

NASA Receives \$13.7 Billion; R&D Up 1 Percent

(The complete series of AAAS R&D Funding Updates, including continually updated analyses of R&D by agency in FY 2000 appropriations, is available on the AAAS R&D Web Site (<http://www.aaas.org/spp/R&D>) in the "FY 2000 R&D" or the "What's New" sections.) (revisions in []))

[On October 20, President Clinton signed into law an FY 2000 VA-HUD appropriations bill (HR 2684) that gives \$13.7 billion to the National Aeronautics and Space Administration (NASA).] The final bill closely follows the Administration request and the Senate version of the bill, and rejects the steep cuts to NASA's budget proposed in the House version. Unlike the House bill, which would have imposed a \$1 billion cut on NASA, **the final bill provides slightly more than the request for a total of \$13.7 billion for NASA's budget, just \$12 million or 0.1 percent less than FY 1999.** The request was for \$13.6 billion. **Total NASA R&D increases slightly by 1.0 percent to \$9.8 billion** (see Table).

Although FY 2000 started on October 1, Congress is still struggling to draft the 13 appropriations bills within discretionary spending caps that are forcing sharp cuts to domestic discretionary programs. The discretionary spending caps, enacted in 1997, require FY 2000 discretionary spending to be nearly \$20 billion below FY 1999 funding levels. Thanks to several accounting maneuvers, including billions of dollars in rescissions of unspent housing funds, designations of emergency spending for disaster relief, and advance appropriations of FY 2001 funds, the final VA-HUD bill manages to stay within tight budget totals while still providing increases for priority programs.

Within the \$70 billion discretionary total for the final VA-HUD bill, padded with an extra \$10 billion in additional funds from accounting maneuvers, Congress provides NASA with \$74 million more than it had requested, for a total NASA budget of \$13.7 billion, just \$12 million or 0.1 percent less than FY 1999. **NASA's R&D funding, which excludes the Space Shuttle program and its mission support costs, totals \$9.8 billion in FY 2000, an increase of \$100 million or 1.0 percent (see Table).**

The **Science, Aeronautics, and Technology (SAT)**, which funds nearly all of NASA's R&D not related to the Space Station, receives \$5.6 billion, a reduction of 0.8 percent from FY 1999 but \$182 million or 3.4 percent more than the request. The final appropriation is close to the Senate-proposed appropriation, in contrast to a proposed 12 percent cut in the House bill. The final bill provides \$2.2 billion for **Space Science**, 3.1 percent more than FY 1999. Congress reduces funding for future Discovery and Explorer missions, which could result in fewer spacecraft launches over the next few years than NASA had planned, and also reduces funding for Mars missions in response to the recent loss of a Mars spacecraft. The bill instructs NASA to prepare a detailed report on the causes of the Mars mission's failure. There are increases for several congressionally designated projects and a \$23 million increase for costs associated with the next servicing mission of the Hubble Space Telescope.

The **Life and Microgravity Sciences and Applications (LMSA)** account within SAT receives a \$276 million appropriation, an increase of 4.7 percent. The increase is due to congressionally designated projects. The House-proposed bill sharply criticized NASA for scheduling only one life and microgravity sciences shuttle mission in the next few years. The final bill retains the House language instructing NASA to add another dedicated science mission by 2001, and provides

science funds in LMSA and shuttle funds in Human Space Flight for that purpose. **Earth Science** receives \$1.4 billion, slightly less than the request but 2.4 percent or \$33 million more than FY 1999. There are more than a dozen congressionally designated projects, requiring offsetting cuts in mission reserves and other regular Earth Science accounts. Although the House proposed to terminate the Triana program, the final bill keeps it alive but directs NASA to suspend all work until the National Academy of Sciences completes an evaluation of the mission.

In the sharpest departure from NASA's priorities, Congress adds \$147 million to the request for **Aero-Space Technology**, leaving the program with \$1.2 billion, which is still 13.9 percent less than FY 1999. Although much of the increase over the request is for congressionally designated projects, the final bill also contains add-ons for R&D in ultra-efficient engine technologies, aircraft noise reduction, flight control, and space launch technologies. Congress also adds \$41 million to the request for **Academic Programs**, resulting in a budget of \$141 million, slightly more than last year. The supplement to the request is entirely for 16 congressionally designated projects.

