National Aeronautics and Space Administration

THE CRITICAL PATH

A FLIGHT PROJECTS DIRECTORATE PUBLICATION ■ 2020 SUMMER ISSUE

GSFC SUPPORTS COMMERCIAL CREW AND #LAUNCHAMERICA

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JWST media team wins top honors

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FLIGHT PROJECTS DIRECTORATE | Volume 28 • Number 2

ENABLING EXPLORATION AND EARTH + SPACE SCIENCE BY TRANSFORMING CONCEPTS AND QUESTIONS INTO REALITY

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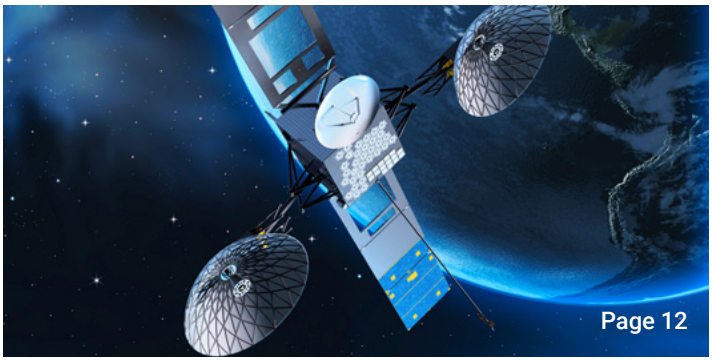

THE CRITICAL PATH
A FLIGHT PROJECTS DIRECTORATE PUBLICATION ■ 2020 SUMMER ISSUE

PUBLISHED BY THE FLIGHT PROJECTS DIRECTORATE

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Have a story idea, news item or letter for The Critical Path?

Let us know about it. Include your **name, phone number** and send it to:

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Code 460
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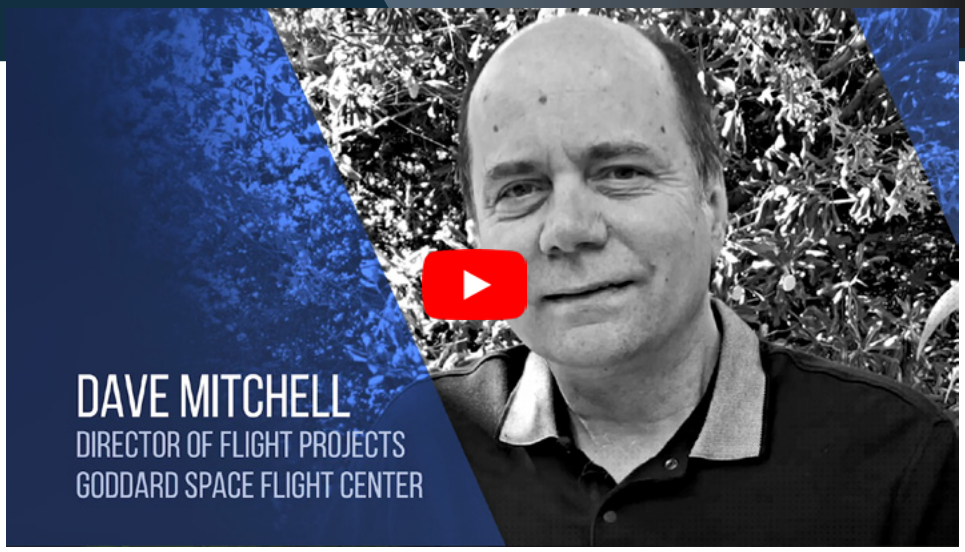
The deadline for the next issue is **October 30, 2020**

DOWNLOAD ISSUE

Message from the DIRECTOR



Wow, what a time it has been over the past several months, not only with the Flight Projects Directorate, but also nationally and internationally. We continue to maneuver through a global pandemic and keep our missions moving forward and more importantly, our people safe. Currently, 20 percent of the Goddard workforce is coming through the gates at the six campuses. The rest of us, myself included, are teleworking from home. It is amazing to see how adaptive the teams have become in this "virtual environment." While we certainly are not as efficient as being onsite working together, the teams continue to make steady progress in developing and operating our missions. Many thanks to the Restart teams for creatively finding ways to bring people back to work onsite in a safe manner with the backdrop of COVID-19. Some recent highlights include: the start of environmental testing of the fully assembled James Webb Space Telescope; the confirmation of the Orbit Servicing, Assembly and Manufacturing-1 (OSAM-1) mission; the OSIRIS-REx pre-tag rehearsal that brought the spacecraft to within 40 meters of the surface of the asteroid Bennu; and communications and navigation support for the historic Commercial Crew Dragon Demo-2 flight which safely sent astronauts Bob Behnken and Doug Hurley from Florida to the International Space Station and back. Of significance, steady progress continues with the LCRD (STPSat-6), Landsat-9, Lucy, JWST, and GOES-T missions as they proceed toward their respective launches in 2021. Meanwhile, our mission operations and networks teams continue to safely fly dozens of missions. Speaking of which, can you believe that the Hubble Space Telescope turned 30 years young in April? What an incredible machine that keeps on ticking thanks to the Goddard team.

Once again, we had a busy summer with high school and college interns, with a new twist of operating in a virtual environment. The energy and results that the interns bring to the Center every summer are always inspiring, even more so this year given that the interns never once set foot in the Goddard facility. I really enjoyed the Let's CONNECT sessions we had with the interns as well as the presentations on their summer internship results. Thanks to the mentors out there for investing in our "people pipeline" and in our future. Hopefully once the pandemic is behind us, we can bring many of the interns back for in-person intern experiences, or at least a tour of the Center.

Congratulations to the Flight Projects Development Program (FPDP) Cohort #3 graduating class comprised of Ben Hall, Joe Stevens, Cathy Stickland, and Jesse Walsh. The FPDP is a two-year program designed to accelerate learning and growth in flight project management. I look forward to seeing their continuing progress as they start into their next assignments in Flight Projects.

This image, nicknamed the "Cosmic Reef," was released on Hubble's 30th birthday. The red nebula and its blue neighbor are part of a star-forming region 163,000 light-years away. CREDIT: NASA, ESA, AND STSCI

As you are all very much aware, we've experienced significant social unrest throughout the country over the past few months. The Agency and Goddard have made a concerted effort to address related issues and concerns within the workplace in a thoughtful and meaningful way. For its part, the Flight Projects Directorate has conducted a series of Listening Sessions that have brought together over 500 people through 10 separate sessions. The discussions have been raw, powerful, sometimes uncomfortable and, hopefully, provided a better understanding of different perspectives as we navigate through these turbulent times. Thank you all for your participation in this important activity.

In closing, I want to acknowledge two people who are leaving Goddard after decades of service to the space program:

Preston Burch

Preston Burch is retiring from his current job as the head of the Astrophysics Project Division. His NASA work dates to the 1960s when he worked at Grumman on the Apollo program and has continued through the decades in government service as well as in the private sector working on myriad missions including the Hubble Space Telescope servicing missions, weather satellite programs, robotics, and next generation Astrophysics missions. Preston plans to stay in the local area and hopes to continue to contribute to the Goddard mission in different ways. We wish him much health and happiness in retirement and look forward to seeing him around campus when we fully reopen the Center.

Finally, after several years of working together, our FPD front office leadership team is going to change. Wanda Peters is leaving Goddard to become the next Science Mission Directorate Deputy Associate Administrator for Programs at NASA Headquarters. While I'm sad to see her leaving, I'm very happy that Wanda is getting this next great opportunity. I'm sure that she is going to do amazing things downtown and we will all continue to partner with her on science missions. As one of my two deputies, Wanda is an incredibly talented, hardworking, and wise deputy to me along with Tom McCarthy. More importantly, Wanda has been a confidante and a lifeline for me these past few years, and a true friend. Thank you, Wanda, for everything that you have done for us in Flight Projects and for Goddard in your 30-plus-year NASA career! ■

Dr. Wanda Peters

David F. Mitchell
Director, Flight Projects
david.f.mitchell@nasa.gov

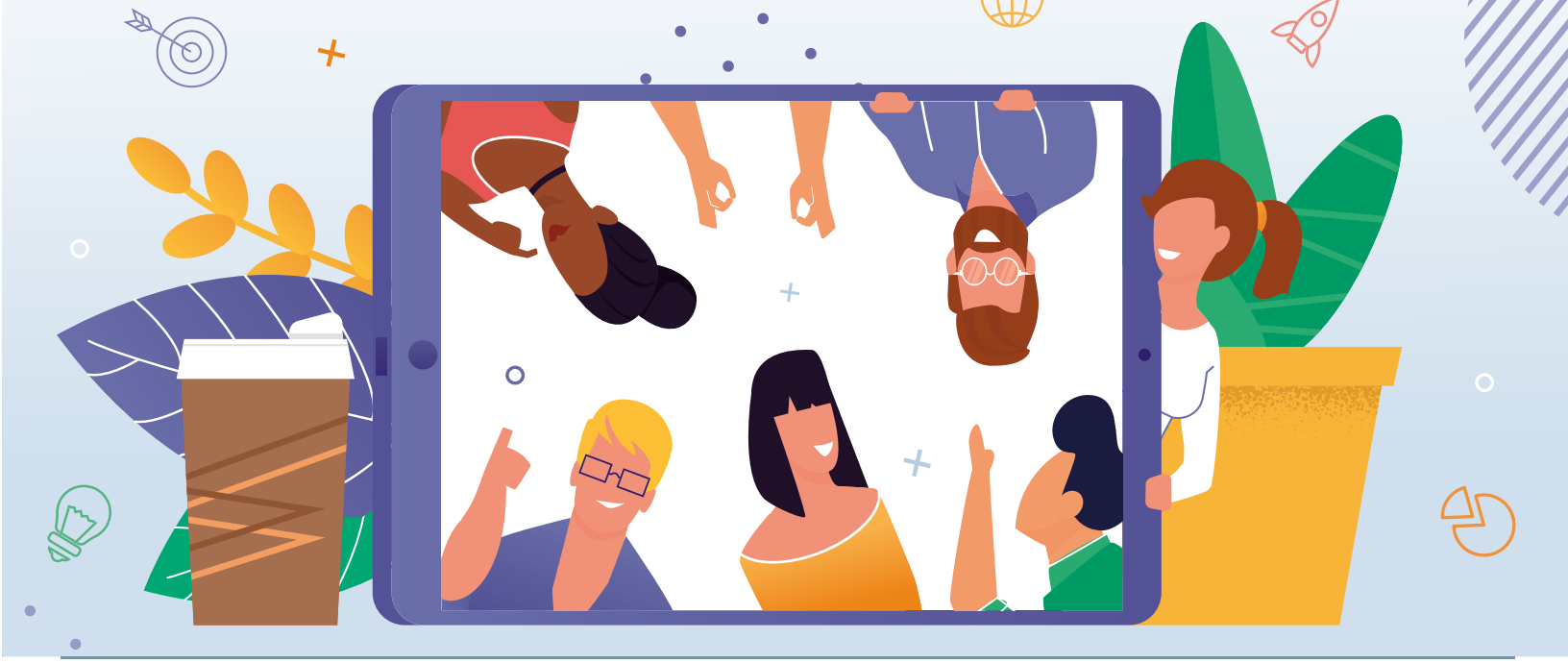
A WORD FROM THE DEPUTY

In the ~~Field~~ home with Tom McCarthy

FPD Deputy Director, Tom McCarthy, shares information on the current work environment, the restart process, and how to "stay calm and carry on."

A Farewell Message from Dr. Wanda Peters

FPD Deputy Director for planning and business management, Dr. Wanda Peters, bids farewell "until we meet again."



WE ARE IN THIS

TOGETHER

NASA Coronavirus information site

https://nasapeople.nasa.gov/coronavirus/

- Current Stage for each Center.
- Federal and NASA guidance.
- NASA Information Technology guidance.
- Travel guidance.

NASA Collaboration Services

https://nasa.sharepoint.com/sites/collaboration

- When to use what.

NASA Agency and Telework Resources

https://nasa.sharepoint.com/sites/collaboration/SitePages/Remote-Collaboration.aspx

- VPN User Guide.
- Team User Guide.
- Audio Conferencing Guide.
- NASA Telework Requirements Checklist.
- **Working virtually at NASA** https://searchpub.nssc.nasa.gov/servlet/sm.web.Fetch/Working_Virtually_at_NASA_v3.pdf?rhid=1000&did=6436603&type=released
- Training, to include SATERN and other training resources.

Code 400 COVID Information

https://fpd400.gsfc.nasa.gov/sites/400/FPD_Internal/SitePages/COVID-19.aspx

Employee Assistance Program

- NASA Center clinicians are available to help employees with a variety of challenges
- https://inside.nasa.gov/health4life/eap_center_contact_list

Thank you

#LAUNCHAMERICA

GODDARD AND THE FLIGHT PROJECTS DIRECTORATE

EMPOWER CREWED SPACEX LAUNCH

It's been almost a decade since the orbiter Atlantis roared down the runway at Kennedy Space Center, Florida, bringing an end to the era of the space shuttle. After the STS-135 mission landed on July 21, 2011, NASA no longer had a spacecraft that could launch astronauts from American soil. Instead, the agency would have to rely on the Soyuz, a Russian spacecraft launched from the Baikonur Cosmodrome in Kazakhstan, half a world away.

But this May, a revolutionary partnership between the U.S. government and private industry changed that paradigm.

On May 30, a SpaceX Crew Dragon spacecraft launched from the historic Launch Complex 39A, the same legendary site where Apollo 11 astronauts lifted off to the Moon over 50 years ago. The Dragon ferried astronauts Robert Behnken and Douglas Hurley to the International Space Station, where they joined the Expedition 63 crew.

This momentous launch proved a new capability for the agency, developed through the Commercial Crew Program, a NASA-backed effort to build a low-Earth orbit economy and empower commercial aerospace companies to journey to the space station. Now that SpaceX can launch astronauts to the space station, NASA can expand crew access to the orbiting laboratory, increasing the amount of U.S. crew time and associated science that can be done onboard.

On launch day, Goddard engineers came to center for a rare day of in-person work in the midst of the COVID-19 pandemic. Donning protective masks and taking their place at console, they helped shepherd the Dragon from the launch pad to low-Earth orbit.

(clockwise from left): SpaceX Dragon crew spacecraft docking with the International Space Station; HSF Mission Manager Rosa Avalos-Warren and HSF Network Director Neil Mallik support the SpaceX Crew Dragon launch from Goddard's Network Integration Center; NASA astronauts Robert Behnken and Douglas Hurley give a thumbs-up from the crew module. CREDIT: NASA AND SPACEX

Continued on page 10

Continued from page 9

In building 13's Network Integration Center, Human Space Flight Network Director Neil Mallik and Human Space Flight Mission Manager Rosa Avalos-Warren made sure that all of NASA's network assets were prepared to support the Dragon. Goddard's Human Space Flight Communications and Tracking Network (HSF CTN) synthesizes network capabilities and infrastructure into comprehensive, integrated services for crewed missions.

For this launch, the HSF CTN enabled continuous communications between the Crew Dragon, the space station and mission control centers at NASA's Johnson Space Center in Houston and the network's White Sands Complex in New Mexico. The Space Network's Tracking and Data Relay Satellite (TDRS) constellation handled communications between ground stations, Dragon and the space station. The NASA Communications Network carried mission data between ground stations and mission control centers.

While Mallik and Avalos-Warren monitored communications from the Network Integration Center, Goddard's Flight Dynamics Facility provided critical flight dynamics services to the mission by making sure that TDRS was pointing at and accurately tracking Dragon, even in the unlikely event of a launch escape. Using tracking data telemetered to Johnson Space Center in Houston and relayed to Goddard, Flight Dynamics Facility engineers ensured astronaut safety throughout the spacecraft's journey to the space station.

Meanwhile, the Search and Rescue (SAR) Office management and technical team were on console in the SAR lab lab in building 25. SAR has joined with the HSF CTN to provide the Commercial Crew Program with responsive location services through the international search and rescue network, Cospas-Sarsat. The Crew Dragon was equipped with an emergency beacon that can provide location services anywhere in the world near-instantaneously upon activation. Each crew member was also equipped with a personal locator beacon to be used in the event they need to exit the capsule prior to normal planned recovery operations.

Goddard has long supported crewed missions to space, empowering astronauts with the communications and navigation capabilities they need to succeed. All future Commercial Crew Program missions will rely on Goddard for communications services, as will the Artemis missions to the Moon and human spaceflight missions that NASA hasn't even dreamed of yet. ■

Watch the video

View "Goddard's Role in Keeping Astronauts Connected to Earth" to learn more about how several Goddard elements worked together to support the historic SpaceX Demo-2 mission, as well as how they will support all future commercial crew missions.

https://svs.gsfc.nasa.gov/13624

Danny Baird / Code 450
Technical Writer, Exploration and Space Communications projects division

FPD

Administrative Support Community Spotlight

The Administrative Support Community Spotlight seeks to recognize and connect members of the administrative 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 administrative support community.

How can we support you?

Contact FPD Administrative 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

JoAnn Brasted

Exploration and Space Communications (ESC)
Administrative Lead and Secretary

JoAnn Brasted, administrative lead and secretary of the Exploration and Space Communications (ESC) projects division, has been with NASA since 1991. She joined the agency after working in the private sector for many years, bringing with her a knack for human resources and personal connection. When she first joined NASA, JoAnn worked for the Earth Science Projects Division, which then became NASA's Mission to Planet Earth, there she worked on projects like Aqua and the Landsat Data Continuity Mission. In 2008, JoAnn transitioned to the ESC, where she is an integral member of the community. In her role, JoAnn manages all of the division's correspondence, ensuring accuracy for any document leaving the division. Additionally, JoAnn handles most of the division's scientific technical information and export control processes, helping authors and presenters get their content approved before publication. However, it is her critical role as travel preparer that JoAnn likes the most, enjoying making reservations and learning about places worldwide where ESC members travel to further exploration. In her role, JoAnn gets to work on a variety of projects and one day is never like the next – keeping her interested. Although she could retire, JoAnn says, "Why retire when you can keep working at one of the best places in the world to work. I enjoy the people and the job." Outside of work, JoAnn likes to socialize with her friends, often attending lunches and picnics by the pool.

Katherine Schauer / Code 450

Exploration and Space Communications (ESC) Projects Division

Empowering Exploration, Infusing Technologies, Revolutionizing Capabilities

Without communications and navigation, there is no mission

Since the inception of the agency, Goddard Space Flight Center has played a critical role in space communications and navigation. NASA organized its earliest networks — the global infrastructure that enabled Mercury, Gemini and Apollo — around the people and facilities in Greenbelt.

Over Goddard's history, the center has had many organizational structures, changing to best support current agency objectives. The most recent reorganization in 1997 created Code 450 which would ultimately become the Exploration and Space Communications (ESC) projects division, a global leader in mission support, mission execution and technology development.

Prior to 1997, Goddard housed network operations in Code 530 under the Mission Operations and Data Systems Directorate. The reorganization consolidated mission communications support within the Flight Projects Directorate under "Network and Mission Services," later "Mission Services" due to the diverse array of flight- and ground-based projects under its purview.

"It's remarkable to see the diversity of the projects that have transitioned through or found a long-term home in Code 450," said Phil Liebrecht who led 450 at its inception. "In addition to mission support and operations, 450 has also managed a wide variety of Goddard's contributions to agency exploration and science initiatives as well as cutting-edge technology development efforts. The diversity of flight missions we worked with, as well as the projects we managed, always kept the job very interesting."

In 2006, in line with the agency's exploration priorities, 450 officially became ESC. ESC supported many activities related to the Constellation program, founded under former President George W. Bush to return humans to the Moon. Now, ESC is developing technologies and capabilities for the Artemis program, which plans to put the first woman and the next man on the Moon.

