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MARSHALL STAR

In This Week's Star ⊞ (Click to Expand)

NASA Moon Mission in Final Preparations for Sept. 8 Launch

NASA news release

NASA's Gravity Recovery And Interior Laboratory (GRAIL) mission to study the moon is in final launch preparations for a scheduled Sept. 8 launch on board a Delta II rocket from Cape Canaveral Air Force Station in Florida.

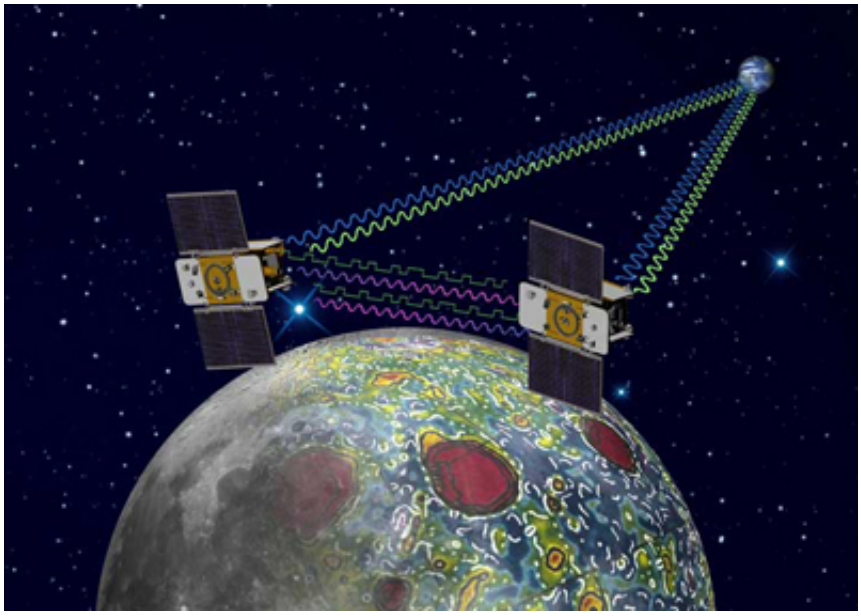

Image right: Using a precision formation-flying technique, the twin GRAIL spacecraft will map the moon's gravity field, as depicted in this artist's rendering. Radio signals traveling between the two spacecraft will provide scientists the exact measurements required, as well as ensure an uninterrupted flow of information when the spacecraft are at the lunar far side, not seen from Earth. The result should be the most accurate gravity map of the moon ever made. (NASA/JPL-Caltech)

GRAIL's twin spacecraft are tasked for a nine-month mission to explore Earth's nearest neighbor in unprecedented detail. They will determine the structure of the lunar interior from crust to core and advance our understanding of the thermal evolution of the moon.

"On Aug. 24, an important mission milestone was reached with final encapsulation of the spacecraft," said David Lehman, GRAIL project manager for NASA's Jet Propulsion Laboratory. "Our two spacecraft are now sitting comfortably inside the payload fairing which will protect them during ascent. Next time the GRAIL twins will see the light of day they will be about 95 miles up and accelerating."

NASA's GRAIL mission is part of the Discovery Program managed at the Marshall Space Flight Center. The Jet Propulsion Laboratory manages the GRAIL mission. Lockheed Martin Space Systems in Denver built the spacecraft. Launch management for the mission is the responsibility of NASA's Launch Services Program at the Kennedy Space Center.

"Little is known about the make-up of our nearest neighbor, and it's exciting to be a part of the team that will unlock that mystery and teach us more about the moon and our own planet," said Rick Turner, GRAIL Project Mission Manager for the Discovery Program at Marshall. "GRAIL will provide scientists with data about a planetary body that directly influences the Earth's tides and also affects the motion and orbit of the Earth."

The spacecraft twins, GRAIL A and B, will fly a circuitous route to lunar orbit taking 3.5 months and covering approximately 2.6 million miles for GRAIL-A, and 2.7 million miles for GRAIL-B.

In lunar orbit, the spacecraft will transmit radio signals precisely defining the distance between them. Regional gravitational differences on the moon are expected to expand and contract that distance.

