WHAT IS THE ALASKA VOLCANO OBSERVATORY?

Alaska Volcano Observatory
Fact Sheet

SUMMARY

Explosive eruptions from Alaska's more than 40 active volcanoes pose a significant and recurring threat to communities, commerce, and aircraft in the north Pacific. The Alaska Volcano Observatory (AVO) was established in 1988 to carry out volcano monitoring, eruption notification, volcanic hazard assessments, and volcano research in Alaska. Effective notifications and advance warnings during the 1989-90 eruptions of Redoubt and the 1992 eruptions of Spurr increased public safety and helped minimize the impact of these events.

INTRODUCTION

Alaska is home to more than 40 active volcanoes, many of which have erupted violently and repeatedly in the last 200 years. The 1912 eruption of Novarupta, 450 km southwest of Anchorage, was the earth's largest volcanic event of this century, and eruptions near Anchorage have caused millions of dollars in damage in the last decade alone. Future explosive eruptions from Alaska's volcanoes pose a significant threat to communities, local and international commerce, and to aircraft in the heavily traveled north Pacific region. The Alaska Volcano Observatory (AVO) was established in 1988 to carry out volcano monitoring, eruption notification, and volcanic hazard assessments in Alaska. The cooperating agencies of AVO are the U.S. Geological Survey (USGS), the University of Alaska Fairbanks Geophysical Institute (UAFGI), and the Alaska Division of Geological and Geophysical Surveys (ADGGS). AVO also plays a key role in notification and tracking of eruptions on the Kamchatka Peninsula of Russia as part of a formal working relationship with the Kamchatkan Volcanic Eruptions Response Team (KVERT). AVO is funded primarily by the USGS Volcano Hazards Program with additional support from the State of Alaska. AVO has 3 main objectives:

(1) to monitor dangerous volcanoes in Alaska;
(2) to assess volcanic hazards, issue timely warnings of imminent activity, and distribute notice of eruptions and potential effects to local, state, and federal officials and the public; and
(3) to conduct basic geological, geochemical, geophysical, and hydrological investigations of Alaskan volcanoes.

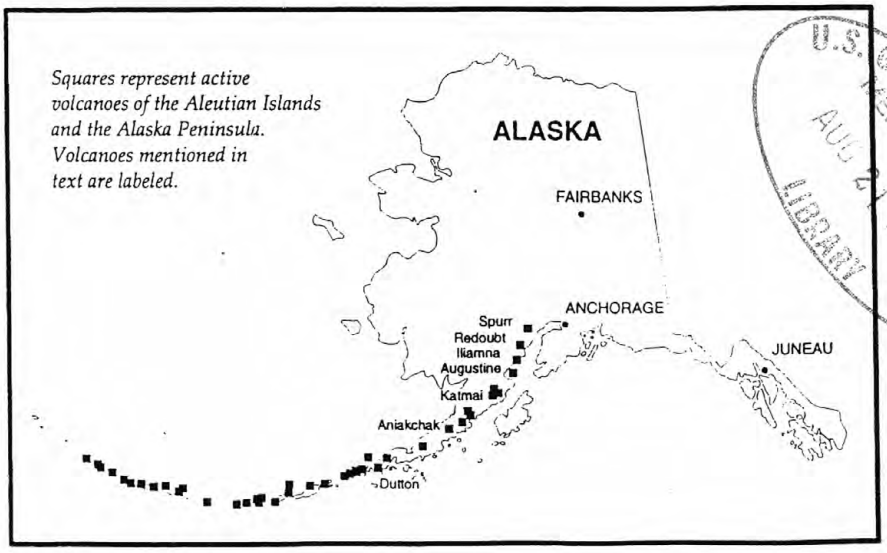
ORGANIZATION

AVO consists of a scientific and crisis coordination center in Anchorage, a UAFGI and USGS seismic recording and analysis center in Fairbanks, and ancillary facilities in Fairbanks, Vancouver, WA, and Menlo Park, CA. AVO is currently staffed by about 15 scientists and technicians. The operation is managed by a Scientist-in-Charge located in Anchorage. During volcanic crises, AVO implements 24-hour duty and may augment its staff with colleagues from other USGS volcano observatories.

VOLCANO MONITORING PROGRAM

Increased earthquake activity at a volcano is perhaps the single most important indicator of volcanic unrest. Accordingly, the backbone of AVO's volcano monitoring program consists of continuously recording seismometers at 4 Cook Inlet volcanoes, Spurr (Crater Peak), Redoubt, Iliamna, and Augustine. Seismic data from these volcanoes are telemetered to AVO facilities in Anchorage and Fairbanks where they are displayed, analyzed, and archived. Other components of the AVO volcano monitoring program include a system to detect volcanogenic lightning, intermittent airborne sulfur dioxide and carbon dioxide measurements to detect changes in volcanic gas emissions, periodic observational overflights, and geologic investigations. AVO also has remote, real-time video capability for Spurr, Redoubt, and Iliamna. Geodetic networks which allow detection of ground motion that may precede eruptions are currently in place at several volcanoes. Although still experimental, near real-time monitoring of ground deformation utilizing Global Positioning System technology is underway at Augustine volcano. AVO scientists also examine satellite data provided by the National Weather Service (NWS) to search for and track possible volcanic plumes. Together, these monitoring techniques allow AVO to warn of the possibility of an eruption from Cook Inlet volcanoes hours to weeks in advance and to issue notification of an ash-producing eruption, usually within 15 minutes of eruption onset. An electronic alarm system alerts AVO to unusual seismicity during nonbusiness hours.

