

John. C. Stennis Space Center



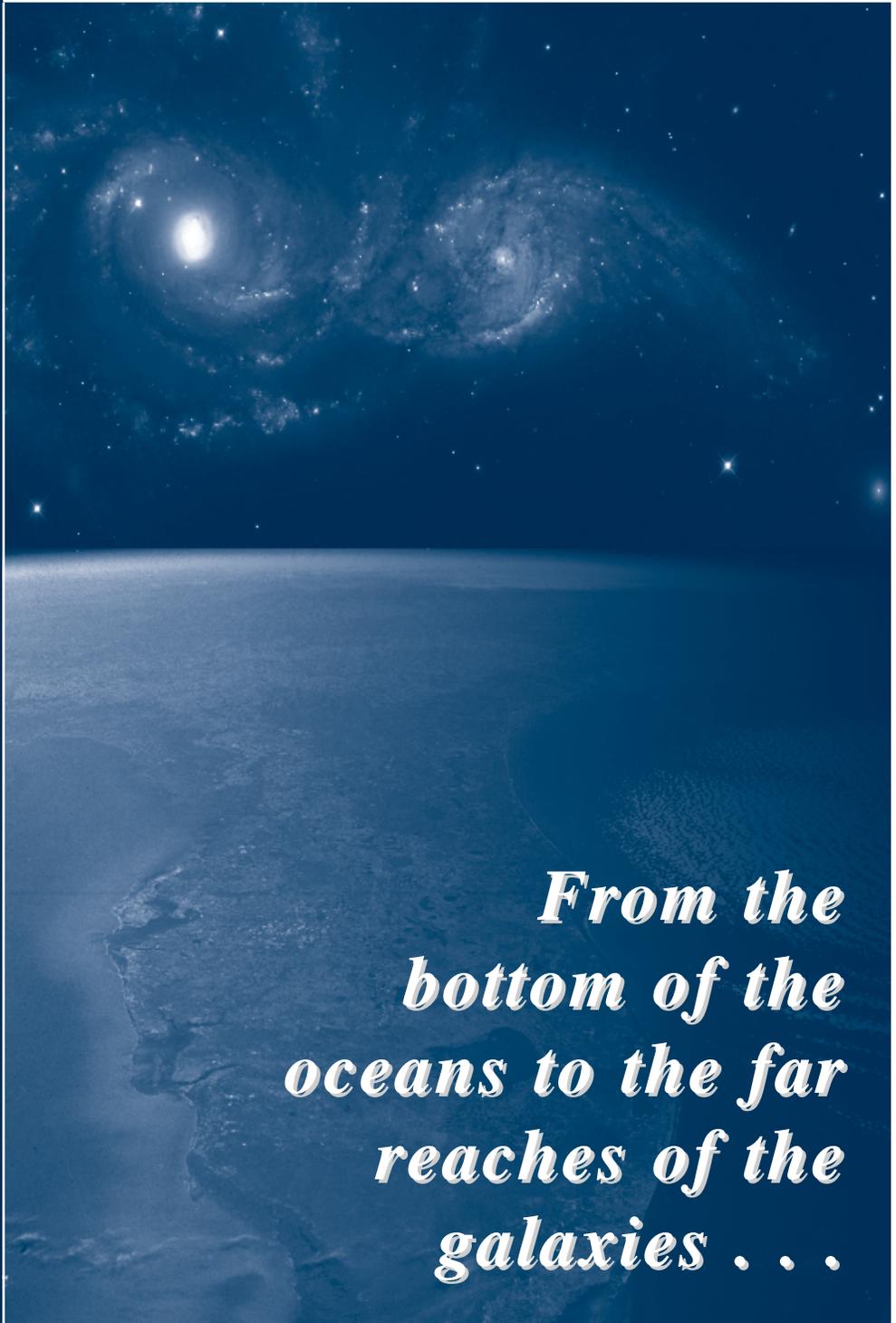
# ASIS

O C E A N   A I R   S P A C E   I N D U S T R Y   S I T E

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Spring 2004



*From the  
bottom of the  
oceans to the far  
reaches of the  
galaxies . . .*

## Inside

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From the

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# irector's esk

**STENNIS SPACE  
CENTER DIRECTOR**

Adm. Thomas  
Q. Donaldson V  
USN (Ret.)



“Change” is another way to spell “improve” – with one less letter. NASA and Stennis Space Center (SSC) are experiencing many changes as we seek to implement The Vision for Space Exploration – to return the Shuttle to flight, to return humans to the Moon and eventually on to Mars.

The newsletter you’re now reading has undergone some obvious changes. In addition to becoming a quarterly publication, the name has been changed from Lagniappe to OASIS to better reflect the uniqueness of SSC.

Although we will continue to capture the focus of Lagniappe, more information on all activities at SSC will be available in the “Around Our World” section on Pages 6 and 7. OASIS captures the spectrum of potential at our center – from the bottom of the oceans to the far reaches of the galaxies. However, the goal of “a little something extra” will continue to live on.

SSC is known for rocket propulsion testing and Earth Science Applications research, but we’re much more than that. This is a unique Federal and Commercial City with more than 30 federal agencies and 60 technology-based companies.

There is a skill-set that flourishes at SSC, and it doesn’t reside in just one organization – it’s a leveraging off similar agencies working with, and benefiting from, each other.

It is because of this synergy that we are including information on activities of other agencies at SSC in the OASIS. We are not abandoning our NASA image, we are building on it to include the many varied and capable agencies and activities found here.

Other prospective changes do specifically relate to NASA. As I mentioned, we are undergoing many changes in our efforts to Return to Flight, complete our international commitments to the International Space Station and attain the vision of returning to the Moon, Mars and beyond. SSC will certainly notice some of those changes, but we must continue to stay focused, work smart and work safe as a vital part of these endeavors.

I’m certain more changes lie ahead for SSC and for NASA. I am confident that with the talented, capable workforce at our center, we will exceed all the challenges in our future.

## On the cover

The cover illustration is a combination of two NASA photographs: an astronaut’s photo of the Gulf Stream and continental shelf waters off the coast of Florida, and a Hubble telescope image of massive galaxy NGC 2207 (on the left in the Hubble image) and the smaller IC 2163 galaxy. Strong tidal forces from NGC 2207 have distorted the shape of IC 2163, flinging out stars and gas into long streamers stretching out a hundred thousand light-years toward the right-hand edge of the image.

# SSC assisting with Return to Flight efforts

Engineers with NASA Stennis Space Center’s (SSC) Propulsion Test Directorate are modifying three test stands in anticipation of Space Shuttle flow liner testing scheduled to begin early this summer. The tests are part of the effort to return the Space Shuttle safely to flight.

