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Marshall Star, August 10, 2011 Edition

MARSHALL STAR

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Marshall Center Director's Breakfast Spotlights Center Accomplishments, Contractor Awards

Marshall Space Flight Center Director Robert Lightfoot addresses the audience at the annual Center Director's Breakfast Aug. 2. (David Brown)





Employees from Teledyne Brown Engineering of Huntsville receive the Marshall Space Flight Center Contractor Excellence Award in the "Large Business -- Service" category from Marshall Center Director Robert Lightfoot. The company contributes a variety of services to Marshall including developing, operating and maintaining facilities and payloads for the International Space Station as well as other engineering services. In 2010, it notably delivered integrated structure and avionics systems for NASA's Robotic Lander Development Project, now undergoing testing at Marshall to enable robust, automated space exploration missions to moons, asteroids and other airless bodies across the solar system. (David Brown)

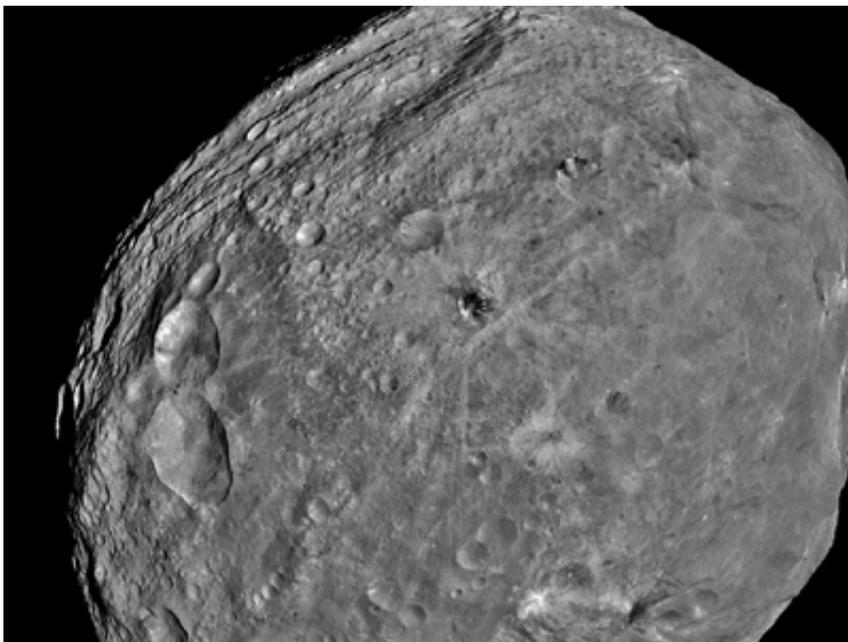
Marshall Space Flight Center Director Robert Lightfoot presents employees from the Alliant Techsystems (ATK) Space Launch Systems of Huntsville with the Marshall Contractor Excellence Award in the "Large Business -- Product" category. ATK provided the space shuttle's reusable solid rocket motors and booster separation motors, and is responsible for the launch abort system motor for the Orion crew capsule, successfully demonstrated in 2010 during NASA's Pad Abort-1 flight test. (David Brown)



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NASA's Dawn Spacecraft Begins Science Orbits of Vesta

NASA News Release



NASA's Dawn spacecraft, the first ever to orbit an object in the main asteroid belt, is spiraling toward its first of four intensive science orbits. That initial orbit of the rocky world Vesta begins Aug. 11, at an altitude of nearly 1,700 miles and will provide in-depth analysis of the asteroid. Vesta is the brightest object in the asteroid belt as seen from Earth and is thought to be the source of a large number of meteorites that fall to Earth.

Image left: NASA's Dawn spacecraft obtained this image of the giant asteroid Vesta with its framing camera on July 24. (NASA/JPL-Caltech/UCLA/MPS/DLR/IDA)

The Dawn team unveiled the first full-frame image of Vesta taken July 24:

http://www.nasa.gov/mission_pages/dawn/multimedia/pia14317.html

This image was taken at a distance of 3,200 miles. Images from Dawn's framing camera, taken for navigation purposes and as preparation for scientific observations, are revealing the first surface details of the giant asteroid. These images go all the way around Vesta, since the giant asteroid turns on its axis once every five hours and 20 minutes.

