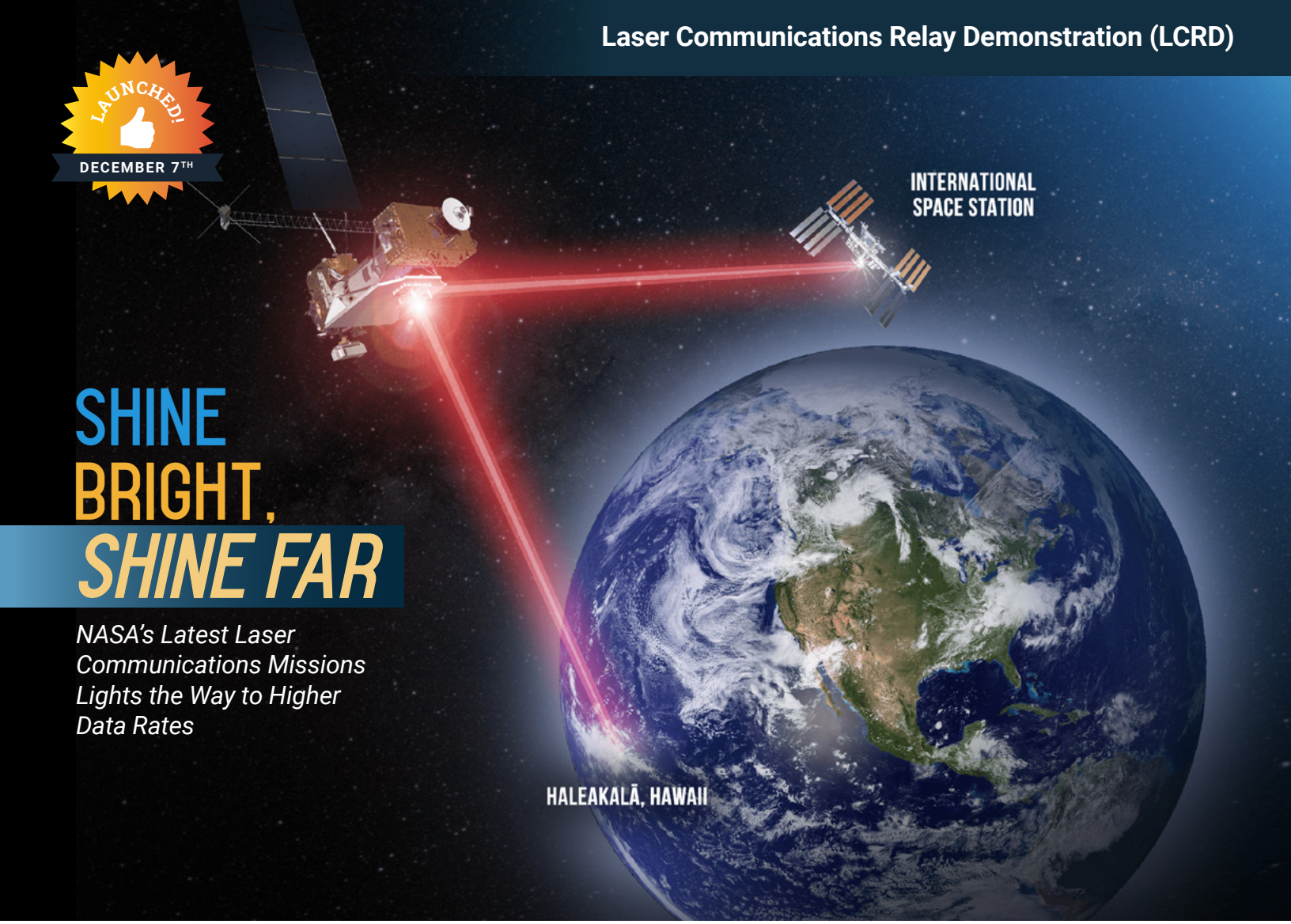
Throughout my 15 years at Goddard, my sense of ownership evolved from serving my project to serving my Center. I became an Associate Branch Head (ABH) and joined Supervisors Workload Action Team to help branches across engineering

*(left to right) Adam and the High Gain Antenna System (HGAS) for Lunar Reconnaissance Orbiter (LRO), Adam's backseat F-18 ride to become familiar with the test range at NASA Armstrong, Adam with offspring, Sam & George (9) and Lucy (13).* CREDIT: ALL PHOTOS COURTESY OF ADAM MATUSZESKI

divisions. As an ABH, I was now responsible for the star players, AND the loners, outcasts, and folks who had tried for decades to bring their full persons to work and were still looking for their place. I came to appreciate their jaded worldviews, and their hopes and dreams in equal measure. The Leadership Development and Excellence in Management courses made me a follower of Delphi ("know thyself") and a student of temperament. I also participated in the Diversity Dialogue Program (DDP) where I was drawn to the power of dialogue, so much that I signed up to become a facilitator, a choice that was both liberating for its alignment to my values and terrifying for its misalignment to my natural aptitude. My experience with DDP and the continuing challenges of women and minorities at Goddard was one of the reasons I applied to the Flight Projects Development Program, to switch from systems engineering to project management. As an ABH, I'd always felt like a concerned parent shipping the branch members off to spend their 8-hour day with a project team, not knowing what they might be experiencing in that project culture. Much like teachers, some project managers build a nurturing environment, and some are barely hanging on.

Speaking of barely hanging on, in 2020 and 2021, my colleagues certainly noticed that I now bring my entire family to work. I see this as a good thing, with our collective humanity now laid bare to the colleagues with whom we have always spent the majority of our waking time. My team members witnessed distance-learning meltdowns (mine as well as my children's), my unkempt and un-showered visage, and my family's struggles to survive if not thrive. Honestly, I wanted them to witness me barely hanging on, because it is OK to be barely hanging on, just as it's OK to recognize that and do some self-care. As a white cis-het male who has the privilege of helping to lead a team through the pandemic, one of my roles is showing that family and self come first, and that you can take a day off when your COVID lap-kitty passes away. Online tools have allowed us the opportunity to dedicate ourselves to our work without sacrificing our families and selves.

The missions that Goddard has launched this past year were masterpieces of collaboration, out-of-the-box thinking, and the result of collective dedication on the part of thousands of Goddard employees, with their full selves peering from their Teams screens and their families or pets at their side. I am hoping that such success under extraordinary times means we have taken yet another step towards making it safe for all to bring our full selves to our work, and not just our brains.




# SHINE BRIGHT, SHINE FAR

*NASA's Latest Laser Communications Missions Lights the Way to Higher Data Rates*

*Optical terminal on the International Space Station communicating through the LCRD payload.* CREDIT: NASA

On December 7, 2021, at 5:19 a.m. EST, NASA's Laser Communications Relay Demonstration (LCRD) was launched as a hosted payload aboard the Department of Defense's Space Test Program Satellite-6 (STPSat-6) by a United Launch Alliance Atlas V rocket.

LCRD is NASA's first two-way optical communications relay system. Using optical communications, LCRD will send data to Earth from geosynchronous orbit at approximately 1.2 gigabits-per-second (Gbps). At this speed and distance, you could download a movie in under a minute.

Since the dawn of space exploration, NASA has used radio frequency systems to communicate with astronauts and spacecraft. However, as space missions generate and collect more data, optical communications will allow missions to send back more data.

LCRD uses infrared light rather than radio waves to encode and transmit data. The infrared light used for optical communications allows missions to pack more data into each transmission. More data yields greater opportunities and discoveries.

In January 2022, NASA confirmed LCRD's First Light – a critical milestone where the LCRD payload transmitted its first beams of laser light through its optical space terminals and was acquired by ground stations.

