National Aeronautics and Space Administration

Roundup

LYNDON B. JOHNSON SPACE CENTER

April | 2012

From sea to shining stars

THE FIRST 50 YEARS

50

JOHNSON SPACE CENTER

NASA/STAFFORD JSC2011E217129

On the cover:

On pages 6 and 7, read how the Biennial Research and Technology Development Report showcases exciting studies that have benefits for our home planet and future space travels.

NASA/HARNETT JSC2012E030442

Photo of the month:

Cute critters and kids combined as the Houston Livestock Show and Rodeo trail ride made its annual stop at the JSC Child Care Center.

JSC Director

NASA/PHOTO

I find it necessary to periodically remind everyone about NASA's policy on Violence in the Workplace. The policy states that it is the responsibility of all employees, civil servants and contractors, to report incidents involving workplace violence or threats of violence. In addition, we each have a responsibility to contribute to a safe and secure workplace environment by avoiding behavior that could provoke or escalate into a hostile situation. The Threat Assessment Team (TAT) is one mechanism we use to address concerns involving potential violence or threats of violence. The TAT is comprised of standing members from the Employee Assistance Program, Legal, Security, Procurement and Human Resources. The TAT members apply their interdisciplinary expertise to:

- Distinguish between inappropriate behaviors and behaviors that are considered workplace violence.
- Assess the level of urgency and take the steps necessary to mitigate risks and ensure the safety of all employees.
- Ensure the fair treatment of all employees, including those who are directly involved.
- Determine whether physical access to Johnson Space Center should be temporarily or permanently revoked.

The members of the TAT take their responsibilities seriously—and I am proud of their professionalism—but my goal is to create an environment where the TAT is not needed at all. Please help us maintain a safe and secure workplace by reporting any threats of violence, and remember that words spoken in anger can have consequences and must be taken seriously.

Mike

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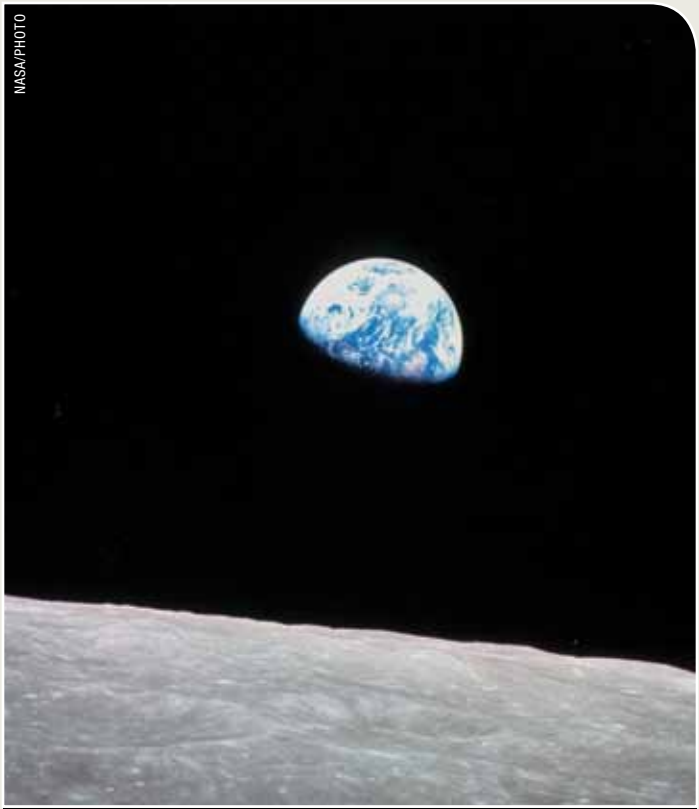
Famous **Earthrise** photo helped **spark** environmental movement

By Neesha Hosein

On Christmas Eve, 1968, none of the astronauts aboard Apollo 8 were prepared for the spellbinding moment when they would first see their home planet rise from behind the desolate lunar horizon. The vision of Earth provided them the first spot of color as they floated in the blackness of space, orbiting the lunar surface.

Apollo 8 launched from Cape Kennedy, Fla., on Dec. 21, 1968. Nearly three hours later, Commander Col. Frank Borman, Command Module Pilot Capt. James A. Lovell Jr. and Lunar Module Pilot Maj. William A. Anders were on their way to the moon, becoming the first mission to provide humans a roundtrip to another celestial body.

Many have seen and admired the "Earthrise" photo as the grandfather of all the modern space images seen today, but how many actually know the history behind Earthrise? On Feb. 13, Anders visited Johnson Space Center for a BBC documentary interview with James Fox, in which he talked about the Apollo 8 mission, its historical significance, his personal experiences during launch and lunar orbit and how he managed to shoot the unforgettable Earthrise photo.



