National Aeronautics and Space Administration

AEROSPACE Frontiers

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Test Facility Helping Solve the Mysteries of Venus

Solar System and Beyond

The Glenn Extreme Environments Rig (GEER) is opening doors to a new field of research. This one-of-a-kind test facility at Lewis Field can simulate planetary environments with extremely high temperatures and pressures, and multicomponent chemistry—such as those found on the surface of Venus.

On Venus, there are clouds of sulfuric acid; surface temperatures exceeding 900 degrees Fahrenheit, hot enough to melt lead; and an atmospheric pressure 100 times that of Earth. Consequently, there is little data to predict how long materials will survive on Venus' surface.

GEER was created to test hardware and science experiments for proposed missions, which are intended to reveal basic information about the planet. The GEER team has demonstrated the ability to reach and operate at Venus surface conditions for 24 days.

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Right: John Doehne and Leah Nakley load the GEER vessel with samples that will be exposed to the Venus atmosphere.

GRC-2015-C-4138 Photo by Bridget Caswell

Orion Hardware Arrives for Testing

A test version of the Crew Module Adapter for Orion's service module arrived at Plum Brook Station in July. The adapter, built by Lockheed Martin, connects the European Space Agency's (ESA) service module to the Orion crew module. A structural representation of the ESA service module will arrive in October. Both will be tested in Plum Brook Station's Space Power Facility, which will simulate launch and ascent acoustics and mechanical vibrations.

GRC-2015-C-3488 Photo by Chris Lynch

NIAC Advances Glenn Proposal

The agency has selected a Glenn technology proposal for continued study under Phase II of the NASA Innovative Advanced Concepts (NIAC) Program. The program aims to turn science fiction into science fact through the development of pioneering technologies.

Last year, "Titan Submarine: Exploring the Depths of Kraken Mare," submitted by Glenn's Steve Oleson and

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In This Issue

Clear Hallways, Safe Egress Are Priority

Maintaining unobstructed hallways and clear egress routes to the outside of a building to permit safe exit in an emergency isn't just to comply with the Ohio Fire Code, it's a priority that will help keep us safe. Too often, we've allowed property and supplies to accumulate in hallways, which can restrict pathways and exits. Some buildings allow for placement of certain items along one side of the hallway. But it's important to ensure these items are stable and will not accidently fall, causing a tripping hazard or blocking access. Hallway clutter isn't just unattractive; it's unsafe. Let's clean up our hallways to ensure a safe, professional environment.

Mark your calendar for Safety and Health Awareness Day, Sept. 23.

—Jim

NIAC Advancing Glenn Proposal

Continued from page 1

his colleagues on the COMPASS (Collaborative Modeling for Parametric Assessment of Space Systems) Team received $100,000 from NIAC for a Phase I, 9-month study. The concept centered around a basic design of a submersible autonomous vehicle to probe the depths of Kraken Mare, the largest northern sea of Titan—Saturn's largest moon.

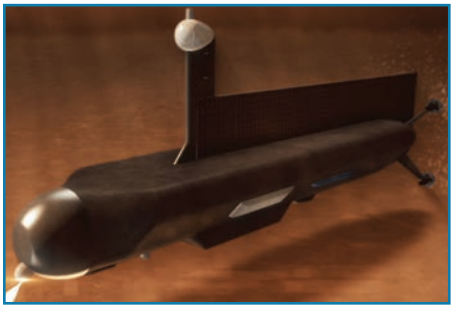
Demonstrating the feasibility and benefit of the concept, the Titan Submarine team was chosen to receive NIAC Phase II funding, worth as much as $500,000 for a 2-year study. Phase II funding allows proposers to further develop their concepts from previously selected Phase I studies and refine their designs and explore aspects of implementing the new technology.

Oleson said Phase II of the "Titan Submarine: Exploring the Kraken Mare" effort will focus on advancing the technology readiness level of the concept to a 2–3 level: (1) by retiring risks of operating a submarine in a cryogenic sea identified in Phase I; (2) gathering new Kraken Sea observations by Cassini, which will better define the sea's depths and constituents; and (3) by further defining science goals and instruments to fulfill them. Each of these tasks will feed into two COMPASS design sessions, which will determine how to deliver the submarine, refine the design and look at alternative concepts.

