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LAGNIAPPE

John C. Stennis Space Center

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Artemis Preparations Continue with RS-25 Engine Testing

SEE PAGE 4

I found myself with a friend going to check the tire pressure in the old four-wheel drive before going out after the big rain to find a little mud. It is fun to splash around as the Pearl River rises out of its banks, but cold temperature always drops the tire pressure in big truck wheels. Anyway, there I was at the gas station airing up my tires, bundled up from the cold, when out of the store walked someone who recognized me. He saw me working the long air hose around to the tire opposite from the pump and decided to walk over to visit.

Though I did not recognize him, he must have seen me in Lagniappe images or onsite somewhere. He came over and introduced himself as Josh, then pulled the hose around the front tire which had it caught. I appreciated the helping hand. I was soon to be out of time on the air pump. How we ended up talking about NASA, I do not recall, but I found myself talking to the young man about the Space Launch System that he heard about on the news.

During our talk, he brought up the successes of commercial companies. He was shocked to hear that those same companies had been working with NASA for years, developing their launch systems, spacecraft, and even testing their designs for rocket engine

components. For some reason, he was under the impression that NASA was against those companies and their space programs. I helped him understand that NASA has been coaching, guiding, and helping those companies meet their space goals.

I thanked him for giving me a helping hand while I was rushing to air up my last truck tire. Then, I explained that in a similar way NASA had been a helping hand to commercial companies. I told him about some of the folk that used Stennis as a place to get a jump start on testing. I told him about the partner agencies that have found permanent homes onsite. Stennis is not a private holding. It is a government facility and NASA works with partners to advance spaceflight, promote industry, use space technologies, and investigate Earth. Stennis folk work like a big family, pooling resources, sharing ideas, and lending a helping hand.

It is a good thing I brought my wench, because no sooner than I got on the trail, I found another four-wheel drive stuck in the mud, and I got a chance to pay kindness forward. I really love these days when the mosquitoes seem to be sleeping. I can get my engine roaring like a rocket engine at Stennis. Ark.



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Stennis Collaborates on Unique Commercial Partnership

NASA's Stennis Space Center has partnered with companies on propulsion test projects in support of the commercialization of space for more than 20 years. In the last half of 2021, however, the NASA site and startup company Firehawk Aerospace participated in a partnership arrangement that provides a new model for future collaborations.

In the typical "service-based" partnership model, Stennis conducts a test campaign for, or in conjunction with, a partner company. With the new approach, Firehawk Aerospace led and managed its own test project at the NASA center, located near Bay St. Louis, Mississippi.

Stennis provided facilities, a dedicated test area and support resources for the company to test its Armstrong 1K rocket engine, using a patented, 3D-printed hybrid fuel and a unique mobile test platform. The company also was able to draw on the experience and expertise of the Stennis propulsion team during the project.

"This partner-managed facility concept was the first of its kind for Stennis," said Paul Rydeen, NASA Stennis project manager. "We are trying to extend our activities to reach markets that are requesting such accommodations. Some companies want the proximity to propulsion infrastructure and support resources but wish to operate their test campaigns by themselves."

The partnership with Firehawk Aerospace provided Stennis a perfect opportunity to demonstrate just how such a "partner-managed facility" arrangement could work, said Kevin Power, NASA Stennis chief of the Propulsion Test Project Management Office. It also provided an example of how companies can benefit from even a short-term partnership with the site as they scale up their own operations.

The arrangement offered several benefits for Firehawk Aerospace. It provided the company a temporary proving ground to move forward as it prepares its own operational facilities elsewhere, to further development of its patented fuel technology, to activate and use its newly built "roadable test stand," and to complete its first-ever rocket engine test campaign. In pursuing these goals, the company was able to draw on lessons learned

from the Stennis team, particularly on technical testing questions and for review of operational and safety procedures.

"Every day of activating and testing a new system is a challenge," said Kevin Lapp, propulsion engineering manager for Firehawk Aerospace. "As a propulsion engineer, though, working at Stennis was a fantastic career opportunity."



