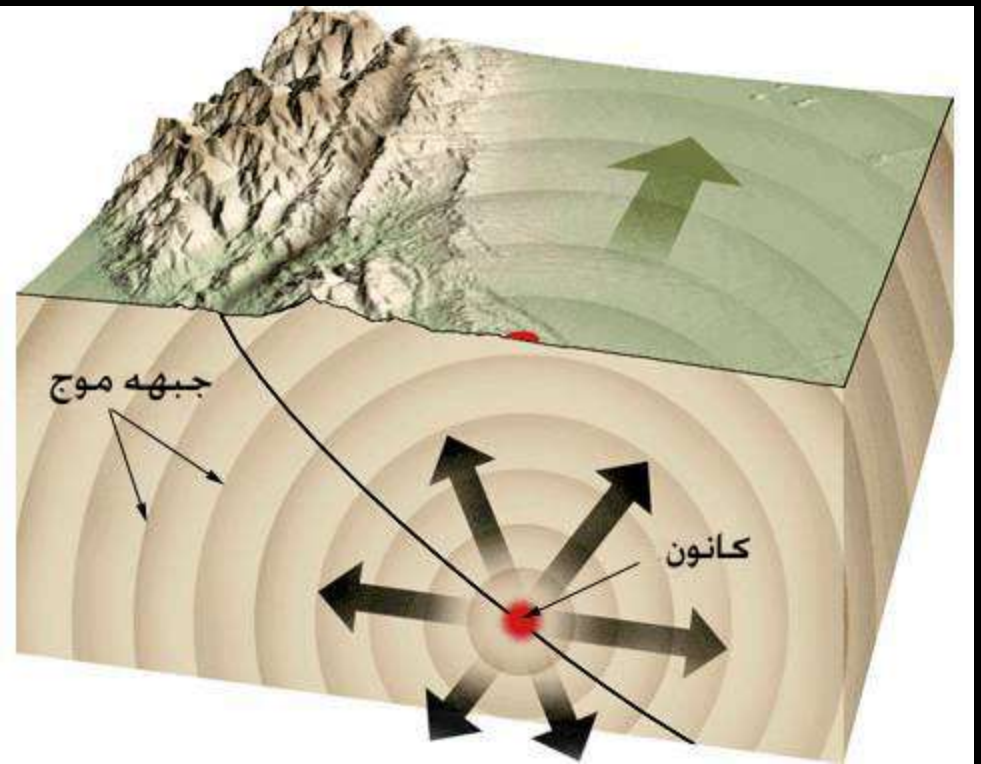
EARTH'S INTERIOR

EXPLORING INSIDE EARTH

- Geologists have used two main types of evidence to learn about Earth's interior: direct evidence from rock samples and indirect evidence from seismic waves.



Evidence from Rock Samples…

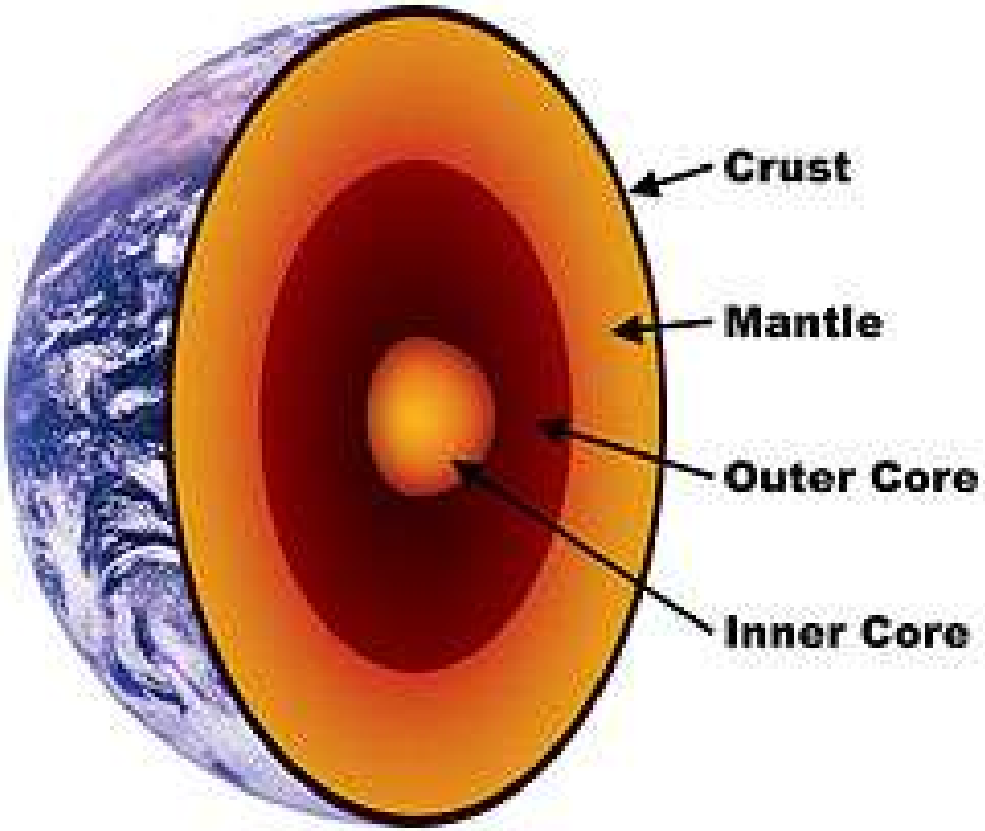
- Rocks from inside Earth give geologists clues about Earth's structure. Geologists have drilled holes as much as 12 km deep into Earth. The drills bring up samples of rock that can be used to make inferences about conditions deep inside Earth.

