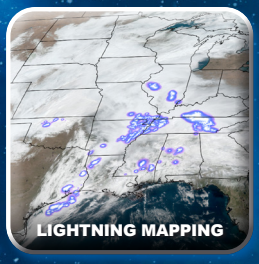
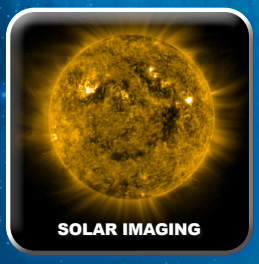
GOES-T



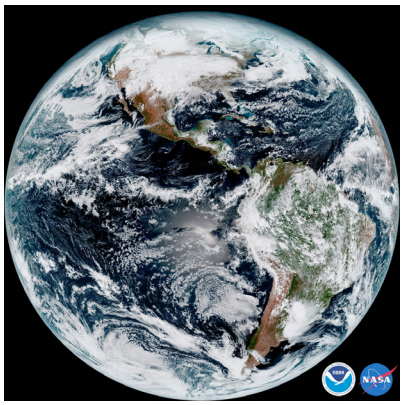


MISSION OVERVIEW

The GOES-T satellite in a clean room. Credit: Lockheed Martin

The GOES-S satellite launch on March 1, 2018. Credit: NASA

MISSION



GOES-16 GeoColor full disk image taken Jan. 15, 2017.

NOAA's GOES-T is the third satellite in the Geostationary Operational Environmental Satellites (GOES) – R Series, the Western Hemisphere's most sophisticated weather-observing and environmental monitoring system. The GOES-R Series provides advanced imagery and atmospheric measurements, real-time mapping of lightning activity, and space weather monitoring. After GOES-T launches, it will be renamed GOES-18 once it reaches geostationary orbit. Following a successful on-orbit checkout of its instruments and systems, NOAA plans to put GOES-T immediately into operational service, replacing GOES-17 as GOES West. GOES-18 will work in tandem with GOES-16, NOAA's operational GOES East satellite. Together, GOES-16 and GOES-18 will watch over more than half the globe – from the west coast of Africa to New Zealand. GOES-17 will become an on-orbit spare.

MONITORING WEATHER ON EARTH AND IN SPACE

The Advanced Baseline Imager (ABI) is the primary instrument on the GOES-R Series for imaging Earth's weather, oceans and environment. ABI is used for a wide range of applications related to severe weather, hurricanes, aviation, natural hazards, the atmosphere, oceans, and cryosphere. ABI scans Earth five times faster with four times the resolution and three times the number of channels than previous GOES for more accurate and reliable forecasts and severe weather warnings.

GOES-R satellites carry the **Geostationary Lightning Mapper (GLM)**, the first instrument of its kind flown in geostationary orbit. Developing severe storms often exhibit a significant increase in lightning activity and GLM data can help forecasters focus on initial thunderstorm development and intensifying severe

storms before they produce damaging winds, hail or even tornadoes.

GOES-R satellites also host a suite of instruments that detect and monitor approaching space weather hazards. The **Solar Ultraviolet Imager (SUVI)** and **Extreme Ultraviolet and X-ray Irradiance Sensors (EXIS)** provide imaging of the sun and detection of solar flares. The **Space Environment In-Situ Suite (SEISS)** and **Magnetometer** monitor, respectively, energetic particles and the magnetic field variations that are associated with space weather. Together, observations from these instruments contribute to space weather forecasts and early warning of disruptions to power utilities and communication and navigation systems as well as radiation damage to orbiting satellites.

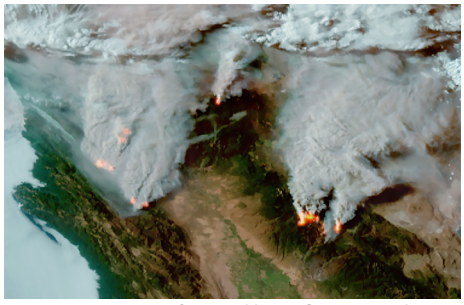
WHAT'S NEW

GOES-T will provide the same observations that GOES-R (GOES-16) and GOES-S (GOES-17) do, but with slight modifications to two of the instruments. In 2018, during post-launch testing of the GOES-17 ABI, scientists discovered an issue with the instrument's cooling system. The loop heat pipe subsystem, which transfers heat from the ABI electronics to the radiator, is not operating as designed. As a result, the ABI detectors can't be maintained at their intended temperatures under specific orbital conditions, leading to a partial loss of infrared imagery at certain times.

An investigation found the most likely cause of the thermal performance issue to be foreign object debris blocking the flow of the coolant in the loop heat pipes. As a result, changes to the design of the ABI radiator and loop heat pipes for GOES-T were implemented to decrease the chance of future cooling system malfunctions. The new design utilizes a simpler hardware configuration, which eliminates the filters that are susceptible to debris.

GOES-T also carries an upgraded magnetometer instrument. The new magnetometer is expected to provide improved performance for measuring magnetic field variations.

BENEFITS



GOES-17 imagery of several large fires in northern California on Aug. 4, 2021. Credit: NOAA

As GOES West, GOES-18 will be positioned to watch over the western contiguous United States, Alaska, Hawaii, Mexico, Central America, and the Pacific Ocean. The satellite will be ideally located to monitor weather systems and hazards that most affect this region of the Western Hemisphere.

- **Critical data over the northeastern Pacific Ocean, where many of the weather systems affecting the continental United States originate**
- **Fire detection, monitoring, and intensity estimation**
- **Detection of low clouds and fog**
- **Hurricane track and intensity forecasts**
- **Monitoring of atmospheric river events that can cause flooding and mudslides**
- **Monitoring of smoke and dust**
- **Data for air quality warnings and alerts**
- **Detection of volcanic eruptions and monitoring of ash and sulfur dioxide**
- **Sea surface temperature data for monitoring fisheries and marine life**
- **Warning of space weather hazards responsible for communications and navigation disruptions and power blackouts**
- **Monitoring of energetic particles responsible for radiation hazards**