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NASA Researcher Receives Arthur S. Flemming Award

By Lynn Chandler

Christa Peters-Lidard of NASA's Goddard Space Flight Center in Greenbelt, Md. has been awarded the 2007 Arthur S. Flemming Award in the category of Applied Science, Engineering, and Mathematics. She was chosen in recognition of her innovative and important contributions, and leadership as a hydrologist, physical scientist, and Branch Head in the Earth Sciences Division.

Peters-Lidard is internationally known for her contributions to high-resolution land surface modeling and satellite data assimilation, and particularly for the application of high-performance computing and communications technologies to this discipline. By creatively synthesizing data and models, she has improved the understanding of the water and energy exchanges that impact weather and climate. Her highly successful and award-winning Land Information System project is revolutionizing U.S. hydrometeorological forecasting capabilities by transitioning the latest NASA science and technology to other agencies with which she works closely, including NOAA and the Air Force Weather Agency. She is an active participant in the scientific community as a journal editor and conference chair.

Established by the Downtown Jaycees in 1948, the Flemming Awards honor outstanding Federal employees. The winners are selected from all areas of the Federal service and recognized by the president of the United States, agency heads, and the private sector. Twelve awards are given annually. Peters-Lidard will speak on behalf of fellow recipients at an awards ceremony on June 2, at the George Washington University in Washington, D.C.

For more information about hydrospheric and biospheric sciences research at NASA, visit: <http://neptune.gsfc.nasa.gov>. For more information about the Arthur S. Flemming Award, visit: <http://www.gwu.edu/flemming>. ■

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Cover caption: An artist depicts the incredibly powerful flare that erupted from the red dwarf star EV Lacertae.

Image Credit: NASA.

GoddardView Info

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Deadlines: News items and brief announcements for publication in the Goddard View must be received by noon of the 1st and 3rd Wednesday 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.

Maryland Lieutenant Governor Visits Goddard

By Kelly Farrell

NASA's Goddard Space Flight Center welcomed Maryland Lieutenant Governor Anthony G. Brown to its facility in Greenbelt, Md., on May 12, 2008. Brown, a Prince George's County native, toured the Center with Goddard's Acting Center Director, Rick Obenschain.

During his visit, Brown was briefed by Dr. Peter Hildebrand, the Center's Deputy Director for Sciences and Exploration, on the unique space-based assets Goddard uses to study climate change in the state of Maryland, the Nation, and the world. Brown also learned about the launch capabilities of Goddard's Wallops Flight Facility, and viewed hardware and tools that will be used for the upcoming Space Shuttle servicing mission to the *Hubble Space Telescope*, one of the Nation's preeminent science programs managed by Goddard.

Brown's visit concluded with a tour of the Spacecraft Integration and Test Facility, where Goddard scientists, engineers, and technicians build and prepare spacecraft for flight. While there, Brown viewed two of Goddard's

eight missions scheduled for launch in the next 18 months. The first was the *Lunar Reconnaissance Orbiter* (LRO), an in-house Goddard mission launching late 2008 to pave the way for the United States to return to the Moon. Lieutenant Governor Brown then looked at the *Solar Dynamics Observatory* (SDO), also scheduled to launch later this year to study the Sun and the effects of space weather.

Brown met several employees throughout his visit, including young engineers who are helping to carry out some of Goddard's most important missions. He praised the Center for its commitment to excellence and expressed support and enthusiasm for its integral role in the Nation's space program. Acting Center Director Rick Obenschain stated, "We are honored to host the Lieutenant Governor and very excited for the opportunity to share with him some of the amazing work Goddard employees do each and every day right here in the state of Maryland. Goddard is proud of its Maryland heritage and looks forward to continuing to work with the State to help better the lives of Maryland residents." ■



Photo credit: Pat Izzo

Caption: Maryland Lieutenant Governor Anthony Brown (second from left) receives a presentation on Hubble tools and equipment from the Hubble program's Jill McGuire (left) and Mark Behnke (far right) of Alliant Techsystems. Goddard Acting Center Director Rick Obenschain is at rear center.

Jupiter's Little Red Spot Hosts Powerful Winds

By Bill Steigerwald, Andrew Cheng, and Mike Buckley

A Category Five hurricane, the strongest class on Earth, has winds raging at more than 155 miles per hour, maxing out around 200 miles per hour. Jupiter's Little Red Spot could blow them away with winds of about 384 miles per hour, some of the highest wind speeds ever detected on any planet. Nearly the size of Earth, the Little Red Spot (LRS) could easily consume the largest terrestrial hurricane.

This fearsome storm has been growing since 1998, with the merger of three smaller white storms that had been observed since the 1930s. Two of these storms coalesced in 1998, and the combined pair merged with a third major Jovian storm in 2000. In late 2005—for reasons still unknown—the combined storm turned red.

The LRS is as red as the similar, but even larger and better known, Great Red Spot (GRS). Like the GRS, Jupiter's LRS is an anticyclone, a storm whose winds circulate in the opposite direction to that of a cyclone—counterclockwise, in this case.

