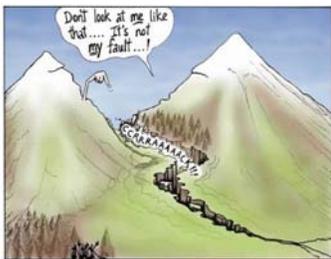


## Physical Science Review

Unit 4 (Chapters 26-34)



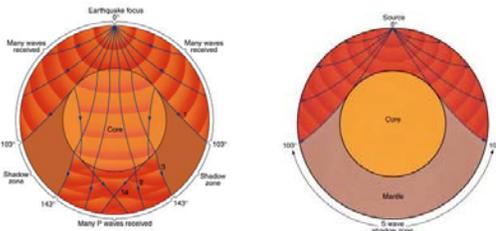
## Test Reviews

- Exam 4
  - Fri Apr 9th - 2-4PM - C295 ESC - Amanda
  - Sat Apr 10th - 12-2PM - 256 CB - Amanda
- Final
  - Wed. Apr 14th - 140 JSB (auditorium)
    - Unit 1 - 1PM - Freddy
    - Unit 2 - 2PM - Chad
  - Thur Apr 15th - 140 JSB (auditorium)
    - Unit 3 - 1PM - Melissa
    - Unit 4 - 2PM - Miriam/Amanda/Steve

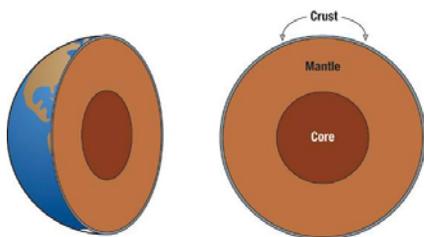
## Earth's Interior

- Review
  - Evidences
    - Direct Observations (Drilling, Mantle Inclusions)
    - Meteorites
    - Gravity & Density
    - Seismic Waves (Shadow Zones)
    - Magnetic Field
  - Compositional Model of Earth Structure
  - Mechanical Model of Earth Structure

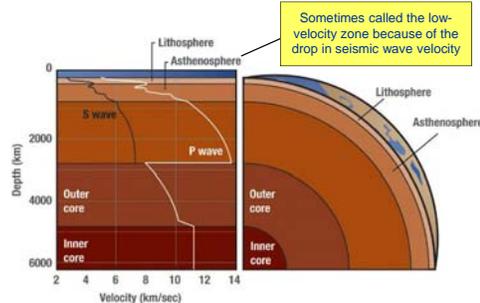
Why are there shadow zones for P and S waves?  
Why are these zones different for P and S waves?



## Compositional Model of Interior



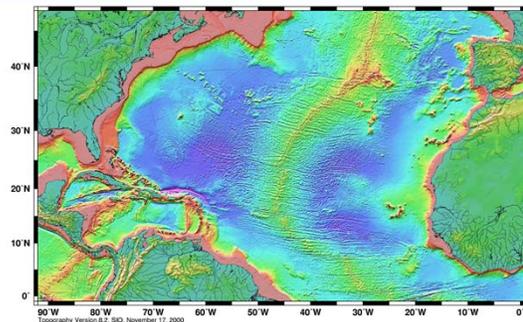
## Mechanical Model of Interior



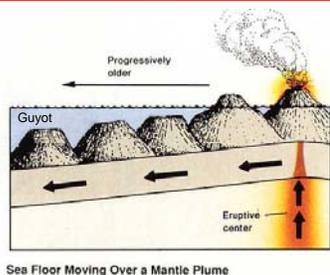
### Evidence for Plate Tectonics

- Review
  - Continental Drift
    - Alfred Wegener's evidences
      - Jigsaw fit of continents
      - Structural fit of continents
      - Fossils
      - Paleoclimatic evidence
      - Paleomagnetic evidence
    - Why was theory not accepted?
  - Additional Evidences leading to acceptance of theory
    - Seafloor topography
    - Guyots
    - Magnetic stripes on seafloor
    - Locations of earthquakes, volcanoes
    - Thickness & age of sediment on seafloor

### Seafloor Topography



### Guyot Formation



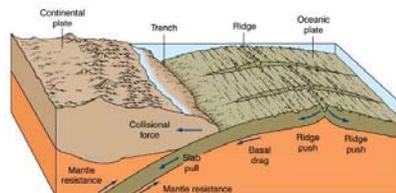
### Which of the following is not an evidence for the theory of plate tectonics?

