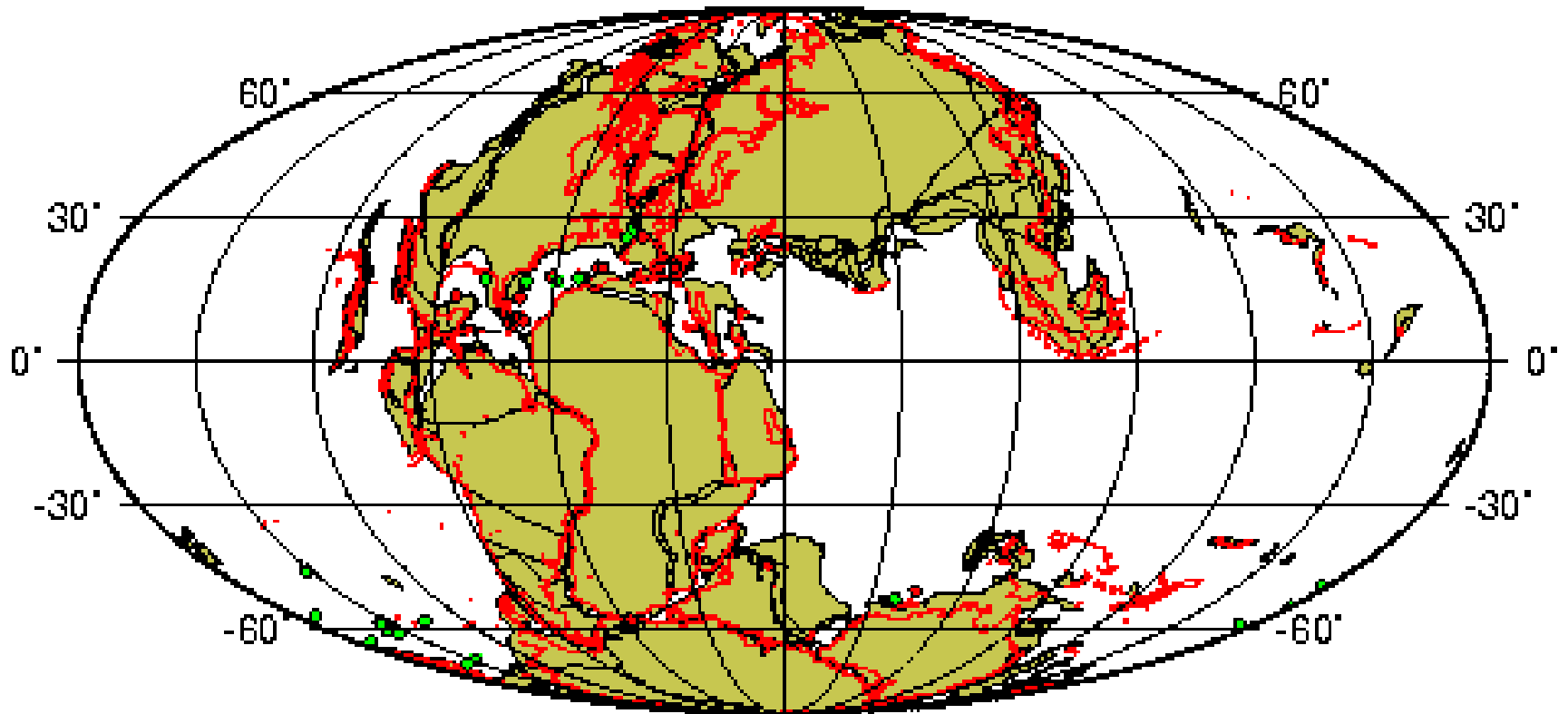
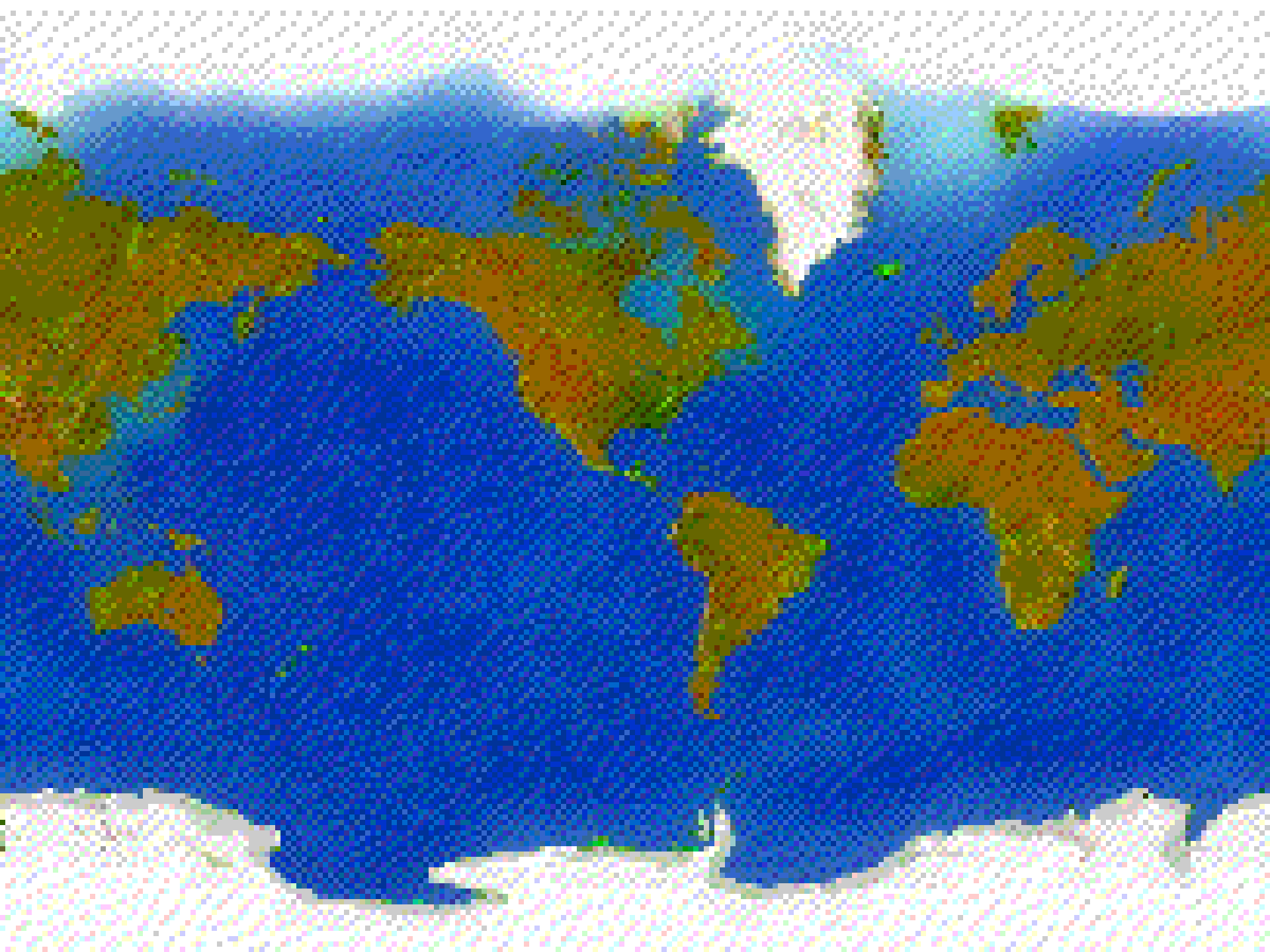


Topic: Plate Tectonics

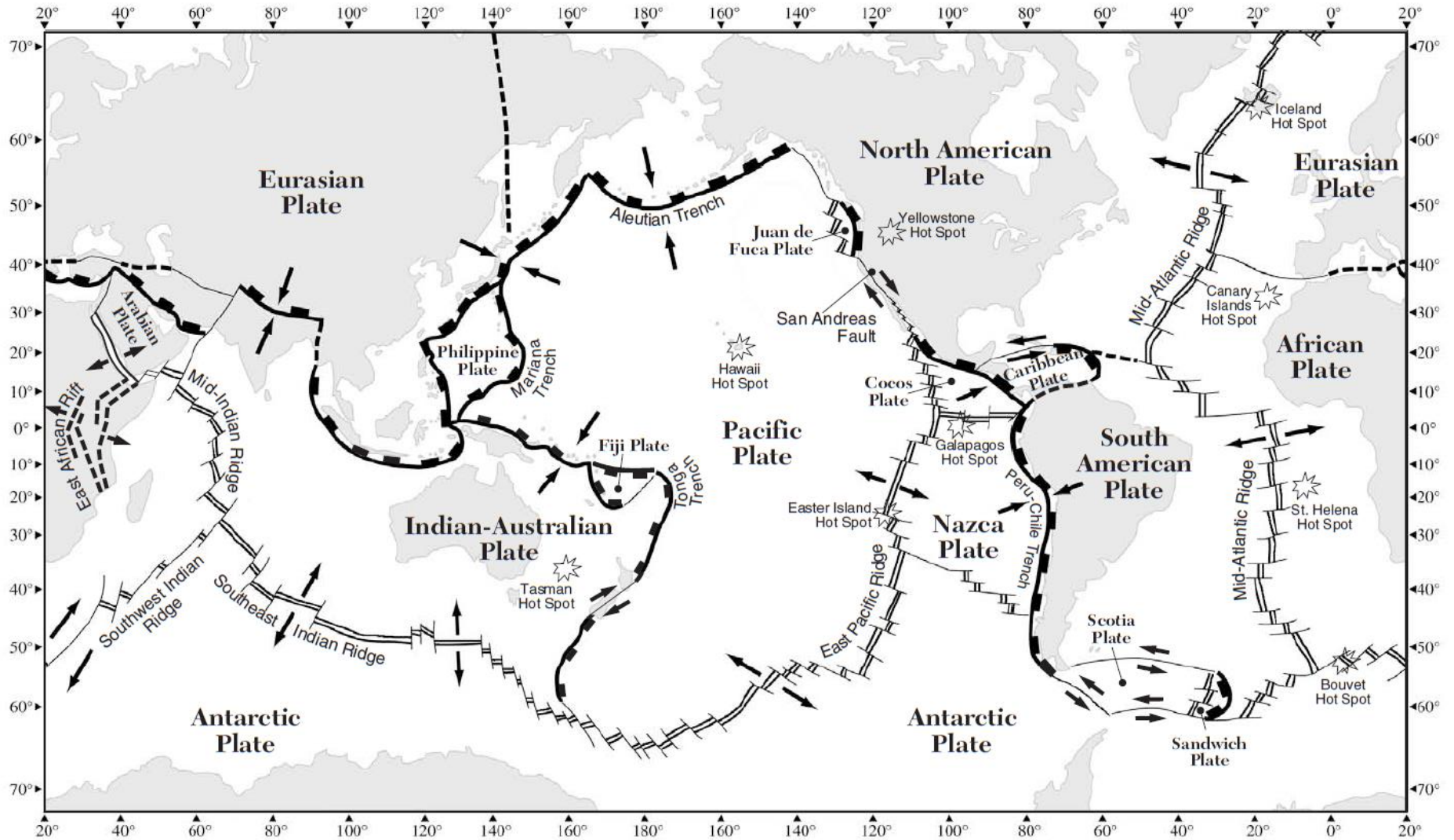
(fill in on note guide & ESRT page 5)



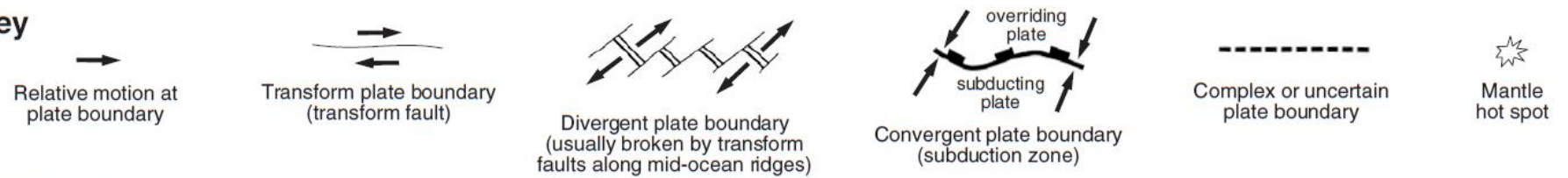
150 My: Deconstruction



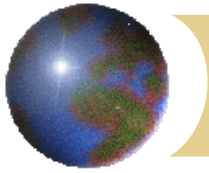
Tectonic Plates



Key



NOTE: Not all mantle hot spots, plates, and boundaries are shown.



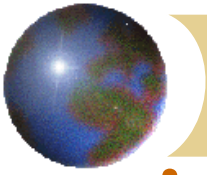
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The Theory of Plate Tectonics is

- the lithosphere is broken into pieces that move around

What would cause the lithosphere plates to move?

