

Testimony of
Kasey White
Director for Geoscience Policy
for the
Geological Society of America
Regarding the
National Science Foundation
and
National Aeronautics and Space Administration
FY 2019 Appropriation
to the
U.S. House of Representatives
Committee on Appropriations
Subcommittee on Commerce, Justice, Science, and Related Agencies
April 27, 2018

Summary

The Geological Society of America (GSA) supports strong and sustained investments in geoscience research and education at the National Science Foundation (NSF) and National Aeronautics and Space Administration (NASA). We thank Congress for the investments made in FY 2018 and encourage a path of sustainable growth forward. We encourage Congress to appropriate \$8.45 billion for NSF in FY 2019 and fully support geoscience research at the agency without restriction. We request \$6.5 billion in FY 2019 to fund NASA's Science Mission Directorate with increased funding for the Earth Science and Planetary Science Divisions. Investment in NSF and NASA is necessary to secure America's future economic leadership, both through the discoveries made and the talent developed through their programs. Earth and space science at these two agencies plays a vital role in American prosperity and security through understanding and documenting mineral and energy resources that underpin economic growth; researching and monitoring potential natural hazards that threaten U.S. and international security; and determining and assessing water quality and availability.

The Geological Society of America (GSA) is a global professional society with a growing membership of more than 26,000 individuals in 115 countries. GSA provides access to elements that are essential to the professional growth of earth scientists at all levels of expertise and from all sectors: academic, government, business, and industry. The Society unites thousands of earth scientists from every corner of the globe in a common purpose to study the mysteries of our planet (and beyond) and share scientific findings.

SCIENCE □ STEWARDSHIP □ SERVICE

National Science Foundation

The Geological Society of America (GSA) appreciates the increase to the National Science Foundation (NSF) budget in the FY 2018 omnibus and thanks the Committee for recognizing the important role that the agency plays in our country's global competitiveness. We urge Congress to provide NSF at least \$8.45 billion in fiscal year 2019.

Sustained increases beyond inflation are necessary to regain America's science and technology leadership and to enable the discoveries that lead to future innovations and industries. According to the *2018 Science and Engineering Indicators Report*, the U.S. investment in R&D of \$497 billion was closely followed by China at \$409 billion. If current trends continue, the National Science Board expects China to surpass the U.S. in R&D investments by the end of this year. Increases in funding will allow NSF to continue to fund its core basic research in addition to growing investments in its Ten Big Ideas. These ideas are designed to identify areas of future investment and position the U.S. on the cutting edge of global science and engineering leadership.

Geoscience research is a critical component of the overall science and technology enterprise and should be funded without restriction. NSF's Directorate for Geosciences is the largest federal supporter of basic geoscience research at universities. NSF's programs in geoscience research and graduate and undergraduate student support contribute significantly to the education and training of the workforce. A recent report by the American Geosciences Institute, [*Status of Recent Geoscience Graduates 2017*](#), illustrates the diversity of careers supported by geoscience research. For example, the report found that the majority of master's degree graduates found jobs in the oil and gas industry and government, while environmental services, such as environmental consulting and remediation of water and soil, hired the highest percentage of bachelor's degree graduates. Other industries hiring geoscientists include manufacturing, trade, construction, information technology services, mining, and agriculture.

Increased investments in NSF's geoscience portfolio are necessary to address such issues as natural hazards, energy and minerals, water resources, and education; geoscience is a key contributor to groundbreaking research across disciplines at NSF. Specific needs include:

- On December 20, 2017, President Trump signed an executive order entitled *A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals*, that finds,

“The United States is heavily reliant on imports of certain mineral commodities that are vital to the Nation's security and economic prosperity. This dependency of the United States on foreign sources creates a strategic vulnerability for both its economy and military to adverse foreign government action, natural disaster, and other events that can disrupt supply of these key minerals.”

NSF's Division of Earth Sciences supports research on the structure, composition, and evolution of the Earth and the processes that govern the formation and behavior of the Earth's materials. This research contributes to a better understanding of the natural

distribution of mineral and energy resources.

