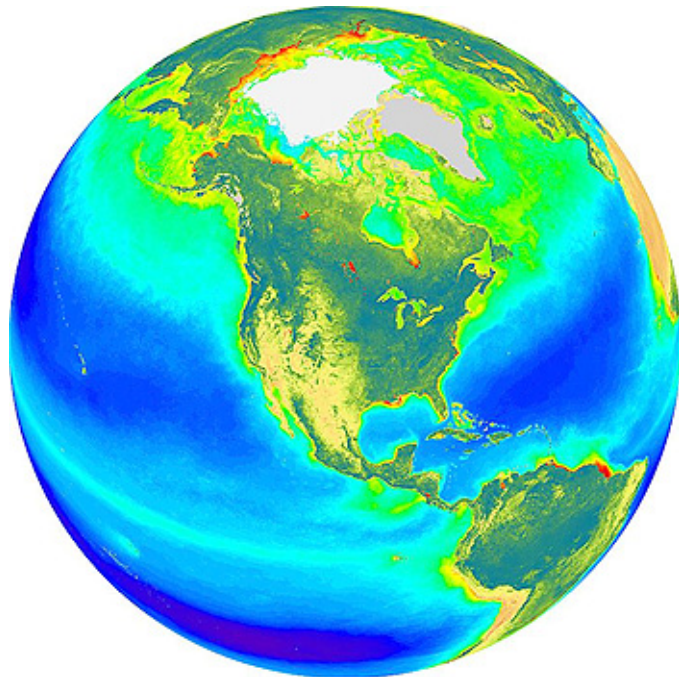
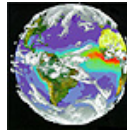


ENTERPRISE: Earth Science



NASA created the first record of the global biosphere using data from the SeaWiFS instrument, flown in an innovative government/commercial partnership. Data on changes in the global biosphere across seasons and years helps researchers understand how carbon circulates in the Earth system, which is one key piece of the climate change puzzle.

THEMES



Earth System Science



Earth Science Applications

EARTH SCIENCE

PURPOSE

The mission of NASA's Earth Science Enterprise (ESE) is to develop a scientific understanding of the Earth system and its response to natural and human-induced changes. This understanding will allow us to improve prediction of climate, weather, and natural hazards. NASA brings to this endeavor the vantage point of space, allowing global views of Earth system change. NASA is a provider of scientific information, via observation, research, modeling, and applications demonstration, for use by both the public and private sectors. NASA has been studying the Earth from space from its beginnings as an Agency. These efforts have led to our current activity of deploying the first series of Earth Observing System (EOS) satellites that will concurrently observe the major interactions of the land, oceans, atmosphere, ice, and life that comprise the Earth system.

In short, the purpose of the ESE is to provide scientific answers to the fundamental question:

How is the Earth changing, and what are the consequences for life on Earth?

ENTERPRISE: Earth Science

FY 2002 ACCOMPLISHMENTS

Understanding iceberg calving, in which huge chunks of ice break off into the sea, may help explain changes in the total mass of Earth's ice as well as interactions among the oceans, ice, and climate. In a NASA-sponsored study, the TERRA MODIS science team observed the disintegration of the Antarctic Larsen Ice Shelf. They found evidence that glaciers melting after ice ages may have dramatically affected global ocean currents and hence, marine and terrestrial productivity. In a finding with more immediate impact, they found that changes in the distribution of icebergs after large calving events radically affect the marine ecosystem food chain.

The Shuttle Radar Topography Mission, a joint effort with the National Imagery and Mapping Agency, completed processing its 30-meter digital elevation models of the Western Hemisphere. This mission used a breakthrough technology, Interferometric Synthetic Aperture Radar, to produce the most detailed, globally consistent topographic data set ever. The data will be used in watershed management, flood remediation, aviation safety, and ecosystem management. Applications were showcased at the 2001 World Summit on Sustainable Development; they included more than 150 DOD applications. The DOD realized a savings of 14 to 1 relative to conventional means of acquiring such data.

