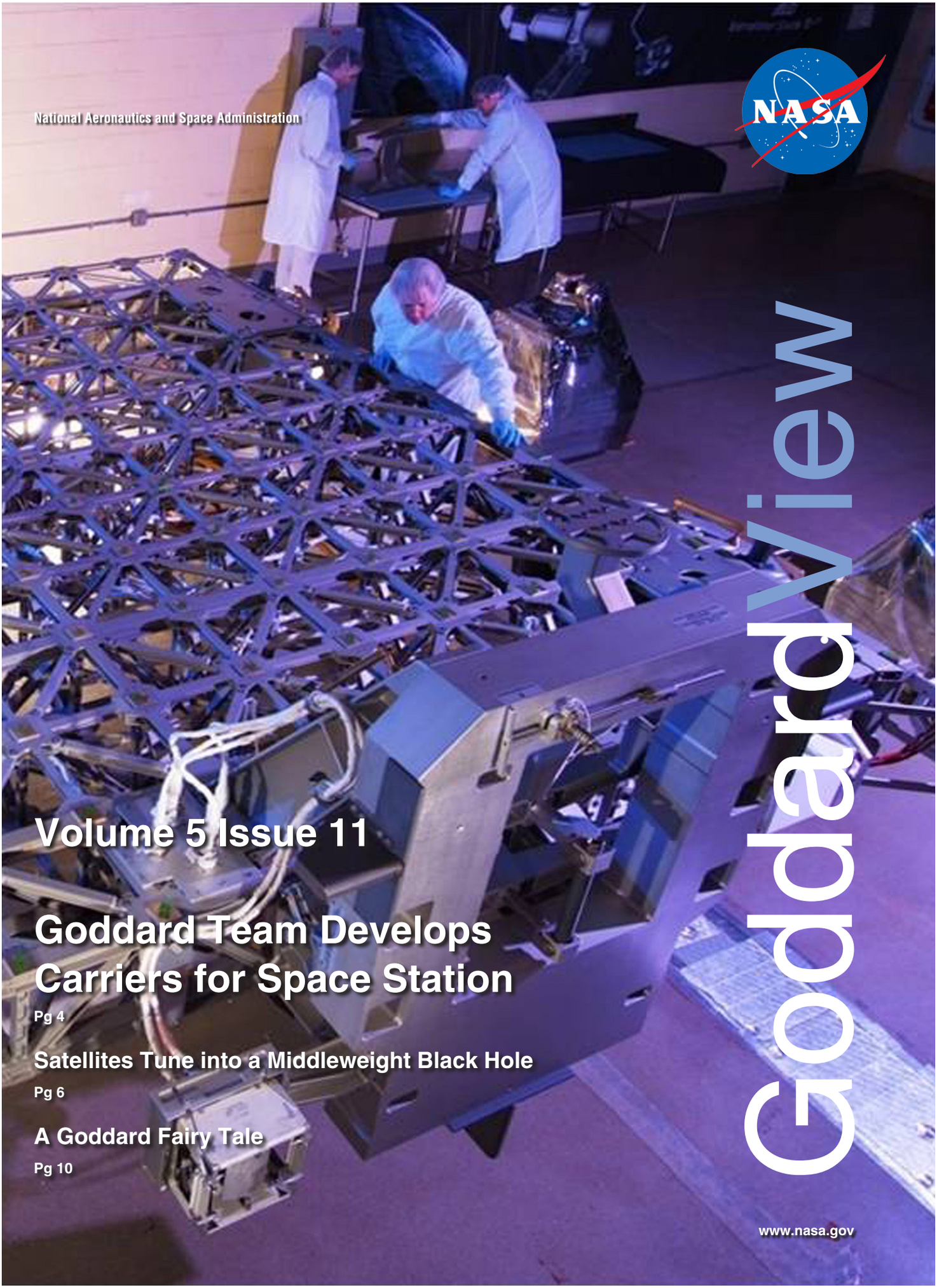

National Aeronautics and Space Administration

# GoddardView

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# Center Director Holds Informal Dialogue

By John M. Putman

On November 10, Center Director Rob Strain held an informal dialogue with the Goddard community in the Goett Auditorium in Building 3.

There was no formal agenda for the session. It was an opportunity for employees to talk with the Director on topics of interest and for them to find out what's on his mind. The discussion was in a question and answer format with employees asking questions ranging from basic questions like, "What does a Center Director do?" to more complex quesitons about leadership and the recent reorganization of some Directorates. The Center Director also spoke about future partnerships with other NASA Centers.

This was the first in a series of informal discussions with the Center Director. Employees at Wallops and IVV are invited to participate as well. All employees are welcome to attend.

Watch Dateline or InsideGoddard (https://internal.gsfc.nasa.gov) for information on the next dialogue. ■

Photo credit: Pat Izzo

*Caption: Center Director Rob Strain talks to Goddard employees about a great many things.*

GoddardView

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Cover caption: Engineers inspect one of the ExPRESS Logistics Carriers in the small clean room at Goddard.
Photo credit: Orbital Sciences Corporation

## GoddardView Info

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Editor: John Putman

Deadlines: News items for publication in the Goddard View must be received by noon of the 2nd and 4th Friday of the month. You may submit contributions to the editor via e-mail at john.m.putman@nasa.gov. Ideas for new stories are welcome but will be published as space allows. All submissions are subject to editing.

# NASA Moon Mission Wins a "Best of What's New" Award by *Popular Science*

By Nancy Neal Jones

NASA's *Lunar Reconnaissance Orbiter* (LRO) is cited as one of the best innovations of 2009 in the December issue of *Popular Science*.

"It is an honor to be selected by *Popular Science* for Best of What's New in aviation," said Craig Tooley, LRO Project Manager from Goddard. "There was tremendous excitement about the United States returning to the Moon after many years. I believe our selection is a result of that excitement."

