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1. Mount Everest
2. Mount Fuji
3. Mauna Kea
4. Himalyan Mountains

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Plate Tectonics and Boundaries

The story so far...

- ✿ Name the four layers of Earth, in order from the inside out.
- Inner core, outer core, mantle, crust
- ✿ What important process occurs in the mantle?
- Convection currents.
- ✿ How does this contribute to plate movement?
- The currents in the mantle move the tectonic plates above it.
- ✿ Today, we will learn HOW continents move!

Sea-floor Spreading

Mid-Atlantic Ridge

- ❁ In 1872, a British vessel HMS Challenger set out to map the ocean floor
- ❁ The oceanographers discovered a long mountain range running north to south down the length of the Atlantic Ocean.
- ❁ They called this the Mid-Atlantic Ridge

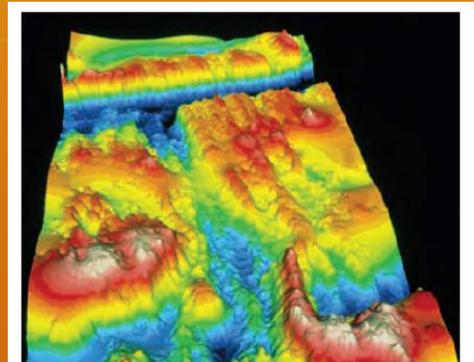
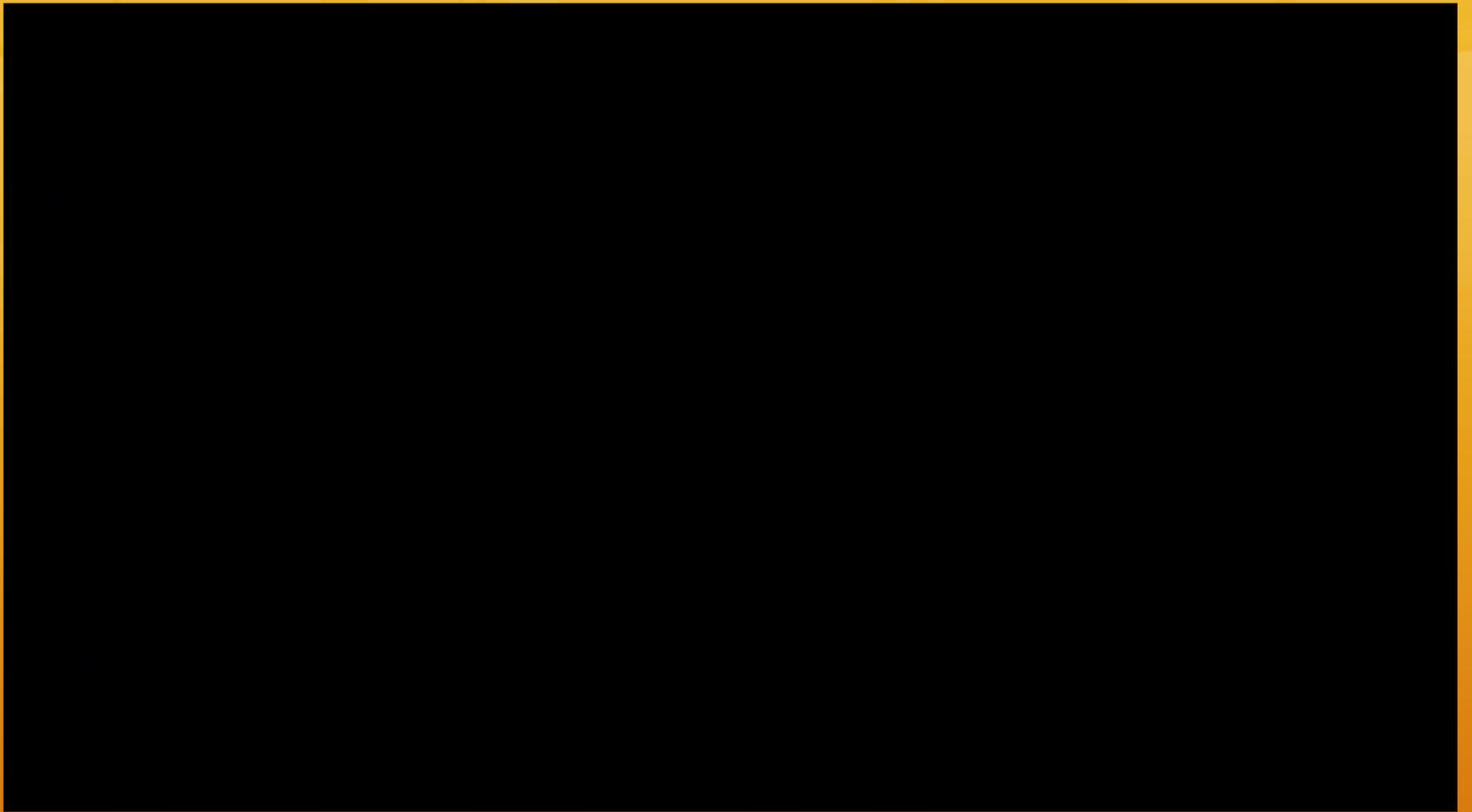


