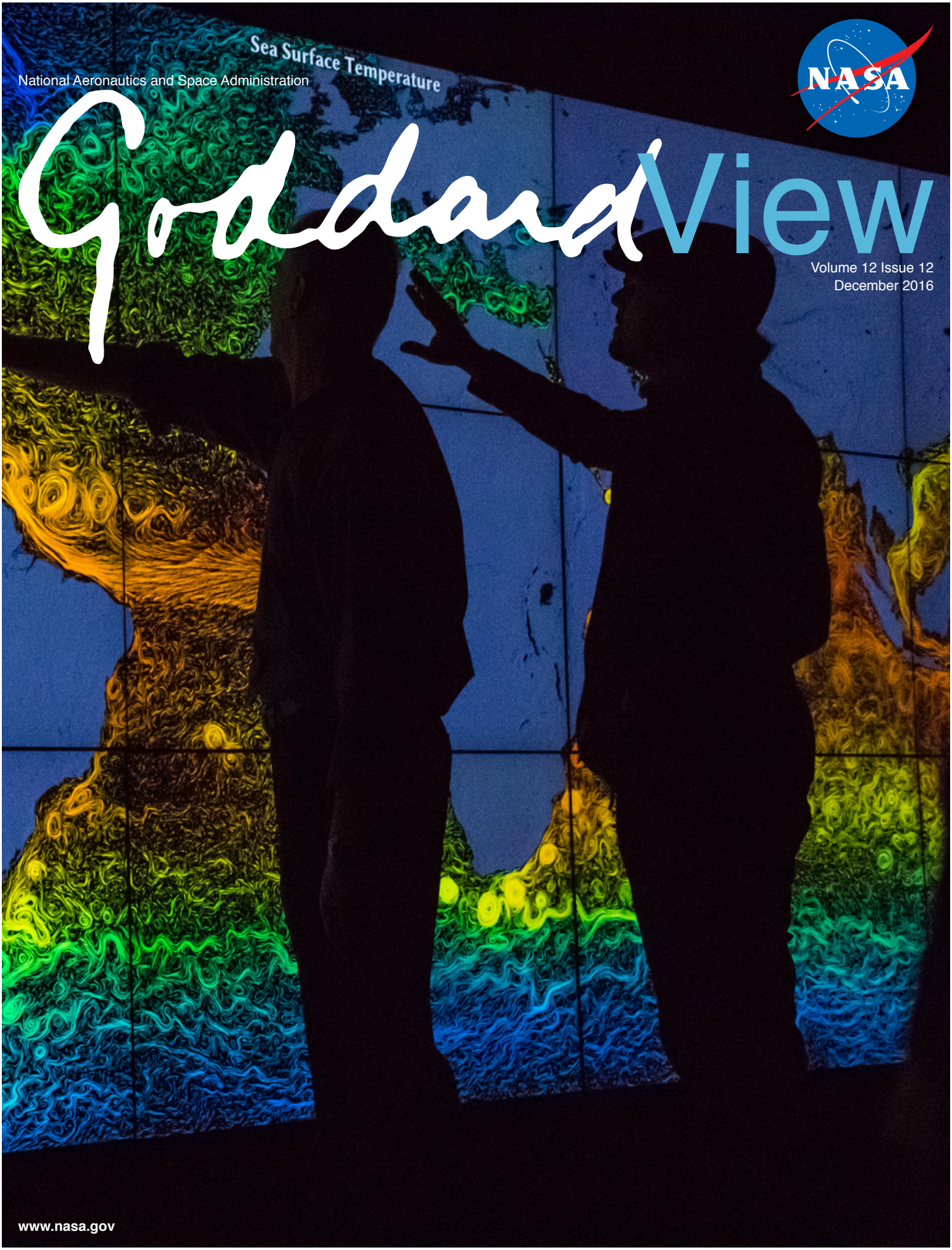

National Aeronautics and Space Administration

Goddard View

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GoddardView

TRENDING

NASA Named Best Place to Work... Again
The Partnership for Public Service has named NASA the best place to work among large federal agencies for the fifth straight year. Goddard ranked 10th among 305 agency subcomponents, the highest among all NASA centers.

NASA Says Goodbye to John Glenn
The agency mourned the death of astronaut pioneer John Glenn, who passed away at the age of 95. He was the first American to orbit Earth when he did it three times during the Mercury-Atlas 6 mission in 1962.

'Hidden Figures' at NatGeo
Twentieth Century Fox hosted a screening of "Hidden Figures" for Goddard employees at the National Geographic Society in Washington, D.C. The film highlights the contributions of three African-American women to NASA missions in the 1960s.