Each year, the editors of *Popular Science* review thousands of products in search of the top 100 technology innovations of the year; breakthrough products and technologies that represent a significant leap in their categories. The winners—the Best of What's New—are awarded inclusion in the much-anticipated December issue of *Popular Science*, the most widely read issue of the year since the debut of Best of What's New in 1987. The Best of What's New awards are presented to 100 new products and technologies in 11 categories: automotive, aviation and space, computing, engineering, gadgets, green technology, home entertainment, security, home technology, personal health, and recreation.

"For 22 years, *Popular Science* has honored the innovations that surprise and amaze us; those that make a positive impact on our world today and challenge our views of what's possible in the future," said Mark Jannot, Editor-in-Chief of *Popular Science*. "The Best of What's New Award is the magazine's top honor, and the 100 winners,chosen from among thousands of entrants, represent the highest level of achievement in their fields."

LRO launched from Kennedy Space Center, Fla. on June 18, 2009. Since that time, the spacecraft has completed calibration and commissioning. LRO has already begun its detailed survey of the Moon. First results from the mission included: new looks at the *Apollo* landing sites, indications that permanently shadowed and nearby regions harbor water and hydrogen, observations that large areas in the permanently shadowed regions are colder than Pluto, and detailed information on terrain roughness.

LRO is scheduled for a one year exploration mission in a polar orbit about 31 miles above the lunar surface. During the next year, LRO will produce a complete map of the lunar surface in unprecedented detail, search for resources and potential safe landing sites for human explorers, and measure lunar temperatures and radiation levels.

NASA's Goddard Space Flight Center built and manages the mission for the Exploration Systems Mission Directorate at NASA Headquarters in Washington. The Institute for Space Research, Moscow, provided the neutron detector aboard the spacecraft.

To read more about the award and other recipients, visit: http://www.popsci.com/bown/2009. To learn more about LRO, visit: http://www.nasa.gov/lro. ■

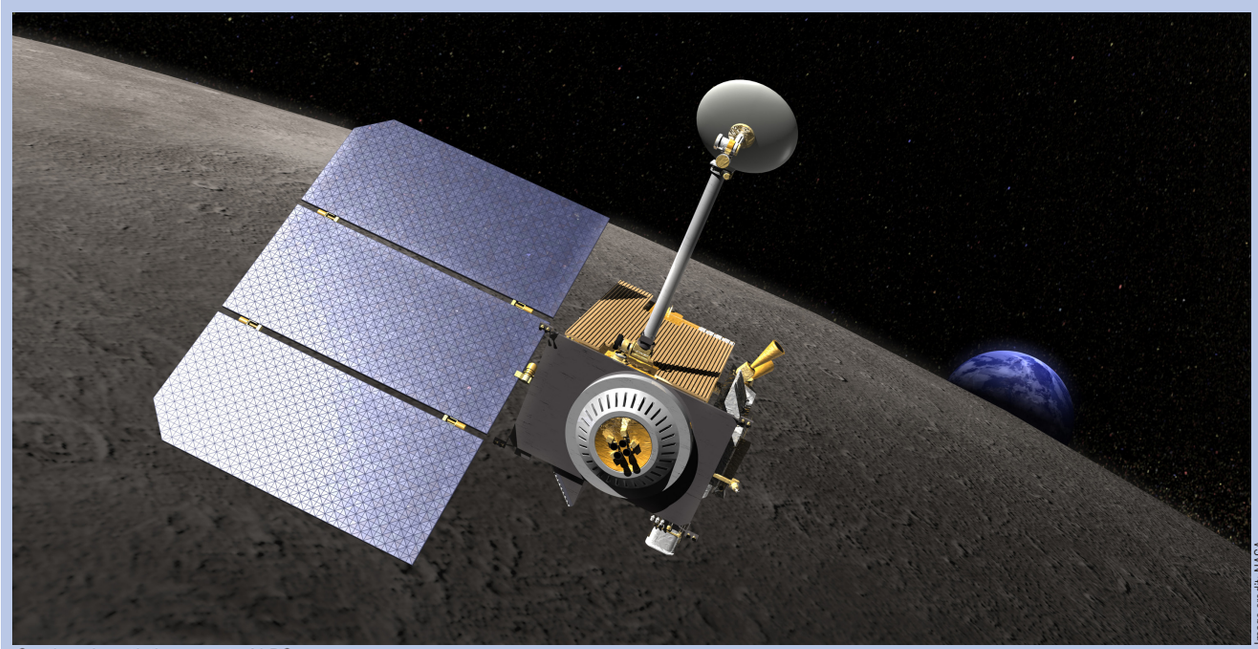

Image credit: NASA

*Caption: An artist's concept of LRO.*

# Goddard Team Develops Carriers for Space Station

By Susan Hendrix and Kevin Carmack

In a partnership that exemplifies the One NASA theme, Goddard Space Flight Center engineers teamed up with the External Payloads Group at Johnson Space Center and the ISS Payload Ground Processing support team at Kennedy Space Center to create the ExPRESS Logistics Carrier (ELC) Project.

The ELC is an un-pressurized attached payload project for the *International Space Station* (ISS) that provides mechanical mounting surfaces, electrical power, and command and data handling services for science experiments on the ISS. ("ExPRESS" stands for Expedite the Processing of Experiments to the Space Station.)

Based at Goddard, this newly formed project designed, built, and tested five unpressurized aluminum carriers and six avionics packages for bringing spare hardware and science to the ISS.

