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

**Consensus Seasonal Weather Outlook**  
**October, November and December (OND)**  
**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

Near to 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 near to below average in the central and east-central Pacific Ocean and were above average in the western and far eastern Pacific Ocean. (CPC-USA) (Fig.1 & 2)

### 1.1 El Niño and La Niña update

The El Niño–Southern Oscillation (ENSO) is currently neutral. However, according to the recent model outlooks, **La Niña** is favoured during the Northern Hemisphere fall and winter 2021-22. Accordingly, the transition from ENSO-neutral to **La Niña** is favored in next couple of months, with a 70-80% chance during the Northern Hemisphere winter 2021-22. (source-CPC-USA) (Fig.3a).

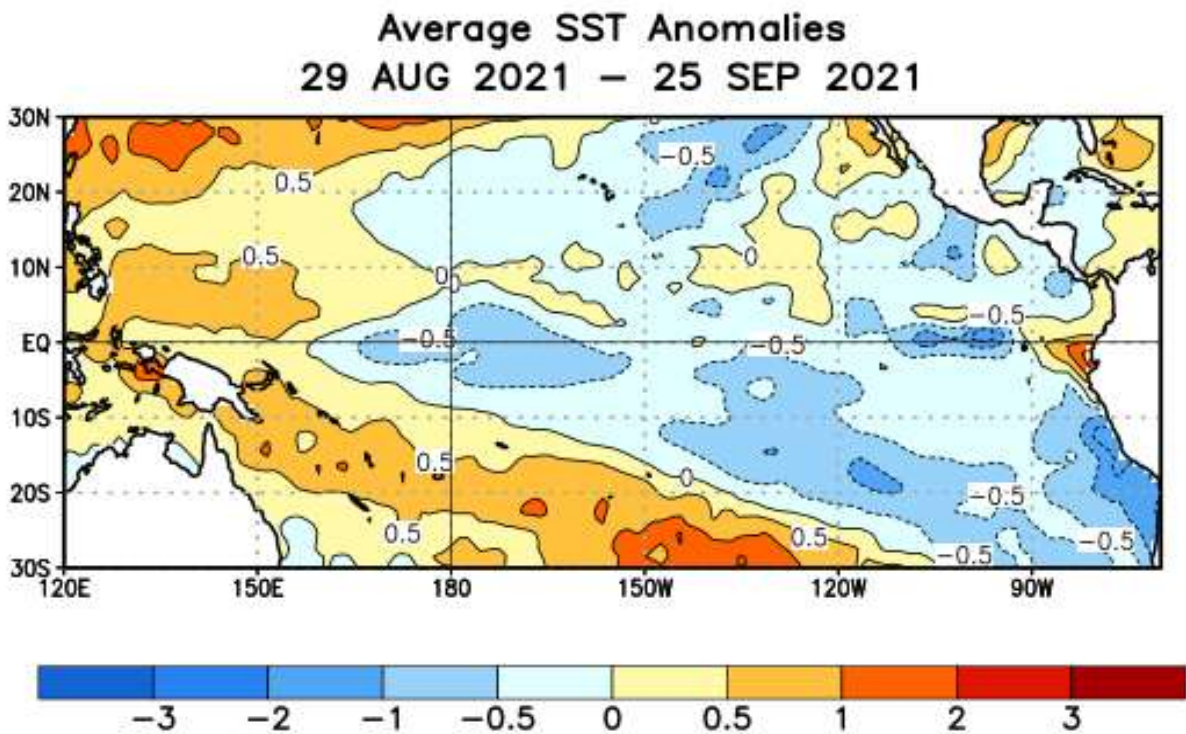


Fig 1: Observed Average sea surface temperature (SST) anomalies (°C)

## Weekly SST Anomalies (DEG C)

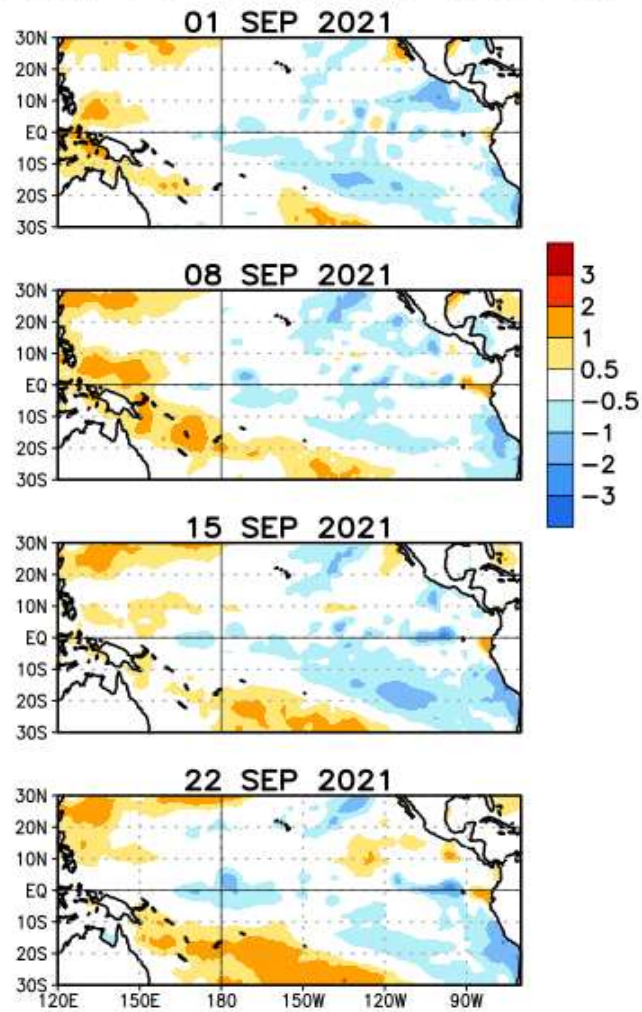


Fig 2: Weekly Observed Average sea surface temperature (SST) anomalies (°C)

