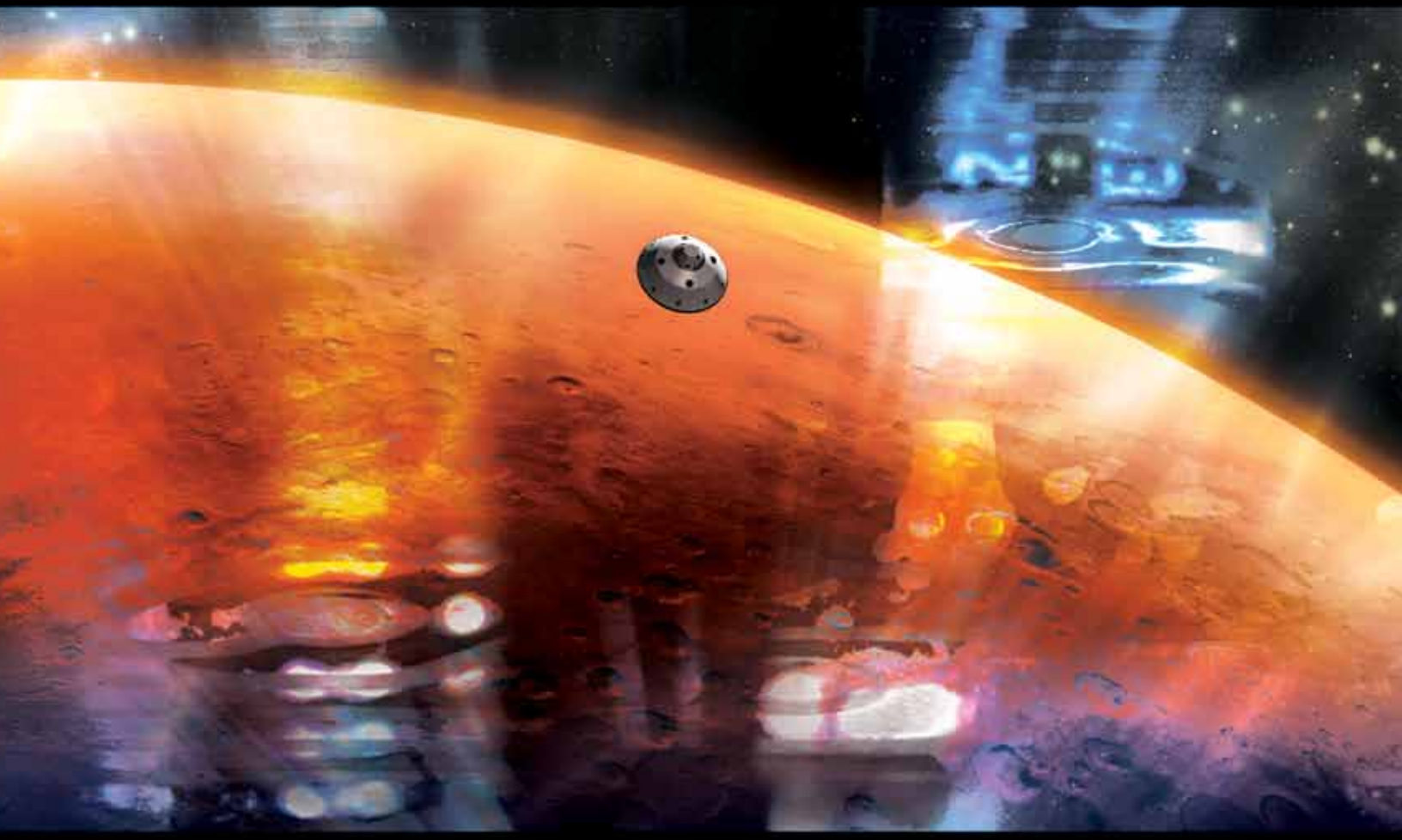
National Aeronautics and Space Administration

Roundup

LYNDON B. JOHNSON SPACE CENTER

Fall | 2012



Curiosity explores Mars

NASA/PHOTO

On the cover:

An artist's rendering of the Mars Science Laboratory's encapsulated Curiosity rover as it closes in on the Martian atmosphere.

NASA/SHERI LOCKE JSC2012E216087

Photo of the month:

Space Shuttle *Endeavour* is ferried by NASA's Shuttle Carrier Aircraft (SCA) over Houston on Sept. 19. NASA pilots Jeff Moultrie and Bill Rieke are at the controls of the SCA. Photo taken by NASA photographer Sheri Locke in the backseat of a NASA T-38 chase plane, with NASA pilot Thomas E. Parent at the controls.

JSC Director

NASA/PHOTO

I sometimes find myself feeling defensive during an election year. Candidates from both parties promise to run the federal government much more efficiently, thereby saving the taxpayers billions of dollars, with the implication that billions of dollars are being wasted by the "federal bureaucracy." The General Services Administration scandal this year seems to have added to the usual election year bombast.

As a taxpayer, I'm a big supporter of saving taxpayer dollars. As a government official, I have a huge responsibility to spend the taxpayers' money very carefully. At the same time, I feel strongly that the investment our nation makes in NASA programs has a huge payback in numerous ways:

- We serve as an engine for economic growth.
- We provide International Space Station-based research that impacts our everyday life.
- We develop new technologies that benefit all of humanity.
- We inspire our children to realize their dreams and reach for the stars.

