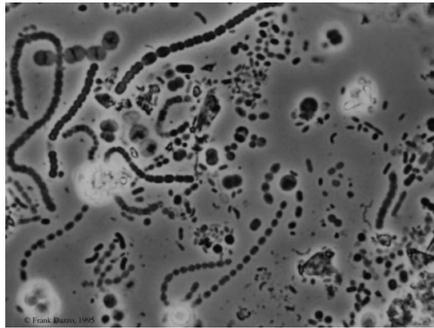
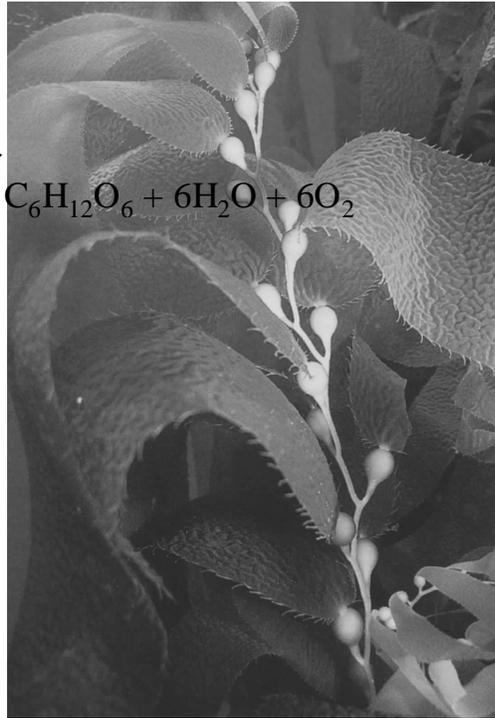
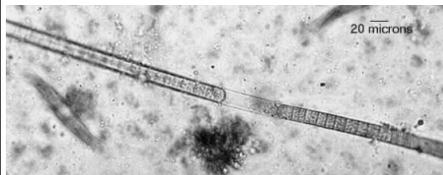
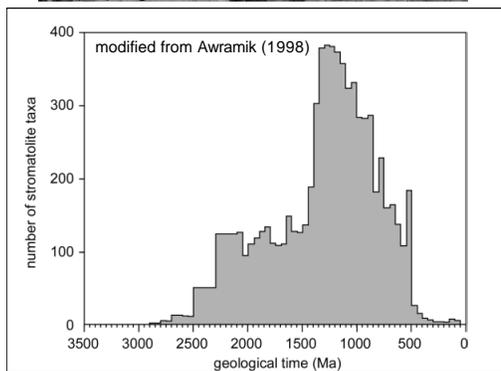
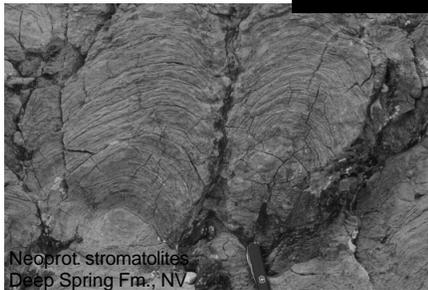


