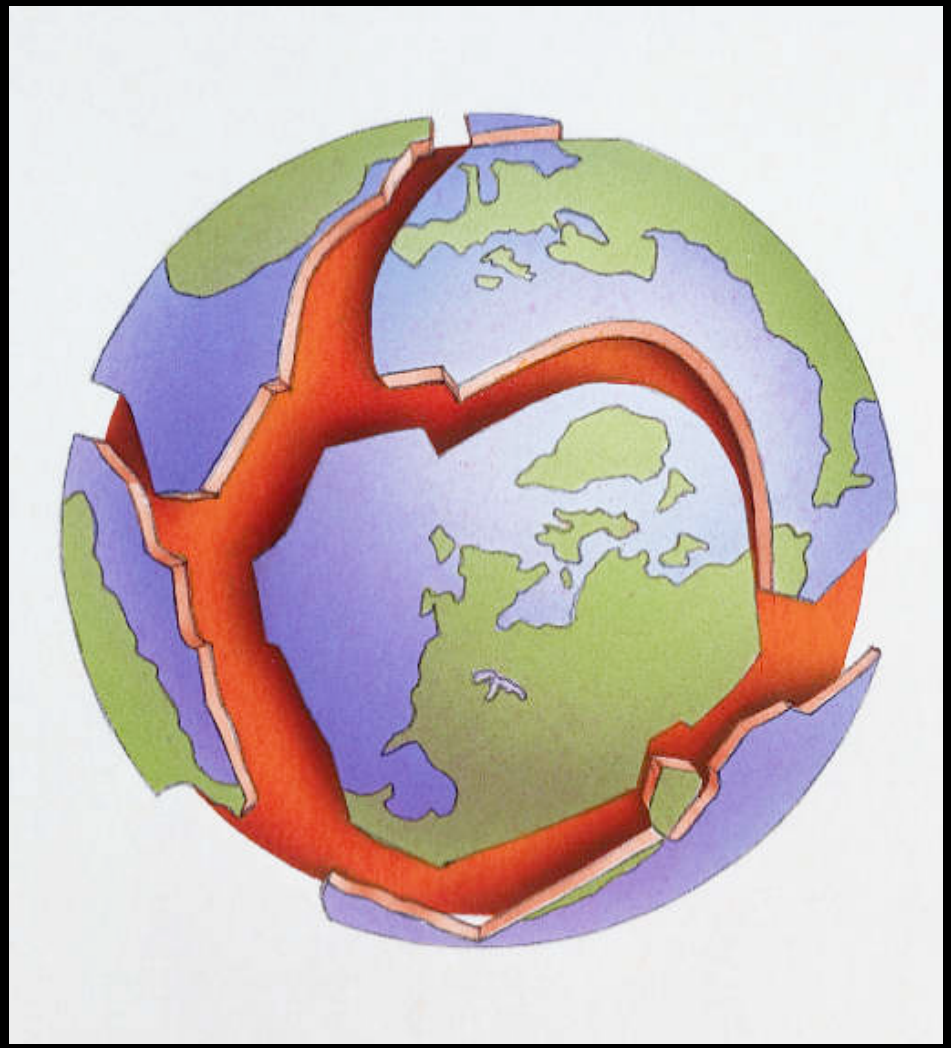
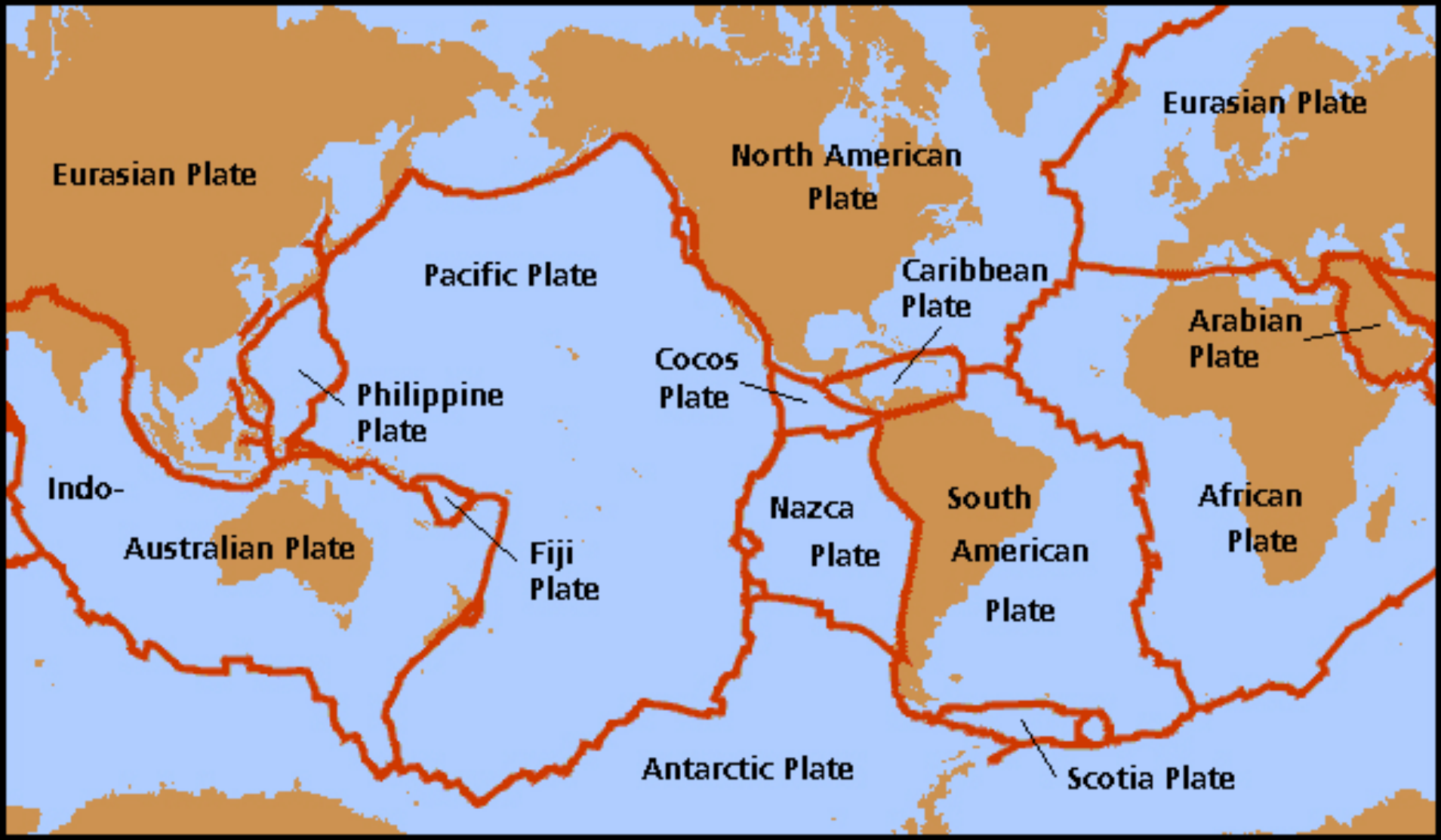
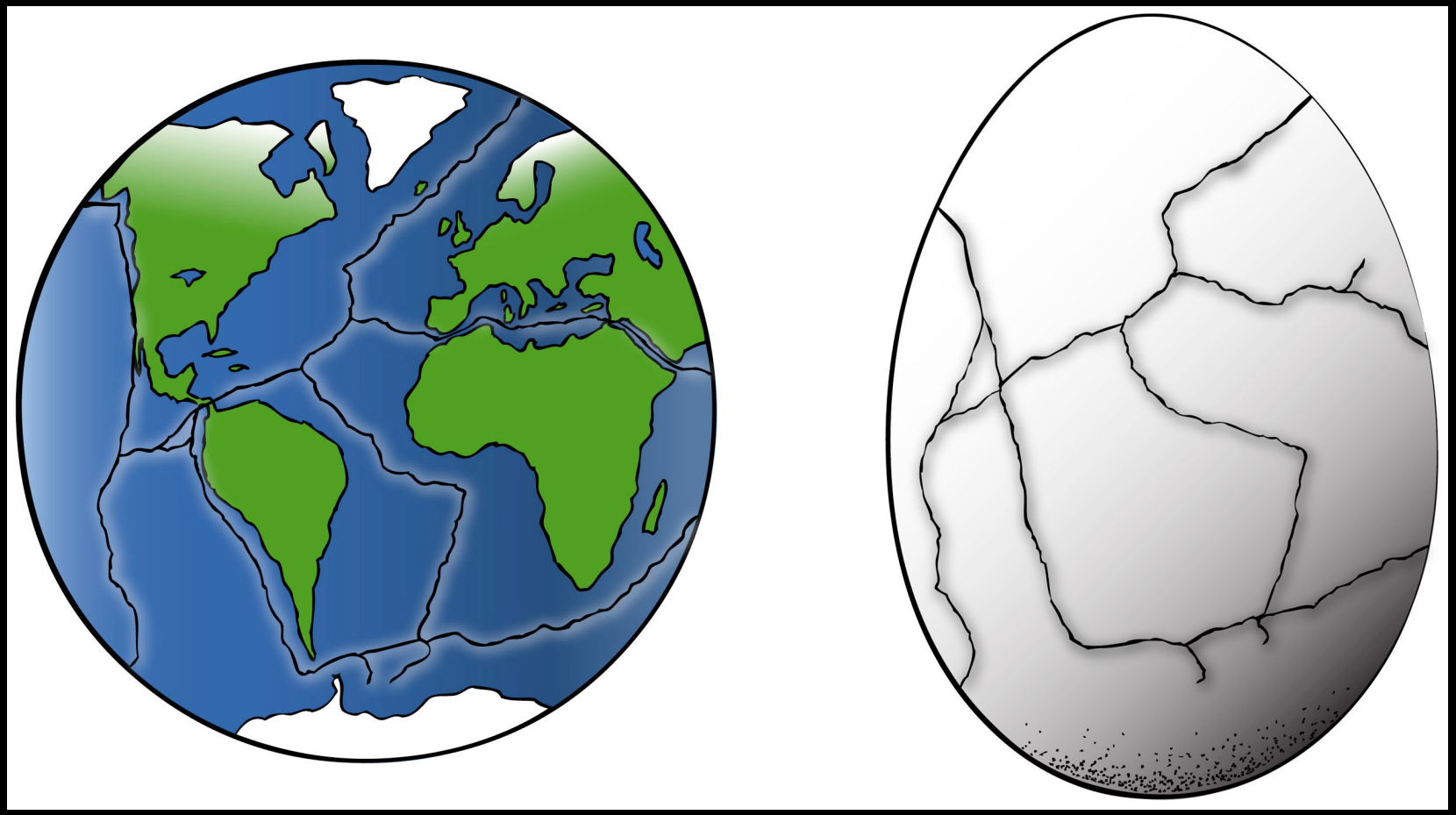
Introduction to Plate Tectonics



