



## Earth System Science Organization (ESSO) Ministry of Earth Sciences (MoES) India Meteorological Department (IMD)

### El Niño Southern Oscillation (ENSO) and Indian Ocean Dipole (IOD) Bulletin

December 2025

#### Highlights

At present, weak La Niña conditions are prevailing over the equatorial Pacific region. The latest forecasts from the Monsoon Mission Climate Forecast System (MMCFS), there is an almost certain probability (approaching 100%) that ENSO conditions will remain in the neutral phase throughout the DJF 2026 season and thereafter.

Currently, negative Indian Ocean Dipole (IOD) conditions are prevailing over the Indian Ocean. The latest MMCFS forecast suggests that these negative IOD conditions are likely to weaken, with an increasing probability of a transition to neutral conditions during the DJF season and thereafter.

#### 1. Current Sea Surface Temperature (SST) Conditions over the Pacific and Indian Oceans

In November 2025, sea surface temperatures (SSTs) were below average in the central and east-central Pacific Ocean (Fig. 1a). SSTs were above average over the western parts of equatorial Pacific Ocean. Warmer-than-average SSTs were observed in the northern extra-tropical regions of the Pacific. Compared to October 2025, negative SST anomalies developed over most parts of the Pacific Ocean. Additionally, cool SST anomalies were present in some parts of both the South and North Pacific Ocean (Fig. 1b).

In November 2025, warmer than average SSTs were seen over eastern parts of the equatorial Indian Ocean and near average over the western Indian Ocean (Fig. 1a). Cool SSTs were observed in the Arabian Sea and warm SSTs over northern Bay of Bengal. Compared to October 2025, cooler SSTs were observed across the eastern and central Indian Ocean, whereas warmer SSTs were recorded in parts of the northern Arabian Sea and the northern Bay of Bengal.

##### 1.1 El Niño Southern Oscillation (ENSO) conditions over the Pacific Ocean

The monthly time series of Niño3.4 SST anomalies for the last 12 months, from December 2024 to November 2025 is shown in Fig. 2(a). Since December 2024, weak La Niña conditions have been observed over the equatorial Pacific, persisting until January 2025. Thereafter, these conditions began to weaken from February 2025 onwards. Thereafter neutral ENSO conditions were observed till September 2025 and borderline La Niña conditions

were observed during October 2025 and continued in the November 2025. Currently, weak La Niña conditions are present.

The strong positive subsurface temperature anomalies are observed over the western Pacific Ocean, both near and above the 20°C isotherm depth (Fig. 2b). Negative subsurface temperature anomalies are observed over the central and eastern equatorial Pacific Ocean occurring near and below the thermocline depth (Fig.2b).

## 1.2. Indian Ocean Dipole (IOD) conditions over the Indian Ocean

Figure 2(c) shows the monthly time series of Dipole Mode Index (DMI) for December 2024 to November 2025. Weak negative IOD conditions were observed from December 2024 & January 2025, followed by prevailing neutral IOD conditions over the Indian Ocean till July 2025. The neutral IOD conditions turned into Weak Negative IOD conditions during October 2025. At present, negative IOD conditions are prevailing over the Indian Ocean.

Strong positive subsurface temperature anomalies (Fig. 2d) were observed in the eastern equatorial Indian Ocean, below the 20°C isotherm depth, extending down to the thermocline depth. Some negative subsurface temperature anomalies are observed over the central Indian Ocean occurring near and below the thermocline depth (Fig.2d).

