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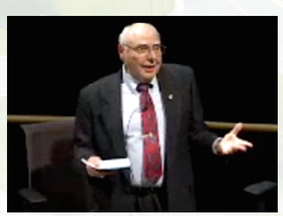
GoddardView

TRENDING

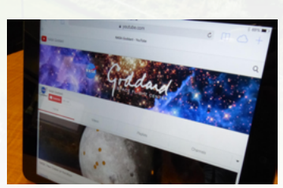
International Space Station Astronaut Visits Goddard
NASA astronaut Steven R. Swanson shared his spaceflight experiences with the Goddard community on March 3. He flew on two missions with the shuttle program and spent six months aboard the International Space Station in 2014.

OSIRIS-REx Completes System Integration Review
The team behind OSIRIS-REx approved a plan for integrating all the systems on the spacecraft, allowing the asteroid sample return mission to proceed with assembly and testing ahead of the planned 2016 launch.



Cepollina Delivers Smithsonian Talk
Frank Cepollina, veteran of five servicing missions to the Hubble Space Telescope, shared the challenges and significance of the Hubble servicing missions during a lecture at the Smithsonian National Air and Space Museum in Washington, D.C.

NASA's Top YouTube Channel
The NASA Goddard YouTube channel has surpassed 80 million all-time plays, making it the agency's most popular channel on the video-sharing platform.



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On the cover: The four Magnetospheric Multiscale mission observatories are processed in an Astrotech Space Operations clean room in preparation for launch from NASA's Kennedy Space Center in Cape Canaveral, Fla. Photo credit: NASA/Kennedy Space Center

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GoddardView **Info**

Goddard View is an official publication of NASA's Goddard Space Flight Center in Greenbelt, Maryland. Goddard View showcases people and achievements in the Goddard community that support the center's mission to explore, discover and understand our dynamic universe. Goddard View is published by the Goddard Office of Communications.

You may submit story ideas to the editor at darrell.d.delarosa@nasa.gov. All contributions are subject to editing and will be published as space allows.

ENGAGE SESSIONS: PROVIDING A BETTER UNDERSTANDING OF GODDARD'S WORK

By Ashley Morrow

On March 12, a quartet of identical spacecraft launched into orbit from NASA's Kennedy Space Center in Cape Canaveral, Florida, to unravel the mysteries of magnetic reconnection – a process that occurs when magnetic fields connect, disconnect and reconfigure explosively around Earth. More than 300 NASA employees helped build the Magnetospheric Multiscale mission at NASA's Goddard Space Flight Center, but several thousand employees at Goddard may not understand what the mission will do.

That's where Deanna Trask and ENGAGE come in.

"We try to reach the general employee. We want to develop a sense of camaraderie by sharing what we're doing on center," said Trask, ENGAGE program manager.

ENGAGE is a lunch-and-learn series devised to provide an opportunity for the Goddard community to learn more about missions, research and projects across the center. The series was born in 2011 out of a science lecture given by John Mather, Goddard scientist and Nobel physics laureate, on Capitol Hill about the James Webb Space Telescope. His subsequent ENGAGE session on Webb made it easier for all audiences to understand.

In February, several weeks prior to launch, MMS Project Scientist Tom Moore explained magnetic reconnection and shared details of the mission with project staff and center employees through an ENGAGE session. "On behalf of the folks who were responsible for getting MMS built and ready, I just wanted to share with the Goddard community the science we are doing," Moore said.

A mission like MMS poses challenges to ENGAGE. The mission draws heavily upon the scientific study of the sun, or heliophysics, which involves concepts that are typically unfamiliar and confusing to most people. Magnetic reconnection is responsible for some of the universe's strangest space weather events. Reconfiguration of magnetic fields can release a violent burst of energy, causing solar flares, auroras and black hole jets, among other things. These events can affect many critical technological systems such as electrical power grids, communications networks and GPS navigation systems. As our world becomes more reliant on technology, knowledge about a process that affects these resources becomes more valuable.

Representatives from the Goddard Office of Communications work together with project leads to make the topic of each session easy to understand for a general audience. Together, they edit and specialize presentations, as well as create diagrams, metaphors and animations that help the audience visualize the science behind the mission.

