



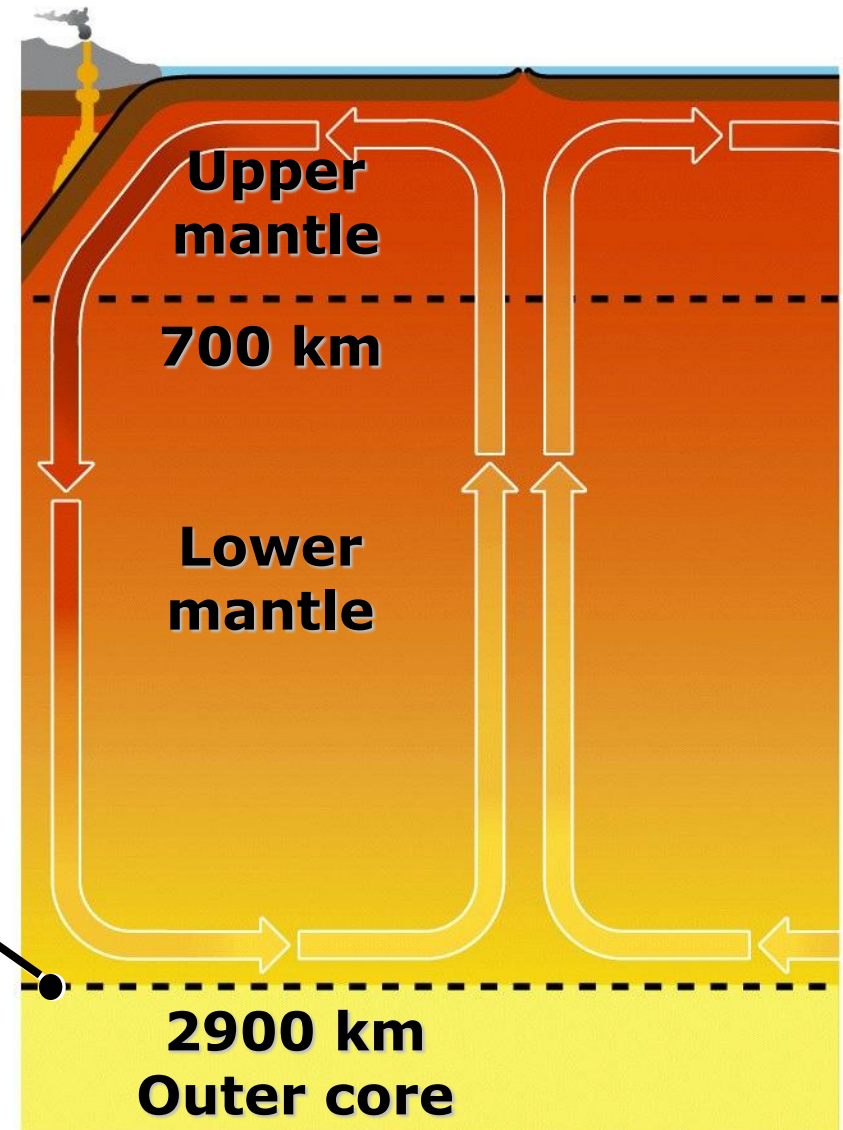
Plate Tectonics: The Unifying Theory

About Plate Tectonics

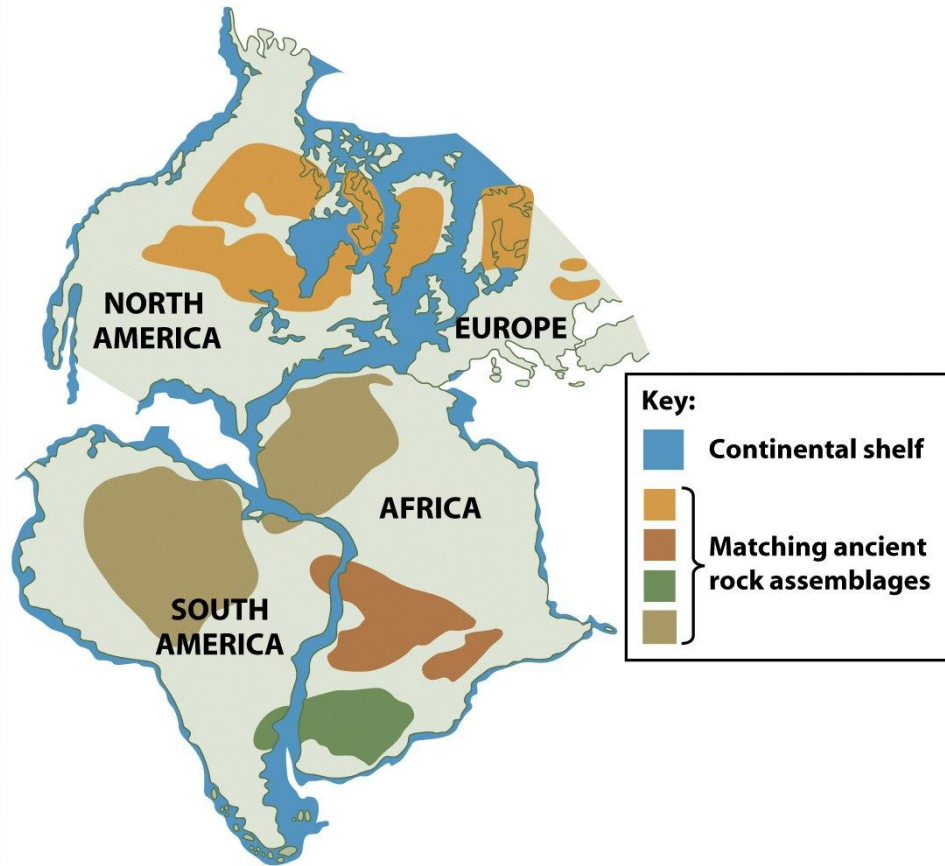
- Movement of plates and the forces acting on them.
 - Explains the distribution of volcanoes, earthquakes, folded mountain chains, rock groupings, and seafloor structures.
 - The movement comes from the mantle convection system.

Mantle Convection: The Engine of Plate Tectonics

Plate recycling extends to the core-mantle boundary.



Formation of the Theory



Continental drift:

The continents used to be one big continent called Pangaea and have drifted apart over time.