Especially during an election year, it may be easy to wonder if your hard work is understood or appreciated by our politicians in Washington. I wanted to pass on the encouraging and positive attitude I've encountered this year, during both the president's budget rollout in February and our annual Center Director Day on the Hill in June, from our senators and representatives. I met with dozens of elected officials of both parties, and they made it clear they were quite impressed with how this team successfully and safely brought the Space Shuttle Program to a close and finished final assembly of the space station. The successful landing and activation of Curiosity has only added to NASA's reputation for making the seemingly impossible look routine.

The budget will continue to be a challenge—probably a quite serious challenge—but you should know that your outstanding work is understood and appreciated by many in Washington. Keep up the good work!

Mike

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ISS Science Corner

By Jessica Nimon

Time in space, a space in time

There are only so many hours in a day, as many people lament while trying to fit in everything they hope to accomplish for work, family and fun. It seems like everyone could use more time. With only 24 hours in a day, people have to divvy up the valuable commodity according to their priorities. This can be a challenging juggling act for anyone, but when you live and work in space, like the crew of the International Space Station, the setting itself can determine time and tasks.

NASA/PHOTO ISS030E049677

Don Pettit, Expedition 30 flight engineer, works on a Synchronized Position Hold, Engage, Reorient, Experimental Satellite, or SPHERES, in a portable glovebox facility in the Destiny laboratory of the space station.

Astronauts aboard the space station are no strangers to the importance of a schedule. In a recent blog entry, NASA astronaut Don Pettit addressed the topic of timekeeping and the challenge of balance. He points out that, whether living in a habitat in the ocean, the Antarctic or in space, survival is the first order of business. In the unrelenting environment of space, the setting can alter priorities with little or no notice. A piece of space debris or unexpected system failure could very quickly reorient every crew member from the task at hand to a united effort.

"When humans venture into a harsh wilderness, the fraction of time on task shrinks, while the effort to simply be there grows," Pettit said. "You are lucky to log six hours of mission tasking and six hours of sleep. The rest of the time is spent simply trying to stay alive."

When there are no immediate dangers, the crew focuses on scheduled workloads and daily routines. The breakdown may vary from day to day, but in general includes a one-hour meeting with mission control, a 12-hour workday, a second one-hour mission control tag up and an hour to finalize tasks before dinner. Sleep and personal time fall within the remainder of the 24-hour day.

"This leaves about a nine-hour slice of off-duty time until the whole routine begins anew," Pettit said. "Note well that this is not 'free time,' but 'off-duty time'—a significant distinction when living on a ship, be it on the ocean or in space."

Within the 12-hour working day, there is a further breakdown of tasks. In general, this comes to 6.5 hours on primary mission tasks, such as research, operations and maintenance. The crew members also spend 2.5 hours on physical training for both research goals and their own health. What time remains is quickly consumed by preparations for the primary tasks, unplanned repairs and general upkeep to maintain smooth operations throughout the mission.

"The breakdown of primary mission tasks is coordinated between the critical systems and the research planners," said NASA's International Space Station Program Scientist Julie Robinson, Ph.D. "Research priorities from the different sponsor organizations are integrated into a single research plan."

While Sundays are light workdays for the crew of the space station, there is no such thing as a weekend off when living in orbit.

"To date, we have had four weekends in a row where something came up that trumped our off-duty time," Pettit said. "During this period we worked over 30 days without a break. When you go to the frontier, you are there to do something productive, not to sip tea and eat bonbons."

Pettit, who returned to Earth on July 1, shares a tip in his blog entry on his own way of making the most of any break time on orbit. This is when he might compose a blog entry, send notes to family or even work on voluntary science or education activities. Citing organization as the key, he keeps a cheat sheet of 5-, 15- and 30-minute task options in his pocket, which he refers to when there is a pause in mission tasks.

"Then, when you truly have a significant span of off-duty time, perhaps on a Saturday night, there is nothing more awe-inspiring than floating for an orbit in the cupola and observing Earth," Pettit said. "My personal slice of time pie may be only a sliver, but oh, how sweet it is!"

NASA/PHOTO ISS030E132525

NASA astronaut Pettit, equipped with a bungee harness, prepares to exercise on the Combined Operational Load Bearing External Resistance Treadmill, or COLBERT, in the Tranquility node of the space station.

Navy 'pilot' program gives scientist astronauts a boost

By Catherine Ragin Williams

It used to be that astronauts had very defined roles upon entering the space agency. You were either a pilot or a scientist, with little gray area in between. But now, with the full utilization of the International Space Station and future spacecraft that will get us deeper into the solar system, the lines have been blurred. Current and future astronauts must be adept at fulfilling any role NASA requires.

"With shuttle, people came in on these two different tracks (pilot and mission specialist), and you had pretty different jobs," said astronaut Kate Rubins. "But now, everybody's going to the ISS (International Space Station), and we're essentially doing the same job—a mix of science and operations."

Recently, NASA sent science-centric astronauts Richard Arnold and Rubins to participate in a pilot program involving the T-6 aircraft, which is part of the Navy Flight Officer curriculum. They spent three months mastering these machines, as well as learning how to become proficient in an operations environment very atypical from a laboratory. Before NASA, neither had aviation experience.

PHOTO COURTESY OF KATE RUBINS

Astronaut Kate Rubins beams from the cockpit of the Navy's T-6 aircraft.

