Kasegaon Education Society's

Arts & Commerce College, Ashta

Department of Geography

On

Plate Tectonics Theory

By

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Theory of Plate Tectonics

Important Facts

1. Plates - Major and Minor
2. Plate Boundaries and Effects
3. Causes of Plate Tectonics

Introduction:

Plate Tectonics-Second Edition of Continental Drift Theory

'*Plate Tectonic'* term first used By Tuzo Wilson, Toranto Uni. In 1965)

Theory Propounded By –**W.J.Morgan** in 1967

The Word Plate Tectonics

Tectonics –From Greek Worda i.e.Tektonikos means Construction / Built

It consider

Magma /lava coming on the surface

Movement of Plates

Subsiding of earth crust

Folding ,faulting, Warp ,Earthquake and volcanoes

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

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 & Mesosphere?

- Asthenosphere - The plastic layer below the lithosphere.
- The plates of the lithosphere float on the Asthenosphere.
- Mesosphere- The plates below the Asthenosphere is Known as Mesosphere.

Basis of Plates

1. The earth surface –Disturpted in Plates
2. Plates divergent due to convection current
3. Plate is Part of lithsphere i.e. Continental & oceanic

Sea floor create continous

4. Earthsurface permanent, no growh
5. Gemorphic Process includes-

Magma /lava coming on the surface

Movement of Plates

Subsiding of earth crust

Folding ,faulting, Warp ,Earthquake and volcanoes

Types of Plates

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

Major Plates

1. America
2. Africa
3. Euoropean
4. Australia
5. Antarctica
6. pacific

Minor Plates

1. Arabian
2. Bismark
3. Carabian
4. Carobina
5. Kokoj
6. Nazak
7. Jue On De-fuka
8. Philipines
9. Scosia


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

PLATES BOUNDARIES

Shows in Next slide figure

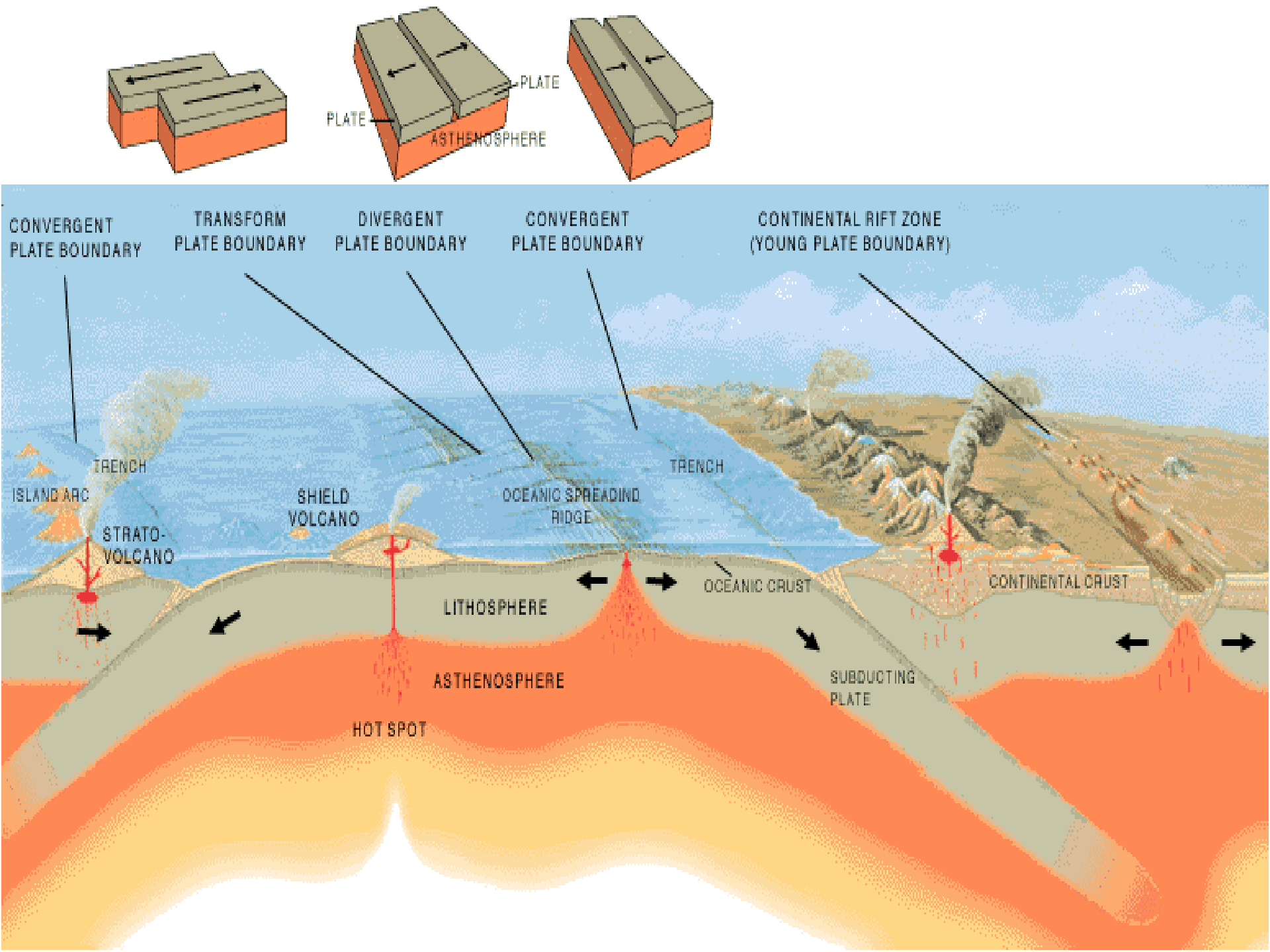


PLATE
PLATE
ASTHENOSPHERE
CONVERGENT PLATE BOUNDARY
TRANSFORM PLATE BOUNDARY
DIVERGENT PLATE BOUNDARY
CONVERGENT PLATE BOUNDARY
CONTINENTAL RIFT ZONE (YOUNG PLATE BOUNDARY)
TRENCH
ISLAND ARC
STRATO-VOLCANO
SHIELD VOLCANO
OCEANIC SPREADING RIDGE
TRENCH
OCEANIC CRUST
CONTINENTAL CRUST
LITHOSPHERE
ASTHENOSPHERE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

