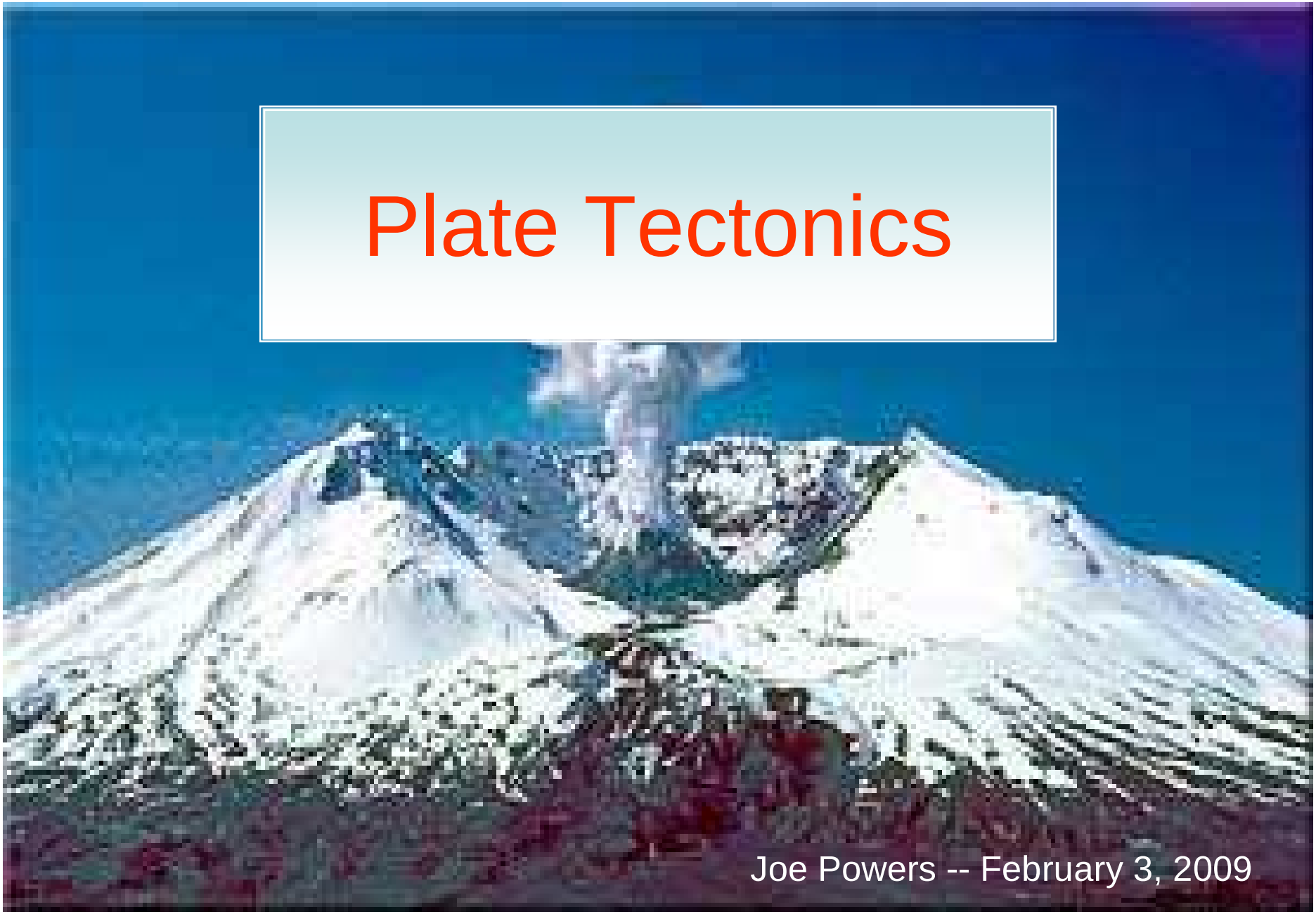


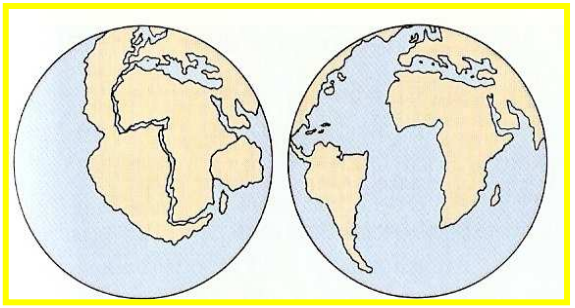
# What Do These Have in Common?