- A. The locations where most earthquakes & volcanoes occur
- B. The age of rocks on the ocean floor
- C. The shadow zone for S-waves passing through the Earth
- D. The similarities in the fossils found on many of the continents

### Chapter 30 – Plate Tectonic Model

- Review
  - Forces that drive plates
  - Basic types of plate interactions and examples of each type
    - Divergent (Spreading)
      - Oceanic
      - Continental
    - Convergent (Collision)
      - Ocean/Ocean
      - Ocean/Continent
      - Continent/Continent
    - Shear (Transform)
  - How continents evolve
  - Hot Spots

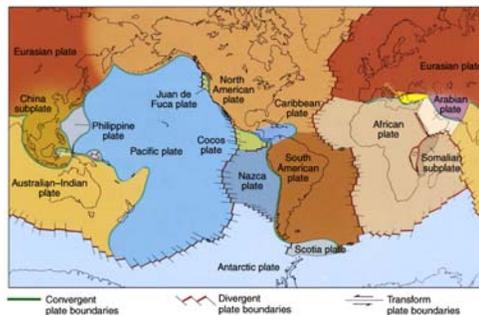
### Forces affecting plate motion



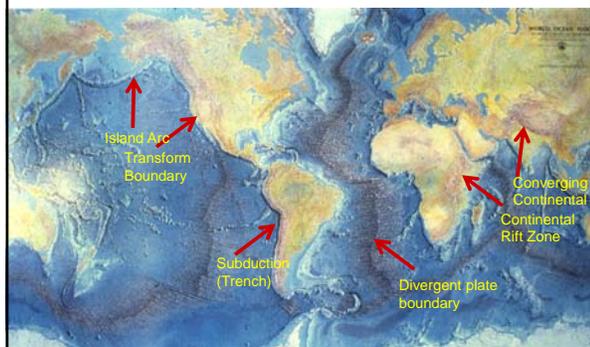
Which is not associated with a plate boundary

- a) East African rift valley
- b) Grand canyon
- c) Icelandic volcanism
- d) San Francisco earthquakes
- e) Aleutian trench

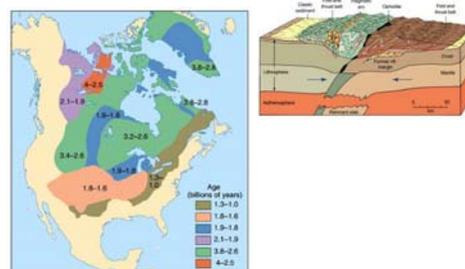
Current plate boundaries



Name that boundary



Continental Growth

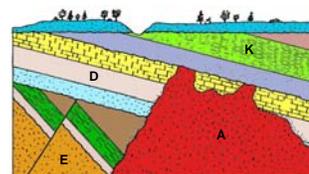


Geologic Time

- Review
  - Principles of Relative Dating
    - Original Horizontality
    - Superposition
    - Cross-cutting Relationships
    - Inclusions
    - Faunal Succession
  - Unconformities
    - Breaks in the rock record
  - Absolute Time
    - Half-life
    - What is it that we are dating?
      - Thermal events, not the elements

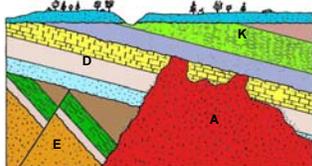
Which of the following is the oldest rock unit shown?

- A. A
- B. E
- C. D
- D. K



What principle of relative dating do you use to determine that A is younger than D?

- A. Superposition
- B. Faunal Succession
- C. Original Horizontality
- D. Cross-cutting Relationships



### Earth Materials

- Review
  - Basic Rock Types
    - Igneous
    - Sedimentary
    - Metamorphic
  - Common rocks of each type

Layers of limestone containing fossil clams and sea snails are found at the top of Mount Timpanogos. What is the best explanation for how they got there?

- A. They were deposited in an ocean and have since been uplifted by tectonic processes
- B. The fossils were formed during metamorphism of the mountain
- C. The mountain has always been there and the fossils are left over from the time of creation
- D. The limestones formed when lava flowed out of a volcano and trapped the fossils

### Surface Processes

- Hydrologic System
  - Rivers
  - Glaciers
  - Groundwater

What is this feature, and how did it form?



What causes alluvial fans?



Come up with a hypothesis about how this valley was formed.