NASA/PHOTO

Apollo 8, the first manned mission to the moon, entered lunar orbit on Dec. 24, 1968. That evening, the astronauts—Commander Frank Borman, Command Module Pilot James A. Lovell Jr. and Lunar Module Pilot William A. Anders—held a live broadcast from lunar orbit, in which they showed pictures of the Earth and moon as seen from their spacecraft. Said Lovell, "The vast loneliness is awe-inspiring and it makes you realize just what you have back there on Earth."

The launch and lunar orbit experience

Anders recalled "sitting on top of the Saturn V, which was a mini nuclear bomb itself."

"When the rockets went off, that was a different matter, because we thought we had simulated every possible crack and cranny of this mission, and yet at the very beginning, we all three realized that we had not simulated the physical environment of the launch of the Saturn V," Anders said.

As they went through the launch sequence, they could not see outside. A thermal shield prevented the crew from seeing beyond one tiny, little hole. When the thermal cover was pulled off the spacecraft by the launch-abort rocket, they were able to see out of their windows, facing upward and seeing only sky above them.

"I was very busy," Anders said. "I was the flight engineer, and Frank Borman told me if he caught me looking out the window, he'd fire me. So even in Earth orbit, I snuck a glance of Australia … nothing but big huge thunderstorms at night that looked like big light bulbs, and also did a quick peek as we went over my hometown of San Diego, which unfortunately was covered with fog. We didn't really get much of a view in Earth orbit."

Anders said their job was not to look at the Earth, but "to go through a simulated lunar mission." It was not until things had calmed down and they were on their way to the moon that they actually got to look back and take a picture of the Earth as they had left it.

"That's when I was thinking, 'That's a pretty place down there,'" Anders said. "It hadn't quite sunk in like the Earthrise picture did, because the Earthrise had the Earth contrasted with this ugly lunar surface."

Anders said they were in darkness as they were "just starting to go around, behind the moon, still in contact with the Earth, but in the shadow of not only the sun but also Earth shine … Earth shine being six times brighter than moon shine."

It was at that time Anders looked out of his window and "saw all these stars, more stars than you could pick out constellations from," and suddenly there was the Earth.

"And I must say, the hair kind of went up on the back of my neck," Anders said.

The Earthrise photo

Anders noted that after the first two-and-a-half to three orbits, they were going backwards, head down, marveling at the lunar surface, and it wasn't until after they had made a "collective maneuver to circularize our orbit at 60 nautical miles that we rolled over, heads up and turned around, going forward, like you would be driving a car around the moon."

He said they were in sunlight, and he was shooting pictures out of the side of the spacecraft, as this was one of his designated jobs.

(continued on page 11)

Though shuttle retired, **visiting** vehicles make **station** a hotspot destination

By Lori Keith

The pace of research aboard the International Space Station is accelerating, even though the space shuttles used to build it have been retired. The space shuttle orbiter's huge cargo-carrying capacity was needed to build the space station, but for daily use, the United States and its international partners have a variety of vehicles to get research materials and equipment to and from the station.

NASA/PHOTO ISS026-E-020910

Backdropped by a cloud-covered part of Earth, the unpiloted Japanese Kounotori2 H-II Transfer Vehicle approaches the International Space Station. The Japan Aerospace Exploration Agency launched the vehicle aboard an H-IIB rocket from the Tanegashima Space Center in southern Japan on Jan. 22, 2011.

Part of this international effort also involves commercial providers in various stages of their vehicle's completion, which are being contracted by NASA to both deliver cargo to the station and return research samples to Earth.

Currently, all astronauts are launched aboard the Roscosmos (Russian Federal Space Agency) Soyuz vehicle for transport to and from the station. Roscosmos also provides the Progress unmanned cargo resupply ships that deliver supplies to the orbiting outpost. Both vehicles use automated systems to dock to the station. The Soyuz returns the crew and a limited amount of cargo home, while the Progress (filled with trash) burns up upon re-entry in the Earth's atmosphere.

The Automated Transfer Vehicle (ATV), built by the European Space Agency, is an unmanned cargo carrier capable of automatically docking with the station. The ATV can carry in excess of 16,800 pounds of cargo, including dry goods, water, gases and propellant. Once the cargo is unloaded, the vehicle is used as a garbage container, with the carrier and enclosed waste also burning up upon re-entry in the Earth's atmosphere. To date, three ATVs have visited the station, with the third blasting off to visit station late in March.

The Japan Aerospace Exploration Agency provides the H-II Transfer Vehicle (HTV), the only vehicle besides the shuttle capable of transporting external cargo to the station. This vehicle is captured with the station's robotic arm and berthed to the designated port, with two visiting the station so far. Like the ATV, the HTV's cargo is unloaded, and the vehicle is used to collect trash. The vehicle also incinerates upon re-entry. The next HTV is slated for launch July 21.

Two commercial resupply service providers are projected to complete flight demonstration capabilities and make deliveries to the station in 2012. Both spacecraft will use the station's common berthing mechanism ports that provide shirtsleeve conditions and large passageways for cargo transfers into the station. Both vehicles require berthing to the station after capture with the station's robotic arm.

