Toppersnotes
Unleash the topper in you

UGC-NET

GEOGRAPHY

NATIONAL TESTING AGENCY (NTA)

PAPER – 2 || VOLUME – 1

SIERRA INNOVATIONS

Index

UNIT – 1

GEOMORPHOLOGY

UNIT – 2

CLIMATOLOGY

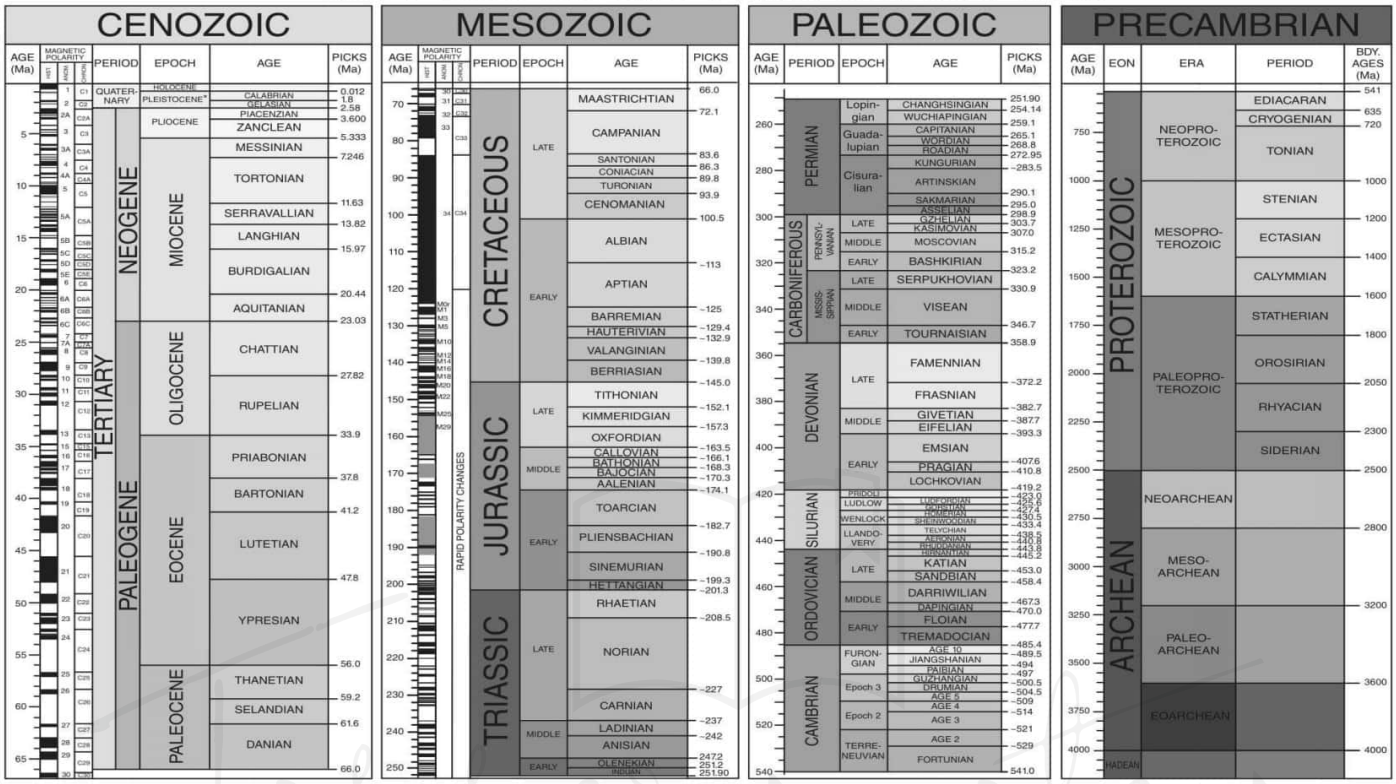
UNIT – 3

Oceanography

UNIT – 4

Geography of Environment

UNIT – I



#Concept of origin continent and ocean formation

1st concept-Sperm Nebula by lord kelvin

Concept-

* Firstly the earth is a type of hot nebula. Time to time it loose its heat and cooled then converts into some ups and down. Upland are denoted as continent part. Deeps are denoted as oceans.

