

Earth is covered by large plates that move, releasing energy. This map shows Earth's major plates. Since Venus doesn't have moving plates, the energy inside it must be released in another way.

## Earth and Venus: Sister Planets

The inside of Earth is a hot place. The processes that formed Earth 4.6 billion years ago produced so much heat that our planet still hasn't cooled off completely, even though it is always releasing heat into space! In addition, radioactive decay inside Earth constantly generates heat. Heat from Earth's interior escapes through volcanic activity, mostly at plate boundaries. All that heat is able to escape because Earth has plates that move around and release the energy.

The inside of Venus is hot, just like the inside of Earth. In fact, Earth and Venus have a lot of things in common: they're about the same

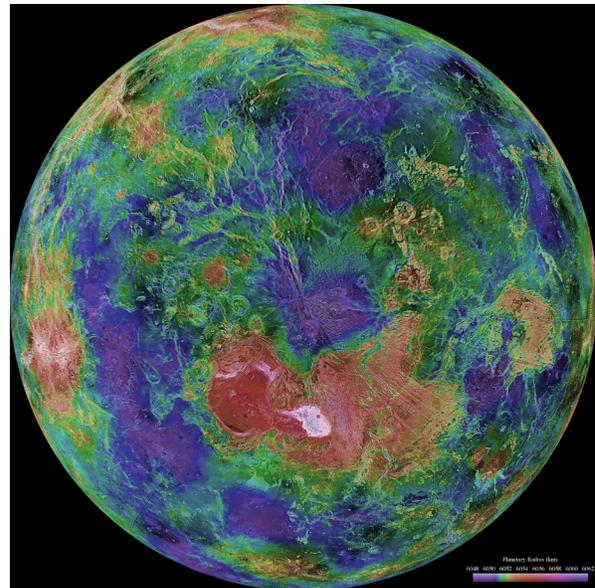
size, Earth is just a little farther from the sun than Venus, and the two planets were formed at the same time. Those similarities tell scientists that Earth and Venus were made of the same materials in about the same amounts. However, Venus does not have plate motion like Earth does. Since Earth and Venus are so similar in all those other ways, Venus must have some other way to release heat from inside the planet.

Since it doesn't have plate tectonics, Venus can't continually release small amounts of heat the way Earth does. Instead, scientists have evidence that Venus has released its heat in just a few big bursts that re-formed the surface

of the whole planet! According to mathematical models made by scientists, the heat inside Venus builds up, heating up the mantle until it begins to melt the surface above it. Hot magma spills out onto the surface as lava, releasing large amounts of heat into space all at once. New igneous rock forms all over the surface of Venus as the lava cools. According to the models, this process may have happened several times in the planet's history.

There's another reason that plate tectonics makes Earth different from Venus: plate motion on Earth causes subduction and uplift of rock formations. Without plate motion, subduction does not occur on Venus. Any uplift on Venus would have to be caused by some other mechanism.

Humans have never set foot on Venus, so what evidence do scientists have that their models are accurate? One type of evidence has to do with craters that are formed when objects flying through space collide with a planet or moon. The surface of Venus has very few craters compared to the planet's nearest neighbors—Mercury and Earth's moon—even though they have both existed for about the same length of time as Venus. Venus has probably experienced about the same number of collisions as the Moon or Mercury throughout its history, so the fact that its surface doesn't have many craters means the surface may have been replaced with a new surface fairly recently. Evidence from craters tells us that, while Venus formed about 4.5 billion years ago, the surface of Venus is only about 500 million years old! That's strong evidence that the planet's whole surface was re-formed at that time.



**This image of Venus has been color-coded to show elevation. Venus has geologic features like Earth does, but it doesn't have plate motion.**