National Aeronautics and Space Administration

Roundup

Lyndon B. Johnson Space Center

January 2009

Reflections

JSC Director

On the cover:

The 2008 year in review.

NASA/DEVIN BOLDT jsc2008e153959

Photo of the month:

On the morning of Dec. 11, Johnson Space Center team members had the rare pleasure of going to work while the center was still blanketed with snow and ice from the previous night's winter weather event. This image, taken at JSC in the mall area by one of the ponds, shows the gorgeous blend of fall foliage with a white winter wonderland.

As we begin this new year, I encourage you to take a moment to reflect on all this great team accomplished in 2008. We celebrated both NASA's 50th anniversary and the 10th anniversary of the International Space Station. Your hard work made the four shuttle missions and Expeditions 17 and 18 wonderfully successful. We also experienced many challenges and setbacks due to Hurricane Ike. The one constant during this past year was teamwork. This strong, dedicated team achieved new milestones and lifted us up when we needed it most.

I hope you take as much pride as I do in successes of the missions in 2008. STS-122 on *Atlantis* expanded the size and research capabilities of the station with the delivery of the European Space Agency's Columbus laboratory.

During the 16-day STS-123 flight, *Endeavour's* seven astronauts worked with the three-member space station crew and ground teams around the world to install the first section of the Japan Aerospace Exploration Agency's Kibo laboratory and the Canadian Space Agency's two-armed robotic system, known as Dextre.

STS-124 and the Discovery crew took the pressurized module (Hope) and the robotic arm to station, completing the Japanese Kibo Laboratory. The mission included three spacewalks. The lab's logistics module, which was installed in a temporary location during STS-123, was attached to the new lab.

During the last shuttle mission of the year, *Endeavour's* STS-126 "extreme home improvement" mission carried supplies and equipment necessary to double the station crew size from three to six members in the spring. The mission's four spacewalks primarily focused on servicing the station's two Solar Alpha Rotary Joints (SARJs), which allow the outpost's solar arrays to track the sun. The starboard SARJ has had limited use since September 2007, but it is now fully functional.

The European Space Agency's Jules Verne Automated Transfer Vehicle demonstrated a successful automated docking of the cargo vehicle with the station this past year. This accomplishment showcases, yet again, the progress made by the international partnership in bringing this incredible space program to fruition.

The Constellation Program has been very busy with planning and testing components for the next generation of spacecraft. NASA and the Orion industry team conducted a successful abort motor test firing at the Alliant Techsystems facility in Promontory, Utah, late in 2008. The abort motor will provide a half-million pounds of thrust to lift the crew module off the Ares I rocket, pulling the crew away safely in the event of an emergency on the launch pad or during the first 300,000 feet of the rocket's climb to orbit. It was the first test of its kind since the beginning of the Apollo Program.

The NASA team showcased its talents and teamwork this year, especially following Hurricane Ike, which we have learned was the third costliest hurricane in U.S history after Andrew and Katrina. Your "can do" spirit allowed us to reopen the center and begin to support our missions much sooner than I initially anticipated. Given the challenges of the extensive and extended power outages, all of you pitched in to account for and then keep our team informed in the days and weeks after Ike. I was immensely proud to be part of the NASA family.

With another year of high-paced activity ahead of us in 2009, it will be important to continue to watch out for each other. In the space business, the first several weeks after the holidays have frequently seen a rise in accidents, incidents and close calls. We all need to take time off for families and ourselves during the holidays, but as we return to work, we need to focus on the job and quickly get back into our habit patterns. Be particularly observant and especially mindful of anything that has the potential to be unsafe, and continue to watch out for each other.

This edition of Roundup highlights some of your hard work and dedication and serves as a chronicle of your progress. I hope you enjoy it. Happy New Year!

Mike

Security

Johnson Space Center made great strides in 2008 implementing Homeland Security Presidential Directive (HSPD)-12.

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 hailed as the answer to audits showing that the government lacked adequate network security for Information Technology (IT) operations. In addition to stringent IT security, which will be ensured with smartcard technology encoded in an employee's badge and his or her specially chosen personal identification number (PIN), physical security at the center will also be revamped.

JSC successfully met the Office of Management and Budget's Sept. 30, 2008, milestone for issuing badges to the population. On Dec. 15, 2008, the standard NASA Gold Badge was retired and is no longer accepted for access to JSC.

A new era for security protection begins in 2009, with the continuation of the second phase of HSPD-12: the use of smartcards and agency identification and authentication initiatives for NASA resources.

For physical access, the new badge is used for access to the center and controlled-access areas (through card readers). In the coming months, secure access to certain high-risk facilities will be enhanced with the introduction of a required PIN.

"Our agency has been recognized in the U.S. Congress for the great progress we've made with HSPD-12 implementation. NASA is used as an example to show other U.S. government agencies how to successfully approach HSPD-12 implementation. This is due to the efforts of both the agency teams developing our HSPD-12 infrastructure and NASA team members for their cooperation in the re-badging process."

– Tom Miglin
JSC and White Sands Test Facility HSPD-12
Deputy Implementation Manager

For IT access, JSC is working to give employees the ability to log into their workstations, Web sites and other applications by inserting their new badge into a computer card reader and entering a PIN. That will start, on a limited basis, the summer of 2009.

