

# Climate change

Core Subject – Meteorology and Environmental Issues

Unit III

# Climate Change

- One of the global issues
- Changing climate of the world

## **WHAT IS CLIMATE?**

- Weather condition
- Prevailing for a longer period of time
- In a larger region

## **WHAT IS WEATHER?**

- The state of atmosphere
- Of a particular region
- For a short period of time



## Weather

**Short-term variation in  
atmosphere**

Weather was good yesterday.

## Climate

**Weather condition over long period**

**Climate change has become a burning  
issue worldwide.**

# Climate Change

- AVG temperature of the earth's surface is **15 degrees Celsius**
- But its increasing
- Has risen by **0.6** degree Celsius by 1800's
- Is expected to increase another **1.4 to 5.8** degree by 2100.

## Sea level rise

- Avg of **10 to 20 cm** rise during 20<sup>th</sup> century
- Expected to increase further by **9 to 88** cm by 2100.

## Snow level ( in India)

- **15%** glacier melt over last 50 years

Most of the climate change only due to human activities.

# Key aspects of Climate change

Global warming

Acid rain

Ozone depletion

Pollution

Loss of biodiversity

Water crisis

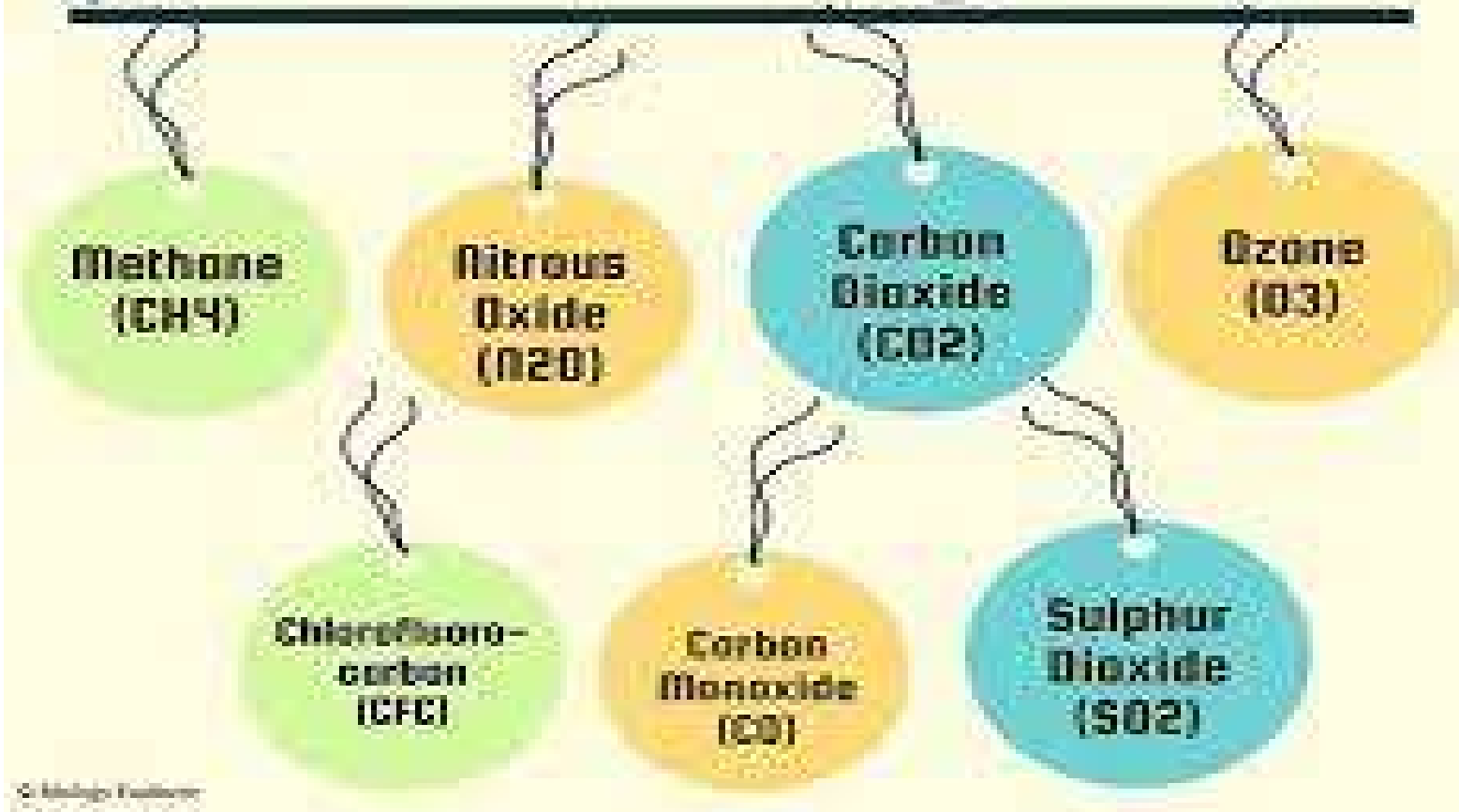
# Human Activities

- Burning of fossil fuel
- Deforestation
- Industrialisation
- Urbanisation

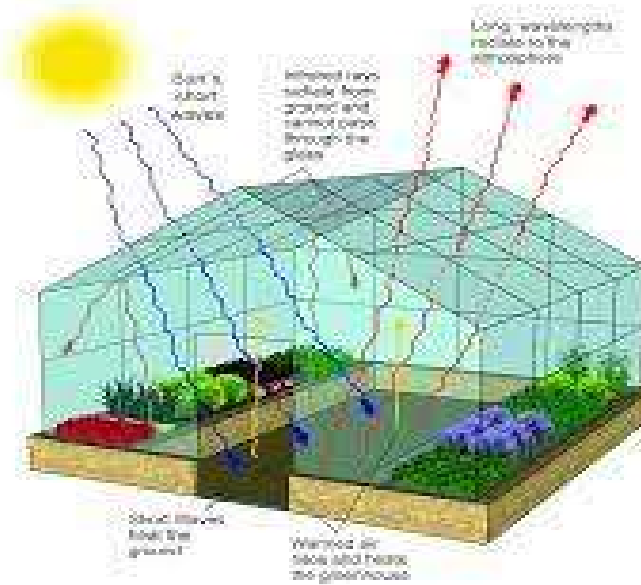
which releases mainly Green House Gases (GHGs)

