

## Earth Sciences in the FY 2004 Budget

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### HIGHLIGHTS

- **Department of Energy (DOE):** Natural gas and petroleum research accounts are slated for major cuts of 40 percent and 91 percent, respectively, in the President's request. Geoscience research within the Basic Energy Sciences account would remain flat.
- **U.S. Geological Survey (USGS):** The President has requested a 2 percent cut for the agency. Unlike last year's request that threatened many water programs with major cuts, this year's request does not repeat these proposals but calls for a large decrease in the Survey's mineral resources program.
- **National Aeronautics and Space Administration (NASA):** The Earth Science Enterprise has requested a 9 percent cut. The request includes targeted research related to the President's Climate Change Research Initiative.
- **National Science Foundation (NSF):** The Geoscience Directorate is funded at the same level as was appropriated in FY 2003. The Major Research Equipment and Facilities Construction (MREFC) account includes \$45 million for the second installment of the EarthScope initiative.

### INTRODUCTION

The earth sciences cover a broad range of the R&D spectrum, running the gamut from fundamental research into the internal processes and deep history of the Earth 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 (see Table 1), 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 2002 Enacted	FY 2003 Enacted	FY 2004 Request	% Change FY 03-04
<b>Department of Energy</b>				
<i>Basic Energy Sciences</i>				
--Geosciences Research	21	21	21	0.0
<i>Fossil Energy R&amp;D</i>				
--Natural Gas Research	44	42	27	-43.5
--Petroleum Research	56	42	15	-64.3
<i>Solar &amp; Renewable Energy</i>				
--Geothermal	27	30	26	-13.3
<i>Yucca Mountain Site Characterization</i>				
--Core Science	71	3	--	--
<b>Department of the Interior</b>				
<i>U.S. Geological Survey*</i>	914	919	896	-2.6
--Geologic Division*	233	233	222	-4.7
--Water Resources Div.*	206	207	200	-3.4
<b>NASA</b>				
<i>Earth Science Enterprise</i>	1,626	1,708	1,552	-9.1
<b>National Science Foundation</b>				
<i>Geosciences Directorate</i>	610	685	688	+0.4
<i>Major Research Equip. EarthScope</i>	--	30	45	+50.0

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 in the Department of Energy (DOE).

## EARTH SCIENCES IN THE FY 2004 BUDGET

As was the case last year, increased need for science in support of homeland security has not translated into increased support for relevant earth science programs. Although the U.S. Geological Survey's (USGS) water-quality monitoring, geospatial information, and hazard-related capabilities are in heavy demand at the new Department of Homeland Security (DHS), there are virtually no increases associated with this theme in the USGS request or that for other earth science programs.

### DEPARTMENT OF ENERGY (DOE)

***Fossil Energy R&D:*** A majority of the earth science research funded through the Office of Fossil Energy is related to petroleum and natural gas exploration and production (E&P). Petroleum, natural gas, and gas hydrates research programs are hard hit by this year's request, as they were in the President's FY 2003 request. Some, but not all, of the cuts requested last year were restored in final FY 2003 appropriations. Funding for oil and natural gas R&D combined now make up only 8 percent of the total Fossil Energy R&D budget, most of which funds coal-related technologies. That percentage has continued to drop with each new request. Natural gas E&P requested \$14 million, a decrease of nearly 40 percent from last year's funding level. Funding for gas hydrates would decrease by 63 percent from FY 2003 under the budget request to total \$3.5 million. The petroleum E&P account would receive a 91 percent cut, leaving the program at \$2 million. The oil and natural gas R&D programs are some of the first to be subjected to a new White House Office of Management and Budget (OMB) assessment of R&D programs based on relevance, quality and performance. Steep budget cuts reflect OMB's assessment that the programs have been ineffective, a conclusion that contrasts with a recent National Research Council report on the same programs that found significant returns on the federal investment. Although most of the coal-related research is concerned with power plant efficiency, there is \$62 million for carbon sequestration research, close to double the FY 2003 appropriations.

***Basic Energy Sciences:*** To align budget accounts with the Basic Energy Sciences (BES) 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

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multiple DOE mission areas including oil and gas exploration and development, geothermal energy, and environmental remediation. The Geoscience Research component within BES would remain basically flat at \$21 million (see Table 1).

