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**வளிமண்டலவியல் திணைக்களம்**  
**DEPARTMENT OF METEOROLOGY**  
ශ්‍රී ලංකාව இலங்கை SRI LANKA

**Consensus Seasonal Weather Outlook**  
**December, January and February (DJF)**  
**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

Below average sea surface temperatures (SST) were observed across most of the Pacific Ocean during the last four weeks. Further, sea surface temperature anomalies were below average across the central and east-central Pacific Ocean and were above average in the far western Pacific Ocean. (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 expected to continue through winter 2021-22 and return to neutral during spring. Further, La Niña is likely to continue through the Northern Hemisphere winter 2021-22 with 90% chance and into spring 2022 with 50% chance. (source- CPC-USA) (Fig.3a).

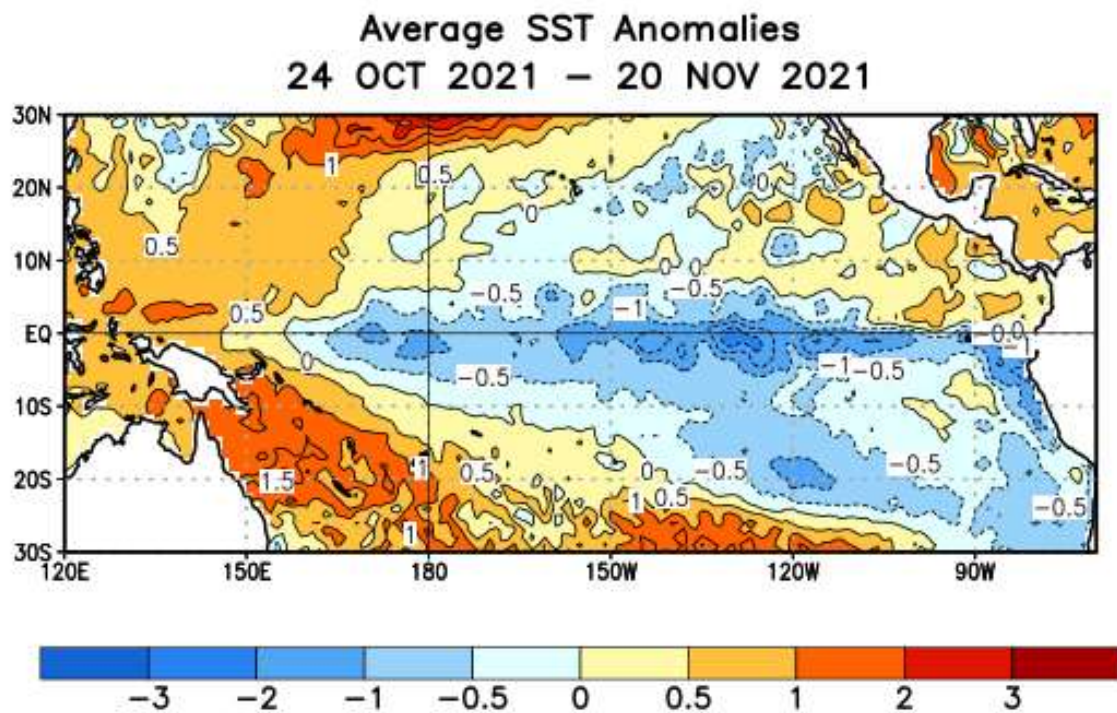


Fig 1: Observed Average sea surface temperature (SST) anomalies (°C)

## Weekly SST Anomalies (DEG C)

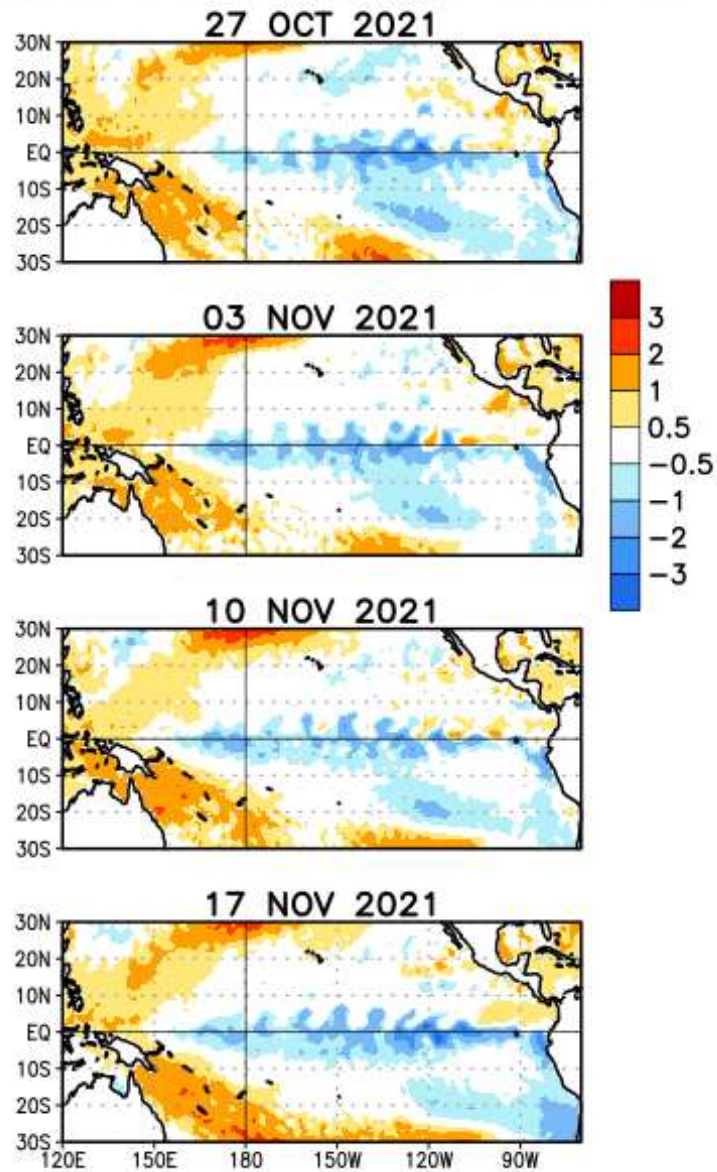


Fig 2: Weekly Observed Average sea surface temperature (SST) anomalies (°C)

