

21-11-21

Ch-13  
Insolation

The sun continuously radiates heat and light energy in all the directions. It is known as solar radiation.

Types of Radiation -

The sun's radiation is made up of three parts - white light (that we see), infrared radiation and ultraviolet radiation.

a) Insolation -

- i) The amount of solar energy received by the earth is called insolation.
- ii) The sun's energy reaches the earth as short wave rays.
- iii) Only one part out of two billion parts reaches the earth.

b) Terrestrial Radiation -

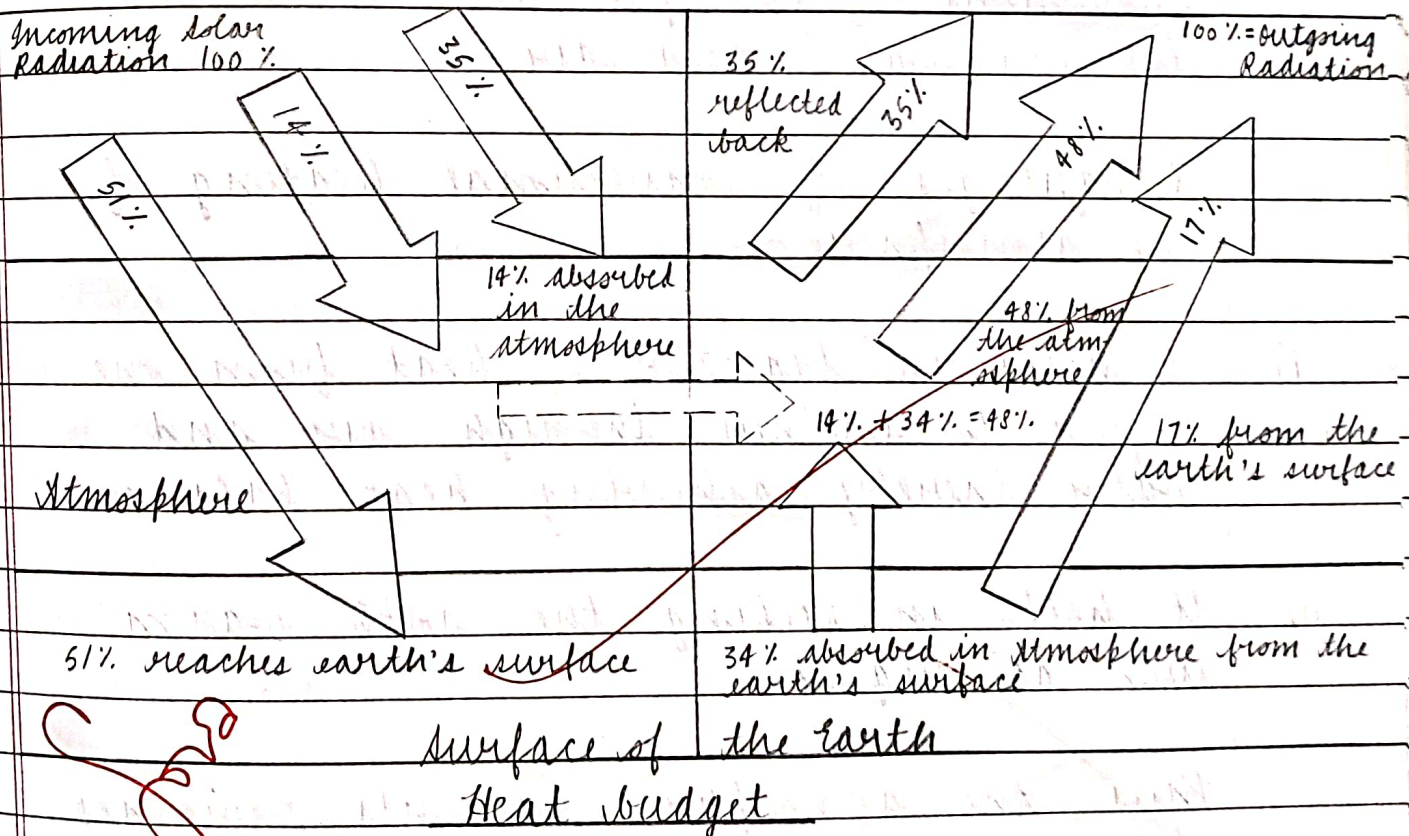
- i) The heat radiated by the earth in the form of long waves is called terrestrial radiation.
- ii) The surface of the earth radiates this heat back into the atmosphere in the form of long waves.
- iii) The earth's atmosphere is heated more by terrestrial radiation (34%) than by insolation.

## Heat balance -

The state of equilibrium on earth between incoming insolation from the sun and outgoing terrestrial radiation from the earth is known as Heat balance.

## Heat budget -

It is the accounts of amount of heat received by the earth and the amount given back when both insolation and terrestrial radiation are balanced it is called Heat budget.



## How is heat balance achieved -

- i) The sun's rays do not warm all parts of earth equally which sets of several processes into motion.

ii) These processes help in attaining heat balance on earth.

iii) They are -

a) conduction - The heat radiated by the earth's surface warms the layers of air above it by direct contact. Conduction is transfer of heat from one medium to other medium by direct contact.

b) convection - It is the transfer of heat from one medium to another by actual movement of the particles. It occurs through water and air.

Advantages of convectional heating of the atmosphere -

i) It helps in transfer of heat from one region to another through air and water thereby achieving heat balance.

ii) It helps in keeping the earth warm even at nights.

Thus, the atmosphere prevents extremes of temperatures. Without atmosphere the days would become very hot and the night would be very cold.

