

NASA Wins Budget Increase, But Faces Tough Choices in 2006

AAAS R&D Funding Update on NASA in the FY 2006 Budget

(This analysis is a preview of the NASA chapter in the forthcoming *AAAS Report XXX: Research and Development FY 2006*, a comprehensive look at the President's budget for R&D in FY 2006. This analysis contains revised AAAS estimates of NASA R&D, different from figures presented in the AAAS Preliminary Analysis of February 10. This analysis was revised again on March 18. More tables and continually updated supplemental materials on R&D in the FY 2006 budget can be found on the AAAS R&D Web site at <http://www.aaas.org/spp/rd>.)

Highlights

- The National Aeronautics and Space Administration (NASA) continues to face daunting challenges, even as it receives favored treatment in the federal budget. **The total NASA budget of \$16.5 billion would be a 1.6 percent increase after a much larger boost in 2005, but NASA's R&D would increase 4.6 percent or \$508 million in FY 2006** because of money freed up by the Space Shuttle's expected return to flight this spring (see Table II-12).
- While the agency would receive additional resources for its ambitious plans to finish construction of the International Space Station, explore the solar system, and develop the technologies needed for future moon and Mars missions, there would also be tough budget choices. **NASA would cancel a servicing mission for the Hubble Space Telescope, and would make steep cuts to aeronautics research** (down 6 percent to \$852 million), the earth sciences portfolio (down 4 percent to \$2.1 billion), and biological and physical research (down 22 percent to \$807 million).
- The cuts would allow for shifts in resources to solar system exploration and R&D for moon and Mars mission technologies. There would be large boosts for robotic moon and Mars exploration (up 17 percent to \$858 million) and development of a Crew Exploration Vehicle within a new Constellation Systems program (up 113 percent to \$1.1 billion).
- The International Space Station would receive \$1.9 billion, up 10.8 percent, in anticipation of the Space Shuttle's return to flight.

NASA R&D in the FY 2006 Budget: More Money, but Tough Choices

In an extremely tough budget environment of rising deficits, restraints on domestic spending, and cuts for many programs, the National Aeronautics and Space Administration (NASA) would escape the tight funding squeeze facing other domestic programs in the proposed FY 2006 budget just as it did in 2005. But the proposed increases for NASA would not be enough to keep the agency from making tough choices as it juggles a full plate of high-priority missions along with its traditional R&D programs. NASA's total budget of \$16.5 billion would be a \$260 million or 1.6 percent increase after an \$820 million increase in 2005 (see Table II-12). The additional funds would allow NASA to keep going on grand new plans for space exploration involving a return to the moon and a possible human flight to Mars in coming decades, after first returning the Space Shuttle to flight this spring and using the Shuttle to finish construction of the International Space Station. The 2006 budget would once again restructure NASA's budget accounts, from 7 enterprises in two major budget accounts to 4 directorates in two major accounts (all amounts in Table II-12 are adjusted for comparability to reflect the proposed new structure).

NASA's R&D (two-thirds of the agency's budget) would total \$11.5 billion, a 4.6 percent or \$508 million increase. R&D funding would grow faster than the total NASA budget because the agency anticipates a reduction in the non-R&D Space Shuttle program from a record \$4.7 billion funding level this year down to \$4.5 billion next year after the Shuttle returns to flight.

Although the moon and Mars missions are the attention-getting centerpiece of NASA's plans, two longstanding programs take up most of the agency's resources this year and next year. The non-R&D Space Shuttle program takes up a record-breaking \$4.7 billion this year, up even from the \$4.3 billion 2005 appropriation of three months ago after NASA shifted funds from other programs to meet escalating safety costs as the Shuttle prepares to return to flight this spring, more than two years after being grounded in the aftermath of the Challenger disaster. With the Shuttle safely back in space, the current proposal is to trim the program's budget down to \$4.5 billion in FY 2006, which would still be high in historical terms.