SMD Associate Administrator Visits Goddard
Thomas Zurbuchen, associate administrator for the NASA Science Mission Directorate, paid a visit to Goddard and spoke to employees about his vision for science at the agency in the years ahead.

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On the cover: Goddard scientist Piers Sellers (left) discusses climate visualizations with Leonardo DiCaprio during filming for the actor's "Before the Flood" documentary. Photo credit: NASA/Goddard/Rebecca Roth

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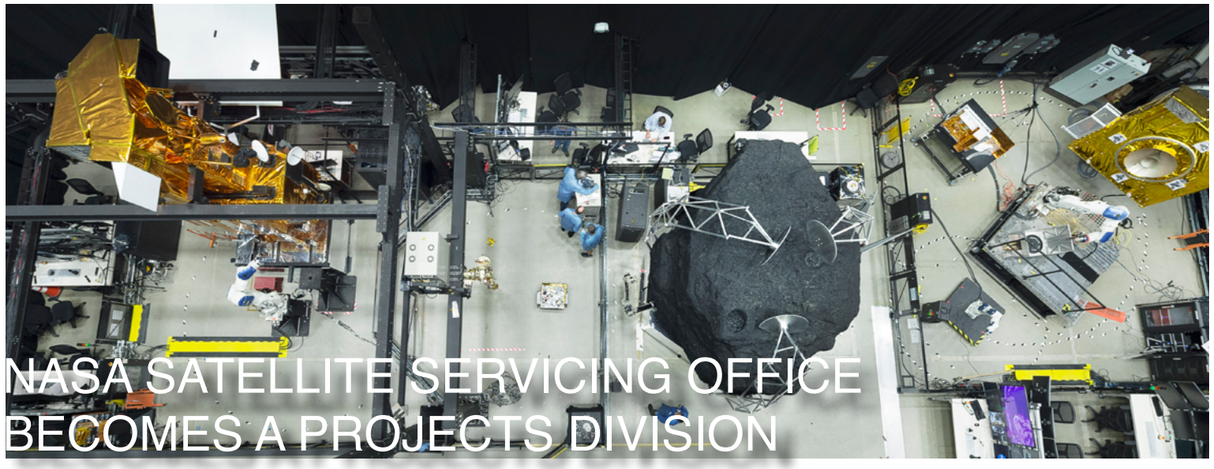
GoddardView Info

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.



NASA SATELLITE SERVICING OFFICE BECOMES A PROJECTS DIVISION

By Peter Sooy

Since 2009, the Satellite Servicing Capabilities Office (SSCO) has been building upon the heritage of satellite servicing and repair that began with NASA's successful servicing of the Hubble Space Telescope. Recently, SSCO became the Satellite Servicing Projects Division (SSPD), continuing its growth from one office with multiple demonstrations to a division of three offices and two projects.

The creation of SSPD is more than a name change. "The growth of satellite servicing projects and demonstrations necessitated the evolution of the office into a division," said Ben Reed, deputy division director for SSPD. SSCO was a vital bridge from human-based shuttle servicing to robotic-based multiple-orbit servicing. "It was the foundation that will allow us as a division to expand our technologies for multiple stakeholders – from on-orbit refueling to large aperture telescope assembly in space, and NASA's Journey to Mars," added Reed.

During its relatively short existence, SSCO completed five technology maturation missions and has three launches planned in the near term. This rapid maturation and cadence of launches has highlighted the need for a formal NASA division. This evolution to a division allows for greater coordination of NASA servicing missions and the execution of a targeted technology development campaign. An additional advantage is the ability to infuse and transfer cross-cutting servicing capabilities to government and domestic industry stakeholders.

The Satellite Servicing Enabling Technologies (SSET) Office manages the development of key technologies critical to in-space robotic servicing. The role of SSET will be to ensure the development of each technology meets overall SSPD requirements and goals.

The Satellite Servicing Advanced Concepts Office is responsible for identifying and developing new and innovative solutions to in-space servicing needs.

The International Space Station Payloads Office is responsible for managing all of the in-space servicing hardware development efforts conducted on the International Space Station. They include the multiphased Robotic Refueling Mission, the ISS Robotic External Leak Locator, Alpha Magnetic Spectrometer tools and the Raven demonstration for both robotic and crewed missions.

The Restore-L project is responsible for managing the overall development of robotic servicing technologies and capabilities to be used for the Restore-L mission. NASA plans to transfer these technologies and capabilities to interested domestic entities in commercially provided servicing and to meet science and exploration objectives on future deep space exploration missions, including the Asteroid Redirect Mission (ARM).

