

Welcome to Class 7: Earth Geology, part III

Remember: sit only in the first 10
rows of the room

What are we going to discuss today?

Why are there earthquakes on Earth?

Greenhouse gases are
GOOD for the Earth!
So, what's the problem
with releasing more?



Burning fossil fuels (oil, coal) releases CO₂

PRS: Why is the Moon, Mars and Mercury cool, while the Earth's center is hot?

1. They do not have radioactive decay.
2. They have had more time to cool off.
3. They never differentiated.
4. They are smaller than Earth.

Work through this exercise in groups

FACT: The amount of heat present is measured by volume of hot material.

FACT: The amount of heat escaping (cooling) is measured by surface area where heat escapes.

What is the equation for the volume of a sphere?

What is the equation for the surface area of a sphere?

Look at your equation for the VOLUME and SURFACE AREA.
Which goes up faster as radius (size) increases?

PRS: Will the Earth ALWAYS be hot at its center?

1. Yes, from radioactive decay.
2. Yes, because it can trap the heat.
3. No, because radioactive decay will stop.
4. No, because it will always lose more heat than it generates.

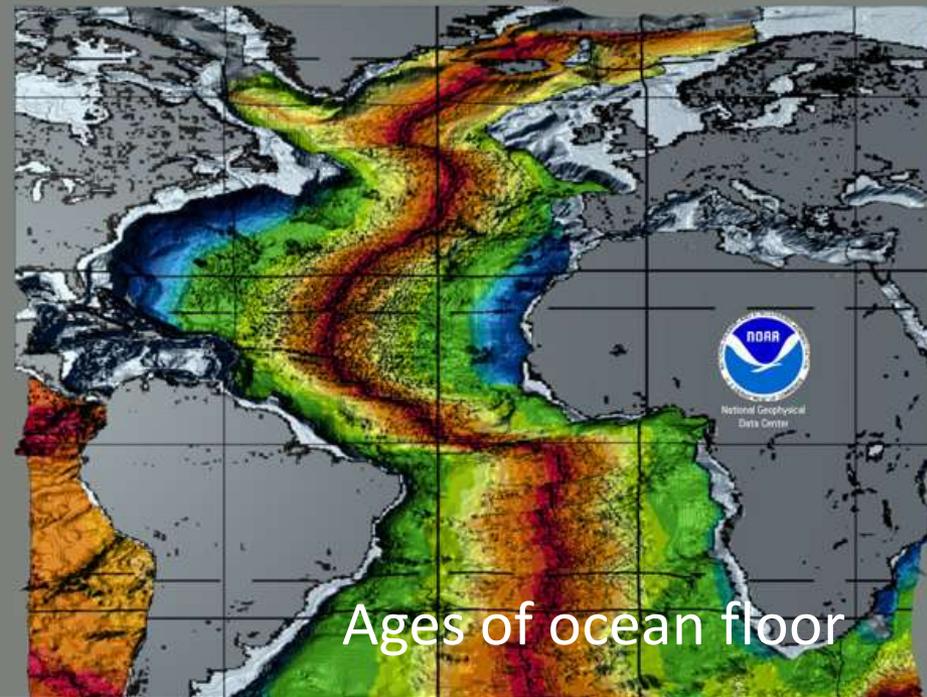
Evidence for Plate Tectonics

Global Positioning Satellites

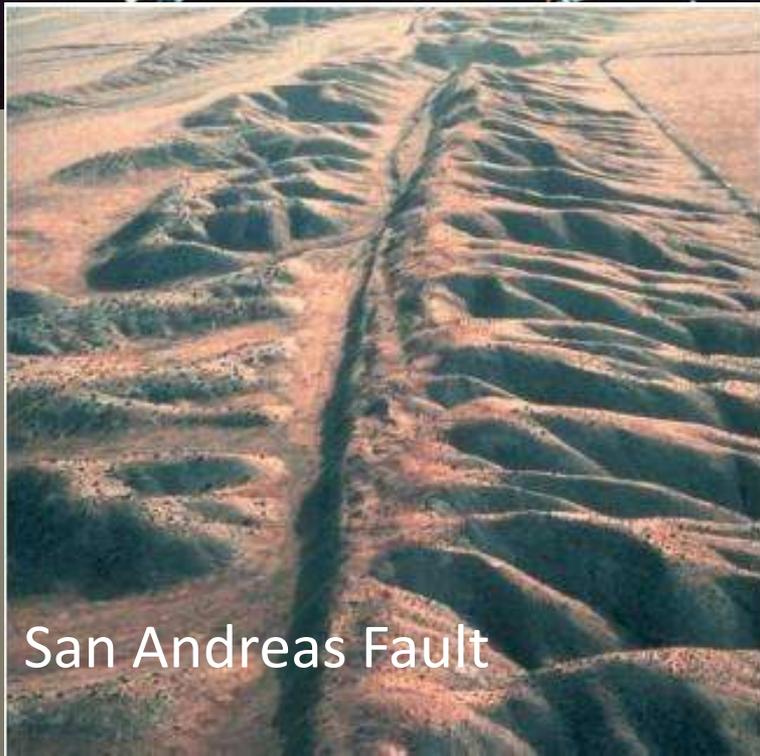


Crustal Age

A full-world view is coming soon to this Web site!



Ages of ocean floor



San Andreas Fault

Haiti's Earthquake



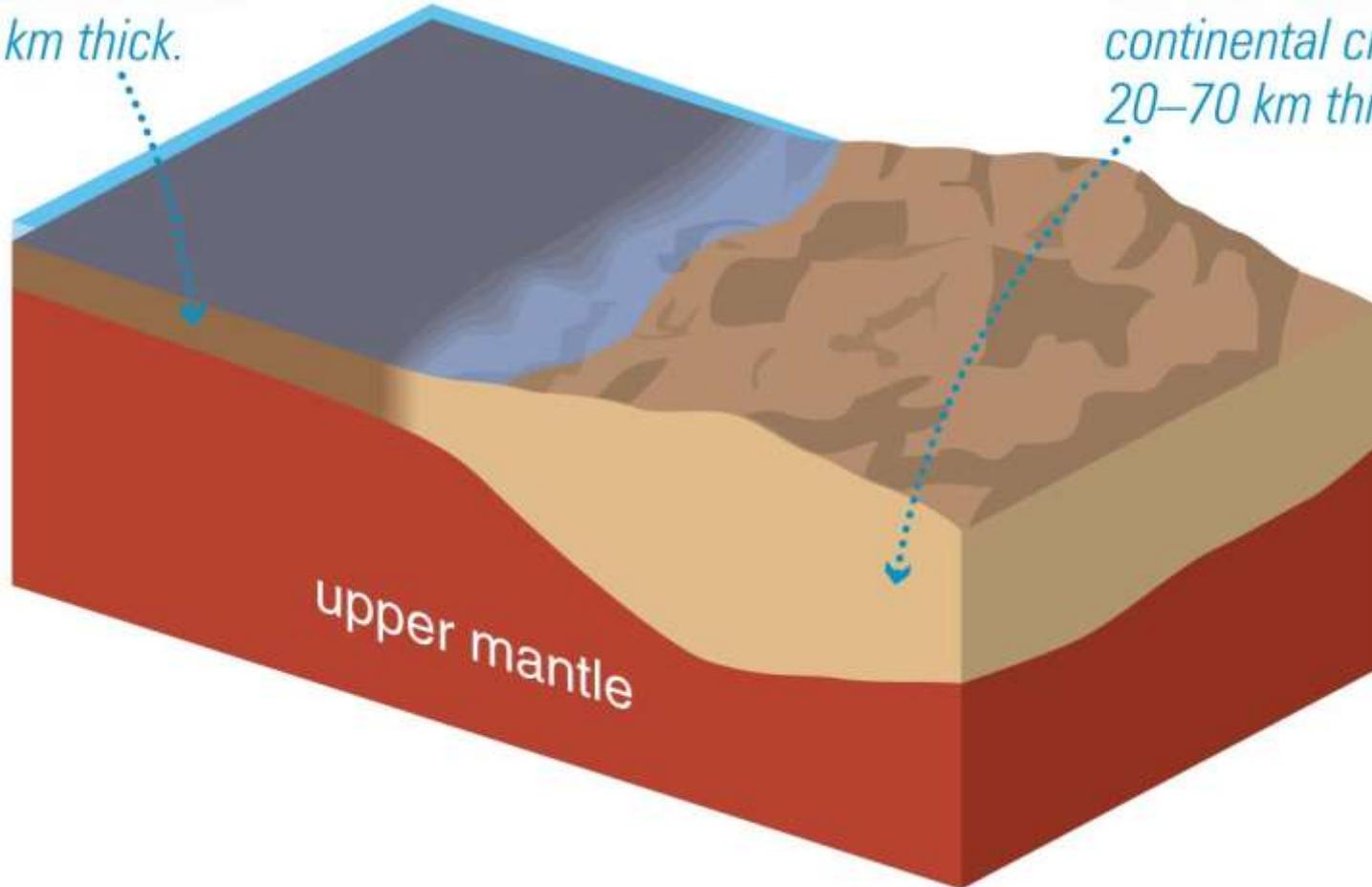
PRS: What is the difference between continental and seafloor crusts?

