National Aeronautics and Space Administration



# AeroSpace FRONTIERS

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Center Holiday Gathering Page 4

> R&D 100 Awards Page 7

CFC Day of Giving Page 12 Orion Spacecraft Arrives in Ohio! Page 2–3



### ACTING DIRECTOR'S SAFETY CORNER

### Welcome 2020

Welcome back from the holidays! This new year started with the continuation of the Orion thermal vacuum testing in the Space Environmental Complex at Plum Brook Station. Our team is delivering testing and quality oversight to assure Artemis' success. Artemis is one of Glenn's top priorities in 2020, including the Orion testing, European Service Module Development and Power and Propulsion Element execution. Glenn will also focus on the development of electrified aircraft, improvement of new mission support operations, modernization of cloudbased alternatives and the center's websites and nurturing of external partnerships. Thank you for your part in successfully executing these priorities with safety, excellence and mission success in mind.

Happy new year,

### AeroSpace Frontiers

is an official publication of Glenn Research Center, National Aeronautics and Space Administration. It is published the second Friday of each month by the Office of Communications & External Relations in the interest of the Glenn workforce, retirees, government officials, business leaders and the general public.

Submit short articles and calendar items to the editor at doreen.b.zudell@nasa.gov.

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# Orion Spacecraft Arrives in Ohio



GRC-2019-C-11993

Photo by Jef Janis

Super Guppy lands at Mansfield Lahm Airport.

NASA's Super Guppy aircraft arrived at Mansfield Lahm Airport on Sunday, Nov. 24, with the Orion spacecraft for Artemis I aboard. The spacecraft came to Ohio for a 4-month environmental test campaign at Plum Brook Station (PBS), which will subject the spacecraft to the vacuum, extreme temperatures and electromagnetic environment it will experience during its journey around the Moon.

"The tests will confirm the spacecraft's systems perform as designed, while ensuring safe operation for the crew during future Artemis missions—both on the ground and in-flight," said Testing Project Manager Nicole Smith. "We like to say, 'we test like we fly,' and that is exactly what we are going to accomplish during the upcoming Artemis 1 environmental tests."

Nearly 1,500 people came out to the landing event, which included NASA exhibits, presentations from Mark Kirasich, the Orion Program manager, and autographs with astronaut Doug Wheelock. At about 4:35 p.m. EST,



**On the Cover:** Nicole Smith, project manager for Orion spacecraft testing at Plum Brook Station, stands in front of NASA's Super Guppy at Mansfield Lahm Airport.

# Undergoes Critical Environmental Testing at Plum Brook Station

the crowd gathered along the flight line as the Guppy, which had traveled from NASA's Kennedy Space Center, appeared in the eastern sky on approach. As the aircraft taxied to a stop, the crowd broke out into cheers, just as the sun began to set.

At sunrise the following day, technicians from NASA, Lockheed Martin and the Ohio Air National Guard opened the Guppy's nose to reveal the wrapped spacecraft. They then loaded Orion onto a large flatbed trailer that would transport it to PBS for testing.

The transportation team drove the spacecraft across Northeast Ohio's new space corridor, arriving at PBS



Orion spacecraft is lifted into the Heat Flux System at the Space Environments Complex.



GRC-2019-C-11965 Photo by Bridget Caswell Dr. Pérez-Davis talks with the public while waiting for the aircraft to land.

on Tuesday, Nov. 26. NASA Glenn worked with the Ohio Department of Transportation and local utility companies to clear more than 700 overhead lines from the 41-mile stretch of rural highway between Mansfield and PBS. The space corridor creates new opportunities for Ohio by enabling PBS to conduct large-scale testing of agency and commercial spacecraft previously unachievable due to logistics challenges.

"This is the final critical step before the spacecraft is ready to be joined with the Space Launch System rocket for this first test flight in 2020," said Acting Director Dr. Marla Pérez-Davis. "Our team at Plum Brook Station has been upgrading the Space Environments Complex to prepare for this test, and we are thrilled that it is here."

