

VOLCANOES

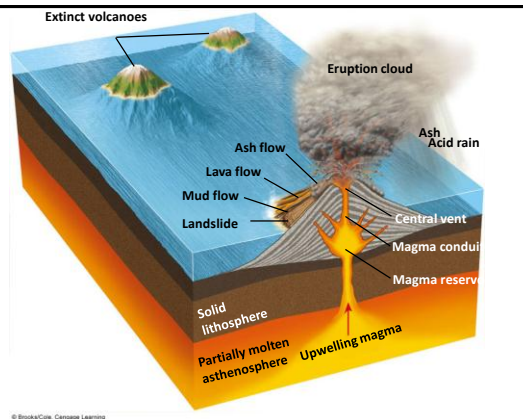
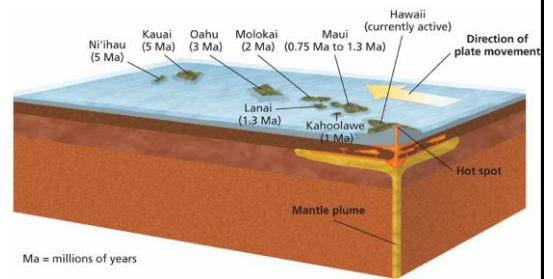
Causes

- Divergent boundaries (some):
 - Mid-Atlantic ridge in the ocean
 - Also on continental-continental boundaries as in the East African Ridge
- Convergent boundaries (tend to be most intense):
 - Plates crushing together and subducting
- NOT generally found at transform boundaries

“Hot Spots”

- Hypothesis is that some parts of the mantle are natural upwellings of very hot, molten rock
- Hot spots are fixed, so as plates move the formed volcanoes become dormant
- New volcanoes formed
- Hawaiian islands may have been caused by this type of activity

Volcanoes



VOLCANIC ERUPTIONS

- Difference between magma & lava: magma is below surface and lava is above it.
- Classify lava based on mineral composition. This composition also gives it many characteristics

Felsic Lava

- High in silicates
- Very high viscosity (flow very slowly)
- Typically on continental plates as this is where most silica content is located

Mafic Lava

- Between 45 and 52% silicates, with much higher Magnesium and Iron levels
- Much less viscous, so they flow more quickly
- Also called Basaltic: type of igneous rock with Mafic characteristics

VOLCANIC ERUPTIONS

- Explosive eruptions:
 - Trapped dissolved gasses
 - Leads to **acidic** atmospheric pollution (SO₂, H₂S, CO₂)
 - Pyroclastic material
 - Volcanic ash, dust, stones, bombs, blocks
- <http://www.youtube.com/watch?v=MLohYFSSOPi>

Types of Volcanoes: Cones

- Typical shape that is imagined
- Often erupt only once and are off-shoots of larger volcanoes
- Felsic, high silicate eruptions, subduction zones and hot spots



Types of Volcanoes: Shields

- Broad, shield-shaped volcanoes
- Basaltic (low silicate) lava flows, at hot spots
- Gentle slope, so typically not catastrophic eruptions

Belknap Shield Volcano,
Oregon

<https://www.youtube.com/watch?v=bWswq8PmRII>



Types of Volcanoes: Fissure Vents

- Large cracks through which lava bubbles up—divergent boundaries
- <http://www.youtube.com/watch?v=7lgfaWKgJt8>



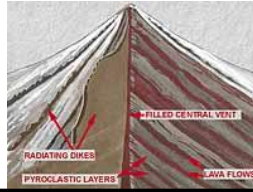
Eyjafjallajökull in Iceland



Galapagos Islands

Types of Volcanoes: Stratovolcanoes

- AKA composite volcanoes
- Large, stratified cones with multiple layers of ash and rock from previous eruptions
- Felsic, high gas content
- Subduction zones
- Ash from these volcanoes can be incredibly dangerous



<https://www.youtube.com/watch?v=1u1Ys4m5zY4>

Mount Rainier, Near Seattle, Washington



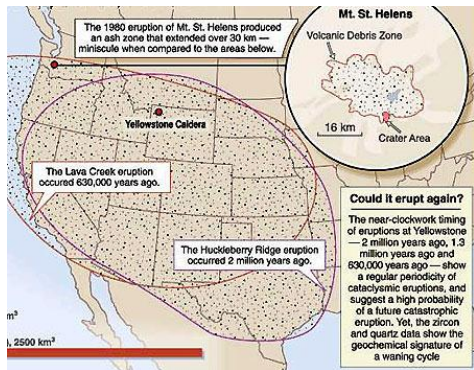
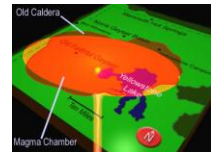
Mount St. Helens



<https://www.youtube.com/watch?v=lhU6jml6NY4>

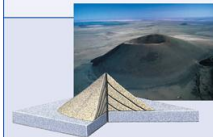
Types of Volcanoes: Super Volcanoes

- Super-sized volcanoes with the potential to cause massive, wide scale damage
- Could wipe out entire continents
- Could cause massive, global cooling
- <http://www.youtube.com/watch?v=SulM31nqaKw>



Types of Volcanoes

Shield Volcanoes Volcanic cones that are broad at the base and have gently sloping sides are called shield volcanoes. A shield volcano covers a wide area and generally forms from quiet eruptions. Layers of hot, mafic lava flow out around the vent, harden, and slowly build up to form the cone. The Hawaiian Islands form a chain of shield volcanoes that built up from the ocean floor at a hot spot.



Cinder Cones A type of volcano that has very steep slopes is a cinder cone. The slope angles of the cinder cones can be close to 40°, and the slopes are rarely more than a few hundred meters high. Cinder cones form from explosive eruptions and are made of pyroclastic material.

Composite Volcanoes Composite volcanoes are made of alternating layers of hardened lava flows and pyroclastic material. During a quiet eruption, lava flows cover the sides of the cone. Then, when an explosive eruption occurs, large amounts of pyroclastic material are deposited around the vent. The explosive eruption is followed again by quiet lava flows. Composite volcanoes, also known as stratovolcanoes, commonly develop to form large volcanic mountains.

Volcanic eruption sequence

- Steam explosions (phreatic explosions)
- Explosive eruption of magma
- Eruption cloud
- Pyroclastic flows
- Lava flows
- Lava fountains
- Volcanic debris & mudflow (lahars)



Predicting Eruptions & Reducing Loss

- Earthquake activity
 - Magma pressure
 - Temperature changes
- Activity patterns
 - Geologic measurements
 - Measuring Devices
- Historical records
- Don't live there at all (helpful)
- Evacuate

Active Volcanoes

- USGS website: <http://volcanoes.usgs.gov/>