

Notepack # 9

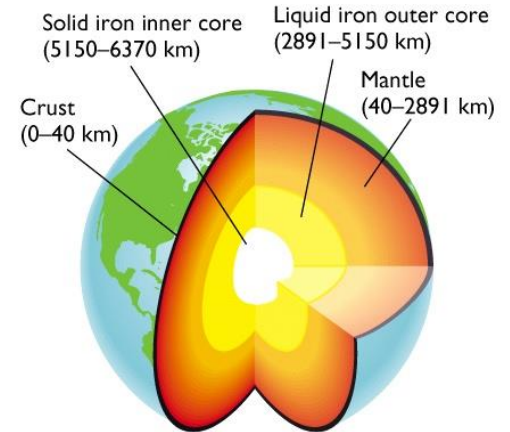
AIM: Why are the continents drifting apart?

Do Now: Watch the video clip and write down what you observe.

<http://www.youtube.com/watch?v=Ci5P5yy0xlg&feature=related>

What do we know as a class, about the Earth?

- The Earth is round
- The Earth is made up of layers of different materials.
- These layer form as the results of different densities.
- The deeper you go towards the center of the Earth, the more hotter and pressure there will be.
- The Earth is constantly changing.
- All the continents were connected at one time in a super continent called Pangaea.



Causes of Plate Tectonics

What is Plate Tectonics

- The Earth's crust and upper mantle are broken into sections called plates.
- These plates contain all the rocks of the continents and the ocean floor.
- These plates “float” on top of liquefied rock called the mantle.
- The Crust “floats” on top of the mantle because it is less dense than the mantle.
- Plates move around on top of the mantle like icebergs floating on the oceans.



How many plates are there?

- There are dozens of tectonic plates on earth but only about seven huge plates.
- The largest include the African Plate, Antarctic Plate, Eurasian Plate, Indo-Australian Plate, North American Plate, Pacific Plate, South American Plate.
- These plates touch each other, rubbing and pushing against each other; creating earthquakes, volcanoes and mountains.



Tectonic Plate Boundary Types:

Extensional 

Compressional 

Transform (sliding) or Undefined 

The Crust

- The crust is also known as the lithosphere.
 - It consists of rock and is mostly solid.
 - Its thickness ranges from 5km in the ocean to 65 km on the continent.

The Asthenosphere

- The asthenosphere, also known as the upper mantle, is about 80 km thick.
- The asthenosphere is not solid nor is it liquidly. Its consistency is said be “plastic”. Like wet pudding..
- The plates of the lithosphere float on the asthenosphere

Types of Plates

- The crust is made of 2 types of plates:
 - Continental plates - plates below the continents
 - Ocean plates - plates below the oceans. They are slightly denser than continental plates.

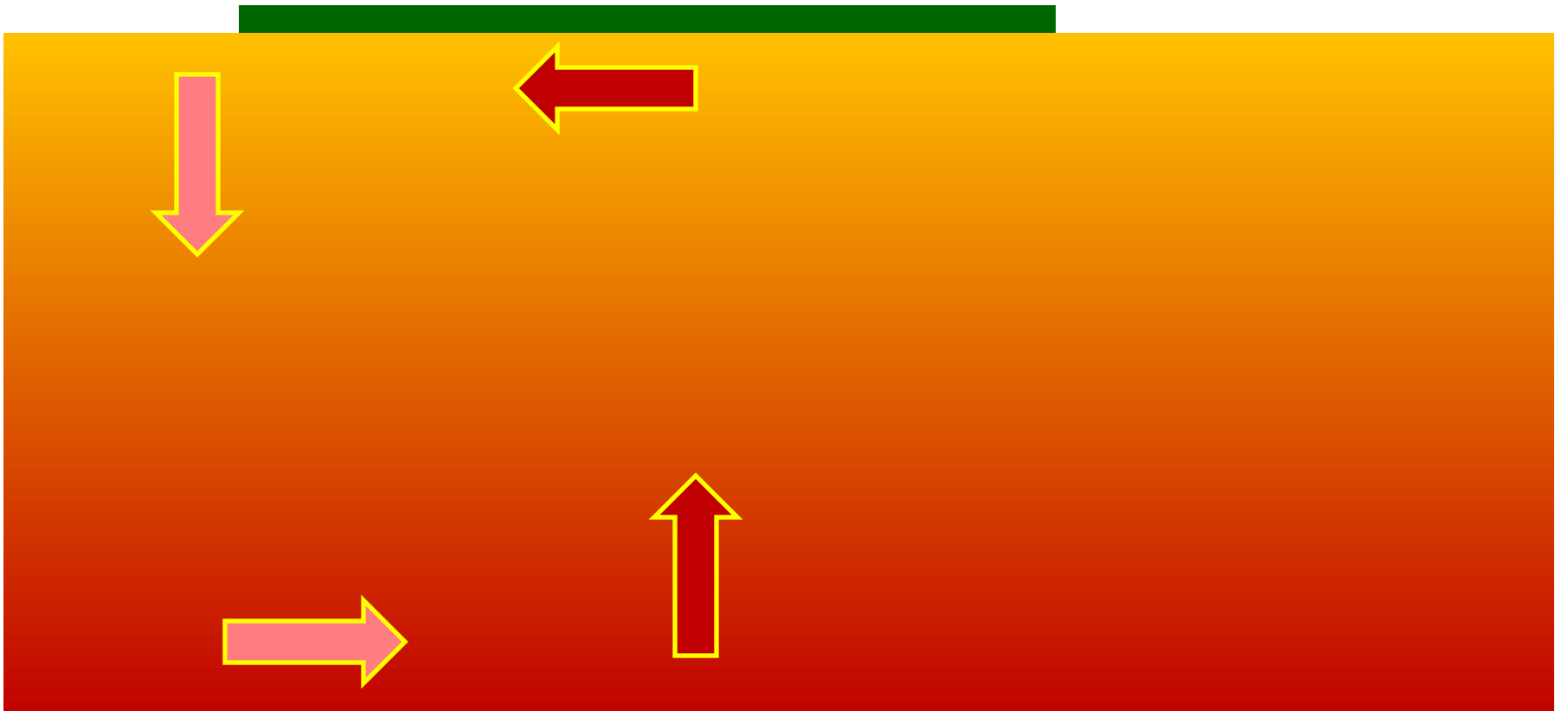
What causes these plates to move?