Plate Boundaries

There are Three Types of Plate Boundaries

1. Divergent or Constructive

2. Convergent or Desturctive

3. Transform or parralel/conservative

1.Divergent/Constructive Boundaries

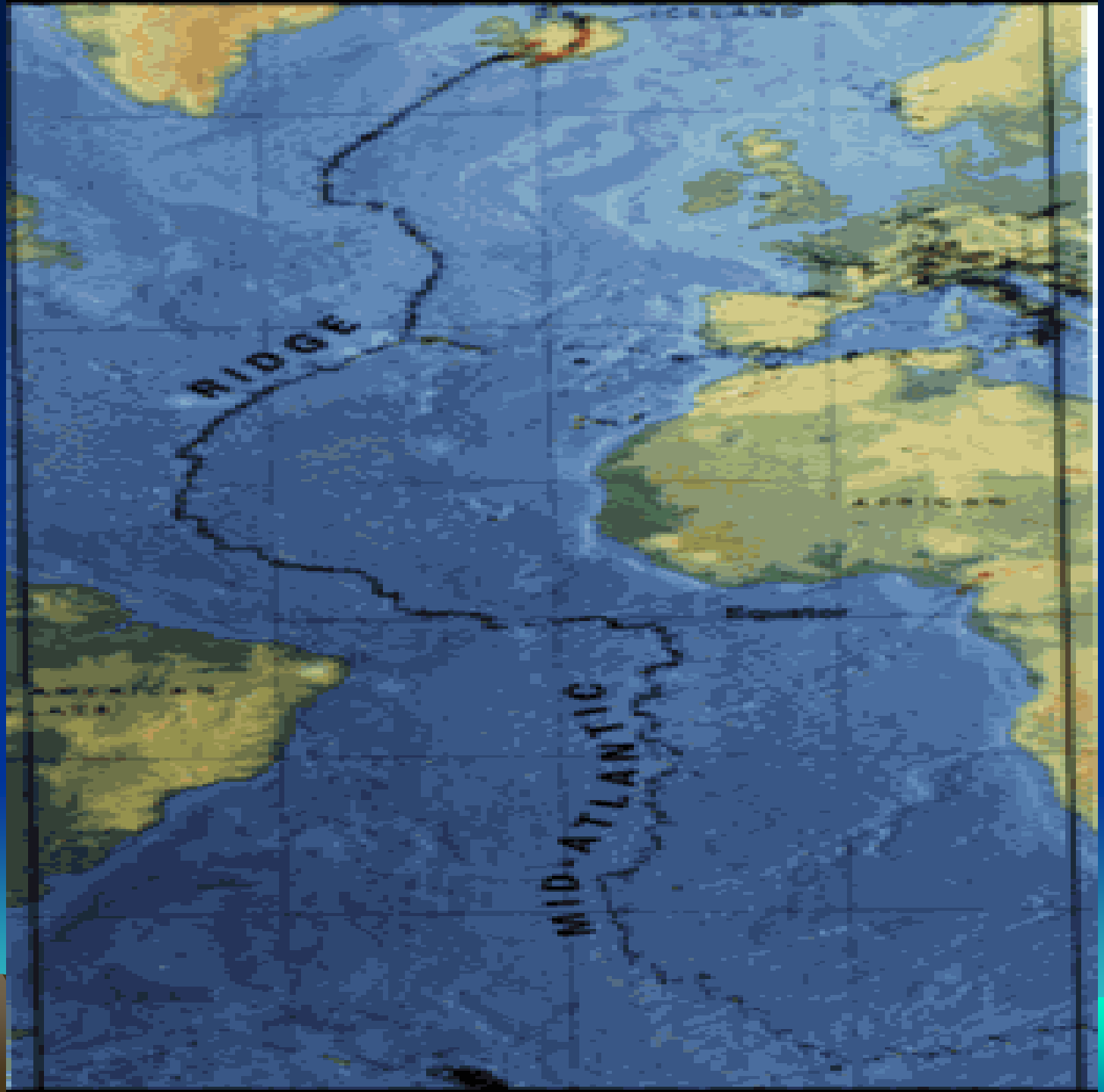
- Boundary between two plates that are moving apart or rifting

