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NCERT Class 11 Geography Chapter 9: Solar Radiation, Heat Balance and Temperature YouTube Lecture Handouts

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[NCERT Class 11 Geography Part 1 Chapter 9: Solar Radiation, Heat Balance and Temperature \[https://www.youtube.com/watch?v=IAUGxsZtQaE\]](https://www.youtube.com/watch?v=IAUGxsZtQaE)

Air in Motion is Known as Wind

Earth receives energy from sun and radiates it back to space – so it never warms up or gets cooler – amount of heat received by different part of earth is not the same due to pressure differences and this causes transfer of heat from one region to another.

Solar Radiation

Insolation – incoming solar radiations (320 Watt/m² in tropics to 70 Watt/m² in poles)

Maximum insolation in subtropical deserts where cloudiness is least

Equator gets less insolation than tropics

At same latitude, insolation is more over continents than oceans

Earth receives 1.94 calories per sq. cm per minute at top of atmosphere – solar output varies due to variation b/w distance of earth and sun

Aphelion – farthest position (4th July)

Perihelion – closest position (3rd Jan) – more insolation than aphelion

Variability in Insolation intensity is affected by:

Rotation of earth on its axis: Earth's axis makes an angle of $66\frac{1}{2}^\circ$ with the plane of its orbit – has more influence on amount of insolation

Angle of inclination of the sun's rays: Higher latitude have lesser angle, cover more area and energy is distributed. Slanting rays pass through greater depth resulting in more absorption, scattering and diffusion

Length of the day

Transparency of the atmosphere (less influence) - water vapor, ozone and other gases absorb much of the near infrared radiation within troposphere

Configuration of land in terms of its aspect (less influence)

Suspended particles in sky scatter visible spectrum to both space and towards earth surface – adds to color (red for rising and setting sun) and blue for scattering of light

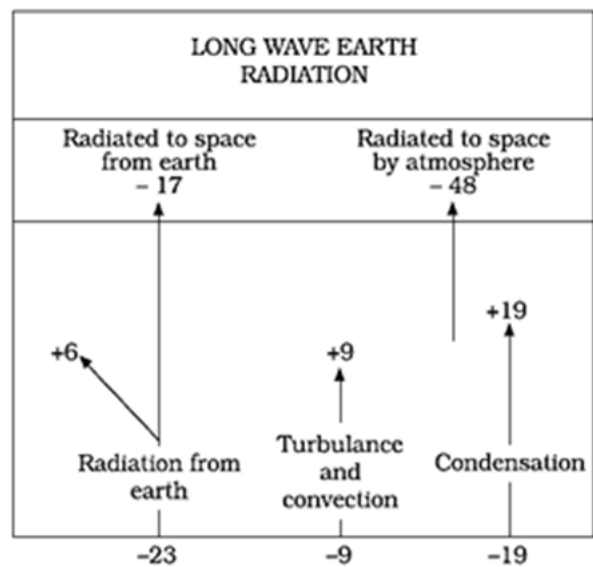
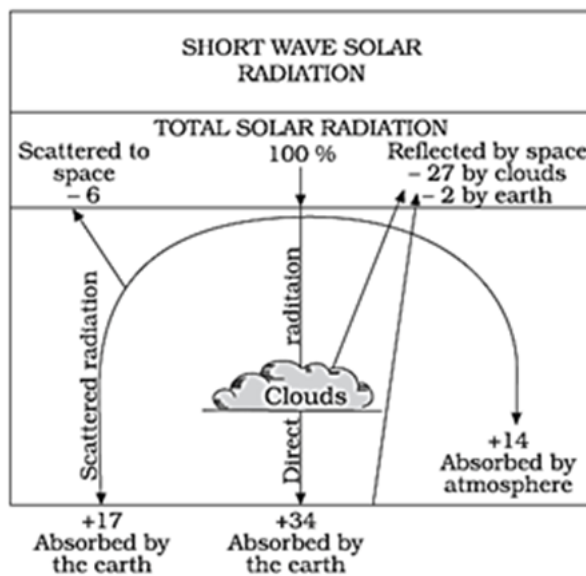
Heating & Cooling of Atmosphere

- Earth transmit heat to layers in long wave form and is heated by **conduction** (when two bodies at unequal temperature are in contact then flow from warmer to cooler body takes place)
- Vertical rise of air as currents is by **convection** – only in troposphere
- Horizontal transfer of heat by **advection** – this is more than vertical movement. In Mid latitude diurnal variation is caused by advection. Loo is an outcome of advection in north India in summers

Terrestrial Radiation

- Insolation as short wave heats the surface – earth gets heated and becomes a radiating body & radiates in long waves and is called terrestrial radiation
- Long waves are absorbed by CO₂ and GHG
- Amount of heat received from the sun is returned to space, thereby maintaining constant temperature at the earth's surface and in the atmosphere

