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G 203 Lecture Notes

Review of Plate Tectonics/Structures/Earth's Interior

3/29/2010

## Stress and Faults:

**Normal Fault** (extension) causes thinning

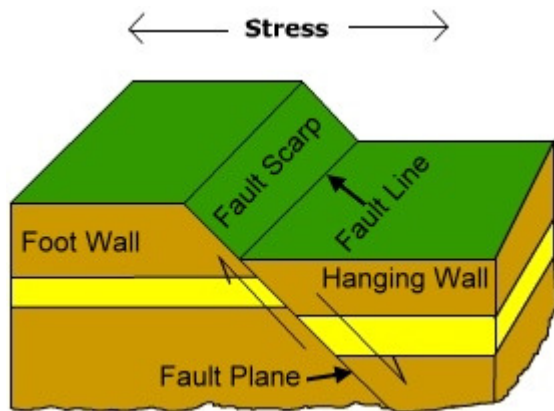


Image found at:

[http://www.uwsp.edu/geo/faculty/ritter/images/lithosphere/tectonics/normal\\_fault\\_labelled\\_diagram.jpg](http://www.uwsp.edu/geo/faculty/ritter/images/lithosphere/tectonics/normal_fault_labelled_diagram.jpg)

**Reverse Fault** (compression) causes thickening

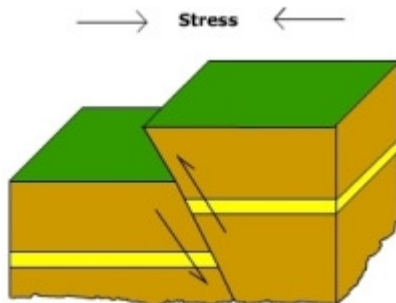


Image found at:

[http://www.uwsp.edu/geo/faculty/ritter/images/lithosphere/tectonics/reverse\\_fault\\_diagram\\_small.jpg](http://www.uwsp.edu/geo/faculty/ritter/images/lithosphere/tectonics/reverse_fault_diagram_small.jpg)

## Strike-Slip Fault (transformation) movement relative

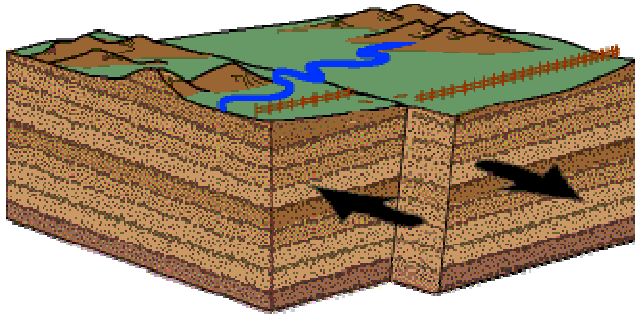


Image found at: <http://www.nature.nps.gov/geology/usgsnps/deform/strikeslip.gif>

## Earth is composed of Compositionally Different Layers

### Crust

1. Oceanic Crust (basalt/maefic and gabbro)
2. Continental Crust (consisting of feldspathic rocks) sedimentary/igneous/metamorphic

Sedimentary Rocks are the most common rocks on the land surface, but they are a thin veneer covering the igneous and metamorphic rocks that make up most of the crust.

\*Fossils and sedimentary rocks are most important in the finding of clues of past environments!

\*Outcrops of bedrock (exposure of rocks at surface) are what geologists look for.

3. Mantle (made of ultramafic rock) garnet/peridotite/dunite

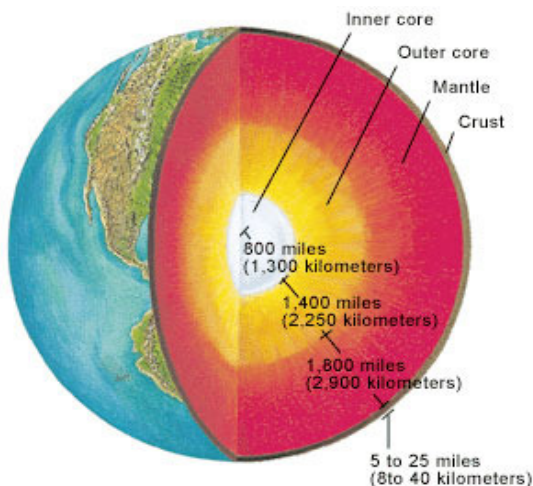


Image found at:

[http://martianchronicles.files.wordpress.com/2008/08/103949main\\_earth10.jpg](http://martianchronicles.files.wordpress.com/2008/08/103949main_earth10.jpg)

4. **Core** (made of iron-nickel alloy)

The Earth is also comprised of Mechanical Layers that do not correspond exactly to Compositional Layers.

