कालगुण विद्या देपार्थमेन्तुव
வளிமண்டலவியல் திணைக்களம்
DEPARTMENT OF METEOROLOGY
ශ්‍රී ලංකාව இலங்கை SRI LANKA

Consensus Seasonal Weather Outlook

April, May and June(AMJ2024)

Seasonal Rainfall and Temperature for Sri Lanka

These forecasts are prepared using

- The prevailing global climate conditions.
- Forecasts from different climate models from around the world.
- Statistical downscaling of GCM output using CPT

Issued by Centre for Climate Change Studies (CCCS)

and

Research Division

1. Prevailing global climate conditions

In the last four weeks, equatorial SSTs were above average across most of the Pacific Ocean, with the largest anomalies in the central and east-central Pacific, and across the Indian Ocean, and the Atlantic Ocean. In the last couple of weeks, below-average SSTs emerged in small regions of the eastern Pacific Ocean. (NOAA CPC). During the last four weeks, negative SST anomaly changes were observed over most of the equatorial Pacific, but were strongest in the far eastern Pacific.

El Nino and La Nina update

A transition from El Niño to ENSO-neutral is expected by April-June season 2024, with ENSO-neutral persisting through May-July 2024. Thereafter, La Niña is favored in June-August, and chances increase through the October-December season(Fig 3a). (Climate Prediction Center / NCEP).
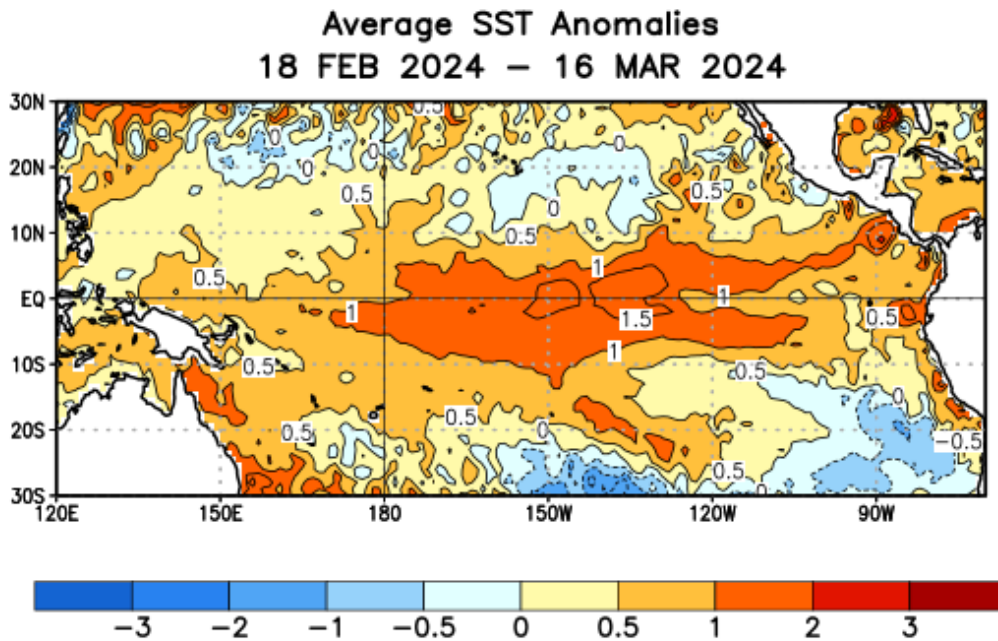
Fig 1: Observed Average sea surface temperature (SST) anomalies (°C)

Weekly SST Anomalies (DEG C)

