

NASA Budget Increases; SAT R&D Up by 11 Percent

(This analysis is part of a series of AAAS R&D Funding Updates on the FY 2001 congressional appropriations process. This analysis includes information on R&D in the House-Senate conference report for NASA appropriations. The complete series of AAAS R&D Funding Updates, including continually updated analyses of R&D by agency in FY 2001 appropriations, is available on the AAAS R&D Web Site (<http://www.aaas.org/spp/R&D>) in the "FY 2001 R&D" or the "What's New" sections.)

On October 19, Congress sent President Clinton a final FY 2001 VA-HUD appropriations bill (HR 5482) that gives a 5.0 percent increase to the budget of the National Aeronautics and Space Administration (NASA). The final bill **boosts NASA's budget by \$685 million or 5.0 percent to \$14.3 billion**, an amount well above the \$14.0 billion NASA request. **NASA R&D climbs 5.6 percent to \$10.3 billion** (see Table). Although funding for the Space Station declines, R&D in the Science, Aeronautics, and Technology (SAT) account increases dramatically by more than 10 percent, including increases of more than 10 percent for space science, life and microgravity sciences, and aeronautics research. [President Clinton signed the bill into law on October 27.]

The final VA-HUD bill provides nearly \$83 billion for discretionary programs, well above the FY 2000 total of \$79 billion but slightly below the \$84 billion Administration request. In the NASA budget, however, Congress appropriated more than the \$13.6 billion FY 2000 funding level and the \$14.0 billion request to reach \$14.3 billion. The bill also funds R&D programs in the National Science Foundation (NSF) and the Environmental Protection Agency (EPA), as well as other programs in the Department of Veterans Affairs and the Department of Housing and Urban Development.

Two-thirds of the NASA budget, which excludes the Space Shuttle program and its associated costs, is classified as R&D. **NASA's R&D totals \$10.3 billion in the Senate plan, a \$544 million or 5.6 percent increase over FY 2000 and \$280 million more than the request.** The total NASA budget rises by 5.0 percent to \$14.3 billion (see Table). The final appropriation far exceeds the earlier House and Senate-proposed funding levels, which would have provided a 1.0 percent cut and 0.7 percent increase, respectively, for NASA R&D. This matches the pattern of other conference reports, which have generally provided far more for R&D programs than either the House or Senate bills, and in many cases more than the President's request. (For details of House appropriations for NASA, please see the June 8 AAAS R&D Funding Update; for details of Senate appropriations, please see the September 20 AAAS R&D Funding Update.)

The big winner in the NASA budget is the **Science, Aeronautics, and Technology (SAT)** account, which funds nearly all of NASA's R&D not related to the Space Station. SAT receives \$6.2 billion, well above the request and a substantial 10.9 percent or \$610 million above the FY 2000 funding level. The House bill would have kept SAT even with FY 2000, while the Senate would have offered only a modest increase. Included in the final bill are over \$200 million in congressionally designated projects spread across the SAT programs.

Space Science receives a generous \$2.5 billion, 13.5 percent more than FY 2000 and well above the original request. The final bill includes \$75 million for the Mars Lander 2003 program, which was proposed by NASA after the original request was submitted in February. The program is NASA's response to thorough reviews of its Mars programs after the losses of two Mars spacecraft last year, and reflects a completely redesigned set of Mars missions for the next decade. The final bill also provides the requested \$20 million for the "Living with a Star" initiative, which envisions a multi-year program to understand the sun's impact on the

Earth and the space environment through a variety of missions to study solar variability. The House had zeroed out the proposed program, but the Senate had funded it.

Life and Microgravity Sciences and Applications (LMSA) receives \$314 million for a 14.4 percent increase. This program funds ground and space-based research to advance the safety and health of astronauts in space, but covers investigations on a variety of life, medical, and microgravity sciences research topics. The final bill also includes instructions to NASA in the Space Shuttle appropriation to submit a plan to Congress for future shuttle research flights, including a full schedule of research missions for microgravity research.

The **Aero-Space Technology** program rises 10.5 percent to \$1.2 billion. The House would have cut funding by nearly a quarter, because it would have provided no funds for the \$290 million request for the Space Launch Initiative, which funds research and development efforts for reusable launch vehicle technology. But the Senate funded all the programs in the account, including the full \$290 million request for the Space Launch Initiative. The final bill follows the Senate lead and also adds over \$80 million in congressionally designated projects.

The **Earth Science** program, formerly known as the Mission to Planet Earth, receives slightly more than the request for \$1.5 billion, 3.0 percent more than FY 2000. The **Academic Programs** appropriation of \$133 million is \$33 million more than the request because of more than a dozen congressionally designated projects, but because there are fewer such projects than in the FY 2000 bill the FY 2001 total is \$6 million less than last year. The core budget funds programs serving academic and minority-serving institutions.