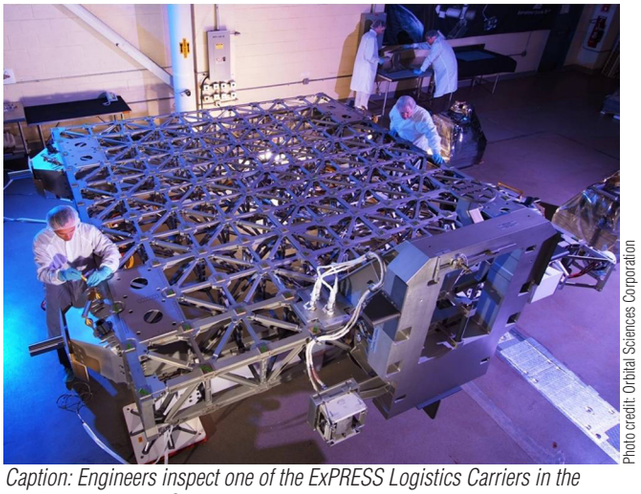

Photo credit: Orbital Sciences Corporation

*Caption: Engineers inspect one of the ExPRESS Logistics Carriers in the small clean room at Goddard.*

The ELCs have a deck size of about 14 feet by 16 feet and span the width of the Space Shuttle's payload bay. Each one is capable of providing scientists with a platform and infrastructure to deploy experiments in the vacuum of space without requiring a separate dedicated Earth-orbiting satellite. Each carrier is also capable of carrying 10,000 lbs. to orbit and will also serve as parking fixtures for spare ISS hardware that can be retrieved when needed.

**Tackling Challenges Head On**

In addition to an aggressive production schedule and nearly 800 ISS requirements, the newly formed ELC Project successfully tackled a multitude of issues that included technical challenges, limited funding, mass optimization, ongoing ISS operations, and the need to accommodate multiple payloads and science experiments on the same platform.

It took more than 100 engineers from Goddard and Marshall Space Flight Centers, and Johnson and Kennedy Space Centers working together over a three-year period to complete this multi-million dollar project.

"Prior to Goddard's involvement, previous efforts to design the avionics for the combined carrier proved too costly and bulky to implement," said ELC Project Manager at Goddard, Kevin Carmack. "Our experts solved the avionics issue by incorporating new technology including high data rate processing into the solution."

Engineers from the *Hubble Space Telescope* (HST) Carriers Development Office at Goddard formed a large segment of this new organization, developing the unique ELC design, which incorporates elements of both types of science and spare hardware pallets. The mechanical challenge was to create the most efficient aluminum design ever flown in order to optimize the payload capability of the structure. The large platform needed to be extremely flat and the 250 holes had to be precisely drilled to allow engineers at KSC to integrate heavy payloads. Because of its prior expertise in building the cargo carriers for *Hubble Space Telescope* servicing missions, Goddard served as the overall designer, integrator, and manufacturer for the ELCs.

Adhering to an aggressive delivery schedule resulting from the pending shut down of the Shuttle program in 2010, engineers from Goddard and Johnson started design activities in early 2006. But as work on the ELC began, the integrated team quickly found themselves tackling a host of other challenges such as cultural barriers, which included differences in design philosophy, test programs, quality oversight, and methods of systems verification.

The distance between Centers and across time zones also proved challenging when scheduling meetings and communicating issues or ideas. Foreign ISS customers, particularly Russia and Germany, presented language barriers as well as distance issues. According to Carmack, the Goddard ELC team viewed these issues as an opportunity to expand relationships, forging stronger partnerships in the process.

**Goddard's Contributions**

The ELC Project engineers at Goddard fabricated the platforms, relying on expertise gleaned from many years of work on Space Shuttle hardware for missions such as *Solar Maximum*, *Gamma Ray Observatory*, *Upper Atmosphere Research Satellite*, as well as five highly successful *Hubble Space Telescope* servicing missions. They also assembled and integrated its components and provided the necessary test facilities, mechanical and electrical ground support equipment, and flight avionics.

The Center's contributions seamlessly interfaced with Johnson's equipment for Shuttle and ISS electrical interfaces, structural grappling, and test facilities such as the Neutral Buoyancy Lab and Kennedy's mechanical ground support equipment for ground handling and launch site integration of the payloads and experiments. Goddard also worked very closely with Marshall Space Flight Center for implementation of their software development and pre-launch verification and checkout.

Continued on Page 5.

# Goddard Team Develops Carriers for Space Station

Continued from Page 4

**Furthering NASA's Goals**

Goddard's ELC Project demonstrates the One NASA theme of making decisions for the common good through its inclusive, participatory philosophy.

"Team members from three Centers served on the Joint Review Board for major milestone reviews, implementing decisions that required cross-Center participation," said Carmack.


Photo credit: NASA

*Caption: In the Space Station Processing Facility at Kennedy Space Center in Florida, workers position the ELC-2 over a transportation canister where it will be secured for its trip to Launch Pad 39A.*

By distributing work among the core competencies of each Center, the ELC Project exemplified how NASA Centers can effectively work together, particularly in the areas of systems engineering, safety, on-orbit operations, reliability, and project management.

Four ELCs will be delivered to the ISS before the scheduled retirement of the Space Shuttle. Two ELCs will be attached to the ISS on the starboard truss 3 and two ELCs will be attached to the port truss via the Space Shuttle's robotic arm.

ELCs 1 and 2 flew aboard the Space Shuttle Atlantis STS-129 mission launched November 16, 2009. ELC4 will fly aboard the Space Shuttle *Discovery* on STS-134 ULF6 mission in July 2010, while ELC3 will be carried to the ISS aboard the Space Shuttle *Endeavour* for the ULF5 mission in September 2010.

For more information about this unique new carrier, go to: http://www.nasa.gov/mission_pages/station/science/experiments/ELC.html. ■

# 2009 Health Benefits Open Season

By Cynthia Gilliam

During the current Health Benefits Open Season—November 9–December 14, 2009—you can enroll in a new health plan of your choice or change to another option within your plan. Further, if you are already enrolled in Federal Flexible Spending Account (FSAFEDS) in 2009, you must re-enroll in FSAFEDS for 2010. Your current enrollment in FSAFEDS does not automatically rollover from year-to-year.

