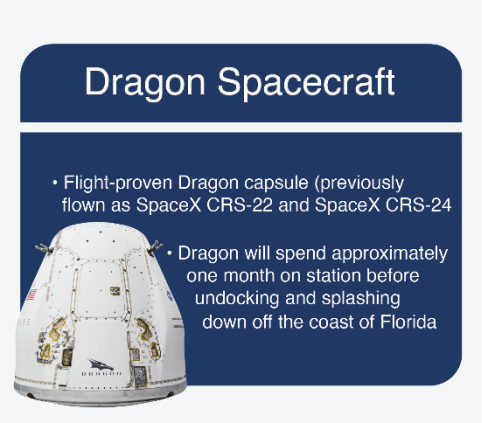
SpaceX CRS-25 Mission Overview

SpaceX's 25th contracted commercial resupply services mission with NASA to the International Space Station will deliver more than 5,800 pounds of science, research, crew supplies, and vehicle hardware to the orbiting laboratory and its crew. This is the fifth mission under SpaceX's Commercial Resupply Services-2 (CRS) contract with NASA. Launch is targeted for 8:44 p.m. EDT Thursday, July 14. Launch activities will air live on NASA Television, the NASA app, and the agency's website.



Arrival and Departure

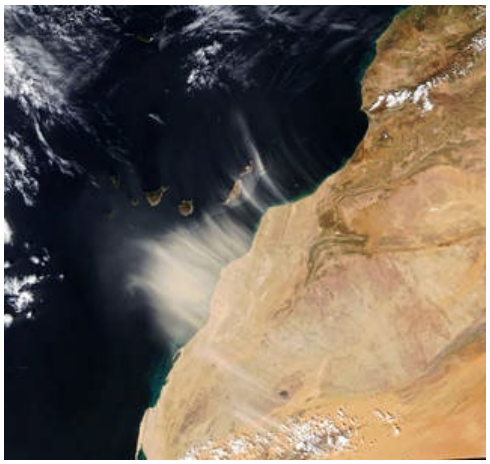
The Dragon spacecraft will arrive at the space station and autonomously dock to the forward-facing port of the Harmony module on the space station at about 11:20 a.m. EDT Friday July 16. Coverage of the rendezvous and docking will begin at 10 a.m. EDT. NASA astronauts Bob Hines and Jessica Watkins will monitor the spacecraft's arrival, which will stay aboard the orbiting laboratory for about one month before splashing down and returning critical science and hardware to teams on Earth.

NASA astronauts and Expedition 67 Flight Engineers Bob Hines and Jessica Watkins

---

Research Highlights

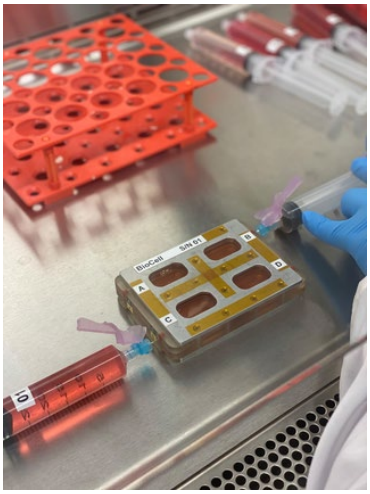
Mapping Earth’s dust
The Earth Surface Mineral Dust Source Investigation (**EMIT**), developed by NASA’s Jet Propulsion Laboratory in Southern California, employs **NASA imaging spectroscopy** technology to measure the mineral composition of dust in Earth's arid regions. Mineral dust blown into the air can travel significant distances and **impact** Earth’s climate, weather, vegetation, and more. For example, dust containing dark minerals that absorb sunlight can warm an area, while light-colored mineral dust can cool it. Blowing dust also affects air quality, surface conditions such as rate of snow melt, and phytoplankton health in the ocean. The investigation collects images for one year to generate maps of the mineral composition in the regions on Earth that produce dust. Such mapping could advance our understanding of the effects of mineral dust on human populations now and in the future.



On Jan. 14, 2022, strong seasonal winds carried dust from northwest Africa over the Canary Islands, causing visibility to drop and air quality to decline. EMIT measures the mineral composition of dust in Earth's arid regions, creating a map that could improve understanding of how dust affects people and communities.
Credits: NASA

Speedier immune system aging

Aging is associated with changes in the immune response known as immunosenescence. Microgravity causes changes in human immune cells that resemble this condition but happen faster than the actual process of aging on Earth.
The **Immunosenescence** investigation, sponsored by ISS National Lab, uses tissue chips to study how microgravity affects immune function during flight and whether immune cells recover post-flight. **Tissue chips** are small devices that contain human cells in a 3D structure, allowing scientists to test how those cells respond to stresses, drugs, and genetic changes.



