

Senate Taps Emergency Funds to Keep NASA R&D Flat

Highlights

- **The Senate would rely on \$800 million in emergency funding to shore up the FY 2005 NASA budget.** The FY 2005 total NASA budget of \$16.4 billion would be \$1 billion or 6.5 percent more than FY 2004, with most of the increase going to returning the Space Shuttle to flight in spring 2005. NASA R&D, which excludes the Shuttle, would stay even at \$11.0 billion (up 0.5 percent; see Table).

- By relying on emergency funds that do not count against strict congressional budget targets, the Senate would be far more generous than the House's proposal to cut funding for NASA down to \$15.1 billion and NASA R&D by 6.2 percent through the elimination of proposed programs to get the new moon-and-Mars missions underway. The Senate would fund most moon-and-Mars missions, though not at the levels proposed by NASA.

- **NASA R&D would increase by 0.5 percent to \$11.0 billion in the Senate bill.** While funding for construction of the International Space Station would increase 6.3 percent to \$1.6 billion, **NASA's support of basic and applied research would fall 8 percent**, primarily from a delay of moon-and-Mars programs and the delay of some Space Station research due to the grounding of the Shuttle.

- The non-R&D Space Shuttle program would receive \$4.8 billion in preparation for a long-delayed return to flight now scheduled for spring 2005, with \$500 million in the Senate bill designated as emergency funding for safety upgrades and other launch preparation costs.

- The Space Science program would emerge a winner among science programs in the Senate bill with \$4.3 billion, up 9.3 percent, an increase due mostly to \$300 million in emergency funds allocated to a repair mission for the Hubble Space Telescope. The Senate would provide \$20 million in new funds for Lunar Exploration to begin preparations for the return to the moon.

NASA R&D in FY 2005 Senate Appropriations

On September 21, the Senate Appropriations Committee drafted its version of an FY 2005 VA/HUD appropriations bill (S 2825) that would boost National Aeronautics and Space Administration (NASA) funding for FY 2005 with the help of \$800 million in emergency funding for the Space Shuttle and the Hubble Space Telescope that would be exempt from the Senate's tight budget targets. The use of emergency funding allows the Senate to be far more generous than a House version of the bill (HR 5041) that would dramatically cut NASA funding. The Senate bill would give NASA a total budget of \$16.4 billion in FY 2005, \$1.0 billion more than FY 2004, \$135 million more than the request, and \$1.2 billion more than the House appropriation (see Table). The Senate would allow NASA to embark on grand new plans for space exploration involving a return to the moon and a possible human flight to Mars in coming decades, unlike the tight House budget which would squash these plans for at least a year.

NASA's R&D (two-thirds of the agency's budget) would be \$11.0 billion, a 0.5 percent increase, less than the request but an improvement over the House-proposed 6.2 percent hit to R&D programs. R&D would show a smaller increase than the overall NASA budget because the Senate would give the largest increase to the Space Shuttle, a non-R&D program. While the Senate increase would fall behind inflation and would delay some of NASA's new moon-and-Mars projects, it would be a marked improvement on a House appropriation that would reduce NASA R&D funding down to levels not seen

since 1990 in today's dollars. (For details of NASA R&D in FY 2005 House appropriations, see the July 28 AAAS R&D Funding Update. For details of R&D in the FY 2005 request, please see Chapter 10 of *AAAS Report XXIX: R&D FY 2005*.)

Both the House and Senate FY 2005 VA-HUD bills would provide \$93 billion in regular funding for discretionary programs, almost \$1 billion more than the President's request and \$2 billion more than FY 2004. 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. But while the House would devote all the additional funds and then some to veterans and housing programs, leaving R&D programs with cuts, the Senate gave itself more flexibility by designating an additional \$2 billion in funding as 'emergency' spending and thus exempt from the tight congressional budget targets. \$800 million of the Senate's emergency funding would go to the NASA budget.

With the January presidential announcement of plans to send humans to the moon again on the way to Mars, the **National Aeronautics and Space Administration (NASA)** was supposed to embark on a new era in its history, with a major commitment of new resources to enable the agency to begin preparing for a new lunar mission. The February release of the FY 2005 budget request of \$16.2 billion for NASA made the agency one of the few domestic agencies favored with a proposed increase (5.6 percent) in tough budgetary times even as other R&D funding agencies faced cuts or flat budgets. But on closer examination, nearly all of the increase would have gone to returning the non-R&D Space Shuttle to flight (up 9.5 percent to \$4.3 billion) and resuming construction of the Space Station (up 24.3 percent to \$1.9 billion).