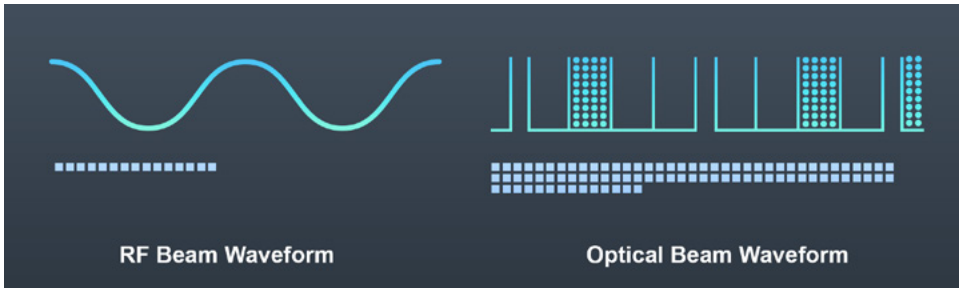
Now, with the LCRD payload fully powered-on, the mission will test its optical capabilities with a variety of experiments from NASA, other government agencies, academia, and commercial companies. These tests will help the aerospace community refine optical technologies, increase knowledge, and identify future applications. Some of these experiments include studying atmospheric

disturbances on laser signals and demonstrating reliable relay service operations.

Exploration and Space Communications (ESC) projects division is providing these opportunities to grow the body of knowledge surrounding optical communications and promote future, industry-led development of laser communications relay systems, leveraging NASA's lessons learned and experiences.

The LCRD project seeks partners to propose supplemental experiments to test the functionality of optical communications links. These experiments are selected via the LCRD experiment proposal process. If you are interested in proposing an experiment for LCRD, please **contact us**.

In addition to doing experiments, some of LCRD's first transmissions will be 2022 New Year's resolutions, gathered through the @NASALaserComm social media accounts. During the year leading up to LCRD's launch, the ESC's Integrated Strategic Products, Information, and Resources Enterprise (INSPIRE) office led a massive launch communications campaign, teaching the employees and the public about the capabilities of optical communications. These efforts will continue as NASA Goddard leads optical communications efforts into the future.




*Optical versus RF: Optical packs data into tighter waves than radio, allowing for more data in a single transmission.* CREDIT: NASA

In May 2022, the TeraByte InfraRed Delivery (TBIRD) CubeSat mission will launch to demonstrate optical communications downlink at unprecedented data rates – 200 gigabits per second. Shortly after, LCRD's first in-space user will launch – the Integrated LCRD Low-Earth Orbit User Modem and Amplifier Terminal (ILLUMA-T). ILLUMA-T will bring optical communications capabilities to the International Space Station, enabling NASA to receive more science and experiment data at once. ■

**Katherine Schauer / Code 450**
***Technical Writer, Exploration and Space Communications***

*NASA's LCRD launched in Dec. 2021 on a United Launch Alliance Atlas V rocket.* CREDIT: NASA

# REFLECTIONS IN TIME

*JWST team looks back as the observatory looks to the future*

With the successful Christmas morning launch of the James Webb Space Telescope (JWST) from French Guiana, team members who supported its earliest design concepts through the launch campaign and commissioning activities reflect on memories made throughout the journey. We asked the team to share their favorite memory and/or describe what sets JWST apart from their work on other missions or projects.

**Favorite Memory?**

**What sets JWST apart?**

*Office of Communications staff share the excitement of seeing the primary mirror deployed in Goddard's clean room.* CREDIT: MAGGIE MASETTI

## JOHN MATHER

### Senior Project Scientist, 27 years

Finding a phone message from Ed Weiler asking if I would like to work on this new project, and if so, a proposal (one page) was needed tomorrow. A month after that, [we were] standing around a white board at STScI with George Roach, who was drawing mission concepts. Bernie Seery was there I think, and Pete Stockman and Pierre Bely. We got it about right.

It's the biggest jump in space astronomy since the Hubble Space Telescope, it serves all astronomers everywhere, and it took the best engineering and management team in the known universe to do it right. It's the only way to answer some of the biggest questions.

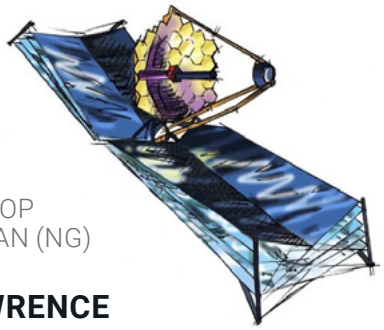
## PAUL GEITHNER

### Deputy Project Manager/ Technical, 25 years

My favorite memory is of my favorite people on this mission as opposed to a specific event.

Since coming to NASA in 1991, Hubble and Webb are the only NASA missions I've worked on. An obvious difference is Webb is a lot longer in duration than a Hubble servicing mission, and of course involved a whole spectrum of immense engineering challenges. I like to say that JWST years are like reverse dog years, i.e., 7 years on Webb is like one year on a 'normal' mission.

WEBB SPACE TELESCOPE



*Early concept drawing.*

CREDIT: NORTHROP GRUMMAN (NG)

## JON LAWRENCE

### LV Liaison/Mechanical Systems Lead, 25 years

About 28 minutes after liftoff, as the Observatory slowly drifted away from the Ariane upper stage, unexpectedly seeing the Solar Array deploy while still in view of the cameras was a phenomenal experience from the Jupiter 2 control room at Guiana Space Center.

The JWST team is the greatest group of people I have ever worked with – they would not let anything stop us from making this incredible machine a success!

## EVE WOOLDRIDGE
### Contamination Lead, 25 years

At one of the early meetings in 1996, someone had a cardboard model of the first concept. They took the model and angled the sunshield – thinking that may be a better thermal design. I realized just how early a concept this was for the "Next Generation Space Telescope (NGST)" and that I could be on a project from concept through launch and was thrilled about that. 25 years later – I did make it to launch!

Contamination control has outstanding support from the scientists, optical engineers, and systems engineers in a way I have not experienced on any other program. Nor has any other program captured so much of my life – heart, soul, mind, energy, excitement.

*Eve Wooldridge at JWST launch pad, Dec. 24, 2021*

## TIM CARNAHAN
### Structural Engineer, 25+ years

Working on the early proposal with Bernie Seery back in the formulation where we had the 'strawman' concept, and then working on the Integrated Science Instrument Module (ISIM) as the analysis lead during early development, and finally as the Thermal Distortion lead.

*Ratna Day with John and Jane Mather and friends.*

## RATNA DAY
### Systems Engineer, 23 years

Sharing a wonderful memory of John Mather's birthday on August 7, 2006, two months before he received the Nobel Prize.

## KEITH PARRISH
### Observatory Manager, 22 years

The realization that my three children grew up with Webb as their sibling and it got much more of my time than any of them did. It struck me about a month before launch that they love and care about Webb as much as I do. Webb's success is personal to them. [But] nothing will ever top a Christmas Eve countdown and Christmas day launch.

It's Webb. The unmanned equivalent of Apollo in its ambitiousness and sheer number of engineering challenges. Hubble servicing is close, but sending Webb off on its own with no help coming makes it incomparable.

## JIM FROST
### Export Control, 22 years

The moment that the last mirror wing segment was deployed brought about relief and a full appreciation of what the JWST team had just accomplished and what was ahead for mankind when these images start coming in. We had made many doubters and critics, who are now believers and fans.

The complexity of this mission has made me reach back and revisit pretty much every skillset that I have acquired over almost four decades at GSFC.

*Joe Howard: 2 decades of JWST – like raising a kid!*

## JOE HOWARD
### Integrated Modeling, 22 years

Being the first in my family to wake up this past Christmas morning (yes, even earlier than my kids!) to set up NASA TV for my family and a Zoom session with colleagues to watch the launch! A VERY memorable Christmas!

JWST has made a significant effort to get the entire international team together throughout the history of the project… the "Partners Workshops" around the world were great team building events.

*Keith Parrish and family, 2015*

*Continued on page 16*

*Continued from page 17*

*(I to r) Claudia Krogel, Laura Paschal, Vicki Kontson and Maureen Disharoon at NG, 2019*

## JEFF SINCELL
### Electrical Systems Engineer, 22 years

Beginning my work at GSFC with the task of documenting all the wires that had to pass between the warm and cryogenic sections of what was then called the NGST. I'm blessed to still be above ground to experience the fruits of our collective labor over two decades later.