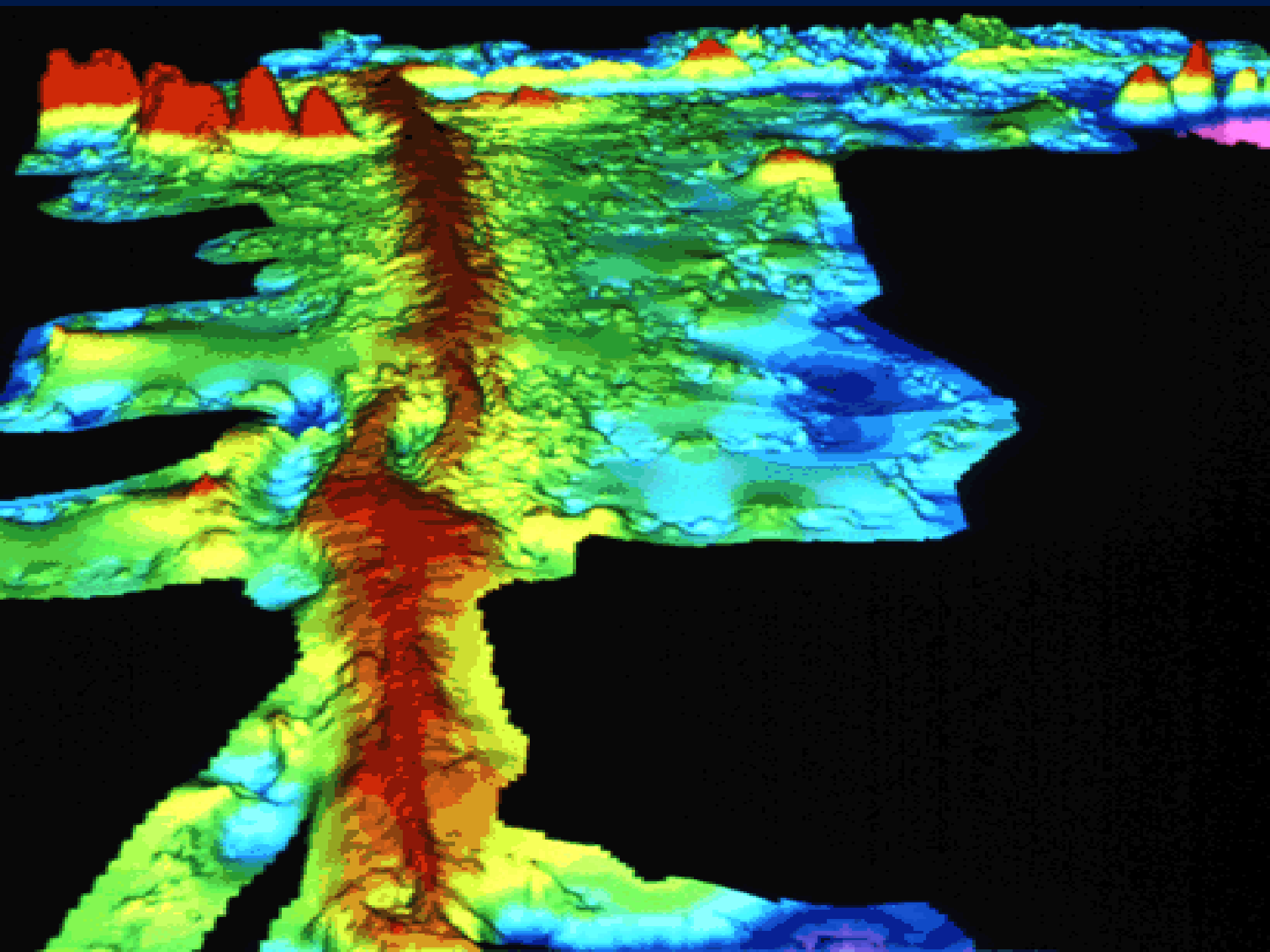
← → (Two Opposite Direction)

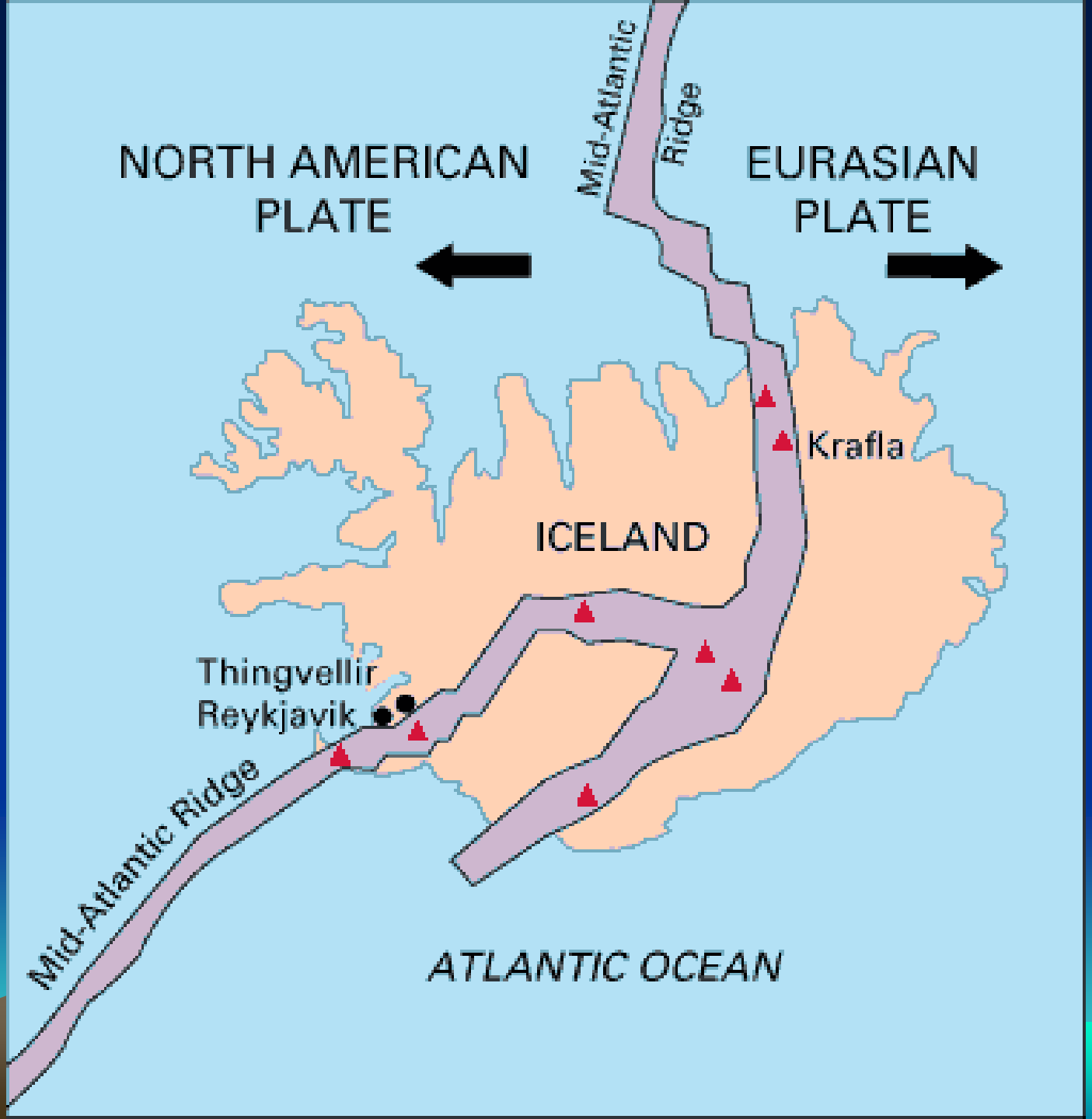
- RIFTING causes SEAFLOOR SPREADING

Features of Divergent Boundaries

1. Mid-ocean ridges
2. Rift valleys (due to two cont.plate divert)
3. New Crust Forms due to Fissure volcanoes
4. These boundaries experence upward movement of convection current.
5. Volcanism ,of the basaltic type.that is where oceanic crust made of basalt.
6. Most of these boundary today lies upon the oceanic floor and are maarked by the presence of oceanic ridges.