Firehawk Aerospace uses a newly built "roadable test stand" to conduct hot fire testing of its Armstrong 1k test article Dec. 1, 2021, at Stennis. The small start-up company is seeking to revolutionize hybrid rocket engine technology with its patented 3-D printed solid fuel. (Firehawk Aerospace)

Working with the Stennis Strategic Business Development Office, Firehawk Aerospace arrived on site in mid-May 2021 and began testing in July. By December, the startup team had completed a successful series of about 100 cold flow and hot fire tests, all using what it calls a "roadable test stand."

Firehawk Aerospace built the fully outfitted and instrumented stand out of a 28-foot enclosed hauler trailer, capable of handling the nitrous oxide, helium, and nitrogen needed for

testing the company's hybrid engine. Hybrid rocket engines use a combination of solid and liquid propellants to fire and produce thrust, in this case a liquid oxidizer with a solid fuel. The hybrid concept date back to the 1930s, though it has yet to establish a solid foothold in modern rocket propulsion.

Firehawk Aerospace is seeking to demonstrate that hybrid engines have technological advantages compared to traditional liquid rocket engines and solid rocket motors. Using the company's 3D-printed fuel, Firehawk Aerospace hopes to bring hybrid propulsion technology to the forefront of the industry.

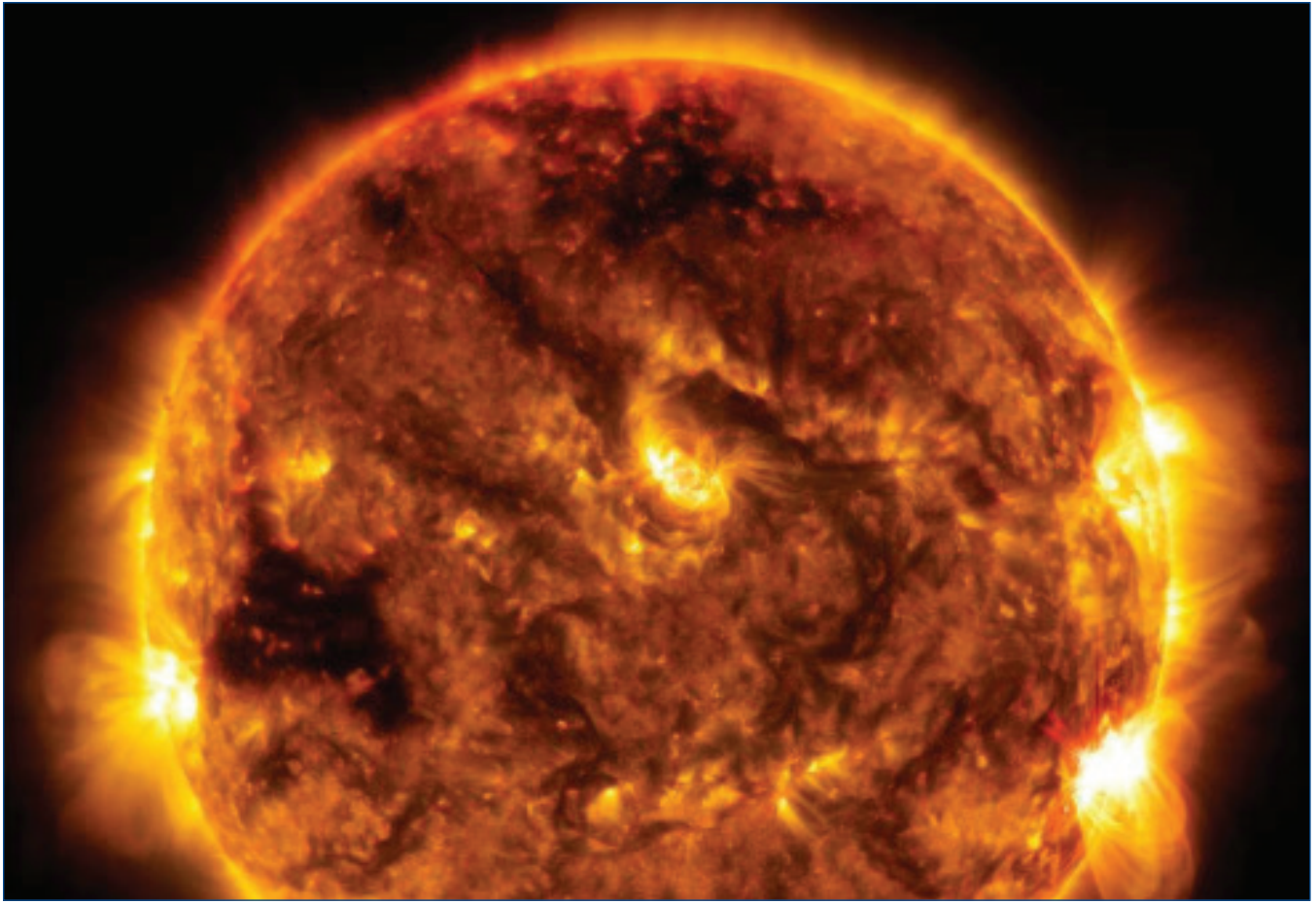
Stennis is America's largest rocket propulsion test site and is equipped to support a range of government and commercial propulsion test projects, from engine components to full-scale rocket stages. Since it began operation in the 1960s, Stennis has helped power the nation's space exploration efforts. It currently is testing rocket stages and engines for NASA's new Space Launch System that will launch Artemis missions to the Moon in preparation for eventual journeys to Mars.

