

Theory of Plate Tectonics

Book F 4-3

Objectives:

Compare and contrast divergent, convergent, and transform plate boundaries.

Describe how convection currents might be the cause of plate tectonics.

Describe the effects of plate tectonics found at each type of boundary.

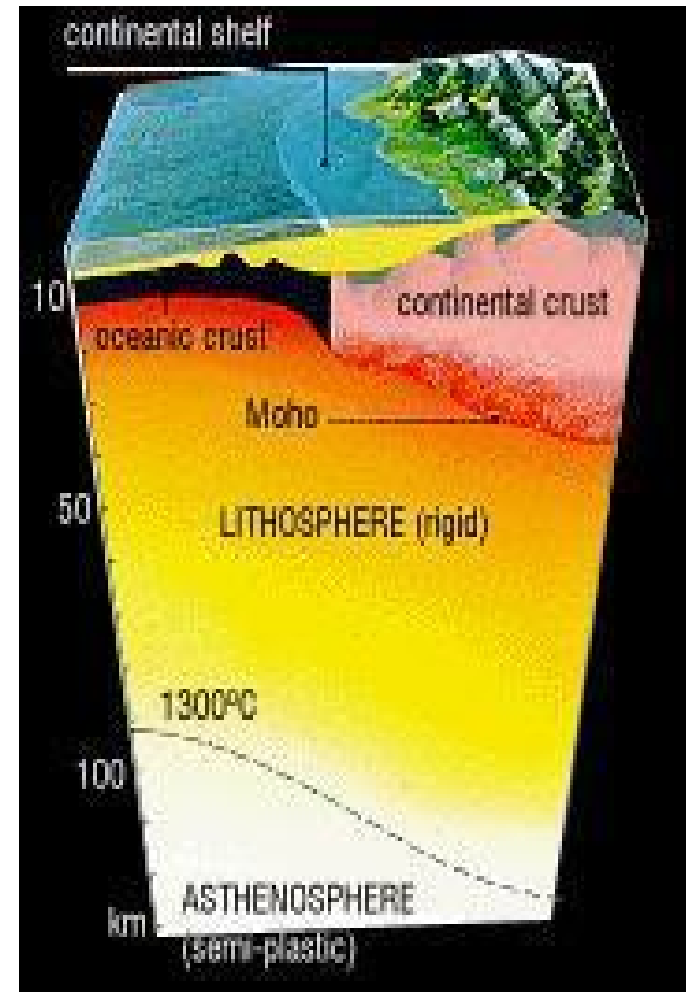
Plate Tectonics

In 1968, J. Tuzo Wilson developed a new theory combined the ideas of continental drift and seafloor spreading. This theory states that the crust and upper mantle are broken into plates and they move around on the mantle.



Composition of Earth's Plates

Plates are made up of the crust and part of the upper mantle. Together they are called the **lithosphere**. It is about 100km (62 miles) thick and it is less dense than the material underneath so it “floats” on top.



Under the lithosphere is the **asthenosphere**. It is more dense than the lithosphere and it is a plastic like layer.