RIDGE
MID-ATLANTIC




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

2.Convergent /Destructive Boundaries

- Boundaries between two plates that are colliding

→ ←

(Two plates goes two direction , from each other)

- There are 3 Stages…

Stage I

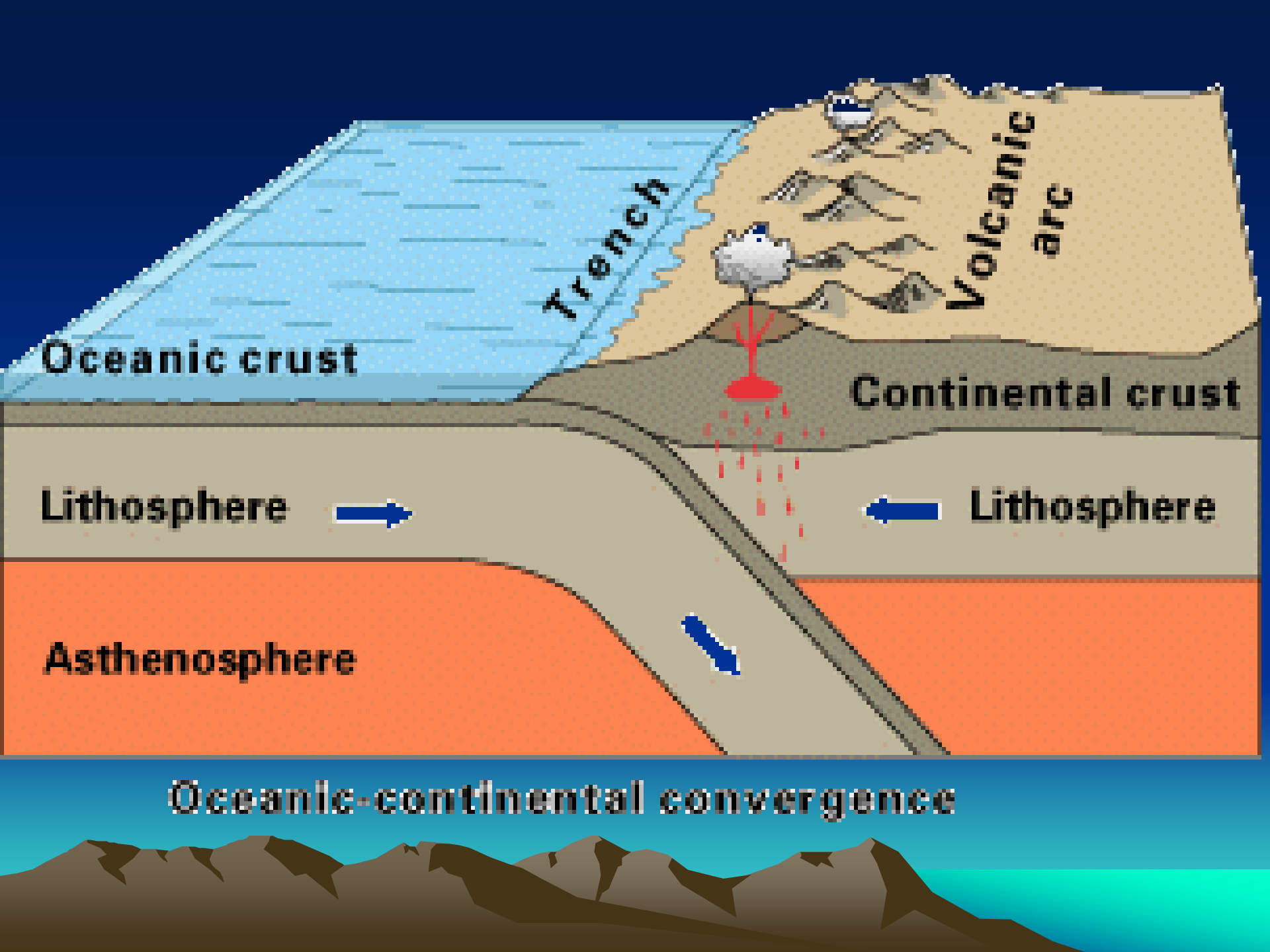
.Ocean plate colliding with a less dense continental plate

Effects

i. Subduction Zone (Narrow & Deep Portion)

