

Cyclone Arnab

Mains: GSI – Geography

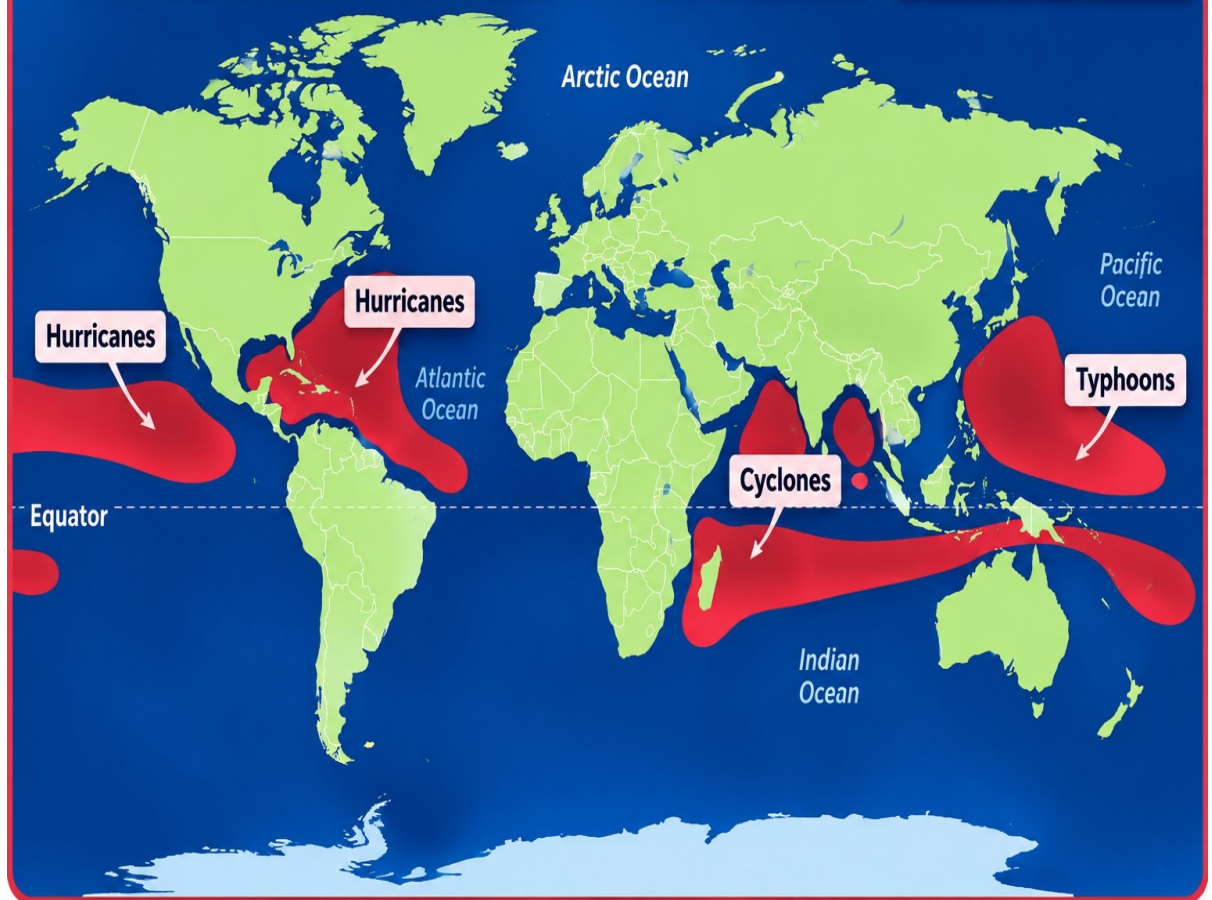
Why in News?

Cyclone Arnab, the first North Indian Ocean cyclone of 2026, made landfall between Bapatla and Visakhapatnam on October 28 after rapidly intensifying into a 'very severe' cyclonic storm, partly influenced by El Nino conditions.

What is a Tropical Cyclone and What are its Types?

- **Tropical cyclone** – A rapidly rotating lowpressure weather system that develops over warm tropical oceans, characterised by strong winds, heavy rainfall and thunderstorms.
- **Formation conditions** – Warm ocean waters (generally 26.5°C or above), sufficient Coriolis force, atmospheric moisture, low vertical wind shear and preexisting atmospheric disturbances.
- **Energy source** – Tropical cyclones derive their energy from warm ocean waters through evaporation and the release of latent heat during condensation.
- **Types of Tropical Cyclones (Based on Ocean Basins)** –
 - Hurricanes – At North Atlantic Ocean and northeastern Pacific Ocean.
 - Typhoons – At northwestern Pacific Ocean.
 - Cyclones – At the North Indian Ocean (Bay of Bengal and Arabian Sea) and South Pacific/Indian Ocean regions.

Tropical Cyclone Distribution



How did Cyclone Arnab Form and Intensify?

- **Formation** - It originated as a lowpressure system over the southeast Bay of Bengal on October 23 and intensified into a cyclone by October 26.
- **Rapid intensification** - It strengthened into a 'very severe' cyclonic storm, with wind speeds of 125-135 kmph and gusts up to 140 kmph.
- **Faster movement** - Its movement towards the coast was faster than initially forecast by the India Meteorological Department (IMD).
- **Prolonged landfall** - It remained nearly stationary near Narsapur and Yanam, maintaining its intensity for around six hours even after landfall.
- **Rainfall impact** - Heavy rainfall affected coastal Andhra Pradesh and Odisha, with Visakhapatnam recording 217 mm of rainfall.

How Does El Nino Influence Tropical Cyclones?

- **Alteration of global wind patterns** - El Nino changes atmospheric circulation, wind patterns and air pressure, causing unusual warming over regions such as the North Indian Ocean.
- **Shift in cyclone formation** - During El Nino years, tropical cyclones in the North Indian Ocean tend to form closer to the equator.
- **Change in cyclone tracks** - Such cyclones are more likely to move towards the

Andhra Pradesh and Tamil Nadu coasts rather than Odisha and West Bengal.

- **Rapid intensification** - Warmer ocean conditions provide additional heat and moisture, enabling cyclones to intensify rapidly and potentially move faster.
- **Historical example** - Cyclone Hudhud (2014), which struck the Andhra Pradesh coast, also developed during an El Nino year.

How Do Warm Oceans Fuel Tropical Cyclones?

- **Sea surface temperature** - Ocean temperatures of 26°C or above, extending to depths of around 50-100 metres, favour tropical cyclone development.
- **Ocean heat availability** - Warm ocean waters provide the heat energy and moisture required for cyclone formation and intensification.
- **El Nino conditions** - During July-September 2026, temperatures in the equatorial Pacific's Nino 3.4 region were 2-2.8°C above normal, indicating strong warming.
- **Rapid intensification** - Cyclone Arnab reached its highest intensity as a 'very severe' cyclonic storm within a single day.

Cyclone intensification is also influenced by wind shear, convection, boundarylayer processes, upperocean circulation and air-sea interactions.

What Lies Ahead?

- Rising sea surface temperatures can increase the potential for rapid cyclone intensification and extreme rainfall.
- Strengthening IMD's earlywarning systems, satellite monitoring and realtime ocean observation is essential to predict cyclone intensity and landfall accurately.
- Strengthening cyclone shelters, coastal infrastructure, mangrove ecosystems and naturebased barriers can reduce disaster vulnerability.

Reference

[The Indian Express| El Niño made Cyclone Arnab stronger](#)