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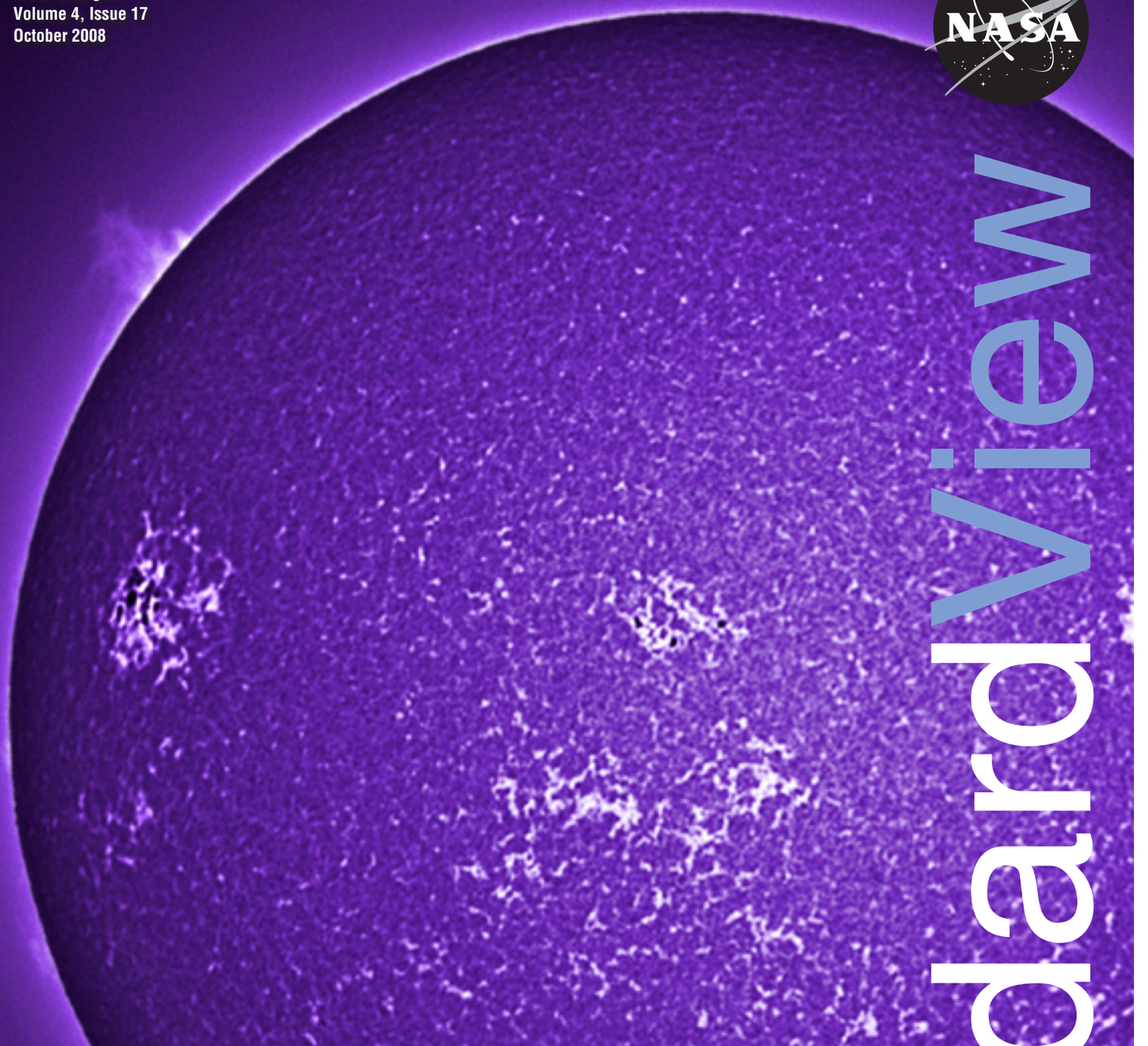

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Center Director Approves FY09 IRAD Program

By Lori Keesey

Goddard Center Director Rob Strain has approved 93 research and development tasks for GSFC's FY09 Internal Research and Development (IRAD) program. The program is aimed at fostering the Center's scientific and technological competitiveness and enhancing its ability to meet NASA's future challenges.

The portfolio includes mission concept, research and development, and technology risk reduction activities important to GSFC's six lines of business, as well as crosscutting technologies that benefit multiple areas of interest.

"I want to acknowledge the quality of the submissions we received under this call," said Chief Technologist Peter Hughes, who manages the Center's IRAD program. "The evaluation process was rigorous, with significant input from our line-of-business leads. As a result, we created a portfolio of investments that is well balanced, opportunity driven, and forward reaching. It emphasizes in-house technology development that will capture new work."

Of the 93 IRAD awards, nearly 23 percent represent ideas offered by new innovators (defined as Principal Investigators with no more than 7 years of professional experience) and about 20 percent address longer-term, high-risk, or early-stage innovations. Fifty-nine percent of the selected proposals are new ideas that have never before received R&D seed funding.

