17

Earth Sciences in the FY 2007 Budget

Margaret Anne Baker, Jenny Fisher and Linda Rowan,
American Geological Institute

HIGHLIGHTS

- **Department of Energy (DOE).** Natural gas and petroleum research as well as geothermal research are slated for elimination in the President's request. Geoscience research within the Basic Energy Sciences account would increase.

- **U.S. Geological Survey (USGS).** The President has requested a 2 percent 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 be cut.

- **National Science Foundation (NSF).** The Geoscience Directorate is funded at a 6 percent increase over FY 2006. The Major Research Equipment and Facilities Construction account includes $27.4 million for the final installment of the EarthScope initiative.

- **National Aeronautics and Space Administration (NASA).** The Earth Systematic Missions program is slated for a slight increase to total $5.3 billion, which includes funds to prepare for the new Landsat satellite.

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 environmental contamination, natural hazards, and sustainable resource development. 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 2005 Enacted	FY 2006 Enacted	FY 2007 Request	% Change FY 06-07
Department of Energy				
- Basic Energy Sciences				
Chemical Sciences, Geosciences				
and Energy Biosciences	232	222	268	+21%
- Fossil Energy R&D				
Natural Gas Research	44	33	--	-100%
Petroleum Research	33	32	--	-100%
- Renewable Energy				
Geothermal	25	23	--	-100%
- Yucca Mountain Site Characterization				
Core science	--	--	--	--
Department of the Interior				
- U.S. Geological Survey*	936	971	945	-2%
*Geologic Division**	*229*	*235*	*217*	*-8%*
*Water Resources Div.**	*211*	*212*	*204*	*-3%*
NASA				
- The Earth-Sun System	2,306	2,134	2,211	+2%
National Science Foundation				
- Geosciences Directorate	697	703	745	+6%
Earth Sciences Division	*137*	*140*	*152*	*+9%*
- Major Research Equip. EarthScope	47	50	27	-45%

Source: Agency budget materials, Office of Management and Budget.
* - Includes non-R&D components.

Taken as a whole, the President's budget favors fundamental Earth science research programs over more applied R&D. The success of the EarthScope initiative at NSF—the first-ever Major Research Equipment and Facilities Construction project for the Earth sciences—contrasts with stagnant or decreasing support in the President's request for applied programs, with the hardest hit being those related to oil and natural gas

technologies and geothermal energy in the Department of Energy (DOE) and mineral resources at the U.S. Geological Survey (USGS).

The need for research and development in support of natural hazards and man-made hazards planning and mitigation has not translated into significant increased support for relevant Earth science programs. Although the USGS water-quality monitoring, seismic monitoring, geospatial information and hazard-related capabilities are in heavy demand, there are only small increases associated with this theme in the USGS request while classic programs, such as the National Earthquake Hazards Reduction Program (NEHRP), remain underfunded in the multiple federal agencies that are authorized to carry out missions in these interagency programs.

DEPARTMENT OF ENERGY (DOE)

Fossil Energy R&D: Historically, a majority of the Earth science research funded through the Office of Fossil Energy is related to petroleum and natural gas exploration and production. This year's request would again zero out 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. Remaining within the Fossil Energy R&D are programs associated with the President's Coal Research Initiative that would receive $280.7 million, a decrease of 10.6 percent from the FY 2006 level. Most of this funding would go to support research for the FutureGen project, a program to investigate the co-production of hydrogen and electricity from coal, such as technologies for Integrated Gasification Combined Cycle power plants and greater understanding of chemical and physical properties of fossil fuels. There is $74 million for carbon sequestration research, which is 11.5 percent higher than the FY 2006 appropriations.

Basic Energy Sciences: To align budget accounts with the Basic Energy Sciences working structure, DOE has placed Earth science research within the combined Chemical Science, Geosciences, and Energy Biosciences Research program. 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—areas with broad application to multiple DOE

mission areas including oil and gas exploration and development, geothermal energy, and environmental remediation. The FY 2007 request for this program is $268 million, which includes $22 million for long-term basic research in geochemistry and geophysics. The program would see an increase of about $48 million, though most of this increase would be devoted to hydrogen and other alternative fuel technologies and nanotechnology.

