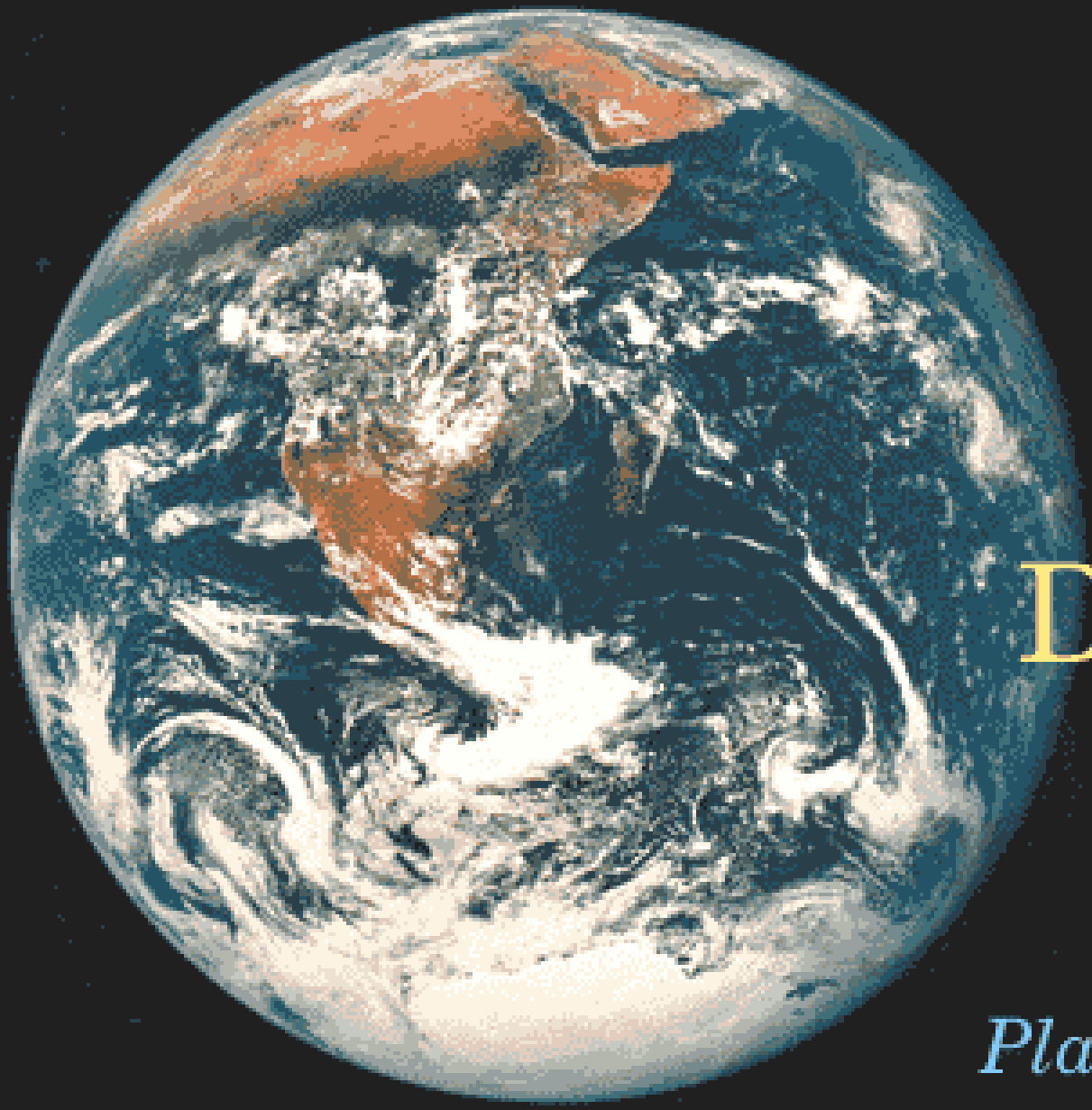


This Dynamic Earth:

the Story of Plate Tectonics

Online edition

Theory of Plate Tectonics

Plate Tectonics

Plate Boundaries

Causes of Plate Tectonics

Plate Tectonics

What is Plate Tectonics

- The Earth's crust and upper mantle are broken into sections called plates
- Plates move around on top of the mantle like rafts


North American
Eurasian
Eurasian
Juan de Fuca
Philippine
Caribbean
Cocos
African
Arabian
Nazca
Australian
Pacific
South American
Scotia
Antartica
Tectonic Plate Boundary Types:
Extensional
Compressional
Transform (sliding) or Undefined

What is the Lithosphere?

- The crust and part of the upper mantle = lithosphere
  - –100 km thick
  - –Less dense than the material below it so it “floats”

What is the Asthenoshere?

- The plastic layer below the lithosphere = asthenosphere
- The plates of the lithosphere float on the asthenosphere

