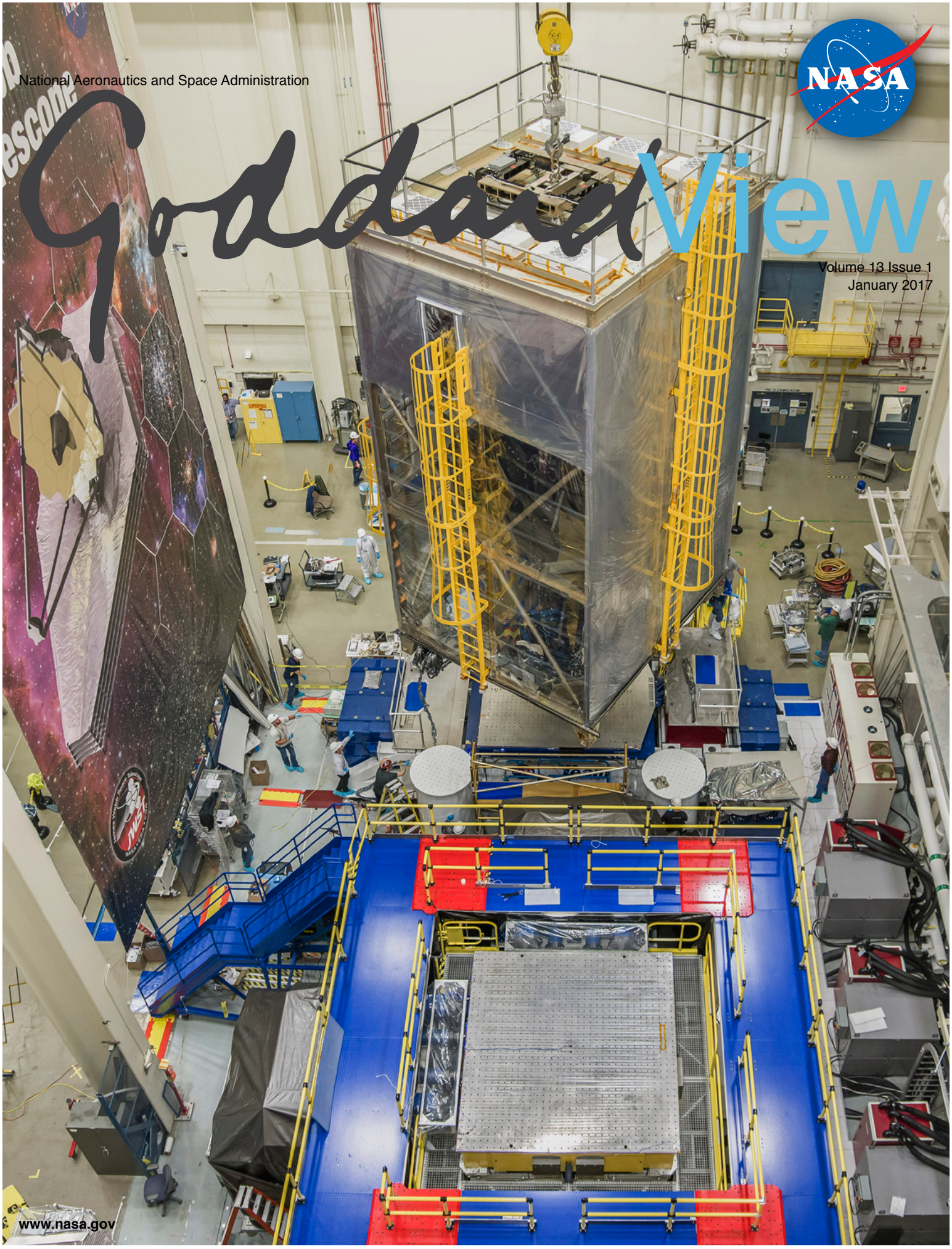

National Aeronautics and Space Administration

Goddard View

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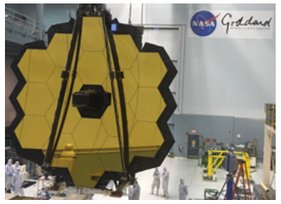
GoddardView

