Testimony of the

Geological Society of America

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Regarding the

National Science Foundation

FY 2011 Budget Request

To the

U.S. House of Representatives

Committee on Appropriations
Subcommittee on Commerce, Science, Justice, and Related Agencies
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Summary

The Geological Society of America urges Congress to appropriate at least $7.424 billion for the National Science Foundation (NSF) in fiscal year 2011, an increase of $552 million or 8.0 percent compared with the enacted level for FY 2010. This funding level would uphold the President's budget request of $7.424 billion for the National Science Foundation in FY 2011. However, it is below NSF's FY 2010 authorized funding level of $8.132 billion under the America COMPETES Act (Public Law 110-69).

The Geological Society of America supports strong and growing investments in earth science research and education at NSF and other federal agencies. Substantial increases in federal funding for earth science research and education are needed to ensure the health, vitality, and security of society and for stewardship of Earth. These investments are necessary to address such issues as energy resources, water resources, climate change, and natural hazards. Earth science research forms the basis for training and educating the next generation of earth science professionals. The devastating earthquake in Haiti on January 12, 2010 that killed an estimated 200,000 people emphatically demonstrates the need for increased federal investments in earth science research that stimulate innovations in natural hazards monitoring and warning systems.

The Geological Society of America, founded in 1888, is a scientific society with over 22,000 members from academia, government, and industry in all 50 states and more than 90 countries. Through its meetings, publications, and programs, GSA enhances the professional growth of its members and promotes the geosciences in the service of humankind. GSA encourages cooperative research among earth, life, planetary, and social scientists, fosters public dialogue on geoscience issues, and supports all levels of earth science education.

Rationale

Science and technology are engines of economic prosperity, environmental quality, and national security. Federal investments in research pay substantial dividends. According to the National Academies' report *Rising Above the Gathering Storm* (2007), "Economic studies conducted even before the information-technology revolution have shown that as much as 85% of measured growth in U.S. income per capita was due to technological change."

The earth sciences are critical components of the overall science and technology enterprise. Growing investments in earth science research are required to stimulate innovations that fuel the economy, provide security, and enhance the quality of life. Substantial increases in federal funding for earth science research are needed to ensure the health, vitality, and security of society and for Earth stewardship. Earth science research provides knowledge and data essential for developing policies, legislation, and regulations regarding land, mineral, energy, and water resources at all levels of government.

Broader Impacts of Earth Science Research and Education

It is critically important to significantly increase NSF's investments in earth science research and education to meet challenges posed by human interactions with Earth's natural system and to help sustain these natural systems and the economy. Increased investments in NSF's earth science portfolio are necessary to address such issues as natural hazards, energy, water resources, and climate change.

- Natural hazards – such as earthquakes, tsunamis, volcanic eruptions, floods, droughts, and hurricanes – remain a major cause of fatalities and economic losses worldwide. An improved scientific understanding of geologic hazards will reduce future losses through better forecasts of their occurrence and magnitude. The devastating earthquake in Haiti on January 12, 2010 that killed an estimated 200,000 people and the enormous earthquake in Chile on February 27, 2010 emphatically demonstrate the need for increased NSF investments in fundamental earth science research that stimulate innovations in natural hazards monitoring and warning systems.
- Energy and mineral resources are critical to the functioning of society and to national security and have positive impacts on local, national, and international economies and quality of life. These resources are often costly and difficult to find, and new generations of geoscientists need the tools and expertise to discover them. In addition, management of their extraction, use, and residue disposal requires a scientific approach that will maximize the derived benefits and minimize the negative effects. Improved scientific understanding of these resources will allow for their better management and utilization while at the same time considering economic and environmental issues. This is particularly significant because shifting resource demands often reframe our knowledge as new research–enabling technologies become available.
- The availability and quality of surface water and groundwater are vital to the well being of both society and ecosystems. Greater scientific understanding of these critical resources—and communication of new insights by geoscientists in formats useful to decision makers—is necessary to ensure adequate and safe water resources for the future. NSF's new program solicitation on water sustainability and climate is designed to address major gaps in our basic understanding of water availability, quality and dynamics, and

the impact of both a changing and variable climate, and human activity, on the water system.

- Forecasting the outcomes of human interactions with Earth's natural systems, including climate change, is limited by an incomplete understanding of geologic and environmental processes. Improved understanding of these processes in Earth's history can increase confidence in the ability to predict future states and enhance the prospects for mitigating or reversing adverse impacts to the planet and its inhabitants.
- Research in earth science is also fundamental to training and educating the next generation of earth science professionals.

