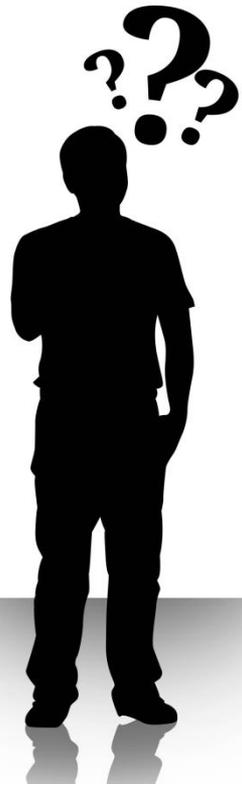


# EARTH'S STRUCTURE

# Think about it....



We all know that Earth has a **HOT** interior, but how do we know this? The deepest holes that scientists have ever drilled were only about 9 miles below the surface.

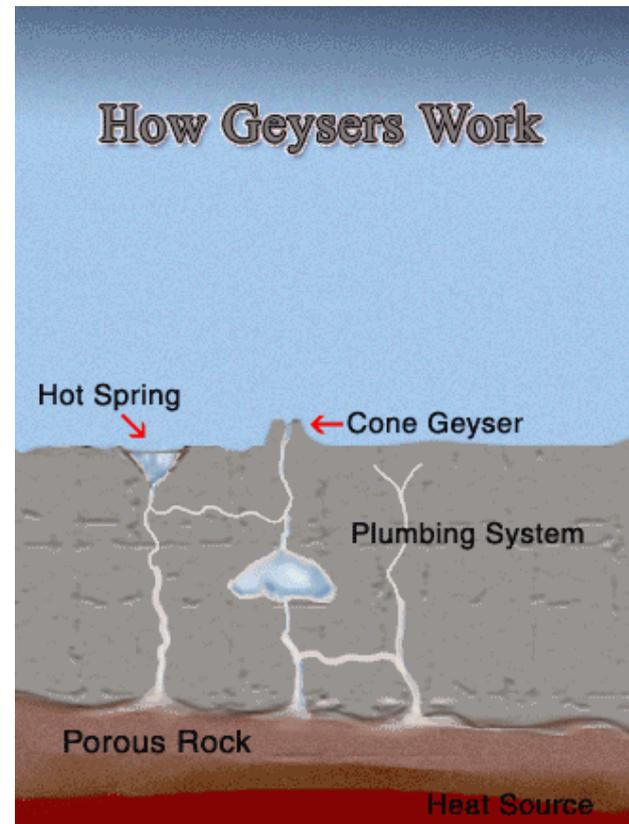
# Volcanoes

- A volcano is a mountain or hill that has an opening that allows hot magma to escape from Earth's interior



# Geysers –

Geysers - tall columns of hot water and steam that shoot up from Earth's surface



# Old Faithful – Yellowstone National Park

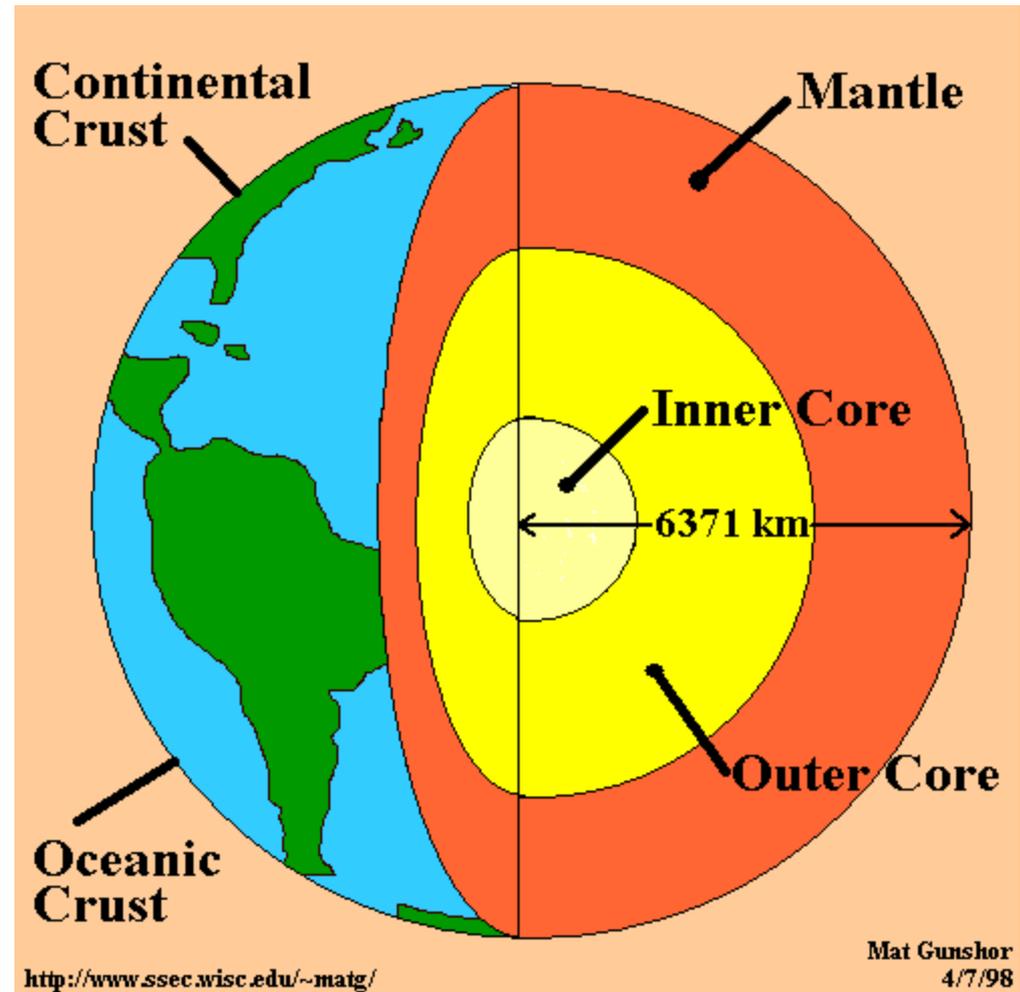


- Yellowstone National Park in Wyoming is known for its geysers and hot springs.

[LIVE webcam for Old Faithful](#)

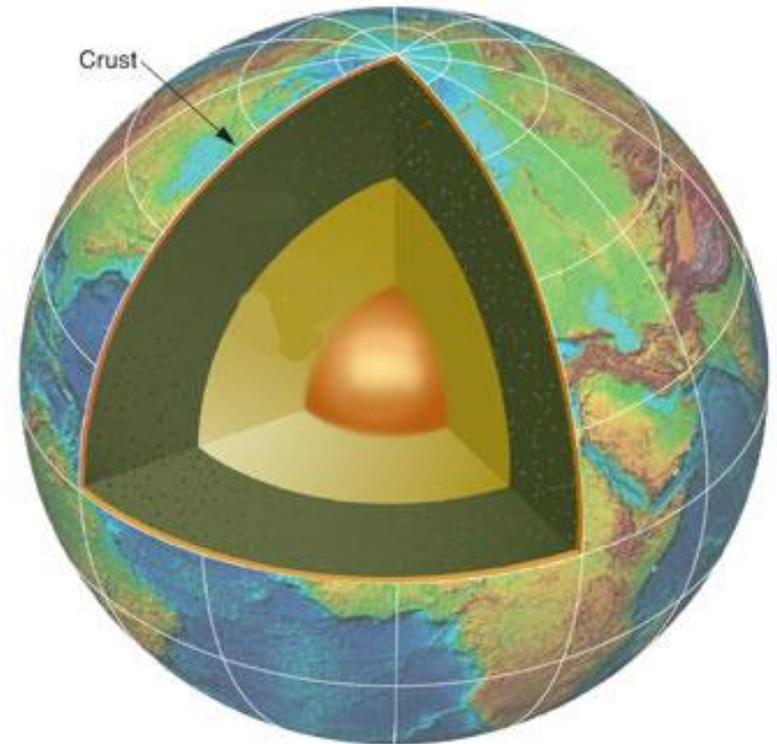
# Earth can be divided into 3 main layers:

1. Crust
2. Mantle
3. Core



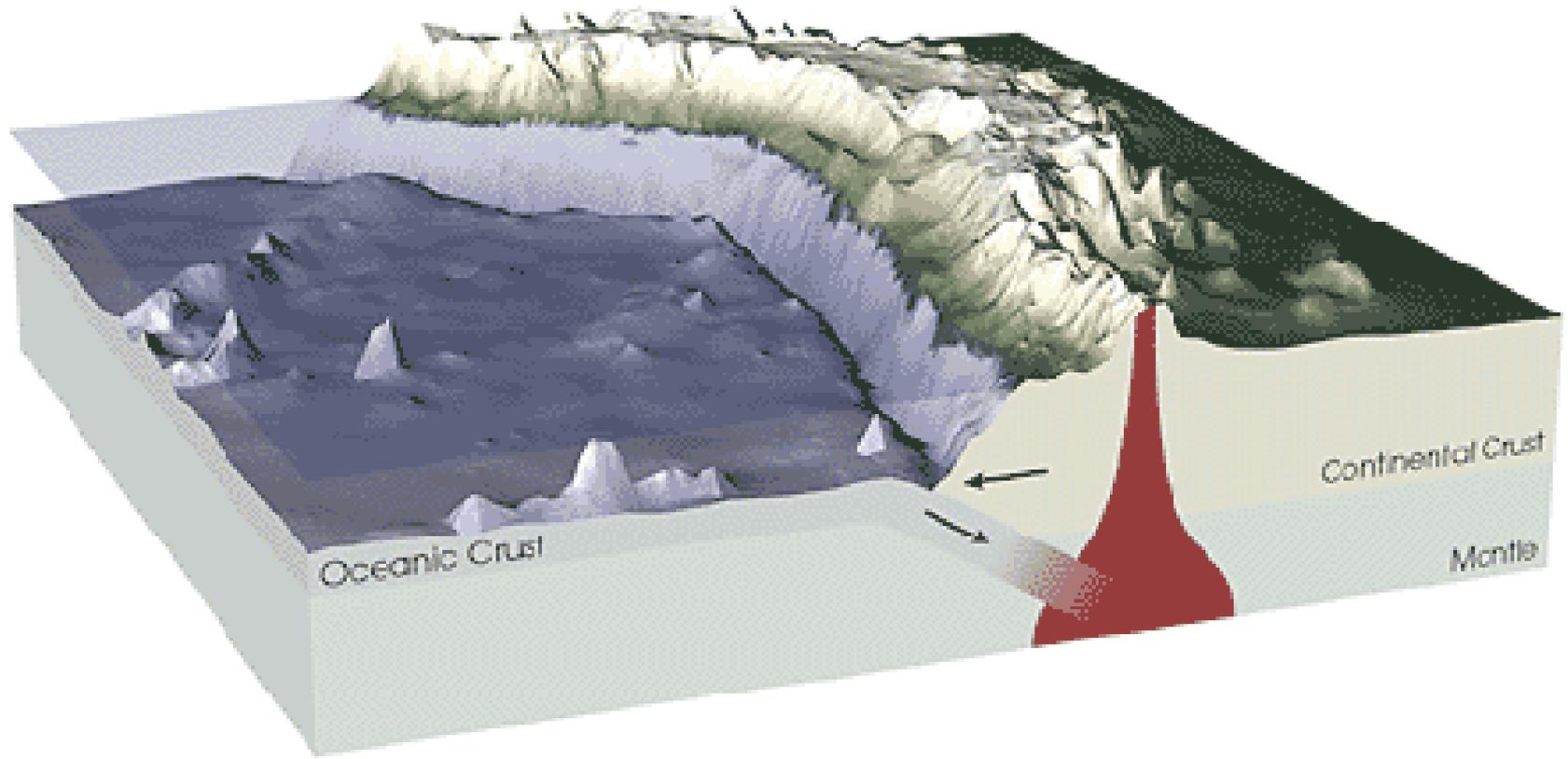
# The Earth's Crust

- The rocky outer layer of Earth
- Thinnest of all the layers
- Mostly made of silicates (compounds made of silicon and oxygen)



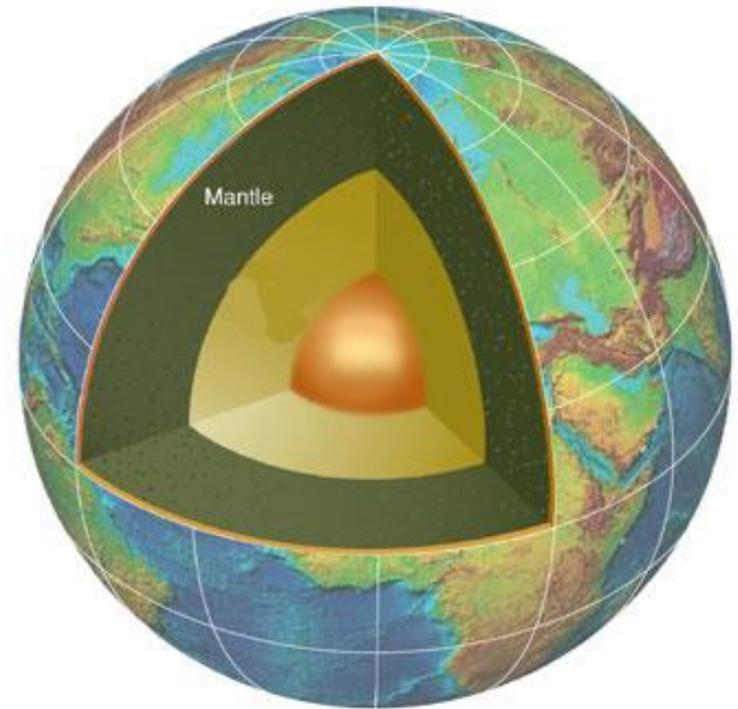
# 2 Different Types of Crust

1. Continental Crust – rock that makes up the continents
  - Consists of less dense rocks such as granite
  - Averages about 40 km in thickness
  - Thicker under mountain chains
2. Oceanic Crust- rock that makes up the ocean floor
  - Composed mostly of dense rocks like basalt
  - About 7 km in thickness (on average)
  - Much thinner than the continental crust



# The Mantle

- Thick solid rocky substance that represents about 85% of the total weight and mass of the Earth.
- Temperature and pressure increase the farther you go down



