Earth System Science Organization (ESSO)
Ministry of Earth Sciences (MoES)
India Meteorological Department
WMO Regional Climate Centre
Pune, India
SEASONAL CLIMATE OUTLOOK FOR SOUTH ASIA
(April to July 2025)

Highlights

- Currently, Neutral El Nino-Southern Oscillation (ENSO) conditions are prevailing over the equatorial Pacific region. However, the atmospheric Circulation features are similar to La Niña conditions. The latest Monsoon Mission Climate Forecast System (MMCFS) as well as other climate model forecasts indicate that the Neutral ENSO conditions are likely to continue during the monsoon season.

- At present, neutral Indian Ocean Dipole (IOD) conditions are observed over the Indian Ocean. The latest MMCFS forecast indicates that the neutral IOD conditions are likely to continue for the next several months.

- The probability forecast for precipitation for AMJ and MJJ seasons indicates that enhanced probability of above normal precipitation is likely over most parts of north along the plains of Himalayas, central, east, northeast, southeast and southern Peninsula of India and enhanced probability of below normal precipitation is likely over north west, extreme north and extreme south of South Asia.

- In April, the country averaged monthly precipitation is likely to be normal to above normal for all countries except Nepal where it is likely to be below normal. In May, the country averaged monthly precipitation is likely to be normal to above normal for Bangladesh, Bhutan, India, Maldives, Myanmar and Nepal and below normal for Afghanistan, Pakistan and Sri Lanka. where it is likely to be below normal. In June, it is likely to be normal to above normal for all countries except Afghanistan and Sri Lanka where it is likely to be below normal. In July, the country averaged monthly precipitation is likely to be normal to above normal for all the South Asian countries except Afghanistan and Maldives where it is likely to be below normal.

- Temperature probability forecast for AMJ and MJJ seasons indicate that enhanced probability of above normal temperatures is likely over most parts of South Asia except over extreme north where enhanced probability of below normal temperature is likely.

- The country averaged monthly temperatures during April and July is likely to be above normal for all the south Asian countries. In May, it is likely to be normal to above normal for all the south Asian countries except Myanmar. In June, the country averaged monthly temperatures are likely to be above normal for all the countries except Bangladesh where it is likely to be below normal.

1. Important Global Climate Factors

1.1 Sea Surface Temperatures over the Pacific Ocean

In March 2025, sea surface temperatures (SSTs) were above average in the eastern and far western Pacific Ocean. Below-average SSTs were evident in the central Pacific Ocean near the Date Line (Fig.1a). Warmer than average SSTs were observed over the northern and southern extra-tropical Pacific region. Compared to February 2025, negative SST anomalies were present over the western equatorial Pacific Ocean. Cool SST anomalies were observed over some parts of the South Pacific Ocean. Positive SST anomalies were also observed over eastern and East Central Equatorial Pacific Ocean (Fig.1b). Currently, Neutral El Nino-Southern Oscillation (ENSO) conditions are prevailing over the equatorial Pacific region. However, the atmospheric Circulation features are similar to La Niña conditions. The latest Monsoon Mission Climate Forecast System (MMCFS) as well as other climate model forecasts indicate that the Neutral ENSO conditions are likely to continue during the monsoon season. (Fig.2)

1.2 Sea Surface Temperatures over Indian Ocean

In March 2025, equatorial SSTs were in the neutral range across most of the central Indian Ocean (Fig. 1a). Above average SSTs were observed in the Northern Arabian Sea. Cool SSTs were observed over parts of western Indian Ocean. Compared to February 2025, cool SSTs were observed across the Eastern Indian Ocean, northern parts of North Bay of Bengal (Fig. 1b). Warm SSTs were observed over most parts of Arabian Sea. At present, neutral Indian Ocean Dipole (IOD) conditions are observed over the Indian Ocean. The latest MMCFS forecast indicates that the neutral IOD conditions are likely to continue for the next several months.