Moore memorably compared the four spacecraft flying in formation to the sensors launched into a tornado in the 1996 film "Twister." Just as the tornado sensors entered the storm to discern the 3-D structure of the tornado, the MMS spacecraft fly in an adjustable formation to observe the 3-D structure of magnetic reconnection.

"Our scientists and engineers are so talented and talk often to people on a more detailed level," Trask said. "We take the time with ENGAGE to make the information accessible and to tailor a presentation to fit our audience."

These efforts are not only intended to disseminate knowledge throughout Goddard, but also to enable employees to discuss unfamiliar missions with the public by articulating Goddard's role and explaining why people should care.

"We want people to understand that NASA is important and that the work we do is important. If people who work here can't express that, how can taxpayers get on board?" Trask added. ■

Above: Tom Moore, project scientist for MMS, explains the mission and magnetic reconnection to Goddard employees during an ENGAGE session.

Photo credit: NASA/Goddard/Bill Hrybyk

Did You Know?

NASA balloons can carry several-ton payloads above 99.5 percent of Earth's atmosphere, or about 130,000 feet.

UP, UP AND AWAY! NASA'S SUPER PRESSURE BALLOON IS HOPING TO BREAK RECORDS

By Jeremy Eggers

Residents in the Southern Hemisphere's mid-latitudes, in such countries as Argentina and South Africa, may catch a glimpse of a large NASA heavy-lift scientific balloon as it travels around the globe on a potentially record-breaking flight.

NASA will launch a heavy-lift super pressure balloon from Wanaka, New Zealand, with the goal of exceeding the current SPB floatation record of 54 days. SPBs have the potential to stay afloat for up to 100 days under the right conditions.

NASA balloons are one of the best-kept secrets in the science community. They provide invaluable science at a relatively low cost, and they offer scientists an opportunity to test ground-breaking instruments before they are considered for free-flying spacecraft.

Standard NASA balloons are very large structures, comprised of 10 to 50 acres or more of film that can carry several-ton payloads above 99.5 percent of Earth's atmosphere, or about 130,000 feet. Balloon film resembles sandwich bags, but of higher quality. Filled with helium and vented to the atmosphere, these large zero-pressure balloons rise and fall with atmospheric pressure, which changes drastically with the day-night cycle.

The pumpkin-shaped SPB to be tested is made from some 22 acres of material reinforced with load-carrying tendons and is completely sealed and not vented to the atmosphere. When fully inflated, the balloon's volume is 92 times greater than that of a typical blimp. Put another way, an entire football stadium could fit inside the balloon.

"The super pressure balloon is a game changer," said Debbie Fairbrother, chief of NASA's Balloon Program Office at Wallops Flight Facility in Virginia and principal investigator for the SPB. "Long duration, mid-latitude balloon flights at stable altitudes will expand the envelope for science and research, spark new technologies, and enable new discoveries."

While long duration is an important objective for this mission, engineers are more keenly focused on the challenge of maintaining a constant altitude during the flight. Most standard heavy-lift zero pressure balloons can vary in altitudes as great as 45,000 feet due to the alternating warming and cooling of the day-night cycle. In response, flight operators typically release excess weight in the form of ballast to maintain altitude. However, the SPB is designed to maintain a positive internal pressure in relation to its environment, keeping the balloon at a constant float altitude. In much the same way a car tire maintains its pressure despite changes in the environment around it, so does the SPB.

The science and engineering communities have previously identified long-duration balloon flights at stable altitudes as playing an important role in providing inexpensive access to the near-space environment for science and technology. The upcoming launch is set to validate the SPB technology, which has been under development by NASA for 15 years.

Drifting eastward at a stable float altitude of 110,000 feet carrying a 5,000 pound payload consisting of tracking and communication instruments, the SPB is expected by NASA to circumnavigate the globe once every 1 to 3 weeks, depending on wind speeds in the stratosphere.

