



## 13,000+ came to experience first evening public engine test



More than 13,000 people, approximately four times more than attended previous public tests, experienced the first-ever evening public engine test of a Space Shuttle Main Engine at Stennis Space Center Saturday, April 21. The 520-second test was a flight certification test for a Block II main engine using the Pratt & Whitney high-pressure fuel turbopump. The Boeing Company, Rocketdyne is responsible for development and flight acceptance testing of Space Shuttle Main Engines. (See story and additional photos, Page 6.)

## New Space Shuttle Block II Main Engine tested at Stennis offers safer shuttle ride

The next Space Shuttle crew can expect an even safer ride into orbit, thanks to the completion of a new Space Shuttle Main Engine. Workers at NASA's Kennedy Space Center, Fla., installed one of the new Block II configuration engines on Space Shuttle Atlantis on April 24 following flight certification at Stennis Space Center. The acceptance test of this position two engine of the cluster of the three main engines was in February.

"Acceptance of the Block II was a major milestone," NASA's Pat Mooney, Space Shuttle Main Engine Project Office manager, said. "The test team at Stennis did an outstanding job processing these flight engines."

Atlantis' first flight using the new engine is targeted for launch June 14 on mission STS-104 to the International Space Station. Atlantis will use one Block II main engine and two Block IIA main engines to complete its full complement of three engines.

Improvements to the main engines con-

tinue to evolve to produce the safest, most reliable and reusable space transportation system in the world.

The Block II main engine configuration includes a new Pratt & Whitney high-pressure fuel turbopump. The primary modification to the engine is the elimination of welds using a casting process for the housing, and an integral shaft/disk with thin-wall blades and ceramic bearings. This makes the pump stronger and should increase the number of flights between major overhauls. Although the new pump adds 300 pounds (135 kilograms) of weight to the shuttle, the results are a more reliable and safer engine because of increased pump robustness.

"With this design change, we believe we have more than doubled the reliability of the engine," said George Hopson, manager of the Space Shuttle Main Engine Project at Marshall Space Flight Center in Huntsville, Ala.

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## NASA-developed imager undergoes first test flight

NASA-developed technology that detects changes in plant chlorophyll levels that may not be visible to the naked eye holds potential as a useful tool for agriculture, forestry, environmental health and industry.

A new use being tested for the portable video imager is in the detection of leaks from septic systems. Last August, representatives from Associated Technical Management Corporation (ATMC) of Texarkana, Texas, the company which has licensed the NASA technology, flew over Mobile County, Ala., with a modified prototype of the imager. This was the first test of the NASA-developed portable video imager for commercial use.

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## Space Day 2001

Stennis Space Center employees participated in Space Day 2001... The Odyssey Continues that was celebrated May 3. Ann Cook, top left, education specialist with NASA's Office of Education, works with fifth grade students at the Bonne Ecole Elementary School in Slidell, La., to launch space capsules of their own design to protect precious cargo — eggs, which represent astronaut occupants. Below left, the students open their capsules to see how well their design protected the "astronaut." Mississippi Governor Ronnie Musgrove issued a proclamation naming May 3 as Space Day in the state of Mississippi. This proclamation was the culminating event in the year-round Embrace Space educational initiative, celebrating the extraordinary achievements, benefits and opportunities in the exploration and use of space.

## Stennis undergoes final ISO 14001 audit

NASA's John C. Stennis Space Center underwent the final audit for ISO 14001 Certification May 2. The audit completes a process initiated in April 2000 when the center was named one of three NASA centers to participate in a national pilot program to implement an Environmental Management System (EMS) based on ISO 14001 standards.

The pilot program came as a result of an executive order signed last year directing all federal agencies to implement an environmental management system.

"Implementation of the Environmental Management System provided Stennis with a comprehensive way to effectively manage and measure the impacts of our operations on the environment," NASA's Ron Magee, environmental officer at Stennis, said.

According to Magee, although ISO 14001 registration is being recommended, Stennis will have to wait on a decision from NASA's Environmental Management Board as to whether NASA will register all

its centers under one ISO 14001 program or whether each center will receive its own individual registration.

"Hopefully, this decision will be reached at a board meeting to be held in Washington in mid-June," he said.