PANGAEA



BREAKUP OF PANGAEA



BREAKUP OF PANGAEA



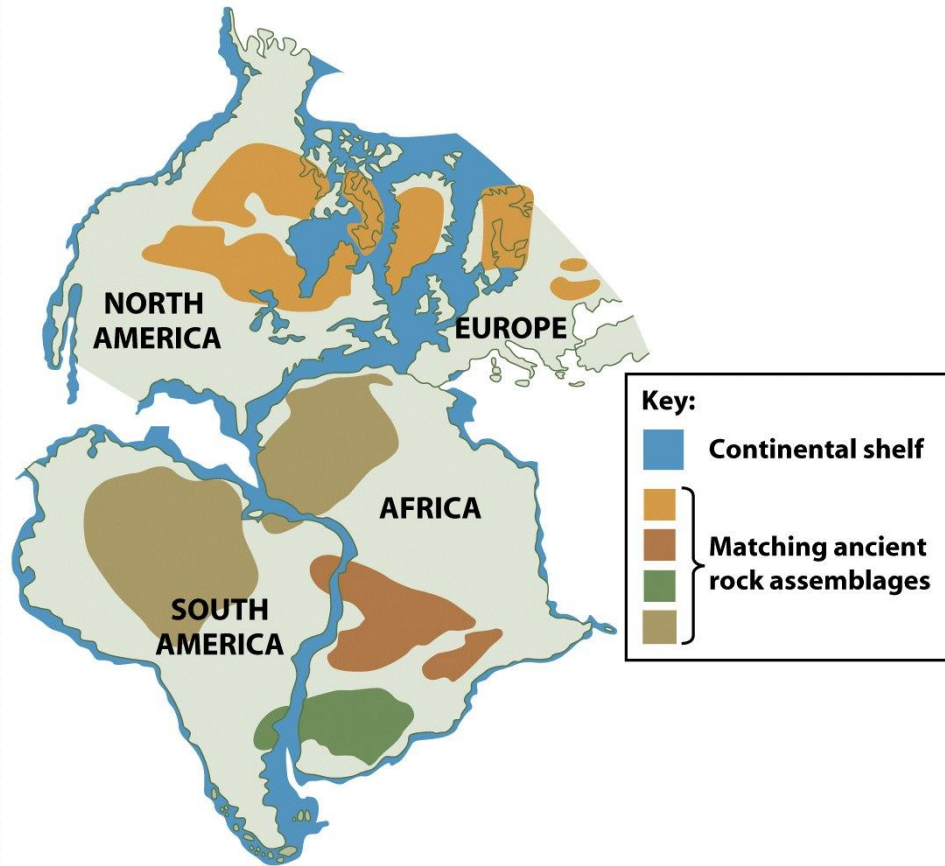
BREAKUP OF PANGAEA



PRESENT DAY



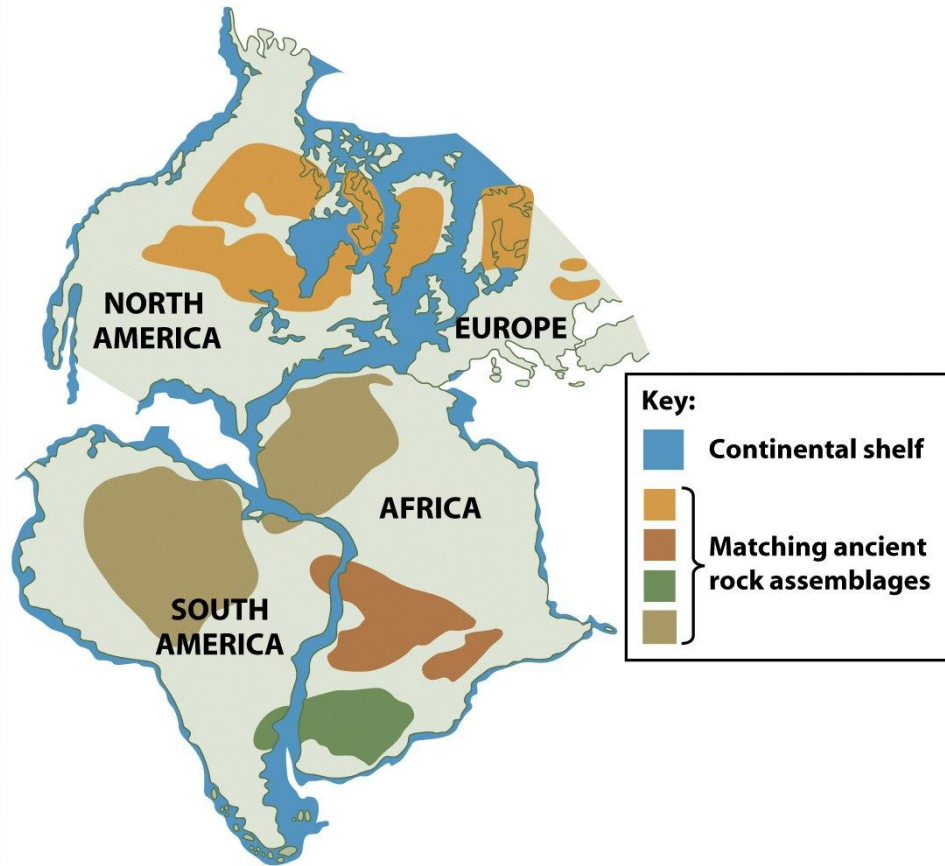
Formation of the Theory



**Continental
drift:**

“jig-saw puzzle”
fit of continents

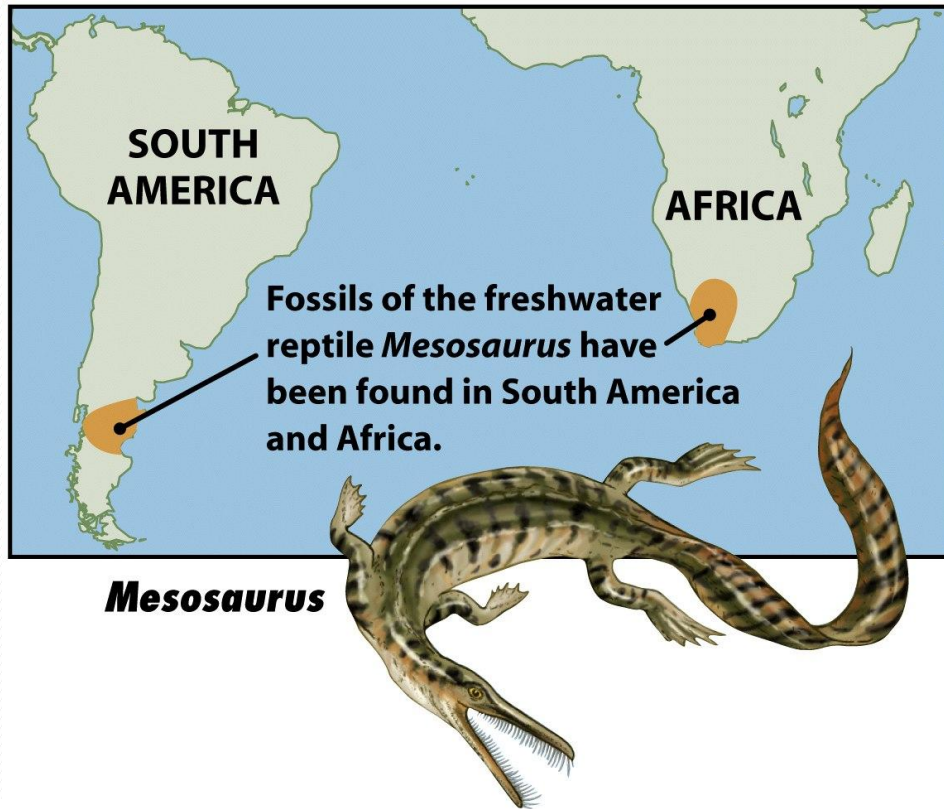
Formation of the Theory



Continental drift:

similarity of rock arrangements and ages across oceans

Formation of the Theory



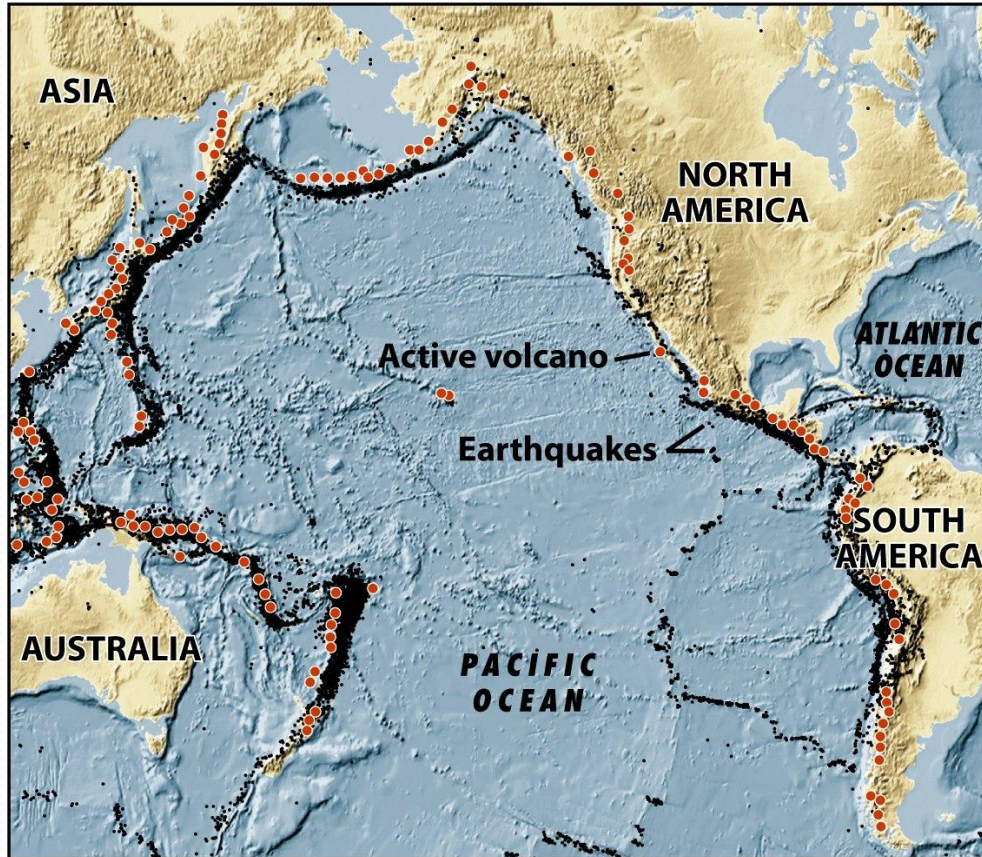
Continental drift:

distribution of certain fossils

Thought Question

- **What piece of evidence was Wegener missing while formulating his theory?**
- **Do you think the geologists of his era were justified in rejecting his theory?**