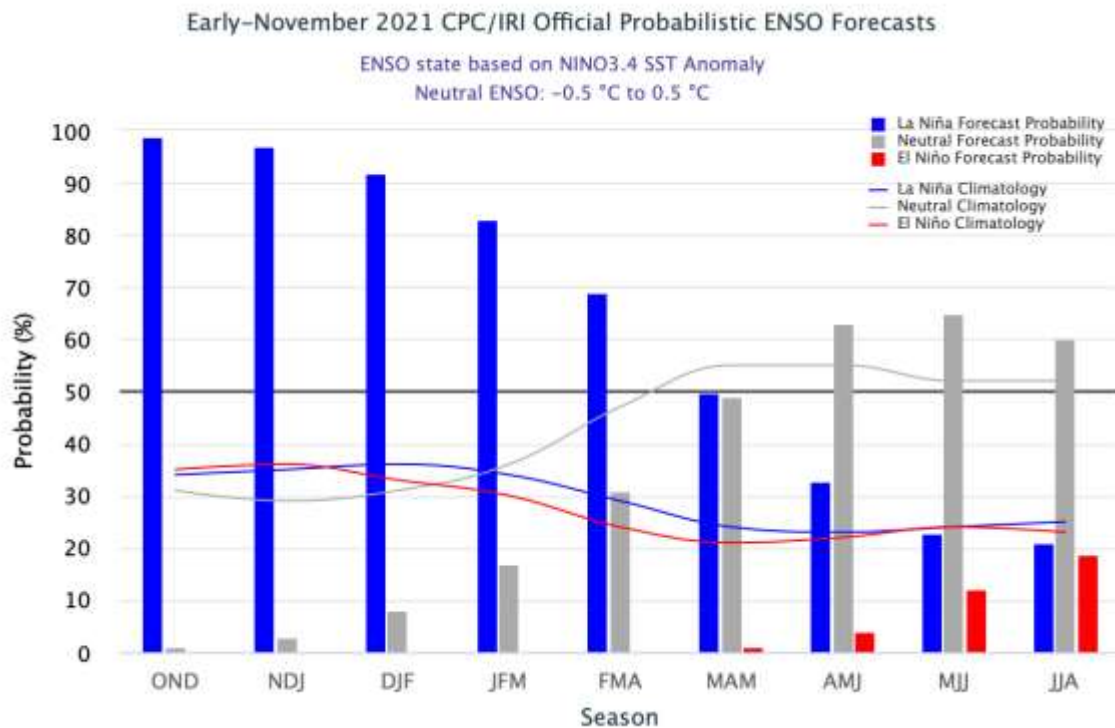


Fig 3a: ENSO forecast from Climate Prediction Center (CPC)/ IRI Forecast

### 1.1.1 Impacts of La-Nina on monthly rainfall anomaly during December, January and February

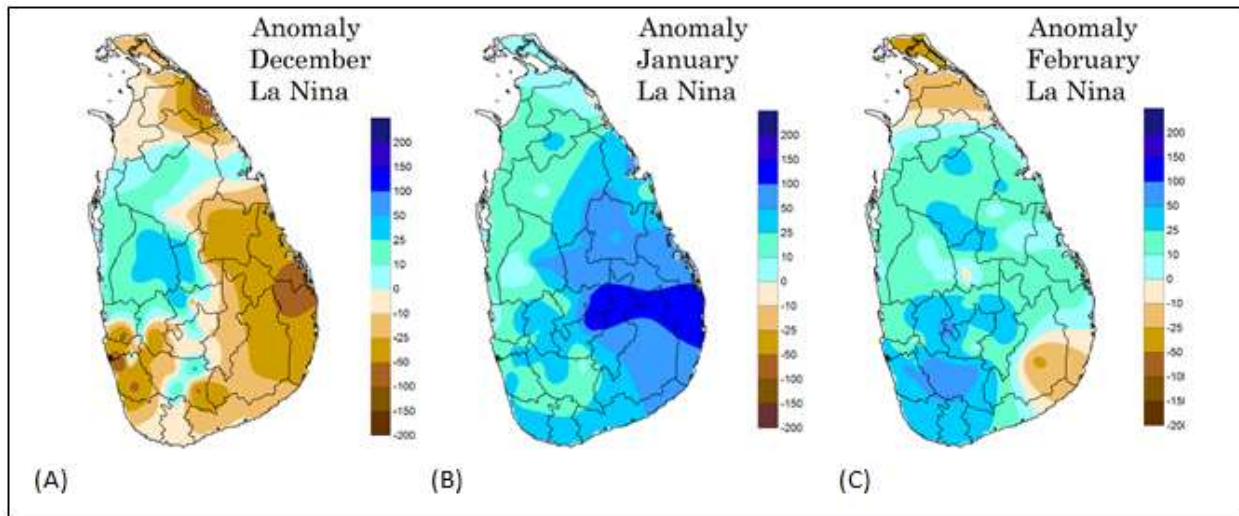


Fig 3b: Monthly Rainfall Anomaly maps of the months of December (A), January (B) and February (C) during La-Nina years (Hapuarachchi et al 2016)

Previous studies conducted by the Department of Meteorology, identified that, during La-Nina years, below normal rainfalls in some parts of Eastern, Uva, Southern and western provinces and in Mulative and Pollonnaruwa districts and above normal rainfall in remaining areas of the

country during the month of December (Fig 3b-A). During the month of January it was observed that above normal rainfall (Fig 3b-B) over the country specially in eastern parts. During the month of February, it could be seen below normal rainfall in Northern and South eastern parts and above normal rainfall in remaining areas of the country (Fig 3b-C).

## 1.2 The Indian Ocean Dipole (IOD) update

Above normal Sea surface temperatures (SSTs) were observed over most parts of the Bay of Bengal and below normal SSTs were observed in the northern Arabian Sea area. However the Indian Ocean Dipole (IOD) is persists within neutral bounds. The latest weekly value of the Indian Ocean Dipole (IOD) index to 21 November was  $-0.34\text{ }^{\circ}\text{C}$ . All five international climate models surveyed by the BoM indicate the monthly IOD value will continue within neutral range for December and likely to continue until April 2022. (Source-Bureau of Meteorology, Australia).

