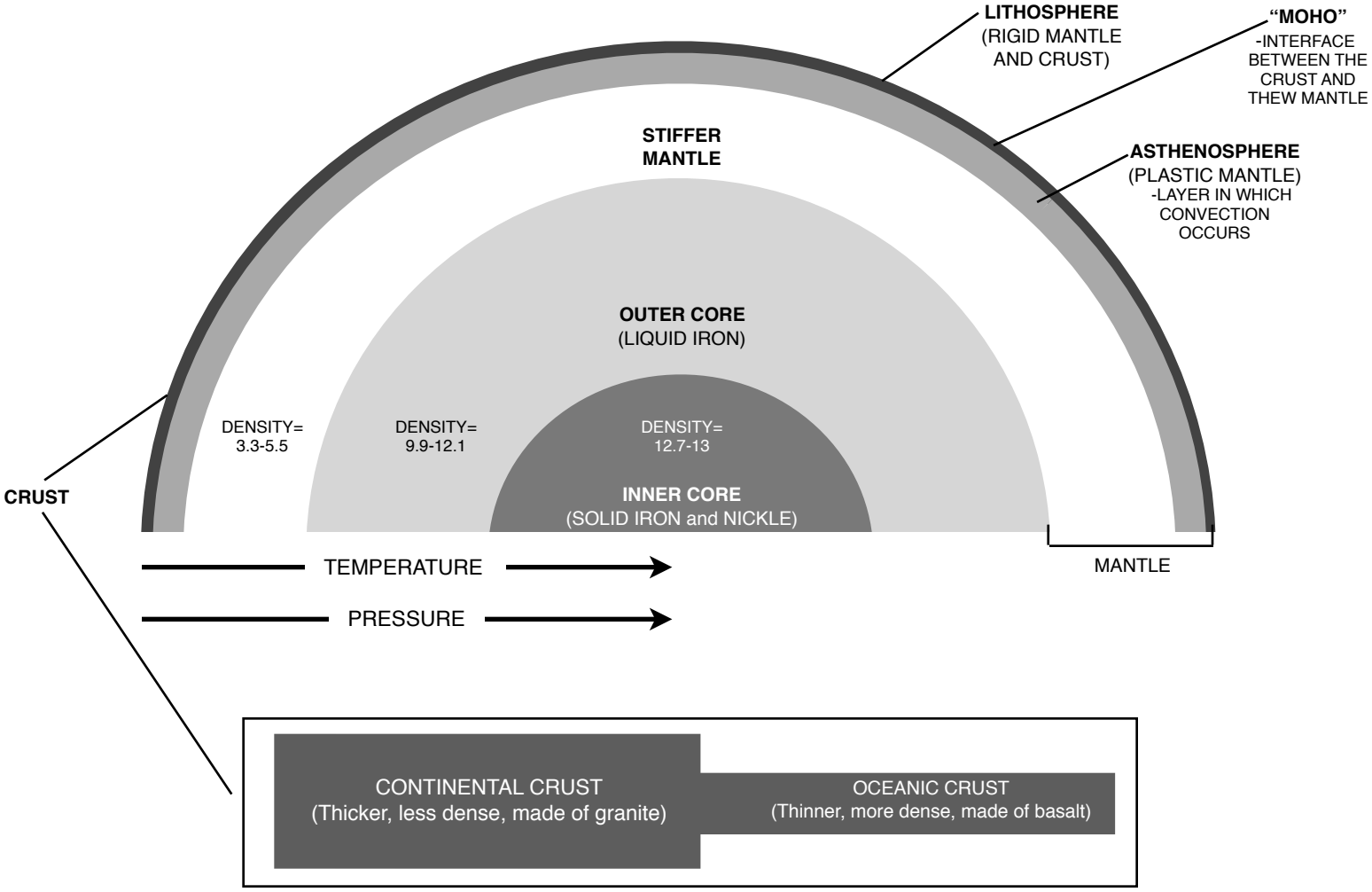
## EARTH'S INTERIOR




*Our understanding of the earth's interior is based entirely on the study of earthquake waves. Be sure to understand and know how to use page 10 of the ESRTs, the inferred properties of the earth's interior.

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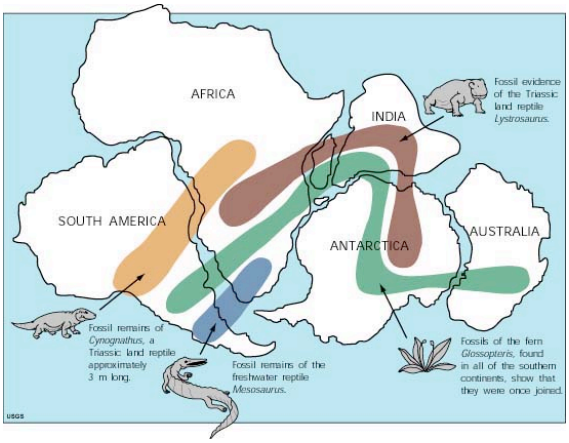
## CONTINENTAL DRIFT

- Proposed by Alfred Wegener, a German meteorologist in 1910
- Suggested that the continents have been moving across the earth's surface for millions of years.



