National Aeronautics and Space Administration

Goddard View

Volume 8 Issue 5
June 2012

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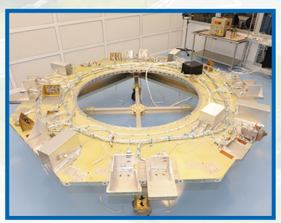
GoddardView

THE WEEKLY

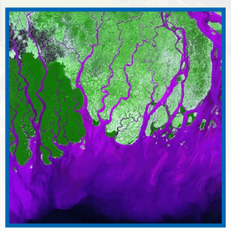
Goddard Intern Mobile Site and Contest
Code 700 is challenging student interns to enhance the intern mobile site. The winning interns will incorporate their ideas and manage the site. Winners will receive a letter and certificate from the Goddard Chief Information. Submissions are due via e-mail by COB June 21. Scan the code to the left or click on the image to visit the site.

Celebrate Goddard 2012
On Thursday, June 28, from 10:00 a.m. to 3:30 p.m., experience Celebrate Goddard in a new way. Family-friendly entertainment, activities, exhibits, special presentations, and facility tours. Click on the image for all the information.



Instrument Integration Begins on MMS
The decks have arrived. Engineers working on NASA's Magnetospheric Multiscale mission have started integrating instruments on the first of four instrument decks in Goddard's newly fabricated cleanroom. MMS consists of four identical spacecraft and each instrument deck will have 25 sensors per spacecraft. Click the image to learn more about MMS.

Best of Earth As Art:
A Contest to Celebrate 40 Years of Landsat
To celebrate the 40th Anniversary of Landsat, the U.S. Geological Survey (USGS) and NASA would like your help in selecting the top five "Earth as Art" images from the more than 120 images in the complete collection. Click the image to see all the candidates and to cast your vote.



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Cover caption: A young visitor to the Goddard Visitor Center tries to see Venus as it crosses in front of the Sun.

Photo Credit: NASA/Goddard/Bill Hrybyk

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 weekly by the Office of Communications.

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News items for publication in *Goddard View* must be received by noon Wednesday of each week. 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.

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OH, THE PLACES WE'LL GO

By: Shamara Thornton

Crafting a stimulating and unique learning environment for students is one of the goals of the staff at Goddard's Child Development Center (GCDC). During the week of April 22, Sam I Am, Ookpik the Snowy Owl, and Goddard senior management got involved to help GCDC mark the 41st annual Week of the Young Child.

Recognized by the National Association for the Education of Young Children (NAEYC), Goddard's Child Development Center held several special events to join the celebration. Established in 1971, the program brings recognition to the idea that the early childhood years provide a foundation for children's success in school and later life. This year's theme was "Early Years are Learning Years." In addition to several other activities like Pajama Day, Mismatched Shoe Day, Crazy Hat Day, and School Spirit Day, GCDC invited senior management to read a story to the children each day of the week.

One of the goals of the week was to generate enthusiasm and love for reading by having senior management participate as guest readers, an idea envisioned by the GCDC staff. During the event, the children were able to interact with storybook favorites like "Green Eggs and Ham," "Ookpik," "Pigsty," "Bailey," and "Go, Dog. Go!"

