

Precipitation

Water falling in solid or liquid form e.g. rain, snow, and hail..

Uses of Precipitation Data

- Runoff estimation analysis
- Groundwater recharge analysis
- Water balance studies of catchments
- Flood analysis for design of hydraulic structures
- Real-time flood forecasting
- low flow studies

Mechanism Producing Precipitation

Three mechanisms are needed for formation of precipitation.

- 1. Lifting and Cooling** - Lifting of air mass to higher altitudes causes cooling of air.
- 2. Condensation** - conversion of water vapor into liquid droplets.
- 3. Droplet Formation** - Growth of droplets is required if the liquid water present in a cloud is to reach ground against the lifting mechanism of air.

Types of Precipitation

Depending upon the way in which the air is lifted and cooled so as to cause precipitation, we have three types of precipitation, as given below:

- **Cyclonic Precipitation**
- **Convective Precipitation**
- **Orographic Precipitation**

Cyclonic Precipitation:

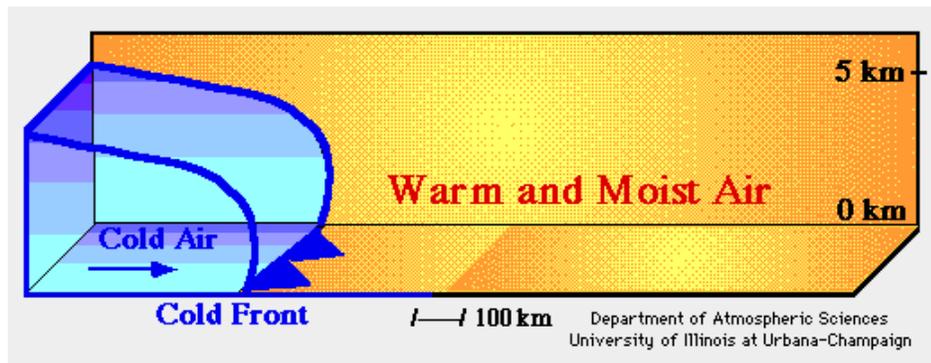
Cyclonic precipitation is caused by lifting of an air mass due to the pressure difference. Cyclonic precipitation may be either frontal or non-frontal cyclonic precipitation.

1. Frontal precipitation:

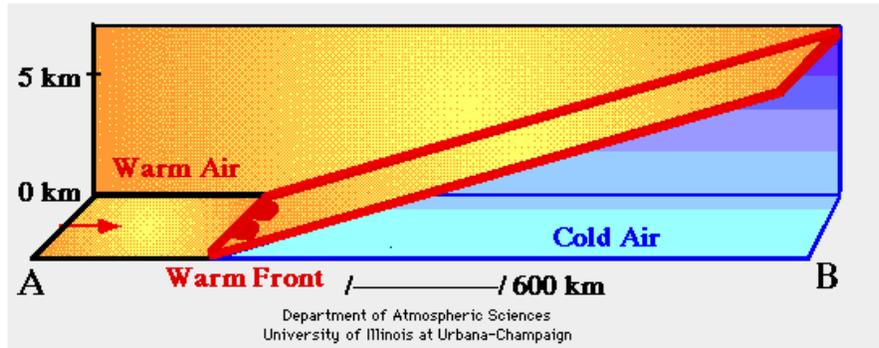
It results from the lifting of warm and moist air on one side of a frontal surface over colder, denser air on the other side. A front may be warm front or cold front depending upon whether there is active or passive ascent of warm air mass over cold air mass.

2. Non-frontal precipitation:

If low pressure occurs in an area (called cyclone), air will flow horizontally from the surrounding area (high pressure), causing the air in the low-pressure area to lift. When the lifted warm-air cools down at higher altitude, non-frontal cyclonic precipitation will occur.



In the case of a cold front, a colder, denser air mass lifts the warm, moist air ahead of it. As the air rises, it cools and its moisture condenses to produce clouds and precipitation. Due to the steep slope of a cold front, forceful rising motion is often produced, leading to the development of showers and occasionally severe thunderstorms.



In the case of a warm front, the warm, less dense air rises up and over the colder air ahead of the front. Again, the air cools as it rises and its moisture condenses to produce clouds and precipitation. Warm fronts have a gentler slope and generally move more slowly than cold fronts, so the rising motion along warm fronts is much more gradual. Precipitation that develops in advance of a surface warm front is typically steady and more widespread than precipitation associated with a cold front. Warm front precipitation is generally light to moderate.

Convective Precipitation

Convective precipitation is caused by natural rising of warmer, lighter air in colder, denser surroundings. Generally, this kind of precipitation occurs in tropics, where on a hot day, the ground surface gets heated unequally, causing the warmer air to lift up as the colder air comes to take its place. The vertical air currents develop tremendous velocities. Convective precipitation occurs in the form of showers of high intensity and short duration.

Orographic Precipitation

Orographic precipitation is caused by air masses which strike some natural topographic barriers like mountains, and cannot move forward and hence rise up, causing condensation and precipitation. All the precipitation we have in Himalayan region is because of this nature. It is rich in moisture because of their long travel over oceans.

Source: <https://civilsolution.wordpress.com/category/civil-engineering/>