

Temperate Cyclone

The Polar Front Theory states that when warm, humid air masses from the tropics and dry, cold air masses from the poles contact, a polar front, which is a discontinuous surface, is created. Such conditions can be seen in subtropical high and subpolar low pressure belts as well as along the Tropopause.

The chilly air forces the warm air from below to rise. A void is created as a result of the reduced pressure. When the surrounding air rushes in to fill the gap and the earth's rotation is combined, a cyclone forms and advances westward (Jet Streams).

How are Extra Tropical Cyclones Formed?

There are five stages to the development of extra tropical cyclones, and these are:

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- Stage I: Beginning/Static
 - Stage II: Young Adult
 - Stage III: Advanced
 - Stage IV: occlusion
 - Stage IV: Dissipation

In the northern hemisphere, the front is surrounded by cold air to the north and warm air to the south. Warm air moves north and cold air moves south as the pressure along the front drops, creating an anticlockwise cyclonic circulation (northern hemisphere). This is due to the Coriolis Force. The cyclonic circulation leads to a well-developed temperate cyclone with a warm front and a cold front.

- There are pockets of warm air or warm sectors in between the front and back cold air or cold sectors.
- As a succession of clouds develop across the sky in front of the warm front, warm air moves over cold air, resulting in precipitation.
- The cold front, which is approaching from behind, lifts the warm air. As a result, cumulus clouds develop along the cold front.

- The warm front gradually loses ground to the cold front because it moves more quickly.
- Once the warm air is entirely pushed up and the front is obscured, the cyclone dissipates (occluded front).
- Activities connected to wind circulation at the surface and in the atmosphere are intimately linked.
- The outcome is that the temperate cyclone is actively engaged in frontogenesis, primarily with occlusion type fronts.
- Individual frontal cyclones typically migrate from west to east and last 3 to 10 days.
- The precise movement of this weather phenomenon is governed by the orientation of the polar jet stream in the upper troposphere.

Seasonal Occurrence of Temperate Cyclone

Winter, late fall, and early spring are the seasons when temperate cyclones are most frequent. They frequently go together with rain and cloudy weather. All temperate cyclone pathways go northward in the summer.

Despite a high concentration of storms across the Bering Strait, the United States, and the Russian Arctic and sub-Arctic zones, there aren't many Extra tropical cyclones over the subtropics and warm temperate zone.

Distribution of Temperate Cyclones

As mentioned before, temperate cyclones develop in the world's mid-latitude zones. The term "extra tropical" is also used to describe this area (beyond tropical). Most extratropical cyclones are located between 35° and 65° degrees latitude north and south. In both hemispheres, their traces have been found beyond 65° degrees latitude.

- A clearly defined zone may be seen over the map of the world based on the frequency and distribution of temperate cyclones.
- Almost all year round, with some seasonal variations, you can find these. However, because there is a greater temperature difference in the winter, they happen more frequently.
- As a result, temperate cyclones form most effectively in the winter, when they also occur more frequently.

Weather Associated With Extra Tropical Cyclone

A extra tropical cyclone's arrival is signalled by a drop in temperature, a drop in mercury, changes in wind direction, a halo surrounding the sun and moon, and a thin veil of cirrus clouds.

A mild drizzle then develops into a vigorous rain. With the warm front's entrance, these circumstances are altered since it stops the mercury from falling and the temperature from rising.

- Rainfall pauses, and the sky is clear until an anticyclonic cold front moves in, bringing with it a drop in temperature, cloudiness, and rain with thunder.
- After that, the weather becomes clear once more.
- When the movement of the temperate cyclones is slower and there is a noticeable variation in temperature and rainfall between the front and rear of the cyclone, more rainfall occurs.
- Anticyclones frequently accompany these cyclones.

Characteristics of Temperate Cyclones

The characteristics of Temperate or Extra Tropical Cyclones are:

Wind and Velocity

- In North America compared to Europe, winds are stronger in the east and south of the continent.
- As the storm moves in, the wind speed picks up; but, as it moves out, it decreases.

Size and Shape

- The temperate cyclones have an inverted V form and are asymmetrical. They go between 500 and 600 kilometres.
- They can reach a height of 8 to 11 kilometres and travel a distance of up to 2500 kilometres throughout North America.

Structure

The cold sector is in the north-west, and the warm sector is in the north-east. This is due to the fact that in the northern hemisphere, warm air masses in the south and cold air masses in the north push against one another and rotate counterclockwise.

Movement and Orientation

The role of the jet stream in temperate cyclogenesis is significant.

- Jet streams also have an impact on temperate cyclones. Because they follow the westerlies, these cyclones are oriented east-west.
- The centre of the storm will move fast east if the storm front is going east-west.
- If the storm front is oriented northward, the centre shifts northward, but after two or three days the pressure difference reduces and the cyclone dissipates.
- If the storm front is moving in a southerly direction, the storm's centre can move as far south as the Mediterranean.

Difference Between Tropical and Temperate Cyclone

The major difference between Tropical and Extra Tropical Cyclone are discussed below:

Tropical Cyclone	Temperate Cyclone
In a tropical cyclone, the wind is blowing significantly faster and more destructively.	Air moves at a relatively slower speed.
Tropical cyclones go westward from eastward.	These cyclones travel eastward from westward.
Only in waters that are warmer than 26–27 degrees Celsius do tropical cyclones form, and they vanish once they land.	Both on land and in the ocean, temperate cyclones can develop.
One tropical cyclone lasts no longer than seven days.	Additional tropical cyclones might last for 15 to 20 days.
Comparatively speaking, a tropical storm affects a lesser region than a temperate cyclone.	A substantially wider area is affected by temperate cyclones.