In recent years, Stennis also has supported commercial test projects for companies such as Aerojet Rocketdyne, Launcher, Blue Origin, SpaceX, Relativity Space, Virgin Orbit, and Ursa Major.

NASA Conducts Second RS-25 Engine Test of Year at Stennis



NASA conducted its second [RS-25 engine](#) hot fire test of the new year Feb. 8 on the Fred Haise Test Stand at Stennis. The test was the third hot fire in the [latest test series](#) that began in mid-December. NASA is testing RS-25 engines to help power the agency's [Space Launch System \(SLS\)](#) rocket on future deep-space missions. Four RS-25 engines will generate a combined 2 million pounds of thrust to power SLS's ascent. Each test in the current series is providing valuable operational data to NASA's lead contractor, Aerojet Rocketdyne, on a variety of new components manufactured with state-of-the-art fabrication techniques as the company begins production of new RS-25 engines. The RS-25 engines for the first four SLS flights are upgraded space shuttle main engines and have completed certification testing. NASA will use the data from the current test series to enhance production of new RS-25 engines and components for use on subsequent SLS missions. The testing is part of NASA's and Aerojet Rocketdyne's effort to use advanced manufacturing methods to significantly reduce the cost and time needed to build new engines. For the Feb. 3 test, engineers fired the RS-25 developmental engine for a full duration of about eight-and-a-half minutes (500 seconds), the same amount of time the engines must operate to help send SLS to space. Operators also fired the engine up to 111% of its original power level, the same level needed during SLS launch. SLS will be the world's most powerful rocket and the only one capable of sending the agency's [Orion spacecraft](#), astronauts, and supplies to the Moon in a single mission. Initial SLS missions will send Orion to the Moon as part of NASA's [Artemis program](#), including the [Artemis I](#) uncrewed test flight this year that will pave the way for future flights with astronauts to explore the lunar surface and prepare for missions to Mars. Artemis missions also will land the first woman and first person of color on the lunar surface. SLS and Orion, along with the commercial [human landing system](#) and the [Gateway](#) outpost in orbit around the Moon, are NASA's backbone for deep space exploration. RS-25 tests at Stennis are conducted by a combined team of NASA, Aerojet Rocketdyne, and Syncom Space Services operators. Syncom Space Services is the prime contractor for Stennis facilities and operations.



