

VOLCANOES

A volcano is a rupture in the earth's crust that allows hot lava, gases and volcanic ash to escape from a magma chamber below the surface. Volcanoes are often found where tectonic plates are diverging or converging and most are found underwater. The word *volcano* is long derived from the name 'Vulcan', the god of fire in Roman mythology. The study of volcanoes is called *volcanology/ volcanology*.

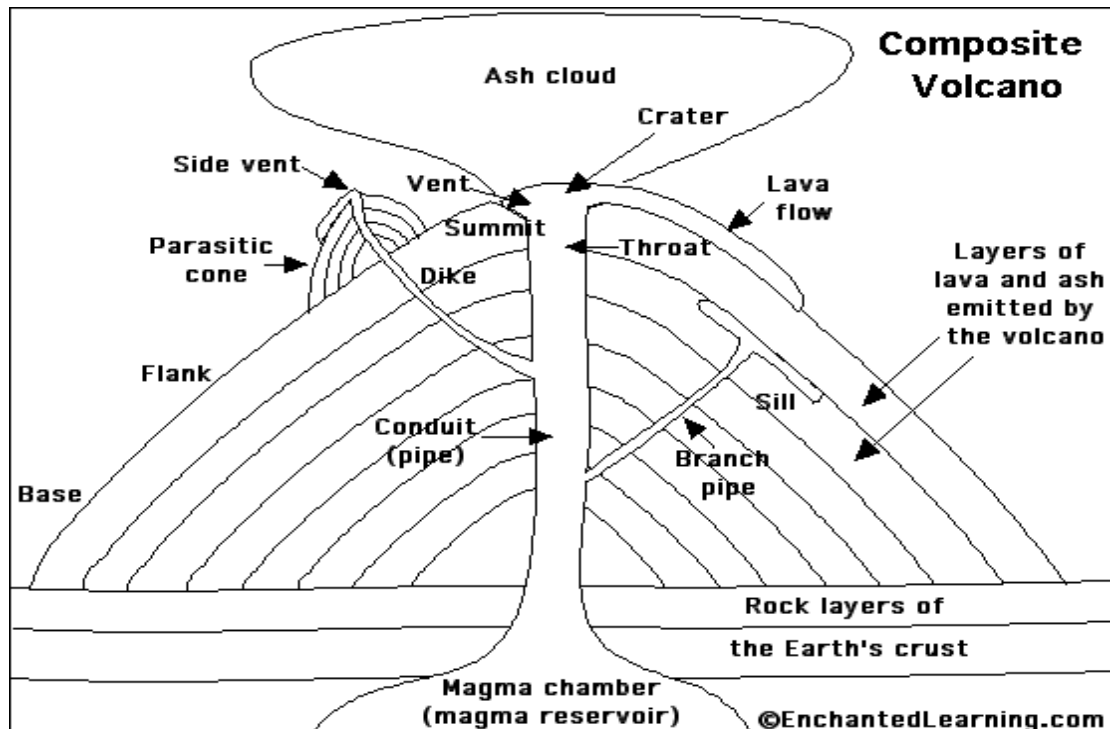
There are three theories that suggests how volcanoes are formed;

HOTSPOT THEORY: hotspots are stationary points in the earth's mantle beneath the lithospheric plate where magma upwells by rising from the earth's crust. Overtime, as the plate moves over the stationary hotspot, volcanic islands or features are formed.

SUBDUCTION ZONE THEORY: in subduction zones, tectonic plates converge and one plate sinks beneath the other into the Earth's mantle. When the descending plate descends, it melts overtime to generate magma. The magma rises through the overriding plate culminating to volcanic eruptions.

RIFT ZONE THEORY: boundaries are divergent causing the tectonic plates to move away from each other. During this separation, magma from the mantle rises to fill the gap hence creating a new crust. The constantly rising magma reaches the surface, leading to volcanic activities.

PARTS OF A VOLCANO



MAGMA CHAMBER: the subterranean reservoir containing molten silicate fluid. The magma and gases build up here with the resulting pressure leading to an eruption.

CONDUIT/PIPE: the channel that carries magma from the reservoir to the vent where it is erupted.

VENT: the main channel through which lava flows and fragmented rocks erupted and volcanic gases.