The testing began in early December and will be completed in two phases inside the world's largest vacuum chamber. The first is a thermal test, lasting approximately 60 days, which replicates flying in and out of sunlight and shadow in space. The second phase is an electromagnetic interference and compatibility test, lasting about 14 days.

The spacecraft will return in March along the same path to Kennedy to begin integration with the Space Launch System.

By Jimi Russell



# Holiday Gathering Spreads Gamaraderie and Cheer

Employees across the center joined their co-workers for the **2019 Holiday Gathering** on Dec. 10 in the MIC Auditorium at Lewis Field. The event featured a year-end highlights video and a look ahead to 2020 priorities from Acting Center Director Dr. Marla Pérez-Davis. Members of the U.S. Marine Corps picked up boxes of employee-donated toys for the Toys for Tots campaign. Festivities included NASA Glenn Jeopardy and the Holiday Decorating Contest winner. The Glenn Ensemble played holiday classics while employees enjoyed light refreshments.



2019-C-11838 Photo by Marvin Smith Associate Director Larry Sivic and Dr. Pérez-Davis flank two members of the Holiday Decorating Contest: Jim Bailey and Joel Chaney.



GRC-2019-C-11878 Photo by Marvin Smith "Jay" Trebeck, played by Jay Jackson, left, with members of the winning Jeopardy team.



GRC-2019-C-11817 Photo by Marvin Smith Members of the Glenn Ensemble provide a festive backdrop for the celebration.



RC-2019-C-11789 Photo by Jef Janis U.S. Marine Corps members pick up boxes of employee-donated toys.

# Glenn Spectrum Team Negotiates Radio Policy in Egypt

Every NASA mission requires communication or data transfer via electromagnetic spectrum—specifically radio waves. Radio spectrum is used for everything from cell phones, to GPS, to controlling drones, to sensing the Earth's changing climate from space. While the amount of radio spectrum available for use by these diverse applications is fixed, the demand for more access keeps increasing.

NASA Glenn's Space Communications and Spectrum Management Office, within the Space Communications and Navigation (SCaN) Program, ensures radio spectrum is managed in a way that allows all radio spectrum used by the agency is to be shared without causing harmful radio interference (i.e., two radio operators accidentally "jamming" each other's communications). The office is also home to NASA's National Spectrum Program Manager John Zuzek; International Spectrum Program Manager Glenn Feldhake; and Acting Director of the NASA Spectrum Analysis Center Dan Bishop.

"NASA's Spectrum Office obtains the required authorizations for every piece of radio equipment used by the agency," said Feldhake. "It also reviews applications from every federal agency to deploy radio equipment anywhere in the United States, as well as applications for nonfederal radio operators wishing to operate at frequencies used by the federal government."

Further, as spacecraft have visibility to the entire planet, NASA's Spectrum Office is required to coordinate both spectrum use and international regulations with other operators around the world. This happens within the auspices of the International Telecommunication Union (ITU).

The ITU is a specialized agency of the United Nations that is responsible for cross-border issues concerning information and communication technologies. The ITU coordinates the shared global use of the radio spectrum, promotes international cooperation in assigning satellite orbits, works to improve telecommunication infrastructure in the developing world and assists in the development and coordination of worldwide technical standards.



GRC-2019-CN-00065 The NASA Delegation, left to right: back row: Zuzek, Coralí Roura (HQ), Brad Kaufman (HQ), Farzin Manshadi (JPL), R.J. Balanga (HQ), and Greg Ratta (ASTS). Front row: Houts, Lisa Cacciatore (GSFC), Feldhake, Vic Sparrow (HQ), and Evans.

