On July 15, 2003, the Expedition 7 crew had a great seat from which to observe tropical storm Claudette as she became a hurricane and blew ashore with high winds and heavy rains that drenched their Houston home base and other Texas areas.

iss007e10244

■ "Costa Rica from Space": NASA scientists and EARTH University from Costa Rica's compilation of pictures taken by astronauts from space that records Costa Rica's geography

■ Lewis and Clark Expedition Project: NASA partnered with Geographic Communication Systems Research in an effort to create a map of Lewis and Clark's 3,700-mile expedition across North America in the early 1800s.

'To explore the universe and search for life'

The Vision for Space Exploration takes us to the Moon and Mars. These pictures can help get us there.

"We are at the forefront of this new vision," Lulla said. "To understand what's happening on Mars, you have to understand what's happening on Earth." For instance, scientists at NASA's Jet Propulsion Laboratory use what they know about rocks, minerals, erosion and water on Earth to figure out the geology and history of Mars.

"If you look at the bigger picture, even though we are going to the Moon and Mars, there is always going to be an intense interest by the public on what's happening on the surface of Earth," Lulla said. "NASA will always have to have an active program where we are looking back on Earth and creating awareness of our own planet, our own habitat, our own home."

These planetary portraits have shed light on some enigmas and can serve as a platform for new visions. With each click of the camera, we get closer to unveiling the big picture and closer to quenching humankind's insatiable thirst for knowledge.

The dark area near Earth's horizon at center frame is actually a shadow cast by the Moon during the total solar eclipse of Dec. 4, 2002. The shadow obscures an area of cloud cover. The station, with three Expedition 6 crewmembers aboard, was over the Indian Ocean at the time of the eclipse. The out-of-focus object in the foreground is part of the frame for the viewing port.

iss006e05070

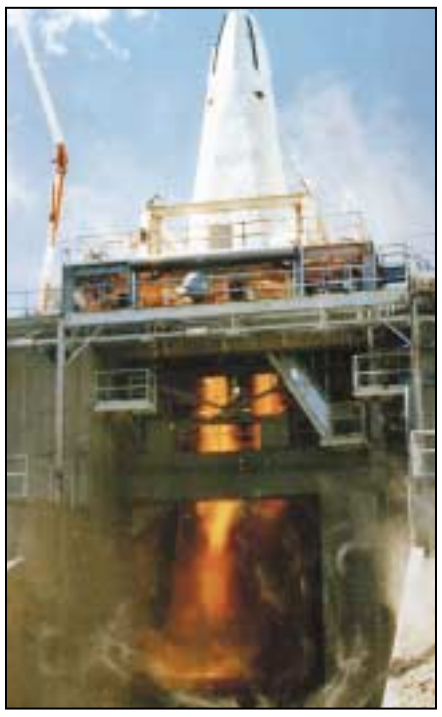
As geomagnetic storms cause beautiful displays of aurora across the United States, astronauts onboard the International Space Station also have the opportunity to take a look. Green colors of the aurora are dominant in this image captured by a digital still camera on October 4, 2001. Auroras are caused when high-energy electrons pour down from the Earth's magnetosphere and collide with atoms.

iss003e6152

White Sands Test Facility Overview

By Ray Melton

Water-cooled probes measure exhaust characteristics of 100 lbf attitude control thruster.



Static firing of DC-X with 4 LOX/Hydrogen RL10-A5 engines.

Precision-cleaning Viking soil sampler that landed on Mars in 1976.

Nestled in the foothills of the San Andres mountains in southwestern New Mexico, the NASA White Sands Test Facility (WSTF) is a remote component of Johnson Space Center. The facility was constructed early in the Apollo era specifically to conduct tests involving spacecraft rocket propulsion systems, toxic or highly reactive chemicals and potentially hazardous materials that could not safely be performed in more heavily populated areas such as Houston.

The WSTF capabilities for space-simulated vacuum firings of solid and liquid rocket propulsion systems are among the best in the nation. The sophisticated laboratories used for evaluating potentially hazardous materials and components for both Earthly and aerospace applications are similarly outstanding. Although most of the work at WSTF is done for NASA, many other fascinating test projects are conducted for customers such as the U.S. military, other government agencies and private industry.

The people at WSTF test rocket engines, resolve space mission anomalies and investigate new materials and components. They also refurbish Space Shuttle propulsion and life support system components for reflight, design and fabricate spaceflight hardware, and perform tests to validate new components to enhance mission safety and extend the operational life of existing spacecraft systems.