SpaceX's Dragon spacecraft is currently contracted to complete 12 missions. Late April is targeted as the new launch timeframe for the demonstration flight to the space station, with the vehicle to be berthed upon arrival. Test cargo will be transferred and returned on the demo flight.

NASA/PHOTO ISS017E015451

The European Space Agency's "Jules Verne" ATV begins its relative separation from the space station. The ATV undocked from the aft port of the Zvezda Service Module on Sept. 5, 2008.

Orbital's Cygnus vehicle is contracted to provide eight missions from 2012 to 2015, and will be berthed to the station. Approximately 44,092 pounds of cargo is planned for delivery to the station, along with disposal of the orbiting laboratory's trash upon the vehicle's re-entry. Cygnus' pressurized cargo module is based on the station's Multi-Purpose Logistics Module, also known as the MPLM.

Space station assembly is now complete, and there are many research facilities in place to continue not only what is currently being done, but expand and do even more investigations. NASA and its partners have supported a continuous presence on the space station for the past 11 years, and the laboratory is expected to operate at least through 2020.

NASA/PHOTO BILL INGALLS

The Soyuz rocket is rolled out to the launch pad on Sept. 28, 2009, at the Baikonur Cosmodrome in Kazakhstan.

Lots of good info on the **Interwebs** about **station**

By Texas Twister

I've been remiss in my reporting duties, as I'm sure you have noticed. (You did notice, right?) Blame it on the Houston Livestock Show and Rodeo this past March. The amount of heifers that just cheerfully descend on Houston … why, it boggles the mind.

But eventually I did get back to my duties as a cutting-edge reporter, and I spend a goodly amount of time using my hoof to awkwardly click my mouse to read about how the International Space Station is benefiting humanity.

Oh, *the humanity.*

Lest you forget, I am not a human. (But I'm sure those benefits apply to me as well.)

Just a tip of the iceberg are impacts that station has made in the areas of human health, disaster relief and global education. Heck, I just found out that when it comes to astronauts' bones, salt may not be the best.

This is *exactly* why I can't be an astronaut. All the tortillas I consume are coated in salt. If I could, I would roll around in the stuff, I love it that much. Perhaps I should end that love affair before osteoporosis kicks in.

As reported on the website, salt intake was investigated in a series of studies, both on the ground and in space, and it was found that not only is sodium retained (probably in the skin), but it also affects the acid balance of the body and bone metabolism. In essence, high salt intake increases acidity in the body, which can accelerate bone loss.

But never fear, because we are ON THIS. The European Space Agency's recent SOdium LOad in microgravity, or SOLO, study focused on learning more about the relationship of salt and the human body. Nine station crew members followed low- and high-salt diets. The expected results may show that additional negative effects can be avoided either by reducing sodium intake or by using an alkalizing agent like bicarbonate to counter the acid imbalance.

I vote for countering.

Or, if you've consumed a lot of funnel cakes like I just did at the rodeo, you may want to learn about getting fit the astronaut way. NASA's Mission X: Train Like an Astronaut, works with the schools in our very own neighborhoods and around the world, harnessing the same skills used to train astronauts to motivate physical education for around 3,700 students in 40 cities around the globe.

Mission X launched in U.S. schools Jan. 18, 2010, complete with activity and educational modules at http://www.trainlikeanastronaut.org. The program is available in six different languages, and the goal is to make kinesiology and nutrition fun for children by encouraging them to train like an astronaut. If Mission X can turn me back into more Longhorn than "Widehorn," I'm all for it.

Food isn't everything (I write while shaking my head). The Interwebs also offers a "Gateway to Photos of the Earth." And who doesn't like a little Earth eye candy, eh? Especially considering this month is all about said planet. The Earth is awful pretty, folks. LET'S KEEP HER THAT WAY.

Brush up on how your space station is benefiting humanity and Longhorns alike by checking out http://www.nasa.gov/mission_pages/station/research/benefits/index.html. More importantly, don't forget to tell all your friends.

Gateway to Photos of the Earth can bring you to awe-inspiring photos such as this one of an Aurora Borealis above the Vancouver/Seattle area of North America.

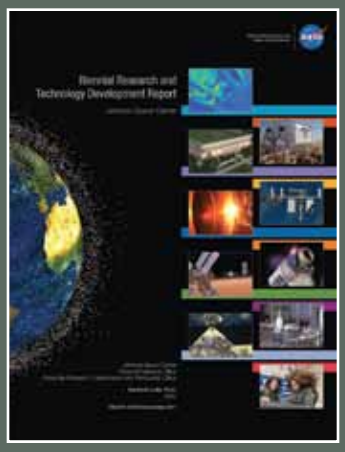
NASA/PHOTO ISS030-E-53880

Biennial Research and Technology **Development Report** illustrates our worldwide impact

By Catherine Ragin Williams

In hardcopy form, it spans more than 300 pages and showcases budding technology and research studies spanning areas from Engineering, Space Life Sciences, planetary sciences and more. The Biennial Research and Technology Development Report illustrates the extent of work being done at Johnson Space Center to outside entities, and even to those within our own gates.

