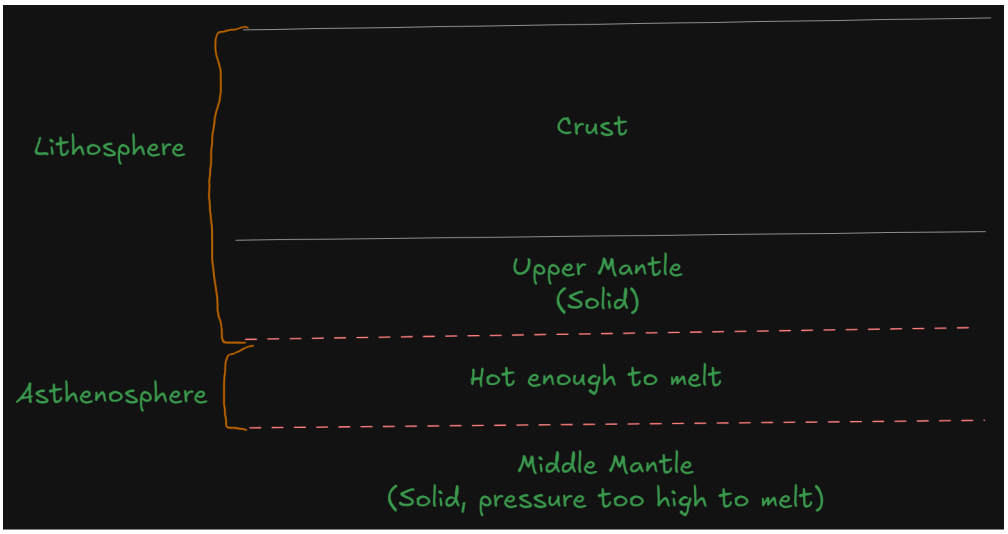
14 - Plate Tectonics

Mantle Convection



Continental Drift

- Alfred Wegener's hypothesis in 1912
- Evidence
  - Fossils
  - Glacial Striations
  - Mountain Ranges
  - Tropical plant fossils in Norway

Modern Evidence for Plate Tectonics

- Developed in 1960's
- Crust is a rigid shell that slides around on a hot, gooey layer within the upper mantle called the asthenosphere (100-300km deep)
  - Two types
    - Oceanic (ex. Gabbro)

        - Dense, dark, thin
    - Continental (ex. Granite)
        - Not dense, light, thick
- Crust + upper-mantle = Lithosphere
    - Fractured shell, made of tectonic plates
    - 16 mm/yr (fast as fingernails grow), different directions
    - May contain both Oceanic and Continental Crust
- Locations of Earthquakes, Volcanoes, Mountain
    - San Andreas Fault = Pacific + Atlantic plates
- Mid Ocean Ridges
- Age of Ocean Floor
- Magnetic Stripes
- GPS

Slab

- Name for an oceanic plate

Slab Pull

- at subduction zones

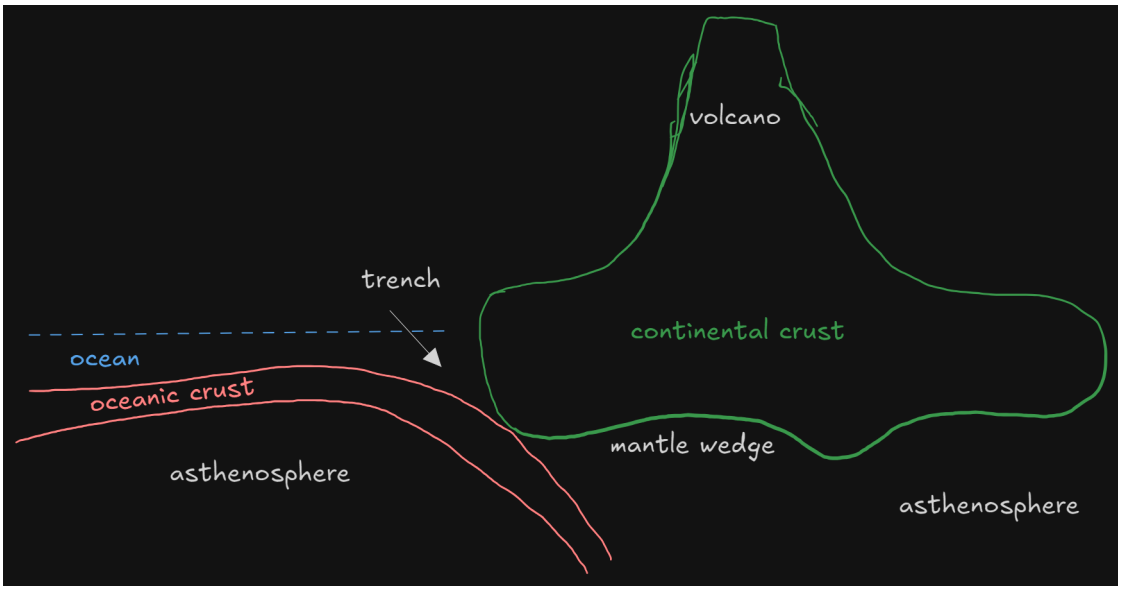
Slab Push

- at divergent boundaries

Types of Plate Boundaries

Convergent

- crashing together
- Subduction zone
    - oceanic/continental



    - oceanic/oceanic
    - occur any time there is oceanic crust
    - large earthquakes volcanic arc, trench, mantle
- continental/continental
    - collisional
    - no subduction
    - Ex. Himalayas, Alps
    - Moderate earthquakes, a little bit of volcanism, huge mountains with folded rocks

Divergent

- Lithosphere splits apart
- Partial melting of mantle rocks = basalt
- New oceanic crust formed
- Can happen in both oceanic and continental crust
- Crust is youngest right at boundary
- associated with minor amounts of volcanoes and shallow earthquakes
- shows cyclical changes in a magnetic field
- why a ridge?

Transform

- sliding past each other
- strike-slip motion. neither pulling or pushing
- moderate earthquakes, little, if any, volcanoes, moderate sized hills and valley (like the Santa Cruz mountains)
- San Andreas fault is between the Pacific (to the west) and North American (to the east) Plate and is right lateral
- Pacific plate moving north-westwards relative to North American Plate

- The lateral direction is the direction you would see the person on the other side moving if facing the fault