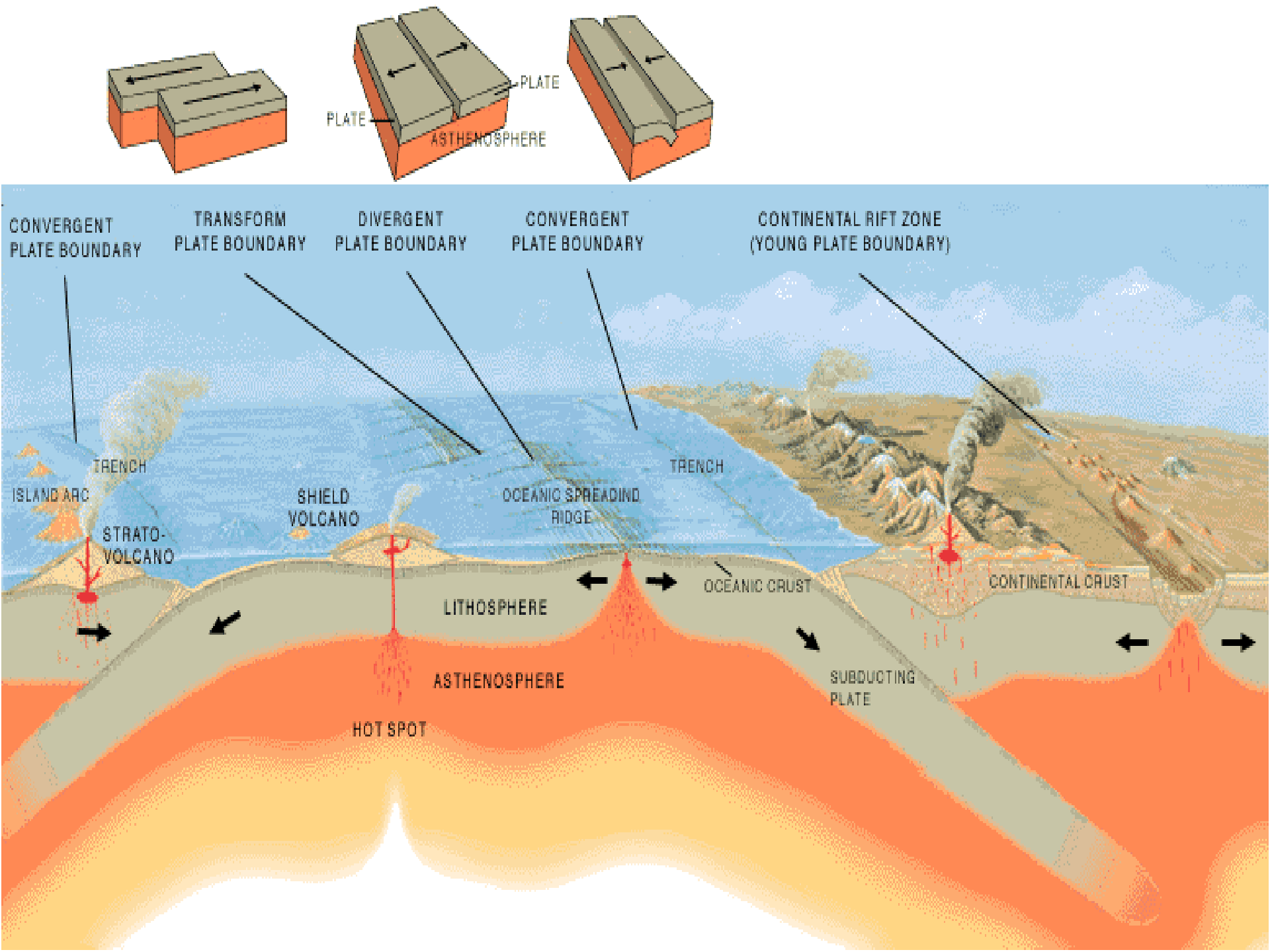


PLATE
PLATE
ASTHENOSPHERE
CONVERGENT PLATE BOUNDARY
TRANSFORM PLATE BOUNDARY
DIVERGENT PLATE BOUNDARY
CONVERGENT PLATE BOUNDARY
CONTINENTAL RIFT ZONE (YOUNG PLATE BOUNDARY)
TRENCH
ISLAND ARC
STRATO-VOLCANO
SHIELD VOLCANO
OCEANIC SPREADING RIDGE
TRENCH
OCEANIC CRUST
CONTINENTAL CRUST
LITHOSPHERE
ASTHENOSPHERE
SUBDUCTING PLATE
HOT SPOT

2 Types of Plates

- Ocean plates - plates below the oceans
- Continental plates - plates below the continents

Questions...

- What is the theory of plate tectonics?
- What is the lithosphere?
- What is the asthenosphere?
- What is the connection between the two?
- What are the two types of plates?

