

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Since 2001, the Administration:

- Doubled the International Space Station's size in orbit as planned and initiated high priority research while improving cost control and financial management;
- Improved scientific understanding of the universe through 44 ongoing and 12 new spacecraft;
- Re-focused the aeronautics program by increasing emphasis on improving the safety and security of passenger and cargo aircraft to better serve the American public's needs; and
- Launched remote sensing satellites to evaluate the impact of the oceans on climate, monitor ice sheets at Earth's poles, and measure Earth's gravitational field.

The President's Budget:

- Establishes a bold vision for sustained, yet affordable, human and robotic exploration of the solar system, with the Moon as a first step toward human missions to Mars and beyond;
- Returns the Space Shuttle safely to flight to complete construction of the International Space Station and begins development of a new generation of human space exploration vehicles;
- Completes the International Space Station while refocusing its research;
- Supports efforts to benefit life on earth through research and educational programs; and
- Focuses on research and technology development activities that will enable extended human and more capable robotic exploration of the solar system.

National Aeronautics and Space Administration

Sean O'Keefe, Administrator

www.nasa.gov 202-358-0000

Number of Employees: 18,900

2005 Discretionary Budget Authority:
\$16.2 billion

Key Components: Nine major field centers, more than 60 operational spacecraft, one International Space Station orbital laboratory, and three Space Shuttle orbiters.



Administrator O'Keefe looks toward the future with children on Space Day 2003.

OVERVIEW

For 45 years, the National Aeronautics and Space Administration (NASA) has been charged with expanding human knowledge of space and Earth as well as improving aeronautical and space vehicle capabilities. In the past three years, the Administration has transformed NASA into a stronger, more fiscally responsible Federal agency. As its top scores on the President's Management Agenda show, the agency has proven itself as a Government leader in managing its human capital needs and in basing its budgetary requirements and management decisions on program performance.

The February 1, 2003, Space Shuttle *Columbia* accident was a tragedy for the Nation and its space program. The Columbia Accident Investigation Board found that NASA must overcome several technical, managerial, and organizational challenges to ensure success and safety in future human space flight missions. The Board also emphasized that the Nation's human space flight program has suffered from a lack of clear long-term direction and vision.

The President has established a new national vision for space exploration: a sustained human and robotic program to explore the solar system and beyond. This vision integrates humans and robots, using each type of explorer where and when it is best suited to safely achieve and enhance the potential for discovery and scientific return of space missions. NASA will achieve this vision by sending robotic missions this decade and human missions next decade to the Moon to test new capabilities and enable subsequent human exploration of Mars and beyond. All the while, the agency will continue to launch robotic explorers to investigate the planetary bodies and phenomena within the solar system and the universe beyond. The President has provided a robust yet responsible multiyear budget for achieving this vision, which will yield remarkable new scientific insights, stimulate American innovation, and inspire young and old alike. Before the *Columbia* tragedy, NASA was planning to spend approximately \$86 billion over the five-year period starting in 2005. To implement the President's new vision, the Budget proposes to redirect funding within this base and adds \$1 billion to the existing plan, or an average of \$200 million a year, to complete additional work.

One of the first steps in achieving the President's vision is to return the Shuttle to flight to complete assembly of the International Space Station. While space exploration is inherently risky, safety will remain the highest priority of the Administration for all Shuttle flights, Space Station expeditions, and future human space flight

endeavors. The Administration plans to retire the Shuttle by the end of this decade to make way for a new and safer generation of crew vehicles to explore the solar system. Space Station research will be reprioritized to focus on preparing for long-duration human space flights.

America's space program will go on. This cause of exploration and discovery is not an option we choose; it is a desire written in the human heart.

President George W. Bush
February 2003

The President's 2005 Budget supports a variety of key research and technology initiatives to achieve the new vision. NASA will invest in new space transportation systems that will enable travel to the Moon and beyond. NASA will also engage in research on long-duration space flight's impact on human physiology and will develop ways to increase the sustainability of humans in space. The Budget also funds development and demonstrations of space nuclear power and advanced propulsion technologies and other breakthrough exploration systems. Finally, the Budget will continue to support NASA initiatives that directly benefit life on Earth, including aviation and Earth science research and education programs.