"Public response to the concept has been huge," Oleson said. "We've received more than half a million hits on our YouTube video and 20-plus Internet news articles. And the coup de grace—a spot in an upcoming British Broadcasting Corporation Horizon film on extraterrestrial seas!"

View the YouTube video at https://www.youtube.com/watch?v=NnKxbdpLP5E.

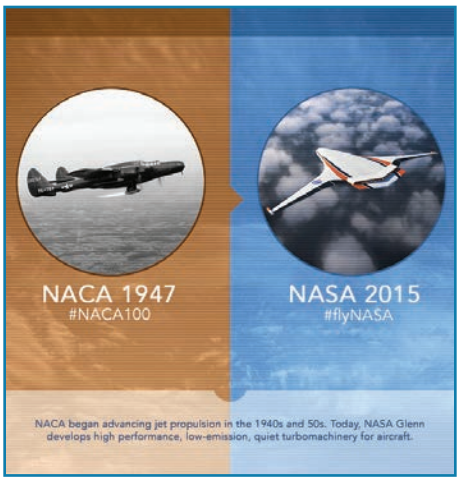
By Doreen B. Zudell



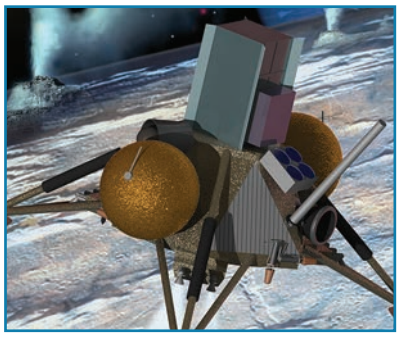
Phase I concept of the submarine.

NACA On Instagram

Learn how NACA research influenced today's science at Glenn in a series of social media shareables this month. Visit the @NASAglenn Instagram every Thursday. #tbt, #NACA100



New Proposal Earns NIAC Funding



Steve Oleson and his colleagues on the COMPASS (Collaborative Modeling for Parametric Assessment of Space Systems) team continue combining imagination and knowledge.

The NASA Innovative Advanced Concepts (NIAC) Program chose the COMPASS team's new proposal, "Triton Hopper: Exploring Neptune's Captured Belt Object" for a Phase I award. The proposal centers on a hopper vehicle using in situ frozen nitrogen propellant gathered from the surface and radioisotope power to make tens of kilometer hops to explore Neptune's moon Triton, which is thought to be a captured Kuiper Belt Object.

NASA 1915-2015

A century of aerospace achievement

What was it like to work here when NASA was NACA? Over the past 5 months, we have shared a few memories of NACA employees still working at the center. Our final profile is Robert Hendricks, who serves in the Propulsion Division, Research and Engineering Directorate. He is also one of Glenn's esteemed Senior Technologists.

Robert Hendricks

Q. How did you begin your career at NACA?
A. After interning summers with North American Aviation and Rocketdyne, I was recruited for NACA's Rocket Branch in 1957. I accepted after graduating from college, prior to my U.S. Air Force commitment. It has been and continues to be a stimulating career.

Q. What do you remember most about the workforce culture of the early years?

Hendricks

A. Back then, colleagues could offer their assistance, right away, with no delay due to WBS guidelines. We always had great technicians, mechanics and mentors, such as Dr. R.W. Graham. And as for finances, one person handled it all.

Q. As NASA has evolved through the years, what has stayed the same?
A. Despite the constraints that sometimes reduce initiative in a large organization, there are still people around here who will support you no matter what. Without their assistance, I would have accomplished nothing.

Q. Who stands out among those you have mentored over your career?
A. How does one pick favorites among his kids? I have been blessed with many and have published much with them.

GRC-1976-C-2806

In this 1976 photo, Hendricks reviews an upgrade to a 30 Tesla magnet configuration for the Liquid Hydrogen Test System.