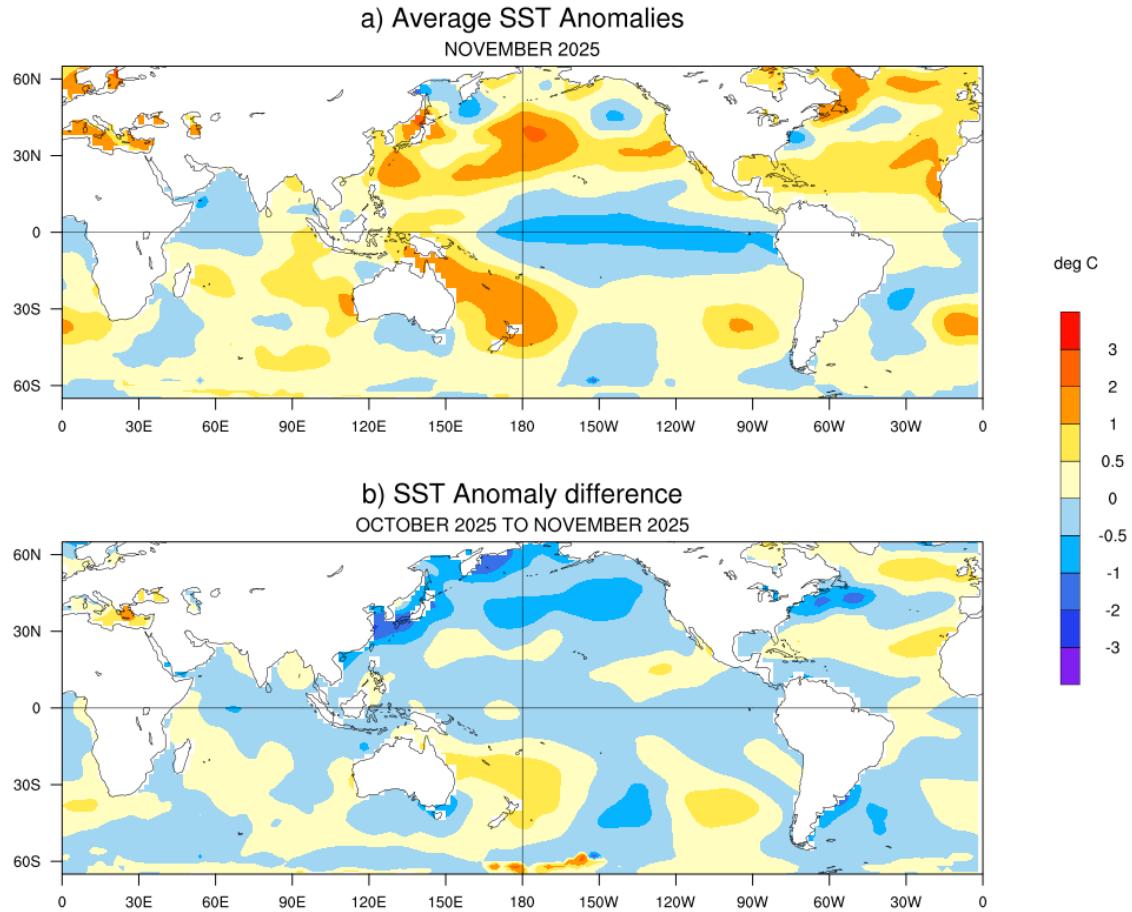
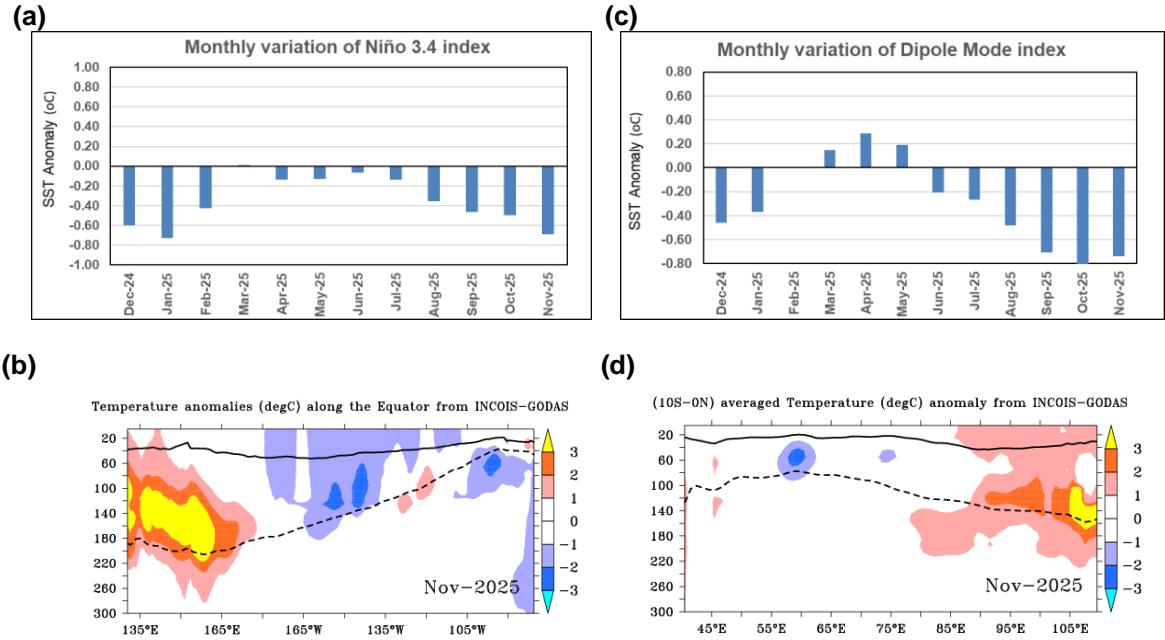


Fig.1: (a) Sea surface temperature (SST) anomalies (degC) during October 2025 and (b) changes in the SST anomalies (degC) from October 2025 to November 2025. SSTs are based on the ERSSTv5 (NCEP-NOAA), and anomalies are computed with respect to 30-year (1991-2020) long term mean.



