

Lithosphere *Part 2*

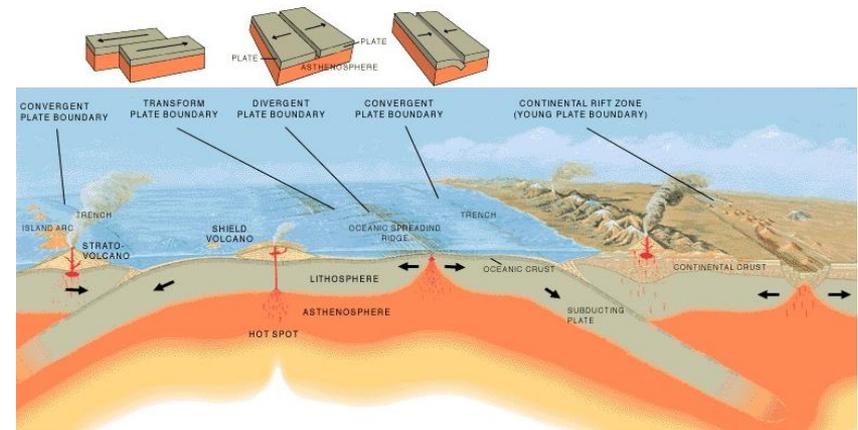
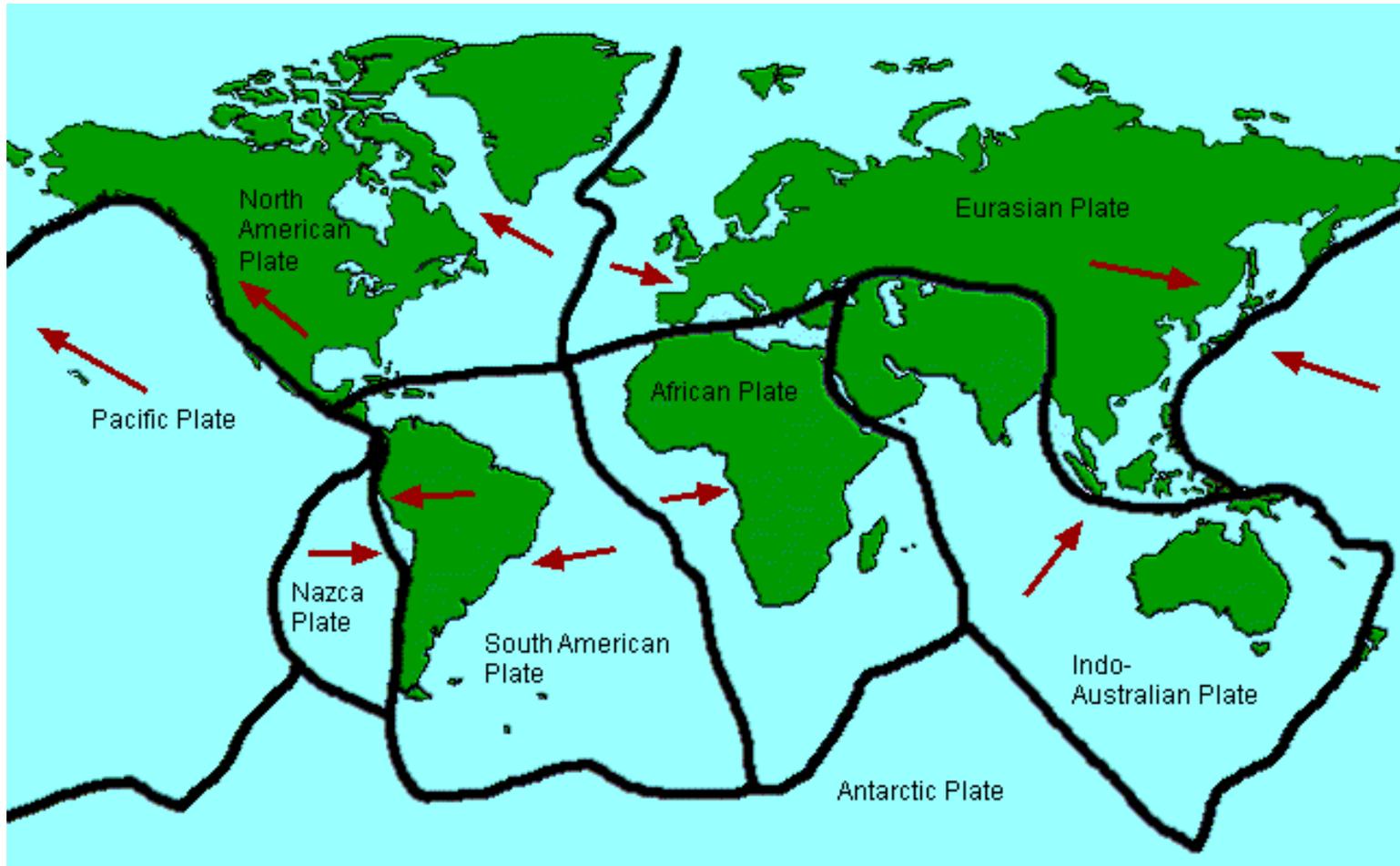


