National Aeronautics and Space Administration

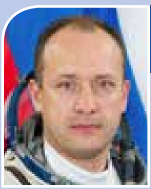
International Space Station

[MISSION SUMMARY]

EXPEDITION 54 began in December 2017 and ends in February 2018. This expedition includes biology and biotechnology, technology demonstrations, astrophysics, and materials science. Three spacewalks are tentatively planned during Expedition 54.

THE CREW:

Soyuz MS-06 Launch: September 2017 • Landing: February 2018



Aleksandr Misurkin (Roscomos) – Commander

Born: Yershichi, Smolensk Region, Russia
Interests: badminton, basketball, downhill skiing, carting
Spaceflights: Exps. 35/36
Bio: https://go.nasa.gov/2vAiNdr

Mark T. Vande Hei (NASA) – Flight Engineer

Born: Falls Church, Virginia
Interests: exercise, camping, windsurfing and reading
Spaceflights: Exps. 53/54 is his first spaceflight
Bio: https://go.nasa.gov/2vzY0a8
Twitter: @Astro_Sabot

Joseph Acaba (NASA) – Flight Engineer

Born: Inglewood, California
Interests: camping, hiking, biking, kayaking and scuba diving
Spaceflights: STS-119, Exps. 31/32
Bio: https://go.nasa.gov/2vA7vWu
Twitter: @AstroAcaba

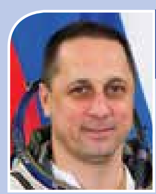
Soyuz MS-07 Launch: December 2017 • Landing: April 2018

Scott Tingle (NASA) – Flight Engineer

Born: Attleboro, Massachusetts
Spaceflights: Exps. 54/55 is his first spaceflight
Bio: https://go.nasa.gov/2z2tjKW
Twitter: @Astro_Maker

Norishige Kanai (JAXA) – Flight Engineer

Born: Tokyo, Japan
Spaceflights: Exps. 54/55 is his first spaceflight
Bio: https://go.nasa.gov/2z2hpkj



Anton Shkaplerov (Roscosmos) – Flight Engineer

Born: Sevastopol, Crimean Region, Ukraine
Interests: fishing, golf, sports, travel
Spaceflights: Exps. 29/30, 42/43
Bio: https://go.nasa.gov/2z2bhZu
Twitter: @Anton_Astrey

THE SCIENCE:

What are some of the investigations the crew is operating?

During Expedition 54, researchers will study bacteria, manufacture fiber optics in microgravity, measure the total amount of sunlight Earth receives, gather data on space debris in low-Earth orbit, and study self-replicating materials.

Investigation tests bacterial antibiotic resistance in microgravity

Antibiotic resistance could pose a danger to astronauts, especially since microgravity has been shown to weaken human immune response. E. coli AntiMicrobial Satellite (EcAMSat) will study microgravity's effect on bacterial antibiotic resistance. The experiment will expose two strains of E. coli, one with a resistance gene, the other without, to three different doses of antibiotics, then examine the viability of each group. Results from this investigation could contribute to determining appropriate antibiotic dosages to protect astronaut health during long-duration human spaceflight and help us understand how antibiotic effectiveness may change as a function of stress on Earth.

Testing Alternative Fibers

Optical Fiber Production in Microgravity (Made in Space Fiber Optics), a U.S. National Lab investigation sponsored by the Center for the Advancement of Science in Space (CASIS), demonstrates the benefits of manufacturing fiber optic filaments in a microgravity environment. This investigation will attempt to pull fiber optic wire from ZBLAN, a heavy metal fluoride glass commonly used to make fiber optic glass. When ZBLAN is solidified on Earth, its atomic structure tends to form into crystals. Research indicates that ZBLAN fiber pulled in microgravity may not crystalize as much, giving it better optical qualities than the silica used in most fiber optic wire. Results from this investigation could lead to the production of higher-quality fiber optic products both in space and on Earth.

Tracking Earth's Sunshine from Space

NASA's Total and Spectral Solar Irradiance Sensor (TSIS) will measure the sun's energy input to Earth. Various satellites have captured a continuous record of this solar energy input to Earth since 1978. TSIS-1 sensors advance previous measurements with three times the accuracy, enabling scientists to study the sun's natural influence on Earth's ozone layer, atmospheric circulation, clouds, and ecosystems. These observations are essential for a scientific understanding of the effects of solar variability on the Earth system.

Monitoring Orbital Debris

The Space Debris Sensor (SDS) will directly measure the orbital debris environment around the space station for two to three years. Mounted on the exterior of the station, this one square meter sensor uses dual-layer thin films, an acoustic sensor system, a resistive grid sensor system and a sensored backstop to provide near-real-time impact detection and recording. Research from this investigation could help lower the risk to human life and critical hardware by orbital debris.

Self-assembling and Self-replicating materials

The Advanced Colloids Experiment- Temperature-7 (ACE-T-7) investigation involves the design and assembly of 3-D structures from small particles suspended in a fluid medium, structures that are vital to the design of advanced optical materials and electronic devices. Future space exploration may use self-assembly and self-replication to make materials and devices that can repair themselves on long duration missions.

THE MISSION **PATCH:**

Orbiting Earth continuously since 1998, the International Space Station (ISS) is one of our greatest engineering achievements. It is depicted in gold, symbolic of constancy and excellence. Flying toward a sunrise represents the station's contributions to a bright future. That sunrise uses blue, white, and red, the combined national colors of Japan, Russia, and the United States, symbolizing the crew's cohesiveness. Crewmember names are in blue, symbolizing devotion and loyalty. The gold border represents the constant human presence in space onboard the orbiting laboratory. Symbolic of new Russian and U.S. spacecraft that will advance human exploration, the patch is shaped as a capsule. The number 54 is drawn as a path eventually leading to Mars. Finally, the stars symbolize the values of leadership, trust, teamwork, and excellence lived by mission control teams throughout the history of human space programs, as well as the global vigilance of those teams while operating the station.

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