Plate Boundaries

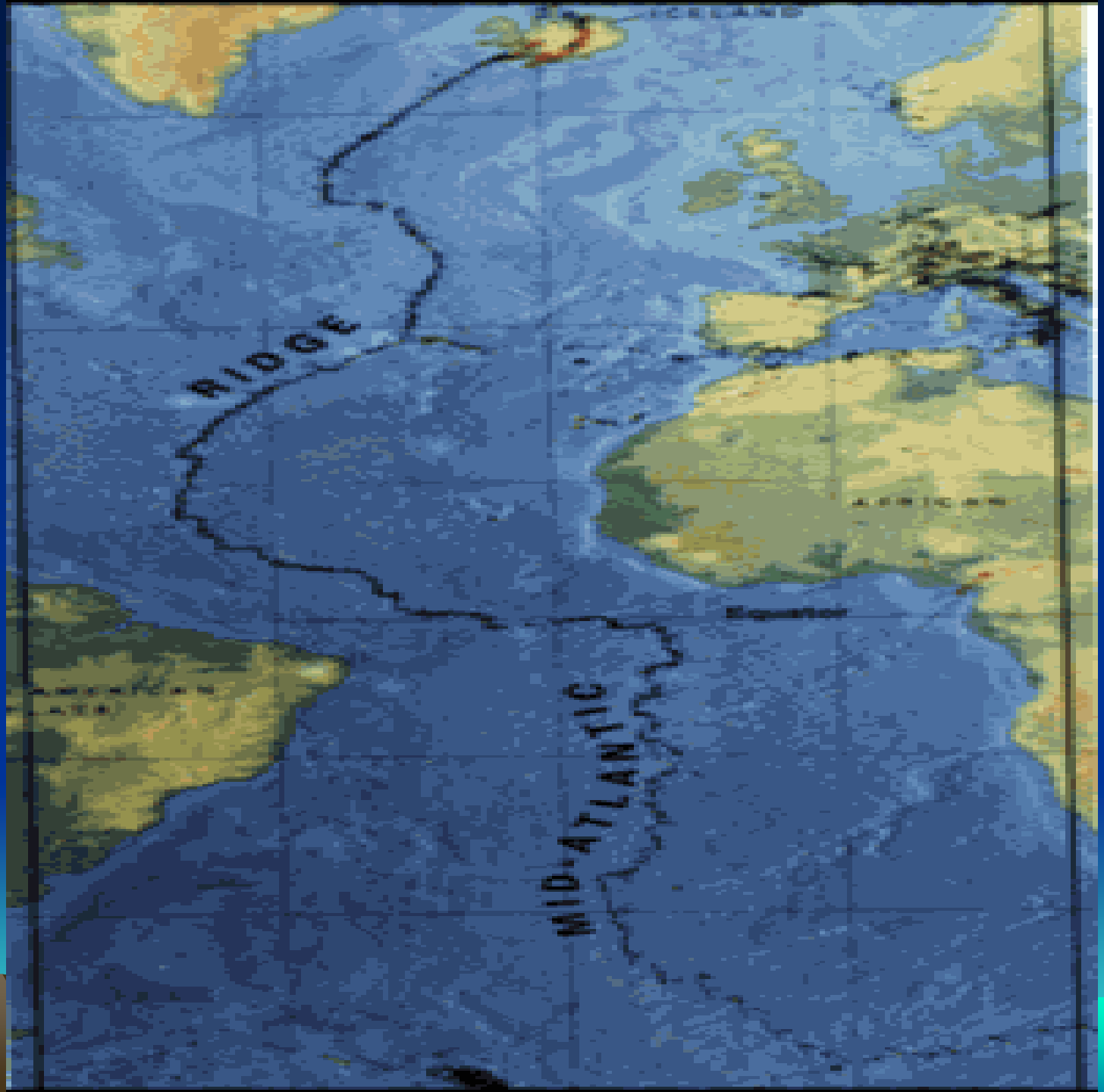
Divergent Boundaries

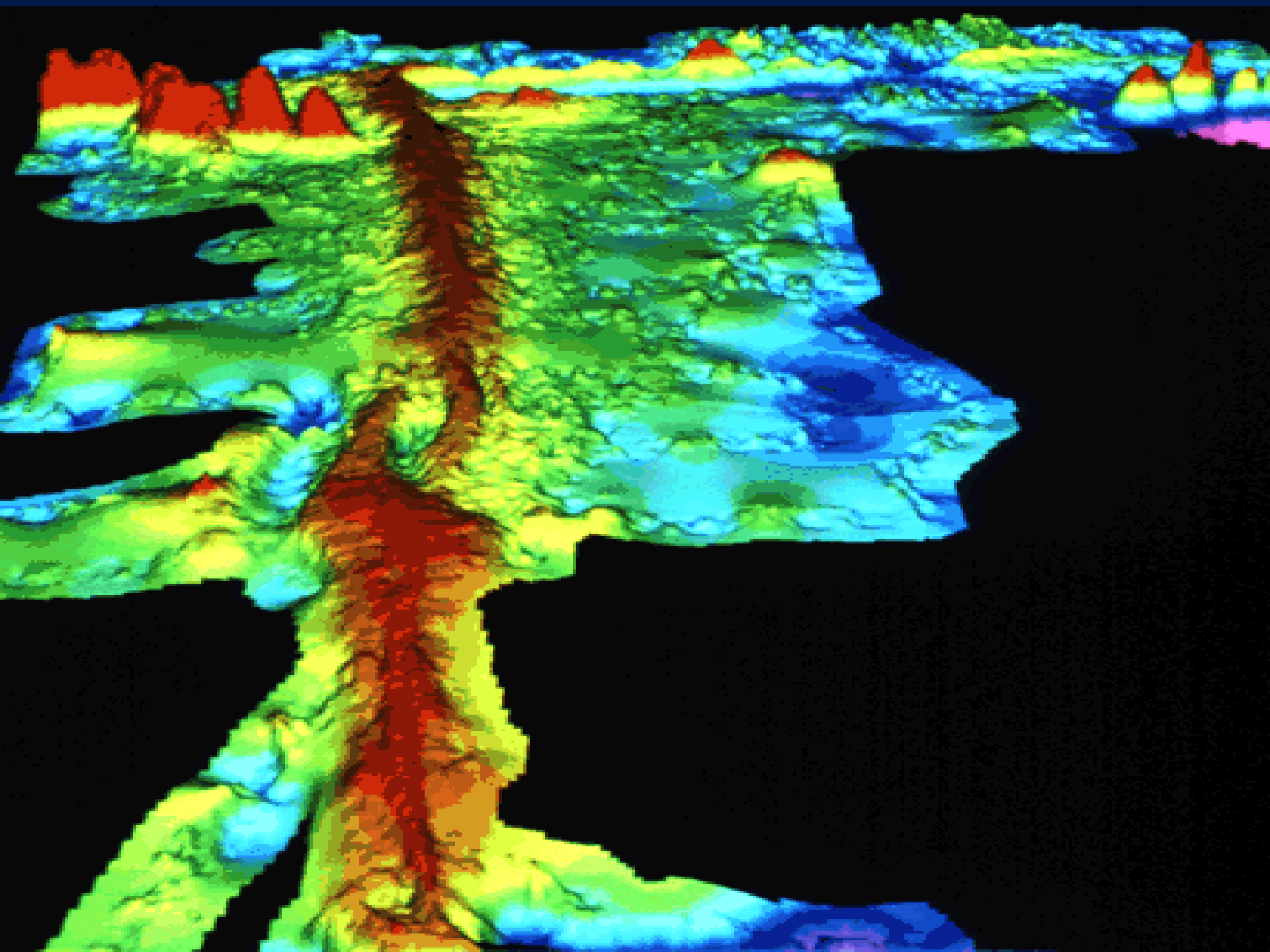
- Boundary between two plates that are moving apart or rifting