Plate Tectonics

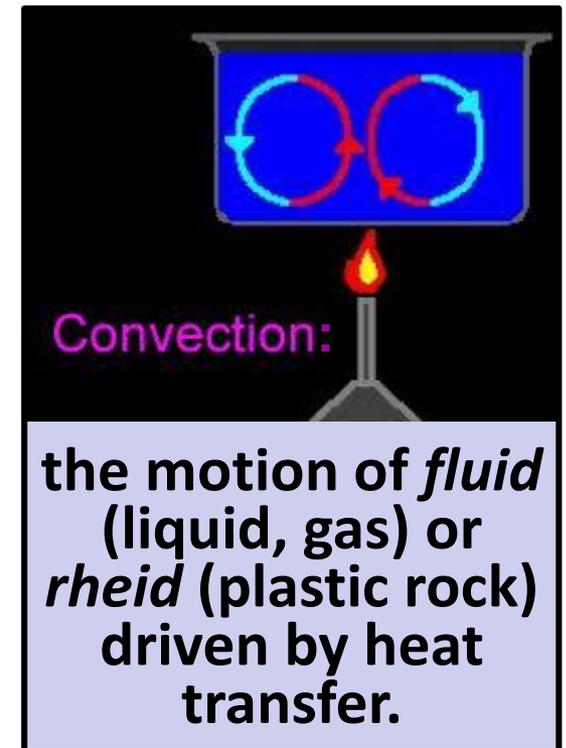
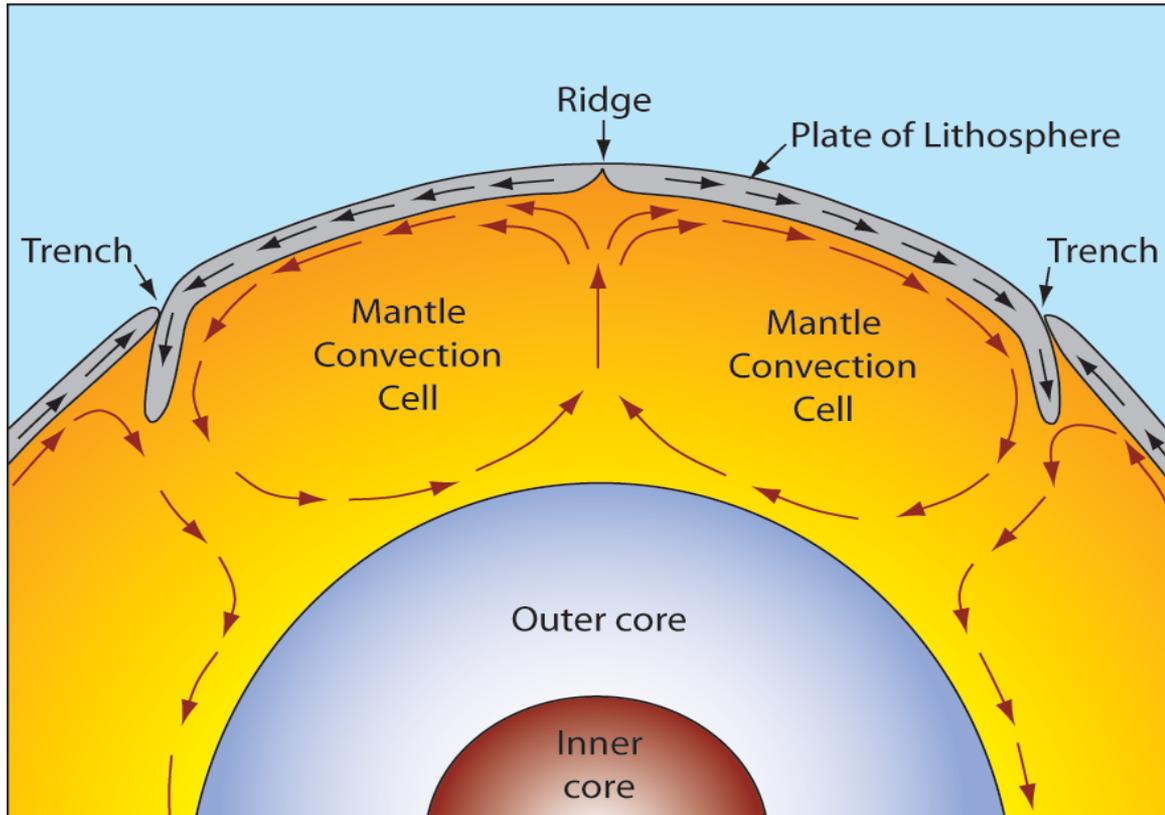
Major Tectonic Plates



All tectonic plates **move** in different directions 1-2 inches per year.

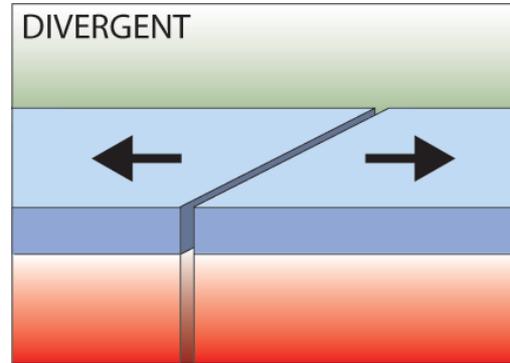
How do Plates Move?

- The driving forces of plate motion still are active subjects of on-going research within geophysics.
- Leading theory: plates of lithosphere are moved around by **convection in the underlying hot mantle**.

