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NASA tests SLS engine at highest power level ever



Have you heard the old saying – “I know that you believe you understand what you think I said, but I’m not sure you realize that what you heard is not what I meant?” Even if not, if you have had teenagers in your house, no explanation of the words are needed. Ark!

Well, for a minute or so during the recent Space Launch System lunch-and-learn, that phrase seemed to come to life. Surely, what I had heard was not what presenter Sharon Cobb had meant – or even said. Maybe it was time to clean my old Gator ears. But no, after checking later, what I thought I had heard was indeed what Cobb had said, although it still seemed too fantastic to believe.

There was a lot of good information in Cobb’s presentation, but the most astounding tidbit for this ole Gator came early when she commented that more than 1,100 companies in 44 states were involved in construction of NASA’s new Space Launch System (SLS). Numbers like that make SLS “truly America’s rocket,” Cobb said.

Those 1,100 companies include large, well-known ones and small “mom-and-pop” types, all helping to

build SLS in some way. It does not take a math whiz to know that those 1,100 companies represent a lot of people as well. Think about it – each and every one of those people at each and every one of those companies has a vested interest in SLS and in the future success of the nation’s space program. That adds up to a lot of involvement and support.

It also adds up to a lot of responsibility for everyone here at Stennis. In a very real sense, all of the efforts of those companies and people are riding on the hard work accomplished right here. After all, it will be Stennis-tested engines and stages that launch “America’s rocket” on its missions.

Cobb acknowledged that fact in speaking about the critical importance of Stennis testing. “We’re counting on you,” she said. “We know you have a history of that (for 50 years or more). ... You are the foundation of making all of this happen.”

I do not know about you, but words like that make me both proud to be a part of that history – and determined to do my part to keep it going.



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Stennis conducts 3rd RS-25 engine test of 2018, powers engine up to 113 percent thrust

Operators powered one of NASA's Space Launch System (SLS) engines up to 113 percent thrust level, the highest RS-25 power level yet achieved, during a test on Feb. 21 at Stennis Space Center. The test lasted 260 seconds with power levels at 113 percent for 50 seconds of the test. This was the third full-duration test conducted on the A-1 Test Stand at Stennis this year. NASA has been using the stand since January 2015 to test RS-25 engines for use on its new SLS rocket. Four RS-25 engines will help power SLS at launch, supplying a combined 2 million pounds of thrust and working in conjunction with a pair of solid rocket boosters to provide more than 8 million pounds of thrust. RS-25 engines are former space shuttle main engines, which were designed more than 40 years ago to provide a specific power level, categorized as 100 percent thrust. Through the years, the engines were modified to provide additional thrust to 109 percent of its original designated level. For the larger, heavier SLS rocket, the engines are being modified again to operate at 111 percent of their original power level. Increased engine performance is crucial for enabling SLS missions to deep space as the rocket evolves to be larger and carry astronauts and heavy cargo on a single flight. The SLS rocket was designed for missions beyond low-Earth orbit carrying crew and cargo to the moon or beyond. The initial configuration for what SLS can carry past low-Earth orbit and on to the moon is more than 26 metric tons, with a final configuration of at least 45 metric tons. All SLS configurations are powered by four RS-25 engines attached to the 212-foot-tall core stage, the backbone of the rocket being built at NASA's Michoud Assembly Facility in New Orleans. In addition to achieving the higher thrust level, the Feb. 21 hot fire also featured a test of an RS-25 flight controller, as well as a 3D-printed engine component. The new flight controller is a major part of the RS-25 modifications, operating as the "brain" of the engine to help it communicate with the SLS rocket and to provide precision control of engine operation and internal health diagnostics. NASA also has been testing a 3D-printed pogo accumulator assembly for the RS-25 engine. Testing of the 3D-printed component is part of an ongoing effort to use advanced manufacturing techniques and processes as a means of reducing engine construction costs to make SLS more affordable. NASA and RS-25 engine manufacturer Aerojet Rocketdyne plans to test a number of 3D-printed components for the RS-25 engine. The recent hot fire provided a key maximum flow level test of the current 3D component. Each RS-25 test moves the agency closer and closer to its return to deep space exploration, to such destinations as the moon and Mars. Earlier this month, the space agency completed testing of all four new RS-25 engine flight controllers needed for the second flight of the SLS rocket. The Exploration Mission-1 (EM-1) flight will test the new rocket and carry an uncrewed Orion spacecraft into space beyond the moon. Exploration Mission-2 (EM-2) will be the first flight to carry humans aboard the Orion spacecraft, returning astronauts to deep space for the first time in more than 40 years. In addition to testing RS-25 engines and flight controllers at Stennis, NASA is preparing to test the actual SLS core stage for the EM-1 mission at the south Mississippi site. The testing will involve installing the flight stage on the B-2 Test Stand and firing all four of its RS-25 engines simultaneously, as during a launch. RS-25 tests at Stennis are conducted by a team of NASA, Aerojet Rocketdyne and Syncom Space Services engineers and operators. Aerojet Rocketdyne is the RS-25 prime contractor. Syncom Space Services is the prime contractor for Stennis facilities and operations.



