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Executive Summary

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15	Authors	S.Balachandran, B.Geetha, K.Ramesh, R.V.Deepa, Y.P.Mourya and K.S.Rakhil
16	Authors' affiliation	India Meteorological Department, Chennai
17	Originating group	Research Section, Regional Meteorological Centre, India Meteorological Department, Chennai
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HIGHLIGHTS

- ✓ During 2020, southwest monsoon (SWM) advanced over Andaman Sea on 17th May, five days ahead of its normal date. However, its further advancement over the Bay of Bengal was delayed due to the formation and movement of super cyclonic storm AMPHAN over the Bay of Bengal during the period 16th-21st May. However, it arrived over Kerala on its normal date of onset (i.e.) the 01st June and covered the entire southern peninsular India (SP) by 12th June. It covered the entire country by 26th June, 12 days before its normal date of 08th July.
- ✓ Rainfall during the SWM season of June-September 2020 over the southern Indian peninsular region comprising of the five states of Andhra Pradesh, Telangana, Karnataka, Kerala and Tamil Nadu and two union territories of Puducherry and Lakshadweep was 939.9 mm which is 30% more than its long period average (LPA) of 726.2 mm. The SWM seasonal rainfall over the country as a whole was 957.6 mm which is 109% of its LPA (880.6 mm).
- ✓ Seasonal rainfall over the nine meteorological subdivisions covering the five states and two union territories in the region was large excess in one sub division - Rayalaseema (RYS), excess in six sub divisions [North Interior Karnataka (NIK), South Interior Karnataka (SIK), Tamil Nadu, Puducherry and Karaikal(TN), Coastal Andhra Pradesh and Yanam(CAP), Telangana (TEL) and Lakshadweep (LAK)] and normal in 2 sub divisions – Kerala and Mahe (KER) and Coastal Karnataka (CK). The seasonal rainfall figures over the nine subdivisions - CAP, RYS, TEL, TN, CK, NIK, SIK, KER and LAK were +24%, +84%, +46%, +24%, +19%, +49%, +20%, +9% and +33% respectively.
- ✓ Under the influence of strong southwesterlies in the lower-mid tropospheric levels over the peninsular region coupled with orographic effect recurrent heavy rainfall activity occurred over Kerala, Karnataka and adjoining hilly regions of Tamil Nadu in the first week of August causing landslides and inland flooding in many areas.
- ✓ The withdrawal of SWM 2020 commenced from the northwest India on 28th September against the normal date of 17th September. The monsoon withdrew from the SP region during 26th-28th October 2020. It withdrew from the entire country on 28th October with the simultaneous commencement of northeast monsoon rains over Tamil Nadu, Kerala and adjoining areas of Andhra Pradesh and Karnataka on 28th October 2020.

1. Onset and Advance

During the year 2020, the Bay of Bengal (BOB) branch of southwest monsoon (SWM) current advanced into the BOB with the characteristic strengthening and deepening of cross equatorial flow and enhanced cloudiness and rainfall over the south Andaman Sea, and some parts of south BOB on 17th May five days ahead of its normal date of 22nd May. However, its further advancement took place on 27th May only due to the formation and movement of super cyclonic storm AMPHAN over the Bay of Bengal during the period 16th-21st May. During 27th-29th May, the monsoon covered entire Andaman Sea, Andaman and Nicobar Islands and advanced into some more parts of south Bay of Bengal, some parts of southwest and southeast Arabian Sea and Maldives-Comorin area. It covered the entire south Arabian sea, Lakshadweep, Maldives areas on 01st June and arrived over Kerala on its normal date of onset (i.e.) the 01st June.

It covered the entire southern peninsular India (SP) comprising of five states (Andhra Pradesh, Telangana, Kerala, Karnataka and Tamil Nadu) and two union territories (Puducherry and Lakshadweep) - divided into nine meteorological subdivisions of Coastal Andhra Pradesh and Yanam(CAP), Telangana (TEL), Rayalaseema (RYS), Tamil Nadu, Puducherry and Karaikal(TN), Coastal Karnataka (CK), North Interior Karnataka (NIK), South Interior Karnataka (SIK), Kerala and Mahe(KER) and Lakshadweep (LAK) - by 12th June (normal: 11th June). The northern limit of monsoon (NLM) passed over Kannur (Kerala), Coimbatore and Kanyakumari on 01st June. It covered entire Kerala and Mahe, some parts of Karnataka and some more parts of Comorin area on 04th June; some more parts of SIK & TN on 06th June, some more parts of SIK, some parts of RYS and most parts of TN on 07th June, remaining parts of TN on 10th June, remaining parts of Karnataka, entire Rayalaseema, CAP and most parts of Telangana on 11th June and the remaining parts of Telangana on 12th June. The advance of the monsoon over the SP region, as depicted by the northern limit of the monsoon (NLM) is presented in Fig.1a.

The onset of the monsoon over Kerala occurred with the formation of a low pressure area over Southeast & adjoining east-central Arabian Sea and Lakshadweep area on 31st May which became well marked over the same region on the evening of 31st and concentrated in to a Depression over east-central & adjoining Southeast Arabian Sea on the early morning of 01st

June. It intensified into a Deep Depression by the early morning of 02nd June over east-central Arabian Sea and further into Cyclonic Storm 'NISARGA' over east-central Arabian Sea by the 02nd evening over the same area. Moving northwards it intensified further into a Severe Cyclonic Storm in the early morning of 03rd and crossed Maharashtra coast, close to south of Alibag during the afternoon of 03rd June.

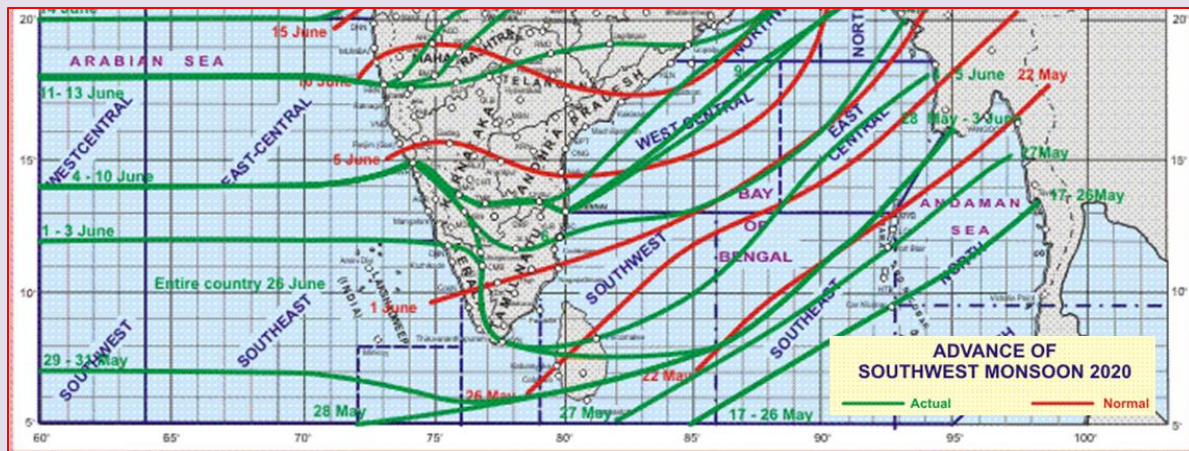


Fig.1a: Advance of southwest monsoon 2020 over southern peninsular India depicted by lines of northern limit of monsoon on various dates

Subsequently, under the influence of east-west shear zone across the SP region, upper air cyclonic circulations, off shore trough and formation of a low pressure area over west-central Bay of Bengal on 09th June and its further movement across CAP & TEL region during 09th-12th June, the monsoon advanced over the SP region. Surface isobaric analysis as on 0830 IST of 01st, 03rd, 05th and 10th June and streamline analysis of lower to mid tropospheric levels as on 0530 IST of 01st and 08th June depicting the above features are presented in Fig.1b.

During the period of onset and advance of the monsoon over the SP region (01st-12th June), *Fairly widespread* (FWS) to *Widespread* (WS) rainfall occurred on all the 12 days over CK and on 10 days over KER. *Scattered* (SCT) to *WS* rainfall was recorded on 8-12 days over LAK, NIK and SIK and 5-8 days over CAP, TEL & RYS during this period. TN, being in the rain shadow region of the western ghats, recorded 3 days of SCT and 9 days of *Isolated* (ISOL) rainfall during this period. (kindly refer Appendix-1 for description of the terms WS, FWS, SCT & ISOL).