PHOTO COURTESY OF RICHARD ARNOLD

Astronaut Richard Arnold stands in front of the T-6 aircraft before undergoing supplemental training in dynamic mission operations.

"When I arrived here in 2004 I had zero (flying experience)," Arnold said. "I've done some since I've gotten here, but this was really valuable training. I think the big thing is just the decision making in a high-speed environment with a fairly complex machine. You can't really do it in a simulator. In a simulator, you go home for dinner. In an airplane, you'll go home for dinner if you make good decisions."

Though the astronauts had dabbled in flying after arriving at NASA, this program was not about learning to fly.

"It's actually taking the folks who have come into the Astronaut Office without a lot of aviation experience and gives them that pilot and operational training we think is going to be really useful for space station," Rubins said. "It has nothing to do with actual flying. It's learning how to think operationally, to prioritize and manage your very big workflow. You've got a huge workload in the aircraft, and we think it's an environment that's analogous to spaceflight."

Completing complex tasks in a high-pressure environment like space station, Soyuz or a future commercial spacecraft demands a well-rounded Astronaut Corps—and the T-6 helps expand their training regimen.

The Navy flight program enables astronauts "to have a good understanding of the vehicle, how the systems work … not blindly following procedures, but understanding what the procedures are trying to tell you," Arnold said. "Those are the things that this kind of aviation training really helps us out with."

For Rubins, the pinnacle of her excursion to Florida was a solo flight in the T-6.

"I had done about half of my private pilot's license, but I hadn't ever soloed an aircraft before," Rubins said. "It was my first solo … and I got to it and was like, wow, that was a big deal. When you sign for an aircraft and you take on that responsibility, then you're the person in charge of getting that aircraft back safely on the ground. You're responsible for all of the operations during the flight. It was a really neat experience."

The astronaut corps of today is dynamic and constantly striving to improve. With the conclusion of Arnold and Rubin's stint in Florida, the Astronaut Office will determine if the T-6 may one day become a standard part of the training flow to supplement the much faster T-38 (a true jet) training done with the Aircraft Operations Division at Ellington Field. The two-seat, supersonic T-38 is used to develop crew coordination and communication skills to help prepare astronauts for spaceflight.

"We train the pilots on how to do science, so I think it is a good idea to train the scientists how to be operators," Rubins said. "It makes sense that we need to learn how to do each other's skill sets now, too."

JSC Safety Action Team makes safety a priority

By Neesha Hosein

The Johnson Space Center workforce knows that safety has long been an essential part of the center's culture. And, if you don't know, you should.

The JSC Safety Action Team (JSAT) was established by the center director in 1998. JSAT is a group of employees dedicated to promoting employee participation in JSC safety, health, environmental protection and emergency preparedness programs.

"In the short time I've been fulfilling this role, I definitely have come to learn how important safety is to our members," said Kelly Byerley, JSAT deputy chair. "It feels good to hear attendees talking to each other about specific issues presented in meetings, knowing that you are helping to spread the safety message and that someone else down the line may benefit from what you have shared with the group."

NASA/JAMES BLAIR JSC2012E215032

JSAT "Then and Now: Comparing How We Operated from the 1960s to 2012" panel members include (from left to right): Patrick Buzzard, JSAT chair and panel moderator (standing); Dr. Ellen Ochoa, deputy JSC director; Milt Heflin, associate center director (technical); Joel Walker, director, Center Operations; Vince Watkins, deputy director, Safety and Mission Assurance; Kirk Shireman, deputy manager, International Space Station Program; John Casper, special assistant for Program Integration, Orion Program; Jeff Davis, director, Space and Life Sciences; Jon Olansen, manager for Project Morpheus; and Hank Rotter, who worked on the Gemini and Apollo programs.

The JSAT provides a forum for employee involvement in the JSC safety program, and members include both civil service, contractor and union employees.

"As deputy director for Safety and Mission Assurance, I am always impressed with the professionalism, dedication and passion exhibited not only by our safety practitioners, but also from senior and line management, as well as employees across JSC," Vince Watkins said. "We share a unique bond, which allows all JSC employees to know the importance of safety and the impacts it can have on our lives."

NASA/JAMES BLAIR JSC2012E215030

Patrick Buzzard, JSAT chair, introduces the members of the safety panel discussion on Sept. 6 in the Teague Auditorium.

JSC Deputy Director and designated safety and health official Ellen Ochoa explained the importance of providing JSC employees a way to get directly involved in spreading the message about safety, encouraging their colleagues to practice safe habits and processes and bringing up topics that could benefit from a little extra visibility.

"I also really enjoy the opportunity to reward members of the JSC community through the annual JSAT awards for their commitment to safety and their readiness to look out for each other," Ochoa said.

JSAT events

JSAT's "Why I Work Safely" (WIWS) badging program is a popular activity seen at most safety, health and environmental activities on-site. Employees bring personal photos of loved ones, pets or cherished possessions to the JSAT booth, and the photos are laminated to a badge including the JSAT logo and the words "The Reason I Work, Drive, and Play Safely:" on one side and JSC emergency telephone numbers and personal emergency contact information on the other.

"Employees are proud to wear these badges along with their JSC employee badge, and many have WIWS badges made for other family members as well," said Reese Squires, Information Technology and Multimedia Services contract safety officer. "In addition to safety, health and environmental events, JSAT volunteers also host a Valentine's Day WIWS activity."