Congress provides \$2.1 billion for continued development and construction of the **International Space Station**, \$209 million or 9.0 percent less than FY 2000 because of a planned reduction in costs after several cost overruns in FY 2000. The non-R&D **Space Shuttle** program, however, sees its funding increase by 5.3 percent to \$3.1 billion, in part to fund upgrades to the shuttle.

The generous FY 2001 appropriation is welcome news for NASA, whose budget has stagnated in recent years both because of tight fiscal policies for all discretionary programs and because of NASA's goal of doing more with less. Figure 1 shows the recent history of NASA's budget for R&D programs. After adjusting for inflation, NASA's R&D has been essentially flat at \$10 billion in today's dollars since FY 1994, and in fact has declined slightly. NASA's R&D grew dramatically from the mid-1980s to the mid-1990s, first because of the development of a new Space Shuttle after the Challenger disaster, and then because of the International Space Station and the expansion of NASA's earth science activities.

Although much of NASA's R&D funds development projects such as the Space Station, **NASA is also an important source of federal support for basic and applied research.** Figure 2 shows the division of NASA's research portfolio (slightly less than half of NASA's R&D budget) by science and engineering discipline, while Figure 3 shows NASA's importance as a funding source for several key disciplines. Engineering research makes up the largest part of the NASA portfolio. NASA funds approximately a third of total federal support for engineering research, and is the second largest agency sponsor behind the Department of Defense. As Figure 3 shows, however, NASA is by far the largest federal sponsor of research in the engineering sub-fields of astronautical engineering and aeronautical engineering, with more than 80 percent of total federal support. NASA is the leading federal sponsor of the environmental sciences (oceanography, atmospheric sciences, geological sciences). The environmental sciences are about a quarter of NASA's portfolio, but NASA accounts for nearly 40 percent of total federal support for environmental sciences research. In particular, NASA funds more than half of all federal support for atmospheric sciences, mostly through the Earth Science program, while NASA is also responsible for nearly a third of total federal support for geology (other major sponsors include the Department of the Interior). NASA also invests heavily in the physical sciences (astronomy, chemistry, and physics). Approximately two-thirds of NASA's physical sciences funding goes to astronomy, and most of the remaining third goes to physics. NASA is the second largest federal sponsor of physical sciences behind the Department of Energy, and is the leading sponsor of astronomy research.

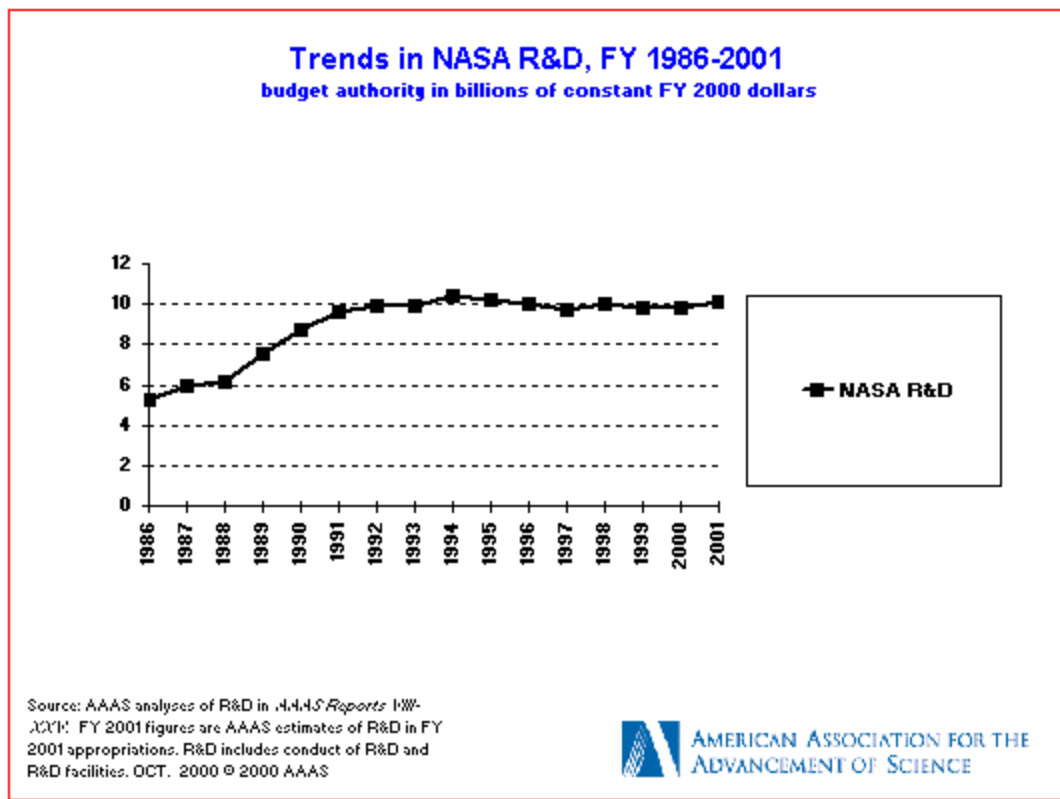


Figure 1.

