THE CRITICAL PATH

A FLIGHT PROJECTS DIRECTORATE PUBLICATION ■ 2017 SUMMER ISSUE

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And Continues the Critical Connection

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Enabling exploration and earth + space science by transforming concepts and questions into reality

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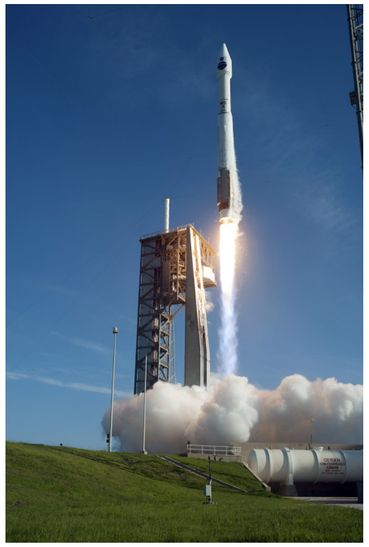

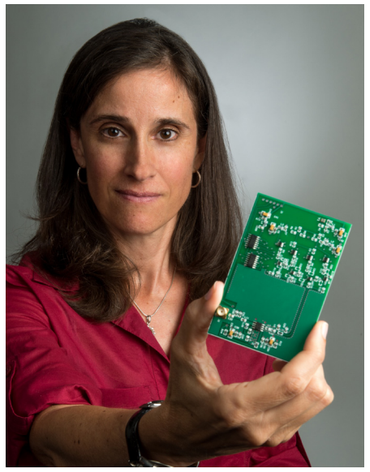

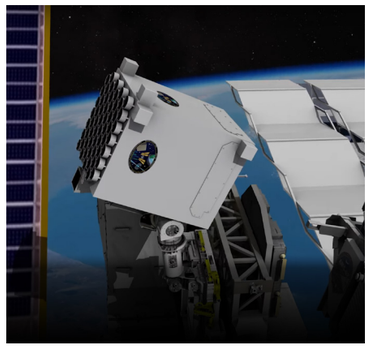

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MESSAGE FROM THE DIRECTOR

THE CRITICAL PATH

PUBLISHED BY THE FLIGHT PROJECTS DIRECTORATE

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HAVE A STORY IDEA, NEWS ITEM OR LETTER FOR THE CRITICAL PATH?
Please let us know about it.

Send your input to
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PHONE
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Don't forget to include your name and phone number.

The deadline for the next issue is November 1, 2017

WE'RE ON THE WEB
Visit the new
Code 400 home page
http://fpd.gsfc.nasa.gov

The Flight Projects Directorate (FPD) continues to be an exciting endeavor with many big events occurring over the past quarter. NICER was successfully launched and is now installed on the International Space Station (ISS), already providing great science on neutron stars. GOES-16 (formerly GOES-R) was handed over to NOAA and is already a critically important asset to the National Weather Service; the JWST telescope segment was shipped to the Johnson Space Center and is now in the large thermal vacuum chamber undergoing cyrovac testing, and on August 18th, TDRS-M had a spectacular launch from Cape Canaveral, Florida on an Atlas-V launch vehicle. TSIS is at the launch site in Florida as well and is being readied for a launch on a Falcon-9 launch vehicle destined for ISS in November. JPSS-1 is completing its processing and will soon be shipped to Vandenberg Air Force Base, California, for launch in the fall 2017 timeframe. Not far behind are the launches of ICON, GOLD, TESS, and GOES-S.

On the new business front, several New Frontiers teams submitted their Step-1 proposals to NASA Headquarters in April. This is the culmination of years of effort to get to this stage. Congratulations are in order to the teams selected for Phase A activities in the SMEX and MIDEX competitions, including Mechanisms of Energetic Mass Ejection–eXplorer (MEME-X), Focusing Optics X-ray Solar Imager (FOXSI), and Transient Astrophysics Observer (TAO). A Partner Mission of Opportunity proposal was also selected for components and scientific analysis for three in-situ payload instruments aboard the Turbulence Heating ObserveR (THOR) mission. Thank you and congratulations to all team members who supported these and other proposals!

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Wanda Peters and I welcome back Tom McCarthy to the Flight Projects Directorate office as our full-time deputy after he spent many months working with the JPSS team during a time of transition. We are very happy to have him back. Also, a big thank you to Nick Chrissotimos for stepping in at the directorate level while Tom was away and also continuing with his day job in Code 460.

Once again we had a great turnout for the FPD Peer Awards ceremony with Wanda Peters doing a wonderful job as our MC. It's a testament to this organization that we broke records with the number of peer award nominations (209) that were submitted, doubling the number of nominations over the past 3 years. It takes time to write up these awards and we're grateful that people feel so strongly about doing this.

I mentioned in the last Critical Path that we had held a strategic retreat with the FPD leadership and we are continuing the momentum from that retreat by holding follow-up sessions (dubbed "FPD Round Table") to start working our strategic initiatives. It is my hope and desire that we make this strategic thinking and planning a part of our DNA and it is sustainable going forward. I'll keep you posted on the successes along the way.

As summer starts to wind down, I want to congratulate all of our summer interns for an awesome summer. There were 127 interns supporting the FPD this year and I had the opportunity to visit the intern poster sessions as well as do several "Let's Connect" sessions with the students. The work these students did in just a few weeks' time was amazing. With people like these interns in our pipeline, I am very optimistic about our future, whether they come back to Goddard or move on to other places.

The Flight Projects Development Program (FPDP) participants have successfully completed their first year-long work assignment and have begun challenging work for the program's second year. They are also actively working on their Capstone project that will supplement the Code 401 capture managers' process manual. We are also preparing for FPDP Cohort #3. Check 'Dateline,' the GSFC internal website, and FPD communications coming in September. For more information on the FPDP click here.

Last but not least, I want to mention that we have established a new community of practice called the "Women of Flight". Through regular networking events, the Women of Flight provides opportunities for networking, counseling for career advancement, improving work-life balance, mentoring the younger generation, and promotes awareness of women's contribution to our NASA mission. This initiative is open to all, women and men, and I encourage you to participate in this community of practice, by sharing your ideas and expertise to help build a robust Flight Directorate community that transcends gender, age, and cultural barriers and ensures mission success for generations to come.

Women of Flight Networking Event, May 17, 2017 Credit: Todd Googins

David F. Mitchell
Director, Flight Projects
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PAUSING TO REFLECT

GODDARD MEMORIAL DAY EVENT 2017

US Army veteran and resources analyst Maria Romo (Code 429) served in the military for 10 years. Her husband, Felipe Romo, who is a financial manager for Code 423, was on active duty at the same time. This year, in her role as vice-chair of the GSFC Veterans' Advisory Committee (VAC), Maria spearheaded an effort to honor those who have served our country, by placing US flags all around the Goddard 'mall' and pausing for a moment of reflection on the meaning of Memorial Day.

NASA GSFC Memorial Day Event 2017 attendees

Maria says, "It's easy to forget what Memorial Day actually means while you're sitting by the pool and looking ahead at summer vacation—but the day signifies much more than just a three-day weekend.

"Memorial Day is a solemn day of remembrance for everyone who has died serving in the American armed forces. For me it is also about remembering the families that are left behind after the loss of their loved one.

"Your life is the greatest gift you can give your country, and on Memorial Day we honor men and women who have given their lives to defend us."

MARIA ROMO / CODE 429
RESOURCES ANALYST

The Battlefield Cross

The helmet and identification tags signify the fallen soldier, their name never to be forgotten. The inverted rifle with bayonet signal a time for prayer, a break in the action to pay tribute to our friend. The combat boots, worn and dirty, represent the final march of the soldier's last battle.

Group Flags

Moment of Reflection: US Flags on the GSFC Mall

VAC Officers

VAC Officers (left to right: Mark Hubbard, Maria Romo, Army Chaplain Lieutenant Colonel Todd M. Wolf, Senior Champion Ray Rubilotta, Teresa Smith, Eric Holmes)

LAUNCHING TDRS-M

AND CONTINUING THE CRITICAL CONNECTION

Orbiting 22,300 miles above Earth, transmitting more than 98 percent of NASA mission data, is a fleet of ten Tracking and Data Relay Satellites (TDRS). On August 18, 2017, at 8:29 a.m. ET, the TDRS project launched its 13th spacecraft, TDRS-M, to a network that provides critical communication services to NASA missions.

TDRS is the space-based portion of NASA's Space Network, a communications network built and operated by NASA's Goddard Space Flight Center, providing continuous global communications coverage to near-Earth-orbiting spacecraft. The addition of TDRS-M will

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CREDIT: UNITED LAUNCH ALLIANCE

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allow the Space Network to expand its communications support services into the middle of the next decade. By replenishing the fleet, the TDRS team ensures astronauts and spacecraft have continuous connectivity to Earth-based team members.

NASA developed TDRS in the 1970s to improve communications coverage throughout spacecraft orbits and to reduce NASA's dependence on international ground stations for NASA space missions. Prior to the 1980s, the ground-based communications system only allowed spacecraft to connect for minutes during a pass over a ground station. With the launch of TDRS-1 and TDRS-3 and positioning over the Atlantic and Pacific oceans, mission orbit connection times increased to 85 percent. The remaining 15 percent became the "Zone of Exclusion." To provide service to this zone, NASA built the Guam Remote Ground Terminal and relocated a TDRS satellite to provide coverage for spacecraft passing over the Indian Ocean. The TDRS satellites, with the support of White Sands Complex in New Mexico and the Guam Remote Ground Terminal, increased mission orbit coverage to at least 95 percent.

Sunrise behind TDRS-M on launch day.
Credit: United Launch Alliance

Since then, the TDRS project has built and launched two additional generations of satellites to expand the network. The third generation of TDRS is functionally identical to the second generation. They provide new communication services and higher data rates relative to the first generation of TDRS. The most significant difference from the second generation to the third generation of TDRS is the return of multiple-access beamforming capabilities to the ground system, as it was originally architected in the first generation of TDRS. These changes will replenish the Demand Access System (DAS) capability and continue to provide continuous and simultaneous support to all in view users who need access on demand.

The Exploration and Space Communications projects division at Goddard has been working to chase perfection through continuous improvement to the TDRS network for over 40 years. Many on the team, like Marco Toral, have worked on all three generations of the TDRS network satellites. Toral is the telecommunications systems engineering manager for the TDRS project. He has been working on TDRS since 1986, starting with TDRS-3 factory testing and launch. Toral sees the TDRS network as a national asset, one that significantly contributes to NASA's quest for furthering communication services.