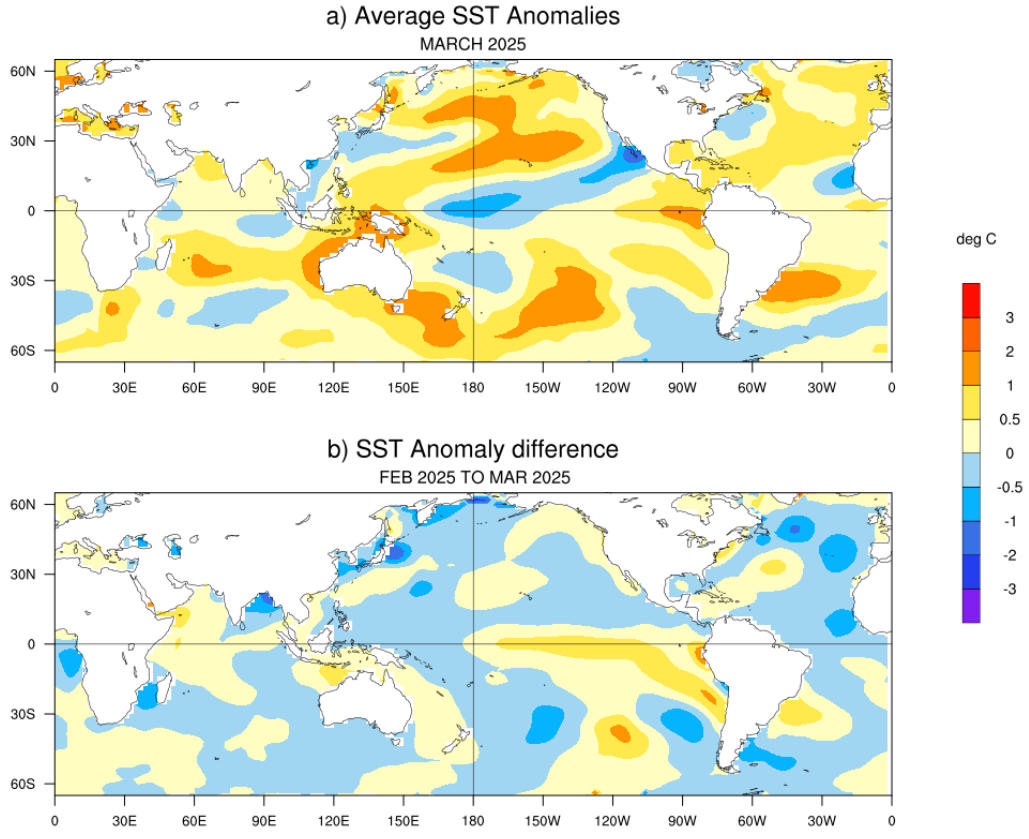

Fig.1: (a) Sea surface temperature (SST) anomalies (^{0}C) during March 2025 and (b) changes in the SST anomalies (^{0}C) from February to March 2025. SSTs are based on the ERSSTv5, from NOAA, and anomalies are computed with respect to 30-year (1991-2020) long term mean.

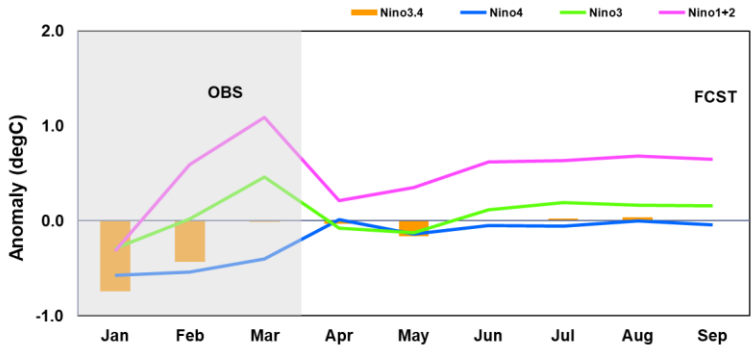

Fig.2: Time series of monthly area-averaged SST anomalies (°C) in the 4 Niño regions. ERSSTv5 observed anomaly for the last 3 months and MMCFS model PDF corrected anomaly forecast for the next 6 months.

