02 April 2024 19:59

906 2395123.

↳ Doubt clearing

Venus — dense.

Mars — less denser.

1. outgassing from volcanoes.

+

release of gases from inside the Earth.

2. Rise of photosynthetic organisms which produced oxygen as a by product.

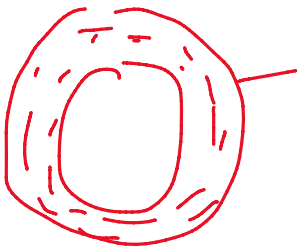
3. Development of the ozone layer.

Origin of atmosphere

- 5 billion yrs ago (Earth was formed)

- 500 million yrs — dense atmosphere.

- 500 million yrs — dense atmosphere.
  ↳ vapour + gases
- H_2, water vapour, CH_4. + carbon oxides.
- N_2 and H_2.
- hydrosphere — 4 billion years ago.
- Blue green algae. — 1 billion years ago.
  ↳ accumulation of Oxygen in the atmosphere
  CO_2 level started decreasing
- Ozone molecules



Young Earth.

- Volcanoes released gases — H_2O, CO_2, NH_3.

  CO_2 → seawater

- O_2.

Current Earth.

- CO_2 and O_2.
- O_2 CO_2.

CO_2 – by burning

→ gets dissolved in sea water / oceans.

H

Gases.

N and O

→ 99% of the clean, dry air.

21% — O

78% — N

CO_2 — 0.038% of dry air

Argon — 0.93%

Ozone — Less than 0.00006%

Neon, Helium, Hydrogen, Xenon, Krypton, Methane.

- Water Vapour.
  - ↳ 0. to 5% by volume

- Particulate Matter.
  - ↳ sand particles, pollen grains, small organisms, oceanic salts, fragments of meteors.

- selective scattering of solar radiation by dust particles. } sky blue.

altitude of 80 kms.

↓

Homosphere

↓

Lower part of the atmosphere

Heterosphere

3 regions

troposphere (bottom layer)

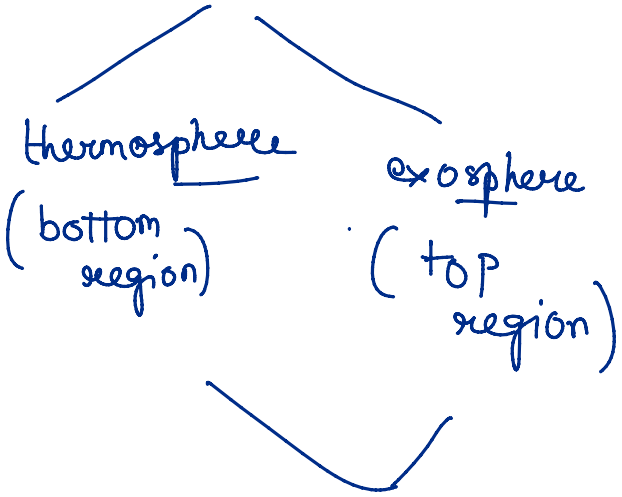
stratosphere (middle layer)

mesosphere (top layer).

→ air composition (same)

→ air concentration (different).

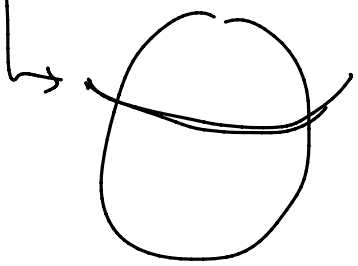
Heterosphere



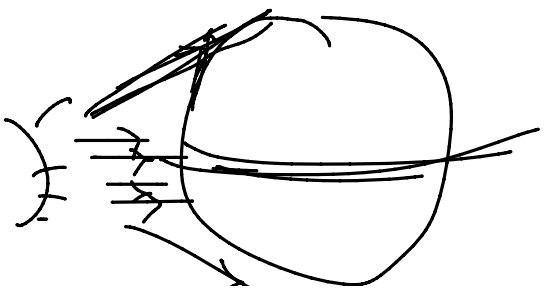
Begins over 80 kms and extends upto 10,000 kms.

Insolation or (Incoming Solar Radiation) (ISR).

↳ short waves.



