Weather Synopsis –December 2020.

The Cyclonic Storm 'Burevi' (1st-3rd December 2020) crossed Sri Lanka coast between Thiriyaya and Kuchchaveli as a cyclonic storm on 2nd December 2020 emerged into Gulf of Mannar on 03rd December bringing strong winds, heavy rainfall ,storm surge and flash floods in low lying areas in Northern and Eastern provinces. According to Disaster Management Centre, at least two people died, six people were injured, 99 houses were fully destroyed 3,486 houses were partially damaged and a total of 95,734 persons affected by Cyclone **Burevi**, including 79,564 in Jaffna alone. The system weakened into a DeepDepression and lay over Gulf of Mannar, close to the coast of Ramanathapuram District, and further weakened into a depression over the same area , then remained practically stationary for 36-hours till 5 December 2020 as a well mark low pressure area.

Above or about normal rainfall was reported at most of the principal meteorological stations except Galle, Hambantota, Badulla, and Bandarawela where below normal rainfall was reported for month of December (Fig 6a). Further above normal rainy days were reported from most of the principal meteorological stations except Badulla and Galle. It is worthy to mention that highest cumulative rainfall was 812.9mm at Jaffna which is nearly 300% of the climatological average. Highest rainfall received during 24hours, was 279.8 mm at Akkarayan at Kilinochchi district on 02nd December.

Above normal rainfall was reported from most of the hydro catchment stations except Victoria where about normal rainfall was reported (Fig 6b).

With the onset of northeast monsoon fairly widespread rainfall activity over northeastern parts with isolated very heavy falls exceeding 150mm was reported from 19th to23rd .Showery conditions were enhanced in northeastern parts due to the presence of low level disturbance in the vicinity of Sri Lanka on 28thanddue to moisture convergence from 30th to 31st. Afternoon thunderstorm activity was reported at some places in Southwest quarter from 07thto 31st December except on 09th, 14th , and 15th.

The maximum temperatures were mostly below normal from 02nd to 05th due to the impact of cyclonic storm "Burevi" and again during last 2 weeks. Minimum temperatures over most parts were above

normal during the month except from 11th to 18th. Highest recorded maximum temperature was 34.7^{0}C at Mattalaon 05th and Lowest recorded minimum temperature was 5.5^{0}C at NuwaraEliya on 14th.

La Niña persisted during December, as indicated by well below-average sea surface temperatures (SSTs) extending from the Date Line to the eastern Pacific Ocean .Ocean Nino Index is -1.2duringSeptember October and November and -1.3 during October November and December (NOAA Climate prediction Center). Neutral IOD condition was observed during December 2020 (BoM, Australia). Sea surface waters in tropical Indian Ocean are warmer than average (Fig. 9)

Two shearlines were appeared with ITCZ in between them. The average position of the shear line in north Indian Ocean was laid between Equator 50^{0}E, 05^{0}N70^{0}E , 02^{0}N90^{0}E Equator 110^{0}E, and 02^{0}N120^{0}E while the average position of the shear line in south Indian Ocean was laid between 08^{0}S50^{0}E, 10^{0}S70^{0}E , 10^{0}S80^{0}E, 08^{0}S100^{0}E, and 18^{0}S120^{0}E. The average position of the Inter-Tropical Convergence zone (ITCZ) was laid between 05^{0}S50^{0}E, 07^{0}S80^{0}E, 06^{0}S100^{0}E and 08^{0}S120^{0}E (Fig 8).

Madden-Julian Oscillation (MJO) was weak during the first week, became strong at the phase 5 during the second week, and weaken during the last two week of December (Fig.10).

Weather Systems

The cyclonic storm, 'Burevi' originated from a low pressure area that developed over South Andaman Sea and adjoining areas on 28th November 2020. It has intensified into a depression in the early morning of 30th November over Southeast Bay of Bengal. It has further intensified into the cyclonic storm 'Burevi' over southwest BoB in the evening of 01st December 2020. It crossed Sri Lanka coast between Thiriyayaand Kuchchaveli as a cyclonic storm during midnight of 2nd December 2020 (Fig 1) . Moving across northern parts of Sri Lanka, it emerged into Gulf of Mannar in the morning and lay centred close to Pamban around noon of 03rd December. The system was remained stationary over Gulf of Mannar close for 36 hours, before gradually weakened into a well marked low pressure area around noon of 05th December. Even after weakening into low pressure area, the system has significantly influence the weather over the northern province bringing nearly 200mm rainfall on 06th December 2020 (Fig 3). Lowest pressure recorded at Trincomali was 1001 mb from 02nd 2000Z to 02

2300Z, at Vavniya was 1001 mb from 02nd 2300Z, at Mannar and Jaffna was 1002 mb from 02nd 2200Z to 02 2300Z (Fig 4).