**Fig.2:** (a) Monthly variation of Niño 3.4 SST index for the last 12 months and (b) Depth-longitude section of sub-surface temperature anomalies in the equatorial ( $5^{\circ}\text{S}$ - $5^{\circ}\text{N}$ ) Pacific Ocean for the month of November 2025. (c) Same as (a) but for the Dipole Mode Index (DMI). (d) Same as (b) but for the tropical Indian Ocean ( $10^{\circ}\text{S}$ -Eq). The anomalies in (a) and (c) were computed using the base period of 1991-2020 (Data Source: ERSSTv5) The solid dark line in (b) and (d) is the  $20^{\circ}\text{C}$  isotherm and the dashed line is thermocline depth (Data Source: INCOIS-GODAS).

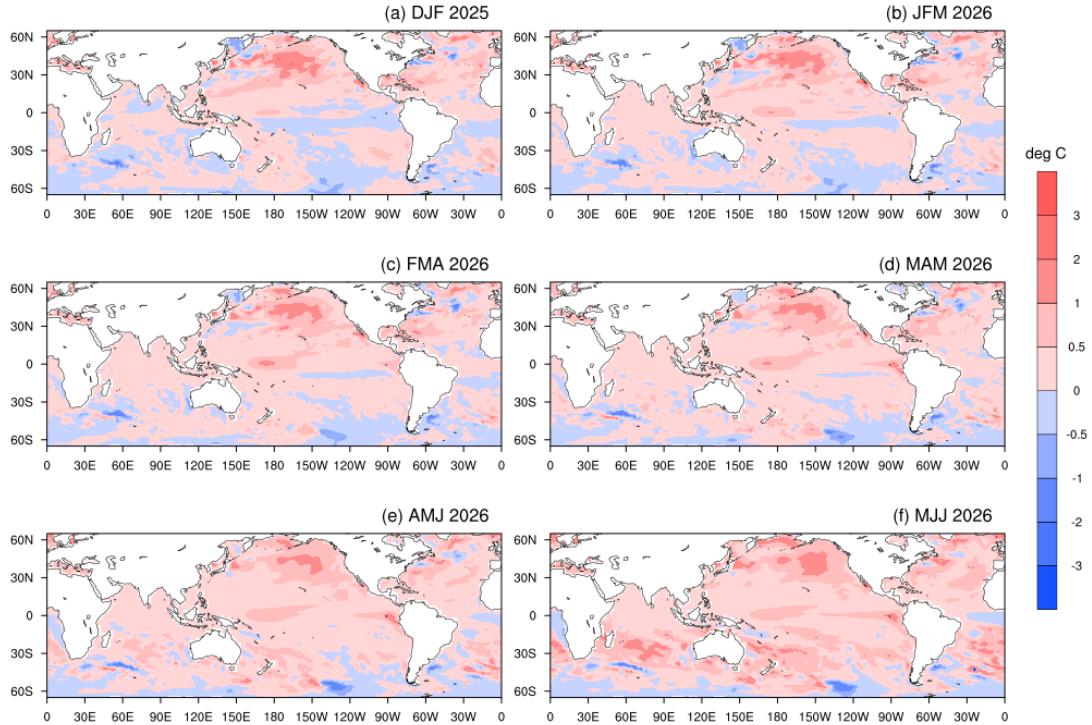
## 2. ENSO and IOD Forecast

The SST forecast was prepared using the high-resolution Monsoon Mission Coupled Forecast System (MMCFS) (AGCM T382L64; ~38 km and OGCM 25 km in the tropics) based on the November 2025 initial conditions. The initial conditions for the model runs were obtained from ESSO-INCOIS and ESSO-NCMRWF analyses. Probability density function (PDF) bias correction was applied to the forecasts of the Niño3.4 index (Fig. 4a) and the DMI (Fig. 4b), based on hindcasts for the period 1999-2008, and anomalies were calculated using the 1991-2020 Climatology.