- Sometimes, forces inside Earth blast rocks to the surface from depths of more than 100 km. These rocks provide more information about Earth's interior.

Evidence from Seismic Waves…

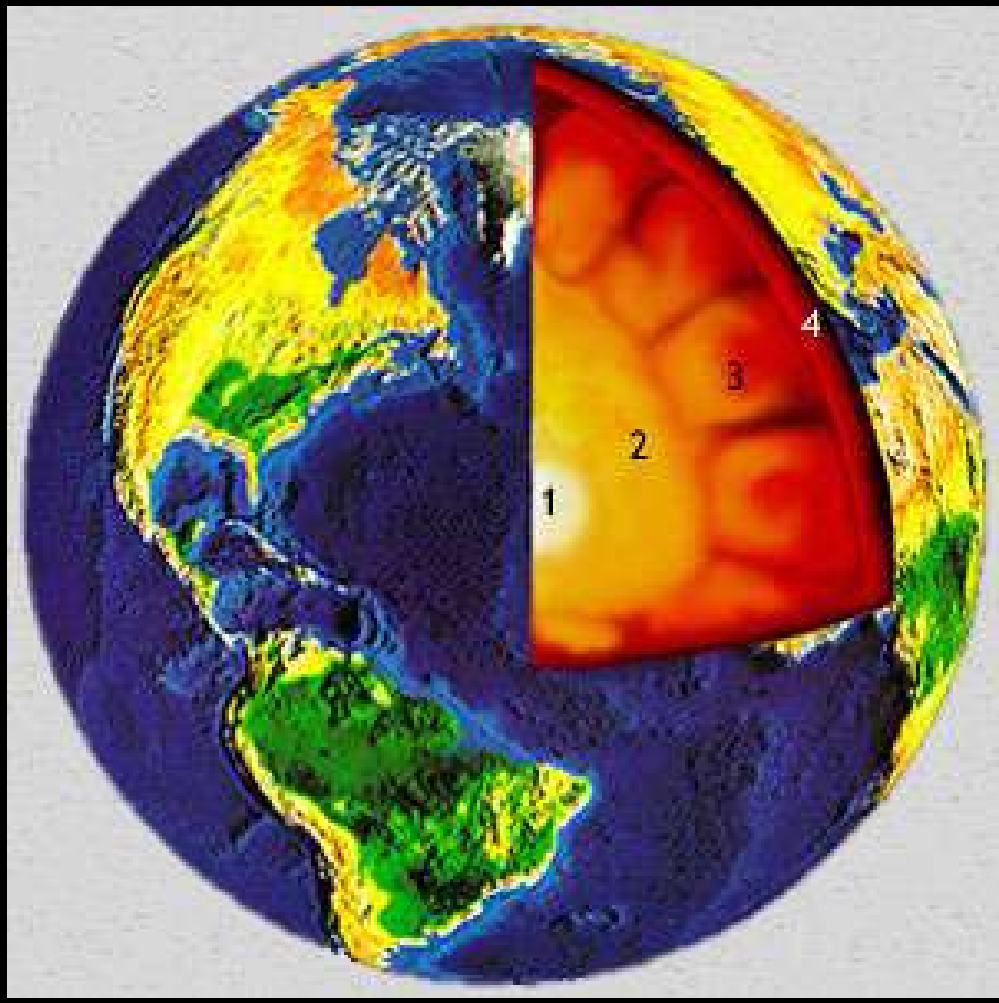
- Since geologists cannot look inside Earth, they must rely on indirect methods of observation. When earthquakes occur, they produce seismic waves. Geologists record seismic waves and study how they travel through Earth. The speed of the seismic waves and the paths they take reveal the structure of the planet.