JSAT Chair Patrick Buzzard organized a safety panel discussion on Sept. 6 in the Teague Auditorium, in which some of JSC's top managers talked about "Then and Now: Comparing How We Operated from the 1960s to 2012."

"It was an honor to be selected as the JSAT chair, and I will work hard to provide our JSAT team with opportunities to interact with senior NASA leadership and hear from safety experts," Buzzard said. "I also hope to engender an atmosphere of openness and inclusiveness, as we are all safety officials, and we all bring something important to the table."

For more information about the JSAT, visit: http://jsat.jsc.nasa.gov/index.cfm

Johnson Space Center, too, has Mars in its clutches

Curiosity's "seven minutes of terror" ignited a Mars mania within the NASA family that extended from the usual suspects of space geeks and rocket scientists to the sometimes indifferent general public. Never in recent history had a robotic mission incited so much excitement and fervor … and perhaps even a renewed passion to explore the Red Planet in our Milky Way neighborhood—and one day send humans there.

"I cannot tell you the number of people—both old and young, scientists and non-scientists—who have expressed awe and enthusiasm at the study of planets beyond Earth," said Dorothy Oehler, participating scientist with the Mars Science Laboratory (MSL) mission. "Mars, in particular, has everyone's attention."

If you happen to be operating under the misconception that NASA's Jet Propulsion Laboratory was the only center in on the popular mission, reorient yourself to this fact: There's plenty of Mars to go around, and nine scientists from Johnson Space Center's Astromaterials Research and Exploration Science (ARES) Directorate supported the mission before, during and after those harrowing seven minutes leading to touchdown.

Those seven minutes

Before we had confirmation that MSL's lovable rover Curiosity had indeed punched through the Martian atmosphere and touched down, there were a lot of held breaths for the human components of the MSL team—and no wonder. When the spacecraft reached the top of the Martian atmosphere, it was travelling about 13,200 mph. Seven minutes later, the rover was stationary on the surface of Mars.

"(There was) complete relief that we landed successfully," said Brad Sutter, collaborator for the Sample Analysis on Mars (SAM) instrument. "The sky crane had never been used before on a Mars mission, so I was nervous about it working properly. It is always a great feeling to see those first images of a new place on Mars and to know that another great adventure is about to begin."

Oehler spoke of the emotion palpable to all involved.

"I was so impressed with the expertise, competence and professionalism of the engineers that worked on the Mars landing," Oehler said. "They made me proud, and I think this is one of NASA's best achievements. At the landing event, many around me had tears in their eyes. I think everyone had similar thoughts."

NASA/JPL-CALTECH

This artist's concept depicts the rover Curiosity, of NASA's MSL mission, as it uses its Chemistry and Camera (ChemCam) instrument to investigate the composition of a rock surface. ChemCam fires laser pulses at a target and views the resulting spark with a telescope and spectrometers to identify chemical elements. The laser is actually in an invisible infrared wavelength, but is shown here as visible red light for purposes of illustration.

Representing JSC

"Any day you can 'go to work on Mars,' it is a great day," said Science Operations Working Group Chair Doug Ming, who also holds a multitude of roles with MSL. "These robotic missions are trailblazers for human missions to Mars."

Though the mission is young, the Red Planet is captivating scientists and observers alike.

"We are still in the rover and instrument checkout stage of the mission," Ming said. "We have obtained incredible images from the rover's cameras. The images of Mr. Sharp are spectacular, showing the layers of minerals, most likely sedimentary deposits. Our job is to try to find out what sedimentary process or processes were involved in their formation."

Sutter, a soil scientist in the evolved gas analysis of Martian soil and rock, will analyze and catalog Mars minerals in the lab at JSC.

"I'm interested in knowing the soil chemical and mineralogical properties and using this knowledge to understand how soils formed in Gale Crater," Sutter said.

The wealth of information that Curiosity will relay back will let

Curious who's on the JSC ARES team supporting MSL (and having all the fun)?

- **Dick Morris** - Co-investigator for the Chemistry and Mineralogy (CheMin) and SAM instruments, payload downlink lead for CheMin.
- **Doug Ming** - Science Operations Working Group chair, CheMin operational lead, CheMin payload uplink lead, CheMin payload downlink lead, co-investigator for the CheMin and SAM instrument teams.
- **John Jones** - Co-investigator for the SAM instrument.
- **Paul Nile** - Participating scientist.
- **Dorothy Oehler** - Participating Scientist.
- **Cherie Achilles** - Payload uplink lead for the CheMin instrument.
- **Doug Archer** - Collaborator for the SAM instrument.
- **Brad Sutter** - Collaborator for the SAM instrument.
- **Liz Rampe** - Collaborator for the CheMin instrument.

By Catherine Ragin Williams

NASA/JPL-CALTECH

This artist's concept shows the sky crane maneuver during the descent of the Curiosity rover to the Martian surface. The entry, descent and landing phase of the Mars Science Laboratory mission began when the spacecraft reached the Martian atmosphere, about 81 miles above the surface of the Gale crater landing area, and ended with Curiosity safe and sound on the surface of Mars.

researchers know of the past climate on Mars, and whether conditions were ever suitable for microbial activity—the building blocks of life.

Oehler and her fellow Geological Theme Group team members will "attempt to reconstruct the geologic history of the sediments in Gale Crater," Oehler said. "But that, of course, will be based on the results we acquire over the two Earth years of this mission."