Figure 12.7 The Mid-Atlantic Ridge is a mountain range in the Atlantic Ocean. This image was made using sonar data. The colours represent the ocean's depth, from white (shallowest) to dark blue (deepest). The top of the image is the northern end.



Sea-floor Spreading

- ❁ Oceanographers found that the youngest rocks were found closest to the ridge... Why?

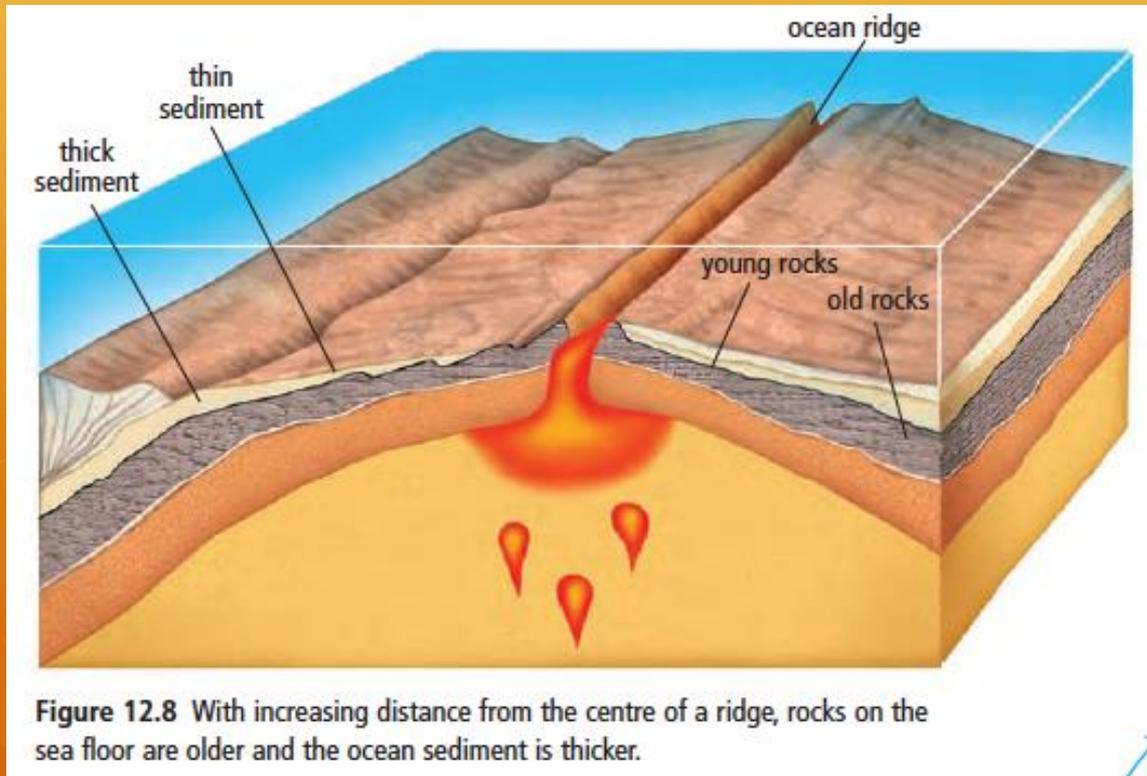


Figure 12.8 With increasing distance from the centre of a ridge, rocks on the sea floor are older and the ocean sediment is thicker.

