Weather Synopsis –July 2020.

Above normal rainfall was reported at most of the principal meteorological stations except stations located in western parts of central mountains such as Katugastota and Nuwara Eliya as well as Ratnapura (Fig 1).

Most of the hydro catchment stations located along western slopes of the central hills reported below normal rainfall. However the hydro catchment stations located along eastern slopes of the central hills such as Victoria, Randenigala, Bowatenna and Ukuwela reported above normal rainfall.

Highest cumulative rainfall was 516 mm at Baddegama. Highest rainfall received during 24hours, was 171.5 mm at Katunayake on 20th July.

Thunderstorm activity was enhanced over inland areas from 08th to 10th July with formation of mild cyclonic circulation over northwestern parts at 850 hPa level on 8th and 500 hPa level on 09th and east west oriented trough across Sri Lanla at 700 hPa level on 8th.
Showery conditions were enhanced from 19th to 21st due to northwest southeast oriented trough appeared across Sri Lanka at 850 hPa and to the southwest of Sri Lanka at 700mb levels.

According to Disaster Management Center (DMC), two deaths were reported due to lightning at LankaPura on 08th and Buttala on 09th . One death was reported due to strong winds at Vavunia North on 20th. Several families were affected by strong winds and high intense rain leading to cutting failures during July 2020 (Table 3**).**

Most of the meteorological stations reported above average maximum temperatures during the first three weeks of the month and below average maximum temperatures during the last week . Exceptionally below normal (6^0 to 7^0C) day temperatures were reported at Batticoloa, Maha Illuppallama, Tricomalee and Vavunia on 28th . Minimum temperatures **a**bove normal during the first half of the month while well above normal (2^0 to 4^0C) night temperatures were reported from Colombo, Ratmalana and Galle. However some stations reported below average minimum temperatures during the 3rd week of the month.

Reported maximum temperature was 36.8^{0}C at Trincomlee on 07th July and reported minimum temperature was 11.9^{0}C at Nuwara Eliya on 20th and 21st July

ENSO neutral conditions were observed during Month of July 2020. Ocean Nino Index is -.2 during May , June and July (NOAA Climate prediction Center). Nuetral IOD was observed during July 2020 (BoM, Australia). Sea surface waters in tropical Indian Ocean are warmer than average (Fig. 5)

The average position of the shear line was laid between 01^{0}S and Equator from 40^{0}E to 60^{0}E, about Equator from 60^{0}E to 100^{0}E, between Equator and 05N and from 100^{0}E to 120^{0}E (Fig 4). It was fluctuated to the north of average position during first two weeks and south of average position during third week and about the average position during last week.

Strong Madden-Julian Oscillation (MJO) was at phase 1 from 1st to 10th July, the stagnated at phase 2 from 11th to 26th and was at phase 3 during remaining days of the month (Fig.6).

Weather Systems

Thunderstorm activity was enhanced over inland areas from 08th to 10th July with formation of mild cyclonic circulation over northwestern parts at 850 hPa level on 8th and 500 hPa level on 09th and east west oriented trough across Sri Lanla at 700 hPa level on 8th.

Showery conditions were enhanced from 19th to 21st due to northwest southeast oriented trough appeared across Sri Lanka at 850 hPa and to the southwest of Sri Lanka at 700mb levels.

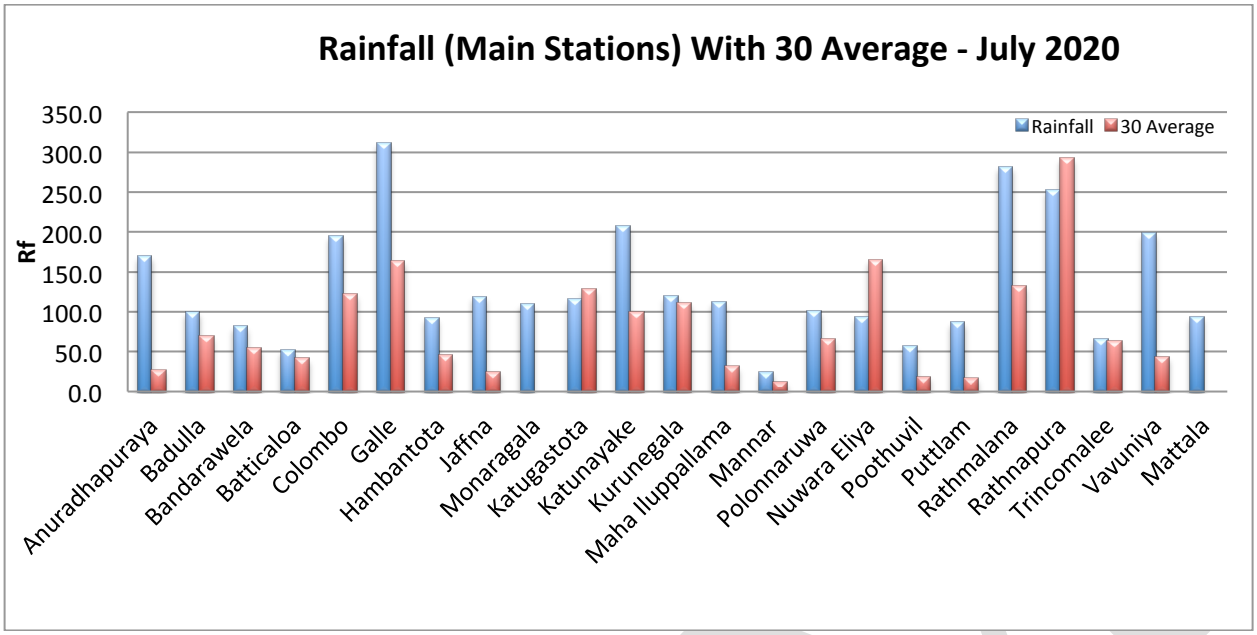

Fig 1: Monthly Total Rainfall(mm) with 30 years (1961-1990) of their averages at Main Meteorological stations areas during July 2020