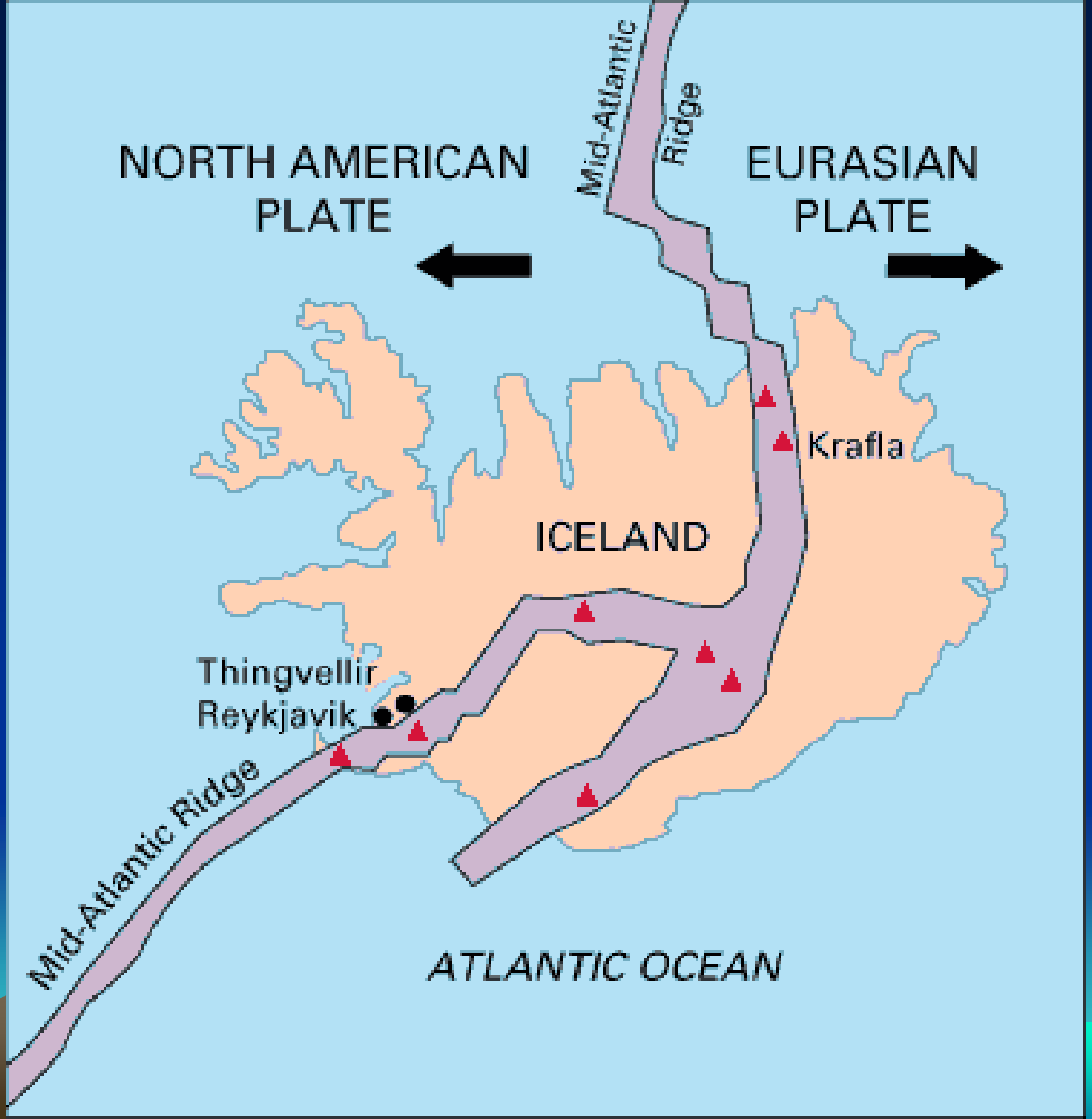
- RIFTING causes SEAFLOOR SPREADING

Features of Divergent Boundaries

- Mid-ocean ridges
- rift valleys
- fissure volcanoes


RIDGE
MID-ATLANTIC




NORTH AMERICAN PLATE
Mid-Atlantic Ridge
EURASIAN PLATE
Krafla
ICELAND
Thingvellir
Reykjavik
Mid-Atlantic Ridge
ATLANTIC OCEAN