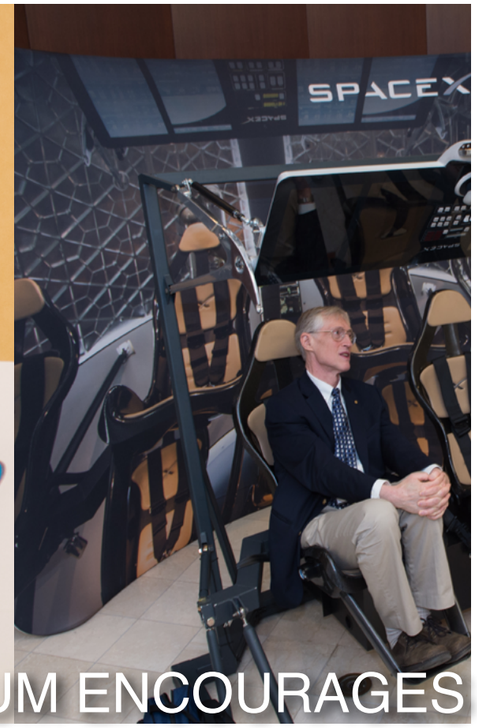
As the balloon travels around Earth, it may be visible from the ground, particularly at sunrise and sunset, to those who live in the Southern Hemisphere's mid-latitudes.

NASA's scientific balloons offer low-cost, near-space access for scientific payloads weighing up to 8,000 pounds for conducting scientific investigations in fields such as astrophysics, heliophysics and atmospheric research.

Wallops manages the agency's scientific balloon program with 10 to 15 flights each year from launch sites worldwide. ■

Opposite: A NASA super pressure balloon being readied for launch in Sweden in 2012. Photo credit: NASA/Balloon Program Office

Below: Super pressure balloon team members install the ripstitch, which will reduce the shock on the payload once the balloon lands, prior to launch in New Zealand. Photo credit: NASA/Balloon Program Office



GODDARD SYMPOSIUM ENCOURAGES CONTINUED INNOVATION AND EXPLORATION

By Mike Calabrese

The 53rd Robert H. Goddard Memorial Symposium was held from March 11-12 at the Greenbelt Marriott in Greenbelt, Maryland. This year's theme was "On the Cusp: What's Next?" The annual symposium is sponsored by the American Astronautical Society and supported by NASA's Goddard Space Flight Center.

"Participants at the symposium were once again treated to insights, observations and strategies for the coming years in science, aeronautics, technology and human exploration by government and industry leaders," said Harley Thronson, program planning committee chair.

Bob Rogers, founder and chairman of design firm BRC Imagination Arts, provided opening remarks and discussed public engagement within NASA. "I'm a storyteller," said Rogers, as he related the history of several large companies in the context of daretakers, or those who take risks; caretakers, or those who manage and administer projects; and undertakers, or those who preside over accelerating decline. He urged NASA to "refresh the daretaker spirit" when it finds itself in caretaker mode.

NASA Administrator Charles Bolden picked up on the daretaker challenge during his keynote address. "Our journey of discovery has only just begun," he said.

He noted the role technology will play in NASA's journey to Mars, following what he calls a "stepping stone approach" that begins with the exploration of asteroids. He highlighted the successful Orion test flight, the growth of commercial ventures in the resupply of the International Space Station and recent science mission successes. "I know what we can do, but we can't do it if we don't pull together," Bolden added.

Additional perspectives from NASA Headquarters in Washington were provided by the agency's mission directorates on a panel moderated by Christyl Johnson, Goddard deputy director for technology and research investments. John Grunsfeld, associate administrator for science, described NASA's approach to innovate, explore, discover and inspire and referenced current and future launches and events, including the Magnetospheric Multiscale mission and the 25th launch anniversary of the Hubble Space Telescope in April. "We are not in caretaker mode," he said. "We are on the cusp of discoveries everywhere."

Greg Williams, deputy associate administrator for human exploration and operations, discussed planning for a Mars journey through cislunar space. Robert Pearce, director for strategy, architecture and analysis, spoke about global mobility with the Next Generation Air Transportation System. Steve Jurczyk, associate administrator for space technology, described a technology path to reach, explore and live on Mars. He specifically mentioned a helicopter concept that triples the range of rovers.

On the "Earth Science and Heliophysics" panel, Lisa Callahan, associate director for mission planning and technology development in Goddard's Earth sciences division, compared the destruction of the ozone layer a decade ago to the climate change situation today. Therese Jorgensen, program director for space weather at the National Science Foundation, discussed the impacts and risks related to space weather.