Health Benefits Premium Conversion (HBPC) allows employees' health benefits insurance deductions to be made before taxes as opposed to after taxes. Only during a Health Benefits Open Season or a qualifying life event will employees have the opportunity to enroll or waive their participation. If you are a Federal Employee Retirement System (FERS) employee, your participation in this benefit will lower your contributions to Social Security, which is part of your retirement under FERS. If you are under either Civil Service Retirement System (CSRS)/Offset or FERS and wish not to continue participating in this benefit, contact the NASA Shared Services Center (NSSC) benefits section for a waiver form at: 1-877-677-2123.

Federal Employees Dental and Vision Insurance Program (FEDVIP) information can be found at: http://www.Benefeds.com. Only during open season can you enroll online for the first time (if you are not a new hire) or make changes to your existing enrollment if you currently participate.

This Health Benefits Open Season, NASA is not using the Checkbook comparison tool. Instead, NASA has selected to use the Plan Smart Choice comparison tool. This tool offers six determination options that you can click on to assist you in your health plan selection. Access this tool by going to: http://www.PlanSmartChoice.com.

Employee Express is the paperless process that you should use to make a Health Benefits Open Season change. You will need your Employee Express personal identification number (PIN) and your Social Security number. If you have misplaced your PIN, call the Employee Express help desk at: (478) 757-3030.

Employees can get the latest information and updates on their Federal benefits by following the Office of Personnel Management (OPM) on Twitter at FedEmployeeBen. OPM will tweet important dates and information about Open Season, financial education tips, and reminders of actions to take to get the most from your benefits. To follow FedEmployeeBen, go to: http://twitter.com/FedEmployeeBen.

You can also become a fan of OPM and the Federal Benefits Open Season through their new Facebook page. OPM will post reminders, breaking information, and items of interest about the health, dental, vision, and flexible spending accounts during the Open Season. To view the Open Season Facebook page, go to: http://www.facebook.com/fedbenefits. ■

# Satellites Tune into a Middleweight Black Hole

By Frances Reddy

While astronomers have studied lightweight and heavyweight black holes for decades, the evidence for black holes with intermediate masses has been much harder to come by. Now, astronomers at Goddard find that an X-ray source in galaxy NGC 5408 represents one of the best cases for a middleweight black hole to date.

"Intermediate-mass black holes contain between 100 and 10,000 times the Sun's mass," explained Tod Strohmayer, an astrophysicist at Goddard. "We observe the heavyweight black holes in the centers of galaxies and the lightweight ones orbiting stars in our own galaxy. But finding the 'tweeners' remains a challenge."

Several nearby galaxies contain brilliant objects known as ultraluminous X-ray sources (ULXs). They appear to emit more energy than any known process powered by stars but less energy than the centers of active galaxies, which are known to contain million-solar-mass black holes.

"ULXs are good candidates for intermediate-mass black holes, and the one in galaxy NGC 5408 is especially interesting," said Richard Mushotzky, an astrophysicist at the University of Maryland, College Park. The galaxy lies 15.8 million light-years away in the constellation Centaurus.

Using the European Space Agency's orbiting *XMM-Newton* observatory, Strohmayer and Mushotzky studied the source—known as NGC 5408 X-1—in 2006 and 2008.

*XMM-Newton* detected what the astronomers call "quasi-periodic oscillations," a nearly regular "flickering" caused by the pile-up of hot gas deep within the accretion disk that forms around a massive object. The rate of this flickering was about 100 times slower than that seen from stellar-mass black holes. Yet, in X-rays, NGC 5408 X-1 outshines these systems by about the same factor.

Based on the timing of the oscillations and other characteristics of the emission, Strohmayer and Mushotzky conclude that NGC 5408 X-1 contains between 1,000 and 9,000 solar masses. This study appears in the October 1 issue of *The Astrophysical Journal*.

"For this mass range, a black hole's event horizon—the part beyond which we cannot see—is between 3,800 and 34,000 miles across, or less than half of Earth's diameter to about four times its size," said Strohmayer.

If NGC 5408 X-1 is indeed actively gobbling gas to fuel its prodigious X-ray emission, the material likely flows to the black hole from an orbiting star. This is typical for stellar-mass black holes in our galaxy.

Strohmayer next enlisted the help of NASA's *Swift* satellite to search for subtle variations of X-rays that would signal the orbit of NGC 5408 X-1's donor star. "*Swift* uniquely provides both the X-ray imaging sensitivity and the scheduling flexibility to enable a search like this," he added. Beginning in April 2008, *Swift* began turning its X-Ray Telescope toward NGC 5408 X-1 a couple of times a week as part of an ongoing campaign.

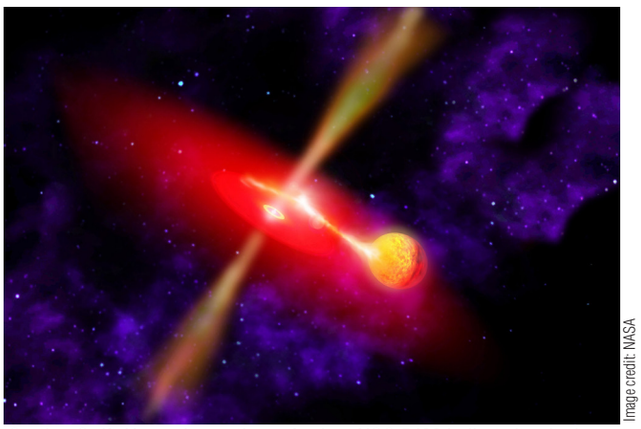

Image credit: NASA

*Caption:* Swift *X-ray observations of galaxy NGC 5408 indicate its ultraluminous X-ray source undergoes periodic changes every 115.5 days. This cycle, astronomers suspect, is linked to the orbit of a donor star around a middleweight black hole, as shown in this artist's concept.*

*Swift* detects a slight rise and fall of X-rays every 115.5 days. "If this is indeed the orbital period of a stellar companion," Strohmayer said, "then it's likely a giant or supergiant star between three and five times the sun's mass." This study has been accepted for publication in a future issue of *The Astrophysical Journal*.