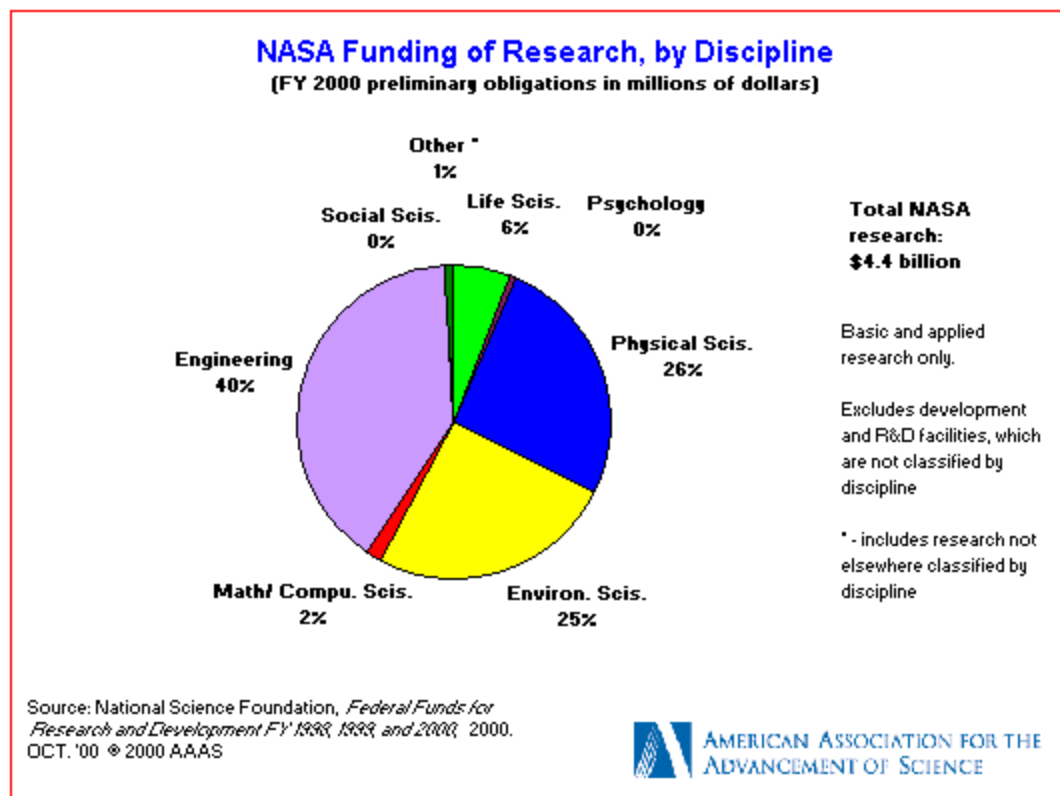


Figure 2.

