

Continental drift essay



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Continental drift is the idea that continents move freely over Earth's surface, changing their positions relative to one another over time. This hypothesis has been around for more than 130 years. It's amazing to know that once ago these continents on Earth were once joined together and have split and moved apart from one another. In 1596, Abraham Ortelius hypothesized that continents "drift", but later a German meteorologist named, Alfred Wegener, fully developed the idea. In the early 1900's, Wegener first proposed the theory of continental drift.

He hypothesized that there was a giant super continent name Pangea, meaning "All-earth (Paleontology and Geology glossary, 1996)." During the Jurassic Period Pangea started to break apart. It then formed two smaller supercontinents called Laurasia and Gondwanaland. "Laurasia was the northern supercontinent, containing what is now North America and Eurasia (excluding India). Gondwanaland was the southern supercontinent, composed of all the present-day Southern Hemisphere continents and India (which has drifted north) (Plummer, Carlson, & Hammersley, 1937).

He based his idea upon 4 different types of evidence: Fit of the Continents, Fossil Evidence, Rock Type and Structural Similarities, and Paleoclimatic Evidence. "In the 1960's, it was recognized that the fit of the continents could be even further improved fitting the continents at the edge of the continental slope - the actual extent of the continental crust (Continental Drift)." Wegener also identified fossils were located on continents that were widely separated.

At some point Wegner's idea of continental drift was accepted because no one could come up with a reasonable mechanism on how the continents actually moved. Seafloor spreading is a theory that was proposed by Harry Hess in the 1960's. " It is the hypothesis that the sea floor forms at the crest of the mid-oceanic ridge, then moves horizontally away from the ridge crest toward an oceanic trench (Plummer, Carlson, & Hammersley, 1937). " As the plates are moving apart, the rocks begin to break and form a crack between the plates.

In this situation earthquakes also form along the plate boundary during the process. Not until the 1960's when plate tectonics came about and further developed through data to understand the movements of continents. The concepts of continental drift and seafloor spreading are united to form the theory of plate tectonics. Plate tectonics is the idea that Earth's surface is divided into a few large, thick plates that move slowly and change in size. It not only explains the movement of Earth but also the cause of earthquakes, volcanoes, oceanic trenches, mountain range formation, and geologic phenomenon.

The top layers of the plates are called the crust. There is the oceanic and continental crust. The oceanic crust is part of Earth's lithosphere that is in the ocean basins. It is composed of mafic or sima rocks and is also thinner, denser, and more active than the continental crust. The continental crust is the layer of the igneous, sedimentary, and metamorphic rocks which forms the continents. There are three types of plate movements: divergence, convergence, and transform (lateral slipping). At the boundaries of the plates, various deformations occur as the plates interact; they separated

from one another (seafloor spreading), collide (forming mountain ranges), slip past one another (subduction zones, in which plates undergo destruction and remelting), and slip laterally (Paleontology and Geology glossary, 1996).

” Divergence is when the plates move away from one another, which is where seafloor spreading takes part. Divergent boundaries is situated along the crest of the mid ocean ridges. The result of the plate boundary is to create, or open new ocean basins.

Continental crust can begin to rift from upward movement from hot rocks from the mantle. It results from an extension that stretches the crust. During the extension of the crust, there are episodes of faulting and volcanism. “ As the spreading continues, the rift valley will widen and deepen, extending out to the sea (Continental Drift). ” The valley will soon become a narrow linear sea and the rifting until it has created a large ocean basin. Convergent boundaries are when the plates move into one another causing a collision. “ When two plates collide, some crust is destroyed in the impact and the plates become smaller.

The results differ depending upon what types of plates are involved (Paleontology and Geology glossary, 1996). ” The plates move only a few centimeters each year. If there is an oceanic and continental plate that collides together, the oceanic plate will be forced under the continental plate because the oceanic is thin and dense and the continental is relatively light and thick. In this matter it is considered subduction. When two oceanic plates collide, it is similar to the oceanic and continental collision except volcanoes can form islands.

One is pushed underneath the other and magma from the mantle rises. The third movement of convergent is when two continental plates collide. The two plates will form mountain ranges as they are compressed and pushed upwards. Transform is when the plates grind past one another. It is the same as the strike-slip motion. “ Most transform boundaries occur in association with mid-ocean ridge systems – forming fracture zones which include the transform fault and their inactive extensions into the plate interior (Continental Drift). ” Due to movement along the boundaries, most earthquakes occur.

Divergent and transform usually has a reason to do with shadow earthquakes taking places in areas that are known to have them. Subduction zones also result in a range of earthquakes. Because of plate tectonics, there are four types of seismic zones. The first is the midocean ridges. The activity is very low because the lithosphere is very thin and weak at the boundaries, so it cannot build up enough strength to cause large earthquakes. With this zone there is a volcanic eruption that accompanies it. The second zone is the shallow focus event which doesn't have any volcanoes.

The third zone is the collision of oceanic and continental crust. Last but not least, the fourth occurs along the boundaries of continental boundaries. “

The current continental and oceanic plates include: the Eurasian plate, Australian-Indian plate, Philippine plate, Pacific plate, Juan de Fuca plate, Nazca plate, Cocos plate, North American plates, Caribbean plate, South American plate, African plate, Arabian plate, and the Antarctic plate. These plates consist of smaller sub-plates (Paleontology and Geology glossary, 1996). These plates were mapped in the second half of the 20th century,

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which is composed of the two different types of lithospheric plates: thick continental and thick oceanic. “ Since the Earth’s crust solidified billions of years ago, plates of its crust have been drifting all over the globe.

The map of the Earth is always changing; not only are the underlying plates moving, but the plates change in size. Also, the sea level changes over time (as the temperature on Earth varies and the poles melt or freeze to varied extents), covering or exposing different amounts of crust (Paleontology and Geology glossary, 1996). Many of years people tried to understand the concept of why was the Earth changing. Scientist couldn’t understand and may not have believed Wegner at the beginning of his research but later after much more research upheld in evidence, they then realized the motions and concept of the plates underneath the Earth’s crust. We do not know when the movements necessarily occur. It has changed so much since then, but the importance of it is that it is still happening today.