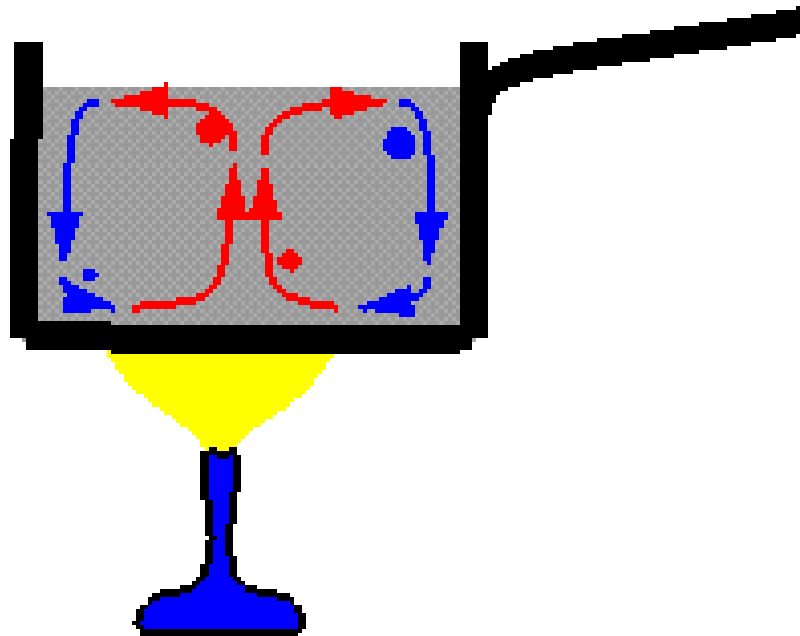




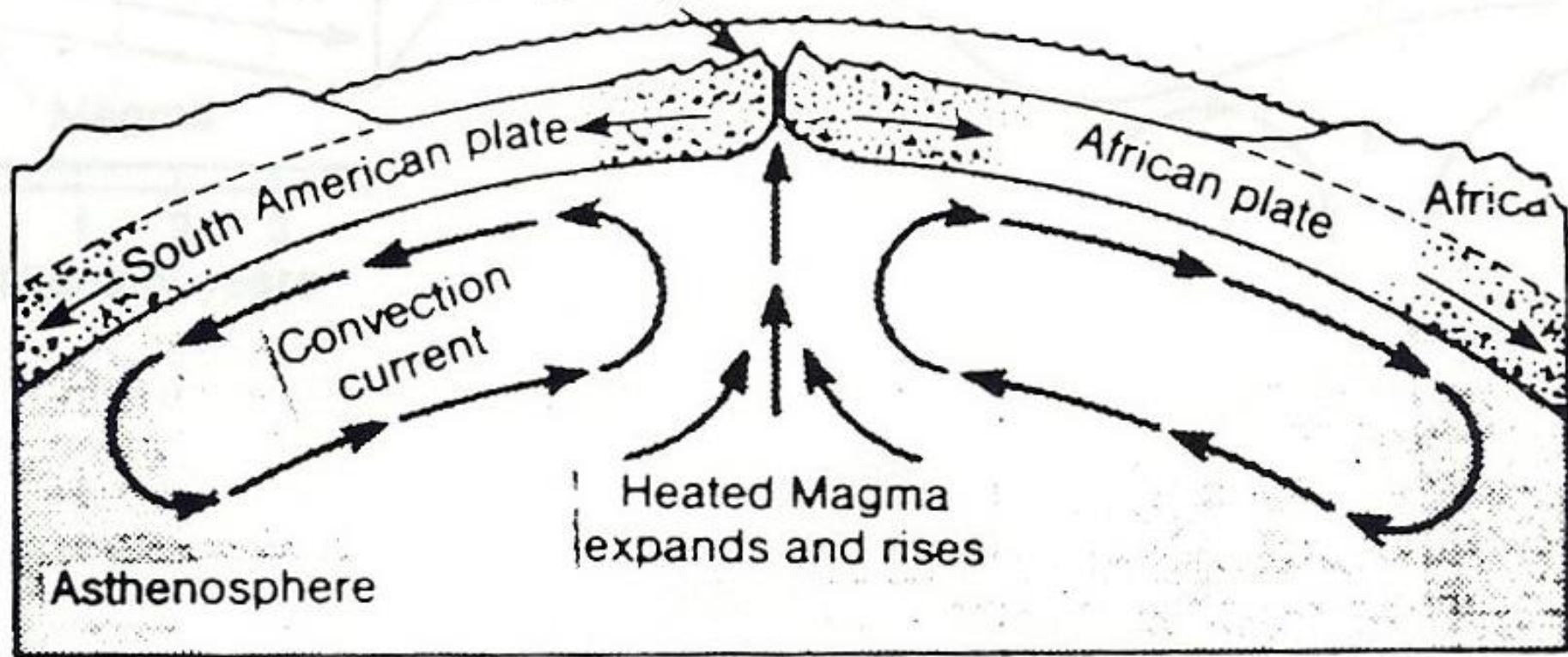
ARTIE.COM

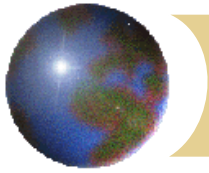
***The driving force behind plate tectonics is**

Convection (Density differences) in asthenosphere



Mid-Atlantic Ridge





3 things can happen at plate boundaries

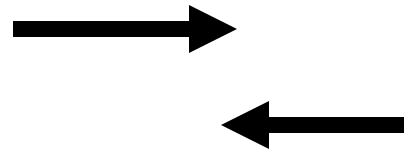
⊕ Converging



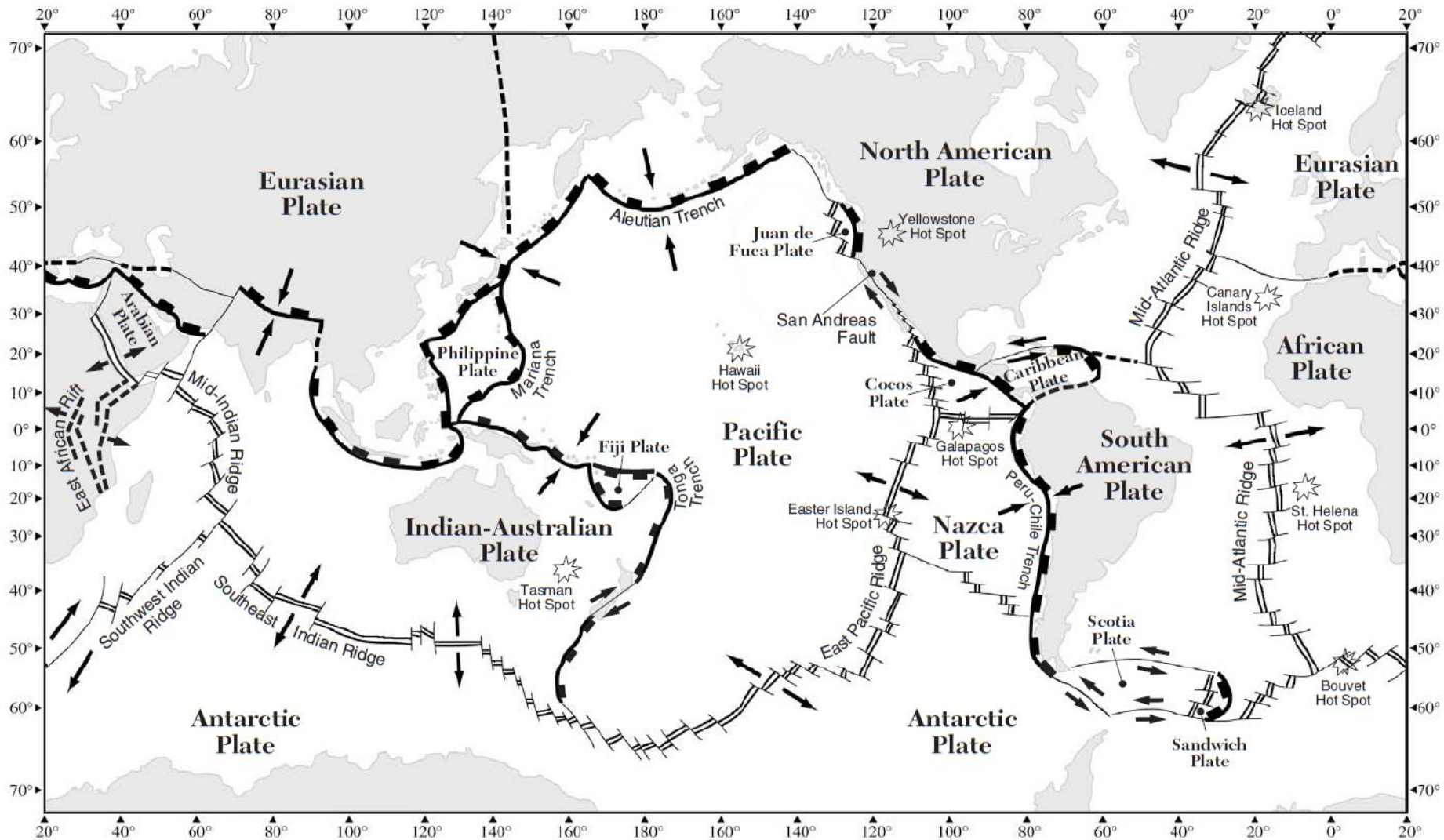
⊕ Diverging



⊕ Transform



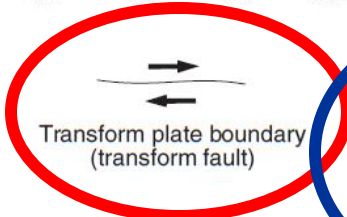
Tectonic Plates



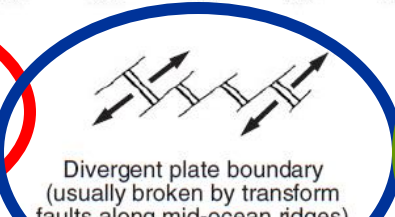
Key



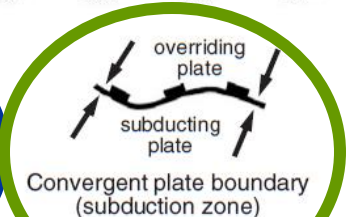
Relative motion at plate boundary



Transform plate boundary (transform fault)



Divergent plate boundary (usually broken by transform faults along mid-ocean ridges)



Convergent plate boundary (subduction zone)

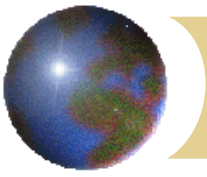


Complex or uncertain plate boundary



Mantle hot spot

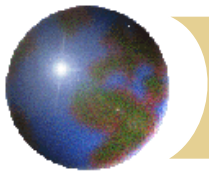
NOTE: Not all mantle hot spots, plates, and boundaries are shown.



