

# Polar Vortex

A polar vortex is a constant, upper-level low pressure area that rotates counter-clockwise at the North Pole and clockwise at the South Pole.

Polar vortices have been in the news ever since the northern hemisphere saw its coldest period during the winter of 2013 - 2014. The same cold spell had come once again in 2020 when the United States of America, Canada and Russia experienced one of the coldest winters on record.

This article will give details about the Polar Vortex within the context of the IAS Exam.

## What is a Polar Vortex?

A polar vortex is a spinning cone of low pressure over the North and South poles which manifests itself in a stronger form due to an temperature increase on account of the contrast in temperature between the polar regions of North America and Europe

Weather patterns develop when the polar vortex spins above the stratosphere, a layer of atmosphere 10-48 km above the ground. At its strongest, the accumulated cold air descends into the polar regions of North America and Europe.

There are times when there is a disruption in the polar vortex. This warms the stratosphere in just a few days.

For UPSC Geography notes, visit the linked article.

## Duration and Strength of a Polar Vortex

The duration and strength of a Polar Vortex is as follows:

### **Strength:**

- A Polar vortex is at its highest during the winter and its lowest during the summer.
- In the event of a volcanic eruption, a polar vortex will be further strengthened and it can stay that way for upto two years after the initial eruption
- There will be a single vortex when the Arctic Vortex is elongated in shape with two cyclone centers.
- The Antarctic polar vortex is far more persistent than the Arctic variant.

- Climate phenomena related to the La Nina will significantly strengthen a polar vortex.

**Duration:**

- The Arctic polar vortex breaks up between mid March to mid-May. This event marks the end of winter and the beginning of spring. Farming activities, ecosystems and other weather cycles are impacted from this event
- The same transition also impacts sea ice, ozone, air temperature and cloud formation as well.
- An early breakup of the polar vortex leads to one warming period that lasts from late February to mid-March. A late breakup period will lead to two warming periods, one in January and one in March.
- There are times when the polar vortex breaks off before the end of the last warming period. If it is big enough then it can move into Canada and the Midwestern, Central and Northeastern United States

## Frequently Asked Questions related to the Polar Vortex

**What are the dangerous effects of a polar vortex?**

A polar vortex is the most dangerous when it weakens as it creates more acute winter conditions and can lead to extreme frigid weather conditions in the northern hemisphere or the regions the polar vortex is in effect.

**How is a polar vortex formed?**

Polar vortex is formed by low pressure that occurs in the Arctic and Antarctic regions. The air is often contained by a strong jet of west-to-east moving winds that act like a wall, containing the cold air.

**How does a polar vortex affect the Ozone Layer?**

The chemical makeup of the Antarctic polar vortex has led to severe ozone depletion. The nitric acid in the stratospheric clouds reacts with chlorofluorocarbons to form chlorine which further accelerates the destruction of the ozone layer.