National Aeronautics and Space Administration

Goddard View

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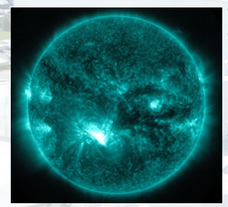
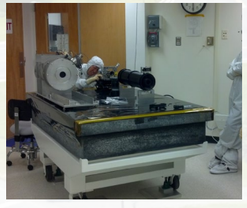
GoddardView

TRENDING



Third Substantial Solar Flare in Two Days
The sun erupted with another significant flare on October 22. NASA's SDO captured images of the event. This flare is classified as an X class flare, the most extreme flares. This is the third substantial flare from the same region of the sun since Oct. 19. See more by clicking on the image.

Conversations with Goddard
Planetary scientist Melissa Trainer travels virtually to Mars, Titan and other extreme solar system environments. Discover more and read all of the Conversations with Goddard by clicking on the photo.



NASA to Study Impacts of Sea Ice Loss
Super-black nanotechnology to be tested for the first time this fall on the ISS will be applied to a complex component critical for suppressing stray light in a new, smaller, less-expensive solar coronagraph designed to fly on ISS or as a payload on a commercial satellite. Learn more.

Conversations with Goddard
Outreach coordinator Winnie Humberson thinks of new ways to share science stories to the public. Read more about Humberson and all the Conversations with Goddard by clicking on the photo.

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On the cover: SDO captured this image of a solar flare on the sun on Nov. 3, 2014. Harmful radiation from a flare cannot pass through Earth's atmosphere to physically affect humans on the ground, however they can disturb the atmosphere where GPS and communications signals travel. Image credit: NASA/SDO

GoddardView Info

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

You may submit contributions to the editor 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.

CONTENTS

WALLOPS FLIGHT FACILITY COMPLETES INITIAL ASSESSMENT AFTER LAUNCH MISHAP

By: Stephanie Schierholz and Keith Koehler

The Wallops Incident Response Team completed an initial assessment of Wallops Island, Virginia, following the catastrophic failure of Orbital Science Corp.'s Antares rocket shortly after liftoff at 6:22 p.m. EDT Tuesday, Oct. 28, from Pad 0A of the Mid-Atlantic Regional Spaceport at NASA's Wallops Flight Facility in Virginia.

"I want to praise the launch team, range safety, all of our emergency responders and those who provided mutual aid and support on a highly-professional response that ensured the safety of our most important resource—our people," said Bill Wrobel, Wallops director. "In the coming days and weeks ahead, we'll continue to assess the damage on the island and begin the process of moving forward to restore our space launch capabilities. There's no doubt in my mind that we will rebound stronger than ever."

The initial assessment is a cursory look; it will take many more weeks to further understand and analyze the full extent of the effects of the event. A number of support buildings in the immediate area have broken windows and imploded doors. A sounding rocket launcher adjacent to the pad, and buildings nearest the pad, suffered the most severe damage.

At Pad 0A, the initial assessment showed damage to the transporter erector launcher and lightning suppression rods, as well as debris around the pad.

The Wallops team also met with a group of state and local officials, including the Virginia Department of Environmental Quality, the Virginia Department of Emergency Management, the Virginia Marine Police, and the U.S. Coast Guard.

The Wallops environmental team also is conducting assessments at the site. Preliminary observations are that the environmental effects of the launch failure were largely contained within the southern third of Wallops Island, in the area immediately adjacent to the pad. Immediately after the incident, the Wallops' industrial hygienist collected air samples at the Wallops mainland area, the Highway 175 causeway, and on Chincoteague Island. No hazardous substances were detected at the sampled locations.

Additional air, soil and water samples will be collected from the incident area as well as at control sites for comparative analysis.

The Coast Guard and Virginia Marine Resources Commission reported today they have not observed any obvious signs of water pollution, such as oil sheens. Furthermore, initial assessments have not revealed any obvious impacts to fish or wildlife resources. The Incident Response Team continues to monitor and assess.

