

Earth Sciences in the FY 2008 Budget

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HIGHLIGHTS

- **Department of Energy.** Natural gas, petroleum and geothermal research are slated for elimination in the President's request. Geosciences research within the Basic Energy Sciences account would increase as part of the American Competitiveness Initiative.

- **U.S. Geological Survey.** The President has requested a slight cut for the agency. Similar to the President's last two requests, the minerals program is poised to take a major cut. Funding for geology and water programs overall would decrease.

- **National Science Foundation.** The Geosciences Directorate is funded at a 6 percent increase over FY 2007 as part of the American Competitiveness Initiative. The Major Research Equipment and Facilities Construction account includes \$42 million for the Alaska Region Research Vessel and \$31 million for the Ocean Observatories Initiative.

- **National Aeronautics and Space Administration (NASA).** The Earth Systematic Missions program is slated for a nearly 18 percent increase to maintain more than a dozen Earth-observing satellites and continue the implementation of the Glory satellite and the Landsat Data Continuity Mission. Other Earth science programs would see large funding cuts to offset the boost for missions.

INTRODUCTION

The Earth sciences cover a broad range of the R&D spectrum, running the gamut from fundamental research into the internal processes of Earth's interior to highly applied, interdisciplinary investigations that

address energy resources, water resources, land-use practices, natural hazards, and environmental issues. Although this chapter focuses on Earth science programs in four key departments and agencies, Earth science activities can be found in 16 other departments and agencies spanning nearly 300 separate programs.

Table 1: Budget request for principal agencies and programs supporting earth-science R&D (budget authority in millions of dollars).

Agency / Program	FY 2006 Enacted	FY 2007 Estimate**	FY 2008 Request	% Change FY 07-08
Department of Energy				
- Basic Energy Sciences Chemical Sciences, Geosciences and Energy Biosciences	207	227	284	+25%
- Fossil Energy R&D				
Natural Gas Research	32	12	--	-100%
Petroleum Research	31	3	--	-100%
- Renewable Energy				
Geothermal	23	5	--	-100%
Department of the Interior				
- U.S. Geological Survey*	971	976	975	-0.3%
<i>Geologic Division*</i>	235	235	222	-6%
<i>Water Resources Div.*</i>	212	212	212	0%
NASA				
- Earth Science Theme ^	1,325	1,443	1,497	+3.7%
National Science Foundation				
- Geosciences Directorate	704	745	792	+6%
<i>Earth Sciences Division</i>	140	152	163	+7%

Source: Agency budget materials, Office of Management and Budget.

* - Includes non-R&D components. ** - latest estimates of FY 2007 joint funding resolution, except for USGS (continuing resolution). ^ - 2006 and 2007 numbers are estimates based on new cost simplification procedures and the reorganization of Earth Science for FY 2008.

The President's budget favors Earth science research associated with several broad-based initiatives. Basic Earth science research within the Office of Science in the Department of Energy (DOE) and the National

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Science Foundation (NSF) would receive increases associated with the American Competitiveness Initiative. The U.S. Geological Survey (USGS), National Oceanic and Atmospheric Administration (NOAA) and NASA would receive small increases for programs associated with the Healthy Lands Initiative, the U.S. Ocean Action Plan, the Landsat Data Continuity Mission and the FY 2008 USGS Hazards Initiative.

Although climate change, energy resources and natural hazards have remained in the spotlight for the public and policymakers, Earth science R&D to address these issues is woefully under funded, even with the increases highlighted in this report.

Earth science funding at NASA has decreased by 30 percent since 2000, and although more funding will be requested for fiscal 2008 for Earth observing satellites, the removal of key instruments and launch delays will limit NASA's abilities to provide observations that address climate change and other issues. Nondefense energy R&D at DOE has also declined by 85 percent since 1978, limiting the nation's capacity to diversify our energy resource portfolio and provide the advances needed for a secure and clean energy future. Overall, rising fixed costs, rising operating costs, cost overruns on major projects and steady underfunding of mission objectives means that vital Earth science R&D is not being completed in a timely fashion to address critical national needs.

DEPARTMENT OF ENERGY (DOE)

Fossil Energy R&D: The Office of Fossil Energy has tended to focus on coal R&D over the past few years, while decreasing spending on petroleum and natural gas R&D. This year's request eliminates the natural gas technologies and the petroleum/oil technologies programs that previously supported fundamental research and future innovations in oil and natural gas exploration, drilling, and production, which are traditionally longer-term projects than those funded by private industry. More than a dozen universities and many national laboratories will lose all of their research funding for these projects. The president's Coal Research Initiative would receive \$384.8 million, an increase of about 25 percent from the FY 2006 level. \$108 million would go to the FutureGen project to investigate the co-production of hydrogen and electricity from a clean coal-fired plant. About \$73 million would be provided for clean coal R&D related to FutureGen, such as carbon sequestration, oxygen and hydrogen separation, turbines, fuel cells, coal-to-hydrogen and other

technologies. The President's request would also repeal mandatory spending from oil and gas lease revenues for ultra-deepwater and unconventional natural gas and petroleum R&D created by the Energy Policy Act of 2005.