Included in these initiatives is a single agency Web site to request access to any agency application—a one-stop shop for account requests. All of these IT access/request changes will occur over the next several years, with a final date of Sept. 30, 2011, for all aspects of HSPD-12 implementation

NASA/BLAIR jsc2006e15159

NASA's Constellation Program is just steps away from the moon

If the greatest adventures begin with small steps, the Constellation Program took some giant strides in 2008. Step by step, the inch stones became milestones. Project managers began to report on completion of important design reviews, hardware, mock-ups and tests.

Lots of tests.

In Firing Room 1 in the Launch Control Center at Kennedy Space Center, workers put together another cabinet to hold equipment that will support the future Ares rocket launches.

Tests on launch-abort motor components: a ground test of a 17-foot-tall Orion abort motor impressed a crowd with 100-foot-high flames. Tests on parachutes, tests on airbags, tests on crew seats and harnesses. Then tests on prototype spacesuits, tests on first-of-their-kind lunar vehicles and even tests on advanced waste-processing units.

There were tests in the desert, tests in the ocean, tests in wind tunnels and tests in centrifuges. Tests across the country and in the virtual world of computers. Some worked. Some didn't.

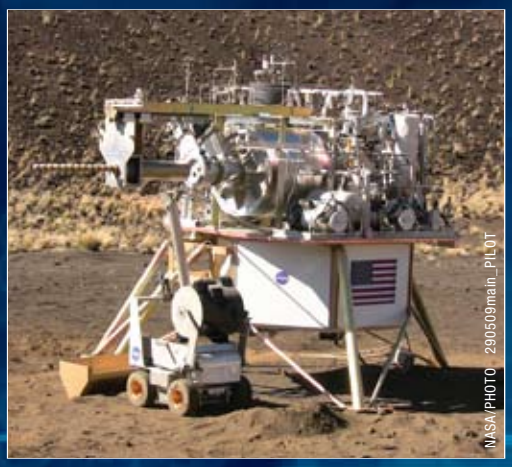
And with each test, Constellation took one step closer to the goal of returning humans to the moon to live and work.

This year, the Constellation Program's many projects and offices gained definition. The Ares I Project completed its preliminary design review, the first such milestone in more than 35 years for a U.S. rocket. The Orion Project saw its first vehicle mock-up arrive at Dryden Flight Research Center to be readied for next year's test of the launch abort system, designed to rescue the spacecraft's crew, if needed.

The mission operations project embarked on a basic operations plan, even putting the Orion/Ares I vehicle through its paces in a simulated virtual mission. The Extravehicular Activity Project put astronauts into futuristic-looking suits and made them walk in "lunar gravity" on a contraption called the Partial Gravity Simulator, or POGO.

Ground operations also began. Construction continued on the lightening protection system needed for the Ares/Orion vehicle. And the first hardware for the Ares I-X vehicle, set for launch in 2009, began to arrive at Kennedy Space Center. Within days, the huge "tuna can" upper-stage simulators joined the STS-119 vehicle stack in the Vehicle Assembly Building—proof that shuttle transition has begun.

At Stennis Space Center, a new test stand began to take form, while next door at the Michoud Assembly Facility, part of the assembly line morphed to add a new welding system for the Orion spacecraft.



The Precursor In-Situ Resource Utilization Lunar Oxygen Testbed, or PILOT system, is shown with Lockheed Martin's Bucketwheel on a lander the size of the Phoenix spacecraft currently on Mars. PILOT could produce up to one quarter of the oxygen needed to sustain a crew of four on the moon.

News media were invited to tour the newly completed Firing Room 1—the prime control room for Constellation launches—and the work being done at Pad B. They also learned how NASA plans to someday turn dirt into oxygen, how many and what types of

Fabricated steel began arriving at Stennis Space Center on Oct. 24, 2008, for construction of the A-3 Test Stand that will be used to test the Ares' J-2X engine currently in development. By the time the initial phase of construction is complete in April, some four million pounds of fabricated steel will be in place, and Stennis will have a towering structure that will be used to test the nation's next generation of moon rockets.

During the 2008 Desert Research and Technology Studies—or RATS—tests at Black Point Lava Flow in Arizona, engineers, geologists and astronauts came together to test NASA's new Small Pressurized Rover.

Also, don't miss the STS-126 crew and NASA's newest prototype rover in the presidential inaugural parade on Jan. 20.

cameras should be on the Orion vehicle, as well as the kind of information systems needed for the program.

The Constellation Program also completed its Lunar Capability Concept Review, demonstrating how the Altair lunar lander and Ares V vehicle will reach the moon and later help as NASA builds a lunar outpost. Meanwhile, engineers in the lunar surface systems tested prototypes like the Small Pressurized (lunar) Rover and an inflatable habitat. The scientists in the human research division studied space in a different way, building foam-board habitats and vehicles to better demonstrate the amount of space astronauts would have to live and work.

2008 was a busy year, and 2009 will be filled with more test hardware, evaluation tests and design reviews. It will be an off-the-planet year. The Lunar Reconnaissance Orbiter, with its cameras aimed at possible landing sites for the Altair lunar lander, is set for launch this coming spring. Copernicus Crater, we've got you in our sights …

In addition, the Constellation Program will have its first two test flights in 2009. The first will be a trial of Orion's launch abort system. Orion's new launch abort motor will fire, lifting the test module to an altitude of about one mile above the U.S. Army's White Sands Missile Range near Las Cruces, N.M. The second test will take the Ares I-X vehicle more than 28 miles high in just two minutes and be the first Constellation vehicle to launch from the Kennedy Space Center's newly configured Pad-B.

