

Our Changing Continent

An introduction to plate tectonics.

A Free Electronic Field Trip (Grades 4-9)
April 2, 2003, Noon-1:00 PM ET.

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Inside the Earth

The ancient Greeks knew the Earth was approximately 12,750 kilometers in diameter, but it wasn't until the turn of the 20th century that scientists determined that our planet is made up of three main layers: the crust, mantle, and core.

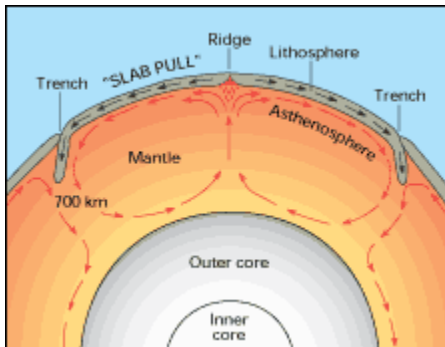
The crust of the Earth is rigid and very thin as compared with the other two layers. Contrasted to the shell of hardboiled egg, it is thinnest beneath the oceans and thickest above continents. It is broken into about 10 major plates, each of which behaves for the most part as separate rigid body sliding over a partially molten mantle. Physicists have determined the thickness of the layers by measuring velocities of earthquake waves.

Under the crust is a layer known to scientists as the asthenosphere. The continents float on this asthenosphere, which is a layer in the upper portions of the mantle that is partially melted.

This layer forms the top portion of the mantle. The remainder of the mantle is a dense, hot layer of semi-solid rock approximately 2,900 km thick. Within this zone, which contains more iron, magnesium, and calcium than the crust, is a hotter and denser layer. The temperatures are due to the tremendous pressures that increase with depth. The mantle might be compared to the white of the hardboiled egg.

At the center of the Earth is the core. Compared to the hardboiled egg again, it is the yoke. The core is more metallic than stony and almost twice as dense as the mantle because of its composition of nickel and iron. Unlike a regular egg yoke, the core is made up of two distinct parts: the liquid outer core and the thick solid inner core. As the Earth rotates, the liquid outer core spins, creating the Earth's magnetic field.

Cutaway views showing the interior structure of the Earth.



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