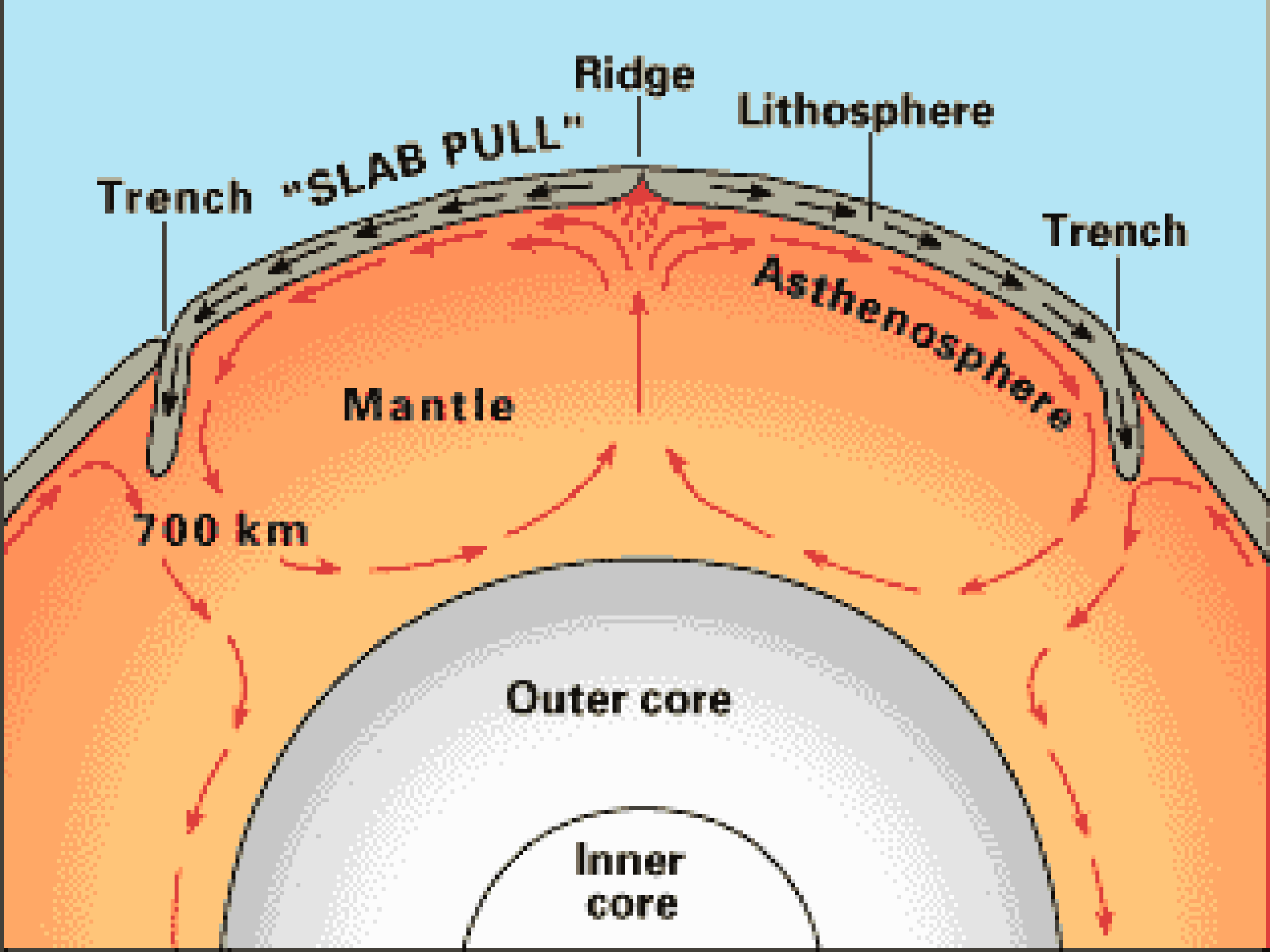
DON'T WRITE

- Like icebergs, plates have no motors to move them.
- Like iceberg, plates rely on currents to pull or push them from one place to another.

What causes these plates to move?

- **Hot magma** in the Earth's mantle moves toward the surface. This is because as the magma heats up, its density decreases.
- But when it reaches the crust, its temperature decrease. As a result, its density increases causing it to sink again.
- This movement of magma rising and sinking creates a current called **convection currents**.
- These convection currents scrape the beneath the plates, causing the plates to move.





Ridge

Lithosphere

Trench

"SLAB PULL"

Trench

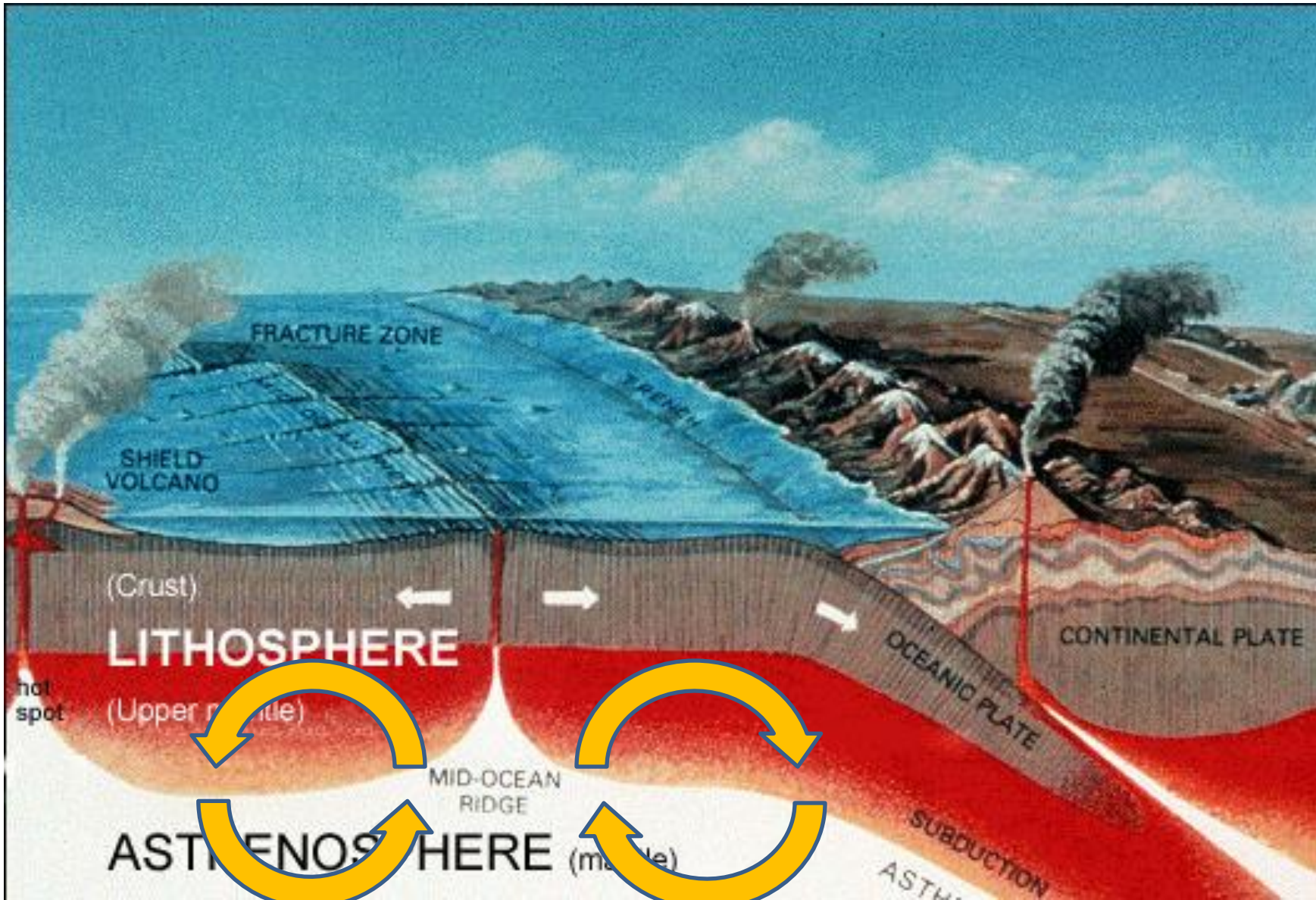
Asthenosphere

Mantle

700 km

Outer core

Inner core



CONVECTION

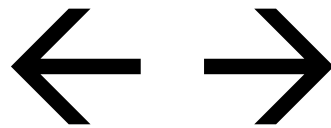
http://www.youtube.com/watch?v=p0dWF_3PYh4

What are Plate Boundaries?

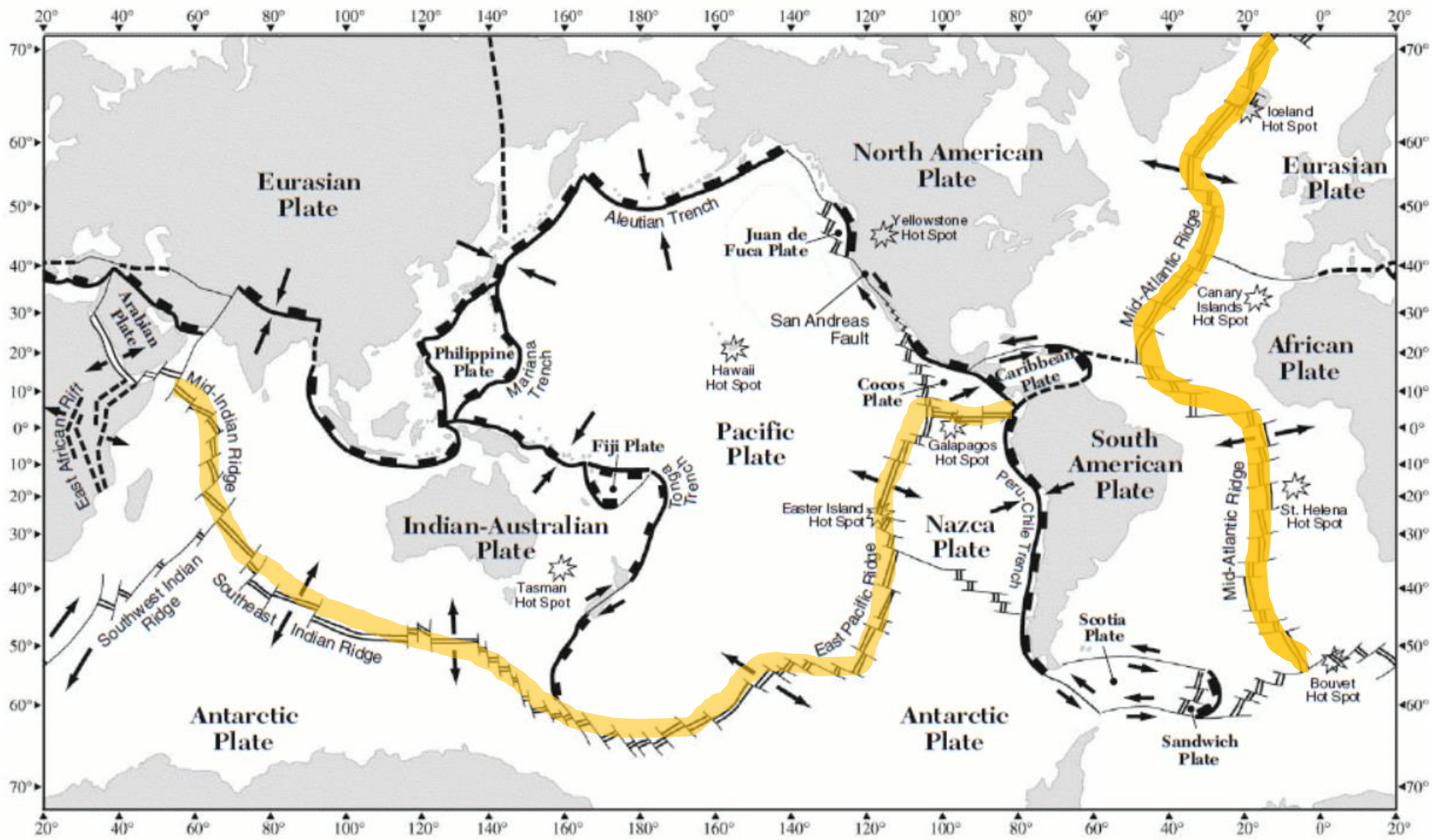
- Plate Boundaries are places where 2 or more plates meet each other.
- There are 3 types of plate boundaries:
 - Divergent Boundaries
 - Convergent Boundaries
 - Transform Fault Boundaries