Preliminary hypotheses point to many interesting findings to come. "The crater includes a five-kilometer mound of sediments," Oehler said. "These appear to extend in age from the period early in Martian history that many think was relatively wet, to a drier and colder period, more like the present. We think the sediments in the mound span this fundamental change on the planet and, consequently, may be able to tell us about the sequence of events involved in that change."

For now, the sediments on mysterious Mars, one of the five planets known to ancient man, aren't talking. But they won't be able to keep all their secrets from Curiosity … for long.

Yes, it gets better

Having a complex, car-sized rover exploring Mars is a stunning engineering feat. But it will become a stunning human achievement when a spacesuited boot disturbs red dust.

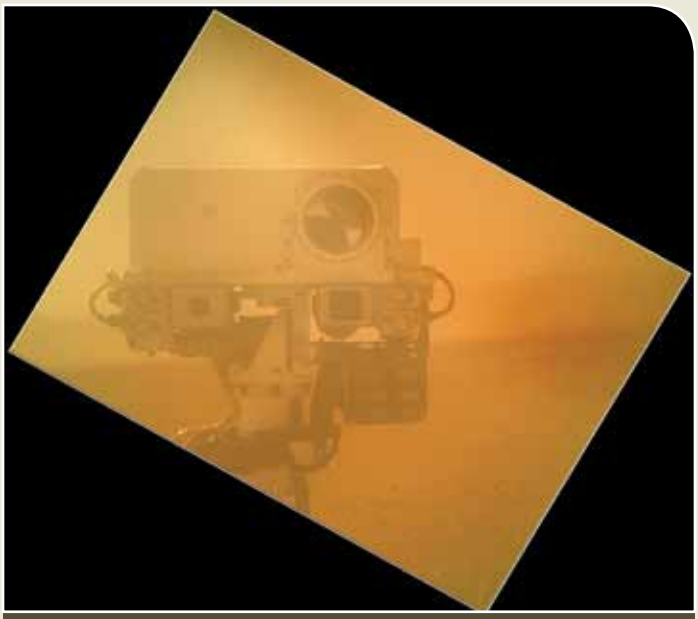
"Knowledge gained from robotic missions will drive where humans should go and what type of science will be conducted on the first human mission to Mars," Sutter said. "We will know so much by the time humans go to Mars that it will make planning a human mission so much easier, which will result in a huge return in science knowledge."

So is there more to come to this Mars story? With each decade and robotic mission, we move closer to the grand finale.

"I once stated in a Mars Exploration Rover press conference back in 2004 that 'if it got any better, I could not stand it,'" Ming said. "Well, guess what? It got better! The geology and scenery at the Curiosity landing site is stunning. I believe we will be rewriting the science books on the history of Mars as the mission progresses."

The basics

NASA's MSL mission set down a large, mobile laboratory—a rover named Curiosity —at Gale Crater, using precision-landing technology that makes many of Mars' most intriguing regions viable destinations for the first time. During the 23 months after landing, Curiosity will analyze dozens of samples drilled from rocks or scooped from the ground as it explores with greater range than any previous Mars rover. Curiosity carries the most advanced payload of scientific gear ever used on Mars' surface, a payload more than 10 times as massive as those of earlier Mars rovers. Its assignment: Investigate whether conditions have been favorable for microbial life and for preserving clues in the rocks about possible past life.



NASA/JPL-CALTECH/MALIN SPACE SCIENCE

On Sol 32 (Sept. 7), the Curiosity rover used a camera located on its arm to obtain this self-portrait. The image of the top of Curiosity's Remote Sensing Mast, showing the MastCam and ChemCam cameras, was acquired by the Mars Hand Lens Imager (MAHLI). The angle of the frame reflects the position of the MAHLI camera on the arm when the image was taken. The image was acquired while MAHLI's clear dust cover was closed.

Great expectations … fulfilled

Building 12 ribbon-cutting ceremony unveils a greener future for Johnson Space Center

by Catherine Ragin Williams

Johnson Space Center's Building 12 is certainly a shell of its former self these days, but in this case, that can be considered a compliment. Now that refurbishment is complete and occupants are more than ready to move into its plush, environmentally friendly accommodations, the building is setting a standard that will earn it a gold certification in Leadership in Energy and Environmental Design from the U.S. Green Building Council.

On Aug. 29, JSC team members had a chance to tour the facility after a ribbon-cutting ceremony held earlier in the day to see many of the green features in person.

Some features, though, are not as readily apparent to the human eye—and must be viewed from a vantage point high above. Building 12 is special among its neighbors because it is not adorned by an ordinary roof, but rather, a vegetative roofing system complete with 68,000 plants that will require no mowing (future occupants might be excited to hear).

NASA/ROBERT MARKOWITZ JSC2012E210696

JSC Director Mike Coats, center, wields oversized scissors during Building 12's ribbon-cutting ceremony.

"My favorite feature is the vegetated roof," said JSC Director of Center Operations Joel Walker. "I'm really excited to see how well it holds up and how much it contributes to the overall energy efficiency of the building."

While plant life is visually more appealing than a regular roof, it serves a purpose.

"If you have a roof that absorbs the solar radiation, it creates heat," said Brian Dark, Gilbane Construction manager. "Then you have the concrete out here that's doing the same thing and the black-top street and the store parking lots throughout the city; there are all these heat islands. It actually raises the temperature somewhere between 10 to 15 degrees in some cases."