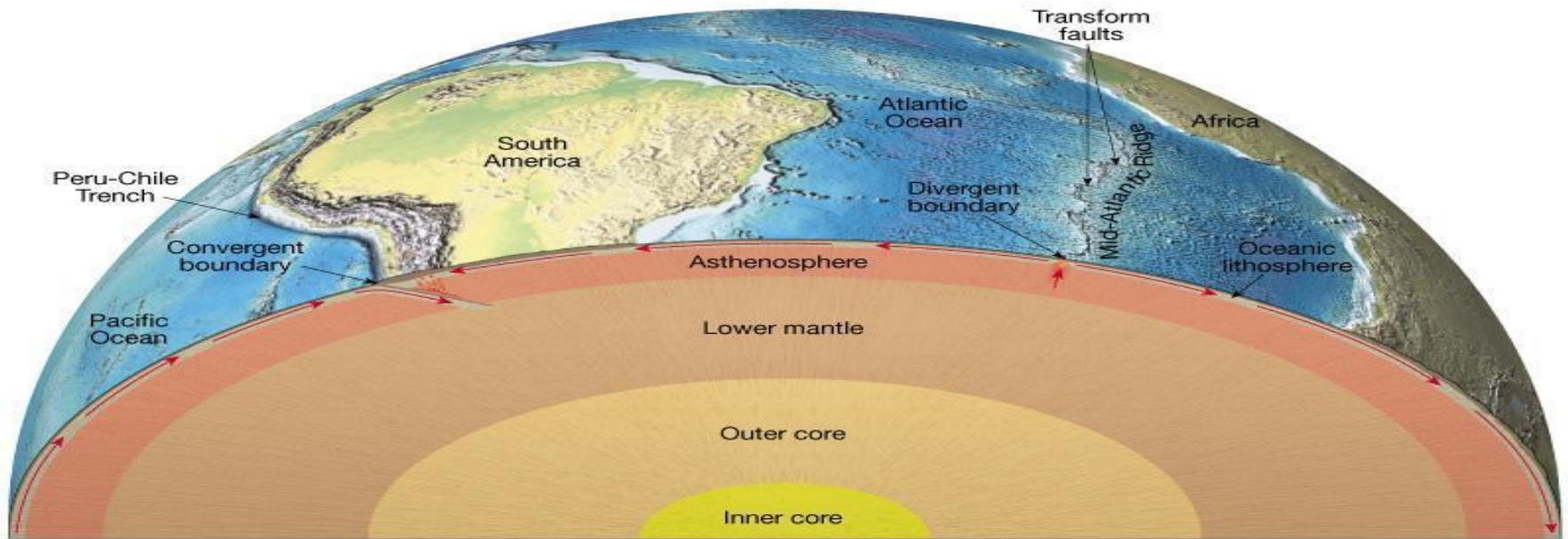


Plate Boundaries

There are three types of plate boundaries. Each type works in different ways. Scientists can use satellites to measure the movement. The plates move for 1 – 10 centimeters a year.