1) Divergent Boundaries

- Divergent Boundaries are Boundaries between two plates that are moving apart or **rifting**



- RIFTING causes SEAFLOOR SPREADING



Key

→
Relative motion at plate boundary

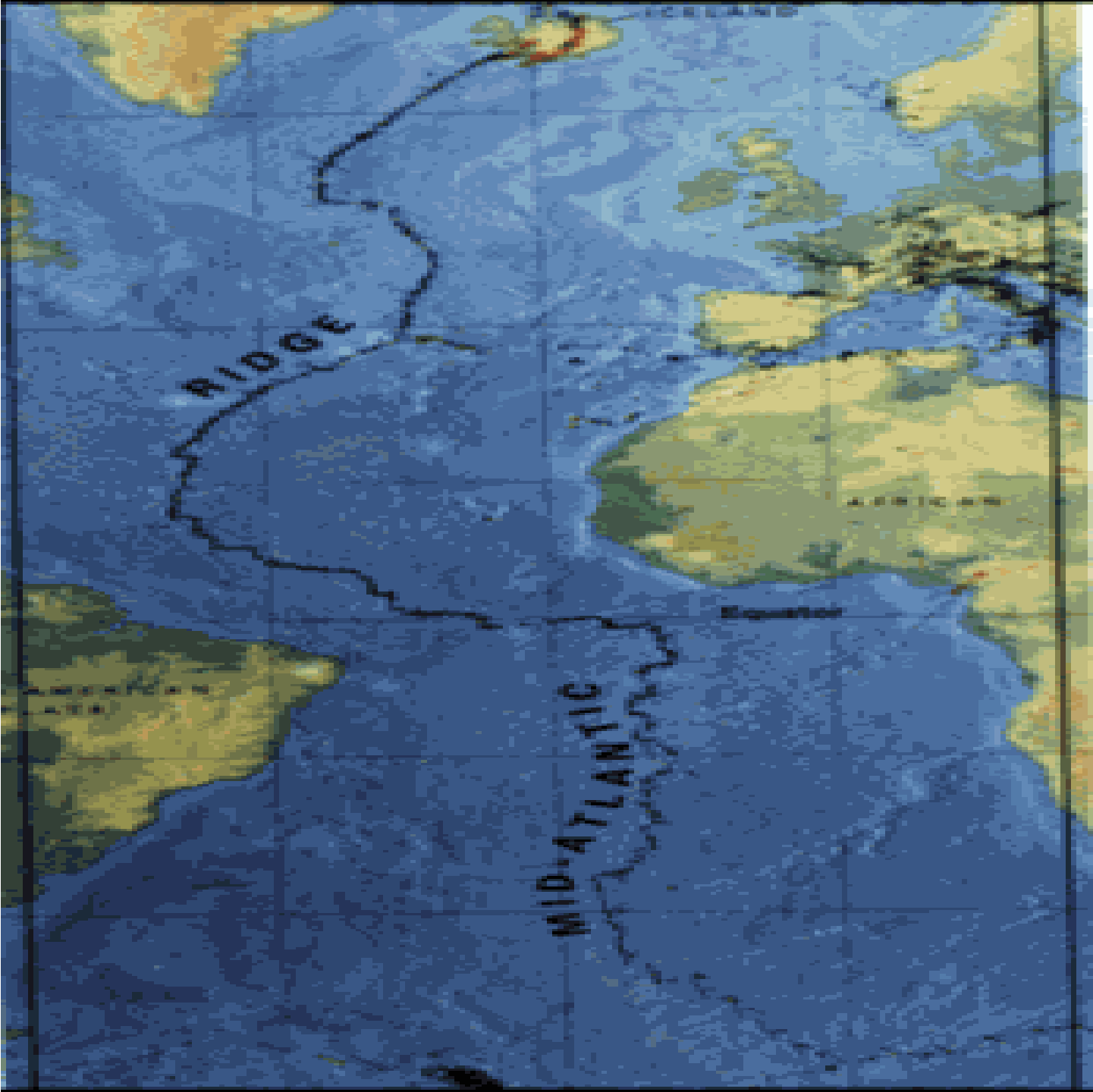
↔
Transform plate boundary (transform fault)