The final VA-HUD bill provides \$2.3 billion for continued development and construction of the **International Space Station**, \$79 million or 3.5 percent more than FY 1999 but \$152 million less than NASA's request, partly because of a \$100 million reduction from the request for development of a crew return vehicle. Although the Senate appropriated Space Station funds in a separate account to prevent NASA from siphoning funds from other Human Space Flight programs to cover cost overruns in the Station, the final bill preserves the existing Human Space Flight account structure. The non-R&D **Space Shuttle** program, the other major program within Human Space Flight, receives \$3.0 billion, slightly more than its current funding. The appropriation includes \$40 million for an additional space shuttle science mission by 2001.

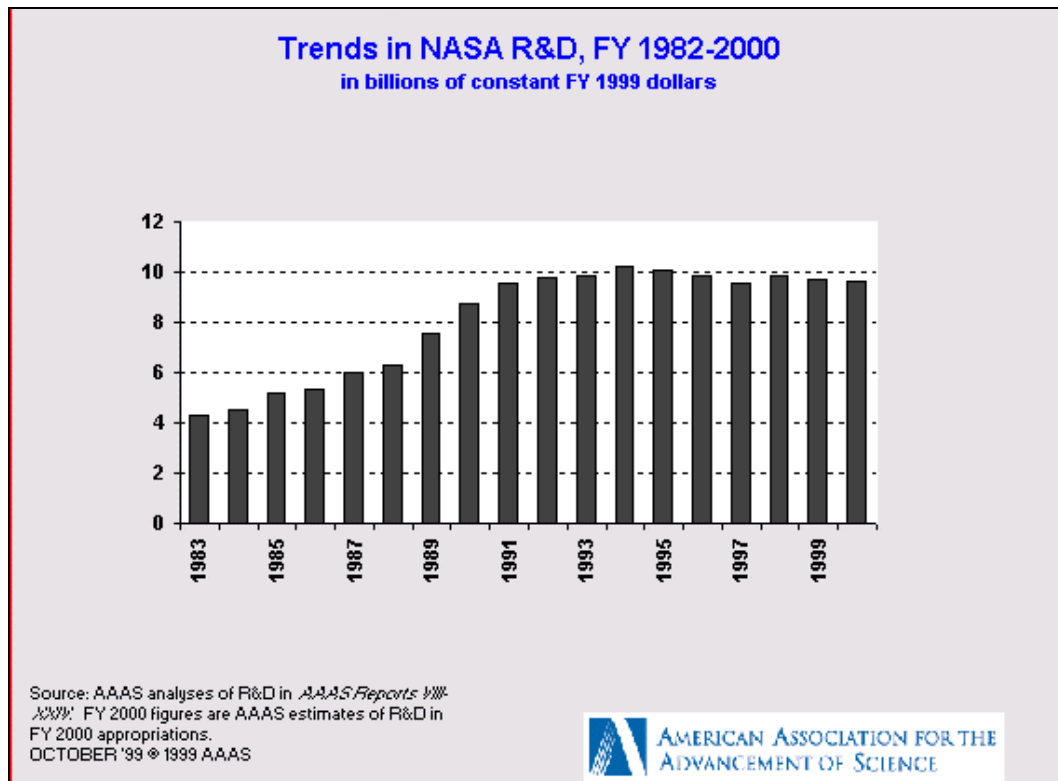


Figure 1.

NASA's R&D funding has declined in the last few years after peaking in FY 1994, and has been stagnant throughout the 1990s. NASA R&D increased dramatically from FY 1986 to FY 1994 because of development of a replacement for the Space Shuttle Challenger, development of the International Space Station, and an expansion of NASA's earth science activities. Growth in the NASA budget stopped in the mid-1990s, and has declined in inflation-adjusted terms as a result of budget cuts and the agency's efforts to streamline its operations and produce cheaper space missions. The R&D appropriation for FY 2000 represents a 1 percent increase, less than the 2 percent expected inflation rate, so once again NASA's R&D declines in real terms.