Within this scope of work, the ITU administers a 2,400page treaty signed by more than 160 countries. The treaty, which is called the ITU Radio Regulations, is renegotiated every 3 to 4 years at a World Radiocommunication Conference (WRC). The most recent WRC took place Oct. 28 to Nov. 22, 2019, in Sharm El-Sheikh, Egypt. Mike Evans, Feldhake, Jacki Houts and Zuzek from the Spectrum Office at Glenn served on the U.S. Delegation directly supporting its ambassador.

"Our team tracked more than 30 issues being negotiated," Feldhake said. "We provided guidance and engineering analysis to regulators and the Department of State to support U.S. positions."

Additionally, just prior to the WRC, the ITU held a Radiocommunication Assembly where Zuzek was reelected as chairman of ITU–R Study Group 7 for Space Science. In this role, he will continue his leadership in developing internationally agreed upon recommendations and reports on matters reviewed by the ITU. These will serve, in part, as the technical basis for renegotiating the ITU Radio Regulations at the next WRC in 2023, both to facilitate NASA's evolving spectrum-dependent requirements and to protect its existing systems.

# Celebrating and Anticipating Lunar Exploration



Last year marked a significant point in the history of humankind as NASA celebrated the 50th anniversary of the Apollo 11 Moon landing. Glenn staff participated in a variety of events throughout the year to acknowledge this historic milestone and excite the public about Artemis—NASA's next giant leap to the Moon.

Glenn's Office of Communications and External Relations staff, with the help of employees across the center, led and/ or supported activities in venues locally, throughout Glenn's six-state area and beyond. Settings ranged from sporting events to museums to air shows.

"The Apollo 50th anniversary has been a great way to celebrate the achievements of Apollo and look ahead to Artemis," said Glenn's Apollo 50th Anniversary Program Manager David DeFelice. "At each of the events it's been wonderful to see the generations connect and share stories and dreams."

The Glenn-designed exhibition, "Apollo and the Next Giant Leap," which appeared at Lewis Field from April 9 to 22, made a huge impact. The 1,000-square-foot exhibit showcased the amazing achievements of Apollo and NASA's plans for the Artemis program. After the exhibit closed, Glenn's Exhibits staff chose artifacts and displayed them at locations such as the Armstrong Museum in Ohio and AirVenture Air Show in Wisconsin. Two smaller exhibits were



GRC-2019-CN-00059 Photo by David DeFelice Astronaut Sunita Williams, pictured with the Apollo 11 astronauts butter sculpture, at the Ohio State Fair.

sent to 14 libraries throughout Glenn's region to enhance their summer reading programs.

The celebration peaked the third week of July in commemoration of Neil Armstrong and Buzz Aldrin's first steps on the Moon, July 20, 1969. Several high-profile events, including the Summer Moon Festival in Wapakoneta, Ohio, brought Glenn staff in contact with thousands of people.

NASA will continue to acknowledge the 4-year Apollo Program through 2022. With the help of the Great Lakes Science Center, Glenn will showcase Apollo milestones. This April marks the 50th anniversary of the Apollo 13 mission. Stayed tuned to Today@Glenn for opportunities to celebrate.

By Doreen B. Zudell



David DeFelice with Exhibit Specialists John Oldham and William Gee after setting up the Apollo and the Next Giant Leap exhibit at The Works museum in Newark, Ohio.



GRC-2019-CN-00060 Photo by David DeFelice The Apollo library display case in Oxford Public Library in Michigan.





GRC-2019-CN-00057 L3 Technologies The communications amplifier (2000HDA—A–126) hardware.

GRC-2019-C-10798 Photo Bridget Caswell Dr. Simons for the L3 Technologies's Linearized, Channelized TWTA team.

# Glenn Adds to R&D 100 Awards Legacy

The R&D World Magazine recognized Glenn researchers' contributions to innovation in the areas of software/services and information technology (IT)/electrical at the annual R&D 100 Awards ceremony on Dec. 5 in San Mateo, California. R&D 100 Awards are given for exceptional new products or processes that were developed and introduced into the marketplace during the previous year.