Divergent Boundaries

Convergent Boundaries

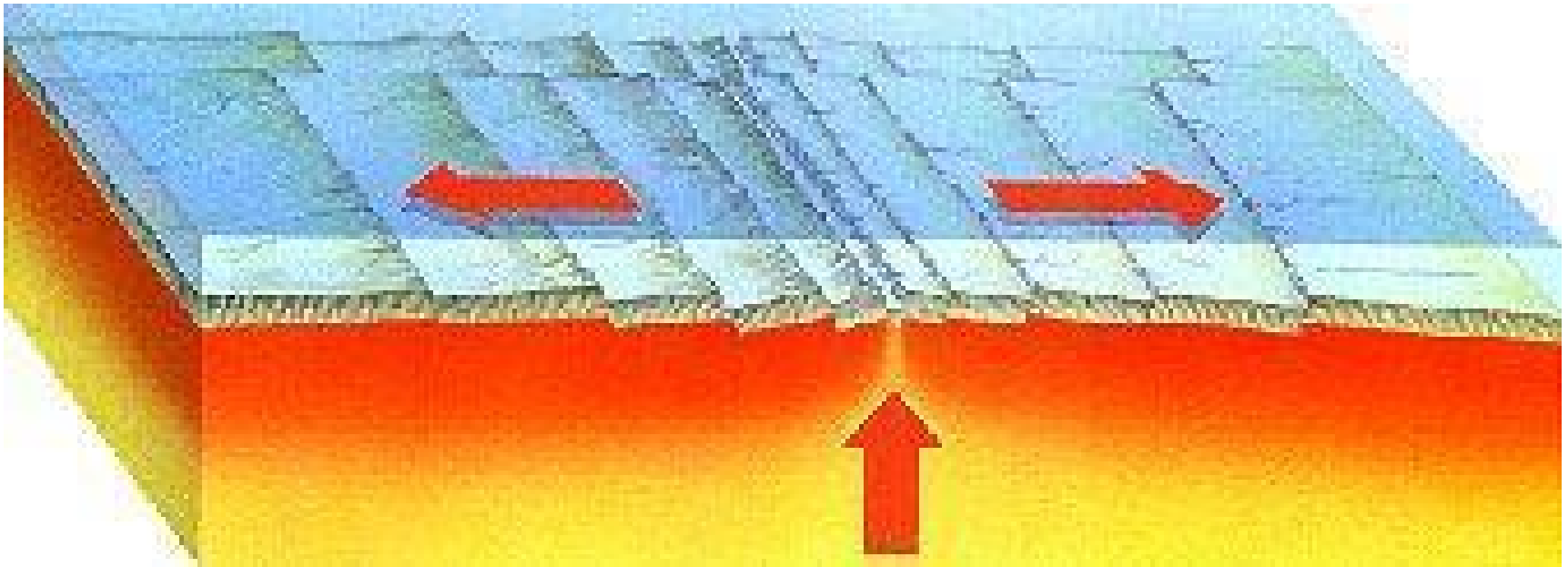
Transform Fault Boundaries



Divergent

Boundaries

A **divergent boundary** is when two plates move apart.

