

Geography Class 11

STUDENTS MUST REMEMBER (9:10 AM):

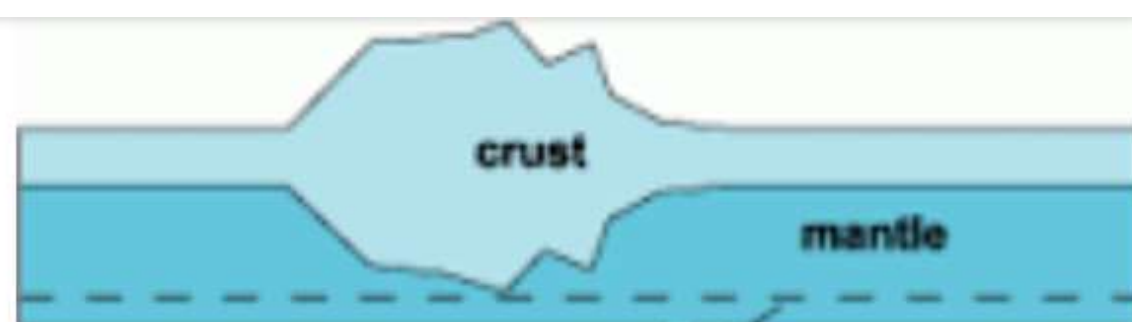
- Students must try to minimize pendency and complete the daily tasks on the day itself.
- Studying according to the pace of the class is good enough but we need to maintain consistency.
- Maintaining balance with personal life & interactions along with reducing distractions is necessary to sustain consistency for a long time.
- For mapping we only need to focus on **two things**:
- (1) Where is the location?
- (2) Why is it in the news?
- We are not supposed to get into too much depth of any of the above two things.

Revision of the previous class:

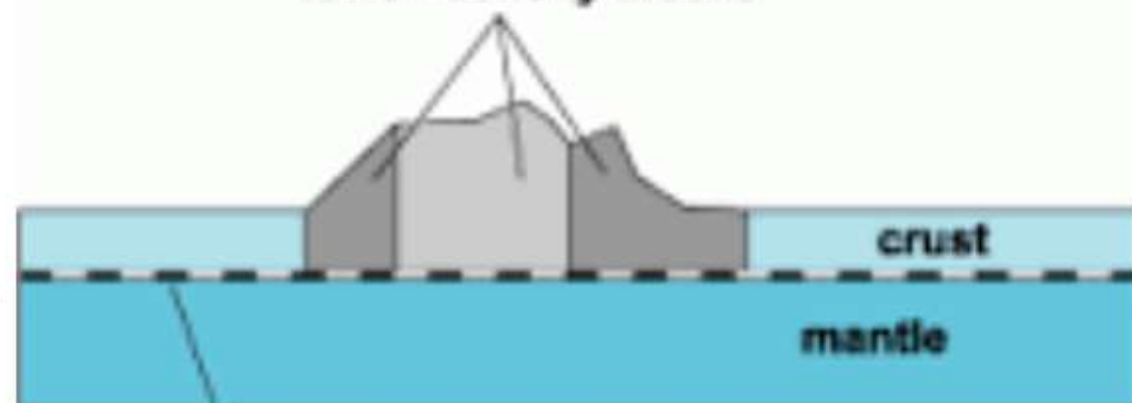
- The processes that bring about changes in the configuration on the surface of the earth are called **Geomorphic processes**.
- These processes can be endogenetic or exogenetic.
- Endogenetic processes can be Diastrophic (Tectonic, Isostatic & Eustatic)& Catastrophic(earthquakes, volcanoes).
- Exogenetic - Aggradation & Degradation(weathering, erosion & mass-movement).
- Tectonic activities can be either Epeirogenic & Orogenic.
- **Epeirogenic** movements are vertical movements that cause continent formation.
- These are characterized by large-scale upliftment, subsidence, emergence, or submergence of land areas.
- **Orogenic** movements are mountain-building movements.
- They act in a **tangential** direction.
- They involve intense folding and faulting of narrow belts.

Isostasy:

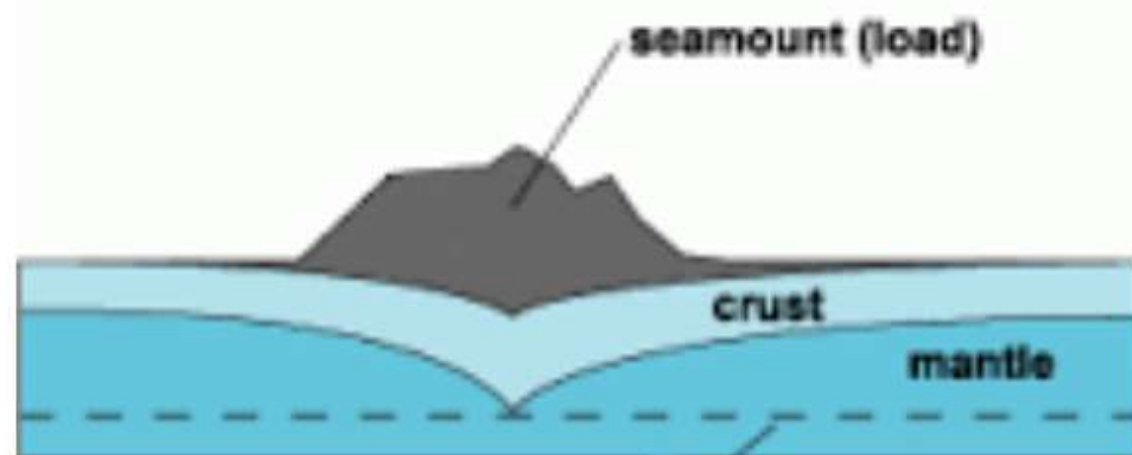
- It refers to the concept that the lighter crust must be floating on the denser underlying mantle.
- The physical properties of the lithosphere are affected by the way the mantle and crust respond to internal and external factors.
- This depends upon the **buoyancy** principle by **Archimedes**.
- **Archimedes' Principle** is the fact that buoyant force is equal to the weight of the displaced fluid.
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(a) depth of compensation