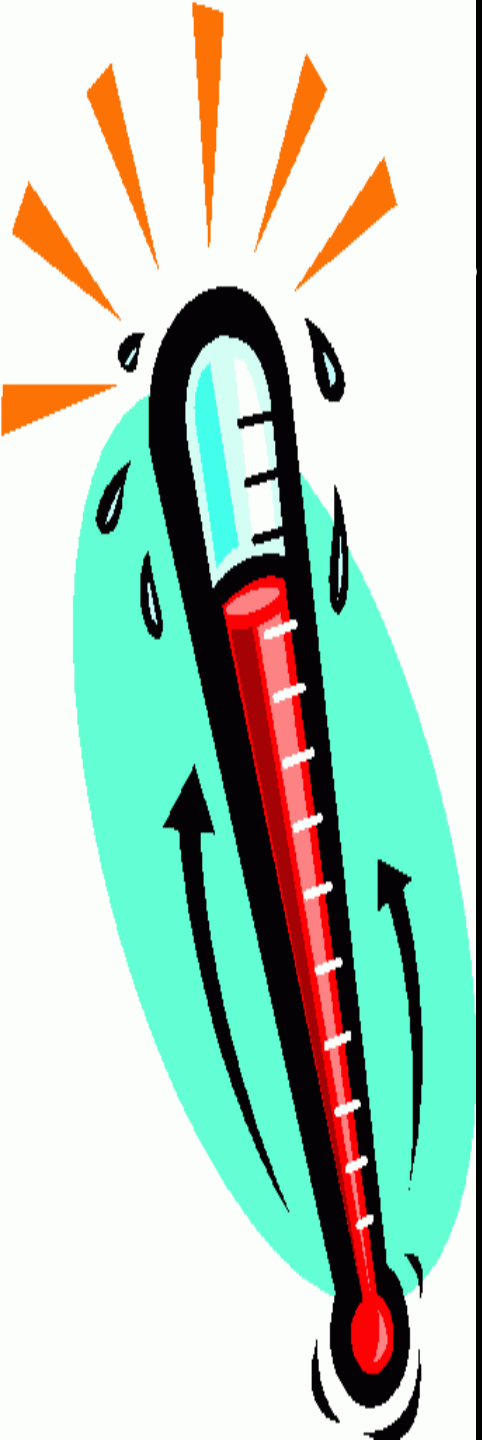
- Using data collected from seismic waves, geologists have learned the Earth's interior is made up of several layers. Each layer surrounds the layer beneath it, like the layers of an onion.



A JOURNEY TO THE CENTER OF THE EARTH

- The three main layers of Earth are the crust, the mantle, and the core. These layers vary greatly in size, composition, temperature, and pressure.