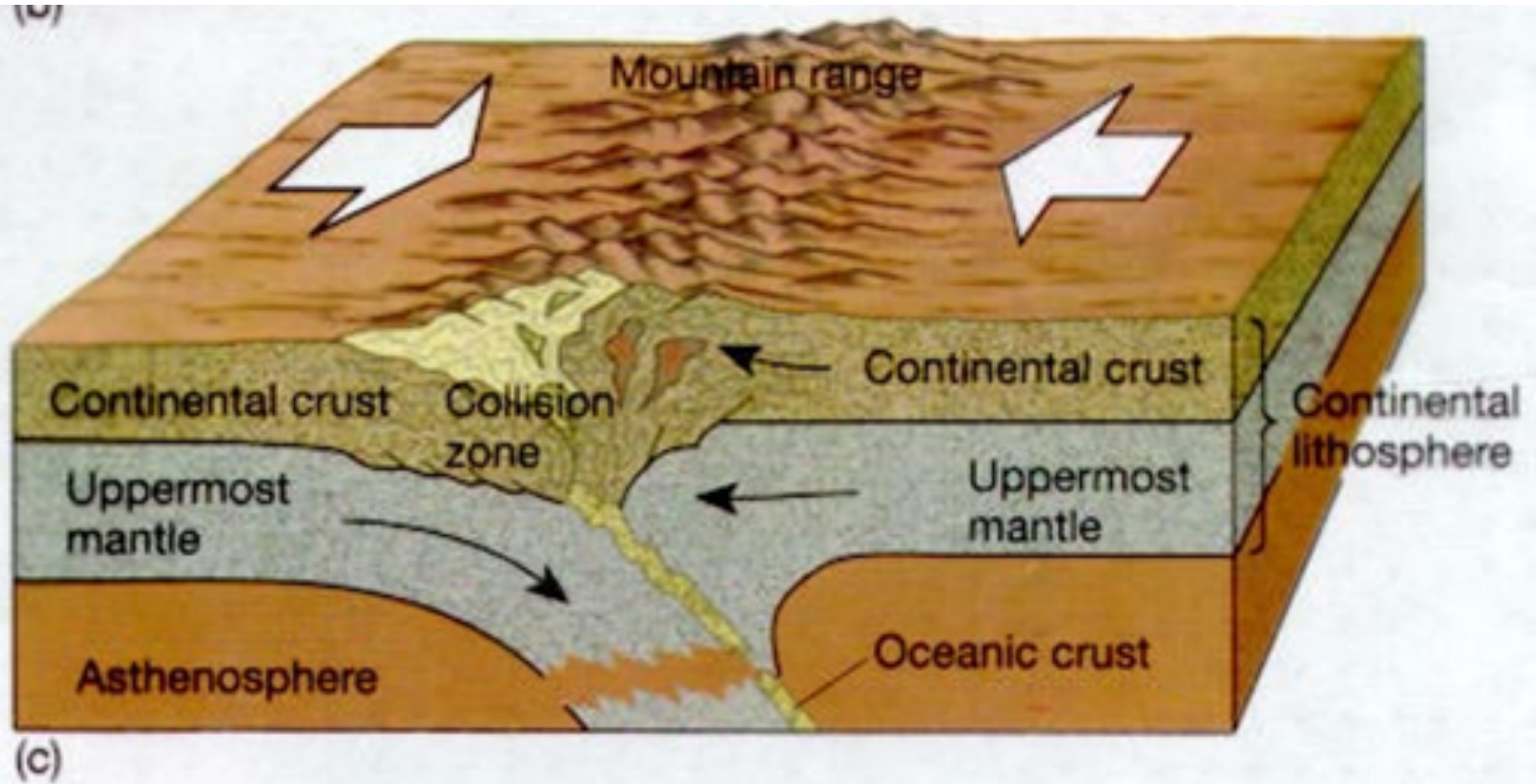


Convergent Boundaries

A **convergent boundary** is when two plates collide. This can happen in three different ways.

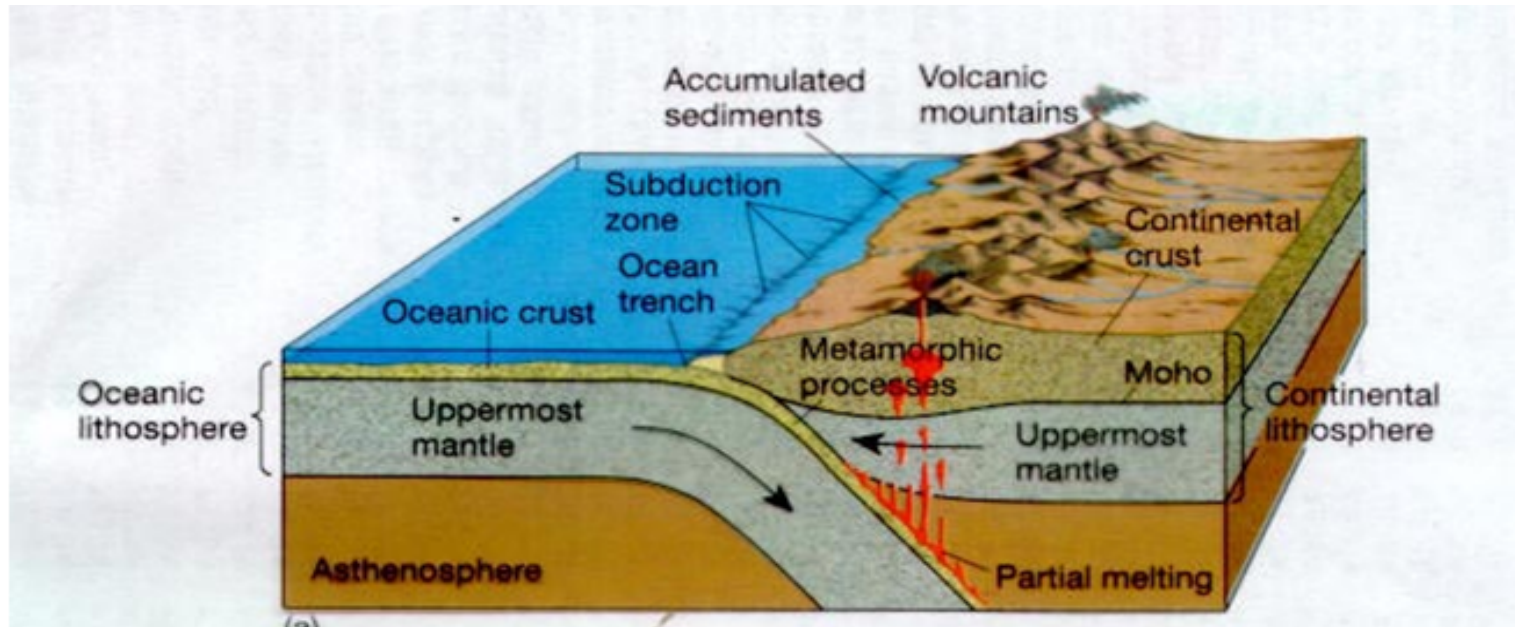
1. Continent plate into continent plate
2. Continent plate into ocean plate
3. Ocean into Ocean plate