Toral says, "TDRS provides a lot of communications services to different users, but it's a combination of the people and being able to identify challenges, find solutions; we never really finish until we satisfy our customers. When you think about it, we were building the new satellites and having the ground station redesigned to provide new services. We're also looking into optical communications for the next generation relay satellites." Toral says future system improvements have to meet an increasing demand for higher data rates by the end user with a system that is always ready to receive and transmit to the user satellites.

The importance of the project to national and international science missions cannot be overstated, according to Dave Littmann, TDRS project manager. "TDRS is a critical connection to the human aspect of our astronauts that are onboard the space station. Anytime someone from NASA or a United States government agency wants to communicate with our astronauts they use TDRS. Data from deep space observations of the Hubble Space Telescope and other science missions are also provided through TDRS for use by engineers, scientists, educators, and many others. Something I find unique about TDRS is the number of different and valuable connections, some perhaps not always fully recognized and understood, that exist across human spaceflight, expendable launch vehicles, and robotic missions for scientific data collection and discovery."

For more information on TDRS-M, check out the latest videos from the Goddard Media Studios:

TDRS – Continuing the Fleet

The TDRS Legacy – An Interview with David Littmann, TDRS Project Manager

KATHERINE SCHAUER, CODE 450
GSFC SUMMER INTERN

DID YOU KNOW...?

The oldest continuous Independence Day celebration in the United States is the 4th of July Parade in Bristol, Rhode Island; it began in 1785.

We want to be in the know! If you have something to share, please send it to Code 400 Diversity and Inclusion Committee, c/o Matthew Ritsko at: matthew.w.ritsko@nasa.gov and we'll include it in a future issue of the Critical Path.

The 232nd Fourth of July parade in Bristol, Rhode Island.
Credit: Kenneth C. Zirkel

NASA'S SEARCH AND RESCUE MISSION MANAGER
Finalist for Prestigious Award

Lisa Mazzuca, NASA's Search and Rescue (SAR) mission manager, has been selected as a finalist for the Samuel J. Heyman Service to America Medal, colloquially referred to as the Oscars of government service.

A committee of government officials, educators, and industry leaders recognized Mazzuca for the new "Promising Innovations" medal based on her life-saving work developing and advancing search-and-rescue systems. These systems help to locate people in distress around the world and show first responders where to rescue them.

"Lisa Mazzuca has been a critical force in improving the search and rescue capability that protects every citizen in our country," said Bob Menrad, chief of the Exploration and Space Communications projects division. "Her passion shows not only at work but also in her personal life where she serves as an auxiliary police officer within her local community. Lisa's leadership in the international forums chartered to ensure worldwide safety through the infusion of the U.S. technology and standards she contributes has been noted by many people and countries. I've had the privilege of being a supervisor within the Federal workforce for several years, and can share without reservation that Lisa is one of the most dedicated and accomplished civil servants I've come across in the U.S. government. Some people ask if government service is worth it – just look at Lisa for the easy answer."

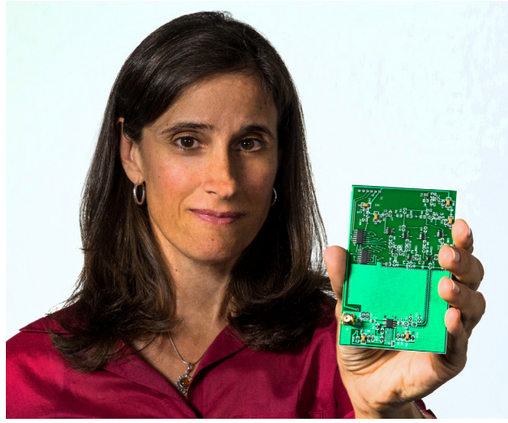
Although Mazzuca's work spans numerous areas, her nomination is primarily based on her contributions to SAR's multi-national efforts and her exemplary leadership in developing and testing next-generation emergency locator beacons. These beacons are critical to boosting SAR's capability to locate those in need of search and rescue as a result of aviation, marine and land-based accidents and mishaps.

In recent years, high-profile airline crashes have dominated news cycles. In 2014, the same year as the disappearance of Malaysian Airlines MH-370, Mazzuca launched a two-year investigation to determine how to improve emergency locator transmitters (ELTs) on aircraft.

"We at NASA recognized that someone had to immediately advance SAR's capabilities, and NASA is uniquely qualified to not only assess performance of these life-saving devices but also apply cutting-edge technology to create a better beacon," Mazzuca said. "So we ended up crashing three planes to better understand beacon functionality during actual distress conditions."

Mazzuca organized and led a team that performed controlled crash tests of real airplanes at NASA's Langley Research Center in Hampton, Virginia, in 2015. These deliberate crashes allowed them to test ELTs in various configurations. Together with their in-depth investigation into historic ELT failures using National Transportation and Safety Board (NTSB) data, this allowed the team to make recommendations for regulatory changes to the Federal Aviation Administration that will improve beacon reliability and system performance. The objective? To ensure that ELTs provide more accurate locations indicating where the plane crashed so that pilots, passengers and crew would be located quickly.

Among the team's recommendations was to replace current transmitter technology in ELTs with second-generation beacons. Under development at NASA's Search and Rescue Mission Office, these cutting-edge beacons have already shown an improvement in pinpointing a location from



about 2 kilometers to 100 meters in testing. This new beacon, coupled with the brand new international SAR space segment, will also provide locations to the rescuers nearly instantaneously anywhere on the surface of the Earth, which is a huge improvement from the nearly 40-year-old system being replaced.

Besides their potential use in airplane crashes, second-generation beacons can be used by amateur hikers, outdoorsmen, boaters, and more. Like first-generation beacons, they will soon be available at virtually any outdoors store at affordable prices. The beacons will also be outfitted on Orion astronaut spacesuits to ensure Mission Control is able keep track of each individual when the capsule splashes down on its return to Earth.

In addition to her NASA role designing innovative solutions, Mazzuca also protects citizens through her role as an auxiliary police flight officer and hoist operator on helicopters in Baltimore, Maryland, and serves as a first mate within their marine police unit. She is SAR-certified, and is a long-time advocate for boating and flight safety.

The Search and Rescue Office is funded by NASA's Human Exploration and Operations Mission Directorate and the Space Communications and Navigation Program Office, both at NASA Headquarters in Washington.

For more information:

- SAMUEL J. HEYMAN SERVICE TO AMERICA MEDALS
- SEARCH AND RESCUE CONTROLLED AIRPLANE CRASH TESTS
- NASA'S SEARCH AND RESCUE OFFICE

ASHLEY HUME, CODE 450
SPACE COMMUNICATIONS AND NAVIGATION

SUMMER FUN
AT CAMP SETEBAID

Jonathan Weiland is a resources analyst assigned to the Laser Communications Relay Demonstration (LCRD) project, Code 450. He has worked at Goddard for almost 3 years and loves his job and the work he does. However every summer, he takes a break from all the e-mails and BOBJ reports at Goddard and spends a week in Bethel, Pennsylvania at Camp Setebaid, a sleep-away summer camp for children with Type 1 diabetes. Jonathan recently shared his experiences with The Critical Path.

Camp counselors Jonathan Weiland, Gabe Shchuka, and Chris Meehan.

I was diagnosed with Type 1 diabetes at age 8. A commonly misunderstood disease, "T1D" as many of us call it, is an autoimmune disease that causes the pancreas to stop producing any insulin, the hormone that a non-diabetic's body secretes any time he or she eats. The result is a disease in which the individual must frequently monitor his blood sugar and administer insulin, either through a vial/syringe or through an insulin pump.

It's a disease that means always having to think "what am I doing? How does this affect my sugar?" It's a constant balancing act … and even if all the rules are followed, the results don't always match.

As a young child, I was one of two diabetics in my school. Many people didn't understand it and countless times I heard "oh, my grandfather had that and had to have his leg cut off." It was jarring, and it made me go home one night and tell my mom "I didn't do anything to get this. I don't want it anymore." My endocrinologist encouraged me to try camp and I quickly liked the idea of it. A place filled with kids just like me, kids who know what it's like to have tiny pinprick dots on their fingertips and bruises on their arms from shots.

That summer, I had the time of my life. I walked in the mess hall to eat breakfast and heard beeping glucose meters and insulin pumps and everyone had to do the same things I had to do. It was normal. I felt normal.

Fifteen summers later, I still go to Camp Setebaid. I return as a counselor and take care of kids who were just like me, fearful, embarrassed, and sick of being misunderstood for a disease that wasn't their fault. We do everything people do at a regular summer camp … we just have to test our blood sugars while we're doing it!

This year, I am one of three directors for the Counselor-In-Training program, where we will be teaching 16- and 17-year-old campers how to become counselors. It is a 2-week grueling program, with one week of learning the ins and outs of camp, child psychology and the mindset of a camper, diabetes education, and nature skills like fire-building, and another week of shadowing staff members and their campers and learning how to be a great counselor.

I went through the same program and feel so much pride in being able to influence a generation of counselors. Camp in general is so important for all children. It teaches countless principles of life skills, leadership, and appreciation for Mother Nature.

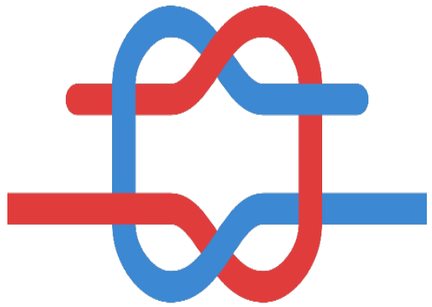
For kids living with a chronic disease like Type 1 diabetes, camp is even more important because it reassures us that no matter how bad it is, no matter how sick I am of doing my insulin pump site, or testing, or being up all night taking care of myself, there's another out there who knows how I feel. I am ecstatic to go to camp this year and continue to spread that message of comradery and positivity, even in the face of something like T1D.

JONATHAN WEILAND, CODE 450
LASER COMMUNICATIONS RELAY
DEMONSTRATION (LCRD) PROJECT

KNOWLEDGE CONTINUITY
AN INDIVIDUAL PERSPECTIVE

Individual Knowledge Continuity: Tools and Techniques for Job Specific Knowledge Transfer

When we conduct Pause and Learn sessions, we are focusing on team experience and team lessons around a particular event or time period. With case studies, we focus on critical institutional lessons that are of value to a wide range of actors within the organization. With knowledge sharing workshops, we disseminate lessons across project teams, breaking down potential silos.



Are we neglecting individual knowledge and job specific knowledge? Regardless of the recent emphasis on the potential knowledge loss related to retirements, how can we ensure smooth changes and reduce the time to proficiency for all employees in new positions, whether the change is the result of a retirement, a job rotation, a promotion, an internal reorganization, or someone leaving the organization altogether. What does it entail from a knowledge transfer perspective? What can and should be documented and how, given various time constraints?

