Earth layers essay sample

Environment, Earth

1. Crust: The Earth’s surface is composed mostly of water, basalt and granite. Oceans cover about 70% of Earth’s surface. The Earth’s thin, rocky crust is composed of silicon, aluminum, calcium, sodium and potassium. The crust is divided into continental plates which drift slowly (only a few centimeters each year) atop the less rigid mantle. The crust is thinner under the oceans; this is where new crust is formed. Continental crust is about 25-90 km thick.

2. Mantle: Under the crust is the rocky mantle, which is composed of silicon, oxygen, magnesium, iron, aluminum, and calcium. The upper mantle is rigid and is part of the lithosphere (together with the crust). The lower mantle runs slowly, at a rate of a few centimeters per year.

3. Core: The Earth has an iron-nickel core that is about 2, 100 miles in radius. At the core-mantle boundary, composition changes. Seismic waves suggest this material is of a very high density (10-13 g/cm3), which can only correspond to a configuration of metals rather than rock. The presence of a magnetic field around the earth also indicates a molten metallic core. Unlike the crust and the mantle, we don’t have any samples of the core to look at, and therefore there is some disagreement about its exact composition.

4. Inner Core: The inner core may have a temperature up to about 13, 000°F (7, 500 K), which is hotter than the surface of the Sun. It has a radius of about 750 miles and is solid. The inner core is considered to be solid because of the behavior of P and S waves passing through it.

5. Outer Core: The outer core is in a liquid state and is about 1, 400 miles (2, 260 km) thick. The outer core is presumed to be liquid because it does not

transmit shear (S) waves and because the velocity of compressional (P) waves that pass through it is sharply reduced.

6. Lithosphere: The lithosphere can be defined as part of the solid outermost surface of a planet. It is the approximate 100 first sturdy and stony kilometers of the earth’s surface. Its name is derived from the Greek words for rock, as “ litho,” and layer, as “ sphere.” When scientists refer to plate tectonics, they are generally referring to the top plate of the earth’s surface, which would be the lithosphere. It is also divided into two sorts of layers, a continental layer and an oceanic layer. It is believed that the oceanic lithosphere is younger than the continental lithosphere. The oceanic lithosphere was made by shifts in Earth’s mantle; however the continental lithosphere was shaped by the residue of continuous melting of material.

7. Asthenosphere: The asthenosphere is a part of the upper mantle that exhibits plastic properties. The asthenosphere is a weaker layer that flows right underneath the lithosphere. The asthenosphere differs from the lithosphere mostly because of its composition. Whereas the lithosphere is a rigid structure, the asthenosphere can be described as a heavy liquid flowing beneath it. The asthenosphere is located about 62 miles beneath the surface of the earth. It has not yet been seen by humans.

8. Mesosphere: this solid part of the mantle is called the mesosphere. The lithospheric mantle, asthenosphere, and mesosphere all share the same composition, but their mechanical properties are significantly different. Geologists often refer to the asthenosphere as the jelly in between two pieces of bread: the lithosphere and mesosphere.

9. Convection Cells: A source of heat is required for a convection cell to form. Fluid is warmed by the heat source and is pushed away. The fluid then begins to lose heat, and unsurprisingly cools. This cooler, denser matter is forced back toward the initial heat source by the flow of newly heated matter. The fluid will continue to move for as long as the heat source is present.

10. “ P” Waves: or primary waves may also be called seismic waves. They are the fastest traveling waves and can travel through solids and liquids but only as sound when moving through gases; they move in a compressional motion. They are caused by earthquakes and measured by seismometers.

11.“ S” Waves: secondary waves, shear wave, or elastic waves is one of the two types of body waves, named because they pass through the body of an object. It is the second direct arrival on an earthquake seismogram, after the compressional primary wave, because S waves travel slower in rock. They pass through solids and move in a strong vertical motion to the direction the wave is traveling, never touching.

12. Shadow Zone: The shadow zone is the area of the earth from angular distances of 104 to 140 degrees from a given earthquake that does not receive any direct P waves. The shadow zone results from S waves being stopped entirely by the liquid core and P waves being bent (refracted) by the liquid core. Through measuring how P and S waves travel through the earth and out the other side, a seismic wave shadow zone was discovered in about 1910. From the lack of S waves and a great slowing of the P wave velocity

(by about 40%) it was inferred that the outer core is made of liquid. The shadow zone also defined the diameter of the core.

13. Moho: The Moho is the boundary between the crust and the mantle in the earth. This is a depth where seismic waves change velocity and there is also a change in chemical composition. Also termed the Mohorovicic' discontinuity after the Croatian seismologist Andrija Mohorovicic that discovered it. The boundary is between 25 and 60 km deep beneath the continents and between 5 and 8 km deep beneath the ocean floor.