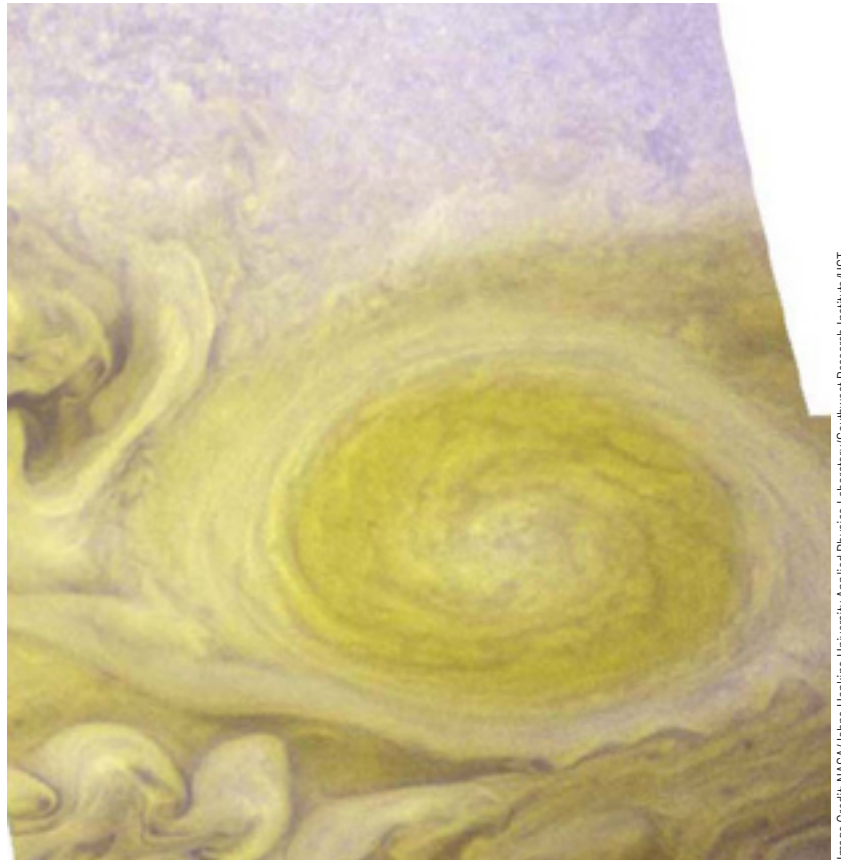
Using data from NASA's *New Horizons* spacecraft and two telescopes on Earth, an international team of scientists confirmed that wind speeds in the LRS have increased substantially over the wind speeds in the precursor storms, which had been observed by NASA's *Voyager* and *Galileo* missions in past decades.

"This storm is still developing, and some of the changes remain mysterious," says Dr. Andrew Cheng of the Johns Hopkins University Applied Physics Laboratory (APL) in Laurel, Md., who led the study team. "This unique set of observations is giving us hints about the storm's structure and makeup. From this, we expect to learn much more about how these large atmospheric disturbances form on worlds across the solar system." The team will publish its work in the June 2008 *Astronomical Journal*.

Researchers measured the latest wind speeds and directions using two image mosaics from *New Horizons*' telescopic Long Range Reconnaissance Imager (LORRI), taken 30 minutes apart in order to track the motion of cloud features.

Dr. Amy Simon-Miller, a researcher at NASA's Goddard Space Flight Center in Greenbelt, Md., and Irene Tsavaris, a summer student from the University of Maryland, College Park, who assisted Simon-Miller, generated all of the wind speed and direction measurements in the paper using a manual tracking technique on the *New Horizons* and *Hubble Space Telescope* data. Simon-Miller also created the color composite of *Hubble* and *New Horizons* data, and generated the figures for the paper.

Scientists combined LORRI image maps of cloud motions with visible-color images from *Hubble*, and mid-infrared images from the European Southern Observatory's Very Large Telescope, perched on an Atacama Desert



Caption: In this quasi-true-color view of Jupiter's Little Red Spot (LRS), generated using a New Horizons-LORRI mosaic in the red and green channels, and a Hubble Space Telescope 410 nm map in the blue channel, the LRS appears with distinctly redder color than the south tropical disturbance to the north or the small oval to the southeast.

mountain in Chile. The latter technique allows scientists to "see" thermal structure and dynamics beneath the visible cloud layers, because thermal infrared wavelengths (indicating heat) can pass through the higher clouds. "The new observations confirm that the thermal structures, wind speeds, and cloud features of the LRS are very similar to those of the GRS," says Dr. Hal Weaver, a member of the study team from APL and the *New Horizons* Project Scientist. "Both the LRS and the GRS extend into the stratosphere, to far higher altitudes than for the smaller storms on Jupiter."

The observations offer clues to the mystery of why the GRS, and now also the LRS, may be so red. The wind speeds and overall strength of the LRS increased substantially in the seven years between the *Galileo* and the *New Horizons* observations, during which the storm became red. "This supports the idea that a common dynamical mechanism explains the reddening of the two largest anticyclonic systems on Jupiter, one possibility of which is that storm winds dredge up material from below," says Simon-Miller.