Some options are discussed below, but first and foremost, it's never too early to start knowledge transfer and this can and should be done regardless of an individual's plans. Knowledge sharing workshops, Communities of Practices, and other knowledge sharing mechanisms are all useful for individuals to transfer their knowledge to others within the organization. Ideally, this knowledge transfer is so embedded in daily conversations that it is almost invisible. Mentoring and coaching are also great ways for individuals to transfer their knowledge before they leave the organization.

.

On top of that, a number of approaches can be deployed to facilitate knowledge continuity between specific individuals (outgoing and incoming staff):

- **Shadowing:** Ideally, the outgoing and incoming staff have some time to talk face-to-face. This is enhanced further when the incoming staff is able to shadow his/her predecessor for some time.

- **Interviews to document core knowledge:** It helps if a knowledge audit has already been done at the organizational level and there is a clear sense of what core knowledge and competencies are associated with the position and need to be more thoroughly documented.

- **Video (screencast) by the outgoing staff to his/her successor:** This is probably not for everyone but it can be very effective as an alternative when face-to-face meetings between the outgoing and incoming staff are not possible. The support staff for the Goddard Chief Knowledge Officer has seen relatively high turnover in the past 8 years. A key responsibility of the support staff was to coordinate the highly successful Road to Mission Success workshop series. While the tasks involved were not complex in themselves, the sequence of tasks and level of attention to details required was quite demanding. To facilitate the work of her successor(s), one coordinator took it upon herself to create short videos (screencasts) explaining the details of the tasks involved while pointing to the related files in the shared drive. These videos are, however, not easy to update, and therefore became "dated" rather quickly.

- **Documenting Personal, Job-specific Lessons Learned:** You don't need to share your professional journal with your successor but you might be able to use it to extract key insights or lessons to discuss with your successor if you're able to meet with him/her or to share a short personal note with them. For example, I was once asked by another NASA center for insights into how to organize successful knowledge sharing workshops. The resulting concept map representing key lessons learned based on personal experience implementing such workshops over 8 years is now a document that can be used (and soon updated) by my successor.

- **Handoff Documents:** Three options (for written documentation) which entail different levels of effort are presented below: Handover notes, Work Instructions, and Knowledge Books.

  Outgoing staff should document their processes and implement good document management practices: Do you want to leave your successor a mess of files in a shared drive or a well-organized archive of your products, templates, and processes? There is no reason to wait to do this. It should ideally be done regardless of whether a job change is in the near future or not.

  - **Handover note:** Key responsibilities, supervisor and reporting procedures, points of contact; key documents/reference materials; status of recent and current projects and activities; where to find files; calendar of major activities/events.

    Organizations where staff turnover is part of the normal routine (State Department assignments, for example) have an inherent rationale for institutionalizing the handover process and using standardized handover notes. Handover notes are factual rather than analytical and succinct (not more than 3 to 4 pages)

  - **Work Instructions:** This is what I do, this is how I do it and this is why (context). A work instruction is a tool provided to help someone to do a job correctly. It helps to ensure a certain standard of quality and consistency in the implementation of a specific task. Work instructions can apply to tasks handled by many different individuals within the organization, ensuring that everyone doing this task follows the same process. A work instruction can also be extremely useful when a single person is responsible for a specific task and therefore no one else knows how it's done. In such cases, having that process documented is critical should the person leave.

  - **Knowledge Book:** A knowledge book is typically developed based on the expertise of several experts rather than an individual but the impending departure of a key expert could lead to the fast-tracking of the activity. Knowledge books represent in-depth information and expertise on particular fields of knowledge that are gathered over a period of months through interviews,

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conversations, and the integration of relevant documents). They represent a significant investment in time and resources and are therefore focused on core knowledge that is of high value to the organization.

The general intent of these change activities and handoff documents is to ease the change and shorten the time it takes for the incoming staff to be fully productive (minimize time to competency). The most appropriate method used will depend on a number of factors, the most critical of which may be time and whether the outgoing and incoming staff will have the ability to spend time together. The table below presents and overview of the alternatives.

TIME/PROCESS AND DOCUMENTATION	HANDOVER NOTE	WORK INSTRUCTIONS	KNOWLEDGE BOOK
No overlap/no meeting	Minimal effort, better than nothing	Could be sufficient for some jobs, when accompanied by a short handover note.	Primary mode of transfer is extensive written documentation, which can become tedious to read without context or discussion.
Short overlap/some meetings	Basic introductions to contacts, some conversations.	Ability to discuss some of the details of how the job is actually done.	Decide how to best use the overlap time available to engage with the documented knowledge.
Planned change	Waste of an opportunity. You need to do more than a handover note.	There is definitely time for work instructions to be developed and discussed. No excuse for not doing it.	Ideal situation that is not going to happen often; can't be the standard process.

There is no excuse for not writing a short handover note. In many cases, there is time (because it's never too early to start writing work instructions) to discuss work instructions and how the work is actually done. On the other hand, most positions will not require a knowledge book.

RESOURCES

Nancy Dixon, "Leveraging Collective Knowledge: NASA's Constellation Program," blog post, Conversation Matters, July 5, 2010.

APQC, Transferring and Applying Critical Knowledge, A Best Practice Report, 2013.

BARBARA FILLIP, CODE 400
OUTGOING FPD KNOWLEDGE MANAGEMENT LEAD

REMEMBERING HILDA THIEN

Throughout her career Hilda was recognized for her valuable support and earned several awards from NASA and the Department of Defense, a career that spanned more than 35 years of service.

The Goddard Space Flight Center and the Flight Projects Directorate lost a valuable member of our team and family when Hilda Thien passed away on June 12, 2017. Hilda is remembered as a genuine, caring, and thoughtful person. She never hesitated in extending a helping hand, lending an ear, or sharing her joy and humor with those around her. She spent the majority of her days at Goddard as a project support manager for the Hubble Space Telescope mission, a position that she accepted in 1996. In that role, she touched many people throughout the Center, including those in logistics, quality assurance, resources, workforce, IT support, and procurement.

Hilda grew up in Maryland and attended Frostburg State University where she received an undergraduate degree in business management. While a student, she started working for the federal government during summers and school breaks at the Government Printing Office in Washington, DC. She later achieved a graduate degree from the University of Maryland University College in science management.

She began her career at NASA in 1990 after completing a 3-year quality assurance internship at Letterkenny Army Depot in Chambersburg, Pennsylvania. She joined the logistics team to provide quality assurance support of operations, receiving all responsibilities for quality assurance policies and procedures.

With that knowledge and experience, Hilda moved over to Hubble as a project support specialist on the hardware team during the inception of the second servicing mission. She was responsible for documentation, property, configuration management, and transportation of space flight hardware, as well as installation of accelerators to determine elements of shock and vibration.

Hilda moved over to the operations side of Hubble 3 years later as the project support manager while supporting the Hubble Space Orbital Servicing Test (HOST) mission. HOST validated components planned for installation during the upcoming Hubble Space Telescope third servicing mission and evaluated new technologies in an Earth-orbiting environment.

Hilda's expertise was sought among other missions as well and she found herself split between Hubble and other duties throughout her career. She supported the Compton Gamma Ray Observatory mission and also served on Source Evaluation Boards for the Geostationary Operational Environmental Satellite weather program.

Throughout her career Hilda was recognized for her valuable support and earned several awards from NASA and the Department of Defense, a career that spanned more than 35 years of service.

Never forgotten and forever missed. Rest in peace Hilda.

JAMES JELETIC / CODE 441
HST OPERATIONS DEPUTY PROJECT MANAGER

GETTING TO KNOW THE FACES OF 400

CANDACE CARLISLE

BORN:

Louisville, KY

EDUCATION:

BS, Computer Science and Physics
College of William and Mary, Williamsburg, VA

MS, Computer Science
Johns Hopkins University, Baltimore, MD

MS, Technical Management
Johns Hopkins University, Baltimore, MD

LIFE BEFORE GODDARD:

Candace has been interested in space and science fiction since childhood, watching moonwalks on TV, collecting Apollo-Soyuz stories from the newspaper, and reading, "A Sound of Thunder," in her fifth grade science class. At first, she wanted to be an astronaut until she realized that she couldn't tolerate rollercoasters, much less a rocket launch. She was the only girl in her high school to take the Nuclear Science class and the only girl in the University of Pennsylvania's summer physics internship program. She launched right into her passion, starting her career with NASA Goddard immediately after college graduation. It is here where she met her husband, where her children attended pre-school and Kindergarten, and where she met many of her close friends.

LIFE AT GODDARD:

Candace began her career in the Mission Operations and Data Systems Directorate. She started as a FORTRAN and C software developer and team lead, and transitioned into system engineering for the Network Control Center (part of the Tracking and Data Relay Satellite System). She spent 6 years on the Earth Science Data and Information System (ESDIS) project in various systems engineering roles, finishing up as system

> **"I learned from ST5, which had a number of re-plans, that the key to success is always having demonstrable progress. Even with re-plans and things changing around you, showing clear progress towards something, whether design or implementation, is the key to project success.**
>
> **-Candace Carlisle**

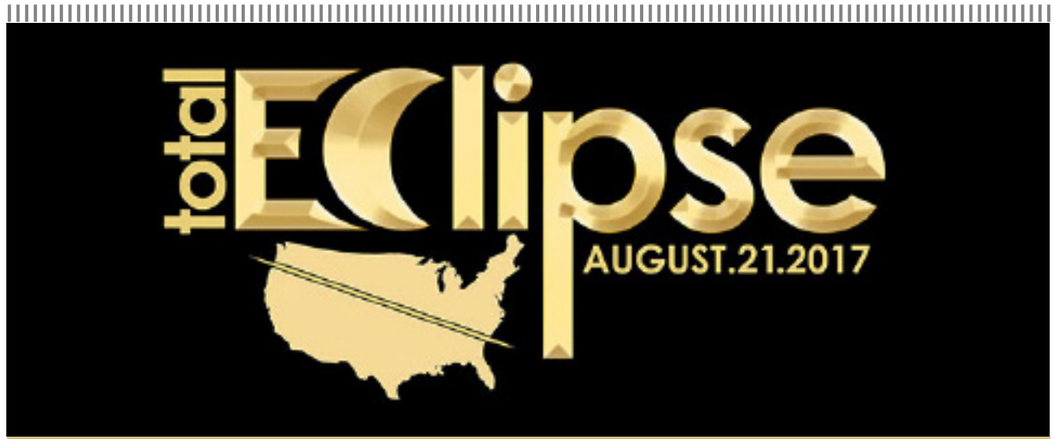
CANDACE CARLISLE

manager. On Space Technology 5 (ST5), she served as mission systems engineer, and transitioned to deputy project manager/ project technologist, staying with the project through its 90-day mission and decommissioning. She was the Global Precipitation Measurement (GPM) deputy project manager from its formulation phase through its successful handover to mission operations. Currently, she serves as the project manager for the Total and Spectral solar Irradiance Sensor (TSIS) at Goddard, with overall responsibility for TSIS-1 on the International Space Station and the TSIS-2 Mission of Opportunity.