During the awards luncheon, AAS recognized Norman R. Augustine, Theresa Schwerin, Michael Gass, R. Steven Nerem, Lynn F.H. Cline, Frank Cepollina and Holly Henry for their contributions to spaceflight and space exploration. John Logsdon was also recognized for his AAS fellowship.

France Córdova, director for the National Science Foundation, delivered the keynote on the second day and discussed joint activities between NASA and NSF in areas such as planet hunting with exoplanet telescopes.

Kathy Laurini, NASA senior advisor for exploration and space operations, moderated a panel focused on the Global Exploration Roadmap and its efforts to obtain sustained government commitment based on partnerships with 12 agencies and China. The next update is due in 2016. For the European Space Agency, the moon is next on the roadmap. For NASA, cislunar space is next with Mars as the horizon goal.

The "Destination Mars Spotlights" session featured Bruce Jakosky, principal investigator for NASA's Mars Atmosphere and Volatile Evolution mission, and Joe Cassady, executive director for space for Aerojet Rocketdyne. Jakosky explained MAVEN's objectives to explore the importance of the historical loss of water and carbon dioxide on Mars, while Cassady indicated that we are on the cusp of breaking the 20-year barrier for a human mission to the planet.

Kathy Flanagan, interim director for the Space Telescope Science Institute, opened "The Next Golden Age of Astronomy" panel with an overview of how new missions build upon earlier ones. John Mather and Mark Clampin, Goddard project scientists for the James Webb Space Telescope, described the search for habitable zones of stars in the galaxy and the exploration of planets not observable from the ground but visible through powerful telescopes, respectively. Alexey Vikhlinin, deputy associate director for the high energy astrophysics division at the Harvard-Smithsonian Center for Astrophysics, cited the need for multi-wavelength data to build on the Chandra X-ray Observatory and define a path to its successor.

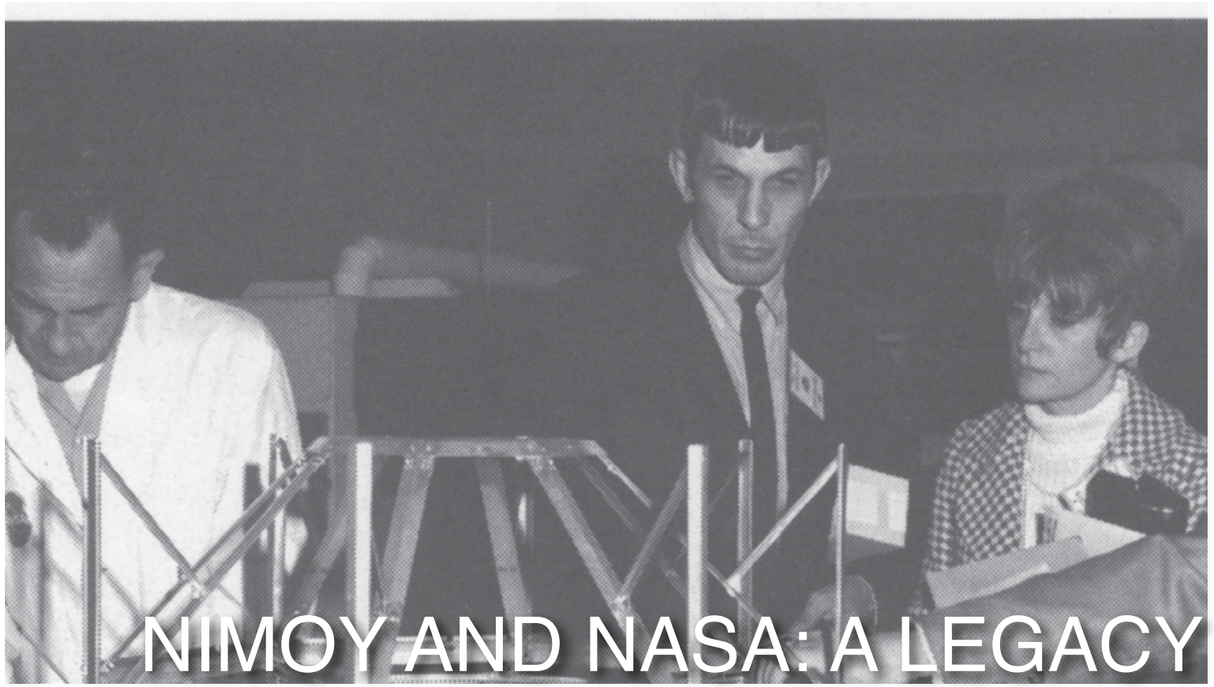
Eric Stallmer, president of the Commercial Spaceflight Federation, moderated a panel on emerging commercial space ventures. Richard DalBello, vice president for Virgin Galactic, provided an update of the company's commercial spaceflight ventures. Barry Matsumori, senior vice president for SpaceX, discussed cargo missions to the space station and NASA's Commercial Crew Program. Peter Marquez, vice president for Planetary Resources, talked about mining asteroids for platinum and precursor technology efforts.