ii. where the less dense plate slides under the more dense plate

iii. VOLCANOES occur at subduction zones



Oceanic-continental convergence

Andes Mountains, South America

Stage II

Ocean plate colliding with another ocean plate

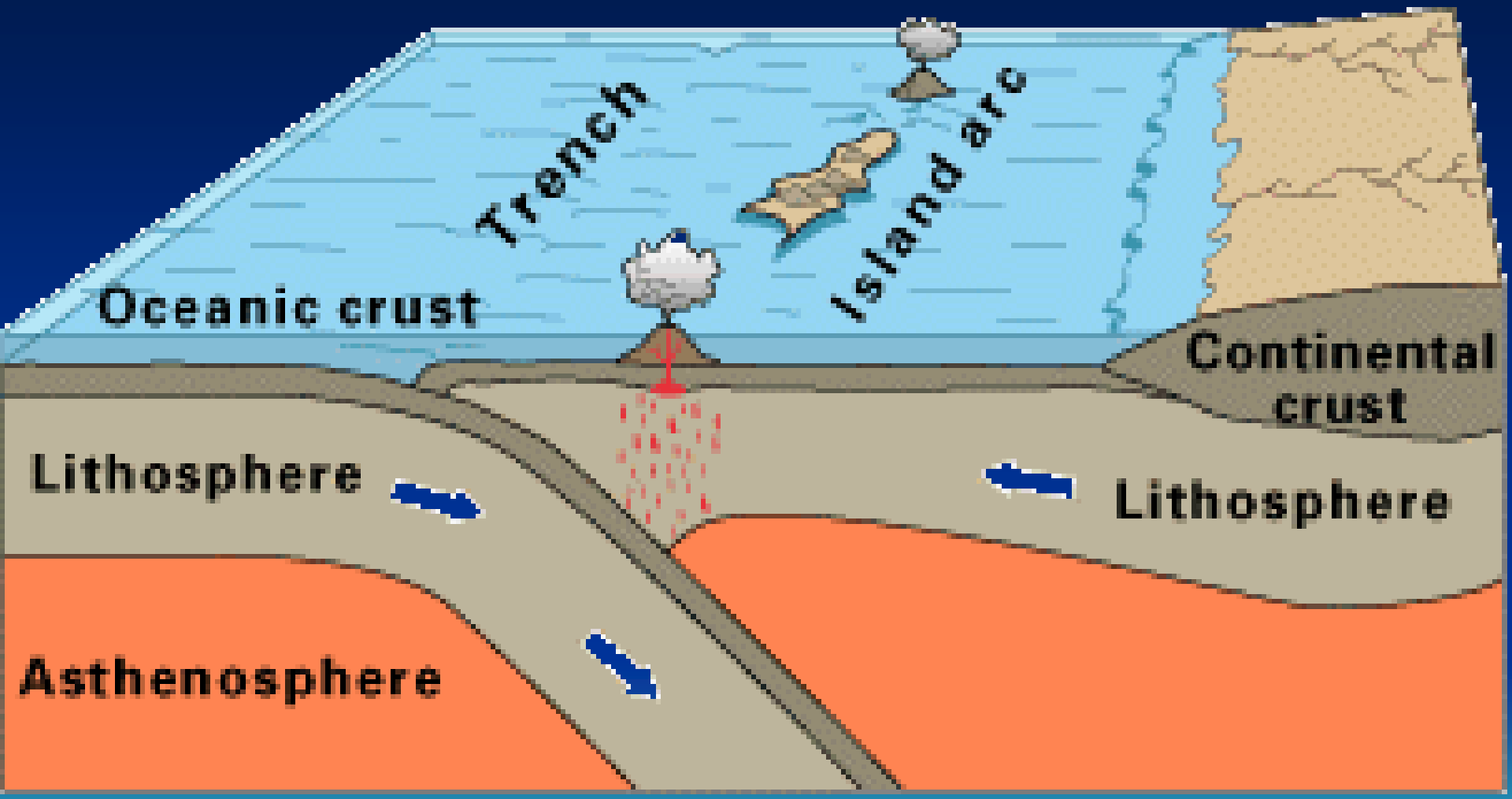
Effect

i. The less dense plate slides under the more dense plate creating a subduction zone called a TRENCH

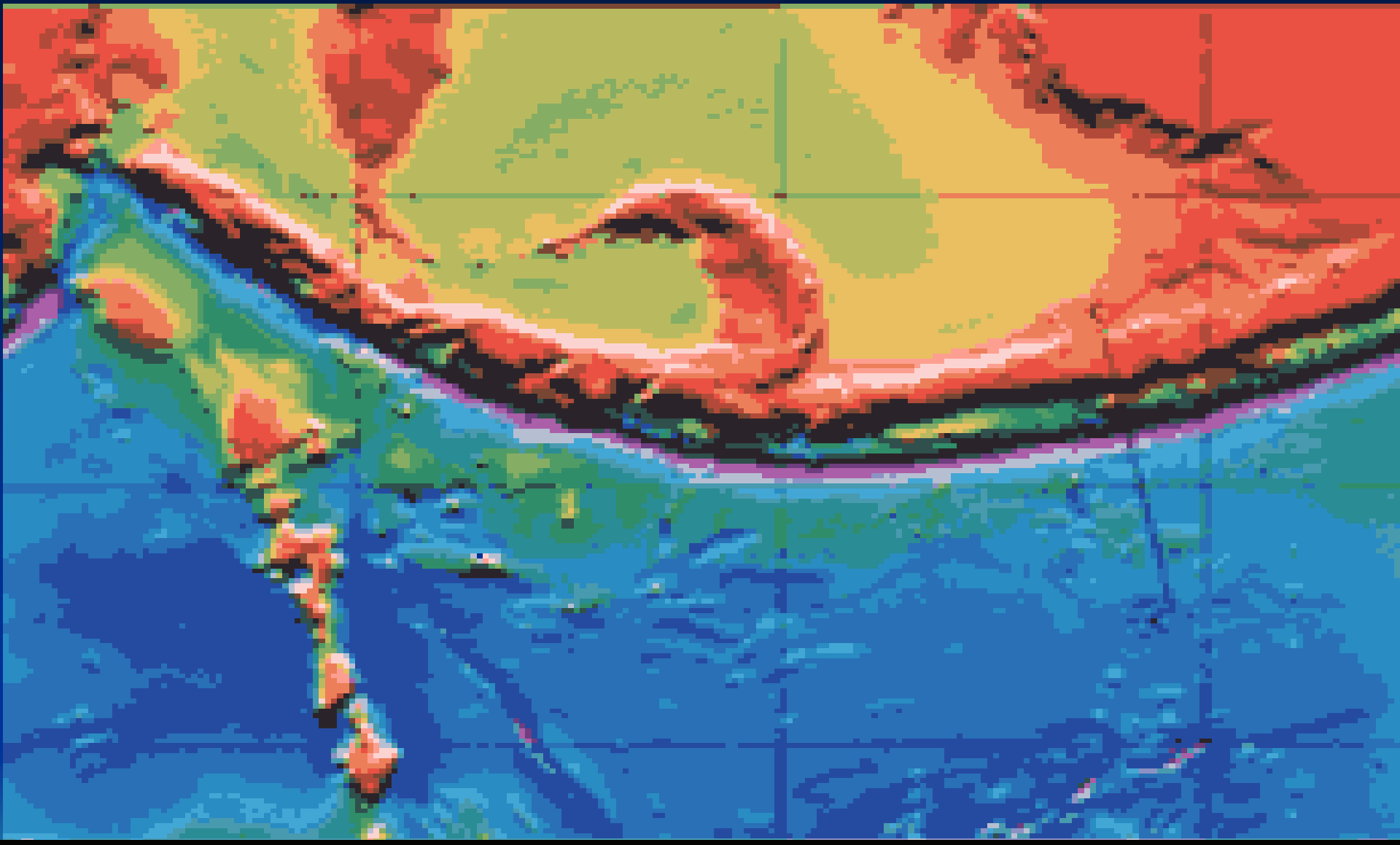
ii. Formation of Island

iii. Create Earthquake- e.g. 26 Dec.2004 (Indonesia, Thailand, Shrilanka Tsunamies)

iv. A place where folded and thrust faulted mountains form.



