

Congress Boosts NASA R&D, Reins in Space Station

(This analysis is part of a series of AAAS R&D Funding Updates on the FY 2002 congressional appropriations process. This analysis includes information on R&D in House-Senate conference appropriations for the National Aeronautics and Space Administration (NASA). The complete series of AAAS R&D Funding Updates, including continually updated analyses of R&D by agency in FY 2002 appropriations, is available on the AAAS R&D Web Site (<http://www.aaas.org/spp/R&D>) in the "FY 2002 R&D" or the "What's New" sections.)

On November 6, a conference report was filed for the FY 2002 VA-HUD appropriations bill (HR 2620; House Report 107-272), which funds the National Aeronautics and Space Administration (NASA). While the House version of the bill would have given NASA \$15.0 billion in FY 2002 and the Senate \$14.6 billion, the final compromise bill would give NASA \$14.8 billion in FY 2002, \$540 million or 3.8 percent more than FY 2001. This would be \$282 million more than the Administration's request of \$14.5 billion. **In the final VA-HUD bill, NASA's R&D funding would rise 3.5 percent to \$10.3 billion, more than the \$10.0 billion request and Senate appropriation but less than the House** (see Table).

The final FY 2002 VA-HUD bill would provide \$85 billion for discretionary programs, more than the House version of the bill (\$85 billion), Senate version of the bill (\$84 billion) and the request (\$83 billion). The bill funds science agencies including the National Science Foundation (NSF), NASA, the Environmental Protection Agency (EPA), and non-R&D programs for veterans and housing. (For information on House appropriations for NASA, please see the July 27 AAAS R&D Funding Update; for information on Senate appropriations for NASA, please see the July 25 AAAS R&D Funding Update; for details of the FY 2002 request for NASA, please see Chapter 10 of *AAAS Report XXVI: R&D FY 2002*.)

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 would total \$10.3 billion in FY 2002, \$343 million or 3.5 percent above FY 2001, well above both the request and the Senate plan but below the \$10.4 billion House total.** Because the Space Shuttle program would receive a large increase, the total NASA budget of \$14.8 billion would show a slightly higher increase (up 3.8 percent).

The troubled **International Space Station** is now projected to run more than \$4 billion over budget over the next five years. The Senate version of the VA-HUD bill proposed to cut the Space Station budget by 21.7 percent over FY 2001, for a total of \$1.7 billion instead of current-year funding of \$2.1 billion, and the report language accompanying the bill was harsh in its criticism of NASA management. The House, however, while also expressing its concern over NASA management and cost overruns, actually would have provided more money for the project than NASA requested after adjusting for a transfer of funds. The final bill essentially splits the difference. The International Space Station account would receive \$1.7 billion, down 18.4 percent or \$389 million from FY 2001, but the final bill would join the earlier versions in transferring Space Station research to the Biological and Physical Research (BPR) account; the FY 2002 final appropriation for life and microgravity research aboard the Station would be \$284 million, the same as the request, and would add another \$55 million in BPR for the Fluids and Combustion Facility and other space station research and equipment. Placing these research funds in a separate account would make it more difficult for NASA to siphon funds from research to construction of the Station. After adjusting transfers, the total Space Station project would receive just \$50 million less than the FY 2001 funding level.

The final bill includes \$40 million for a Crew Return Vehicle (CRV). The House bill would have provided \$275 million for a CRV, a program deleted from the request and Senate plans. The CRV would be used as an emergency escape vehicle for the Station crew. Without this six or seven-person vehicle, Station crews would be limited to three, drastically reducing the amount of research that can be done on the Station to an estimated 20 person-hours a week. NASA had proposed to eliminate the CRV as a cost-cutting measure.

Although the Space Station would receive nearly full funding, the conference report of the final VA-HUD bill expresses major concerns about the project. It criticizes NASA's newly redesigned concept for the finished space station as ill-defined, and expresses concerns that research space and time are inadequately provided for. The report instructs NASA to submit a report to Congress outlining in full NASA's plans for the "U.S. Core Complete" configuration of the Space Station, including a ten-year cost profile and clear definitions of the station research program.

The **Science, Aeronautics, and Technology (SAT)** account, which funds nearly all of NASA's R&D not related to the Space Station, would receive \$7.9 billion, 11.2 percent or \$790 million above FY 2001. Nearly half of the increase would be due to the transfer of Space Station research to Biological and Physical Research (BPR), while much of the remaining increase would be due to more than \$230 million in congressionally designated R&D projects. BPR, formerly known as Life and Microgravity Sciences and Applications, would receive \$714 million for an 88.6 percent increase. Taking out the Space Station research, however, would leave \$375 million, slightly below the FY 2001 funding level. 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. Funding for core research programs would be reduced further by 10 congressionally earmarked R&D projects.