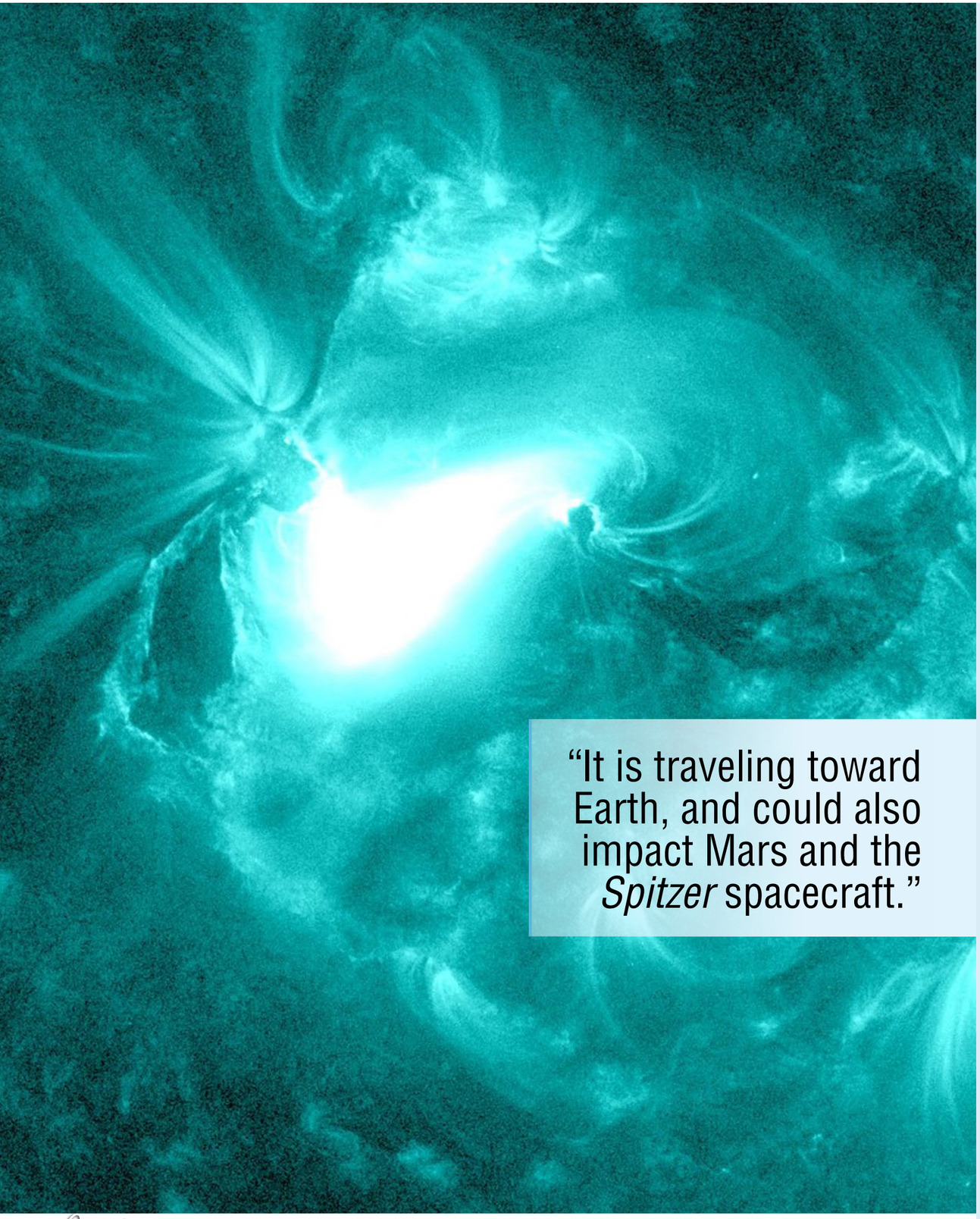
Syretha O. Storey, Director of the Goddard Child Development Center, said, "NASA Goddard Child Development Center (GCDC) had an unprecedented level of support from Goddard Senior Management. In the early childhood community, this makes the difference between good care and education and excellent care and education. This reading event was an example of their willingness to ensure that we offer high quality care and education for the young children of the Goddard community. Through their reading and presence, they helped our students understand the importance of having a love of reading."

To help keep the excitement of reading going, senior management also participated in the school wide activities while reading aloud childhood favorites. Guest reader Ray Rubilotta, Acting Director of the Management Operations Directorate, said, "It re-charged my own 'personal battery' for the day to be around the children. The energy, interest, enthusiasm, and interaction they shared with me while I was reading the book made the time fly by, and really made the entire experience enjoyable."

Other guest readers included Deputy Center Director Rick Obenschain; Ron Brade, director of the Office of Human Capital Management; Dennis Andrucyk, director of the Applied Engineering and Technology Directorate; Judy Bruner, director of the Office of Systems Safety and Mission Assurance; and Adrian Gardner, director of the Information Technology and Communications Directorate.

Week of the Yong Child is one of the many unique programs offered by the GCDC. Throughout the year, students participate in Music Appreciation Month, read and reenact books, participate in the Center's bi-annual fun runs, and go on an array of field trips ranging from the Goddard Visitor Center to the National History Museum in Washington, D.C. ■

Above: Management Operations Directorate Acting Director, Ray Rubilotta, is guest reader for the GCDC Stars during School Spirit day on April 26, 2012. Credit: NASA/Goddard/Bill Hrybyk



"It is traveling toward Earth, and could also impact Mars and the *Spitzer* spacecraft."

