Volcanoes

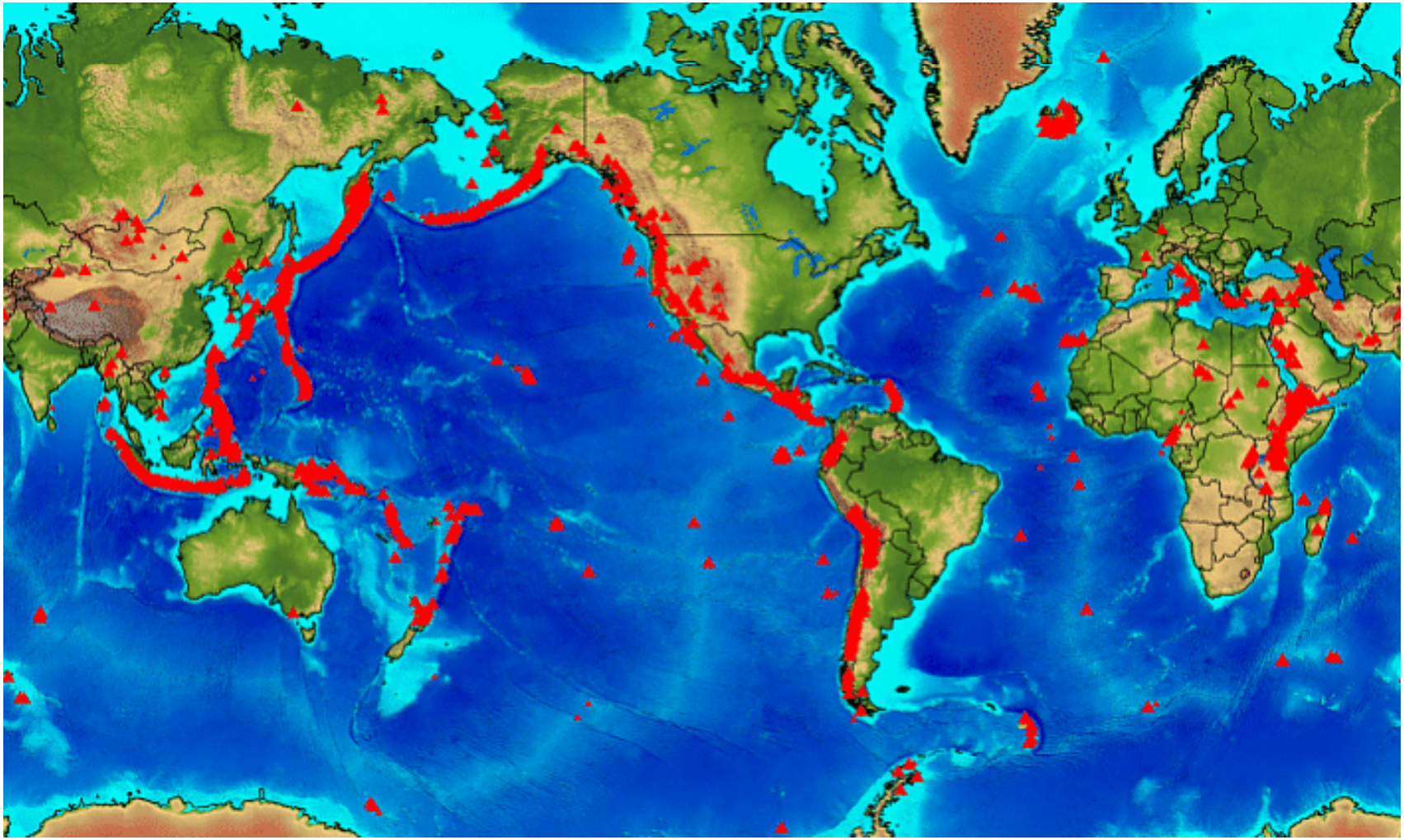
The cause of it all…

- What causes volcanoes to erupt???
- The shift in the Earth's plates are what causes volcanoes to form.
- As the plates join or separate some of the molten rock is exposed.
- ***viscosity,*** resistance of a fluid to flow.

Where do volcanoes erupt???

