National Aeronautics and Space Administration

Lyndon B. Johnson Space Center

roundup

NASA/Blair

The NBL celebrates 10 years

JUNE 2007 ■ volume 46 ■ number 6

JSCdirector

I am asking everyone to be patient and understanding as we implement the various requirements of Homeland Security Presidential Directive 12 (HSPD 12), which requires everyone associated with NASA to eventually receive new badges (again) and use card readers to access NASA Information Technology (IT) resources. It is important to understand that HSPD 12 is being implemented across the entire federal government because there are very real threats out there, particularly to our IT resources. Hackers, both foreign and domestic, have been aggressively trying to compromise our computer networks. These "cyber attacks" have been relentless and frequently successful, and will undoubtedly continue and intensify. To go into too much detail would in itself violate security protocol and perhaps aid the hackers, but it is important to realize that the requirements of HSPD 12 have been carefully thought out in response to real and ongoing threats. Your patience is very much appreciated.

HSPD 12: What's in it for me?

How will HSPD 12 improve the center and its operations?

HSPD 12 is designed to enhance security, increase efficiency, reduce identity fraud, protect personal privacy and increase mission success.

What changes will I notice as HSPD 12 is implemented?

- There will be changes to "in processing" and procedures for all civil servants, contractors and partners.
- Everyone who has a permanent badge today will be issued a smartcard badge.
- Employees will all have, at the minimum, an NAC-I background investigation.
- Anyone who gets access to an IT system or application must first have a validated identity.
- Access to IT systems and applications will be controlled more tightly than ever before.
- All systems and applications will be retrofitted to accommodate two-factor authentication, or two forms of proof for access, such as a smartcard and a PIN or password.
- NASA will adopt a Cyber Identity Management System, which will work as a new glorified X500 phone directory. This system will take all the validated identities and provide improved information for every individual.

On the cover

The Neutral Buoyancy Laboratory (NBL) housed in the Sonny Carter Training Facility celebrates 10 years of service this year. NASA team members use the NBL to develop flight procedures, verify hardware compatibility, train astronauts and refine spacewalk procedures during flight that are necessary to ensure mission success. Read more about this amazing facility on page 6.

The next chapter in our safety and security

by Catherine E. Borsché

It was only a few months ago that Johnson Space Center started its campaign to inform JSC team members about the upcoming new security features that would be implemented with Homeland Security Presidential Directive (HSPD 12). Now that vision for increased security is becoming a reality, with waves of change moving across the center.

HSPD 12 mandates that all government agencies must implement security controls and measures under the direction of the National Institute of Standards and Technology. Issued Aug. 27, 2004, HSPD 12 was touted as the answer to audits showing that the government lacked adequate network security for Information Technology (IT) operations. In addition to stringent IT security, physical security elements at JSC will be vastly improved.

"In order for JSC to become compliant with HSPD 12, several steps need to be completed. The most immediate step is completing background investigation on all individuals: civil servant, contractor, foreign national, etc., that access the JSC facility for more than 180 days or access NASA's IT systems and information," said Lynn Vernon, chief of the Information and Applications Systems Division and JSC HSPD 12 Implementation manager.

Strides have already been made to get JSC in compliance with the presidential directive.

"The civil servant community has been completed, and progress is being made on completing the contractor community. The next step is starting in May/June timeframe and continuing through Oct. 30," Vernon said. "All current JSC-badged individuals that have completed their investigations will get new badges with the smartcard."

The advent of the smartcard, a badge equipped with a computer chip to store information, will add a new layer of security that did not exist previously. Before, you only needed a log-in ID and password to access a computer system.

"We will require you to plug your smartcard into your computer before you can actually get on the system and get to any NASA data," Vernon said of the new procedures.

To get the new smartcard badge, all employees will have to undergo thorough background checks, which will include getting new pictures, taking fingerprints and providing I-9 (acceptable documents to accompany a federal or state identification) credential data for validation.

"We will also be deploying smartcard readers to all Windows desktop machines starting in July," Vernon said.

But you won't just notice changes at your computer workstations.

In the next few months, "access to most controlled access areas, such as the Mission Control Center, simulators, etc., will soon be requiring a user PIN in addition to the badge proximity reader," said Tom Miglin, JSC and White Sands Test Facility HSPD 12 deputy implementation manager.

No one at JSC will be immune to the changing security climate.

"All systems, applications, facilities and users will be impacted by HSPD 12," Vernon said. "This is a complete change in our physical and IT security processes and procedures, which will result in a cultural (shift)."

The importance of the changes, even just in the IT environment, is evident by the work being done to get all systems in conformity.

"The JSC HSPD 12 team is working individually and with representatives of JSC's high-security systems to ensure a transition to HSPD 12 that does not cause any disruption to mission operations," Miglin said.