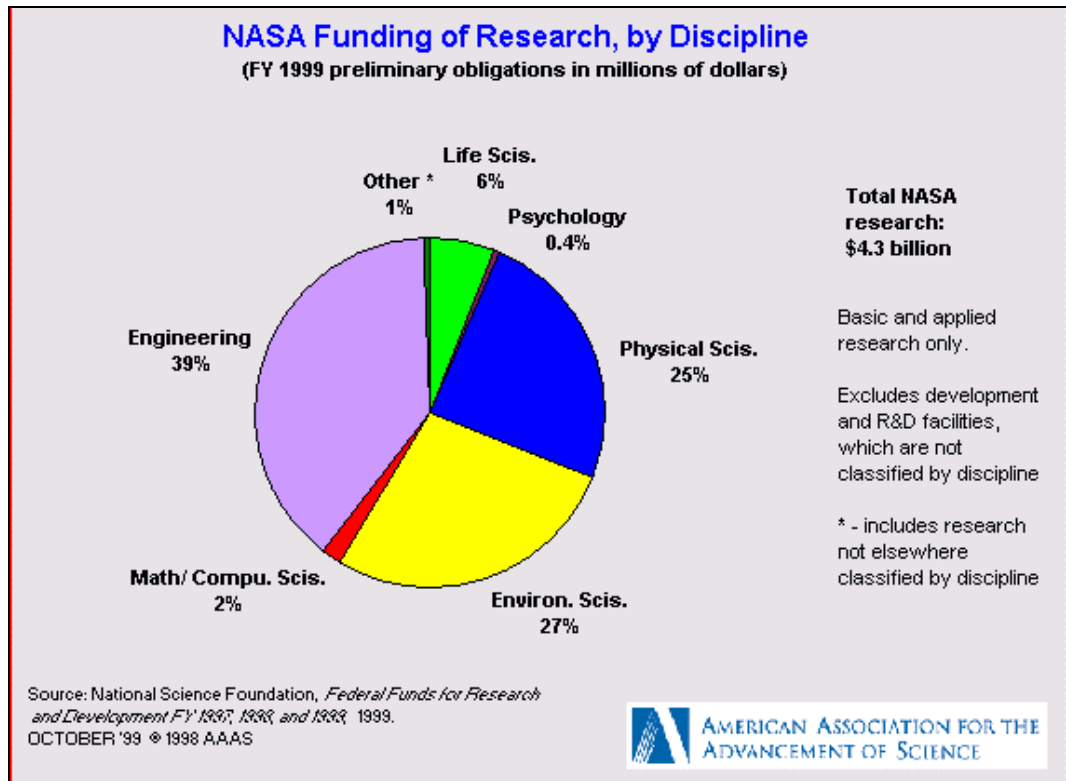


Figure 2.

Although much of NASA's R&D funds development rather than research for science missions 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. Engineering research makes up the largest part of the 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. 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. 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.

NASA's R&D funding is thus important to the overall health of engineering, physical sciences, and environmental sciences, but recent trends in NASA's budget are mixed for these disciplines. Figure

3 shows that NASA research, in inflation-adjusted terms, is on a slight upward trend within the flat total R&D budget, but NASA's support for engineering research has been flat to declining (except for a possible statistical error in FY 1998), as has NASA's support for physical sciences research. Funding for environmental sciences research has been increasing, mostly because of NASA's and the Clinton Administration's strong support for the Mission to Planet Earth program, now the Earth Science program. Much of the remaining increase in total NASA research in the 1990s is due to a dramatic expansion of support for the life sciences, though the total is still a small fraction both of total NASA research and total federal support for life sciences.