The response team has opened the area of Wallops Island, north of the island flagpole opposite of the launch pad location, to allow the U.S. Navy to return back to work. ■

Above: An aerial view of the Wallops Island launch facilities taken by the Wallops Incident Response Team Oct. 29 following the failed launch attempt of Orbital Science Corp.'s Antares rocket Oct. 28. Photo credit: NASA/Terry Zaperach

How cold? Try -387 degrees Fahrenheit...

WEBB'S HEART SURVIVES DEEP FREEZE TEST

By: Laura Betz

After 116 days of being subjected to extremely frigid temperatures like that in space, the heart of the James Webb Space Telescope, the Integrated Science Instrument Module (ISIM) and its sensitive instruments, emerged unscathed from the thermal vacuum chamber at NASA's Goddard Space Flight Center in Greenbelt, Maryland.

Teams of engineers and technicians have been on heart-monitoring duty around the clock since this complicated assembly was lowered into the chamber for its summer-long test.

Engineer Mike Drury, the ISIM Lead Integration and Test Engineer, is one of the test directors making sure that Webb will thrive in the frigid conditions at its final destination in space one million miles away from Earth. "The telescope is going to L2 or Lagrange Point 2, which is a very extreme environment," said Drury. "The heart of Webb called ISIM is a very important part of the observatory and will provide all of Webb's images."

These images will reveal the first galaxies forming 13.5 billion years ago. The telescope will also pierce through interstellar dust clouds to capture stars and planets forming in our own galaxy. Operating a telescope powerful enough to complete these tasks requires incredibly cold temperatures.

How cold? Try -387 degrees Fahrenheit, or 40 degrees Kelvin. This is 260 degrees Fahrenheit colder than any place on the Earth's surface has ever been. To create temperatures that cold on Earth, the team uses the massive thermal vacuum chamber at Goddard called the Space Environment Simulator, or SES, that duplicates the vacuum and extreme temperatures of space. This 40-foot-tall, 27-foot-diameter cylindrical chamber eliminates the tiniest trace of air with vacuum pumps and uses liquid nitrogen and even colder liquid helium to drop the temperature simulating the space environment.

"We complete these tests to make sure that when this telescope cools down, the four parts of the heart are still positioned meticulously so that when light enters the telescope we capture it the right way," said Paul Geithner, Webb's deputy project manger. "The biggest stress for this telescope will be when it cools down. When the telescope structure goes from room temperature to its super cold operating temperature, it will see more stress from shrinkage than it will from violent vibration during launch," said Geithner.

NASA photographer Desiree Stover captured the photo of ISIM as it was lowered into the chamber for testing. The heart of the telescope weighs about as much as an elephant. Inside its black composite frame the four science instruments are tightly packed and are specially designed to capture specific information about distant light in the universe.

"When I first started here at Goddard, the ISIM structure was completely bare," said Stover who has been at Goddard for two years. "Leading up to this test all four science instruments were integrated onto it, along with heat straps, harnesses and blankets."

Tightening the bolts and putting everything together beforehand required very dedicated teams. "When ISIM was lowered into the chamber at the start of the test, that was a pretty emotional moment that represented an intense amount of work," said Marc Sansebastian, a mechanical assembly, integration and test technician. "After ISIM traveled overhead, we shifted back to technical mode because there are a million things that happen that you don't see."

At any given time of day during the test, the control room held representatives from all four-instrument teams. Each instrument has a test engineer, who makes sure the test is going well, and a data analyzer. Those teams are testing the hundreds of electrical connections and computer programs that give life to Webb's heart. "Kind of like having a car in a garage in the winter. You want to check the car to make sure that it is still working," said Alistair Glasse, instrument scientist for the Mid-Infrared Instrument.

"The weather this year was phenomenal for the test. When the weather is bad, when it's humid and when it gets stormy that's when we run into problems with the chamber," said Ray Lundquist, ISIM Lead Systems Engineer. "At the beginning of the test, we had a couple of storms and the building got hit by lightning that shut the whole system down for 30 minutes, but since that storm we have had really great weather."

Once the test was completed, the team warmed up the chamber, and completed the final functional test and a series of data analyses before they opened up the chamber.

"We've been very fortunate on this test. We've worked with all of the different teams. We have all been working shifts and pitching in," said Drury. "I'm really amazed at how well everyone is getting along together. We have a lot of people who are willing to help out."