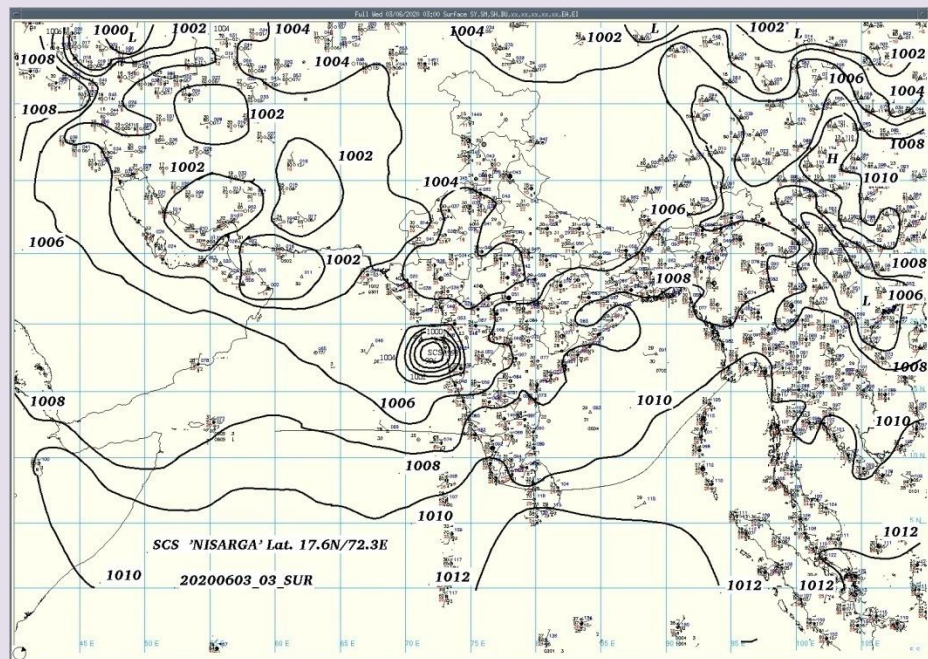
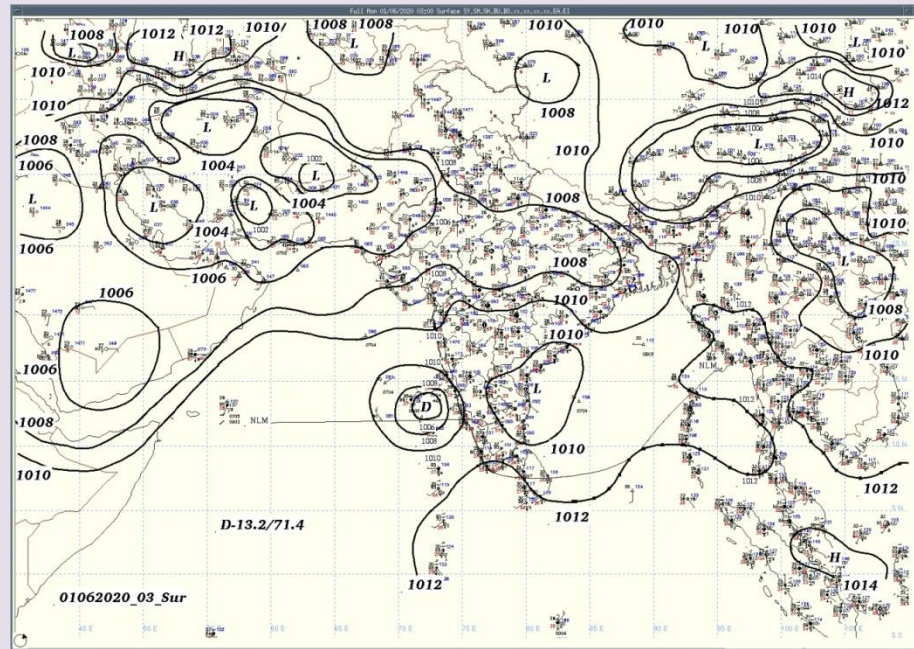


Fig.1b: Surface Isobaric analysis as on 0830 IST of 01st, 03rd, 5th and 10th June and streamline analysis of lower-mid tropospheric levels as on 01st and 08th June 2020 / 0530 IST

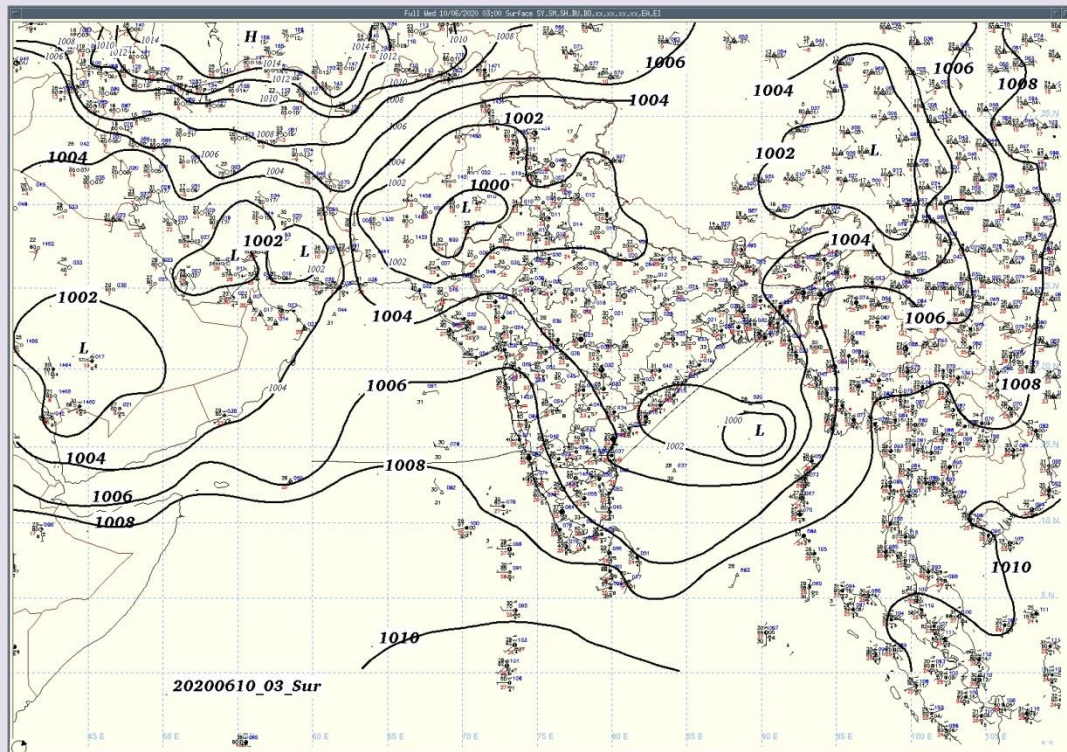
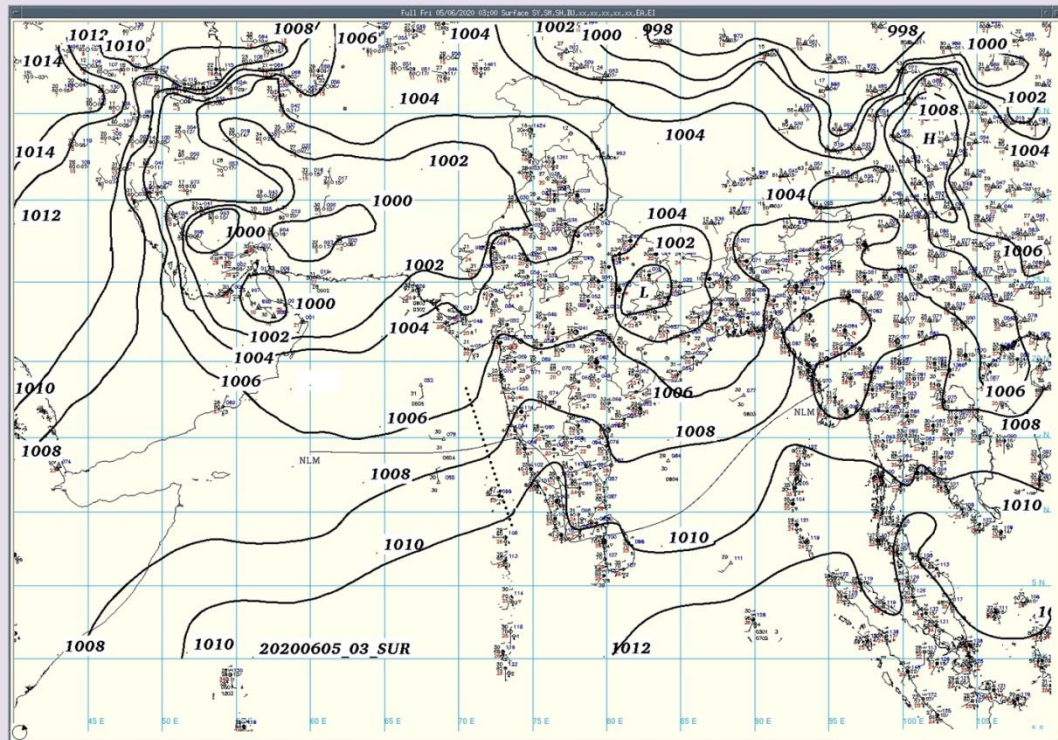