Oxygen

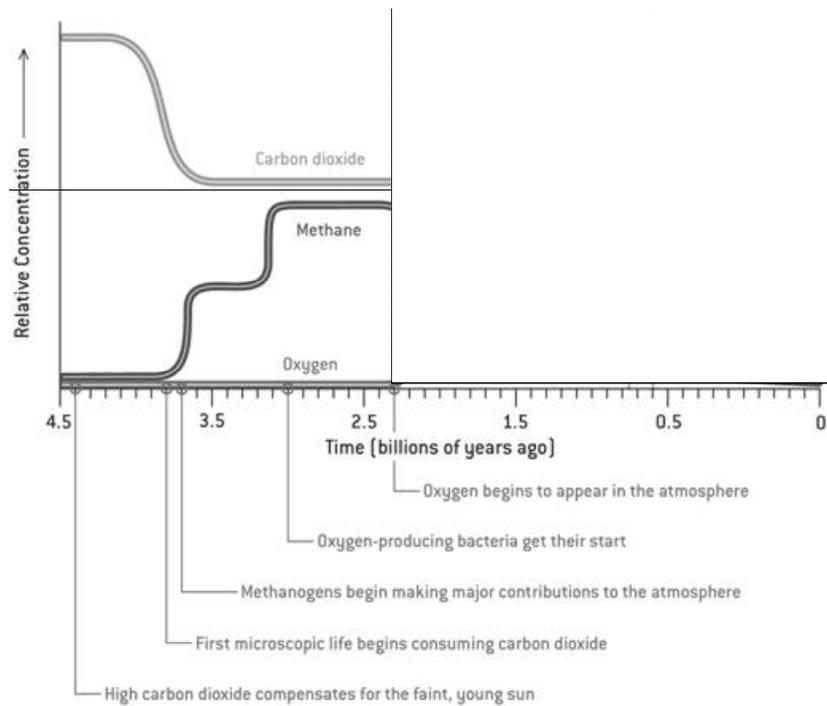
Photosynthesis



Stromatolites



Lyngbya, filamentous cyanobacteria
(from Cyanosite, Purdue U.)



(Kasting, 2004)

Sources for GG

Carbon Dioxide CO₂

- Fossil fuel combustion
- Deforestation

Methane CH₄

- Flooded soil crops (e.g. rice)
- Fossil fuel mining
- Ruminants
- Landfills
- Organic wastes
- Human stimulated eutrophication

Nitrogen Oxides NO₂

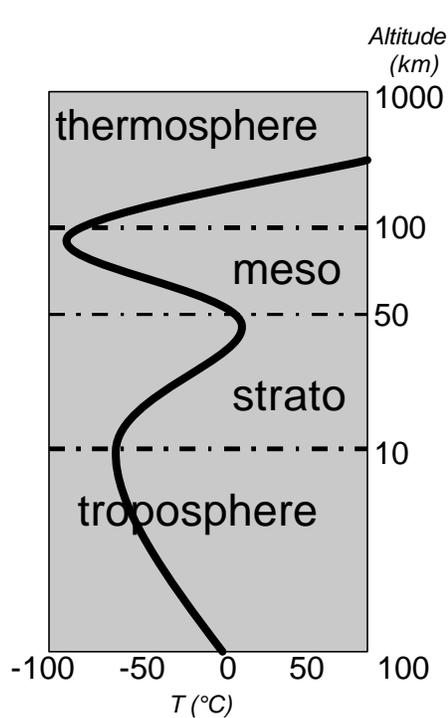
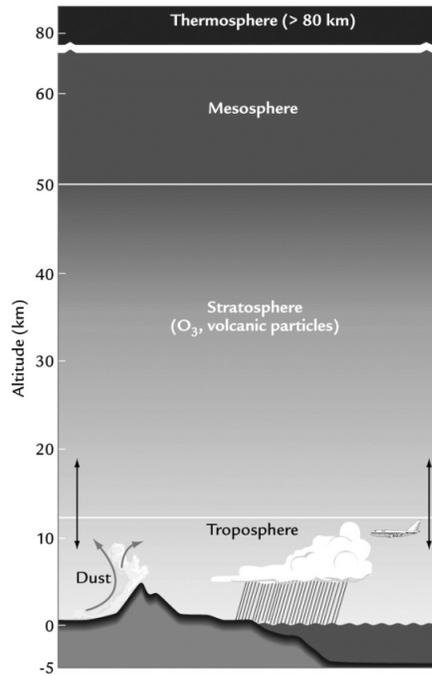
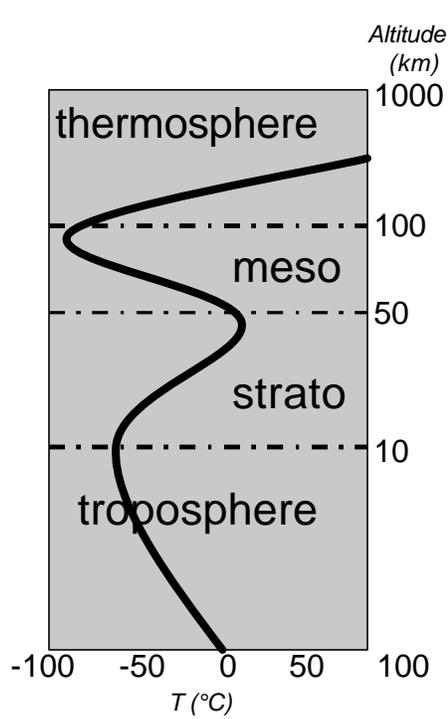
- Fossil fuel combustion
- Fertilizers