For example, "The JSC HSPD 12 team is developing outreach specifically targeted at application owners to aid in the transition of 700-plus computer applications at JSC to HSPD 12 compliance," Miglin said.

So what can JSC team members do to help the process along?

"Attend our town hall briefings to get a better understanding of the impacts. Look at your current implementation and start assessing the changes that are required to support the HSPD 12 requirements," Vernon said. "Be responsive on the investigations (eQIP) invites and ensure that you provide correct information."

Although an implementation plan of this scale does carry some risk for possible complications when migrating to the new system, the future rewards will outweigh any near-term challenges.

"Each phase of the implementation carries a risk to operations. We are working to continually minimize this risk by providing consistent and better communications to all of the affected community," Vernon said. "We are also making sure that we pilot and test configuration options to ensure that we understand the implications and impacts to the users and changing the process where this can be minimized and still accomplish the requirements."

Family ties

by Kendra Phipps

Moments after the launch of Apollo 13—in the movie version, at least—the wives of Jim Lovell and Fred Haise, Marilyn and Mary, were surrounded by scoop-hungry reporters. As the reporters approached with their cameras and microphones, launch-viewing veteran Marilyn Lovell slipped first-timer Mary Haise a press-friendly platitude: "Remember, you're proud, happy and thrilled!"

Whether or not that actually happened, astronauts' families have often been the focus of media attention. They can represent a way to add another human element to the adventure of spaceflight.

Johnson Space Center's Family Support Office (FSO), within the Astronaut Office, seeks to help family members through the surreal experience of a loved one's space mission. This can include prepping them for media interviews—sort of an official version of Marilyn Lovell's coaching.

"I tell them, you're going to be asked a hundred times, 'Oh aren't you excited? Aren't you scared?' And that can get old really quickly," said the FSO's Beth Turner, Family Travel coordinator and administrative family escort with United Space Alliance.

But interview preparation is just a small fraction of what the FSO does. Other tasks include coordinating travel to launches, planning for contingencies, and facilitating communications between crews and families when they are separated.

Family Services Coordinator Laura Steinmann with Behavioral Health and Performance (BHP) at Wyle Laboratories said that "communication is the key" to providing all of these services to families.

"I communicate regularly with all astronaut families by e-mail, mail and newsletters, as well as via Web site," said Steinmann. "This not only provides families with information, but it helps us to understand issues they face."

Families are 'intertwined' with mission success

The FSO's roots were established in the early days of the Space Shuttle Program, when a part-time position was created to support shuttle astronauts' families. In 1985, the position became full-time. Later, when NASA collaborated with Russia's Mir space station, the

Family Services coordinator Laura Steinmann with Behavioral Health and Performance at Wyle Laboratories.

JSC Family Support Office's Beth Turner, Family Travel coordinator and administrative family escort with United Space Alliance says the reason she likes her job is because "It is a great job to get to work with the astronauts, but a great honor to get to work with their families."

missions got longer and the potential for physical and psychological concerns grew—both for the crew members and for their loved ones. By the time the International Space Station (ISS) Program got going, the need for long-duration family support was clear.

"ISS Program managers recognized that because of the rigors of preflight training flow deployments and the long missions, the families were intertwined with overall mission success," said Steinmann. The FSO works closely with Behavioral Medicine and Operational Psychology within Space Medicine's BHP group to provide services for space station astronauts and their families.

The office provides families with several levels of support. A Crew Support astronaut is assigned to each space station astronaut's family to help them "acclimate to the whole launch process," said Turner, and also serve as the family's liaison to NASA during the mission. There are also astronauts designated to assist a crew member's immediate and extended families.

Turner said that the astronaut corps as a whole does a great job of taking care of family members. "It's very much a protective shield they like to form around the families, so I just try to facilitate that as best as I can," she said.

The FSO does that in a myriad of ways. For example, Steinmann serves as the ombudsman for astronaut families, acts as their liaison for JSC departments like Flight Medicine and JSC Security, and provides training and resources for families.

"I maintain a library of information for families, and provide educational and training events and briefings on topics pertaining to family issues, such as deployment, separation and reunion, and emergency preparedness," she said.

The office's emergency preparedness measures include keeping accurate contact information for all family members. That information was invaluable when Hurricane Rita was bearing down on Houston in 2005 because, as the storm approached, a group of astronauts was busy with wilderness training out of state. While the astronauts were unaware of the situation, their families were evacuating from Houston. The FSO ensured that the astronauts were made aware of their families' evacuation plans and whereabouts.

Staying connected

After training is finished and a mission launches, one of the FSO's main responsibilities for shuttle crew members is to coordinate a two-way videoconference with their families, which are conducted at the Mission Control Center or in Crew Quarters. For space station crew members, the FSO assists the BHP Operational Psychology Group, as needed, to install the Polycom videoconferencing equipment in crew members' homes and coordinate the weekly two-way video conferences that keep them in contact with their Earth-bound loved ones.

