Unit 2 – Earth's Structure

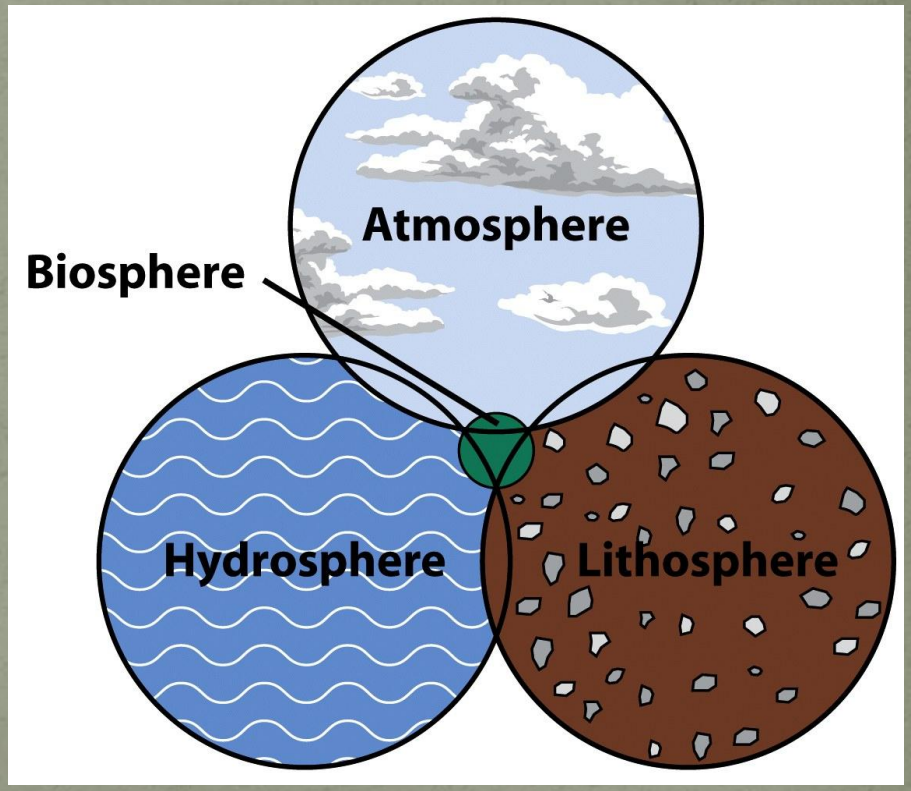
Section 1 – Plate Movement

Geology

- Geology is the study of planet Earth, including its composition and structure.

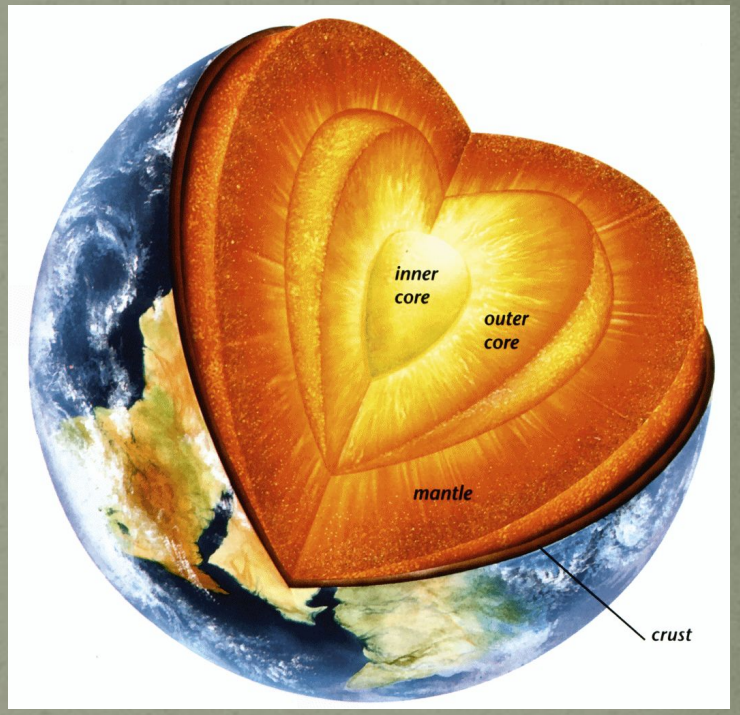
Earth's Realms

- Earth is divided into 4 major realms:
  - Atmosphere – gases surrounding earth
  - Hydrosphere - earth's supply of water
  - Lithosphere - soil and rock of the earth's crust
  - Biosphere – contains earth's communities, ecosystems, and landscapes; relies on the other three realms for survival.