- Mt. St. Helens - 1980
- Indonesian Tsunami in 2004
- Rocky Mountains
- San Francisco Earthquake(s)
- Explosion of Krakatoa (biggest ever)
- Fossils of Tropical Plants in Antarctica

Answer: Plate Tectonics

# Plate Tectonics Overview

- Definition - the earth's crust is composed of rigid segments (plates) in constant (although considered slow in a human-scale time frame) motion (tectonics) relative to each other.
- Plate tectonics theory explains volcanism, earthquakes, and mountain formation
- Land & ocean floor moving and constantly being regenerated.
- History of the Idea



Snider-Pelligrini, 1858
Noah's Flood

Wegner – 1915

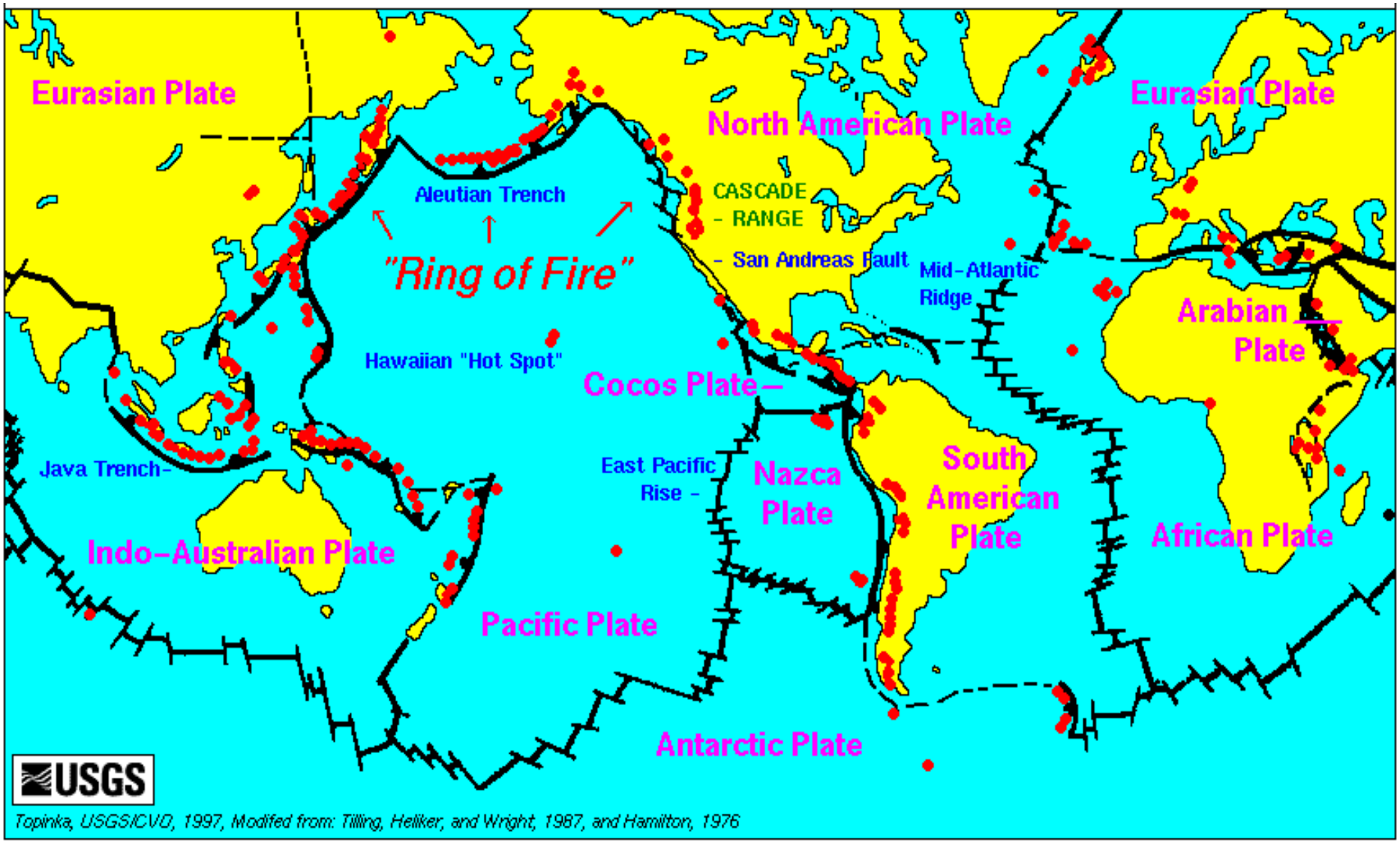
Brute Force Plow thru Oceans

1960's – Tectonics "Proof"

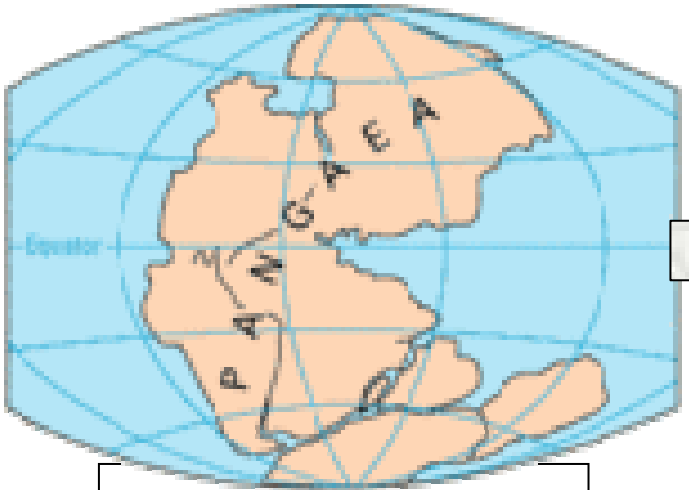
- Common Fossils
- Glaciation Data
- Magnetic Data – new!