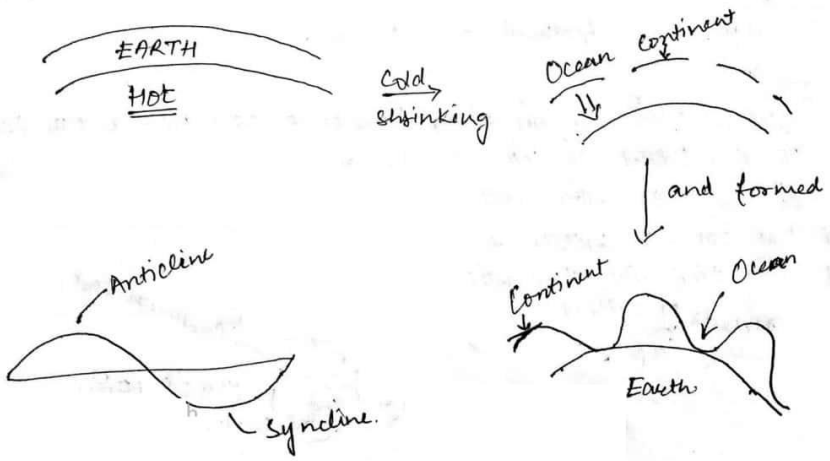
Criticism-

1. Mountain problem because the distribution of mountain is not defined in this theory.
2. Distribution of the hemispheres is not explained.
3. Ocean and land part will be changeable time to time.

2nd concept-synclinal and anticynclinal by- lepworth and love

Concept-

Firstly, Earth is hot then time to time the heat released then earth shrinking and occurring folds and formed anticline and synclinal landforms.



Synclinal and antisynclinal by love

In 1907 love analyse the problem by mathematical terms.

Concept-

* Analyse every mass has a geometric centre and a gravitational centre. By these centres the earth formed as features like continent and ocean.

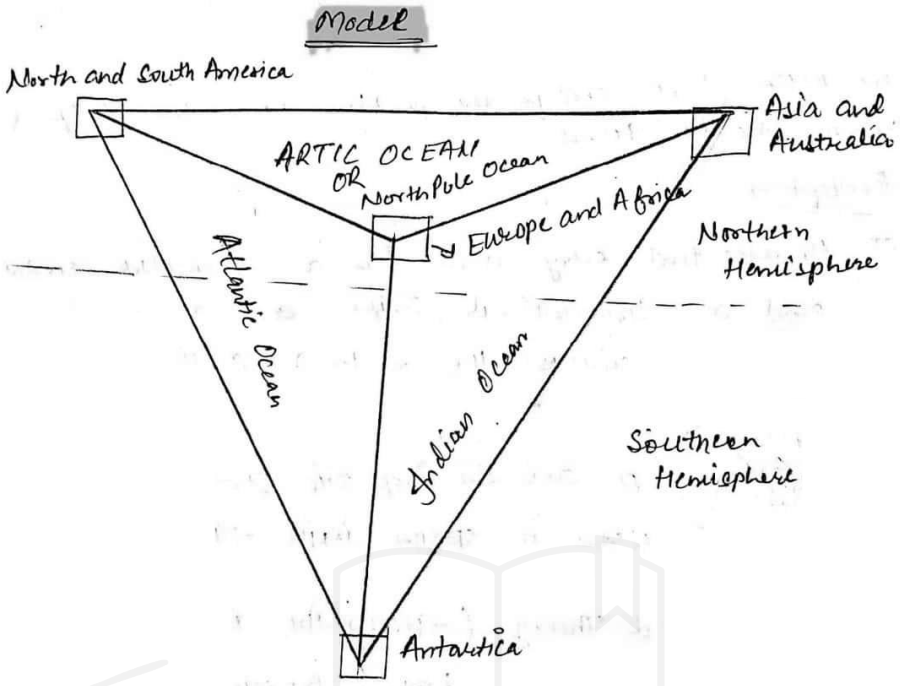
Tetrahedral theory by Lothian green (1875)

Assumption/questions-

1. Why land and ocean part are in antipodal situation?
2. Why north hemisphere has more land part then south hemisphere?

Concept-

* The earth is type of circle but when it shrinking it converts into tetrahedral shape.
* Continental edges are convex.



CONTINENTAL DRIFT THEORY

* F.B Taylor postulated his concept of "horizontal zontal displacement of the continent" in the year of 1908 but published only in the year 1910.
* The main purpose of his hypothesis was to explain the problems of the origin of the folded mountains of tertiary period.
* F.B Taylor wanted to solve the problem of the distributional pattern of tertiary folded mountains like Rockies, and es and alps type (alps, Caucasus and Himalayas).
* The concept of taylor, is considered to be first attempt in the field of continental drift though Antonio snidar. Antonio snidar presented his views about "drift" in the year 1858 in France. Snider explain the similarity of the fossils of the coal seams of carboniferous period in the north America and Europe.

Taylor started this theory from cretaceous period.

