

Plate Tectonics: Concept, Plate Margins, types & movements

Welcome Students

My name is Dixita Shingadi, Assistant Professor in Geography from Government College of Arts, Science and Commerce, Quepem-Goa. In this module we will be learning about Plate Tectonic theory.

Learning outcomes

At the end of this session you will be able to:

1. Understand the mechanism of plate tectonics.
2. Differentiate between the three types of plate margin.

Introduction

Earth's interior is divided into three layers i.e. crust, mantle and core. Crust and upper part of the mantle makes up the lithosphere. Earth's surface is divided into several tectonic plates. These tectonic plates are also called as the Lithospheric plates. These Lithospheric plates can be defined as rigid, and the solid crystal layers which are constantly in motion. The term tectonics means the deformation of the earth crust (construction or building of the earth surface). Hence the entire mechanism of the movement of the plates and the resultant reactions out of it is called as the plate tectonics.

The word plate tectonics was first put forth by Tuzo Wilson in 1965. Later in 1967, this theory was put forth by the W. J. Morgan. It is based on the continental drift theory proposed by Alfred Wegner. Hence this entire theory of plate tectonics states that the earth surface is divided into several tectonic plates, and these tectonic plates are constantly in motion. Scientists believe that the convection currents rising up from the Asthenosphere is the main reason for the movement of this place.

Plate boundary and the plate margin

Plate boundary is the location where these two plates meet whereas plate margin is the outer edge of the plate. Understanding the difference between two is very important for the understanding of this theory. As mentioned earlier that the earth surface is divided into several tectonic plates, some of these tectonic plates are bigger in size and some of them are smaller in size. The bigger plates are called as the major plates, which are seven in number. They are Eurasian, Indo-Australian, African, North American, South American, Pacific and the Antarctica Plate.

There are several minor plates which are smaller in size, like for example Nazca, Cocos, Caribbean, Arabian Plate, etc. This is the concise picture of the major and the minor Lithospheric plates of the earth surface. Here you can see; this is the Pacific Plate, North American plate, South American plate, African

Plate, Eurasian Plate, Australian plate. Similarly, these are minor plates like Philippine plate, then Cocos Plate, Nazca Plate, Caribbean Plate and many more.

If you look at all the major plates of the Earth surface except Pacific Plate, which is completely consist of oceanic crust, all the other major plates have both oceanic as well as the continental crust. Example- African plate consists of the African continent as well as the southern part of Atlantic Ocean and Indian Ocean.

Types of plate margins

There are three types of plate margins; Constructive, disruptive and conservative.

1. Constructive plate margin or the divergent plate boundary

In this, the two plates move away from each other at the mid oceanic ridge and the hot molten material that is, the magma rises from the Asthenosphere and solidifies at the edges of the plate. The solidification of this magma leads to the formation of new crust, which is also called as the sea floor spreading. This plate margin is called as the constructive plate margin because here the new crust is formed on the ocean floor. Mid Atlantic Ocean ridge and East African Rift are some of the examples of the divergent plate boundary.

2. Destructive plate margin or the convergent plate boundary.

In this, the two plates move towards each other and the plate having the higher density, like in this case it is the oceanic plate which plunges down into the Asthenosphere. This process is called as the Subduction zone. The subducted plate melts into the Asthenosphere due to the heavy temperature and rises in the form of volcano. This plate margin is called as destructive plate margin because here the part of the earth crust is destructed or loss under the earth surface. This type of plate boundary is associated with various geological events like mountain building, volcanoes and earthquakes. This plate boundary is further subdivided into three types:

- A. **Continent and Oceanic-** When one continental plate and the other oceanic plate converge or move towards each other, the oceanic plate being denser, it subducts and volcanic eruption occurs.
- B. **Oceanic and Oceanic-** Similarly, when the two oceanic plates converge or move towards each other, the Subduction occurs, and gives rise to volcanic eruption.
- C. **Continent and Continent-** When the two continental plates move towards each other, Subduction doesn't occur. When the two plates move towards each other, the edges of the plates are compressed, folded, and uplifted which leads to the formation of mountains. Like for example: Himalayan mountain chain is formed due to the convergence of two continental plates i.e. the Eurasian plate and the Indo-Australian Plate.

3. Conservative plate

In this, the two plates slide past each other and the crust is neither created nor destroyed. That is why it is called as the conservative plate margin. New crust is not created and not even the part of the earth crust is disrupted. The best example of this is the Saint Andreas Fault at California in USA, which is formed due to the transform plate boundary.

This is the concise picture of three types of plate movement wherein you can see the transform plate boundary, divergent plate boundary, and a convergent plate boundary. The tectonic movements of these plates are very important for the formation or the destruction of the land masses and the ocean floor. The Meso-geo landscapes like mountains, example- Himalayas, Rockies, Andes, etc. have been formed due to the movement of these Tectonic plates. Similarly, the changes on the ocean floor, or the formation of the deep oceanic features like trenches, are formed due to the crustal plate movements.

Finally, to conclude I would like to say that, though this theory has faced certain criticism but it is considered as one of the most valid explanations for various geological events.

These are the references

Thank you.