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வளிமண்டலவியல் திணைக்களம்
DEPARTMENT OF METEOROLOGY
ශ්‍රී ලංකාව இலங்கை SRI LANKA

Consensus Seasonal Weather Outlook

February, March and April (FMA)

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

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and

Research Division

1. Prevailing global climate conditions

Below average sea surface temperatures (SST) were observed across the Central and the East Pacific Ocean during the last four weeks. Further, negative sea surface temperature anomalies persisted in the central and eastern Pacific Ocean while positive sea surface temperatues persisted in the Northern Pasific. (CPC-USA) (Fig.1 & 2)

1.1 El Nino and La Nina update

The tropical Pacific atmosphere is consist with La Niña conditions. A majority of the statistical and dynamical models predict La Niña is favored to continue through winter 2021-22 and transition to ENSO neutral during spring 2022. Further, La Niña is likely to continue in to the Northern Hemisphere spring with 67% chance during March – May 2022 and then transition to ENSO-neutral during April-June 2022 with 51% . (source-CPC-USA) (Fig.3a).
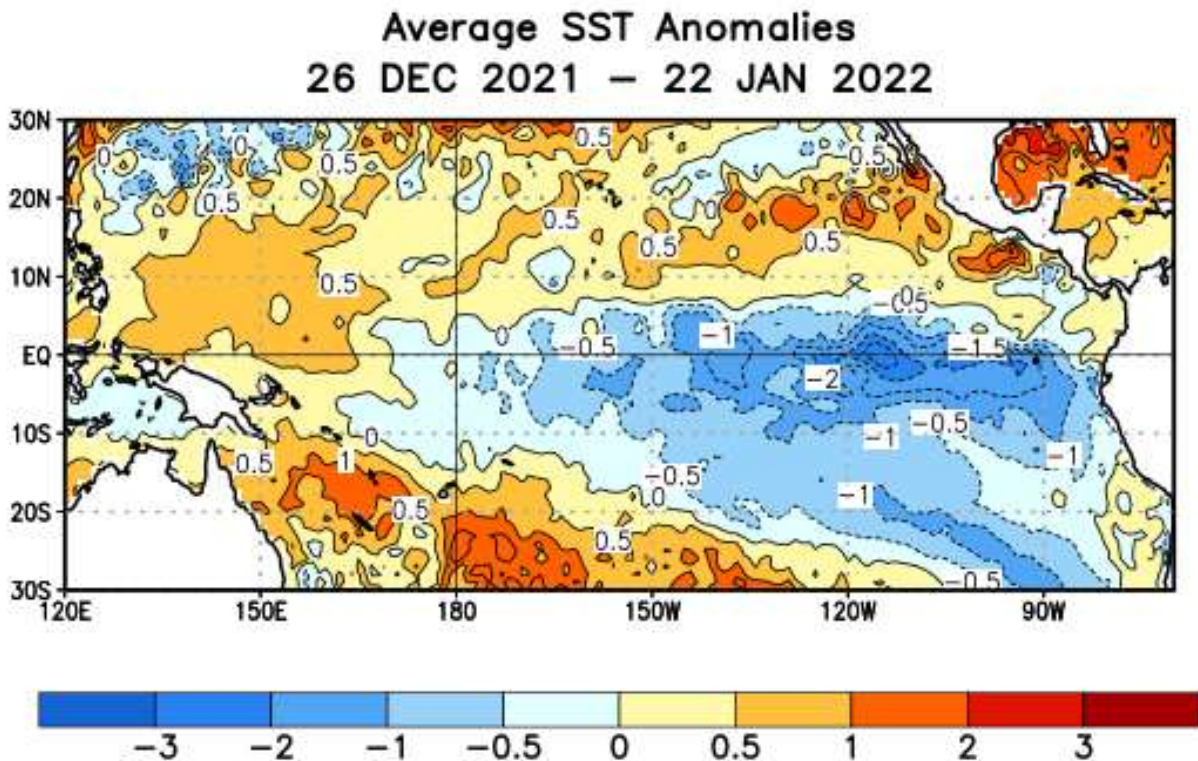

Fig 1: Observed Average sea surface temperature (SST) anomalies (°C)
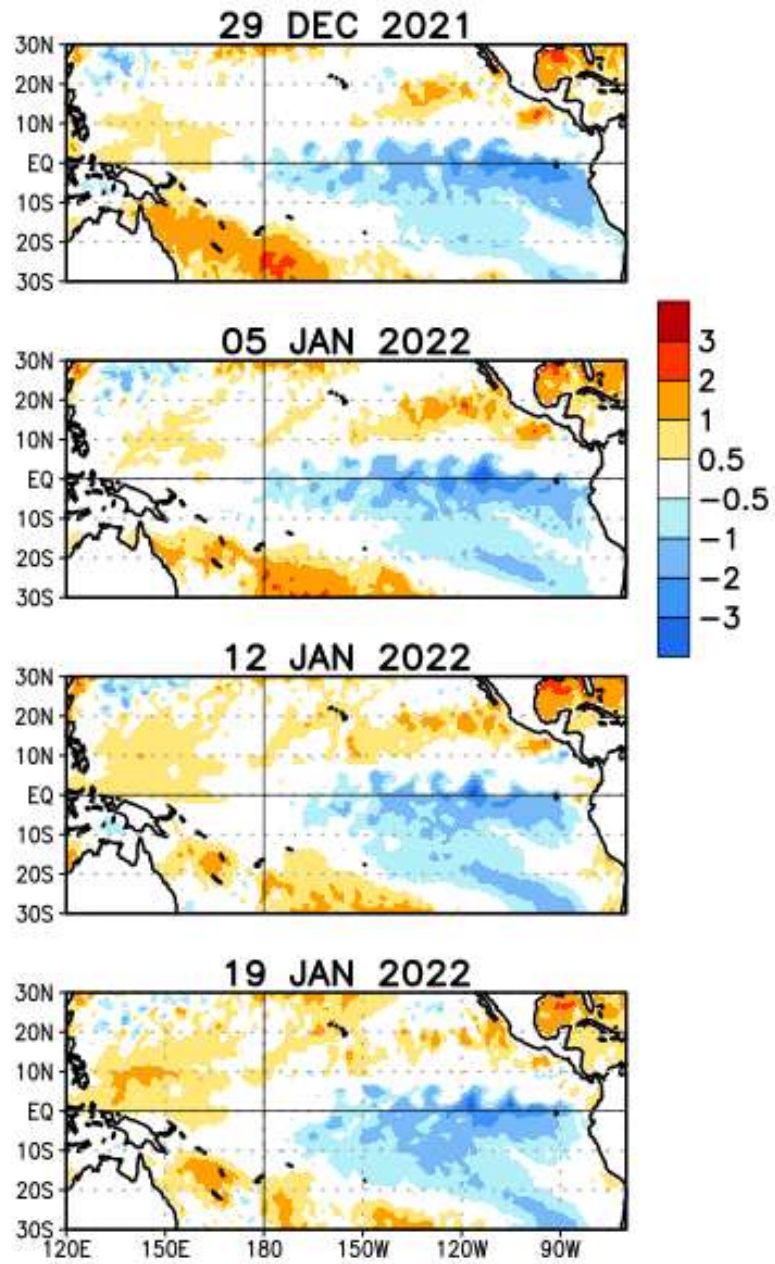
Weekly SST Anomalies (DEG C)

