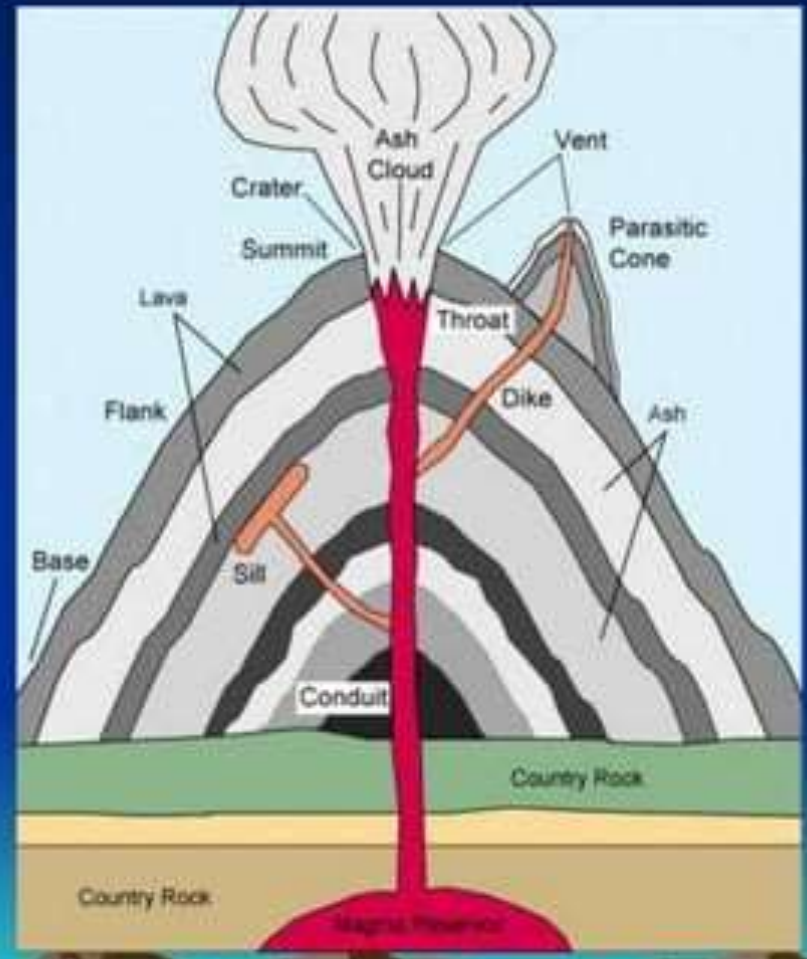
Formation of a Volcano



Magma

Deep within the Earth, under tremendous pressure and at great temperatures, rock exists as a hot liquid called magma. This molten rock is found in pockets called magma chambers.

Lava

- When the magma reaches the surface, it is called lava. The place in the Earth's surface through which magma and other materials reach the surface is called a volcano. In some places, lava can build up to forma cone-shaped mountain.
- The opening from which lava erupts is the vent. Volcanoes often have more than one vent.

Dark-Colored Lava

- There are four types of lava.
- One is dark-colored and contains a lot of water. This is rich in iron and magnesium and cools to form igneous rocks such as basalt. This lava is thin and runny and most tends to flow. The islands of Hawaii and Iceland were formed by many lava flows.

Light-Colored Lava

- The second type of lava is light in color. This lava, contains little water and is rich in silicon and aluminum. Light-colored lava causes explosive eruptions. Silicon tends to harden in the vents and form rocks. Steam and new lava build up under the rocks. When the pressure becomes great, a violent explosion occurs. When this type of lava cools it form the igneous rock, rhyolite, which resembles granite.

Combination Lava

- The third type of lava has a chemical composition similar to that of both the dark-colored type and the light-colored type. Different varieties of igneous rocks in the Earth's crust, such as andesite, are form from this type of lava.

Gaseous Lava

- The fourth type of lava contains large amounts of gases such as steam and carbon dioxide. When this lava hardens, it forms rocks with many holes in them, due to gas bubbles. Pumice and scoria are igneous rocks formed from this type of lava.