Within SAT, **Space Science** would receive \$2.8 billion, an 8.5 percent or \$224 million increase. The House, Senate, and the final bill would go along with NASA's requested steep cuts to the Earth Science program, with the final total of \$1.6 billion representing an 8.3 percent cut from the FY 2001 funding level.

The **Aero-Space Technology** program would rise 12.4 percent or \$275 million to \$2.5 billion. Much of the increase would be due to a boost from \$272 million in FY 2001 to \$465 million in FY 2002 for the Space Launch Initiative, which funds research and development efforts for reusable launch vehicle technology. There would also be \$83 million for unrequested congressional earmarks. Because NASA funds both space and aeronautics programs from this account, obscuring the precise NASA investment in aeronautics, the conference report instructs NASA to establish a separate aeronautics line in the next budget.

The **Academic Programs** appropriation of \$231 million would be a substantial 73.9 percent or \$98 million increase over FY 2001, more than either the House appropriation of \$189 million or the Senate's \$211 million. The Senate bill contained 27 congressionally designated projects totaling \$53 million, while the House bill contained a partially overlapping list of 22 congressionally designated projects totaling \$35 million. The final bill includes 40 projects totaling \$67 million. Although all programs in this account are classified as R&D, the congressionally designated projects include funds for planetariums, science museums, education center, and even a dormitory.

The relatively generous FY 2002 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 1991, and in fact has declined slightly. NASA's R&D grew dramatically from the mid-1980s to the early 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. Since then, however, NASA has had to accommodate increased costs of the Space Station and an ambitious research agenda within a stagnant R&D budget. After bottoming out in FY 2000, NASA R&D has stayed ahead of inflation for two years.

Although much of NASA's R&D funds development and facilities 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.

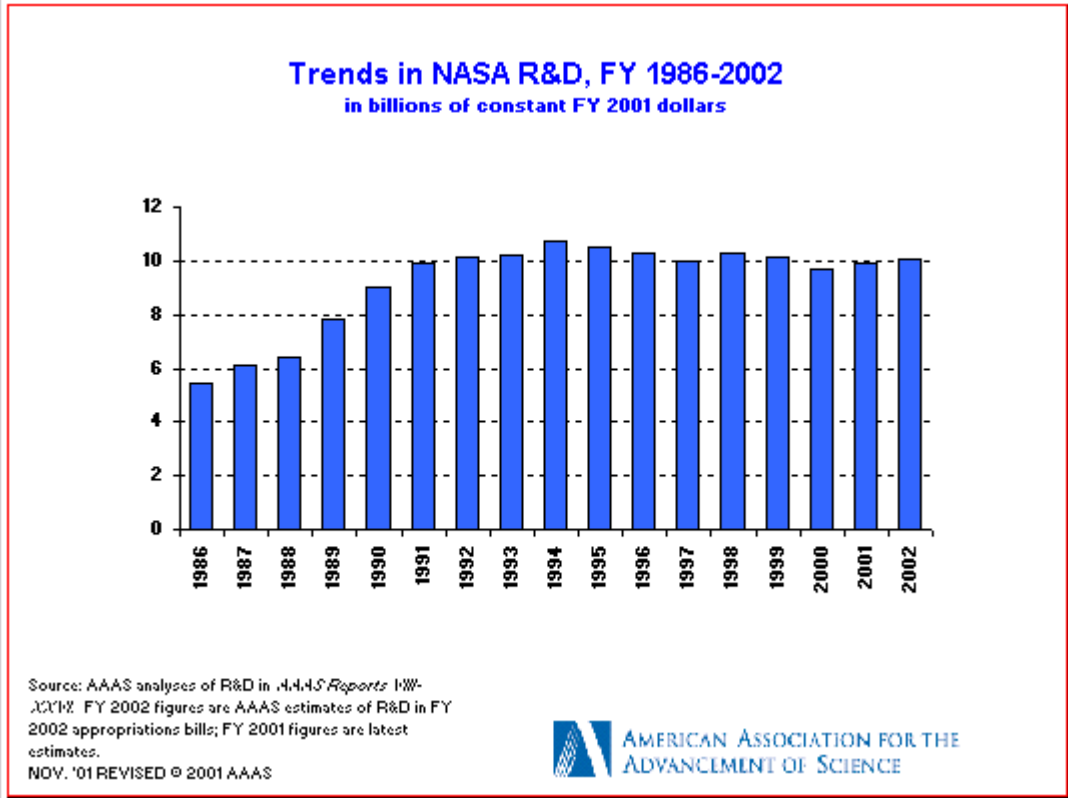


Figure 1. (click on the image to view or download a color full-page PDF version of the chart)