FULFILLING NASA'S EXPLORATION MISSION

Space Launch System update – 'It's happening now'



(Top photo) Sharon Cobb, program operations and strategic communications manager for NASA's Space Launch System (SLS) Program, speaks to Stennis Space Center employees during a lunch-and-learn session Feb. 27. Cobb visited the site to provide an overview of the SLS Program, including the testing work under way at Stennis. Characterizing SLS as "America's rocket," Cobb updated employees about areas of work on the vehicle, which is being built to carry humans deeper into space than ever before. Cobb praised the work Stennis is doing to test RS-25 engines that will help power SLS at launch and its preparations for testing the SLS core stage for the rocket's first mission. "The work you're continuing to do is so important to our future, ..." she emphasized. "We're always watching (what you do)." Cobb said SLS is well on its way to completion and is designed to evolve in the years ahead to provide more capabilities than ever for space exploration. "We have a long way to go, but we are so far along," she said.

(Bottom photo) Stennis Space Center Deputy Director Randy Galloway presents Sharon Cobb a commemorative photo of the site's first RS-25 engine test following her Space Launch System presentation to employees Feb. 27.



FULFILLING NASA'S EXPLORATION MISSION

Pegasus barge transports SLS test hardware



NASA's Pegasus barge leaves the Michoud Assembly Facility in New Orleans on March 2 (above), en route to NASA's Marshall Space Flight Center in Huntsville, Ala. Pegasus ferried a structural test version of the intertank for NASA's new deep-space rocket, the Space Launch System (SLS), along the Tombigbee and Tennessee rivers, arriving at Marshall on March 4 (right). The intertank is the second piece of structural hardware for the massive SLS core stage built at Michoud and delivered to Marshall for testing. The test hardware is structurally identical to the flight version of the intertank that will connect the core stage's two colossal fuel tanks, serve as the upper-connection point for the two solid rocket boosters and house critical avionics and electronics. Engineers at Marshall will push, pull and bend the intertank with millions of pounds of force to ensure the hardware can withstand the forces of launch and ascent. SLS will enable a new era of exploration beyond Earth's orbit, launching astronauts in NASA's Orion spacecraft on deep-space exploration missions to the Moon, Mars and beyond. The Pegasus barge, originally used during the Space Shuttle Program, has been redesigned and extended to accommodate the SLS rocket's massive, 212-foot-long core stage – the backbone of the rocket. The 310-foot-long barge will ferry the flight core stage from Michoud to Stennis Space Center for testing and to Kennedy Space Center for launch. Stennis is preparing its B-2 Test Stand to test the SLS core stage that will be used on the rocket's first flight, the uncrewed Expedition Mission-1. The south Mississippi site also is testing RS-25 engines that will help power the SLS core stage on its A-1 Test Stand.