## Factors affecting distribution of temperature -

The temperature of atmosphere depends upon a number of factors -

1) **latitudes** - temperature depends on latitudes of the place.

temperature decreases with increase in latitudes on either side of the equator. This is due to :-

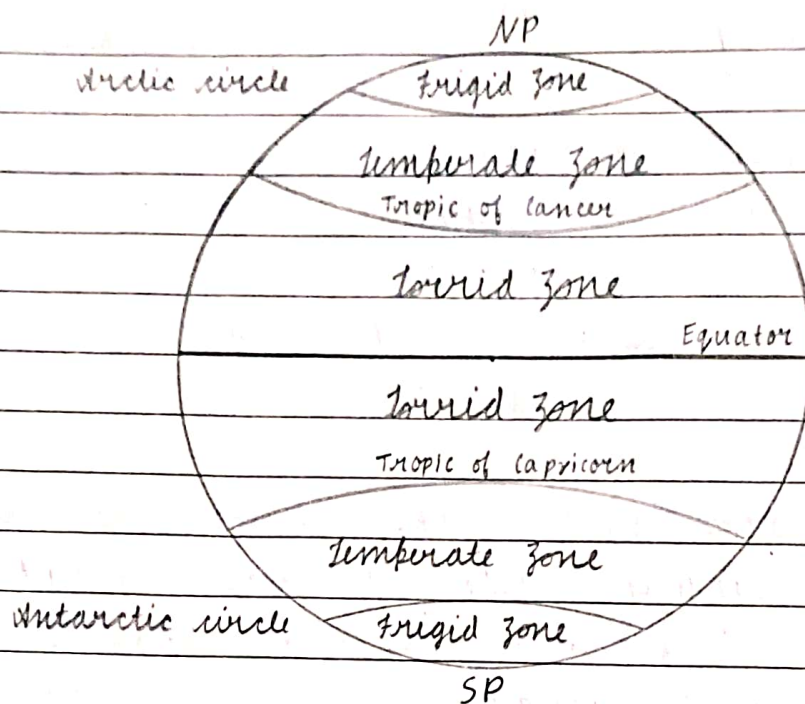
- a) Earth's spherical shape
- b) Revolution of earth around the sun

These two factors indicate that higher the latitude colder is the place.

ii) Sun's rays strike the earth at varying angle of incidence which results in unequal distribution of heat on the earth.

iii) On this basis the earth is divided into different heat zones :

- a) Torrid zone
- b) Temperate zone
- c) Frigid zone

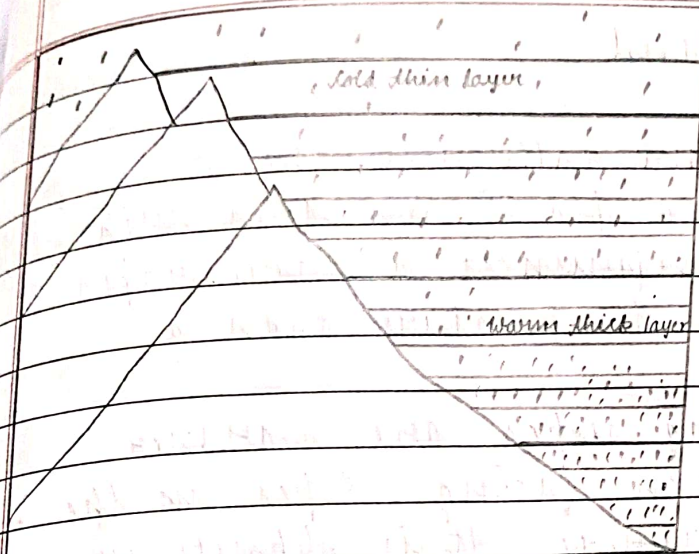


### Heat Zones

#### 2. Altitude -

The height of a place above the mean sea level is known as its altitude.

- i) Temperature decreases with an increase in altitude because -
  - a) The atmosphere is heated more by terrestrial radiation than by insolation.
  - b) Since the air is denser near the earth surface its heat absorption capacity is more in the lower layers as compared to the upper layers.
- ii) The temperature decreases at a rate of  $1^{\circ}\text{C}$  for every 166 m of ascent or  $6^{\circ}\text{C}$  for every 1 km. This is known as normal lapse rate.



Temperature decreases with increase in altitude.

### 3 Distance from the sea -

- i) land is heated by conduction whereas water is heated by convection.
- ii) land heats up faster and cools faster in comparison to water bodies. It is because the specific heat capacity of land is less than that of water.
- iii) This results in the blowing of land and sea breezes near the coastal area which moderates the temperatures throughout the year (Oceanic climate).
- iv) On the other hand places located far away from the moderating influence of the sea have extremes of temperature (very hot during summers and very cold during winters). THIS IS CALLED CONTINENTAL CLIMATE.

#### 4. Slope of the land -

- i) Slope of the land influences the temperature of a place. An area with a steep slope experiences a more rapid change in the temperature than a gentle one.
- ii) The south facing slopes are warmer than the north facing slopes in the northern hemisphere. It is opposite in the southern hemisphere.

#### - Temperature inversion -

- i) It is the phenomenon of inversion of the lapse rate in which the temperature actually increases with an increase in height but it occurs only under certain conditions.
- ii) On calm and cold winter nights the heat from the valleys escapes making the slopes warmer. On the other hand cold air from the slopes sinks towards the valley making it colder. This is called temperature inversion.

#### 5. Wind and Ocean currents -

- i) The warm ocean currents such as Gulf stream, the north atlantic drift increase the temperatures of the coastal areas whereas the cold ocean currents such as Labrador and Oyashio current decrease the

temperature.

ii) Similarly warm winds increase the temperature of area where they blow whereas cold winds decrease the temperature.