



# The Marshall Star

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## Inside This Issue:

NASA Prepares to Launch First Mission to Explore Martian Upper Atmosphere [page 2](#)



Marshall Space Flight Center 'Goes Pink' to Support Breast Cancer Awareness [page 4](#)



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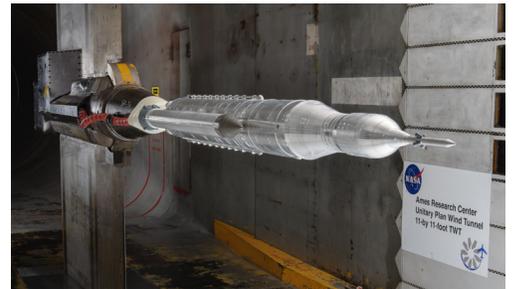
## Wind Tunnel Testing Used to Understand the Unsteady Side of Aerodynamics

By Megan Davidson

Think about a time you've been a passenger in a car and stuck your hand out the window. As your speed increases, so do the vibrations in your hand. Trying to keep those fingers steady as the wind whips around them at 75 mph gets pretty tricky, right?

You've just had a quick lesson in unsteady aerodynamics, something engineers are researching and testing on a much larger scale and with supersonic speeds using wind tunnel technology.

See [Wind Tunnel Testing](#) on [page 3](#)



A scale model of the Space Launch System (SLS) is tested in an 11-by-11-foot transonic wind tunnel at NASA's Ames Research Center. The tests will be used to enhance the design and stability of the SLS -- essential to America's future in human spaceflight and scientific exploration of deep space. (NASA)

## "Thanks-for-Giving": CFC Charity Fair and Lunch Set for Nov. 12

By Bill Hubscher

Despite a quiet start because of the government shutdown, the annual Combined Federal Campaign, or CFC, is well underway and organizers of the Marshall Space Flight Center's CFC are planning an event to help make for a strong finish.

Before the three-week government shutdown beginning Oct. 1, organizers

See ["Thanks-for-Giving"](#) on [page 4](#)



# NASA Prepares to Launch First Mission to Explore Martian Upper Atmosphere

*From news release*

A NASA spacecraft that will examine the upper atmosphere of Mars in unprecedented detail is undergoing final preparations for a scheduled launch at 1:28 p.m. EST on Nov. 18, from Cape Canaveral Air Force Station in Florida.

NASA's Marshall Space Flight Center is planning employee and public viewing events to celebrate the historic launch. The employee event will be at the Activity Building with the launch being shown live at 12:28 p.m.

The public viewing event will be held at the U.S. Space and Rocket Center's digital theatre located in the Davidson Center. The activities will start at 11 a.m. CST and the launch will be shown live at 12:28 p.m. Look for more information on both of these events early next week through Heads Up, Explorer Net, and the Marshall Center's social media channels.

The Mars Atmosphere and Volatile Evolution mission (MAVEN) will examine specific processes on Mars that led to the loss of much of its atmosphere. Data and analysis could tell planetary scientists the history of climate change on the Red Planet and provide further information on the history of planetary habitability.

The 5,410-pound spacecraft will launch aboard a United Launch Alliance Atlas V 401 rocket on a 10-month journey to Mars. After arriving at Mars in September 2014, MAVEN will settle into its elliptical science orbit.

Over the course of its one-Earth-year primary mission, MAVEN will observe all of Mars' latitudes. Altitudes will range from 93 miles to more than 3,800 miles. During the primary mission, MAVEN will execute five deep dip maneuvers, descending to an altitude of 78 miles. This marks the lower boundary of the planet's upper atmosphere.

The MAVEN spacecraft will carry three instrument suites. The Particles and Fields Package, provided by the University of California at Berkeley with support from the University of Colorado, Boulder's Laboratory for Atmospheric and Space Physics (CU/LASP) and NASA's