From inch stones to milestones, the next great adventure has begun. Once again, NASA is just steps away from the moon.

Orion's Abort Flight Test crew module as it is being delivered via an Air Force C-17 to NASA's Dryden Flight Research Center in Edwards, Calif., where it will be integrated with instrumentation, computers, wiring and parachutes.

Celebrate...good times, c'mon!

We had much to be thankful for while eating turkey and ham during Thanksgiving of 2008. Johnson Space Center had a wealth of achievements, past and present, to celebrate, and we did it just as we do exploration—big.

It was a momentous anniversary celebration for a major event in NASA history: the forming of the space agency. Communications and Public Affairs, JSC Office of External Relations, in conjunction with Dangerous Films and the Discovery Channel, gave employees the opportunity to watch all six episodes of the documentary, "When We Left Earth: The NASA Missions," in the Building 30 Auditorium the week of July 14.

Milt Heflin, Johnson Space Center's associate director (technical), introduced the episodes during a three-day period.

NASA/SOWA JSC2008E054857

JSC Associate Director (technical) Milt Heflin provided the introduction to the documentary, "When We Left Earth: The NASA Missions."

On Nov. 20, the International Space Station Program invited NASA family and friends to Space Center Houston to help celebrate the 10th anniversary of the launch of Zarya, the station's first element.

In attendance was more than 1,000 NASA employees and contractors, their families and representatives from the space station's International Partners. Guests enjoyed a fajita buffet, refreshments and a performance by the astronaut band Max Q. The members of Expedition 17, as well as astronauts Shannon Walker, Leland Melvin, Bill McArthur and Clay Anderson, signed autographs throughout the evening.

International collaboration has been a major factor in the space station from the beginning. International Space Station Program Manager Michael Suffredini described Zarya as "an international module before it ever got to orbit—it was an international effort." Currently, the station effort involves over 100,000 people from space agencies and contractors in 37 states and 15 countries.

NASA/BLAIR JSC2008E147796

Astronaut Leland Melvin signs an autograph for a fan at the International Space Station 10-year Anniversary Party.

The "big party" of the year was most certainly NASA's 50th Anniversary Celebration. Nearly 3,000 NASA team members and their families, including some of the brightest stars in the history of our nation's space program, gathered at the Galveston Convention Center on Nov. 22 to celebrate 50 years of NASA.

The event featured a wine-and-cheese reception with astronauts from Gemini to the International Space Station era, as well as bands, DJs, catered international cuisine, dancing, exhibits, entertainers, a champagne toast, celebratory fireworks, handmade chocolate truffles and a commemorative 50th anniversary champagne glass as parting gifts.

At half a century, there's no such thing as over the hill—we're just getting this party started.

NASA/MARKOWITZ jsc2008e149018

Entertainers wowed NASA team members who attended the "biggest party of the year" at NASA's 50th anniversary celebration.

Center Director's Systems Engineering Forum

Nearly 300 civil servants and contractors participated in the four-hour Systems Engineering (SE) Forum held Aug. 21 at the Gilruth Center. This widely attended event featured a panel of distinguished SE design experts who shared their insights and lessons learned from challenges similar to those facing the Constellation Program today. Many attended from remote locations using teleconference capabilities, and others tuned in to the live and recorded broadcasts, which aired on Johnson Space Center TV.

The forum was sponsored by JSC Director Mike Coats and was presented in collaboration with the NASA Academy of Program/Project Management and Engineering Leadership. In addition, the JSC Engineering Directorate was instrumental in making the SE forum a success. Douglas Terrier, associate director of Engineering, and Linda Bromley, manager of the Engineering Services and Management Integration Office, were key contributors during the planning stage for this premiere event at JSC.

Panelists:

- Wayne Hale, NASA deputy associate administrator for Strategic Partnerships
- Richard Ryan, technical specialist, Chief Engineer's Office, Marshall Space Flight Center
- Brian Muirhead, Program Systems engineer, Constellation Program
- Dale Thomas, deputy program manager, Constellation Program
- Brian Persons, Engineering director, Naval Sea Systems Command
- Michael Gaydar, Chief Systems engineer, Naval Air Systems Command

JSC Chief of Staff Bobby Watkins, Office of the Director, gave the opening remarks. Steve Kapurch from the Office of the Chief Engineer at NASA Headquarters facilitated the panel.

Electronic copies of the panelists' presentations may be found on the following internal NASA Web sites:

EA Engineering Academy:
http://ea.jsc.nasa.gov/Ea_web/HTML/emplsrv/academy/se_forum.asp

NASA Engineering Network:
http://nen.nasa.gov/portal/site/llis/community/SE/

NASA/MARKOWITZ jsc2008e126168

From left to right: Dale Thomas, Steve Kapurch, Michael Gaydar, Richard Ryan, Brian Muirhead, Wayne Hale, Brian Persons and Bobby Watkins.

Panelists addressed a packed house at the Center Director's Systems Engineering Forum.

