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Safety Culture Survey

Periodically, we conduct a Safety Culture Survey to assess our center performance in providing a safety-driven environment for all who work at NASA Glenn. This year, the survey closed on April 15, and the participation rate was very good. We increased the number of responses received by more than 35% and collected over 1,500 comments. The results will be shared in the August timeframe and used to modify our approach to enhance safety and mission success. Thank you for taking the time to provide your input through the survey and making a positive impact in our pursuit of safety and excellence.

Embracing a strong safety culture creates a safe work environment to deliver on our mission commitments.



AeroSpace Frontiers

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

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On the Cover: Glenn engineer Fransua Thomas checks the test soil for consistency before measuring excavation forces.

At left: Kyle Johnson, Fransua Thomas and John Veneziano carefully attach a test bucket to the load cell mounted on the APEX arm.

Robotic Mining Laboratory Simulates Excavation in Extraterrestrial Environment

To reduce the cost to get to deep space and return home, and eventually live and work there for months or years, crew members must have access to the life-sustaining elements and critical supplies readily available on Earth. On the Moon, and eventually on Mars, surface materials can be mined to produce oxygen, water and other valuable resources.

The farther humans go into deep space, the more important it will be to generate needed products from local materials, a practice called in situ resource utilization (ISRU).

Started as part of NASA's Advanced Exploration Systems ISRU Technology Project led by Diane Linne, and now in the Space Technology Mission Directorate, Glenn has created an excavation laboratory. It is located near the Simulated Lunar Operations Laboratory in the Engine Research Building complex. A 40- by 20-foot, 16-foot-high windowed enclosure houses the Advanced Planetary Excavator (APEX) robotic arm, along with a shaker table and soil bins. These items combined allow researchers to replicate excavation in extraterrestrial environments using simulants of off-world dirt, or regolith.

"Since lunar material (Moon rock) is precious and not replaceable yet, we use simulants of regolith for testing," explained Phillip Abel, deputy chief of Glenn's Mechanisms and Tribology Branch and excavation lead. "Glenn, in conjunction with Case Western Reserve University, has created a simulant called GRC–3, specifically designed to mimic lunar surface excavation."

Excavation here on Earth is quite different than on the Moon or Mars. When we dig a hole into soil on Earth, we have plenty of weight due to gravity to put behind the shovel. On the Moon or Mars, we may not have the ability to put as much weight behind the shovel to dig effectively due to low gravity and the need to design lightweight machines for launch from Earth.

"In addition to quantitatively measuring the forces in excavation to validate our modeling, we are also examining how to reduce the excavation forces in order to reduce how much vehicle traction you need," Abel said.

Glenn's Margaret Proctor led the setup of the new laboratory with help and input from facilities and fabrication personnel and co-researchers. Fransua Thomas is leading the current testing, with multiple people supporting the effort. While the team is gathering initial data now to compare with modeling being done by Dr. Walter Duval, the tests in dry GRC–3 are expected to be completed by this summer.

"We're excited about this ISRU activity," Abel said. "This will lead us into the next stages of exploration as part of the Moon to Mars initiative."

Glenn Visionaries Inspire Employee Discussion



Dr. John Betterson, at the podium, moderates the discussion of visionaries, seated, left to right: Koch, Calhoun and Dr. Pérez-Davis.

On March 20, Glenn's Women's Advisory Group, in partnership with the Office of Diversity and Equal Opportunity, hosted "Visionary Women: Champions at Glenn," in recognition of Women's History Month. The event acknowledged and invited discussion with three of Glenn's visionaries: Deputy Center Director Dr. Marla Pérez-Davis; Deputy Chief of the Program and Project Assurance Division Cynthia Calhoun; and Acoustics Branch Aerospace Engineer Danielle Koch. They discussed the role that mentors, quality training and a work/life balance played in identifying their strengths, challenges and eventual opportunity for leadership.

NEWS AND EVENTS

Appreciation Event Shows Some Love to CFC Participants



Rodgers, left, and Colwall, Keyworker of the Year.

Team members and supporters of Glenn's 2018 Combined Federal Campaign (CFC) gathered on March 20 to acknowledge the accomplishments and recognize employees who helped Show Some Love to those in need.

Associate Director Janet Watkins, CFC Chairperson Terri Rodgers, Loaned Executive Osvaldo Rivera and Campaign Associate Director for the Northern Ohio Zone 28 Carol McClain thanked employees for their service and generosity. More than 350 federal employees pledged \$244,033 to help improve the quality of life for people and communities.