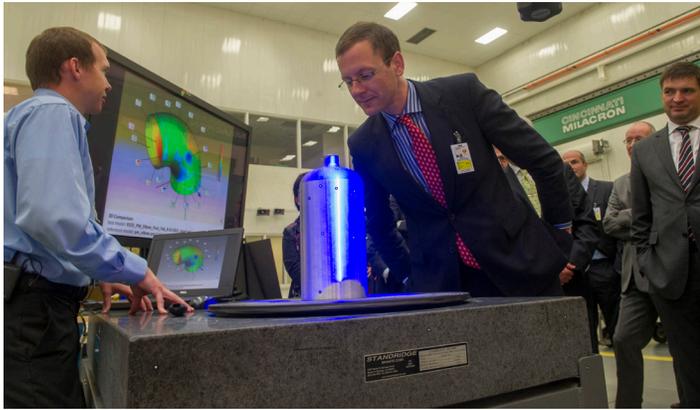
*Inside the Payload Hazardous Servicing Facility at NASA's Kennedy Space Center, engineers and technicians perform a spin test of the Mars Atmosphere and Volatile Evolution, or MAVEN, spacecraft. The operation is designed to verify that MAVEN is properly balanced as it spins during the initial mission activities. (NASA)*

Goddard Space Flight Center, contains six instruments to characterize the solar wind and the ionosphere of Mars. The Remote Sensing Package, built by CU/LASP, will determine global characteristics of the upper atmosphere and ionosphere. The Neutral Gas and Ion Mass Spectrometer, built by Goddard, will measure the composition of Mars' upper atmosphere.

MAVEN's principal investigator is based at CU/LASP. The university provided science instruments and leads science operations, as well as education and public outreach, for the mission. Goddard manages the project and provided two of the science instruments for the mission. Lockheed Martin built the spacecraft and is responsible for mission operations. The University of California at Berkeley's Space Sciences Laboratory provided science instruments for the mission. NASA's Jet Propulsion Laboratory in Pasadena, Calif., provides navigation support, Deep Space Network support, and Electra telecommunications relay hardware and operations.

For more information about the MAVEN mission, visit: <http://www.nasa.gov/maven> and <http://lasp.colorado.edu/home/maven/>

## German Business Delegates Visit Marshall



Marshall Space Flight Center mechanical engineer Brian West, left, demonstrates a structured light scanning process to Sen. Martin Günthner, center, of the Ministry of Economic Affairs, Labour and Ports of Bremen, Germany, and other German business delegates who visited Marshall on Oct. 30. The delegation's visit to Marshall was the first stop during a tour of popular Huntsville landmarks hosted by the Huntsville/Madison County Chamber of Commerce. (NASA/MSFC/Emmett Given)

## Wind Tunnel Testing *Continued from page 1*

The wind tunnel tests, recently conducted at NASA's Ames Research Center, will be used to enhance the design and stability of the Space Launch System (SLS), NASA's new heavy-lift launch vehicle. The SLS capability is essential to America's future in human spaceflight and scientific exploration of deep space. Only with a heavy-lift launch vehicle can humans explore our solar system, investigate asteroids and one day set foot on Mars.

"The aeroacoustic tests we just completed at Ames are all about unsteady aerodynamics," said John Blevins, lead engineer for aerodynamics and acoustics in the Spacecraft & Vehicle Systems Department at NASA's Marshall Space Flight Center. "Local vibrations can have a major impact on the rocket and critical hardware."

"You don't fly hardware, especially with people on board, unless you can verify the environments they fly in," he added. "There are standard practices we've learned from past successful programs. Wind tunnel testing is a cost-effective way to set the requirements needed for all the rocket's components to sustain the flight."

Four models of three different crew and cargo variations of the SLS, including the 70-metric-ton (77 ton) configuration, were tested in a series of wind tunnels at Ames. The 70-metric-ton configuration will be used for the maiden flight of SLS.

Crews of engineers worked around the clock to accomplish the test objectives. "Since vibrations are very localized, they may affect how hardware on the rocket will work," said Andy Herron, lead data analyst for the aeroacoustics tests at the Marshall Center. "Our job is to figure out what these vibrations are, so when another team is designing something -- for example, an avionics box -- we can determine if that hardware needs to be

moved or isolated on the vehicle. Or, it may be that the design needs to be tweaked a bit -- all with the goal that the parts will work the way they are intended."

For the tests, the models were affixed with pressure transducers, or sensors, that measure pressures on the model at specific locations. They were first put in the 11-by-11-foot transonic wind tunnel, with wind speeds ranging from Mach .7 to Mach 1.4. A Mach figure represents the ratio of the speed of an object to the speed of sound in the surrounding medium, like air.

Also included in this test series were critical buffet tests, which determine how air affects the vehicle at low frequencies.

The models were then put in a unitary 9-by-7-foot wind tunnel, with winds ranging from Mach 1.55 to Mach 2.5. This test was high-supersonic flow and more focused on local vibrations. Shock waves attach at different places throughout the vehicle, like the feed line or the boosters.

