Research Paper IMPACT FACTOR VALUE : 5.983 | E-ISSN NO : 2455-295X | VOLUME : 11 | ISSUE : 12 |DECEMBER 2025

DETERMINANTS OF GEOMORPHOS: PLATE TECTONICS

AAKASH RAINA [1]

[1] ASSISTANT PROFESSOR, GEOGRAPHY, DADA PAMMA RAM GIRLS PG COLLEGE, SRI VIJAYNAGAR.

ABSTRACT:

Everything in the Universe, is subject to change. As such, the topography of our planet has been changing from it's inception to the present.

Earth's external and internal forces are responsible for these changes. Planets are major factors in these internal forces. A plate is a rigid shapeless land mass and the study of the nature and flow of these plates is called plate tectonics.

KEYWORDS:

BENNI-OFF ZONE, HOT PLUMES, CONTINENTAL DRIFT, ISLAND ARC, CONVERGENT EDGE, DIVERGENT EDGE.

PAPER ACCEPTED DATE:	PAPER PUBLISHED DATE:
25th December 2025	28th December 2025

SUBJECT PRESENTMENT:

Plate Tectonics refers to that large process by which landforms are determined. It is made up of two words,'Plate' – A rigid landmass,'Tectonic' – Movement or Motion.

The term 'Plate' first coined by Professor 'Hugo Wilson' of the University of Toronto (Canada) in 1965. Morgan and his colleagues (Parker and Mackenzie) proposed the theory of 'Plate Tectonics' in 1967.

TYPES OF PLATES

1. Macro/Primary Plates — Secondary/Small Plates

There are seven (7) large plates in the interior of the Earth:-

(1) **Pacific plate** – Oceanic Plate.
Direction – North – East, Motion – 1-3 cm./year

(2) **Eurasian Plate** – Continental Plate
Direction – to East, Motion – 2-3 cm./year

(3) **African Plate** – Continental Plate
Direction – North – East, Motion – 2-3 cm./year

(4) **Indo-Australian plate**-Oceanic-Continental Plate,
Direction-North-East,Motion-7-8cm/year

(5) **North American Plate**-Continental Plate
Direction-West,Motion-2-3cm./Year

(6) **South American Plate**-Continental Plate
Direction -West,Motion-2-3cm./Year

(7) **Antarctic Plate**-Continental Plate Located at South Pole,
Direction and Motion are Stable(Because Surrounded by Divergent Plate Boundaries).

MINOR/ACCESSORY/SMALL PLATES:

(1) **Juande Fuca Plate**–Small Oceanic Plate Located at West to North America &East of Pacific Ocean.

(2) **Cocos Plate**–Itis an Oceanic Plate, Located West of South America &South-East of the Pacific Ocean.

(3) **Nazca Plate**–It is an Oceanic Plate, located West of South America & South – East of the Pacific Ocean.

(4) **Scotia Plate**– Itis in the Southern Part of South America.

(5) **Caribbean Plate**– It is Located Between North and South America, down to Caribbean Sea.

(6) **Arabian Plate**– Extendsto Arabian Peninsula, Persian Gulf & Red Sea.

(7) **Somali Plate**–Thisplate Covers Horn of Africa (Somalia, Ethiopia) & Madagascar, located at Eastern side of Africa.

(8) **Caroline Plate**– Itis an Oceanic Plate Which lies Near the Equator in the Western Pacific.

(9) **Fuji Plate**– Located at North-Eastern Side of Australia.

(10) **Philippine Plate** – This is an Oceanic Tectonic Plate Situated in the Western Pacific Ocean.

(11) **Anatolian plate** – A Continental Tectonic Plate Lying under Asiatic Part of Turkey, known as Anatolia.

(12) **Bismarck Plate** – This minor plate is located at western side of Pacific Ocean and near to Philippine.

(13) **Burma Plate** –Itis a minor tectonic plate, located in the sound- East Asia encompassing Myanmar (Burma).

(14) **Sunda Plate** –Thisplate Consist South-Eastern part of Asia with South China Sea & Island Countries.

(15) **Gorda Plate** – It is a small oceanic tectonic Plate, located at the coast of Northern California.

(16) **Capricorn Plate** – This plate lying beneath the Indian Ocean basin in the southern and Eastern Hemisphere.

