

## Earth Sciences in the FY 2003 Budget

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### HIGHLIGHTS

- **Department of Energy (DOE):** Natural gas and petroleum research accounts are slated for cuts of 50 percent and 37 percent, respectively, in the President's request. Geoscience research in DOE Basic Energy Sciences would stay flat as would core science supporting the high-level nuclear waste disposal program.
- **U.S. Geological Survey (USGS):** The President has requested a 5.2 percent cut for this agency. Several water-related research programs face substantial reductions or elimination; the Toxic Substances Hydrology program is slated for a 30 percent reduction with the remainder transferred to NSF. The National Cooperative Geologic Mapping program faces a \$6 million cut.
- **National Aeronautics and Space Administration (NASA):** Earth science programs are flat-funded at \$1.6 billion, but most research programs are cut in order to make room for large increases in mission operations.
- **National Science Foundation (NSF):** The Geosciences Directorate is the recipient of all of the Administration's proposed program transfers into NSF, giving the impression of a sizable increase. Base funding for the directorate, however, is only up 1.2 percent. The Major Research Equipment account request includes \$35 million for initial funding of the EarthScope continental imaging project.

**INTRODUCTION**

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

Agency / Program	FY 2001 Actual	FY 2002 Estimate	FY 2003 Request	% Change FY 02-03
Department of Energy				
Basic Energy Sciences				
Geosciences Research	21	21	21	0.0
Fossil Energy R&D				
Natural Gas Research	44	45	23	-50.0
Petroleum Research	65	56	35	-36.8
Solar & Renewable Energy				
Geothermal	27	27	26	-2.9
Yucca Mountain Site Characterization				
Core Science	66	71	71	0.0
Department of the Interior				
U.S. Geological Survey*	884	914	867	-5.1
Geologic Division*	225	233	225	-3.5
Water Resources Div.*	204	206	178	-13.6
NASA				
Earth Science Enterprise	1,762	1,626	1,628	0.2
Earth Science Program Science	350	341	354	3.9
EOS Science	48	49	54	8.9
National Science Foundation				
Geosciences Directorate	564	610	691	13.4
Earth Sciences Division	116	126	153	21.1
Major Research Equip. -- EarthScope		--	35.0	--

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

\* - Includes non-R&D components.

The final enacted budget seldom varies from the President's request by more than a few percent. But within that overall similarity, substantial changes can take place in those program areas where Administration and congressional priorities and perspectives differ. Such was the case this past year for several solid-earth science programs that faced major reductions in the President's request but emerged with increases in their appropriations. Supporters of those programs can only hope that the same takes place with this year's budget. The President's FY 2003 request includes many of the same reductions to earth science programs

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in the Department of Energy (DOE) and Department of the Interior that he requested in FY 2002.

Transfers complicate the overall funding picture for the solid-earth sciences in this year's request. Earth science programs at the National Science Foundation (NSF) are slated to receive a substantial increase, but that increase is almost entirely offset by decreases in other agencies whose programs are being transferred to NSF, creating a zero-sum game for actual research dollars.

Despite the fact that homeland security is a top priority in the Administration's budget request, it is noticeable only in its absence when it comes to the request for 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 Office of Homeland Security, there are virtually no increases associated with this theme in the USGS or other earth science requests.

### DEPARTMENT OF ENERGY

***Fossil Energy R&D:*** A majority of the geoscience 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 (see Table II-11). A 37 percent cut in petroleum E&P would significantly reduce geoscience research related to improving characterization of oil-bearing formations. Natural gas research is cut 50 percent, including a 24.6 percent cut in natural gas E&P—the remaining \$15.5 million would provide final allocations for several advanced drilling and diagnostic tools. Also within the natural gas account, gas hydrate research would receive a 54.2 percent cut to total \$4.5 million for research on seafloor stability and the role of hydrates in climate change. President Bush announced a new Coal Research Initiative (CRI) last year and has continued it in the FY 2003 budget. Built as a cooperative, cost-sharing program, the CRI would combine previously allocated funds with new money for a total of \$330 million to solicit proposals in primarily applied research. Within CCRI, \$54 million is targeted towards carbon sequestration research. (For more on the DOE budget, see Chapter 9.)

***Basic Energy Sciences:*** To align the budget account with the Basic Energy Sciences (BES) working structure, geoscience research is now a

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part of the combined Chemical Science, Geosciences, and Energy Biosciences Research program. This program provides peer-reviewed grants to universities and DOE national laboratories for fundamental geoscience research in geochemistry, hydrology, rock mechanics, and geophysical imaging—areas with application to multiple DOE mission areas including oil and gas exploration and development, geothermal energy, and environmental remediation. The BES Geoscience Research component would remain at the \$21.3 million FY 2002 level.

***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. The Geoscience and Supporting Technology account would see an 11.3 percent increase to total \$7.7 million. Exploration and drilling research would receive \$12.1 million, an increase of 49.6 percent. GeoPowering the West, an initiative started two years ago by the previous administration, is slated for \$1.4 million, a decrease of 56.3 percent.