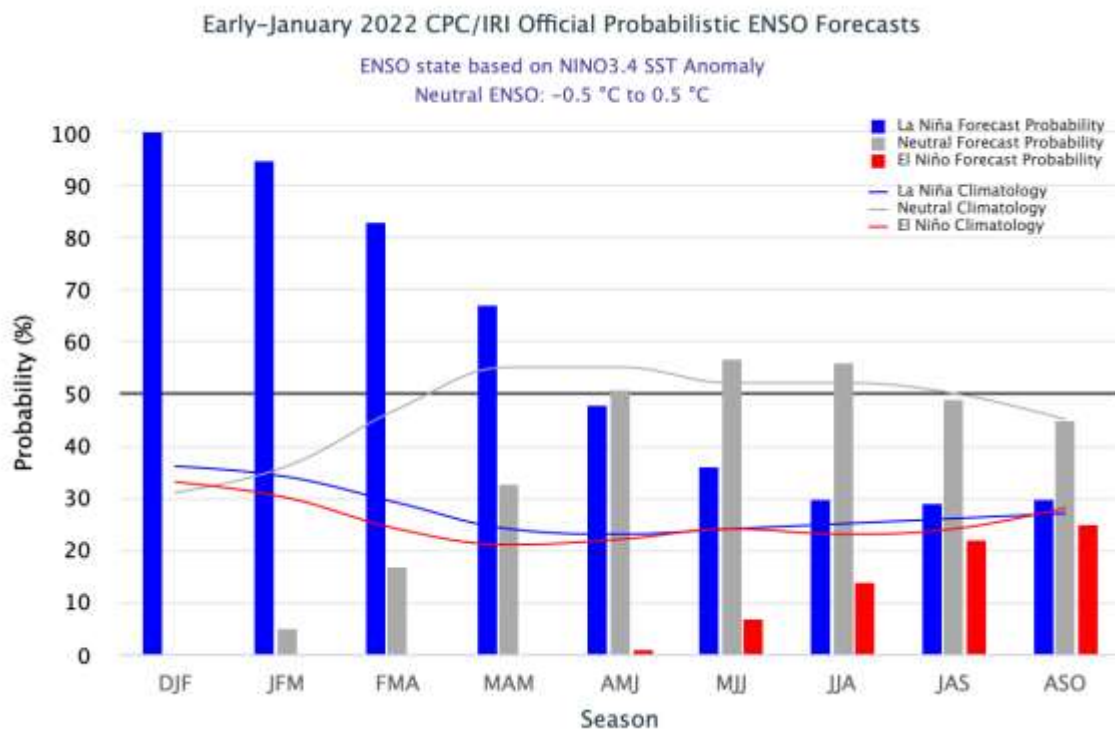Fig 2: Weekly Observed Average sea surface temperature (SST) anomalies (°C)

Fig 3a: ENSO forecast from Climate Prediction Center (CPC)/ IRI Forecast

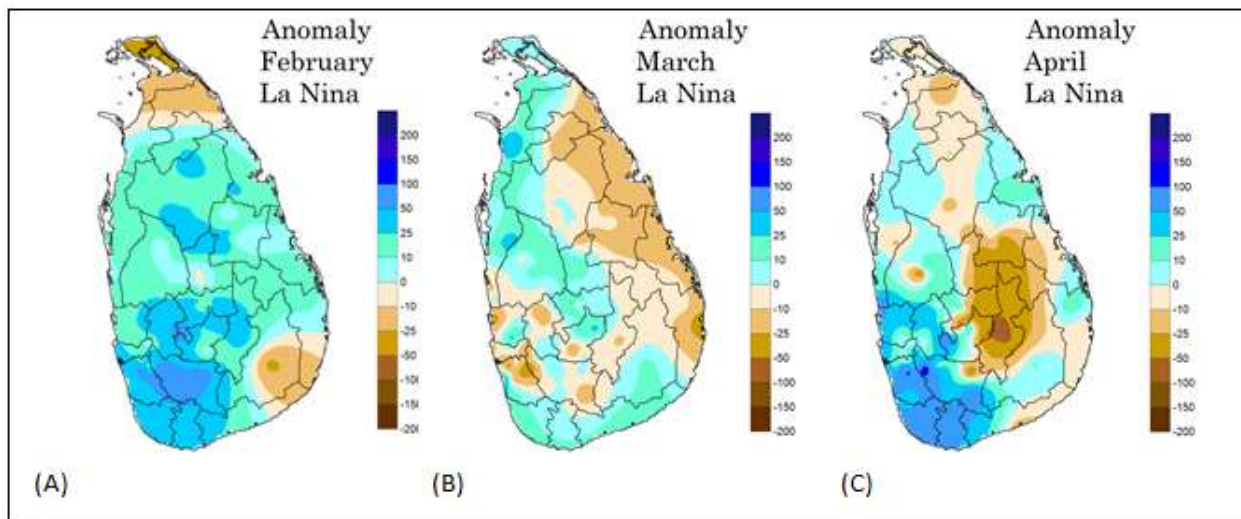**1.1.1 Impacts of La-Nina on monthly rainfall anomaly during February, March and April**

Fig 3b: Monthly Rainfall Anomaly maps of the months of February (A), March (B) and April (C) during La-Nina years (Hapuarachchi et al 2016)

Previous studies conducted by the Department of Meteorology, identified that, during La-Nina years, above normal rainfalls in most of the areas of the country except northern and southeastern parts where below normal rainfalls were observed during the month of February (Fig 3b-A).