The ARM Capture Module Project is responsible for the front end of the robotic spacecraft. ARM's robotic mission will demonstrate advanced, high-power solar electric propulsion capabilities, retrieval of a boulder from an asteroid, deep space trajectory and navigation, and automated rendezvous and docking of multiple vehicles – all key components of future in-space operations for missions to Mars.

What has remained the same is the people. "The spirit of innovation still runs deep among the entire division," said Reed. "The passion to challenge the status quo of 'one-and-done' missions burns as bright as ever." Developments within SSPD will create more capabilities and possibilities for future NASA missions, according to Reed. "SSPD will carry on the skunkworks environment of SSCO and Hubble servicing to better position NASA's abilities with in-space robotic repair, upgrade and disposal." ■

Above: A view inside the Robotic Operations Center, NASA's newest facility for satellite servicing development.

Photo credit: NASA/Goddard/Chris Gunn

GINA DIBRACCIO: A MAVEN OF MAVEN AND A FITNESS BUFF

By Elaine Hunt

What do you do at Goddard?

I am a magnetometer team member in the Goddard Planetary Magnetospheres Lab. My group builds magnetometers to measure magnetic fields in space. As a research scientist, my primary job function is to analyze these data in order to understand space plasma dynamics in different planetary environments. Currently, with NASA's MAVEN mission at Mars, I am analyzing magnetic field and plasma data so that we may learn why Mars is losing its atmosphere to space. I have investigated the sun's interaction with Mercury's magnetic field using data from the MESSENGER mission. I am also preparing to work with data collected by the Juno spacecraft at Jupiter.

What's your favorite part about working here?

My favorite part about working at Goddard is that I get to see data as soon as they arrive from space. I have the chance to make new discoveries every day, and this never loses its excitement! NASA offers many different opportunities, and I always try to take advantage of them. Whether it's meeting an astronaut or enrolling in a career-building workshop, I've had many great experiences.

How did you get into your field?

As a young kid, I decided that I wanted to become an astronaut one day. My parents helped me to follow this passion by bringing me to the local planetarium, taking a special trip to the Smithsonian Air and Space Museum, and buying me a telescope. When it was time for college, I decided to major in physics and astronomy. A few years later, I was selected for an internship at NASA's Glenn Research Center in Cleveland, where I had my first research experience. This position led me to the NASA co-op program, and I stayed at Glenn to work radioisotope energy sources for deep space missions before transferring to Goddard. During this time at Goddard, I began to hone in on my interest in space plasma physics and found my niche in the field by analyzing in situ magnetic field data at Mercury. Concurrent to this time at Goddard, I began my graduate program at the University of Michigan, where I received a Ph.D. in atmospheric and space sciences.

What's the coolest thing you've done while at Goddard?

I'm not sure that I can choose just one! In January, I had the once-in-a-lifetime chance to attend a meeting in Rovaniemi, Finland – the Arctic Circle! Not only was I collaborating with scientists from all over the world, but we also made time for unique excursions. January is prime time for aurora viewing in Finland. For this reason, we took a reindeer sleigh ride in minus 40-degree weather to watch the aurora light up the night sky. This is something I will never forget.

More recently, in July, I was selected to attend the 66th Lindau Nobel Laureates Meeting in Lindau, Germany. I spent one week on a tiny island in southern Germany where I interacted with more than 30 Nobel laureates. To say that this was a unique experience would be an understatement.

What do you do outside of work?

For reasons related to both health and stress relief, I am really passionate about nutrition and fitness. In fact, when I'm not analyzing MAVEN data, I spend my time training for long-distance races or being a fitness coach. I also love to travel with my husband! In the last year alone, I've been fortunate enough to experience Finland, Germany, France, Singapore, Cambodia, Vietnam, Hawaii, Fiji and more. I find it really interesting to visit new cities, meet new people and try new cuisines.

What advice do you have for people just getting into your field?

Students and younger scientists often ask how I achieved my goal of working at NASA. I mostly attribute this to hard work and determination. Graduate school has its ups and downs. Sometimes it's smooth sailing and at other times you are presented with challenges. These challenges provide an opportunity to grow as a scientist. Additionally, I recommend seeking various research opportunities, such as internships, to experience different types of research. It's natural to like some more than others, but you will not know what you prefer until you give them a try. ■