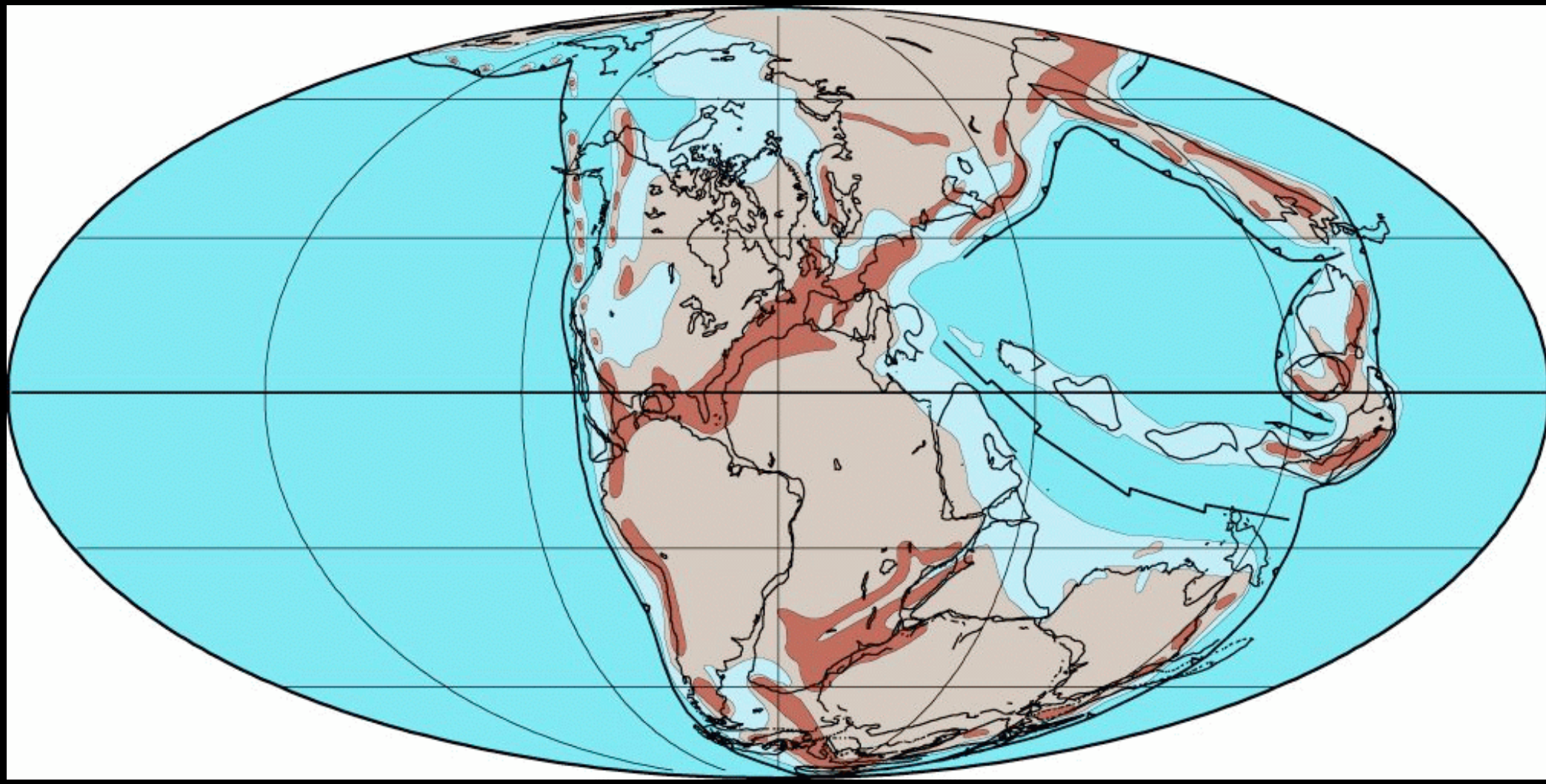
The Theory of Plate Tectonics states that the crust of the Earth is divided into "plates" which are slowly moving.



The plates cover earth's "crust." You can imagine them as a cracked egg shell.



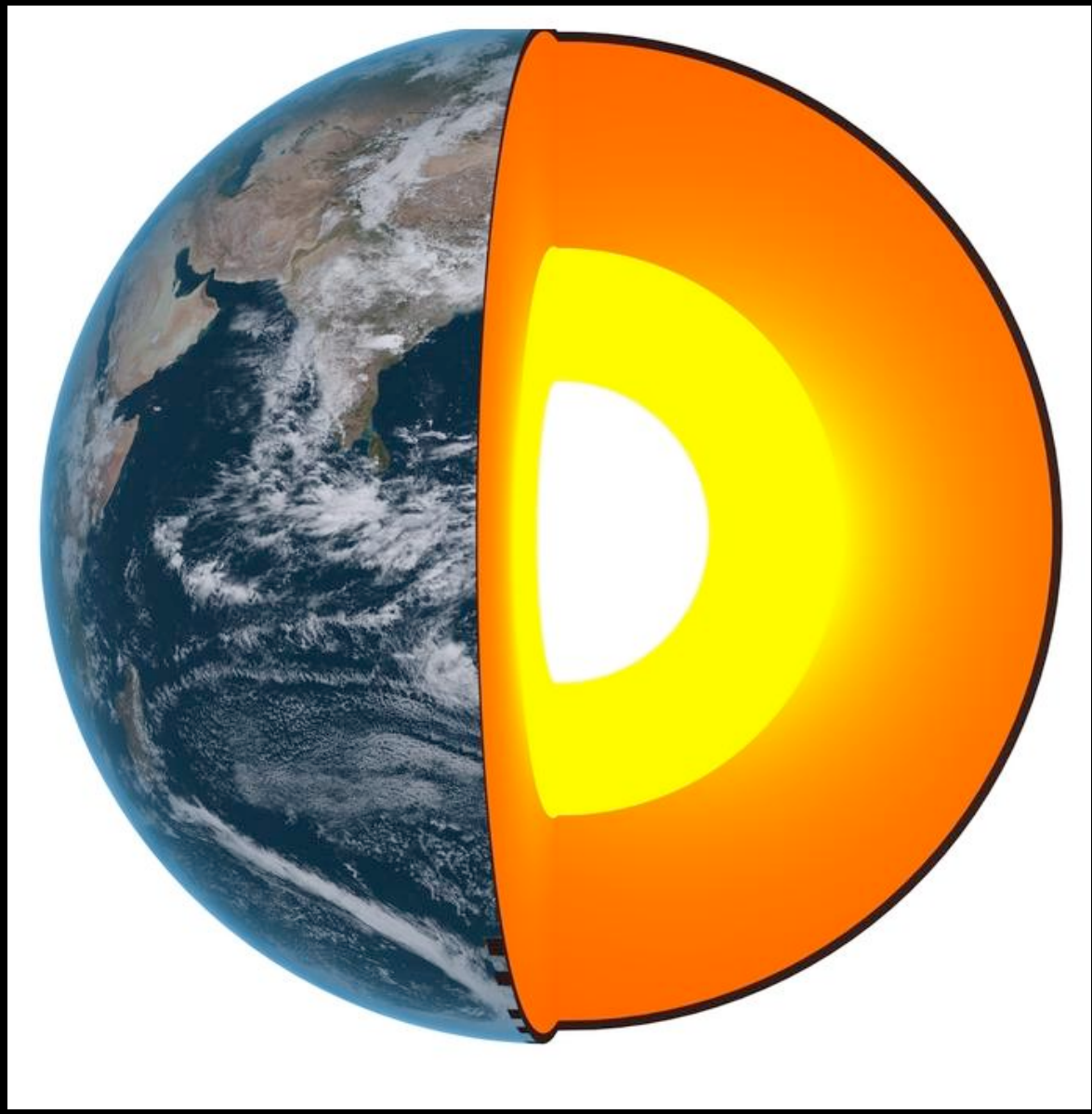
This explained HOW continent moved, the missing piece in Wegener's <u>Theory of Continental Drift</u>