Chlorofluorocarbons CFC₃

- Release of refrigerant CFCs

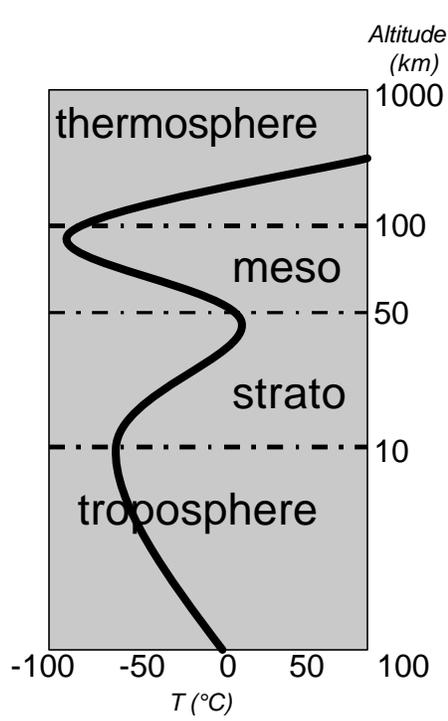
Natural Sources:

Combustion
Fermentation
Respiration



Troposphere

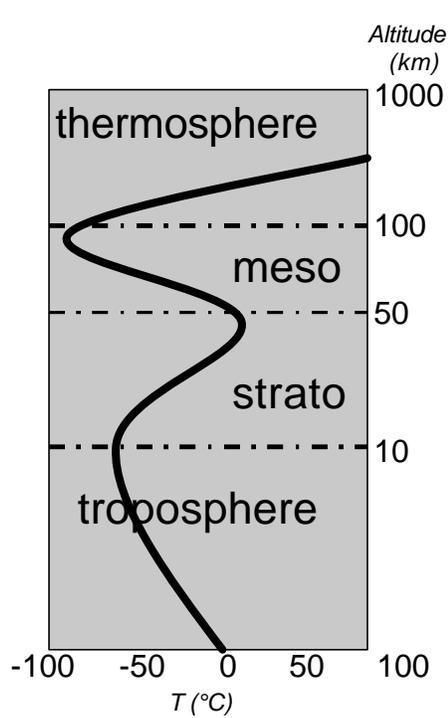
- ~8-18 km
- T: 15° to -50°C
- Weather
- ~75% of gases
- Air rises, cools, condenses



Stratosphere

- Up to 50 km
- $T > -50^{\circ}\text{C}$ to 0°C
- Above clouds

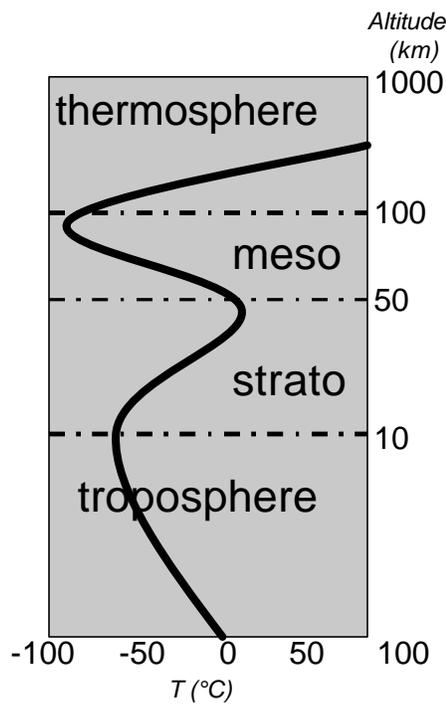
Why does T increase?