Increased NSF investments in earth science education at all levels are needed because knowledge of the earth sciences is essential to science literacy and to meeting the environmental and resource challenges of the twenty-first century.

Earth science research and education should be a component of broader initiatives to increase overall public investments in science and technology. For example, earth science research should be included in a recommendation by the National Academies to "increase the federal investment in long-term basic research by 10% each year over the next 7 years…" (*Rising Above the Gathering Storm*, 2007). Likewise, implementation of the America COMPETES Act, which authorizes a doubling of the budgets of key science agencies in seven years, should encompass earth science research and education.

Extraordinary Scientific Opportunities in the Earth Sciences

In October 2009, NSF's Advisory Committee for Geosciences released a major report, *GEO Vision: Unraveling Earth's Complexities Through the Geosciences*. "Society stands at a crossroads. With the growing problems of resource depletion, energy sustainability, environmental degradation, and climate change, we wonder if protecting the health of the planet while achieving widespread economic prosperity can become a reality," the report says.

The NSF report provides a vision for the future of research in the geosciences as focused on fostering a sustainable future through a better understanding of our complex and changing planet. The report articulates a path to achieving its vision. It recommends a new emphasis on interdisciplinary research in order to achieve reasoned and scientifically sound insights for policy makers. The challenges ahead for the geosciences, the report says, are understanding and forecasting the behavior of a complex and evolving Earth; reducing vulnerability and sustaining life; and growing the geosciences workforce of the future. Substantial increases in resources are needed to meet these challenges.

Extraordinary scientific opportunities in the earth sciences have been summarized in a series of reports, including:

- *GEO Vision: Unraveling Earth's Complexities Through the Geosciences* (NSF Advisory Committee for Geosciences, 2009)
- *Seismological Grand Challenges in Understanding Earth's Dynamic Systems* (Incorporated Research Institutions for Seismology, 2009)
- *Hydrology of a Dynamic Earth* (Consortium of Universities for the Advancement of Hydrologic Science, 2007)
- *Future Research Directions in Paleontology* (Paleontological Society and Society for Vertebrate Paleontology, 2007)

- *The Geological Record of Biosphere Dynamics* (National Research Council, 2005)
- *Basic Research Opportunities in the Earth Sciences* (National Research Council, 2001)

NSF's Earth Sciences Division regularly receives a large number of exciting research proposals that are highly rated for both their scientific merit and their broader impacts, but many meritorious projects have not been funded due to budget constraints. Additional investments in earth science research can have significant positive impacts on society.

EarthScope is producing transformative science while being developed on time and on budget. When this major project was being developed, it was widely expected that the NSF budget would experience a sustained period of robust growth as indicated by the NSF Authorization Act of 2002 and the America COMPETES Act. If NSF's budget growth is not robust, some members of the earth science community are concerned that EarthScope expenses could put downward pressure on budgets and success rates for other time-sensitive research opportunities in the earth sciences.

Conclusion

The NSF budget request for FY 2011 is being considered at the same time that the America COMPETES Act is being reauthorized. The America COMPETES Act set the stage to double the NSF budget over seven years. Despite overwhelming bipartisan support for the America COMPETES Act, appropriations for NSF have fallen short of the authorized doubling path in the regular appropriations bills for fiscal years 2007 - 2010. NSF received $3.0 billion in economic stimulus funds under the American Recovery and Reinvestment Act of 2009. This one-time injection of funding is very helpful, but sustained growth in NSF's budget is needed to achieve the objectives of the America COMPETES Act.

The Geological Society of America joins with the Coalition for National Science Funding and other organizations in recommending an appropriation of at least $7.424 billion for NSF in fiscal year 2011, an increase of $552 million or 8.0 percent compared with the enacted level for FY 2010. This funding level would uphold the President's FY 2011 budget request of $7.424 billion for the National Science Foundation. However, it is below NSF's FY 2010 authorized funding level of $8.132 billion under the America COMPETES Act (Public Law 110-69).

The Geological Society of America is grateful to the House Appropriations Subcommittee on Commerce, Science, Justice, and Related Activities for its past leadership in increasing investments in the National Science Foundation and other science agencies. We remain grateful to the subcommittee for its leadership in providing $3.0 billion in stimulus funds for NSF under the American Recovery and Reinvestment Act of 2009. Thank you for your thoughtful consideration of our recommendations.

For additional information or to learn more about the Geological Society of America – including GSA Position Statements on water resources, energy and mineral resources, natural hazards, and public investment in earth science research – please visit www.geosociety.org or contact Dr. Craig Schiffries at cschiffries@geosociety.org.