

Weather Synopsis –May 2020.

Above normal rainfall was reported over most parts of the island except western coastal areas where slightly below average rainfall was reported (Fig 1).

Inter monsoon conditions continued during first two weeks with widespread afternoon thundershowers in second week of the month. Strong convective activity caused two deaths due to lightning at Kinniya on 01st and at Mihinthale on 04th. According to Disaster Management Center (DMC), several families were affected by hazards caused by convective activity such as lightning, locally isolated strong winds probably associated with the downdrafts of cumulonimbus clouds (a downdraft is a small-scale column of air that rapidly sinks toward the ground often bringing strong winds), high intense rain leading to cutting failures and minor floods during this period (Table 1).

Showery conditions were enhanced over south-western parts and adjacent areas of the country with the temporary establishment south-westerly wind flow across the island with the formation of Tropical cyclone Amphan at the Bay of Bengal during the 3rd week of the month. A Low Pressure Area has formed over southeast Bay of Bengal and adjoining south Andaman Sea, on 13 May 2020, became a depression on 16th May 2020 and intensified into the cyclonic storm 'AMPHAN' in the same location at evening of 16th May. It has undergone rapid intensification from very severe cyclonic storm, extremely severe cyclonic storm, then in to in to a super cyclonic storm from 17th to 18th May. AMPHAN moved north-northeastwards slightly degraded in to a severe cyclonic storm before crossed West Bengal – Bangladesh coasts near Lat. 21.65°N and longitude 88.3°E on 20th May, 2020 (Fig 2). During the intensification process from low pressure area to a depression as well as during the rapid intensification process of AMPHAN cyclone to a super cyclonic storm, extreme weather conditions with strong winds, lightning and very heavy rainfall exceeding 150mm experienced particularly over southwestern parts of Sri Lanka on 15th, 18th and 19th (Figs. 3a, 3b, 3c, 4a, 4b, 4c, and 5).

Extreme weather events leading to landslides and cutting failures at Kegalle, Ratnapura, and Matara districts, strong winds at Kegalle, Ratnapura, Matara, Galle, Hambantota, Kandy, Nuwara Eliya, Gampaha, Kalutara, Colombo, Jaffna, Kilinochchi, Mullaitivu, Matale, Badulla, Monaragala, Puttalam, affected more than 6000 families and around 25,000 people. 8 people were died following this disaster (source DMC).

With the strengthening of westerlies and increase in convective clouds, the southwest Monsoon has established over Southern part of Sri Lanka on 28th May. According to India Meteorological Department (IMD) the Northern Limit of Monsoon (NLM) passed through 5°N 72°E, 6°N 79°E, 8°N 86°E, 11°N 90°E, 14°N 93°E and 16°N 95°E on 28th (Fig. 6). However formation of a low pressure area over southeast Arabian Sea and Lakshadweep area on 31st May 2020, has restricted further advancement of monsoon flow across Sri Lanka for remaining days of May 2020.

Above normal rainfall was reported from most of the principal meteorological stations except stations located in western coastal belt such as Ratmalana, Colombo, Katunayaka and Puttalam as well as Jaffna, Trincomalee and Hambantota where below average rainfall was reported (Fig. 7). Number of rainy days was about or above average except Ratmalana (Fig. 9). Most of the hydro catchment stations, except Samanalawewa reported above average rainfall (Fig. 8). Highest cumulative rainfall was 998.2 mm at Guruluvana. Highest rainfall received during 24 hours, was 260 mm at Kukuleganga on the 26th.

Most of the meteorological stations reported above average Maximum temperatures during first 2 weeks, then slightly below average temperatures during third week and near average temperatures 7 during last week ((Fig.15). Minimum temperatures were above average over most of the stations especially during the 2nd half of the month(Fig.16). Reported maximum temperature was -37.8⁰C at Batticaloa on 21st May and reported minimum temperature was 9.8⁰C at NuwaraEliya on 3rd May (Table).

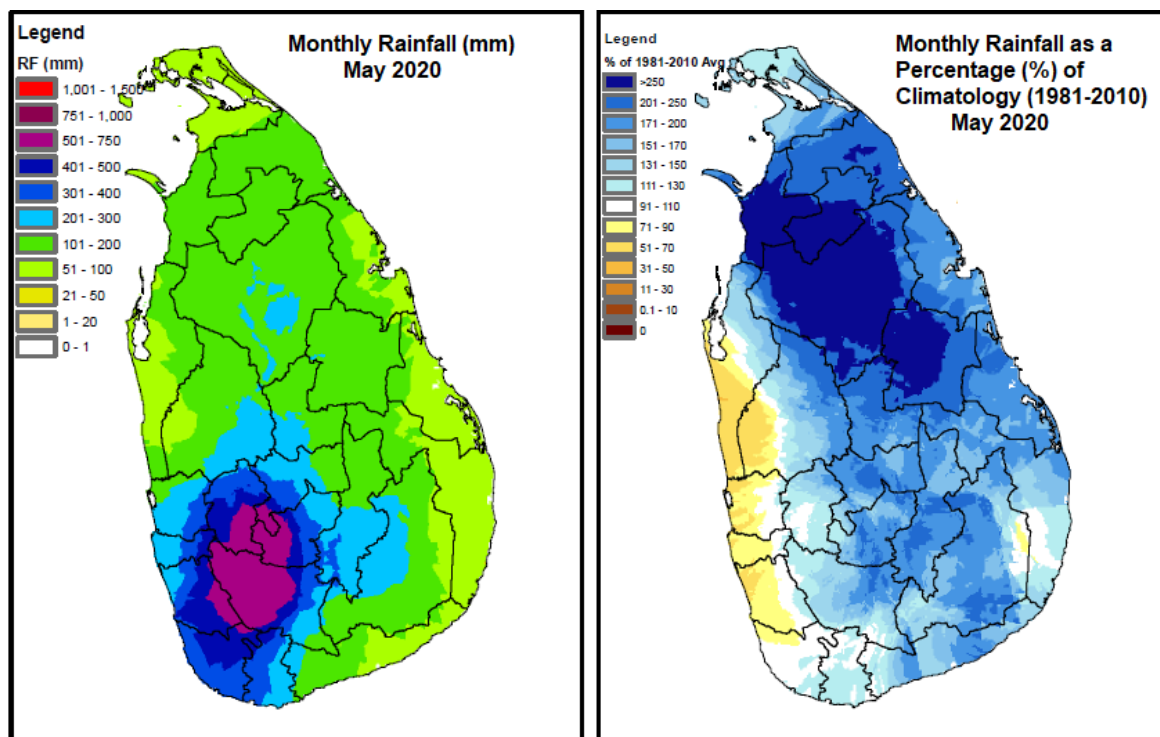


Fig 1: Monthly total rainfall for May2020 and monthly total rainfall for May 2020 as a percentage of Climatology (1981-2010) (Source Drought Bulletin, DoM) .

ENSO and IOD neutral conditions were observed during Month of May 2020. Ocean Nino Index is around 0.3 during March, April and May (NOAA Climate prediction Center). Sea surface waters in tropical Indian Ocean are warmer than average (Fig. 10)

The Madden-Julian Oscillation (MJO) was strong at phase 04 from 1st May to 03rd May became weak from 04th to 12th and became strong at phase 2 from 13th to 18th, propagated eastward in to phase 3 on 19th and 20th, propagated further eastward to phase 4 to 8 for the rest of the month (Fig.11).

