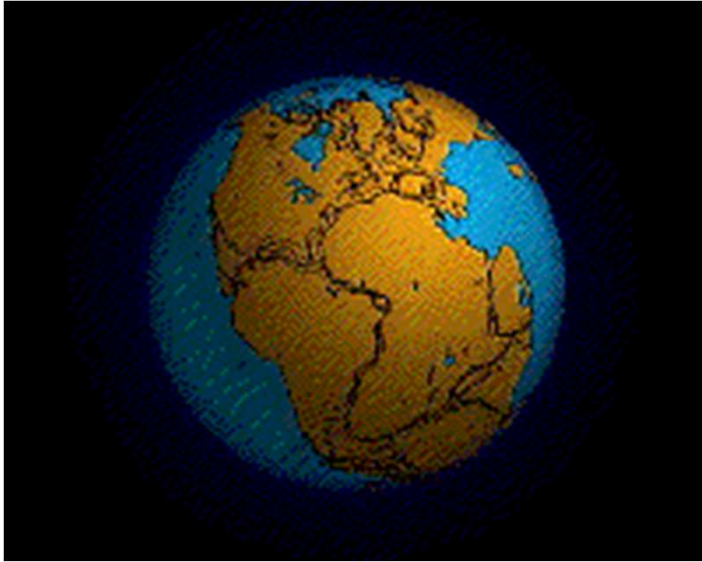
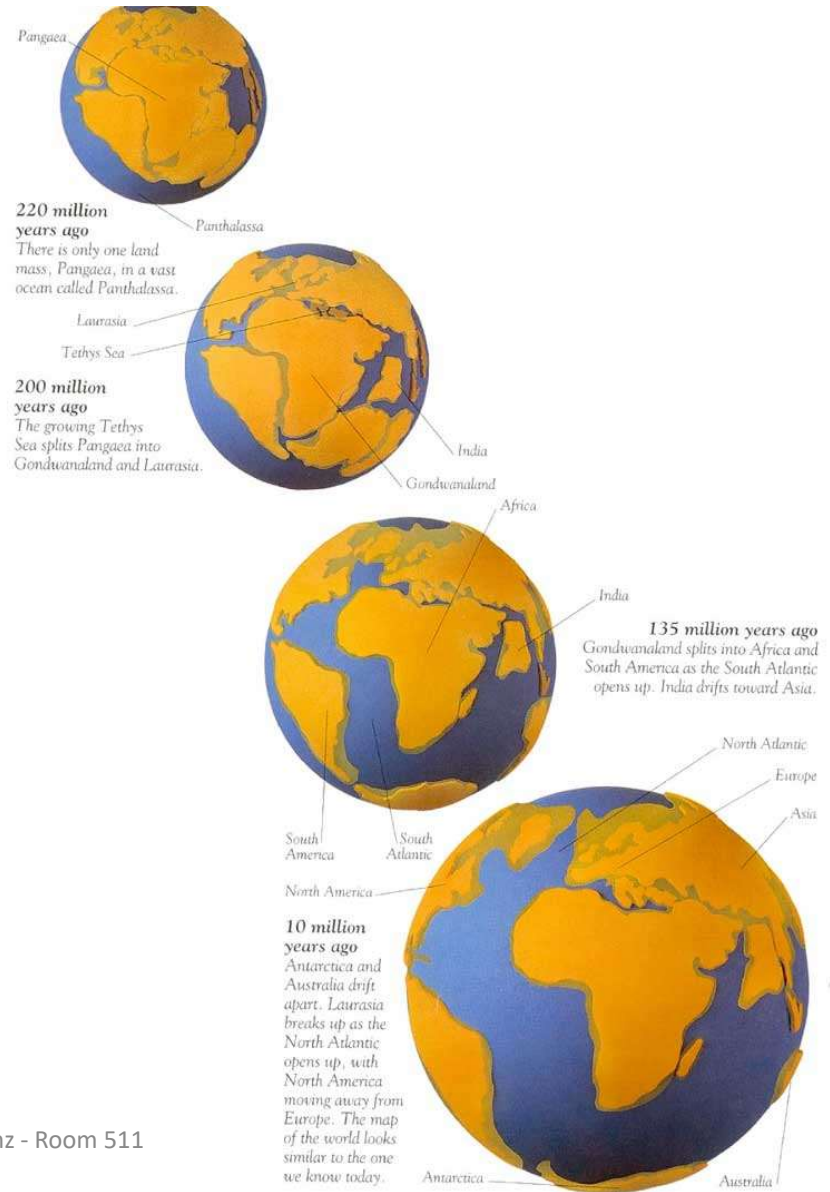
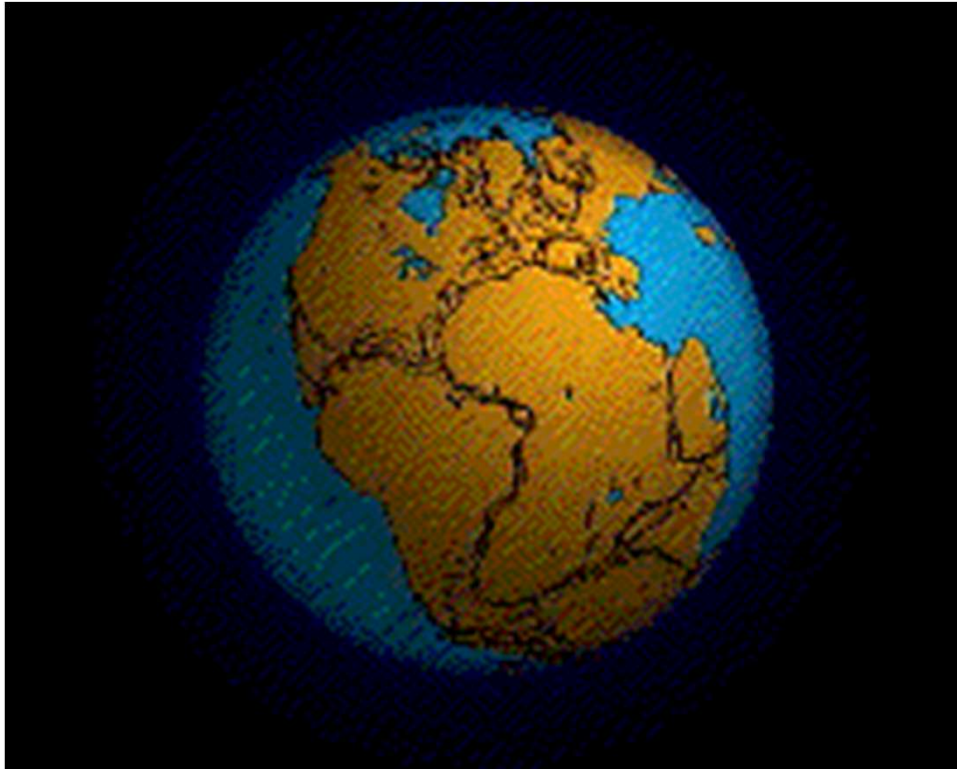


