



One thing that makes the space station so distinctive is the experience that it gives the crews visiting the orbiting complex. After months of settling into a "routine" aboard the station, crewmembers never forget how special it is to be where they are.

"Of course, this 'routine' happens in the novel environment of space," Expedition 5 Flight Engineer Peggy Whitson wrote in her 13th letter home from the station. "Being here, living here, is something that I will probably spend the rest of my life striving to find just the right words to try and encompass and convey just a fraction of what makes our endeavors in space so special and essential."

Another year flown by...

Nov. 29, 2004: It was a short trip, considering they were moving at about five miles a second. Space station crewmembers, Soyuz Commander Salizhan Sharipov and Expedition 10 Commander Leroy Chiao, flew their Soyuz TMA-5 spacecraft from the Pirs Docking Compartment to a docking port on the Zarya module. The move was made to prepare for two spacewalks from Pirs early in 2005.

Dec. 25, 2004: It was propelled by a rocket instead of reindeer, but the Progress cargo craft made things aboard the space station look a lot more like Christmas. The uncrewed Russian cargo carrier docked to the space station with a Christmas delivery of 2.5 tons of food, fuel, oxygen, water, supplies and gifts for Chiao and Sharipov.

Jan. 12, 2005: The earthquake that rocked the Earth beneath the Indian Ocean Dec. 26, 2004, caused massive tsunamis to devastate parts of the coasts of almost a dozen countries inland. As the space station circled the globe, flying some 230 miles above the affected areas, the Expedition 10 crew captured snapshots from space of the tsunamis' aftermath.



NASA ISS096715-042



NASA ISS003E7553



NASA ISS004E8852

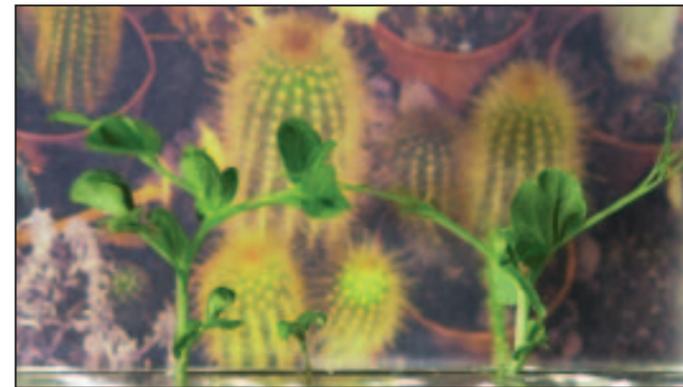
An STS-96 crewmember aboard Discovery recorded this image (top photo) of the International Space Station with a 70mm camera during a fly-around following separation of the two spacecraft.

Pictured near Earth's horizon, Hurricane Michelle made landfall on Cuba Nov. 4, 2001, with sustained winds of 135 miles per hour.

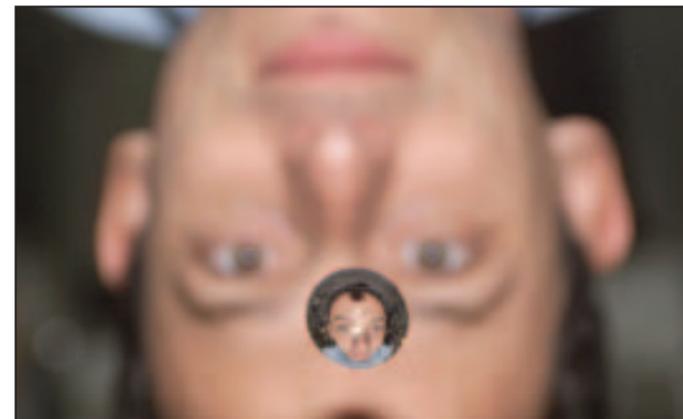
Astronaut Daniel W. Bursch, flight engineer for Expedition 4, captured this image of Mt. Everest (near frame center). "One morning I happened to be up early. I realized that we were in an attitude that would allow me to open the window shutter and there was Mt Everest! The low sun angle (it was close to orbital sunrise) gave tremendous relief to the mountains."



NASA ISS005E21775



NASA ISS006E45049



NASA ISS007E17973

Astronauts Michael E. Lopez-Alegria (left) and John B. Herrington, STS-113 mission specialists, work on the newly installed Port One truss on the International Space Station during a session of extravehicular activity. The end effector of the Canadarm2/Space Station Remote Manipulator System and Earth's horizon are visible in right frame.

A close-up view of sprouts on the Russian BIO-5 Rasteniya-2/Lada-2 (Plants-2) plant growth experiment, which is located in the Zvezda Service Module on the International Space Station.

European Space Agency Astronaut Pedro Duque of Spain watches a water bubble float between him and the camera, showing his image refracted, on the International Space Station.