# The Mantle is divided into 3 layers:

## 1. Lithosphere

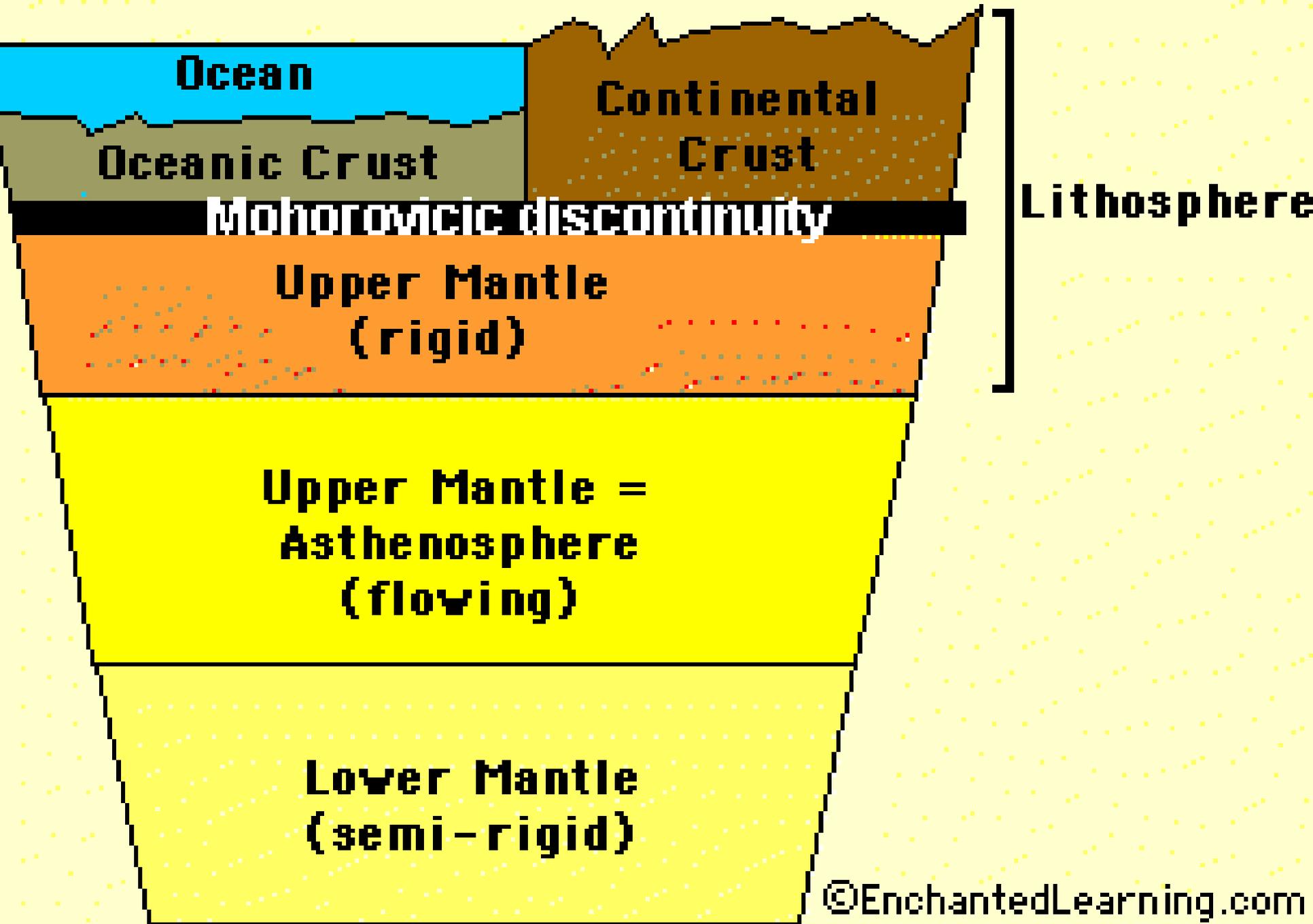
- Relatively cool, rigid rock
- Includes upper part of mantle and crust
- About 100 km thick

## 2. Asthenosphere

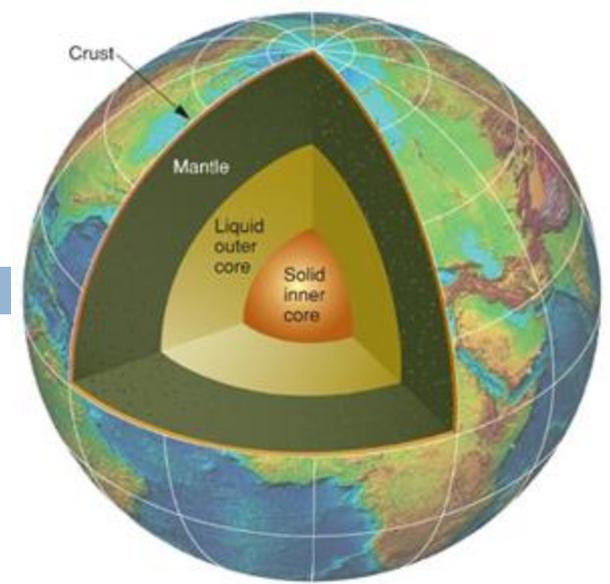
- Softer, weaker rock that can flow slowly

## 3. Mesosphere

- Stronger, lower part of the mantle
- Extends all the way down to the upper surface of Earth's core



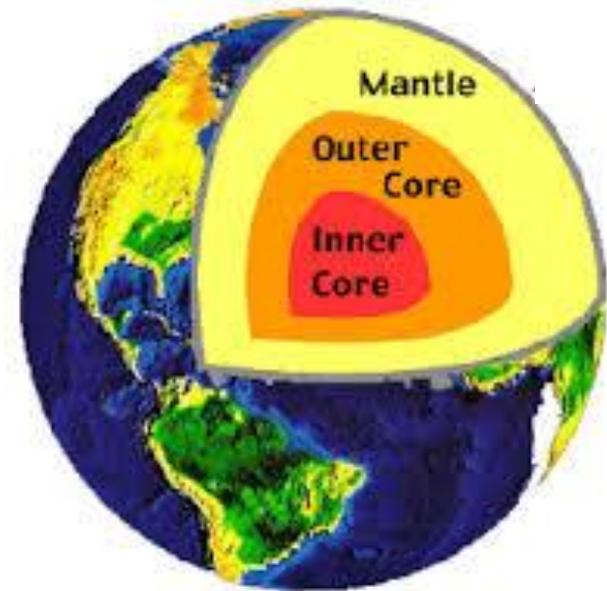
# The Core



- Large sphere of metal that occupies Earth's center
- It is believed that the core is mostly made of iron with some nickel and some lighter elements
- Pressure increases greatly with depth
- Pressure is estimated to be 3.6 million times greater at the core than at the surface of Earth
- The temp at the center is approximately  $5500^{\circ}\text{C}$