The program will officially begin Oct. 1. ■

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Cover caption: "Cantaloupe ridges" on the Sun. The glowing white magnetic network is what gives the Sun its extra oblateness during times of high solar activity. The photographer, an amateur astronomer, used a violet calcium-K filter to achieve the purple color.

Photo credit: Gary Palmer.

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.

NASA Spacecraft Finds the Sun is Not a Perfect Sphere

By Tony Phillips

Scientists using NASA's *Reuven Ramaty High-Energy Solar Spectroscopic Imager* (RHESSI) spacecraft have measured the roundness of the Sun with unprecedented precision. They have found that it is not a perfect sphere. During years of high solar activity the Sun develops a thin "cantaloupe skin" that significantly increases its apparent oblateness: the Sun's equatorial radius becomes slightly larger than its polar radius. Their results appear in the Oct. 2nd edition of *Science Express*.

"The Sun is the biggest, and therefore smoothest, object in the solar system, perfect at the 0.001% level because of its extremely strong gravity," says study co-author Hugh Hudson of the University of California, Berkeley. "Measuring its exact shape is no easy task."

RHESSI, an X-ray/gamma-ray space telescope launched in 2002 on a mission to study solar flares, was never intended to measure the roundness of the Sun. It has turned out, however, to be ideal for the purpose. RHESSI observes the solar disk through a narrow slit and spins at 15 rpm. The spacecraft's rapid rotation and high data sampling rate (necessary to catch fast solar flares) make it possible for investigators to trace the shape of the Sun with fewer systematic errors than any previous study. Their technique is particularly sensitive to small differences in polar vs. equatorial radius or "oblateness."

"We have found that the surface of the Sun has a rough structure: bright ridges arranged in a network pattern, as on the surface of a cantaloupe but much more subtle," describes Hudson. During active phases of the solar cycle, these ridges emerge around the Sun's equator, brightening and fattening the "stellar waist." At the time of RHESSI's measurements in 2004, ridges increased the Sun's apparent equatorial radius by an angle of 10.77 ±0.44 milli-arcseconds, or about the same as the width of a human hair viewed one mile away.

"That may sound like a very small angle, but it is in fact significant," says Alexei Pevtsov, RHESSI Program Scientist at NASA Headquarters. Tiny departures from perfect roundness can, for example, affect the Sun's gravitational pull on Mercury and skew tests of Einstein's theory of relativity that depend on careful measurements of the inner planet's orbit. Small bulges are also telltale signs of hidden motions inside the Sun. For instance, if the Sun had a rapidly rotating core left over from early stages of star formation, and if that core were tilted with respect to its outer layers, the result would be surface bulging. "RHESSI's precision measurements place severe constraints on any such models."

The "cantaloupe ridges" are magnetic in nature. They outline giant, bubbling convection cells on the surface of the Sun called "supergranules."

Supergranules are like bubbles in a pot of boiling water amplified to the scale of a star; on the Sun they measure some 30,000 km across (twice as wide as Earth) and are made of seething hot magnetized plasma. Magnetic fields at the center of these bubbles are swept out to the edge where they form ridges of magnetism. The ridges are most prominent during years around solar maximum when the Sun's inner dynamo revs up to produce the strongest magnetic fields. Solar physicists have known about supergranules and the magnetic network they produce for many years, but only now has RHESSI revealed their unexpected connection to the Sun's oblateness.

"When we subtract the effect of the magnetic network, we get a true measure of the Sun's shape resulting from gravitational forces and motions alone," says Hudson. "The corrected oblateness of the non-magnetic Sun is 8.01 ±0.14 milli-arcseconds, near the value expected from simple rotation."

Further analysis of RHESSI oblateness data may help researchers detect a long-sought type of seismic wave echoing through the interior of the Sun: the gravitational oscillation or "g-mode." Detecting g-modes would open a new frontier in solar physics—the study of the Sun's internal core.

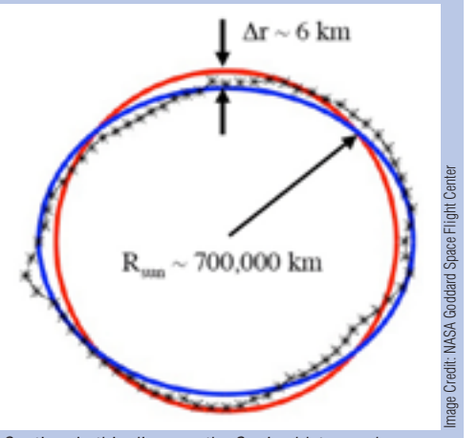


Image Credit: NASA Goddard Space Flight Center

Caption: In this diagram, the Sun's oblateness has been magnified for easy visibility. The blue curve traces the Sun's shape averaged over a three month period. The black asterisked curve traces a shorter 10-day average. The "wiggles" in the 10-day curve are caused by strong magnetic ridges in the vicinity of sunspots.