NASA Glenn received the Director's Award for exceptional efforts in support of the campaign. Chris Colwall, Engineering Management Branch, received the Keyworker of the Year award for his outstanding service and creativity throughout the campaign. Rodgers passed the CFC torch to Co-Chair Issam Boukabou, who will chair the 2019 campaign.

Glenn Assists in Determining Earth and Space Air Prize Winner



Glenn's Dr. Marit Meyer, right, and Dr. Paul Mudgett, NASA Johnson's Biomedical Research and Environment Sciences Division, conducted performance testing in Glenn's Gases and Aerosols from Smoldering Polymers (GASP) Laboratory to help determine the winner of the 2018 Earth and Space Air Prize Competition. Mudgett proposed a challenge to create an aerosol sensor capable of monitoring and alerting engineers to air quality for humans living on Earth or traveling in spacecraft. NASA, in collaboration with the Robert Wood Johnson Foundation, selected Applied Particle Technology LLC of St. Louis, the winner of the \$100,000 prize. Development of the aerosol sensor is already underway for testing aboard the International Space Station. Meyer, manager of particulate monitoring roadmap for NASA's Life Support Systems Project, will also benefit from the research.

By S. Jenise Veris

Black Migrations: Journey Toward Equality

African Heritage Advisory Group (AHAG) members, Brandon White, Shanton Bland and Marcus Tarver kicked off Glenn's Black History Month Observance by performing monologues to the theme of "Black Migrations" on March 26. Keynote speaker, Dr. Deborah Abbott, who specializes in African American genealogy, gave a snapshot of the history of the Great Migration that occurred from 1915 to 1970. Her presentation, packed with facts and anecdotes, took the audience back in time as she illustrated how people's courage and fortitude began the journey for equal rights. AHAG and the Office of Diversity and Equal Opportunity hosted the event.





MiniGEER Focuses on Short-Duration Testing in Extreme Environments



Mark Kubiak adjusts gas fill and vent valves prior to a test in MiniGEER. The test section of the chamber is located at the bottom of this photo, wrapped inside a band heater.

Word is definitely spreading about the Glenn Extreme Environments Rig (GEER). The largest chamber of its kind in the world for testing materials in extreme environments has been cloned in a miniature version that will advance our knowledge of materials applicable to deep space exploration.

GEER, a world-class, ground-based test rig, creates the hightemperature, high-pressure and toxic atmospheric conditions found in many planets and moons in the solar system and beyond. Researchers have relied on GEER to help them investigate, develop and validate spacecraft systems and instrumentation in extreme environments since 2015.

While GEER focuses primarily on long-duration testing, a growing number of researchers desire short-duration testing. To accommodate this need, engineers in Glenn's Aerospace Test Branch—Alicia Graham, Conrad Doehne and Mark Kubiak—developed a small version of the test rig, which they call MiniGEER.

MiniGEER's chamber has a volume of 4 liters in relation to GEER's 811-liter chamber, and offers all the same pressure and temperature criteria that GEER offers. Currently MiniGEER is limited to a tri-gas mixture, but the team is hopeful that the funding will come through to add a complete gas mixing system to allow for full Venus surface mixture as well as other planetary environments.

During testing in GEER, the main user dictates the characteristics of the atmosphere and exposure time, while "ride-along" users are invited to test several material or technology articles separately, but within the chamber. These materials cannot be removed until the end of the test cycle, even if it is longer than they desire.

"Ride-along samples that require shorter-duration testing can now be placed into the MiniGEER," Doehne said. "This offers more customers a quicker, cost-effective way of testing in extreme environments."

MiniGEER also gives users more control over the test. Since the samples are not included in a chamber with other materials, customers can dictate their own exposure characteristics.

"Both GEER and MiniGEER offer a wide variety of material testing in virtually any extreme environment," said GEER Facility Manager Jim Mullins. "The science and technologies that result from this testing will allow us to explore even farther, understand science more deeply and provide spinoff materials and technologies that embed themselves in our everyday lives here on Earth."

Dr. Kavandi Inducted Into U.S. Astronaut Hall of Fame

NASA Glenn Center Director Dr. Janet Kavandi was inducted into the U.S. Astronaut Hall of Fame in a ceremony at NASA's Kennedy Space Center Visitor Complex on April 6. Veteran Astronaut James Buchli was also inducted.