Renita Fincke, wife of Expedition 9 Flight Engineer Mike Fincke, said that she really appreciated the communications help. The Finckes' son, Chandra, was 2 years old when his dad traveled to the space station, and teleconferences allowed father and son to keep in touch.

"That helps Chandra out a lot because he's very excited to see his daddy flipping around, floating and things like that," said Renita Fincke in a Roundup interview during Expedition 9.

Communication was even more important to the Finckes because Renita was expecting the couple's second child during the mission. Thanks to the efforts of FSO, BHP and other support offices, Mike was able to witness—via cell phone—the birth of daughter Tarali. Mike was sent electronic photos of the baby soon after the birth, and he thanked his NASA coworkers for ensuring he stayed connected to his family.

Spaceflight missions, like births and other major life milestones, can bring out all kinds of emotions. Turner and Steinmann both said that every family reacts differently during a mission.

"One thing we want to convey to families is that there is no way they are 'supposed' to feel," said Steinmann. "Everyone in the family will have different emotions at different times throughout the mission, such as happiness, sadness, excitement, anxiety, relief or a mixture of all these."

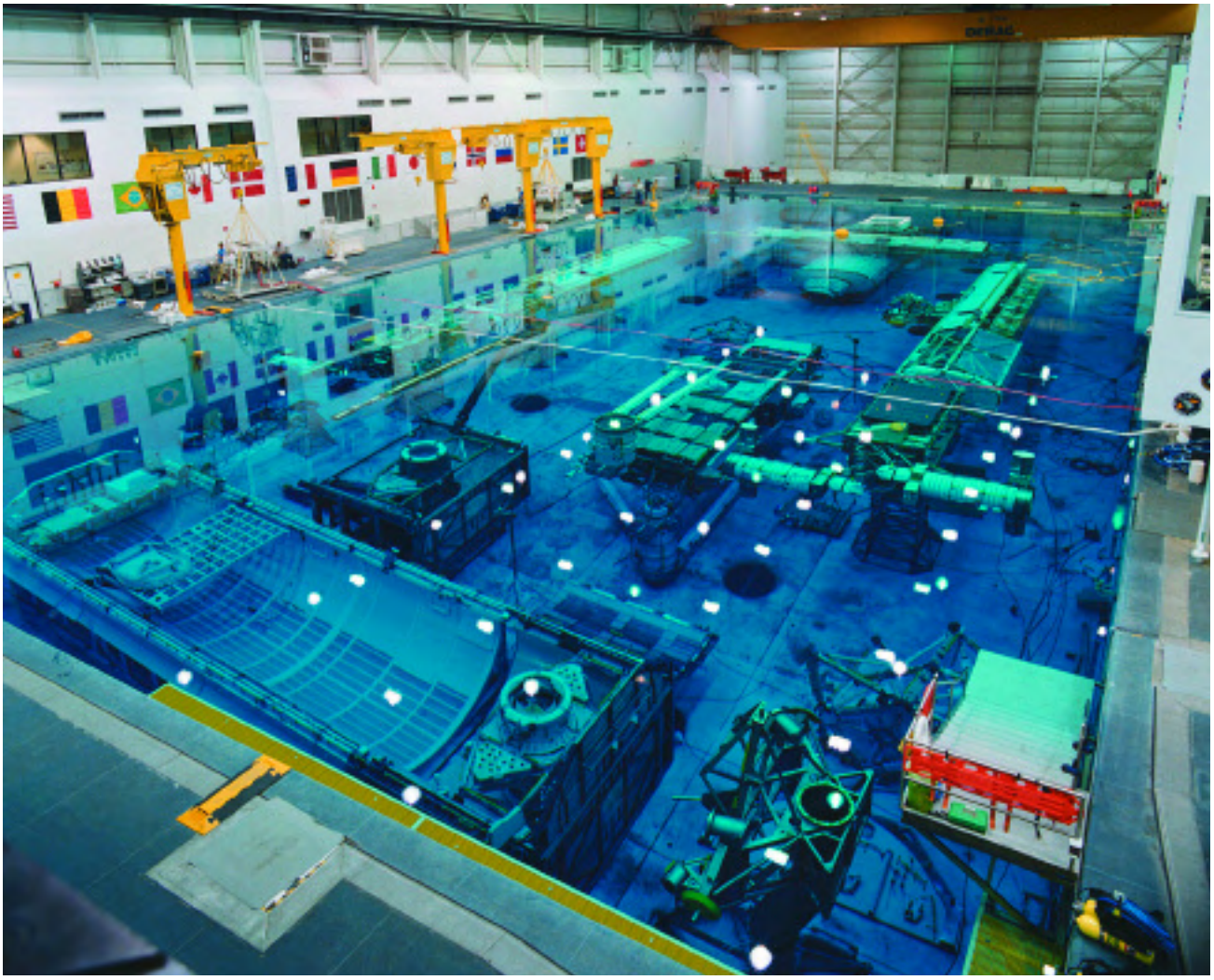
The FSO does its best to help families navigate these emotions, and asks for suggestions and "lessons learned" after each mission to keep improving its support. While it's a difficult job, Turner said it is rewarding each time she watches a shuttle launch with a family.