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Convergent

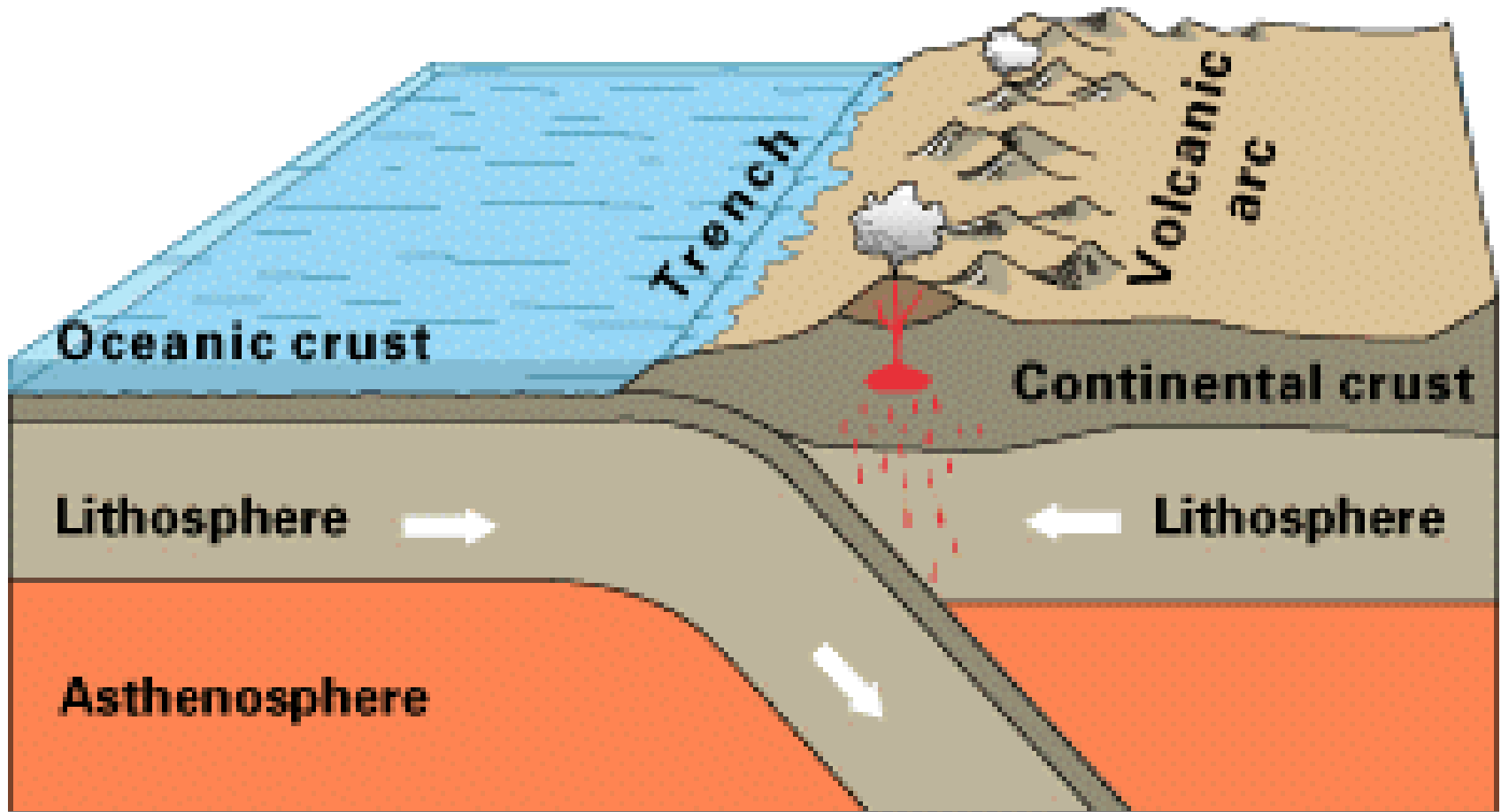
- ⊕ Plates collide

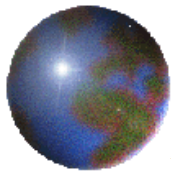


OCEANIC CRUST VS. CONTINENTAL CRUST

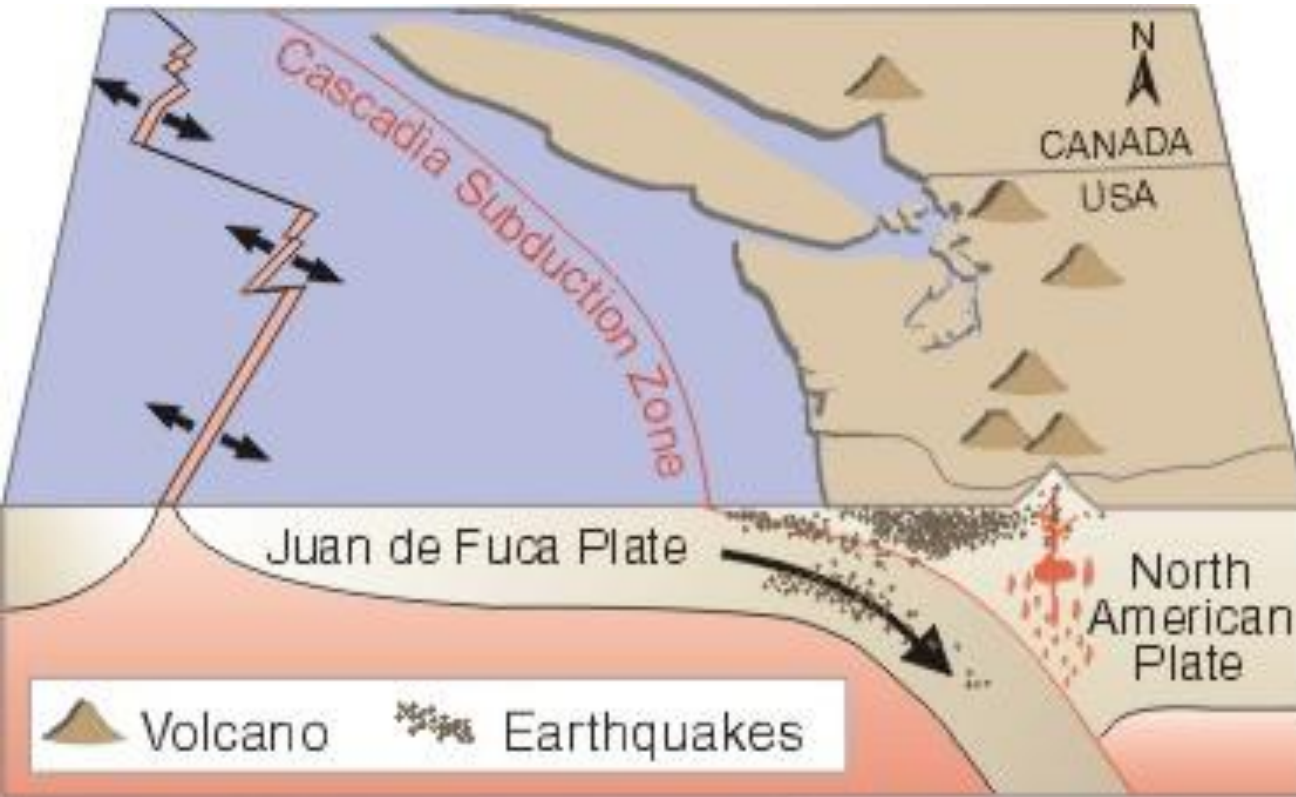
Basalt, Denser

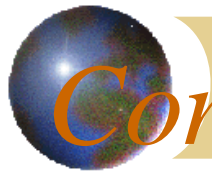
Granite, less dense





Example: Cascade Mountains





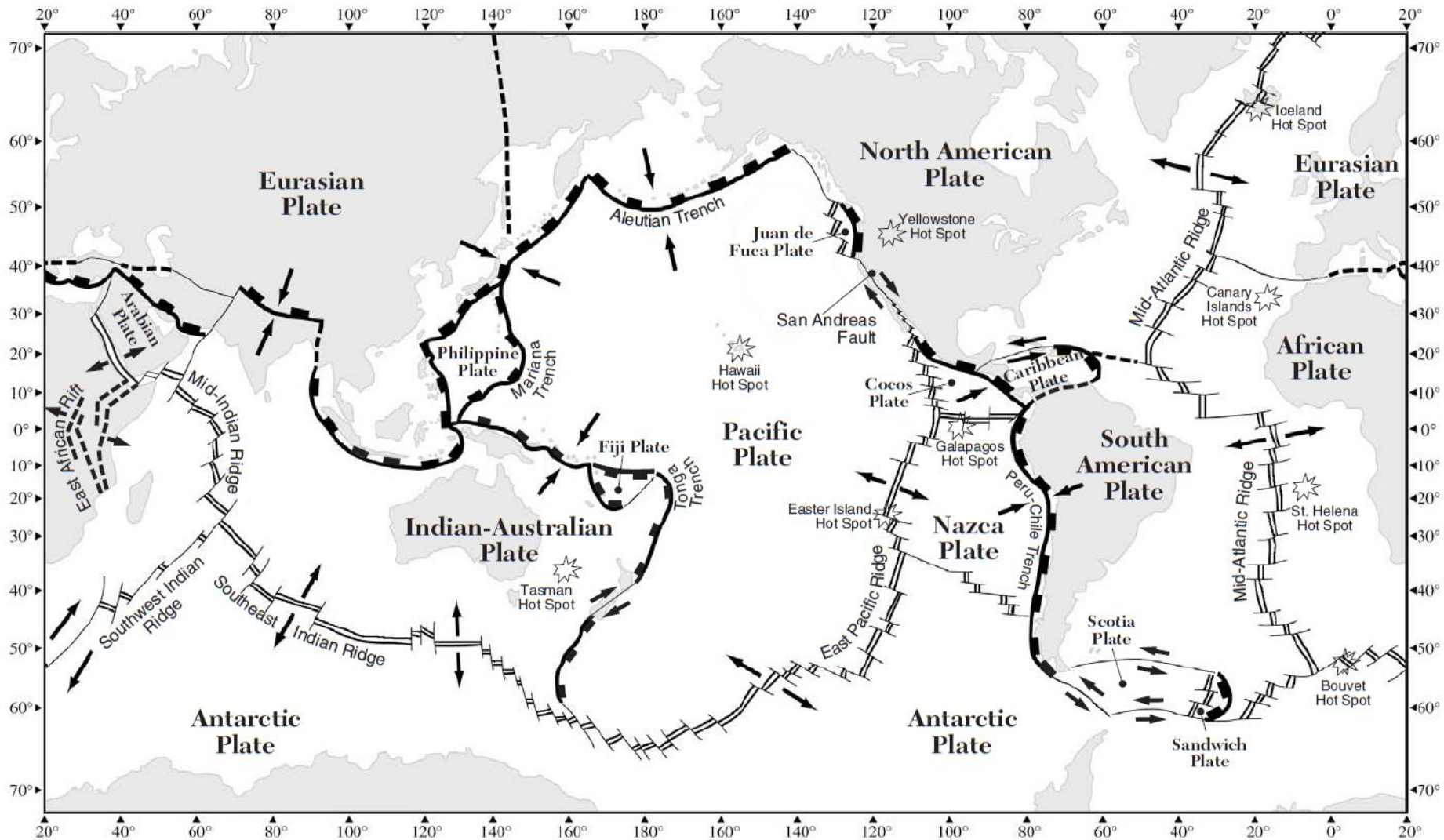
Continental vs. Oceanic



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- ⊕ **Result:** Subducting oceanic crust
 - ⊕ **Features:**
 - 1) Deep Sea Trench
 - 2) Volcanoes & Mountains on continental crust
 - 3) Earthquakes
- Example:** Cascade Mts., West USA

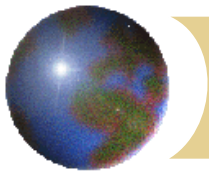
Tectonic Plates



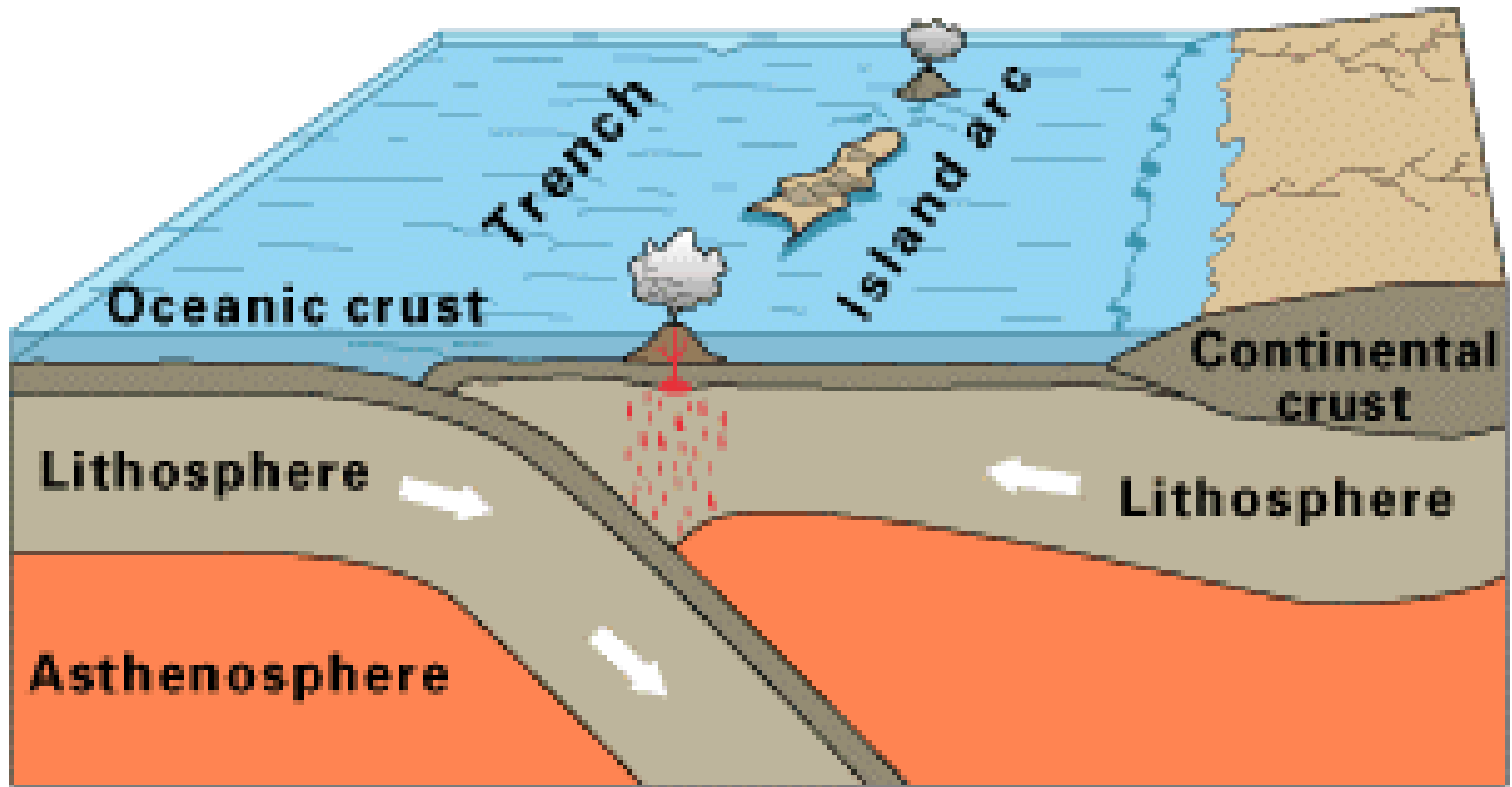
Key

- Relative motion at plate boundary
- ↔ Transform plate boundary (transform fault)
- ⊃⊂ Divergent plate boundary (usually broken by transform faults along mid-ocean ridges)
- ⊃⊂ Convergent plate boundary (subduction zone)
- Complex or uncertain plate boundary
- ★ Mantle hot spot

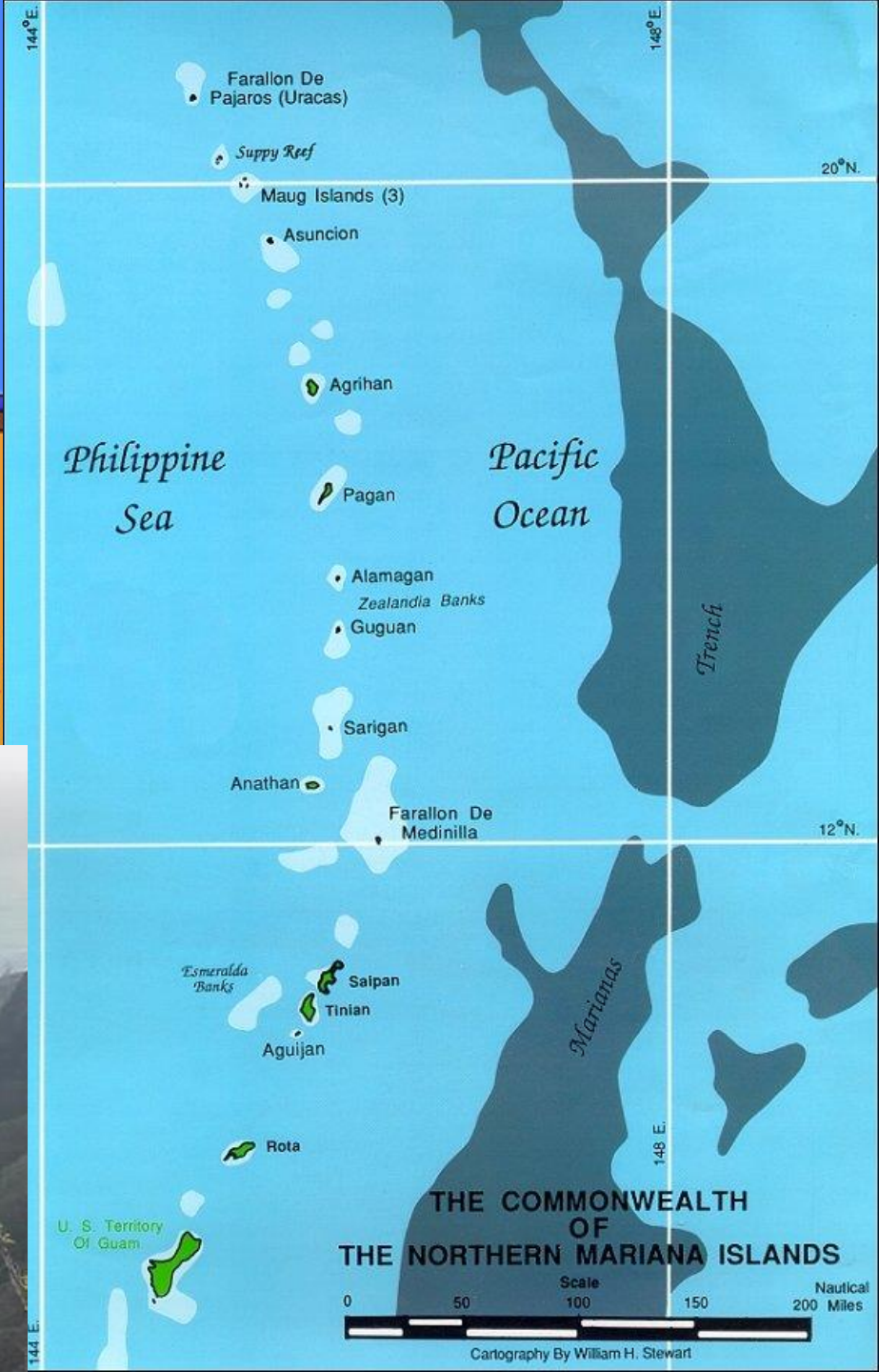
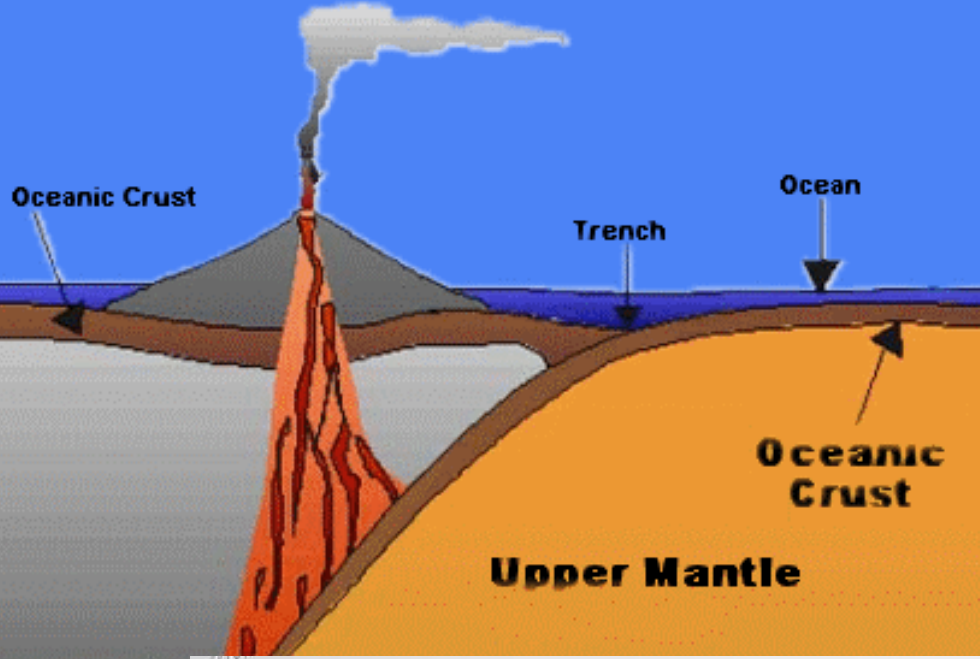
NOTE: Not all mantle hot spots, plates, and boundaries are shown.

