Writing Prompt: Why does the ocean floor consists of cooled lava? Answer in a five sentence paragraph.

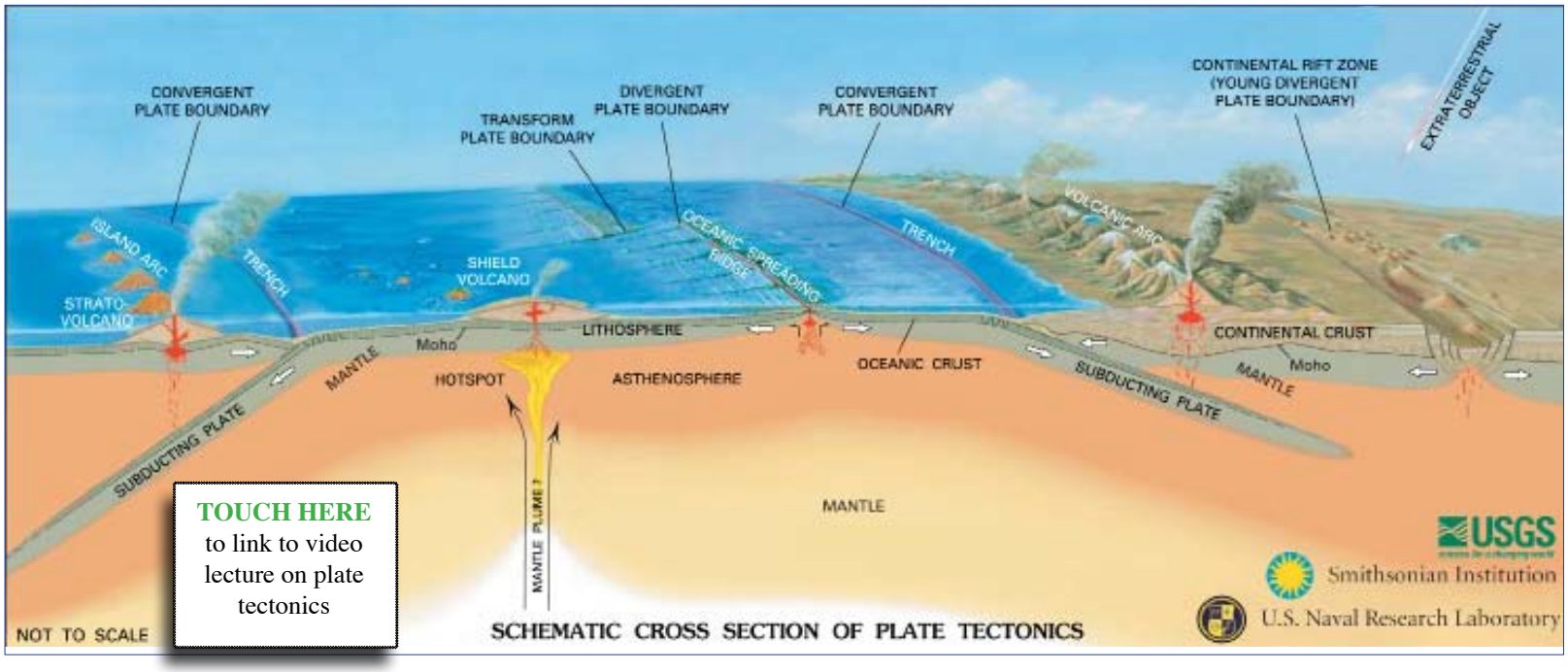
Plate Tectonics

Plate tectonics theory describes how the lithosphere of the Earth is broken into various plates. These plates drift on the asthenosphere at very slow rates. As plates move away from each other the lithosphere thins and tears. At these divergent plate boundaries new oceanic lithosphere is created in the gaps from upwelling magma from the mantle. This upwelling magma forms mid-ocean ridges, long mountain chains that mark the boundaries between diverging plates.

The static size of the Earth implies that crust must be destroyed at about the same rate it is being created. Plate tectonics provides the mechanism to recycle the Earth's crust. Destruction (recycling) of crust takes place along convergent boundaries where plates are moving toward each other, and sometimes one plate sinks (is subducted) beneath another. The location where the sinking of a plate occurs is called a subduction zone. A transform boundary is where plates slide past each other with no creation or destruction of lithosphere.

