National Aeronautics and Space Administration

# International Space Station

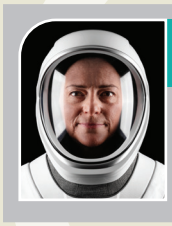
## [ MISSION SUMMARY ]

**EXPEDITION 68** began in September 2022 and ends in March 2023. This expedition will include research investigations focused on biology, Earth science, human research, physical sciences and technology development, providing the foundation for continuing human spaceflight beyond low-Earth orbit to the Moon and Mars.

## THE **CREW:**

**Sergey Prokopyev (Roscosmos)**
**Commander**

**Born:** Sverdlovsk, Russia
**Spaceflights:** Expedition 56/57
**Bio:** https://go.nasa.gov/3wJzMrV



**Nicole Mann (NASA)**
**Flight Engineer**

**Born:** Petaluma, California
**Spaceflights:** First flight
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**Twitter:** @AstroDuke

**Dmitri Petelin (Roscosmos)**
**Flight Engineer**

**Born:** Kostanay, Kazakhstan
**Spaceflights:** First flight
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**Josh Cassada (NASA)**
**Flight Engineer**

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**Spaceflights:** First flight
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**Twitter:** @Astro_Josh
**Instagram:** @Astro_Cassada

**Frank Rubio (NASA)**
**Flight Engineer**

**Born:** Los Angeles, California
**Spaceflights:** First flight
**Bio:** https://go.nasa.gov/3TyAhyw

**Koichi Wakata (JAXA)**
**Flight Engineer**

**Born:** Saitama, Japan
**Spaceflights:** STS-72, STS-92, STS-119/127 (Expedition 18/19/20) and Expedition 38/39
**Bio**: https://go.nasa.gov/3wJbn5s
**Twitter:** @Astro_Wakata

**Anna Kikina (Roscosmos)**
**Flight Engineer**

**Born:** Novosibirsk, Russia
**Spaceflights:** First flight
**Bio:** https://go.nasa.gov/3eagnd4

## THE **SCIENCE:**

### What are some investigations the crew is operating?

During Expedition 68, crew members will conduct experiments studying cardiovascular health in microgravity and how spaceflight affects properties of heart cells derived from stem cells, continuing efforts to establish a functional 3D heart tissue model that researchers can use to test new drugs. The BioFabrication Facility will return to the orbiting laboratory after receiving upgrades back on Earth, ready to embark on the next stages of 3D printing knee cartilage and cardiac tissue samples. Exploration studies will include astronauts growing crops of red dwarf tomatoes as part of NASA's research into plant growth in microgravity, which will be a critical piece of missions to the Moon and Mars. They will also study liquid behavior in environments that simulate the gravity of the Moon and Mars, which could contribute to better design of exploration systems such as lunar rovers, life support systems, and rocket fuel tanks.

### BioFabrication Facility

The biological 3D printer, BioFabrication Facility (BFF), is returning to the International Space Station after coming back to Earth for upgrades. BFF was designed to print organ-like tissues in microgravity, acting as a steppingstone in a long-term plan to manufacture human organs in space for use by patients on Earth. Sponsored by the ISS National Laboratory, the first experiment to be conducted in the upgraded facility is BFF-Meniscus-2. The study attempts to print a meniscus, also known as knee cartilage tissue, using only bioinks and cells. The next experiment, BFF-Cardiac, tries to print and process cardiac tissue samples for study and eventual use on Earth. These are important steps in BFF's long-term mission.

### Plant Habitat-03

Plants that are exposed to the stresses of spaceflight undergo epigenetic changes: the addition of extra information to DNA rather than editing existing information. NASA's Plant Habitat-03 investigation seeks to examine if these additions space-grown plants experience can be transmitted through seeds to the next generation. Seeds produced in orbit by space-grown plants are returned to Earth, processed, and flown back to space. These space-grown seeds are grown alongside seeds from Earth-grown plants to help determine whether second-generation adaptations continue to build up or stabilize. This could help researchers determine whether growing a generation of plants in space provides an advantage to the next generation.

### Catastrophic Post-Wildfire Mudflows

Severe wildfires affect not only forest canopies, but also the ground below. This damage to plants and soil can cause increased rain runoff, leading to landslides. These devastating mudflows are comprised of a mixture of air, water, and sand, but the structure and properties of the slurry are not well understood. Catastrophic Post-Wildfire Mudflows studies the formation and stability of this bubble-sand structure in microgravity. Without the sedimentation that occurs on Earth due to gravity, researchers can examine what other forces govern the structure and properties of the mudflow. A better understanding of these phenomena could improve the understanding, modeling, and predicting of mudflows and support development of solutions to prevent mudflows.

### Cardinal Heart 2.0

The Cardinal Heart investigation conducted aboard the space station showed that four weeks of microgravity exposure can cause significant changes in heart cell function and gene expression. These changes could lead to long-term medical issues. The Cardinal Heart 2.0 experiment builds on these results, using heart organoids to test whether clinically approved drugs reduce these microgravity-induced changes in heart cell function. Results could support development of effective drug combinations to improve the health of astronauts and patients on Earth..

### Neural Integration System

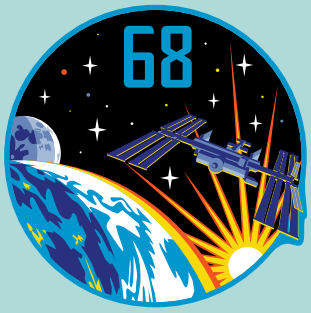
This Japan Aerospace Exploration Agency (JAXA) sponsored study uses tiny worms to examine how microgravity affects the nervous system. Research has shown that spaceflight can affect the nervous system, and neural networks may transmit the effects of microgravity throughout the body. This investigation examines the molecular sources that are responsible for a variety of diseases caused by the body no longer carrying the loads of gravity. Results could support development of countermeasures to protect crew members on future space missions and contribute to improving health for Earth's aging population, especially those with neuromuscular dysfunctions such as Parkinson's disease.

## THE MISSION **PATCH:**

International Space Station Expedition 68 marks the 24th year of operation since the start of its assembly on orbit. Today, the U.S., Russia, Japan, Canada, and the European Space Agency are partnering in the operation of the largest ever orbital outpost managed by humankind.

Seven sparkling stars in the vastness of space represent crewmembers and experts on the ground operating the space station. Bright sunbeams illuminate the station, a platform for scientific research, Earth and astronomical observation, education, as well as development of new technologies necessary for the exploration beyond low-Earth orbit, on the Moon and Mars.

Credits: NASA

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