

CRS Report for Congress

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The National Aeronautics and Space Administration: Overview, FY2005 Budget in Brief, and Key Issues for Congress

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Summary

The National Aeronautics and Space Administration (NASA) conducts U.S. civilian space activities. Its FY2005 budget request is \$16.2 billion, a 5.6% increase over its FY2004 appropriation of \$15.4 billion. The increase is primarily for fulfilling new exploration goals that were announced by President Bush in January 2004 that include returning the space shuttle to flight, completing construction of the International Space Station, and returning humans to the Moon by 2020. The House Appropriations Committee version of the FY2005 VA-HUD-IA appropriations bill, which includes NASA, cuts the NASA request by \$1.1 billion (H.R. 5041). The Senate Appropriations Committee version (S. 2825) adds \$135 million to the request. The Senate Commerce Committee ordered reported a FY2005-2009 NASA authorization bill (S. 2541) that recommends \$16.2 billion for FY2005. NASA received \$126 million for hurricane relief in an FY2005 supplemental act (P.L. 108-324). This report is updated regularly.

Agency Overview

The National Aeronautics and Space Administration (NASA) was created by the 1958 National Aeronautics and Space Act (P.L. 85-568). NASA's charter is to conduct civilian space and aeronautics activities. Military space and aeronautics activities are conducted by the Department of Defense (DOD) and the intelligence community. DOD and NASA cooperate in some areas of technology development and occasionally have joint programs. NASA opened its doors on October 1, 1958, almost exactly one year after the Soviet Union ushered in the Space Age with the launch of the world's first satellite, Sputnik, on October 4, 1957. In the more than 45 years that have elapsed, NASA has conducted far reaching programs in human and robotic spaceflight, technology development, and scientific research.

The agency is managed from NASA Headquarters in Washington, D.C. It has nine major field centers around the country: **Ames Research Center**, Moffett Field, CA; **Dryden Flight Research Center**, Edwards, CA; **Glenn Research Center**, Cleveland, OH; **Goddard Space Flight Center**, Greenbelt, MD; **Johnson Space Center**, Houston,

TX; **Kennedy Space Center**, Cape Canaveral, FL; **Langley Research Center**, Hampton, VA; **Marshall Space Flight Center**, Huntsville, AL; **Stennis Space Center**, in Mississippi, near Slidell, LA. The **Jet Propulsion Laboratory**, Pasadena, CA (often counted as a 10th NASA center), is a federally funded research and development center operated for NASA by the California Institute of Technology. Goddard Space Flight Center manages the Goddard Institute of Space Studies (New York, NY), the Independent Validation and Verification Facility (Fairmont, WV); and the Wallops Flight Facility (Wallops, VA). Ames Research Center manages Moffett Federal Airfield, Mountain View, CA. Johnson Space Center manages the White Sands Test Facility, White Sands, NM. Web links are at [<http://www.nasa.gov/about/highlights/OrganizationIndex.html>]. NASA employs approximately 19,000 civil servants (full time equivalents), and 40,000 contractors and grantees working at or near NASA centers. For more information on NASA's workforce, see [<http://nasapeople.nasa.gov/workforce/default.htm>].

Mr. Sean O'Keefe is the Administrator of NASA. NASA headquarters has four "mission directorates": Exploration Systems, Space Operations (including the space station and space shuttle), Science, and Aeronautics Research. Links to those mission directorates and individual NASA programs are at [<http://www.hq.nasa.gov/hq/org.html>].

NASA's FY2005 Budget Request

For FY2005, NASA is requesting \$16.2 billion, a 5.6% increase over its FY2004 appropriation of \$15.4 billion.

Table 1: NASA's FY2005 Budget Request (in \$ millions)

Category	FY2004 approp.	FY2005 Req.	FY2005 Appropriations ††		FY2005 Authorization
			House Cmte	Sen. Cmte	Sen. Cmte
Exploration, Science, & Aeronautics	7,830	7,760	7,621	7,937	7,760
Space Science	3,971	4,138			4,138
Earth Science	1,613	1,485			1,485
Biol. & Phys. Res.	985	1,049			1,049
Aeronautics	1,034	919			919
Education	226	169			169
Exploration Capabilities	7,521	8,456	7,497	8,411	8,441
Exploration Systems	1,646	1,782			1,768
<i>Space Launch Init.</i>	†	†			—
<i>Other</i>	†	†			—
<i>Human & Robotic Tech.</i>	679	1,094			1,079
<i>Transportation Systems</i>	967	689			689
Space Flight	5,875	6,674			6,674

