

## METEOROLOGY NOTES

### I. Layers of the Atmosphere

#### A Troposphere

1. Bottom layer
2. Temperature decreases as altitude increases
3. Pressure decreases as altitude increases
4. Contains all life and all weather
5. Contains CO<sub>2</sub> and H<sub>2</sub>O vapor the greenhouse gases
  - a. additional CO<sub>2</sub> coming from industry & exhaust
  - b. trap heat in the troposphere
  - c. layer has raised 1 degree last century
    - 1). some scientists do not agree
    - 2) claim natural warming not due to human pollution
    - 3) others say we are headed for an ice age
  - d. if trend continues, temps will raise 4 deg in next 200 years, causing ice caps to melt.

#### B. Stratosphere

1. Second layer
2. Contains O<sub>3</sub> – ozone
  - a. absorbs UV radiation, w/out all life would die from sun's rays
3. O<sub>3</sub> absorbs UV, T increase as altitude increases
4. CFC, chlorofluorocarbons are chemically reacting to O<sub>3</sub> => O<sub>2</sub>
  - a. basically infinite reaction, each CFC lasts over 200 yrs causing trillions of reactions before it stops.
  - b. Total process is unknown
  - c. Causing a thinning or "hole" over Antarctica which fluctuates
    - 1) some "healing" has occurred
    - 2) UV rays have been tested higher, potential harm to life in algae and bacteria forms here
  - d. Political problems w/developed nations and 3<sup>rd</sup> world- 3<sup>rd</sup> world blame us for problem (it's ours) but US and Canada see it as a world problem – a lot of political tension as to what needs to be done about it.

### Relative Humidity

1. definition – the amount of water in air compared to the amount the air could hold. Dependent on temperature
2. 0% - extremely dry – Antarctica or desert (probably more like 2-10%)  
100% - extremely wet – tropical rain forest – raining
3. psychrometer-
  - a. dry bulb- measures regular air temperature

- b. wet bulb- measures cooling temperature
- c. use ESRT to identify RH
- d. talk about curly hair stretches when the humidity is high “bad hair day”, uncontrollable

#### Dew Point

- 1. definition- the temperature that the air will condense to create “dew”
- 2. also known as fog, clouds etc
- 3. ESRT table
- 4. Requires a nuclei or surface to condense dust, salt molecules, glass, car, other gas molecules
- 5. Frost / killing frost
- 6. LAB ACTIVITY – RELATIVE HUMISITY USING PSYCHROMOTERS, LAB ACTIVITY – Dew Point and Relative Humidity P518-519

#### Clouds

- 1. condensation of vapor in the sky
  - a. as air rises, temps cool, cool to dew point
  - b. cloud base – altitude air reaches dew point
    - 1) makes cloud look flat on bottom – all clouds will start @ same altitude
- 2. types
  - a. cirrus (Ci) – means high altitudes
    - 1) thin, feathery, tufted
    - 2) since very high made of ice crystals
  - b. Stratus (s) – low sheets or layers of clouds
  - c. Cumulus (c) – thick, puffy, masses
  - d. Alto- medium altitude clouds
  - e. Nimbus – towering usually gray – filled w/ water
  - f. Examples – stratocumulus – puffy white clouds in layers – covers the sky  
 Nimbostratus- dark gray layers producing steady rain  
 Cirrostratus- high altitude layered clouds  
 cumulonimbus- dark, puffy, rain clouds towering
  - g. Cloud base or condensation level
    - 1) Clouds having a flat bottom – dew point has been reached
  - h. 3. Symbols Showing Percentage of Sky Covered see pg 511 – note on ESRT

#### Forms of Precipitation

Rain

Hail

Sleet- water droplets freeze as they fall through the air column

Freezing rain – at freezing and rain falls and freezes on surfaces

Snow

See precipitation symbols on pg 514 – be familiar – notice on ESRT

## Rain Shadow

Mountain – use example from the coast of CA – warm, moist air from the Pacific ocean rises w/ the mountain's surface.

As air rises it cools, RH increases

Reaches dew point – creates a cloud

Air continues to cool and precipitation occurs on the *windward side*

Air flows over the mtn top, and begins to warm, relative humidity decreases

Air is extremely dry – absorbs all water vapor – desert

## Acid Rain

Air flows up and over mountains

Precipitation – normally acidic around pH 6

joins with pollution SO<sub>2</sub>, NO<sub>2</sub> specifically drops pH to 2-4

Adirondack region – specifically granitic, unreactive to acid

Rain remains acidic hurts insect larvae, frog offspring, fish eggs. Cuticle on trees especially pines and firs – water is crystal clear blue