

The Theory of Plate Tectonics

Objectives

- **Describe** the three types of tectonic plate boundaries.
- **Describe** the three forces thought to move tectonic plates.
- **Explain** how scientists measure the rate at which tectonic plates move.

I. Tectonic Plate Boundaries

- A. **Convergent Boundaries** When two tectonic plates collide, the boundary between them is a convergent boundary.
- B. **Divergent Boundaries** When two tectonic plates separate, the boundary between them is called a divergent boundary.
- C. **Transform Boundaries** When two tectonic plates slide past each other horizontally, the boundary between them is a transform boundary.

Continental-Continental Collisions

When two tectonic plates with continental crust collide, they buckle and thicken, which pushes the continental crust upward.

Convergent boundaries

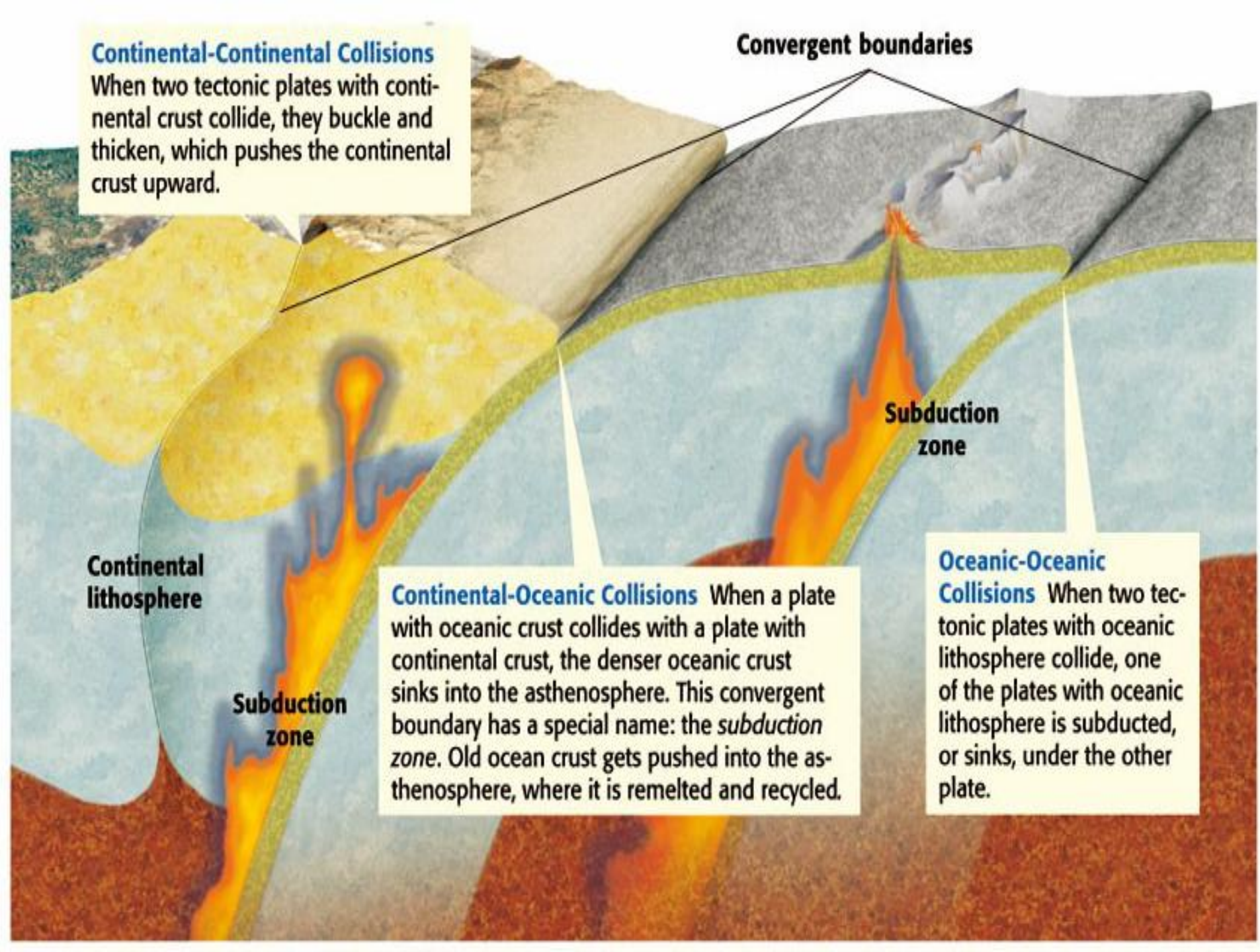
Subduction zone

Continental lithosphere

Subduction zone

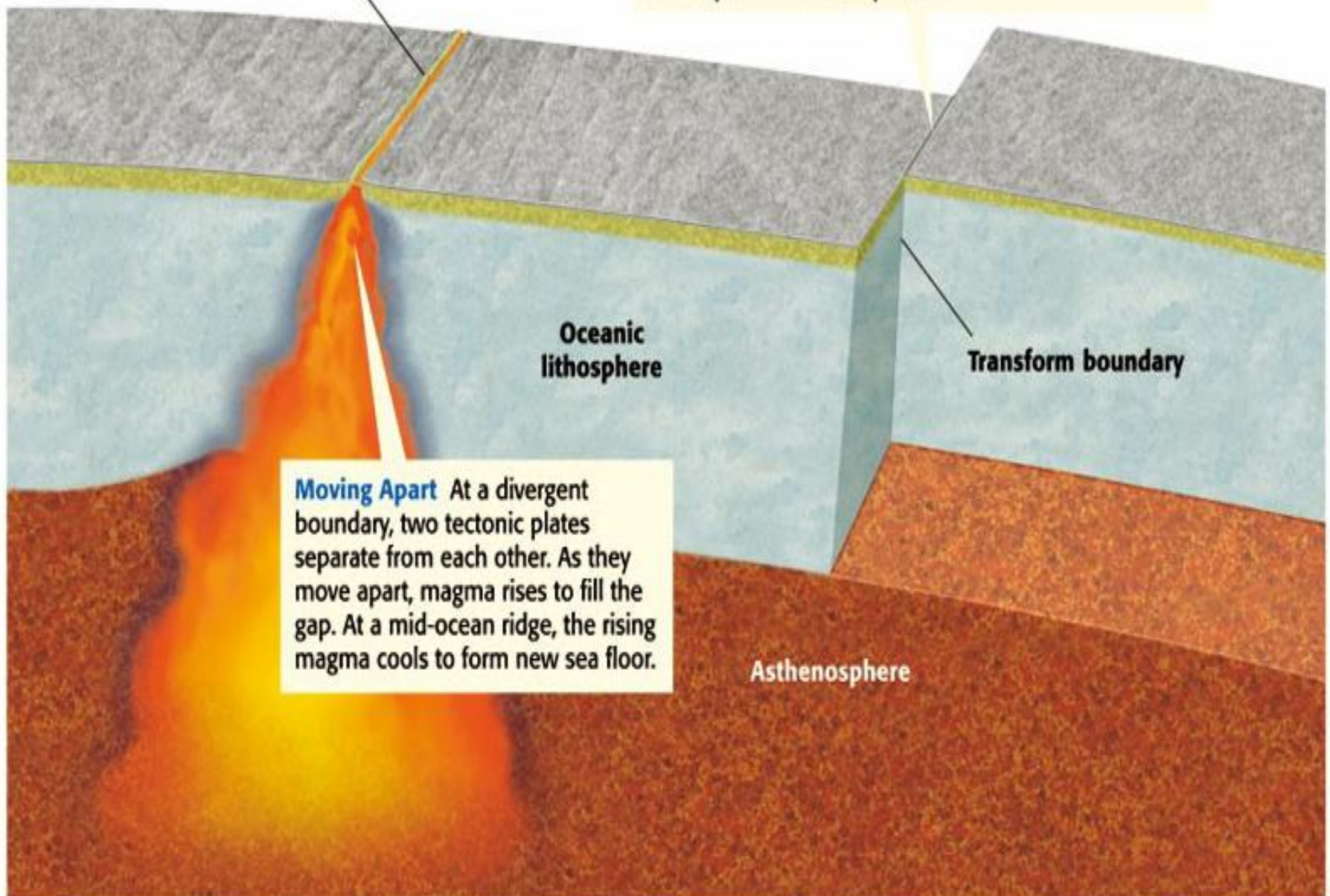
Continental-Oceanic Collisions When a plate with oceanic crust collides with a plate with continental crust, the denser oceanic crust sinks into the asthenosphere. This convergent boundary has a special name: the *subduction zone*. Old ocean crust gets pushed into the asthenosphere, where it is remelted and recycled.

Oceanic-Oceanic Collisions When two tectonic plates with oceanic lithosphere collide, one of the plates with oceanic lithosphere is subducted, or sinks, under the other plate.



Sliding Past At a transform boundary, two tectonic plates slide past one another. Because tectonic plates have irregular edges, they grind and jerk as they slide, which produces earthquakes.