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Jupiter's Little Red Spot Hosts Powerful Winds

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"We can say that the LRS is currently still red, though it may have changed appearance slightly from last year with more white clouds in the center. We will confirm this with the *Hubble Space Telescope* in May, June, and July, as the LRS passes the GRS. These passages occur roughly every two years, but we are particularly interested in this year's passage because last year saw Jupiter undergo a global upheaval, with many belts and zones changing colors. The change in activity has all sorts of potential for further changes, especially when the LRS gets bumped around a bit by passing the GRS. Both storms deflect wind jets around their perimeters, and the compression of those jets between the LRS and GRS will force the oval slightly southward. We are most likely to see changes after such a passage as the winds and storms re-adjust," said Simon-Miller.

"The LRS will continue to evolve, as the GRS does. Nothing on Jupiter remains the same. In terms of size growth, it can't really grow in latitude, as it is bound by Jupiter's zonal winds. That can change slightly, and it could expand in longitude, though we haven't seen them ever really do that. As for whether the wind speed in the LRS will continue to increase, we have no idea, although there should be a theoretical limit, based on the atmospheric temperature, composition, etc." said Simon-Miller.

The LRS already rivals the steadily shrinking GRS in size and wind speed. The new thermal and wind field observations hint at an interaction between the south tropical disturbance, the Little Red Spot, and a warm cyclonic region south of the LRS, forming a complex that could dwarf the Great Red Spot.

"The Great Red Spot may not always be the largest and strongest storm on Jupiter," says Dr. Glenn Orton of NASA's Jet Propulsion Laboratory in Pasadena, Calif. "Continued monitoring of Jupiter's constantly evolving atmosphere will surely yield more surprises."

New Horizons made its observations as it flew past Jupiter in February 2007 on its way to Pluto. The spacecraft is the first mission in NASA's New Frontiers Program of medium-class spacecraft exploration projects. Dr. Alan Stern leads the mission and science team as Principal Investigator; APL manages the mission for NASA's Science Mission Directorate. The mission team also includes Southwest Research Institute, Ball Aerospace Corporation, Boeing Company, NASA's Goddard Space Flight Center, NASA's Jet Propulsion Laboratory, Stanford University, KinetX, Inc., Lockheed Martin Corporation, University of Colorado, U.S. Department of Energy, and a number of other firms, NASA Centers, and university partners. ■

Send Your Name to the Moon with the New Lunar Mission

By Grey Hautaluoma and Nancy Neal Jones



Image Credit: NASA

Caption: Artist's rendition of the Lunar Reconnaissance Orbiter.

NASA invites people of all ages to join the lunar exploration journey with an opportunity to send their names to the Moon aboard the *Lunar Reconnaissance Orbiter* (LRO).

"Everyone who sends their name to the Moon, like I'm doing, becomes part of the next wave of lunar explorers," said Cathy Peddie, Deputy Project Manager for LRO at NASA's Goddard Space Flight Center in Greenbelt, Md. "The LRO mission is the first step in NASA's plans to return humans to the Moon by 2020, and your name can reach there first. How cool is that?"

LRO will provide the most comprehensive data set ever returned from the Moon. The mission will focus on the selection of safe landing sites and identification of lunar resources. It also will study how the lunar radiation environment could affect humans.

Furthermore, LRO will create a comprehensive atlas of the Moon's features and resources that will be needed as NASA designs and builds a planned lunar outpost. The mission will support future human exploration while providing a foundation for upcoming science missions. LRO is scheduled for launch in late 2008.

The *Lunar Reconnaissance Orbiter* is being built at Goddard. The mission will also be managed at the Center for NASA's Explorations Systems Mission Directorate in Washington, D.C.

The *Send Your Name to the Moon* Web site enables everyone to participate in the lunar adventure and place their names in orbit around the Moon for years to come. Participants can submit their information at <http://lro.jhuapl.edu/NameToMoon/>, print a certificate, and have their name entered into a database. The database will be placed on a microchip that will be integrated onto the spacecraft. The deadline for submitting names is June 27, 2008.

For more information about the Lunar Reconnaissance Orbiter, visit: <http://lunar.gsfc.nasa.gov>. ■

Construction Update #5: Goddard’s New Science Building “Topped Out”

By Rob Gutro

[This is the fifth in a recurring series of articles chronicling the construction of Goddard’s Exploration Sciences Building \(ESB\)](#)

May 9th was a very wet day, but not wet enough to stop the “Topping Out” event at Goddard’s Exploration Science Building (ESB).

A “Topping Out” party is a recognized milestone in the construction industry signifying the completion of the building structure. The completion of the structure on the ESB was marked by the last level of concrete pour, which is on the top of the building. “Topping Out” parties are thrown for the workers to thank them for the work they have accomplished. Despite the downpour outside, and deep mud around the building, there was a crowd of over 150 people.

Jerry LeFevre, Project Manager of Manhattan Construction in Fairfax, Va., kicked off the ceremony. “The purpose of this ceremony is to thank the men and women for all their hard work and making this building come together,” LeFevre said. He cited all of the contractors working on the building, and it was quite a long list.