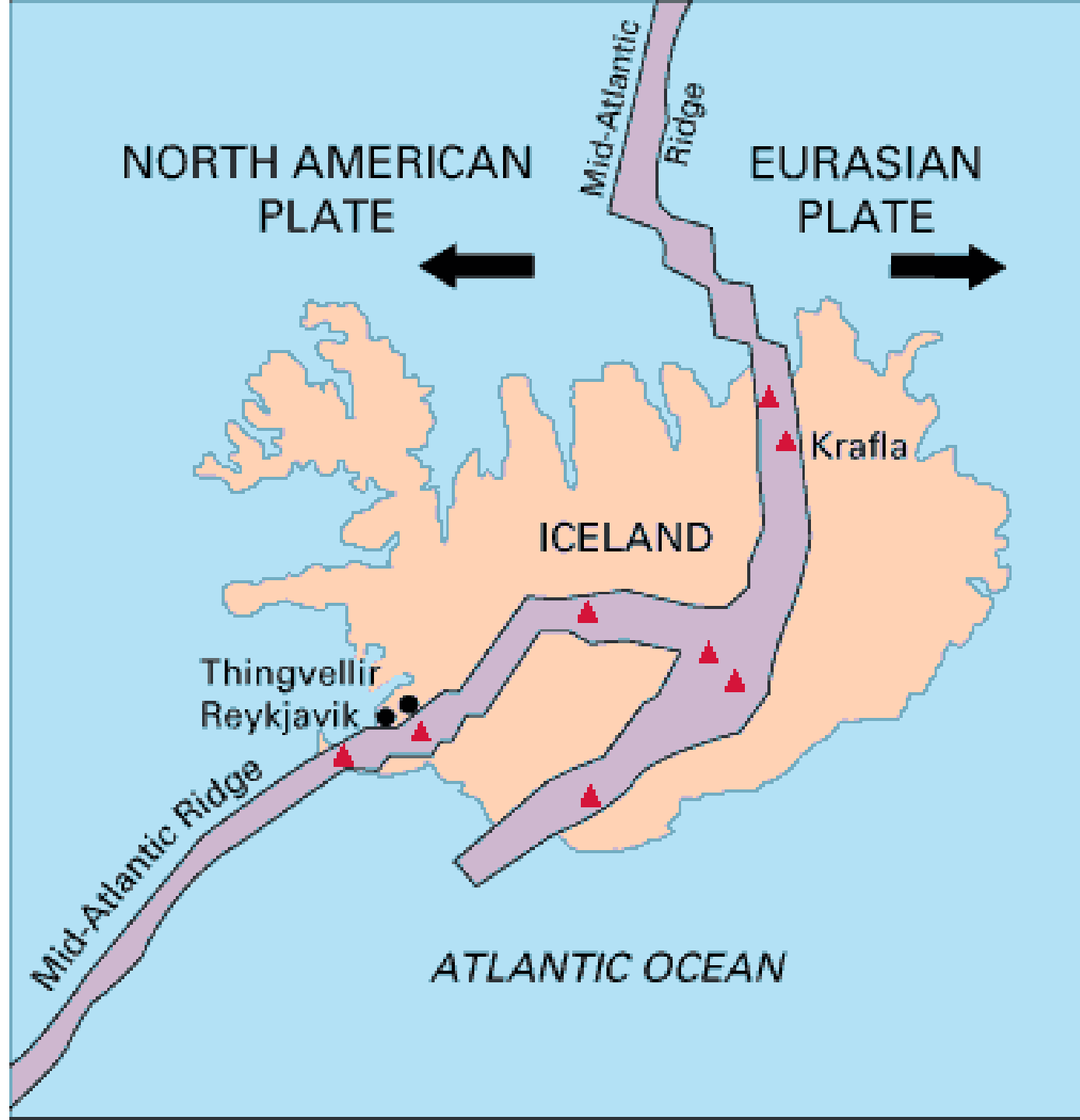
↔
Divergent plate boundary

↔
overriding plate
↔
subducting plate

Complex or uncertain plate boundary

★
Mantle hot spot



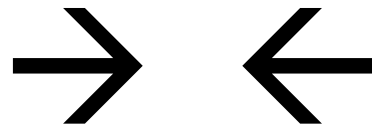


Features of Divergent Boundaries

- Mid-ocean ridges
- rift valleys
- fissure volcanoes

2) Convergent Boundaries

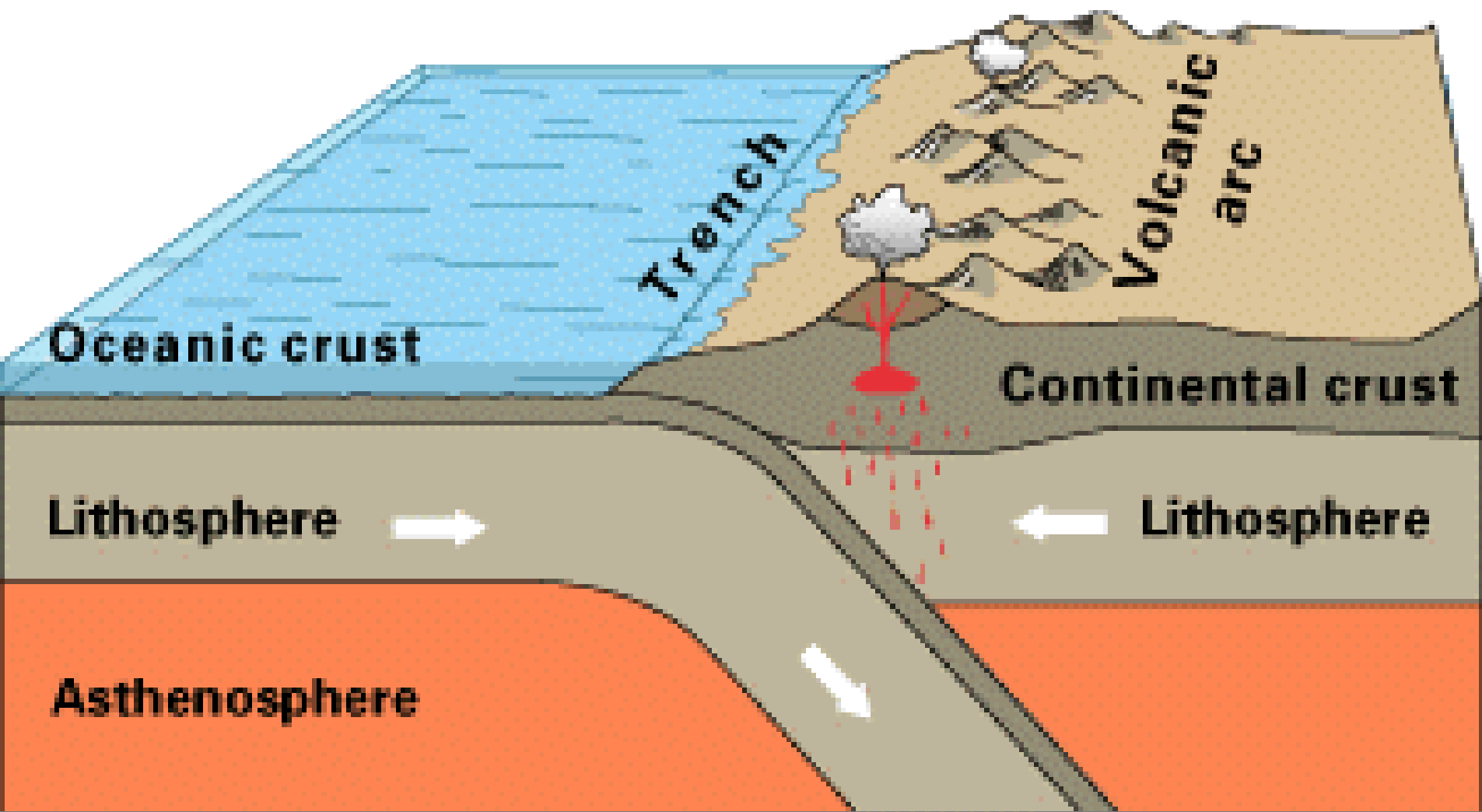
- Convergent Boundaries are Boundaries between two plates that are **colliding**



- There are 3 types...

Type 1

- Ocean plate colliding with a less dense continental plate
- Subduction Zone: where the less dense plate slides under the more dense plate
- VOLCANOES occur at subduction zones