TWO CMEs HIT EARTH'S MAGNETOSPHERE

By: Karen Fox

On June 16, 2012, the combined effects of two coronal mass ejections (CME) from AR 1504, passed NASA's *Advanced Composition Explorer* (ACE) spacecraft on the way toward Earth's protective magnetic bubble, the magnetosphere. ACE is approximately 900,000 miles from Earth and can detect such incoming shocks about 30-45 minutes before they hit the magnetosphere.

Simulations performed at Goddard's Space Weather Center indicate that the disturbance strongly compressed the magnetopause, ultimately to a minimum of approximately 24,000 miles from Earth's surface. This is an altitude some 2,000 miles lower than spacecraft in geosynchronous orbit.

The changing shape of Earth's magnetopause also influenced the aurora, causing bright aurora to be seen at lower latitudes than normal, as low as Iowa, Nebraska, and Maryland.

An active region on the Sun, numbered AR 1504, rotated into view over the left side of the Sun on June 10, 2012. The region fired off two M-class flares and two CMEs on June 13 and June 14, 2012. The first flare lasted for a relatively long three hours, peaking on June 13, 2012 at 9:17 AM EDT. The associated CME traveled at approximately 375 miles per second and is directed toward Earth, though due to its slow speed, the effect on Earth is expected to be minimal.

The second M-class flare was also a long-duration flare, and it peaked on June 14. The CME associated with this flare is traveling much faster—preliminary analysis at Goddard's Space Weather Center indicates it is traveling at speeds of approximately 800 miles per second. It is traveling toward Earth, and could also impact Mars and the *Spitzer* spacecraft.

The Sun's outer solar atmosphere, the corona, is structured by strong magnetic fields. Where these fields are closed, often above sunspot groups, the confined solar atmosphere can suddenly and violently release bubbles of gas and magnetic fields called coronal mass ejections. A large CME can contain a billion tons of matter that can be accelerated to several million miles per hour in a spectacular explosion. Solar material streams out through the interplanetary medium, impacting any planet or spacecraft in its path. CMEs are sometimes associated with flares but can occur independently.

A solar flare is an intense burst of radiation coming from the release of magnetic energy associated with sunspots. Flares are our solar system's largest explosive events. They are seen as bright areas on the sun and they can last from minutes to hours. We typically see a solar flare by the photons (or light) it releases, at most every wavelength of the spectrum. The primary ways we monitor flares are in x-rays and optical light. Flares are also sites where particles (electrons, protons, and heavier particles) are accelerated. ■

Above: Aurora were seen as far south as Ocean City, Maryland. This photo was taken by a camper on the shores of Assateague Island, facing North. Image courtesy of Jeff Berkes.

Opposite: The *Solar Dynamics Observatory* captured this image of an M1.2 class flare on June 13, 2012. The Sun is shown here in teal as this is the color typically used to represent light in the 131 Angstrom wavelength, a wavelength particularly good for observing flares. Credit: NASA/SDO

NASA SATELLITES VIEW SEVERE MARYLAND WEATHER

By: Rob Gutro

On Friday, June 1, 2012 severe weather generated nine weak tornadoes across Maryland, according to the National Weather Service. As the system that generated them approached, NASA's *Aqua* satellite gathered information about power behind it. NASA also created an animation of the severe weather as it was seen from NOAA's GOES-13 satellite.

The Atmospheric Infrared Sounder (AIRS) instrument that flies aboard *Aqua* provided both a visible and an infrared look at the severe weather that moved into Maryland on June 1 and generated an astounding number of tornadoes—nine in all.

Aqua passed over Maryland on June 1 around 2:53 p.m. EDT and AIRS captured data on temperature and cloud heights. The infrared imagery showed that the major activity was located in West Virginia and heading eastward toward Maryland. When cloud temperatures get colder, it means that clouds are getting higher. Building clouds indicate a lot of "uplift" in the atmosphere and stronger thunderstorms.

Ed Olsen of the AIRS Team at NASA's Jet Propulsion Laboratory, Pasadena, Calif. said that the AIRS imagery showed "The center of most intense activity over West Virginia appears to have cloud top temperatures between -27 and -45 Fahrenheit (-33.1 and -43.1 Celsius/230 and 240 Kelvin), meaning that the cloud tops (assuming U.S. Standard Atmosphere) are between 4.6 and 5.6 miles (7.5 and 9 kilometers) high."

