

## Antarctica's Deep-winter Heatwave

### Why in news?

For the second time in two years, a record-breaking heatwave is sweeping through Antarctica at the height of its winter season.

### What are the characteristics of Antarctica?

- **Geography** - It is *one among the seven continents* of the Earth and contains the geographic South Pole.
- **Size** - It is the *5<sup>th</sup> largest continent*.
- **Atmospheric parameters** - It is, on average, the *coldest, driest, and windiest* of the continents.
- It is mainly a *polar desert*, with annual precipitation of over 200 mm.
- **Temperatures** - It holds the record for the lowest measured temperature on Earth, *-89.2 °C (-128.6 °F)*.
  - **Near the coast** - The temperature can exceed 10 °C in summer and fall to below -40 °C in winter.
  - **Over the elevated inland** - It can rise to about -30 °C in summer but fall below -80 °C in winter.
- **Source of water** - About 70% of the world's freshwater reserves are frozen in Antarctica.



## What is Antarctica's deep-winter heatwave?

- **Normal Deep-winter temperatures** - It usually vary between **minus 50 degrees and minus 60 degrees** Celsius.
- **Antarctica's Deep-winter heat wave** - For the second time in two years, a heatwave is sweeping through Antarctica at the height of its winter season.
- Heat wave is a *period of abnormally high temperatures*, more than the normal maximum temperature that occurs.
  - *Ground temperatures have been 10 degrees Celsius higher* than normal on average since mid-July and up to 28 degrees higher on certain days.
  - In *East Antarctica*, the temperatures are currently in the range of **minus 25 degrees to minus 30 degrees** Celsius.

*East Antarctica is the relatively higher-elevation swathe that makes up two-thirds of the world's coldest continent*

- **Reasons** - It is mainly due to *changes in atmospheric and Oceanic variables* in the southern hemisphere especially Antarctica and in Southern Ocean.
- **Weakening of the polar vortex** - It a rare event that is only *expected to occur once every two decades* on average.

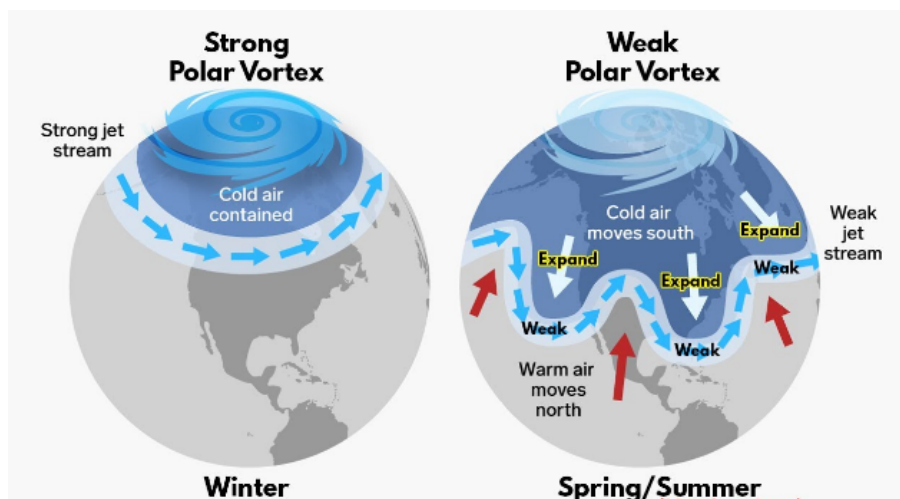
**Polar vortex** is the band of cold air and low pressure systems that spins around the poles of the Earth in the stratosphere. The vortex that usually remains strong

and stable during winter in the southern hemisphere keeps the cold air trapped over Antarctica and not letting hot air come in.

- This year, the stability of vortex has been disturbed by large-scale atmospheric waves (periodic disturbances in the fields of atmospheric variables).

**Atmospheric wave** is a periodic disturbance in the fields of atmospheric variables like surface pressure or geopotential height, temperature, or wind velocity.

- Due to this, the vortex released trapped cold air, and opened the door for warmer air to enter the region.
- As this warmer air travelled downwards from the upper atmosphere, it caused an increase in temperatures.



- **Reduction of Antarctic sea ice** - This June the extent of Antarctic sea ice was the second-lowest ever for that time of year.
- Generally, sea ice plays a crucial role in keeping temperatures down in the Polar Regions.
  - It ensures that the air remains cool by acting as a barrier between the cold air and the relatively warmer water below.
  - White surface of Sea ice reflects more sunlight (solar energy) back to space than liquid water.
- **Warmer Southern Ocean** - Heat travels to Antarctica from the warmer southern ocean surrounding it.
- **Global warming** - Antarctica is warming at a rate of 0.22 degrees Celsius to 0.32 degrees Celsius per decade — almost twice as fast as the rest of the world.

IPCC has estimated that the Earth as a whole is warming at the rate of 0.14-0.18 degrees Celsius per decade.

To know about Arctic Polar Vortex, click [here](#)

## What are the effects of winter heat wave?

- **Ice sheet reduction** - Antarctica's hot winter will lead to further reduction in Antarctic Ice Sheet.
  - The Antarctic Ice Sheet, covering 98% of the Antarctic continent holds more than 60% of the world's total freshwater.
- **Sea level rise** - It can potentially raise global sea levels by hundreds of feet.
  - Antarctica has already lost 280% more ice mass in the 2000s and 2010s than it lost in the 1980s and 1990s.
- **Displacement of people** - Sea level rise will cause coastal cities and population to move away from coastal line.
  - A sea level rise by a few feet will displace the roughly 230 million people who live within 3 feet of the high tide line today.
- **Affects global ocean circulation system** - Melting ice in Antarctica slows down this circulation.
  - Global ocean circulation system regulates climate by storing and transporting heat, carbon, nutrients, and freshwater around the world.
- A slower global ocean circulation system will lead to oceans absorbing less heat and CO2 further intensifying global warming.
- **Reduction in ocean salinity** - Freshwater from melting ice reduces the salinity and density of the surface water.

## References

[Indian Express | Antarctica winter heatwave](#)

