

October 5, 2015

Unit 5

Energy and heat transfer – thermal energy, heat vs. temperature, EM radiation, longwave, shortwave, emission by sun and earth, conduction, convection, sensible heat, latent heat

Global energy balance – energy transfers are both radiative and nonradiative, solar radiation into the atm (180-220 W/m² tropics – 240-280 W/m² low-lat deserts), direct and diffuse radiation, albedo, terrestrial radiation, greenhouse gases and greenhouse effect, effect of clouds?, counterradiation, latitudinal variations in net radiation,

Finish with (1) hypothetical effects of volcano on global temps, (2) Mars, Venus, and the Greenhouse

Unit 6

Composition and Structure of the atmosphere; weather vs. climate, main ingredients of the atm (N₂, O₂, Ar, CO₂, H₂O, CH₄, O₃) – Highlight CO₂, H₂O, CH₄, photochemical reactions, isotopes such as N¹⁵, traces gases, ppm (CO₂ + ~ 390 ppm), ppb (CH₄ = ~ 1800 ppb), residence times, atmospheric particulates, photosynthesis; homosphere, heterosphere, constant vs. variable gases, history of atmospheric gases, CO₂ variability, H₂O, O₃ issues, ozone hole, aerosols, troposphere, tropopause, lapse rate, stratosphere, temperature inversions, stratopause, mesosphere (ionization, auroras), mesopause, thermosphere

Finish with Kittinger's leap

Unit 7

Temperatures of the lower atmosphere; kinetic energy, temperature vs. heat, thermometer, Celsius vs. Fahrenheit vs. Kelvin, environmental lapse rate (6 deg 1000m average only!), concept of atmospheric stability, dry adiabatic lapse rate (10 deg C/1000m), saturated (or moist/wet) adiabatic lapse rate (4 – 9 deg C/1000m), condensation. ELR > DALR [unstable], ELR < SALR [stable], DALR > ELR > SALR [conditionally unstable] – conditionally unstable means unstable if condensation occurs & stable otherwise, weather balloons, assessing stability by looking at the atmosphere, temperature inversions and air pollution, urban dust domes; horizontal distribution of temperatures: daily and yearly cycles, land/water heating differences, maritime effect vs. continentality, advection, isotherms, temperature gradient