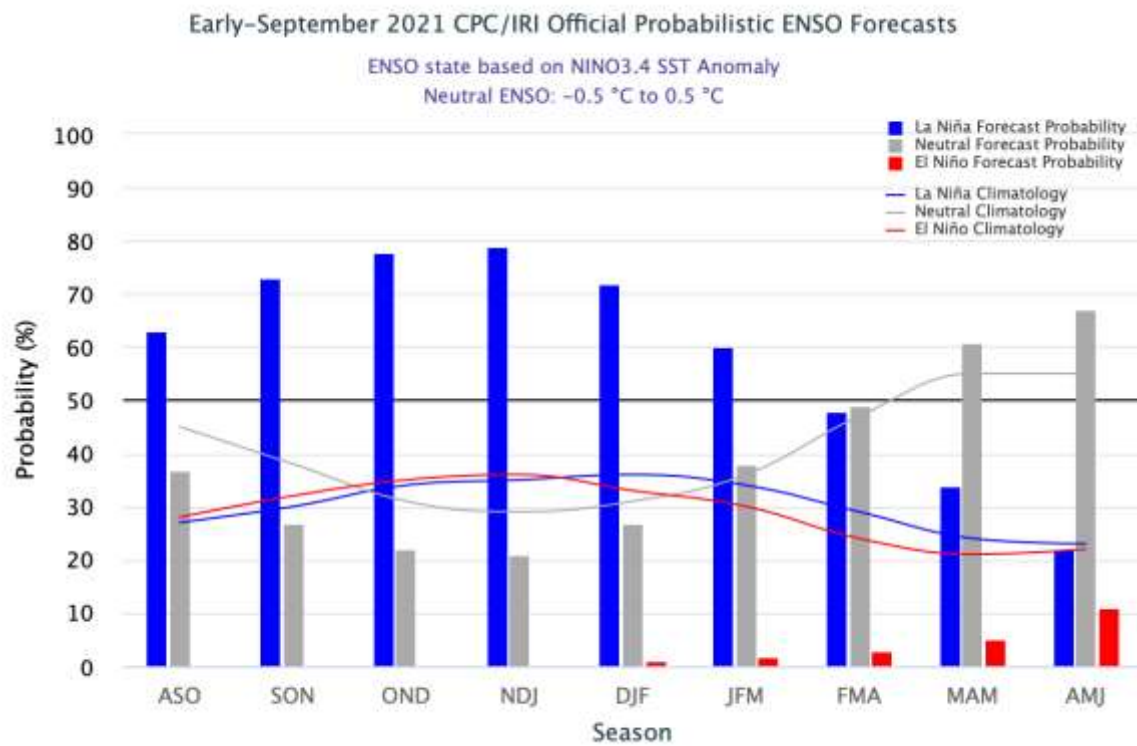


Fig 3a: ENSO forecast from Climate Prediction Center (CPC)/ IRI Forecast

### 1.1.1 Impacts of La-Nina on monthly rainfall anomaly during October, November and December

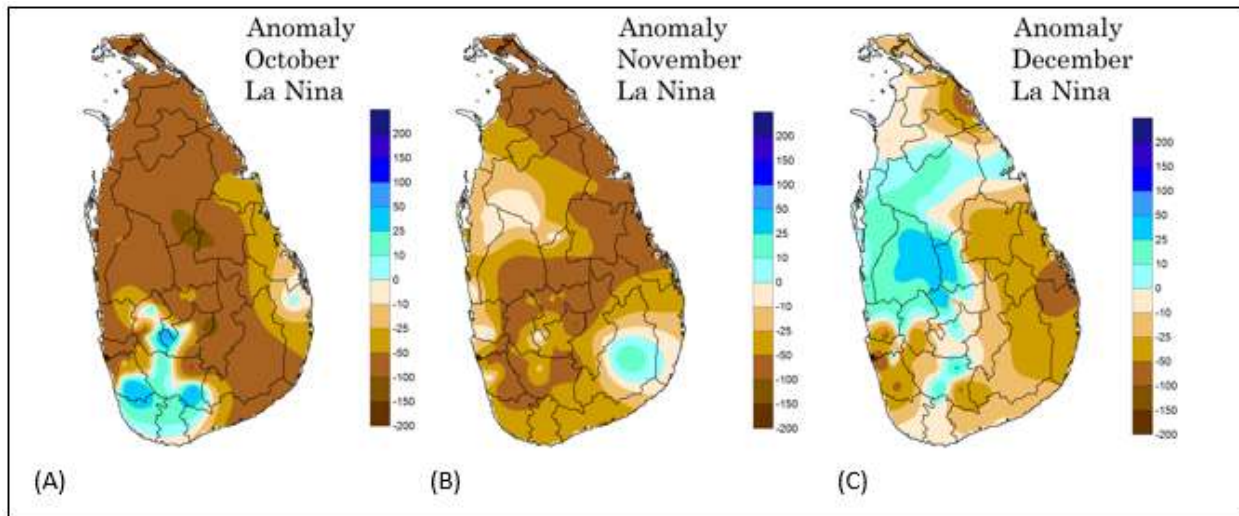


Fig 3b: Monthly Rainfall Anomaly maps of the months of October (A), November (B) and December (C) during La-Nina years (Hapuarachchi et al 2016)

Previous studies conducted by the Department of Meteorology, identified that, during La-Nina years, it is evident that below normal rainfalls over most parts of the country except in some

areas in Kaluthara, Galle, Mathara, Hambantota, Rathnapura, Kegalle and Nuwara Eliya districts where above normal rainfall were observed during the month of October (Fig 3b-A). Below normal rainfall were observed over most parts of the country except some parts of Monaragala District where above normal rainfall was observed, during the month of November (Fig 3b-B). During the month of December, below normal rainfall were observed 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 (Fig 3b-C).