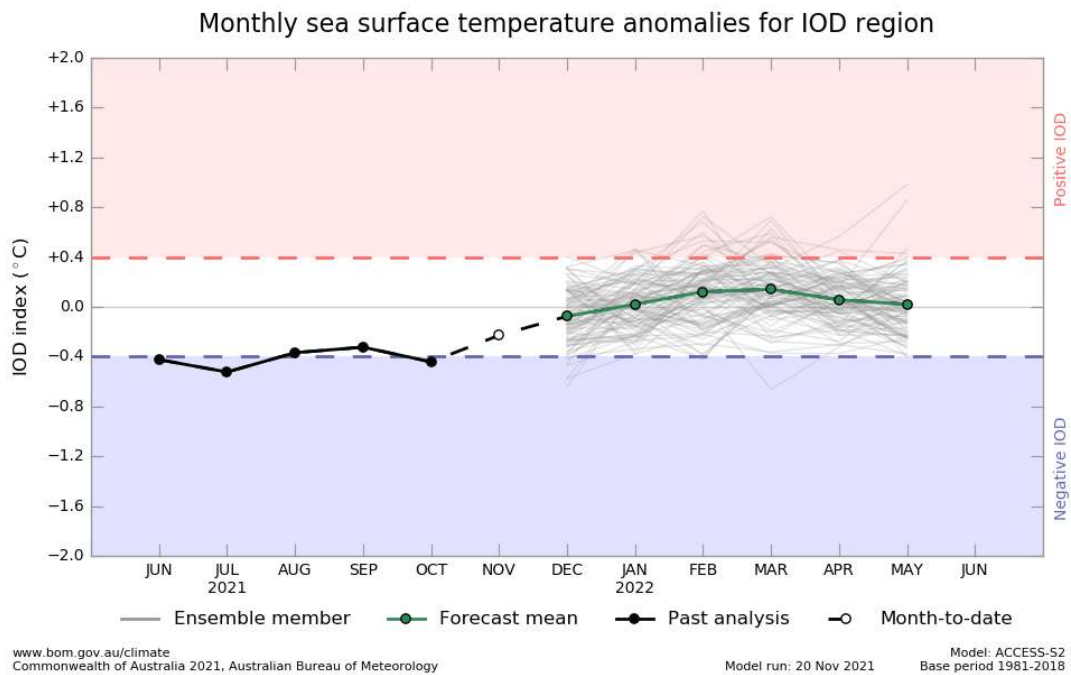


Figure 4a: IOD forecast from Australian Bureau of Meteorology .

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

### 2.1 December to February (DJF) 2021/2022 season

Figure 5 shows the probabilistic multi model ensemble forecast which prepared by using dynamical models from 13 Global Producing Centers (GPC) for DJF season. According to that above normal rainfall can be expected over most parts of the country except Southern part, where no clear signal indicated. Accordingly below, about or above normal rainfall can be expected over Southern part during December -February(DJF) 2021/2022season.

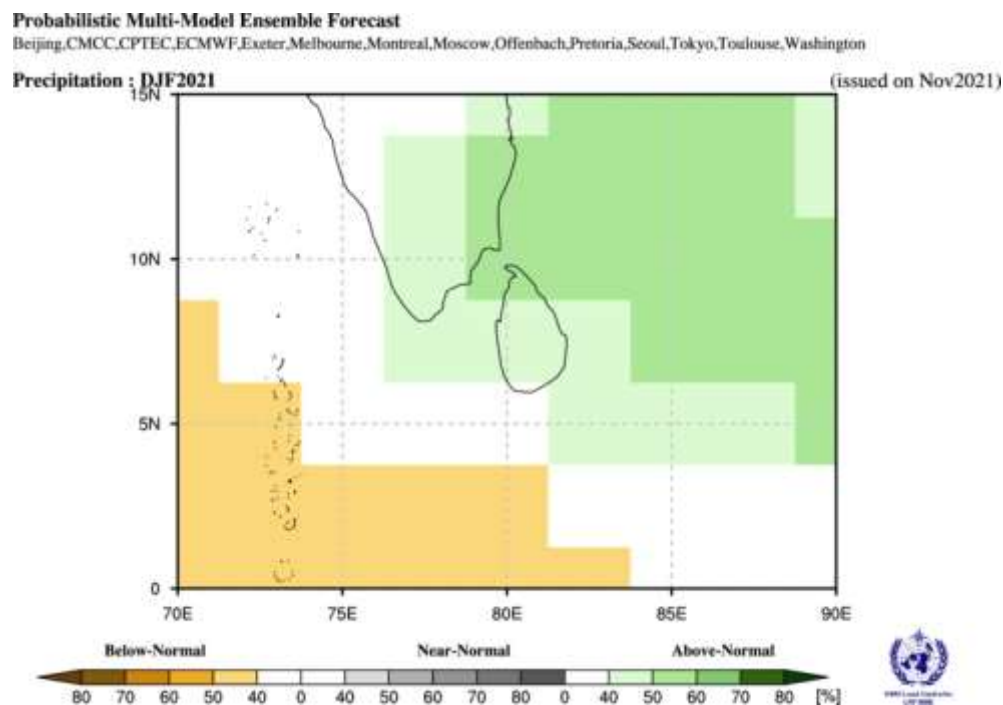


Fig 5: Probabilistic multi model ensemble forecast for DJF using dynamical models from 13 WMO global producing centers (GPC).

Figure 6 depicts individual forecasts provided by same GPC centers for the DJF season. Out of 13 GPC individual models, 7 models predicted above normal rainfall over the Northeastern part of the country and there is no clear signal in 6 GPC models. Accordingly, there is a probability for above normal rainfalls over Northern and Eastern parts of the country during DJF 2021/2022 season.