"Now that we are in orbit around one of the last unexplored worlds in the inner solar system, we can see that it's a unique and fascinating place," said Marc Rayman, Dawn's chief engineer and mission manager at NASA's Jet Propulsion Laboratory.

After traveling nearly four years and 1.7 billion miles, Dawn has been captured by Vesta's gravity, and there currently are 1,800 miles between the asteroid and the spacecraft. The giant asteroid and its new neighbor are approximately 114 million miles away from Earth.

"We have been calling Vesta the smallest terrestrial planet," said Chris Russell, Dawn's principal investigator at the University of California, Los Angeles or UCLA. "The latest imagery provides much justification for our expectations. They show that a variety of processes were once at work on the surface of Vesta and provide extensive evidence for Vesta's planetary aspirations."

Engineers still are working to determine the exact time that Dawn entered Vesta's orbit, but the team has reported an approximate orbit insertion time of 9:47 p.m. PDT on July 15.

In addition to the framing camera, Dawn's instruments include the gamma ray and neutron detector and the visible and infrared mapping spectrometer. The gamma ray and neutron detector uses 21 sensors with a very wide field of view to measure the energy of subatomic particles emitted by the elements in the upper yard (meter) of the asteroid's surface. The visible and infrared mapping spectrometer will measure the surface mineralogy of both Vesta and Dawn's next target, the dwarf planet Ceres. The spectrometer is a modification of a similar one flying on the European Space Agency's Rosetta and Venus Express missions.

Dawn also will make another set of scientific measurements at Vesta and Ceres using the spacecraft's radio transmitter in tandem with sensitive antennas on Earth. Scientists will monitor signals from Dawn and later Ceres to detect subtle

variations in the objects' gravity fields. These variations will provide clues about the interior structure of these bodies by studying the mass distributed in each gravity field.

"The new observations of Vesta are an inspirational reminder of the wonders unveiled through ongoing exploration of our solar system," said Jim Green, planetary division director at NASA Headquarters.

Dawn launched in September 2007. Following a year at Vesta, the spacecraft will depart in July 2012 for Ceres, where it will arrive in 2015. Dawn's mission to Vesta and Ceres is managed by JPL for NASA's Science Mission Directorate in Washington. Dawn is a project of the directorate's Discovery Program, managed by the Marshall Space Flight Center.

UCLA is responsible for overall Dawn mission science. Orbital Sciences Corp. in Dulles, Va., designed and built the spacecraft. The German Aerospace Center, the Max Planck Institute for Solar System Research, the Italian Space Agency and the Italian National Astrophysical Institute are international partners on the mission team.

For more information about Dawn, visit:

<http://www.nasa.gov/dawn>

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Marshall Center Team Invited To Register Now For Shuttle Celebration Aug. 20

The Marshall Space Flight Center will host a celebration of NASA's Space Shuttle Program Aug. 20 at the [U.S. Space & Rocket Center](#) in Huntsville.

To honor this remarkable, 30-year chapter in America's saga of space exploration, the Marshall workforce and their families will join with the public to salute the thousands of men and women who sent America's flagship aloft, creating a fascinating and rewarding era of research and discovery.

All visitors, including Marshall team members and their families, must preregister for the event, and bring a printout of their online registration to be admitted to the event.

Individuals and groups may register at <http://www.spacecamp.com/Aug20>.



The event will be held from 6-10 p.m. CDT on Aug. 20. It will include rides, live music, games, large-screen shuttle videos, Oscar the interactive robot, an inflatable space shuttle slide and other activities for children, plus opportunities to mingle with shuttle astronauts and NASA program veterans.

Tickets are \$5 per person, which includes a meal of hot dog, chips and soft drink for each guest and access to the entire museum and to all rides (IMAX movie presentations are an additional \$5, and other meals, drinks and refreshments will be available for purchase). Admittance is free for children 3 or younger.

The shuttle celebration is cosponsored by the U.S. Space & Rocket Center. Special Marshall Center exhibits and presentations will showcase the center's historic role in the shuttle program and its many accomplishments throughout the life of the program. In the early 1970s, Marshall was assigned responsibility for developing the shuttle's powerful propulsion

elements, including the external tank, solid rocket boosters and the space shuttle main engines. Marshall engineers conducted orbiter vibration testing in 1978, and the center has continued to manage shuttle propulsion elements throughout its three decades of flight.