"A small taskforce was put together to see how we best communicate with the research communities, and one of the recommendations was to publish a report that talks about the new work and new research technologies we are developing in a way that they all can appreciate and understand," said Kamlesh Lulla, Ph.D., director of the University Research, Collaboration and Partnership Office within the JSC External Relations Office.



"The main purpose of this report is communication, but the outcome we would like is collaboration. We want to collaborate with universities and research institutions that are interested in doing research that is relevant to Johnson Space Center for future human spaceflight."

The report is mailed to more than 450 deans of engineering and sciences all over the country.

"They identify the areas that their school or university is interested in working on, and they contact me for further discussions," Lulla said. "And then I put them in touch with our directorate experts. Many times that builds discussions of mutual collaboration or cooperation, even technical information interchange."

This immense communications resource is pulled together with the help of contributing authors, who submit their ongoing studies for inclusion into the report. Not only does the report lead to partnering with outside organizations, but it also helps create awareness throughout disciplines within JSC.

"Many people think of JSC as an operational center or an engineering center (or) have this perception that we don't do technology development or research, which is far from the truth," Lulla said. "It's an evidence that yes, we do research, we do technology development, and we want to foster that culture more and more at JSC."

Following are two examples of exciting studies you'll find within the report, available to all at:
http://www.nasa.gov/centers/johnson/external_relations/university/

Early life on Earth and the search for extraterrestrial biosignatures

Understanding the earliest terrestrial life on our planet is of astrobiological importance, as insight into the evolutionary process on Earth can help us understand the development of life on other planets. Yet, the nature of early life on Earth is difficult to assess, because the oldest potential biosignatures are usually poorly preserved.

With the relatively new technique of nanometer-scale, secondary ion mass spectrometry (NanoSIMS), we will be able to unlock the secrets of these ancient microorganisms.

"The NanoSIMS study is helping us to characterize, at a sub-micron scale, well preserved and non-controversial microbial life that lived on Earth in its early history," said Dorothy Oehler, Ph.D., research scientist with LZ Technology. "Once we can do this, then recognizing less well-preserved fragments of living systems from either the earliest part of Earth history or from other planets should be easier."

NanoSIMS allows scientists to more confidently interpret controversial organic structures in 3-billion-year-old sediments.

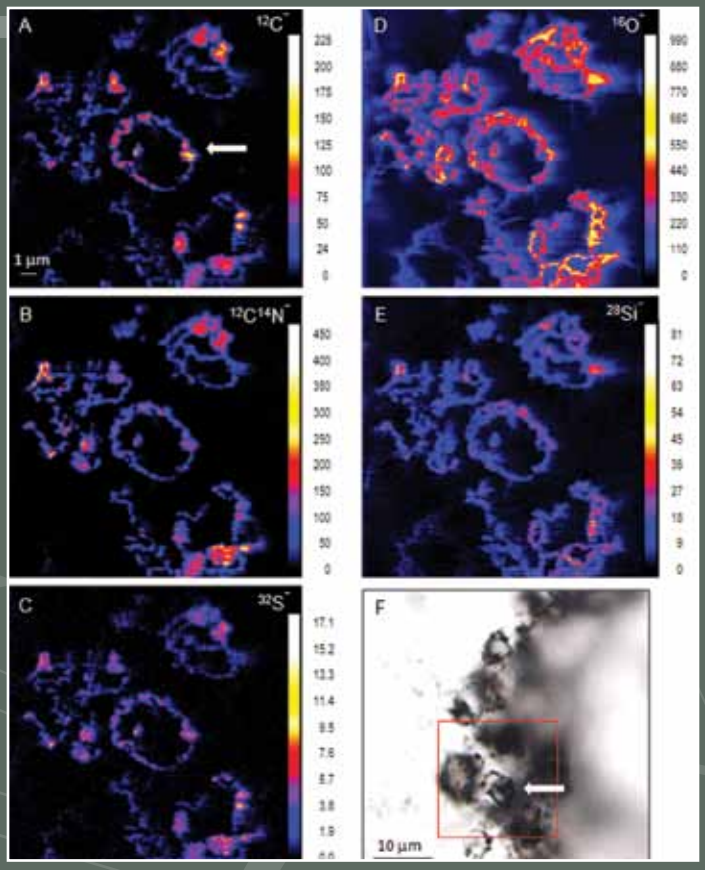
"These results add to a growing body of data suggesting that the earliest part of Earth history, the Archean, was a time of evolutionary innovation," Oehler said. "The biosphere on Earth, by about 3 billion years ago, was multifaceted and diverse."

With all that we have learned about our home planet, there is still much to be revealed in the celestial realm.