Lat : 0~15, Lon : 70~90  
 Precipitation : DJF2021

[Unit : mm]  
 (issued on Nov2021)

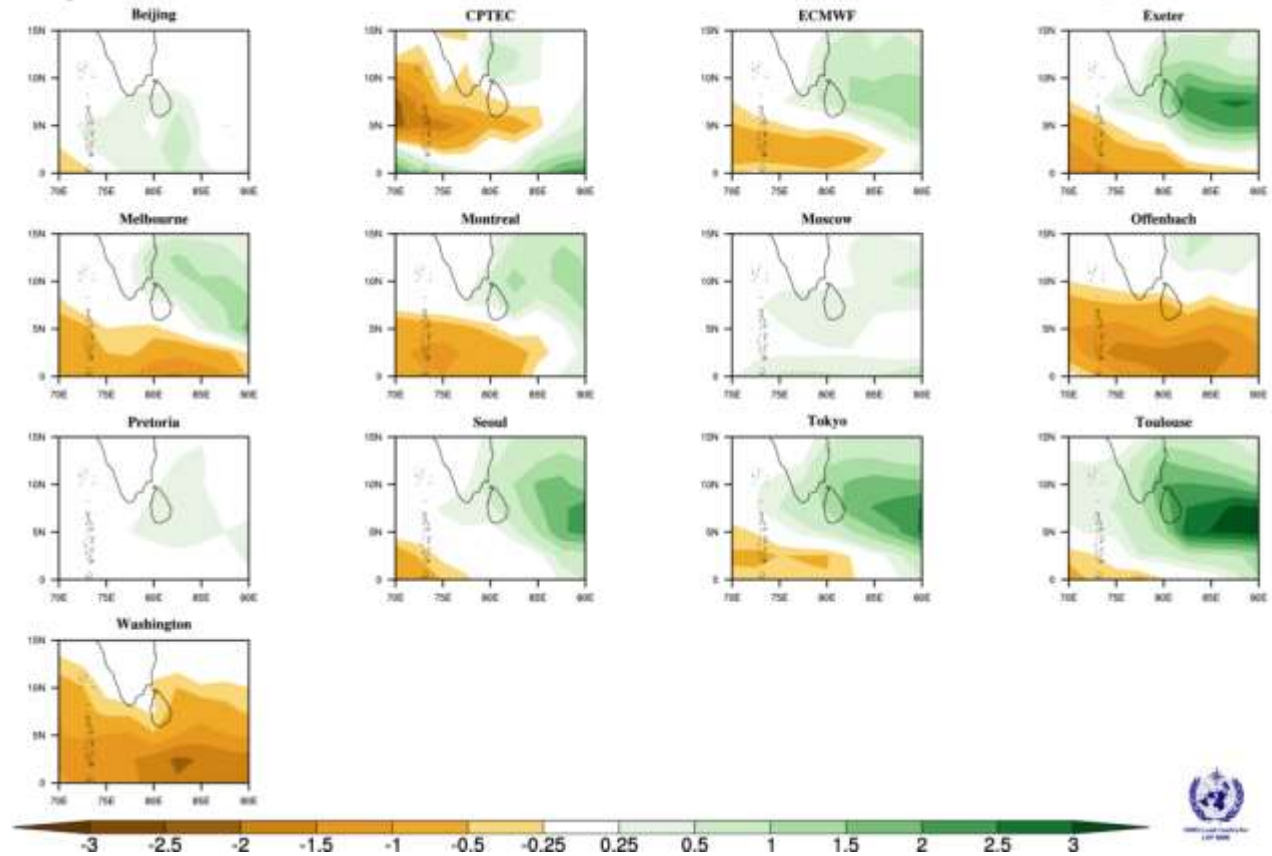


Fig 6: Individual forecasts for DJF 2021/2022 season by dynamical models from 12 WMO global producing centers (GPC).

## 2.2 Monthly Forecast for December 2021, January and February 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 December, January 2021 and February 2022. According to that during the month of December it can be expected slightly above normal rainfall over most parts of the country and slightly below normal rainfall over southern part of the country. There is no clear signal indicate over eastern part of the country and accordingly below, about or above normal rainfall can be expected over eastern part during December 2021. During the month of January and February 2022 it can be expected slightly above normal rainfall over most parts of the country.

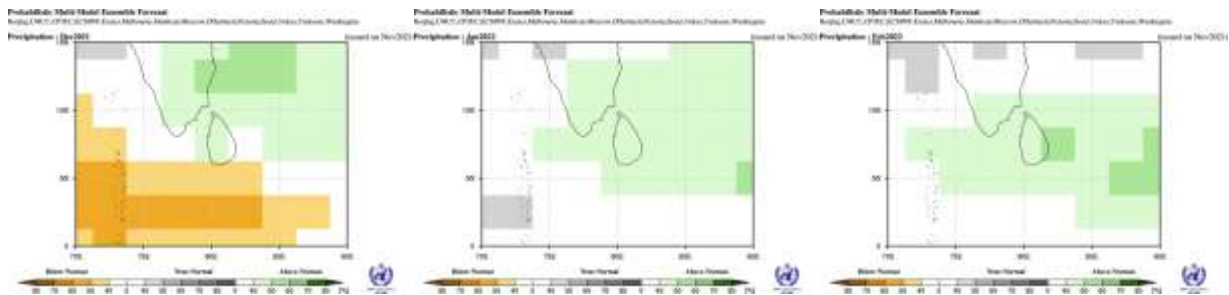


Fig 7: Probabilistic multi model ensemble forecast for December 2021 (left), January 2022 (middle) and February 2022 (right) using dynamical models from 13 WMO global producing centers (GPC).