Watch [The Marshall Star](#), ExplorNet and [Facebook](#) for new details as the date nears.

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Crew Members of Last Space Shuttle Mission to Visit Marshall Center Aug. 11

By *Sanda Martel*



NASA astronauts who flew the final space shuttle mission, STS-135, will visit the Marshall Space Flight Center Aug. 11. Commander Chris Ferguson, Pilot Doug Hurley and Mission Specialists Sandra Magnus and Rex Walheim will present highlights of their 13-day mission to the International Space Station at 2:15 p.m. in Morris Auditorium, Building 4200. An autograph session will follow.

Image left: STS-135 crew members, from left, Mission Specialist Rex Walheim, Pilot Doug Hurley, Commander Chris Ferguson and Mission Specialist Sandy Magnus. (NASA)

The STS-135 astronauts delivered more than 9,400 pounds of spare parts, equipment and other supplies in the Raffaello multipurpose

logistics module, which is managed by engineers at the Marshall Center. These supplies will sustain space station operations for the next year.

Martel, an AI Signal Research Inc. employee, supports the Office of Strategic Analysis & Communications.

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NASA's Juno Spacecraft Launches to Jupiter

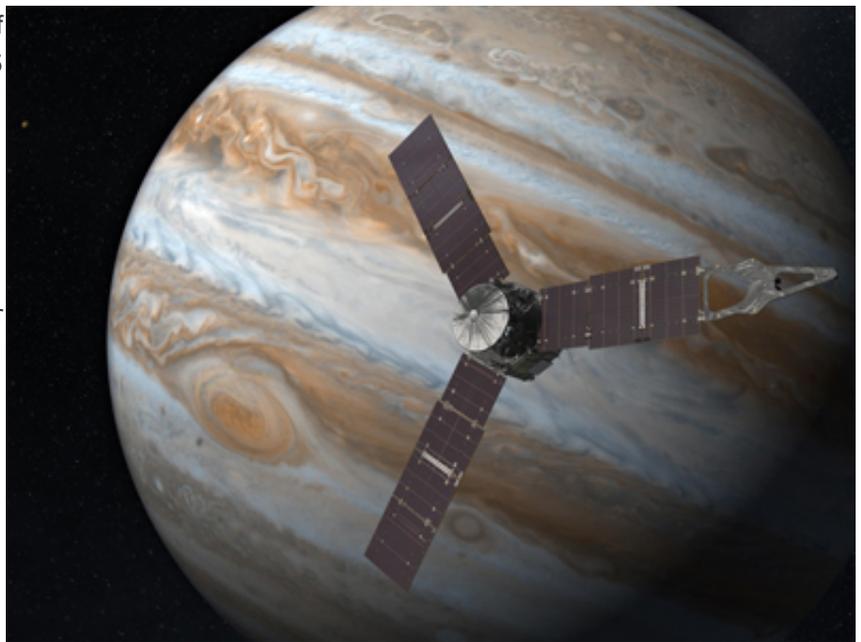
NASA News Release

NASA's solar-powered Juno spacecraft lifted off from Cape Canaveral Air Force Station at 11:25 p.m. CDT Aug. 5 to begin a five-year journey to Jupiter.

Image right: Artist rendering of the Juno satellite orbiting Jupiter. (NASA)

Juno's detailed study of the largest planet in our solar system will help reveal Jupiter's origin and evolution. As the archetype of giant gas planets, Jupiter can help scientists understand the origin of our solar system and learn more about planetary systems around other stars.

"Today, with the launch of the Juno spacecraft, NASA began a journey to yet another new frontier," NASA Administrator Charles Bolden said. "The future of exploration includes cutting-edge science like this to help us better understand our solar system and an ever-increasing array of challenging destinations."



NASA's Juno Project is managed by the New Frontiers Program at the Marshall Space Flight Center. NASA's Jet Propulsion Laboratory manages the Juno Project for the principal investigator, Scott Bolton, of Southwest Research Institute in San Antonio. Lockheed Martin Space Systems, Denver, built the spacecraft. Launch management for the mission was the responsibility of NASA's Launch Services Program at the Kennedy Space Center.