Q. What do you feel is the most important contribution you have made to NASA's mission?
A. Some may say enabling upper stage propulsion systems, secondary engine systems flows, alternate fueled combustion or alternate energy. It's a most difficult question that only time may resolve.

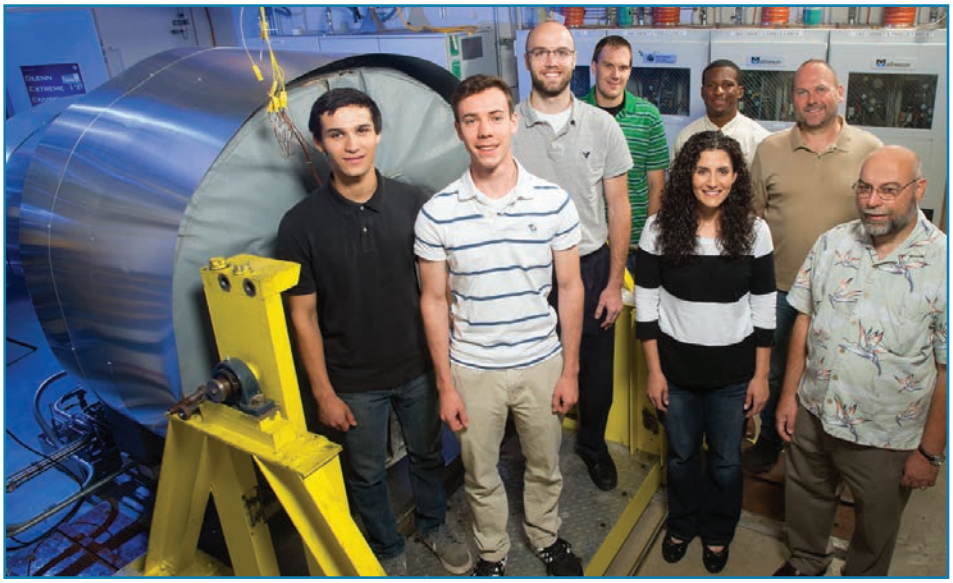
By S. Jenise Veris

Mysteries of Venus

Continued from page 1

During a fellowship at NASA Glenn, Case Western University's professor Ralph Harvey has been working with the GEER team to prepare and conduct a series of tests to determine how Venus surface minerals interact with its atmosphere. "GEER offers an unparalleled capability to simulate this extreme environment," Harvey said.

Glenn's Extreme Environments Manager Dan Vento, Space Science Project Office, said that word of the incredible 24-cubic-foot chamber is catching on in the scientific community. "We are constantly getting inquiries from potential users inside and outside of NASA," he said. "GEER will be a very busy place."



GRC-1976-C-4134 Photo by Bridget Caswell

The GEER team of engineers, technicians and interns, pictured, left to right: A.J. Almy, Austin Flint, J. Michael Newman, Joe Rymut, Leah Nakley, Marcus Tarver, John Doehne and Dan Vento.

For GEER, the team has been able to leverage Glenn's capabilities in high-temperature materials and electronics and in mitigating high-temperature corrosion. This expertise was developed mainly for the aeronautics program but has direct applications to operating in a Venus-like environment.

By Doreen B. Zudell

Advisory Group Advocates Safe, Inclusive Workplace

NASA Glenn's Rainbow Alliance, formerly known as the Lesbian, Gay, Bisexual, Transgender (LGBT) Advisory Group, hosted its inaugural event with an open house and brown bag lunch at the Guerin House, June 10. The event focused on sharing the advisory group's objectives and introducing group members comprised of employees and Glenn's Office of Diversity and Equal Opportunity (ODEO) staff.

Center Director Jim Free provided opening remarks. He pledged his support and applauded members of the advisory group for their contributions toward creating an environment free from discrimination and harassment.

"It's important to me that everyone feel comfortable and happy driving through the gate," Free said. "We bring our whole self to work, so we have to bring our whole self to the NASA mission."

Thomas Roese, artist and long-time member of Parents, Families and Friends of Lesbians and Gays (PFLAG) in Cleveland, gave the keynote address. He shared information on PFLAG's efforts to foster understanding and acceptance within families, and education and advocacy within the Greater Cleveland community.