For the second year in a row, wildfires coinciding with widespread summer drought challenged the resources of the U.S. Forest Service (USFS) and other agencies responsible for detecting, assessing, and fighting forest fires. In a joint effort, NASA and the USFS successfully validated the MODIS Rapid Fire Response project. By providing near real-time data daily from the MODIS sensors on the Terra and Aqua satellites, this program helped the Forest Service determine how to best mobilize its resources to combat the fires. The MODIS data, coupled with information from other satellites on an area's fuel potential, openness of tree canopy, and topography, are used to create models to predict the likely track of a fire.

THEME DISTRIBUTION

Budget Authority (\$ in millions)	FY 2002	FY 2003 President's Budget, As Amended	FY 2004 President's Budget
Earth System Science	1,241.4	1,248.8	1,477.4
Earth Science Applications	94.7	61.7	74.8
<u>Institutional Support</u>	<u>256.1</u>	<u>317.9</u>	<u>--</u>
Total	1,592.2	1,628.4	1,552.2

Note: For all formats, the FY 2002 column reflects the FY 2002 Congressional Operating Plan letter dated 9/30/02. The FY 2003 column reflects the FY 2003 Presidents Budget Submit (PBS) as Amended. The Change column includes both programmatic and full cost adjustments. FY2004 is in full cost.

Indicates budget numbers in Full Cost.

Earth System Science

Within this theme, we are deploying and operating the first comprehensive constellation of Earth-observing research satellites designed to reveal interactions among Earth's continents, atmosphere, oceans, ice, and life. These interactions produce the conditions that sustain life on Earth. Data and information from our satellites enable researchers to understand the causes and consequences of global change and inform the decisions made by governments, businesses, and citizens to improve our quality of life. Highlights for FY 2004 include:

Overall budget

FY 2004 request is \$1,477 million, a \$52 million or 3.4 percent decrease from FY 2003 President's Request (full cost):

- The decrease in the budget from FY 2003 to FY 2004 is driven primarily by major development programs that are past their peak development spending and are preparing for launches in 2004 including AURA, Cloudsat, and Calipso.

ENTERPRISE: Earth Science

- \$96 million for the NPOESS Preparatory Project (NPP) under development in partnership with National Oceanic and Atmospheric Administration and the Department of Defense (DOD). NPP transfers critical research instruments to operational agencies and maintains data continuity for NASA sponsored scientific investigations.
- \$60 million for the Landsat data continuity mission, which is an innovative program to seek partnerships with industry to continue receiving critical land remote sensing data.
- \$524 million for research and modeling that help answer critical scientific questions on climate change to aid policy and economic decision-makers.

New Initiative – Climate Change Research Initiative Acceleration

Request includes \$26 million for this new initiative (\$72 million over five years)

- Accelerates evaluation of non-carbon dioxide (CO₂) impact on climate change. These factors potentially have as much or more influence as CO₂, which is the focus of most studies, and can be reduced with far less economic impact and with added benefits to public health and agriculture.
- To greatly enhance our ability to evaluate non-CO₂ forcings, an advanced polarimeter instrument will be flown to measure methane, tropospheric ozone, aerosols and black carbon. Tropospheric ozone, black carbon (soot) and aerosols are also important public health factors.
- Advanced polarimeter will be launched in the 2007 timeframe, which is about four years earlier than originally planned.

Earth Science Applications

Within this theme, NASA works with other federal agencies to apply our research results and Earth observation information products to applications of national priority. We have identified applications where our partner agencies have decision support systems, such as weather prediction models and near-airport terrain databases, that are being improved based on NASA research and technological innovations. For each application, joint applications research and demonstrations are under way or being developed. In addition, the theme develops crosscutting solutions that advance the use of NASA information and technology across a range of potential new applications. Highlights for FY 2004 include:

Overall budget

FY 2004 request is \$75 million, a \$6.5 million or 8.0 percent decrease from FY 2003 President's Request (full cost):

- Theme completely revamped to focus on 12 specific applications of national priority where other agencies' decision support systems can be markedly improved based on NASA-provided data and information. Competitive, merit-review will be the hallmark of extramural project selection.