21 FEB 2024

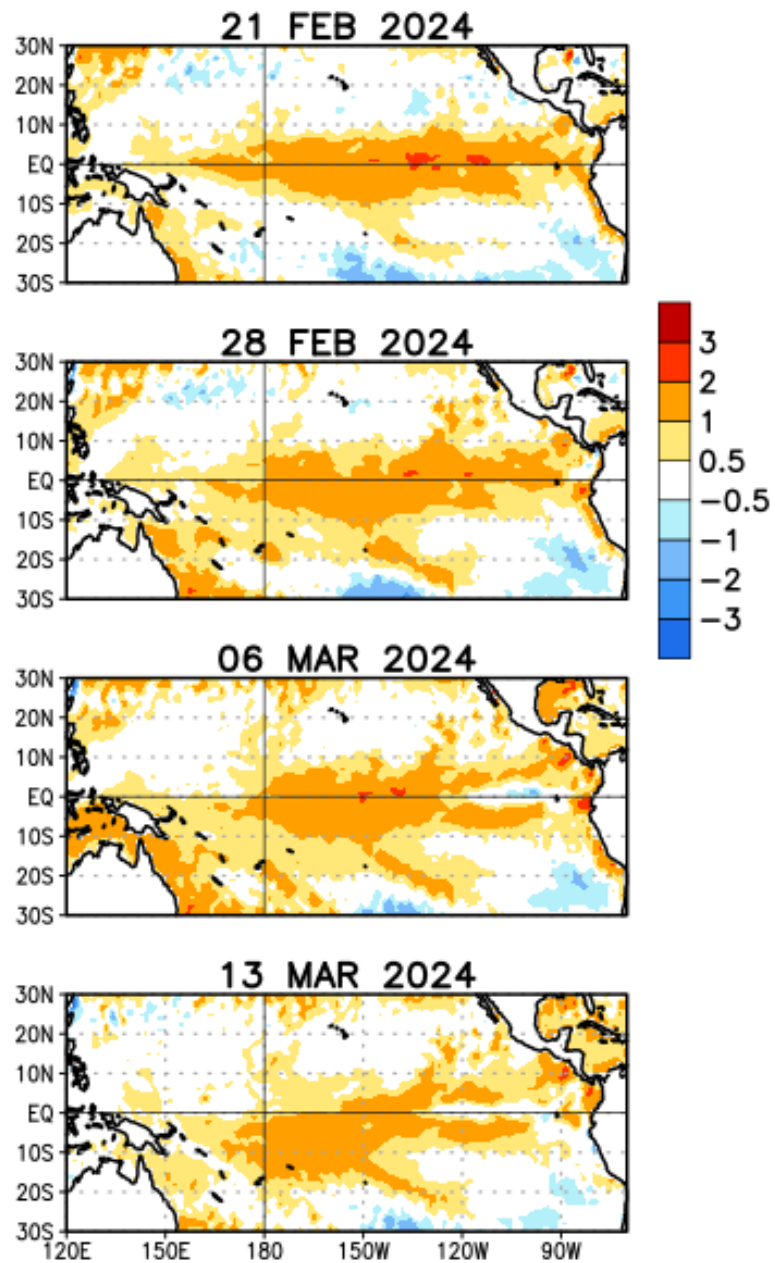## 28 FEB 2024

06 MAR 2024

13 MAR 2024

Fig 2: Weekly Observed Average sea surface temperature (SST) anomalies (°C)
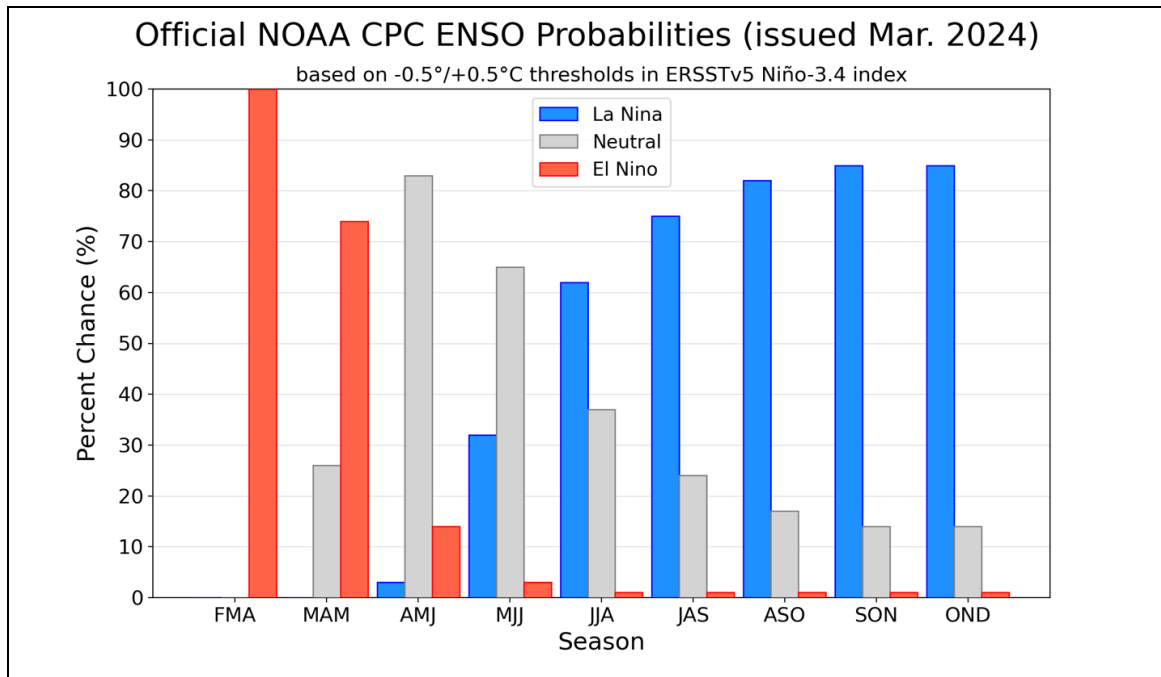
Fig 3a: ENSO forecast from Climate Prediction Center (CPC)/ IRI Forecast

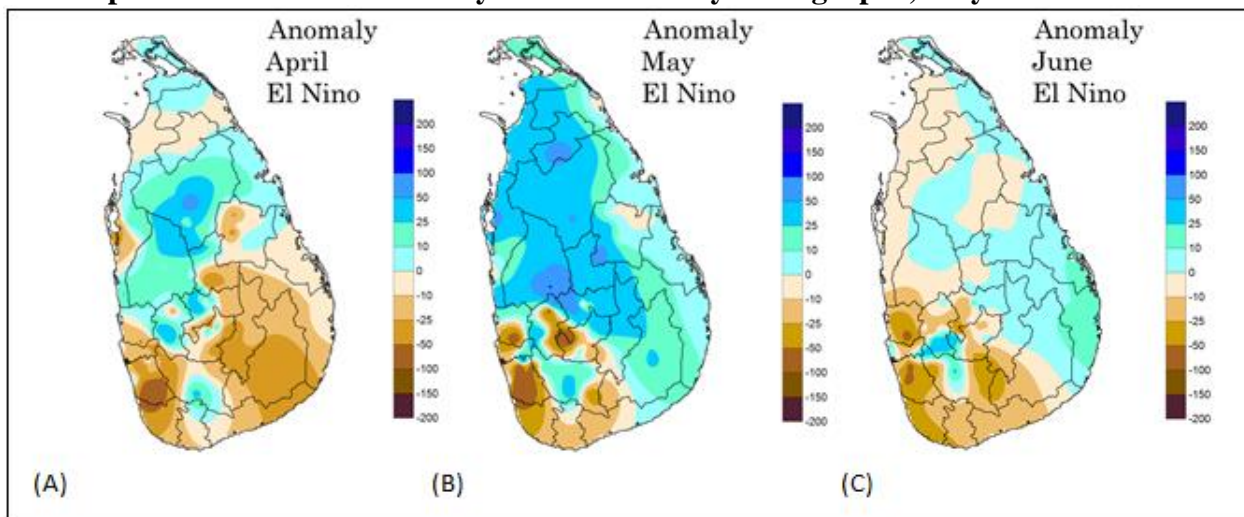### 1.1.1 Impacts of El-Niño on monthly rainfall anomaly during April, May and June

Fig 3b: Monthly Rainfall Anomaly maps of the months of April(A), May (B) and June (C) during El-Niño years (Hapuarachchi et al 2016)

A research conducted by the Department of Meteorology, it has been found that, slightly above normal rainfalls were observed Anuradhpura, Trincomalee, Kilinochchi, Jaffna and Kurunegala districts and below normal over remaining areas during the month of April. It has been observed below normal rainfalls in some areas in Western, Southern and Central parts of the country and above normal rainfalls are possible in remaining areas during the month of May. During the month of June slightly below normal rainfalls were experienced over south western parts and near normal over remaining areas of the country during past El Nino conditions (Fig 3b(C)).

1.2 The Indian Ocean Dipole (IOD) update

Although the most recent value of the Indian Ocean Dipole (IOD) index (+0.86 °C) is above the positive IOD threshold, the IOD is currently neutral.