Shown in this photo is pre-flight preparation of tissue chips for the Immunosenescence investigation, which studies the effects of microgravity on immune function to determine the mechanisms behind immune system aging.
Credits: Sonja Schrepfer, University of California San Francisco

Soil in space

On Earth, complex communities of microorganisms carry out key functions in soil, including cycling of carbon and other nutrients and supporting plant growth. **DynaMoS**, sponsored by

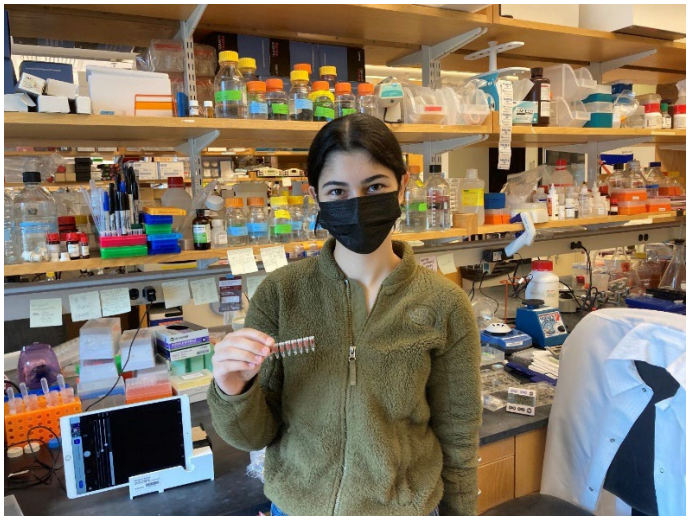
NASA's Division of Biological and Physical Sciences (BPS), examines how microgravity affects metabolic interactions in communities of soil microbes. This research focuses on microbe communities that decompose chitin, a natural carbon polymer on Earth.

BeaverCube

BeaverCube is an education mission that will teach high school students aerospace science by having them design a CubeSat. BeaverCube will host one visible and two infrared imagers to measure cloud properties, ocean surface temperatures and ocean color to study the Earth's climate and weather systems. It also will demonstrate an application for the use of shape memory alloy technology via an on-orbit calibration technique.

Genes, no cells

Cell-free technology is a platform for producing protein without specialized equipment of living cells that need to be cultured. **Genes in Space-9**, sponsored by the ISS National Lab, demonstrates cell-free production of protein in microgravity and evaluates two cell-free biosensors that can detect specific target molecules. This technology could provide a simple, portable, and low-cost tool for medical diagnostics, on-demand production of medicine and vaccines, and environmental monitoring on future space missions.

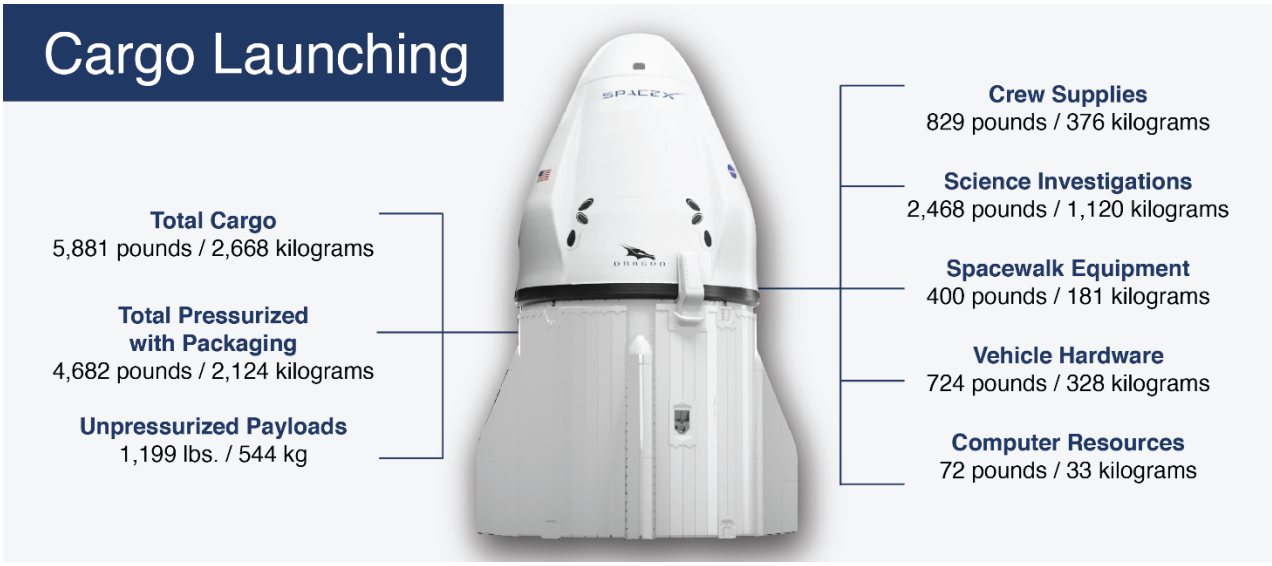


Selin Kocalar, the student who designed the experiment on which Genes in Space-9 is based, prepares her samples for launch.
Credits: Genes in Space

Better concrete

Biopolymer Research for In-Situ Capabilities looks at how microgravity affects the process of creating a concrete alternative made with an organic material and on-site materials such as lunar or Martian dust, known as a biopolymer soil composite (BPC). Using resources available where construction takes place makes it possible to increase the mass of the construction material and, therefore, the amount of shielding.