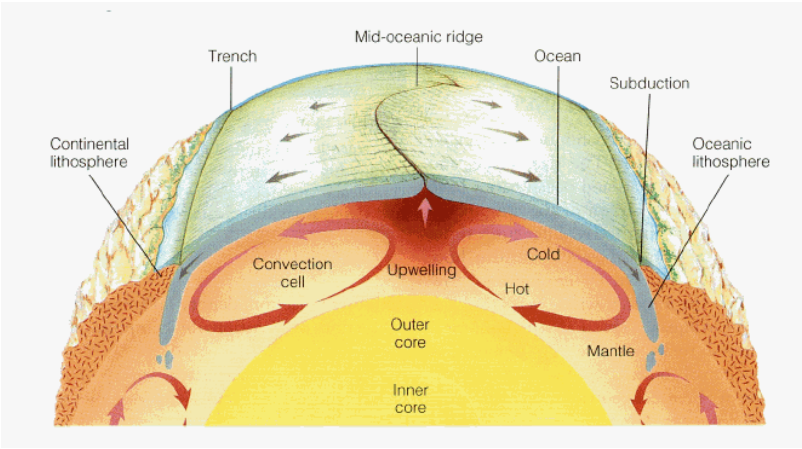

- Suggested that continents were once together in a super-continent called Pangaea about 250 million years ago
- Presented the following pieces of evidence:

✳ The apparent fit of the continents
✳ Fossil correlation
✳ Rock/Mountain correlation
✳ Paleoclimate data (coal in Antarctica, Glaciers in the tropics)

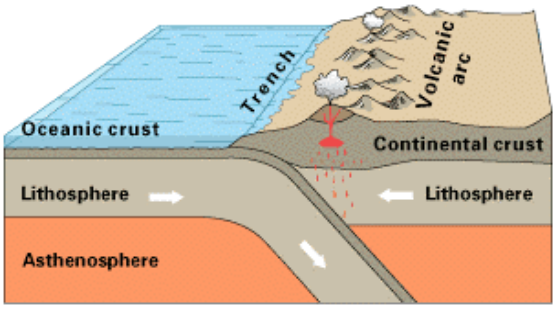
- Wegener's theory was rejected because he failed to explain what force was driving the motion

## PLATE TECTONICS

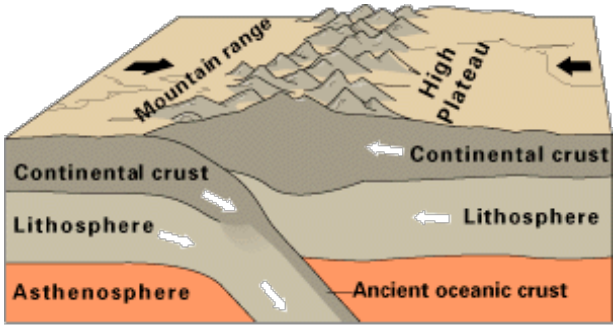
- Theory developed in the mid-1900's that explained all geologic observations including mountains, earthquakes, volcanoes, and trenches
- The lithosphere of the earth is broken up into plates which "float" on the plastic asthenosphere below
- Convection currents in the asthenosphere move the plates around
- Plates interact with each other in three ways:
  - ✳ Move towards each other (CONVERGENT)
  - ✳ Move away from each other (DIVERGENT)
  - ✳ Slide past one another (TRANSFORM)



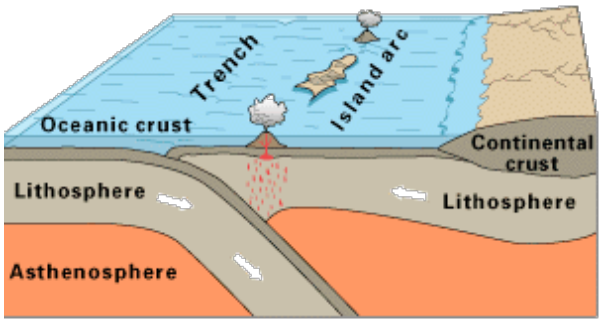

### *CONVERGENT PLATE BOUNDARIES*




- **Subduction zone** (continental crust and oceanic crust)
- The oceanic crust is forced beneath the continental crust because it is more dense
- Volcanoes, mountains, earthquakes and trenches are common
- Example: Western South America