Category	FY2004 approp.	FY2005 Req.	FY2005 Appropriations ††		FY2005 Authorization
			House Cmte	Sen. Cmte	Sen. Cmte
<i>Space Station*</i>	1,498	1,863			1,863
<i>Space Shuttle</i>	3,945	4,319			4,319
<i>Space Flight Support</i>	432	492			492
Inspector General	27	28	31	32	28
Ind. Tech. Eng. Auth.	—	—	—	—	15
Total	15,378	16,244	15,149	16,379	16,245

Source: NASA FY2004 and FY2005 budget justifications, and bills or committee reports. Totals may not add due to rounding.

* Not including funds for research aboard the space station, which is in the Biological and Physical Research line. For FY2004, that is \$578 million; for FY2005, it is \$549 million.

† NASA's FY2005 request assumes cancellation of the Space Launch Initiative, reallocation of its remaining funding, and restructuring of what was called "Crosscutting Technologies," of which SLI was a part.

†† The House and Senate Appropriations Committee reports do not include the level of detail needed to definitively determine totals for the subcategories in this table.

The House Appropriations Committee version of the FY2005 VA-HUD-IA bill (H.R. 5041, H.Rept. 108-674) cut \$1.1 billion from the request. Major reductions include all \$438 million from the Crew Exploration Vehicle (CEV); \$230 million of the \$438 million for Project Prometheus; \$190 million from the \$1.9 billion for International Space Station (ISS), including \$70 million of the \$140 million for a new ISS Crew/Cargo Services line; and \$103 million of the \$309 million for bioastronautics research. **The Senate Appropriations Committee** (S. 2825, S.Rept. 108-353) recommended \$16.4 billion, \$135 million over the request, including \$800 million designated as emergency spending: \$500 million for the space shuttle, and \$300 million for the Hubble Space Telescope (\$100 million in Exploration Capabilities, and \$200 million in Exploration, Science, and Aeronautics). Among the cuts made by the Senate committee are \$160 million from CEV, all \$115 million from exploration systems technology maturation, \$260 million from ISS (including all \$140 million from ISS Crew/Cargo), and \$124 million from biological research. **The Senate Commerce Committee** has ordered reported a FY2005-2009 NASA authorization bill (S. 2541) that essentially recommends the amounts requested by NASA.

Key Issues for Congress

Return to Flight of the Space Shuttle

The space shuttle *Columbia* disintegrated as it returned to Earth on February 1, 2003; all seven astronauts aboard were killed. NASA and its contractors are working to resume shuttle launches as soon as possible, consistent with ensuring the shuttle is as safe as possible. See CRS Report RS21408 for more on *Columbia* and "Return to Flight" (RTF). In the FY2005 budget request, shuttle funding would rise from \$4 billion to \$4.3 billion. One issue involved in RTF is whether schedule pressure could influence shuttle program managers to take shortcuts, and if President Bush's new exploration initiative (see below) adds to that pressure. President Bush has called for ISS construction to be completed by 2010, at which point the shuttle system would be retired. NASA estimates that 25-30

shuttle launches are required to complete construction. By ending the shuttle program, funds would be freed for the President's exploration initiative. NASA's FY2005 request includes "out-year" projections that reduce the shuttle budget by \$1.5 billion in FY2008 and FY2009 to help pay for the exploration initiative. The *Columbia* Accident Investigation Board (CAIB) cited schedule pressure as one factor in the *Columbia* tragedy. It also noted that funding was taken from the shuttle budget over several years to pay for other NASA programs, particularly ISS. NASA's willingness to slip RTF, most recently to May 2005, suggests to some that NASA is proceeding cautiously, but the agency's plan to launch 25-30 flights in less than six years makes others worry that an environment similar to that prior to *Columbia* is being recreated. (The most recent slip was caused in part by hurricane damage at Kennedy Space Center—Congress appropriated \$126 million to NASA for hurricane relief in the FY2005 military construction/emergency supplemental appropriations act, P.L. 108-324.) The House and Senate Appropriations Committee fully funded the FY2005 request for the shuttle, and the Senate committee added another \$500 million for the shuttle, designated as emergency spending. The Senate Commerce Committee recommended the requested shuttle funding level. It also created a separate budget account, with \$15 million in FY2005, for an Independent Technical Engineering Authority that is not tied to any specific NASA program and would be responsible for technical standards for the shuttle and waivers thereto. CAIB recommended that NASA establish an Independent Technical Authority (ITA) that would have similar functions. NASA is setting up the ITA; it reports to the NASA Chief Engineer.

