

Volcanoes

Safe air travel is imperiled by the threat of crippling damage to aircraft from volcanic-ash clouds drifting at high altitudes, particularly in the North Pacific where heavily traveled air routes overlie Alaska's 40 active volcanoes. Long-term operation of real-time volcano monitoring in Alaska is needed to help mitigate volcanic risk to aviation. From FY 1996 to 2000, with funding from the Federal Aviation Administration of \$2 million annually, the USGS has installed, operated, and maintained seismic monitors at 20 active volcanoes in Alaska's distant and relatively inaccessible Aleutian Islands for the purpose of rapidly providing information about impending volcanic activity to the aviation community so that encounters with ash clouds can be averted. The proposed increase of \$500,000 for FY 2001 would enable the USGS to expand this real-time volcano monitoring capability to an additional high-risk Alaskan volcano.

The USGS monitors selected volcanoes with a combination of instruments and techniques to detect the rise of magma in the Earth's crust so that timely warnings of eruptions can be issued. Priorities for deciding which areas to monitor and the extent of monitoring needed are based on the likelihood, style, and magnitude of

Can Real-Time Information Help?

Early warning of volcanic eruptions in Alaska played a major role in reducing damage to aircraft from volcanic ash clouds: from \$160 million during the eruptions of Mt. Redoubt in 1989-90 to less than \$8 million during the eruption of Mt. Spurr in 1992. The warnings also prevented life-threatening situations for airline passengers and crews in 1996 during the eruption of Pavlof Volcano on the Alaska Peninsula.

eruptions and on the potential impacts of volcanic activity on people and economic systems.

Volcanoes pose a direct threat to many communities in the western United States, Hawaii, and Alaska. In addition, volcanic ash clouds drifting at high altitudes are a hazard to aircraft. They are carried by jet stream winds over the United States, Canada, and the Pacific Ocean. The USGS helps reduce the human and economic losses and disruptions associated with volcanic activity by (1) assessing and monitoring potential volcanic hazards, (2) providing warning information on volcanic activity and rapid monitoring response to volcanic crises, and (3) improving the scientific understanding of volcanic processes.

With approximately 70 active and potentially active volcanoes, the United States is among the most volcanically vigorous countries in the world. During the twentieth century, volcanic eruptions in Washington, California, Alaska, and Hawaii devastated thousands of square miles and caused substantial economic and societal disruption and, in the worst instances, loss of life.

The USGS works closely with scientists in other agencies; public-safety officials at the Federal, State, and local levels; government land managers; business leaders; the media; land developers and planners; educational institutions; and citizens' groups. Information is disseminated through briefings, workshops, maps, scientific publications, videos, digital databases, web sites, newspaper articles, and interviews with news and education media. During volcanic crises, USGS personnel work directly with authorities responsible for public safety.

Geologic Hazards, Resources, and Processes	(Dollars in Thousands)
Geologic Hazard Assessments	
Volcano Hazards	+\$ 500

USGS monitoring is conducted at its four volcano observatories in Alaska, the Cascades, Hawaii, and Long Valley, California; the observatories collaborate with universities or State and Federal agencies. The Alaska Volcano Observatory (AVO) is a cooperative effort of the USGS, the University of Alaska Fairbanks, and the State of Alaska Division of Geological and Geophysical Surveys. AVO monitors the volcanoes of Alaska, which threaten not only local populations but also aircraft and travelers using the major air routes across the North Pacific. AVO also is responsible for disseminating warnings about dangerous eruptions and ash clouds from Kamchatkan volcanoes that may affect planes flying in U.S.-controlled airspace.

The Cascades Volcano Observatory (CVO) in Vancouver, Washington, monitors the volcanoes of the Cascade Range in Washington and Oregon (in partnership with the University of Washington) and northern California. The Hawaiian Volcano Observatory (HVO) monitors volcanoes on the Island of Hawaii; the eruption of Kilauea Volcano, which began in 1983, still continues. The Long Valley Volcano Observatory in California focuses on the large Long Valley volcanic center near Mammoth Lakes, where complex signs of volcanic unrest have recurred episodically since 1980. The USGS also supports seismic monitoring of the Yellowstone volcanic region in partnership with the University of Utah.

As the nation's largest water, earth and biological science and civilian mapping agency, the USGS works in cooperation with more than 2000 organizations across the country to provide reliable, impartial, scientific information to resource managers, planners, and other customers. This information is gathered in every state by USGS scientists to minimize the loss of life and property from natural disasters, contribute to sound economic and physical development of the nation's natural resources, and enhance the quality of life by monitoring water, biological, energy, and mineral resources.