Webb had hundreds of deployment actuators, every one of which had to work for the mission to succeed. It's a huge credit to the mechanical team that every single one worked flawlessly.

## JANE STECK
### Integrated Ground Support System (IGSS) Development Manager, 22 years

The entire journey supporting NASA's reach for the stars. In junior high school I was inspired by Lt. Colonel John H. Glenn who sent a letter for our yearbook, an excerpt saying, "The space age will provide many opportunities for you young people as you seek to find your places of service in tomorrow's world." - John H. Glenn 2/5/1963

The JWST launch, supported by an amazing group of international participants, was the most dignified and precise mission I have witnessed to date. My wish for all, particularly the young girls of today, is to be as fortunate as I am.

## MAUREEN DISHAROON
### Data Manager, 22 years

Listening to John Mather and Mike Menzel explain "how" JWST's science and engineering challenges could meet mission objectives and minutes later seeing them easily pivot to explain "why" the science discoveries would be important to small children and a curious public—in language they could all understand. It was pure magic.

There were a lot of "unknown" technologies that were developed for JWST that presented multiple high risks that always hovered in the background every single day. The brilliant minds across the globe that pulled this mission off are to be saluted.

## LAURA PASCHAL
### Data Management Office, 22 years

Supporting partners' workshops – I was thrilled to again be part of an international project that brought together people from all over the world.

Working together for this length of time creates bonds that will last a lifetime – we have made lifelong friends, celebrating with them in good times and commiserating during the sad.

## CHARLIE CALHOON
### Systems/Programmatics Consultant, 22 years

I joined JWST in June of 2000 as a support service contractor on a short time assignment to support preparation of the ISIM pre-phase-A concept reports and presentations. Here I am 22 years later and I have never left.

*Lee Feinberg, 2021*

## LEE FEINBERG
### Optical Telescope Element (OTE) Manager, 20+ years

The liquid nitrogen trucks pulling up to the Johnson Space Center (JSC) chamber during Hurricane Harvey (note: our 5-day supply was down to less than a day and we were getting ready to end the test early).

I worked on (Hubble) servicing missions 1 and 2. Those were sprints. This was a marathon (which we sprinted).

## RAY OHL
### Optics I&T Lead, 20+ years

Seeing my [replacement] show up after a ~>30-hour shift as a [test lead] during a cryo-vacuum test of Ground Support Equipment during a terrible snow storm, including a long power outage that caused us to trigger emergency measures.

The complexity, teamwork/leadership, and level of organization (for the optics discipline) needed through implementation was very different from other projects.

*(I to r) Peter Stockman (STScI), Marcia Rieke (NIRCam PI / University of Arizona), Hashima Hassan (NASA Headquarters), and John Mather, August 2001.*

## JOHN MCCLOSKEY
### Electromagnetic Compatibility Lead, 20 years

I came on board in May 2002, when my 20-year-old son Owen was 3 months old and my 22-year-old daughter was 3.

The true feeling of being a family (however dysfunctional at times), no doubt brought on by the sheer amount of time many of us have spent in the trenches together.

*John McCloskey and family, 2002*

## MIKE WORONOWICZ
### Contamination Engineer, 20 years

The OTE/ISIM (OTIS) test campaign once it got underway, as well as efforts to understand the fairing jettison environment.

My involvement regarding investigations of a number of interesting issues that pushed the envelope of knowledge in so many ways.

## BILL MILLER
### Flight Software Dev and Test Lead, 20 years

Developing ISIM flight software interfaces, coding the telemetry and command software, the development and test of science instrument development units to send to science instrument sites.

*Chris Dailey and family, 2017*

## CHRIS DAILEY
### Electrical Engineer, 20 years

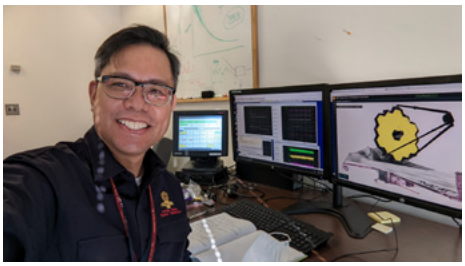
Being at the launch site for the final preparations and watching the launch with my own two eyes. It was amazing and I'll remember it forever.

The privilege to work with so many talented people and honor of helping make something so much of the world is enthusiastically interested in really sets JWST apart.

## ACEY HERRERA
### Design Engineer, 20 years

Being able to have fun with colleagues after work playing racquetball in the early days of the project and extending that sense of camaraderie outside of working hours.

Being able to participate on a project from end-to-end definitely has JWST as a standout in one's career. From designing the instrument carrier (ISIM) to eventually being a part of the spacecraft commissioning is a rare opportunity on a project this size.



*Acey Herrera at JWST commissioning, 2021*

*Claudia Krogel and colleague, 2007*

## CLAUDIA KROGEL
### Lead Configuration Manager, 19 years

Participating in Partner Workshops and witnessing the camaraderie amongst all the international partners. I will cherish the laughter we shared, lifetime memories and friendships made, and will dearly miss the ones that have departed from this universe.

Longest project I have worked on and with the most impact to mankind.

## DAVE SPEER
### IRSU Systems Engineer, 18 years

Seeing the first post-launch ISIM remote services unit (IRSU) telemetry on the Ground, after launch vehicle (LV) Fairing separation.

Being able to contribute to a mission like JWST, and work with all the incredible people on this team, is a dream come true...the capstone on my entire career with NASA.

*JWST team at Goddard, 2005*

*Continued on page 20*

*Carl Starr (center front) and team*

## CARL STARR
**Mission Operations Manager, 18 years**

A team building trip to Disney World.

JWST is not like any other mission; everything we've done was created from scratch.

## VICKI KONTSON
**Data Management Office, 18 years**

Watching the launch on Christmas morning, surrounded by my family. I found myself flashing back to earlier days on the project, memories of the joy when the major milestones were met to the fun had at the holiday parties and gatherings.

This team has a sense of ownership and pride that is contagious. In addition to being brilliant, they are good, kind people.

## MAGGIE MASETTI
**Web Developer, 17 years**

The very first time we got to see the mirror turn to face the observation area. We were all reflected in it, with John Mather right up front. What a special day!

I'd mostly worked on small projects that flew under the radar before this one, and the amount of attention, both positive and negative, is markedly different.

*Continued from page 19*

## JEFF KIRK
**OTIS Test Operations Lead, 17 years**

The 3-month OTIS cryo-vacuum test at JSC, when Hurricane Harvey hit in the middle of that test campaign, it really gave us a scare. We were concerned for the safety of the flight hardware but also everyone involved in the testing. Fortunately, we made it through while keeping both the hardware and personnel safe.

There are many people on JWST who I consider to be part of my extended family… that I have found to be unique to this mission. Many of us have known each-other for the better part of our adult lives.

## RUDY IVANCIC
**Observatory Electrical Systems, 16+ years**

When we fired the first group of five Membrane Release Devices during thermal vacuum test. That grouping of Non-Explosive Actuators was a very novel concept developed by necessity to be able support 200-ish releases using the available limited ordnance circuits.

The tremendous electrical challenges associated with designing the cryogenic electrical services while accommodating thermal and optical requirements.

## SANDRA IRISH
**Structures Lead, 16 years**

Mechanical testing of the entire assembly OTIS at GSFC. This was the largest hardware ever mechanically tested at GSFC and we performed this testing using a new vibration shaker system. It was the first time this hardware was ever subjected to sine vibration mechanical loads so it was exciting and also stressful.

*Begoña Vila Costas, Canada, c. 2009*

## BEGOÑA VILA COSTAS
**FGS Systems / SI Commissioning, 16 years**

Participating in the test campaign at the launch site and being able to host the launch as Spanish commentator – my mom does not speak English and with the launch on the 25th of December, it felt a little bit as if I was at home talking to my family on such a memorable day.

[As] an international collaboration, it is always a pleasure to see my Canadian colleagues and European team members on the various test phases and reviews and now, throughout commissioning, to work alongside them.

