

Geography Class 19

A BRIEF RECAP OF THE TOPICS DISCUSSED IN THE PREVIOUS CLASS.

(09:04 AM)

GLACIER LAKE OUTBURST FLOODS (GLOF) (09:13 AM)

- GLOFs occur when a glacier-fed lake, formed by the accumulation of meltwater behind a moraine (a ridge of unconsolidated glacial debris), experiences a breach or collapse of the moraine, leading to a sudden release of water.
- Moraines can be **unstable due to their loose and unconsolidated nature**.
- Factors such as erosion, melting, and the weakening of the moraine can contribute to its collapse, leading to a GLOF.
- **Heavy rainfall** is a common trigger for GLOFs.
- The catastrophic flooding in the Kedarnath region in 2013 was indeed triggered by a GLOF event at **Chorabari Lake (also known as Gandhi Sarovar)**.
- Due to climate change, the number of GLOFs will increase in future.

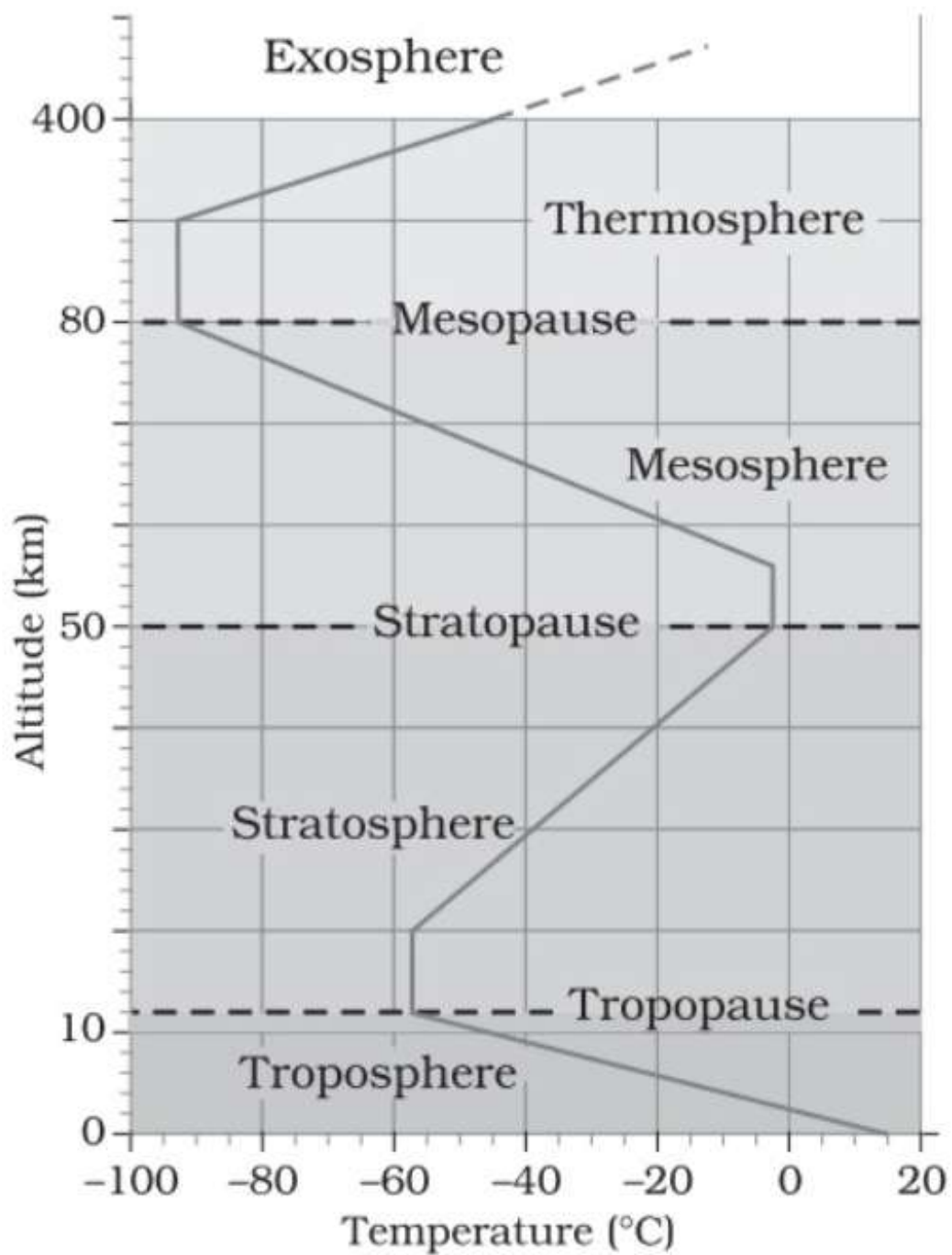
CLIMATOLOGY (09:19 AM)