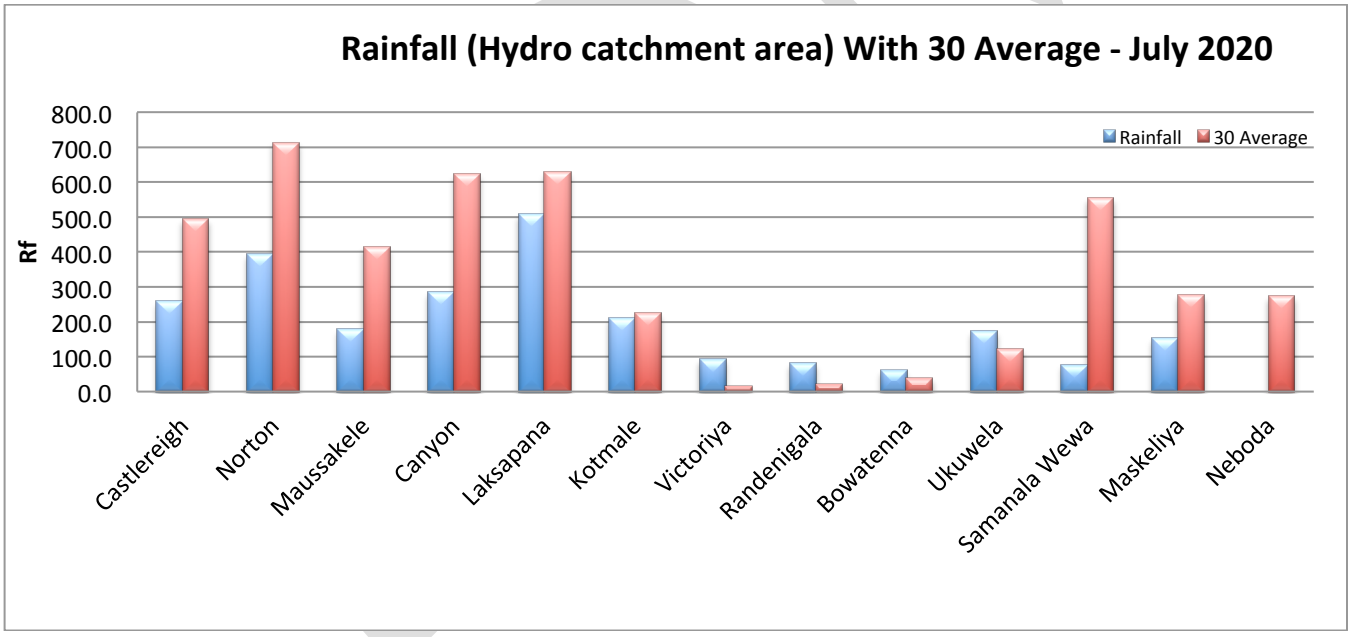

Fig 2: Monthly Total Rainfall(mm) with 30 years (1961-1990) of their averages at Hydro catchment areas during July 2020