Continental Drift and Seafloor Spreading

209PC Lecture

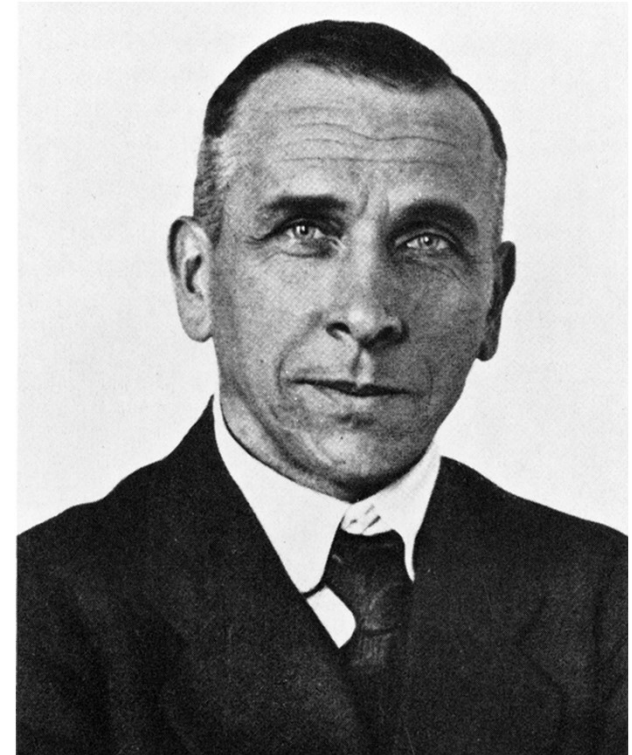


Continental Drifting?



Alfred Wegener

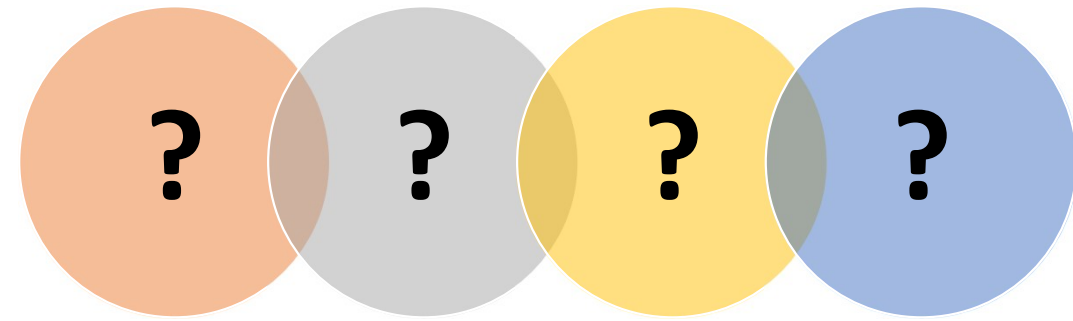
- **1912 - Proposed hypothesis of continental drift**
 - **200 million years ago**
 - All continents formed a single landmass, **Pangaea**
 - Surrounded by one ocean, **Panthalassa**
- **Not accepted until the 1950's**
 - **New science: Paleomagnetism**



Wegener circa 1924-30
German polar researcher,
geophysicist and meteorologist

The Science Channel Videos: 100 Greatest Discoveries: Continental Drift





Evidence of Continental Drift

Why did Wegener believe that the continents were together and drifted apart?

Apparent
Fit of
Continents

?

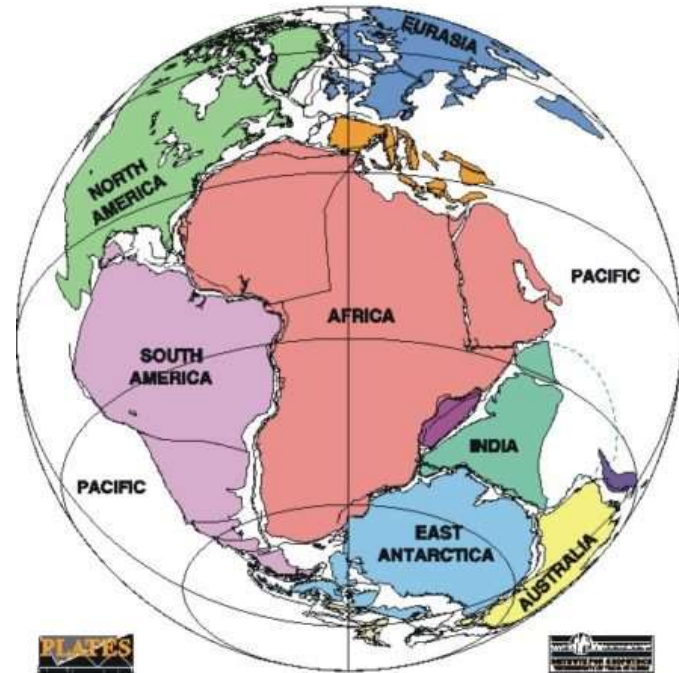
?

?