GRAIL scientists will use these accurate measurements to define the moon's gravity field. The data will allow mission scientists to understand what goes on below the surface of our natural satellite.

"GRAIL will unlock lunar mysteries and help us understand how the moon, Earth and other rocky planets evolved as well," said Maria Zuber, GRAIL principal investigator from the Massachusetts Institute of Technology in Cambridge.

GRAIL's launch period opens Sept. 8 and extends through Oct. 19. On each day, there are two separate launch opportunities separated by approximately 39 minutes. On Sept. 8, the first launch opportunity is 9:37 a.m. CDT; the second is 10:16 a.m.

For extensive pre-launch and launch day coverage of the GRAIL spacecraft, visit:

http://www.nasa.gov

A prelaunch webcast for the mission will be streamed at noon on Sept. 7. Live countdown coverage through NASA's Launch Blog begins at 7:30 a.m. on Sept. 8. Coverage features live updates as countdown milestones occur and streaming video clips highlighting launch preparations and liftoff.

To view the webcast and the blog or to learn more about the GRAIL mission, visit:

http://www.nasa.gov/mission_pages/grail/main/index.html

and

http://grail.nasa.gov

To view live interviews with lunar scientists from 1-6 p.m. on Sept. 8 and 9, visit:

http://www.livestream.com/grail

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NASA and ATK Full-Scale Solid Rocket Motor Test Set for Sept. 8
NASA news release

NASA and Alliant Techsystems Inc. (ATK) will conduct a full-scale test of a five-segment, solid rocket motor at the ATK Aerospace Systems test facility in Promontory, Utah, at 3:05 p.m. CDT Sept. 8.

Image left: The DM-3 motor is prepared for testing at the ATK Aerospace Systems test facility in Promontory, Utah. (ATK)

The solid rocket motor is managed by the Marshall Space Flight Center. ATK Space Systems is the prime contractor.

The static firing of the five-segment solid rocket motor, designated Development Motor-3 (DM-3), will last approximately two minutes. DM-3 is the third in a series of development motors and the most heavily instrumented solid rocket motor in NASA history, with a total of 37 test objectives measured through more than 970 instruments.

The DM-3 incorporates several performance-based improvements to the designs of the first two development motors. Additionally, the core of DM-3 will be heated to 90 degrees Fahrenheit for this full-duration firing to verify the motor's performance at high temperatures.

This test will continue to advance understanding of five-segment solid rocket motor performance and specifically assess performance at the highest end of the motor's accepted temperature range. Through development testing, the solid rocket motor will be certified to fly at ambient temperatures ranging from 40 to 90 degrees Fahrenheit.

For more information about NASA and agency programs, click here.

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Resupply Craft Lost During Aug. 24 Launch to Space Station
From combined reports

The International Space Station Progress 44 spacecraft and nearly 3 tons of supplies for the station were lost Aug. 24 when the launch vehicle experienced a failure during the climb to orbit. It was monitored impacting the Altai region of Russia.

The Progress 44 resupply craft launches on time from Baikonur Cosmodrome before a loss of communication a few minutes later. (NASA TV)

The resupply craft launched at 8 a.m. CDT from Baikonur Cosmodrome in Kazakhstan. However, the Russian Mission Control Center in Korolev, outside Moscow, reported communication with the Progress 44 was lost 5 minutes, 50 seconds after launch.

"Following 320 seconds of flight, there was a failure in the upper stage of the launch vehicle," said Maxim Matuchen, the head of the control center. "We lost comm(unications) after a while with the launch vehicle and we did not report stage separation."

International Space Station Program Manager Michael Suffredini held news

conferences at the Johnson Space Center on Aug. 24 and Aug. 29, discussing the loss of the resupply vehicle and the impact it may have on the program and the space station crew. There are plenty of supplies to support the crew, Suffredini said, and the station is in a good configuration. However, he added, a Russian commission has been formed to investigate the root cause of the vehicle loss, which may affect upcoming Russian spacecraft launches.

International Space Station Program Manager Michael Suffredini discusses the loss of the Progress 44 resupply craft during a news conference at Johnson Space Center. (NASA TV)

"We'll give our Russian colleagues time to work through this anomaly, and together we'll finalize a plan for the crew with focus on safety," said Suffredini. "As soon as we have a plan or an idea of the anomaly cause, we'll let you know."