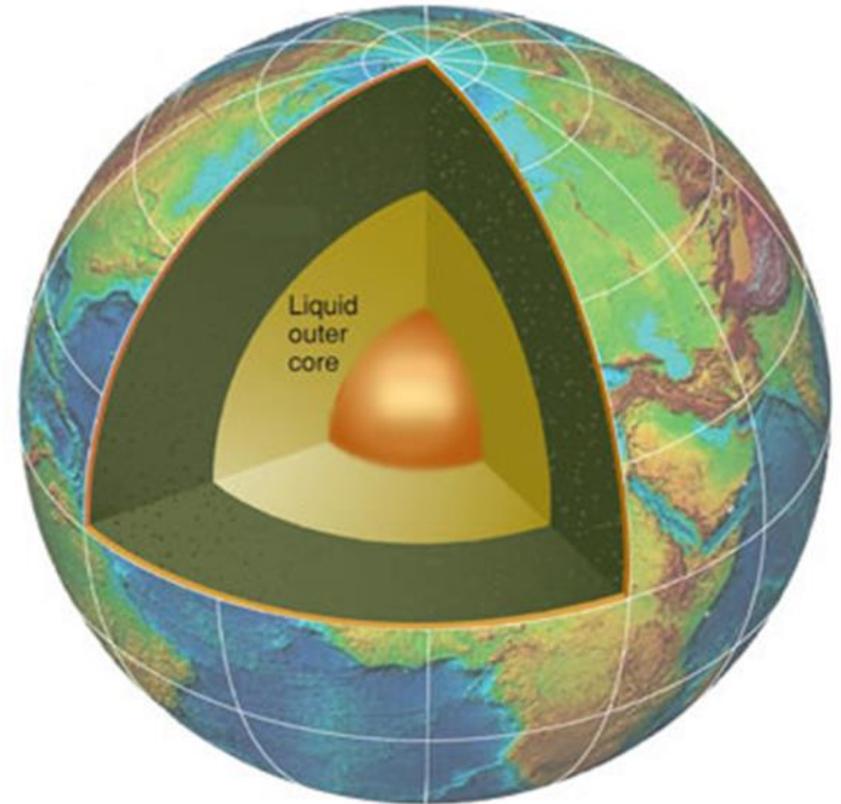
# 2 Layers of the Core

1. Outer Core
2. Inner Core



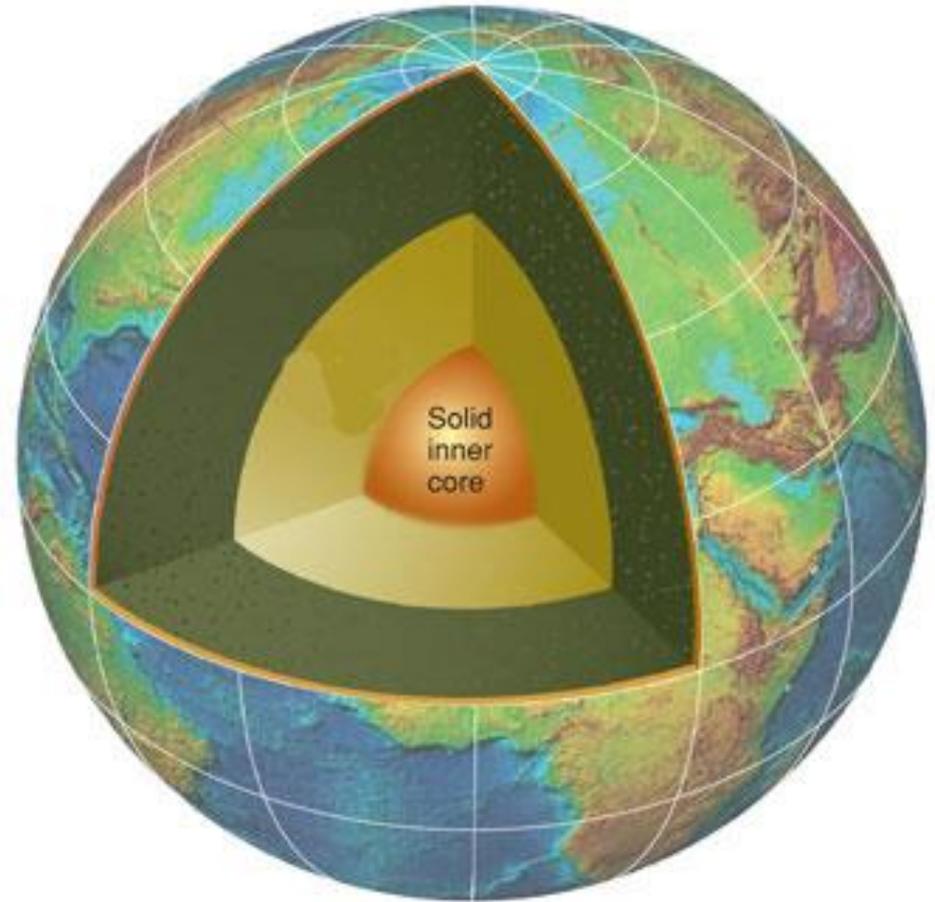
# Outer Core

- The outer core's high temperatures keep the metal in the liquid form
- The flowing molten iron creates Earth's magnetic field

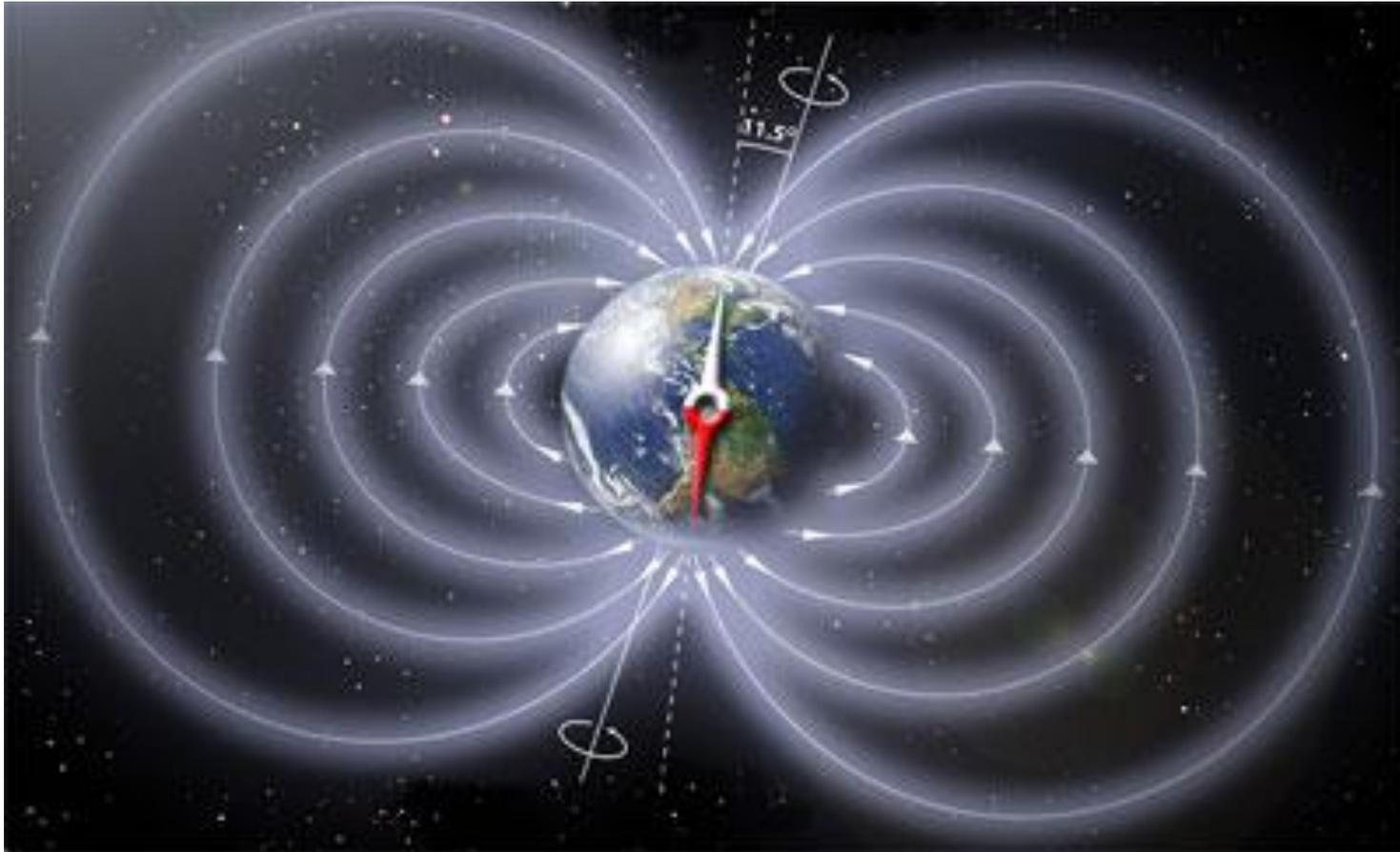


# Inner Core

- The inner core is even hotter than the outer core, but the pressure exerted upon this inner core causes it to be in a solid state. It is probably made up of nickel and iron as well.



Scientists believe that the presence of molten iron and nickel explain Earth's magnetic field.