AN AGENCY IN TRANSFORMATION

During the past three years, NASA has grown into a stronger, more fiscally responsible Federal agency. During the 1990s, International Space Station costs were spiraling out of control, potentially threatening other NASA programs and using taxpayer resources ineffectively. Using independent reviews and implementing management reforms, Space Station managers have since gained control over the costs of this unique laboratory. In recognition of this achievement, the Administration has approved expansion of the laboratory to accommodate more crew researchers. In addition, in the last decade, several NASA robotic science spacecraft experienced failures after launch. Although some failures are inevitable in the harsh space environment, the agency has embraced the lessons arising from these failures and now successfully manages several dozen scientific spacecraft and continues to launch more each year.

The Nation suffered a major setback on February 1, 2003, when the Space Shuttle *Columbia* tragedy claimed the lives of seven astronauts and grounded the Shuttle fleet. The accident was a chilling reminder that space exploration is far from easy and routine.

President Bush pledged that despite the tragedy the U.S. civil space program, including human space flight, would continue. The President's Budget provides resources for the Space Shuttle's safe return to flight to complete assembly of the Space Station. It also provides funds to begin work on a new and safer generation of crew vehicles to explore the solar system.

The President is committed to pursuing a bold, new space exploration vision that will renew the agency's vigor and ensure the Nation's focus on compelling and inspiring space goals. NASA will realize the vision with a focused and fiscally responsible budget.

A NEW VISION FOR SPACE EXPLORATION

NASA leads the world in space exploration. For decades, the global public has witnessed spectacular NASA space achievements, including the *Voyager* spacecraft tours of the planets, rover landings on Mars, and compelling images of celestial phenomena from space observatories capable of peering into the early universe. But while NASA's robotic trailblazers and technological achievements have gained attention for their contributions to science, human space flight has remained confined to within a few hundred miles of the Earth's surface for the past 30 years. While NASA has learned much about how humans can work in space through the Space Shuttle and International Space Station programs, the human program has lacked a clear long-term national direction and vision.



Imagery from NASA space telescopes, such as this portrait of a spiral galaxy, will help scientists to better understand how stars form and evolve.

We must establish the Nation's vision for human space flight, and determine how willing we are to resource that vision.

Admiral Hal Gehman, USN (Retired)
Chairman, Columbia Accident Investigation Board

The President's proposal represents a bold vision, making both human and robotic exploration beyond low Earth orbit the highest priority for the Nation's civil space program. NASA will embark on a sustained program to explore the solar system and beyond. Together, human and robotic explorers will seek to answer ageless questions about the origins and evolution of the

universe and the existence of life beyond Earth while expanding knowledge and establishing the capabilities to enable humans to live and work throughout the solar system. NASA will begin immediately to implement the vision, pacing progress according to experience, technology readiness, and affordability.

Achieving this new vision for space exploration will not be easy. It will require a commitment to a focused and responsible multiyear budget, starting in 2005. NASA will have to develop innovative solutions to surmount many technological, physiological, and organizational challenges to make sustainable long-term human space exploration possible. The years ahead are bound not only to yield astounding new insights about the solar system and worlds beyond and how humans can best live and work beyond Earth, but also to catalyze American innovation and inspire future generations of space explorers.

Exploring the Solar System

Recent discoveries, including planets orbiting distant stars and possible evidence of water—a key ingredient for life—on Mars and Jupiter’s moons, suggest the potential to answer questions of whether life exists elsewhere. Building on these discoveries and a record of strong performance in space science, NASA will aggressively survey the solar system and beyond with robotic spacecraft. The President’s 2005 Budget augments NASA’s Mars exploration program to accelerate the search for water and life, and prepare for future human missions. The program also supports advanced robotic missions to Jupiter’s moons and other planetary bodies, and pursues advanced space telescopes to search for Earth-like planets in other solar systems. NASA’s space science missions will inform decisions about where human explorers should travel, the conditions they will endure, and the technologies necessary to support them.

As a stepping stone to Mars and beyond, NASA’s near-term focus for human exploration will be the Moon. While the Apollo expeditions of the 1960s and early 1970s revolutionized scientific understanding of the Moon, Americans spent only a few weeks on the lunar surface and thus did not learn how to live and work over the long periods of time that will be required for human visits to more distant planetary bodies. Because the extreme temperatures, radiation, absence of breathable air, and other conditions make the space environment inhospitable to humans, scientists and engineers must learn more about how to make long-duration human space exploration possible. The Moon is the closest body in space to Earth and therefore can serve as a test bed to prepare for human exploration at Mars and beyond. In addition, using lunar and other space resources may prove important to sustained exploration beyond the Earth-Moon system.