IOD events are typically unable to form between December and April. When the monsoon trough shifts southwards into the southern hemisphere, it changes the broadscale wind patterns, meaning that the IOD pattern is unable to form. Most global climate models suggest IOD values will remain neutral until at least April. Beyond this time, models tend towards a positive IOD. However, at this time of year the confidence in model IOD forecasts beyond autumn is low.(source-BOM,Australia).
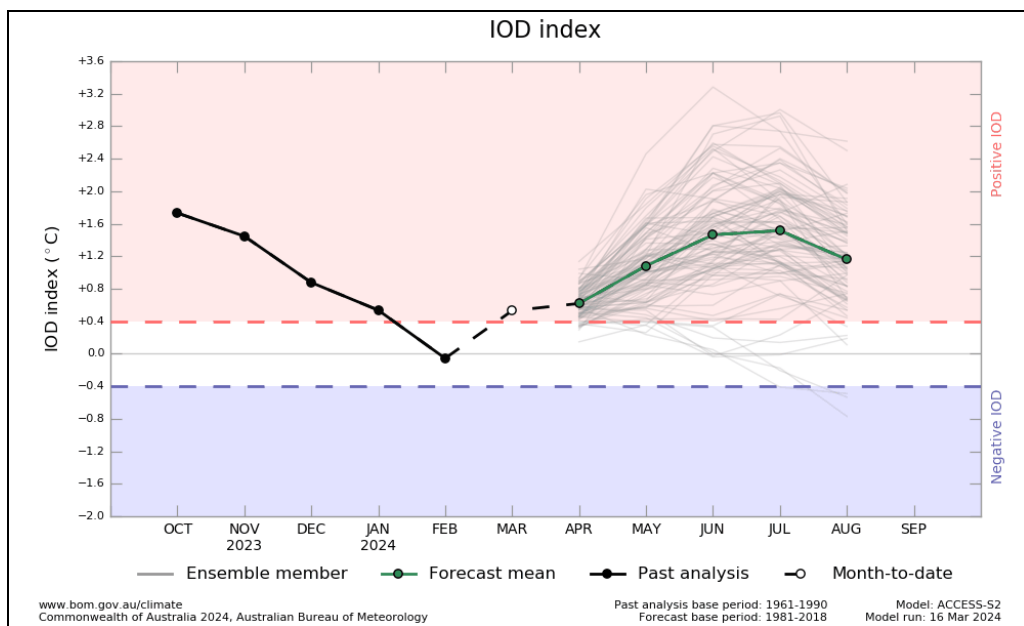

Figure 4a: IOD forecast from Australian Bureau of Meteorology

2. Forecasts from different climate models from around the world

2.1 April to June (AMJ) 2024 season

Figure 5 shows the probabilistic multi model ensemble forecast which prepared by using dynamical models from 12 Global Producing Centers (GPC) for AMJ season. According to that above normal rainfall can be expected for AMJ 2024 season.
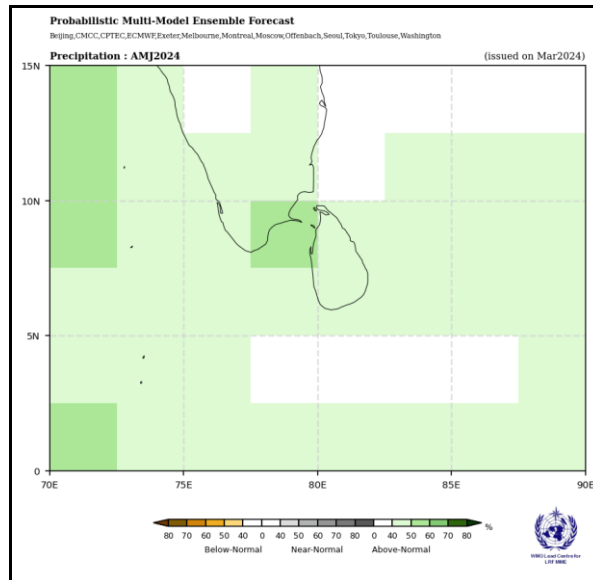
Fig 5: Probabilistic multi model ensemble forecast for AMJ using dynamical models from 12 WMO global producing centers (GPC).
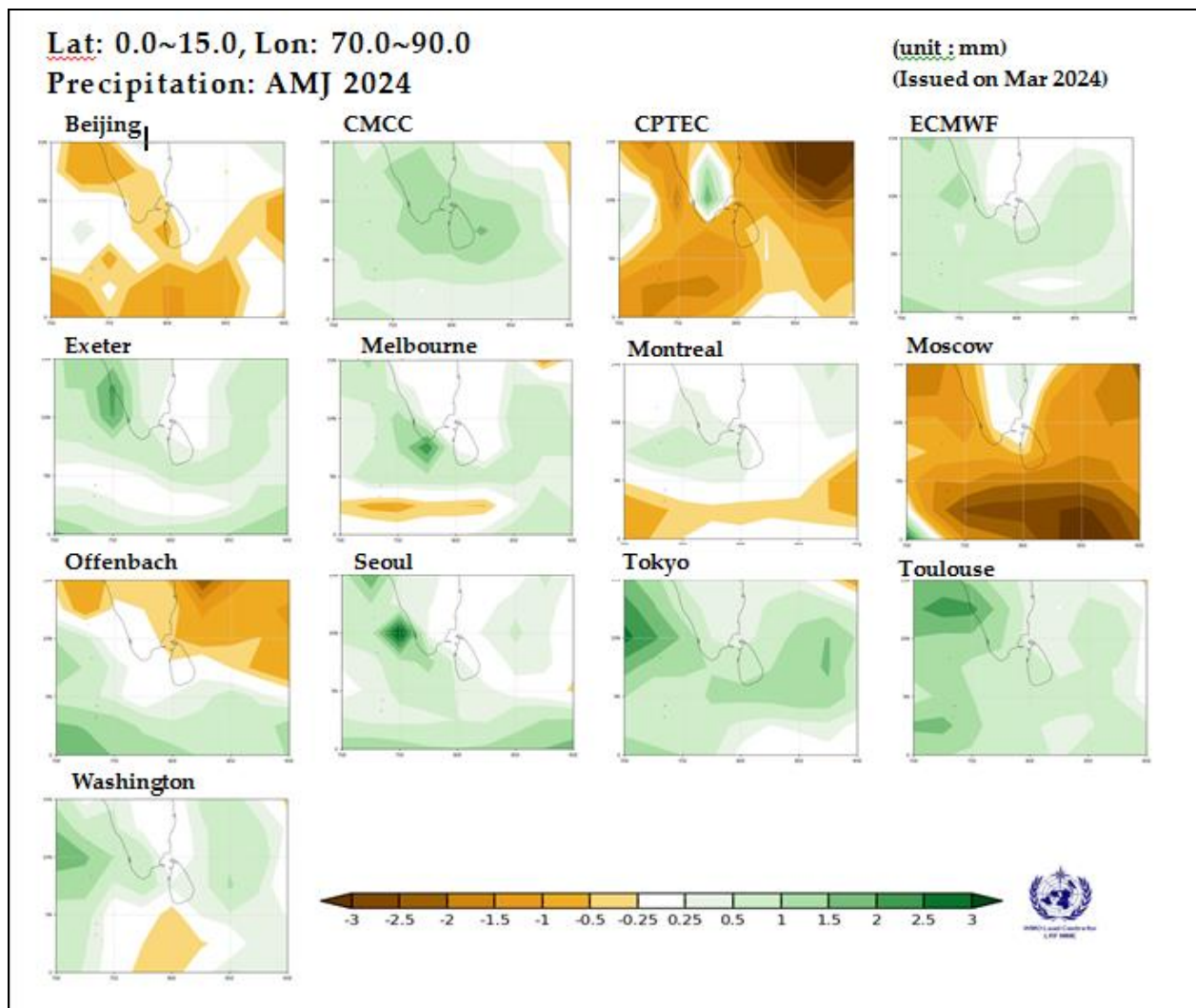