Evidence of Continental Drift

Apparent Fit of the
Continents –
Coastlines match like
pieces of a puzzle

PANGAEA



Apparent
Fit of
Continents

Fossil
Correlation

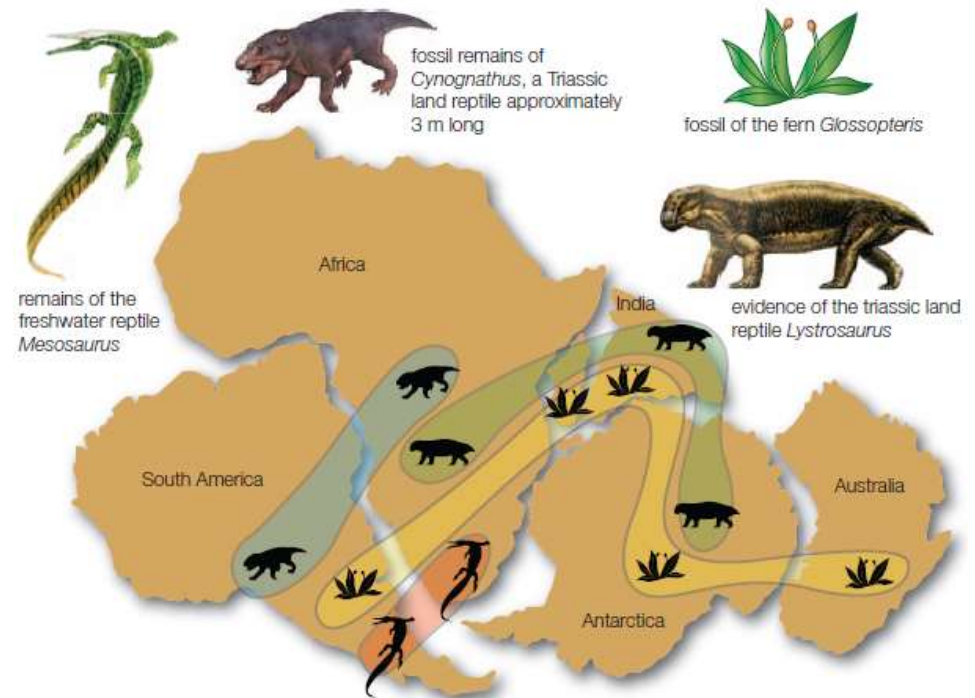
?

?

Evidence of Continental Drift

Fossil Correlation –

- Identical fossils have been found in the rocks on either side of an ocean
- Age and type of rocks match on distant continents



Apparent
Fit of
Continents

Fossil
Correlation

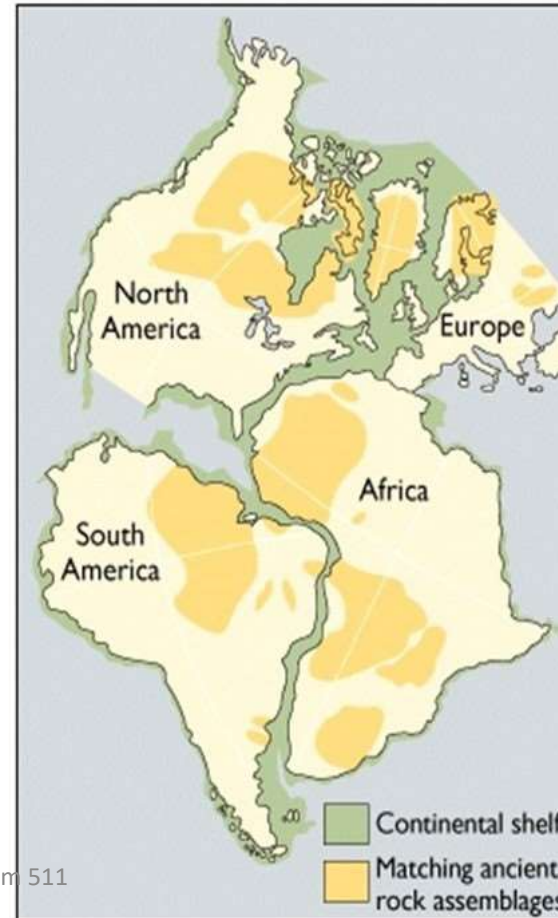
Rock and
Mountain
Correlation

?

Evidence of Continental Drift

Rock and Mountain Correlation –

- Identical rocks and mountain structures have been found on either side of an ocean
- Age and type of rocks match on distant continents



Apparent
Fit of
Continents

Fossil
Correlation

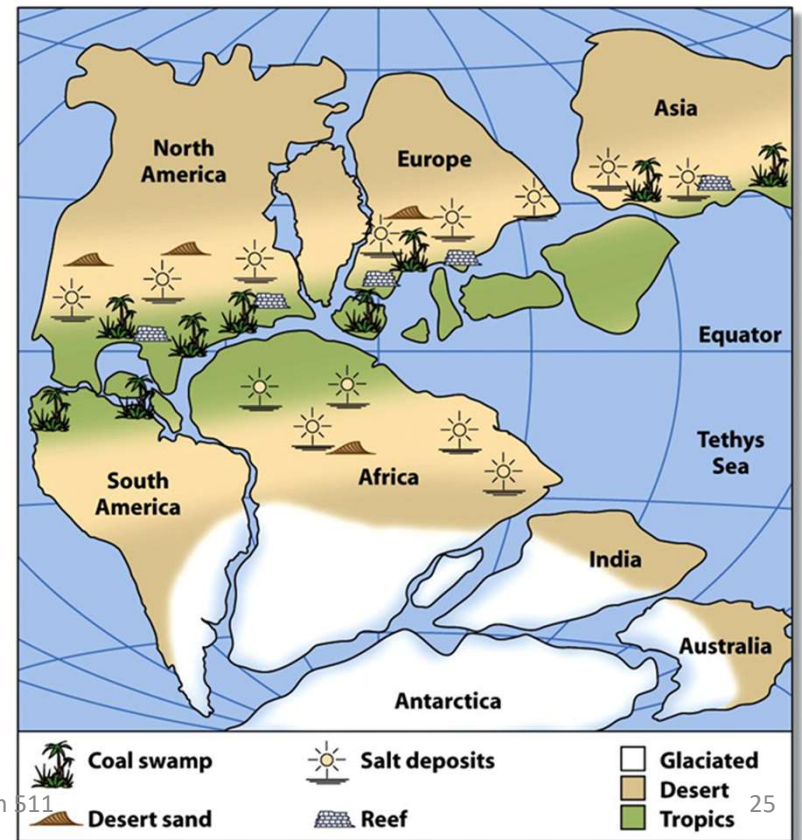
Rock and
Mountain
Correlation

Paleo-
climate
Data

Evidence of Continental Drift

Paleoclimate Data –

- Climate patterns have changed due to land masses shifting and moving to different locations.
- Glacial debris and evidence now found in tropical areas
- Tropical fossils now found in arctic areas (E.g. Coal)