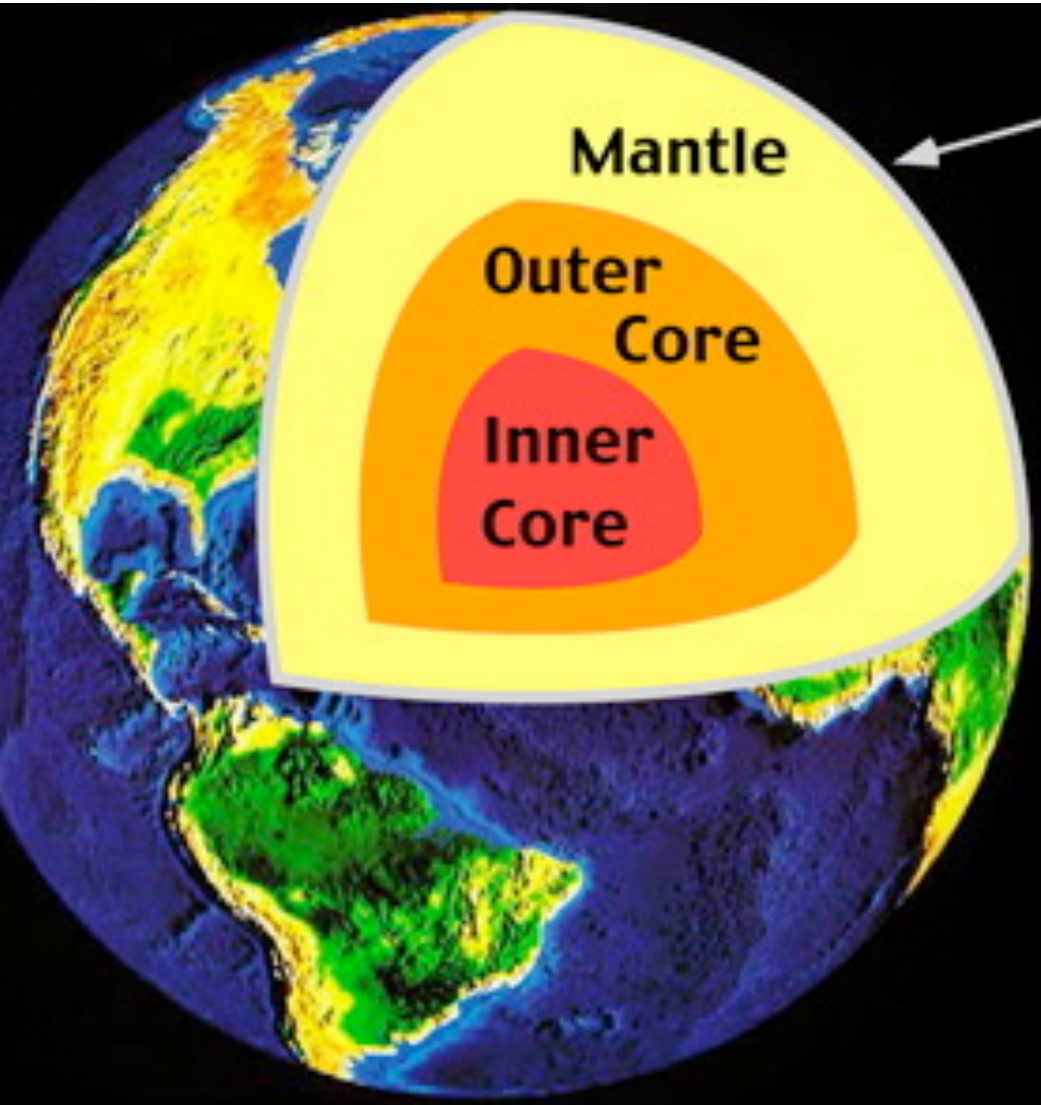


So how do the plates move?

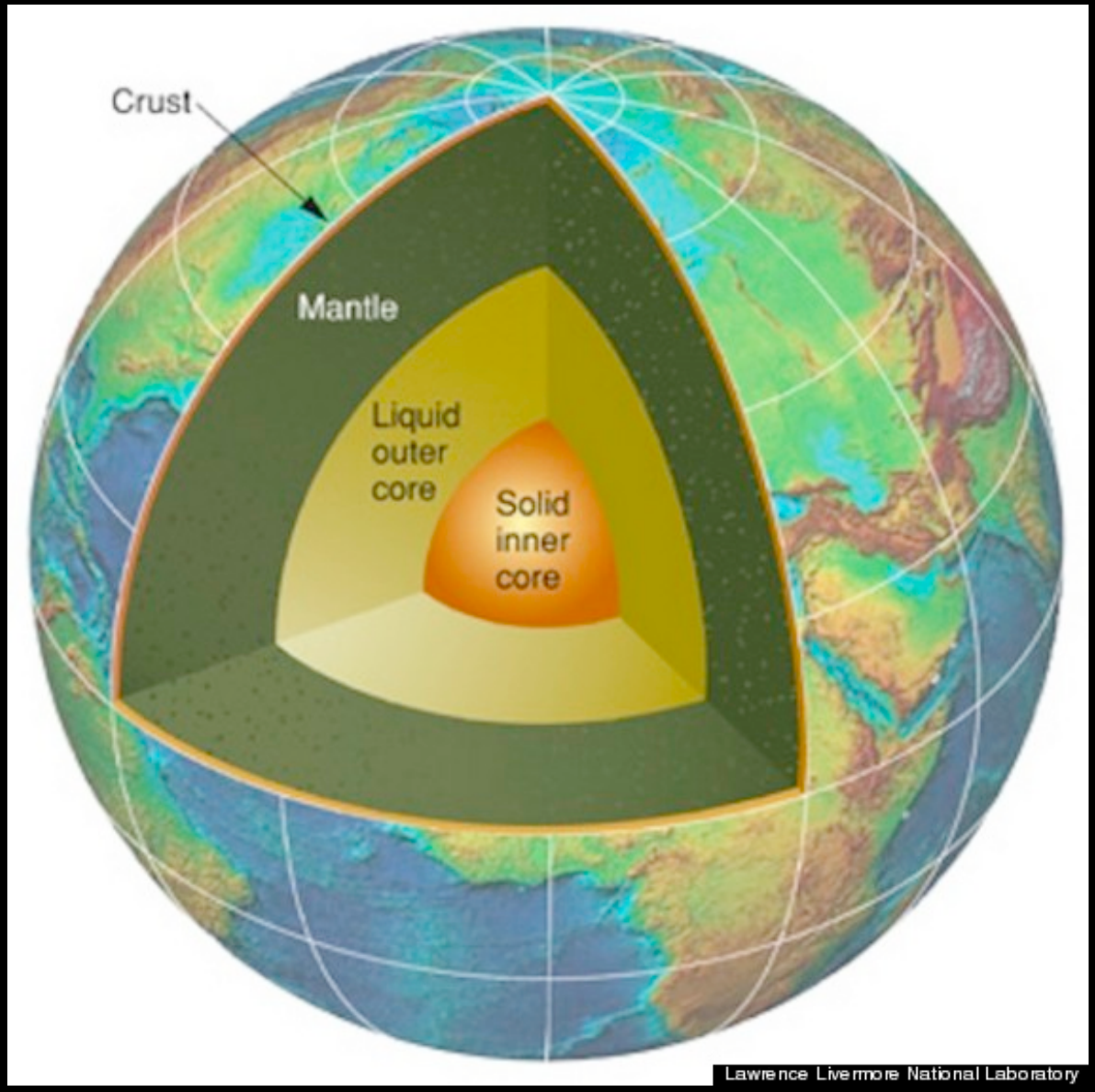
To understand this, you need to understand the

interior structure of the Earth.