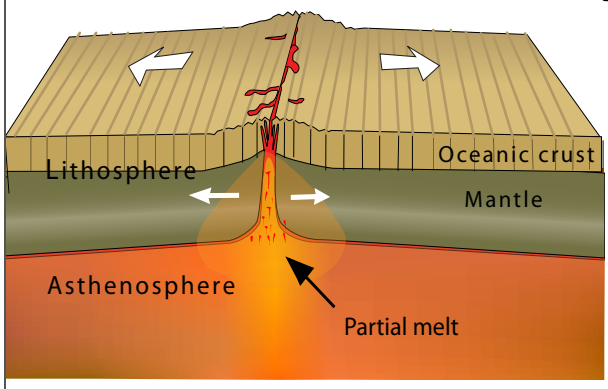
Plate Margin Examples

There are three general types of plate boundaries: divergent, convergent, and transform. Each general type has multiple 'species': divergent boundaries can be spreading ocean ridges or continental rift zones; convergent boundaries can occur between two oceanic plates, an oceanic and continental plate, or between two continental plates.

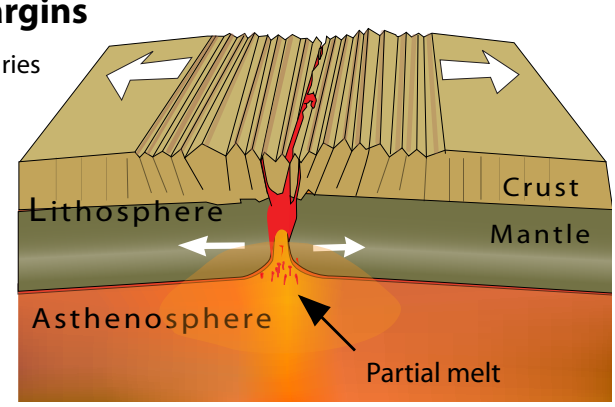


TOUCH HERE to link to video lecture on plate tectonics

Divergent Margins



Divergent boundaries occur where plates are moving apart. Hot mantle rock rises and partial melting occurs. New crust is created by the magma pushing up from the mantle.



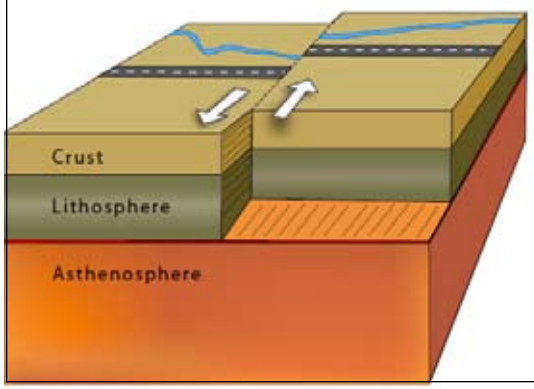
Fast-spreading ridges—Mountain chain forms along the crest of the ridge. High heat and magma input making the ridge bouyant. New crust is added both as dikes and as erupted lava (Ex. East Pacific Rise).

CLICK HERE to watch animation of processes.

Slow-spreading ridges form valleys on the ridge crests. Lower heat input (Ex. Mid-Atlantic Ridge). The early onset of extension forms a basin-and-range province of parallel mountains and valleys dispersed across a broad uplifted area.

Most of the information in this Background document is modified from USGS.gov

**NOTE: on these drawings, the crust appears separate from the lithosphere. The crust is part of the lithosphereic plate.*

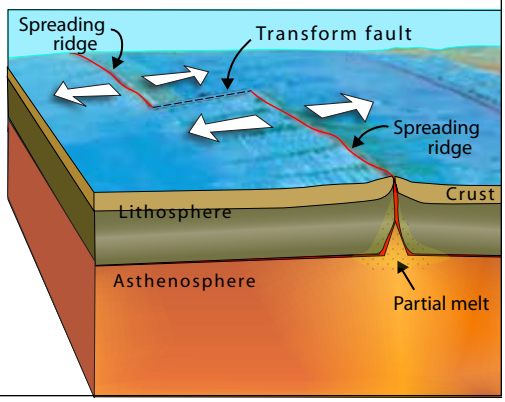


Transform Margins

Two plates slide against each other.