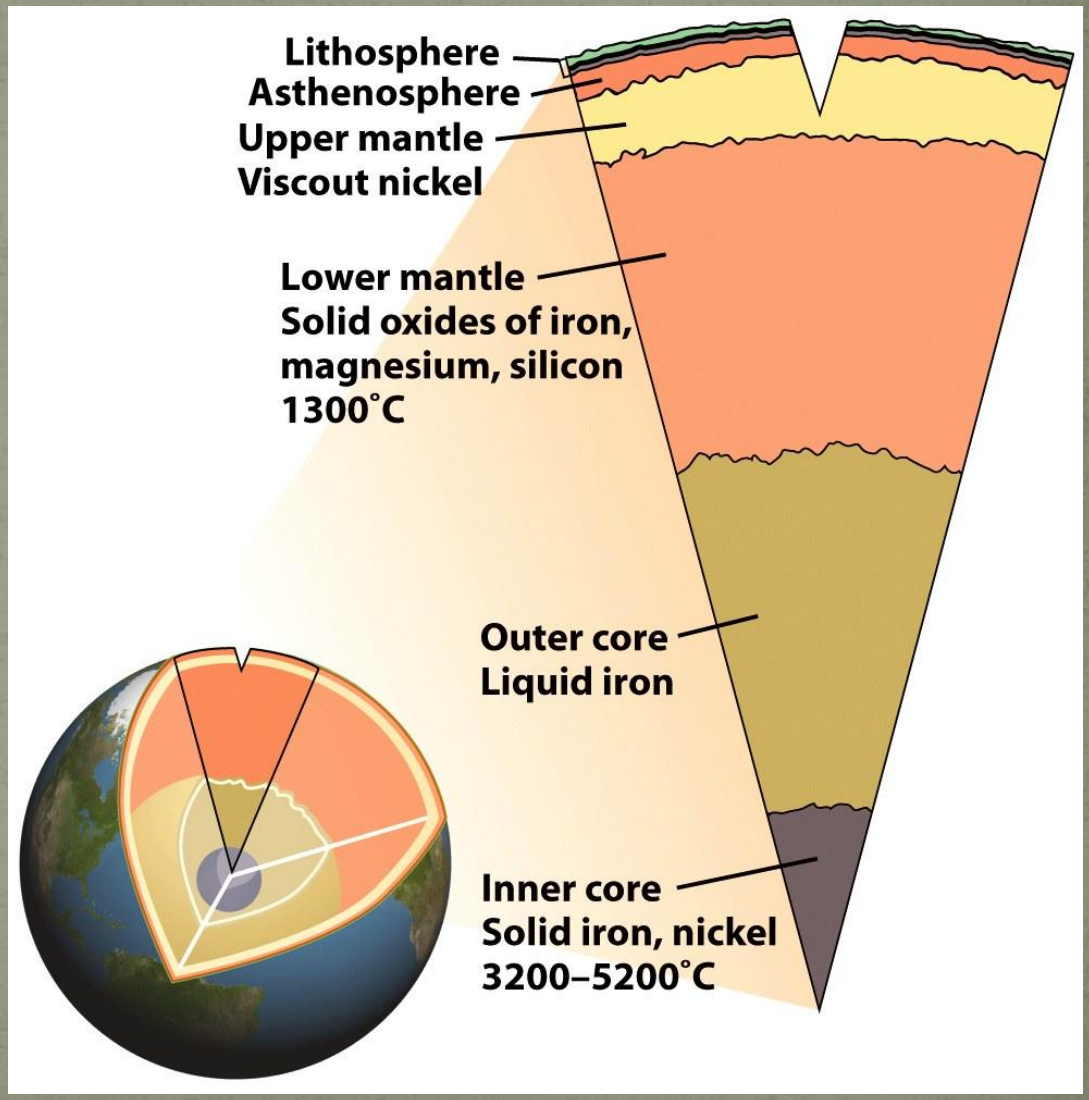
A Cross-Section of Earth

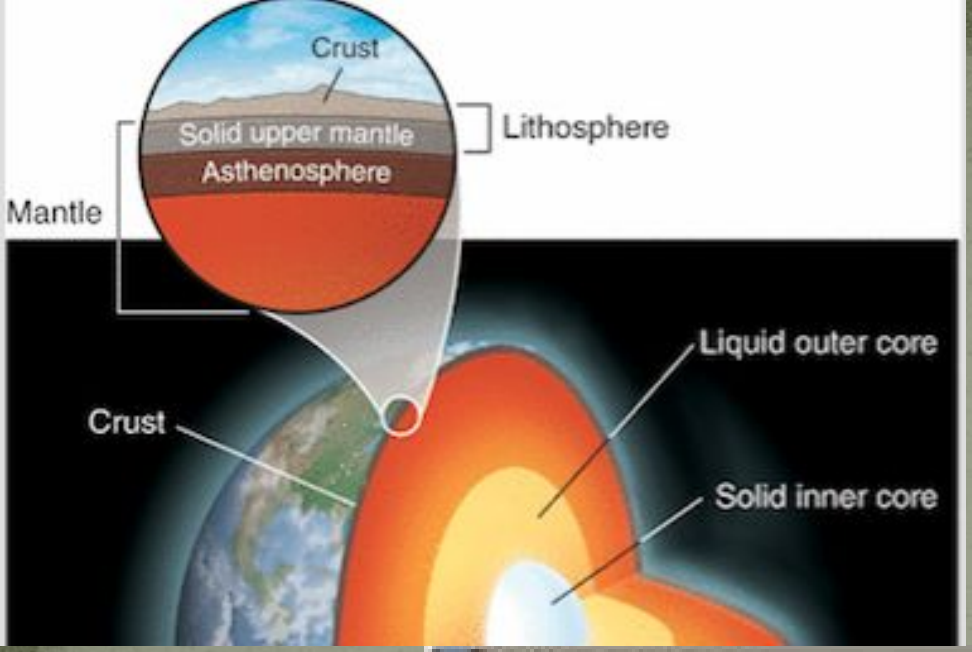
- Earth is divided into three main layers:
  - **Crust** – rocky outer layer of the planet; thinnest part of the earth
  - **Mantle** – very thick layer of hot, but mostly solid rock; some layers soft and fluid
  - **Core** – large sphere of metal that occupies the center of Earth; composed mostly of Iron; hottest part of earth – 5500°C



Internal Planetary Processes

- Layers of the earth that directly affect us
  - Lithosphere
    - Outermost rigid rock layer made up of tectonic plates
  - Asthenosphere
    - Upper mantle comprised of hot, soft rock




Crust
Solid upper mantle
Asthenosphere
Lithosphere
Mantle
Liquid outer core
Crust
Solid inner core