→ more concentrated near the Equator



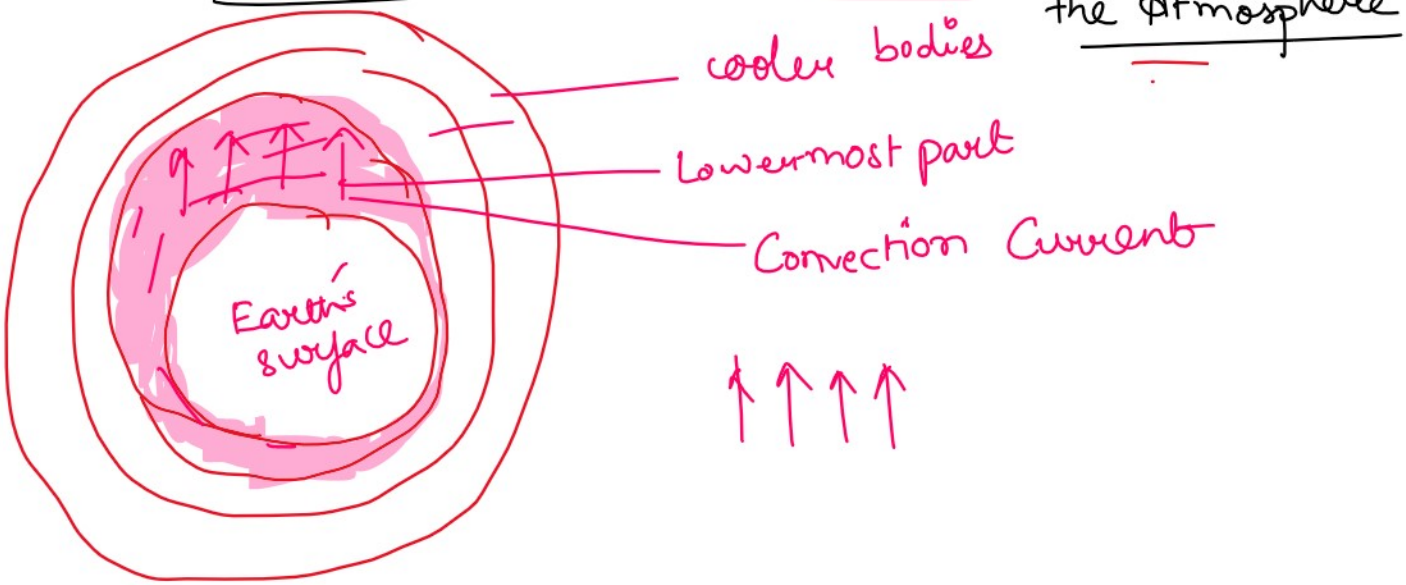
1. Rotation

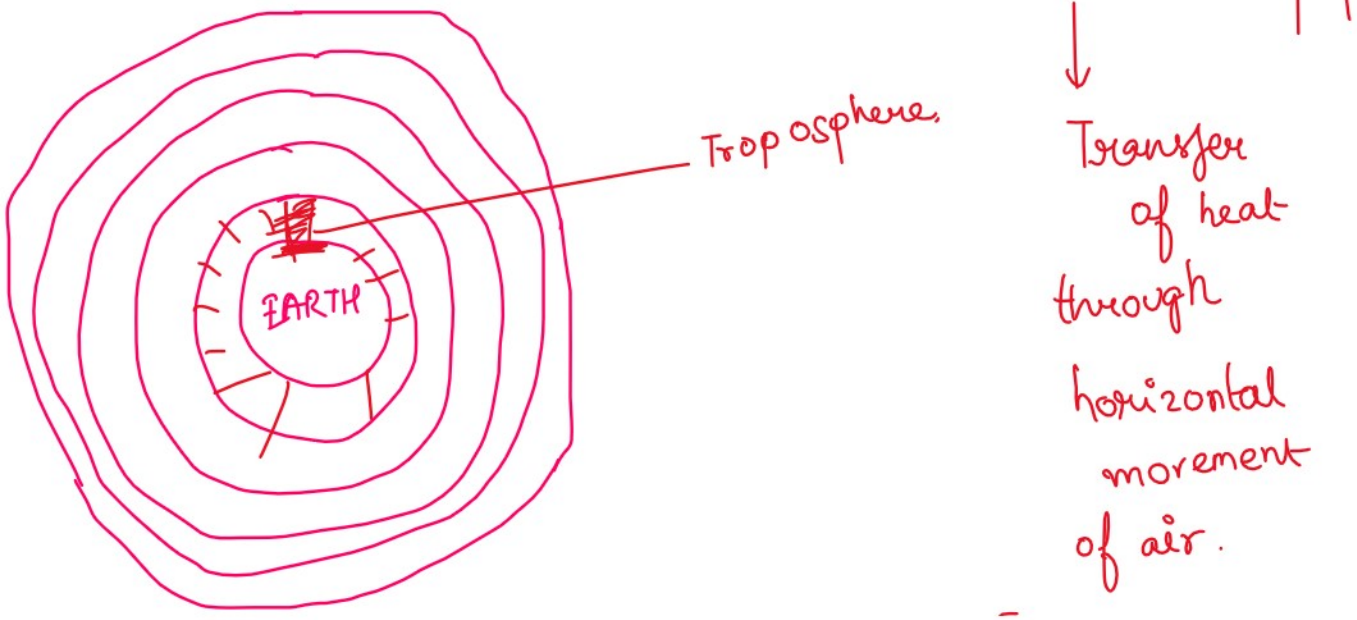
2. Length of the day

3. Configuration of the land

4. Angle of inclination of the sun's rays.

Terrestrial Radiation, Heating and Cooling of the Atmosphere





of air.