"They're always so excited; that's probably the best part," she said. "They're just so happy to see their loved one doing what they've dreamed of doing. You get to see the culmination of that, and then be there for the reunions at landing."

You're 10 years old...

Happy birthday, NBL!

by Catherine E. Borsché



Neutral Buoyancy Laboratory operations and facilities in the Sonny Carter Training Facility.

The best kind of party to celebrate the Neutral Buoyancy Laboratory's (NBL's) 10 years of operation would have to be one that the lab specializes in—a pool party! The first NBL run, or training exercise, was completed Jan. 7, 1997. Its official dedication was months later. Since then, the specialized underwater training facility and laboratory has enjoyed an illustrious, albeit somewhat short, history.

"When you look at the history of neutral buoyancy training, from Gemini to station, you can really see the tremendous importance this type of training facility has to the agency. International Space Station assembly would have been nearly impossible without the use of neutral buoyancy training," said Chris Borne, NBL deputy operations manager for Oceaneering Space Systems. "You just can't get this type of training in any other environment on the planet. The exact where and how we fall in for future programs is still to be determined, but I can't imagine starting that journey without including the NBL in the mix."

The massive pool is not for the faint of heart. The NBL was sized to perform two training sessions simultaneously. It is 202 feet in length, 102 feet in width and 40 feet in depth. The behemoth human aquarium holds 6.2 million gallons of water. Even at this size, the space station, at 350 feet by 240 feet when complete, will not fit inside the NBL.

Neutral buoyancy is the term used to describe something that has an equal tendency to float as it does to sink. Articles that are configured to be neutrally buoyant (which is accomplished with

a combination of weights and flotation devices) seem to "hover" under water, and large, neutrally-buoyant items can be easily manipulated much like in orbit.

Even so, there are two important differences. First, a suited astronaut in the NBL is not truly weightless. While it is true the suit/astronaut combination is neutrally buoyant, the astronauts feel their weight while in the suit. Second, water drag acts to hinder motion. This makes some things easier to do in the NBL than on orbit and some things more difficult. Both effects are unlike the conditions of space and must be recognized during extravehicular activity (EVA) training. However, even with these limitations, neutral buoyancy is currently the best available method for training for spacewalks.

Close-up view of divers at work in the pool during a training session.

"Simply put, the NBL is my hands-down favorite place in all of Johnson Space Center. It's here that you really immerse yourself, literally and figuratively, into the space environment while still tethered to Earth," said astronaut Scott Parazynski, who has trained the most hours in the facility. "As soon as my visor drops below the surface of the water, for all intents and purposes I'm floating outside the station: the fidelity of the mockups is near perfect, down to the labels on the handrails and the physical alignment of the countless connectors. When you're actually outside doing a real EVA, it feels like you've been there a million times before. It's only when you glance up and see the Aurora Borealis or the Himalayas that you realize you're no longer in the NBL!"

A facility of this magnitude takes extensive coordination to run smoothly.

"EVA training at the NBL is extremely complex. There are (more than) 200 people working in the facility. In addition to the people that work at the NBL, we interface extensively with our users in the Mission Operations Directorate, the Astronaut Office and others to meet their needs and ensure that training and testing is as safe and accurate as possible," said Ronald Lee, chief of the NBL. "We are also extremely safety conscious, since our daily operations are inherently risky. Having a good working relationship with the safety community is vital. The NBL is one of the more hazardous facilities we operate at JSC, and the NBL team's dedication to safety and our mission makes it a world-class facility."

The record speaks for itself. In the past three years, the NBL has not had a lost-workday injury in over 75,000 hours of diving operations.

However, what makes the NBL such an awe-inspiring place to work is not the most obvious to the naked eye.

"What's truly impressive to me is the caliber of the team that operates the NBL. It takes dozens of people—divers, suit and tool technicians, safety specialists, medics, mockup engineers and others—to pull off each and every NBL run safely and successfully," Parazynski said. "On any given day you might have four suited subjects, four divers on surface-supplied dive system umbilicals, and numerous safety, utility and camera divers in the water."