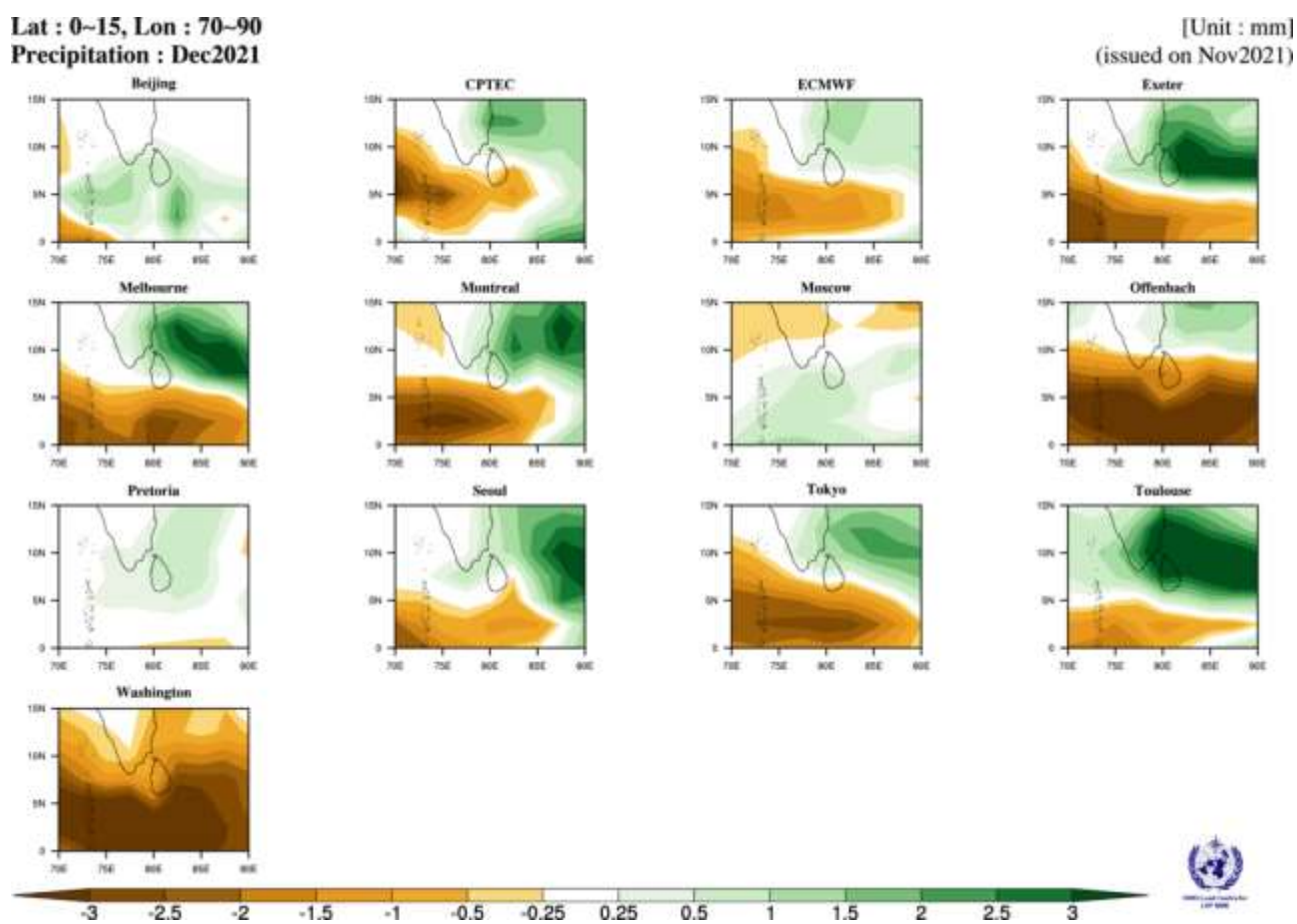


Fig 8: Individual forecast for December 2021 by dynamical models from 13 WMO global producing centers (GPC).

Figure 8 shows the 13 monthly forecasts from individual global producing centers (GPC) for December 2021. Out of 13 GPC forecasts, 7 GPC models predicted slightly above normal rainfall over NorthEastern part of the country and 1 predicted below normal rainfall over most



parts of the country and there is no clear signals indicated in 5 GPC models. Accordingly, near or slightly above normal rainfalls are likely over Northeastern part of the country and no signal for remaining areas, where there are equal probability for below, about or above normal rainfall during the month of December 2021.

Lat : 0~15, Lon : 70~90  
Precipitation : Jan2022

[Unit : mm]  
(issued on Nov2021)