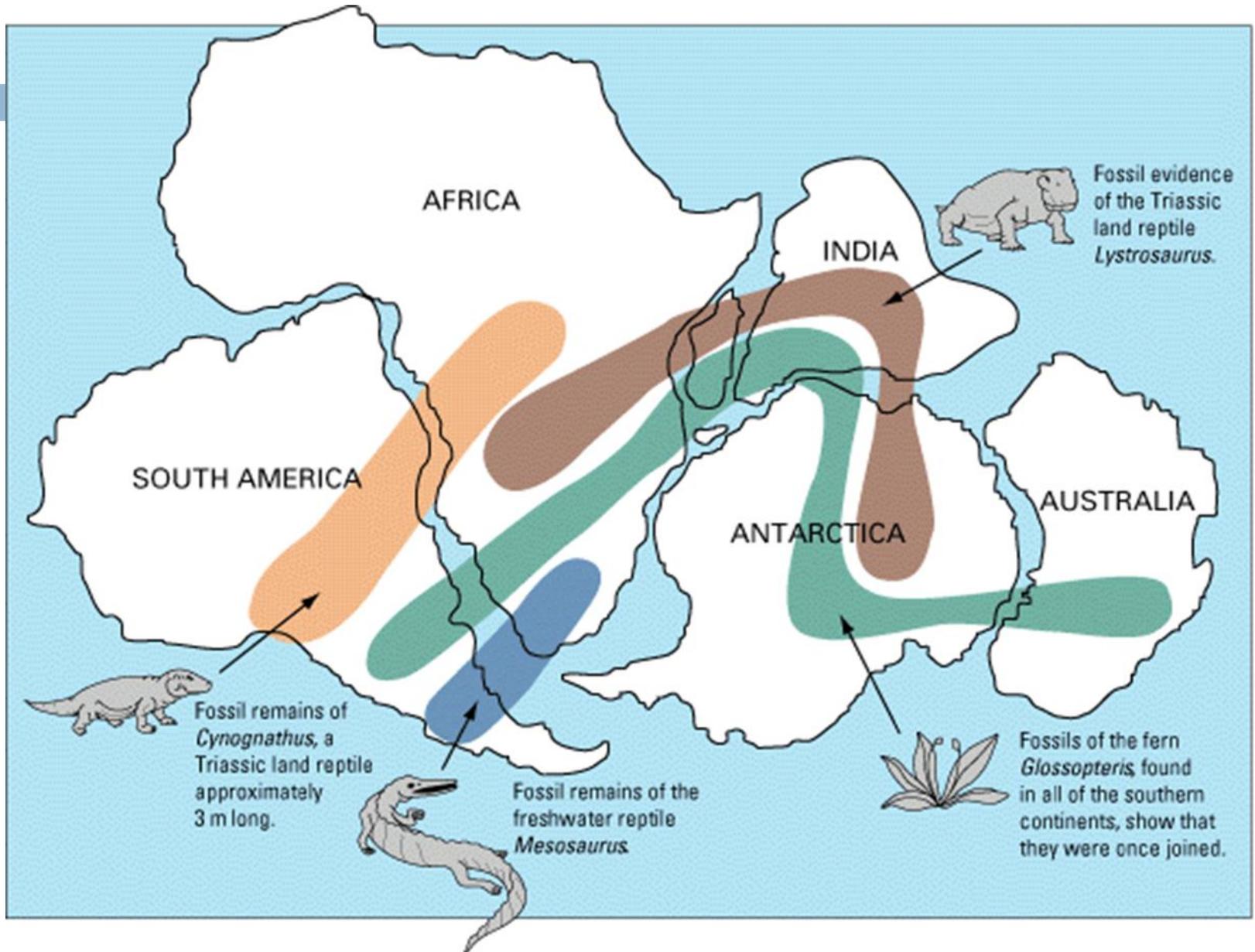


# Plate Tectonics

- Alfred Wegener first proposed the theory of continental drift.
- Continental drift is Wegener's theory that all continents had once been joined together in a single landmass and have drifted apart since.
- Wegener named this supercontinent Pangaea.
- Wegener's theory was rejected by scientists because he could not explain what force pushes or pulls continents.

[BrainPop: Plate Tectonics](#)

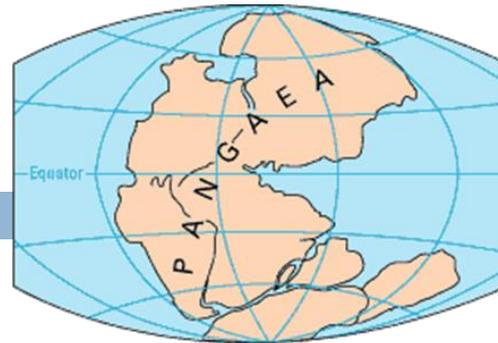
# Fossil evidence



# Moving Plates

The idea of giant plates of rock slowly moving across Earth's surface is called Plate Tectonics.

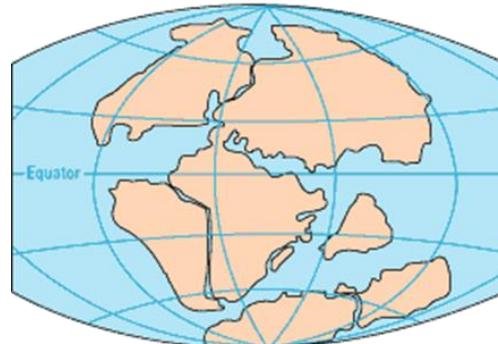
The average speed of the plates is about 10 cm a year.



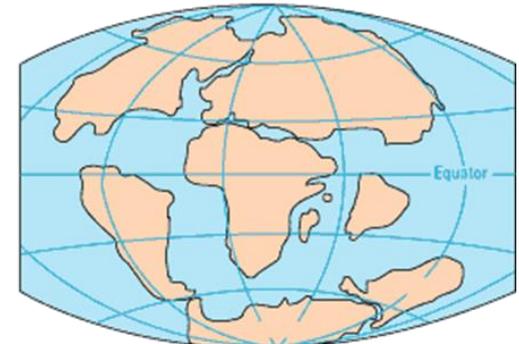
PERMIAN  
225 million years ago



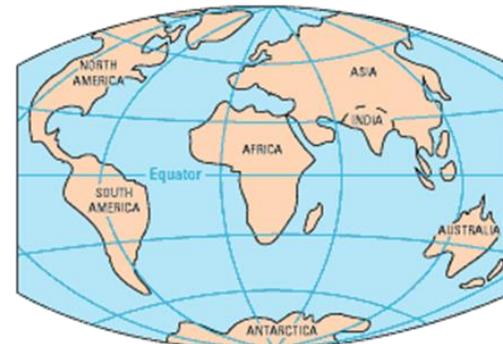
TRIASSIC  
200 million years ago



JURASSIC  
135 million years ago



CRETACEOUS  
65 million years ago



PRESENT DAY

# 2 Types of Plates

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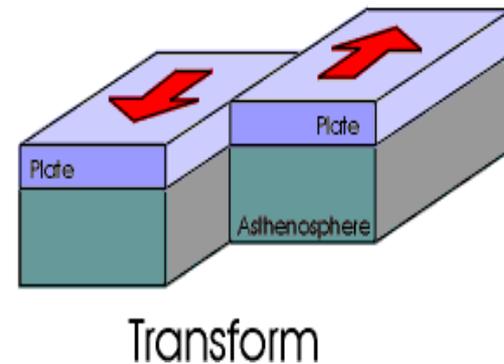
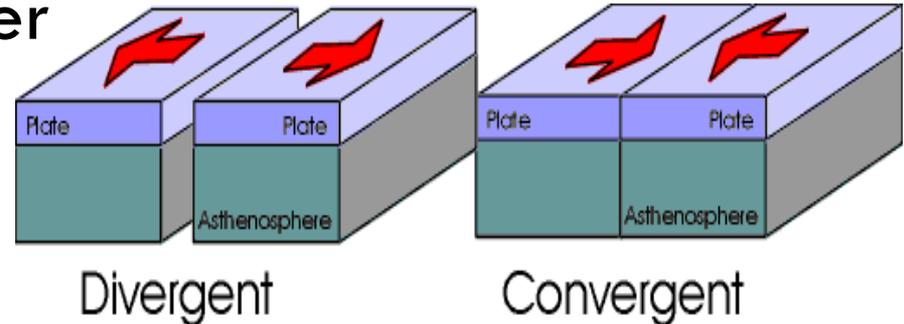
- Oceanic Plates – made of dense ocean floor material
- Continental plates – made up of lighter continental rock “riding” on top of denser rock.

# Types of Plate Boundaries

□ Converging – Moving together

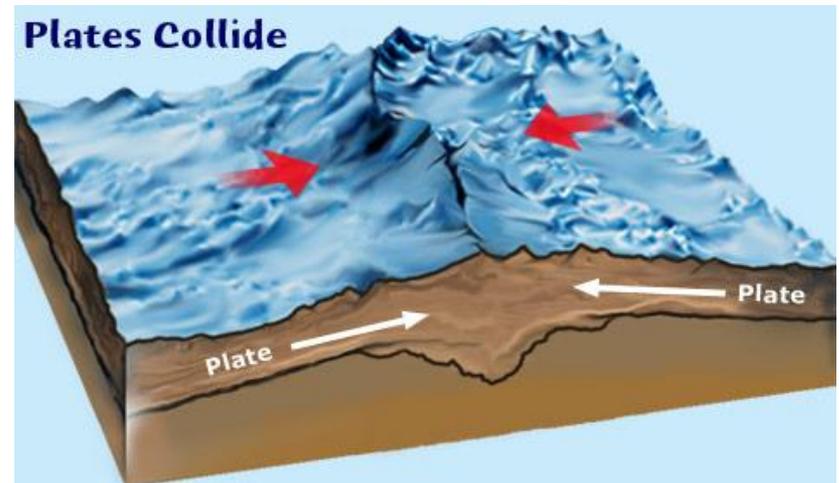
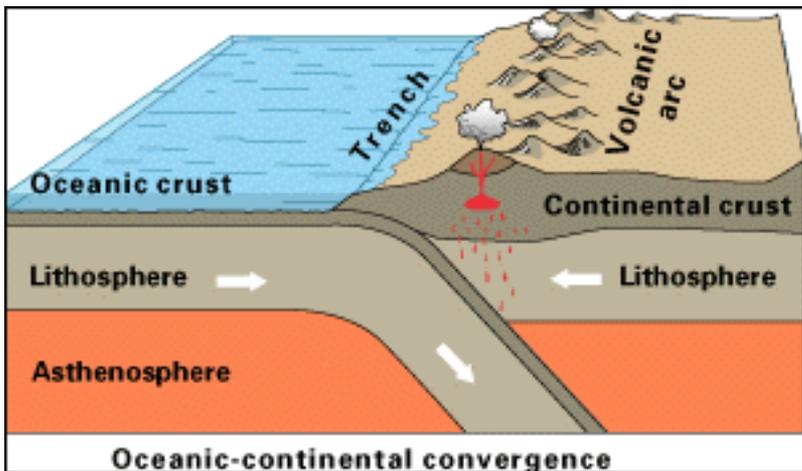
□ Diverging – Moving apart

