Class 11 Geography Notes Chapter 9 Solar Radiation, Heat Balance and Temperature

We live at the bottom of a huge pile of air. We inhale and exhale but we feel the air when it is in motion. It means air in motion is wind.

Envelop of air is atmosphere which is formed of multitude gases. These gases support life over the earth's surface.

The earth's surface receives most of its energy in short wavelengths.

The annual insolation received by the earth on 3rd January is slightly more than the amount received on 4th July. However, the effect of this variation in the solar output is masked by other factors like the distribution of land, sea and the atmospheric circulation. Hence, this variation in the solar output does not have great effect on daily weather changes on the surface of the earth.

The earth receives its entire energy from the sun and reflect most of it back to the space. Therefore, we see that the earth neither remains cold nor hot for too long. And hence temperature at different places of the earth is different. This difference in temperature causes difference in pressure.

As the earth is a geoid resembling a sphere, the sun's rays fall obliquely at the top of the atmosphere and the earth intercepts a very small portion of the sun's energy. On an average the earth receives 1.94 calories per sq. cm per minute at the top of its atmosphere.

The solar output received at the top of the atmosphere varies slightly in a year due to the variations in the distance between the earth and the sun.

During its revolution around the sun, the earth is farthest from the sun (152 million km) on 4th July, 't his position of the earth is called aphelion.

On 3rd January, the earth is the nearest to the sun (147 million km). This position is called perihelion.

The annual insolation received by the earth on 3rd January is slightly more than the amount received on 4th July.

The amount of solar radiation keeps changing daily, on the basis of weather and per year.

Output is masked by other factors like the distribution of land and sea and the atmospheric circulation. Hence, this variation in the solar output does not have great effect on daily weather changes on the surface of the earth.

The earth's axis makes an angle of 6614 with the plane of its orbit round the sun has a greater influence on the amount of insolation received at different latitudes.

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The insolation received at the surface varies from about 320 Watt/m2 in the tropics to about 70 Watt/m2 in the poles.

Maximum insolation is received over the subtropical deserts, where the cloudiness is the least. Equator receives comparatively less insolation than the tropics. Generally, at the same latitude the insolation is more over the continent than over the oceans. In winter, the middle and higher latitudes receive less radiation than in summer.

The earth after being heated by insolation transmits the heat to the atmospheric layers near to the earth in long wave form. The air in contact with the land gets heated slowly and the upper layers in contact with the lower layers also get heated. This process is called conduction.

The air in cpntact with the earth rises vertically on heating in the form of currents and further transmits the heat of the atmosphere. This process of vertical heating of the atmosphere is known as convection.

Out of 100 units of heat received, roughly 35 units are reflected back to space even before reaching the earth's surface. Of these, 27 units are reflected back from the top of the clouds and 2 units from the snow and ice-covered areas of the earth. The remaining 65 units are absorbed, 14 units within the atmosphere and 51 units by the earth's surface.

Normally, temperature decreases with increase in elevation. It is called normal lapse rate. At times, the situations is reversed and the normal lapse rate is inverted. It is called Inversion of temperature. Inversion is usually of short duration but quite common nonetheless.

A long winter night with clear skies and still air is ideal situation for inversion. The heat of the day is radiated off during the night, and by early morning hours, the earth is cooler than the air above. Over polar areas, temperature inversion is normal throughout the year.

Surface inversion promotes stability in the lower layers of the atmosphere. Smoke and dust particles get collected beneath the inversion layer and spread horizontally to fill the lower strat a of the atmosphere. Dense fogs in mornings are common occurrences especially during winter season. This inversion commonly lasts for few hours until the sun comes up and beings to warm the earth. The inversion takes place in hills and mountains due to air drainage.

Blowing of cold air at the hills and mountains, during night, flows under the influence of gravity. Being heavy and dense, the cold air acts almost like water and moves down the slope to pile up deeply in pockets and valley bottoms with warm air above.

Class 11 Geography Notes Chapter 9 Important Terms:

- Insolation: The energy received by the earth is known as incoming solar radiation which in short is termed as insolation.

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- Aphelion: During its revolution around the sun, the earth is farthest from the sun (152 million km) on 4th July. This position of the earth is called aphelion.
- Perihelion: On 3rd January, the earth is the nearest to the sun (147 million km). This position is called perihelion.
- Terrestrial radiation: The insolation received by the earth is in short waves forms and heats up its surface. The earth after being heated itself becomes a radiating body and it radiates energy to the atmosphere in long wave form. This energy heats up the atmosphere from below. This process is known as terrestrial radiation.
- Conduction: The earth after being heated by insolation transmits the heat to the atmospheric layers near to the earth in long wave form. The air in contact with the land gets heated slowly and the upper layers in contact with the lower layers also get heated. This process is called conduction.
- Convection: The air in contact with the earth rises vertically on heating in the form of currents and further transmits the heat of the atmosphere. This process of vertical heating of the atmosphere is known as convection.
- Advection: The convective transfer of energy is confined only to the troposphere. The transfer of heat through horizontal movement of air is called advection.
- Albedo: While passing through the atmosphere some amount of energy is reflected, scattered and absorbed. Only the remaining part reaches the earth surface. The reflected amount of radiation is called the albedo of the earth.
- Normal lapse rate: Normally, temperature decreases with increase in elevation. It is called normal lapse rate.
- Loo: Summer season local winds is called ‘loo’. It is the result of advection.
- Isotherms: The Isotherms are lines joining places having equal temperature.
- Inversion of temperature: At times, the situations is reversed and the normal lapse rate is inverted. It is called Inversion of temperature.
- Air drainage: Being heavy and dense, the cold air acts almost like water and moves down the slope to pile up deeply in pockets and valley bottoms with warm air above. This is called air drainage. It protects plants from frost damages.
- Plank’s law: Plank’s law states that hotter a body, the more energy it will radiate and shorter the wavelength of that radiation.
- Specific heat: Specific heat is the energy needed to raise the temperature of one gram of substance by one Celsius.

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