Apparent
Fit of
Continents

Fossil
Correlation

Rock and
Mountain
Correlation

Paleo-
climate
Data

Evidence of Continental Drift

...But one thing was missing!

- Wegener had the evidence,
but did not know how it worked
- His ideas weren't accepted until after his death (1950's)
- ...Enter Harry Hess and Seafloor Spreading





110 Chapter 2

Seafloor Spreading

110 Chapter 2.1

Harry Hess and Seafloor Spreading Notes

Warm-up

- What were the 4 pieces of evidence Wegener presented and why wasn't it enough for his peers to accept his theory?

Apparent
Fit of
Continents

Fossil
Correlation

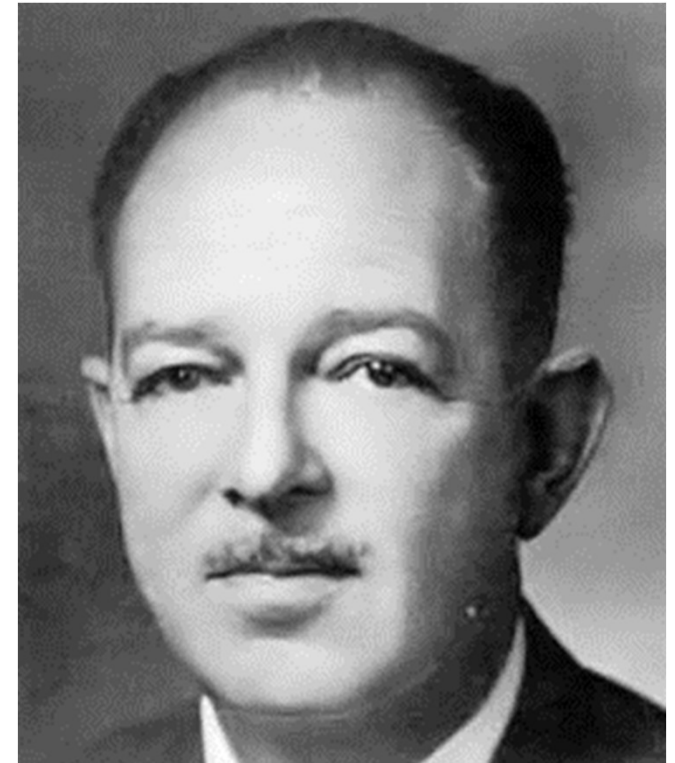
Rock and
Mountain
Correlation

Paleo-
climate
Data

Evidence of Continental Drift

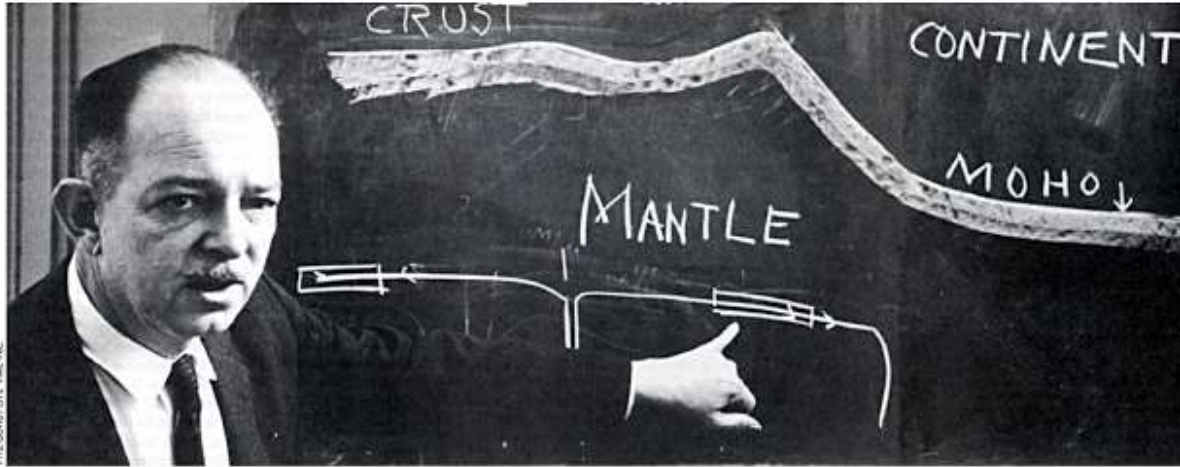
...But one thing was missing!