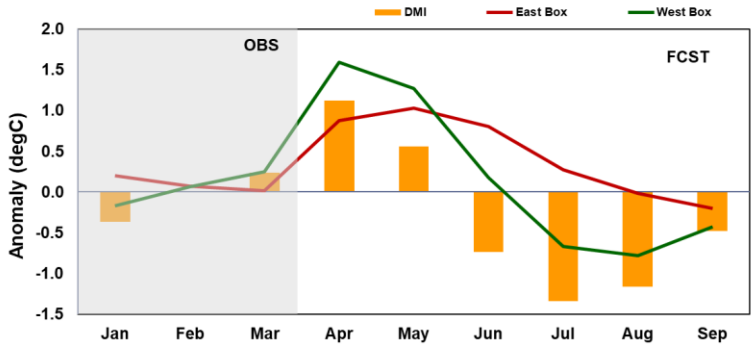

Fig.3: The time series of the monthly area-averaged SST anomaly Indices (°C) over west equatorial Indian Ocean (WEI) & east equatorial Indian Ocean (EEI) along with Dipole Mode Index (DMI=WEI-EEI) representing Indian Ocean Dipole (IOD). ERSSTv5 observed anomaly for the last 3 months and MMCFS model PDF corrected anomaly forecast for the next 6 months.

1.3 Convection (OLR Anomaly) Pattern over the Asia Pacific Region

The Outgoing Longwave Radiation (OLR) anomaly during March 2025 is shown in (Fig.4). Negative OLR anomalies (enhanced convection, blue shading) were observed over most parts of South Bay of Bengal, South Arabian Sea, south China Sea, and eastern equatorial Pacific Ocean. Negative OLR anomalies were also observed over some parts of southern tip of Southeast Asia, maritime continent and parts of eastern Australia. Positive OLR anomalies (suppressed convection, orange/red shading) were observed over western and central tropical Pacific Ocean. Positive OLR anomalies were also observed over northwest parts of South east Asia and some parts of west Australia and north America.