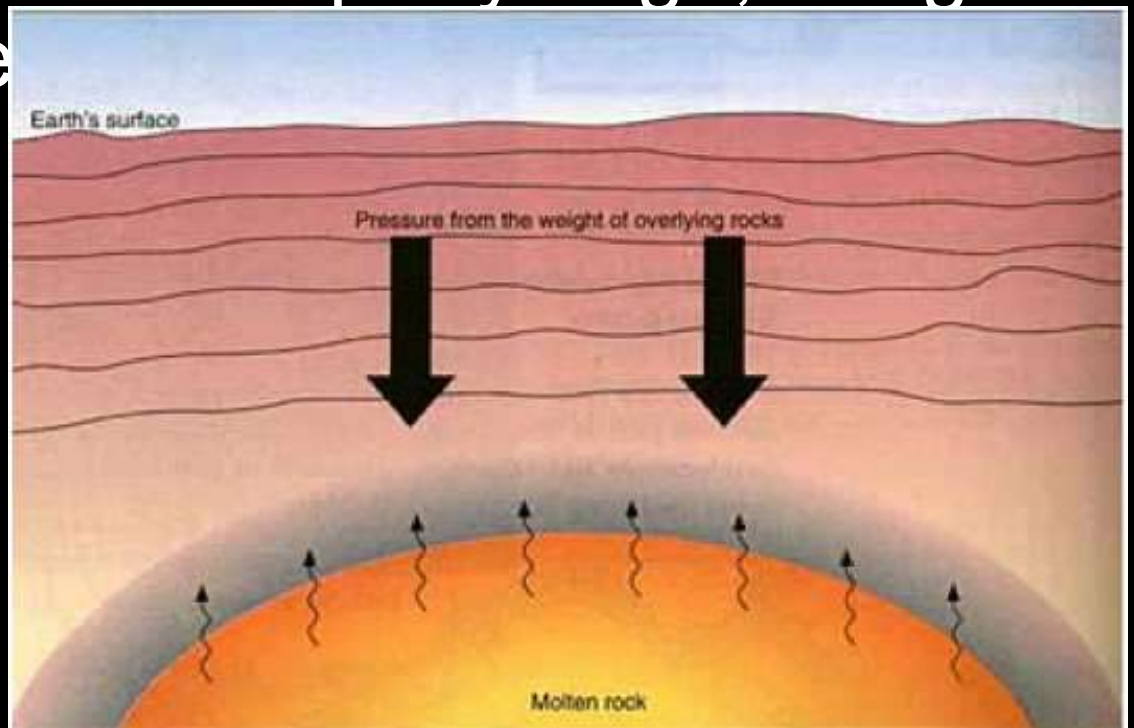


Temperature…

About 20 meters below Earth's surface, rock begins to get warmer. For every 40 meters that you descend from that point, the temperature rises 1 degree Celsius. This rapid rise of temperature continues for several tens of km, and continues to grow hotter and hotter approaching the core. The high temperatures inside Earth are a result of heat left over from the formation of the planet.

Pressure…

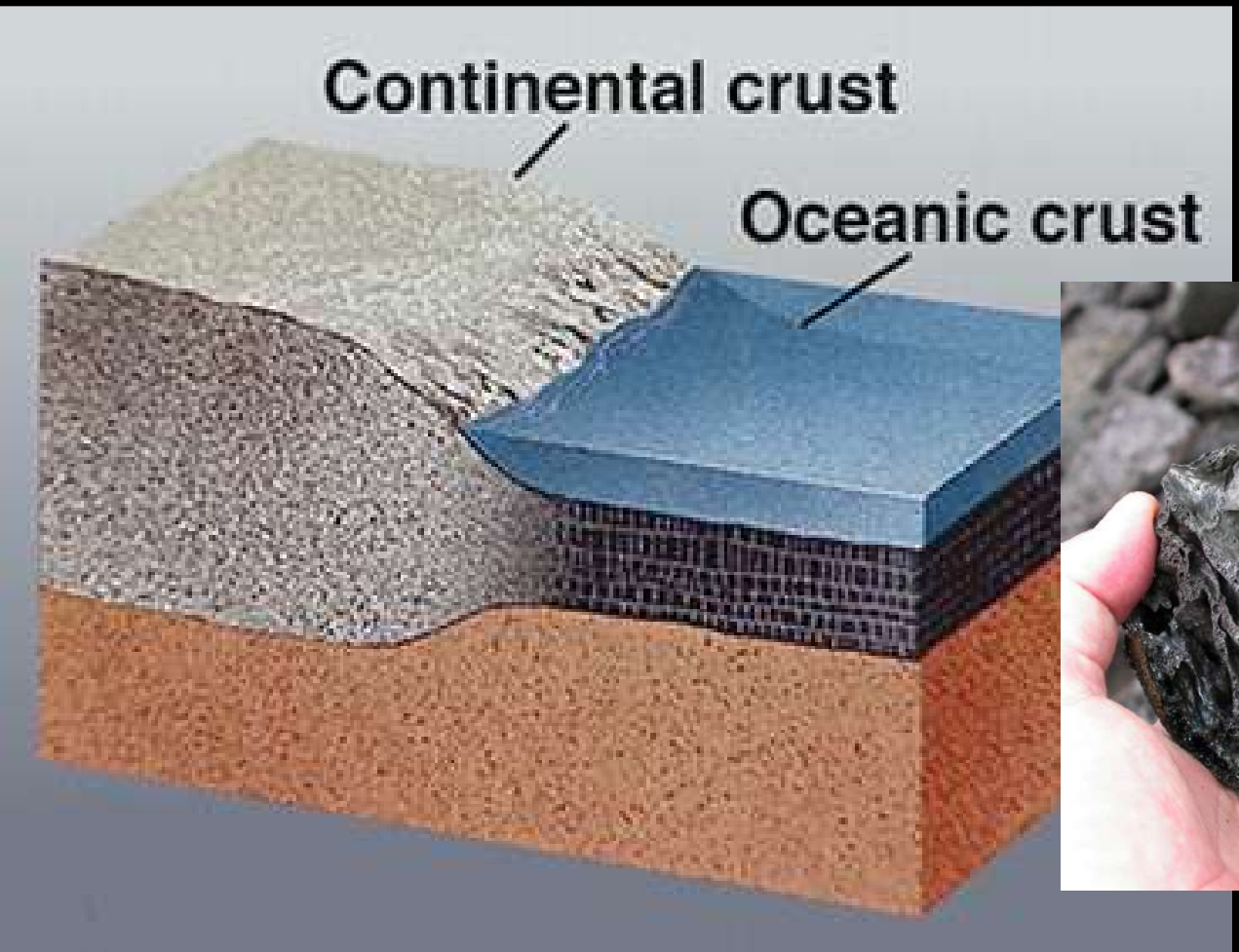
- The more you descend into Earth's interior, the amount of pressure increases. Pressure results from a force pressing on an area. Because of the weight of the rock above, pressure inside Earth increases as you go deeper. The deeper you go, the greater the pressure