Lee echoes Parazynski's thoughts. "I think the facility is magnificent. One of my favorite activities is to give tours of the facility to visitors. As one of the world's largest indoor water tanks, it holds a real 'wow' factor," Lee said. "However, the facility would be just a big swimming pool if it weren't for the outstanding personnel who support our operations and have a team attitude."

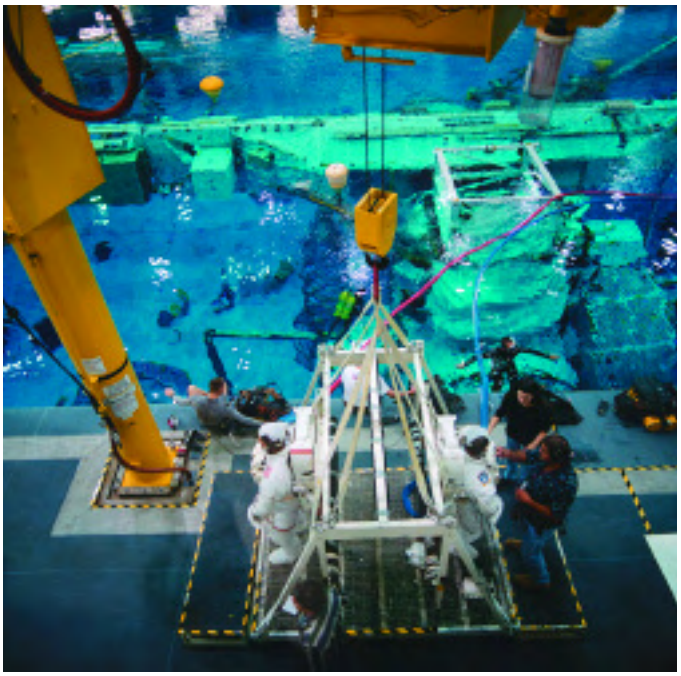
The NBL plays a vital role in the completion of the space station and other important missions, including the Hubble re-servicing mission. The NBL has already begun to play a role in Constellation, with research and development of new spacesuit architecture. Eventually, the NBL will aid in training astronauts for amazing destinations deep into the cosmos.

The exercises done in the depths of the pool translate astonishingly well to the work completed in the cold abyss of space.

"I'd have to say that the NBL divers have been alongside me in spirit for each of the spacewalks I've done on orbit," Parazynski said. "You train each EVA timeline roughly seven times in the pool before you actually float out the hatch to do it for real, so you get to know the dive team really well. They are alongside you as you learn how to walk the walk and often have great suggestions on how to make your EVAs more efficient or successful. They see what works and what doesn't every day in the pool. I often wish we could take some of them along (in space) to see their handiwork!"

NBL team members know that they are doing great things for NASA's space program when they find out that their efforts made the "real deal" a seamless transition.

As Lee said, "It is great to hear the astronauts tell us after their mission that their spacewalk was just like being in the NBL…but without the bubbles."



View of NBL training with two astronauts in spacesuits about to be lowered into the pool and divers in the water waiting for the training to start.

Universal classroom a big hit

by Lori Meggs

Imagine a classroom project to build training hardware for astronauts. Or growing plants on the International Space Station. Or snapping photographs from space.

For more than six years the space station—where crews perform experiments 220 miles above Earth—has become a base for an integral part of school curriculums around the world. Nearly 32 million U.S. and international partner students—from kindergarten to college—have had the opportunity to participate in a live downlink from the space station where astronauts answer their questions about living, working and doing scientific research in space. Nearly a million U.S. students and thousands of international students have participated in hands-on or "inquiry-based" learning linked to research on the station.

Adventures of the Agronauts developed a plant growth experiment for teachers and students. Girls at the Sally Ride Science Festival held at Meredith College in Raleigh, N.C. had the opportunity to participate.

"Educators have found that students are really motivated when they can compare their experiments in the classroom with similar investigations on the space station," said Julie Robinson, International Space Station Program scientist at JSC. "Educational activities linked to the space station motivate students to pursue studies in science, engineering, technology and math."

One popular project currently operating on the space station, called the Commercial Generic Bioprocessing Apparatus Science Insert (CSI), uses small growth chambers in an incubator to help students investigate the effects of living in space on small plants and animals. The studies are linked to established ground-based curricula. Students can participate in several different experiments that grow more than their interest in science. The equipment for the experiment was developed by Bioserve Space Technologies in partnership with the University of Colorado in Boulder.

Using the Agronauts curriculum developed by North Carolina State University, elementary students can learn about seed germination and how gravity affects plant growth. They grow their own gardens in their classrooms and monitor variations in how the same plants grow in a garden habitat on orbit.