During her tenure with TSIS-1, Candace has had to overcome many challenges. Through fiscal year 2015, TSIS funding originated from the National Oceanic and Atmospheric Administration (NOAA) with project management completed by NASA. There were severe budget challenges, but the TSIS team was able to continue making progress even with such limited resources. At the start of the 2016 fiscal year, all responsibility including funding transferred to NASA, and the project successfully passed the NASA Key Decision Point (KDP)-C that year, and successfully secured the budget and schedule reserve to support the project through launch and its 5-year operation. Candace commends her excellent team as they overcome the many challenges and remain on target for launch significantly ahead of the level 1 requirement. TSIS-1 is expected to launch this November aboard SpaceX 13.

LIFE OUTSIDE OF GODDARD:

Candace is a bicyclist, kayaker, second soprano, and mother of two young adults. She is one of the organizers of a local women's cycling group, DIVA Cycling (https://www.meetup.com/DIVA-Cycling). Her husband, Steve Tompkins, is also an engineer at Goddard. ▲



Where were you for the Solar Eclipse 2017?

Q. Did you get some great images of the eclipse or of your co-workers wearing their **CRAZY GLASSES?**

The Critical Path is asking readers to **share their Eclipse stories, pictures, and thoughts**. Please send to Paula Wood at Paula.l.Wood@nasa.gov before November 1, 2017 and we'll include them in our next issue.

April 1, 2017 through June 30, 2017

GOINGS

BRUCE E. THOMAN (from 453) - Retired from 453/ Near Earth Network (NEN) project, Ground Systems Mission

DOROTHY CATES (from 405) – Resigned from 405/Resource Analysis Office (RAO), Operations Research

REASSIGNMENTS, REALIGNMENTS & DETAILS WITHIN CODE 400

ROBERT W. JENKENS (from 433) to 434/Lucy project, observatory manager

SRIDHAR S. MANTHRIPRAGADA (from 495) to 490.1/MOMA-Mass Spectrometer (ExoMars mission) (MOMA-MS) instrument project manager

ALBERT G. VERNACCHIO (from 448) to 401/Advanced Concepts & Formulation Office (ACFO), supervisory-deputy program manager

MATTHEW J. STRUBE (from 429) to 483/Restore-L project, instrument manager

CHRISTINA L. RAMSEY (from 450.1) to 458/Space Network Ground Segment Sustainment (SGSS) project, resources analyst

TODD T. KING (from 490.1) to 450.2/ Laser-Enhanced Mission Navigation and Operations Services (LEMNOS) supervisory-project manager

ANTONIOS A. SEAS (from 401) to 450.2/Tropospheric Emissions: Monitoring of Pollution (TEMPO), LEMNOS deputy project manager

BRIAN CHRISTOPHER THOMAS (from 480) to 429/Landsat 9, Flight Projects Development Program (FPDP)-2, administrative manager

KEVIN N. MILLER (from 401) to 480/Satellite Servicing Projects Division (SSPD), deputy project manager/resources

TYNIKA N. RAWLINGS (from 458) to 450.2/LEMNOS, financial management specialist

ARTHUR D. JACQUES (from 460) to 490/Instrument Projects Division, instrument project manager

JOAN M. RODRIGUEZ RIVERA (from 490) to 417/GOES-R, resources analyst

JULIE A. CROOKE (from 101) to 401/AFCO, study manager

OBADIAH KEGEGE (from 497) to 453/NEN project, FPDP-2, AST, technical engineer operations management

REASSIGNMENTS, REALIGNMENTS & DETAILS WITHIN CODE 400

JAMES R. MORRISSEY from 444) to 401/AFCO, instrument capture project manager

PAULA L. WOOD (from 460) to 460/Explorers & Heliophysics Projects Division, project support specialist

REORGANIZATIONS WITHIN CODE 400

RENAME – 401/Advanced Concepts & Formulation Office (ACFO) to Project Formulation & Development Office (PFDO) (pending)

INACTIVATE – 433/Origins, Spectral Interpretation, Resource Identification, and Security-Regolith Explorer (OSIRIS-Rex) (pending)

ESTABLISH – 434/LUCY project (pending)

RENAME – 492/Fast Plasma Instrument (FPI) instrument project to the High Resolution Mid-Infrared Spectrometer (HIRMES) instrument project (pending)

INACTIVATE – 494/OSIRIS REx Visible and near-IR Spectrometer (OVIRS) instrument project (pending)

ESTABLISH – 499/Lucy Ralph (L'Ralph) instrument project (pending)

RENAME – 456/Space Network Expansion (SNE) to Laser-Enhanced Mission Navigation and Operations Services (LEMNOS) project (pending)

RENAME – 461/Magnetospheric Multiscale (MMS) project office to X-ray Astronomy Recovery Mission (XARM) project (pending)

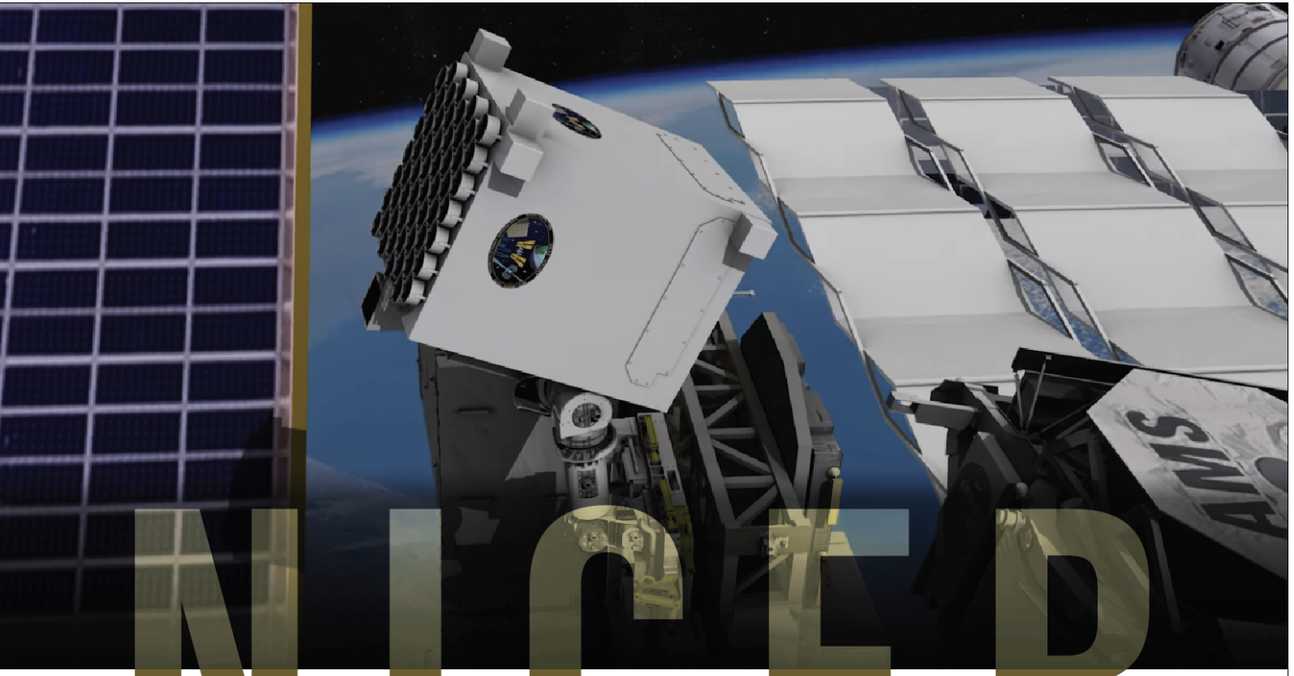
RENAME – 490.2/Soft X-Ray Spectrometer (SXS) instrument project to Resolve instrument project (pending)

LISA HOFFMANN, CODE 400
ADMINISTRATIVE OFFICER

OUT & ABOUT

LIFE'S HIGHLIGHTS OFF CAMPUS

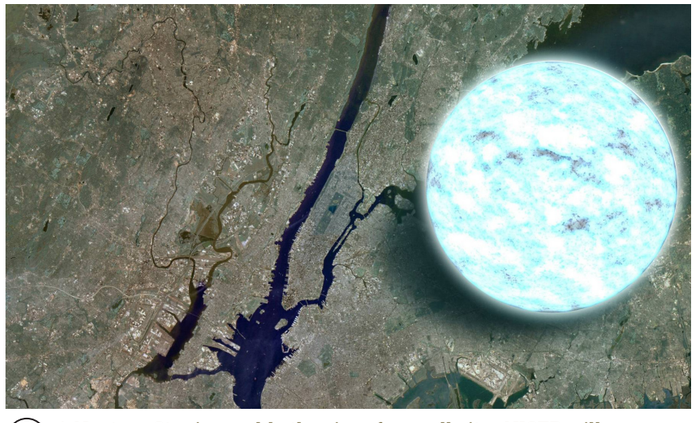
Congratulations to Shana Faris (Code 210S/460) on the birth of her daughter, Logan, born on July 8. Logan weighed 8 lbs, 6 oz.



NICER

INVESTIGATING THE DENSEST KNOWN OBJECTS IN THE UNIVERSE

"How big is a neutron star?" is one of many long-standing astrophysics questions about the ultra-dense, fast-spinning, powerfully magnetic objects commonly observed as pulsars. The Neutron star Interior Composition Explorer (NICER) mission will reveal some of the extraordinary physics at work in and around neutron stars, confronting theoretical predictions with unique X-ray measurements of these stellar corpses. In particular, NICER will probe the nature of the densest stable form of matter, deep in the cores of neutron stars, by measuring the sizes of a handful of neutron stars.



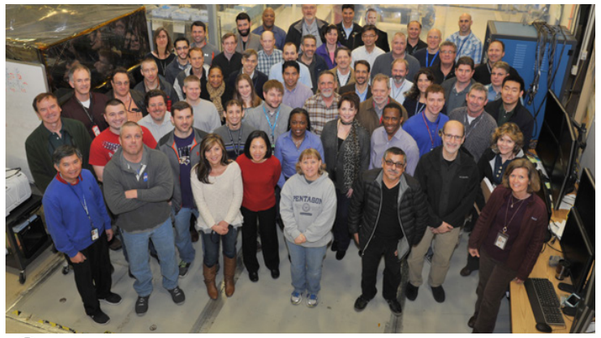
A Neutron Star is roughly the size of a small city. NICER will measure the radius of a neutron star to better than 5% precision.