THE CRUST

- The crust is the layer of rock that forms Earth's outer skin. The crust is a layer of solid rock that includes both dry land and the ocean floor. This layer of the Earth is much thinner than the layers beneath it.

- The crust beneath the ocean is called oceanic crust, which consists mostly of rocks such as basalt. Basalt is dark rock with a fine texture.



BASALT

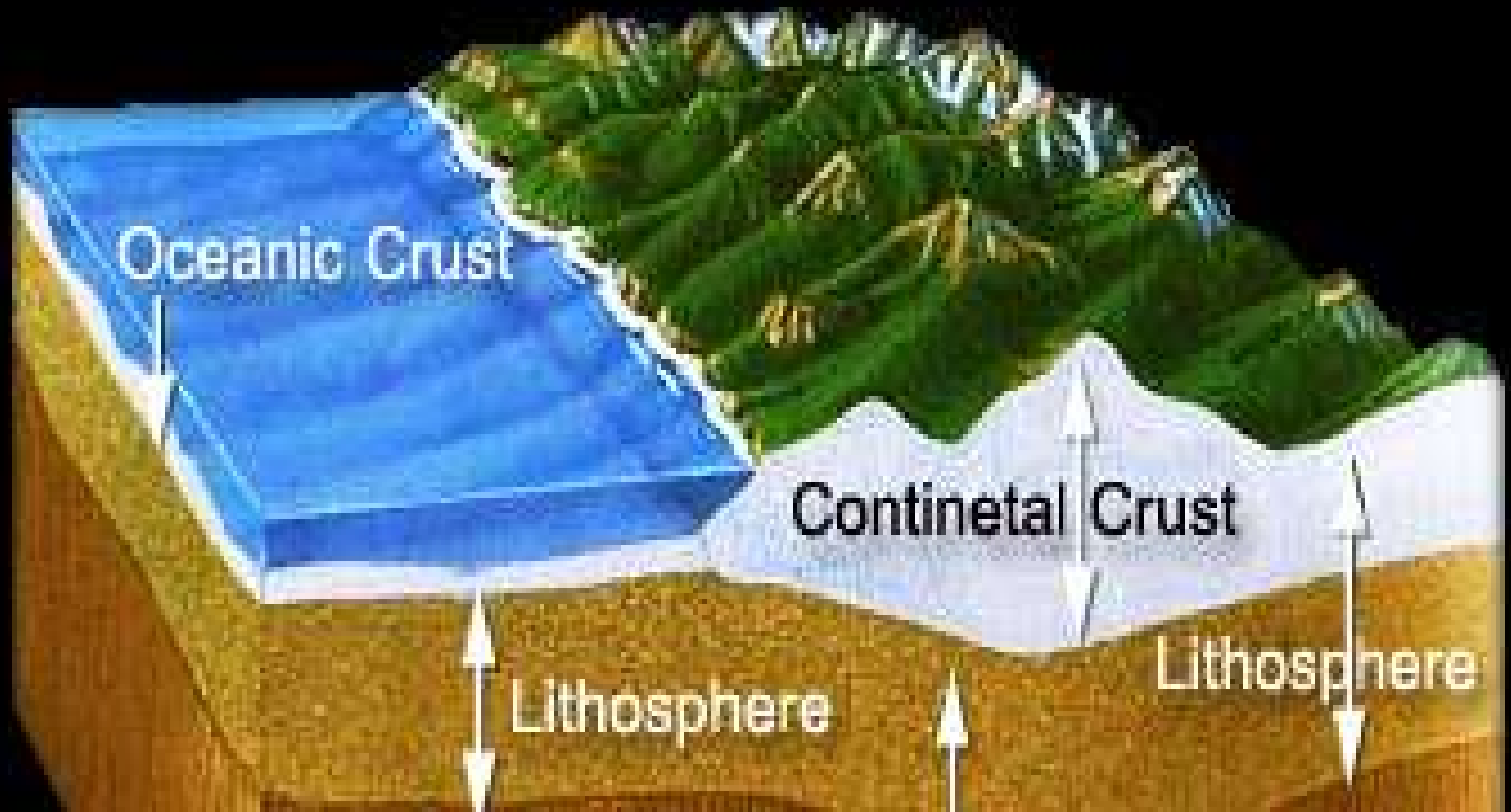
- Continental crust, crust that forms the continents, consists mainly of rocks such as granite. Granite is a rock that usually is light in color and has a coarse texture.

