NORTHROP GRUMMAN

National Aeronautics and Space Administration

NASA

OVERVIEW

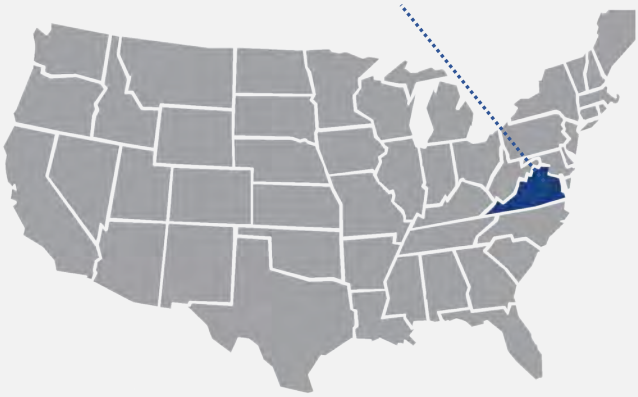
CRS-10 Mission

Northrop Grumman's 10th contracted cargo resupply mission (CRS-10) with NASA to the International Space Station will deliver more than 7,300 pounds of science and research, crew supplies and vehicle hardware to the orbital laboratory and its crew. Launch is targeted for no earlier than Friday, Nov. 16, 2018.

Launch Vehicle
Antares 230 Rocket

- Features all new RD-181 engines
- Increased performance and flexibility

Launch Site:
Wallops Flight Facility, Virginia



John Young

NASA Astronaut • 1930 - 2018

John Young Mission Patches

Gemini 3


Gemini 10

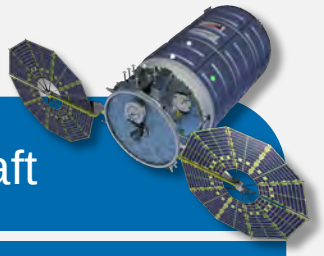
Apollo 10


Apollo 16

STS-1


STS-9

The Cygnus spacecraft for this space station resupply mission is named in honor of John Young, who walked on the Moon during Apollo 16 and commanded the first space shuttle mission. Young, who passed away in January of 2018, was selected in NASA's second astronaut class and flew during the Gemini, Apollo and Space Shuttle programs.



Cygnus Spacecraft

- Will deliver hardware and supplies to support dozens of science and research investigations
- Will spend 3 months attached to the space station on the Unity module
- In February, will dispose of several tons of trash during destructive re-entry into Earth's atmosphere

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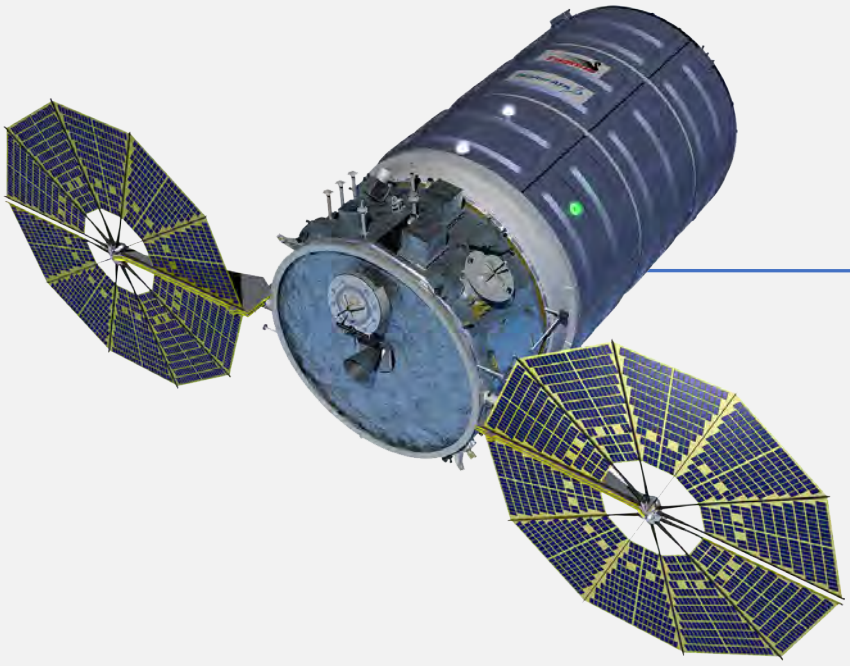
CARGO