Oceanic-oceanic convergence



Aleutian Islands, Alaska

Stage III

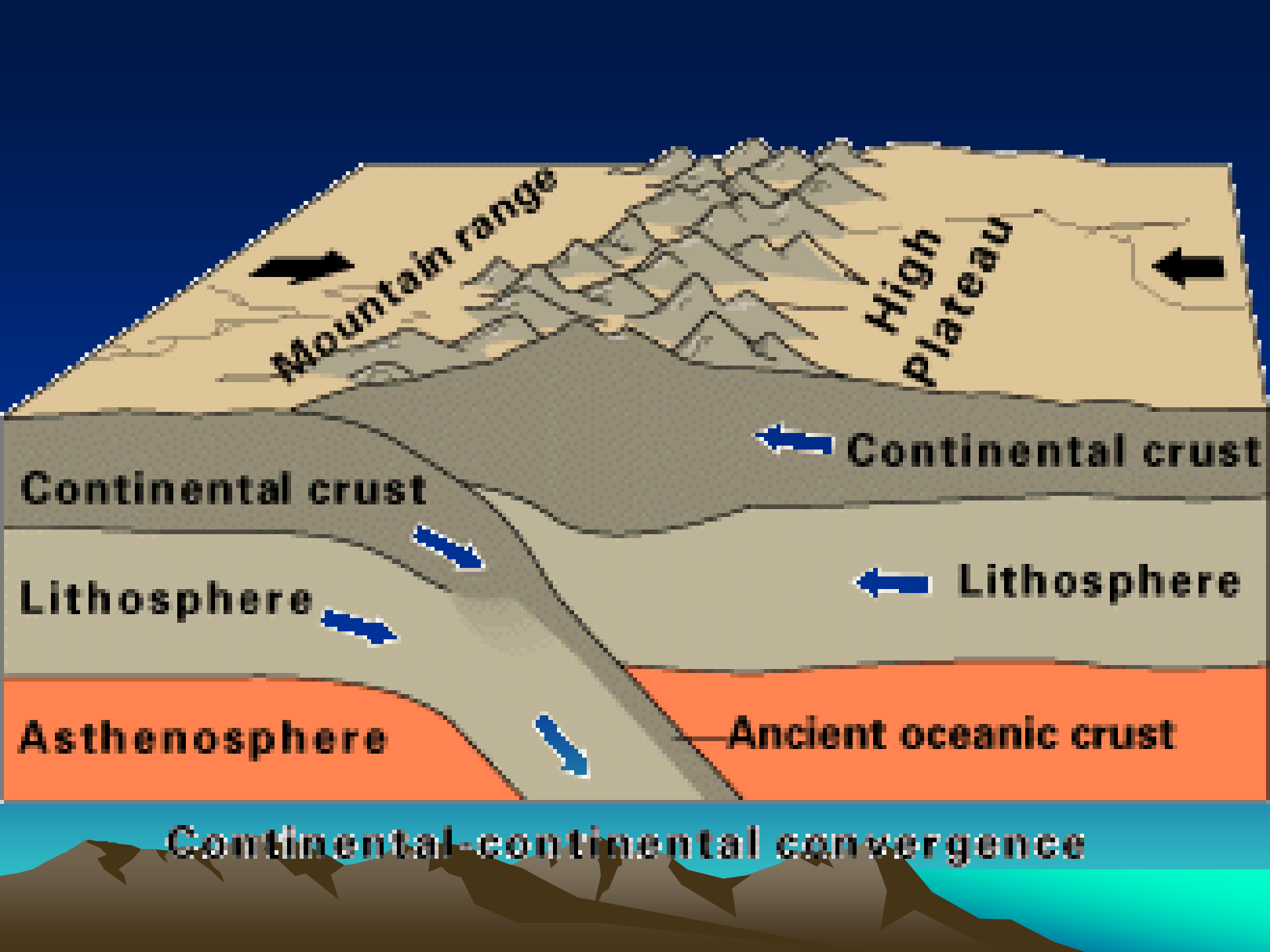
continental plate colliding with another continental plate