NICER is the first mission designed specifically for the study of neutron stars, with simultaneous fast timing—some pulsars flicker and flash hundreds of times each second—spectroscopy, and sensitivity to faint X-ray emissions.

In addition to its principal science goals, NICER will enable the first demonstration of spacecraft navigation using pulsars as beacons, through the Station Explorer for X-ray Timing and Navigation Technology (SEXTANT) enhancement to the mission, which is funded by the the NASA Space Technology Mission Directorate's Game-Changing Development program.

GSFC is the lead institution on the NICER project, with responsibilities including the principal investigator (Dr. Keith Gendreau, Code 662) and science leadership, project management (Sridhar Manthripragada, Code 490, is Project Manager), systems engineering, safety and mission assurance, development of the mechanical, thermal, optical, pointing, and flight software systems, integration and test, and the Science and Mission Operations Center (SMOC).

A Neutron Star is roughly the size of a small city. NICER will measure the radius of a neutron star to better than 5% precision.

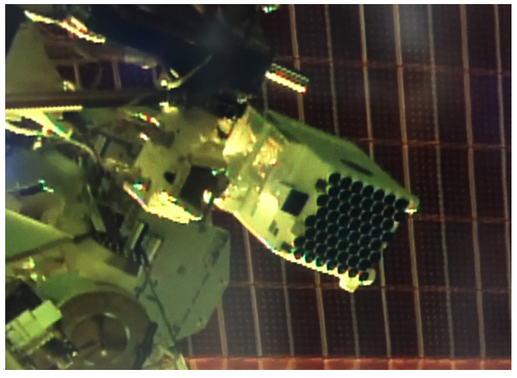


Core NICER Development Team at GSFC

GSFC's hardware-development partners include the Massachusetts Institute of Technology (MIT), the Technical University of Denmark (DTU), and Moog, Inc. Additional science team members are based at the Naval Research Laboratory and universities across the USA, together with McGill University in Canada.

NICER was selected in 2013 by NASA's Science Mission Directorate as an Astrophysics Explorer Mission of Opportunity. An external attached payload on the International Space Station (ISS), NICER was launched on June 3, 2017, aboard the eleventh SpaceX Commercial Resupply Services (CRS-11) flight. Ten days later, the payload was robotically installed on one of Station's zenith-side Express Logistics Carrier (ELC) platforms. Following launch-lock release, NICER deployed on June 16 and began a month of commissioning and early calibration activities.

SpaceX-11 Launch from Cape Canaveral, Florida on June 3, 2017



NICER successfully attached on ISS ELC2 and deployed

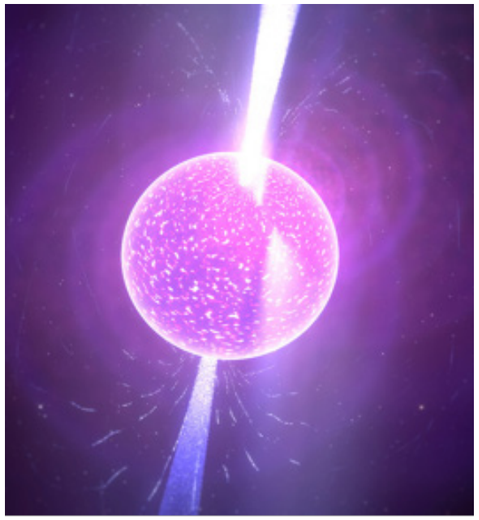
CONTINUED ON PAGE 24

CONTINUED FROM PAGE 23

NICER SCIENCE OBJECTIVES

UNCOVERING THE NATURE AND BEHAVIOR OF NEUTRON STARS

Neutron stars embody extreme conditions impossible to replicate in a laboratory. They crush up to twice the mass of our Sun into a city-size volume; they are the most powerful magnets known, with magnetic fields trillions of times stronger than Earth's; and they are the most rapidly rotating known stars, with the fastest spinners revolving more than 700 times each second.



Artist's concept of pulsar (rapidly rotating neutron star emitting X-rays)

NICER provides high-precision measurements of the structure, dynamics, and energetics of neutron stars through observations in "soft" X-rays (photon energies between 0.2 and 12 keV), the part of the electromagnetic spectrum in which these stars radiate both from their million-degree solid surfaces and from their strong magnetic fields. NICER seeks to:

- Make mass and radius determinations by measuring fast X-ray brightness variations with unprecedented precision. NICER's results will discriminate among dozens of proposed "equation of state" theoretical models, constraining a basic unknown of nuclear physics, the so-called nuclear symmetry energy at high densities.
- Discover periodic pulsations and other brightness oscillations in both steady and transient neutron star systems.
- Explore the maximum spin rate of neutron stars, and establish the long-term (months to years) spin stability of millisecond-period pulsars, nature's best clocks.
- Characterize outbursts and spin variations from dynamic phenomena associated with neutron stars, such as thermonuclear explosions on their surfaces and spin "glitches" arising from their superfluid interiors.
- Define the physical properties (mechanical, thermal) of the solid crusts of neutron stars, by measuring temperatures and detecting natural vibration frequencies in star-quakes.
- Determine X-ray radiation patterns and spectra, especially in relation to emissions in other wavelength bands such as radio and gamma-ray, to test models of radiation in ultra-strong magnetic and gravitational fields.

NICER MISSION OVERVIEW

ASTROPHYSICS ON THE ISS

The ISS offers established infrastructure for transportation, power, and communication for the NICER payload. The stable platform and generous resources simplified NICER's design, reducing cost and risk. NICER is compatible with the ISS vibration, contamination, and radiation environments.

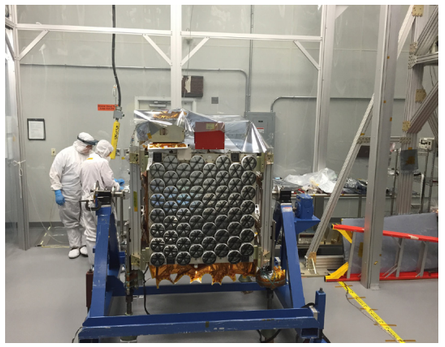
Over its 18-month baseline mission, NICER will achieve its science objectives by collecting X-ray light from neutron stars distributed across the sky. Typically, NICER will observe between two and four targets during each 91-minute ISS orbit. In addition to a reusable deploy/stow capability (which will be used, for example, when astronauts perform spacewalks nearby), the payload's pointing system supports the X-ray Timing Instrument (XTI) with a pair of gimbaled actuators in an elevation-over-azimuth configuration. With feedback from a star-tracker camera, pointing-control flight software directs the XTI toward celestial targets with arcminute-level pointing precision, consistent with the requirements of NICER's optical system.

NICER SCIENCE INSTRUMENT

56 OPTICS AND DETECTORS

The XTI consists of an array of 56 X-ray "concentrator" optics and matching detectors, which record the detection times and energies of individual X-ray photons. NICER's optics represent an innovative, simplified configuration of grazing-incidence aluminum-foil optics developed at GSFC and flown on multiple past missions, optimized for NICER's neutron star targets. Silicon drift detectors (SDDs) procured from Amptek, Inc., and integrated with a readout system developed by MIT, provide an unprecedented combination of good energy resolution and fast timing, simultaneously. The highly modular system of parallel optic-detector pairs provides not only risk mitigation through redundancy, but also a novel capability to observe very bright X-ray sources without problems related to overwhelming detectors in other instruments.

The payload uses an on-board GPS receiver, with GSFC Navigator heritage, to register the precise times and positions of photon detections. This offers the important capability of relating the arrival times of the mission's first and last detected photons, across years, to a fraction of a microsecond.



SEXTANT TECHNOLOGY DEMONSTRATION

REAL-TIME, AUTONOMOUS NAVIGATION IN THE SOLAR-SYSTEM AND BEYOND

Since soon after the discovery of pulsars in 1967, it was realized that a system of highly accurate clocks distributed across the galaxy could serve as a navigational aid for spacecraft far from Earth. The concept was even used on the famous Pioneer Plaques and Voyager Records to communicate the location of our solar system to any extraterrestrial civilization that might eventually come across those planetary explorers. Pulsar-based navigation has been studied extensively on paper and in computer simulations, but never yet demonstrated in space. NICER's scientific focus on pulsars presents a unique opportunity, one that is being exploited by SEXTANT, the flight software and ground support effort to validate the technology for real-time, autonomous orbit determination. Future deep-space applications of X-ray pulsar-based navigation will build on SEXTANT's demonstration of this capability in the dynamic ISS environment, the discovery and characterization of new pulsar beacons suitable for navigation, and its "stretch" goal of establishing a pulsar-based timescale for clock synchronization across the solar system.

ZAVEN ARZOUMANIAN. CODE 662
NICER DEPUTY PRINCIPAL INVESTIGATOR

EYE ON THE UNIVERSE

Observing the departure from Goddard of the JWST OTIS (see the related story on page 28), Pat Durning, wife of JWST deputy project manager John Durning, wrote a poem for the entire JWST team. However, since the ideas she describes apply to so many other NASA and Goddard teams, she has agreed to share it with our readers. She writes, "As a family member of a member of the team, I have witnessed this project from the sidelines and was inspired to try to put into words how awesome you all are. This is written for everyday humans that come together to do exceptional things. After a day's work, they go home to the tasks and joys of family and friends – and also the usual hassles of daily life. But when they come together, exceptional things – science that can change how humanity views itself – are born! Those of us (family and friends) who witness this project ***notice***. We notice and applaud you for your collective efforts towards the greater good."

Cold.

Silent.

Alone in the Dark

Our Hope of Discovery

Our Fear of Not-Knowing

*

Calculated, slow assembly

One piece rests upon another

by the Group that Builds:

- while paying the mortgage
- taking the kid to school
- caring for a dying parent
- living, loving

One moment rests upon the past (over, over again)

Dusk till gracious Dawn

Work for the Eternal Glimpse goes on

*

Test aNd TWist
PUSH aNd PULL

For the Unknown Journey, ahead

While safe in the gravity

Of our planet's earthen beds

*

A Collective of insights:

- minds for science
- Builders
- Movers
- Testers
- those that oversee

Grouped together for a moment in time to

Test aNd Twist, PUSH aNd PULL

*

Cold silence

Sailing alone in the dark

Further away gliding

Until commanded to Stop.