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DISCOVERY
EDUCATION



Harry Hess

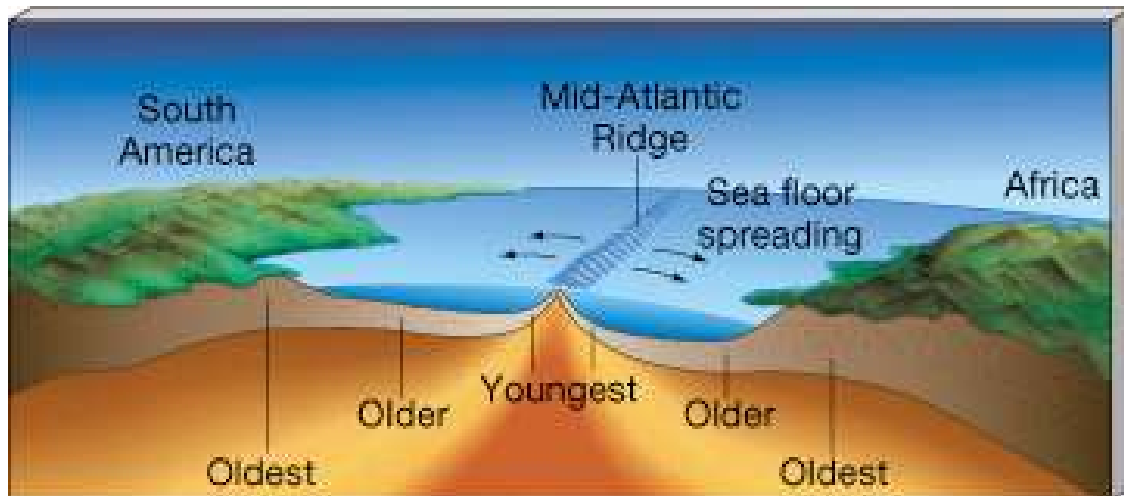
Geologist & Naval Officer

- Suggested that the seafloor is spreading a part at the mid-ocean ridge:
 - Magma wells up from the center of the ridge as the tectonic plates pull a part
 - New seafloor is created when the magma cools
 - This could be what Wegener was looking for...





Seafloor Spreading



Earth Systems - Hinz - Room 511

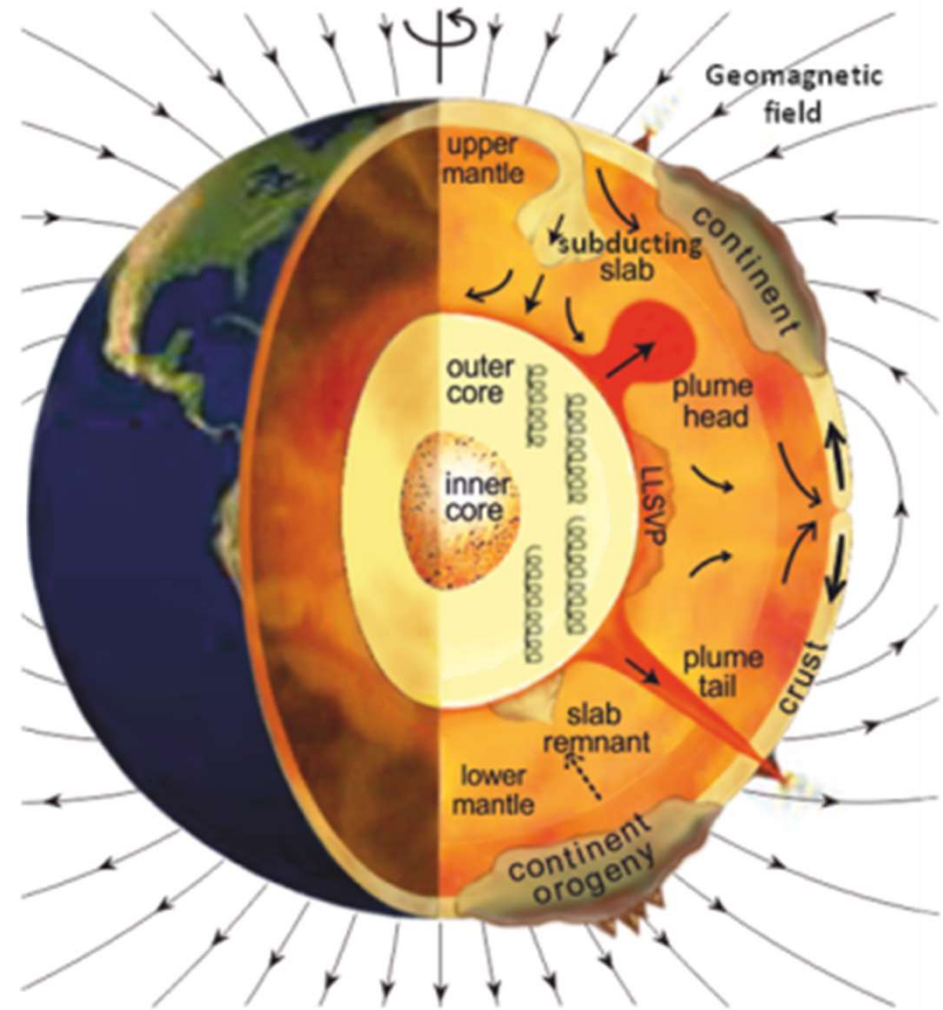
- **Mid-Atlantic Ridge:** undersea range of mountains that divide the Atlantic ocean.
- Scientists used sonar to map it
- Found that the rocks were relatively young near the center of the ridge and oldest near the coastlines.