## BRENT WARNER
**Thermal Analyst, 16 years**

One day, I was walking down the hall and heard some noise coming from one of the offices. Looking in, I saw John Mather, running the vacuum cleaner over the carpet of his new office. He has a mind that can comprehend features of the cosmos that most of us have never heard of, but he's also down to Earth enough that he understands how to use a vacuum cleaner!

## PEIMAN MAGHAMI
**ACS/LOS Lead Engineer, 15 years**

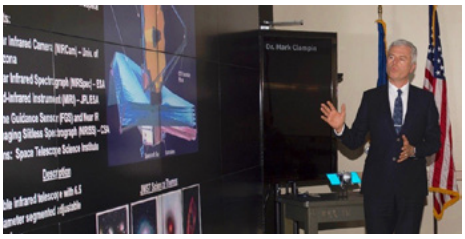
To have seen, in person, the hard work of so many folks pay off, with a successful launch, Mid-Course Correction burn, Deployments, and a successful commissioning.

Its technical challenges, its dedication to technical details, and its longevity.

## KELLY HENDERSON-NELSON
### Contamination Control Engineer, 15 years

Supporting the OTIS Cryogenic Thermal Vacuum Testing, and finding out at the end of the test that we were completely successful in keeping OTIS clean!

Supporting five different programs (ISIM, OTE, OTIS, Sunshield, Spacecraft) at once.



*Mark Clampin, 2021*

## MARK CLAMPIN
### Deputy Director/Sciences and Exploration, 12 years

The first full scale deployment of the Integration Validation Article sunshield. It was like it slowly came to life.

Complexity.

## JAMES COOPER
### Sunshield Manager, 12 years

The day that Sunshield deployments were completed on-orbit.

The way that the team dealt with adversity. Every time we had an issue or setback, the team reacted with determination and integrity, and found a way to recover.

## KAREN RICHON
### Flight Dynamics Lead, 12 years

Seeing the solar array deploy on orbit. Not the launch, not even separation. It was the solar array – no twirling and shimmying needed, throw those contingency plans out, we have power!

Size of the JWST team: Having literally hundreds of people on teleconferences for many regular meetings.

*Buddy Taylor, 2021*

## BUDDY TAYLOR
### Lead Design Engineer, Approx. 12 years

Sitting in a technical meeting with the late Thomas Kutscheid from Astrium, who was positively FEARED by my Goddard coworkers. Thomas noticed a discrepancy in my design, scowled, and asked what had happened. I admitted that I had made a mistake. The room went silent, and Thomas smiled and said, "Then you will fix?" and everyone started breathing again. Lesson learned: NEVER try to hide your mistakes!

## STEFANIE MILAM
### Deputy Project Scientist/ Planetary, 10 years

The day I got to see the telescope in person in the clean room at Northrop Grumman. What an emotional experience – so much work, dedication, endurance to get this massive telescope launched.

*Stephanie Milam, 2021*

## SHARON DONAHUE
### IGSS Software Assurance Manager, 9 years

Having to retain that core team of experts (Jeff Kirk, Ed Shade, Robert Rashford, Ed Cheng, etc.) when I learned that there was no funding remaining…we were able to find short term solutions for all these critical folks…retaining them when full funding was re-established.

Since the [science equation] logic was so old, it was poorly written and hard to understand. Heck, JWST started prior to the publication of the NASA Software Engineering Standard. A tremendous challenge was updating code to run on newer processors and operating systems.

## KAN YANG
### Thermal Engineer, 6 years

When we were cryogenic vacuum testing ISIM at GSFC, a lightning strike caused a power outage and loss of helium compressor control at the chamber, putting the test article at risk of contamination and damage. [On this and other occasions], the team was never deterred, and each engineer, technician, and scientist knew their exact roles to safe the hardware and mitigate damage if necessary.

I have never met a smarter or more dedicated group of people than the colleagues I've worked with on JWST.

*Compiled by Laura Paschal and Maureen Disharoon / Code 443 JWST Data Managers*

"Some of us will move on to working other missions, others will take on new jobs, and still others will retire, but we will all remain part of this JWST extended family for life!"

- Jeff Kirk

# WHAT'S UP WITH OUR Flight Projects Development Program?

## COHORT 5

Please join in congratulating and welcoming the following technical and business participants of the Flight Projects Development Program (FPDP) Cohort #5:

**Konrad Bergandy/544**

**Carla Newman/155**

**Tynika Rawlings/155.4**

**Neerav Shah/401**

**Ellen Shea/153.1**

**Christopher Strickland/548**

**Stephanie Vidal/401**


*Cohort 5's orientation was held on April 27, 2022. The participants were welcomed to the program by a few members of the FPDP Governance Board. Pictured (left to right): Joe Stevens (triad coach and FPDP Cohort 3 graduate), Neerav Shah, Walt Falconer (FPDP facilitator), Carla Newman, Ellen Shea, Donna Swann (FPDP program manager), Nikki Rawlings, Konrad Bergandy, Stephanie Vidal, Chris Strickland, Cathy Richardson (FPDP Governance Board chair), Sharon Cooper (FPDP Governance Board member), Cynthia Simmons (FPDP Governance Board member)* CREDIT: NASA

Flight Projects Diversity and Inclusion (FP D&I) starts here.

## Can we count you in?

FP D&I is recruiting new 2022/2023 members to be part of a committee that listens to all perspectives, provides an opportunity for learning, and promotes voices for inclusion.

Learn more and consider joining by contacting:

donna.j.swann@nasa.gov

*or*

tara.dulaney@nasa.gov

# OUT & ABOUT

## LIFE'S HIGHLIGHTS OFF CAMPUS

Congratulations to Bruce Milam (401.1). His first grandson, Fletcher Douglas Milam, was born December 30, 2021. He was 8 lbs., 6 oz. Fletcher is the first child for Bruce's son, Joshua Milam and his wife Sarah. Sarah's sister is Liz Hoy (618).

Susie Jones' (155.1) daughter and husband welcomed their second son on February 26, 2022. Landon Carl Klein was 8 lbs., 1 oz. and 21 inches long. Proud parents George and Crystal Klein, and big brother Logan, are elated. The cradle in the background of the picture has been used in the family for 3 generations. This is Susie's 5th grandchild.