- **Convergent plate boundaries – where two of Earth's plates join together**
- **Divergent plate boundaries – where two of Earth's plates move apart RING OF FIRE!!**
- **Hot spots – active areas below the earths crust**

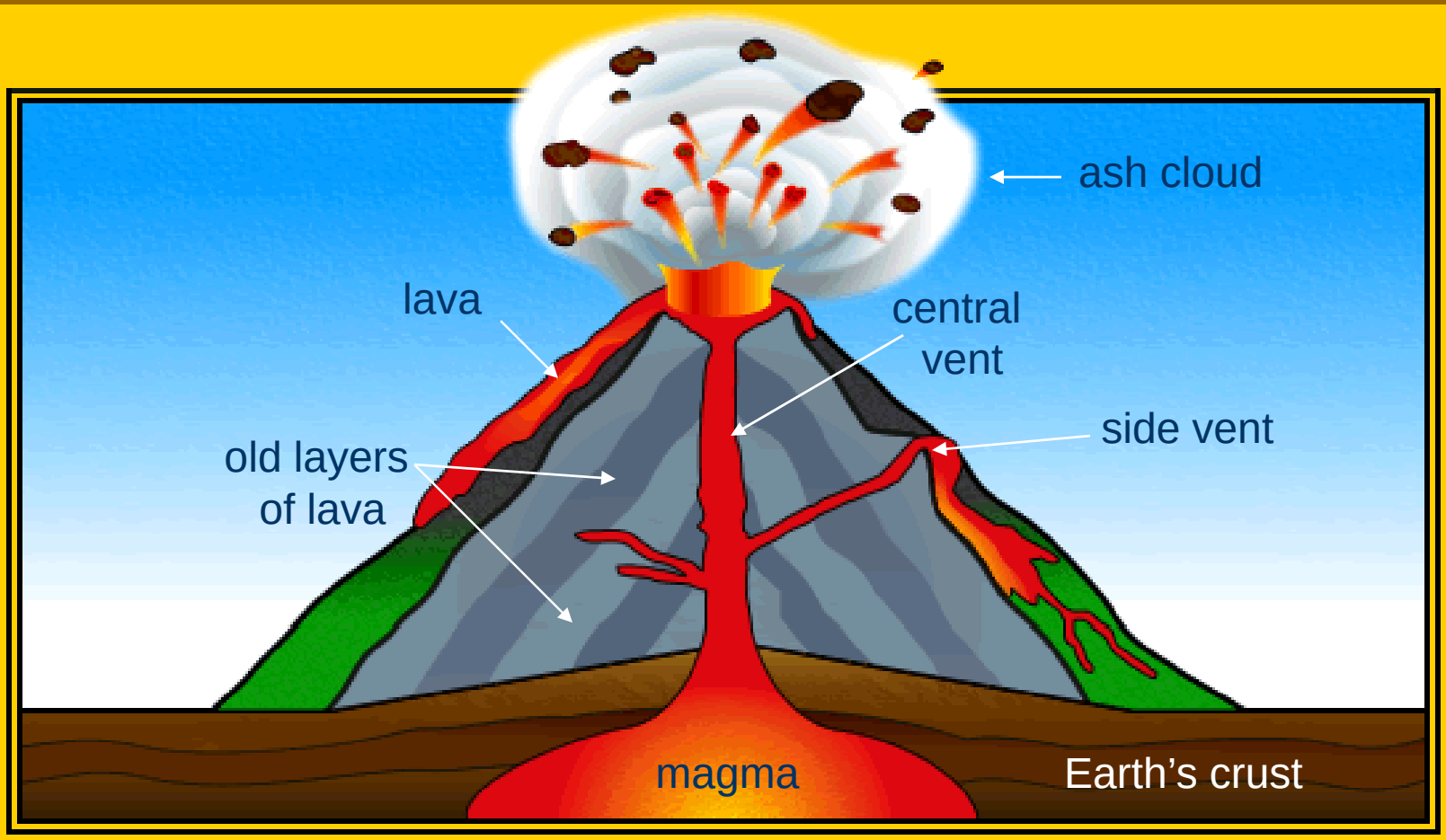
Where do volcanoes erupt???
(click on it)



Structure of a Volcano

- Magma – the molten, or liquid-like, rock within the Earth
- Lava – magma that reaches Earth's surface
- Vent – an opening through which molten (liquid-like) rock flows onto Earth's surface
- Volcanoes always have one central vent, but can also have several smaller side vents.