**WHICH ARE THE GHGs?**

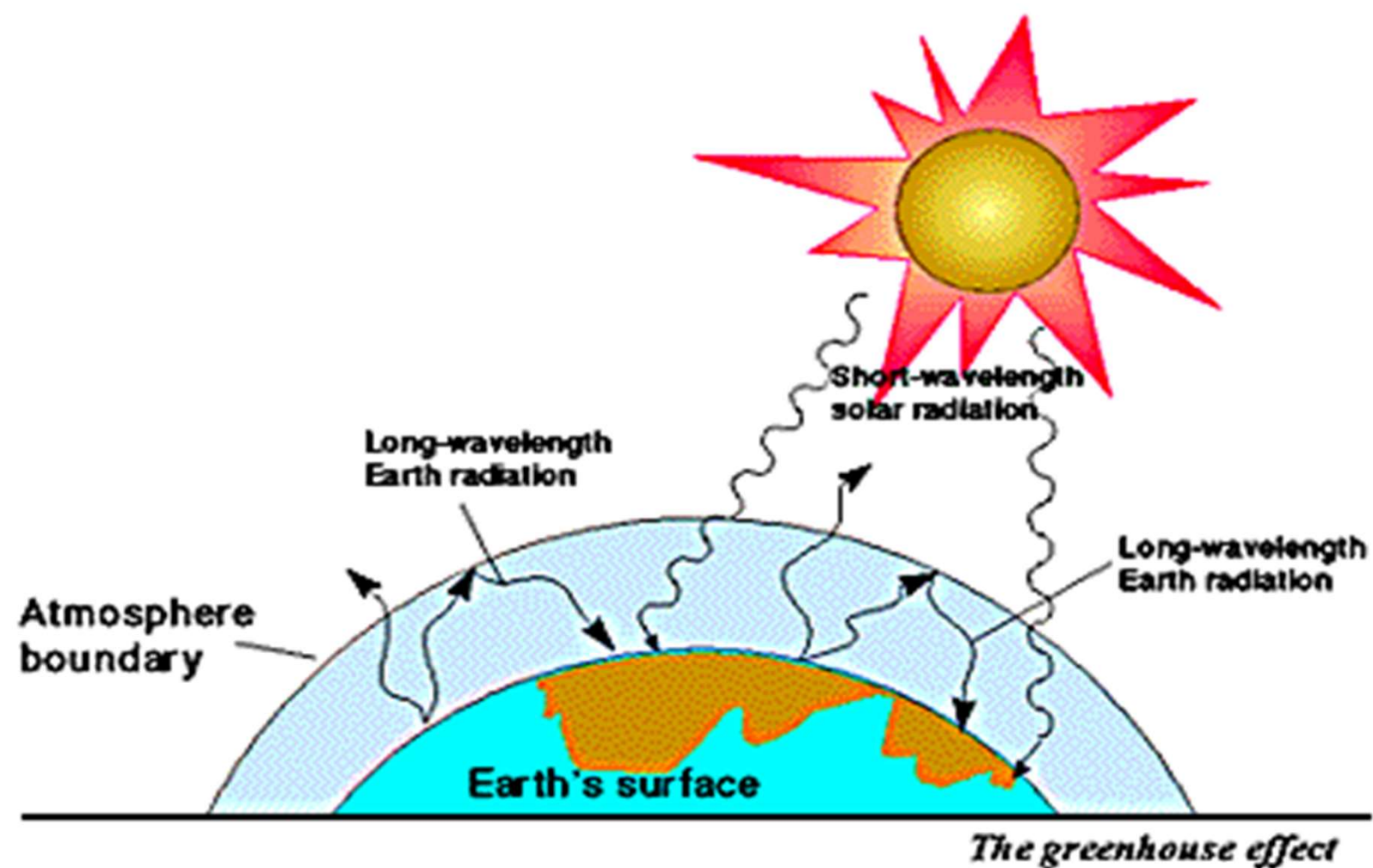
# The Greenhouse Gases



- Water vapours
- Ground level ozone







- The gaseous envelope allows sunlight (short wave) to reach the earth
- When light radiates in the form of long waves (infra red) radiations, it is absorbed by GHGs

### **Causes Warming**

- The atmosphere radiates part of this energy back to the earth.
- This downward flux of radiation (*green house flux*) keep the earth warm

**This phenomena is called Green house effect**

- The mean annual temperature of the earth is about 15°C
- In the absence of GHGs mean temp on would be -20°C
- Rise in the of earth's surface depend on the amount of CO2
- Normal CO2 conc. 0.03% keeps the temp. on the earth's surface nearly constant
- It is due to energy balance of sun rays, which strike on the earth, heat it and then radiate back into the space
- This phenomena is called as energy budget.

# Green House Gases

## **Carbon dioxide**

- Increasing due to combustion of fossil fuel
- Source is industries and transportation
- Increase nearly 25% since 1850
- Conc. Risen from 280 ppm since 19<sup>th</sup> century to 316 ppm in 1960 and 359 ppm in 1994
- At 400 ppm of CO<sub>2</sub> global temperature will rise to about 1<sup>0</sup>C

# Green House Gases

## **Methane**

- Primary component of Natural gas
- Naturally released from garbage dumps
- Rice fields and swamps contributes about 25-30% globally
- In India, paddy fields contributes to about 2 % and cattle about 9%
- Risen from 750 ppb in 1750 AD to 1750 ppb in 2000.
- Global warming potential of CH<sub>4</sub> is 11 times more than CO<sub>2</sub>

# Green House Gases

## **CFC**

- Man made gas
- Used in foam, solvents, aerosols, refrigerants, air conditioners
- India produces 5000 tonnes/yr against global production of 7,00,000 tonnes/yr i.e less than 1%
- Efforts are being made to reduce the production
- More than 15 million tonnes have already been released by 1985
- Global warming potential is 1600 to 15000 times as compared to that of CO<sub>2</sub>

# Green House Gases

## **Nitrous oxides**

- Quite stable gas
- Avg. life span 150 yrs
- Source – natural soil, inland water, oceans, fertilizers and burning of forests, grassland and other biomass
- Conc. has increased from 270 ppb in preindustrial era to 316 ppb in 2000
- Global warming potential is 270 times higher than that of CO<sub>2</sub>