Basic Energy Sciences: Earth science research resides within the Chemical Science, Geosciences, and Energy Biosciences Research program of Basic Energy Sciences within the Office of Science. This program provides peer-reviewed grants to universities and DOE national laboratories for fundamental Earth science research in geochemistry, hydrology, rock mechanics, and geophysical imaging. The FY 2008 request for this program is \$284 million, an increase of 25 percent over the FY 2007 plan. Investments includes \$59.5 million for hydrogen fuel cell R&D, \$69.1 million for solar energy R&D and \$15.8 million for biomass energy R&D and all these programs are related to presidential initiatives.

Geothermal: The geothermal research program within the Renewable Energy account, which funds Earth science research in materials, geofluids, geochemistry, geophysics, rock properties, reservoir modeling, and seismic mapping, would be terminated.

Yucca Mountain Site Characterization: Yucca Mountain was approved for development in 2002 and DOE had to delay its request for a site license for construction in 2004. Submission of a license application is expected by June 30, 2008. Spending in FY 2008 will focus on the department's revised license application at the Nuclear Regulatory Commission, planning facilities for the receipt of spent waste and infrastructure upgrades for safety. Overall, the Yucca Mountain project would receive \$495 million, a decrease of about \$50 million compared to FY 2007, primarily due to a deferment in transportation development.

U.S. GEOLOGICAL SURVEY (USGS)

The President's total request for the USGS is \$975 million, a decrease of less than 1 percent from this year's \$976 million. Four projects highlighted in the budget request include an Integrated Multi-Hazards Demonstration Project, the Healthy Lands Initiative, the U.S. Ocean Action Plan, and the Landsat Data Continuity Mission.

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Geologic programs would receive a total of \$222 million, a 6 percent decrease from last year. The Mineral Resources Program, which is the sole federal provider of scientific information for objective mineral resource assessments and unbiased research results on mineral potential, production, consumption, and environmental effects, is again slated for a small cut of about \$1 million with the assumption that the FY 2007 budget started at \$31 million, a 38 percent reduction compared to FY 2006. This large reduction of about \$24 million over the two fiscal years would terminate or limit research on industrial minerals, research on inorganic toxins, the Mineral Resources External Research program and the internationally coordinated global mineral resource assessment. Additionally, this cut would eliminate more than 200 full time positions within the USGS at facilities in Reston (VA), Reno (NV), Tucson (AZ), Denver (CO) and Menlo Park (CA), among others. The program will focus on funding for minerals surveys and studies relevant to ongoing federal land management, regulatory, and remediation activities. The Landsat mission would receive \$24 million in new funding, which offsets the nearly \$24 million reduction in the Mineral Resources Program.

Overall, water programs would receive \$212 million, the same as last year's allocation without any increases for inflation or rising fixed costs. Once again the 54 State Water Resources Research Institutes, which received about \$6 million in FY 2007, are slated for termination. The President requested \$65 million for the National Water Quality Assessment program, which is almost a \$1 million increase from last year's funding level. The budget request includes \$3 million for the USGS to initiate the U.S. Ocean Action Plan in partnership with NOAA and other agencies; \$1.5 million would go to Coastal and Marine Geology and \$1.5 million would go to the Hydrologic Network. The water programs will also receive \$100,000 for the National Streamflow Information program to support the multi-hazards demonstration project.

NATIONAL SCIENCE FOUNDATION (NSF)

Funding for the Geosciences Directorate (GEO) would be a 6 percent boost from the FY 2007 appropriation, with a budget request of \$792 million. The majority of the solid Earth science research within GEO is funded through the Earth Science Division (EAR) that has requested \$163.3 million, a 7 percent increase. The bulk of the increase will be directed to EarthScope.

EarthScope—comprised of the U.S. Seismic Array (USArray), the San Andreas Fault Observatory at Depth (SAFOD), and the Plate Boundary Observatory (PBO)—would be granted an increase of \$10 million for a total of \$21.6 million for operations and scientific support.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

NASA has re-organized the Science Mission Directorate and replaced the three divisions (Solar System Exploration, Sun-Earth and The Universe) with four themes (Earth Science, Heliophysics, Planetary Science and Astrophysics). The Earth Science theme would receive \$1.5 billion in the fiscal 2008 request. The new Earth Science Division (ESD) consists of seven programs: Earth Systematic Missions, Earth Science Pathfinder, Research, Applied Sciences, Multi-Mission Operations, Technology and Education and Outreach. ESD has 14 operational missions on orbit, 5 missions in implementation, and 2 missions in formulation.

The nearly 4 percent increase for Earth Science will be devoted primarily to implementing 5 missions—the NPOESS Preparatory Project (NPP), the Glory Mission, the Landsat Data Continuity Mission (LDCM), the Global Precipitation Measurement (GPM) and the Ocean Surface Topography Mission (OSTM). Even with this increased funding, many of these missions have been pared down and most will have delayed launch dates. While Multi-Mission Operations will receive a 7 percent increase, all other programs will see large cuts. Budgetary constraints mean that new missions are unlikely to launch on time and announcements of new mission opportunities are likely to be deferred. In addition to the bleak outlook for future Earth-observing missions, external grants for basic Earth science research in support of NASA objectives would be cut by 20 percent in fiscal 2008.