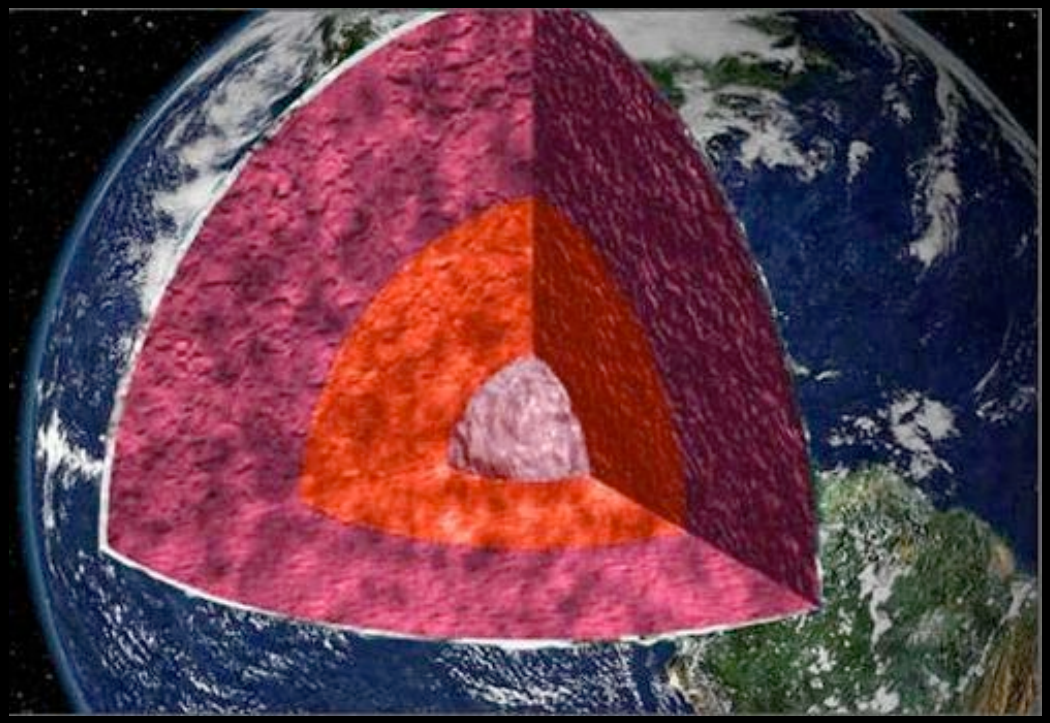


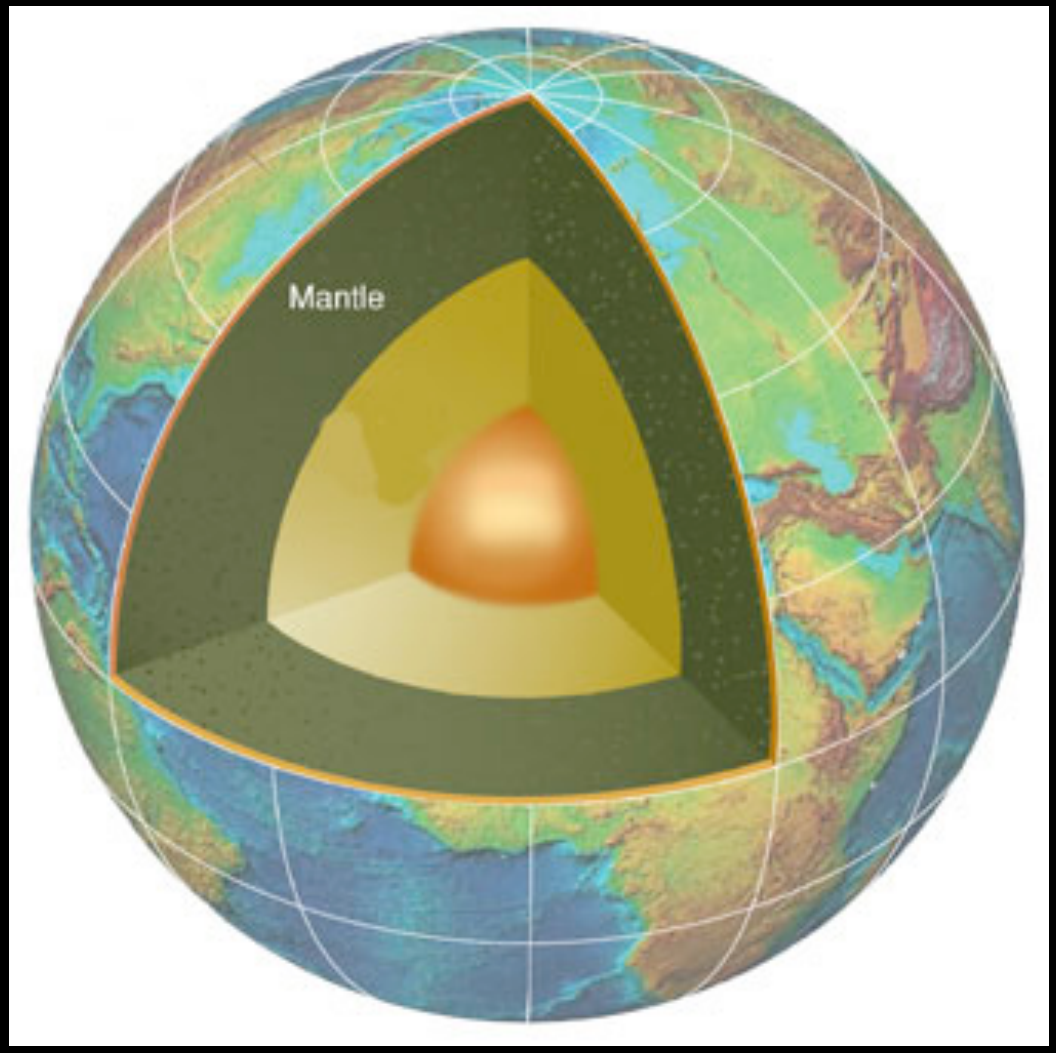
The interior of Earth is divided into different layers, some of which are **solid** and some of which are **liquid**. All are **hotter** than the surface of Earth.



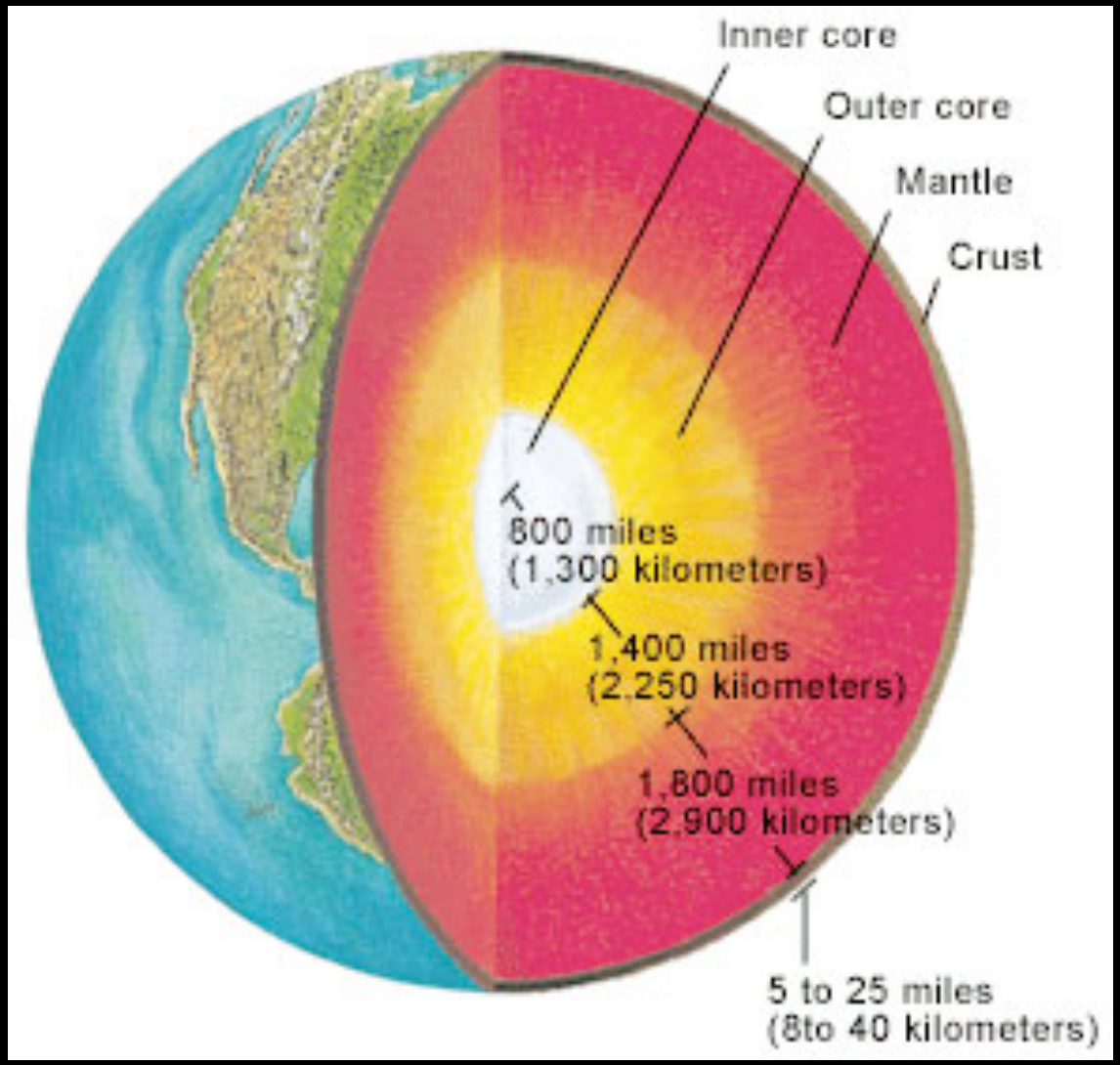
The inner core is made of **nickel** and **iron**

Even though the inner core is hotter than the outer core, it is **solid** because of pressure caused by gravity

