



# NASA Glenn Demonstrates Electronics for Longer Venus Surface Missions

A team of NASA Glenn scientists recently completed a technology demonstration that could enable new scientific missions to the surface of Venus. The team demonstrated the first prolonged operation of electronics in the harsh conditions found on Venus.

“With further technology development, such electronics could drastically improve Venus lander designs and mission concepts, enabling the first long-duration missions to the surface of Venus,” said Phil Neudeck, lead electronics engineer, Smart Sensors and Electronics Systems Branch.

Current Venus landers can only operate on the planet’s surface for a few hours

**Continued on page 3**



GRC-2016-C-02360

Photo by Rami Daud

*Researchers use a metal deposition system in the fabrication of the Venus-durable silicon carbide integrated circuits.*

## The Dust Never Settles on the Space Station



GRC-2016-C-09831

Photo by Rami Daud

When your house gets dusty, the dust settles, falling down to lower surfaces, awaiting your attention with the vacuum cleaner or duster. Not so on the International Space Station. Like any home, it gets dusty, but the particles do not settle...they float.

And that’s a problem for astronauts living and working there. Dust can get in their eyes and nose, causing irritation and allergic reactions.

**Continued on page 2**

*Dr. Marit Meyer at Glenn’s Telescience Support Center communicates with the Payload Operations team at Marshall Space Flight Center while her experiment on the International Space Station is conducted.*

### In This Issue

Director’s Safety Corner .....	2	CFC Presents Big Check .....	5	Benafan Earns Honor .....	6
Day of Remembrance.....	3	Band Forms Ensemble .....	5	Phasing Retirement.....	8



## Success! Boundary Layer Testing Safely Completed

Congratulations to all those involved in the successful development and testing of the Boundary Layer Ingesting Inlet/Distortion Tolerant Fan (BLI2DTF) in the 8- by 6-Foot Supersonic Wind Tunnel. This trailblazing suite of tests is a testament to the dedication of our Research and Engineering, Test Operations, Manufacturing, and Safety and Mission Assurance teams. Thank you for addressing hardware and integration challenges, while exceeding all expectations to meet test objectives and allowing for a safe transition to the Quiet SuperSonic Technology (QueSST) test. I look forward to the BLI2DTF results and its impact on future air transportation.

*Coming next month—Celebrating an Amazing European Service Module Test Campaign!*

—Janet



## Check Out Sprout Café!

***Feeling hungry?  
Didn't pack a lunch?***

Stop by the Sprout Café for a delicious bite to eat with various entrees, salad bar and grab-n-go items!

Various options in addition to the daily specials are available until 2 p.m. Visit the website at <https://www.grc.nasa.gov/exchange/cafe/> to check out the menu for this week!

## Dust Never Settles

Continued from page 1

Although high-efficiency filters are installed on the space station and the astronauts vacuum regularly, there has never been a thorough investigation of airborne particulates until now.

NASA Glenn Research Scientist Dr. Marit Meyer, Combustion Physics and Reacting Processes Branch, is leading an experiment to sample airborne particles on the station to help improve astronaut health and wellness. The experiment involves two types of samplers designed by the RJ Lee Group, Inc. which are portable collection devices.

“Collecting this data will help us to ultimately build a particulate matter monitor so NASA can improve the environment for astronauts on station and other long-term missions in deep space,” Meyer said.

The first collection device is an electric sampler placed on the wall near where the astronauts work. A pump draws air through a cartridge containing a heated channel and across a very small disk. The airborne particles are drawn inside and get stuck to the surface of the disk.

“For six hours at a time the sampler collects particles as small as nanometer sizes, given off by the astronauts where they exercise and work,” Meyer explained.

She is particularly interested in collecting data from near the cargo bay area.

