



# INTERNATIONAL SPACE EXPLORATION UPDATE

Center for Strategic and International Studies ■ Washington, D.C.

## NASA FY 2007 Budget Proposal—An Analysis



### **Objectives**

This paper has three objectives:

1. Assess the change in projected out-year expenditures with the FY 2005 budget of the National Aeronautics and Space Administration (NASA).
2. Assess how likely this budget is to compensate for the \$5 to \$6 billion shortfall from the FY 2006 budget, which will exist until the space shuttle is retired.
3. Assess how science and aeronautics research will be affected, where providing funding for future space transportation infrastructure is concerned, and what the consequences will be for U.S. leadership in the international community.

### **Comparison with the FY 2005 Budget**

In January 2004, President George W. Bush unveiled the new, bold, and noble Vision for Space Exploration (VSE). One month later, NASA released its FY 2005 budget, which was in line with the president's vision. On February 6, 2006, NASA announced its FY 2007 budget. This budget, when combined with data from the FY 2006 budget, shows a \$2.7 billion shortfall for FY 2006–2009 inclusive, when compared to original FY 2005 projections. In other words, NASA is now counting on receiving less money than it had anticipated under the original VSE budget plan.

The overall shortfall for these four years is quite pronounced for science and amounts to a total of \$5.4 billion; a decrease, as compared with the original FY 2005 projection. This decrease arises from a \$3.3 billion decrease in earth and space sciences funding and a \$2.1 billion drop in funding for physical and biological sciences.

This dramatic decrease in funding will cause problems in international cooperation on earth and space science, an area in which NASA has had a good record. The Stratospheric Observation for Infrared Astronomy (SOFIA) project, which has been a joint program with the German space agency, German Aerospace Center (DLR), may be cancelled. Similarly, the Laser Interferometer Space Antenna (LISA), a project between NASA and the European Space Agency (ESA), may also experience an early end to NASA participation, and the replacement for NASA's Hubble Space Telescope (HST), the James Webb Space Telescope (JWST), is likely to be delayed.

### **Comparison with the FY 2006 Budget—The Shuttle Situation**

Last year, the total proposed NASA budget for the fiscal years 2007 through 2010 was \$69.905 billion. This amount appeared to allocate \$5 to \$6 billion less than was needed to fund the shuttle flights required to complete the International Space Station (ISS)—something specified as being a primary goal of the VSE. The total budget for the years 2007–2010 proposed in the FY 2007 budget is even lower, at \$69.741 billion. Clearly, the shortfall in funding for the shuttle and for the completion of the ISS will have to be addressed with this even smaller budget.

A more detailed comparison of the forecasted budgets between FY 2006 and FY 2007 shows the following changes in allocations in the 2007–2010 timeframe:

- \$3.0 billion *reduction* in earth and space science programs
- \$2.1 billion *reduction* in biological and physical science programs

- \$1.9 billion *increase* in funding for exploration systems
- \$2.3 billion *increase* in funding for the space shuttle

But even with this \$2.3 billion increase in shuttle funding, there will still be a shortfall of as much as \$3.7 billion, if the ISS is to be completed. Perhaps, the reduction of the number of shuttle flights from 19 to 16 based on the elimination of two contingency logistical flights, the cancellation of the HST servicing mission, the retirement of the shuttle Atlantis in 2008, and the extension of shuttle flights through 2010 will be enough to provide sufficient resources to complete the ISS.

However, no more shuttle flights can be cut if the United States is to complete the ISS. Operationally, there is no margin for error either. Consider the following hypothetical launch calendar:

2006—2 launches  
 2007—4 launches  
 2008—4 launches  
 2009—3 launches  
 2010—3 launches

Also, note that the portion of the NASA budget dedicated to human spaceflight over this period will jump from 50 percent to 60 percent (this number does not include the recent \$2 billion overrun projected for using the “off-the-shelf” SRB in the shuttle-derived crew launch vehicle). It should be noted that such an increase may not be politically sustainable in a restrictive budget environment. The FY 2007 budget proposal seems to stabilize the level of funding for aeronautics research at about \$720 million per year—a 25 percent drop from two years ago and roughly 50 percent less than levels five years ago.

## Conclusion

NASA faces very difficult choices, many of them not obvious, when it comes to funding its exploration and science programs. On one hand, in order to ultimately achieve success in implementing the VSE, NASA must maintain strong international partnerships. But as science has been an area in which NASA has experienced significant success in international partnerships, cuts to science programs may potentially drive away the very same partners NASA will seek out in space exploration. On the other hand, if drastic cuts aren’t made somewhere in NASA’s budget, it will become almost impossible to find sufficient funding for the growing costs associated with the current architecture for implementing the vision. More problematically, if only a few cuts are made in science, NASA will still be reliant on foreign partners to implement the VSE, the very same partners they will drive away if successful international science programs are cut. Both of these points highlight a more subtle threat to the VSE. As we have seen previously with ESA, if the scientific community becomes a sufficiently large constituency, then it becomes very difficult indeed to focus any effort on the human component of space exploration. NASA administrator Michael Griffin must be judicious in cuts to science programs to fund the VSE. While cuts must be made, he must ensure that the cuts don’t incur excess collateral damage to NASA’s international relationships, otherwise those potential partners will be driven further away from NASA and, ultimately, from human space exploration with NASA in its entirety.