The James Webb Space Telescope is the scientific successor to NASA's Hubble Space Telescope. It will be the most powerful space telescope ever built. Webb is an international project led by NASA with its partners, the European Space Agency and the Canadian Space Agency. ■

Opposite: A crane lifts the heart of the James Webb Space Telescope from the Goddard Thermal Vacuum Chamber where it spent weeks in a space-like environment. Photo credit: NASA/Goddard/Chris Gunn

HS3 MISSION CONTINUES WITH FLIGHTS OVER HURRICANE GONZALO

By: Robert Gutro

Tropical Storm Gonzalo strengthened into a hurricane on Oct. 14 when it was near Puerto Rico and provided a natural laboratory for the next phase of NASA's HS3 or Hurricane and Severe Storm Sentinel mission.

The WB-57 aircraft flew over Hurricane Gonzalo on Oct. 15 carrying two HS3 mission instruments called HIWRAP and HIRAD in addition to a new Office of Naval Research sponsored dropsonde system.

The WB-57 is a mid-wing, long-range aircraft capable of operation for extended periods of time from sea level to altitudes in excess of 60,000 feet. Two crewmembers are positioned at separate tandem stations in the forward section of the fuselage. The WB-57 will fly for approximately 6 hours, has a range of approximately 2,500 miles, and can carry up to 8,800 pounds of payload.

HIWRAP is the High-altitude Imaging Wind and Rain Airborne Profiler, a "conically scanning" Doppler radar, meaning it scans in a cone-shaped manner. Wind measurements are crucial for understanding and forecasting tropical storms since they are closely tied to the overall dynamics of the storm. The HIWRAP instrument is able to measure line-of-sight (along the radar beam) winds and rain and because it scans in a cone beneath the aircraft, it gets two looks at most parts of the storm, allowing calculations of the 3-D wind and rain fields. In the absence of rain, it can also measure ocean surface winds.

The Hurricane Imaging Radiometer (HIRAD) is a passive microwave radiometer that was developed at NASA's Marshall Space Flight Center, Huntsville, Alabama. HIRAD's purpose is to map out where the strongest winds are in a hurricane. HIRAD provides unique observations of sea surface wind speed, temperature and rain. The data HIRAD gathers will advance understanding and predictability of hurricane intensity. HIRAD's data will also help better determine maximum wind speed and structure of the vortex (spinning center). The region with the strongest winds is also much better observed with HIRAD than current capabilities.

The WB-57 aircraft is also testing a new dropsonde system developed by Yankee Environmental Systems. The WB-57's focus is on the upper-level outflow from storms and its connection to the inner-core region.

When the WB-57 investigated Gonzalo it was a Category 4 storm on the Saffir-Simpson Hurricane Scale. According to the National Hurricane Center, Gonzalo is the first category 4 hurricane in the Atlantic basin since Ophelia in 2011. NOAA's GOES-East satellite captured a visible image of Gonzalo on Oct. 15 at 15:15 UTC (11:15 a.m. EDT) that showed the eye of the storm obscured by high clouds. The National Hurricane Center noted that NOAA aircraft data and microwave images clearly showed concentric eyewalls, with the inner radius of maximum winds only about 4-5 nautical miles from the center.

An image from the Special Sensor Microwave Imager (SSMI) aboard the Defense Meteorological Satellite Program (DMSP) F-15 satellite taken on Oct. 13 at 07:13 UTC (3:13 a.m. EDT) showed very tiny inner eyewall and a new secondary eyewall, concentric about the center.

At 11 a.m. EDT on Oct. 15, Gonzalo's maximum sustained winds increased to near 130 mph (215 kph) and the National Hurricane Center (NHC) noted that fluctuations in intensity were expected over the next couple of days. Gonzalo's cloud-covered eye was located near latitude 23.5 north and longitude 68.0 west, about 640 miles (1,025 km) south-southwest of Bermuda. Gonzalo was moving toward the northwest near 12 mph (19 kph). The minimum central pressure was reported by an Air Force reconnaissance aircraft was 949 millibars.

The WB-57 has been conducting science missions for the Office of Naval Research in September and will continue through October 2014.