At WSTF, there are some fascinating and unusual jobs, such as:

- Working with special light-gas guns, which can propel 1-inch-diameter projectiles 10 times as fast as a rifle bullet. This simulates the impact of micrometeoroids or orbital debris on components for the International Space Station, Space Shuttle Orbiter or other spacecraft.
- Conducting tests to see how various materials, including metals, burn and how fires propagate in the microgravity environment of space.
- Testing new components that must operate in corrosive or highly reactive environments, such as pure oxygen, where even stainless steels and titanium alloys burn violently.

WSTF also operates the White Sands Space Harbor (WSSH), an alternate orbiter landing site with 7-mile-long laser-leveled pure gypsum runways. The WSSH is where Space Shuttle astronauts are trained to perform the critical final approach and landing phase of the mission, using specially modified aircraft that simulate the response and aerodynamic behavior of the orbiter.

WSSH is equipped to accommodate an Orbiter landing if an emergency should develop in flight, or if adverse weather conditions were to render the primary landing facilities at Kennedy Space Center or Edwards Air Force Base unsuitable.

The current WSTF workforce of about 690 people is comprised of 54 NASA civil service personnel and 633 contractor employees. The installation is certified to the quality management standards of ISO 9001 and ISO 14001 and was declared an OSHA Star site in recognition of its excellent programs dedicated to ensuring workplace safety.

A scientist operates an x-ray photoelectron spectroscopy instrument for molecular analysis of surface effects such as corrosion and contamination.

Stardust

Interstellar dust samples to end multibillion-mile trek at JSC

By Bill Jeffs

Billowing clouds of ice, dust and gases; surveyors of the solar system; voyagers from places only dreamed of by humans – these are comets. The keys that unlock the mystery of the early formation of Earth may be found in them.

"Comets are believed to be the oldest, most primitive bodies in the solar system, possibly composed of some of the basic building blocks of life," said Mike Zolensky, NASA Space Scientist in JSC's Office of Astromaterials Research and Exploration Science. "They contain the remains of materials that formed our solar system. Striking Earth over billions of years, comets contributed to our atmosphere, at the same time introducing carbon-based molecules, a fundamental element to life on this planet. In our investigation of these returning samples, we expect to find evidence that comets brought water to the Earth, Mars and other worlds, making life possible."

Samples from deep space to be returned to the Johnson Space Center in fewer than two years will help scientists determine how life formed on Earth and how water was delivered to the inner solar system.

The Stardust spacecraft's precious cargo of cometary samples and interstellar dust will be delivered to the Curatorial Facility at JSC in January 2006, concluding a journey of billions of miles. There scientists will make the first analyses of the particles, searching for clues that may for the first time reveal the true nature of comets, their role in the early history of the solar system, and, possibly, the origin of water and organic matter on Earth and Mars.

Having traveled two billion miles across cold, interstellar-dust-swept space in just under five years, NASA's Stardust spacecraft encountered its target, comet Wild 2, on Jan. 2. Telemetry data gathered during Stardust's 12-minute flight through a storm of cometary particles at six times the speed of a bullet indicate that the spacecraft encountered several high-speed jets of particles. The spacecraft took images of the comet nucleus with unprecedented detail, which will revolutionize the study of the geology and history of these icy bodies.

The spacecraft is now on its two-year, 708-million-mile trek back to Earth, where it will drop off a capsule containing the samples at the U.S. Air Force's Utah Test and Training Range in January 2006. The capsule will be immediately taken to JSC where the samples will be examined and then stored.

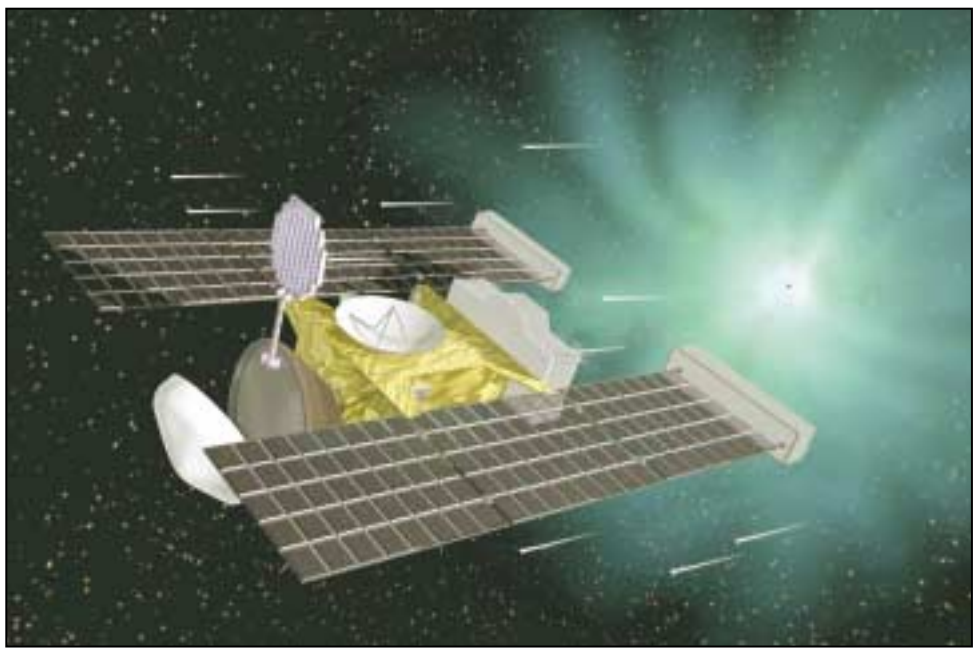
ARES scientists are key members of the Stardust science team. Fred Horz and Zolensky, co-investigators on the mission, helped design and test the silica aerogel, the magic material that captured and now holds the comet grains. They also developed many of the techniques that will be used to extract the cometary and interstellar grains from the aerogel.