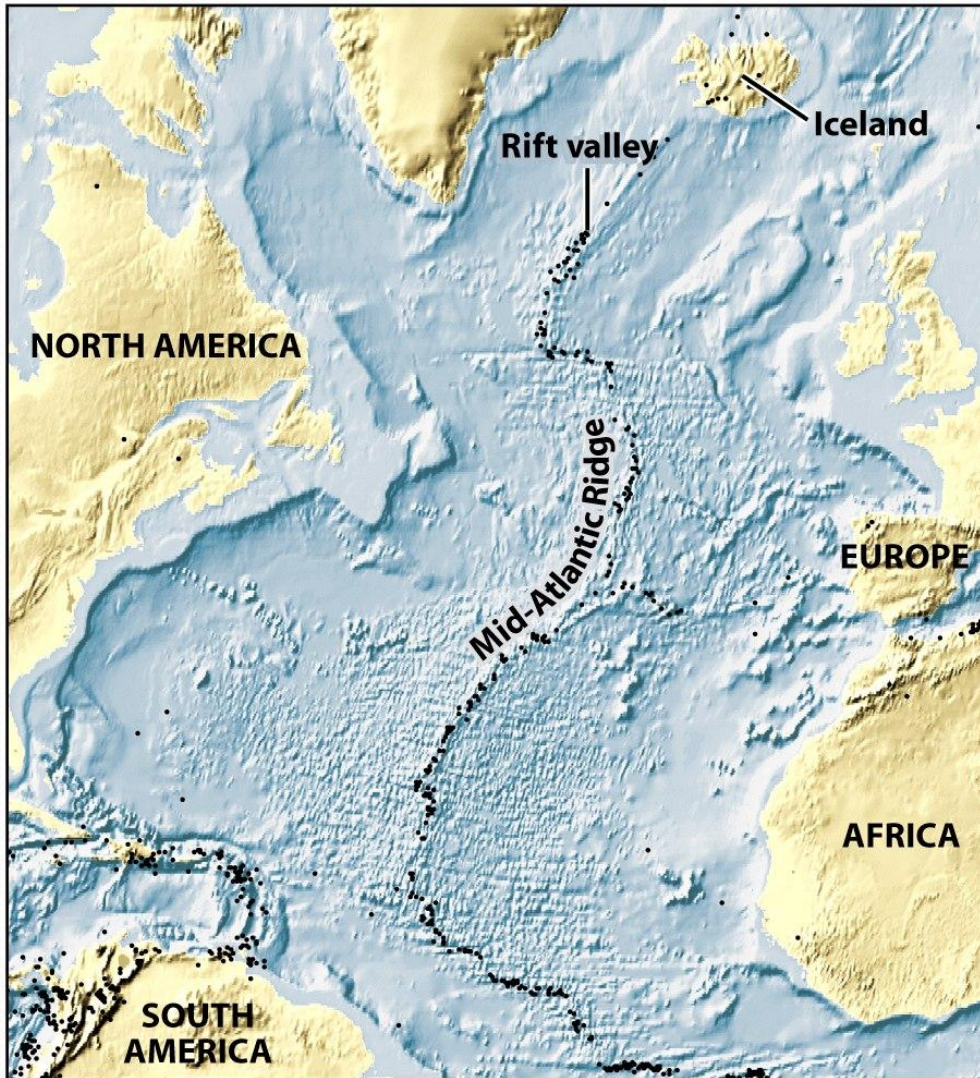
Formation of the Theory



Seafloor spreading:

formation of new crust which causes the plates to move

Formation of the Theory



**Seafloor
spreading:**

new crust
formed there

The Mosaic of Earth's Tectonic Plates

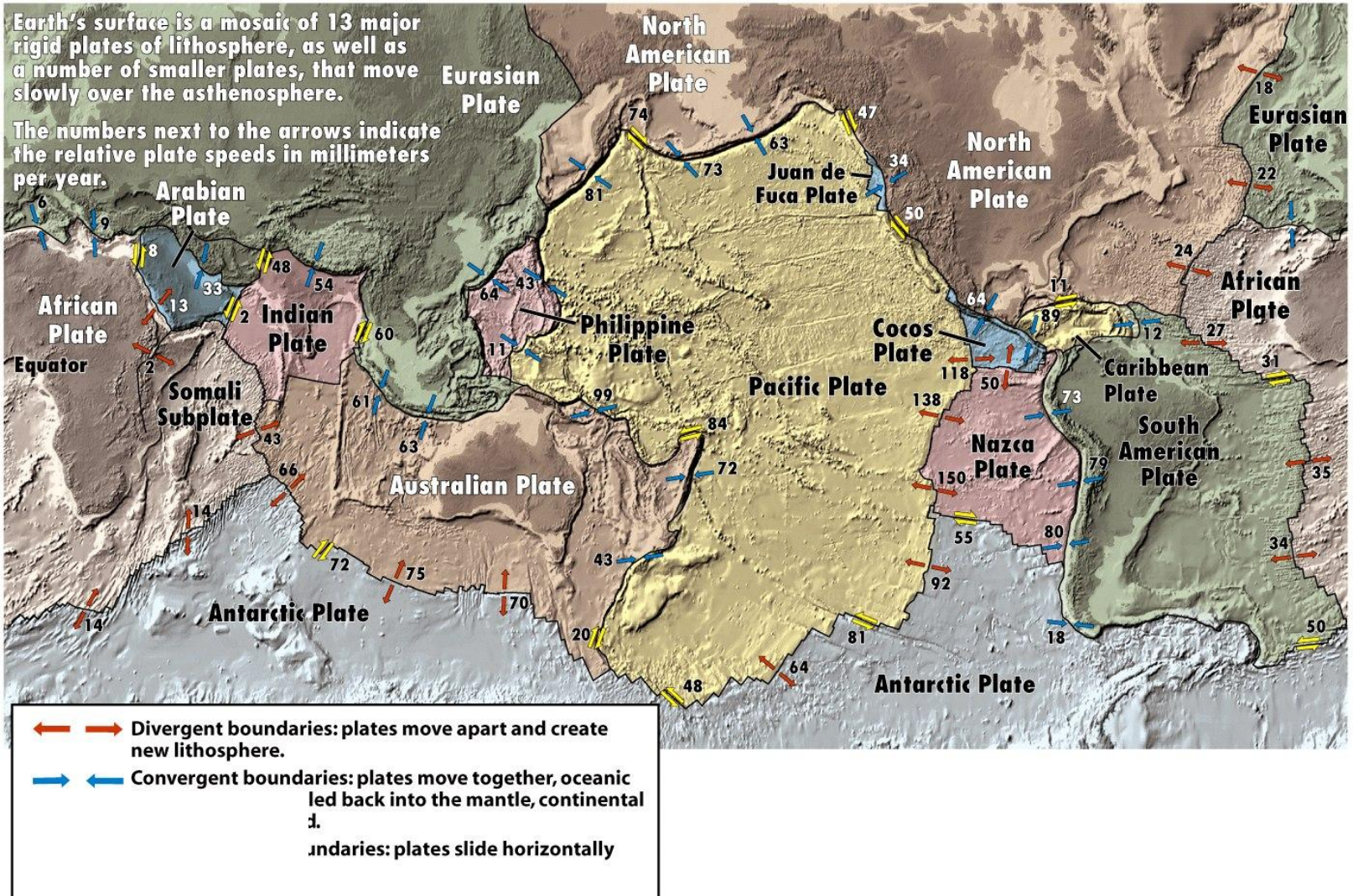
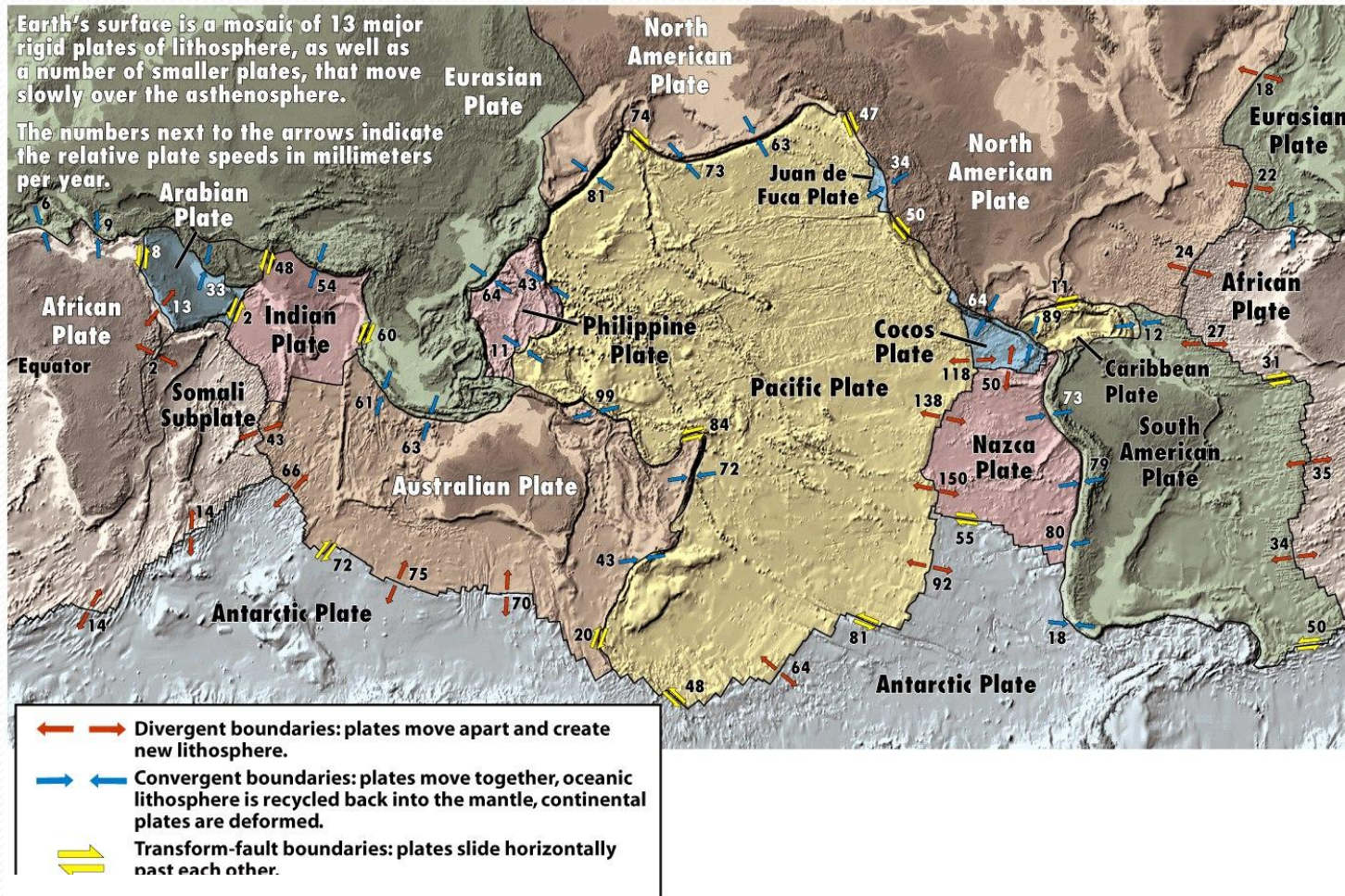


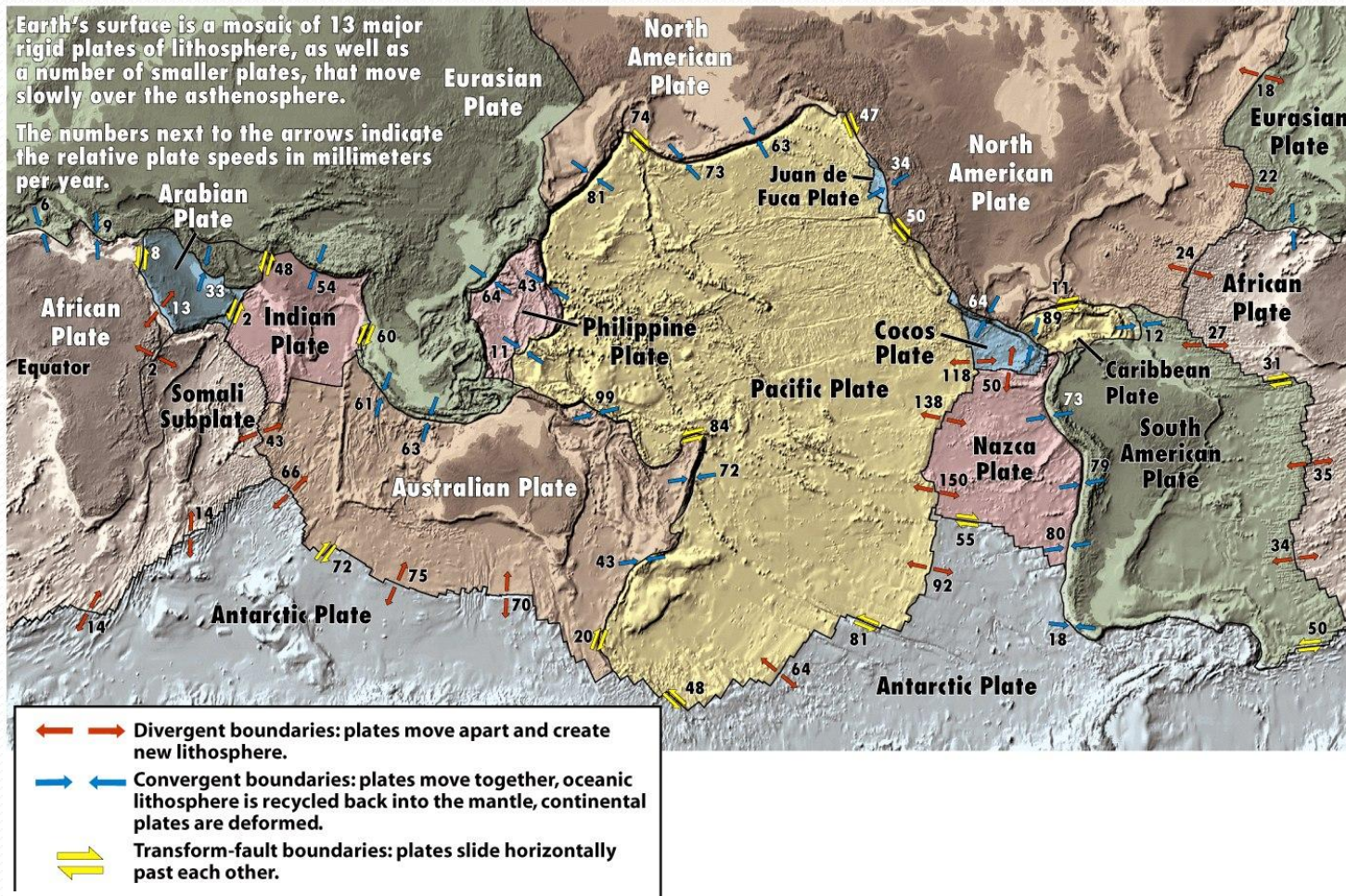
Figure 2-5
Understanding Earth, Fifth Edition
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The Mosaic of Earth's Tectonic Plates