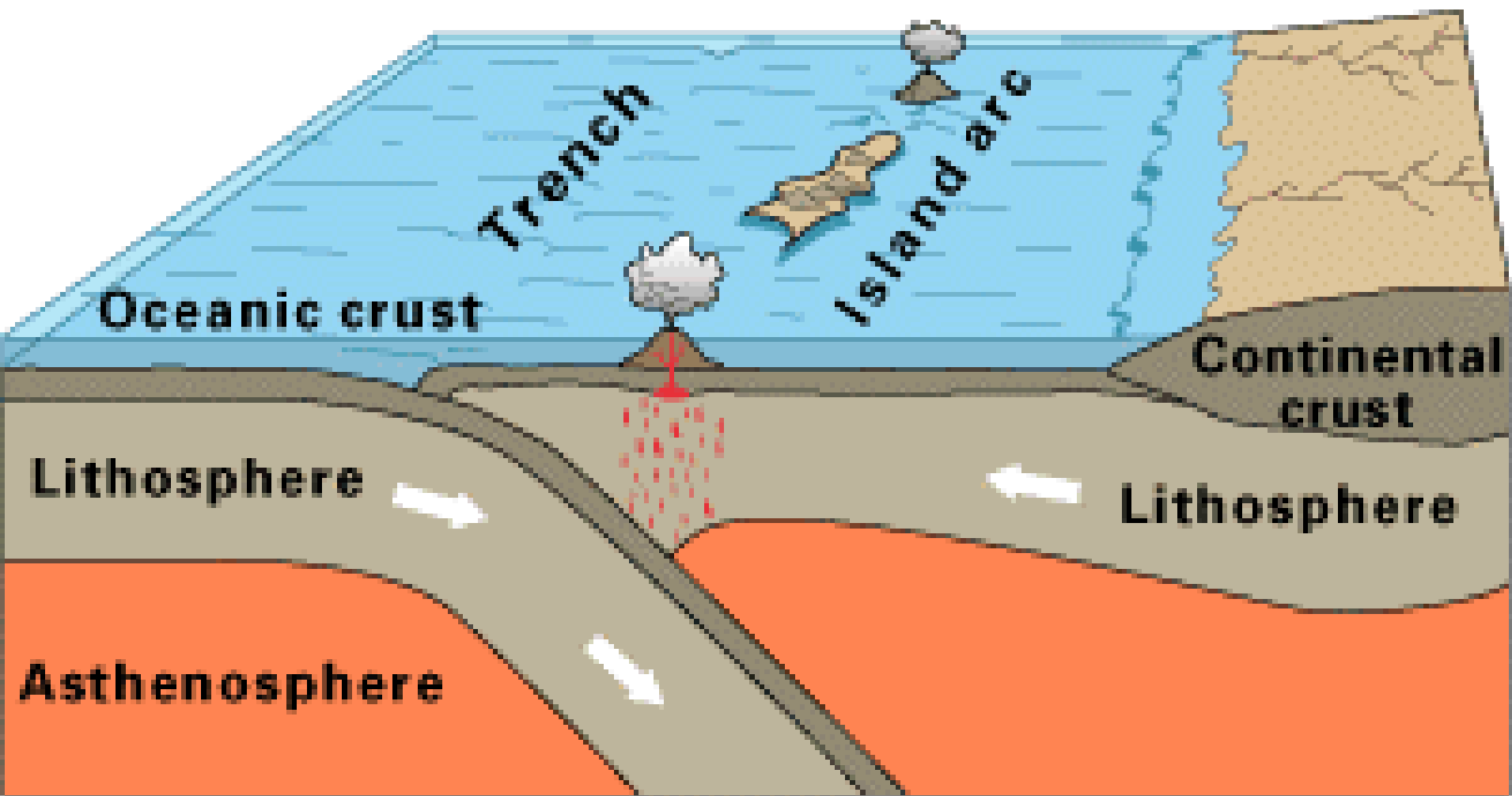
Oceanic-continental convergence

Andes Mountains, South America

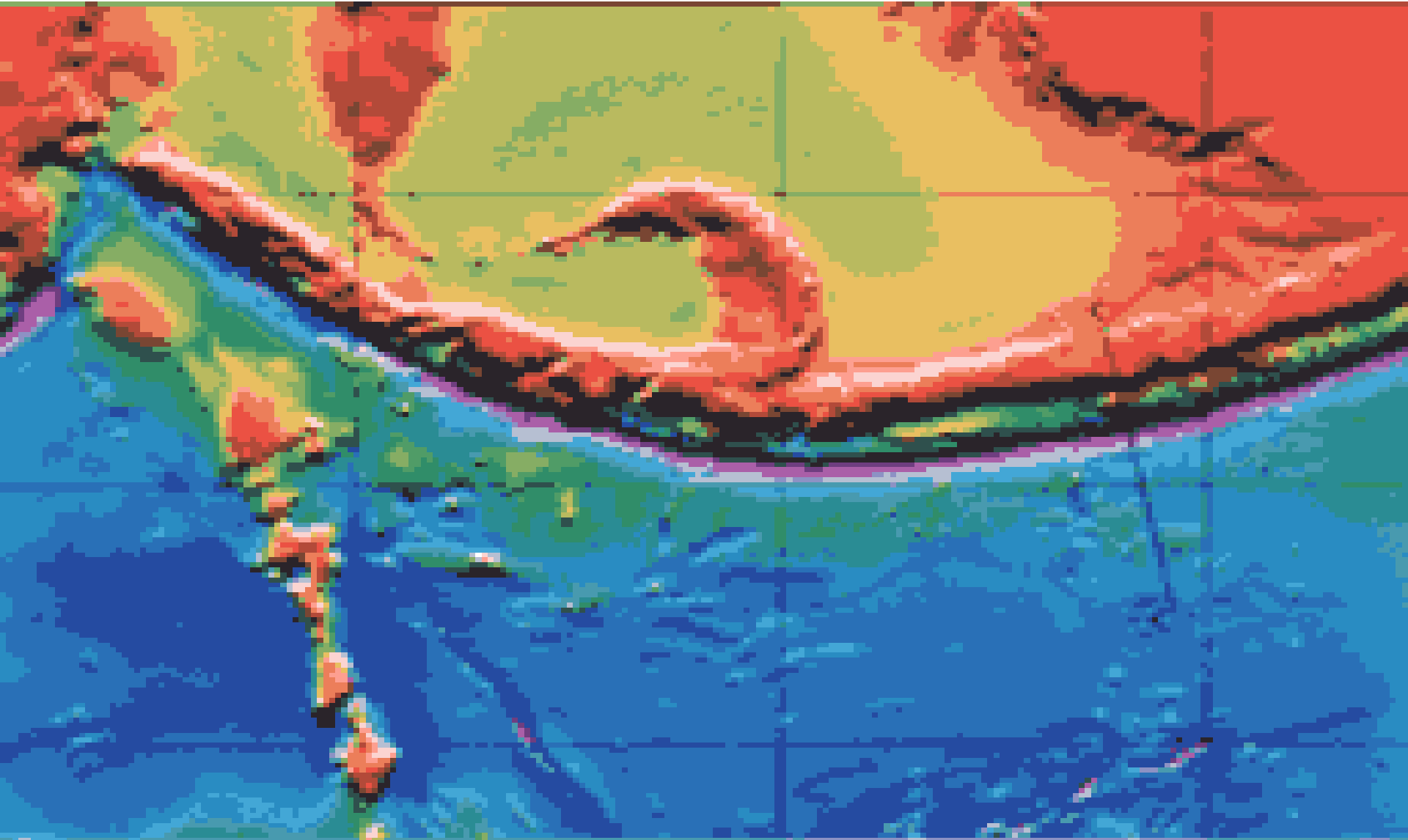


Type 2

- Ocean plate colliding with another ocean plate
- The less dense plate slides under the more dense plate creating a subduction zone called a TRENCH