□ Sliding (Transform) – Sliding past



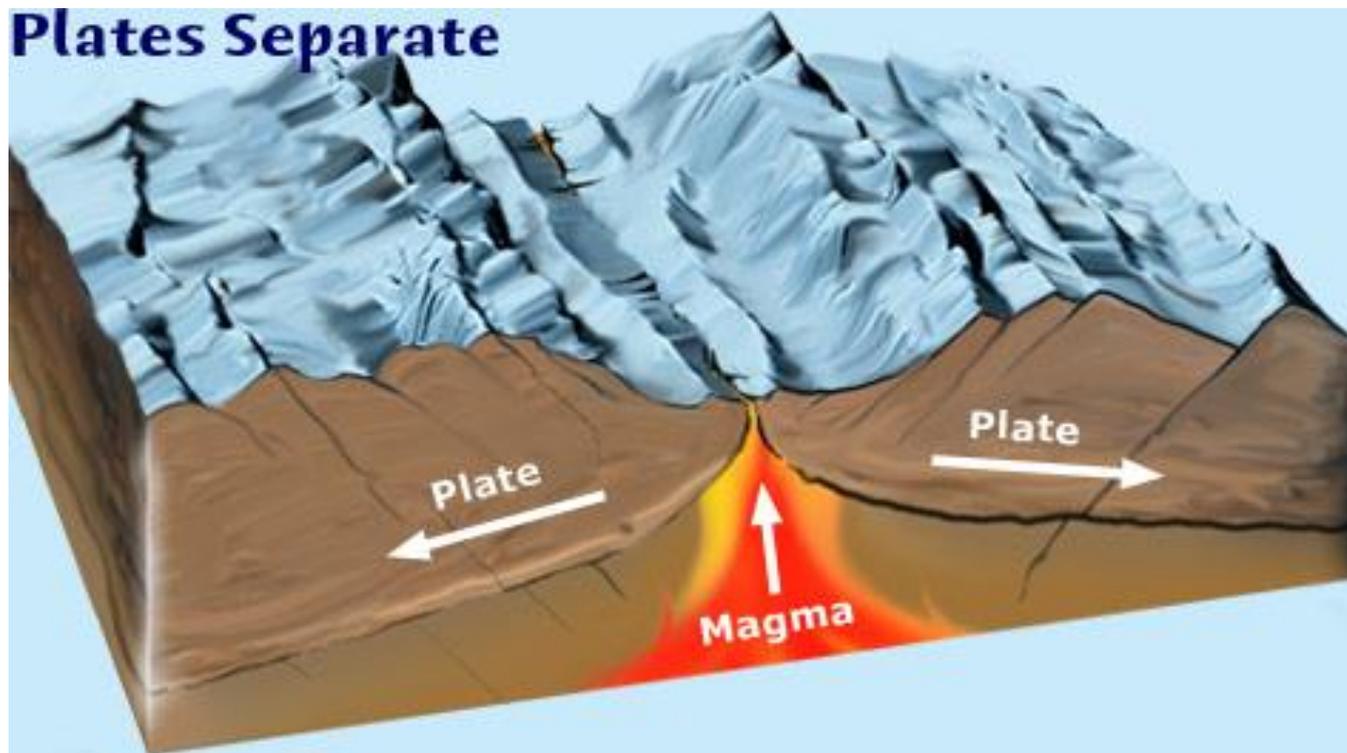
# Converging Plate Boundaries

- Two plates move toward one another. One may move under the other in a process called subduction. It is typically the more dense oceanic plate that slides under the lighter continental plate.



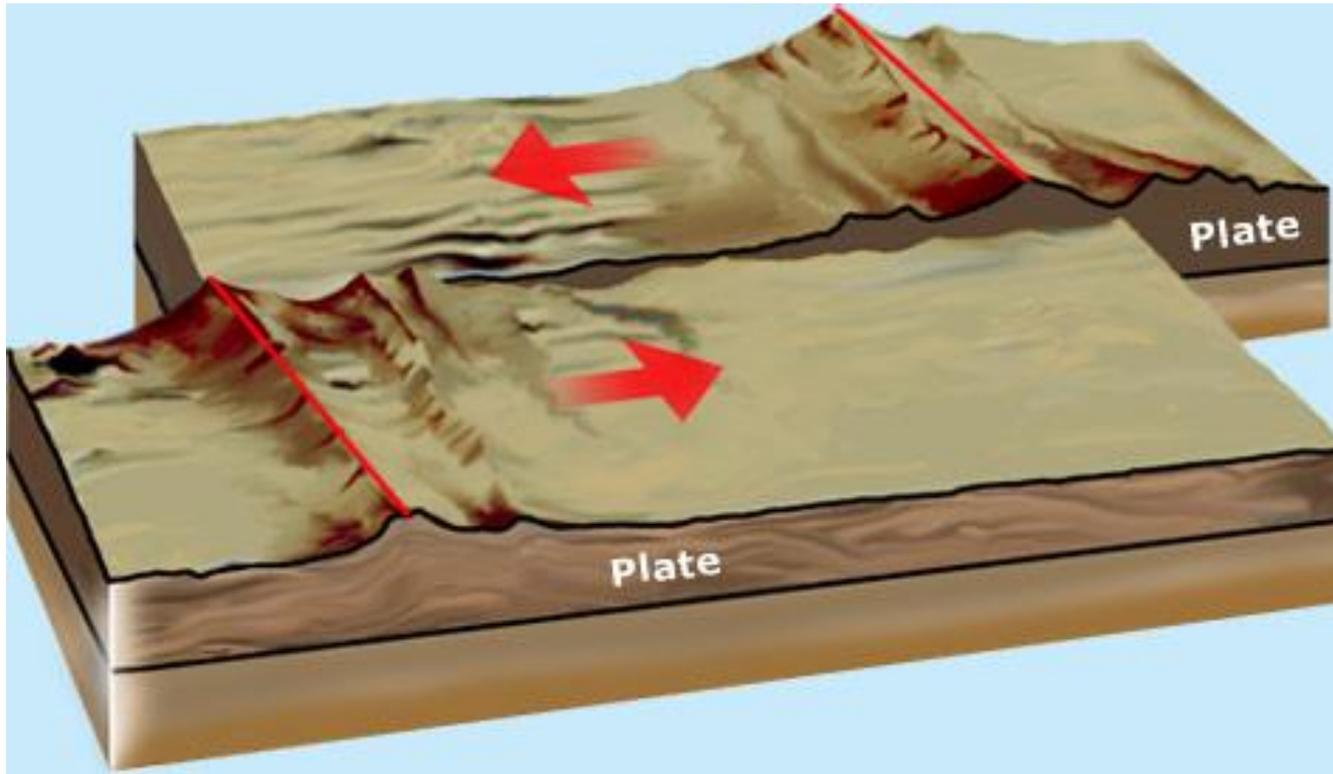
# Diverging Boundaries

- Two plates move away from each other. Molten rock rises to fill the gap, creating new crust.