"The pioneering spirit we see in every astronaut is truly exemplified by this year's inductees," said NASA Administrator Jim Bridenstine. "Janet Kavandi and James Buchli represent the best of America's astronauts, and I congratulate them for achieving this prestigious honor. Each has contributed greatly to the NASA mission, and their efforts have helped lay the groundwork for where we are today—including Janet's leadership directing Glenn's Moon to Mars work—as we chart a course for a return of American astronauts to the lunar surface in 5 years, and eventually on to Mars."

Bob Cabana, director of NASA's Kennedy Space Center and a 2008 inductee, was among the speakers at the ceremony. This event now brings the total number of hall of fame space explorers to 99.

Kavandi was a member of NASA's 15th class of astronaut candidates, selected in 1994. She is a veteran of three space shuttle missions, serving as a mission specialist on STS–91 in 1998, STS–99 in 2000, and STS–104 in 2001. She has logged more than 33 days in space, traveling more than 13.1 million miles in 535 Earth orbits.



Dr. Kavandi at the U.S. Astronaut Hall of Fame ceremony.

During her time in the NASA Astronaut Office, Kavandi supported International Space Station payload integration, capsule communications and robotics and served as deputy chief of the Astronaut Office. She became the director of Glenn in 2016.

The Astronaut Scholarship Foundation selects astronauts for induction into the U.S. Astronaut Hall of Fame, which was founded more than 30 years ago by the six surviving Mercury 7 astronauts as a venue where space travelers could be remembered and honored.

Learn more about Kavandi's journey at https://go.nasa.gov/2Da6zul.



Kavandi Rallies Support for Return to Moon

Center Director Dr. Janet Kavandi held an All Hands Meeting, April 18, to discuss NASA's human mission to the Moon by 2024 and Glenn's involvement in this mission. Using excerpts from NASA Administrator Jim Bridenstine's speech at the 35th Space Symposium, Kavandi addressed key challenges necessary to accelerate America's return to the Moon. She assured employees of the center's commitment to the challenge, and that Risk Management will be essential to ensure that safety will not be compromised to achieve the goal.



Apollo Program Reflections

From October 2018 through December 2022, NASA will mark the 50th anniversary of the Apollo Program that landed a dozen astronauts on the Moon between July 1969 and December 1972.

Here's a snapshot of the Apollo mission that occurred during the month of May:



DATE: May 18 to 26, 1969 MISSION: Tested the Lunar Module around the Moon CREW: Cernan, Young, Stafford

To learn more about the Apollo Program, visit https://www.nasa.gov/mission_pages/ apollo/index.html.



Cleveland Monsters Celebrate Apollo 11 Moon Landing Anniversary at the Q

NASA Glenn supported the Cleveland Monsters in celebrating the 50th anniversary of Apollo 11 with a special Monsters Moon Landing Night at the Quicken Loans Arena in Cleveland, March 23. Glenn employees, retirees and their families were among the crowd of 15,290 who watched the Monsters crush the Hershey Bears 5–2.

Glenn's Office of Communications and External Relations staff set up Apollo and Moon-related exhibits in the concourse, including an authentic Moon rock. Employees across the center assisted in staffing the exhibits and interactive activities that drew nearly 1,500 people to NASA's exhibit area.

"We are so grateful to the NASA team for putting on a first-class exhibit that was interactive, entertaining, educational and fun," said Pam Frasco, vice president of Marketing and Communications for the Cleveland Monsters. "Our fans still cannot stop talking about it!"

The Monsters wore specialty spacesuit-themed uniforms featuring the Apollo 11 design during the game, and retired NASA astronaut Mario Runco Jr. dropped the ceremonial puck and signed autographs. The Monsters broadcasted the "We are NASA" video throughout the arena during the game.





FEB Awards Honor Service to Job and Community

Seven NASA Glenn employees received the Federal Executive Board (FEB) "Wings of Excellence" Award during the Awards and Recognition Luncheon on May 3. The award recognizes those employees whose outstanding performance on the job or in the community has been an inspiration to others and/or brought credit to the federal service. Congratulations to the following Glenn honorees:



Earp



Dr. Gilliam



Wilson



Friedlander

Wagner



Portraits by Barbara Breen and Patrick McNamara, Louis Stokes Cleveland VA Medical Center.

Robert H. Earp for his service as Glenn's patent counsel and one of NASA's leading experts in intellectual property and patent law. Earp's modernization of the NASA patent acquisition process has resulted in dramatic cost savings to American taxpayers, while also increasing protection of valuable commercial technologies for technology transfer to NASA partners and the benefit of humankind.