MAJOR FORCES RELATE TO PLATE FLOW:

1- **Convective current forces** :- Origin form the 'Asthenosphere' According to AsthurHolmes ' Radioactive elements' (Hot Plums)

2- **Secondary forces** : -

1. Gravitational forces 2. Surface tension forces 3. Buoyance force, thermal force, earth's rotational forces.

Plates move through various forces, creating plate edges where geological activity occurs. Thus there are there plate boundaries.

(1) **Divergent plate Margin / Boundary**-

Where two plates move in opposite directions, there edges are called divergent boundaries, this is also called creative edge.

Hot plums : Radioactive elements are found in the Asthenosphere. This is due to the high temperature. Rocks melt to form hot magma, which moves vertically in the form of "Hot Plums"

This creates tensional forces on the underside of the plates, causing the two plates to move in opposite direction. Divergence of two plates creates a normal fault. Normal faults eject hot magma. Hot liquid magma solidifies as basaltic lava, forming an oceanic ridge, hence it's also called " constructive margin."

(2) **Convergent plate edge / boundary:**

When two plates come closer to each other and collide, that margin is called convergent edge.

When convection waves generated by hot liquid magma move laterally beneath the plate, compressional forces are exerted on plates.This cause the plates to collide as they come closer to each other. This causes the displacement of a heavier, higher density plate. This heavier plate enters the asthenosphere and melts rapidly due to the high temperature. Meting of the plate leads to its destruction, hence it's called " Destructive plate edge."

TYPES OF CONVERGENT PLATE MARGINS:-

(1) Oceanic – oceanic convergence

(2) Oceanic- continental convergence

(3) Continental – continental convergence

THE FOLLOWING EVENTS OCCUR AT CONVERGENT BOUNDARIES:-

- Formation of mountains
- Formation of deep depressions
- Origin of explosive volcanoes
- Origin of earth quakes of high intensity and deep depth.

BENI OFF ZONE:

It is a geological region where two tectonic, plates meet. They collide, causing one plate to be subducted beneath the other, which then melts into magma. This causes earthquakes in this magma. This Causes earthquakes in this region, which can extend as deep as 700 km. into the Earth. The region is named after American seismologist ' Hugo Benioff', who described it in detail.

3- **Transform Margin or Conservative plate Boundary/Edge:**

At these plate boundaries , the plates move close to each-other, and lateral motion cause the plates to move parallel to each other. At such boundaries, neither a new plate is created nor a plate is destroyed. A transform fold is formed between the two plates. For example the ' San Andreas Fault' and the ' Africa great Right Valley.'

RESULT OF PLATE TECTONIC PROCESS:

1. **Continental Drift** – Due to the force generated by convection currents, there is a movement in the continents and ocean plates, due to which there is displacement of the continents which is continents and oceans emerged in the 'Pliocene period.'
2. **Formation of Mid-Ocean Ridges** – Due to the movement of plates hot liquid magma comes out due to tension force at the divergent plate edges and forms a chain of mid-ocean ridges thousands of km long in the form of fissure, eruptions. Exp- 'Mid Atlantic ridge.'
3. **Formation of fold mountains** – Continental crust is folded under compressional forces at Convergent plate margins and forms Folded Mountains. Exp- Rockies, Andes, Himalayas.
4. **Formation oceanic trenches-**The seduction of a heavier plate onto a convergent plate creates trenches along the ocean's edge. Exp- Curile Ternch, Chile trench, Japan Trench.
5. **Origin of Volcanoes and Earthquakes** –Volcanoes and Earthquakes originate with difference in intensity on all three sides of the

plates.

6. **Island Arcs** – Due to the presence of oceanic-oceanic margins at convergent boundaries, a series of island arcs are formed in are-shape, in the ocean. Exp. - Aleutian Arc, CurileArc, Philippine Arc, Japan Arc etc.

CONCLUSION:

The huge, located inside the Earth, rigid land masses are called plates, which move 2-20cm per year. Plate tectonic demonstrates that continents as well as the oceans, are not static, and the Earth's primary land forms and major geomorphologies are determined by these plates.

REFERENCES

1. Physical geography – Savindra Singh

2. Principal of Geomorphology – W.D. Thornburg

3. Physical Geography – Mazid Hussain

4. Bhugol ek samagra Adhyan – Mahesh Barmwal

5. Physical Geography – Stapler

6. Principles of physical geography – Arther Holmes

7. Physical, Economic and Human Geography- D.R. Khullar