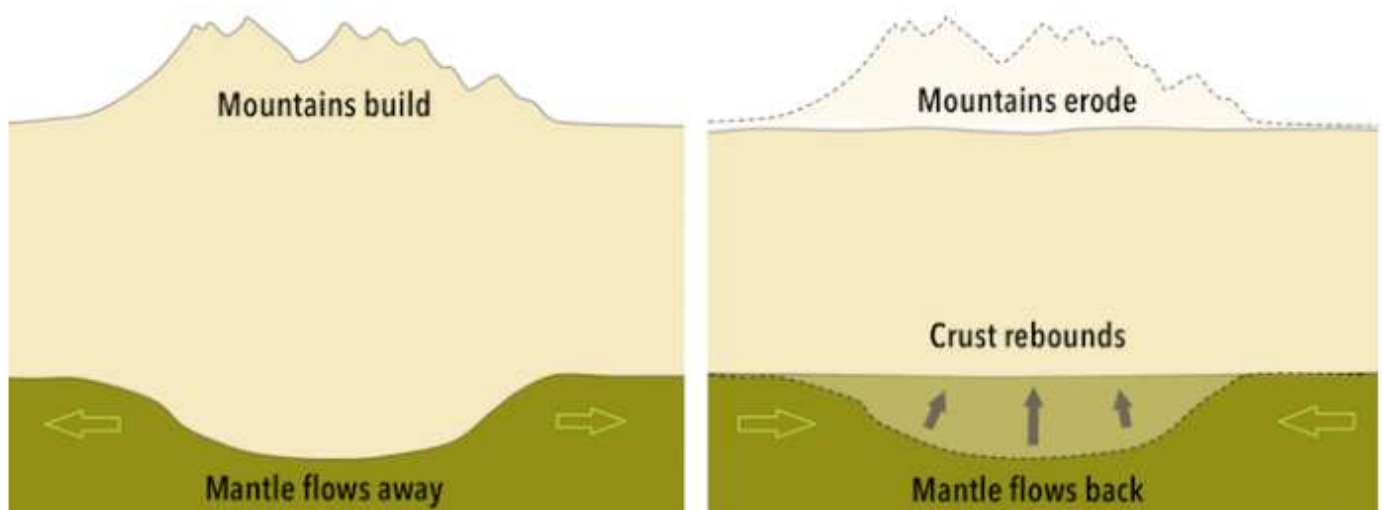


(b) depth of compensation



(c) depth of compensation

- They include vertical movements on the basis of **floatation displacement** between the rock layers differing densities to achieve balanced crustal columns of uniform mass above a level of compensation in which the topographic elevation is inversely related to the underlying rock density.
- **For example**, mountains have deeper roots.
- **Depth of compensation** is the depth below which the pressure (both upwards and downwards) is identical across any horizontal surface.
- As the mountains form and erode, the pressure they exert on the underlying layers of the earth change.
- When mountains form, the pressure increases downwards and when mountains erode, this pressure reduces.
- The earth's crustal column adjusts to changes in weight.