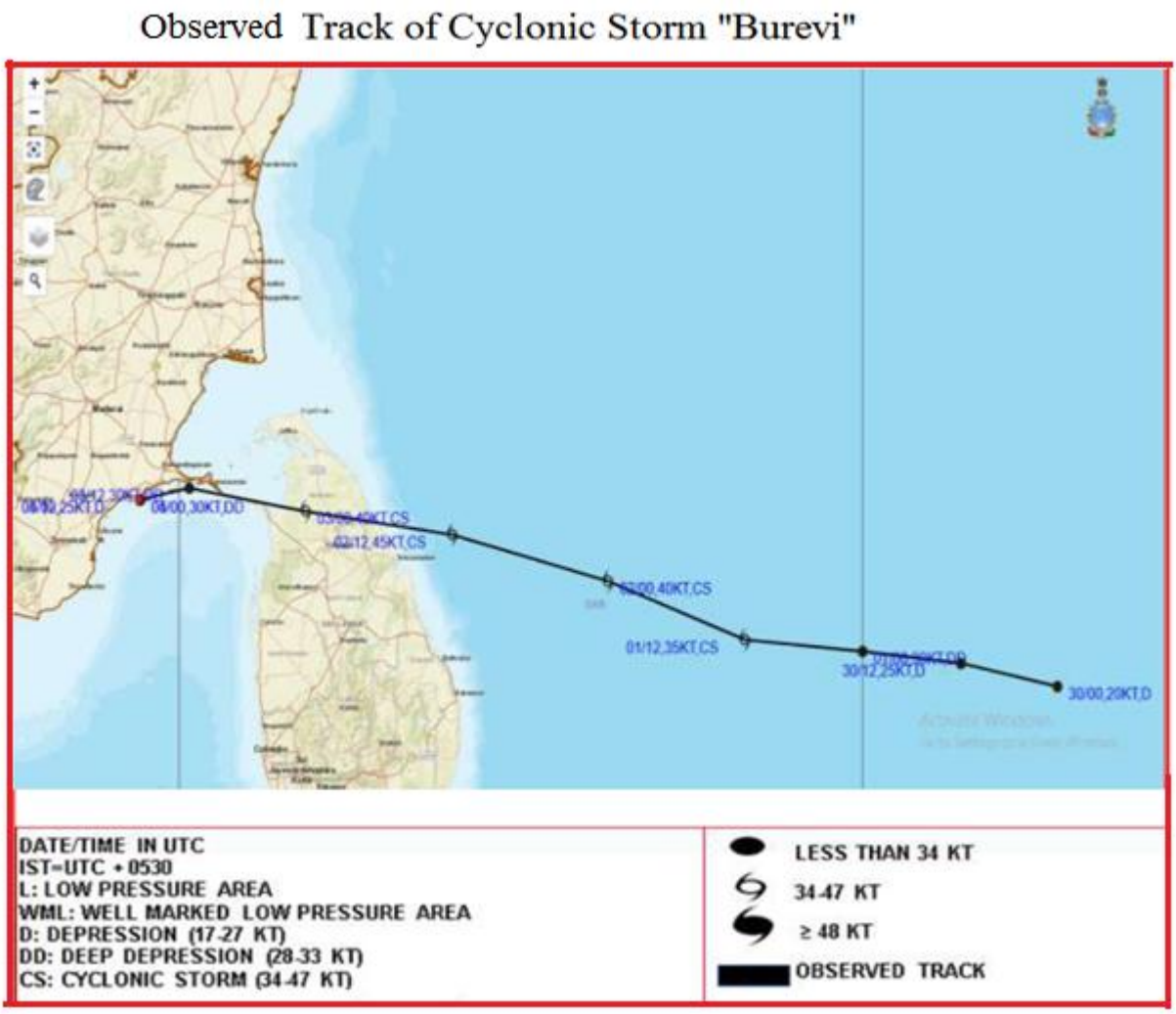


Fig 1: Observed track of the Cyclonic Storm "Burevi"

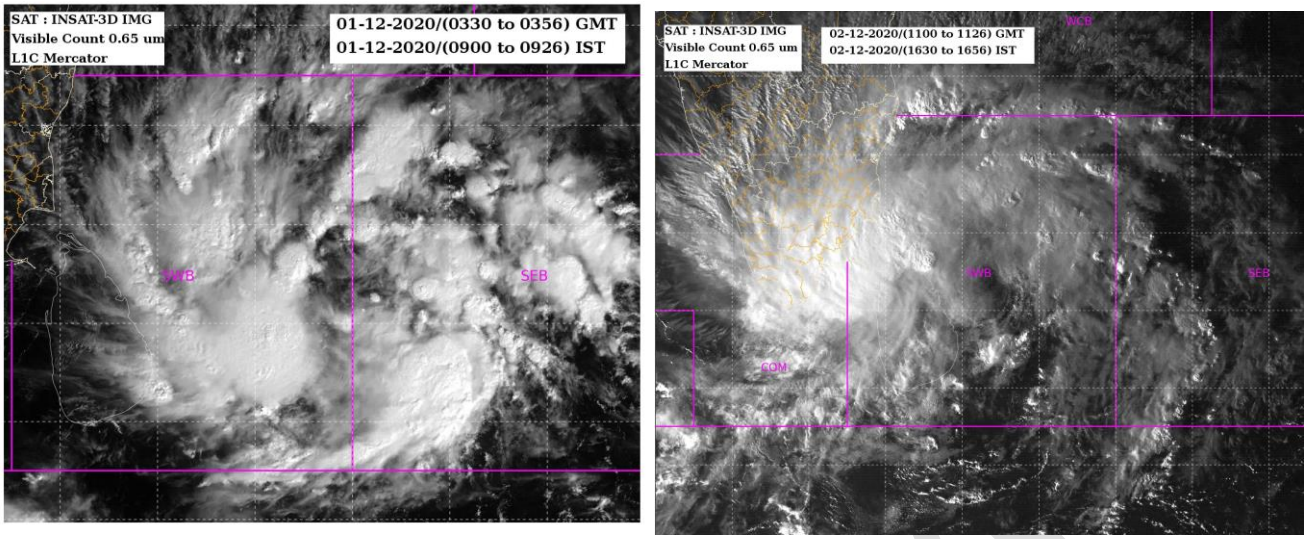


Fig 2: Satellite Images (INSAT-3D) of the Cyclonic Storm Burevi on 01 December 2020 (Left) and 02 December 2020 (Right)

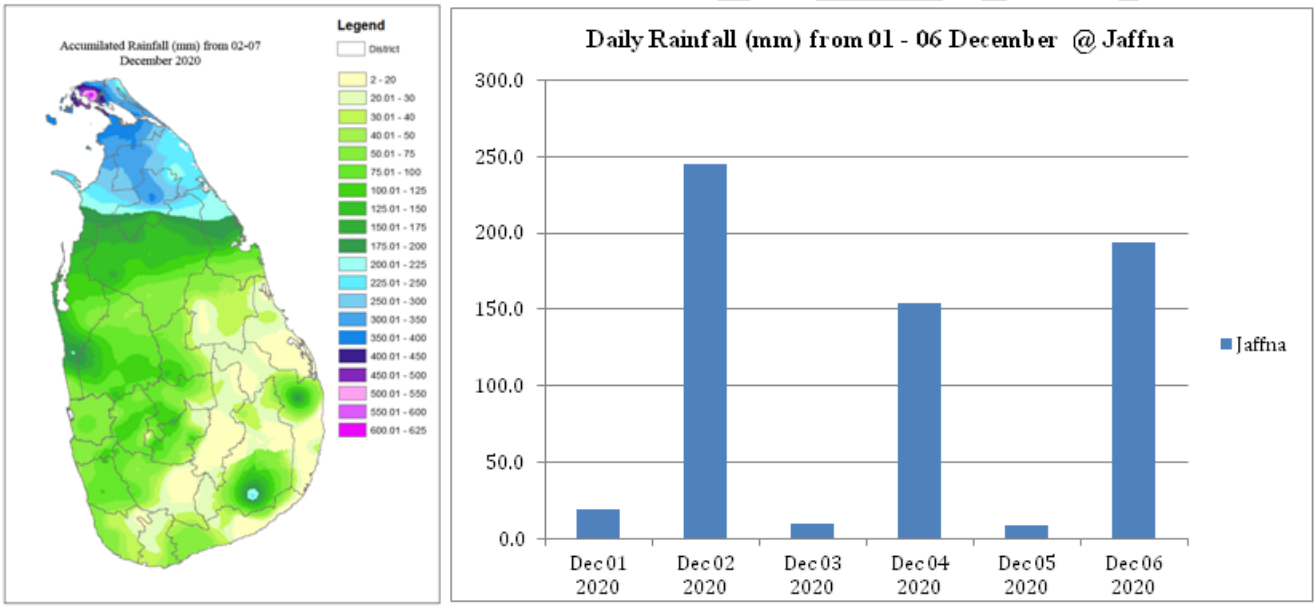


Fig 3: Accumulated Rainfall (mm) from 02 - 07 December 2020 (Left) Daily Rainfall (mm) at Jaffna from 02 to 06 December 2020 (Right)