A green roof eliminates that result altogether.

But to be successful in today's green building and design environment, the project team must consider factors that go beyond typical features and construction. Building 12's bicycle and changing rooms reduce the environmental effects of automobile use by encouraging greener forms of transportation. Building occupants that live close to the center will be able to bike to work and store their bike on a secure rack. The changing room with the shower will make transitioning to work much easier after using such forms of transportation, too. It's a simplistic but valuable way to reduce emissions.

NASA/JAMES BLAIR JSC2012E018607

The vegetative roof is a show-stopping green feature for this LEED building.

The refurbished building will offer daylight and views for about 90 percent of its spaces. Daylighting reduces the need for electric lighting, which results in decreased energy usage. Though all the glass may seem counterintuitive to reducing energy (after all, doesn't that just let heat in?), high-efficiency glazing on the windows will actually reflect heat away. In addition, the second level of the building sports sunshades with integrated photovoltaic (PV) panels. The PV panels produce about 50 watts of electricity per panel during peak performance, further reducing the building's overall operating costs and energy drag.

There's much more to ooh and aah over, like smart water fixtures that reduce water consumption and building materials with recycled content used in the process, but you'll just have to trek over to see. While you're there, try not to be envious of the increased thermal control individuals will have courtesy of an under-floor air system that supplies tempered air through floor-mounted supply diffusers.

"We incorporated a lot of little changes in Building 12 based on user experiences from Building 20," Walker said. "As we continue to refurbish and build, I believe we will be making improvements and trying new things each time. That makes each new job a little better and a little more unique."

NASA/ROBERT MARKOWITZ JSC2012E210062

Window sunshades, complete with photovoltaic panels that produce their own electricity, add to the energy savings.

Opportunity **knocked**, they **answered**

by Catherine Ragin Williams

The best and brightest are not only at NASA—they are also with the National Space Biomedical Research Institute (NSBRI) Summer Internship Program, supporting NASA. This summer, while we were baking walking to and from our cars in the parking lot, these four featured NSBRI interns were cooking up research and developments at Johnson Space Center.

Created in 1998, the NSBRI Summer Internship Program expanded partnerships at JSC, as well as Ames Research Center (ARC) and Glenn Research Center (GRC), to provide research and learning experiences for undergraduate, graduate and medical students, with the greater goal of promoting human space exploration and NASA/NSBRI research.

"The NSBRI has financially supported a total of 174 students in the Summer Internship Program," said Amanda Smith Hackler, NSBRI Science Education and Outreach manager. "This 10-week internship begins with one week at NSBRI Headquarters for the Bioastronautics Institute, followed by nine weeks of space-related research at JSC. This activity adds unique value to NASA's programs by directly supporting the agency's strategic education approaches to advance the development of new exploration capabilities, support technology and promote research. It also helps address the well-documented need to expand the numbers of students and professionals in the STEM (science, technology, engineering and math) pipeline."

Once qualified candidates are selected for the program, they are matched with researchers at JSC, ARC and GRC who can best maximize their skills in a summer research project.

Meet the NSBRI interns

Aziza Nanyamka Glass

Cornell University College of Veterinary Medicine, doctor of veterinary medicine candidate

"Interning at JSC provides the opportunity to gain exposure into a field of science that, at first glance, does not have a correlation to veterinary medicine," Aziza Nanyamka Glass said. "However, I have learned just the opposite. I believe that space medicine provides an accelerated model to study diseases and their development. Public and animal health improves by solving the same problems that enable astronauts to extend their mission durations, allowing them to go to Near-Earth Asteroids and Mars."

Indeed, Nanyamka Glass' study at JSC put her in a realm she is comfortable with—animals—but also relates to space in a quirky way. Her summer project tested the effects of a green tea extract-enriched diet on the eyes of rats in a ground model for microgravity.

"This has the potential to develop a countermeasure for the risk of oxidative stress, possibly associated with axial hyperopia (farsightedness) that some astronauts develop after a long-duration space mission," Nanyamka Glass said.

While Nanyamka Glass wants to become a veterinary research scientist, she acknowledges that there is a place for space when she reaches that goal.

"As I learn about life sciences research conducted at NASA, I am further convinced that a veterinary research perspective can contribute to the advancement of space biomedicine," Nanyamka Glass said. "I can also be a part of a great American legacy: space exploration."

Nikhil Vadhavkar

Harvard, Massachusetts Institute of Technology (MIT), Ph.D. student, medical engineering and medical physics

"I feel so fortunate to have met people who are passionate about NASA and have shared their interests and life experiences," Nikhil Vadhavkar said. "The personal connection inspires me in a way that no book, movie or Wikipedia article can duplicate."

Vadhavkar spent his summer working with crash-test models for not just any vehicle—try space vehicles.

"Although it may look gentle from a helicopter, a spacecraft hitting the ground (Soyuz) or the water (Orion) can be a jarring impact," Vadhavkar said. "Astronauts experience bone and muscle loss during long-duration flight, making them particularly susceptible to injury. Astronauts need to be able to quickly and safely exit the capsule immediately after landing, and they may not have the benefit of a ground crew to help them out."

PHOTO NASA/JAMES BLAIR JSC2012E107292

Nikhil Vadhavkar, a Ph.D. student at MIT, examines the interior of a Orion capsule replica in the Space Vehicle Mockup Facility at JSC.

