Geology II
Plate Techtonics
Rock Formation

Lecture 14

Crust nor Continent is Permanent

- **12 large plates** & some smaller make up the crust.
- **Continents** are land masses resting on top of the plates.
  - some are on just one plate: South America, Australia, Antarctic
  - others over two or more plates: India, Asia
  - Continents make up ¼ of the surface of the earth.

- Interactions between the plates making up the earth's crust and the outer layers of the mantle beneath it, cause changes to the surface of the earth.

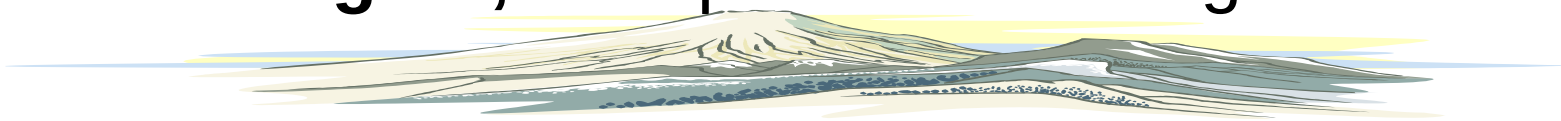
- This consistent gradual motion sometimes creates violent activity resulting in mountains, trenches, earthquakes, & volcanoes.

Plates Interact at 3 Types of Boundaries

– **Divergent** along a ridge creating new crust
  - volcanoes exist-new crust

  spreads out where plates diverge.

– **Convergent,** one plate subducting another



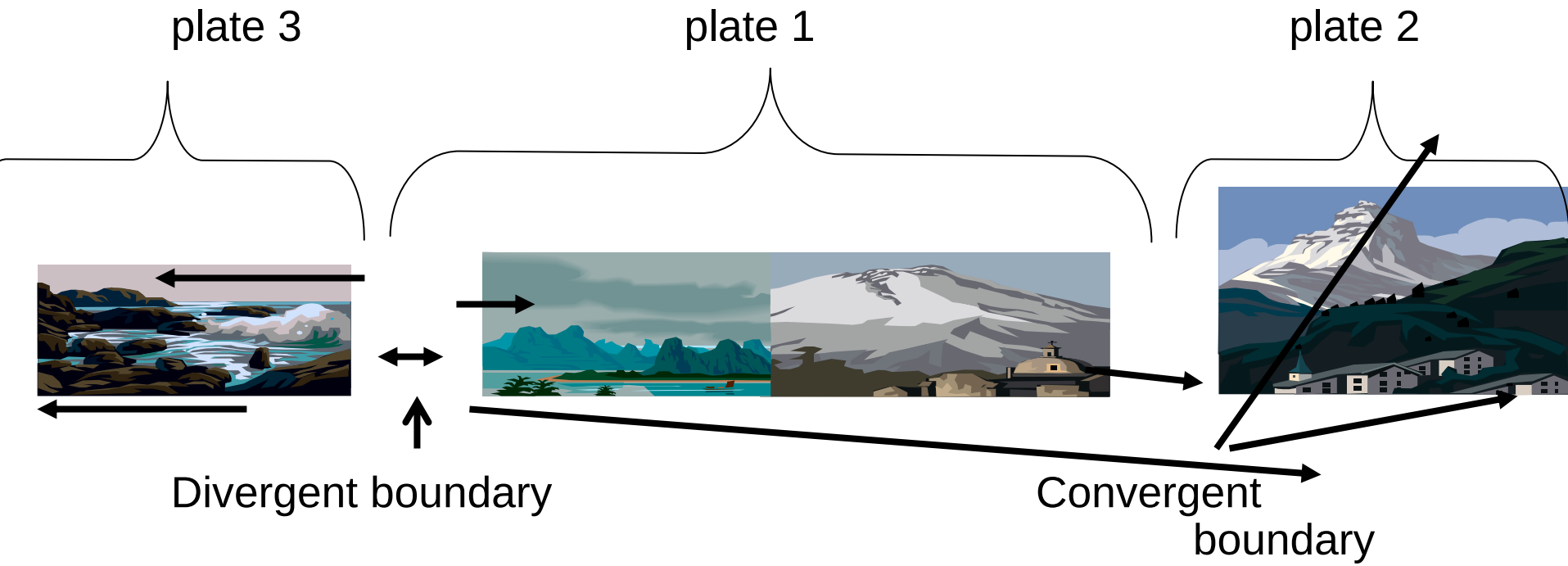
  - Mountains are created where continents ride the plates and trenches are created where no continents exist (beneath the ocean)

– **Neutral**, 2 plates scrape against each-other causing a fault zone.
  - earthquake activity

Regions of Plates Differ in Activity

- One edge of a plate usually is involved in one type of tectonic activity creating a different scenario on an opposite edge of itself.
  - In order for the crust to cycle between going back into the earth and new crust emerging, some sort of balance is necessary.
  - For example, a plate could have one edge at a converging zone, subducting beneath a different plate. Yet have another edge at a diverging zone.

Regions of Plates Differ in Activity



One edge of plate 1 is pushed by the spreading crust and another edge of it is subducting under a different plate.

The Rock Cycle.

- As the mantle convects or moves about it also creates the environments for the formation of rock.
- There are three general groups of rock, based on how they are created.
- Once a rock is created it can undergo structural changes, and become reclassified.
- Elements cycle in and out of the solid earth to the hydrosphere and into the atmosphere or back into rock.

Types of Rock: Igneous

Igneous Fire formed rock.

Intrusive: formed beneath the surface

Extrusive: cools after reaching the surface

Hot freshly formed Magma or molten rock cools to a solid.

The elements involved, speed of cooling, place of cooling
and resulting pressure involved in formation will give the rock its traits.

Examples: Basalt: extrusive volcanic rock
Granite: intrusive volcanic rock
Obsidian: volcanic glass

Often a medium hard substance relative to the other two groups.

Types of Rock :Sedimentary

Layers of Sediments fused together from pressure. Usually formed underwater, is slow flowing areas where sediment falls layer after layer. Where such rocks are formed is a prime place for fossils to form, they get covered up very slowly with little disturbance.

Examples:

Limestone: microscopic organisms skeletons usually of calcium carbonate , sandstone, shale

Sandstone: sand

Shale: silt and clay

Such rock is not as strong as the other two types of rock; it weathers more easily.

Types of Rock :Metamorphic

Just as the name implies, this rock started as either sedimentary or igneous and was altered.

This happens when such rock is pushed back down into the mantle and experiences high temperature and pressure.

Atoms rearrange themselves to form new and more dense rock.

Water molecules, for instance, may be pressed out as the rock condenses.

Examples include:

Marble was once limestone

Slate was once shale

Schist was once slate

Rocks end up far from where they are formed.

- On the tops of mountains we find rock that was created below the surface and is pushed up.
- Weaker rock weathers into sand to eventually create beaches, soil or more rock.
- Stronger rock creates mountain peaks.

Mountains

- Mountains make up a large portion of the earth's surface. They are also related to surface water.
- Mountains create the headwaters of watersheds.
  - **Headwaters** are the origin of the waters that flow down mountain sides into rivers.
  - A **watershed** is a region where one river is the recipient of all flowing freshwater.