USGS CVO Media Newsroom Volcano FAQs

Q. Which Cascade volcano will erupt next?

A. No one knows for sure, but seven of them have erupted in just the past 300 years: Mount St. Helens (1800-57, 1980-86 and 2004-08), Lassen Peak (1914-17), Mount Baker (1843), Glacier Peak (1700s), Mount Rainier (1894-95), Mount Hood (1780-93), and Mount Shasta (1786). Any of these could be the next to erupt, though the odds are highest at Mount St. Helens.

Q. How often do the Cascade volcanoes erupt?

A. The Cascades are an active volcanic range. During the last 4,000 years, a Cascade Range volcano will erupt on average, once or twice per century.

Q. Why are the Cascades here?

A. The Cascade chain is 1600 miles (3000 km) long, stretching from Mount Meager in British Columbia to Lassen Peak in northern California. The roughly linear string of volcanoes in the Cascade Range is not an accident of nature. Volcanoes stand directly above a subducting oceanic plate (50-75 mi or 80-120 km deep) where the conditions are suitable to form magma.

Q. What process creates the magma that erupts at Cascade volcanoes?

A. Magma forms in the mantle, where the subducted oceanic plate has sunk to great depths. Temperatures and pressures at such depths are sufficiently high to cause water within the oceanic plate to sweat into the mantle rock. The addition of water to hot mantle rocks causes rock to melt, which forms magma. This magma begins to rise because it is less dense than surrounding solid mantle rock.

Q. What kinds of unusual activity might be noticed before an eruption?

A. Common symptoms of volcanic unrest include an increase in the frequency or intensity of earthquakes beneath a volcano; the occurrence of volcanic tremor, a specific type of earthquake activity that signals magma movement; swelling, subsidence, or cracking of the ground; increased steam emission or small steam

explosions; melting snow or ice; changes in existing fumaroles or hot springs, or the appearance of new ones; and increased discharge of magmatic gases. Volcanologists assess the significance of volcanic unrest partly by monitoring the pace and intensity of such activity.

Q. What starts an eruption?

A. Gases, such as water vapor, CO_2, SO_2 and other rare gases, are the driving forces that power explosive volcanic eruptions. However, gases are not the only players in a volcanic eruption. The size and explosiveness of an eruption are also controlled by the amount of magma in the magma chamber, the magma's chemical composition, and the pressure change in the narrow conduit that leads to Earth's surface.

Q. What kinds of hazards are associated with volcanic eruptions?

A. Before an eruption begins, rising magma opens cracks (fractures) in rocks beneath the volcano, commonly causing earthquakes, deformation (minor rising or falling) of the land surface and release of gases.

Debris flows, or **lahars**, are slurries of muddy debris and water caused by mixing of loose material with water, melted snow, or ice. Lahars destroyed houses, bridges, and logging trucks during the May 1980 eruption of Mount St. Helens, and have inundated many valleys around other Cascade volcanoes. Lahars at Nevado del Ruiz volcano, Colombia, in 1985, killed more than 23,000 people. At Mount Rainier, lahars have been produced by major landslides that were neither triggered nor accompanied by eruptive activity. Lahars can travel many tens of miles in a period of hours, destroying everything in their paths.

Tephra (ash and coarser debris) is composed of fragments of magma or rock blown apart by gas expansion. Tephra can cause roofs to collapse, endanger people with respiratory problems, and damage machinery. Tephra can clog machinery, severely damage aircraft, cause respiratory problems, and short out power lines up to hundreds of miles downwind of eruptions. Explosions may also throw large rocks up to a few miles. Falling blocks killed people at Galeras Volcano in Colombia in 1992, and at Mount Etna, Italy, in 1979.

Pyroclastic surges and flows are hot, turbulent clouds of tephra (known as surges), or dense, turbulent mixtures of tephra and gas (known as flows). Pyroclastic flows and surges can travel more than a hundred miles per hour and incinerate or crush most objects in their path. Though most extend only a few miles, a pyroclastic surge at

Mount St. Helens in 1980 extended 18 miles (28 km) and killed 57 people. Pyroclastic surges at El Chichón volcano in Mexico in 1982 killed 2000 people, and pyroclastic flows at Mount Unzen, Japan, in June, 1991, killed 43 people. Speeding vehicles cannot outrun a pyroclastic flow or surge.

Lava flows erupted at explosive stratovolcanoes like those in the Pacific Northwest and Alaska are typically slow-moving, thick, viscous flows. Kilauea volcano on the Island of Hawaii has produced thin, fluid lava flows throughout its history, and almost continuously since 1983. Lava flows destroyed a visitor center at Kilauea in 1989 and overran the village of Kalapana on the volcano's southeast flank in 1991.

Q. Can volcanoes be dangerous even when they don't erupt?

A. Definitely. Many stratovolcanoes have a plumbing system of hot acidic water that progressively breaks down hard rock to soft, clay-rich material. As a result, the volcano is gradually weakened, and large parts may suddenly fail. Resulting landslides and/or lahars are especially dangerous because they can occur without any volcanic or seismic warning.