Sea-floor Spreading

- ❁ In 1960, Harry Hess proposed an explanation:
 - ❁ Magma rises from beneath the Earth's surface
 - ❁ When it breaks through the Earth's surface, it hardens and forms new sea floor
 - ❁ New magma forces apart the hardened material and continuously pushes older rock aside

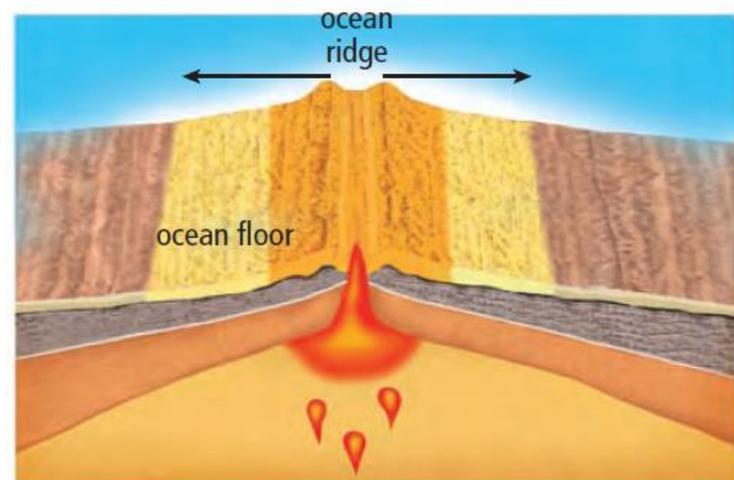
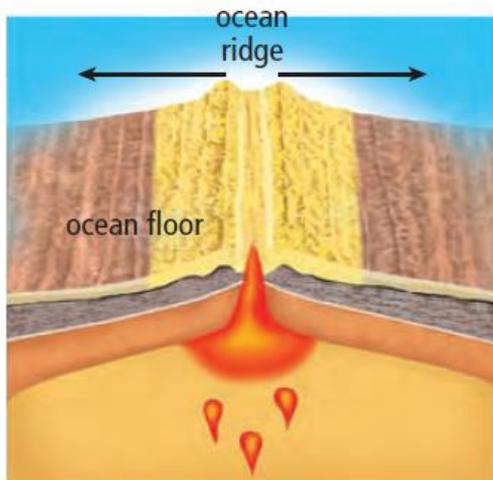


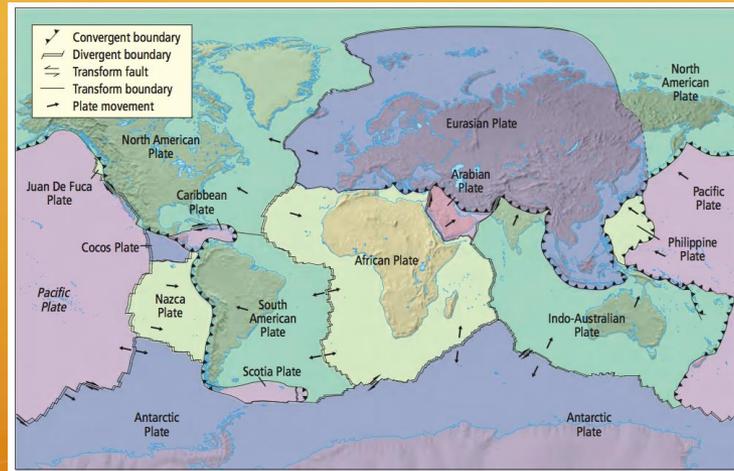
Figure 12.11 Convection currents under Earth's surface may cause magma to rise, which causes the sea floor to spread apart.

