WINGS OVER HOUSTON

NASA/Blair JSC2005E41203

NASA/Blair JSC2005E41206

NASA/Blair JSC2005E41208

NASA/Blair JSC2005E41204

NASA soars into Wings Over Houston Airshow

NASA recently participated in the 21st annual Wings Over Houston Airshow Festival held Oct. 8 & 9 at Ellington Field. Visitors had the opportunity to learn about the astronauts, view high-tech NASA aircraft and explore the NASA exhibit tent.

Space Center Roundup

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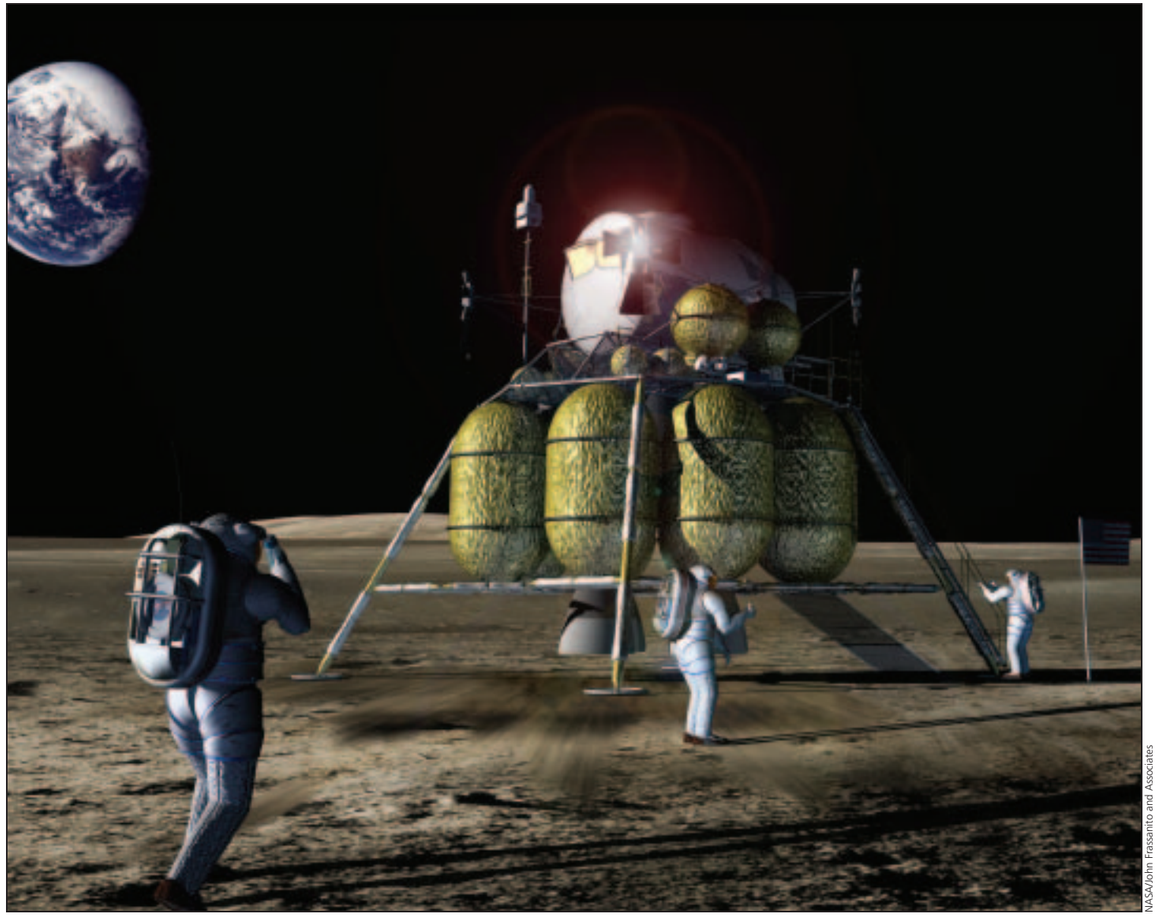


NASA/John Frassanito and Associates

Revisiting an old friend

This artist's concept provides a glimpse into a future crewed mission to revisit the moon. Coupled with a lunar lander, the next-generation spacecraft system will be able to send twice as many astronauts to the moon's surface. With larger crews and longer lunar missions, NASA will be able to build the foundation of a thriving exploration program.

November
2005
Houston, Texas

Beak sends...

A MESSAGE FROM CENTER DIRECTOR LT. GEN. JEFFERSON D. HOWELL JR.

