Monday – Tuesday, Jan 24-25, 2005

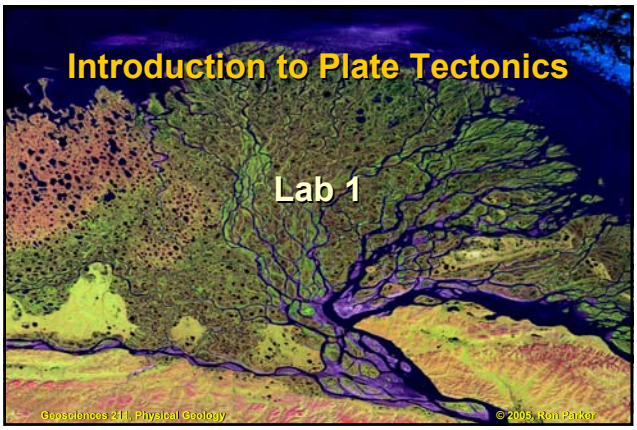

Plate Tectonics

The comprehensive model of "How the Earth Works"

- The earth's surface is broken into ~ 20 rigid plates.
- All plates contain oceanic crust; some also have continental.
- Plates move on convecting mantle "at the rate fingernails grow."
- Plates interact at their edges causing volcanoes and earthquakes.

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Plate Tectonics: The New Paradigm

Plate tectonics yields a unified explanation of:

- Earth's major surface processes
- The distribution of earthquakes
- The distribution of volcanoes
- The origin of continents and ocean basins
- The past distributions of plants and animals
- The mechanism of orogenesis (mountain building)
- The driving engine of the rock cycle

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Plates

- The "Plates" of Plate Tectonics are fragments of lithosphere.
- Lithosphere, the outermost layer of Earth, consists of…
  - The uppermost mantle, and
  - The crust.

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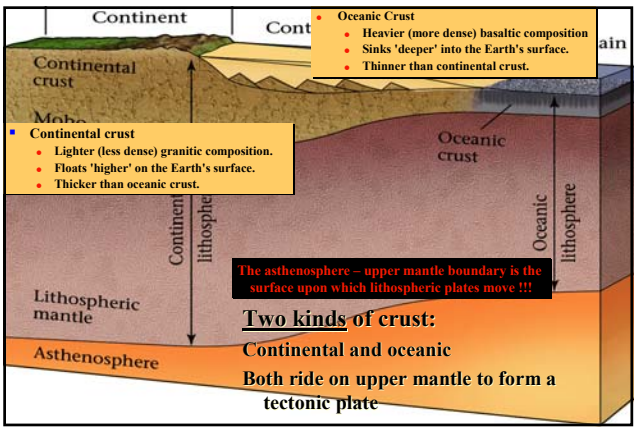


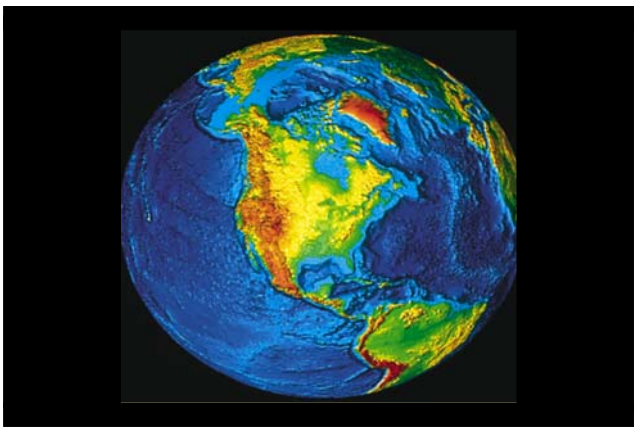
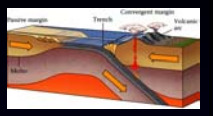


Plate Motion

- All plates move relative to one other.
  - Very slow (on a human time scale)*
  - Plate motion is continuous and inexorable
  - Average about 5 centimeters (2 inches) per year: "as fast as you fingernails grow"



*On a geologic time scale plate motion is extremely rapid.

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Plate Boundaries

- 3 Types of Plate boundaries
  - Divergent boundary – Pull-apart
  - Convergent boundary – Push together
  - Transform – Slide past one another

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Plate Boundaries

- 3 Types of Plate boundaries
  - Divergent boundary – Pull-apart
    - Rifts (CC)
    - Mid-Ocean Ridges (OC)
  - Convergent boundary – Push together
  - Transform – Slide past one another

CC = continental crust
OC = oceanic crust

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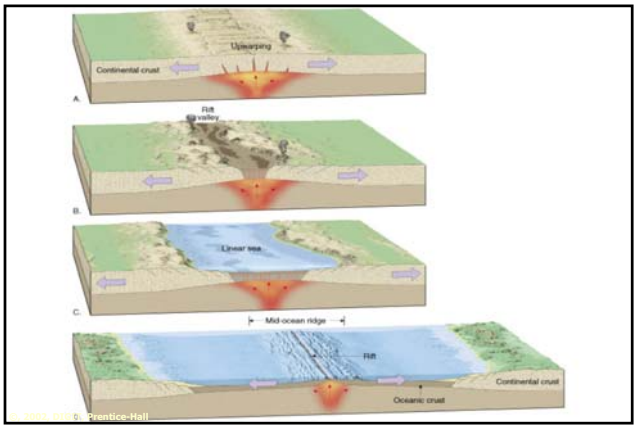