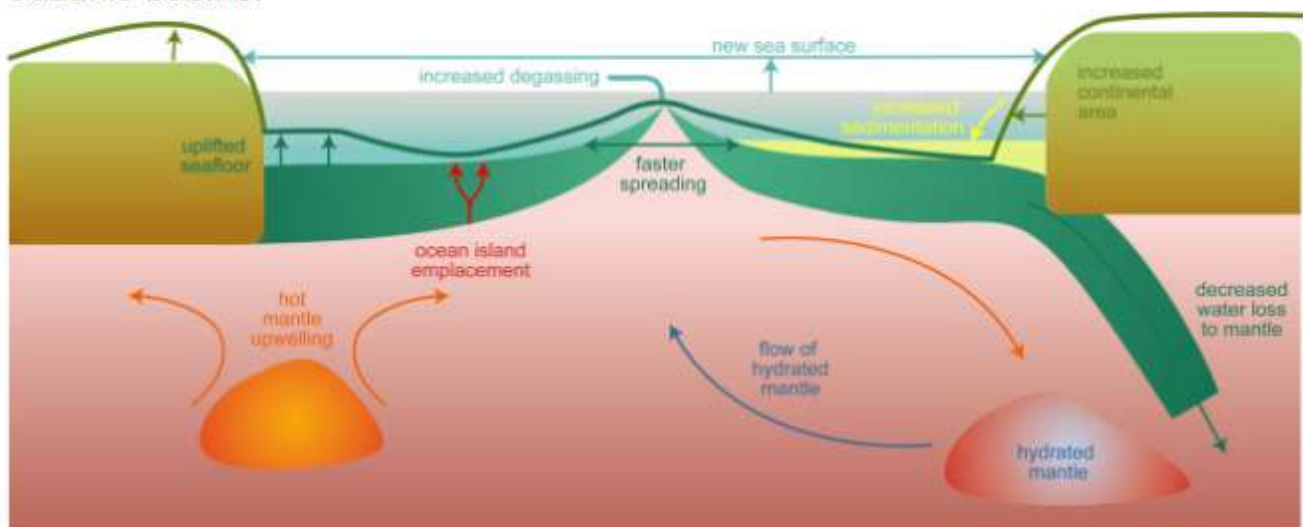


- This effect is prominently seen on the coast of **Norway (Scandinavia)**.
- Norway had remnants of the last ice age (which ended 11000 years ago) in the form of large glaciers.
- These large glaciers exerted large pressure on the mountains and land.
- As these glaciers started to melt, the exerted pressure started to decrease and the land started to rise.
- This rise is visible on the Norway coast.



EUSTATIC CHANGES (9:40 AM):

- They involve worldwide sea levels which include the changes in the total volume of liquid seawater and the capacity of ocean basins.
- **For example-** Convections from the interior will arch up and displace water from oceanic basins.



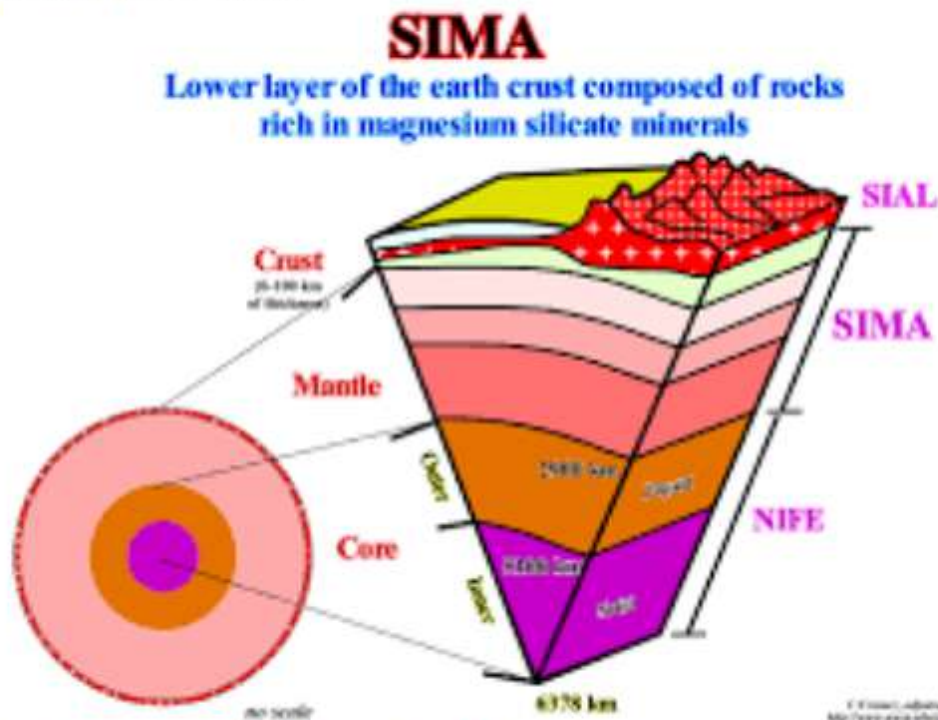
Continental Drift Theory:

- **Alfred Wegner** was a German meteorologist that put forward his idea in the form of the Continental Drift Theory in 1912.
- **Meteorology** refers to the study of weather.
- He proposed the theory to explain major variations in the Earth's climate.



Assumptions of the theory:

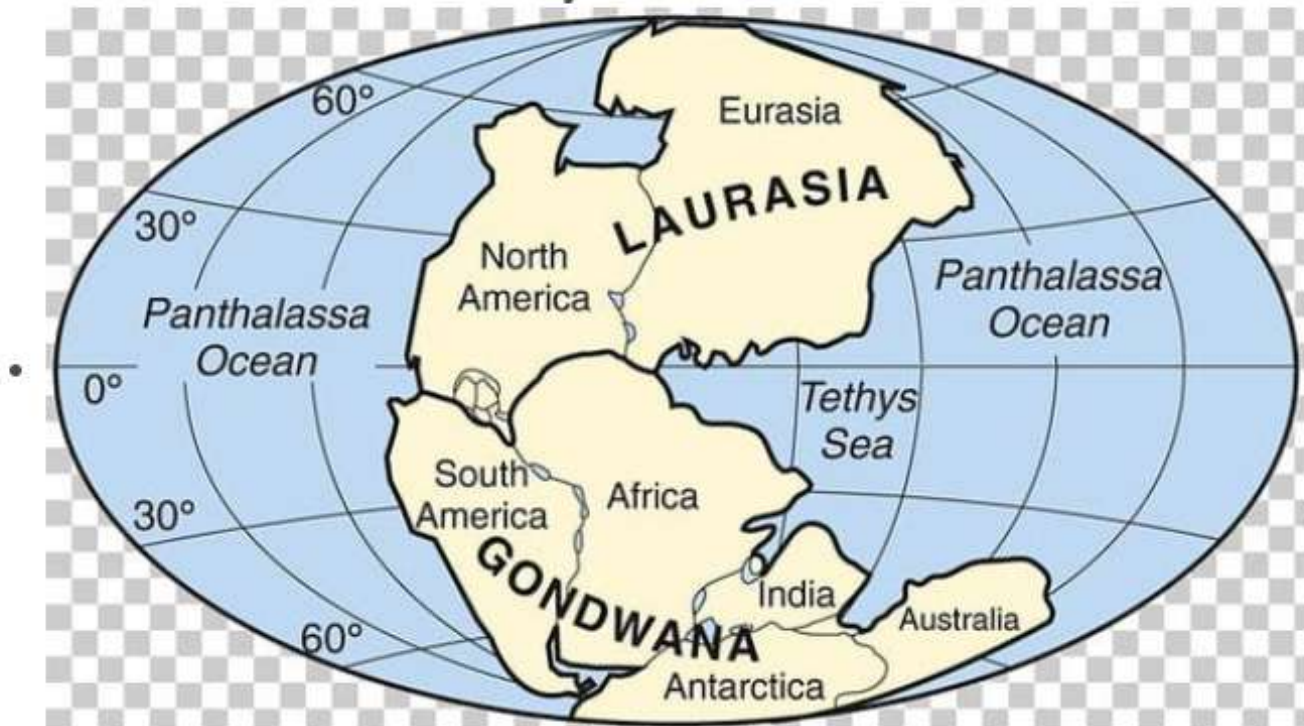
- He proposed that the earth is made up of three layers- Outer SiAl, Intermediate SiMa, and inner NiFe.



- SiAl is the continental mass, SiMa is the oceanic crust and Nife is the core.
- The continental masses are floating over the oceanic crust without any resistance.

EXPLANATION (10:10 AM):

- During the Carboniferous period- 280 million years ago, there was only one supercontinent called **Pangea** with one super-ocean **Panthalassa**.
- The supercontinent got separated into northern **Laurasia** and Southern **Gondwana** by a rift running from East to West.
- This rift was filled with the **Tethys Sea**.



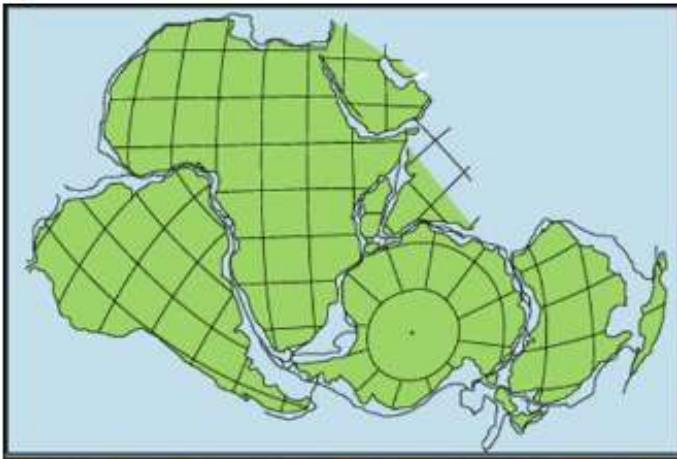
- The northern part consisted of North America, Greenland, and Eurasia (without ~~Arabia~~ & India).
- The southern Gondwana land consisted of Africa with Arabia, Madagascar, India, Australia, Antarctica, and South America.
- A north-south rift separated North America from Eurasia and South America from Africa, which started to move towards the West.
- India started to move towards the north.
- Australia got separated from Antarctica and moved towards the east.
- Arabia got separated from Africa and merged with Asia.

Forces responsible for the movements per Wegner:

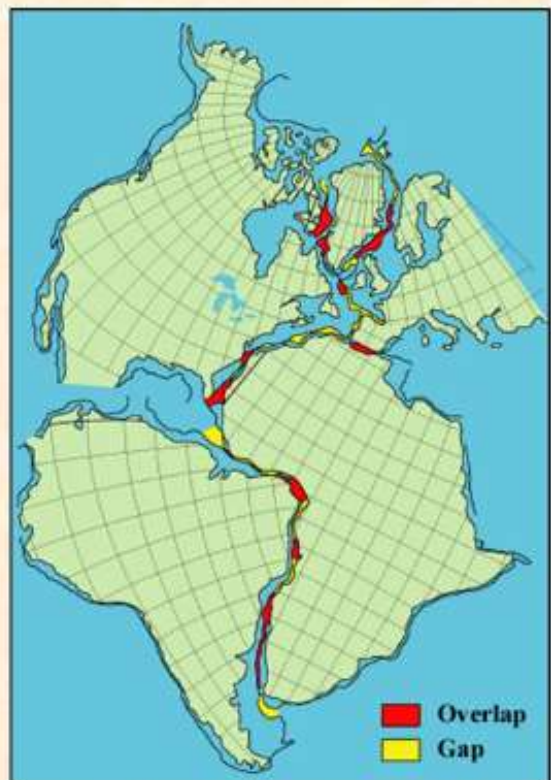
- **Equatorward Motion** which was caused by **pole-fleeing force**.
- This force was a result of gravitational differential force and the force of buoyancy to adjust the center of gravity and the center of buoyancy
- The **westward motion** was caused by the **tidal forces** of the sun and moon due to gravity.

