NATURE OF PLATE

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Abstract:

The nature is cover by the colour of blue and green, blue is the ocean and the green is the vegetation. All this are separated by the plates, which are derived from a single continent as per the thesis of Wegner. There are a no of plates in different size, structure etc, some are continental , some are oceanic. These are all moving on the underlying magma. Their movements also have a variant. So the nature of the plates have a deep impact on the earth.

Keywords: continental plate, oceanic plate, magma, nature, movement of plate, size and structure of plate

INTRODUCTION:

Earth's tectonic plates may have taken as long as 1 billion years to form. Starting roughly 4 billion years ago, cooler plates of Earth's crust were pulled downward into the warmer upper mantle damaging and weakling the surrounding crust. The process happen again and again until the weak area formed plate boundaries. Other researchers have estimated that a global tectonic plate system emerged around 3 billion years ago. All the plates are floating over the underlying hot asthenosphere. There are mainly two type of plates can be found , Continental plates and oceanic plates. There are a number of plate on the surface mainly 7 major plates can be found, some are medium plates and a huge number of micro plates. Some plates are thicker, likely some are lighter. The density of each plates are different and the size are also differ from each other. So their movements are also different in speed and also in the direction. A tectonic plates is also called lithospheric plate which are mainly made by Continental and Oceanic crust. The continental crust is mainly composed of granite rocks which are made up relatively lighter minerals such as quartz and feldspar.

STRUCTURE AND COMPOSITION OF PLATES:

A plate is a structural element which is characterized by two key properties. Firstly, its geometric configuration is a three-dimensional solid whose thickness is very small when compared with other dimensions. Secondly, the effects of the loads that are expected to be applied on it only generate stresses whose resultants are, in practical terms, exclusively normal to the element's thickness. Thin plates are initially flat structural members bounded by two parallel planes, called faces, and a cylindrical surface, called an edge or boundary. Geometrically, plates are bounded either by straight or curved boundaries.

The static or dynamic loads carried by plates are predominantly perpendicular to the plate faces. Core Mantle and crust are divisions based on composition. The crust make up less than 1% of 8 earth by mass, consisting of oceanic crushed and Continental crust is often more felsic rock. The mental is hot and represents about 68% of Earth's mass. Finally the code is mostly made by Iron metal. The code makes up about 31% of the earth. Lithosphere and asthenosphere are divisions based on Mechanical properties. The lithosphere is composed of both the crust and the portion of the upper Mantle that behaves as a brittle, rigid solid. The asthenosphere is partially molten upper mental materials that behaves plastically and can flow.

- **CRUST AND LITHOSPHERE:**

Earth's outer surface is the crust a cold thin, brittle outer shell made of rocks. The crust is very thin related to the radius of the planet. There are two very different type of crust, each with its own distinctive physical and chemical properties. Oceanic crust is composed of magma that erupts on the sea floor to create basaltic Lava flow or cool deeper down to create the intrusive igneous rock. Sediments, primarily mud and the shells of tiny sea creatures, coat the sea floor. Sediments is thickest near the shore where it comes off the continents in rivers and on wind currents. Continental crust is made up of many types of igneous, metamorphic and sedimentary rocks. The average composition of granite, which is much less dense than the mafic igneous rocks of the ocean is crust. Because it is thick and has relatively low density, Continental crust rises higher on the mantle then the ocean crust, which sinks into the mantle to form best scenes. When filled with water these basins form the earth's oceans. The lithosphere is the outermost mechanical layer which behaves as a brittle, rigid solid. The lithosphere is near about 100 KM thick. The definition of the lithosphere is based on how Earth materials behave so it include the Crust and the uppermost mantle which are both brittle. Since it is brittle and rigid, when stresses act on the lithosphere, it breaks. This is known as earthquake.

- **MANTLE:**

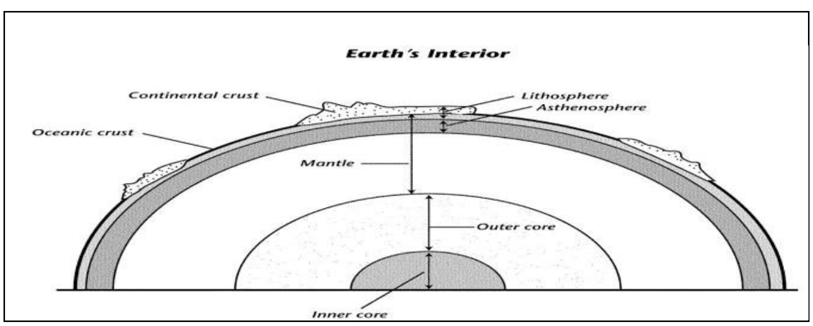
The two most important things about the mantle are, it is made of solid rocks and it is hot. Scientists know that the mantle, is made of rocks based on evidence of seismic waves heat flow and meteorites. The properties fit the ultramafic rocks peridotite which is made of the iron and magnesium, rich silicate minerals. Peridotite is really found on the Earth's surface. Scientists knows that the mantle is extremely hot because the heat flowing outward from it and because of its physical properties. Heat flows into different ways in the earth, search Convection and conduction processes. Conduction is defined as a heat transfer that occurs through repaid collisions of atoms, which can only happen if the materials is solid. Heat flows from warmer to the coolest place until all are the same temperature. The mantle is host mostly because of heat conduction from the core. Convection currents within Earth mantle form as materials near the core heats up. As the code heats the bottom layer of mantle materials particles move more rapidly, decreasing its density and causing it to rise. The rising materials begin the Convection currents. When the warm materials reach the surface it spreads horizontally. It eventually becomes cool and denser enough to sink Back Down into the mantle. At the bottom of the mantle the materials travel horizontally and heated by the core. It reaches by the location where warm mantle materials rises, and the mantle convictions cell is complete.