Flow liners, in the Space Shuttle’s main propulsion system fuel feed lines, protect flexible joints from the liquid hydrogen fuel as it feeds toward the Space Shuttle Main Engine (SSME) turbopumps. Small cracks have been found in the flow liners inside the hydrogen fuel lines aboard all NASA’s orbiters – Atlantis, Discovery and Endeavour.

The cracks were first found in June 2002, resulting in concern that a piece of flow liner material may work free and enter the SSME’s turbopumps, causing potential for a premature engine shutdown in flight. After extensive testing and analysis, the existing cracks on the orbiters’ flow liners were repaired by welding.

SSC is modifying the A-1 Test Stand and the E-1 Cell 2 Test Position to accommodate test articles that will be used to gather data while simulating the actual flight environment. The fuel duct on the A-2 Test Stand is also being modified to support fuel flow characterization efforts.

The A-2 stand currently supports SSME testing and certification for flight. The A-1 was used for testing SSMEs until last summer, when refurbishment of A-2 was completed and all SSME test activities were transferred there.

In December 2003 the Space Shuttle Program Office engaged the Rocket Propulsion Test (RPT) Program Office at SSC to assist in determining the most suitable test location to conduct the proposed flow liner testing. The RPT Program Office evaluated existing NASA, Department of Defense and commercial rocket propulsion test facilities in order to make this determination. The RPT Program Office’s selection was based on the facility’s capability and readiness along with the experience of the test crews. The SSC A-1 and E-1 stands were

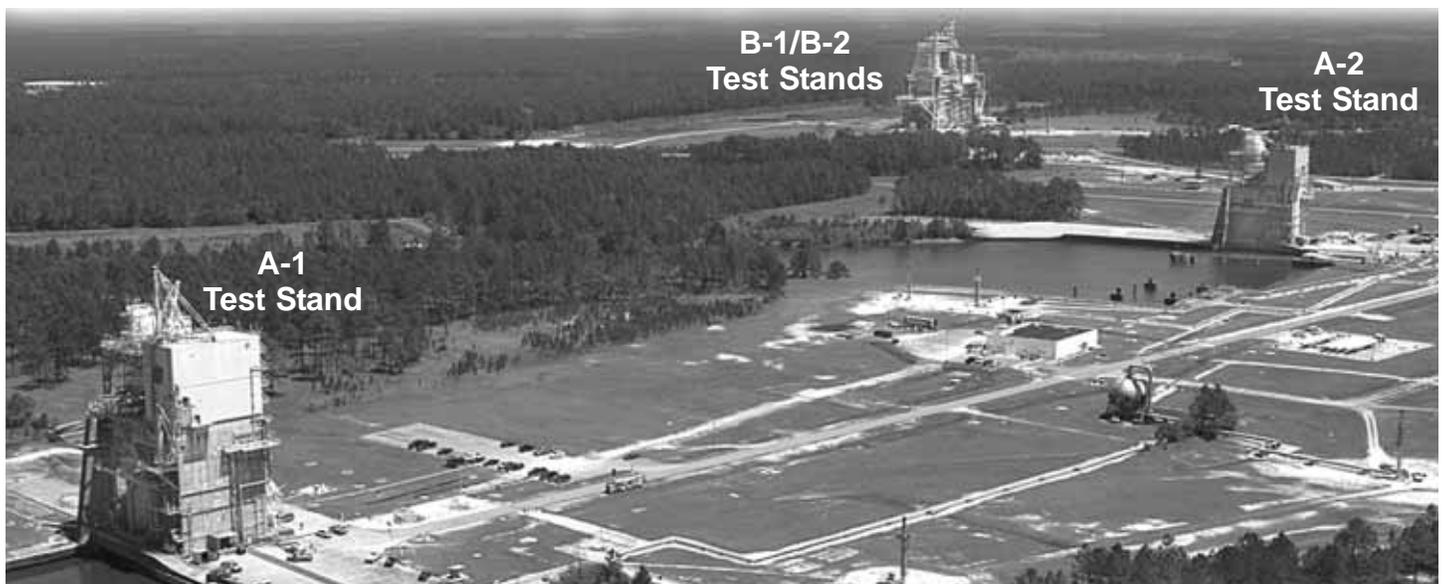


Mississippi Space Services welders Jerry Holland (left) and Jeremy Saucier weld additional instrumentation ports to the liquid oxygen piping that feeds into the Space Shuttle Main Engine. The ports will be used to obtain high-frequency dynamic-pressure data from inside the duct during Space Shuttle flow liner testing.

chosen as the appropriate locations to conduct this important Return to Flight test activity.

SSC engineers and technicians from NASA, the Rocketdyne Propulsion and Power unit of The Boeing Co., Mississippi Space Services and Lockheed Martin Space Operations have been designing, modifying, repairing, fabricating and installing complex test systems in support of A-1 and E-1 Cell 2 activation. The flow liner test articles are being designed at Marshall Space Flight Center in Huntsville, Ala., and at The Boeing Co.’s Huntington Beach Facility in California.

“Our purpose is to provide the data that will be used to assess and define the characteristics of the Space Shuttle fuel system flow liners in order to clear the Space Shuttle for safe flight,” said Ronnie Rigney, deputy project manager of the SSME Project Office at SSC. “We have an excellent team of people working hard to ready our facilities for this important task.”



# SSC increases ability to test kerosene engines



Above, technicians at the E-1 Test Stand lift a tank into position that will enable engineers to test RP-1 (kerosene-fueled) test articles. At right, the workers ready the tank for positioning. The 100-ton, high-pressure run tank will supply the RP-1 used for preburner and thrust chamber testing. The tank installation was one of the final tasks in completing a major steel modification to the test stand.

NASA Stennis Space Center (SSC) has significantly increased its capability to test RP-1 (kerosene-fueled) test articles. Engineers recently accomplished a test-complex milestone with the installation of high-pressure, small- and large-volume RP-1 run systems.

The enhancements enable SSC to perform liquid oxygen/RP-1 testing for NASA's advanced technology programs, which will seek to develop and demonstrate technologies needed for safe, routine and cost-effective access to space in the future.

Kerosene-fueled engines, such as the F-1 engine that propelled the Saturn V launch vehicle of the Apollo lunar program, have

greater thrust capability than current hydrogen-fueled engines. The F-1 achieved 1.5 million pounds of thrust.

The RP-1 systems were installed at SSC's E Test Complex, a versatile, three-stand facility (E-1, E-2 and E-3) that includes seven separate test cells capable of testing that involves ultra high-pressure gases and high-pressure, cryogenic (super-cold) fluids. Both a high-pressure RP-1 tank for preburner and thrust chamber testing, and a low-pressure RP-1 tank for pump testing were installed as recently as March.