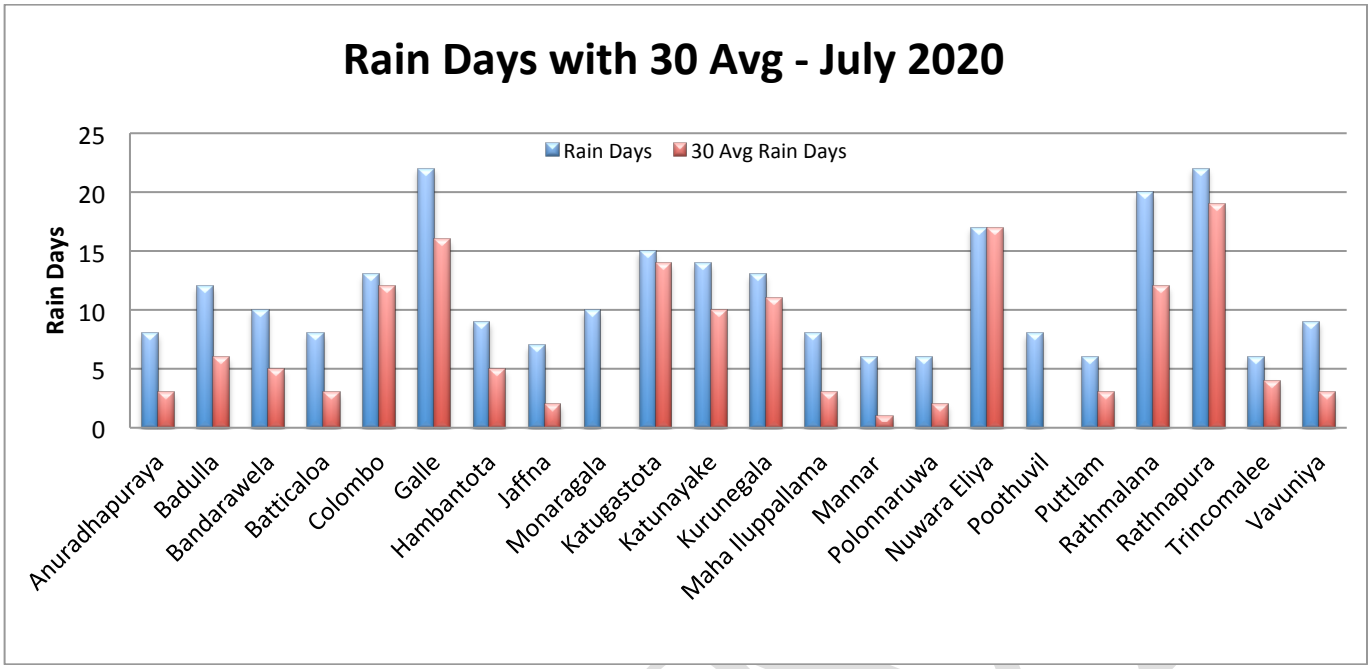

Fig 3: monthly total no of rainy days with 30 years(1961-1990) of their averages at main Meteorological stations during July 2020