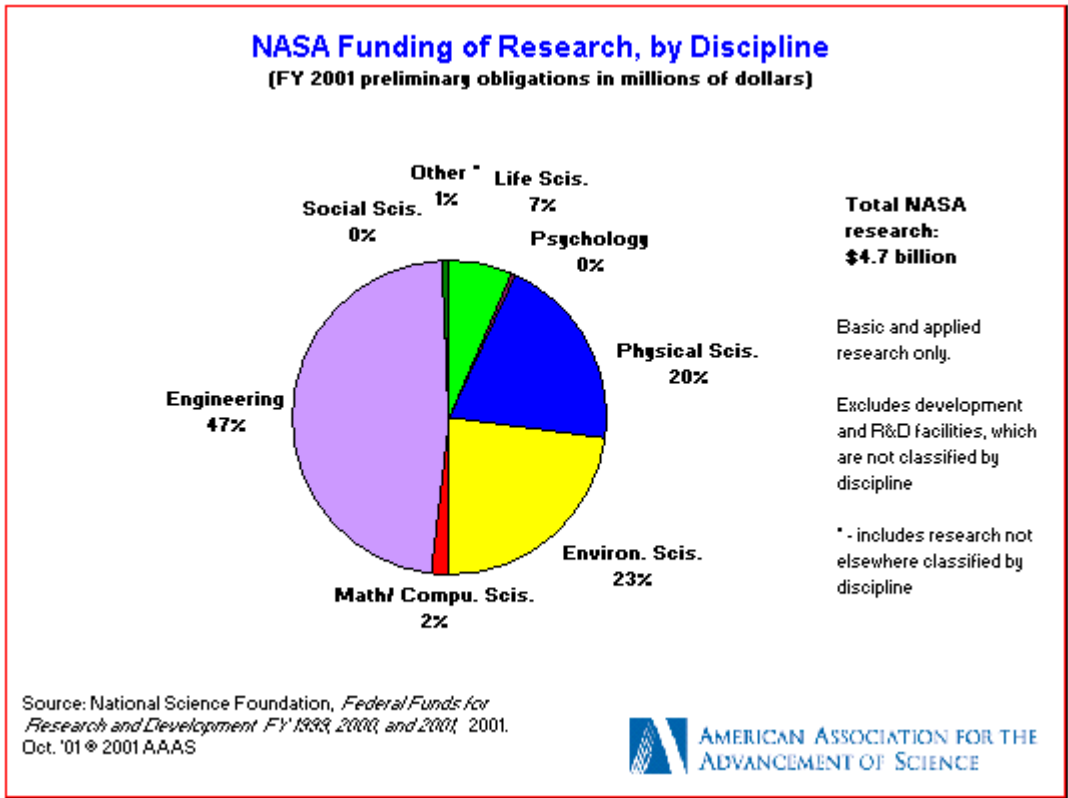


Figure 2. (click on the image to view or download a color full-page PDF version of the chart)

