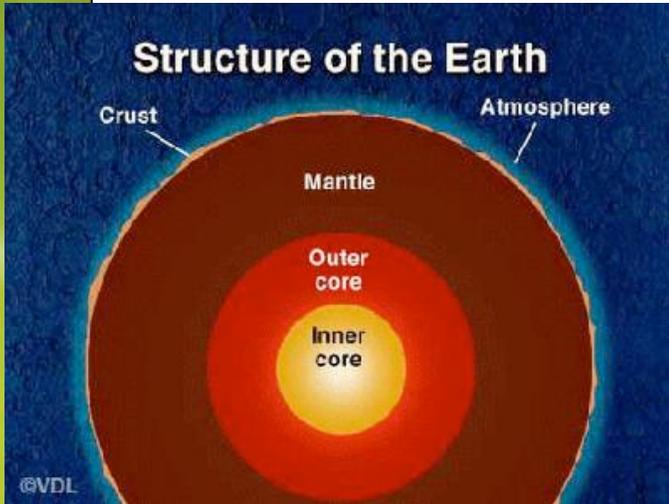


# Can Humans Travel to the Center of the Earth?

Many people wonder if it is possible to travel to the center of Earth. If possible, this journey would pass through the four main layers of Earth. It would start at the crust, the outermost layer, then pass through the mantle, which is directly under the crust. Under the mantle lies the outer core

and in the center of Earth is the inner core. Scientists called geologists learn about these layers by studying rocks. They also study how waves from earthquakes, called seismic waves, move through the different layers. This information tells them about the structure of Earth and just how deep into Earth humans can travel.



Earth has four main layers: the crust, the mantle, the outer core and the inner core.

## The Crust and Mantle

When compared to the rest of Earth's interior, the crust is very thin and also very cool. This is the part of Earth where organisms live. The crust is made of many different kinds of solid rock. Crust under the continents has an average thickness of 30 km, but it can be as thick as 100 km. Crust under the oceans is typically 5–8 km thick. The temperature on the outside surface of the crust varies depending on the location on the globe and the season.

Humans can travel down into the inner parts of the crust. Humans dig open mines and tunnels, or shafts, to collect natural resources such as coal, gold and copper. One of the deepest mines on Earth, the Mponeng gold mine in South Africa,



Humans use machines to collect minerals and ore from deep in Earth's crust, as seen here in this photo of an open mine

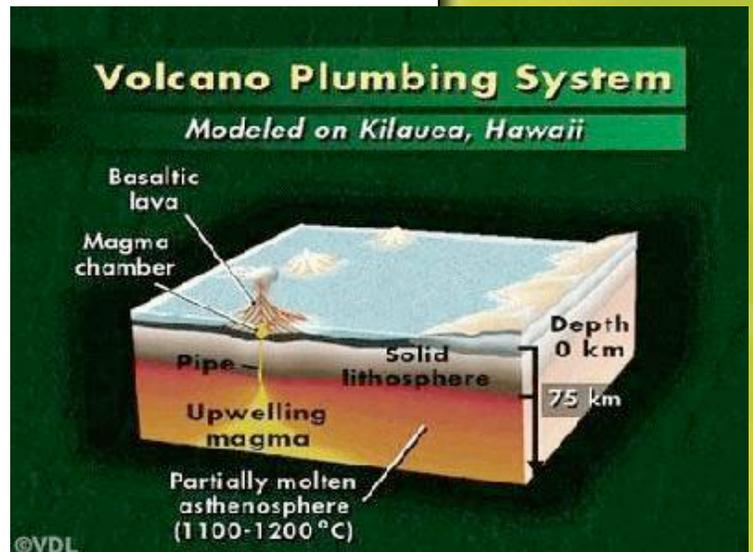
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reaches more than two miles down into Earth. Miners travel down to the mine site on an elevator that takes about an hour to reach the bottom. Because of its depth, conditions in the Mponeng mine are harsh.

Below the crust lies the mantle. The mantle is the largest layer of Earth—approximately 2900 km thick. Temperatures at the top of the mantle, near the crust, are around 1600 degrees Fahrenheit. Miners in the Mponeng gold mine can feel the increase in temperature as they go deeper into the mine. The air can reach 150 degrees Fahrenheit. Rocks deep in Earth have the weight of all the rocks above them pressing down on them. This increases the pressure on these rocks and the air that is in the mines. Digging mines this deep requires technology that can withstand such extreme heat and pressure.

Humans have not been able to travel more than a few miles beneath Earth's surface because of the intense heat and pressure. For the same reasons, humans have not been able to travel into the mantle. Temperatures in the mantle range from 1600 degrees Fahrenheit at the top to 4000 degrees Fahrenheit near the bottom. The temperature is high enough to melt rocks. These melted, or molten, regions of the mantle are called magma. Magma can travel to the surface of Earth through volcanoes. When magma comes up to the surface it is called lava. Humans do not have the technology necessary to build a device that can survive the heat and pressure in the mantle. However, humans have been able to learn about magma by studying the lava that comes out of volcanoes.

## The Outer Core and Inner Core

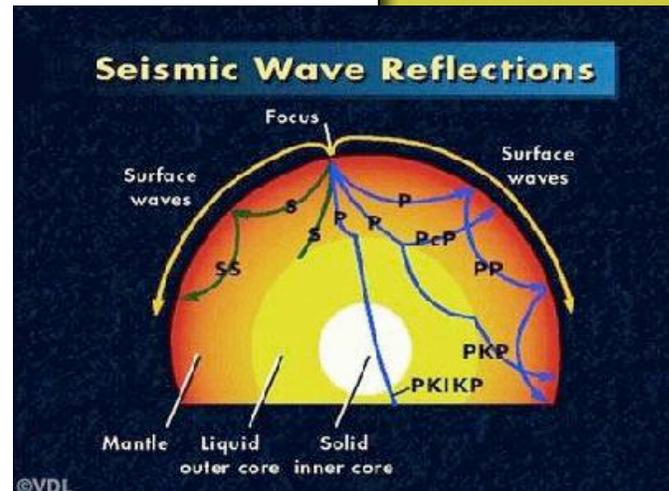


Magma from the mantle can travel through cracks in the crust to the surface of Earth. Once it is on the surface, magma is called lava.

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The outer core is directly below the mantle and is more than 2,200 km thick. The inner core is at the center of Earth and is more than 1,200 km thick. Temperature and pressure continue to increase in these layers. Temperatures in the outer and inner cores can reach 9000 degrees Fahrenheit. Both layers of the core are made of iron and nickel. The temperature in the outer and inner cores is high enough to keep these metals in a melted, or liquid, state. Indeed, the outer core consists of liquid metals, but the inner core is solid. This is due to the increase in pressure from the outer to inner core. The inner core has so much pressure acting on it that its molecules are squeezed together very tightly.

Even though humans cannot travel to the outer and inner cores, scientists have learned much about these layers by studying how seismic waves pass through them. Seismic waves travel at different speeds through solids and liquids. Geologists calculate how fast they move through Earth at different depths. This data plus data collected from lava and other rocks have allowed scientists to learn about the structure of Earth without having to travel to the center of it.



Seismic waves generated by earthquakes travel through solids and liquids at different speeds. Scientists study data from seismic waves to help them determine what the different layers of Earth are made of.