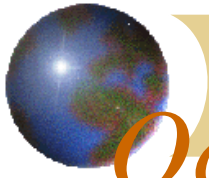


OCEANIC CRUST VS. OCEANIC CRUST



ISLAND - ARC VOLCANO





Oceanic vs. Oceanic

✦ **Result:** Subducting oceanic crust

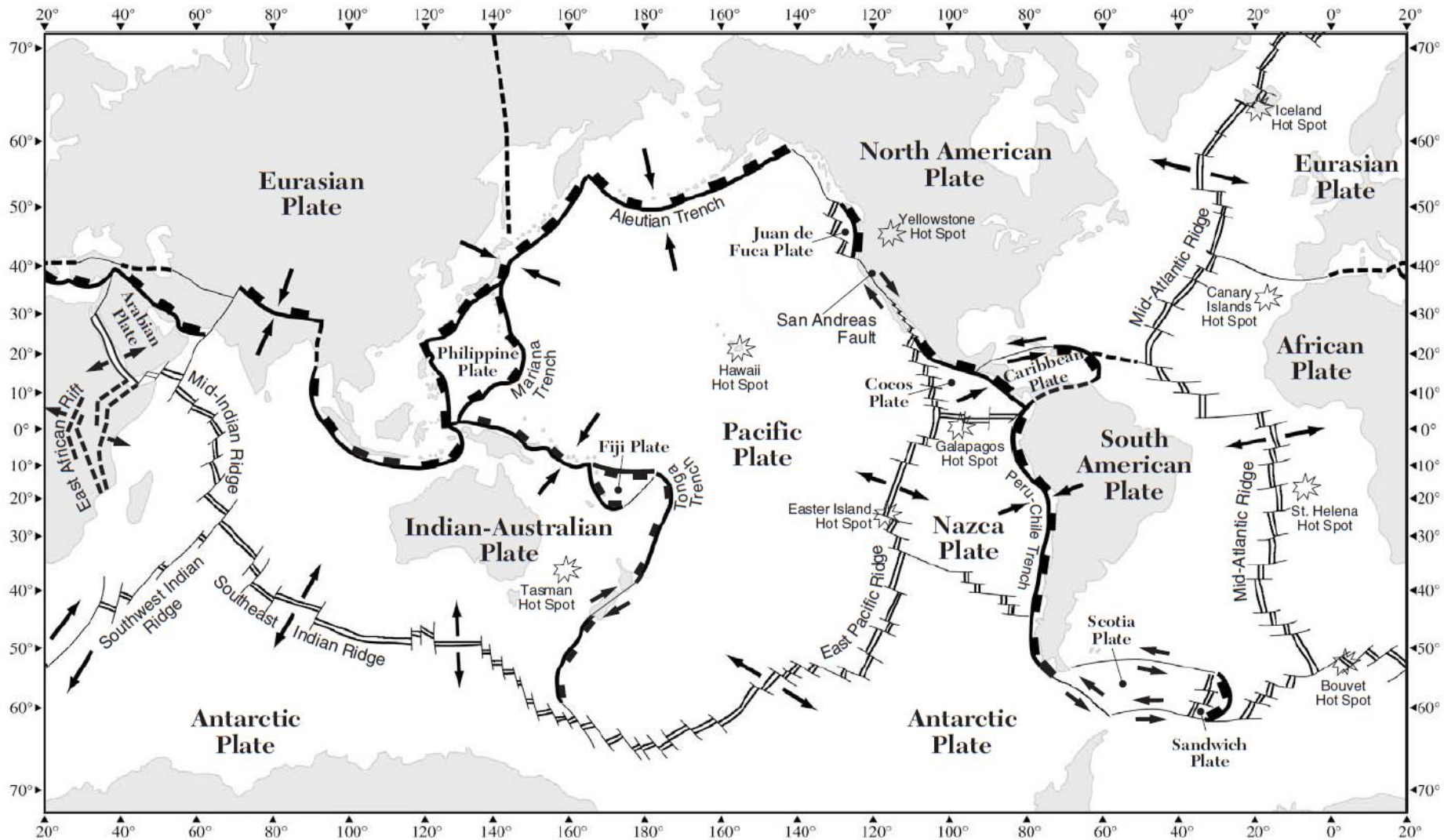
✦ **Features:**

- 1) Deep Sea Trench
- 2) Volcanoes Island Arc
- 3) Earthquakes

Example: Mariana Islands, Pacific Ocean



Tectonic Plates



Key

→
Relative motion at plate boundary

↔
Transform plate boundary (transform fault)

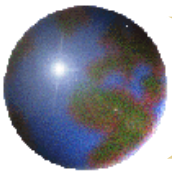
↔
Divergent plate boundary (usually broken by transform faults along mid-ocean ridges)

↔
Convergent plate boundary (subduction zone)

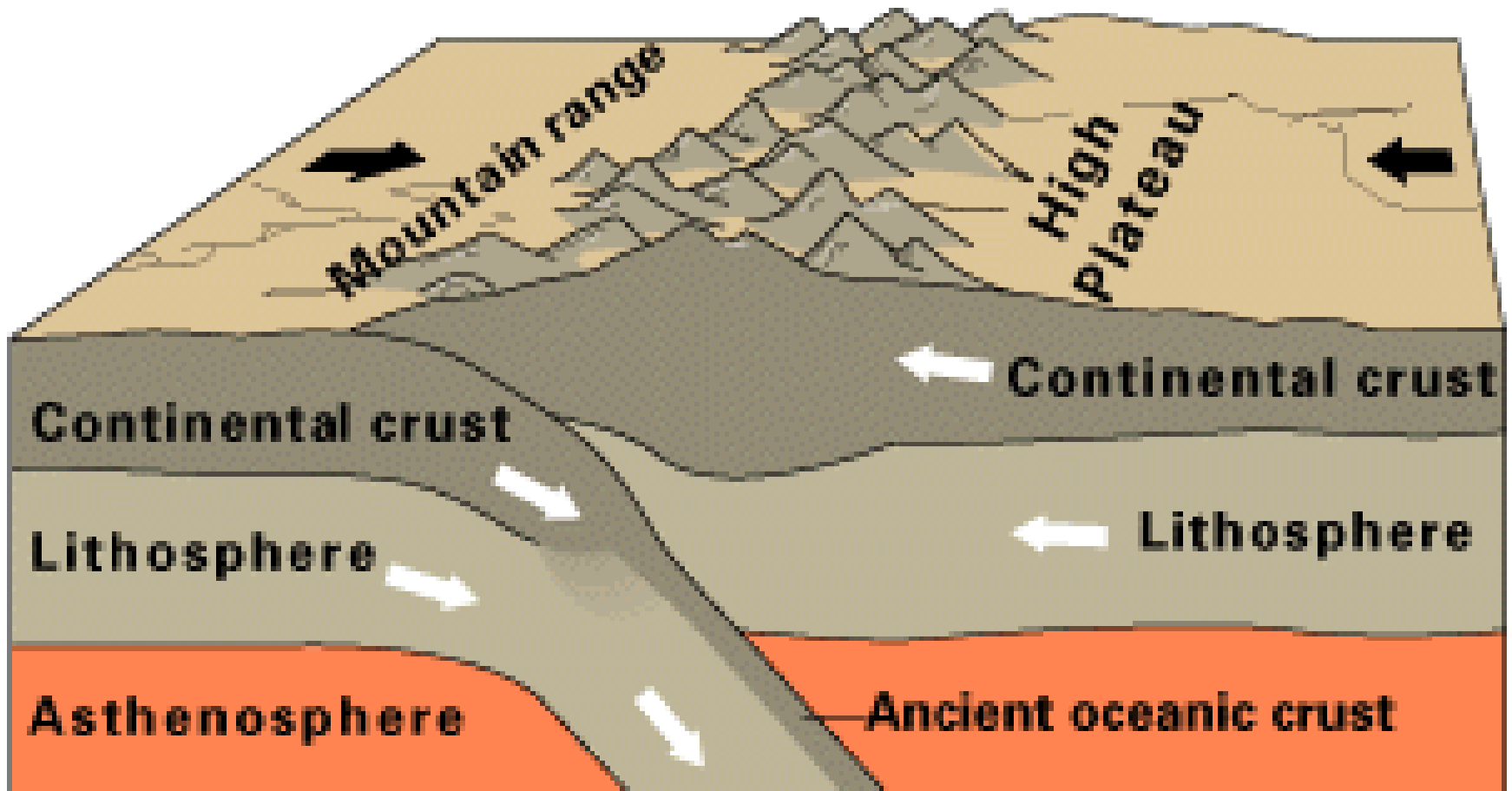
Complex or uncertain plate boundary

★
Mantle hot spot

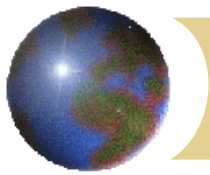
NOTE: Not all mantle hot spots, plates, and boundaries are shown.



