Class 2a: Landforms
or
What goes up must come down

Today's class

- "The summit of Mt. Everest is marine limestone."
- Tectonic forces
  - Earthquakes, volcanoes
  - Diastrophism
- Gradational processes
  - Weathering, mass wasting
  - Erosion/deposition: water, waves, wind
- Examples from CA, SW Asia, Oceania

Rock cycle

- Your responsibility!
- Differences between igneous, sedimentary, metamorphic
- Examples of each

Plate tectonics

- Theorized in 1912; proven after WWII
- 12 large plates (lithosphere) float on liquid rock (asthenosphere)
- 200 million years ago, all one continent (Pangaea)

Plate tectonics

- Divergent boundaries
  - Generally mid-ocean
  - Underwater volcanoes, few quakes
- Convergent boundaries
  - Usually near continental edges
  - Violent volcanoes near ocean, strong quakes
- Transform boundaries
  - No volcanoes, mild to strong quakes

Earthquakes

- Stress relief via crust movement
- 500,000 per year; 800 felt
- Seismic waves of energy
  - P-waves or primary waves (Slinky)
  - S-waves or secondary waves (up and down)
- Earthquakes don't kill people, buildings (and gas mains) do

Diastrophism

- Your responsibility!
- Folding vs. faulting
- Escarpment, rift valley, fault-block mountain (Sierra Nevada)

Volcanism

- Pressure on molten rock
- Composite volcanoes
  - Violent and explosive
  - Along subduction zones
  - Relatively hard to predict
- Shield volcanoes
  - More calm and constant
  - Along divergent boundaries or at hot spots
  - Relatively less dangerous

Gradational processes

- Weathering
  - Chemical vs. physical
- Mass movement
- Erosion/deposition
  - Water (rivers, oceans)
  - Ice (glaciers)
  - Wind

Weathering

- Most mountains are going down faster than they’re going up
- Mechanical weathering breaks rocks into smaller pieces
  - Frost action
  - Salt crystals
  - Roots
  - Exfoliation
- Rock chemistry does not change

Weathering

- Chemical weathering changes the chemistry of rocks
  - Oxidation (exposure to oxygen)
  - Hydrolysis (exposure to water)
  - Carbonation (exposure to carbon dioxide)
- Warmth and water encourage chemical reactions
- Weathering loosens rock particles, creates soil

Erosion and deposition

- Erosion carries particles away
- Deposition deposits them
- Running water
  - Constant water, floods
  - Most important landform agent in deserts
  - Floodplains, levees, and deltas
  - Arroyos and alluvial fans

Glaciers

- Rivers of ice
- Carve out landforms from mountains
  - Glacial troughs
  - Fjords
  - Cirques
- And deposit material when they leave
  - Outwash plain
  - Moraines

Waves and coastlines

- Waves transfer energy, don’t move water
- Energy moves particles down the coast (longshore current)
- Newer coastline=erosion
- Older coastline=deposition
- Barrier reef: only organically formed landform