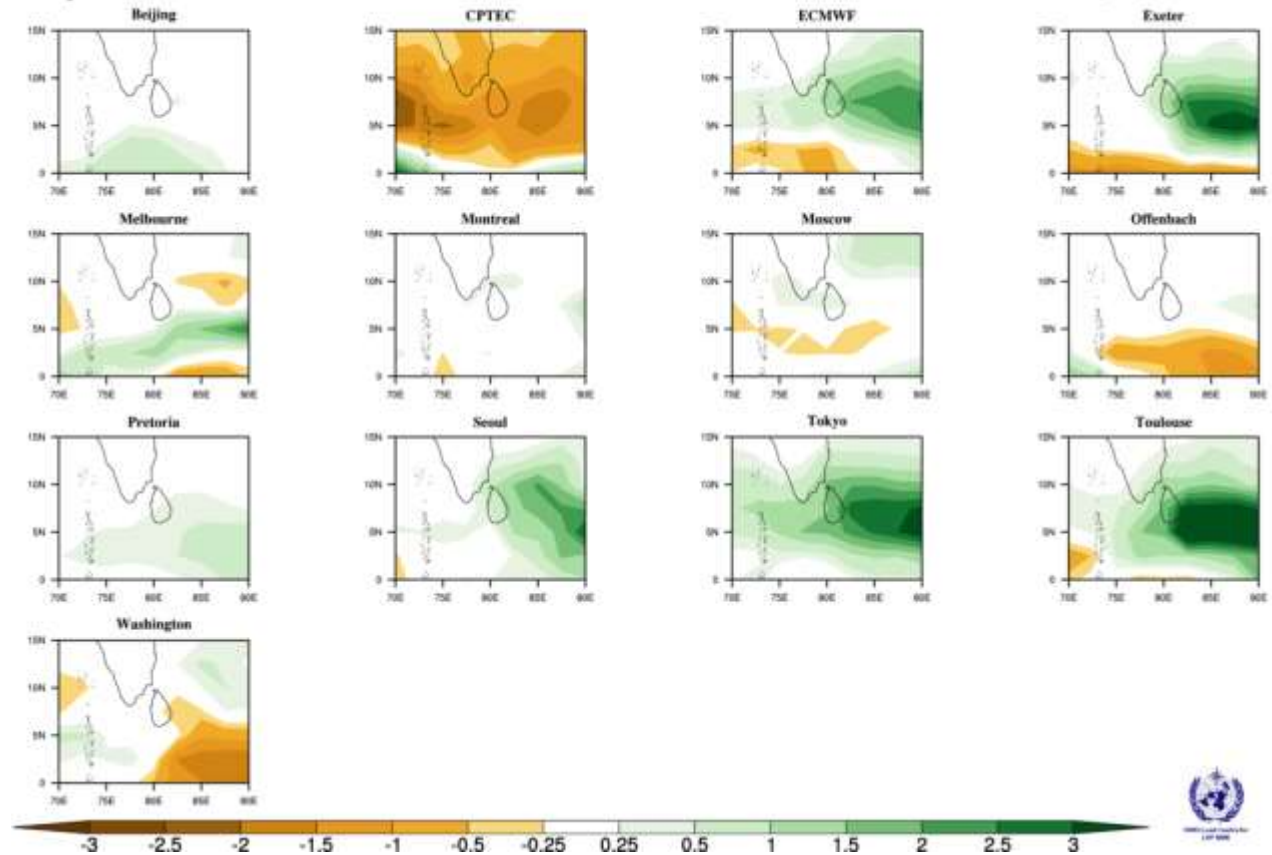


Fig 9: Individual forecast for January 2022 by dynamical models from 13 WMO global producing centers (GPC).

Figure 9 shows the monthly forecasts from individual global producing centers (GPC) for January 2022. Out of 13 GPC forecasts, 5 GPC models predicted above normal rainfall over the country and 1 GPC model predicted below normal rainfall. There is no clear signal in 7 GPC models for the month of January 2022. Accordingly, it can be expected below, about or above normal rainfall over the country during the month of January 2022.

Lat : 0~15, Lon : 70~90  
 Precipitation : Feb2022

[Unit : mm]  
 (issued on Nov2021)

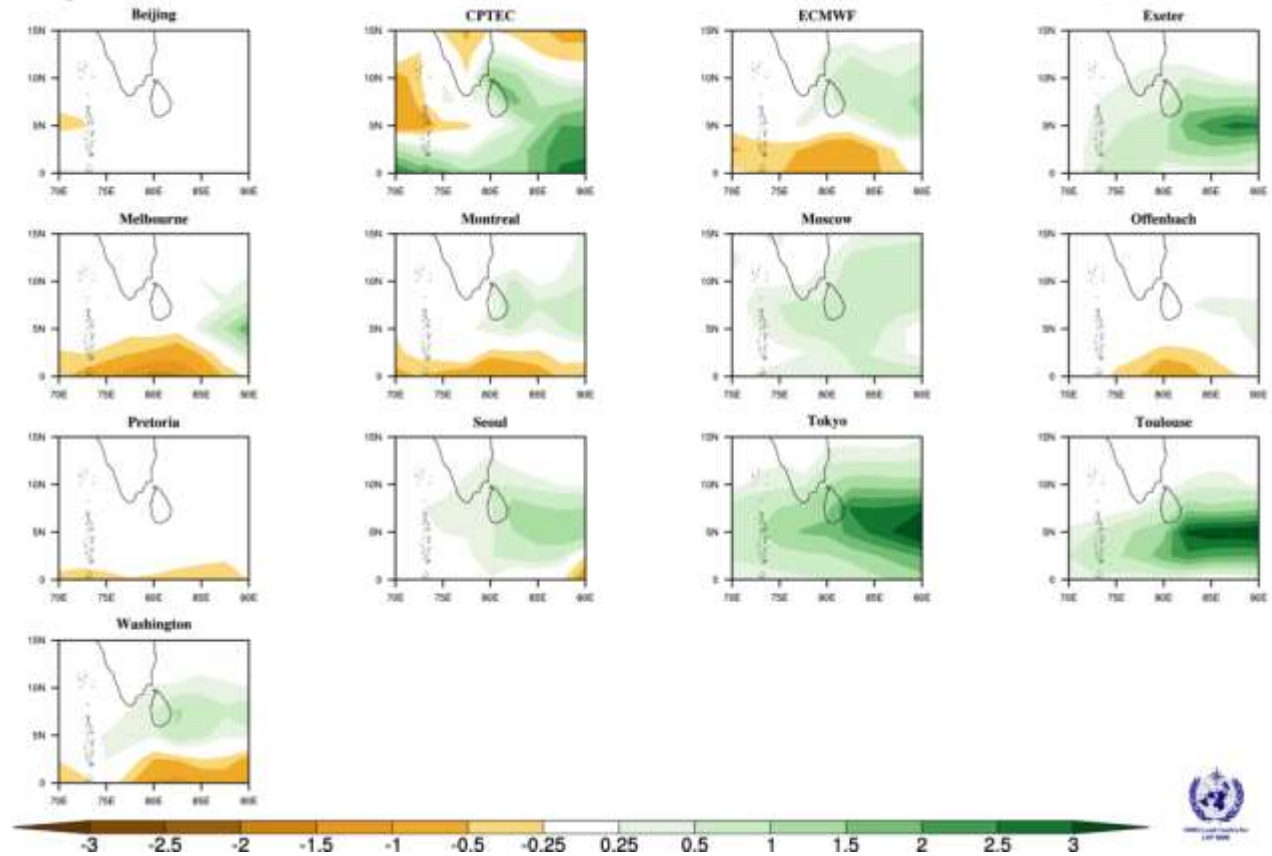


Fig 10: Individual forecast for February 2022 by dynamical models from 13 WMO global producing centers (GPC).

Figure 10 shows the monthly forecasts from 13 individual global producing centers (GPC) for February 2022. Out of 13 GPC forecasts, 8 GPC models indicate near normal rainfall over the country. There is no clear signal from 5 GPC models for the month of February 2022. Accordingly near normal rainfall can be expected over the country during the month of February 2022.

