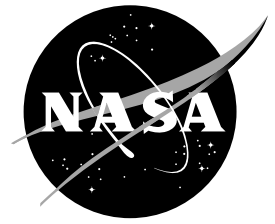


# NASA Facts

National Aeronautics and  
Space Administration

**Goddard Space Flight Center**  
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FS-2004-5-066-GSFC

## Upcoming GSFC Missions for 2004-2006

### NASA's New Structure

In a move designed to align NASA with the new vision for space exploration program, the Agency is transforming its organizational structure to better implement the "Vision for Space Exploration."

NASA's Mission Directorates are now structured as follows:

- **Science:** Carry out the scientific exploration of the Earth, Moon, Mars and beyond; chart the best route of discovery; and reap the benefits of Earth and space exploration for society. A combined organization is best able to establish an understanding of the Earth, other planets and their evolution, bring the lessons of our study of Earth to the exploration of the Solar System, and to assure the discoveries made here will enhance our work there.
- **Exploration Systems:** Develop capabilities and supporting research and technology, which enable sustained and affordable human and robotic exploration; includes the biological and physical research necessary to ensure the health and safety of crew during long duration space flight.
- **Aeronautics Research:** Research and develop aeronautical technologies for safe, reliable and efficient aviation systems.
- **Space Operations:** Direct space flight operations, space launches and space communications, as well

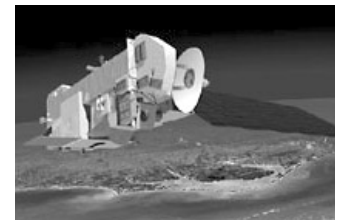
as the operation of integrated systems in low-Earth orbit and beyond.

As a Center for science, Goddard missions focus on improving our understanding of the Earth as a system, as well as the universe and beyond. The following information includes a brief summary of Goddard-managed missions for the years 2004-2006.

For information regarding NASA-wide missions, go to: [www.nasa.gov](http://www.nasa.gov)

### Missions for 2004:

**AURA** - Aura is NASA's newest Earth Observing System mission that will explore the atmosphere's natural variability and its response to human activity so that we can better predict changes in the Earth system. Aura will help answer important questions such as: Is the stratospheric ozone layer recovering? What are the processes controlling air quality? How is the Earth's climate changing?



*Artist concept of the AURA spacecraft.*

By 2006, Aura will be a member of a constellation of satellites flying in a formation referred to as the "A-Train." Flying with Aura in the A-Train are Aqua, CloudSat, CALIPSO, and OCO. A French mission called PARASOL will soon join this constellation.

While each satellite has an independent science mission, the complementary satellite observations will enable scientists to obtain more information than they could using the observations of a single mission.

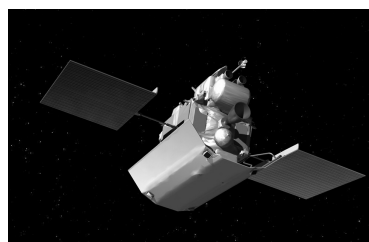
Aura launched from Vandenberg Air Force Base, Calif. aboard a Delta 7920 rocket in July and is managed by the Earth Observing System AURA Project Office at Goddard.

For more information about AURA, visit:  
<http://eos-chem.gsfc.nasa.gov/>

**MESSENGER** - The Mercury Surface, Space Environment, Geochemistry, and Ranging mission will help answer six important science questions:

- Why is Mercury so dense?
- What is Mercury's geologic history?
- What are the structure and state of Mercury's core?
- What is the nature of Mercury's magnetic field?
- What are the unusual materials at Mercury's poles?
- What volatiles are important at Mercury?

Mercury, Venus, Earth, and Mars are 'rocky' planets, with Mercury being the smallest, the densest (after correcting for self-compression), the one with the oldest surface, the one with the largest daily variations in surface temperature - and the least explored. Exploring this planet is crucial to developing a better understanding of how our own Earth formed, how it evolved and how it interacts with the Sun.



Artist concept of the MESSENGER spacecraft.

MESSENGER launched from Cape Canaveral Air Force Station, Fla. on August 3, aboard a Delta II rocket.

