Continental Drift and Plate Tectonics Notes

Part 1 – Alfred Wegener and Continental Drift

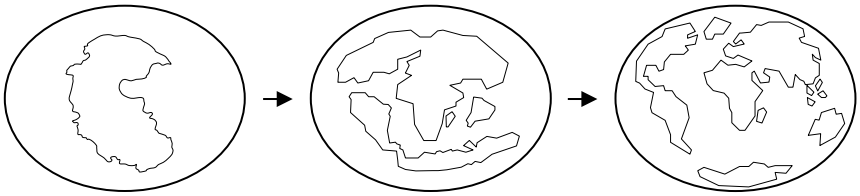
Continental Drift is…

The idea that the world's land masses are slowly moving over time

PANGAEA

The supercontinent made of all continents that existed millions of years ago.

THE BREAKUP OF PANGAEA



Alfred's Evidences

1: Geometric Evidence

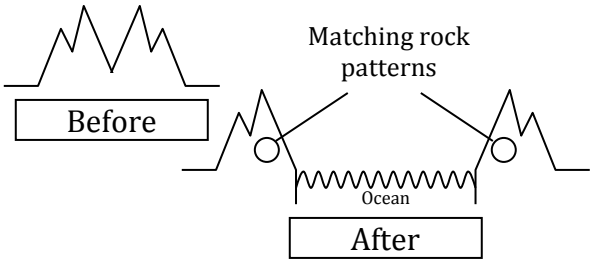
If you look closely at coastlines it appears that the continents can be pieced together like a puzzle. Especially if you look at the coasts of North and South America as they match up with Africa.

2: Fossil Evidence

Fossils of the same species are found on opposite shorelines of continents separated by vast oceans. The fact that these fossils are not found worldwide is evidence that the continents used to be together.

3: Mountain Evidence

It appears that mountain ranges end abruptly on one continent and pick back up on another. Even the layers of rocks within these mountains match up – evidence that they used to be part of the same mountain range before the continents split.



4: Climate Evidence

Fossils of tropical plants are found in some (currently) cold regions of the Earth. Also, evidence of past glaciers is found in many places that are too warm for glaciers today. This is evidence that the continents have moved over time – thus the evidence of different past climates.

Part 2 – Alfred's Rejection

Why was Alfred rejected in his own time?

*Because although he had evidence he had **NO MECHANISM** to explain how the continents were moving. In other words, he could not explain HOW they were moving.*

HYPOTHESIS	THEORY
Has evidence	*Has evidence*
Cannot explain the cause or the "how"	*Explains the cause or the "how"*

Part 3 – Harry Hess and Modern Evidence

SONAR

Technology that uses sound waves to determine depths and sizes of objects

Revealed ----▶

MID-OCEAN RIDGES

Long underwater mountain ranges where magma rises up from the mantle.

HARRY HESS

Geologist and U.S. Naval Officer that came up with the idea that the continents move because the ocean floor is getting wider

Discovered ----▶

SEAFLOOR SPREADING

The seafloor slowly grows outward from mid-ocean ridges as new crust is formed, pushing the continents along for the ride.

*This is the **MECHANISM** of continental drift!*

EVIDENCE OF SEAFLOOR SPREADING

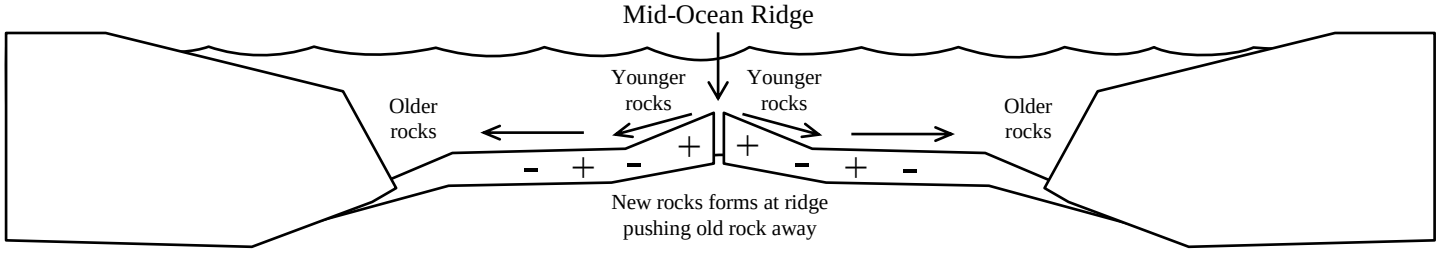
THE AGE OF OCEAN ROCKS

The fact that rocks get older at equal rates the farther away you get from a mid-ocean ridge is evidence of seafloor spreading

MAGNETIC STRIPING

The fact that magnetic stripes on the ocean floor are identical on both sides of a mid-ocean ridge is evidence of seafloor spreading

SEAFLOOR SPREADING DIAGRAM



Part 4 – The Driving Forces of Plate Movement

1. Convection

Hot things rise and cold things sink because of changes in density. Convection acts like a conveyor belt, rolling the plates along on top.

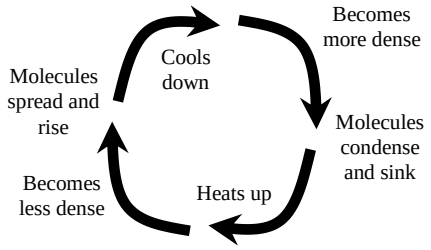
2. Gravity

Force that pulls objects towards the Earth. Gravity moves plates by pulling them down at subduction zones.