***Yucca Mountain Site Characterization:*** This year's budget request marks a changing priority for the Yucca Mountain site in Nevada. Now that President Bush has made his formal recommendation to Congress for the nation to move ahead with developing Yucca Mountain as the world's first high-level nuclear waste repository, the budget request for Yucca Mountain shifts funding within the Site Characterization account to activities supporting submission of a license application to the U.S. Nuclear Regulatory Commission. Funding for the Core Science account would remain at \$71.3 million.

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

The same USGS programs that were targeted for cuts in the President's FY 2002 request are also targets in FY 2003, with the largest reductions going to water and cooperative programs. Although some of the requested reductions simply remove congressionally added projects (earmarks), others reflect the lower priority assigned to, in the words of the Interior Department budget documents, "programs that primarily benefit external customers." The documents go on to state that "the first and most important customers of USGS science are the land and resources management bureaus of the Department of the Interior." For

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USGS as a whole, the Bush Administration is seeking a \$47 million, or 5.1 percent, cut to \$867.3 million.

Water programs within USGS are hit hard by the President's budget request. Several programs are targeted for elimination and, in one case, transfer out of Interior. Funding for the National Water Quality Assessment (NAWQA) program, which collects and analyzes data from large river basins and aquifers, is to be cut by 9.2 percent to \$63.1 million. The Toxic Substances Hydrology Program is a collaborative effort of USGS scientists, university and private-sector researchers, and state, local, and federal agency scientists conducting long-term research on water resource contamination in both surface and groundwater environments. The Administration proposal would downsize the program from the \$13.9 million allocated in FY 2002 to only \$10 million, which would be transferred to the National Science Foundation. The cooperative Water Resources Research Institutes, which receive state matching funds, are targeted for elimination at a \$6 million savings.

Several of the USGS budget cuts result from a decision by the Office of Management and Budget (OMB) not to include so-called Title VIII funds as part of the request. For the past two years, several USGS cooperative programs have received funding through a separate account in the Interior and Related Agencies appropriations bill known as the Title VIII Conservation Funding category. Last year, the USGS received an additional \$25 million from Title VIII. Funding from this account was planned as a six-year initiative, but funding is not mandatory and this not guaranteed from year to year. Primarily because Title VIII funding is not requested, the National Streamflow Information Program—which operates a national network of streamgages—would receive a \$2 million cut, and the National Cooperative Geologic Mapping program faces a \$6 million cut. (For more on USGS, see Chapter 18.)

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

NASA's Earth Science Enterprise (ESE) supports Earth systems science, an interdisciplinary research field that looks at the oceans, land surface, atmosphere, and biota as dynamically related components of the Earth system. Funding for the Office of Earth Science would be virtually unchanged from last year at \$1.6 billion (see Table II-12). Within that apparent flat funding, a four-fold increase in mission operations is offset by cuts in virtually all the other programs within the Earth Science

Enterprise (ESE). Earth Science Program Science would increase by 3.9 percent to total \$353.9 million. Budget documents indicate that no new satellite missions will be undertaken until the Administration conducts a review of the U.S. Global Change Research Program (USGCRP; see Chapter 15 for more information). The lion's share of the funding coordinated by this interagency initiative is related to NASA Earth Science satellite-based observation platforms.

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

The budget request for the Geosciences Directorate (GEO) includes transferred funds from three other federal programs—the USGS Toxic Substances Hydrology program (\$10 million), the National Oceanic and Atmospheric Administration Sea Grant program (\$57 million), and the Environmental Protection Agency environmental education program (\$9 million). Including these funds, the request for GEO is an impressive 13.4 percent increase to \$691 million (see Table II-7). Without these transfers, the directorate would receive a 1.2 percent increase, a decrease in real dollars. Including the transfers, the Earth Sciences Division (EAR) is slated for a 21.1 percent increase, but that means only a 3.6 percent increase for base programs. The EAR request includes \$116.9 million for Earth Science Project Support, which funds researchers in earth science, in multidisciplinary groups, and in outreach activities.

As it did in FY 2001, NSF has included the EarthScope project in its Major Research Equipment (MRE) request. The previous inclusion was part of a massive increase in the final Clinton administration budget request, and it was not included in the final appropriation. EarthScope is unique for MRE in that it is not a single facility but rather four separate, broadly distributed projects: the U.S. Seismic Array (USArray), the San Andreas Fault Observatory at Depth (SAFOD), the Plate Boundary Observatory (PBO), and the Interferometric Synthetic Aperture Radar satellite (InSAR). The \$35 million of first-year funding would be divided between USArray, PBO, and SAFOD. Although funding for the MRE account is separate from the funding that goes to the research directorates, the fourth component of EarthScope (InSAR) is listed as a priority within the EAR Instrumentation and Facilities account, which calls for “development of a dedicated InSAR satellite mission, carried out jointly with NASA and USGS, to provide spatially-continuous strain measurements over wide geographic areas.” EarthScope is expected to last five years at a total cost of \$187 million.