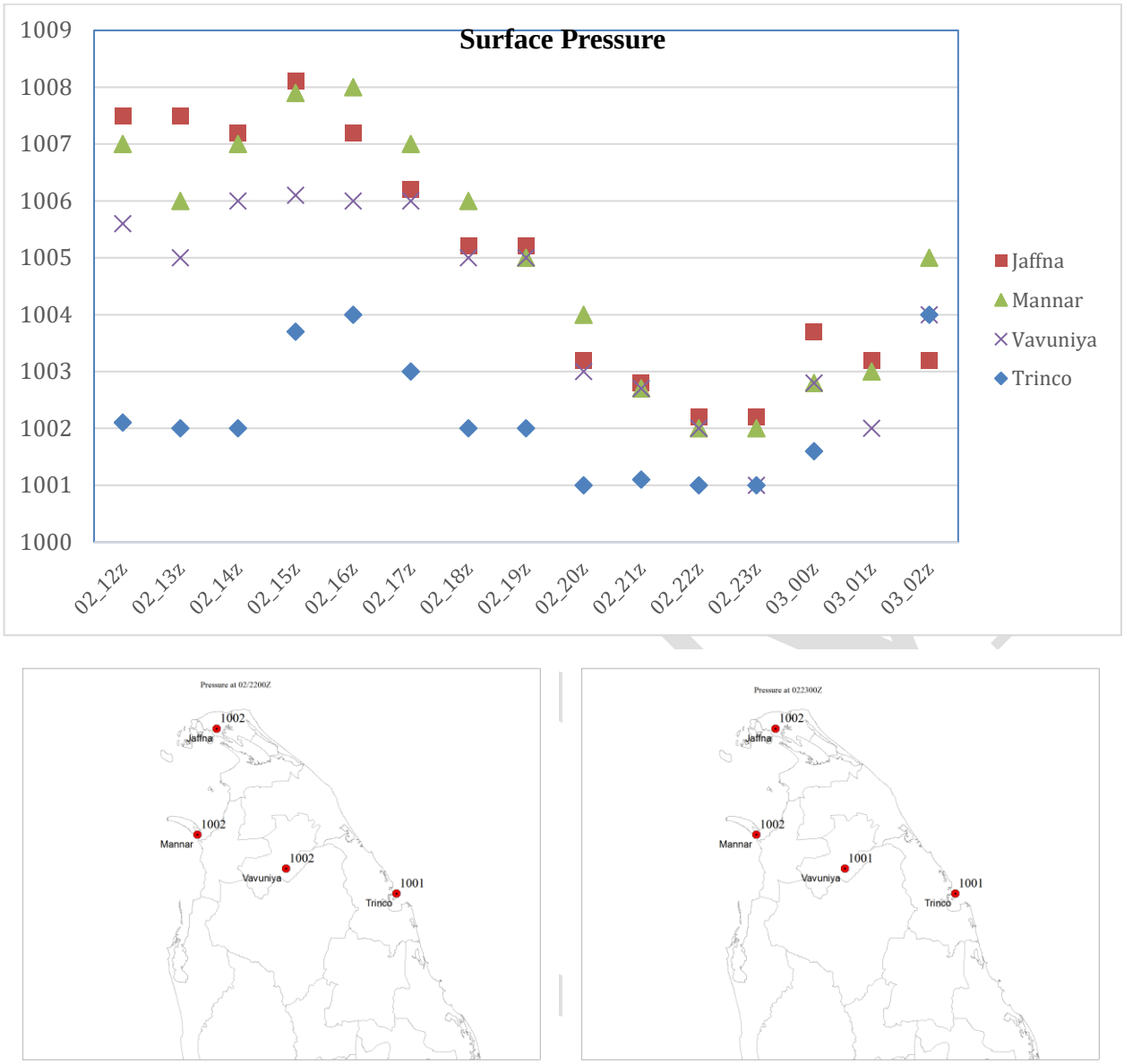


Fig 4: Surface Pressure variation from 02 to 03 December 2020


MANNAR
03-12-2020


JAFFNA
03-12-2020


POONERYN
03-12-2020

Fig 5 : Impacts of Cyclonic storm Burevi

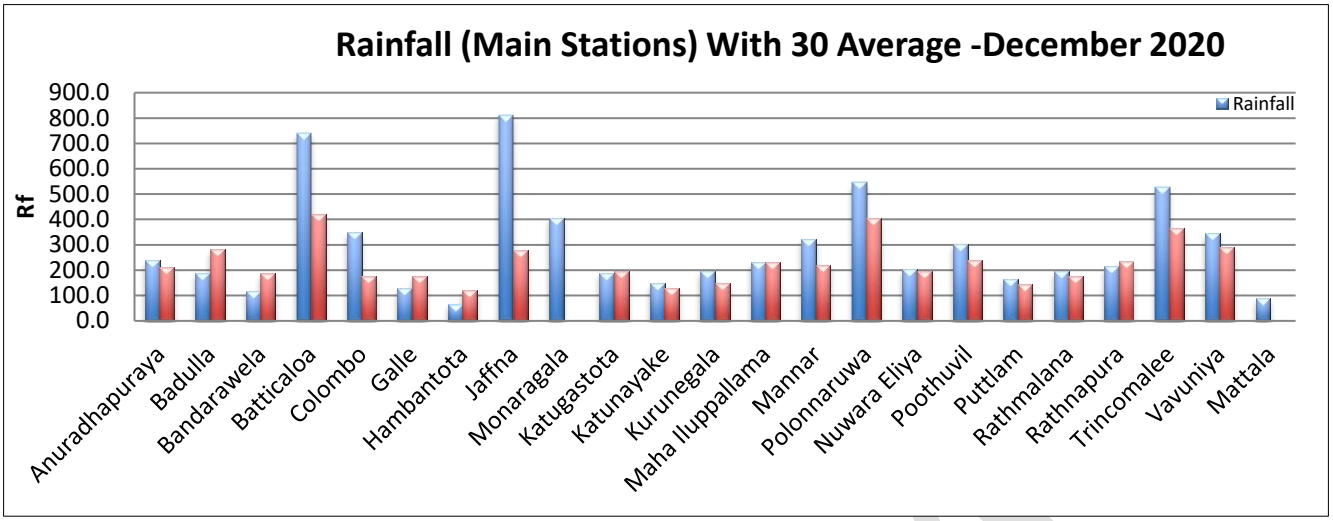


Fig 6a: Monthly Total Rainfall (mm) with with 30 year average (1961-1990) at Main Meteorological stations areas duringDecember 2020