During the month of March it was observed that above normal rainfalls (Fig 3b-B) over the northern, northwestern and southern coastal areas and below normal rainfall in eastern part of the country. During the month of April, it could be seen above normal rainfall in southwestern parts and below normal rainfall in eastern slope of the cental hills. (Fig 3b-C).

1.2 The Indian Ocean Dipole (IOD) update

Near normal Sea surface temperatures (SSTs) were observed over most parts of the Indian Ocean while SSTs in the western parts of the Indian ocean and Bay of Bengal are higher than the normal. However the Indian Ocean Dipole (IOD) is persists within neutral bounds. The latest weekly value of the Indian Ocean Dipole (IOD) index to 16th January was −0.30 °C. All five international climate models surveyed by the BoM indicate the monthly IOD value will continue within neutral range for February and likely to continue coming months in 2022. (Source-Bureau of Meteorology, Australia).
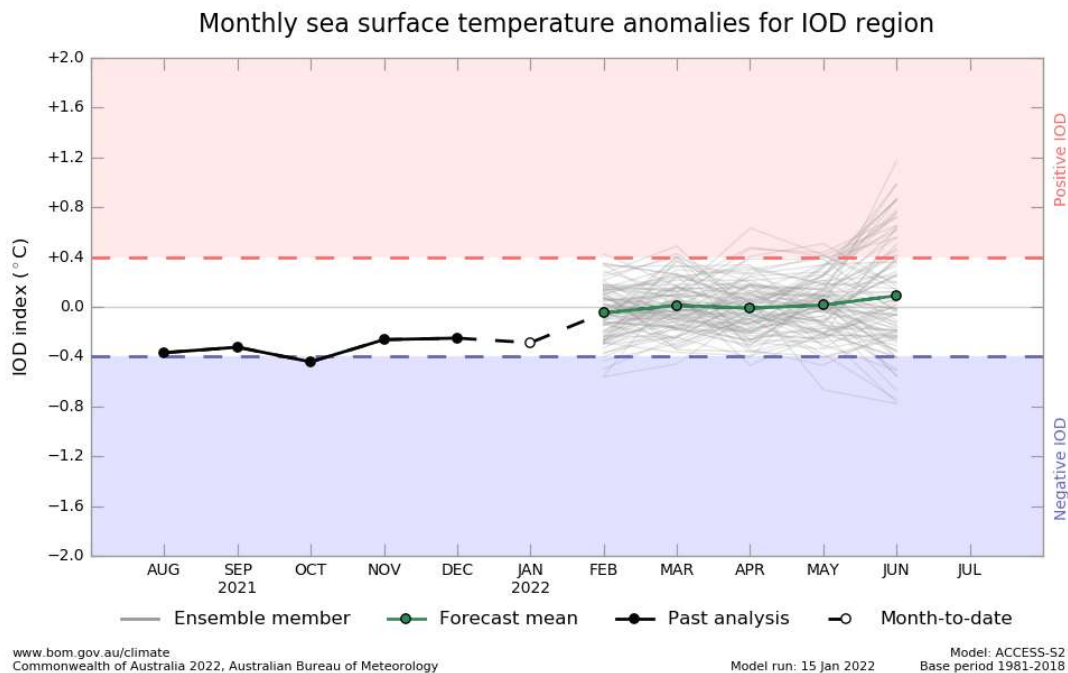

Figure 4a: IOD forecast from Australian Bureau of Meteorology .

2. Forecasts from different climate models from around the world.

2.1 February to April (FMA) 2022 season

Figure 5 shows the probabilistic multi model ensemble forecast which prepared by using dynamical models from 14 Global Producing Centers (GPC) for FMA season. According to that above normal rainfall can be expected over most parts of the country during February –April (FMA) 2022 season.
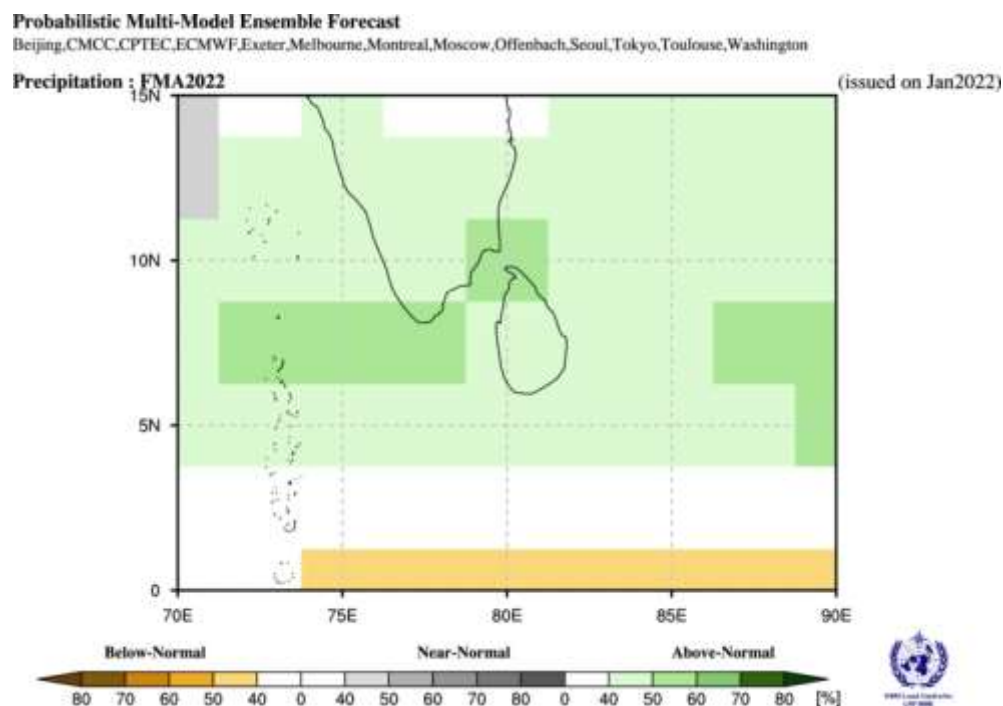
Fig 5: Probabilistic multi model ensemble forecast for FMA using dynamical models from 14 WMO global producing centers (GPC).