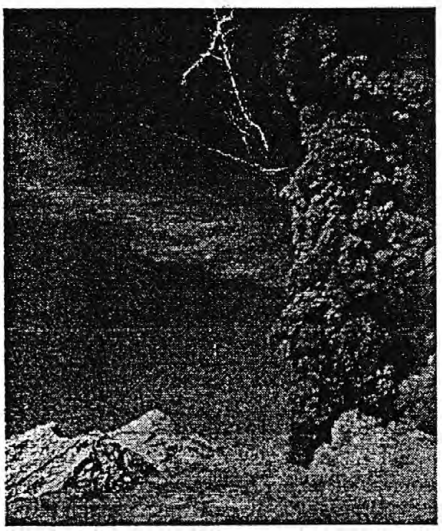
AVO also maintains two seismometers on Dutton volcano near King Cove, one seismometer at Aniakchak volcano near Port Heiden, and a small array of seismometers near the site of the catastrophic 1912 eruption in Katmai National Park. Seismic data from these volcanoes are collected and analyzed on a weekly to biweekly basis. Currently, AVO has no instrumentation on other volcanoes. To detect and monitor eruptions outside the Cook Inlet, AVO relies on pilot reports relayed through the Federal Aviation Administration (FAA), satellite imagery, and observations from villages, the military, and fishing vessels. AVO has the capability to deploy a temporary seismic array on any remote volcano that is judged to be potentially dangerous.



COMMUNICATION AND OUTREACH

During volcanic crises, AVO-Anchorage becomes the principal point of contact for information on volcanic activity and hazard assessment. At all times and especially during emergencies, AVO maintains close communication links with other agencies. During eruptions, AVO employs a rapid telephone call-down procedure to notify critical agencies including FAA, NWS, the Department of Defense, the Governor's Office, and the Alaska Department of Emergency Services of the situation. At the same time, a written statement that includes the location, time, size of the eruption, and a description of projected ash plume path is distributed by facsimile and electronic mail to federal, state, and local government agencies, critical industries, the media, and commercial air carriers. Subsequent information releases are prepared as needed, depending on changes in volcanic activity or hazards. AVO also maintains two recorded message lines which are updated frequently with summaries of volcanic activity.

During non-crisis periods, AVO releases a weekly written summary of volcanic activity in Alaska. AVO fields many calls from the general public and routinely gives interviews with media and tours of the facility. Frequent presentations to schools and other groups and publication of scientific results and other materials are part of a vigorous outreach program.



Crater Peak vent of Spurr volcano in eruption, August 18, 1992. Photo by R. McGimsey, USGS.

HAZARD ASSESSMENTS

In support of public land-use planning, development of emergency response plans, and general public awareness of the nature of volcanic activity in Alaska, AVO is responsible for assessing the full range of potential hazards at specific volcanic centers. Hazard assessments include a description of the history of a given volcano, explanations of likely eruption scenarios, and determination of probable impact zones for the range of expected hazards. A hazard assessment has been completed and published for Redoubt volcano; several others are currently underway.

RESEARCH PROGRAM

Alaska's active volcanoes offer superb opportunities for basic scientific investigations of volcanic processes. An important component of AVO's mission is to conduct and publish research at selected volcanic centers. The scope of this research includes:

- geologic mapping to determine eruptive histories of active volcanoes
- geochemical characterization and modeling of magmatic systems
- documentation and modeling of eruptive processes
- geophysical exploration of the interiors of volcanoes
- documentation and modeling of volcano-glacier interactions, lahar and debris-flow processes
- development of new instrumentation to aid in monitoring, prediction, and interpretation of volcanic unrest

Results of these studies contribute to completion of volcanic hazard assessments and to enhancement of AVO's monitoring and predictive capabilities.

FOR MORE INFORMATION:

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RECENT ERUPTIONS

Since 1989, two major eruptions in the Cook Inlet region of Alaska, as well as numerous smaller eruptions elsewhere in the Aleutian chain and on the Kamchatka Peninsula, have served to illustrate AVO's contributions to increased public safety. Less than 24 hours following a public warning from AVO, Redoubt volcano, 170 km southwest of Anchorage, erupted violently in mid-December 1989 sending a column of ash more than 12 km into the atmosphere. The volcano erupted a total of 19 times through April 1990, each time producing an ash plume that caused major disruptions in air traffic. Hot debris cascading onto the ice-and snow-covered slopes of Redoubt generated fast-moving debris flows which threatened a large oil-storage facility at the mouth of the Drift River. More than $160 million in damage and lost revenue were incurred. Advance notices from AVO of several eruptive episodes were critical in decisions to evacuate the threatened oil facility. AVO's rapid dissemination of projected ash plume trajectories to airlines also resulted in safe and efficient rerouting of air traffic in the north Pacific.

Two years later, in June 1992, the Crater Peak vent of Spurr volcano, 125 km west of Anchorage erupted explosively, sending a plume of ash over the interior of Alaska. This eruption came only weeks after an official announcement by AVO of the increased likelihood of activity at Spurr. Two additional eruptions from Crater Peak in August and September of 1992 dumped up to 3 mm of coarse ash on Anchorage, interrupting air traffic, commerce, and community activities in south-central Alaska. Again, timely notification of eruptive activity and forecasts of ash plume motion and fallout onto populated areas allowed the public, private industry, utilities, and government agencies to prepare and respond appropriately.

On September 30, 1994, a violent eruption of Klyuchevskoy volcano in central Kamchatka produced a widespread ash plume which extended across major north Pacific air routes. Coordinated by AVO, effective communication between Russian scientists, FAA, NWS, and air carriers resulted in successful rerouting of dozens of aircraft and minimized disruption and economic impact.

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