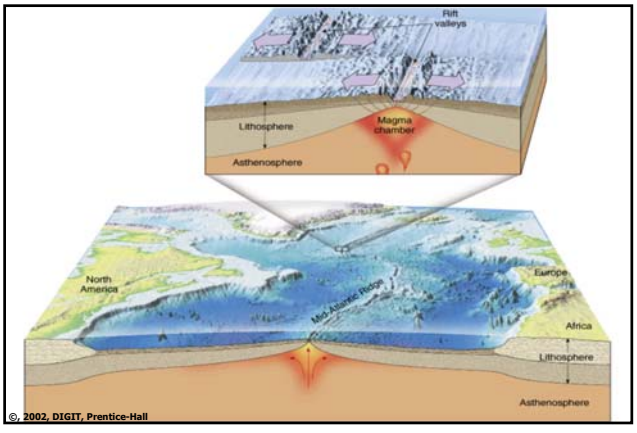

Plate Boundaries

- 3 Types of Plate boundaries
  - Divergent boundary – Pull-apart
    - Rifts (CC)
    - Mid-Ocean Ridges (OC)
  - Convergent boundary – Push together
    - Collision zones (CC)
    - Subduction zones (OC)
  - Transform – Slide past one another

CC = continental crust
OC = oceanic crust

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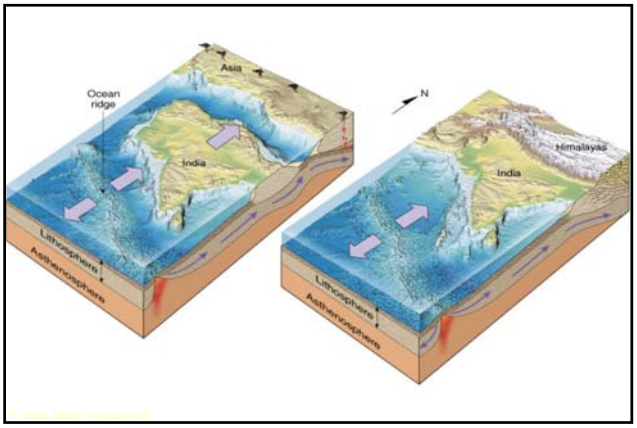

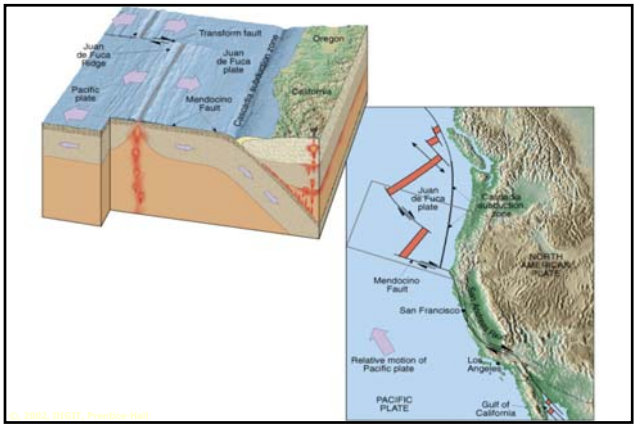

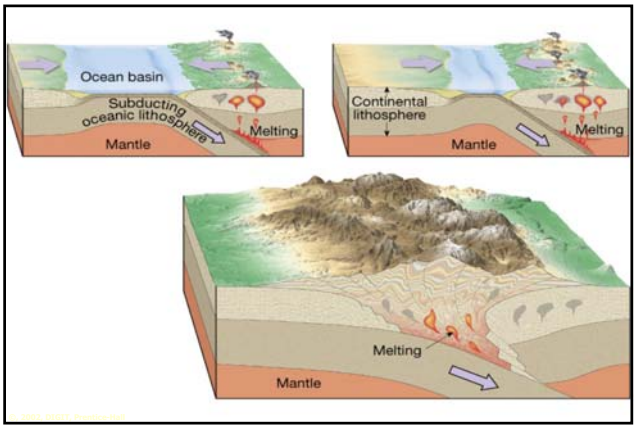

Plate Boundaries

- 3 Types of Plate boundaries
  - Divergent boundary – Pull-apart
    - Rifts (CC)
    - Mid-Ocean Ridges (OC)
  - Convergent boundary – Push together
    - Collision zones (CC)
    - Subduction zones (OC)
  - Transform – Slide past one another
    - Strike-slip faults (CC)
    - Oceanic fracture zones (OC)

CC = continental crust
OC = oceanic crust

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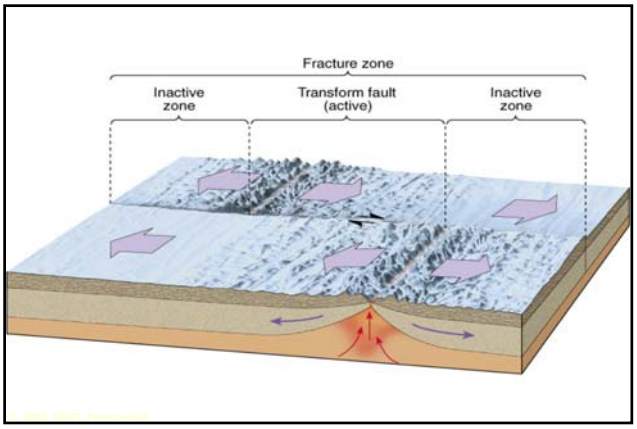

Lithospheric Plate Boundaries

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