## 1.2 The Indian Ocean Dipole (IOD) update

Sea surface temperatures (SSTs) in the Indian Ocean were warmer than average across much of the eastern half of the basin. However, the negative Indian Ocean Dipole (IOD) event has weakened, with index values falling just shy of the negative IOD threshold (i.e.  $-0.4\text{ }^{\circ}\text{C}$ ) for most of the past month and a half. The weak negative IOD pattern could persist through October according to the most of international climate modals and all models indicate a return to a neutral IOD pattern by December 2021. (Source-Bureau of Meteorology, Australia).

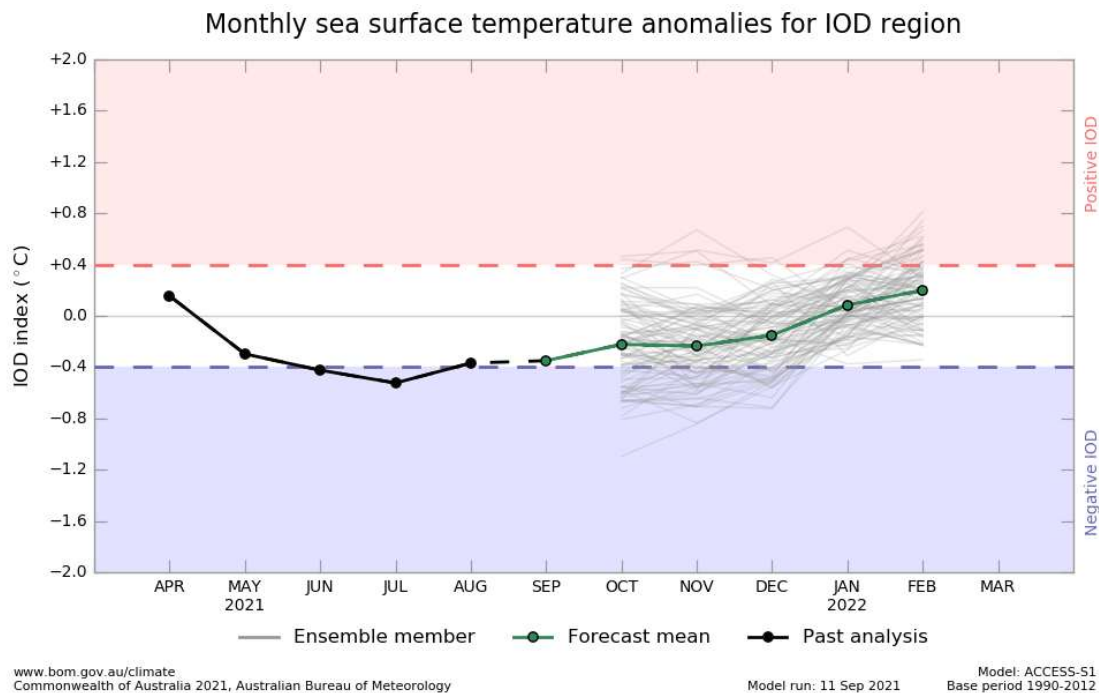


Figure 4a: IOD forecast from Australian Bureau of Meteorology .

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

### 2.1 October to December (OND) 2021 season

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

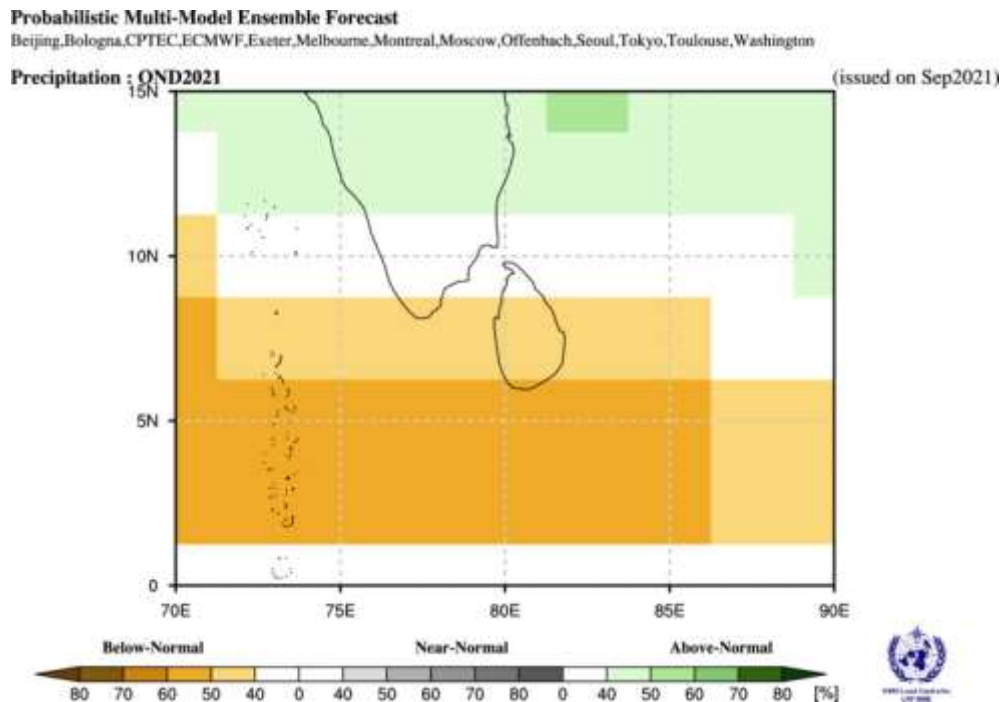


Fig 5: Probabilistic multi model ensemble forecast for OND using dynamical models from 13 WMO global producing centers (GPC).

