Plate Tectonic Theory

↳ Imp for mains & prelims

* About Theory:—

① Key theory of geomorphology

② it is latest, scientific theory of Earth Crust formation & Evolution.

③ this Comprehensive theory given by:→

- Morgan
- Mckanzie
- Parkar
- Harry Hess of sea floor Spreading theory (1960s)
- Wooldridge

Year : 1967

③ Edward Suess - Sial floats over Sima discarded by Plate Tectonic theory (Lithosphere floats over asthenosphere)

→ Geologist: Study Atlantic Ocean. How Atlantic Ocean formed

Wilson cycle — formation & Death of Oceans

Old Concepts - People

① Ring of fire - North Pacific Ocean
   — Hugo Benioff (1940s)

② Plate tectonic - term coined by - Tuzo Wilson

PTT

↳ accepts views of

Hugo Benioff

↳ accepts views of

- Seafloor spreading theory (H. Hess)
- Paleomagnetism & Geomagnetism
- discarded notion of sial & sima
- discarded Continental drift theory

but use the Concept of "Pangaea" Supercontinent.

↳ Panthalasa (Mega Ocean)

Angara River: Siberia (Russia)

Laurasia plateau - East Canada

Gondwanaland - Nagpur rock studies

Acc to. GSI. India

Part of Gondwanland

Intact Supercontinent in Carboniferous Period.

Gondwanaland —

S. America - Africa - Madagscar

Srilanka - India - Australia - Antartica

* Broke Away / drifting during Mesozoic era — & formed Gondwanland & Angaraland (Laurasia) and formed Paratheys sea (then Thetys sea)

According to PTT Lithosphere divided into various tectonic Plates. These plates move in Horizontal directions.

- movements of Lithospheric Plate called "Tectonism"
- Scientific study of Lithospheric movements and formation & destruction of Earth Crust called - "plate tectonics"

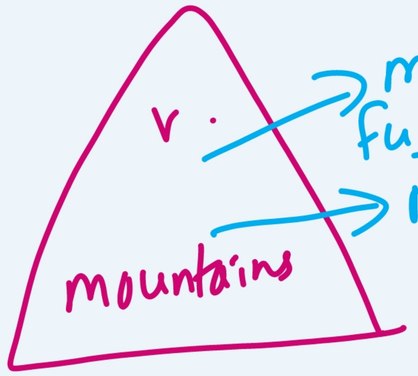
lithosphere (crust + Upper mantle)
- Thickness varies (5 km - 200 km)
- Oceanic crust & Continental Crust

- Tectonic Plate - Massive irregular lithospheric rigid solid blocks (lithospheric slabs)
- These plates moves over aesthenosphere → Partial liquid ductile in nature
  - weak zone
  - zone of magma (molten Rock)
  - Source of minerals inside the earth
  - located upto 400 km but below lithosphere.

So, PPT Explains

- formation of Young Fold mountains Island Arc (festoons)
- Volcanic mountains & Plateau
- about Volcanism processes & eruptions

Ex



mt. ~~Fujiyama~~ Fujiyama - Japan
Mt. Etna, Mt Vesuvius (Italy) (Mt. Stromboli)

Composite volcano
Stratovolcanoes
Convergent plate B.

Shield Volcano
fissure volcano
Divergent plate B.

- Explains Earthquake distribution & global patteen.
- All Three types of plate boundaries related with Earthquakes)

strategic (USA) Naval Base
Central Hawaii Island - P.O

Deccan - India plateau
snake plateau - USA

Even PTT Explains
The Mechanism of
faulting & folding associated
with Orogeny Processes (mountain
building Process)

Note:- Narmada & Tapi
rift valleys formed due to
Convergent plate boundary activity
when Himalayas were formed.
(mainly due to Subsidence of land)

Ex

Rift valley Diverge Plate	Young Fold mountain Converge Plate	Transform plate	Plate
Normal fault	Reverse fault	Strike slip fault	Fault

Types

Thrust fault

lateral slip (Horizontal)