1. Seafloor crust is less dense
2. Continental crust is thinner
3. Seafloor crust is always older
4. Continental crust presses deeper into the mantle

Continental vs. Seafloor Crust

The relatively dense, young seafloor crust is 5–10 km thick.

The less dense, older continental crust is 20–70 km thick.



upper mantle

Why do the plates move?

1. Pressure from volcanoes.
2. Radioactive heat escaping.
3. Coriolis force from the Earth's rotation.
4. Convection in the mantle.

What happens at the boundaries when the plates move relative to each other?

A) Continental is stretched away from Continental

1) SUBDUCTION

B) Seafloor pushes into Continental

C) Continental pushes into Continental

2) CONVERGENT

D) Seafloor is stretched away from Seafloor

E) Seafloor pushes into Seafloor

4) SEAFLOOR SPREADING

F) Plates moving sideways relative to each other

3) RIFT

5) FAULT

PRS: A) Continental is stretched away from continental

1. Subduction
2. Convergent
3. Rift
4. Seafloor spreading
5. Fault

PRS: B) Seafloor pushes into Continental

1. Subduction
2. Convergent
3. Rift
4. Seafloor spreading
5. Fault

PRS: C) Continental pushes into continental

1. Subduction
2. Convergent
3. Rift
4. Seafloor spreading
5. Fault

PRS: D) Seafloor stretches away from seafloor

1. Subduction
2. Convergent
3. Rift
4. Seafloor spreading
5. Fault

PRS: E) Seafloor pushes into seafloor

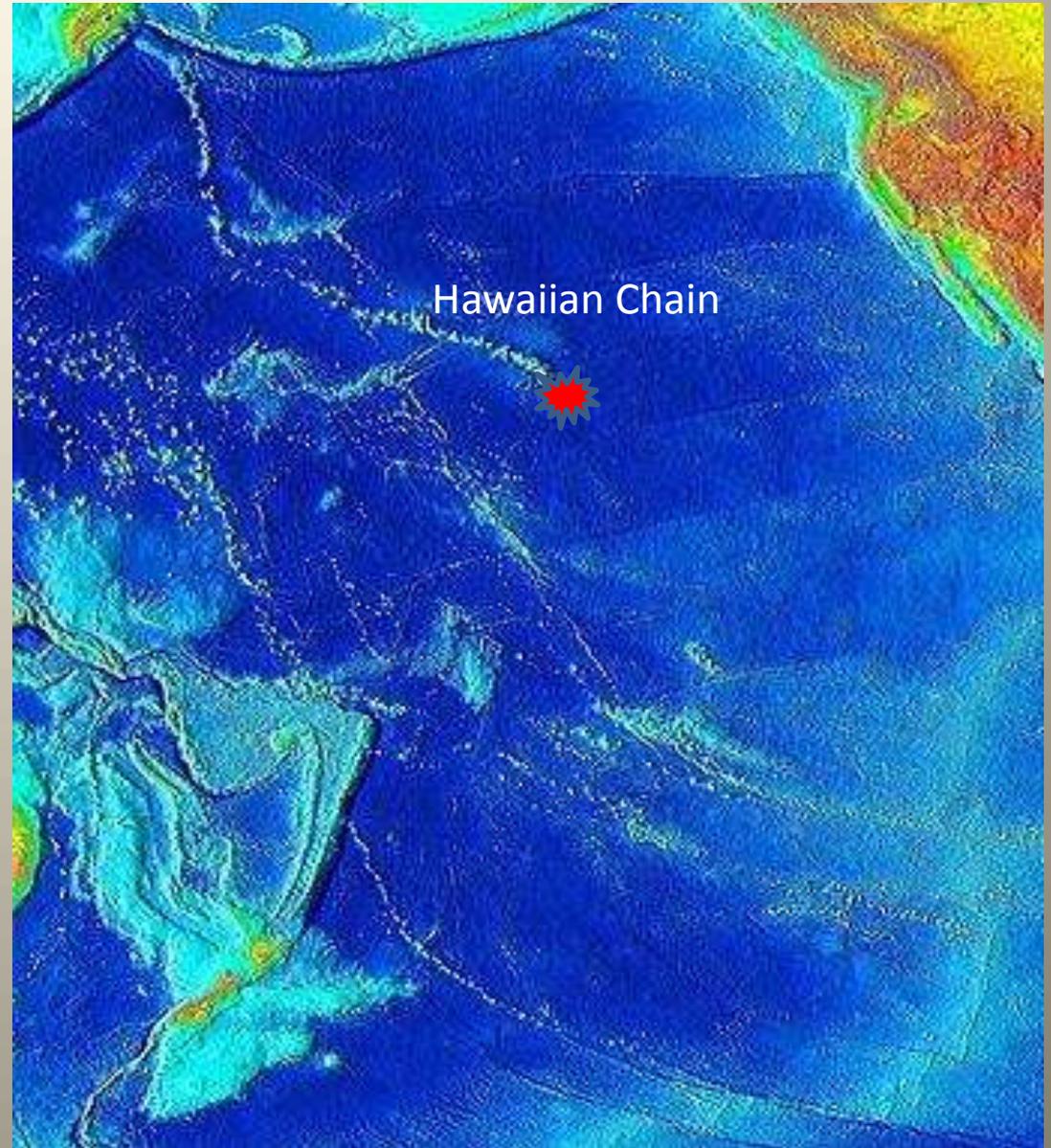
1. Subduction (usually)
2. Convergent
3. Rift
4. Seafloor spreading
5. Fault