TRENDING

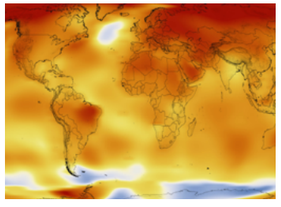
NASA Observes Annual Day of Remembrance
The Day of Remembrance honors members of the NASA family who gave their lives in the name of exploration. This year marks the 50th anniversary of the prelaunch fire aboard Apollo 1, which claimed the lives of three astronauts.

Webb Vibration Testing Resumes
Following a vibration anomaly in early December, engineers resumed vibration testing for the James Webb Space Telescope. The tests will help ensure that the telescope can withstand the vibrations of a launch prior to its deployment to space in 2018.



NASA Mourns Death of Astronaut Gene Cernan
Eugene Cernan passed away on Jan. 16 at the age of 82. A veteran of three space missions, he was the second American to walk in space and, as commander of Apollo 17, the last man to set foot on the moon.

2016 Is Warmest Year on Record
Independent analyses by the Goddard Institute for Space Studies and the National Oceanic and Atmospheric Administration concluded that Earth's average surface temperatures in 2016 were the warmest since modern record-keeping began in 1880.



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On the cover: Resumption of vibration testing for the James Webb Space Telescope following a vibration anomaly in early December.

Photo credit: NASA/Goddard/Chris Gunn

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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.

ECLIPSE 2017: NASA SUPPORTS SCIENCE IN THE SHADOW

By Sarah Frazier

The first total solar eclipse in the continental United States in nearly 40 years will take place on Aug. 21, 2017. Beyond providing a brilliant sight in the daytime sky, the event will present a rare chance for scientists to collect data only available during eclipses. NASA is funding 11 scientific studies that will take advantage of this opportunity.

"When the moon blocks out the sun during a total eclipse, those regions of Earth that are in the direct path of totality become dark as night for almost three minutes," said Steve Clarke, director of the Heliophysics Division at NASA Headquarters in Washington. "This will be one of the best-observed eclipses to date, and we plan to take advantage of this unique opportunity to learn as much as we can about the sun and its effects on Earth."

The August 2017 total solar eclipse will provide a unique opportunity to study Earth, the sun and their interaction thanks to the eclipse's long path over land. The path of the total eclipse crosses the United States from coast to coast, enabling scientists to take ground-based observations for more than an hour to complement the wealth of data provided by NASA satellites.

The 11 NASA-funded studies span a range of disciplines, using the total solar eclipse to observe our sun and Earth, test new instruments, and even leverage the skills of citizen scientists to expand our understanding of the sun-Earth system.

During a total solar eclipse, the moon blocks out the sun's overwhelmingly bright face, revealing the relatively faint solar atmosphere, or corona. Scientists can also use an instrument called a coronagraph – which uses a disk to block out the light of the sun – to create an artificial eclipse.

However, a phenomenon called diffraction blurs the light near the disk in a coronagraph, making it difficult to get clear pictures of the inner parts of the corona, so total solar eclipses remain the only opportunities to study these regions in clear detail in visible light. In many ways, these inner regions of the corona are the missing link in understanding the sources of space weather, so total solar eclipses are truly invaluable in our quest to understand the sun-Earth connection.

Total solar eclipses are also opportunities to study Earth under uncommon conditions. The sudden blocking of the sun during an eclipse reduces the light and temperature on the ground, and these quick-changing conditions can affect weather, vegetation and animal behavior. ■

Above: An illustration of the path of totality across the United States for the August 2017 total solar eclipse. Image credit: NASA Scientific Visualization Studio

Below: A total solar eclipse in November 2012 as viewed from Australia. Image courtesy: Romeo Durscher

GODDARD SCIENTIST WINS 2017 GLBT SCIENTIST AWARD

By Rob Gutro

Matthew McGill of NASA's Goddard Space Flight Center has been selected as the recipient of the 2017 National Organization of Gay and Lesbian Scientists and Technical Professionals (NOGLSTP) Scientist of the Year Award.

