NASA Mission Summary

National Aeronautics and Space Administration

Washington, D.C. 20546
(202) 358-1100

http://www.nasa.gov/station

May 2011

ISS EXPEDITION 28 MISSION SUMMARY

Expedition 28 begins with the Soyuz TMA-20 undocking in May 2011 when Expedition 27 commander Kondratyev hands control over to Borisenko. Soyuz TMA-02M will arrive later with the remaining three Expedition 28 crew members. They will continue world-class research while preparing the International Space Station for the future, provisioning it with supplies and spare parts to support the station until new resupply spacecraft are ready. The crew also will be aboard to see Space Exploration Technologies Corp.'s planned fly-by of its Dragon capsule. They will continue with installing infrastructure upgrades to the station's command and control computers and its communications systems, which began with Expedition 26. Expedition 28 crew members also will assist the STS-134 mission and prepare the station for STS-135, the final mission of the Space Shuttle Program. Expedition 28 will end in September 2011.

CREW

Andrey Borisenko (Baw-ruh-SEHN-ko)
Roscosmos
Commander
- First spaceflight
- Born: April 17, 1964, in St. Petersburg, Russia
- Married with one child
- Selected as cosmonaut candidate in May 2003
- Enjoys fishing, badminton and road trips

Ron Garan (GEH-rin)
NASA
Flight Engineer (Colonel, USAF, Ret.)
- Second spaceflight
- Born: Oct. 30, 1961, in Yonkers, N.Y.
- Married with three children
- Logged 13+ days in space
- Logged 5,000+ hours in 30+ different aircraft

Alexander Samokutyaev (Sah-mo-koo-tee-YAH-yev)
Roscosmos
Flight Engineer (Lieutenant-Colonel, Russian Air Force)
- First spaceflight
- Born: March 13, 1970, in Penza, Russia
- Married with one child
- Logged 650+ hours in multiple types of aircraft
- Enjoys ice hockey and traveling

Sergei Volkov
Roscosmos
Flight Engineer (Colonel, Russian Air Force)
- Second spaceflight
- Born: April 1, 1973, in Chuguyev, Ukraine
- Married with one child
- Logged 199 days in space
- Enjoys tennis, windsurfing, reading and museums

Michael E. Fossum
NASA
Flight Engineer (Colonel, USAF Reserve, Ret.)
- Third spaceflight
- Born: 1957, in Sioux Falls, S.D.
- Married with four children
- Logged 26+ days in space and six EVAs
- Logged 1,800+ hours in 35 different aircraft

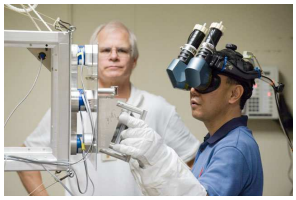
Satoshi Furukawa (Sah-TOE-shee Foo-ruh-KAH-wah)
JAXA
Flight Engineer
- First spaceflight
- Born: 1964, in Yokohama, Japan
- Married with two children
- Became a Japanese astronaut candidate in 1999
- Enjoys baseball, bowling, music and travelling

EXPEDITION 28 CREW PATCH

In the foreground of the patch, the space station is displayed to acknowledge the efforts of everyone who has supported it, from scientists and engineers to support personnel on Earth and astronauts in space. Prominently displayed in the background is our home planet, Earth—the focus of much of our exploration and research in space. The moon is included to stress the importance of our planet's closest neighbor to the future of our world. To acknowledge the significant milestone of 50 years of human spaceflight, the words "Гагарин" (Gagarin), "Shepard" and "50 Years" are included in the design to commemorate the April 12, 1961, flight of Yuri Gagarin, the first person in space and the May 5, 1961, flight of Alan Shepard, the first American in space.

FACTS AND FIGURES

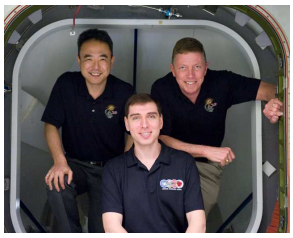
- Expedition 27 crew members Borisenko, Garan and Samokutyaev launched from the Baikonur Cosmodrome in Kazakhstan in their Soyuz TMA-21 on April 4. They will become Expedition 28 crew members in May, with the departure of three of their colleagues.
- Expedition 28 crew members Volkov, Fossum and Furukawa will launch from the Baikonur Cosmodrome in Kazakhstan in their Soyuz TMA-02M on June 7. They will become Expedition 29 crew members in September, when Borisenko, Garan and Samokutyaev return to Earth.
- Expedition 28 will participate in the final two space shuttle missions, STS-134 and STS-135.
- Borisenko became the 200th unique crew member to cross the threshold of the International Space Station.
- Crew members have performed 127 space station-based spacewalks. The STS-134 crew will include the last spacewalks performed on the station by a space shuttle crew.
- Expedition 28 will work with some 111 experiments involving approximately 200 researchers across a variety of fields, including human life sciences, physical sciences and Earth observation. The crew also will conduct technology demonstrations ranging from recycling to robotics.
- The station measures 357 feet end-to-end, about the length of a U.S. football field including the end zones.
- An acre of solar panels supplies the station with 75 to 90 kilowatts of power.
- The International Space Station effort involves more than 100,000 people in space agencies and at 500



Furukawa uses virtual reality hardware to rehearse his duties

Fossum trains for a spacewalk in the Neutral Buoyancy Laboratory

Volkov and Fossum practice advanced cardiac life support training



Furukawa, Volkov and Fossum pose in the Space Vehicle Mock-up Facility

RESEARCH AND TECHNOLOGY DEVELOPMENT OVERVIEW

- Robonaut 2 tests how human-like robots work in microgravity. Software upgrades and lower bodies can potentially allow it to move around inside and outside the station. This will help NASA understand robotic capabilities for future deep space missions.
- Boiling Experiment Facility supports experiments on heat transfer and vapor removal processes in boiling, which could lead to development of more efficient cooling systems for space and Earth applications.
- The eight Expedite the Processing of Experiments to Space Station (EXPRESS) racks aboard support various experiments.
- Light Miscroscopy Module (LMM) examines samples from experiments on the station. This prevents the samples from having to be returned to Earth. LMM is isolated from vibrations on the station, allowing it to obtain clear, high-resolution images.
- A Japanese experiment looks at Marangoni convection, a fluid movement similar to "legs" of wine that form inside a glass. To study this in microgravity, researchers use silicone oil placed between two discs. Since warm air does not rise, and cool air does not fall in microgravity, one disc can be heated more than another to induce Marangoni convection.
- Several European Space Agency experiments look at convection processes using aluminum alloys to help optimize industrial casting processes. Columnar-to-Equiaxed Transition in Solidification Processing (CETSOL) and Microstructure Formation in Casting of Technical Alloys under Diffusive and Magnetically Controlled Convective Conditions (MICAST) examine growth and evolution of microstructures during crystallization of metallic alloys. CETSOL gives confidence in reliability of numerical tools. MICAST studies microstructure formation. Solidification along a Eutectic path in Ternary Alloys (SETA) will look at growth of low-temperature alloys of aluminum manganese and silicon.
- The Shape Memory Foam experiment will evaluate recovery of shape memory epoxy foam in microgravity. The study will look at shape memory properties needed to manufacture a new-concept actuator that can transform energy from one kind to another.