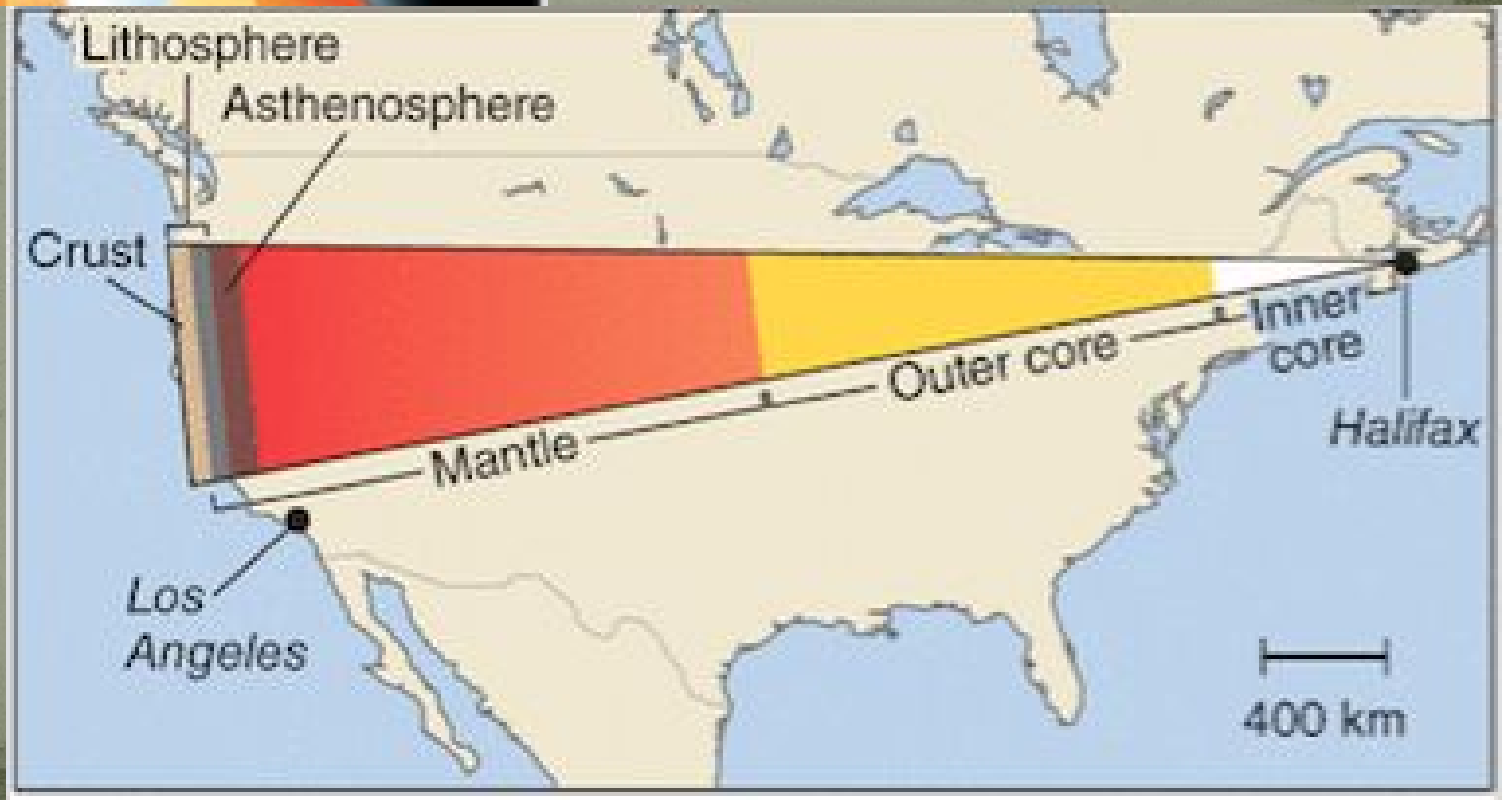
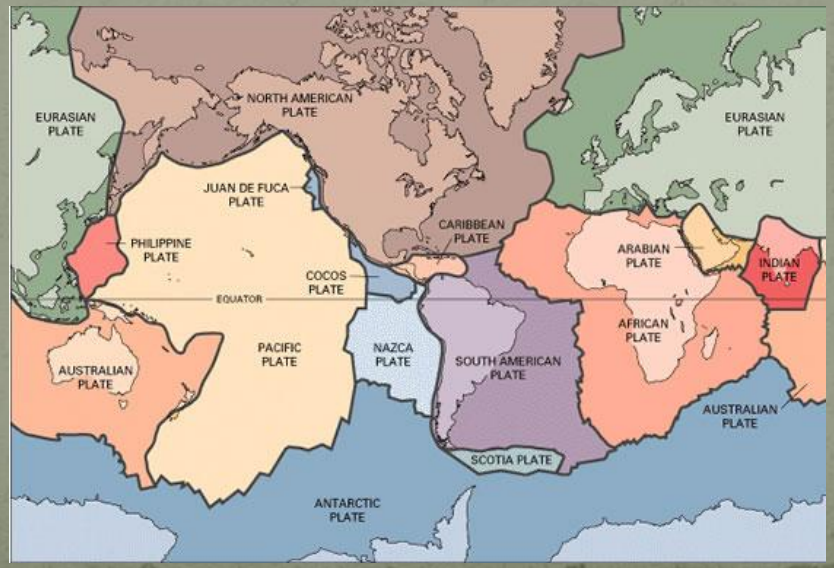

Lithosphere
Asthenosphere
Crust
Mantle
Outer core
Inner core
Halifax
Los Angeles
400 km

Plate Tectonics

- Theory that explains the formation and movement of Earth's *plates*, large chunks of the crust that move slowly around the planet.
- As these plates move, they can interact with one another forming mountains, ocean trenches, or new land.