This award is presented to a gay, lesbian, bisexual or transgender (GLBT) scientist who has made outstanding contributions in their field.

McGill was chosen to receive the award thanks to his outstanding achievements in the application of lidar technology in the study of Earth's atmosphere to better understand climate change impacts. Lidar is a remote-sensing method that uses light from a pulsed laser to measure properties of the atmosphere.

"This is truly a unique and prestigious honor. To be recognized from amongst all science disciplines is humbling and also acknowledges the importance of the work the Earth science community is pursuing," McGill said upon being notified of the award. "Moreover, to be recognized as a visible member of, and advocate for, the GLBT community provides important recognition of the value of GLBT professionals. Such visibility is particularly important within government agencies, such as NASA."

McGill is both a research physicist and the chief technologist of the Goddard Earth Sciences Division.

As a research physicist, his focus is on studying the atmosphere. He develops new concepts, prototypes new instruments, participates in field campaigns, analyzes data from instruments and satellites, writes proposals, and mentors younger researchers.

As his division's chief technologist, he advises management on where the agency should make strategic investments and connects scientists and engineers to make them happen.

Since 2000, McGill has served as the principal investigator for the Cloud Physics Lidar, an instrument that operates on NASA's high-altitude aircraft and has flown aboard an unmanned Global Hawk aircraft during the Hurricane Severe Storm Sentinel mission. He has developed multiple laser remote-sensing instruments, primarily for use on high-altitude research aircraft.

In 2011, he led the development of the Multiple Altimeter Beam Experimental Lidar instrument to conclusively demonstrate a new approach to measuring surface elevation as a demonstrator for the ICESat-2 mission.

Most recently, McGill led an award-winning team that designed and built the Cloud Aerosol Transport System (CATS) instrument, a low-cost lidar system built as a technology demonstrator on the International Space Station. CATS uses a laser to study clouds and pollutants in the atmosphere.

Launched in January 2015, CATS has been successfully operating on the space station for two years.

McGill has participated in at least 20 field campaigns over the past two decades. His instruments have been used in Costa Rica, South Africa, Iceland and throughout the continental United States.

NOGLSTP annually recognizes a scientist of the year, engineer of the year and educator of the year across the broad spectrum of science, engineering and academia.

The NOGLSTP awards were established as a means of identifying, honoring and documenting the contributions of outstanding GLBT science, engineering and technology professionals, as well as corporations, academic institutions and businesses that support GLBT professionals in science and technology.

The award will be presented at the banquet of the Out to Innovate conference on March 4, in Danvers, Massachusetts. ■

Center: Matthew McGill

Photo credit: NASA/Goddard

LIKE FATHER, LIKE SON: A JOURNEY THROUGH CIVIL RIGHTS WITH JOSH WHITE JR.

By Trena Ferrell

Josh White Jr. has had an accomplished career in the blues. At the age of 4, he began performing with his father Josh White Sr. at America's first integrated nightclub. He has entertained crowds on some of the world's biggest stages, including Carnegie Hall, the Lincoln Center, the Kennedy Center and the Berlin Philharmonic Hall. He has been nominated for a Grammy and has won a Tony Award. Several universities have recognized his accomplishments to music and society with honorary doctorates.

In addition to being an accomplished musician in his own right, White Sr. was also one of the pre-eminent figures of the civil rights movement in the 1940s, helping break down the segregation of defense plants, the armed forces and performance venues across the country. In the 1960s, White Sr. performed at voter registration rallies in the South and at the historic March on Washington in 1963.

White Jr. has used his craft to keep his father's memory and contributions alive.

On Jan. 9, in celebration of Martin Luther King Jr.'s birthday and African American History Month, White Jr. paid a visit to NASA's Goddard Space Flight Center as part of a colloquium organized by the Goddard Exploring Leadership Colloquium and the Goddard African American Advisory Committee.