Acc. to him there are two land masses during cretaceous period. Lauratia and Gondwanaland were located near north and south poles respectively.

He assumed that the continents were made of sial which was practically absent in the oceanic crust.

According to Taylor there are two movements

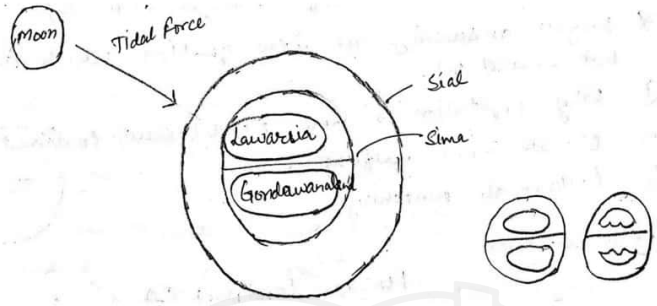
1. Towards equator.
2. Westward movement but driving force responsible for both types of movements was tidal force of the moon.

* Consequently tidal force of moon towards the moon towards the earth in a radial manner. This movement of land mass resulted into tensional force near the North Pole which caused stretching, splitting and rupture in the landmass.
* By this formation of baffin bay, labrodar sea and davis strait were found.

° Displacement of the Gondwanaland from the South Pole towards the equator causes splitting and disruption.

° By this formation Great Australian Bight and Ross sea were found.

1. Atlantic and Indian oceans are supposed to have formed because of filling of gaps between the drifting continents with water.
2. The Himalayas, Caucasus and Alps are formed during equator ward movement of the Laurasia and Gondwanaland from north and south poles respectively.
3. The Rockies and Andes were formed due to westward movement of the land masses (act as a lobe).



Criticism

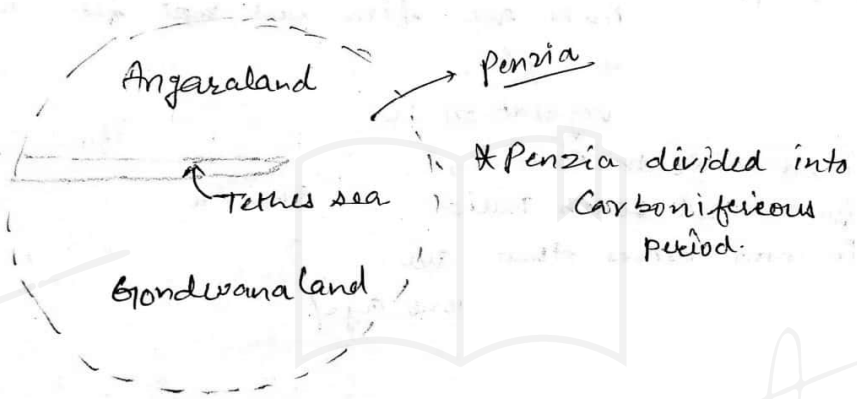
* F.B Taylor's explain the concept for origin of mountains but displacement of land masses up to 32-64 km would have sufficient enough for the purpose but he described displacement of the landmasses for thousands of kilometers.
* Moon made in cretaceous age but the rocky and Andes Mountains are made in Triassic age.
* Such a huge force can also stop the revolution of earth.

CONTINENT DRIFT THEORY OF WEGNER

* Professor Alfred Wegener of Germany was primarily a meteorologist. This concept entitled "die entstehung der kintinente and ozeane" and his book was translated in English in 1924.
* The main problem before Wegener, which needed explanation, was related to climate changes.
* The climate changes which have occurred on the globe may be explained in two ways:-
    1. If continent remains stationary at their places on earth, the climate zones might shifted from one region might have experienced varying climate conditions from time to time.
    2. If the climate zones remained stationary the land masses might have been displaced and drifted.

