SPACEX CRS-10 MISSION OVERVIEW

SpaceX's tenth contracted cargo resupply mission with NASA to the International Space Station will deliver almost 5,500 pounds of science and research, crew supplies and vehicle hardware to the orbital laboratory and its crew. Launch is targeted for Saturday, Feb. 18, 2017.

The spacecraft will launch aboard a Falcon 9 rocket from Launch Complex 39A at NASA's Kennedy Space Center in Florida and arrive at the space station two days later. **Expedition 50** crew members Shane Kimbrough and Peggy Whitson of NASA, Thomas Pesquet of ESA (European Space Agency) and cosmonauts Sergey Ryzhikov, Andrey Borisenko and Oleg Novitskiy of Roscosmos are currently living aboard the orbiting laboratory. Pesquet and Kimbrough will use the station's robotic arm to capture Dragon when it arrives on station. The spacecraft will be berthed to the Earth-facing port on the Harmony module.

Dragon will carry hardware and supplies to support dozens of the of approximately 250 science and research investigations that will occur during Expeditions 50 and 51. The unpressurized trunk of the spacecraft will also hold the **Stratospheric Aerosol and Gas Experiment (SAGE) III** experiment, which will provide continuity for key climate observations and data records.

TOTAL CARGO:	**5489.5 lbs. / 2490 kg**
TOTAL PRESSURIZED CARGO WITH PACKAGING:	**3373.1 lbs. / 1530 kg**
• *Science Investigations*	*1613.8 lbs. / 732 kg*
• *Crew Supplies*	*652.6 lbs. / 296 kg*
• *Vehicle Hardware*	*842.2 lbs. / 382 kg*
• *Spacewalk Equipment*	*22.0 lbs. / 10 kg*
• *Computer Resources*	*24.2 lbs. / 11 kg*
• *Russian Hardware*	*48.5 lbs. / 22 kg*
UNPRESSURIZED	
• *SAGE-III & STP-H5 Lightning Imaging Sensor*	*2116.4 lbs. / 960 kg*

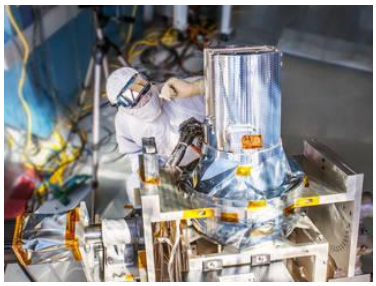
Installation and Undocking Overview:
About 10 minutes after launch, Dragon reaches its preliminary orbit. It then deploys its solar arrays and begins a carefully choreographed series of thruster firings to reach the space station. After a two-day trip, Thomas Pesquet will use the station's 57.7-foot (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 for the station's arm to install Dragon on the bottom side of the Harmony module for its stay at the International Space Station. By the next day, the crew will pressurize the vestibule between the station and Dragon and 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.

SPACEX CRS-10 SCIENCE OVERVIEW

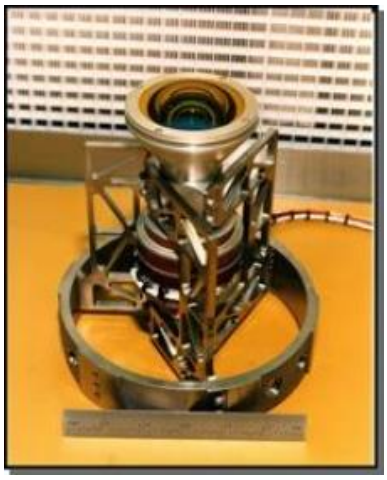
The tenth SpaceX cargo resupply launch to the International Space Station will deliver investigations that study human health, Earth science and weather patterns. Highlights include:

Stratospheric Aerosol and Gas Experiment (SAGE) III is part of one of NASA's longest running Earth-observing programs, providing continuous, long-term data to help scientists better understand and care for Earth's atmosphere. SAGE was first operated in 1979 following the Stratospheric Aerosol Measurement (SAM), on the Apollo-Soyuz mission. SAGE III will measure stratospheric ozone, aerosols, and other trace gases by locking onto the sun or moon and scanning a thin profile of the atmosphere. In addition to measuring the key components of the atmosphere, this investigation will also measure temperatures in the stratosphere and mesosphere, as well as profiles of trace gases. Understanding these measurements will allow national and international leaders to make informed policy decisions regarding the protection and preservation of Earth's atmosphere.



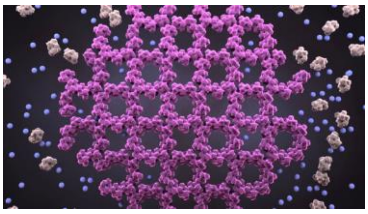
SAGE III will measure aerosols, ozone, water vapor and other gases to help scientists better understand levels of ozone in the Earth's atmosphere.
Credits: NASA Langley/Sean Smith

Lightning Imaging Sensor (STP-H5 LIS) is an external payload that will measure the amount, rate and energy of lightning as it strikes around the world. Lightning flashes on Earth about 45 times per second, according to space-borne lightning detection instruments. This investigation continues those observations using a similar sensor aboard the station. Data transmitted from this device will improve our understanding of lightening and provide valuable insight into weather prediction, climate change, atmospheric chemistry and physics, and air- and spacecraft safety.



Optics in the Lightning Imaging Sensor telescope.
Credit: NASA

Microgravity Growth of Crystalline Monoclonal Antibodies for Pharmaceutical Applications (CASIS PCG 5) (CASIS/National Lab) will crystallize a human monoclonal antibody, developed by Merck Research Labs, that is currently undergoing clinical trials for the treatment of immunological disease. Monoclonal antibodies are important for fighting off a wide range of human diseases, including cancers. These antibodies work with the natural immune system to bind to certain molecules to detect, purify and block their growth. Preserving these antibodies in crystals allows researchers a glimpse into how the biological molecules are arranged, which can provide new information about how they work in the body. Thus far, Earth-grown crystalline suspensions of monoclonal antibodies have proven to be too low-quality to fully model. With the absence of gravity and convection aboard the station, larger crystals with more pure compositions and structures can grow. The results from this investigation have the potential to improve the way monoclonal antibody treatments are administered on Earth. Crystallizing the antibodies could enable methods for large-scale delivery through injections rather than intravenously, and improve methods for long-term storage.



CASIS PCG 5 will crystallize a human monoclonal antibody, developed by Merck Research Labs, that is currently undergoing clinical trials for the treatment of immunological disease.
Credits: NASA

Microgravity Expanded Stem Cells (CASIS/National Lab) will have crew members observe cell growth and morphological characteristics in microgravity and analyze gene expression profiles of cells grown on the station. Stem cells are used in a variety of medical therapies, including the treatment of stroke. Currently, scientists have no way of efficiently expanding the cells, a process that may be accelerated in a microgravity environment. This information will provide insight into how human cancers start and spread, which aids in the development of prevention and treatment plans. Results from this investigation could lead to the treatment of disease and injury in space, as well as provide a way to improve stem cell production for human therapy on Earth.