"In the future, if samples are returned to Earth from carefully selected sites on either Mars or asteroids, the NanoSIMS would be a new tool in our arsenal of techniques to be used to search for and study any biogenic signatures within these samples," said Senior Scientist Everett Gibson, Ph.D.

PHOTO CREDIT: NASA AMES RESEARCH CENTER/ED SCHILLING

The Japan Aerospace Exploration Agency's Hayabusa spacecraft leaves a streak of light behind the clouds as it re-enters Earth's atmosphere over the Woomera Test Range in Australia. This image was taken from Kingoonya, South Australia, a nearby town. Hayabusa—the first asteroid sample return mission—is also highlighted in the 2011 Biennial Research and Technology Development Report.



Controversial, organic microstructures in a 3-billion-year-old rock from the Pilbara of Australia: (a-e) nanometer-scale, secondary ion mass spectrometry maps of the spheroidal structures within the red rectangle of slide F; (f) optical photomicrograph in transmitted light of a thin section.

The value of human engineering in designing exploration spacecraft

The role of a human engineering team on a major design and development project such as Orion or the Space Exploration Vehicle is to ensure the architecture follows a human-centered design (HCD) approach. HCD focuses on making systems usable by ensuring that the needs, abilities and limitations of the human user are met.

"Most importantly, HCD is an iterative activity that intentionally uses data gathered from users and evaluations to inform designs," said Harry Litaker, senior Human Factors Design engineer. "The benefits of the HCD approach can be realized in terms of cost control, mission success and user satisfaction."

With Orion's development underway, human engineering is a timely consideration. One recent success story was the early evaluation of seat egress, which examined the ability of the crew to exit the seat in the most up-to-date cabin and seat configuration and assessed crew-vehicle accommodation. This achievement would not have been made possible without the professionals working under the Bioastronautics Contract in support of the Habitability and Human Factors Branch.

"The evaluation identified an impediment to egress caused by the location of a support beam, allowing for early rework of the design, saving cost and schedule," said Senior Human Factors Design Engineer Jennifer Boyer, Ph.D. "The human-in-the-loop driven redesign not only saved the program money by alleviating costly structural changes later in the design, but also allowed for increased crew maneuverability and performance, which impact mission success."

An evaluation of a vehicle's design goes in stages. Early evaluations focus on individual components. Later, work continues to ensure a smooth integration of the components within a subsystem. With continued refinement of the design, evaluations are merged at the system level. For example, a vehicle egress evaluation provides data on seat design, strut design, interior volume and mobility aids.

By the time Orion launches on her maiden voyage, each nook and cranny will have been discussed, dissected and tested at length, ensuring that her crew will be in for a ride as comfortable as can be expected within a capsule hurtling to a far-out destination.

2011 Report Highlights

- Prepared in collaboration with JSC Strategic Opportunities and Partnership Development Office and center chief technologist
- An innovator/investigator/researcher centered report with more than 338 authors/coauthors highlighting their technical results
- Contents correlate to Office of Chief Technologist's Space Technology Roadmap
- An opportunity for directorates to showcase their exciting technical projects and disseminate JSC's accomplishments to external and internal audiences

To view the Biennial Research and Technology Development Report in full, go to:
http://www.nasa.gov/centers/johnson/external_relations/university/

To learn more or be included in a future report, created every two years, email: Kamlesh.p.lulla@nasa.gov

NASA/PHOTO JSC2007E103298

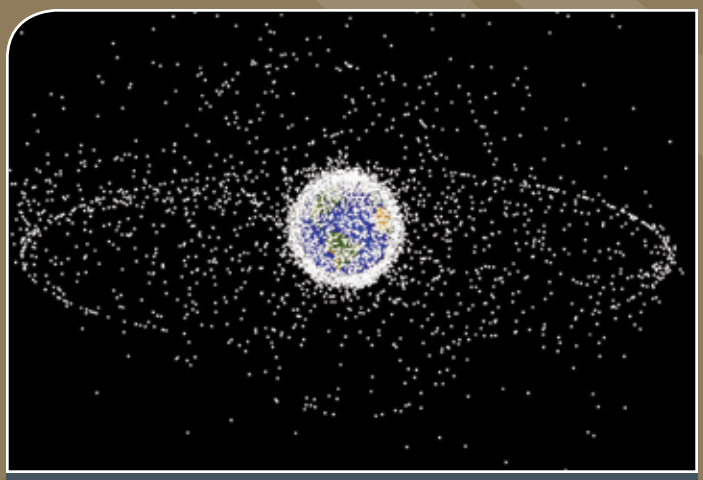
Suited test subjects take part in a seat layout assessment of the Orion mock-up.

JSC leads NASA's Orbital Debris Research and Science Operations

By Neesha Hosein

The NASA Johnson Space Center Orbital Debris Program Office (ODPO) is the lead NASA center for orbital debris research, recognized worldwide for its initiative in addressing orbital debris issues. The NASA ODPO has taken the international lead in conducting measurements of the environment and in developing the technical consensus for adopting mitigation measures to protect users of the orbital environment.