Continental Plates



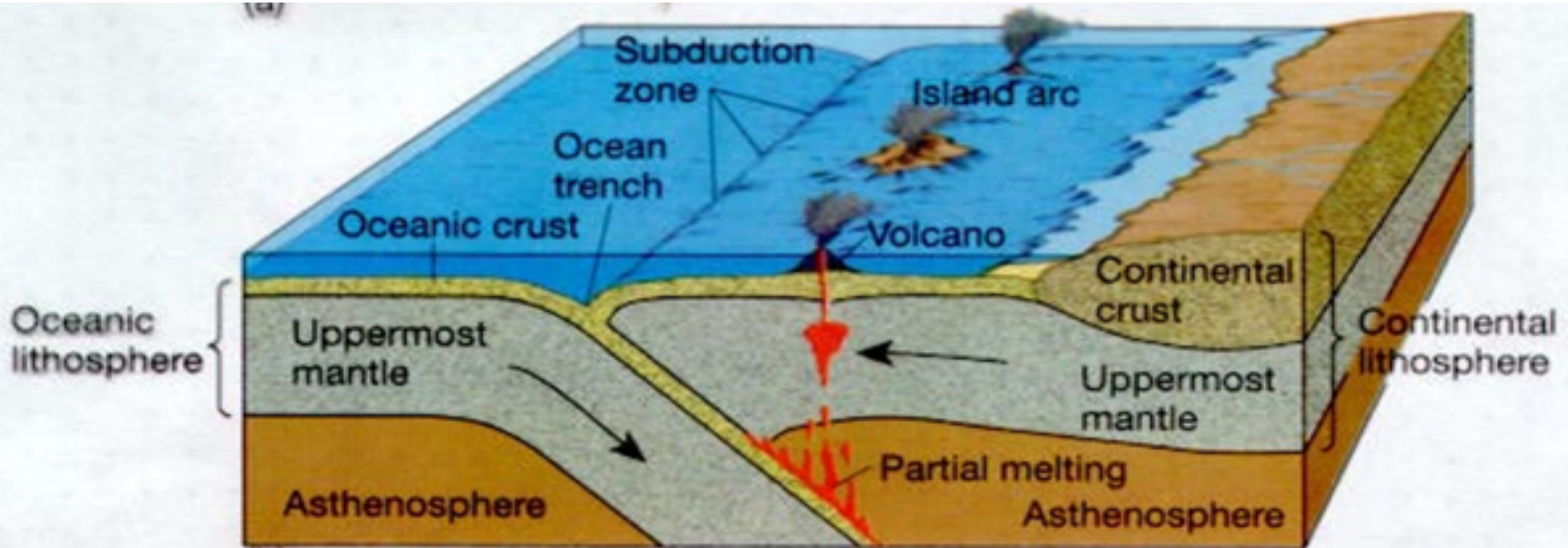
Continental plates pushing into each other will force up mountains.

Continental and Oceanic Plates



When a continental plate collides with an ocean plate, the continental plate will slide above the ocean plate. This creates a **subduction zone**. Volcanoes will form on the land.

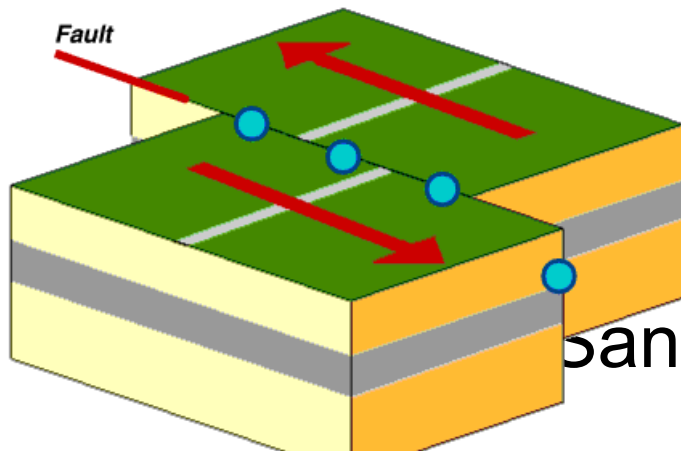
Oceanic into Oceanic Plates



When an oceanic plate collides with another oceanic plate, one will sink creating a **subduction** zone. The other will rise up and form volcanoes in the ocean.

Transform Fault Boundaries

Transform faults occur when two plates slide one another. They could be moving in the same direction or in opposite directions at different rates.