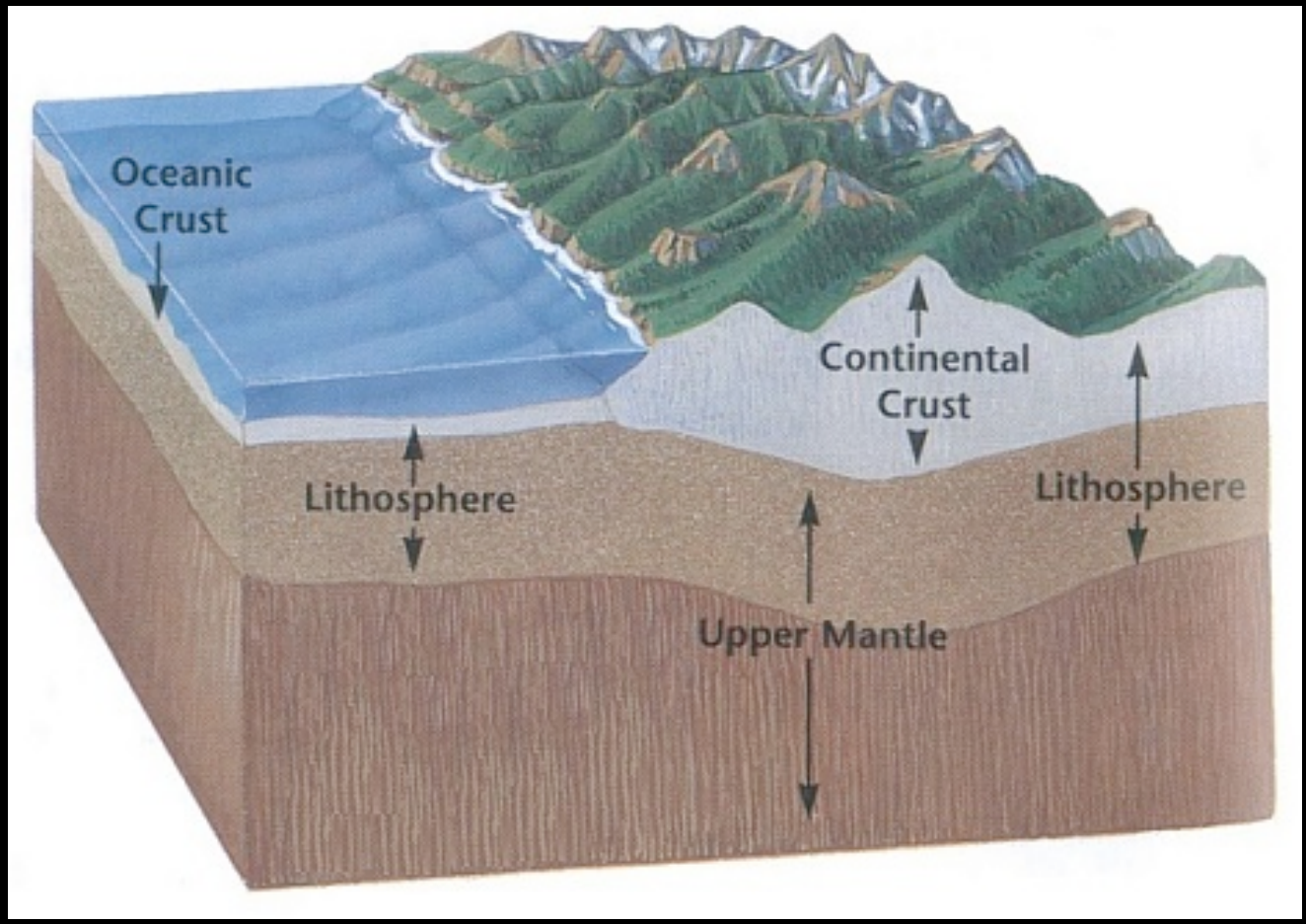




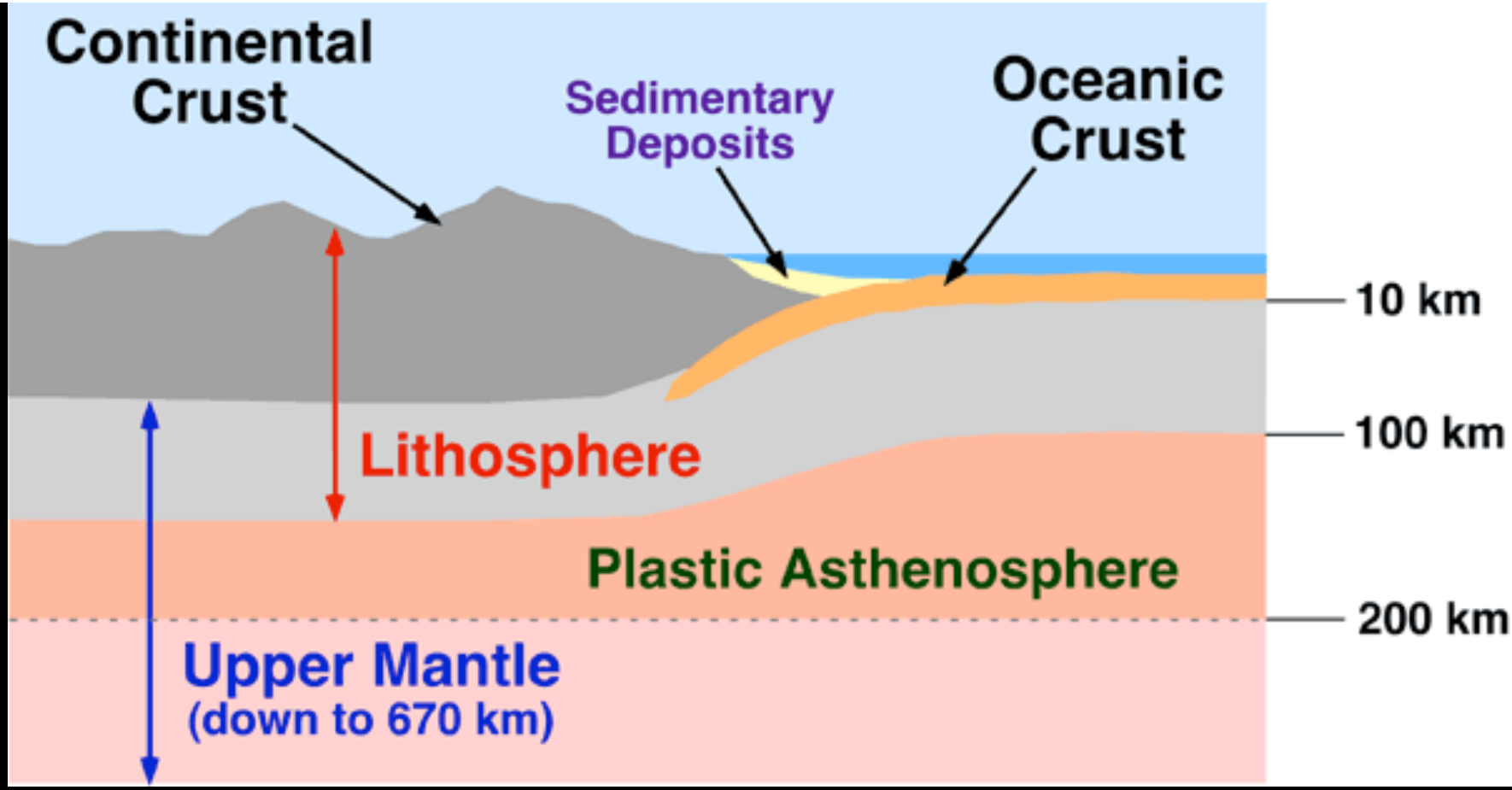
The mantle of the earth is mostly solid.



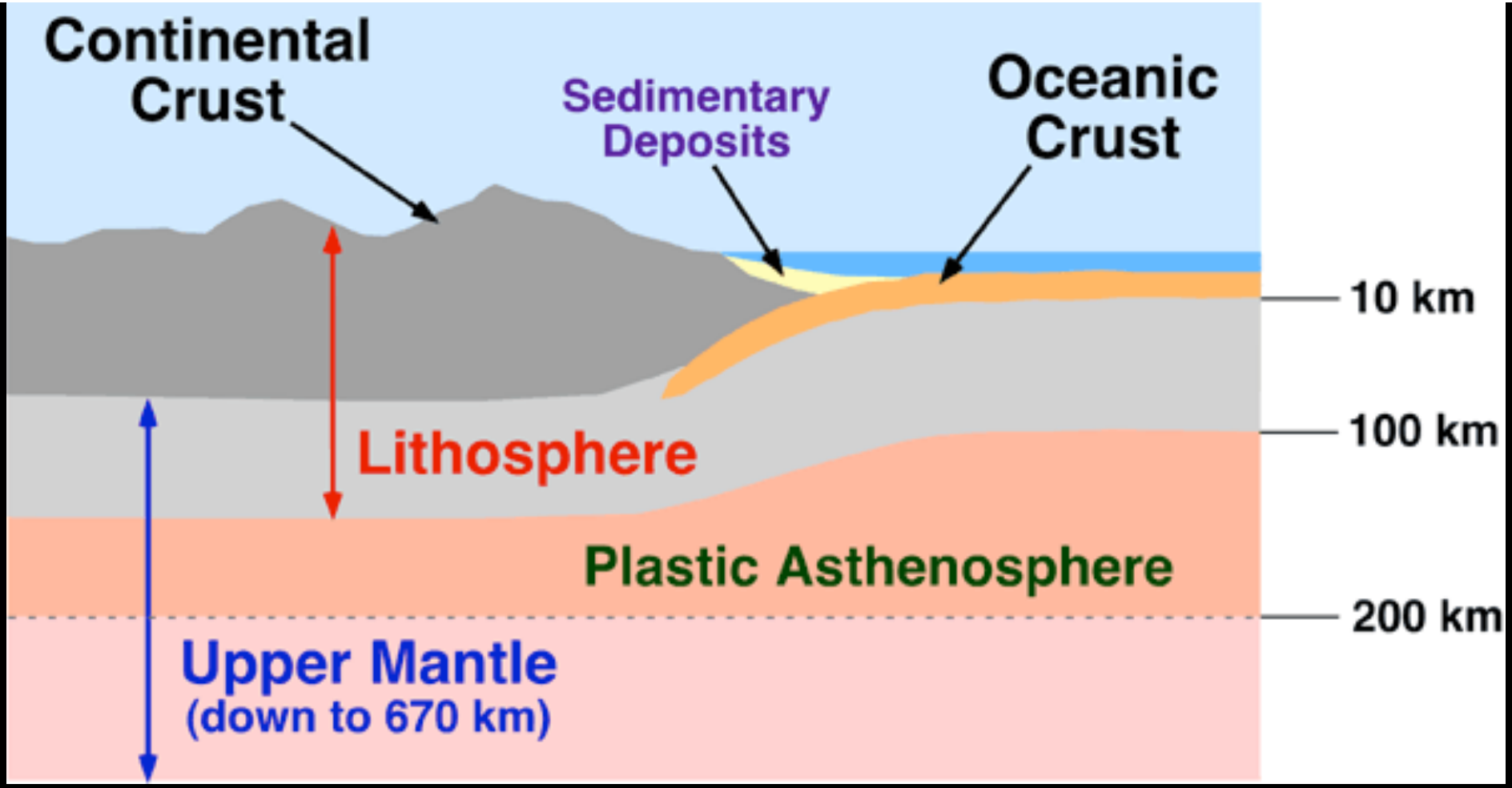
Earth's mantle is about 1,800 miles thick