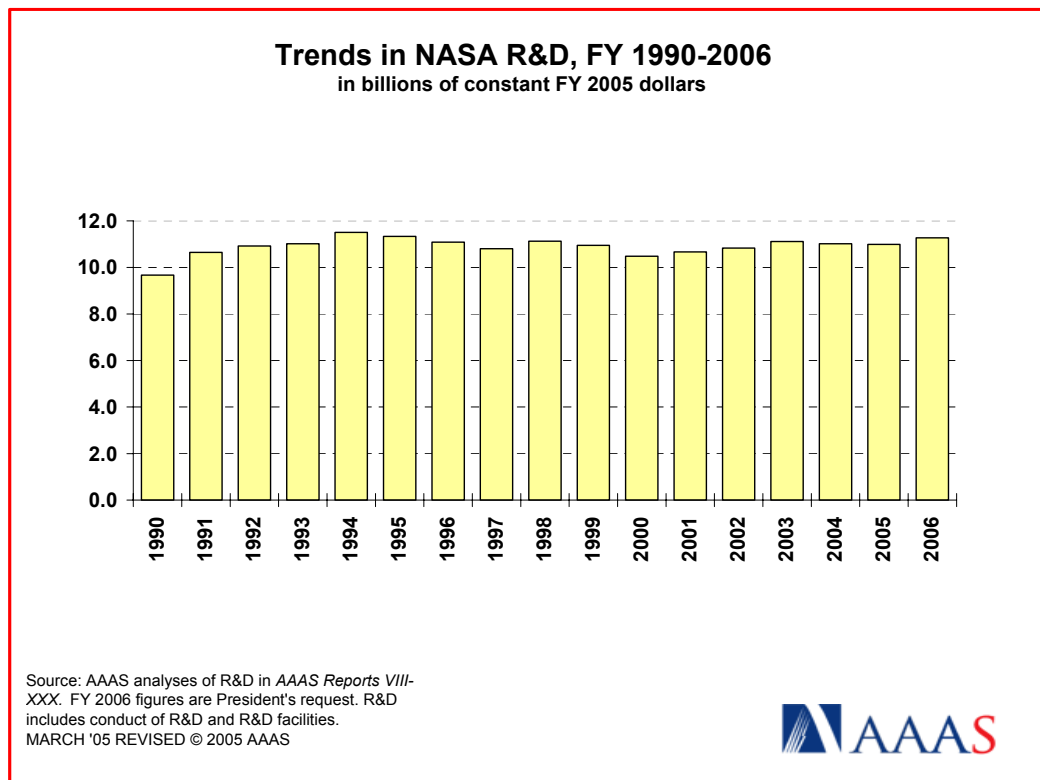


Figure 1. (click on image for PDF)

The budget would increase funding for the International Space Station by \$180 million or 11 percent to \$1.9 billion next year. The Station is now essentially in maintenance mode of two astronauts supplied by Russian spacecraft, with construction activities in limbo indefinitely until the Space Shuttle resumes its role of carrying Station components into orbit. After shrinking to \$1.4 billion last year, the FY 2005 plan envisions Space Station construction resuming at \$1.7 billion after the Shuttle returns to flight, and proceeding full speed ahead next year.

With these two big-ticket current programs provided for, **the FY 2006 budget would also provide funds for moon-and-Mars programs, especially within the Exploration Systems (ES) account.** In a newly organized budget structure, NASA would create the Constellation Systems program as the focal point for R&D efforts in the space flight technologies needed to return humans to the moon and then onward to Mars. From \$527 million this year, Constellation Systems funding would more than double to \$1.1 billion, primarily for R&D on the Crew Exploration Vehicle (CEV), a project to develop a next-generation spacecraft capable of taking humans beyond low-Earth orbit. The first demonstration flights are currently

planned for 2008. Exploration Systems R&T (research and technology) would surge 27 percent to \$919 million for R&D to meet the technical challenges lying ahead for the moon and Mars missions. At the same time, the Prometheus Nuclear Systems and Technology program to develop new power and propulsion technologies based on nuclear power for future NASA missions, a key need if NASA is to launch spacecraft to the Moon and beyond, would see its funding decline 26 percent to \$320 million in a restructuring of program milestones. Funding for the Mars and Lunar Exploration programs for robotic exploration would total \$858 million in combined funding, up 17 percent from this year to build on recent successes of the headline-grabbing Mars rovers and to gear up for a 2008 robotic mission to the moon.