SSC's E Complex is poised to test engines of the future with a commitment to systems and facility improvement. Engineers are taking full advantage of three decades of technological advances in design and analysis, experimental techniques, ground testing and system engineering methods.

Established in the 1960s as a national test center for flight-certifying all first and second stages of the Saturn V "Moon Rocket" for the Apollo lunar landing program, SSC now tests and certifies the flight-worthiness of all Space Shuttle Main Engines and Boeing's RS-68 engines.

SSC is also the home of NASA's Rocket Propulsion Test (RPT) Program Office, which coordinates the utilization of rocket propulsion test facilities in support of NASA, the Department of Defense and commercial partners, through the Rocket Propulsion Test Management Board (RPTMB) and the National Rocket Propulsion Test Alliance (NRPTA).



## New codes aid The Vision for Space Exploration

In January, President Bush unveiled a powerful exploration vision for NASA. In the months since the formulation of The Vision for Space Exploration, NASA has been busy establishing two new program offices, known as Code T and Code O.

The Office of Exploration Systems (Code T), led by Associate Administrator Craig E. Steidle, was established to

set priorities for achieving the exploration goals in human and robotic technology and transportation systems for The Vision for Space Exploration.

Code T will provide the focus and direction of future exploration technologies by applying strategy-to-task analytical processes involving an



AA Craig Steidle  
Office of Exploration Systems  
(Code T)

integrated team of users and developers.

"The only way we're going to do this, is if we do it together," Steidle said.

According to Steidle, "We're going to do business differently" to meet the goals of The Vision for

Space Exploration. The new codes will "enable NASA to do in the future, what it has so successfully done in the past."

The Office of Institutional and Corporate Management (Code O), under the leadership of Assistant Administrator Jeff Sutton, provides leadership, technical expertise, policy making and management



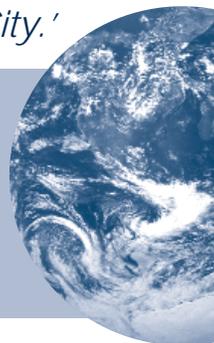
AA Jeff Sutton  
Office of Institutional and  
Corporate Management  
(Code O)

for agencywide systems; and shared services management in support of NASA's mission.

The office will provide leadership for all NASA's business and technical shared services, and will offer leadership, management and coordination of institutional service functions at NASA Headquarters, including program management budget formulation; facilities,

administrative services, logistics, transportation and safety; information resources management and communications; printing, graphics and information services; and human resources management, including Headquarters training and equal opportunity and diversity management.

OASIS presents *Around Our World*, a new feature highlighting the agencies that make Stennis Space Center a 'unique Federal and Commercial City.'



**Only at SSC can you find the following in one location:**

- Unmanned, undersea vehicles built to go to the bottom of the oceans, and Space Shuttle Main Engines tested to carry precious cargo into space
- Navy SEALs on the Pearl River and satellites built by Lockheed Martin – think of it in terms of 'true-grit to no-grit'
- Ten federal and state marine, coastal and ocean-related organizations co-located and collaborating
- Sea floor-to-space data collection sensors and 3-D visualization capabilities to display the data

**AGENCIES AT SSC:**

**NASA - National Aeronautics and Space Administration**

**Department of Defense**

- Commander, Naval Meteorology and Oceanography Command
- Naval Oceanographic Office
- Naval Research Laboratory Detachment
- Naval Small Craft Instruction and Technical Training School
- Special Boat Team 22, U.S. Navy
- Navy Human Resources Service Center Southeast
- Mississippi Army Ammunition Plant Industrial Complex
- Defense Contract Management Agency

**Department of Commerce**

- National Data Buoy Center, National Weather Service
- NOAA National Marine Fisheries Service
- National Coastal Data Development Center

**Department of Transportation**

- U.S. Coast Guard, National Data Buoy Center

**Department of Interior**

- United States Geological Survey (USGS) Water Resources Division
- USGS Geomagnetism Center

**Environmental Protection Agency**

- Environmental Chemistry Laboratory
- Gulf of Mexico Program

**State of Mississippi**

- Mississippi Enterprise for Technology
- Enterprise for Innovative Geospatial Solutions

**State of Louisiana**

- Louisiana Technology Transfer Office, Louisiana Business & Technology Center

**Mississippi Enterprise for Technology**

- Stennis Technology Enterprise Center
- Institute for Technology Development

**UNIVERSITIES & COLLEGES:**

- Mississippi State University
- Pearl River Community College
- University of New Orleans
- University of Southern Mississippi (USM)
- University of Mississippi

**USM College of Science and Technology**

- Dept. of Marine Sciences

**COMMERCIAL PARTNERS:**

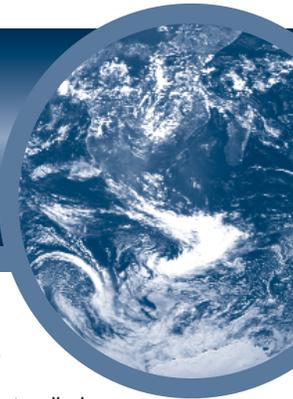
- Lockheed Martin Mississippi Space and Technology Center
- The Boeing Company

**MAJOR CONTRACTORS:**

- The Boeing Company
- Lockheed Martin Space Operations, Stennis Programs
- Lockheed Martin Information Technology
- Mason Technologies
- Mississippi Space Services
- Paragon Systems Inc.
- Science Applications International Corp.
- Pratt & Whitney



# AROUND



## Naval Oceanographic Office

The Naval Oceanographic Office (NAVOCEANO)/Department of Defense (DoD) Major Shared Resource Center (MSRC) at Stennis Space Center (SSC) was recently selected to receive new super-computer systems that will triple the computing capability of the center and secure its place as one of the most capable high-performance computing centers in the world. The new systems, some of the largest ever built by IBM, will increase computing capability to approximately 30 trillion operations per second by the end of June.



The 30 trillion operations this Navy/DoD supercomputer can accomplish in just one second would take a typical human being 1.2 million years to accomplish. That is a lot of power, but almost normal when compared to the enormous amounts of data processed each day at the center by more than 4,000 users.

The high-performance capabilities of the supercomputer provide NAVOCEANO with the ability to perform global-scale modeling and simulation to carry out its mission to maximize America's sea power and support the Naval Fleet.

As the center maintains day-to-day operations that support the warfighter, product turnaround to the fleet is time-critical.

The center's capabilities are available 24 hours a day. This helps the NAVOCEANO/DoD MSRC maintain a 99.6 percent capability at any given time – the highest availability within the DoD MSRC program.



