



POLAR VORTEX: GEOGRAPHY

NEWS: Winter storm Blair hits US: Five dead, power outages, travel chaos reported across multiple states

WHAT'S IN THE NEWS?

A severe winter storm in the United States, caused by polar vortex disruption, has impacted 60 million people across 30 states, resulting in fatalities, emergency declarations, and widespread disruptions. Ongoing research suggests that climate change may destabilize the polar vortex and jet stream, intensifying such extreme cold events.

Impact of the Winter Storm in the United States

1. Human and Social Toll:

- At least five fatalities have been reported due to dangerous weather conditions.
- Emergency services are overwhelmed with snow-related accidents and medical emergencies.

2. Disruption to Daily Life:

- **Schools:**
 - Mass closures, affecting students and parents.
- **Travel and Roads:**
 - Hazardous road conditions caused numerous accidents.
 - Snow and ice made highways impassable, with travel advisories issued.
- **Power Outages:**
 - Widespread power failures have left communities without heating in freezing conditions.

3. Weather Alerts and Emergency Declarations:

- 60 million people in 30 states are under severe weather alerts.
- Seven states (Maryland, Virginia, West Virginia, Kansas, Missouri, Kentucky, and Arkansas) have declared emergencies, mobilizing resources to respond to the storm

What is the Polar Vortex?

1. Definition:



- A polar vortex is a large, low-pressure area of cold, dense air swirling around Earth's polar regions. It acts as a barrier that traps frigid air within the poles.

2. Types of Polar Vortex:

- **Tropospheric Polar Vortex:**

- Found in the lowest atmospheric layer (up to 15 km).
- Influences weather systems experienced on the surface.

- **Stratospheric Polar Vortex:**

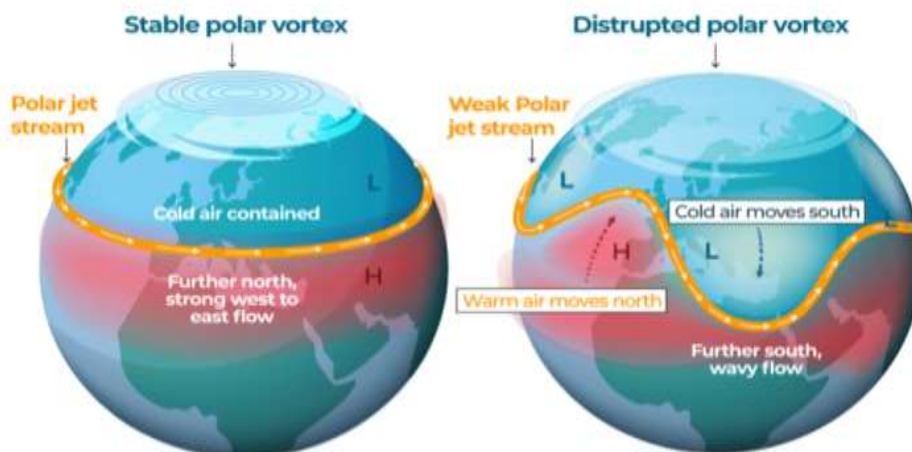
- Located 15–50 km above the surface.
- Strongest in autumn and weakens or dissipates during summer.

3. Weakening and Cold Spells:

- When the polar vortex weakens, it allows cold arctic air to escape southward into mid-latitude regions, causing extreme cold spells as far south as Florida.

What is the polar vortex?

The Arctic polar vortex is a band of strong westerly winds that forms in the stratosphere between about 16 km (10 miles) and 48 km (30 miles) above the North Pole every winter. The winds enclose a large pool of extremely cold air.



When the polar vortex is strong and stable the jet stream stays further north, keeping the cold air contained over the Arctic and the mid latitudes warmer than usual

Every other year the polar vortex dramatically weakens and can be pushed off the pole. This pushes cold air southwards and warm air northwards into the Arctic.



Role of the Jet Stream in Weather Disruptions

1. The Function of the Jet Stream:

- A fast-moving wind band in the upper atmosphere that typically confines cold polar air to the north.

2. Impact of Polar Vortex Weakening:

- When the vortex weakens, the jet stream becomes wavy and unstable.
- This allows cold air to spill southward into areas unaccustomed to such freezing temperatures.

3. Extreme Weather Creation:

- The interaction of the weakened polar vortex and a disrupted jet stream is a critical driver of severe winter storms and cold weather outbreaks.

Climate Change and the Polar Vortex

1. Ongoing Research:

- Scientists are actively studying how climate change impacts the polar vortex and related weather patterns.

2. The Link with Global Warming:

- **Accelerated Polar Warming:**
 - The Arctic is warming faster than the rest of the planet, reducing the temperature gradient that stabilizes the polar vortex.
- **Weakened Polar Vortex:**
 - This warming weakens the polar vortex, making it prone to disruptions.
- **Unstable Jet Stream:**
 - A weaker vortex destabilizes the jet stream, allowing arctic air to escape southward more frequently.

3. Implications:

- As global temperatures rise, cold spells in mid-latitude regions may become more frequent and intense, contrary to the general expectation of warming.

Source: <https://indianexpress.com/article/world/winter-storm-blair-hits-us-five-dead-9764026/lite/>