The data from the AIRS instrument is also used to create an accurate 3-D map of atmospheric temperature, water vapor and clouds, all of which are helpful to forecasters.

NOAA's GOES-13 satellite was providing real-time visible imagery of the severe weather outbreak when tornadoes were touching down around Maryland on June 1. The NASA GOES Project, located at Goddard, combined the GOES imagery to create an animation of the severe weather outbreak. The animation that runs almost eight seconds shows the movement of the severe storms from 1:45 p.m. to 7:45 p.m. EDT. The colorized full resolution uses the GOES visible data of the clouds, overlaid on a U.S. map created by imagery from the Moderate Resolution Spectroradiometer instrument (MODIS), an instrument that flies onboard both the *Aqua* and *Terra* satellites.

The animation shows a cold front approaching from the west spawned severe storms along the U.S. East Coast, including nine weak tornadoes in Maryland around sunset. From the GOES viewpoint, all that surface action is covered by cloud tops.

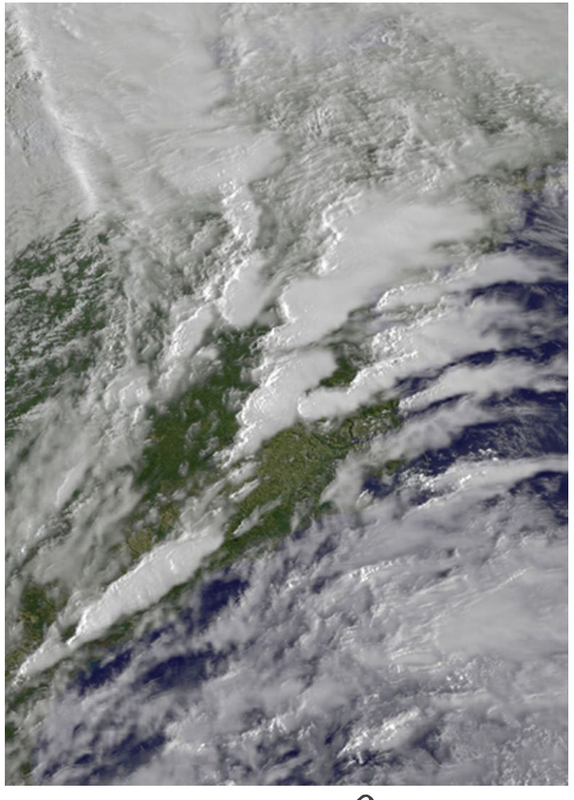
Baltimore meteorologist Justin Berk compiled a listing of the individual tornadoes. The ten tornadoes include: An EF-1 tornado with 90 mph winds in Pleasant Hills, Harford County; an EF-0 tornado started near Fort Meade and moved to BWI Marshall Airport; another tornado (not rated yet) in Gamber, Carroll County; an EF-0 in Centreville in Queen Anne's County, Md.; two possible EF-0 tornadoes in Damascus, Montgomery County; an EF-0 at Springdale, Prince George's County (just outside the Washington, D.C. beltway); an EF-1 touched down in Watersville, Howard County; another EF-0 tornado touched down in Mount Airy in Carroll County; and another tornado (not yet rated) made an appearance in Simpsonville, Howard County.

Click on the image at right to watch the animation. ■

Above: Around 6:20 p.m. EDT on Friday, June 1, as severe weather continued in Maryland, the tornado that touched down near Fort Meade, Md. was photographed from Greenbelt, Md. This image was taken from the rocket garden behind the NASA Goddard Visitor's Center. Credit: WJZ-TV, Baltimore, Md.

> "...a cold front from the west spawned severe storms...including nine tornados"

Right: NOAA's GOES-13 satellite captured a visible image of the severe weather outbreak when tornadoes were touching down around Maryland on June 1. This image was taken at 6:15 p.m. EDT. The clouds that appear almost flat and positioned from southwest to northeast included the severe storms. The image was created by the NASA GOES Project at Goddard. Credit: NASA GOES Project



Earlier this year, NASA completed deep-freeze tests on the *James Webb Space Telescope* mirrors in a shroud at the X-ray and Cryogenic Facility (XRCF) at Marshall Space Flight Center in Huntsville, Ala.

All of *Webb*'s 18 main mirror segments were tested under conditions similar to what they will experience when operating in space to verify they will work as expected. Tested in batches of six, the mirrors were transferred to the cryogenic testing chamber where they were plunged to a chilly –414 degrees Fahrenheit (–248 C).