"Since its founding, ESC's chartered roles and responsibilities have expanded significantly from the operations and maintenance mindset to much more," said ESC chief Bob Menrad. "We infuse new technologies for exploration, develop new capabilities for science missions, and research groundbreaking communications innovations."

ESC's broad portfolio includes network operations and maintenance, technology development and creating new business opportunities that advance the nation's exploration goals. Their mission supports the vision of their stakeholders in the Space Communications and Navigation (SCaN) program office at NASA Headquarters in Washington.

Continued on page 14

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Current Projects

450.1 NIMO

The Networks Integration Management Office (NIMO) synthesizes communications services for missions. They offer these services through Goddard's two major networks: the Near Earth Network (NEN) and the Space Network (SN). They support launch vehicles, science missions, human exploration missions, and more, providing customers with communications solutions through the entire mission life cycle.

Within NIMO, the Human Space Flight Communications and Tracking Network (HSF CTN) integrates network elements into comprehensive services for crewed missions. HSF CTN support enables communications services to the International Space Station and all visiting vehicles. This includes Commercial Crew Program spacecraft like the SpaceX Crew Dragon and the Boeing Starliner.

Additionally, NIMO and HSF CTN will play a critical role in the Artemis missions to the Moon. HSF CTN will work with the Jet Propulsion Laboratory in Southern California to provide communications services through NASA's Deep Space Network alongside the SN and NEN. Using all three of these networks, NASA will ensure the safety and success of these lunar missions.

450.2 TEMPO

The Technology Enterprise and Mission Pathfinder Office (TEMPO) manages ESC's innovation pipeline, enhancing communications and navigation capabilities and infusing new technologies. The office incubates technologies and projects until they are ready to be implemented or enter operations. They also conduct feasibility studies that showcase new capabilities.

Currently, the office is working to infuse Delay/Disruption Tolerant Networking (DTN). DTN's Bundle Protocol will extend internet-like capabilities to the harsh environment of space, where end-to-end links may be unavailable or limited. TEMPO is working with NASA's Plankton, Aerosol, Cloud, ocean and Ecosystem (PACE) mission, which will be the first space-based operational use of DTN through the NEN.

TEMPO, working with the ESC architect, led a multi-disciplinary team at Goddard to propose LunaNet. The LunaNet architecture leverages DTN alongside other innovative capabilities to create a flexible and extensible "Internet on the Moon." LunaNet will enable Artemis missions and future lunar endeavors while providing a platform for NASA to build out network services further into the solar system.

Early in TEMPO's history, the office helped to advance optical communications technologies, which use infrared lasers to provide missions with increased data rates. TEMPO is now focused on quantum networking, realizing national strategic goals like intercontinental quantum entanglement distribution. This research could enable improved security, enhanced timing architectures, and serve as key infrastructure for a future quantum internet.

450.3 SAR

Since 1979, the Search and Rescue (SAR) office has lent NASA expertise to the international satellite-aided search and rescue program, which saves thousands of lives internationally each year, guiding first responders to people in distress. The team designed and built the ground and space segment prototypes of the search and rescue network, as well as prototype beacons that can locate users worldwide. These have been spun off into commercial products available for purchase.

Recently, SAR helped upgrade both the space and ground segments of the network, resulting in more accurate location services and a more robust network overall. Additionally, SAR has developed second-generation beacon technology that takes full advantage of the upgrades and offers a host of new services to users.

The first users of second-generation beacon technology will be Artemis astronauts journeying to the Moon. The specialized beacons for Artemis, Advanced Next-Generation Emergency Locator (ANGEL) beacons, will help NASA locate astronauts should they need to egress from their capsule upon returning to Earth.

Beyond Earth's bounds, SAR is developing 'LunaSAR,' a component of LunaNet. LunaSAR will allow astronauts on the Moon will have similar distress-tracking capabilities to those available to adventurers on Earth, including two-way texting with NASA mission control.

451 LCRD/ ILLUMA-T

As the first end-to-end, bidirectional optical relay to enter operations, the Laser Communications Relay Demonstration (LCRD) will demonstrate the robust capabilities of optical communications. Optical communications will use infrared lasers to provide missions with increased bandwidth and decreased size, weight and power requirements over comparable radio communications systems. LCRD was recently integrated onto a U.S. Space Force spacecraft, with an anticipated launch in early 2021.

The Integrated LCRD Low-Earth Orbit User Modem and Amplifier Terminal (ILLUMA-T), hosted on the space station, will be the first laser relay demonstration from low-Earth orbit. Following the on-orbit experiment phase, the terminal may be used to provide a new high data rate connection for station operations and science. ILLUMA-T is preparing to enter its build phase, with an anticipated launch in 2022.

452 The Space Network

The SN consists of a constellation of Tracking and Data Relay Satellites (TDRS) in geosynchronous orbit and the ground stations that support them. The SN architecture provides continuous communications services to flagship missions like the space station and the Hubble Space Telescope, as well as crucial tracking and telemetry services to launch vehicles.

SN will assume control of the LCRD spacecraft when it enters operations and is developing optical ground stations to enable data transference over laser links between the ground and spacecraft.

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453 The Near Earth Network

The NEN is comprised of a worldwide network of over 30 commercial and NASA-owned antenna ground systems that provide telemetry, tracking, and command services to spacecraft at a variety of orbits within a million miles of Earth. The network provides direct-to-Earth communications and tracking services to over 40 NASA missions studying an array of topics from climate change to black holes.

The NEN recently completed their Launch Communications Segment (LCS), which will provide communications and tracking support for missions launching from or returning to Kennedy Space Center in Florida. LCS comprises three ground stations – the Kennedy Uplink Station, Ponce De Leon, and Bermuda — and will be a crucial component of Artemis mission launches.

The NEN Initiative for Ka-band Advancement (NIKA) is building tri-band antennas capable of supporting legacy and future missions. While a majority of NASA missions use X-band and S-band radio frequency bands, Ka-band's larger bandwidth enables much higher data rates. NIKA will allow high-tech missions to send more data at once than ever before.

The NEN is also developing Ka-band antenna arraying, which enables two or more NEN antennas to function as one larger antenna capable of receiving data at higher data rates than either could individually. While NASA has experimented with antenna arraying since the 1980s, the NEN's High Data Rate Signal Combiner surpasses the data rates of previous systems. In fact, the team was recently awarded a provisional patent for the technology.

455 ESP

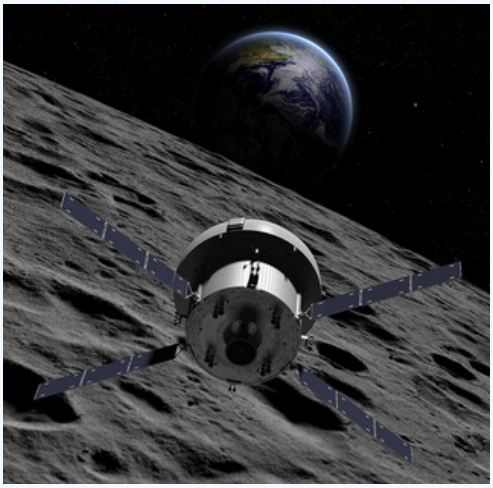
The Exploration Systems Project (ESP) is a small, advanced concepts formulation and development team dedicated to supporting current and future exploration efforts. ESP's cross-cutting work ranges from avionics and software to architecture analysis and advanced exploration systems development.

Currently, ESP is working with SpaceX, Blue Origin and Dynetics, three contractors selected by NASA to design human landing systems for lunar exploration. The ESP will play a critical role in the development of these systems for NASA, collaborating on modeling and simulations that help to inform landing dynamics and lunar surface activities. They will also provide insight into software, avionics, structures, guidance, navigation and control, autonomy, and automation.

The ESP is also leading the development of the Broadband InfraRed Compact High-Resolution Exploration Spectrometer (BIRCHES), an instrument designed to investigate the distribution of water and other resources on the Moon. BIRCHES is the primary instrument on the Lunar IceCube mission, a CubeSat launching as a secondary payload of the Artemis I mission.

456 LEMNOS

The Laser-Enhanced Mission Communications, Navigation and Operational Services (LEMNOS) office infuses optical communications on current and future missions. Currently, the LEMNOS office is developing an optical communications terminal for the high-profile Artemis II mission. LEMNOS will furnish the Orion spacecraft with an optical terminal dubbed the Orion Artemis II Optical Communications System (O2O).



458 SGSS

The Space Network Ground Segment Sustainment (SGSS) project manages critical upgrades to space communications infrastructure supporting the TDRS constellation. These upgrades will modernize SN ground systems and improve many of its capabilities. This is the first time NASA has performed upgrades of this magnitude while maintaining operations. Ultimately, the upgrades will also extend the longevity of ground systems while making them more cost effective and improving data rates.

Other Work

Spectrum Management

The Goddard Spectrum Management Office protects all assets — space and ground — that transmit and receive data through radio frequency. Every Goddard mission that uses radio frequencies works with ESC's spectrum management office, ensuring they use the appropriate band so that interference will not occur with other assets.

ESC Deputy Spectrum Manager Lisa Cacciatore (bottom row, second from left) and colleagues at the ITU World Radio Conference, held in Sharm El-Sheikh, Egypt. CREDIT: NASA

The office represents NASA on the international stage by attending the International Telecommunication Union Radiocommunications World Radio Conference, where over 180 nations assemble to revise current treaties and add new regulations. The office presents and defends the agency's radio frequency needs, protecting NASA's band allocations.

Continued on page 18

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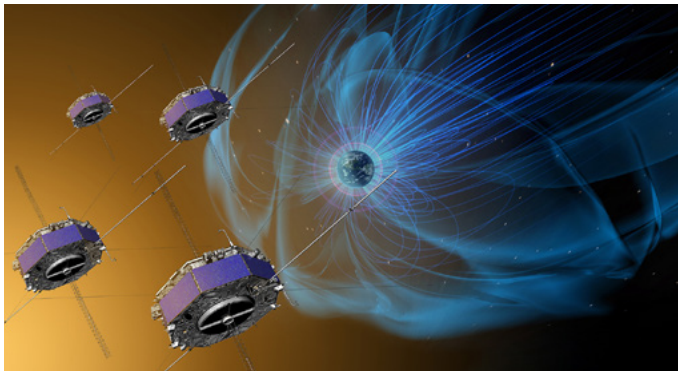
PNT

In navigation, ESC positioning, navigation and timing (PNT) engineers are sought-out experts worldwide. They serve on committees and organizations determining the future of space navigation both nationally and internationally, advocating for NASA's interests.

They also investigate the use of Global Navigation Satellite System (GNSS) signals in space. GNSS signals, such as those from the GPS, have long been used by spacecraft close to Earth, but Goddard navigation engineers have demonstrated that they can also be used for accurate location services halfway to the Moon. High-accuracy modeling shows this is a viable navigation option even in lunar orbit.

These engineers also contribute to navigation technology development efforts. The Station Explorer for X-ray Timing And Navigation (SEXTANT), an experiment using the space station's Neutron Star Interior Composition Explorer (NICER), measured the ultra-regular oscillations of pulsars to demonstrate an independent onboard navigation technique known as XNAV. SEXTANT helped prove that pulsars could be used in a similar manner to GNSS satellites, but anywhere in the galaxy.



New Business/Strategic Partnerships

NASA is journeying to the Moon, Mars and beyond, but we aren't going alone. The agency is exploring with the help of universities, commercial industry and other government agencies. ESC actively seeks strategic partnerships to enhance existing capabilities and develop revolutionary space communications and navigation technologies. These partnerships, along with new business opportunities, enable missions of the future and industry's ability to take advantage of new capabilities – supporting groundbreaking science for decades to come and allowing the Artemis generation of astronauts to keep connected with the ground.

ESC established a new role of deputy program manager/strategic partnerships in February 2020 to strategically find and promptly respond to new opportunities that grow Goddard's portfolio of innovative technologies, infusing new and challenging work that fulfills the organization's mission and vision.

Policy and Strategic Communications (PSC)

Working closely with the SCaN program, ESC develops innovative internal and external products to educate a variety of audiences about SCaN efforts. The team's portfolio encompasses conferences and outreach events, writing and digital media products, a large summer intern program and more.

Legacy Projects

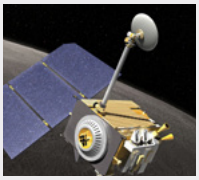
1970

TDRS

The TDRS project developed the relay satellites that comprise the space segment of the SN. The TDRS program began in the early 1970s, developing technologies and capabilities over the next four decades that provide robust, worldwide relay communications services. The last TDRS satellite launched in 2017, replenishing the fleet and preparing ESC to support missions for many years to come. There are currently seven TDRS actively supporting NASA missions over three regions of the globe: the Atlantic Ocean, the Pacific Ocean and the Indian Ocean.

2009

LRO



ESC once housed the Lunar Reconnaissance Orbiter (LRO), a flagship lunar mission that has laid the foundation for future exploration. Launched in 2009, LRO is a robotic mission mapping the Moon's surface. LRO observations have enabled numerous groundbreaking discoveries, and NASA is using its high-resolution maps to plan the Artemis missions.

2013

LLCD

The Lunar Laser Communications Demonstration (LLCD) experiment launched in 2013 and proved the viability of optical communications, leading to the development of ESC's LCRD and other Goddard-developed optical technologies. An unqualified success, LLCD was the first technology demonstration of optical communications, enabling data rates five times faster than ever before from beyond low-Earth orbit.

Other legacy projects include: the Orbital Launch Services Program (OLSP), which provided launch services before it transitioned to Kennedy, merging with the Atlas Program to form the Launch Services Program; the Rapid Spacecraft Development Office (RSDO), which enables fast procurement of spacecraft and payload space for future missions, now Code 401.1; the EXpedite the PRocessing of Experiments to the Space Station (EXPRESS) Logistics Carrier (ELC), designed to support external payloads mounted to the space station; and the Integrated Financial Management Project (IFMP), established to centralize financial accounting systems, before it moved to NASA Headquarters.

Though Goddard has long been home to communications and navigation support, ESC itself has only been around since 2006 — Code 450 since 1997. Though that's just a small portion of NASA's storied 60-year history, the division has already had a profound impact on Goddard, the agency, and the nation as a whole. In just a couple decades, ESC has positioned itself as a global leader in space operations and technology, providing cost-effective solutions and sought-after expertise and innovation.

Looking to the future, the division envisions the capabilities that will enable humanity to extend its reach ever-further into space. Their work on DTN and LunaNet will enable Artemis and, ultimately, create an internet that extends across the solar system. ESC's early research into quantum communications technologies promises to make those networks perfectly secure.

ESC offers robust and capable communications services to a diverse and ever-growing set of missions. Working with industry partners, ESC will continue to provide crucial links from space to ground while embracing NASA's goals for commercialization and growing the space economy.

The division's tag-line, emblazoned on many of the division's presentations, says it best. ESC is "more than you ever imagined." ■

Danny Baird and Katherine Schauer / Code 450
Technical Writers, Exploration and Space Communications projects division

Earth Science Mission Operations continue critical on-site work during Stage Four

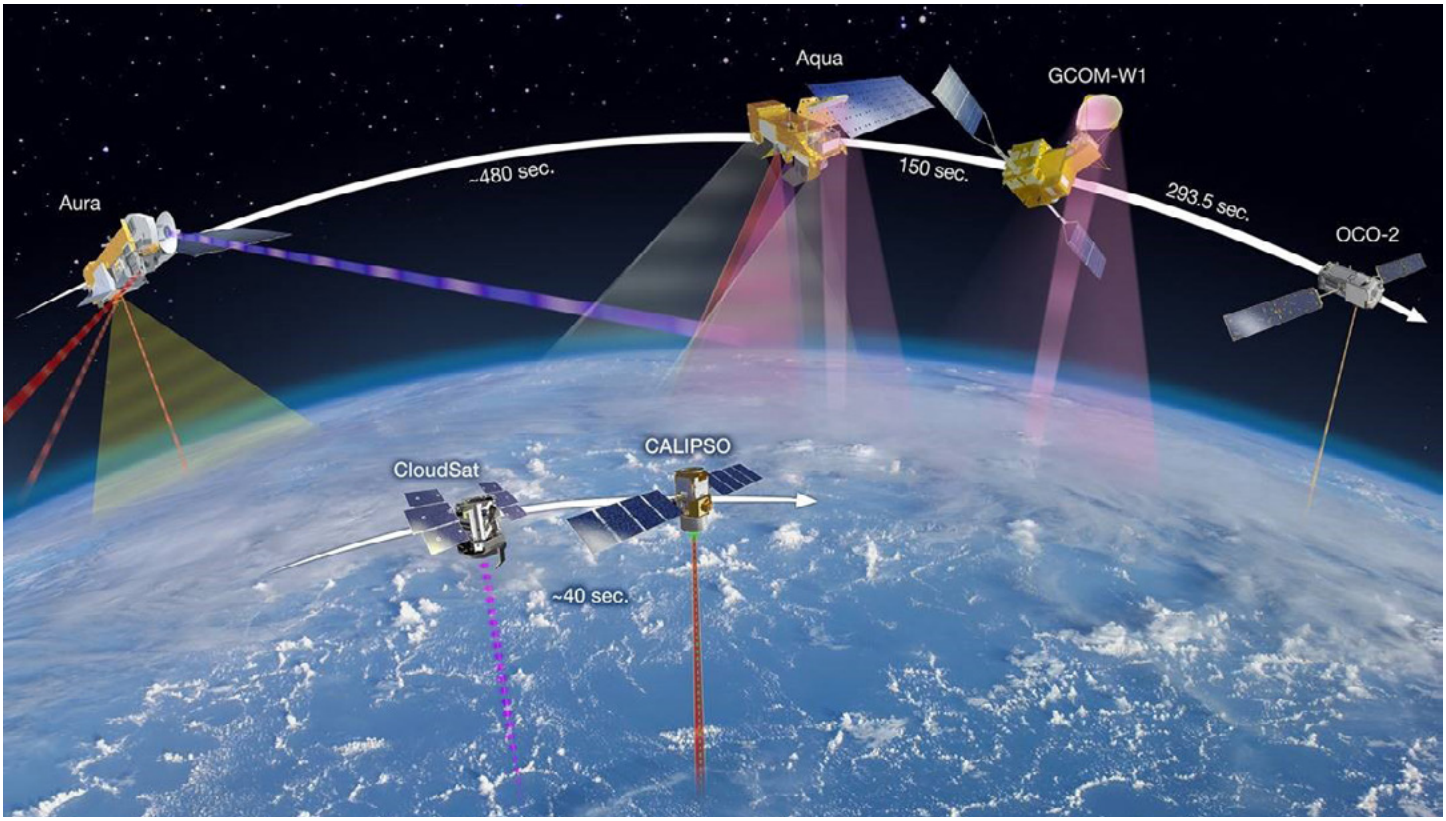
Although many of our colleagues are able to telework during Stage Four of NASA's response to the COVID-19 pandemic, some organizations require on-site work to continue mission-critical tasks. The Earth Science Mission Operations (ESMO, Code 428) project manages four spacecraft at GSFC and is responsible for spacecraft maintenance and operations to ensure the health and safety of billions of dollars in national assets by fulfilling the primary operational requirements for each mission and providing the scientific community with high-quality data products in a timely manner. Although COVID-19 has changed the way ESMO supports its missions, the team's work, on and off site, remains as critical as ever.

ESMO utilizes a team of approximately 35 rotating staff members, typically limiting staff on site at any given time to about six individuals. Given that Goddard's Building 32, where the ESMO team resides, was designed to support 2,000 staff at any time, walking the halls with a team of six provides a unique perspective.