The Senate VA-HUD bill would try to keep NASA's plans on track, though with some modifications. The Senate would fully fund the requested increase to \$4.3 billion for the non-R&D Space Shuttle and would provide an additional \$500 million in emergency funding for safety upgrades and other expenses necessary to prepare the Shuttle for a return to flight in spring 2005, for a total of \$4.8 billion (up 22.2 percent).

The Senate would trim the \$1.9 billion request for the Space Station down to \$1.6 billion, which would still be 6.3 percent more than FY 2004 spending. With the original deadline of February 2004 for completion of the core station long shattered, 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. The Senate allocation recognizes that the continued grounding of the Shuttle will delay Station construction, and thus the project will require less money than estimated earlier.

With these two big-ticket current programs provided for, **the Senate bill would also provide funds to start a new moon-and-Mars related program within the Exploration Systems (ES) account**, in contrast to a cash-strapped House bill that would kill or delay it. The Senate would provide \$268 million to begin development of the Crew Exploration Vehicle (CEV), a project to develop the next-generation spacecraft capable of taking humans beyond low-Earth orbit, less than the \$428 million request but much better than zero in the House bill. The House bill describes the reduction as a delay in CRV development, but it would set back the project timetable by at least a year while the Senate would at least allow the program to start. The CEV project is designed to replace the Space Launch Initiative, another program to develop next-generation space launch vehicles.

The Senate would give the new Human and Robotic Technology (HRT) program \$988 million, down from the request but still up 45.5 percent from the comparable programs in FY 2004. The Senate would give \$430 million to Project Prometheus to develop new power and propulsion technologies based on nuclear power for future NASA missions, while the House could only find \$208 million.

The Exploration, Science, and Aeronautics (ESA) account, which funds most of NASA's research, would be battered in the House bill with a reduction to \$7.6 billion, down 2.7 percent from this year, but would hold nearly steady at \$7.9 billion in the Senate bill for a 1.4 percent increase (see Table). But most ESA accounts would still fall in the Senate bill, with the bulk of the increase devoted to emergency funds for the Hubble Space Telescope.

The Space Science program would see its budget rise dramatically by 9.3 percent or \$371 million to \$4.3 billion, but \$300 million of the increase would be emergency spending to fund a servicing mission to the Hubble. NASA has attracted strong criticism this year for canceling a previously planned shuttle servicing mission to extend the life of the Hubble, instead focusing on robotic servicing. The House bill urges NASA to keep alive the option of a shuttle mission for Hubble, but would not provide any additional funds beyond the \$130 million request for the overall Hubble program (down sharply from \$241 million this year), which would not have paid for a mission. The Senate bill would provide core Hubble funding plus the \$300 million in dedicated funding for a servicing mission after the Shuttle eventually returns to flight. Space Science would also contain \$20 million for the Lunar Exploration program to develop the new technologies needed for a human return to the moon, down from the \$70 million request. The Senate would leave mostly untouched the proposed reductions in other Space Science efforts in Solar System Exploration, understanding the Sun-Earth connection, and exploring the structure and evolution of the universe.

Outside of Space Science, most of NASA's research-oriented programs would face cuts, even in the relatively generous Senate bill. The Earth Science program would fall 6.0 percent to \$1.5 billion in the Senate plan and by a similar amount in the House plan, confirming the lower priority assigned to space-based observations of the Earth within NASA's portfolio of activities. In Biological and Physical Research, both the House and the Senate would take funds out of the request for a Senate reduction of 4.9 percent down to \$937 million. And both the House and the Senate would confirm NASA's trend of moving away from the first 'A' in its name by cutting Aeronautics funding, in the Senate's case cutting by 7.9 percent to \$953 million, similar to the House cut and NASA's own plans. **At the same time, both the House and the Senate would add \$101 million for a partially overlapping list of earmarks to the NASA budget, further squeezing the shrinking resources for these programs.**

Impacts of the NASA R&D Portfolio

Although much of NASA's R&D portfolio funds development and facilities projects such as the Space Station, **NASA is also an important source of federal support for basic and applied research.** Engineering research makes up the largest part of the NASA portfolio. NASA funds approximately 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.

The House cuts would hit NASA research disproportionately, with an estimated 18 percent decline in NASA basic and applied research, mostly from cuts in applied research related to the new moon and Mars efforts but also from cuts in Earth Science, Biological and Physical Research, and aeronautics research. While the Senate would spare the new moon and Mars efforts, cuts in the other programs would result in an 8 percent cut in NASA support of research even in the more generous Senate bill.

