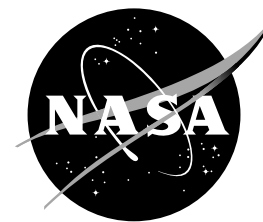


NASA Facts

National Aeronautics and
Space Administration

Goddard Space Flight Center

Greenbelt, Maryland 20771
(301) 286-8955



FS-2003-10-062-GSFC



Goddard Space Flight Center

NASA's Vision and Mission:

To understand and protect our home planet
To explore the Universe and search for life
To inspire the next generation of explorers
...as only NASA can

HISTORY

NASA's Goddard Space Flight Center, established in 1959 and named after rocket research pioneer Dr. Robert H. Goddard, employs hundreds of premier scientists and engineers who are devoted to research in Earth science, space science, and technology.

The Center's fundamental mission is to expand our current knowledge of the Earth and its environment, the solar system, and the Universe through observations from space. To ensure our Nation maintains leadership in this endeavor, Goddard is committed to excellence in scientific research and investigation, the development of new space systems and the continued advancement of essential technologies.

ORGANIZATION

Goddard is comprised of a system of directorates:

Office of the Director - Provides overall management, strategic planning, and integration of the diversified activities of the Center. Included within this directorate are the Equal Opportunity Programs Office, the Office of Public Affairs, and the Office of Chief Counsel.

Operating within this directorate is the Independent Verification and Validation Facility in Fairmont, W.Va., which was established in 1993 as part of an Agency-wide strategy to provide the highest achievable level of safety and cost-effectiveness for mission critical software.

Office of Human Resources - Provides customer-focused services and innovative solutions that position Goddard to optimize its most valuable resource - its employees. Staff members provide services in the areas of recruitment, compensation, benefits (including family friendly leave/programs), training and development, change management, employee and labor relations and workforce planning. The goal of the Office of Human Resources is to create and maintain a supportive work environment for all employees in order to achieve success in NASA's mission.

Office of the Chief Financial Officer - Plans and directs the development, implementation, oversight and administration of Goddard's system of resources management and financial control.

Management Operations Directorate - Provides program, infrastructure and institutional support to ensure the success of Goddard's missions. In addition to supplying traditional institutional supplies and services and maintaining the Center's infrastructure, the directorate plays a key role in the evolution of the Center's project management, its scientific and technological activities, and oversees safety, environmental and security issues.

Office of Systems Safety and Mission Assurance - Has broad responsibility and general authority for reviewing technical and flight safety aspects of Goddard projects, spacecraft, launch vehicle and operational ground systems, and scientific instruments for satellites and Space Shuttle payloads.

The office assures mission success and reliability by performing independent design reviews of technical and flight safety aspects of spacecraft and instruments, supporting systems, and safety and mission assurance throughout the program life cycle of Goddard's missions.

Flight Programs and Projects Directorate - Manages and implements Goddard's flight programs and projects. Performs mission formulation, design, fabrication, integration and test, qualification, readiness review management, launch and orbital operations, contract management, and technical and business management.

Primary responsibilities for the Agency's Space Science Enterprise include the Hubble Space Telescope and the follow-on James Webb Space Telescope, the Living with a Star and Solar Terrestrial Probes Programs, the Explorers Program, and Structure and Evolution of the Universe missions .

For the Earth Science Enterprise, responsibilities include the Geostationary and Polar Operational Weather Satellites, and the Earth Observing System (EOS) Program including the Earth Science Explorers. Within the EOS Program, the Directorate provides scientists and other users access to Earth science data via the Earth Observing System Data and Information System (EOSDIS) . EOSDIS commands and controls the EOS satellites, generates useful products from orbital observations and supports the generation of data sets for use in global climate models.

The directorate also oversees development and operation of the Tracking and Data Relay Satellites, as well as the Space and Ground Networks, and a portion of the New Millennium Program.

Applied Engineering and Technology Directorate - Provides engineering expertise for end-to-end conceptualization, development and use of Earth and space science missions, including the delivery of science products. The directorate also provides expertise in the areas of information, electrical and mechanical systems, guidance, navigation and control, and instrument technology.

Space Sciences Directorate - Seeks to expand scientific knowledge by observational and theoretical research as it relates to the solar system, our galaxy and the universe. Directorate personnel perform this work often in partnership with national and/or international scientific communities. Programs range from basic research, to flight experiment development, to mission operations and data analysis.