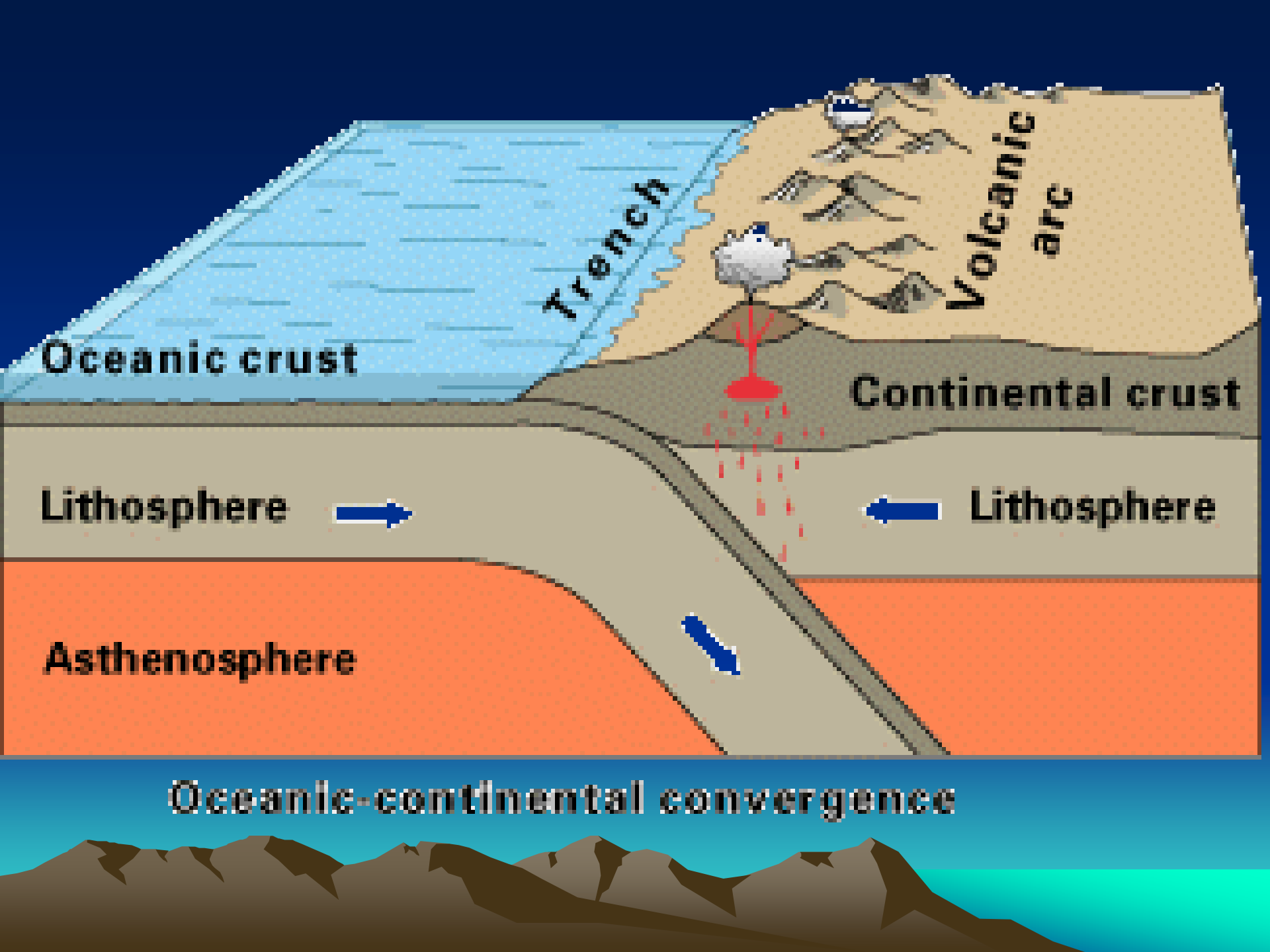
Convergent Boundaries

- 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

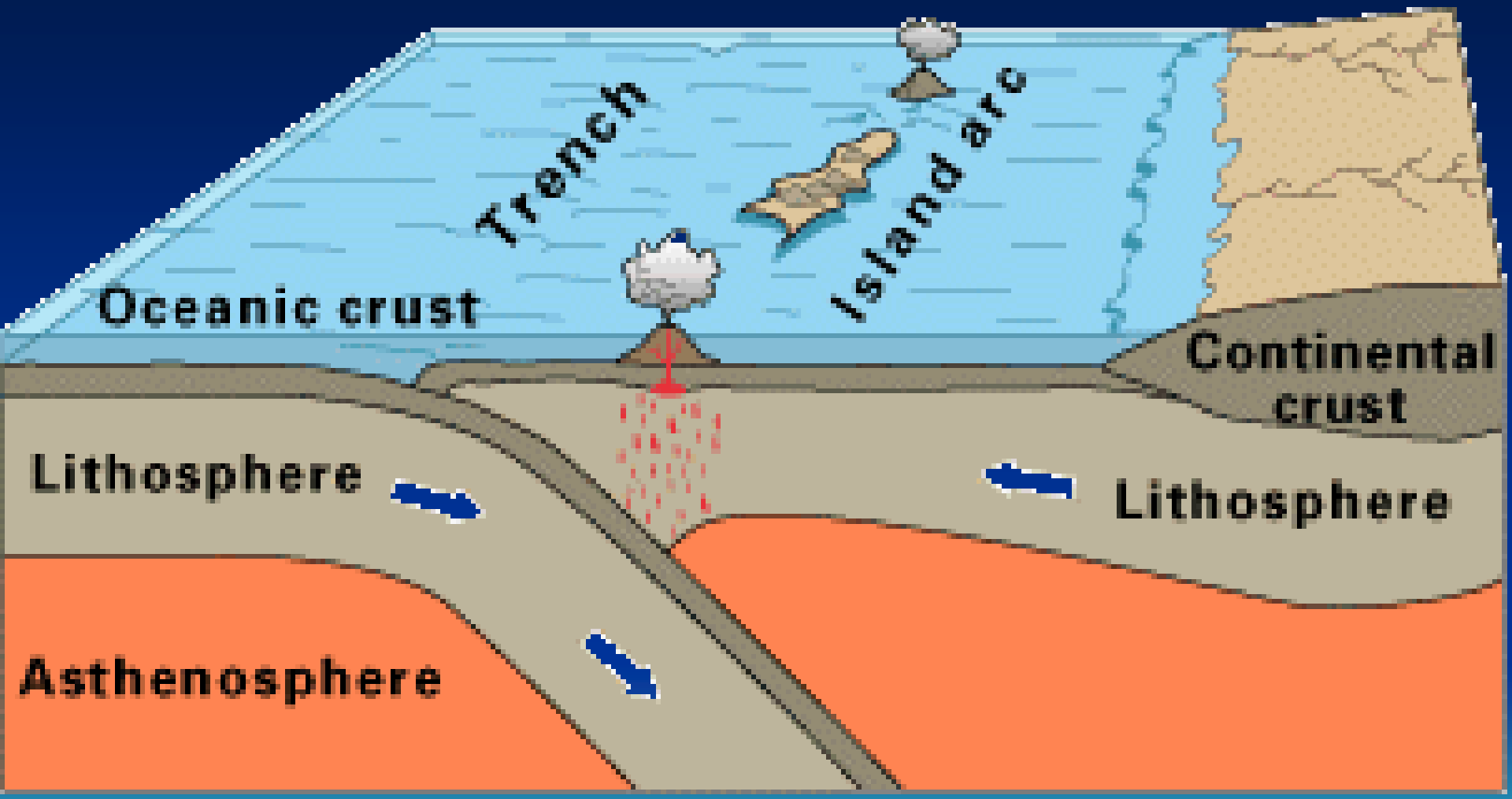


Oceanic-continental convergence

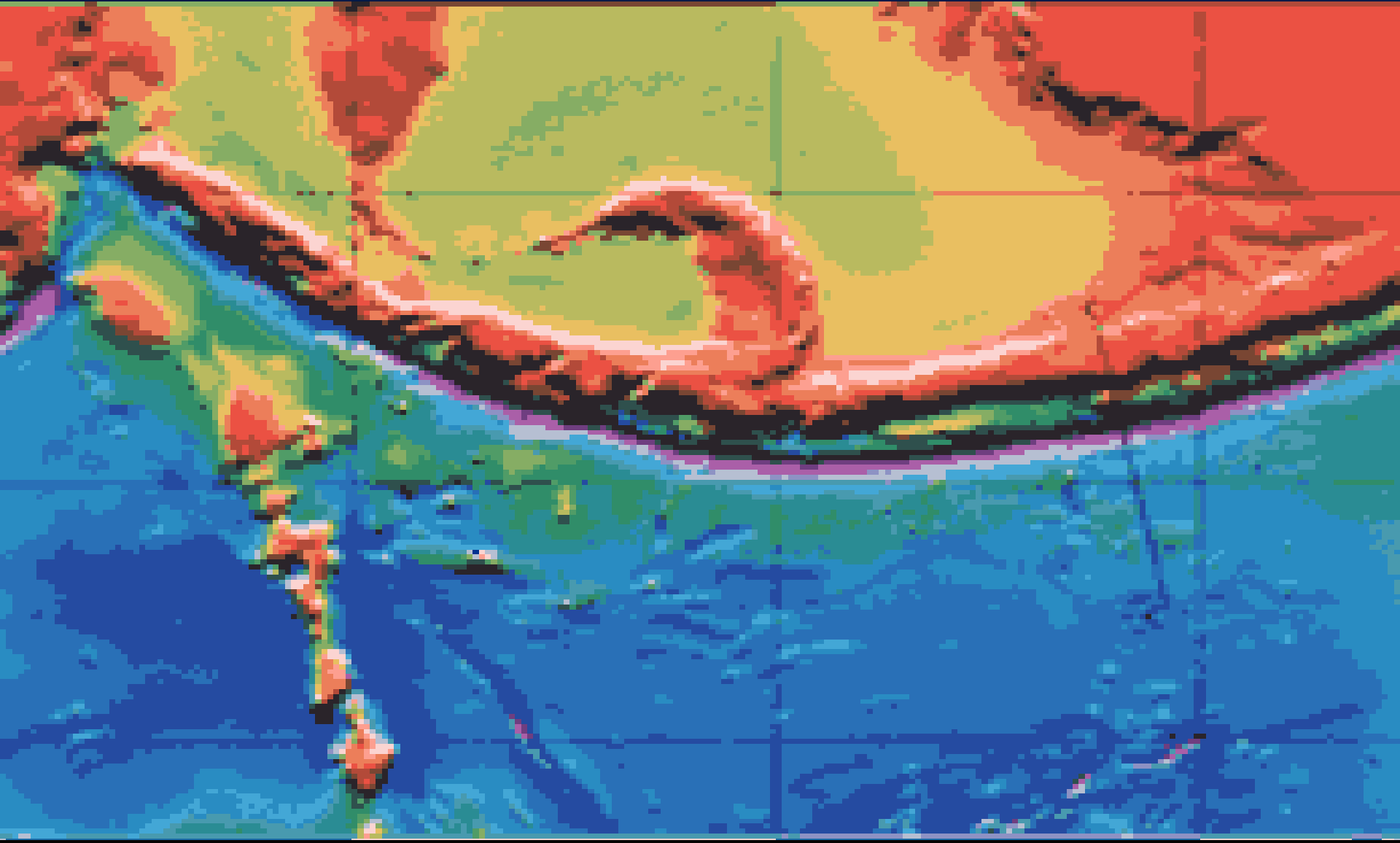