David J. Friedlander for service as an aerospace research engineer committed to inspiring the next generation of scientists and engineers through community outreach. Friedlander engages thousands of students and the general public through his hands-on demonstrations of a small portable wind tunnel and live videoconferencing as a subject matter expert on STEM careers for Glenn's Connections Program.

Dr. Karen Gilliam for her leadership in the agency's training, leadership and organization development programs, in addition to her community outreach, and diversity and inclusion initiatives. Most notably, she serves as a board member of Restore Cleveland Hope, which promotes and celebrates Cleveland's Underground Railroad history. She facilitates true stories from the Underground Railroad in both neighborhood and organizational settings.

Deborah J. Lockhart for service as a public affairs specialist and for community outreach. Lockhart helped raise awareness of STEM opportunities to girls and young women by serving on the steering committee for the American Heart Association's STEM Goes Red for Girls; and coordinating Glenn's "Words of Wisdom" STEM-themed lunch series. She also serves as a Girl Scout troop leader.

Osvaldo Rivera, Glenn's Safety and Mission Assurance technical advisor, for his services as Loaned Executive, Combined Federal Campaign in 2016 and 2018, responsible with campaign oversight of over 25 federal agencies, and chief editor of the Ohio Zone 28 CFC newsletter. Additionally, Rivera chaired and was a voting member of the Source Evaluation Committee for Glenn's Medical Services procurement that earned an on-time award.

Ingrid E. Wagner for her leadership as a mishap support specialist, contributions to the NASA Safety and Mission Assurance and community outreach. Wagner developed and presented significant materials for confined space entry training and initiated an awareness campaign. She provides technical and administrative consultation as an industrial hygienist to the Cuyahoga County Emergency Preparedness Council. She also volunteers with her local German heritage organization.

Barbara J. Wilson, an Information Technology (IT) specialist, for developing and managing workflow through a pre- and post-travel checklist, standard configurations and a Traveler's User Guide that earned a 98% customer satisfaction rating from over 100 NASA travelers. These tools enabled collaboration with mission partners throughout international travel while ensuring IT mobile and transportable resources compliance to safeguard NASA data and IT assets.

PROMOTIONS





Dr. Dempsey

Ganss

Dr. Paula J. Dempsey has been selected chief of the Acoustics Branch in the Propulsion Division, Research and Engineering Directorate. Dempsey previously served as deputy project manager for the Revolutionary Vertical Lift Technology Project in the Advanced Air Vehicle Program.

Meghan R. Ganss, has been selected executive support assistant (ESA) to the Center Deputy Director. Ganss will provide assistance relative to a wide variety of administrative, logistical and secretarial duties in the Center Director's office. She previously served as ESA to Glenn's Associate Director.

RETIREMENTS





Dr. Handschuh

with NASA.

Dr. Robert F. Handschuh, Rotating and Drive Systems Branch, Materials and Structures Division, retired Jan. 1, 2019, with 39 years of federal service, including 10 ½ years

Ann P. Over, European Service Module Integration Office, Space Flights Systems Directorate, retired March 1, 2019, with 35 years of service.

Follow NASA Glenn on LinkedIn!

We recently relaunched our LinkedIn page. Follow along as we share center news, events and technology highlights on this professional networking platform.

LinkedIn.com/company/nasaglenn

MORE THAN A MEMORY





Sulak

Vrtis

Donald P. Sulak, 90, a 1990 retiree with 30 years of NASA service, died March 17. Sulak was a U.S. Navy veteran of WWII, who reenlisted as a U.S. Marine during the Korean Conflict. He joined the NASA workforce as an apprentice and graduated in 1959 to become a machinist, delivering engineering models of flight hardware such as the Surface Tension Driven Convection experiment. After retirement, Sulak worked as an on-site contractor, fabricating test hardware for the Wave Rotor Project. Sulak's granddaughter, Michelle Lasic, continues his legacy working in Glenn's 9- by 15-Foot Low-Speed Wind Tunnel.

James M. Vrtis, 83, a 1992 retiree with 30 years of NASA service, died March 12. Vrtis was a member of the Physical/Mechanical Calibration Group that received a Silver Snoopy Award as part of a group that evaluated 116 transducers in 20 days to meet critical shuttle deadlines. They accomplished the task in just 8 days. Vrtis retired from the Logistics Management Division. He was a U.S. Air Force veteran.

AWARDS



Executive Director of AAS Jim Way presents the award to Over.

