National Aeronautics and Space Administration

International Space Station

[MISSION SUMMARY]

EXPEDITION 50

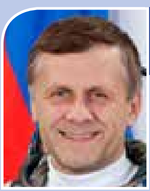
Expedition 50 began October 30, 2016 and ends April 10, 2017. This expedition includes biotechnological research, human research and Earth and space science. Two spacewalks are tentatively planned during Expedition 50.

THE **CREW:**

Soyuz MS-02 Launch: October 19, 2016 • Landing: April 10, 2017

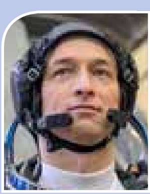
Robert Shane Kimbrough (NASA) – Commander

Born: Killeen, Texas
Interests: baseball, golf, weightlifting and running
Spaceflights: STS-126, Expedition 49
Bio: http://go.nasa.gov/2eoHfTG
Twitter: @astro_kimbrough
Instagram: @astro_kimbrough



Andrey Borisenko (Roscosmos) – Flight Engineer

Born: Leningrad, Russia
Interests: fishing, badminton and road trips
Spaceflights: Expeditions 27, 28, and 49
Bio: http://go.nasa.gov/2eoOoDC



Sergey Ryzhikov (Roscosmos) – Flight Engineer

Born: Bugulma, Tatarstan, Russian
Interests: sports, games and music
Spaceflights: Expedition 49
Bio: http://go.nasa.gov/2eoLUoC

Soyuz MS-03 Launch: November 17, 2016 • Landing: Spring 2017

Peggy Whitson (NASA) – Flight Engineer

Born: Mount Ayr, Iowa
Interests: weightlifting, biking, basketball and water skiing
Spaceflights: STS-111, STS – 113, Expeditions 5 and 16
Bio: http://go.nasa.gov/2eoOV8r
Twitter: @AstroPeggy

Thomas Pesquet (ESA) – Flight Engineer

Born: Rouen, France
Interests: basketball, jogging, swimming, squash, mountain biking, kite surfing, skiing, sailing and mountaineering
Spaceflights: Expedition 50 marks his first space station mission
Bio: http://go.nasa.gov/YSS3JI
Twitter: @thom_astro
Instagram: @thom_astro

Oleg Novitskiy (Roscomos) – Flight Engineer

Born: Cherven, Minsk Region, Belorussia
Interests: football, tourism, hunting, fishing, table tennis and reading
Spaceflights: Expeditions 33 and 34
Bio: http://go.nasa.gov/2eoGOsu

THE **SCIENCE:**

What are some of the investigations the crew is operating?

During Expedition 50, researchers will investigate how lighting can change the overall health and well-being of crew members, how microgravity can affect the genetic properties of space-grown plants, and how microgravity impacts tissue regeneration in humans.

Tissue Regeneration-Bone Defect

Only a few animals, such as tadpoles and salamanders, can regrow a lost limb, but the onset of this process exists in all vertebrates. Tissue Regeneration-Bone Defect (Rodent Research-4 (CASIS)), a U.S. National Laboratory investigation sponsored by the Center for the Advancement of Science in Space (CASIS), studies what prevents other vertebrates such as rodents and humans from regrowing lost bone and tissue, and how microgravity conditions impact the process. Results will provide a new understanding of the biological reasons behind the inability for humans to grow a lost limb at the wound site, and could lead to tissue regeneration efforts in space.

Crew members in orbit often experience reduced bone density and muscle mass, a potential consequence of microgravity-induced stress. Previous research indicates that reduced gravity can promote cell growth, making microgravity a potentially viable environment for tissue regeneration research. Results could ultimately lead to tissue regeneration, which would be of great benefit to civilians and military patients who have lost limbs.

Lighting Effects

Spaceflight exposes crew members to environments that are not conducive to a typical day-night sleep and wake schedule, or circadian rhythm. In fact, crew members aboard the International Space Station see 16 sunrises each day, which can impact their sleep schedules. Abnormal day lengths, late-night work hours, and shifting time zones abruptly can all lead to circadian misalignment, which can reduce sleep quality and quantity, and impair alertness, reaction time and cognition, and increase the risk of fatigue-related accidents on the station.

The Testing Solid State Lighting Countermeasures to Improve Circadian Adaptation, Sleep and Performance during High Fidelity Analog and Flight Studies for the International Space Station (Lighting Effects) investigation combats this challenge by replacing the current light bulbs on board the station with bulbs that can be adjusted for intensity and wavelength throughout the day. Research has shown that monochromatic and narrow-bandwidth short-wavelength blue lights are effective in suppressing nocturnal melatonin, phase-shifting the internal circadian pacemaker and enhancing alertness and performance. The enrichment of white-appearing light in the blue portion of the spectrum has strong potential as a safe, non-pharmacological countermeasure to reduce the risk of circadian misalignment and performance deficits in space. Results from this investigation could lead to a better understanding of how electric lighting can be used to improve alertness during waking hours and promote sleep during evening hours, both on ground and in orbit.

Stratospheric Aerosol and Gas Experiment III

The SAGE program is one of NASA's longest running Earth-observing programs, providing continuous, long-term data to help scientists better understand and care for Earth's atmosphere. SAGE was first operated in 1979 following the Stratospheric Aerosol Measurement, on the Apollo-Soyuz mission.

SAGE III, an investigation developed by Ball Aerospace and Technologies Corporation, ESA (the European Space Agency), Thales Alenia Space – Italia, and NASA's Langley Research Center, will measure stratospheric ozone, aerosols, and other trace gases by locking onto the sun or moon and scanning a thin profile of the atmosphere. In addition to measuring the key components of the atmosphere, SAGE III also will measure temperatures in the stratosphere and mesosphere, as well as profiles of trace gases.

Understanding these measurements will allow national and international leaders to make informed policy decisions regarding the protection and preservation of Earth's atmosphere. When the ozone is damaged, all of Earth's inhabitants, including humans, plants and animals, are exposed to more harmful sun rays, which can cause long-term problems such as cataracts, cancer and reduced crop yield.

THE MISSION **PATCH:**

The Expedition 50 patch encompasses the spirit of human exploration from previous missions to the moon to current exploration on the International Space Station (ISS). The red border symbolizes future human exploration of Mars – the Red Planet. Our home planet Earth is prominent in the patch to remind us that everything done on the mission is to help people on Earth – "Off the Earth, For the Earth." The background colors of red, white, and blue represent the national colors of all six crew members – United States, Russia, and France. The six stars represent the families of all six crewmembers. Finally, the numeral 50 signifies the 50th Expedition to the ISS.

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