The Inter Tropical Convergence Zone fluctuated around Equator 50⁰E, 05⁰N 80⁰E and 05⁰N 120⁰E till 15th May. The average position of the shear line laid around Equator 40⁰E, 02⁰S 70⁰E and 04⁰S 100⁰E (Fig 10).

Weather Systems

A Low Pressure Area has formed over southeast Bay of Bengal and adjoining south Andaman Sea, on 13th May 2020, became a well marked low pressure area over southeast Bay of Bengal on 14th May 2020, concentrated into a depression centered near 10.4°N and 87°E at 00UTC/ 16th May 2020 over southeast Bay of Bengal (BoB), intensified into a deep depression near 10.9°N and 86.3°E at 09UTC/ 16th May, into cyclonic storm 'AMPHAN' in the same location at evening 12UTC/ 16th May. It further intensified into a severe cyclonic storm at 03 UTC 17th May, 2020 and centered near 11.4°N and 86.0°E. It has underwent rapid intensification from very severe cyclonic storm 11.7°N and 86.0°E around 09UTC/17th, extremely severe cyclonic storm near 12.9°N and 86.4°E 21UTC/17th, then in to in to a super cyclonic storm 06UTC/ 18th May . Super Cyclonic storm "AMPHAN" moved northward lay centered at 15.6°N and 86.7°E at UTC/19th and maintained it's Super Cyclonic status nearly for 24 hours around the same region. Weak vertical wind shear, very warm sea surface temperatures, and increased cross equatorial wind surge over West Central BoB aid the rapid intensification of AMPHAN in to a Super Cyclonic Storm. Interaction of MJO, Equatorial Rossby wave and Kelvin wave also support enhancement of convective activity and hence the intensification of the system (Fig .11). AMPHAN was the first Super Cyclonic Storm over the Bay of Bengal, after the Odisha Super Cyclonic Storm of 1999. AMPHAN moved north-northeastwards and slightly degrade in to a very severe cyclonic storm due to unfavourable environment of increase in vertical wind shear and low Ocean thermal energy, before crossing West Bengal – Bangladesh coasts near Lat. 21.65°N and longitude 88.3°E on 20th May, 2020 during 1000-1200 UTC, with maximum sustained wind speed of 85 knots gusting to 100 knots (Fig. 2).The system maintained the cyclonic storm intensity for almost 15 hours even after landfall from 1200 UTC of 20th May to 0300 UTC of 21st May (Source India Meteorological Department).

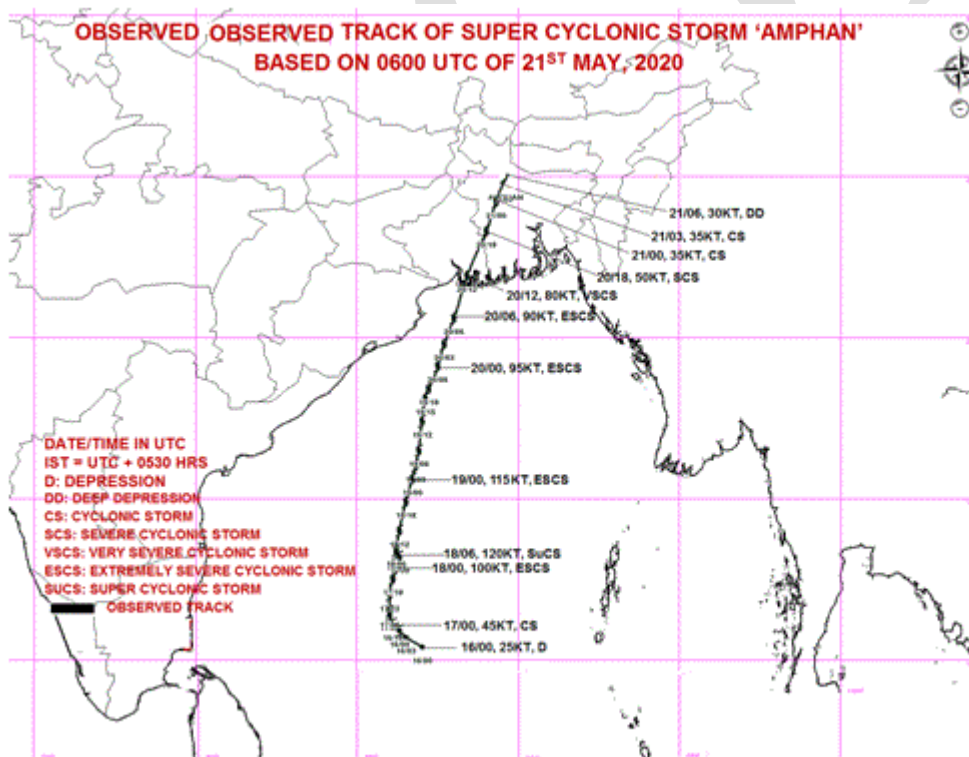


Fig 2: Observed Track of Amphan (Source : IMD)

