-Chapter 10: Global Climate Systems

* No two places on earth are exactly the same, why?
* Climactic condition:
  + Humidity
  + Heat
  + Elevation
  + Latitude
  + Soil type
  + Non-biotic
* Ecosystems
  + Self-regulation
  + Communication
  + Nature-balance?
* Biotic
* Biomes/Major Ecosystems:
  + Forest
  + Desert
  + Grassland
  + Tundra
* Climate Elements:
  + Insulation
  + Air pressure
  + Air mass
  + Precipitation
  + Temperature
  + mT-marine tropical
  + mC- marine continental
  + high pressure/low pressure
  + El Nino/Southern Oscillation
  + Classifications pp. 281
  + Koppen system
* Boundaries-related to air masses, but subject to shift at edges, see p. 285
* Paleo climatology –pollen courts
* Climate Change Lecture
  + Stepiup.irg this weekend
  + Reduction of 80% of CO2 by 2050
  + No half measures
  + We have ten years to fundamentally transform our economy, and lead the world in the same direction or “face a totally different planet”
  + Campus climate challenge: 100% clean energy at our school
  + And so we see how the climate shifting can affect small things which may affect larger things (microclimate)
  + Ends with global warming consideration of which we have discussed at length
  + The area w/most concern is the arctic melting ice
* : Climate-Biomes/Ecosystems:
  + Primary producers, primary consumers, secondary, tertiary, top predator
  + Habitat, conversation, #1 cause, invasive species
  + Size of shape = theory of biogeography of islands or of parcels of land
  + Genetic fitness decrease with inbreeding-bottleneck example
  + As habitat shrinks-less individuals around, resulting in the 6h great extinction, which we are engaged with and responsible for
* Ch. 11: LITHOSPHERE:
* Endogenic system;
  + Deep in the earth radioactive decay of elements created heat via convection
  + Move, warp fracture the upper earth
  + These events can be catastrophic-huge instantaneous events that created mountains, valleys, volcanoes, islands
  + And so the theory of catastrophe didn’t require eons and so the world could have been formed in 5000 years or so
  + Fundamentalists, uniformitarianism, slow change, not as before
* Pg. 324 Drivers:
  + 46 billions years ago, the earth conjualeded and sorted out by density
    - Heavier matter sinking into the center of the earth, like iron
    - Solid iron core
    - Liquid iron outer core
    - Lower mantle, upper mantle, athenosphere, lithosphere-uppermost, silica at top
  + The Dynamic Planet:
    - Lithosphere
    - Just as the atmosphere was layered, so is the earth
    - Heated core of molten
* Geologic Time Scale
  + - Begin 4.567 billion years old
    - 30 million old, earth was slammed by impact asteroid
    - Carved out the material that coalesced into the moon
* The time scale of life: 88% of all time on earth
  + - 540 million years ago MYA
    - 100 bacteria evolved –Precambrian (6 major cataclysmic extinctions of almost all life forms)
    - 440 MYA first invertebrates evolved-Cambrian
* The earth’s core
  + Inner core
    - Molten iron-perhaps a single enormous crystal, 5500-12000 F, 1400 miles
* Outer core
  + - fluid-reverses magnetism
    - converts thermal and gravitational energy into magnetism
    - reverses polarity
    - 9 times in last 4 million years/500,000 years
    - Magnetic field protects against cosmic radiation and solar wind
* The mantles- Lower and upper
  + - 80% of earth’s volume
    - Rich in oxides
* Lithosphere- crust 0.43, 43-70 km thick
* Asthenosphere-weak-plastic of molten rock from radioactive decay
  + - Conversion currents move moisture, rocks, slowly deforms crust
    - Hotspots develop like pimples, bring molten rock to the surface-eruption in Hawaii, also thought to be connected to deep pipes in lower mantle
* Crusts:
  + Continental-granite
  + Oceanic-basalt
  + Irregular-brittle layer that floats on hotter, more dense rock
* 5 Layers “Everything Changes, Nothing’s the same”
  + 40-75 km thick-Lithosphere, crust uppermost mantle
  + Asthenosphere-irregularly molten
  + Outer mantle
  + Inner mantle
  + Outer core
  + Inner core
  + Crust is brittle, fractured into larger plates, laying over dynamic core
  + Reverse of magnetism every 500,000 years
  + Small magnetic particles align in the molten state
  + Seismic caves travel differently through different material, thickness or viscosity
  + Oceanic Crust is 3 miles thick-basalt
  + Continental crust is 19 miles thick-granite
    - Mountain building-erosion
    - Isostasy-weight rebound, elasticity
* Everything changes in the geologic cycle:
  + Hydrologic
  + Rock cycle
  + Tectonic cycle
* Rock Cycle: (field trip forms)
  + 8 elements = 99% crust
  + O2 + silicon = 74 %
  + O2- reactive-atmospheric gas, 47% in Rx, 21% in air
  + Minerals:
    - 4200 chemicals in formation
* Rocks:
  + - Assemblage of minerals or mishmash
    - Defined by their origins:
      * Igneous-melted
      * Sedimentary-settled out of H2O
      * Metamorphic-altered by heat and pressure
* Igneous:
  + - five formed from magma liquid rock that intrudes into other Rx lava-extrudes to the surface
    - 90% of crust
    - Batholiths-intrusive rock body like origin of Yosemite
* Sedimentary:
  + - Rocks once uplifted and exposed to the hydrologic cycle
    - Rock begins to disintegrate over time
    - Glaciers, water and wind move mass
    - Sandstone-physically laid down, shale = mud, limestone = CaCO3, dissolved solution
    - Strata-graphy-like a book
* Metamorphic Rocks
* Plate Tectonics:
  + Triassic Period-225 MYA = Pangaea-super continent
  + Pan = means all, gea = geo = earth, all one earth
  + Mid latitude coal deposits
  + Construction:
    - Sea floor spreading-linked by a submarine mountain range around the globe called the mid oceanic ridge
    - Mechanism?
    - Magma convection brings hot rock to the surface and breaks the crust
    - So youngest crust is at the cracks
    - Oldest is seafloor, 208 MYA, older rock is gone
    - Ocean trenches-plunging lithosphere beneath the continental plates
* The Poem