With this year's recognition, the center's total number of the prestigious R&D 100 innovation awards—commonly referred to as the 'Oscars of Inventions"—rises to 127. The awards are selected by an independent panel of judges based on the technical significance, uniqueness and usefulness of projects and technologies from across industry, government and academia.

The Glenn software team of Dr. Justin Gray, Bret Naylor (DBCO), Dr. Kenneth Moore (DBCO) and Dr. Tristan Hearn, Propulsion Systems Analysis Branch; Robert Falck, Mission Architecture and Analysis Branch; Stephen Ryan, Aeronautics and Ground-Based Systems Branch; and Dr. Herbert Schilling, Information and Applications Office, earned an R&D 100 Award for Open Multidisciplinary Analysis and Optimization (OpenMDAO) Framework. OpenMDAO is an open source framework that allows users to solve the most complex multidisciplinary analysis design optimization problems at an unprecedented scale. It can be used to streamline design processes for extremely complex systems, from experimental aircraft to wind turbines to space missions, saving significant cost and time. Dr. Rainee Simons, Advanced High Frequency Branch, collaborated on a team with Glenn's external partner, L3 Technologies Electron Devices Inc., for the Linearized, Channelized Traveling-Wave Tube Amplifier (TWTA). Their high-power radio frequency amplifier (2000HDA–A16) is designed specifically to exploit available Q-band frequency spectrum for satellite-to-Earth data transmission. The power, efficiency, linearity and reliability of this spaceflight-qualified amplifier enables gigabitsper-second (Gbps) data rates across satellite links that will enable interoperability of NASA and commercial systems and also dramatically improve worldwide communications using these links. This is the third time the team has won the R&D 100 Award. They were also recognized in 2006 and 2009 for the development of the Ka-band and the K-band TWTAs, which flew on the Kepler and the Lunar Reconnaissance Orbiter missions, respectively.

For a list of all the winners, visit https://www.rdworldonline.com/2019-rd-100-award-winners-unveiled/.



GRC-2019-C-11891

Photo Jef Janis

OpenMDAO team, left to right: front: Dr. Schilling, Dr. Moore and Dr. Hearn; back: Dr. Gray and Falck. Not pictured: Ryan.

## Glenn, American Heart Association Raise STEM Awareness

Panelist Erin Rezich (in blue), an aerospace engineer at Glenn, speaks to 180 female students during the American Heart Association's third annual STEM Goes Red for Girls event at Cuyahoga Community College Western Campus, Nov. 15. Women make up half of the workforce but hold less than 25 percent of jobs in STEM-related fields. STEM Goes Red for Girls enabled NASA Glenn staff, along with other STEM-related organizations, to provide hands-on activities and mentoring to young girls. The event helped enhance their knowledge, transform the way they think about STEM and uncover their potential.



GRC-2019-CN-00064

Photo by Debbie Lockhart

# **NEWS AND EVENTS**

### Trending With Tech Transfer: NITINOL 60, a Superalloy



Glenn's Technology Transfer Office has signed a nonexclusive evaluation license with Kamatics Corporation, Bloomfield, Connecticut, specializing in bearings and engineering product innovation. Kamatics, along with their high-precision, roller bearing manufacturing affiliate GRW, Lexington, Kentucky, will investigate use of NiTiNOL 60 (60NiTi), a nickel-titanium alloy among a suite of shock- and corrosion-proof superelastic intermetallic materials Glenn has developed for use in ball bearings and other mechanical components. This technology will be used for Kamatics and GRW's antimagnetic bearing medical

*Technology Transfer licensing icon.* will be used for Kamatics and GRW's antimagnetic bearing medical equipment such as X-rays, MRIs and CT scans applicable to customers in medical supplies and medical professionals.

For more information on NASA Glenn's technologies available for licensing, visit https://technology.grc.nasa.gov/.

