

## 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.