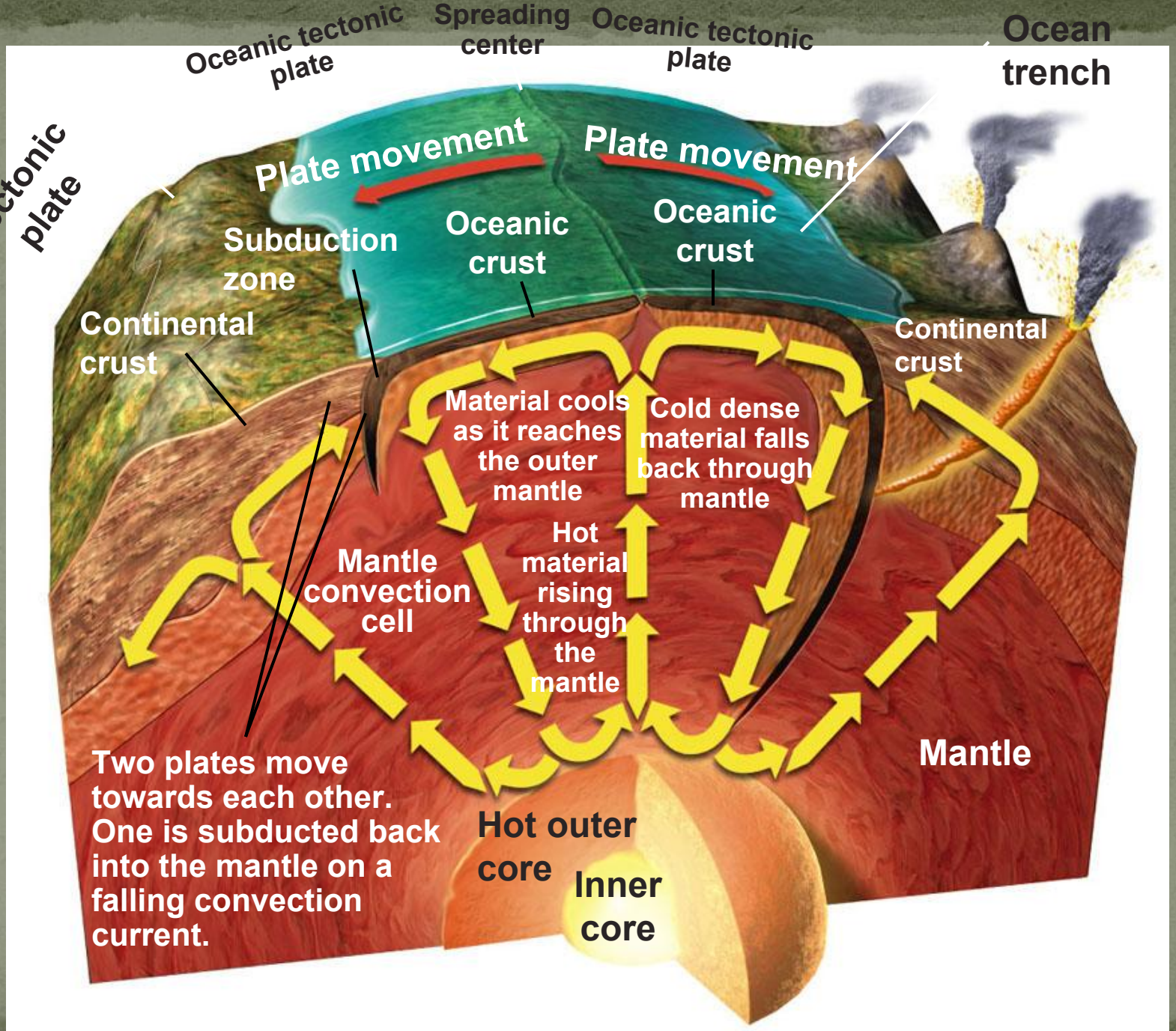
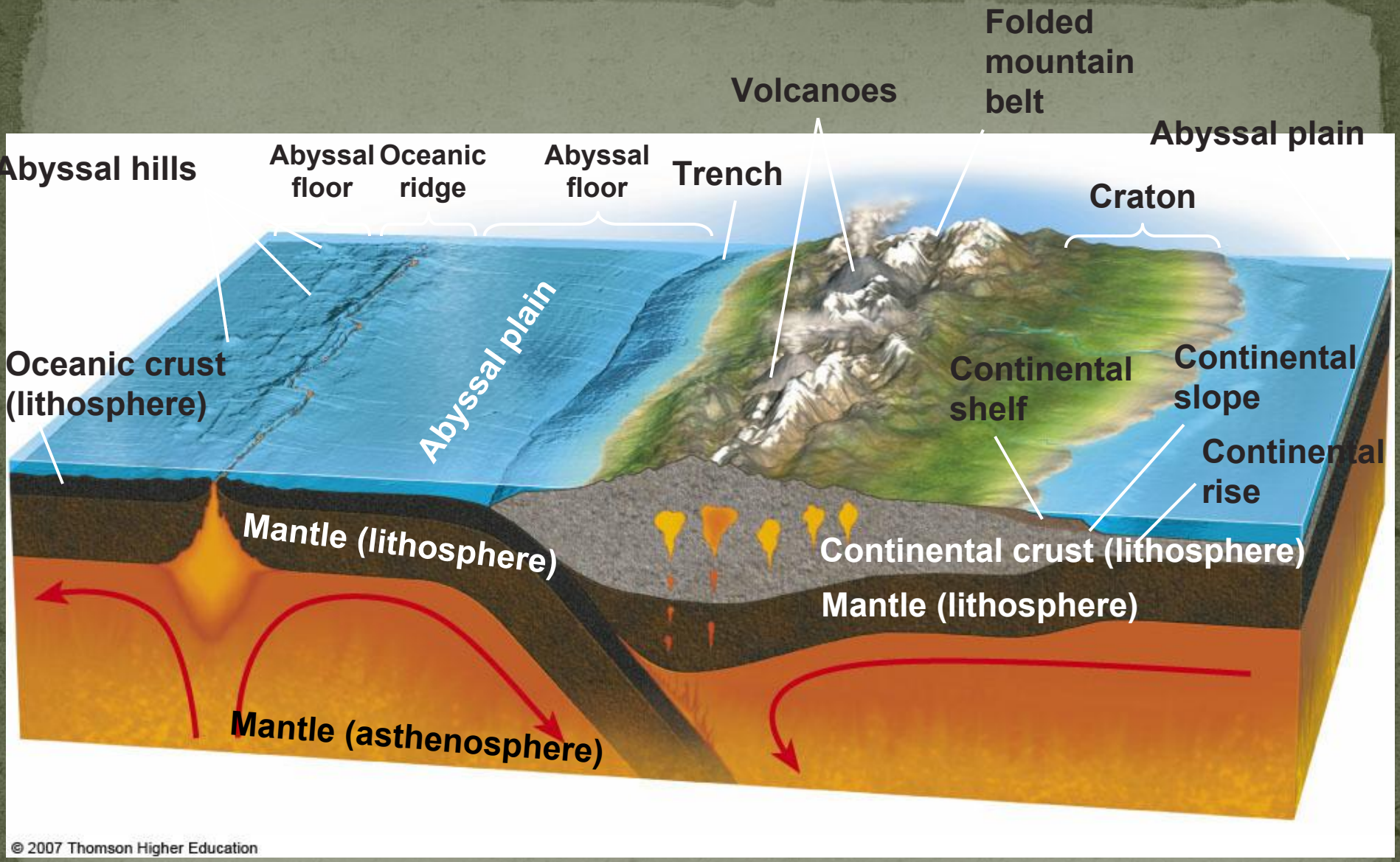


Plate Boundaries

- The locations at which plates meet are called plate boundaries
  - There are three main types:
    - Divergent Boundaries
    - Convergent Boundaries
    - Transform Boundaries
  - The type of boundary it is tells you how the plates interact