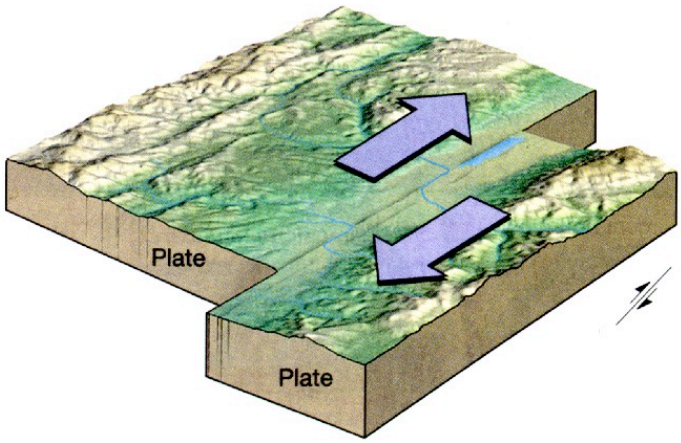

- **Collision zone** (continental crust and continental crust)
- The colliding plates have the same density and therefore crumple up as they collide
- Mountains and earthquakes are common
- Example: Himalayas




- **Island Arc** (oceanic crust and oceanic crust)
- The two oceanic plates collide and one usually subducts under the other
- Volcanic islands, earthquakes and trenches are common
- Example: Aleutian Islands

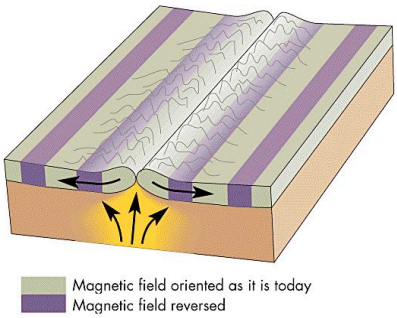
### *TRANSFORM PLATE BOUNDARIES*

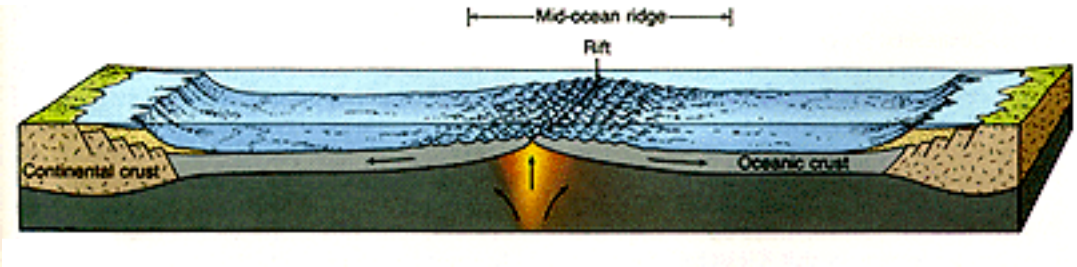
- Two plates slide laterally past one another
- Earthquakes are common as friction and pressure builds up between the plates
- Example: San Andreas Fault



## *DIVERGENT PLATE BOUNDARIES*

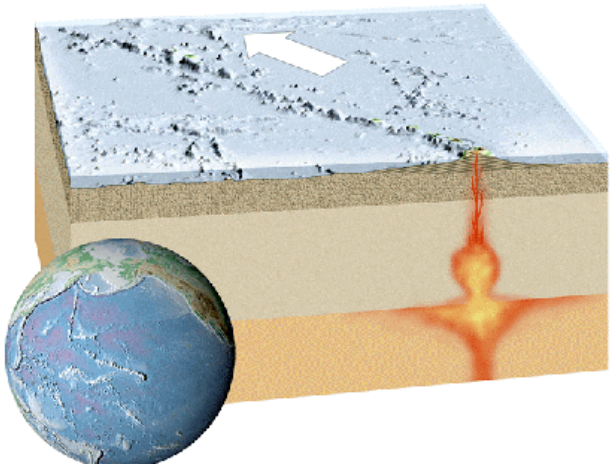
- Two plates move away from one another
- Magma rises at the boundary forming a ridge with a valley and new sea-floor
- Alternating bands of magnetic polarity are locked in the sea-floor
- Sea-floor rock gets increasing older as you move away from the boundary
- Example: Mid-Atlantic Ridge




## HOT SPOTS

- There are locations on earth, away from plate boundaries, where volcanic activity occurs
- Magma rises from the mantle and forces its way through the lithosphere, forming a chain of volcanoes.
- Example: Hawaii



## DEFORMATION

- When plates interact, rocks are exposed to intense pressure which cause deformation
- Rock layers are always laid down horizontally; if they are observed in any other position, you can infer that deformation has taken place
- The discovery of marine fossils high in mountains is evidence for **crustal uplift**
- Major types of deformation include **folds**, **faults**, and **tilts**