BBC HD

DIVX
VIDEO

Plate Boundaries

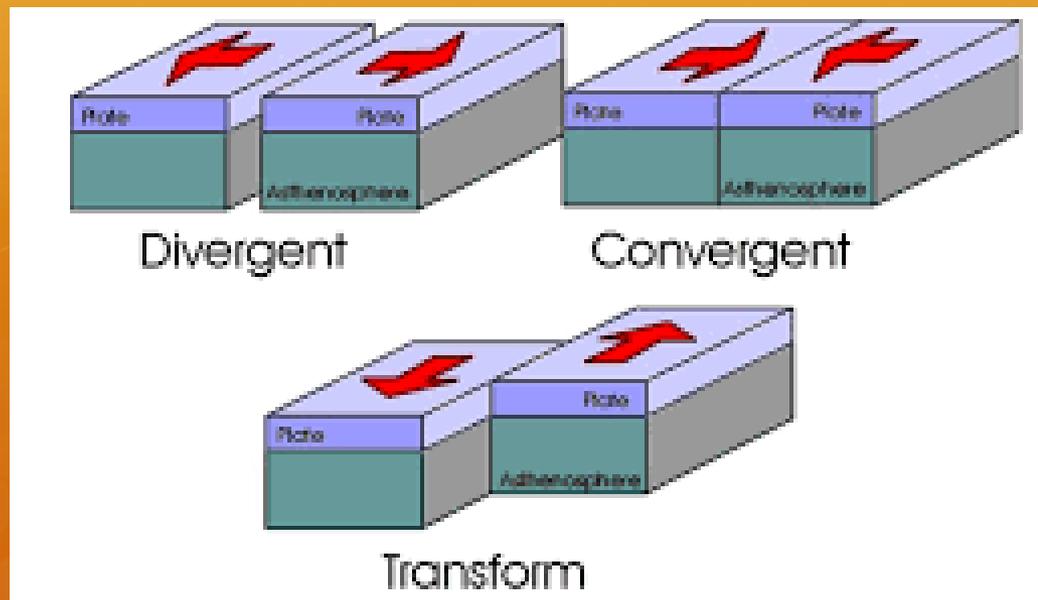
- ❁ A plate boundary is a region where two tectonic plates are in contact.



- ❁ The way in which tectonic plates interact depends on...
 - ❁ The density of plate
 - ❁ The direction of plate movement

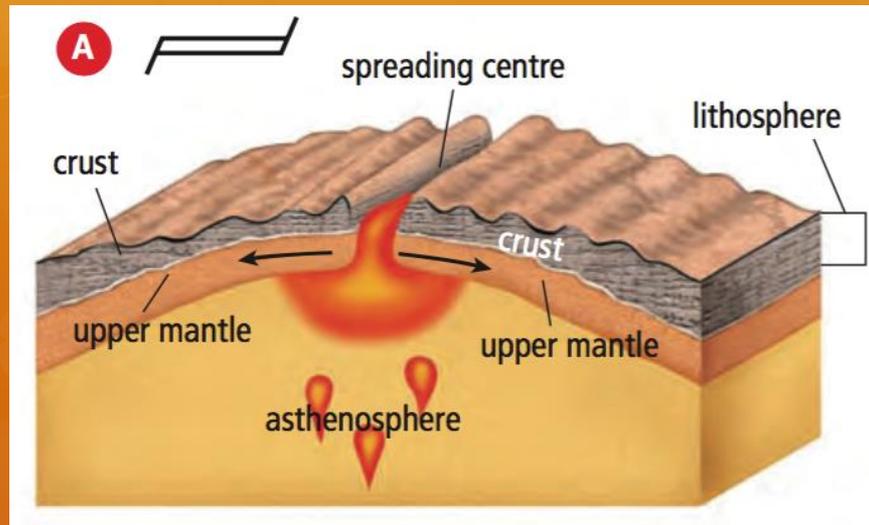
Types of Plate Interaction

- ❁ Divergent (spreading apart)
- ❁ Convergent (moving together)
- ❁ Transform (sliding by)