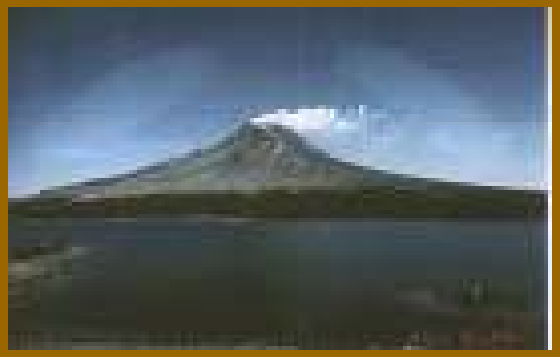
Structure of a Volcano



Types of Volcanoes

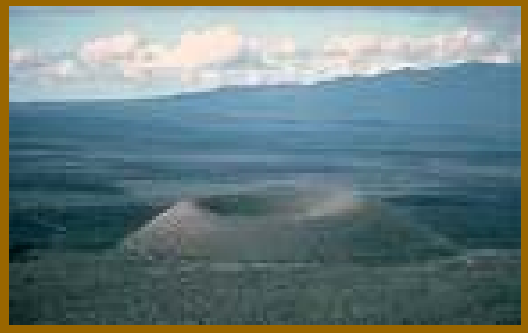
There are three major types of volcanoes:

- Shield volcanoes



- Composite volcanoes

- Cinder cone volcanoes

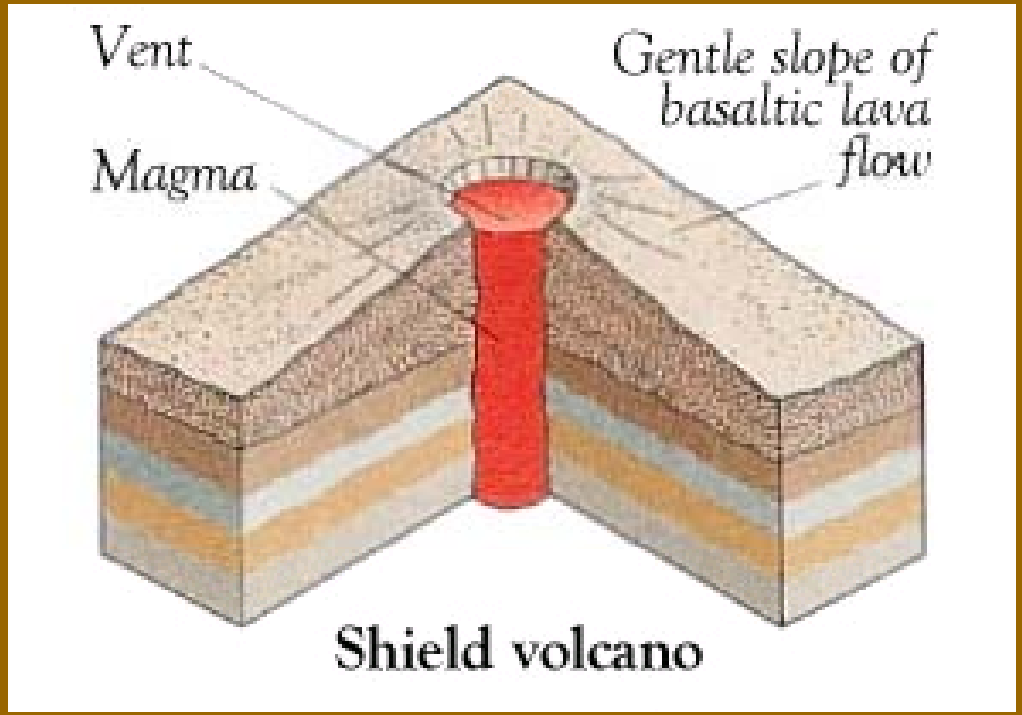


Shield Volcanoes

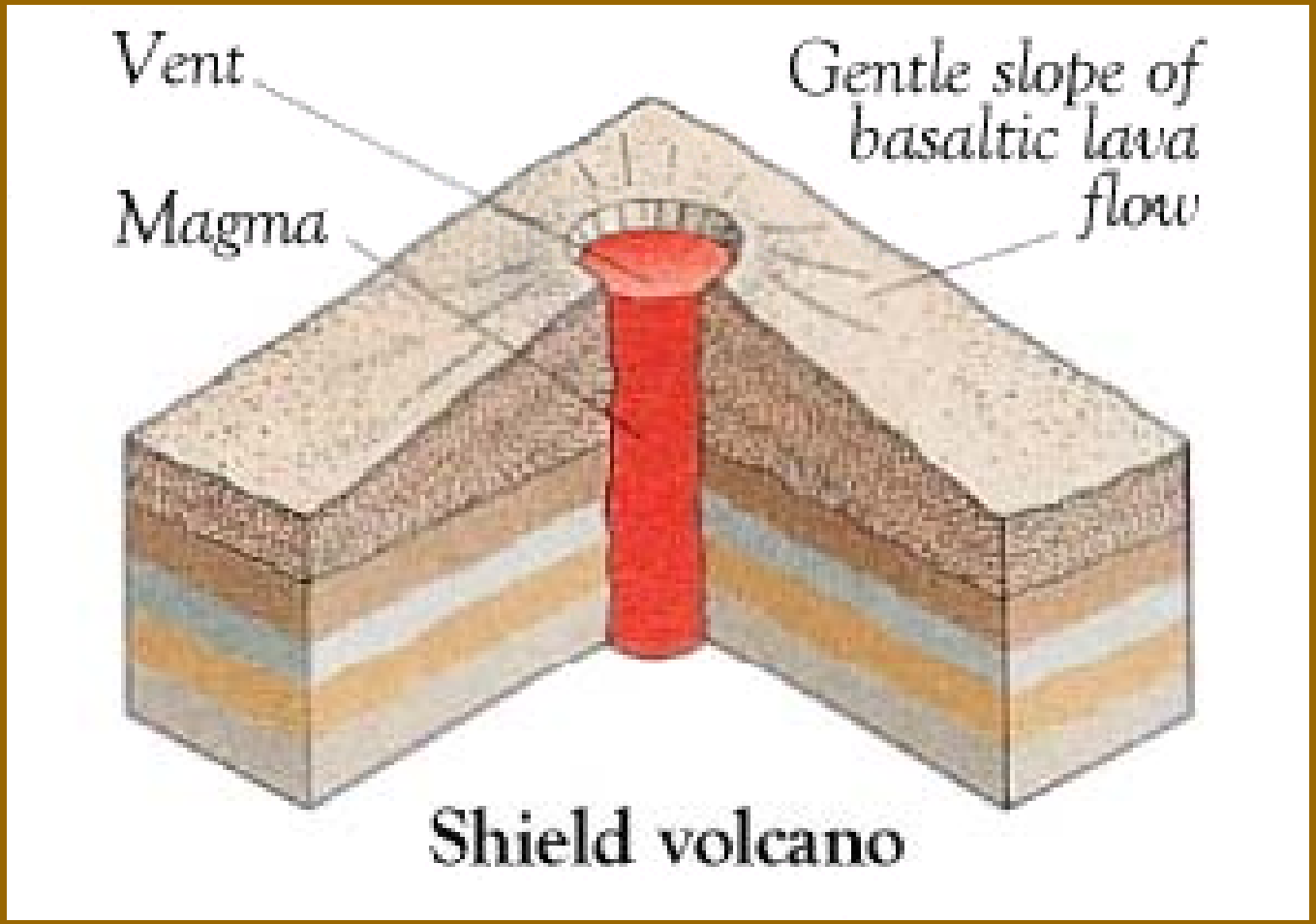
- The magma inside a shield volcano is rich in iron and magnesium and is very fluid.
- Since the magma is very fluid, the lava coming out of the volcano tends to flow great distances.
- When shield volcanoes erupt, the flowing lava gives the volcano the shape of a gently sloping mountain.

Shield Volcanoes

- Eruptions of shield volcanoes are mild and can occur several times.
- Mauna Loa in Hawaii is an example of a shield volcano.