The Expedition 28 crew is continuing to prepare for the planned departure of three crew members -- Commander Andrey Borisenko, and Flight Engineers Alexander Samokutyaev and Ron Garan. The exact date of that upcoming departure is now being reviewed. "We'll probably end up bringing the crew back in mid-September, but that's not a final decision," said Suffredini. "We can support either. We'll decide what's safest for the crew."

On Aug. 23 -- the day before the loss of Progress 44 -- Progress 43, which was loaded with trash and discarded items, undocked from the aft end of the Zvezda service module at 4:37 a.m. as the station passed 230 statute miles over northern China. It was commanded to a parking orbit a safe distance away from the station for engineering tests and experiments. The Progress 43 will be deorbited on Sept. 1 for a destructive re-entry over the Pacific Ocean.

For the latest news aboard the space station, click here.

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Marshall Engineer Cindy Stemple Guides NASA Robotic Lander Flight Tests

By Rick Smith

In Huntsville this summer, as the heat index repeatedly topped 100 degrees Fahrenheit, it must have been a relief to conduct complex hardware tests in a cool indoor laboratory. But Marshall Space Flight Center engineer Cindy Stemple has been waiting for weeks to get outside, heat or no heat. She's ready to see her latest project fly.

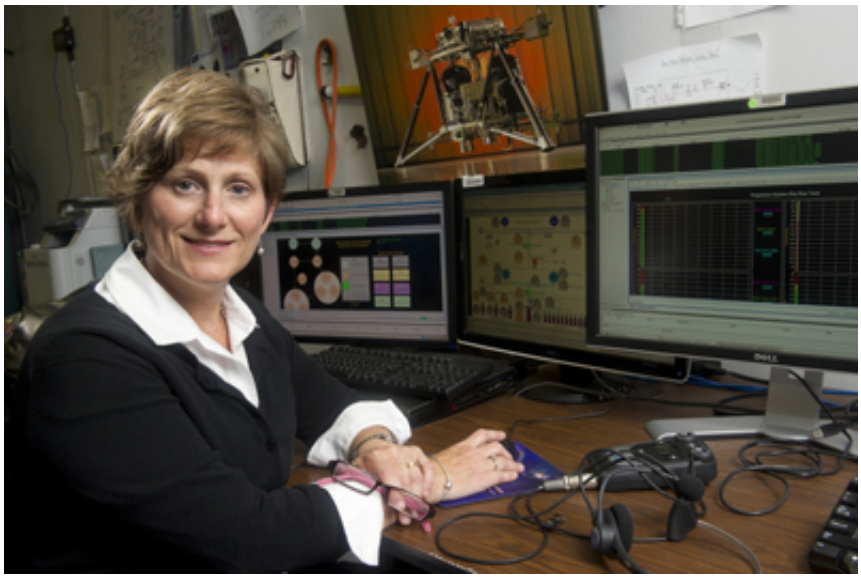

Image right: Marshall engineer Cindy Stemple (NASA/MSFC/Emmett Given)

Stemple is flight control commander -- and wears other hats as needed -- for the Robotic Lander Development Project at the Marshall Center. Her team has spent the past two years designing and testing a sophisticated, next-generation robotic lander prototype they've dubbed "MightyEagle." The project will help NASA devise a small, smart, low-cost lander that uses pulsed thrusters to gently ease itself onto the surface of the moon, near-Earth asteroids or other airless bodies -- leading to a new generation of robust, versatile, automated spacecraft that will explore and conduct science across the solar system.

The lander team includes Marshall engineers and their partners at Johns Hopkins University's Applied Physics Laboratory in Laurel, Md., and the Von Braun Center for Science and Innovation in Huntsville. The latter includes two Huntsville-based contributors: Teledyne Brown Engineering and Dynetics Corp. The Planetary Science Division of NASA's Science Mission Directorate in Washington directs the project.