STRUCTURE OF ATMOSPHERE (09:19 AM)

- Gases are present in the uniform mixture at the lowest layers (up to 80 Km of the distance) of our atmosphere. This layer is known as the **Homosphere**.
- After these layers, the gases get separated in different proportions. This layer is known as the **heterosphere**.

DIFFERENCE BETWEEN HOMOSPHERE AND HETEROSPHERE (09:25 AM)

Homosphere	Heterosphere
It is a uniform layer of the atmosphere where all the gases are mixed up.	The gases formed separate layers
It is up to 80 Km from the Earth's surface.	This is beyond 80 Km.
In this, the gases are mainly in molecular form . (Combination of the same matter).	In this, the gases are in the atomic form .
It has a higher proportion of water vapour and dust particles.	It has a very low proportion of water vapour and dust particles.
It is divided into three layers.	It is divided into two layers.
Troposphere (06 to 16 Km), Stratosphere (upto 50 Km), Mesosphere (up to 80)	Thermosphere (from 80 Km to 500/700 Km), Exosphere (above 700 Km)



TROPOSPHERE (09:39 AM)

- It extends from sea level to **16 Km near the tropics and 6 Km near the poles.**
- Temperature decreases in Troposphere at the rate of **6.5° C/Km**. This rate is known as the **Normal Lapse Rate (NLR)**.
- Troposphere contains **99.9% of water vapour and dust particles**. It contains **75% of all the gases in the atmosphere.**
- It is also known as the **zone of turbulence or zone of convection and friction layer.**
- All weather phenomena are restricted to the troposphere.
- The edge of the troposphere is called **Tropopause** where mixing stops.

STRATOSPHERE (09:54 AM)

- It extends from tropopause to **up to 50 Km.**
- It is called so because layers are **stratified and non-convective in nature.**
- The temperature rises in the stratosphere due to the **absorption of UV radiation by ozone.**
- The conditions are extremely dry except few rare clouds called **stratospheric clouds.**
- Examples of stratospheric clouds are the mother of pearl, nacreous, etc.
- The edge of the stratosphere is called the **stratopause.**

MESOSPHERE (10:04 AM)

- It extends from Stratopause to **up to 80 Km.**
- The temperature decreases with height and reaches the lowest in the atmosphere i.e. ~~-19° C.~~ **-90 degree celsius.**
- The edge of the mesosphere is called Mesopause.

HETEROSPHERE (10:12 AM)

- It is mainly made of the Thermosphere and Exosphere.

THERMOSPHERE (10:13 AM)

- It extends from Mesopause to up to 500/700 Km.
- It consists of a lower nitrogen layer and upper Oxygen layer in atomic form.
- The temperature rises rapidly in the thermosphere due to the absorption of high-energy solar radiation.
- The temperature reaches nearly **1200° C by 350 Km**. However, high temperature is not felt due to the absence of molecular collision.

EXOSPHERE (10: 29 AM)

- It extends from the edge of the thermosphere to the vacuum.
- It contains the layers of **Oxygen, Helium, and Hydrogen in atomic form**.
- It contains the magnetosphere which is composed of electrons, protons derived from solar winds and other charged particles trapped in Earth's magnetic field.
- They are arranged in two bands at 3000 and 15000 Kms, known as the Van Allen Radiation Belts.

IONOSPHERE (10:31 AM)

- It extends between **80 to 650 Km**.
- It is formed due to ionization by solar radiation.
- It is made up of different layers such as D, E, F.
- It reflects back short-wave radio waves to the Earth's surface and helps in radio communication.