Pictures from: Earth's Dynamic Systems, 6th ed., Hamblin, 1992

# Major Tectonic Plates

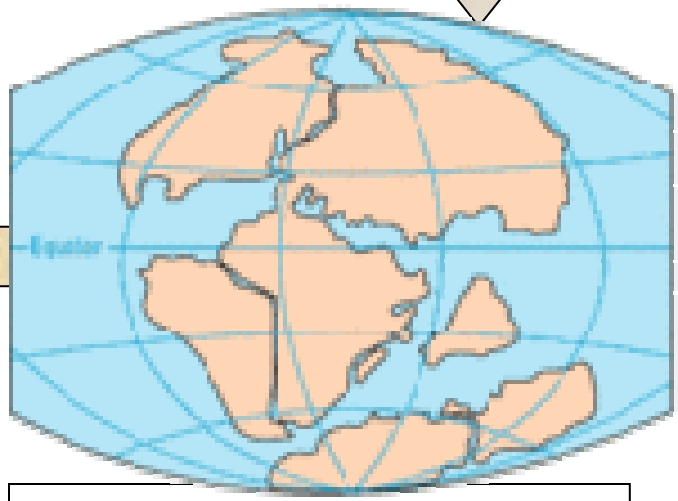


# Plate Tectonics-Movement

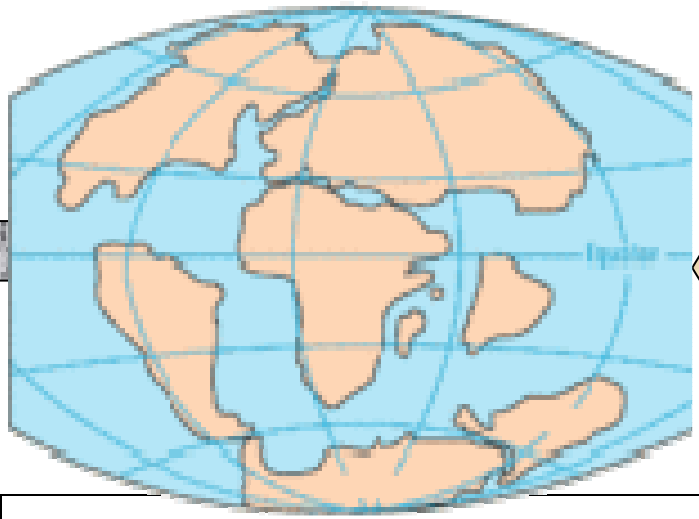



Permian – 225 mya*
Reptiles appeared

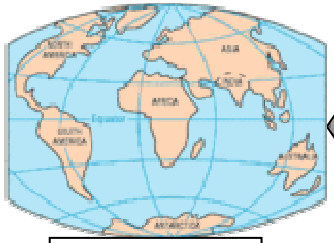

Triassic – 200 mya
Dinosaurs appeared



Jurassic – 135 mya
Mammals & Birds appeared



Cretaceous – 65 mya Alligators & Horses appeared

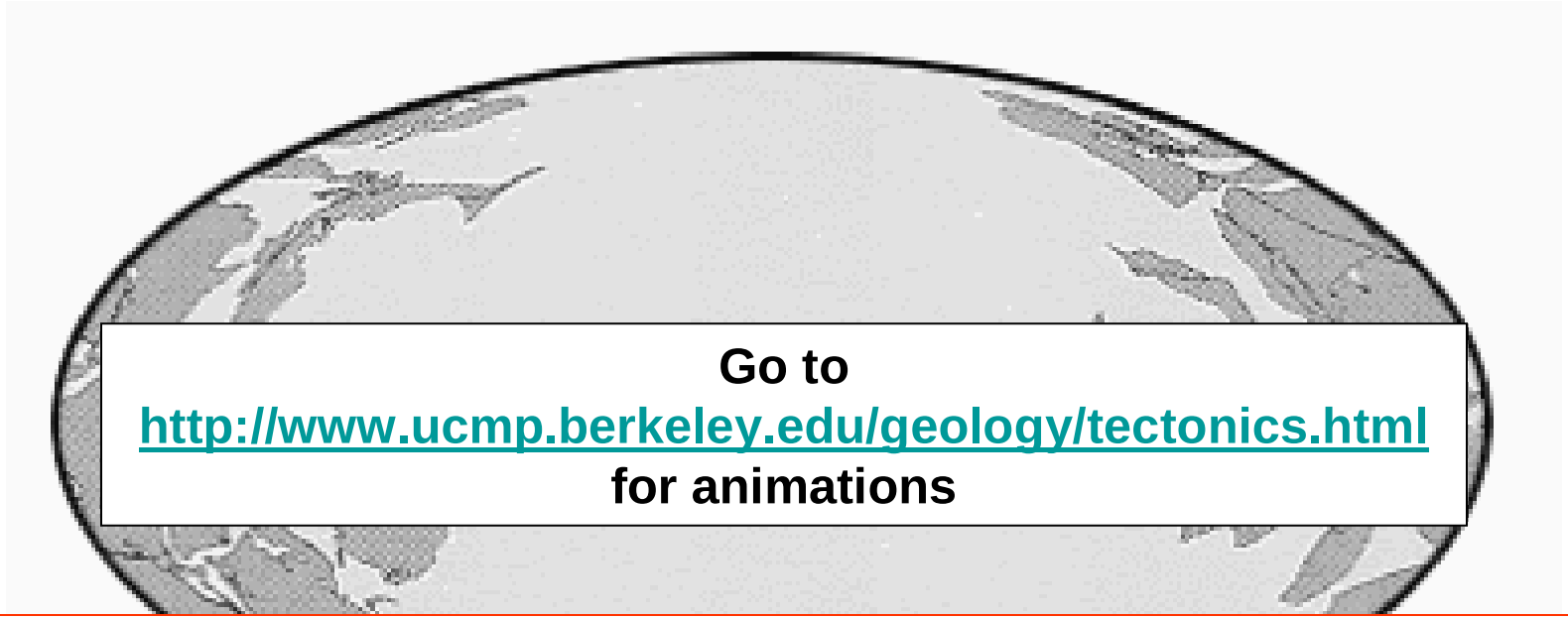


Present

* mya = million years ago

Pictures from:
http://pubs.usgs.gov/gip/dynamic/historical.html

