NASA Facts

National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland 20771
(301) 286-8955

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NASA AND NOAA LAUNCH LATEST ENVIRONMENTAL SATELLITE GOES-M

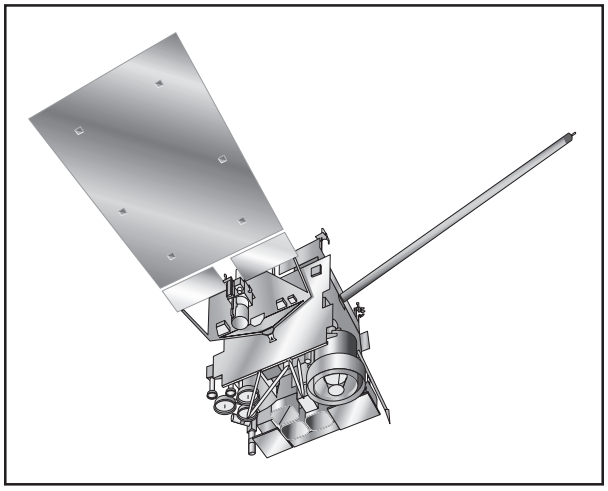
In 1983, NASA signed an agreement with the National Oceanic and Atmospheric Administration (NOAA) to design and build a new generation of environmental satellites. These satellites would carry instruments designed to operate as never before, taking near continuous observations of Earth.

The NASA-NOAA Partnership

NASA and NOAA are actively engaged in a cooperative program to continue the Geostationary Operational Environmental Satellite (GOES) system with the launch of the GOES-M satellite. NASA and NOAA have worked jointly to perfect, develop and complete the GOES program, begun in 1975 with the launch of the GOES-1 satellite.

This new generation of environmental satellites – GOES I through M – are a key element in NOAA's National Weather Service (NWS) modernization program.

NASA's Goddard Space Flight Center (GSFC), Greenbelt, Md., is responsible for procuring, developing and verification testing of the spacecraft, instruments and unique ground equipment. Following deployment of the spacecraft from the launch vehicle, GSFC is responsible for the mission operation phase leading to injection of the satellite into geostationary orbit and initial in-orbit satellite checkout and evaluation.



The GOES Spacecraft

NOAA is responsible for program funding and the in-orbit operation of the system. NOAA also determines the need for satellite replacement.

NOAA and NASA jointly design, develop, install and integrate the ground system needed to acquire, process and disseminate the data from the sensors on the GOES satellites. NASA's Kennedy Space Center is responsible for launch services.

Design and Operations

Goddard engineers design the satellite to operate in geosynchronous orbit 22,240 miles (35,790 kilometers) above the Earth. At this orbit, because the satellite's orbital velocity matches the rotation of the Earth, it appears to remain stationary in the sky. In addition, Goddard engineers developed the GOES satellites with a three-axis body stabilized spacecraft design. This enables the satellite to "stare" at the Earth and more frequently provide images of clouds, Earth's surface temperature and water vapor fields, and to continuously sound the atmosphere for vertical thermal and vapor profiles.

In the past, scientists from environmental service agencies have stated a need for continuous, dependable, timely and high-quality observations of the Earth and its environment. This series of GOES satellites provide half-hourly observations to fill the need. The instruments on board the satellites measure Earth's emitted and reflected radiation from which atmospheric temperature, winds, moisture and cloud cover can be derived.

Each satellite in the series carries two major instruments: an Imager and a Sounder. These instruments acquire high-resolution visible and infrared data, as well as temperature and moisture profiles of the atmosphere. They continuously transmit these data to ground terminals where the data are processed for rebroadcast to primary weather service offices in the United States and around the world, including the global research community.

These instruments provide two valuable features. The first, flexible scan, offers small-scale area imaging that lets meteorologists take pictures of local weather trouble spots. This allows them to improve short-term forecasts over local areas. The second feature, simultaneous and independent imaging and sounding, is designed to allow weather forecasters to use multiple measurements of weather phenomena to increase the accuracy of their forecasts.

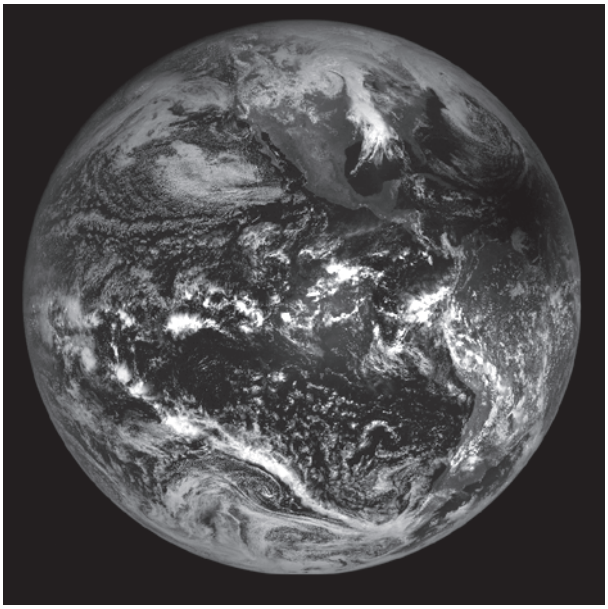
In addition to the Imager and the Sounder instruments, GOES-M will carry the new Solar X-ray Imager (SXI). The imager will be used to determine when to issue forecasts and alerts of "space weather" conditions that may interfere with ground and space systems.