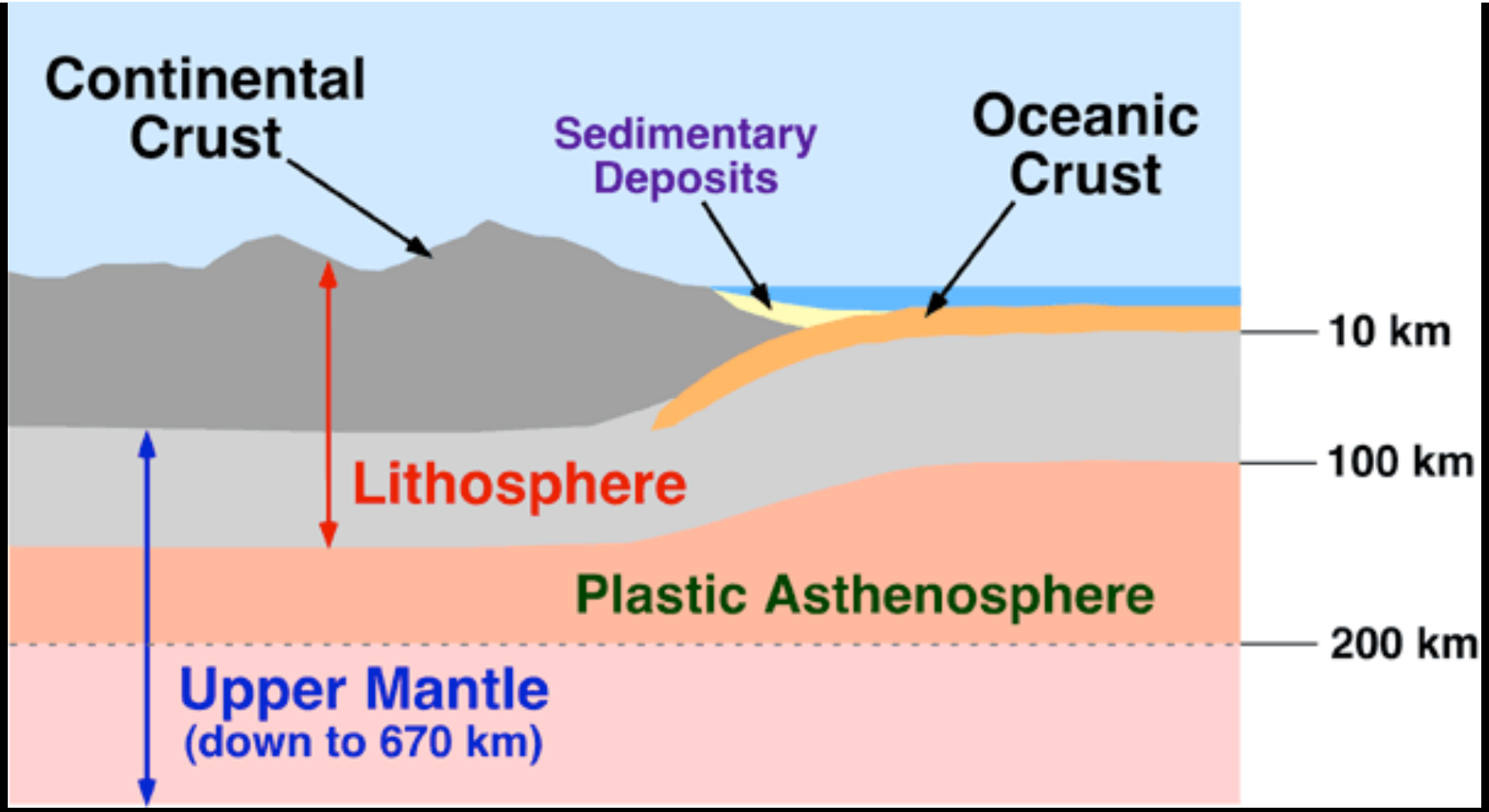
Earth's crust is about 10 miles thick.



Earth's "plates" sit on top of the **lithosphere** and the **asthenosphere**.

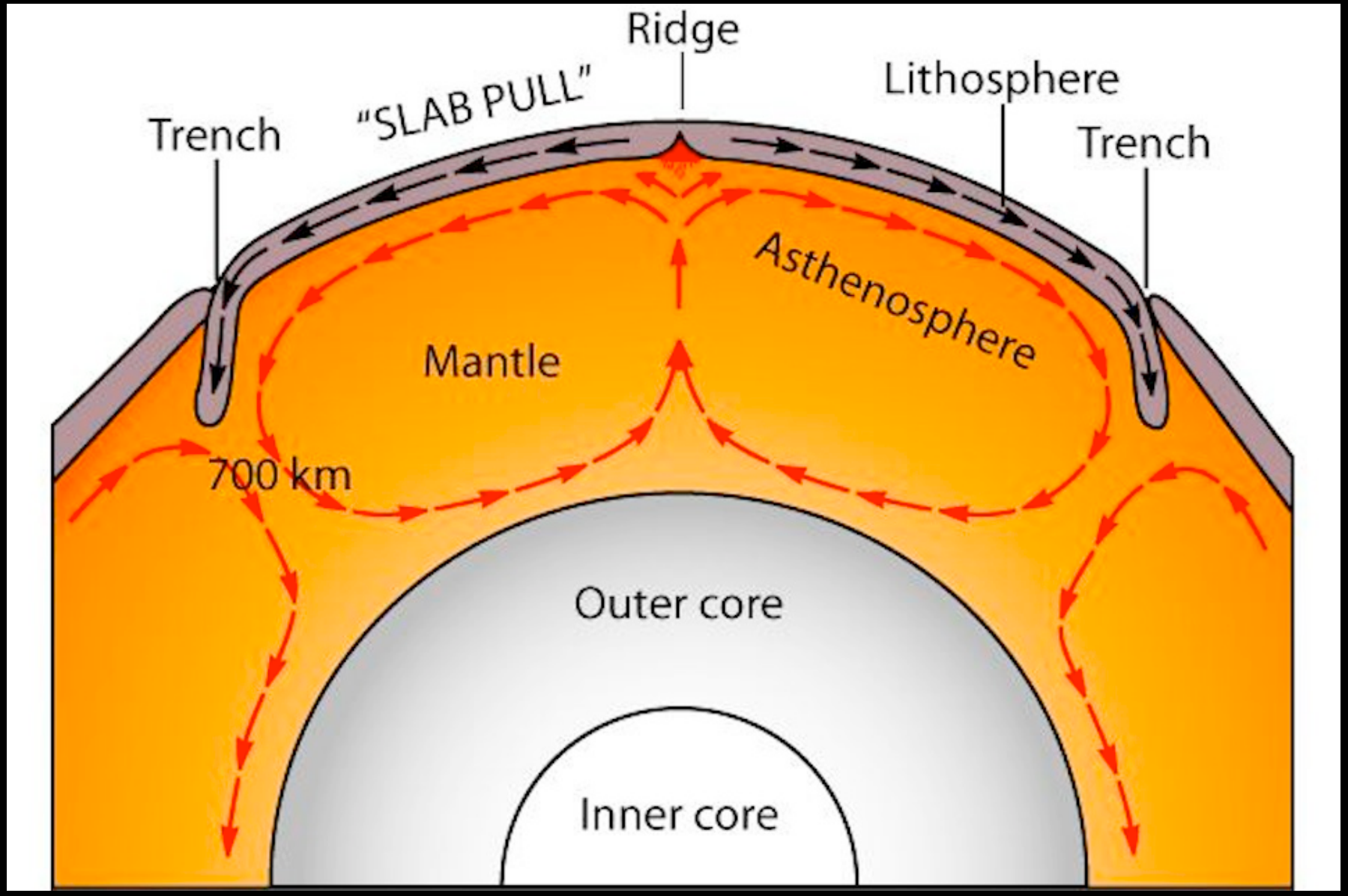


The **asthenosphere** is movable like chewing gum. It is called "plastic."

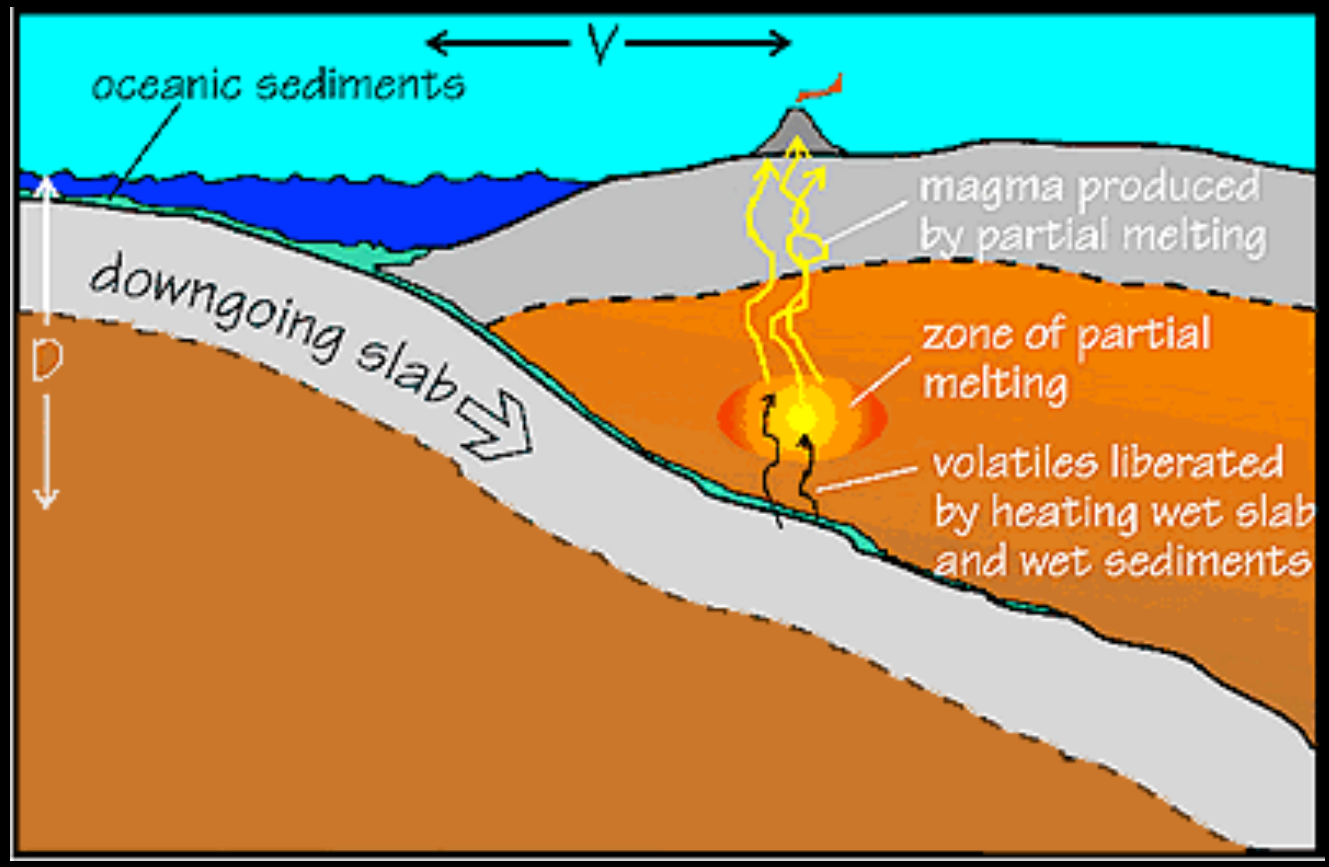


The **lithosphere** is generally **solid** and makes up the plates.