Over Receives AAS Space Flight Award

The American Astronautical Society (AAS) presented to Ann P. Over their prestigious 2018 Space Flight Award during the 2019 Robert H. Goddard Memorial Symposium on March 21. Over, who retired from the Space Flight Systems Directorate on March 1, was lauded for "extraordinary achievements and contributions to the advancement of space flight and space exploration over the course of her 35year career."

IN APPRECIATION

Thank you to all who attended my retirement gathering, as the event was overwhelming. During my career at NASA Glenn as a NASA and Army employee, I worked on many extremely interesting problems. With the help of my supervisors, fellow engineers, administrative assistants and the experimental technical staff, we made many important research contributions. I wish all of my colleagues much success in the future for NASA, the Army and our nation.

Upcoming Center Events



June 25 Lewis Field Program and Mishap PanelJune 26 Plum Brook Station Program and Health WalkJune 27 Lewis Field Health Day

Stay tuned to *Today@Glenn* for details. POC: Andrea Bonesteel, 3–2059





2019 Center Picnic Wednesday, Aug. 7

(Rain date: Thursday, Aug. 8) 11 a.m. to 2 p.m. Lewis Field Picnic Grounds

All civil servants, contractors and retirees welcome Watch *Today@Glenn* for details.

Asian Pacific Islander Heritage Program



Glenn's 2019 Asian American and Pacific Islander Heritage event will be Wednesday, May 22, from 10 to 11 a.m. in the Briefing Center. Olivia Adrian, president, Federal Asian Pacific American Council, will be the keynote speaker.

POC: Angela Pierce, 3-2813

GSEL MOBILE LIBRARIAN

The Glenn Science and Engineering Library (GSEL) Mobile Librarian will be visiting building 49 through May 16, and building 54 from June 4 to 13 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

RETIRED WOMEN'S LUNCHEON

The next luncheon is Thursday, May 16, at 1 p.m., at D'Agnese's Italian Restaurant, 1100 W. Royalton Road, Broadview Heights. Please notify Gerry Ziemba at gto64gerry@yahoo.com or 330–273–4850 to reserve a place.

OUTDOOR SIREN TESTING

The Emergency Management Office staff will conduct an audible siren test on the "HAZMAT" tone on Saturday, June 1 at Lewis Field. A mass notification "voice" test at buildings 100 and 302 will be conducted on Wednesday, June 5.

POC: Allen Turner, 3–6826

SUSTAINABILITY EVENT

Come learn about current initiatives and policies to protect and keep Lake Erie healthy from the Alliance for the Great Lakes on Monday, June 3, from 12 to 1 p.m. in the Building 15 Small Dining Room. All employees are welcome to attend!

POC: David Smith, 3-5109

IFPTE LOCAL 28, LESA MEETING

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

Deadline for next calendar section is **May 22, noon**. News and feature stories require additional time. NASA Glenn Employees: For more calendar information, visit **https://wing.grc.nasa.gov/event-calendar/**. National Aeronautics and Space Administration

John H. Glenn Research Center

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Plum Brook Station 3597 E. Scheid Road Sandusky, Ohio 44870

www.nasa.gov

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

Glenn Supports FIRST Buckeye Regional



Robots in action during this year's game called Destination: Deep Space.

Over 1,500 young innovators, representing 60 teams, put their skills and robots to the test over 3 days of competition at Cleveland State University's Wolstein Center, March 28 to 30. They came to compete in the Buckeye Regional FIRST Robotics Competition with a space-themed robotics challenge named "Destination: Deep Space," commemorating the 50th anniversary of the first manned landing on the Moon.

NASA Glenn's Office of Education is the largest sponsor of the Buckeye Regional—awarding grants to 11 Ohio teams and providing a significant number of the 200-plus volunteers required to make the competition run smoothly!



Tom and Mary Anne Sours, winners of the Buckeye Regional Outstanding Volunteers of the Year award.

This year, Tom Sours, Space Environments Test Branch, and his daughter, Mary Anne, Operational Safety Branch, earned the regional's Outstanding Volunteers of the Year award. They have served as mentor, advisor or volunteer in some capacity since 2012.

FIRST (For Inspiration and Recognition of Science and Technology) engages students in mentor-based programs that build science, engineering and technology skills. They learn coding, programming and engineering in a real-world environment, while working collaboratively to solve an annual robotics challenge. In addition to learning valuable STEM and life skills, participants are also eligible to apply for \$80 million in college scholarships.

By S. Jenise Veris

Emergency and Inclement Weather Lines

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

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