Divergent

- ❁ Divergent plate boundaries mark where the areas where tectonic plates are spreading apart
- ❁ In the ocean, sea floor spreading causes plates to separate.
- ❁ Ex. Mid-Atlantic Ridge



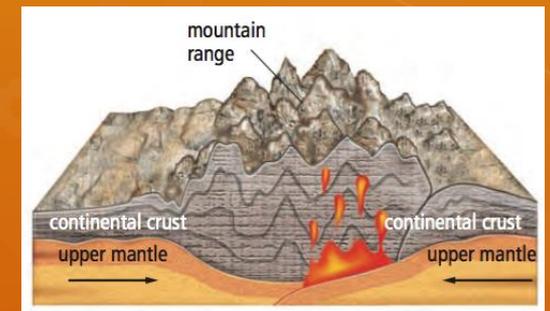
Convergent

- ✿ Convergent plate boundaries occur where tectonic plates collide.
- ✿ Depends on the density of the plates
- ✿ Three Types:
 - ✿ Continental + Continental
 - ✿ Oceanic + Oceanic
 - ✿ Oceanic + Continental

Convergent

1. Continental plate + continental plate

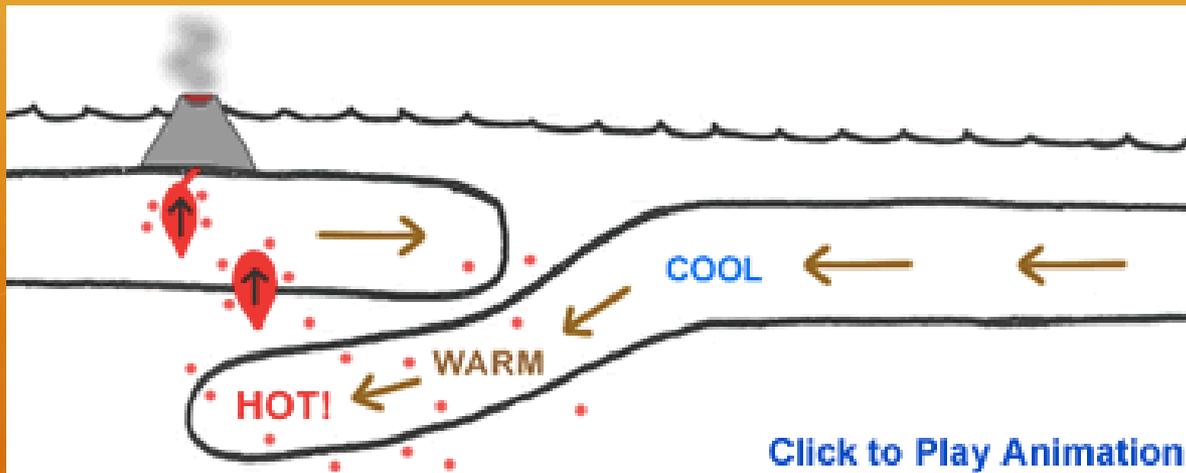
- ❁ Plates have similar density
- ❁ As the plates collide, their edges fold and crumple, forming great mountain ranges
- ❁ Ex. Himalayas