THE MANTLE

- Below Earth's crust is the mantle. Earth's mantle is made up of rock that is very hot, but solid. Scientists divide the mantle into layers based on the physical characteristics of those layers. Overall, the mantle is nearly 3000 km thick.

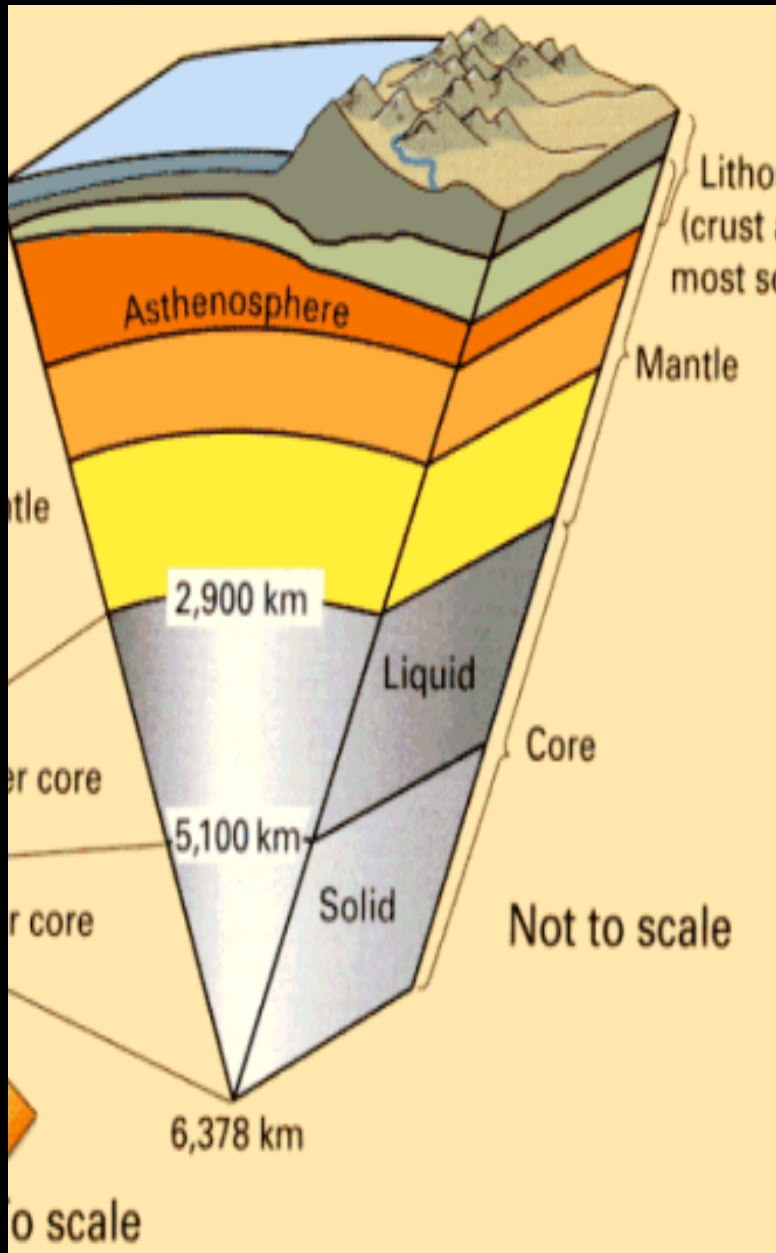
The Lithosphere…

- The upper most part of the mantle and the crust together form a rigid layer called the lithosphere. In Greek. “lithos” means “rock.”