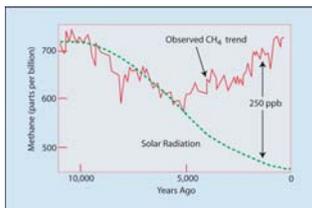


### Earth's Climate

- Climate Change
  - Evidences
    - Solar Radiation Cycles
    - Temperature Change
    - CO<sub>2</sub> and Methane
  - Forecasts for the future

The graph below shows atmospheric methane concentrations for the last 10,000 years. Why has the methane concentration continued to increase even with a drop in solar radiation during the last 5,000 years?

- A. A change in the ellipticity of Earth's orbit
- B. An increase in the tilt of Earth's rotation axis
- C. Human activities that have released extra methane



### Extreme Weather

- The primary drivers for most extreme weather events continue to be the natural climate cycles (shifting location of warm water in Pacific, etc.)
- Increased temperatures can also play a role.
  - Increased energy leads to increased evaporation
  - Intense rainfall has increased about 20% in the US due to increased moisture content in the air.
  - Tropical rain belts are predicted to expand, pushing subtropical dry zones towards the poles
  - Warming in the arctic can change the jet stream path, adding more north/south meanders.
  - Heat waves are becoming more probable (one study estimates that they are about 20% more probable than in the 1980s)
- Models predict increased hurricanes and typhoons, but so far we haven't observed any statistically significant shifts.
- Tornadoes are very hard to model and predict, and there isn't any compelling evidence yet that warming will cause an increase or that warming won't have an effect. We are still studying.
- Much of the perceived increase in severe weather has to do with people locating in regions where it occurs and a lack of preparation in many cases.
- Individual weather events (including those discussed in this article) are not evidence of changing patterns. All of these types of weather events have happened in the past. We are just studying to see how the probabilities change.



### Beyond the Earth

- Review
  - Structure of Solar System
    - Terrestrial Planets
    - Jovian Planets
    - How are they different?
  - Features of Planets
    - What is unique to Earth?
    - How do the Earth and the Moon compare?
  - How do we determine distances?
    - Radar Ranging
    - Triangulation

Which of the following planets would likely have the highest density?

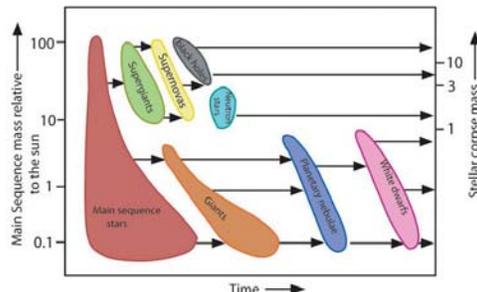
- A. Jupiter
- B. Saturn
- C. Neptune
- D. Uranus
- E. Mercury



### Life Cycle of a Star

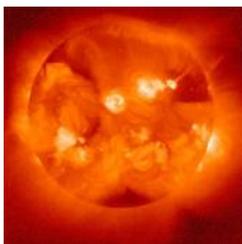
- Life History of Typical Star
  - Nebula
  - Protostar (~10 million yrs)
  - Main Fusion Stage (~10 billion yrs)
  - Red Giant
  - White Dwarf
- How does the history of smaller and bigger stars differ from typical stars?
- How can we use the HR diagram to determine distance?

### Stellar Evolution



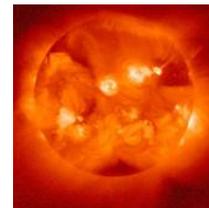
For a typical star, like our Sun, the hydrogen/proton fusion stage is...

- A. The shortest life stage
- B. The earliest life stage
- C. The longest life stage
- D. None of the above, a star like our Sun doesn't ever reach the hydrogen fusion stage.



Two **main sequence** stars have different colors, but the same brightness. Which one is **closest** to the Earth?

- A. The bluest one
- B. The reddest one
- C. The yellowest one
- D. Impossible to tell from color



### Cosmology

- Structure of Milky Way
- Types of galaxies
  - Elliptical, Spiral, Barred, Irregular
  - How can we determine the age of a galaxy?
- Determining Distance
  - Cepheid Variables
  - Red Shift
- Big Bang Model
  - Evidence
    - Expansion of Universe (Red Shift)
    - Microwave background radiation
    - Composition of Universe (H, He)
    - Dark Night Sky (Olber's Paradox)