Astronaut visits Stennis, shares International Space Station mission experiences



(Top left photo) Astronaut Randy Bresnik shares experiences from his recent stay on the International Space Station (ISS) during a visit to Stennis Space Center on March 7. Bresnik shared stories and images about his experience as a member of the Expedition 52/53 crew. Bresnik launched to the ISS last July and returned to Earth in December. He participated in three spacewalks during the mission. In addition to the ISS mission, Bresnik spoke about his experiences training as a "cave-a-naut" with the European Space Agency to test living deep beneath the Earth's surface and as an "aquanaut" living underwater for NASA's Extreme Environment Mission Operation 19.

(Top right photo) Astronaut Randy Bresnik stands atop the B-1/B-2 Test Stand at Stennis Space Center during a tour of the stand March 7.

(Bottom left photo) Astronaut Randy Bresnik appears with members of the Stennis Space Center management team during his visit to the site March 7. In addition to meeting with center leaders, Bresnik visited with employees who had received recent safety awards (bottom right photo).



Stennis employees receive technology awards



Several Stennis Space Center employees recently received NASA Space Technology Mission Directorate (STMD) awards for outstanding performance and accomplishments. The awards were presented at a Feb. 28 ceremony at NASA Headquarters and highlighted on site March 5.

(Top photo) Howard Conyers (center) and other members of Stennis team that developed the High Dynamic Range Stereo-X (HiDyRS-X) camera received an STMD Innovation Award, given to recognize incredible success and demonstration of innovation by early career employees. Developed with onsite partner Innovative Imaging & Research, HiDyRS-X is a groundbreaking, state-of-the-art system for viewing and analyzing propulsion test plumes. Conyers is joined by (l to r): Stennis Engineering and Test Directorate Director John Bailey; team members Andy Guymon, Aaron Head and Mark Turowski; Stennis Director Rick Gilbrech and Stennis Chief Technologist Ramona Travis.

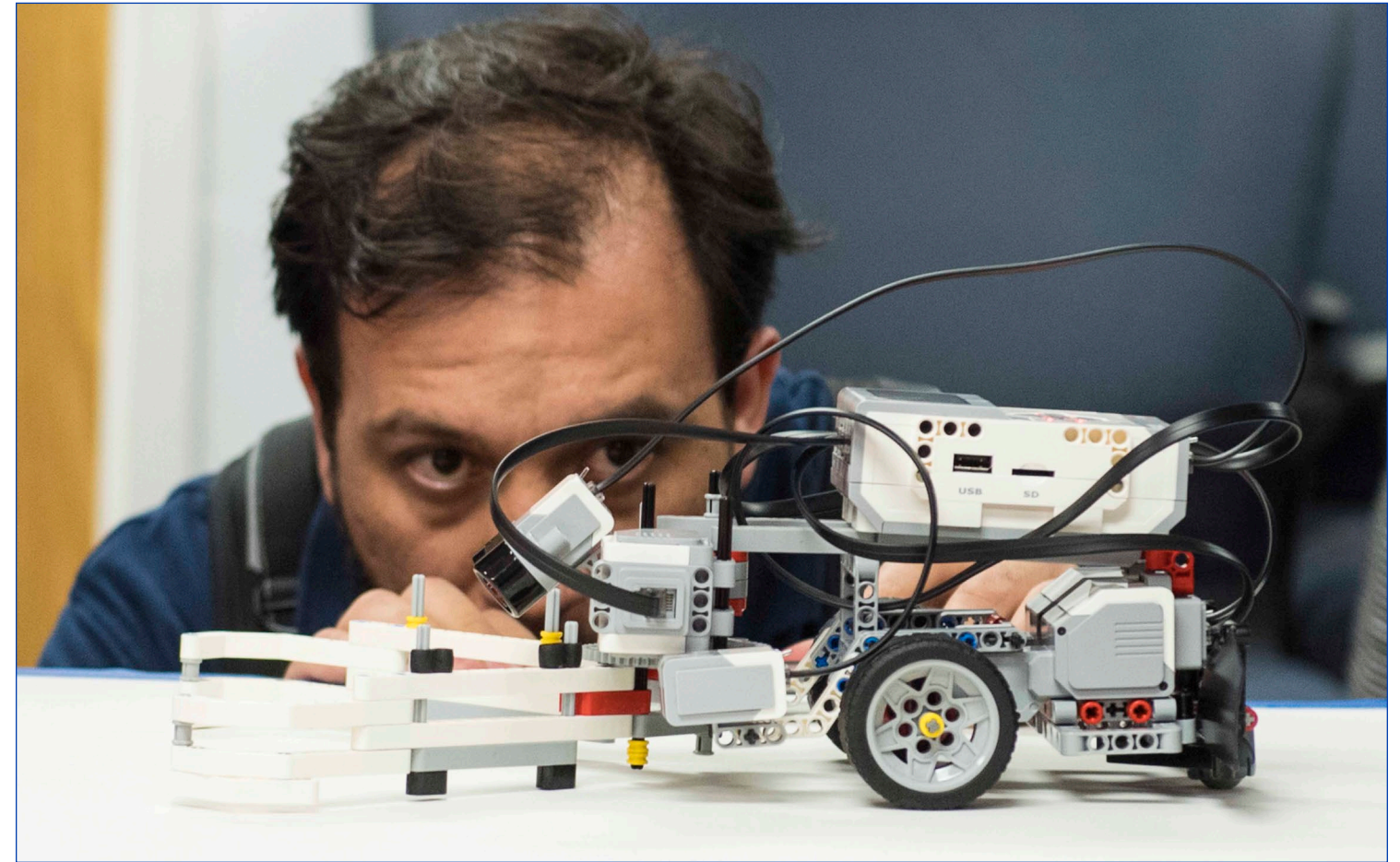
(Middle photo) Daniel Allgood received an STMD Exceptional Achievement (Technical) Award for his work modeling hydrogen propellant detonation and propagation. Rocket engine testing requires use of highly explosive cryogenic fuels. Allgood's modeling system helps better predict conditions that could lead to unintended detonations of propellants and the resulting impacts. Allgood is joined by (l to r): Tom Meredith, chief of the Design and Analysis Division of the Stennis Engineering and Test Directorate; Stennis Director Rick Gilbrech and Stennis Chief Technologist Ramona Travis.