NASA's space science missions are grouped into four major themes, with Goddard having responsibility for two:

- Sun-Earth Connection (SEC) - The goal of SEC missions is to better understand the Sun, heliosphere and planetary environments as a single connected system. For more information, visit: <http://sec.gsfc.nasa.gov>
- Structure and Evolution of the Universe (SEU) - The SEU missions seek to explore and understand the dynamic transformations of energy in the Universe - the entire web of biological and physical interactions that determine the evolution of our cosmic habitat. For more information, visit: <http://universe.gsfc.nasa.gov/home.html>

Living With a Star is one of NASA's largest Sun-Earth Connection endeavors. Its goal is to develop the scientific understanding necessary to effectively address aspects of the connected Sun-Earth system that directly impact life on Earth.

NASA's newest program within the SEU theme, *Beyond Einstein*, will help answer important questions such as, 'What powered the Big Bang? What happens at the edge of a black hole? What is dark energy?'

For more than a decade, NASA's Hubble Space Telescope has provided a detailed view of the unimagined complexity and diversity of the universe. With each new instrument installed by astronauts during servicing missions, Hubble's capabilities grow by factors of 10. Hubble studies the nature of quasars, the birth and death of stars, detects and measures supermassive black holes, as well as the formation of planetary systems.

Three science laboratories and the Space Science Data Operations Office, operate within the Space Sciences Directorate. Each of the laboratories are described below in order of high- to low-energy research:

- *The Laboratory for High Energy Astrophysics* is recognized worldwide as a center of excellence and leadership in cosmic ray, X-ray and gamma ray astrophysics. Scientists work with engineers and technicians to pioneer state-of-the-art instruments, which yield breakthrough

discoveries. The laboratory is currently building the Swift mission to determine the nature of gamma ray bursts, considered the largest explosions in space since the Big Bang. The laboratory also is building next-generation X-ray and gamma-ray detectors for future NASA missions.

A Gravitational Wave Astrophysics group was recently established in the Laboratory for High Energy Astrophysics. It focuses the work of experts on theory and engineering to develop gravitational wave detectors, and ultimately space-based missions, to measure gravitational waves. Predicted by Einstein, such waves have never been directly detected, and presumably travel at light speed, penetrating the entire Universe without interference from dust or gas in space.

- *The Laboratory for Astronomy and Solar Physics* conceives and implements research projects in ultraviolet and optical space astronomy, as well as studies from space of infrared, sub-millimeter, and radio waves. The laboratory also conducts solar physics missions and research programs. Currently operating programs include the Hubble Space Telescope that bears the laboratory's Space Telescope Imaging Spectrograph, an instrument that performed the most important census of giant black holes in galaxies. The laboratory-built Wilkinson Microwave Anisotropy Probe is also operating as the first artificial satellite at the L2 point, a location about one million miles from Earth in the direction opposite the Sun. Laboratory personnel also have leadership roles in developing NASA's future James Webb Space Telescope, and in operating the Solar and Heliospheric Observatory, orbiting at the L1 point, nearly one million miles sunward of the Earth.

Scientists here, in conjunction with other Goddard and university-based colleagues, conduct an active program of instrument and technology development for interferometry - a method of obtaining exceptionally high spatial resolution in future space telescope missions.

- *The Laboratory for Extraterrestrial Physics* advances our understanding of the physics and chemistry of the solar system, the Earth's magnetospheric environment, including subatomic particles, plasmas, waves, and electric and magnetic fields, and similar properties of interplanetary space and the environments of planets beyond Earth. Laboratory scientists include leaders in magnetometry, (the precision measurement of weak magnetic fields in space), who have made major discoveries in the field, including important contributions to understanding the ancient environment of Mars and its suitability for the existence of life. Research on comets focuses on such fundamental questions as to whether they may have contributed much of the early water on Earth.

A Community Coordinated Modeling Center, operated within the Laboratory for Extraterrestrial Physics, concentrates the efforts of NASA and various Defense and civil agencies on developing the best ways to model, understand and forecast space weather and its effects on the Earth's environment.

- *The Space Data Operations Office* concentrates on improved methods of data archiving, retrieval and modeling for the worldwide scientific community. Much of this work is done through the National Space Science Data Center, which archives measurements and images from several NASA missions for scientific study and general public interest. Information technology and security are equally important functions of the Space Data Operations Office.

Suborbital and Special Orbital Projects Directorate - Located at NASA's Wallops Flight Facility, Wallops Island, Va., the directorate manages the Agency's Sounding Rocket and Scientific Balloon Programs, Shuttle Small Payloads Projects, University Class Projects, International Space Station Research Program, and scientific aircraft. Personnel here conduct a variety of scientific and technological research at an on-site test range, which includes tracking and data acquisition systems, a research airport, and rocket launch facilities. Research conducted here supports NASA, Department of Defense, and other government agencies, and commercial organizations.