*

Galaxies are perceived

Un-knowing becomes clear

Cold, silent space

Our Eternal Eye rests here

Our Hope of Discovery

Our Fear of not knowing

Pat Durning

NASA'S JAMES WEBB SPACE TELESCOPE

MOVES FROM GODDARD TO COMPLETE CRYOGENIC TESTING AT NASA'S JOHNSON SPACE CENTER

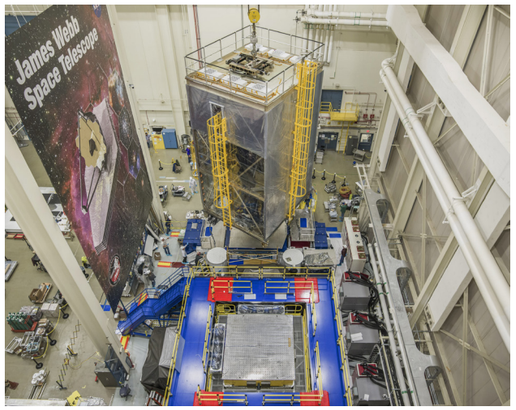
NASA's James Webb Space Telescope has had a busy past few months, undergoing a series of rigorous tests. From earsplitting roars and vibrations meant to simulate the stresses of launch, to frigid temperatures and an airless environment to simulate space, the Webb telescope has undergone a battery of tests in preparation for its anticipated journey to the second Lagrange point (L2) in late 2018.

VIBRATION AND ACOUSTIC TESTING AT GODDARD

The Webb telescope's combined Optical Telescope Element (OTE) and Integrated Science Instrument Module (ISIM), called OTIS, began its gauntlet of tests in December 2016 by being vigorously shaken atop massive, custom-built shaker tables in Building 29 at GSFC. These tests helped ensure the spacecraft and its instruments were fit to withstand the vibrations they will experience during launch. The testing measured the telescope's response to three different axes of vibration.

A slight hiccup during this testing, caused by "gapping," or extremely small motions, in one primary mirror wing launch restraint mechanism led this testing to be postponed about two months. The launch restraint mechanisms are designed keep the telescope's mirror wings folded up for launch. The team at Goddard completed the vibration testing on February 17.

"We have learned valuable lessons that will be applied to the final pre-launch tests of Webb at the observatory level once it is fully assembled in 2018," Lee Feinberg, an engineer and the Webb optical telescope element manager at Goddard, said at the time. "Fortunately, by learning these lessons early, we've been able to add diagnostic tests that let us show how the ground vibration test itself is more severe than the launch vibration environment in a way that can give us confidence that the launch itself will be fully successful."



NASA engineers and technicians perform vibration testing on the James Webb Space Telescope. Credit: NASA/Chris Gunn

Following the vibration testing, the Webb team moved the telescope into Goddard's acoustic test chamber, where it was subjected to the noise and resulting vibration of launch. Inside the chamber, giant air horns use an alternating flow of nitrogen gas to produce a sound level as high as 150 decibels. This is about the same decibel level as the horns found on some large tractor trailer trucks. Goddard's industrial-sized air horns work much the same as their commercial-sized counterparts, commonly used at sports games and other social events. "Imagine [air horns] with horns many feet long and several feet in diameter, powered by a facility supply of pressurized nitrogen gas, and you get the idea," explained Paul Geithner, deputy project manager/technical for the Webb telescope.

This acoustic test completed successfully, without issue. With the rigorous tests completed, optical engineers used an interferometer to measure the shape of Webb's mirrors to ensure they remained undamaged.

A JOURNEY HALFWAY ACROSS THE COUNTRY

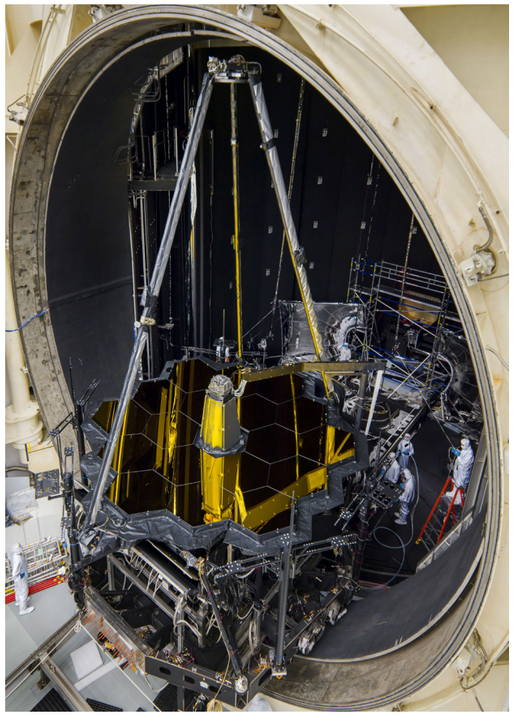
Goddard bid adieu to the telescope in May, when the Webb team very carefully packaged it into a specially-made shipping container and loaded it onto a tractor trailer truck. They then drove the telescope to Joint Base Andrews, where the entire truck was loaded into a U.S. Air Force C-5 aircraft.

The Webb telescope experienced its first "liftoff" when the military cargo plane took off from Joint Base Andrews on May 4 and flew about 1,200 miles to Ellington Field Joint Reserve Base in Houston. Once the giant plane landed, the truck carrying the telescope drove to its next destination, NASA's Johnson Space Center (JSC) in Houston. At JSC, Webb was carefully unloaded into a cleanroom.

CRYOGENIC TESTING AT JOHNSON SPACE CENTER

It took several weeks to unpack, deploy, and instrument the telescope before it could be moved into the Center's historic Chamber A, an immense thermal-vacuum testing chamber that will test how the telescope performs in an airless, frigid environment akin to space.

On June 20, engineers at JSC used a set of rails to slide the telescope into the chamber. From within the chamber, they continued to prepare Webb for cryogenic testing. This included suspending the telescope very slightly from the ceiling of the chamber by using six steel suspension rods, each 60 feet (18.2 meters) long and only about 1.5 inches (38.1 mm) in diameter, to insulate it from the effects of vibrations that could occur during testing. These rods, string-like considering the size of the chamber and of Webb, are attached to the platform on which the telescope is sitting and suspend it like a marionette held by an unseen puppeteer.



Crossing chamber A threshold. Credit: NASA/Chris Gunn.

On July 10, engineers at JSC closed the vault-like, 40-foot diameter, 40-ton door of Chamber A. On July 13, they began the pumpdown of the chamber, where the air is removed from it to create a vacuum. It takes a few days to pull the roughly 11,000 cubic meters of air (amounting to more than 14 metric tons of mass) from the chamber. "Once vacuum is reached … the gas remaining in the chamber weighs only about 2 grams, which is about how much one or two paperclips weigh!" said Geithner. Though most of the air was

CONTINUED ON PAGE 30

CONTINUED FROM PAGE 29

Chamber A door closing. Credit: NASA/Chris Gunn

removed during the first few hours of pumpdown, it takes a longer period of time to get to the level of vacuum required for testing, Geithner explained. "Evacuating the chamber is certainly not at all linear!" he added.

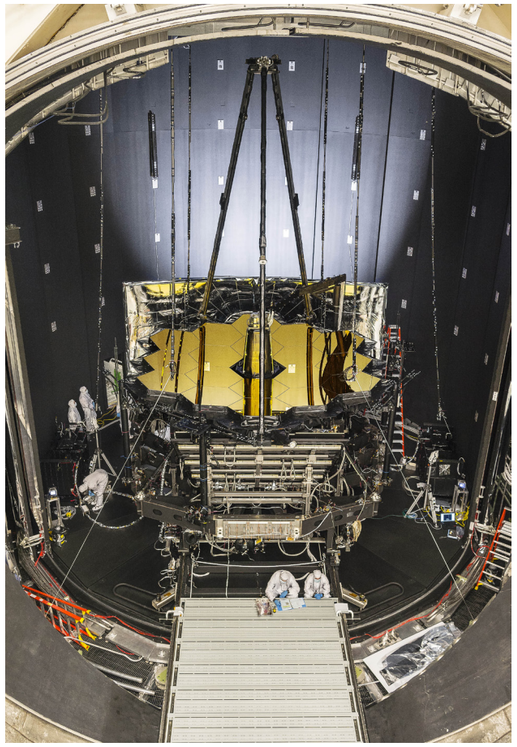
Once the air is removed, it will take about one month to lower the temperatures of the telescope and its scientific instruments to the levels required for testing. Webb's telescope and scientific instruments (cameras and spectrometers) operate at temperatures of around 37 Kelvin, which is around minus 393 Fahrenheit (minus 236 Celsius).

Chamber A previously had only a liquid nitrogen shroud inside, and because liquid nitrogen is 77 Kelvin (minus 321 degrees Fahrenheit/minus 196 Celsius), engineers could not get test articles within the chamber any colder than that. Because of this, Chamber A was upgraded with a cold gaseous helium shroud, which enables the chamber to reach colder temperatures than it has ever reached before.
In a vacuum, an object most often loses heat by radiating it to something colder than itself. Webb telescope will cool as its heat radiates to the shrouds that surround it. "The shrouds are thin, metal shells with plumbing criss-crossing their surface, through which the cryogens (liquid nitrogen or chilled gaseous helium) flow," said Geithner. "Thus, the telescope is surrounded by cold from every angle, and as it loses heat to these cold shrouds, it gets cold too."

Geithner described these layered shrouds as being "nested, 'Russian doll style,' inside the chamber." Within the chamber sits the liquid nitrogen shroud, within that shroud sits the cold gaseous helium shroud, and within the helium shroud sits the smallest nesting doll, the Webb telescope.

Cryogenic testing will last for about 100 days. Though the Webb telescope will be enveloped in darkness during that time, the engineers testing the telescope will be far from blind. "There are many thermal sensors that monitor temperatures of the telescope and the support equipment," said Gary Matthews, an integration and test engineer at Goddard, who is testing the Webb telescope while it is at JSC. "Specialized camera systems track the physical position of the hardware inside the chamber, monitoring how Webb moves as it gets colder."

In space, the telescope must be kept extremely cold to be able to detect the infrared light from very faint, distant objects. To protect the telescope from external sources of light and heat (like the Sun, Earth, and Moon), as well as from heat emitted by the observatory, a five-layer, tennis court-sized sunshield acts like a parasol that provides shade. The sunshield separates the observatory into a warm, Sun-facing side (reaching temperatures close to 185 degrees Fahrenheit/85 degrees Celsius) and a cold side (minus 400 degrees Fahrenheit/minus 240 degrees Celsius). The sunshield blocks sunlight from interfering with the sensitive telescope instruments.



NASA's James Webb Space Telescope sits inside Chamber A. Credit: NASA/Chris Gunn

COMPLETING THE CROSS-COUNTRY JOURNEY

In fall of 2017, after the Webb telescope's OTIS module thaws from its cryogenic state, it will be shipped to Northrop Grumman in Redondo Beach, California, to meet up with the spacecraft element and finally become one, complete James Webb Space Telescope observatory. The telescope's spacecraft element is composed of the spacecraft bus and the sunshield.