NASA has selected two science missions – the Multi-Slit Solar Explorer and HeliSwarm – to help improve understanding of the dynamics of the Sun, the Sun-Earth connection, and the constantly changing space environment. These missions will provide deeper insights into the universe and offer critical information to help protect astronauts, satellites, and communications signals such as GPS. For more, click [here](#).

NASA in the News

NASA Prepares to Join Two Major Parts for Artemis II Core Stage

Technicians are preparing to connect two major parts of the [Space Launch System](#) (SLS) rocket's [Artemis II](#) core stage. On Jan. 30, technicians moved the largest part of the stage, the 130-foot liquid hydrogen tank, to the vertical assembly area at [Michoud Assembly Facility](#). There, it will be prepared for joining with the 66-foot forward assembly. The forward assembly, comprised of the joined forward skirt, intertank, and liquid oxygen tank, completed construction and was transported to the final assembly area inside the factory Jan. 10. Technicians will move the liquid hydrogen tank back to this final assembly area where Boeing, the lead core stage contractor, will join the two structures. This will complete construction of most of the core stage that will launch the first crew on the Artemis II mission. Only the engine section, the fifth piece of the stage, will need to be added to complete the Artemis II core stage. For more, click [here](#).

NASA Telescope Spots Highest-Energy Light Ever Detected From Jupiter

Scientists have been [studying Jupiter](#) up close since the 1970s, but the gas giant is still full of mysteries. New observations by NASA's [NuSTAR](#) space observatory have revealed the highest-energy light ever detected from Jupiter. The light, in the form of X-rays that NuSTAR can detect, is also the highest-energy light ever detected from a solar system planet other than Earth. A [paper](#) in the journal *Nature Astronomy* reports the finding and solves a decades-old mystery: Why the [Ulysses](#) mission saw no X-rays when it flew past Jupiter in 1992. NASA's [Chandra](#) X-ray Observatory and the ESA (European Space Agency) [XMM-Newton](#) observatory have both studied [low-energy X-rays](#) from Jupiter's auroras – light shows near the planet's north and south poles that are produced when volcanoes on Jupiter's moon Io shower the planet with ions. Researchers faced multiple hurdles to make the NuSTAR detection. For more, click [here](#).

Security Officer at Stennis Helps Protect National Space Efforts

Justin Smith, contracting officer's representative and physical security officer for NASA's Stennis Space Center, helps secure the national effort to make space missions possible. After 20 years on site, Smith oversees Stennis's Protective Services Security Contract and Electronic Security Maintenance Contract, making the short drive in for work from his family land, where his ancestors have lived for generations.

Smith grew up in Poplarville, Mississippi, on land that has been in his family for longer than the town of Poplarville has had a name. It just so happens that the city was named after his ancestor "Poplar" Jim Smith. The nickname "Poplar" was given due to a poplar tree grove on his homestead that stretched along the railroad in the 1880s. To purchase the homestead, Jim Smith traded 10 bushels of corn to the Native American tribe. His descendants still live on the land today, and the history is part of the story of Pearl River County and Poplarville.

Growing up, Smith knew little about the many activities at nearby Stennis. Smith had an uncle who worked onsite for Rocketdyne, but he did not give much thought to working there himself in his youth. Smith remembers watching shuttle missions on television and the Columbia tragedy, but otherwise attended to other interests. It was not until his father brought him along on a trip to a government vehicle auction that he realized Stennis was substantial. His first thoughts were, "This is a lot of stuff in the middle of nowhere."

The Stennis multiagency federal city lies within the 13,800-acre gated Fee Area but is surrounded by 125,000 acres of the uninhabited acoustical buffer zone. The "middle of nowhere" Smith encountered turned out to be the nation's premier propulsion test facility.