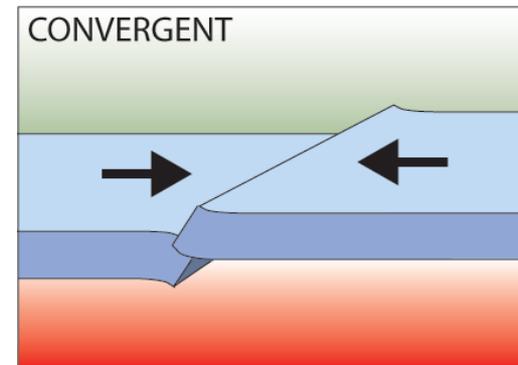


Three types of plate boundary

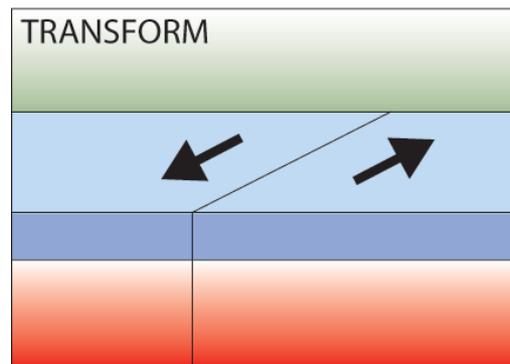
- **Divergent**



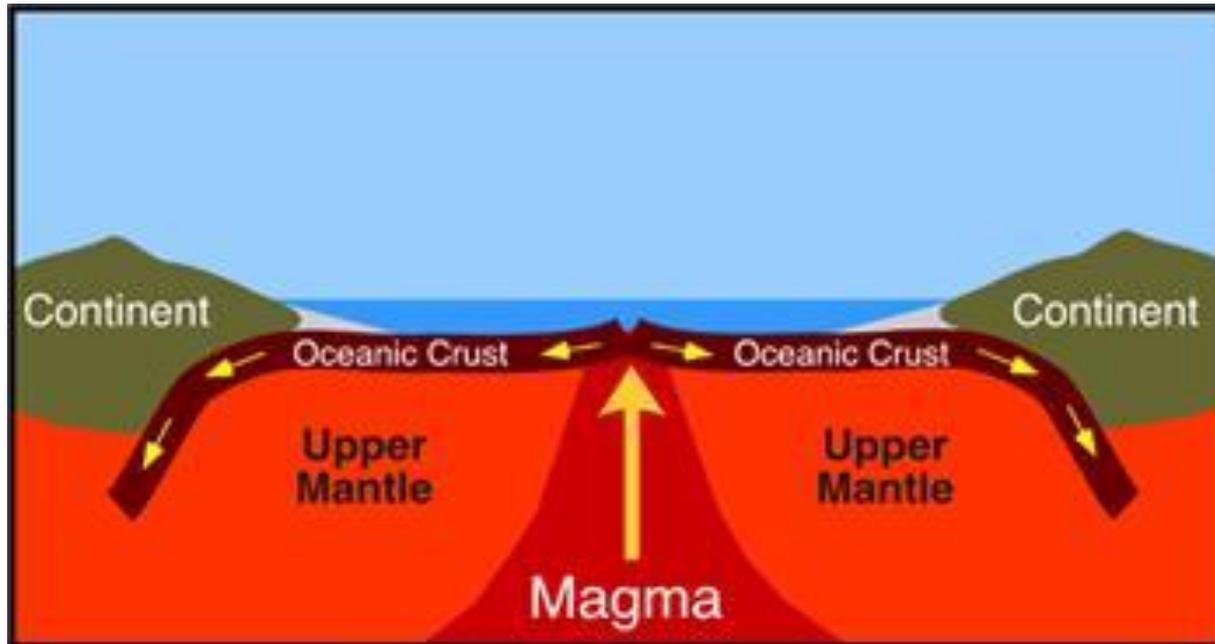
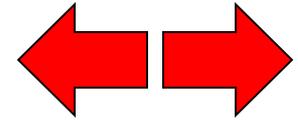
- **Convergent**