Andes Mountains, South America

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



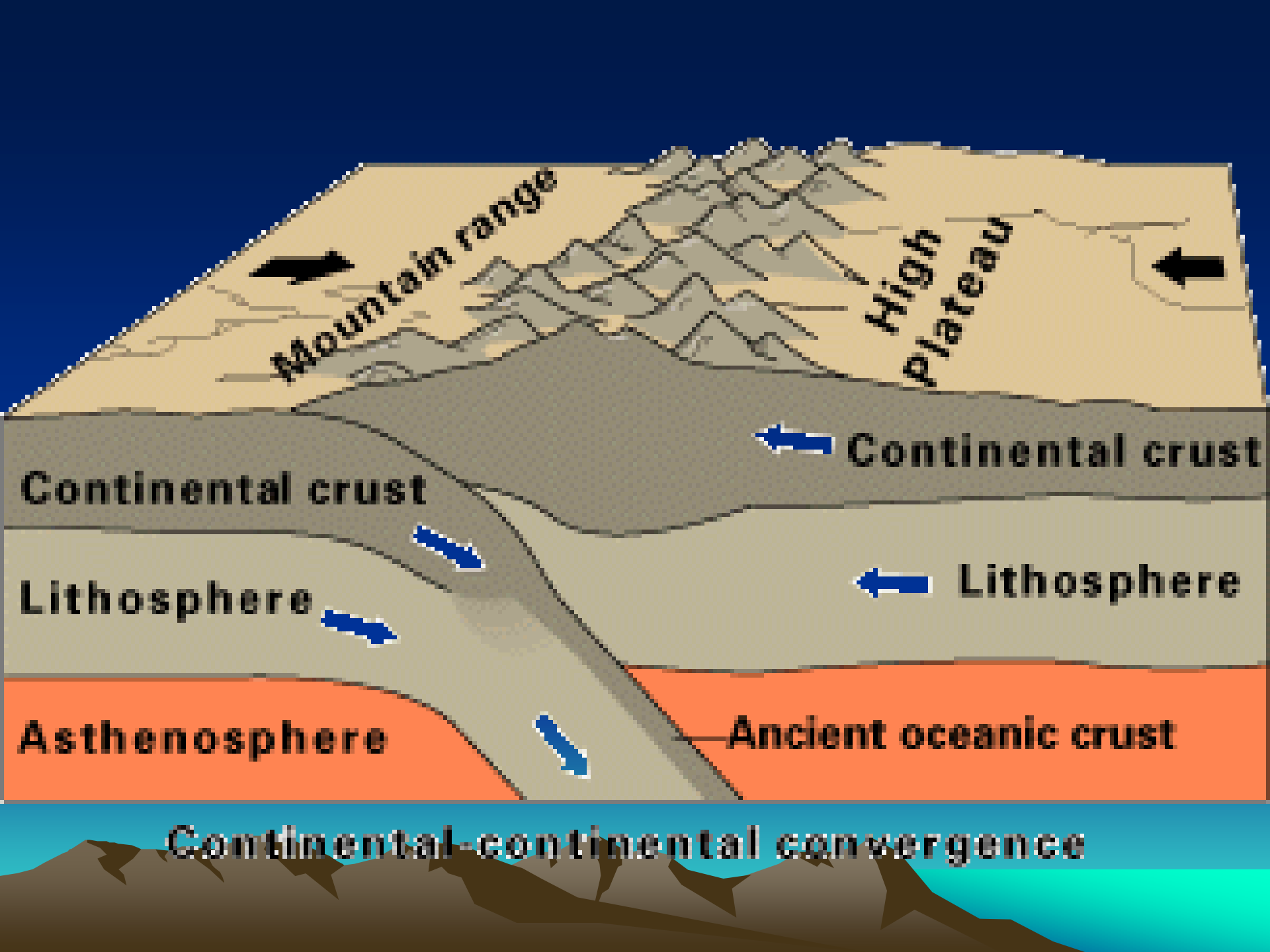
Oceanic-oceanic convergence

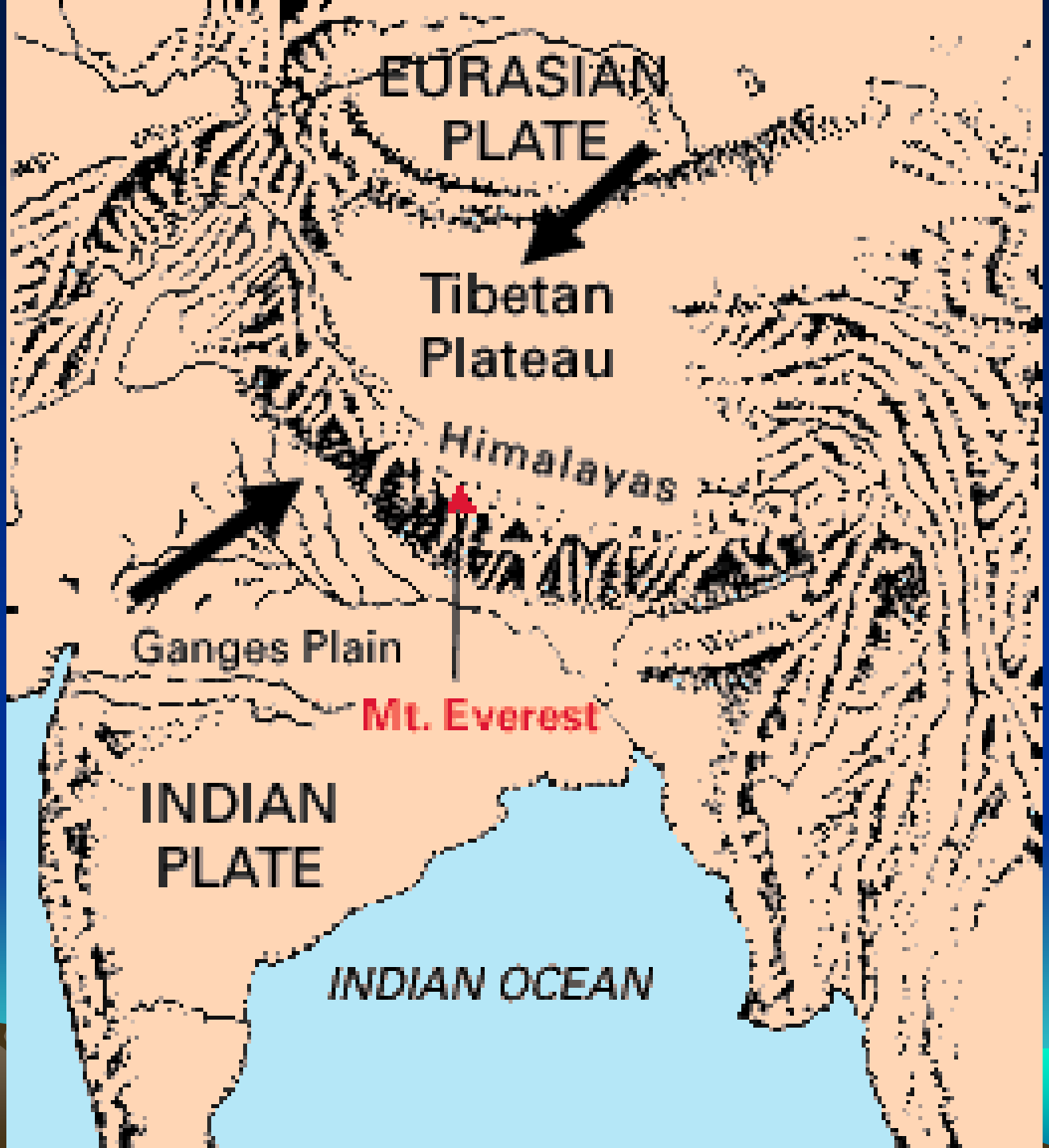