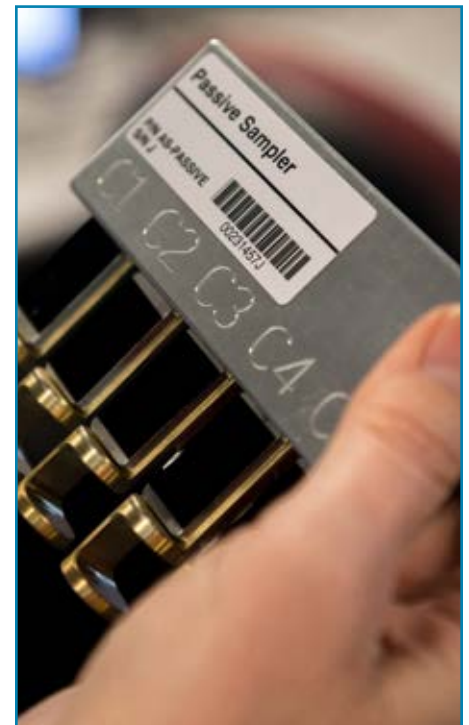
“When cargo vehicles are opened to retrieve supplies, any particulates inside can circulate into the station and affect the air astronauts breathe,” she said.

Additionally, seven passive samplers are placed near air ducts and vents. These devices have several plates with sticky surfaces that are opened all at once and then closed at different times to collect larger particulates.

“We expect to see lint, skin flakes and metal particles when we study the samples upon their return from the space station,” Meyer said.

When the samplers return to Earth, the cartridges and other samples will be analyzed in a variety of light, laser and electron microscopes.

By Nancy Smith Kilkenny



GRC-2016-C-09824

Photo by Rami Daud

*This passive air sampler has several plates with sticky surfaces that collect large particulates floating inside the space station.*



## NASA Day of Remembrance: *Kalpana Chawla's Legacy Endures*

Astronaut Kalpana Chawla's quest for knowledge and discovery still inspires people to push boundaries 14 years after the Space Shuttle Columbia disaster took her life and that of her six fellow STS-107 crew members. Chawla's husband, Jean-Pierre Harrison, and Center Director Janet Kavandi shared memories and personal photographs depicting Chawla's life and legacy during NASA's Day of Remembrance observance at Glenn, Jan. 31.

Kavandi was in the same astronaut class (1995) as Chawla, and served as Harrison's casualty assistance officer after the Columbia accident. Harrison said Kalpana, the first Indian to go to space, is idolized in India. He introduced Aishwarya Stanley, a young aerospace engineer from India, who told how Chawla's belief that "with hard work everything is possible" inspired Stanley to follow her dreams.

Glenn's observance also recognized the fallen heroes of the Challenger and Apollo 1 missions. Jan. 28 marked the 31st anniversary of the Challenger and Jan. 27 the 50th anniversary of the Apollo 1 accidents.

Kavandi reminded employees that even with knowledge and advanced technology, space travel remains a risky endeavor.

"Your work is very important and affects the lives of the many people who fly both inside and outside the atmosphere," Kavandi said. "What you do makes a difference."

By Doreen B. Zudell



*Harrison reflects on his wife's legacy.*

## Electronics for Longer Venus Surface Missions

Continued from page 1

due to the extreme atmospheric conditions. The surface temperature on Venus is nearly 860 degrees Fahrenheit, which is hotter than most ovens, and the planet has a high-pressure carbon dioxide atmosphere. Because commercial electronics do not work in this environment, the electronics on past Venus landers have been protected by thermal and pressure-resistant vessels. These vessels only last a few hours, and they add substantial mass and expense to a mission.

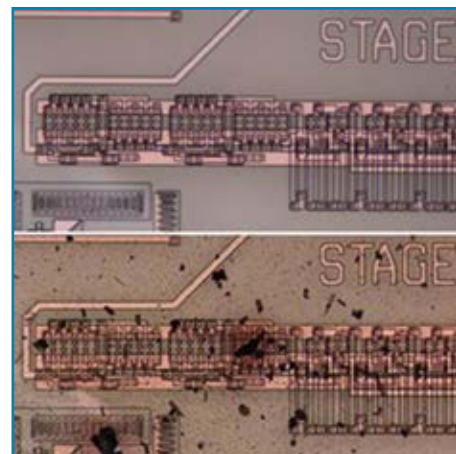
To overcome these challenges, the Glenn team developed and implemented extremely durable silicon carbide semiconductor integrated circuits. They then electrically tested two of these integrated circuits in the Glenn Extreme Environments Rig (GEER), which can precisely simulate the conditions expected on Venus' surface. The circuits withstood the Venus surface temperature and atmospheric conditions for 521 hours—operating more than 100 times longer than previously demonstrated Venus mission electronics.