"This is the fastest acoustic test we've ever done, in terms of Mach speed," said Marshall's Darren Reed, lead engineer for the acoustics test. "We tested a wide range of configurations, Mach numbers, angles and more than 4,000 data conditions -- each one with hundreds of transducer measurements."

The next step will be to analyze the test data and share it across the SLS Program for use on the design and development of different components -- including the [core stage](#) -- on the actual vehicle.

*Davidson, an Analytical Services Inc. employee, supports the Office of Strategic Analysis & Communications.*

# Marshall Space Flight Center 'Goes Pink' to Support Breast Cancer Awareness



On Oct. 31, Marshall Space Flight Center team members were encouraged to “Pink Up MSFC” to support breast cancer awareness. Terry Minor, far left, of the Marshall Stages Office, wears a pink tie to show his support. Marshall team members and breast cancer survivors were available to share information regarding signs, symptoms, early detection and cancer survivorship in the lobby of Building 4203. They include, from left, Rebecca Selvage, Safety & Quality Department; Patty Montgomery, Mission Operations Laboratory; Debra Willcutt, Mission Operations Laboratory; and Trish Motts, Business Process & Application Operation Process Office. (NASA/MSFC/ Emmett Given)

## “Thanks-for-Giving” *Continued from page 1*

for Marshall’s CFC had planned a major event to kickoff the season of giving. Speakers were booked, local non-profit organizations were lined up to attend, live music was scheduled, and a free hot dog lunch planned. But the shutdown and resulting furlough forced the cancellation of the event.

“The kickoff is important for the success of the CFC,” said Renee Higgins, manager of the Marshall Center’s Training and Incentives Office and this year’s executive chairperson for Marshall’s CFC. “The event puts the annual charity drive into the forefront of people’s minds and helps get us off to a great start.”

Now, with the CFC drive officially underway, organizers are reminding the Marshall workforce about all the charitable organizations that need help -- and at the same time thanking those who have already donated, signed up for informational bus tours or volunteer hours as part of Community Service Days.

“Some have already given monetary donations and others have donated their time through Community Service Days,” said Higgins. “We just want to remind everyone that donations are critical, especially this time of year. The ‘Thanks-for-Giving’ Charity Fair is a way to thank those who have already given, introduce employees to local charities and their needs, and continue to encourage employees to participate in CFC, whether it be through a

donation, a Bus Tour, a Community Service Day, or all of these options “

The “Thanks-for-Giving” Charity Fair will feature personnel from more than 30 local non-profit organizations who can discuss the many ways Marshall team members can help those in need. The event will be in the Activities Building 4316 on Nov. 12 from 10:30 a.m. to 12:30 p.m.

Lunch and transportation will be provided and door prizes awarded. Details are posted on the [CFC page on ExplorNet](#).

When the official drive ends in mid-January, the organizing committee hopes to have raised more than \$700,000 for charity.

The CFC mission is to support and promote philanthropy, giving all employees an opportunity to improve the quality of life for all. Marshall’s fundraiser is part of the annual Tennessee Valley Combined Federal Campaign, a joint effort between the Marshall Center, other federal agencies at Redstone Arsenal, and in surrounding Alabama and Tennessee counties.

*Hubscher, an Analytical Services, Inc. employee, supports the Office of Strategic Analysis & Communications.*

# Virtual Project Management Challenge Sheds Light on Affordable Space Missions

Do you want to know more about how engineers at NASA's Marshall Space Flight Center are reducing the cost of space missions? You can find out by watching an online presentation: [Cutting More than Metal: How New Technology and Flexible Engineering Can Enable Affordable Space Missions](#).

At the request of NASA's Office of the Chief Engineer, Marshall Center engineers recently discussed this topic as part of the 2013 NASA Project Management (PM) Challenge, which provides training for NASA civil servants, contractors and grantees and is even open to the public. Each session is live and interactive with an opportunity for the audience to pose questions to the speaker via a session moderator. Sessions are recorded, so you can now view the September presentations by

Erin Betts, a Marshall propulsion engineer, and Stan Rhodes, manager of the Marshall Systems Engineering Management Office.

To view the webcast, please go to the [NASA PM Challenge website](#) and click the "Watch Now" button located beneath the session information.

The webcasts use the Silverlight Player, which must be installed on your computer before viewing the webcast. To test your computer configuration and to learn how to use the player controls to submit questions and find related material, please view this "Tour the Player" video [here](#). If you do not have Silverlight installed already, this video will provide a link for download and installation.

