

NASA Mission Summary

National Aeronautics and
Space Administration
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STS-135 MISSION SUMMARY

June 2011

SPACE SHUTTLE ATLANTIS

Space shuttle Atlantis' 12-day mission to the International Space Station will deliver the Raffaello multi-purpose logistics module filled with supplies and spare parts to sustain station operations once the shuttles are retired. The mission also will fly the Robotic Refueling Mission (RRM), an experiment designed to demonstrate and test the tools, technologies and techniques needed to robotically refuel satellites in space, even satellites not designed to be serviced. The crew also will return an ammonia pump that recently failed on the station. Engineers want to understand why the pump failed and improve designs for future spacecraft. This is the final flight for shuttle Atlantis and the Space Shuttle Program. NASA's workhorses for the past 30 years have completed their mission to build and supply the orbiting outpost, and the agency is now looking to destinations beyond low-Earth orbit.

CREW



Chris Ferguson
Commander (Captain, U.S. Navy, Ret.)

- Third spaceflight
- Born Sept. 1, 1961, in Philadelphia, Pa.
- Married with three children
- Logged 28+ days in space
- Enjoys golf, woodworking, playing drums



Doug Hurley
Pilot (Colonel, USMC)

- Second spaceflight
- Born on Oct. 21, 1966. Hometown: Apalachin, N.Y.
- Married with one child
- Logged 4,000+ hours in 25 different aircraft
- Enjoys hunting, cycling, NASCAR



Sandra Magnus
Mission Specialist-1

- Third spaceflight
- Born Oct. 30, 1964, in Belleville, Ill.
- Ph.D., material science and engineering, 1996
- Logged 4+ months in space
- Enjoys soccer, reading, cooking, travel, water activities



Rex Walheim (WALL-hime)
Mission Specialist-2 (Colonel, USAF, Ret.)

- Third spaceflight
- Born Oct. 10, 1962. Hometown: San Carlos, Calif.
- Married with two children
- Logged 24+ days in space and 5 spacewalks
- Enjoys snow skiing, hiking, softball, football

The STS-135 patch represents the space shuttle Atlantis embarking on its mission to resupply the International Space Station. Atlantis is centered over elements of the NASA emblem depicting how the space shuttle has been at the heart of NASA for the last 30 years. It also pays tribute to the entire NASA and contractor team that made possible all the incredible accomplishments of the space shuttle. Omega, the last letter in the Greek alphabet, recognizes this mission as the last flight of the Space Shuttle Program.



**Shuttle Atlantis
lifts off on its
maiden voyage**

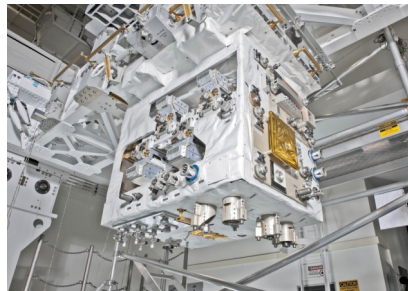
Atlantis, the fourth orbiter built, flew its maiden voyage on Oct. 3, 1985, on the STS-51-J mission. Later missions included the first docking to the Russian Mir space station on STS-71 in June 1995; delivery of the Destiny Laboratory to the space station on STS-98 in February 2001; the first launch with a camera mounted to the external tank, which captured the shuttle's ascent to orbit on STS-112 in October 2002; and the final servicing mission to the Hubble Space Telescope on STS-125 in May 2009. Atlantis is named after the two-masted, primary research ship for the Woods Hole Oceanographic Institute in Massachusetts from 1930 to 1966.

MISISON FLIGHT DAY TIMELINE

- **FD 1:** STS-135 is targeted to launch at 11:26 a.m. EDT on July 8 from NASA's Kennedy Space Center in Florida.
- **FD 2:** The crew will perform a survey of the Thermal Protection System (TPS), the heat shield that protects the shuttle on reentry, and prepare for docking to the International Space Station on FD3.
- **FD 3:** Atlantis will perform a Rendezvous Pitch Maneuver, a backflip to expose its underside for the station crew to photograph. The shuttle will dock to the space station and the crews will open the hatches.
- **FD 4:** The crew will temporarily attach the Raffaello multi-purpose logistics module to the station's Harmony module and review and prepare for FD5's spacewalk.
- **FD 5:** Expedition 28 astronauts Michael Fossum and Ron Garan will perform a spacewalk to transfer a failed ammonia pump to the shuttle cargo bay, transfer the RRM to the station and place an experiment on ELC-2 for long-duration exposure.
- **FD 6:** The crew will unpack more than 8,000 pounds of supplies from Raffaello (or the shuttle crew will perform a focused inspection of the TPS, if necessary).
- **FD 7:** The crews will finish unpacking Raffaello in the morning and have off-duty time in the evening.
- **FD 8:** The crew will stow more than 5,000 pounds of cargo in Raffaello that will be returned to Earth.
- **FD 9:** The crews will finish stowing items in Raffaello, prepare it for unberthing and return it to Atlantis. The shuttle crew will have off-duty time in the evening.
- **FD 10:** Raffaello will be unberthed from Harmony and returned to Atlantis' cargo bay. After final farewells, the crews will close the hatches for the final time between a space shuttle and the International Space Station.
- **FD 11:** Atlantis will undock from the station and will fly around for visual surveys of the station. The crew members then will conduct late inspection of the TPS in preparation for their return to Earth.
- **FD 12:** The astronauts will perform standard checks of the shuttle's systems in preparation for landing. They also will pay tribute to Atlantis and the Space Shuttle Program. Before leaving orbit, the crew will deploy the Solar Cell Experiment, a 5"x5"x10" satellite.
- **FD 13:** STS-135 is targeted to land at 7:06 a.m. on July 20 at Kennedy.



Astronauts replace pump module



The Robotic Refueling Mission payload



Raffaello being prepared at Kennedy

SPACE SHUTTLE PROGRAM FACTS

- STS-135 is the 135th and final shuttle mission and the 33rd flight of Atlantis.
- 355 individuals will have flown 852 times on 135 shuttle missions since STS-1 launched on April 12, 1981.
- Sixteen countries have been represented on shuttle missions: Belgium, Canada, France, Germany, Israel, Italy, Japan, Mexico, Netherlands, Russia, Saudi Arabia, Spain, Sweden, Switzerland, Ukraine and the United States.
- Fourteen people died during two accidents: STS-51L on Jan. 28, 1986 and STS-107 on Feb. 1, 2003.
- The five orbiters have flown 537,114,016 miles. STS-135 will add more than four million miles to the total.
- More than 2,000 experiments have been conducted on the shuttles in the fields of Earth, biological and materials sciences and astronomy.
- The shuttles have docked to two space stations: Between 1994 and 1998, nine missions flew to the Russian Mir. With STS-135, 37 shuttle missions will have flown to the International Space Station.
- Shuttles have landed at the Kennedy Space Center 77 times, Edwards Air Force Base in California 54 times and the White Sands Test Facility, N.M. once.
- In launch configuration, the space shuttle, external tank, twin solid rocket boosters, and the three space shuttle main engines contain about 2.5 million moving parts.