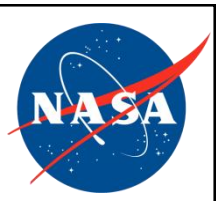
SpaceX CRS-5

Fifth Commercial Resupply Services Flight to the International Space Station

National Aeronautics and Space Administration



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OVERVIEW

The Dragon spacecraft will be filled with more than 5,000 pounds of supplies and payloads, including critical materials to support 256 science and research investigations that will occur during Expeditions 42 and 43. Science payloads will enable model organism research using fruit flies and will study flatworms to better understand wound healing in space. A special science payload is the Cloud-Aerosol Transport System which will monitor cloud and aerosol coverage which directly impacts global climate. The mission also delivers an IMAX camera for filming during four increments and tools that will be used in future EVA's to prepare the station for the installation of the new international docking adapters. After four weeks at the space station, the spacecraft will return with more than 3,600 pounds of cargo, including crew supplies, hardware and computer resources, science experiments, space station hardware, and trash.

DRAGON CARGO

	LAUNCH ITEMS	RETURN ITEMS
TOTAL CARGO:	**5108 lbs / 2317 kg**	**2936 lbs / 1332 kg**
Crew Supplies	1080 lbs / 490 kg	46 lbs / 21 kg
Crew care packages		
Crew provisions		
Food		
Vehicle Hardware	1495 lbs / 678 kg	511 lbs / 232 kg
Crew Health Care System hardware		
Environment Control & Life Support equipment		
Electrical Power System hardware		
Flight Crew Equipment		
Japan Aerospace Exploration Agency equipment		
Science Investigations	1272 lbs / 577 kg	1658 lbs / 752 kg
U.S. investigations		
Japan Aerospace Exploration Agency investigations		
European Space Agency investigations		
Computer Resources	35 lbs / 16 kg	2 lbs / 1 kg
Command and Data Handling		
Photo and TV equipment		
EVA equipment	51 lbs / 23 kg	189 lbs / 86 kg
Russian hardware	86 lbs / 39 kg	77 lbs / 35 kg
CATS External Payload	1089 lbs / 494 kg	---
Misc Return Cargo/Trash	---	1369 lbs/ 205 kg
Total weight of cargo with packaging	5280 lbs / 2395 kg	3664 lbs / 1662 kg

RENDEZVOUS AND RETURN

About 10 minutes after launch, Dragon reaches its preliminary orbit. It then deploys its solar arrays and begins a carefully choreographed series of thruster firings to reach the space station. After a two-day trip, NASA astronauts Barry Wilmore and Terry Virts will use the station's 57.7-foot (17.6-meter) robotic arm to reach out and capture the Dragon spacecraft as they operate from the station's cupola. Ground commands will be sent from Houston for the station's arm to install Dragon on the bottom side of the station's Harmony module for its stay at the International Space Station. By the next day, crew will pressurize the vestibule between the station and Dragon and will open the hatch that leads to the forward bulkhead of Dragon. During the next four weeks, the crew will unload the spacecraft and reload it with cargo to return to Earth. About five and a half hours after it departs the station, it will splash down in the Pacific Ocean off the coast of Baja California. This is the fifth of 12 missions under the SpaceX Commercial Resupply Services contract with NASA. Under the contract, SpaceX will deliver a minimum of 20 metric tons of cargo to the space station.

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RESEARCH HIGHLIGHTS

CATS

The Cloud-Aerosol Transport System (CATS) investigation uses a light detection and ranging (LiDAR) system to measure the location, composition and distribution of pollution, dust, smoke, aerosols and other particulates in the atmosphere. CATS is mounted on the Japanese Experiment Module's Exposed Facility and is used to study the atmospheric constituents that impact global climate. By gaining a better understanding of cloud and aerosol coverage, scientists can create a better model of the Earth's climate feedback processes.

Flatworm Regeneration

Flatworms regenerate their own cells, replacing them as they age or are damaged. This investigation studies the cell signaling mechanisms these organisms use while regenerating their tissue in microgravity. Results provide insight into how gravity affects tissue regeneration and the rebuilding of damaged organs and nerves, which is important for understanding how wounds heal in space.

Fruit Fly Lab

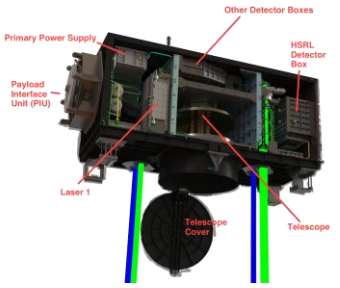
The common fruit fly (Drosophila melanogaster) is an important animal model for the human immune system, making it a useful model for studying the biological effects of spaceflight. Spaceflight affects the innate immune system, which could make animals including humans more susceptible to disease, especially because microbes can become more virulent in space. The NASA Ames Research Center (ARC) ISS Drosophila Experiment (Fruit Fly Lab-01) studies the combined effect of altered host immunity with changes to microbes in space.

Micro-5

The investigation of interactions between the host and bacteria, conserved cellular responses, and countermeasure efficacy during spaceflight using the human surrogate model Caenorhabditis elegans (Micro-5) aims to better understand the risks of in-flight infections in space explorers during long-term space flight, using the model organism Caenorhabditis elegans (roundworm) with the microbe Salmonella typhimurium (that causes food poisoning in humans).

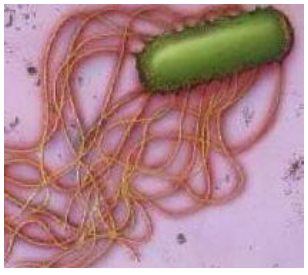
NanoRacks-SABOL

In degenerative brain diseases like Alzheimer's, proteins clump together in the brain and form fibrous plaques, known as amyloids. These structures are made from proteins that normally dissolve in liquid, but they become insoluble when they self-assemble. NanoRacks-Self-Assembly in Biology and the Origin of Life (NanoRacks-SABOL) seeks to successfully grow amyloid fibers in microgravity for the first time, aiming to compare them with fibers grown on the ground.



CATS will study the Earth's atmosphere to help scientists form better models of the Earth's climate feedback process

The common fruit fly (Drosophila melanogaster) under carbon dioxide anesthesia



Microscopic view of Salmonella typhimurium bacteria which will be studied in the Micro-5 investigation