Stennis created an EMS Core Team representing NASA, Mississippi Space Services, Lockheed Martin Space Operations and the Boeing Company. This team set about the task of identifying environmental impacts associated with every Stennis activity and evaluated those activities in terms of risk to the center.

Goals were set to reduce the risk identified, and procedures were put into place to aid the center in reaching these goals.

"Even though the center has always had a fine environmental program, the ISO 14001 program has allowed us to better structure ourselves here at Stennis to assure environmental stewardship and compliance in our present and future endeavors," Magee concluded.

## NEWSCLIPS

**NASA and foundation provides child's first chance to enjoy spring** — Eight-year old Cardi Hicks of Magnolia, Texas, suffers from four rare skin diseases that forces him to stay out of the Sun and its potentially harmful ultraviolet light.

NASA's Johnson Space Center in Houston, Texas, and the Hypohidrotic Ectodermal Dysplasia Foundation and Related Disorders, Hampton, Va., provided Hicks with a special UV-protection suit last month developed from space-based technology. The suit allows him to go outside protected from harmful light.

**Hot space research yields cooler down-to-Earth benefits** — A paper-thin coating of an innovative NASA material used to prevent space vehicles from burning up during planetary reentry may soon be available to protect one's house, car and boat from fire.

Protective Ceramic Coating (PCC) invented at NASA's Ames Research Center, Moffett Field, Calif., in the heart of Silicon Valley, repels heat from virtually any surface it covers. This allows it to shield ceramics, wood, steel, plastics and fiberglass from high temperatures. Wessex, Inc., Blacksburg, Va, has been licensed to develop and market the material. PCC may serve as heat protection for car and boat engines, as well as various building materials, making these modes of transportation and environments more fire-resistant and safer for the consumer.

**Greenhouse gases responsible for quicker northern winter warming** — According to a study published in the April issue of the *Journal of Geophysical Research — Atmospheres*, NASA scientists at Goddard Institute for Space Studies concluded that greenhouse gases, more than any of the other factors — including volcanic aerosols, polar ozone depletion and solar radiation — increase the strength of the polar winds that regulate the winter climate in the Northern Hemisphere. The study reported the warming trend would likely continue over the next 30 years.

## International Space Station Status Report

NASA and the Italian Space Agency (ASI) announced an agreement April 19 on the framework of a potential bilateral cooperative agreement that could result in ASI development of a U.S. Habitation Module for the International Space Station (ISS). This agreement allows the United States to explore an alternative approach to achieve full crew habitation of the space station within the constraints of the President's fiscal year 2002 budget plans.

In the President's plan, the Habitation Module, which was to house crew quarters and other essential habitability functions for three to four additional space station crews, was considered a high-cost risk element, and as such, its funding was redirected to address cost challenges in maintaining the core U.S. assembly elements and high priority ISS objectives.

The agreement will be part of NASA's ongoing program assessment, which includes possible decisions to develop and deploy U.S. elements or enhancements beyond completion of the U.S. core, within available funding. Successful restoration of a habitation capability for six or more crews would significantly increase the availability of crew time to conduct important research.

NASA and ASI are discussing launch services, additional Space Shuttle and ISS astronaut crew opportunities and assignments, space station utilization, and increased visibility for the Italian role in the ISS partnership as possible considerations for Italy.

Any increase in U.S. research utilization to be provided to ASI would be enabled through the increased capabilities realized through the provision of habitation for an expanded space station crew.



**A crew member of STS-100 aimed a digital still camera through Endeavour's aft flight deck window to record this image of the cargo bay, backdropped against a scene of black space and Earth's horizon. Housed in the bay, beyond the docking mechanism in the foreground, is the Italian Space Agency-provided Raffaello cargo module. It carried several tons of equipment for the Expedition Two crew and racks of hardware for installation in Destiny Research Module that will be used for scientific research in the future. Endeavour's Canadian-built Remote Manipulator System arm can be seen in its berthed position on the port side of the payload bay. STS-100 launched from Kennedy Space Center April 19 and concluded April 30.**

## Hubble snaps photos of galactic survivor

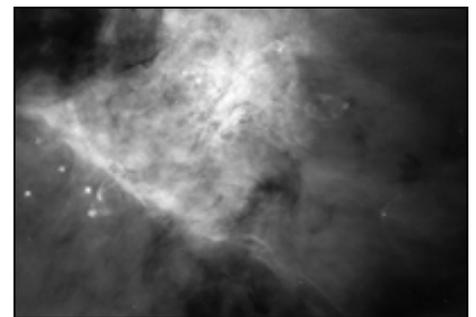
A dramatic life-and-death struggle of planetary survival taking place inside a giant cloud of gas and dust 1,500 light-years from Earth could hold the key to how many planets actually exist in our Milky Way galaxy.