The paper reporting these results, "A Large Excess in Apparent Solar Oblateness Due to Surface Magnetism," was authored by Martin Fivian, Hugh Hudson, Robert Lin, and Jabran Zahid, and appears in the Oct. 2nd issue of *Science Express*.

RHESSI's primary mission is to explore the basic physics of particle acceleration and explosive energy release in solar flares. RHESSI was launched in 2002 to study solar flares and to understand the processes that take place in the magnetized plasmas of the solar atmosphere during a flare. RHESSI is part of Goddard's Small Explorer program. ■

Apollo Heat Shield Uncrated After 35 Years, Helps New Crew Vehicle Design

By Rob Gutro

NASA scientists, developing the next generation of exploration vehicles and heat shields for NASA's *Orion* Crew Exploration Vehicle, experienced "Christmas in July" when they uncrated the heat shields used on the *Apollo* missions some 35 years ago. These shields now are being analyzed to help with the development and engineering process.

Teams of NASA scientists and engineers working on the *Orion* Crew Exploration Vehicle Thermal Protection System Advanced Development Project went to the Smithsonian Institution's National Air and Space Museum's Garber Facility in Suitland, Md., July 31 through August 1, 2008. The Garber Facility curators and conservators collect, preserve, and restore all things air and space. This includes airplanes, spacecraft, and spacesuits.

The *Orion* teams included members from both NASA's Goddard Space Flight Center in Greenbelt, Md., and NASA Ames Research Center in Moffett Field, Calif.

"We started working together at the end of June to track down any *Apollo*-era heat shields that they had in storage," said Elizabeth (Betsy) Pugel of the Detector Systems Branch at Goddard. "We located one and opened it. It was like a nerd Christmas for us!"

Image credit: Debora McCallum

Caption: Ethiraj Venkatapathy from NASA Ames, Betsy Pugel of Goddard, and Hanna Szczepanowska, a National Air and Space Museum Conservator examine the 1966 Apollo *test vehicle heat shield.*

The *Orion* team was interested in the archived heat shield material because it included an *Apollo* heat shield that flew into low-Earth orbit and returned to Earth on August 26, 1966.

"We are examining the design of the carrier structure (the metal structure that connects the heat shield to the vessel that contains the astronauts) and the heat shield material's thermal response," Pugel said.

Image credit: Debora McCallum

Caption: Matt Gasch of Ames (l) and Betsy Pugel of Goddard examine the remains of a 1966 Apollo *test vehicle heat shield.*

"The Smithsonian has been generous in their providing large pieces of the heat shield that we will be doing destructive and non-destructive testing on during the months before *Orion*'s Preliminary Design Review," said Matthew Gasch, a research scientist at NASA Ames. "This information will further our confidence in our design and materials development."

Orion will be capable of carrying crew and cargo to the Space Station. It will be able to rendezvous with a lunar landing module and an Earth departure stage in low-Earth orbit to carry crews to the Moon and, one day, to Mars-bound vehicles assembled in low-Earth orbit.

Orion will be the Earth entry vehicle for lunar and Mars returns. *Orion*'s design will borrow its shape from the capsules of the past, but takes advantage of 21st century technology in computers, electronics, life support, propulsion, and heat protection systems.

Making its first flights early in the next decade, *Orion* is part of the Constellation Program to send human explorers back to the Moon, and then onward to Mars and other destinations in the solar system.

For more information about *Orion*, visit: http://www.nasa.gov/orion. ■

Top Winners Announced for Discovery Education 3M Young Scientist Challenge

By Dewayne Washington

NASA's Goddard Space Flight Center in Greenbelt, Md. hosted the Discovery Education 3M Young Scientist Challenge on October 5–6 for the competition finals. Ten middle school student finalists from across the country vied for the title of "America's Top Young Scientist" and a chance to win a $50,000 U.S. Savings Bond. Five teacher finalists contended for recognition as "America's Top Science Teacher."

After two days of challenges, Melissa Rey from Chesterfield, Mo. was named "America's Top Young Scientist" in the Building 8 Auditorium. Edward Evans from Welch, W.Va., earned the "American's Top Science Teacher" award.

The competition was hosted at Goddard as part of a NASA-Discovery Space Act Agreement to celebrate NASA's 50 years of discovery. Goddard scientists, engineers, and Goddard's resident astronaut, Paul Richards, assisted in challenging each participant on their knowledge of space-related themes and activities. Challenges included jet propulsion, repair of the *Hubble Space Telescope*, Martian topography, jet propulsion, mechanical engineering, trajectory, black holes, and how to simulate lunar gravity on Earth.

The Discovery Education 3M Young Scientist Challenge targets middle school students in the years when research indicates their interest in science begins to fade and encourages them to explore scientific concepts and creatively communicate their findings. This event provided 10 middle school students and 5 teachers an opportunity to demonstrate their science prowess in a series of team-based, interactive challenges focused on this year's theme, "The Science of Space."