<b>Total NASA Budget</b> (in millions of then year dollars)								
<i>Projections of</i>	<b>FY2005</b>	<b>FY2006</b>	<b>FY2007</b>	<b>FY2008</b>	<b>FY2009</b>	<b>FY2010</b>	<b>FY2011</b>	<b>2007–2010 Totals</b>
<b>FY 2005 Budget</b>	\$16,244	\$17,002	\$17,815	\$18,001	\$18,034	-	-	-
<b>FY 2006 Budget</b>	-	\$16,456	\$16,962	\$17,305	\$17,611	\$18,027		\$69,905
<b>FY 2007 Budget</b>	-	-	\$16,792	\$17,309	\$17,614	\$18,026	\$18,460	\$69,741
<i>Comparison with</i>								<b>Cumulative Total</b>
<b>FY 2005 Projections</b>	-	<b>-\$546</b>	<b>-\$1,023</b>	<b>-\$692</b>	<b>-\$420</b>	-	-	<b>-\$2,681</b>
<b>FY 2006 Projections</b>	-	-	<b>-\$170</b>	\$4	\$3	<b>-\$1</b>	-	<b>-\$164</b>

<b>Earth and Space Science Programs<sup>1</sup></b> (in millions of then year dollars)								
<i>Projections of</i>	<b>FY2005</b>	<b>FY2006</b>	<b>FY2007</b>	<b>FY2008</b>	<b>FY2009</b>	<b>FY2010</b>	<b>FY2011</b>	<b>2007–2010 Totals</b>
<b>FY 2005 Budget</b>	\$5,623	\$5,794	\$6,274	\$6,863	\$7,035	-	-	-
<b>FY 2006 Budget</b>	-	\$5,476	\$5,960	\$6,503	\$6,853	\$6,798		\$26,114
<b>FY 2007 Budget</b>	-	-	\$5,603	\$5,750	\$5,848	\$5,913	\$5,961	\$23,114
<i>Comparison with</i>								<b>Cumulative Total</b>
<b>FY 2005 Projections</b>	-	<b>-\$318</b>	<b>-\$671</b>	<b>-\$1,113</b>	<b>-\$1,187</b>	-	-	<b>-\$3,289</b>
<b>FY 2006 Projections</b>	-	-	<b>-\$358</b>	<b>-\$753</b>	<b>-\$1,005</b>	<b>-\$885</b>	-	<b>-\$3,001</b>

<b>Biological and Physical Science Programs</b> (in millions of then year dollars)								
<i>Projections of</i>	<b>FY2005</b>	<b>FY2006</b>	<b>FY2007</b>	<b>FY2008</b>	<b>FY2009</b>	<b>FY2010</b>	<b>FY2011</b>	<b>2007–2010 Totals</b>
<b>FY 2005 Budget</b>	\$1,049	\$950	\$938	\$941	\$944	-	-	-
<b>FY 2006 Budget</b>	-	\$806	\$796	\$812	\$818	\$815		\$3,241
<b>FY 2007 Budget</b>	-	-	\$275	\$281	\$281	\$292	\$312	\$1,129
<i>Comparison with</i>								<b>Cumulative Total</b>
<b>FY 2005 Projections</b>	-	<b>-\$144</b>	<b>-\$663</b>	<b>-\$660</b>	<b>-\$663</b>	-	-	<b>-\$2,130</b>
<b>FY 2006 Projections</b>	-	-	<b>-\$521</b>	<b>-\$531</b>	<b>-\$537</b>	<b>-\$523</b>	-	<b>-\$2,112</b>

<b>Aeronautics Programs</b> (in millions of then year dollars)								
<i>Projections of</i>	<b>FY2005</b>	<b>FY2006</b>	<b>FY2007</b>	<b>FY2008</b>	<b>FY2009</b>	<b>FY2010</b>	<b>FY2011</b>	<b>2007–2010 Totals</b>
<b>FY 2005 Budget</b>	\$919	\$957	\$938	\$926	\$942	-	-	-
<b>FY 2006 Budget</b>	-	\$852	\$727	\$730	\$727	\$717		\$2,901
<b>FY 2007 Budget</b>	-	-	\$724	\$731	\$732	\$722	\$722	\$2,909
<i>Comparison with</i>								<b>Cumulative Total</b>
<b>FY 2005 Projections</b>	-	<b>-\$105</b>	<b>-\$214</b>	<b>-\$195</b>	<b>-\$210</b>	-	-	<b>-\$724</b>
<b>FY 2006 Projections</b>	-	-	<b>-\$3</b>	<b>\$1</b>	<b>\$5</b>	<b>\$5</b>	-	<b>\$8</b>

