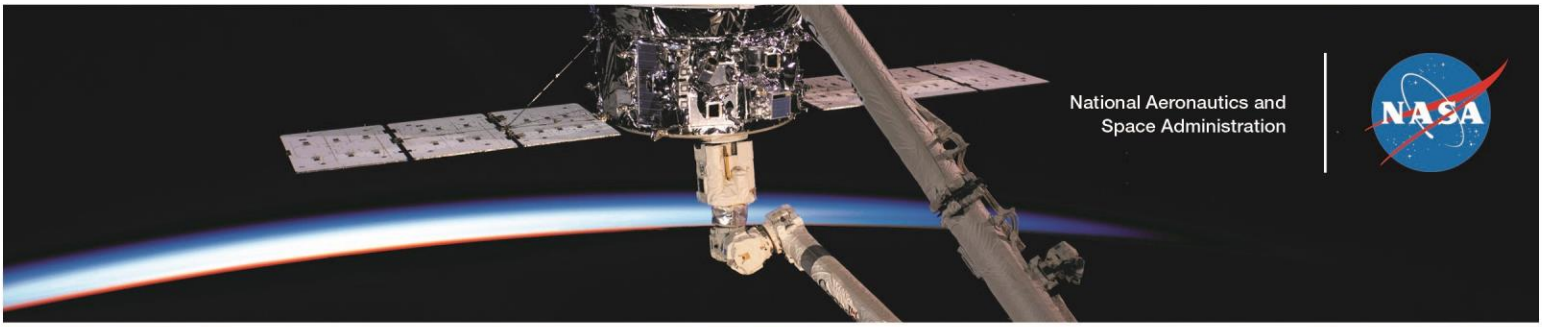


ORBITAL ATK CRS-6 MISSION OVERVIEW

Orbital ATK's fifth contracted cargo resupply mission with NASA to the International Space Station will deliver over 7,700 pounds of science and research, crew supplies and vehicle hardware to the orbital laboratory and its crew. Launch is targeted for Tuesday, March 22, 2016.

The spacecraft will launch aboard an Atlas V rocket from Cape Canaveral Air Force Station in Florida, carrying essential supplies to the crew aboard the station. After arriving at the station, station crew members Tim Kopra and Tim Peake will use the station's robotic arm to capture Cygnus. It will be berthed to the Earth-facing port on the Unity module.

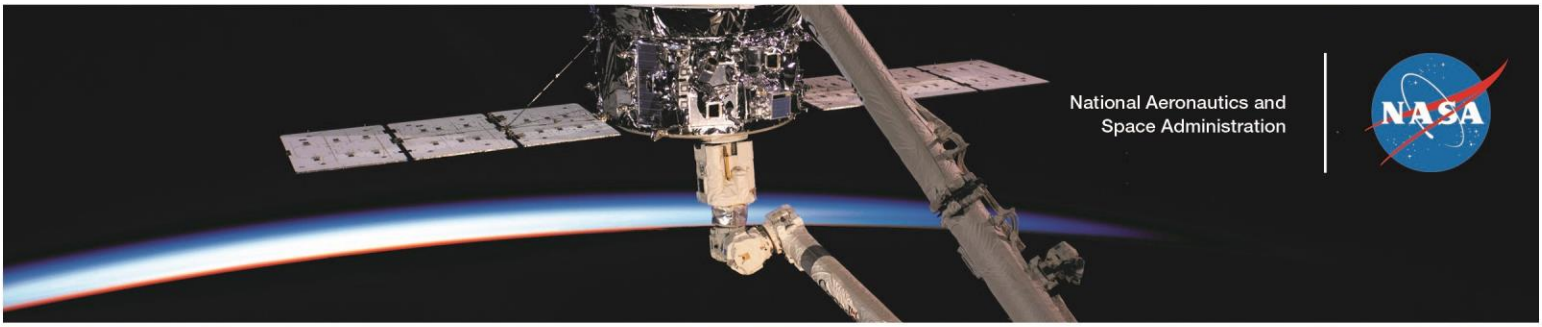
Cygnus will carry hardware and supplies to support dozens of the of approximately 250 science and research investigations that will occur during Expeditions 47 and 48.

The Cygnus spacecraft will spend almost two months attached to the space station. In May, the spacecraft will dispose of about 3,000 pounds of trash during its destructive reentry into Earth's atmosphere.