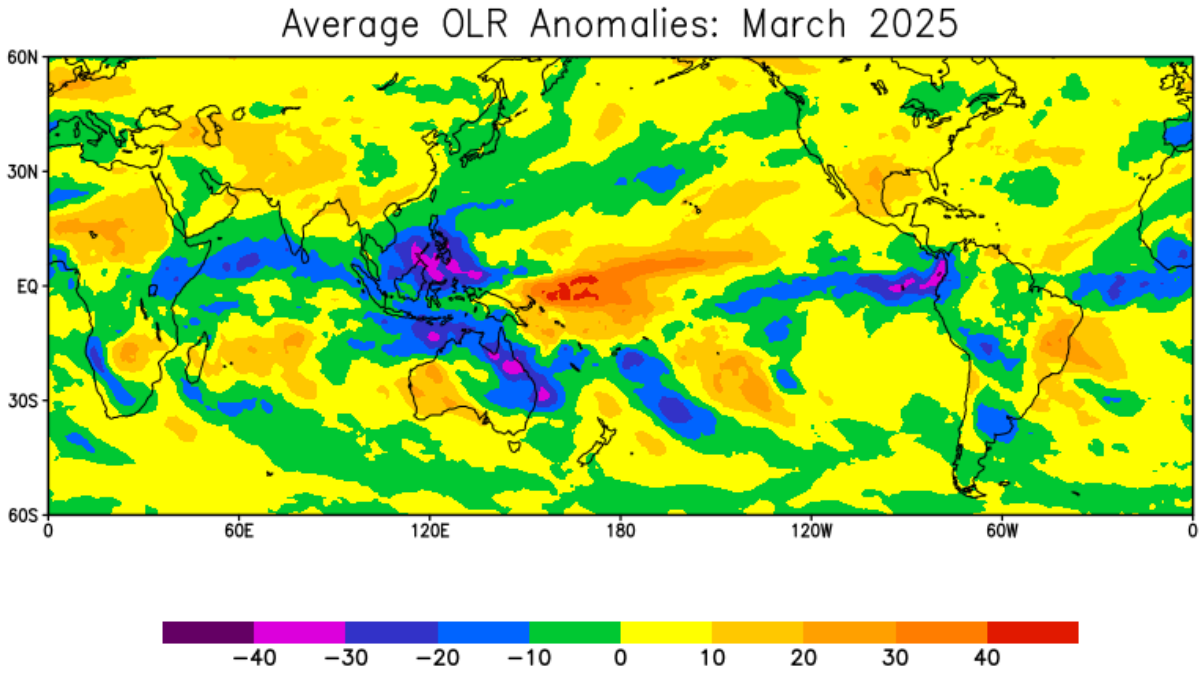

Fig.4: Outgoing Long Wave Radiation (OLR) Anomaly (W/m^2) for March 2025 (Data source: NCEP-NOAA)

1.4 Snow Cover Area over the Northern Hemisphere (NH)

During March 2025, the NH snow cover area (37.93 million Sq. km) was less than the 1991-2020 normal by 1.86 million Sq. km (Fig. 5). Eurasian Snow cover area (22.66 million Sq. km) was 1.43 million Sq. km less than the 1991-2020 normal. North America snow cover area of 15.27 million sq. km was less by 0.43 million Sq. Km with respect to 1991-2020 normal.

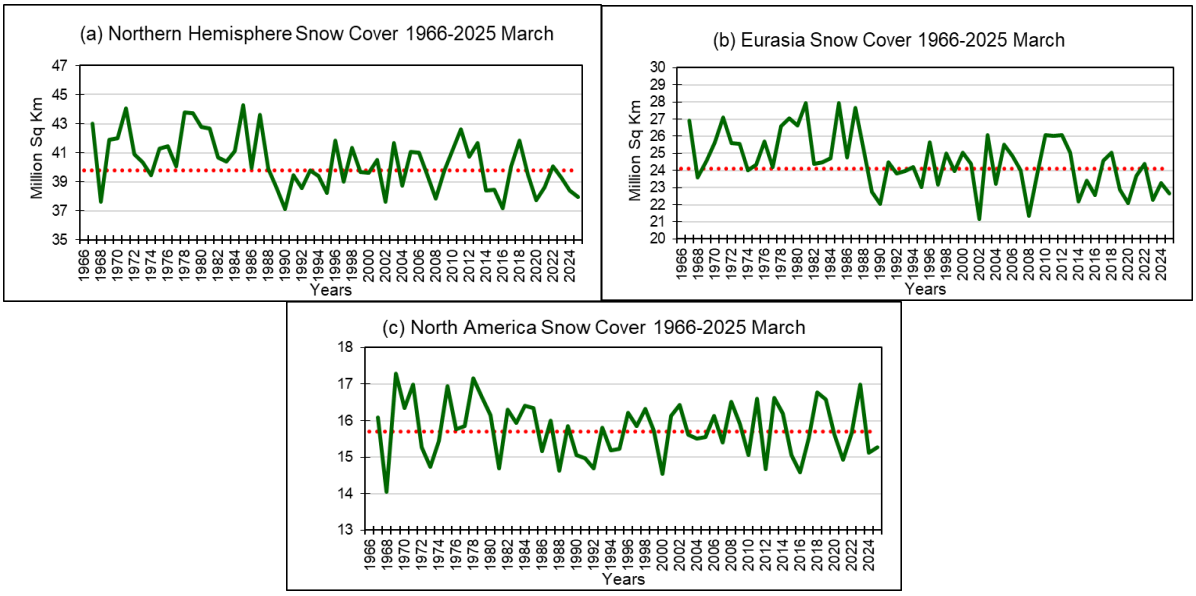

Fig.5. Snow cover area (million Sq. km) for the month of March during the period 1966-2025 (green solid lines) and normal value (1991-2020) (red dotted line) for (a) Northern Hemisphere (b) Eurasia and (c) North America. (Data Source: Rutgers University Snow Lab).

