

## **Quadrant II –Notes**

**Programme: Bachelor of Arts (Third Year)**

**Subject: Geography**

**Course Code: GEC106**

**Course Title: Climatology and Oceanography**

**Unit: II – Extreme Events and Climatic Classification.**

**Module Name: Origin and Classification of Fronts, Frontogenesis and Frontolysis.**

**Name of the Presenter: Mr. Vishal R. Gaonkar**

---

### **Notes:**

#### **➤ Fronts:**

- The transition zone or layer of discontinuity formed by convergence of two air masses having different physical properties such as temperature, humidity, density, and pressure and wind direction is known as front.
- When two contrasting air masses meet, they form a front, which is a boundary that separates two air masses.
- In other words, fronts are defined as 'zone of mixing' or 'discontinuity between two air masses'.
- **Frontogenesis:**
  - The process associated with the creation of new fronts or the regeneration of decaying fronts already in existence is called Frontogenesis.
  - The region having convergence of contrasting air masses is called the region of Frontogenesis.
- **Frontolysis:**
  - The process of destruction or dying of fronts is called Frontolysis.

- **Origin or Conditions Required for the Formation of Front:**

- When two air masses having contrasting temperatures (Cold, dry and dense v/s warm, moist and light) converge with each other, the warmer air mass is pushed upwards over the cold air mass.
- Front is formed when the angle between axis of outflow and the isotherms is less than  $45^{\circ}$ .
- A stationary front is formed when convergence between two air masses parallel to each other.

- **Origin of Frontogenesis:**

- Frontogenesis requires certain characteristics for processes to occur. They are:

1. **Temperature Difference:**

- The two opposing air masses that converge to form a front must have
- A contrasting temperature. If one air mass is warm, moist and light, a front can only be created when the other air mass is cold, dry and dense.

2. **Convergence of Air Masses:**

- It is the pre-requisite for the Frontogenesis process.
- When two air masses having different temperature converge, they try to invade the space of each other and this leads to the formation of the fronts.
- For Frontolysis to occur, the air masses have to diverge or get diluted by mixing and the contrast being removed.

- **Origin of Frontolysis:**

- Frontolysis (frontal decay) represents the final phase of a front's existence. The dissipation of fronts takes place in three ways:

(1) Through front's stagnation over a similar surface;

(2) As a result of both the air masses cold and warm moving on parallel tracks at the same speed;

(3) By the system entering air of the same temperature.

- Frontolysis happens in the area of Siberia, Northern America etc.

### ❖ **Classification of Fronts:**

- The types of front depend on the characteristics of the front, direction of the movement of the air mass, mechanism of frontogenesis and associated weather.
- Fronts are classified into four main types:
  1. Cold Front
  2. Warm Front
  3. Occluded Front
  4. Stationary Front.

#### **A. Cold Front:**

- A cold front is formed when the cold air mass in the frontal zone moves under the warm air mass. The cold air gets active and it invades the territory of the warm air.
- The cold air being the dense the air settles down and forces the warm air to uplift. The slope of the cold front is 1:50 to 1:100.
- The weather conditions associated with a cold front is a bad weather that brings with it thick clouds, heavy precipitations, thunderstorms, and lightning.

#### **B. Warm Front:**

- Warm front is defined as a gently sloping frontal surface in which there is active movement of warm air over the cold air.
- The average slope of the warm front in the middle latitude is 1:100 to 1:400.
- The warm air that has risen above then cools down adiabatically and then it becomes saturated and gets condensed and later, it causes gentle precipitation.
- The frontal boundary of such front has a very gentle slope.
- They move slowly and are less violent in nature in comparison to a cold front.
- They may result in thunderstorms but most of the time they are associated with strati form clouds that bring light to moderate rainfall.

### **C. Occluded Front:**

- Occluded front is formed when cold front overtakes warm front and warm air is completely displaced from the ground surface.
- Finally, the cold and warm fronts combine into one. Thus, a long and backward swinging occluded front comes into existence.
- There are two types of occlusion:
  - I. Cold occlusion
  - II. Warm occlusion.

### **D. Stationary Front:**

- Stationary front is formed when two air masses converge in a manner that they are parallel to each other and there is no vertical movement of the air.
- Stationary front neither travels forward nor backward. It remains stationary in its position.
- Stationary fronts are formed rarely because due to Coriolis force, most of the time a slope is created before the formation of a front.