EVIDENCES GIVEN BY WEGNER(11:00 AM):

I. Jigsaw Fit of the continents:



This “jigsaw” fit of continental margins is best when the outline is the edges of the continental shelves.



- Similarities in the coastlines on the opposite sides of the oceans were found.
- All the continents can be merged together to form one big continent.

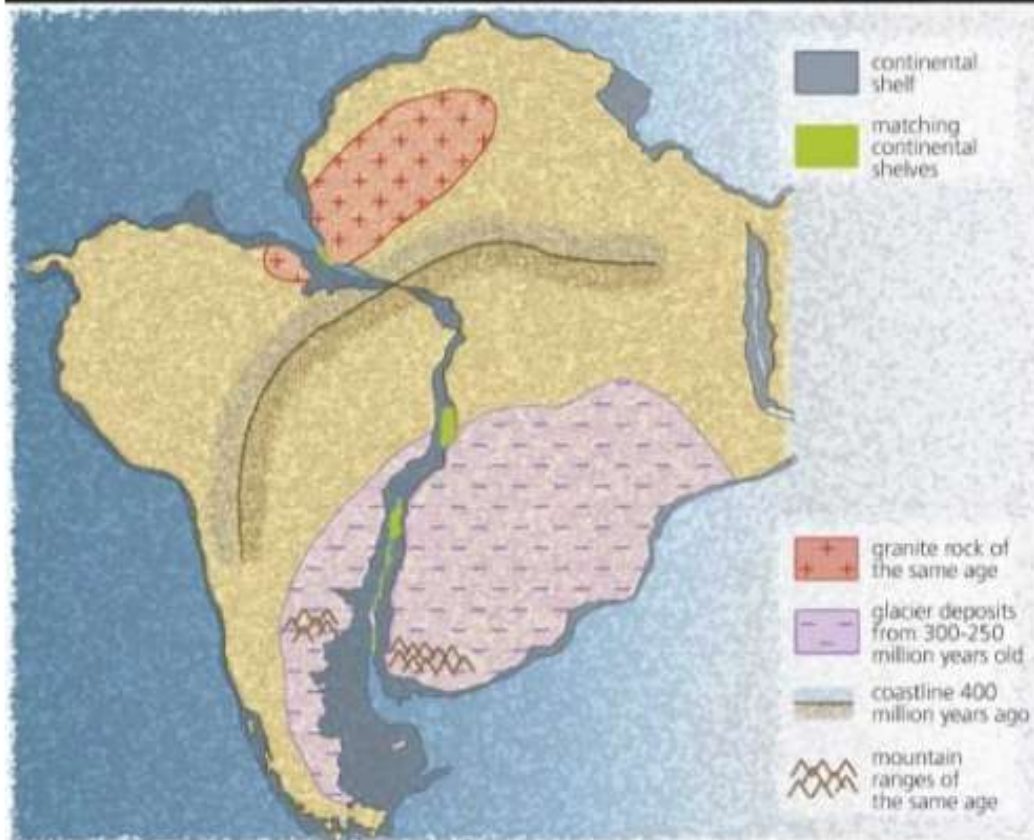
II. Structural evidence:

- This refers to the similarities in the age and structure of mountain belts in different parts of the world.
- **For example-** The mountain belts of Brazil terminate along the eastern coast of South America and the same type of mountains re-appear in Western Africa.
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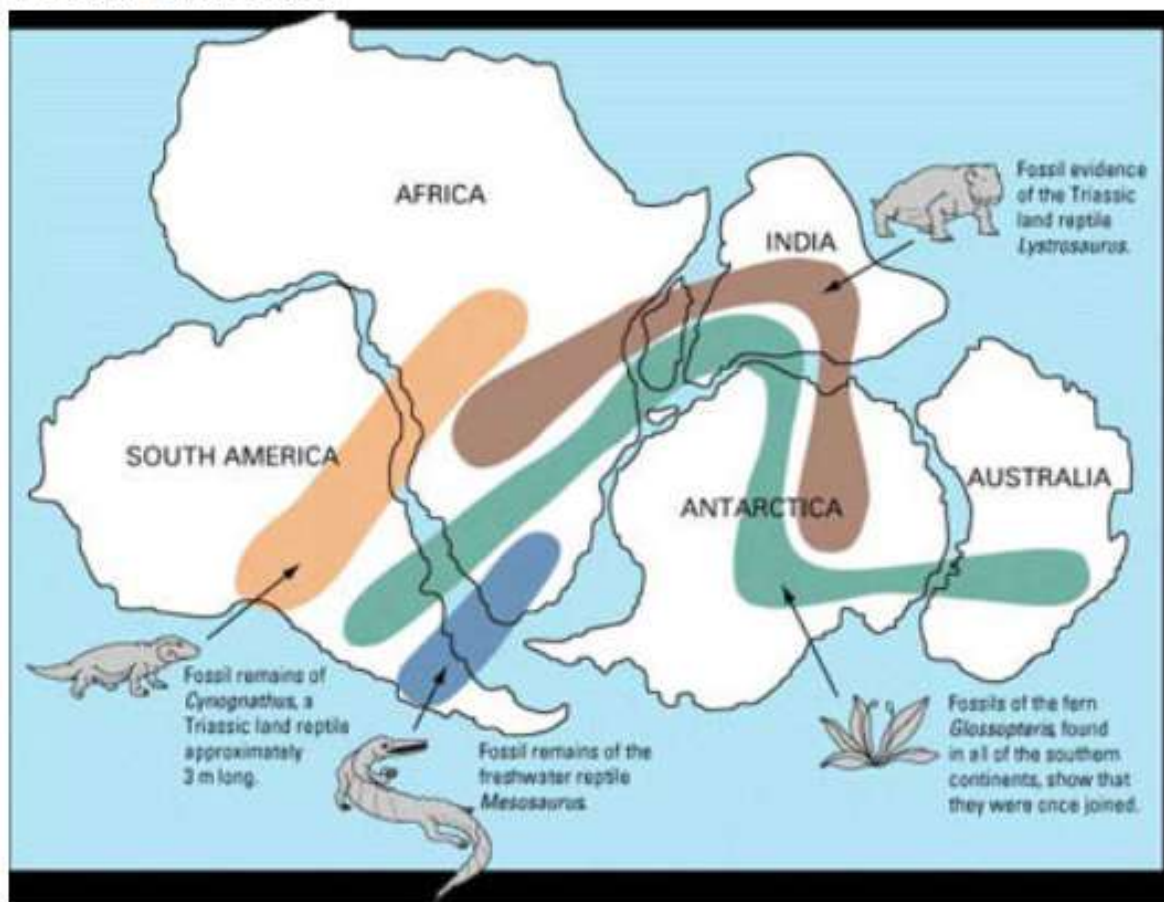


III. Stratigraphic evidence:

- It refers to the similarities in the rock formations.
- **For example-** the Eastern coast of Brazil has the same type of rock formations observed on the western coast of Africa.

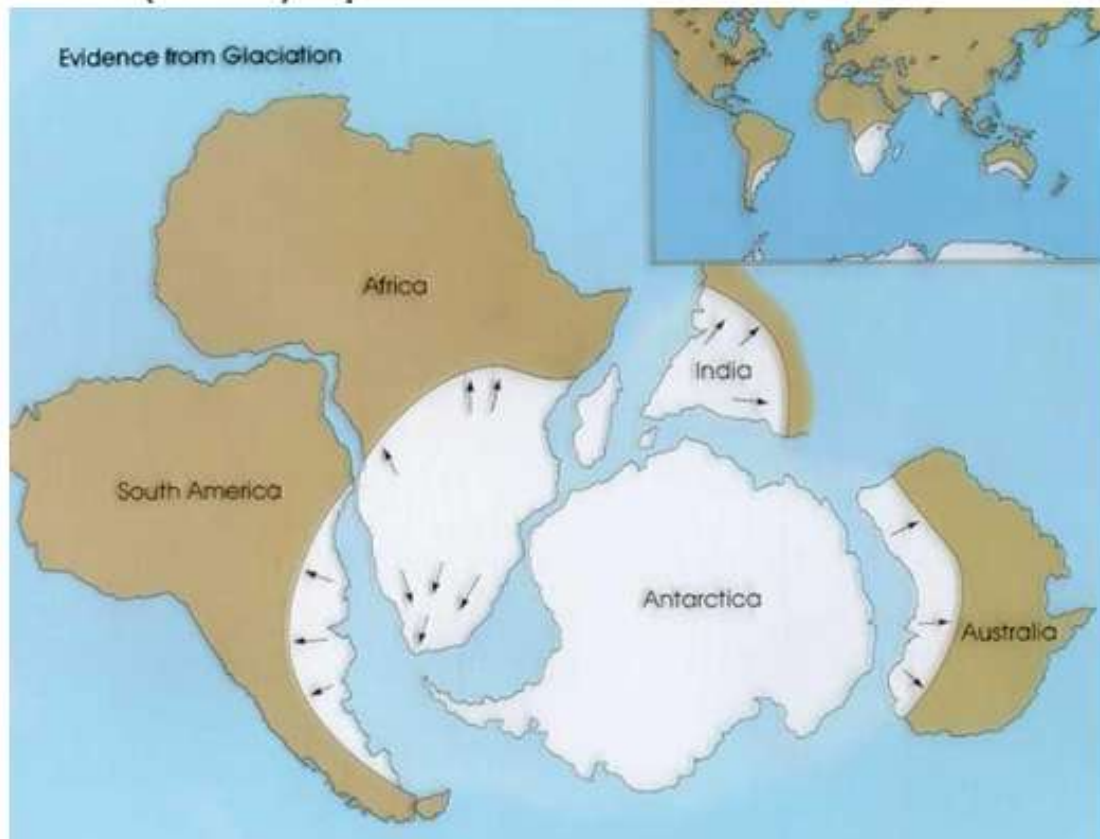


IV. Fossil Evidence:



- **Mesosaurus**- The freshwater reptiles whose fossils were found across South America and Africa which are separated by a wide ocean.
- **Glossopteris**- This floral evidence was found all across the Gondwanaland.