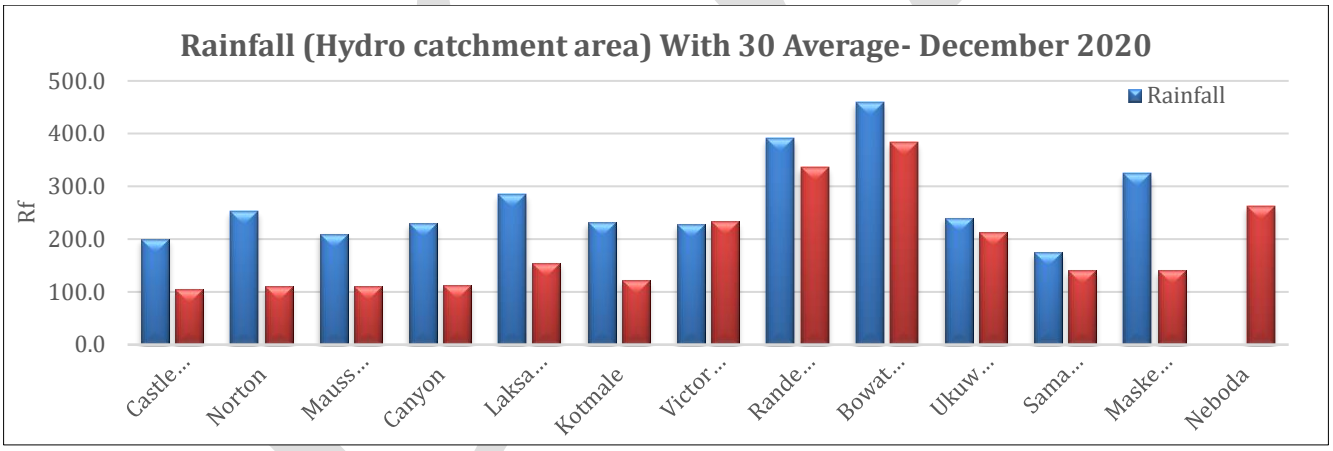


Fig 6b: Monthly Total Rainfall(mm) with 30 yearaverage (1961-1990) at Hydro catchment areas during December 2020

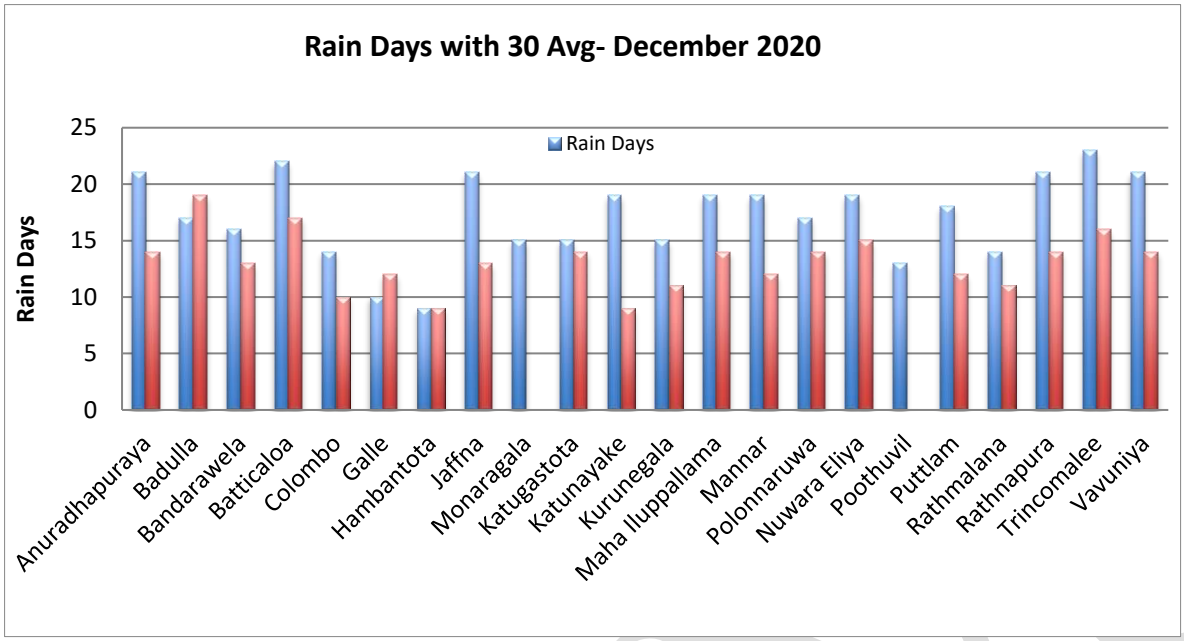


Fig 7: monthly total no of rainy days with with 30 year average (1961-1990) at main Meteorological stations during December 2020