### **ESM Pre-Ship Review Team Earns SFA Team Award**

Susan Motil, chief of the European Service Module (ESM) Integration Office, presented a Space Flight Awareness Team award to Glenn members of the ESM Pre-Ship Review Team on Oct. 31. The award recognizes "exceptional performance in completion of the ESM Pre-Ship Review and delivery of the ESM—1 to NASA's Kennedy Space Center, which was a critical milestone for the Orion Program, as it enables the start of integration and testing of the ESM with the rest of the Orion vehicle." The shipment was particularly challenging due to the complexity of negotiations based on a four-party team—NASA, Lockheed Martin, the European Space Agency and Airbus. The team worked across multiple time zones, language barriers and cultural differences. A small portion of the Glenn team is represented below.



GRC-2019-C-11751

A portion of the Glenn team pictured, back row, left to right: Motil, Donald Butler, Rob Overy, Mark Hyatt and Stacy Alcorso. Front row: Natalie Goldin, Kristen Bury, Karen Fashimpaur, Edward Lewandowski and Kathleen Kachmar.

#### Photo by Jef Janis

# **SFA Artemis I Testing Contributions Rewarded**

Astronaut Jim Kelly and the International Space Station Director in NASA's Human Exploration and Operations Mission Directorate Sam Scimemi, presented Space Flight Awareness Honoree awards for Artemis I design and hardware testing to ensure future human spaceflight mission success, Nov. 6.



Pictured, left to right: Scimemi, Liang, Bobanga and Kelly.



Pictured, left to right: Scimemi, Liang, Henry and Kelly.

Glenn's **John O. Bobanga**, ESM Propulsion Qualification Module Safety and Mission Assurance lead, Reliability and System Safety Engineering Branch; and **Michael W. Henry**, lead mechanical systems engineer, Space Environments Complex, were among those recognized during a ceremony in Houston. Anita Liang, Glenn's Safety and Mission Assurance director, attended to show her support.



Griffin

### PROMOTIONS

RETIREMENTS

Danielle M. Griffin has been selected Center Risk manager in Glenn's Management Integration Office, Safety and Mission Assurance Directorate. She previously served as the Center Mishap Investigation manager, and most recently, as the Center Technical and Quality Audit lead. **Dr. Peter M. Struk** has been selected chief of the lcing Branch in the Propulsion Division. Struk most recently served the branch as lead investigator for a series of ice crystal icing tests supporting the Advanced Air Transport Technology project.



Dr. Struk



Cotton



**Brown-Houston** 



Jennings, Jr.





Saad



Sammon

**David Cotton,** Technical Services Branch, Fabrications Division, retired Dec. 27, 2019, with 33 ½ years of service.

Stephanie Brown-Houston, Office of Education, Center Operations Directorate, retired Dec. 31, 2019, with 20 ½ years of service.

**Frank Jennings Jr.,** Office of Communications and External Relations Deputy Division Chief, retired Dec. 31, 2019, with 35 years of federal service, including 6 ½ years with NASA.

Anderson K. Marlow, Aerospace Test Branch, Testing Division, retired Dec. 30, 2019, with 39 years of service.

Adam M. Redding, Aviation Test Branch, Facilities, Test



Sefcik





and Manufacturing Division, retired Dec. 31, 2019, with 31 years of service.

**George J. Saad,** Diagnostics and Electromagnetics Branch, Power Division, retired Dec. 31, 2019, with 41 years of federal service, including 31 with NASA.

Lynne Sammon, Office of Education, Center Operations Directorate, retired Dec. 31, 2019, with 30 years of service.

**Robert J. Sefcik,** Office of Chief Financial Officer, retired Dec. 31, 2019, with 29 years of service.

Lawrence Wald, Management Support and Integration Branch, Research and Engineering Directorate, retired Aug. 31, 2019, with 35 years of service.

### **Retiring soon?**

Share your retirement in AeroSpace Frontiers. Fill out the GRC341 form and send it to Doreen.B.Zudell@nasa.gov.