Convergent

2. Oceanic plate + oceanic plate

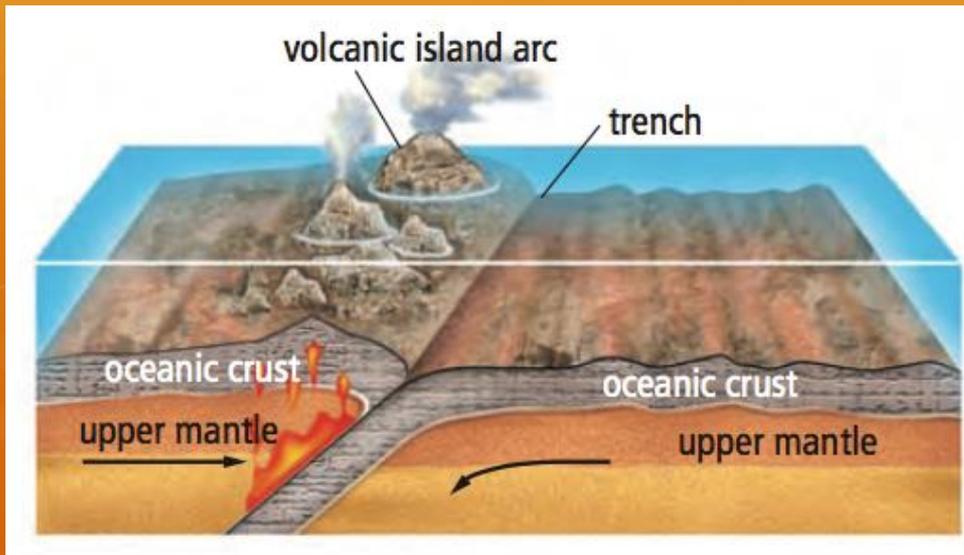
- ❁ SUBDUCTION occurs where the more dense (heavier) plate will slide under the less dense (lighter) plate and deep into the mantle

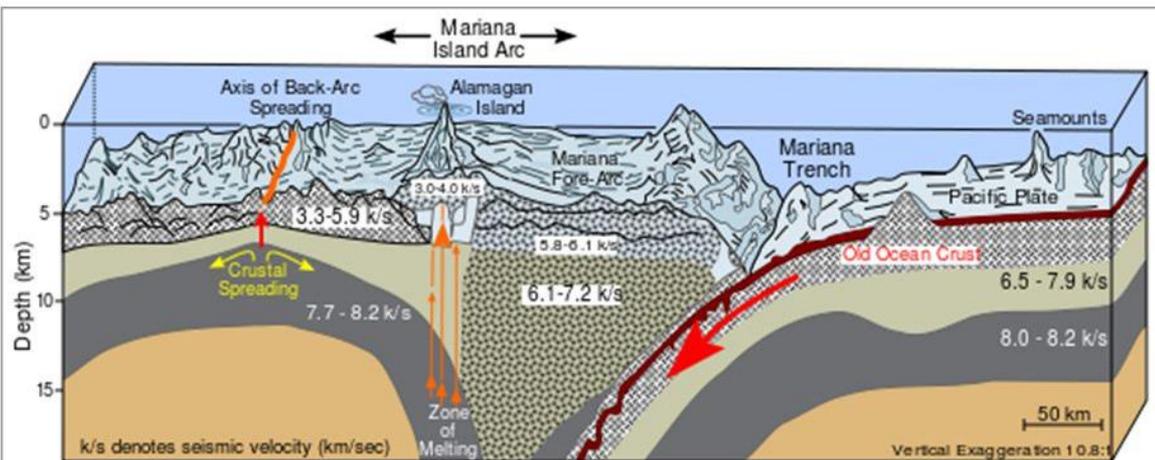


Convergent

2. Oceanic plate + oceanic plate

- ✿ A deep underwater valley called a trench is formed
- ✿ Can produce a volcanic island arc
- ✿ Ex. Islands of Japan and Indonesia





- Island arc crust, including rocks from contemporary volcanism and from older, rifted, volcanic arcs.
- Basaltic crust, including old crust on the Pacific Plate and young crust formed in the back-arc.