Figure 6 depicts individual forecasts provided by same GPC centers for the FMA season. Out of 12 GPC individual models, 6 models predicted near or slightly above normal rainfall over the country and there is no clear signal in 6 GPC models. Accordingly, above normal rainfall can be expected over the country during FMA 2022 season.

Fig 6: Individual forecasts for FMA 2022 season by dynamical models from 12 WMO global producing centers (GPC).

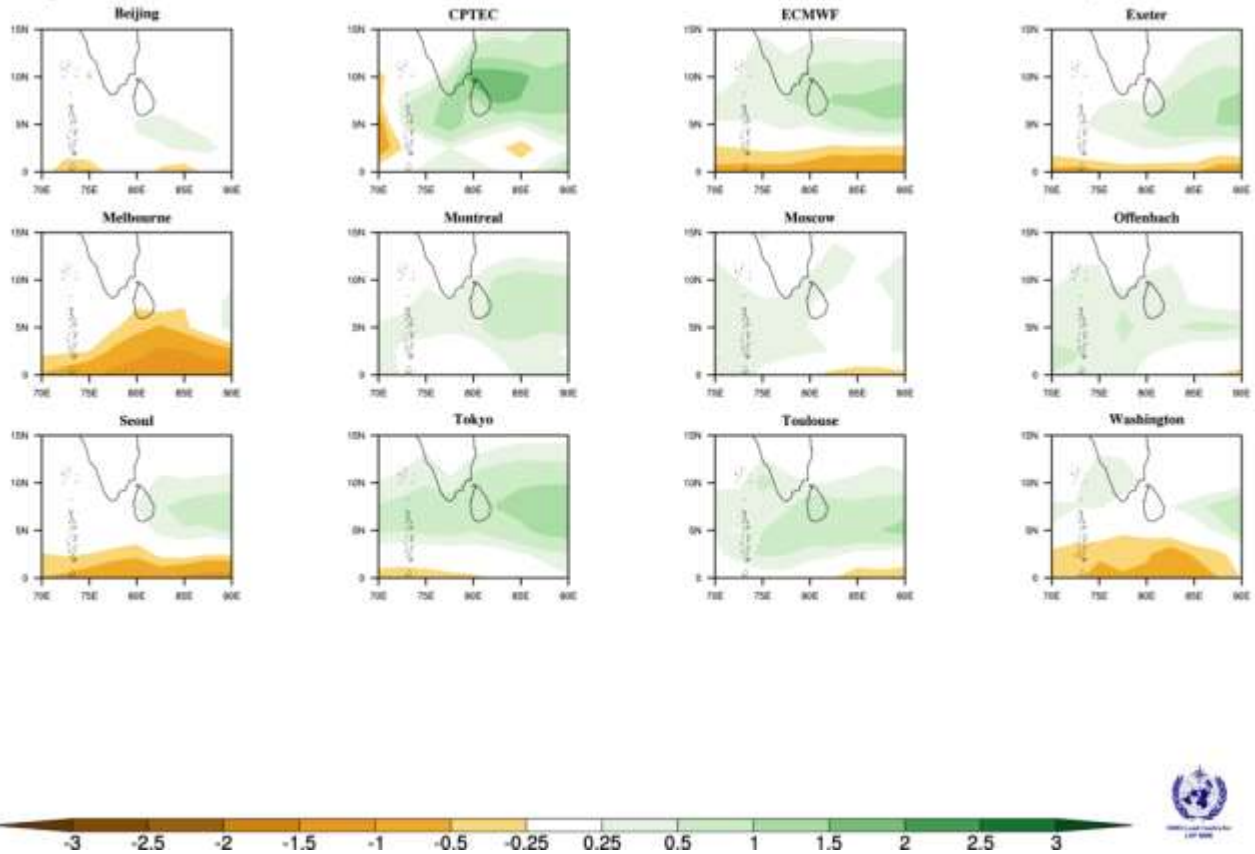## 2.2 Monthly Forecast for February, March and April 2022

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 February, March and April 2022. According to that during the months of February and March it can be expected slightly above normal rainfall over the country. During the month of April it can be expected slightly above normal rainfall over most parts of the country except Northern, Eastern and Southern parts of the country, where no clear signal indicated. Accordingly below, about or above normal rainfall can be expected over no signal areas during the season.
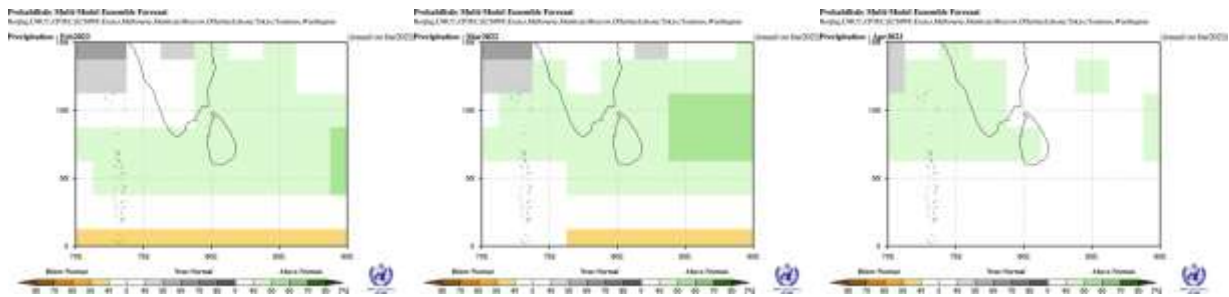
Fig 7: Probabilistic multi model ensemble forecast for February (left), March (middle) and April (right) 2022 using dynamical models from 13 WMO global producing centers (GPC).