NASA/MARKOWITZ jsc2008e126177

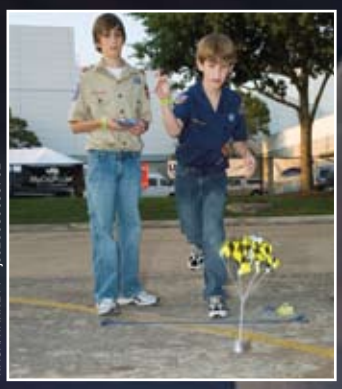
Outreach

While everyone at Johnson Space Center knows the value of what we do each day, we have a responsibility to the community to be ambassadors for the space program. JSC was its own ambassador in 2008, reaching over a million people total in different corners of the country, from Seattle, to Washington, D.C., to Daytona, Fla.

JSC also played an integral role in our own backyard, supporting local events such as Wings Over Houston, Rodeo Houston, Yuri's Night, the Houston Marathon and NASA Nights for professional sports teams.

Here are some more major highlights from 2008.

NASA/BLAIR JSC2008E025016


NASA/HARNETT jsc2008e033702

NASA/HARNETT jsc2008e017948

NASA/GEESEMAN JSC2008E002934

JSC reached out to the public with (from left) an interactive booth at Rodeo Houston; a Yuri's Night celebration at Space Center Houston; the Texas Independence Trail Ride stop at JSC; and also the Houston Marathon, where astronaut Jose M. Hernandez signed autographs for fans.

NASA/DEHOYOS JSC2008E046710

NASA/DEHOYOS jsc2008e046710

'Driven to Explore'

Just as NASA is driven to explore, the NASA "Driven to Explore" exhibit brings space exploration to audiences of all ages. The exhibit is a mobile, multimedia experience showcasing the Space Shuttle Program, the progress of the International Space Station and benefits of space exploration leading into NASA's next major program, Constellation.

As part of this unique exploration experience, visitors learn why NASA is going back to the moon, and how and what astronauts plan to do while there. Plus, visitors have the unique opportunity to touch a 3-billion-year-old moon rock brought back aboard Apollo 17, the last manned mission to the moon in 1972.

Last spring, the exhibit was launched into service at Space Center Houston, just in time for JSC's "Bring Our Children to Work Day" on June 12.

Throughout the rest of the year, the Driven to Explore exhibit toured the country, making a stop at the Dallas-Fort Worth Summer Balloon Classic June 20 to 22, and then journeyed to Philadelphia, Pennsylvania, for the Association of Science-Technology Centers annual conference Oct. 17 to 19.

After the conference, it was off to Columbus, Ohio, for three days at the Center of Science and Industry (COSI). Ranked as the number one science center in the United States by *Parents* magazine, COSI hosted the exhibit Oct. 22 to 26.

After nearly a 1,500-mile journey, the exhibit landed at the Museum of Science and History in Corpus Christi, Texas, before moving to the Rio Grande Valley. From Dec. 9 to 10, visitors in McAllen, Texas, saw the exhibit at the International Museum of Art and Science.

On Dec. 20, Driven to Explore made a special appearance at the U.S. Representative Sheila Jackson Lee holiday party in Houston.

From the Lone Star State to the City of Brotherly Love to the heart of the Midwest, NASA's Driven to Explore exhibit gave visitors across America the opportunity to not only touch another planet, but to become inspired about the future of America's space program.

NASA/PHOTO jsc2008e105693

Bob Cabana, a former astronaut and director of the Kennedy Space Center, speaks with the media during a Hometown Heroes event..

Hometown Heroes

With the roar of thousands of baseball fans cheering them on, five NASA astronauts threw out the ceremonial first pitch at Major League Baseball games this summer. These astronauts traveled back to their home regions to promote NASA's celebration of the International Space Station's 10th year in orbit. The tour not only combined NASA with America's favorite pastime, it also promoted human spaceflight to the local media and various community outlets.

The cities touched by the outreach program included Kansas City, Baltimore, Seattle, Minneapolis, Chicago, New York and Los Angeles.

Hometown Heroes astronauts:

- Clay Anderson
- Terry Virts
- Bob Cabana
- Dan Tani
- Garrett Reisman

NASA/PHOTO jsc2008e106049

Astronaut Garrett Reisman throws the first pitch at a New York Yankees game on Aug. 26.

"I thought the whole program that we did was perfect. Hometown visits are the best kinds of NASA public relations."

– Terry Virts, Astronaut

VEISHEA

On April 12, NASA representatives, including astronaut Clay Anderson, attended VEISHEA (Veterinary Medicine, Engineering, Industrial Science, Home Economics, Agriculture) at Iowa State University. The event, which is the largest student-run festival in the nation, is held at Iowa State each spring. It offered a great opportunity for NASA to talk with the students and community members about the Constellation Program. Anderson, who was inducted into the Aerospace Engineering Hall of Distinguished Alumni during the event, served as grand marshal of the kick-off parade.

NASA's large exhibit contained information on the mission of Constellation, including details on the Orion crew exploration vehicle and the Ares crew launch vehicles. Helping out the NASA team were student volunteers and NASA co-ops from Iowa State, who trekked around the campus during the event to get the word out. Cosmo, NASA's seven-foot inflatable astronaut, made an appearance and was a big hit. Anderson signed autographs and took pictures with the event attendees at the booth.

Even though the temperature was below freezing and it was snowing, more than 700 people stopped by to talk with NASA. With the help of Anderson and Cosmo, NASA drew one of the biggest crowds of all the booths.

