National Aeronautics and Space Administration

International Space Station

[MISSION SUMMARY]

EXPEDITION 59 began in March 2019 and ends in June 2019. This expedition will include research investigations and technology demonstrations not possible on Earth to advance scientific knowledge of Earth, space, physical and biological sciences.

THE **CREW:**

Soyuz MS-11 Launch: Dec. 3, 2018 • Landing: June 2019

Anne McClain (NASA) – Flight Engineer

Born: Spokane, Washington
Interests: Weightlifting, rugby, golf, biking, high-intensity fitness training and running
Spaceflights: First flight
Bio: https://go.nasa.gov/2s8ryrB
Twitter: @AstroAnnimal

David Saint-Jacques (CSA) – Flight Engineer

Born: Saint-Lambert, Quebec
Interests: Mountaineering, cycling, skiing and sailing
Spaceflights: First flight
Bio: https://go.nasa.gov/2VBcqAu
Twitter: @Astro_DavidS

Oleg Kononenko (Roscosmos) – Commander

Born: Türkmenabat, Turkmenistan
Spaceflights: Exp. 17, 30/31, 44/45
Bio: https://go.nasa.gov/2QviZ3S

Soyuz MS-12 Launch: March 2019 • Landing: October 2019

Nick Hague (NASA) – Flight Engineer

Born: Belleville, Kansas
Interests: Exercising, flying, snow skiing and scuba
Spaceflights: Soyuz MS-10
Bio: https://go.nasa.gov/2Qz3qZ1
Twitter: @AstroHague

Christina Koch (NASA) – Flight Engineer

Born: Grand Rapids, Michigan
Interests: Backpacking, rock climbing, paddling and sailing
Spaceflights: First flight
Bio: https://go.nasa.gov/2QCRHbX
Twitter: @Astro_Christina

Alexey Ovchinin (Roscosmos) – Flight Engineer

Born: Rybinsk, Russia
Spaceflights: Exp. 47/48, Soyuz MS-10
Bio: https://go.nasa.gov/2QAQBgu

THE **SCIENCE:**

What are some of the investigations the crew operated?

During Expedition 59, researchers will use tissue chips to study changes in the human body caused by microgravity, conduct research on regolith simulants in the Hermes research facility, test free-flying robots inside the station and study the complex dynamics of the Earth's atmospheric carbon cycle using the Orbiting Carbon Observatory 3 space instrument.

Tissue Chips

A cutting-edge system for research is heading to the International Space Station, and could help save time and money for pharmaceutical development. Researchers are using a new technology called "tissue chips" that could offer more insights into predicting the effectiveness of potential pharmaceuticals in humans. Tissue chips are bioengineered devices that mimic the function of human organs. Fluid that mimics blood can be passed through the chip to simulate blood flow, and can include drugs or toxins. In microgravity, changes occur in human health and human cells that resemble accelerated aging and disease processes. This allows scientists to make observations over the course of a few weeks that might take months in a laboratory on Earth. This research may also help us advance tissue chip technologies for more efficient pharmaceutical testing on Earth, and could be used for understanding how diseases develop in healthy tissues. For more information, click here.

Astrobee

Astrobee is NASA's next generation of free-flying robots aboard the International Space Station. The self-contained, cube-shaped robots are designed to help scientists and engineers develop and test technologies for use in microgravity to assist astronauts with routine chores, and give ground controllers additional eyes and ears on the space station. The autonomous robots, powered by fans and vision-based navigation, perform crew monitoring, sampling, logistics management, and accommodate up to three investigations. They are operated remotely from the ground. For more information, click here.

Hermes Facility

Hermes is an experimental microgravity facility that enables science experiments, microgravity exposure testing, testing of engineering components, testing of CubeSats, concept trials, and any payloads that fit within the Hermes design and operations constraints. It is open to any investigation that benefits from microgravity exposure. Hermes is a microgravity facility for regolith research. Future missions, crewed and robotic, that visit small bodies should know how to interact with a loosely-aggregated surface. Best way to sample material? How do you set anchors? How do you safely move and process material for "living off the land"? What materials properties should you expect for the surface? How much will fly free when disturbed? Experiments housed in Hermes could help answer these questions. For more information, click here.

Orbiting Carbon Observatory 3

The Orbiting Carbon Observatory 3 (OCO-3) is a space instrument designed to investigate important questions about the distribution of carbon dioxide on Earth as it relates to growing urban populations and changing patterns of fossil fuel combustion. OCO-3 will observe the complex dynamics of the Earth's atmospheric carbon cycle. OCO-3 continues the global carbon dioxide record started by OCO-2, but adds complementary information with sampling at all sunlit hours, a unique feature of sampling from orbiting laboratory. In addition to global sampling, OCO-3 capabilities allow for targeted local mapping of emissions hotspots. Understanding carbon sources and sinks can help in forecasting and reducing the long term risks of increased atmospheric heat retention. OCO-3 also demonstrates how space platforms can be used to study the Earth's atmosphere and its effects on climate. For more information, click here.

THE MISSION **PATCH:**

The Expedition 59 patch celebrates the International Space Station's role as a microgravity science laboratory. The crew, made up of scientists, doctors, engineers and pilots, will conduct hundreds of experiments for the benefit of mankind and our fragile environment on planet Earth.

The patch shape depicts the cupola windows. Through these windows, astronauts have made many significant observations of Earth's ecosystems and they have discovered and documented real-time events like volcanic eruptions and earthquakes.

The position of the Earth at the top of the patch depicts where the Earth would be seen by an astronaut from the cupola. It represents the explorers' unique perspective on his or her home. The image at the center of the patch is the station itself, the largest single structure humans have ever put into space, an engineering marvel.

The station is overlaid on an atom, the basic building block of all matter. The atom has three electron orbits with the flags of Russia, the United States of America and Canada, representing the home countries of the Expedition 59 crew. Like electrons in an atom, international cooperation is the basic stabilizing force that enables large scale space exploration.

To achieve great deeds, humans from all across the globe must work together in peace with a shared vision. The Expedition 59 patch celebrates the massive scientific accomplishments of the space station while highlighting the importance of global teamwork in understanding our planet and continuing with bold exploration in the future.

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