Cross-Section Sketch of Mariana Arc

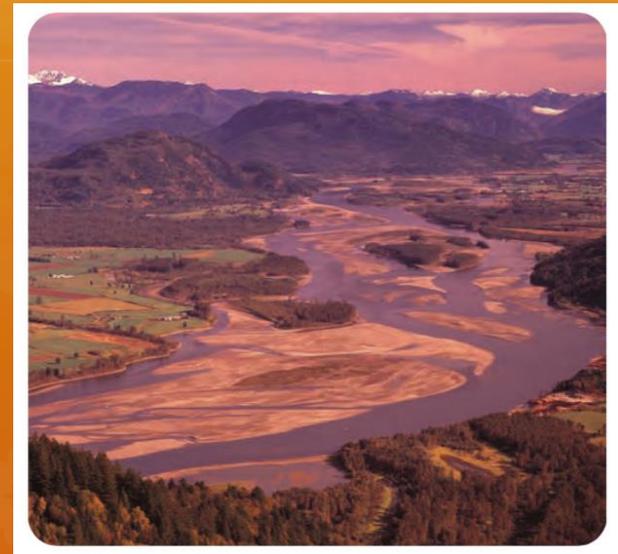
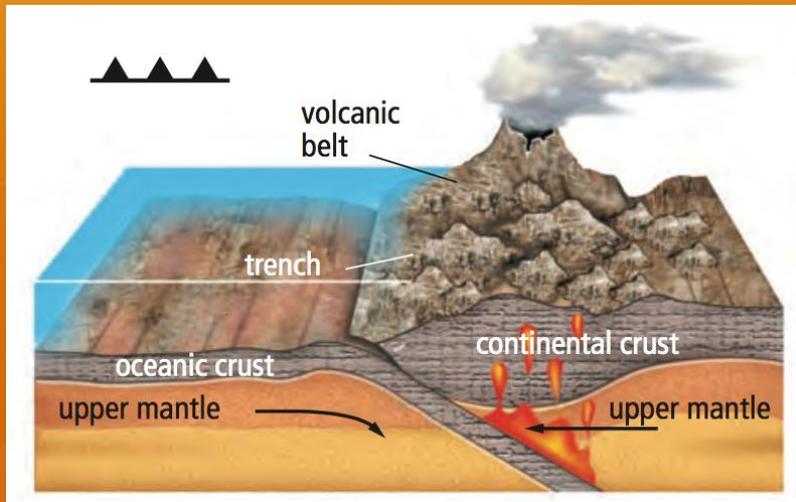
(After Hussong and Fryer, 1981)



Convergent

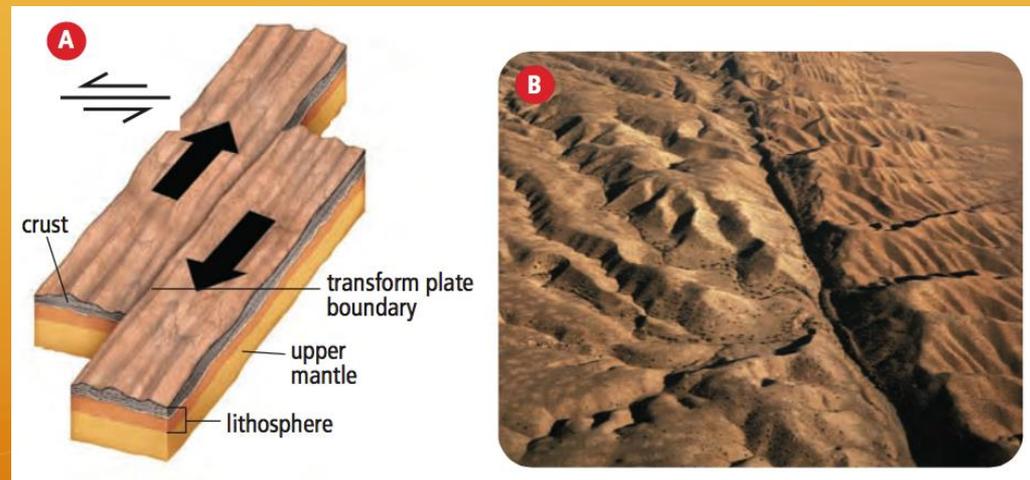
3. Oceanic plate + continental plate

- ❁ Oceanic plate is more dense (heavier) and is forced to slide under the continental plate
- ❁ Also produces an underwater trench
- ❁ Ex. The Coast Mountains of B.C.