Center: Gina DiBraccio

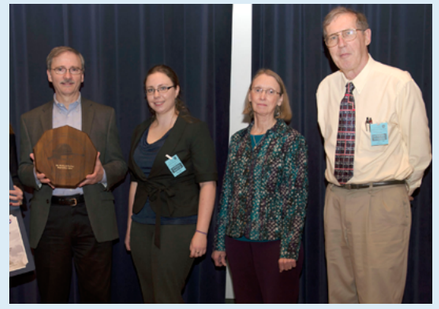
Photo credit: NASA/Goddard/Bill Hrybyk

LOST, BUT FOUND: LINDSAY AWARD RECIPIENT DISCOVERS HOPE FOR PIONEERING TECHNOLOGY IN MISSION'S MISFORTUNE

By Darrell Dela Rosa

Sent into orbit in February 2016, the Hitomi spacecraft was designed to explore the evolution of the universe's largest structures and the behavior of matter in extreme gravity fields. A little more than a month after launch, the mission produced an exciting culmination of many years of work by astrophysicist Richard Kelley and fellow scientists from NASA's Goddard Space Flight Center, as well as scientists and colleagues from institutions in the United States, Japan and the Netherlands. Hitomi, known as Astro-H before launch, peered into the Perseus cluster – a collection of thousands of galaxies bound together by gravity. Located about 240 million light-years from Earth, the cluster contains a significant amount of hot gas, whose dynamics couldn't be measured prior to the mission. The observation revealed that turbulence accounts for only a minor amount of total gas pressure, a discovery that will help scientists better measure the mass of distant galaxy clusters in the future.

The moment, remarkable as it was, proved to be bittersweet for the Hitomi team. The Japan Aerospace Exploration Agency (JAXA) lost contact with the satellite not long afterward, learning that a series of attitude control malfunctions caused elements of the satellite to break up.



Before the demise, however, the discovery had the added effect of demonstrating the power of Hitomi's X-ray microcalorimeter, a Goddard-built pioneering instrument that allowed for the observation using a technology that produces crisp spectral resolution for sources occupying a large area in the sky.

In recognition of this accomplishment, Kelley, U.S. principal investigator for the mission, was presented with the John C. Lindsay Memorial Award – named in honor of the former associate chief of the Goddard Space Sciences Division who advanced the study of the sun using satellites and rocket-borne experiments. Established in 1966, a year after Lindsay's passing, it is given annually to "Goddard scientists who exemplify the same level of scientific achievement."

"I was extremely humbled and honored to receive the award," said Kelley. "It was very important for me to accept this on behalf of the large team that made the work successful. Hundreds have worked on this project dating back to the 1980s!"

He began his career in X-ray astronomy during graduate school at the Massachusetts Institute of Technology using observations from NASA's Small Astronomy Satellite-3. In 1984, a year after arriving at Goddard, he started developing microcalorimeters alongside colleague Harvey Moseley and contributed to the improvement in energy resolution for the devices.

"The work of the team Rich has led for nearly 30 years has made Goddard the world leader in the development of X-ray calorimeters," said Rob Petre, Kelley's colleague in the Goddard X-ray Astrophysics Laboratory.

A committee of former award winners selected Kelley as this year's recipient, while the Goddard Awards Office handled the logistics. The Goddard Scientific Colloquium organized and hosted the accompanying Lindsay Lecture.

"For many years, Rich has led the group that developed the X-ray microcalorimeter and pursued ways to get it into space. This year, all that hard work paid off with these remarkable results," said David Thompson, a member of the selection committee as co-recipient of the award in 2010, and current chair of the colloquium. "Rich always emphasizes the team, and it is an outstanding team, but someone has to lead, and that is what he has done."

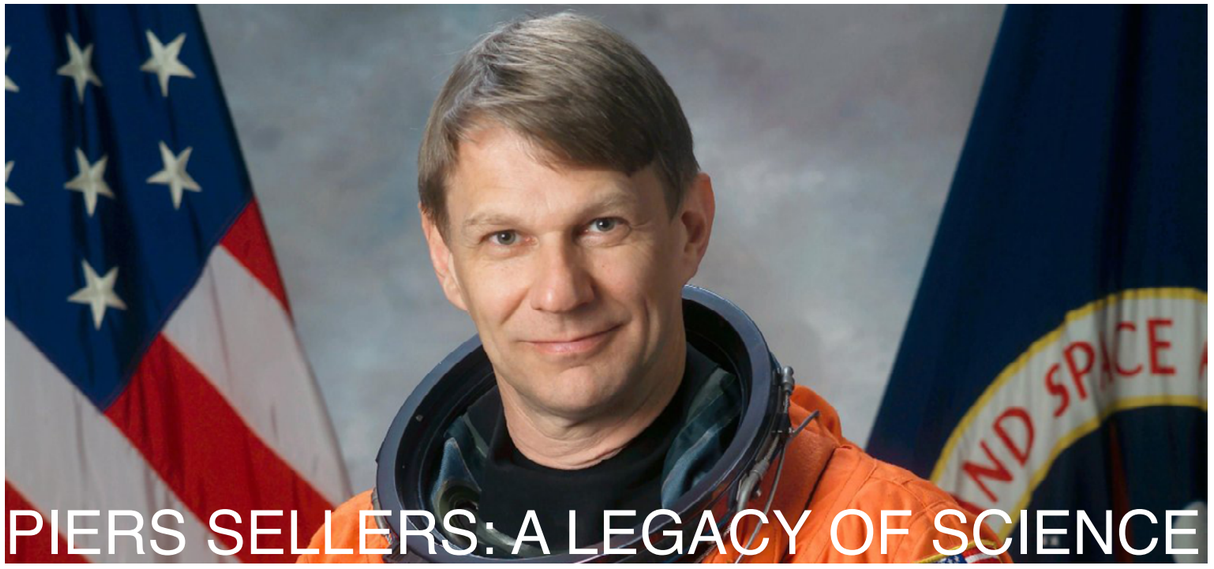
Entitled "The Perseus Cluster of Galaxies and the Future of High-Resolution Imaging X-Ray Spectroscopy," Kelley's lecture described the decades of work leading up to Hitomi's discovery, and he offered his vision for leveraging the technology going forward.