New crust formed ← →

Old Crust destroyed → ←

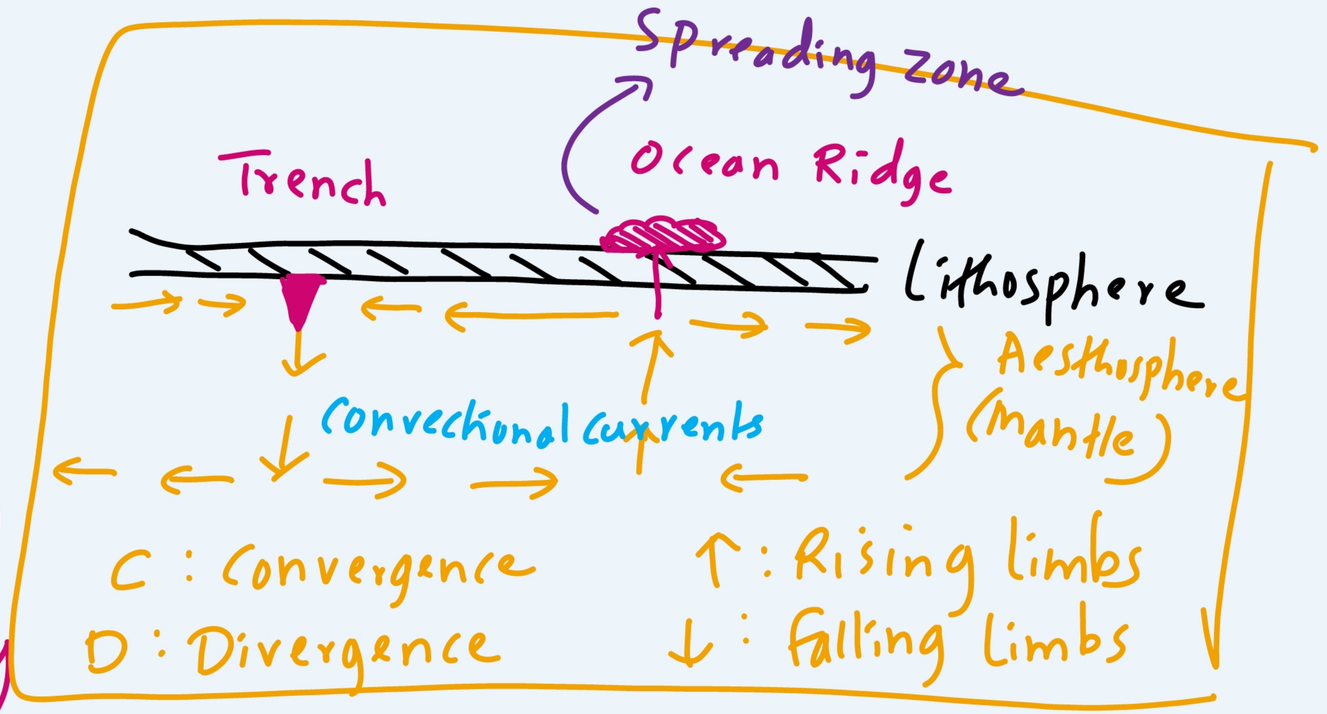
= plate movement

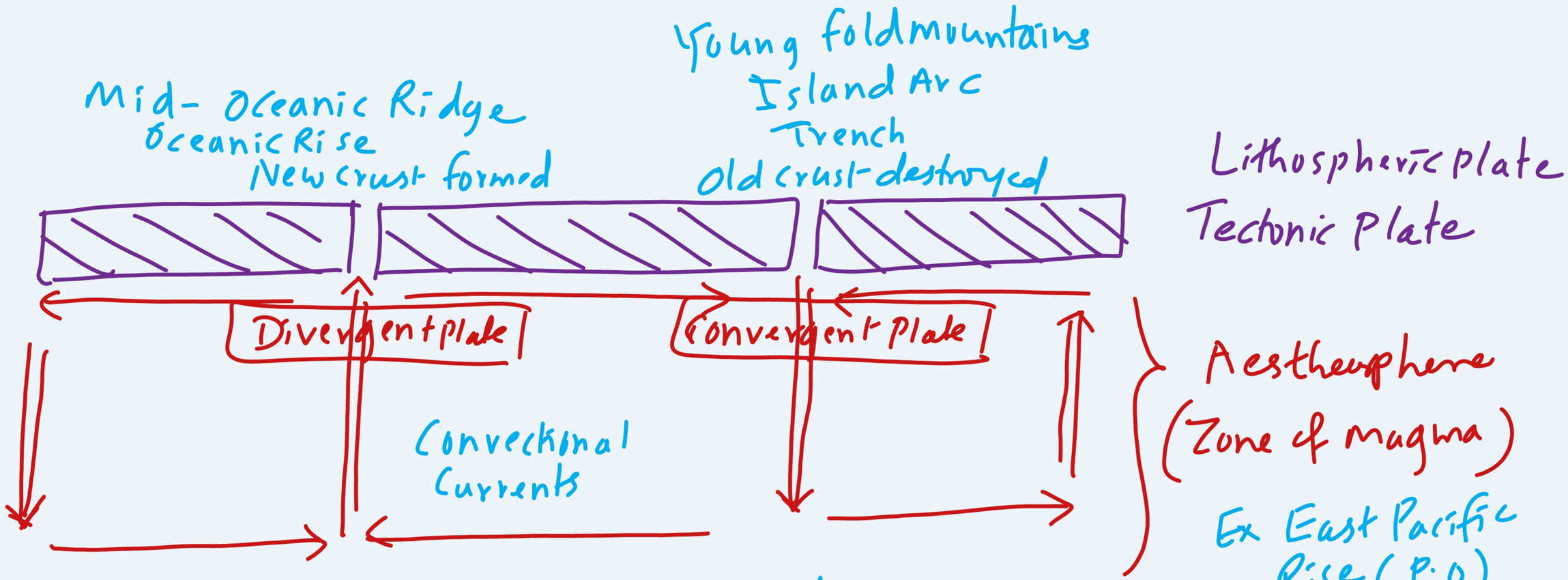
Neither Crust formed or destroyed

Note

- Convectional Current Theory (CCT)
  - 1930s
  - Arthur Holmes
  - ~~[illegible]~~
  - Concept of CCT used by Sea floor Spreading theory (SFS)
  - CCT is soul of SFS Theory

So PTT used CCT + SFS Concept.





Note: fast movement divergent plate — Rise
slow " " " — Ridge > Oceanic

According to Plate tectonic Theory

