

WEATHER

VS

CLIMATE

*** the day-to-day conditions
properties
of the atmosphere
atmosphere, including
average
variability, etc.

** constantly changing
changes

** the state or condition of the
aggregate
atmosphere at a particular
time and place

** Comprised of various factors:
and
air pressure, air temperature,
events
humidity, clouds, precipitation,
years
wind, visibility, etc.
factors)

*** the statistical
of the
measures of the
conditions,

** slow long-term

** a description of
weather conditions

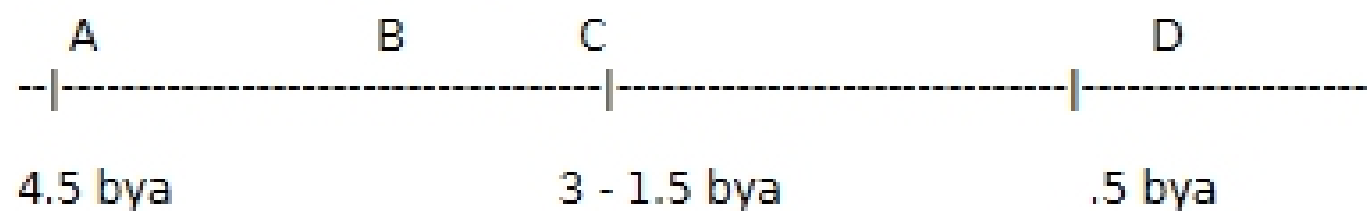
** a sum of the daily
seasonal weather
over decades of
(averages of these

Meteorology: the science that studies the atmosphere

Climatology: the study of long-term atmospheric conditions

ORIGIN OF THE ATMOSPHERE

bya = billion of years ago



A: Earth formed and hot gases escape; degassing

B: Earth cooled and gases accumulate; atmosphere comprised of carbon dioxide, nitrogen and methane, BUT NO oxygen or ozone

C: Oxygen generating organisms evolved; oxygen supply slowly rises

D: Green plants widespread; atmosphere takes on present conditions; ozone levels increase and spread

** Main process for increased oxygen levels is ***photosynthesis***

COMPOSITION OF THE ATMOSPHERE

** a **mixture of discrete gases** with solid and liquid particles suspended in it

** Some components are fairly stable while others vary spatially and temporally

** **constant gases** - found in same proportions within lower atmosphere

up to 50 miles above ground

** **variable gases** - present in differing amounts spatially and/or temporally

Constant Gases: 3 gases make-up just under 100% of the atmosphere

Nitrogen(N): ~ 78%

Oxygen(O₂): ~ 21%

Argon(Ar): ~ .9%

Variable Gases: 3 which influence weather and life systems

Carbon dioxide(CO₂)

Water vapor(H₂O)

Ozone(O₃)

** Carbon dioxide: and Methane: absorb radiant energy emitted by Earth

** Water vapor: quite variable throughout the atmosphere

* 4% by volume in tropics to <1% in deserts

* source of clouds and precipitation

* absorbs radiant energy & important in energy transfer

* water is only substance found in all 3 states (solid, liquid, gas)

** Ozone:

* formation is by splitting an O₂ molecule with shortwave (solar) radiation

and the single O atoms combining with an O₂

** OZONE "HOLE"

* thought to be caused by increased amounts of chlorofluorocarbons, CFC's in the stratosphere

* 1% loss of O₃ leads to a 2% increase in Ultra Violet(UV) radiation absorbed at the earth's surface

** Consequences (of less ozone):

*

*

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VERTICAL STRUCTURE OF THE ATMOSPHERE

** **Air Pressure:** force exerted by the weight of a column of air above a given point

* at sea level the average air pressure is 1000mb or 1 kg above every square cm

* inverse relationship between air pressure and height pressure decreases with increasing height

* 50% of atmosphere is below 5.6 km (~3.36 mi)

* 90% of the atmosphere is below 16 km (~9.6 mi)

** **Temperature (T°):** measure of the degree of hotness or coldness if a substance; the average molecular motion of an object

* temperature may decrease or increase with increasing altitude

* in the Troposphere it normally decreases 6.5degree C/km

* if the temperate increase with altitude, it's called **inversion**

* a change in temperate with a change in altitude is called the **lapse rate** or the **Temperature lapse rate**

Layers of the Atmosphere:

2 general regions:

Homosphere: uniform chemical composition;
from surface to a height of 80 - 100 km (50 - 63 mi)