

VOLCANOES

Congressional Hazards Caucus Alliance Factsheet

Approximately 170 active volcanoes lie within the borders of the United States and its territories. At least 54 of these volcanoes pose major and foreseeable threats to their surroundings and to industries that contribute to the national economy, such as agriculture, aviation, and transportation.

The last major eruption in the contiguous United States occurred at Mount St. Helens in Washington in 1980, killing 57 people and disrupting the economy at a cost of nearly \$1 billion in losses to forestry, critical infrastructure, and agriculture.¹

Since that cataclysmic eruption, scientists have refined systems for monitoring volcanoes and making reliable forecasts of eruptions. Increased monitoring investment will help to lessen the human and financial tolls of future eruptions.

VOLCANIC HAZARDS

Volcanoes produce a variety of hazards:

- **Volcanic ash**, which can travel hundreds of miles, clogging aircraft engines, grounding air traffic, and disrupting domestic and international trade hundreds of miles from the erupting volcano.
- **Volcanic mudflows**, which can flood populated areas tens of miles from an ice-clad volcano.
- **Local hazards such as lava flows and avalanches of hot rock and gas.**

FEDERAL ACCOMPLISHMENTS

VOLCANO MONITORING AND OBSERVATORIES

The U.S. Geological Survey (USGS) has principal responsibility for the mitigation of volcanic hazards in the United States through the USGS Volcano Hazards Program (<http://volcanoes.usgs.gov>). Over the past 34 years, the USGS has developed robust capabilities for monitoring and hazard assessment.



Above: Locations of volcanoes in the contiguous United States (top), Hawaii (middle left), and Alaska (bottom right). Green symbol indicates location of volcanoes that are assigned an activity level by USGS. Yellow and orange symbols indicate elevated alert.

Credit: Volcano Hazards Program/USGS. Screenshot of "U.S. Volcanoes and Current Activity Alerts" <http://volcanoes.usgs.gov>

NATIONAL VOLCANO EARLY WARNING SYSTEM (NVEWS)

Improving monitoring installations at high-threat volcanoes is a priority for the USGS. The USGS has assessed the hazard level of all U.S. volcanoes in order to identify gaps between monitoring need and actual capability. The National Volcano Early Warning System would ensure that high-threat volcanoes have the monitoring stations necessary to detect activity in time to forecast an eruption and issue early warnings for communities at risk.

[1] Washington State Department of Commerce and Economic Development Research Division

Below: The USGS operates five observatories.

Observatory	Region	Formal Partners
Alaska Volcano Observatory (AVO) Anchorage, AK Fairbanks, AK	Alaska Northern Mariana Islands	Geophysical Institute of the University of Alaska Fairbanks Alaska Division of Geological and Geophysical Surveys
California Volcano Observatory (CalVO) Menlo Park, CA	California Nevada	Housed at USGS Western Region Headquarters
Cascades Volcano Observatory (CVO) Vancouver, WA	Washington Oregon Idaho	Pacific Northwest Seismic Network Hosts the USGS/ USAID Volcano Disaster Assistance Program (VDAP)
Hawaiian Volcano Observatory (HVO) Big Island of Hawai'i	Hawai'i	Hawai'i Volcanoes National Park University of Hawai'i
Yellowstone Volcano Observatory (YVO)	Yellowstone Plateau (Wyoming)	University of Utah Yellowstone National Park

MONITORING TECHNIQUES

Volcanoes provide multiple signals prior to an eruption. Scientists measure these signals to assess the likely threat of an eruption. For example:

- **Seismology:** Analysis of earthquakes from the volcano can reveal how and where magma is moving beneath the surface.
- **Gas monitoring:** The types and amount of gas a volcano releases can reveal the likelihood of an eruption.
- **Ground deformation measurement:** Movements of the ground surface can signal an impending eruption.
- **Satellite remote sensing:** Remote satellite measurements of volcanic gas, ash, ground deformation, and heat output reveal activity at volcanoes that would be inaccessible otherwise, like the Aleutian Island volcanoes.

Several agencies use satellite remote sensing to monitor volcanic activity, including USGS, NOAA, NASA, and academic partners.

VOLCANIC ASH ADVISORY CENTERS (VAAC)

The National Oceanic and Atmospheric Administration (NOAA) maintains two of the world's nine Volcanic Ash Advisory Centers (<http://www.ssd.noaa.gov/VAAC/vaac.html>). VAAC experts in Anchorage and Washington, DC, use satellite remote sensing to detect ash in the atmosphere and issue alerts.

VOLCANIC HAZARDS RESEARCH

Over the past 30 years, government-funded research by federal and academic institutions has provided critical insight into volcanoes and their hazards. In addition to research by the USGS Volcano Hazards Program, the National Science Foundation (NSF) and NASA provide grants for academic research.

In conjunction with the USGS, the Smithsonian Global Volcanism Program (GVP) maintains a comprehensive

historical database on volcanic activity and publishes a weekly update of recent eruptions worldwide (http://www.volcano.si.edu/reports_weekly.cfm).

EMERGENCY RESPONSE

The USGS developed the Volcano Notification Service (<http://volcanoes.usgs.gov/vns/>) to issue volcano alerts, updates, and information statements to the public about U.S. volcanoes. USGS staff work with officials at the federal, state, and local levels to ensure effective coordination of information before and during volcanic activity.

In the case of volcanic disaster, the Federal Emergency Management Agency (FEMA) is responsible for coordinating federal response and providing disaster assistance.

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