Stemple and the team spent much of the summer testing the prototype in a U.S. Army propulsion test facility on Redstone Arsenal. The prototype is a tripod-like construct that is 4 feet tall and 8 feet in diameter. It weighs about 700 pounds when fueled, but you'd never suspect the weight as it smoothly lifts off the cement floor of the test chamber, hovering between 6 feet and 16 feet in the air.

As flight control commander, Stemple's got a lot to do with that smooth test run. "I work with the engineers in the planning and development phase of each hover test, preparing the sequence of commands to maneuver the test article," she says. "During the test, I provide command and control to support pressurization, fueling and flight of the prototype."

That's the fun part, she says -- preparing the system to operate on its own in distant, alien environments, particularly during tricky landing operations.

"Developing an autonomous, or primarily self-guiding, lander is important, because radio commands sent from Earth to another world experience time delays," she says. "If the lander encounters an obstacle in the final seconds before landing, it might be too late for a controller back here on Earth to intervene in time. That's why we're developing a smart vehicle with sophisticated sensors and self-analyzing, self-correcting capabilities, enabling it to troubleshoot and adjust without human intervention."

Stemple has a hand in that technology development as well. She serves as ground data systems lead, managing all the data systems used to command and control the prototype, and as software integration manager, overseeing all testing and integrating of the lander's flight software.

She juggles these roles with finesse, but she's happiest when she's putting MightyEagle through its paces: autonomous, closed-loop, free-flight test runs, hovering for up to 30 seconds at a time at various heights while Marshall engineers and their industry partners study its performance and refine its onboard sensors, avionics and power and guidance systems. To date, Stemple and the team have conducted more than 160 total tests on two lander prototypes: the warm-gas, peroxide-fueled test article being put through the paces in the Army test lab; and an earlier, cold-gas version fueled with compressed air, which was completed and tested in just nine months.

The first hover flight in June sticks out in Stemple's mind as a highlight. "It was the culmination of many hours of tireless effort put into the development, integration and testing," she says. "It's been amazing to see what we've accomplished in such a short amount of time."

Now the team is taking the prototype outside for a series of increasingly complex flight tests on the Army's Redstone Arsenal test range. During testing, set to begin in early September, the lander is expected to fly multiple times, demonstrating a variety of high-flying ascent, descent and horizontal maneuvers.

Mention to Stemple the potential for more sizzling late-summer temperatures and she just chuckles. She grew up in Long Beach, Miss., about 70 miles east of New Orleans on the Gulf Coast. She knows all about heat.

The robotic lander will know all about heat, too, in its travels -- and bone-chilling cold as well. On the lunar surface, for example, temperatures can climb as high as 260 degrees Fahrenheit during the day, then plummet to minus-279 degrees Fahrenheit overnight. Among its many areas of focus, the team is studying innovative thermal management systems and techniques to protect the craft no matter where its exploration missions take it -- enabling it to perform equally well in the frigid gulf of space or under the harsh glare of a hot sun unshielded by Earth's atmosphere.

Stemple can't wait. "I am very optimistic that the engineering innovations and the lessons learned in the development and testing of the lander prototype will inform a new era in robotic exploration," she says. "Robotic missions help us make exciting new discoveries in alien environments and demonstrate and validate vital new capabilities -- serving as vital precursor missions for more rewarding future human exploration of our solar system."

She smiles. "That's just cool," she says, and goes back to work, readying the lander prototype for its days in the sun.

More about Cindy Stemple

Stemple is a 1985 graduate of Mississippi State University in Starkville, where she earned her undergraduate degree in computer science. After college, she worked as a software developer on the F16 program at General Dynamics in Fort Worth, Texas, then moved to Huntsville to work for SCI Inc. as a technical support specialist.

She joined NASA in 1987, initially designing data systems for testing the Chandra X-ray Observatory, which flew to space in 1999 and continues to unlock the mysteries of the universe, studying cosmic X-ray emissions 100 times fainter than any previous space telescope could see.

Among her many career highlights, she designed, developed and wrote software to test vital International Space Station science facilities, including the Microgravity Science Glovebox and the Materials Science Research Rack. The glovebox, flown to the space station in 2002, permits controlled scientific study of materials and samples on orbit, with real-time video and data access by scientists on the ground. The research rack, delivered to the station in 2009, allows for on-orbit study of a variety of materials, including metals, ceramics and glass.