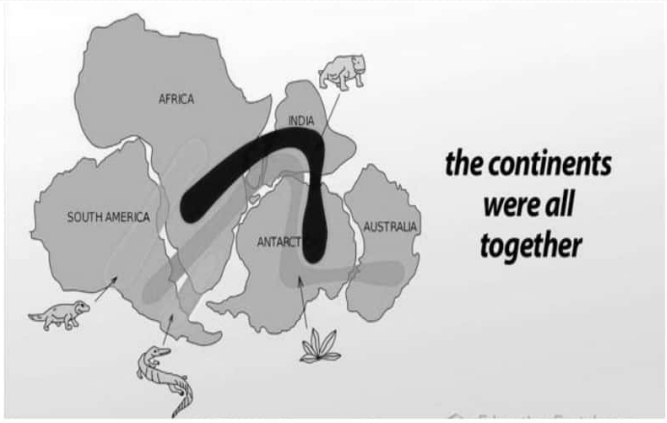
Basic premise of the theory

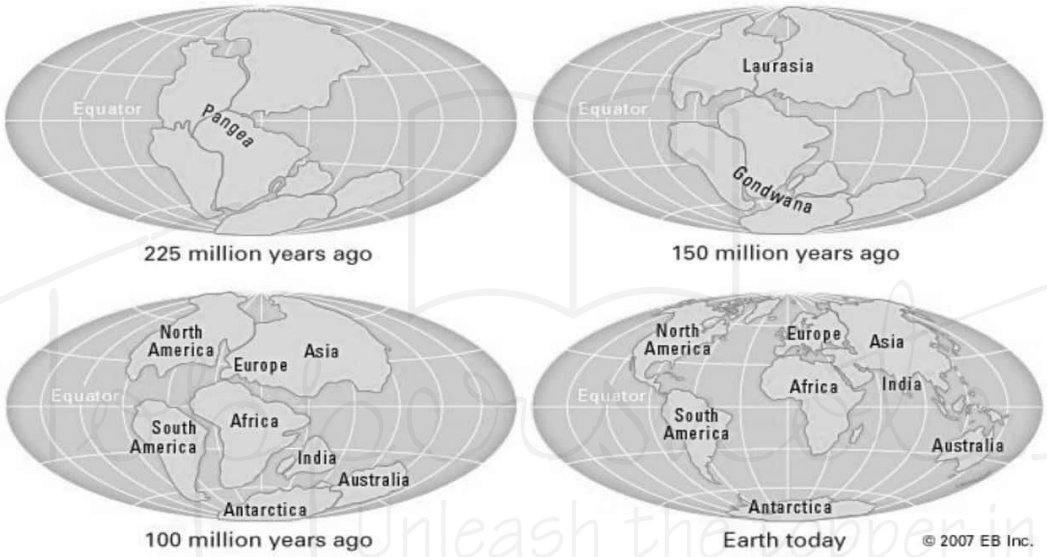
* Wegner follow the Edward suess three layer system sial, sima and nife. Sial easily floating on sima. He assumed, on basis of paleomagnetism, sea floor spreding and on basis of different scientific subjects, that all the landmasses were united together in the form of one landmass, named Pangaea, in carboniferous period. Pangaea surrounded by a huge water body (Panthalasa).
* The Wegener theory begins from carboniferous period. The Pangaea was disrupted during subsequent periods and broken landmasses drifted and resultant the continents and ocean became possible.



Evidence in support of the theory

* He claimed that all the present – day continent could be joined to Pangaea.
* The following evidences:-
  1. There is geographical similarity along both the coasts of the Atlantic Ocean.
  2. Geological evidence denote the Caledonian and hercynian mountains system of the western and eastern coastal areas of the Atlantic are similar identical.
  3. Geologically, both the coasts of the Atlantic are identical by Du Toit says after a detailed study that both coasts are more or less similar.
  4. There is marked similarity in the fossils and vegetation remains found on the eastern coast of South America and the western coast of Africa.
  5. Greenland is drifting westward at the rate of 20 cm per year. The evidence of sea floor spreading confirmed in 1960.
  6. The lemmings (small sized animals) of the northern part of Scandinavia have a tendency to run westward when their population is increased but they foundered in the sea water due to absence of any land beyond Norwegian coast.

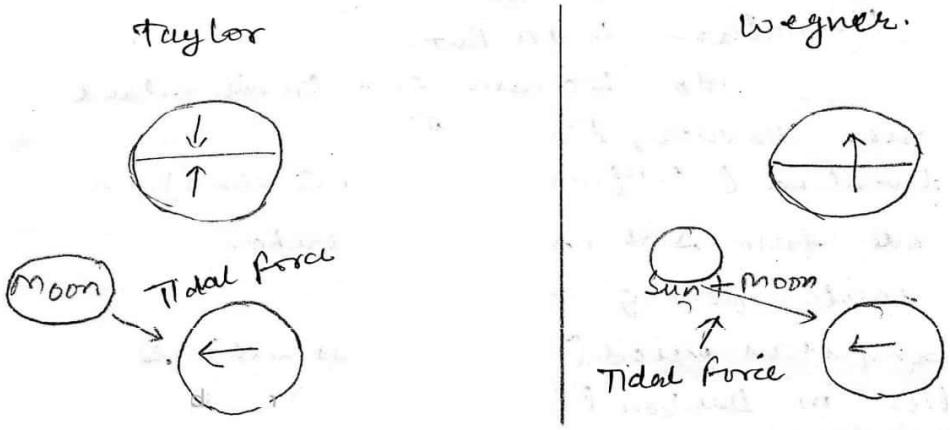




Process of the theory

* Force responsible for drift :-
  1. Equatorward or north ward.
  2. Westward movement.
* The equatorward and north ward movement of continental blocks was caused by gravitational differential force and force of buoyancy.
* The westward movement of the continents was caused by the tidal force of the sun and moon.