The project immediately launched a Safe Distancing Team whose efforts at the start of Stage Four operations required extensive support for Building 32's Mission Operations Center (MOC) and Building 13's Backup MOC. The team's multi-step implementation plan required moving network interfaces and reconfiguring consoles from their previous close quarter setup into physically separate spaces. In Building 13, the Backup MOC, where the team typically works close together, shoulder to shoulder, they devised a creative reconfiguration utilizing adjacent office space to create a footprint that enables continuation of remote operation even in stop-work situations for emergency cleaning/sanitizing related to a potential COVID case. The team also developed detailed mapping for approved routes throughout the building and provided signage in Building 32 to enhance safety between different operating groups to contain these organizations and eliminate cross-contamination. These procedures have proven to reduce contact, enabling smaller contact groups should exposure occur.

On site, ESMO's Global Precipitation Measurement (GPM) mission operations team immediately transitioned from on-site operations to minimal staffing. This required implementing a number of process streamlining activities that enabled the spacecraft to lengthen the on-board stored command from one to seven days. They also added remote telemetry monitoring capabilities to further reduce on-site presence. The team was able to address two GPM anomalies during Stage Four operations.

ESMO's information technology (IT) team has been put to the test, like so many others on Center, to support Stage Four operations. Given the nature of ESMO's work, security is the utmost concern and the team utilized NASA's resources to ensure that off-site work maintains the high levels of security required for these critical operations. Extensive use of NASA's virtual private network, two-factor authentication, and secure remote access services have ensured that those on site and off continue to work effectively within this paradigm. From



ESMO operates NASA's contributions to the International Afternoon Constellation, which includes the A-Train satellites (OCO-2, GCOM-W1, Aqua, and Aura) as well as the C-Train satellites (CALIPSO and CloudSat). CREDIT: NASA

securing and safely distributing loaner laptops to larger scale technology efforts, the team continues to be a primary support system for the project.

There have been a number of examples of high impact information technology efforts on Center over the past few months. For ESMO, the GPM team quickly deployed a capability to securely distribute MOC telemetry displays using video capture devices allowing real-time screen displays over Microsoft Teams for critical operations among the flight operations team, mission director, instrument teams, Japan Aerospace Exploration Agency, Packet Processing System group, and GSFC engineers in response to the GPM Spacecraft anomaly activities. The team's efforts enabled ESMO to quickly assemble an anomaly review team and allowed all involved to monitor telemetry during critical operations activities.

Behind the smaller group of individuals on site, is a team providing exceptional support to maintain the health and safety of on-orbit assets, as well as easing the mental burden of ESMO staff during this trying time. Upon transitioning to Stage Four, ESMO management immediately generated staffing plans and processes to ensure the safety and well-being of personnel and allowing its missions to maintain 24x7 operations in line with the medical guidance provided to GSFC. ESMO successfully optimized efficiency on site prior to COVID-19 and worked diligently to maintain those efficiencies in this new environment. They also developed staffing contingency and contact scenarios should a potential coronavirus case occur. This required constant communication with personnel, both relaying information and messages from upper management and bringing forward any questions or concerns from the mission-essential staff.

ESMO support teams sourced and provided no-contact delivery of critical supplies to ensure continued on-site operations sustained the increased safety requirements and prepared for developments as coronavirus health recommendations evolved. The team visited numerous local stores, met team members

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(clockwise from left): ESMO support teams sourced and provided no-contact delivery of critical supplies; Team member Marcus Gray sewed over 60 cloth face masks for the entire team; Aqua Flight Systems Manager, Thomas Rusu, conceived and recorded a podcast series on coronavirus-related topics. CREDIT: PHOTOS COURTESY OF MARCUS GRAY AND THOMAS RUSU

remotely, and completed online orders to gather sufficient cleaning equipment, hand sanitizer, gloves, and keyboard covers, and delivered items to various physical locations in Building 32 for on-site members. This level of effort was required given the initial extreme reduction in availability through NASA ordering services and commercially. One team member, Marcus Gray, went as far as gathering cloth, thread, and elastic to sew over 60 cloth face masks for the entire team.

The creativity of those supporting the on-site team has also been exceptional. ESMO's Aqua Flight Systems Manager, Thomas Rusu, provides extensive daily support to the members on the Earth Observing System (EOS) online rotating-shift crew and its planning and scheduling staff, who are now on the front lines providing around-the-clock, mission-critical operations for EOS satellites. He developed a new podcast series, which he conceived and recorded on his own time to provide critical information regarding a number of coronavirus-related topics and status for Earth Observing System mission operations. Tom successfully created this valuable resource for the team while teleworking from home, maintaining his duties as the Aqua flight systems manager, and managing his two young children and family needs at home, a juggling act relatable to so many during this period.

Although this time has been extremely difficult for all team members, we can agree that the increased camaraderie and additional understanding regarding the immense value ESMO offers to NASA's missions emphasizes the amazing culture within GSFC and the Flight Projects Directorate. The team continues to prioritize connecting with each other during this time via Teams and other methods. NASA and Goddard Space Flight Center's response to the pandemic and the dedication of our teams has provided outstanding examples of our ability to overcome challenges and of our unity and strength. ■

Rachel Brinson / Code 420
Senior Technical Writer, Earth Science Projects Division

Sandy Womack
Earth Observing System (EOS) Mission Planner

Sandy Womack is one of the critical staff members supporting the Terra, Aqua, and Aura missions, joining a handful of her coworkers as part of ESMO's rotating on-site team. When asked how operations have changed since NASA entered Stage 4, Sandy detailed how shift hand-overs, previously completed in-person, are now completed via phone just before the transition. She also noted how the teams are implementing cleaning protocols to transition from one staff member to the other within the MOC and how most operations consoles have been set so there is only one person in a room using individually-assigned stations.

But most importantly, Sandy was amazingly positive, evidence of the strength of her organization. She noted that other than losing track of days of the week, COVID-19 operations remind her of the quiet environment that the team is familiar with due to their 7-day-a-week, and therefore weekend, operations. Sandy typically works 8- to 10-hour shifts, depending on what is occurring with her mission that day.

She noted that the ESMO team has always had an inherent flexibility due to the nature of their work, and she would know, having been part of ESMO for 29 years. Sandy stated that the team is always monitoring items of interest, including mission status, critical contacts, information transfers, eclipses, or drag maneuvers. Recently, the team was closely monitoring contact changes due to the moving target regarding the SpaceX launch. The team's resilience enabled them to coordinate quickly with other partners, even those teleworking, in an extremely compressed timeframe to develop on-call contacts with partner organizations. During Stage Four, the team also tested a new hybrid antenna, which has been successful.

Overall, Sandy is adjusting to the quiet on-site work and although she misses the buzz, the team continues to make efforts to email and check in. More than anything, she appreciates the thought expressed by the Center as she drives out each day and views GSFC's new exit banner thanking those working on site.

WEBB MEDIA TEAM WINS TOP HONORS!

Congratulations to members of the James Webb Space Telescope (JWST) media team who were recognized recently for their stunning images and videos. JWST photographer Chris Gunn and videographers Mike Starobin and Mike McClare received NASA Photographer and Videographer of the Year Awards.

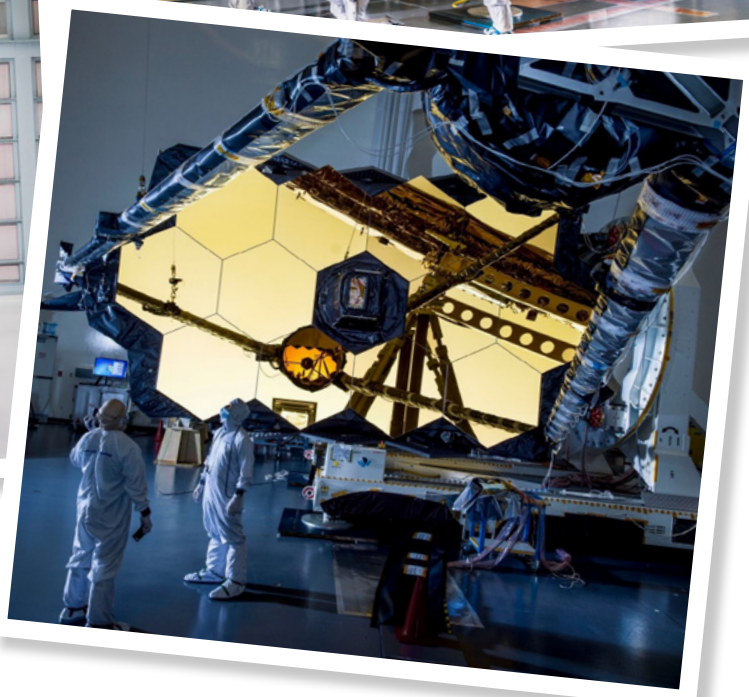
CHRIS GUNN NAMED NASA PHOTOGRAPHER OF THE YEAR

The FPD's Chris Gunn was named the well-deserved winner of the 'Places' category for his mesmerizing shot of a lone person standing facing a wall of HEPA filters in the Building 29 Space Systems Development and Integration Facility (SSDIF). It was a triple celebration for Chris, who also placed first and third in the 'Documentation' category for capturing stunning JWST integration activities.

In the past, NASA photographers rarely received individual recognition. Since they work for a government agency, their images are released into the public domain and are often only credited as "Photo by NASA." The Agency's internal Photographer of the Year contest was created in 2018 by Maura White, NASA's head of mission imagery at Johnson Space Center's multimedia office, to provide some well-deserved recognition.

Chris began working at NASA in 2000 on the Hubble Space Telescope servicing mission technical photography team and has led the JWST photography team since 2009. Despite his demonstrated creativity, he refers to himself as a technician. "I think everyone has a creative spark in them, but you have to go beyond creativity. You still need discipline; you need to work hard. Photography is more science than art." He adds, "Some highly creative people have a different way of seeing things. Being a photographer allows me to appreciate how other people see things."

For JWST, Chris is embedded in the development team as the massive telescope is assembled, integrated and tested. "For me, a science-fiction buff, it's almost like seeing the *Enterprise* being built," Chris says. He captures nearly every step in the process for the project's photographic records – "almost every single wrench turn, every single movement is documented," he said. Working with JWST lead media producer, Mike McClare, he helped assemble time-lapse photography that has been featured in many videos of the JWST integration and assembly process.



This mesmerizing shot of the Building 29 clean room was first-place winner in the 'Places' category; Stunning overviews of JWST placed first (top) and third (bottom) in the 'Documentation' category. CREDIT: NASA/CHRIS GUNN

Chris' work has also received wider recognition. After project approval, some of his 'beauty shots' are released to the public and have been reproduced in *National Geographic*, *The New York Times*, and *Popular Science*, among other worldwide print and on-line publications. ■

Edited by Laura Paschal / Code 443
The Critical Path Team

View more of Chris' breathtaking photography

- https://www.hasselblad.com/stories/chris-gunn-nasa-james-webb-telescope-hasselblad
- https://www.instagram.com/thelightandthelens/
- https://www.facebook.com/watch/?v=361907911203085

SHOOTING NASA'S WEBB

THROUGH THE LENS OF TWO NASA VIDEOGRAPHERS OF THE YEAR

Two longtime video producers at Goddard were recently recognized with the agency's highest honors for their work in telling the story of the James Webb Space Telescope.

Michael Starobin and Mike McClare placed among the top three in the Production category at the 2019 NASA Videographer of the Year Awards, held in June of this year. Starobin garnered first place with his video series, "Heat Signatures," while McClare came in third for his "Introduction to the James Webb Space Telescope Mission" video.

Winners were selected by a panel of expert filmmakers from NASA and other media organizations. In 2005, NASA's Imagery Experts Program Manager Rodney Grubbs created the event to recognize NASA's unsung heroes behind the camera.

CREDIT: NASA/W.HRYBYK

MICHAEL STAROBIN
BRINGING WEBB DOWN TO EARTH

Michael Starobin first came up with the concept for his winning series, "Heat Signatures," about five or six years ago.

"Webb is such a technical project about a subject that people really don't deeply understand," he explained. "I wanted to show that it's built by people who are our neighbors, ordinary people who went to school and go to work."

In "Heat Signatures," each video highlights an individual working on Webb, whether they are scientists, custodians, or accounts managers, and features one of their interests outside of working at NASA. For instance, in the pilot video of the series, Program Scientist Eric Smith demonstrates his winemaking hobby. Another video showcases how Webb engineer Amy Lo and her husband fix race cars in their spare time.

The title for the series takes inspiration from the telescope, which will see in the infrared part of the spectrum. Similarly, an infrared security camera can pick up an individual's shape, sometimes known as their "heat signature."

"Each of these people is leaving their own profile as they move through the world, their personal signature," Starobin said. "If we're looking at infrared, we won't see what our eyes show us with ordinary light. We'll see details that would otherwise be invisible."

For this series, Starobin used close-up shots in his videography to express a sense of intimacy between the viewer and his subjects.

"I shot them with what's called a prime lens, which means you can't zoom in or out. You have to move yourself to change the shot, and generally I tried to get right in their faces. That way, even if they were talking about engineering and science, viewers feel a sense of relatability," he said.

As of right now, "Heat Signatures" is still a work in progress — Starobin submitted four finished videos to the contest, but he hopes to have as many as 20 or 30 subjects. Although the series is not yet available, you can expect "Heat Signatures" to be released closer to the launch date of the James Webb Space Telescope.

A screen still from "Heat Signatures." In the pilot video, JWST Program Scientist Eric Smith demonstrates the winemaking process. CREDIT: NASA/MICHAEL STAROBIN

A screen still from "Heat Signatures." This video features JWST engineer Amy Lo and her passion for fixing race cars. CREDIT: NASA/MICHAEL STAROBIN

CREDIT: NASA/CHRIS GUNN

MIKE MCCLARE
TRACKING A TELESCOPE THROUGH TIME

Mike McClare has been the lead media producer for Webb since 2009. In addition to his and his team's production work, he oversees the telescope's very own time capsule: a huge server containing more than 11 years of timelapse footage that captures the observatory's entire building and testing process so far. He started the project with NASA photographer Chris Gunn, who was awarded NASA's Photographer of the Year this year.

McClare's videography, along with some of his timelapse work, is featured in his winning video, titled "An Introduction to the James Webb Space Telescope Mission."

Like Starobin, McClare constantly strives to relate the Webb telescope to the general public with his work. For this video, he chose a novel approach. The video starts and ends with the same message — "this is your telescope" — and explains how everyone can benefit from the ways Webb will advance our knowledge of the universe and our solar system.

"What we're doing here isn't just for the scientists, it's for everybody," McClare clarified. "Webb is one of the most challenging science missions NASA has ever done, and I wanted people to understand the incredible effort it takes to build Webb, as well as its huge science reward."

McClare wrote about 24 scripts before settling on the theme of the video. He's also applied that same tenacity to all elements of his role, but especially when it comes to shooting in the challenging environment of a cleanroom. Getting equipment in there requires a lengthy decontamination process. For a mission as large as Webb, that means McClare has had to use special gear, including a 35-foot crane!

McClare recognizes the gravity of being a timekeeper for Webb — that how he chooses to represent Webb will have a legacy long after the mission heads into space.

"I'm looking at the mission 50 years in the future — somebody's going to go back and want to tell the Webb story, and I want to make sure they have a deep resource of amazing footage to work with," he said. ■

Isabelle Yan / Code 443
JWST Social Media Specialist/ Science Writer

More information about Webb

- http://www.nasa.gov/webb

Progressing Missions with Progressing ALS:

Dave Parker gives new meaning to work-life balance

In the fall of 1992, Dave Parker began his career as a prime engineer of the electrical power team for the first Hubble Space Telescope (HST) Servicing Mission. Almost 30 years later, he continues to be an influential and diligent employee at Goddard Space Flight Center. His efforts have greatly contributed to the success of many NASA missions, including all of the HST servicing missions. Dave has always been a crucial part of the satellite servicing team, even when faced with the incredible obstacle of a terminal illness.

On November 19, 2015, Dave was diagnosed with Amyotrophic Lateral Sclerosis (ALS), a progressive neurological disease that leads to paralysis and loss of speech, swallowing, and breathing functions. Because of ALS, Dave is now bound to his wheelchair and hospital bed. Over the course of 5 years, he lost the use of his arms, hands, legs, and core, and has developed difficulty speaking and swallowing. ALS has severely impacted his day-to-day activities, but his attitude and outlook on life remain bright. His contributions to NASA's Exploration and In-Space Services (NExIS) team, formerly the Satellite Servicing Projects Division, of which he is a part, continue to be invaluable.

"[Dave is] an active member of the team and is relied upon for expertise and engineering judgement," NExIS Division Chief Benjamin Reed said. "We consider ourselves lucky to have Dave as a member of the team. Our success is due in large part to his contributions."

Dave enjoys exploring his neighborhood. CREDIT: NASA

A Shout Out to Dave

NASA astronaut Chris Cassidy gave a shout-out to Dave during installation of the Robotic Tool Stowage (RiTS) on the International Space Station (ISS). The RiTS was developed by NASA's Exploration & In-space Services (NExIS), formerly the Satellite Servicing Projects Division.

https://youtu.be/Pe6dQu2GRXE

Dave Parker disassembles battery modules after their return from a Hubble Space Telescope servicing mission. CREDIT: NASA

An Uphill Battle

Upon hearing his diagnosis, Dave had many things to consider. He knew his motor functions would decrease substantially over the coming years, but was determined to continue the important work he does for NASA. That's where his coworkers stepped in.

Dave's wife, Christy Hansen, began researching technologies and NASA processes that could enable Dave to continue working once he could no longer use his hands or speak. Christy engaged Goddard's IT department to initiate the path that ultimately led to the integration of Dave's eye-gaze system. IT experts across Goddard and other NASA centers, as well as Dave and Christy's engineering friends and colleagues, collectively helped to design, purchase, obtain required exemption and approvals for, and assemble the whole system in his home. This computer allows Dave to work from the comfort of his home using only his eyes to manipulate the computer. Due to his ALS, Dave is now bound to a wheelchair and hospital bed. Even with specially-outfitted technology, Dave still faces challenges in his work.

"Doing everything from home and not being able to draw my ideas out is difficult," Dave said. "Every morning, to know that people still depend on me to get work done and help others as well gives me a great reason to get out of bed."

One of Dave's toughest struggles is conveying an idea to someone in a way that captures the exact meaning. He faces everyday obstacles, such as being restricted to work from home, not working hands-on with any hardware or in the cleanroom, and completing tasks at a slower pace.
Dave's greatest motivation is the support from his family at home and his family at Goddard.

Continued on page 30

(Left) A few members of the Robotic Tool Stowage (RiTS) team hold a sign and photo to represent Dave near a launch pad at Kennedy Space Center. (Middle) Dave and his colleagues pose for a photo in a cleanroom. (Right) Dave's team holds a sign that reads "Team Dave" in the Neutral Buoyancy Lab (NBL). CREDIT: NASA

Continued from page 29

"Knowing that my Goddard family cares so much is one of the biggest reasons why I am still working," he said. "It's amazing how many fantastic people work here."

A few of Dave's colleagues have worked alongside him since he began his NASA career in 1992. The HST team feels like an extended family, he said, and the team has continued to grow together since the conclusion of his time with HST.

"Being able to work on an incredible piece of equipment that has rewritten so much of what we know about our universe is just amazing," Dave said. "Hubble was definitely the highlight of my career. It opened the eyes and inspired so many kids, scientists, astrophysicists, and more."

All in the Family

Dave was and continues to be heavily impacted by those in his life. "The list can go on and on," he said. "You could go to any Goddard employee with a question or potential idea for something and they would give you exactly what you need and more." Dave's wife, Christy Hansen, also works at Goddard and expertly balances her job caring for Dave and her work at NASA.