Divergent boundary



Oceanic lithosphere

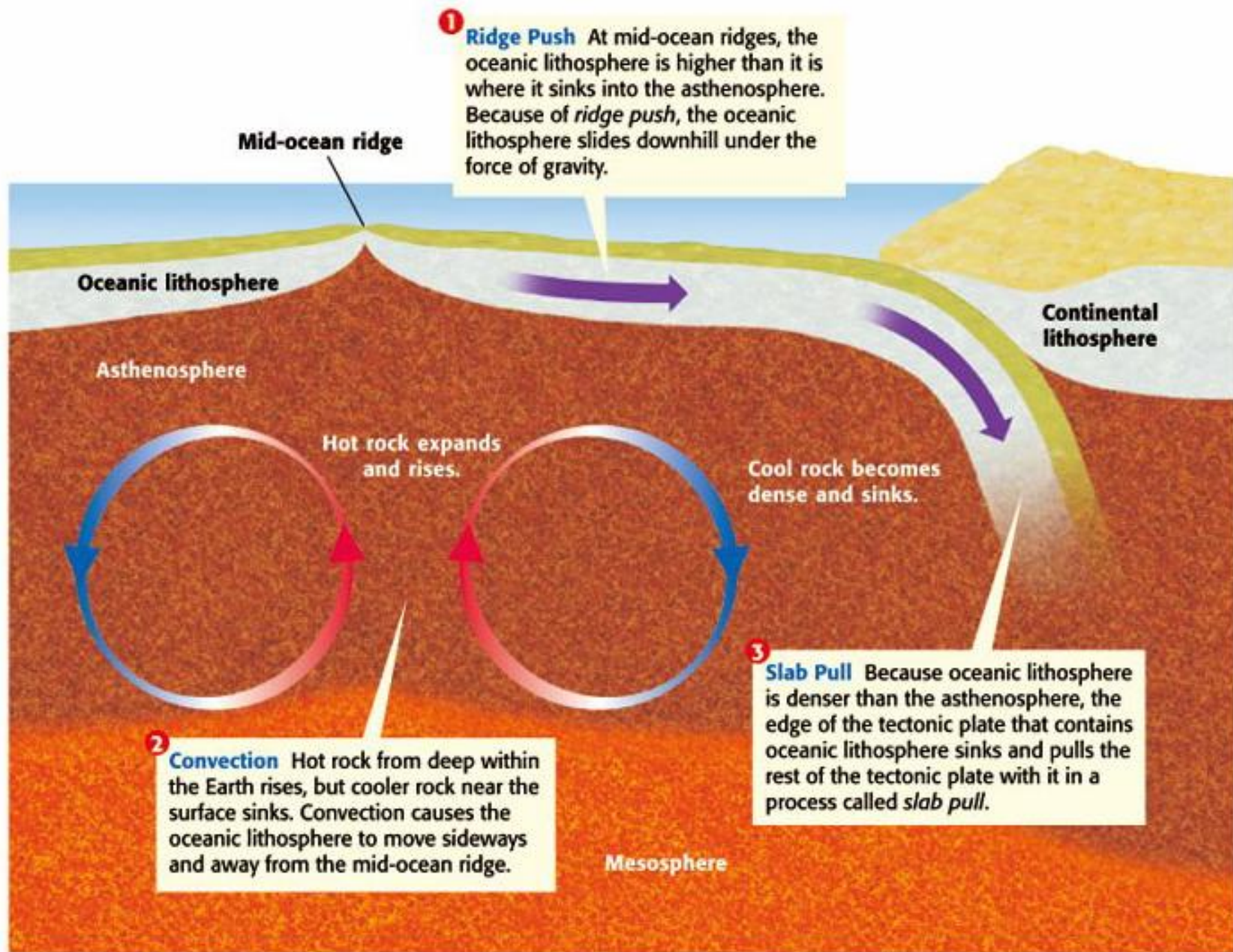
Transform boundary

Moving Apart At a divergent boundary, two tectonic plates separate from each other. As they move apart, magma rises to fill the gap. At a mid-ocean ridge, the rising magma cools to form new sea floor.

Asthenosphere

II. Possible Causes of Tectonic Plate Motion

A. Movement of the Asthenosphere The solid rock of the asthenosphere flows very slowly. This movement occurs because of changes in density within the asthenosphere. These density changes are caused by the outward flow of thermal energy from deep within the Earth. As you can see on the next slide, movements of the asthenosphere may lead to tectonic plate motion.



III. Tracking Tectonic Plate Motion

A. Measuring Tectonic Plate Movement

Tectonic plate movements are so slow and gradual that you can't see or feel them—the movement is measured in centimeters per year.

B. The Global Positioning System Scientists use a system of satellites called the *global positioning system* (GPS) to measure the rate of tectonic plate movement.