The Occupant Protection Laboratory has collaborated with researchers to create various computer models for impact.

"A computer model is not useful unless it correlates well with a real-world situation, so we are comparing it to data obtained from crash-test dummies that have been accelerated on a sled," Vadhavkar said. "By determining the fidelity of these models, we can run simulations that will impact the design of future spacecraft."

(continued on page 12)

Spotlight: **Allan Dupont**

Engineering lead, International Space Station Rendezvous Proximity Operations and Capture for Visiting Vehicles

Q: What has been the best part of your nearly 50-year career at Johnson Space Center?
A: Being a part of the many NASA accomplishments during my career has been special. From the perspective of Rendezvous Proximity Operations and Capture, my tasks here at JSC have provided decades of challenging work with highly skilled and dedicated colleagues. I have been privileged to participate in many programs, from Gemini/Apollo to the space shuttle and space station. I have been privileged to be the "new" person in a learning mode, the one at the forefront of the action, as well as a mentor to the other "new" people. But the best part has been the journey.

Q: Favorite hobbies or interesting things you do away from the office?
A: My passions are music and photography. Having been a singer as a young child, I currently rehearse and sing with two different choirs. I play guitar and ukulele (you might have expected the uke since I was born and grew up in Hawaii). I'm also part of the Hawaiian Aikane Club and part of a small combo singing Hawaiian music. We performed at the JSC centerwide picnic a few years ago. Wherever I go, I'm taking pictures. I have thousands. With the advent of the Internet, and lately high-speed data transfer, I now utilize online publishers to create photo albums. When there is time, I golf.

Q: What big dreams did you have growing up?
A: I was fascinated by airplanes, so flying was on my mind. Then there was Sputnik … so my thoughts rose higher. But I did manage to acquire a pilot's license along the way.

Q: What would people be surprised to know about you?
A: I relate to various groups, at least one of which would say "That's not surprising" to anything I've said here. I'll reveal this personal one: I have been within five pounds of the same weight since 1968.

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: Such a good question for thinking about but difficult to answer. It might change day to day. But today, my technical nature says Neil Armstrong for his career in aviation, space and post-lunar landing. My spiritual nature says Billy Graham for his dedication and unwavering message. My family nature says Georgia Bratcher, my wife's grandmother, who came to Texas in a covered wagon.

Q: Your first co-op tour at JSC began Aug. 23, 1963. What advice do you have for new co-ops coming in?
A: This is serious work that we do, so be dedicated and pay attention; there is a lot you can learn that is technical and relational, so learn both. There are a broad spectrum of experiences before you … keep an open mind. And amidst all, find joy and have fun.

Q: What seemingly "little things" bring you joy?
A: Listening to musical vocal harmony, seeing a sunset, small children laughing and helping out someone in need.

Q: What sparks your inner innovator?
A: A new issue to solve.

NASA/PHOTO JSC2012E215216

Q: Describe yourself in three words.
A: Dedicated. Satisfied. Grateful.

Q: What is your favorite memory of NASA or JSC from the 1960s?
A: Neil Armstrong stepping onto the lunar surface on Aug. 20, 1969. I was 25 years old.

Q: What is your favorite memory of NASA or JSC from the 2000s?
A: The view of the International Space Station as the Automated Transfer Vehicle from the European Space Agency docked to the station on April 3, 2008. I was 63 years old.

Q: JSC turned 51 this September. Where do you hope to see NASA 50 years from now?
A: I see NASA in the forefront of human interplanetary travel, planetary bases; in the forefront of robotic missions beyond our solar system.

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.

Center Scoop

Johnson Space Center honored for facility, technology

Johnson Space Center has been chosen as the year's outstanding laboratory in America's heartland.

And one of the projects to come out of it—the Human Grasp Assist Device, also known as the Robo-Glove—has been chosen as its Notable Technology Development.

The award was recently announced by the Federal Laboratory Consortium (FLC) Mid-Continent Region. The FLC is a nationwide network of federal laboratories that provides the forum to develop strategies and opportunities for linking the laboratory mission technologies and expertise with the marketplace. It serves as a technology matchmaker, pairing federal resources and technologies with private industry needs. The Mid-Continent Region of the group covers 14 states.

"The work done at Johnson has truly advanced the mission and goals of the FLC and highlighted how technology transfer can succeed," said Ann Kerksieck, program manager for the FLC Mid-Continent Region.

JSC, one of 10 NASA centers across the country, is home to the astronaut corps, mission control and the International Space Station and Orion programs, as well as the numerous scientists, engineers and laboratories that support them. The center also actively promotes partnerships with industry, academia and other government agencies to solve technical challenges for NASA and find uses for NASA technologies outside of the aerospace industry.

The Robo-Glove is one example of such a partnership. The product of a collaboration between NASA and General Motors (GM), it is a robotic glove that autoworkers and astronauts can wear to help do their respective jobs better while potentially reducing the risk of repetitive-stress injuries. It was built using technology the two groups developed for the Robonaut 2 humanoid robot, which now resides aboard the International Space Station.

"You don't have to be an astronaut to benefit from NASA technology," said JSC Deputy Director Ellen Ochoa. "The Robo-Glove is a great example of that. Working together on one project, NASA and GM engineers saw potential for a new project that had uses in space and here on Earth. What we do here at Johnson Space Center affects people around the world in a multitude of ways."