# **Upcoming Center Events**



**Volunteers are needed!** The FIRST Robotics Competition Buckeye Regional requires more than 200 volunteers to make the competition run smoothly. On Thursday through Saturday, March 26 to 28, 2020, over 1,500 young innovators will practice and compete their robots in this year's game challenge, "Infinite Recharge." The theme is inspired by Star Wars: Force for Change. To learn more about the Buckeye Regional and register as a volunteer, go to www1.grc.nasa.gov/frcbuckeye.

### Make a Donation...

American Red Cross staff will be on-site Jan. 22 and 23, from 8:30 a.m. to 3:30 p.m. Appointments are encouraged and can be scheduled by using the Donor App, entering NASA for the Sponsor Code or going to the American Red Cross website.

Correction

Glenn civil service employees who successfully donate will be granted up to 2 hours Excused Leave (select XLV68-Blood Donation in WebTADS), which must be used the day of your donation.

POC: Rhonda Billick, 3–6286

# •



Two key members of Glenn's Test Facility Tours website were inadvertently omitted from the December *AeroSpace Frontiers* article on the Apex Award of Excellence for Special Purpose website. **Doris Bliumentalis,** Office of the Chief Information Officer, and **Kathy Zona,** detailed to



### **GSEL MOBILE LIBRARIAN**

The Glenn Science and Engineering Library (GSEL) Mobile Librarian will be visiting building 341 (Fitness Center) on Jan. 14 and 16, from 11 a.m. to 1 p.m. and building 49 from Jan. 28 to 30 and Feb. 4 and 6, from 1 to 3 p.m. A Glenn reference librarian will be ready to assist employees with subject searches, finding specific books and articles and other information needs on the spot.

POC: Robin Pertz, 3-5776

### **OUTDOOR SIREN TESTING**

The Emergency Management Office staff will conduct an audible siren test on the "severe thunderstorm" tone on Saturday, Feb. 1 at Lewis Field. A mass notification "voice" test will be conducted at building 6 on Wednesday, Feb. 5. An audible siren test will be conducted.

POC: Allen Turner, 3-6826

### **IFPTE LOCAL 28, LESA MEETING**

LESA will hold its next membership meeting, Wednesday, Feb. 12, noon, in the Glenn Employee Center's Small Dining Room.

Deadline for next calendar section is **Jan. 22, noon**. News and feature stories require additional time.

Facilities Division, were part of the team that designed the site at https://www.grc.nasa.gov/f/fx/fxt/tour/.

The site enables more effective handling of increasing requests for tours. It defines a process for online tour requests, specifies authorized tour audiences and lists more than 25 of Glenn's most popular facilities.

National Aeronautics and Space Administration

John H. Glenn Research Center

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www.nasa.gov

Read AeroSpace Frontiers online at http://www.nasa.gov/centers/glenn/news/AF/index.html.

### **Employees Give Back on National Day of Giving**



GRC-2018-C-05676

Forever Amber Acres Animal Santuary in Medina. Left to right: Nicole Barcellos, Angela Windau, John Trzop (Forever Amber Acres), Andrea Bonesteel and Ayoub Kirresh (Forever Amber Acres).



GRC-2018-C-05676 Towards Employment in Cleveland. Left to right: Christopher Peters, Paht Juangphanich, Issam Boukabou and Anthony Williams.

National Day of Giving is a global day dedicated to giving back. On Tuesday, Dec. 3, Glenn employees donated their time to help a variety of service organizations. Glenn's Combined Federal Campaign team made it possible for employees to sign up for specific community service opportunities from several charities that were available on the Day of Giving.



GRC-2018-C-05676 Wade Park School in collaboration with America Scores, Cleveland. Diana Chan with students. Other Glenn volunteers included Chris Colwell, Antoine Moss and Mark Sorrells.

**Emergency and Inclement Weather Lines** 

Lewis Field: 216–433–9328 (WEAT) Plum Brook Station: 419–621–3333

### **Connect With Glenn**