- **Transform**



Divergent Boundaries

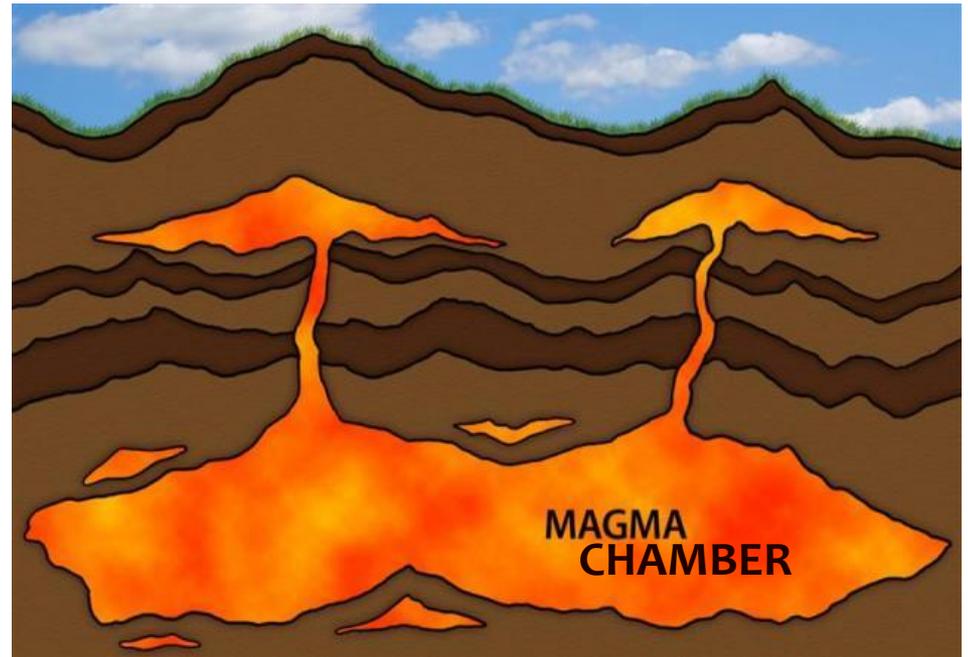
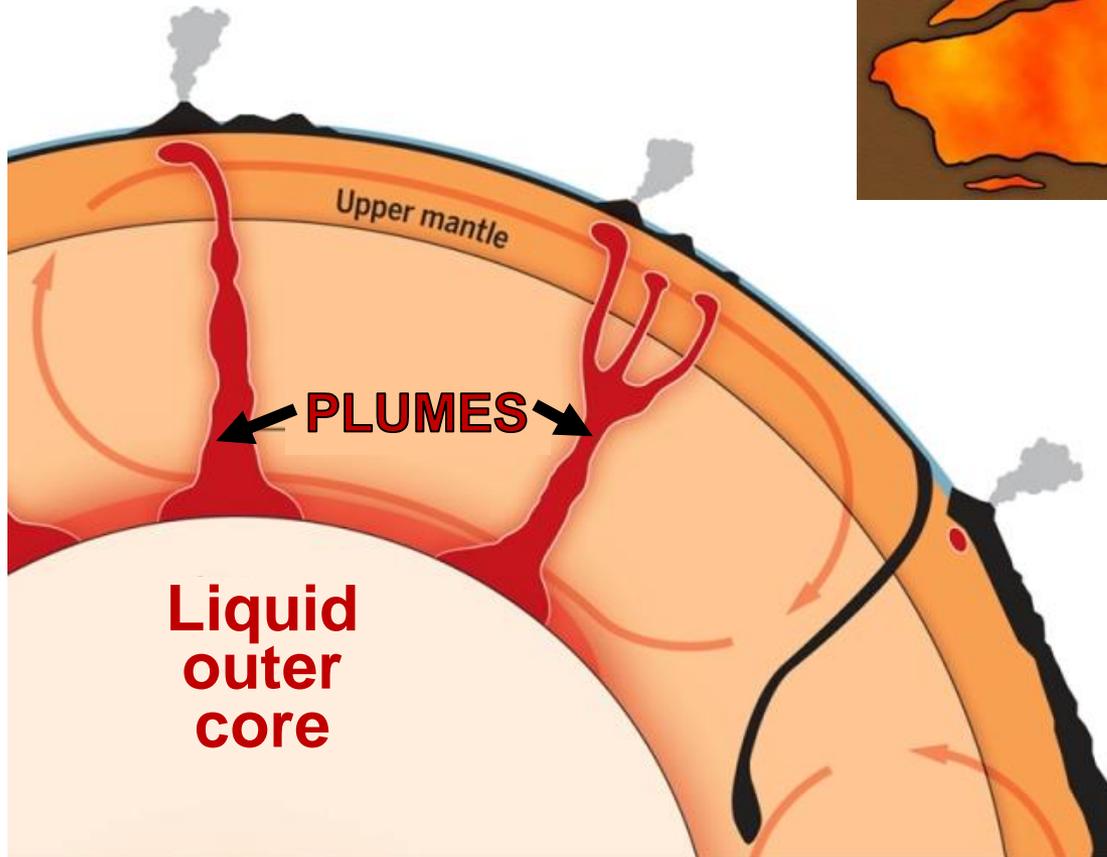


- **Spreading ridges:**
 - as plates **move apart**, new material is **erupted** to fill the gap
 - young crust is formed