<b>Exploration Systems</b> (in millions of then year dollars)								
<i>Projections of</i>	<b>FY2005</b>	<b>FY2006</b>	<b>FY2007</b>	<b>FY2008</b>	<b>FY2009</b>	<b>FY2010</b>	<b>FY2011</b>	<b>2007–2010 Totals</b>
<b>FY 2005 Budget</b>	\$1,782	\$2,579	\$2,941	\$2,809	\$3,313	-	-	-
<b>FY 2006 Budget</b>	-	\$2,359	\$2,911	\$3,013	\$3,655	\$4,833		\$14,412
<b>FY 2007 Budget</b>	-	-	\$3,703	\$3,700	\$4,218	\$4,763	\$8,463	\$16,384
<i>Comparison with</i>								<b>Cumulative Total</b>
<b>FY 2005 Projections</b>	-	<b>-\$220</b>	<b>\$762</b>	<b>\$891</b>	<b>\$905</b>	-	-	<b>\$2,338</b>
<b>FY 2006 Projections</b>	-	-	<b>\$792</b>	<b>\$687</b>	<b>\$563</b>	<b>-\$70</b>	-	<b>\$1,972</b>

<b>International Space Station</b> (in millions of then year dollars)								
<i>Projections of</i>	<b>FY2005</b>	<b>FY2006</b>	<b>FY2007</b>	<b>FY2008</b>	<b>FY2009</b>	<b>FY2010</b>	<b>FY2011</b>	<b>2007–2010 Totals</b>
<b>FY 2005 Budget</b>	\$1,863	\$1,764	\$1,780	\$1,779	\$2,115	-	-	-
<b>FY 2006 Budget</b>	-	\$1,856	\$1,853	\$1,790	\$2,152	\$2,375		\$8,170
<b>FY 2007 Budget</b>	-	-	\$1,811	\$2,200	\$2,255	\$2,197	\$2,360	\$8,463
<i>Comparison with</i>								<b>Cumulative Total</b>
<b>FY 2005 Projections</b>	-	<b>\$92</b>	<b>\$31</b>	<b>\$421</b>	<b>\$140</b>	-	-	<b>\$684</b>
<b>FY 2006 Projections</b>	-	-	<b>-\$42</b>	<b>\$410</b>	<b>\$103</b>	<b>-\$178</b>	-	<b>\$293</b>

<sup>1</sup> Earth and space science totals include the lunar reconnaissance orbiter, which was moved to exploration systems in the president's budget request for FY 2007.

<b>Space Shuttle</b> (in millions of then year dollars)								
<i>Projections of</i>	<b>FY2005</b>	<b>FY2006</b>	<b>FY2007</b>	<b>FY2008</b>	<b>FY2009</b>	<b>FY2010</b>	<b>FY2011</b>	<b>2007–2010 Totals</b>
<b>FY 2005 Budget</b>	\$4,319	\$4,326	\$4,314	\$4,027	\$3,030	-	-	-
<b>FY 2006 Budget</b>	-	\$4,530	\$4,172	\$3,865	\$2,815	\$2,419		\$13,271
<b>FY 2007 Budget</b>	-	-	\$4,056	\$4,087	\$3,794	\$3,651	\$146	\$15,588
<i>Comparison with</i>								<b>Cumulative Total</b>
<b>FY 2005 Projections</b>	-	\$204	<b>-\$258</b>	\$60	\$764	-	-	\$770
<b>FY 2006 Projections</b>	-	-	<b>-\$116</b>	\$222	\$979	\$1,232	-	\$2,317

<b>Total Human Spaceflight</b> (in millions of then year dollars)								
	<b>FY2005</b>	<b>FY2006</b>	<b>FY2007</b>	<b>FY2008</b>	<b>FY2009</b>	<b>FY2010</b>	<b>FY2011</b>	<b>2007–2010 Totals</b>
<b>Total Budget</b>	\$7,964	\$8,745	\$9,570	\$9,987	\$10,267	\$10,611	\$10,969	\$40,435
<i>As a Percent of Budget</i>								
<b>FY 2006 Projections</b>	<b>49%</b>	<b>53%</b>	<b>57%</b>	<b>58%</b>	<b>58%</b>	<b>59%</b>	<b>59%</b>	<b>58%</b>

*International Space Exploration Update* is published by the Center for Strategic and International Studies (CSIS), a private, tax-exempt institution focusing on international policy issues. Its research is nonpartisan and nonproprietary. CSIS does not take specific policy positions; accordingly, all views, positions, and conclusions expressed in this publication should be understood to be solely those of the author(s).

© 2006 by the Center for Strategic and International Studies.