



Natural Hazards Science for Disaster Response

FY 2016 President's Proposed Budget

Total requested increase is \$6,618,000

In the past year, the USGS responded to earthquakes around the globe, including the magnitude-6.0 earthquake in the San Francisco Bay area. There were volcanic eruptions in Alaska and Hawaii, and USGS scientists assisted with the devastating landslide in Washington State as well as landslides in California and Colorado. Across a number of hazards, the USGS is proposing to strengthen its capabilities both before and after disasters strike, harnessing new technology and promoting partnerships.

Expanding Use of Flood Inundation Mapping and Rapid Deployable Streamgages

A joint effort to standardize and expand the availability of flood-inundation maps is underway by the USGS, National Oceanic and Atmospheric Association (NOAA), and the U.S. Army Corps of Engineers. For the first time, users can know the forecasted floodwater extent and see, street-by-street, forecasts of timing and duration of inundation, hours or even days prior. Requested funding will help develop and improve mapping procedures and expand the library of flood-inundation maps. These maps are indexed to USGS streamgage data, ensuring that the maps reflect current flood conditions in a timely and reliable manner. However, some flood-threatened communities lack a permanent USGS streamgage, and a portion of the requested funding will support the installation and operation of temporary rapid-deployable streamgages. Implemented together, the measures will provide crucial data for flood response activities.

Rapid Response to Volcano Unrest and Eruption

Roughly half of the Nation's 169 volcanoes are potentially dangerous due to the manner in which they erupt and the communities within their reach. With the proposed funding, the USGS will expand the development of real-time ash-fall modeling that allows forecasts of when and how much ash will accumulate. This USGS ash modeling is coordinated with NOAA's National Weather Service and the Air Force Weather Agency. The USGS will expand the monitoring network at Mount Hood, which is a very-high-threat and ash-producing volcano near Portland, Oregon. A real-time monitoring network will be installed at Glacier Peak in Washington, while networks will be improved at Baker in Washington as well as Mt. Shasta and Lassen Peak in California. Damaged and failed networks will be repaired on high-threat volcanoes in Alaska and in the Northern Mariana Islands. These steps are part of the effort to improve the National Volcanic Early Warning System (NVEWS).

Earthquake Early Warning and Rapid Event Characterization

The USGS and its partners are developing an earthquake early warning system for the West Coast. With the requested funding, the USGS aims to implement a limited public warning system by 2018. The system is now a pre-prototype called *ShakeAlert*, and serves test users. Currently there are not enough sensors through the Advanced National Seismic System to provide fast and reliable alerts uniformly across the West Coast. The USGS will work with partners, including state agencies and private-sector utilities, to improve network coverage and monitoring of critical infrastructure on major faults. The USGS will also improve the support structure for rapid emergency response and work with users to create needed products. This request builds on previous federal, state, local and private-sector funding for earthquake early warning research and development.

Global Seismographic Network Primary Sensor Deployment

The Global Seismographic Network (GSN) provides high-quality seismic data to a variety of stakeholders, but some of the sensors are decades old and many have failed. GSN data are used for earthquake alerts and situational awareness products; tsunami warnings by NOAA's National Weather Service; nuclear treaty verification research by the Department of Energy (DOE) and the Department of Defense; and basic research on the Earth by the National Science Foundation (NSF). Requested funding supports the installation of borehole (underground) sensors, funded by DOE's National Nuclear Security Agency, as well as repairs to many vaults that house the sensors. The network is jointly supported by the USGS and the NSF, and operated in cooperation with the IRIS consortium of universities.

Landslide Response

Debris flows are fast-moving landslides that can destroy property and take lives, and areas burned by wildfire are particularly susceptible to this type of landslide. A debris-flow early warning system developed by the USGS and NOAA's National Weather Service is operational in southern California. Additional funding would be used to expand data collection in Arizona and Colorado to support debris-flow early warning in areas recently burned by wildfire. Resources would also be used to partner with Federal, State, and local emergency management, and the private sector to advance development of an integrated system to landslide processes. Such a system would enhance the USGS ability to respond to landslide crises such as the SR530 landslide near Oso, WA.



Improved Geomagnetic Monitoring to Support Space Weather Situational Awareness

Geomagnetic storms driven by large solar flares are a hazard for our technology-dependent society. They are often global in extent and can regionally impact radio communications, GPS systems, satellite operations, pipelines, and electric power grids. Proposed funding will provide enhanced monitoring of magnetic and electric fields at ground-level and improve three-dimensional models of electrical conductivity. Investments will lead to a national capability in mapping geomagnetic hazards to assess space weather vulnerability and risk as well as improve situational awareness of space weather and its impacts.

Rapid Wildfire Science Response

Wildfires pose a hazard across the U.S. to human safety, landscape resilience, and infrastructure. This funding would enable USGS to develop a set of protocols, relevant databases, and monitoring equipment that will be easily deployed for wildfire response, especially for Federal land management agencies in DOI and the USFS. This will bolster USGS support of Federal wildfire management policy development by providing information and tools to ensure that response planning and activities are based on the best available science. This new capacity will allow real-time science support for elements of the Federal Land Assistance, Management and Enhancement (FLAME) Act and the DOI Secretary's Order for Rangeland Fire Prevention, Management and Restoration.

Disaster Scenarios and Strategic Science Crisis Response

To prepare for the impacts of hazards before they strike, the USGS will expand the development and delivery of disaster scenario products that allow communities to understand hazard impacts and make preparations before disaster strikes. Funding would also aid in the development of a strategic science capability to rapidly deliver scientifically based information on the likely range of impacts from a given natural hazard or other environmental crisis. It would continue to support the rapid implementation of strategic science crisis teams, like those set up during the Deepwater Horizon oil spill and in response to Hurricane Sandy, allowing decision-makers to quickly evaluate long-term consequences of alternative response and recovery strategies.