March 2, 2005: An uncrewed Russian cargo craft with about 2.3 tons of supplies and equipment aboard docked with the space station. The Progress 17 spacecraft docked to the station's Zvezda Service Module.

March 28, 2005: Space station crewmembers wound up a successful spacewalk, finishing preparations to welcome the Automated Transfer Vehicle (ATV). Chiao and Sharipov installed on the Zvezda Service Module the final three antennas of a six-antenna set for the ATV, an uncrewed European cargo carrier scheduled to make its first trip to the station early in 2005. They also installed a Global Positioning System antenna for the ATV.

April 14, 2005: The Expedition 11 crew – Commander Sergei Krikalev and NASA Science Officer Astronaut John Phillips – launched from the Baikonur Cosmodrome in Kazakhstan. With this eleventh crew of the space station was European Space Agency Astronaut Roberto Vittori of Italy.

June 14, 2005: Congressional testimony reached new heights. The House Subcommittee on Space and Aeronautics, chaired by Rep. Ken Calvert (R-Calif.), heard testimony from Phillips as he orbited the Earth. It was a first for the Congressional representatives and for Phillips.

June 18, 2005: Progress 18 lifted off June 16 from the Baikonur Cosmodrome in Kazakhstan and docked June 18. Among its 4,662 pounds of cargo were 397 pounds of propellant, 242 pounds of oxygen and 926 pounds of water. Also aboard was a camera that was used to photograph thermal protection tiles of Discovery as the orbiter approached the station on the space shuttle's Return to Flight mission, STS-114.



Continued on page 10

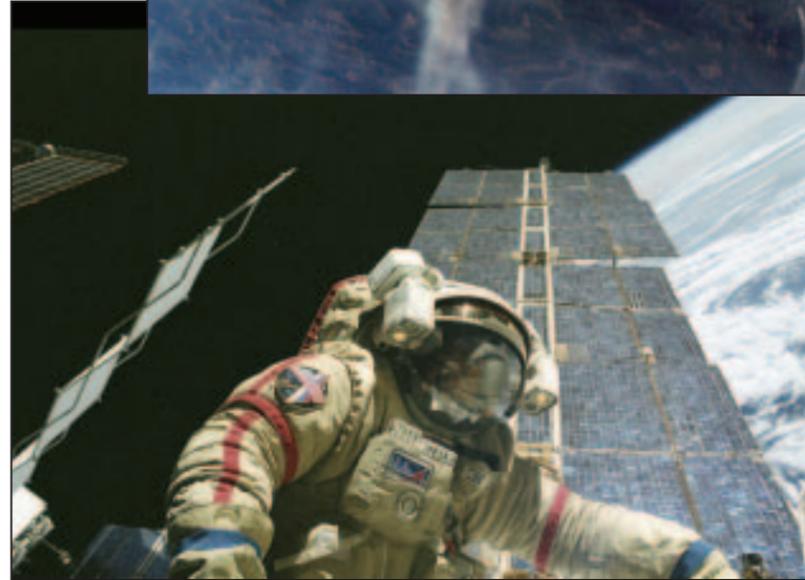
July 28, 2005: STS-114 visited the space station! After completing leak checks, the STS-114 crew entered the space station. STS-114 was the first shuttle mission to visit the station since STS-113 left in December 2002. The two crews conducted a station safety briefing and began joint operations after they greeted each other.

Aug. 16, 2005: Krikalev became the human with the most cumulative time in space. At 12:44 a.m. CDT, he passed the record of 748 days held by Cosmonaut Sergei Avdeyev. In Space Station Mission Control Houston, Spacecraft Communicator Ken Ham called Krikalev to congratulate him. "Fly on, Sergei," Ham said.

Aug. 18, 2005: Krikalev and Phillips closed the airlock hatch of the Pirs docking compartment, ending a successful spacewalk on the space station. The first task was to remove a Russian Biorisk experiment container housing bacteria from the outside of Pirs. Next they removed a micro-particles capture (MPAC) and space environment exposure device (SEED) panel from the large-diameter aft section of the Zvezda Service Module. MPAC is a micrometeoroid and orbital debris collector. SEED is a materials exposure array. Crewmembers then moved to the Matroska experiment, a torso-like container with radiation dosimeters in human-tissue-equivalent material. They removed it and later, with the MPAC and SEED panel, brought it back inside the station.