"I feel privileged to be here. When I think of gigs, this one would never have entered my mind," said White Jr. about performing in front of a NASA audience. He added that his style is like that of John Denver, but with more soul.

White Jr. started off his concert with the hit "One Meatball," originally recorded by his father and the first record by a black male artist to sell 1 million copies.

Combining songs with storytelling, he continued with selections that documented a journey through the civil rights era, including "Trouble," "Uncle Sam Says" and "Defense Factor Blues."

Like his father, White. Jr. has performed at hundreds of rallies for civil rights and other social causes throughout the United States. He explained that through it all, he lives by the motto "Keep the positive," echoing themes from his music. ■

Above: Josh White Jr. posing in front of a model of the Hubble Space Telescope. Photo credit: NASA/Goddard/Debora McCallum

Below: White Jr. performing his own hits as well as songs by his father during a colloquium organized by the Goddard Exploring Leadership Colloquium and the Goddard African American Advisory Committee. Photo credit: NASA/Goddard/Debora McCallum.

GODDARD'S 2016

January

Scientists Find 2015 to Be Warmest Year on Record: The year 2015 ranks as Earth's warmest since 1880, according to two separate analyses by NASA and the National Oceanic and Atmospheric Administration. Fifteen of the 16 warmest years on record have now occurred since 2001, according to the analyses.

February

Gravitational Waves Detected: The National Science Foundation announced the detection of gravitational waves by the Laser Interferometer Gravitational-Wave Observatory, a pair of ground-based observatories in Hanford, Washington, and Livingston, Louisiana. The discovery confirms the existence of gravitational waves as posited by Albert Einstein a century ago in his general theory of relativity.

March

Celebrating 90 Years: Robert Goddard's Rocket and the Launch of Spaceflight: On March 16, 1926, physicist Robert H. Goddard launched the world's first rocket powered by liquid fuel. Ninety years later, Goddard's pioneering achievements remain fundamental to the field of rocketry and NASA's work. He is the namesake of NASA's Goddard Space Flight Center.

April

Hubble Discovers Moon Orbiting Dwarf Planet Makemake: The Hubble Space Telescope spotted a small, dark moon orbiting Makemake, the second brightest icy dwarf planet – after Pluto – in the Kuiper Belt. The Kuiper Belt is a vast reservoir of leftover frozen material from the construction of our solar system 4.5 billion years ago and is home to several dwarf planets.

June

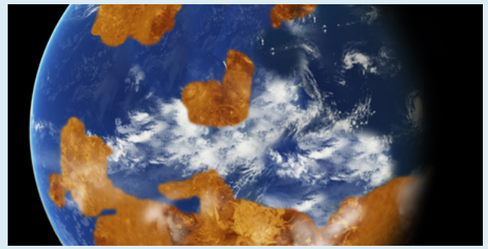
Satellite Finds Unreported Sources of Toxic Air Pollution: Using a new satellite-based method, scientists at NASA, Environment and Climate Change Canada, and two universities located 39 unreported and major human-made sources of toxic sulfur dioxide emissions. A known health hazard and a contributor to acid rain, sulfur dioxide is one of six air pollutants regulated by the U.S. Environmental Protection Agency.

July

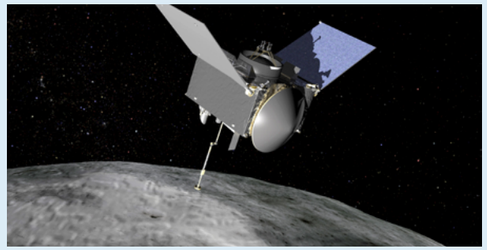
Moon 'Photobombs' Earth: For only the second time in a year, a NASA camera aboard the Deep Space Climate Observatory (DSCOVR) captured a view of the moon as it moved in front of the sunlit side of Earth. The images were taken by NASA's Earth Polychromatic Imaging Camera, a four-megapixel CCD camera and telescope on the DSCOVR satellite, which is in orbit 1 million miles above Earth.