Mesosphere

- 50-100 km
- 0°C to -80°C
- meteors burn





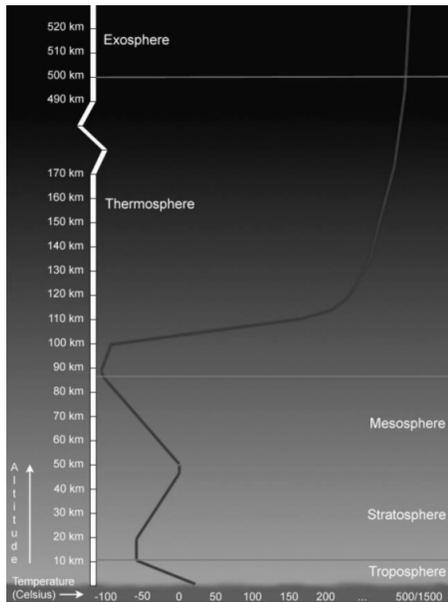
Thermosphere

(region: Ionosphere)

- > 100 km
- T inc. with alt.
- little air -> high T var.
225-1225° C
- Aurora borealis
- solar winds affect



<http://www.geo.mtu.edu/weather/aurora/images/aurora/jan.cu>



Exosphere

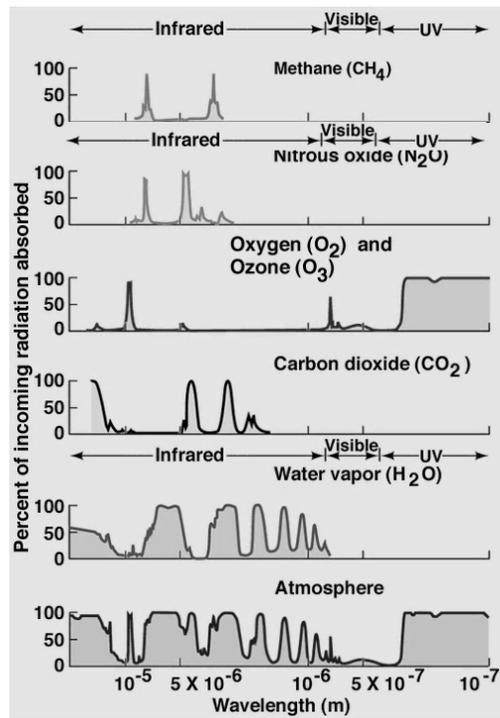
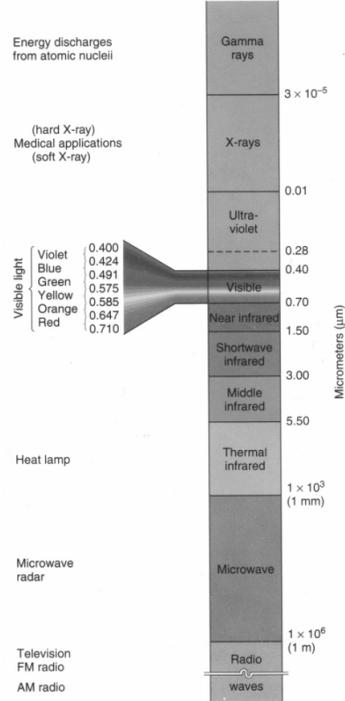
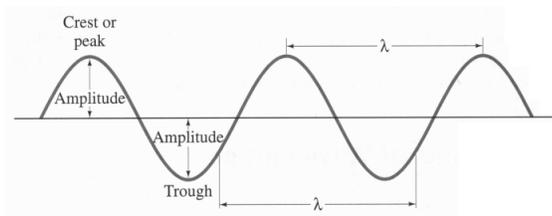
- where atoms, molecules escape to space