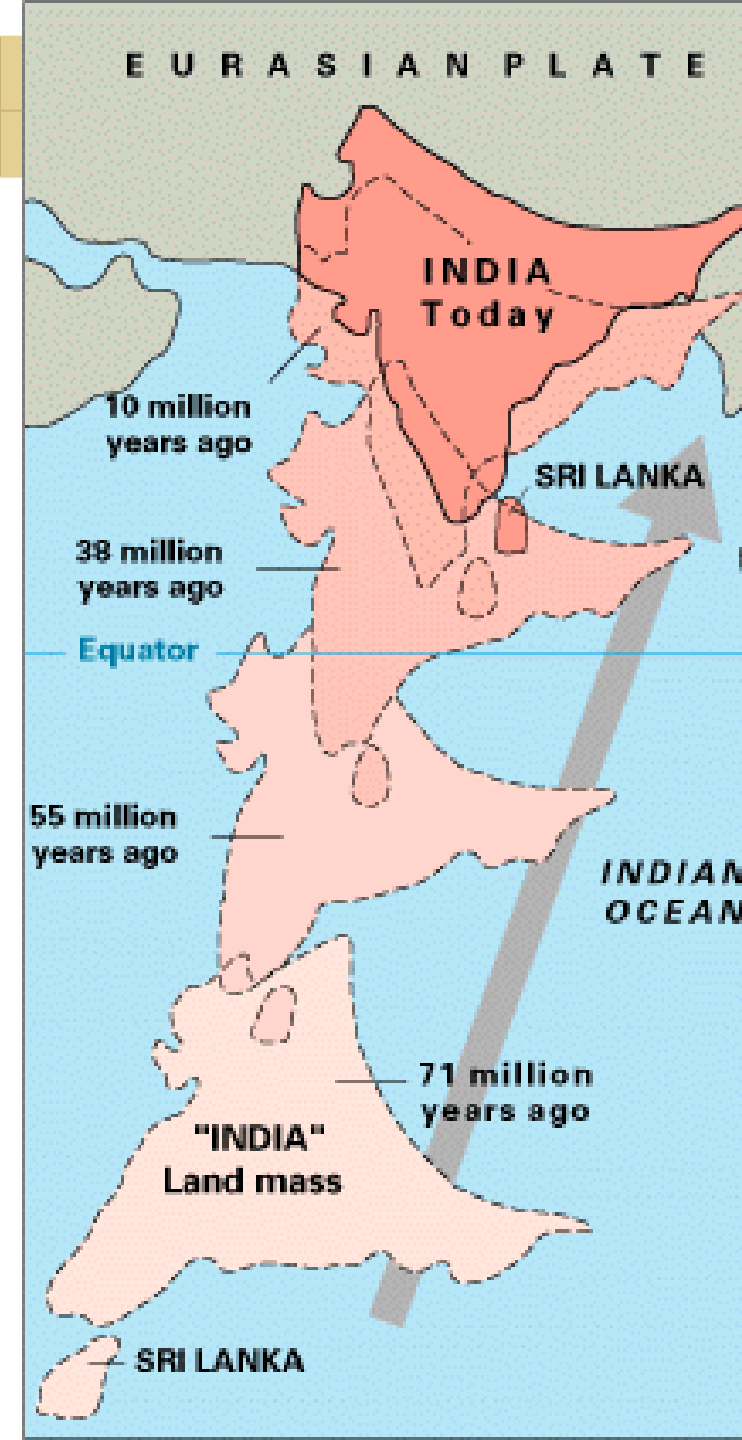
CONTINENTAL CRUST VS. CONTINENTAL CRUST

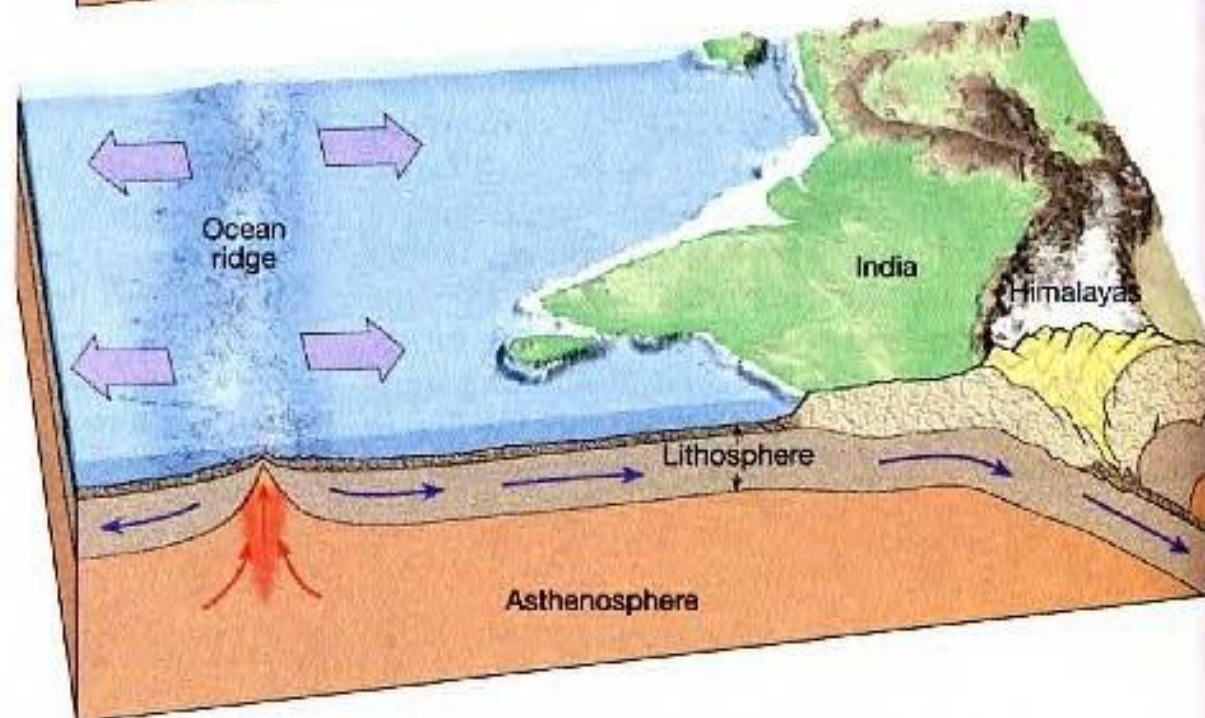
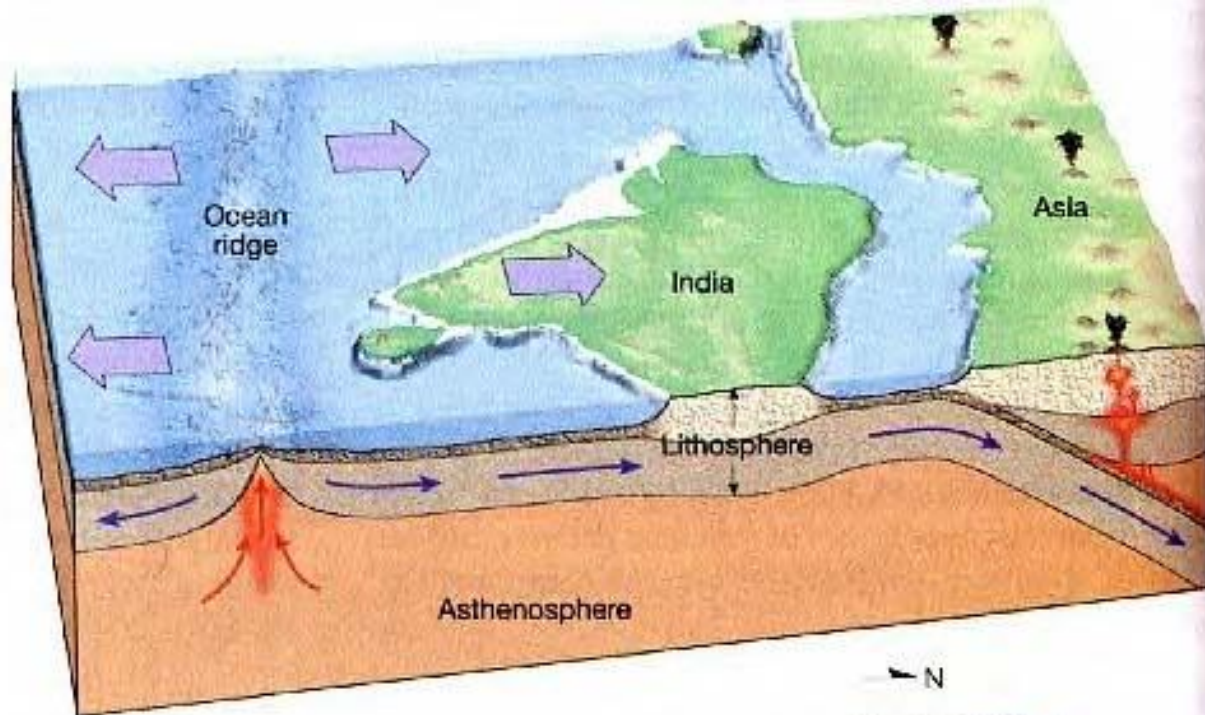
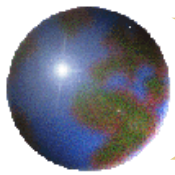


<http://www.pbs.org/wnet/savageearth/animations/rift-collide.html>



Indian Subcontinent Moving Toward Asia

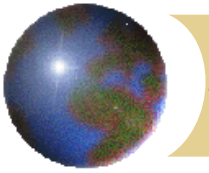






(C) L.W. Wildervanck

✪ Mount Everest is 29,035 ft
Grows Larger Each Year Due to Tectonic Forces



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Continental vs. Continental

⊕ **Result: Collisions**

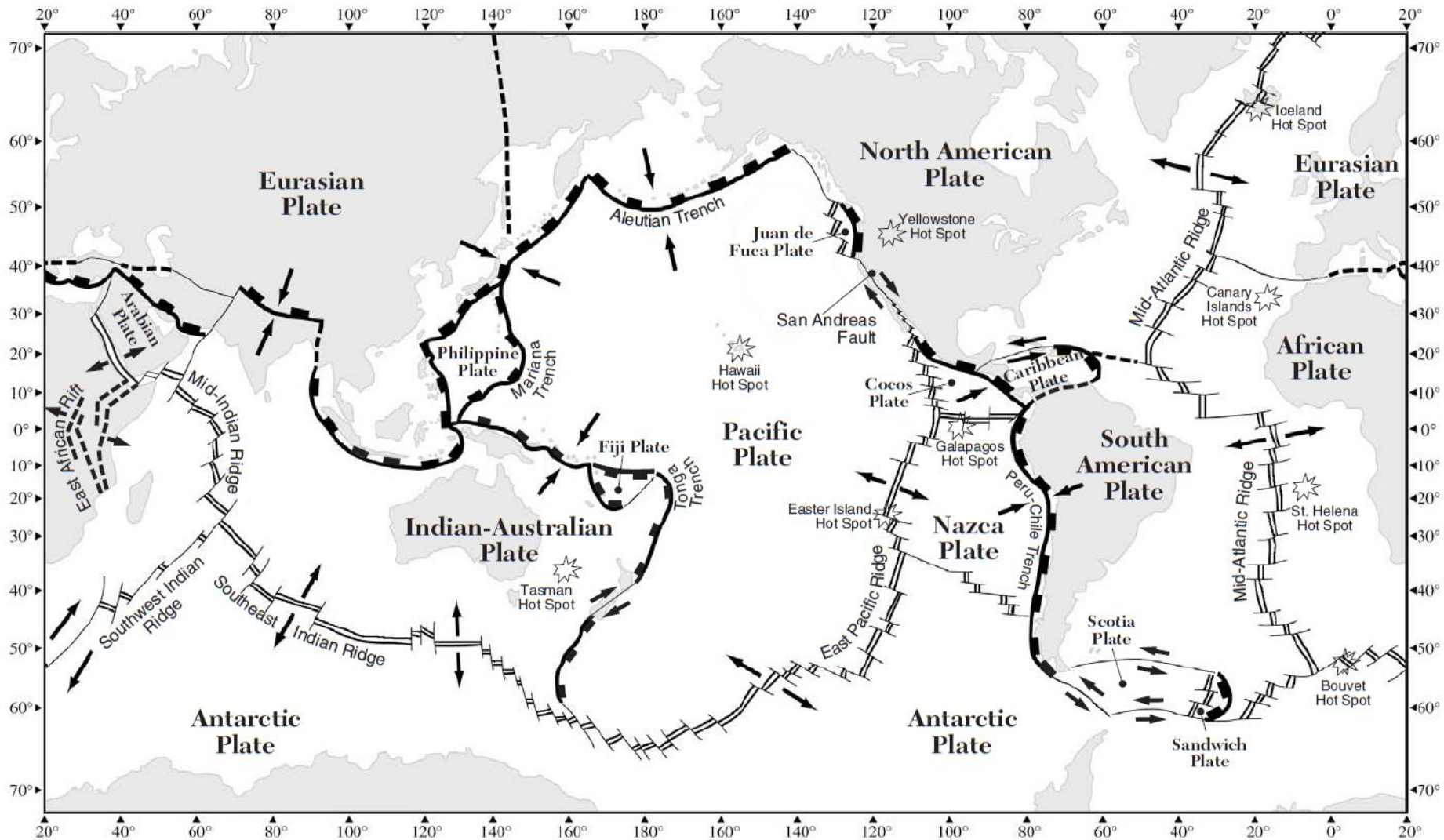
⊕ **Features:**

1) High Mountain Chains

2) Earthquakes

Example: Himalayan Mountains

Tectonic Plates



Key

→
Relative motion at plate boundary

↔
Transform plate boundary (transform fault)

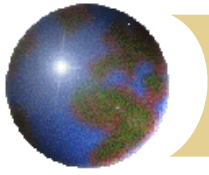
↘ ↙
Divergent plate boundary (usually broken by transform faults along mid-ocean ridges)

↘ ↙
Convergent plate boundary (subduction zone)

Complex or uncertain plate boundary

★
Mantle hot spot

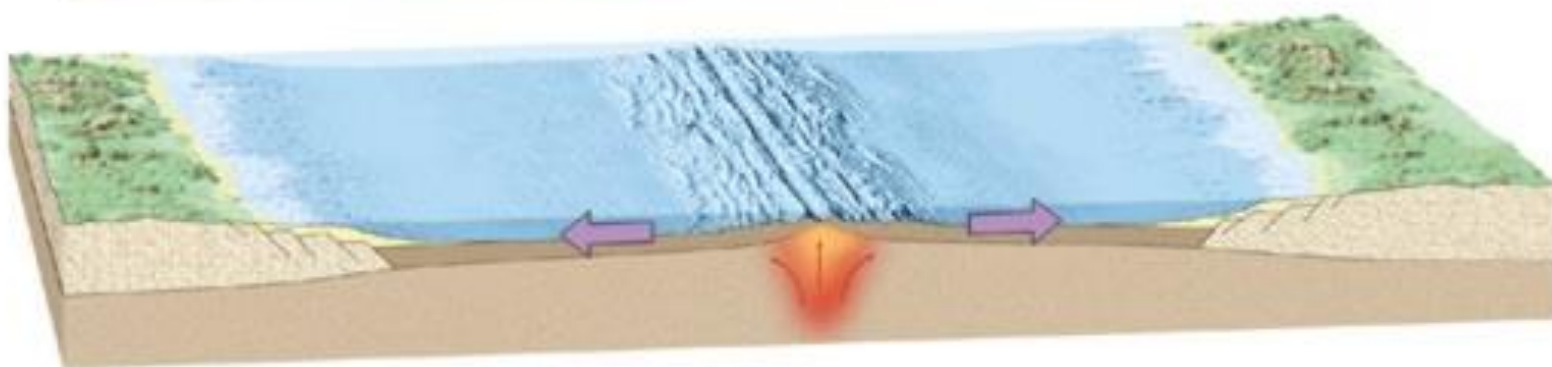
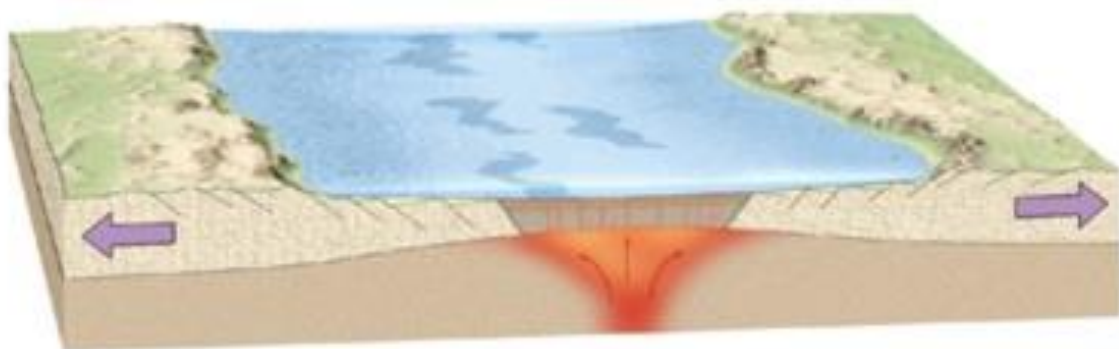
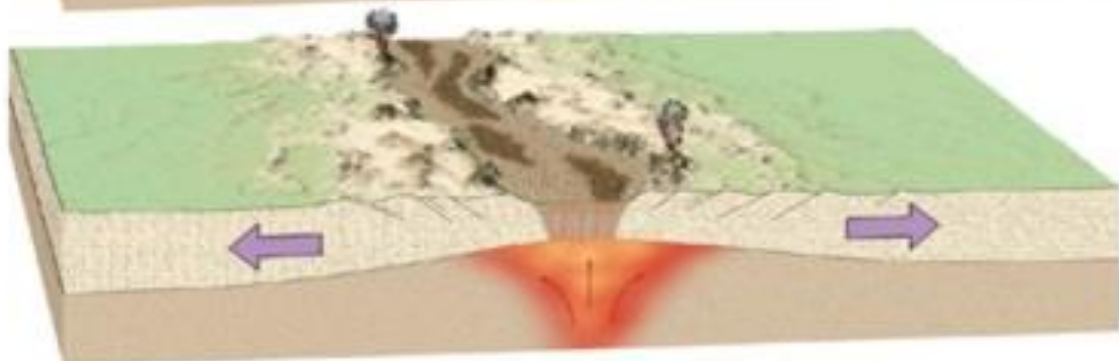
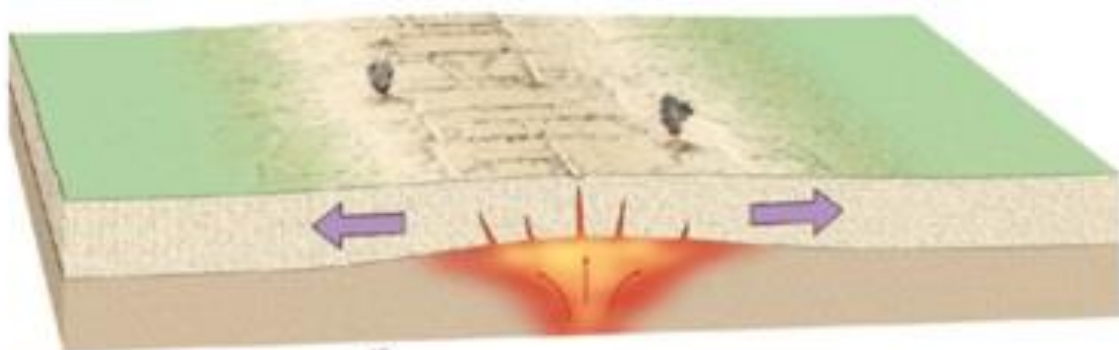
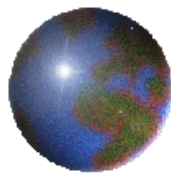
NOTE: Not all mantle hot spots, plates, and boundaries are shown.