The risk of mudflows formed this way is especially high along rivers downstream from Mount Rainier, because of the large population on floodplains, the huge weakened edifice of the volcano, and a long history of large flows that occurred when the volcano was otherwise dormant.

Q. How does the CVO monitor Cascade Range volcanoes?

A. In cooperation with universities and state agencies, the USGS-CVO monitors seismic activity, ground deformation, volcanic gases, thermal emissions, and changes in water levels and chemistry. When unusual activity is detected, a response team may do more ground surveys and install more instruments, if possible, to better determine if an eruption is likely.

Q. How does the USGS provide eruption warnings?

A. The USGS volcano observatories post updates about volcanic activity on our Volcano Hazards Program web sites and users can subscribe to the Volcano Notification Service to receive updates. Information about our alert system is available on our Alert-Notification System webpage.

If activity at a volcano increases, we provide hazards-zone maps and other information about the frequency of eruptions and extent of specific hazards to public officials, land-use planners, and emergency-management agencies. The assessments we've already completed are available online in our hazard assessments section. The USGS works with the Federal Aviation Administration and National Weather Service to provide airline pilots with timely information about hazardous volcanic ash clouds.

When communities are at risk, scientists give hazards information directly to public officials to help them make decisions about land-use or evacuations. Unlike what is often portrayed in movies, warnings are delivered only after a thorough analysis of all existing information and careful consultation among members of the USGS response team. Our goal is always to keep natural processes from becoming natural disasters.

Q. How can I get updates and notifications?

A. The Volcano Notification Service (VNS) is a free service that sends you notification emails about volcanic activity happening at monitored U.S. volcanoes. You can customize the VNS to only deliver notifications for certain volcanoes, or a range of volcanoes, as well as choose the separate notification types you want to receive. Notifications are issued by the five U.S. Volcano Observatories: Alaska (AVO), Cascades (CVO), Hawaiian (HVO), California (CalVO), and Yellowstone (YVO).

Q. How can residents who live near volcanoes prepare for future eruptions?

A. Residents can obtain copies of USGS volcano-hazard assessments to determine whether they live or work in areas at risk from volcanic activity. Everyone should plan how they and their family will respond to a natural disaster, including unrest or eruptive activity at nearby volcanoes. Preparation might include knowing where to go when family members are separated, where to go for emergency housing, what emergency supplies to keep on hand, and how to be self-sufficient for several days, as recommended by local emergency management agencies. Residents who live within 100 miles of a volcano should also find out what their local officials are doing to prepare their community for the possibility of renewed volcanic activity. Lastly, enjoy the scenic, recreational, and inspirational benefits of living near an active volcano!

Q. How many volcanoes exist in the United States and its territories?

A. The U.S. and its territories have about 170 volcanoes that have been active during the past 10,000 years, and most could erupt again in the future. In the past 500 years, 80 U.S. volcanoes have erupted one or more times.

Q. How many potentially active volcanoes are there on Earth?

A. There are about 1500 potentially active volcanoes worldwide, aside from the continuous belt of volcanoes on the ocean floor. About 500 of these have erupted in historical time.

Q. How many people live close to volcanoes?

A. According to 2009 World Bank population data, it is estimated that at least 600 million people live in areas potentially affected by volcanic hazards. *[Source: Auker, M.R., Stephen, R., Sparks, J., Siebert, L., Crosweller, H.S., Ewert, J., 2013, A statistical analysis of the global historical volcanic fatalities record: Journal of Applied Volcanology 2013, 2:2, available at http://www.appliedvolc.com/content/2/1/2.]*

Q. How many people have died as a result of volcanic eruptions?

A. Between 1600 to 2010 AD, 278,880 fatalities are recorded from 533 fatal incidents at 198 volcanoes across 38 countries. The fatality count is dominated by a handful of disasters, at Tambora (1815), Krakatau (1883), Pelée (1902), Nevado del Ruiz (1985), Unzen (1792), Grímsvötn (1783), Santa Maria (1902, 1929), Kilauea (1790), Kelut (1919), Tungurahua (1640), Galunggung (1822), and Vesuvius (1631). The number and probability of fatalities are strongly influenced by volcano explosivity and population density around volcanoes. The occurrence and extent of lahars (mudflows) and pyroclastic density currents have caused 50% of fatalities. With the largest disasters removed, over 90% of fatalities occurred between 5 km and 30 km from volcanoes, though the most devastating eruptions impacted far beyond these distances. *[Source: Auker, M.R., Stephen, R., Sparks, J., Siebert, L., Crosweller, H.S., Ewert, J., 2013, A statistical analysis of the global historical volcanic fatalities record: Journal of Applied Volcanology 2013, 2:2, available at http://www.appliedvolc.com/content/2/1/2.]*