Fig 6: Individual forecasts for AMJ 2024 season by dynamical models from 13 WMO global producing centers (GPC).

Figure 6 depicts individual forecasts provided by same GPC centers for the AMJ season. Out of 13 GPC individual models, 1 GPC model predicted below normal rainfall over the country and 4 GPC models predicted above normal rainfall and there is no clear signal indicated in 8 GPC models. Accordingly below, about or above normal rainfalls can be expected over the country during AMJ 2024 season.

2.2 Monthly Forecast for April, May and June 2024

Figure 7 shows the probabilistic multi model ensemble forecasts, which are prepared by using dynamical models from 13 global producing centers (GPC), for the months of April, May and June 2024. According to that during the month of April it can be expected below normal rainfall over some areas in Western, Southern, Sabaragamuwa and Uva provinces and in Ampara district. It can be expected near normal rainfalls over remaining areas of the country. During the months of May and June above normal rainfalls are likely over most parts of the country.
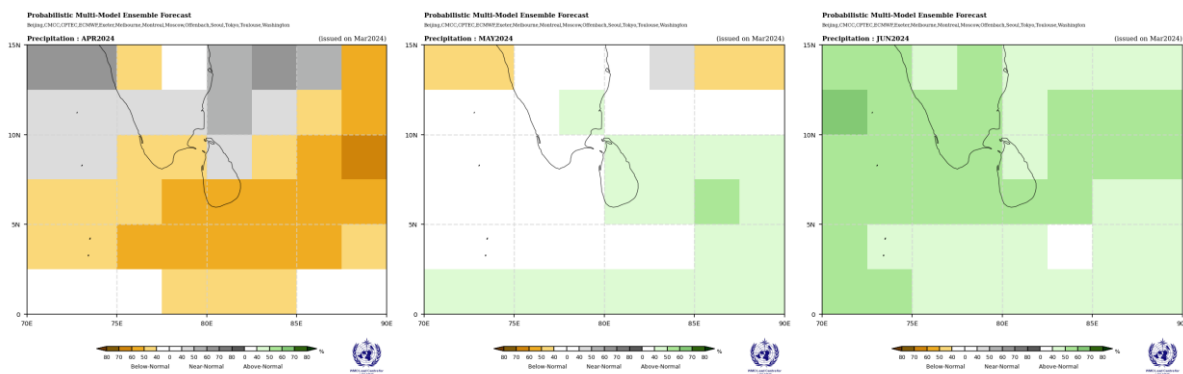

Fig 7: Probabilistic multi model ensemble forecast for April (left), May (middle) and June (right) 2024 using dynamical models from 13 WMO global producing centers (GPC).

Fig 8: Individual forecast for April 2024 by dynamical models from 13 WMO global producing centers (GPC).

Figure 8 shows the 13 monthly forecasts from individual global producing centers (GPC) for April 2024. Out of 13 GPC forecasts, 5 GPC models predicted below normal rainfalls over the country. There is no clear signal indicated in 8 GPC models. Accordingly below or about or above normal rainfalls are possible over the country during the month of April 2024.
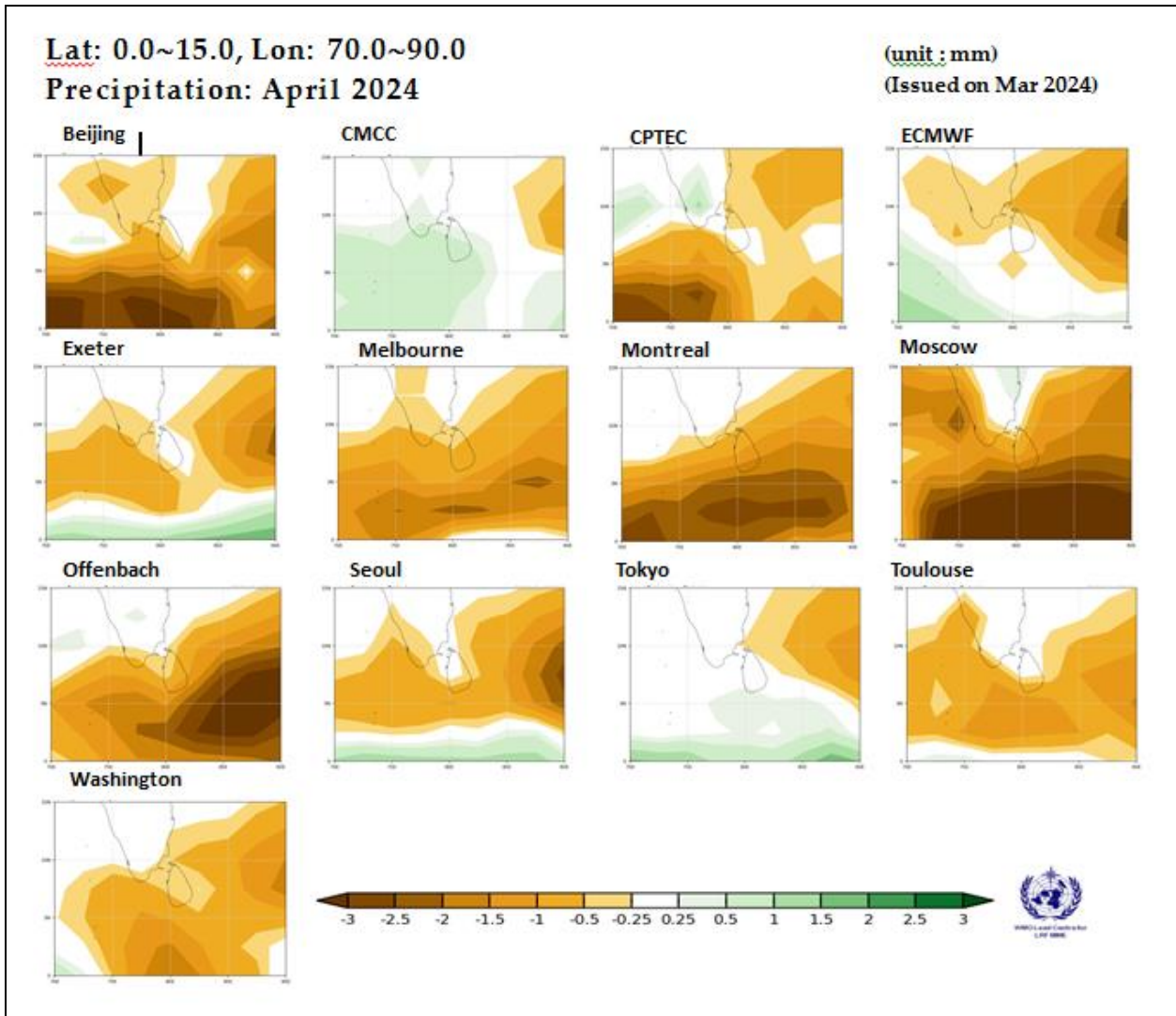
Fig 9: Individual forecast for May 2024 by dynamical models from 13 WMO global producing centers (GPC).