Another CSI experiment monitors small worms—model organisms used to study physiological processes that also affect humans—to gain insight about their multigenerational and long-term growth on the station versus in the classroom. Middle school students watch the worms grow through an automatic video downlink. Samples from the investigations are also of interest to several international teams of scientists who will be examining the space-grown seedlings and worms once they are returned to Earth.

In a CSI experiment planned for the future, students will examine crystal growth formation to learn how spaceflight and microgravity can help improve protein crystals. Students will grow crystals in their classrooms and use the Internet to compare their growth rate to those grown in space.

"These experiments are providing an extraordinary educational experience to thousands of elementary, middle and high school students who otherwise would not have access to science conducted onboard the station," said Stefanie Countryman, education program coordinator at the University of Colorado. "Our CSI payload challenges students to think in unique and creative ways. It also is helping to raise a generation of children who (understands) why the space station and space exploration are invaluable to our nation."

Another experiment gives students actual control of a camera on the space station. The educational program Earth Knowledge Acquired by Middle School Students, or EarthKAM, gives thousands

of students each year an unprecedented opportunity to photograph and examine the Earth from the unique perspective of space.

Using the EarthKAM Web pages at **http://earthkam.ucsd.edu/**, students maneuver a special digital camera mounted in a space station window. Students photograph a wide range of beautiful and fascinating features on the surface of the Earth. They study the photos to learn more about the physical features of the Earth's surface such as volcanoes, river deltas and pollution.

"We are giving students the opportunity to not only operate something in space, but also learn about geography in an exciting way," said Sally Ride, EarthKAM's principal investigator and the former NASA astronaut who became the first American woman to reach space. "It's amazing to see just how many schools are benefiting from this experiment and gaining a new understanding of the world we live in."

To date, more than 82,000 students in 1,260 middle schools in the United States and 15 other countries have participated in the EarthKAM project. A total of 150 college students from the University of California at San Diego have operated the experiment. Both high school and college students have received more than 20,000 photographs from the station since EarthKAM began in March 2001 on Expedition 2—the second research mission to the station.

Education Payload Operations is another successful education program in which students learn how simple objects like toys and tools behave differently in space. Station crew members demonstrate the physical properties of those objects such as force, motion and energy that may be obscured by gravity on Earth. The demonstrations, developed by the Teaching from Space Office at JSC, have been performed by crew members on the station since Expedition 4 began in December 2001.

"From astronauts showing how simple and familiar phenomena such as water droplets behave on the station, to inviting students of all ages to pose questions to station crews during live television events, these diverse activities connect with students and bring the station experience into their lives," said Jon Neubauer, education specialist in the Teaching from Space Office at JSC.

All Education Payload Operations activities are videotaped and are being incorporated into a variety of NASA education resources. More than 500 videos have been distributed by NASA's Central Operation of Resources for Educators (CORE) to science teachers, and about 1,500 teachers each year are trained to use the materials in their classrooms.

Video demonstrations have been developed by NASA to meet the educational needs of science museums for use in lessons and exhibits as part of the Museum Aerospace Education Alliance. Space station crew members on three separate Expeditions used items such as paper airplanes and musical instruments to show how these ordinary objects perform in microgravity.

During Expedition 6—the sixth research mission to the station from October 2002 to April 2003—astronaut Don Pettit enjoyed performing a number of experiments on the station that became known as "Saturday Morning Science." Building from his own curiosity about the physical effects of the microgravity environment, Pettit showed a variety of fluid physics principles by experimenting with thin films and fluid flows and growing salt crystals out of a suspended thin film solution. "Saturday Morning Science" experiments were made into NASA videos that are used by high school and college students as a guide to performing similar experiments in their classes.

Adventures of the Agronauts brings the space station to the Creekside Elementary Science Fair in Durham, N.C. Students of all ages compared real-time photos of seeds germinating in space with photos of the ground control experiment at the University of Colorado. Students planted their own seeds and traced the difference in growth patterns on graph paper.

While some students may not be participating in on-orbit activities, they are certainly doing their part on the ground. Students at 22 high schools across the country are building hardware for space station mockups used by NASA astronauts and ground personnel to train for space missions. Students who participate in the High Schools United with NASA to Create Hardware (HUNCH) program learn how to engineer, draft and manufacture equipment similar to that used on the space station.

At NASA's Marshall Space Flight Center in Huntsville, Ala., and at JSC, students meet with NASA engineers, analyze current training hardware and then build it. Twenty cargo lockers like those used for storage on the space station have been built by the students. They built a prototype valve to control water flow and cooling to station racks to train crews on how to handle any leaks on the station.

Students participating in these NASA educational activities have built power supplies for utility panels to power laptops and payloads. All of these student-built products are already being used in training sessions at the Marshall Space Flight Center and at JSC.