Difference between Taylor and Wegner concept.



Shifting of the positions of the poles

Silurian	14°N latitude 124°W longitude	To the north-west of Madagascar
Carboniferous	16°N latitude 147°W longitude	Near Durban in Natal
Tertiary	51°N latitude 153°W longitude	Near 53°S latitude to the South of Africa

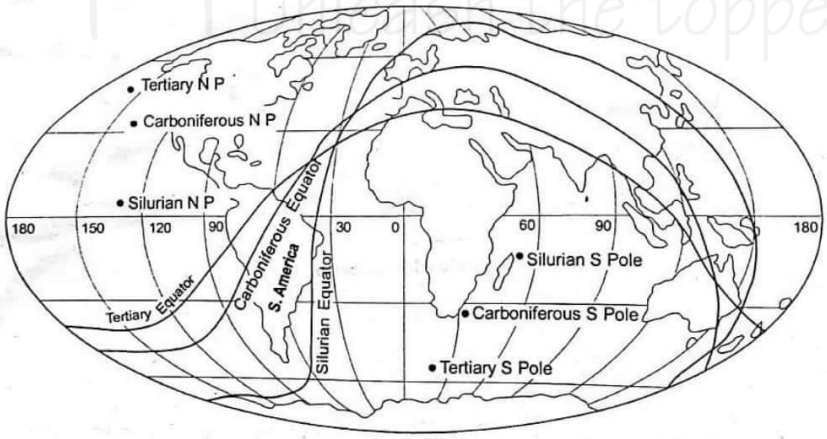
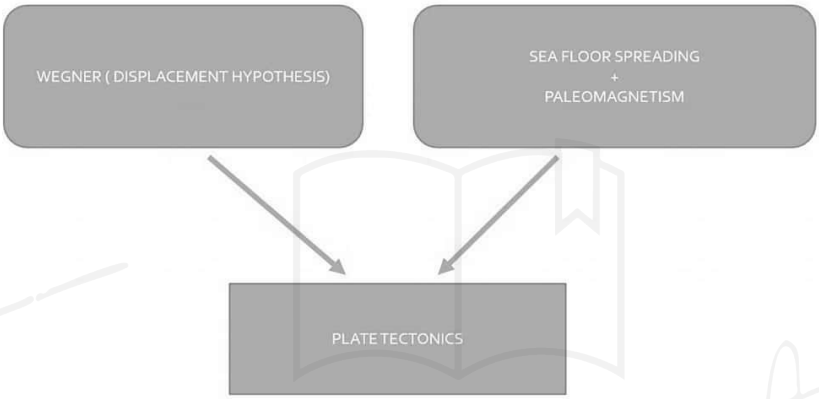


Fig. 5.6 : Different positions of Poles and Equator.

Criticism/evaluation of the theory

1. The forces applied by Wegener (tidal force of sun and moon or force) buoyancy are not sufficient enough to drift the continents so apart. This force would stop the earth's rotation.
2. Both the coast of the Atlantic Ocean cannot be completely refitted.
3. This theory remain useful in the present time because it solve many problem regarding the origin of continent and ocean.

MACHANISM OF PLATE TECTONIC THEORY



According to plate tectonic theory mountains are formed due to collision of two convergent plates. Mountains are always formed along the destructive plate boundaries. It is obvious that the process of mountain building is associated with destructive plate boundaries of two convergent plates. The plate tectonic theory gives a valid information about the formation of mountains due to compression of sediments caused by the collision of two convergent plate boundaries. Two plates moving together under the impact of thermal convective currents collide against each other and the plate boundary having relatively denser materials is sub-ducted under the other plate boundary of relatively lighter materials. This subduction zone is also called Benioff zone. The subduction of plate boundary causes lateral compressive force which ultimately squeezes and folds the sediments and materials of the margins of the plates and thus mountains are formed. The subducted part of the plate after reaching a depth of 100km or more in the mantle is liquefied and thus expands in volume because of conversion of the portion of plate into magma. This expansion of molten materials causes further rise in the mountains.