The news, published in the journal *Science*, is that NASA's Hubble Space Telescope got an inside look at Earth's closest large star factory. The images provide the first direct visual evidence for growth of planets inside embryonic dust disks around dozens of stars in the giant Orion Nebula.

Orion's protoplanetary disks were first discovered in 1992 and dubbed "proplyds." At first, their existence seemed to greatly improve the odds for abundant planets in the galaxy. However, subsequent Hubble pictures revealed proplyds being blow-torched away by a relentless blast of radiation from the nebula's largest star.

Researchers predict that within 100,000 years the vast majority of the youngest disks will be largely destroyed. For the proplyds that are shielded from the ultraviolet radiation, planet formation will be business as usual with these stars probably becoming hosts to a variety of planets.

"This discovery goes a long way toward



**The seemingly infinite tapestry of rich detail revealed by Hubble shows a churning turbulent star factory set within a maelstrom of flowing, luminescent gas.**

helping us answer one of the biggest questions in science: are we alone?" Dr. Anne Kinney, director of NASA's Origins Program at NASA Headquarters, Washington, D.C., said. "Understanding planet formation gets us a step closer to that goal — something we hope to answer with the Terrestrial Planet Finder, a large space-based telescope we're planning for the next decade."

The Hubble Space Telescope is a project of international cooperation between NASA and the European Space Agency.

## Stennis receives two proposals for SBIR Phase II contracts

NASA has selected 27 research proposals for Phase II contract awards as part of its Small Business Innovation Research (SBIR) Program. The combined total of the awards is expected to be more than \$16 million. These awards are in addition to the initial 110 selected for the SBIR 1999 Program in September.

Phase II continues development of the most promising Phase I projects. Selection criteria include technical merit and innovation, Phase I results, value to NASA, commercial potential and company capabilities.

The goals of the SBIR are to stimulate technological innovation, increase the use of small business — including women-owned and disadvantaged firms — in meeting federal research and development needs, and increase private sector commercialization of federally funded research.

See **SBIR**, Page 6



NASA's Mary Byrd, left, and daughter, Jessica, try their hands at guiding Flash the Robot as part of the ninth annual National Take Our Daughters to Work Day program sponsored by the Stennis Sitewide Federal Women's Program. Girls from south Mississippi and Louisiana visited Stennis Space Center April 26. Activities included demonstrations of Flash, the 2000 FIRST Robotics regional winning robot, and Flashback, the team's 2001 entry, a College Career Fair and a tour of Stennis facilities. Approximately 300 girls representing the site agencies and contractors attended the days' activities.

## IMAGER . . .

(Continued from Page 1)

ATMC received a dual-use license for commercialization of the portable video imager. The imager is a portable remote sensing device that is mounted on aircraft for field surveys and data acquisition. The imager was initially designed for early detection of the chlorophyll loss which usually accompanies plant stress caused by factors such as insufficient nutrients, inadequate watering, disease or insect infestation.

For this new application, the imager was used to detect raw sewage leaking into the environment near Mobile Bay. The Environmental Protection Agency's (EPA) Gulf of Mexico Program, which targets areas in the five Gulf Coast states to improve the environmental health of the Gulf, sees the potential of the project in the protection of human health. "This project shows how small efforts benefit the larger picture," Bryon Griffith, Gulf of Mexico Program deputy director at Stennis Space Center, said.

The data from this project was then provided to the Mobile County Health Department for evaluation. Preliminary results indicated that the technology may be



NASA's Bruce Spiering demonstrates the portable video imager during a technology commercialization briefing at Stennis. Spiering and NASA's Dr. Greg Carter first devel-

useful in detecting sewage system problems and in documenting chronic public sewer overflows.

According to Clarence Erdman, director of Environmental Health Services for the Mobile County Health Department, data collected from the flight enabled public officials to better utilize limited manpower resources. Continued development of the technology may address public health and water quality issues.