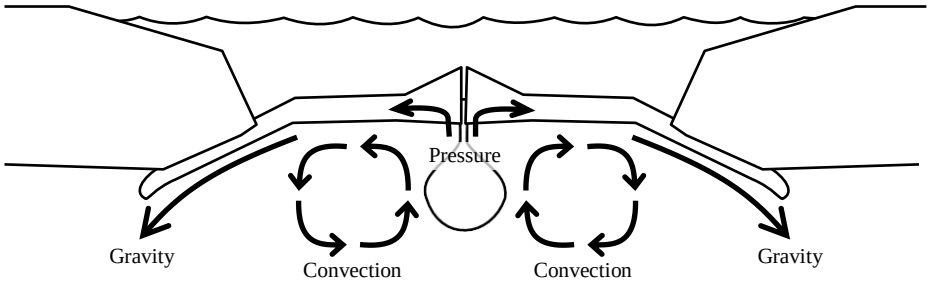
3. Pressure

Force that pushes outward against the space around it. Pressure moves the plates as rising magma pushes at the mid-ocean ridge.

Convection Diagram



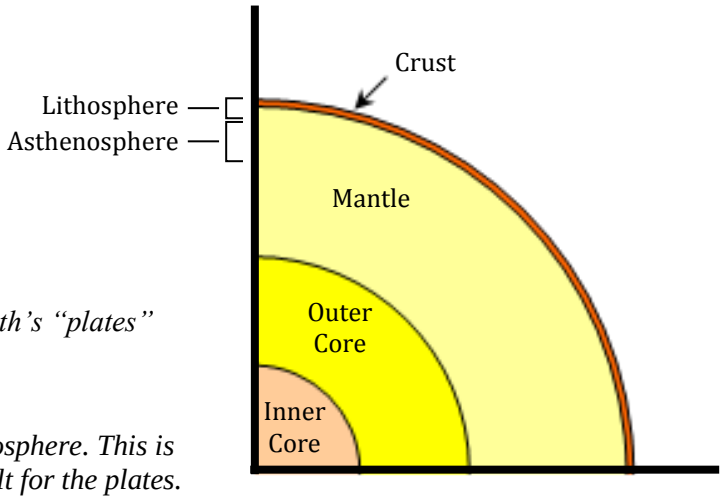
Driving Forces in Action



Part 5 – Plate Tectonics

Plate Tectonics –

The theory describing how Earth's plates move and what happens when they interact with each other.



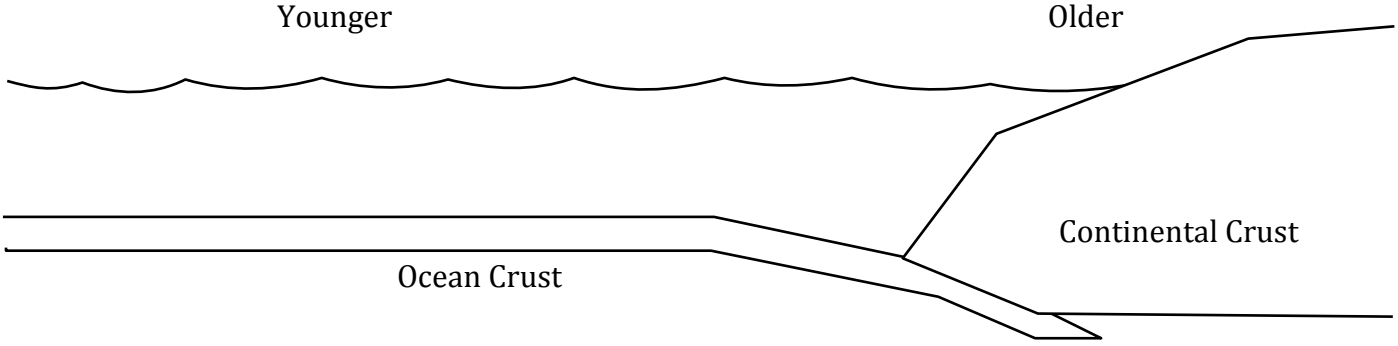
Lithosphere –

Made up of the crust and the top part of the mantle. Earth's "plates" are made from this layer.

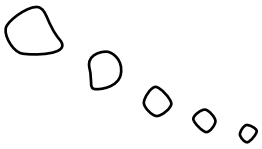
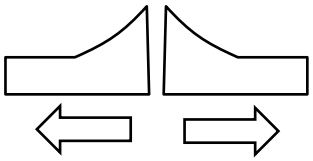
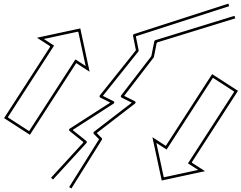
Asthenosphere –

The liquidy-solid (like silly putty) layer beneath the lithosphere. This is the layer that the plates float on. It is like a conveyor belt for the plates.

Ocean Crust	vs.	Continental Crust
Thinner		Thicker
More Dense		Less Dense
Younger		Older



Part 6 - Plate Boundaries

Type of Boundary	Definition	What it creates	Picture
Convergent (Land Vs. Land)	*Continental crust collides with continental crust*	*Mountains Earthquakes Subduction Zones*	
Convergent (Land Vs. Ocean)	*Continental crust collides with oceanic crust*	*Volcanoes Trenches Earthquakes Subduction Zones*	
Convergent (Ocean Vs. Ocean)	*Oceanic crust collides with oceanic crust*	*Island Arcs Trenches Earthquakes Subduction Zones*	
Divergent	*Two plates move away from each other, usually oceanic crust*	*Mid-Ocean Ridges Earthquakes*	
Transform	*Two plates scrape past each other*	*Earthquakes*	

Most of the world's volcanoes and earthquakes…

Happen at plate boundaries, especially convergent boundaries

A hotspot is…

A location that is volcanically active even though it is not located near a plate boundary