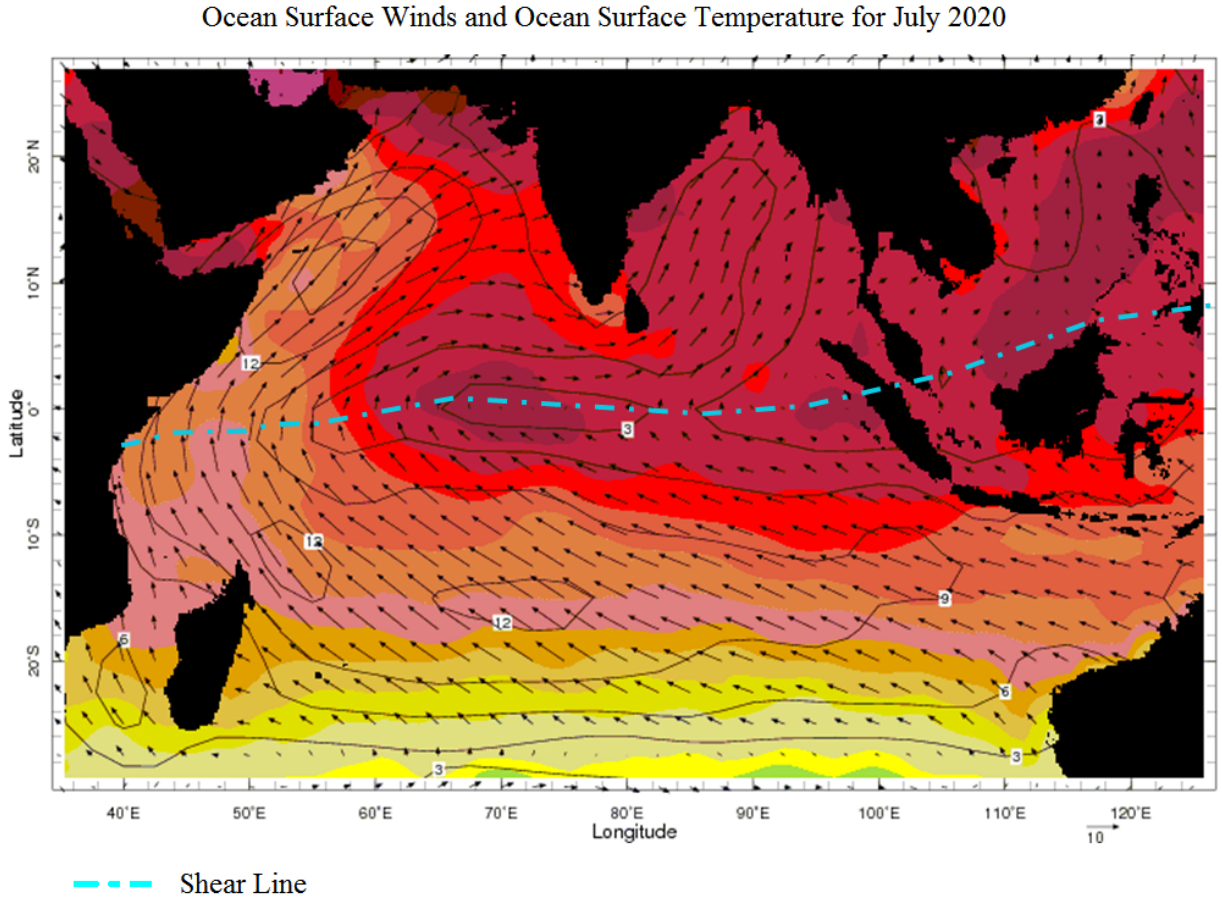

Fig 4: Ocean Surface Winds and Ocean Surface Temperature for July 2020

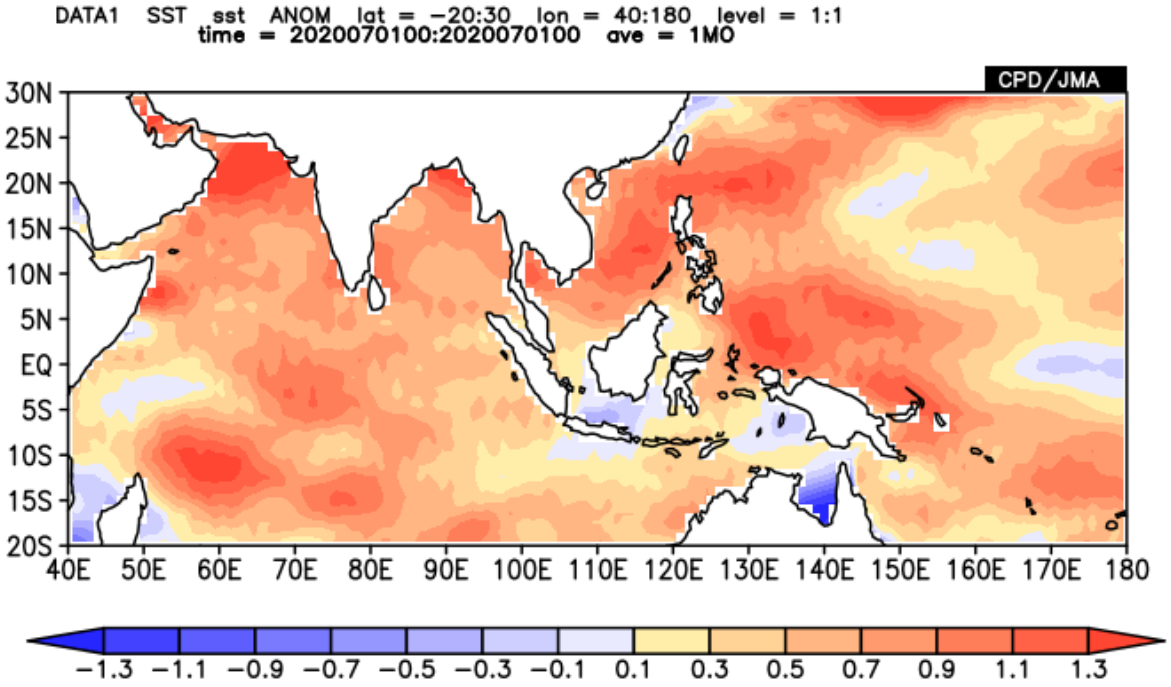

Fig 5: Sea Surface Temperature anomalies for July 2020

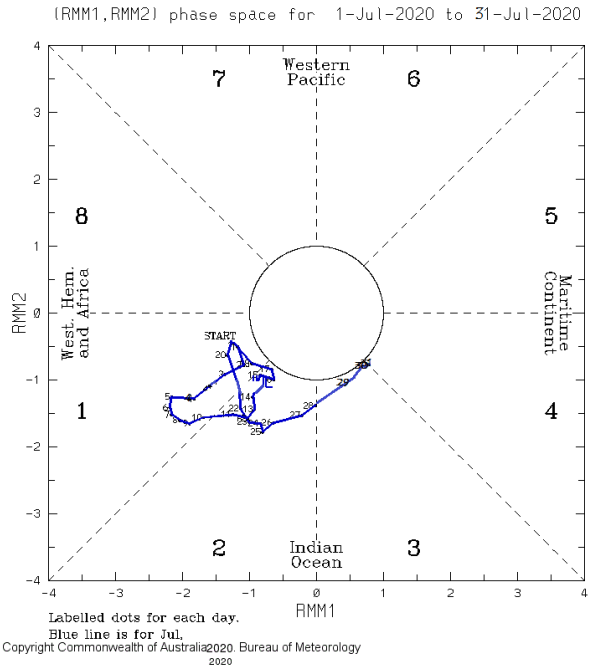

Fig 6: Phase diagram of MJO Index

Surface pressure and winds: The surface pressure was about or below average except 24th to 26th when it was above average. Southwesterly pressure gradient was mild on 8th, 10 th, 11 th, 18 th, 20 th, 22 to 25 th, and 29 th; moderate on 01st to 2nd, 04th to 07th, 12th to 17th, 26th , 27th and 30th; and steep on 3rd and 31st. Pressure distribution was fairly even 9 th, 19 th, 21st and 28 th.

The surface wind was from westerly to Southwesterly direction and speed varied within 05-15kts.

Upper winds:

At 850hPa, Westerly wind flow is dominated over the island. Anomalous south easterly flow suggest that weakening of monsoon flow at 850mb level (Fig 7). Mild cyclonic circulation appeared over Sri Lanka on 08th. Deep northwest southeast oriented trough appeared to the west of Sri Lanka on 19th July and over Sri Lanka on 20th July providing favourable condition for rainfall enhancement.

At 700 hPa, Westerly wind flow is dominated over the island. Anomalous south easterly flow suggest that weakening of monsoon flow at 700mb level (Fig 8). Deep northwest southeast oriented trough appeared to the southwest of Sri Lanka on 19th July and over Sri Lanka on 20th July providing favourable condition for rainfall enhancement

At 500 hPa, Northwesterly to southeasterly wind flow supported by the northwest southeast oriented trough appeared across Sri Lanka . This trough provided favourable conditions for formation of evening thunder showers at the leeside of the island . Mild cyclonic circulation appeared over Northwesten parts of Sri Lanka on 09th

The 200 hpa the upper tropospheric ridge was laid from 29^0N40^0E to 27^0N100^0E . Tropical easterly jet was appeared in the vicinity of Sri Lanka.