A Naval Oceanographic Office (NAVOCEANO) hydrographic survey launch deploys from the USNS Henson. The Henson and the 12 NAVOCEANO surveyors aboard are currently collecting hydrographic data in the western Atlantic to support safety of navigation charts for fleet operations.

The MSRC's focus includes Navy operations and DoD-wide research and development programs. NAVOCEANO and other Navy commands use 15 percent of the MSRC capacity while DoD, industry and academia from around the world utilize the rest.

The expansion will also benefit Mississippi and Louisiana, putting a global

spotlight on the expanding technology and scientific opportunities at SSC and the Gulf Coast.

NAVOCEANO supplies oceanographic knowledge to all elements of the DoD by conducting ocean surveys, analyzing oceanographic data and generating products to meet safe navigation and weapon/sensor performance needs using a variety of platforms that include ships, aircraft and satellite sensors and buoys.

For more information on the Naval Oceanographic Office, visit [www.navo.navy.mil](http://www.navo.navy.mil).

## National Data Buoy Center

A partnership between the National Data Buoy Center and operators of nonfederal weather stations is providing "one-stop shopping" for forecasters and the maritime public.



Previously, weather forecasters and the maritime public had to visit dozens of different Web sites to see data gathered by stations supported at marine and coastal weather stations maintained to support the needs of state agencies, oceanographic researchers and industry. But before 2002, their measurements did not appear on well-known Web sites, such as that of the National Data Buoy Center, a part of the National Oceanographic and Atmospheric Administration (NOAA).

In 2002, the buoy center began working with these nonfederal entities to integrate their marine observations with those made from federally supported sites. The buoy center receives the observations, checks them for quality, distributes them in near real time into the Weather Service communications stream and onto NOAA Web sites, and archives them.

National Weather Service forecasters appreciate this partnership because additional marine observations appear directly on their computer weather maps. The Weather Channel and local TV meteorologists like it because it provides additional data to produce on-air graphics.

Boaters benefit because they can easily find all the observations. Mariners who are away from the Web can get the observations via telephone by calling the Dial-A-Buoy system. The nonfederal data providers benefit because their observations are quality controlled by the buoy center. They also gain greater visibility because of wider distribution of their observations.

Information from nonfederal stations now makes up more than 13 percent of all observations distributed by the buoy center. It operates approximately 150 stations in U.S. waters, and some 50 additional nonfederal partner stations provide data from moored buoys, beaches, piers and lighthouses and drifting surface buoys. For more information, contact Dave Gilhousen, National Data Buoy Center, at (228) 688-2840, Dial-A-Buoy at (228) 688-1948, or visit [www.ndbc.noaa.gov](http://www.ndbc.noaa.gov).

# OUR WORLD

## GeoResources Institute

Mississippi State University's (MSU) GeoResources Institute (GRI) has expanded its operations at Stennis Space Center (SSC). Already recognized as a major center for research in "middleware" development for oceanography and meteorology, the GRI-Stennis operation also provides software engineering, computer modeling and applications development services in natural resource management, air and water quality, remote sensing, visualization of large data sets and other disciplines relating to geospatial and computer sciences.



Through coordinated efforts with the MSU main campus faculty, national agency assets available at SSC, commercial companies and other educational institutions in Mississippi and elsewhere, GRI-Stennis has access to a wide range of expertise and experience, performing research and development programs in biological and physical sciences; environmental issue management; space sciences; geospatial system verification and validation; and computer modeling of physical and biological phenomena.

The GeoResources Institute at MSU has provided technical, educational and business-building resources for advanced geospatial technologies as a NASA Earth Science Applications Directorate partner since its inception in 1999. The GRI-Stennis group also provides a "window into MSU" for coastal organizations looking for such assistance. Dr. Jon Arvik has been named director of the SSC unit, following his service as chief technologist and director of Commercial Development for the Remote Sensing Technologies Center at MSU. Arvik is a member of the management team of the campus GRI.

Based in the National Science Foundation's Engineering Research Center at MSU, the GRI campus organization includes the Remote Sensing Technologies Center, Mississippi's Water Resources Research Institute, the Computational Geospatial Technologies Center and the Visualization, Analysis and Imaging laboratory. These organizations, along with the professional capabilities of GRI-Stennis, provide a concentrated level of expertise not available elsewhere in the geospatial sciences.

For more information, see [www.gri.msstate.edu](http://www.gri.msstate.edu), or contact Dr. Arvik at (228) 688-1103.

## Gulf of Mexico Program

Twenty-five years ago, The Nature Conservancy and the state of Mississippi partnered to protect 35,000 acres along the Pascagoula River's 81-mile corridor. The results



of a different kind of partnership dealing with the river were recently unveiled as the premiere of "The Singing River, Rhythms of Nature" documentary that was shown at Pelican Landing in Pascagoula. The U.S. Environmental Protection Agency Gulf of Mexico Program was one of the partners in producing the film, which was born out of the vision of The Nature Conservancy of Mississippi to increase public awareness about the Pascagoula River.

The documentary was filmed over a two-year period and captures the spirit of the river's life, through rains, seasonal flooding and receding water levels. The beauty and ecological significance to the river is in its natural flowing waters. The Nature Conservancy's vision was supported by Chevron Texaco, the initial major funding partner for the documentary. Collins, Miss., native and actor Gerald McRaney narrates the film produced by Mississippi Public Broadcasting (MPB) in association with The Nature Conservancy. Major funding was provided by Chevron Texaco, EPA's Gulf of Mexico Program, Mississippi Department of Environmental Quality, Mississippi Department of Marine Resources, Mississippi Power Company and the Mississippi Secretary of State's Office. Additional support was provided by the Mississippi Museum of Natural Science Foundation and the U.S. Department of Agriculture Forest Service.

For information on future broadcasts of the documentary, visit [www.mpbonline.org](http://www.mpbonline.org).

## National Oceanic and Atmospheric Administration

The American Red Cross and the Gulf Coast Community Foundation will host "Coastal Mississippi: Plan, Prepare, Survive, Restore," an extreme weather fair, with events on May 12-13 and May 15-16. Other SSC organizations participating include the National Oceanic and Atmospheric Administration and NASA.

The two-week program includes exhibitors, awards for children's art program, a celebration for hurricane survivors, a health fair, safe boating and career day.

On May 12, there will be a children's art exhibition at The Depot in Bay St. Louis. A Career Day will be held at Hancock High School on May 13. The main event will take place May 15-16 at Stennis International Airport. The Xtreme Weather Fair attendees can see a NOAA P3 research aircraft, scheduled to arrive at the airport at 11 a.m. May 15. Emergency vehicles and other displays will be available for tours at the airport.