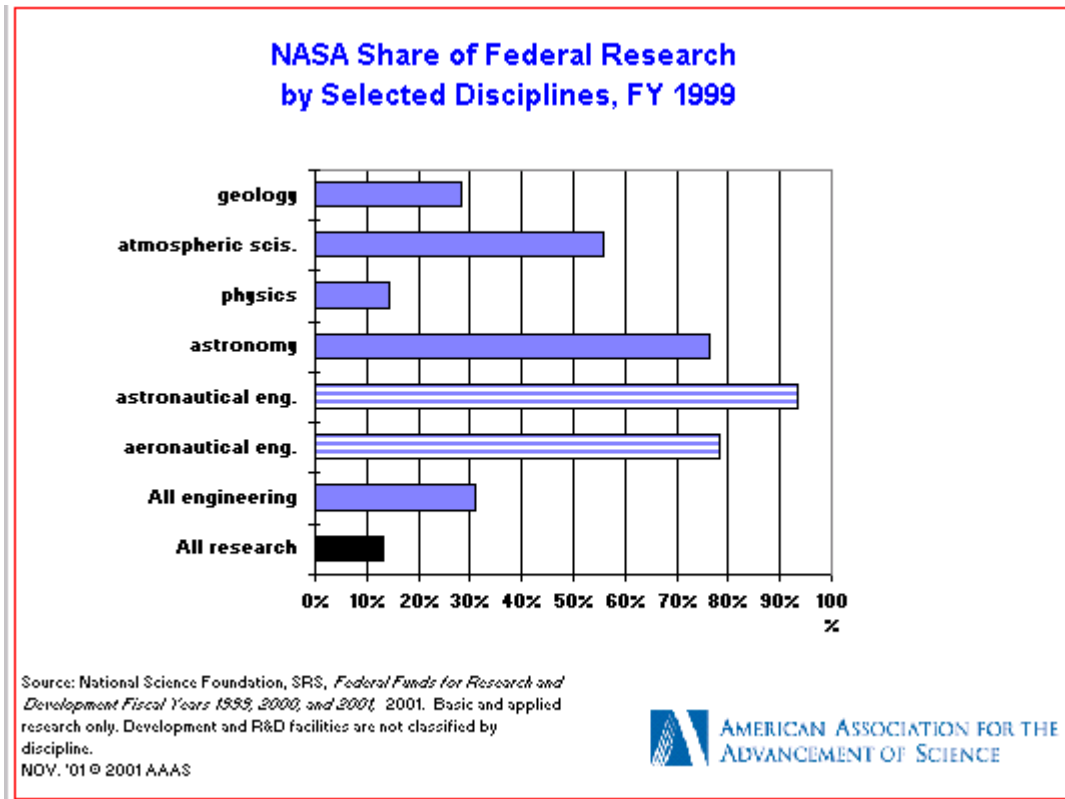


Figure 3. (click on the image to view or download a color full-page PDF version of the chart)

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 largest agency sponsor. As Figure 3 shows, NASA support is especially important in some engineering sub-fields such as astronautical engineering and aeronautical engineering; NASA supplies nearly all of the federal funds for these sub-fields. 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 a third 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 and NSF). 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.

The FY 2002 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.

Congress is expected to give final approval to the VA-HUD bill in the next few days, and President Bush is expected to sign it into law.

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**Table. National Aeronautics and Space Administration
House-Senate Conference on R&D in the FY 2002 Budget
(budget authority in millions of dollars)**

	FY 2001 Estimate	FY 2002 Request	Action by House-Senate Conference				
			FY 2002 CONF.	Chg. from Request Amount	Chg. from Request Percent	Chg. from FY 2001 Amount	Chg. from FY 2001 Percent
Summary of R&D by Appropriation:							
1. Human Space Flight (HSF)							
Space Station *	2,113	2,087	1,724	-364	-17.4%	-389	-18.4%
Other	788	737	737	0	0.0%	-51	-6.5%
Total R&D HSF	2,901	2,825	2,461	-364	-12.9%	-440	-15.2%
2. Science, Aeronautics and Technology (SAT)							
Space Science	2,625	2,786	2,849	63	2.2%	224	8.5%
Biological & Physical Research *	379	361	714	353	97.9%	336	88.6%
Earth Science	1,716	1,515	1,573	58	3.9%	-143	-8.3%
Aero-Space Technology	2,214	2,376	2,490	114	4.8%	275	12.4%
Academic Programs	133	154	231	77	50.2%	98	73.9%
Total SAT	7,067	7,192	7,857	665	9.3%	790	11.2%
Less Non-R&D in SAT	-42	-50	-50	0	0.0%	-7	17.5%
Total NASA R&D	9,925	9,966	10,268	302	3.0%	343	3.5%
NASA Non-R&D Activities:							
Space Shuttle (in HSF)	3,119	3,284	3,284	0	0.0%	165	5.3%
Other Non-R&D in HSF	1,144	1,188	1,168	-20	-1.7%	24	2.1%
Non-R&D in SAT	42	50	50	0	0.0%	7	17.5%
Inspector General	23	24	24	0	0.0%	1	3.5%
Total NASA Non-R&D Activities	4,328	4,545	4,525	-20	-0.4%	197	4.6%
TOTAL NASA Budget	14,253	14,511	14,793	282	1.9%	540	3.8%

AAAS estimates based on FY 2002 appropriations bills. Includes conduct of R&D and R&D facilities.

FY 2001 and FY 2002 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.

* - The FY 2002 Conference appropriation would transfer Space Station research from the International Space Station account to the Biological and Physical Research account. The FY 2002 Conference transfer for Space Station research would be \$284 million; there is an additional \$55 million in BPR for space station equipment.

November 7, 2001 - House-Senate conference funding levels.

These appropriations are final unless the conference report is rejected or vetoed.

Some funding levels may be amended by later appropriations bills.