**What is
magma
and where
does it come
from?**

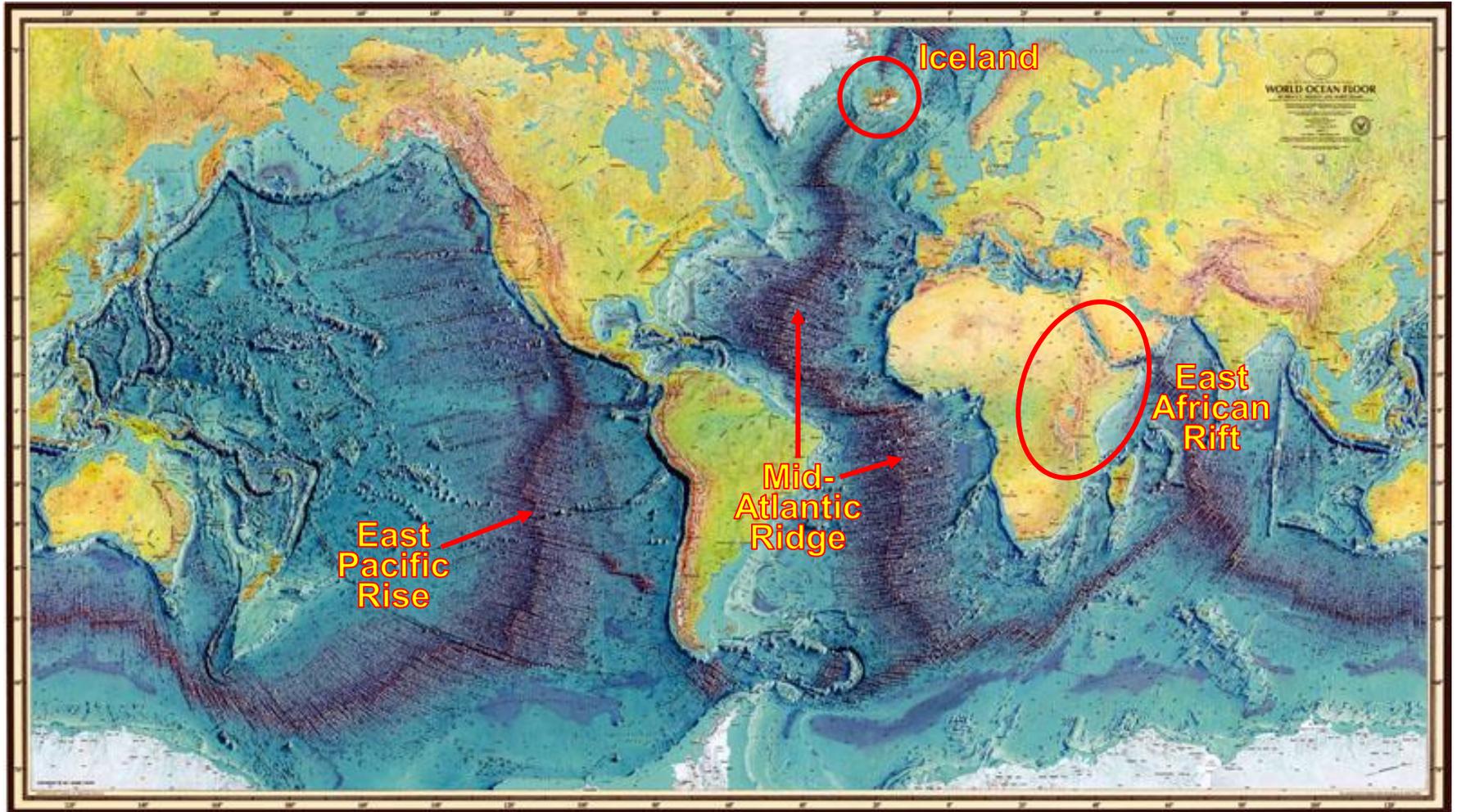
Magma

- Partially molten rock found in high temperature, low pressure environments beneath the Earth's surface.



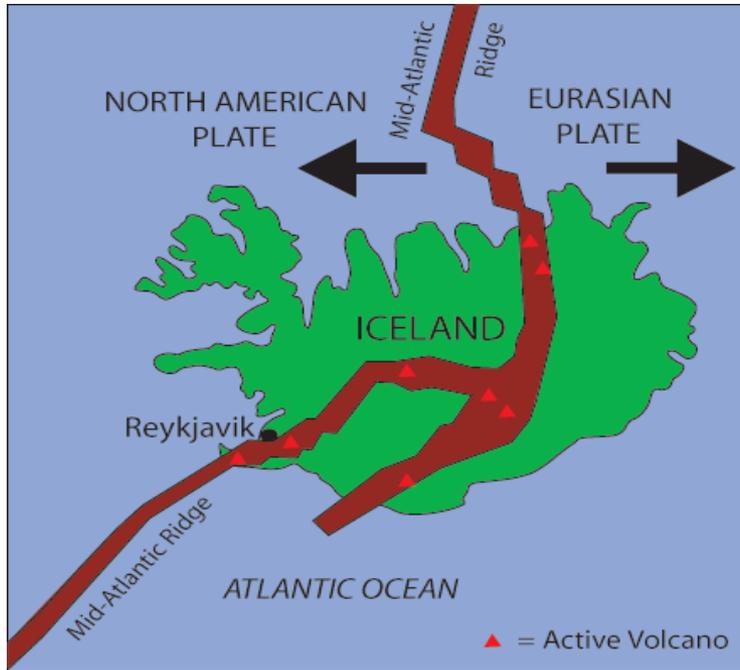
- Develops and collects in **magma chambers** usually within several miles of the Earth's surface.
- May also rise in **mantle plumes** directly from the outer core/mantle boundary.

World's Ocean Ridges and Continental Rifts



The ocean floor is not flat. It has well-pronounced mountain ridges running along the spreading plate boundaries.

Iceland: an example of continental drift

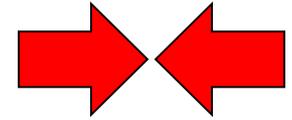


Iceland has a ***divergent plate boundary*** running through its middle.

In fact, the island exists because of this feature!