(Bottom photo) Stennis Chief Technologist Ramona Travis received an STMD Innovation Award for her work to improve the effectiveness and efficiency of the NASA Small Business Technology Transfer Research Program through the engagement and coordination of chief technologists across the agency. The efforts have resulted in high-quality technology developments by small business/university partners that are having a significant impact on NASA programs and projects.

Stennis also was part of an agencywide Small Business Innovation Research and Small Business Technology Transfer Research Program team that received an SMTD Partnership Award for major improvements to those agency programs.



Select community college scholars visit Stennis for STEM-focused workshop



The Stennis Space Center Office of Education hosted 43 community college students from across the country for the Winter 2018 NASA Community College Aerospace Scholars (NCAS) Program the week of Feb. 19. Funded by the Minority University Research and Education Program, NCAS supports community college students who are interested in pursuing STEM (science, technology, engineering and mathematics) studies and future STEM careers. The weeklong workshop is designed to provide students with a hands-on, collaborative NASA experience and to encourage them in ongoing studies. During the Stennis workshop, students were divided into four teams competing to design and build the most reliable and cost-efficient Mars rover. The teams built a prototype of their robot design to demonstrate its effectiveness during mock missions on a simulated Mars terrain. The teams also developed mock production budgets and other documents needed to "win" a NASA contract for their rover design. The teams worked with Stennis Space Center educators and engineering mentors throughout the effort. They also had opportunities to work on developing personal resumes, to tour various Stennis facilities and to hear from Stennis engineers about their work at the rocket engine test center. Two students also will be chosen to return as student assistants for the upcoming workshop. In the top left photo, students are shown in front of an RS-25 engine during their tour of the Aerojet Rocketdyne engine assembly facility at Stennis. For more regarding NCAS, visit: <https://go.usa.gov/xnJHC> and <https://www.nasa.gov/education>.