"Bringing a powerful new tool to X-ray astronomy has been historic for the advancement of science," he said. "When we apply new instrumentation that is significantly more sensitive, we continue to discover many surprises in astronomy."

NASA and JAXA have committed to creating a new mission that will pick up where Hitomi left off, and Kelley and his colleagues are partnering with teams in Europe to build a new microcalorimeter with twice the energy resolution as the one aboard Hitomi. Kelley hopes the advancement will open up the possibility for simultaneous high-resolution imaging and spectroscopy for X-ray astronomy.

"There was a time when X-ray astronomy was a niche field," added Kelley. "We are now in an era in which high-resolution X-ray images and spectra help give a full picture of how celestial objects came to be as they are." ■

Center: Goddard astrophysicist Richard Kelley (left) accepts the John C. Lindsay Memorial Award alongside members of Lindsay's family. Photo credit: NASA/Goddard/Debora McCallum



PIERS SELLERS: A LEGACY OF SCIENCE

By Patrick Lynch

Piers Sellers, who passed away on Dec. 23 more than a year after learning he had pancreatic cancer, leaves behind a dynamic legacy at 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.

But his most lasting contributions will be in the field in which he began his career: science.

Sellers arrived at NASA's Goddard Space Flight Center in 1982 from his native Great Britain and dove into pioneering research on the use of satellites and computer models to study photosynthesis on a global scale. An ecologist by training, Sellers focused on the challenges of understanding and simulating the complex interactions between Earth's atmosphere and biosphere – the collection of the planet's plant life.

In the mid-1980s, Sellers led the work that created the first realistic computer model of how the biosphere interacts with Earth's climate. He would go on to mine this line of research, breaking new ground and helping build the foundation for what the science community now understands.

"It took years and years, but at the end of it we came up with a complete theoretical understanding of how it goes from a single leaf, with its little chloroplasts doing photosynthesis, to what that looks like from space, and then how to integrate the whole thing to find out the photosynthetic power of the planet," Sellers said in a 2016 interview.

Sellers' five most impactful scientific journal articles – collectively outlining his Simple Biosphere Model (SiB), updates to it (SiB-2), and insights into how forest canopies conduct photosynthesis – have been cited in a combined 7,697 scientific papers. The work has had enormous impact on the current understanding not only of how the planet works, but also of how Earth will respond to rising carbon dioxide concentrations in the atmosphere.

"Piers did seminal work," said Colleen Hartman, head of the Goddard Sciences and Exploration Directorate. "It completely changed the paradigm of how to use satellite data and made it so much more useful for applications in the real world and for understanding our changing climate. Purely on the science, he would be an icon."

Compton Tucker, longtime close friend and scientific collaborator, said Sellers' work unified different strands of research in the field of remote sensing from space.

"What was really crucial was that Piers brought the theory to what we were measuring," Tucker said. "What his studies of photosynthesis showed was that it didn't matter if you were working on one leaf, or were working on tens, or hundreds, or thousands of kilometers. The same relationship held and scaled regardless of what scale you were working at. This was a major revelation."

In the late 1980s, Sellers led two groundbreaking field research campaigns. The FIFE campaign in the Kansas grasslands and BOREAS campaign across the Canadian boreal forests combined ground, aircraft and satellite measurements and provided important new insights into forest and land ecosystem interactions with the climate.

