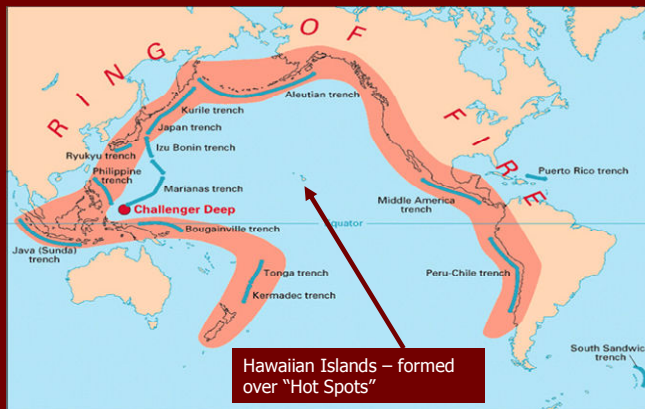


Earth Science

Chapter 6 Volcanoes

Volcanoes and Plate Tectonics

- **Volcano** - a weak spot in the crust where molten material, or magma, comes to the surface.
- **Ring of Fire** - Major Volcanic Belt surrounding the Pacific Ocean Tectonic Plate Boundaries



Volcano Formation

1. Along Tectonic Plate Boundaries
2. Above a hot spot when magma erupts through the crust and reaches the surface.

Volcanic Eruptions

Effervescent Eruptions

Like fizz in soda bottles, bubbles of gas shoot upward from deep down in some volcanoes, such as Italy's Stromboli, a new study says. The discovery helps explain why those volcanoes are so unpredictable and explosive.

East View of Stromboli Island

SUMMIT ELEVATION
3,032 ft/924 m

Stromboli
village

ACTIVE CRATERS
Located in a depression, which protects much of the island from lava flow

LARGE GAS BUBBLES
Rise faster than magma, boosting explosive force at the surface

Magma

SOURCES: "Magmatic Gas Composition Reveals the Source Depth of Slug-Driven Strombolian Explosive Activity," *Science*; Global Volcanism Program, Smithsonian; USGS; ESRI; TeleAtlas

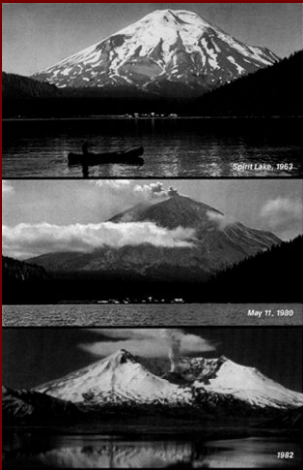
Miranda Mulligan for NATIONAL GEOGRAPHIC NEWS

As magma rises toward the surface, the dissolved gas begins to expand as pressure decreases and this exerts an enormous upward force on the magma.

When a volcano erupts, the force of the expanding gases pushes magma from the magma chamber through the pipe until it flows or explodes out of the vent.

Mt. St. Helen's Eruption

- May 18, 1980 eruption triggered 5.1 earthquake
- 57 People killed
- 7,000 big game animals, 12 million Chinook and Coho salmon, and millions of birds and small mammals are believed to have died
- \$1.1 billion in property damages for timber loss, etc.



You Tube
Broadcast Yourself™

You Tube
Broadcast Yourself™

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

- **active** volcano - is one that is erupting or has shown signs that it may erupt in the near future.
- **dormant** volcano is not active now but may become active in the future.
- **extinct** volcano is unlikely to erupt again



Four Main Types of Lava

- **Dark Colored - Pahoehoe Lava & Aa Lava**

- a. Contains a lot of water
- b. Rich in iron and magnesium
- c. Cools and forms rocks like basalt
- d. Usually thin and runny: Hawaiian



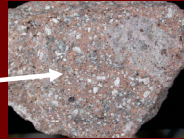
Pahoehoe Lava



Aa Lava

- Light-color

- a. Contains only a little water
- b. Rich in silicon and aluminum
- c. Cools and forms rhyolite
- d. Thick and explosive: Mt. St. Helens



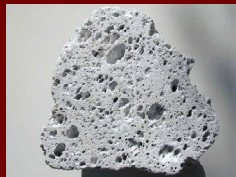
■ Combination

- a. Chemical composition similar to both light and dark
- b. Cools to form andesite _____



- Contains > Gases

- a. Steam and CO₂
- b. Forms rocks w/ many holes when cooled
- c. Pumice and scoria



- 1. **Volcanic Dust**
 - a. < .25 mm
 - b. Consistency of flour grains
- 2. **Volcanic Ash**
 - a. .25mm – 5mm in size
 - b. Rice grain in size
- 3. **Cinders**
 - a. small volcanic bombs about golf ball size
- 4. **Volcanic bombs**
 - a. A few centimeters to
 - several meters in diameter



Pyroclastic Flow

- **Pyroclastic Flow** -an explosive fast-moving current of hot gas and rock (1800 °F) hurls out ash, cinders, and bombs.