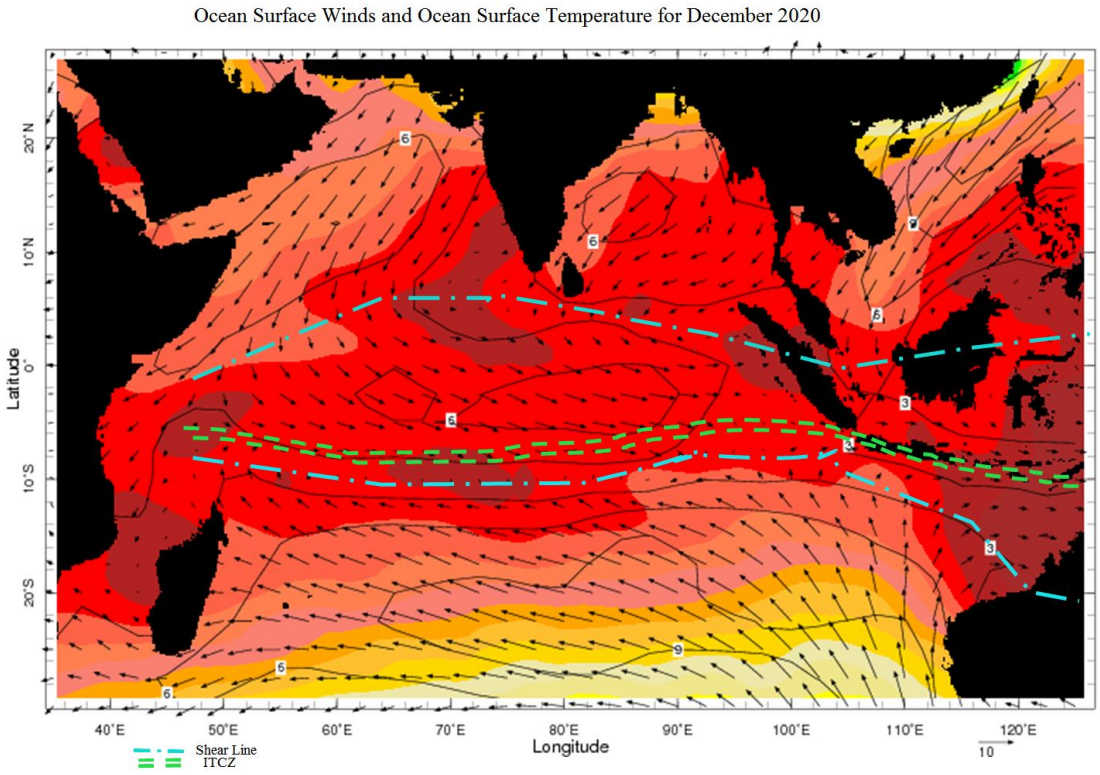


Fig 8: Ocean Surface Winds and Ocean Surface Temperature for December 2020

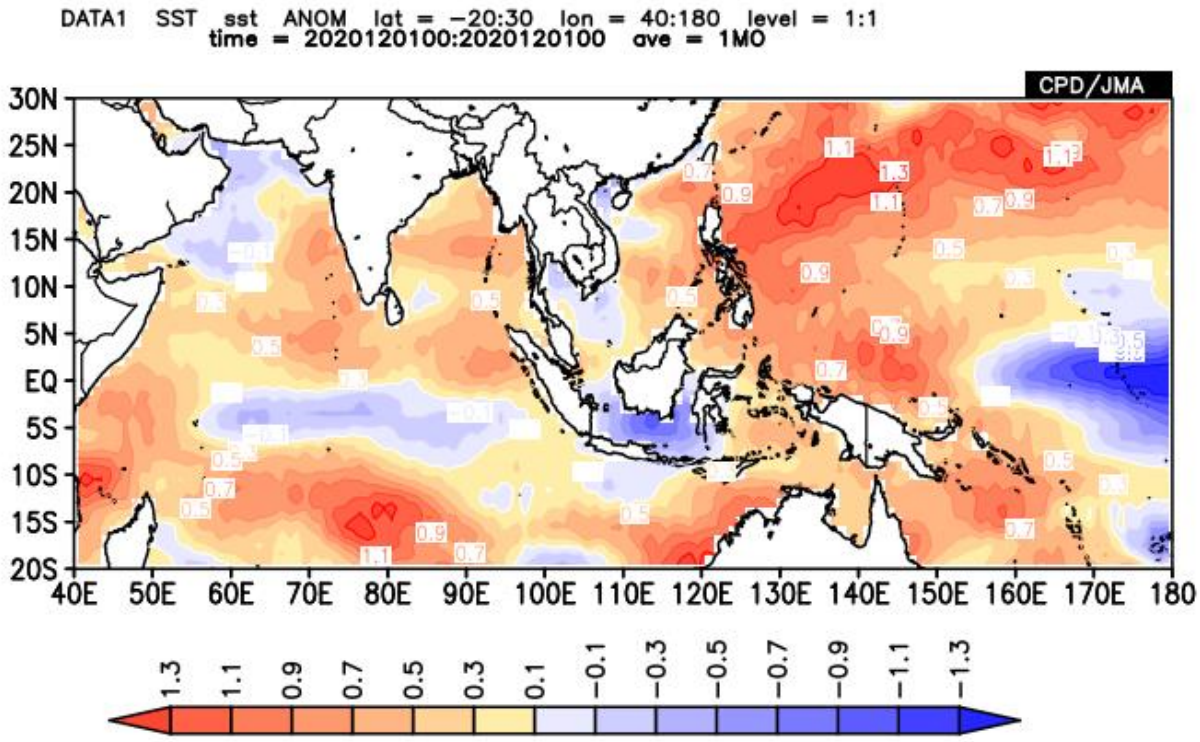


Fig 9: Sea Surface Temperature anomalies for December 2020

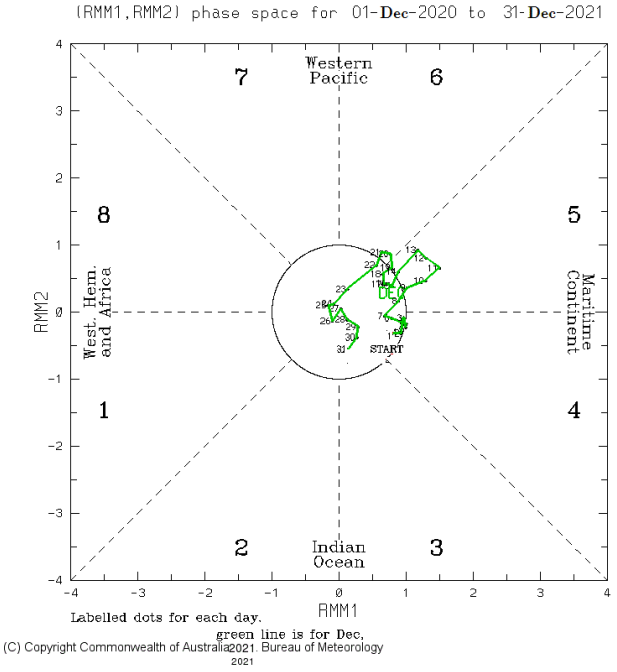


Fig 10: Phase diagram of MJO Index

Surface pressure and winds: The surface pressure was below average except from 07th to 12th and 16th to 17th when it was about or above average. Pressure distribution was even or fairly even during most of December except from 02nd to 05th under the influence of cyclonic storm "Burevi" ; and 23rd and 27th December 2020. Southwesterly pressure gradient was steep on 03rd while it was moderate on 02nd, 04th and 05th. Mild pressure gradient was observed on 23rd and 27th · The surface wind was Northeasterly in direction during most of month of December.