Fig.1b contd.

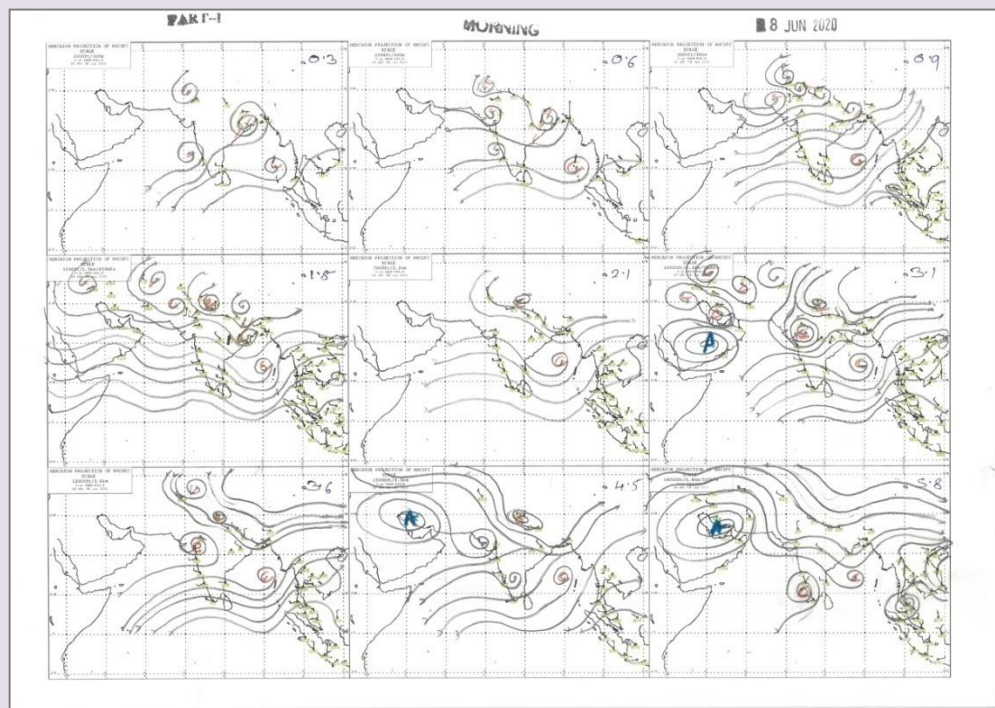
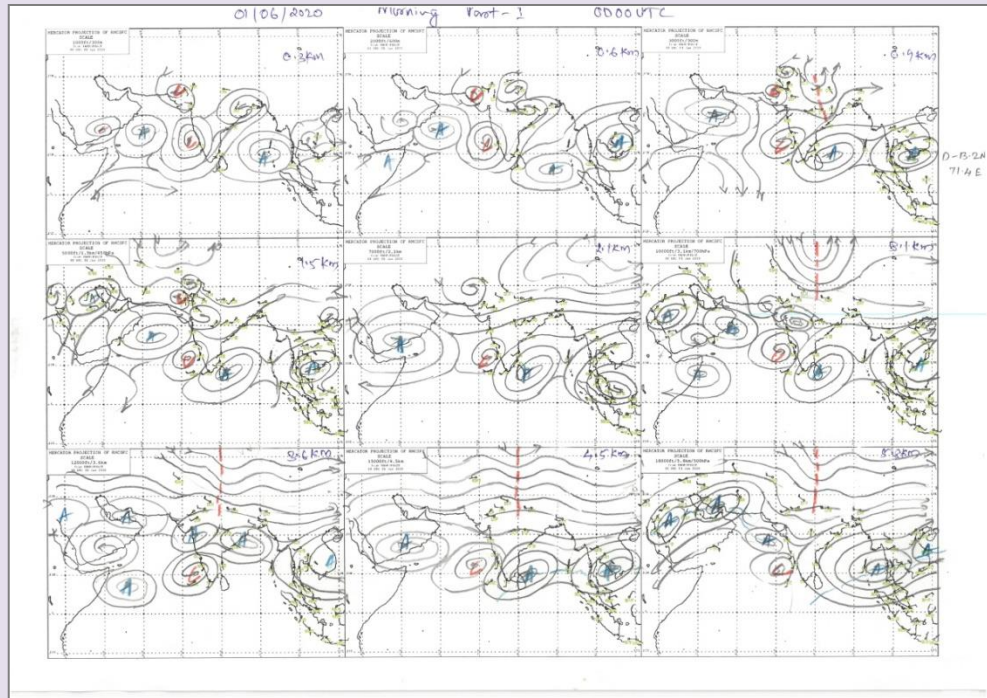


Fig.1b: contd.

Fig.1c presents the INSAT-3D satellite infrared imageries depicting the cloudiness associated with the onset of SWM over Kerala on 01st June and its further advance into the SP region by 12th June 2020. Fig.1d presents the GPM satellite – gauge merged rainfall depicting the

advance of SWM 2020 over the SP region and Fig.1e depicts the gauge observed rainfall over Kerala during the onset period as on 01st and 02nd June 2020.