President Bush's Exploration Initiative

On January 14, 2004, President George W. Bush made a major space policy address in which he directed NASA to focus its activities on returning astronauts to the Moon by 2020, and someday sending them to Mars and "worlds beyond" (see CRS Report RS21720). To accomplish those goals, NASA would terminate the shuttle program in 2010 (discussed above); build a new Crew Exploration Vehicle (CEV) able to take astronauts to Earth orbit by 2014 and ultimately to the Moon; restructure the U.S. ISS-based research program to support only life sciences research associated with achieving the exploration goals; and build robotic probes as "trailblazers" for the astronauts. The President invited other countries to join. Between 2010 when the shuttle is terminated, and at least 2014 when the CEV would be available for Earth-orbital flights, U.S. astronauts would have to rely on Russia to travel to and from ISS.

Cost and Other Issues. Initially, the President and NASA did not provide cost estimates for achieving the goals, only budget estimates for FY2005-FY2009, and a budget chart (the "sand chart," see below) extending to FY2020. In late February 2004, however, NASA released a cost estimate for landing a crew on the Moon in 2020 — \$64 billion (FY2003 dollars): \$24 billion (FY2004-2020) to build and operate the Crew Exploration Vehicle; and \$40 billion (FY2011-2020) to build the lunar lander portion of that vehicle, a new launch vehicle, and operations. The estimate does not include the cost of robotic missions. An estimate for sending astronauts to Mars was not provided.

The President plans to fund the initiative by redirecting most of the needed funding from other NASA activities, rather than adding significant sums to the NASA budget. A NASA budget chart (dubbed the "sand chart," and available at [http://www.nasa.gov/pdf/54873main_budget_chart_14jan04.pdf]) covering FY2004-2020 shows a NASA budget that increases 5% in FY2005 and 2006, less than 1% in FY2007-

2009, and is roughly level with inflation beyond FY2009. NASA says the intent of the chart is to demonstrate there is no “balloon” in funding past FY2009. The total amount of funding represented in the chart appears to be \$150-170 billion.

NASA explains that the FY2005 budget request and its projections through FY2009 include an “additional” \$12.6 billion for the initiative. However, only \$1 billion is new money. The other \$11.6 billion is redirected from other NASA programs, leading some to question whether it is an “addition.” Redirecting most of the funding from other NASA activities may quell concerns about rising deficits and neglecting other national priorities in order to fund the initiative, but it subjects the plan to criticism that total agency projected funding level is insufficient, and that the plan will preclude other NASA activities. Mr. O’Keefe says that the schedule will be allowed to slip, rather than increasing the budget.

By agreeing to take most of the funding from other NASA activities, NASA has opened the door to questions about the value of those activities even if the Bush initiative is not adopted. If Congress and the public are not persuaded to embark upon the President’s vision, what direction should NASA be given for the future? Is it reasonable to assume that the proposed \$11.6 billion in cuts can be made in any case? Should U.S. participation in the ISS program continue? Under the President’s plan, the only apparent reasons for U.S. involvement in ISS are fulfilling its commitments to the other partners, and performing research associated with the President’s goals. If the latter rationale is eliminated, are the international commitments sufficient to warrant spending \$6.7 billion (\$2.4 billion for the space station and \$4.3 billion for the shuttle) in FY2005 alone? Are they worth the risk to astronaut lives inherent in human space flight? Or are there other reasons that U.S. taxpayers may wish to continue the human space flight program, such as its oft-cited value in demonstrating U.S. technological leadership, stimulating children to study math and science, or satisfying an intangible “desire written in the human heart” as stated by President Bush following the *Columbia* accident?