The *Swift* observations cover only about four orbital cycles, so continued observation is needed to confirm the orbital nature of the X-ray modulation.

"Astronomers have been studying NGC 5408 X-1 for a long time because it is one of the best candidates for an intermediate-mass black hole," adds Philip Kaaret at the University of Iowa, who has studied the object at radio wavelengths but is unaffiliated with either study. "These new results probe what is happening close to the black hole and add strong evidence that it is unusually massive."

To learn more about *Swift*, visit: http://www.nasa.gov/swift. ■

# *Fermi* Telescope Caps First Year with Glimpse of Space-Time

By France Reddy

During its first year of operations, NASA's *Fermi Gamma Ray Space Telescope* mapped the extreme sky with unprecedented resolution and sensitivity.

It captured more than 1,000 discrete sources of gamma rays—the highest-energy form of light. Capping these achievements was a measurement that provided rare experimental evidence about the very structure of space and time, unified as space-time in Einstein's theories.

"Physicists would like to replace Einstein's vision of gravity—as expressed in his relativity theories—with something that handles all fundamental forces," said Peter Michelson, principal investigator of *Fermi*'s Large Area Telescope, or LAT, at Stanford University in Palo Alto, Calif. "There are many ideas, but few ways to test them."

Many approaches to new theories of gravity picture space-time as having a shifting, frothy structure at physical scales trillions of times smaller than an electron. Some models predict that the foamy aspect of space-time will cause higher-energy gamma rays to move slightly more slowly than photons at lower energy.

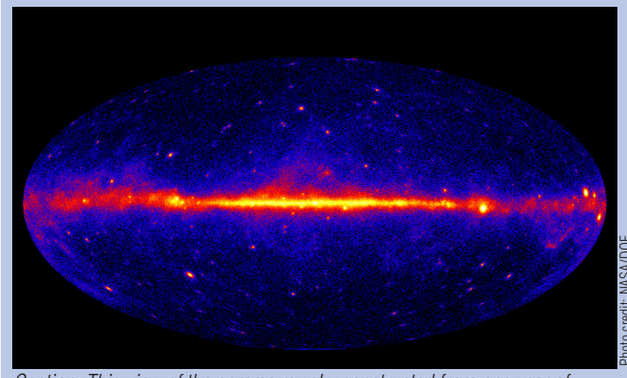

Photo credit: NASA/DOE

*Caption: This view of the gamma ray sky constructed from one year of* Fermi *LAT observations is the best view of the extreme universe to date. The map shows the rate at which the LAT detects gamma rays with energies above 300 million electron volts—about 120 million times the energy of visible light—from different sky directions. Brighter colors equal higher rates.*

Such a model would violate Einstein's edict that all electromagnetic radiation—radio waves, infrared, visible light, X-rays, and gamma rays—travels through a vacuum at the same speed.

On May 10, 2009, *Fermi* and other satellites detected a so-called short gamma ray burst, designated GRB 090510. Astronomers think this type of explosion happens when neutron stars collide. Ground-based studies show the event took place in a galaxy 7.3 billion light-years away. Of the many gamma ray photons that *Fermi*'s LAT detected from the 2.1-second burst, two possessed energies differing by a million times. Yet after traveling some seven billion years, the pair arrived just nine-tenths of a second apart. "This measurement eliminates any approach to a new theory of gravity that predicts a strong energy dependent change in the speed of light," Michelson said. "To one part in 100 million billion, these two photons traveled at the same speed. Einstein still rules."

*Fermi*'s secondary instrument, the Gamma ray Burst Monitor, has observed low-energy gamma rays from more than 250 bursts. The LAT observed 12 of these bursts at higher energy, revealing three record setting blasts. GRB 090510 displayed the fastest observed motions, with ejected matter moving at 99.99995 percent of light speed. The highest energy gamma ray yet seen from a burst—33.4 billion electron volts or about 13 billion times the energy of visible light—came from September's GRB 090902B. Last year's GRB 080916C produced the greatest total energy, equivalent to 9,000 typical supernovae.

Scanning the entire sky every three hours, the LAT is giving *Fermi* scientists an increasingly detailed look at the extreme universe. "We've discovered more than a thousand persistent gamma ray sources—five times the number previously known," said Project Scientist Julie McEnery at Goddard. "And we've associated nearly half of them with objects known at other wavelengths."

Blazars—distant galaxies whose massive black holes emit fast-moving jets of matter toward us—are by far the most prevalent source, now numbering more than 500. In our own galaxy, gamma ray sources include 46 pulsars and two binary systems where a neutron star rapidly orbits a hot, young star.

"The *Fermi* team did a great job commissioning the spacecraft and starting its science observations," said Jon Morse, Astrophysics Division Director at NASA Headquarters in Washington. "And now *Fermi* is more than fulfilling its unique scientific promise for making novel, high-impact discoveries about the extreme universe and the fabric of space-time."

NASA's *Fermi Gamma Ray Space Telescope* is an astrophysics and particle physics partnership developed in collaboration with the U.S. Department of Energy, along with important contributions from academic institutions and partners in France, Germany, Italy, Japan, Sweden, and the United States. ■

# Not Another Fish Story—Hobby Becomes Valuable Research Tool for NASA and NOAA

By Elizabeth M. Jarrell

Mike Weiss, former Deputy Program Manager for the *Hubble Space Telescope* and current Exploration Systems Projects Project Manager, has always been interested in photography. His interest in underwater photography started in 1982 while working with the astronauts at the Johnson Space Center on the Solar Maximum Repair Mission. While designing NASA's first Shuttle-based satellite repair mission, Goddard's engineering team realized that there was a compelling need to integrate spacecraft experts with astronauts and Shuttle experts. Since the astronauts trained underwater to simulate the zero-gravity effects of spacewalking, some of the spacecraft experts—including Weiss—became SCUBA-certified to be able to go into the tanks with the astronauts.