The President’s new vision for space exploration targets Mars as a destination for human visitors.

The President’s Budget begins implementing the new space exploration vision by returning humans to the Moon to prepare for human travel to Mars and beyond. Beginning in 2008, NASA will launch robotic spacecraft to the Moon to provide detailed maps of the Moon’s physical geography and natural resources and to identify the best locations for humans to visit. By 2020, humans will again arrive on the Moon.

Ultimately, humans will travel to Mars and then deeper into the solar system, the timing and choice of destination guided by mastery of exploration skills and technologies on the Moon and the discoveries made by robotic space explorers.

Making Appropriate Infrastructure and Transportation Investments

Achieving the President's vision requires NASA to reprioritize its portfolio of space assets and vehicles, redirecting resources from those less integral to the vision in an effort to enhance and initiate capabilities that will support it.

The Space Shuttle has served as the centerpiece of the Nation's human space flight program for more than 20 years. This vehicle is the workhorse for Space Station assembly and remains instrumental for the laboratory's completion. Consequently, NASA will return the Shuttle to service to complete the Space Station, doing so with safety as its top priority and based on the Columbia Accident Investigation Board's recommendations. But because the aging system remains costly to operate, lacks some safety capabilities that could be incorporated into future systems, and lacks the capability to fly beyond low Earth orbit, NASA plans to retire the Shuttle by the end of the decade, once its role in Space Station assembly is complete.



NASA will return the Space Shuttle to flight to complete assembly of the International Space Station. Safety remains the agency's highest priority.

Completion of the International Space Station, a unique asset shared by multiple international partners, remains a high priority. In concert with the new exploration vision, NASA will refocus U.S. Space Station research on activities that prepare human explorers to travel beyond low Earth orbit, such as the development of countermeasures against space radiation and the long-term effects of reduced gravity.

NASA will begin to design and develop a crew exploration vehicle that will ensure safe, reliable, and affordable access to space beyond Earth orbit. The new vehicle will be designed primarily to support exploration missions but may also support Space Station crew transfer flights in the next decade.

Investing in Enabling Technologies and Research

Funding the proper technologies and research areas will be essential to human and advanced robotic explorers' ability to reach the Moon, Mars, and destinations beyond. The 2005 Budget, therefore, supports a variety of key research and technology initiatives. NASA will engage in research on the impact of long-duration space flight on human physiology and will develop ways to improve the sustainability of human exploration. The Budget also supports the development of nuclear power and advanced propulsion technologies that will sustain applications ranging from high-power spacecraft instruments, to energy sources for humans and advanced robots on other planetary bodies, to robotic and human-carrying vehicle propulsion systems. In addition, the agency will pursue other safe, reliable, effective, and low-cost exploration technologies such as optical communications, radiation shielding, and processes to extract and use space resources, as well as systems that enable robots and humans to work together in space.

Continuing to Improve Life on Earth

NASA continues to play an integral role in improving life on Earth. The agency’s aeronautics program will enhance the safety, security, efficiency, and environmental impact of aviation. As one of the largest pieces of the interagency Climate Change Science Program, NASA’s satellites, technologies, and research are contributing to the understanding and protection of Earth. NASA observations are helping to improve techniques to forecast the weather, monitor forest fires, and track the spread of pollutants. The Budget supports increased investments in the President’s Climate Change Research Initiative, including investment in a critical satellite to help determine the impacts of aerosols such as soot and dust on global climate change. Also, NASA education programs continue to encourage students to enter science and engineering careers.



Space Station research will prepare humans to travel beyond low Earth orbit.

PERFORMANCE EVALUATION OF SELECT PROGRAMS











The Budget continues to focus on improving program performance. Seven of NASA’s programs were assessed using the Program Assessment Rating Tool (PART), which evaluated each programs’ design and purpose, strategic planning efforts, how well they are managed, and whether they are generating positive results for taxpayers. Below are some of the highlights and recommendations from the PART evaluations. For further details on NASA’s performance assessments, see the White House budget website at www.whitehouse.gov/omb/budget/.