For more information, contact Michael Crane at (228) 688-1579 or [michael.crane@noaa.gov](mailto:michael.crane@noaa.gov).



# SSC had significant impact to area in past year

Recently released figures show NASA Stennis Space Center (SSC) had a significant economic impact on surrounding communities in fiscal year 2003.

In 2003, SSC had a direct global economic impact of \$755 million. The economic impact on areas within a 50-mile radius totaled \$533 million.

The annual report, prepared by Dr. Charles Campbell, professor of economics, Mississippi State University, estimated that area employment would have been reduced by 28,679 jobs if SSC had not been in operation during the last fiscal year. The estimate takes into account the direct and indirect effects within a 50-mile radius of the space center. The area includes Hancock, Harrison and Pearl River counties in Mississippi, and St. Tammany Parish in Louisiana.

The report also showed that, had SSC not been in operation in fiscal year 2003, personal income would have been reduced by more than \$1.006 billion. Retail sales would also have been reduced by more than \$402 million. The estimated tax revenue impact from the center on the local government income is \$109 million.

The residential distribution of the center's 4,524 employees for fiscal year 2003 is as follows: 1,197 lived in Pearl River County, Miss.; 961 lived in Hancock County, Miss.; 987 lived in St. Tammany Parish, La.; 833 lived in Harrison County, Miss.; 239 lived elsewhere in Louisiana; 202 lived elsewhere in Mississippi; and 105 lived in states other than Mississippi or Louisiana.

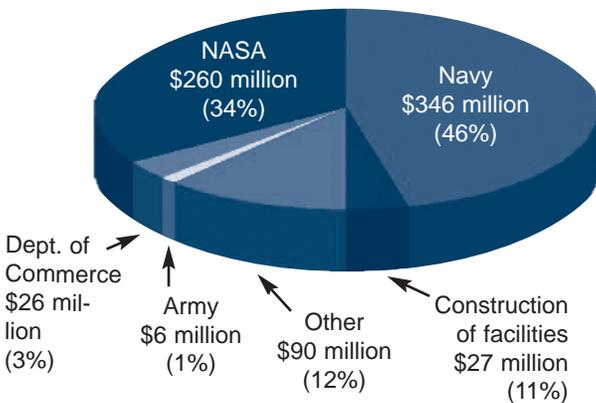
Among civil service employees at SSC, 6 percent held doctoral degrees; 15 percent held master's degrees; 30 percent held bachelor's degrees; 11 percent held associate's degrees; 16 percent have had some college; and 21 percent held high school diplomas. The average salary at SSC is \$76,000, including fringe benefits.

NASA gathers its yearly economic impact information and compiles it with economic information from the more than 30 other resident agencies and seven major contractors at SSC.

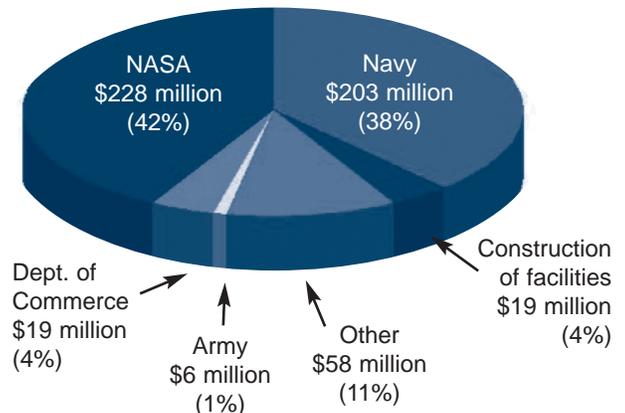
Each year, the information is provided to Campbell, who analyzes the information and provides an assessment of the center's total economic impact considering both direct and indirect factors on the local community.

**SSC added more than \$1 billion to personal income in 2003**

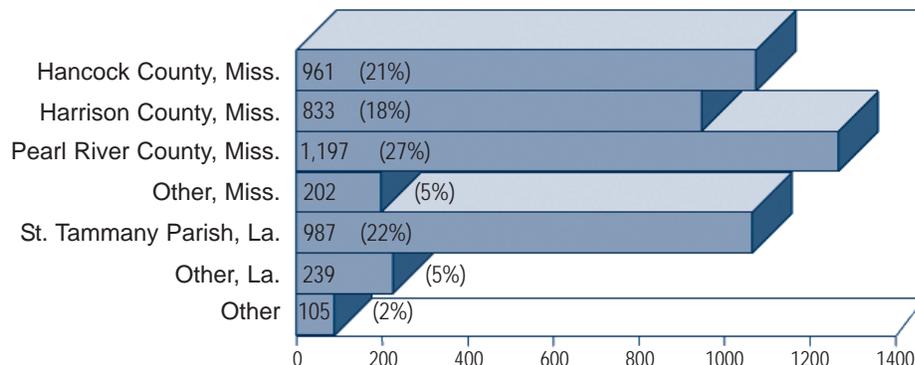
**Direct Global Economic Impact \$755 million**



**Direct Economic Impact 50-mile radius \$533 million**



**Residential Distribution of Personnel**



# NASA SSC propulsion test team wins prestigious space achievement award



The Integrated Powerhead Demonstrator Test Team at NASA Stennis Space Center

The Integrated Powerhead Demonstrator (IPD) Test Team at NASA Stennis Space Center (SSC) received a prestigious national award March 11 as recognition for a significant contribution to the U.S. space program.

IPD Project Manager Dr. Harry Ryan accepted a Stellar Award from the Rotary National Award for Space Achievement (RNASA) Foundation at its 18th annual National Space Trophy Dinner in Houston.

RNASA, established by the Space Center Rotary Club in 1985, selects team and individual winners based on accomplishments that hold the greatest promise for furthering activities in space. Nominations come from those who work in government and industry, members of professional organizations and individuals.

IPD component testing began at SSC in 1999 and recently completed two extensive turbopump testing projects at the E-1 Test Stand. The test series, completed in November 2003, was the culmination of a three-year effort of design, construction, activation and component test activities.

The IPD is a 250,000-pound thrust, liquid hydrogen-fueled engine, part of NASA's Next Generation Launch Technology program, which seeks to provide safe, dependable, cost-cutting technologies for future space launch systems. The IPD is designed not as a flight article, but as a way to acquire data through testing and to build technology for future engine design.

The IPD is also part of the Department of Defense's Integrated High Payoff Rocket Propulsion Technology program, which seeks to double the performance and capability of today's state-of-the-art rocket propulsion systems while decreasing costs associated with military and commercial access to space.

"It was a big project for us," said Ryan, who took over as project manager in June 2002. "It touched a lot of people, NASA and contractors alike. It was very much a joint effort between many, many parties, including the U.S. Air Force, Marshall Space Flight Center and The Boeing Company."