Volcanic Eruptions

- During volcanic eruptions, many rock fragments are blown into the air. The smallest particles are called volcanic dust. (less than 0.25 mm)
- Volcanic Ash (0.25 -5mm) falls to the Earth and forms small rocks.
- Volcanic bombs (a few cm to several meters) are molten and harden as they travel through the air.

Types of Volcanoes

- Different types of volcanic eruptions form different types of volcanoes.
- Cinder cones
- Shield volcanoes
- Composite volcanoes

Three Types

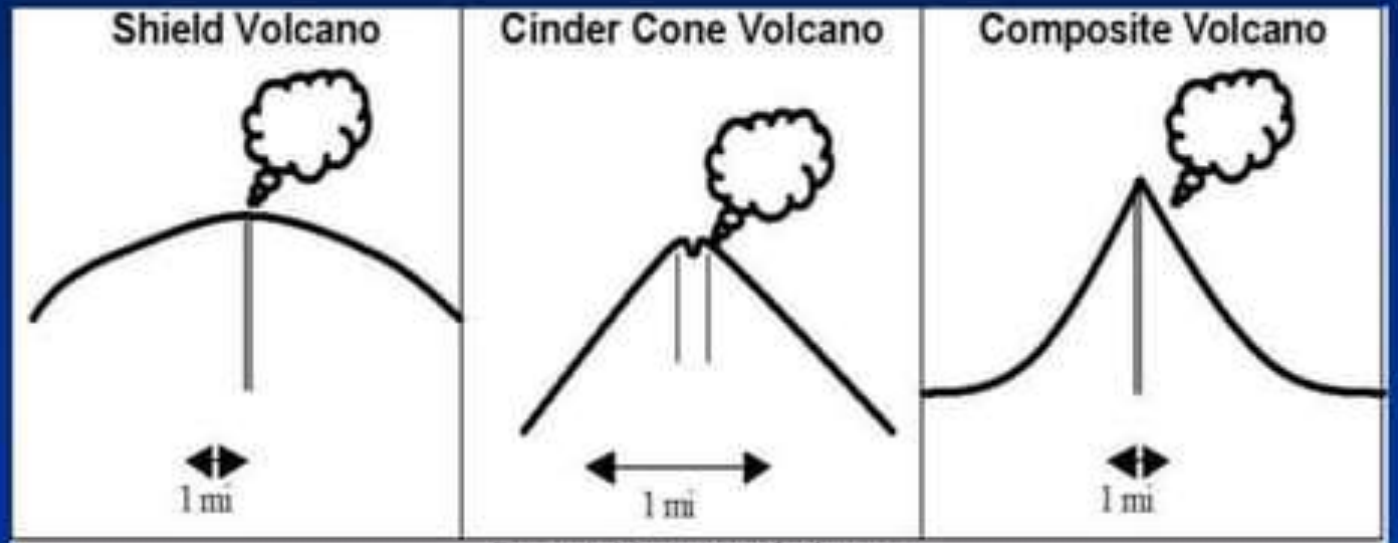


Figure 1: Main types of volcanoes

Cinder Cones

- Volcanoes made mostly of cinders and other rock particles that have been blown into the air are called cinder cones. Cinder cones form from explosive eruptions. Because the material is loosely arranged, the cones are not high. The have a narrow base and steep sides such as Paricutin in Mexico.

Cinder Cone Volcano

Shield Volcanoes

- Volcanoes composed of quiet flows are called shield volcanoes. Because it is rummy, the lava flows over a large area. After several eruptions, a dome-shaped mountain is formed such as Mauna Loa (4km over sea level) in the Hawaiian Islands.