TOTAL CARGO:	**7231.1 lbs. / 3280 kg**
• *Science Investigations*	*1715.2 lbs. / 778 kg*
• *Crew Supplies*	*2511.1 lbs. / 1139 kg*
• *Vehicle Hardware*	*2442.7 lbs. / 1108 kg*
• *Spacewalk Equipment*	*346.1 lbs. / 157 kg*
• *Computer Resources*	*216 lbs. / 98 kg*
TOTAL CARGO WITH PACKAGING:	**7758 lbs. / 3519 kg**

This will be the second flight of an enhanced Cygnus spacecraft to the International Space Station. The cargo freighter now features a greater payload capacity, new UltraFlex solar arrays and new fuel tanks. This is also the second Cygnus mission utilizing the Atlas V launch system, providing increased performance and flexibility to the Orbital ATK cargo delivery service.

Cygnus' pressurized cargo module (PCM) has been extended and increases the spacecraft's interior volume capacity by 25 percent, enabling more cargo to be delivered with each mission. With the increase in volume, coupled with weight savings from upgraded components, the enhanced Cygnus has a maximum payload of more than 3,500 kilograms (7,700 pounds), which is 1,200 kilograms (2,630 pounds) more than its predecessor.



ORBITAL ATK CRS-6 RESEARCH OVERVIEW

The new experiments arriving to the orbital laboratory will challenge and inspire future scientists and explorers. Science payloads will study fire, meteors, regolith, adhesion, and 3-D printing in microgravity.

Saffire-I provides a new way to study a realistic fire on an exploration vehicle, which has not been possible in the past because the risks for performing such studies on manned spacecraft are too high. Instruments on the returning Cygnus will measure flame growth, oxygen use and more. Results could determine microgravity flammability limits for several spacecraft materials, help to validate NASA's material selection criteria, and help scientists understand how microgravity and limited oxygen affect flame size. The investigation is crucial for the safety of current and future space missions.

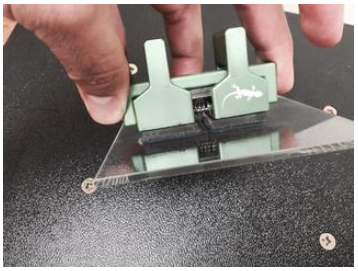
Meteor will enable the first space-based observations of meteors entering Earth's atmosphere from space. Meteor uses high-resolution video and image analysis of the atmosphere to ascertain the physical and chemical properties of the meteoroid dust, such as size, density and chemical composition. Since scientists usually identify the parent comets or asteroids for most meteor showers, the study of the meteoroid dust from the space station provides information about those parent comets and asteroids. Investigating the elemental composition of meteors adds to our understanding of how the planets developed, and continuous measurement of meteor interactions with Earth's atmosphere could spot previously unforeseen meteors.

Strata-I could give us answers about how regolith behaves and moves in microgravity, how easy or difficult it is to anchor a spacecraft in regolith, how it interacts with spacecraft and spacesuit materials, and other important properties. The Strata-1 experimental facility exposes a series of regolith simulants, including pulverized meteorite material, glass beads, and regolith simulants composed of terrestrial materials and stored in multiple transparent tubes, to prolonged microgravity on the space station. Scientists will monitor changes in regolith layers and layering, size sorting, and particle migration via video images and close examination after return of regolith samples to Earth. Strata-1 can be used in a range of future experiments to study the behavior of materials like those seen on specific types of asteroids and the Mars moon, Phobos, which have been identified as exploration targets for the Asteroid Redirect Mission (**ARM**).

Gecko Gripper tests a gecko-adhesive gripping device that can stick on command in the harsh environment of space. Gecko Grippers have many applications on current and future space missions, including acting as mounting devices for payloads, instruction manuals and many other small items within the space station. The technology in this investigation also holds promise for industries where gecko-like grippers could be used in factories to handle fragile or lightweight objects like glass, and bags or boxes of food.

Additive Manufacturing Facility will add a new capability to the station. Additive manufacturing (3D printing) is the process of building a part layer-by-layer, with an efficient use of the material. The AMF uses this technology to enable the production of components on the space station for both NASA and commercial objectives. Parts, entire experiments, and tools can be created on demand.

A view of the contents of two of Strata-1's tubes. The regolith simulant on the left is a simplified model consisting of angular fragments of colored glass, sorted into three sizes. The tube on the right contains pulverized meteorite material to closely resemble the actual regolith on a small asteroid, also sorted into three sizes.
Credits: NASA



Small handheld gecko grippers and associated test hardware.
Credits: NASA

The Additive Manufacturing Facility (AMF) at Made in Space headquarters.
Credits: Made in Space