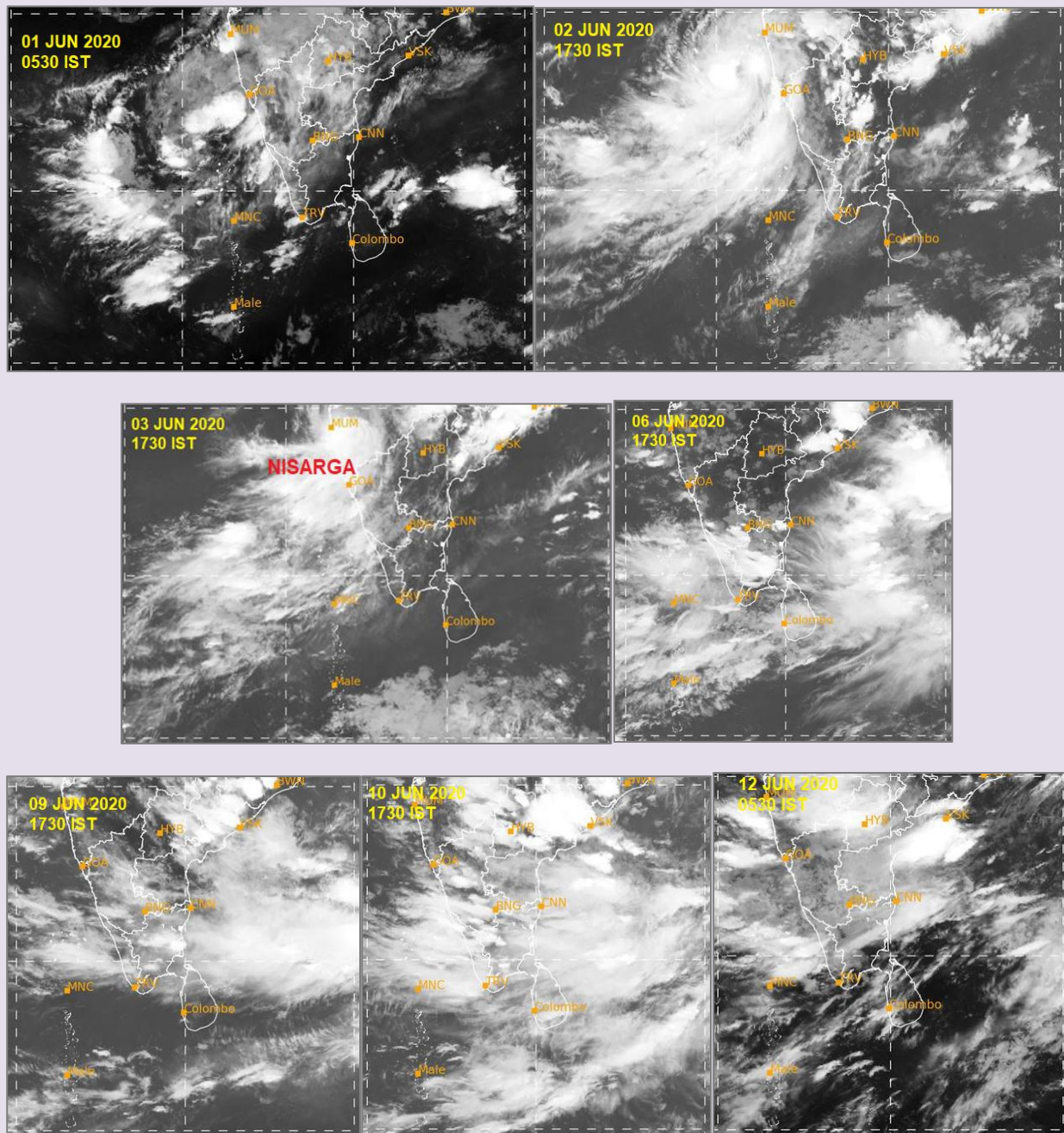


Fig.1c: INSAT-3D infra-red imageries as on 01/0530, 02/1730, 09/1730, 03/1730, 06/1730, 09/1730, 10/1730 and 12/0530 IST of June 2020 depicting the advance of SWM 2020 over the SP region

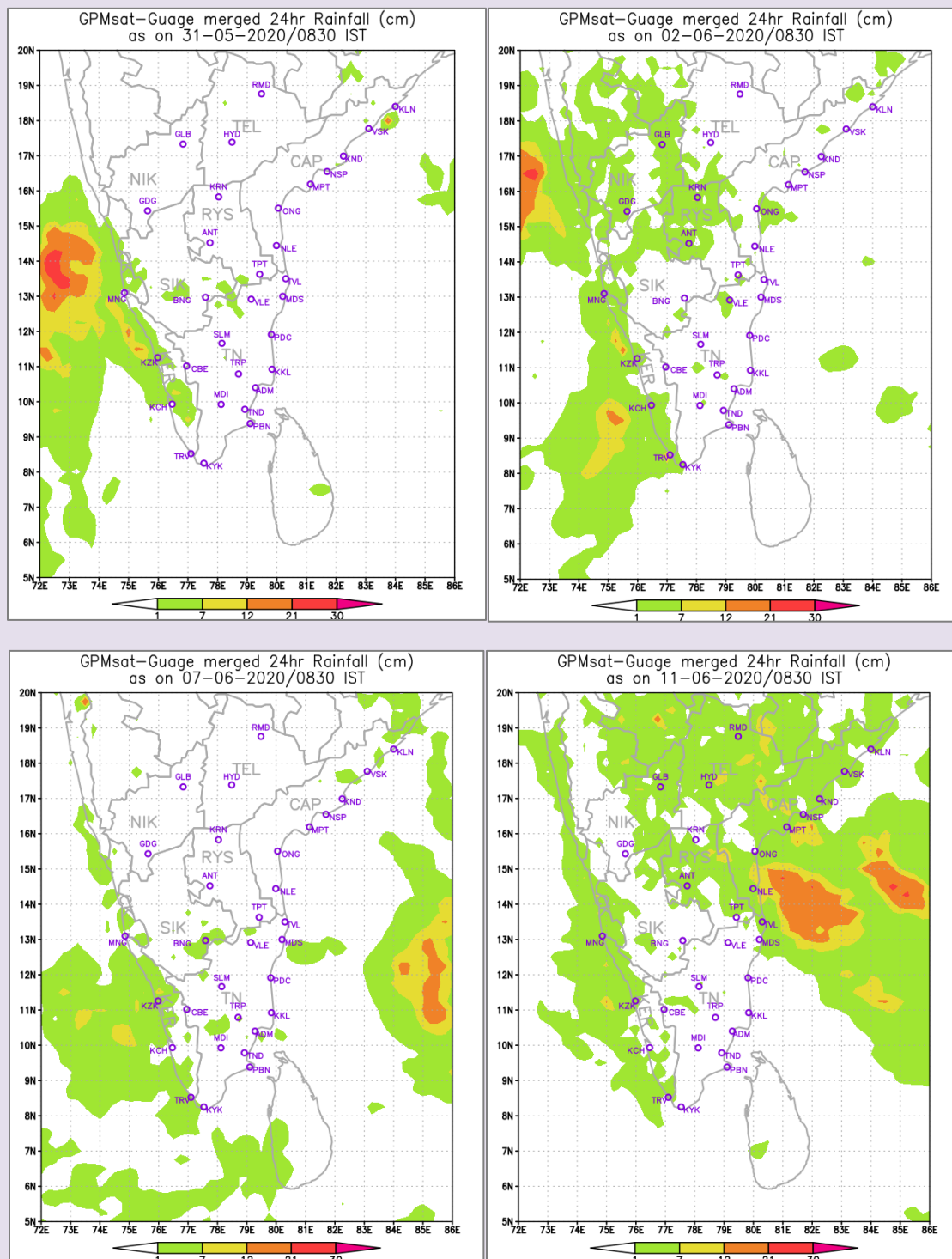


Fig.1d: GPM Sat – Gauge merged rainfall in cm as on 24-hr ending 0830 IST of 31st May, 02nd,07th and 11th June 2020 depicting the advance of monsoon rains over the SP region during SWM 2020.

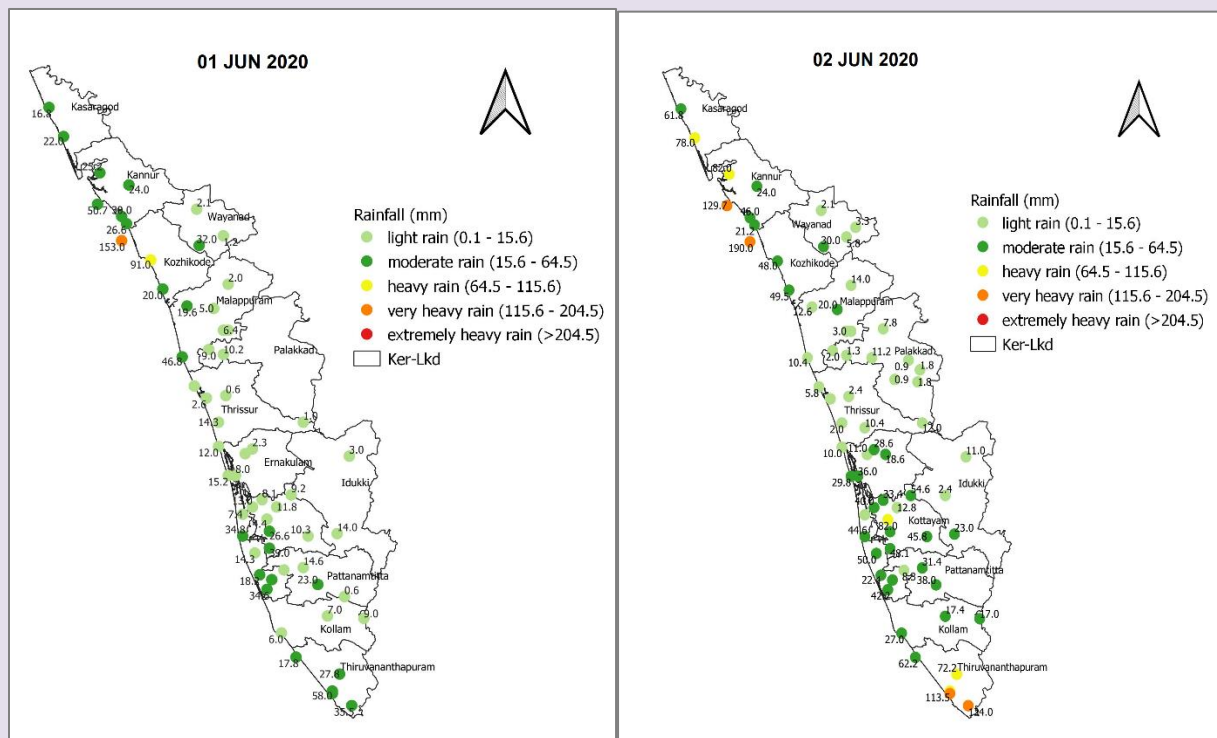


Fig.1e: Rainfall distribution over Kerala along with intensity as on 24-hr ending 0830 IST of 01st and 02nd June 2020