Impact of AMPHAN super cyclonic stormon extreme weather events over Sri Lanka

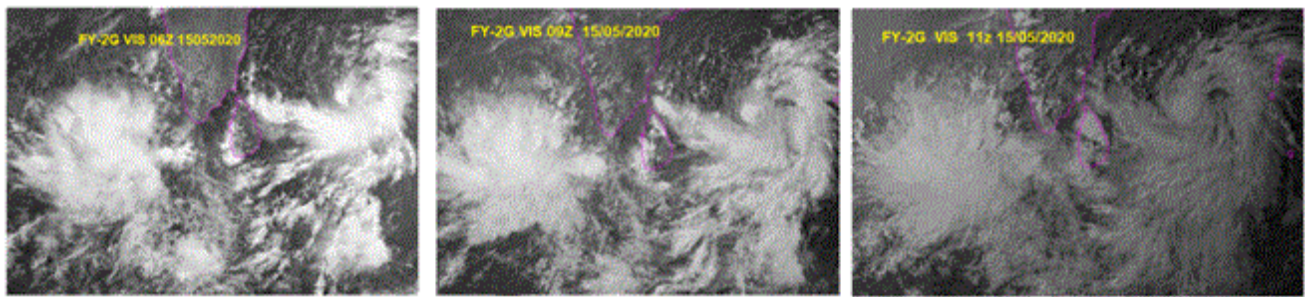


Fig 3a : FY-2G visible images on 15th May 2020

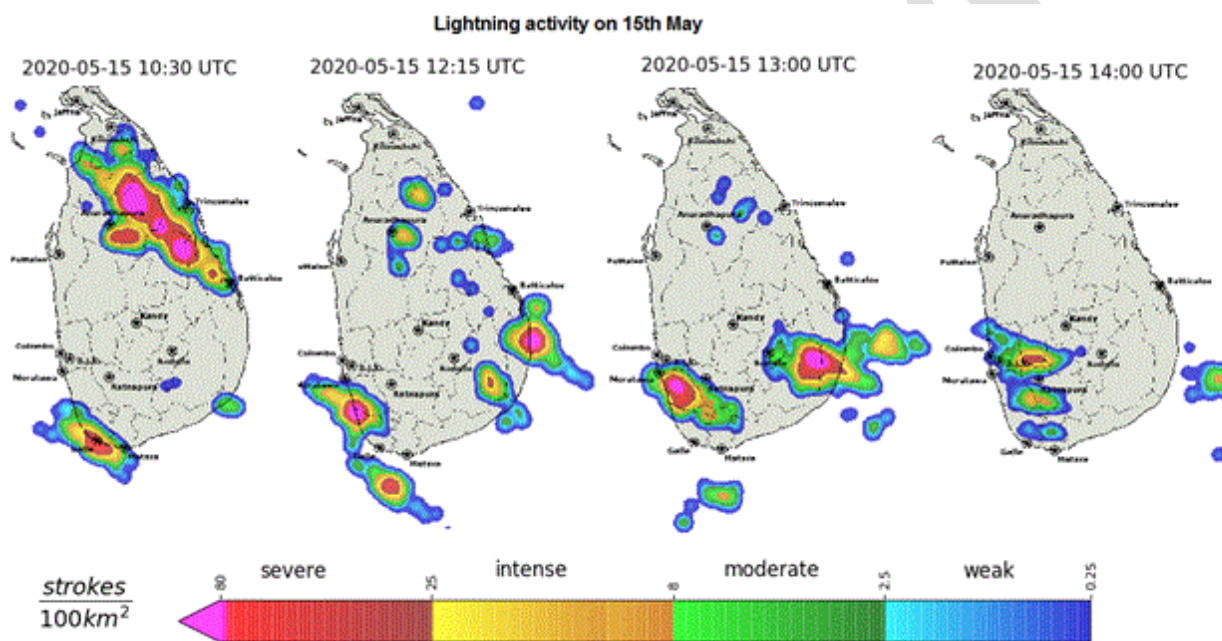


Fig 3b : GLD360 lightning stroke maps on 15th May 2020 (Source : Finish Meteorological Institute)

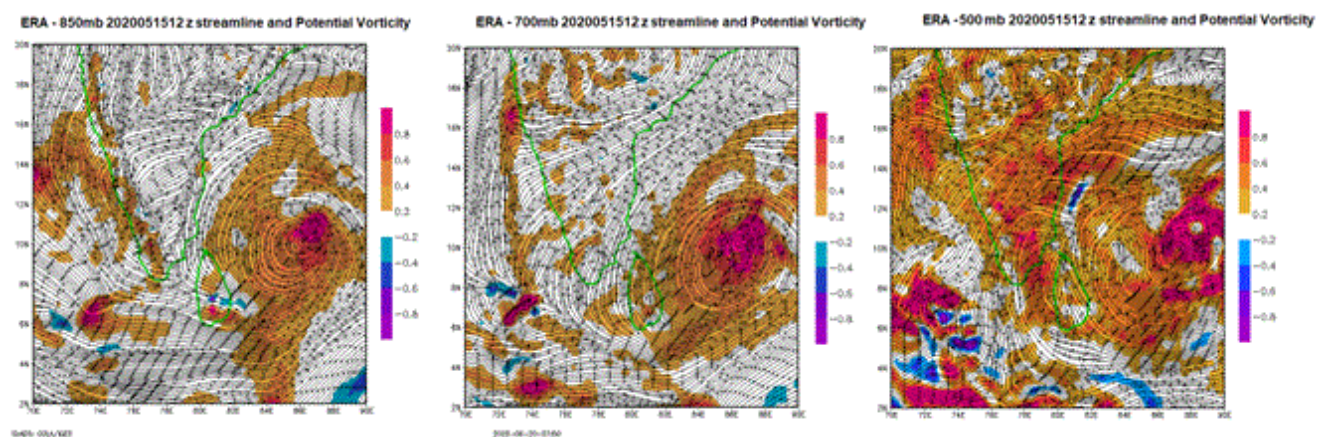


Fig 3c :ERA reanalysis Stream lines and Potential Vorticity ($\times 10^6$) on 20200515 1200Z