**Share your news!**

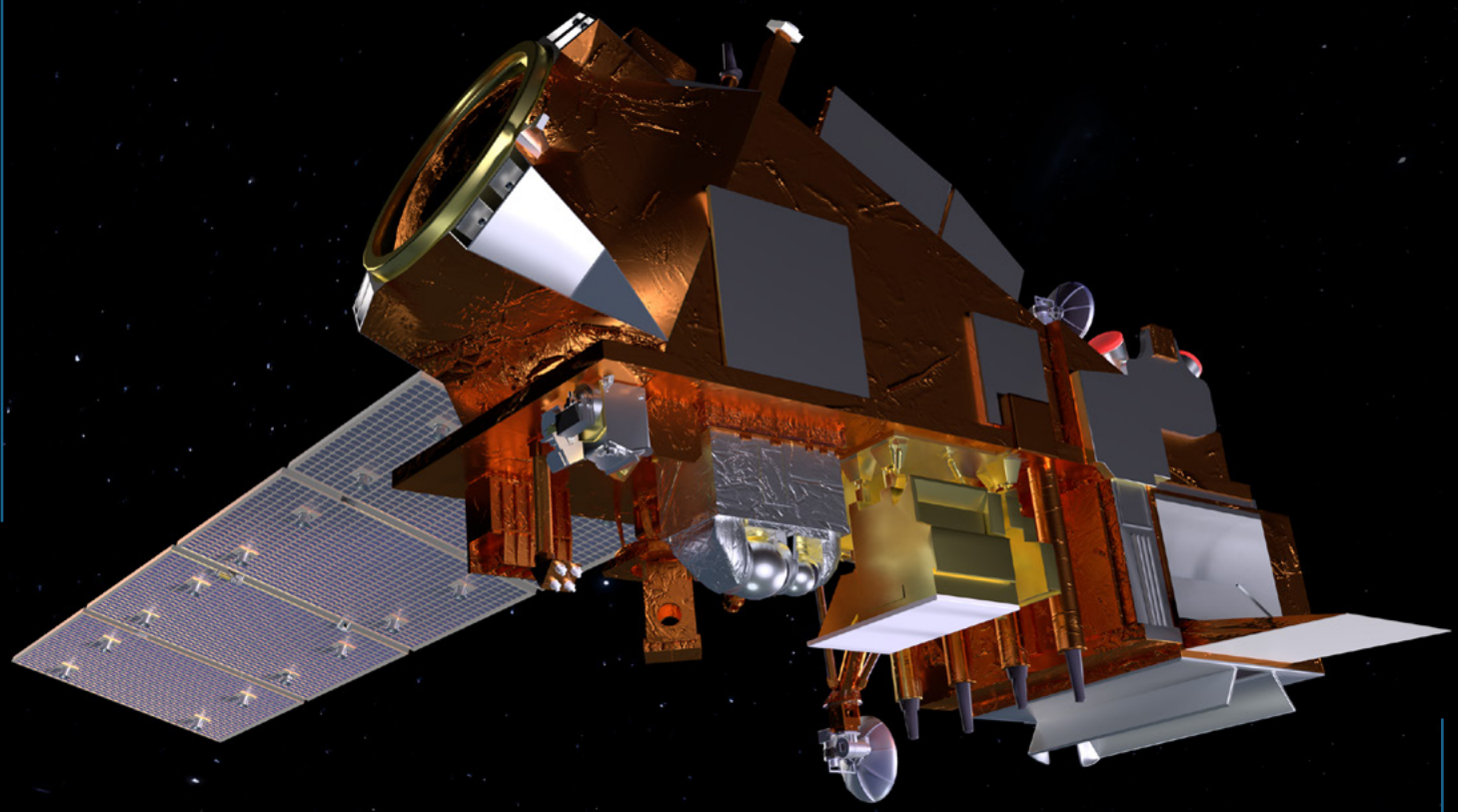
**Weddings, births, interesting travel experiences...we want to know!**

Please send your inputs to Paula Wood. Include your **name, phone number** to:

paula.l.wood@nasa.gov
Code 460
Ext. 6-9125

# NOAA's Next Polar Orbiting Satellite Prepares for Launch

FPD SPOTLIGHT



In September 2022, the third satellite in the Joint Polar Satellite System (JPSS) series is expected to launch from Vandenberg Space Force Base in California, providing data that informs weather forecasts, extreme weather events and climate change.

*An artist's rendition of the JPSS-2 satellite in space.* CREDIT: LAMONT W. HARVEY

JPSS-2, to be renamed National Oceanic and Atmospheric Administration (NOAA)-21 after launch, will continue the work of its predecessors, NOAA-20 and Suomi-NPP (National Polar-Orbiting Partnership), which launched in 2017 and 2011, respectively. The launch will mark the culmination of a decade of work by the team, and the challenges that came with it.

While most of the satellite instruments are identical to those of its predecessors, flight engineers had to overcome the obstacle of integrating these instruments into a brand new spacecraft bus. And they had to do this while simultaneously working on the next two satellites in the series, JPSS-3 and JPSS-4, which are expected to provide measurements into at least the late 2030s.

## JPSS orbit and instruments

The JPSS satellites are polar orbiters, meaning they orbit from the North to the South Pole, circle our planet 14 times a day, and pass over every location on Earth at least twice. Like NOAA-20, JPSS-2 is built and launched by NASA, and once it reaches orbit, NOAA will take over operations.

JPSS-2 will carry four instruments, the Advanced Technology Microwave Sounder, or ATMS; the Cross-track Infrared Sounder, or CrIS; the Visible Infrared Imaging Radiometer Suite, VIIRS; and the Ozone Mapping and Profiler Suite, also known as OMPS. Combined, these instruments deliver important data on storms and weather events. They monitor wildfires and smoke, measure the insides of hurricanes, track the health of major crops worldwide and tell us about ocean temperature, health and air quality.

**VIIRS** is like the eyes of the satellite. It provides striking color images of hurricanes, wildfires, floods, dust storms and harmful algal blooms. It helps detect, map and monitor wildfires and measure the thickness and movement of wildfire smoke. Its Day-Night band sensor gives us nighttime images, like power outages after a storm and dazzling Northern lights.

*The JPSS-2 satellite in the vibration chamber at the Northrop Grumman facility in Gilbert, Arizona.* CREDIT: NORTHROP GRUMMAN

**OMPS** tracks the health and concentration of ozone in the atmosphere. It measures particulate matter in pollution, dust, smoke and biomass burns. It also measures volcanic clouds and sulfur dioxide emissions from volcanoes.

**CrIS** takes highly detailed measurements of atmospheric temperature and water vapor that feed our weather forecasts.

*Continued on page 26*

*Continued from page 25*

And **ATMS** provides as much as 80 percent of the data that feed global weather models. It also gives us long-term records of our atmosphere, and shows us how the temperature in both the lower and upper atmosphere has changed over time.

"The public should be assured that we are taking care of the critical needs of numerical weather prediction," said JPSS program scientist Dr. Satya Kalluri. "We are part of the global backbone that provides the vertical structure of the atmosphere for temperature and water vapor — these are the two essential ingredients for hurricane formation, precipitation or the lack thereof," he said.

Precipitation, he added, is caused by the instability of the atmosphere and the availability of moisture. "Too much and you can have floods; too little, and you can have droughts," Dr. Kalluri said.

## Building a new bus

While Ball Aerospace built the bus for NOAA-20, Northrop Grumman was responsible for building the JPSS-2 spacecraft bus. And at the time the spacecraft was chosen, all JPSS-2 instruments were already well into being built, said JPSS Flight mission systems engineer, Lou Parkinson.

"The ground rule was, we can't change the instruments," she said. "Anything we found that wasn't compatible, we had to change it on the spacecraft side of the interface."

The payload interface electronics, for example, were designed specifically to work with the existing instruments, and the spacecraft was updated to be more compatible with the ground system, Parkinson said. Some of these updates were straightforward, others were more challenging, she added, but in the end the team made it work in a way that accommodated both the instruments and the ground system infrastructure.

"JPSS-2 was the pathfinder, so JPSS-3 and JPSS-4 will incorporate the lessons learned from JPSS-2," Parkinson said.

In a launch year, it's typical for an engineer to work exclusively on the spacecraft preparing for orbit. But in this case, many of the mission's engineers are simultaneously working on the two satellites that will launch in the years after JPSS-2. Instruments for JPSS-3 have finished most of their environmental testing and will soon be shipped to storage, Parkinson said. And instruments on JPSS-4 are in the process of being manufactured as the bus structure and components get built.

"The only way this is all possible is because of the team," she said. "The flight project team is great. Everybody is working together, pulling their weight, taking responsibility, and doing what they need to do, but with the proper checks and balances in place. That's the only way it works. Otherwise it's too big of a job for any one person to do."

