

Student Notes: Unit 4- From Continental Drift to Plate Tectonics

Part 1 – Continental Drift

Reminders from Previous Chapters

- After the Hadean Eon earth's crust began to cool which caused:
 - materials were layered according to their densities
 - the earth's crust to eventually become solidified
- The core of the earth remains hot because of the following reasons:
 - radioactive material found in the earth's core decaying
 - heat left over from the formation of the earth during accretion
 - pressure from the layer's masses on top of it
- Heat rises from the core to the crust creating convection currents in the mantle
- The currents cause:
 - continents to spread apart creating boundaries or plates
 - volcanoes erupt at breaking boundaries

Continental Drift & Plate Tectonics:

- Continental drift = a hypothesis that Earth's lithosphere is broken into continents which move.
- The earth's lithosphere is broken into 20 major plates that float and move along the asthenosphere.
- Plates are set in motion by convection currents in the mantle.
- Plate tectonics = is the theory that describes the formation, movements and interactions of these plates.
- In some places the plates are moving towards each other, in other places they are moving away from each other or in other places are sliding past each other.

Understanding of Crust Movement Timeline:

- 1596 – 1858 □ many scientists theorized that the continents on either side of the Atlantic Ocean were able to fit together like a puzzle
- 1912 □ Alfred Wegener refined the theory stating that all continents fit together as one supercontinent and was separated into parts due to volcanic activity; however did not know what caused them to drift.
- 1950's to 60's □ the theory of sea-floor spreading believed to occur at mid ocean ridges where volcanic activity creates new oceanic floor that gradually moves away from the ridge.
- 1970's □ plate tectonics brings together the combination of all theories before it. It describes the formation, movements and interactions of the plates.

Proof of Plate Tectonics:

- In the 1500's explorers noticed that continents seemed to fit together like puzzle pieces
- In 1912 Alfred Wegener noticed that fossil remains of Mesosaurus (a reptile living 270 million years ago) were found in South America and Africa.
- In the 1960's discoveries about earthquakes, magnetism, and the age of rocks on the ocean floor supported the theory changing people's ideas forever.

How it all Began.....

- 250 million years ago (at the end of the Paleozoic Era), all the continents were welded together into one landmass called Pangaea.
- The process of sea-floor spreading caused Pangaea to break and spread apart.
- It all happened due to convection currents in the asthenosphere.
- The sea floor splits and moves apart at divergent boundaries causing magma to fill the opening. As the magma cools it hardens and adds to the ocean floor.
 - These boundaries can spread between 5 to 15 cm per year.

- It is not a coincidence that earthquakes and volcanic activity occurs heavily along the belts that follow the plate boundaries as there is movement of plates and magma at these areas.