David Larsen, Exploration Sciences Building Project Manager at Goddard, spoke next. Addressing the construction workers, he said “Your work is part of the big picture of NASA research into things like gravitational waves and the enigma of life.” Dave concluded by saying “This project started seven years ago, and I’ve felt like an expectant father since then—now you’ve made it happen.”

The last speaker was Dale Harlow, jobsite superintendent from Manhattan Construction, who offered his thanks and congratulations.

“Although we’re having the party now, there are a couple more concrete pours remaining that have been delayed because of all the rainy weather this spring,” said Mike Boisclair, the Quality Associate Manager at NASA. Since spring arrived officially on March 21, Maryland has received rain about every 3–4 days. “There’s also a lot of work going on in the inside, including plumbing, ductwork, and electrical,” Boisclair said.

Bob Blend, the mechanical inspector, praised the work of mechanical contractor, the J.J. Kirklín Company of Rockville, Md. “They’re one step ahead of other contractors because they have a 3-D autocad system, so you can see the building in three dimensions,” Blend said. “It’s much easier than looking at line drawings.”

Stanley Wojner, the Assistant Director from Code 600, was in the audience. He had a special interest in the topping off party, because employees from his code will be moving into the building.

The building was designed by EwingCole Architects, based in Philadelphia, Pa. and Washington, D.C. The architect that designed the building was also in attendance.

For more information about the NASA Exploration Sciences Building, visit: http://www.nasa.gov/centers/goddard/news/green_building.html. ■



Caption: David Larsen.

Photo Credit: Debora McCallum

Extending *Hubble's* Mission Life with New Batteries

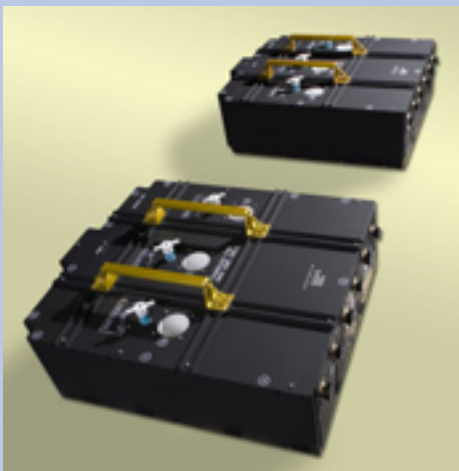
By Susan Hendrix

Over the years, disposable and rechargeable batteries for electronics have made life easier for millions of consumers, running everything from smoke detectors to digital cameras to laptop computers.

Hubble's Rechargeable Batteries

The *Hubble Space Telescope* relies on specially formulated rechargeable batteries that provide power to the telescope's science instruments and critical components during each night orbit.

During *Hubble's* sunlight (or daytime) orbit, its solar arrays provide power



Caption: Two nickel hydrogen battery modules, containing three batteries each, destined for Hubble.

to the electrical components and charge the batteries so they have enough power to support *Hubble* during its night orbit. Because *Hubble* spends about one third of its 97 minute orbit around the Earth "in the dark" it must rely on the energy that is stored in its onboard batteries to supply power to the entire telescope.

Photo Credit: NASA

Bigger Batteries are Better

The six, 125 lb. nickel hydrogen batteries on *Hubble* have provided electrical power to the telescope during its night orbit since the telescope launched in 1990. That means they have been operating for more than 17 years and counting. How is this possible?

Engineers on the ground carefully manage the charging of *Hubble's* batteries, enabling the spacecraft to function efficiently during the entire orbit. "*Hubble's* batteries have far exceeded our expectations," says Mike Weiss, *Hubble's* Deputy Program Manager at NASA's Goddard Space Flight Center. "They have made possible all of the improvements we have made to *Hubble* over the course of four servicing missions. On Servicing Mission 4 (SM4), after 18 years of remarkable performance, the time has finally come to renew *Hubble's* lease on life with new batteries."



Caption: Mission specialist Michael Good practices installing a battery module into the Hubble High Fidelity Mechanical Simulator, located in the clean room at NASA's Goddard Space Flight Center.

Photo Credit: NASA

Unlike a small digital camera battery that weighs only a few ounces, *Hubble's* batteries are much larger and heavier. Collectively, they weigh 460 lbs. and measure 36 inches long, 32 inches wide, and 11 inches high.

A battery's ability to store energy and supply this energy over time is measured in terms of battery storage capacity. Engineers measure such capacity in terms of ampere-hours, or "amp-hours." Each *Hubble* battery begins its life in space with about 75 amp-hours of capacity. By comparison, the typical modern digital camera battery has about 1 amp-hour of capacity. While digital camera batteries deliver their power around 6 volts, *Hubble's* power is delivered at 24 volts. This means *Hubble* batteries store about 2,000 times the amount of energy that is stored in a digital camera battery.

What Lies Ahead

The batteries on *Hubble* are original equipment. These components were originally tagged with a five-year mission life. Their extended useful life is due largely to a team of electrical power system engineers at Goddard Space Flight Center who constantly monitor the amount of current flowing into the batteries, along with their temperature during charging cycles. Small tweaks to the charging cycles are made when needed to ensure optimal performance.