Work at JSC continues with developing an improved understanding of the orbital debris environment and measures that can be taken to control debris growth.



NASA/PHOTO

This computer-generated image from a distant oblique vantage point provides a good view of the object population in the geosynchronous region (around 35,785 kilometers altitude). Note: The larger population of objects over the northern hemisphere is due mostly to Russian objects in high-inclination, high-eccentricity orbits.

Heather Cowardin, optical lead for the Engineering and Sciences Contract Group's Orbital Debris Research and Science Operations (ODRSO), is involved with a variety of optical projects, including development of a NASA Meter-Class Autonomous Telescope; acquiring and analyzing optical data on spent rocket bodies in Earth orbit; and acquiring and analyzing orbital debris population data on the near-geosynchronous region using several telescopes in Chile. These include the 0.6-meter aperture Curtis-Schmidt telescope operated under grant with the University of Michigan at the Cerro Tololo Inter-American Observatory and the 6.5-meter aperture Magellan telescopes at the Las Campanas Observatory.

"My primary project is the Optical Measurement Center (OMC)," Cowardin said. "The OMC attempts to emulate space-based illumination conditions using equipment and techniques that parallel telescopic observations and source-target-sensor orientations."

Using the lab they can study shape, phase functions, material characterization and rotational analysis to compare with telescopic data to better characterize the known and unknown targets in Earth orbit.

Team structure and goals

"The coolest thing about the OMC lab is we have a programmable robot that can run autonomously once a program file has been uploaded, and soon people will be able to log in on the webcam and watch the measurements in real time," Cowardin said.

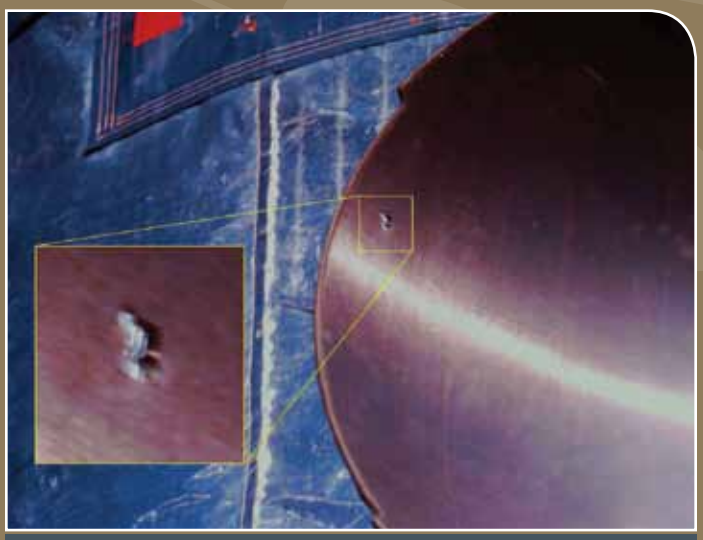
The team handles space debris fragments and materials from multiple sources, such as hyper- and low-velocity ground test impacts, pressurized explosions and samples of pristine materials from the original manufacturers. Examples of such materials include multi-layer insulation, solar cells, metals, carbon fiber reinforced plastic, glass fiber reinforced plastic, electrical potting, wires and circuit boards.

"We also have scaled rocket bodies we examine to study orbital periodicity about specific rotation axis," Cowardin said. "Soon we will also be studying scaled asteroids for phase function and photometric analysis."

The team is evaluating the tumble rate of these rocket bodies so that they will understand the difficulties involved when trying to rendezvous with them, grab them or attach something to them so the objects can re-enter the atmosphere faster.

The major goal is to map the space environment using spectral and photometric measurements to analyze shape, rotation, and ultimately derive an Optical Size Estimation Model comparable to the current NASA radar Size Estimation Model. Together, these models use measurements taken in the lab and remotely to build higher fidelity models that accurately portray the current and future space debris environment.

For more information about orbital debris research at JSC, visit: http://orbitaldebris.jsc.nasa.gov/



NASA/PHOTO

An orbital debris impact that completely penetrated the antenna dish of the Hubble Space Telescope, illustrating why orbital debris research is vital for the health of existing space systems and vehicles.

Teachers take flight to share the wonders of space and science

By Rachel Kraft

"What a fantastic week. The best of my teaching career! I have not seen our school community so excited in 18 years of teaching."

This reflection made by a Pennsylvania teacher capped off a week of new experiences and collaboration for educators who participated in the Office of Education's Reduced Gravity Education Flight Program (RGEFP).

More than 70 kindergarten through 12th grade teachers who were selected by the Teaching From Space (TFS) Office or taught at NASA Explorer Schools (NES) visited Johnson Space Center to take part in the program. The educators weren't just given the chance to fly research in microgravity; they were exposed to elements of the engineering design, scientific inquiry and experiential learning processes that their students must understand to successfully pursue degrees in science, technology, engineering and mathematics (STEM).

