National Aeronautics and Space Administration

International Space Station

[MISSION SUMMARY]

EXPEDITION 40 began May 13, 2014, and ends September 10, 2014. This expedition will include research projects focusing on human research, biology and biotechnology, Earth and space science, physical science investigations, technology demonstrations and educational activities. There are two Russian and three U.S. spacewalks planned during Expedition 40.

THE **CREW:**

Soyuz TMA-12M • Launch: March 25, 2014 • Landing: September 2014

Oleg Artemyev (Roscosmos) – Flight Engineer
(AH'-leg Ar-tuh-MY-ev)

Born: Riga, Latvia
Interests: Physics
Spaceflights: Exps. 39 and 40 mark his first missions
Cosmonaut Bio: http://go.nasa.gov/1iKilTW

Alexander Skvortsov (Roscosmos) – Flight Engineer
(Skuh-VORT-soff)

Born: Schelkovo, Moscow Region, Russia
Interests: Diving, soccer, badminton, fishing, hunting, tourism
Spaceflights: Exps. 23, 24, 39
Cosmonaut Bio: http://go.nasa.gov/1ilN4Oh_

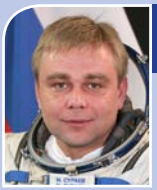
Steve Swanson (NASA) – Commander
(SWAHN-son)

Born: Syracuse, New York
Interests: Mountain biking, basketball, skiing, weight lifting, trail running, woodworking, spending time with family
Spaceflights: STS-117; STS-119; Exp. 39
Instagram: http://instagram.com/iss
Astronaut Bio: http://go.nasa.gov/1bEdlAJ

Soyuz TMA-13M • Launch: May 28, 2014 • Landing: November 2014

Alexander Gerst (ESA) – Flight Engineer
(GHUR-st)

Born: Künzelsau, Germany
Interests: Climbing, fencing, hiking, mountaineering, running, scuba diving, skydiving, snowboarding, swimming
Spaceflights: Exps. 40 and 41 mark his first missions
Twitter: @Astro_Alex
Astronaut Bio: http://go.nasa.gov/1oMphcb



Maxim Suraev (Roscosmos) – Flight Engineer
(Suh-RYE-ev)

Born: Chelyabinsk, Russia
Interests: Fishing, reading, scuba diving, sports
Spaceflights: Exps. 21, 22
Cosmonaut Bio: http://go.nasa.gov/1oMpqfv

Reid Wiseman (NASA) – Flight Engineer
(wize-man)

Born: Baltimore, Maryland
Interests: Education, golf, running, woodworking
Spaceflights: Exps. 40 and 41 mark his first missions
Twitter: @astro_reid
Astronaut Bio: http://go.nasa.gov/1cRNLtH

THE **SCIENCE:**

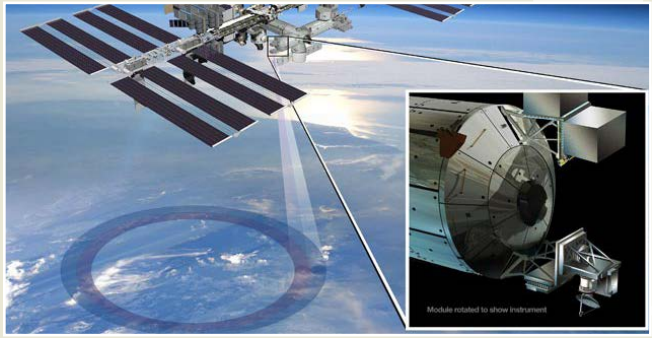
"What are some of the investigations that the crew is working on?"

Earth remote sensing, an assessment of human behavior and performance and studies of animal biology and bone and muscle physiology define the research of Expedition 40. Other investigations include technology demonstrations, physical and space sciences and educational activities. Expedition 40 activities will help advance our body of scientific knowledge, leading to potential Earth benefits such as improved weather forecasts and human medical advancements.

International Space Station-Rapid Scatterometer (ISS-RapidScat)

The ISS-RapidScat will monitor ocean winds from the ideal vantage point of the space station. This space-based scatterometer is a remote sensing instrument that uses radar pulses reflected from the ocean's surface from different angles to calculate surface wind speed and direction. This information will be useful for weather forecasting and hurricane monitoring.

In addition to improving weather models, the ISS-RapidScat instrument enhances measurements from other international scatterometers by cross-checking their data. Due to its unique orbit, ISS-RapidScat will observe different parts of the planet at different times of day, allowing the instrument to track the effects of the sun on ocean winds as the day progresses. Because the instrument reuses leftover hardware originally built to test parts of the now inoperable NASA QuikScat scatterometer, this investigation demonstrates a unique way to replace an instrument aboard an aging satellite.



This artist's rendering of the ISS-RapidScat instrument (inset), will measure ocean surface wind speed and direction and help improve weather forecasts, including hurricane monitoring. It will be installed on the end of the station's Columbus laboratory. (NASA/JPL-Caltech/Johnson Space Center)

Assessing the Impact of Communication Delay on Behavioral Health and Performance: An Examination of Autonomous Operations Utilizing the International Space Station (Comm Delay Assessment)

Comm Delay Assessment evaluates the effects of delayed communications for interplanetary crews that have to handle medical and other emergencies in deep space. In addition to time delays experienced as they travel farther away from Earth, uncertainty in performing a crucial task can impact crew performance and interaction. Three crew members will perform eight tasks, with and without 50-second delays added. These tasks will vary in their level of stress and familiarity. This type of research may help refine procedures for Earth-based teams that operate in extreme or remote environments with intermittent or no contact with a home base and its experts.

Rodent Research Hardware and Operations Validation (Rodent Research-1)

Rodent research hardware provides a platform for long-duration rodent experiments in space. These experiments examine how microgravity affects animals, providing information relevant to human spaceflight, discoveries in basic biology and knowledge that will have direct impact toward human health on Earth. Rodent Research-1 tests the operational capabilities of the new hardware system, including the transporter, rodent habitat, and access unit.

In-flight Demonstration of Portable Load Monitoring Devices-Phase I: XSENS ForceShoe (Force Shoes)

The Force Shoes investigation is an evaluation of the XSENS ForceShoe system as a potential method to measure exercise loads on the Advanced Resistive Exercise Device (ARED) during crew member exercise sessions on the space station. Up to four astronauts will collect a series of static and dynamic load measurements using ARED. Researchers will use the measurements made by the XSENS ForceShoe system to quantify exercise load data needed for support of current and future human research experiments. This data also will be applied to populations on Earth restricted from exercise by injury, age, lifestyle or confined work and living space.

The ForceShoe engineering evaluation will help validate the use of portable load monitoring devices in space. (NASA)

THE MISSION **PATCH:**

The Expedition 40 patch depicts the past, present and future of human space exploration. The crew wrote the description that follows: The reliable and proven Soyuz, our ride to the International Space Station, is a part of the past, present and future. The space station is the culmination of an enormous effort by many countries partnering to produce a first-class orbiting laboratory, and its image represents the current state of space exploration. The space station is immensely significant to us as our home away from home and our oasis in the sky. The commercial cargo vehicle is also part of current human space exploration and is a link to the future. A blend of legacy and future technologies is being used to create the next spacecraft that will carry humans from our planet to destinations beyond. The sun on Earth's horizon represents the new achievements and technologies that will come about due to our continued effort in space exploration.

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