NASA's ambitious plans would not all fit into its budget even with an increase, necessitating tough budget choices. To make ends meet, NASA would cancel a servicing mission for the Hubble Space Telescope, and would make steep cuts to aeronautics research, the earth sciences portfolio, and biological and physical research. The most controversial cut would be the **Hubble Space Telescope**. NASA attracted strong criticism last year for canceling a planned shuttle servicing mission to extend the life of the Hubble, instead focusing on robotic servicing. Congress spoke up in its FY 2005 NASA appropriation by allocating \$291 million for Hubble, including funding a servicing mission, but the current 2005 NASA plan shows \$216 million. In the FY 2006 budget, NASA would cancel any servicing mission, whether robotic or human, and would instead allocate just \$191 million for Hubble operations and a robotic mission to deorbit the telescope when it reaches the end of its current useful life. At the same time, the next-generation James Webb Space Telescope scheduled for launch in 2011 would receive \$372 million, an increase of \$60 million. While new technologies in Exploration Systems would receive boosts, NASA's support of biological and physical research would be restructured to focus on future space mission needs into a Human Systems R&T program and would fall 20 percent down to \$807 million. While the 'S' in NASA would continue to grow, the first 'A' for aeronautics research would continue to shrink, falling 5.9 percent to \$852 million. And the newly restructured Earth-Sun System program, taking in the Earth Science mission and other related programs and forming the core of NASA's environmental sciences portfolio, would see its funding fall 4.3 percent to \$2.1 billion. Finally, Education Programs would decline 23 percent to \$167 million because of the proposed elimination of congressional earmarks.

Impacts of the NASA R&D Portfolio

The proposed increase to NASA's R&D portfolio in FY 2006 would continue a modest upward trend for the last few years, as shown in Figure 1. NASA's R&D funding has just kept pace with inflation going back to FY 1991, and recent increases have been just barely ahead of inflation. Although the Bush Administration's moon and Mars plan ignited hopes of increasing resources in a time of fiscal austerity, NASA committed to carrying out its ambitious plans with a budget plan that would just keep pace with expected inflation over the next decade. Although inflationary increases are more than most R&D funding agencies are likely to get in the next few years, NASA's big plans for the next few years will require NASA to reshuffle its resources and to meet ambitious targets for deployment, construction, and then phase-out of the Space Shuttle and Space Station programs to make room for moon and Mars programs. Thus, NASA's R&D funding is likely to stay at this year's levels in inflation-adjusted dollars for the foreseeable future, with increases in priority programs offset by cuts in other areas.

Although much of NASA's R&D portfolio funds development and facilities projects such as the Space Station, **NASA is responsible for 10 percent of all federal support for basic and applied research, with far larger roles in key fields.** Engineering research makes up the largest part of the NASA portfolio (see Figure 2). NASA funds more than a quarter of total federal support for engineering research. NASA supplies nearly all the federal support for some engineering sub-fields such as astronautical engineering and aeronautical engineering. NASA is the leading federal sponsor of the environmental sciences (oceanography, atmospheric sciences, geological sciences). The environmental sciences are a quarter of NASA's portfolio, but NASA accounts for a third of total federal support for environmental sciences research. NASA also invests heavily in the physical sciences (astronomy, chemistry, and physics). NASA is the second largest federal sponsor of physical sciences behind the Department of Energy, and is by far the leading sponsor of astronomy research with more than 70 percent of the federal total.

