



## ANTICYCLONES - GEOGRAPHY

**News:** *How a massive anticyclone caused floods in Dubai and humid heat in Mumbai, on the other side of the Arabian Sea*

### What's in the news?

- Extreme weather in Dubai (floods) and Mumbai (humid heat) was influenced by a northern Indian Ocean anticyclone, highlighting global weather interconnectivity.

### Key takeaways:

#### Mumbai's Humid Heatwave:

- Mumbai experienced a humid heatwave as a result of the anticyclone's impact. The descending air from the anticyclone **suppressed the development of cooling sea breezes**.
  - Sea breezes typically help moderate temperatures in coastal areas like Mumbai. However, the presence of the anticyclone prevented this cooling effect, leading to higher-than-usual temperatures and humidity.
- The **warm air sweeping in from the northern Arabian Sea**, combined with moisture from the pre-monsoon period, contributed to the intense humidity observed in Mumbai.

#### Dubai's Torrential Rainfall and Flooding:

- Dubai and other parts of the United Arab Emirates experienced excessive rainfall and flooding due to the anticyclone system.
- The anticyclone-blocking effect **prevented the normal passage of weather systems, such as a western disturbance**, which may have otherwise influenced the region.
- **Cloud seeding operations** conducted by the National Centre of Meteorology of the UAE, along with the presence of dust particles in the atmosphere, likely enhanced the rainfall.

### Anticyclones:

- An anticyclone is a region of **high atmospheric pressure characterised by descending air**. As the air descends, it warms and inhibits the formation of clouds and precipitation.
- Anticyclones can **influence large areas of the atmosphere**, affecting weather patterns and conditions over vast regions.

### Structure of Anticyclones:

- Anticyclones feature descending air, leading to high pressure at the Earth's surface.
- **Winds circulate** clockwise around the central region of high pressure in the Northern Hemisphere and counterclockwise in the Southern Hemisphere.
- They are associated with **clear skies, cooler temperatures, and drier air at the surface**.
- **Fog formation** is common overnight within regions of higher pressure due to subsidence and stable air conditions.



## Anticyclonic Weather Conditions:

<u>Winter Anticyclones</u>	<u>Summer Anticyclones</u>
Dry and bright with very little cloud.	Very little cloud
Sun low in the sky, so cold conditions.	Dry with light winds
Clear evening skies mean that nights can be very cold.	Sun high in the sky, so hot and sunny
Early morning frost and fog may last all day.	Cloudless skies at night allow heat to escape, so nights can be cool.
Extensive low cloud or fog may produce overcast or 'gloomy' conditions.	Risk of thunderstorms at end of 'heat wave' conditions
	Early morning dew and mist.

### Effects of Anticyclones:

- Anticyclones result in light surface winds and subsidence of air, leading to clear skies and rapid temperature changes.
- **Subsidence warms air** by adiabatic heating, causing temperatures to rise during the day and drop at night.
- When humidity rises overnight, anticyclones can promote fog formation.
- In urban areas, subsidence under high-pressure systems can lead to particulate buildup and haze.

### Regional and Global Impact:

- Anticyclones contribute to the **formation of subtropical ridges**, which influence global climate and precipitation patterns.
- They play a role in steering tropical cyclones around their margin and can inhibit free convection and cloud development near their centres.
- Upper-level anticyclones allow for **upper-level divergence**, leading to surface convergence and potential thunderstorm development.



## Go back to basics:

### Cyclones and Anticyclones Difference:

Characteristic	Cyclone	Anticyclone
<b>Atmospheric Pressure</b>	Low-pressure system. Pressure increases on moving away from the centre.	High-pressure system. Pressure decreases on moving away from the centre.
<b>Air Circulation</b>	Inward and upward	Downward and outward
<b>Rotation Direction</b>	Counterclockwise in Northern Hemisphere) and Clockwise in Southern Hemisphere	Clockwise in Northern Hemisphere and Counterclockwise in Southern Hemisphere
<b>Weather Conditions</b>	Stormy, cloudy, rainy, strong winds; exemplified by <b>hurricanes</b> .	Calm, clear skies, stable weather; exemplified by <b>the Azores High</b> .
<b>Damage</b>	Can cause great damage to lives and property. <b>For example, cyclone Tauktae resulted in at least 174 fatalities, with over 80 individuals still missing, and caused estimated losses of US\$1.57 billion.</b>	Does not cause loss to lives and property. Instead, it leads to pleasant weather. For example, <b>the Bermuda-Azores High brings fair weather.</b>
<b>Global Distribution</b>	Found in various regions worldwide, including tropical and temperate zones, exemplified by <b>their occurrences in the Atlantic Ocean and Pacific Ocean.</b>	Also found in different regions, but more prevalent in subtropical and high-latitude areas.  <b>For example, the Siberian High in Eurasia.</b>