According to Weiss, "Thus began a beautiful partnership between Goddard and Johnson combining human and robotics expertise. This capability eventually blossomed into the *Hubble* repair legacy."

Shortly thereafter, Weiss began open water diving, or SCUBA diving in the ocean. He also enjoys other types of diving including drift diving, night diving, cavern diving, and wreck diving. According to Weiss, diving "is not just jumping into the ocean." It is a very enjoyable activity, but requires a lot of training and a lot of experience. He began combining his love of photography and diving by entering the word of underwater photography. He now takes digital stills while open water diving five or six times a year and spends three or four weeks a year on the ocean floor. Weiss often dives with fellow Goddard employees Russ Harrison, who shoots video, and Oren Sheinman, his brother-in-law, who acts as their dive buddy and spotter. The group dives "basically any place that has marine life, coral reefs, and allows divers." They've been to South Florida, Puerto Rico, Mexico, Maui, Roatan, and Belize.

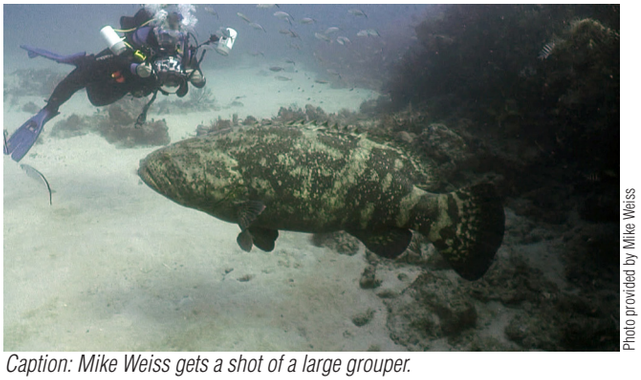

Photo provided by Mike Weiss

*Caption: Mike Weiss gets a shot of a large grouper.*

Weiss shares his striking underwater photographs with friends and family. In addition, he provides them to Dive Master, a part-time researcher for the National Oceanic and Atmospheric Administration who uses Weiss' photographs to document coral conditions to help understand the impact of people and the environment on the reefs. He has also written for a few dive magazines that have incorporated his photographs as well. In so doing, he has evolved from a hobbyist to a semi-professional underwater photographer assisting with research.

Weiss, who is largely self-taught through trial and error, uses a digital single lens reflex (SLR) camera equipped with special underwater housing and two external strobes or flashes. Waterproofing a camera costs more than the actual camera. Weiss explains, "Underwater photography has a huge learning curve. Every photo you take is a learning experience. In photographing a subject, you learn a lot about that subject and its environment."

Underwater photography presents many unique challenges. "Unfortunately, fish don't pose." The photographer is also moving. There are also lighting and exposure issues. "You lose reds underwater at very shallow depths. Between 30 and 40 feet, you lose everything but blues and greens. Strobes give you the light and color back," says Weiss. The background offers additional problems. "There is usually a lot of stuff in the water. It's the equivalent of photographing a subject in a roomful of dust." This effect, known as backscatter lighting, can be reduced by using strategically positioned strobes.

Photo credit: Mike Weiss

*Caption: Flamingo tongue, taken in La Parguera, Puerto Rico.*

Weiss processes his own digital photographs. Normally he only adjusts the white balance, which is how the camera interprets the light. Weiss does not change the color, but adjusting the white balance improves the overall color.

"It's a beautiful world underwater, but to enjoy and appreciate the beauty you really have to pay attention to what you're doing," warns Weiss, "Safety first, always, and absolutely. No exceptions." In addition to being mindful of possible equipment failures, "you have to be aware of the marine life, their habits, and their environments. You have to know the animals. Some sharks are aggressive and some are not." Danger can be well camouflaged. "You're not supposed to touch the coral, but if you do, a rock could actually be a fish with a poisonous spine." Although Weiss has never been hurt, he has had several close calls, "You have to be able to handle emergencies." He has a wireless, air-integrated dive computer, which provides real-time monitoring of vital air and tissue-loading data that tells him how much longer he can be underwater. Most of all, Weiss cautions, always dive with a buddy.

Weiss' son Brian, who just became a certified open-water diver, and recently graduated with a degree in media arts and design, is eager to continue the family tradition. To see more of Weiss' remarkable underwater photography, visit the Goddard Dive Club Web site at: http://www.goddardscuba.com. ■

# Eigenbrode Named Innovator of the Year—Flatley Wins Honorable Mention

By Lori J. Keesey

The Office of the Chief Technologist has selected Goddard scientist Jennifer Eigenbrode to receive its 2009 "IRAD Innovator of the Year" award, an honor bestowed annually on Principal Investigators who exemplify the best in research and development.

Photo credit: Chris Gunn

*Caption: Goddard scientist Jennifer Eigenbrode shows the tools she used to validate a new experiment that will fly on the Sample Analysis at Mars (SAM) instrument.*

Also being recognized is Thomas Flatley, whose contributions earned him an honorable mention for his work advancing a state-of-the-art hybrid computer system—SpaceCube—that provides 15 to 25 times the processing power of a typical flight processor.

"We bestow the awards on IRAD Principal Investigators who advance NASA's missions and goals," said Chief Technologist Peter Hughes, whose organization sponsors the awards. "Jennifer's work allowed Goddard to enhance the capabilities of the Sample Analysis at Mars (SAM) instrument and potentially identify organic compounds and their origins in greater detail when operations begin in 2012. Tom has worked tirelessly to develop spaceborne science and operational capabilities for SpaceCube—efforts that led to a successful demonstration of the relative navigation experiment during the *Hubble* servicing mission earlier this year."