The Asthenosphere…

- Below the lithosphere is a layer that is hotter and under increasing pressure. Like road tar is softened by the heat of the sun, this part of the mantle is somewhat soft- it can bend like plastic. This soft layer of the mantle is called the asthenosphere. In Greek, “asthenes” means “weak.” Although this layer is softer than the rest of the mantle, it is still solid.



The Lower Mantle…

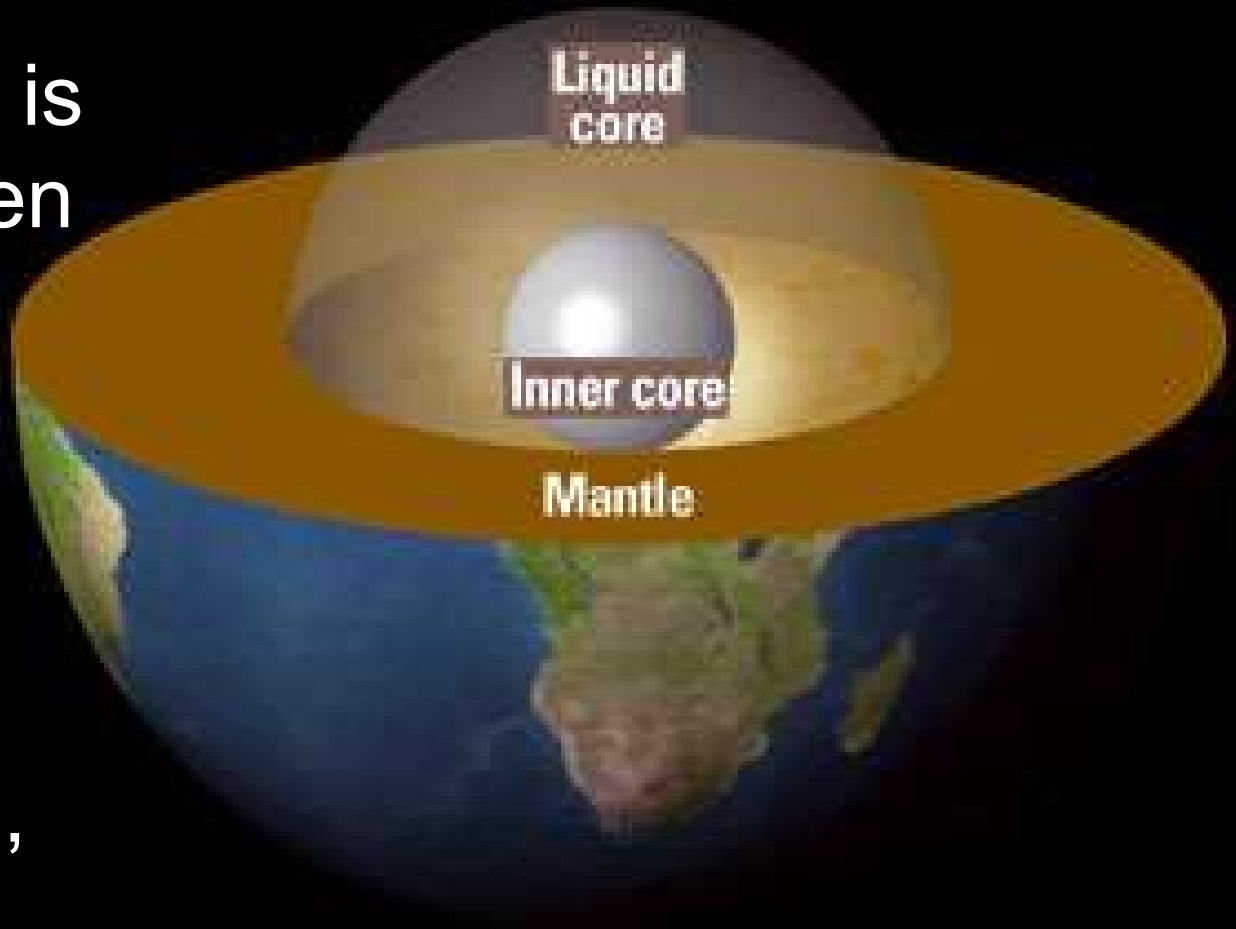
- Below the asthenosphere, the mantle is solid. This solid material extends all the way to Earth's core.