The symposium closed with remarks from Frank Morring and Marcia Smith, editors for Aviation Week & Space Technology and SpacePolicyOnline, respectively. Morring reintroduced the daretaker approach suggested by Rogers, making note of the exciting science and innovation currently taking place in the aerospace industry.

"Each year, I say this symposium's program is the best yet," said Jim Kirkpatrick, AAS executive director. "But this year's program really hit it out of the ballpark." ■

Above: NASA Administrator Charles Bolden delivers the keynote address to symposium attendees (left). John Mather, Goddard astrophysicist, visits a model of SpaceX's partially reusable Dragon spacecraft (center). Bob Rogers, chairman of BRC Imagination Arts, asks questions to students on the "Generation Next" panel (right).

Photo credits: NASA/Goddard/Bill Hrybyk



NIMOY AND NASA: A LEGACY TRAVERSING TIME AND SPACE

By Tashiana Osborne

Science fiction enthusiasts and real-life space explorers alike held Leonard Nimoy in the highest regard. He was best known for portraying the character Mr. Spock on the original series of "Star Trek" in the late 1960s. It was a role he would reprise in several Star Trek films and subsequent series as recently as 2013. Nimoy passed away in February at age 83 from pulmonary complications.

Many scientists and engineers at NASA's Goddard Space Flight Center regularly watched the series in their youth, and quite a number have attributed their career decisions to the influence that Nimoy, Spock and "Star Trek" have had on their lives.

"Leonard Nimoy made astrophysics come alive and he made it cool, and I became a NASA astrophysicist," said David Batchelor, longtime admirer of Nimoy's work. His fascination with Spock and the series would lead him to author "The Science of Star Trek," which examines the scientific credibility of key technologies featured on the show.

"The character of Mr. Spock offered a unique perspective which allowed him, and me, to explore aspects of what it is to be a human being and what it is to be a good one," added David Quinn, Goddard mission director for space science mission operations. "It's a lesson I've carried with me ever since."

Spock, whose genetic makeup partly came from the extraterrestrial Vulcan species, was known as a highly factual, emotionless, analytical and purposeful leader throughout "Star Trek." He commonly gave the greeting "Live long and prosper" and gestured using the Vulcan salute. Both the greeting and gesture were created by Nimoy himself.

"I think the biggest influence Spock had on me and likely many others here was his being analytic and relying heavily on science and trying to marginalize emotional influences," said Glenn Bock, Goddard integration and testing engineer. "Many of us are trying to attain that level of art in our engineering."

Nimoy and the show have connections with NASA's history. In 1959, just seven years prior to "Star Trek" coming on the air, NASA established Goddard, the agency's first spaceflight center. Nimoy would tour Goddard in 1967, marking what would be part of the beginning of a relationship between NASA and what many would say is the most popular space fiction franchise ever.

Nichelle Nichols, who played Lt. Uhura on the original series, was one of the first African-American women to play a major television role that was not that of a servant. After the show went off air, Nichols worked alongside NASA on a campaign to encourage women and minorities to apply for opportunities within space science. Her efforts led to the recruitment of Sally Ride, NASA's first female astronaut; Guion Bluford, the first African-American in space; and Charles Bolden, a shuttle astronaut and current NASA administrator; among many others.