In the 1990s, Sellers served as the first project scientist for the Terra mission, the first satellite in NASA's Earth Observing System and a flagship of the agency's Earth-observing fleet.

After 14 years as a NASA scientist, Sellers changed course in 1996 when he joined the NASA astronaut corps. In three space shuttle missions, STS-112, 121 and 132, he completed spacewalks, helped build the International Space Station and gained a perspective on Earth that would infuse his talks to the public for the rest of his life.

And then after 14 years as an astronaut, Sellers returned to Goddard as a leader within the Goddard Sciences and Exploration Directorate and Goddard Earth Sciences Division. He took to management with the same energy that he had applied to being a scientist and an astronaut, Hartman said, and in doing so inspired those around him.

"It's not hyperbole to say every life he touched was moved for the better," Hartman said. "His inclusiveness, kindness of heart, wit and intellect came through every day at Goddard. You can say Piers Sellers loved a lot of things, but high, high, high on that list would be science at Goddard."

Goddard Center Director Chris Scolese remarked on Sellers' ability to energize those around him. "We remember Piers as an exceptional scientist and leader, but most importantly as an inspiring human being," Scolese said. "He could make you think anything was possible, was always up for the adventure, and would remind you along the way how lucky we are to do the work we do here at Goddard."

After learning of his cancer diagnosis, Sellers took on a much higher public profile when a January 2016 op-ed he wrote in The New York Times resonated deeply with people around the world. It captured both the depth of his thinking on the topic and his pragmatic optimism.

"There is no convincing, demonstrated reason to believe that our evolving future will be worse than our present, assuming careful management of the challenges and risks," Sellers wrote. "History is replete with examples of us humans getting out of tight spots. The winners tended to be realistic, pragmatic and flexible; the losers were often in denial of the threat."

In the final year of his life, Sellers gave dozens of interviews about his grounded, yet hopeful, perspective, culminating in an appearance in the documentary "Before the Flood," released this fall.

Sellers' enthusiasm for NASA's role in understanding our home planet was apparent until the end. In an interview at Goddard earlier this year, he summed up his thoughts on working at NASA.

"We're very fortunate working in the field that we do," he said. "It's incredibly fascinating and exacting and interesting, just the things we do day to day. And, you know, most of my friends are at work. Every day I work with my friends. I love it." ■

Above, left: Astronaut photo of Piers Sellers. Photo credit: NASA

Above, right: Piers Sellers (right) with actor Leonardo DiCaprio in April 2016 during a filming session for DiCaprio's "Before the Flood" documentary. Photo credit: NASA/Goddard/Rebecca Roth

FOUR GODDARD SCIENTISTS HONORED AS AGU FELLOWS

By Rob Gutro

Four scientists from NASA's Goddard Space Flight Center have been named fellows by the American Geophysical Union (AGU). Claire Parkinson, Paul Mahaffy, Brent Holben and Nat Gopalswamy are among the prestigious 2016 class of honorees.

AGU is an organization dedicated to advancing Earth and space sciences for the benefit of humanity through its scholarly publications, conferences and outreach programs.

Being named a fellow is an honor given to individual AGU members who have made exceptional scientific contributions and gained prominence in their respective fields of Earth and space sciences.

The fellows were honored during an AGU event at the organization's annual fall meeting in San Francisco on Dec. 14.

Established in 1962, the Union Fellows program recognizes AGU members who made exceptional contributions to Earth and space sciences as valued by their peers. The Union Fellow honor is a tribute awarded to eligible AGU members who have attained acknowledged eminence in the geosciences and are carefully vetted by section and focus group committees.

Claire Parkinson is the project scientist for NASA's Earth-observing Aqua satellite and a senior climate scientist who researches sea ice and its role in the global climate system. Her research has involved numerical modeling and field work in both the Arctic and Antarctic, but mostly it has centered on satellite data analysis.

"The American Geophysical Union is an extremely important organization for Earth scientists; I feel greatly honored to be elected a fellow," Parkinson said.

Brent Holben is project leader for the global Aerosol Robotic Network sun-sky radiometer network and a research scientist who performs research in ground-based and satellite remote sensing of land cover and aerosols. He developed innovative methods for in-orbit calibration of satellite visible and near-infrared sensors. Holben and his team have led or participated in numerous domestic and international airborne, ground-based and satellite field campaigns that emphasize research and validation.