Rainbow Alliance Advisory Group members, who call themselves LGBT allies, include: Luis Beltran (co-chair), Kelly Gilkey, Larry Liou, Christine Paulsen, Amy Stalker, William Sikora (new executive sponsor), Avis Hudson-Burnette (ODEO advisor) and Di-meta Hughes (volunteer). The advisory group is currently accepting new members and volunteers. Please contact Hudson-Burnette if interested in learning more about membership or volunteer opportunities.

GRC-2015-C-3666 Photo by Bridget Caswell

Local artist and long-time member of PFLAG, Roese, related examples of LGBT struggles in the workplace.

Glenn Empowers Girls in STEM

Glenn's Office of Education kicked off its inaugural "Girls in STEM" event, July 13, to inspire STEM career choices. More than 70 students across Northeast Ohio attended the event that featured activities, tours and science demonstrations. A panel of NASA women discussed their journey to pursuing a job in the STEM field and offered advice on lessons learned. Towards the same goal, Glenn staffed a NASA tent and the Journey to Tomorrow trailer at the American Heritage Girls National Convention in Anderson, Indiana, June 24–27. Pictured above, left, Dennis Stocker demonstrates the physics of microgravity at the American Heritage Girls event. Right: Girls discover the possibilities of pursuing a STEM career at the Glenn event.

Photo by Carlos Gomez

GRC-2015-C-3982 Photo by Bridget Caswell

Photo by S. Jenise Veris

Local Government Channel Host Visits Glenn

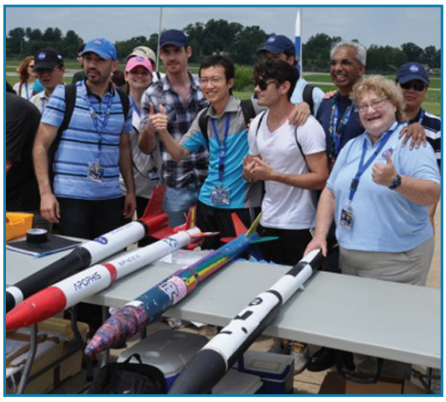
Leah Haslage, producer and host of TV20's "Listen Up Cleveland" program, visited Glenn to learn about the center's advanced solar electric propulsion (SEP) work. Haslage interviewed Center Director Jim Free in Glenn's Electric Propulsion Laboratory's Vacuum Chamber 5, which is used to simulate the space environment desired for SEP research supporting NASA's Asteroid Redirect Mission. They also discussed Glenn's local partnerships, Ohio astronauts and support to astronaut training and safety. Haslage and cameraman, Henry Pikturna, later toured several facilities. They are pictured here during filming.

Glenn Increases "Awesome Factor" for International Space University

More than 100 engineers, scientists and other professionals from 30 countries traveled to NASA Glenn, July 7–8, eager to have another incredible experience through the International Space University's 2015 Space Studies Program (SSP15). During the visit, they toured Lewis Field and Plum Brook Station facilities and engaged in lively discussions with Glenn's science and engineering experts supporting academic activities based at Ohio University (OU).

Over the past 5 years, NASA has been a primary sponsor of the SSP, an intense 9-week program that covers all aspects of space and its enterprises. The program features core lecturers, departmental activities and team projects that allow participants to produce new perspectives on current space topics by combining their international, interdisciplinary and intercultural backgrounds.

As a NASA-sponsoring center, Glenn has committed several experts to conduct lectures, hands-on experiments and other activities on behalf of the program. They include standard-bearers, Dr. Sheila Bailey, Dr. Geoff Landis and NASA retiree Dr. Dan Glover, who have served multiple years. Bailey co-chairs the SSP15 Space Engineering Department.



GRC-2015-C-4202 Photos by Bridget Caswell

Above: Bailey, far right, inserted the igniters and cheered participating teams at the Rocket Launch at Ohio University. Right: Robin Brown took the SSP15 group on a tour of Plum Brook's Reverberant Acoustic Test Facility. The facility can simulate noise levels during a space vehicle launch and supersonic ascent.