Upper winds:

At 850hPa, Northeasterly wind flow is dominated over the island. East-west oriented trough is appeared to the South of Sri Lanka. Anomalous cyclonic circulationappeared to the northwest of Sri Lanka at 850mb level (Fig 11).

At 700 hPa, Northeasterly wind flow is dominated over the island. East-west oriented trough is appeared to the South of Sri Lanka. Anomalous cyclonic circulation appeared over Sri Lanka at 700mb level (Fig 12).

At 500 hPa,Northeasterly wind flow is dominated over the island. East-west oriented trough is appeared to the South of Sri Lanka. Anomalous cyclonic circulation appeared to west of Sri Lanka at 500mb level (Fig 13).

The 200 hpa the upper tropospheric ridge was laid from 10^0N40^0E, 14^0N60^0E, 15^0N80^0E, and 16^0N120^0E

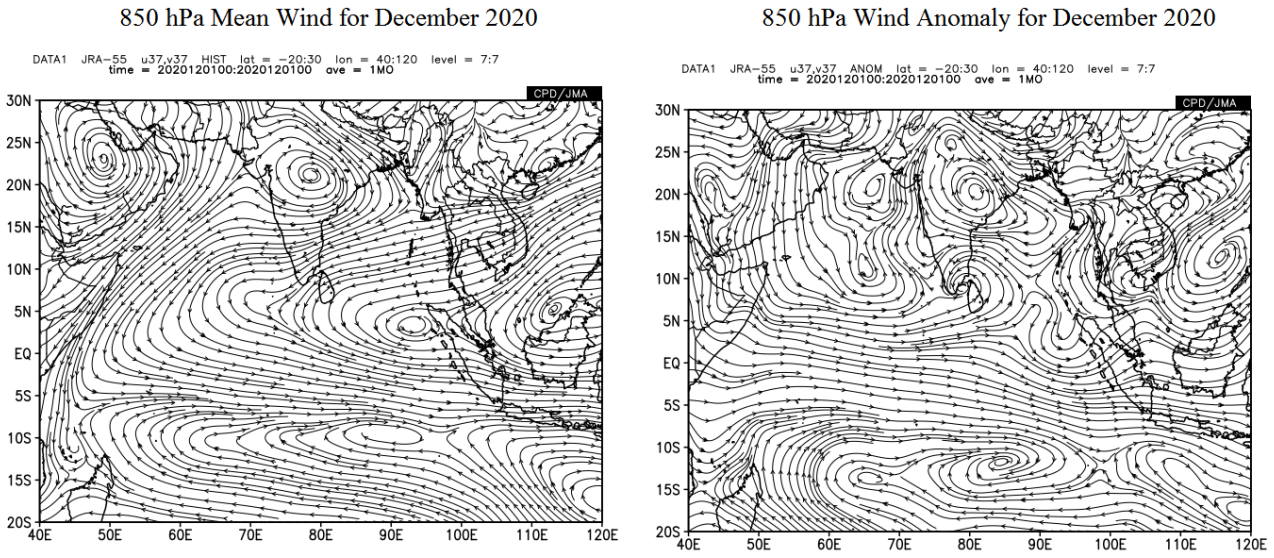


Fig. 11 Monthly average wind pattern at 850hpa level during the month of December 2020 (JRA55)

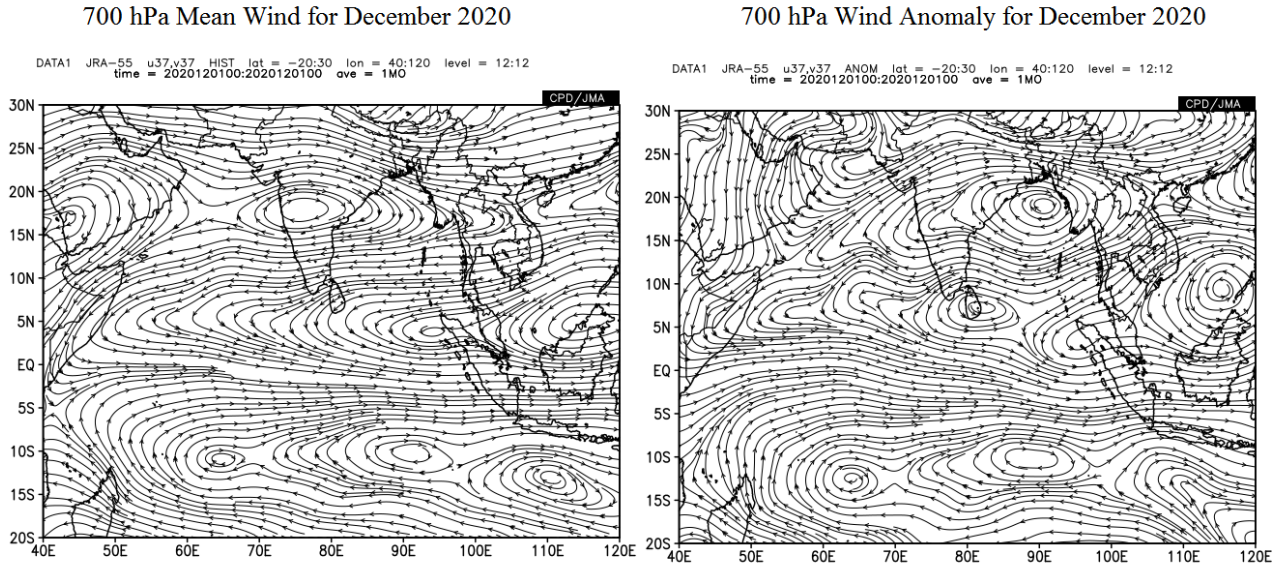
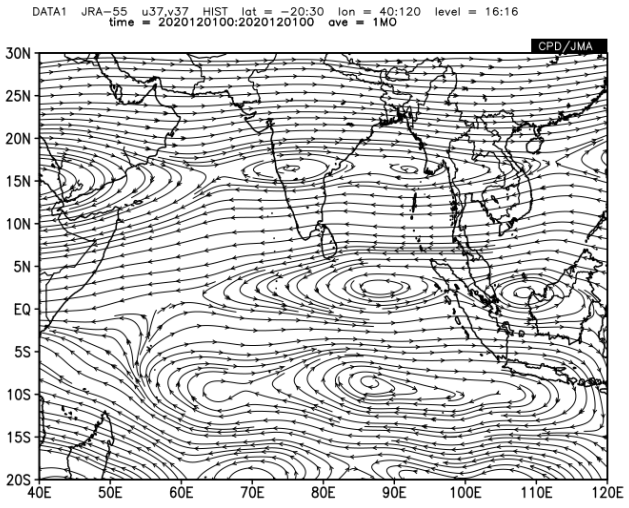