After Juno's launch aboard an Atlas V rocket, engineers received communications from the Juno spacecraft, and its solar arrays -- the biggest on any NASA deep-space probe -- have been deployed.

Juno will cover the distance from Earth to the moon -- about 250,000 miles -- in less than one day's time. It will take another five years and 1,740 million miles to complete the journey to Jupiter. The spacecraft will orbit the planet's poles 33 times and use its collection of eight science instruments to probe beneath the gas giant's obscuring cloud cover to learn more about its origins, structure, atmosphere, and magnetosphere, and look for a potential solid planetary core.

"Little is known about the oldest and largest planet in our solar system, and it's exciting to be a part of the team that will unlock that mystery," said Brian Key, Juno Project Mission Manager for the New Frontiers Program. "Juno will provide scientists with a treasure trove of data once it makes its orbital insertion, five years from now, around Jupiter."

With four large moons and many smaller moons, Jupiter forms its own miniature solar system. Its composition resembles a star's, and if it had been about 80 times more massive, the planet could have become a star instead.

"Jupiter is the Rosetta Stone of our solar system," said Scott Bolton, Juno's principal investigator from the Southwest Research Institute. "It is by far the oldest planet, contains more material than all the other planets, asteroids and comets combined and carries deep inside it the story of not only the solar system but of us. Juno is going there as our emissary -- to interpret what Jupiter has to say."

Juno's name comes from Greek and Roman mythology. The god Jupiter drew a veil of clouds around himself to hide his mischief, and his wife, the goddess Juno, was able to peer through the clouds and reveal Jupiter's true nature.

For more information about Juno, visit:

NASA Chat: Stay 'Up All Night' to Watch the Perseids Aug. 12



Looking for a good reason to enjoy an August evening? This year's Perseid meteor shower peaks on the night of Aug. 12 and into the early morning of Aug 13. The Perseids are considered the best meteor shower of the year by many, but with the full moon washing out all but the brightest meteors, rates will probably only be 20-30 per hour at most -- weather permitting. The Perseids rate in the Southern Hemisphere is quite a bit lower, since the Perseid radiant doesn't climb above the horizon.

Image left: Perseid meteor shower. All images credit/copyright to [Michael Menefee](#).

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Make plans to chat with NASA astronomer Bill Cooke and his team from the Marshall Space Flight Center as they answer questions about the Perseids via live web chat. Join them on Aug. 12 at 10 p.m. CDT and then make plans to stay "up all night" until 4 a.m. CDT Aug. 13.

The Perseids have been observed for at least 2,000 years and are associated with the comet Swift-Tuttle, which orbits the sun once every 133 years. Each year in August, the Earth passes through a cloud of the comet's debris. These bits of ice and dust -- most over 1,000 years old -- burn up in the Earth's atmosphere. The Perseids can be seen all over the sky, but the best viewing opportunities will be across the Northern Hemisphere. Those with sharp eyes will see that the meteors appear to radiate from the direction of the constellation Perseus.

Joining the chat is easy. Simply return to [this chat page](#) a few minutes before 10 p.m. CDT Aug. 12. The chat module will appear at the bottom of this page. Simply type your name to join the chat, and the team will take your questions.

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Huntsville Mayor Tommy Battle Presents Intern Cup to Marshall Center Director Robert Lightfoot

At the Aug. 2 Marshall Center Director's Breakfast at the U.S. Space & Rocket Center, Mayor Tommy Battle, front left, presented the Intern Cup to Marshall Space Flight Center Director Robert Lightfoot, front right, while Marshall summer interns look on. Marshall's intern team -- dubbed the "Pocket Rockets" -- defeated the city hall intern team 14-7 in the annual Intern Cup flag football game July 25. Each year, the winning team receives bragging rights for the year and the coveted silver "Intern Cup," which will be kept at Marshall until next summer's game. (David Brown)



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The Art of Precision Cooking -- in Space

NASA Enhances Materials Science Research Rack Onboard International Space Station

By Janet Anderson



If you think it's tough to make Baked Alaska or a delicate soufflé or some other temperature-sensitive dish in your kitchen at home, imagine the painstaking task of trying to cook to perfection 250 miles in the sky -- where you can't even peek inside the oven.