"The experience has been well worth my time and NASA's investment," Bailey affirmed. "These are the people who will lead space exploration into the future."

More recently, Glenn's Nancy Hall, Kurt Sacksteder and OU alumnus of the College of Engineering, Bryan Smith, joined the education team supporting SSP15. Additionally, Glenn's Cynthia Calhoun, also an OU engineering alumna, coordinated two educational outreach opportunities for SSP15 students.

Smith, Glenn's Space Flight Systems director, presented a theme-day lecture that focused on NASA's planned Asteroid Redirect Mission. He encouraged students to comment and discuss their views about Solar Electric Propulsion, which is key to the mission.

"I'm impressed with the level of knowledge the international community has about NASA missions. They are astutely aware of the need for collaborations," Smith said. "The SSP brings recognition to the diverse international contributions to exploration and leverage that it brings. I hope their visit to Glenn leaves an impression on how we can be a key contributor."

To learn more about Glenn activities with the International Space University, visit http://www.nasa.gov/feature/isu-educates-future-space-leaders.

By S. Jenise Veris

News and Events

Photo by Doreen B. Zudell

Fresh Summer Fare!

To promote healthy living, Glenn's Fitness Center hosted a Summer Farmers Market, July 7, at the Picnic Grounds. More than 250 employees who attended chose from an array of fresh produce, pastas, dips, homemade goods and more—all presented by local vendors. Pictured: Employees choose from a cornucopia of produce from local vendor Morningside Farm.

Mark your calendar for the next Farmers Market: Tuesday, Aug. 18, 10:30 a.m. to 2 p.m. at the Picnic Grounds.

Institute Fuels Federal Leaders of Tomorrow

The 2015 Cleveland Federal Community Leadership Institute (CFCLI) awarded a certificate of graduation to five Glenn employees, June 23.

The 9-month program is designed to develop leaders committed to advancing cooperation among federal agencies in the Greater Cleveland area, while strengthening community partnerships. Completing a community service project, in one of five targeted areas, was a condition of graduation. The graduates and their projects include:

Candace Johnson, Housing Group, partnered with the Veterans Affairs (VA) Canteen Service and VA Women's Clinic on the "Pink Bag Project" to help homeless women veterans residing in the VA Domiciliary at Wade Park accelerate their transition to independence.

Kelly DiFrancesco and **Kelly Ison**, Seniors Group, partnered with the City of Brecksville's Human Services staff to establish "Senior Tech Saturdays," 2-hour workshops for senior citizens that focused on how to search the Web and use email, navigate popular social media channels and operate a smart phone.

Photo by Ron Petransky, VHACLE

Pictured are NASA Glenn's 2015 CFLCI graduates and center personnel who provided CFCLI support. They include, left to right: Mike Goin, Kelly DiFrancesco, Jessica Reinert, Kelly Ison, Candace Johnson, Karen Gilliam, Nola Bland, Nikki Welch, retiree Robert Allen, Lisa Hicks and Janet Clark.

Jessica Reinert, Veterans Group, collaborated with the Veterans of Foreign Wars, VA Outpatient Clinic and the Community Resource and Referral Center to aid Northeast Ohio veterans. They agreed to establish semiannual consumable drives and collect independent donations in conjunction with their Memorial Day and Veterans Day holiday observances.

Nikki Welch, At-Risk Youth Group, partnered with Ohio Means Jobs and the Ohio State Bar Foundation on "Suits for Success" clothing drive and professional development, for transitional foster youth in Cuyahoga County.

By S. Jenise Veris

Awards & Honors

The National Technical Association (NTA), Cleveland Chapter, honored two NASA Glenn employees during its 13th Annual Nsorma Awards, held June 2 at the Ohio Aerospace Institute. Nsorma honorees are women and men of color, in the fields of science, technology and education, who demonstrate outstanding character, personal accomplishment, professional fortitude and community impact.

James Jr.