"These students are NASA's future," said Robinson. "Whether it's a future scientist seeking a breakthrough in medicine, the future astronaut flying to the moon or Mars, or the future engineer building spacecraft to take us there, it will be a proud moment to hear them say their participation in our space station educational activities led them to those careers."

A league of their own

by Catherine E. Borsché

They may not have hit thousands of home runs out of the park, but veteran space shuttle astronauts Mike Coats and Steven A. Hawley have certainly rocketed themselves off of our home planet in pursuit of NASA's exploration goals. The two Johnson Space Center senior staff members, along with former astronaut Jeffrey A. Hoffman, joined the ranks of other elite American space heroes on May 5 as they were inducted into the U.S. Astronaut Hall of Fame.

Hawley, director of Astromaterials Research and Exploration Science, found out back in January he would receive, along with Coats and Hoffman, this prestigious tribute.

"I was surprised and very honored, particularly when I understood the voting was done by a group of individuals that included more than (just) astronauts," Hawley said.

JSC Director Mike Coats was pleased with his company in this sixth group of shuttle astronauts inducted into the U.S. Astronaut Hall of Fame.

"My first reaction was surprise, then delight, to be selected with Steve and Jeff. They were not only classmates but (are) good friends."

The induction ceremony took place at Kennedy Space Center in Florida. The group joined the ranks of legendary space pioneers such as Neil Armstrong, John Glenn, Alan Shepard, Sally Ride and John Young.

Both Coats and Hawley have had many standout moments in their NASA careers.

"My proudest moments had to be as a crewman when the orbiter rolled to a stop after a successful mission. So much work goes into every mission by thousands of dedicated people that calling out 'Houston, wheels stop' at the end of the flight is a moment so satisfying it's hard to describe," Coats said. "The feeling is a mixture of pride, satisfaction, relief and joy, knowing you're about to see your family again."

Hawley said he felt the most satisfaction working with the great observatories he helped launch into the cosmos.

"I always felt that as an astronomer/astronaut, there was no greater privilege than to be allowed to help deploy the Hubble Space Telescope (HST) and Chandra and also upgrade the HST on a servicing mission," Hawley said. "What the great observatories have done for astronomy is truly astounding."

The 2007 inductees were selected by a committee of current Hall of Fame astronauts, former NASA officials and flight directors, historians, journalists and other space authorities. To be eligible, an astronaut must have made his or her first flight at least 17 years before the induction year and must be retired at least five years from NASA's astronaut corps. Candidates must be a U.S. citizen, NASA-trained and have orbited the Earth at least once. In balloting, committee members evaluate not only an individual's flight accomplishments, but also how he or she contributed to the success and future success of the U.S. space program in post-flight assignments.

Their achievements will be added to those of former astronauts. Earlier inductees represented the Mercury, Gemini, Apollo, Skylab and Apollo-Soyuz programs. With the addition of Coats, Hawley and Hoffman, the U.S. Astronaut Hall of Fame will have honored 66 of America's space explorers.

Some of the fondest memories are not all about success and spaceflight tasks. Coats recalls a pad abort during his first launch attempt of STS-41D in 1984.

"After hearing the main engines begin to ignite and *Discovery* start to rock forward, it was suddenly and completely still. We were all lying in our seats, trying to comprehend what happened, when the first words were uttered by Steve Hawley: 'I thought we'd be a lot higher at MECO (Main Engine Cutoff),'" Coats said. "It was one of those times when you think, I wish I had said that. It took a while to put out the residual hydrogen fire, and we

were soaking wet after exiting the launch tower with the fire suppression system activated. It was memorable for a lot of reasons, (and) not exactly what we were expecting on our first mission to space."

For anyone looking to join Coats and Hawley in the U.S. Astronaut Hall of Fame, they do have advice for future explorers.

"Find something to study that you really like so that you'll be good at it. The people who are most successful and happy in their careers are passionate about what they do," Hawley said. "Also, learn to be your own worst critic. Be honest with yourself about strengths and weaknesses, and work to improve. Hold yourself accountable for your promises and your actions. It boils down to those three things—passion, discipline and accountability."

Coats says he believes the best is yet to come for NASA, and says now is a great time to get involved in cutting-edge discoveries.

"While I'm proud to have been part of the first 50 years of spaceflight, the young people who will be our future explorers will have an even more exciting time during the next 50 years. They will colonize the moon, first set foot on other planets, find water and possibly life throughout the solar system and make discoveries we can't even imagine now," Coats said. "My advice is to take every advantage of this wonderful time and wonderful opportunity in the history of (humankind). I envy them."