Fig 8: Individual forecast for February 2022 by dynamical models from 12 WMO global producing centers (GPC).

Figure 8 shows the 12 monthly forecasts from individual global producing centers (GPC) for February 2022. Out of 12 GPC forecasts, 7 GPC models predicted near or a slightly above normal rainfall over the country and there is no clear signals indicated in 5 GPC models. Accordingly near or a slightly above normal rainfall can be expected over the country during the month of February 2022.

Lat : 0~15, Lon : 70~90
Precipitation : Mar2022

[Unit : mm]
(issued on Jan2022)

Fig 9: Individual forecast for March 2022 by dynamical models from 12 WMO global producing centers (GPC).

Figure 9 shows the monthly forecasts from individual global producing centers (GPC) for March 2022. Out of 12 GPC forecasts, 7 GPC models predicted near or slightly above normal rainfall over the country, particularly over Eastern and Southeaster part of the country and there is no clear signal in 5 GPC models for the month of March 2022. Accordingly, it can be expected near or slightly above normal rainfall over the country during the month of March 2022.

Lat : 0~15, Lon : 70~90
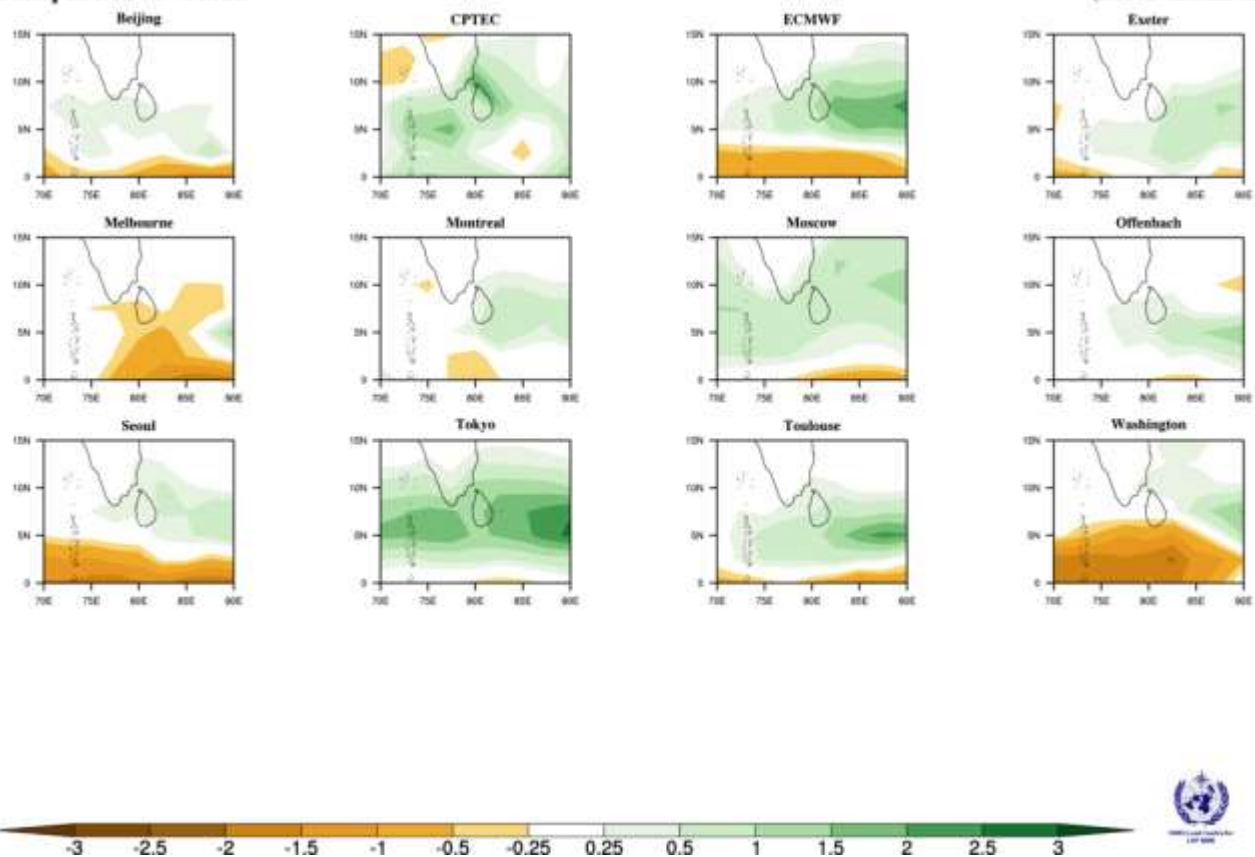Precipitation : Apr2022