In 1976, as NASA was preparing the first launches of its Space Shuttle Program, "Star Trek" devotees successfully completed a write-in campaign to name one of the shuttles "Enterprise," a reference to show's fictional Starship Enterprise spacecraft.

Other Star Trek talent would eventually follow Nimoy's lead and visit Goddard, including Nichols, George Takei and James Doohan from the original series, as well as Jeri Ryan and Connor Trinneer from future spinoffs.

The bridge of the Starship Enterprise even inspired the design of several control centers at Goddard. "I was going to buy a captain's chair because it was just so wrong that it was missing in the room!" Bock joked.

In a 2010 National Space Symposium interview, Nimoy said that NASA's Apollo 11 moon landing contributed to the continued success of "Star Trek" episodes. "In 1969, Neil Armstrong stepped onto the moon and I think that had a great impact on the 'Star Trek' reruns," he said. "I think people began to look at 'Star Trek' in a new and different way."

"NASA was fortunate to have him as a friend and a colleague," Bolden said in a statement. "He was much more than the Science Officer for the USS Enterprise. Leonard was a talented actor, director, philanthropist, and a gracious man dedicated to art in many forms."

"I was 12 when the original 'Star Trek' aired, and Spock quickly became my favorite character because he was smart and logical. I could also identify with his stoicism," recalled Barbara Scott, former Goddard flight software manager for the Hubble Space Telescope. "I was happy to find out in later years that Leonard himself was smart and a genuinely nice person," she added.

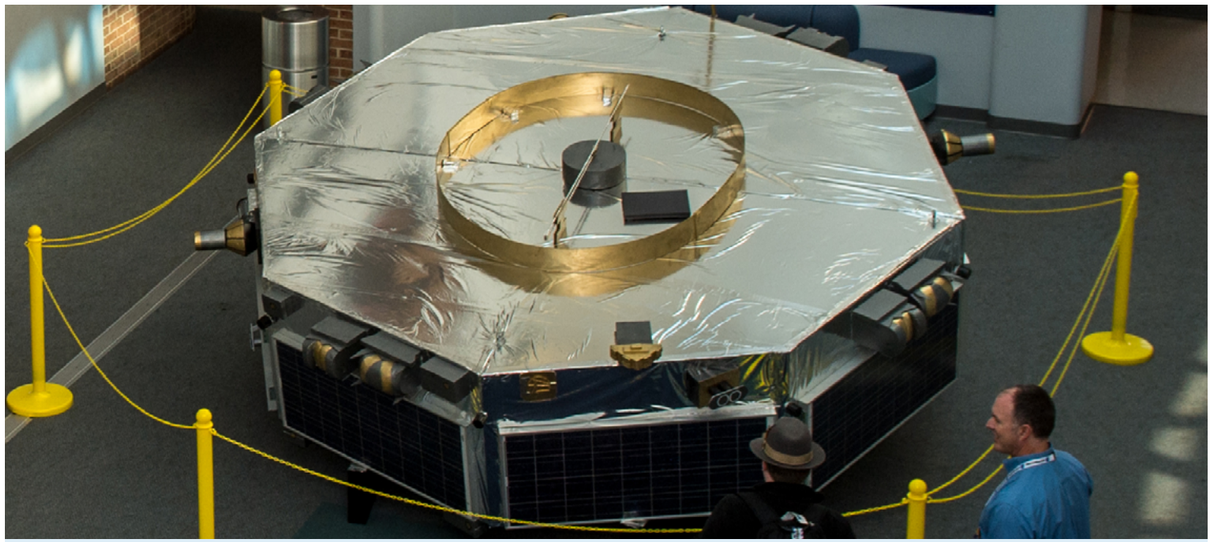
Following his passing, tributes have poured in from all over the world and, appropriately, from space. Astronauts have posted tweets and a few have even offered Nimoy the Vulcan salute from the International Space Station.

Nearly half a century after "Star Trek" introduced the world to Spock, the spirit of Nimoy, his character and the franchise continue to inspire generations of astronauts, space scientists and engineers, as well as legions of fans on Earth and beyond.

