



Hubble Space Telescope – Mission Operations

NASA's Goddard Space Flight Center (GSFC) in Greenbelt, Maryland, is home to the Hubble Space Telescope Operations Project. This is the government's team of engineers, scientists, and managers who oversee all aspects of Hubble's mission. Together, the operations team focuses on keeping Hubble healthy and productive. Their tasks include monitoring the telescope's subsystems (like power, thermal, pointing control, and science instruments), flight software development, and systems administration of the network and ground system components.

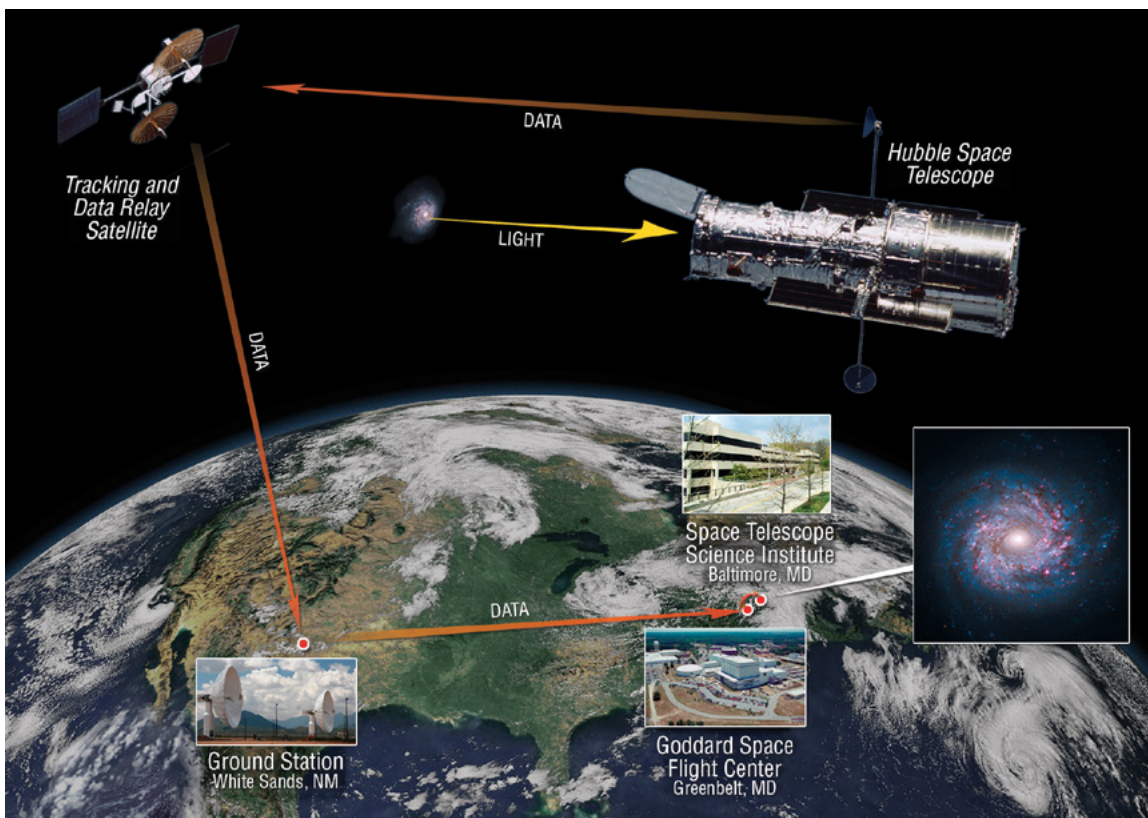
At GSFC, the Space Telescope Operations Control Center (STOCC) is the heart of Hubble's mission control. It consists of a Mission Operations Room (MOR), which is Hubble's primary command and control room, and the Operations Support Room (OSR).

Before May 2011, a team of console operators staffed the MOR around the clock. They managed Hubble's science and engineering data recorders and loaded Hubble's computers with command sequences, all while monitoring telemetry from the telescope and reporting any issues to the appropriate subsystem engineers.

Today, all of those functions are autonomous, enabling STOCC employees to focus on special operations and testing. Plus, they can work a more standard shift on weekdays. However, if a spacecraft or ground system anomaly occurs when the facility is unoccupied, a high reliability texting system immediately alerts the operations team.

In the OSR, personnel verify any configuration or procedure changes planned for Hubble by analyzing engineering telemetry against a

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Hubble transmits its data using Tracking and Data Relay Satellite System (TDRSS) spacecraft.



The Mission Operations Room during observatory commanding (left) and the Operations Support Room during Servicing Mission 4 (right)

high-fidelity spacecraft simulator. The team also verifies such changes on the spacecraft itself and responds to anomalies in a similar fashion. In addition, this team continuously studies Hubble's subsystem performance to look for trends that could signal component degradation, and that identify ways to improve system performance and extend the mission's lifetime.

A network interface from the STOCC to NASA's White Sands Test Facility complex located in White Sands, New Mexico allows engineers to communicate with Hubble. Large antennae at White Sands transmit radio waves to NASA's Tracking and Data Relay Satellite System, which then forwards commands to Hubble itself. Science observations and engineering data that the telescope stores on solid-state recorders are returned to GSFC using the reverse path. Once received and quality checked, the science data is then forwarded to the Space Telescope Science Institute (STScI) in Baltimore, Maryland.

A separate team at STScI is responsible for Hubble's science operations. They are responsible for awarding and scheduling Hubble's observing time, calibrating data received from Hubble, and archiving datasets. STScI and GSFC work closely together to operate Hubble.

The Hubble mission and science operations teams work to continuously improve the telescope's science

productivity. Hubble remains at the forefront of astrophysics research because of its optical quality, excellent pointing performance, and the diverse capabilities of its instruments – all thanks to Hubble's dedicated operations staff.

Even given its highly productive work since 1990, Hubble has only observed one-tenth of one percent of the night sky! The observatory continues its mission to this day, and is in good health. Hubble is expected to remain operating into the 2030s.



Hubble system engineers discuss future pointing maneuvers in the Operations Support Room.

National Aeronautics and Space Administration

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