

Precipitation or Rainfall:

Precipitation is the natural process of conversion of atmospheric water vapour into water. The water falls (comes down) in the form of a rainfall or snow fall.

The term precipitation is also used to refer rainfall.

It is a term and includes all forms of falling moisture viz., rainfall, snowfall, sleet, hail etc.

Rainfall occurs in the form of a pattern.

The small crystals then grow in the size by combining with other crystals.

A stage comes when they fall down on the earth as snow or as rain water.

Forms of Precipitation:

Precipitation takes place in many different forms.

Dew is condensation on the ground of atmospheric vapor caused by radiational cooling of the lower layers of atmosphere, usually at night. Frost is dew formed under freezing conditions.

CORIOLIS EFFECT:

Precipitation patterns are determined by the movement of large air masses. These are affected greatly by the Coriolis effect.

Air cools with increasing height throughout the troposphere.

The rate at which it cools is called the lapse rate and equals about 3.6°F per 1,000 ft (6.5°C per km).

Reasons for change of state:

i. Hot air mass has large capacity to hold the vapour particles in suspension.

(i) Rain:

It consists of water drops mostly larger than 0.5 mm in diameter.

Drops bigger than 6 mm tend to break up as they fall.

(ii) Drizzle:

They are tiny water droplets of size between 0.1 to 0.5 mm which fall with such slow settling rates that they occasionally appear to float.

(iii) Snow:

It is that type of precipitation which results from sublimation, i.e., water vapour directly changes into ice.

It falls as white or translucent ice crystals often agglomerated into snowflakes.

The specific gravity of snow is often taken to be 0.1.

(iv) Hail:

It is the precipitation in form of lumps of ice.

The hail stones are produced in convective clouds mostly cumulonimbus.

Their shape may be conical, spheroidal or irregular.

The size of hail stones may be anything more than 5 mm.

The specific gravity of hail stone is about 0.8.

(v) Snow Pallets:

Sometimes they are called soft hail also.

Snow pallets are more crisp and are of size 2 to 5 mm.

Due to their, crispness upon hitting the hard ground they often break up.

(vi) Sleet:

When the rain drops fall through the layer of sub-freezing air near the earth's surface the rain drops get frozen to ice stage.

It is called sleet or grains of ice.

Mechanisms for Production of Rainfall

Mechanism to produce cooling of the air –

Mechanism to produce condensation.

Mechanism for droplet growth.

Mechanism to produce accumulation of moisture of sufficient intensity to account for the observed rates of rainfall.

Types of Precipitation:

There are three major types of precipitation: cyclonic, convective, and orographic.

Each type represents a different method of lifting of the air mass, resulting in cooling and condensation of atmospheric water vapor.

Cyclonic Precipitation:

It is caused by lifting associated with the horizontal convergence of inflowing atmosphere into an area of low pressure.

There are two kinds of cyclonic precipitation.

Non-frontal precipitation involves only this convergence and lifting.

Frontal precipitation results when one air mass is lifted over another.

A front is defined as the boundary between two air masses of different temperatures and densities.

A warm front is the result of a warm air mass overriding a cold air mass, causing extensive areas of cloudiness and precipitation.

As the warm front approaches a given area, the precipitation becomes more continuous and intense. Warm fronts move at a speed of 15-50 km/h (10-30 mph).

A cold front results from a strong push of a cold air mass against and beneath a warm air mass.

At the front towering clouds develop together with intense short duration precipitation. Cold fronts move at a speed of 30-80 km/h (20-50 mph).

Orographic Precipitation:

It is caused when air masses are lifted as they move over mountain barriers.

Such orographic barriers tend to increase both cyclonic and orographic precipitation due to the increased lifting involved.

Precipitation is generally heavier on the windward slope than on the leeward slope.

Convective Precipitation:

Due to some local effects air gets heated up and stores more vapour particles.

Then it rises up in the atmosphere as it is lighter than the cold air surrounding that area.

At high altitudes it gets cooled and precipitation occurs.

The intensity of this type of precipitation may range from light showers to cloud bursts.

Variation of Rainfall:

Factors responsible for inequitable distribution of rainfall over large area are the following:

1. Nearness to Sea:

From the sea very large quantity of water goes to the atmosphere in the form of vapour.

Naturally when excessively moisture laden clouds pass over the sea coast, clouds drop off some of their load.

As a result coastal area receives more rainfall.

2. Presence of Mountains:

Windward side slope of the side towards which clouds travel gets excessive rains whereas on the other or leeward side slope there is area of rain-shadow.

Mountainous region receives more rainfall than plain areas.

3. Direction of Wind:

Clouds are driven by wind.

4. Development of Forest:

The forests also behave to some extent as a barrier and intercept the clouds to derive rainfall.

The area with thick forest gets more rainfall.

5. Height of a Place Above Sea Level or Altitude:

The places of high altitude receive more precipitation.

At high altitudes temperature of atmosphere is low and when clouds reach that area they get cooled and precipitation occurs.