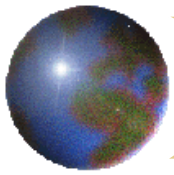


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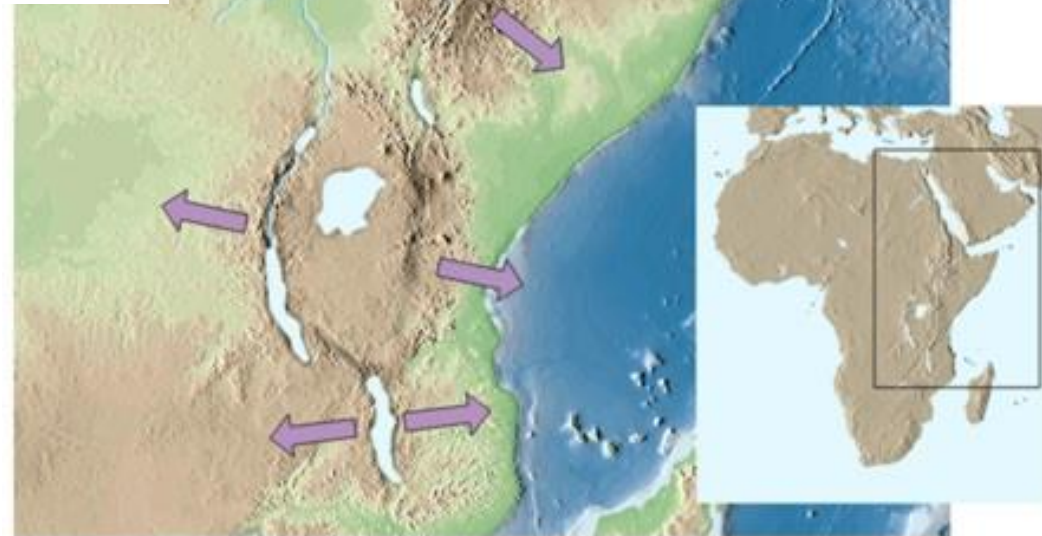
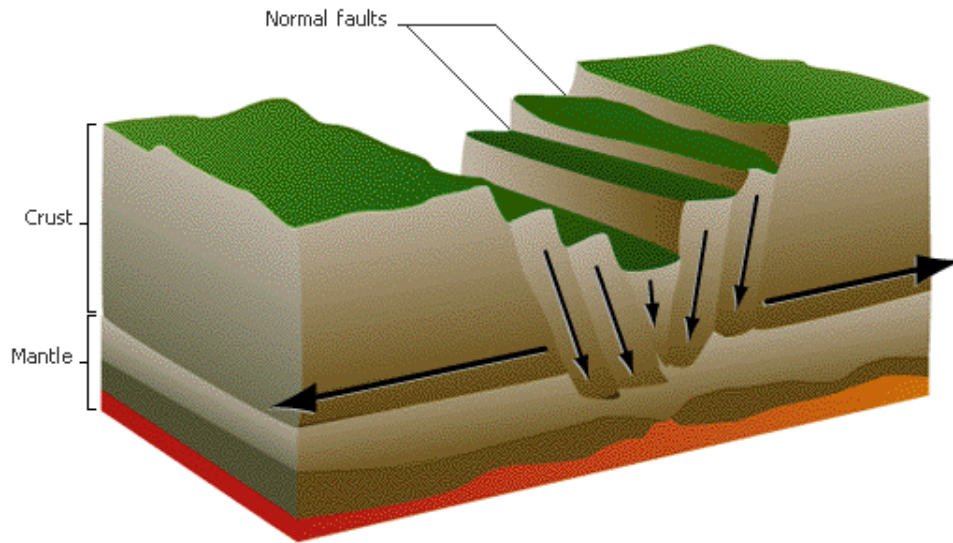
Diverging

⊕ Plates move apart

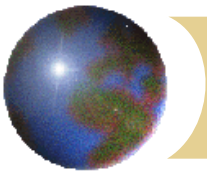




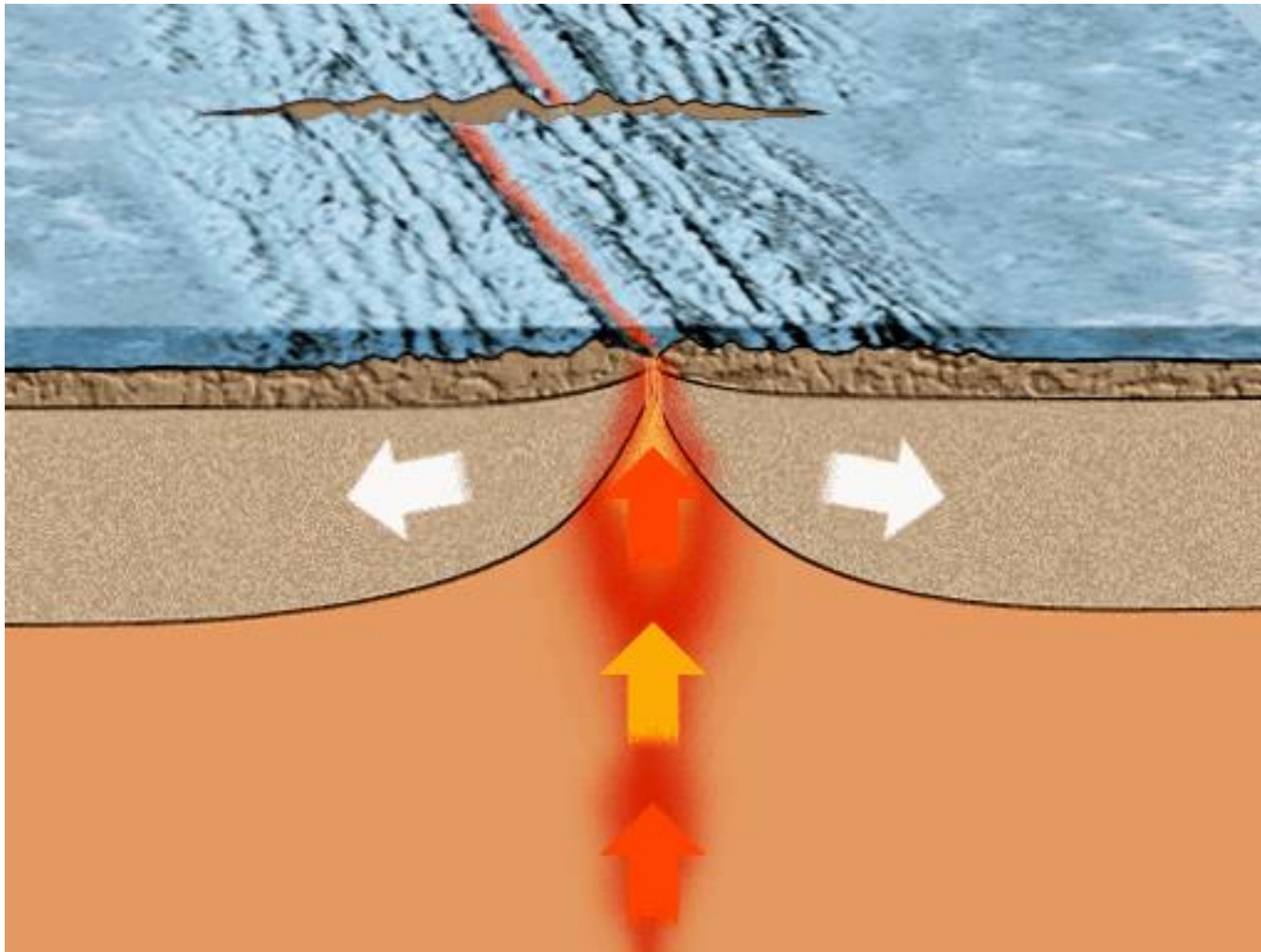
Rifting Zone on Land



East African Rift Valley



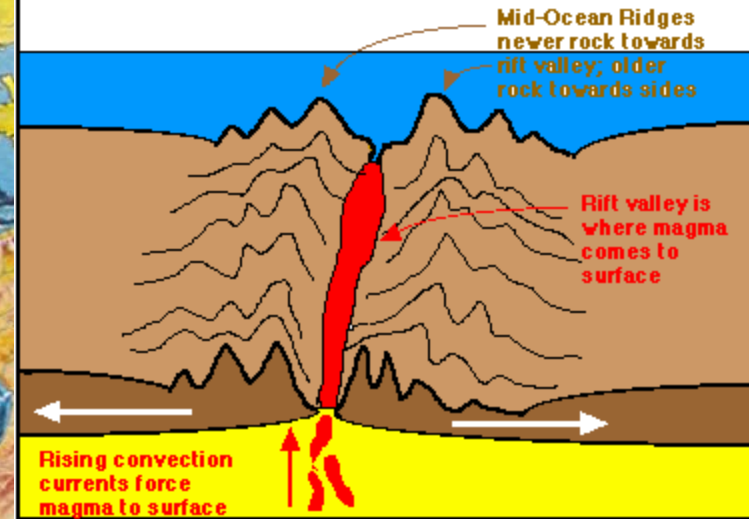
Rifting zone under the ocean



Mid Atlantic Ridge



Mid-Ocean Ridge at Diverging Boundary





Diverging Plates



ARTIE.COM

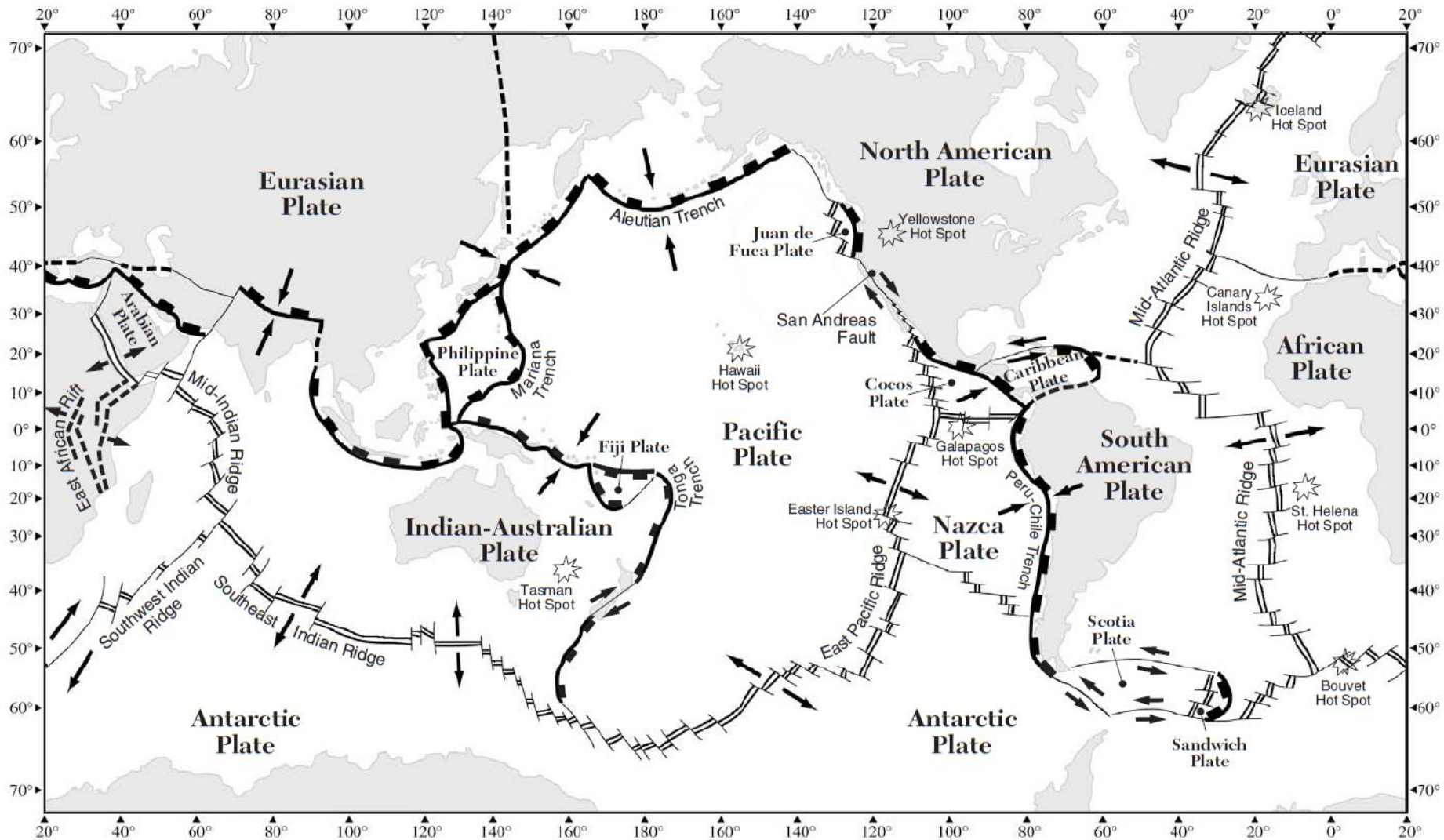
✚ **Result:** Magma rises to surface, new crust forms

✚ **Features:**

- 1) Mid-Ocean Ridges
- 2) Rift Valleys
- 3) Earthquakes
- 4) Volcanoes

Example: Mid-Atlantic Ridge

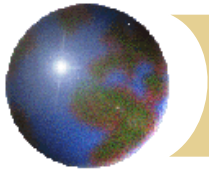
Tectonic Plates



Key

- Relative motion at plate boundary
- ↔ Transform plate boundary (transform fault)
- ⊃⊃⊃⊃ Divergent plate boundary (usually broken by transform faults along mid-ocean ridges)
- ⊃⊃⊃⊃ Convergent plate boundary (subduction zone)
- Complex or uncertain plate boundary
- ★ Mantle hot spot

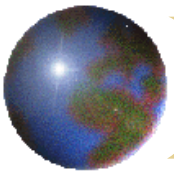
NOTE: Not all mantle hot spots, plates, and boundaries are shown.