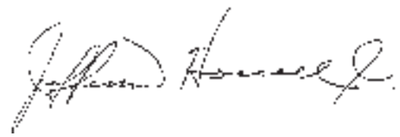
Aloha

By the time this is read, a new Johnson Space Center director will be close to being named. I am absolutely confident that you will give that person the same loyalty and extraordinary performance that I have enjoyed in my tenure. I am also confident that JSC will not only remain the preeminent center for human spaceflight activities, but will improve in all aspects of its endeavors. NASA and JSC are going to accomplish great things!

Once more, thanks for your wonderful service to our nation while I was on your team. Being part of JSC has been a source of incredible pride and satisfaction for me. I hope you realize the great respect and, indeed, affection I have for all of you.

Many of you know that I spent 10 of my 38 years of Marine service in Hawaii. I grew to love the Hawaiian language, which is very lyrical and pleasing to the ear. My favorite Hawaiian word is Aloha. It is a signal of warm friendship, and is used both as a greeting and as a way of saying farewell. Saying Aloha when parting isn't really saying goodbye; it's saying "Until we meet again." To all of you I say ALOHA!

Beak sends...



Long-distance house calls

by Brad Thomas

There are no doctors' offices or emergency rooms in space. Therefore orbiting astronauts must rely on support from the ground to remain healthy and to handle medical issues.

This particular responsibility on the ground belongs to the Mission Control Center (MCC) console position called "Surgeon." The Surgeon console is staffed by medical doctors who specialize in aerospace medicine. They are often referred to as flight surgeons.

Dr. Terry Taddeo is one of the flight surgeon team members who works in the MCC. He said he finds aerospace medicine is unique in its objective.

"The basic job is to make sure there is no impact to the mission due to the health of the crew," Taddeo said. "Aerospace medicine is different than primary care specialties like family practice. The primary job is keeping healthy people healthy in dangerous environments."

A doctor from the team is usually assigned to a shuttle mission about six months before it is scheduled to launch and as early as a year before the launch of a station crew. The amount of time the doctor spends with the crew during training and the amount of communication with the crew on orbit depends on the type of mission.

The difference between shuttle and station assignments, which affects the surgeon's job functions, is mission duration and crew size. Shuttle missions are one to two weeks long and have up to seven crewmembers. Station missions are months long and have two to three crewmembers.

Taddeo has worked as both a space shuttle and a space station flight surgeon. He is assigned to NASA's next space shuttle mission, STS-121. The STS-121 crew is now in training. He said that he is in contact with the crew infrequently right now, but will be in more frequent contact as the launch date approaches. Depending on the training phase, a surgeon can be in contact with a station crew on a daily basis.

Once a crew is in orbit, the contact frequency changes. The surgeon will tag up with a shuttle crew for 10 minutes on a daily basis to discuss any health issues that may be a concern. A station surgeon confers with each crewmember individually once a week for 20 minutes. However, the astronauts have the ability to call or e-mail the surgeon at other times.

To do their job better, the surgeons participate in some types of astronaut training, including flights on aircraft that simulate the microgravity environment of space.

NASA/Ingalls JSC2004E22850

Astronaut C. Michael Foale (right), Expedition 8 commander and NASA ISS science officer, begins to acclimate to gravity in his reclining chair with Lead Flight Surgeon Terry Taddeo at his side.

"Part of the flight surgeon's job is to understand the environment the crews will be in," Taddeo said.

The surgeons prepare the crew for orbital healthcare by training the crew on how to use medical equipment onboard the vehicles and how to treat common problems and some emergencies. They also review the contents of spacecraft medical kits.

Taddeo said minor health issues do occur in space. "The most frequent problems we see are motion sickness, headaches, back pain and cuts and bruises," Taddeo said.

In addition to the shuttle or space station crews to which they are assigned, the surgeons are responsible for the health of the crewmembers' families. "If you want to keep the crewmembers happy, keep their families healthy," Taddeo said.

As NASA moves ahead with the Vision for Space Exploration, keeping crews healthy will become more challenging due to the longer-duration flights that will send astronauts to the moon and Mars.

"A lot of the surgeons are waiting for this to happen," Taddeo said. "It will offer challenges different from operations in low Earth orbit. The shuttle is a legacy program in which the medical philosophy and systems are set. With the Vision for Space Exploration, we are at the stage where we can make a difference."