Dr. Greg Carter and Bruce Spiering, the NASA researchers at Stennis who first developed the imager, said the technology holds possibilities for a broad range of uses

"from field crops to pine plantations and environmental monitoring."

"This is the first dual-use project for Stennis Space Center," said Kirk Sharp, NASA's Technology Transfer manager at Stennis. "Leveraging dollars from the partnership and assuring commercial use of our technology is the essence of NASA's Commercial Technology Program. Bringing businesses in up front is why dual-use projects can succeed."

The project was a collaborative effort in the commercial development of NASA technology among NASA, ATMC, EPA and the Mobile County Health Department.

## E-Complex upgrades anticipate customer's future testing needs

Design efforts for nearly \$42 million in upgrades to the E-Complex facilities at Stennis Space Center are nearly complete. According to NASA's Boyce Mix, director of the Propulsion Test Directorate at Stennis, the upgrades will improve the center's ability to meet customer needs more efficiently.

"Our customer base is growing," Mix said. "With the development of lower cost systems using various fuels, component development and hybrid technology, the demand — from both governmental and commercial customers — calls for added capabilities at all E-Complex Test Facilities.

"The upgrades are required to continue

programs using liquid hydrogen and oxygen, as well as to accommodate the interest in the use of hydrocarbons and hydrogen peroxide. Additional infrastructure enhancements and test position expansion will allow for longer duration tests and higher thrust capabilities."

NASA's David Liberto, project manager in the Propulsion Test Directorate at Stennis, said the scope of the project includes additional pressure vessels, vessel foundations, ducting and pressurization components, and supporting infrastructure. Also included are new propellant storage facilities, pressurant gas vessels, flare stacks, de-ionized water systems and

increased purge (helium and nitrogen) systems to enhance operational efficiency and test turn-around time.

"Instrumentation and controls for the facility systems are included as well as design, special studies and field investigations," Liberto said. "Completion of the upgrades in 2003 will move the E-Complex Test Facilities at Stennis into an arena of its own in terms of advanced technology and capabilities."

Initial implementation of upgrades at E-2 Cell 1 and E-3 is scheduled to begin this summer. Upgrades to E-2 Cell 2 are scheduled to begin in fiscal year 2002 with upgrades to E-1 beginning in fiscal year



**Stennis' Center Operations and Support Directorate coordinated a disaster exercise April 11 at the E-Complex to evaluate staff performance in mitigating an emergency situation at the complex and test stand. Personnel participating in the planning of the exercise included, from left, NASA's Mike Rewis, Glenn Liebig, Bartt Hebert and Clyde Dease, and Mississippi Space Services' Paul Byrd, Ted Clark and Wendy McQueen.**

### Disaster drill conducted at E-Complex

The scenario was set. Smoke began to fill the high bay area of Building 4010. At approximately 10:20 a.m., April 11, the repetitive sound of an alarm broke the daily routine at the E-Complex. Engineers, technicians and staff began executing evacuation procedures.

During the evacuation of the test control center, another alarm sounded indicating a break in a hydraulic line on level three of the E-1 test stand. The stand had a test article in place with propellant on board. Simultaneously, word came that one technician on the stand, exposed to hydraulic fluid from the ruptured line, was injured and on the ground. Another technician was missing. It

was unknown if fire had broken out on the stand. What to do?

NASA Fire Protection and Emergency Services Manager Clyde Dease, serving as the on-scene commander for the disaster simulation, along with other NASA and Mississippi Space Services safety and emergency personnel, observed and evaluated the response procedures of both the E-Complex staff and Stennis medical and fire teams.

"It was a tremendous effort by all participants to develop and implement an exercise that will serve as a catalyst to improve both the margin of safety and the ability to respond during an actual emergency," Dease said.



**Firefighters Warren Fandal, left, and Joe Bourgeois, right, assist designated drill victim, Lockheed Martin's Gregg Conn, center, onto a litter for transport.**



**NASA electrical engineers, from left, Melissa Huggins and Amy Rice, respond to emergency alarms by accounting for personnel at the badge exchange.**

## Tremendous crowd 'feels the power' of a SSME public test firing

NASA officials were both pleased and surprised with the tremendous public interest and attendance for the first-ever evening public engine test of a Space Shuttle Main Engine at Stennis Space Center Saturday, April 21.