"The large tube is the back of the helium shroud that will go around the mirrors and cool them," says Lee Feinberg, the NASA Optical Telescope Element Manager for the *James Webb Space Telescope* at Goddard, "The gaseous helium shroud sits inside of a liquid nitrogen shroud, which sits inside of a vacuum chamber. All three work together to create a vacuum and cold environment to test the mirrors."

That cold environment mimics the harsh cold of space. Once at sub-zero temperatures, the testing team measured the surface shape of the mirror segments to see how they performed at cryogenic temperatures. The team measured the mirror segments by using laser systems to illuminate them for reflection of the light back into a sensor. The sensor then measures the change in shape of the mirror as the temperature changes.

When fully deployed, *Webb*'s mirror will be over six times larger than that of the *Hubble Space Telescope*'s mirror. It's designed to look farther away and further back in time, and will be able to detect light from distant galaxies.

But despite *Webb*'s size, its segmented beryllium mirror technology is significantly lighter than *Hubble*'s one-piece glass mirror technology. Each of the 18 hexagonal, gold-coated primary mirror segments is hollowed out and ribbed on the backside, which Feinberg explains "lightweights" them to reduce their mass while keeping their precise shape. ■

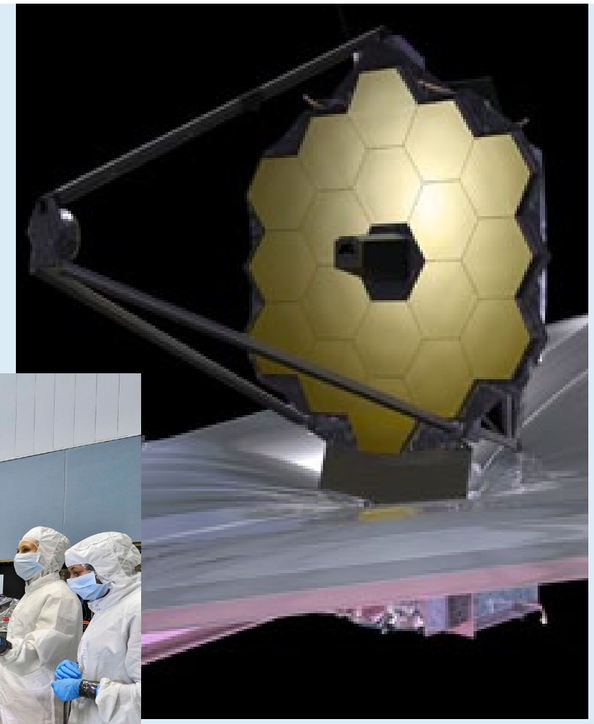
Above: A batch of mirror segments sit on a stand placed inside a helium-cooled shroud. The base of the shroud is visible in the lower left. The part resembling a swing is a counterbalance weight for the crane that lifted the fully populated test stand into place. Photo credit: NASA

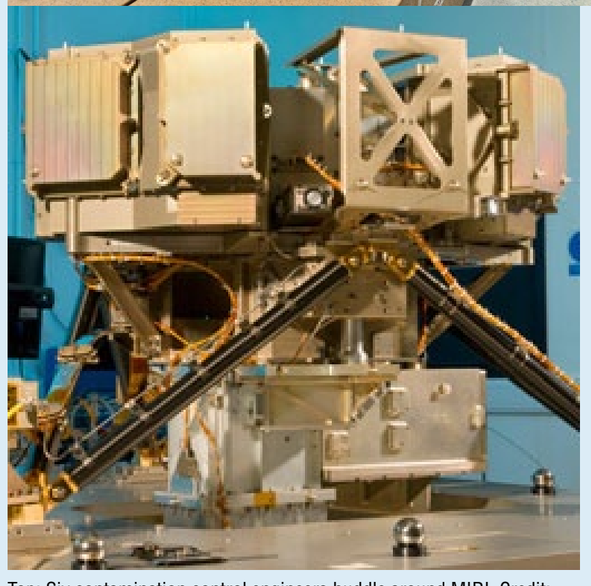
JAMES WEBB SPACE TELESCOPE MIRRORS GET SHROUDED

By: Laura Betz

FIRST *WEBB TELESCOPE* FLIGHT INSTRUMENT DELIVERED

By: Rob Gutro and Priscilla Vega





Top: Six contamination control engineers huddle around MIRI. Credit: NASA/Chris Gunn

Above: MIRI undergoing alignment testing at the Rutherford Appleton Laboratory Space in Oxfordshire, U.K. Credit: RAL

The first of four instruments to fly aboard the *James Webb Space Telescope* (*Webb*) has been delivered to NASA. The Mid-Infrared Instrument (MIRI) will allow scientists to study cold and distant objects in greater detail than ever before. Since its arrival, it has been undergoing inspection before being integrated into *Webb*'s science instrument payload known as the Integrated Science Instrument Module (ISIM).