"Our battle to manage and cope with the progressive aspects of ALS continues at an insane pace," Christy said. "The secondary effects of the disease are numerous, and something that was difficult to prepare for – even with our extreme NASA spaceflight projects contingency planning and training experience."

Dave attributes much of his success and positive memories to the many people he worked with since his beginnings at Goddard.

Pushing Forward

Despite the setbacks from his ALS, Dave is an avid worker for Goddard, working on the On-Orbit Servicing, Assembly, and Manufacturing mission (OSAM-1). The mission will robotically refuel a satellite in space, assemble a communications antenna, and manufacture a beam, developing groundbreaking technologies for use in future NASA missions. Dave specifically works on developing the technologies for the robotic arms and electronic components needed for the mission.

"We are all more than work associates, we are a work family," he said. "The outpouring of friendship, love, and support during my battle with ALS has been amazing."

Dave has also worked on other NExIS missions. He created a lightbar for the Robotic Tool

Stowage unit (RiTS), which launched to the International Space Station (ISS) on December 5, 2019. The RiTS is an aluminum unit designed to provide thermal and physical protection for the storage of tools on the outside of ISS. The lightbar is a critical part of RiTS, used to ensure it is operating correctly. It acts as a visual display that indicates that RiTS is receiving uninterrupted power from the ISS, thereby allowing RiTS to continue heating and thermally protecting the tools stored inside its aluminum housing.

"Our team remembered there are many cameras outside of the space station," Dave said. "So we thought, 'build a lighted display, visible day or night, by space station cameras to provide this information.'"

Throughout the RiTS development process, Dave had a NExIS proxy, Justin Cassidy Jr., act as his hands on the Goddard cleanroom to manage the flight hardware and carry out the necessary testing. Cassidy worked to physically execute Dave's vision at Goddard and other testing facilities, when Dave could not.

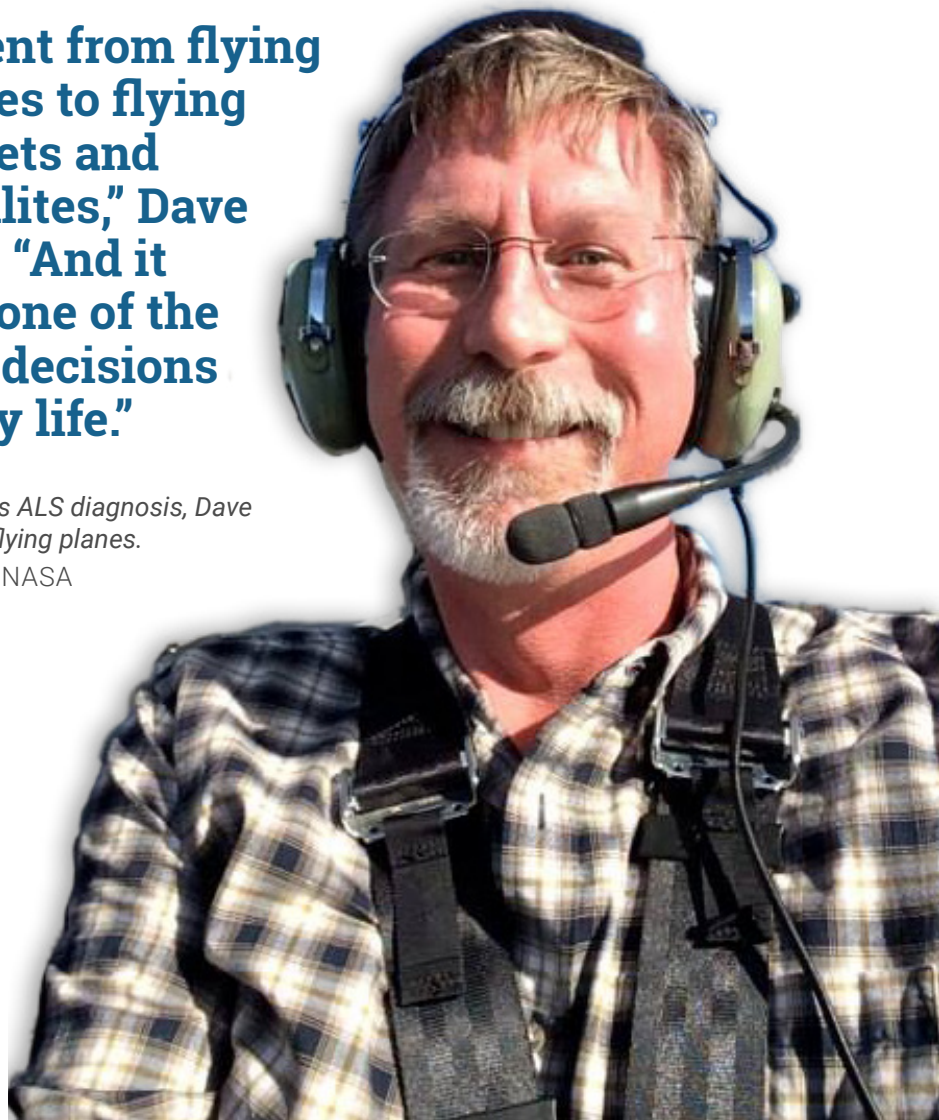
RiTS was assembled at Goddard in a large clean room. CREDIT: NASA

Onward and Upward

Dave has worked within NASA for 28 years, but his passion for flight has lasted his whole life. From the airplane knick-knacks scattered throughout his home to the airplanes he has piloted, Dave has always found happiness in flight.

In the first stages of his ALS, Christy set up a day of flying a private plane for her husband, which left a lasting smile on his face. Dave is a self-proclaimed airplane nerd, who is content simply watching them land and take off from an airport. Even so, his love of aircraft is no match for the love he holds for electrical engineering and satellite servicing.

"I went from flying planes to flying rockets and satellites," Dave said. "And it was one of the best decisions of my life."



Before his ALS diagnosis, Dave enjoyed flying planes.
CREDIT: NASA

This interview was originally published on the NExIS website: https://nexis.gsfc.nasa.gov/index.html in May, in support of ALS Awareness Month. ■

Rachel Reed / Code 480
Editor: Katy Cawdrey / Code 480

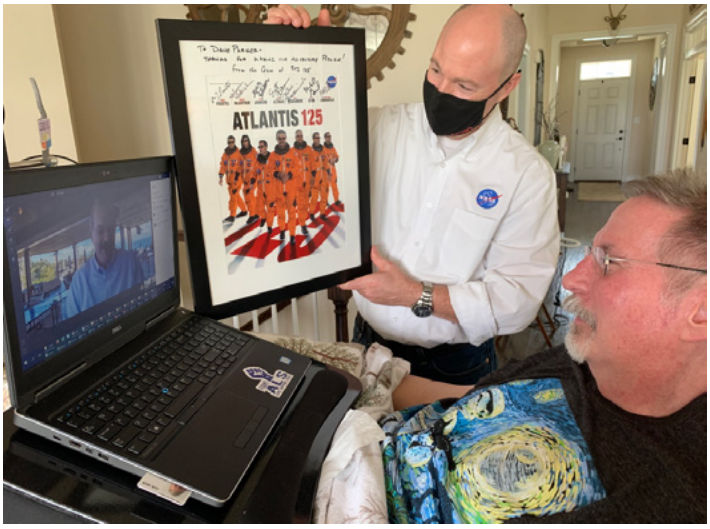
This lightbar is a prominent feature on RiTS, and was designed by Dave.
CREDIT: NASA

“Thanks for making our adventure possible!”

Throughout his career, Dave has worked closely with astronauts, many of whom he calls his friends. On August 24, retired astronaut Scott “Scooter” Altman paid Dave a virtual visit to present him with an award of appreciation from the entire crew of the final Hubble Space Telescope Servicing Mission, STS-125. Altman virtually presented the award, which was signed by the crew and read, “Thanks for making our adventure possible!” Benjamin Reed worked with Dave and Scott on the Hubble servicing missions and was physically in attendance to present the award. “Having worked with Dave for 20 years I am continually impressed by his engineering skills, professionalism and dedication to the team,” said Ben. “I am proud to be associated with him, and it was my honor to present him with this token of appreciation.”

During the informal award presentation, Scott, Ben, Dave, and Christy shared stories about the Hubble servicing missions, and Dave and Scott exchanged tales of their flying adventures. After the event, Dave used his specially-equipped eye gaze computer technology to email a note of appreciation to Ben, Scott, and the STS-125 crew that he was still in orbit with the love, care, and amazing support that lifted his spirits that day. ■

Colleen Ponton, Code 440
Vanessa Lloyd, Code 480



Ben Reed (left) holds a signed award of appreciation presented to Dave on behalf of the STS-125 crew. Ben and Dave were joined virtually by retired astronaut Scott Altman (center), and by Dave’s wife, Christy (right). CREDIT: NASA

So, whatcha been doin'?

Earlier this year, The Critical Path asked FPD employees to share their experiences while in quarantine. As expected, they have risen to the challenges presented by the COVID-19 pandemic by helping their neighbors and essential workers, reaching out to others, exploring new activities, and making good use of time typically spent commuting.

Thanks to Matt Ritsko who compiled the following stories from his colleagues on the JPSS project:

"I donated to the First Baptist Church of Glenarden and Impact One Church, which have been distributing groceries and providing cash donations to families in need during the pandemic."

– Kim Hamilton –

"I made money donations to three small businesses in the area. GG's Day Care: new daycare business owner Tanya White-Conner had to delay her grand opening set for March 22. Posh Cycling and Fitness: Fitness instructors are teaching at least one day a week using Zoom, even though they are not getting their regular pay. The classes are open to everyone, and all you have to do is sign up on their website. Fit for the Journey Wellness Center Non-Profit Organization: The founder, Terri Inabinet, was planning to launch her non-profit on April 25 along with a book she wrote. Although her launch party was canceled, Terri is helping others during this pandemic under her non-profit organization."

– Liz Prince –

"My family's donations to Feed America are being matched by Northrop Grumman."

– Michelle Birdsall –

"I'm donating platelets at NIH, and I support county donation center operations and events one day every week or two."

– Mike Simpson–

"I have been crocheting mask extenders and headbands for our local nurses working at University of Maryland Charles Regional Medical Center to help protect their ears from sores from wearing masks for extended periods of time. For the headbands, I followed this same pattern but made it longer to wrap around your head then I sewed on two buttons for the mask to hook on to. Below is a picture to get an idea of how the headband works."

– Liz Goelling –

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Continued from page 33

"My wife and I have been delivering groceries to at-risk neighbors, and my mother-in-law has been sewing masks that my wife is distributing to displaced members of the community as organized by our church."

– David Cranor –

"I have been hand-sewing masks out of handkerchiefs matching military uniform patterns for my husband's Army company. Only a specific color/pattern is permitted, so this has been a challenge. I am making as many as I can by hand in the evenings after work and send them to my husband in Georgia where he is currently stationed."

– Ashley R. Dale –

"Tim and I purchased a case of 160 N-95 masks and made a drive-by curbside delivery to our local University of Maryland Shore Regional Health Emergency Center in Queenstown, MD. We made two charitable donations to Feeding America's COVID-19 fund to provide food to struggling families and The Gates Philanthropy Partners Combating COVID-19 Fund in support of vaccine development."

– Debbi Haynes-Jacintho –

"I have made more than 35 masks for family and friends. I also coordinated an effort with my church to have masks made for a local grocery store."

– Adam Wilson –

"I am helping with Columbia Community Care, which provides food, toiletries, diapers, and personal hygiene items for anyone in need, distributing these items daily at four locations. I have donated food, money, and volunteered to distribute food. The organization was founded by a local high school teacher in Howard County, MD."

– Teressa Spencer –

"Our community set up a fund to feed lunch to nurses on staff at Anne Arundel Medical Center (AAMC) using local restaurants twice a week. My husband and I donated lunch one day to an entire floor at Anne Arundel Medical Center, and knowing we are also supporting our local restaurants is a plus. We also contribute weekly to the Maryland Food Bank, as our community sends a weekly truck load of food and supplies to them."

– Heidi Wood –

"I'm helping keep the community fed by working a second job at Giant Grocery Store in the evenings/ weekends, stocking shelves, running Customer Service, and checkout lanes."

– Misty Chamberlain –

Other employees shared their experiences:

"I have been spending my free time making masks – 337 so far. I signed up to help Teri O'Meara make masks for the police departments, correction centers, nursing homes and food banks. These are all made by volunteers and go to four different counties on the Eastern Shore. I have also made some for co-workers and family members to keep them safe and free from COVID-19. I have made some regular cotton masks and am now making N95 filter masks."

Teresa Cooper/ Code 400

"Since being quarantined, I've been working with a very close friend to sew masks for him to distribute among various nursing homes and assisted living facilities in his D.C. neighborhood. He gave me a 500-thread count sheet set which I was able to make into over 50 masks. While I was at it, I made masks for many of our neighbors, as well as some to keep as spares. The quarantine situation has solidified our relationship with the neighbors since we're all at home these days. I find we socialize more and we enjoy seeing each other and meeting at a safe distance. We've also gotten more involved in virtual meetings with friends so it's a great way to stay in touch while being apart. My cooking hobby has turned into an obsession during the shutdown. I've been cooking lots of different dishes and experimenting with new recipes, even venturing to make my own bread. Cooking is my passion and I enjoy having a little extra time to hone my skills on this hobby. Another hobby that I've had some extra time to follow up with is music. A few years ago I had a sort of mid-life crisis and bought myself a Gibson Les Paul electric guitar and have been playing classic rock songs ever since. On pleasant afternoons, I take the guitar outdoors and practice, sort of serenading my neighbors at the same time. Several of them have thanked me for the free concert. This year I also bought a Yamaha acoustic guitar with electric pick-up and I took that over to my neighbors' house and played for them on the porch, still practicing social distancing. In addition to playing the guitars, I enjoy playing the piano whenever I have the time."

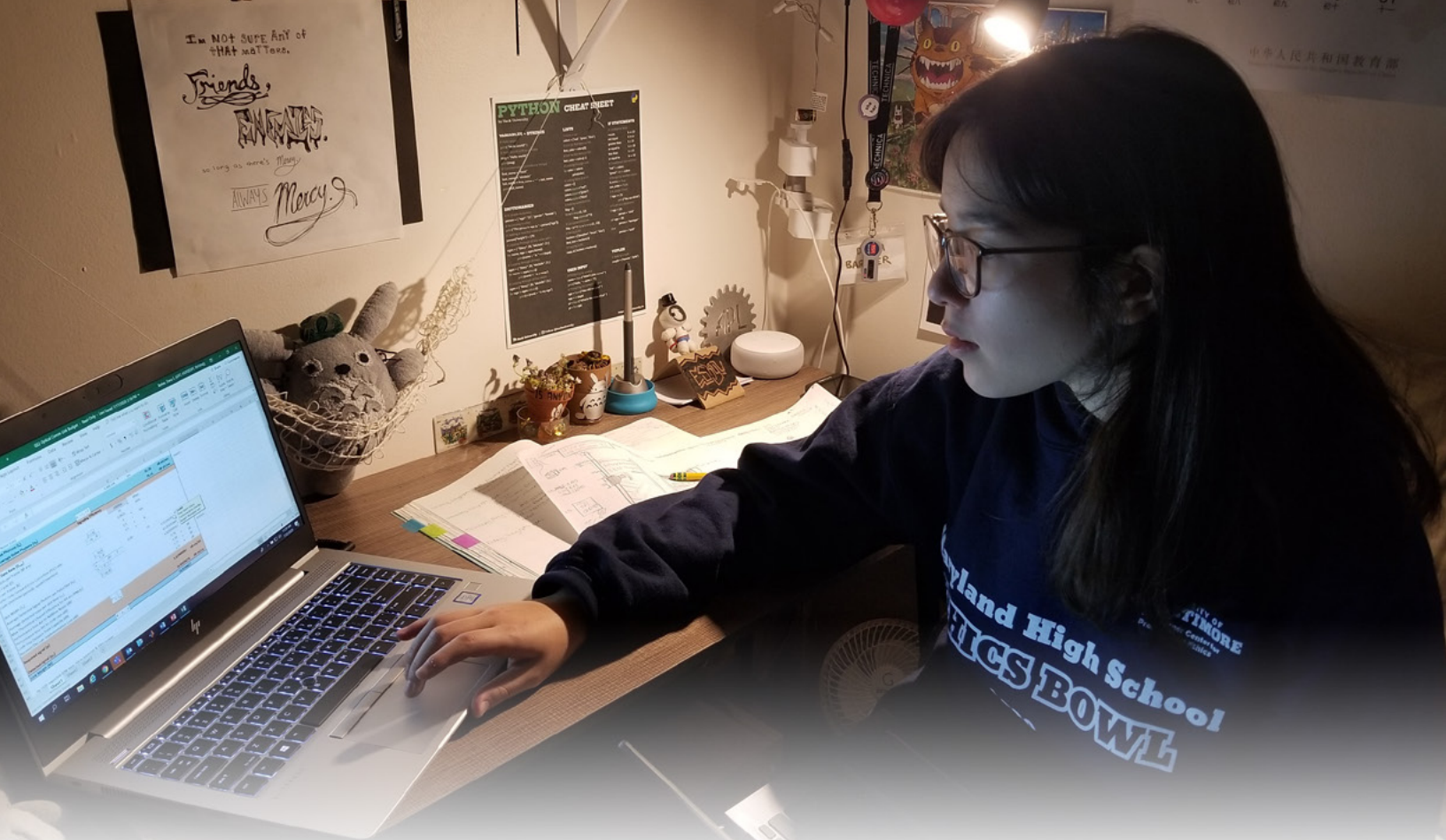
Susan Wright/Code 440

"During mandatory telework I have gained 3 to 4 hours of extra time each day. My how I love my commute! With the extra time, my husband and I decided to farm bees. Prior to having kids, we farmed bees, but as you know, kids and a job take up more time than you have each day and farming bees is very labor intensive. I ordered four sets of queen bees with helpers and into the hives we placed them. The bees arrive in a crate with the queen bee in her own special container. The post office is more than happy to notify you that your bees have arrived! Luckily the bees arrived about a week before the honey flow started. The middle picture shows my husband extracting the queen from its container. My husband set up a bee march for my benefit and it was amazing to watch. With the queen in the hive, the bees in unison marched from their crate along the sheet to their new home. I wouldn't have believed that bees could march together in unison had I not seen it. Our goal for the first year is to establish the bees in their hives and for them to make enough honey to get themselves through the winter. Then hopefully a year or so down the road we will have honey. I also included a picture of my husband in half a bee suit working with the bees. Now all we wear is a bee hat with face covering. Believe it or not, I underwent what seemed like 10 years of allergy shots because I was allergic to honey bees. Bees are fascinating and truly amazing the way they work as a team."

Cindy Fryer/Code 405

Stay safe and thank you!