Shield Volcanoes



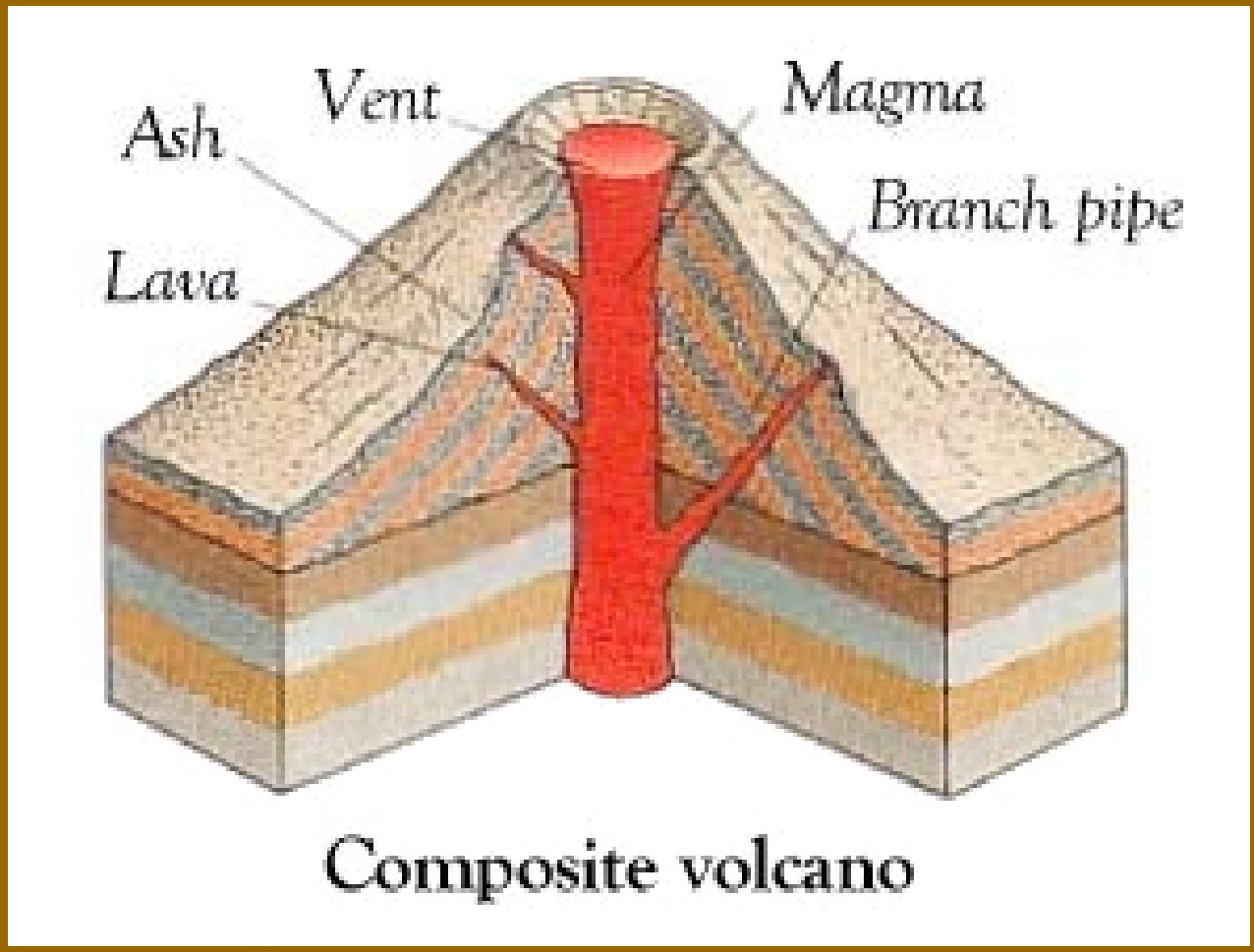
Composite Volcanoes

- The magma inside a composite volcano is rich in silica and much thicker than magma from a shield volcano.
- Gases get trapped inside this thicker magma.
- Eruptions from composite volcanoes can be flowing lava or explosions. The explosive eruptions come from the trapped gases and produce cinders and ash.

Composite Volcanoes

- These different types of eruptions are what give composite volcanoes their alternating layers of lava and cinders.
- Composite volcanoes have much steeper slopes than shield volcanoes.
- Mount Fuji in Japan and Mount St. Helens in the USA are examples of composite volcanoes.

