

## Unit V:

Climatic classification: need and basis – Koppen's classification- climate change: Global warming- EL-nino and La-nino- Weather Forecasting – Types

### Climatic classification: need and basics:

The earliest known classification of climate, devised by the Greeks, simply divided each hemisphere into a mathematical climate of three zones, the "summerless," "intermediate," and "winterless," thus accounting only for the latitudinal differences in solar effect (the Greek word klima means "inclination"). More recently, these zones have been labeled the Torrid, Temperate, and Frigid Zones.

### Koeppen's Climate Classification

- Koeppen's Classification of climate is the most commonly used classification of climate.
- This climate classification scheme was developed by Wladimir Peter Koeppen in 1884.
- He recognized a close relationship between the distribution of vegetation and climate.
- The categories are based on the data of annual and monthly averages of temperature and precipitation.
- He selected specific values of temperature and precipitation and related them to the distribution of vegetation and used these values for classifying the climates.
- The Koeppen climate classification system recognizes five major climatic types and each type is designated by a capital letter- A, B, C, D, E, and H.
- The seasons of dryness are indicated by the small letters: f, m, w, and s.
  - f -no dry season
  - m – Monsoon climate
  - w- Winter dry season
  - s – Summer dry season
- The small letters a, b, c, and d refer to the degree of severity of temperature.
- climatic groups and their characteristics according to Koeppen

| Group                      | Characteristics   |
|----------------------------|---|
| <b>A- Tropical</b>         | The average temperature of the coldest month is 18° C or higher   |
| <b>B- Dry Climates</b>     | Potential evaporation exceeds precipitation   |
| <b>C- Warm Temperate</b>   | The average temperature of the coldest month of the (Mid-latitude) climates years is higher than minus 3°C but below 18°C |
| <b>D- Cold Snow forest</b> | The average temperature of the coldest month is minus 3° C or below   |
| <b>E- Cold Climates</b>    | Cold Climates Average temperature for all months is below 10° C   |
| <b>H- Highlands</b>        | Cold due to elevation   |

## Climatic Types According to Koeppen

| Group                        | Type                 | Letter Code | Characteristics                     |
|------------------------------|----------------------|-------------|-------------------------------------|
| A-Tropical Humid Climate     | Tropical Wet         | Af          | No dry season                       |
|                              | Tropical Monsoon     | Am          | Monsoonal, Short dry season         |
|                              | Tropical wet and dry | Aw          | Winter dry season                   |
|                              | Subtropical Steppe   | BSh         | Low-latitude semi-arid or dry       |
| B-Dry Climate                | Subtropical Desert   | BWh         | Low-latitude arid or dry            |
|                              | Mid-latitude Steppe  | BSk         | Mid-latitude semi-arid or dry       |
|                              | Mid-latitude Desert  | BWk         | Mid-latitude arid or dry            |
| C-Warm temperate Climates    | Humid subtropical    | Cfa         | No dry season                       |
|                              | Mediterranean        | Cs          | Dry hot summer                      |
|                              | Marine west coast    | Cfb         | No dry season, warm and cool summer |
| D- Cold Snow-forest Climates | Humid Continental    | Df          | No dry season, severe winter        |
|                              | Subarctic            | Dw          | Winter dry and very severe          |
| E-Cold climates              | Tundra               | ET          | No true summer                      |
|                              | Polar ice cap        | EF          | Perennial ice                       |
| H-highland                   | Highland             | H           | Highland with snow cover            |

### Climate Change:

Climate Change is a periodic modification of Earth's climate brought about due to the changes in the atmosphere as well as the interactions between the atmosphere and various other geological, chemical, biological and geographical factors within the Earth's system.

- Climate change can make weather patterns less predictable. These unforeseen weather patterns can make it difficult to maintain and grow crops, making agriculture-dependent countries like India vulnerable.
- it is also causing damaging weather events like more frequent and intense hurricanes, floods, cyclones, flooding etc.
- Due to the rising temperature caused by climate change, the ice in the polar regions is melting at an accelerated rate, causing sea levels to rise. This is damaging the coastlines due to the increased flooding and erosion.
- The cause of the current rapid climate change is due to human activities and threatening the very survival of humankind.

## **El Nino**

During El Nino, trade winds weaken. Warm water is pushed back east, toward the west coast of the Americas.

El Nino means Little Boy, or Christ Child in Spanish. South American fishermen first noticed periods of unusually warm water in the Pacific Ocean in the 1600s. The full name they used was El Nino de Navidad, because El Nino typically peaks around December.

El Nino can [affect our weather significantly](#). The warmer waters cause the Pacific jet stream to move south of its neutral position. With this shift, areas in the northern U.S. and Canada are dryer and warmer than usual. But in the U.S. Gulf Coast and Southeast, these periods are wetter than usual and have increased flooding.

## **La Nina**

La Nina means Little Girl in Spanish. La Nina is also sometimes called El Viejo, anti-El Nino, or simply "a cold event." La Nina has the opposite effect of El Nino. During La Nina events, trade winds are even stronger than usual, pushing more warm water toward Asia. Off the west coast of the Americas, upwelling increases, bringing cold, nutrient-rich water to the surface.

These cold waters in the Pacific push the jet stream northward. This tends to lead to drought in the southern U.S. and heavy rains and flooding in the Pacific Northwest and Canada. During a La Nina year, winter temperatures are warmer than normal in the South and cooler than normal in the North. La Nina can also lead to a [more severe hurricane season](#).

## **Weather forecasting:**

The prediction of weather in the tropical regions, like India, is a major challenge due to the complex and dynamic nature weather system. The day to day changes of weather elements such as rainfall, temperature, wind speed and humidity are the important meteorological parameters to be monitored on a continuous basis. The meteorological satellites provide a synoptic measurement of weather parameters at frequent intervals. The satellite images on cloud

cover and various parameters such as winds, rainfall, sea surface temperature etc., have become an integral part of weather forecasting.

Types of weather forecasting

There are four main **types of weather** prediction we're going to discuss in this lesson: short-range, medium-range, long-range, and hazardous **weather forecasting**. Long-range **forecasts** are given between one month and a year in advance.