In her spare time, Stemple enjoys boating, baking bread and traveling abroad with her husband Dan and their three children. As a two-time cancer survivor, she recently was selected as a "Hero of Hope" by the American Cancer Society. She serves as a motivational speaker, inspiring hope, courage and determination in the fight to eliminate cancer. She also volunteers as a "Reach To Recovery" area coordinator for the American Cancer Society and works with the Huntsville-area "Bosom Buddy" cancer support group.

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

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Dr. Matthew Adler Wins Marshall's 18th Annual Software of the Year Award

By Carolyn McMillan

Innovator Dr. Matthew Adler has won the Marshall Space Flight Center 18th Annual Software of the Year Award for his Surface Crack Potential Difference, or SCPD, software.

Image right: Dr. Matthew Adler, center, receives his Marshall Software of the Year Award at the July 28 Marshall Center Honor Awards ceremony. He is flanked by Bryan O'Connor, left, NASA chief, Safety & Mission Assurance, and Marshall Center Director Robert Lightfoot. (David Higginbotham)

SCPD is a crack monitoring tool that provides reliable transfer predictions of crack behavior in actual hardware from metallic laboratory test articles. The tool has been developed into a graphical user interface, or GUI, and is being distributed as a standalone

executable.

Marshall Center Director Robert Lightfoot recommended the software to NASA Headquarters as the Marshall submission to the agency's annual software competition. Adler represented Marshall at the event held at the Ames Research Center in June.

Adler is an employee of ICRC, a subcontractor to Jacobs Engineering, which supports the Engineering Directorate's Damage Tolerance Assessment Branch. According to Dr. Wayne R. Gamwell, Marshall's chief of the Damage Tolerance Assessment Branch, Adler's software "represents a significant step forward in the damage tolerance testing and analysis of metallic components." Gamwell added, "By combining fracture mechanics theory, potential difference measurement techniques, and software programming, Dr. Adler has developed a fracture-testing tool that transforms surface flaw sizing from art to science."

The other software submitted to the Software of the Year Panel was the Pressure Systems Reporting Tool, or PSRT, an application designed and implemented to support the risk-based management of pressure systems vessels at Marshall. Its innovators include Brandon Roberts, Danny Punch and Albert Pulley.

The annual NASA Software of the Year Award is a prestigious honor designed to give recognition to developers of innovative software tools created for or by NASA and owned by NASA.

McMillan is the Marshall New Technology Representative.

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Marshall Association Meeting to be Held Sept. 7

All Marshall Space Flight Center team members are invited to attend the Marshall Association meeting Sept. 7 from 11 a.m. until 1 p.m. at the Redstone Officer's Club featuring guest speaker Col. John Hamilton, garrison commander for Redstone Arsenal. Hamilton will speak about base realignment and closure or BRAC, and the changes at Redstone.

The menu is a stir-fry buffet served with rice and dessert at a cost of $11 for members and $13 for nonmembers.

Please RSVP for lunch to Janet Anderson by Friday, Sept. 2 to attend.

The Marshall Association is the professional, employee service organization at the Marshall Center. Civil service employees and contractors at the center can learn more about the association here.

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Obituaries

Alvin Baggett, 86, of Huntsville died Aug. 27. He retired from the Marshall Center in 1986 as a personnel management specialist supervisor.

Ralph Anderson Burns, 78, of Huntsville died July 31. He retired from the Marshall Center in 1989 as a life support studies scientist. He is survived by his wife, Carolyn Burns.

Weldon Coleman, 80, of Huntsville died July 31. He retired from the Marshall Center in 1975 as an employee development specialist. He is survived by his wife, Joyce Coleman.

Herman Thomason, 85, of Madison died Aug. 18. He retired from the Marshall Center in 1984 as the deputy director of the Science & Engineering Directorate. He is survived by his wife, Donna Jo Thomason.

Norman Eddie Trentham, 71, of Huntsville died Aug. 8. He retired from the Marshall Center in 2001 as a reliability and quality assurance engineer. He is survived by his wife, Ann Trentham.

Find this article at:

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