The Critical Path Team



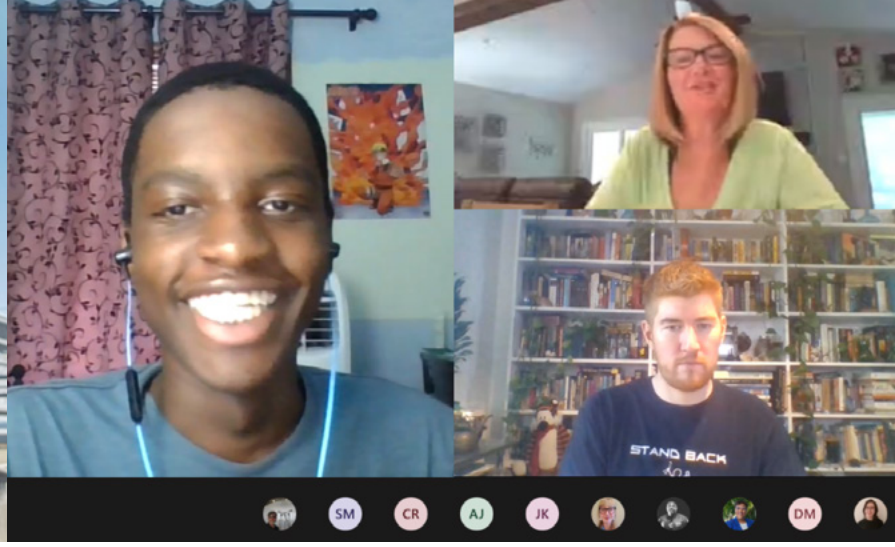
SCaN Internship Project Provides Unique Opportunities

Every summer, workplaces across the country welcome student interns into their ranks. NASA's Space Communications and Navigation (SCaN) program, the program office for all of NASA's space communications, is no different. For this purpose, SCaN developed the SCaN Internship Project (SIP) and has charged Goddard Space Flight Center's own Exploration and Space Communications (ESC) projects division to administer it. ESC's work encompasses a wide range of activities and services, including managing two of NASA's networks and developing new communications and navigation technologies, so there are ample opportunities for interns with interests in and career paths towards a broad number of fields, ranging from engineering and computer science, to physics and astronomy, to education and public outreach.

This year's program brings together more than 40 interns spanning Fairbanks, Alaska, to Carolina, Puerto Rico. They complete their work through one of three locations: Goddard Space Flight Center in Greenbelt, Maryland, Wallops Flight Facility at Wallops Island, Virginia, and the White Sands Complex in Las Cruces, New Mexico. Each intern is assigned a project tailored to their individual strengths, interests, and educational backgrounds, and they work closely with mentors, NASA employees who train them and oversee their progress.

Due to the COVID-19 pandemic, this year's program is being conducted entirely remotely. Interns are dialing in from their homes across five different time zones, using NASA-furnished laptops and connecting with their mentors and each other through programs such as Microsoft Teams and WebEx. The SIP has risen to the unique challenges of this environment, providing robust intern programming just as it does every year.

In addition to giving interns hands-on work experience, the SIP provides opportunities for professional development. The 10-week program is



(Left) Daniel Manely under the AS-1 Antenna. CREDIT: DANIEL MANLEY *(Right) Reggie Gesicho, Donna Swann and Jimmy Acevedo participate in a 'Let's CONNECT' session.* CREDIT: SHANNON SMITH

filled with workshops on subjects like public speaking, resume building, and stress reduction. There are networking opportunities where interns can meet and speak with SCaN and ESC leadership and even NASA astronauts. These leaders share stories from their careers and provide valuable practical advice. There are also opportunities for interns to engage in clubs and other organizations like Goddard's Amateur Radio Club and the Diversity and Inclusion Committee.

A large reason for the scope and success of the SIP is its dedicated intern coordinator, a position currently held by Jimmy Acevedo, a former SIP intern himself. Jimmy oversees every aspect of the program from garnering applicants, vetting and selecting interns, assigning mentors to each intern, and developing and scheduling programming. He also oversees the completion of an intern Look Book, which contains short bios and descriptions of each intern's project alongside highlights from the summer. Being a coordinator full-time allows Acevedo to interface with the interns more closely. It's an enormous year-round job that spans much more than just the program's 10 weeks. Much of the "off season" is spent documenting and formalizing the curriculum, with an eye towards making the program more extensible. Furthermore, the SIP is constantly evaluating its content to maximize value for its interns.

"SCaN, in part, uses the internship program as a vetting process to help build a pipeline to maintain and develop NASA's workforce well into the future," said Acevedo. "We encourage outstanding interns to return to the program. Returning interns can make much more efficient use of their time by building upon their knowledge and experience from previous years. What's more, new interns benefit from returning interns' experience and perhaps learn more than they might have alone."

Some returning interns take on more formalized roles helping to train new interns. Alexander Scott, who first interned with the SIP in 2019, is one of these. Scott has been working on a networking management tool to implement Delay/Disruption Tolerant Networking (DTN), a suite of protocols that can store data for later transmission in the event that data connections are disrupted. He received a part-time position at Goddard the following fall, continuing work the same group, while also going to school full-time at the University of Maryland for computer science. He returned again as an intern this summer.

These experiences put Scott in a unique position to be a team leader for other DTN interns this year. He has put together presentations and tutorials to help familiarize new interns with important concepts and has even created games to use as team-building exercises.

"Originally, I thought the internship would be about just keeping your head down and doing your work," said Scott. "My school's computer science department doesn't typically work in teams, so being a part of a team was a very valuable learning experience for me. Being

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the facilitator of a team as part of my mentoring activities has been particularly important. Helping to build a team rather than just be a part of one is difficult but rewarding work."

Because the SIP is built for use as a workforce pipeline, a number of NASA employees who mentor SIP interns are familiar with the SIP from the inside. Tyler Williams is a radio frequency compatibility testing engineer at Goddard, a mentor to two first-time interns this year, and was an intern in 2018.

"When we got the chance to bring in interns to help, I already knew the high caliber at which they would work, and the drive and initiative they would bring," said Williams.

"The SIP brings together people with diverse backgrounds who are already knowledgeable in their respective fields. They come in with fresh new perspectives that show in the quality of their work."

For many interns, the SIP is not their first or only internship experience. Those who have interned outside of NASA are pleasantly surprised at how comprehensive and hands-on the SIP is in comparison.

Emily Cavanaugh, a 2019 intern, was recently hired as a configuration and documentation manager in Goddard's Earth Science Projects Division. Cavanaugh spent her internship as the intern documentarian, photographing intern workshops and events, writing articles highlighting individual interns, and helping to write and produce the intern Look Book.

"I participated in a number of other internship programs in the past," said Cavanaugh. "The SIP provided me with meaningful, hands-on experience and my coworkers trusted me with a lot of responsibility. It gave me a good sense of how NASA runs, and how best to communicate in a work environment. In previous internships, I felt much more on the periphery of those environments. This was definitely the most helpful internship I have been a part of."

Though interns come to the SIP with experience in specific fields, interns' projects broaden their horizons and introduce them to subjects which they otherwise might not have been exposed to.

Meghna Sitaram, a second-year intern, was originally drawn to the program for this reason. She is working on the Low-Cost Optical Telescope project to create a test ground station at the Goddard Geophysical and Astronomical Observatory using optical communications, transmitting data using infrared lasers. Sitaram's specific portion of this project involves creating software to track satellites across the sky and make the appropriate coordinate adjustments to ensure the ground station is pointed in the right place to receive the spacecraft's data.

"I love the varied nature of the work I'm doing," said Sitaram. "It mixes astronomy, optics, engineering, hardware, and software. That combined with all the networking opportunities and seminars makes this a unique experience."

The SIP not only provides opportunities for interns and helps maintain SCaN's workforce, but the SIP model could provide benefits to other organizations within NASA.

"The SIP has been built in a modular fashion so that it could potentially be used as a template for other divisions within Goddard and the agency," said Acevedo. "Each organization could inject their own orientations, deliverables, and workshops into the SIP framework."

Its remote nature may have made this year's SCaN Internship Project look different from previous years, but SIP's ability to shift to meet the changing needs of its interns shows its strength. SIP is constantly evolving in the same way NASA's workforce evolves from mission to mission and decade to decade, meeting ever-changing challenges as the agency expands humanity's reach into the stars. ■

Matthew D. Peters / Code 450
Exploration and Space Communications Division Editor

That was Then ... This is Now

NASA interns compare last year's on-site experience to this year's telework

Over the past few summers, I have worked at NASA Goddard Space Flight Center (GSFC) as a summer intern. I love coming to the Greenbelt campus for the first time every summer and getting excited to receive a badge and a welcome package. This experience brings students from all over the country together. Being able to interact with other interns on the first day and seeing their expectations for the summer is always eye-opening. While on site, I have become knowledgeable about what it's like to be inside of a work environment, by sitting in meetings, going through training sessions, and just going out to get lunch with coworkers.

Audris Jones / Code 155

Rising junior at Georgia Tech University

While at Goddard, I have explored various projects. I have learned to appreciate the beauty of science that comes through NASA. One opportunity was seeing the mirrors that were installed on the James Webb Space Telescope (JWST) while they were in the Goddard cleanroom. I have even had the privilege to visit another NASA center. The on-center internship experience is not complete without mentioning the poster session at the end, where all the interns share the work and impact they have made to a NASA mission. People from all over Goddard come to learn about what projects and activities the interns performed over the summer. The best part of the on-site experience for me is seeing your mentor's face and knowing how proud they are of your accomplishments.

This summer has been entirely different for everyone involved. We are all navigating through a virtual internship experience. Telework has had some challenges, but it has also given the interns opportunities that were not present before. The new work environment has shown me how dedicated the NASA team is to helping interns still feel as though they are making an impact. Even with the new challenges, there are still chances to hear from amazing speakers, not only from Goddard, but from all NASA centers. The integration of interns from different centers has helped me realize how diverse the work is at NASA.

Aside from having computer problems, the virtual process has been fun-filled and unique. Microsoft Teams has been a big part of the virtual process. It has been great to see other people's faces and ask what they may be working on to make things feel more normal. This unconventional style of work has opened doors, allowing students from around the country to experience what it's like to be a part of the NASA team while still being at home. Even though everything is not always perfect, it is comforting to know that there are people in the NASA community who are trying to make the best of the situation and give students an incredible opportunity by allowing the internship program to continue this summer virtually.

"I can say that NASA is a great place to work, and there is always someone there to help if you need it."

My internship experiences have brought many connections with amazing people. I can say that NASA is a great place to work, and there is always someone there to help if you need it. The connections that I have made while at Goddard have made every experience exceptional. The virtual and on-site experiences have been and continue to be great, but the incredible feeling of being on-site at Goddard will always be extraordinarily special.

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Continued from page 39.

After my sophomore year of high school, I had my first summer internship at GSFC. I worked in Code 480, formerly the Satellite Servicing Projects Division (SSPD). Currently, I plan to major in either economics or mechanical engineering. Prior to the internship, I had always been interested in robotics and mechanical design and in the last 2 years, I have also fostered a major interest in economics.

My project last summer focused on the implementation of Cooperative Servicing Valves (CSVs) in future satellite designs to allow for the refueling of satellites. I worked with 3D modeling programs in conjunction with NASA's Exploration and In-Space Services (NExIS) Algorithm Development Platform, a robot control software, to test various models to determine the minimum spacing between multiple CSVs and the surrounding "bathtub" recess they were placed in. After the CSV evaluation, I helped my mentor with camera control for RRM-3 technology demonstrations. I never had an actual job before this internship, so the experience provided valuable insight into the workplace and the skills necessary to succeed.

Nicholas Snyder / Code 480

Rising senior at Mount Hebron High School in Ellicott City, Maryland

"I'm just thankful for the opportunity, that NASA can still offer internships given the chaotic environment of the world."

While I expected to be working on a different project at NASA this summer, I never expected to not even be there. Prior to my start date, I was perplexed as to how the summer internships were going to be held, since in-person demonstrations, computers, models, and communication were such a big part of my work last summer. However I've realized that there are a lot of benefits to teleworking. For the most part, it's more efficient to communicate online; people don't have to be in the same building or reserve meeting rooms, and it's easier to share and demonstrate work when it can be shared directly from a computer.

Currently, I am working on a scaled-down 3D model and hardware design for the Mars Sample Return (MSR) mission. I'm using Solidworks, a CAD software, to simplify and scale down current MSR models for an MSR desktop robot and orbiter at 1/3 scale of the actual designs to be used for mission planning and demonstrations. I also plan out how the different models will interact with one another and create a list of parts, accounting for budget constraints, for the actual hardware models. One issue has been when I have to consult about a design or a model that we don't have access to, since the actual model is on campus. Without a good idea of what the model is supposed to look like as a reference, it can be more of a hassle to create the design.

There's a certain authenticity of working in person, where working in the actual facilities feels more professional. While I miss walking around the campus, seeing the different technologies, and riding the bikes when going from building to building, the convenience of working from home has been a major advantage. Last year, transportation took almost 2 hours each day. I run cross-country, indoor track, and outdoor track, and I didn't have the time to train as much as I normally would. Now that work is 2 seconds from my bed, I can sleep in, eat breakfast, and run, all before my start time. Although it is very different not being able to go to the cafeterias for lunch and converse with friends, it's easier to multi-task on my work from home. If I have meetings to attend or work to get done, I can eat and attend at the same time. I also have much more flexibility. Overall, I'm just thankful for the opportunity, that NASA can still offer internships given the chaotic environment of the world. It has definitely been an easy situation to adapt to and there haven't been any constraints or major obstacles to success that I may have expected before starting.

I have been interning at Goddard since June 2019 working for NExIS, on the OSAM-1 mission, within its robot subsystem group. My job as an intern involves working with 3D models and developing code to aid engineers during the design process. Since I've been here longer than most interns, I take pride in mentoring new high school and college NASA interns. It can be pretty daunting getting acclimated to a new environment (especially NASA), so I try my best to make everyone feel at home and feel valued, just how others treated me when I first came here.

"I miss casual Fridays even when every day is casual Friday now."

Dalton Durant / Code 480

Recently received a Bachelor of Science degree from the University of Maryland's Aerospace Engineering program

Dalton at the 2019 poster session. CREDIT: NASA

I consider myself lucky to be amongst so many caring and intelligent individuals who make working at NASA so comforting. However lately, it has been a challenge to connect with my co-workers, supervisors, and fellow interns. Working from home is definitely more enervating and undermining than working on center, but we try to make the best of it. The NExIS* robotics group mentors and interns have fun virtual functions. We've had exercise challenges, a spirit week, and even a baking contest, just to name a few. I've even started hosting "Intern Happy Hour" once a week which gives an hour block for interns in the NExIS robotics group to catch up and bond virtually.

One of the best parts about coming into work on center was seeing all the new changes and all the progress being made on various missions. It's extremely encouraging when you realize history is being made all around you. Working virtually, there isn't that awe-inspiring effect. It's always in the back of my mind, but I still long for the day to see everything bustling again. I miss all the NASA events, barbecues, and intern lunch breaks at the Orion Deli. I miss the never-ending distracting cubicle stories. I miss casual Fridays even when every day is casual Friday now. All of these things, though small, are nostalgic to me. I know this virtual lifestyle is not permanent and all I can do is embrace it and make the most of it. One of these days, GSFC will be back open for business and waiting for us to make new memories.

***NExIS (Code 480) provided several opportunities for summer interns to bond virtually, including:**

- **Boot Camp:** an annual orientation session to introduce Division policies, help interns start to get to know each other, and share details about Division missions. Going virtual for 2020 allowed all interns to have orientation together (instead of separate college and high school sessions for different start dates).
- **Recipe Contest:** With an online poll for the most creative entry, this activity offered a chance for interns and coordinators to try something new in the kitchen, share part of their culture, or just have some fun.
- **Baby Photos Quiz:** Online activity to match baby photos with recent photos of 10 interns. This gave a fun little break and also helped the interns – and coordinators – get to know each other a little better despite the miles between them.
- **Spirit Week:** Each day of the week had a different theme: Pajama Day, Crazy Hair Day, Space Day, Jersey Day, and Throwback Day.
- **NASA Fact or Fiction:** Virtual trivia contest about NASA history and space facts.

Building the Workforce of the Future:

A Panel Discussion with the Flight Projects Directorate

The Flight Projects Diversity and Inclusion Committee (FP D&I) sponsored a "Building the Workforce of the Future: A Panel Discussion with the Flight Projects Directorate" for all GSFC Interns on July 28. Although not in the Building 8 auditorium this year, the interns were engaged in asking inquisitive questions using Microsoft Teams. The panelists, who gave excellent advice on career goals, resume building, and the importance of networking, mentoring, and taking risks, were:

David Mitchell, Director
Flight Projects Directorate (FPD)

Dr. Wanda Peters
Deputy Director for Planning and Business Management, Flight Projects Directorate (FPD)

Daniel Battle
Resource Analyst, Joint Polar Satellite System (JPSS)

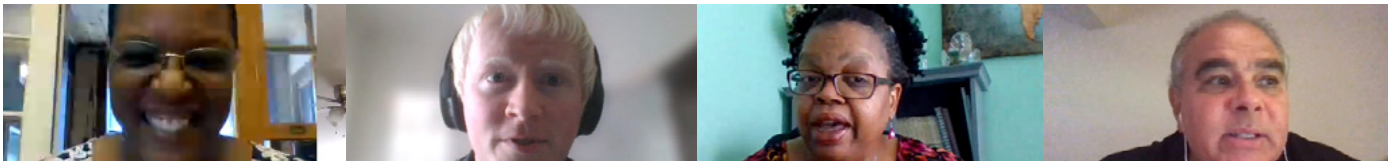
Gene Martin
Deputy Program Manager, Space Weather Follow-On (SWFO)

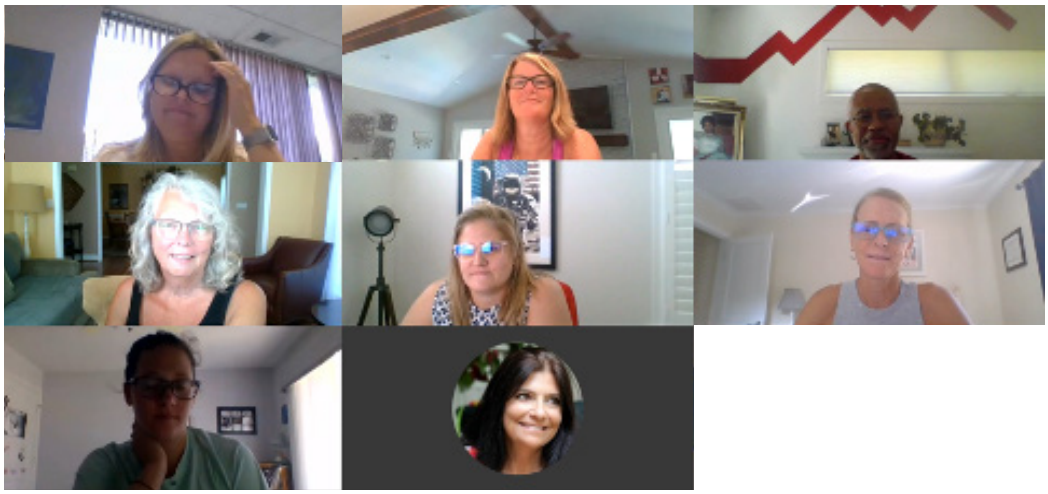
Donita Marshall
Technology Information Specialist, Resource Analysis Office (RAO)

Dr. Lisa Mazzuca
Project Manager, Search and Rescue (SAR) Office

Natalie Provost
Aerospace Engineer, Joint Polar Satellite System (JPSS)

We thank all the panelists for taking the time to have this discussion with the interns!





To learn more about GSFC's Diversity & Inclusion Program Office, please visit: https://diversity.gsfc.nasa.gov/

Flight Projects Virtual Showcase & Scavenger Hunt for Interns

The Flight Projects Directorate (FPD) and the Flight Projects Diversity and Inclusion Committee (FP D&I) welcomed interns to participate in a virtual project showcase and scavenger hunt. Thirty-five projects were highlighted in this fun exhibit which was designed to share the amazing work being completed across the FPD. Thirty-one interns participated in the scavenger hunt and NASA prizes were awarded to the three with the highest point totals.