1.5. Madden Julian Oscillation (MJO)

During the first fortnight of March 2025, MJO moved eastwards from phase 1 (Western H. and Africa) to phase 2 (Indian Ocean) with enhanced strength. In the third week it moved to phase 4 (Maritime continent) with enhanced strength. It then moved eastwards to phase 6 (Western Pacific) in the fourth week with reduced strength. The MJO phase diagram illustrates the progression of the MJO through different phases, which generally coincide with locations along the equator around the globe.

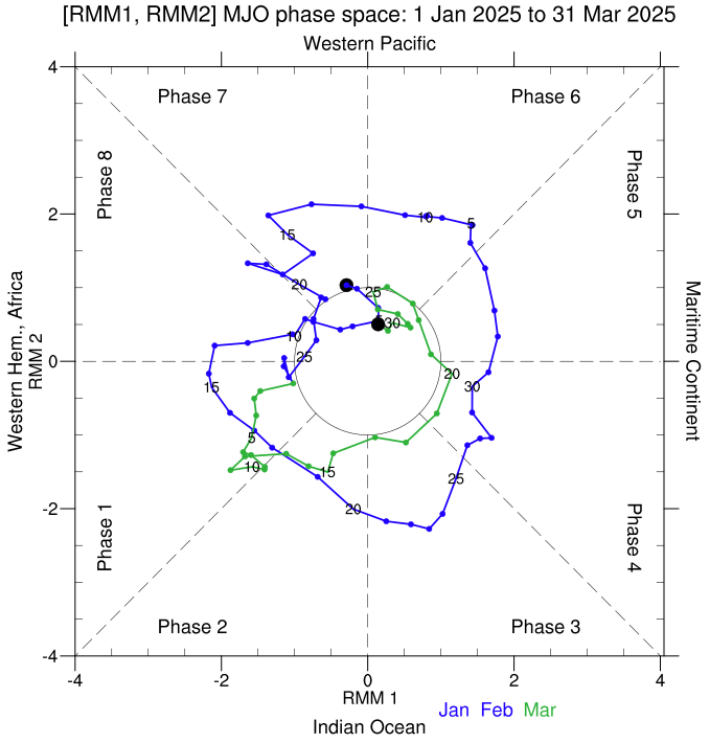

Fig.6. RMM phase diagram for Madden Julian Oscillation (MJO) for the period January to March 2025. (Data Source: http://www.bom.gov.au/climate/mjo/).

2. Seasonal Outlook for South Asia

The seasonal outlook was prepared based on the forecast from Monsoon Mission Coupled Forecasting System (MMCFS). The model is a fully coupled ocean-atmosphere-land model. The atmospheric component of CFSv2 is Global Forecast System (GFS) with spectral resolution of T382 (approximately 38 km) and 64 hybrid vertical levels and the ocean component is Geophysical Fluid Dynamics Laboratory (GFDL) Flexible Modelling System (FMS) Modular Ocean Model version.

2.1. Precipitation Probability Forecast:

The probability forecasts for precipitation for the seasons April to June 2025 (AMJ) and May to July 2025 (MJJ) are given in the Figures 7a and 7b respectively. The forecast is prepared based on the March initial conditions. The probability forecast for precipitation for AMJ and MJJ seasons indicates that enhanced probability of above normal precipitation is likely over most parts of north along the plains of Himalayas, central, east, northeast, southeast and southern Peninsula of India and enhanced probability of below normal precipitation is likely over north west, extreme north and extreme south of South Asia.