Smith did not begin working for NASA at Stennis after school. For Smith, an opportunity to work at Stennis opened with an interview for a position with Datastar Inc. He had been working in an information technology service company out of Ridgeland, Mississippi, on projects that kept him living out of hotels for most of each month, including weekends. Datastar Inc held a subcontractor position to Lockheed Martin, which, in turn, held the Stennis Information Technology Service Contract. The interview led Smith to begin work at Stennis as a Datastar Inc. employee Aug. 13, 2001.

After the September 11 tragedy, Smith began to climb the ranks of leadership from desktop support to domain

administration and general system administrative support. At that time, Smith was introduced to another company installing security cameras. Smith soon realized security installation would not stop with cameras. It would move on to using card

physical security began to merge. So, I began to learn as much as I could about this merge and electronic security." The decision turned out to be perfect preparation for Smith's next role.

Smith said. "As I read, I began to believe that I could do the job if only I could get an interview."

With that interview and the knowledge he developed, Smith made another significant professional change. Smith transitioned from a position as a Stennis contractor to a civil servant role Dec. 5, 2011, and has worked for NASA ever since that time.

In that regard, Smith has contributed to national goals to return humans, including the first woman and first person of color, to the Moon as part of NASA's Artemis program. He helped establish and ensure security for the Space Launch System (SLS) core stage Green Run test project, including transport of the core stage to the facility aboard the Pegasus barge. The SLS Green Run testing was the largest test project at Stennis in 40 years.

"I find myself anxious and excited after seeing all the long hard hours that went into the Green Run test," said Smith. "With seeing Pegasus in and out of Stennis, carrying vital pieces of the test equipment, to seeing the SLS rocket module on the Stennis test stand, to viewing the test, I am looking forward to the positive news as NASA prepares for human flight back to the Moon and beyond."

Leading the way on the electronic security installation at Stennis, Smith began in a time where only a few buildings had any electronic security. Today, Smith's teams continue developing and installing security measures across the center, especially in those areas closely related to NASA's mission. His work directly helps protect the property and data for both NASA and multiple commercial companies investing in Stennis, developing their low-Earth orbit space travel program.

"I get to work with a lot of great people," said Smith. "Stennis has a range of personnel working throughout the center. They hold many differences in age, race, lifestyle, belief, and culture. We also continue to have personnel coming to Stennis to perform work from other countries. Stennis is a place where, no matter where you are from or who you are, everyone works together to support the missions."



After 20 years at Stennis, Justin Smith helps secure the national effort to make space missions possible as a physical security officer and contract officer representative on security contracts.

readers and perhaps more.

"It was clear the way the government had been doing business was changing," Smith said. "Information technology and

In the latter part of 2011, Smith noticed a job posting that looked similar to his current position. "I was hesitant about applying, as I thought I lacked in my portfolio the skills and achievements to meet the requirements for the position,"

Smith has 20 years of service at Stennis. The latest 10 years of that time, Smith has served as a NASA civil servant. With his help, NASA is taking steps to develop a future for humans in space and here on Earth.

Stennis News

Stennis Engineer Named to Lead Key NASA Office

Longtime Stennis Space Center employee Christine Powell has achieved federal Senior Executive Service (SES) status and been selected to lead NASA's [Rocket Propulsion Test \(RPT\)](#) Program office located at Stennis.

In her new role, Powell will lead an RPT team responsible for managing NASA's chemical rocket propulsion test facilities, activities, and resources across the agency. The office also leads in identifying and integrating agency rocket propulsion test requirements and advancing propulsion test technologies. Powell's appointment to the key role was made possible by her attainment of SES status.

Created in 1979, SES classification is designed for federal employees who use well-developed executive skills to administer programs at the highest levels of the government. The leadership program requires candidates to demonstrate skills in five key areas – leading change, leading people, results driven, business acumen, and building coalitions.

Prior to assuming her new position, Powell, a native of Biloxi, Mississippi, and resident of Carriere, Mississippi, served as assistant director of the Stennis

Engineering and Test Directorate. The role included a range of responsibilities, including leadership of the directorate's Project Formulation Planning and Control Office.