Space weather conditions include ionospheric changes that affect radio communication and magnetospheric variations that can induce currents in electric power grids and long distance pipelines, cause navigational errors in magnetic guidance systems and, introduce changes in spacecraft charging producing high energy particles that can cause single event upsets in satellite circuitry. Magnetospheric variations can also expose astronauts to increased radiation.

The SXI will observe solar flares, solar active regions, coronal holes and coronal mass ejections. Images from the SXI will be used by NOAA and U.S. Air Force forecasters to monitor solar conditions that affect space weather. The SXI will fly on future GOES satellites.

The GOES satellites also provide instantaneous relay of distress signals from people, aircraft, or marine vessels to the search and rescue ground stations of the Search and Rescue Satellite Aided Tracking (SARSAT)System. A dedicated search and rescue transponder on board GOES is designed to detect emergency distress signals originating from Earth-based sources. These unique identification signals are normally combined with signals received by NOAA's

Polar Operational Environmental Satellite system and relayed to a search and rescue ground terminal. The combined data are usedto perform effective search and rescue operations.



A GOES 10 Visible Image as seen in February, 1998.

The GOES I-M system serves the central and eastern Pacific Ocean; North, Central, and South America; and the central and western Atlantic Ocean. Pacific coverage includes Hawaii and the Gulf of Alaska. This is accomplished by two satellites, GOES West located at 135 degrees west longitude and GOES East at 75 degrees west longitude. NOAA's Command and Data acquisition station located in Wallops, Va., supports the interface to both satellites. The NOAA Satellite Operations Control Center in Suitland, Md. provides spacecraft scheduling, health and safety monitoring and engineering analyses. Processed data are received at the National Weather Service's National Centers for Environmental Prediction in Camp Springs, Md., and NWS forecast offices across the United States.

GOES System in Weather Forecasting

The GOES system is a basic element of U.S. weather monitoring and forecast operations and is a key component of NOAA's National Weather Service modernization program. Spacecraft and ground-based systems work together to accomplish the GOES mission of providing weather imagery and quantitative sounding data that form a continuous and reliable stream of environmental information for weather forecasting and related services.

The GOES I-M satellites provide weather imagery and atmospheric sounding information for improved weather services, particularly for the timely forecasting of life- and property-threatening severe storms.

Commercial weather groups, universities, the Department of Defense, NASA, and the global research community also use GOES data products. Other users of these products can also be found in air and ground traffic control, ship navigation and agricultural sectors.

Satellite Series

The GOES satellites are given a letter designation while under construction on the ground and are renamed with a numerical designation after launch. This is done for two reasons: First, satellites are easier to track in orbit if they are designated with a number. Second, the satellites are built in alphabetical order but are not necessarily launched in this same order. Therefore, to avoid confusion, they are numbered upon reaching orbit.

The first satellite in the series, GOES-I, was launched April 13, 1994, from Cape Canaveral Air Force Station (CCAFS), Fla. This advanced satellite is providing more

The Atlas 1 (AC-73) carrying the GOES-I weather satellite, the first of five next-generation advanced weather satellites for NOAA, was launched from Launch Complex 36B at Cape Canaveral Air Force Station, Florida, on April 13, 1994, at 2:04 a.m. EDT.

precise and timely weather observation and atmospheric measurement data for the United States than ever before possible. GOES-8 is located at 75 degrees West longitude, overlooking the East Coast of North and South America and the Atlantic Ocean. GOES-I was renamed GOES-8 after achieving orbit and is still actively collecting data.

GOES-J, the second in the I-M series, was launched aboard an Atlas 1 rocket from CCAFS, on May 23, 1995. GOES-J was renamed GOES-9 after achieving orbit.

In early 1996, GOES-9 was positioned to view western the United States, West coast, Hawaii, Alaska, and the Pacific, or 135 degrees West longitude. As with GOES-8, this advanced satellite provided the most precise and timely weather, observation and atmospheric measurement data ever for the United States.

GOES-K, the third in the series, was successfully launched aboard an Atlas 1 rocket from CCAFS on April 25, 1997. GOES-K was renamed GOES-10 upon reaching orbit. GOES-10 replaced GOES-9 as the West Coast operational spacecraft on July 28, 1998.

GOES-L was launched aboard an Atlas rocket on May 3, 2000 from CCAFS. The satellite was renamed GOES-11 upon reaching orbit where it is stored until it is needed to replace one of the older GOES satellites.

The launch of the final spacecraft in the series, GOES-M, is scheduled for launch in the summer of 2001. It will also be stored on orbit until it is needed to replace one of the older GOES satellites. Its primary objective is to provide a full capability satellite in an on-orbit storage condition, to assure NOAA continuity in services from a two-satellite constellation.

Data from the GOES spacecraft are helping NASA scientists design instruments for follow-on missions for the NASA program known as the Earth Science Enterprise.

The goal of the Earth Science Enterprise is to allow humans to better understand natural environmental changes. Earth science data, which NASA distributes to researchers worldwide, is essential to making informed decisions about the environment.

For more information, visit the GOES web sites at:

http://goes2.gsfc.nasa.gov
http://www.osd.noaa.gov/sats/goes.htm
http://rsd.gsfc.nasa.gov/goes/