Transition

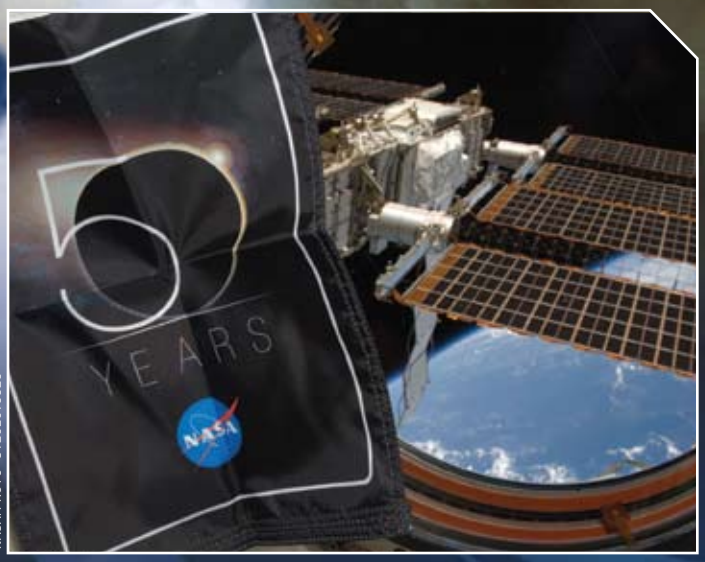
Johnson Space Center

As we ended fiscal year 2008, it is with great pride that I acknowledge the many important Johnson Space Center milestones that have been met thus far. First, the Planning, Programming, Budgeting and Execution-10 submission earlier this year proved to be a very tedious but successful process. Next, the JSC facility data submission to JSC Facility Review Database and our support of Exploration Requirements for Institutional Capabilities ensures that data is at the hands of JSC senior management, the programs and NASA Headquarters. This data facilitates decision-making that will make for a successful retirement and transition of the Space Shuttle Program, including transition to the International Space Station and Constellation Programs. In addition, the Offices of the Chief Financial Officer and Procurement did an outstanding job of working together to achieve one of the best obligation performances (~$41M in unobligated carryover) in JSC history.

From a personal standpoint, it is invigorating to see the dedication to each mission from our talented and tireless team. With each and every flight, the NASA team, as a whole, provides sheer determination; in fact, I cannot begin to count the number of times I have seen this type of perseverance. Without you, this endeavor would not be a success!

In the meantime, remember that the JSC Transition Web site includes the capability for you to ask questions and provide comments—something I would strongly encourage everyone to take advantage of. I want to know your thoughts and concerns, so please visit the JSC Transition Web site at http://transition.jsc.nasa.gov and use the "contact us" feature to share your thoughts.

Mike Coats
JSC Center Director



NASA/PHOTO S126E013825

Space Shuttle Program

We're getting closer to the end—and the beginning. There are approximately 10 flights left before the shuttle fleet is retired and the Constellation Program takes center stage.

As a program, we have been working for the past several years to get ready for the former. That process is well underway, and though there is still plenty of work to do, we've been able to focus more of our attention on the latter: the bigger Transition picture.

At the Program Manager's Review in September, Shuttle and Constellation came together for the first time to discuss, at a program level, the best way for the Space Shuttle Program to do that. The goal of the meeting was to come up with a list of proposals on how the two programs could collaborate given the resources available.

The result was a 20-page list of possibilities that are now being evaluated by the project offices, everything from Shuttle sharing its flight software engineers to providing ground operations support for Ares 1X. The idea is that getting Shuttle workers involved part-time with Constellation now not only helps Constellation accomplish its work, but it gives Shuttle employees a foot in the door that will help them make a full-time move to the new program. It also allows them to stick with Shuttle in the meantime without shortchanging their career.

The end of the Space Shuttle Program isn't the end of the agency, or even the edge of the map. We know what comes next, and though two years is not a long time, it is enough time to plan for it. The next step is to take this inter-program collaboration to the next level. Collaboration shouldn't stop with the Shuttle and the Constellation Program. This is our chance to work with programs across the agency, at all 10 centers. Before it ends, the Space Shuttle Program plans to do its part to leave a more efficient and agile agency in its wake.

Team NASA and Space Center Volunteers 2008

Keeping the NASA spirit alive

TEAM NASA

As a dynamic team comprised of Johnson Space Center civil servant, contractor and community representatives, Team NASA built a seamless partnership with JSC to enhance the center's events and overall goals. The team consistently met this challenge by providing coordinated planning, organization and communication for the successful implementation of various JSC initiatives.

NASA/PHOTO

Here are just a few of the events and activities supported by the Team NASA committee:

- Houston Livestock Show and Rodeo Trail Riders' Breakfast
- Houston A+ Challenge Teacher Externship
- JSC Chili Cook-off
- Bring Our Children to Work Day
- Safety and Total Health Day

In an effort to better support JSC's Education Outreach initiatives, Team NASA formed an education subcommittee in 2007 to enhance and strengthen JSC-approved Education Outreach-related projects primarily geared toward engaging young students in math, science and engineering disciplines. The committee also supported programs aimed at promoting teacher development goals, with the intent to reach an even larger student population and positively impact tomorrow's workforce.

