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Indian Ocean Dipole and its Effect on El Nino

Why in news?

Experts have predicted a positive Indian Ocean Dipole in the coming months.

What is Indian Ocean Dipole?

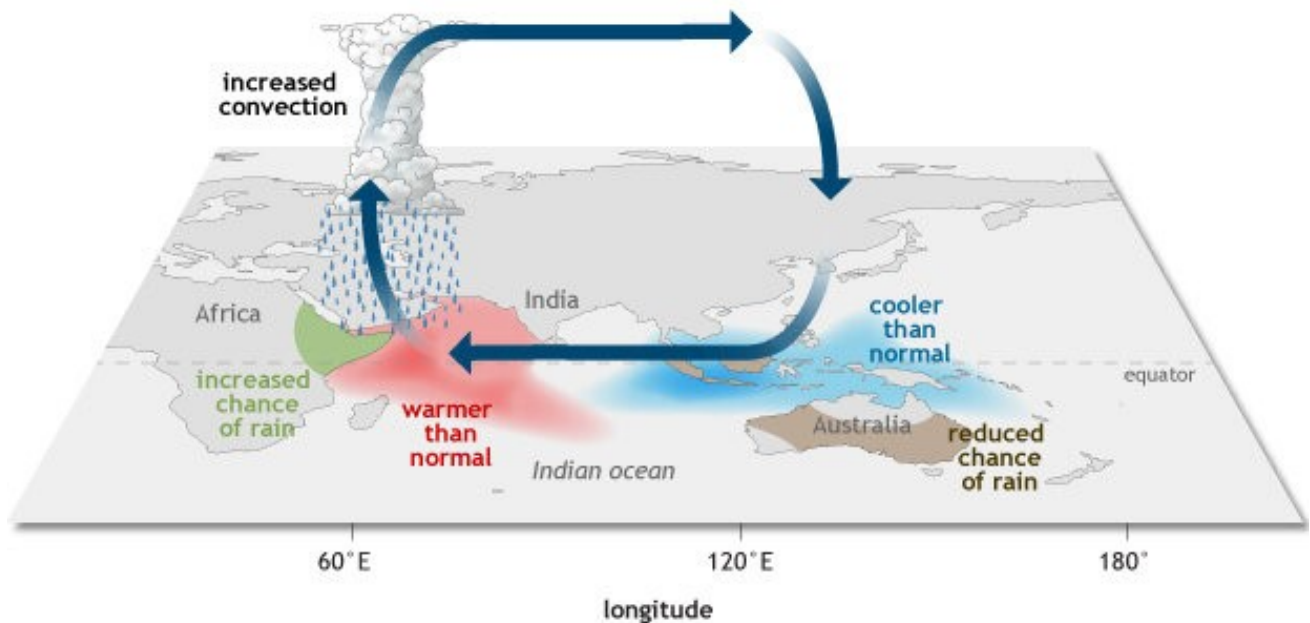
- The Indian Ocean Dipole (IOD) is a coupled ocean atmosphere phenomenon in the Indian Ocean.
- IOD is defined by the ***difference in sea surface temperature*** between the western pole in the Arabian Sea (western Indian Ocean) and an eastern pole in the eastern Indian Ocean south of Indonesia.
- What is Indian Ocean Dipole, how it will impact Monsoon this year?
- The IOD is sometimes called ***India's El-Nino*** and its impact can be seen in weather and climate patterns in India and as far as Indonesia, Australia, New Zealand and Africa.

What are the phases of IOD?

- IOD has 3 phases - Positive IOD, Neutral Phase, Negative IOD
- **Positive event**- Warmer sea surface temperatures in the western Indian Ocean relative to the east.
- It brings *more rainfall to India*.