Folded mountain belt
Volcanoes
Abyssal plain
Abyssal hills
Abyssal floor
Oceanic ridge
Abyssal floor
Trench
Craton
Abyssal plain
Oceanic crust (lithosphere)
Continental shelf
Continental slope
Continental rise
Mantle (lithosphere)
Continental crust (lithosphere)
Mantle (lithosphere)
Mantle (asthenosphere)
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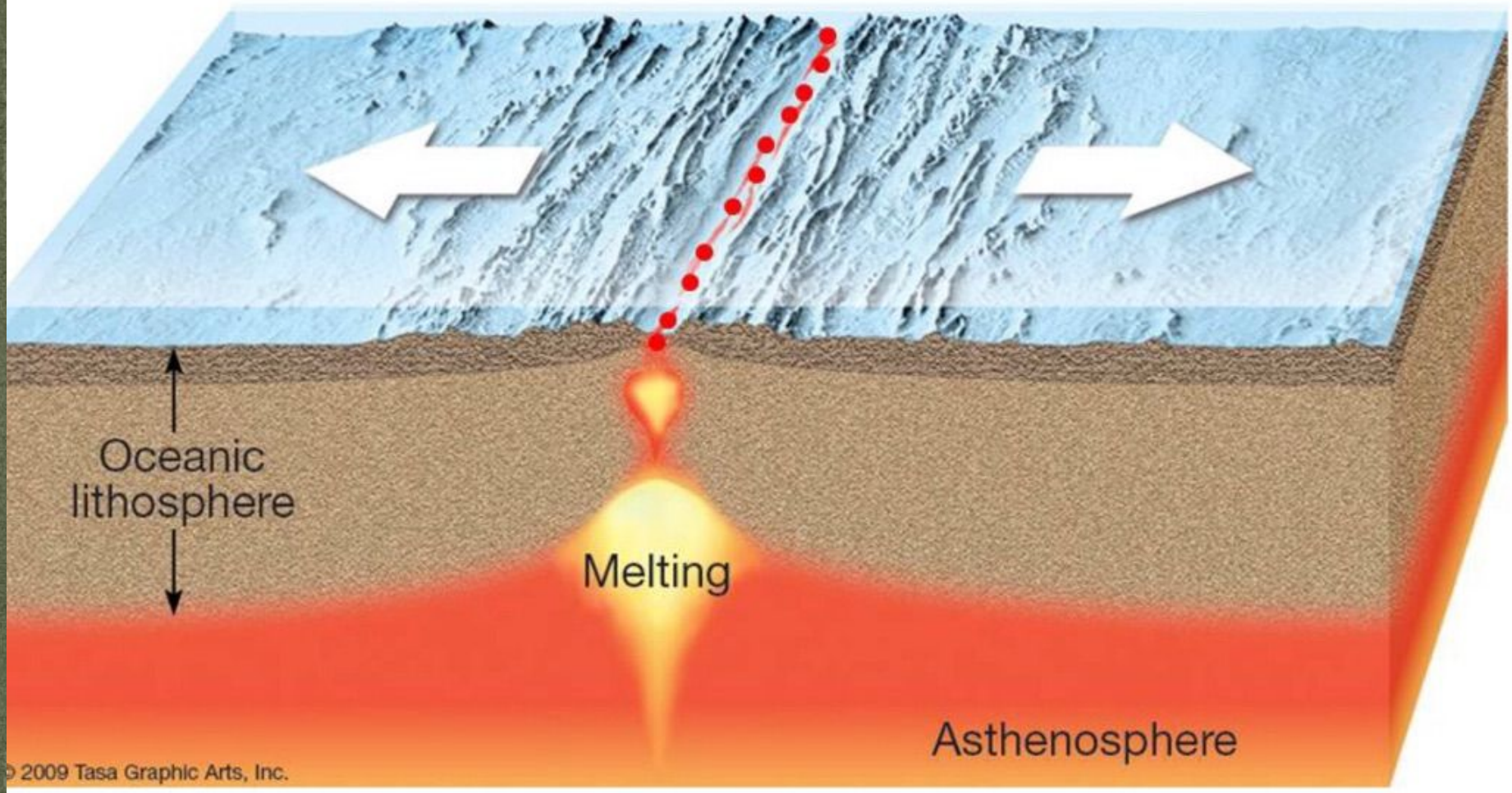
Divergent Boundaries

- Where plates move apart
- When Continental plates move apart, they create a rift valley

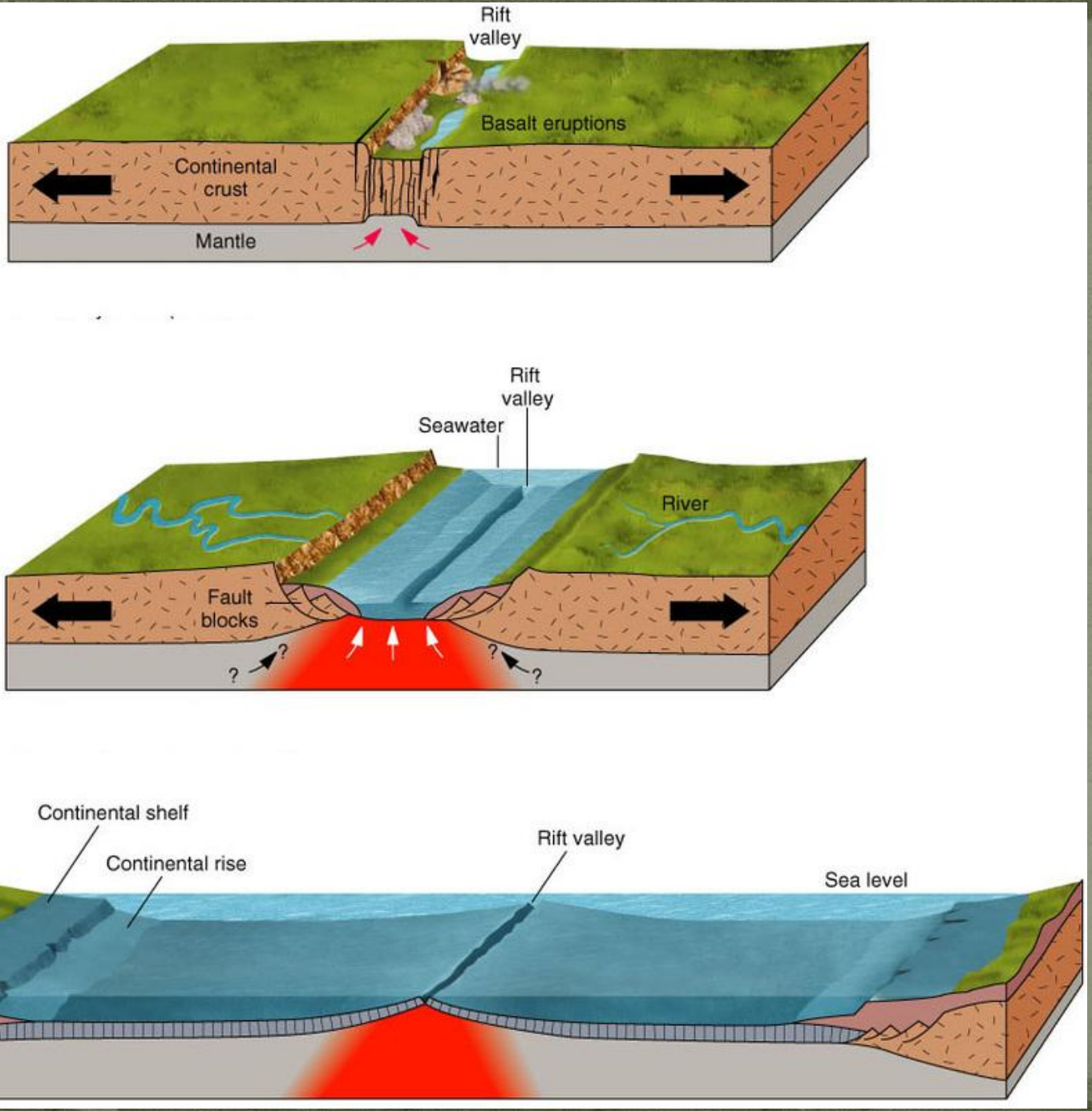
Examples:

- Mid-Atlantic Ridge (Oceanic)
- East Pacific Rise (Oceanic)
- East African Rift (Continental)

DIVERGENT PLATE BOUNDARY

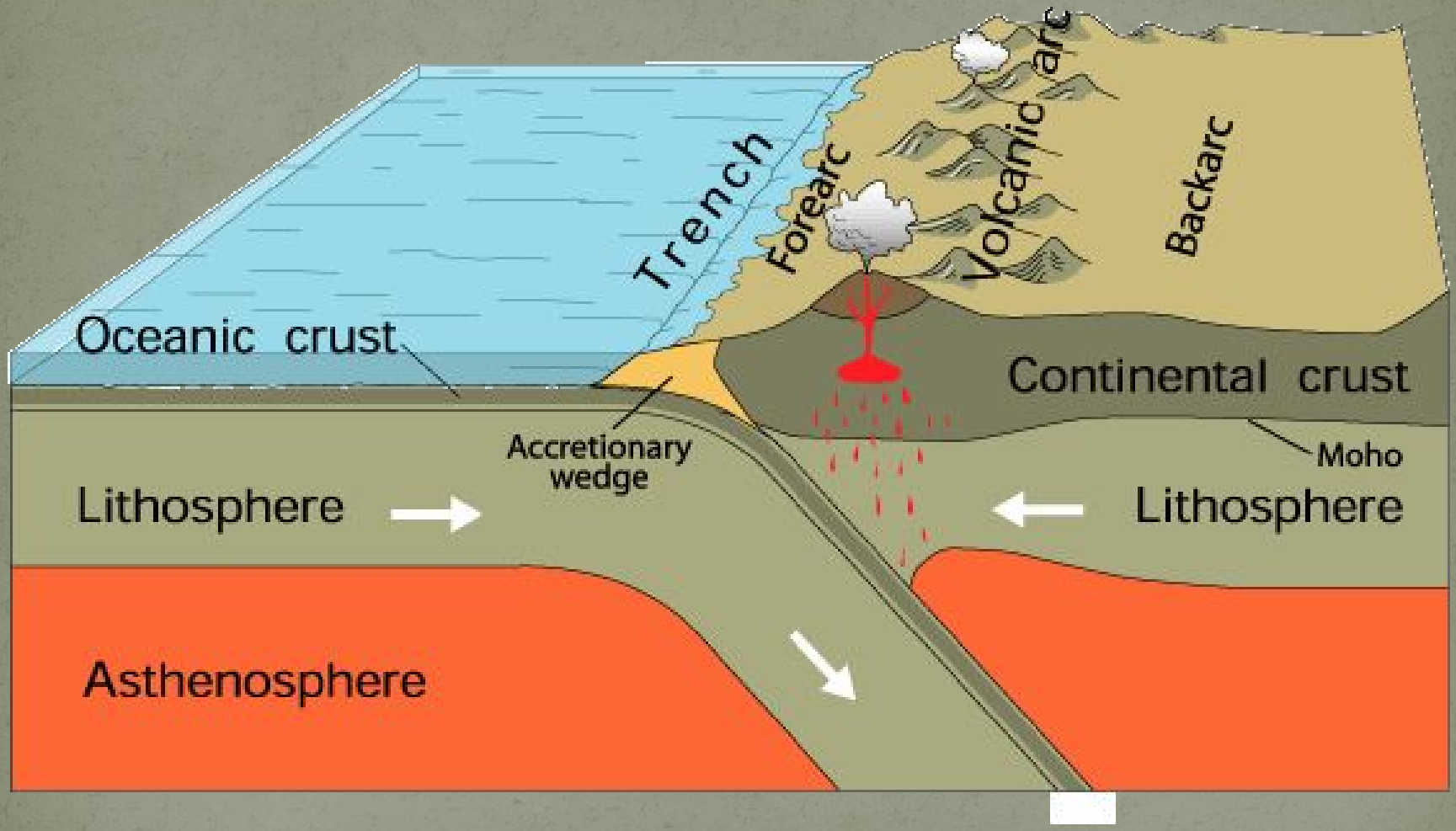


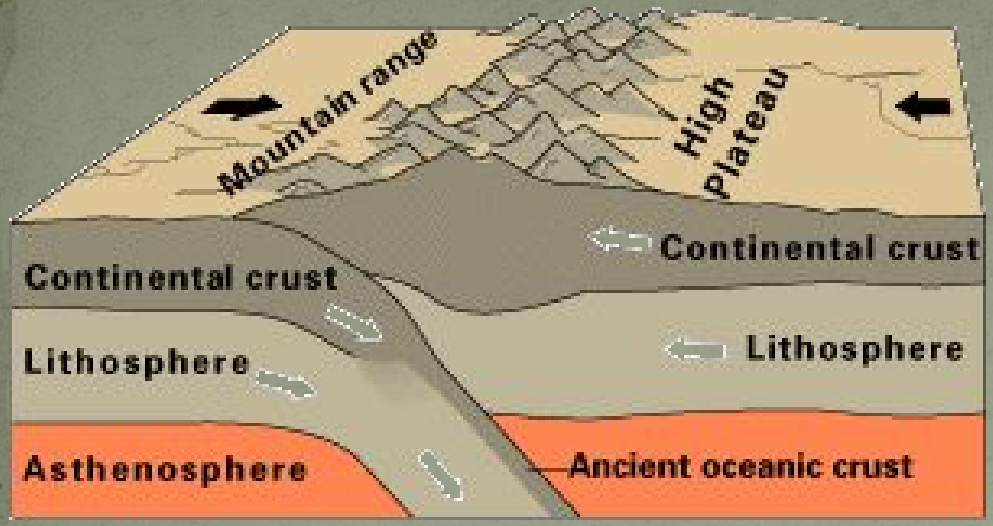
Plates move apart


Rift valley
Basalt eruptions
Continental crust
Mantle
Rift valley
Seawater
River
Fault blocks
? ? ? ?
Continental shelf
Continental rise
Rift valley
Sea level