Stennis program celebrates Black History Month

Ronald Randolph, director of payroll services for the St. Tammany Parish School Board in Covington, La., speaks to Stennis Space Center employees during a Black History Month program Feb. 22. Black History Month, also known as National African American History Month, is observed every February to celebrate achievements by African Americans and to recognize their contributions to American history, society and culture. This year's theme is "African Americans in Times of War," commemorating the 100th anniversary of the end of World War I and highlighting the service and sacrifice of African Americans during wartime. The service of African Americans in the military helped advance America's civil rights movement in various ways, particularly by setting an example of races serving side-by-side in military units. During his presentation, Randolph talked about how civil rights progress has impacted his personal journey.



NASA in the News

NASA seeks input from cloud gazers

It is almost spring, the time of year when the looming change in seasons could lead to some pretty fascinating cloud activity in the sky. NASA and the GLOBE Program are asking for citizens' help by taking part in a science cloud observation challenge. From March 15 through April 15, citizen scientists of all ages can make up to 10 cloud observations per day using the GLOBE Observer app or one of the other data entry options (for trained GLOBE members). Challenge participants with the most observations will be congratulated by a NASA scientist in a video posted on the GLOBE Program's website and on social media. Researchers use, and value, such citizen science cloud data because it helps to validate data from Earth-observing instruments. Individuals do not have to be cloud-gazing pros to participate in the challenge opportunity. NASA researcher Marilé Colón Robles offers the following advice: "Just go outside." Read more about the science cloud observation challenge at: <https://go.usa.gov/xnhef>. For cloud observation tips, visit: <https://scool.larc.nasa.gov/GLOBE/lintips.html>

Public invited to join mission to Sun

NASA is inviting people around the world to submit their names online to be placed on a microchip aboard NASA's historic Parker Solar Probe mission launching this summer. The mission will travel through the Sun's atmosphere, facing brutal heat and radiation conditions – and submitted names will go along for the ride. "This probe will journey to a region humanity has never explored before," said Thomas Zurbuchen, the associate administrator for the Science Mission Directorate at NASA Headquarters in Washington. "This mission will answer questions scientists have sought to uncover for more than six decades." The Parker spacecraft, about the size of a small car, will travel directly into the Sun's atmosphere about 4 million miles from the star's surface. Data collected from the mission is expected to revolutionize understanding of the Sun, where changing conditions can spread out into the solar system, affecting Earth and other worlds. Name submissions will be accepted until April 27, 2018. Learn more and submit one's name at: <http://go.nasa.gov/HotTicket>.

Hail & Farewell

NASA bids farewell to the following:

Ron Magee

AST, Technical Management

Center Operations Directorate

Ensuring the safety of all workers – on and off duty

Note: The following is part of a regular focus on safety and health at Stennis Space Center. It was written by Lt. Kierstin Pastrana with the Commander Naval Meteorology and Oceanography Command.

Commander Naval Meteorology and Oceanography Command (CNMOC) facilitates an environment in which safety comes first. While working conditions in an office environment are not typically deemed unsafe, we have protocols in place that help employees – military and civilian – ensure their safety is first at work, on travel and at home.

Working with Commander Naval Region South East, all employees are enrolled in a program called Enterprise Safety Application Management System, which is a web-enabled service that allows online training in an array of topics. There are several required courses that everyone must take, but the curriculum also can be tailored to job specific duties.

All workers are required to enroll in an office ergonomics course to help reduce the injury risks associated with office workplaces, which impacts everyone at CNMOC. Everyone under the age of 26 must complete a “Driving for Life” course that focuses on driving scenarios known to cause the highest number of deaths and on how to react to potentially dangerous situations.