Earth Sciences Directorate - Plans, organizes and evaluates a broad program of scientific research in the Earth sciences, ranging from basic research to flight experiment development, to mission operations and data analysis.

NASA's Earth Science Enterprise transforms raw data from numerous Earth-observing missions into scientific knowledge. Here personnel conduct missions that obtain highly accurate and frequent measurements of the Earth, as well as manage advanced computer networks that transmit data and resulting information to a wide variety of global users.

Three laboratories operate with the Earth Sciences Directorate:

- *The Laboratory for Atmospheres* advances our knowledge and understanding of the Earth's atmospheres, and those of other planets. The laboratory conducts a broad theoretical and experimental research program studying the structural, dynamic, radiative, and chemical properties of atmospheres, with extensive use of space, airborne and surface observations.
- *The Laboratory for Terrestrial Physics* advances the knowledge of Earth and planetary science through innovative research using space technology. Scientific investigations include the internal structure, dynamics and material variations of the solid Earth and planets, and biospheric interactions and global change research enhances our understanding of the effects of climate change on ecosystems, and effects of land surface vegetation changes on Earth's climate.

The Earth and Space Data Computing Division manages and operates a super computing and data center, allowing NASA science data to reach scientists worldwide. More than 1,000 U.S. scientists use Goddard's super computers to develop Earth system models for mathematical abstractions of processes and assimilations of observational data. The division has networks and transparent interfaces, providing scientists with direct access to important visualization tools, whereby results are then displayed at their remote locations. The data pro-

vides NASA-supported scientists with increased understanding of the Earth, and our solar system and universe through computational modeling and processing of the space-borne observations.

The Laboratory for Hydrospheric Processes is an important resource for observing, understanding and modeling the global oceans and related research in the marine bio-geochemical, cryospheric, and hydrologic processes. Research activities focus on links between all aspects of the water cycle, as well as global weather and climate. Scientists here develop and apply microwave and multi-spectral optical remote sensing to measure and define oceanic biological productivity, the abundance of water, ice and snow on land surfaces, oceanic salinity, precipitation, and the exchange of water between soil, biosphere, and atmosphere.

Goddard scientists enable use of and timely access to NASA's science expertise, data and technologies to address priority health issues. The Directorate promotes improved understanding of links between the environment, weather and climate, and public health problems such as infections and vector-borne diseases, urban, regional and global air and water pollution, heat stress, ultraviolet radiation, air and waterborne diseases and contaminant transport and deposition. By using NASA's unique vantage point in space, improved computational capabilities, geographic information systems and interdisciplinary research approach, scientists can observe, better measure, monitor and predict environmental related public health issues.

The Goddard Institute for Space Studies is a division of Goddard's Earth Sciences Directorate. Located at Columbia University, New York City, researchers here focus on the prediction of atmospheric and climate variations. This interdisciplinary research initiative studies natural and man-made changes in our environment, which occur at different times from the seasonal effects of volcanic explosions to the millennia of ice ages, which can affect the physical environment of our planet.

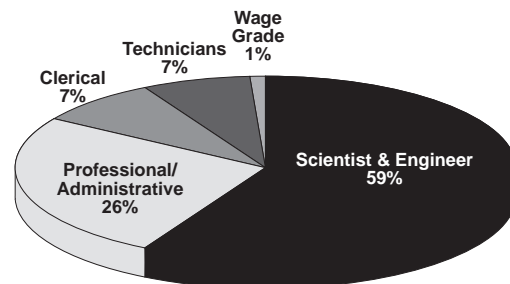
The Global Change Data Center develops and operates data systems, generates science data products, and provides archival, distribution and information management services to maximize

Goddard's Earth science data. Rapid access to Earth science data from satellites and ground validation stations is vital to our Nation's efforts in understanding the effects of global environmental change. Data and information management challenges continue to grow as data volume increases. To help meet this challenge, the Center is applying advanced information technologies for better data access and storage, network throughput, processing power and database/information management.

OUR WORKFORCE

Goddard Space Flight Center employs a total of about 9,230 civil servants and contractors at the Goddard campus in Greenbelt, Md., Wallops Flight Facility, Wallops Island, Va, Goddard Institute for Space Science in New York City, Independent Verification & Validation Facility in Fairmont, W.Va., and the White Sands Complex, near Las Cruces, N.M.

**Full-time Permanent Civil Servants by Skill
October 2002**



EXPLORING ADVANCED TECHNOLOGY

To continue NASA's discoveries of the universe and our near-Earth environment, Goddard's future missions are focusing on spacecraft that are smaller, lighter and less costly to launch and operate than those in operation.