2. Rainfall distribution

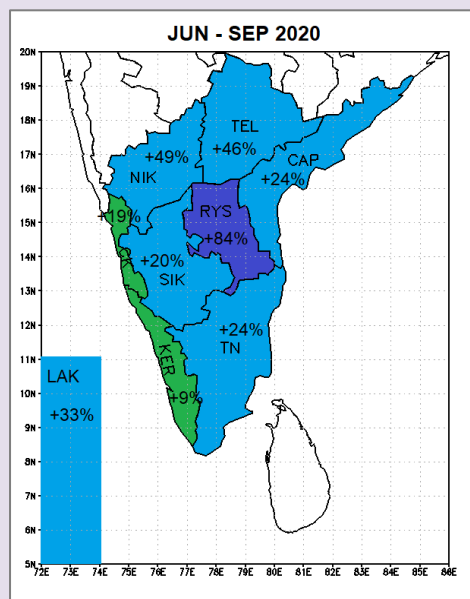
2.1 Seasonal subdivisioanal rainfall

The SWM seasonal rainfall (June-September) during 2020 over the country as a whole was 109 of its long period average (LPA) and that over the SP region was 130% of its LPA. The spatial rainfall distribution is determined in terms of percentage departure from normal (PDN) over 36 meteorological subdivisions in the country. As per IMD's classification of monsoon performance over a meteorological subdivision, if the amount of rainfall received over a region (expressed as PDN) is between -19% and +19%, the monsoon performance is termed as *normal*. If the PDN is between -20% and -59%, the region comes under *deficient* category, if PDN is less than or equal to -60%, the region falls under *scanty* rainfall category, PDN of +20% to +59% indicates *excess* rainfall category and if the PDN is greater than or equal to +60%, it is termed as *large excess*. During SWM 2020, all the nine subdivisions in the SP region received above normal rainfall with RYS recording *large excess* rainfall of +84% and six other subdivisions –

NIK, TEL, LAK, CAP, TN and SIK recording *excess* rainfall of +49%, +46%, +33%, +24%, +24% and +20% respectively. CK & KER came under *normal* category with +19% and +9% respectively. The cumulative seasonal (01st June to 30th Sep 2020) rainfall figures for the nine meteorological subdivisions of the SP region are furnished in Table-1 and Fig.2.

Table-1: Seasonal subdivisional rainfall distribution over the SP region during the SWM season, 2020 (01st June-30th Sep 2020)

SUB-DIVISION	Actual rainfall (mm)	Normal rainfall (mm)	Percentage departure from normal (%)
COASTAL AP & YANAM (CAP)	725.3	586.9	+24
TELENGANA (TEL)	1094.3	751.9	+46
RAYALASEEMA (RYS)	756.1	411.6	+84
TAMILNADU, PDC and KKL (TN)	424.1	342	+24
COASTAL KARNATAKA (CK)	3682.4	3095.1	+19
NORTH INTERIOR KARNATAKA (NIK)	739.1	497.1	+49
SOUTH INTERIOR KARNATAKA (SIK)	816.5	681.8	+20
KERALA & MAHE (KER)	2227.9	2049.2	+9
LAKSHADWEEP (LAK)	1345.4	1013.1	+33



<i>Largely Deficient</i>	<i>Deficient</i>	<i>Normal</i>	<i>Excess</i>	<i>Large Excess</i>
$\leq -60\%$	-20% to -59%	-19% to +19%	+20% to +59%	$\geq +60\%$

Fig.2: Seasonal Subdivisional rainfall (in percentage departures from normal) during Jun-Sep 2020 over the SP region

2.2 Monthly subdivisional rainfall

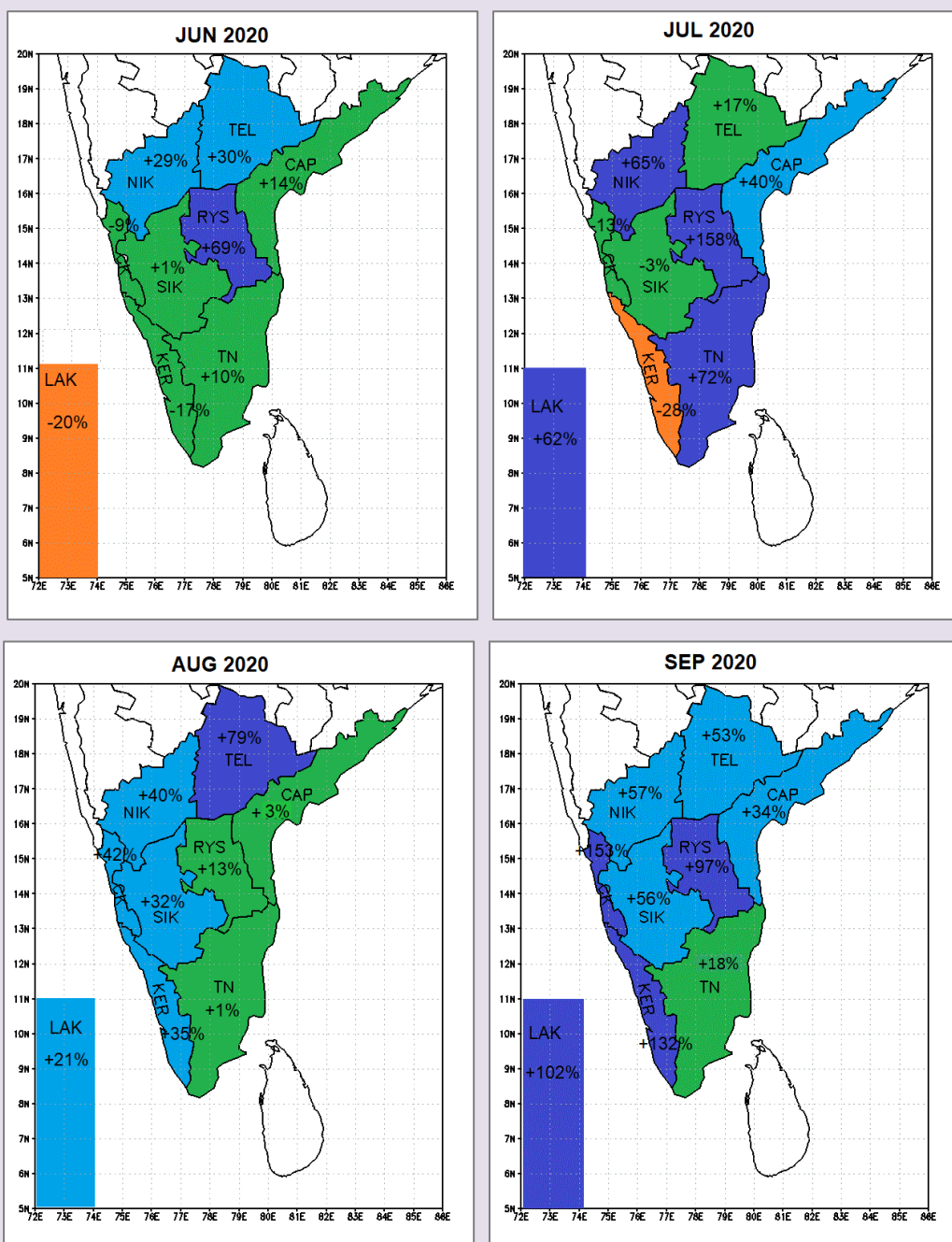
The monthly subdivisional rainfall scenario during the SWM 2020 season is presented in Table-2 and Fig.3. Excepting the subdivisions of LAK and KER which received *deficient* rainfall during June and July respectively, all the subdivisions in the SP region recorded *normal* to *large excess* rainfall during all the four months of the season. NIK received *excess* to *large excess* rainfall during all the four months and RYS received *large excess* rainfall in three of the four months during the season (June: +69%, July: +158% & September: +97%). On the monthly performance, it is noted that during September, excepting TN that came under *normal* category, all the subdivisions in the region received *excess* to *large excess* with CK, KER & LAK recording more than 100% excess (+153%, +132% and +102% respectively). Further, RYS also recorded *large excess* rainfall of +97% during the month. Aside from September, July also saw *large excess* rainfall in four subdivisions (RYS: +158%, TN: +72%, NIK: +65% and LAK (+62%).