MIRI will observe light with wavelengths in the mid-infrared range of 5 microns to 28 microns, which is a longer wavelength than human eyes can detect. It is the only instrument of the four with this particular ability to observe the physical processes occurring in the cosmos.

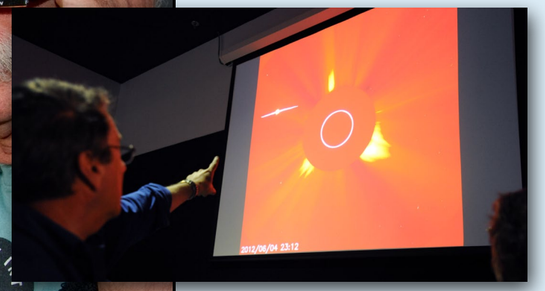
"MIRI will enable *Webb* to distinguish the oldest galaxies from more evolved objects that have undergone several cycles of star birth and death," said Matt Greenhouse, ISIM project scientist at Goddard. "MIRI also will provide a unique window into the birthplaces of stars, which are typically enshrouded by dust that shorter wavelength light cannot penetrate."

MIRI's sensitive detectors will allow it to observe light, cool stars in very distant galaxies; unveil newly forming stars within our Milky Way; find signatures of the formation of planets around stars other than our own; and take imagery and spectroscopy of planets, comets, and the outermost bits of debris in our solar system. MIRI's images will enable scientists to study an object's shape and structure.

"MIRI will help us understand what's out there at the edge of what we can see," said Mike Ressler, the instrument's project scientist at NASA's Jet Propulsion Laboratory in Pasadena, Calif. "The shorter-wavelength instruments will discover the glow of the farthest known objects, but we need MIRI to help identify what they are—supermassive black holes, newborn galaxies, or something we've never seen before." ■

VENUS TRANSIT AT GODDARD VISITOR CENTER

By: John Putman



On June 5, 2012, over 1,000 visitors came to the Goddard Visitor Center to witness a stellar occurrence not to happen again for 105 years: the transit of Venus across the face of the Sun.

A transit of Venus occurs when the planet Venus passes directly between the Sun and Earth. During the event, Venus will be seen from Earth as a small black sphere moving across the face of the Sun. The event was visible beginning just after 6 p.m. EDT and continuing through sunset. The entire transit lasted more than six hours.

The Visitor Center hosted a watch party that included near-real-time images from NASA's *Solar Dynamics Observatory*, coverage of the event from several locations via NASA TV, in-person presentations by NASA experts, hands-on activities for children of all ages, and viewing opportunities of the transit via solar telescopes. Visitors also had access to the Visitor Center's ongoing displays and captivating *Science on a Sphere* visual presentation chamber.

Despite cloudy skies, many visitors stood outside either near the telescopes provided by the Goddard Astronomy Club or with a pair of solar viewing glasses, in a vain attempt to see the transit. There were breaks in the clouds but not enough to see much of the Sun, much less Venus crossing the star.

Video of the Venus transit became NASA's third-ever video to surpass 1 million YouTube views. It stands now at 1.8 million, the agency's second-most popular posting.

The Venus transit happens in pairs eight years apart that are separated from each other by 105 or 121 years. The last transit was in 2004 and the next will not happen until 2117. ■

Photo credit: NASA/Goddard/Bill Hrybyk and Debora McCallum

OUTSIDE GODDARD

Song of the Wild

By: Elizabeth M. Jarrell

You may think that your family dogs are wild, but Data Visualizer and Designer Robert Simmon, creator of the famous "Blue Marble" image of Earth, really does live with two wild dogs, one of which was even born in a zoo.