Program	Rating	Explanation	Recommendation
Mars Exploration	Effective	The program is well-defined and well-managed and is making excellent progress towards achieving its science goals.	Augment the program to accelerate the search for life on Mars and prepare for future human exploration.
Solar System Exploration	Effective	The program is well-defined and well-managed, has a clear purpose and ties directly to NASA’s mission.	Continue to support a diverse mission portfolio, including missions to search for habitable environments and life.
Mission and Science Measurement Technology	Moderately Effective	The program has improved due to its responsiveness to external review and effective management.	Leverage the program as a foundation for a new exploration technology program.

Program	Rating	Explanation	Recommendation
Biological Sciences Research	Results Not Demonstrated	The selection and prioritization of scientific research has improved; however, additional work is needed to develop suitable performance goals and demonstrate results.	Refocus the program to support the new exploration vision.
Earth Science Applications	Results Not Demonstrated	The program has taken the right steps to establish a viable strategy but will require additional time to demonstrate results.	Continue to focus on implementation and fully develop products and partnerships.
Space Shuttle	Results Not Demonstrated	The program lacks good performance measures. The hiatus that has followed the <i>Columbia</i> tragedy has prevented the program from achieving results.	Increase return-to-flight funding to improve results in future years. Plan to retire the Shuttle by the end of the decade, once its role in Station assembly is complete.
Space Station	Results Not Demonstrated	The program lacks good long-term performance measures and has been unable to achieve goals due to Shuttle unavailability.	Reduce dependence on problematic crew and cargo transfer systems. Redirect the program to bring it into alignment with the new exploration vision.

UPDATE ON THE PRESIDENT'S MANAGEMENT AGENDA

The accompanying table provides an update on NASA's implementation of the President's Management Agenda as of December 31, 2003.

	Human Capital	Competitive Sourcing	Financial Performance	E-Government	Budget and Performance Integration
Status					
Progress					

Arrows indicate change in status rating since evaluation as of September 30, 2003.

NASA's status ratings improved in four of five initiative areas this quarter. NASA implemented its first human capital plan, established an accountability system to track the associated results, and demonstrated its ability to make distinctions in employee performance using a comprehensive awards system. NASA has a competitive sourcing plan and announced two standard competitions involving more than 230 positions. NASA also has an information technology architecture in place that it is using to guide its investments and strengthen its IT security and project justifications. All of NASA's major IT systems are now operating within 10 percent of the planned budget and schedule. The agency uses performance information and full-cost considerations to develop its budget requests and inform management decisions. For instance, NASA considered technical performance, technical risk, and marginal scientific benefit in a recent study to determine the marginal cost of optimizing the viewing capability of a space telescope planned for launch early in the next decade. NASA has taken steps toward resolving inconsistencies in financial reporting and issues relating to valuation of contractor held property by implementing the Core Financial Module of the Integrated Financial Management Program. Data reconciliation issues due to the conversion from the old to the new financial management system, however, have presented significant challenges to NASA's efforts to prepare financial statements for 2003. NASA is one of 12 major research and development (R&D) agencies that plans, manages, and assesses its R&D programs consistent with the R&D Investment Criteria, which are discussed in detail in the Research and Development chapter in the *Analytical Perspectives* volume.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
(In millions of dollars)

	Actual		Estimate	
	2001	2003	2004	2005
Spending				
Discretionary Budget Authority:				
Exploration, Science, and Aeronautics.....	5,839	7,475	7,830	7,690
<i>Space Science (non-add)</i>	2,609	3,531	3,971	4,068
<i>Earth Science (non-add)</i>	1,762	1,717	1,613	1,485
<i>Biological and Physical Research (non-add)</i>	362	883	985	1,049
<i>Aeronautics (non-add)</i>	975	1,145	1,034	919
<i>Education Programs (non-add)</i>	133	199	226	169
Exploration Capabilities.....	8,391	7,890	7,521	8,526
<i>Space Flight (non-add)</i>	7,153	6,149	5,875	6,674
<i>Crosscutting Technology (non-add)</i>	1,238	1,741	—	—
<i>Exploration Systems (non-add)</i>	—	—	1,646	1,852
Inspector General.....	23	25	27	28
Total, Discretionary budget authority	14,253	15,390	15,378	16,244
Total, Discretionary outlays	14,094	14,551	14,600	16,385