"The echoes of his work will inspire optimism and hope for generations to come," said Quinn. "Well done, sir, and thank you! LLAP!" ■

Above, left: Leonard Nimoy (center) tours Goddard's facilities in 1967, a year after "Star Trek" first went on air. Photo credit: NASA/Goddard

Above, right: Leonard Nimoy (sixth from left) and other members of the "Star Trek" cast attend the rollout of the space shuttle Enterprise in Palmdale, Calif., in 1976. Photo credit: NASA



STUDENTS FIND MMS AS SOURCE OF INSPIRATION

By Clare Skelly

Carol Coryea, a science teacher at Paw Paw Schools in West Virginia, first learned about the Magnetospheric Multiscale mission in 2012 while taking a class at NASA's Educator Resource Center in the state. She then started using iPads to teach her seventh-grade students about the mission and solar weather.

She didn't stop there. Coryea visited NASA's Goddard Space Flight Center a total of five times with her students. During her first visit, she met and began working with Troy Cline, education and public outreach mission lead for MMS, to come up with additional ways of incorporating MMS into her science curriculum.

One of the goals of the education and public outreach team is to maintain students' interest in science and math. "It's vital to instill passion in kids by talking about how NASA researches and explores the environment around us and in space," Cline explained.

After noticing the intriguing style of the MMS spacecraft in person, Coryea considered making science models in the classroom. Her initial Popsicle-stick-and-glue assignment quickly evolved into a much larger project.

Coryea and Paw Paw technology teacher Chris Poniris secured a grant through NASA's Space Grant Consortium to build a full-scale model of an MMS spacecraft. Seventh- through 12th-grade students at Paw Paw worked on the project three days a week for eight months, fabricating materials and creating an exceptional final project. The model was on display at Goddard last fall. This spring, the model will be displayed at the Clay Center for the Arts and Sciences in the West Virginia capital of Charleston.

"This project has made a lasting impression on many students," Coryea said. Paw Paw has a great story to tell. The K-12 school has a high poverty rate and all students are eligible for the free-or-reduced lunch program.

In addition, the project has compelled her students to think more seriously about higher education. One of her students who visited Goddard's robotics lab now talks about pursuing a career in robotics. "Before last October, that wasn't the case," Coryea said. Other students have become engaging speakers on the project and MMS.

Coryea and another educator from Texas traveled to NASA's Kennedy Space Center in Cape Canaveral, Florida, with groups of students to participate in a series of student-led activities related to MMS. The trip culminated with their attendance at the MMS launch on March 12.

Coryea's students are now documenting their trip on a website and writing blog entries on what they learned. She hopes the experience will encourage the students to continually challenge themselves and serve as an inspiration to others.

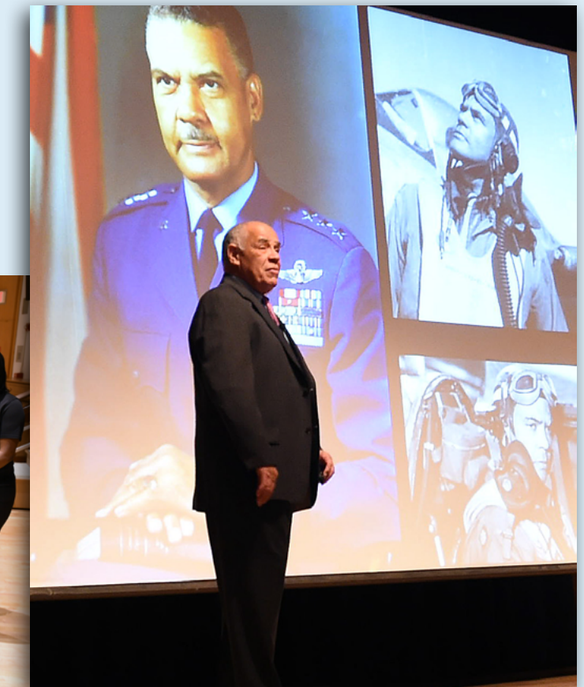
"When you ask scientists and engineers 'What inspired you?' you'll often get answers that refer to an event in middle or high school," Cline said. "We're hoping by talking passionately about the mission and NASA we encourage kids to pursue careers that capture their interests." ■

Above: A full-scale model of an MMS spacecraft, built by Carol Coryea's students, on display at Goddard.

