

A satellite image of Earth showing several large-scale weather systems. In the center, a tropical cyclone is visible with a distinct eye and spiral cloud bands. To the left and right, there are larger, more diffuse systems characteristic of temperate cyclones. The image is in grayscale, highlighting the cloud patterns against the darker ocean and land surfaces.

TROPICAL CYCLONE AND TEMPERATE CYCLONES

CYCLONES:-

Cyclones are centers of low pressure surrounded by closed isobars having increasing pressure outward and closed air circulation (convergent air circulation) from outside towards the central low pressure in such a way that winds blow in anticlockwise and clockwise directions in the northern and the southern hemisphere respectively.

TYPES OF CYCLONES:-

There are two types of cyclones based on forms of locations are as:-

1. Tropical cyclones and
2. Temperate cyclones (extratropical cyclones)

Tropical cyclones:-

cyclones developed in the regions lying between the tropics of Capricorn and Cancer are called tropical cyclones, which are not regular and uniform. The tropical cyclone is powerful manifestation of the Earth's energy and moisture system. They originate entirely within the tropical air masses. The weather conditions of low latitudes mainly rainfall regimes are largely controlled by cyclones.

ORIGINE OF TROPICAL CYCLONES:-

The mechanism that leads to the origin and development of tropical cyclones is not fully known due to the inadequacy of data. There are, certain conditions which result in the origin of tropical cyclones. These conditions are:-

- ❖ large and continuous supply of warm and moist air.
- ❖ large value of coriolis force.
- ❖ weak vertical wind.
- ❖ upper level anticyclone
- ❖ presence of anticyclonic circulation.

In tropical cyclones, cyclonic motion begins with slow moving easterly waves of low pressure in the trade wind belt of the tropics, such as the Caribbean Sea and the China Sea.

MAIN CHARACTERISTICS OF TROPICAL CYCLONES:-

Following are the main characteristics of tropical cyclones:-

- I. They have circular and enclosed isobars.
- II. The isobars are close to each other and consequently, the isobaric gradient is steep.
- III. Their diameter varies between 150 and 300 km.
- IV. In initial stage their speed varies between 15 and 30 kmph which accelerates subsequently up to 200 km and even more per hour.
- V. Heavy rainfall continues even after the winds have become weak.

CLASSIFICATION OF TROPICAL CYCLONES

DESIGNATION	WINDS	FEATURES
Tropical Disturbance	Variable low	Definite area surface low pressure, patches of clouds
Tropical Depression	Up to 34 kmph	Gale force, organising circulation, light to moderate rain.
Tropical Storm	35 to 64 kmph	Close isobars, definite circular organisation, heavy rain,
Hurricane(Atlantic and Pacific), Cyclones Indian Ocean, Willy willy(Northern Australia).	40 to 200 kmph	steep gradient, cumulus-nimbus clouds, heavy rains, thunder and lightning.

TEMPERATE CYCLONES(EXTRA-TROPICAL CYCLONES):-

- Temperate cyclones, also called as extra tropical cyclones or wave cyclones or simply depressions are atmospheric disturbances having low pressure in the center and increasing pressure outward.
- The convergence of the cold front and the warm front in the temperate latitude cyclones conducive for the development of mid-latitude cyclone. The development and strengthening of a mid-latitude wave cyclone is known as cyclogenesis.
- They move counterclockwise in the Northern hemisphere and clockwise in the southern hemisphere.
- The temperate cyclonic motion is generated by the pressure gradient force, the coriolis force, and the surface friction force.
- The temperate cyclone takes 3-10 days to complete its cycle from birth, maturity, and death.

ORIGINE OF TEMPERATE CYCLONES:-

The first pioneer serious attempt was made by Fitzroy in the year 1863 in this precarious field. He postulated that extra tropical or temperate cyclones originated because of the convergence of two opposing air masses of contrasting physical properties i.e. temperature, pressure, density and humidity.