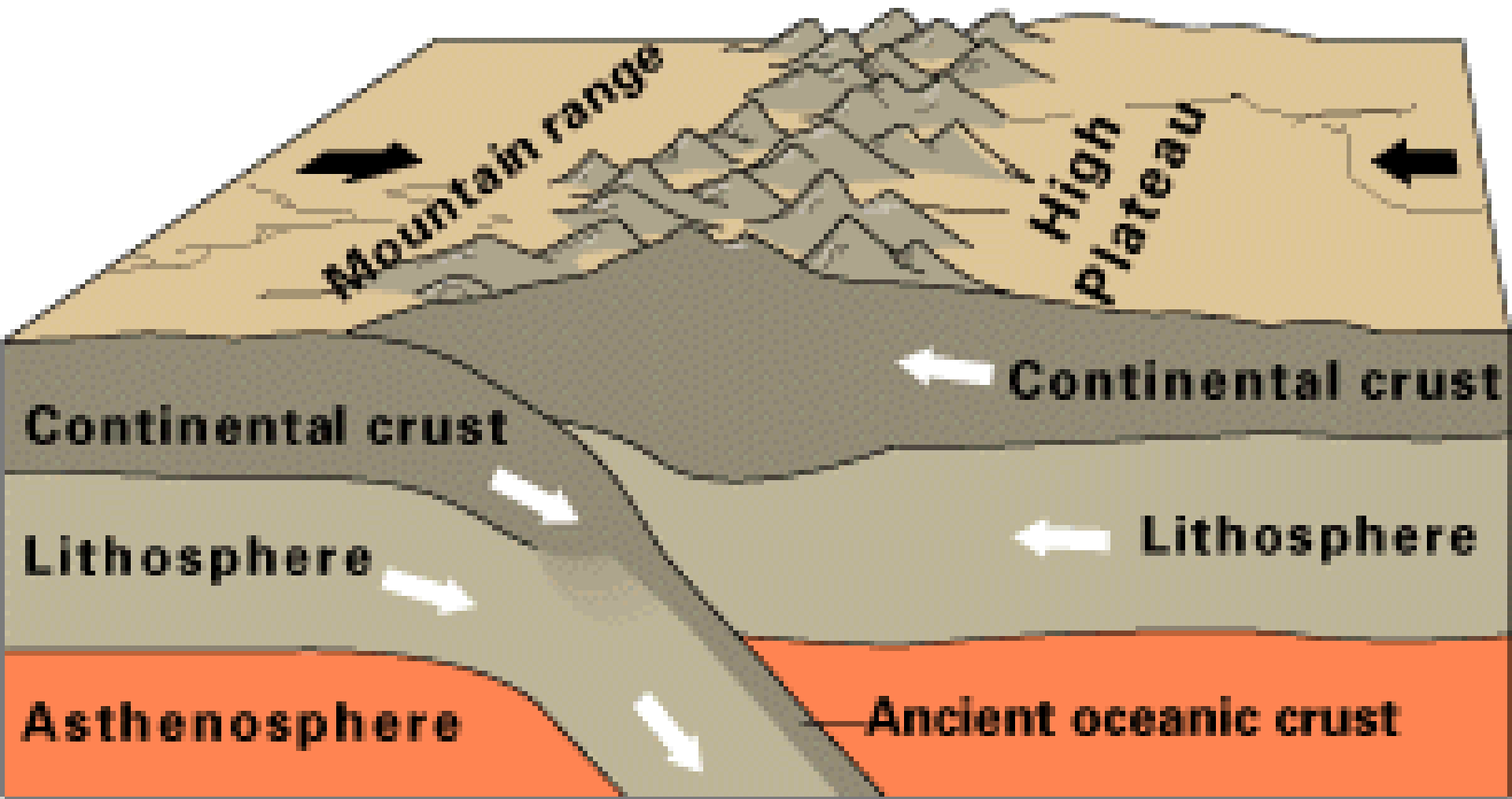
Oceanic-oceanic convergence



Alutian Islands, Alaska

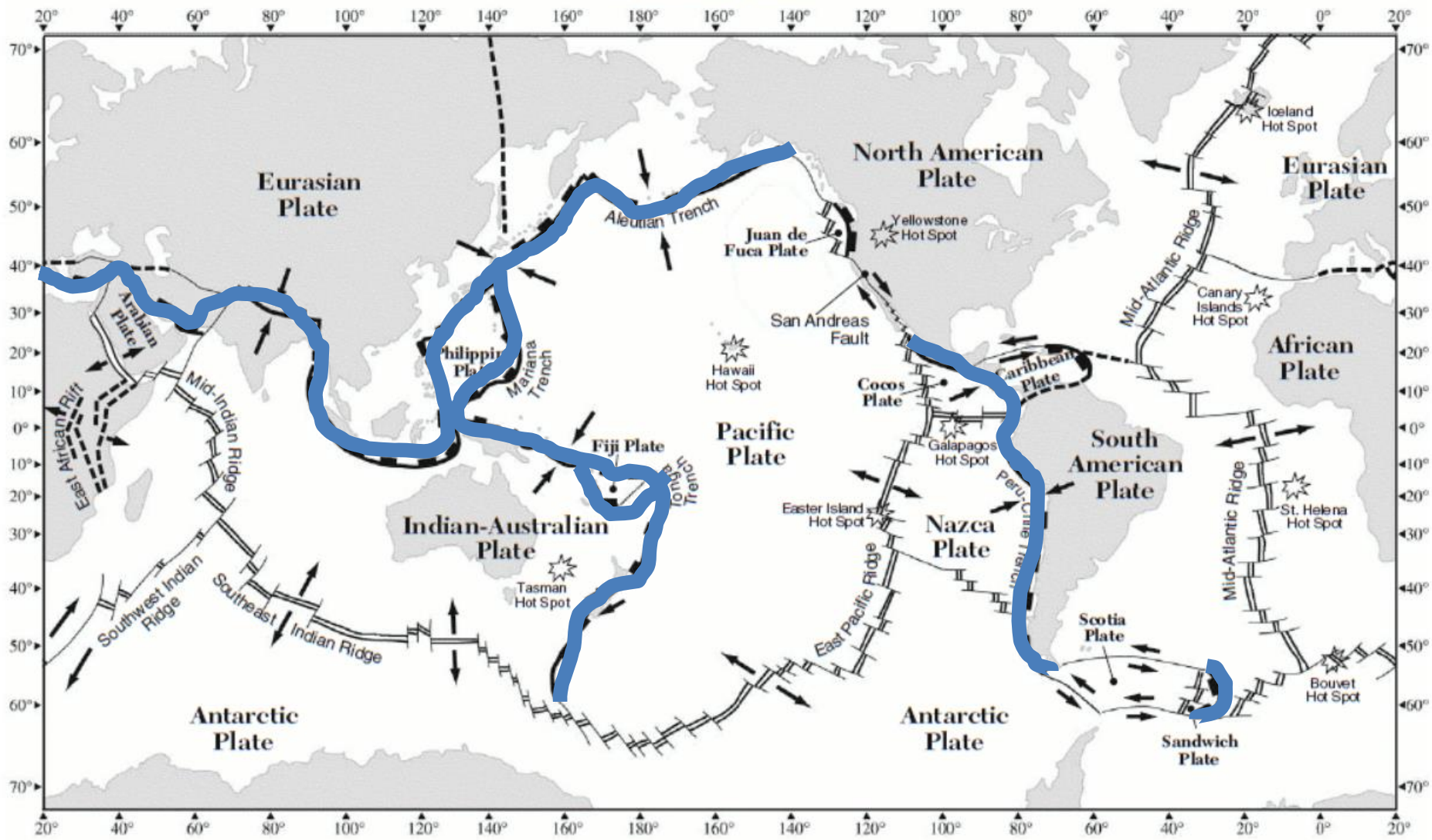
Type 3

- A continental plate colliding with another continental plate
- Have Collision Zones:
 - a place where folded and thrust faulted mountains form.



Continental-continental convergence





Key

→
Relative motion at plate boundary

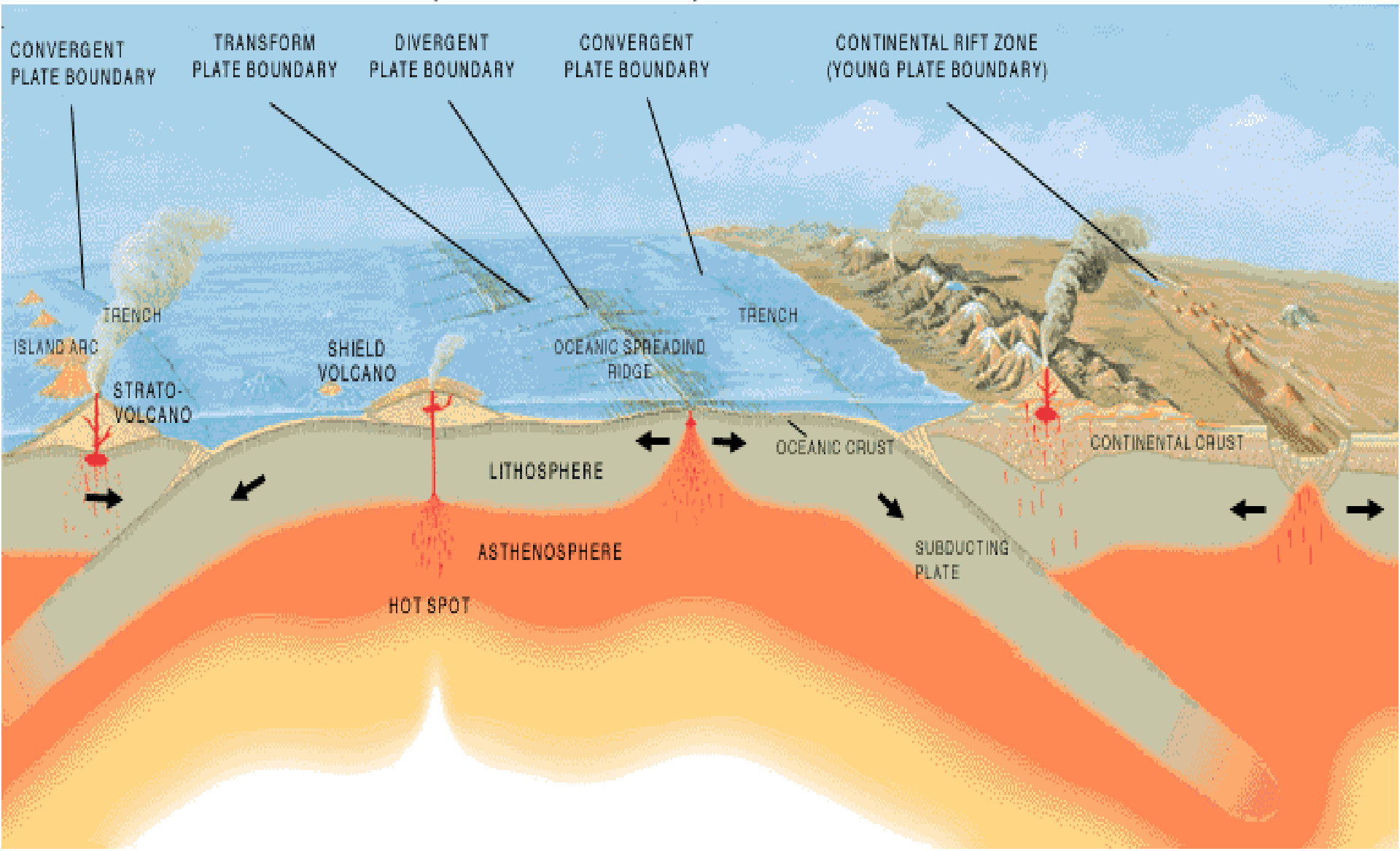
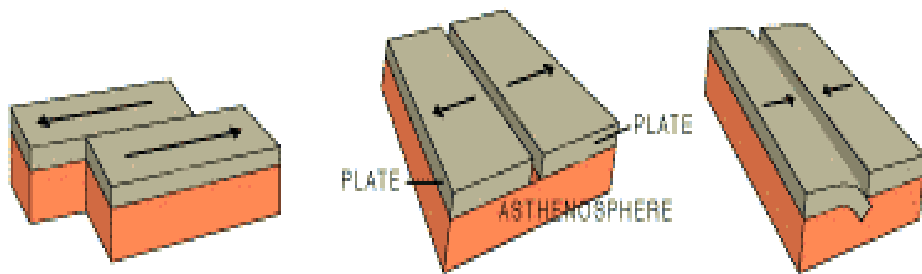
↔
Transform plate boundary (transform fault)