Figure 9 shows the monthly forecasts from individual global producing centers (GPC) for May 2024. Out of 13 GPC forecasts, 3 GPC models predicted below normal rainfalls and 6 model predicted above normal rainfall over the country. There is no clear signal indicated in 4 GPC models. Accordingly above normal rainfalls can be expected over the country during the month of May 2024.
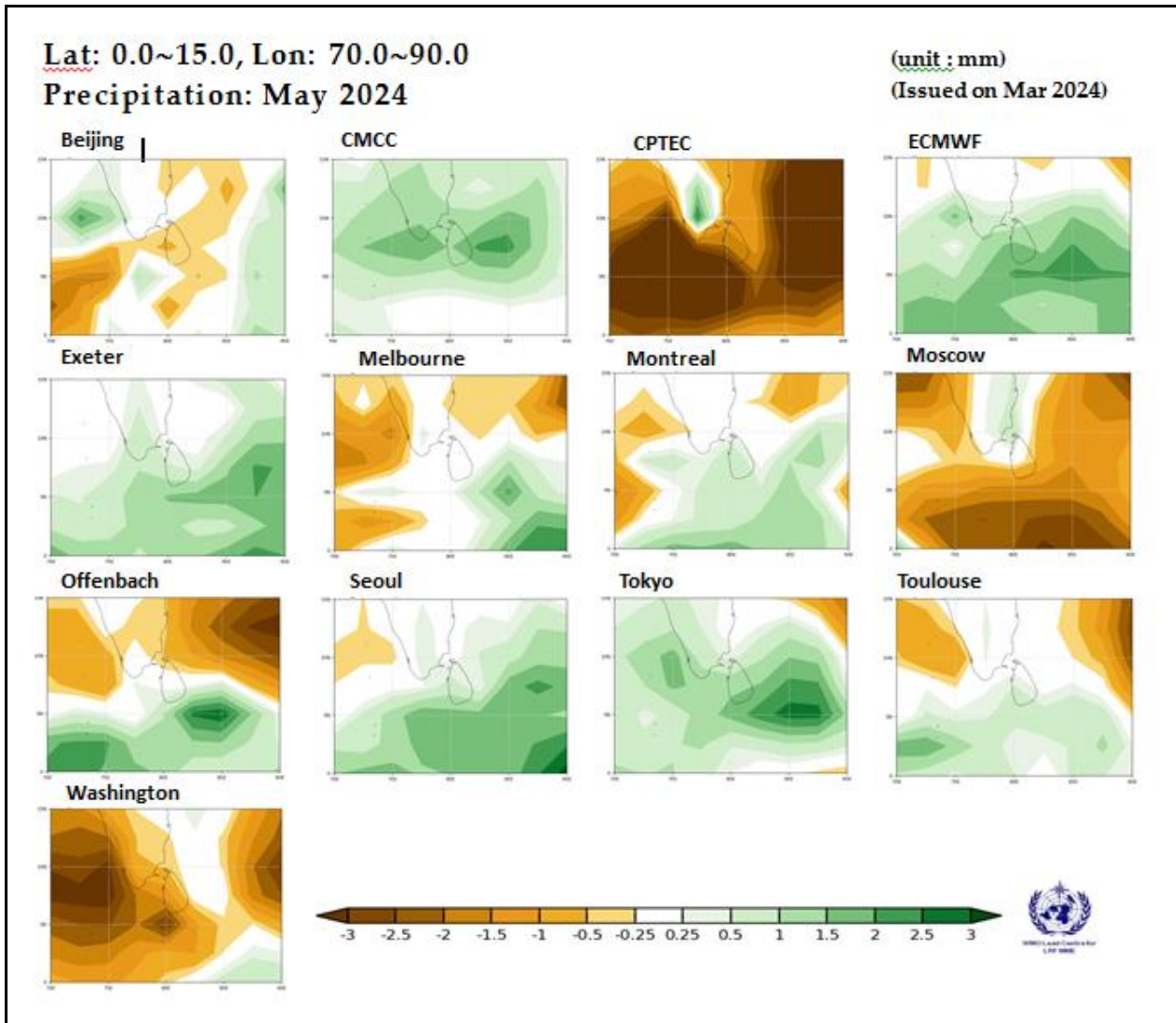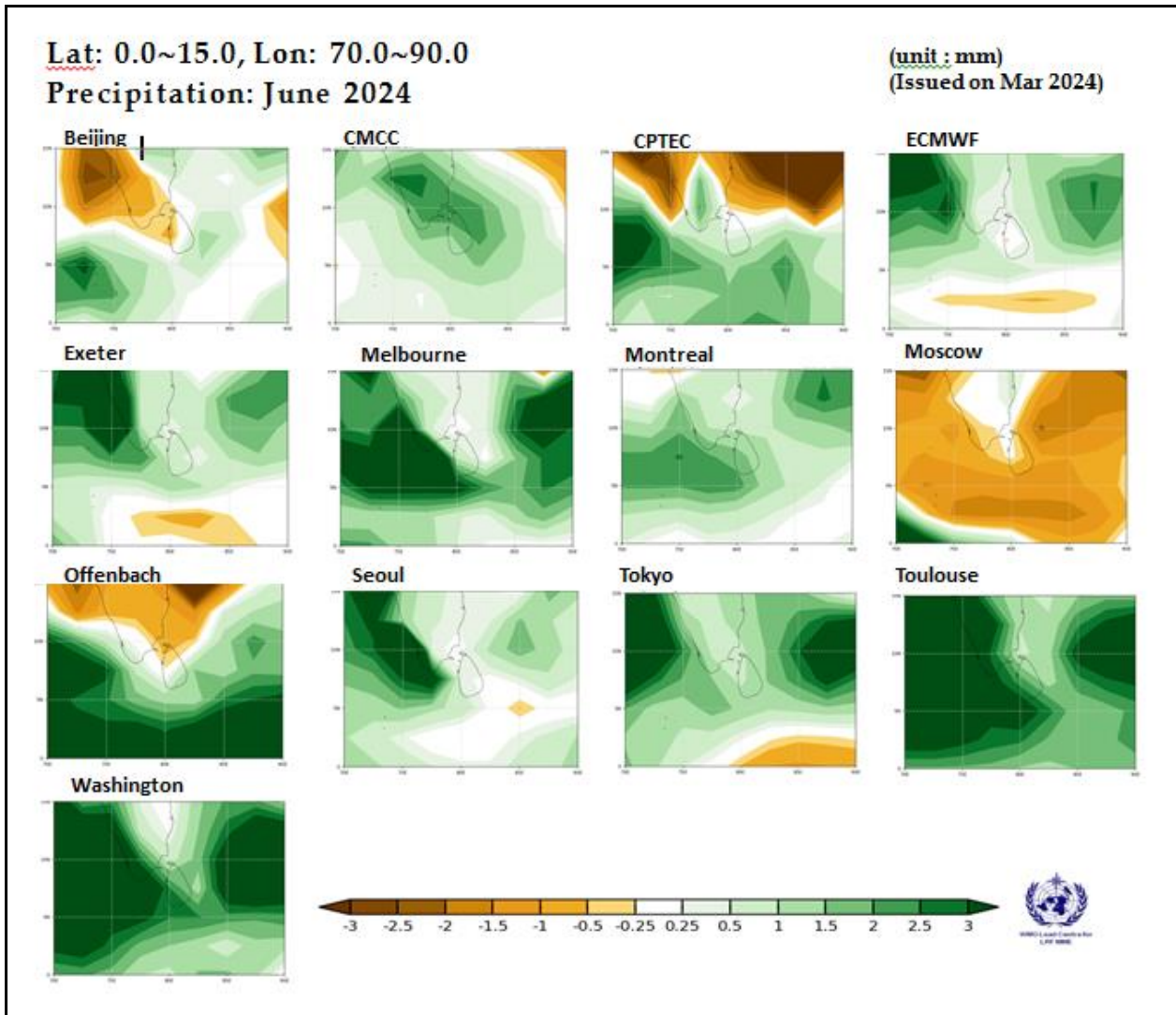
Fig 10: Individual forecast for June 2024 by dynamical models from 13 WMO global producing centers (GPC).