MILESTONES AT A GLANCE

August



Climate Models Suggest Venus May Have Been Habitable: Venus may have had a shallow liquid-water ocean and habitable surface temperatures for up to 2 billion years in its early history, according to computer modeling of the planet's ancient climate by scientists at NASA's Goddard Institute for Space Studies.



September

OSIRIS-REx Launches Toward Asteroid Encounter: The Origins, Spectral Interpretation, Resource Identification, Security-Regolith Explorer launched on Sept. 8 on its way to the asteroid Bennu as part of a mission that scientists anticipate will reveal answers to some of the basic questions about the solar system. The mission will return asteroid samples that will be the largest returned from space since the Apollo era.

October

Antares Rocket Soars From Virginia's Eastern Shore: Orbital ATK's Cygnus spacecraft lifted off from the Mid-Atlantic Regional Spaceport aboard the company's upgraded Antares 230 rocket, carrying more than 5,100 pounds of cargo to the International Space Station. This was the first launch from Wallops since an Antares rocket and its Cygnus spacecraft were lost in October 2014.

November

James Webb Space Telescope Milestone: Completion of Telescope Element: A moment two decades in the making, thousands of people completed the construction of the telescope element of the largest space telescope ever built. The optical and science segment of the James Webb Space Telescope stands complete in Goddard's high bay clean room, one of the largest in the world.

Launch of GOES-16, the Next-Generation Weather Satellite: NASA successfully launched for the National Oceanic and Atmospheric Administration the first in a series of highly advanced geostationary weather satellites from Cape Canaveral Air Force Station in Florida. GOES-16, which will become operational in 2017, will boost the nation's weather-observation capabilities, leading to more accurate and timely forecasts and warnings.

December

Piers Sellers, 1955-2016: Piers Sellers passed away on Dec. 23, more than a year after learning he had pancreatic cancer. He leaves behind a dynamic legacy at Goddard and NASA. As an astronaut, he helped build the International Space Station. As a manager, he helped lead hundreds of scientists. And as a public figure, he was an inspiration to many for his optimistic take on humanity's ability to confront Earth's changing climate. ■

Photo credits: NASA; NASA/Bill Ingalls; NASA/Goddard; National Oceanic and Atmospheric Administration; European Space Agency; Southwest Research Institute/A. Parker

By Sarah Schlieder

Two scientists from NASA's Goddard Space Flight Center were named recipients of Presidential Early Career Awards for Scientists and Engineers, known as PECASE. The awards are the highest honors given by the U.S. government to science and engineering professionals early in their careers.

Dalia Kirschbaum and Miguel Román are Goddard's two of 102 total scientists and researchers who were given the award. Awardees are selected for their work toward innovative research in science and technology, as well as their commitment to community service through scientific leadership, public education and community outreach.

Kirschbaum serves as the associate deputy project scientist for applications for the Global Precipitation Measurement (GPM) mission, providing scientific leadership for applications research and outreach activities. She is also the acting applied sciences manager at Goddard. She is on several science teams, focusing on landslide hazard assessment, and she serves as a disaster response coordinator for the agency.

"It is truly an honor and privilege to be recognized at the highest level for scientific contributions to the field," Kirschbaum said. "Being within the NASA community has been inspirational, from working with the GPM mission, to disaster research and response, to collaborating with colleagues both here and abroad. Though only one person's name is listed, this award should be considered a team honor due to the many people who have been influential, supportive and foundational in guiding my work, and who continually strive to advance and communicate our knowledge of how Earth is changing and impacts us."

Román is a lead member on multiple science teams, including the Moderate Resolution Imaging Spectrometer (MODIS) instrument team. MODIS instruments fly aboard NASA's Terra and Aqua satellites. He is also on the Visible Infrared Imaging Radiometer Suite team, overseeing an instrument aboard NASA-NOAA's Suomi National Polar-Orbiting Partnership satellite. Román also serves as a disaster response coordinator for the agency.

"It is an honor to represent NASA on the national stage and to be able to share in our agency's mission – to use the unique vantage of space to monitor Earth's vital signs and to further our understanding of the wide-ranging environmental changes and their impacts on the most basic aspects of life and society," Román said.

