Welcome to the next

session of introduction to

plate tectonics.In previous session we learned

about continental drift theory,

which was put forth by Alfred

Wegener. Now, this theory was not accepted by scientists

scientific community due to

Since he was not able to explain the mechanism behind the

movement of plate.

Today, in this session we are going to look at the mechanism

which leads to plate tectonics.

The main force that shapes

shapes a planet surface over long amount of time is

the movement of Earth's outer layer by the process of plate

tectonics.

This image which you can see,shows lithospheric plates which

fit together like a jigsaw puzzle.

These are marked by black color.

These plates, are made of rocks which are light weight

compared to the denser fluid

layer underneath. This allows the plate to float on the top of

the denser material.

Ouris made up of layers and there are two types of layer

which we need to know about in order to understand plate

tectonics.

These are compositional layers and mechanical layers.

Core, Mantle and crust are divisions based on composition.

The crust make up less than1% of the earth by mass,

consisting of Oceanic crust and continental crust.

The mantle is hot and represents about 68% of the Earth's mass.

Finally, the core is mostly made up of iron

metal. The core makes up about 31% of the Earth.

Earth can also be defined and divided based on how inside of

the planet behaves.

there by the mechanical layer corresponds to the physical and

mechanical properties of the

Earth. There are five mechanical layers of earth.

The first one is Lithosphere.

The lithosphere is the outermost layer of the earth

that consists of entire crust and the topmost

portion of the mantle.

Further most as we have seen earlier, they are divided into

pieces called tectonic plates.

The movement of these plates are responsible for many

geological events like earthquakes and volcanic

eruptions.

The next layer below the lithosphere is the asthenosphere.

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A relatively narrow mobile zone exists below the lithosphere.

And within the mantle called

asthenosphere. Here mantle is partially molten and the

zone is composed of hot semi-solid material

that can soften and flow.

The rigid lithosphere is thought to float or move

about on this slowly flowing asthenosphere.

The next mechanical layer is the mesosphere.

The mesosphere is the layer below below asthenosphere, but

above the outer core.

It is essentially the lower

mantle. Despite of high

temperature, an intense pressure in this region restricts the

movement of material present.Thus making it extremely rigid.

Next we have the outer core.

The outer core extends from the bottom of the mesosphere and

surrounds the inner core.

It is composed of iron and

nickel. The extreme temperature allows the

metal to remain in the liquid phase. It is the

the only layer of the earth that is true liquid.

Next we have the inner core.

The inner core is also made up of iron and some nickel.

However, unlike the outer core, It is solid in

nature. The solidity is due to the intense pressure

from the upper layer.

With this background, let us know about the mechanism or the

force which leads to the

lithospheric movement.
This moment is caused by the convection cells which are

created in the mantle.

Let me explain what are convections with the help

of an example.

If you take a bigger filled with water and suppose you have a

heat source at the bottom.

Because of the heat source, the water will start to boil.

The water at the bottom of the beaker warms 1st and rises

because it is less dense than water at the top.

When the hot water reaches the top of the beaker, it flows

along the surface until it is cool and it sinks.

The convection continues as long as the heat source is present.

So as you can see in this image,the arrows which are marked in

circular arrows which are marked in black, those are the

convections which are created into the beaker due to heat.

A similar process might cause convection in the

Earth's mantle.

Convection in the mantle is similar as convection in a beaker

of water on the stove.

Convection currents within earth's mantle form as material

near the core heats up as the core heats the bottom layer of

the mantle material. Particles Move more rapidly, decreasing

its density and causing it to

rise. The rising material begins the convection current.

When the warm material reaches the surface, it spreads

horizontally. The material cools because. It is no longer near

the core. It eventually becomes cool and dense enough to sink

back down into the mantle.

At the bottom of the mantle, the material travels horizontally and is heated by the core.

It reaches the location where warm mantle material rises and the mantle convection cell is complete. The Lithospheric plates above this convection cell is dragged along with the cell movement.

Scientists once thought that the Earth's plate just served on the surface of the mantlel giant convection cell. But now it is also known that plate help them self move instead of just surfing around. Just like convection cells, plates have warm and thin part that are more likely to rise and cooler, denser part that are more likely to sink. New parts of the plate rise because they are warm and the plate is thin.

As the hot magma rises to the surface at the spreading ridge and forms new crust , the new crust pushes the rest of the plate out of its way.

This is called ridge push.

Old part of the plate are likely to sink down into the mantle at subduction zone because.They're cooler and thicker, and

then the warm mantle material

underneath them. This Is called slab pull.

So basically there are three forces. One is frictional drag.

The second one is ridge push and 3rd is slab pull which causes

the movement of plates.

Thank you.