Because of normal aging and cycling, however, the telescope's batteries are showing an expected slow loss in capacity, or their ability to hold a charge. During the next *Hubble* servicing mission later this year, astronauts will replace the existing batteries with new and improved ones that will enable *Hubble* to continue its amazing scientific journey for years to come. ■

The Mouse That Roared: Pipsqueak Star Unleashes Monster Flare

By Robert Naeye

On April 25, NASA's *Swift* satellite witnessed the brightest flare ever seen from a normal star other than our Sun. The flare, an explosive release of energy from a star, packed the power of thousands of solar flares. It would have been visible to the naked eye if the star had been easily observable in the night sky at the time.

The star, known as EV Lacertae, isn't much to write home about. It's a run-of-the-mill red dwarf, by far the most common type of star in the universe. It shines with only 1 percent of the Sun's light, and contains only a third of the Sun's mass. At a distance of 16 light-years, EV Lacertae is one of our closest stellar neighbors. With its feeble light output, its faint magnitude-10 glow is far below naked-eye visibility.



Caption: An artist depicts the incredibly powerful flare that erupted from the red dwarf star EV Lacertae.

"Here's a small, cool star that shot off a monster flare. This star has a record of producing flares, but this one takes the cake," says Rachel Osten, a *Hubble* Fellow at the University of Maryland, College Park and NASA's Goddard Space Flight Center in Greenbelt, Md. "Flares like this would deplete the atmospheres of life-bearing planets, sterilizing their surfaces."

The flare was first seen by the Russian-built Konus instrument on NASA's *Wind* satellite in the early morning hours of April 25. *Swift*'s X-ray telescope caught the flare less than 2 minutes later, and quickly turned to point toward EV Lacertae. When *Swift* tried to observe the star with its ultraviolet/optical telescope, the flare was so bright that the instrument shut itself down for safety reasons. The star remained bright in X-rays for 8 hours before settling back to normal.

EV Lacertae is relatively young, with an estimated age of a few hundred million years. The star rotates once every four days, which is much faster than the Sun, which rotates once every four weeks. EV Lacertae's fast rotation generates strong localized magnetic fields, making it more than 100 times as magnetically powerful as the Sun's field. The energy stored in its magnetic field powers these giant flares.

EV Lacertae's constellation, Lacerta, is visible in the spring for only a few hours each night in the Northern Hemisphere. If the star had been more easily visible, the flare probably would have been bright enough that the star could have been seen with the naked eye for 1–2 hours.

The flare's incredible brightness enabled *Swift* to make detailed measurements. "This gives us a golden opportunity to study a stellar flare on a second-by-second basis to see how it evolved," says Stephen Drake of NASA Goddard.

Because EV Lacertae is 15 times younger than our Sun, it gives us a window into our solar system's early history. Younger stars rotate faster and generate more powerful flares, so in its first billion years the Sun must have let loose millions of energetic flares that would have profoundly affected Earth and the other planets.

Flares release energy across the electromagnetic spectrum, but the extremely high gas temperatures produced by flares can only be studied with high-energy telescopes like those on *Swift*. *Swift*'s wide field and rapid repointing capabilities, designed to study gamma-ray bursts, make it ideal for studying stellar flares. Most other X-ray observatories have studied this star and others like it, but they have to be extremely lucky to catch and study powerful flares because of their much smaller fields of view.

Eric Feigelson of the Pennsylvania State University in University Park, Pa. says, "I find it remarkable that a satellite designed to detect the explosive birth of black holes in distant galaxies can also detect explosions on stars in the immediate neighborhood of our Sun." ■

Goddard Employees Get an Introduction to GLAST

By Rob Gutro

On May 20, Goddard employees were treated to an introduction of NASA's *Gamma-ray Large Area Space Telescope* (GLAST) from Goddard's Acting Center Director Laurie Leshin and GLAST Project Scientist Steven Ritz.

Laurie gave a very enthusiastic welcome to the crowd of over 140 employees who braved the rain and came to the Building 8 auditorium. She highlighted Steve Ritz's experience and said, "We're all excited to hear how GLAST will give us 'gamma-ray vision.'"

Steve provided a lively introduction to GLAST, what it will explore, study, and reveal. He said that GLAST is a powerful space observatory that will, "Provide an entirely new way to look at the universe." He explained that gamma-rays are the highest-energy form of light, and the gamma-ray sky is incredibly different from the one we perceive with our own eyes.

With a huge leap in capabilities, GLAST will enable scientists to answer persistent questions, including supermassive black hole systems, pulsars, the origin of cosmic rays, and will search for signals of new physics.



Photo Credit: Bill Hrybyk

Caption: Dr. Steven Ritz talks to Goddard employees about GLAST.

Steve highlighted the two instruments aboard GLAST, the Large Area Space Telescope (LAT) and the GLAST Burst Monitor (GBM), and was proud of the international collaboration that made this incredible mission possible.