## NASA 'HEROES' Team Launches Balloon Solar/Space Imager

By Rick Smith and Janet Anderson

An innovative, dual solar/space imaging project, jointly developed by researchers at two NASA field centers, successfully completed its mission on Sept. 22, at Fort Sumner, N.M.

The "High Energy Replicated Optics to Explore the Sun" project (HEROES) was a joint effort to fly a powerful X-ray telescope high into Earth's atmosphere. During the day, HEROES studied solar flares, providing new insight into the way the sun's magnetic energy functions. At night, the telescope's eye turned outward to the stars, observing a variety of astrophysical targets.

Planned and developed over a period of 15 months by a combined team of solar scientists, astrophysicists and engineers at NASA's Marshall Space Flight Center and NASA's Goddard Space Flight Center, the scientific balloon carrying HEROES launched from the Fort Sumner test site managed by the Columbia Scientific Balloon Facility of Palestine, Texas, on Sept. 21. HEROES flew to an altitude of approximately 25 miles, well into Earth's stratosphere.

The HEROES project was selected for the HOPE award,



*HEROES co-principal investigator Jessica Gaskin looks on as final preparations are made for launch of the HEROES balloon payload. (NASA/MSFC/Emmett Given)*

which is presented annually by the NASA Academy of Program/Project & Engineering Leadership, in partnership with NASA's Science Mission Directorate, Office of the Chief Engineer and Office of the Chief Technologist. The awards are designed to help NASA engineers and scientists with little or no previous flight-project experience take a mission from concept to launch to post-flight analysis over the course of a year.

See **HEROES** on [page 6](#)

## Comet Ison Roars Through Leo



*In the early morning of Oct. 25, at 5:45 a.m. CDT, a scientist at NASA's Marshall Space Flight Center, using a 14-inch telescope, captured this image of Comet C/2012 S1 (ISON), which is brightening as it approaches the sun. The comet shines with a faint green color, left center. The diagonal streak, right center, was caused by the Italian SkyMed-2 satellite passing through the field of view. At magnitude 8.5, the comet is still too faint for the unaided eye or small binoculars, but is an easy target in a small telescope. (NASA/MSFC/Aaron Kingery)*

## HEROES *Continued from page 5*

“HEROES was a unique opportunity that allowed me to work with very talented and experienced engineers and to receive personalized training,” said Jonathan Pryor, an engineer at Marshall. “I do feel more confident in myself as an engineer as a result of this project.”

The HEROES project is an advanced version of NASA's successful [High Energy Replicated Optics](#) telescope (HERO) first flown to the upper atmosphere by Marshall researchers in 2001 to detect distant X-ray sources in space. HEROES significantly modified the original high-flying imager with a number of upgrades, most notably an innovative targeting technology dubbed the Solar Aspect System. Developed by Goddard, this sophisticated, new pointing technology enabled scientists to aim HEROES with a high degree of precision, targeting specific points on the sun to obtain high-resolution images and spectroscopic data. When the sun set on HEROES, the telescope used its star camera to target and document additional X-ray sources overnight.

The cross-center NASA team, led by co-principal investigators Jessica Gaskin at Marshall and Steven Christe at Goddard, spent several weeks prepping the instrument and assessing mission specifications for launch of HEROES. The Marshall and Goddard centers have more than 35 years of experience in flying high-altitude test balloons, plus decades of experienced NASA leadership in scientific research and spacecraft development, integration, test and launch.

“The flight exceeded expectations and the payload had a good landing,” Gaskin said. “Both solar and astrophysical science data were collected. We are currently analyzing



*HEROES successfully completed its mission Sept. 21-22 at Fort Sumner, N.M. The flight exceeded expectations and the payload had a good landing 35 nautical miles from Fort Sumner. Both solar and astrophysical data were collected and are currently being analyzed. (NASA/MSFC/Emmett Given)*

the data at Marshall and Goddard.”

To learn more about the HEROES team in their own words, follow the team's blog at: <http://heroesballoon.wordpress.com>

To view additional HEROES images, visit: <http://www.nasa.gov/centers/marshall/multimedia/photos/2013/13-110.html>

For more information about the Columbia Scientific Balloon Facility, visit: <http://www.csbf.nasa.gov>

*Smith is a media specialist and Anderson is a public affairs officer, both supporting the Office of Strategic Analysis & Communications.*