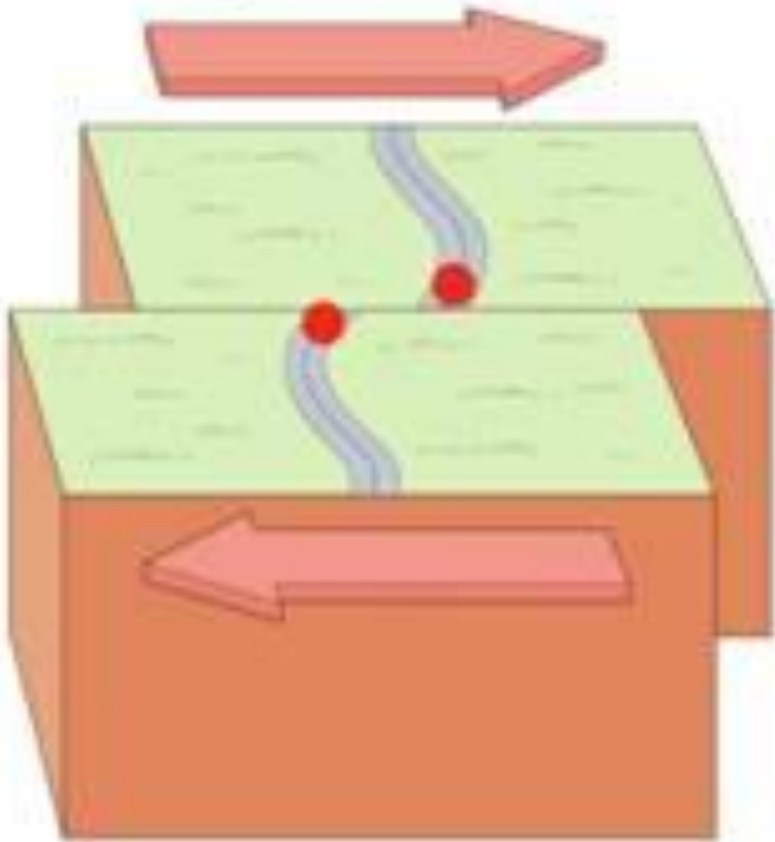
ARTIE.COM

Transform

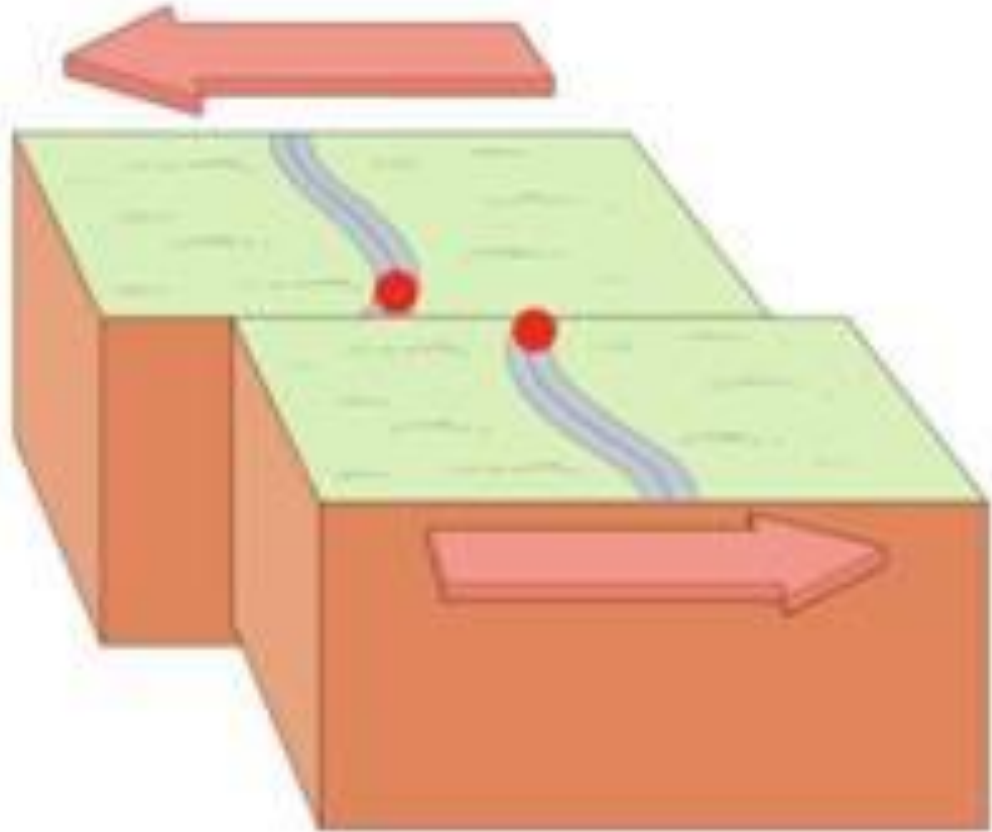
⊕ Plates slide past each other

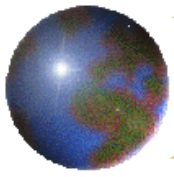


Right-lateral*

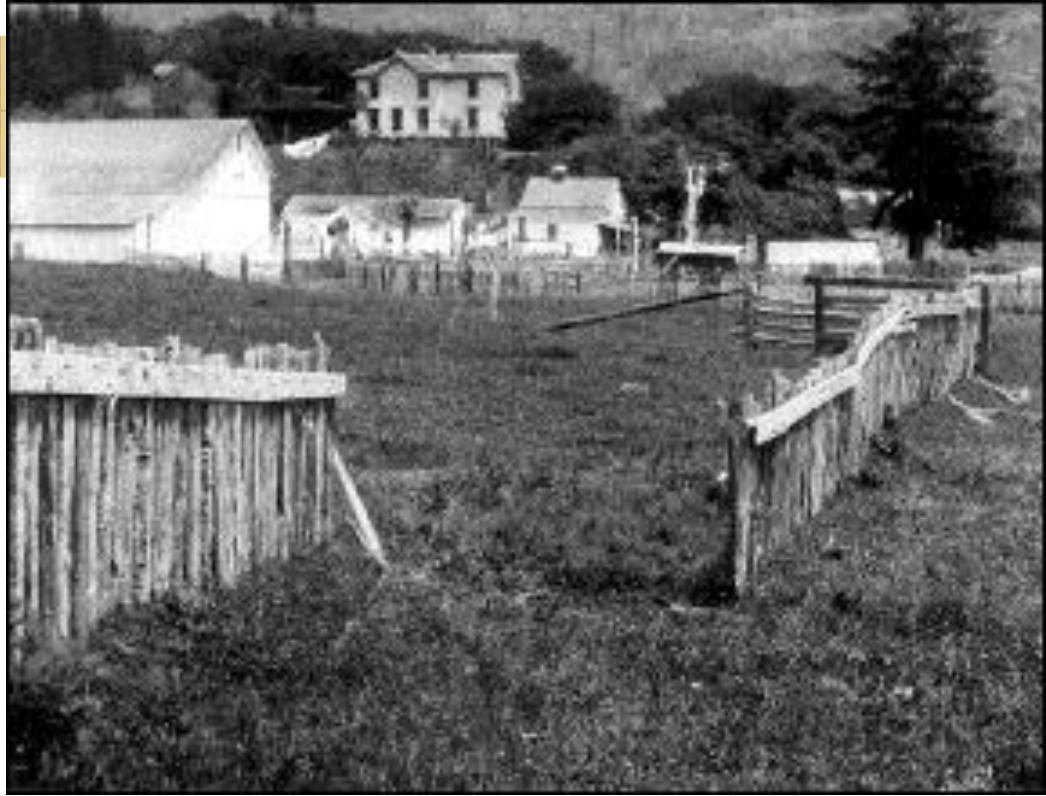


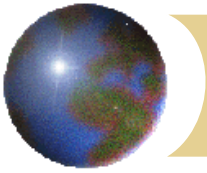
Left-lateral**





San Andreas Fault California





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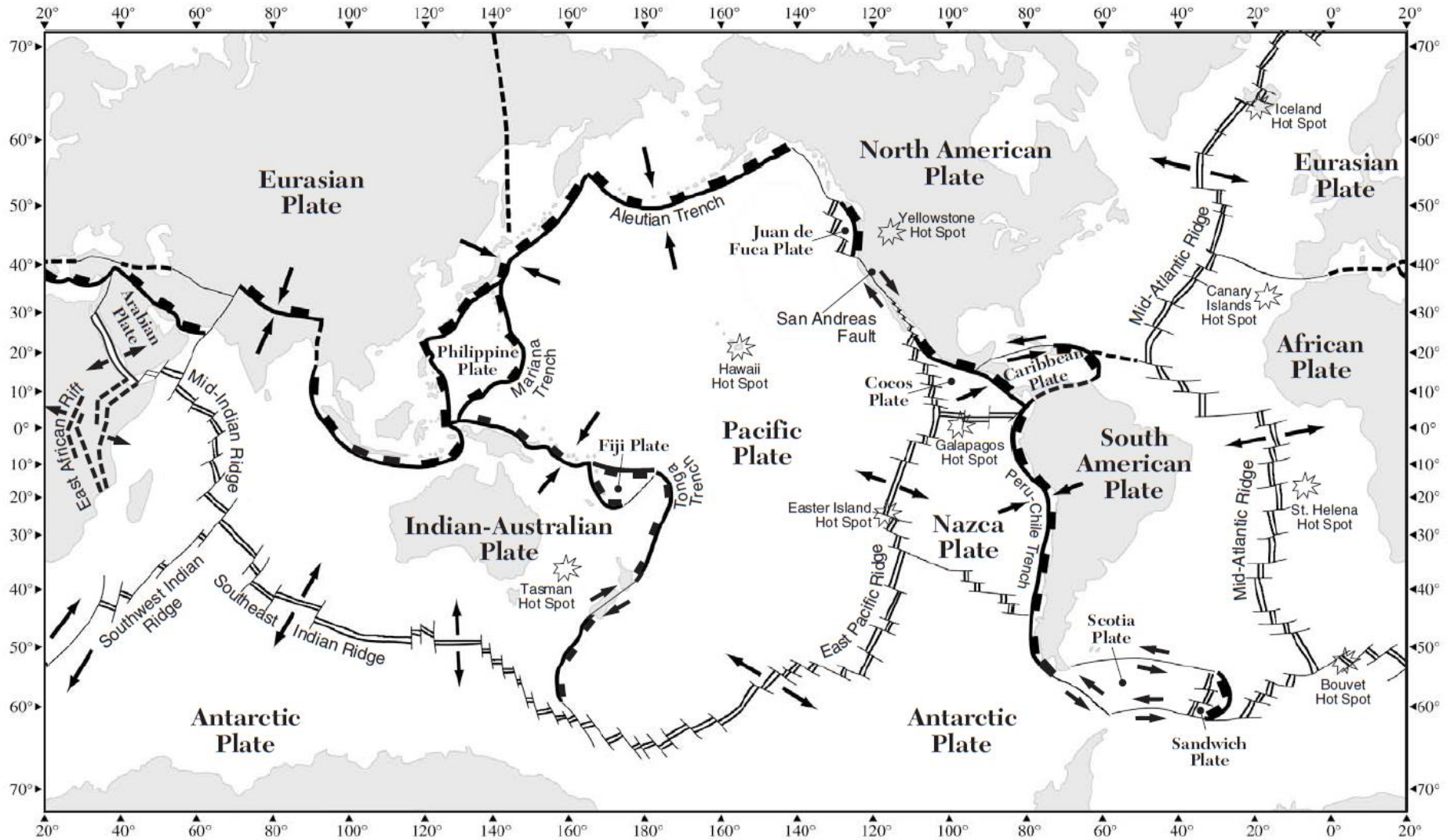
Transform

Features:

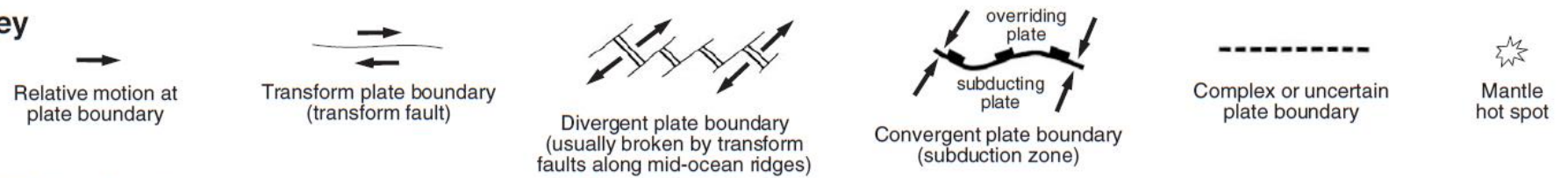
1) Earthquakes

Example: San Andreas Fault, CA

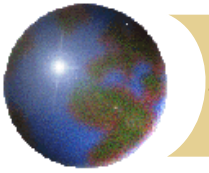
Tectonic Plates



Key



NOTE: Not all mantle hot spots, plates, and boundaries are shown.



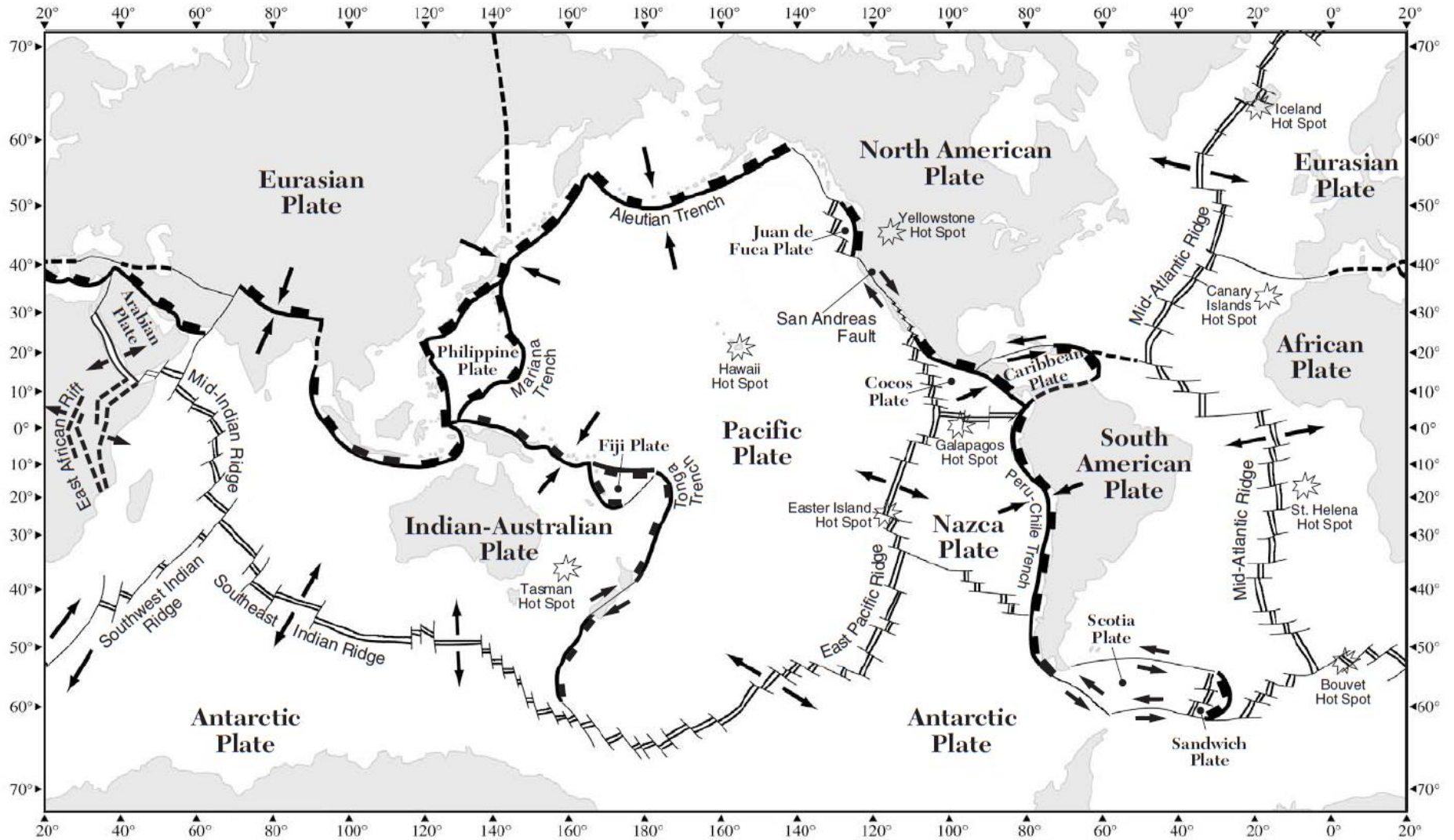
ARTIE.COM

FQ:




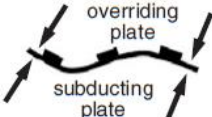

✚ Why does oceanic crust subduct under continental crust?