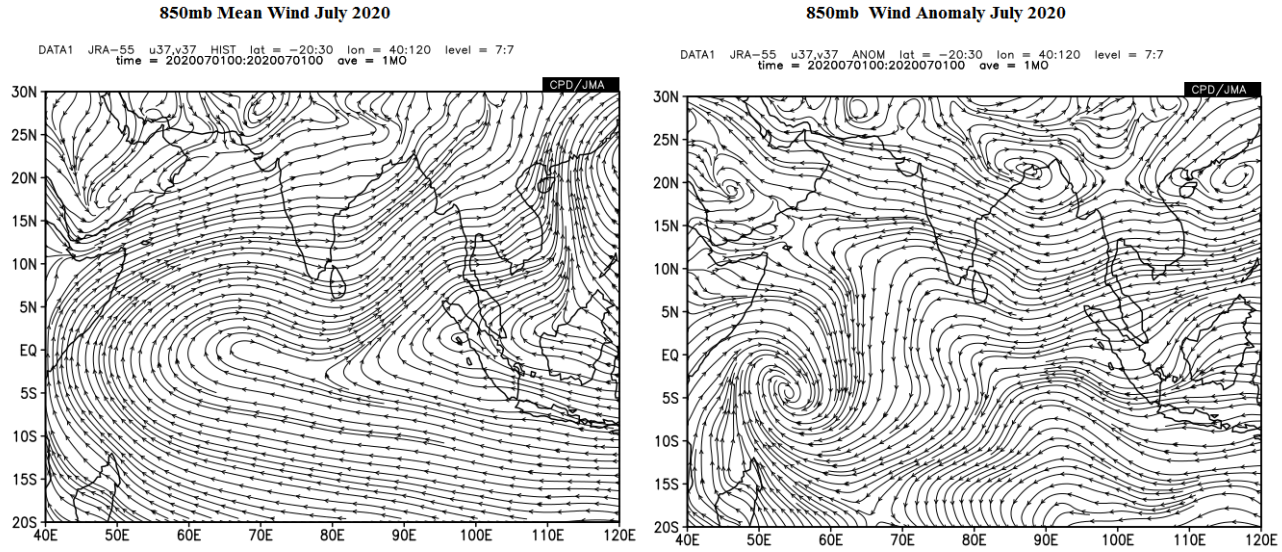

Fig. 7 Monthly average wind pattern at 850hpa level during the month of July 2020 (JRA55)

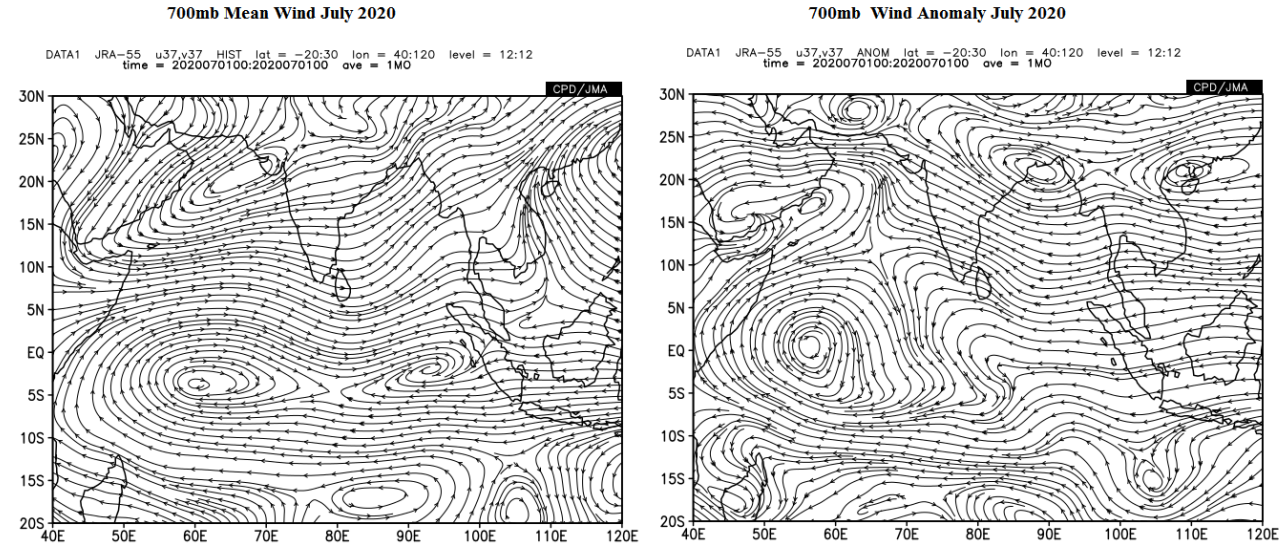

Fig. 8 Monthly average wind pattern at 700hpa level during the month of July 2020 (JRA55)