Figure 6 depicts individual forecasts provided by same GPC centers for the OND season. Out of 12 GPC individual models, 3 models predicted below normal rainfall over the country and 3 models predicted below normal over most parts except northern part where there is no clear signal. One model particted a slightly above normal rainfalls over Sri Lanka while remaining models did not indicate clear signals. Accordingly, there is a probability for below normal rainfalls over most parts of the country except Northern part, where equal chances for having below, about or above normal rainfall, during OND 2021 season.

Lat : 0~15, Lon : 70~90  
Precipitation : OND2021

[Unit : mm]  
(issued on Sep2021)

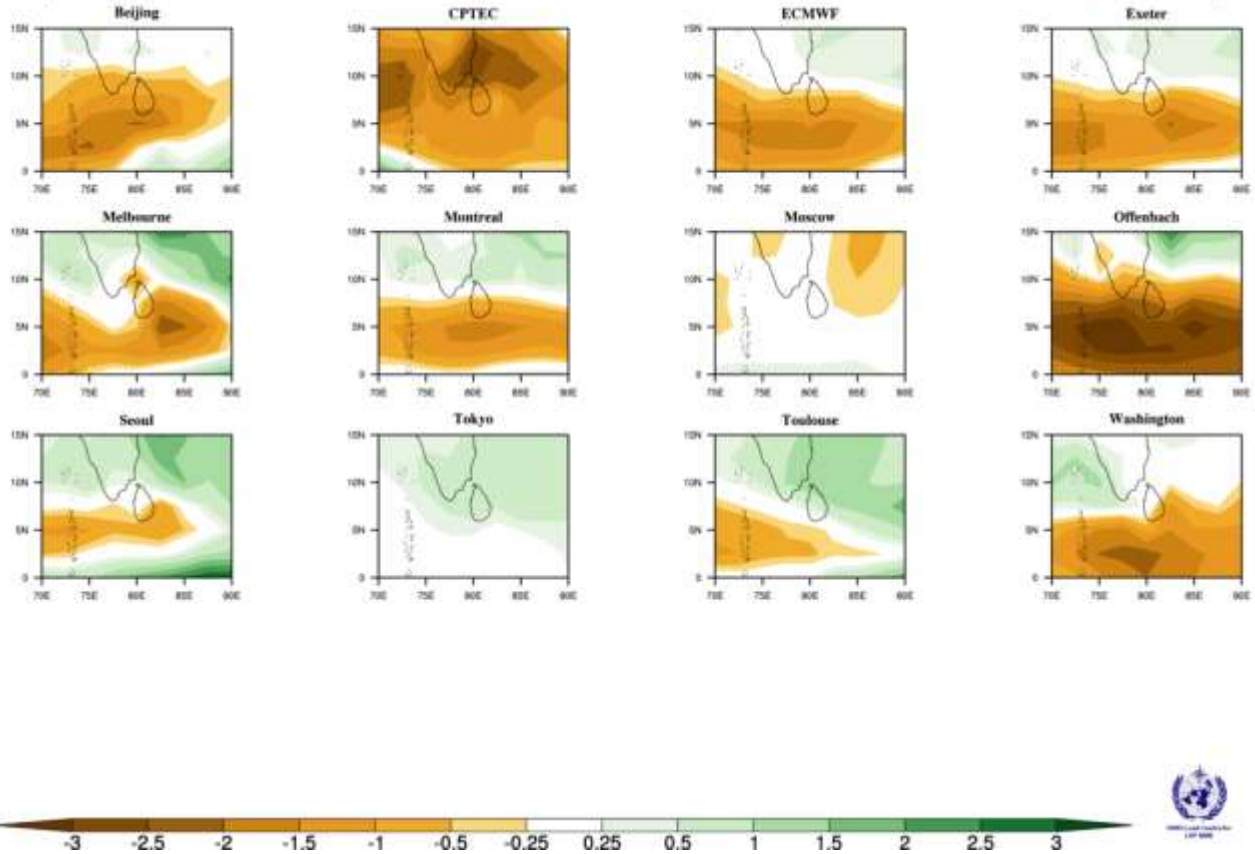


Fig 6: Individual forecasts for OND 2021 season by dynamical models from 12 WMO global producing centers (GPC).

## 2.2 Monthly Forecast for October, November and December 2021

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 October, November and December 2021. According to that it can be expected slightly below normal rainfall over the country except northern part, where no clear signal indicate during October 2021. During the month of November there is a possibility of having below normal rainfall over eastern and southern parts and no clear signal in remaining areas. During the month of December 2021 below normal rainfall can be expected in southern part. There is no clear signal indicate over remaining areas of the country. Accordingly below, about or above normal rainfall can be expected over no signal areas for the months of October, November and December 2021.

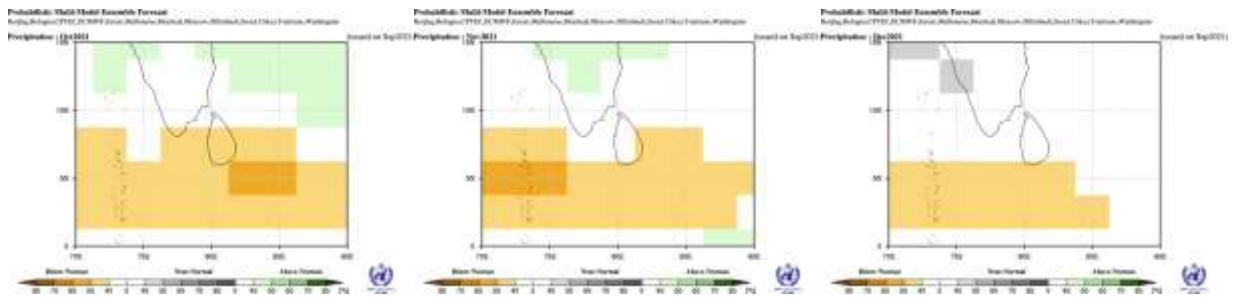


Fig 7: Probabilistic multi model ensemble forecast for October (left), November (middle) and December 2021 (right) using dynamical models from 13 WMO global producing centers (GPC).