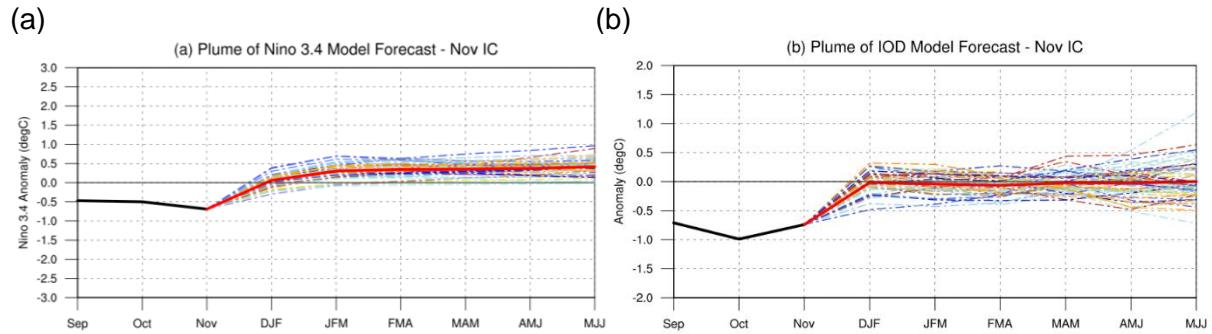
In November 2025, sea surface temperatures (SSTs) were below average in the central and east-central Pacific Ocean. SSTs were above average over the western parts of equatorial Pacific Ocean. The 3-month season-averaged SST anomaly forecast for the Pacific Ocean (Fig. 3) indicates neutral SSTs over the central equatorial Pacific Ocean during DJF and thereafter. The latest MMCFS plume and probability forecast (Fig. 4a & 5a) indicates there is a fairly strong chance (~100%) of neutral conditions during DJF 2026 and seasons thereafter. IMD is closely monitoring ENSO conditions. IMD provides monthly updates, reflecting the latest observations and changes in the Pacific Ocean.

The 3-month season-averaged SST anomaly forecast for the Indian Ocean (Fig. 3) suggests that neutral SST anomalies are prevailing over most parts of the Indian Ocean Indian Ocean during the upcoming seasons. The latest MMCFS forecast indicates that the current negative IOD conditions are likely to weaken, with an increasing chance of transitioning to neutral conditions during the DJF season and beyond (see Figs. 4b and 5b).

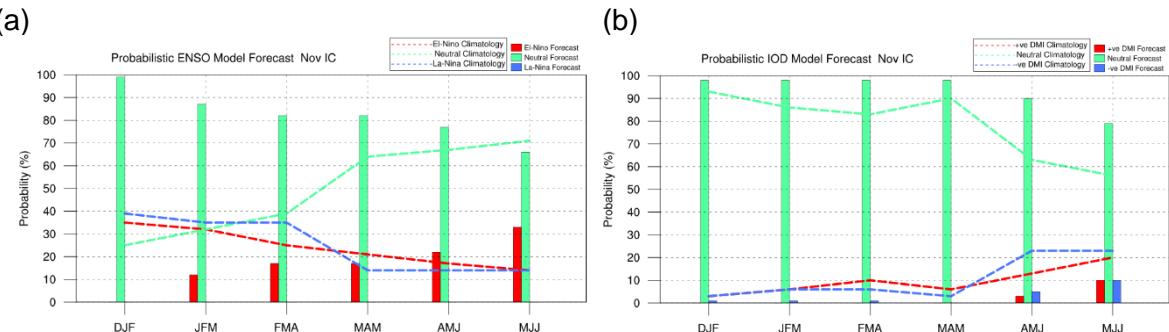
## MMCFS SST Anomaly Forecast :Nov 2025 IC



**Fig.3:** Forecasted Seasonal mean SST anomalies for three-monthly (a) December to February (DJF 2025), (b) January to March (JFM 2026), (c) February to April (FMA 2026), (d) March to May (MAM 2026), (e) April to Jun (AMJ 2026) and (f) May to Jul (MJJ 2026) Model bias correction base period: 1999-2008; Climatology base period:1991-2020).



**Fig.4:** Plume of (a) Niño 3.4 SST index, (b) Indian Ocean Dipole (IOD) Mode Index forecasted by high-resolution MMCFS. The forecasts were PDF corrected for bias and variance. The solid green line is the observed SST anomaly (ERSSTv5, NOAA) and the solid red line is the ensemble mean SST anomaly forecast of 58 members (MMCFS). The individual ensemble member forecasts are shown in light dotted lines of different colours.



**Fig.5:** Probability forecast along with climatological probabilities of (a) Niño 3.4 and (b) Indian Ocean Dipole (IOD) Mode Index from high-resolution MMCFS. The data source for Climatology probabilities: NOAA Extended Reconstructed SST V5. Criteria used for Probabilistic ENSO Forecast: La Niña  $\leq -0.5$ , Neutral  $<0.5$  to  $>-0.5$ , El Niño  $\geq 0.5$ . Criteria used for Probabilistic DMI Forecast: negative DMI  $\leq -0.4$ , Neutral  $<0.4$  to  $>-0.4$ , positive DMI  $\geq 0.4$ .