Aleutian Islands, Alaska

Type 3

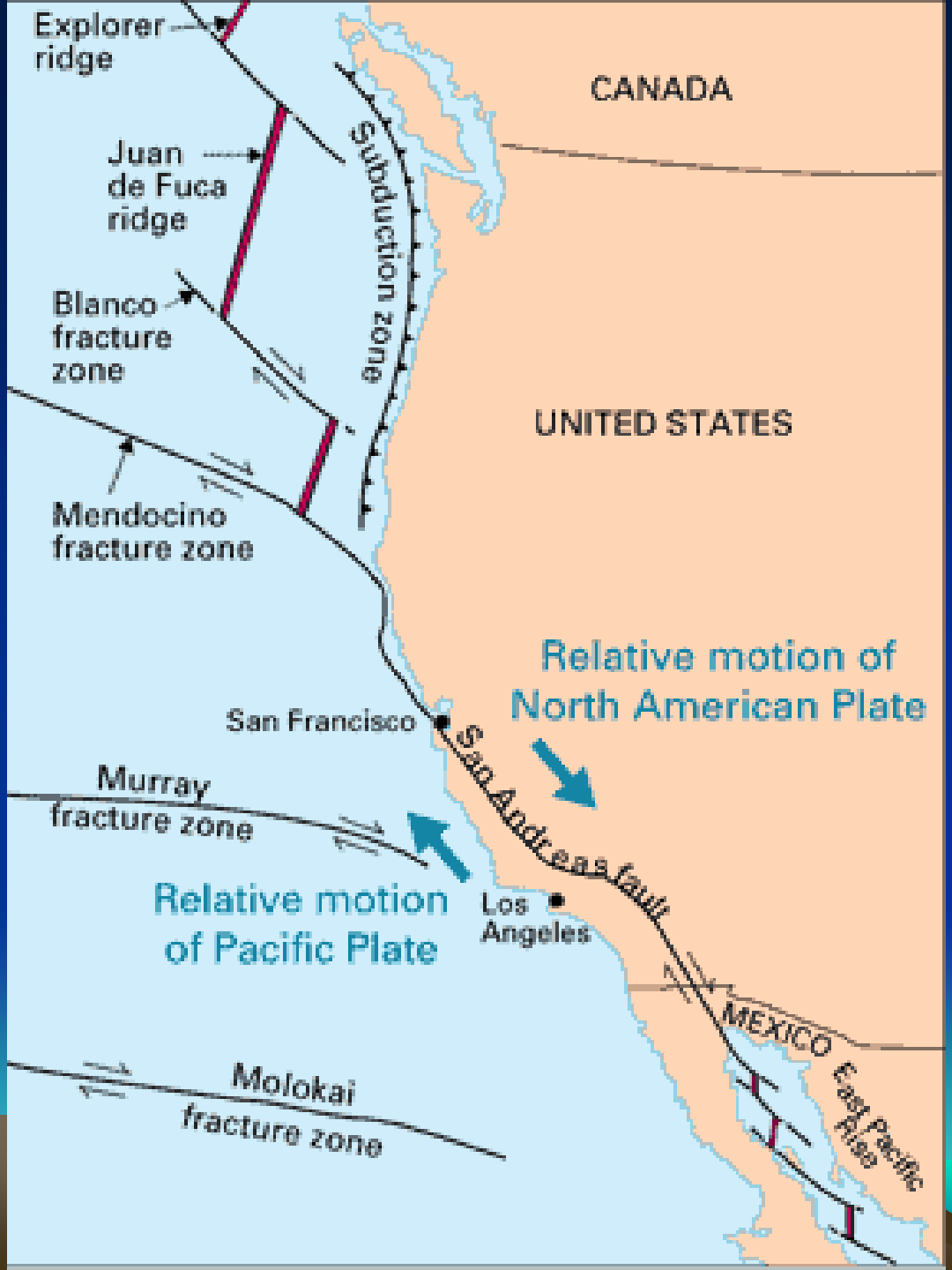
- A continental plate colliding with another continental plate
- Have Collision Zones:
  - –a place where folded and thrust faulted mountains form.