BRANCH PIPE: the vertical conduit below a volcano through which magma has passed and that has become filled with solidified magma, volcanic breccia and fragments of older rock.

DIKE: tabular bodies of magma that cut through and across the layering of adjacent rocks. Forms when magma rises into an existing fracture, or creates a new crack by forcing its way through existing rocks before solidifying.

SILL: tabular sheet intrusion that has intruded between older layers of sedimentary rocks, beds of volcanic lava or tuff or along the direction of foliation in metamorphic rock. It does not cut across preexisting rock beds as it is a concordant intrusive sheet.

PARASITIC CONE: the cone-shaped accumulation of volcanic material not part of the central vent of a volcano. Forms from eruptions from fractures on the flank of the volcano since it is unstable.

FLANK: occurs where the lava-filled fractures intersect the slope of the volcano.

TYPES OF VOLCANOES

There are several types of volcanoes, each with their unique characteristics, mode of formation and distribution;

CINDER CONES: these are simple volcanoes with a bowl-shaped crater at the summit and with steep sides. They only grow to the mere size of a hill. They are often created of eruption from a single opening. They are typically made of piles of lava rather than ash. During the eruption, blobs of lava are blown into the air and break into small fragments that fall around the opening of the volcano. The pile forms an oval-shaped small volcano.

Cinder cones include Paricutin in Mexico, Mt. Rukinear in Congo and Puy de Pariou in France.

COMPOSITE VOLCANOES: also known as strato-volcanoes. Composite volcanoes are tall, symmetrically shaped with steep sides, sometimes rising 10,000 feet high. They are built of alternating layers of lava flows, volcanic ash and cinders.

Some composite volcanoes include Mt. Fuji in Japan, Mt. St. Helens in Washington State and Mt. Kilimanjaro in Kenya.

SHIELD VOLCANOES: they are tall and broad with flat round shapes. They have low slopes and almost always have large craters at their summits. They are built by countless outpourings of lava that advance

great distances from a central summit vent or group of vents. The outpourings of lava are typically not accompanied by pyroclastic material, an aspect that makes the shield volcanoes relatively safe during eruptions.

Some examples of shield volcanoes include Mauna Loa in Hawaii and Erta Ale in Ethiopia.

FISSURE VOLCANOES: they lack a central crater. Giant cracks open in the ground expelling vast quantities of lava. The lava spreads far and wide to form huge pools that can cover almost everything around. When the pools of lava cool and solidify, the surface remains mostly flat, depriving it of the physical protruding aspect found in other volcanoes.

Los Pilas volcano in Nicaragua (1952) is a sheer example of a fissure volcano.

Volcanic eruptions vary in intensity, with effusive and explosive eruptions being the main ones.

Effusive eruptions are gentle as lava flows steadily from the volcano. It is often associated with low-viscosity ballistic magma. Hawaiian volcanoes frequently exhibit such eruptions.

Explosive eruptions are violent eruptions where gas, ash and volcanic rocks are rapidly released out of a volcano. It is typically linked to more viscous magma such as *andesite* and *rhyolitic*. Mt. St. Helens had such an eruption in 1980.

Phreatomagmatic Eruptions that involves magma interacting with water and **Strombolian Eruptions** which involve periodic, relatively mild explosions ejecting incandescent lava fragments are other types of eruptions.

Sixty percent of all active volcanoes occur at the boundaries between tectonic plates. Most volcanoes are found along a belt called the '**ring of fire**' that encircles the Pacific Ocean. This is because the tectonic plates around this area are in constant movement.

Volcanic eruptions causes destruction when lava flows downhill, the ash and debris burying things and falling rocks hitting people or animals. Underwater volcanoes can trigger tsunamis which are often catastrophic. Large eruptions can inject ash and gases into the stratosphere, affecting global climate through temporary cooling, sunlight blockage hence a *volcanic winter*.

Volcanoes can also alter the landscapes, creating new landforms like calderas or lava plateaus.

Volcanoes are inexorable phenomenal forces that can only be accepted and appreciated as part of the general geographical aspect of Earth. From their attractive creations to irreversible destructions, volcanoes forever remain a wonder to be marveled at and be explored further by geographers.