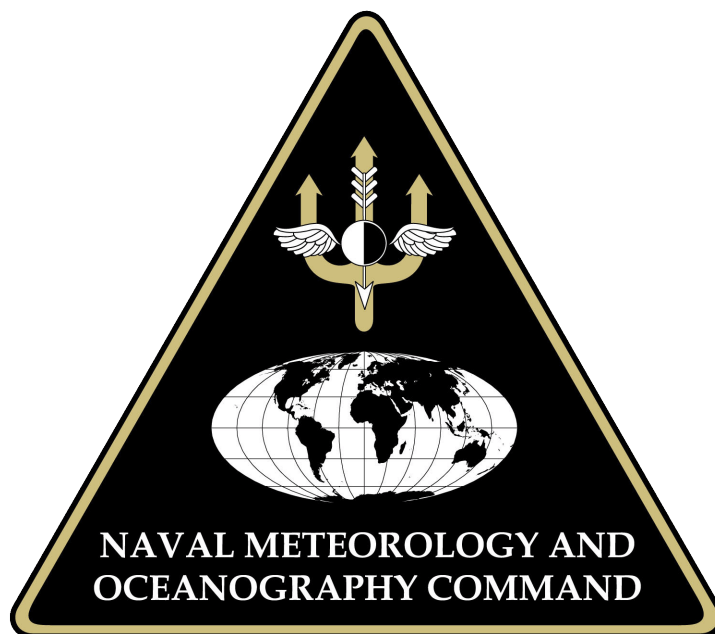
If supervisors are approving leave for someone in their department and they deem the purpose for travel to be high-risk, supervisors have the ability to use a safety course tailored to that need to ensure personnel return from leave safely.

We work closely with our employees who own and ride motorcycles to ensure they are properly educated and safe on the roads. The motorcycle safety representative is responsible for following the Department of the Navy’s

Motorcycle Safety Program, which requires that all military personnel, and recommends that civilians, attend motorcycle safety courses and wear personal protective equipment at all times to increase safety of motorcycle riders.

In addition to meeting the Navy’s requirements, the basic rider course can help riders get their motorcycle license/endorsement in 45 states and several countries around the globe. Thanks to such efforts, personnel at CNMOC have had zero motorcycle mishaps over the past three years, largely due to the Navy’s motorcycle safety program.

Our safety team is committed to ensuring all CNMOC personnel have the tools to prevent unsafe conditions and make good decisions both on and off duty.



An engaged safety culture keeps Stennis Space Center rocketing forward!

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At the end of the day, the goals are simple – safety and security.

Jodi Rell, former Governor of Connecticut

**You don’t need to know the whole alphabet of safety.
The a, b, c of it will save you if you follow it: Always Be Careful.**

Colorado School of Mines Magazine, Golden, Colorado, August 1918

1970 – Earth Resources Laboratory arrives

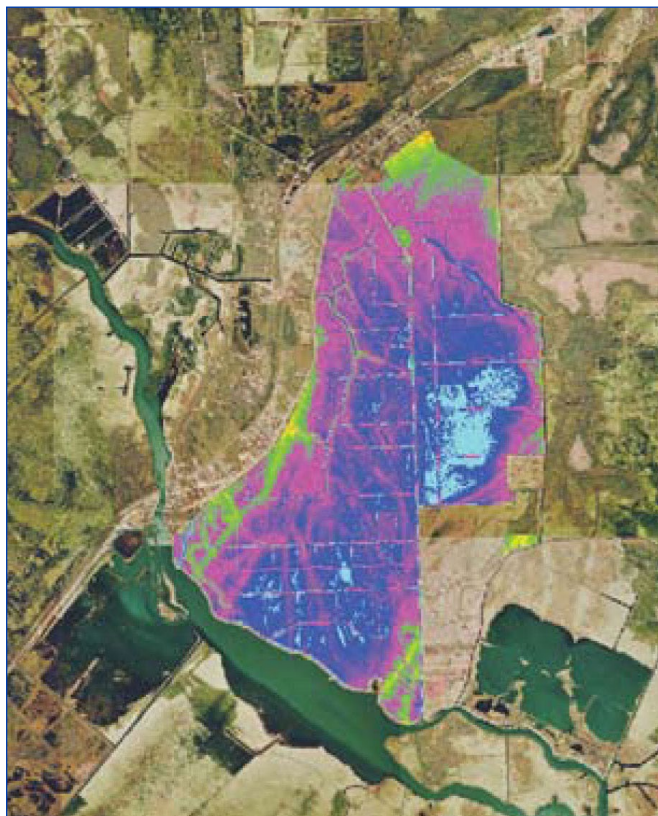
Note: For more than 50 years, NASA's John C. Stennis Space Center has played a pivotal role in the success of the nation's space program. This month's Lagniappe provides a glimpse into the history of the south Mississippi rocket engine test center.