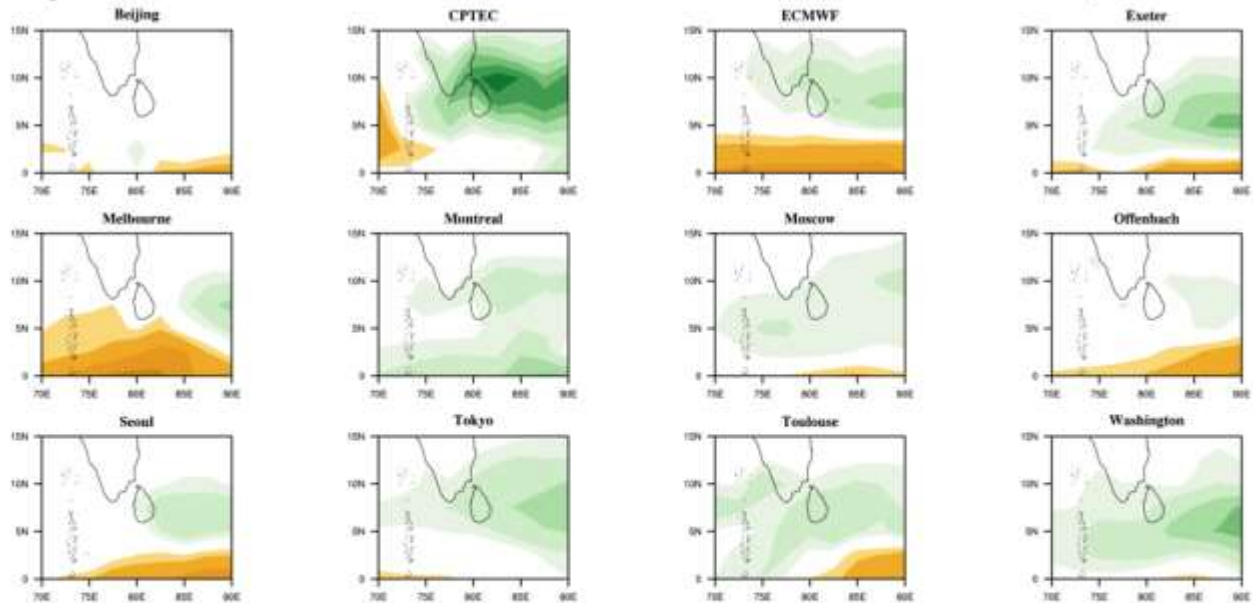[Unit : mm]
(issued on Jan2022)
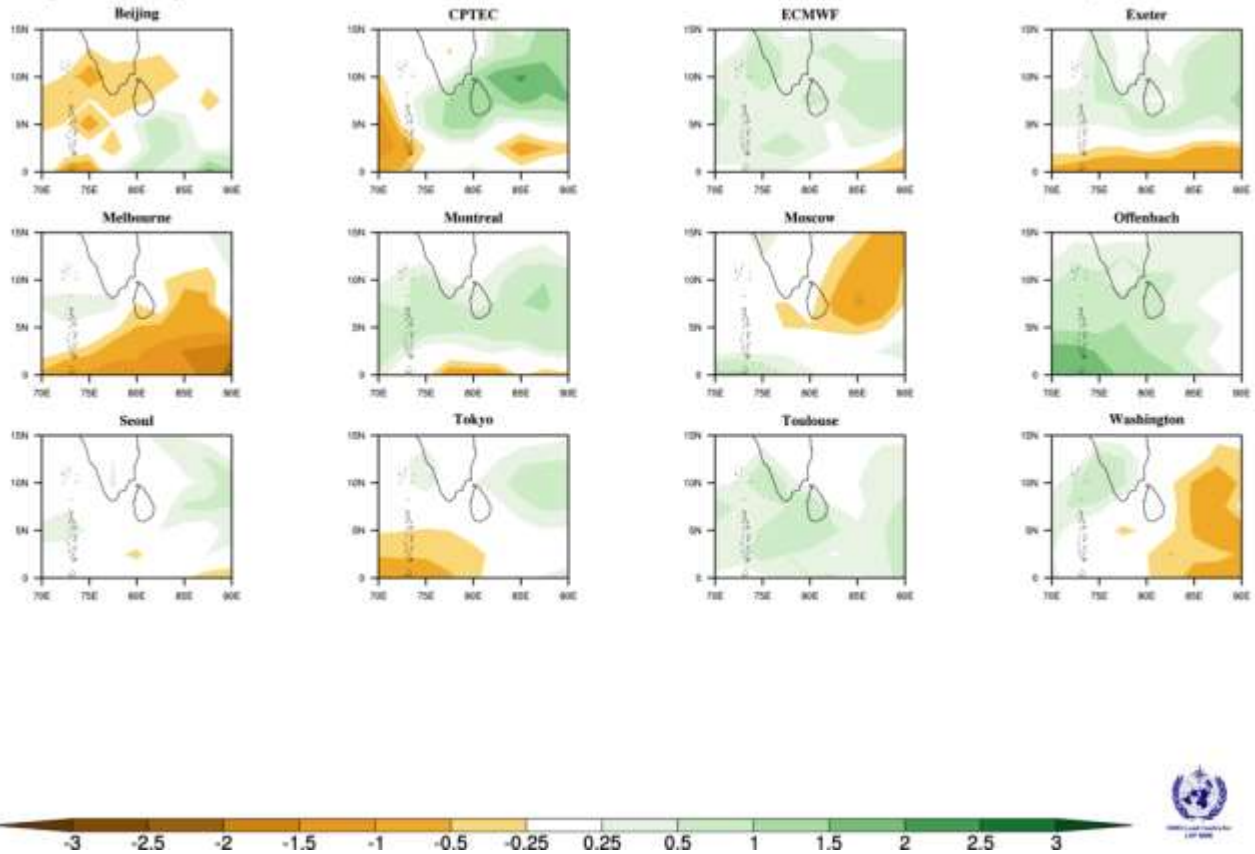
Fig 10: Individual forecast for April 2022 by dynamical models from 12 WMO global producing centers (GPC).

Figure 10 shows the monthly forecasts from 12 individual global producing centers (GPC) for April 2022. Out of 12 GPC forecasts, 4 GPC models indicate slightly above normal rainfall over the country. There is no clear signal from 8 GPC models for the month of April 2022. Accordingly below or about or above normal rainfall can be expected over the country during the month of April 2022.

3. Statistical downscaling of CFSv2 global forecast output

3.1 Probabilistic rainfall forecast for FMA season 2022 using Climate Predictability tool (CPT)

The following district wise probabilistic rainfall forecasts for the season of FMA 2022 have been prepared with the multi model ensemble method to downscale ,SST data of CFSv2, CCSM4, and ECMWF by using CPT.

