

How is the asthenosphere different from the lithosphere?

Answer 1:

The difference between asthenosphere and lithosphere is how the materials in these layers can flow. Rocks in the lithosphere are "rigid", meaning that they can bend but they cannot flow. Rocks in the asthenosphere are "plastic", meaning that they can flow in response to deformation. Even though it can flow, the asthenosphere is still made of solid (not liquid) rock; you can think of it kind of like Silly Putty. What determines whether rocks act in a rigid manner (bending or breaking) or a plastic manner (flowing) is temperature. Deep in the Earth, hot rocks (above about 1300°C) can flow, whereas cold rocks cannot. The lithosphere is broken up into rigid plates that ride on top of the flowing asthenosphere. In terms of chemical composition, there is no difference between the upper part of the asthenosphere and the lower part of the lithosphere. In fact, if the upper part of the asthenosphere cools down it becomes part of the lithosphere.

In addition to layers with different mechanical properties (lithosphere vs. asthenosphere), we can talk about layers with different chemical composition. The outer most layer of the Earth is the crust, which varies in thickness from about 7-70 km. Below that is the mantle, which is made up of denser rocks than the crust. At a depth of almost 3000 km, you reach the core, which is made of iron and nickel and is even denser than the mantle. The lithosphere is made up the crust plus the very upper part of the mantle, whereas the asthenosphere is only upper mantle material.

The Earth's Crust, Lithosphere and Asthenosphere

Crust, the upper [layer](#) of the Earth, is not always the same. Crust under the oceans is only about 5 km thick while continental crust can be up to 65 km thick. Also, ocean crust is made of denser minerals than continental crust.

The tectonic plates are made up of Earth's crust and the upper part of the mantle layer underneath. Together the crust and upper mantle are called the **lithosphere** and they extend about 80 km deep. The lithosphere is broken into giant plates that fit around the globe like puzzle pieces. These puzzle pieces [move](#) a little bit each year as they slide on top of a somewhat fluid part of the mantle called the asthenosphere. All this moving rock can cause [earthquakes](#).

The **asthenosphere** is ductile and can be pushed and deformed like silly putty in response to the warmth of the Earth. These rocks actually flow, moving in response to the stresses placed upon them by the churning motions of the deep interior of the Earth. The flowing asthenosphere carries the lithosphere of the Earth, including the continents, on its back.