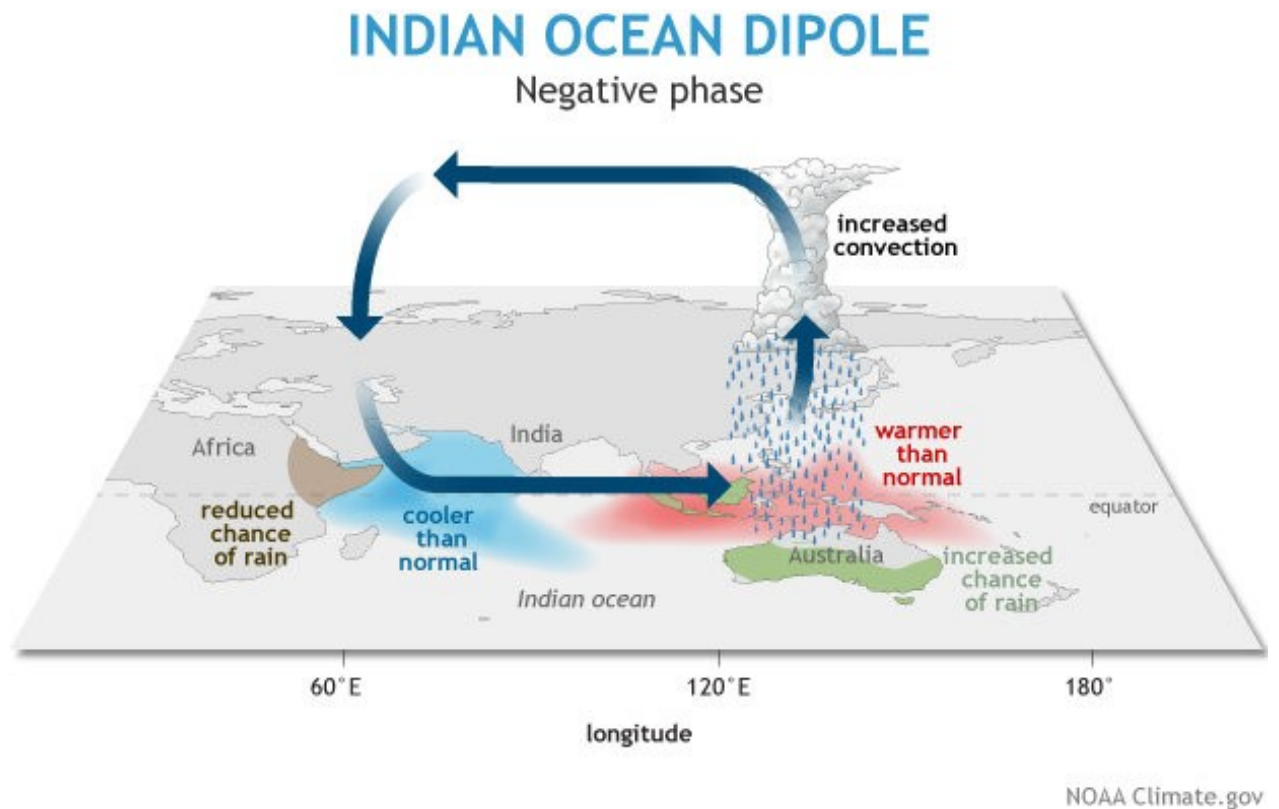
INDIAN OCEAN DIPOLE

Positive phase



NOAA Climate.gov

- **Neutral event**-Water flows from the Pacific between Indonesia's islands, keeping seas warm to the northwest of Australia.
- Air rises above this area and falls across the western half of Indian Ocean basin, blowing westerly winds along the equator.
- This has **very less impact of Indian monsoon.**
- **Negative event**- Cooler sea surface temperatures in the western Indian Ocean relative to the east.
- It brings **less rainfall to India.**



The Indian Ocean Dipole is currently neutral. The India Meteorological Department (IMD) has said that there was an 80% chance of a positive IOD in the coming months.

What is ENSO?

- **El Nino** - El Nino is the warming of sea waters in Central-east Equatorial Pacific that occurs every few years (Warm phase off the coast of Peru).
- Over India, the El Nino has the impact of **suppressing monsoon** rainfall.
- **La Nina** - La Niña sees cooler than average sea surface temperatures in the equatorial Pacific region (Cool phase).
- In the Indian context, La Nina is associated with **good rainfall** during the monsoon season.
- Both these conditions, together called **El Nino Southern Oscillation or ENSO**, affect weather events across the world.

To know more about El Niño-La Niña Weather Patterns, click [here](#)

What is the effect of IOD on ENSO?

- A positive IOD event is often seen developing at times of an El Nino, while a negative IOD is sometimes associated with La Nina.
- During El Nino, the Pacific side of Indonesia is cooler than normal because of which the Indian Ocean side also gets cooler.
- That helps the development of a positive IOD.
- If both IOD and ENSO are strong their circulation can impact each other.

- Compared to ENSO events, the impacts of IODs are much weaker.

Quick facts

India Meteorological Department (IMD)

- IMD was established in **1875**.
- It is the national meteorological service of the country and the principal government agency in all matters relating to meteorology and allied subjects.
- It works under the aegis of **Ministry of Earth Science**.

References

1. [The Indian Express | Indian Ocean Dipole](#)
2. [The Hindu | Outlook for Monsoon](#)
3. [IMD| India Meteorological Department](#)



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