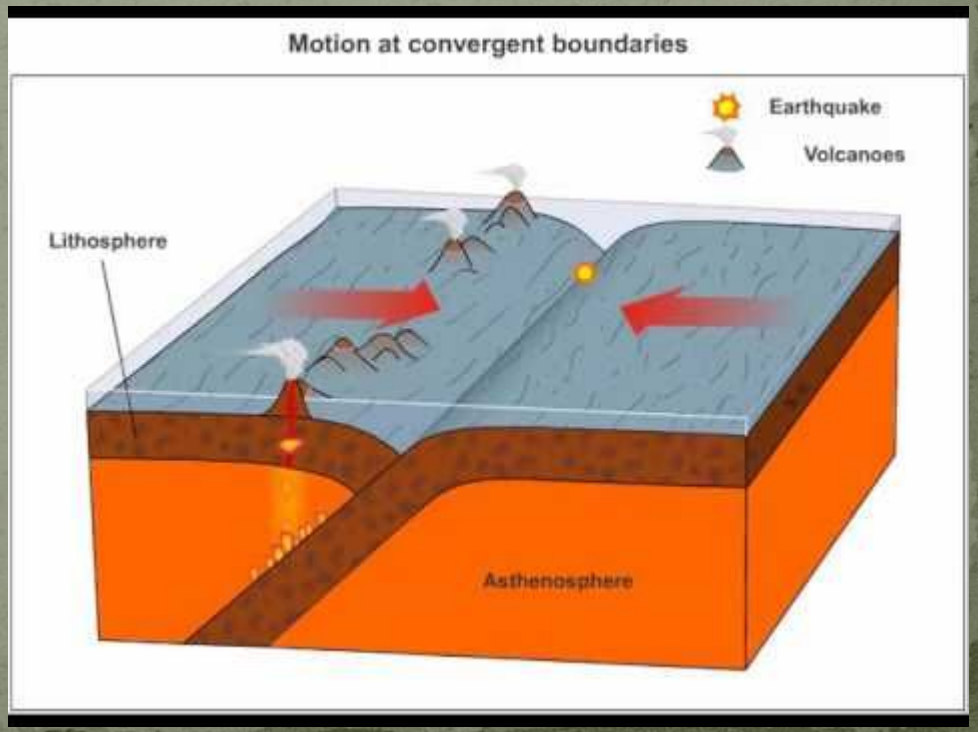
Convergent Boundaries

- One plate goes below (subducts) below another
  - Creates a subduction zone
  - When one plate plunges below another, it will begin to melt
  - Melted plate rises to the surface and erupts, creating volcanoes
  - When two continental plates collide, they can rise to create mountains
- Examples:
  - Himalayas Mountains (Continental)
  - Marianas Trench (Oceanic)
  - Japan Island Arc (Oceanic-Continental)


Trench
Forearc
Volcanic arc
Backarc
Oceanic crust
Continental crust
Accretionary wedge
Moho
Lithosphere
Lithosphere
Asthenosphere