PRS: F) Plates moving sideways relative to each other

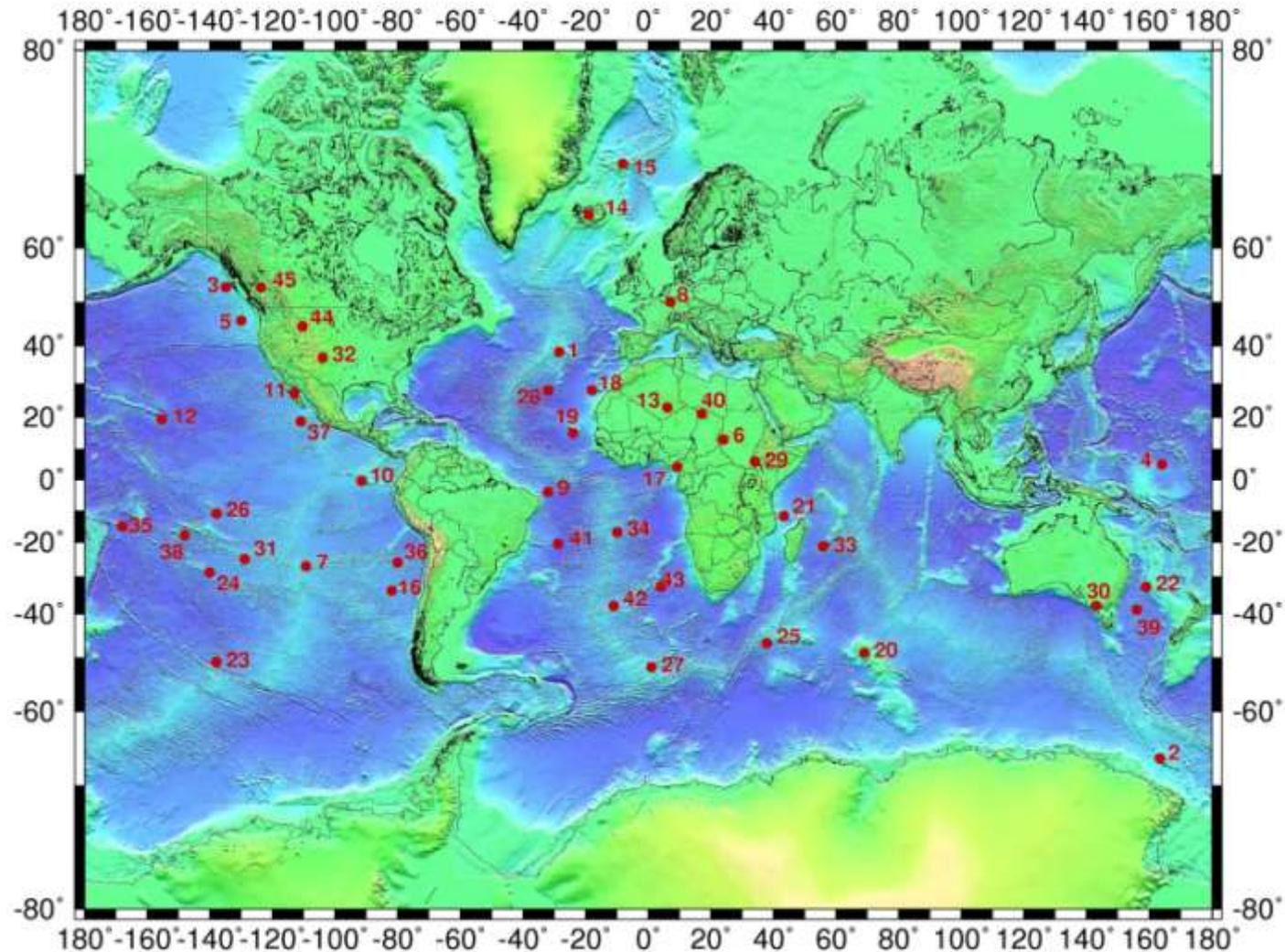
1. Subduction
2. Mountains
3. Rift
4. Seafloor spreading
5. Fault