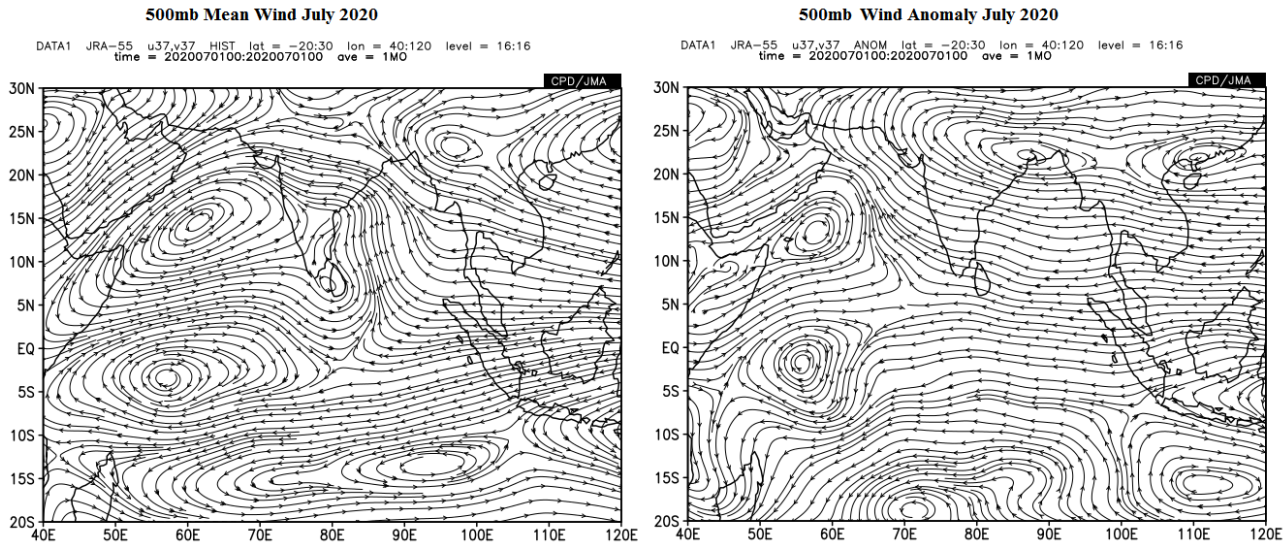

Fig. 9 Monthly average wind pattern at 500hpa level during the month of July 2020 (JRA55)

Temperature Field:

The maximum temperatures in the day were mostly 1-3^{0}C above normal in most places during first 3 weeks of the month of July 2020. Day temperatures were mostly below normal during last week of the month and on 20th July. Some stations reported significantly below average maximum temperatures on 20th and 28th (Fig.10). 6^0 to 7^{0}C below normal day temperatures were reported at Batticoloa, Maha Illuppallama, Tricomalee and Vavunia on 28th .

Highest recorded maximum temperature for the month of July 2020 was 36.8^{0}C at Trincomalee on 09th (Table 4a).

Night minimum temperatures over most parts were above normal especially during the first half of the month (Fig 11). However some stations reported below average minimum temperatures during the 3rd week of the month. 2^0 to 4^{0}C above normal night temperatures were reported at Colombo, Ratmalana and Galle during most of the first half of the month. Lowest recorded minimum temperature for the month of July 2020 was 11.9^{0}C at NuwaraEliya on 20th and 21st (Table 4b).

Maximum and Minimum departures from normal day/night temperature were shown in table 4.