Fig. 12 Monthly average wind pattern at 700hpa level during the month of December 2020 (JRA55)

500 hPa Mean Wind for December 2020



500 hPa Wind Anomaly for December 2020

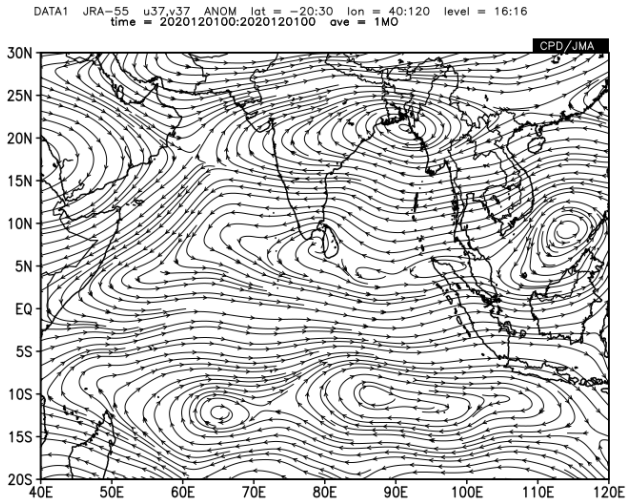


Fig. 13 Monthly average wind pattern at 500hpa level during the month of December 2020 (JRA55)

Temperature Field:

The maximum temperatures in the day were mostly below normal over most places except southwrn coastal region from 02nd to 05th due to the impact of cyclonic storm "Burevi". Above normal maximum temperature were reported from 06th to 19th ofDecember 2020.Below normal maximum temperatures were reported over most places during last two weeks except from 23rd to 25th , and from 29th to 30th (Fig.14). Highest recorded maximum temperature for the month of December 2020 was 34.7^{0}C at Mattala on 05th (Table 3a).

Minimum temperatures over most parts were above normal during the month except from 11th to 18th when below normal minimum temperature were reported at several places (Fig 15). Lowest recorded minimum temperature for the month of December 2020 was 5.5^{0}C at NuwaraEliya on 14th (Table 3b).

Maximum and Minimum departures from normal day/night temperature were shown in table 3.

