The Earth's Layers and Spheres

Spheres:

Lithosphere - land

Hydrosphere - water

Biosphere - living things

Atmosphere - air

Layers from deepest to shallowest:

Inner core - solid

Outer core - liquid

Mantle - lower-upper mantle is **asthenosphere** and uppermost part is **lithosphere**

Crust - lithosphere

Plate Tectonic Theory

Explains the **origins of continents and oceans**, mountain ranges and **folded rocks**, different rock types, earthquakes and volcanoes, and **continental drift**.

The earth's ***lithosphere*** is comprised of a number of large tectonic plates which have been slowly moving for 3.4 billion years.

Lithosphere - the rigid, outermost shell of the earth comprised of the crust and portion of the upper mantle.

Plate Motion

Convection currents

1. Convection

Heat is generated in earth's core and ***convection*** causes it slowly rise through the mantle to the asthenosphere.

2. Ridge Push

The intrusion of magma pushes plates away from the ridge and they float on the convection currents of the asthenosphere

3. Slab Pull

The denser end of the plates sink into the subduction zone.

Convection - Hotter rock moves upward while cooler rock sinks.

Paleopeography

Supercontinents:

Rodinia

Proterozoic, 750 Ma

Pangea

Permian, 255 Ma

200 Ma ago, Pangea separated into pieces over millions of years due to tectonic activity.

Ma - Mega annum = 1 million years

Tectonic Plate Boundaries

Divergent - where plates divide

Crust expands, elevates, and cracks; most located at oceanic ridges. Continental rifting occurs when asthenosphere rises and erupts, putting a rift in the plates

Convergent - where plates collide

Oceanic-Continental - occurs when a oceanic plate collides with a continental plate; ***subduction*** of an oceanic plate forms a line of volcanoes called continental arc; shallow, deep earthquakes.

Oceanic-Oceanic - deep trench forms at subduction zone; magma erupts and forms an island arc, landward of trench; shallow deep earthquakes.

Continental-Continental - Intensely deformed mountain belts of pre-existing continental rocks.

Transform - where plates slide past each other

Large horizontal fractures or faults in the crust; earthquakes are common, volcanoes are not.

Subduction - portion of a tectonic plate sinks beneath another plate into earth's interior

The Wilson Cycle

The Wilson Cycle is a model that describes the opening and closing of ocean ***basins*** caused by movement of the earth's plates.

OPENING PHASE

Stage A: Embryonic - Uplifting; A plume of magma begins to thin a stable continental ***craton***

Stage B: Juvenile - Divergence; The continent has been separated into 2 continents and a **new ocean basin**

Stage C: Mature - Divergence; The ocean basin widens and the continents push away from the ridge; sediment accumulates along the divergent margins

CLOSING PHASE

Stage D: Declining - Convergent; A subduction zone forms and causes a change in plate motion direction; ocean basin remains under edge of one continent

Stage E: Terminal - Convergent; Remnant ocean basin subducts, continents about to collide.

Stage F: Suturing - Convergence and uplift; Collision of the 2 continental blocks occurs forming a mountain, closing the basin

Stage G - Mountains erode (peneplain) and tectonic stability returns

Basin - bowl shaped depression in the earths surface formed by weather, erosion, and plate tectonic activity

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