For more information about the Discovery Education 3M Young Scientist Challenge or to view student submission videos, visit: http://youngscientist.discoveryeducation.com/home.html. See the Discovery Education 3M Young Scientist Challenge photo gallery on Pages 6–7. ■

Photo Credit: NASA

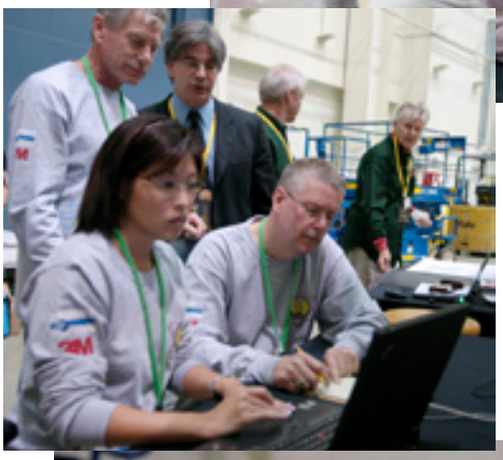
Caption: Young Scientist Challenge winner Melissa Rey stands with runners-up Shyamal Buch (left) and Peter Ku next to her.

Photo Credit: Wade Sisler

Caption: Young Scientist Challenge winner Melissa Rey and other future scientists listen intently.

Discovery Education 3M Young Scientist Challenge Photo Gallery

All photos by Debora McCallum



Discovery Education 3M Young Scientist Challenge Photo Gallery

Spotless Sun: Blankest Year of the Space Age

By Tony Phillips

Astronomers who count sunspots have announced that 2008 is now the "blankest year" of the Space Age.

As of Sept. 27, 2008, the Sun has been blank—with no visible sunspots—on 200 days of the year. To find a year with more blank suns, you have to go back to 1954, three years before the launch of *Sputnik*, when the Sun was blank 241 times.

"Sunspot counts are at a 50-year low," says solar physicist David Hathaway of NASA Marshall Space Flight Center in Huntsville, Ala. "We're experiencing a deep minimum of the solar cycle."

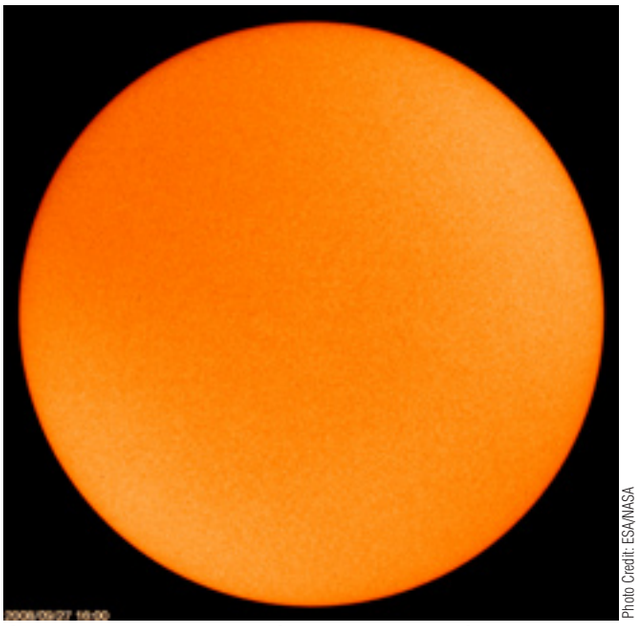


Photo Credit: ESA/NASA

Caption: This image, taken by the Solar and Heliospheric Observatory *(SOHO) on Sept. 27, 2008, shows a solar disk completely unmarked by sunspots.*

The difference is the phase of the 11-year solar cycle. For example, 2001 was a year of solar maximum, with lots of sunspots, solar flares, and geomagnetic storms. At the opposite extreme of this cycle, 2008 was a year of solar minimum, a quiet time on the Sun.

If solar activity continues as low as it has been, 2008 could rack up a whopping 290 spotless days by the end of December, making it a century-level year in terms of spotlessness.

Hathaway cautions that this development may sound more exciting than it actually is, "While the solar minimum of 2008 is shaping up to be the deepest of the Space Age, it is still unremarkable compared to the long and deep solar minima of the late 19th and early 20th centuries." Those earlier minima routinely racked up 200 to 300 spotless days per year.

Some solar physicists are welcoming the lull. "This gives us a chance to study the Sun without the complications of sunspots," says Dean Pesnell of the Goddard Space Flight Center in Greenbelt, Md. "Right now we have the best instrumentation in history looking at the Sun. There is a whole fleet of spacecraft devoted to solar physics: *Solar and Heliospheric Observatory* (SOHO), *Hinode*, *Advanced Composition Explorer* (ACE), *Solar Terrestrial Relations Observatory* (STEREO), and others. We're bound to learn new things during this long solar minimum."

