**Chapter 9 Notes Plate Tectonics**  Mr. Tuss/2017

Plate Tectonics Video Lesson clip (<https://www.youtube.com/watch?v=zbtAXW-2nz0&t=98s>)

**9.1 – Continental Drift**

1. In 1915 Alfred Wegener proposed the theory of continental drift.
   1. Continents had once been joined to form a

single supercontinent: Pangaea (all Land).

* 1. Began to break apart 200 million years ago.

1. Wegener’s Evidence
   1. The continents appear to fit like a puzzle
   2. Matching Fossils -

several fossil organisms found on different landmasses.

* 1. Rock Types -

mountain ranges in North America match mountains

in Scandinavia

* 1. Ancient Climates -

Glacier Evidence

1. Scientists dismissed Wegener’s Theory:
   1. He couldn’t explain how the continents moved.
   2. By 1967 new technology led to findings which

led to a theory called **plate tectonics**.

**9.2 – Sea Floor Spreading**

1. Exploring the Ocean Floor
   1. Mid 1800’s ships started mapping

the ocean floor and found mountains.

* 1. 1900’s SONAR made mapping more accurate.
     1. Deep ocean trenches found around the edges of the Pacific.
     2. Mid-Ocean Ridges through middle of all major oceans.

1. The Process of Sea Floor Spreading -

Harry Hess – 1963 Proposed hypothesis

* 1. Volcanic eruptions occur along mid-ocean ridges
  2. Eruptions form new ‘land’ that moves outward,

away from ridges 1-2 inches/year

1. Evidence of Sea Floor Spreading
   1. Magnetic stripes of rock on ocean floor;
      1. Ships towed instruments on ocean floor

found areas of reverse polarity

* 1. Earthquake Patterns;

most earthquakes occur around trenches

* 1. Age of ocean floor is youngest at the mid-ocean ridges.
  2. Hot Spots –
     1. A hot spot is a concentration of heat in the mantle

capable of producing magma, which rises to Earth’s surface.

Example: Hawaii

* + 1. Hot spot evidence supports that the plates move

over the Earth’s surface.

**9.3 - The Theory of Plate Tectonics**

According to the plate tectonics model the **uppermost mantle** and

overlaying **crust** behaves as a strong rigid layer known as the **lithosphere**.

The lithosphere overlies a weak region of the mantle known as the **asthenosphere**.

Temperature & pressure at this depth makes the asthenosphere rocky

material is **near its melting point** = Consistency of hot asphalt.

* **Oceanic crust** is dense and mostly made of basalt-like material.
* **Continental crust** is generally less dense igneous rock such as granite

Earth’s Interior and Plate Tectonic video clip (<https://www.youtube.com/watch?v=0mWQs1_L3fA>)

1. 1960’s – J. Tuzo Wilson and other geologists proposed

the Plate Tectonics Theory:

* 1. The uppermost mantle, along with the overlying crust,

behaves as a strong, rigid layer

* 1. This layer is known as the lithosphere.
  2. A plate is one of numerous rigid sections of the lithosphere

that move as a unit over the material of the asthenosphere.

1. Actions at Plate Boundaries
   1. Divergent Boundaries form:
      1. Oceanic ridges
      2. Rift valleys (on land or under water)
   2. Convergent Boundaries –

A subduction zone occurs when one oceanic plate is forced

down into the mantle beneath a second plate.

* + 1. Three basic types:
       1. Oceanic- Continental:

Continental volcanic arcs and Ocean trenches

* + - 1. Oceanic-Oceanic:

Volcanic island arcs and trenches

* + - 1. Continental-Continental forms mountains
  1. Transform fault boundaries, plates grind past each other.

**9.4 Mechanisms of Plate Motion**

1. Cause of Plate Motion
   1. Scientists generally agree that convection

occurring in the mantle is the basic driving force for plate movement.

* 1. Convective flow is the motion of matter

resulting from changes in temperature.

* 1. Mantle Convection
     1. Mantle plumes are masses of hotter-than-normal

mantle material that ascend toward the surface, where they may lead to

igneous activity.

* + 1. The unequal distribution of heat within Earth

causes the thermal convection in the mantle that ultimately drives plate motion.