Composite Volcanoes



Cinder Cone Volcanoes

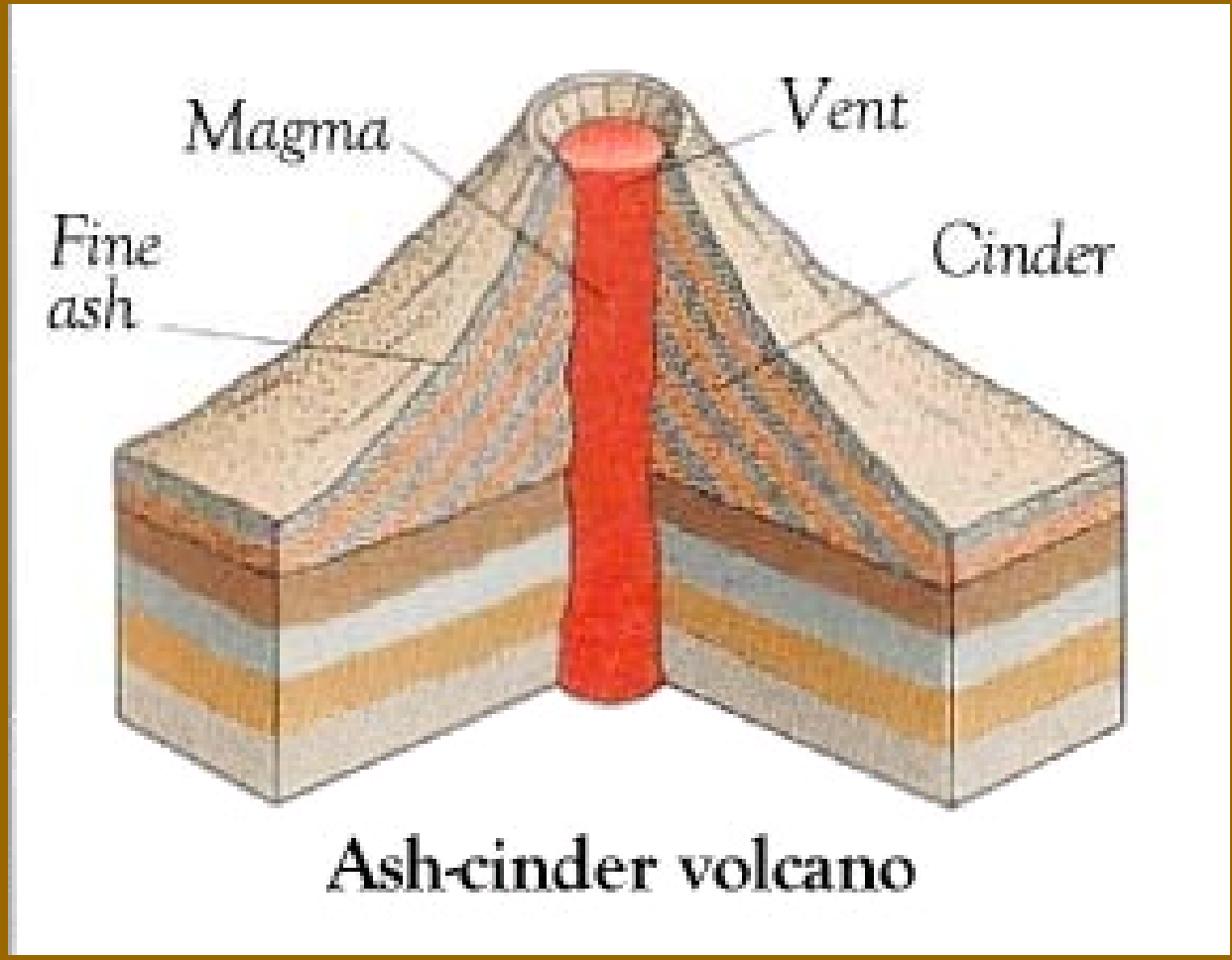
- The magma inside a cinder cone volcano has large amounts of gas trapped in it.
- Eruptions from cinder cone volcanoes are violent and explosive because of all the gas trapped in the magma.
- The large amounts of hot ash and lava thrown out of the vent fall to the ground forming the cone shape that these volcanoes have.

Cinder Cone Volcanoes

- Cinder cone volcanoes are usually only active for a short time and then become dormant (inactive).

- Paricutin in Mexico is an example of a cinder cone volcano.

