-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