2020 Virtual Scavenger Hunt Winners

1st place (tie)

Kai Boyd (552) &

Kathryn Gansler (616)

3rd place

Ashley Chang (611 GISS)

SCAN INTERNSHIP PROJECT 2020

Meet the talented men and women of the Space Communications and Navigation (SCaN) Internship Program who completed the summer 2020 season remotely through NASA's Goddard Space Flight Center! SCaN interns use their diverse personal and educational backgrounds to push the boundaries of communications and navigation technologies and explore ways to enhance SCaN Networks. Their work enables SCaN to meet the needs of missions, now and in the future.

Watch the video

- https://youtu.be/9XhWM8R3UKI

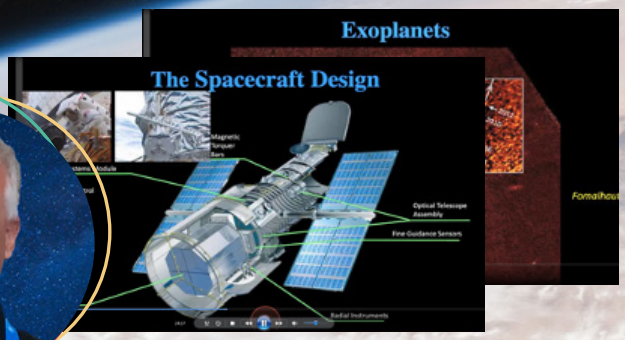
Interns Learn About the Hubble Space Telescope

For 30 years the Hubble Space Telescope (HST) has transformed our understanding of the universe. On July 20, interns joined HST's deputy project manager, Jim Jeletic, for his virtual presentation, "NASA's Incredible Exploration Machine: The Story of The Hubble Space Telescope". Interns learned about HST's history, design, servicing missions, pop culture, and more.

Many thanks to Jim for the very informative presentation, and to Michelle Birdsall (470) and Shannon Smith (403) for their help planning this event.

More information on HST

- http://www.nasa.gov/hubble



Jim Jeletic
Deputy Project Manager

The Director of the Flight Projects Directorate (FPD), Dave Mitchell, and his deputies, Tom McCarthy (Deputy Director of FPD) and Wanda Peters (Deputy Director for Planning & Business Management), invited Code 400-funded interns to a Let's CONNECT session on July 29. During the hour-long gathering, interns and our senior leaders got to know each other, and Dave, Tom, and Wanda gave valuable career guidance, while sharing their own experiences. This session was especially helpful in making connections this summer in our virtual environment.

LET'S CONNECT CODE 400

CODE 400

(left clockwise) Jimmy Acevedo, Christian Rivera Rivera, Dana Barker, Audris Jones, Reggie Gesicho, Jamarius Reid, Rowan Parker, Jeff Klusendorf. CREDIT: NASA

WHAT'S UP WITH OUR Flight Projects Development Program?

It's a Wrap!

Please help us to congratulate the Flight Projects Development Program (FPDP) Cohort #3 participants, Ben Hall, Cathy Stickland, Joe Stevens, and Jesse Walsh, for successfully completing the program requirements and formally graduating from FPDP on August 24, 2020 in a virtual ceremony!

(left to right): Ben, Cathy, Jesse and Joe show off their certificates during the virtual graduation ceremony, held August 24, 2020. CREDIT: NASA

August 24 was a special day. Although the FPDP graduates, Governance Board, Program Manager, mentors, supervisors, and other supporters adapted to a Microsoft Teams meeting to celebrate their big day, the typical celebratory toast with a glass of champagne will have to wait until we see each other face-to-face.

Adapting to changing environments is just one skill set this cohort has enhanced since their start date of April 4, 2018. During the first year, while revving up in the Flight Projects' elite program and their first assignment, they were halted by the record-breaking 35-day Government furlough. Ben, Cathy, Joe, and Jesse persevered out of the pause and accelerated through two assignments, over 30 days of NASA Academy of Program/Project and Engineering Leadership (APPEL) project management related training, completed our rigorous program curriculum, presented at three NASA-wide project management workshops, and successfully executed a Capstone project during the onset of a global pandemic. Well done!

I would like to take this opportunity to thank the many people who supported the Cohort along their two-year journey:

The FPDP Governance Board, who demonstrate their commitment to the future of the Flight Projects Directorate through their unrelenting support of the FPDP: Dave Mitchell, (Chair), Mooni Ahmed (retired), Pietro Campanella, Carmel Conaty, Tom McCarthy, Wanda Peters, Tracy Felton, and Cynthia Simmons.

The Mentors, who shared their valuable time, stories, lessons learned, friendship, wisdom, and nurturing with the participants: Andre Dress, Christine Hinkle, Lillian Reichenthal, Cathy Richardson, Rich Ryan, Bill Sluder, Jahi Wartts, and Beth Weinstein.

The Work Assignment Supervisors, who took a risk and provided challenging work assignments, allowing the participants to stretch and grow: Chikia Barnes, Lorrie Eakin, Robert Estep, Christine Hinkle, Art Jacques, Nicholas Jedrich, Lisa Kelly, Heather Matthews, Anthony Mcnair, Matt Ritsko, Brent Robertson, Steve Schmidt, Scott Schwinger, and Al Vernacchio (retired).

The Subject Matter Experts, who thoroughly analyzed and evaluated dozens of resumes, ensuring a highly qualified pool of candidates: Mike Donnelly (retired), Ken Schwer, Otilia Rodriguez–Alvarez, Matt Ritsko, Kevin Miller, and Lauri Via (retired).

The Code 400/150 staff, for providing much needed guidance, support, and solutions along the way: Shannon Smith, Karen Rogers, Jen Poston, Alicia Jose, Kerri Anderson, Leslie Watzin, Jaqueline Seymore, Sarah Harnish, Lisa Hoffmann, Rich Ryan, and Dave Baden.

I would also like to thank Walt Faulconer, who brought his expertise as the facilitator of the FPDP by advising the Cohort and coordinating end-to-end planning for the orientation and workshops, including securing the distinguished speakers, and Dr. Steve Morgan, who provided one-on-one coaching and conducted two team-building training courses which were tailored to the skills and needs of the Cohort.

The past two years have been exhausting and rewarding, and have allowed Ben, Cathy, Joe, and Jesse to exponentially expand their project management knowledge, abilities, and networks. Please join me in congratulating them or this significant accomplishment. They have demonstrated they can reach goals they set for themselves, and become the future leaders of the FPD, Goddard, and NASA. ■

Donna Swann / Code 400
FPD Assistant Director
FPDP Program Manager

Congratulations, Ben, Joe, Cathy, and Jesse!

(left) The FPDP participants presented their Capstone project virtually on June 30, 2020 to the Governance Board, and their mentors and supervisors. (right) The graduates reminisced about experiences they shared throughout their two-year FPDP journey during the virtual graduation ceremony on August 24, 2020. CREDIT: NASA

For more information about the FPDP, please look for an overview on the FPD hub, or contact Donna Swann at:

donna.j.swann@nasa.gov

COHORT #3

Stay tuned for a cohort #4 update in the next issue.

JPSS in Your Community: Benefits beyond the Data

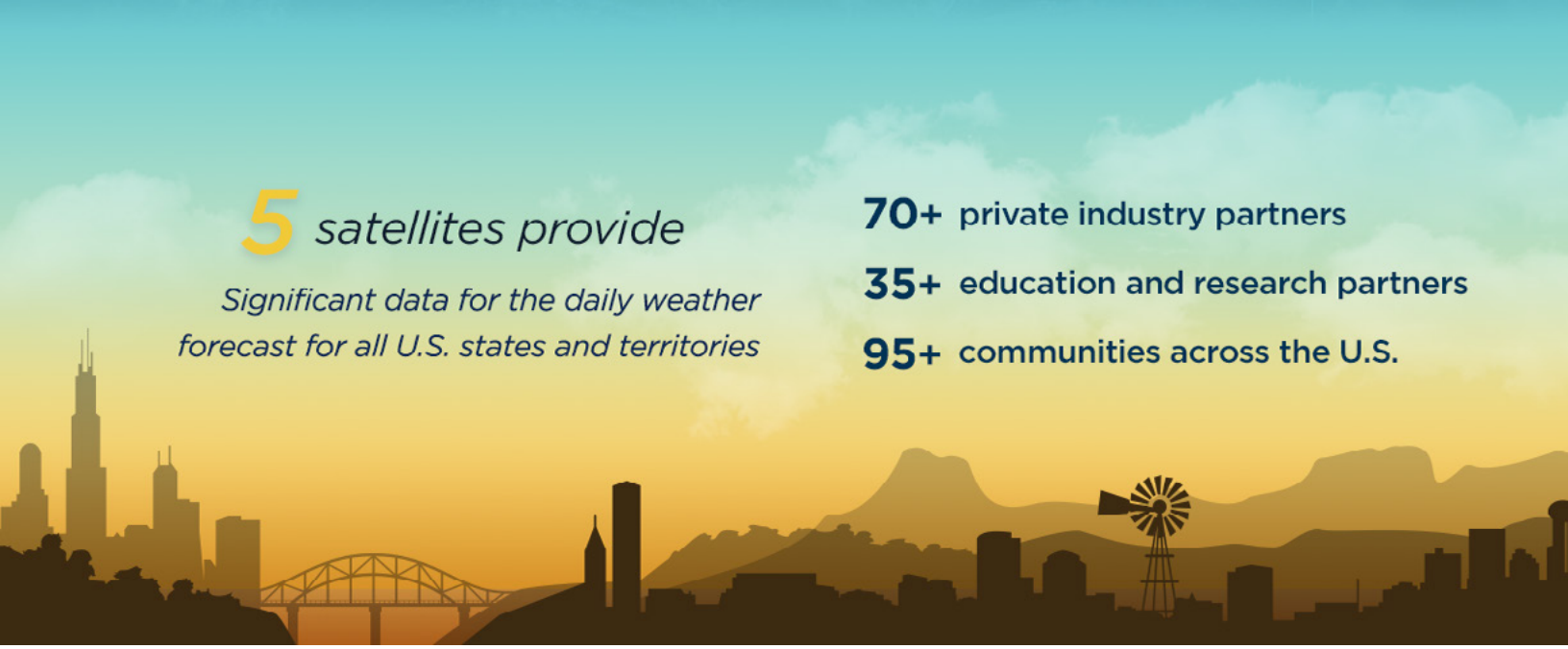
Severe weather events cause approximately $15 billion in damage per year within the United States. Weather observations from low-Earth-orbiting satellites like the Joint Polar Satellite System (JPSS) are critical to decisions made in every state and territory to provide weather forecasts, watches, warnings and even emergency response to help protect people and property.

But the program also has significant lesser-known benefits closer to Earth. Across the country, the JPSS Program collaborates with more than 70 companies, 35 education and research institutions, and numerous government agencies to ensure continuity of weather and environmental data for decades to come. Recently, the JPSS Program created a new web application called "JPSS in Your Community" to enable the general public to explore the many ways the JPSS Program benefits their own states and local communities.

Through a visually engaging, map-based interface, students and the general public can see examples of how JPSS data are used in their state, and the industry, education and government partnerships in their local area.

"JPSS touches everyone through its data," said Matt Ritsko, Goddard's National Oceanic and Atmospheric Administration (NOAA) Business Branch Lead. "The JPSS in Your Community application tells the story of how people in local communities are part of a team to make JPSS possible. Extreme weather events have profound impacts everywhere; JPSS spacecraft are always on watch to provide the insights needed in your local community, helping you each and every day."

The JPSS Program consists of five low-Earth-orbiting satellites, two in orbit at any one time, that collect critical data for weather forecasting and environmental monitoring. These satellites began launching in 2011 and will continue through the early 2030s. Additionally, the program provides the ground communications and data processing systems that allow the data to get back to Earth,

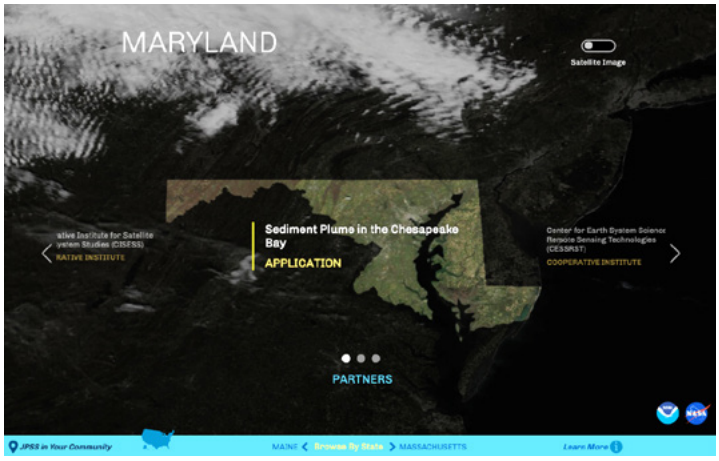


and a science team to help other entities like the National Weather Service apply JPSS data to their products and forecasts.

Check out how JPSS benefits your state or territory here: **https://www.jpss.noaa.gov/jpss-in-your-community/**

The Joint Polar Satellite System is the nation's advanced series of polar-orbiting environmental satellites. JPSS represents significant technological and scientific advancements in observations used for severe weather prediction and environmental monitoring. These data are critical to the timeliness and accuracy of forecasts three to seven days in advance of a severe weather event. JPSS is a collaborative effort between NOAA and NASA. ■

Ashley Hume / Code 470
JPSS Strategic Communications and STEM Engagement Lead

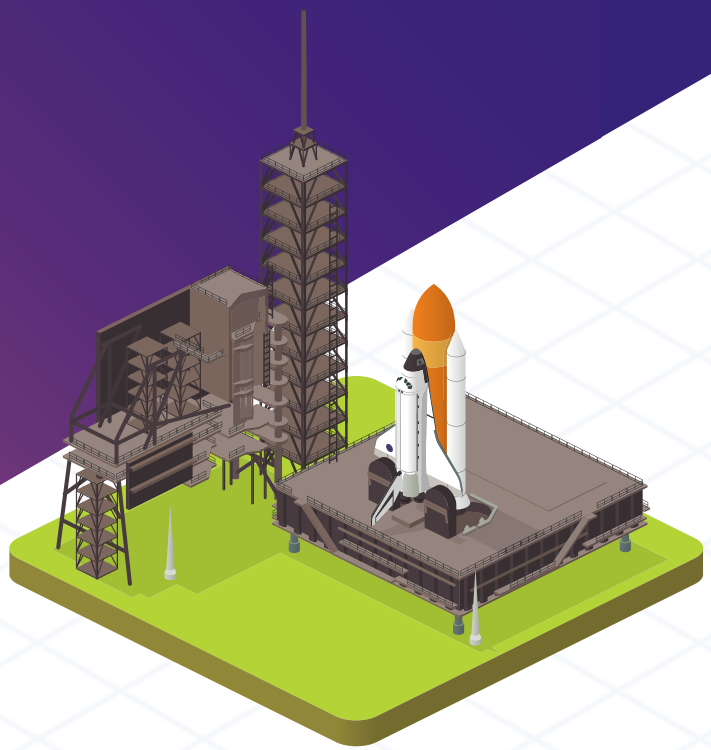


View the web app

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

KNOWLEDGE MANAGEMENT *Insights*

Leading Through Transitions



Hardships or 'heat experiences' are not something you would willingly enter into your development plan for the coming year. Yet, as we have seen with COVID, some hardships are unavoidable. Continuing discrimination and injustice present additional trials. A silver lining is that hardships can be our most powerful teachers as we learn from pushing through challenges. They can also be mined for long-lasting lessons in leadership.

Moving Forward

Goddard's Office of the Chief Knowledge Officer (OCKO) recently hosted a Case Study workshop on "Lessons from the Challenger Launch Decision." Allan McDonald, Director of Morton Thiokol's Space Shuttle Solid Rocket Motor Project for Challenger, was a guest panelist.

According to the Center for Creative Leadership (CCL), hardship and lessons from personal life are essential for leadership development. McDonald's story illustrates how both honed his leadership growth and maturity.

On the evening of January 27, 1986, McDonald and representatives from Morton Thiokol and NASA discussed safety concerns about the Challenger launch the next day. Upon objections from his engineers, McDonald made the fateful decision not to sign off on the launch. His engineers were concerned about the O-rings failing due to predicted cold temperatures. In retrospect, he said it was the smartest decision he ever made. The launch approval was signed by a Morton Thiokol executive instead.

Allan McDonald details his inside knowledge and perspective of the Challenger tragedy in the book "Truth, Lies, and O-Rings: Inside the Space Challenger Disaster". For someone lacking McDonald's perseverance this might have read like a Greek tragedy. For McDonald, the aftermath of the Challenger accident included congressional hearings, litigation by astronauts' families, and a job demotion following his straightforward testimony before a Presidential Commission. Allan and his family were socially ostracized by former colleagues and friends.

Eventually, a resolution was introduced into Congress to reinstate McDonald to his former job. He is the only person in history to have his job restored by an Act of Congress. McDonald

eventually became vice president of engineering for space operations at a reconstituted Thiokol and led the redesign of the solid rocket booster motors.

McDonald managed to derive positive lessons from Challenger despite the subsequent years of personal struggle. Today he gives lectures to students and engineers, during which he stresses the importance of ethics, honest communications, tenacity, nonconformism, and personal resilience. He is also a contributor to Chapman University's Servant Leadership program.

Navigating the Neutral Zone

Given ongoing uncertainties related to COVID, it could be useful to reflect on what is known about change and transitions. For this, I keep turning to Williams Bridges' 30-year-old change model. According to Bridges, change is an external event. A transition, on the other hand, is an internal experience – it is how you respond to what has happened to you. As with COVID, change can happen very quickly. Transitions happen more slowly, over time.

Bridges' model consists of three transitions: 1. Something Ends, 2. The Neutral Zone, and 3. The New Beginning. Today, we find ourselves in a much different place than when the quarantine began. The old is gone but the new beginning or new normal is not here yet. In this video, Stanford professors, Bill Burnett and Dave Evans discuss how to set and manage expectations while going through the Neutral Zone. ■

Judy Dickinson / Code 400
FPD Knowledge Management Lead

> "Change comes more from managing the journey than from announcing the destination."
>
> – William Bridges

Apollo Era Resources

The Academy of Program/Project and Engineering Leadership (APPEL) Knowledge Services has rolled out a comprehensive collection of articles, case studies, and videos from the Apollo era. This new collection covers the history of Apollo and the wealth of insights gathered during a period of significant growth and transformation for NASA. Apollo lessons will always be relevant to NASA's technical workforce and can be leveraged as the agency moves forward with the Artemis Program. Students and researchers alike will benefit from this collection.

Dr. Bart Singer of the Langley Research Center (LaRC) initiated the Apollo Era Resources collection. He was assisted by representatives from Knowledge Management offices at every NASA center.

- https://appel.nasa.gov/apollo-era-resources/

For more information:

- Allan J. McDonald, *Truth, Lies, and O-Rings: Inside the Space Challenger Disaster*, 2012
- William Bridges, *Managing Transitions: Making the Most of Change*, 2017

AN ALIEN OBSERVATION OF GODDARD BEHAVIOR BEYOND COVID-19

A light-hearted perspective on a very serious issue

Captain B. F. Skinner
Alien Observer, Earth
Orilla, Othala Galaxy

FOCUS ON FACILITIES

Imagine for moment, what an alien civilization might observe watching Goddard Space Flight Center during recent events, through their most advanced space-time "telescope." For the irony of it and for a little fun, let us name their telescope, the Constellations Optical Viewer and Imaging Device (COVID). Moreover, let's just say it's version 19. It is extremely powerful, as we shall soon see.