Goddard scientists and engineers are currently designing more sensitive science instruments and detectors, along with navigation-related systems that will allow tiny satellites to fly in precise formation with each other. This new technique will allow joint observations of the Sun and distant stellar

objects. One such mission, Space Technology-5 (ST-5), is the fourth deep space mission planned under NASA's New Millennium Program. Due to their extremely small size, the satellites will be launched as secondary payloads, fit underneath a larger craft. After deployment of the larger craft, the 'nanosats' will be released with a spinning motion, much like a Frisbee, enabling them to collect sunlight, which in turn will be converted into solar energy and used to power their internal components and instruments.

TRANSFERRING TECHNOLOGY

The Center's Office of Technology Transfer (previously known as the Technology Commercialization Office) effectively promotes Goddard technologies, capabilities and facilities to various commercial, academic and government communities. Goddard researchers are encouraged to participate in the technology transfer process by identifying, documenting and submitting new technologies to OTT personnel, who maintain and disseminate an inventory of such technologies.

Technology transfer is a vital part of NASA's mission. Goddard's technology, expertise, and facilities are considered a national asset that can be leveraged to develop new products and processes, which benefit the United States. Benefits of technology transfer include increasing the Nation's competitiveness, improving the balance of trade, and enriching the lives of its citizens.

An example of technology applied in industry is the Secure Ambulation Module, or SAM. Enduro Medical Technology recently licensed the Goddard cable-compliant and walker technologies, using them to create a rehabilitative device that allows patients with degenerative illnesses or traumatic injuries to receive physical therapy in a safe and stable standing position. The late James Kerly, a prominent Goddard researcher, developed the cable-compliant mechanisms in the 1980s for use in sounding rocket assemblies and robotics. These mechanisms are incredibly versatile, with applica-

tions in numerous other areas such as car bumpers, medical joints, hinges, and sports and recreational equipment.

To find out more information about Goddard's technology transfer program, visit: <http://tco.gsfc.nasa.gov/>

GENERAL PUBLIC INQUIRIES

If you would like additional information about Goddard's missions, spacecraft, or special events and programs for the local community, visit us on the Web at: <http://www.gsfc.nasa.gov/>

You can also obtain general information by dialing 301-286-8955, or sending a letter to:

NASA's Goddard Space Flight Center,
Office of Public Affairs, Code 130
Greenbelt, MD 20771

For information regarding Wallops Flight Facility activities, call 757-824-1579.

General information regarding NASA's missions, programs and launches can be found at: <http://www.nasa.gov>

GODDARD EDUCATIONAL PROGRAMS

NASA offers a wealth of educational programs, which benefit thousands of teachers and students. One such example is the NASA Explorer Schools (NES) program, which establishes a three-year partnership between NASA and 50 school teams, consisting of teachers and education administrators from diverse communities across the country. Last year's teams spanned 30 states, and 80 percent of the schools are located in high poverty areas, with 75 percent representing predominantly minority communities.

While partnered with NASA, NES teams acquire and use new teaching resources and technology tools for grades 4 - 9 using NASA's unique content, experts and other resources. Schools in the program are eligible to receive up to \$17,500 (pending continued funding) during the three-year period to purchase technology tools that support science and mathematics instruction.

The Goddard Educator Resource Center, located in our Visitor Center, is a valuable source of informational materials. Please call 301-286-8570, or TDD 301-286-8103; for Wallops call 757-824-1776. Or visit us on the Web at: <http://education.gsfc.nasa.gov/>

GODDARD VISITOR CENTER

Visitor Centers are located at the Goddard Greenbelt and Wallops Island Flight Facility locations. Groups wishing to tour Goddard-Greenbelt should call 301-286-8981; or call 757-824-1344 to tour the Wallops facility.

BUSINESS OPPORTUNITIES

Individuals and companies wishing to obtain information about Goddard procurements should

call 301-286-7522. For general information about grants and cooperative agreements call 301-286-8511. Or visit the website at: <http://genesis.gsfc.nasa.gov/gsfcwelc.htm>

The NASA Acquisition Internet Service (NAIS) is a searchable website at: <http://prod.nais.nasa.gov/cgi-bin/nais/welcome.cgi> where companies can obtain information about business opportunities with Goddard.

SBIR AND STTR PROGRAMS

The Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs at Goddard provide opportunities for small, high technology companies and research institutions to participate in government-sponsored research and development (R&D) efforts in key technology areas. NASA encourages small business concerns (with 500 or fewer employees) or non-profit research institutions (such as universities and research laboratories with ties to an SBC) to learn more about these programs and significant sources of seed funding for the development of your innovations. For more information, visit: <http://sbir.gsfc.nasa.gov/SBIR/SBIR.html>