It has a greater density (3.0 g/cm^3)

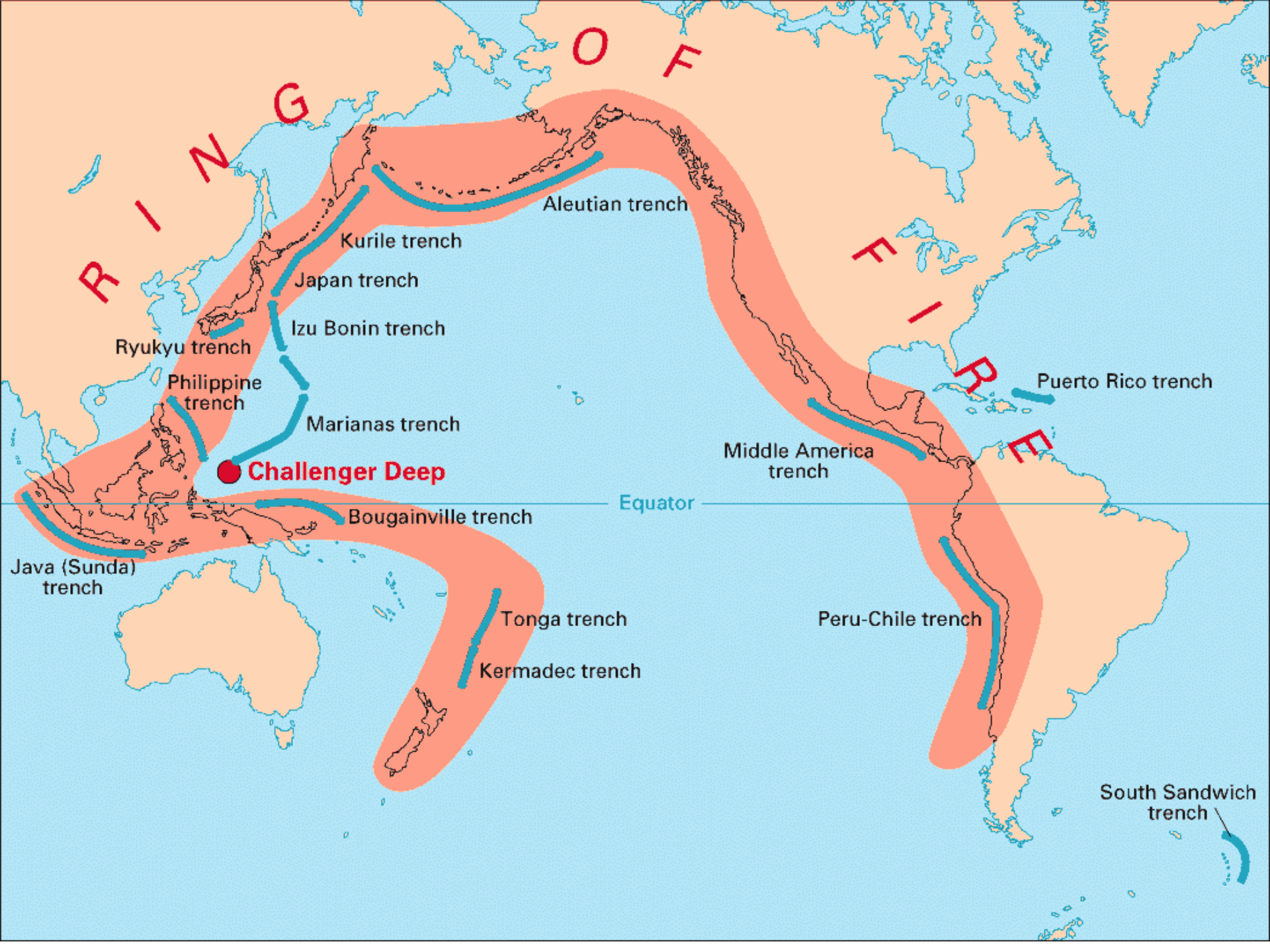
Tectonic Plates

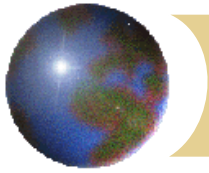


Key

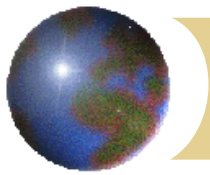
- 
 Relative motion at plate boundary
- 
 Transform plate boundary (transform fault)
- 
 Divergent plate boundary (usually broken by transform faults along mid-ocean ridges)
- 
 Convergent plate boundary (subduction zone)
- 
 Complex or uncertain plate boundary
- 
 Mantle hot spot

NOTE: Not all mantle hot spots, plates, and boundaries are shown.

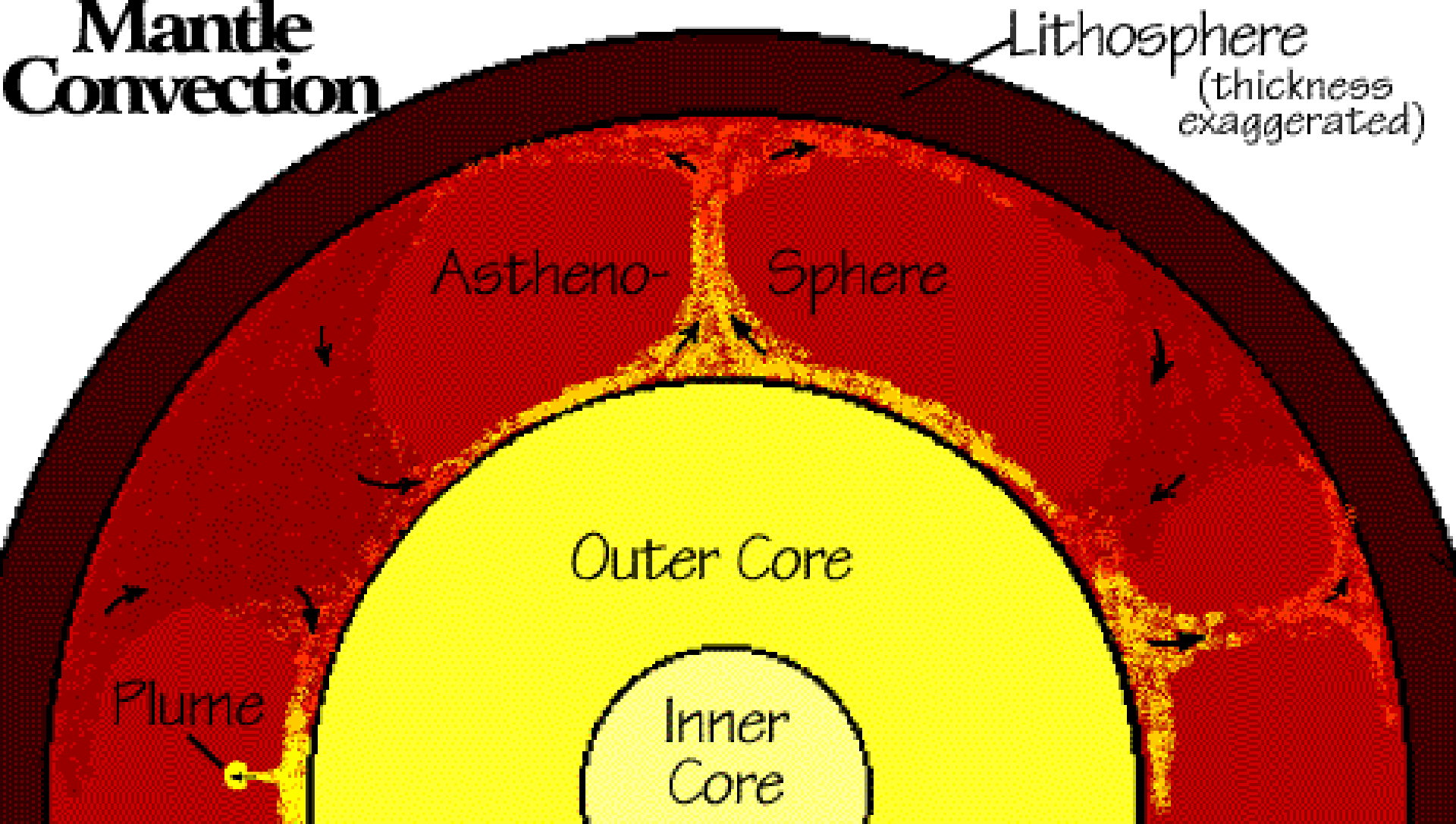


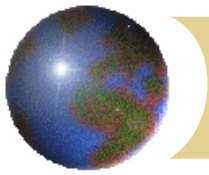


Time for a Worksheet



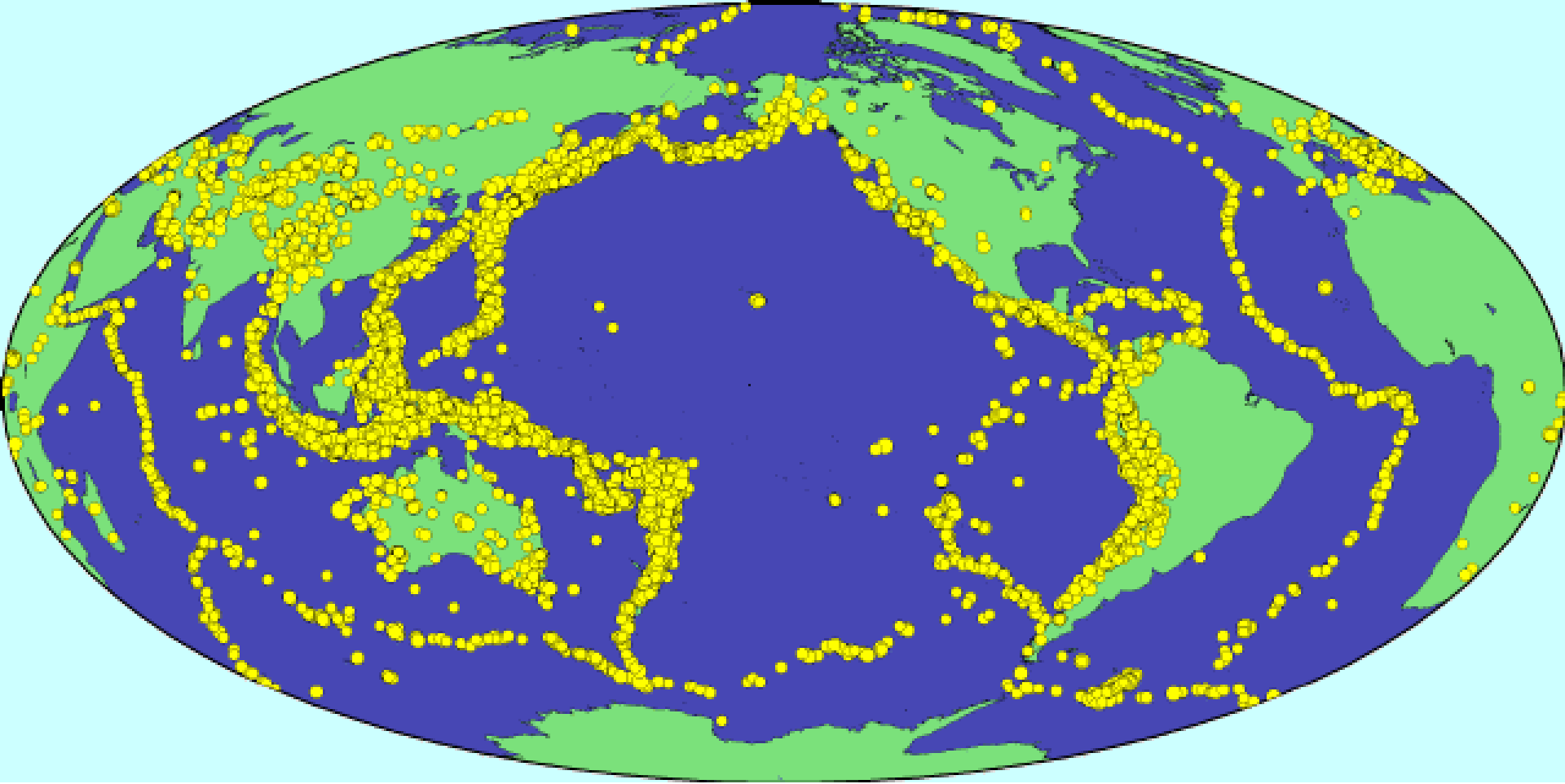
Mantle Convection



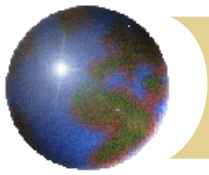


Major Concepts

- ✦ The lithosphere is divided into 6 major plates
 - ✦ Pacific, American, Indian, African, Eurasian, Antarctic
- ✦ There are also many smaller plates as well



Distribution of Earthquakes



Hot Spots



Kauai



Oahu

Honolulu

Molokai



Maui

Lanai

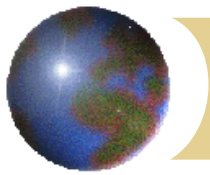


Big
Island



40 km

Hawaii



"Hotspot" Volcano (e.g., Hawaii)