Beginning in 1970, the Earth Resources Laboratory (ERL) was housed at the then-National Space Technology Laboratories and helped shape what is known today about satellite imagery and remote sensing technology.

The laboratory quickly gained prominence for its pioneering scientific achievements in remote sensing and space technology applications. It used data generated by satellites, aircraft and spacecraft to provide valuable information about Earth.

ERL capabilities particularly were instrumental when hurricanes hit Florida and the Gulf Coast, tornadoes swept through Alabama and Mississippi, or forest fires burned in California. However, the information generated by ERL had a large pool of applications and also could be used to help governments and organizations in such areas as agriculture planning, resources management and environmental monitoring.

Scientists and researchers at ERL used their programs around the world and, in order to do so, they needed a way to process the data from the remote sensing applications. In 1978, Ronnie Pearson developed a software



(Left photo) a remote sensing data set provides soil and elevation information for use in a wetland mitigation project. (Above photo) A remote sensing image provides data about the Florida peninsula's citrus-growing region.

called the Earth Resources Laboratory Applications Software (ELAS) that could travel. ELAS is a transferable set of software for processing complicated remote sensing data into readable and usable information sets.

Suddenly, researchers and scientists could go where they were needed and process the data more efficiently. By 1984, 25 states, 150 government agencies and numerous foreign countries where remote sensing was being conducted had access to the software.

Development of ELAS was recognized as recently as 2008 as a key NASA "spinoff" technology tool that has been improved and enhanced since its development.

Office of Diversity and Equal Opportunity

‘Nevertheless, she persisted:’ Fighting discrimination of women

In 1987, the U.S. Congress designated March as National Women’s History Month. Each year, the National Women’s History Project determines a special theme and selects national honorees whose lives exemplify that theme.

This year’s theme is “NEVERTHELESS SHE PERSISTED: Honoring Women Who Fight All Forms of Discrimination Against Women.”

The 2018 National Women’s History theme presents the opportunity to honor women who have shaped America’s history and its future through their tireless commitment to ending discrimination against women and girls. The theme embodies women working together with strength, tenacity and courage to overcome obstacles and achieve joyful accomplishments.

Throughout this year, 15 outstanding women will be honored for their unrelenting and inspirational persistence and for understanding that, by fighting all forms of discrimination against women and girls, they have shaped America’s history and future. Their lives demonstrate the power of voice, of persistent action and of believing that meaningful and lasting change is possible in this democratic society.

The theme celebrates women fighting not only against sexism but also against the many intersecting forms of discrimination faced by American women, including discrimination based on race and ethnicity, class, disability, sexual orientation, veteran status and many other categories. From spearheading legislation against segregation to leading the reproductive justice movement, the 2018 honorees are dismantling the structural, cultural and legal forms of discrimination that for too long have plagued American women.

The phrase “Nevertheless, she persisted” was born in February 2017 when U.S. Sen. Elizabeth Warren was silenced during Attorney General Jeff Sessions’ confirmation hearing. At the time, Warren was reading an opposition letter penned by Coretta Scott King in 1986.

Referring to the incident, Senate Majority Leader Mitch McConnell later said, “Senator Warren was giving a lengthy speech. She had appeared to violate the rule. She was warned. She was given an explanation. Nevertheless, she persisted.” Women activists immediately adopted the phrase in hashtags and memes to refer to any strong women who refuse to be silenced.

Fighting all forms of discrimination against women takes

persistence. The 2018 honorees have all gotten the message to stop, either directly or indirectly, yet they have all continued to fight and have succeeded in bringing positive change to the lives of diverse American women.

One of those honorees is Marty Langelan, a leader in the global effort to end harassment and gender-based violence. Langelan is called “the godmother of direct intervention.” She is an economist, martial artist, past president of the District of Columbia Rape Crisis Center and the author of *‘Back Off: How to Confront and Stop Sexual Harassment.’* She has been derailing harassers for decades.