Lithosphere (10-200kms) \*Brittle Rock (All earthquakes occur in this layer)

Asthenosphere (soft layer) \*almost at melting temperature

Mesosphere

Outer Core

Inner Core

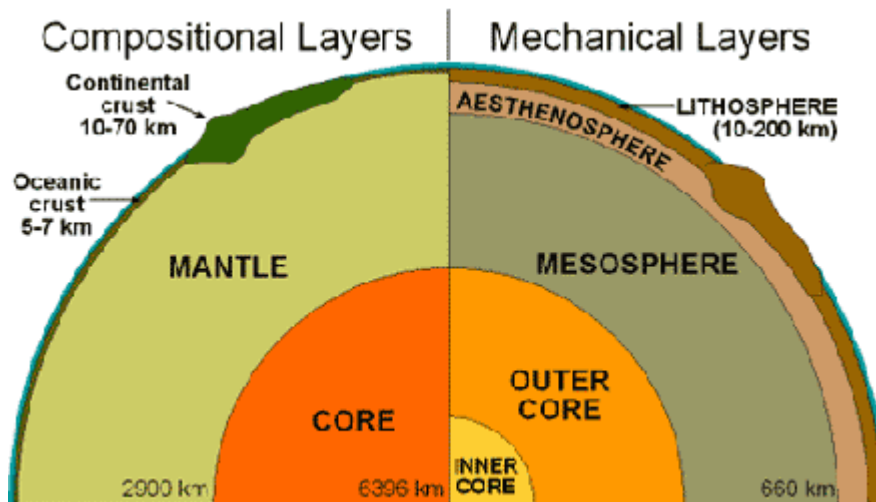


Image found at: <http://www.visionlearning.com/library/modules/mid69/Image/VLObject-1630-030917010902.gif>

## Phase Diagram:

As an example water was used during the lecture. The three forms of water Liquid/Ice/Steam experience changes at certain temperatures and at different Pressures.