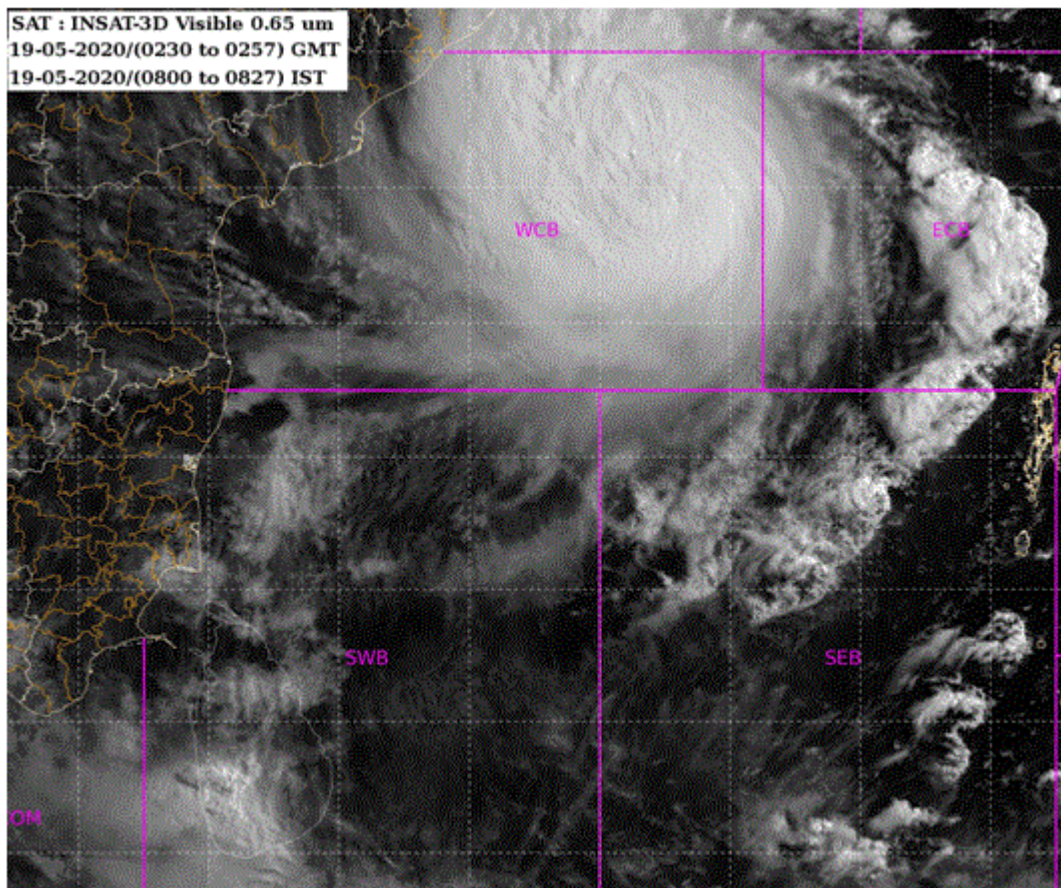


Fig 4a Kalpana visible images on 19th May 2020 0230Z

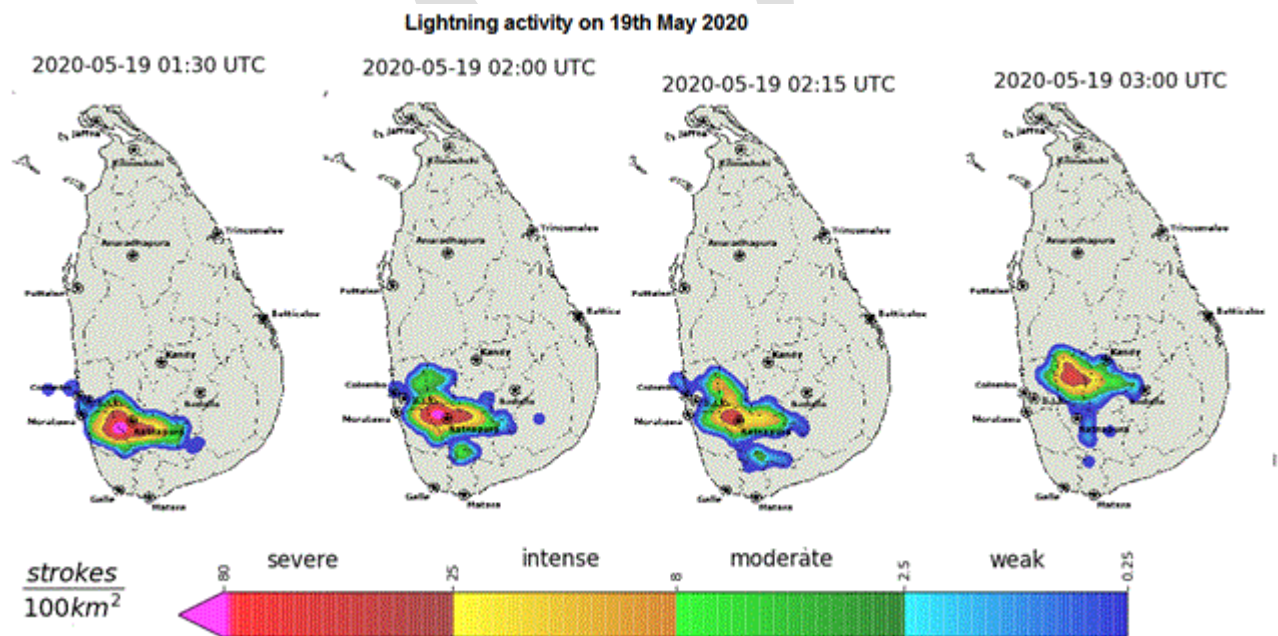


Fig 4b GLD360 lightning stroke maps on 19th May 2020 (Source : Finish Meteorological Institute)

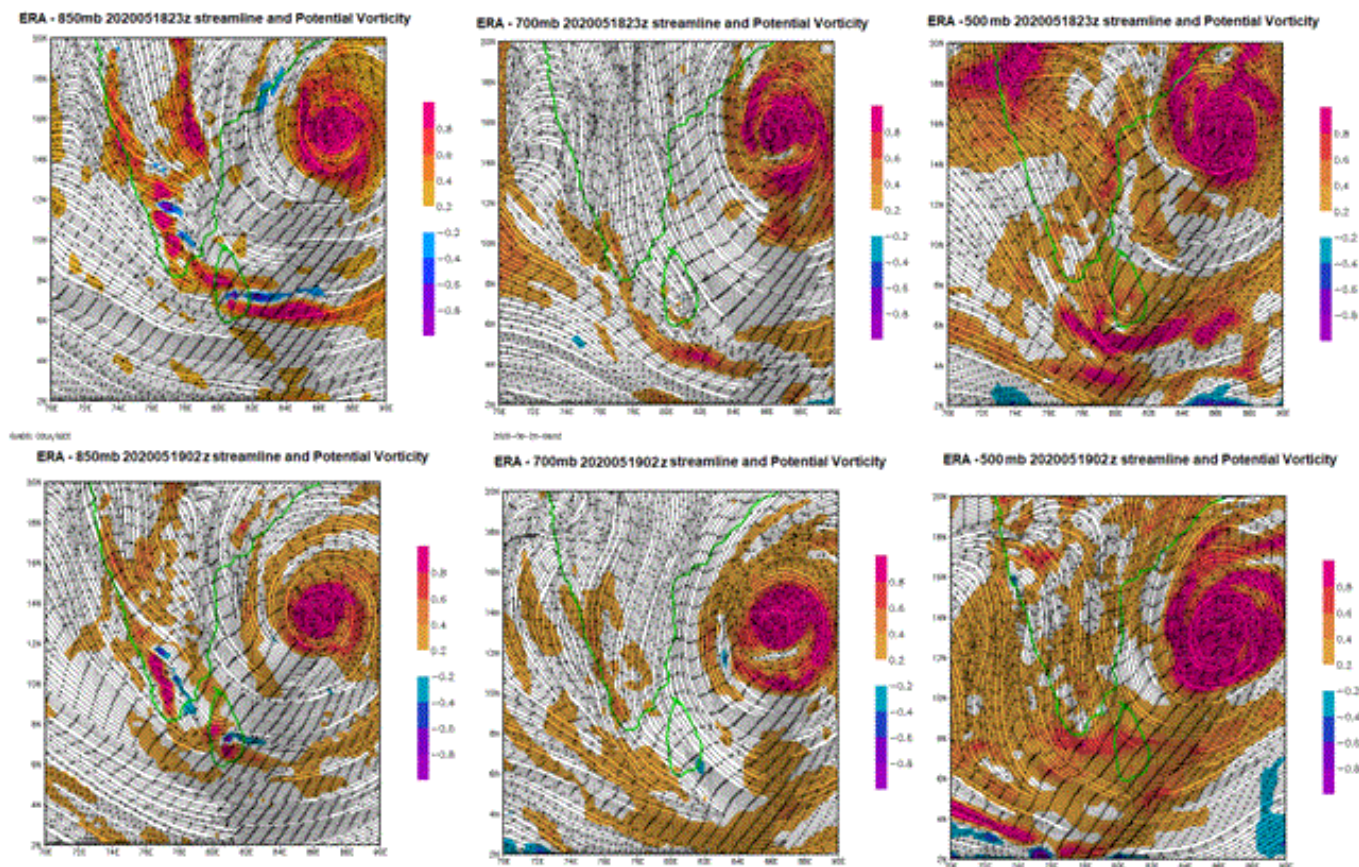


Fig 4c ERA reanalysis Stream lines and Potential Vorticity ($\times 10^6$) on 2020051823Z and 2020051902Z.

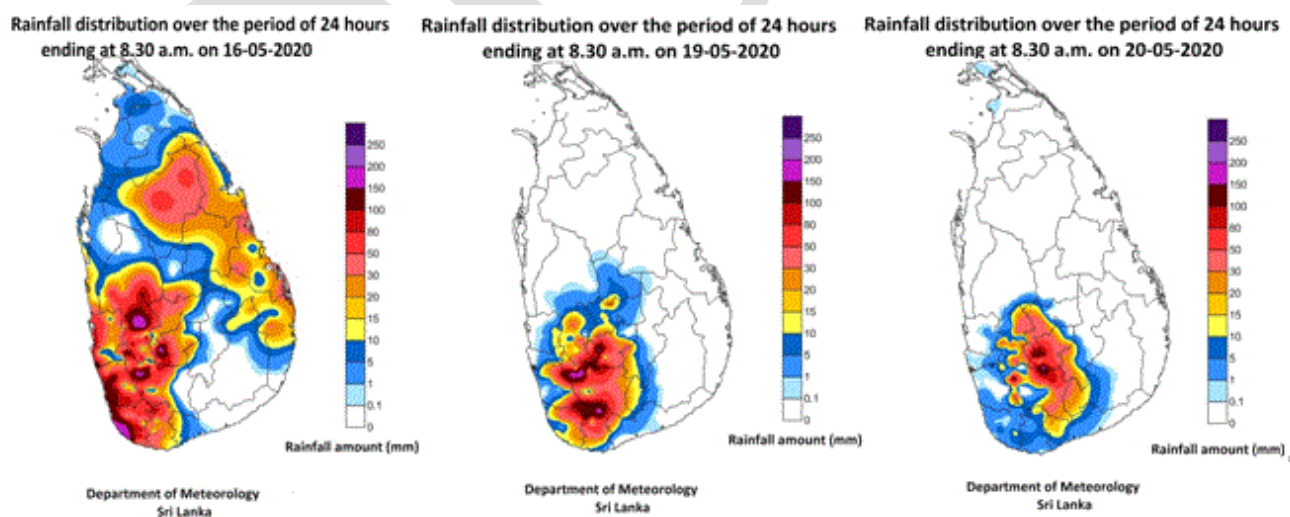


Fig 5: Daily rainfall maps for 15th May, 18th May and 19th May

During the intensification process from a low pressure area into a depression occurred on 15th and early morning hours of 16th, enhanced convective activity was apparent over Sri Lanka especially over the south-western parts as well as north-eastern and south eastern parts (Figs 3a, 3b, 3c and 5).