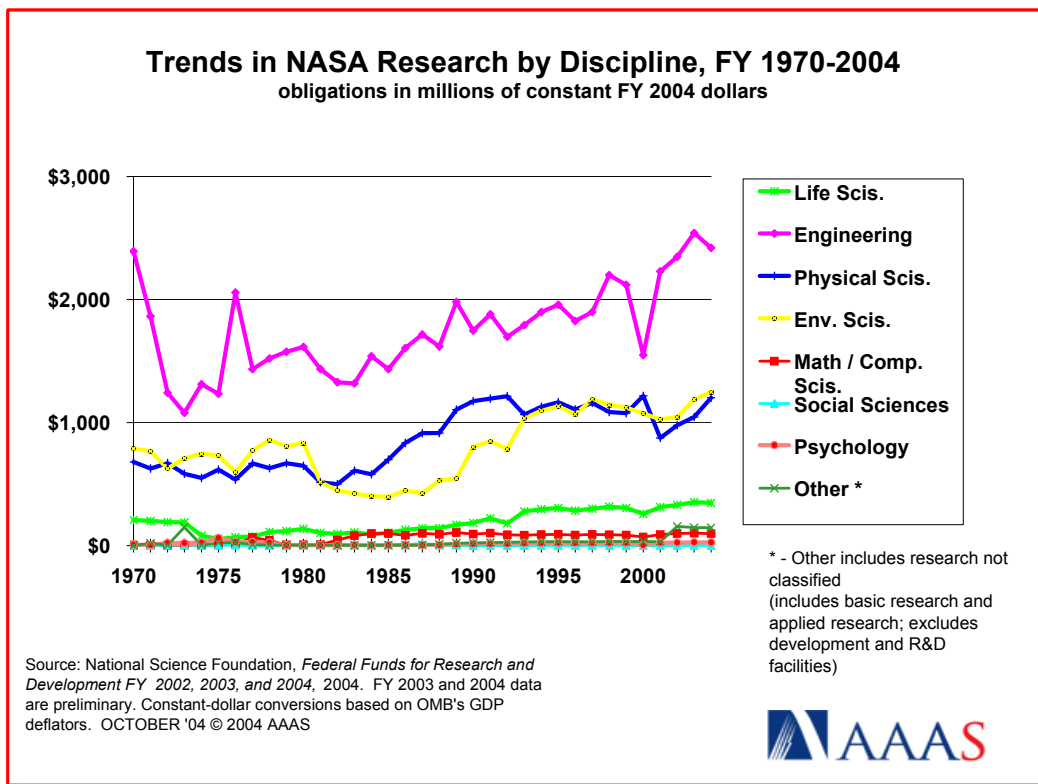


Figure 2. (click on the image for PDF)

- March 9, 2005 (revised March 18)

(More materials on R&D in the FY 2006 budget, historical data and charts, and more information on *AAAS Report XXX: Research and Development FY 2006*, can be found on the AAAS R&D Web site at <http://www.aaas.org/spp/rd>.)

AAAS R&D Budget and Policy Program
1200 New York Avenue, NW
Washington, DC 20005
(202) 326-6607
AAAS R&D Web site: <http://www.aaas.org/spp/rd>



Table II-12. NASA R&D

Table II-12. R&D in the National Aeronautics and Space Administration
(budget authority in millions of dollars)

	FY 2004 Actual	FY 2005 Estimate	FY 2006 Budget	Change FY 05-06	
				Amount	Percent
Detail of NASA Budget:					
1. Exploration Capabilities (EC)					
Space Operations					
International Space Station	1,364	1,676	1,857	180	10.8%
Space Shuttle	4,061	4,669	4,531	-138	-3.0%
Space and Flight Support	466	485	376	-110	-22.6%
Total Exploration Capabilities	5,890	6,830	6,763	-68	-1.0%
2. Science, Aeronautics, and Exploration (SAE)					
Science					
Solar System Exploration:					
Discovery	272	181	169	-12	-6.6%
New Frontiers	148	211	159	-52	-24.8%
Technology	193	131	96	-35	-26.8%
Deep Space Mission Sys.	265	258	257	0	-0.1%
Solar System Research	418	345	363	17	5.0%
Mars Exploration	596	681	723	42	6.2%
Robotic Lunar Exploration	17	52	135	83	158.8%
Total Solar System Exploration	1,909	1,858	1,901	43	2.3%
The Universe:					
Navigator	165	234	199	-34	-14.7%
James Webb Space Telescope	243	312	372	60	19.2%
Hubble Space Telescope	243	216	191	-25	-11.6%
SOFIA 1/	67	51	48	-3	-5.1%
Gamma-Ray Large Area Tel.	103	107	99	-8	-7.1%
Discovery	51	126	118	-8	-6.1%
Explorer	58	82	101	19	22.9%
Universe Research	363	332	316	-16	-4.8%
Int'l Space Science Collab.	32	13	13	0	-2.3%
Beyond Einstein	27	42	56	14	32.8%
Total Universe	1,352	1,513	1,512	-1	-0.1%
Earth-Sun System:					
Earth Systematic Missions	208	301	182	-119	-39.5%
Living with a Star	126	203	234	32	15.6%
Solar Terrestrial Probes	158	100	79	-22	-21.4%
Explorer Program	129	104	117	14	13.0%

(continued)