110 Chapter 2.2

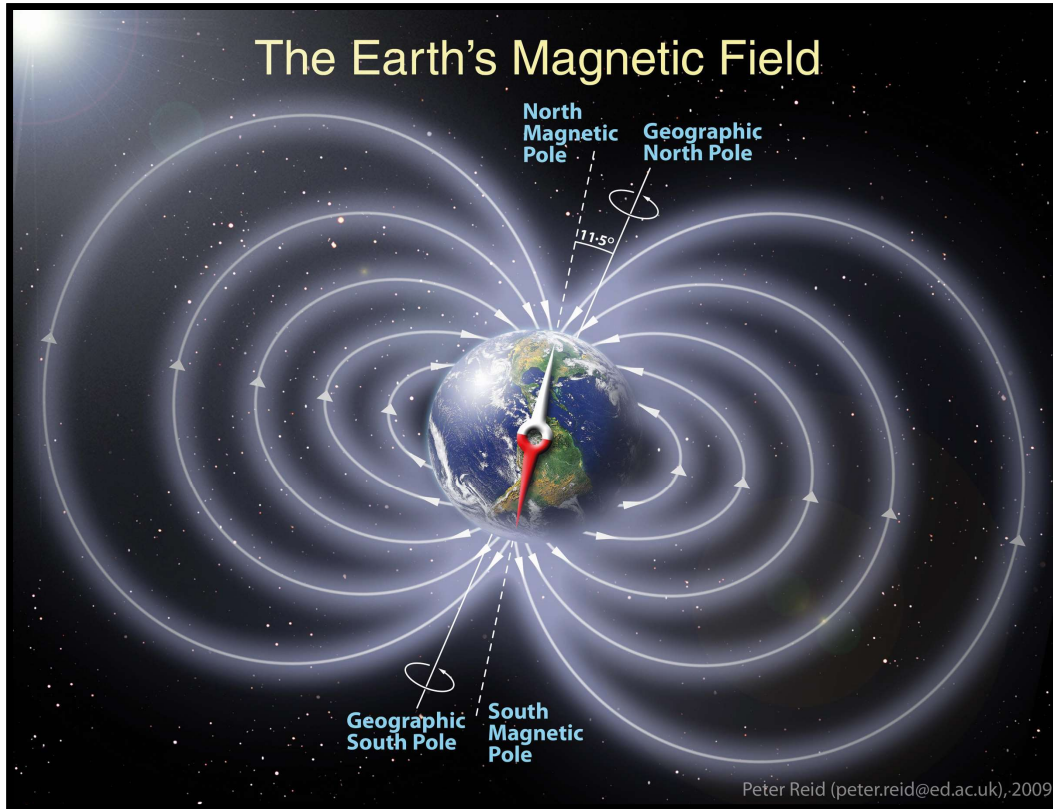
Paleomagnetism Notes

Earth's Magnetic Field

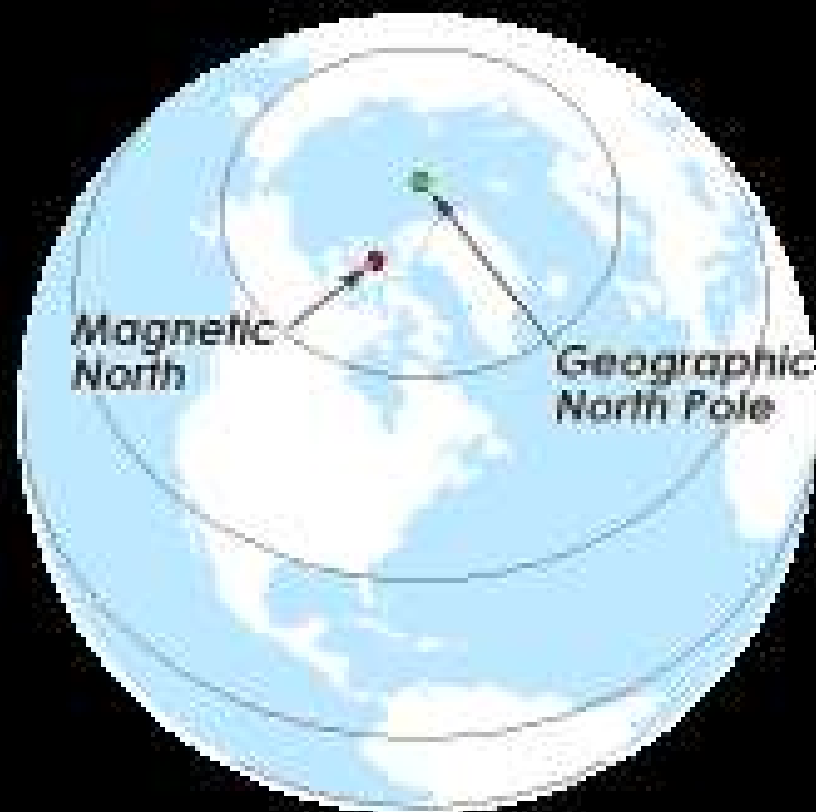
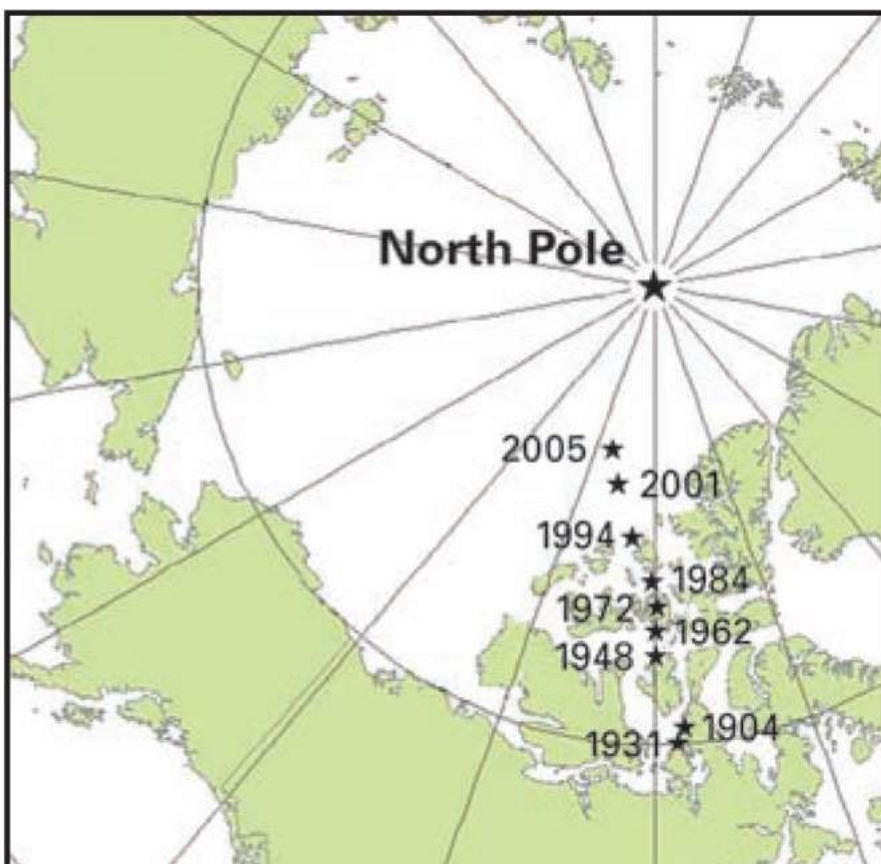
- Generated deep inside our planet
- Earth's solid inner core churns a liquid outer core (Iron and Nickel)
 1. Acts like convection
 2. Generates electric currents
 3. And...makes a magnetic field.