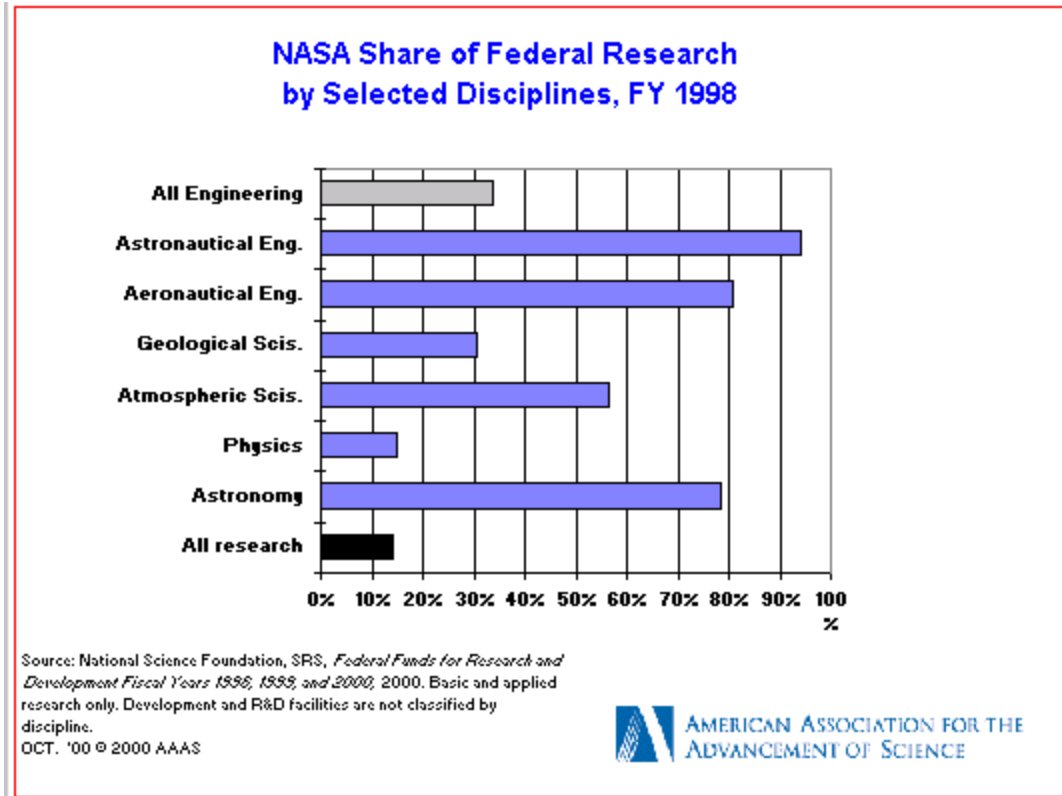


Figure 3.

The FY 2001 NASA budget, with its generous increases for the research programs in SAT, should allow NASA to expand its basic and applied research support for the above disciplines after several years of stagnant funding. NASA's research portfolio is scheduled to expand in future years if all goes according to plan, as the Space Station program evolves into more of a research and less of a construction program, and as NASA continues to shift its aeronautical and earth science programs away from development toward research.

The final VA-HUD bill emerged from conference last week, and was approved by the House and Senate on October 19. Attached to the bill is a revised version of the Energy-Water bill, which had been vetoed by the President. [President Clinton signed the VA-HUD/Energy-Water bill into law on October 27.]

-October 24, 2000 (updated November 1)

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**Table. National Aeronautics and Space Administration
House-Senate Conference on R&D in the FY 2001 Budget
(budget authority in millions of dollars)**

	FY 2000 Estimate	FY 2001 Request	FY 2001 CONF.	House-Senate Conference			
				Chg. from Request Amount	Percent	Chg. from FY 2000 Amount	Percent
Summary of R&D by Appropriation:							
1. Human Space Flight (HSF)							
Space Station	2,323	2,115	2,115	0	0.0%	-209	-9.0%
Other	10	20	20	0	0.0%	10	93.7%
Total R&D HSF	2,333	2,135	2,135	0	0.0%	-199	-8.5%
2. Science, Aeronautics and Technology (SAT)							
Space Science	2,193	2,399	2,488	90	3.7%	296	13.5%
Life & Microgravity Sciences	275	302	314	12	4.0%	40	14.4%
Earth Science	1,443	1,406	1,486	81	5.7%	43	3.0%
Aero-Space Technology	1,125	1,193	1,243	50	4.2%	118	10.5%
Mission Communications Serv.	406	529	525	-4	-0.8%	119	29.2%
Academic Programs	139	100	133	33	33.2%	-6	-4.1%
Total R&D SAT	5,581	5,929	6,191	261	4.4%	610	10.9%
3. Mission Support R&D	1,862	1,976	1,995	19	1.0%	133	7.1%
Total NASA R&D	9,777	10,040	10,320	280	2.8%	544	5.6%
NASA Non-R&D Activities:							
Space Shuttle (in HSF)	2,980	3,166	3,139	-27	-0.9%	159	5.3%
Other Non-R&D in HSF	155	200	190	-10	-5.0%	35	22.6%
Mission Support Non-R&D	670	608	614	6	1.0%	-56	-8.4%
Inspector General	20	22	23	1	4.5%	3	15.0%
Total NASA Non-R&D Activities	3,824	3,995	3,965	-30	-0.8%	141	3.7%
TOTAL NASA Budget	13,601	14,035	14,285	250	1.8%	685	5.0%

AAAS estimates based on FY 2001 appropriations bills. Includes conduct of R&D and R&D facilities.

FY 2000 and FY 2001 request figures based on OMB R&D data and supplemental agency budget data.

Figures are rounded to the nearest million. Changes calculated from unrounded figures.

October 24, 2000 - House-Senate conference funding levels.

These funding levels are FINAL unless the bill is vetoed, or rescissions/supplementals are enacted in later appropriations bills.