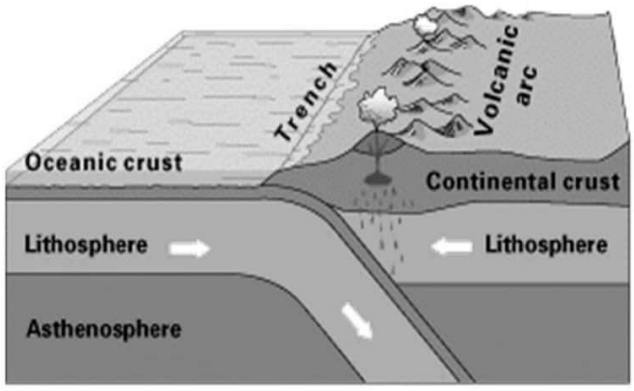
The convergence and consequent collision of plate boundaries occurs in three situations
(i) Collision of two oceanic plates
(ii) Collision of oceanic-continental plates
(iii) Collision of two continental plates

1. Convergence of two oceanic plates:

The collision of two oceanic plates and subduction of the boundary of the plate of relatively denser materials results in the formation of the fold mountain ranges of island arcs and festoons (like a row), for example, island arcs and festoons formed by Japanese islands, Philippines etc. around the western margin of the Pacific Ocean off the east coast of Asia.

The best example of the formation of mountains due to collision of two oceanic plates is the situation of Japanese island arc. Mountains of Japan range in height from 3000m to 4000mAMSL.

* According to plate tectonic theory the subducted portion of plate after reaching a depth of 100km or more starts melting due to high temperature prevailing in the upper mantle. The magma, thus formed, go up and appears as volcanic eruption about 200km away from the oceanic trench. Since Japan is very close to the Japan Trench and hence western part of Japan is more frequented by volcanic activities. This process is still continuing as the Pacific plate is being continuously subducted under the oceanic crust along the Japan Trench.



Oceanic-continental convergence

2. Convergence of continental and oceanic plates:

The collision of continental and oceanic convergent plates results in the formation of cordillera type of folded mountains, e.g., the western cordillera of North America (including the Rockies).

When one continental and the other oceanic plates collide due to their convergence along subduction or Benioff zone, the oceanic plate boundary being heavier due to comparatively denser materials is subducted below the continental plate boundary.

The sediments deposited on the continental margins are squeezed and folded due to compressive forces caused by the subduction of oceanic plate. The Rockies and the Andes mountains were formed due to subduction of the Pacific Ocean plate under the American continental plate.

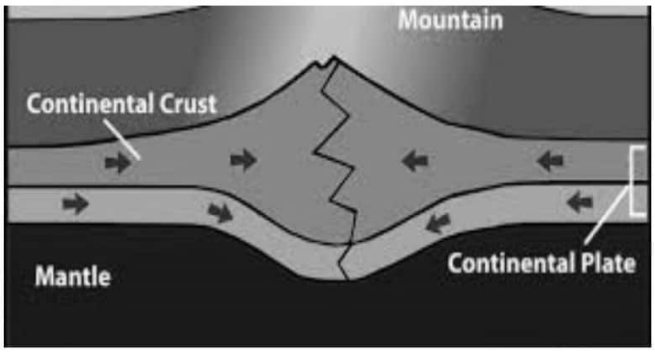
3. Convergence of two continental plates:

When two convergent plates composed of continental crusts collide against each other, the continental plate having relatively denser materials is subducted under the other continental plate having comparatively lighter materials than the former.

The resultant lateral compression squeezes and folds the sediments deposited on either side of continental plate margins and the sediments of the geosynclines lying between two convergent continental plates and thus forms extensive folded mountains e.g. the Alps and the Himalayas.

The origin of the Alpine mountains of Europe and Asia is well explained on the basis of this mechanism (collision of two convergent continental plate boundaries) of plate tectonics.

About 70-65 million years ago there was an extensive geosyncline, known as Tethys geosyncline, in the place of the Himalayas.



The geo-synclinal sediments of Tethys sea were squeezed and folded into Alpine-Himalayan mountain chains due to lateral compressive forces caused by the convergence and collision of Eurasian and African-Indian continental plates during

Cenozoic Era. Tethys geosyncline was bordered by Asiatic plate in the north and Indian plate in the south.

Tethys geosyncline began to contract in size due to movement of Indian and Asiatic plates together. About 60-30 million years ago the Indian plate came very close to Asiatic plate.

#Plate tectonics

The internal hard substance in the earth is called plate.

The term 'plate' was first used by Canadian geologist J.T. Wilson in 1965.

According to condition and weightage plate is divided into two types:-

1. Continent plate 2.67g cm $^{-3}$
2. Oceanic plate 2.95g cm $^{-3}$

McKenzie and Parker, W.J. Morgan and Le Pichon elaborated the various aspects of plate tectonics.