Lat : 0~15, Lon : 70~90  
Precipitation : Oct2021

[Unit : mm]  
(issued on Sep2021)

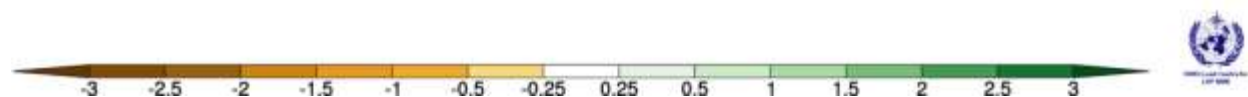
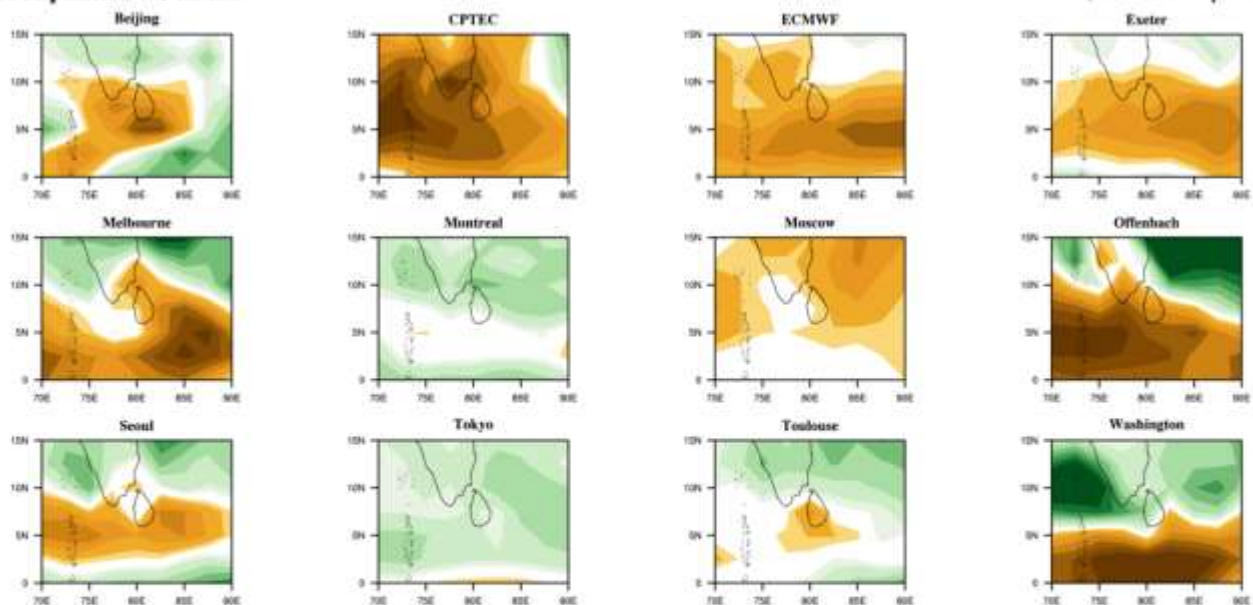


Fig 8: Individual forecast for October 2021 by dynamical models from 12 WMO global producing centers (GPC).

Figure 8 shows the 12 monthly forecasts from individual global producing centers (GPC) for October 2021. Out of 12 GPC forecasts, 3 GPC models predicted slightly above normal and 6 models predicted below normal rainfall over most parts of the country and there is no clear signals indicated in 3 GPC models. Accordingly, there is a possibility of having below normal



rainfall over the country, during the month of October 2021.

Lat : 0~15, Lon : 70~90  
Precipitation : Nov2021

[Unit : mm]  
(issued on Sep2021)