For more information on GLAST, visit: <http://www.nasa.gov/glast>. ■

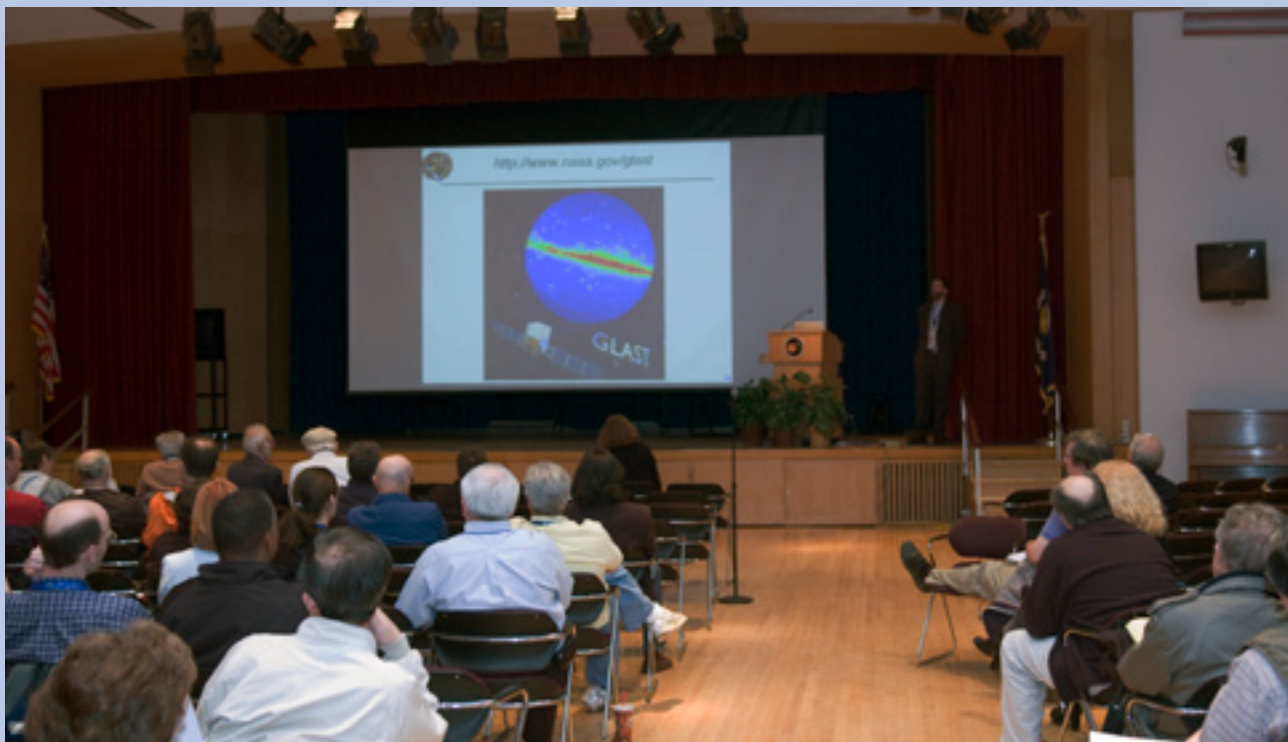


Photo Credit: Bill Hrybyk

Caption: Goddard employees filled the Building 8 auditorium to learn about GLAST.

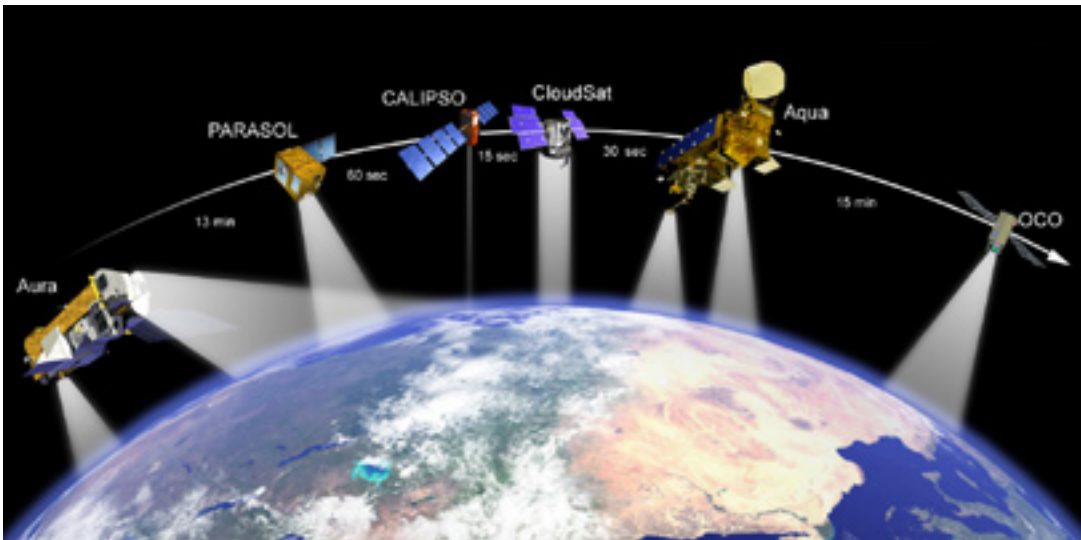
Satellites Illuminate Pollution's Influence On Clouds

By Kathryn Hansen

Clouds have typically posed a problem for scientists using satellites to observe the lowest part of the atmosphere because they block the satellite's ability to capture a clear, unobstructed view of Earth's surface. It turns out, however, that these "obstructions" are worth a closer look, as clouds and their characteristics actually serve a valuable role in Earth's climate. That closer look is now available from satellites comprising the Afternoon Constellation, or A-Train.