Langelan pioneered feminist self-defense training and bystander tactics, organized the first major city-wide anti-harassment campaign (1985-87) and conducted the first feminist survey on harassment. She recently designed the first effective harassment-prevention strategy for public bus/subway systems, training thousands of transit workers. Her self-defense and anti-harassment programs are used worldwide.

Langelan has taught hundreds of thousands of people how to interrupt sexist/racist behavior, reclaim jobs and neighborhoods from harassers, and shut down sexual predators. Langelan developed the Direct-Action Toolkit – more than 100 practical, principled ways to stop harassers in their tracks. Unlike legal/administrative remedies, direct-action works fast. The intervention tools are an efficient form of nonviolent civil disobedience, designed to disrupt the aggressor’s agenda. The direct-action techniques can even turn harassers into allies.

Langelan provides violence-intervention skills for international human-rights organizations, anti-rape activists, environmentalists and many others. She also teaches kids how to stop bullies.

In 1971, Langelan filed and won one of the earliest federal sex-discrimination actions, tackling the sexist disparity in graduate student funding. As a young government economist, she founded one of the first Federal Women’s Committees, making the Civil Aeronautics Board reallocate its training funds and open upward-mobility jobs.

She also has handled discrimination cases for federal employees and won the Department of Transportation’s Silver Medal for creating the national system to rate the on-time performance of airlines.

Information in this article came from the National Women’s History project. For more information and to view the profiles of all 2018 honorees, visit www.nwhp.org.

Stennis Space Center hosts South Mississippi Area III Special Olympics games



Stennis Space Center hosted annual South Mississippi Area III Special Olympics Field Games on March 10, with participants from a four-county area gathering for friendly competition in numerous summer sporting events. About 120 athletes with special needs gathered for the event at INFINITY Science Center just outside of Stennis. The Special Olympics program is designed to provide year-round sports training and athletic competition for intellectually or developmentally challenged adults and children. The program seeks to help athletes gain confidence and build a positive self-image that carries over into the classroom, home, workplace and community. Patterned on the World Olympics, the games include an opening ceremony and a host of Olympic-type track and field competitions. All athletes receive ribbons for participating. Stennis Space Center has hosted the South Mississippi Area III Special Olympics Field Games since 1983. For more information about Special Olympics, visit online at: <https://www.sscspecialolympics.com/>.



Faces of Stennis

Each month, Lagniappe will feature employees at Stennis Space Center whose work enables the center to fulfill its mission as the nation's largest rocket engine test center. This month's employee is highlighted on the following page.



David Carver



No disrespect to Hank Williams Jr., but as far as David Carver is concerned, “family tradition” revolves around Stennis Space Center. A Bay St. Louis native, Carver recalls annual school field trips to the rocket engine test site. “I remember vividly sitting in StenniSphere, listening to an explanation of how the insulating tiles on the space shuttle worked,” he says, recounting how the presenter held a torch flame to a tile until it glowed orange. Yet, when he held the tile out at the end for the students to touch, “it was literally, and figuratively, cool,” Carver explains. In addition to that exposure to the site, Carver’s uncle and brother worked at Stennis. It seemed inevitably that he would follow in their shoes after earning a degree in electrical engineering from Mississippi State University. Carver first worked for Lockheed Martin as a remote sensing scientist, then relocated to Michoud

Assembly Facility in 2007 to work as an electrical lead on the space shuttle external tank project. In 2011, the Waveland resident returned to Stennis, this time as the NASA electrical test operations lead for the A-1 Test Stand. Carver’s responsibilities includes preparation of the test stand’s electrical, instrumentation and data acquisition systems for rocket engine testing. Carver’s return to Stennis coincided with the transition of test stand operations back to NASA, and he is proud to have played a part in that process. He also welcomes the opportunity to work with, and learn from, bright Stennis colleagues. However, he leaves no doubt as to the best thing about being at Stennis – “We test rocket engines!” Needless to say, what Carver looks forward to most is watching those engines help launch NASA on the next great human space exploration missions.