National Aeronautics and Space Administration

International Space Station

[MISSION SUMMARY]

EXPEDITION 41 begins Sept. 10, 2014, and ends Nov. 10, 2014. This expedition will include research projects focusing on biology, physical science and Earth and space science investigations. There are one Russian and two U.S. spacewalks planned during Expedition 41.

THE **CREW:**

Soyuz TMA-13M • Launch: May 28, 2014 • Landing: November 10, 2014

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

Born: Chelyabinsk, Russia
Interests: Fishing, reading, scuba diving, sports
Spaceflights: Exps. 21, 22, 40
Bio: http://go.nasa.gov/1oMpqfv
Twitter: @Msuraev

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
Bio: http://go.nasa.gov/1oMphcb
Twitter: @Astro_Alex

Reid Wiseman (NASA) – Flight Engineer

Born: Baltimore, Maryland
Interests: Education, golf, running, woodworking
Spaceflights: Exps. 40 and 41 mark his first missions
Bio: http://go.nasa.gov/1cRNLtH
Twitter: @astro_reid
Vine: http://go.nasa.gov/1IE159e

Soyuz TMA-14M • Launch: September 25, 2014 • Landing: March 2015

Barry "Butch" Wilmore (NASA) – Flight Engineer

Born: Mt. Juliet, Tennessee
Interests: Football, flying
Spaceflights: STS-129
Bio: http://go.nasa.gov/tdaz79

Alexander Samokutyaev (Roscosmos) – Flight Engineer (Sah-moe-koo-tee-YAH-yehv)

Born: Penza, Russia
Interests: Ice hockey, travel
Spaceflights: Exps. 27, 28
Bio: http://go.nasa.gov/1Ad0gxC

Elena Serova (Roscosmos) – Flight Engineer (Suh-ROH-vuh)

Born: Vozdvizhenka, Russia
Interests: Economics, flying
Spaceflights: Exps. 41 and 42 mark her first missions
Bio: http://go.nasa.gov/1AcZvVr

THE **SCIENCE:**

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

Seedling growth, observation of meteors entering Earth's atmosphere and studies of animal biology and bone and muscle physiology define the research of Expedition 41. Model organisms, such as plant seedlings and small fish, traveling to the space station will help advance our body of scientific knowledge about the influence of microgravity on cells. Model organisms are non-human species with characteristics that allow them easily to be maintained, reproduced and studied in a laboratory. Taking these organisms to space allows for examination of growth and development and physiological, psychological and aging processes without the impact of gravity.

Biological Research in Canisters-19 (BRIC-19)

BRIC hardware has supported a variety of plant growth investigations aboard the space station. The new BRIC-19 investigation will focus on the growth and development of Arabidopsis thaliana seedlings in microgravity. A. thaliana is a small flowering plant related to cabbage. Researchers hope to get a better understanding of how the growth responses of plants are altered by growth in microgravity. The seedlings will be preserved and returned to the ground for evaluation. While the BRIC hardware helps to maximize research and minimize space and crew time, it also adds to the collective body of knowledge about basic plant growth phenomena and may help improve growth and biomass production to benefit farming practices on Earth.

A view of seedling growth in a petri dish, grown in the Biological Research in Canisters hardware aboard the International Space Station. (NASA)

Meteor Composition Determination (Meteor)

Meteor is a new space station payload that will enable the first space-based observations of meteors entering Earth's atmosphere from space. Meteors are somewhat rare and are difficult to monitor from the ground because of Earth's atmosphere. Meteor uses high-resolution video and image analysis of the atmosphere to ascertain the physical and chemical properties of the meteoroid dust, such as size, density and chemical composition. Since scientists usually identify the parent comets or asteroids for most meteor showers, the study of the meteoroid dust from the space station provides information about the parent comets and asteroids. Investigating the elemental composition of meteors adds to our understanding of how the planets developed, and continuous measurement of meteor interactions with Earth's atmosphere could spot previously unforeseen meteors.

Effects of Gravity on Maintenance of Muscle Mass in Zebrafish (Zebrafish Muscle)

The Zebrafish Muscle investigation will observe the effects of microgravity on the zebrafish, Danio rerio, a tropical freshwater fish belonging to the minnow family. The goal of the study is to determine whether zebrafish muscles weaken in microgravity similarly to human muscles, and if so, isolate the cause. Results from the Zebrafish Muscle investigation may help identify molecular changes involved in the deterioration of muscles exposed to microgravity. This data can help scientists develop new treatments for weakened muscles. The findings could potentially benefit patients on extended bed rest or with limited mobility. In addition, this information would aid researchers in developing countermeasures for muscle weakness in astronauts living in microgravity during extended missions.

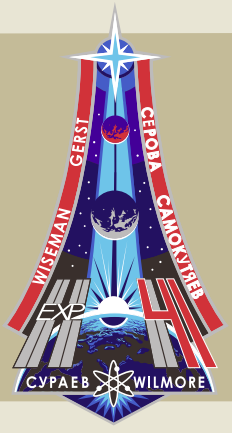
The Zebrafish Muscle study will observe the effects of microgravity aboard the International Space Station on the zebrafish. (Japanese Aerospace Exploration Agency)

Osteocytes and mechano-transduction (Osteo-4)

The Osteo-4 study examines the effects of microgravity on the function of osteocytes, the most common cells in bone. These cells reside within the mineralized bone and can sense mechanical forces; but, researchers do not know how. This study allows, for the first time, direct analysis of the changes in the physical appearance and genetic expression of bone cells in mice living in microgravity aboard the space station. This investigation may significantly advance the knowledge of the role of mechanical forces, or lack thereof, on osteocyte functions and further enhance understanding of these cells. Results derived from this study could have significant implications for treatment of bone disorders related to disuse or immobilization such as osteopenia (low bone density), osteoporosis or even paralysis. This may also assist researchers in developing additional mechanisms to combat bone density loss in crew members living aboard the space station.

THE MISSION **PATCH:**

The Expedition 41 crew wrote the description that follows: Portraying the road of human exploration into our vastly unknown universe, all elements of the Expedition 41 patch build from the foundation, our Earth, to the stars beyond our solar system. The focus of our six-month expedition to the space station is Earth and its inhabitants, as well as a scientific look out into our universe. The distinguishing space station solar arrays reach onward and serve as the central element, with the icon of an atom underneath representing the multitude of research aboard that will bring new discoveries for the benefit of humanity. The sun is rising over Earth's horizon, spreading its light along the road of human exploration. Equipped with the knowledge and inspiration gained from the space station, our successful multinational cooperation will lead human space exploration to the moon, Mars, and ultimately, the stars. We are Expedition 41. Join us for the adventure.



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