"We demonstrated vastly longer electrical operation with chips directly exposed—no cooling and no protective chip packaging—to a high-fidelity physical and chemical reproduction of Venus' surface atmosphere," Neudeck said. "Both integrated circuits still worked after the end of the test."

Earlier this year, the team demonstrated nearly identical silicon carbide integrated circuits for more than 1,000 hours at 900 degrees Fahrenheit in Earth-atmosphere oven testing. The integrated circuits were originally designed to operate in hot regions of fuel-efficient aircraft engines.

"This work not only enables the potential for new science in extended Venus surface and other planetary exploration, but it also has potentially significant impact for a range of Earth relevant applications, such as in aircraft engines to enable new capabilities, improve operations and reduce emissions," said Dr. Gary Hunter, principal investigator for Venus surface electronics development, Smart Sensors and Electronics Systems Branch.

By Jan Wittry



*Integrated circuit before (above) and after (below) testing in Venus atmospheric conditions.*

## MLK Observance Calls for Mentorship

Glenn celebrated Dr. Martin Luther King Jr.'s life and dreams with an MLK Day of Service, Jan. 25, themed "Remember! Celebrate! Act! A Day On, Not a Day Off!" Coinciding with National Mentoring Month, the event called for employees to reach out and become a mentor within the center and the community. Charles "CJ" Harkness, chief diversity officer, Baldwin Wallace University, supported the theme in his keynote address. Center Director Janet Kavandi welcomed employees while Kathy Clark, Glenn Mentoring Program, and Dr. Antoine Moss, mentor, reflected on the value of mentoring. Representatives from participating mentoring organizations staffed informational tables. Pictured, left to right: Kavandi, Harkness and Glenn's Office of Diversity and Equal Opportunity Director Aretha Carr.



GRC-2017-C-00576

Photo by Rami Daud

## Glenn-Cavs Team for Black Heritage Event

NASA Glenn teamed up with the 2016 NBA Champion Cleveland Cavaliers for their Black Heritage Celebration, Feb. 1, at Quicken Loans Arena. Themed around the film "Hidden Figures," the event included an appearance by former astronaut Dr. Guion Bluford, the first African-American in space. Four of Glenn's "Modern Figures" were honored at center court during halftime including Director Dr. Janet Kavandi. A video tribute on the scoreboard highlighted the career of Glenn's most prominent "hidden figure," Annie Easley, who worked as a human computer. A video message from astronaut Shane Kimbrough was downlinked from the International Space Station. Approximately 20,000 fans attended the game. Pictured, below left, left to right: Bluford, Lizalyn Smith, Dr. Dionne Hernandez-Lugo, Dr. Quynhgio Nguyen, Carol Tolbert and Kavandi are introduced as some of Glenn's Modern Figures. Pictured, below right: Kimbrough offers a message from the space station.



GRC-2017-C-00622



GRC-2017-C-00650

Photos by Bridget Caswell



## News and Events

# CFC Team Achieves Goal, Earns Awards, Continues Legacy of Giving

*"It has been an honor and privilege leading the CFC, and witnessing the great things we can accomplish together!"*

—CFC Chair Mary Jo Long-Davis

Team members and supporters of Glenn's 2016 Combined Federal Campaign (CFC) gathered Feb. 2 to celebrate a successful campaign. The center exceeded its goal and presented the "big check" of \$427,672 to North Coast CFC Director Carol McClain.