The award was established in 1996 and is coordinated by the Office of Science and Technology Policy within the Executive Office of the President. ■

Above: Dalia Kirschbaum (left) and Miguel Román.

Photo credits: NASA/Goddard/Bill Hrybyk

GODDARD SCIENTISTS RECEIVE PRESIDENTIAL EARLY CAREER AWARDS

GODDARD'S OWN 'HIDDEN FIGURE,' AND A LEGEND OF INVENTION

The film "Hidden Figures" chronicled the careers of three African-American women who were indispensable during NASA's early years. Here are profiles of two African-Americans who made lasting contributions to NASA's Goddard Space Flight Center.

Melba Roy Mouton

Melba Roy Mouton earned her bachelor's and master's degrees in mathematics from Howard University in Washington, D.C. After working several years for the Army Map Service and the U.S. Census Bureau, she began her NASA career at Goddard in 1959.

Recognized as a "computer," she became the head mathematician for Echo satellites 1 and 2, and by 1961, the head programmer for a team responsible for predicting spacecraft trajectories and locations. She was later promoted as the program production section chief for the center. This work gave NASA the ability to track spacecraft while in orbit.

Chanda Prescod-Weinstein, who did post-doctoral work at NASA, said of Mouton's work, "When we launch satellites into orbit, there are a lot of things to keep track of. We have to ensure that gravitational pull from other bodies, such as other satellites, the moon, etc., don't perturb and destabilize the orbit. These are extremely hard calculations to do even today, even with a machine-computer. So, what she did was extremely intense, difficult work."

The goal of her work, in addition to ensuring satellites remained in a stable orbit, was to know where everything was at all times.

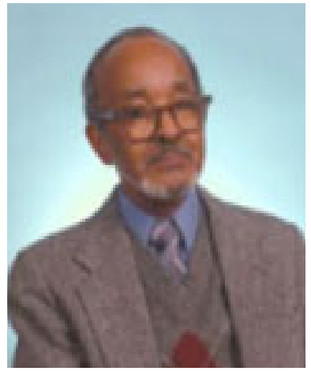
By 1972, Mouton had become the assistant chief of research programs for the Goddard Trajectory and Geodynamics Division. Her computations helped produce the orbital elements timetables, allowing the tracking of satellite orbits.

During her 18-year career, the native of Fairfax, Virginia, was recognized with an Apollo Achievement Award and an Exceptional Performance Award. She is the author of "Automated Methods of Computer Program Documentation." She retired in 1973 and died of a brain tumor in 1990 at the age of 61.

Emmett Chappelle

In 2007, Emmett Chappelle was inducted into the National Inventors Hall of Fame in Akron, Ohio, confirming his status as one of NASA's great innovators. The retired Goddard research scientist owns 14 U.S. patents, an indication of a life's work devoted to technical innovation. He has been widely recognized as one of the 20th century's top African-American scientists.

The National Inventors Hall of Fame recognized his work with lyophilized reaction mixtures. Chappelle's work revealed that a specific combination of chemicals causes all living organisms to emit light. Through his discovery, Chappelle facilitated important findings in biology and chemistry, leading to the development of remote sensing of vegetation health through laser-induced fluorescence.



He also developed innovative techniques used to detect bacteria in urine, blood, spinal fluids, drinking water and foods.

Chappelle's work hastened the development of laser-induced fluorescence as a means to detect plant stress. This technique allows scientists to measure crop health and productivity based on the amount of light that crops emit. The creation of such data can be used to improve food production through effective planting, irrigation and fertilization patterns.

He began his work with NASA in 1963 while a senior biochemist at the Hazelton Laboratory in Falls Church, Virginia. In 1966, Chappelle joined Goddard as an exobiologist and later became an astrochemist.