"The incredible number of visitors that turned out for the evening test further affirmed the public's desire to be a part of the space program," said NASA Public Affairs Officer Myron Webb.

"We are disappointed we were unable to accommodate everyone due to the overwhelming response. Plans are already under way and preparations are being made to better accommodate large crowds and ensure an enjoyable experience for all who attend future public engine tests."



The crowd enthusiastically enjoyed presentations and rocket demonstrations by Visitor Relations Specialists from StenniSphere as they waited for the first evening public engine test.

Above, NASA astronaut Daniel Tani spoke to the large audience at the A-2 test stand viewing area and signed autographs. Tani told the crowd that it was a special treat for him to watch the testing of the engine that would later this year take him for his first ride in space.



Louisiana astronaut Jim Halsell recently visited Stennis Space Center. Touring the A-2 test stand and assessing the infrastructure are, from left, Space Shuttle Main Engine Project Manager Pat Mooney, ABE Operations Lead Stan Gill, Halsell, and Propulsion Test Directorate Operations Chief Robert Lightfoot.

## SBIR . . .

(Continued from Page 4)

Stennis Space Center received two of the 27 proposals submitted by small, high technology businesses from across the country. The selected firms will be awarded contracts valued up to \$600,000 each for a two-year performance period.

Firms to negotiate projects with Stennis include: Intelligent Optical Systems, Inc., Torrance, Calif., for the Multipoint Fiber Optic Sensor for Cryogenic Fuel Leak Detection, and Genex Technologies, Inc., Kensington, Md., for A Novel Volumetric 3D Display for Satellite Data Visualization.

For more information, visit Stennis Space Center's Technology Transfer Office Web site at [http://technology.ssc.nasa.gov/act\\_sbi\\_research\\_program.html](http://technology.ssc.nasa.gov/act_sbi_research_program.html).

# Stennis program assists tribal school systems at conference

NASA's Office of Education at Stennis Space Center provided technical demonstrations at the annual Access Native America Technology Conference April 24-26 hosted by the Mississippi Band of Choctaw Indians Tribal Schools in partnership with the Bureau of Indian Affairs Office of Indian Education.

Dr. David Powe, manager of the NASA Office of Education at Stennis Space Center, served as the keynote speaker. An estimated 100 tribal school systems were represented at this three-day event. Educators from Native American Indian schools throughout the United States attended the conference focusing on technology in education.

According to NASA's Nancy Sullivan, special projects for the Office of Education at Stennis, the education office works closely with the Choctaw Tribal School system to support these technology efforts and recently provided support to launch an Interactive Video Network Classroom connecting to Mississippi ETV Interactive Video Network. Collaborative efforts between NASA's Office of Education at Stennis and the Mississippi Band of Choctaw Indians have included NASA-sponsored assistance through the Computers to Schools Program and the opening of a NASA Educator Resource Center. Collaborations have also included the Choctaw Tribal School system's participation in the GLOBE program, assistance with the mapping of The Trail of Tears, and the signing of the Space Act Agreement.

The Space Act Agreement provided opportunities for NASA education activities with the Mississippi Choctaw Education System, the Mississippi Band of Choctaw Indians, and Earth science and remote sensing programs.



More than 330 Stennis employees and guests enjoyed mounds of hot crawfish, corn on the cob, potatoes, hamburgers and live music served up by volunteers such as, from left, NASA's Brad Messer and Ryan Roberts at the NASA Exchange Crawfish Boil April 20 at the Cypress House pavilion.

## Mississippi Space Services appoints Kirt Bush FOSC project manager at Stennis

The Mississippi Space Services (MSS) Board of Directors recently announced the appointment of Kirt Bush as project manager of the Facility Operations Services Contract at Stennis Space Center. Bush, who has served as the business manager of MSS since August 1999, supporting the phase-in and start-up of operations on the contract, follows Leo Ponder who announced his retirement in March. Bush's appointment will become effective Aug. 4.



Kirt Bush

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"I am looking forward to my new assignment and the opportunity to continue our commitment to NASA and the Stennis resident agencies. I want to thank all Team MSS employees for their support and the MSS Board of Directors for the confidence they have shown in my abilities."