The component testing benefited both the E-1 test facility and the IPD program,

according to Ryan. "It tested the maximum capabilities of E-1," he said. "We gained a lot of experience and demonstrated that E-1 could do what it is designed to do. We acquired a lot of data that will lower the risk for the program and should reverberate through future designs. Lowering the risk is the whole point." Now that component testing is complete, SSC engineers are preparing for engine systems testing at E-1, scheduled to begin this fall. The engine is currently being assembled at SSC.

Ryan, meanwhile, is beaming with pride about the project and the team after returning from the black-tie dinner, which was attended by more than 500 people. It was also the occasion for Apollo 11 Astronaut Neil Armstrong to receive RNASA's top award, the 2004 National Space Trophy Award. It is presented annually to an individual who has excelled in furthering national goals in the field of space.

"I was just thrilled to be there," Ryan said. "It is a great honor, and I don't know how to describe the 200 percent personal satisfaction I feel."

## Stennis airborne sensor program completes final data mission

A set of multispectral sensors, designed and operated at NASA Stennis Space Center (SSC), recently flew its final mission in support of NASA's Earth Science Enterprise.

In March, the Airborne Terrestrial Applications Sensor (ATLAS) collected aerial data on Puerto Rico's El Yunque rain forest and measured heat above the island's cities. It was the final task for the sensors that have been a workhorse for studies of crop stress, urban heat islands and coastal erosion, among others. The sensors and their program will be retired by the end of April.

Today, the remote sensing community relies more heavily on modern image sources such as satellites.

In the four years leading up to its retirement, ATLAS and its Learjet 23 carrier have served as a good example of the One NASA effort. SSC's Earth Science Applications (ESA) Directorate and the Aircraft Operations Office at Glenn Research Center (GRC) in Ohio have collaborated to deliver ATLAS remote sensing data in support of NASA's Earth science mission.

"Glenn has housed and maintained the Learjet, which cuts our operating costs," said Katie Wallace, ESA's aircraft program manager. "And Glenn benefits because their pilots get to keep up their flight hours and proficiency."

NASA sensors have flown nearly 800 missions since 1980, including studying volcanoes on Russia's Kamchatka Peninsula; monitoring erosion in the Louisiana marsh; and identifying opium-producing poppy fields in Mexico and Colombia. Last year, ATLAS helped correct SSC's infrastructure maps, locating buried pipes 10 to 15 feet away from the locations shown on the 40-year-old engineering blueprints.

"It's a special system because you can fly it whenever you choose," said Lockheed Martin's Duane O'Neal. "You get low-altitude, high-resolution data. When you look at the same area in a satellite image, you have to take what you can get depending on the weather."

O'Neal, an aircraft equipment flight specialist, has operated ATLAS and other SSC sensors for 23 years.

The Learjet's team brought the plane and its cargo to SSC in April for one last flight and calibration test before removing and storing ATLAS. The Learjet will return to GRC, where it may continue to support NASA's scientific missions.

ATLAS' digital data will reside at SSC, and will continue to be available for the next few years to any researcher who requests it, Wallace said.



The SSC team responsible for maintaining and operating the ATLAS sensor consists of (from left) Duane O'Neal of Lockheed Martin Space Operations, Debbie Fendley of Datastar, Don Powell of LMSO and Katie Wallace of NASA's Earth Science Applications Directorate. Not pictured is sensor operator Phil Kuper, also of LMSO.

# Profile



## Duane O'Neal

**Aircraft equipment flight specialist**

**Current position:** Aircraft equipment flight specialist for Lockheed Martin Space Operations. For the past 23 years, I've been operating, maintaining and calibrating all airborne sensor systems flown aboard NASA's Learjet 23, including ATLAS. I also work in the lab, calibrating different sensors and test equipment, and doing electro-optical work. I'm past retirement age but just don't want to give in yet.

**Career history:** I started off in the Navy as a flight crew member on a P2V-7, a Lockheed Martin Neptune patrol bomber based in Brunswick, Maine. I spent six months in Iceland patrolling the north Atlantic right after Korea. Then, I was an F-111 tech rep for General Dynamics in Thailand during the Vietnam conflict. After that, I worked for General Instruments as an area manager back in Texas, then hired on with Lockheed Martin. I spent a year building and testing airborne remote sensing systems at Johnson Space Center. I started here at Stennis in 1981. I've flown airborne sensor missions all over the U.S., in Russia and Puerto Rico; I flew in Europe with the Ames Research Center folks. I've also flown missions in Hawaii and Australia. In all, I've flown between 700 and 800 missions.

**Hometown:** Overton, Texas; I now live in Bay St. Louis, Miss.

**Hobbies:** Playing bluegrass music on banjo (one I built myself) and guitar. My son and I maintain a small vineyard on our property. We like to make our own wine.

**Family:** Three sons – one next door, one in Maine, one in Colorado; a daughter in Missouri; and more grandkids than I can count.



SSC's 1963 Learjet Model 23 has carried the Airborne Terrestrial Applications Sensor (ATLAS) since 1993. ATLAS flew its final remote data collection mission in April.

# StenniSphere mosaic honors fallen astronauts

A luminescent Earth, Moon and Space Shuttle begin to take shape against a swirling star field of deep blue, as artist Elizabeth Veglia carefully selects the next colored tile fragment.

StenniSphere, the visitor center at NASA Stennis Space Center (SSC), commissioned Veglia, a renowned mosaic tile artist from Hancock County, Miss., to design and create a memorial mural in honor of America's fallen astronauts. The mural will be permanently displayed at StenniSphere.

Veglia's creation comes at a time when NASA – and the rest of America – reflects on its space heroes. Prior to Feb. 1, the first anniversary of the Space Shuttle Columbia tragedy, NASA Administrator Sean O'Keefe declared Jan. 29 as Remembrance Day for Columbia and the crews of Apollo 1 (Jan. 27, 1967) and Challenger (Jan. 28, 1986).

In the mosaic, the Moon, Space Shuttle, Earth and the heavens represent aspects of each mission honored in the work. Clusters of stars to the right of the nose of the Space Shuttle represent the astronauts aboard the missions: a cluster of three stars represents Apollo 1; two seven-star clusters represent Challenger and Columbia.

To mark the anniversaries, SSC and the public took part by placing tiles on the mural under the direction of the artist.



Renowned mosaic muralist Elizabeth Veglia of Hancock County, Miss., stands with the completed astronaut memorial mural that will be on permanent display in StenniSphere, the visitor center at SSC.

“We felt it was important to not only create a permanent memorial to America's fallen astronauts, but also to allow our employees, visitors and school-children to become part of the process as they remember Columbia and the other lost crews,” said Linda Theobald, NASA public affairs officer at SSC, who developed the idea for the mosaic.

