Indian Ocean Dipole and its Effect on El Nino

Why in news?

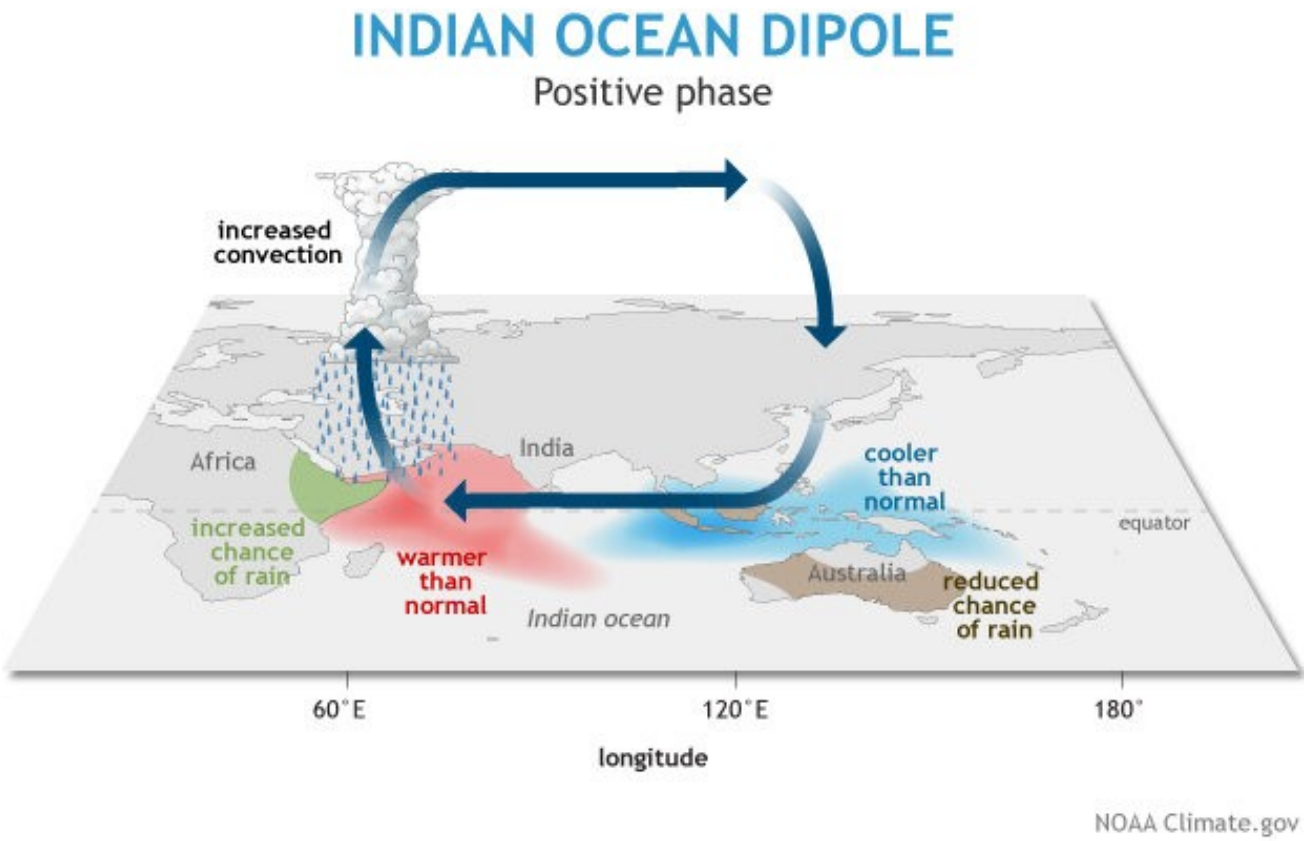
Experts have predicted a positive Indian Ocean Dipole in the coming months.

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.

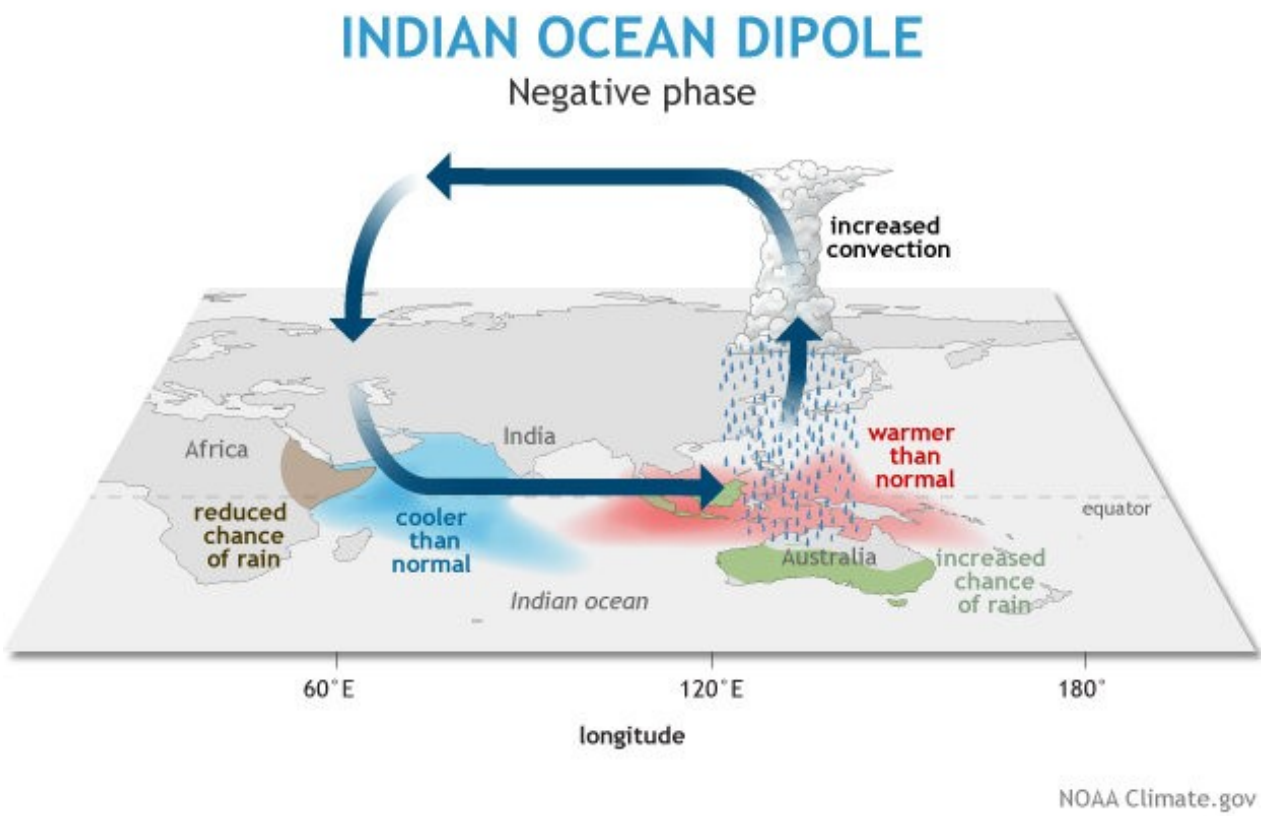
What are the phases of IOD?

- 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.*



- **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