**7TH Grade Science WEEK 4 Ms.Bens’ Science Class**

**Plate Tectonics: Continental Drift and Sea Floor Spreading**

**Vocabulary words to define:**

**sonar**

**mid-ocean ridge**

**deep ocean trench**

**sea-floor spreading**

**subduction**

In 1910, a German scientist named Alfred Wegener formed a hypothesis that Earth continents moved. He observed that coastlines of several continents matched like pieces of a jigsaw puzzle. Wegener’s hypothesis was that all the continents we once joined together in a single landmass and have since drifted apart. He named the supercontinent Pangaea, meaning “all lands”. According to Wegener, Pangaea existed about 250 million years ago. Over millions of years Pangaea broke apart and slowly moved to the continents present day position. This idea became known as continental drift. Wegener gathered evidence from different scientific fields to support continental drift. He studied land features, fossils, and evidence from climate change.

Mountain ranges and other features provided evidence for continental drift. Wegener noticed that when he pieced together maps of Africa and South America, a mountain range running from east to west in Africa lines up with a range in South America. He also noticed that European coal fields matched up with coal fields in North America.

Fossils also provided evidence to support continental drift. On widely separated landmasses, fossils from reptiles and fernlike plants were found. This convinced Wegener that the continents had once been united.

Wegener used evidence from climate change to further support his theory. For example, an island in the Arctic Ocean contains fossils of tropical plants. According to Wegener, the island once must have been located close to the equator. Wegener also pointed to scratches on rocks in South Africa that were made by glaciers. These scratches show that the mild climate of South Africa was once cold enough for glaciers to form. According to Wegener’s theory, Earth’s climate has not changed. Instead, the positions of the continents have changed.

Wegener also attempted to explain how the drift of continents took place. He could not provide a satisfactory explanation for the force that pushes or pulls continents. Because he could not identify the cause of continental drift, most geologists rejected his theory. In the 1960’s, new evidence about Earth’s structure led scientists to reconsider continental drift.

Sonar is a device that bounces sound waves off underwater objects and then records the echoes of these sound waves. The longest chain of mountains in the world is the system of mid-ocean ridges. The mid-ocean ridges curve along the sea floor, extending into all of Earth’s oceans. Most of the mountains in the mid-ocean ridges lie hidden under hundreds of meters of water. A steep-sided valley splits the top of some mid-ocean ridges.

Earth’s ocean floors move, carrying the continents along with them. This movement begins at a mid-ocean ridge. A ridge forms along a crack in the oceanic crust. At a mid-ocean ridge, molten material rises from the mantle and erupts. This process, called sea-floor spreading continually adds new material to the ocean floor. In sea-floor spreading, sea floor spreads apart along both sides of a mid-ocean ridge as new crust is added. As a result, the ocean floors move like conveyor belts, carrying the continents along with them.

Several types of evidence supported the theory of sea-floor spreading: eruptions of molten material, magnetic stripes in the rock of the ocean floor, and the ages of the rocks themselves. Scientists have found strange rocks shaped like pillows in the central valley of mid-ocean ridges. Such rocks can form only if molten material hardens quickly after erupting under water. The presence of the rocks supports the theory of sea-floor spreading. More support came when scientists discovered that ocean floor rock lies in a pattern of magnetized “stripes”. The pattern is the same on both sides of the ridge. These stripes hold a record of reversals in Earth’s magnetic field. The final proof for sea-floor spreading came from ocean rock samples. The farther from the ridge samples were taken, the older the rocks were.

The ocean floor does not just keep spreading, it sinks into deep underwater canyons called deep-ocean trenches. Where there are trenches, subduction takes place. Subduction is the process by which the ocean floor sinks into a deep-ocean trench and back into the mantle. The processes of subduction and sea-floor spreading can change the size and shape of the oceans over millions of years.