The HS3 mission is funded by NASA Headquarters and overseen by NASA's Earth System Science Pathfinder Program at NASA's Langley Research Center in Hampton, Virginia. It is one of five large airborne campaigns operating under the Earth Venture program.

The HS3 mission also involves collaborations with partners including the National Centers for Environmental Prediction, Naval Postgraduate School, Naval Research Laboratory, NOAA's Unmanned Aircraft System Program, Hurricane Research Division and Earth System Research Laboratory, Northrop Grumman Space Technology, National Center for Atmospheric Research, State University of New York at Albany, University of Maryland - Baltimore County, University of Wisconsin, and University of Utah. The HS3 mission is managed by the Earth Science Project Office at NASA Ames Research Center in Moffett Field, California. The WB-57 is housed at NASA's Johnson Space Center in Houston, Texas, home of the NASA WB-57 High Altitude Research Program. ■

Above: The WB-57 can climb up to 54,000 feet, where Gonzalo's cirrus clouds will top off. Photo credit: NASA/ Johnson

By: Karen Fox

A sounding rocket outfitted with technology to gather 1,500 images of the sun over its five-minute mission is preparing to launch in early November 2014. Capturing five images per second, the RAISE mission will focus in on the split-second changes that occur near active regions on the sun, birth to giant eruptions on the sun that shoot energy and particles out in all directions.

“Even on a five-minute flight, there are niche areas of science we can focus on well,” said Don Hassler, a solar scientist at the Southwest Research Institute in Boulder, Colorado, and director of the Institut d’Astrophysique Spatiale in Orsay, France. “There are areas of the sun that need to be examined with the high-cadence observations we can provide.”

RAISE—Rapid Acquisition Imaging Spectrograph Experiment—creates a kind of data product called a spectrogram, which separates the light from the sun into different wavelengths. The different wavelengths correspond to differing temperatures and velocities of the material. Therefore, analyzing the intensity of light at each wavelength gives scientists much needed information about how material is being heated and moved around on the sun.

The sun has been extremely active recently, producing several X-class flares in the past few weeks. The team will aim their instrument at one of these active regions to try to understand better the dynamics that cause these regions to erupt. By focusing in on the quick changes in this region, they hope to see how heat and energy move through such active regions, which in turn helps scientist understand what creates the regions and perhaps even what catalyzes the sun’s eruptions.

Sounding rockets fly for just 15 minutes, providing five to six minutes of access to science that can only be accomplished from space. The extreme ultraviolet light that RAISE observes, for example, cannot pass through Earth’s atmosphere to reach ground telescopes. While the flight time is short, such missions provide a low-cost access to high-quality research.

In addition, the rockets provide a test bed for new technologies. The current RAISE payload includes a new diffraction grating, which reflects light and separates it into its separate wavelengths.

“This is the second time we have flown the RAISE payload, and we keep improving it along the way,” said Hassler. “This is a technology that is maturing relatively quickly.”

An instrument capable of such high-cadence observation could make its way on to future, more permanent solar observatories. It is already serving as a development platform for instruments on the joint European Space Agency-NASA Solar Orbiter Mission, which is scheduled to launch in 2017 and to go to within 26 million miles of the sun. (Mercury’s closest approach to the sun is about 28.6 million miles.)

RAISE’s launch is planned for Nov. 3, 2014, from the White Sands Missile Range near Las Cruces, New Mexico. Launch timing will depend on good weather conditions as well as coordinated timing with other space observatories. ■

Above: The Rapid Acquisition Imaging Spectrograph Experiment is seen peeking out of a clean room during testing before its scheduled November 2014 launch. Photo credit: NASA/RAISE

SOUNDING ROCKET TO GATHER 1,500 SUN IMAGES IN FIVE MINUTES

NASA TEAM ADVANCES NEXT-GENERATION 3D-IMAGING LIDAR

By: Lori Keesey

Building, fixing, and refueling space-based assets or rendezvousing with a comet or asteroid will require a robotic vehicle and a super-precise, high-resolution 3-D imaging lidar that will generate real-time images needed to guide the vehicle to a target traveling at thousands of miles per hour.