Cargo Highlights



Hardware

Launch:

- **Pretreat and Water Dose Pump** – This critical Waste and Hygiene Compartment (WHC) pump allows for the dosing of pretreat into the space station toilet system. This spare will support the legacy toilet operations and will provide fault tolerance in the event of premature pump failure.
- **Catalytic Reactor** – Following the removal and replacement of the installed unit in June 2022, this unit provides critical sparing support for the water production capability for the Environmental Control and Life Support System (ECLSS).
- **Ion Exchange Bed** – Responsible for removing byproducts from the catalytic reactor, this unit is capable of providing microbial control on-orbit throughout the Water Processor Assembly (WPA) subsystem on-orbit.
- **Advanced Resistive Exercise Device (ARED) Cable Arm Ropes** – Designed to sustain high loads via the ARED, the previously installed units we replaced following observable fraying. These critical spares will provide fault tolerance for ARED in supporting crew exercise activities on-orbit.
- **Potable Water Dispenser (PWD) Filters** – This critical filter assembly is used to remove iodine from water consumed by the crew during nominal operations. These two filters will support the crew's water needs through early 2023.
- **Brine Processor Assembly Bladders** – Used to recover additional water from urine brine, these units will further support the USOS segment's water reclamation and processing capability.

- **Rodent Research Habitats and Transporters** – Rodents, habitats, transporters, and support hardware required for the rodent-specific activities during the mission duration.
- **Advanced Plant Habitat Environmental Control System (ECS) Module** – Designed to provide temperature and humidity control, this module will aid in providing optimal air mixing within the habitat chamber.
- **Battery Charge/Discharge Unit (BCDU) –** Following return on NASA's SpaceX CRS-19, this unit was refurbished for re-flight to support the space station's Electrical Power System**.** Additionally, this unit is launching externally in the Dragon trunk.

Return:

- **Catalytic Reactor** – Supporting the International Space Station's Environmental Control and Life Support System's (ECLSS) Water Process Assembly (WPA), this unit was uninstalled in 2021 following degraded performance. Returning to the ground for test, teardown, and evaluation (TT&E), this spare will be refurbished to support future ECLSS requirements and demand.
- **Nitrogen Purge Orbital Replacement Unit (ORU) –** Utilized to purge the Oxygen Generator Assembly (OGA) cell stack upon shutdown as a protection mechanism. This unit was uninstalled in Feb. 2022 after weeks of degraded operations and is being returned for inspection and refurbishment for future spares support.
- **Solid State Lighting Assembly (SSLA)** – Designed to replace most of the legacy lights on-orbit, this is the first of the upgraded lighting assemblies that have failed before their expected life limit and is being returned for investigation.
- **Nitrogen/Oxygen Recharge System (NORS) Oxygen Recharge Tank Assembly (RTA)** – High-pressure gas tank returning to ground to supply future oxygen to support critical extravehicular activities in the 2023 timeframe.
- **Hydrogen Sensor Orbital Replacement Unit (ORU)** – Critical Environmental Control and Life Support System (ECLSS) hardware that monitors for the presence of excess hydrogen in the generated oxygen, which helps inform NASA of problems with the OGS's cell stack. This sensor will undergo recalibration and nominal refurbishment for future use.
- **Treadmill 2 (T2) Isolators** – All eight isolator (X-, Y-, Z-axis, and upper) pairs were replaced due to degraded performance, with the remaining spares inventory flown on NASA's SpaceX Crew-4. Failed units are being returned to the ground for investigation and refurbishment to support future treadmill exercise activities for the crew.
- **ARED Belt/Pulley Assembly** – After being replaced due to the balancing arms being popped out of their detents/catches, this failed unit will undergo refurbishment to support sustaining the crew's necessary exercise requirements.
- **Extravehicular Mobility Unit** (**EMU) 3015 –** After successfully completing the U.S. EVA-80 spacewalk, a thin layer of moisture was discovered on the inner surface of the helmet and on an absorption pad. To further investigate the cause and source of this water, EMU 3015 will be returned to Earth for test, teardown, and evaluation (TT&E).

Watch & Engage

Live coverage of the launch from Launch Complex Pad 39A from NASA's Kennedy Space Center in Florida will air on NASA Television, the NASA app, and the agency's website at 8:15 p.m. EDT Thursday, July 14, with liftoff at 8:44 p.m. EDT.

Subscribe and get the latest NASA news with a weekly update in your inbox:

https://www.nasa.gov/subscribe