Virtual *Cockpit* *Becomes* Reality

by Roger Roberts and Joanne Hale

IMAGINE

what it would be like to fly an aircraft hundreds of miles an hour at low altitudes without the use of windows. Now imagine if scientists were able to replace each of the aircraft's windows with a real-time digital image of the aircraft's immediate surroundings. One group of JSC engineers has already taken the first steps in making that vision a reality.

NASA/Markowitz/Stafford JSC2004-00588

Members of the ACES team stand beside the ACES van as it prepares for testing at JSC's "Mars Yard."

The Advanced Cockpit Evaluation System (ACES) uses inexpensive desktop computers to produce live panoramic views of real-world environments. This synthetic view is created by using a combination of live video, advanced computer graphics and modern sensor technology.

On the outside, the ACES mobile command station appears standard in almost every respect. It resembles an average cargo van equipped with the most basic of options. But appearances can be deceiving.

"Sitting in the back of the van is like sitting in the cockpit of some sort of experimental aircraft," Jim Secor, ACES engineer, said. "Everything is there – a cockpit, controls and even windows. The only difference is our windows are actually monitors that look into a world where information is displayed across a continuous horizon."

ACES' view is achieved by blending live video with synthetic imagery sources such as satellite photos, heads-up displays and topographical imagery scans.

"If you depend solely on your eyes or video image to navigate, you will eventually find yourself in a situation where you are, in fact, flying blind," Jeff Fox, ACES team lead, said. "With ACES, if live video were to fail, then a synthetic virtual scene would be immediately available to maintain total situational awareness. Since ACES does not depend on line of sight to render its views, it can even be used in vehicles that have no windows at all."

ACES provides two ways to present the blend of video and synthetic imagery. The primary method allows images to be displayed on five flat-panel computer monitors. These monitors are located in the rear of the van and are arranged in a semicircle designed to mimic a forward field of view. The middle monitor displays live video while the remaining four monitors recreate the rest of the scene using computer graphics.

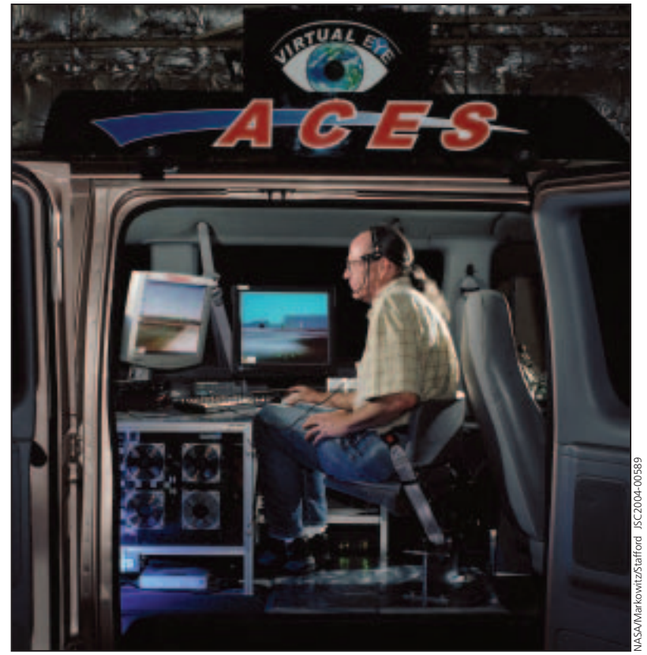
In addition to the monitor configuration, ACES also has a helmet-mounted display system that creates a digital view of reality.

"Inside the van there are seven state-of-the-art computers that work in parallel to process the sensor data to generate an immersive 3-D environment," Patrick Laport, ACES software integration engineer, said. "Basically, ACES makes you feel like you've stepped into the greatest video game of all time."

The capacity to present basic information such as speed and altitude on top of live video imagery is only the beginning of ACES' potential.

"We are currently working with the Federal Aviation Administration to design a system that will help pilots land both commercial and general aviation aircraft," Laport said. "Currently, pilots must use a combination of instrumentation and textual procedures to plan their final approach. With ACES, we can combine all necessary information into a single graphic interface that would give pilots a complete 3-D view of their current environment."

Recently, in the high deserts of Arizona, ACES' versatility proved useful in supporting the ongoing testing of NASA's prototype planetary rover, also known as the Science Crew Operations and Utility Testbed (SCOUT).



NASA/MarkowitzStafford JSC2004-00589

Jim Secor, ACES engineer, oversees synthetic vision operations from inside the ACES van/mobile command station.