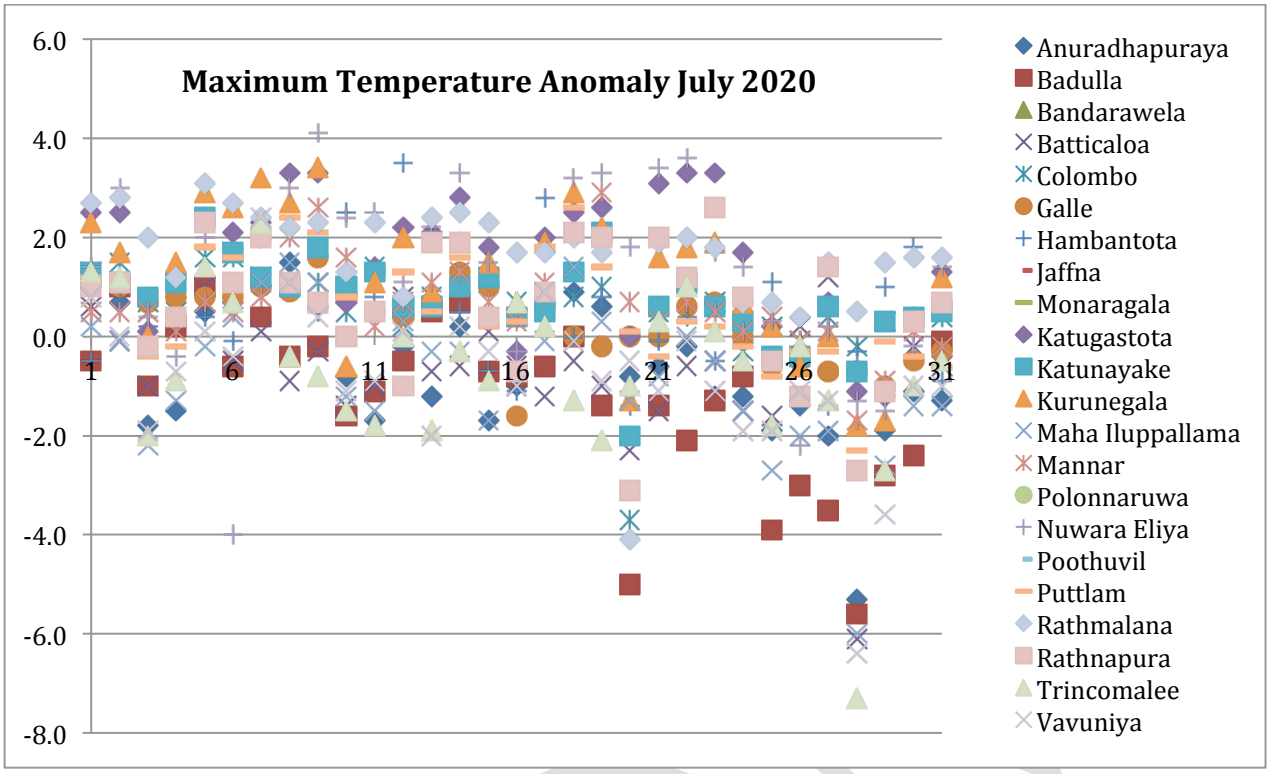

Fig 10 Maximum Temperature anomaly (^{0}C) for July 2020

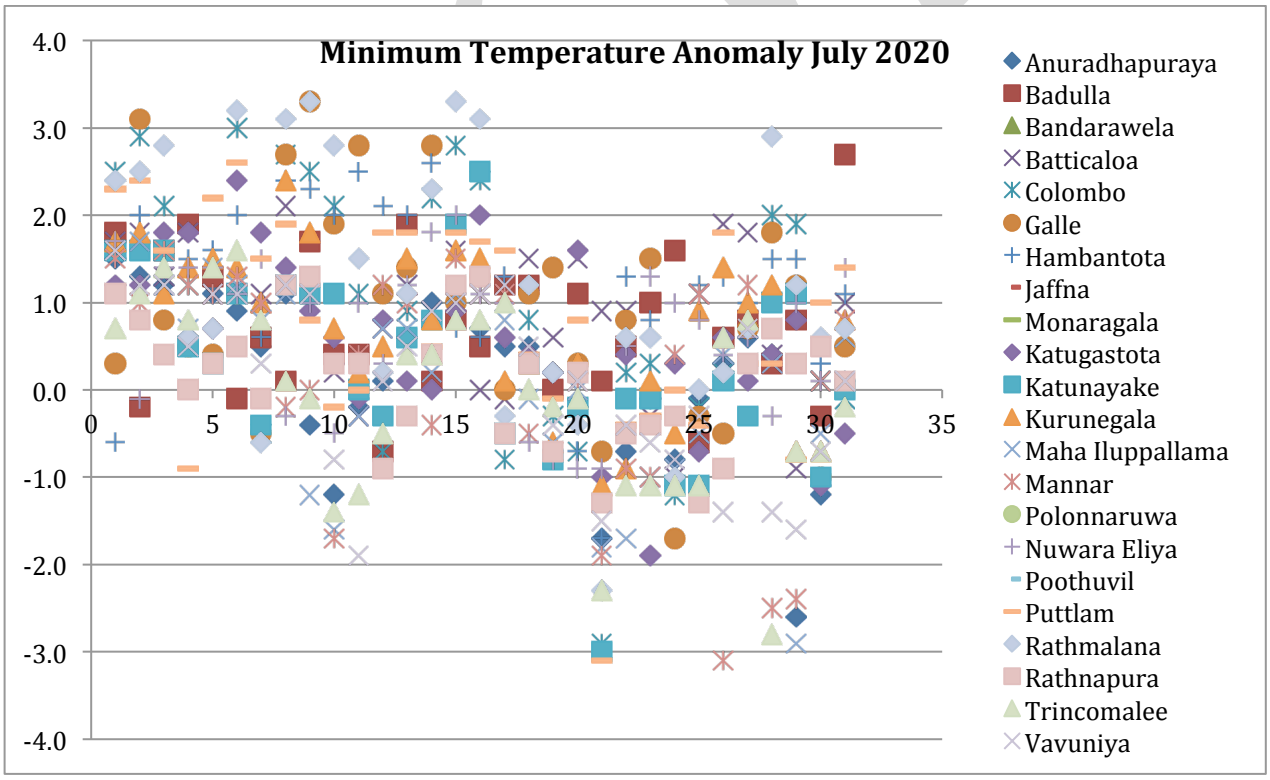

Fig 11 Minimum Temperature anomaly (^{0}C) for July 2020

Above average rainfall was reported from most of the main meteorological station except Katugastota, NuwaraEliya and Ratnapura stations. Maximum percentage was reported from Anuradhapura (624.7%) while minimum from NuwaraEliya station (56.6%) (Table 2). Number of rainy days was above average except Colombo, Katugastota and NuwaraEliya where about average rainy days were reported (Fig 3) (Table 2).

Most of the hydro catchment stations located along western slopes of the central hills reported below normal rainfall. However the hydro catchment stations located along eastern slopes of the central hills such as Victoria, Randenigala, Bowatenna and Ukuwela reported above normal rainfall. (Fig 2).

Highest cumulative rainfall was 516 mm at Baddegama . Highest rainfall received during 24hours, was 171.5 mm at Katunayake on 20th July.

The monthly total rainfall and the number of rain days at the principal meteorological stations, total rainfall at hydro catchment areas, are shown in tables 1and 2.