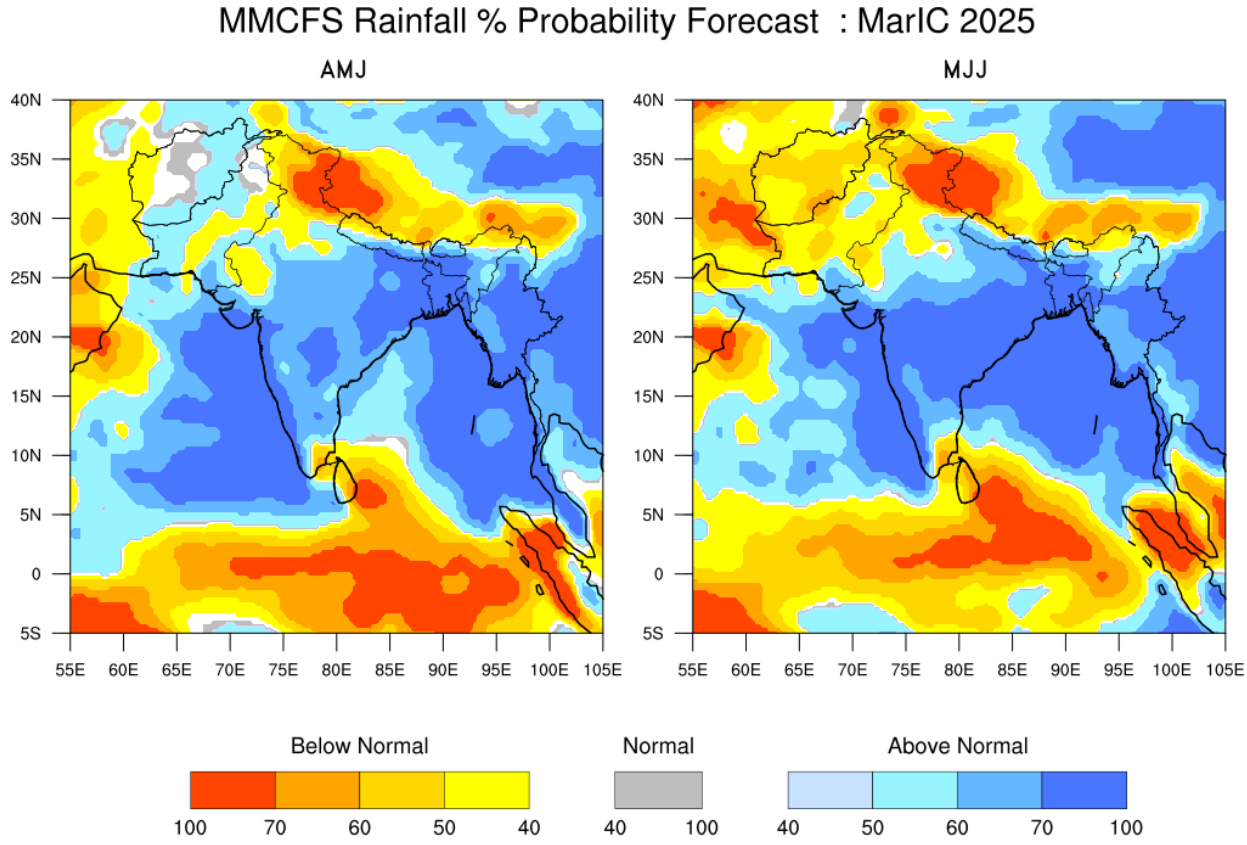

Fig.7: Seasonal probability (%) forecasts of precipitation for (a) AMJ 2025 (left) and (b) MJJ 2025 (right) based on initial conditions of March 2025.The white colour indicates climatological probability.

2.2. Temperature Probability Forecast*:*

The probability forecasts for temperature for the season April to June 2025 (AMJ) and May to July 2025 (MJJ) are given in the Figures 8a and 8b respectively. The forecast is prepared based on the March initial conditions. Temperature probability forecast for AMJ and MJJ seasons indicate that enhanced probability of above normal temperatures is likely over most parts of South Asia except over extreme north where enhanced probability of below normal temperature is likely.