The district wise 30 year average rainfalls during FMA 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) –FMA	Probability%		
		Below	Normal	Above
Colombo	540.8	50	30	20
Kalutara	695.1	60	20	20
Galle	633.9	60	20	20
Matara	494.4	20	30	50
Hambantota	255.3	20	20	60
Ampara	330.5	20	20	60
Batticaloa	266.1	20	30	50
Trincomalee	199.2	25	30	45
Mullaithivu	178.9	30	30	40
Jaffna	93.1	40	30	30
Killinochchi	141.8	40	30	30
Mannar	195.3	45	25	30
Puttalam	264.2	55	25	20
Gampaha	474.4	55	25	20
Kegalle	647.2	45	30	25
Ratnapura	644.0	25	30	45
Monaragala	389.5	20	20	60
Badulla	509.8	25	30	45
Pollonnaruwa	300.5	25	30	45
Vavuniya	212.8	30	30	40
Anuradapura	244.9	40	30	30
Kurunegala	362.1	55	25	20
Matale	394.6	45	25	30
Kandy	448.9	20	25	55
Nuwaraeliya	475.7	20	20	60

Table 1: Probabilistic Rainfall Forecast for FMA season 2022 using CPT

Fig 11: Probabilistic rainfall forecast for February -April 2022 using CPT

According to the CPT (Fig 11 and table 01), above normal rainfalls can be expected in 11 districts out of 25. Below normal rainfall can be expected in 9 districts. There is no clear signal for Jaffna, Killinochchi, Mulathivu, Vavuniya and Anuradhapura districts for FMA season 2022. Therefore equal chances exist of receiving below normal, about normal or above normal rainfall over Jaffna, Killinochchi, Mulathivu, Vavuniya and Anuradhapura districts for FMA Season 2022.

3.2 Probabilistic rainfall forecast for FMA 2022 season using RIMES FOCUS System
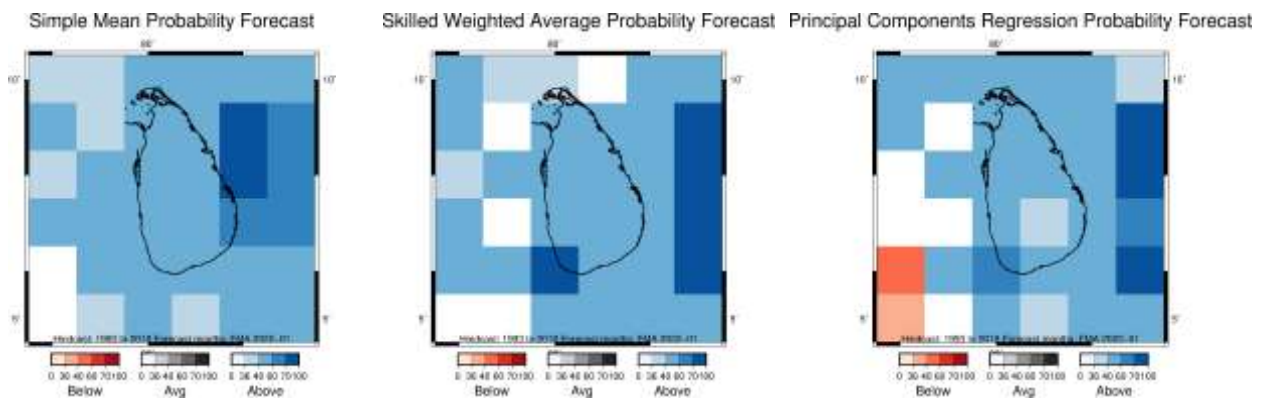

Fig 12. Probabilistic rainfall forecast for February-April 2022 using RIMES FOCUS System

Figure 12 depicts the Probabilistic rainfall forecast for FMA 2022 season, which has been prepared by using RIMES FOCUS System.

According to the model outputs it can be expected slightly above normal rainfalls over most parts of the country during FMA season 2022.

4. SUMMARY :

SUMMARY of MODEL FORECAST for FMA 2022 season for SRI LANKA						
Season	WMO LC MME	WMO GPC	CPT	FOCUS	Impact of Global conditions	Final
FMA season 2022	AN in Northern province and near or a slightly above normal elsewhere	Near or a Slightly Above Normal	AN- 11 districts(Eastern part of the country) BN-9 districts(Western coast) No Signal- Jaffna, Killinochchi, Mulathivu, Vavuniya and Anuradhapura	Slightly AN		Near normal rainfalls
February 2022	Near or slightly above Normal	Near or slightly above Normal	Near or slightly above Normal		La-Nina years, above normal rainfalls in most of the areas of the country except northern and southeastern parts where below normal rainfall	Near or a slightly above normal
March 2022	Near or a slightly above	Near			Above normal rainfalls over the northern, northwestern and southern coastal areas and below normal rainfall in eastern part of the country.	Near normal rainfalls in Eastern and Uva provinces and no signal for other areas
April 2022	No Signal- Northern, Eastern and Southern part AN- Elsewhere	No Signal			Above normal rainfall in southwestern parts and below normal rainfall in eastern slope of the cental hills.	No signal

BN: Below Normal **NN**: Near Normal **AN**: Above Normal **CP**: Climatological Probability
Table 2: Summery of Model Forecasts for FMA season 2022

4.1 Summery of Prevailing global climate conditions

- La Niña is persist in the Pacific Ocean and is expected to continue through winter 2021-22 and return to neutral during spring. Further La Niña is likely to continue in to the Northern Hemisphere spring with 67% chance during March – May 2022 and then transition to ENSO-neutral during April-June 2022 with 51% (source-CPC-USA) (Fig.3a).

- Indian Ocean Dipole (IOD) is persists within neutral bounds.. All five international climate models surveyed by the BoM indicate the monthly IOD value will continue within neutral range for February and likely to continue coming months in 2022. (Source-Bureau of Meteorology, Australia).