***Geothermal:*** The geothermal research program within the Solar and Renewable Energy account funds earth-science research in materials, geofluids, geochemistry, geophysics, rock properties, reservoir modeling, and seismic mapping. Like many accounts within the Office of Energy Efficiency and Renewable Energy, geothermal research was cut to make way for increased hydrogen research in response to the President's hydrogen economy initiative. In total, the geothermal account has requested \$26 million, a 17.6 percent decrease from last year's allocation. Within this account, most of the earth science research is funded through the Geoscience and Supporting Technologies account that has requested \$10 million, and the Exploration and Drilling account that has requested \$12 million.

***Yucca Mountain Site Characterization:*** Last year's decision by the President and Congress to accept the Yucca Mountain site as the nation's permanent underground repository site for high-level nuclear waste means that the project has moved into its second phase. After more than 20 years and \$4 billion in site characterization, funding for Yucca Mountain will now be focused primarily on activities to support the submission of a license application to the U.S. Nuclear Regulatory Commission. Due to this new focus, the budget request no longer includes the Core Science account, although some applied research, particularly, in hydrology continues. Overall, the Yucca Mountain nuclear waste repository project requested \$457 million. (For more on DOE, please see Chapter 9.)

#### **U.S. GEOLOGICAL SURVEY (USGS)**

Looking at the USGS as a whole, this year's request is much more favorable to the agency than last year's request but still represents a decrease from the final FY 2003 appropriations. The total request is \$896 million, a decrease of more than 2 percent from last year's level. Last year's request was hardest on water programs as the administration sought large cuts and transfers to other agencies. This year, the administration did not request those cuts but sought savings from resource-related programs.

## EARTH SCIENCES IN THE FY 2004 BUDGET

Geologic programs would receive a total of \$222 million, a 5 percent decrease from last year. The biggest hit goes to the Mineral Resources Program, which would receive a \$9.1 million cut. As with other programs, such cuts are in addition to the budgetary erosion due to increases in uncontrollable costs. The proposed cuts would eliminate a global mineral resource assessment currently underway as well as geochemical process studies on the effects of toxic materials associated with mineral deposits. Assessment activities for federal and local land managers would be reduced, among other activities.

Overall, water programs would receive \$200 million, a 3 percent decrease from last year's allocation. The National Water-Quality Assessment program requested \$64 million, which is essentially flat from last year's funding level. The Toxic Substances Hydrology program, last year proposed for cutbacks and a transfer of what remained to the National Science Foundation (NSF), would receive \$11.1 million boost, a decrease of 18 percent from final FY 2003 appropriations.

### **NATIONAL SCIENCE FOUNDATION (NSF)**

Funding for the Geoscience Directorate (GEO) would remain basically flat from the FY 2003 appropriation, with a budget request of \$688 million. Congress rejected a proposal in last year's budget request to transfer several programs from other federal agencies into GEO, a proposal that was not repeated in this year's request. The majority of the solid earth science research within GEO is funded through the Earth Science Division (EAR), which would receive \$144 million FY 2004. According to the budget documents, EAR is focusing more of its resources to support educational activities, especially activities linked to the new EarthScope initiative.

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 \$30 million in funding for FY 2003. This year's request is for \$45 million. This second installment of a proposed five-year \$187 million project would not provide funds for a fourth component of EarthScope, and the Interferometric Synthetic Aperture

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Radar satellite (InSAR), which nevertheless is listed as a priority for EAR science. (For more on the NSF budget, please see Chapter 7.)

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)**

NASA's Earth Science Enterprise (ESE) works to develop a scientific understanding of the Earth and its response to natural and human-induced changes. ESE's budget has again been reorganized, this time to better coordinate with the agency's mission plan, making it, as the House Science Committee notes, "extremely difficult to compare the FY 2004 proposal with those from previous years." The requested \$1.6 billion for ESE is a 9 percent decrease from the FY 2003 allocation. Within this request, \$1.5 billion is for Earth System Science, which includes \$26 million for a new initiative to accelerate the evaluation of non-carbon dioxide compounds on climate change as part of the president's Climate Change Research Initiative (CCRI). (For more on the NASA budget, please see Chapter 10; for more on CCRI, please see Chapter 16.)