- The quality and quantity of surface water and groundwater have a direct impact on the wellbeing of societies and ecosystems, as evidenced by flooding and drought impacts experienced across the US during the past year. NSF's research addresses major gaps in our understanding of water availability, quality, and dynamics, including the impact of both a changing climate and human activity on the water system.
- The Division of Atmospheric and Geospace Sciences provides critical infrastructure and research funding for understanding our planet, including weather and precipitation variability and atmospheric and space weather hazards. Earth and space observations provide data necessary to predict severe space weather events, which affect the electric power grid, satellite communications and information, and space-based position, navigation, and timing systems.
- The National Research Council report [*Sea Change: 2015-2025 Decadal Survey of Ocean Sciences*](#) highlights research questions to guide NSF investment. The report identifies questions that will help make informed decisions, including: How can risk be better characterized and the ability to forecast geohazards like megaequakes, tsunamis, undersea landslides, and volcanic eruptions be improved? What are the rates, mechanisms, impacts, and geographic variability of sea level change? How different will marine food webs be at mid-century? In the next 100 years?
- Natural hazards – including earthquakes, tsunamis, volcanic eruptions, wildfires, and landslides – are a major cause of fatalities and economic losses. Recent natural disasters provide unmistakable evidence that the United States remains vulnerable to staggering losses. An improved scientific understanding of geologic hazards will reduce future losses by informing effective planning and mitigation. We urge Congress to support NSF investments in fundamental Earth science research and facilities that underpin innovations in natural hazards monitoring and warning systems.

National Aeronautics and Space Administration

GSA requests request \$6.5 billion to fund NASA's Science Mission Directorate (SMD) and increased funding for the Earth Science and Planetary Science Divisions. Increased funding will be critical to implement the recommendations of the National Academy of Sciences' *Earth Science and Applications from Space (ESAS) Decadal Survey* report released earlier this year. The report notes,

“Earth science and applications are a key part of the nation's information infrastructure, warranting a U.S. program of Earth observations from space that is robust, resilient, and appropriately balanced.”

The data and observations from Earth observing missions and research are a tremendously important resource for natural resource exploration and land use planning, as well as assessing water resources, natural disaster impacts, and global agriculture production. GSA supports

interagency efforts to ensure the future viability of Landsat satellites as well as funding to increase the capabilities and uses of multi-spacecraft constellations of small scientific satellites.

We appreciate congressional support in FY 2018 for Earth Science Missions, and request that Congress continue their funding in FY 2019. These missions will advance science frontiers and provide critical data for society. For example, PACE will help us monitor the duration and impact of harmful algae blooms and CLARREO Pathfinder will enable industry and military decision-makers to more accurately assess natural hazards, such as flooding.

Planetary research is directly linked to Earth science research and cuts in either program will hinder the other. To support missions to better understand the workings of the entire solar system, planetary scientists engage in both terrestrial field studies and Earth observation to examine geologic features and processes that are common on other planets, such as impact structures, volcanic constructs, tectonic structures, and glacial and fluvial deposits and landforms. In addition, geochemical planetary research studies include investigations of extraterrestrial materials now on Earth, including lunar samples, meteorites, cosmic dust particles, and, most recently, particles returned from comets and asteroids. We appreciate past congressional support for this area and urge you to continue to increase this important area to support priority areas identified in the [Planetary Science Decadal Survey](#).

Support Needed to Educate Future Innovations and Innovators

Earth science research and education are fundamental to training the next generation of Earth science professionals. *Status of the Geoscience Workforce Report 2016* found an expected deficit of approximately 90,000 geoscientists by 2024.

Increased NSF and NASA investments in Earth science education are necessary to meet these workforce needs and develop an informed, science-literate electorate. Earth scientists will be essential to meeting the environmental and resource challenges of the twenty-first century. NSF's Education and Human Resources Directorate researches and improves the way we teach science and provides research and fellowship opportunities for students to encourage them to continue in the sciences. Similarly, NASA's educational programs have inspired and led many into science careers. GSA fully supports these efforts, as well as programs to make the geoscience workforce more diverse.

Please contact GSA Director for Geoscience Policy Kasey White at kwhite@geosociety.org for additional information or to learn more about the Geological Society of America – including GSA Position Statements on water resources, planetary research, energy and mineral resources, natural hazards, climate change, and public investment in Earth science research.