### 3. Statistical downscaling of CFSv2 global forecast output

#### 3.1 Probabilistic rainfall forecast for DJF season 2021/2022 using Climate Predictability tool (CPT)

The following district wise probabilistic rainfall forecasts for the season of DJF 2021/2022 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 DJF 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) –DJF	Probability%		
		Below	Normal	Above
Colombo	358.6	25	25	50
Kalutara	499.9	30	25	45
Galle	484.7	30	30	40
Matara	444.8	20	30	50
Hambantota	293.8	20	30	50
Ampara	705.5	25	30	45
Batticaloa	704.2	25	30	45
Trincomalee	545.4	25	30	45
Mullaithivu	428.1	25	30	45
Jaffna	360.5	25	30	45
Killinochchi	400.9	25	30	45
Mannar	308.6	25	30	45
Puttalam	211.6	25	25	50
Gampaha	271.6	25	25	50
Kegalle	364.2	25	25	50
Ratnapura	466.4	25	25	50
Monaragala	493.6	25	30	45
Badulla	749.0	25	30	45
Pollonnaruwa	639.8	25	30	45
Vavuniya	384.6	25	30	45
Anuradapura	373.2	25	30	45
Kurunegala	276.2	20	30	50
Matale	681.2	30	30	40
Kandy	586.9	25	30	45
Nuwaraeliya	493.2	25	30	45

**Table 1:** Probabilistic Rainfall Forecast for DJF season 2021/2022 using CPT



Fig 11: Probabilistic rainfall forecast for December -February 2021/2022 using CPT

According to the CPT (Fig 11 and table 01), above normal rainfalls can be expected in 23 districts out of 25. There is no clear signal for Mathale and Galle districts for DJF season 2021/2022. Therefore equal chances exist of receiving below normal, about normal or above normal rainfall over Mathale and Galle districts for DJF Season 2021/2022.

**3.2 Probabilistic rainfall forecast for DJF 2021/2022 season using RIMES FOCUS System**

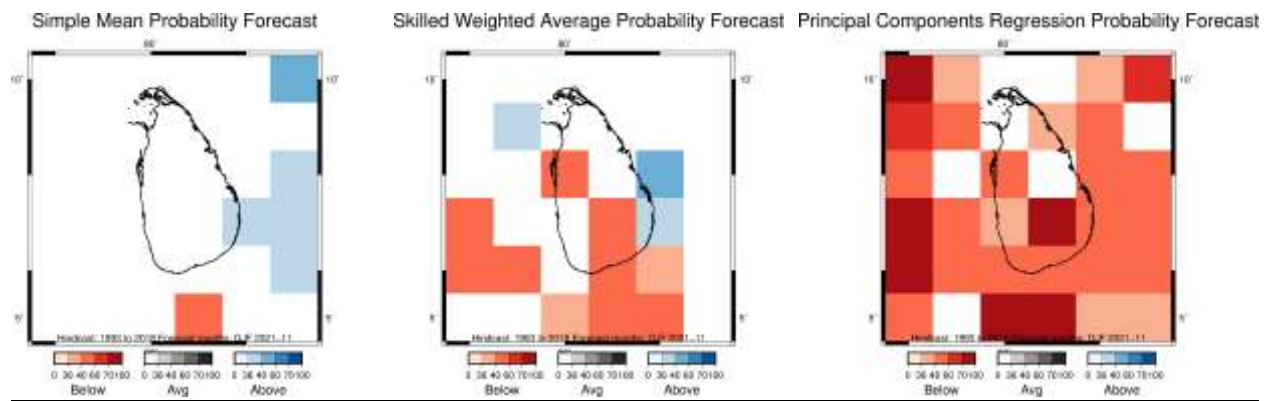


Fig 12. Probabilistic rainfall forecast for December-February 2021/2022 using RIMES FOCUS System

Figure 12 depicts the Probabilistic rainfall forecast for DJF 2021/2022 season, which has been prepared by using RIMES FOCUS System.

According to the model outputs it can be expected below normal rainfalls over North western and South eastern parts of the country. There is no clear signal indicated over the other areas and accordingly below, about or above normal rainfall can be expected during DJF season 2021/2022.

#### 4. SUMMARY :

SUMMARY of MODEL FORECAST for DJF 2021/2022 season for SRI LANKA						
Season	WMO LC MME	WMO GPC	CPT	FOCUS	Impact of Global conditions	Final
DJF season 2021/2022	No Signal- Southern part AN- Remaining area	AN	No Signal- Mathale, Galle AN- Remaining Area	BN-North west and South East No Signal- Remaining area	La Nna is likely to continue during Northern hemispheric winter.	Slightly above normal rainfalls in Northern,Eastern,North - central and Uva provinces and climatological probability for other areas.
December 2021	BN- Southern part No Signal- Eastern part AN- Remaining area	No Signal	BN- Mathale, Kandy, Badulla No Signal- Anuradhapura, Polonnaruwa, Ampara, Baticaloa, Monaragala, Nuwara Eliya, Galle and Kalutara AN- Remaining area		La Nna is likely to continue during Northern hemispheric winter.	Near or slightly above normal rainfalls in Northern,Eastern,North- central and Uva provinces and climatological probability for other areas.
January 2021	AN	No Signal			La Nna is likely to continue during Northern hemispheric winter.	Near or slightly above normal rainfalls are likely over most parts
February 2022	AN	AN			La Nna is likely to continue during Northern hemispheric winter.	Near Normal rainfalls over most parts

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

**Table 2:** Summary of Model Forecasts for DJF season 2021/2022

#### 4.1 Summary 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 through the Northern Hemisphere winter 2021-22 with 90% chance and into spring 2022 with 50% chance. (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 December and likely to continue until April 2022. (Source- Bureau of Meteorology, Australia).

## **5. Consensus Seasonal outlook for December 2021, January and February 2022**

Considering the prevailing global climate conditions, forecasts from different global climate models and statistical downscaling of GCM output using CPT, consensus forecasts for December 2021 to February 2022 are concluded as follows.