Table-2: Monthly subdivisional rainfall performance during SWM 2020

Sub-division	Jun			Jul			Aug			Sep		
	ACL (mm)	NOR (mm)	PDN (%)	ACL (mm)	NOR (mm)	PDN (%)	ACL (mm)	NOR (mm)	PDN (%)	ACL (mm)	NOR (mm)	PDN (%)
CAP	120.0	105.2	14	220.6	157.9	40	167.6	162.1	3	217.2	161.7	34
TEL	169.6	130.4	30	272.1	232.7	17	402.6	225.5	79	250.1	163.3	53
RYS	120.2	70.9	69	238.5	92.6	158	122.6	108.5	13	274.8	139.6	97
TN	59.3	54.1	10	130.4	76.0	72	94.6	93.7	1	139.8	118.2	18
CK	788.3	866.7	-9	973.3	1116.3	-13	1147.4	806.3	42	773.4	305.8	153
NIK	137.8	107.1	29	203.2	123.5	65	170.7	122.0	40	227.4	144.5	57
SIK	145.5	144.1	1	207.0	213.3	-3	235.5	178.0	32	228.5	146.4	56
KER	535.5	643.0	-17	514.9	720.0	-28	575.7	426.7	35	601.8	259.5	132
LAK	265.4	330.3	-20	476.2	294.0	62	269.6	223.2	21	334.3	165.6	102

ACL: Actual; NOR: Normal; PDN: Percentage Departures from Normal

Largely Deficient	Deficient	Normal	Excess	Large Excess
≤ -60%	-20% to -59%	-19% to +19%	+20% to +59%	≥ +60%



Largely Deficient	Deficient	Normal	Excess	Large Excess
$\leq -60\%$	$-20\% \text{ to } -59\%$	$-19\% \text{ to } +19\%$	$+20\% \text{ to } +59\%$	$\geq +60\%$

Fig.3: Monthly subdivisional rainfall distribution during Jun-Sep 2020

2.3 Weekly subdivisional rainfall progress

Week by week and cumulative weekly performance of SWM 2020 over the SP region are presented in Table-3a and Table-3b respectively.

Table-3a: Week by week subdivisional rainfall during June-Sep 2020 over the SP region

SUB-DIVISION	WEEK-BY-WEEK: PDN (%)																	
	03-Jun	10-Jun	17-Jun	24-Jun	01-Jul	08-Jul	15-Jul	22-Jul	29-Jul	05-Aug	12-Aug	19-Aug	26-Aug	02-Sep	09-Sep	16-Sep	23-Sep	30-Sep
COASTAL ANDHRA PRADESH (CAP)		-7	57	-17	-5	52	195	-14	-24	18	-23	54	-4	-11	-70	154	1	48
TELANGANA (TEL)		-58	107	-18	-13	51	58	11	-15	-26	17	296	56	-45	-75	219	58	92
RAYALASEEMA (RYS)		-95	20	2	527	-5	264	208	89	185	-23	-43	-13	26	37	221	55	87
TAMIL NADU & PUDUCHERRY (TN)	37	-53	-56	-25	249	21	149	45	85	56	111	-93	-9	73	77	-14	-55	14
COASTAL KARNATAKA (CK)	31	-29	44	-26	-59	40	-15	-8	-61	45	96	11	1	-36	8	281	507	-21
NORTH INTERIOR KARNATAKA (NIK)	98	-69	51	-25	70	34	66	121	44	51	38	144	1	-58	91	122	33	44
SOUTH INTERIOR KARNATAKA (SIK)	62	-33	14	-38	26	6	-31	43	-20	64	137	-11	-48	10	204	61	24	-39
KERALA (KER)	48	-30	-22	-26	-32	-4	-71	-23	-42	102	217	-65	-77	-83	145	267	274	-69
LAKSHADWEEP (LAK)	87	-43	-60	-18	60	-31	31	130	110	185	216	-98	-86	-64	282	82	145	-83

Table-3b: Weekly cumulative subdivisional rainfall during Jun-Sep 2020

SUB-DIVISION	CUMULATIVE WEEK ENDING : PDN (%)																		
	03-Jun	10-Jun	17-Jun	24-Jun	01-Jul	08-Jul	15-Jul	22-Jul	29-Jul	05-Aug	12-Aug	19-Aug	26-Aug	02-Sep	09-Sep	16-Sep	23-Sep	30-Sep	
COASTAL ANDHRA PRADESH (CAP)		-13	37	21	14	23	54	42	31	29	23	27	24	21	15	24	22	24	
TELANGANA (TEL)		48	82	47	30	35	40	35	26	18	18	47	47	41	33	42	43	46	
RAYALASEEMA (RYS)		-21	-2	-1	82	66	104	123	118	126	109	94	81	76	73	87	83	84	
TAMIL NADU & PUDUCHERRY (TN)		-50	-52	-45	9	11	38	39	47	48	55	36	31	35	39	34	25	24	
COASTAL KARNATAKA (CK)	31	1	25	6	-11	-1	-3	-3	-11	-5	4	5	5	3	4	10	20	19	
NORTH INTERIOR KARNATAKA (NIK)	98	15	30	14	26	27	34	48	47	47	46	54	50	42	46	51	49	49	
SOUTH INTERIOR KARNATAKA (SIK)	62	-12	1	-12	-2	-1	-7	2	-2	6	20	17	12	12	21	23	23	20	
KERALA (KER)	118	0	-11	-16	-20	-16	-25	-25	-27	-15	1	-3	-7	-10	-4	4	11	9	
LAKSHADWEEP (LAK)	34	-23	-37	-31	-14	-18	-10	5	15	29	41	32	24	20	30	32	37	33	

<i>Largely Deficient</i>	<i>Deficient</i>	<i>Normal</i>	<i>Excess</i>	<i>Large Excess</i>
≤ -60%	-20% to -59%	-19% to +19%	+20% to +59%	≥ +60%

During the SWM season of 2020, rainfall over CAP & RYS was fairly well distributed with *normal* to *large excess* rainfall occurring in 14 of the 17 weeks in the season. However, in KER *large excess* rainfall of 102% to 274% occurred during 5 weeks and *deficient* to *largely deficient* rainfall was recorded during 11 other weeks in the season.

Considering the cumulative seasonal rainfall performance at the end of every week, it is noted that CAP, TEL, CK, NIK & SIK came under *normal to large excess* category during all the weeks in the season. Starting from the week ending 01st July, excepting KER, all the subdivisions in the region, came under *normal to excess* with RYS coming under *large excess* category throughout.

2.4 Daily subdivisional rainfall and monsoon activity

Table-4a presents daily spatial rainfall distribution over various subdivisions of the SP region during the SWM 2020 and Table-4b, the percentage frequency of various categories of spatial rainfall distribution over each subdivision during the season.