Once fully assembled, the observatory will undergo more testing before its launch in late 2018.

The James Webb Space Telescope is the scientific successor to NASA's Hubble Space Telescope. It will be the most powerful space telescope ever built. Webb is an international project led by NASA with its partners, the European Space Agency (ESA) and the Canadian Space Agency (CSA).

To learn more about the Webb telescope, visit: www.jwst.nasa.gov or www.nasa.gov/webb

ERIC VILLARD / 443,
JWST SCIENCE WRITER

2016 ROBERT H. GODDARD

AWARD RECIPIENTS

The Robert H. Goddard Awards ceremony was held on Thursday, May 4, 2017, and recognized exceptional achievement in the following areas. Below are the recipients from Code 400

EXCEPTIONAL ACHIEVEMENT AWARD FOR:

CUSTOMER SERVICE (INDIVIDUAL AND TEAM RECOGNITION)

PAMELA CARRICK is deserving of the Customer Service Award for her sustained and superior service to her Landsat 9 customer

THERMAL VACUUM OPERATIONS TEAM For more than six years of innovative collaboration to exceed customers' objectives for successful mission-critical thermal vacuum testing for JWST.

ENGINEERING (INDIVIDUAL AND TEAM RECOGNITION)

BRIAN COMBER For exceptional thermal engineering support of JWST cryogenic thermal-vacuum tests.

CHARLIE ATKINSON - For your outstanding engineering expertise and dedication demonstrated for the design, build and testing of JWST's Optical Telescope Element.

ENGINEERING (INDIVIDUAL AND TEAM RECOGNITION CONTINUED)

DAVID MCCORMICK - For achieving record-breaking quantities of high-accuracy satellite ranging data resulting in NASA's most precise remote sensing Earth science ever.

DENNIS SKELTON - For more than fifteen years of expert-level stray light analysis in support of the James Webb Space Telescope Program.

NANCY LINTON - For your sustained excellence in providing systems engineering support to the Near Earth Network (NEN) resulting in increased communications capabilities for NASA missions.

WILLIAM WHITMAN - For dedication to the JWST ground segment team as it prepares for JWST operations.

BLAIR RUSSELL - For your excellent mechanical engineering support to the OSIRIS-REx mission.

OVIRS INSTRUMENT TEAM - In recognition of your engineering expertise, resilience in the face of adversity, and remarkable dedication in the design and development of the OVIRS instrument.

ENGINEERING (INDIVIDUAL AND TEAM RECOGNITION CONTINUED)

OSIRIS-REX CAMERA SUITE (OCAMS) DEVELOPMENT TEAM - In recognition of engineering ingenuity/ expertise and tireless dedication toward the development of the OSIRIS-REx Camera Suite.

OSIRIS-REX THERMAL EMISSION SPECTROMETER (OTES) DEVELOPMENT TEAM - In recognition of unparalleled engineering ingenuity/expertise and tireless dedication toward the development of the OSIRIS-REx Thermal Emission Spectrometer (OTES).

ATLAS Q-SWITCH ANOMALY INVESTIGATION TEAM - For the outstanding detailed engineering evaluation and assessment of the risks associated with the potential failure of the ATLAS laser Q-Switch..

OTE-ISIM OPTICAL ALIGNMENT TEAM - For incredible success in achieving the accurate optical alignment of the OTE and ISIM elements, creating the JWST optical system.

OUTREACH

ESC DIVISION'S EDUCATION AND PUBLIC OUTREACH TEAM - For continuing the Exploration and Space Communications Projects Division's commitment to further NASA's mission through robust and engaging Education and Public Outreach.

GSFC HST 25TH ANNIVERSARY OUTREACH PLANNING TEAM - In recognition of your extensive and innovative leadership for the education of the local and worldwide community to the inspiring accomplishments of HST.

LEADERSHIP

MARK VOYTON - For more than a decade of outstanding leadership to guide the ISIM and OTIS teams through unprecedented testing at GSFC and JSC for the JWST project.

PAUL GEITHNER - For your leadership to overcome many challenges between competing organizations to deliver JWST's MIRI cryo cooler on time for observatory-level integration.

PROFESSIONAL ADMINISTRATIVE (INDIVIDUAL AND TEAM RECOGNITION)

CAROL GRUNSFELD - In recognition of outstanding effort on the DSCOVR NASA/ NOAA/USAF team that enabled the launch of the DSCOVR mission.

DARLENE FENNELL - For outstanding contributions to the Earth Systematic Missions Program Office scientific, technical and mission performance activities.

KELLY HYDE - For superior service in support of all aspects of Space Science Mission Operations.

LANDSAT 9 RESOURCES TEAM - In recognition of Landsat 9 exemplary contributions to mission success, financial and resources management at the Goddard Space Flight Center.

SCIENCE (TEAM RECOGNITION)

HITOMI SOFT X-RAY SPECTROMETER & TELESCOPE TEAM - For completing the highly successful NASA contributions to the Hitomi X-Ray Observatory and obtaining transformational results in X-ray astronomy.

QUALITY & PROCESS IMPROVEMENT AWARD

KEVIN MCMAHON - For initiative and innovation in transforming the GOES-R Ground System project systems engineering team and processes to agilely support pre-launch needs.

ROBERT H. GODDARD AWARD OF MERIT

FRANK CEPOLLINA - For recognition of a 53-year career of mission success and invention at Goddard Space Flight Center.

FRANK STOCKLIN - For your 50-year career as one of NASA's premier radio frequency experts, providing critical RF solutions that enable the downlink of hundreds of Terabytes of science data each day.

SECRETARIAL/CLERICAL

DIANE E. TRAKAS - In recognition of integrity, commitment, and work ethic in providing outstanding project support to the Earth Science Data & Information Systems Project.

STEPHANIE CLARK - For your superior organizational skills in support of the James Webb Space Telescope project that keep the daily operations of the project running smoothly.

INTERNS, INTERNS EVERYWHERE

Over 100 students attended the project showcase and engaged the panelists as they asked questions related to jobs, education, and career paths.

The summer months were once again busy with interns all around GSFC. With over 400 summer interns across the Center, the Starbucks saw a larger line, the bikeshare saw a definite spike, and you had to be very careful when driving due to all of our students walking to and fro as they took advantage of networking with fellow students. The Flight Projects Directorate sponsored 127 summer interns. Most of our interns on-boarded on June 5th and worked 8 weeks on a project which they ultimately had to describe, explaining impacts and results through a presentation and poster session. Interns were also afforded other great opportunities, like a lecture from Goddard's Nobel Laureate, Dr. John Mather, touring clean rooms and labs, and having small group discussions with our own Flight Projects leadership.

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On July 20th, the Flight Projects Directorate's Diversity and Inclusion Committee once again hosted a Project Showcase for interns. This year's event was moved to the larger Building 8 Auditorium where a group of panelists answered questions regarding interviewing advice, how to get a job at GSFC, and continuing education recommendations. The interns were then able to roam the auditorium to visit 19 project tables lining the perimeter, learning about current missions and talking to folks directly involved. A scavenger hunt also took place, encouraging the students to engage with the project leads to win awesome project memorabilia. The winners , Alexandra Doten and John Laporte, received a gift bag including Hubble Space Telescope (HST) and Earth Science Data and Information Systems (ESDIS) memorabilia as well as a private tour through Goddard's Vehicle Electrical System Test (VEST) facility with the HST deputy project manager.

The FPD Intern / Project Showcase panelists included (left to right): Aaron McCleskey, Theresa Quarles, Javier Ocasio-Perez, Cathy Richardson, David Mitchell, and facilitator, Donna Swann.

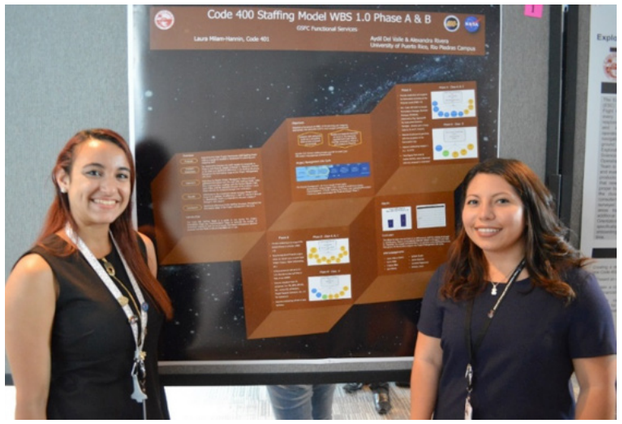
Project personnel engaged with students about the impacts and innovation of their projects and shared project memorabilia.

The Director of Flight Projects held five 'Let's CONNECT' sessions for the interns to get together and ask questions about topics such as which majors to pursue in college, receive recommendations on whether to pursue a Master's degree or get experience first, and hear about career options around the civil service and contractors, as well as from the Director sharing his own career path stories.

The Office of Education's Poster Session was an afternoon for the memory books! This event is usually held as the summer winds down, and this year packed the Building 28 atrium, and I do mean packed. There were posters displayed with eager interns beside them ready to explain their exciting summer work, standing upstairs, downstairs, in hallways, in conference rooms, and even in the skybox! Held on August 3rd from 1 to 4 p.m., if you were anywhere near Building 28 on that afternoon, there wasn't a parking space available for close to a mile! It was a great afternoon that all the interns , mentors, and directorates, as well as the Office of Education, can be proud of.

Dave Mitchell, Director of Flight Projects, and Wanda Peters, Deputy Director of Business and Planning for Flight Projects, visited the poster session and engaged with students about their summer assignments.

Building 28 was packed!



Aydil Del Valle Rodriguez and Alexandria Rivera Pereira, who attend the University of Puerto Rico, spent the summer developing a staffing model for a new project in the Formulation Phase.

Dylan Rankin, a 4th year undergraduate in Mechanical Engineering at the University of Maryland, Baltimore County, won the poster session Star Award for Engineering.

Omar Negro and Alexandra Gorbea, who both attend the University of Puerto Rico, Rio Piedras campus, won the Swoosh Award for Functional Services for their poster, "Where on Earth is the Satellite Servicing Projects Division Inventory?"

The Flight Projects Directorate had two organizations that coordinated their own programs. The Satellite Servicing Projects Division (SSPD), Code 480, hosted 35 interns this summer, representing 22 different educational institutions from eight states and Puerto Rico. These students worked to further the division's mission of advancing the state of the art in robotic servicing through servicing missions, technology development campaigns, and technology transfer to government and industry stakeholders. The interns had the opportunity to participate in a multitude of events that explained the inner workings of SSPD and NASA, including talks by managers of SSPD's various missions, a talk by astronaut Dr. John

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Grunsfeld about his experience servicing HST, and Friday Lunch and Learn sessions which covered topics such as the history of robotics and the history of the Shuttle and Hubble. Interns were also able to participate in other enrichment activities such as a VIP tour of the Smithsonian Air and Space Museum and a tour of the Space Systems Laboratory at the University of Maryland. Throughout the internship season, SSPD offered sessions geared at preparing interns for the next phases in their careers, featuring topics such as grad school tips, job application skills, and more. Interns were also able to interact with SSPD mentors and each other on a personal level at a preparatory Boot Camp, a picnic, and other social events.