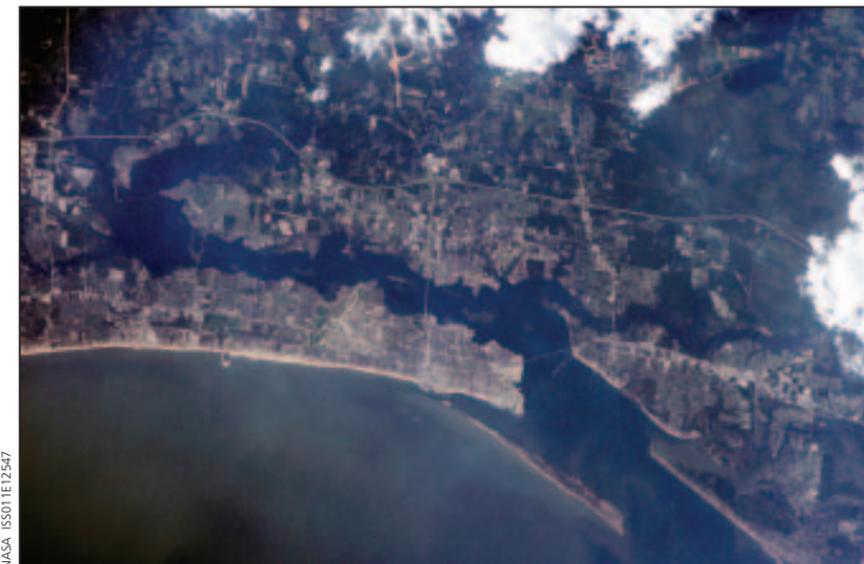


NASA ISS011E09046



NASA ISS010E3563

Lightning was the suspected cause of this giant wildfire, raging through an area northeast of Phoenix. This is one of a series of images photographed by Astronaut John Phillips, Expedition 11 flight engineer and NASA ISS science officer, aboard the orbiting complex, flying at an altitude of 220 miles.



NASA ISS011E12547

Astronaut Leroy Chiao, Expedition 10 commander and NASA ISS science officer, in the first of two sessions of extravehicular activities performed by the Expedition 10 crew during their six-month mission. Chiao and cosmonaut Salizhan S. Sharipov (out of frame), flight engineer representing Russia's Federal Space Agency, spent 5-1/2 hours outside the space station installing a work platform, cables and robotic and scientific experiments on the exterior of the Zvezda Service Module.

Damage from Hurricane Katrina in Biloxi, Miss., is featured in the image at left photographed by an Expedition 11 crewmember. Flooded areas are indicated by dark greenish-brown coloration along river courses to the northeast and northwest of downtown.

SCENES FROM THE DESERT

NASA's 'RATS' test technologies for tomorrow's treks

by Amiko Nevills

Rust-colored sand sifts through gloved hands as he slips the soil into a pouch – a travel souvenir. Standing, the suited explorer recharges his air tank, looks across the rocky landscape and imagines colonization on distant lands.

He studies the map his route planner plotted before climbing into a two-seated buggy. Bound for the next steep slope, he treks across the barren, rugged terrain, dipping and bumping along the way.

This scene, scripted from the high desert of Arizona, may one day become a real-life drama in space as humans first inhabit Mars. Future explorers will need the help of sophisticated technology to venture across stretches of the Red Planet. Gathering clues of its past, while planning for its potential future with humans, will depend on mobility.

Developing that mobility requires extensive testing, like that recently done by NASA's Desert Research and Technology Studies (RATS) team.

"NASA's future involves returning to the moon and then human exploration of Mars," said Johnson Space Center's Joe Kosmo, who led the team. "Field work will be the basic method of operation on these planetary surfaces. Field testing prepares and provides a high-fidelity, hands-on experience base for engineers and scientists to better design and operate the emerging technologies for planetary surface systems."

For the eighth consecutive season, the RATS team took over the dry, dusty desert land of Arizona to torment some of their latest vehicles and gear to better understand just what it takes to be mobile.

Arizona's high desert is far from Mars – about 200 million miles – but its environment is not far off the mark as a testbed. Its red, rocky surface and harsh climate comes closest to Mars on Earth.

The desert trials put to the test two spacesuited explorers, a new Science Crew Operations and Utility Testbed rover and a system to recharge air tanks while they're in use. The 10-day trials took place in remote areas near Flagstaff, Ariz.

The Desert RATS team included engineers and scientists from JSC and NASA's Glenn and Ames Research Centers in cooperation with experts from Oceanering Sea and Space Systems, Hamilton Sundstrand, ILC/Dover, Carnegie Institute, University Space Research Association and Virginia Commonwealth University.

Engineers and scientists worked side by side in the desert with robots on tasks supported by a variety of advanced spacesuit prototypes, field assistant vehicles and science equipment. Long-distance support and coordination was provided by the Mission Operations Exploration Planning and Operations Center in Houston.

Desert RATS team members weren't the only ones learning from the desert. Students across the country also tapped into the arid region through satellite-link Webcasts by NASA's Digital Learning Network. These one-hour programs showed students what it will take to send humans to Mars, and may have provided the kids with the answers they'll need when they venture to the Red Planet. As the next generation of explorers, one of these students may be the first person to set foot on Mars.



NASA/Marikowitz JSC2005E38283

Science, Crew, Operations and Utility Testbed Project Lead Frank Delgado and Desert RATS Lead Joe Kosmo (right) of JSC discuss experiment operations as technicians prepare the rover and two suited subjects for a test.