CRS-10 Mission



Crew Supplies
2,515.5 lbs. / 1,141 kg

Science Investigations
2,301.6 lbs. / 1,044 kg

Spacewalk Equipment
68.3 lbs. / 31 kg

Vehicle Hardware
2,076.8 lbs. / 942 kg

Computer Resources
253.5 lbs. / 115 kg

Total Cargo:	**7,385.5 lbs. / 3,350 kg**
Total Pressurized Cargo with Packaging:	**7,215.8 lbs. / 3,273 kg**
Unpressurized Cargo (NanoRacks Deployer):	**169.8 lbs. / 77 kg**

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HARDWARE

CRS-10 Mission

Highlights

HP Zbook Laptops: New laptops to replace previous generation of computers used aboard station. Laptops are used for activities including crew office needs, conducting experiments and controlling systems aboard the station.

Water Storage System (WSS) Tanks: Four water storage tanks previously used during the space shuttle program that will comprise a new water storage and delivery system.

Urine Processor Assembly (UPA) Distillation Assembly (DA): The primary component in the station's urine processor that distills clean, drinkable water from crew urine.

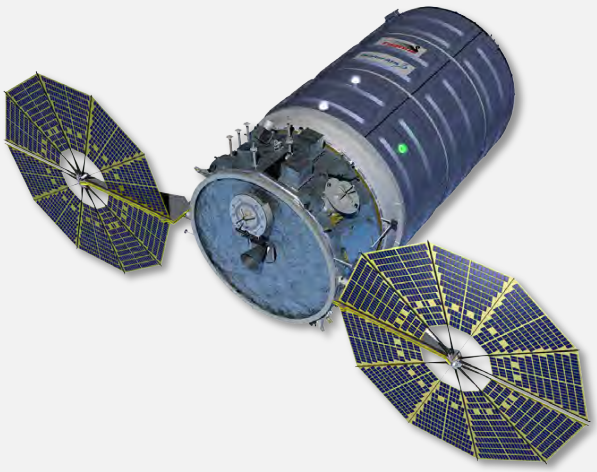
Fluid Control and Pump Assembly (FCPA): An approximately 100 pound device used to pump crew urine to the distillation assembly and remove both clean water and waste once the distillation is complete.

Pressure Control and Pump Assembly (PCPA): Part of the station's UPA used to create a vacuum enabling the distillation of urine into clean water.

Robotic Arm Operators for Cygnus Capture

Serena Auñón-Chancellor (prime)
NASA

Alexander Gerst
ESA



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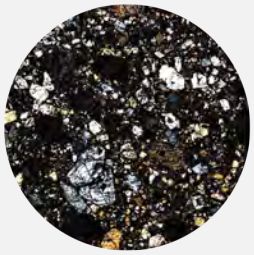
RESEARCH

CRS-10 Mission

The new experiments arriving to the orbital laboratory will challenge and inspire future scientists and explorers. Science payloads will study communication and navigation, microbiology, animal biology and plant biology.

The Refabricator demonstrates the first integrated 3D Printer and Recycler on board the International Space Station (ISS). Refabricator recycles waste plastic materials into high quality 3D-printer filament, providing the potential for sustainable fabrication, repair, and recycling capabilities on long-duration space missions. This hardware represents a key component of NASA's In-Space Manufacturing (ISM) technology development roadmap.

The Effect of Long Duration Hypogravity on the Perception of Self-Motion (VECTION) study aims to determine to what extent an astronaut's ability to visually interpret motion, orientation, and distance may be disrupted in a microgravity environment, and how it may adapt, and how it may be changed upon return to Earth. Multiple experimental time points inflight and upon return to Earth allows for the adaptation and recovery process to be investigated.



Experimental Chondrule Formation at the International Space Station (EXCISS) simulates the high-energy, low gravity foundry of the early solar system using automated cameras and a contained apparatus aboard the International Space Station (ISS). Many questions remain as to how the dust originally created by star-based processes turned into intermediate-sized particles, which eventually became planets, moons and other objects. EXCISS specifically zaps a specially formulated dust with an electrical current and then studies the shape and texture of pellets formed from these steps in the absence of gravity.

Crystallization of LRRK2 Under Microgravity Conditions-2 (CASIS PCG 16) evaluates growth of Leucine-rich repeat kinase 2 (LRRK2) protein crystals in microgravity. LRRK2 is implicated in Parkinson’s disease, but crystals of the protein grown on Earth are too small and compact to study. Detailed analysis of larger, space-grown crystals can define the protein’s exact shape and morphology and help scientists better understand the disease’s pathology.