

Module 6:

Vocabulary:

Epicenter- The point on the surface of the earth directly above an earthquake's focus.

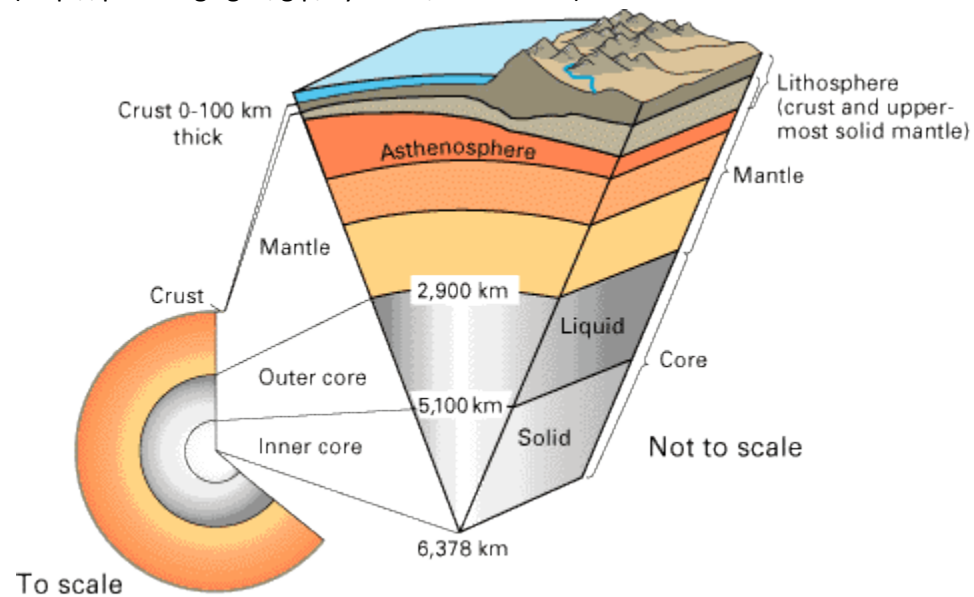
Fault – The boundary between a section of moving rock and section of stationary rock.

Plastic Rock – Rock that behaves like something between a liquid and a solid .

Sedimentary Rock – Rock formed when heat, pressure, and chemical reactions cement sediments together.

Cutaway views showing the internal structure of the Earth. Below: This view drawn to scale demonstrates that the Earth's crust literally is only skin deep. Below right: A view not drawn to scale to show the Earth's three main layers (crust, mantle, and core) in more detail (see text).

(<http://pubs.usgs.gov/gip/dynamic/inside.html>)



[The Layers of the Earth](#)

The Earth is layered into 5 sections.(look at figure 6.1)

1. Atmosphere
2. Hydrosphere
3. Crust
4. Mantle
5. Core

The Crust:

- Referred to as the Lithosphere
- The outermost layer of rock
 - The Continental Crust : approx 12-55 miles thick
 - The Oceanic Crust: approx. 6.5 miles thick
- Solid Rock made of Aluminum and Silica
- Most earthquakes occur in the crust
- Mohorovicic Discontinuity is located below the crust

The Earth's Crust

<http://earthquake.usgs.gov/research/structure/crust/index.php>

The Mantle:

- The upper part of the mantle is located in the Lithosphere
- Motion of Plate Tectonics occur in the Mantle
- Plastic Rock made of ferro(iron)-magnesium silicates
 - This thick "syrup" rock has the unique ability to be both liquid and solid.
 - With pressure it hardens
 - When the pressure released it liquefies
- Gutenberg Discontinuity is located between the Mantle and the Outer Core

The Outer Core:

- Composed of mostly molten iron and nickel.
- It is 2300 km thick
- The outer core is liquid due to the extreme heat.
- The Lehmann Discontinuity is located between the Outer and Inner Core

The Inner Core:

- Composed of mostly solid iron
- It is 1200 km thick
- The inner core is solid due to the extreme pressure even though it is hotter than the outer core.

- The Earth's Magnetic Field is controlled by the core. (theoretically)
 - Consider this idea: The heat of the core causes the movement of the upper layers. This movement , energy, creates the flow which contributes or causes the magnetosphere.

Types of Rock

There are 3 classifications of rock which the crust is composed of:

- Sedimentary
 - Rock formed by Sediment
 - Ie: Limestone
- Igneous
 - Rock from Molten Rock
 - Ie: Magma, cooled lava
- Metamorphic
 - Igneous or Sedimentary Rock that has become a new type of rock due to pressure
 - Ie: Marble

Rocks:

<http://www.nature.nps.gov/Geology/usgsnps/rxmin/rock.html>

<http://csmres.jmu.edu/geollab/fichter/SedRx/SimpModl.html>

- **Research Moment:**

Right now I want to ask you to take some time to define a few words.