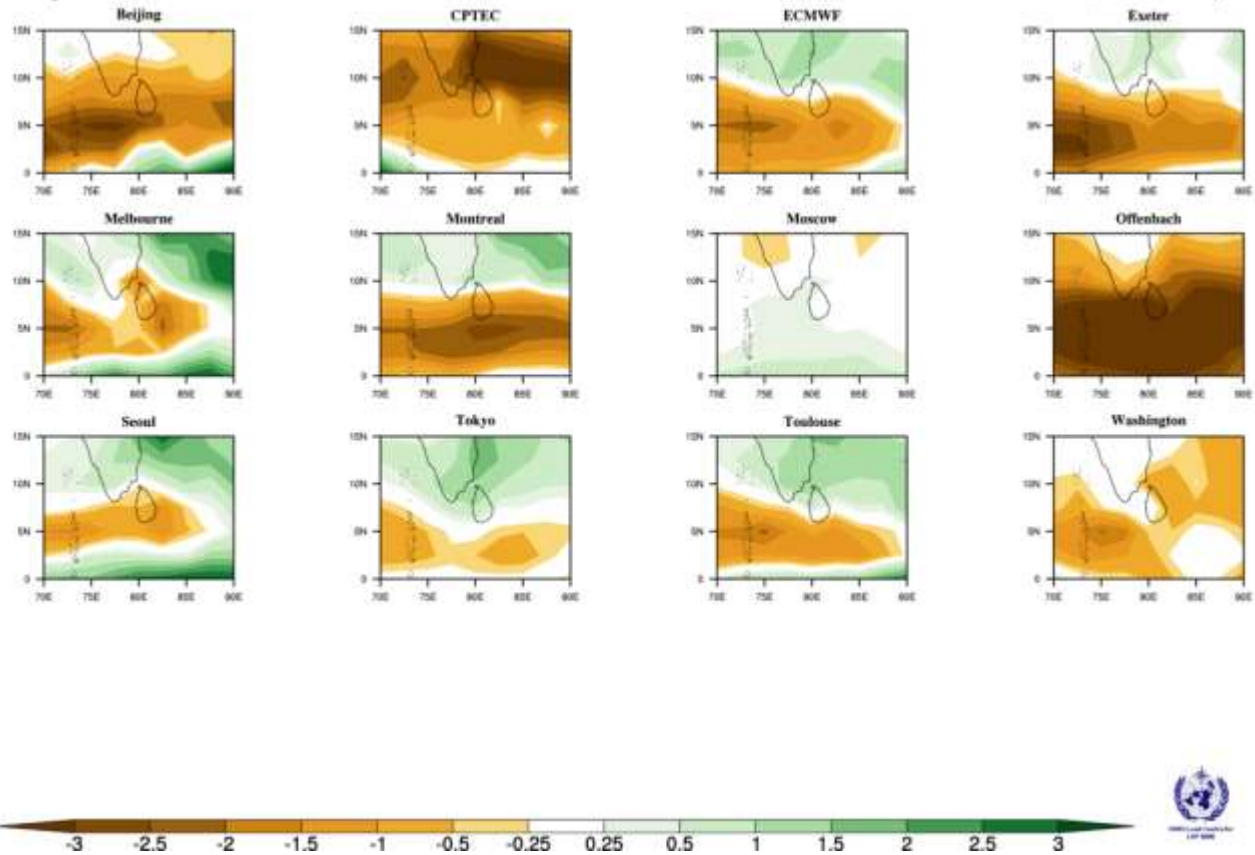


Fig 9: Individual forecast for November 2021 by dynamical models from 12 WMO global producing centers (GPC).

Figure 9 shows the monthly forecasts from individual global producing centers (GPC) for November 2021. Out of 12 GPC forecasts, 5 GPC models predicted below normal rainfall over the country. Another 2 GPC models predicted below normal rainfall except northern part. There is no clear signal in 5 GPC models for the month of November 2021. Accordingly, there is a chance of having below normal rainfall over the country except northern part during the month of November 2021.

Lat : 0~15, Lon : 70~90  
Precipitation : Dec2021

[Unit : mm]  
(issued on Sep2021)

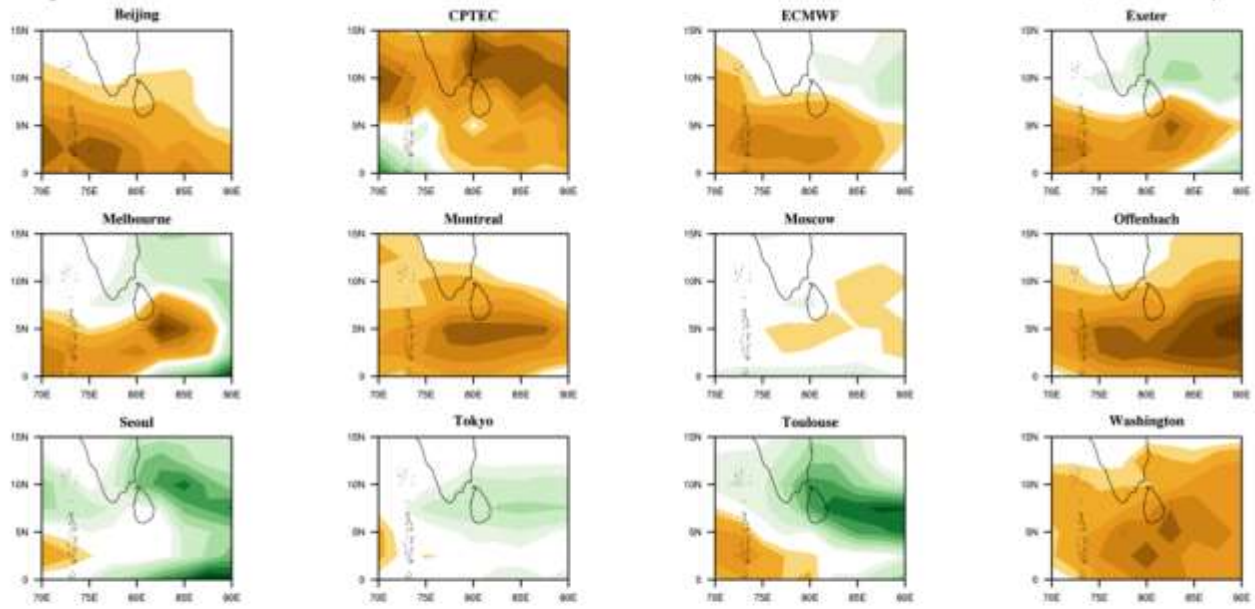


Fig 10: Individual forecast for December 2021 by dynamical models from 12 WMO global producing centers (GPC).

Figure 10 shows the monthly forecasts from 12 individual global producing centers (GPC) for December 2021. Out of 12 GPC forecasts, 2 GPC models indicate above normal rainfall and 5 GPC models predicted below normal rainfall over the country. There is no clear signal from 5 GPC models for the month of December 2021. Accordingly there are equal chances of having below, about or above normal rainfall over the country during the month of December 2021 .