"Using the ACES mobile command station, our team was able to easily interface with and remotely control SCOUT in both day and nighttime operations," Fox said. "With only a few seconds' communication delay to the moon, the situational awareness provided by ACES may give future lunar rover pilots the vision necessary for enhanced real-time remote control from the Earth itself."

"Though it may be a while, the day is coming when ACES, and projects like it will become a part of everyday life," Coffman said. "In the future, cars, planes and spacecraft may all exist in a world where the options are limited only by our capacity to understand and create them. It's only a matter of time."

With the myriad of possibilities represented by the ACES project, Fox said he believes one attribute remains key in distinguishing it amongst its peers.

"ACES' main attribute lies in its relative affordability," Fox said. "While it's true other technologies currently emulate some of ACES' abilities, many of them are higher-priced systems. Since ACES is comprised almost entirely of off-the-shelf hardware, it maintains an adaptability factor that makes it ideal for exploring possibilities in a wide range of environments."

While Fox and his team continue to make advancements in ACES technology, the project remains in its infancy.

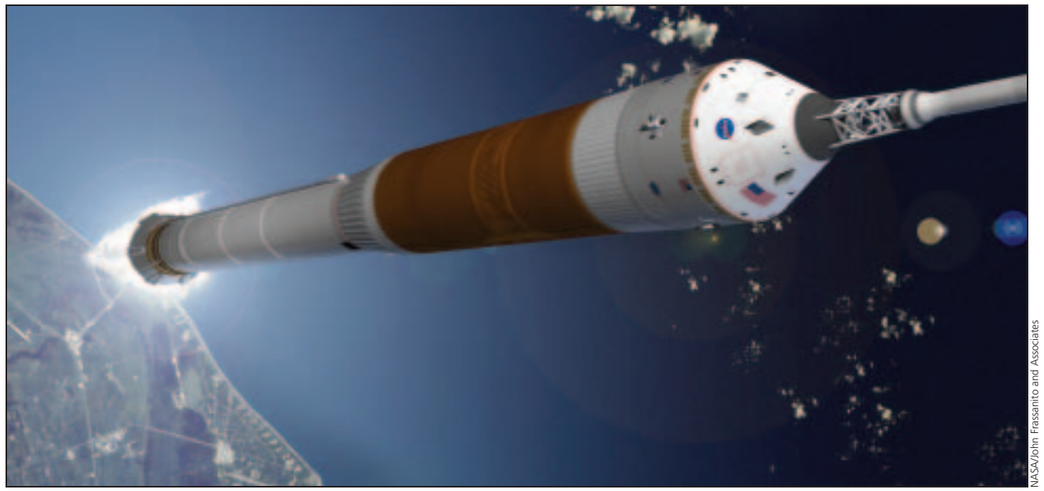
NASA/Markowitz JSC2005E38281

ACES mobile command station remotely controls SCOUT in the Mars-like environment of the Arizona desert.

Hello, stranger

NASA WILL REVISIT THE MOON WITH THE CREW EXPLORATION VEHICLE

by Catherine E. Borsché



NASA/John Frassanito and Associates

NASA/John Frassanito and Associates

Top: *The launch system devised for the next-generation spacecraft will use powerful, reliable shuttle propulsion elements already in existence. In this rendering, astronauts onboard the Crew Exploration Vehicle (CEV) launch into orbit on a rocket made up of a single shuttle-derived solid rocket booster, with a second stage powered by a shuttle main engine.* **Above:** *The CEV will not only be suited for missions to the moon and beyond; it will also be capable of delivering crews and supplies to the International Space Station. Here the CEV prepares to align and dock with the station.*

'Think of it as Apollo on steroids'

NASA Administrator Mike Griffin

For decades, the moon has been quietly orbiting the Earth, undisturbed since past visits from Apollo crews. But change will be forthcoming to the remote lunar destination – in the form of a new next-generation spacecraft.

On Sept. 19, NASA Administrator Michael Griffin released the results of the agency's exploration architecture study, a blueprint for the next-generation spacecraft. This spacecraft will use an improved, blunt-body capsule, much like the shape of the Apollo spacecraft, but with more than three times the volume of the Apollo capsules. However, even if it looks like an ordinary capsule, this new vehicle will have many more capabilities.

"It's a significant advancement over Apollo. Much of it looks the same, but that's because the physics of atmospheric entry haven't changed recently," Griffin said. "We really proved once again how much of it all the Apollo guys got right."

The centerpiece of this system is a new spacecraft designed to carry four astronauts to and from the moon and support up to six crewmembers on future missions to Mars.