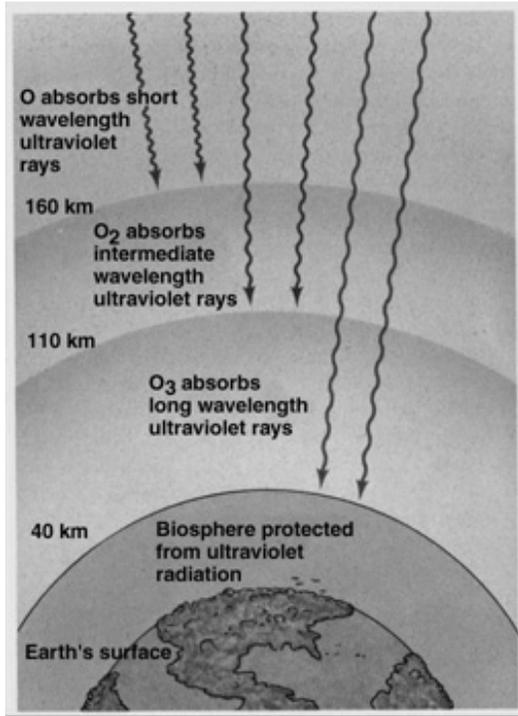
Electromagnetic Spectrum & Electromagnetic Energy

wavelength: "type" of radiation

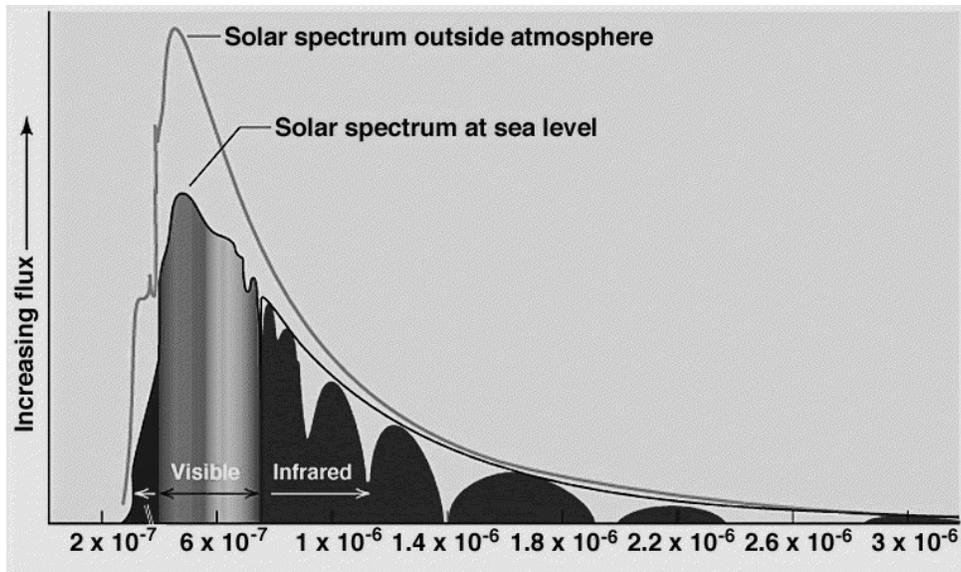
amplitude: amount of energy being carried



Images: ess.geology.ufl.edu



Images: ess.geology.ufl.edu



Images: ess.geology.ufl.edu

Solar Constant

1367 W/m²

1 W = 1 joule/sec

Exceptions?

sun spot cycle (~ 11-year)

life of sun ~ faint early sun, red giant