Figure 10 shows the monthly forecasts from 13 individual global producing centers (GPC) for June 2024. Out of 13 GPC forecasts, 7 GPC models indicate above normal rainfall and there is no clear signal indicated in 6 GPC models. Accordingly it can be expected slightly above normal rainfall over most parts of the country during the month of June 2024.

3. Statistical downscaling of CFSv2 global forecast output

3.1 Probabilistic rainfall forecast for AMJ season 2024 using Climate Predictability tool (CPT)

The following district wise probabilistic rainfall forecasts for the season of AMJ 2024 have been prepared with the multi model ensemble method to downscale, SST data of CFSv2, CCSM4, GFDL and ECMWF by using CPT.

The district wise 30 year average rainfalls during AMJ season are given in the column 2 of the table 1. Chance (probability) of receiving below/about/above average is given in the columns 3, 4, and 5 respectively in the table 1.

District	Average rainfall (mm) –AMJ (1981-2010)	Probability%		
		Below	Normal	Above
Colombo	860.3	40	30	30
Kalutara	1152.4	50	30	20
Galle	995.9	40	30	30
Matara	739.7	15	25	60
Hambantota	228.1	20	20	60
Ampara	160.3	20	20	60
Batticaloa	131.8	20	20	60
Trincomalee	137.2	20	20	60
Mullaithivu	142.2	20	20	60
Jaffna	105.2	20	20	60
Killinochchi	122.8	20	20	60
Mannar	175.8	20	20	60
Puttalam	301.6	20	20	60
Gampaha	713.9	30	30	40
Kegalle	1050.5	25	25	50
Ratnapura	924.2	20	20	60
Monaragala	259.6	20	20	60
Badulla	338.1	20	20	60
Pollonnaruwa	172.9	20	20	60
Vavuniya	178.7	20	20	60
Anuradapura	210.1	20	20	60
Kurunegala	395.1	20	20	60
Matale	304.3	20	20	60
Kandy	499.9	20	20	60
Nuwaraeliya	754.7	20	20	60

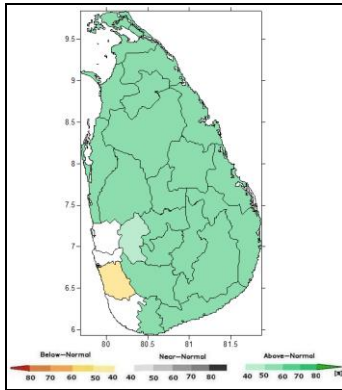**Table 1:** Probabilistic Rainfall Forecast for AMJ season 2024 using CPT

Fig 11: Probabilistic rainfall forecast for April –June 2024 using CPT

According to the CPT (Fig 11 and table 01), below normal rainfalls can be expected in Kalutara district. There is no clear signal indicated in Colombo, Gampaha and Galle districts and above normal rainfalls are expected over remaining areas of the country. Accordingly equal chances exist of receiving below, about or above normal rainfall over no signal areas of the country for AMJ Season 2024.