- Theory
- Ruling Theory

The Earth's Magnetism

This Module will discuss 2 different theories in detail.

- The Dynamo Theory vs The Rapid Decay Theory
 - Dynamo Theory:<http://physics.aps.org/story/v5/st20>
 - Rapid Decay Theory:<http://creation.com/the-earths-magnetic-field-evidence-that-the-earth-is-young>

These 2 theories attempt to explain the earth's magnetic field and how it works.

- Dr. Wile takes time to point out that there is no such thing as an unbiased scientist. Explain how this could possibly "alter" the outcome of results? Study the concept of the Double-Blind Studies and how they are created to remove every instance of bias in the results.

Magnetic Field:

<http://www.icr.org/article/371/>

http://www.creationresearch.org/crsq/articles/21/21_3/21_3.html

- *Can you relate how the magnetic field shows a Creator?*

Plate Tectonics

This is the theory that the lithosphere is comprised of fractured plates that float on the asthenosphere.

These plates move and form many geological formations on the crust of the earth. (See page 146)

This leads to another theory!

- What is Pangea?
 - This is the theory that the Earth at one time was one huge land mass. (Look at figure 6.5)

Research the concept of plate tectonics as well as looking at both sides of the debate of Pangea. Make a list proofs both for and against this theory, then decide what you think. Is it possible? Do you think that a global flood, such as Noah's Flood, could have caused enough damage to separate a large land mass such as is suggested in the theory of Pangea?

Tectonic Plates

- <http://pubs.usgs.gov/gip/dynamic/slabs.html>
- <http://library.thinkquest.org/17701/high/tectonics/ptdiv.html>
- <http://creation.com/catastrophic-plate-tectonics-the-geophysical-context-of-the-genesis-flood>
- <http://www.answersingenesis.org/articles/tj/v16/n1/plate>
- <http://www.globalflood.org/>

Mid-Ocean Ridge: Largest Ocean Range

- <http://pubs.usgs.gov/gip/dynamic/slabs.html>
- <http://pubs.usgs.gov/gip/dynamic/topomap.html>

Pangea:

- <http://www.odsn.de/odsn/services/paleomap/animation.html>

Earthquakes

Earthquakes are measured vibrations of the earth's crust from volcanic activity or movement on faults. (Look at figure 6.6)

- Seismology is a branch of science that has been developed to study Earthquakes and the movement of the Tectonic Plates.

- Dr. Wile mentions earlier in the Module that we know about the Layers of the Earth, below the crust, by Indirect Observation. Is there Indirect Observation inherent in this branch of science?
- Read Revelation 16:18. Copy this scripture in your notebook.

Seismographs:

- <http://www.thetech.org/exhibits/online/quakes/seismo/>
- Build a seismograph:
<http://cse.ssl.berkeley.edu/lessons/indiv/davis/hs/Seismograph.html>
- http://earthquake.usgs.gov/learn/topics/seismology/keeping_track.php

Mountains and Volcanoes

The last part of this module focuses on the study of the formation of Mountains and Volcanic Activity as being prominent features of the earth's crust. This module gives a brief introduction to the topic. Take time to become familiar with the names of the types of mountains and terms that apply to both topics.

Mountain Types:

- Fault Block – Formed along a fault
- Folded – formed with extreme pressure of rock masses
- Dome - magma pushes the crust upward, but is contained and does not release the magma as a volcanic eruption.
- Volcanic - also known as a volcano, formed as a result of magma moving out onto the earth's crust.
 - Volcanoes are classified as:
 - Active – have erupted recently. (Mt. St. Helens or Mt. Pinatubo)
 - Dormant-have not erupted recently, but could still possibly erupt.(Mauna Kea in Hawaii)
 - Extinct- volcanoes never expected to erupt again. (Mt.Kilimanjaro in Tanzania)

Research Activity: Research the 1980 Eruption of Mt. St. Helens. This event not only was catastrophic, but it set the stage for massive study for creation scientists. Discuss how this effects the creation vs. evolution debate.

Websites:

The Layers of the Earth

- <http://www.learner.org/interactives/dynamicearth/structure.html>
- http://library.thinkquest.org/28327/html/universe/solar_system/planets/earth/interior/layers_of_earth.html
- http://www.rocksandminerals4u.com/earths_interior.html
- http://www.thetech.org/exhibits_events/online/quakes/inside/crust.html