Powell also served on a technical committee to ensure readiness of the [B-2 Test Stand](#) at Stennis for recent Green Run testing of NASA's [Space Launch System](#) core stage, directly supporting the agency's [Artemis](#) effort to return humans, including the first woman and first person of color, to the Moon.



Powell has served in multiple positions since beginning her 31-year NASA career at Stennis as a student intern in 1991. After graduating from Mississippi State University and becoming a full-time employee at Stennis in 1995, she worked as a controls engineer, instrumentation engineer, data acquisition engineer, test project console operator, systems engineer lead, project manager, and Systems Engineering Branch chief. She also provided support to several program-level and agency-level teams and committees, leading efficiency and effectiveness initiatives for propulsion testing, and overseeing data, risk, and business management functions in the Engineering and Test Directorate.

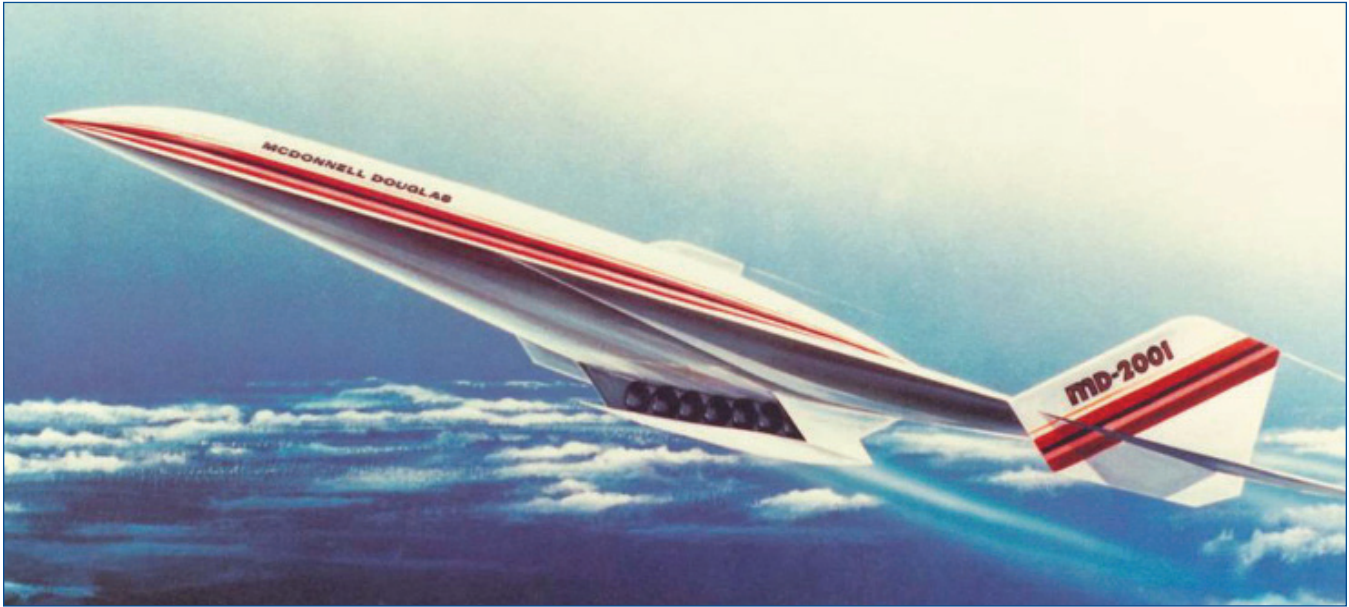
NASA Recognizes Stennis Space Center Employee

To mark progress in NASA's Artemis program that will return humans, including the first woman and first person of color, to the Moon, the space agency has been recognizing Space Heroes performing necessary and critical work. Overall, 28 Stennis Space Center employees have been cited for their Artemis-related efforts. The latest is Christopher Carmichael.