As seen, *fairly widespread to widespread* rainfall occurred over CK, KER and LAK on more than 75% of the days during the season (92%, 79% & 76% respectively) and NIK, SIK and TEL recorded *fairly widespread to widespread* rainfall on 45%-55% of the days. CAP and RYS recorded *isolated to fairly widespread* rainfall on more than 80% of the days. TN reported only *isolated to scattered* rainfall on 89% of the days. During the 24 hours ending 0830 IST of 13th and 14th September, all the subdivisions in the region excepting TN received *widespread* rainfall. Further, during the 24 hours ending 0830 IST of 12th June and 16th July, *fairly widespread to widespread* rainfall was realised over all the subdivisions in the region excepting TN which experienced only scattered rainfall on these days.

Table-5 presents the monthly and seasonal frequency of *active* and *vigorous* monsoon days over the various subdivisions of the SP region during the SWM season 2020. SIK and TEL experienced 38 days of *active to vigorous* monsoon activity during the season followed by RYS- 37 days, CK- 36 days, and NIK- 35 days. CAP and KER experienced 25-28 days of *active to vigorous* monsoon activity and TN-13 days of *active to vigorous* monsoon activity. In most subdivisions in the region, major activity was in the month of September followed by July 2020.

Table-4a: Daily subdivisional rainfall distribution over the SP region during SWM 2020

Date as on 0830 IST	CAP	TEL	RYS	TN	CK	NIK	SIK	KER	LAK
01-Jun	ISOL	FWD	SCT	ISOL	WD	WD	FWD	WD	WD
02-Jun	SCT	SCT	FWD	SCT	WD	WD	FWD	WD	WD
03-Jun	SCT	WD	SCT	ISOL	WD	FWD	SCT	WD	WD
04-Jun	SCT	ISOL	DRY	ISOL	WD	FWD	SCT	WD	SCT
05-Jun	SCT	ISOL	ISOL	ISOL	WD	SCT	ISOL	WD	FWD
06-Jun	ISOL	ISOL	ISOL	ISOL	WD	SCT	SCT	WD	SCT
07-Jun	ISOL	ISOL	ISOL	SCT	WD	ISOL	SCT	WD	FWD
08-Jun	ISOL	ISOL	ISOL	ISOL	FWD	ISOL	SCT	FWD	WD
09-Jun	SCT	ISOL	DRY	ISOL	FWD	ISOL	ISOL	ISOL	SCT
10-Jun	FWD	WD	ISOL	ISOL	WD	ISOL	SCT	SCT	FWD
11-Jun	WD	WD	WD	ISOL	WD	FWD	WD	WD	SCT
12-Jun	WD	WD	WD	SCT	WD	WD	WD	WD	FWD
13-Jun	SCT	ISOL	DRY	ISOL	WD	SCT	SCT	WD	WD
14-Jun	ISOL	ISOL	DRY	ISOL	WD	SCT	FWD	WD	WD
15-Jun	SCT	SCT	ISOL	ISOL	WD	SCT	SCT	WD	WD
16-Jun	FWD	FWD	ISOL	ISOL	WD	SCT	SCT	WD	WD
17-Jun	SCT	WD	ISOL	ISOL	WD	WD	FWD	WD	WD
18-Jun	FWD	SCT	ISOL	ISOL	WD	WD	FWD	WD	WD
19-Jun	SCT	FWD	ISOL	ISOL	WD	FWD	SCT	WD	WD
20-Jun	ISOL	ISOL	SCT	ISOL	WD	SCT	SCT	WD	WD
21-Jun	SCT	FWD	ISOL	ISOL	WD	ISOL	ISOL	WD	WD
22-Jun	SCT	ISOL	SCT	ISOL	WD	ISOL	SCT	WD	WD
23-Jun	ISOL	SCT	ISOL	ISOL	WD	SCT	SCT	WD	WD
24-Jun	ISOL	ISOL	ISOL	ISOL	WD	ISOL	SCT	ISOL	WD
25-Jun	SCT	ISOL	FWD	FWD	FWD	SCT	WD	WD	WD
26-Jun	SCT	ISOL	SCT	FWD	WD	WD	WD	FWD	WD
27-Jun	ISOL	ISOL	ISOL	ISOL	FWD	SCT	SCT	WD	WD
28-Jun	ISOL	FWD	FWD	ISOL	WD	SCT	ISOL	WD	SCT
29-Jun	SCT	SCT	FWD	ISOL	WD	SCT	SCT	WD	WD
30-Jun	SCT	SCT	WD	SCT	WD	SCT	FWD	WD	FWD
01-Jul	SCT	SCT	FWD	ISOL	WD	SCT	ISOL	FWD	WD
02-Jul	SCT	FWD	SCT	ISOL	WD	FWD	SCT	WD	WD
03-Jul	ISOL	SCT	FWD	ISOL	WD	FWD	WD	WD	WD
04-Jul	FWD	WD	ISOL	SCT	WD	SCT	WD	WD	WD
05-Jul	WD	FWD	ISOL	SCT	WD	WD	FWD	WD	SCT
06-Jul	FWD	WD	ISOL	ISOL	WD	FWD	FWD	WD	FWD
07-Jul	SCT	ISOL	ISOL	ISOL	WD	SCT	SCT	WD	FWD
08-Jul	SCT	SCT	ISOL	SCT	WD	WD	FWD	WD	SCT
09-Jul	FWD	FWD	WD	SCT	WD	WD	WD	FWD	FWD
10-Jul	SCT	WD	SCT	FWD	WD	WD	WD	WD	WD
11-Jul	SCT	SCT	SCT	SCT	WD	FWD	SCT	SCT	WD
12-Jul	SCT	SCT	SCT	SCT	WD	ISOL	SCT	WD	WD
13-Jul	FWD	SCT	SCT	ISOL	WD	SCT	SCT	FWD	WD
14-Jul	FWD	SCT	SCT	ISOL	WD	FWD	SCT	FWD	WD
15-Jul	WD	WD	WD	SCT	WD	WD	FWD	SCT	WD
16-Jul	FWD	WD	WD	SCT	WD	WD	WD	WD	FWD
17-Jul	FWD	SCT	FWD	SCT	WD	WD	WD	WD	WD
18-Jul	SCT	SCT	SCT	ISOL	WD	WD	FWD	WD	WD
19-Jul	ISOL	ISOL	FWD	ISOL	WD	FWD	FWD	WD	FWD
20-Jul	SCT	FWD	WD	SCT	FWD	WD	WD	SCT	WD
21-Jul	SCT	WD	WD	SCT	WD	WD	WD	WD	WD
22-Jul	ISOL	ISOL	ISOL	ISOL	SCT	ISOL	ISOL	SCT	FWD
23-Jul	SCT	WD	SCT	ISOL	SCT	SCT	SCT	FWD	FWD
24-Jul	FWD	WD	SCT	SCT	FWD	SCT	WD	WD	WD
25-Jul	SCT	FWD	FWD	ISOL	WD	WD	SCT	WD	WD
26-Jul	SCT	SCT	FWD	FWD	WD	FWD	FWD	WD	FWD
27-Jul	ISOL	ISOL	ISOL	ISOL	WD	ISOL	ISOL	ISOL	DRY
28-Jul	ISOL	ISOL	ISOL	SCT	WD	ISOL	SCT	FWD	DRY
29-Jul	FWD	WD	SCT	FWD	WD	FWD	FWD	WD	WD
30-Jul	SCT	SCT	FWD	SCT	WD	WD	WD	WD	WD
31-Jul	SCT	SCT	SCT	ISOL	WD	SCT	SCT	WD	WD