"On the inside it will have a totally modernized system," Charles Dingell, JSC Chief Engineer for the Crew Exploration Vehicle (CEV), said. "It's a very flexible spacecraft that will be able to take crews to the lunar vicinity as well as perform crew transfer missions to the International Space Station."

The launch system that will get the crew off the ground builds on powerful, reliable shuttle propulsion elements. Astronauts will launch on a rocket made up of a single shuttle solid rocket booster, with a second stage powered by a shuttle main engine.

A second, heavy-lift system uses a pair of longer solid rocket boosters and five shuttle main engines to put up to 125 metric tons in orbit – about one and a half times the weight of a shuttle orbiter. This versatile system will be used to carry cargo and to put the components needed to go to the moon and Mars into orbit. The heavy-lift rocket can be modified to carry crews as well.

"We estimate that we can use about 85 percent of the facilities that are in play today for the space shuttle [for the CEV]," Griffin said. "The extensive use of shuttle components available today in this architecture is pretty obvious. I would say this approach affords us the opportunity to retain the maximum number of today's workforce for the designs that we have."

Best of all, these launch systems are 10 times safer than the shuttle because of an escape rocket on top of the capsule that can quickly blast the crew away if launch problems develop.

There's also little chance of damage from launch vehicle debris, since the capsule sits on top of the rocket.

The CEV is also an improvement over the rudimentary atmospheric reentry of the Apollo era.

"It will have precision-entry targeting, so it can land the crew on land rather than splash down in the ocean," Dingell said.

The new ship can be reused up to 10 times. After the craft parachutes to dry land (with a splashdown as a backup option), NASA can easily recover it, replace the heat shield and launch it again.

Future missions

The journey will start with robotic missions between 2008 and 2011 to study, map and learn about the lunar surface. These early missions will help determine lunar landing sites and whether resources, such as oxygen, hydrogen and metals, are available for use in NASA's long-term lunar exploration objectives.

"This architecture provides global lunar surface access," Griffin said.

This is a great improvement over the Apollo system, since Apollo was limited to studying the equatorial regions of the moon. This new exploration system will also allow us to establish a permanent human presence on the moon while preparing for Mars and beyond.

The first human lunar flight is scheduled for 2018. Coupled with the new lunar lander, this next-generation spacecraft system can send twice as many astronauts to the moon's surface, and they can stay longer, with the initial missions lasting four to seven days.

Once a lunar outpost is established, crews could remain on the lunar surface for up to six months. The spacecraft can also operate without a crew in lunar orbit, eliminating the need for one astronaut to stay behind while others explore the surface.

For larger exploration goals, the CEV could serve as the basic architecture for missions to Mars.

"The CEV is designed with its launch system to go to low Earth orbit. You must go through low Earth orbit to go anywhere else," Griffin said. "We can go to the moon. In later decades, we can go to Mars. We can service the space station. We can undertake the service of the Hubble Space Telescope or other space telescopes, as may exist. We can do anything."

In the wake of the storm

by Brad Thomas

WHEN HURRICANE KATRINA stormed ashore in late August, it changed the lives of hundreds of thousands of people on the upper Gulf Coast. In the wake of the storm, many people throughout the Houston area – including Johnson Space Center employees – stepped up to provide support to those who were ravaged by Katrina.

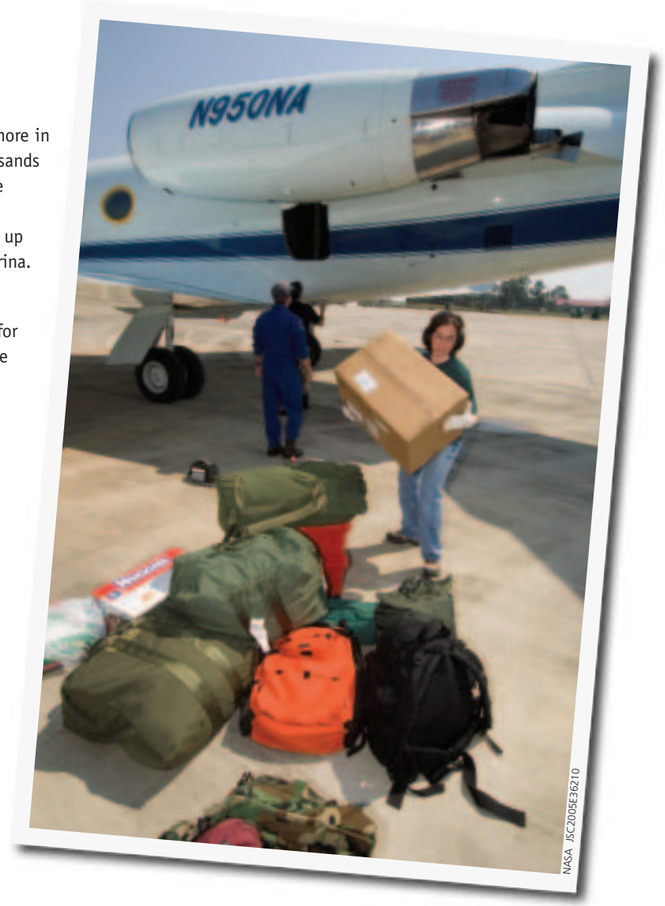
"It is an example of how the community can pull together," said Steve Nagel, chief of aviation safety for NASA at Ellington Field. "It makes me feel good to be a part of an organization like this one."

