Arctic cold blast

November 26, 2019
***Source**: The Hindu*

Manifest pedagogy: Many parts of the temperate world are facing extreme winters. Weakening of the polar vortex and jet streams is responsible for such extremes. It is said, global warming as the key factor responsible for it. The probability of asking above article is higher in prelims.

In news: Arctic cold blast has hit North America and UK with Freezing temperatures and weather warnings

Placing it in syllabus: Important geophysical phenomena

Dimensions:

- Arctic cold blast and polar vortex
- Bomb cyclone
- Arctic cold blast and Indian winter

Content:

The polar vortex has collapsed plunging Europe and USA into deep freezing conditions. Cold weather is hitting large swaths of the continents and "record colds," are being experienced by the countries.

Arctic cold blast and polar vortex:

A polar vortex is an **upper-level low-pressure area lying near one of the Earth's poles.** There are **two polar vortices** in the Earth's atmosphere, overlying the North and South Poles.

The **bases** of the two polar vortices are **located in the middle and upper troposphere** and extend into the stratosphere. Beneath that lies a large mass of cold, **dense Arctic air.**

A **polar vortex strengthens in the winter and weakens in the**

summer because of its dependence on the temperature difference between the equator and the poles. When **the vortex of the Arctic is weaker**, the flow of Arctic air becomes more disorganized.

In Northern Hemisphere, jet **stream, the "river" of air that flows from west to east**, is hotter near the equator than near the North Pole.

The **disruption in the polar vortex results in warm winds entering the upper atmosphere over the Arctic** resulting in a warming of the stratosphere over the North Pole and this could cause the **cold trapped in the Arctic to spill out.**

Air generally flows from cold to warm, from high pressure to lower pressure areas. The spinning earth deflects the air as it flows southward from the high latitudes, so it ends up flowing from west toward the east in a **ribbon-like pattern.**

The **masses of cold Arctic air can push equatorward, bringing with them a rapid and sharp temperature drop and causes Arctic cold blast.** There have been **increasing disruptions in the vortex in recent decades** because of changes in the jet stream that some studies have attributed to **global warming.**

Bomb cyclone:

- A "bomb cyclone" is a weather phenomenon that entails a **rapid drop in air pressure and a storm strengthening explosively.**
- Generally, **pressure must drop 24 millibars (a unit of pressure) within 24 hours.**
- However, this benchmark is **also based on the latitude of the storm** and the millibar requirement can change depending on where the storm forms.
- **All bomb cyclones are not hurricanes.**

Difference between bomb cyclone and hurricanes:

Hurricanes tend to form in tropical areas but **bomb cyclones arise in mid-latitudes,** where fronts of warm and cold air might collide (this temperature difference fuels the drop in the pressure).

Hurricanes are powered by warm seas. Bomb cyclones don't need balmy ocean waters in order to form. While they sometimes arise over the **ocean**, they can **also appear over land** (e.g. cyclone that hit the northern Plains in the US in March 2019).

Hurricanes are most **common in summer. Bomb cyclones form between late fall and early spring,** when warm tropical air bumps up against frigid Arctic air.

Arctic cold blast and Indian winter:

- In recent years, temperatures have been on a **reducing note over few places in Northern India,** with parts of Rajasthan recording temperatures below the freezing point as well.
- According to the experts this **winter chill could be linked to the breaking up of the polar vortex.**
- The cold from the Arctic is being spilled into Europe and the US which has been **pushing Western disturbances more towards the South** than its normal position, thereby **transmitting the cold weather of Southern Europe into Northern parts of India.**
- **Western disturbances are low pressure winds that travel westwards from the Mediterranean region** bringing cold winds which impact the northern parts of India, particularly the Himalayas.
- Of late, Western disturbances have been more frequent in time and more in number as compared to other years.
- The **long and chilly winter in north India could be linked to arctic cold blasts** that have been spilling southwards.