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Upper winds:

At 850hPa, Westerly wind flow was dominated over the island. North easterly South westerly oriented trough axis associated Cyclonic circulation centered over Westcentral BoB was evident to the northwest of Sri Lanka. Influence from super cyclonic storm Amphan dominates the average wind flow over South Asian region (Fig 12)

At 700 hPa, Northwesterly wind flow was dominated over the island. North easterly South westerly oriented trough axis associated Cyclonic circulation centered over Westcentral BoB was evident across of Sri Lanka. Influence from super cyclonic storm Amphan dominates the average wind flow over South Asian region (Fig 13)

At 500 hPa, Westerly wind flow was dominated over the island. North easterly South westerly oriented trough axis was evident to the northwest of Sri Lanka . Influence from super cyclonic storm Amphan dominates the average wind flow over South Asian region (Fig 14)

The 200 hpa the upper tropospheric ridge was laid from $10^{\circ}\text{N}40^{\circ}\text{E}$ to $13^{\circ}\text{N}80^{\circ}\text{E}$ and $15^{\circ}\text{N}100^{\circ}\text{E}$ bringing predominantly southeasterly winds across Sri Lanka.

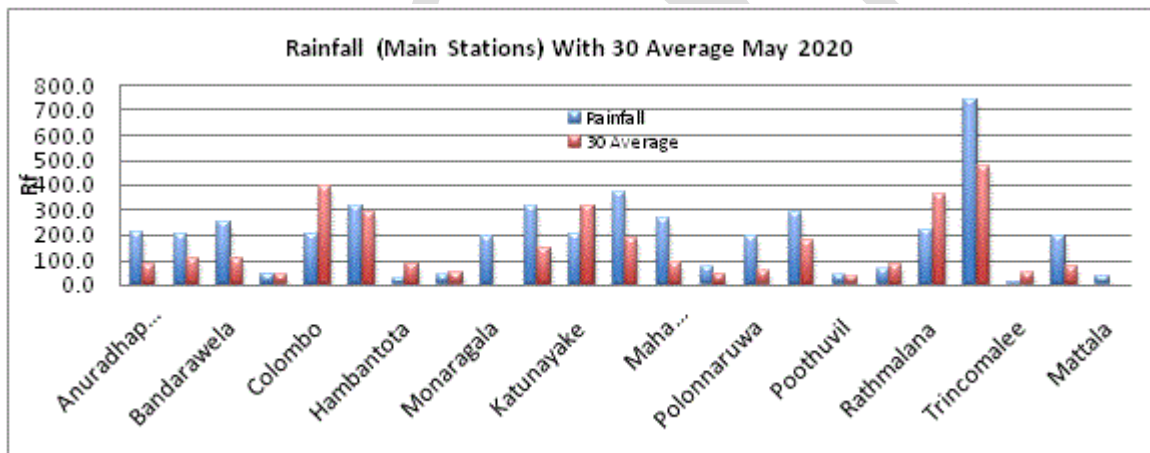


Fig 7: Monthly Total Rainfall(mm) with 30 years (1961-1990) of their averages at Main Meteorological stations areas during May 2020

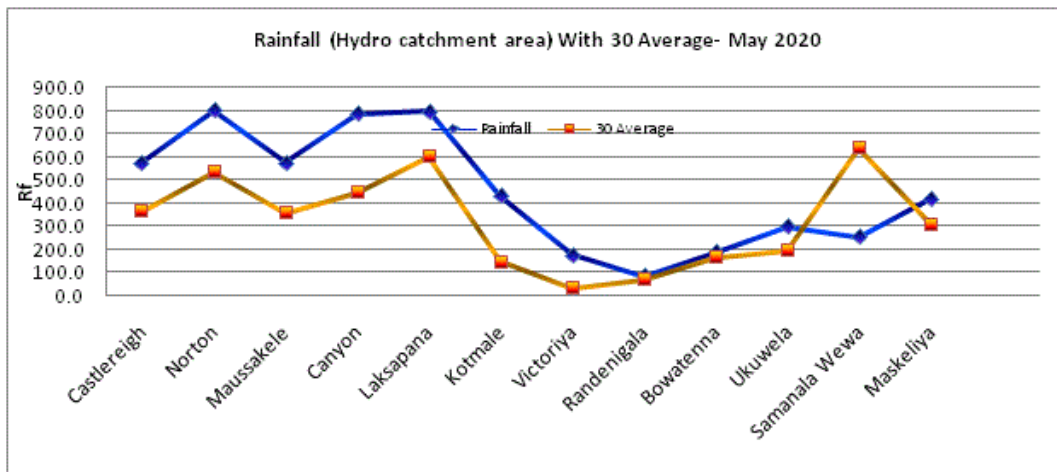


Fig 8: Monthly Total Rainfall(mm) with 30 years (1961-1990) of their averages at **Hydro catchment areas** during May 2020

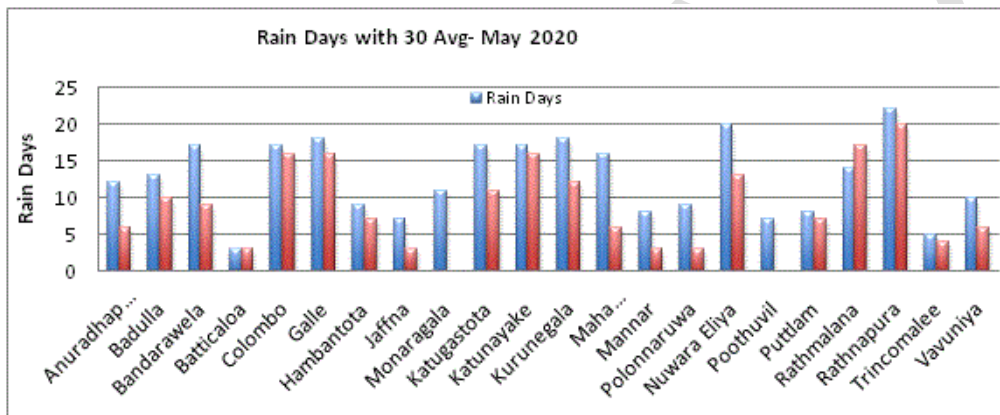


Fig 9: monthly total no of rainy days with 30 years(1961-1990) of their averages at main Meteorological stations during