V. Glacial (Tillites) Deposits:



- They are presently found in warm tropical regions like South America, South Africa, Australia, India, etc.

VI. Placer Deposits:

- They are the sediments that have been deposited at a place different from their place of origin due to depositional forces.
- Rich deposits of gold placer deposits near the **Ghana Coast** without any source of gold nearby, but the source is found in Brazil.
- The **impurity analysis** of gold placer deposits is very accurate.
- This is because impurities from two places cannot be the same.
- This analysis told us the gold found in **Indus Valley Civilization** sites was sourced from the **Kolar Gold Field**.



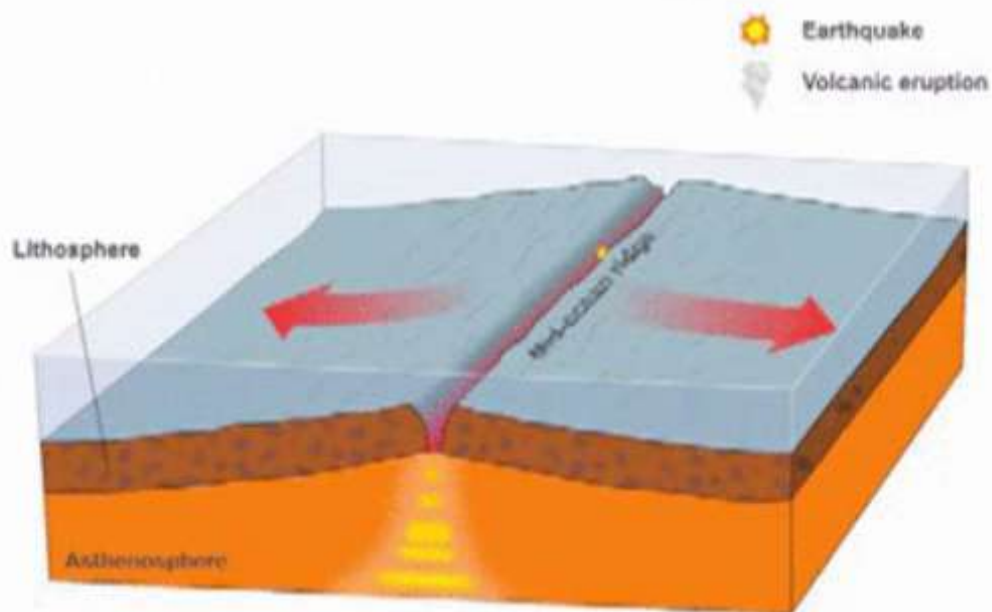
CRITICISMS OF THE THEORY (11:35 AM):

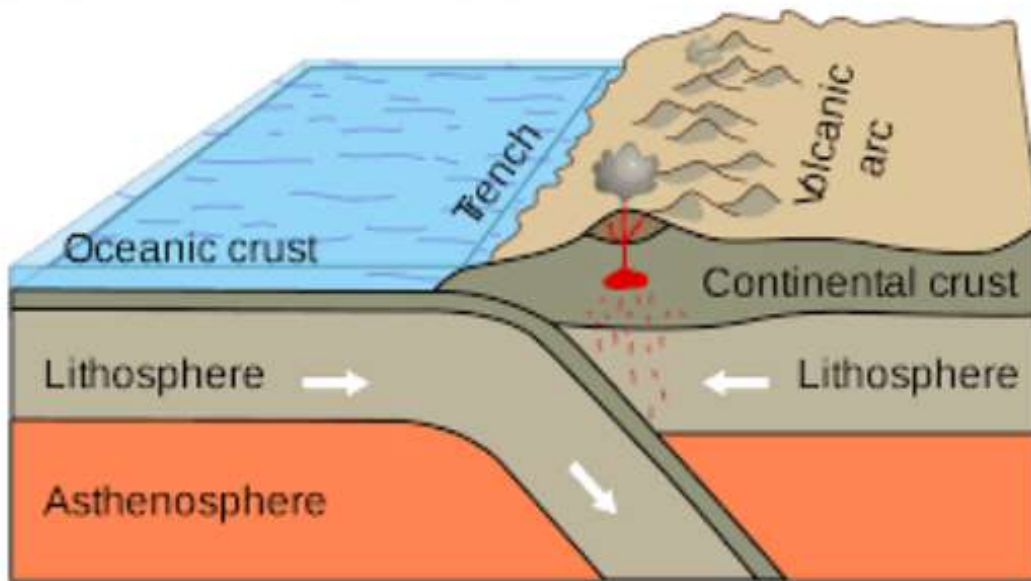
- The forces envisaged for the movement of the continents were considered to be inadequate.
- The rocks of continental and oceanic crusts are rigid and they would not permit easy drifting of continents over the oceanic crust.
- The theory did not describe the conditions of pre-carboniferous times.

Sea-Floor Spreading Theory:

- The theory was proposed by **Harry Hess** in 1961.
- Due to **SONAR(Sound Navigation And Ranging)** mapping of the ocean floor, we discovered many new facts.
- The oceanic crust was much thinner than the continental crust.
- No oceanic rock older the 150 million years were found, while we had many land rocks older than 4 billion years.
- Seafloor spreading is a geologic process in which tectonic plates—large slabs of Earth's lithosphere—split apart from each other.
- As per the theory, the new crust was being formed at Mid Oceanic ridges and the older crust was being destroyed at oceanic trenches.