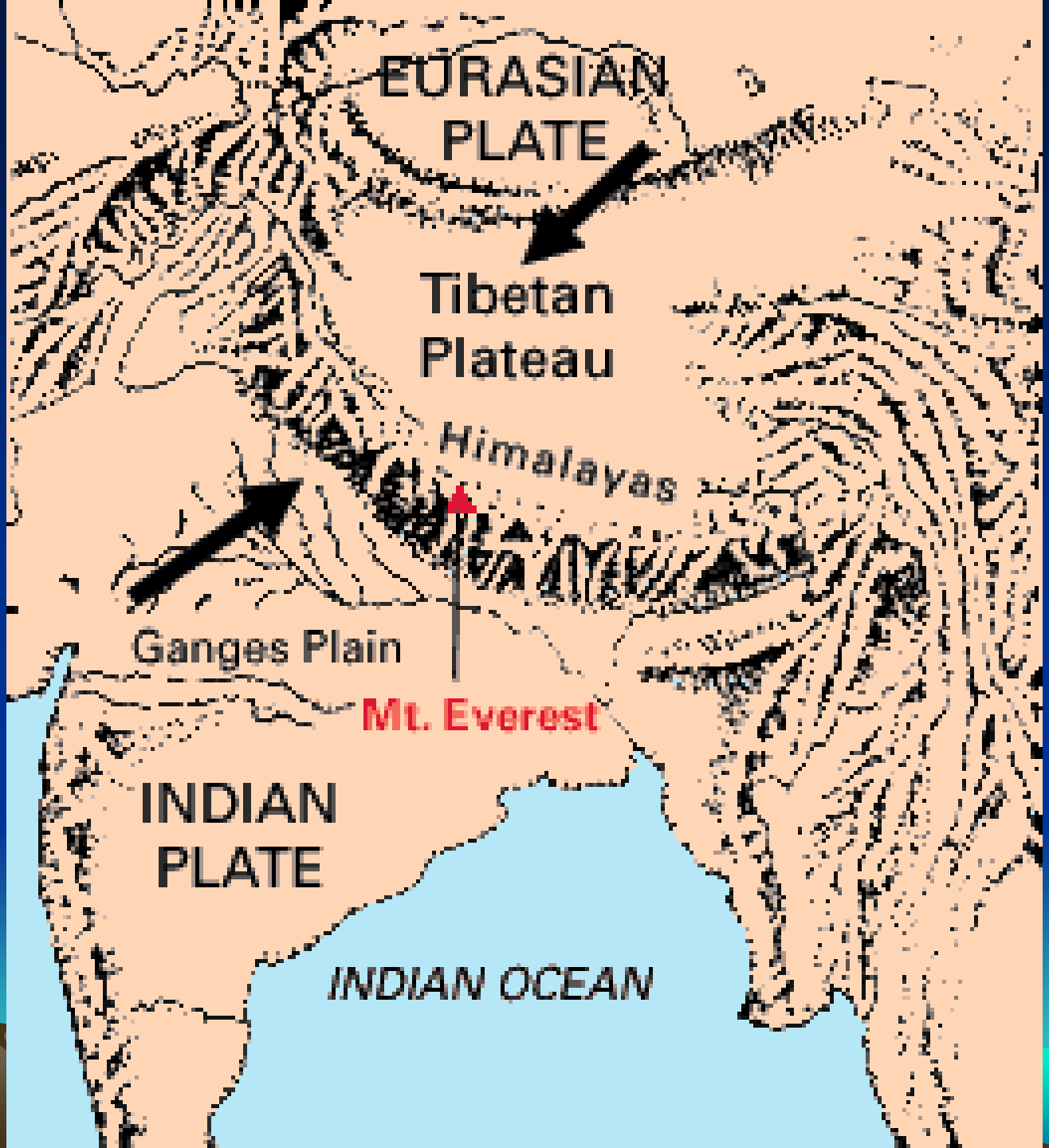
i. Effects

–No Subduction and No volcanism

Stage iv

- Continents are melted permanently. No signs of Volcanism and seismicity so,it is a single plate .
- Ural and Applachiones are the example.


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

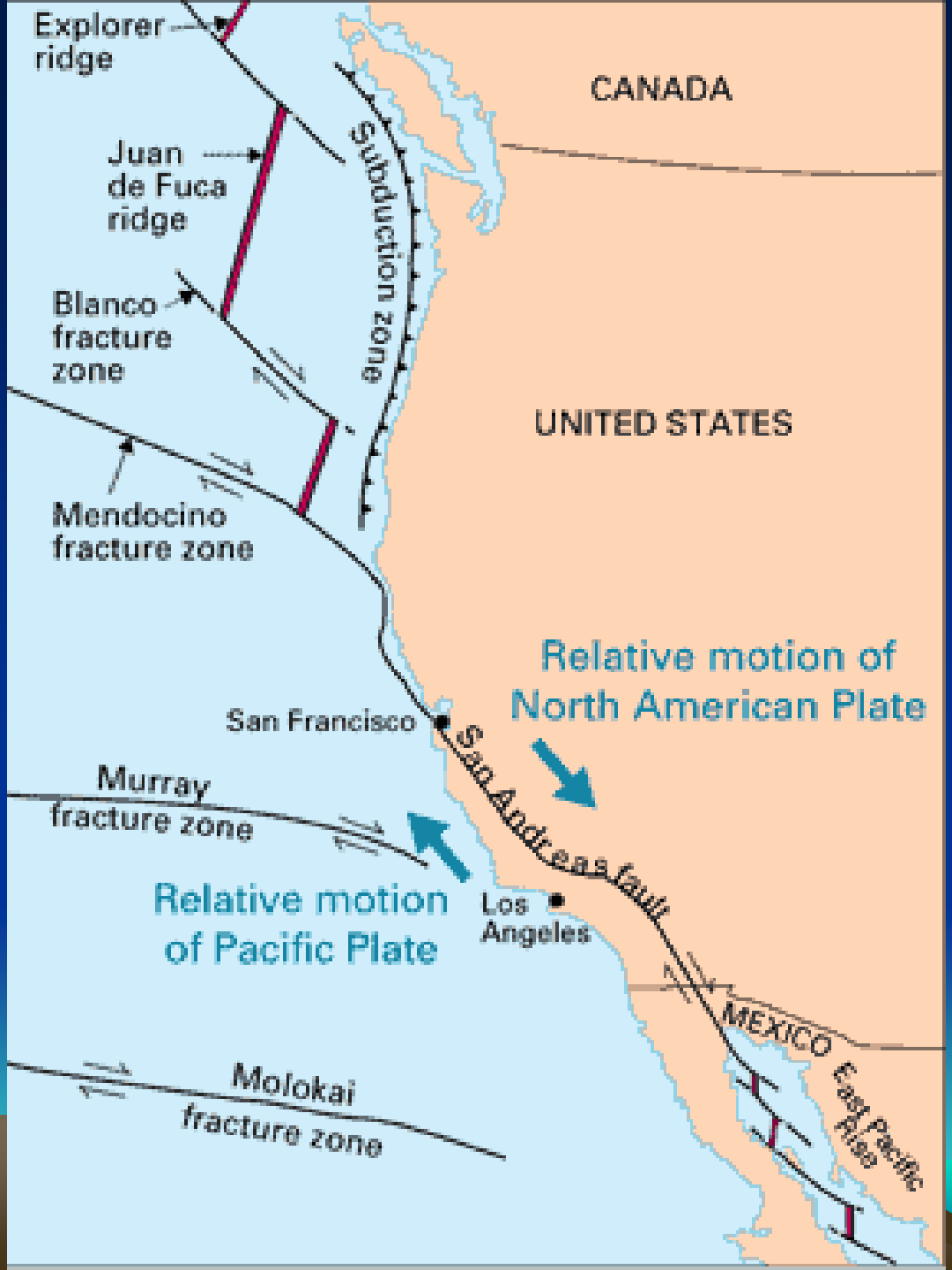
3.Transform/Parrallel Fault Boundaries

- Boundary between two plates that are sliding past each other/parrallel (One or More Plates move One direction)
- Effects