As an example, Pesnell offers helioseismology, "By monitoring the Sun's vibrating surface, helioseismologists can probe the stellar interior in much the same way geologists use earthquakes to probe inside Earth. With sunspots out of the way, we gain a better view of the Sun's subsurface winds and inner magnetic dynamo."

"There is also the matter of solar irradiance," adds Pesnell. "Researchers are now seeing the dimmest Sun in their records. The change is small, just a fraction of a percent, but significant. Questions about effects on climate are natural if the Sun continues to dim."

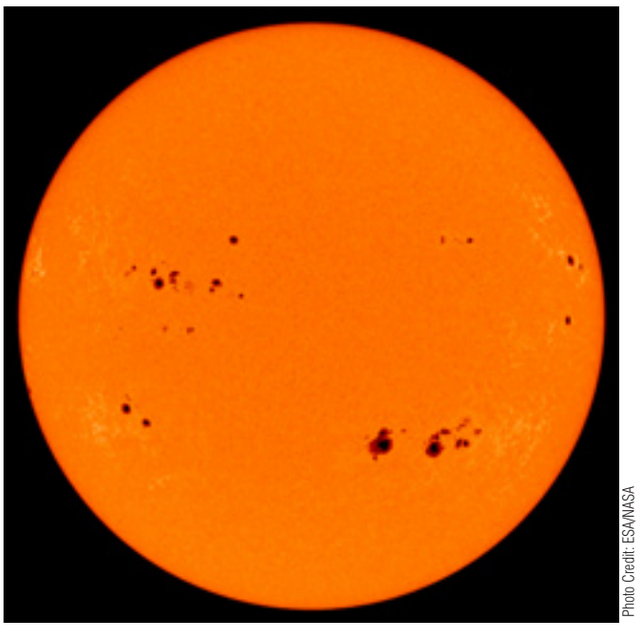


Photo Credit: ESA/NASA

Caption: A SOHO image taken seven years earlier on Sept. 27, 2001, is peppered with colossal sunspots, all crackling with solar flares.

Pesnell is NASA's Project Scientist for the *Solar Dynamics Observatory* (SDO), a new spacecraft equipped to study both solar irradiance and helioseismic waves. Construction of SDO is complete, he says, and it has passed prelaunch vibration and thermal testing. "We are ready to launch! Solar minimum is a great time to go."

Coinciding with the string of blank suns is a 50-year record low in solar wind pressure, a recent discovery of the *Ulysses* spacecraft. The pressure drop began years before the current minimum, so it is unclear how the two phenomena are connected, if at all. ■