Three types of boundaries

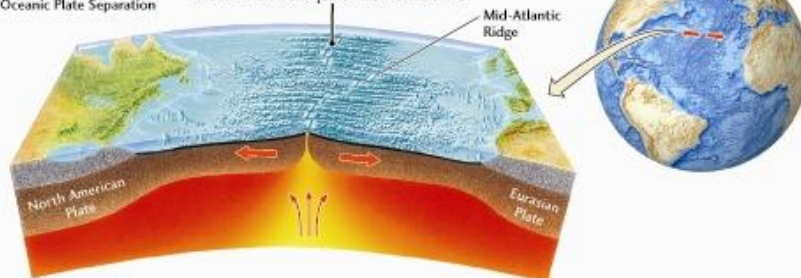
The Mosaic of Earth's Tectonic Plates



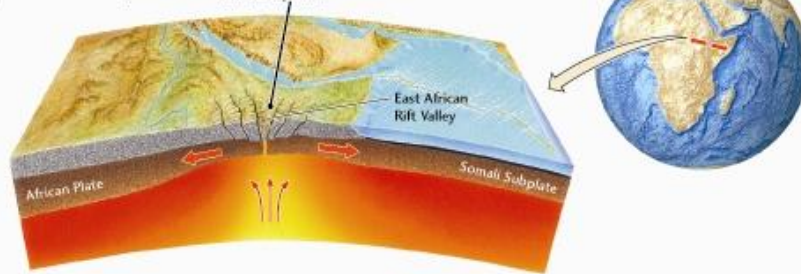
Divergent, Convergent, Transform

DIVERGENT BOUNDARIES

- (a) Oceanic Plate Separation
- Rifting and spreading along a narrow zone have created the Mid-Atlantic Ridge, a mid-ocean mountain chain where volcanoes and earthquakes are concentrated.

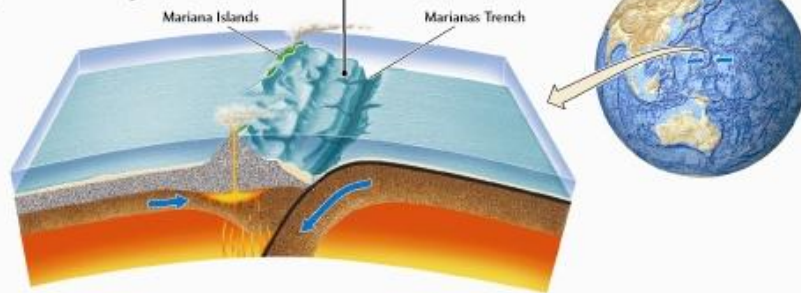


- (b) Continental Plate Separation
- In East Africa, an earlier stage of rifting and spreading has created parallel valleys in a zone with volcanoes and earthquakes.



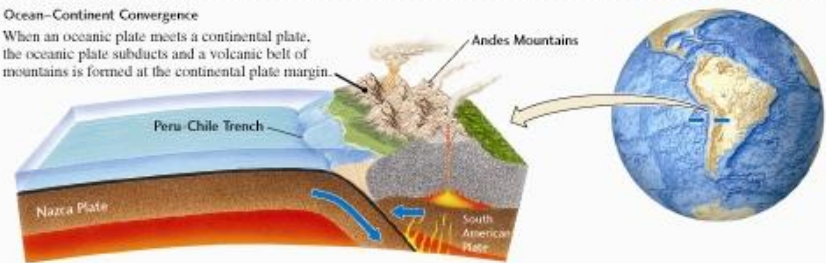
CONVERGENT BOUNDARIES

- (c) Ocean-Ocean Convergence
- When two oceanic plates converge, they form a deep-sea trench and a volcanic island arc.



- (d) Ocean-Continent Convergence

When an oceanic plate meets a continental plate, the oceanic plate subducts and a volcanic belt of mountains is formed at the continental plate margin.



- (e) Continent-Continent Convergence

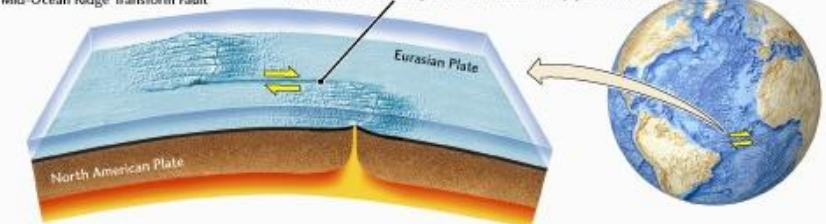
When two continental plates collide, the crust crumples and thickens, creating high mountains and a wide plateau.



TRANSFORM-FAULT BOUNDARIES

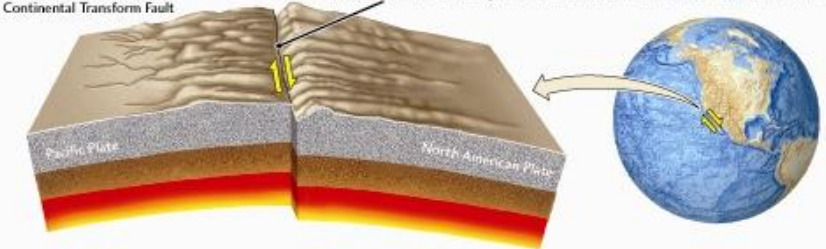
- (f) Mid-Ocean Ridge Transform Fault

Spreading centers are offset by mid-ocean ridge transform faults, where the two oceanic plates slide horizontally past each other.



- (g) Continental Transform Fault

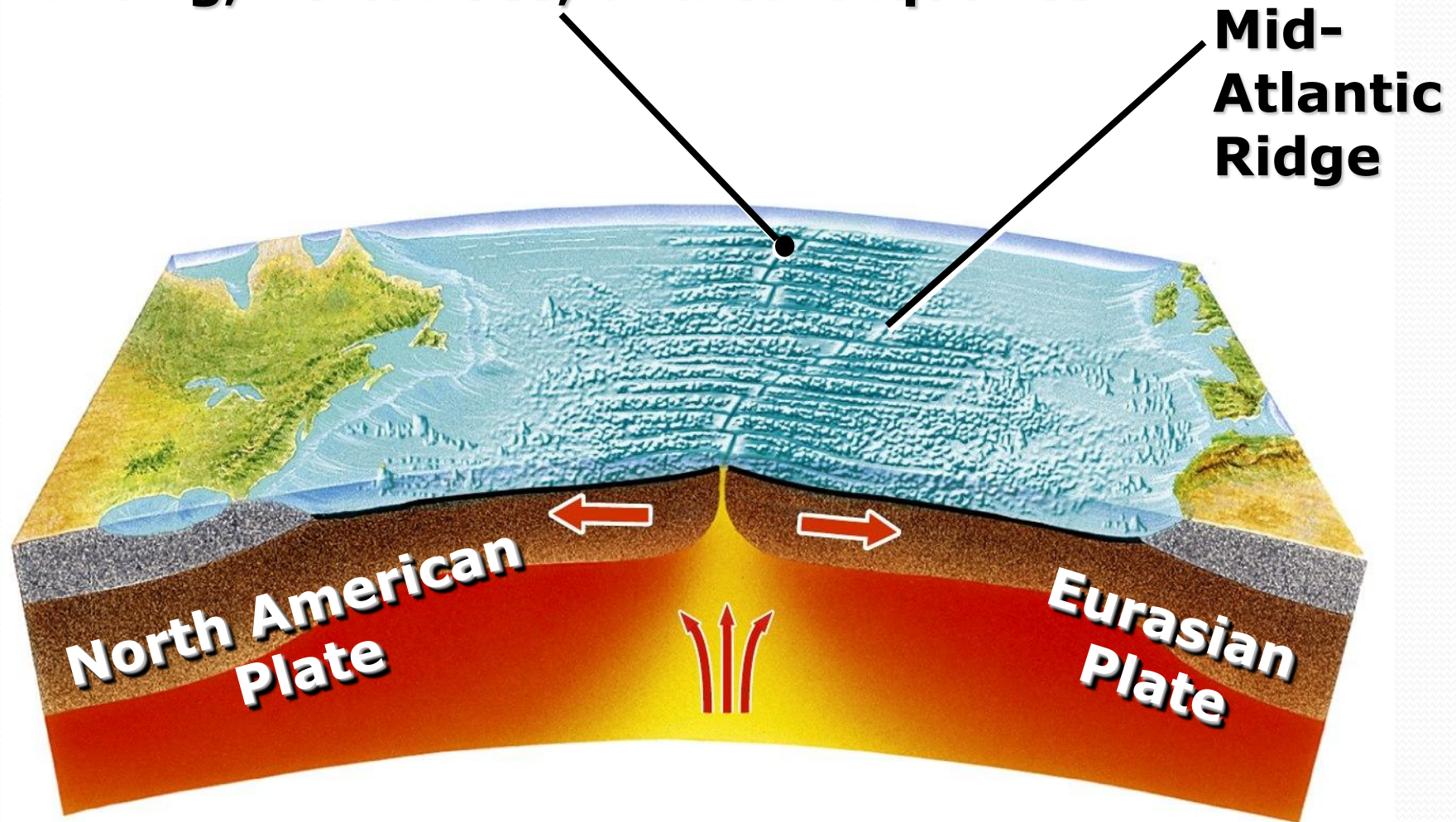
The San Andreas fault in California, where the Pacific Plate slides past the North American Plate, is an example of a transform fault that offsets continental crust.