In testing funded by the Internal Research and Development (IRAD) program, Eigenbrode demonstrated that thermochemolysis—the combination of heat and a specific chemical—would significantly enhance the ability of SAM to analyze large carbon molecules if they are discovered on Mars. Her testing led to the inclusion of her experiment on the instrument, which is one of 10 flying on the Mars Science Laboratory. "With the addition of Jennifer's experiment, the range of organic molecules that can be detected by SAM has been substantially expanded with no hardware modifications. It will further our understanding of the biological potential on Mars," said SAM Principal Investigator Paul Mahaffy.

SpaceCube, meanwhile, played a pivotal role in the relative navigation experiment carried out during the *Hubble* servicing mission. As the Shuttle approached *Hubble* and astronauts prepared to grapple the telescope, the SpaceCube computer ran behind the scenes to help simulate the exacting maneuvers. It calculated the position and orientation of the observatory relative to the Space Shuttle. The successful demonstration validated an important navigational capability for future science and exploration efforts.

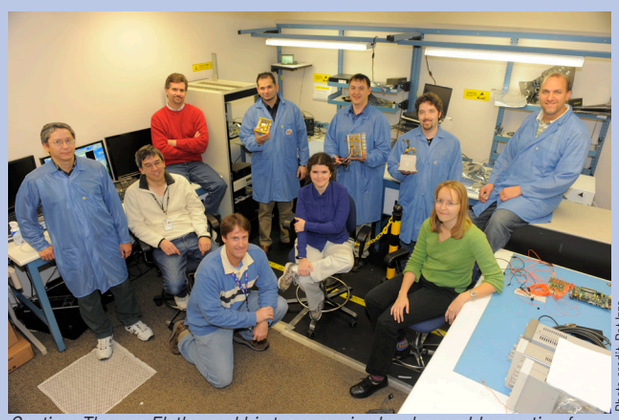

Photo credit: Pat Izzo

*Caption: Thomas Flatley and his team received an honorable mention for their work advancing SpaceCube, a hybrid computer system.Team members include (left to right): Manuel Buenfil, Mike Lin, Tom Flatley, Ed Hicks (kneeling), Danny Espinosa, Robin Ripley (seated), Gary Crum, Alessandro Geist, Karin Blank (seated), and Jeff Hosler. Not pictured: Dave Petrick.*

SpaceCube offers other important applications for planetary and Earth science missions, said Deborah Amato, Goddard's crosscutting technology focus area lead. "We're impressed with Tom Flatley's ability to work across the Agency's diverse missions to demonstrate and leverage this highly enabling advanced technology," she said. In November, for example, SpaceCube will be attached to the *International Space Station* to demonstrate an innovative radiation-hardening technology. Flatley also is demonstrating SpaceCube on an upcoming Earth science flight opportunity in spring 2012 and is collaborating with a number of industry vendors interested in commercializing the system. ■

# A Goddard Fairy Tale

By Elizabeth M. Jarrell

The story of Trena Ferrell, Education Specialist, and Mark Branch, Aerospace Engineer, is of a marriage made at Goddard. They first met at the Goddard Visitor Center in May 2008. They are now engaged to be married.

Ferrell was working with NASA Explorer Schools, a partnership between NASA and high-poverty, high-minority schools to get students interested in science, technology, engineering, and mathematics (STEM) fields. That particular day, she had students from a NASA Explorer School in Baltimore and needed a speaker familiar with that area. Her supervisor mentioned Branch, so Ferrell arranged for him to speak to the kids.

Unknown to Ferrell, that day Branch was being shadowed by ABC News for a segment on him that eventually aired on Good Morning American in January 2009. This was the first of many pleasant surprises from Branch.

Photo credit: Debora McCallum

*Caption: Ferrell and Branch at the Goddard Visitor Center.*

In speaking to the kids, Branch, who moonlights as hip-hop spin master "DJ Scientific," assumed that persona. He emphasized the correlation between music and science and encouraged the kids to "shoot for the stars" and even to become NASA scientists and engineers.

Ferrell was most impressed.

Ferrell sent Branch a written thank you note, which led to a series of emails and phone calls and eventually a dinner invitation to his country club. They became friends first, then romantic interests later, sometime around the beginning of 2009. At that time, while Branch was on vacation, Ferrell saw the Good Morning America piece on him, and called him so that they could watch it together.

Over Memorial Day weekend 2009, Ferrell met Branch's entire family at a picnic. Unknown to Ferrell, Branch's mother discretely told him that Ferrell was "the one for him." When someone is both your mother and a school principal, you listen.

On Father's Day 2009, Branch met Ferrell's father at the country club. Again without Ferrell's knowledge and in absolute secrecy, Branch formally asked her father for her hand in marriage. Her father gave his consent.

Photo credit: Pat Izzo

*Caption: Mark Branch, alias DJ Scientific, proposes to the future "Mrs. Scientific."*

The big engagement happened on June 30, 2009 at the Visitor Center where they had first met. Again, without Ferrell's knowledge, early that morning Branch called her mother asking her permission to marry Ferrell. She consented. He also called a colleague, who arranged for Goddard photographer Pat Izzo to be present at the Visitor Center for the big moment.

Later that day, Branch called Ferrell requesting some educational materials for students at the Visitor Center. Ferrell raced over with the educational materials. To Ferrell's total shock and surprise, Branch proposed then and there. Branch got down on one knee, offering a dozen roses, a beautiful card, and a gorgeous ring. Izzo captured the entire proposal. Having worked as a DJ for the NFL Players' Gala, Branch knows how to stage a production with pageantry. Unfortunately, Ferrell could not then go to lunch with Branch as she had a prior commitment involving a lunch event with the Center Director, who trumps even new fiancés.

Ferrell's and Branch's wedding will be in early summer at the country club. Their story is indeed a Goddard fairy tale. ■

# Goddard's Robert Cahalan Elected Fellow of the American Meteorological Society

By Rob Gutro

Photo credit: NASA

*Caption: Robert Cahalan.*

Robert Cahalan, Head of the Climate and Radiation Branch of Goddard's Laboratory for Atmospheres in the Earth Sciences Division was recently elected a Fellow of the American Meteorological Society (AMS).