- Solid rock, comprised entirely of ultramafic peridotite (82% of Earth’s volume)
- Density increases from ~3.5 g/cm3 at top to ~5.5 g/cm3 at base
- Below ~100 km depth, mantle is hot enough to flow very slowly (~15 cm/year)

This is known as convection: hot material rises, cool material sinks 2885 km thick in total, but split into two separate sub layers: Upper mantle (0–660 km depth) Lower mantle (660–2900 km depth) Also includes the transition zone between 400–660 km depth

- **CORE:**

At the planet's center lies are dense metallic core. Scientists known that the core is metal for the few reasons. The densely Earth's surface layers is much less than the overall density of the planet, as calculated from the planet's rotation. If the surface layers are less dense then average, then the interior must be denser than average. Calculations indicate that the core is about 85% iron metal with the Nickel metal making up much of the remaining 15%. Also metallic materials are thought to be representative of the core. If Earth's core is not metal the planet would not have a magnetic field. Metal such as iron ore magnetic, but rocks which makes up the mantle and crust, is not. Scientists know that the outer core is liquid and the inner core is solid because S waves stop the inner core. The strong magnetic field is caused by conviction in the liquid outer Core. Convection currents in the outer core are due to heat from the even hotter inner core. The heat that keeps the outer core from solidifying is produced by the breakdown of radioactive elements in the inner core.



- A metal alloy containing mainly iron (Fe) and Nickel (Ni)
- Also rich in heavy metals such as platinum (Pt) and gold (Au)
- Inner core is solid Density is 13 g/cm3 1220 km thick
- Outer core is liquid Density is 10–12 g/cm3 2255 km thick
- Initially mostly liquid, but has cooled over time and partially solidified
- Flow in the outer core generates the Earth's magnetic field

HOW PLATES MOVE:

Convection within the Earth's mantle causes the plates to move. Mantle material is heated above the core. The hot mantle rises up towards the surface. As the mantle rises it cools. At the surface the material moves horizontally away from a mid-ocean ridge crest. The material continues to cool. It sinks back down
into the mantle at a deep sea trench. The material sinks back down to the core. It moves horizontally again, completing a convection cell.

PLATE BOUNDARIES:

Plate boundaries are where two plates meet. Most geologic activity takes place at plate boundaries. This activity includes volcanoes, earthquakes, and mountain building. The activity occurs as plates interact. How can plates interact? Plates can move away from each other. They can move toward each other. Finally, they can slide past each other.
These are the three types of plate boundaries:

1. Divergent plate boundaries: the two plates move away from each other.
2. Convergent plate boundaries: the two plates move towards each other.
3. Transform plate boundaries: the two plates slip past each other.

ACTIVE PLATE MARGINS:

Western North America has volcanoes and earthquakes. Mountains line the region. California, with its volcanoes and earthquakes, is an important part of the Pacific Ring of Fire. This is the boundary between the North American and Pacific Plates.

PASSIVE PLATE MARGINS:

Mountain ranges also line the eastern edge of North America. But there are no active volcanoes or earthquakes. Where did those mountains come from? These mountains formed at a convergent plate boundary when Pangaea came together. About 200 million years ago these mountains were similar to the Himalayas today. There were also earthquakes.

THE SUPERCONTINENT CYCLE:

Scientists think that Pangaea was not the first supercontinent. There were others before it. The continents are now moving together. This is because of subduction around the Pacific Ocean. Eventually, the Pacific will disappear and a new supercontinent will form. This won't be for hundreds of millions of years. The creation and breakup of a supercontinent takes place about every 500 million years.

TYPE OF CRUST:

Two types of crust are found, such continental and oceanic crust.

- Continental crust underlies the continents Average density of ~2.7 g/cm3 Average thickness 35–40 km Felsic (granitic) to intermediate in composition.
- Oceanic crust underlies the oceans Average density of ~3.0 g/cm3 Average thickness 7–10 km mafic (basaltic and gabbroic) in composition.
- Crust–mantle boundary is termed the 'Moho'

CRUST VERSUS MANTLE:

The crust is a product of mantle melting. Typical mantle rocks have a higher magnesium to iron ratio, and a smaller portion of silicon and aluminum than the crust.

LITHOSPHERE VERSUS ASTHENOSPHERE:

While the lithosphere behaves as a rigid body over geologic time scales, the asthenosphere deforms in ductile fashion. The lithosphere is fragmented into tectonic plates, which move relative to one another. There are two types of lithosphere: oceanic and continental.

UPPER VERSUS LOWER MANTLE:

Together the lithosphere and the asthenosphere form the upper mantle. The mesosphere, extending between the 660 boundary and the outer core, corresponds to the lower mantle. The region between 410 and 660 km is referred to as the transition zone.

SHADOW ZONE:

The shadow zone is the area of the earth from angular distances of 104 to 140 degree from a given earthquake that does not received any direct P waves. The shadow zone results from S waves being stopped entirely by the liquid core and P waves being bent by the liquid core.

CONCLUSION:

Plates motions causes mountain to rise where plate push together, or converge and continents to fracture and oceans to form where all plates pull apart, or diverge. The continents are embedded in the plates or drift passibly with them, which over millions of years result in significant changes in Earth's geography. As ideas concerning plate tectonic have evolved since 1970s, it has become apparent that while the theory can be applied rigorously to the oceans, the same cannot be said to the continents. Because of the strength and rigidity of oceanic plates, deformation is focused into narrow linear zones along plate margins.

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