↔
Divergent plate boundary

↔
overriding plate
subducting plate

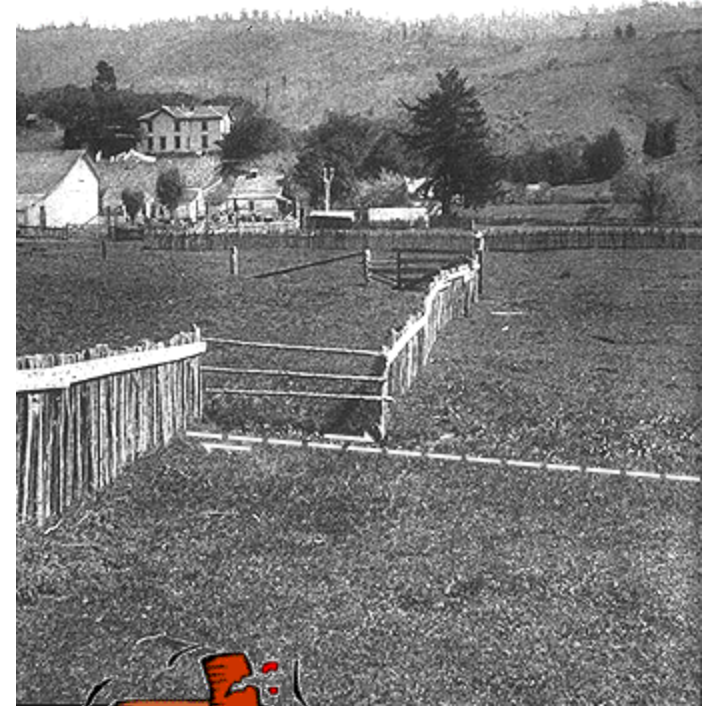
Complex or uncertain plate boundary

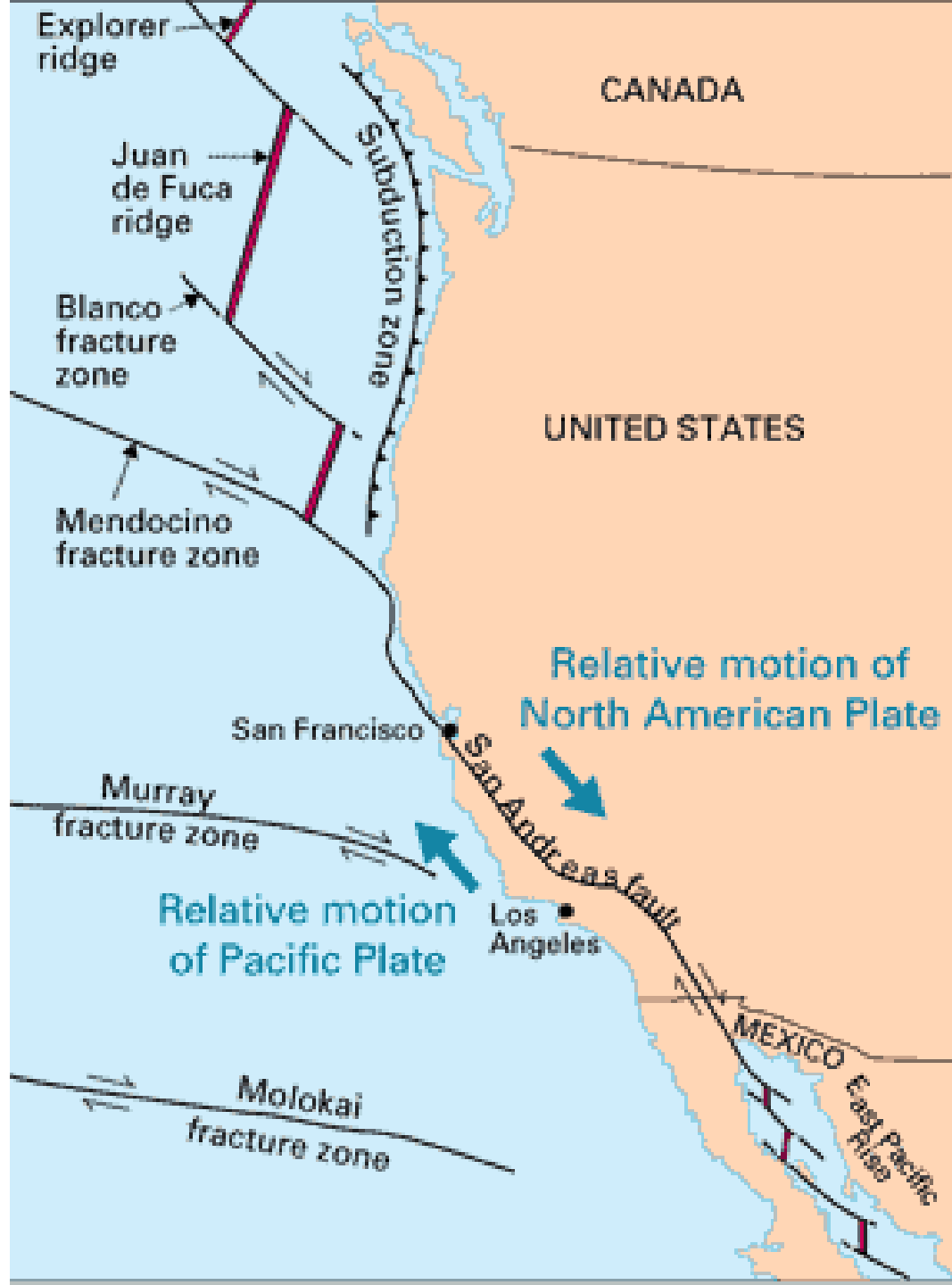
★
Mantle hot spot



3) Transform Fault Boundaries

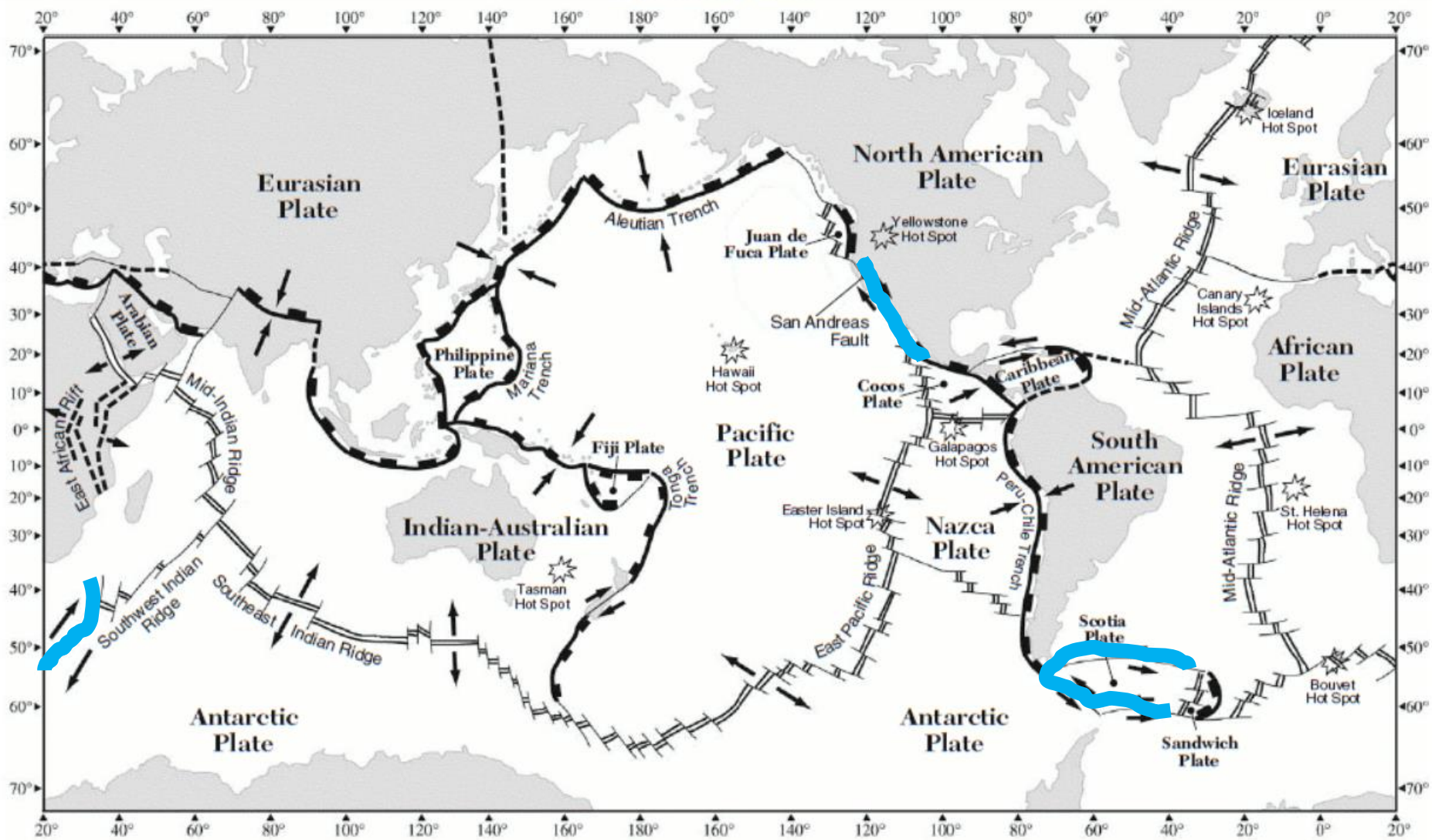
- Boundary between two plates that are sliding past each other
- **EARTHQUAKES** along faults





San Andreas Fault, CA





Key

- 

Relative motion at plate boundary
- 

Transform plate boundary (transform fault)
- 

Divergent plate boundary
- 

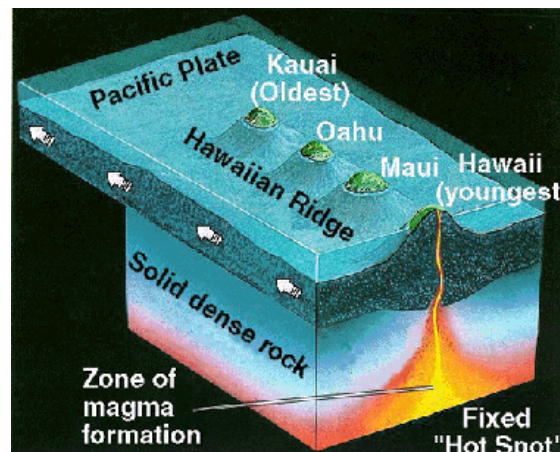
overriding plate
subducting plate
- 

Complex or uncertain plate boundary
- 

Mantle hot spot

What are Hotspots?