Hot Spot Trails: Island chains

Hot mantle material rises up and the seafloor crust moves across it

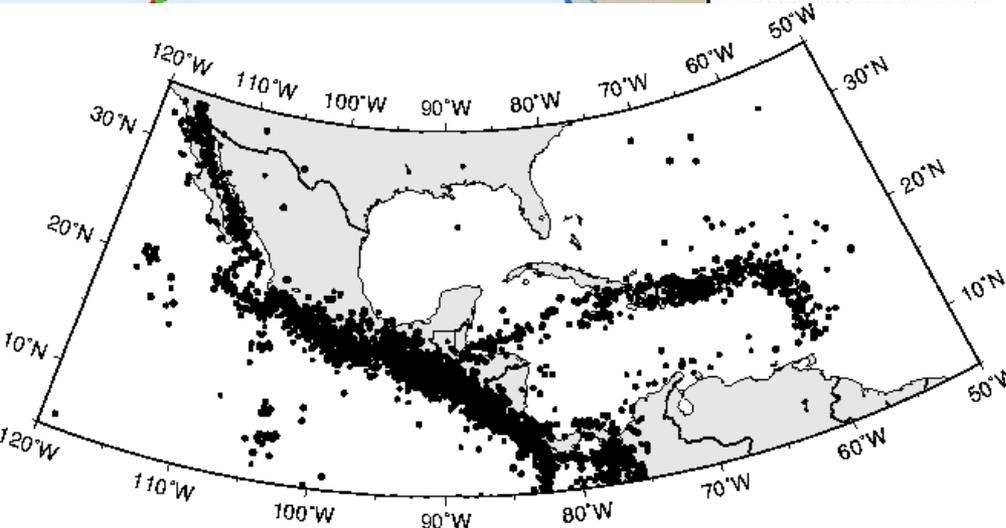
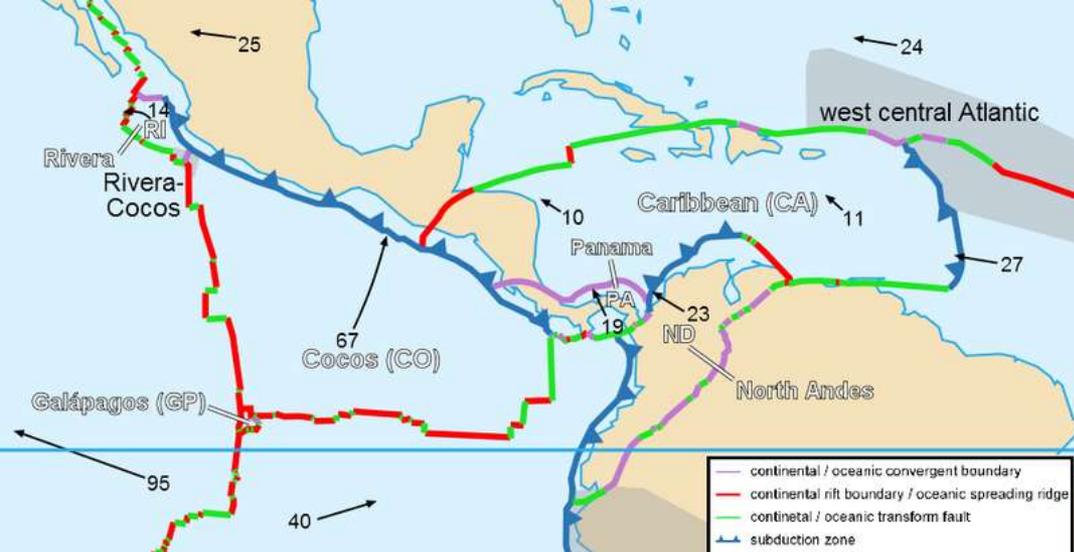


Hot spots can exist in Continental Crust, too.



Hot spots and seafloor-seafloor subduction have what in common?

They both make island chains!