In addition to capturing samples of cometary material for return to Earth, Stardust will collect and return grains from a newly discovered stream of particles from interstellar space. These samples may provide a window into the distant past, helping scientists around the world unravel some of the mysteries surrounding the birth and evolution of the solar system and distant stars.

Over the next year, a dedicated handling and curation lab will be built in Building 31 at JSC. The samples will arrive in January 2006 for initial characterization and ultimate curation. Horz and Zolensky are sample analysis leads for this effort. Zolensky will become the sample curator.

"This is a real time of change at ARES," said Gordon McKay, manager of the Astromaterials Research Office. "We are adding several major state-of-the-art instruments for analyzing the Stardust samples at nearly the atomic-scale." Curation efforts will undergo a similar metamorphosis in order to process samples invisible to the naked eye.

The Stardust spacecraft was launched in February 1999. Stardust is the first sample return mission launched in 30 years and the first to collect material from deep space.



The Stardust spacecraft was launched on February 7, 1999, from Cape Canaveral Air Station, Florida, aboard a Delta II rocket. The primary goal of Stardust is to collect dust and carbon-based samples during its closest encounter with Comet Wild 2 – pronounced "Vilt 2" after the name of its Swiss discoverer.

CLOCKWISE FROM LEFT

This photo illustrates the excellent insulating properties of aerogel. The crayons on top of the aerogel are protected from the flame underneath, and are not melting.

Aerogel and Dr. Peter Tsou, JPL scientist. Though it has a ghostly appearance like a hologram, aerogel is very solid. It feels like hard Styrofoam to the touch. The aerogel used by Stardust is specially manufactured at JPL.

In an experiment using a special air gun, particles are shot into aerogel at high velocities. A close-up of particles that have been captured in aerogel are shown here. The particles leave a carrot-shaped trail in the aerogel.

RETURN OF THE SPACE COWBOYS

The space cowboys and cowgirls of Johnson Space Center took part in the 2004 Houston Livestock Show and Rodeo in March. The Texas Independence Trail Ride made its way through JSC on Feb. 24, and NASA was this year's featured community organization at the rodeo itself. NASA treated rodeo-goers to a moving video tribute to space exploration each evening before the concerts began. On March 2, the rodeo's opening night, the STS-114 crewmembers were treated with Southern hospitality and a standing ovation as they were introduced to rodeo fans. Commander Eileen Collins was joined by her crew of Pilot James Kelly and Mission Specialists Soichi Noguchi, Steve Robinson, Andy Thomas, Wendy Lawrence and Charlie Camarda.

In addition to the NASA tributes in Reliant Stadium, the NASA exhibit was the center of attention at the rodeo's exhibit area in Reliant Center. The interactive exhibit at the rodeo was a huge hit with rodeo visitors both young and old. Teachers and parents lined up with their students and children to get pictures taken in a life-size spacesuit mock-up. Another section of the exhibit, called the Shuttle Launch Experience, gave visitors the feeling of being at a Space Shuttle launch. A life-size mock-up of a Mars Exploration Rover was on hand to inspire and educate visitors. The exhibit also included a three-panel wall series entitled "Returning to Flight... To the Moon... To Mars and Beyond." Visitors could read about NASA's new exploration vision, take an interactive tour of the International Space Station and find out what they would weigh on other planets.

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 AP121. Visit our Web site at: **www.jsc.nasa.gov/roundup/weekly/** For distribution questions or to suggest a story idea, please call 281/244-6397 or send an e-mail to roundup@ems.jsc.nasa.gov.

Joanne Hale Editor
Kendra Phipps Assistant Editor
Marshall Mellard Graphic Designer

PRSRT STD
U.S. POSTAGE
PAID
WEBSTER, TX
Permit No. G27