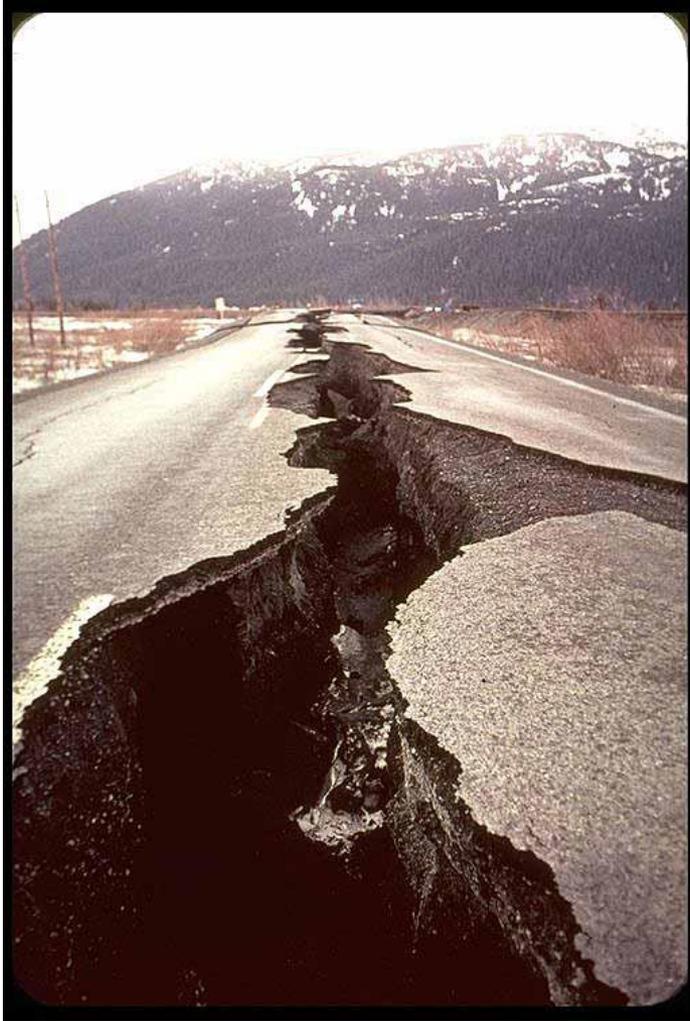
# Sliding Boundaries

- Two plates slide past each other, moving in opposite directions.



# Lesson 2

## What are Earthquakes and Volcanoes?



# Faults

- Faults are cracks in Earth's crust at which movement takes place.



**San Andreas Fault**

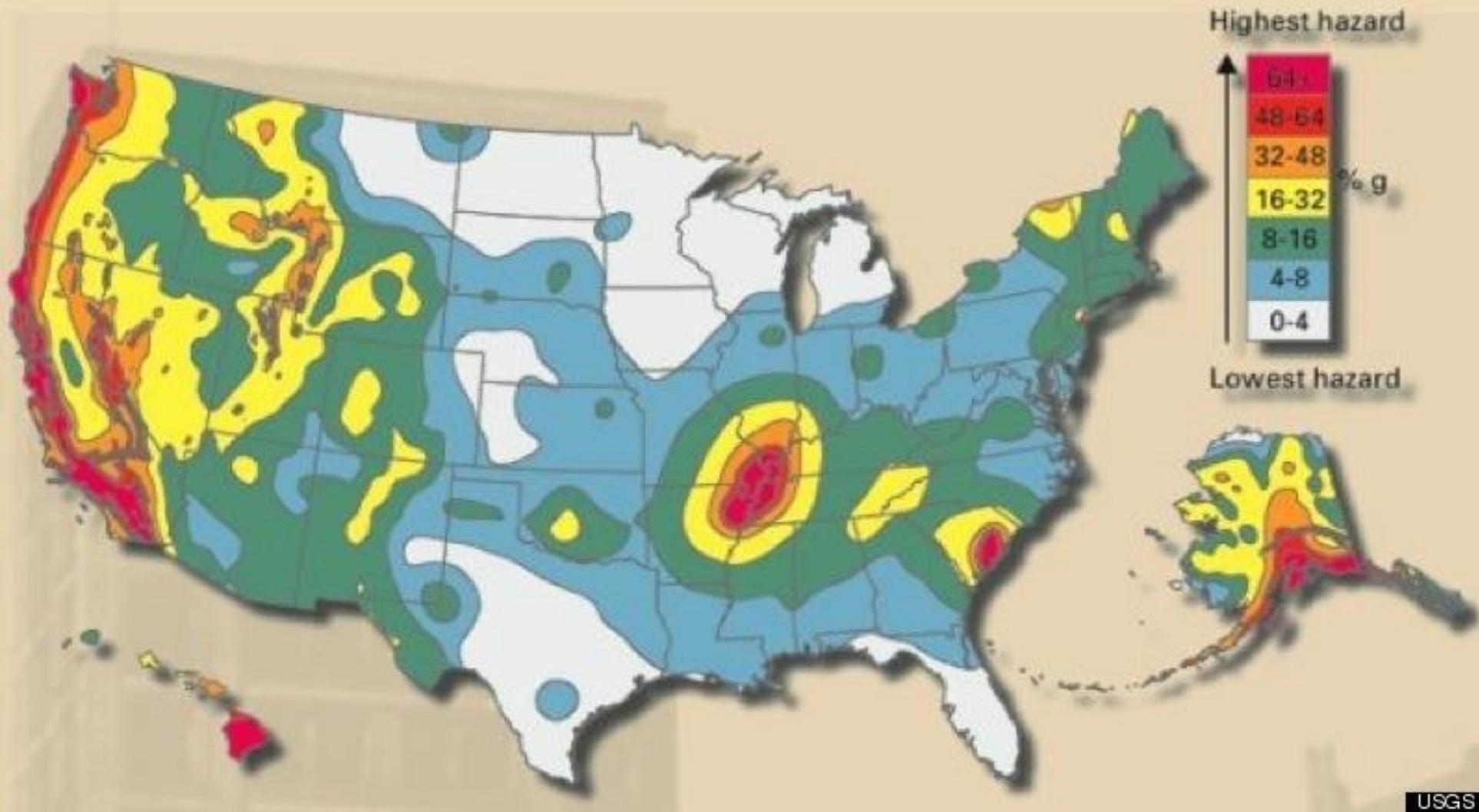
# Earthquakes

- An earthquake is a major shaking of Earth's crust.



[National Geographic Video \(2:38\)](#)

[BrainPop: Earthquakes](#)



This map courtesy of the U.S. Geological Survey (USGS) shows the major earthquake hazard areas within the United States based on fault lines.

# What causes earthquakes?

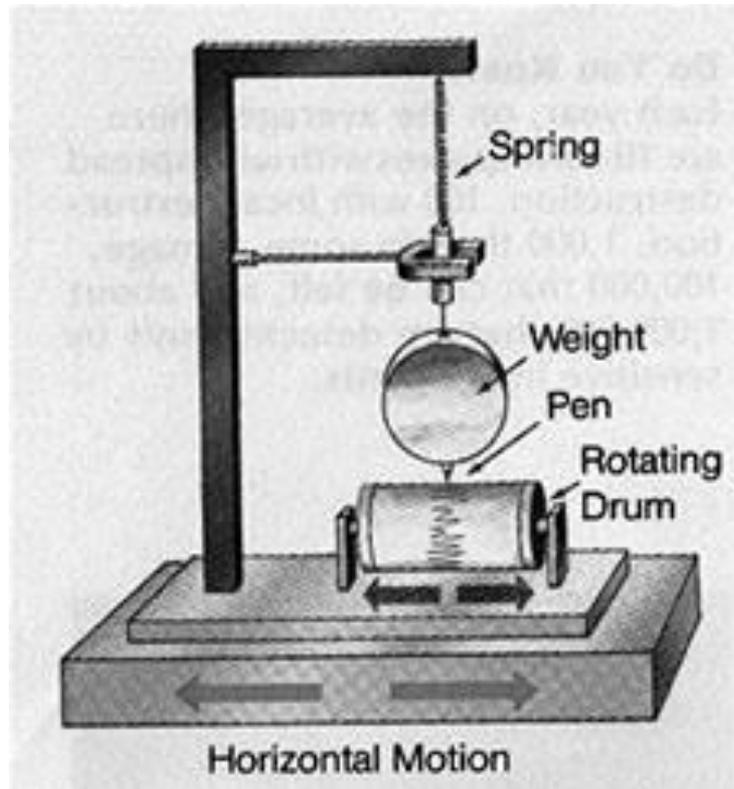
- As plates move, stress builds up until the rocks finally break.
- The plates shutter and jolt into a new position.