For more information about MESSENGER, visit:  
<http://messenger.jhuapl.edu/index.html>

**SWIFT** - The Swift Gamma Ray Burst Explorer is a first-of-its-kind multi-wavelength observatory dedicated to studying gamma-ray bursts, which announce the birth of black holes. Gamma-ray bursts are the most powerful type of explosions known, second only to the Big Bang in total energy release.



Artist concept of the SWIFT spacecraft.

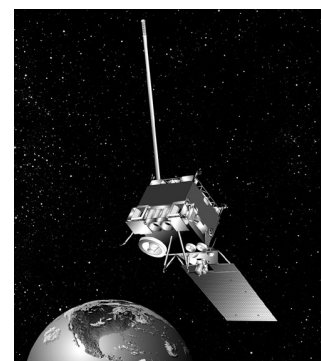
Data from SWIFT will help determine the origin of gamma-ray bursts, classify existing ones and search for new types, determine how blast waves evolve and interact with their surroundings, use gamma-ray bursts to study the early universe, and perform a survey of the sky in the hard X-ray band.

This Medium-Sized Explorer (MIDEX) mission is managed by the Explorers Program Office at Goddard. SWIFT is scheduled to launch aboard a Delta rocket from Cape Canaveral Air Force Station, Fla. no earlier in October 2004.

For more information about SWIFT, visit:  
<http://swift.gsfc.nasa.gov/>

### Missions Planned for 2005:

**GOES-N** - The National Oceanic and Atmospheric Administration's Geostationary Operational Environmental Satellites (GOES) provide continuous monitoring scientists need for intensive data analysis. Developed jointly with NASA, each GOES spacecraft circles the Earth in a geosynchronous orbit roughly 22,300 miles above our planet. This high perch enables the satellites a full-disc view of Earth. Due to their fixed spot, they provide a constant



Artist concept of the GOES-N spacecraft.

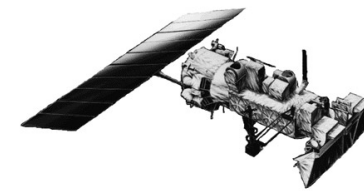
vigil for the atmospheric "triggers" of severe weather conditions such as tornadoes, flash floods, hailstorms and hurricanes.

GOES satellite imagery is used extensively by researchers to estimate the amount of rainfall during thunderstorms and hurricanes for flash flood warnings, for snowfall accumulations and overall extent of snow cover. Data collected helps meteorologists develop more accurate public winter storm warnings and spring snowmelt advisories. Sensors onboard the satellite also can detect ice fields and map the movements of sea and lake ice.

GOES-N is scheduled to lift off from Cape Canaveral Air Force Station, Fla. aboard a Delta IV rocket no earlier than January 2005.

For more information about GOES-N, visit:  
<http://www.oso.noaa.gov/goes/>

**NOAA-N** - Since 1978, NASA and NOAA have jointly developed a valuable series of Polar-orbiting Operational Environmental Satellites (POES). These satellites measure valuable global data for NOAA's short and long-range weather forecasting systems, providing near real-time environmental data for any region of the Earth that is no more than six hours old. The satellite data, which includes images that are often seen on televised nightly news programs, provide global information to the major weather forecasting agencies around the world, and direct-read-out data to thousands of individual users.



Artist concept of the NOAA-N spacecraft.

NOAA-N is scheduled to launch in February 2005 aboard a Delta II rocket from Vandenberg Air Force Base, Calif.

For more information about NOAA-N, visit:  
<http://www.oso.noaa.gov/poes/>

**CloudSat** - CloudSat's trio of three satellites will be the first mission to study clouds on a global basis. They will use advanced radar to "slice" through clouds to see their vertical structure, providing a completely new observational capability from space (current weather satellites can only image the uppermost layers of clouds).



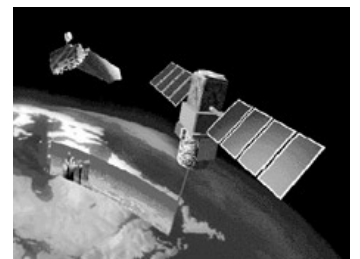
Artist concept of the CloudSat spacecraft.