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

#### 3.1 Probabilistic rainfall forecast for OND season 2021 using Climate Predictability tool (CPT)

The following district wise probabilistic rainfall forecasts for the season of OND 2021 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 OND 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) -OND	Probability%		
		Below	Normal	Above
Colombo	924.3	50	25	25
Kalutara	1124.8	55	25	20
Galle	1038.8	50	25	25
Matara	900.8	35	30	35
Hambantota	556.1	35	30	35
Ampara	794.8	45	30	25
Batticaloa	873.4	45	30	25
Trincomalee	846.8	45	30	25
Mullaithivu	804.2	40	30	30
Jaffna	809.5	40	30	30
Killinochchi	814.6	35	30	35
Mannar	634.5	45	30	25
Puttalam	590.6	45	30	25
Gampaha	816.7	50	30	20
Kegalle	1043.5	50	30	20
Ratnapura	973.2	35	30	35
Monaragala	780.5	40	30	30
Badulla	954.4	50	30	20
Pollonnaruwa	880.1	50	30	20
Vavuniya	757.2	45	30	25
Anuradapura	699.3	50	30	20
Kurunegala	708.8	55	25	20
Matale	927.2	55	25	20
Kandy	961.0	55	25	20
Nuwaraeliya	871.7	40	30	30

**Table 1:** Probabilistic Rainfall Forecast for OND season 2021 using CPT



Fig 11: Probabilistic rainfall forecast for October -December 2021 using CPT

According to the CPT (Fig 11 and table 01), below normal rainfalls can be expected in 17 districts out of 25. There is no clear signal for Nuwara Eliya, Rathnapura, Monaragala, Mathara, Hambantota, Jaffna, Killinochchi and Mulathivu districts for OND season 2021. Therefore equal chances exist of receiving below normal, about normal or above normal rainfall over those districts for OND Season 2021.

**3.2 Probabilistic rainfall forecast for OND 2021 season using RIMES FOCUS System**

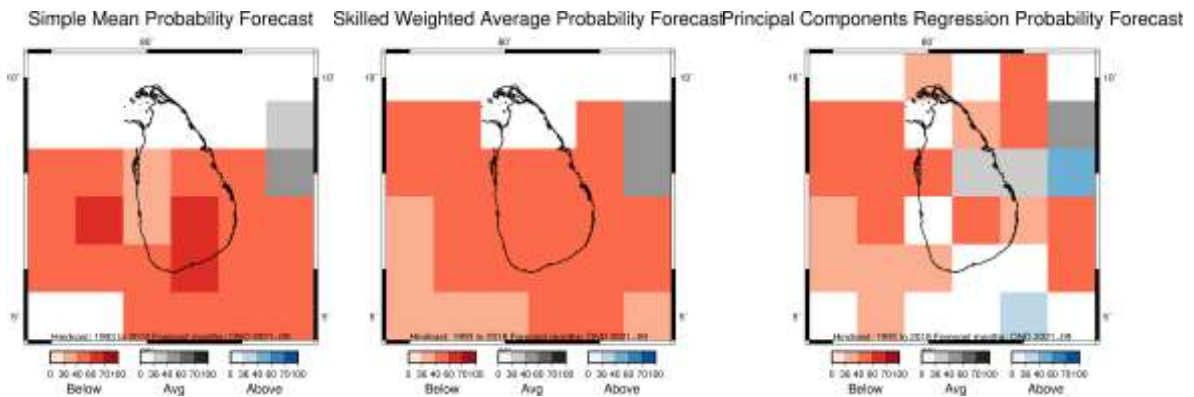


Fig 12. Probabilistic rainfall forecast for October-December 2021 using RIMES FOCUS System

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

According to the model outputs it can be expected slightly below normal rainfalls over most parts of the country except northern part, where no clear signal indicated during OND season 2021.

#### 4. SUMMARY :

SUMMARY of MODEL FORECAST for OND 2021 season for SRI LANKA						
Season	WMO LC MME	WMO GPC	CPT	FOCUS	Impact of Global conditions	Final
OND season 2021	No Signal- Northern part BN- Remaining areas	No Signal	No Signal- Nuwara Eliya, Rathnapura, Monaragala, Mathara, Hambantota, Jaffna, Killinochchi and Mulathivu BN-Remaining areas	No signal- Northern part BN- Remaining areas	La Nina condition is likely to develop during the OND 2021 season and may cause to reduce rainfall over most parts of the country during October and November months.	Below normal rainfall over most parts except Jaffna and Killinochchie districts where there is a chance for near normal rainfalls.
October 2021	No Signal- Northern part BN- Remaining areas	BN	No Signal- Batticaloa, Ampara, Nuwara Eliya, Hambantota BN – Remaining areas		La Nina condition is likely to develop during the OND 2021 season and may cause to reduce rainfall over most parts of the country during October.	Below normal rainfalls over most parts
November 2021	BN-Southern and Eastern part  No Signal- Remaining areas	No Signal- Northern part  BN- Remaining areas			La Nina condition is likely to develop during the OND 2021 season and may cause to reduce rainfall over most parts of the country during the month of November .	Below normal rainfalls over most parts
December 2021	BN-Southern part  No Signal- Remaining areas	No Signal				No signal

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

**Table 2:** Summery of Model Forecasts for OND season 2021

#### 4.1 Summery of Prevailing global climate conditions

- The El Niño–Southern Oscillation (ENSO) is currently neutral. However, according to the recent model outlooks, **La Niña** is favoured during the Northern Hemisphere fall and winter 2021-22. Accordingly, the transition from ENSO-neutral to **La Niña** is favored in next couple of months, with a 70-80% chance during the Northern Hemisphere winter 2021-22. (source-CPC-USA)

- The weak negative IOD pattern could persist through October 2021 and to return to a neutral IOD pattern by December 2021. (Source-Bureau of Meteorology, Australia).

## **5. Consensus Seasonal outlook for October, November and December 2021**

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

### **5.1 Rainfall forecast for October-November-December (OND) three months period**

Below normal rainfalls are likely over most parts of the island with a slight possibility for near normal in extrem North of Sri Lanka (Jaffan and Killinochci districts) during OND 2021 season (Fig. 13)

### **5.2 Rainfall forecast for the month of October 2021**

There is a possibility for below normal rainfalls over most parts of the country during the month of October 2021.