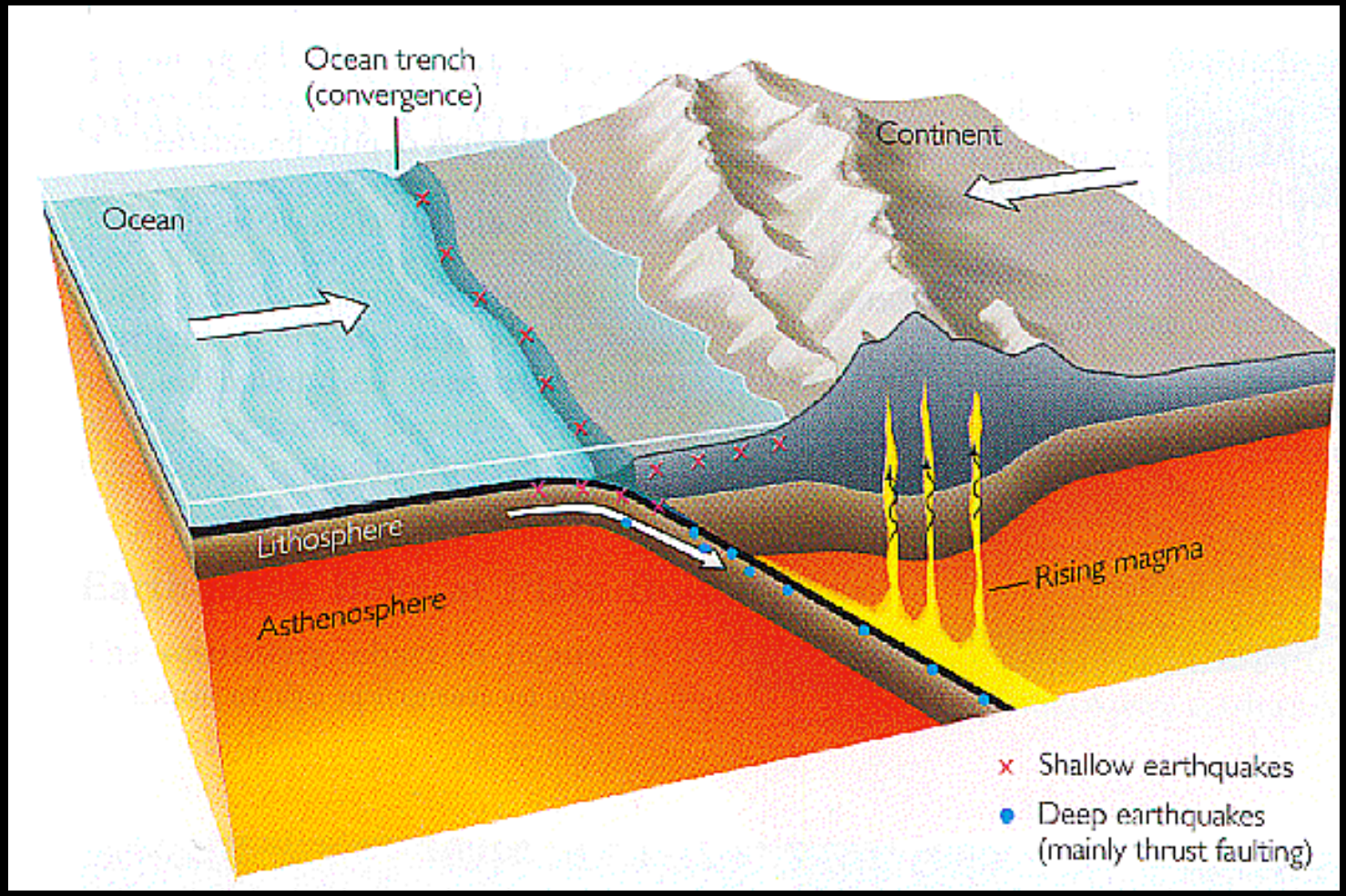
Plates can move on top of the plastic asthenosphere.



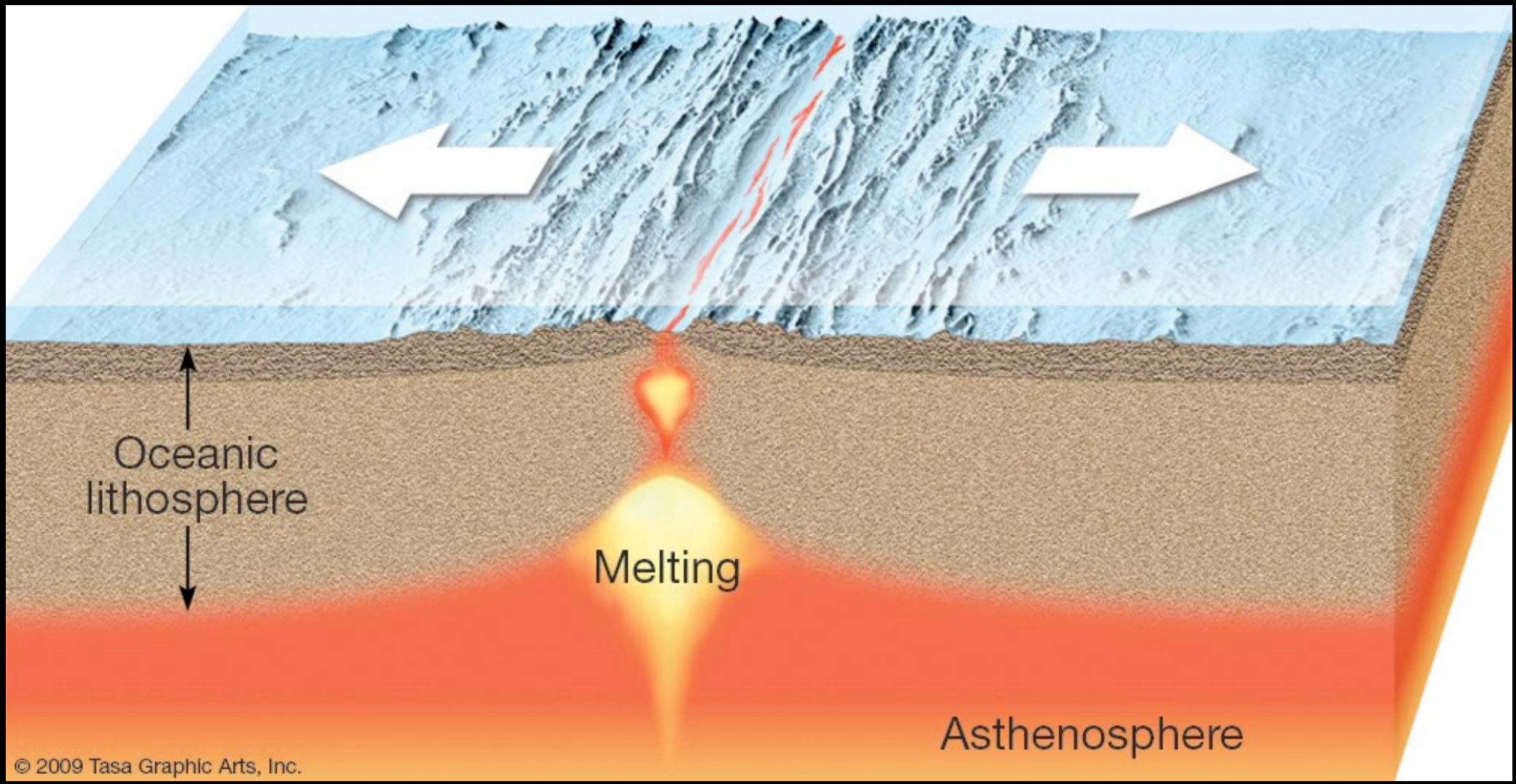
In some places the edge of a plate gets pulled into the Asthenosphere