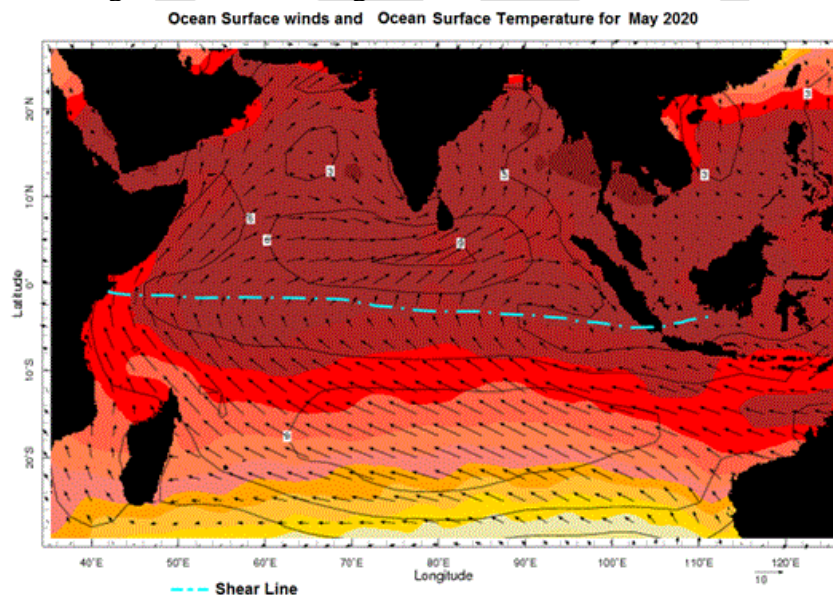


Fig 10: Ocean Surface Winds and Ocean Surface Temperature for May 2020

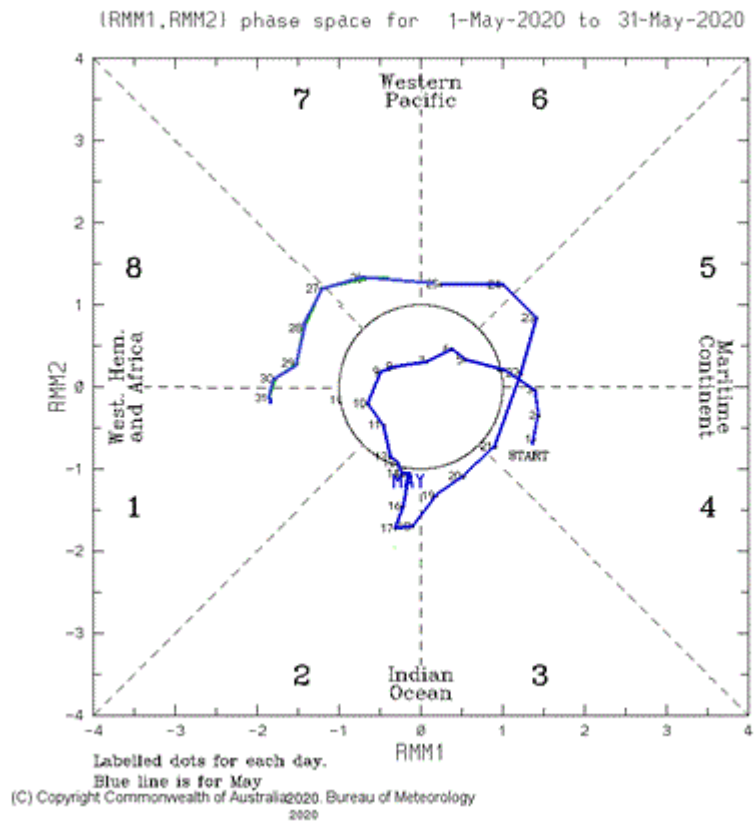


Fig 11 Phase diagram of MJO Index

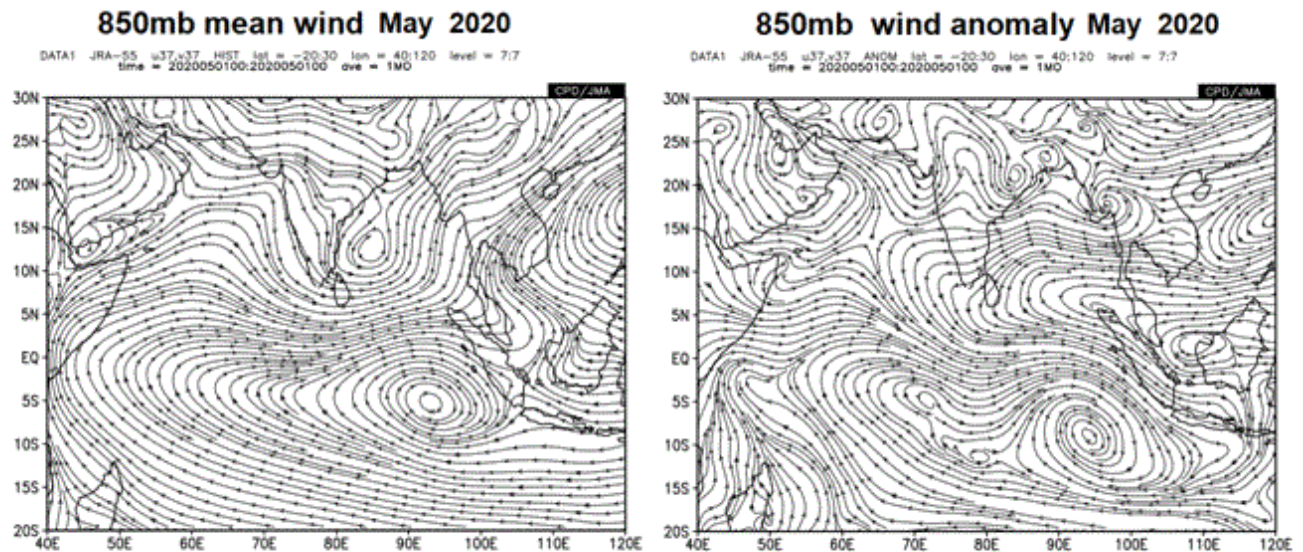


Fig. 12 Monthly average wind pattern at 850hpa level during the month of May 2020 (JRA55)

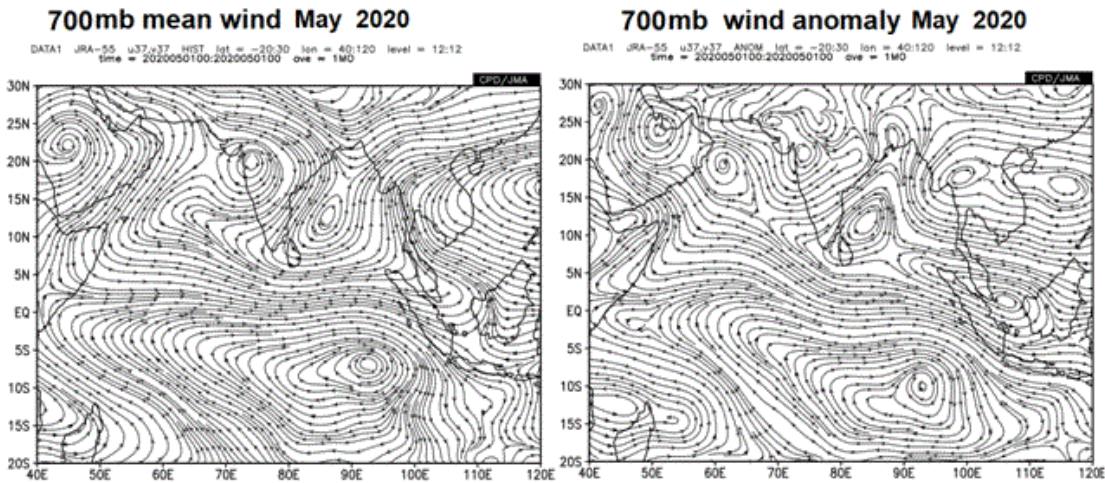


Fig. 13 Monthly average wind pattern at 700hpa level during the month of May 2020 (JRA55)