Next Steps

The House VA-HUD bill's proposed cuts to NSF, NASA, and EPA look so steep, especially in an election year, that the bill may never make it to the House floor as a stand-alone bill. With the October 1 start of FY 2005 already past and the October 8 target adjournment date looming with other legislative priorities stacked up, the Senate will run out of time to debate and approve its version bill as a stand-alone bill. Thus, NASA programs will operate through at least November 20 at FY 2004 levels under a continuing resolution (CR; temporary appropriations bill) approved by Congress this week. After the November elections, Congress will try to finish up appropriations; the most likely scenario is that the VA-HUD bill will be rolled into an omnibus appropriations bill along with the other unfinished appropriations bills in a

post-election lame duck session. The big unanswered questions are whether the steep House cuts or the more generous Senate funding levels will prevail in the final FY 2005 NASA budget, and when NASA will receive its final budget.

(This analysis is one of a series of AAAS R&D Funding Updates on the FY 2005 congressional appropriations process. This analysis includes information on R&D in Senate appropriations for NASA. The complete series of AAAS R&D Funding Updates, including continually updated analyses of R&D by agency in FY 2005 appropriations, is available on the AAAS R&D Web Site (<http://www.aaas.org/spp/rd>) in the "FY 2005 R&D" or the "What's New" sections.)

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Table. NASA R&D in FY 2005 Senate Appropriations

**Table. National Aeronautics and Space Administration
Senate Appropriations Committee Action on R&D in the FY 2005 Budget
(budget authority in millions of dollars)**

	FY 2004 Estimate	FY 2005 Request	FY 2005 House	Action by Senate				
				FY 2005 Senate	Chg. from Request Amount	Percent	Chg. from FY 2004 Amount	Percent
Summary of R&D by Appropriation:								
1. Exploration Capabilities (EC) / Space Flight Capabilities								
Space Flight								
International Space Station	1,498	1,863	1,673	1,593	-270	-14.5%	95	6.3%
Space Shuttle	3,945	4,319	4,319	4,819	500	11.6%	874	22.2%
Space and Flight Support	432	492	492	492	0	0.0%	60	14.0%
Total Space Flight	5,875	6,674	6,484	6,904	230	3.4%	1,029	17.5%
Exploration Systems								
Human and Robotic Technology	679	1,094	862	988	-105	-9.6%	309	45.5%
Transportation Systems	967	689	151	519	-170	-24.7%	-448	-46.3%
Total Exploration Systems	1,646	1,782	1,013	1,507	-275	-15.4%	-139	-8.4%
Total EC	7,521	8,456	7,497	8,411	-45	-0.5%	890	11.8%
2. Exploration, Science, and Aeronautics (ESA) / Science, Aeronautics and Exploration								
Space Science	3,971	4,138	4,034	4,342	204	4.9%	371	9.3%
Earth Science	1,613	1,485	1,475	1,516	31	2.1%	-97	-6.0%
Biological and Physical Research	985	1,049	957	937	-112	-10.6%	-48	-4.9%
Aeronautics	1,034	919	955	953	34	3.7%	-81	-7.9%
Education Programs	226	169	200	188	19	11.3%	-39	-17.1%
Total ESA	7,830	7,760	7,621	7,937	176	2.3%	106	1.4%
3. Inspector General	27	28	31	32	4	14.5%	5	17.0%
Total NASA Budget	15,378	16,244	15,149	16,379	135	0.8%	1,001	6.5%
<i>minus non-R&D Activities:</i>								
Space Shuttle	-3,945	-4,319	-4,319	-4,819	-500	11.6%	-874	22.2%
Other non-R&D	-432	-492	-492	-492	0	0.0%	-60	14.0%
Inspector General	-27	-28	-31	-32	-4	14.5%	-5	17.0%
Education and Training	-65	-71	-71	-71	0	0.0%	-6	9.8%
Total NASA Non-R&D Activities	-4,469	-4,910	-4,914	-5,414	-504	10.3%	-945	21.2%
TOTAL NASA R&D	10,909	11,334	10,235	10,965	-369	-3.3%	56	0.5%

AAAS estimates based on FY 2005 appropriations bills. Includes conduct of R&D and R&D facilities.

FY 2004 and FY 2005 request figures based on OMB R&D data and supplemental agency budget data.

The FY 2005 Senate figures include \$800 million in spending designated as emergency.

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

October 1, 2004 - AAAS estimates of House and Senate Appropriations Committee-approved funding levels.