Bush joined MSS's parent company, Computer Sciences Corporation (CSC), in 1979 and has supported projects at various Navy and Marine installations throughout the world. In 1994, he transferred to NASA's Wallops Flight Facility, Wallops Island, Va., as the resident chief engineer, working on projects supporting manned and unmanned missions.



The Environmental Protection Agency's Energy Star Label for Buildings — the Mark of Excellence in Energy Performance — was recently presented to Stennis Space Center. Building 1020, the former administration facility for the Commander, Naval Meteorology and Oceanography Command (CNMOC), was selected to receive the prestigious award by demonstrating energy performance in the top 25 percent of the office buildings market while maintaining indoor environment requirements for air quality, thermal comfort and lighting performance. Receiving the award, from left, are CNMOC's Technical/Deputy Director Dr. Donald Durham, Rear Adm. Thomas Q. Donaldson V, CNMOC commander, and Stennis Acting Director Mark Craig.

**Safety  
Corner**

# Will carpal tunnel syndrome just go away?

Will carpal tunnel syndrome just go away? Maybe time does heal some wounds.

Italian researchers studied 354 patients with carpal tunnel syndrome referred to surgeons. Over the course of about a year, more than 200 of the study patients were left untreated, only sporadically using anti-inflammatory medication for pain relief.

By the end of the study, patients' reports and tests of nerve function in the wrist showed that 34 percent had improved; 21 percent had worsened.



Findings were presented at the annual meeting of the American Academy of Orthopedic Surgeons.

Younger patients have a better chance of improving without therapy, according to researchers.

Also, having carpal tunnel syndrome in only one hand boosted the odds of improvement, according to the study.

Patients with two injured limbs were 70 percent less likely to see their symptoms decrease.

## QUICK LOOK

■ **Old Timers' Day** is set for May 18 at the Cypress House pavilion beginning at 4 p.m. Hot dogs, hamburgers and beverages will be served. There is no charge for retirees and their spouse or guest. Current employees at Stennis may also attend Old Timers' Day for a charge of \$2 to cover food and beverages. This year's event is sponsored by NASA, Mississippi Space Services and the Stennis Space Center Recreation Association. For more information, contact Jeanne Kellar at (228) 688-3043.

■ **Safety Day activities** at Stennis are scheduled for June 28. The day is aimed at encouraging safe working habits. The events begin at 9 a.m. in the Gainesville Room in Building 1100. For details, contact Brian Hey at Ext. 1249.

■ **The Annual NASA Shrimp Boil** is scheduled Friday, June 22 at the Cypress House pavilion. The event is open to NASA employees, family, retirees and guests. For more information, contact the NASA Exchange at Ext. 7764.

## NEW SSME . . .

(Continued from Page 1)

Previous improvements to the Space Shuttle Main Engine include the Block I configuration, which featured an improved high-pressure liquid oxygen turbopump, two-duct engine power head and single-coil heat exchanger. The turbopump incorporated ball bearings of silicon nitride — a ceramic material 30 percent harder and 40 percent lighter than steel. The Block I engine first flew in 1995.

The Block IIA engine added a larger throat main-combustion chamber to Block I improvements. The new chamber lowered the engine's operating pressures and temperatures while increasing the engine's operational safety margin. This engine first flew in 1998.

The engines perform at greater temperature extremes than any mechanical system in common use today. At minus 423 degrees Fahrenheit (minus 217 degrees Celsius), the liquid hydrogen fuel is the second coldest liquid on Earth. When it and the liquid oxygen are combusted, the temperature in the main combustion chamber of the engine is 6,000 degrees Fahrenheit (3,316 degrees Celsius), hotter than the boiling point of iron.

Boeing Rocketdyne, Canoga Park, Calif., manufactures the Space Shuttle Main Engine and performs acceptance testing at Stennis Space Center.

## LAGNIAPPE

*Lagniappe* is published monthly by the John C. Stennis Space Center, National Aeronautics and Space Administration. Mark Craig is the acting director, Myron Webb is the public affairs officer, and Lane Cooksey is the news chief. Comments and suggestions should be forwarded to the Lagniappe Office, Building 1200, Room 208D, Stennis Space Center, MS 39529, or call (228) 688-3585.

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National Aeronautics and  
Space Administration

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