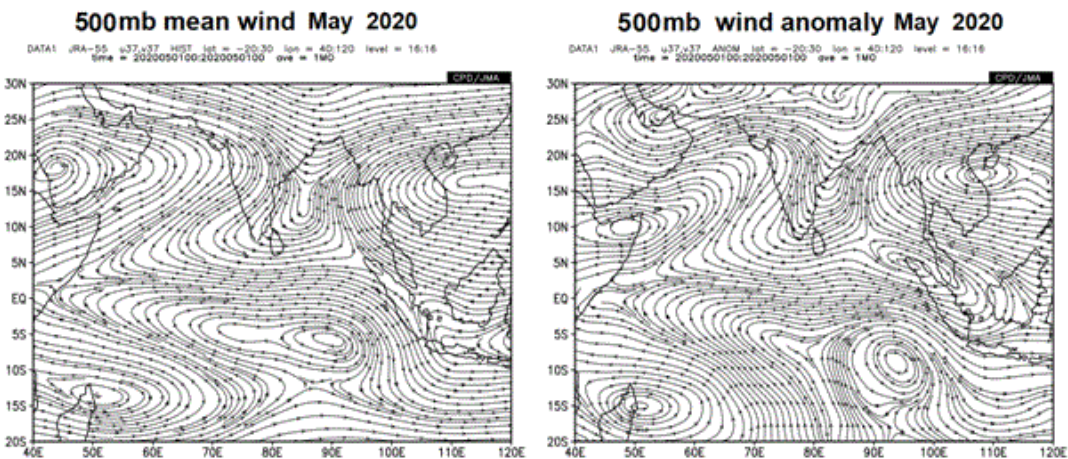


Fig. 14 Monthly average wind pattern at 500hpa level during the month of May 2020 (JRA55)

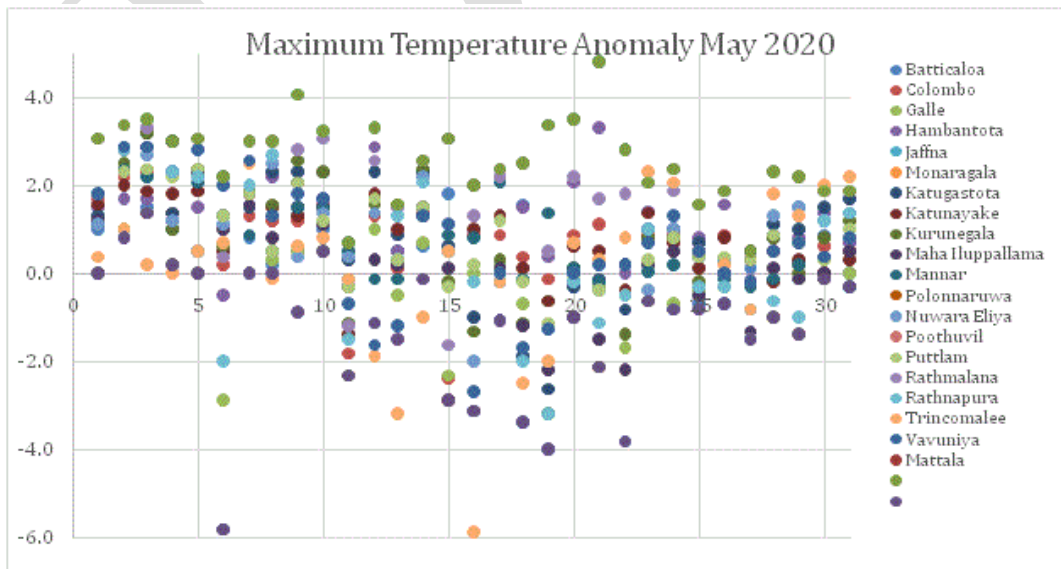


Fig 15 Maximum Temperature anomaly ($^{\circ}\text{C}$) for May 2020

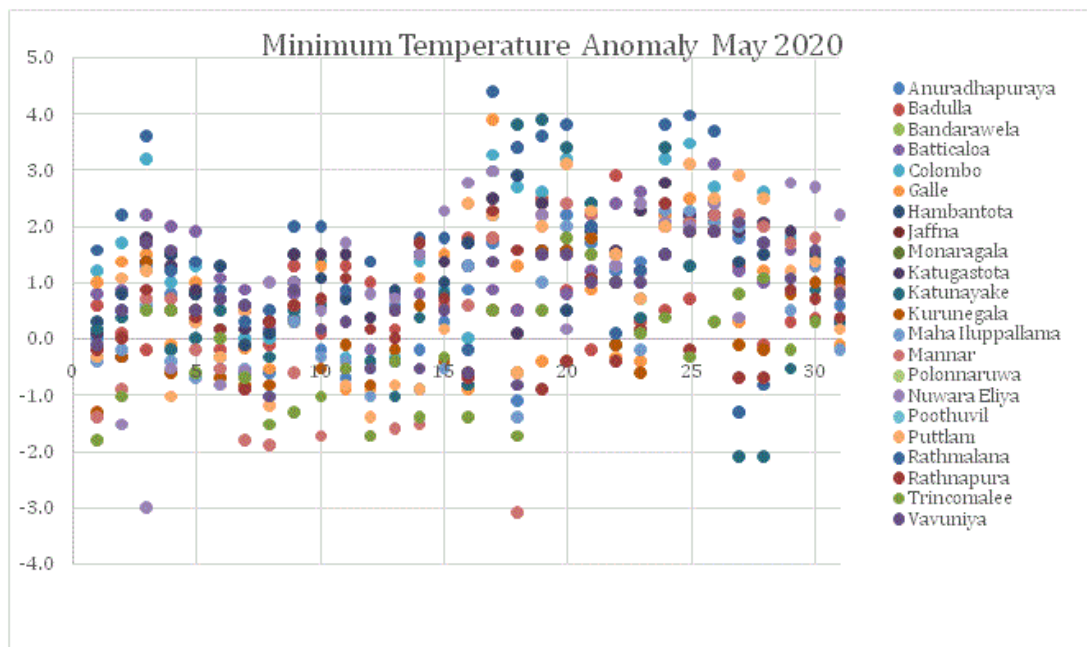


Fig 16 Minimum Temperature anomaly ($^{\circ}\text{C}$) for May 2020

Temperature Field:

The maximum temperatures in the day were mostly $1-3^{\circ}\text{C}$ above normal in most places during the first 2 weeks of the month. Slightly below average temperatures were experienced during third week and near average temperatures were reported during the last week (Fig 15). Highest recorded maximum temperature for the month of May 2020 was 37.8°C at Batticaloa on 21st May (Table 5a).

Night minimum temperatures over most parts were above normal especially during the second half of the month (Fig 16). 4°C above normal night temperatures were reported at Ratmalana on 25th. Lowest recorded minimum temperature for the month of May 2020 was 9.8°C at Nuwara Eliya on 3rd May (Table 5b).

Maximum and Minimum departures from normal day/night temperature were shown in table 5.