3.2 Multi-model ensemble mean forecast of NMME models

This probabilistic forecast is developed by combining direct Forecasts from 5 NMME models (CFS, CanSIPS, GFDL, COLA and NASA) with the forecasts obtained by statistically processing of each models.

According to the model above normal rainfalls are expected in most parts of the country (Figure 12) during AMJ 2024 season.
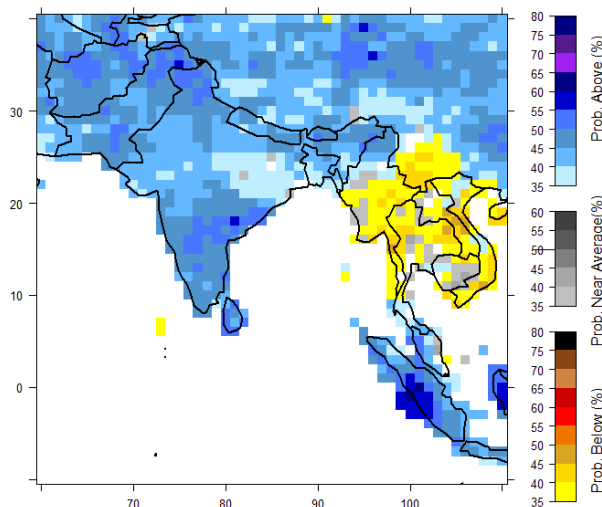

Fig 12. Average probability forecast of NMME models for AMJ 2024

3.3 Probabilistic rainfall forecast for AMJ 2024 season using RIMES FOCUS System
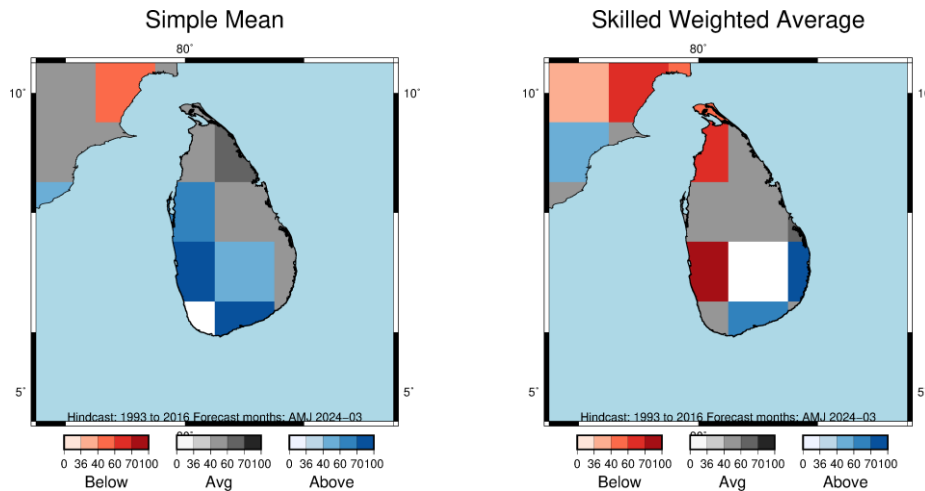

Fig 13. Probabilistic rainfall forecast for April-June 2024 using RIMES FOCUS System

Figure 13 depicts the Probabilistic rainfall forecast for AMJ 2024 season, which has been prepared by using RIMES FOCUS System. According to the model outputs above normal rainfalls are likely over Matara and Hambantota districts and near or above normal rainfalls are likely over North western, North central and Eastern provinces and some areas in Mullativu and Vavuniya districts. No clear signal indicate for other areas of the country for AMJ season 2024.

4. SUMMARY :

SUMMARY of MODEL FORECAST for AMJ 2024 season for SRI LANKA

Season	WMO LC MME	WMO GPC	CPT	FOCUS	Impact of Global conditions	Final Rainfall Forecast
AMJ season 2024	**AN**	**No Signal**	**BN-** Kalutara **No Signal-** Colombo, Gampaha and Galle	near or above normal rainfalls over North western, North central and Eastern provinces and Mathara, Hambantota, Mullativu and Vavuniya districts		Above normal rainfalls are likely over Southwestern parts and near normal over elsewhere of the country
April 2024	**BN-** Western, Southern, Sabaragamuwa and Uva provinces. Ampara district **NN-**Elsewhere	**No Signal**				Near normal rainfalls are likely over Western, Southern, Sabaragamuwa, Central and Uva provinces. No Signal - Elsewhere
May 2024	**AN**	**AN**				Above normal rainfalls are likely over Southwestern parts and near normal over elsewhere of the country
June 2024	**AN**	**AN**				Above normal rainfalls are likely over Southwestern parts and near normal over elsewhere of the country

Table 2: Summery of Model Forecasts for AMJ season 2024

BN: Below Normal   **NN**: Near Normal   **AN**: Above Normal   **CP**: Climatological Probability

4.1 Summery of prevailing global climate conditions

A transition from El Niño to ENSO-neutral is expected by April-June season 2024, with ENSO-neutral persisting through May-July 2024. Thereafter, La Niña is favored in June-August, and chances increase through the October-December season.

Most global climate models suggest IOD values will remain neutral until at least April. Beyond this time, models tend towards a positive IOD. However, at this time of year the confidence in model IOD forecasts beyond southern hemisphere autumn is low.

5. Consensus Seasonal outlook for April, May and June 2024

Considering the prevailing global climate conditions, forecasts from different global climate models and statistical downscaling of GCM output using CPT, consensus forecasts for April to June 2024 season is concluded as follows.

5.1 Rainfall forecast for the three months period during April-May-June (AMJ) 2024

Above normal rainfalls are likely over Southwestern parts and near normal rainfalls are likely elsewhere of the country during April- June 2024 season (Fig. 14).
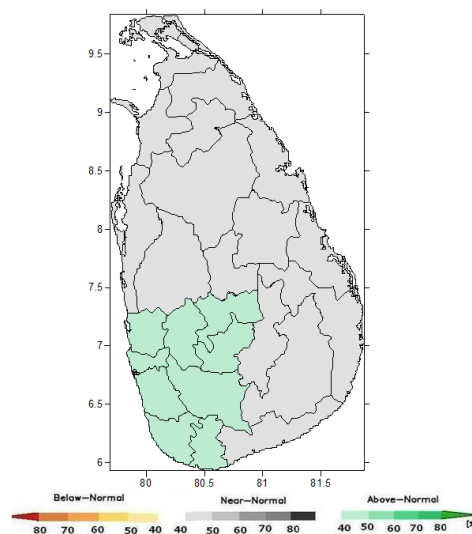
Fig 14. Consensus Probabilistic rainfall forecast for April–June 2024

5.2 Rainfall forecast for April 2024

There is a higher chance of having near normal rainfall over Western, Southern, Sabaragamuwa, Central and Uva provinces and there is no clear signal indicated for the remaining areas of the country. Accordingly there is an equal probability for below or near or above normal rainfall over these area during the month of April 2024.