1. Divergent Boundaries

(a) Oceanic vs. Oceanic

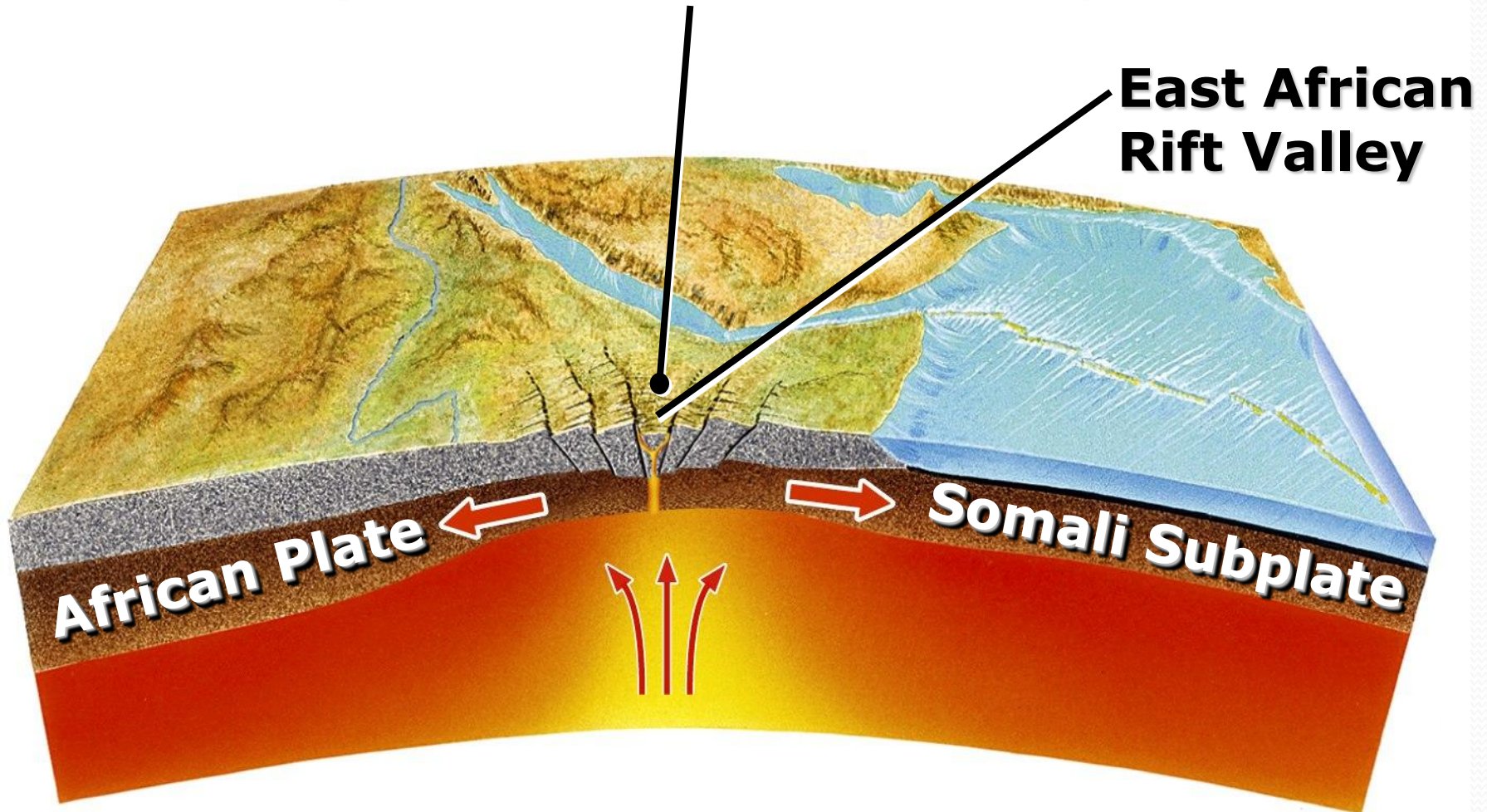
ripping, volcanoes, and earthquakes



(b) Continent vs. Continent

(b) Continent vs. Continent

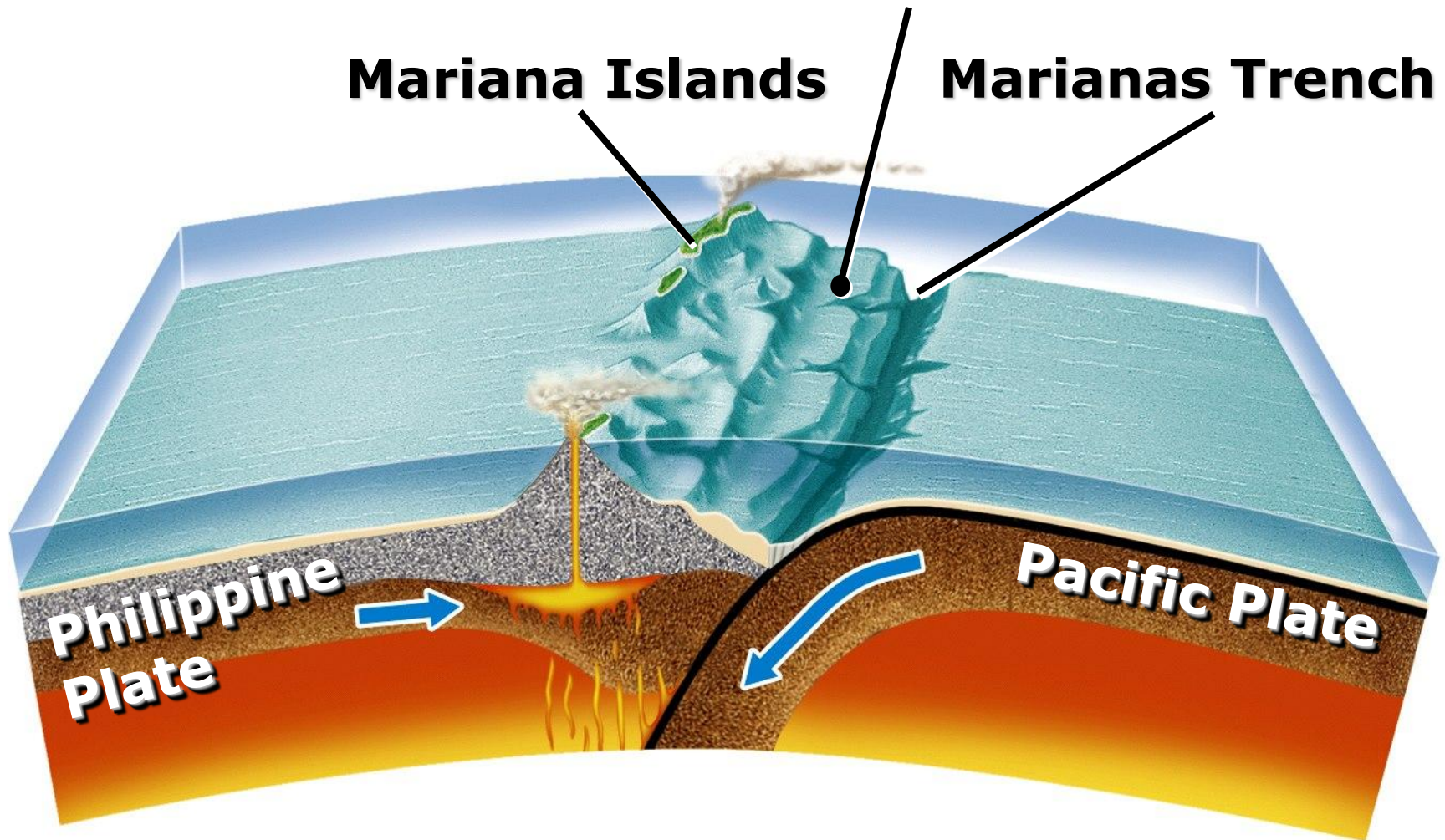
rift valleys, volcanoes, and earthquakes