Nagel along with some of his Aircraft Operations Division (AOD) coworkers were involved in Katrina efforts at Ellington and at ground zero in Mississippi and Louisiana. Their efforts included collecting donations, working in shelters and providing support in the disaster zone.

Hangar 990 becomes transfer point for evacuees

NASA's Hangar 990 at Ellington Field served as an evacuee staging point following Katrina. The operation was run by the Veterans Administration (VA), with NASA hosting. AOD Director Jimmie Mizell was one of the NASA team members who worked with relief efforts at Ellington. He served as the point of contact between NASA and the VA.

The evacuees received medical assistance when they got to Ellington, as well as some emotional support. One of the first things done for the evacuees, Mizell said, was to tell them, "You are here. You are safe. We care about you."



Workers unload cargo at Stennis Space Center in Mississippi. The equipment and supplies were used during Hurricane Katrina recovery activities.

Mizell said that approximately 26 planes landed at Ellington, bringing in more than 750 evacuees. Many of them had endured difficult conditions before being evacuated from New Orleans. Some of the evacuees were rescued from rooftops and highways where they were stranded for many hours.

Clothing and food donations were given by family, friends and local restaurants.

A family reunited

Katrina left its mark on personal lives. Families were separated with people desperately seeking loved ones. In some cases, family members wound up in different states. The workers at Ellington helped in these efforts.

"We reunited many families," Mizell said. He recounted one case that was particularly memorable for him.

While his team was working with the VA to get the first flight of evacuees processed, Mizell was approached by a VA social worker and a gentleman who needed assistance. The man needed to charge his cell phone. Mizell took him to his office; unfortunately, the damaged phone could not be charged.

"At this point, he became very discouraged and started to cry," Mizell said. "I asked him 'Sir, is there anything I can do for you?' His reply was 'Not unless you can help me find my wife.'"

Mizell said that after a few deep breaths and a quick prayer, he asked the man what he could do about his wife.

"He told me she was critically ill, and they were not allowed on the same aircraft since she was critical and he was not," Mizell said. "He was in Houston and he indicated to me her aircraft had departed for Florida. He thought he heard they were going to Pensacola. I did a search on the Internet for hospitals in Pensacola and, being familiar with the area there, started making some phone calls."

Mizell made two phone calls. The first was unfruitful, but the second brought success. After introducing himself and explaining what he was doing, a hospital worker gave Mizell the room number.

"Without telling [the husband] of what I learned, I called the room and asked for her by name," Mizell said. "It was her. Again, I introduced myself and told her I worked for NASA in Houston and that I had a gentleman that desperately wanted to talk with her. I gave him the phone and had to walk away as they talked."

Mizell's efforts did not stop there. "After they had a chance to talk," he said, "we found the social worker who had brought him in and got him a ride to Hobby Airport, and he was on the next plane to Pensacola."

AOD team supports aircraft operations at Stennis and Michoud

Meanwhile, members of the AOD team were dispatched to Stennis Space Center in Mississippi to organize air operations between there and NASA's Michoud Assembly Facility in New Orleans. Research Pilot Scott Reagan and Flight Simulation Engineer Rocky Smith arrived at Stennis four days after Katrina made landfall.

One U.S. Army and two Kennedy Space Center helicopters were used to carry personnel and supplies between Stennis and Michoud. The flight crews and other personnel at Stennis and Michoud had to deal with limited communication capabilities due to the storm's destructive blow.

"Our value was providing communication between the air crews and the outside world," Reagan said. "Michoud was in trouble. We helped resupply it."