NASA Spacecraft Ready to Explore Outer Solar System

By Laura Layton

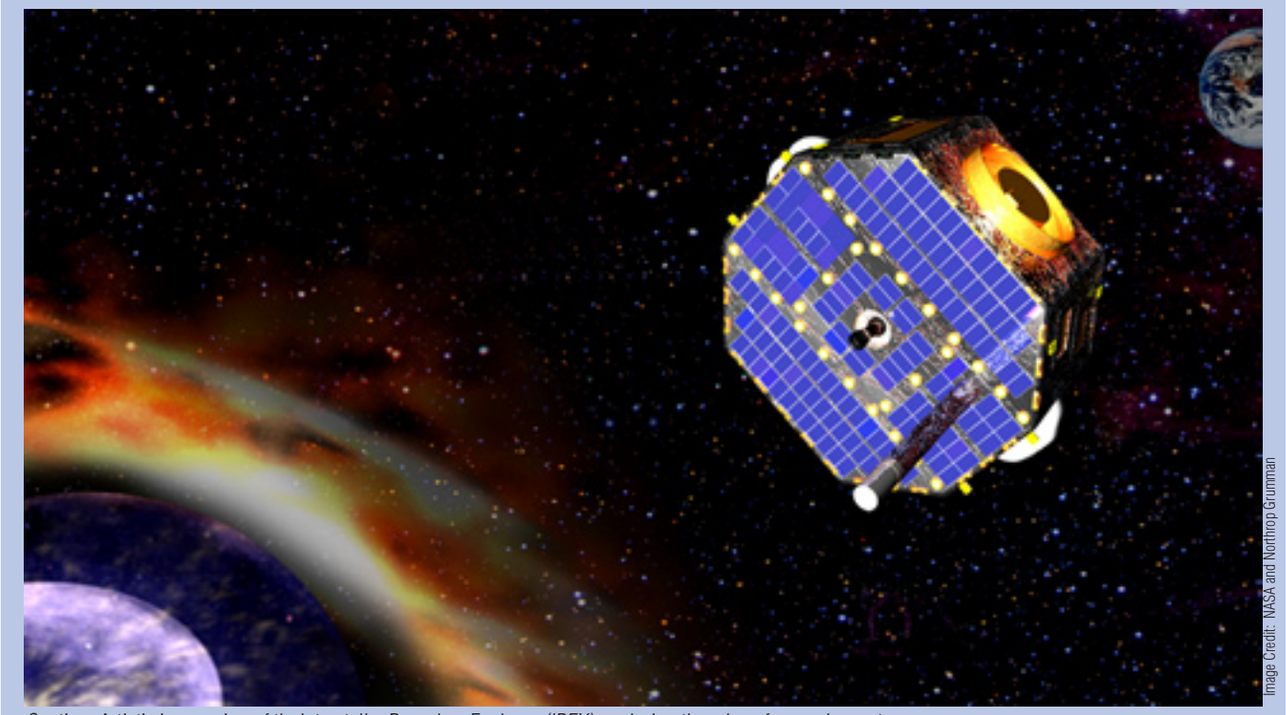


Image Credit: NASA and Northrop Grumman

Caption: Artist's impression of the Interstellar Boundary Explorer *(IBEX) exploring the edge of our solar system.*

The first NASA spacecraft to image and map the dynamic interactions taking place where the hot solar wind slams into the cold expanse of space is ready for launch Oct. 19. The two-year mission will begin from the Kwajalein Atoll, part of the Marshall Islands in the Pacific Ocean.

Called the *Interstellar Boundary Explorer* (IBEX), the spacecraft will conduct extremely high-altitude orbits above Earth to investigate and capture images of processes taking place at the farthest reaches of the solar system. Known as the interstellar boundary, this region marks where the solar system meets interstellar space.

"The interstellar boundary regions are critical because they shield us from the vast majority of dangerous galactic cosmic rays, which otherwise would penetrate into Earth's orbit and make human spaceflight much more dangerous," said David J. McComas, IBEX Principal Investigator and Senior Executive Director of the Space Science and Engineering Division at the Southwest Research Institute in San Antonio, Texas.

The story of the outer solar system began to unfold when the *Voyager 1* and *Voyager 2* spacecrafts left the inner solar system and headed out toward the boundary between our solar system and interstellar space.

"The *Voyager* spacecraft are making fascinating observations of the local conditions at two points beyond the termination shock that show totally unexpected results and challenge many of our notions about this important region," said McComas.

Other spacecraft have continued the exploration of the interstellar boundary region. Recently, a pair of NASA Sun-focused satellites, the *Solar Terrestrial Relations Observatory* (STEREO) mission, detected a higher-energy version of the particles IBEX will observe in the heliosphere. The heliosphere is an area containing the solar wind. It stretches from the Sun to a distance several times the orbit of Pluto.

IBEX will thoroughly map this interstellar boundary region of the solar system. The images will allow scientists to understand the interaction between our Sun and the galaxy for the very first time.

IBEX will be launched aboard a Pegasus rocket dropped from the wing of an L-1011 aircraft flying over the Pacific Ocean. The Pegasus will carry the spacecraft approximately 130 miles above Earth and place it in orbit.

"What makes the IBEX mission unique is that it has an extra kick during launch," said Willis Jenkins, IBEX Program Executive at NASA Headquarters in Washington, D.C. "An extra solid-state motor pushes the spacecraft farther out of low-Earth orbit where the Pegasus launch vehicle leaves it."

The IBEX mission is the next in NASA's series of low-cost, rapidly developed Small Explorers spacecraft. Goddard Space Flight Center in Greenbelt, Md. manages the Explorers Program for NASA's Science Mission Directorate in Washington, D.C. The mission was developed by Southwest Research Institute with national and international partner participation.

For more information about IBEX, visit: http://www.nasa.gov/ibex. ■

The *James Webb Space Telescope* Model Is Flying to Germany

By Rob Gutro and Richard Dent

The model of the *James Webb Space Telescope* (JWST) has been making a lot of "orbits" around the world, and is now slated to "land" at the Deutsches Museum in Munich, Germany from October 13–28, 2008.

The actual *James Webb Space Telescope* is in the process of being built. Once it launches in 2013, it will find the first galaxies and will peer through dusty clouds to see stars forming planetary systems, connecting the Milky Way to our own Solar System. *Webb*'s instruments have been designed to work primarily in the infrared range of the electromagnetic spectrum, with some capability in the visible range.

In the meantime, a life-sized model of the *Webb* telescope was built by Northrop Grumman to give the viewing public here on Earth a better understanding of the size, scale, and complexity of this breakthrough satellite. Northrop Grumman Corporation, Redondo Beach, Calif., and many other U.S. and international partners are working with NASA to build the actual telescope and technologies.

"The Deutsches Museum is home to a beautiful telescope collection, including the Fraunhofer Refractor, used to discover Neptune. It's wonderful to bring the *James Webb Space Telescope* model here so that people see both historical and state-of-the-art astronomical instruments," said Eric Smith, *James Webb Space Telescope* Program Scientist at NASA Headquarters in Washington, D.C. "The timing is perfect because in October, there is a workshop meeting of the *Webb* telescope scientists and engineers nearby, so people working on the project can get to see the life-sized model." EADS Astrium, one of the international partners currently working to build *Webb*, is hosting both the workshop and the display of the model in Munich.