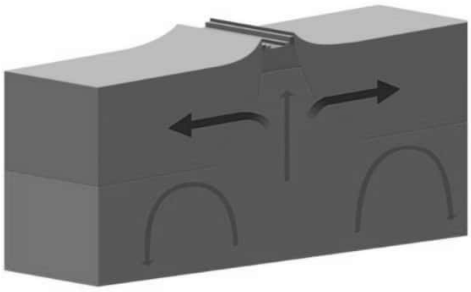
First plate tectonics given by Harry Hess (Priston university) in 1960. He elaborated the mechanism of plate movement on the basis of the evidences of sea-floor spreading.

Plate tectonic theory is a comprehensive theory which offers explanations for various relief features and tectonic events viz. mountain building, folding and faulting, continental drift, vulcanicity, seismic events (earthquakes) etc.

Three types of plate boundaries have been identified:

1. Constructive plate margins (Divergent Plate Boundary)
2. Destructive plate margins (Convergent Plate Boundary)
3. Conservative plate margins (Transform Plate Boundary)

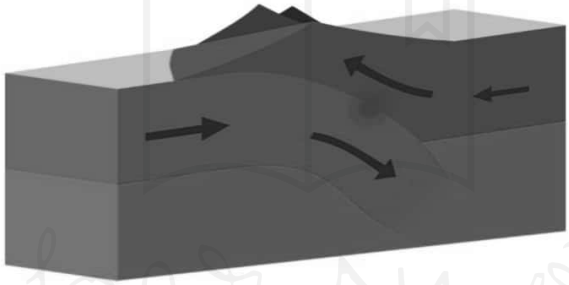
1. <u>Constructive plate Margins (Divergent Plate Boundary)</u>:



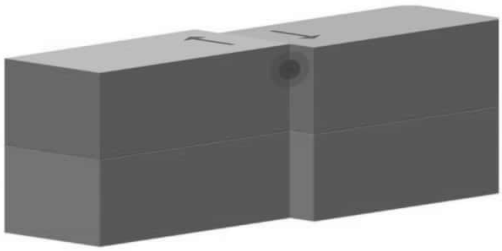
Also called as 'divergent plate boundaries' represent zones of divergence along the mid- oceanic ridges and are characterized by continuous addition (accretion) of materials as there is constant upwelling of molten materials (basaltic lavas) from below the mid oceanic ridges. These basaltic lavas are cooled and solidified and are added to the trailing margins of the divergent plates and thus new oceanic crust is continuously formed. Example- mid Atlantic Ocean plates makes new crust.

2. Destructive plate Margins (Convergent Plate Boundary):

   Also known as 'convergent plate boundaries' are those where two plates collide against each other and the leading edge of one plate having relatively lighter material overrides the other plate and the overridden plate boundary of relatively denser material is sub-ducted or thrust into the upper mantle and thus a part of the crust is lost in the mantle. This mechanism results in constant loss of crustal materials. Example- ring of fire in Pacific Ocean.



3. Conservative plate Margins (Transform Plate Boundary):
   Also known as 'shear plate boundaries' are those where two plates slip past each other without any collision along the transform fault and thus crust is neither created nor destroyed. Example – rift valley (Jordan to Jambaji)