"The A-Train is providing a new way to examine cloud types," said Mark Schoeberl, A-Train Project Scientist at NASA's Goddard Space Flight Center in Greenbelt, Md.

Using data from instruments in a constellation of NASA satellites, scientists have discovered that they can see deep inside of clouds. The satellites are taking first-of-a-kind measurements, shedding new light on the link between clouds, pollution, and rainfall.



Caption: Artist's concept showing the A-Train Constellation flying in formation to make near-simultaneous observations of Earth.

Jonathan Jiang, of NASA's Jet Propulsion Laboratory in Pasadena, Calif., and colleagues used these A-Train sensors to find that South American clouds infused with airborne pollution—classified as "polluted clouds"—tend to produce less rain than their "clean" counterparts during the region's dry season. Details of the findings were presented on May 27 at the American Geophysical Union's 2008 Joint Assembly in Fort Lauderdale, Fla.

Discovery of the link between rain and pollution was possible because of near-simultaneous measurements from multiple satellites making up the string of satellites in the Afternoon Constellation, more commonly called the A-Train. "Typically, it is very hard to get a sense of how important the effect of pollution on clouds is," said Anne Douglass, Deputy Project Scientist at Goddard for NASA's *Aura* satellite. "With the A-Train, we can see the clouds every day and we're getting confirmation on a global scale that we have an issue here."

Jiang's team used the Microwave Limb Sounder on the A-Train's *Aura* satellite to measure the level of carbon monoxide in clouds. The presence of carbon monoxide implies the presence of smoke and other aerosols, which usually come from the same emission source, such as a power plant or agricultural fire.

With the ability to distinguish between polluted and clean clouds, the team next used *Aqua*'s Moderate Resolution Imaging Spectroradiometer to study how ice particle sizes change when aerosol pollution is present in the clouds. The team also used NASA's *Tropical Rainfall Measuring Mission* satellite to measure the amount of precipitation falling from the polluted and clean clouds. All three measurements together show the relationship between pollution, clouds, and precipitation.

The team found that polluted clouds suppressed rainfall during the June to October dry season in South America, which is also a period of increased

agricultural burning. During that period, it was more difficult for the measurably smaller ice particles in aerosol polluted clouds to grow large enough to fall as rain.

This trend turned up seasonal and regional differences, however, and aerosol pollution was found, on average, to be less of a factor during the

wet monsoon seasons in South America and in South Asia. Other physical effects, such as large-scale dynamics and rainy conditions that clear the air of aerosol particles, might also be at play, the researchers suggest.

"The complexity of interactions between aerosols and clouds pose difficult problems that no one satellite instrument can solve," said Jiang. "But when you put parameters from multiple satellites all together, you will find much more information than from a single instrument alone."

The five satellites—NASA's *Aqua*, *Aura*, CloudSat, and CALIPSO, and the French Space Agency's PARASOL—of the A-Train orbit only 8 minutes apart and can be thought of as an extended satellite observatory, providing unprecedented information about clouds, aerosols, and atmospheric composition. ■

Meet the Faces at Goddard Behind GLAST: Kevin Grady

By Rob Gutro



Photo Credit: NASA

Caption: Kevin Grady.

You may see him walking through Building 23 at Goddard, his home away from home. Kevin Grady is the Program Manager for the *Gamma-ray Large Area Space Telescope* (GLAST) mission.

Kevin is responsible for the overall management and implementation of the GLAST mission. He has been the GLAST Program Manager since 2003. In this position, he has been responsible for the overall development and management of this high energy astrophysics mission.

When asked what he liked best about his job, Kevin said, "The best thing about the kind of work we do is to try to be up to the challenge of doing something, which, if you step back and look at it, is nearly impossible. We are building something of enormous complexity, that's the size of a large SUV, putting it 400 miles up in space, while setting the bar. At the end of all of this, we rewrite the science books, or discover some new scientific principles as a final product. Any one of us is a small piece of the puzzle, but being part of something as compelling as that, is what makes this so extraordinary."

Kevin has worked for NASA Goddard since 1978. For much of his career, he has been in the Flight Programs and Project Directorate, managing or

supporting some of Goddard's largest astronomy and remote sensing flight missions. He started his career at Goddard in the Engineering Directorate as a controls engineer. In 1987, he moved from the Engineering Directorate into the Flight Programs and Projects Directorate where he has been ever since.

From 2001 to 2003, Kevin was the Project Manager of the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP). In this position, he was responsible for the development of the aforementioned NPOESS, a pathfinder mission for the next generation polar orbiting weather constellation. From 1991 to 2001, he was either the Project Manager or Deputy Project Manager of the Earth Observing System (EOS) *Terra* mission. He was the Deputy Project Manager of *Terra* until 1997, at which point he became the Project Manager for the *Terra* mission. *Terra* was the first of the flagship missions for the Earth Observation System program.