THE CORE

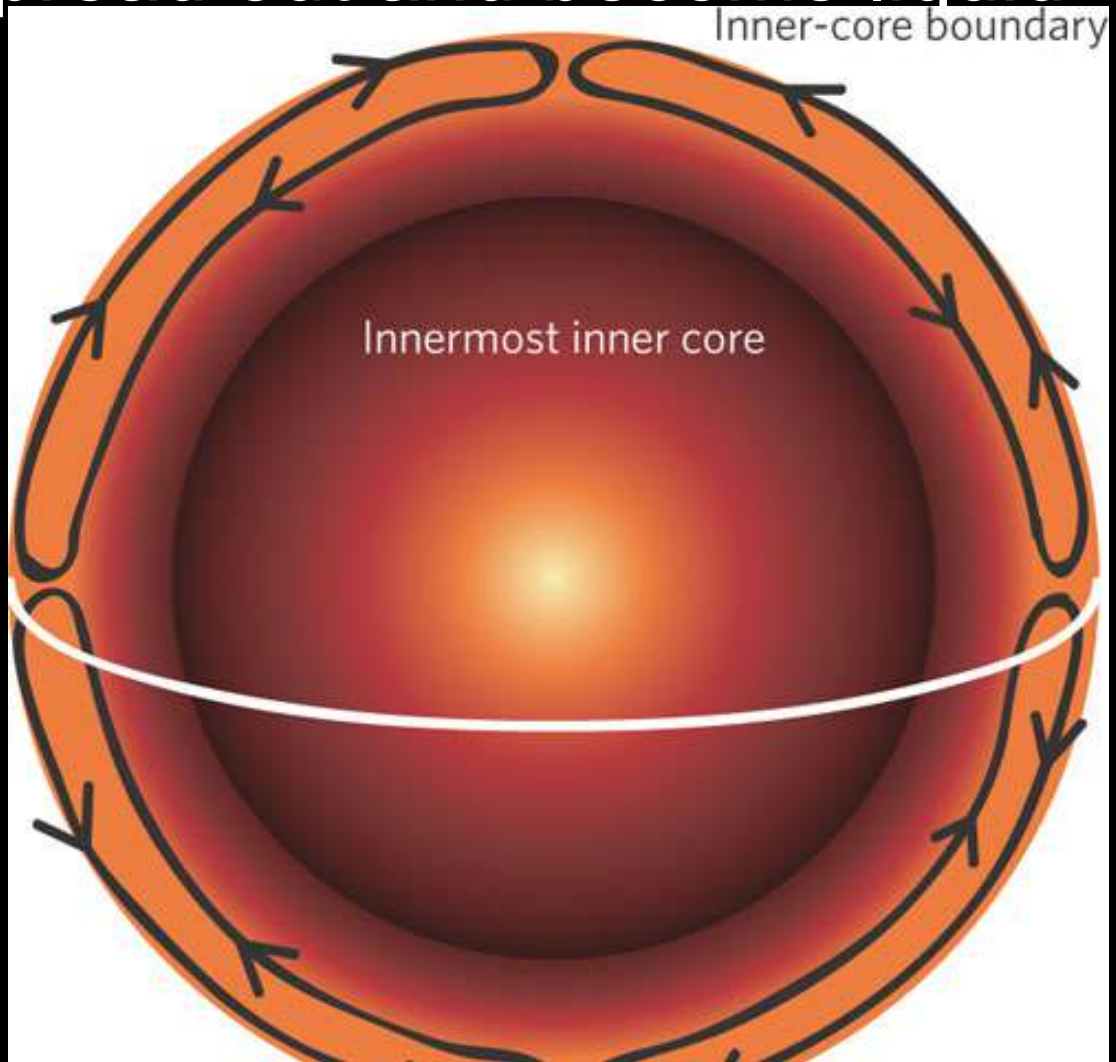
- Beneath the mantle is Earth's core. The core is made mostly of the metals iron and nickel. It consist of two parts- a liquid outer core and solid inner core.

The Inner and Outer Cores…

- The outer core is a layer of molten metal that surrounds the inner core. Despite pressure from the rock above, it is liquid.



- The inner core is a dense ball of solid metal. In the inner core, extreme pressure squeezes the atoms of iron and nickel so much that they cannot spread out and become liquid.



The Core and Earth's Magnetic Field…

- Scientists believe that movements in the Earth's liquid outer core create Earth's magnetic field. Because Earth has a magnetic field, the planet acts as a giant bar magnet.