Thomas

Sell James Jr., who retired from NASA Glenn's Reliability and System Safety Engineering Branch in April, received the Lifetime Achievement Award. He was recognized for a long career of technical contributions, most notably in the field of aerospace engineering. He was also lauded for his commitment to community outreach and tutoring.

Fransua Thomas, Mechanisms and Tribology Branch, received the Prince (rising star) Award. He is recognized for his technical contributions in the areas of communications and materials. He was also applauded for his community outreach and tutoring.

Dr. Pérez-Davis

Crain's Cleveland Business magazine recognized Dr. Marla Pérez-Davis as one ofNortheast Ohio's "brilliant female leaders" at the annual Women of Note Summit & Awards Luncheon, July 23. Pérez-Davis joined the NASA workforce after graduating from the University of Puerto Rico in 1983. Since then, she has matriculated the ranks as a researcher, project manager, branch chief and office director to become deputy director of NASA Glenn's Research and Engineering Directorate.

More Than a Memory

Miles, A Ready Resource on Noise

Dr. Miles

Dr. Jeffrey H. Miles, 74, a member of NASA Glenn's Acoustics Branch, who served the agency for nearly 50 years, died June 23 after a brief illness. Miles conducted research in the area of engine core noise. He had been working with a NASA-industry team of researchers with the Advanced Air Transport Technology (AATT) Project, which focused on reducing the environmental impact of commercial aviation.

Miles was an honored associate fellow of the American Institute of Aeronautics and Astronautics. He authored/co-authored more than 75 journal articles and technical reports on the subject of diagnostics of turbine engine noise, propulsion and power. More recently, he received a patent for signal processing techniques for the study of combustion noise and emissions for modern propulsion systems.

Acoustics Branch Chief, Brian Fite, said Miles was an avid reader across the sciences. "Jeffrey assembled an extensive library of NASA reports and conference publications over the years, which made him a knowledgeable resource on historical projects," Fite said. "His ready recall—in considerable detail—for work completed decades ago was useful to all of us, but especially to younger members of our branch. He will be sorely missed."

James P. Cusick, 81, a 1981 retiree and U.S. Army veteran with 25 years of federal service, died July 12. Cusick was a physicist in photovoltaics for the Market Development Section, funded by the Department of Energy. His group introduced solar cells to recreational vehicles and developed a portable solar-powered medical refrigerator for use in high-altitude regions requested by an international health care agency. Cusick served on the Lewis Social Activities Committee for nearly a decade. He retired from the Solar and Electrochemistry Division.

Charles A. Wasserbauer, 86, a 1999 retiree with nearly 50 years of service, died June 22. Early in his career, Wasserbauer was an aerospace engineer in the Fluid System Components Division. He earned two Tech Brief Awards for developing performance prediction computer programs for radial inflow turbines. He retired from the Aeropropulsion Facilities and Experiments Division, working as a mechanical design and operating engineer. Wasserbauer was the founder and NASA Activities Council board representative for the NASA Lewis Aviation History Buff Club.

Wasserbauer

LERCIP Intern Made Notable Contributions

Christopher A. Grabowski, 37, a NASA Glenn LERCIP intern supporting Paragon TEC in Glenn's Information and Applications Office, died unexpectedly, July 12.

Sgt. Grabowski

Grabowski was an Army veteran of the Iraq Conflict. He was serving in the Army National Guard, while attending the Indiana University of Pennsylvania where he majored in computer science.

According to Glenn mentor Justin Gray, Grabowski was contributing to the Open MDAO effort, building a visualization tool displaying the structure of complex system models. He performed web programming and 3D graphics, and authored several Java Script libraries on the topic.

"Chris was a hardworking, energetic man," Gray added, "I wish we could have collaborated longer."

Connect with Glenn

Emergency and Inclement Weather Lines
Lewis Field: 216–433–9328 (WEAT)
Plum Brook Station: 419–621–3333

Calendar

RETIRED NASA WOMEN'S LUNCHEON: The next luncheon will be Thursday, August 20, at 1 p.m. at Thyme2 Restaurant, 113 W. Smith Rd., Medina. Please make your reservation with Gerry Ziemba at 330-273-4850 or gto64gerry@yahoo.com.