# Plate Tectonics-Movement



**Go to**
**http://www.ucmp.berkeley.edu/geology/tectonics.html**
**for animations**

When trying the animations, of course look for the break up of the super continents, but also look for:

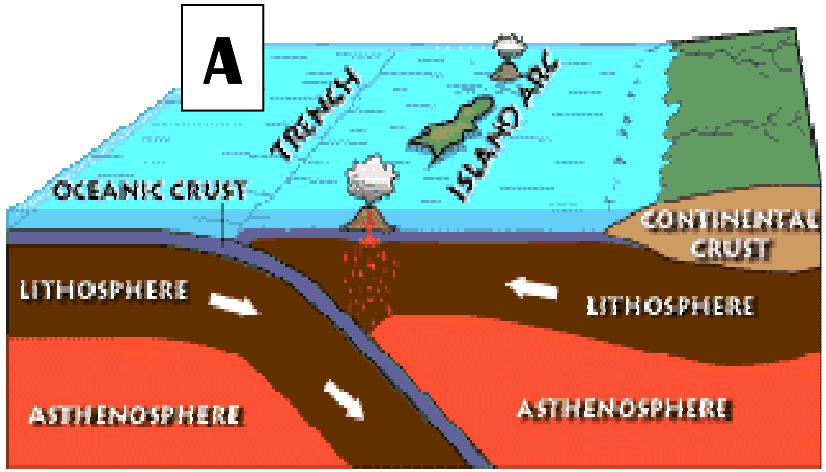
- India rocketing north and crashing into Asia (fast movement – geologically fast)
- North and South America joining together – recent event (geologically recent)

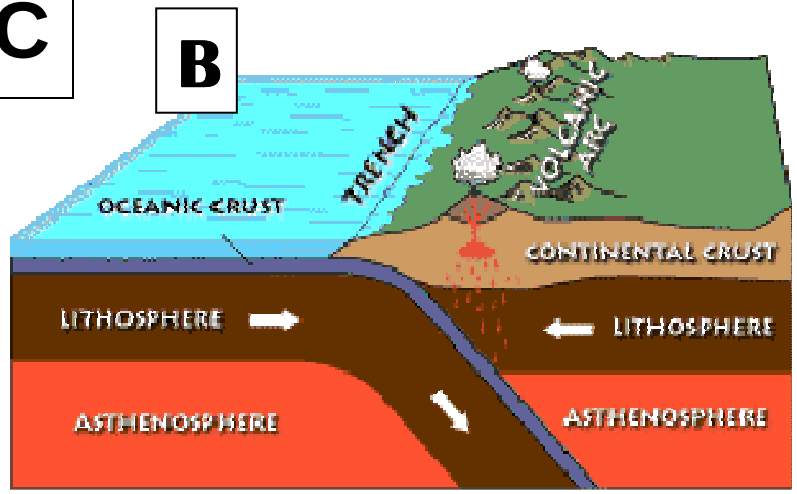
# Plate Boundaries (1 of 3)
# Where the Action Is

