**HUMIDITY:**

* Amount of water vapour present in the air.

**RELATIVE HUMIDITY:**

* The ratio of water vapour present in the air compared to the amount the same volume could hold if it were saturated; and
* If a given mass of air is heated and no new water vapour is added, the relative humidity decreases**.**

**DEW POINT:**

* The temperature to which air must be cooled, at a constant pressure, to become saturated.

**SATURATION**:

* When a mass of air is holding the maximum amount of water vapour it can hold, at a given temperature, it is saturated.

**CONDENSATION:**

* When invisible water vapour cools it condenses to the form of visible water droplets.

**SUBLIMATION**:

* The water vapour changes directly into ice crystals without passing through the visible water droplet stage.

**EVAPORATION**:

* When water droplets heat and form water vapour.

**ISOTHERM**:

Lines joining places of equal temperature.

**FREEZING POINT:**

Point at which water freezes (0°C).

**BOILING POINT:**

* The point at which water boils (100°C).

**TEMPERATURE HAS AN EFFECT ON AIR DENSITY**:

* Cold air is more dense (heavier); and
* Warm air is less dense (lighter)

### **ATMOSPHERIC HEATING**

#### ***The atmosphere is heated from below***

**Radiation** – short wave radiation from the sun is absorbed by the earth’s surface and re-radiated to the atmosphere in long waves. This long wave radiation heats the troposphere from below.

**Advection** – as cool air moves over a warmer surface it is heated by contact with this surface.

**Compression** – as air sinks, it moves into an area of higher pressure and is compressed. As it compresses it heats up.

##### **HEAT DISTRIBUTION ALOFT**

**Conduction** – heat gradually diffuses through an object, moving from hot to cold. Plays a very minor role in weather;

**Convection** – when warm air rises, colder air moves in to replace it causing a vertical circulation resulting in heat distribution; and

**Turbulence** – friction between the earth’s surface and the moving air causes mechanical turbulence which results in heat distribution.

###### **ATMOSPHERIC COOLING**

**Advection:** Warm air moves over a cooler surface and cools down by contact with this surface.

**Expansion:** As air is forced to rise, it expands and cools.

**Radiation:** After sunset, the earth continues to radiate its heat thus becoming cooler. Air in contact with this cooler surface becomes cooler.

# VERTICAL DISTRIBUTION OF TEMPERATURE

* Decrease of temperature with altitude is known as lapse rate; and
* Increase in temperature with altitude is known as an inversion.

TYPES OF LAPSE RATES:

***Dry Adiabatic:*** 3.0oC / 1000';

***Wet Adiabatic:*** 1.5oC / 1000'; and

***ICAO Standard:*** 1.98oC / 1000'.

# STABILITY AND INSTABILITY

**(stable and unstable**)

**Stability:** The tendency of air to remain at its horizontal level when disturbed. It resists upward or downward displacement.

**Instability:** The tendency of air to continue to move away from its original horizontal level when disturbed.

* Unstable air is indicated by a steep lapse rate;
* Stable air is indicated by a shallow lapse rate;
* Heating from below causes instability; and
* Cooling from below causes stability.

WEATHER CHARACTERISTICS:

|  |  |  |
| --- | --- | --- |
| Characteristic | Stable Air  | Unstable Air |
| Lapse Rate | Shallow | Steep |
| Cloud | Stratus  | Cumulus  |
| Precipitation | Steady | Showers |
| Visibility | Poor | Good |