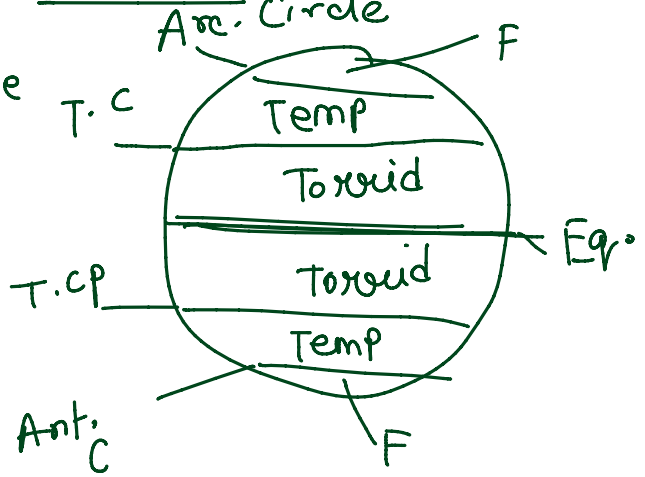
[advection current]

E.g ⇒ 100

- 35% of solar radiation is reflected back.
  - ↳ 'albedo of the earth'
- Out of remaining 65%,
  - ↳ 14% absorbed by the atmosphere
  - 51% is absorbed by the earth's surface

3 major heat Zones of the Earth :-

1. Temperate Zone
2. Torrid Zone
3. Frigid Zone



Notes on Heat Balance

The heat balance of the atmosphere and the Earth refers to the equilibrium between the energy the Earth receives from the Sun and the energy it emits back into space. This balance is crucial for maintaining stable temperatures on Earth and plays a significant role in shaping climate patterns.

1. Solar Radiation: The primary source of energy for the Earth is solar radiation. Sunlight reaches the Earth's atmosphere, where some of it is absorbed by the atmosphere itself, clouds, and the Earth's surface. The rest is reflected back into space.
2. Absorption and Reflection: When sunlight strikes the Earth's surface, it is absorbed and converted into heat energy. Some of this heat is then radiated back into the atmosphere as infrared radiation. Some of the incoming solar radiation is also reflected back into space by clouds, aerosols, and the Earth's surface.
3. Greenhouse Effect: The Earth's atmosphere plays a crucial role in trapping some of the heat radiated by the Earth's surface, a phenomenon known as the greenhouse effect. Certain gases in the atmosphere, such as carbon dioxide (CO2), water vapor, methane (CH4), and others, absorb and re-emit infrared radiation, trapping heat and warming the Earth's surface.
4. Heat Exchange: Heat is exchanged between the Earth's surface and the atmosphere through processes such as conduction, convection, and latent heat transfer (evaporation and condensation of water).
5. Radiative Cooling: The Earth also emits heat energy in the form of infrared radiation back into space. This process is known as radiative cooling.
6. Global Energy Balance: The Earth maintains a relatively stable temperature when the amount of incoming solar radiation is balanced by the outgoing heat energy radiated into space. Any imbalance in this energy exchange can lead to changes in temperature, resulting in climate variability and potentially leading to long-term climate change.

Terrestrial radiation refers to the emission of heat energy from the Earth's surface back into the atmosphere and ultimately into space. This radiation primarily occurs in the form of infrared radiation, also known as longwave radiation, due to the relatively low temperatures of the Earth's surface compared to the Sun.

1. Absorption of Solar Radiation: During the day, the Earth's surface absorbs incoming solar radiation from the Sun. This absorbed solar energy heats up the Earth's surface, causing it to warm.
2. Emission of Infrared Radiation: As the Earth's surface warms up, it emits heat energy in the form of infrared radiation. This terrestrial radiation occurs continuously, both during the day and at night, although the intensity varies depending on factors such as the time of day, season, and geographic location.
3. Greenhouse Effect: Some of the emitted infrared radiation is absorbed and re-radiated by greenhouse gases in the Earth's atmosphere, such as water vapor, carbon dioxide, methane, and others. These gases trap heat energy, contributing to the greenhouse effect, which helps to keep the Earth's surface warmer than it would be otherwise.
4. Radiative Cooling: Despite the greenhouse effect, the Earth still loses heat energy to space through radiative cooling. The balance between incoming solar radiation and outgoing terrestrial radiation is crucial for maintaining the Earth's overall temperature equilibrium.
5. Atmospheric Dynamics: The process of terrestrial radiation plays a significant role in shaping atmospheric dynamics, including temperature patterns, weather systems, and climate variability.