Cinder Cone Volcanoes



Ash-cinder volcano

Volcanic Products

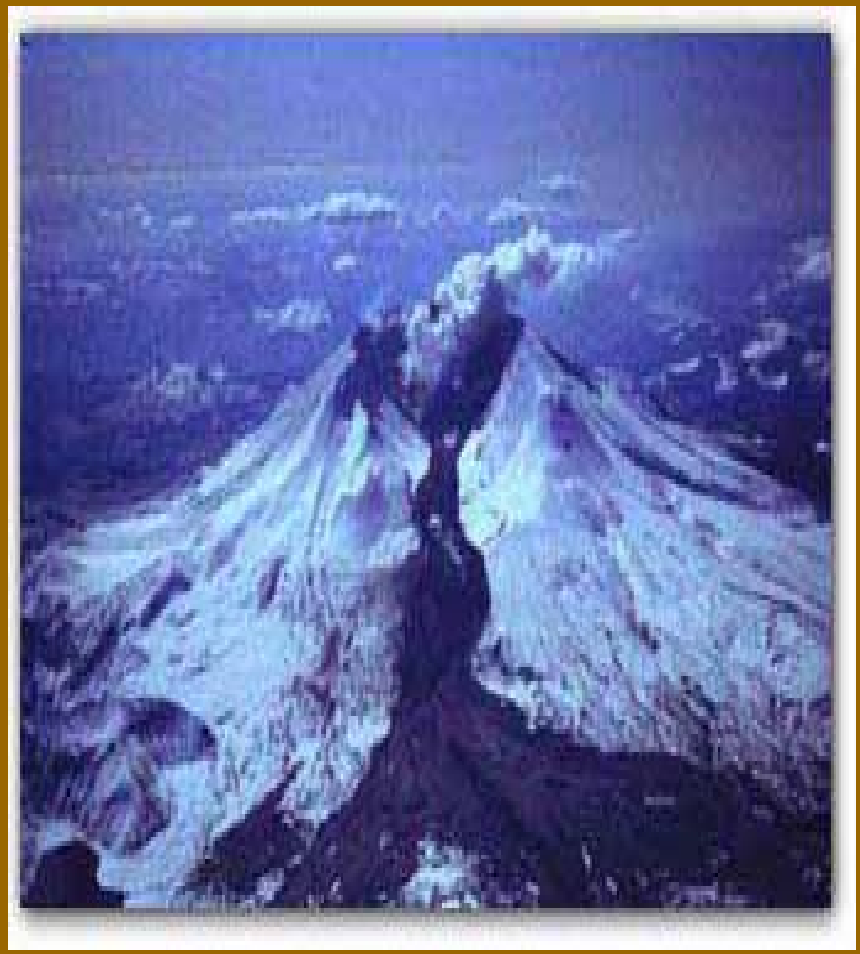
- Pyroclastic flows
- Lahars
- Lava
- Volcanic ash

Pyroclastic flows

- **Pyroclastic flows** are mixtures of hot gas, ash and other volcanic rocks travelling very quickly down the slopes of volcanoes. They are one of the most dangerous hazards posed by volcanoes.
- **Pyroclastic flows** are so hot and choking that if one is caught in one the person will certainly be killed. Because these flows are very fast they cannot be out-runned!

Lahars

- **Lahars are mudflows formed by the mixing of volcanic particles and water.**
- The direct impact of a **lahar**'s turbulent flow front or from the boulders and logs carried by the lahar can easily crush, abrade, or shear off just about **anything at ground level** in the path of a **lahar**.
- The force of a **lahar** is so big that buildings and valuable land may become partially or completely buried by one or more cement-like layers of rock debris (even if not crushed or carried away).



Volcanic ash

- **Volcanic ash** is a volcanic rock which is exploded from a vent in fragments less than 2mm in size.
- Volcanic **ash**-particles are like small **sharp glass-particles** that damage anything they come across.
- During heavy **ash-rains** houses and buildings may collapse, people and animals may die by lack of oxygen.

Pahoehoe Lava

- **Pahoehoe** lavas flow smoothly and are often formed by small volumes of hot, fluid basalt. The higher the volume of lava emitted the faster the current.
- . When the **pahoehoe lava flow** cools, it often solidifies to a smooth surface.

Aa Lava

- **Aa** flows are emitted from the vent at high rates ranging to 50km an hour, often with much lava fountaining.
- **Aa** flows are animated with sporadic bursts of energy. They may push down houses, walls and forests.
- However, the hallmark of **aa lava flows** is the **very rough surface** it produces when it cools and solidifies.

