

International Space Station Research

NASAfacts



NASA astronaut Christina Koch performs science operations in the Microgravity Science Glovebox for the Ring Sheared Drop investigation into the mechanisms of Alzheimer's. Koch set a record for the longest single spaceflight in history by a woman, after 328 days living and working aboard the International Space Station. Her extended mission will provide researchers the opportunity to observe effects of long-duration spaceflight on a woman. Credit: NASA

The International Space Station has offered nearly 20 years of research opportunities in a way that no other platform has been able to accomplish, as an ongoing human presence for conducting science in space.

A Unique Laboratory

The orbiting laboratory opens a new world of possibilities in research by removing one variable that has been consistent in all Earth-bound science: gravity.

In space, everything from liquids and gases to plants and cells behave differently than on Earth, resulting in previously unseen and often unexpected outcomes. This research provides new insight into the role of gravity in everyday life and helps us gain a better fundamental understanding of these processes.

The orbiting laboratory's exterior also provides an environment for testing the resiliency of various materials under the vacuum, extreme temperature and high radiation conditions of space.

Orbiting at about 250 miles above our home planet, the space station also serves as an observation platform that is vital to an increased understanding of the Earth, its weather and how it changes over time.

Types of Research Conducted on the Space Station

Researchers conduct experiments across a wide variety of disciplines, making often-surprising discoveries that can affect scientific understanding of fundamental systems. These insights can lead to results that benefit life on Earth, while also helping us learn more about how to extend the human presence in space.

Major areas of inquiry for researchers on the space station include:

- Biology and Biotechnology
- Earth and Space Science
- Educational and Cultural Activities
- Human Research
- Physical Science
- Technology Development and Demonstration

In 2005, the International Space Station was designated a U.S. National Laboratory, enabling non-NASA government agencies, academic institutions and private companies the ability to utilize the unique environment on the orbiting laboratory. The ISS National Lab is responsible for sponsoring space-based research, technology and educational initiatives that bring value to our nation and support the economic development of a sustainable market in low-Earth orbit.

International Partnerships

The International Space Station is regarded as the most complex engineering, scientific, collaborative human feat ever managed. An international partnership provides and operates the elements of the orbiting laboratory. Principal partners include the space agencies of the United States (NASA), Russia (ROSCOSMOS), Canada (CSA), Japan (JAXA) and Europe (ESA), which includes the following participating countries: Belgium, Denmark, France, Germany, Italy, The Netherlands, Norway, Spain, Sweden, Switzerland, and the United Kingdom.

Commercial Marketing Opportunities in Low-Earth Orbit

New opportunities on the space station allow a shift from the paradigm of government-funded, contractor-provided goods and services to a commercial market in which NASA is one of many customers.



The Northrop Grumman Cygnus (right foreground), and the SpaceX Dragon (top rear) cargo vehicles are seen attached to the orbiting laboratory. Commercial resupply missions regularly bring new science and cargo to the space station. Credit: NASA

From commercial firms using research and development funds to conduct applied research on the space station to commercial service providers selling unique services to users of the orbiting lab, a new economy in low-Earth orbit is beginning to emerge.



JAXA (Japanese Aerospace Exploration Agency) astronaut Takuya Onishi uses the Fundoscope during a Health Maintenance System (HMS) eye examination. Eye exams are performed regularly in order to monitor crewmembers eye health. Vision is one of the many aspects of the human body that is affected by long-duration stays in a microgravity environment. Credit: NASA

Achieving Artemis and Beyond

Here are some ways the orbiting laboratory is making crucial contributions to the Artemis mission, which will take us to the Moon and enable us to go on to Mars.

- The lab has served as a testbed for developing and refining state-of-the-art life support systems for spacecraft.
- It has allowed us to develop capabilities to autonomously monitor the microbial health of spacecraft and planetary habitats and to test and refine DNA sequencing processes in microgravity so that we may identify DNA-based life elsewhere in the solar system.
- On-demand manufacturing will play a key role in developing and sustaining planetary missions. The space station has been home to multiple tests of 3D printing in microgravity, helping us to learn how this technology will work in space.
- The space station is the only place to conduct research on how long-duration living in microgravity affects the human body.
- It is also the only place to test technologies that will take humankind farther into space.

Learn More: nasa.gov/iss-science


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