Additionally, the center earned several awards from the North Coast CFC, including the Director's Award for Outstanding Leadership, Chairperson's Award in the Big "11" Agency Category and the Appreciation Award for Achieving 100 Percent of Goal.

Glenn CFC awards included Keyworker of the Year presented to Heather Blum, Occupational Health Branch; Directorate Chairperson of the Year presented to Richard Kurak, Office of the Chief Information Officer; and the Code L Charity Cup presented to the Propulsion Division with the highest percentage of participation (61.4 percent).

By Doreen B. Zudell



GRC-2017-C-00596

Photo by Marvin Smith

Kavandi presents check to McClain.

## The NASA Glenn Band Modifies to Meet Demand



The NASA Glenn Band performed at more than a dozen center events in 2016—from the Center Picnic to the Holiday Gathering. The band gained respect, recognition and requests for numerous engagements to end the year on a high note.

"Our mission is to support Glenn morale and expand public awareness and appreciation of the center," explained founder Jeff Woytach, Science and Space Technology Systems Branch. "In 2017, we want to support more pub-

lic events in and outside of the gates, such as National Lab Day, which enables band members to support STEAM (Science, Technology, Engineering, Art and Math) outreach."

To accommodate demand, the band recently created a spinoff group, the Lewis Ensemble. This group of up to 12 musicians can be assembled on short notice, compared to the full band, to oblige an occasional unannounced event or venue with limited space.

"The Ensemble performed the National Anthem for the Center's John Glenn Tribute" said Woytach. "We also had the unexpected pleasure of perform-

ing, by request, one of Senator Glenn's favorites, which just happened to be in our repertoire!"

The full complement of the Glenn Band includes 25-plus dedicated employees and retirees, along with several North Olmsted High School (NOHS) music students. They rehearse hours weekly on their own time under the direction of Erik Kalish, NOHS band and orchestra director.

Employees interested in joining or requesting the Glenn Band or Ensemble should contact Woytach at 216-977-7075 or [Jeffrey.m.woytach@nasa.gov](mailto:Jeffrey.m.woytach@nasa.gov).

By S. Jenise Veris



GRC-2016-C-09593

Photo by Marvin Smith

The Glenn Ensemble performs at the center's John Glenn Tribute.

# Dr. Benafan Earns Presidential Early Career Award



Benafan

In January, former President Obama named Glenn's Dr. Othmane Benafan among five NASA researchers who received the Presidential Early Career Award for Scientists and Engineers (PECASE) Award. This is the highest honor bestowed by the U.S. government on scientists and engineers who are beginning research careers.

Benafan, High Temperature and Smart Alloys Branch, researches smart materials and shape memory alloys, materials that can be stretched and reshaped by applying heat. Although several applications for the material have been identified, Benafan is developing a rock splitter for potential NASA exploration of the rocky terrain of Mars without using forceful explosives.

"These PECASE winners represent some of the brightest researchers that NASA supports," said NASA's Acting Chief Scientist Gale Allen. "They were selected for what they have already accomplished, but more importantly, for where we expect they will lead the nation in the future."

By S. Jenise Veris

## Calendar

### WOMEN'S HISTORY OBSERVANCE:

Come join in the celebration of Women's History Month on March 22, from 10 to 11:30 a.m. at the Guerin Management Center. The event will feature a panel of Glenn female trailblazers. POC: Nola Bland, 3-9343

### GIVE THE GIFT OF LIFE:

The next onsite Red Cross Blood Drive takes place on Wednesday and Thursday, March 22 and 23, from 8:30 a.m. to 3:30 p.m. in the Administration Building Auditorium. POC: Rhonda Billick, 3-6286

### APRIL OUTDOOR SIREN TESTING:

The Emergency Management Office staff will conduct the Lewis Field audible siren test focusing on the "emergency condition" tone on Saturday, April 1. An outdoor "voice" test will be conducted at Building 39 on Wednesday, April 5 at Lewis Field. POC: Allen Turner, 3-6826

### IFPTE LOCAL 28, LESA MEETING:

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

### NASA RETIRED WOMEN'S LUNCHEON:

The NASA Retired Women's Luncheon is Thursday, May 18, at 1 p.m. at Hecks Cafe, 35514 Detroit Road, Avon. Please confirm your place by calling Gerry Ziemba at 330-273-4850 or email [gto64gerry@yahoo.com](mailto:gto64gerry@yahoo.com).