i. Not forms new crust

ii. Not change in rock structure

iii. EARTHQUAKES along faults due to plates up-down moves

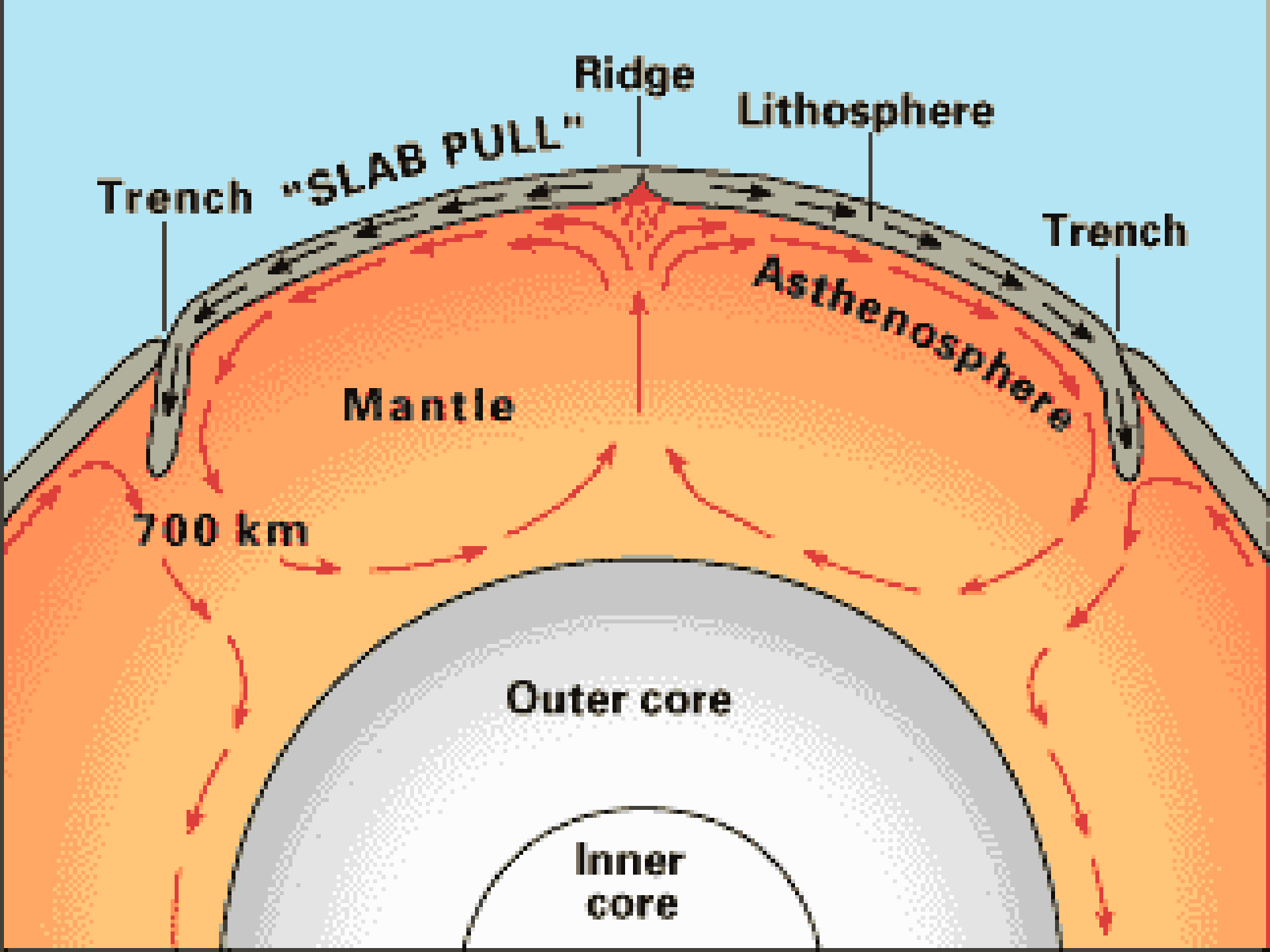

Explorer ridge
Juan de Fuca ridge
Blanco fracture zone
Mendocino fracture zone
Murray fracture zone
Molokai fracture zone
Subduction zone
CANADA
UNITED STATES
MEXICO
San Francisco
Los Angeles
San Andreas fault
East Pacific Rise
Relative motion of North American Plate
Relative motion of Pacific Plate

San Andreas Fault, CA

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

Merits of the Theory

1. Understand the features of landforms
2. Dynamic seafloor
3. Acquire information forces responsible to move plate
4. Large revolution in Geoscience

Demerits

1. Don’t give specific volume of plates
2. Don’t give the information about movements of plate
4. Sea floor and mountain chain- relation can’t focus
5. Mountain building but morgan not gives about it any explanation

Difference Between Continental Drift & Plate Tectonic

Continental Drift theory

- A. Wegner
- Earth-Sial,Sima, Nife
- Continent flot on sima
- Only movement of cont.
- Pangaea drifting –part can't meet each other in future
- Earth crust divergent towards equaor and Westward
- Stages can't say wegner of pangaea disturption
- Type of cont.no argument
- Force-gravitational and bouncy

Plate Tectonic

- Morgan P.J.
- Earth-lithosphere,Asthenosphere, Mesosphere
- Lithosphere flot on asthenosphere
- Both cont. & Ocean Dynamic
- Big plates meet in future
- Plates divergent all direction
- Stages gives
- Type of plates gives explanation
- Force-convectional Currents

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?

Questions...

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