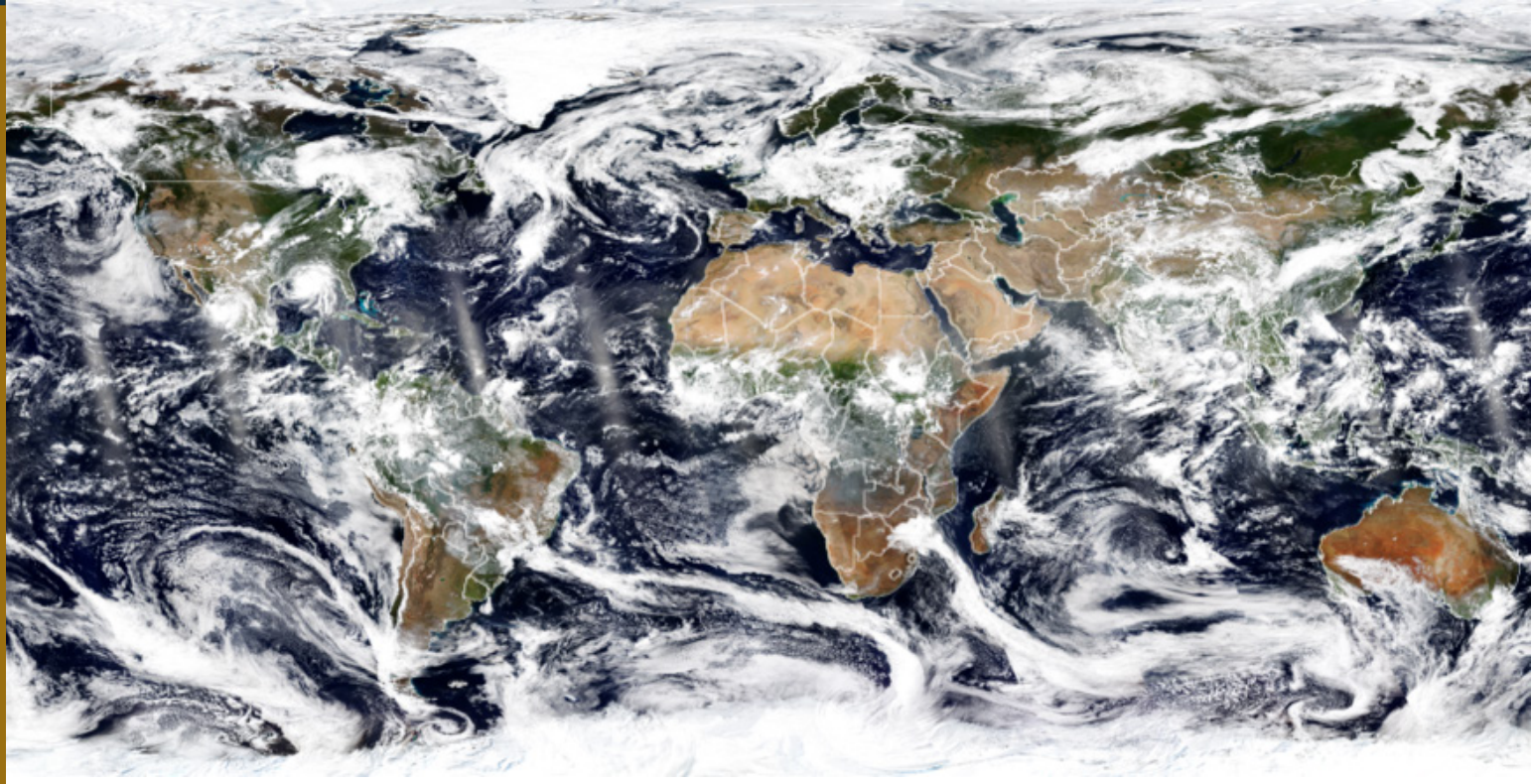
> "The only way this is all possible is because of the team"
>
> **Lou Parkinson**
> JPSS Flight mission systems engineer

## Milestone timeline

Meanwhile, the JPSS-2 satellite is currently undergoing thermal vacuum testing, a critical milestone, which involves stressing the system by exposing it to an environment similar to what it will encounter while orbiting the Earth, said Chris Brann, deputy project manager for the JPSS flight project, who has been with the mission since 2010. When completed, these tests will ensure that the satellite's hardware will function in the extreme temperatures and vacuum of space.

"The satellite has to keep itself warm enough in a cold state and cool when it's in a hot state, and still provide the science performance as it's going through the temperature transitions," Brann said. "If it works at the two extremes of hot and cold, it will work in between."

After the thermal vacuum test, the satellite's solar array will be installed, and it will be put into



*A daylight image composite of Earth from August 29, 2021, captured by the NOAA-20 satellite's VIIRS instrument. Hurricane Ida makes landfall on the U.S. Gulf Coast, while Hurricane Nora spins in the eastern Pacific Ocean.* CREDIT: NOAA

a shipping container, which is controlled for temperature and humidity. It will then be shipped to the launch site in California, where it will go through a final series of tests before getting installed on the rocket, Brann said.

So much has to come together when planning for the launch, Parkinson said. "Not only do we build the satellite and test the satellite and launch the satellite, but then we need to be able to hand over a successfully operating satellite to NOAA to make sure they can continue operations."

And the launch, if successful, "will be the culmination of many, many years of hard work and labor by hundreds, if not thousands, of people," Kalluri said.

"You see a launch, and if you're associated with the mission, you have bragging rights to say, 'I had a part to play in the mission. There's a piece of this that I built.'" ■

**Jenny Marder / Code 470**
*Senior Science Writer, Joint Polar Satellite System*

## JPSS in Your Community

Check out how JPSS benefits your state or territory

- **http://www.jpss.noaa.gov/jpss-in-your-community**

# FPD

## Project Support Community Spotlight

The Project Support Community Spotlight seeks to recognize and connect members of the project support community across the Flight Projects Directorate. Additionally, resources and relevant information will be highlighted in each Critical Path publication. The Critical Path team looks forward to connecting with and highlighting the project support community.

### How can we support you?

Contact FPD Project Support website for general information.

- Admin Space Station (AdSS) for Goddard Space Flight Center (GSFC) **https://fpdsp13.gsfc.nasa.gov/sites/100/SitePages/Admin_Portal.aspx**
- Flight Projects Directorate Project Support **https://fpd400.gsfc.nasa.gov/sites/400/FPD_Internal/SitePages/ProjectSupport.aspx**

jacqueline.seymore@nasa.gov
(301) 286-6307
sarah.a.harnish@nasa.gov
(301) 286-6567

## Jennifer Clark

***Joint Polar Satellite System (JPSS)***
**Project Support Specialist**

Jennifer Clark first joined JPSS as a NOAA contractor in late 2011. Eight years later, in 2019 she moved onto a NASA contractor position. Prior to joining the team, she worked outside of the organization for an insurance broker. In her current role, Jennifer works on a wide range of administrative tasks for the JPSS Program Office, such as distributing actions from NESDIS, attending meetings to record minutes and notes, assisting with on- and off-boarding employees, and coordinating the JPSS internal awards. When asked what her favorite part of her job is, Jennifer says, "I enjoy that I work on a wide range of tasks and that there is always something new to learn." She also says that she enjoys the diverse group of people she gets to work with. In Jennifer's free time, she enjoys being outside with her two dogs and spending time with friends. In addition, Jennifer also fosters animals from the Anne Arundel County SPCA, where she has fostered several dogs over the years and currently has a cat staying with her. ■

**JPSS Comms Team / Code 470**

# 2021 Code 400 FPD Peer Awards & Achievements

Congratulations to all of the 2021 Agency Honor Award recipients! Thank you to our nominators for their work recognizing our FPD teams and individuals for their exceptional achievements. Digital certificates are being disseminated. Please use the link below to view the award recipients.

**2021 FPD PEER AWARD RECIPIENTS**

## 2022 FPD Award Season is Open Now

Learn more or nominate some here

CLOSING JUNE 1

# 2021 ROBERT H. GODDARD AWARD RECIPIENTS

Congratulations to all of the 2021 Robert H. Goddard Award recipients! Thank you to our nominators for their work recognizing our FPD teams and individuals for their exceptional achievements. Digital certificates are being disseminated. Please use the link below to view the award recipients.

**2021 RHG AWARD RECIPIENTS**

# KNOWLEDGE MANAGEMENT *Insights*

## Agility Routines

For the past two years, we have had to adapt to a different way of working. We've navigated evolving health guidance, witnessed major social change, and communicated with friends and family in new ways. It has been a constant swirl of disruption.

Secretary Nelson praised NASA employees' response to the pandemic. The rapid transition to remote work and new onsite safety protocols was exemplary. The pace of change will continue as we move on to a new way of working.

The authors, Miller and Kirkpatrick, define **organizational agility** as being able to sense and respond to changes in a timely and effective manner. To break it down:

- **Sensing** is paying attention to changes outside the organization – new policies, politics, technology, natural disasters, pandemics – as well as changes within the organization. These include new leaders, policy changes, budgets, or resource changes.
- **Interpreting** is figuring out what these changes mean to your mission and work.
- **Responding** is deciding what to do if the change occurs. Ideally, a response will be proactive, not reactive.