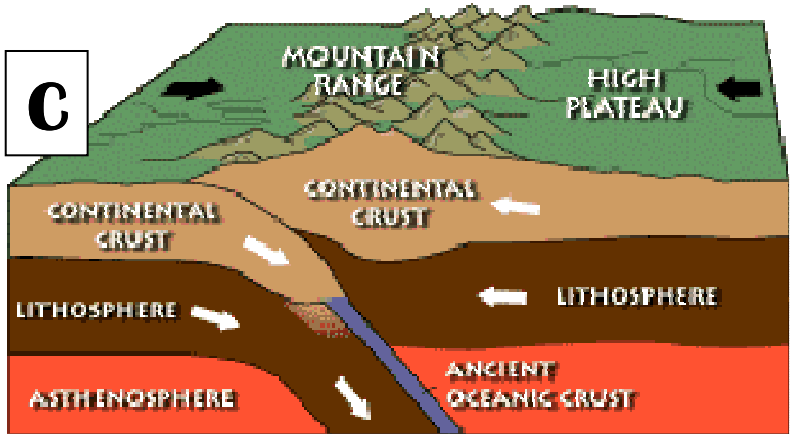
## Convergent Boundaries

Plates are crashing into each other; eg:

- Indonesia - **A**
- South America - **B**
- Himalayas (India doing the crashing) - **C**



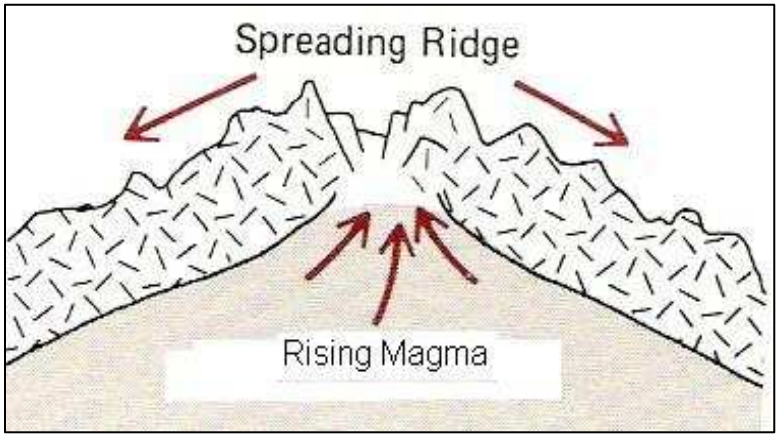

Pictures from http://geology.about.com/library/bl/blnutshell_convergence.htm

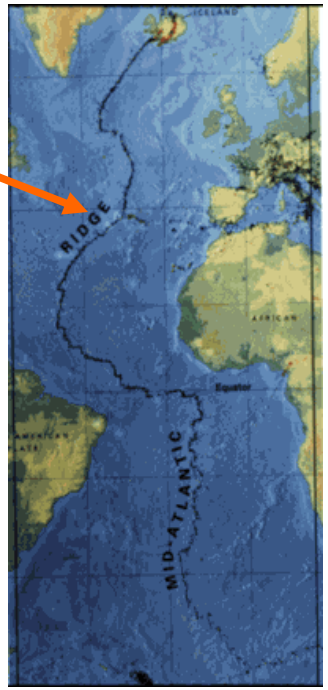
# Plate Boundaries (2 of 3)
# Where the Action Is

## Divergent Boundaries*

Plates are pulling away from each other

- Mid-Atlantic Ridge
- Red Sea & Africa's Rift Valley
- Baja California




* Divergent boundaries are found only at ocean-ocean or continent-continent boundaries.

Drawing from: Physical Geology, 2nd d., Hay & McAlester, 1985

Picture from: http://pubs.usgs.gov/gip/dynamic/understanding.html

# Plate Boundaries (3 of 3)
# Where the Action Is

Transform Boundaries

Plates are sliding along each other*

- Sea floor – most common around diverging boundaries
- Land - San Andreas Fault (picture at right)

* Not quite so simple – transform faults can connect two plate boundaries, and ....

Picture from: http://pubs.usgs.gov/gip/dynamic/San_Andreas.html

# So what does all this old & slow stuff mean today?

- Natural events
  - Volcanoes, Earthquakes, Tsunamis
  - Protection from these? (i.e. prediction, building codes, warning systems)
- Geology & Paleontology
  - Where to find geologic resources
  - Where you find rocks & fossils
- Where are we headed, tectonically speaking? (answer: to China, then to Africa??)