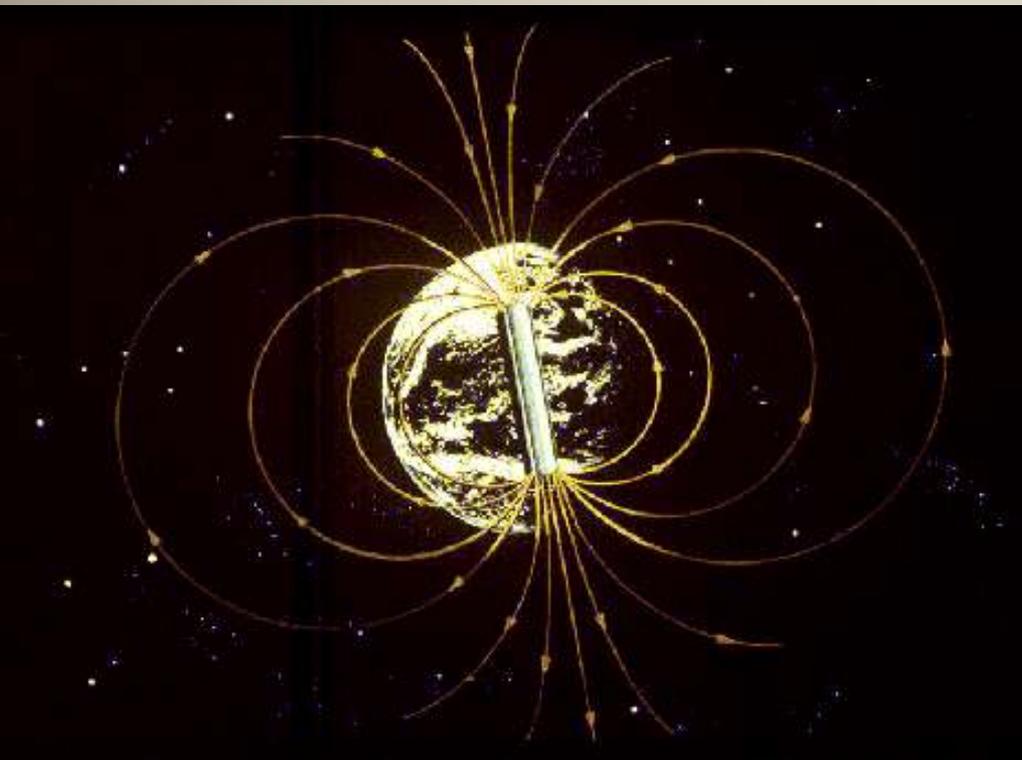
PRS: Our Earth's magnetic field is generated in the _____