A team of technologists at NASA’s Goddard Space Flight Center in Greenbelt, Maryland, is developing a next-generation 3-D scanning lidar—the Goddard Reconfiguable Solid-state Scanning Lidar (GRSSLi)—that could provide the imagery needed to execute these orbital dances. “We have made a tremendous amount of progress,” said Nat Gill, GRSSLi principal investigator at Goddard. “We have a long way to go, but we hope to validate the GRSSLi system this fall.”

The current system has achieved a technology-readiness level of five. In the parlance of NASA engineers, this means that once the team completes this iteration of GRSSLi, the team will be ready to build another system that would undergo vibration and thermal-vacuum testing.

GRSSLi is a next-generation scanning lidar based on technologies developed by the Army Research Laboratory, which later transferred the technology to Spectrolab, Inc., a wholly owned subsidiary The Boeing Co. The company now markets the instrument as the SpectroScan 3D.

GRSSLi, however, will take 3-D imaging lidar to the next level—all from a small, low-cost, low-weight platform capable of centimeter-level resolution over a range of distances, from meters to kilometers, said GRSSLi Co-Principal Investigator Tony Yu, who received Goddard Internal Research and Development (IRAD) program funding to help advance GRSSLi and its close cousin, a non-scanning 3-D imaging lidar.

Equipped with a low-power, eye-safe laser, a micro-electro-mechanical scanner and a single photodetector, GRSSLi will “paint” a scene with the scanning laser and its detector will sense the reflected light to create a high-resolution 3-D image at kilometer distances. Just as important, the instrument is equipped with onboard “vision” algorithms or software that interpret the three-dimensional image returned by the lidar. These algorithms estimate location and attitude—or in other words, the pose—of a target relative to the lidar.

“The SpectroScan 3D is a low-cost lidar, but it can’t provide centimeter-level resolution beyond 30 meters (~98 feet),” Yu said. “We are retrofitting this lidar system with a high-energy laser system to extend the range to beyond one kilometer.” GRSSLi currently has a limited range of about 66 feet, Yu said. This year, the goal is to extend the range to 100 meters (0.6 miles) by increasing the power of the laser transmitter and adding a more sensitive detector.

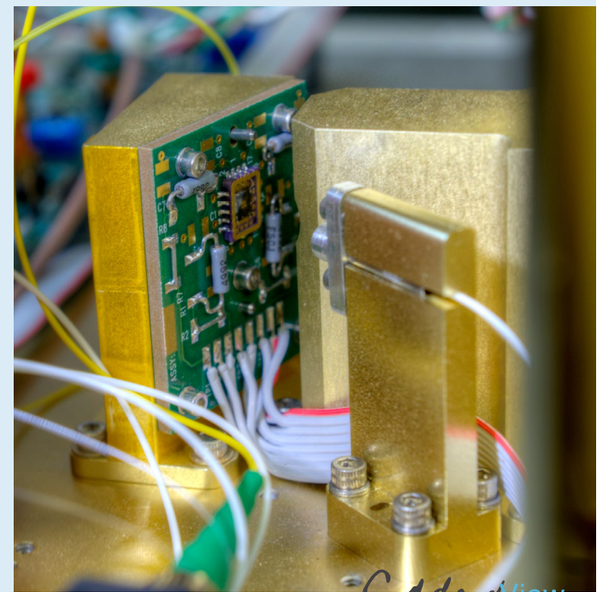
The lidar, however, wouldn’t be limited to servicing and repairing satellites and other orbiting assets, Yu said. Under the same IRAD task, Yu and Gill are working to advance a non-scanning version of GRSSLi that would be ideal for close approaches to asteroids. “We view the 3-D scanning lidar as an intermediate step to a non-scanning lidar system,” Yu said.

This particular instrument would employ a flash lidar, which doesn’t paint a scene with a mechanical scanner, but rather illuminates the target with a single pulse of laser light—much like a camera flash. The advantage is the elimination of moving parts that could fail. A telescope then would capture the returning photons and image them on a photon-sensitive detector array. Each pixel of that array would measure the photons’ times of flight to create a 3-D image of the target.

Although flash lidars are available commercially—and, in fact, one is baselined for the Goddard-led OSIRIS-REx mission—they do not produce high-resolution images from kilometer (mile) distances, a capability that would benefit science and military applications, Yu said.

