

November 4, 2015

Finishing up Climate Topics

Concept of the Anthropocene, Early Anthropocene hypothesis, Carbon isotopes show that the rising CO₂ levels are due to fossil fuels as the carbon origin, model ensembles, disappearing climates, climate change and weather extremes

Unit 20

Climate, soil, plants, and animals. pedology, biogeography (phytogeography, zoogeography). Geography of soils, soils as an interface between biotic and abiotic systems, rates of development, relationship of soils to biota, effects of farming. Biogeography, biogeography as a very visible response to global change, species, spatial distributions on the earth & why, threats to the biosphere & biodiversity such as erosion and forest destruction, example of Dust Bowl, conservation. Global carbon cycle, biomass, pools and fluxes, puzzle of the missing atmospheric carbon.

Unit 24

Biogeographic processes, photosynthesis by bacterial and later plants – conversion of water and CO₂ into carbohydrates and oxygen, production of the ozone layer, chlorophyll, tree canopy crown geometry and latitude, Respiration – organisms use oxygen to break down carbohydrates and release energy, water, CO₂. Animals also feed on plants (thus returning more CO₂ through respiration), and bacteria and fungi also decompose dead plant material, converting it to CO₂ through respiration., carbon cycle. Limits of photosynthesis due to heat increasing respiration and also through limiting availability of water, stomata. Biomass (total biomass/phytomass), primary producers, net primary productivity, global distribution of net primary productivity. Ecosystems, food chains/webs, autotrophs, herbivores, carnivores, decomposers, trophic levels. In water – phytoplankton, zooplankton, etc. Energy flow through trophic levels means there are far fewer organisms at higher trophic levels, trophic cascade, trophic collapse. Plant succession, disturbance, primary succession, secondary succession, climax community. Geographic dispersal, optimum ranges for species, zones of physiological stress, zones of intolerance, Physical factors (Temperature, availability of water [xerophytes, deciduous vs. evergreen trees], other climate factors, distribution of soils, landforms), Biotic factors (competition, amensalism [one species inhibited by another], predation, mutualism), Disturbance, Species dispersal vs. vicariance (like Gondwana splitting), endemic species.

Unit 25

The global distribution of plants, biomes, terrestrial vs. marine, Primary factors: climate and terrain, climate factors: (1) atmosphere and its circulation systems [which determine moisture-carrying airmasses], (2) solar radiation, terrain factors: (1) distribution of the landmasses and ocean basins, (2) topography of the continents. Relationship of latitudinal transition of biomes to altitudinal ecotone transitions in high mountain areas [von Humboldt]. Principal Terrestrial Biomes (1) Tropical Rainforest (Af, Am, sometimes Aw), dominated by tall, closely-spaced evergreen trees, multi-level canopy structure, presence of epiphytes and lianas, leaf litter decomposition, monsoon rainforests. (2) Tropical Savanna, Aw, thorn forests, lower trees, fire and grass mat, deciduous trees such as acacia and baobab. (3) Desert (BW and BS), sparse vegetation, perennials more dominant in savannas, ephemerals more dominant in deserts, succulents, root structures of trees, cacti, etc. (4) Temperate Grassland (BS), climate-controlled, tall-grass & short-grass prairie, organic-rich soil, grazing animals, agriculture, (5) Temperate Forest, several varieties including temperate deciduous forest biome (in Cf) – oak, beech, birch, walnut, maple, ash, some conifers, temperate evergreen forest (in Cf or Cs) – needle-leaf trees in northern hemisphere such as doug firs and redwoods, in New Zealand trees there are broadleaf and small-leaf. (6) Mediterranean Scrub (in Cs) – pine, oak, hot dry summers and cool moist winters, California/Mediterranean, central Chile, South Africa Cape Province, dense human population. (7) Northern Coniferous Forest (in D climates) – boreal forest, taiga, needle-leaf trees, some adaptation to freezing and waterlogged soils. (8) Tundra – frozen soils, no trees, but instead sedges, mosses, lichens, dwarf trees in some places, xeriphytic adaptations.