Even though the New Orleans area took a hard hit, Reagan said the Michoud facility fared relatively well – despite being isolated for more than a week due to floodwater and debris blocking roadways. The levees around the external tank processing facility had held. However, Michoud had its problems, including a power outage.

In addition to the flights between Michoud and Stennis, Reagan and Smith used the helicopters to survey power lines around Stennis and to survey damage in local neighborhoods. One flight included NASA Administrator Michael Griffin, who got a first-hand look at the damage to NASA facilities and the area.

Research Pilot Scott Reagan stands in front of a destroyed Mississippi Gulf Coast casino. The casino boat came to rest in a parking lot after Hurricane Katrina's storm surge lifted it from its location in the water.

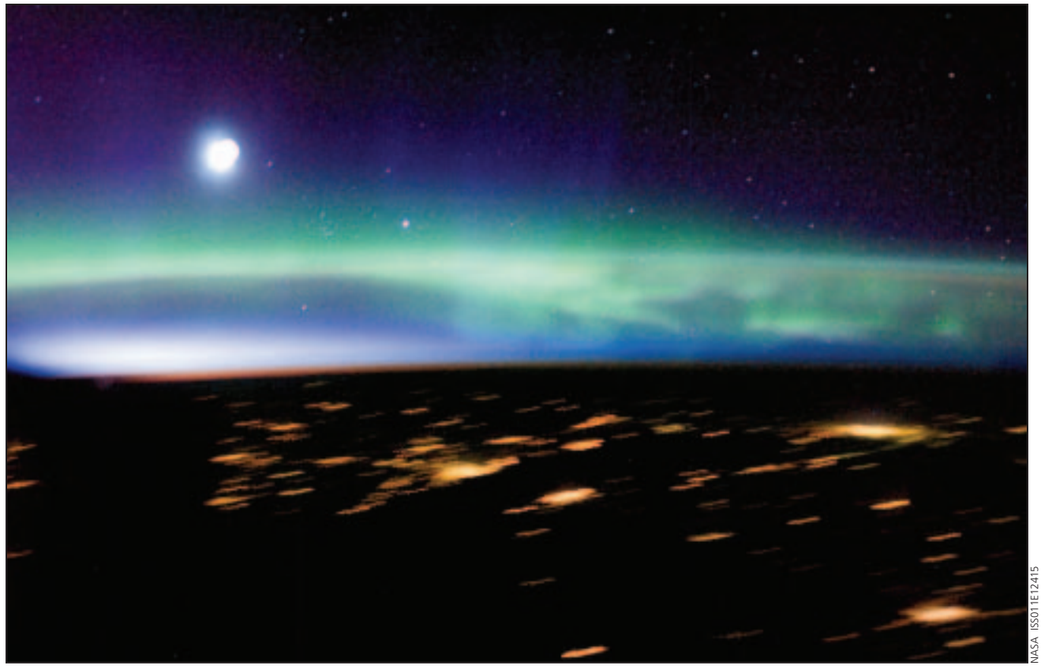
All in all, the helicopters carried more than 250 passengers and delivered more than 35,000 pounds of equipment and supplies to Michoud. They logged 80 flight hours in a week and a half.

Reagan and Smith left the area Sept. 11; their mission ended when the Marines reached Michoud on the ground. Reagan said progress was being made. "By the time we left, they basically had power back to most of the buildings at Stennis," he said.

Reagan and Smith both said the NASA team members at Stennis and Michoud went the extra mile during the time of crisis. At one point, Stennis was taking care of 1,300 people who took shelter there, many of whom were not employees or employee family members. Most of the evacuees stayed in the first floor of the center's headquarters building.

"There were a significant number of NASA employees who no longer had homes," Smith said. "Even though they had their own problems, they worked well as a team."

Smith said, "Stennis really did a superb job of taking care of those people. It wasn't their job, but they did it."



NASA ISS011E12415

Aurora Borealis and lights in Finland, Russia, Estonia and Latvia are featured in this digital still picture taken by an Expedition 11 crewmember aboard the International Space Station. If it was daylight, parts of the Eastern Baltic Sea would be visible. The cluster of stars to the lower right of the thin crescent moon is the Praesepe or Beehive Cluster in Cancer. Just to the right of that is the planet Saturn.

Back to Earth

EXPEDITION 11 WRAPS UP A SUCCESSFUL MISSION

by Catherine E. Borsché

On Oct. 10, the anniversary of Columbus' historic voyage to North America, Expedition 11 landed in Kazakhstan, marking an end to its historic mission after more than 179 days in space.