Geothermal: The geothermal research program within the Renewable Energy account funds Earth science research in materials, geofluids, geochemistry, geophysics, rock properties, reservoir modeling, and seismic mapping. The budget request would eliminate the DOE Geothermal Technology programs. A major aim of the program is to work with industry to establish geothermal energy as an economical energy source. Provisions in the Energy Policy Act of 2005, however, provide tax incentives to encourage the development of new geothermal power plants.

Yucca Mountain Site Characterization: Yucca Mountain was approved for development in 2002 and DOE had to delay their request for a site license for construction in 2004. Submission of a license application was delayed for several reasons, however. Two primary and persistent problems are a court ruling that invalidates the Environmental Protection Agency (EPA) compliance period for waste disposal, and underfunding of the Yucca Mountain project by about $1 billion over the past 10 years. Spending in FY 2007 will focus on defending the department's license application at the Nuclear Regulatory Commission, improving decaying site infrastructure, planning facilities for the receipt of spent waste and developing a transportation infrastructure for spent waste. Overall, the Yucca Mountain project would receive an increase of 10 percent from $495 million last year to $545 million.

U.S. GEOLOGICAL SURVEY (USGS)

The President's total request for the USGS is $945 million, a decrease of 2 percent from last year's $971 million. Four projects highlighted in the budget request include a new Integrated Multi-Hazards Demonstration Project, the National Streamflow Information Program, the Energy Resources Program, and some new funding to begin development of the Landsat 8 ground system.

Geologic programs would receive a total of $217 million, an 8 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 major cut for an overall budget of $31 million, a 38 percent decrease compared to last year. This reduction would terminate or reduce research on industrial minerals, research on inorganic toxins, materials flow analyses, 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, Reno, Tucson, Denver and Menlo Park, among others. The program will focus on funding for minerals surveys and studies relevant to ongoing federal land management, regulatory, and remediation activities.

Overall, water programs would receive $204 million, a 4 percent decrease from last year's allocation. A majority of this decrease is related to the proposed elimination of the 54 State Water Resources Research Institutes. The President requested $63 million for the National Water-Quality Assessment program, which is almost a $1.5 million increase from last year's funding level. The budget request does include a $2.3 million increase for streamgaging activities, which will help increase the number of streamgages reporting in real-time by 30 and allow for continuous operations at high priority sites. The water programs will also receive $200,000 for the National Streamflow Information program to support the multi-hazards demonstration project. (For more on USGS, see Chapter 13.)

NATIONAL SCIENCE FOUNDATION (NSF)

Funding for the Geoscience Directorate (GEO) would receive a 6 percent boost from the FY 2006 appropriation, with a budget request of $744.9 million. The majority of the solid Earth science research within GEO is funded through the Earth Science Division (EAR) that has requested $152.3 million. The EAR request increase is in part to support research affiliated with the EarthScope facility and for improving cyber-infrastructure.

The EarthScope initiative—comprised of the U.S. Seismic Array (USArray), the San Andreas Fault Observatory at Depth (SAFOD), and

the Plate Boundary Observatory (PBO)—is again included in the NSF's Major Research Equipment and Facilities Construction (MREFC) account, having received $50 million in funding for FY 2006. This year's request is $27.4 for the final phase of implementing EarthScope. Future funding for EarthScope is projected to come primarily from the Geoscience Directorate after FY 2007. (For more on the NSF budget, see Chapter 7.)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

Internal reorganization at NASA has left three major accounts—Science, Aeronautics and Exploration (SAE); Exploration Capabilities; and Inspector General—unchanged. However, within the SAE account, NASA has eliminated the Space Science, Earth Science and Biological & Physical Research Enterprises and combined them into one Science account. Within this new Science "Mission Directorate" are three divisions: Solar System Exploration, The Universe, and The Earth-Sun System, which houses the agency's Earth science programs. The Earth-Sun System will develop a scientific understanding of Earth and its response to natural and human-induced changes through major missions including the National Polar Orbiting Environmental Satellite System (NPOESS).

The Administration requests a slight increase for a total budget of $5.3 billion for the Science Mission Directorate, of which $2 billion would be devoted to the Earth-Sun System. One of the largest increases in Earth science programs at NASA is in the Earth Systematic Missions program that supports several of the Earth orbiting satellites that collect and observe regional and global changes in climate and surface data. The budget request includes a $71 million increase for the Landsat Data Continuity Mission's transition from formulation to development beginning in March 2007. This mission will develop an independent spacecraft to collect the required land surface data and deliver its data to the United States Geological Survey (USGS). (For more on the NASA budget, see Chapter 10.)