Earth's Poles Reverse



- The spinning and churning of the Outer Core creates Earth's magnetic fields.
- The magnetic poles are moving
- The poles reverse every 1000 to 1 million years.

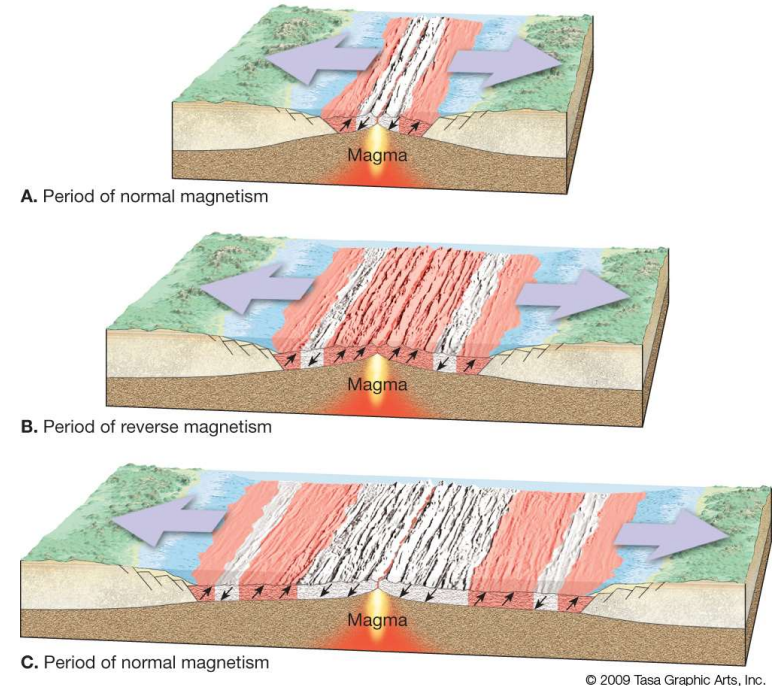


Paleomagnetism:

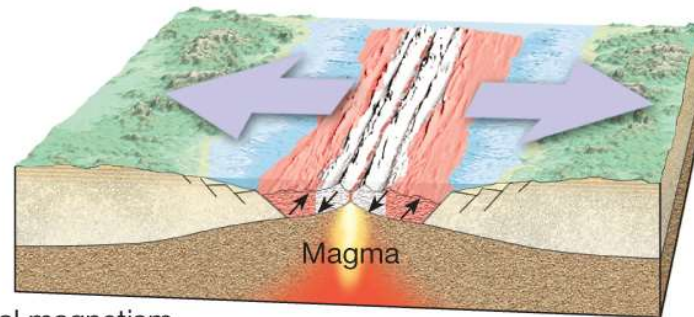
Proving the Earth's Magnetic Field Reverses

EVIDENCE?

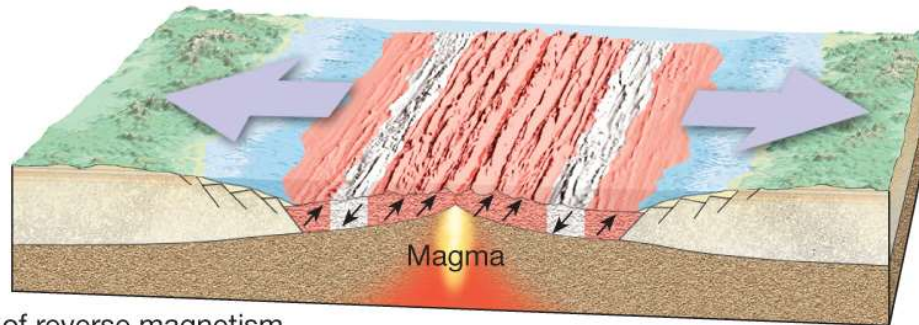
- Lava comes to the surface
- When lava cools, minerals (like Iron (Fe)) align with the current magnetic field
- Stripes formed to either side of the Mid-Atlantic ridge



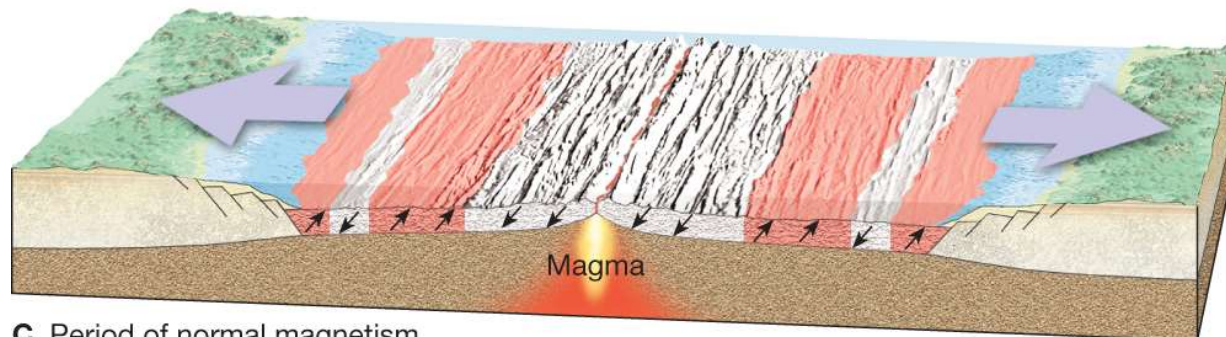
[click here to access the animation](#)