FY2005 Budget Request. A NASA chart identifies \$4.5 billion of the agency’s FY2005 \$16.2 billion request as “exploration specific,” but that does not include the space shuttle and space station programs, which are related to it. Among the exploration specific projects are: \$428 million for Project Prometheus, to design nuclear power and propulsion systems that would first be used on a robotic spacecraft, the Jupiter Icy Moons Orbiter (JIMO), which would study three Jovian moons; \$428 million for the Crew Exploration Vehicle (CEV) to take astronauts to the Moon; \$115 million for technology maturation; and \$70 million for robotic lunar probes as precursors to human missions.

Congressional Action. The House Appropriations Committee cut \$230 million from Prometheus; all of the funds for the CEV (shown as \$438 million in committee documents, but as \$428 million in NASA’s budget request); and \$30 million from technology maturation. Related projects in other parts of NASA that were cut include \$12.4 million of the \$12.5 million for scientific instruments to be carried aboard JIMO, all \$70 million for robotic lunar probes, \$103 million from the \$309 million for bioastronautics research, \$190 million of the \$1.9 billion for ISS construction and operations (including \$70 million of the \$140 million for ISS Crew/Cargo services to fund alternatives to the space shuttle). The Senate Appropriations Committee cut \$260 million from the ISS (including all \$140 million for ISS Crew/Cargo), \$160 million from CEV, \$50 million from lunar probes, and \$50 million from planning for future Mars probes. Both committees expressed support for the President’s goals, but cited the constrained budgetary climate as

a factor in their decisions. The Senate Commerce Committee essentially recommended the requested levels for these programs, but Human & Robotic Technology was cut by \$15 million to fund the Independent Technical Engineering Authority.

Hubble Space Telescope

A planned shuttle mission to service the Hubble Space Telescope was cancelled, primarily for safety reasons, in the wake of the *Columbia* accident (for more information, see CRS Report RS21767). NASA now intends to proceed with design of a robotic servicing mission to Hubble. NASA Administrator O'Keefe has been quoted as estimating the cost at between \$1 billion and \$1.6 billion. (Cost estimates are still imprecise because many technical issues remain to be resolved.) The FY2005 budget request did not include funds for this mission because the decision had not yet been made to proceed with design. Press reports have indicated that a budget amendment will be submitted to reallocate funds within the planned total for NASA to accommodate a robotic servicing mission, but no amendment has yet been submitted. The Senate Appropriations Committee provided \$300 million in emergency funds for a Hubble servicing mission in its markup of the FY2005 VA-HUD-IA appropriations bill (S. 2825): \$100 million in the Exploration Capabilities account, and \$200 million in the Exploration, Science, and Aeronautics account.

Aeronautics

Congress has expressed concern about constraints in NASA's funding for aeronautics R&D for several years. The need to reprioritize NASA spending in light of President Bush's new initiative may exacerbate those concerns. Aeronautics advocates decry a multi-year slide in funding, although this trend has been difficult to track recently because of changes in how NASA presents its annual budget. Aeronautics R&D at NASA was cut by about one-third in the late 1990s, with the termination of programs in high-speed research and advanced subsonic technology. NASA's aeronautics activities have been restructured several times, including the August 2004 reorganization noted above. Critics have argued for several years that NASA lacks a clear vision of its goals and direction in aeronautics, despite release of the *NASA Aeronautics Blueprint* [http://www.aerospace.nasa.gov/aboutus/tf/aero_blueprint/cover.html] in February 2001 and further recommendations by the congressionally established Commission on the Future of the United States Aerospace Industry ([<http://www.ita.doc.gov/td/aerospace/aerospacecommission/aerospacecommission.htm>]) and the National Research Council ([<http://books.nap.edu/html/atp/0309091195.pdf>]). The FY2005 request for aeronautics is \$919 million, a reduction of 11% from FY2004. Most of the reduction comes from eliminating funds for items added at congressional direction in FY2004. Other changes include a \$7 million increase for aircraft noise reduction and \$15 million to fund rotorcraft research. The House Appropriations Committee recommended increases for 24 specific projects, totaling \$42.9 million, and directed NASA to develop "a prioritized set of aeronautics goals through 2020" along with associated annual funding requirements. The Senate Appropriations Committee provided \$25 million to continue research on hypersonic engine technologies and recommended increases for 17 specific projects, totaling \$33.8 million.