### **5.1 Rainfall forecast for December-January-February (DJF)2021/2022 three months period**

Slightly above normal rainfalls are likely over Northern, North-central, Uva and Eastern provinces and no signal for other areas where there are equal probabilities of having above, near or below normal rainfalls, during DJF 2021/2022 season(Fig. 13).

### **5.2 Rainfall forecast for December 2021**

Near or slightly above normal rainfalls are likely over Northern, North-central, Uva and Eastern provinces and no signal for other areas where there are equal probabilities of having above, near or below normal rainfall, during the month of December 2021.

In addition to that there is a possibility to develop low pressure systems and depressions over and vicinity of Sri Lanka, which could have enhanced the rainfall over the country, during the month of December.

### **5.3 Rainfall forecasts for January 2022**

There is a possibility for near or slightly above normal rainfalls over most parts during the month of January 2022.

In addition to that there is a possibility to develop wavy type disturbances over and vicinity of Sri Lanka, which could have enhanced the rainfall over the country during the month of January.

### **5.4 Rainfall forecasts for February 2022**

Near normal rainfalls are likely over most parts of the country during the month of February 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 phenomena which can't be underestimated.



Fig 13. Consensus Probabilistic rainfall forecast for December 2021–February 2022

## 5.5 Probabilistic Temperature Forecast from December 2021 to February 2022 (DJF)

The probabilistic Temperature forecast for December, January and February season (DJF) 2021/2022 for Sri Lanka as given below.

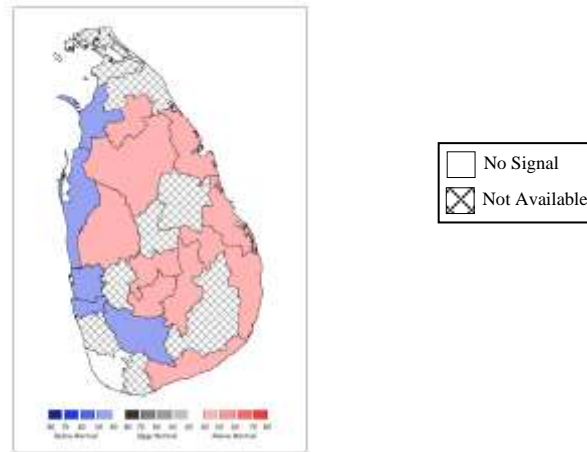


Fig 14: Probabilistic forecast for Maximum Temperatures for DJF season 2021/2022

Fig 14 and Table 3 show the probabilistic forecast for Maximum Temperatures during DJF season 2021/2022.

There is a higher chance of experiencing slightly above the normal Maximum Temperatures in Vavunia, Trincomalee, Anuradhapura, Kurunegala, Kandy, Nuwara Eliya, Badulla, Hambantota, Batticaloa and Ampara districts and slightly below the normal Maximum Temperatures in Mannar, Puttulum, Gampaha, Colombo and Ratnapura Districts (Fig 14) for the DJF season 2021/2022.

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 (°C) – (DJF)	Probability %		
		Below	Normal	Above
Anuradhapura	30.1	30	30	40
Badulla	25.7	30	30	40
Batticaloa	28.2	25	30	45
Colombo	30.8	40	30	30
Galle	29.3	30	35	35
Hambantota	29.9	30	30	40
Katugastota	28.7	35	25	40
Katunayake	31.9	40	30	30
Mannar	29.3	40	30	30
MahaIlluppallama	30.0	30	30	40
NuwaraEliya	20.2	35	25	40
Pottuvil	29.5	25	30	45
Puttalam	30.8	40	30	30
Ratnapura	32.8	40	30	30
Ratmalana	31.0	40	30	30
Trincomalee	28.3	30	30	40
Vavuniya	29.7	30	30	40
Kurunegala	31.3	25	30	45
Bandarawela	23.0	35	25	40

Table 3: probabilistic forecast for Maximum Temperature for DJF season 2021/2022

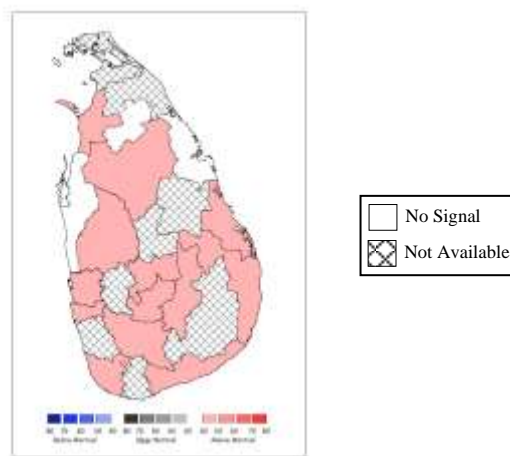


Fig 15: Probabilistic forecast for Minimum Temperatures for DJF season 2021/2022

Fig 15 and Table 4 provide the probabilistic forecast for Minimum Temperatures during DJF season 2021/2022.

Accordingly, there is a higher chance of experiencing slightly above the normal Minimum Temperatures in Anuradhapura, Mannar, Kurunegala, Colombo, Gampaha, Galle, Hambantota, Rathnapura, Kandy, Nuwara Eliya, Badulla, Ampara and Batticaloa districts (Fig 15) during DJF season 2021/2022.

District	Average Minimum Temperature (°C) – (DJF)	Probability %		
		Below	Normal	Above
Anuradhapura	21.4	30	30	40
Badulla	17.7	30	30	40
Batticaloa	23.4	35	25	40
Colombo	22.6	30	30	40
Galle	23.0	25	30	45
Hambantota	23.0	25	35	40
Katugastota	18.8	25	30	45
Katunayake	22.0	30	30	40
Mannar	23.7	30	30	40
Mahalluppallama	20.8	25	30	45
NuwaraEliya	10.0	25	30	45
Pottuvil	22.3	30	30	40
Puttalam	21.5	35	30	35
Ratnapura	21.9	30	30	40
Ratmalana	22.1	35	20	45
Trincomalee	24.3	35	35	30
Vavuniya	20.6	35	30	35
Kurunegala	21.1	30	30	40
Bandarawela	14.3	30	30	40

Table 4: Probabilistic forecast for Minimum Temperatures for DJF season 2021/2022

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