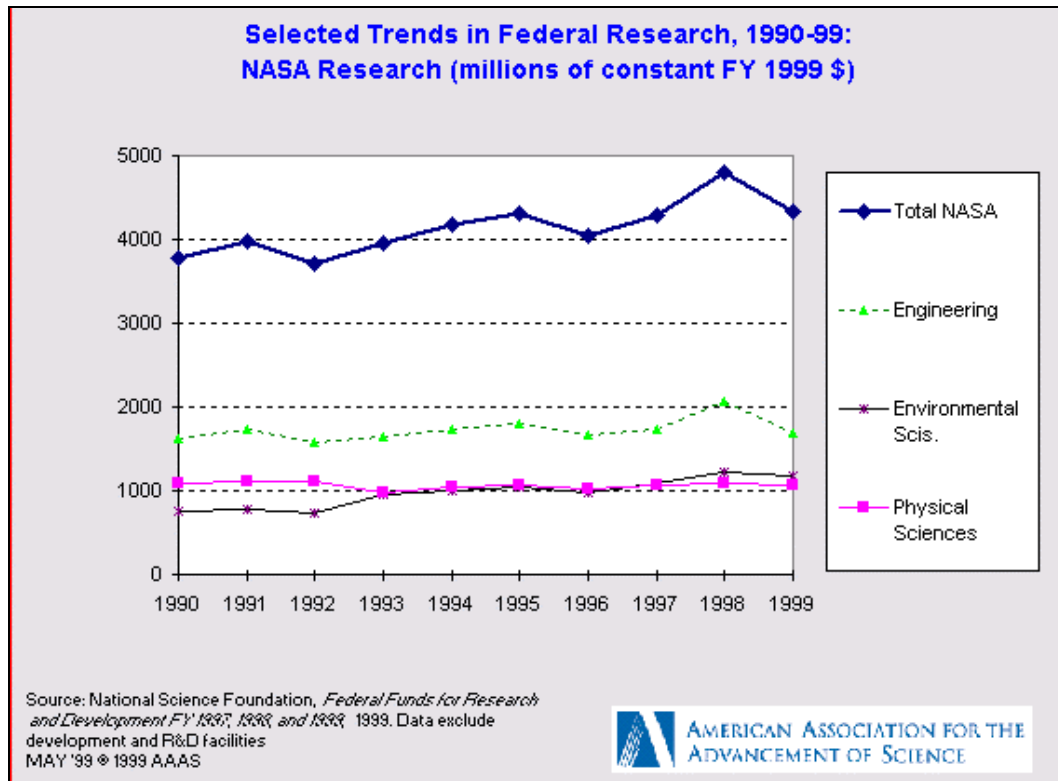


Figure 3.

[President Clinton signed the VA-HUD bill into law on October 20.] Although these funding levels would be final under normal circumstances, Congress may still re-open completed FY 2000 appropriations if it runs into trouble passing the remaining appropriations bills. Congress is seriously considering enacting across-the-board cuts in discretionary spending to get all FY 2000 appropriations under budget targets. These cuts could affect NASA and other agencies in the VA-HUD bill even after the bill becomes law.

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**Table. National Aeronautics and Space Administration
House-Senate Conference on R&D in the FY 2000 Budget
(budget authority in millions of dollars)**

	FY 1999 Estimate	FY 2000 Request	FY 2000 CONF.	House-Senate Conference			
				Chg. from Request		Chg. from FY 1999	
				Amount	Percent	Amount	Percent
Summary of R&D by Appropriation:							
1. Human Space Flight (HSF)							
Space Station	2,252	2,483	2,331	-152	-6.1%	79	3.5%
Other	20	6	6	0	0.0%	-14	-69.7%
Total R&D HSF	2,272	2,489	2,337	-152	-6.1%	65	2.9%
2. Science, Aeronautics and Technology (SAT)							
Space Science	2,119	2,197	2,186	-11	-0.5%	67	3.1%
Life & Microgravity Sciences	264	256	276	20	7.6%	12	4.7%
Earth Science	1,414	1,459	1,447	-12	-0.8%	33	2.4%
Aero-Space Technology	1,339	1,007	1,153	147	14.6%	-186	-13.9%
<i>Aeronautics</i>	769	620	684	64	10.3%	-85	-11.0%
<i>Adv. Space Transportation</i>	430	254	337	83	32.8%	-92	-21.5%
<i>Commercial Technology Progs.</i>	140	133	132	-1	-0.4%	-8	-6.0%
Mission Communications Serv.	380	406	404	-2	-0.6%	24	6.3%
Academic Programs	139	100	141	41	40.7%	2	1.6%
Total R&D SAT	5,654	5,425	5,607	182	3.4%	-47	-0.8%
3. Mission Support R&D							
	1,790	1,856	1,872	16	0.8%	82	4.6%
Total NASA R&D	9,715	9,770	9,815	45	0.5%	100	1.0%
NASA Non-R&D Activities:							
Space Shuttle (in HSF)	2,998	2,986	3,011	25	0.8%	13	0.4%
Russian Cooperation (HSF)	53	0	0	0	-	-53	-100.0%
Other Non-R&D in HSF	157	163	163	0	0.0%	6	3.8%
Mission Support Non-R&D	721	638	643	5	0.7%	-78	-10.8%
Inspector General	20	21	20	-1	-3.8%	0	0.0%
Total NASA Non-R&D Activities	3,950	3,809	3,837	29	0.8%	-112	-2.8%
TOTAL NASA Budget	13,665	13,578	13,653	74	0.5%	-12	-0.1%

AAAS estimates. Includes conduct of R&D and R&D facilities.

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

Based on House-Senate conference funding levels.

These figures are final unless additional appropriations or rescissions are enacted in an omnibus appropriations bill.