The aliens have studied Earth, especially the NASA Goddard Space Flight Center, on and off for several years now. They mainly want to ensure we Earthlings don't get too reckless with ventures into the universe. We attracted their attention after they traced space-time field disturbances created by one of NASA's satellites back to its source; of course, Earth.

The COVID-19 instrument has several functions and is able to analyze the data it retrieves at 19 functional levels of detail. Just at Level 4, it can capture what is happening inside Goddard facilities. Amazingly, this is the lesser of its capabilities.

After studying Goddard for several years, the aliens know us very well. The most mundane knowledge they possess is human habits and patterns. By comparison, they even know how much we covet large offices and need huge amounts of I &T space to create fledgling spacecraft …fledgling, at least from their standpoint of superior technology.

Curiously, recent observations show a marked change in human behavior. The Goddard Earthlings remain physically much farther apart than they have during past observations. Similarly, our facilities have about fifty percent fewer of us than before. The majority consistently wear a new device. We tug at them occasionally and often repeat our verbal exchanges, which have become muddled because of it. With a boost to Level 5, the COVID-19 also reveals the facial device has dramatically reduced the exchange of aerosolized particulates moving between us.

Our working surfaces have sprouted a curious new transparent barrier. We seem very intent to stay on either side of it. Even more noticeable, we remain at a distance equal to six feet or greater when assembled together in open space. Yet, we reduce the distance when a barrier is present. The respiration particles that land and accumulate on the new barriers are

Be well, stay well, Goddard.

Captain B. F. Skinner

wiped away routinely with an alcohol-based fluid.

There's a regular rotation of us from one day to another and the seats occupied during one rotation is different than the next. There is always only one-half the total capacity of any space in use. With mounting concern, the aliens boost the COVID-19 setting to Level 8, and at this level it registers feelings of mixed satisfaction by us Earthlings due to both the extra space we now enjoy but also lingering worry and consternation.

When Earthlings encounter one another, the once-seen ritual of joining of our grasping appendage, that we call a handshake is now a brief touch of a bent joint. The aliens see that this occurs very infrequently. When it does, there's an odd dance of awkwardness around the handshake-corrected-to-joint bump, almost reminiscent of Elaine's dance moves from a Jerry Seinfeld episode.

Many other things seem to have changed in general, and a scan of our brain activity indicates hyper-electrical activity that only lessens when we are alone. Yet, this brain activity remains constantly higher than ever observed before. The alien scientists conclude that a major life-threatening situation occurred since they last focused on Earth, one to which all Earthlings are responding.

Because the aliens have a great deal of empathy for all life in the universe, they discuss waiving their normal scientific ethic, which reserves use of the highest settings of the COVID-19. They agree to kick up the COVID-19 to Level 17. At this level, they can peer into Earth's future. After they do, they breathe a sigh of relief.

In the time of one solar rotation, Goddard Earthling behavior looks much like what they saw when they first took interest in us. Moreover, we are happier overall; we care much less about physical space, having learned how to operate and be efficient using a new paradigm of our capabilities. We spend much more time very close to one another, carrying on our work to explore the universe. Best of all, the aliens find that only minuscule traces remain of the biological anomaly that briefly changed all human activity.

From the power of their COVID-19, the aliens conclude the Goddard humans and all humans have a bright and responsible future place in the universe and, they look forward to this ultimate engagement. Be well, stay well Goddard. ■

Bill Glenn / Code 400
Mission Support Manager

Watch the series

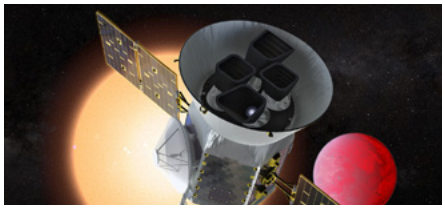
https://www.nasa.gov/content/mission-operations-hubble-eye-in-the-sky

HUBBLE
Eye in the Sky

This series, Hubble – Eye in the Sky, takes you behind the scenes into the world of Hubble Space Telescope operations. Discover the strategies needed to run a bus-sized observatory as it speeds around Earth at 17,000 miles per hour, and find out how Hubble collects the incredible images and groundbreaking data that have transformed humanity's vision of space. Witness the ingenuity that keeps such a complex and remote machine working to investigate the mysteries of the universe for more than 30 years.

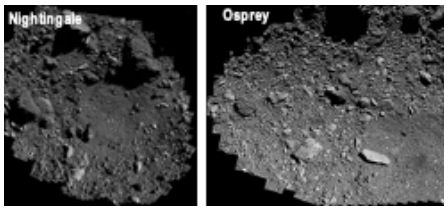
FPD Mission Updates

Transiting Exoplanet Survey Satellite (TESS)



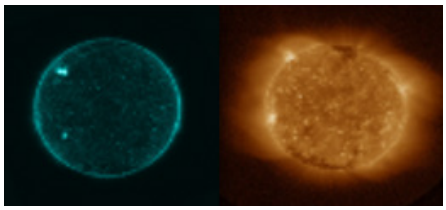
Transiting Exoplanet Survey Satellite (TESS) made observations in orbit 60, which represents the completion of TESS's prime mission science collection, effectively a full sky survey.

OSIRIS-REx



OSIRIS-REx mosaics of the prime (Nightingale) and backup (Osprey) sample collection sites were compiled from observations from Reconnaissance sorties to 250m from the respective sites.

GOES-16

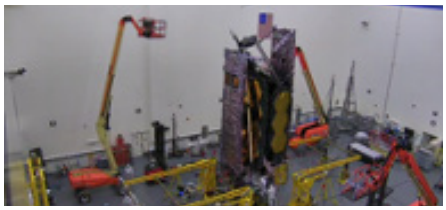


GOES-16 Solar Ultraviolet Imager (SUVI) observed two solar flares on the morning of May 29.

Roman Space Telescope (RST)

NASA renames WFIRST after Nancy Grace Roman. The new name is Roman Space Telescope (RST). RST's primary mirror was successfully refigured, polished, and coated and is awaiting the final at-temperature optical test.

JWST

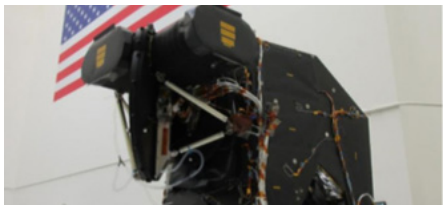


JWST held a Pre-Environmental Review (PER) in June and successfully completed the pre-observatory comprehensive system test #4 and ground segment end-to-end test #3.

GOES-T

GOES-T Advanced Baseline Imager (ABI) and Geostationary Lightning Mapper (GLM) instruments completed testing and shipped to the I&T facility for spacecraft integration.

LandSat 9



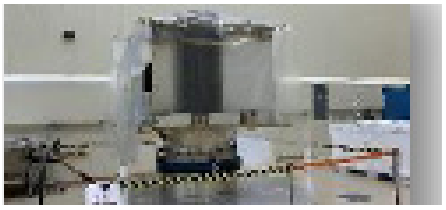
LandSat 9: Spacecraft bus comprehensive performance test successfully completed on June 10. OLI-2 safe-to-mate, signal characterization, electrical integration, and functional testing successfully completed. Amid COVID-19 concerns, Ball recalled their Gilbert, Arizona, on-site team (June 24) during signal characterization. Tools and procedures were quickly brought on-line to complete functional testing remotely.

JPSS-3

Integration is complete for the JPSS-3 VIIRS sensor

super module. It passed its sensor integration manufacturing readiness review in May.

Lucy

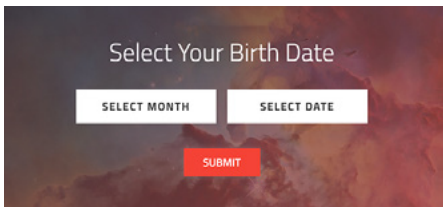


Lucy's spacecraft structure has been lifted from assembly dolly to propulsion integration stand in the Lockheed Martin SSB highbay.

ESDIS & ESMO

ESDIS and ESMO placed a 'thank you' sign in front of Building 32 recognizing the operations staff who have diligently come in daily to ensure the safe operations of the Earth science missions like Aqua, Terra, Aura, and others.

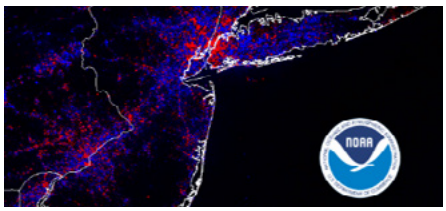
Hubble



The nasa.gov/hubble website saw 16.8 million pageviews during the 30 days of the 30th anniversary celebration. The "What Did Hubble See on Your Birthday?" tool added another 106 million pageviews to that total.

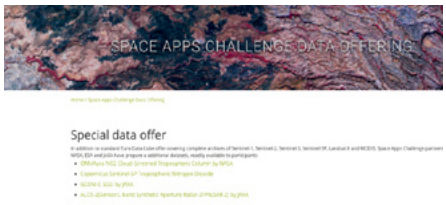
The United States Mint announced the designs for the 2020 American Innovation™ $1 Coin program. The Hubble Space Telescope was selected for the Maryland coin.

Suomi-NPP



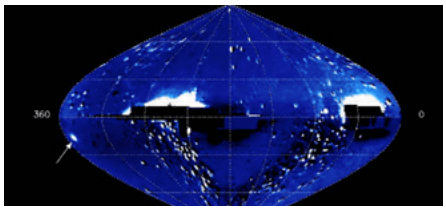
Suomi-NPP continued to provide observations of nighttime lights in the U.S. during the pandemic, allowing scientists to discern marked differences in nighttime light levels between February and March 2020.

ESDIS DAAC



A simple-to-use mapping tool from the ESDIS DAAC: Socio-Economic Data & Applications Center (SEDAC) shows both demographic data along with regularly updated information about reported global cases of COVID-19. The SEDAC COVID-19 Viewer is unique in its ability to allow users to visualize age and sex data for any area worldwide.

SOHO



SOHO was featured on NASA's website for comet SWAN discovery. The new comet was first spotted in April, by an amateur astronomer named Michael Mattiazzo using data from a SOHO instrument called Solar Wind Anisotropies (SWAN). The comet appears to leave the left side of the image and reappear on the right side around May 3. This is the 3,932nd comet discovered using data from SOHO.

XRISM/Resolve

The XRISM/Resolve team completed a successful checkout of NASA's flight hardware at 50 mK in cryogen-free mode. Working closely together with our JAXA colleagues, the team has been supporting all of the test activities in Japan since March remotely. This includes supporting the testing and subsequent leak investigation of the JAXA Dewar until NASA's team is able to travel to support the de-integration and repair activities in Japan.

Code 400

FPD

Peer Awards & Achievements

In our current environment, the third annual FPDFest was held virtually on September 3rd to feature FPD's Peer Awards, and to recognize the accomplishments of our community over the past year. We did miss the Rita's Italian Ice and the face-to-face networking but it was great seeing everyone online. FPD Peer Awards winners are featured in the coming pages for those who missed the virtual ceremony.

Silo Slammer

The recipient of this award exemplifies a commitment to openly collaborate, share ideas, and respond to needs beyond their own organization to achieve a successful team solution.

2020 PEER AWARD FOR EXCELLENCE IS AWARDED TO

Aaron McCleskey

Boundless Energy

The recipient of this award recognizes an employee who goes above and beyond their regular assignment. Characteristics of this person include: volunteering for extra committees, mentoring, outreach activities, or going the extra mile to help others.

2020 PEER AWARD FOR EXCELLENCE IS AWARDED TO

Amy DeLisa
Faiza Hartnett
Stephanie Clark
Daniel Mcguinness
William Paradis
Heather Matthews

Mission Impossible

This award exemplifies a person who has a really big, demanding, seemingly impossible job, yet they manage to successfully keep all the "balls in the air." This awardee is someone who does more with less and develops new and creative ways of approaching their work.

2020 PEER AWARD FOR EXCELLENCE IS AWARDED TO

Kevin Kranacs
David Larsen
Jennifer Brill

Continued on page 58

Continued from page 57

Steady Helm

This award exemplifies a person who has a special ability to keep the team focused on a crisis, keep things moving, perform well under pressure, and reinforce good morale and respect for all team members during times of stress and adversity.

2020 PEER AWARD FOR EXCELLENCE IS AWARDED TO

Derrick Early
Michael Hill
David Haskins
Lauren Alvey

Rookie of the Year

This award recognizes and distinguishes an employee who has demonstrated agility by getting up to speed quickly in assuming their new responsibilities as they transitioned to their new duties in a new position.

2020 PEER AWARD FOR EXCELLENCE IS AWARDED TO

William Alberding
Kathryn Cawdrey

Unsung Hero

This award recognizes an employee who has exhibited dedication to their job from behind the scenes with a can-do attitude, a willingness to support the Directorate, and a commitment to meet the needs of customers and co-workers.

2020 PEER AWARD FOR EXCELLENCE IS AWARDED TO

Jessie Hughes
Dan Blackwood
Robert Jones
Jeffrey Pedelty

Wild Card

This award recognizes an FPD team member whose unique actions further the FPD's objectives and best reflect the important values of the Center: Safety, Integrity, Teamwork, and Excellence.

2020 PEER AWARD FOR EXCELLENCE IS AWARDED TO

Kelly Catlett

Mary Walker

Antonio Reyes

Inclusion Fusion

The recipient of this award exhibits an exceptional ability to bring together varying skill levels, experiences, and backgrounds to foster an environment where all individuals can contribute fully and are valued, engaged and supported to reach their full potential.

2020 PEER AWARD FOR EXCELLENCE IS AWARDED TO

Kenneth Anderson

Shannon Smith

Mentor "Under Your Wing"

The recipient of this award recognizes an employee who embraces mentoring and actively participates in the development of others. This awardee seeks to positively influence an individuals' career development by actively encouraging and guiding mentees in developing and achieving career goals.

2020 PEER AWARD FOR EXCELLENCE IS AWARDED TO

Scott Merritt

Nicholas Scott

Hang Ten

This award recognizes a person who demonstrates effective and decisive leadership qualities, an ability to advance their teams' project amidst adversity and does so in a seemingly effortless manner.

2020 PEER AWARD FOR EXCELLENCE IS AWARDED TO

Edward Grigsby

Michael Bay

2019 ROBERT H. GODDARD AWARD RECIPIENTS

On the following page are the recipients of the Robert H. Goddard Award from Code 400, recognizing exceptional achievement in the following areas.

Due to the current environment, an in-person ceremony will not be held. The Human Resources Office is working on other ways to recognize these employees for their outstanding accomplishments.

EXCEPTIONAL ACHIEVEMENT AWARD FOR:

Customer Service (Individual and Team Recognition)

Stephen B. Padgett

For exceptional dedication and leadership in cross-utilizing functions for NASA's Goddard Space Flight Center.

Greg Mandt

For Exemplary Customer Service to the National Weather Service in managing the GOES R and JPSS Programs.

Cory Helm

For maintaining an exceptionally positive attitude and remaining a true team player – always willing to assist in any way possible.

Janel Cassard

For outstanding customer service, facilitating critical agreements that enable continued mission support for dozens of NASA missions.

Barbara Haskell

For outstanding dedication to the Flight Projects Directorate and the resources community.

Amanda Hametz

For outstanding financial expertise in keeping Space Network Ground Segment Sustainment project running smoothly and efficiently.

Donnie Gates

For Donnie Gates' commitment to customer service and his significant contributions in support of to the launch site activities of the ICON mission.

Jean Huber

For your comprehensive and creative problem-solving skills that help the JWST team track and verify critical flight hardware requirements to reduce risk to the mission.

TIRS-2 Scene Select Mechanism Anomaly Investigation Team

For extraordinary customer service to rapidly resolve the TIRS-2 Scene Select Mechanism anomaly to enable the delivery of a reliable system ahead of schedule.

Ball Aerospace OLI-2 Instrument Team

For exemplary performance in developing the Operational Land Imager 2 instrument for the Landsat 9 mission.

Continued on page 62

Continued from page 61

EXCEPTIONAL ACHIEVEMENT AWARD FOR:

Customer Service (Individual and Team Recognition)

Goddard Integrated Design Center

For exceptional customer service to the LUVOIR Astro2020 Decadal concept study.

EXCEPTIONAL ACHIEVEMENT AWARD FOR:

Diversity and Inclusion and EEO

FP Diversity and Inclusion Team

For an exceptional display of energy, talent, and commitment to making Goddard a welcoming and safe environment for all.

EXCEPTIONAL ACHIEVEMENT AWARD FOR:

Engineering (Individual and Team Recognition)

Mark Neuman

For exceptional contributions leading to the successful development and launch of several ISS payloads including the Robotic Refueling Mission 3.

Jim Basl

For exceptional dedication as the lead stress analyst for ISS-hosted SSPD payloads.

Ryan Olds

For exceptional engineering accomplishments in the development and operations of the Guidance, Navigation, and Control systems for the OSIRIS-REx mission.

Anjani T. Polit

For exceptional systems engineering, teamwork, and leadership of the science planning activities on the OSIRIS-REx mission.

EXCEPTIONAL ACHIEVEMENT AWARD FOR:

Engineering (Individual and Team Recognition)

David Alexander

For demonstrated engineering excellence significantly contributing to the success of TIRS-2.

Michael Burnett

For exceptional engineering leadership architecting elements of the GOES-R Series Ground System and the Level Zero Storage Service.

Peyush Jain

For the successful design and development of the enterprise architecture JPSS GRAVITE system in support of JPSS's Calibration/Validation campaign.

Xuan Nyguyen

For outstanding technical expertise in backwards engineering a critical circuit board for the SAR ground station antennas.

Rafael A. Garcia

For outstanding performance in engineering developing the Protocol Coupler Router for the DoD Space Test Program and NASA LCRD Project.

Thermal Infrared Sensor - 2 Team

For demonstrated excellence and dedication to develop and deliver the TIRS-2 instrument that meets requirements with margin ahead of schedule and under budget.

SUVI ECI Team

For outstanding efforts in developing a novel way of using the Solar Ultraviolet Imager (SUVI) as an Extended Coronal Imaging (ECI) instrument.

SGSS Engineering Team

For exceptional dedication and perseverance in obtaining Level 6 Test Readiness of the Space Network Ground Segment Sustainment System.

The Hubble CAROLInE Team

For outstanding innovation and teamwork to accelerate the return to science following payload lock-up events.

Optical Communications Laser Ranging Patent Team

For outstanding contributions in securing a patent for precision ranging through optical communications systems, enhancing navigation capabilities for NASA and industry.

Continued on page 64

Continued from page 63

EXCEPTIONAL ACHIEVEMENT AWARD FOR:

Engineering (Individual and Team Recognition)

ESMO Conjunction Assessment Process Improvement Team

For exceptional ESMO Conjunction Assessment process improvements enabling significantly decreased risk and man hours.

JWST SCE Thermal Vacuum Test Thermal Team

For the ingenuity and selfless dedication demonstrated to successfully plan and execute critical thermal testing for JWST's spacecraft element.

RRM3 Engineering Development Team

For exceptional innovation and perseverance in developing technologies to help spacecraft live longer and journey farther.

EXCEPTIONAL ACHIEVEMENT AWARD FOR:

Leadership

James (Jim) Pontius

For outstanding leadership and management of the Global Ecosystem Dynamics Investigation (GEDI) Lidar Project.

Jason Hair

For exceptional leadership, dedication and exemplary performance in delivering the TIRS-2 Instrument ahead of schedule and 20% under budget.

Rob Lilly

In recognition of vision and leadership in developing the state-of-the-art Technical Data Management System to ensure GSFC's work is efficiently developed for years to come.

Paul Buchanan

For exceptional leadership of the SENSE contract procurement team, leading to the successful selection of the Peraton Company.

Laurie Mann

For exceptional leadership of the TIRS-2 systems engineering team to ensure mission success.