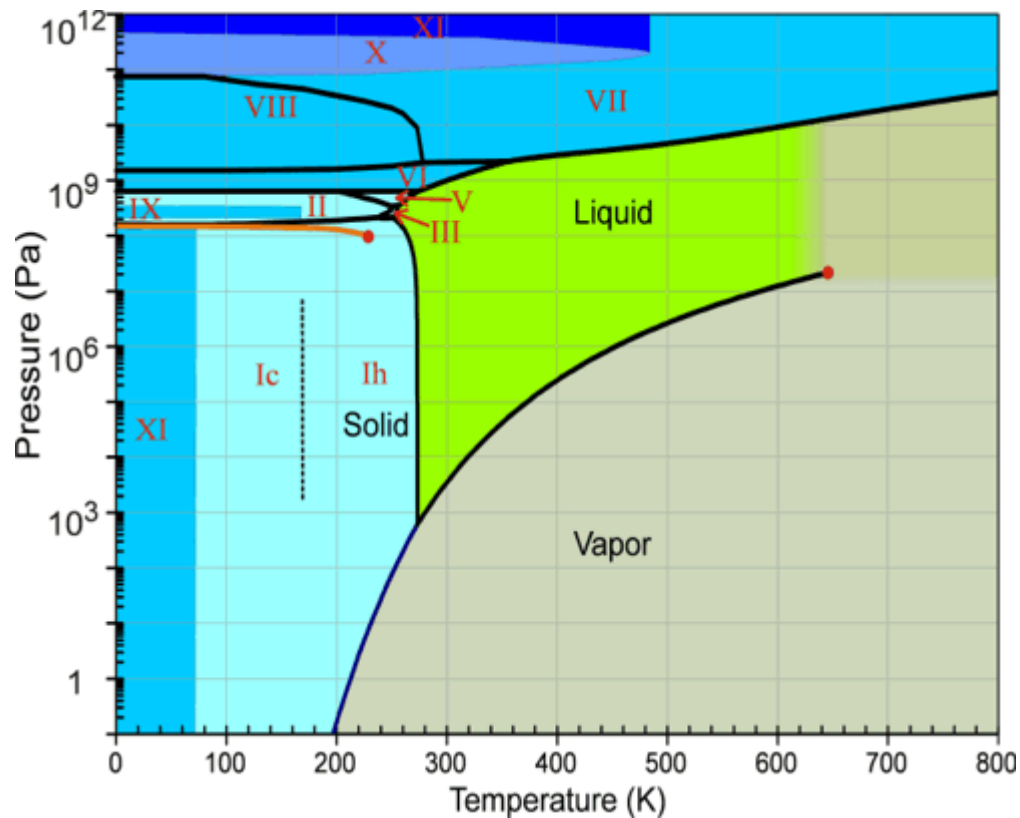


Image found at:

[http://www.colorado.edu/physics/phys4230/phys4230\\_sp02/images/phase.gif](http://www.colorado.edu/physics/phys4230/phys4230_sp02/images/phase.gif)

In Geology, a slight change in the Asthenosphere can cause magma generation.

## Theory of Plate Tectonics:

The Lithosphere is floating on the Asthenosphere

**Continental Drift** (Wegener 1915) stated that parts of the Earth's crust slowly drift on a liquid core.

Evidence:

Fossil and Plant distribution in Africa and South America

Mountain and rock ages of the Appalachian and Caledonian ranges

Crust fractures and glacial deposits (distribution of environmental features) Ex. Coal deposits.

Wegener failed to come up with a mechanism!

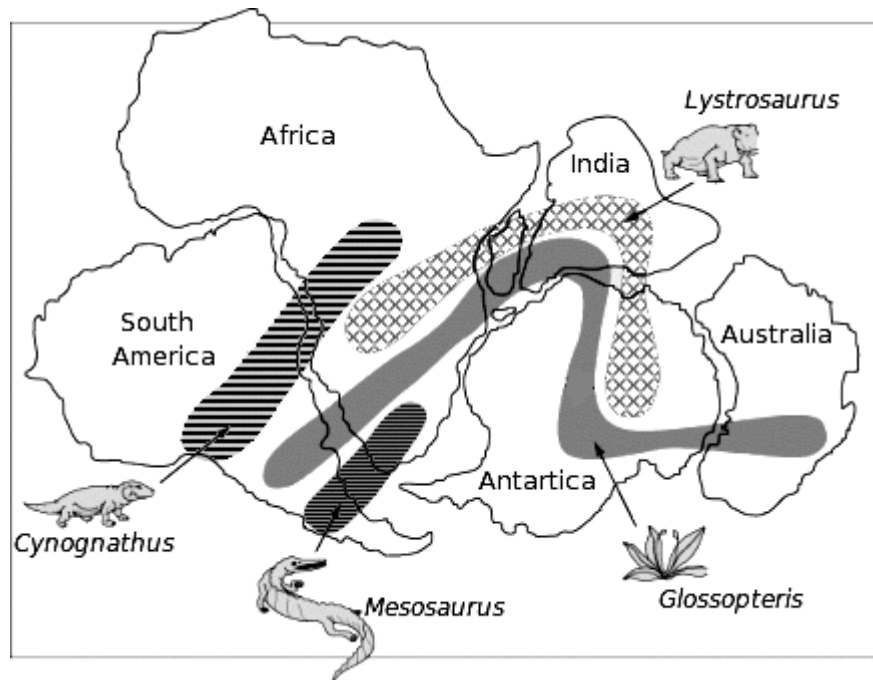


Image found at: <http://www.scientus.org/Pellegrini-Wegener-1.gif>

He was later validated in the 1960s after extensive research suggested a mechanism.

The interior of the Earth is hotter than the exterior.

Hot mantle rises and cool mantle sinks (Convection)