Volcanic Gas

- **Volcanic gas** is contained within magma. As the magma rises to the Earth's surface the **gases** are released. Because some gases are toxic they can suffocate people.

Global Impact

- When a volcano erupts it throws out a lot of ash. At short notice this ash can be very harmful to the environment, but on the long term the **ash layer**, which contains many **useful minerals**, will be converted to a very **fertile soil**.

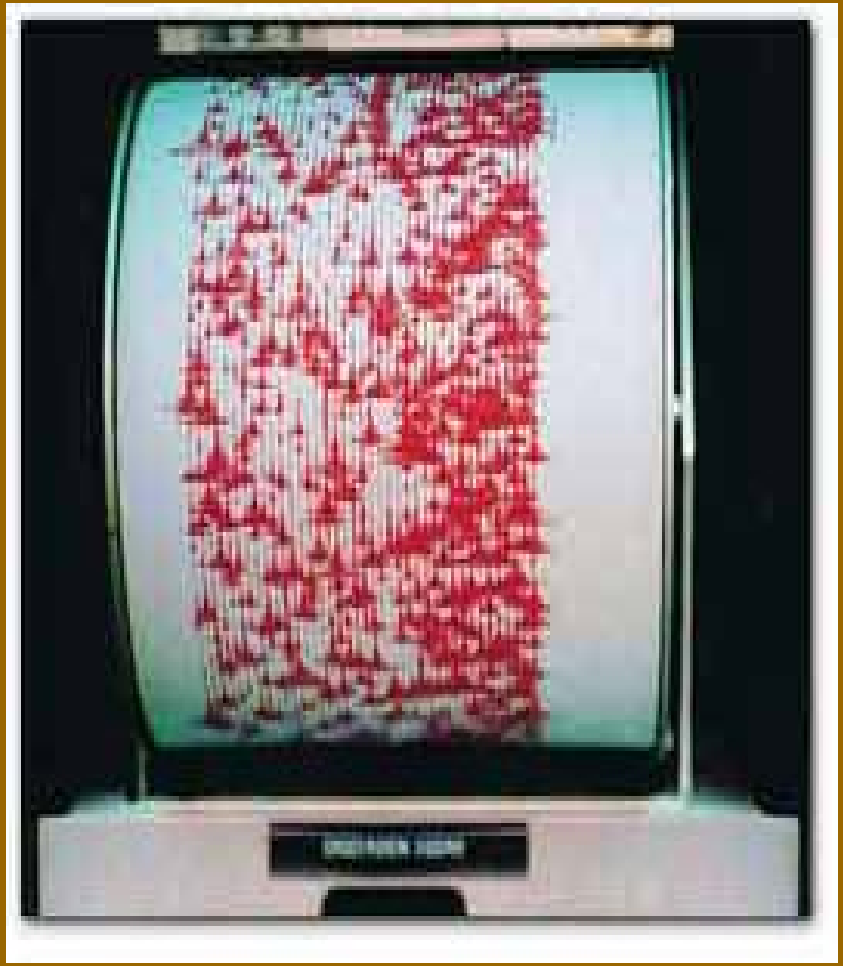
- Volcanoes provide **resources** for **energy extraction**, also called **geothermal resources**. Heat from the earth's crust is being converted to energy. The big advantages to this type of energy are that it is **very clean** and the **resources** are **nearly inexhaustible**.

Global Impact

- Sea Floor Spreading- new crust is formed at the bottom of the ocean floor.

Seismometers

- **Seismometers** are instruments that measure and record motions of the ground, including those of seismic waves generated by earthquakes.



Interactive Volcano

Final Exam Focus Question

- Most of the gas erupted from a volcano is steam, the remainder is…
- A) hydrogen sulfide B) Carbon Dioxide

- Although volcanic ash is talked about a lot, the most significant global effects are produced by:
- A) heat from lava flows
- B) melting of glaciers during eruptions
- C) Destruction of vegetation

Final Exam Focus

- Why do earthquakes cause such large death tolls in 3rd world countries?
- A) more tsunamis B) poor hospitals
- C) stronger earthquakes
- D) weak but heavy construction materials

- What is a tsunami?
- A) measure of energy released by an earthquake
- B) A seismic sea wave

Final Exam Focus

- Why do volcanoes occur at subduction zones?
- A) compression heats the rocks
- B) The descending slab begins to melt
- C) tension opens cracks so material from the core can rise.