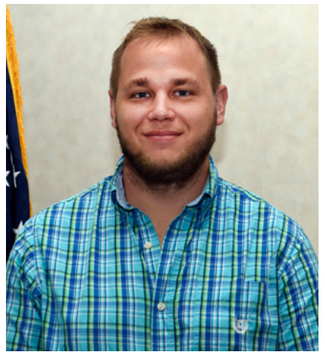
Paul Mahaffy is the director of the Goddard Solar System Exploration Division. "It is an honor to be named a member of the 2016 Class of AGU Fellows," Mahaffy said. His research interest has been primarily on understanding the formation and evolution of planetary bodies through in situ compositional and isotopic measurements. "Planetary science is a team sport, and many engineers, technicians, scientists, and support and management folks have participated with me in developing and implementing cutting-edge concepts for exploration of the moon, Mars, Jupiter and other locations in our solar system," he added. "Thanks to the members of the Goddard team who have helped make Curiosity/SAM, LADEE/NMS, and MAVEN/NGIMS a success."

Nat Gopalswamy is an astrophysicist in the Goddard Solar Physics Laboratory and staff scientist in the Goddard Heliophysics Division. Over the past three decades, he has been engaged in solving problems in solar and solar terrestrial physics using data from various large radio telescopes and space missions. In particular, he is interested in coronal mass ejections and their impact on Earth and on the heliosphere in the form of magnetic storms and particle radiation.

"It is a great honor to be recognized by the American Geophysical Union," Gopalswamy said. "The recognition truly is to the field of solar terrestrial sciences and to the national and international scientists I collaborate with." ■

Center (clockwise from top left): Claire Parkinson, Brent Holben, Nat Gopalswamy and Paul Mahaffy.

Photo credits: NASA, NASA/Goddard/Bill Hrybyk, NASA/Goddard/Brent Holben

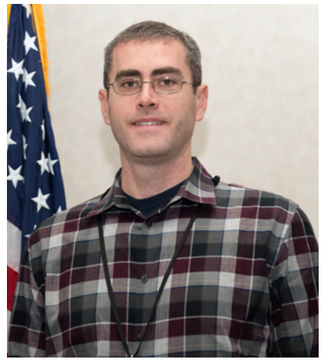


Charles J. Turner

Code 555, Pathways Intern

Why Goddard?: No other organization has a mission of greater importance than NASA.

Hobbies/interests: son, science fiction, home brewing, traveling



Scott Guzewich

Code 693, Research Astrophysicist

Why Goddard?: I've wanted to work for NASA since I was a teenager.

Hobbies/interests: coaching children's sports, Baltimore Ravens football, Baltimore Orioles baseball

Tiffany Hoerbelt

Code 595, Flight Dynamics Engineer

Why Goddard?: Working at NASA has been my goal since I was a child.

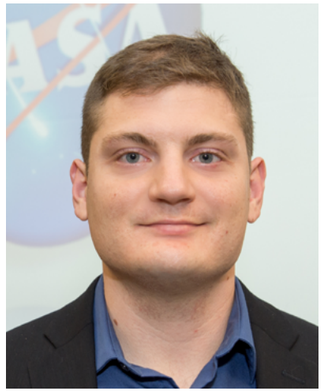
Hobbies/interests: hiking, singing, reading, journaling

Eric Parker

Code 691, Research Space Scientist

Why Goddard?: Goddard has a great astrobiology program that will allow me to combine my expertise and interests.

Hobbies/interests: sports, camping, fishing

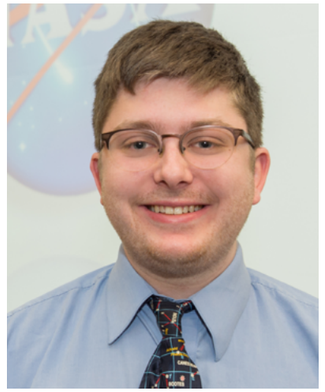


Luke Dercher

Code 587, Student Trainee

Why Goddard?: I'm passionate about space exploration.

Hobbies/interests: martial arts, sword fighting, robots



Steven West

Code 596, Pathways Intern

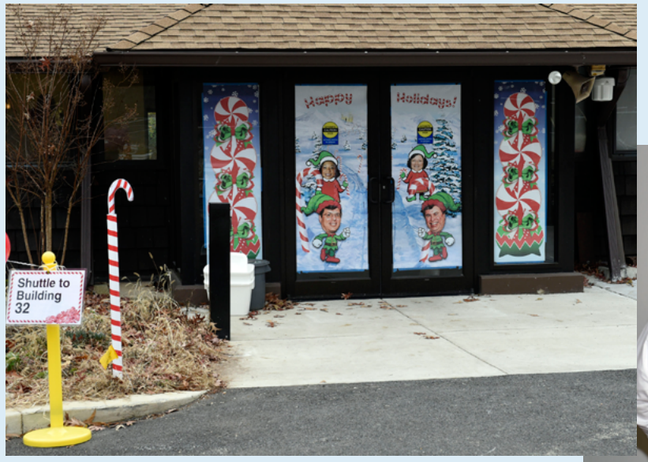
Why Goddard?: I have dreamed of working for NASA on flight missions, and Goddard matches my interests perfectly.