However there is a possibility to develop low pressure systems and depressions over and vicinity of Sri Lanka, which enhance the rainfall over the country during the month of October.

### **5.3 Rainfall forecasts for November 2021**

There is a possibility for below normal rainfalls over most parts of the country during the month of November 2021.

However there is a possibility to develop low pressure systems and depressions over and vicinity of Sri Lanka, which enhance the rainfall over the country during the month of November.

### **5.4 Rainfall forecasts for December 2021**

There is no clear signal to provide forecast for the month of December 2021. Therefore there are equal chances of receiving below normal, about normal or above normal rainfall over Sri Lanka during the month of December 2021.

However there is a possibility to develop low pressure systems depressions and cyclones in the Bay of Bengal, which enhance the rainfall over the country during the month of December.

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 October–November–December 2021

### 5.5 Probabilistic Temperature Forecast from October to December 2021 (OND)

The probabilistic Temperature forecast for October, November and December season (OND) 2021 for Sri Lanka as given below.

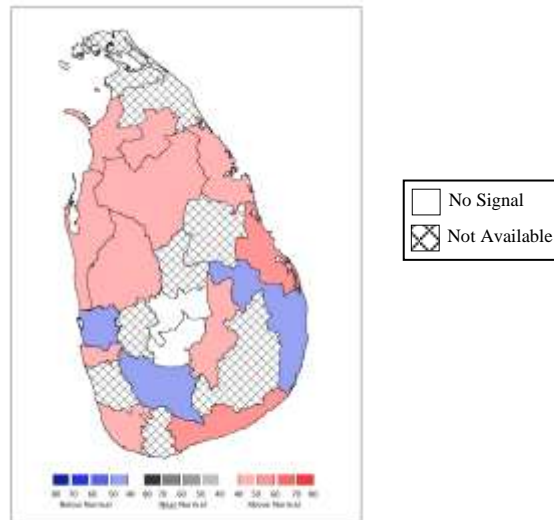


Fig 14: Probabilistic forecast for Maximum Temperatures for OND season 2021

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

There is a higher chance of experiencing slightly above the normal Maximum Temperatures in Vavunia, Mannar, Trincomalee, Anuradhapura, Puttlum, Kurunegala, Colombo, Galle, Badulla Batticaloa and Hambantota districts and slightly below the normal Maximum Temperatures in Gampaha, Ratnapura and Ampara Districts (Fig 14) for the OND season 2021.

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) – (OND)	Probability %		
		Below	Normal	Above
Anuradhapura	30.5	30	30	40
Badulla	27.1	30	30	40
Batticaloa	29.4	25	25	50
Colombo	30.1	30	30	40
Galle	28.9	30	25	45
Hambantota	29.8	25	25	50
Katugastota	28.3	35	35	30
Katunayake	30.9	40	30	30
Mannar	29.6	30	30	40
MahaIlluppallama	30.4	30	30	40
NuwaraEliya	19.6	35	35	30
Pottuvil	30.5	45	30	25
Puttalam	30.4	30	30	40
Ratnapura	31.6	40	30	30
Ratmalana	30.4	30	30	40
Trincomalee	29.7	30	30	40
Vavuniya	30.3	30	30	40
Kurunegala	30.7	25	30	45
Bandarawela	23.5	35	25	40

Table 3: probabilistic forecast for Maximum Temperature for OND season 2021



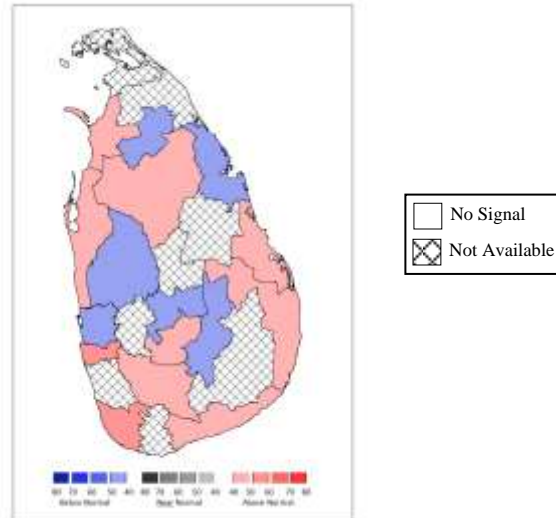


Fig 15: Probabilistic forecast for Minimum Temperatures for OND season 2021

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

Accordingly, there is a higher chance of experiencing slightly above the normal Minimum Temperatures in Mannar, Aanuradhapura, Puttalam, Colombo, Galle, Hambantota, Rathnapura, Nuwara Eliya, Ampara and Batticaloa districts and slightly below the normal Minimum Temperatures in Vavunia, Kurunegala, Gampaha, Kandy, Badulla and Trincomalee districts (Fig 15) during OND season 2021.

District	Average Minimum Temperature (°C) – (OND)	Probability %		
		Below	Normal	Above
Anuradhapura	22.6	30	30	40
Badulla	18.7	40	30	30
Batticaloa	23.9	35	25	40
Colombo	23.3	20	30	50
Galle	23.6	20	30	50
Hambantota	23.7	25	35	40
Katugastota	19.9	45	30	25
Katunayake	22.9	40	30	30
Mannar	24.6	30	30	40
Mahalluppallama	22.2	25	30	45
NuwaraEliya	11.4	25	30	45
Pottuvil	23.2	30	30	40
Puttalam	23.0	30	30	40
Ratnapura	22.6	30	30	40
Ratmalana	23.0	25	25	50
Trincomalee	24.3	45	35	20
Vavuniya	22.2	40	30	30
Kurunegala	22.2	40	30	30
Bandarawela	15.6	40	30	30

Table 4: Probabilistic forecast for Minimum Temperatures for OND season 2021

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