Chapter 13

* Weathering and Mass Wasting
* Geomorphology-landform science and in this case we’re talking about weathering
* Uplift in the geomorphic cycle begins process event:
  + Adjustment
  + New equilibrium
  + Event
* Slope🡪exposed material to transport and erosion
* Hard rock🡪bigger🡪smaller
* To make the slope stable-or-Read Angle and Repose by Wallace Stegner
* Weathering can be physical, mechanical or chemical
  + Organic, roots
  + Frozen, joints
  + Exfoliation
* Physical
* Chemical-oxidation, carbonation, Karst landscapes caves
* Mass wasting-Show slide:
  + Avalanches
  + Landslides
  + Slips-flows
  + Solification-creep
* Man-made mistakes
* Exogenic force
* Fluvial-stream-river related processes, patterns, prediction
* Gravity and isolation
  + Erosion
  + Transport
  + Deposition
  + Sorted
  + Alluvium
* Base level-cannot erode lower
  + Local
  + Ultimate
* Drainage levels-divides, defines a watershed
* Continental divide-med, pac, gulf of mexico, atlantic
* See example in book of Pa rivers going to Gulf of Mexico or to Atlantic
  + Sediment feeds delta
  + Key for Mississippi and hurricane issues
* Stream discharge leeked to evaporation rate, i.e. Nile
* Colorado River fails to reach basin
* Sediment off stream
* Still waters run deep, shallow riffles run fast
* Suspended load-physical
* Dissolved load-chemical
* Gradient-down-hill slope
* Deposits = point bar
* Meanders, under cuts, ox bow
* Braided streams-glacial
* Flood plains-100 year flood-Mississippi Delta
* Deposition
* Levees
* Sinking Delta
* Barrier Islands
* Flood Insurance- San Joachin delta and levee system failure
* Read Chapter 16

Chapter 14

* River systems-hydrology
* Fluvial-geomorphology
* How does a stream bed form
* Drainage-how much land/water covered
* A vast network-arterian system
  + Rivers, streams
  + Describe and enscribe
  + The landform base under the H2O
* Watersheds-drainage portion of a creek, stream, river-shapes the land
* Gradient-ultimate base level
* Load-deposits-weight-isostatic,
  + Sinking delta, starved without sediments and lack of vegetation
* Floodplain- Ch.19 608-628
* Amazon, Congo, Yangtze, Mississippi