From 1985 to 1991, he worked on the Goddard Work Package 3 element of the Space Station Freedom program. Initially, he was the lead for the Work Package 3 guidance, navigation, and control (GN&C) activities. Later he became the head of an office in the Work Package 3 Systems Engineering and Integration element. He then became the Platform Manager for Work Package 3, and when the polar platform moved out of the Space Station Program and into the EOS Program, Kevin became the Observatory Manager for the first of the EOS missions (*Terra*). Shortly thereafter, he became the Deputy Project Manager for *Terra*.

From 1978 to 1985, as a member of the Guidance and Control Branch of the Engineering Directorate, he was the lead GN&C engineer for the Landsat 4 and 5 missions, GN&C Manager for the Solar Maximum Repair Mission (SMRM), and an altitude control system integration and test engineer on the Solar Maximum Mission (SMM).

He has Bachelor of Science degrees in physics and engineering from Drexel University, and a Master of Science degree in electrical engineering from the Johns Hopkins University.

Skiing, mountain biking, golf, and coaching his two sons' baseball teams are Kevin's other interests. Skiing and mountain biking are special because it gets his family outdoors to some extraordinary places. He said, "Golf has the special appeal of, like building satellites, doing something that is nearly impossible. And being able to watch my two sons play baseball is especially enjoyable and rewarding, as baseball is a wonderful game, and working with the young boys is a lot of fun."

For more information about GLAST, visit: <http://www.nasa.gov/glast>. ■

New Faces:

A monthly feature spotlighting new members of the Goddard community.

By John Putman



Photo credit: Bill Hrybyk

Caption: Patrick Thompson.

Patrick Thompson is a Senior Optical Engineer in Code 551.

After 7 years of physics, optics, and co-op work—some on the *Chandra X-ray Observatory*—he earned bachelor's and master's degrees from the Georgia Institute of Technology. Patrick received a Ph.D. in optical sciences and engineering from the University of Central Florida and the Center for Research and Education in Optics and Lasers (CREOL).

Patrick worked for the Applied Physics Lab (APL) leading design and analysis for many space science and military optical instruments, including the *Mars Reconnaissance Orbiter's* Compact Reconnaissance Imaging Spectrometer for Mars (CRISM) instrument.

Patrick came to NASA Goddard because he, "Couldn't resist...becoming an integral part of one of the top space science, exploration, and optical engineering institutions in the world."

Patrick savors working with, "the kind of people and world-class facilities that, even in the most modest ways, will surely write history by making dreams come true." In fact, one of Patrick's personal dreams is to, "Build a large telescope on the Moon."

When not at work, Patrick enjoys amateur astronomy, hiking, camping, scuba diving, cooking, and spending time with family and friends, preferably doing all the above. ■

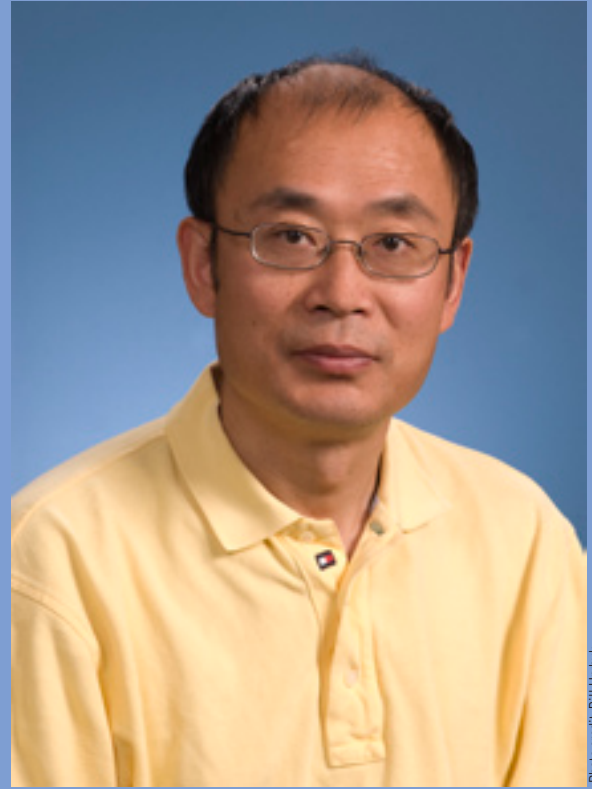


Photo credit: Bill Hrybyk

Caption: Guangying Yang.

Guangying Yang is an Electronics Engineer with AST-Electro-Optical Sensor Systems, in Code 554.

Originally from China, Guan graduated from Drexel University in Philadelphia, Pa.

Guan was attracted to NASA Goddard because, "NASA pursues the unknowns on Earth and space with cutting edge technology."

For Guan, the most rewarding part of working at NASA Goddard is the association with, "talented people and flexible resources."

When not at work, Guan enjoys spending time outdoors with his family, and has recently begun work on some home improvement projects. ■