Photo credit: NASA/Goddard/Bill Hrybyk

FREDERICK GREGORY HEADLINES AFRICAN-AMERICAN HISTORY MONTH EVENT

By Trena Ferrell



NASA's Goddard Space Flight Center welcomed former astronaut and retired Air Force Col. Frederick D. Gregory on Feb. 24 as part of the center's celebration of African-American History Month. He spoke at length about his motto in life: "Have Fun and Make a Contribution."

In 1978, Gregory was among those selected for NASA's Astronaut Group 8, a collection of 35 astronauts – comprised largely of women and minorities – chosen to fly for the agency's then-upcoming Space Shuttle Program. He flew on three missions aboard Challenger, Discovery and Atlantis.

He later served at NASA Headquarters in Washington as associate administrator for safety and mission assurance as well as associate administrator for space flight. In 2002, Gregory was sworn in as NASA's deputy administrator, becoming the first African-American to occupy the post.

Organized by Goddard's African American Advisory Committee, the event also featured the Largo High School Choir from Upper Marlboro, Maryland, and the Washington, D.C.-based R&B group Blackbyrds. ■

Photo credits: NASA/Goddard/Debora McCallum

OUTSIDE GODDARD

By Elizabeth M. Jarrell

A Comic Walks Into Goddard...

During the day, Kasha Patel is a science journalist at NASA's Goddard Space Flight Center. After work, she hangs up her NASA badge and prepares for an unusual evening activity: stand-up comedy. With the tagline "Filling the Unknown Demand of Indian Female Comics from West Virginia," Patel has performed original stand-up routines about her childhood and family behind comedy mics all over the United States.

"If you share something unique about your life and your family, people will be interested. I do some riffs on being a Hindu who went to Catholic grade school, arranged marriages and our family names. But, I also like to do science jokes," said Patel.

Complementing her interest in science journalism, Patel also wants to do science comedy, jokes to inspire the general public's interest in science. To celebrate her 23rd birthday, Patel hosted a science comedy night called "This Scientist Walks into a Bar" at the Bier Baron Tavern in Washington, D.C. The event, attended by nearly 150 people, was presented in conjunction with the D.C. Science Writers Association for which she serves as board member and social chair. Patel hosted an evening of funny stories, jokes and songs delivered by scientists, writers, comics and other science enthusiasts.

While obtaining her master's degree in science journalism at Boston University, Patel attended a sketch comedy performance at a local comedy club and thought that performing comedy looked like fun. She enrolled in the club's stand-up comedy classes and soon started performing at open mics.

"I have a subtle sense of humor that many people don't associate with stand-up comedians, and I'm pretty quiet around people I don't know very well. Practicing stand-up comedy surprised a lot of those people, but my friends always thought that I was funny and unconventional," said Patel.

Patel grew up with three older brothers, so she was the victim of many practical jokes. Instead of playing hide-and-seek," her brothers played a game called "Kasha's it!" in which she would hide and her brothers would supposedly search for her. They never did. All three of her brothers — whom she thought were going to be her most difficult audience — have seen her perform stand-up and laughed.

Patel was accepted into the first comedy festival she applied to, the Chicago Women's Funny Festival held in June 2014. At the end of the same month, she returned to Chicago to audition for NBC's "Stand Up for Diversity" competition. Although she didn't make the cut, she was excited to meet other stand-up comics who are equally serious about comedy.

For Patel, the challenge is not stage fright, as she rarely gets nervous on stage thanks to her experience on her high school speech and debate team. She wrote and performed humorous speeches and won many tournaments, even competing at national competitions.

Instead, Patel's challenge is writing original, creative jokes that will always get a laugh. "You can write jokes however you want. There's more than one way to get a laugh. I like comedy that has at least a kernel of truth," said Patel.

She attends open mics several times a week to practice and test new jokes. She also writes a blog, Comedic Commentary, about current events and her adventures in comedy.

"Life takes you in so many unexpected directions. Stand-up comedy is a really fun endeavor for me. I can't predict what will happen, so I'm open to everything," said Patel" ■

Center: Kasha Patel celebrates her birthday during science comedy night at Bier Baron Tavern in Washington, D.C.

Photo credit: Kasha Patel