To further support these goals, an interactive Web site called My Rocket Scientist (http://myrocketscientist.wordpress.com/) was launched. It featured mentoring and tutoring volunteer opportunities available at area schools, shelters and special events. All are invited and encouraged to visit the site often to volunteer time and talent at one or more of the featured opportunities.

SPACE CENTER VOLUNTEERS

Often described as "competitors by day, partners by compassion," the Space Center Volunteers (SCV) is an active volunteer organization consisting of contractor and civil servant team members working together to promote JSC's goodwill in the surrounding communities.

SCV's foundation is not based on large corporate funds and sponsorships, but rather the combined spirit, enthusiasm and tireless energy of the aerospace professionals who consistently dedicate their time, answer the call when needed and touch the lives of so many. **Here is just a small sample of some of the community events SCV proudly supported in 2008:**

Special Olympics: Since 2005, SCV has supported the two-day Special Olympics Texas-Gulf Coast's Area 22 Spring Games, growing to nearly 200 volunteers representing 18 different Bay Area Houston companies, as well as JSC. Volunteers are involved in all aspects of the Spring Games, from setup to teardown; however, the favorite role of the SCV is well known to be that of "cheerleader" for the competing athletes during events and medal ceremonies.

Elves and More: Supporting the Elves and More Bike Build has become an SCV holiday tradition. Together with other Houstonians at Christmastime, the SCV congregate at Reliant Center to help piece together thousands of bicycles for underprivileged children in the city, who will receive an unexpected gift from Santa on Christmas day.

Hurricane Ike Relief: SCV responded to the huge need in our area by mobilizing for several activities, from helping the Bay Area Pet Adoption Center cleanup, assisting in debris cleanup in Shoreacres, Texas, to working with Interfaith Caring Ministries at the temporary distribution center in League City, Texas.

SCV invites the aerospace community to join together under one banner as we celebrate and demonstrate the generous spirit of our community. For the latest information on SCV opportunities, visit: http://www.bayareahouston.com/Home/AerospaceInitiatives/SpaceCenterVolunteers/

NASA/PHOTO

2008 Missions

EXPEDITION 16

On Oct. 10, 2007, an American astronaut, a Russian cosmonaut and a Malaysian spaceflight participant launched aboard the Soyuz TMA-11 spacecraft to the International Space Station from the Baikonur Cosmodrome in Kazakhstan. Expedition 16 marked the beginning of the most complex phase of station assembly since humans first occupied the outpost seven years ago. The mission included five spacewalks, the last being on Jan. 30. Expedition 16 Commander Peggy Whitson and Flight Engineer Dan Tani replaced a motor at the base of one of the station's solar wings during a seven-hour, 10-minute spacewalk. Whitson and Tani also inspected a joint that helps rotate the starboard solar arrays during the spacewalk, done from the station's Quest airlock in U.S. spacesuits. The Expedition 16 crew members were Russia's Federal Space Agency cosmonaut Yuri Malenchenko, flight engineer and Soyuz commander; Peggy Whitson, commander; Malaysian spaceflight participant Sheikh Muszaphar Shukor; European Space Agency (ESA) astronaut Léopold Eyharts, flight engineer; Garrett Reisman, flight engineer; and Dan Tani, flight engineer.

NASA/PHOTO iss016e027426

A cloud over Africa is featured in this image photographed by an Expedition 16 crew member on the station. Deemed by many meteorologists as one of the most impressive of cloud formations, cumulonimbus (from the Latin for "puffy" and "dark") clouds form due to vigorous convection of warm and moist unstable air.

NASA/PHOTO iss015e35126

Peggy A. Whitson, Expedition 16 commander, places the Expedition 16 patch above a hatch in the Destiny laboratory, which adds to the growing collection of insignias representing crews who have lived and worked on the International Space Station.

STS-122

STS-122 Space Shuttle *Atlantis* launched Feb. 7 at 1:45 p.m. CST as the 121st NASA space shuttle flight. The original launch date for STS-122 was Dec. 6, 2007, but because of Engine Cutoff Sensor reading errors, the launch was postponed to Dec. 9, 2007. During the second launch attempt, the sensors failed again, and the launch was halted. A tanking test on Dec. 18 revealed the problem was with a connector between the external tank and the shuttle. The connector was replaced and the shuttle launched on Feb. 7. As the first mission of 2008, it was commanded by veteran space flier Steve Frick to deliver ESA's Columbus Laboratory to the International Space Station. Alan Poindexter served as pilot, and mission specialists included Rex Walheim, Stanley Love, Leland Melvin and ESA astronaut Hans Schlegel. This was a particularly memorable flight for Poindexter, Love and Melvin, who all made their first spaceflight on this mission. Expedition 16 Flight Engineer Dan Tani, who flew to the station on the STS-120 mission, returned home with the STS-122 crew. He was replaced with Eyharts. STS-122 was the 24th shuttle mission to the station.

NASA/PHOTO S122E008923

STS-122 Mission Specialist Rex Walheim performs work on the outside of the Columbus laboratory, the newest piece of hardware on the International Space Station.

NASA/PHOTO s123e007123

JAXA astronaut Takao Doi (top right), NASA astronauts Robert L. Behnken (top left) and Mike Foreman, all STS-123 mission specialists, are pictured on the middeck of Space Shuttle Endeavour while docked with the station.