"My girlfriend and I were cat people," says Simmon. "After her cats died, she convinced me to get a New Guinea Singing Dog (Singers) and then another." They adopted dogs in 2006 through the New Guinea Singing Dog Conservation Society (NGSDCS). "We got our first puppy Kumi, a male, but were asked to help socialize his littermate Tari until the Toronto Zoo was ready for her," he says. Three months later, Tari left and three years later another female, Jaya, arrived. "Jaya was born in the San Diego Zoo," says Simmon. "The first pictures I saw of her were taken by tourists." Both of their dogs are part of the conservation program.

Singers are an ancient, wild breed of dogs. "They are not recommended for people unless they have astonishing amounts of time to take care of them," explains Simmon. Describing life with Singers, he says, "They're mostly fine when you're around, they're happy, and they have been outside recently enough. But they can be extremely destructive and persistent if left alone." They tried crating the dogs but found them to be "not crate-trainable." They then locked the dogs in the kitchen with a baby gate and added fiberboard for height. "They can get extremely obsessive," notes Simmon. "One day I came home to a completely trashed house. Tari had escaped and torn up everything."

Simmon keeps a running account of things that the dogs have destroyed. To date, The List includes shoes, sunglasses, headphones, one armchair, two couches, and one carpet. And their dogs are young yet. He remains optimistic. "They are so much better now and almost entirely not destructive." Now that the dogs are older, they are able to stay together in a very large, covered crate the size of a small kennel run positioned with a view of the back yard.

Simmon follows a rigorous walking schedule giving both dogs an hour walk in the morning and another hour walk in the evening plus short walks at lunch time and before bedtime. He uses harnesses because the dogs tend to slip out of collars. "The only reason we know any neighbors is because we walk the dogs," he notes.

The NGSDCS refers to Singers as "living fossils." According to the NGSDCS, Singers were first discovered in New Guinea only about 50 years ago. While people migrated from Asia to New Guinea to Australia about 50,000 years ago, the NGSDCS notes that no one really knows when the dogs came. The NGSDCS refers to Singers as a subspecies of wolf, but states that the relationship between Singers and Dingoes, the wild dogs of Australia originally owned by the Aborigines, remains unclear.

"Singers kind of look like a fox or a small wolf with bushy tails, but their faces are broader," says Simmon. Their colors range from red to brown to black with possible white on their faces, feet, and stomachs. They are double-coated, with an extremely thick undercoat. "In the dark, their eyes reflect green, not red like domestic dogs," he notes, "which may indicate superior night vision." Singers weigh 20 to 30 pounds and are 14 to 16 inches tall.

Their high prey drive combined with certain unique physical characteristics makes keeping these acrobatic escape artists challenging at best. "They can climb trees and fences and can jump six feet, so you need a six foot fence with an overhang plus wire under the ground to prevent them from digging out," Simmon says. "They do not respect human boundaries at all. If they see prey, they will go.

They are extremely tuned into small, furry animals." Simmon keeps a second list, this one for creatures their dogs have eaten which, to date, includes a handful of mice and moles, several rabbits, three squirrels, one woodchuck, one opossum, and almost one beaver. Singers are also extraordinarily flexible. "They can rotate their heads 180 degrees to look directly behind them. They can lie down with their front feet pointing in one direction and their rear feet pointing in another," says Simmon.

Aspects of the Singer's temperament underscores that they remain wild. Their idea of play is grabbing the back of another dog's neck and shaking, which is how some dogs kill their prey. "They are not big cuddlers," says Simmon. "They cuddle on their own terms, which are how they always do everything anyway." They will offer a head toss to indicate when they want something such as food. The most unique aspect of Singers is of course their vocalization. "Think of a wolf howl and make it smaller," explains Simmon. "The sound can last three or four minutes, but is more modulated and has greater tonality than a wolf's howl. If they are upset, they can even make a sound like crying."

Simmon took their dogs to obedience training as pups, but they were difficult to train. He says, "They will do a 'sit' or a 'down,' but not if they are distracted and they are easily distracted, especially by anything small and furry." The Singers eat half kibble and half boiled chicken. "We've tried everything, but they do not like raw food unless it is self-caught," he says. "They are super-picky eaters. They are spoiled wild animals."

Simmon summarizes the essential difference between a domestic versus a wild dog: "With a well-trained domestic dog, you can keep the dog's attention even in extreme situations. But with a Singer or a wolf, there is no guarantee. That is the wild part." Still, he loves his and thinks they are cute. He concludes, "If you saw them, you'd think they were adorable! They are adorable!" ■

Below: Kumi searching for deer in Greenbelt National Park. Photo provided by Robert Simmon.