EADS Astrium GmbH, with several locations in Germany, is partnering with NASA to sponsor the model display. They are also building the Near Infrared Spectrograph, or NIRSpec, instrument for the *Webb* telescope, one of four science instruments onboard the observatory. The 200 kg spectrograph will be able to detect extremely faint radiation from some of the most distant galaxies and observe more than 100 objects simultaneously.

Photo Credit: NASA

Caption: The full-scale model of the James Webb Space Telescope *on its visit to Dublin in June 2007.*

The Deutsches Museum in Munich, Germany has over 100,000 objects from the fields of science and technology. The exhibits and collections cover all areas of science and technology from mining to atomic physics to biology. They extend from the Stone Age to the present time. Collecting historically significant objects is one of the Museum's central tasks, and the *Webb* telescope model makes a nice temporary exhibit to showcase the next generation of space telescopes.

The *Webb* telescope model has "orbited" the Earth a number of times since 2005. It has "landed" at Colorado Springs, Colo.; Paris, France; Greenbelt, Md.; Rochester, N.Y.; Orlando, Fla.; Washington, D.C.; Dublin, Ireland; and most recently Montreal, Canada.

The model was specifically designed for an environment that is subject to gravity and weather. It is constructed mainly of aluminum and steel, weighs 12,000 lbs., and is approximately 80 feet long, 40 feet wide, and 40 feet tall. The model requires two trucks to ship it and assembly takes a crew of 12 approximately four days. Funds used to build the model were provided solely by Northrop Grumman.

The *James Webb Space Telescope* is a joint project of NASA, the European Space Agency, and the Canadian Space Agency. NASA's Goddard Space Flight Center is managing the development effort.

For more information on JWST, visit: http://jwst.gsfc.nasa.gov/index.html. ■

Goddard-Managed Satellite Records Rare Neutron Star

By Francis Reddy

"Twinkle, twinkle little star" goes the nursery rhyme. Now, astronomers are reporting on a strange case where one of the littlest of stars "twinkled" with gamma rays, X-rays, and light—and then vanished.

The story began on June 10, 2007, when a spike of gamma rays lasting less than five seconds washed over NASA's *Swift* satellite. But this high-energy flash wasn't a gamma-ray burst—the birth cry of a black hole far across the universe. It was something much closer to home.

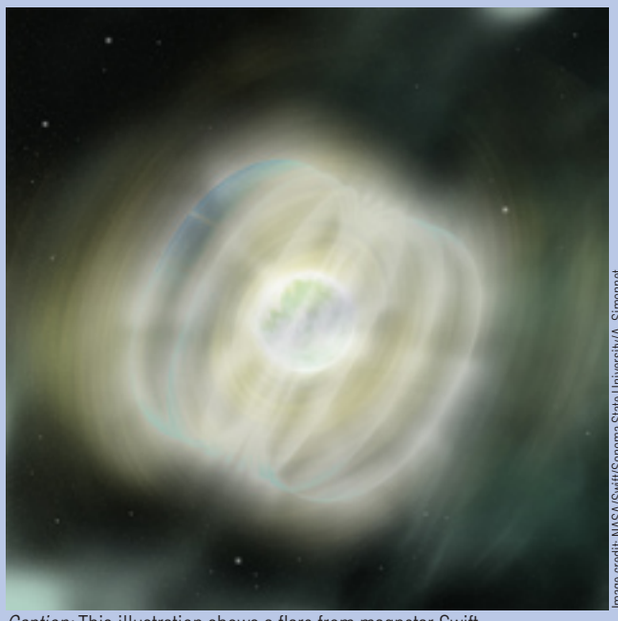


Image credit: NASA/Swift/Sonoma State University/A. Simonnet

Caption: This illustration shows a flare from magnetar Swift J195509+261406. A starquake is probably what triggered the object's 40 optical flares.

Swift immediately reported the event's position to astronomers all over the world. Within a minute, robotic telescopes turned to a spot in the constellation Vulpecula. Because *Swift* found an X-ray glow coming from this point, astronomers cataloged the object as "Swift J195509+261406," after its position in the sky and the discovering satellite.

During the next three days, the object brightened and faded in visible light. Not once, not twice—but 40 times. Eleven days later, it flashed again, this time at infrared wavelengths. Then, it disappeared from view.

"I love it when *Swift* enables a discovery like this," says Neil Gehrels, the mission's lead scientist at NASA Goddard Space Flight Center in Greenbelt, Md. "The observatory is an astronomical robot built for gamma-ray burst studies, but it can also quickly point at other bizarre objects with bright flares."