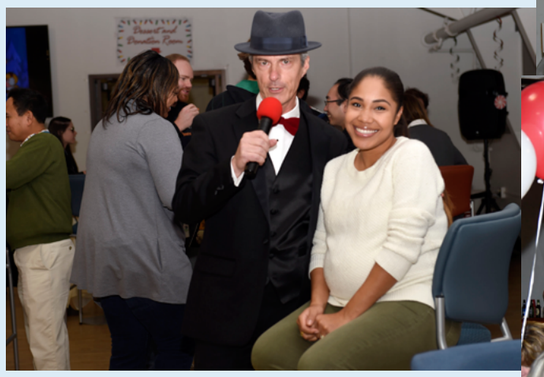
Hobbies/interests: astronomy, music, art

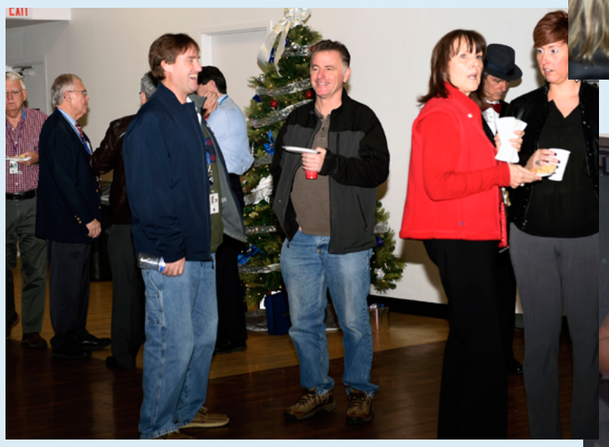
EMPLOYEE SPOTLIGHT

Goddard is pleased to welcome these new employees to the NASA community.

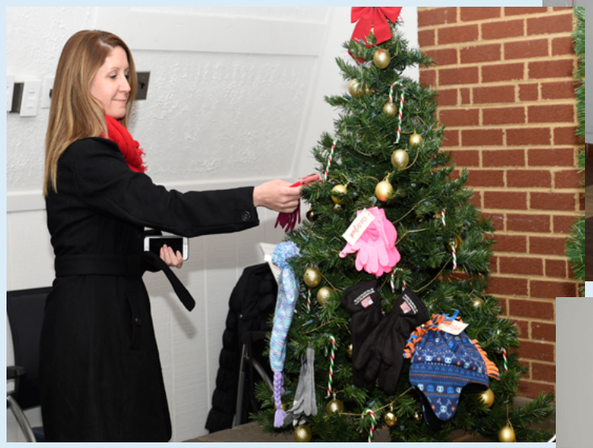
HOLIDAYS AT GODDARD: EMPLOYEES TAKE

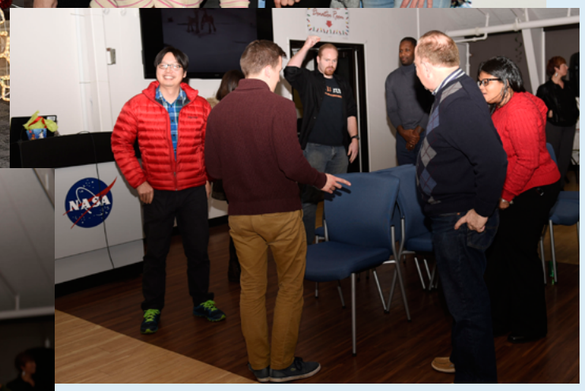






A STROLL DOWN ‘CANDY CANE LANE’





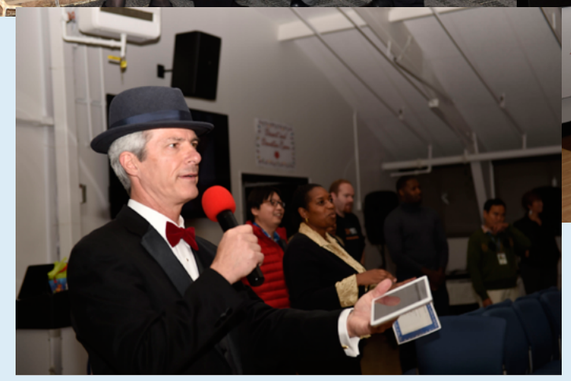


Photo credits: NASA/Goddard/Debora McCallum