2. Convergent Boundaries

(a) Oceanic vs. Oceanic

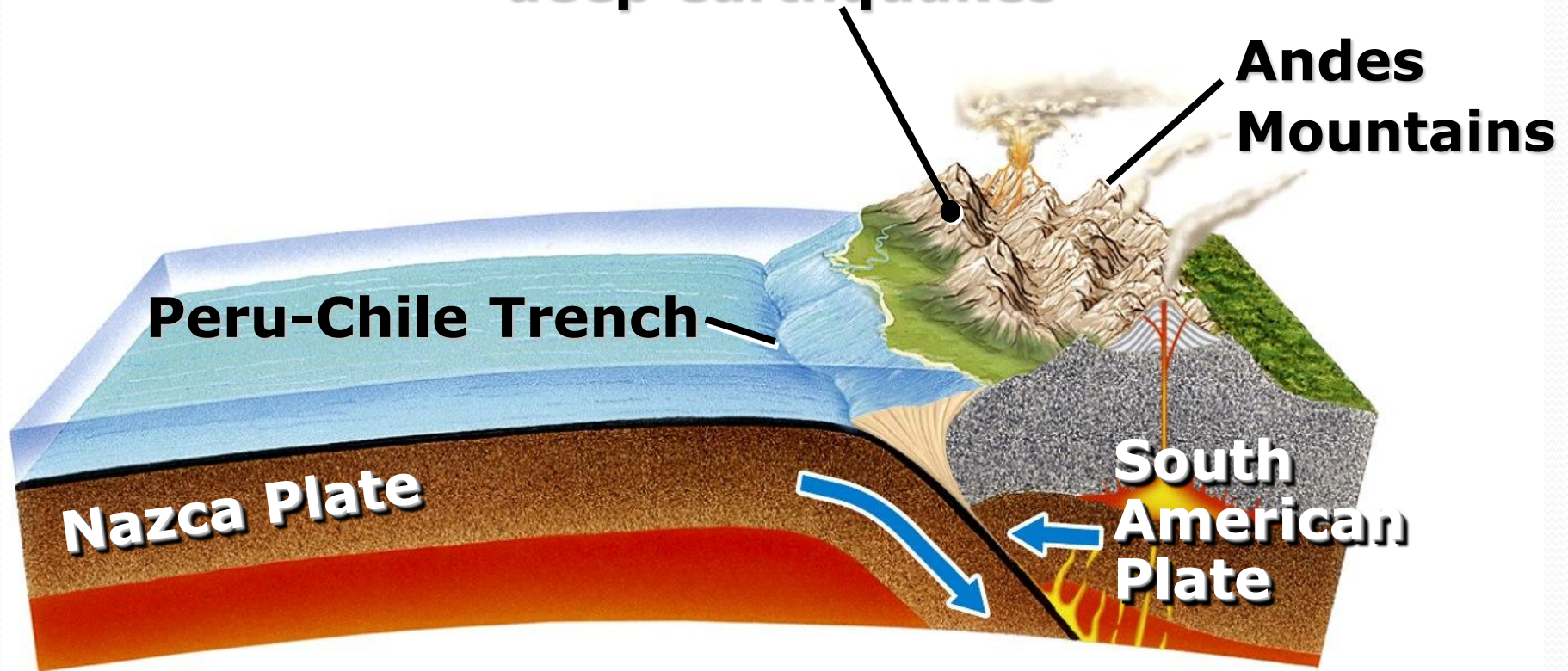
oceanic trench, volcanic island arc, and deep earthquakes



2. Convergent Boundaries

(b) Oceanic vs. Continent

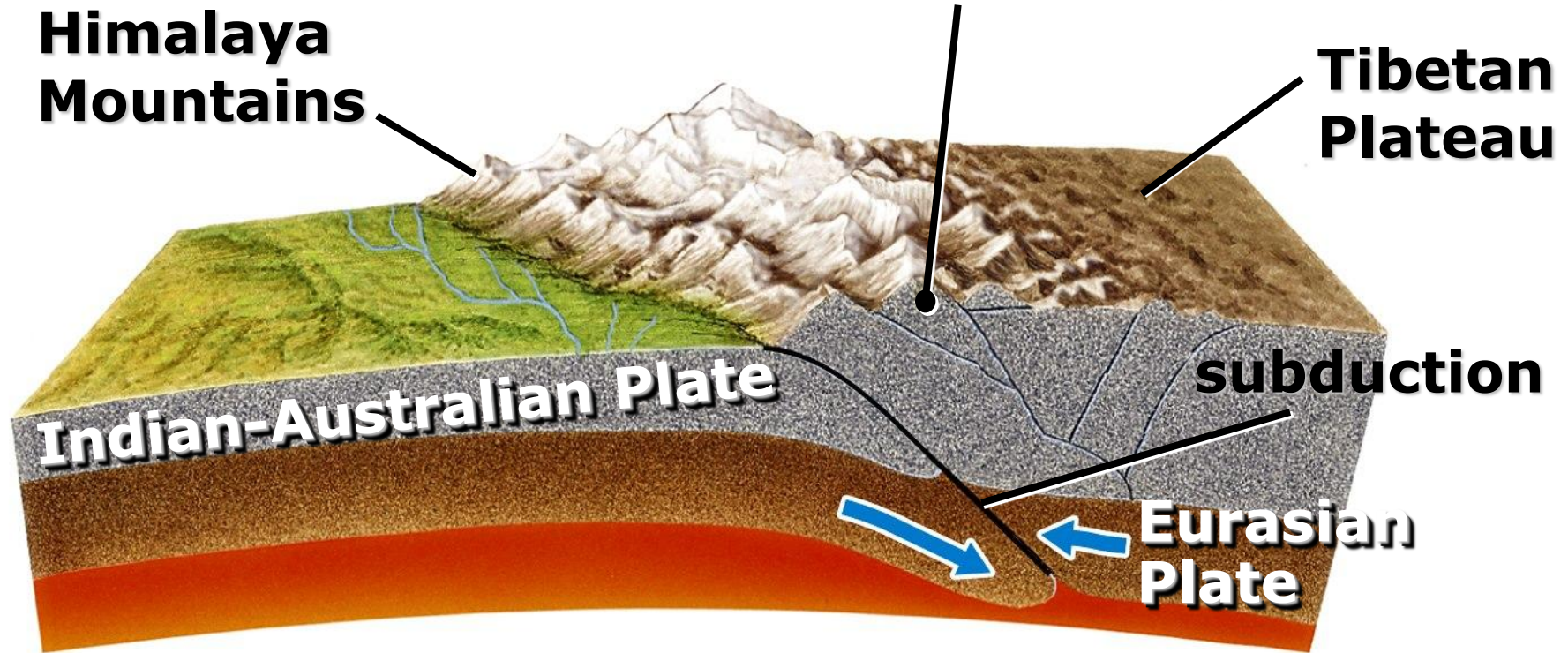
volcanic mountain chain, folded mountains, and deep earthquakes