TRANSPORTATION IN THE ATMOSPHERE (10:36 AM)

- **Karman line** is a boundary of outer space **defined at 100 Km from sea level**.
- Above this boundary, the air is **too thin** for any type of aircraft for other flights except the spacecraft.
- However, international law does not define the limit of Airspace.

INSOLATION, HEAT BUDGET, AND ALBEDO (11:08 AM)

- Insolation is the amount of incoming solar radiation.
- It is equal to **2 billionth of the solar energy**.
- The amount of insolation received on the surface is equal to **1.92 calories per cm² per minute**.

GREEN HOUSE EFFECT (11:17 AM)

- The incoming solar radiation is **shorter in wavelength**.
- It is absorbed by the earth's surface and it is reemitted as **long-wavelength terrestrial radiation**.
- The lower atmosphere is transparent to incoming solar radiation and opaque to outgoing terrestrial radiation.
- The warming of the earth's atmosphere and its surface by the absorption of terrestrial radiation due to the presence of some of the gases is called the Green House Effect and the gases responsible for it are called the Green House Gases.
- **Carbon Dioxide (CO₂), Methane (CH₄), Nitrous Oxide (N₂O), Hydro Fluorocarbon (HFC), Perfloro carbon (PFC), and Sufurhexa Floride (SF₆) are the main Green House gases.** Besides that, water vapour is another
- Since the earth's surface absorbs incoming radiation and emits terrestrial radiation, it acts as a source of heat for the atmosphere. Therefore temperature decreases with height at a rate of **6.5° C/Km**.

METHODS OF HEAT TRANSFER IN THE ATMOSPHERE (11:37 AM)

- **Radiation:** It involves the transfer of heat in the form of radiant energy. **Example:** Incoming solar radiation.
- **Conduction:** Transfer of heat through the molecular activity at the zone of contact. **Example:** The zone of contact between the troposphere and the earth's surface.
- **Convection:** The transfer of heat by the vertical movement of mass or air is called convection. **Example:** Convection of air along the equator.
- **Advection:** Transfer of heat by horizontal movement of the earth. **Example:** Planetary winds, ocean currents, etc.
mass

FACTORS AFFECTING INSOLATION (11:47 AM)

- **Latitude:** It decides the angle of incidence of sun rays near the equator where the insolation falls vertically.
- It is concentrated over a smaller area.
- Near the temperate regions where insolation falls at an **oblique angle** gets distributed over the larger area.
- **Transparency of Atmosphere:** It includes cloud cover, dust particles, and water vapour which reduces the transparency of the atmosphere reducing the insolation received at the surface.
- **Length of the Day:** Longer the duration higher is the insolation received.

MAPPING (11:57 AM)

- Location of the water bodies surrounding Asia.
- **Europe:** Surrounded by three major water bodies Mediterranean Sea, Arctic, and Atlantic. It is called the **peninsula of the peninsula**. Peninsulas.
- It is connected with the **land boundary with Asia**. → Ural and Caucasus mountains.
- Three major water bodies between Europe, Africa and Asia are the Caspian Sea, the Black Sea and the Mediterranean Sea.
- The **Aegean Sea** played a very important role in **ancient sea trade**. The Silk Route was passing through it.
- The **War of Troy** was for the control of the Aegean Sea.
- Istanbul is the largest city in Europe in terms of population.
- **Europe and Africa:** The Strait of Gibraltar is indeed a narrow waterway that separates Europe and Africa. It connects the Atlantic Ocean to the Mediterranean Sea. Gibraltar peninsula belongs to the UK.
- The **Rock of Gibraltar** is a prominent landmark located on the Gibraltar Peninsula.
- The Alps are a major mountain range in Europe.
- **Mount Elbrus**, located in the Caucasus Mountain Range, is indeed considered the **highest peak in Europe**.
- The lowest point in Europe is the shore of the Caspian Sea, specifically the Caspian Depression.
- **Adriatic Sea:** Famous for the Karst Topography.
- **North Sea:** The North Sea is located between the United Kingdom and the rest of Europe, bordered by several countries including the UK, Norway, Germany, and the Netherlands. It is known for its significant petroleum reserves, including the production of Brent Crude Oil.
- Baltic Sea.

The topic for the next class discussion: Heat Budget, Albedo, Temperature and Pressure

Marmara sea connects Aegean Sea and Black Sea

in Europe Physical