NASA/PHOTO JSC2012E023147

NASA Explorer School teachers explain one of their experiments in Ellington Field's Hangar 990 during the reduced-gravity week.

The reduced-gravity opportunity used to be reserved exclusively for undergraduate students in STEM disciplines, but as the program has evolved since its inception in 1995, the Office of Education began to offer opportunities for teachers.

"If you touch a teacher, you can inspire generations to come, so that was part of the motivation," said Sara Malloy, RGEFP lead coordinator.

The comprehensive experience gave teachers more than just a joy ride in weightlessness. Both TFS and NES teachers spent several months communicating in Web-based interactions with NASA to master the concept of microgravity. TFS teachers built an online community of practice where educators excited about teaching the concept collaborated and discussed ways to excite students and cultivate a continuing dialogue. NES teachers participated in several Digital Learning Network events with NASA education specialists, which were designed to energize students to think about how microgravity can alter scientific principles.

"We wanted to train the educators to make sure that when they walk away from here, they know what microgravity is and they know how to explain it to their students and the local education community," said Dynae Fullwood, TFS education specialist.

NES participants tested three pre-built experiments that evaluated inertial balance, projectile motion and fluid dynamics. One of the key learning opportunities for these teachers was to adapt each experiment to fit a particular grade level or integrate it into the courses they were teaching at their schools.

"Regardless of what grade they were teaching, they were able to take the experiment and tie it in as an example in the curriculum that they were teaching," said Jamie Semple, RGEFP's program coordinator, who designed and built the experiments performed by NES teachers. "I can't think of a school that didn't have at least one solid extension. Some were even holding events with parents at night, almost like mini science fairs."

NES participants also had time to perform a fourth experiment conceived by students.

"It was their opportunity to have their students fly something on the flight based on a scientific concept," Semple said.

The seven TFS teams proposed, designed and built their own experiments based on student input. A team from Lebanon School District in Tennessee, for example, tested three methods for wound closure: stitching, stapling and liquid adhesive. Other teams explored electron flow, convection currents and electrolysis.

The experience didn't end after the last parabola, either. Throughout the flight week, educators were exposed to other NASA opportunities for themselves and their students. Each team of educators also engaged in a variety of outreach efforts to share their experience and knowledge with others in their schools, school districts and communities. By the end, participating educators reached more than 1,600 students and 2,100 people in the educational and local communities.

NASA/PHOTO JSC2012E024804

Teaching From Space participants investigate science in microgravity.

Spotlight: **Koorosh Araghi**

Principal Investigator and Fuel Cell Technology Manager

NASA/PHOTO

Q: Coolest part of working at Johnson Space Center?
A: Developing advanced fuel cell power and Water Electrolysis Systems for future space exploration vehicles, lunar/Martian landers, surface life support systems and space and planetary habitats.

Q: Favorite hobbies or interesting things you do away from the office?
A: Spending time with my family, traveling, working out and skiing.

Q: What was your first job (not necessarily at NASA, but ever)?
A: Summer job at my dad's friend's auto body shop at age 13.

Q: What would people be surprised to know about you?
A: That the solid oxide electrochemical technology I was developing during my undergrad research was selected for a 2001 Mars In-Situ Resource Utilization mission to produce oxygen from the Martian atmosphere.

Q: If you could trade places with any other person for a week, famous or not famous, living or dead, real or fictional, who would it be?
A: Dr. Martin Luther King Jr.

Q: What is your favorite indulgence?
A: Strawberry cheesecake ice cream.

Q: What is the best advice someone has given you?
A:
- Guard your tongue. Say less than you think.
- Keep an open mind. Discuss, but don't argue. Disagree without being disagreeable.
- Be interested in others, their pursuits, work and family.

Q: What cosmic destination would you want to travel to if you were an astronaut?
A: Mars.

Q: What would we find in your refrigerator right now?
A: Since my mom is visiting, plenty of wonderful Mediterranean and Persian food.

Q: What was your proudest moment?
A: The birth of my daughter Felicia.

Q: When did you first become interested in space and why?
A: In the summer of 1994, when for the first time I came to JSC to develop a Solid Oxide Electrochemical System to produce oxygen and methane from carbon dioxide and hydrogen.

Q: Describe yourself in three words.
A: Friendly, caring, creative.

Q: What is the most interesting thing you have learned being in the Propulsion and Power Division?
A: I have learned so many incredible things during my 15 years with EP. One of the most important lessons that I learned was teamwork.

Q: JSC turns 51 in September. Where do you hope to see NASA 50 years from now?
A: Developing habitats both on the moon and Mars. In-Situ Resource Utilization of the moon and Mars to produce water, propellant and power. Collaborating more with industry and international partners.

PHOTO: THE ADVANCED FUEL CELL TECHNOLOGY PROGRAM.

During September 2010, JSC, Glenn Research Center and industry partners participate in an advanced fuel cell technology demonstration in Flagstaff, Ariz.