Carmichael provided critical leadership in coordinating all aspects of information technology (IT) support as the deputy chief information officer at Stennis for the Space Launch System (SLS) wet dress rehearsal and hot fire tests, ensuring the mission and partners had every IT requirement met for a successful Green Run test campaign. For more on Green Run testing, click [here](#).

Stennis, Langley Enjoy Longstanding Partnership



The above image is an artist rendering of the X-30 hypersonic McDonnell Douglas National Aerospace Plane being developed

In his 1961 State of the Union address, then-President John F. Kennedy said, “I believe this nation should commit itself to achieving the goal, before the decade is out, of landing a man on the Moon and returning him safely to Earth.” So, researchers at NASA’s Langley Research Center near Hampton, Virginia, and other NASA centers nationwide brainstormed on how the United States would get a human on the Moon and home again.

Langley recently had worked on similar human spacecraft solutions with Project Mercury. During those missions, NASA developed the knowledge that successfully sent Alan Shepard to space for a 15-minute suborbital flight in the Mercury capsule Freedom 7.

NASA considered many ideas to achieve the next goal of putting humans on the Moon. However, they reduced and categorized the options into three basic plans: Direct ascent, which involved an Earth launch to the Moon, then return launch to Earth without rendezvous; Earth Orbital Rendezvous, which launched spacecraft components to low-Earth orbit for assembly, then boosted the spacecraft to the Moon before returning to Earth; or a lunar orbital rendezvous (LOR), which involved launching a main spacecraft and lander to the Moon, using the lander to travel to the lunar surface before re-docking with the main spacecraft, then returning only the main spacecraft to Earth. Langley researchers preferred the third option.

After months of research and debate, NASA selected LOR and the Saturn V rocket as the launch vehicle. The Saturn V rocket engines, and all other rocket engines in the Apollo and Space Shuttle Programs, would be tested

in Hancock County, Mississippi, at NASA’s Stennis Space Center.

In the 1970s, Langley worked with Stennis to study space applications and develop environmental instrumentation and sensing equipment. Interested in environmental pollution matters, Langley sought information and research from Stennis and the facilities housed there. Then Stennis facilities included: Earth Resources Laboratory; Gulf Coast Hydrosience Center; the U.S. Fish and Wildlife Service, which was conducting the Atchafalaya Land and Water Management Study; the National Pesticides Monitoring Laboratory; and the Oceanographic Instrumentation Center.

In the 1980s and early 1990s, President Ronald Reagan instituted a short-lived program. Then called the National Aero-Space Plane (NASP), the program became known as the Orient Express. Unfortunately, the program was never fully realized. It closed about 10 years after being announced, but the program brought new light and ideas to NASA’s supersonic and hypersonic vehicle research.

In the short time that NASP was active, Langley and Stennis worked jointly, researching and developing the engines that would take people on supersonic flights. The plan proved neither monetarily feasible nor physically practical for the potential passengers riding in the plane, but the ingenuity remained.

Working with Langley over the last 50 years, Stennis has made tremendous leaps in research and development. The cooperation will continue to benefit NASA and the nation in the years to come. For more on the NASP program, click [here](#).

Office of Diversity and Equal Opportunity

Celebrate Black History Month and Pioneer Scientists

In 1926, Carter G. Woodson, an American historian, author, journalist, and founder of the Association for the Study of African American Life and History (ASALH), established February as “Black History Month.” Woodson’s purpose in creating Black History Month was to bring public attention to the important contributions of African American people in America. Since its inception, Black History Month has become a time to reflect on the histories, experiences, accomplishments, cultures, and communities of African American people.

The 2022 Black History Month theme announced by ASALH is “Black Health and Wellness.” The theme focuses on the legacies of African American scholars, medical practitioners in Western medicine, and other medical practitioners throughout the African diaspora, such as birth workers, doulas, midwives, naturopaths, and herbalists. In addition, the 2022 theme considers activities, rituals, and initiatives that African American communities have done to stay well.