# How are earthquakes recorded?

- As Earth's crust shakes, it sends out energy waves called SEISMIC waves.
- A SEISMOGRAPH is a tool used to measure these seismic waves.
- The record of the seismic waves that is recorded by the seismograph is called the SEISMOGRAM.
- The study of earthquakes is called SEISMOLOGY.

# Seismograph

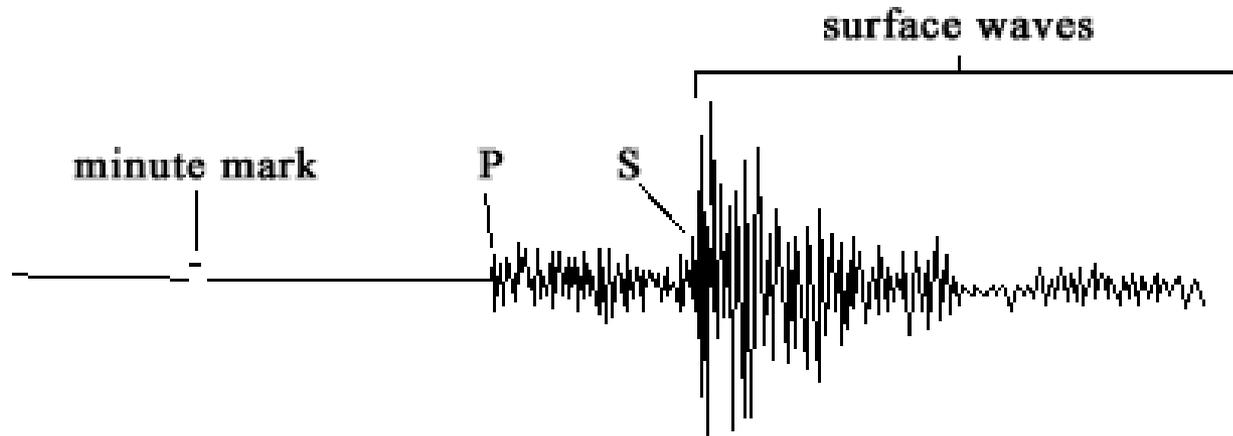
- (graph – to write)



[How Does a Seismograph Work? Video \(2:14\)](#)

# Seismogram

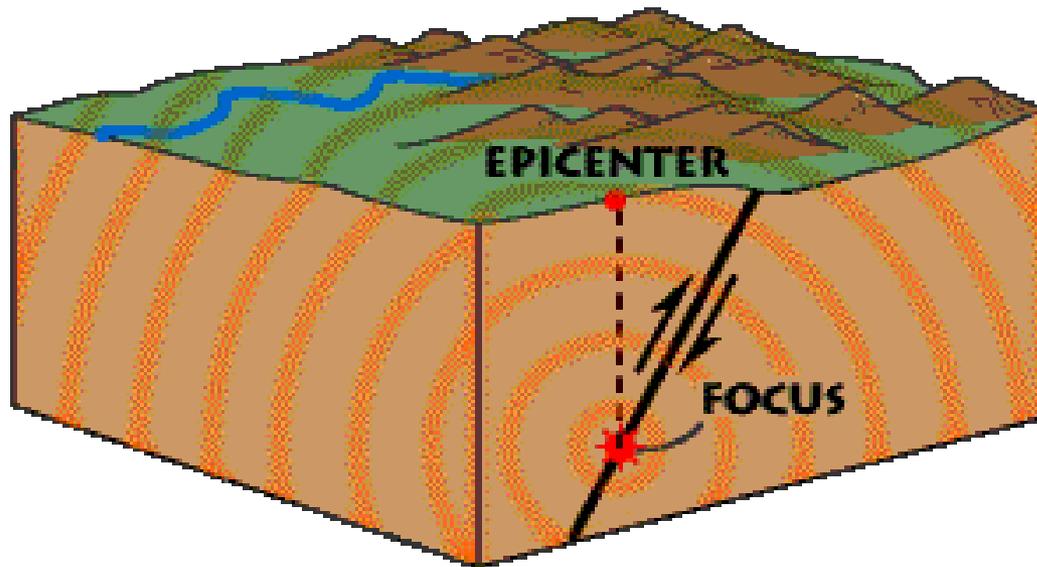
- Root word: gram – something written, a record



- The scale that is used to express the magnitude of the seismic waves is called the Richter scale.
- 3.5 on the Richter scale may not be felt
- 7.5 is a major earthquake.

# Focus & Epicenter

- Focus – point underground where faulting occurs
- Epicenter – point on surface directly above focus



# Volcanoes

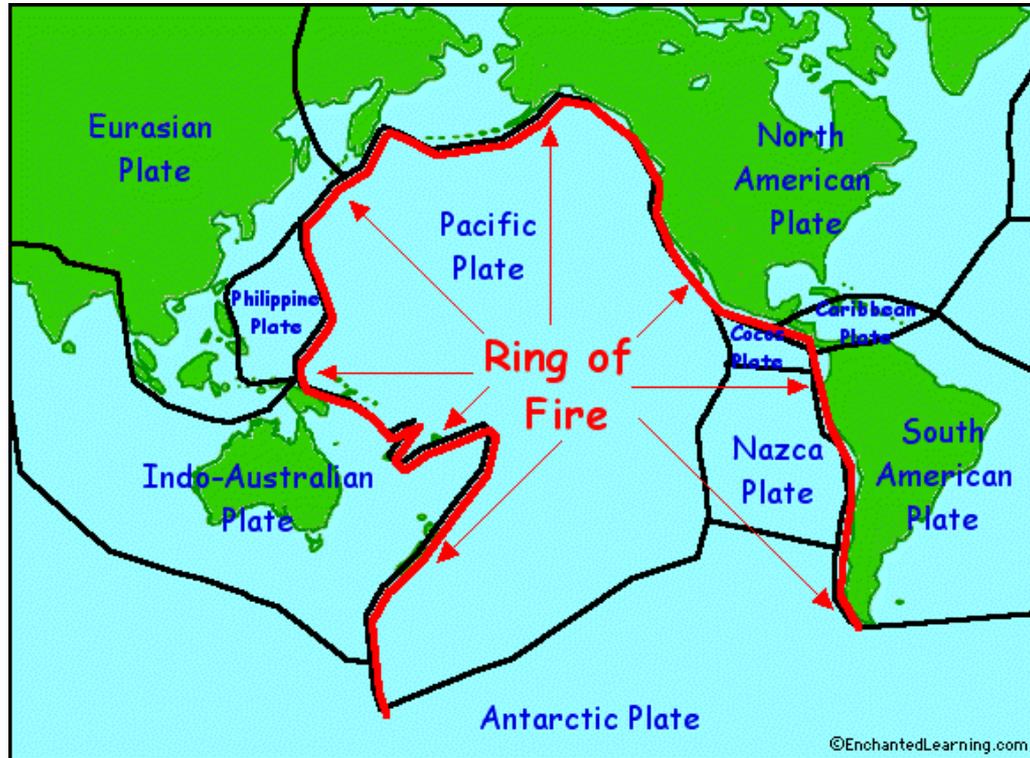


# What is a volcano?

- An opening in Earth's crust through which hot gases, melted rock, rock fragments and ash erupt.
- Melted rock – MAGMA
- Once magma reaches the surface it is called LAVA.



# RING OF FIRE



- Zone around the Pacific Ocean with high earthquake and volcano activity.

[Discovery Education: Ring on Fire \(0:45\)](#)