### FIRST ROBOTICS STAFFING NEEDED:

The 2017 FIRST Buckeye Regional Robotics Competition will be held March 30 to April 1, at Cleveland State University's Wolstein Center. More than 60 high school teams and 1,500 students will be participating in this annual STEM event. Staff is still needed for various positions throughout the 3-day event.



Staffing role descriptions and registration information can be found at <http://www.oai.org/firstbuckeye/volunteers.html>.

POC: Tim Dedula, 3-3668

### NASA SCHOLARSHIP FUND:

The NASA College Scholarship Fund is announcing its 2017 agencywide call for applications. Up to five scholarships will be awarded in the amount of \$2,000 each in this 34th year of the program (2017-2018 school year).



The scholarship is renewable for a maximum of \$8,000 over 6 calendar years. Applicants must be dependents of current/retired NASA employees or reimbursable detailees with NASA for a period of 2 years as of January 2017.

For full details, visit <https://nasapeople.nasa.gov/nasascholarship/index.htm>.

POC: Vanessa Webbs, 3-3768

### Emergency and Inclement Weather Lines

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

### Connect With Glenn



## More Than a Memory

### Loew Brought Skill, Strong Work Ethic



Loew

**Ray Loew**, 57, an electrical test engineer in the Facilities Testing Branch, died unexpectedly on Dec. 30, 2016. He earned a Bachelor of Science in Electrical Engineering degree from the University of Akron and worked as a contract test engineer at NASA Glenn for the last 20 years, most recently for HX5 Sierra JV.

“Ray’s tireless contributions to NASA’s work at the Aero-Acoustic Propulsion Laboratory and his kindness and friendship to all he came in contact with will be sorely missed,” said Loew’s supervisor Ed Becks, HX5 Sierra. “Ray helped everyone, never asking anything in return.”

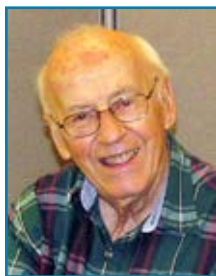
### Hanzel Valued As Metrology Technician, Co-worker



Hanzel

**Rich Hanzel**, 53, an ATS employee who supported the Calibration Laboratory, died suddenly Jan. 7. He came to the center in 1987 after leaving the Air Force where he received his primary training as a metrology technician. He worked in several of the calibration disciplines and spent the last several years as the lead technician and area coordinator for the primary pressure calibration lab.

“Rich received multiple customer recognition rewards for his work, including a 1991 Group Achievement award from the Johnson Space Center director for support of pressure transducers used in evaluation of aerodynamic loads distribution on the orbiter, Columbia,” said Metrology Services Manager Terry Fleet, ATS. “He was a valuable team member and will be greatly missed.”



Graham

**Dr. Robert W. Graham**, 94, a 1989 retiree with 41 years of NACA/NASA service, died Jan. 30. From hiring Neil Armstrong to researching the propellant that took Armstrong to the moon, Graham played a key role in making the Apollo 11 mission possible. As head of the Rocket Fluid Dynamics Section during the 1950s and 1960s, Graham was a major proponent for liquid hydrogen as the best source of rocket fuel for breaking Earth’s orbit and reaching the moon. His area focused on developing the propellant for the J-2 and RL-10 engines used in the Saturn upper stages, Delta IV, shuttle’s main engines and Centaur. Graham’s family will hold a public memorial service in his honor, Saturday, March 25 at 2 p.m. at United Methodist Church in Berea.