"I really enjoyed my time at Goddard," Chappelle said after his induction to the hall of fame was announced. "The people made it a great place for me to do my research, and I really appreciated that NASA recognized the importance of my work." ■

Photo credits: NASA/Goddard

BOLDEN AND NEWMAN BID NASA

FAREWELL IN FINAL TOWN HALL EVENT

Charlie Bolden and Dava Newman hosted a town hall event at NASA Headquarters in Washington during their final days as NASA administrator and deputy administrator, respectively.

Throughout their tenures, Bolden and Newman made several visits to NASA's Goddard Space Flight Center, from hosting congressional visits and promoting science and innovation to checking in on missions and honoring the center's most accomplished employees. ■

Photo credits: NASA/Bill Ingalls and Joel Kowsky; NASA/Goddard/Bill Hrybyk

NORMAN KURING:
MAKING THE UNSEEN OCEAN VISIBLE

By Elizabeth M. Jarrell

What do you do and what is most interesting about your role here at Goddard? How do you help support Goddard's mission?

I'm an oceanographer. Our group does oceanography connected to the color of the ocean, which we measure using instruments on satellites operated by NASA and other international partners. We use those data to look at the ocean to see how the ocean reflects sunlight in different wavelengths. This helps us locate phytoplankton and determine their concentrations. Phytoplankton are the basis of most of the food webs in the oceans. They are also very important in removing carbon dioxide from the atmosphere and providing roughly half of the oxygen we have to breathe.

How did curiosity lead you to become an oceanographer at Goddard?

Growing up, I watched Jacques Cousteau and Marlin Perkins on television exploring the natural world. I was fascinated by a world that I had not been aware of and one that I had never visited, particularly the underwater world. I got an undergraduate degree in biological oceanography from the Florida Institute of Technology in Melbourne. I got a master's in biological oceanography at Dalhousie University in Halifax, Nova Scotia, Canada. While at Dalhousie, I did a summer internship at Goddard in 1986 with the progenitors of the ocean color group that I'm with today. We're a unique group with interesting backgrounds. I haven't quite figured out why our group works as well as it does; we just all like and respect each other. We also have interesting lives outside of work.

How did the Blue Marble 2012 come about?

Jim Gleason, a project scientist for the Visible Infrared Imaging Radiometer Suite (VIIRS) on the Suomi NPP satellite, asked me for an image of VIIRS ocean color to take to an American Meteorological Society meeting in New Orleans. I looked for a day that was relatively cloud free and showed interesting features on land and on the water. For this image, I stitched together images from four satellite orbits which works out to about six hours' worth of data. I spent a few days, less than a week, searching and assembling. The original Blue Marble was the Apollo image. When I made this image, I was not thinking of that Blue Marble. Someone else named it.

Did you ever think that your image would become a postage stamp?

I didn't realize that my image was even being considered for a stamp until it was already decided. On Dec. 29, 2015, I was told that this image would become a stamp. This image is one of eight on a sheet including Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. Pluto has its own stamp with the New Horizons spacecraft. All the images come from NASA satellites.

How did you feel attending the stamp release ceremony of your image?

I was pleased and surprised by the crowd's interest, but I was also very nervous about my speaking role. My wife was excited. I'm a very low-key kind of person, but I still find the attention flattering, though most unexpected.

On May 31, 2016, I was in Manhattan at the release ceremony at the World Stamp Show, which is only held every 10 years. I was one of the speakers. I talked about how fascinating it is that we can collect data from different planets, that we're a curious species and want to know more about the universe. But there is only one planet that we know of that will support human life, and that is Earth. Then I showed the stamp.

What is next for you?

I'm the kind of guy who, left to my own devices, always comes back late from a hike. That inexorable tractor beam of curiosity keeps pulling me around the next bend, or block, then over the next ridge, or bridge, toward whatever might lie beyond. The wider, unexplored universe pulls on me the same way. The space programs of the United States and other countries fuel my curiosity by gathering imagery like that used for the Blue Marble 2012. We live on a remarkably beautiful planet. We need to take care of her. Appreciate nature, go outside and explore. ■

Center: Norman Kuring speaking at the World Stamp Show NY-2016.

Photo credit: U.S. Postal Service/Daniel Afzal