STS-123

The second mission of the year was truly a global effort. STS-123 Space Shuttle *Endeavour* launched March 11 at 3:28 a.m. CDT. Commanded by veteran space flier Dominic Gorie, this mission included many milestones for space exploration. Topping the list was the delivery of part of the Japan Aerospace Exploration Agency's (JAXA's) module, marking the beginning of the agency's presence on the station. The 122nd space shuttle mission delivered the Japanese Kibo Logistics Module, along with the Canadian Dextre robotics system to the station. The mission duration was 15 days and 18 hours, and it was the first mission to fully utilize the Station-to-Shuttle Power Transfer System, allowing space station power to augment the shuttle power systems. The mission set a record for a shuttle's longest stay at the station. Minor technical problems occurred soon after takeoff, with a part on the Flash Evaporator System (FES) and two left Reaction Control System thrusters. To correct the problem, the astronauts turned on the backup FES when the primary one failed. Gregory H. Johnson served as pilot, and mission specialists were Rick M. Linnehan, Robert L. Behnken, Mike Foreman and JAXA astronaut Takao Doi. STS-123 was the first spaceflight for Johnson, Behnken and Foreman. The trip left behind Reisman at the station and returned Eyharts to Earth.

EXPEDITION 17

Expedition 17 left Earth on April 8 aboard a Soyuz TMA-12 spacecraft. Station Commander Sergei Volkov and Flight Engineer Oleg Kononenko wrapped up a six-hour, 18-minute spacewalk on July 10 after inspecting their Soyuz TMA-12 spacecraft and retrieving a pyro bolt from it. Volkov and Kononenko conducted another spacewalk on July 15 to outfit the Russian segment's exterior, install one scientific experiment and retrieve another. Once aboard the station, Volkov and Kononenko joined Garrett Reisman, who transferred from Expedition 16 to join the Expedition 17 crew. Reisman was replaced by Gregory Chamitoff, who launched aboard the Space Shuttle *Discovery* mission STS-124 on May 31. Volkov and Kononenko landed safely on Oct. 24, while Chamitoff remained aboard the station as an Expedition 18 crew member.

NASA/PHOTO sts124-s-023

A videographer with NASA's Kennedy Space Center captures the launch of Space Shuttle Discovery on its STS-124 mission.

STS-124

Known as the mission of hope, STS-124 Space Shuttle *Discovery* continued the delivery of Japan's Experiment Module, which included a pressurized module and robotic arm known as "Kibo," meaning hope in Japanese. The 123rd space shuttle flight launched May 31 at 4:02 p.m. CDT. Mark Kelly headed this mission to the station, while Ken Ham served as the pilot. Mission specialists included Karen Nyberg, Ron Garan and Mike Fossum. JAXA astronaut Akihiko Hoshide also served as a mission specialist. The STS-124 mission was the second of three flights to launch components to complete the Kibo laboratory. The mission included three spacewalks, and the lab's logistics module was attached to the new lab. Stephen G. Bowen was previously named to the STS-124 crew, but was reassigned to STS-126. The change allowed room for the STS-124 mission to rotate its space station residents. Chamitoff flew to the station as a mission specialist on STS-124 and took Garrett Reisman's place as flight engineer on the station.

NASA/PHOTO iss017e011574

Expedition 17 Flight Engineer Greg Chamitoff smiles for a photo near a chess board in the Harmony node of the International Space Station.

EXPEDITION 18

Expedition 18 launched to the station on Oct. 12. The arrival of the Expedition 18 crew marked the beginning of a testing period of equipment that will support the expansion of the station to six people next spring. The first two crew members, Mike Fincke and Yuri Lonchakov, were sent to station aboard a Soyuz TMA-13 spacecraft. Fincke and Lonchakov will spend six months on the station, while Chamitoff returned to Earth Oct. 24 with the STS-126 crew. Sandra Magnus joined the Expedition 18 crew after launching on STS-126. There are no U.S.-based spacewalks scheduled for Expedition 18; however, Fincke and Lonchakov plan to venture outside the Russian segment's Pirs Docking Compartment for the station's 21st Russian spacewalk. It will be Fincke's fifth time to don one of the Russian Orlan spacesuits and Lonchakov's first. Plans for the spacewalk are still in works, but several tasks have already been identified. Fincke and Lonchakov will be installing the Expose-R and Impuls experiments on the exterior of the Zvezda Service Module. Expose-R is an ESA experiment that arrived on a Progress vehicle in November. It is designed to expose organic material to the extreme environment of space.

NASA/INGALLS STS126-S042

The moon is seen rising above the Space Shuttle Endeavour (STS-126) on Friday, Nov. 14, 2008, at the Kennedy Space Center in Cape Canaveral, Fla

STS-126

The final mission of the year was STS-126 Space Shuttle *Endeavour*. Launched Nov. 14 at 6:55 p.m. CST, *Endeavour* carried a reusable logistics module with supplies and equipment, including additional crew quarters, additional exercise equipment, equipment for the regenerative life support system and spare hardware, to prepare the station to eventually house six crew members at a time. This mission included four spacewalks largely dedicated to servicing and repair of the Solar Alpha Rotary Joints. In addition, the shuttle carried the signatures of more than 500,000 students that participated in the 2008 Student Signatures in Space program, jointly sponsored by NASA and Lockheed Martin. One of the primary goals of *Endeavour's* ongoing mission was to install the new water-recycling system, activate it and begin initial urine-processing runs. Veteran space flier Chris Ferguson commanded the mission aboard *Endeavour*. Eric Boe served as the pilot, and mission specialists were Steve Bowen, Shane Kimbrough, Heidemarie Stefanyshyn-Piper, Donald Pettit and Magnus. Magnus remained on the station, replacing Expedition 17/18 Flight Engineer Chamitoff, who returned to Earth with the STS-126 crew. Magnus will serve as a flight engineer and NASA science officer for Expedition 18, and will return on shuttle mission STS-119. This is the 27th shuttle mission to the station.