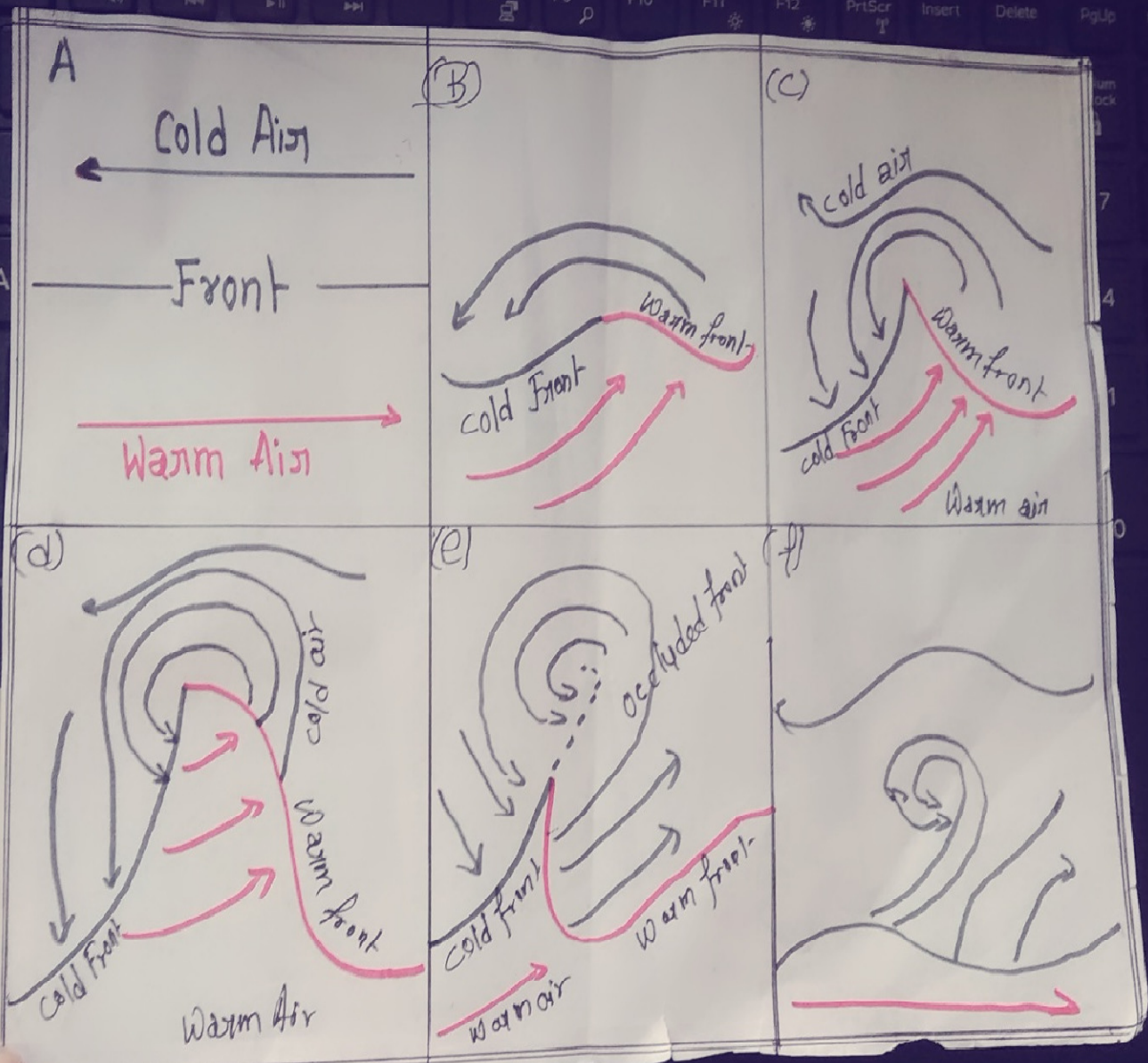
POLAR FRONT THEORY

The Polar Front Theory was propounded by Bjerknes in 1918. it deals with the stages of development of temperate cyclones. According to Bjerknes, a cyclone originates through the following six stages.

Stage I:- Involves the convergence of two air masses of contrasting physical properties and directions. Initially , the air masses move parallel to each other and a stationary front is formed. This is called initial stage.

Stage II:- is also called as 'incipient stage' during which the warm and cold air masses penetrate into the territories of each other and thus a wave-line front is formed.

Stage III:- is the mature stage when the cyclone is fully developed and isobars become almost circular.



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Stage IV:- warm sector is narrowed in extent due to the advancement of cold front than warm extent due to the advancement of cold front than warm front, as cold front comes nearer to warm front.

Stage V:- starts with the occlusion of cyclone when the advancing cold front finally overtakes the warm front and an occluded front is formed.

Stage VI:- warm sector completely disappears , occluded front is eliminated and ultimately cyclone dies out.

CHARACTERISTICS OF A TEMPERATE CYCLONE:-

Following are the main characteristics of a temperate cyclone:-

- i. The temperate cyclones may be more than 1600 km in diameter.
- ii. The isobars of a temperate cyclone are generally elongated or oval shaped.
- iii. They change their path with season. In the winter season they adopt a more southerly course covering the Mediterranean Sea, while in summer they move northward giving no rainfall in the Mediterranean region.
- iv. Their general direction of movement is from west to east.
- v. They are human friendly. The light showers of the temperate cyclone is highly effective and beneficial for the agricultural activities and human efficiency.

What is the difference between tropical and temperate cyclones?

Major differences between cyclones in Tropical and Temperate climates.

- In general, the cyclones which form in tropical regions (0–30° N and 0–30°S) are called tropical cyclones.
- The cyclones which form in Temperate regions (30–60°N and 30–60°S) are called Temperate cyclones.
- One of the major differences between these is ‘**source**’ to form a cyclone. i.e. in tropical regions, cyclones generally form by **thermal convection** but, whereas in temperate climates, cyclones form by **fronts** (Boundary between two different air masses).

- Tropical cyclones are mesoscale weather systems, the diameter of the storm is of the order a few hundred km. Temperate cyclones are synoptic scale systems, thousands of km across.

- Tropical cyclones are warm cored (centre warmer than their surroundings), and winds decrease with height. Temperate cyclones are cold cored, and winds increase with height.
- Tropical cyclones have much more intense rainfall than temperate cyclones, since deep convection is their source of energy. Temperate cyclones tend to have more moderate rainfall, although in extreme cases still enough to cause destructive flooding.
- Tropical cyclones have strongest winds in the lower troposphere, near the top of the boundary layer, a few hundred meters above the ground. Temperate cyclones have their strongest winds at the top of the troposphere in the core of the jet stream.

There are many differences between these two cyclones like intensity, wind speed, eye diameter, maximum spatial and temporal extent of cyclone, landfall etc.. but Main differences among all are **Source** and the **place** where do they form. based on these two only they got named like tropical and temperate cyclones.

Thank you!