NASA/ PHOTO

Robonaut and spacesuit-gloved hands are extended toward each other to demonstrate the collaboration between robots and humans in space.

For information about JSC and partnership opportunities, visit: http://www.nasa.gov/centers/johnson/capabilities/index.html

For information on the Robo-Glove, visit: http://www.nasa.gov/mission_pages/station/main/robo-glove.html

The decade of space station utilization

The First Annual International Space Station (ISS) Research and Development Conference, held in Denver the last week of June, was a collaborative event between the American Astronautical Society, the Center for the Advancement of Science in Space (CASIS) and NASA. The event attracted approximately 400 scientists, engineers, students, industry leaders and business representatives. Michael Suffredini, ISS program manager, and Dr. Julie Robinson, ISS program scientist, addressed the attendees, as did several other NASA officials.

CREDIT: AMERICAN ASTRONAUTICAL SOCIETY

The First Annual International Space Station Research and Development Conference provided updates on science and technology accomplishments, offering potential users information and avenues for sending their investigations to the space station. The conference took place June 26 to 28 in Denver.

Researchers were on hand to share their experiences and results of their investigations, highlighting disciplines from spacecraft technology to life, space, Earth and physical sciences. Conference presenters provided information for those interested in developing microgravity experiments to fly on station, including the process for requesting space (and crew time) on the orbiting laboratory, funding resources and launch opportunities. Three major themes of station research focus are benefits to life on Earth, benefits to future space exploration and basic discovery.

CASIS, the nonprofit organization in charge of promoting and managing research aboard the space station's U.S. National Laboratory segment, made a first call for solicitations, focusing on advancing protein crystallization investigations. Protein crystallography has led to potential drug therapies for Duchenne muscular dystrophy and is one of the many benefits realized from research on the space station. Two new solicitations involving materials science and Earth observational science will be announced soon.

"Through these solicitations, CASIS is opening a new, quick-reaction avenue to do research aboard the ISS, opening the next generation of scientific advances in these fields," said Deepak Agrawal, CASIS director of Science and Technology.

To learn more about the process for doing research on the station, visit: http://www.nasa.gov/mission_pages/station/research/ops/index.html

To learn more about CASIS, visit: http://www.iss-casis.org/

To learn more about the U.S. National Laboratory portion of station, including current and past studies, visit: http://www.nasa.gov/mission_pages/station/research/nlab/

To read more about the conference, visit: http://go.usa.gov/rSgh

Roundup

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Opportunity knocked, they answered

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Vadhavkar credits Jeff Somers, his research mentor, for teaching him transferable skills that will be useful in any engineering venture, though engineering isn't the only discipline needed to further NASA's missions.

"Since joining the Bioastronautics Training Program at Harvard and MIT, I have learned that human spaceflight needs people from every single background," Vadhavkar said.

Ramon Boudreaux

Texas A&M University, Ph.D. student, biomedical engineering

"During orientation of my first semester in college, the department head stood in front of his new batch of eager freshmen and imparted one simple message: If you work hard and take the next four years of your lives very seriously, you will be awarded opportunities beyond your dreams," Ramon Boudreaux said.

NASA/JAMES BLAIR JSC2012E107291

NSBRI summer intern Ramon Boudreaux (standing) and Bone Densitometry Technologist Lisa King (far left) administer a dual-energy X-ray absorptiometry scan.

Little did he know that those words would later hold a very special meaning as he worked in the Bone and Mineral Lab at JSC. For his internship, Boudreaux analyzed the femoral neck strength in patients exposed to 90 days of mechanical unloading through bed rest.

"Decreases in femoral neck strength leave individuals susceptible to hip fracture," Boudreaux said. "As a proposed countermeasure, I explored the efficacy of testosterone supplementation, as well as a combination of resistance and aerobic exercise to help mitigate declines in bone density and strength. We anticipate that bed rest will significantly decrease bone density, and both testosterone and exercise countermeasures will attenuate these losses."

Not only has he played a part in ground-breaking research, but he's also met a lot of interesting people along the way.

"Working at JSC has broadened my network and helped me identify prominent Space Life Sciences researchers, with whom I would love to work with in the future," Boudreaux said.

Erik Alden Kraus

Harvard University, mechanical engineering

"Manned spaceflight is the acme of human engineering achievement, and JSC is the hub of manned spaceflight research and engineering," Erik Kraus said.

With that in mind, Kraus made the move to take part in the plethora of opportunities at JSC.

"The bulk of my experiences has been twofold: I have been working on-site in the Cardiovascular Research Laboratory, whose scientists do great research; and I have also been attending lectures and tours set up from the directors of the Space Life Sciences Summer Institute. This experience has been like a dream for me," Kraus said.

Kraus has spent the bulk of his time "writing software that analyzes ultrasonic images of cardiovascular physiology to determine the quality of the image and enable early detection of possible insidious changes to one's cardiovascular system."

This particular software has applications in spaceflight, where one's cardiovascular system adapts to microgravity, as well as strenuous and taxing job positions such as rescue diving and the military.

Kraus, like his peers, noticed the immense team effort ongoing at JSC, and enjoyed his time being part of the NASA family.

"I feel that the research I do on a daily basis is an important cog in the spaceflight machine that will take us back around the moon, to Mars and beyond," Kraus said.

Online applications for the 2013 NSBRI Summer Internship Program will be accepted beginning Oct. 1.

See http://www.nsbri.org/summerinternship/ for more.