CloudSat's primary goal is to furnish data needed to evaluate and improve the way clouds are represented in global models, thereby improving our understanding of clouds and their role in climate change.

CloudSat is scheduled to launch jointly in the Spring of 2005 with NASA's CALIPSO spacecraft aboard a Delta 7420 rocket from Vandenberg Air Force Base, Calif.

For more information about CloudSat, visit:  
<http://cloudsat.atmos.colostate.edu/cloudsat.html>

**CALIPSO** - The Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (CALIPSO) mission is a collaborative effort between NASA and the French space agency Centre National d'Etudes Spatiales that will address the role of clouds and aerosols in the Earth's radiation budget, providing key measurements necessary for improved climate predictions.



Artist concept of the CALIPSO spacecraft.

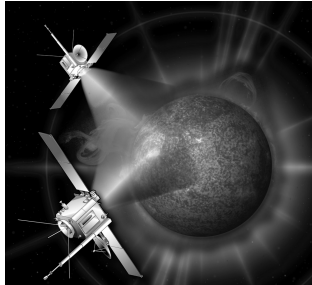
CALIPSO is part of NASA's Earth System Science Pathfinder Program, a series of missions designed to examine critical issues in Earth system science. CALIPSO is scheduled to launch jointly in the spring of 2005 with NASA's CloudSat spacecraft aboard

a Delta 7420 rocket from Vandenberg Air Force Base, Calif.

*For more information about CALIPSO, visit:  
<http://www-calipso.larc.nasa.gov/calipso.html>*

## Missions Planned for 2006:

**STEREO** – The Solar Terrestrial Relations Observatory (STEREO) Mission consists of two satellites that will orbit the Sun, providing three-dimensional images of its surface. STEREO will also trace the flow of energy and matter from the Sun to Earth, revealing true 3-D structures of coronal mass ejections to determine why they occur.



*Artist concept of the STEREO spacecraft.*

STEREO is part of NASA's Sun-Earth Connection program, whose primary focus is to understand the Sun, heliosphere and planetary environments as a single connected system.

The mission is scheduled to launch in February 2006 from Cape Canaveral Air Force station, Fla. aboard a Delta 2925 rocket.

*For more information about STEREO, visit:  
<http://stp.gsfc.nasa.gov/missions/stereo/stereohtm>*

**THEMIS** –A NASA Medium Explorer mission, The Time History of Events and Macroscale Interactions during Substorms (THEMIS) mission will fly five small spacecraft through explosive geomagnetic disturbances to solve the mystery of what triggers the colorful eruptions of the Northern and Southern lights. These violent substorms reflect major reconfigurations of near-Earth space and have significant implications for space weather, affecting numerous orbiting satellites as well as terrestrial communications.

The Explorers Program Office at Goddard manages THEMIS, which is scheduled to launch from Cape Canaveral Air Force Station, Fla. aboard a Delta II rocket in the summer of 2006.

*For more information about THEMIS, visit:  
<http://sprg.ssl.berkeley.edu/themis/>*

**AIM** - The Aeronomy of Ice in the Mesosphere, or AIM, mission will study the highest clouds in the earth's atmosphere — noctilucent, or "night shining" clouds. Made up of frozen water or ice crystals, noctilucent



*Artist concept of the AIM spacecraft.*

clouds are similar to clouds that appear in the sky each day. However, unlike more common clouds, which form up to five miles above the Earth's surface, noctilucent clouds form 50 miles above the Earth, are contained in a layer of the atmosphere called the mesosphere, can only be seen near twilight, and usually form only at very high latitudes near the North and South poles.

Noctilucent clouds appear to be getting brighter over time and scientists want to know why and if such changes are being caused by natural variations in the earth's atmosphere or influenced by human activities.

AIM is scheduled to launch in the fall of 2006 aboard a Pegasus XL rocket from Vandenberg AFB, Calif.

*For more information about AIM, visit:  
<http://aim.hamptonu.edu/>*