According to ASALH, “To foster good health and wellness, African American people have embarked on self-determination, mutual aid, and social support initiatives to build hospitals, medical and nursing schools (i.e., Meharry Medical College, Howard University College of Medicine, Provident Hospital and Training School, Morehouse School of Medicine, etc.), and community clinics.

Individuals, grassroots organizations, and mutual aid societies, such as the African Union Society, the National Association of Colored Women, and the Black Panther Party, established clinics. Those clinics provided spaces for African American people to counter economic and health disparities and discrimination found at mainstream institutions. Initiatives to help decrease disparities have centered on several outcomes, including having more diverse practitioners and representation in all segments of the medical and health fields.

Many African Americans worked to enhance health and wellness in the United States

throughout the ages. According to Insight News, in 1721, during a smallpox outbreak in Boston, Onesimus, “an enslaved African teaching his master the method of inoculation, helped end the smallpox outbreak.” Dr. Daniel Hale Williams performed the first successful open-heart surgery in 1893 at Chicago’s Provident Hospital. Most recently, during the COVID-19 pandemic, Dr. Kizzmekia Corbett “led the team of scientists that developed the vaccine to immunize Americans.”

In addition to medical professionals, numerous African American scientists developed new scientific discoveries. According to a National Geographic article, “Making History: African American Pioneers of Science,” one of the first significant scientists of the 19th century was George Washington Carver. Carver was an agricultural chemist who used peanuts to develop alternative farming methods. Along with these, Carver developed soap, face powder, shampoo, metal polish, adhesives, and even mayonnaise, all from peanuts.

Percy L. Julian was a chemist who used soya products to develop innovative drugs and industrial chemicals during the early 20th century. Julian’s most notable discoveries, known as “bean soup,” saved the lives of thousands of sailors and naval air personnel during World War II.

Scientists who are special to NASA include Mae C. Jemison. Jemison was a Peace Corps medical officer before joining NASA’s astronaut training program. She was a part of an eight-day space flight aboard Endeavour in 1992, which made her the first female African American in space.

To learn more about Black History Month and other African American pioneers of science, check out the links below:

[The Association for the Study of African American Life and History](#)

[Black Scientists and Inventors | Black History Month \(nationalgeographic.com\)](#)

[Black History Month 2022 celebrates Black health and wellness | Columnists |](#)

Online Resources

NASA Spinoff 2022

Stennis Emergency Management

This is NASA 2022 video

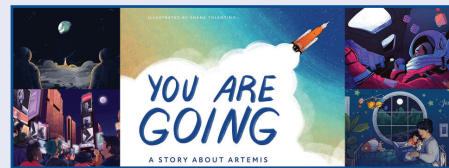
NASA Coronavirus Response

I Am Stennis Facebook Videos

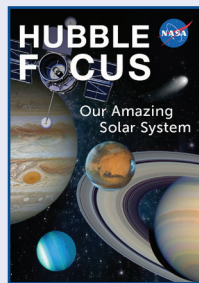
Stennis Fact Sheets



First Woman Graphic Novel



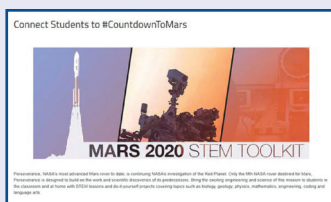
You are Going Children's Book



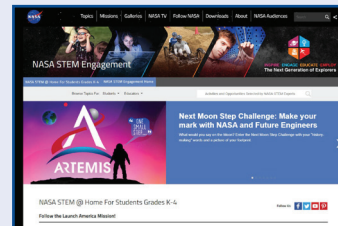
NASA E-Book Downloads



Stennis Artemis Resources page



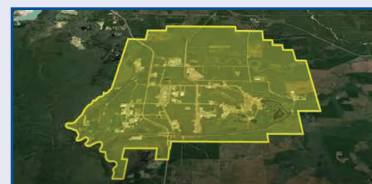
MARS 2020 STEM Toolkit



NASA STEM@Home for Students



NASA at Home



Stennis Virtual Tour