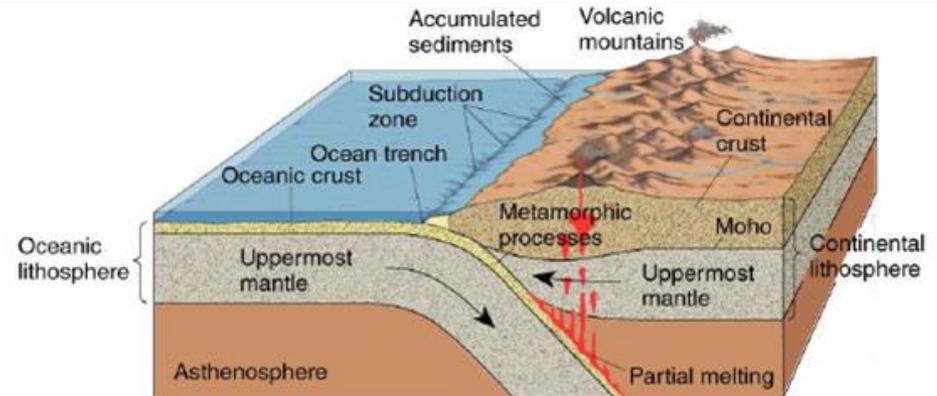


Convergent Boundaries

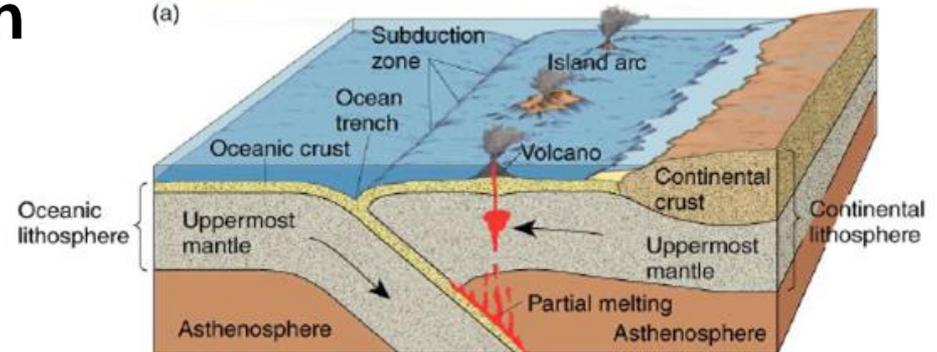


Three types:

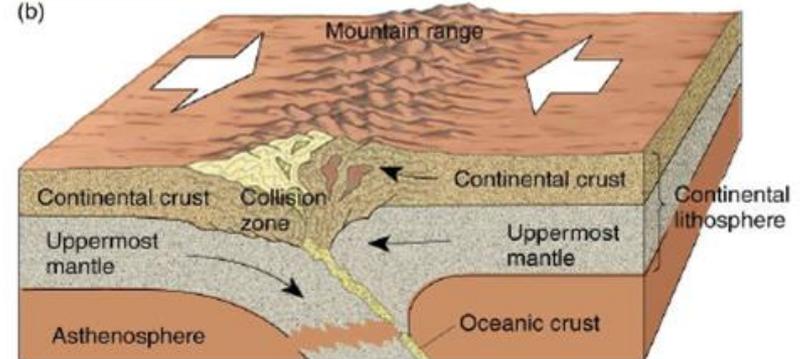
- a) **Continent-oceanic** crust collision
- b) **Ocean-ocean** collision
- c) **Continent-continent** collision



(a)



(b)



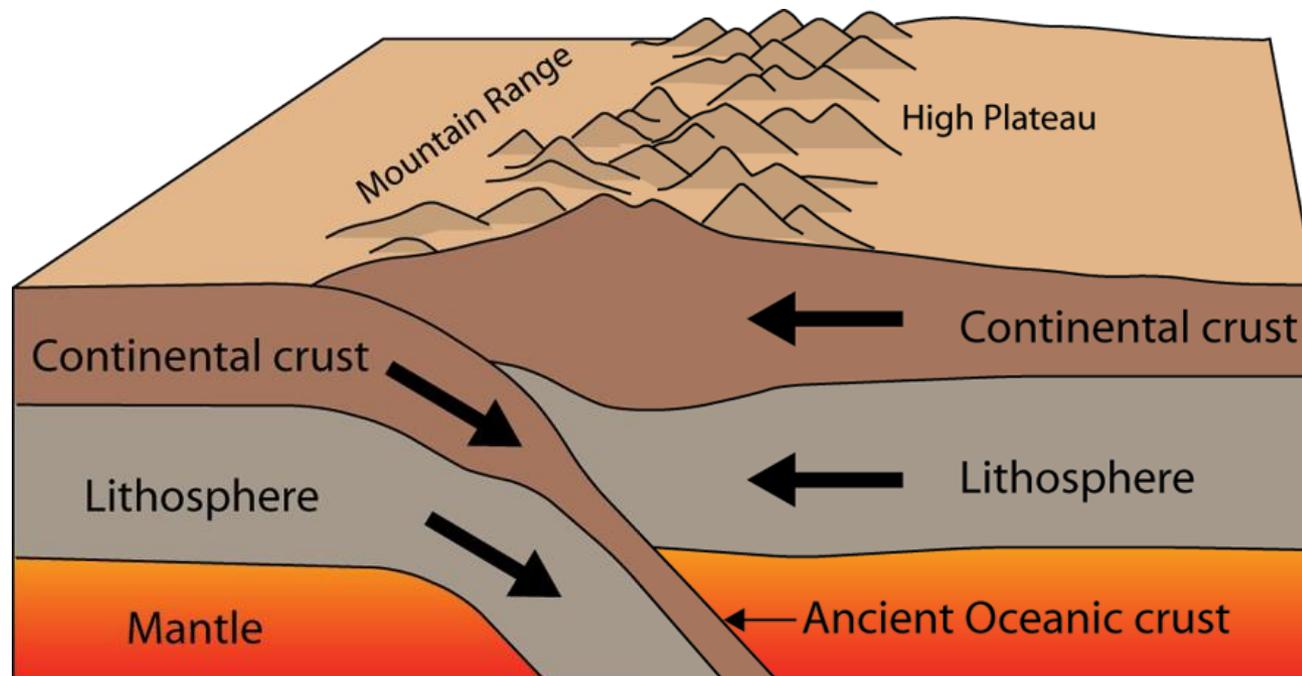
(c)

Convergent boundaries are also called destructive plate boundaries.

