

CHAPTER -4

DISTRIBUTION OF OCEANS AND WATER

Oceanic water covers 71 % and Continents covers 29 % of earth surface.

CONTINENTAL DRIFT

- From the known records of history Abraham Ortelius, a Dutch map maker, who first proposed the possibility in 1596.
- Antonio Pellegrini drew a map showing the three continents together.
- Alfred Wagner who put forth a comprehensive argument in the form of Continental Drift Theory in 1912.

CONTINENTAL DRIFT THEORY

- All the continents formed a single continental mass (Pangaea) and mega ocean surrounded the same.
- Around 200 million years ago the Pangaea separated by the sea of Tethys. Laurasia (north) and Gondwanaland (south).
- Subsequently Laurasia and Gondwanaland continued to break in to various smaller continents that exist today
- Laurasia split to form the northern land mass
 - → North America and Eurasia.
- Gondwanaland split to form the southern land mass
 - → South America, Africa, Indian Peninsula, Australia and Antarctica.



EVIDENCE IN SUPPORT OF THE CONTINENTAL DRIFT

1. The matching of continents (jig-saw-fit).-- on either side of the Atlantic Ocean.
2. Rocks of same age across the ocean -- Similarity in the age of rocks on either side of Atlantic Ocean
3. Tillite. Tillite – the sedimentary rock formed out of deposits of glaciers. These Gondwana systems of sediments are found in India, Africa, Falkland Island, Madagascar, Antarctica and Australia. It also provides evidence of Palaeoclimate.
4. Placer deposit. Placer Deposits – The occurrence of rich placer deposits of gold in Ghana coast of Africa and the presence of source rock in Brazilian Plateau.
5. Distribution of fossils. Similarity in the plant and animal fossils found on either side of marine barriers.

FORCE FOR DRIFTING

1. Pole-fleeing force:- Relates to the rotation of the earth
2. Tidal force: - is due to the attraction of sun and moon that develops tides in oceanic water.

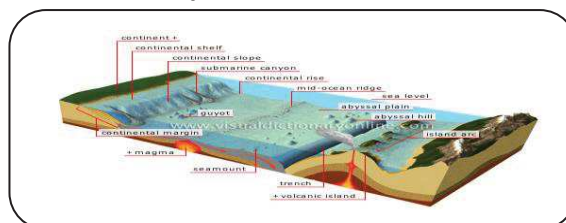
OCEAN FLOOR CONFIGURATION

The ocean floor may be segmented into three major divisions based on the depth as well as the forms of relief.

1. Continental margins
2. Abyssal Plains
3. Mid oceanic Ridges

CONTINENTAL MARGINS

- These form the transition between continental shores and deep sea basins.
- They include
 - Continental shelf
 - Continental slope
 - Continental rise
 - Deep oceanic trenches



ABYSSAL PLAINS

- These are extensive plains that lie between the Continental margins and Mid oceanic Ridges
- Abyssal Plains are the areas where the Continental sediments that move beyond the margins get deposited

MID OCEANIC RIDGES

- These are interconnected chain of mountain system within ocean.
- It is the largest mountain chain on earth surface.
- It is the zone of intense volcanic activity.

SEA FLOOR SPREADING

- Proposed by HESS in 1961.
 - Constant eruptions at the crest of the oceanic ridges cause the rupture of the oceanic crust and the new lava wedges into it. The ocean floor thus spreads.

PLATE TECTONICS

- This concept put forth in 1967 by McKenzie, Parker and Morgan.
- A tectonic plate is an irregularly-shaped, massive slab of solid rock.
- Plate may be Continental and oceanic depending on which of the two occupy a larger portion of the plate.
- Plates move horizontally over the Asthenosphere.