5. Consensus Seasonal outlook for February, March and April 2022

Considering the prevailing global climate conditions, forecasts from different global climate models and statistical downscaling of GCM output using CPT, consensus forecasts for February to April 2022 are concluded as follows.

5.1 Rainfall forecast for February-March-April (FMA) 2022 three months period

There is a probability for near normal rainfall over most parts of the country for the season of FMA 2022. (Fig. 13).

5.2 Rainfall forecast for February 2022

Near or slightly above normal rainfalls are likely over most parts of the country during the month of February 2022.

5.3 Rainfall forecasts for March 2022

There is a possibility for near normal rainfalls over Eastern and Uva provinces and no signals for other areas where there are equal chances for having below, near or above normal rainfalls during the month of March 2022.

5.4 Rainfall forecasts for April 2022

There is no clear signal to issue a forecast for the month of April 2022. As such there are equal probabilities of having above, near or below normal rainfalls, during April 2022.

**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 phenomina which can't be underestimated.

Fig 13. Consensus Probabilistic rainfall forecast for February–April 2022

5.5 Probabilistic Temperature Forecast from February to April 2022 (FMA)

The probabilistic Temperature forecast for February, March and April season (FMA) 2022 for Sri Lanka as given below.
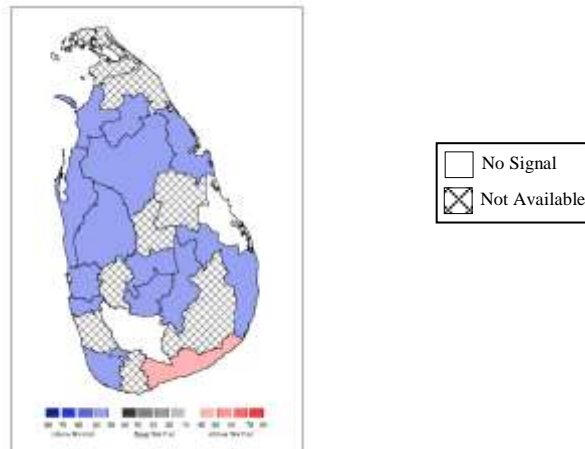

Fig 14: Probabilistic forecast for Maximum Temperatures for FMA season 2022

Fig 14 and Table 3 show the probabilistic forecast for Maximum Temperatures during FMA season 2022.

There is a higher chance of experiencing slightly below the normal Maximum Temperatures in Vavunia, Mannar, Puttlum, Anuradhapura, Kurunegala, Gampaha, Colombo, Galle, Kandy, Nuwara Eliya, Badulla, Ampara and Trincomalee districts and slightly above the normal Maximum Temperatures in Hambantota Districts (Fig 14) for the FMA season 2022.

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) – (FMA)	Probability %		
		Below	Normal	Above
Anuradhapura	33.7	45	20	35
Badulla	28.5	40	30	30
Batticaloa	30.1	35	35	30
Colombo	31.6	40	30	30
Galle	30.4	40	30	30
Hambantota	30.8	25	30	45
Katugastota	30.8	45	25	30
Katunayake	32.5	40	30	30
Mannar	31.6	45	30	25
MahaIlluppallama	33.0	45	35	20
NuwaraEliya	22.1	45	20	35
Pottuvil	30.4	40	30	30
Puttalam	32.7	45	25	30
Ratnapura	33.8	35	30	35
Ratmalana	31.7	40	30	30
Trincomalee	30.9	45	30	25
Vavuniya	33.1	45	20	35
Kurunegala	33.7	40	30	30
Bandarawela	25.2	45	35	20

Table 3: probabilistic forecast for Maximum Temperature for FMA season 2022
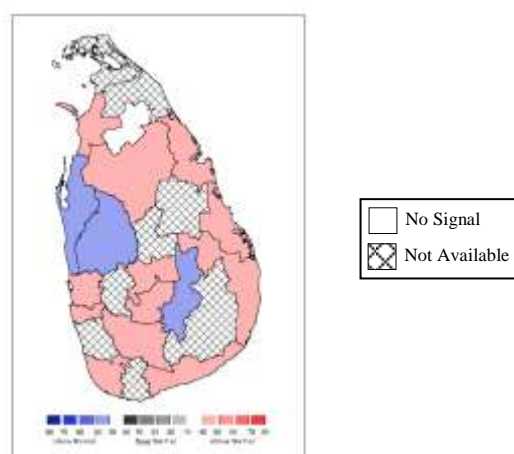

Fig 15: Probabilistic forecast for Minimum Temperatures for FMA season 2022

Fig 15 and Table 4 provide the probabilistic forecast for Minimum Temperatures during FMA season 2022.

Accordingly, there is a higher chance of experiencing slightly above the normal Minimum Temperatures in Mannar, Aanuradhapura, Colombo, Gampaha, Rathnapura, Hambantota, Galle, Kandy, Nuwara Eliya, Ampara, Batticaloa and Trincomalee districts and slightly below the normal Minimum Temperatures in Puttlum, Kurunegala and Badulla districts (Fig 15) during FMA season 2022.

District	Average Minimum Temperature (^{0}C) – (FMA)	Probability %		
		Below	Normal	Above
Anuradhapura	22.8	30	25	45
Badulla	18.1	40	30	30
Batticaloa	24.3	30	25	45
Colombo	23.6	30	30	40
Galle	23.9	30	30	40
Hambantota	24.0	30	25	45
Katugastota	19.8	30	30	40
Katunayake	23.0	25	30	45
Mannar	24.6	35	20	45
MahaIlluppallama	22.1	35	20	45
NuwaraEliya	10.4	30	30	40
Pottuvil	22.6	25	30	45
Puttalam	23.0	40	30	30
Ratnapura	22.6	30	30	40
Ratmalana	23.2	30	35	45
Trincomalee	25.1	30	30	40
Vavuniya	21.9	35	35	30
Kurunegala	22.3	45	20	35
Bandarawela	14.7	40	30	30

Table 4: Probabilistic forecast for Minimum Temperatures for FMA season 2022

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