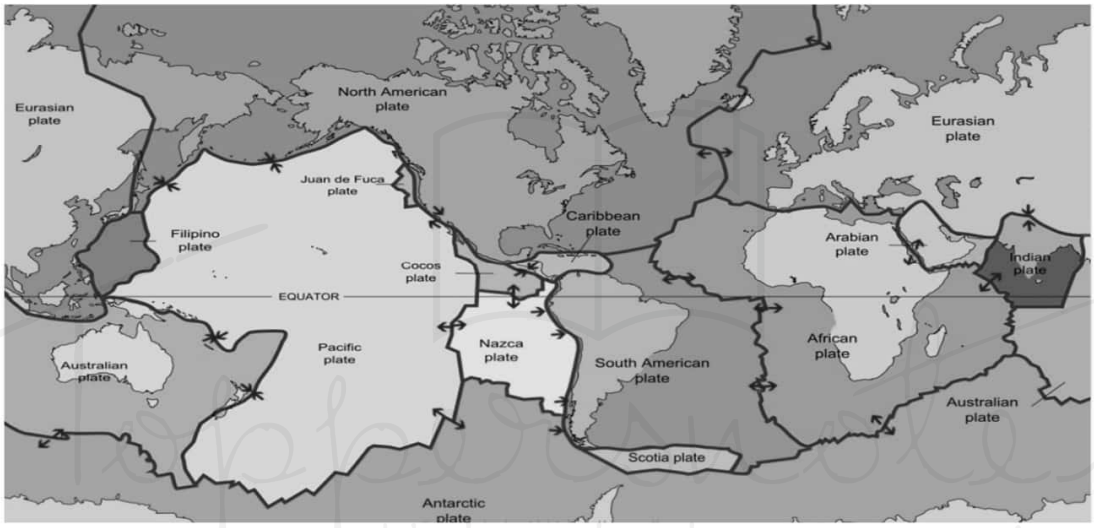


Major tectonic plates

1. Antarctica and the surrounding oceanic plate
2. North American plate
3. South American plate
4. Pacific plate
5. India-Australia-New Zealand plate
6. Africa with the eastern Atlantic floor plate
7. Eurasia and the adjacent oceanic plate

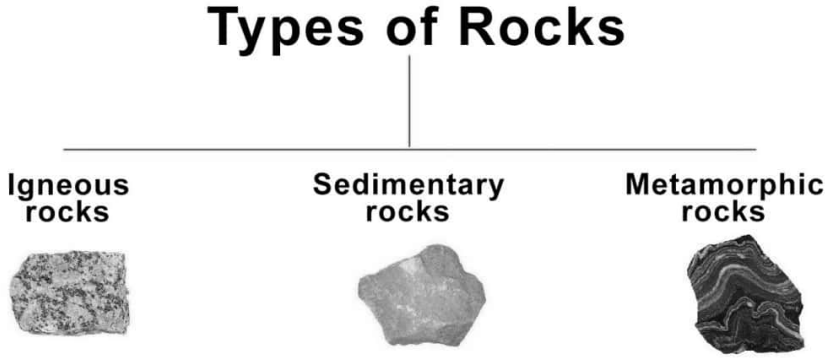
Minor tectonic plates

1. Cocos plate: Between Central America and Pacific plate
2. Nazca plate: Between South America and Pacific plate
3. Arabian plate: Mostly the Saudi Arabian landmass
4. Philippine plate: Between the Asiatic and Pacific plate
5. Turkish plate,
6. Aegean plate (Mediterranean region),
7. Caribbean plate,
8. Juan de Fuca plate (between Pacific and North American plates)
9. Iranian plate.



#Rocks

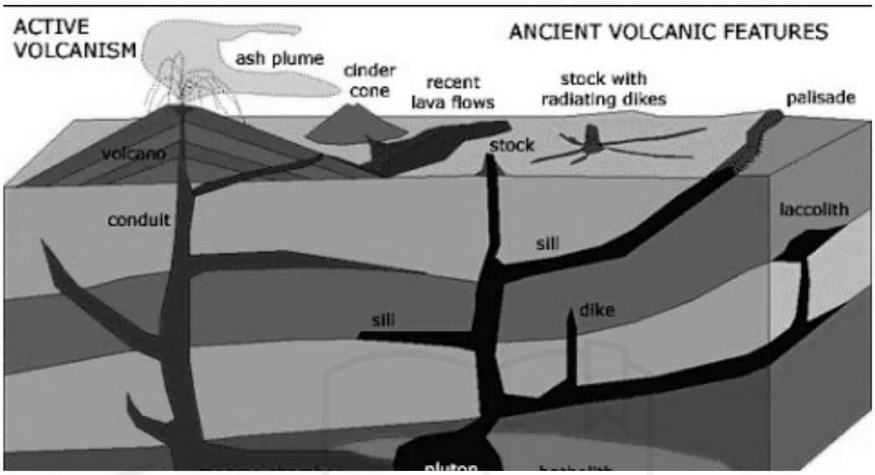
A rock is a naturally formed, non-living earth material. Rocks are made of collections of mineral grains that are held together in a firm, solid mass. Rocks are identified primarily by the minerals they contain and by their texture.



IGNEOUS ROCKS

Specifications:-

Hard, crystalline type, formation by cooling the magma.



ON BASIS OF MAGMA ERRUPTION

Fisser eruption: - when eruption through the wide hole and spread on the earth easily. For ex.-deccan trap.

Central eruption: - when eruption through the centre and a narrow hole. It erupted very furious type such like an active volcano.

Distribution on the basis of amount of silica

Amount	Name	Interior igneous rock	Exterior igneous rocks
65% and more	Silica, fanatic	Granite	Riolite
65%	Intermideate	Diorite	Andasite
45-65%	Acidic (basic)	Gabro	Basalt
0-45%	Altra basic	Paridatite	--------

On the basis of size/particles

In increasing order:-

* Glassy
* Afanatic
* Fanatic
* Pigmatic
* Performatic