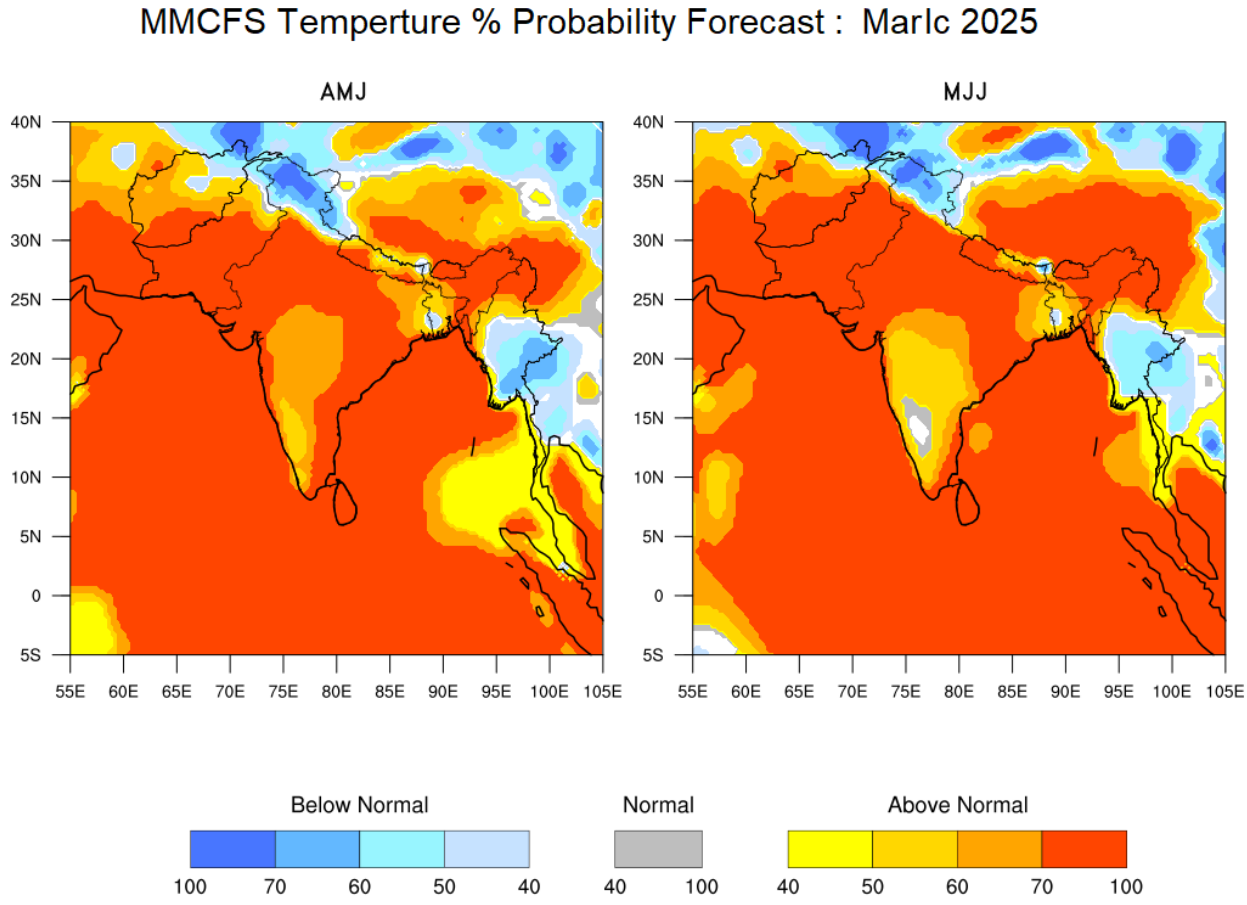

Fig. 8: Probability (%) forecast for the seasonal mean temperature for (a) AMJ 2025 (left) and (b) MJJ 2025 (right) based on initial conditions of March 2025. The white colour indicates climatological probability.

3. Forecast Outlook for the Country Averaged Monthly Precipitation and Temperature

The MMCFS model forecast for monthly precipitation and temperature for the next four months (from April to July 2025) averaged over the 9 south Asian countries viz., Afghanistan, Bangladesh, Bhutan, India, Maldives, Myanmar, Nepal, Pakistan and Sri Lanka were shown in the Figures 9. The monthly rainfall anomaly is expressed as percentage departure from Long Period Model Average (LPMA) and monthly temperature anomaly is expressed in degree Celsius.