SEVEN MAJOR PLATES :--

- | | | | | |
|--------------------------|---------------------------------------|-------------------|---------------------|------------------|
| (1) North American plate | (2) South American plate | (3) Pacific plate | (4) Antarctic plate | (5) Africa plate |
| (6) Eurasian plate | (7) India-Australia-New Zealand plate | | | |

MINOR PLATES:--

- | | | | | |
|-----------------|-----------------|----------------|-------------------|----------------------|
| (1) COCOS PLATE | (2) NASCA PLATE | (3) FIJI PLATE | (4) ARABIAN PLATE | (5) PHILIPPINE PLATE |
|-----------------|-----------------|----------------|-------------------|----------------------|

THREE TYPES OF PLATE BOUNDARIES

1. Divergent boundaries
2. Convergent boundaries
3. Transform boundaries

DIVERGENT BOUNDARIES

- Where new crust is generated as the plates pull away from each other.
- The sites where the plates move away from each other are called Spreading sites.
- Best example is Mid-Atlantic Ridge.

CONVERGENT BOUNDARIES

- Where the crust is destroyed as one plate dived under another.
- The location where sinking of a plate occurs called subduction zone.
- There are Three ways of Convergence occur
 1. Between an oceanic and continental plate
 2. Between two oceanic plates
 3. Between two continental plates

TRANSFORM BOUNDARIES

- The plates slide horizontally past each other.
- There is neither produced nor destroyed.

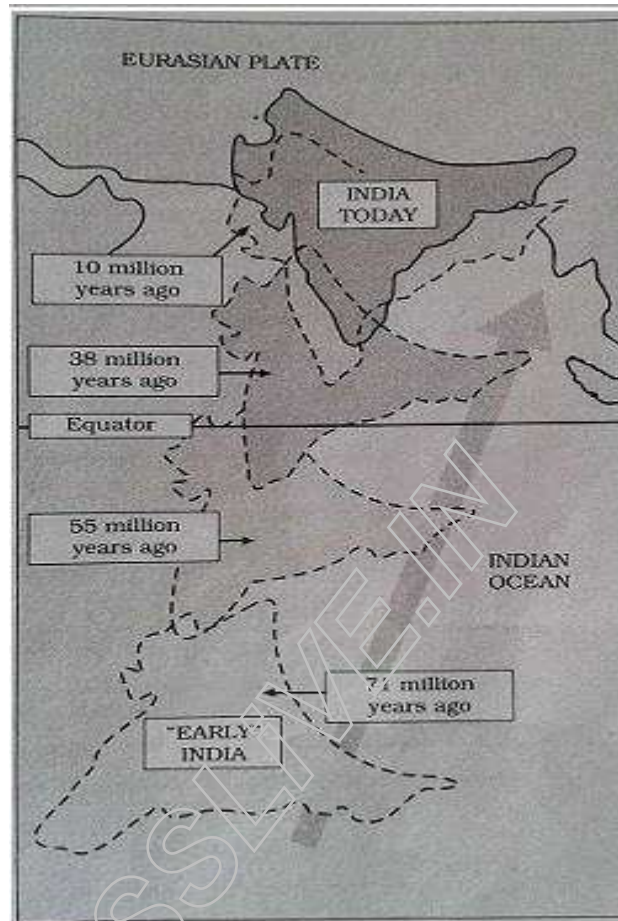
- The plate movement rate vary considerably.

- The Arctic ridge has the lowest rate (less than 2.5 cm/yr).
- East Pacific rise has the fastest rate (more than 15 cm/yr).

MOVEMENT OF THE INDIAN PLATE

- India was a large island situated off the Australian coast, in a vast ocean.
- India is supposed to have started her northward journey about 200 million years ago.
- About 140 million years ago the sub continent was located at 50° S latitude.

- About 60 million years ago a major event was occurred was the outpouring of lava and formation of the Deccan Traps. The subcontinent was close to the equator.
- About 40 million years ago the formation of Himalayas took place. This process is still continuing and the height of Himalaya is rising even to this date.



movement of indian plate

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