Why?

Continent-Continent Collision

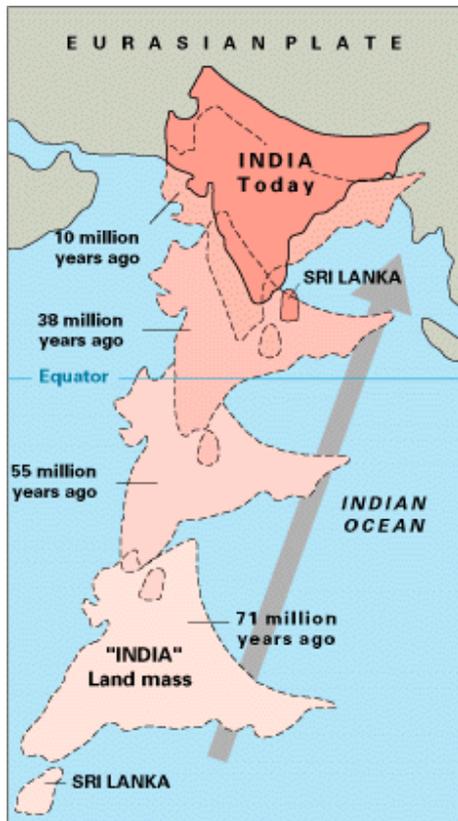
- Plates push against each other



- **Forms mountains** (European Alps, Himalayas)

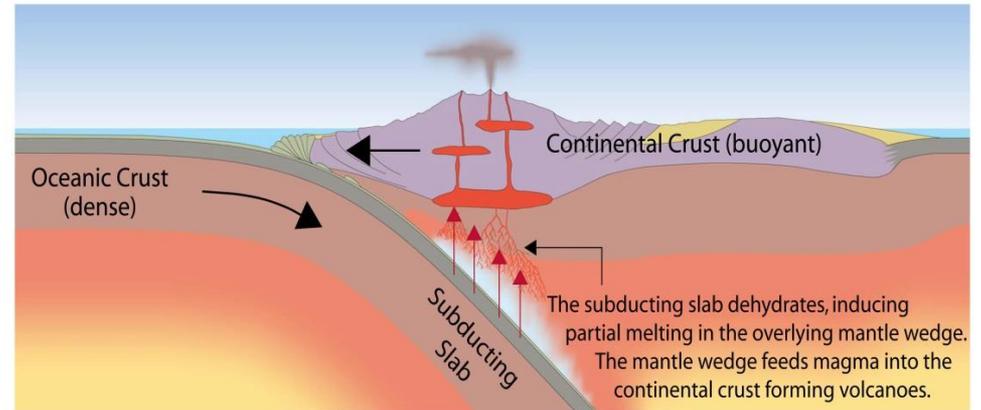
Himalayas

Himalayan range is home to more than one hundred mountains exceeding 7,200 m (23,600 feet) in elevation, and all of the planet's peaks exceeding 8,000 m, including the highest, Mount Everest.



Continent-Oceanic Crust Collision

“Subduction”

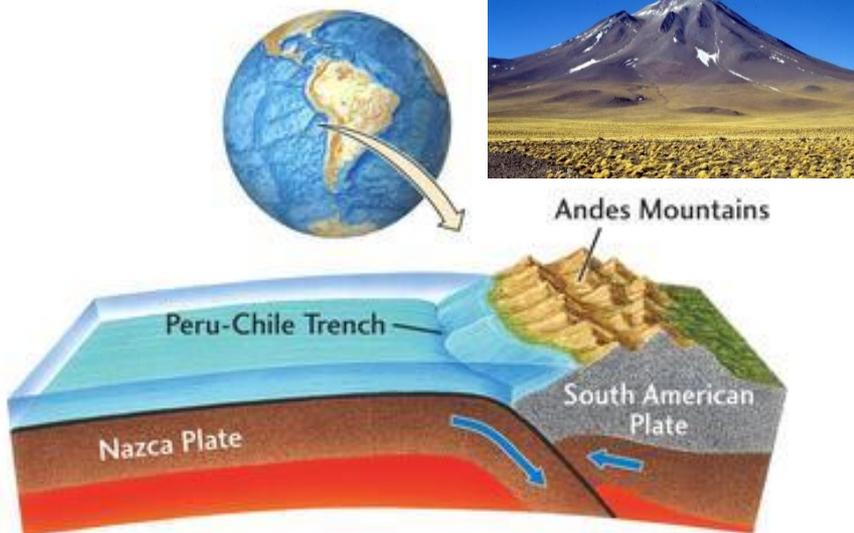


- **Oceanic** lithosphere subducts underneath the **continental** lithosphere.

- As it subsides, oceanic lithosphere heats and dehydrates.