WANTED!

Do you know a JSC colleague or team that does something extraordinary on or off the job? Whether it's a unique skill, interesting work, special professional accomplishment, remarkable second career, hobby or volunteerism, your nominee(s) may deserve the spotlight!

The Roundup shines the light on one special person or team each month, chosen from a cross section of the JSC workforce. To suggest "Spotlight" candidates, send your nomination to the JSC Roundup Office mailbox at jsc-roundup@mail.nasa.gov. Please include contact information and a brief description of why your nominee(s) should be considered.

Johnson Space Center Ombudsmen Office

Got issues? We have answers. The Ombudsman Office provides advice and counsel to individuals on a wide range of interpersonal and workplace-related issues. It is one of several resources at Johnson Space Center that can help an individual with issue resolution, and offers unique advantages.

First, the Ombudsman is *confidential*. Your privacy will be respected, and your issue will not be discussed with anyone else without your express permission.

The Ombudsman is also *informal*, meaning that there is no official or unofficial record of your visit, and the visit does not initiate any process or action that you do not control.

The Ombudsman Office is *independent*, reporting directly to the JSC director. It therefore examines all issues without any organizational influence or bias. This also gives them license to act effectively in any areas that you authorize.

Finally, the Ombudsman acts as a neutral party, assessing the concern that you present without taking sides. This allows them to offer advice, having considered the issue from more than one perspective.

The best way to initiate a discussion is with a phone call to either of the two ombudsmen, Donna Blackshear-Reynolds or John Casper. They will set up a meeting with you at a time and place of your choosing, but usually in the secure lounge in Building 13, Room 233. A typical visit lasts about an hour, assuring that they have understood the issue and its background completely and accurately.

NASA/MARKOWITZ JSC2012E036111

Contact either Donna Blackshear-Reynolds or John Casper if you have an issue that you need assistance with:

- Donna Blackshear-Reynolds, 281-792-9318, donna.m.blackshear-reynolds@nasa.gov
- John Casper, 281-792-9364, john.h.casper@nasa.gov

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"I don't know who said it, maybe all of us said, 'Oh my God, look at that!'"Anders said. "And up came the Earth. We had had no discussion on the ground, no briefing, no instructions on what to do. I jokingly said, 'Well, it's not on the flight plan,' and the other two guys were yelling at me to give them cameras. I had the only color camera with a long lens, so I floated a black-and-white over to Borman. I can't remember what Lovell got. They were all yelling for cameras, and we started snapping away."

Earthrise became one of the most famous photographs from all of the Apollo missions and one of the most reproduced space photographs of all time. It has also been credited for inspiring the beginning of the environmental movement. In *Life* magazine's 100 Photographs that Changed the World edition, wilderness photographer Galen Rowell called Earthrise "the most influential environmental photograph ever taken." Another boost of fame came in 1969, when the U.S. Postal Service issued a stamp commemorating the Apollo 8 mission.

This April, as we celebrate another Earth day, we remember that this photo was one of the many reasons behind our emotional drive to preserve and protect our blue marble.

For the full story on Earthrise and more on Apollo 8, visit the JSC home page: http://www.nasa.gov/centers/johnson/home/index.html

NASA/PHOTO S68-50265

The prime crew of the Apollo 8 lunar orbit mission, from left to right: James A. Lovell Jr., command module pilot; William A. Anders, lunar module pilot; and Frank Borman, commander.

Roundup

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The little **capsule** that could

NASA plans to test Orion in low-Earth orbit in 2014.

NASA/PHOTO

In early March, Lockheed Martin announced that it had selected the Delta IV Heavy to launch Orion for the Exploration Flight Test-1 (EFT-1) flight. This milestone is slated for 2014 and will send Orion 3,600 miles into space, more than 15 times farther away from Earth than the International Space Station, returning it at speeds not seen since Apollo. Check out the latest update from Orion and take a look at the new graphics and animation that explain the EFT-1 mission at: http://www.nasa.gov/exploration/systems/mpcv/test_flight_2014.html

"We can test parachutes by dropping them from a plane. We can test thrusters in stands on the ground. We can check the splashdown in a water tank. We can test all the pieces and parts, but a space flight is the only place we can see all of these things work together and work under the real conditions they will face with a crew onboard," said Orion Program Manager Mark Geyer.

The EFT-1 flight will test the kind of return that will be required when astronauts come home from voyages beyond low-Earth orbit. As Orion re-enters the atmosphere, it will endure temperatures almost 2,000 degrees Fahrenheit, higher than any human spacecraft since astronauts returned from the moon.

The first integrated flight test that follows EFT-1, an uncrewed Orion launched atop the Space Launch System, is set for 2017. That test will put the entire, integrated exploration system that will return humans to deep-space travel through its paces. Orion ultimately will carry astronauts to asteroids or Mars and other far-out destinations.

Stay tuned as the future unfolds.