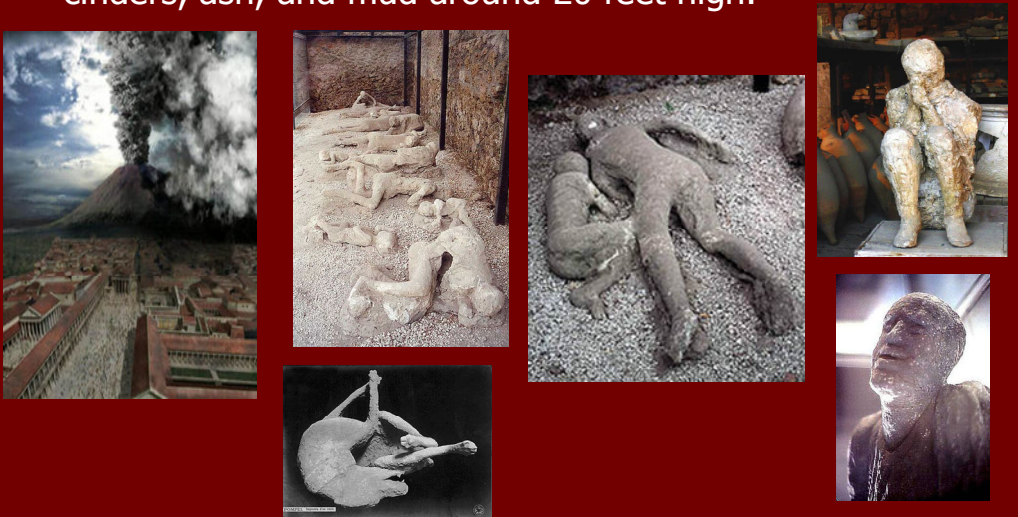


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Mt Vesuvius & Pompeii, Italy

- Erupted in 79 AD, approximately 20,000 people were killed in this eruption
- Pompeii is buried & is covered in a pyroclastic flow of cinders, ash, and mud around 20 feet high.



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Composite Volcanoes

- Built up of alternating layers of cinders and lava
- Examples: Mt. Vesuvius in Italy, Mt St. Helens, Mt Shasta

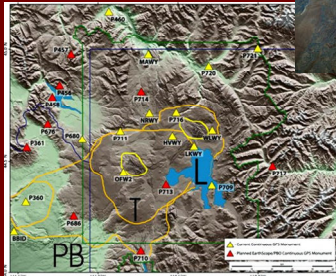


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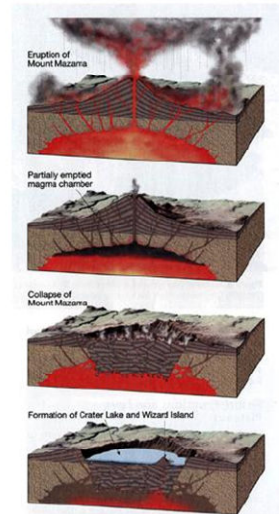


Volcanic Landforms: Calderas

- Huge hole left by the collapse of a volcanic mountain
- An enormous eruption may empty a volcano's main vent and magma chamber. With nothing to support it, the top of the mountain collapses inward.
- Yellowstone in Wyoming, Crater Lake in Oregon



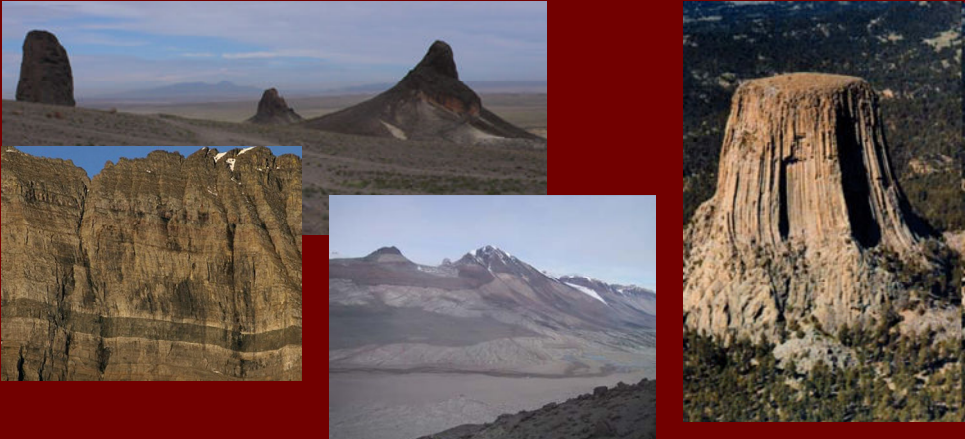
Caldera Formation



Volcanic Landforms:

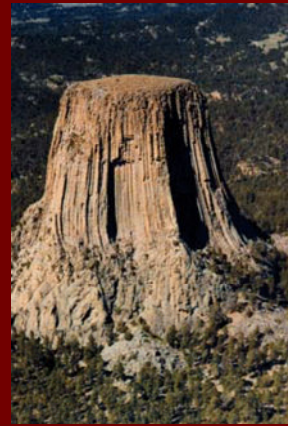
Necks & Dikes

- **Volcanic Neck** - magma hardens in a volcano's pipe. The softer rock around the pipe wears away, exposing the hard rock of the volcanic neck.
- A **sill** forms when magma squeezes between horizontal layers of rock and hardens.



The image contains four photographs illustrating volcanic landforms. The top-left photo shows a landscape with several volcanic necks, including a prominent one on the left and a larger, more complex one on the right. The bottom-left photo is a close-up of a volcanic neck, showing its layered structure and a small snow patch. The bottom-center photo shows a volcanic neck with a snow-capped peak in the background. The right photo is a close-up of a volcanic neck, showing its layered structure and a small snow patch.

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- A **sill** forms when magma squeezes between horizontal layers of rock and hardens.



Volcanic Landforms:

Sills and Batholiths

- **Dike** – a vertical column of cooled magma that forms when magma forces itself across rock layers and hardens.
- **Batholith** -a large body of magma cools inside the crust, a mass of rock