5.3 Rainfall forecasts for May 2024

There is a higher chance of having above normal rainfalls over Southwestern parts and near normal rainfalls over elsewhere of the country during the month of May 2024. In addition to thet, generally there is a possibility for developing atmospheric disturbances, low pressure systems and cyclones in the vicinity of Sri lanka during the latter part of month of May.

5.4 Rainfall forecasts for June 2024

There is a chance of having above normal rainfalls over Southwestern parts and near normal rainfalls over elsewhere of the country during the month of June 2024

**In addition, the predictability is also limited due to strong day-to-day atmospheric variability caused by the passage of the synoptic scale systems such as lows and depressions. Intraseasonal Oscillations such as Madden Julian Oscillations (MJO) is also another atmospheric phenomena which can't be underestimated.

5.5 Probabilistic Temperature Forecast from April to June 2024 (AMJ 2024)

The probabilistic Temperature forecast for April, May and June 2024 (AMJ 2024) season for Sri Lanka as given below.

Fig 15: Probabilistic forecast for Maximum Temperatures for AMJ season 2024

Fig 15 and Table 3 show the probabilistic forecast for Maximum Temperatures during AMJ season 2024.

There is a higher chance of experiencing slightly above the normal Maximum Temperatures in Mannar, Vavuniya, Anuradapura, Puttalum, Kurunegala, Gampaha, Colombo, Galle, Hambantota, Rathnapura, Kandy, Nuwara Eliya, Badulla, Ampara, Batticaloa and Trincomalee districts(Fig 14) for the AMJ season 2024.

The district wise average Maximum Temperatures are given in the column 2 of the table 3 and the chance (probability) of receiving below/about/above averages are given in the columns 3, 4, and 5 respectively.

District	Average Maximum Temperature (^{0}C) – (AMJ) (1981-2010)	Probability %		
		Below	Normal	Above
Anuradhapura	33.8	30	30	40
Badulla	31.2	30	30	40
Batticaloa	33.3	35	35	30
Colombo	31.3	25	30	45
Galle	30.2	30	30	40
Hambantota	31.2	30	30	40
Katugastota	29.9	25	30	45
Katunayake	31.7	30	30	40
Mannar	32.3	30	30	40
MahaIlluppallama	33.1	30	30	40
NuwaraEliya	21.0	25	30	45
Pottuvil	34.0	30	30	40
Puttalam	32.4	30	30	40
Ratnapura	32.0	25	30	45
Ratmalana	32.0	25	30	45
Trincomalee	34.6	30	30	40
Vavuniya	34.5	30	30	40
Kurunegala	32.4	25	30	45
Bandarawela	26.5	25	30	45

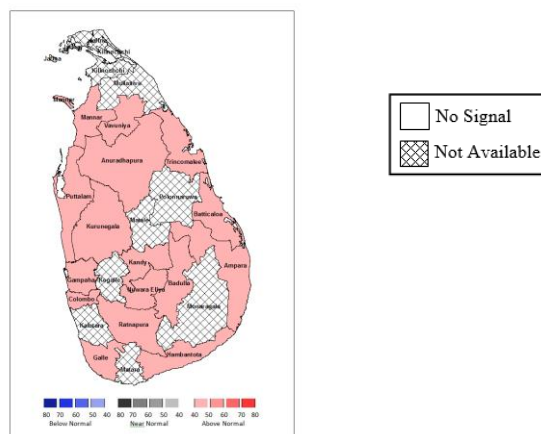Table 3: probabilistic forecast for Maximum Temperature for AMJ season 2024
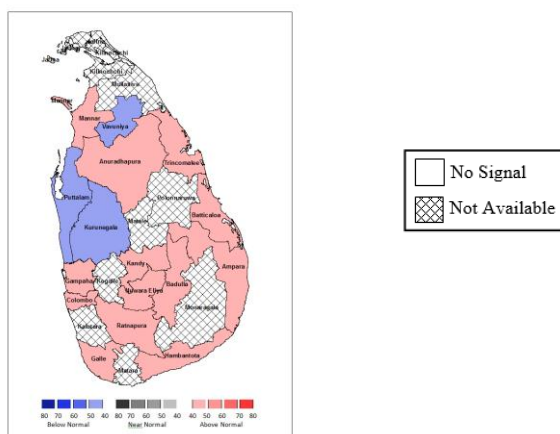
Fig 16: Probabilistic forecast for Minimum Temperatures for AMJ season 2024

District	Average Minimum Temperature (^{0}C) – (AMJ) (1981-2010)	Probability %		
		Below	Normal	Above
Anuradhapura	25.0	30	30	40
Badulla	19.5	30	30	40
Batticaloa	25.6	30	30	40
Colombo	25.6	30	30	40
Galle	25.5	30	30	40
Hambantota	25.4	30	30	40
Katugastota	21.6	30	30	40
Katunayake	25.1	30	30	40
Mannar	26.9	30	30	40
MahaIlluppallama	24.5	30	30	40
NuwaraEliya	12.9	30	25	45
Pottuvil	24.9	30	30	40
Puttalam	25.7	40	30	30
Ratnapura	23.9	30	30	40
Ratmalana	25.5	30	30	40
Trincomalee	26.1	30	30	40
Vavuniya	24.5	40	30	30
Kurunegala	24.1	40	30	30
Bandarawela	17.6	30	30	40

Table 4: Probabilistic forecast for Minimum Temperatures for AMJ season 2024

Fig 16 and Table 4 provide the probabilistic forecast for Minimum Temperatures during AMJ season 2024.

Accordingly, there is a higher chance of experiencing slightly above the normal Minimum Temperatures in Mannar, Anuradapura, Gampaha, Colombo, Galle, Hambantota, Rathnapura, Kandy, Nuwara Eliya, Badulla, Ampara, Batticaloa and Trincomalee districts and slightly below the normal Minimum Temperatures in Puttalam, Kurunegala and Vavuniya districts (Fig 15) during AMJ season 2024.

Note- Temperature forecasts are not available in **Matara, Kegalle, Kalutara, Monaragala, Polonnaruwa, Jaffna, Killinochchi, Mullativu and Mathale** districts due to unavailability of Climate data.