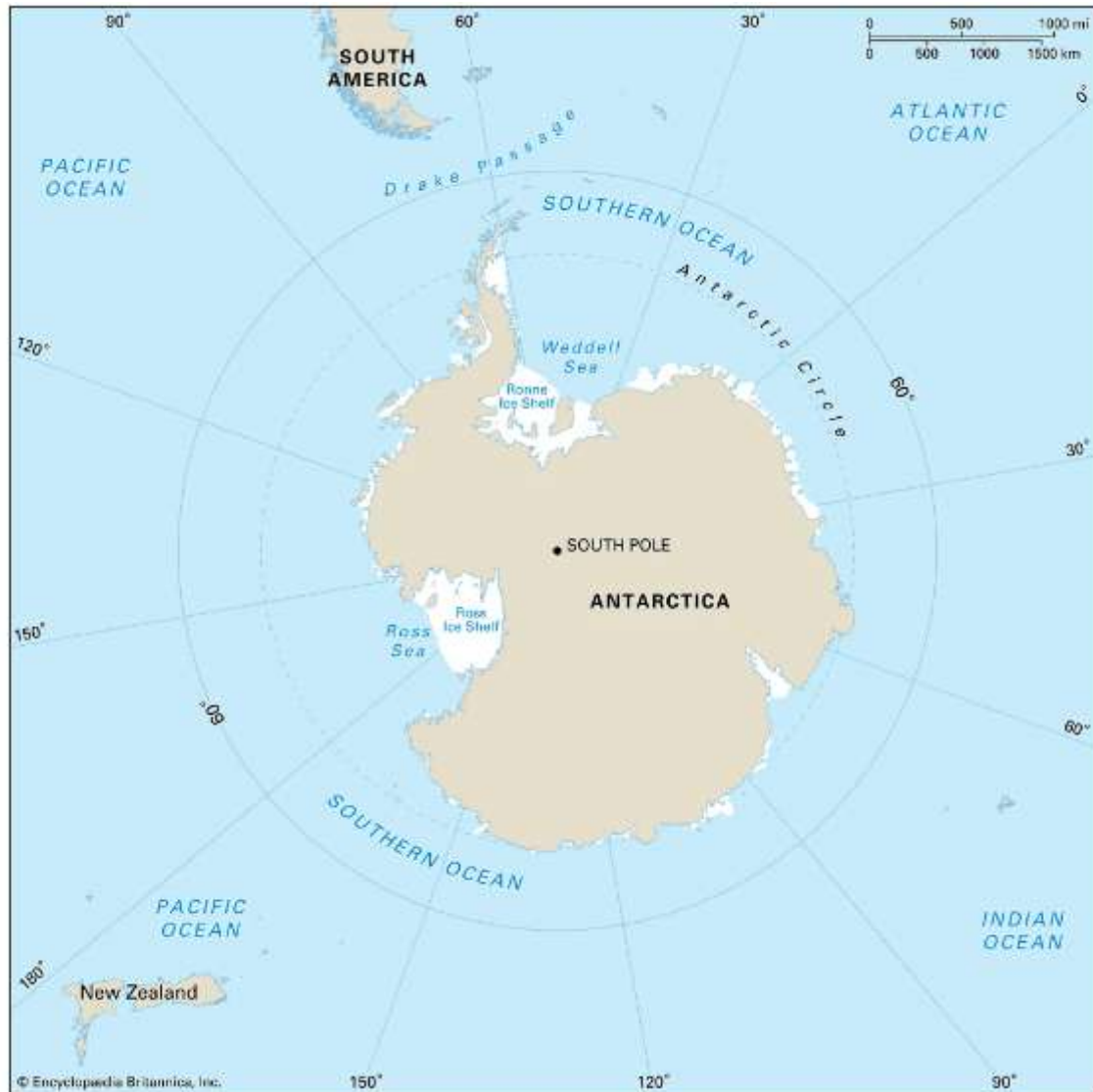
Mid-Ocean Ridge





Mapping exercise:

- The Atlantic Ocean is the youngest ocean.
- The Indian Ocean is not connected with the Atlantic Ocean and this causes occurrences of monsoons and cyclones.
- The Arctic Ocean is the smallest ocean.
- A major part of the Arctic Ocean is covered with thick ice.
- The polar bear is the largest land carnivore, which is found only in the north pole.
- The penguins are found only in the south pole.
- In 2010, the **Southern Ocean** was demarcated by the **International Hydrographic Organization**.
- This is the ocean which consists of waters below 60 degrees south latitude.



- The demarcation is done at 60 degrees south because waters beyond this latitude do not get easily mixed with other waters.
- This is due to the presence of **oceanic currents** which can be understood as "rivers flowing in the ocean".

The topics for the next class are the dictation of the **Sea Floor Spreading theory** and the **Plate Tectonic Theory**.

CONTINENTAL DRIFT OF PLATES



225 Million Years Ago



150 Million Years Ago



100 Million Years Ago



Earth Today