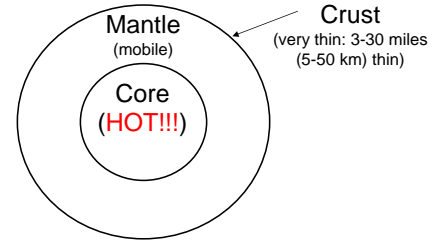


Plate Tectonics

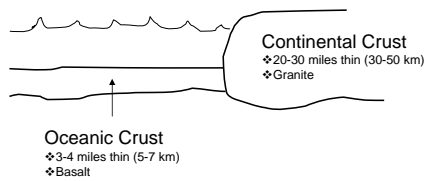
Chapter 6, *Earth Science* (Tarbuck and Lutgens, 7th Ed.)

The Solid Earth

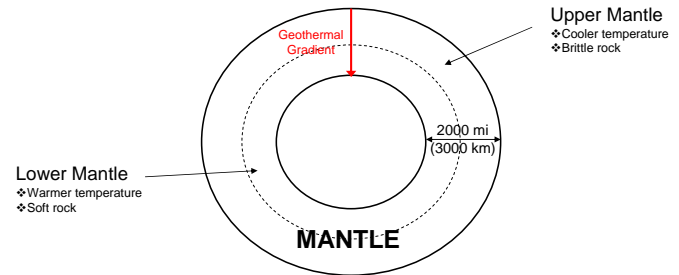


Earth's Crust

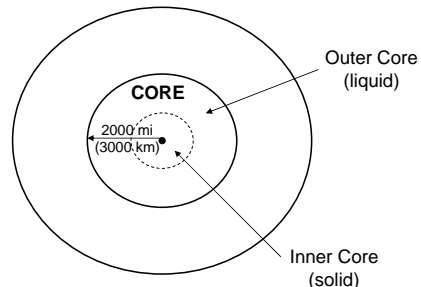
- Earth's crust can be divided into 2 types:
 - Continental Crust
 - Oceanic Crust



Earth's Mantle



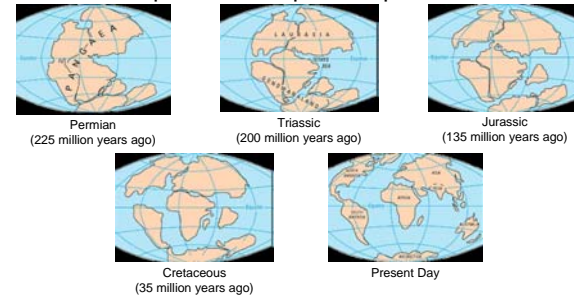
Earth's Core



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Continental Drift Theory

- Theory that a supercontinent once existed, called Pangaea, that broke into smaller continents which drifted apart to their present positions.



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Problems with Continental Drift

- No acceptable mechanism - Where did the energy come from?
- Proposes that continents move *through* oceanic crust – but geological features do not support this (the oceanic crust would deform).
- Doesn't account for the erosion of coastlines that must have occurred over 250,000 years.

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Plate Tectonics Theory

- Outer lithosphere (crust and rigid part of mantle) consists of about 20 segments (plates).
- Most plates consist of both oceanic and continental crust.
 - This differs from continental drift theory.
 - A few plates consist entirely of one type of crust.
- Plates are assumed to be rigid – most motion occurs along boundaries, not between different parts of one plate.

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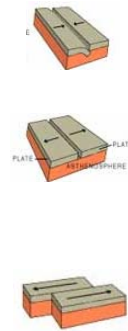
How Plate Tectonics resolved Continental Drift Problems

- Proposes mechanism: that heat from Earth's core supplies energy and mechanism for movement.
- Instead of saying that continents move *through* oceanic crust, proposes that oceanic crust moves *with* continental crust.
- Looks at continental shelf outlines for continental fit instead of coastlines.

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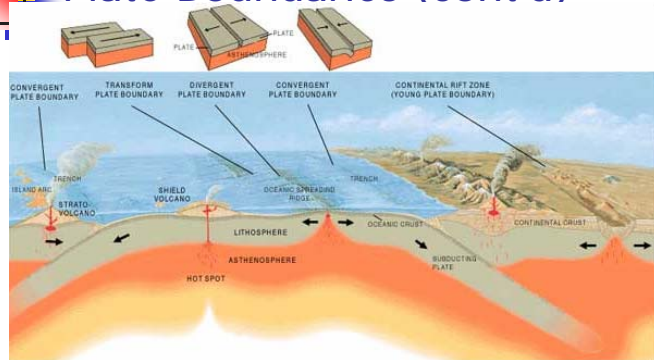
Plate Boundaries

- ***Divergent*** – plates move apart, resulting in upwelling of magma that cools to create new crust
- ***Convergent*** – plates move together, causing one plate to be consumed into the mantle as it descends below the overriding plate
- ***Transform*** – plates slide past each other (crust is neither created nor destroyed here)



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Plate Boundaries (cont'd)



Source: <http://www.sheppardsoftware.com/globeweb/factfile/Unique-facts-Globe2.htm>

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Modern Evidence for Plate Tectonics

- ***Paleomagnetic evidence*** (magnetic alignment of ancient rocks with the location of magnetic poles at the time the rocks were formed) revealed the following:
 - Motion of continents relative to magnetic poles
 - Magnetic polarity reversals in rock corresponding to the Earth's polarity reversals over time
- Crustal age – rock gets older farther from mid-ocean ridges
- Hot Spots
- Distribution of earthquake and volcanic activity

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Mechanism of Plate Tectonics

- Uneven distribution of heat from the Earth's core is the underlying cause of plate movement.
- Convection currents in the mantle are thought to drive the motion of the crust.
- The exact motions of the mantle are not well understood yet.

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