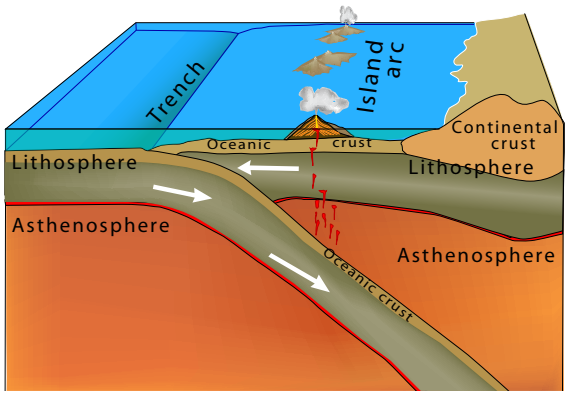
Left: Offset seen on the road and stream crossing the fault (*Example*: San Andreas Fault, California)

Right: Transform faults also form the margin between offset spreading ridges.

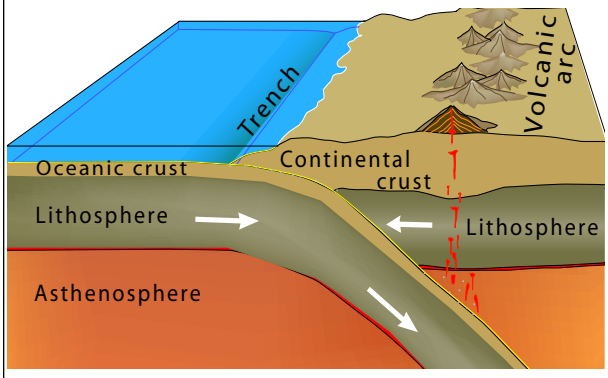


Convergent Margins

Crust is destroyed as two plates move towards each other. The heavier plate dives (subducts) beneath the more-bouyant plate.

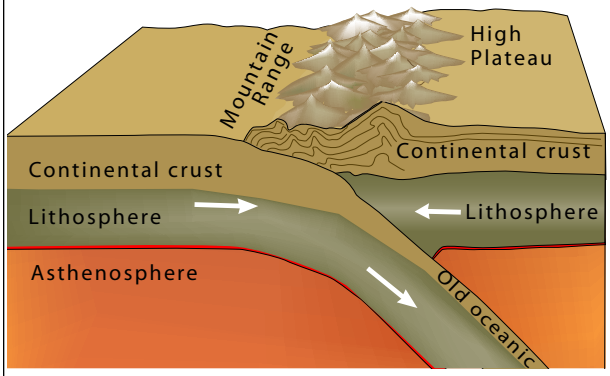


Oceanic-oceanic convergence—When two oceanic plates converge, one subducts beneath the other, and in the process a trench is formed. (*Example*: The Marianas Trench, the Challenger Deep, at the southern end of the Marianas Trench, plunges deeper into the Earth's interior (nearly 11,000 m) than Mount Everest, the world's tallest mountain, rises above sea level (about 8,854 m).) Inboard of the overlying plate a volcanic arc forms. This is because water being released from the subducting slab facilitates melting of the overlying mantle. The melt rises to form volcanoes. (Ex. the Aleutian Islands.)



Oceanic-Continental convergence—An oceanic plate converges on a continental plate and the denser crust of the oceanic plate sinks beneath the more-bouyant continental plate. In this type of convergence, trenches, strong, destructive earthquakes and the rapid uplift of mountain ranges are common. Water released from subducting slab facilitates melting. Rising melt builds volcanic arc. (*Examples*: Juan de Fuca plate subducting beneath the North American plate off shore in the Pacific Northwest.Off the coast of South America along the Peru-Chile trench, the oceanic Nazca Plate is being subducted beneath the South American Plate. In turn, the overriding South American Plate is being lifted up, creating the towering Andes mountains.)

CLICK HERE to watch animation of oceanic-continental subduction.



Continental-continental convergence—When two continents meet head-on, neither is subducted because the continental rocks are relatively light and, resist downward motion. Instead, the crust tends to buckle and be pushed upward or sideways. (*Example*: The Himalayan mountain range dramatically demonstrates one of the most visible and spectacular consequences of plate tectonics. The Himalayas, towering as high as 8,854 m above sea level, form the highest continental mountains in the world.)