LEADERSHIP FOCUS SERIES: Further develop your leadership potential through these workshops. Each one runs from 10 a.m. to noon. The next workshop in the series focuses on organization. "Leading Across Silos: A Case Study on How to Work Through Dilemma" will be Tuesday, Sept. 1, in the MIC Auditorium. (Supervisors only)

IFPTE LOCAL 28, LESA MEETING: LESA will hold its next membership meeting, Wednesday, Sept. 9, noon, in the Glenn Employee Center's Small Dining Room.

SATURDAY TOURS AT LEWIS FIELD: Glenn offers free tours of its world-class facilities at Lewis Field one Saturday a month through October. Tour buses depart from the Main Gate every hour starting at 10 a.m. One-hour tours begin with a multimedia presentation in the Briefing Center Auditorium. The Sept. 12 tour will showcase Glenn's Extreme Environments Rig. For more information and a complete schedule, visit http://www.nasa.gov/centers/glenn/events/tours.html.

NATIONAL HISPANIC HERITAGE MONTH: America celebrates National Hispanic Heritage Month Sept. 15 to October 15. Stay tuned for *Today@Glenn* for Glenn's observance date and time.

SAFETY AND HEALTH AWARENESS DAY: Mark your calendar for Sept. 23. See *Today@Glenn* for details.

National Aeronautics and Space Administration

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September 2015 Calendar section deadline: Aug. 21, noon
News and feature stories require additional time

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

First Voyage to Pluto Enters New Realm

Glenn celebrates with local museum

After a decade-long journey through our solar system, NASA's New Horizons spacecraft made its closest approach to Pluto, July 14, about 7,750 miles above the surface. This made it the farthest-reaching space mission to explore a primary destination so far from Earth—some 3 billion miles away.

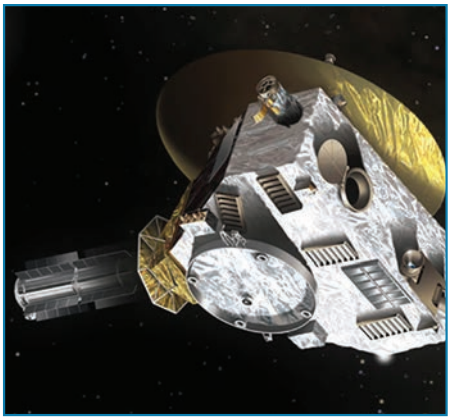
The New Horizons mission is helping us understand worlds at the edge of our solar system by making the first reconnaissance of the Pluto system. The spacecraft is venturing deeper into the distant, mysterious Kuiper Belt—a relic of solar system formation.

New Horizons launched on Jan. 19, 2006, on an Atlas V rocket with its Centaur upper stage (originally developed by NASA Glenn). It swung past Jupiter for a gravity assist and scientific studies in February 2007, and then began a 6-month-long reconnaissance flyby study of Pluto and its moons. The spacecraft is powered by a radioisotope power system being managed by Glenn.

On July 15, NASA Glenn teamed up with the Cleveland Museum of Natural History to celebrate the success of the New Horizons spacecraft mission to the dwarf planet Pluto. The event, "Plutopalooza," featured presentations by Glenn staff. Guests enjoyed several outdoor demonstrations of rocketry and power systems. Glenn employees staffed NASA exhibits, including a model of the New Horizons spacecraft and the latest images, as well.

At 9:04 p.m., guests at the museum, as well as an estimated 4,000 people attending Wade Oval Wednesday across the street, marked "Pluto Time." This is a moment near dawn and dusk each day when the illumination on Earth matches that of noon on Pluto.

By Doreen B. Zudell



Above: An artist rendering of NASA's New Horizons spacecraft. Below, left: Dan Vento, front left, assisted by Dwayne Hunt, demonstrate a soda bottle rocket on the stage of Wade Oval Wednesday. Below, right: Kristin Spear gives young visitors hands-on experiences with alternative energy demonstrations.

GRC-2015-C-4061

GRC-2015-C-4052 Photos by Chris Lynch