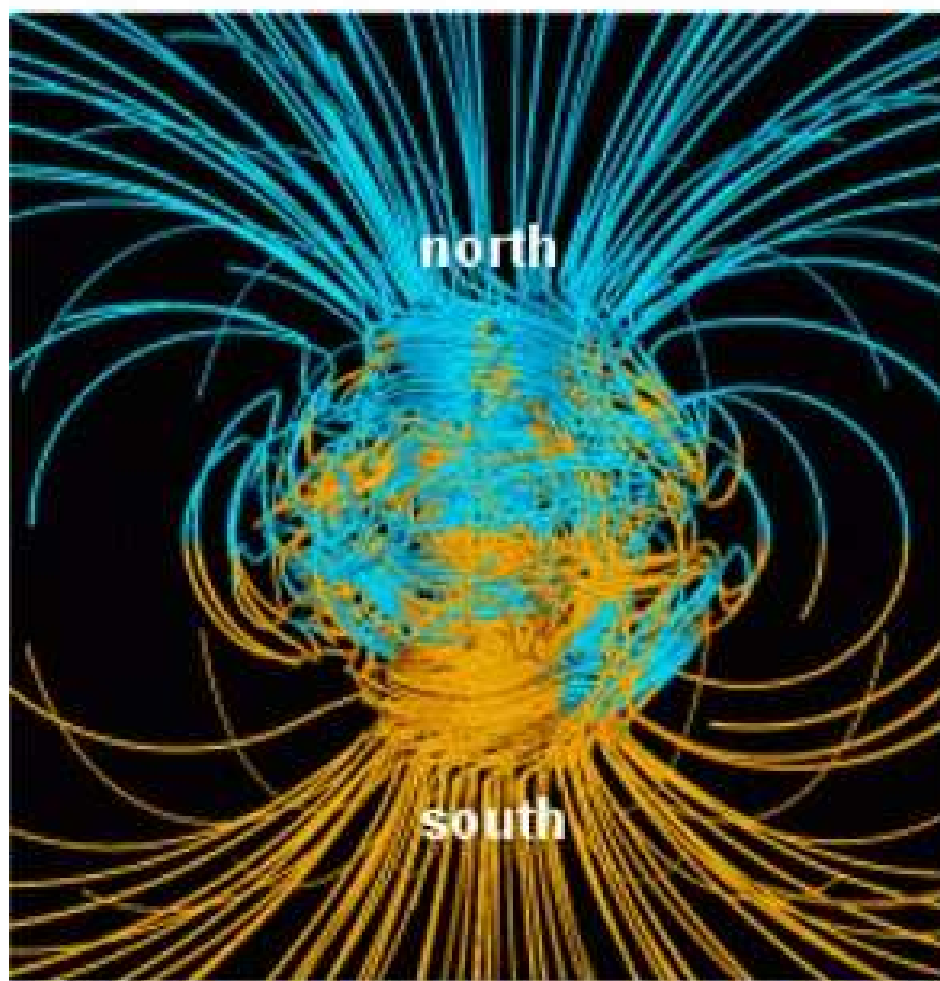
A. Period of normal magnetism



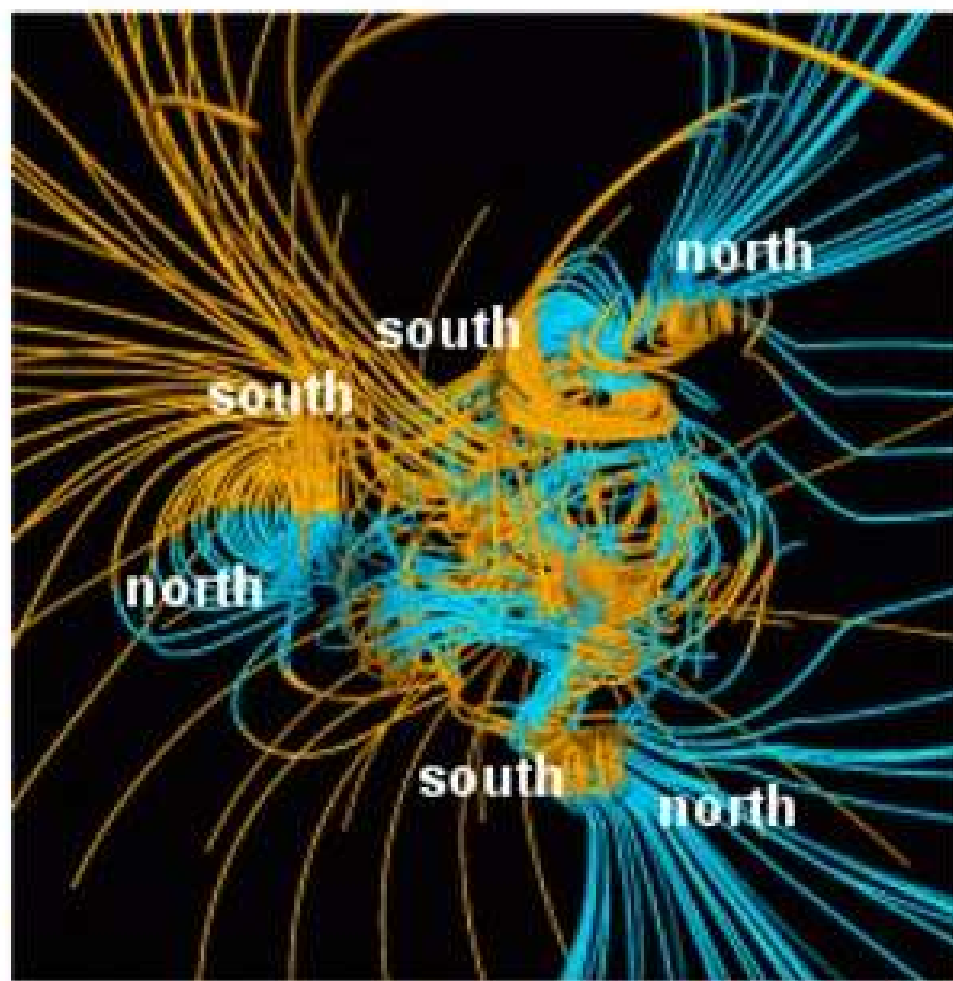
B. Period of reverse magnetism



C. Period of normal magnetism



between reversals



during a reversal