Plates

classified as

SIZE

Major — 7
- Pacific Plate
- N. American plate

minor plate — 20+
Ex: Nazca plate, Cocos plate, Burma plate, Sunda plate

or

SHAPE | Nature

Surface Topography Configuration

Ex: Pacific plate
- Basaltic rocks
- Denser plate
- more density plate

TYPES

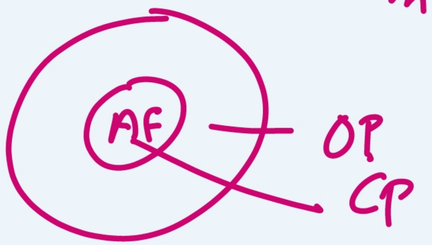
Combination of Both
Ex: African plate

Oceanic Plate | Continental Plate

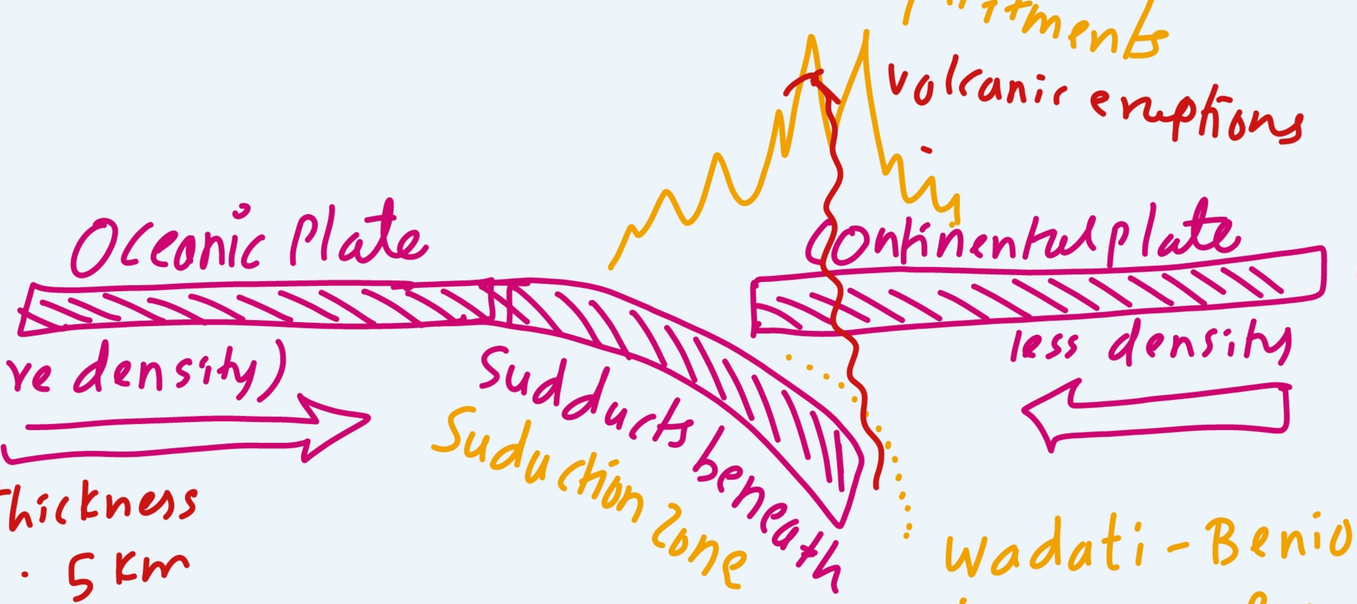
Eurasian Plate
- Granite Rocks
- Lighter plate
- less density plate