Expedition 11 included Commander Sergei Krikalev and NASA International Space Station Science Officer and Flight Engineer John Phillips, both veterans of space travel. During this mission they had the opportunity to do many exciting things, some of which included welcoming the STS-114 crew to the International Space Station on its Return to Flight mission, conducting a spacewalk and working on experiments to further understanding of human biology and the space environment.

"With our new emphasis as announced by the president [last] year, we're going to be focusing our science on things that will take us farther and longer into space. For many of those experiments, the crewmembers are human guinea pigs," Phillips said.

Not only did the crewmembers learn more about how their bodies reacted to space, but they were also able to study processes like combustion in space with the SpaceDRUMS experiment.

Another key objective of the mission was to continue developing the space station into a one-of-a-kind research platform and scientific laboratory. Phillips noted that they would have the privilege of installing the Human Research Facilities (HRF) Rack 2. HRF 2 was delivered during the STS-114 visit to the station.

On July 28, Expedition 11 was able to do something that a space station crew had not had the ability to do since December 2002: welcome a shuttle crew to the station. *Discovery* arrived in dramatic fashion, doing a back-flip before docking to enable the station crew to photograph *Discovery*'s heat shield. The shuttle crew was also able to thoroughly replenish station supplies with an extensive cargo transfer.

The station crew ventured out of their metallic living quarters on Aug. 18 to complete a spacewalk. They first removed a Russian Biorisk experiment housing bacteria from the outside of Pirs. Next, they detached a micrometeoroid and orbital debris collector (MPAC) and materials exposure array (SEED) panel from the aft section of the Zvezda Service Module.

The crewmembers also removed the Matroska experiment, a torso-like container with radiation dosimeters in human-tissue-equivalent material, and, later, with the MPAC and SEED panel, brought it back inside the station.

Krikalev and Phillips also installed a spare television camera on Zvezda and photographed and checked a Korma contamination-exposure experiment tablet on a handrail – all of which is not too shabby for a five-hour spacewalk.

Both Krikalev and Phillips had moments of distinction on the mission.

Phillips had the honor of being the first astronaut to testify before Congress while in space, orbiting the Earth at a mere five miles per second. Phillips took questions from the House Subcommittee on Space and Aeronautics on a wide range of topics, from safety on board to the view from orbit.

Krikalev also set a new time-in-space record, becoming the human with the most cumulative time in space as of Aug. 16. He surpassed the previous record of 748 days held by Sergei Avdeyev. But Krikalev said he isn't focused on breaking records.

"The job itself is very interesting for me, being there and being able to look back on Earth, to do something challenging," Krikalev said, indicating that is what was important. As for the record, "I probably never paid enough attention to it."

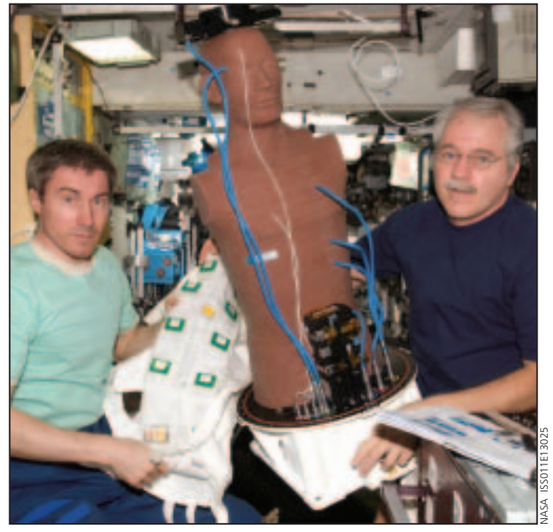
As of landing, Krikalev's cumulative time in space had reached 803 days, nine hours and 39 minutes.

Phillips said he believes deeply in what NASA is doing for the future.

"A civilization that only looks inward will stagnate," Phillips said. "We have to keep looking outward; we have to keep finding new avenues for human endeavor and human expression."

NASA ISS011E11944

Astronaut John L. Phillips, Expedition 11 NASA space station science officer and flight engineer, participates in the 62nd spacewalk in support of station assembly.



NASA ISS011E13025

Cosmonaut Sergei K. Krikalev (above left), Expedition 11 commander representing Russia's Federal Space Agency, and Phillips hold the European Space Agency Matroshka radiation experiment in the Zvezda Service Module of the station. Matroshka, a human-torso-like device, was retrieved from the exterior of the station during an August spacewalk for return to Earth. The experiment is designed to better understand the exposure of astronauts, including those making spacewalks, to radiation.