On Remembrance Day, SSC Director Tom Q. Donaldson V, RDML USN

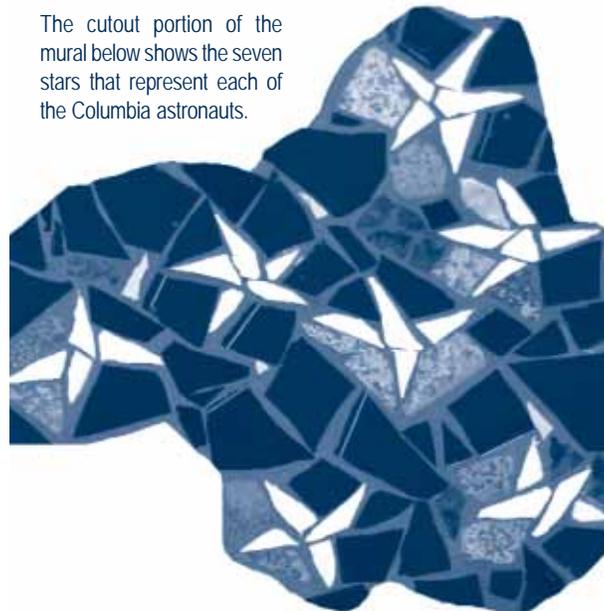
(Ret.), honored the work by laying the first tile.

“I can't think of a better way to personally take part in memorializing these American heroes,” Donaldson said.

Veglia, who has directed similar large-scale art projects for 25 years, is known for allowing public participation in her mural projects, working with school groups and communities alike to teach them the mosaic art form.



SSC Deputy Director David Throckmorton (left) and Director Tom Q. Donaldson V, RDML USN (Ret.), with the help of Veglia (center), each place a tile on a portion of SSC's memorial mosaic.



The cutout portion of the mural below shows the seven stars that represent each of the Columbia astronauts.

# SSC shares space vision with next generation of explorers



NASA Stennis Space Center Director Tom Q. Donaldson V, RDML USN, (Ret.) visited Bay-Waveland Middle School, a NASA Explorer School, on Feb. 20 to share The Vision for Space Exploration with the next generation of explorers.

At right, Adm. Donaldson addresses students from Ed Mayo and North Gulfport middle schools, both NASA Explorer Schools, at NASA Stennis Space Center (SSC) April 13. Following the presentation, the students took part in learning activities held at StenniSphere, the visitor center at SSC.

NASA Stennis Space Center (SSC) Director Tom Q. Donaldson V, RDML USN (Ret.), recently spoke with Mississippi students at NASA Explorer Schools (NES) about The Vision for Space Exploration. Five schools in Mississippi have been selected for the Explorer Schools program, which is sponsored by NASA's Education Enterprise in collaboration with the National Science Teachers Association. It was established in 2003 to forge ties between NASA and teachers and administrators from diverse communities.

Adm. Donaldson participated in NES events at Bay-Waveland Middle School in Waveland, Miss., on Feb. 20; and Choctaw Middle School in Choctaw, Miss., on April 6. Students from Ed Mayo Junior High School in Moss Point, Miss., and North Gulfport Middle School in Gulfport, Miss., visited SSC on April 13.

Dr. Dorothy Hayden-Watkins, NASA Assistant Administrator for Equal Opportunity Programs and a native of Newton, Miss., spoke to students at Florence Middle School in Florence, Miss., on April 7.

At all of the events, students learned about The Vision for Space Exploration, America's destiny as explorers and NASA's steppingstone approach to exploring the Moon, Mars and beyond.

"As NASA implements The Vision for Space Exploration," Adm. Donaldson said, "it's important this next generation of explorers understands the exciting opportunities this vision holds for them. Partnering with our schools is one way to help create learning environments that will nurture these students who may

one day explore Mars and beyond. We're a nation of explorers who depends on our youth to turn this vision into reality.

"Mars is an exciting planet to explore, and someone in your generation is going to walk on Mars," he told the students.

Adm. Donaldson was joined by other NASA leaders and state elected officials at some of the NES events. U.S. Rep. Gene Taylor attended the event at Bay-Waveland.

The Mississippi NES schools are among only 50 schools around the country chosen for the three-year partnership. The program's aim is to increase student interest in math, science and technology, and to educate them about careers in those fields.



At left, Chenise Ben, age 11, concentrates on the movements of a LEGO version of NASA's Mars Exploration Rover during Adm. Donaldson's visit to Choctaw Central Middle School.

Below, Dr. Dorothy Hayden-Watkins, NASA Assistant Administrator for Equal Opportunity Programs, speaks to Florence (Miss.) Middle School students during a NASA Explorer Schools event held there April 7.



# State dominates FIRST regional competition

Five teams from Mississippi traveled to Houston, Texas, recently to challenge teams from the U.S., Mexico and Ecuador in the FIRST (For Inspiration and Recognition of Science and Technology) Robotics Lone Star regional competition.

NASA Stennis Space Center (SSC) has sponsored teams in the competition since 2000 and has helped each one get its start with the FIRST program. SSC offers grants to qualifying teams for their first two years of competition then offers mentorship and advice. Offering the grant for two years gives teams the opportunity to build community support and find additional sponsorship.

SSC employees dedicated weeks of their time after work and on weekends to help teams design and construct robots for FIRST. Engineers shared their professional expertise with teams in the SSC area and were essential to each team's success in FIRST regional competitions.

Participating NASA engineers were Roy Worthy, Scott Olive, Christine Powell, Bo Clarke, Jim Barnett and Michele Beisler.

Worthy, Olive and Mississippi Space Services engineer Allen Forsman served as mentors to the Pearl River/Picayune team, while Randy Greer of Lockheed Martin Space Operations programmed its robot. Powell, Clarke and Barnett assisted the



NASA engineer and team mentor Scott Olive (center), watches as the Pearl River/Picayune team guides their robot to win the Highest Rookie Seed Award.

Gulfport team. Beisler worked with a team from Pearl River, La.

"To me, FIRST Robotics is all about opening doors for students," said Powell. "This program builds engineers, scientists and teachers. But it also builds explorers and leaders. I truly believe that those who will go to the Moon and to Mars will be FIRST alumni, and I can't wait to go along for the ride."

Teams from Gulfport High School in Gulfport, Warren Central High School in Vicksburg, Provine High School in Jackson, Monroe County Vo-tech in Aberdeen and a combined team of students from Pearl River Central High School in Carriere and Picayune Memorial High School in Picayune, participated in the Lone Star regional.