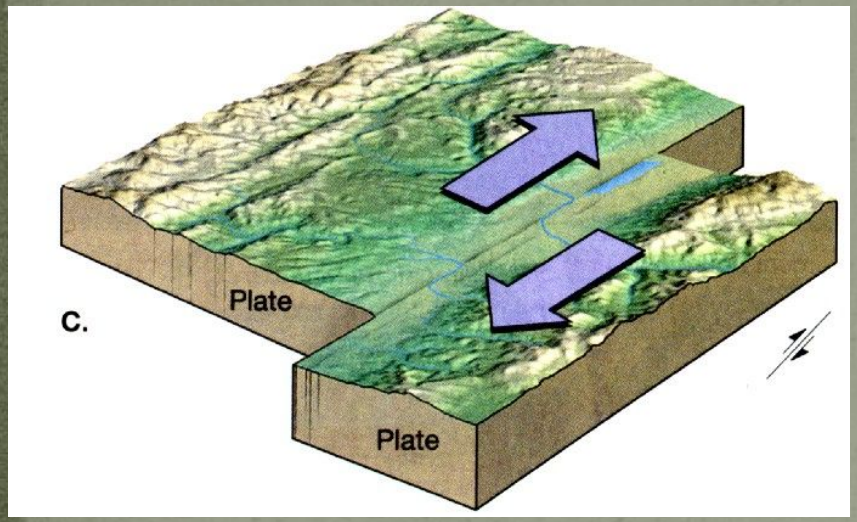
Continental-continental convergence

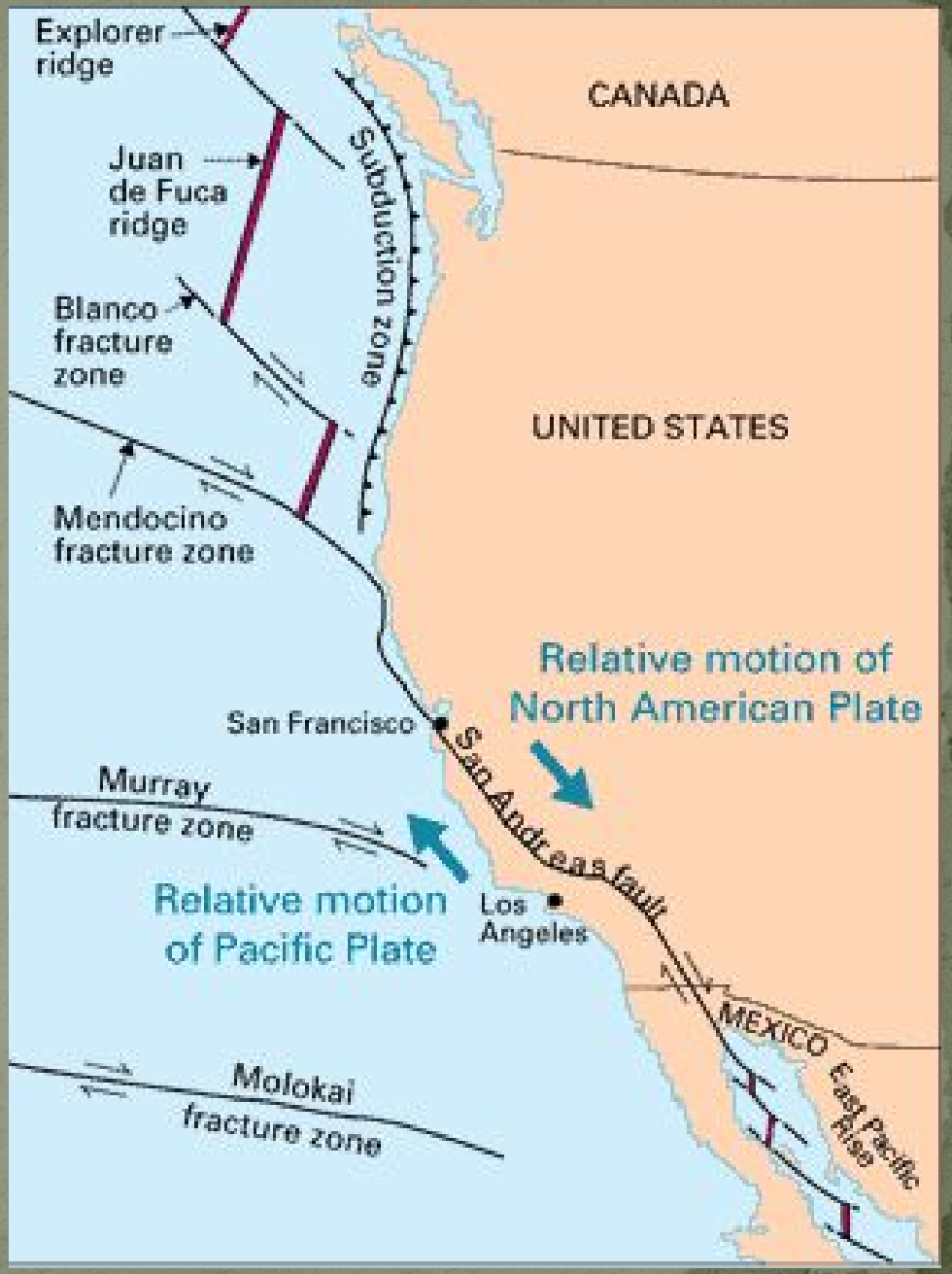


Transform Boundaries

- Plates slide past each other
- Earthquakes very common

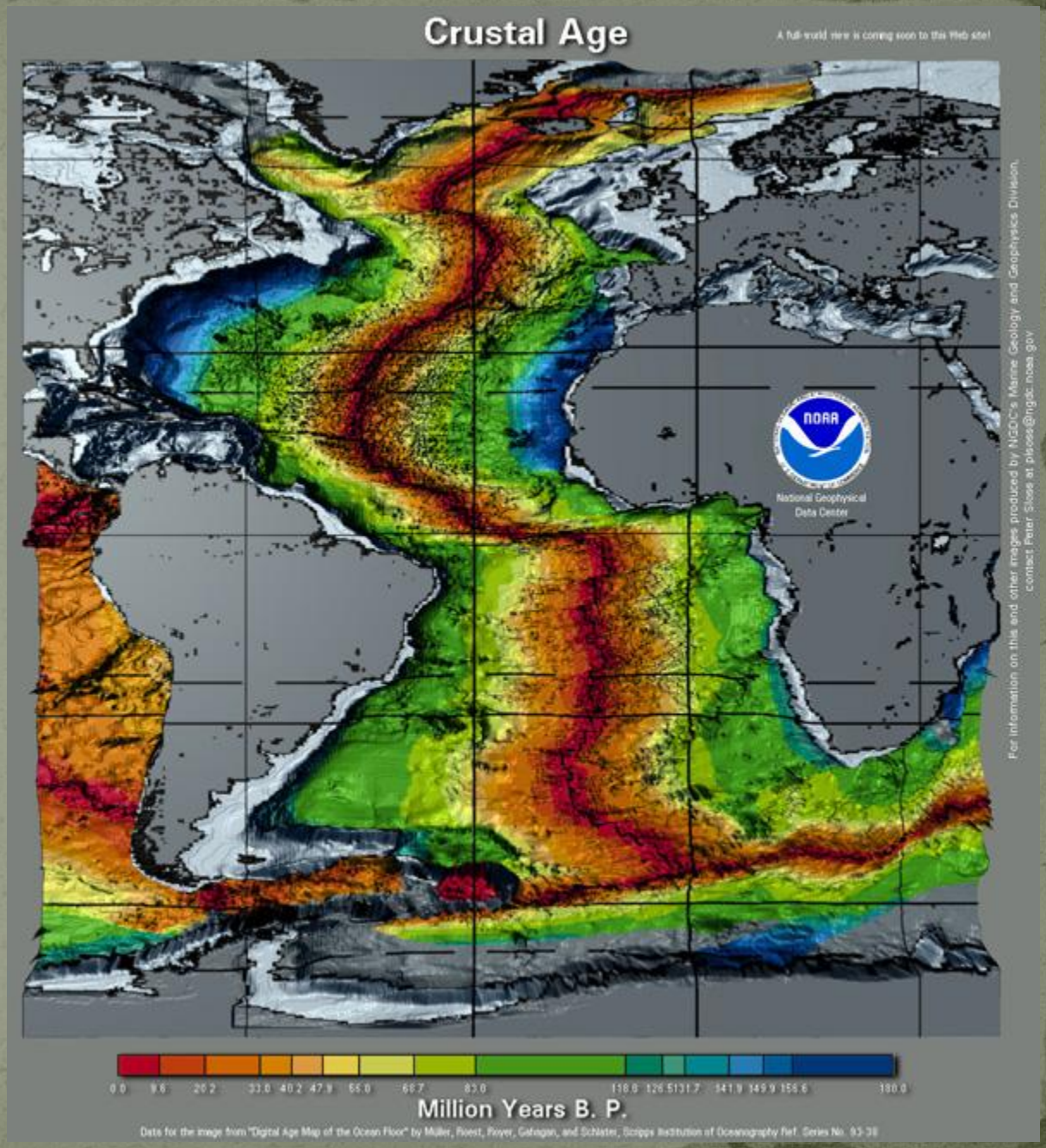
- Examples:
  - San Andreas Fault in California


C.
Plate
Plate


Explorer ridge
Juan de Fuca ridge
Blanco fracture zone
Mendocino fracture zone
Murray fracture zone
Molokai fracture zone
Subduction zone
CANADA
UNITED STATES
MEXICO
San Francisco
Los Angeles
San Andreas fault
Relative motion of North American Plate
Relative motion of Pacific Plate
East Pacific Rise

How do we know the plates are moving???

1. Age of Rocks



2. GPS

- In modern times, we also can track the movement of landforms using GPS coordinates
  - We know they are moving and the direction of movement by looking at how the GPS coordinates of objects can change SLIGHTLY