1. Crust
2. Mantle
3. Outer core
4. Inner core

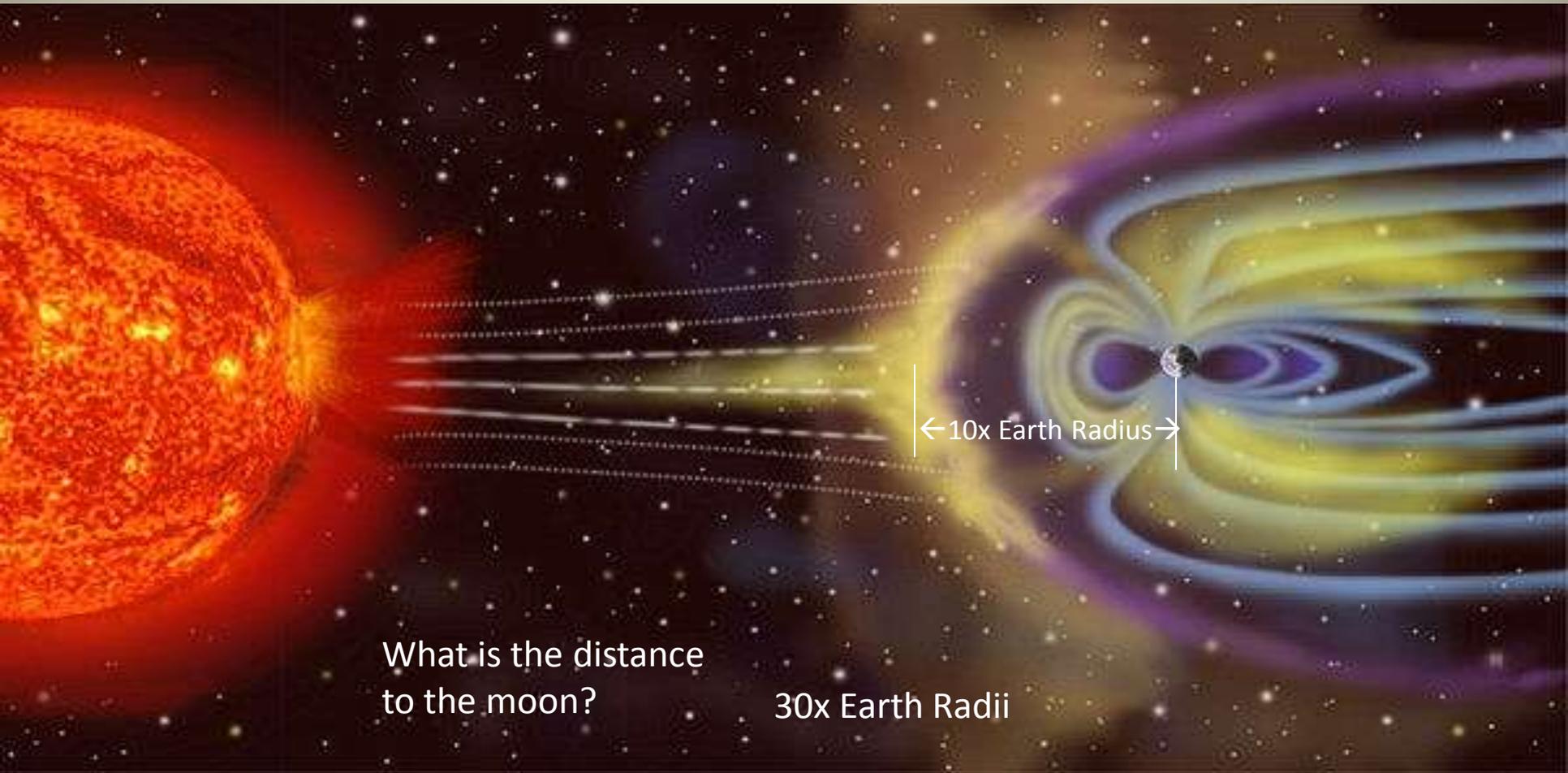
What is required for a planetary magnetic field to exist?

A planet will act like a large 'bar magnet' if it has the following characteristics:

1. A conducting fluid (liquid or gas)
2. Movement or convection of that fluid
3. Moderately fast rotation of the planet



Look at this picture and figure out what may be happening



What is the distance
to the moon?

30x Earth Radii

For this class, there are two aspects to remember. What are they?

Put all your materials on the floor and place your PRS clicker in front of you.

Please: use just one clicker for yourself.

Take care that others can not view your selection

1. What is the difference between continental and seafloor crust?

1. Seafloor crust is always older
2. Continental crust is thinner
3. Continental crust presses deeper into the mantle
4. Seafloor crust is less dense

2. When seafloor crust moves over a hot spot it creates

1. A Subduction zone
2. A Seafloor spreading
3. A rift
4. An island chain
5. A fault

3. Which is not required to maintain a planetary magnetic field?

1. Volcanism
2. Conducting fluid
3. Convection of the fluid
4. Rotation of the planet
5. All of the above

4. The Earth's magnetic field provides

1. Energy for life
2. Protection of the atmosphere
3. Stable orbit for the Moon
4. All of the above

To do list for next class

- Refer to the class syllabus
- Read assigned pages in textbook and review study questions on objectives list
- Register and bring PRS transmitter to class
- Bring textbook to class (not mandatory)