

WEATHER AND CLIMATE

WEATHER

Weather- “the state of the atmosphere with respect to heat or cold, wetness or dryness, calm or storm, clearness or cloudiness”.

- Temporary behavior of atmosphere (what’s going on at any certain time)
- Small geographic area
- Can change rapidly

The aspects involved in weather include small areas and duration, expressed in numerical values, etc. The different weather elements are solar radiation, temperature, pressure, wind, humidity, rainfall evaporation, etc. is highly variable. It changes constantly sometimes from hour to hour and at other times from day to day.

- The study of weather is meteorology
- Someone who studies weather is called a meteorologist

CLIMATE

Climate – “the average course or condition of the weather at a place usually over a period of years as exhibited by temperature, wind velocity, and precipitation”

- Long-term behavior of atmosphere (100+ years)
- Large geographic area
- Very slow to change

‘Summation of weather conditions over a given region during comparatively longer period’.

‘The sum of all statistical information of weather in a particular area during a specified interval of time, usually, a season or a year or even a decade’.

DIFFERENCES BETWEEN WEATHER AND CLIMATE

WEATHER	CLIMATE
1. It is the study of atmospheric conditions for a short period of time	1. It is the study of the average weather condition observed over a long period of time
2. Changes from place to place even in a small locality	2. Different in different large region
3. Changes according to time (every moment)	3. Change requires longer (years) time.
4. It depends on a smaller areas like country or city.	4. It depends on a larger area like state or whole country
5. Similar numerical values of weather of different places usually have same weather	5. Similar numerical values of climate of different places usually have different climates.
6. Crop growth, development and yield are decided by weather in a given season.	6. Selection of crops suitable for a place is decided based on climate of the region.

THE ELEMENTS OF WEATHER

1. Temperature
2. Humidity
3. Precipitation
4. Wind
5. Air pressure
6. Visibility

1. Temperature

- Temperature is a measure of how hot or cold something is.
- A thermometer measures temperature.
- In science we use degree Celsius.
- A liquid, usually alcohol or mercury, is sealed in glass tube. when its heated, it expands, (thermal expansion) rising higher in the tube, when it cools it contracts, filling less of the tube.

2. Humidity

- Humidity is the amount of water vapor in the air.
- A hygrometer measures humidity.

- As water evaporates, it changes from liquid to gas, from liquid water to water vapor.
- That amount of water vapor in the air is humidity. As more water evaporates and turns to water vapor, humidity increases.
- Warm air can hold more water vapor than cold air.

1. Precipitation

3. Precipitation

- Precipitation is any form of water that falls to the Earth's surface from clouds.
- A rain gauge measures precipitation.

Types of precipitation

1. Rain: water droplets the most common type of precipitation
2. Sleet: rain falling through cold air form ice pellets.
3. Hail: layered lumps of ice.
4. Snow: ice crystals in the form of flakes.
5. Freezing rain: liquid droplets that land and freeze when they hit surface temperatures of less than 0 c.

4. Wind

- Wind is the sideways movement of air. The air always moves from an area of high pressure to an area of low pressure.
- Air moves from areas of high pressure to areas of low pressure. This movement of air is the wind.
- Differences in air pressure are caused by differences in how places are heated by the sun. warm air has less pressure than cooler air.
- Anemometer measures wind.

5. Air pressure

- Air pressure is the force of the weight of air pressing down on a unit of area. Air pressure is exerted in all directions down, up and sideways.
- Air pressure can change with the temperature. Warm air rises resulting in lower pressure. On the other hand, cold air will sink making the air pressure higher.
- A barometer measures air pressure.

6. Visibility

- Visibility is a measure of the transparency of the atmosphere.
- It describes how far we can see.

FACTORS AFFECTING CLIMATE

1) LATITUDE: The distance from the equator, either south or north, largely creates variations in the climate. Based on the latitude, the climate has been classified as:

i) Tropical

- **30°** - equator
- No winter, warm year-round
- High temp, rainfall, humidity

Tropical climates are characterized by monthly average temperatures of 18 °C (64.4 °F) or higher year-round and feature hot temperatures. There are normally only two seasons in tropical climates, a wet season and a dry season.

ii) Sub-tropical

A humid subtropical climate is a zone of climate characterized by hot and humid summers, and cold to mild winters. Climates are termed humid subtropical when they have at least 8 months with a mean temperature above 10 °C (50 °F).

iii) Temperate

- **60° - 30°** latitude
- Variety of climate patterns
- Moderate precipitation (rain/snow)

Temperate climate" refers to climates between Polar and Tropical. These different climates all fall within the temperate zone which has a basic definition as being any climate with a mean temperature above -3 °C (26.6 °F) but below 18 °C (64.4 °F) in the coldest month.

iv) Polar

- 90° - 60° latitude
- Cool summers, cold year-round
- Dry

The polar climate regions are characterized by a lack of warm summers. Every month in a polar climate has an average temperature of less than 10 °C (50 °F). A polar climate consists of cool summers and very cold winters, which results in permanent or semi-permanent layer of ice.

2) ALTITUDE (ELEVATION): The height from the mean sea level (MSL) creates variation in climate. Even in the tropical regions, the high mountains have temperate climate. The temperature decreases by 6.5 °C/Km from the sea level. Generally, there is also a decrease in pressure and increase in precipitation and wind velocity.

3) PRECIPITATION: The quantity and distribution of rainfall decides the nature of vegetation and the nature of the cultivated crops. The crop regions are classified on the basis of average rainfall which is as follow.

Rainfall(mm)	Name of the climatic region
Less than 500	Arid
500-750	Semi-arid
750-1000	Sub-arid
More than 1000	Humid

IV) SOIL TYPE: Soil is a product of climatic action on rocks as modified by landscape and vegetation over a long period of time. The colour of the soil surface affects the absorption, storage and re radiation of heat. White colour reflects while black absorbs more radiation. Due to differential absorption of heat energy, variations in temperature are created at different places. In black soil areas, the climate is hot while in red soil areas, it is comparatively cooler due to lesser heat absorption.

V) NEARNESS TO LARGE WATER BODIES: The presence of large water bodies like lakes and sea including its current affect the climate of the surrounding areas, eg. Islands and coastal areas. The movement of air from earth's surface and

from water bodies to earth modify the climate. The extreme variation in temperature during summer and winter is minimized in coastal areas and island.

VI) TOPOGRAPHY: The surface of landscape (leveled or uneven surface areas) produces marked change in the climate. This involves the altitude of the place, steepness of the slope and exposure of the slope to light and wind.

VII) VEGETATION: Kinds of vegetation characterize the nature of climate. Thick vegetation is found in tropical regions where temperature and precipitation are high.

SCALES OF CLIMATE AND THEIR IMPORTANCE

I) MICROCLIMATE:

Microclimate deals with the climatic features to small areas and with the physical processes that take place in the layer of air very near to the ground.

II) MESO CLIMATE:

The scale of meso climate falls between micro and macro climates. It is concerned with the study of climate over relatively smaller areas between 10 & 100 km across.

III) MACRO CLIMATE:

Macro climate deals with the study of atmosphere over large areas of the earth and with the large scale atmospheric motions that cause weather.