- Hotspots are specific areas on the Asthenosphere that for some reason is very hot.
- As plates move over this area, magma move through the crust to the surface.
- The Hawaii hotspot is a volcanic hotspot responsible for the creation of the Hawaiian Islands in the central Pacific Ocean.



Northwestern
Hawaiian Islands

Kauai

Oahu

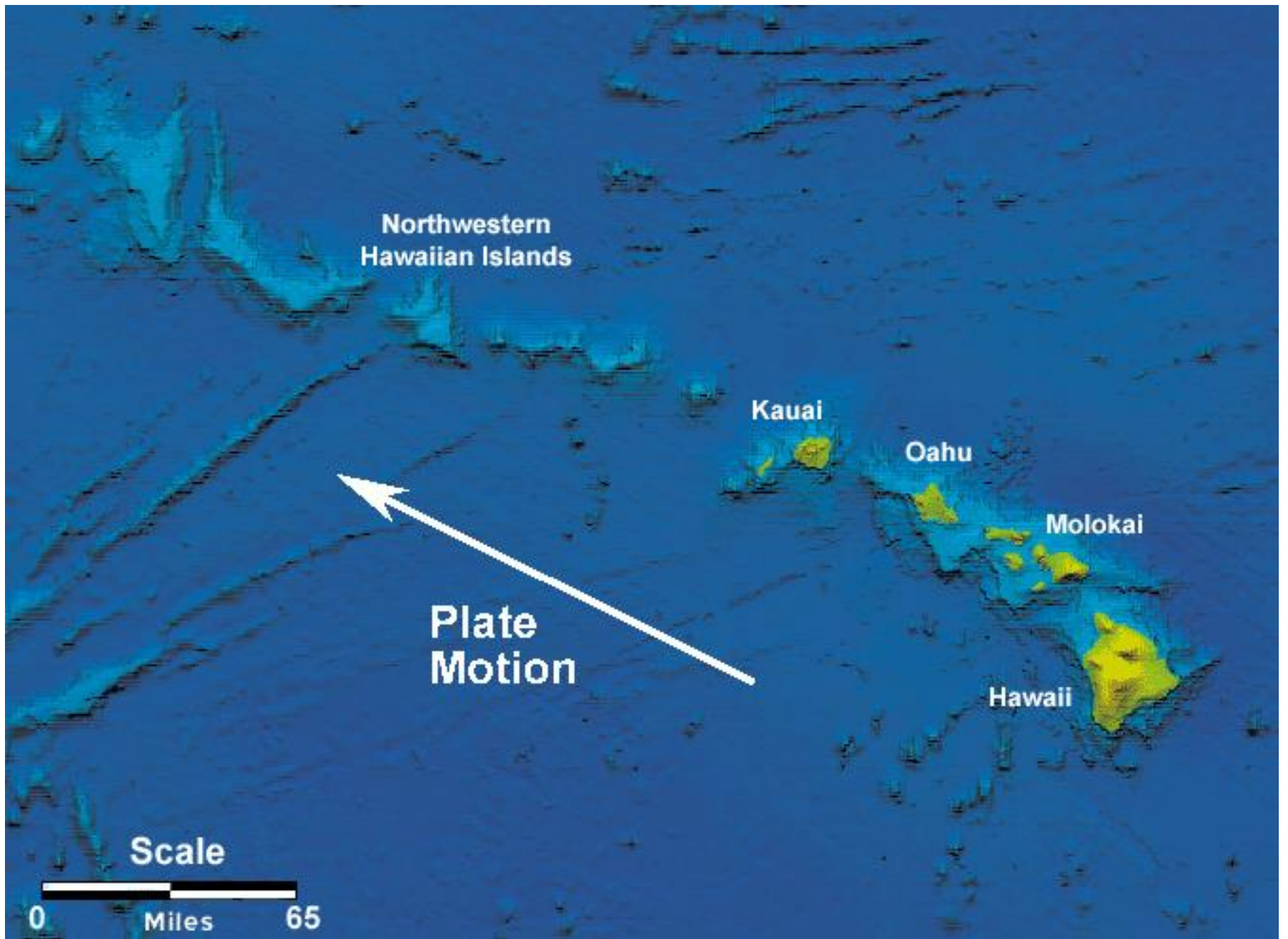
Molokai

Hawaii

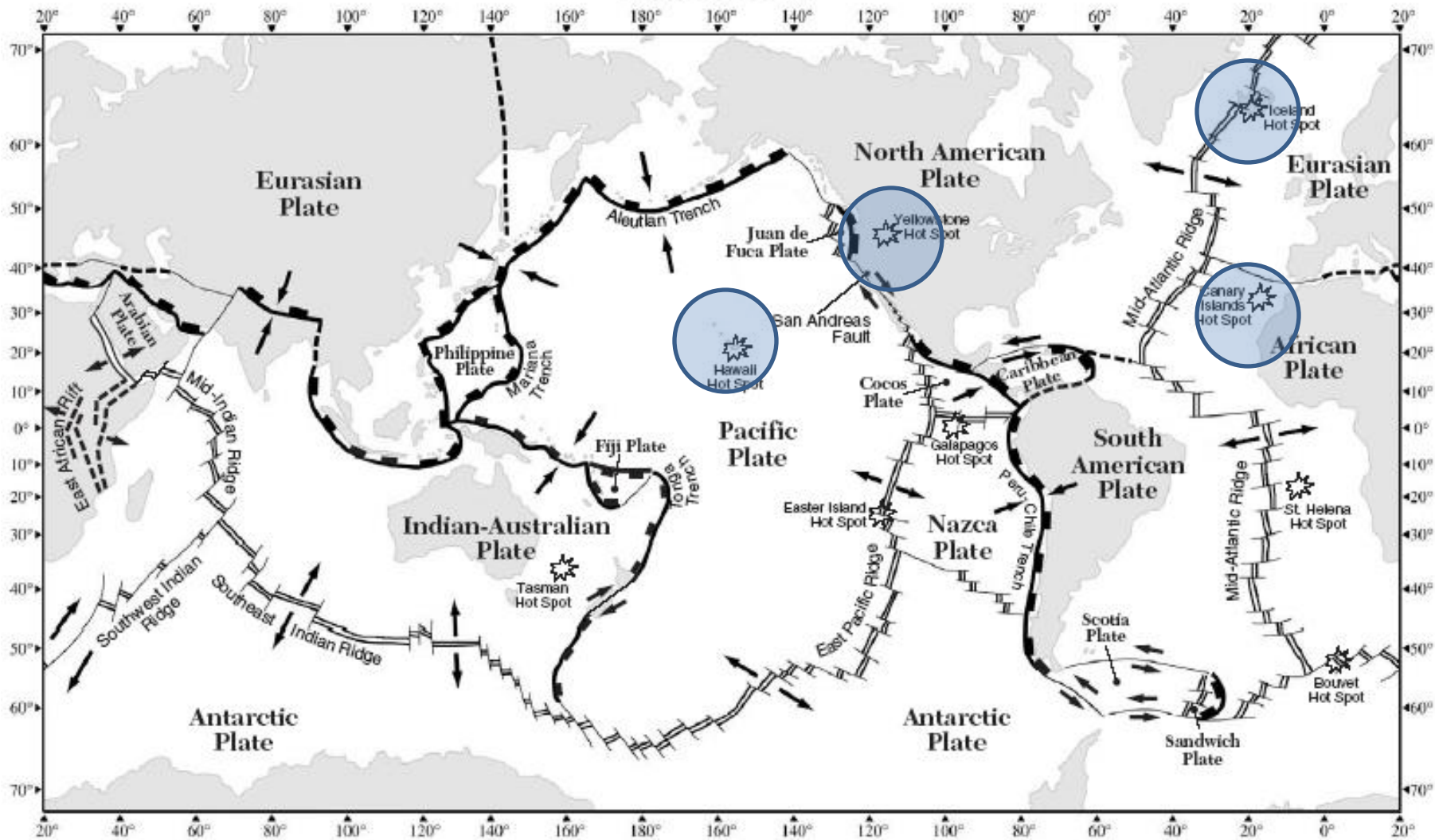
Plate
Motion

Scale

0 Miles 65



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.

Question based on P 5 of the ESRT

1. Name the boundary that exists between the following plates:
 - Antarctic and Indian-Australian
 - African and South American
 - Eurasian and Pacific
2. Find Hawaii and describe what is happening at there.
3. Name one place you would be likely to find mountains.