“A need exists for long-to-short range, low-cost, reliable multifunctional imaging lidars, not only for asteroid rendezvous and planetary rovers, but also for satellite servicing,” Yu said. “We are making progress, but we do have a way to go.” ■

Below: The micro-electro-mechanical mirror at the center of the circuit board provides the scanning function in the Goddard Rendezvous Solid-state Scanning Lidar. Photo credit: NASA/Goddard/ Bill Hrybyk

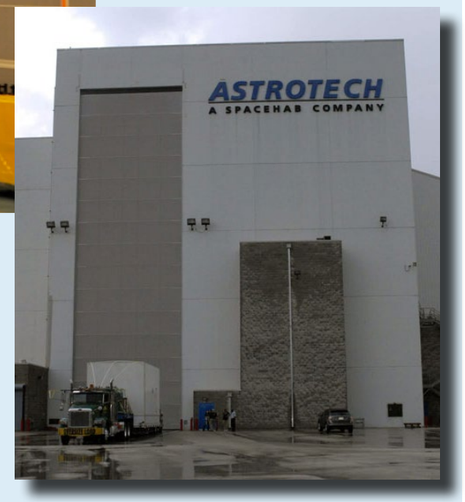


FIRST TWO MMS OBSERVATORIES SHIPPED TO FLORIDA

Center: The MMS engineering team at NASA Goddard begin bagging the first two Magnetospheric Multiscale observatories with protective wrapping in preparation for shipment to Astrotech Space Operations, NASA's pre-launch processing facility in Florida.

Clockwise form top right:

The MMS engineering team at NASA's Goddard Space Flight Center in Greenbelt, Md., finish applying special adhesive to the bag which houses NASA's Magnetospheric Multiscale, or MMS, observatories #1 and 2.



Astrotech Space Operations, located near Kennedy Space Center, Florida.

NASA and contractor personnel at Astrotech Space Operations in Florida stand by to assist with unloading the first two Magnetospheric Multiscale observatories that arrived on Oct. 29, 2014.

The shipping container with NASA's Magnetospheric Multiscale, or MMS, Observatories 1 and 2, arrived at Astrotech Space Operations in Florida on Oct. 29, 2014 for pre-launch processing. ■

Photo credit: NASA

i am goddard

By: John M. Putman

Carlos McKenzie, the associate chief for the Office of Program Support, takes the time to get to know his employees and what they are doing so he can help them succeed. He is an advocate for them to improve and develop their knowledge, skills and talents. McKenzie embodies the i am goddard value "Get out and talk with employees."

"I am constantly visiting their offices and having conversations with them," McKenzie said.

McKenzie learns more about his employees, personally and professionally, and discovers what his employees need to best do their jobs. Employees learn more about McKenzie and can express expectations and goals in an engaging way. Both McKenzie and his employees get a lot out of these ongoing conversations.

It is a two-way relationship. Twice a year, for about an hour, employees come to McKenzie to talk about anything one-on-one. It is an opportunity to share challenges and successes and for employees to safely discuss whatever they want. Both McKenzie and his employees look forward to the focused conversations. McKenzie always gets positive feedback.

"What can we do to improve in their development? I learn something new from them every time. There's always something new."

McKenzie's conversational style is a reflection of things he learned from a previous supervisor, Michael McGrath, associate director for acquisition in the Management Operations Directorate. "I mirror some of my patterns and management activities based on some of the things I liked when he was my associate chief."

McKenzie started at Goddard in December 1999 seeking new challenges. The flexibility he brought to his duties in Panama traveled with him. "I don't want to be in the middle of the box. Try to be on the edges of the box and find creative solutions that will meet our technical customers need."

McKenzie also uses his conversations to support employees' other interests. "For example, I have one employee involved with the African American Advisory Committee and others are involved with the different procurement learning groups. I encourage all to get out there and get involved."

"Diversity influences everything that we do in procurement. We strive to look at everything before coming up with assignments. We do our best to include everyone in the process. We are definitely inclusive and try to bring everyone on board."

Learn more about i am goddard. ■

Center: Carlos McKenzie. Photo credit: NASA/Goddard/Bill Hrybyk