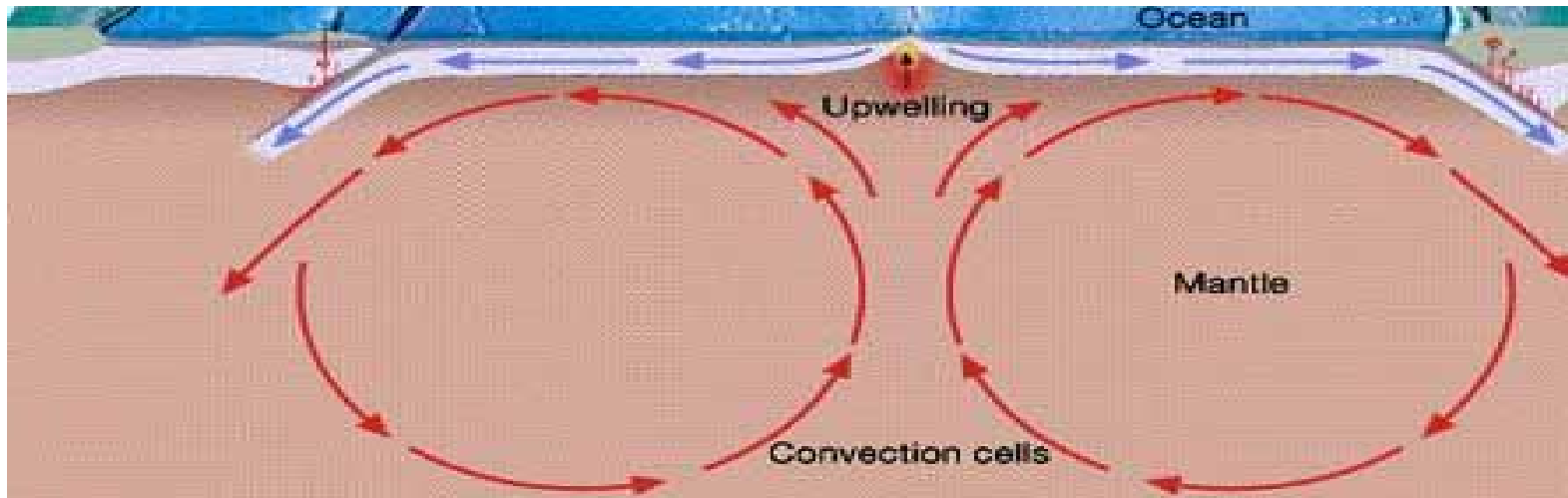


San Andreas Fault.



Moving Mantle Material

Scientists now think that the plates move because of **convection currents** within Earth's mantle. The molten rock cycles around just like warm and cool air currents.



Features Caused by Plate Tectonics

Many landforms are caused by plate tectonics. They cause fault block mountains and rift valleys to form.



Earthquakes, volcanic mountains and rift valleys are also caused by the moving of the tectonic plates.