Image left: German researcher Dr. Petra Neuhauser, right, examines the sample, joined by Dr. Alex Lehoczky, left, materials scientist at the Marshall Center, and Dr. Surendra Tewari, center, professor at Cleveland State University in Ohio, where the sample was sent for additional study. (MSFC/Emmett Given)

A new furnace -- one capable of enhanced processing of materials science samples -- has been added to NASA's Materials Science

Research Rack or MSRR on the International Space Station. Dubbed the "Solidification and Quenching Furnace" or SQF, the new apparatus is designed to "cook" metals, ceramics, alloys, crystals and glass with culinary precision.

"Processing materials at high temperatures in the manned space environment presents several challenging problems," said Jimmie Johnson, project manager for MSRR. "These challenges include precise temperature control, ensuring a safe environment for the crew, yet obtaining a high enough temperature to yield good science results."

The SQF provides three heater zones to ensure accurate temperature profiles and maintain the sample's required temperature variations throughout the solidification process. This capability provides much faster solidification rates, and allows correlation of each sample's microstructure to the processing parameters, thereby influencing material properties

"The goal of studying materials processing in space is to develop a better understanding of the chemical and physical properties involved," said Alex Lehoczky, project scientist for MSRR. "Equipped with this knowledge, we can better predict conditions needed on Earth to achieve improved materials. After all, materials science is an integral part of developing new materials for our everyday life."

A U.S. materials science sample processed in the SQF was returned to Earth by space shuttle Discovery during the STS-133 mission. Upon its return, the cartridge containing the processed sample was delivered to the Marshall Space Flight Center for initial examination prior to opening. In May, the cartridge was opened and the sample was removed. It was X-rayed at the Marshall Center for an initial assessment and then transferred to coinvestigator professor Surendra Tewari, who transported it to his laboratory at Cleveland State University in Ohio for continued analysis. Professor Tewari and professors David Poirier and Robert Erdman of the University of Arizona in Tucson are collaborating on this study.

Image right: Using heat guns to open a U.S. sample cartridge processed in space are, from left, German researchers Dr. Petra Neuhauser and Dr. Harold Lenski, and Jeff Clancy of Teledyne Brown Engineering. The sample, returned to Earth during the STS-133 shuttle mission, was the first processed in the solidification quench furnace in the Materials Science Research Rack on the International Space Station. (MSFC/Emmett Given)



The Materials Science Research Rack allows for the on-orbit study of a variety of materials -- including metals, ceramics, semi-conductor crystals and glasses. The first American sample processed in the SQF consisted of an aluminum and silicon alloy that was melted and then directionally solidified. Similar processing of various alloys is typically used for producing commercially important products such as high temperature turbine blades.

Applied materials science is essential for the development of new, safer, stronger and more durable materials for use throughout everyday life. One of the goals of performing research in space is to gain a better understanding of the role of gravity in the microstructural development during solidification.

In just over a year, MSRR has successfully completed more than 620 hours of operating time. The rack is about the size of a large refrigerator, measuring 6 feet high, 3.5 feet wide and 40 inches deep and weighs about 1 ton. It currently accommodates two furnace inserts in which sample materials can be processed at temperatures of up to 2,500 degrees Fahrenheit. Sample cartridges are inserted in the respective furnaces one at a time by members of the space station crew for processing. Once a cartridge is in place, the experiment can be run by automated command initiated from the ground. Processed samples are returned to Earth as soon as possible for evaluation and analysis.

Development of the furnaces and research rack was a cooperative effort between the Marshall Center and the European Space Agency.

For more information about science on the space station, visit:

http://www.nasa.gov/mission_pages/station/science/

For more information about liquidmetal technologies, visit:
http://www.sti.nasa.gov/tto/Spinoff2004/ch_7.html

Anderson is a public affairs officer in the Office of Strategic Analysis and Communications.

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Marshall Building Incurs Damage Following Aug. 4 Storms



The B and C wings of Building 4487 lost large sections of roofing material during an overnight storm Aug. 4. Up to 300 Marshall Space Flight Center team members working in the building were affected and went to an alternate work space or home on administrative leave. A temporary roof was installed over the weekend allowing employees to return to their offices Aug. 8. (NASA/MSFC)

Find this article at:

<http://www.nasa.gov/centers/marshall/about/star/index.html>