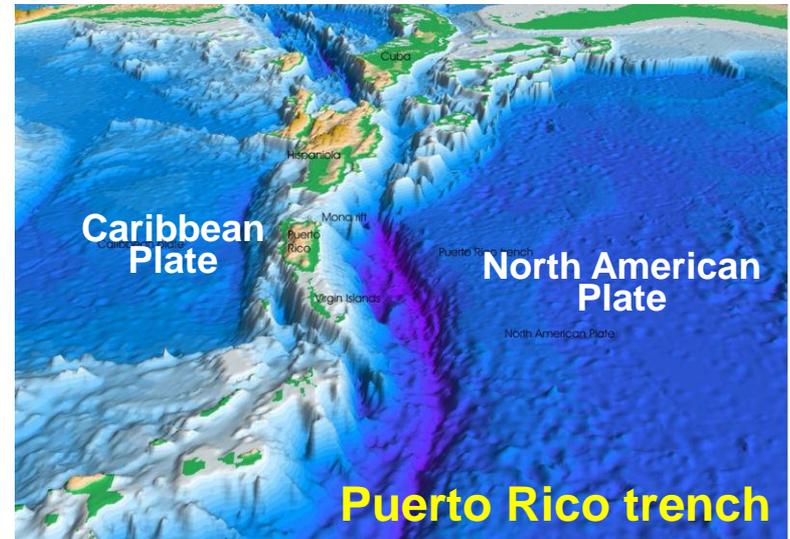
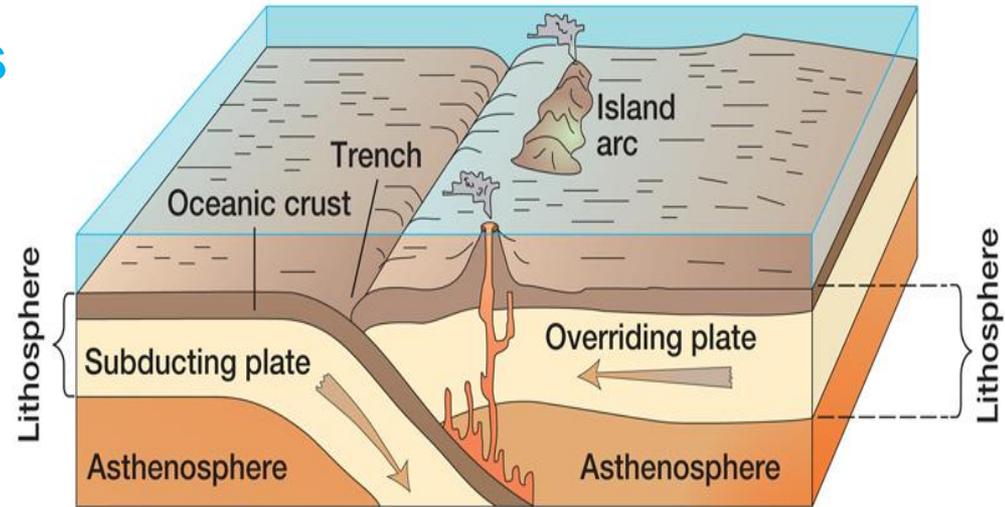
- The melt from mantle rises forming **volcanism**.

- Example: the Andes.

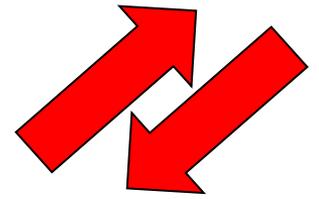


Ocean-Ocean Plate Collision

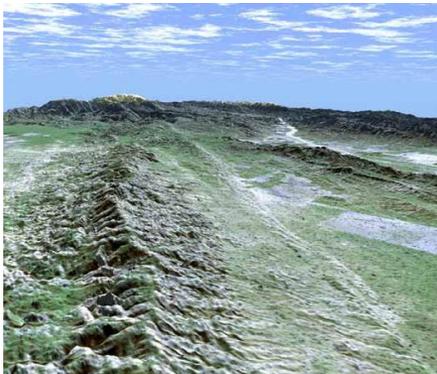
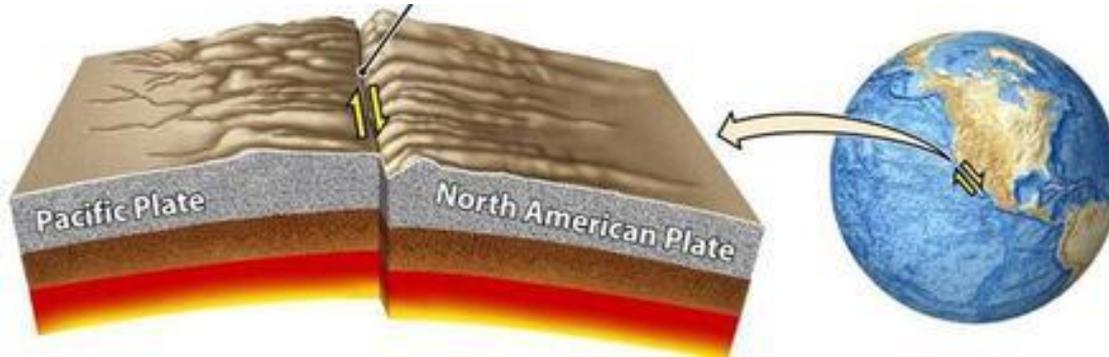
- When **two oceanic plates collide**, the **younger one runs over the older one** which causes it to sink into the mantle forming a **subduction zone**.
- The subducting plate is bent downward to form a **very deep depression** in the ocean floor called a **trench**.
- **Volcanic island arc** is usually formed fairly close to, but not right next to, the trench.
(ex: Mariana Islands, Aleutian Islands, Solomon Islands, Lesser Antilles)



Transform Boundaries



- Plates slide past each other



San Andreas Transform Fault

What are the consequences of the tectonic plates movement?

- **Landscape formation**
- **Volcano formation**
- **Orogeny (mountain formation)**
- **Earthquakes**
- **Tsunami formation**



The Pacific Ring of Fire