Shield Volcanoes

Composite Volcanoes

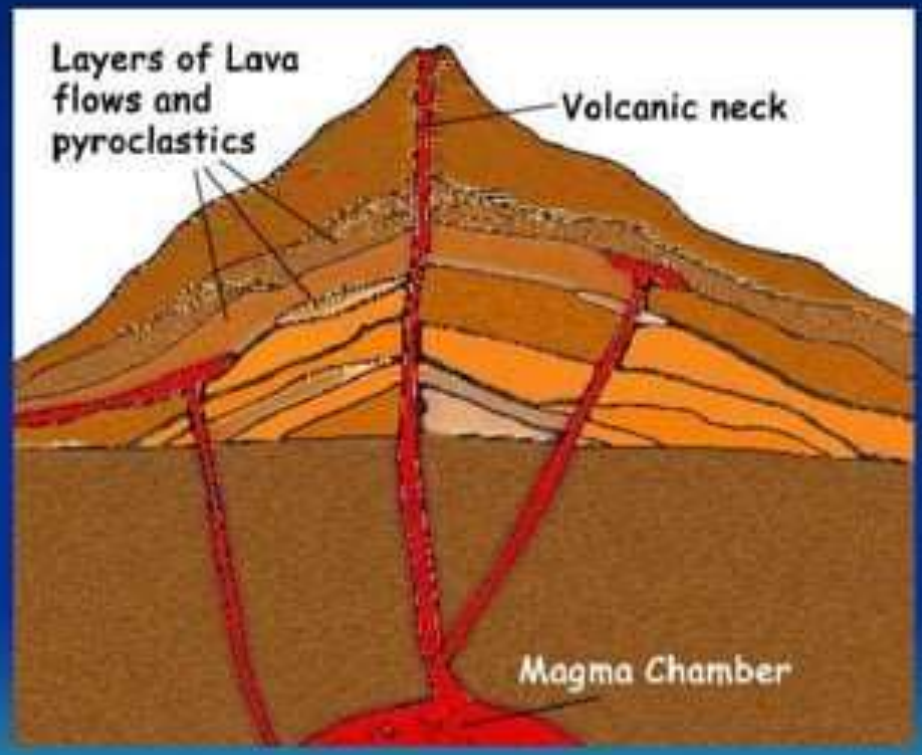
- Volcanoes built up of alternating layers of rock particles and lava are called composite volcanoes. During the formation of a composite volcano, a violent eruption first occurs, hurling volcanic bombs, cinder and ash out of the vent. Then a quiet eruption, produces lava flow that covers the rock particles. After alternating eruptions, a cone-shaped mountain forms such as Mount Vesuvius.

Mount Vesuvius

Mount Vesuvius

- Images of victims in eruption of Vesuvius in 79 AD. Most died as a result of suffocation.