In April, the country averaged monthly precipitation is likely to be normal to above normal for all countries except Nepal where it is likely to be below normal. In May, the country averaged monthly precipitation is likely to be normal to above normal for Bangladesh, Bhutan, India, Maldives, Myanmar and Nepal and below normal for Afghanistan, Pakistan and Sri Lanka. where it is likely to be below normal. In June, it is likely to be normal to above normal for all countries except Afghanistan and Sri Lanka where it is likely to be below normal. In July, the country averaged monthly precipitation is likely to be normal to above normal for all the South Asian countries except Afghanistan and Maldives where it is likely to be below normal.

The country averaged monthly temperatures during April and July is likely to be above normal for all the south Asian countries. In May, it is likely to be normal to above normal for all the south Asian countries except Myanmar. In June, the country averaged monthly temperatures are likely to be above normal for all the countries except Bangladesh where it is likely to be below normal.

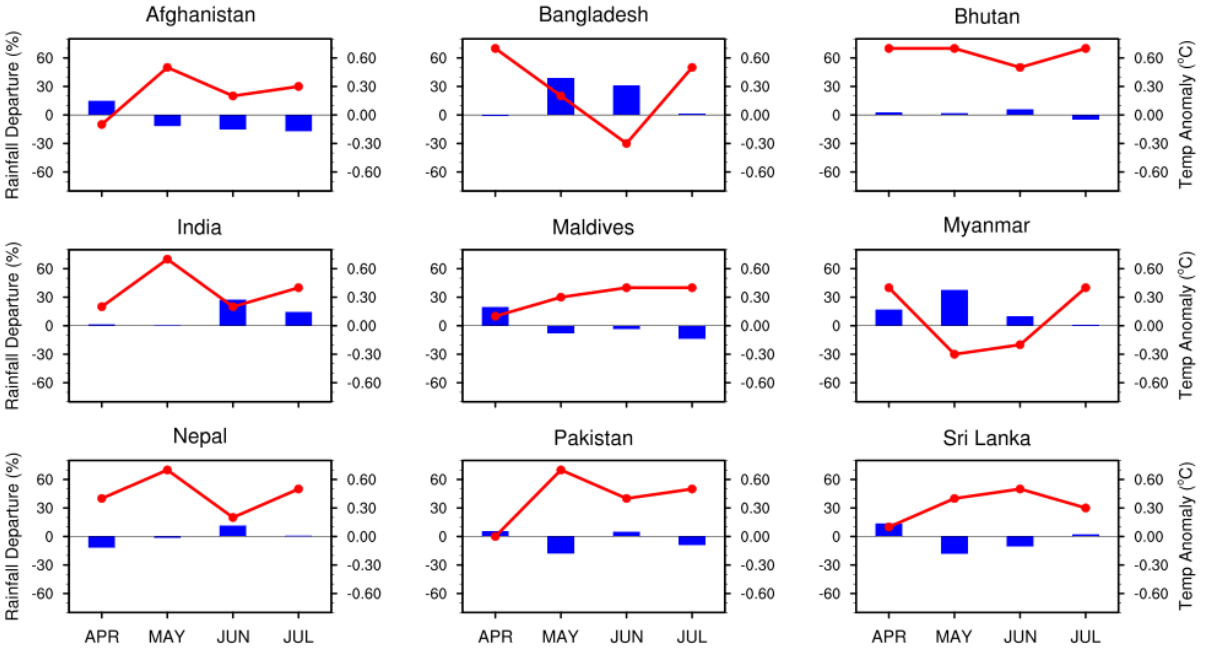

Fig. 9: Monthly country averaged rainfall forecast expressed as percentage departures (%) and Monthly country averaged temperature anomaly (°C) forecast during April to July 2025. Here, the normal range for country averaged monthly precipitation is taken as -10% to +10% (Left Vertical Axis Scale for Precipitation indicated in blue shaded bars) and the normal range for country averaged monthly temperature is taken -0.25°C to +0.25°C (Right Vertical Axis Scale for Temperature indicated in red coloured lines).