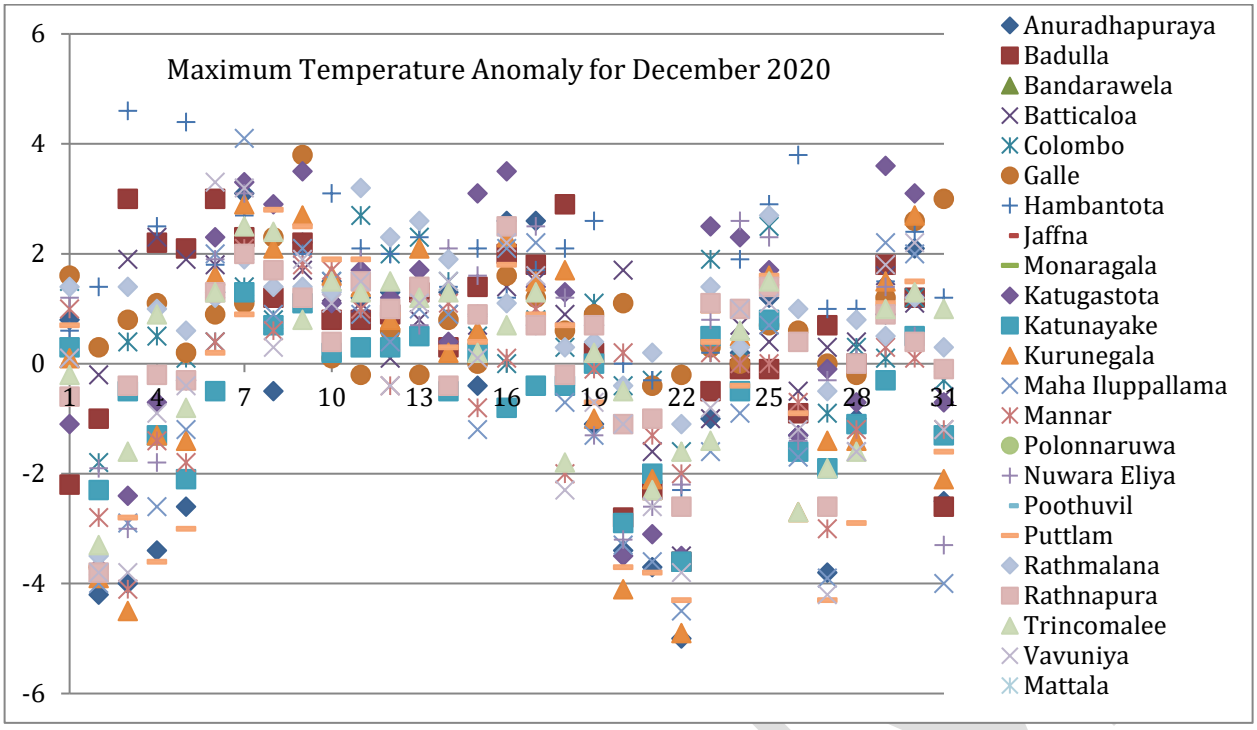


Fig 14 Maximum Temperature anomaly (^{0}C) for December 2020

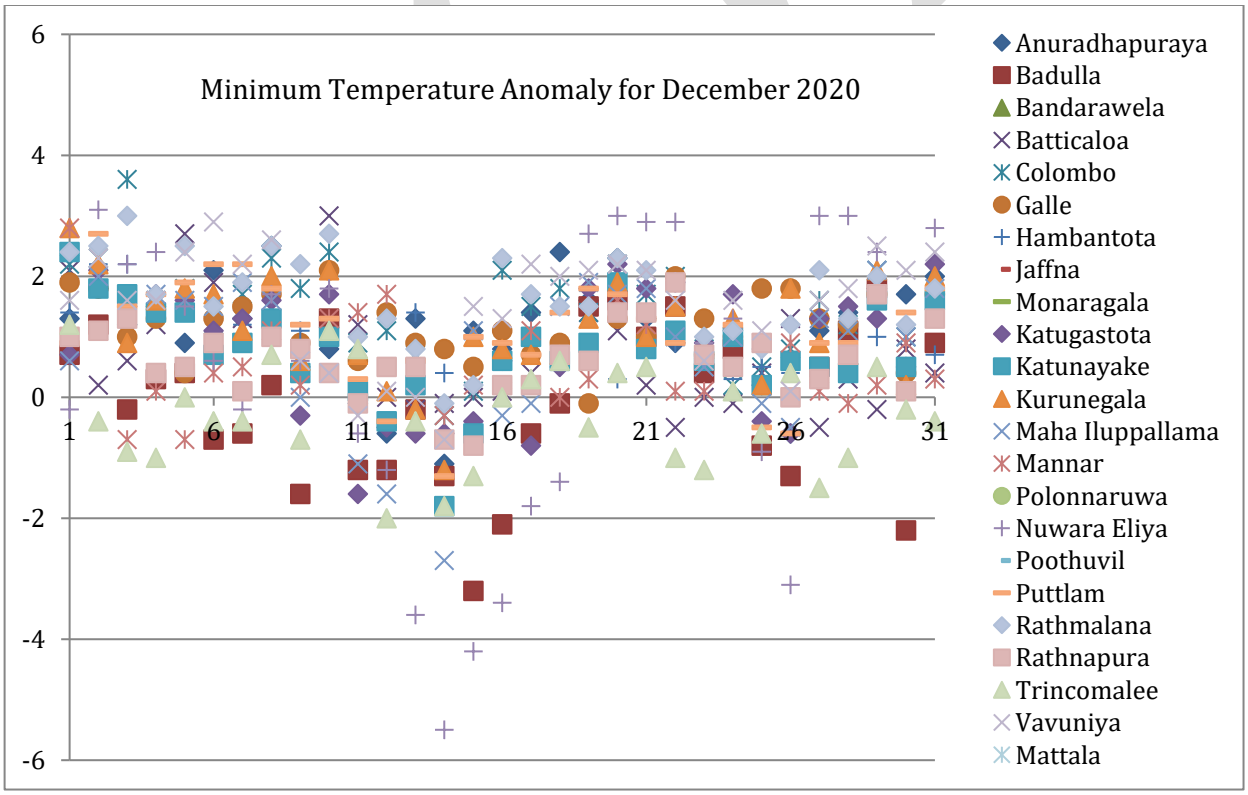


Fig 15 Minimum Temperature anomaly (^{0}C) for December 2020

Above or about normal rainfall was reported at most of the principal meteorological stations except Galle, Hambantota, Badulla, and Bandarawela where below normal rainfall was reported for month of December (Fig 1). Maximum percentage was reported from Jaffna (292.2%) while minimum from Hambantota station (54.3%) (Table 2). Further above normal rainy days were reported from most of the principal meteorological stations except Badulla and Galle.

Above normal rainfall was reported from most of the hydro catchment stations except Victoria where about normal rainfall was reported.

Highest cumulative rainfall was 812.9mm at Jaffna. Highest rainfall received during 24hours, was 279.8 mm at Akkarayan on 02nd December.

The monthly total rainfall and the number of rain days at the principal meteorological stations, total rainfall at hydro catchment areas, are shown in tables1and 2.

Table-01-Monthly Total Rainfall (mm) with 30 years (1961-1990) of their averages at Hydro catchment areas

Hydro Catchment	Dec 2020	Average	% (percentage of average)
Castlereigh	199.8	105.9	188.6%
Norton	252.8	110.0	229.8%
Maussakele	210.0	110.2	190.5%
Canyon	229.6	113.1	203.1%
Laksapana	284.8	154.5	184.4%
Kotmale	231.7	121.5	190.8%
Victoriya	227.5	233.8	97.3%
Randenigala	391.3	335.9	116.5%
Bowatenna	459.8	383.8	119.8%
Ukuwela	240.5	212.9	113.0%
SamanalaWewa	175.0	140.2	124.8%
Maskeliya	324.2	140.4	230.9%
Neboda		261.8	

Note that the meteorological day in this text is reckoned as the 24hr period from 08.30hrs to 08.30hrs following day

Table-02- The monthly total rainfall and the number of rain days at the principal meteorological stations recorded in the month against the respective averages (1961-1990).

	Monthly Total rainfall(mm)			Monthly Total No of rainy Days		
Meteorological station	2020-Dec	Average	%	2020-Dec	Average	%
Anuradhapuraya	239.2	210.9	113.4%	21	14	150.0%
Badulla	187.4	281.5	66.6%	17	19	89.5%
Bandarawela	118.5	186.2	63.6%	16	13	123.1%
Batticaloa	740.8	418.5	177.0%	22	17	129.4%
Colombo	348.6	175.3	198.9%	14	10	140.0%
Galle	128.4	176.9	72.6%	10	12	83.3%
Hambantota	65.8	121.1	54.3%	9	9	100.0%
Jaffna	812.9	278.2	292.2%	21	13	161.5%
Monaragala	406.3			15		
Katugastota	189.3	195.7	96.7%	15	14	107.1%
Katunayake	148.6	129.7	114.6%	19	9	211.1%
Kurunegala	195.7	149.0	131.3%	15	11	136.4%
MahaIluppallama	230.2	230.0	100.1%	19	14	135.7%
Mannar	320.7	221.2	145.0%	19	12	158.3%
Polonnaruwa	547.6	404.2	135.5%	17	14	121.4%
NuwaraEliya	203.2	196.0	103.7%	19	15	126.7%
Poothuvil	304.6	237.1	128.5%	13	na	
Puttlam	165.5	142.7	116.0%	18	12	150.0%
Rathmalana	195.5	177.8	110.0%	14	11	127.3%
Rathnapura	214.5	235.3	91.2%	21	14	150.0%
Trincomalee	528.7	364.5	145.0%	23	16	143.8%
Vavuniya	345.1	289.6	119.2%	21	14	150.0%
Mattala	88.7			9		

Table 3(a) - Extremes of Maximum Temperatures December 2020				
	Maximum			
	Value	Offsets (-)	Offsets (+)	Highest Std.Div
Value	34.7^{0}C	5	4.6	5.26
Station	Mattala	Anuradhapuraya	Hambantota	Monaragala
Date	05/12	22/12	03/12	

Table 3(b) -Extremes of Minimum Temperature December 2020				
	Minimum			
	Value	Offsets (-)	Offsets (+)	Highest Std.Div
Value	5.5^{0}C	5.5	3.6	4.46
Station	NuwaraEliya	NuwaraEliya	Colombo	NuwaraEliya
Date	14/12	14/12	03/12	

Prepared by National Meteorological Centre(NMC)

Department of Meteorology