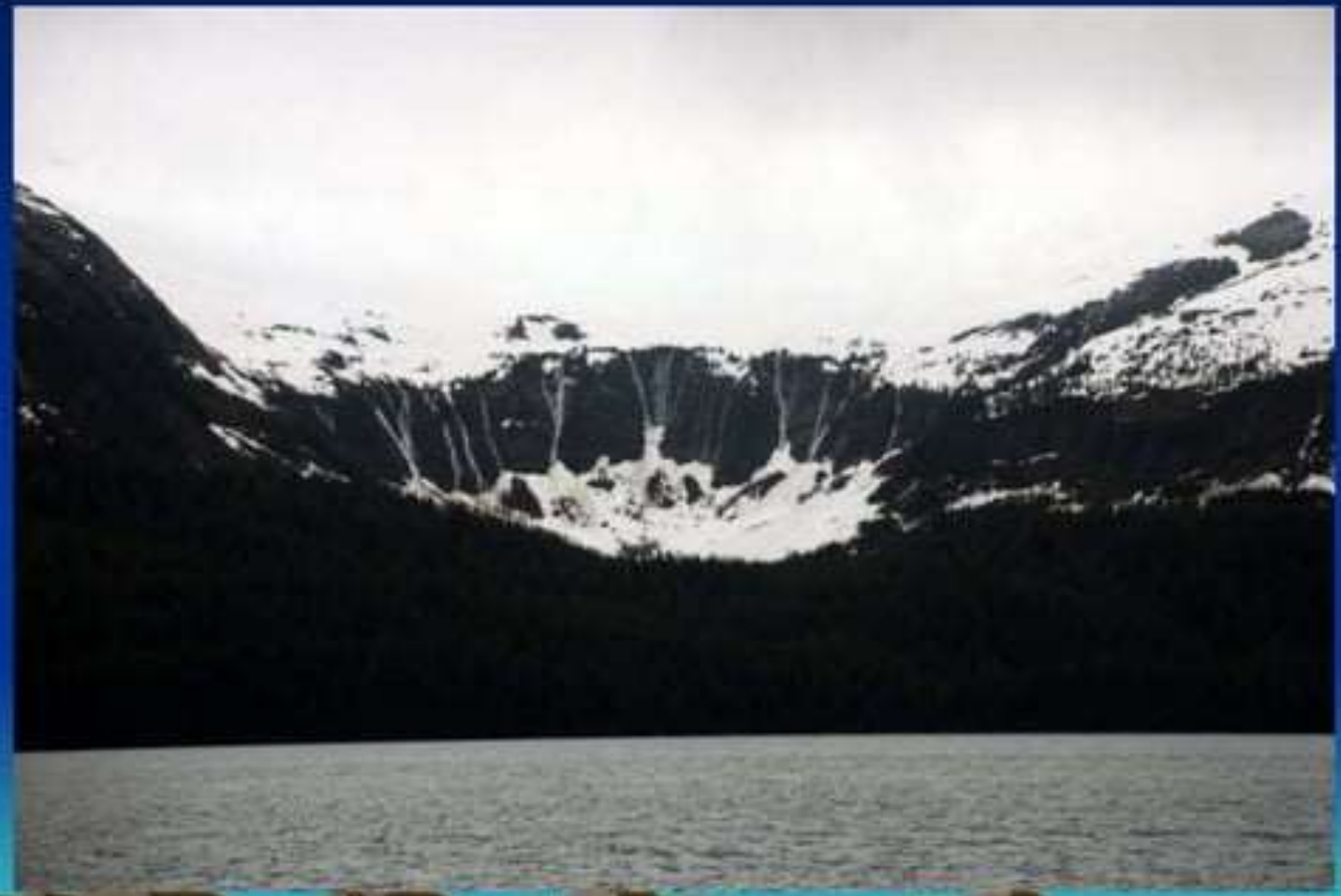
Composite Volcano



Crater

- There is often a funnel-shaped pit or depression at the top of a volcanic cone. This pit is called a crater. If the crater becomes very large as a result of the collapse of its walls, it is called a caldera. A caldera may also form when the top of a volcano explodes or collapses.

Volcanic Crater



Volcanic Activity

- Volcanoes are rather unpredictable . Some erupt regularly, others have not erupted in modern history. Scientists classify them as active, dormant or extinct.

Active Volcanoes

- An active volcano is one that erupts wither continually or periodically such as Mount Katmai in Alaska and Mount St. Helens in the Cascade Range.

Dormant Volcano

- A volcano that has been known to erupt within modern times but is now inactive is classified as a dormant volcano. Mount Rainier in Washington state are example of dormant volcanoes in the United States.

Extinct Volcano

- A volcano not known to have erupted within modern history is classified as an extinct volcano. They have been worn away almost to the level of their magma chamber. Scientists can be wrong. Mount St. Helens was considered to be dormant but erupted after long periods of inactivity.

Volcano and Earthquake Zones

- Most major earthquakes and volcanic eruptions occur in three zones of the world. Scientists believe that there is a great deal of movement and activity in the Earth's crust in these three zones.

Ring of Fire

- One major earthquake and volcano zone extends nearly all the way around the edge of the Pacific Ocean. This zone goes through New Zealand, the Philippines, Japan, Alaska and along the western coasts of North and South America. The San Andreas fault is part of this zone.

Mediterranean Zone

- A second Major earthquake and volcano zone is located near the Mediterranean Zone and extends across Asia into India. Many countries in the zone, including Italy, Greece and Turkey, have violent earthquakes. Many volcanic eruptions also occur in this zone.

Mid-Atlantic Ridge Zone

- The third major earthquake and volcano zone extends through Iceland and to the middle of the Atlantic Ocean. There is under the ocean a long range of volcanic mountains called the Mid-Atlantic Ocean Range. Scientists believe that the volcano and earthquake activity are due to the formation of new parts of the Earth's crust along the ridge. The volcanic island of Iceland is part of this zone.