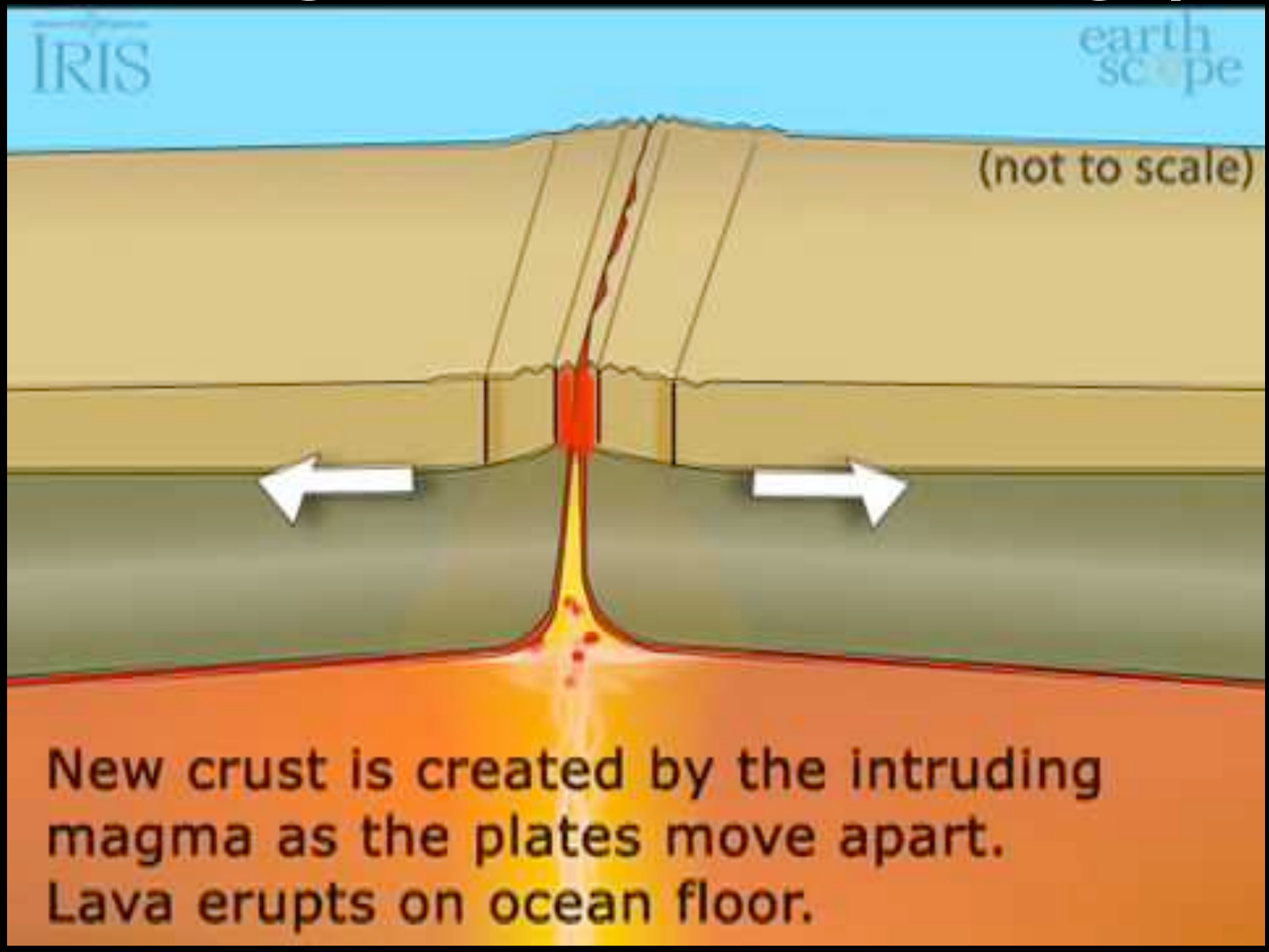
This is called a subduction zone. The plate gets melted back into the Earth.



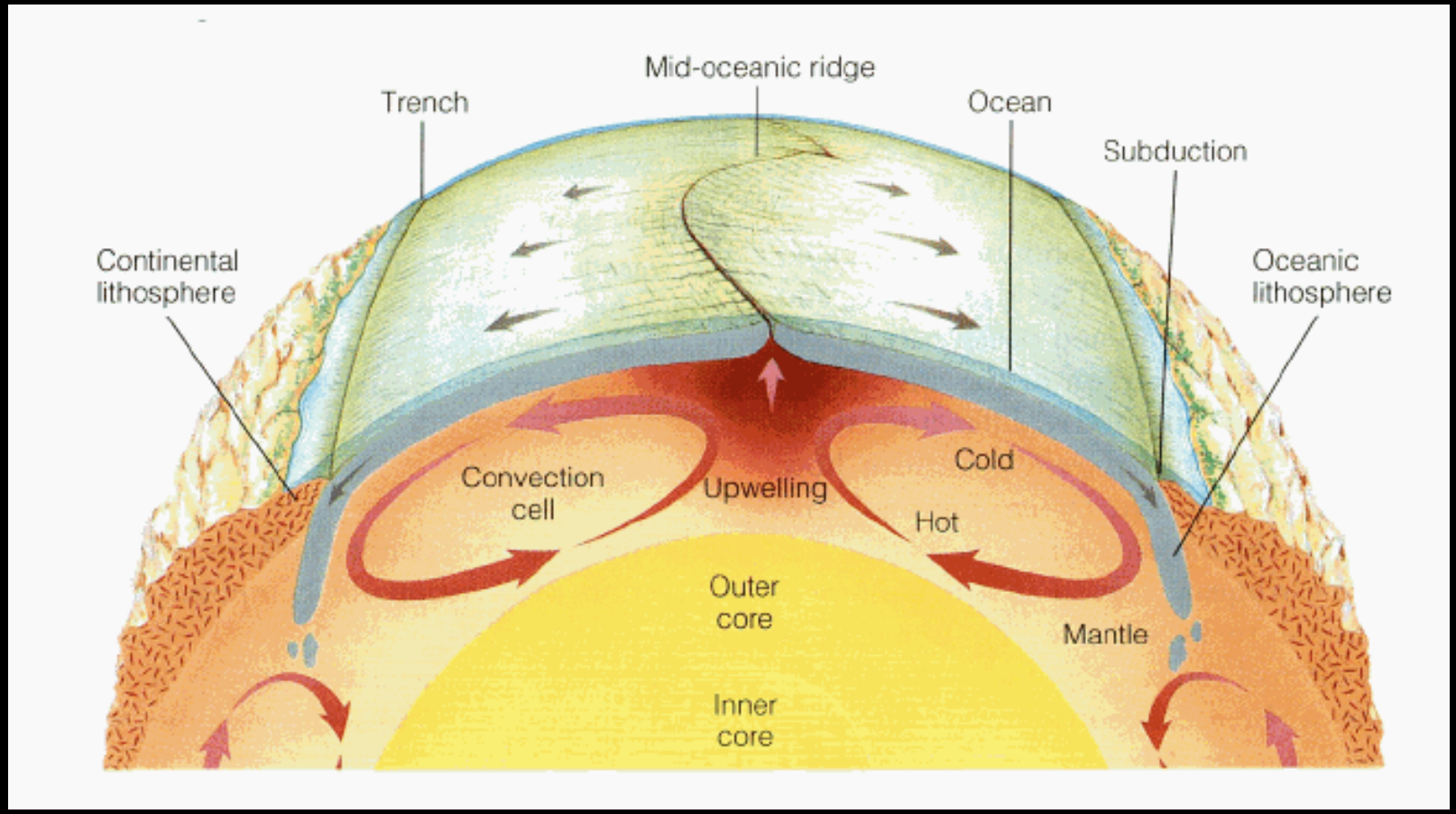
In other places the edge of two plates are getting farther apart.



In these places, magma rises up making new crust in the gap.



Continents move as the edge of the plates get pulled apart or pulled under.



See the plates...

http://mpbn.pbslearningmedia.org/asset/ess05_int_boundaries/

VIDEO:
The Pangaea Pop-Up

http://ed.ted.com/lessons/the-pangaea-pop-up-michael-molina

VIDEO:
Earth's Interior and Plate Boundaries

http://www.youtube.com/watch?v=0mWQs1_L3fA

Follow-Up:

Is Earth getting larger as plates move apart and new crust forms? Explain your answer.

What is the evidence for plate tectonics?

VIDEO LINKS:

Plate Tectonics: Further Evidence

http://mpbn.pbslearningmedia.org/resource/ess05.sci.ess.earthsys.wegener2/plate-tectonics-further-evidence/

Plate Tectonics: Lake Mead Nevada

http://mpbn.pbslearningmedia.org/resource/ess05.sci.ess.earthsys.meadnv/plate-tectonics-lake-mead-nevada/

1. How did the new information about the ocean floor support Wegener's theory?

2. How do the rocks at Lake Mead support the theory of plate tectonics?

3. What other evidence would help convince you that the theory of plate tectonics was real?

Ongoing Evidence for Plate Tectonics

http://www.visionlearning.com/en/library/Earth-Science/6/The-Origins-of-Plate-Tectonic-Theory/65

Today, much of the evidence concerning plate tectonics is acquired with satellite technology. Through use of the global positioning system (GPS) and other satellite-based data collection techniques, scientists can directly measure the velocity (or speed and direction of movement) of plates on Earth's surface. Speeds range from 10 to 100 mm per year, confirming the long-held belief that plates move at a slow but constant rate (see our module on Linear Equations for more detail on how to calculate rates of plate movement).

The Himalayas, as it turns out, started forming about 40 million years ago when the Indian Plate collided head-on with the Eurasian Plate, shoving and folding rocks that had formed below sea level into lofty peaks. Because the Indian Plate is still moving northward, the Himalayas are still rising at a rate of about 1 cm per year. We no longer need to invoke a shrinking, wrinkled Earth to explain the marine fossils at the top of these tall mountains; it is the process of plate tectonics that continues to lift seafloor rocks to the sky.

Earth is incredibly dynamic - mountain chains build and erode away, volcanoes erupt and go extinct, seas advance and recede - and these changes are all a result of the processes of plate tectonics. Before Wegener, few had conceived of such a world. His continental drift theory was the first step in the development of plate tectonic theory, the foundation upon which modern geology is built.