Samantha Hicks

For exceptional leadership of the TIRS-2 mechanical engineering team resulting in technical and programmatic success.

EXCEPTIONAL ACHIEVEMENT AWARD FOR:
Leadership

Christopher Morris

For dedicated service as the GSFC GOES program support manager, including Astrotech launch services for GOES-R and GOES-S launch.

Andre Dress

For exceptional leadership of the PACE project and its team, navigating through a number of significant challenges and successfully proceeding to Phase C.

Andrew Mitchell

In recognition of significant efforts leading the Earth Science Data and Information System project to develop new systems and processes and maintaining reliable operations.

EXCEPTIONAL ACHIEVEMENT AWARD FOR:
Mentoring

Ryan Turner

For exceptional dedication to mentoring, impacting and guiding the lives of many interns in the SCaN Intern Project.

EXCEPTIONAL ACHIEVEMENT AWARD FOR:
Mission and Enabling Support (Individual and Team)

Wanda Peters

For exemplary enabling of mission success for flight projects through strategic business planning.

Norman Reese

For exceptional achievement leading GOES-R Series Ground System network infrastructure reliability and performance improvements.

Delta IV WGS-10 Launch Vehicle Team

Excellence Under Pressure: Delta IV WGS-10 Recovery & Launch.

Continued on page 66

Continued from page 65

EXCEPTIONAL ACHIEVEMENT AWARD FOR:
New Opportunities Captured

The LunaNet Team

For exceptional technical expertise in rapidly developing a strategic proposal for communications and navigation infrastructure at the Moon.

AMS Repair Tools Team

For successfully leveraging tool expertise to facilitate collaboration with Johnson Space Center on AMS Repair Tool Development.

EXCEPTIONAL ACHIEVEMENT AWARD FOR:
Outreach

Tessa Iglesias

For exceptional effort in increasing the ESC's presence around Goddard through internal communications products, monthly and quarterly newsletters and bi-annual forums.

Daniel Baird

For exceptional efforts in creating vivid and dynamic external communications products that highlight the necessity of space communications and navigation.

EXCEPTIONAL ACHIEVEMENT AWARD FOR:
Professional Administrative (Individual and Team Recognition)

Donna Smith

In recognition of Donna's outstanding day-to-day efforts, keeping the ESC operating smoothly and efficiently.

Candace Masters

For exceptional dedication to the overall success of TIRS-2 throughout development.

EXCEPTIONAL ACHIEVEMENT AWARD FOR:
Professional Administrative (Individual and Team Recognition)

Dereck Robinson

For outstanding leadership in implementing Earned Value Management across all Goddard projects.

Joyce L. White

For her dedicated service as the Configuration Management lead for the GOES-R Program Office and the Mission Operations Support Team (MOST).

EXCEPTIONAL ACHIEVEMENT AWARD FOR:
Professional Administrative (Individual and Team Recognition)

Kelly Catlett

In recognition of significant contributions to the general business discipline across the Program Analysis and Control contract and to the Earth Science Projects Division.

Sandra Sumner

For your expert insight and understanding of all phases of the budget lifecycle used for critical financial planning and key project decisions for the JWST Project.

PACE Furlough Budget and Schedule Recovery Team

For exceptional contributions and dedication to the PACE mission during its recovery efforts following the Government shutdown.

EXCEPTIONAL ACHIEVEMENT AWARD FOR:
Quality and Process Improvement (Individual and Team Recognition)

Barbara Lambert

For outstanding vision and decades of exemplary performance in evolving and developing state-of-the-art photographic documentation capabilities for NASA missions.

Dana Shum

In recognition of exceptional achievement in improving software development and integration processes for the Earth Observing System Data and Information System.

Harness Workmanship Team

For demonstrated excellence to improve the processes to fabricate and assemble quality electrical wiring harnesses.

GOES-R GSP ECP-033 Integrated Project Team (IPT)

For innovative development, negotiation, and timely execution of a significant contract extension for the GOES-R Ground System.

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EXCEPTIONAL ACHIEVEMENT AWARD FOR:
Secretarial/Clerical

Kimberly Walker El

For outstanding support and unwavering dedication to the LCRD and ILLUMA-T projects.

EXCEPTIONAL ACHIEVEMENT AWARD FOR:
Supervision

Cindy Fryer

For decades-long commitment to delivering RAO's objective of conducting independent assessments and the exceptional management and support you provide to your team.

EXCEPTIONAL ACHIEVEMENT AWARD FOR:
Technicians (Individual and Team Recognition)

Dennis Hewitt

For demonstrated exceptional performance and customer service resulting in a number of significant accomplishments and contributions over an entire career at Goddard.

Scott Low

For exceptional dedication to the JPSS MOST by going beyond assigned responsibilities and providing improvements that save both time and resources.

NEN Launch Communications Segment Team

For exceptional technical expertise in the modification of the KSC spaceport, enabling communication to NASA's human exploration missions.

Robotic Refueling Mission 3 Technician Team

For exemplary innovation in integration, testing, and recovery of Robotic Refueling Mission 3.

Coming and Goings

January 1 through June 30, 2020

Comings

Pam Taylor (100) to 448/Roman Space Telescope (RST)

Jacob Burke (566) to 450/Division

Matthew O'Neil (372) to 401.1/ Rapid Spacecraft Development Office (RSDO)

Ross Henry (551) to 483/Restore-L

Charles Bacon (599) to 484/ Exploration and In-Space Services (ExIS) subsystems

Chris Carson (599) to 434/Lucy

Jamie Esper (592) to 450.2/ Technical Enterprise Mission Pathfinder Office (TEMPO) Detail position

Devon Greene (Reinstatement) to 405/Resource Analysis Office (RAO)

Roger Clason (700) to 470/ Joint Polar Satellite System (JPSS)

Russell Snyder (599) to 481/ Architecture Development Office (ADO)

Lamont Ruley (585) to 460/Division

Tyrone Dillard (383) to 460/Division

Adam Matuszeski (599) to 422/ GeoCarb

Andrea Poulin (544) to 401/ Deep Atmosphere Venus Investigation of Noble gases, Chemistry, and Imaging (DAVINCI)

Chetan Sayal (581) to 450/ Integrated LCRD LEO User Modem and Amplifier Terminal (ILLUMA-T)

Corina Koca (544) to 460/ Geospace Dynamics Constellation (GDC)

Kristen Brown (597) to 490/ Hazard Detection Lidar (HDL)

Milton Davis (596) to 483/Restore-L

Peter Rossoni (544) to 456/ Laser-Enhanced Mission Communication Navigation and Operational Services (LEMNOS)

Rene Wong Pineiro (221) to 450/ Division

John Gygax (544) to 448/RST

Richard Tseng (external) to 450/ Division

Christy Hansen (610) to 400/FPD

Peyush Jain (581) to 450.2/TEMPO Detail position

Jon Verville (585) to 450.2/TEMPO Detail position

Goings

Lou Kalil (405) Retirement

Renan Borelli (460) Retirement

Linda Pattison (470) Reassignment to 585

Azita Valinia (440) to NASA Engineeringi and Safety Center (NESC) 3-Year Temporary Appointment

John Leon (425) Retirement

Ronald Miller (452) Retirement

Mike Little (407) Reassignment to 606

Theresa Hayden (460) Retirement

Bryan Fafaul (472) Retirement

Reassignments/ Realignments Details within Code 400

Ron Hooker (421) to 424/ Total and Spectral Solar Irradiance Sensor (TSIS)-2

Juli Lander (451) to 483/Restore-L

James Morrissey (401) to 411.1/ Space Weather Follow-On (SWFO) L-1

Hsiao Smith (480) to 448/RST

Jackie Townsend (470) to 448/RST

Vir Thanvi (458) to 450/Division

Greg Dell (428) to 424/TSIS-2

Bruce Milam (470) to 401.1/RSDO

Roberto Aleman (421) to 460/ Division

Todd King (483) to 422/GEOCarb

Barbara Grofic (401) to 440/Division

Param Nair (424) to 472/JPSS Flight

Karen Rogers / Code 400
Administrative Officer

Christy Hansen

Flight Projects Directorate (Code 400)
Chief of Staff

Born A suburb outside of Philadelphia, PA – in Delaware County

Education BS: Comprehensive Science, with Minor in Physics, Villanova University; MS: Space Studies, University of North Dakota

As the recently-appointed FPD Chief of Staff, Christy's duties include overseeing special projects and assignments from Center and Code 400 leadership, such as providing technical and programmatic assessments, studies, and recommendations. She coordinates Senior Executive dialogs with Code 400, industry and Center partners. She oversees Rideshare and SmallSat projects, captures Code 400 highlights and accomplishments, and most recently, is involved in tracking COVID impacts.

Life Before Goddard

Christy began her career at Johnson Space Center (JSC), where she worked for 11 years in the Mission Operations Directorate (MOD) as part of the Extra-vehicular Activity (EVA) group, as an operations engineer, astronaut instructor, and flight controller. She worked several International Space Station (ISS) and Hubble Space Telescope (HST) missions as the EVA task lead responsible for procedure and EVA timeline development, astronaut training across several venues, including the Neutral Buoyance Lab (NBL) Virtual Reality lab, air-bearing floor, mass simulator lab, and KC-135 microgravity aircraft, and provided real-time flight controller support of on-orbit mission operations. "Plan, Train, Fly", was their motto! In support of the final servicing mission to Hubble, STS-125/SM-4 in 2009, she trained the EVA/spacewalking astronauts using the tools and techniques required to perform complex tasks on a telescope in a spacesuit in zero gravity.

Life at Goddard

Christy came to Goddard in 2010 in what is now Code 480, the NASA Exploration and In-Space Services projects Division. She was the Operations Manager for the Robotic Refueling Tech Demo payload that flew to ISS on the last shuttle mission, STS-135.

In 2012, she moved into Code 615, the Cryospheric Sciences Lab, as the Project Manager for the Operation IceBridge airborne science mission. In this role, she helped to lead and facilitate seven airborne deployments to Greenland, Alaska, Chile, and Antarctica. Her most challenging accomplishment was the deployment to McMurdo, Antarctica using Wallop's P-3 wheeled aircraft and landing on an 8-foot thick runway made of sea ice in 2013.

In 2015, Christy became Goddard's new Airborne Sciences Manager, overseeing and guiding all of Goddard's airborne science missions in the Code 610/Earth Science Division. She provided management support, mentorship, and guidance to airborne science teams across all Earth science labs at Goddard. She also led the development of the Earth Venture-Suborbital (EVS-3) proposal call for concepts and served as capture manager for Goddard's four down-selected proposals. She also provided management support to multi-Center airborne

(clockwise from left): Christy made it to the South Pole while supporting Operation IceBridge; At the top of a KSC launch pad, by the Atlantis space shuttle external tank, while supporting the Robotic Refueling Mission (RRM) technology demonstration payload to space station; Standing in front of the Russell glacier in Kangerlussuaq, Greenland, on an Operation IceBridge deployment. CREDIT: ALL PHOTOS COURTESY OF CHRISTY HANSEN

science missions with the Jet Propulsion Lab, Langley Research Center, and JSC. In 2019, Christy started a year-long detail at NASA Headquarters, in the Science Mission Directorate (SMD) working for the Deputy Associate Administrator for Programs (DAAP). Here, she led the SMD Rideshare activity, Standing Review Board Working Group Improvements project, and facilitated the SMD Risk Management Board.

Life Outside Goddard

Christy has always enjoyed sports, outdoor activities, and travel. Her favorite places traveled to for work and vacation include McMurdo and the South Pole station in Antarctica; New Zealand; Punta Arenas, Chile; and Kanger, Greenland (as part of operation IceBridge); Bora Bora (for her honeymoon); Scotland (for something called Scottish Space School during her JSC days), and Hawaii and Alaska with her family. Currently, Christy spends most of her free time taking care of her husband, Dave Parker, who has Amyotrophic Lateral Sclerosis (ALS), a progressive neurodegenerative disease. Dave still works using special eye-gaze technology, since he can no longer move or use his hands. He's in Code 480 and is currently supporting On-Orbit Servicing, Assembly, and Manufacturing mission (OSAM-1) work. Dave made significant contributions to all of the Hubble servicing missions as well, including most of the electrical components, like the new solar arrays, batteries power control unit. ■

> "Never interrupt someone doing something you said couldn't be done"
>
> Amelia Earhart

Andrew Mitchell

Earth Science Data and Information System (ESDIS) (Code 423)
Project Manager

Born Philadelphia, PA

Education B.S., Aviation Science – Software Engineering, University of Maryland Eastern Shore (UMES)
M.S., Applied Computer Science, UMES

As project manager of NASA's Earth Science Data and Information System (ESDIS) Project (Code 423), Andrew oversees the team of data scientists, engineers, and system administrators responsible for the science systems of NASA's Earth Observing System Data and Information System (EOSDIS).

Life Before Goddard

Andrew Mitchell wants to know how things work. Growing up in Philadelphia, PA, he wanted to know what created the picture on the television screen, how a clock was put together, and how processors controlled his parents' computers. The first computer language he learned was Pascal in a class he took at George Washington Carver High School of Engineering and Science. His love of flying (he piloted an aircraft when he was 12) and his desire to some day work for NASA (preferably as an astronaut) led him to the aviation program at the University of Maryland Eastern Shore, where an air traffic control class piqued his interest in learning more about the high-power computers controlling the images he saw on the radar plot. The result was a bachelor's degree in aviation science followed by a graduate degree in applied computer science.

Life at Goddard

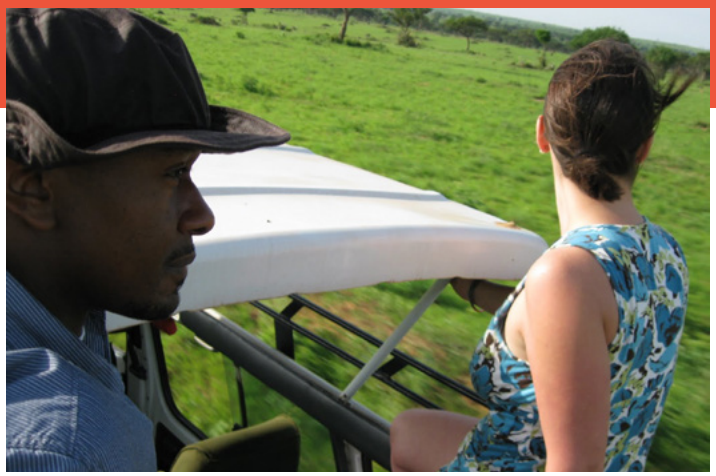
His nearly 20-year career at NASA began with an undergraduate internship at Wallops Flight Facility, followed by internships at Greenbelt and Wallops during his graduate studies. His second Wallops internship led to a co-op position, which turned into a full-time position as a computer engineer at Wallops in 2002. Andrew arrived at the Greenbelt campus in October 2005 as a computer engineer with the Computing Environments and Collaborative Technologies Branch.

Andrew began his work with EOSDIS in 2007 as the engineer in charge of EOSDIS metadata systems. He joined the ESDIS project (Code 423) as deputy project manager in 2015 and became project manager in 2017.

The ESDIS project designs and operates one of the largest Earth science data systems in the world (the EOSDIS), and contains most of the data from Earth Science Projects Division (Code 420) missions and projects from the last 30 years.

Along with planning, organizing, and directing the ESDIS project, Andrew coordinates the work of 12 discipline-specific EOSDIS Distributed Active Archive Centers (DAACs) and 10 Science Investigator-led Processing Systems (SIPS) located at NASA facilities and academic institutions across the country.

Andrew represents NASA Earth observing satellite and Earth science data interests in numerous international organizations. He has been part of the Committee on Earth Observation Satellites (CEOS) Working Group on Information Systems and Services (WGISS) for the past 10 years and is a past chairperson. NASA is an original member of CEOS, which was established in 1984



(clockwise from left): Andrew with an Italian colleague from ESA at the 31st CEOS Plenary meeting in Rapid City, SD, in October 2017; On safari in Kenya; Gorilla trekking in Uganda.
CREDIT: ALL PHOTOS COURTESY OF ANDREW MITCHELL

to facilitate the international coordination of space-based Earth observations.

Andrew also works with NASA's Office of International and Interagency Relations (OIIR). He helped facilitate a dataset exchange between NASA and ESA (European Space Agency), and recently was part of a team that set up an agreement for NASA to become a data mirroring site for the European Commission's Copernicus program. He also worked with the Japan Aerospace Exploration Agency on a similar agreement for NASA to mirror Synthetic Aperture Radar (SAR) data.

Andrew counts earning Federal Acquisition Certification to be a NASA project manager and his current work as ESDIS project manager as his two top achievements during his years at Goddard. For Andrew, working with the incredibly smart, dedicated, and enthusiastic ESDIS team makes coming to work a joy for him. Andrew's colleagues also think highly of his work, and he is the recipient of a 2020 Robert H. Goddard Award in the Leadership category.

Life Outside Goddard

Travel is a huge focus of Andrew's life outside Goddard. He's visited all continents, with activities including gorilla trekking in Uganda, safaris in Kenya, and retreats in Bali. He always tries to include a philanthropic element as part of his trips by donating time and resources to local organizations.

Outside of travel, Andrew enjoys activities that bring an adrenaline rush, including bungee jumping (four times), sky diving, jet skiing, and parasailing. He's also someone you'll want on your side in a fight. Along with regular CrossFit workouts, Andrew has studied krav maga since 2006. Originally developed for the Israeli Defense Forces, krav maga focuses on self-protection techniques related to reality-based attack situations.

Krav maga also stresses the ability to block out distractions to reach goals. This, Andrew

says, helps him focus on the many tasks he deals with daily and set obtainable goals. For Andrew Mitchell, the ability to "starve your distractions, feed your focus" is a mantra he tries to carry throughout his life as he continues his explorations into how things work. ■

Josh Blumenfeld / Code 423
NASA EOSDIS Science Writer

"Starve your distractions, feed your focus"

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 April 2020 through August 2020 are shown above.

DID YOU KNOW...?

Juneteenth is a nationally celebrated commemoration of ending slavery within the United States. The Emancipation Proclamation was signed on January 1, 1863, however the Civil War did not officially end until 1865 and over that period in time many slaveholders migrated to Texas to escape fighting. Nearly two and a half years later on June 19, 1865, in Galveston Texas, federal troops occupied the state to announce the emancipation of those held as slaves. Texas was more remote and had a low presence of Union troops until that time. Juneteenth is recognized as state holiday or a special day of observance in 47 of the states today.

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
Code 400 Diversity and Inclusion Committee
Ext. 6-2515

OUT & ABOUT

LIFE'S HIGHLIGHTS OFF CAMPUS

Congratulations to Patricia Aldridge (452) on the birth of her fifth grandchild. Merida Claudia Gregory was born on April 28, 2020, at 10:07am, weighing 8 lbs., 2 oz. Proud Mom and Dad are David Gregory (720) and his wife, Kim.

Best wishes to Emily Roth (460) and Rodney Hill III, on the birth of their son, Rodney Hill IV, born on June 11, 2020, weighing 6 lbs., 14 oz, and 19 inches long. Big sister, Ava is excited about having a baby brother.

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

FLIGHT PROJECTS
LAUNCH SCHEDULE 2021

JANUARY

1/2021
Laser Communications Relay Demonstration (LCRD)

SEPTEMBER

9/2021 (TBC)
Landsat 9

9/2021
Imaging X-ray Polarimetry Explorer (IXPE)

OCTOBER

10/2021
Lucy

10/2021
James Webb Space Telescope (JWST)

DECEMBER

12/2021
Geostationary Operational Environmental Satellite (GOES-T)

TBC: To Be Confirmed