2. Convergent Boundaries

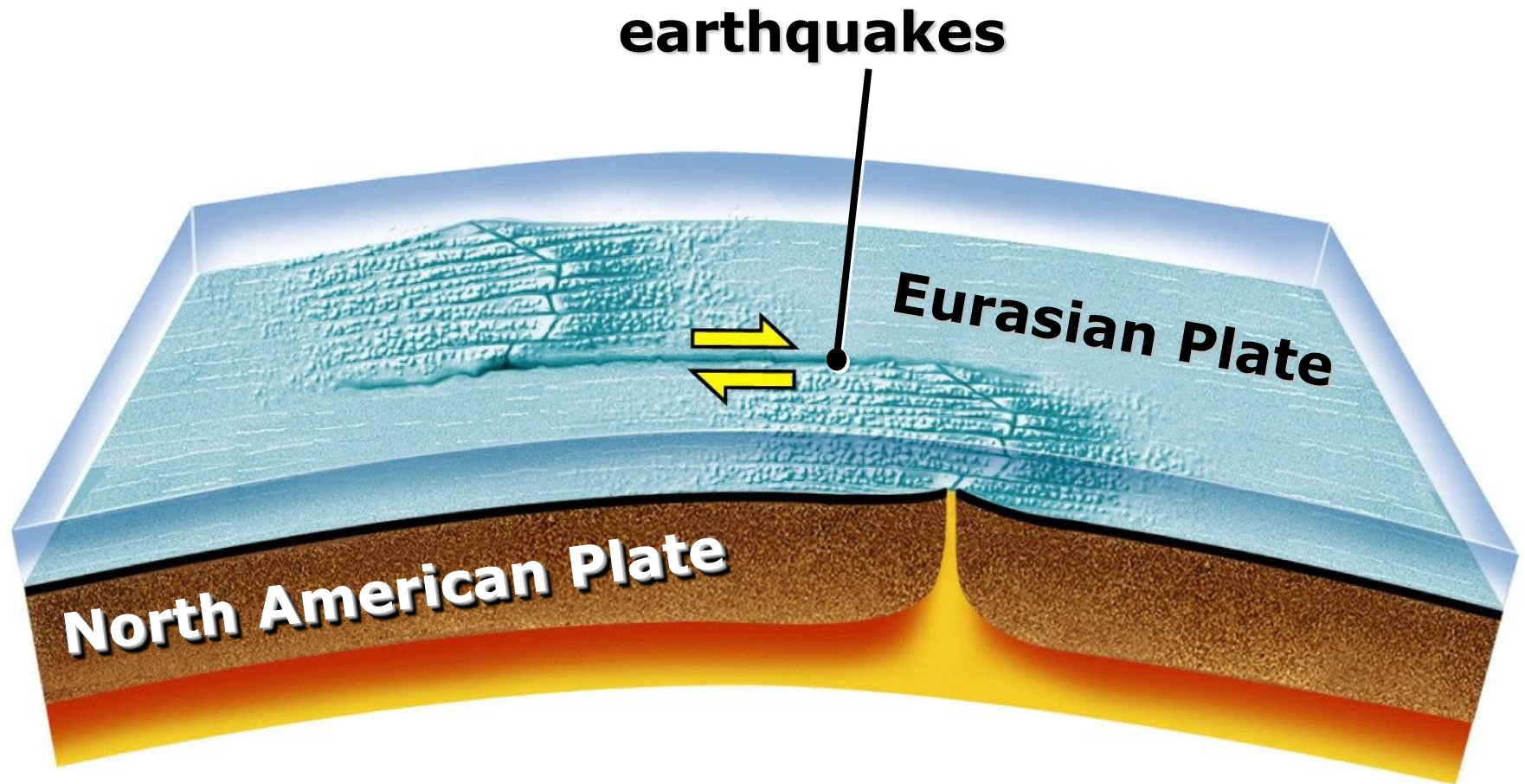
(c) Continent vs. Continent convergence

crustal thickening, folded mountains, and earthquakes



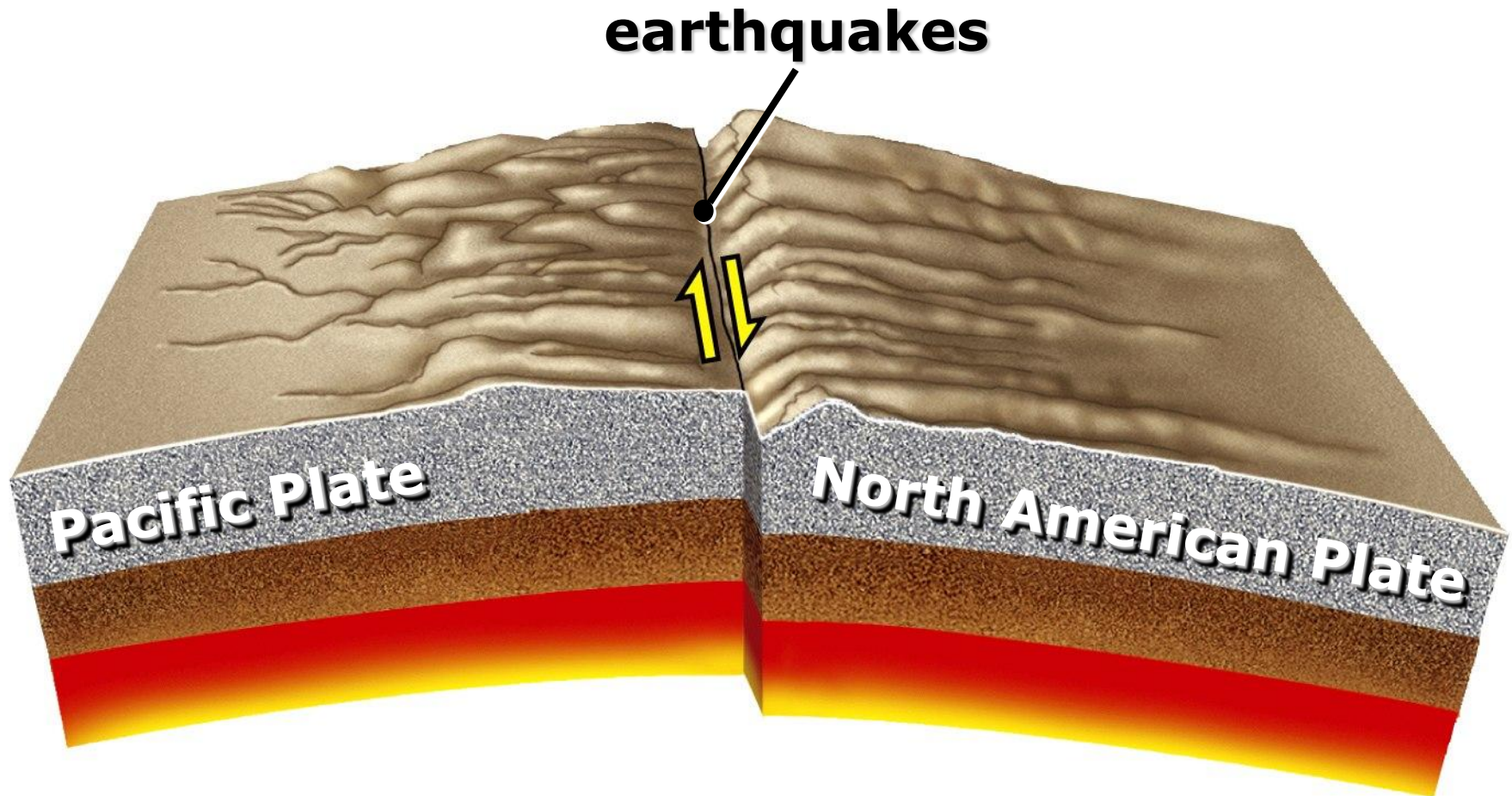
3. Transform-Fault Boundaries

(a) Oceanic transform fault



3. Transform-Fault Boundaries

(b) Continental transform fault



Key terms and concepts

Continental drift

Convergent boundary

Divergent boundary

Mid-ocean ridge

Pangaea

Plate tectonics

Seafloor spreading

Subduction

Transform fault