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

Hydro Catchment	July 2020	Average	% (percentage of average)
Castlereigh	**257.7**	495.1	52.1%
Norton	**394.2**	714.0	55.2%
Maussakele	**178.9**	415.2	43.1%
Canyon	**284.7**	623.9	45.6%
Laksapana	**507.5**	629.3	80.6%
Kotmale	**211.5**	225.2	93.9%
Victoriya	**91.2**	15.5	588.4%
Randenigala	**81.7**	21.1	387.8%
Bowatenna	**60.1**	38.2	157.3%
Ukuwela	**174.5**	120.5	144.8%
Samanala Wewa	**77.0**	554.1	13.9%
Maskeliya	**152.3**	277.1	55.0%
Neboda		272.6	

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

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

Meteorological station	Monthly Total rainfall(mm)			Monthly Total No of rainy Days		
	2020-July	Average	%	2020-July	Average	%
Anuradhapuraya	169.3	27.1	624.7%	8	3	266.7%
Badulla	99.5	69.3	143.6%	12	6	200.0%
Bandarawela	81.6	54.7	149.2%	10	5	200.0%
Batticaloa	51.4	41.4	124.2%	8	3	266.7%
Colombo	195.2	121.9	160.1%	13	12	108.3%
Galle	311.3	163.2	190.7%	22	16	137.5%
Hambantota	91.8	45.5	201.8%	9	5	180.0%
Jaffna	118.5	25.1	472.1%	7	2	350.0%
Monaragala	110.2			10		
Katugastota	115.5	128.1	90.2%	15	14	107.1%
Katunayake	206.8	99.2	208.5%	14	10	140.0%
Kurunegala	119.3	111.2	107.3%	13	11	118.2%
Maha Iluppallama	112.7	31.0	363.5%	8	3	266.7%
Mannar	24.3	12.4	196.0%	6	1	600.0%
Polonnaruwa	101.3	65.6	154.4%	6	2	300.0%
Nuwara Eliya	93.4	164.9	56.6%	17	17	100.0%
Poothuvil	56.7	18.9	300.0%	8	na	
Puttlam	86.6	16.8	515.5%	6	3	200.0%
Rathmalana	282.0	132.7	212.5%	20	12	166.7%
Rathnapura	253.2	292.8	86.5%	22	19	115.8%
Trincomalee	65.5	63.8	102.7%	6	4	150.0%
Vavuniya	197.9	43.5	454.9%	9	3	300.0%
Mattala	93.6			7		

Table 3 hazards caused during July 2020

date	Lightning	Strong Winds	Heavy Rain	Cutting failure
03		Udunuwara	Udunuwara	
05		Chavakachcheri Udunuwara		
06		Akurana Kundasale		
07		Meegahakiula		Beliatta
08	Lankapura	Lankapura Mihinthale Palugaswewa Medawachchiya Galenbidunuwewa Madulla	Madulla Soranatotota	
09	Mannar Town Manthaiwest Buththala Kundasale	Mannar Town Manthaiwest Harispattuwa Ududumbara Minipe Thanamalvila Buththala Badalkumbura Siyambalanduwa Gomarankadawala Meegahakiula Haldunmulla	Buththala Badalkumbura Siyambalanduwa	

10		Minipe	Panwila	
11		Passara Thumpane	Passara	
13		Hatharaliyadda Medadumbara Damana Lahugala Mahaoya Hatharaliyadda	Pasbage Korale	
14			Udapalatha	
15		Ampara		
16		Yatiyantota, Akurana Ududumbara Poojapitiya Mahaoya	Udapalatha Pasbage Korale	
17		Udunuwara Doluwa Hatharaliyadda Yatinuwara	Pathadumbara Doluwa	
18	Yatiyantota	Hatharaliyadda	Hatharaliyadda	
19		Ududumbara, Dompe	Udapalatha	
20	Negambo	Ganga Ihala Korale, Hatharaliyadda Vavuniya North, Akmeemana, Matugama, Ingiriya, Bandaragama, Millaniya, Dodangoda, Panadura, Palindanuwara, Agalawatta, Rathmalana, Ja'Pura - Kotte, Gampaha, Meerigama, Dompe, Ja Ela, Minuwangoda, Aththanagalla, Wennappuwa, Madampe, Chilaw, Mundalama, Kalpitiy , Mahawewa Nawagaththegama, Kegalle Yatiyantota	Pathadumbara Ja'Pura - Kotte, Thimbirigasyaya, Rathmalana Wennappuwa, Madampe, Chilaw, Mundalama,	
21		Hatharaliyadda, Nattandita Wanathawilluwa		
22		Ududumbara		
23		Ududumbara, Kundasale,	Welikanda (lightning)	
25		Beliatta		
26		Delft, Sandilippai,		
27		Puthukudiyirippu, Velanai, Beliatta Weeraketiya		
28		Harispattuwa Puthukudiyirippu, Walapane, Kothmale, Beliatta		
29		Udunuwara, Beliatta, Pasbagekorale, Velanai, Agunukolapelassa, Galigamuwa, Yatiyantota		Mawanelle
30		Agunukolapelassa, Ambalantota, Tangalle, Koralaipattu North,		

Table 4(a) - Extremes of Maximum Temperatures July 2020				
	Maximum			
	Value	Offsets (-)	Offsets (+)	Highest Std.Div
Value	36.8^{0}C	7.3	4.1	1.92
Station	Trincomlee	Trincomlee	NuwaraEliya	Polonnaruwa & NuwaraEliya
Date	07/07	28/07	09/07	

Table 4(b) -Extremes of Minimum Temperature July 2020				
	Minimum			
	Value	Offsets (-)	Offsets (+)	Highest Std.Div
Value	11.9^{0}C	3.1	3.3	1.49
Station	NuwaraEliya	Puttalum & Mannar	Ratmalana	Ratmalana
Date	20/07 & 21/07	21/07 & 26/07	09-07 /15-07	

Prepared by National Meteorological Centre (NMC)
Department of Meteorology