Return to Sender: MISSE-6 Comes Home After More Than a Year in Space

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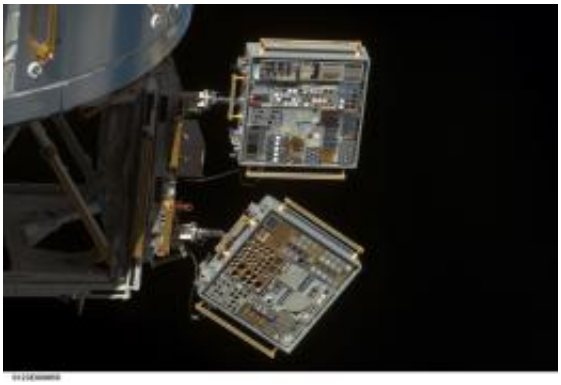

The MISSE-6 experiment aboard the International Space Station. Image Credit: NASA

(PhysOrg.com) -- It's been eight years since the first Materials International Space Station Experiment, or MISSE, arrived at the orbiting laboratory. During that time, more than 4,000 materials samples have been placed outside the space station to test how they react to the harsh environment of space.

The fourth set of test hardware in the experiment series -- MISSE-6A and 6B -- launched aboard space shuttle Endeavour in March 2008. After more than a year of exposure attached to the station's exterior, several hundred materials samples are returning to Earth with the STS-128 space shuttle crew that launched on shuttle Discovery from the Kennedy Space Center, Fla., Aug. 28.

During a Sept. 1 spacewalk, STS-128 astronauts Danny Olivas and Nicole Stott removed MISSE-6A and 6B from outside the European Space Agency's Columbus Laboratory.

The MISSE-6A and 6B investigators are studying more than 400 new materials that could be used in advanced reusable launch systems and advanced spacecraft systems. Those materials include silicone rubber seal materials planned for use on NASA's Orion crew exploration vehicle; insulation materials for use on NASA's Altair lunar module; paints for lunar power systems; and other optical, electronic and thermal control materials designed to help protect the next generation of spacecraft.

Investigators will evaluate these samples for their reaction to direct sunlight, radiation, temperature extremes and atomic oxygen erosion. Atomic oxygen is the major component of the low-Earth orbit space environment. The findings will provide a better understanding of the durability of these materials.

The MISSE program is managed by NASA's Langley Research Center in Hampton, Va., and the U.S. Naval Research Laboratory in Washington, and includes investigators from NASA's Marshall Space Flight Center in Huntsville, Ala.; NASA's Glenn Research Center in Cleveland, Ohio; Air Force Research Laboratory at Wright-Patterson Air Force Base, Ohio; Sandia National Laboratory, N.M.; Boeing Phantom Works in Renton, Wash.; and Aerospace Corporation in El Segundo, Calif. The Department of Defense Space Test Program is responsible for integration of all the MISSE passive experiment containers with the space shuttle and for the launch and on-orbit operations of the experiments.

Marshall Center engineer Miria Finckenor is one of the MISSE-6A and 6B investigators studying heat shield materials that could be used on the

Orion vehicle and aluminum-lithium alloys to save weight on lunar and Mars missions.

"It will be fascinating to see how these latest MISSE samples have withstood the space environment," said Finckenor. "The data from these materials will continue to help engineers and scientists improve space environment models and ground simulation testing."

Kim de Groh is one of the Glenn Research Center's MISSE investigators studying how atomic oxygen affects spacecraft surface materials. For her, it's not only about conducting valuable NASA research; it's also about inspiring the next generation of NASA scientists and engineers.

"The majority of my MISSE flight experiments engage high school girls in the investigations," said de Groh. "The students, from Hathaway Brown School in Shaker Heights, Ohio, help conduct pre-flight research, such as obtaining pre-flight mass measurements; they mount samples into special flight holders prior to launch; and they help analyze the samples once they return from space."

De Groh said the students begin working with NASA as freshmen or sophomores and continue through their high school years. "So far, these students have collectively earned more than $80,000 in scholarships from their performance at prestigious national and international science fairs," she said.

Glenn Research Center scientists also are testing seals for the Orion Advanced Docking and Berthing System. The seal forms the interface between the crew module and whatever it docks with, such as the space station or the lunar service module.

"We are hopeful the space testing of these seal materials will confirm the simulations we have already done as part of the ground testing," said

Henry de Groh, a Glenn Research Center MISSE investigator. "The seal is needed to keep the air in the cabin from leaking out."

The next in the series is MISSE 7A and 7B targeted for launch on STS-129 in November. MISSE 7A and 7B will test space suit materials for use on the lunar surface and materials for the new solar arrays being designed for Orion.

Naval Research Laboratory scientist Rob Walters also noted the importance of tests on MISSE for improving the development of future satellite systems.

"MISSE-7A and 7B include solar cell experiments, an advanced camera system and particle radiation effects studies on cutting edge microprocessor technologies," said Walters. "The deployment of MISSE-7 will mark a tremendous evolution of the MISSE program from simple, passive material experiments to a complex, active experiment platform providing rapid access to space, real-time data telemetry and sample return."

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