Mountain range
High plateau
Continental crust
Continental crust
Lithosphere
Lithosphere
Asthenosphere
Ancient oceanic crust
Continental-continental convergence


EURASIAN
PLATE
Tibetan
Plateau
Himalayas
Ganges Plain
Mt. Everest
INDIAN
PLATE
INDIAN OCEAN

Transform Fault Boundaries

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


Explorer ridge
Juan de Fuca ridge
Blanco fracture zone
Mendocino fracture zone
Murray fracture zone
Molokai fracture zone
Subduction zone
CANADA
UNITED STATES
MEXICO
San Francisco
Los Angeles
San Andreas fault
East Pacific Rise
Relative motion of North American Plate
Relative motion of Pacific Plate

San Andreas Fault, CA

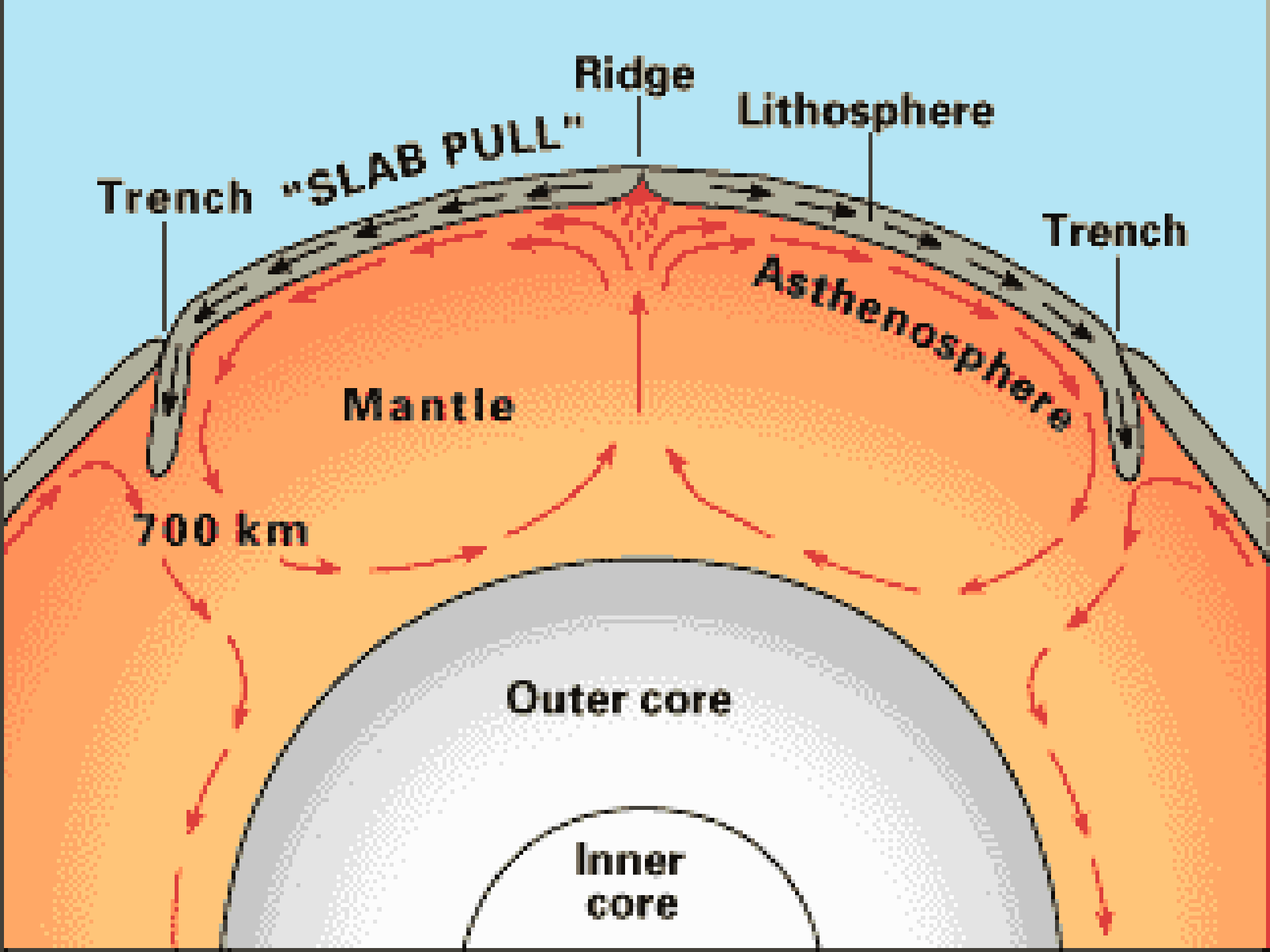
Questions...

- What are the three types of boundaries?
- What direction do plates go for each?
- Which boundary has a subduction zone…what occurs at a subduction zone?

Causes of Plate Tectonics

Convection Currents

- Hot magma in the Earth moves toward the surface, cools, then sinks again.
- Creates convection currents beneath the plates that cause the plates to move.


Ridge
Lithosphere
Trench
"SLAB PULL"
Trench
Asthenosphere
Mantle
700 km
Outer core
Inner
core

Questions...

- What causes plates to move?
- How is a convection current formed?