**Tesfahune Teclé**, 73, a 2012 retiree with 23 years of NASA service, died Jan. 16. Teclé was an electrical engineer who spent most of his career in the Electrical and Avionics Systems Branch of the Electrical Systems Division. He earned a Group Achievement Award (1991) as a member of the Preliminary Design Review, Resources and Restructuring Team. Teclé retired from the Propulsion, Structures and Thermal Systems Division.

**Adelbert “Del” O. Tischler**, 98, a 1973 retiree with 33 years of service, died Jan. 12. Tischler began his NACA/NASA career at Langley in 1940 before reassignment to Cleveland’s Aircraft Engine Research Lab. During the War, he specialized in combustion research focused on fuels for existing aircraft engines. Afterwards he became an expert on high-energy propellants for turbojet and rocket engines and headed the center’s Rocket Combustion Section. Tischler transferred to Headquarters in 1958 to help establish NASA. He also held positions managing the agency’s liquid rocket engines, launch vehicles, chemical propulsion, and shuttle technologies programs before retiring in 1973. He earned several prestigious awards for his work in propulsion.

## Retirements

**Mark Bodziony**, Wind Tunnel and Propulsion Branch, Test Division, retired Jan. 3, 2017, with 41 ½ years of service.

**Hugh McLaughlin**, Logistics and Technical Information Division, Center Operations Directorate, retired Dec. 28, 2016, with 50 years of service.

**Carol J. Vance**, Logistics and Technical Information Division, Center Operations Directorate, retired Jan. 31, 2017, with 28 years of service.



## National Aeronautics and Space Administration

### John H. Glenn Research Center at Lewis Field

21000 Brookpark Road  
Cleveland, Ohio 44135

[www.nasa.gov](http://www.nasa.gov)

*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 via e-mail to the editor: [doreen.b.zudell@nasa.gov](mailto:doreen.b.zudell@nasa.gov) or 216-433-5317.

**April 2017 Calendar section deadline: March 17, noon**  
News and feature stories require additional time

Editor: **Doreen B. Zudell**, ATS  
Assistant Editor: **S. Jenise Veris**, ATS  
Managing Editor: **Kelly R. DiFrancesco**



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

# Is NASA's Phased Retirement for You?

David McKissock, Power Architecture and Analysis Branch, wanted to dedicate more time to activities outside of work but was not ready to leap into full retirement. In January 2016, McKissock entered into NASA's Phased Retirement Program, which allows him to work part time and earn partial retirement benefits.

Glenn's Phased Retirement Point of Contact, Cynthia Forman, Office of Human Capital Management (OHCM), said the objective of the program is twofold. "Employees slowly adjust to new patterns of working and living,

thereby reducing post-retirement stress; and NASA maintains employees' critical skills and competencies through mentoring and knowledge transfer."

Under the program, employees work a half-time schedule (40 hours per pay period) and draw about half annuity before transitioning to full retirement. Additionally, they are required to spend 20 percent of the time in mentoring/knowledge transfer activities. The agreement is limited to an initial period of up to 2 years, with a 1-year extension possible at management's discretion.

Eligible employees are responsible for proposing the work they would perform during the phased retirement period and developing a mentoring plan that addresses their transfer of knowledge.

McKissock, who oversaw a large project prior to applying to the program, was able to transition back to some of his previous work now that he is in phased retirement.

"It's vital that you research the current and projected climate of the center," McKissock explained. "Your skills and competencies must be of value and there must be opportunities to mentor within the area."

Forman, also in the Phased Retirement Program, is currently transferring her knowledge to Lauren Demirjian, OHCM. She will become the point of contact when Forman enters full retirement.

NASA was on the forefront of a small group of federal agencies that rolled out phased retirement in 2015. To date, NASA has accepted 35 applicants agencywide, with 13 of those from Glenn. Three of those Glenn participants are now in full retirement.

For information about phased retirement, visit Glenn's OHCM website, <https://www.grc.nasa.gov/ohcm/>.



GRC-2017-CN-00596

Photo by Doreen B. Zudell

*Left to right: Demirjian and Forman meet with McKissock to discuss phased retirement issues.*

By Doreen B. Zudell