Top: ***The U.S. Astronaut Hall of Fame facility is part of the Kennedy Space Center Visitor Complex in Florida.***

Middle: ***From left to right, the newest additions of veteran space shuttle astronauts inducted to the U.S. Astronaut Hall of Fame: Jeffrey A. Hoffman, Steven A. Hawley and Michael L. Coats.***

Bottom: ***Many NASA legends were on hand to watch the induction ceremony for the sixth group of space shuttle astronauts given the prestigious spaceflight Hall of Fame honor.***

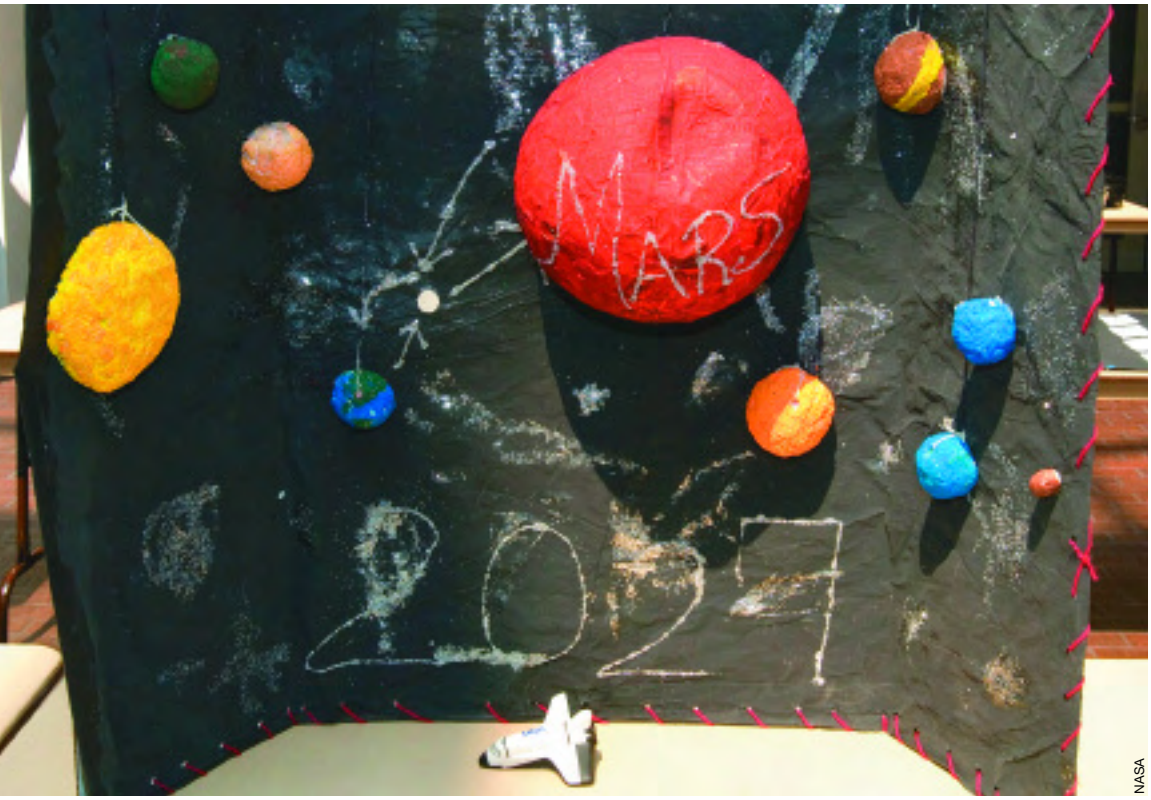
NASA honors students at University of Houston-Clear Lake

More than 180 local third-, fourth- and fifth-graders were honored at a recognition ceremony recently during NASA's Second Annual 21st Century Explorer Final Project Fair, hosted by the University of Houston-Clear Lake's Intercultural and International Student Services Office.

The students learned about recycling in space, propulsion systems and many other space exploration topics as participants in NASA's 21st Century Explorer Program. The bilingual-standards-based, after-school program uses the Web, animation and video to introduce science, technology, engineering, mathematics and NASA missions to students. This was the program's second pilot year.

The event offered hands-on workshops, focus groups and an audition for students to star in three new video clips, or "newsbreaks." The 30-second video clips are used to illustrate each of the program's Web-based lessons.


NASA



NASA


NASA

Space Center Roundup

The Roundup is an official publication of the National Aeronautics and Space Administration, Johnson Space Center, Houston, Texas, and is published by the Public Affairs Office for all Space Center employees. The Roundup office is in Bldg. 2, Rm. 166A. The mail code is AP411. Visit our Web site at: http://www.jsc.nasa.gov/roundup/online/ For distribution questions or to suggest a story idea, please call 281/244-6397 or send an e-mail to jsc-roundup@mail.nasa.gov.

Joanne Hale Editor
Catherine Borsché Staff Writer
Marshall Mellard Graphic Designer

PRSRT STD
U.S. POSTAGE
PAID
WEBSTER, TX
Permit No. 39