Rainfall: Wetter than normal condition was evident over most parts of the Island except western coastal areas (Fig 1) for May 2020. Above normal rainfall was reported from most of the principal meteorological stations except stations located in western coastal belt such as Ratmalana, Colombo, Katunayaka and Puttalam as well as Jaffna, Trincomalee and Hambantota where below average rainfall was reported (Fig 7). Maximum percentage was reported from Polonnaruwa (334.4%) while minimum from Hambantota station (30.4%) (Table 2). Number of rainy days was about or above average except Ratmalana (Fig 9). It is worthy mentioned that Polonnaruwa station which received maximum percentage of rainfall reported 3 times more number of rainy days than climatological average (Table 2).

Most of the hydro catchment stations, except Samanalawewa reported above average rainfall (Fig 8).

Highest cumulative rainfall was 998.2 mm at Guruluvana . Highest rainfall received during 24hours, was 260 mm at Kukuleganga on the 26th. Significant rainfalls exceeding 100mm reported during May 2020 are shown in table 4.

The monthly total rainfall map, total rainfall and the number of rain days at the principal meteorological stations, total rainfall at hydro catchment areas, significant rainfalls exceeding 100mm are shown in figures 1,8,9 and 10 and tables 2,3, and 4.

Table 1 hazards caused by convective activity during first two weeks of May 2020

date	Lightning	Strong Winds	Minor floods	Cutting failure
01		Thambalagamuwa, Kinniya		
02		Udapalatha		
03	Warakapola	Paathadumbara, Warakapola, Dehiowita, Galigamuwa, Yatiyantota		
04		Rambewa		
05		Kanthale, Morawewa, Deraniyagala, Bulathkohupitiya		
06		Pachchilaippalai, Karachchi		
07		Kundasale		
08		Yatinuwara		
09		Madadumbara, Mawanella	Paathadumb ara	
10	Lunugamwehera, Dompe, RuwanwellaMahakumbukkada wala	Gangaihalakorale, Hambantota, Gampaha, Aththanagalla, JaEla, Meerigama, Mahena, Warakapola		MawanellaNuwarael iya Udapalatha
11	AnamaduwaYatiyantota	Panwila, Udunuwara, UdapalathaGangaihalako rale	Chilaw	Udapalatha
12	AranayakeMaritimepaththu	Karaweddi, Godakawela		DehiowitaDeraniyag ala
13		Thunukkai. Openayake		

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-May	Average	%	2020-May	Average	%
Anuradhapuraya	206.0	84.3	244.4%	12	6	200%
Badulla	198.5	104.0	190.9%	13	10	130%
Bandarawela	249.2	104.2	239.2%	17	9	188.9%
Batticaloa	44.1	39.3	112.2%	3	3	100%
Colombo	200.2	392.4	51.0%	17	16	106.25%
Galle	314.4	290.4	108.3%	18	16	112.5%
Hambantota	25.9	85.1	30.4%	9	7	128.6%
Jaffna	39.9	46.7	85.4%	7	3	233.3%
Monaragala	191.0			11		
Katugastota	316.3	144.0	219.7%	17	11	154.6%
Katunayake	203.7	317.6	64.1%	17	16	106.25%
Kurunegala	373.5	188.3	198.4%	18	12	150%
MahaIluppallama	264.4	93.0	284.3%	16	6	266.7%
Mannar	69.5	44.7	155.5%	8	3	266.7%
Polonnaruwa	193.6	57.9	334.4%	9	3	300%
NuwaraEliya	287.8	175.9	163.6%	20	13	153.85%
Poothuvil	41.3	35.1	117.7%	7	na	
Puttlam	66.0	84.3	78.3%	8	7	114.3%
Rathmalana	220.4	360.6	61.1%	14	17	82.4%
Rathnapura	737.1	475.9	154.9%	22	20	110%
Trincomalee	10.6	50.2	21.1%	5	4	125%
Vavuniya	196.4	74.8	262.6%	10	6	166.7%
Mattala	29.8			10		

Table-03-Monthly Total Rainfall (mm) with 30 years (1961-1990) of their averages at Hydro catchment areas

Hydro Catchment	May 2020	Average	% (Percentage of average)
Castlereigh	577.3	366.2	157.6%
Norton	805.1	534.4	150.7%
Maussakele	577.1	358.0	161.2%
Canyon	788.7	449.0	175.7%
Laksapana	798.4	604.3	132.1%
Kotmale	432.9	148.7	291.1%
Victoriya	177.8	31.9	556.7%
Randenigala	88.3	72.6	121.6%
Bowatenna	188.6	165.0	114.3%
Ukuwela	300.3	195.5	153.6%
SamanalaWewa	254.5	642.3	39.6%
Maskeliya	421.9	307.1	137.4%
Neboda		576.1	

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

Table 4 : Significant rainfalls exceeding 100mm reported during May 2020

Date	Rainfall amount received at particular stations
08	Canawarella113mm; Galgamuwa107.4mm
09	Lower Spring Valley157 mm; Deniyaya112 mm;
10	Kukuleganga125 mm; Dehiwala104.2 mm;
11	Polonnaruwa111.5 mm;
12	Lower Spring Valley147 mm; Guruluwana116.3 mm; Karagala105 mm;
15	Monrovia193.3 mm; Norton187.3 mm; Karagala182 mm; Ilubuluwa Estate173 mm; Watawala169.3 mm; Galle163.3 mm; Undugoda162 mm; Rathnapura155.6 mm; Warakapola152.4 mm; Tampana145.5 mm; Baddegama145 mm; Castlereigh144 mm; Weweltalawa135 mm; Maussakele133.25 mm; Canyon125 mm; Laksapana124 mm; Guruluwana113.4 mm; Rathmalana111.8 mm; Kurunagala110.2 mm; Beausejour Lower 109 mm; Kukuleganga105 mm; Vogan Estate103.3 mm; Mathugama101 mm;
16	Colombo Fort122.3 mm;
17	IlubuluwaEstat113 mm;
18	Rathnapura193.3 mm; Kuttapitiya Tea Fac187.3 mm; Watawala172.3 mm; Deniyaya168.5 mm; Guruluwana 121.4 mm; Batuwana118.8 mm; Norton103.5 mm;
19	Ilubuluwa Estate145 mm; Kotagala Rosita121.8 mm; Norton119.8 mm; Laksapana119.8 mm; Watawala104.6 mm;
22	Kuttapitiya Tea Fac112.3 mm;
24	Guruluwana170.4 mm; Elston123 mm; Moraliya100 mm;
26	Kukuleganga 260 mm; Padukka Estate 160.5 mm; Nittambuwa 148 mm; Gampaha(Bot-Garden)134 mm;

Table 5(a) - Extremes of Maximum Temperatures				May	2020
	Maximum			Highest Std.Div	
	Value	Offsets			
		(-)	(+)		
Value	37.8 ⁰ C	5.9	4.8	1.91	
Station	Batticaloa	Trincomalee	Batticoloa	Ratnapura	
Date	21/05/2020	16/05/2020	21/05/2020		
Table 5(b) -Extremes of Minimum Temperature May 2020					
	Minimum			Highest Std.Div	
	Value	Offsets			
		(-)	(+)		
Value	9.8 ⁰ C	3.1	4.4	1.65	
Station	NuwaraEliya	Mannar	Ratmalana	Mannar	
Date	03/05/2020	18/04/2020	17/05/2020		

Prepared by National Meteorological Centre(NMC)
Department of Meteorology