Miller and Kirkpatrick believe that ongoing agility routines like sensing, interpreting, and responding, should become second nature to everyone. The timely alignment of responses to the challenges in which we operate will reinforce forward progress.

Project teams may want to identify the signals and information worth paying attention to during their adaptation to the 'new normal'. Following are questions that other project teams have raised.

### Onboarding

- Are administrative tasks, including security protocols, efficient?
- Are new hires able to form relationships with and learn from more experienced employees?

### Project Roles and Responsibilities

- Do organization charts adequately represent what people do? Are there overlapping roles?
- Is there a valid plan regarding hierarchy and decision authority?
- Are partner agreements clearly understood?
- When the pressure is on, are team members able to implement effectively?

### Workload Balancing

- Are resource audits being done throughout the mission?
- Is the true depth of the team adequate to perform the work?

### Communications

- Are project communications tools available to all partners?
- Does the team have the right meeting cadence? Do employees have adequate time to do their work and participate in other discussions?
- Are virtual work hours working well? What is the expectation about returning emails?
- Is an online meeting suitable for the problem being addressed? Would in-person engineering discussions be preferable?

### Test Monitoring

- Are there conditions in which it is advantageous to do remote test monitoring? Is it easier to get the right person to look at the problem?

## Loose Connections

Virtual work offers many benefits, yet some employees miss impromptu hallway meetings and in-person engineering discussions. Useful information is commonly shared in the *meeting after the meeting*.

There have been studies of the links between knowledge sharing and trust. If trust wanes, so does the willingness to offer, share, ask for and leverage knowledge. A possible reason for the erosion of trust is the loss of *weak ties*. These are the relationships that fall somewhere between a stranger and a trusted colleague. Weak ties are valuable for the dissemination of knowledge. A closed inner circle tends to recycle the knowledge it already has. New information is more likely to come from external contacts.

### References


Sarah Miller and Shelley A. Kirkpatrick, PhD, *The Government Leader's Field Guide to Organizational Agility: How to Navigate Complex and Turbulent Times*, Berrett-Koehler Publications, 2021.

Nick Milton, *Will KM be hit by a 'Trust Recession'?* From the Knowledge Management Front-Line, 2022.


Immediate work teams have been effective in staying connected during the pandemic. As people adapt to new ways of working, employees will be able to have more impromptu conversations, make new contacts, and expand their sources of knowledge.

## APPEL Updates

Check out **APPEL.NASA.gov** for new discipline-specific gateways in **Critical Knowledge**, **Program & Project Management**, **Lessons Learned**, **Systems Engineering**, as well as a new multimedia portal called **Watch, Listen, Learn**. ■


**Judy Dickinson / Code 400**
*FPD Knowledge Management Lead*


### Agility Levers

Multiple levers can be used to support timely and effective responses to a constantly changing environment.

1. **Organizational Structure.** Agile organizations have stability with a flat structure. Small teams have flexibility working on new initiatives.
2. **Knowledge Sharing and Expectations.** Data and information are distributed as needed. Lessons and insights from pilots to large programs are shared to benefit others.
3. **Decision-Making**. Decisions are made where expertise resides, including at the lowest levels.
4. **Leadership.** Leaders are collaborative and provide access to resources and senior leaders as needed.
5. **Process Management.** Processes underlying predictable work are well-defined and stable. Processes in support of innovation are intentionally flexible.
6. **Roles.** Those people who carry out stable and predictable functions have well-defined roles. Roles are less defined for those who undertake the actions required for any situation.
7. **Norms and Expectations.** Norms and expectations are clearly communicated. Psychological safety is emphasized and based on the employee experience, not words.

# Michelle Belleville

*Flight Projects Directorate (Code 400)*
Senior Creative Project Lead

**Born** Warwick, RI

**Education** Providence College, School of Communication and Parson School of Design

## Life Before Goddard

Michelle didn't always follow the traditional path, growing up torn between wanting to become an accountant or a rock star. Her path somehow brought her both. After high school she enrolled at Providence College in Rhode Island with a focus on liberal arts before relocating to the Midwest to join a number of bands. She was a bassist and vocalist by night and worked in accounting at an insurance agency by day. She had a successful music career for more than 12 years including several regional tours.

At that time, digital and visual media, including 3D animation and art, were coming to the forefront around the nation. Her employer was interested in building this environment and Michelle was able to utilize her knowledge in music production and her creative and visual passions to start developing presentations and other multi-media products that included design, music, and content.

Michelle convinced her Vice President to send her to school to learn more about digital media to develop the company's website. The website launched and was immediately successful.

Michelle had found her passion and relocated to Washington, DC during the explosion of the internet working with startup companies. She was later hired as a creative director for a design firm and developed campaigns, digital products, and websites for several high profile clients, including Bristol-Meyers Squibb, the Foundation for the National Institutes of Health, the Motion Picture Association, Pfizer, PhRMA, and Verizon.

## Life at Goddard

In 2018, Michelle joined Goddard as part of the PAAC contract as a senior creative project lead and graphic designer. Her duties have evolved and expanded ever since. She prides herself on her design strategy with her experience spanning far above her outstanding graphic design work (including this here Critical Path 😊). Her focus is to provide full-scale strategic planning and project management for flight project design needs. From start to finish, Michelle assists with building budgets and timelines, presenting strategies and status to stakeholders, coordinating all project contributions such as video producers, writers, interactive programmers and artists, as well as meeting and coordinating logistics for her customers. She has contributed to and led several well-received websites, print products, presentations, and flight campaigns. Her big picture views and coordination with Agency, Center, and project initiatives allow her work to truly shine not just in adding content to websites but increasing the value and reach of the content that is created.

Two of her most intensive projects supported the Landsat 9 mission and Hubble Space Telescope. For **Hubble**, she was brought on to help with the general web page update. She identified several opportunities for science and web modernization and presented a restructure of the website architecture that was approved and implemented. She is in the process of redesigning the Hubble Mission site for the web modernization of nasa.gov. For Landsat 9, she led the development of the mission's **interactive website**. This included


*(Clockwise from top left) With Godzilla in Tokyo, Japan, on tour with my husband Dylan's band in Tokyo, Dylan and Michelle's wedding photo, with friends hanging out with Mayer Hawthorne after a show in DC, The Fiendish Thingies punk band I was in, and my big shot in a heavy metal band called Hyphen.* CREDIT: ALL PHOTOS COURTESY OF MICHELLE BELLEVILLE

3D animations, content creation, and videos to provide a platform for the mission and significantly expanded and branded the mission in preparation for its successful September 2021 launch and continues to be referenced by science users today.

In her spare time, Michelle is focused on continuing her development in user interface and user experience design (UI/UX), immersive storytelling and the continued evolution of the Directorate's role in multimedia. She volunteered to be part of NASA's Web Modernization Team (NWMT) that is revamping NASA.gov both in terms of design and functionality, as well as participating in the Agency's Content Management System (CMS) group to research and suggest new CMS systems for the Agency's websites. She has been selected to lead the design team for the Science Web Modernization Team (SWMT) which is taking on the effort of redesigning science.nasa.gov. Her work in this area will enable the Hubble mission site to be a test subject for the Agency in coordination with the Office of Communications efforts. She also leads the PAAC creatives group that provides a forum and opportunities to cross-utilize PAAC's small group of artists across the Directorate and is involved in the NASA creative group which is a forum to learn about colleagues, different disciplines, sharing resources, reduce communication blockages and siloed work. Michelle also continues to build her wealth of knowledge through her pursuit of design related certificates from Parsons School of Design.