Astronomers think the object was a neutron star—the crushed innards of a massive star that long ago exploded as a supernova—about 15,000 light-years away. Writing in the Sept. 25 issue of the science journal *Nature*, a team of 42 scientists concludes that Swift J195509+261406 is a special type of neutron star called a magnetar.

"We are dealing with an object that was hibernating for decades before entering a brief activity period," explains Alberto J. Castro-Tirado, lead author of the paper. "Magnetars remain quiet for decades."

Although measuring only about 12 miles across—about the size of a city—neutron stars have the strongest magnetic fields in the cosmos. Sometimes, those magnetic fields are super strong—more than 100 times the strength of typical neutron stars.

Astronomers put these magnetic monsters in their own class: magnetars. Only about a dozen magnetars are known, but scientists suspect our galaxy contains many more. We just don't see them because they're quiet most of the time.

So what happened last year? Why did this previously unseen star begin behaving so badly? And why did it stop?

Combine a magnetar's pumped-up magnetic field with its rapid spin, and sooner or later something has to give. Every now and then, the magnetar's rigid crust snaps under the strain.

This "starquake" releases pent-up magnetic energy, which creates bursts of light and radiation. Once the star's crust and magnetic field settle down, the star goes dark and disappears from our view. At least until the next quake.

Astronomers suspect that magnetars lose their punch as time passes, but Swift J195509+261406 provides the missing link between objects exhibiting regular activity and those that have settled into retirement—and invisibility.

Swift is a first-of-its-kind multi-wavelength observatory dedicated to the study of gamma-ray burst (GRB) science. Its three instruments work together to observe GRBs and their afterglows. *Swift* is part of NASA's Medium Explorer program. It was launched into a low-Earth orbit on a Delta 7320 rocket on November 20, 2004.

Swift is managed by Goddard Space Flight Center in Greenbelt, Md. It was built and is being operated in collaboration with The Pennsylvania State University, the Los Alamos National Laboratory, and General Dynamics in the U.S.; the University of Leicester and Mullard Space Sciences Laboratory in the United Kingdom; Brera Observatory and the Italian Space Agency in Italy; plus partners in Germany and Japan.

For more information on *Swift*, visit: http://www.nasa.gov/swift. ■

In Memoriam: Beth Brown

By Dewayne Washington

Dr. Beth Brown, 39, astrophysicist and Assistant Director for Science Communication and Higher Education for the Science and Exploration Directorate at Goddard, died suddenly on October 5, 2008 at Doctor's Community Hospital in Lanham, Maryland.

Along with her research accomplishments, Brown had developed a reputation for outstanding work in public outreach support. Brown was often asked to travel across the country spreading her enthusiasm about working in the world of astrophysics. "I like science because I am curious about how something works and why something exists," Brown had said. "I love my job because of the variety of things I get to do and the possibility of discovering something new."

Brown often credited television for sparking her curiosity in the study of outer space. "I remember reading lots of science fiction books and loved watching *Star Trek*," Brown had said. She first wanted to be an astronaut, but later realized her true love was in the study of the stars. So began a life's desire that along the way created some amazing accomplishments.

The Roanoke, Va. native was the valedictorian at William Fleming high school and graduated Summa Cum Laude with a Bachelor of Science degree in astrophysics from Howard University. She earned her M.S. and Ph.D. in astronomy from the University of Michigan. Brown was the first African-American woman to obtain a doctorate from the University of Michigan's Department of Astronomy. She had been recognized as one of the "Women of NASA," a project designed to encourage young women to pursue careers in math, science, and technology by using women within NASA as role models.

In 2006, Brown was able to again walk the halls of Howard University, this time as a faculty member after being selected for the NASA Administrator's Fellowship Program. Brown credited Dr. Nick White, then the Astrophysics Science Division Director, for encouraging her to apply. "I feel like Nick was directly responsible for this opportunity," Brown had said. Brown was thrilled to give back to her alma mater.

After completing the two-year program, she was asked and accepted a new position at Goddard. "Beth had recently joined my leadership team, and with her energetic and thoughtful approach, had already had an impact," White says. "It is a tragedy she was so unexpectedly taken at a new peak in her career. She will be greatly missed by all of us."

Brown's professional career in space studies began within the gates of Goddard. "She was truly a poster child for the NASA pipeline," says Dillard Menchen, Deputy Chief of Education at Goddard. Brown's initial exposure began during the summers of 1989 and 1990.

Brown returned to Goddard after receiving her Ph.D. as a Research Associate for the National Research Council. Brown joined the National Space Science Data Center in 2001 as a civil servant. "Despite all of her grand achievements and accolades, she remained humble and true to her spiritual beliefs," Menchan says.

Beth leaves behind her father, mother, brother, and several close extended family members. In her most recent e-mail traffic, Beth would conclude with a quote, possibly a hint of something she wanted to leave behind: *"Science is organized knowledge. Wisdom is organized life." – Immanuel Kant.* ■

Photo credit: Jay Friedlander

Caption: Beth Brown.