Heat Budget



Reflected amount of radiation is known as albedo

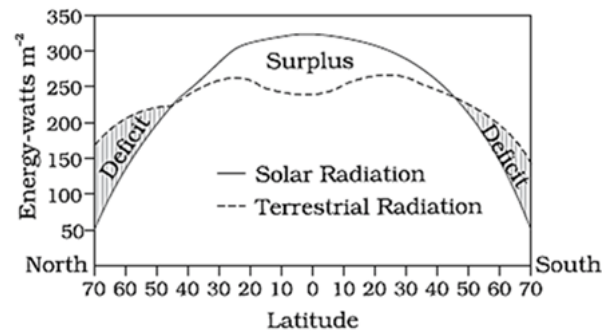
65 units are absorbed [14 within atmosphere and 51 (as 17 and 34) by earth's surface]

34 units absorbed by atmosphere are seen in 2nd diagram as (6,9 and 19)

Total radiation that returns is $17 + 48 = 65$ units

The 65 units absorbed and radiated balance and we have a heat budget

Some latitude have surplus while others have deficit heat budget



Surplus heat from tropics is redistributed polewards – so tropics are not heated by surplus heat accumulation

Temperature

Interaction of insolation and earth's surface creates heat (molecular movement of particle) – measured as temperature (degree of hotness or coldness)

Temperature is influenced by:

Latitude of place – temp. depends on insolation

Altitude of place – near sea level have higher temperature, rate of decrease is 6.5°C per 1000 m

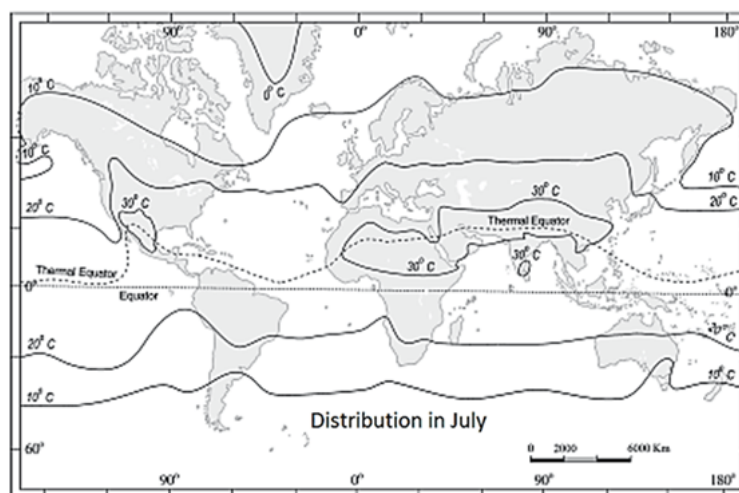
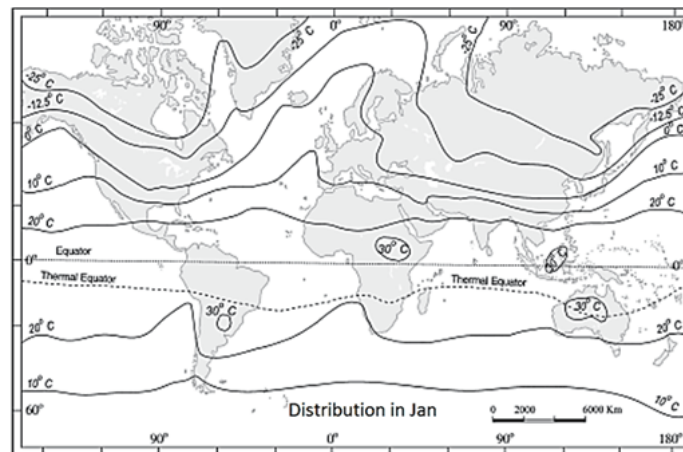
Distance from sea & mass circulation – sea gets heated slowly and land gets heated quickly causing land and sea breeze

Air mass and presence of warm and cold current – affects temperature, places close to warm current record higher temperature

Local aspects

Distribution of Temperature

- Isotherm – line joining places of equal temperature
- Isotherms are parallel to latitude – deviation is more in Jan than July mainly in northern hemisphere (more land)
- Deviation is northward over ocean and southward over continent in North Atlantic Ocean. Presence of warm ocean currents, Gulf Stream and North Atlantic drift, make Northern Atlantic Ocean warmer and the isotherms bend towards the north.
- More pronounced in Serbian plains.



- South Hemisphere – Isotherm of 20°C, 10°C, and 0°C runs parallel to 35°S, 45°S and 60°S latitudes respectively.
- Range of Temperature: Highest range of temperature is more than 60°C over the north-eastern part of Eurasian continent. This is due to continentality.
- The least range of temperature 3°C, is found between 20°S and 15°N.