Acidic Composition
more silica

Ex: Zealandia - Minor Plate
Kumari kandam - Lemuria Plate - minor plate



Types of plate



Young fold Mountains Ex ≡ Rockies - North America
Alps - Europe
Andes - South America
↑ Ojas del Salado
Highest Volcano of world.

Uplifments
volcanic eruptions

O.P thickness
avg. 5 km

Continental plate
thickness 30km - 70km
↓
mountain

Wadati - Benioff zone
↳ zone of subduction
↳ Related with Earthquake (seismicity)

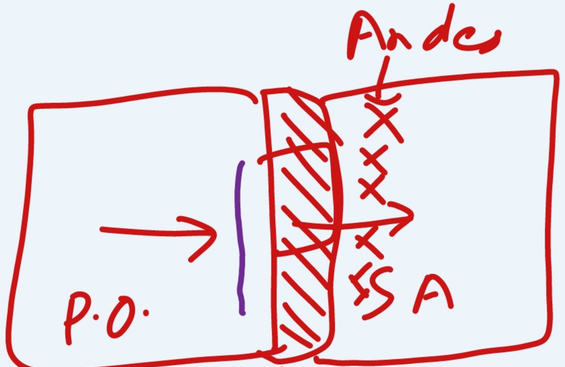
fig. Convergent plate boundary

6852 Islands
- © 7000 Islands (14)

Ex

Nazca plate
↳ minor plate of Pacificplate
↳ located between Pacific Oceanic plate & South America continental Plate.
Oceanic plate

- Nazca plate subduct beneath South America plate, it leads to upliftment of Andes (7000km)
Corderilla – Community of mountains (in North - south direction)



Convergent plate

Nazca plate

- Trench Peruchile Trench

In maps

Convergent P.B =

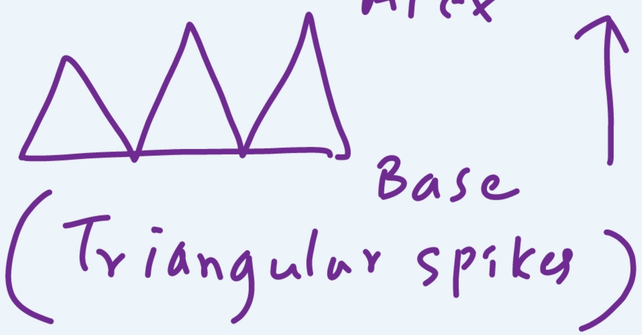
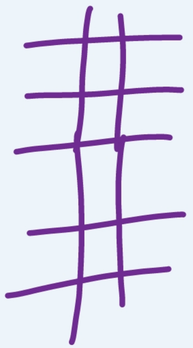


Plate direction

Transform plate boundary



Divergent P.B =

Ex Mid-oceanic Ridges

Two parallel mountains between them - Rift valley

- Divergent Plate Boundary
- They ~~Cover~~ cover more Percentage in the world
- Here Techonic Plates moves away - drift
- Hence Spreading Zone formed.
- due to Rise of magma and subsequent cooling & solidification help to create

Unique landforms

Ex

① mid oceanic Ridges (mid Atlantic Ridge)
mid oceanic Rise (East Pacific Rise)

② Oceanic Islands - volcanic Islands
Ex Easter Island - chile

③ volcanic eruptions - leads to formation of volconic plateau Ex Hawai Islands (Hotspot)

④ Rift valley on Continent
Ex Great African Rift valley

Convergent P.B (Destructive Plate Margin)

↳ Here Plates moves Closer

↳ Subduction zone

→ Wadati-Benioff zone

> → Volcanic & Earthquakes Eruptions Possible

→ Called as "Zone of destruction"

→ Lithosphere destroyed.

landforms / Mariana Trench

↳ Trench - Deep

↳ Island-Arc / festoons

Ex = Kuril Islands ← Aleutian Islands ←

↳ Young fold mountains

→ volcanic mountains

→ Composite volcanoes

Convergent

Types of Plate	Earthquakes	Volcanoes
Oceanic - Oceanic	✓	✓
Continental - Continental	✓	× Himalayas
Ocenic - Continental	✓	✓