

Volcanoes

A volcano is an opening in the earth's crust through which magma, molten rock, and ash are erupted on to the land. Volcanoes tend to be conical in shape, although there are a variety of forms depending upon:

• the nature of the material erupted
 • the type of eruption
 • the amount of change since the eruption.

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Most volcanoes are located at the edges of plate boundaries, although some are found in the interior of plates.

PREDICTING VOLCANOES

Scientists are increasingly successful in predicting volcanoes. Since 1980 they have correctly predicted 19 of Mt St Helen's 22 eruptions and Alaska's Redoubt volcano in 1989. The main ways of prediction include:

- **seismometers** to record swarms of tiny earthquakes that occur as the magma rises
- **chemical sensors** to measure increased sulphur levels
- **lasers** to detect the physical swelling of the volcano
- **ultra sound** to monitor low frequency waves in the magma, resulting from the surge of gas and molten rock, as happened at Pinatubo, El Chichon, and Mt St Helens

Type of flow

Aa flow is a few metres thick; consists of two distinct zones - an upper rubbly part, and a lower massive part of solid lava which cools slowly.

Pahoehoe flow is the least viscous of all lavas; rates of advance can be slow; cool surface, flow occurs underneath.

Nature of lava

Aa surfaces are a loose jumble of irregularly shaped cindery blocks with razory sides.

Pahoehoe surfaces can be smooth and glossy but may also have cavities; surface may also be crumpled with channels.

THE PACIFIC RING OF FIRE

Three-quarters of the earth's 550 historically active volcanoes lie along the Pacific Ring of Fire. This includes most of the world's recent eruptions, including Mount Pinatubo in the Philippines, which erupted in 1991. Without volcanic activity the Philippines would not exist: they comprise the remains of previous eruptions.

CASE STUDY: MOUNT PINATUBO

Details: 9 June 1991; eruption after 600 years; between 12 and 15 June ash and rock was scattered over a radius of 100 km; killed 350 people and made 200 000 people homeless, largely due to mudslides.

Effects: Mudslides covered 50 000 ha of cropland and destroyed 200 000 homes; 600 000 people lost their jobs.

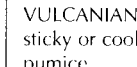
Causes:

- Earthquake 16 July 1990 (7.7 on the Richter Scale; 1 600 dead)
- Basalt from the upper mantle squeezed into the magma chamber of the dormant volcano
- Basalt reactivated viscous lava and created gas-charged magma (andesite)
- This rose towards the surface causing volcano to bulge
- Pressure blasted away the dome spewing 20 million tonnes of material into the atmosphere

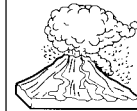
TYPES OF VOLCANIC ERUPTIONS



HAWAIIAN TYPE Runny basaltic lava which travels down sides in lava flows. Gases escape easily.



VULCANIAN TYPE Violent gas explosions blast out plugs of sticky or cooled lava. Fragments build up cone of ash and pumice.



PLINIAN TYPE Gas rushes up through sticky lava and blasts ash and fragments into sky in huge explosion. Gas clouds and lava can also rush down slopes. Part of volcano may be blasted away during eruption.

WORLD'S EXPLOSIVE VOLCANOES

Place	Date
Tambora, Indonesia	1815
Krakatoa, Indonesia	1883
Katmai, US	1912
Mt St Helens, US	1980
Mt Pinatubo, Philippines	1991