After the preliminary rounds, each of the five Mississippi teams earned a spot in an alliance to compete in the final rounds of competition. The alliance that included the Gulfport High School team was victorious, with the runner-up award going to the Provine team.

Besides winning first- and second-place honors, the state's teams won several awards. The Pearl River/Picayune team won the Highest Rookie Seed Award, and Gulfport High School won the Johnson & Johnson Sportsmanship Award. The Warren Central team took home both the Motorola Quality Award and the Delphi "Driving Tomorrow's Technology" Award for outstanding design and engineering.

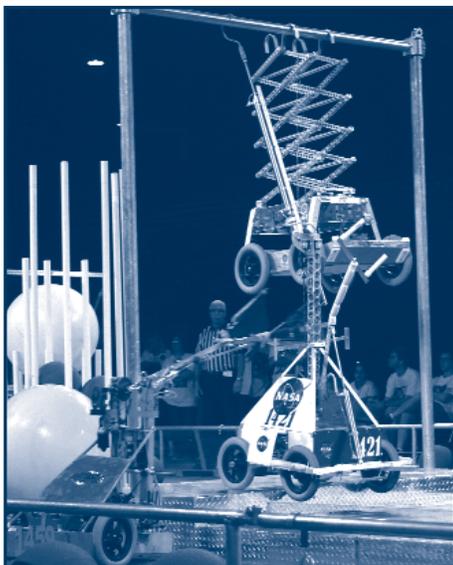
Another Mississippi team, Choctaw Central High School from Choctaw, chose to travel to the Peachtree regional competition in Atlanta, Ga., where they won a Judge's Award.

FIRST was founded by world-renowned inventor Dean Kamen and is meant to inspire students to explore science and technology fields. Working side by side with engineers while learning principles of engineering and the FIRST principles of gracious professionalism and teamwork helps many participants consider new paths for their future.

## Regional awards won by state teams

All five Mississippi teams advanced to the quarterfinal rounds of competition.

- **Gulfport High School** alliance: 1st place and Johnson & Johnson Sportsmanship Award
- **Provine High School** alliance: 2nd place; Provine teacher/mentor Lender Luse won the Regional Woodie Flowers Award
- **Pearl River/Picayune** combined team: Highest Rookie Seed Award
- **Warren Central High School**: the Delphi "Driving Tomorrow's Technology" Award and the Motorola Quality Award
- **Choctaw Central High School**: a Judge's Award at the Peachtree Regional in Atlanta



A robot built and controlled by students from Warren Central High School in Vicksburg hangs on a bar and lifts itself up to score 50 points for the team. Its alliance partner robot, controlled by students from Pearl River Central High School and Picayune Memorial High School, is seen making its way onto the platform at left.

INSPIRING  
 the next  
 generation . . .  
 as only NASA can

Coming this  
 summer:

StenniSphere, the visitor center at NASA Stennis Space Center, celebrates the 35th anniversary of the Apollo 11 Moon landing.

Look for new exhibits and exciting events!

### Astro Camp heads to nation's capital

A young visitor to the Lifestyles Expo 2004 in Washington, D.C., learns about the principles of propulsion from StenniSphere Supervisor Ken Albright (right) and Astro Camp Director Maria Lott.

Camp activities conducted by Albright, Lott and other staffers at the April 3 expo aimed to help fulfill NASA's mission to inspire the next generation of explorers and share The Vision for Space Exploration.



### Sun-Earth Day celebrated at StenniSphere

Makesi Willis, a student at Bay-Waveland Middle School in Bay St. Louis, peers through a telescope during annual Sun-Earth Day activities held March 31 at StenniSphere, the visitor center at NASA Stennis Space Center. Sun-Earth Day is an international event that celebrates the complex relationship between Earth and its closest star, the Sun.

### Students journey into space with help of SSC

Sherrill Reynolds (center) of the NASA Educator Resource Center at SSC, presents "Journey Into Space" at Little Oak Middle School in Slidell, La.



### JROTC students board the Space Station

Jessica Boyles, a student at West Lowndes High School in Columbus, Miss., tries her hand at the glove box inside the International Space Station exhibit in StenniSphere. The exhibit aims to teach visitors what it's like to live and work in space. Boyles and fellow members of the Air Force Junior Reserve Officers' Training Corps visited StenniSphere in February.

# SSC hosts annual Special Olympics games

At right, the Harrison County Super Stars march in the parade that opened the Special Olympics event held April 3 at NASA Stennis Space Center.



At left, Special Olympics volunteer, NASA's Rich Harris (left), Mrs. South Mississippi Donna Perkins, and Event King Rex Gipson, all of Picayune, light the Olympic torch before the torch run at the games.

At right, Special Olympians Gabe Kelley of Biloxi (left) Antino Evans of Wiggins, and Thomas "TJ" Muffler of McHenry compete in the 50-yard dash .



# Expedition 9 crew boards International Space Station



Photo courtesy European Space Agency

Above, the ISS Soyuz 8 spacecraft blasts off from Kazakhstan April 18 on its way to the International Space Station.

At right, Expedition 8 and Expedition 9 gather inside the Zvezda Service Module. Pictured are (from left) Expedition 8 Flight Engineer Alexander Kaleri, European Space Agency Astronaut André Kuipers, Expedition 9 Commander Gennady Padalka, Expedition 8 Commander Michael Foale and Expedition 9 Science Officer Mike Fincke.

The Expedition 9 crew, Commander Gennady Padalka and NASA ISS Science Officer Mike Fincke, successfully docked and entered the International Space Station (ISS) on April 21. The crew launched from Baikonur Cosmodrome in Kazakhstan on April 18 atop the ISS Soyuz 8 spacecraft. Traveling with them was European Space Agency Astronaut André Kuipers.

After nine days of joint operations and handover activities with the Expedition 8 crew, Padalka and Fincke will spend about six months aboard the ISS. Kuipers will depart the ISS with Expedition 8 crew members Michael Foale and Alexander Kaleri on April 29. Landing in Kazakhstan is scheduled for 7:09 p.m. CDT the same day.

An Extra Vehicular Activity, or spacewalk, may be conducted to solve problems with Control Moment Gyro #2. For more information on ISS and Expedition 9, visit <http://www.nasa.gov>.



# Gravity Probe B testing Einstein's relativity theories



Gravity Probe B was successfully launched April 20 onboard a Boeing Delta II rocket from Vandenberg Air Force Base. The Gravity Probe B program, managed by Marshall Space Flight Center, is one of the most thoroughly researched programs ever undertaken by NASA. Gravity Probe B will measure two parts of Albert Einstein's general theory of relativity by assessing how the presence of Earth warps space and time, and how Earth's rotation drags space and time.

Above is pictured the launch, inset with a photo of Albert Einstein.



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