Bob Cahalan is being recognized for his pioneering theoretical and experimental advances in understanding the role of cloud structure in climate, his lead role as Project Scientist of the Solar Radiation and Climate Experiment (SORCE), and his leadership in three-dimensional atmospheric radiative transfer. He has worked on global warming and other climate change research at Goddard since 1979, and he is the President of the International Radiation Commission.

His research on clouds led to retrieval techniques that extend the independent pixel approximation, an "effective thickness approximation" relating cloud optical properties to cloud structure. With colleagues at Goddard and Los Alamos National Lab, Cahalan designed a lidar system, Thickness from Offbeam Returns (THOR) that employs a multiple field-of-view wide-angle receiver to determine thickness of optically thick cloud, ice, and snow layers.

Cahalan co-founded the Chesapeake Education, Arts, and Research Society (CHEARS) with his wife Margaret after being inspired by the Chesapeake Bay Foundation's 2005 Annual "State of the Bay" report that called the Bay "a system in crisis." CHEARS is dedicated to the health of the Chesapeake Bay watershed.

CHEARS makes Cahalan's dedication to the Earth more personal. "Since 1979, when I moved here with my family, we become increasingly concerned with the growing stresses that humans have placed on our Chesapeake Watershed's fragile ecosystem," Cahalan said. "Pollution generated in urban, suburban, and rural population areas, and increasing impacts of global warming not only endanger human health but put at risk the very existence of unique species such as the tiny bog turtle, oysters, and even the Baltimore oriole."

Cahalan resides in Greenbelt with his wife and two sons, where he said, "I enjoy learning about farming and biking from my son Joel and about plants and chaos from my son Gabriel."

Bob has played host to national and international organizations like the U.S. Department of Energy's Atmospheric Radiation Measurement and NASA's Earth Observing Systems-Landsat science teams, to universities in the U.S., Canada, and the Netherlands.

New Fellows are elected each year by the AMS Executive Council from a slate submitted by the Fellows Committee of not more than one-tenth of one percent of all AMS Members. The formal announcement of Dr. Cahalan's election will take place at the 90th AMS Annual Meeting in Atlanta, Ga. during January 17-21, 2010.

Bob said that his favorite quote is from Paul B. MacCready who said, "You can do all kinds of things if you just plunge ahead. It doesn't mean you're any good at them, but you can be good enough."

Obviously, through this AMS nomination, a lot of colleagues believe that Bob is extremely good at what he does. ■

# **Employee** Spotlight: Madison Townley

By Christina Coleman

Madison P. Townley is a former United States Marine who served on an elite team of bomb technicians, Explosive Ordnance Disposal during the Reagan and Bush administrations. He served nine years in the Bureau of Alcohol, Tobacco, and Firearms (ATF) where he rose to the position of Bureau Chief of the Office of Operational Security. In addition, Townley has participated in numerous operations with ATF and Joint Agency Task Forces such as the D.C. Sniper Investigation, Olympic Park bombing, G-8 summits, MS-13 Gang Task Force, and U.S. Olympics security planning.

But, according to Townley, a native of Alexandria, La., none of these accomplishments alone prepared him for his position as Chief of Protective Services, Agent in Charge at Goddard Space Flight Center. Medals and plaques from his past don't crowd his office. Instead, four photographs with the words "confidence," "trust," "teamwork," and "concentration" decorate the walls. These photographs were given to him by his former ATF team.

Photo credit: Pat Izzo

*Caption: Madison Townley.*

"I have to have the confidence that you'll get the job done," he started. "You have to trust me and I have to trust you," he continued.

Townley demonstrates how those four words are principles to a successful protective organization. But not before making sure to specify that protection is not single focused.

"I prefer [the term] 'protective services.' It covers every aspect of security, law enforcement, program protection, and safeguarding national interest," Townley said. "It was never about security," said Townley, who grew up in a family with his father as a police officer and his older brother in the military. "It's always about protecting and serving."

Protective Services, as Townley explained, has many different branches. Among them is making sure civil servants and contractors are protected from physical threats.

The threat of information being compromised is also paramount. "As far as information, I assess the value of the information and determine how at risk it may be to compromise. " Townley said. "It's easier to steal information and technology than it is to research and develop it yourself. Our adversaries want our technology."

Although his former positions required him to consider protective services on a national scale, Townley considers Goddard a "little town" that needs the same amount of supervision to prevent disaster. "With 8,000 employees here at GSFC, something is bound to happen," he said. "I must ensure that all of the Protective Services team is trained and prepared to respond to any event we are called to."

A typical day, however, includes much more than that, starting with morning briefings from his team on updates around the Center as well as local, state, and national threat concerns. Physical security has to be monitored, such as security cameras and door access. Gate security is analyzed. Townley makes it a point to talk to Center Directorates to make sure that their protective service needs are being met. His advice coveted, Townley is constantly running off to speaking engagements around the Center to brief employees on how to stay safe and safeguard critical information in today's environment. In what he says is center to his success, Townley is thoroughly embedded with the Directorates in order to make necessary improvements to ensure safety. It is his business model, and it allows him insight into the problems and threats that are posed in different areas of the center. Not to mention his interaction and partnership with his Federal partners such as DHS, FBI and the NSA.

What may be his most impressive leadership skill is his ability to listen to the people he serves in order to meet their needs. He encourages individuals to seek his advice and counsel of the team on any security matter in order to better educate and protect them. "My door is always open," Townley said. "I listen to their concerns. If there is a problem that door is their door."

But if there is one goal for the future of security at Goddard it is to "improve upon our services." "We want to be a deterrent," Townley said. "A lot of this is prevention."

Despite Townley's extensive training, which could be deterrent enough, those four photographs serve as the blueprint for his success and paint a picture of what the future of Goddard's security could look like. Goddard's next threat would never guess that all it took was Townley's code of concentration, teamwork, confidence, and trust to get the job done. ■