## Life Outside Goddard

Michelle lives in DC with her husband, Dylan Cristy, a fellow PAAC team member, and her 14-year old blind, deaf, and wheel-chair bound dog named Lilu. She is an avid participant in DC's music and arts scene. Prior to the pandemic, she was a frequent traveler, having to postpone a big trip to Europe, but has appreciated several domestic trips and is looking forward to a return to Europe soon. Her passion for growth and development coupled with her work takes up her remaining time but she wouldn't want it any other way. ■

> "I don't know where I'm going from here, but I promise it won't be boring."
>
> David Bowie

# Sergey Krimchansky

*GSFC Dragonfly Payload Project (Code 431)*
**Project Manager**

**Born** Kyiv, Ukraine

**Education** Bachelor's and Master's in Electrical Engineering, The City College of New York

## Life Before Goddard

Sergey knew as a child that he wanted to be an engineer. He dedicated his childhood to his schoolwork prior to immigrating to the United States as a teenager. Growing up in Queens, New York, Sergey attended Forest Hills High School, before enrolling at the City College in Harlem. Upon graduation, Sergey took a position with the U.S. Army as a civil servant engineer for various projects at the Harry Diamond Laboratory, which was merged and is now known as the Army Research Laboratory. When accepting this position, Sergey relocated to Maryland and has remained here ever since.

## Life at Goddard

Sergey joined Goddard in 1990 before the engineering directorate existed, initially with the Television Infrared Observation Satellite (TIROS) project, the predecessor to the Suomi National Polar-orbiting Partnership (SNPP) and Joint Polar Satellite System (JPSS). He served as an instrument manager with his nose to the stone with TIROS for over 10 years. Sergey dedicated a large portion of his career at NASA to microwave instruments, in line with some of the work he had done for the Army. TIROS was later transitioned to become the Polar Operational Environmental Satellite (POES) program. He delivered four second generation microwave instruments, the first of which was launched on NOAA-K. These instruments were built and provided to the Europeans for the POES Meteorological Operation (MetOp) series.

Sergey served as the instrument systems manager for the next generation of microwave instruments, the Advanced Technology Microwave Sounder (ATMS), which were transferred to NPP. Last year, NASA designated the ATMS instruments as the "most important instrument you've never heard of", given their immense data contributions that feed weather models for forecasting and extreme weather planning. Multiple copies were later built for JPSS.

After NPP, Sergey joined the Global Precipitation Management mission as the instrument manager for the mission's Microwave Imager (GMI) and the instrument systems manager for the Japanese contribution. Both of these instruments are still operational, having been on-orbit for over 8 years.

Sergey joined the Total and Spectral solar Irradiance Sensor (TSIS) 1 mission as its deputy project manager, technical from its assignment to Goddard through launch to the International Space Station (ISS) and was critical with the initiation of the TSIS-2 mission. With TSIS-1, Sergey was interested in learning about the ISS and how it worked.

Sergey currently serves as the project manager for Goddard's collaboration of three payloads to the Dragonfly mission: the Mass Spectrometer, Drill for Acquisition of Complex Organics, and Gamma-ray Neutron Spectrometer pulsed

*(top) Sergey (left) and the TSIS-1 team received an Agency Group Achievement Award, (bottom) The FPD awarded Sergey the Steady Helm Peer Award in 2019, and (right) Sergey inspects a satellite model at the NASA-NOAA TIROS/POES 60th Anniversary Celebration.* CREDIT: ALL PHOTOS COURTESY OF SERGEY KRIMCHANSKY

neutron generator. Goddard's contributions are part of the larger Applied Physics Laboratory mission that will explore Titan, a moon of Saturn hypothesized to be similar to very early Earth.

When asked about his career, Sergey spoke to the importance of developing good working relationships, especially with his international partners and ensuring that NASA puts its best foot forward for these missions. One of his focuses is ensuring he is working towards management expectations and finds that his goal is always to develop the right people to work with to reach success. His top advice and one he takes deep to heart is the need to listen, which many of his team members who truly know him acknowledge as one of his strengths. Although he may not always agree, he identified that listening, and with respect, to hear all facets of different perspectives, ensures those managing instruments and projects can formulate the best way to move forward with critical decisions.

Sergey brings immense passion to his projects and although he may not directly convey it, for those that work with him it is clear that he truly cares. He shoots from the hip and always gives 150 percent. When asked his favorite part about working for NASA, Sergey noted that the Agency does more than just help advance America, it contributes more than just economy, politics, or science, but advances humanity and that is something to be proud of.

## Life Outside Goddard

Cliché to say, but Sergey is immensely passionate about his work and has dedicated his life to his projects and team members. Outside of work, he spends time completing creative and functional home improvement projects. He has a twin brother, Alexander Krimchansky, who also works at Goddard on the Geostationary Operational Environmental Satellite. Just remember, don't confuse the Krimchansky brothers. ■

> "Perfection is achieved, not when there is nothing more to add, but when there is nothing left to take away."
>
> **Antoine de Saint-Exupéry**

# THE LATEST SAR SAVES

## NASA'S SEARCH AND RESCUE (SAR) OFFICE CONTINUES ITS EFFORTS TO DEVELOP AND IMPROVE ON LIFE-SAVING DISTRESS BEACON TECHNOLOGIES.


Each icon on this map represents one rescue event, though multiple saves may be involved with each event. The Search and Rescue Satellite Aided Tracking (SARSAT) system is able to detect three types of beacons:

**Personal Locator Beacons (PLBs)**

Used primarily by hikers and outdoor enthusiasts

**Emergency Position Indicating Radio Beacons (EPIRBs)**

Used by commercial and recreation ships

**Emergency Locator Transmitters (ELTs)**

Used by civilian aircraft

COSPAS-SARSAT rescues from November 2021 through March 2022 are shown above.

## OLDER AMERICANS MONTH

### AGE MY WAY: MAY 2022

Did you know the month of May is a national observance of Older Americans Month (OAM)? Established in 1963, OAM is led by the Administration for Community Living. It seeks to celebrate the accomplishments of the elderly while raising awareness on issues such as elder care, neglect and abuse. The OAM theme for 2022 is focused on aging in place; how adults can live independently in their communities as long as possible. Visit the OAM website at https://bit.ly/3wvWd4C

## DID YOU KNOW..?

### We want to be in the know!

If you have something to share, send it to Matthew Ritsko. Include your **name, phone number** and send it to:

matthew.w.ritsko@nasa.gov

Flight Project Diversity and Inclusion Committee

Ext. 6-2515

# Coming and Goings

## November 1, 2021 through February 28, 2022

### Comings

**Camille Thurston** (210S) to 457/Near Space Network Project (NSN)

**Chanel Duncan** (383) to 460/ Explorers and Heliophysics Projects Division (EHPD)

**Brooke Hsu** (External) to 401/ Project Formulation and Development Office (PFDO)

**Bradley Hill** (External) to 450.2/Technology Enterprise and Mission Pathfinder Office (TEMPO)

**Alan Hylton** (External) to 457/ Near Space Network Project (NSN)

**Dana Ostrenga** (External) to 423/Earth Science Data and Information Systems Project (ESDIS)

**Lindsai Bland** (External) to 457/Near Space Network Project (NSN)

**Michele Gates** (100) to 400/ Flight Projects Directorate (FPD)

### Goings

**Jeff Pedelty** (429) Retirement

**Ken Anderson** (448) Retirement

**Greg Frazier** (460) Retirement

**John Lee** (400) Retirement

**Mike Myslinski** (441) Retirement

**Lisa Cacciatore** (457) Transfer to FAA

**Thomas McCarthy** (400) to 500

**Paul Guill** (405) Retirement

**Gail Dellagatta** (443) Retirement

### Reassignments/ Realignments Details within Code 400

**Glenn Jackson** (451) to 450/Exploration and Space Communications Division (ESC)

**Nidhin Babu** (451) to 452/ Lunar Communications Relay and Navigation Systems Project (LCRNS)

**Christopher Carson** (434) to 465/Geospace Dynamics Constellation (GDC)

**Andre Dress** (427) to 472/Joint Polar Satellite System (JPSS) Flight

**Mark Voyton** (443) to 427/ Plankton, Aerosol, Cloud, ocean Ecosystem (PACE)

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Karen Rogers / Code 400
*Administrative Officer*

# FLIGHT PROJECTS
## LAUNCH SCHEDULE 2022

FALL/WINTER

Joint Polar
Satellite System
(JPSS)