NASA/PHOTO iss018e006077

Kennedy Space Center and Cape Canaveral, Fla., are featured in this image photographed by an Expedition 18 crew member on the station. Launch complex 39, with pads A and B, is visible at center left. The Vehicle Assembly Building is visible at lower right.

Prelude to Hubble

The final mission to the Hubble Space Telescope was originally scheduled for October. However, because of an anomaly that occurred on Sept. 27 aboard the telescope, STS-125 has been delayed until at least May 2009 to prepare a second data-handling unit replacement for the telescope. Space Shuttle *Atlantis* was to carry new instruments to Hubble: a replacement Fine Guidance Sensor and six new gyroscopes and batteries to allow the telescope to continue to function at least through 2013. The crew was also to install a new thermal blanket layer to provide improved insulation and a "soft-capture mechanism" to aid in the safe de-orbiting by an unmanned spacecraft at the end of its operational lifespan.

Statistics

NASA Johnson Space Center Economic Impact in Texas Fiscal Year 2008

While Johnson Space Center has earned a global reputation for achievements in space exploration, less evident are the economic benefits the institution brings locally and to the state of Texas. JSC's role is a vital part of the regional and state economies. Here are some highlights:

- In Fiscal Year 2008 (FY08), JSC obligated a total of $5 billion, or about one-third of the agency total.
- About $4.5 billion of the total obligation ($5 billion) was for contracts and grants.
- 92 large businesses performed portions of the contracts totaling slightly more than $3.1 billion in Texas.
- $219 million went to 120 small businesses working in Texas.
- JSC obligated almost $25 million on grants, contracts and agreements with Texas universities and education institutions in FY08.
- JSC did over $57 million in business with women-owned businesses in Texas.
- Nearly $23 million was spent on contracts performed in Texas by veteran-owned businesses.
- Nearly $26.5 million of JSC funding in FY08 was obligated on grants, contracts and agreements with nonprofit organizations.

PROGRAM	OBLIGATIONS ($B)	OBLIGATIONS %
Space Shuttle	1.9	38%
International Space Station	1.4	28%
Exploration	1.2	24%
Institutional Overhead	0.4	8%
Other	0.1	2%
Total	5.0	100%

JSC Economic Impact of Civil Service Workforce in FY08

COMMUNITIES	TOTAL NUMBER OF EMPLOYEES	ESTIMATED INCOME OF EMPLOYEES (Dollars in Millions)
Webster	83	7.8
League City	630	67
Seabrook/El Lago/Taylor Lake	266	30.1
Kemah/Bacliff	42	4.4
Clear Lake Area (including Nassau Bay)	997	113.9
Friendswood	358	41.8
Dickinson	66	6.3
Alvin	43	4.2
Pearland	162	17.2
La Porte/Shoreacres/Baytown	37	3.4
Pasadena/Deer Park	50	4.4
Other Houston Areas	346	33.6
Other Galveston County Areas	62	6.2
Other Areas of Texas	136	12.3
Out of State*	201	14.1
Total	3,479	366.7

Note: The number of civil servants is a headcount value as of Nov. 30, and the salary shown reflects the adjusted basic pay within the Federal Personnel and Payroll System database for calendar year 2008. The adjusted basic pay is defined as an employee's basic pay plus the locality differential. Income numbers are rounded.

** The "Out of State" value includes White Sands Test Facility.*

Flight of fancy

NASA/BOLDT jsc2008e154189

"When I watched Space Shuttle *Endeavour* piggyback aboard [the 747] aircraft carrier, it took my breath away. The duo circled slowly many times in the area, as if in a private air parade. What was even grander is the mass of people who came outside during the day to witness the event. People were lined up outside of office buildings, schools and banks. Many vehicles pulled to the side of the road to take pictures and live recordings of the sighting. It felt celestial to have a shuttle that had flown in space fly directly over my vehicle. The day was gorgeous, too; the snow still blanketed the ground and the sky was extremely clear, crisp and bright. The scene brought a sense of calm and community to me."

– Tumarrow Johns Iglehart,
business analyst, 4W Solutions

On Dec. 11, Johnson Space Center, Ellington Field, Sonny Carter Training Facility and the surrounding areas had an opportunity to see a special bird in the sky flying over: NASA's own Space Shuttle *Endeavour*. This sighting was a magnificent cap to 2008 and a reminder of why we are all here—whether working directly to achieve spaceflight goals or playing a supportive role so that NASA can accomplish its mission.

Endeavour, atop a modified Boeing 747 shuttle aircraft carrier, flew over around 12:30 p.m. while on a journey to Kennedy Space Center. *Endeavour* was hitching a ride back to Florida after landing on Nov. 30, at Edwards Air Force Base in California.

NASA/DEHOYOS jsc2008e154198

Roundup

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