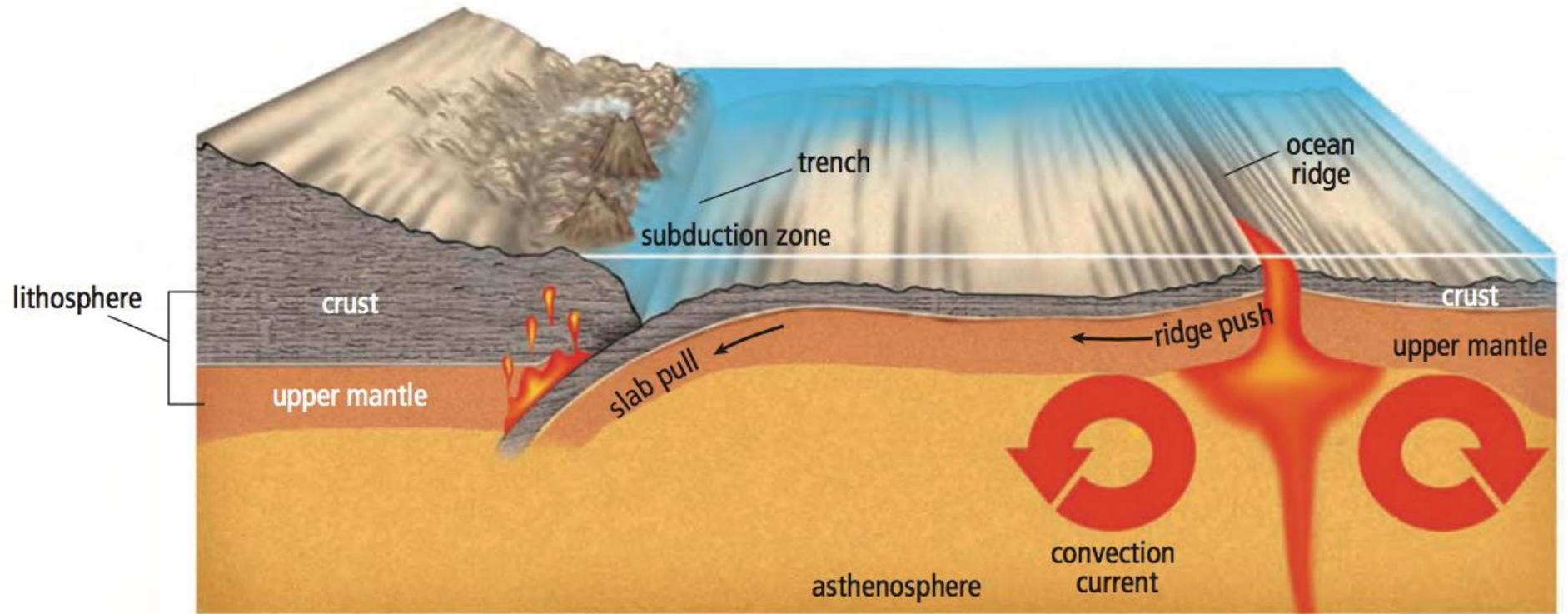


Transform

- ❁ Transform plate boundary occurs when tectonic plates slide past one another.



- ❁ At these boundaries, no mountains or volcanoes form
- ❁ Ex. San Andreas Fault of California



Video



https://www.youtube.com/watch?v=3ZpDjdFzQUM&ab_channel=MooMooMathandScience