

MIT OpenCourseWare
<http://ocw.mit.edu>

12.002 Physics and Chemistry of the Earth and Terrestrial Planets
Fall 2008

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.

Polar Wander and Continental Drift

1620 - Francis Bacon, pointed out similarities of coastlines of Brazil and Africa

1912 - Alfred Wegner (German meteorologist and geologist)

All continents assembled 250 million years ago as one supercontinent called Pangaea

Based on similar geology and fossils. They since drifted to their current position.

1956 - Keith Runcorn demonstrated that Apparent Polar Wander (APW) paths of North America and Europe from late Paleozoic to early Mesozoic rocks in North America and Europe matched better if Atlantic closed.

1957 - Ted Irving showed that the APW paths of some continents also matched if Atlantic were closed before the Earth Mesozoic.

1960s - Vine and Matthews: argued that stripes of rocks with alternating polarity of magnetization reflected creation of new crust at seafloor ridges followed by symmetrical spreading: convection

Same time - paleomagnetists like Allen Cox (Stanford) started studying continental lavas. Eventually found that 10^5 to 10^6 years the field reversed. Magnetostatigraphic timescale of periods of alternating magnetic fields.

Record of last reversal in seafloor rocks same as in continents (780,000 thousand years ago)

1960's

Magnetic reversals

Seafloor spreading

Rigid plates

These three elements together really brought plate tectonics hypothesis to foreground.

Lithosphere is part of convective process; on all other terrestrial planets today, the uppermost part (lithosphere) is not part of convection.

Arthur Holmes - radiometric dating - relating continental drift (1929) with convection