How many students can say, "Over the summer I hung out with an astronaut?" These lucky students can, as Dr. John Grunsfeld shared his experience servicing the Hubble Space Telescope.

Code 480 interns received a VIP tour of the Smithsonian Air and Space Museum from Valerie Neal, Curator and Chair of the museum's Space History Department, and Frank Cepollina, SSPD Chief of Special Operations.

Justin Brannon of SSPD guided the students around the Space Systems Laboratory at the University of Maryland.

The Code 450/ Space Communications and Navigation (SCaN) Summer Intern Program is Goddard's largest group of interns coordinated by a single organization. It has grown over the last few years into a full-year pipeline, with approximately one-quarter of the summer interns continuing their work into the fall and winter or actually accepting jobs within the NASA community. Their work primarily focuses on enhancing network operations and processes and technologies that enhance NASA communication architectures and networks. This summer, Code 450 hosted 62 interns. They represented 33 educational institutions and came from 16 states and Puerto Rico, plus the UK, Mexico, and Jamaica. It was an extremely diverse and talented group of students that worked hard and even had a little play time. They participated in all the events above as well as a collaboration workshop and numerous Center and NASA activities, including the Code 400 Career Fair, a trip to the Wallops Flight Facility (WFF) to tour the Near Earth Network facilities and the WFF launch facilities, and a NASA Communications course. Code 450 intern Matthew Rankin received a Star Award at the Poster Session and Matthew Lyn received the 2017 SCaN Space Generation Congress grant for his proposal to initiate the development of the SCaN Intern Ambassador Program. This scholarship will allow him to attend the Space Generation Congress in Australia in September. And finally, some of the interns' summer work was so innovative and creative, they will be filing Invention Disclosures!

Code 450 interns visited theWallops Flight Facility.

Barbara Adde, SCaN's Director of Policy and Strategic Communications, presented the SCaN award to Matthew Lyn, who attends New York University, inviting him to attend the Space Generation Congress in Australia in September.

DONNA SWANN / CODE 400
FPD ASSISTANT DIRECTOR

Bruce Tsai

BOUNDLESS ENERGY

For your extraordinary commitment to excellence and to your JPSS team responsibilities.

DAVID MITCHELL,
BRUCE TSAI, AND TOM MCCARTHY

Peter Woolner

BOUNDLESS ENERGY

For excellence and service above and beyond, leading to an operational GOES-R Antenna System.

DAVID MITCHELL,
PETER WOOLNER, AND TOM MCCARTHY

Rob Messerly

BOUNDLESS ENERGY

For exceptional outreach and integration leadership across Ground-Flight systems, resulting in a successful GOES-R post-launch test campaign.

WITH DAVID MITCHELL,
ROB MESSERLY, AND TOM MCCARTHY

Cathy Peddie

BOUNDLESS ENERGY

For tireless leadership in challenging, motivating and encouraging the WFIRST team through numerous technical, programmatic, and personal hurdles above the call of duty.

WITH DAVID MITCHELL, KEVIN GRADY ACCEPTING
FOR CATHY PEDDIE, AND TOM MCCARTHY

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Steve Tipton

BOUNDLESS ENERGY

Steve Tipton is dedicated to the success of the entire SSPD team, showcasing great agility and balance by integrating big picture thinking with innovative process efficiency.

WITH DAVID MITCHELL, STEVE TIPTON, AND TOM MCCARTHY

Noosha Haghani

HANG TEN

For doing the work of four people and giving 100% to each of them.

WITH DAVID MITCHELL, NOOSHA HAGHANI, AND TOM MCCARTHY

Maria Romo

HONORING DIVERSITY & INCLUSION

In honor of your outstanding commitment to diversity and inclusion.

WITH DAVID MITCHELL, MARIA ROMO, AND TOM MCCARTHY

Joana Lauderdale

MENTOR "UNDER YOUR WING"

For dedication to the MOMA-MS team effort on multiple technical fronts.

WITH DAVID MITCHELL, JOANA LAUDERDALE, AND TOM MCCARTHY

Yanick Romero Negron

MENTOR "UNDER YOUR WING"

For your endless knowledge and willingness to teach.

WITH DAVID MITCHELL, YANICK ROMERO NEGRON, TOM MCCARTHY

Zakiya Tomlinson

MENTOR "UNDER YOUR WING"

For her unwavering dedication and support of Satellite Servicing Projects Division interns.

WITH DAVID MITCHELL, ZAKIYA TOMLINSON, AND TOM MCCARTHY

Chuck Chidekel

MISSION IMPOSSIBLE

For your creativity in planning the unique ICESat-2 two round I&T program and dedication to ensure a safe and successful implementation of this demanding effort.

WITH DAVID MITCHELL, CHUCK CHIDEKEL, AND TOM MCCARTHY

Debra Yoder

MISSION IMPOSSIBLE

For completing a seemingly impossible effort that contributed greatly to the ongoing success of the Landsat 9 mission this year, Debra Yoder is awarded the Mission Impossible Peer Award.

WITH DAVID MITCHELL, DEBRA YODER, AND TOM MCCARTHY

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Lauri Via

MISSION IMPOSSIBLE

In recognition of exemplary service and dedication to the Joint Polar Satellite System Program (JPSS).

WITH DAVID MITCHELL, LAURI VIA, AND TOM MCCARTHY

Bo Naasz

MISSION IMPOSSIBLE

Bo Naasz is often the loudest voice in the room advocating doing "what's right", even if it means breaking from tradition and ruffling feathers.

WITH DAVID MITCHELL, BO NAASZ, AND TOM MCCARTHY

Jeffrey Kronenwetter

ROOKIE OF THE YEAR

For his hard work that enabled a successful GOES-16 post-launch testing enabled and guided by his experience, expertise, and friendliness.

WITH DAVID MITCHELL, ALAN RETH, CINDY MERROW ACCEPTING FOR JEFFREY KRONENWETTER, KUMAR TADIKONDA, AND TOM MCCARTHY

Traci Daelemans

ROOKIE OF THE YEAR

In her first eight months on the job, Traci consistently goes above and beyond the scope of her job responsibilities and look for ways to go the extra mile.

WITH DAVID MITCHELL, TRACI DAELEMANS, AND TOM MCCARTHY

Charnita Bowlding

ROOKIE OF THE YEAR

For your cheerful willingness to support the JPSS Flight project as the ATMS resources analyst.

DAVID MITCHELL, CHARNITA BOWLDING, AND TOM MCCARTHY

Brian Thomas

ROOKIE OF THE YEAR

Brian Thomas is one of the most talented analysts around, capable of confidently stepping into an unknown situation, hitting the ground running, and providing immediate results.

WITH DAVID MITCHELL, BRIAN THOMAS, AND TOM MCCARTHY

Joe Burt

SILO SLAMMER

The Rideshare Architecture – Joe collected requirements from a wide range of science and engineering challenges and developed a family of low-cost rideshare spacecraft.

WITH DAVID MITCHELL, JOE BURT, AND TOM MCCARTHY

Cecilia Czarnecki

STEADY HELM

For skillfully coordinating and providing leadership during the move of Code 400 employees to Building 36, fostering communication and finding solutions throughout the process.

WITH DAVID MITCHELL, CECILIA CZARNECKI, AND TOM MCCARTHY

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Katie Bisci

STEADY HELM

For your steady helm throughout WFIRST Phase A that values each team member and results in their best work.

DAVID MITCHELL, CHRISTINE STEELEY ACCEPTING FOR KATIE BISCI, AND TOM MCCARTHY

Karen Latham

STEADY HELM

For her key role in supporting and enabling the JPSS Ground project team at all levels in ever-challenging circumstances.

WITH STEVE PADGETT, DAVID MITCHELL, DEBBIE HINKLE ACCEPTING FOR KAREN LATHAM, HEIDI WOOD, AND TOM MCCARTHY

Oscar Cheatom

UNSUNG HERO

For your dedication to the mission success of in-house instruments.

WITH TOM MCCARTHY, SARAH DUREJA ACCEPTING FOR OSCAR CHEATOM, AND DAVID MITCHELL

Judy Brudi

UNSUNG HERO

In recognition of your dedication and support to the combined industry and government GOES-R Advanced Baseline Imager development team.

WITH DAVID MITCHELL, BILL LEBAIR ACCEPTING FOR JUDY BRUDI, MONICA TODIRITA, AND TOM MCCARTHY

Nancy Dixon

UNSUNG HERO

For outstanding contributions to the POES project as the project support, property custodian and SEM instrument resources analyst.

WITH DAVID MITCHELL, NANCY DIXON, AND TOM MCCARTHY

Tom Gitlin

UNSUNG HERO

In recognition of your professional dedication and personal sacrifice in accepting the critical role of SCNS COR upon the untimely passing of our colleague Kevin McCarthy.

WITH DAVID MITCHELL, TOM GITLIN,AND TOM MCCARTHY

Thomas Williams

WILD CARD

In recognition of 40+ years of technical excellence, extraordinary versatility, and unwavering devotion to every team of which you have been a part.

WITH DAVID MITCHELL, THOMAS WILLIAMS, AND TOM MCCARTHY

Jahi Wartts

WILD CARD

For your strong personal commitment to the mission success, high degree of integrity, solution oriented approach, and demonstrated excellence.

WITH DAVID MITCHELL, JAHI WARTTS, AND TOM MCCARTHY

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Bradley Tse

WILD CARD

Brad's dedication, hard work and teamwork have provided the team amazing software for both engineering and science analysis.

WITH DAVID MITCHELL, BRADLEY TSE, AND TOM MCCARTHY

FLIGHT PROJECTS

LAUNCH SCHEDULE 2017-2018

11/2017
Joint Polar Satellite System (JPSS)-1

11/2017
Total and Spectral Solar Irradiance Sensor (TSIS) Instrument

12/2017
Ionospheric Connection Explorer (ICON)

1/2018
Global-scale Observations of the Limb and Disk

2/2018
Robot Refueling Mission 3 (RRM-3)

3/2018
Geostationary Operational Environmental Satellite (GOES-S)

3/2018
Transiting Exoplanet Survey Satellite (TESS)

NOVEMBER DECEMBER JANUARY FEBRUARY MARCH