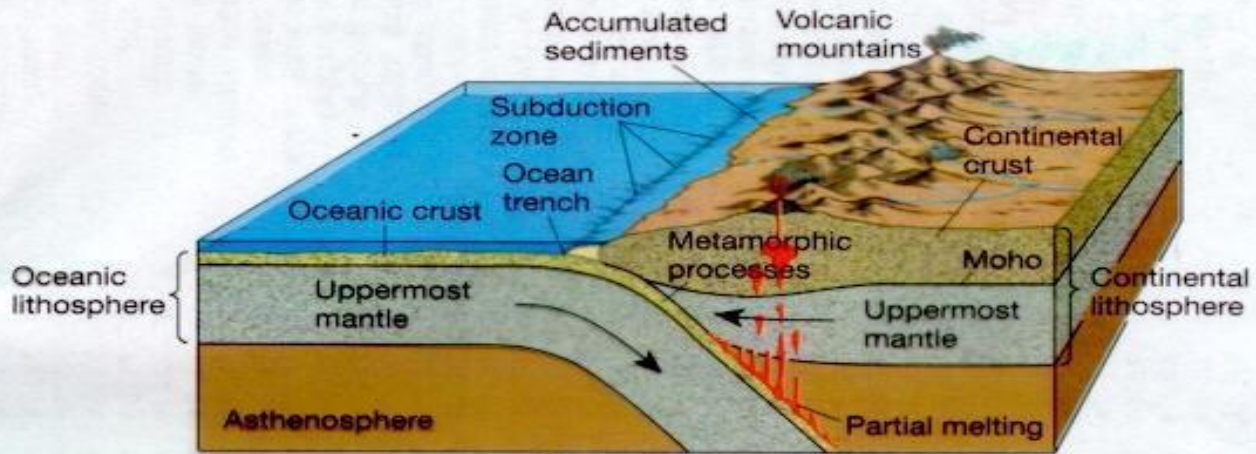


Testing for Plate Tectonics

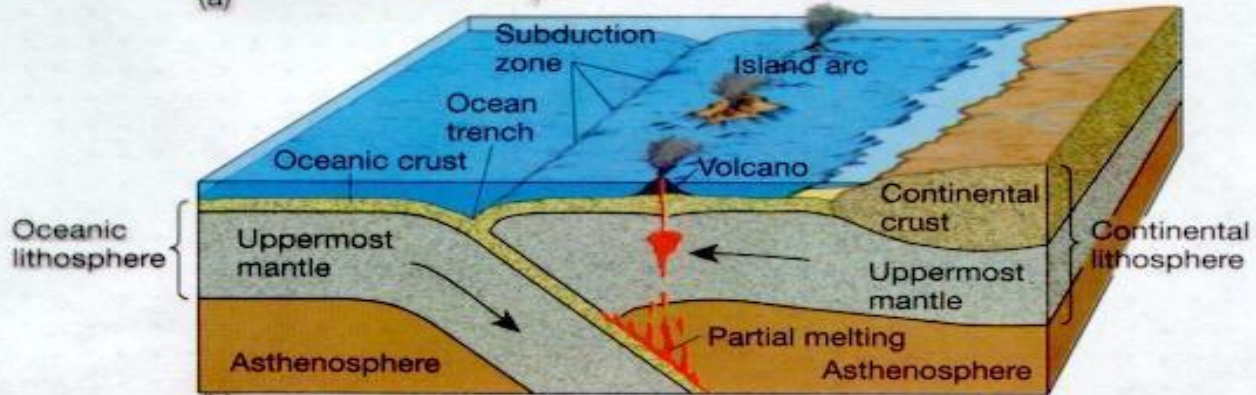
Scientists use lasers and satellites to measure the movement of Earth's plates. They can measure exact movements of Earth's plates of as little as 1 cm per year.

Satellite Laser
Ranging System

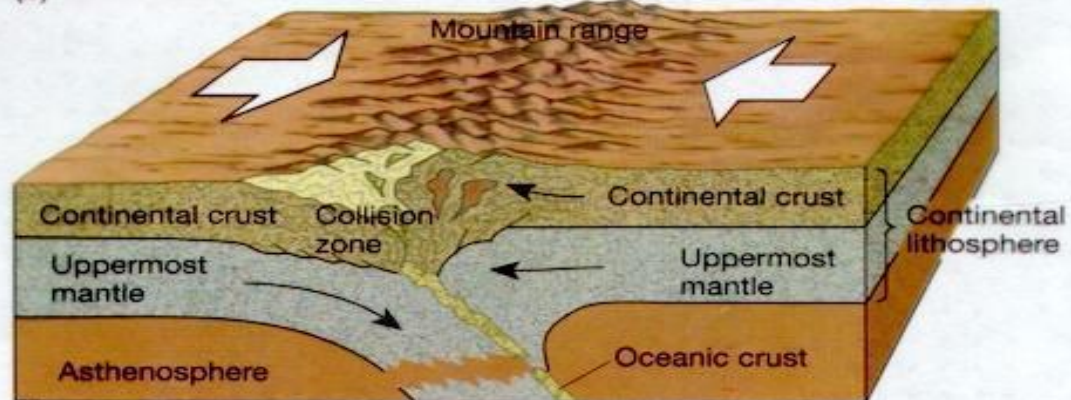




(a)



(b)



(c)