Date as on 0830 IST	CAP	TEL	RYS	TN	CK	NIK	SIK	KER	LAK
01-Aug	SCT	SCT	WD	SCT	WD	SCT	FWD	WD	WD
02-Aug	FWD	FWD	WD	ISOL	WD	SCT	FWD	WD	WD
03-Aug	FWD	FWD	SCT	SCT	WD	FWD	FWD	WD	WD
04-Aug	FWD	SCT	FWD	ISOL	WD	FWD	WD	WD	WD
05-Aug	FWD	FWD	SCT	ISOL	WD	WD	WD	WD	WD
06-Aug	SCT	FWD	ISOL	ISOL	WD	WD	WD	WD	SCT
07-Aug	ISOL	SCT	ISOL	SCT	WD	FWD	WD	WD	WD
08-Aug	ISOL	ISOL	ISOL	ISOL	WD	FWD	WD	WD	WD
09-Aug	SCT	ISOL	ISOL	FWD	WD	SCT	WD	WD	WD
10-Aug	WD	WD	FWD	SCT	WD	WD	WD	WD	WD
11-Aug	SCT	WD	ISOL	ISOL	WD	FWD	FWD	WD	WD
12-Aug	FWD	SCT	SCT	ISOL	WD	SCT	WD	WD	SCT
13-Aug	FWD	WD	ISOL	ISOL	WD	FWD	SCT	FWD	DRY
14-Aug	FWD	WD	ISOL	ISOL	WD	FWD	SCT	FWD	FWD
15-Aug	FWD	WD	ISOL	ISOL	WD	FWD	SCT	SCT	DRY
16-Aug	FWD	WD	SCT	ISOL	WD	WD	SCT	ISOL	DRY
17-Aug	FWD	WD	FWD	ISOL	WD	WD	WD	WD	SCT
18-Aug	SCT	FWD	SCT	ISOL	WD	WD	WD	FWD	SCT
19-Aug	SCT	WD	ISOL	ISOL	WD	FWD	SCT	WD	DRY
20-Aug	FWD	WD	ISOL	ISOL	WD	SCT	SCT	SCT	SCT
21-Aug	FWD	WD	SCT	ISOL	WD	WD	FWD	FWD	WD
22-Aug	FWD	FWD	SCT	ISOL	WD	FWD	FWD	SCT	FWD
23-Aug	SCT	ISOL	ISOL	ISOL	WD	FWD	FWD	SCT	SCT
24-Aug	SCT	SCT	FWD	FWD	WD	SCT	SCT	SCT	SCT
25-Aug	SCT	ISOL	ISOL	SCT	WD	FWD	ISOL	ISOL	DRY
26-Aug	SCT	ISOL	DRY	ISOL	FWD	ISOL	ISOL	ISOL	DRY
27-Aug	SCT	FWD	ISOL	SCT	ISOL	ISOL	ISOL	ISOL	DRY
28-Aug	ISOL	FWD	DRY	ISOL	FWD	SCT	ISOL	ISOL	SCT
29-Aug	SCT	SCT	ISOL	ISOL	WD	ISOL	ISOL	ISOL	FWD
30-Aug	SCT	SCT	ISOL	ISOL	WD	SCT	ISOL	ISOL	WD
31-Aug	ISOL	ISOL	FWD	SCT	WD	SCT	SCT	ISOL	DRY
01-Sep	ISOL	ISOL	ISOL	FWD	FWD	ISOL	FWD	FWD	FWD
02-Sep	FWD	ISOL	FWD	FWD	SCT	SCT	WD	WD	WD
03-Sep	SCT	SCT	FWD	FWD	WD	FWD	WD	WD	WD
04-Sep	ISOL	ISOL	FWD	SCT	SCT	SCT	FWD	SCT	SCT
05-Sep	ISOL	ISOL	ISOL	SCT	WD	SCT	SCT	FWD	WD
06-Sep	ISOL	ISOL	ISOL	ISOL	FWD	ISOL	SCT	FWD	WD
07-Sep	ISOL	ISOL	ISOL	SCT	WD	FWD	FWD	WD	WD
08-Sep	ISOL	ISOL	FWD	ISOL	SCT	SCT	WD	WD	WD
09-Sep	ISOL	ISOL	SCT	SCT	WD	FWD	FWD	WD	WD
10-Sep	ISOL	SCT	FWD	FWD	WD	FWD	WD	WD	WD
11-Sep	SCT	FWD	FWD	ISOL	WD	SCT	SCT	WD	WD
12-Sep	SCT	FWD	SCT	ISOL	WD	FWD	FWD	WD	WD
13-Sep	WD	WD	WD	ISOL	WD	WD	WD	WD	WD
14-Sep	WD	WD	WD	SCT	WD	WD	WD	WD	WD
15-Sep	WD	WD	FWD	ISOL	WD	FWD	SCT	WD	WD
16-Sep	FWD	FWD	FWD	ISOL	WD	WD	SCT	WD	WD
17-Sep	SCT	FWD	SCT	ISOL	WD	FWD	SCT	WD	FWD
18-Sep	ISOL	SCT	FWD	ISOL	WD	FWD	FWD	WD	WD
19-Sep	FWD	FWD	WD	SCT	WD	SCT	SCT	WD	WD
20-Sep	FWD	WD	SCT	ISOL	WD	FWD	WD	WD	WD
21-Sep	FWD	WD	FWD	ISOL	WD	WD	WD	WD	WD
22-Sep	ISOL	SCT	ISOL	ISOL	WD	FWD	FWD	WD	WD
23-Sep	ISOL	SCT	ISOL	ISOL	WD	FWD	FWD	WD	WD
24-Sep	ISOL	ISOL	DRY	ISOL	WD	ISOL	ISOL	WD	WD
25-Sep	ISOL	ISOL	ISOL	ISOL	WD	SCT	ISOL	SCT	FWD
26-Sep	WD	WD	WD	SCT	WD	WD	FWD	FWD	DRY
27-Sep	SCT	FWD	FWD	ISOL	WD	WD	SCT	SCT	FWD
28-Sep	ISOL	ISOL	ISOL	SCT	ISOL	FWD	SCT	SCT	FWD
29-Sep	ISOL	ISOL	ISOL	FWD	SCT	ISOL	ISOL	SCT	DRY
30-Sep	WD	SCT	WD	FWD	SCT	ISOL	FWD	FWD	SCT

Table-4b: Percentage frequency of various categories of daily spatial rainfall distribution over the subdivisions of the SP region during SWM season, 2020

Category	Frequency (%)								
	CAP	TEL	RYS	TN	CK	NIK	SIK	KER	LAK
WS	8	25	12	0	84	25	26	65	59
FWS	25	20	22	11	8	30	25	14	17
SCT	39	25	22	27	6	30	35	12	14
ISOL	28	30	38	62	2	16	13	9	0
DRY	0	0	6	0	0	0	0	0	10

WS: Widespread; FWS: Fairly Widespread; SCT: Scattered; ISOL: Isolated; DRY: No rain
(Note: Kindly refer Appendix(i) for explanations on categorization of spatial rainfall distribution)

Table-5: Subdivision-wise frequency of Vigorous and Active monsoon conditions over the SP region during SWM season, 2020

Subdivision	JUN		JUL		AUG		SEP		Jun-Sep	
	ACT	VIG	ACT	VIG	ACT	VIG	ACT	VIG	ACT	VIG
COASTAL AP and YANAM	3	1	7	1	4	0	6	3	20	5
TELANGANA	5	1	9	0	8	4	6	5	28	10
RAYALASEEMA	2	4	4	8	3	3	9	4	18	19
TAMIL NADU, PDC and KKL	0	2	1	2	1	1	5	1	7	6
COASTAL KARNATAKA	4	0	7	0	12	0	5	8	28	8
NORTH INTERIOR KARNATAKA	3	1	13	1	1	4	10	2	27	8
SOUTH INTERIOR KARNATAKA	5	0	8	0	8	3	10	4	31	7
KERALA and MAHE	5	0	2	0	5	3	9	4	21	7
LAKSHADWEEP	0	0	0	0	0	0	0	0	0	0

ACT: Active monsoon conditions (FWD to WD rainfall over the subdivision with rainfall amount 1½ to 4 times the normal and at least 2 stations reporting 5 cm or more along the west coast or 3 cm or more elsewhere)

VIG: Vigorous monsoon conditions (FWD to WD rainfall over the subdivision with rainfall amount more than 4 times the normal and at least 2 stations reporting 8 cm or more along the west coast or 5 cm or more elsewhere).

2.5 District-wise seasonal rainfall distribution

Table -6 presents the district rainfall distribution as percentage departures from normal over the nine meteorological subdivisions of the SP region during the period Jun-Sep 2020 and Fig.4, the district-wise seasonal rainfall over the various states and UTs over the SP region.

Table-6: District rainfall performance over various sub divisions of the SP region during June-September, 2020

Met. Sub division	Total No. of districts	No. of districts under various categories of monsoon performance				
		<i>Large Excess</i>	<i>Excess</i>	<i>Normal</i>	<i>Deficient</i>	<i>Large Deficient</i>
COASTAL AP and YANAM	10	0	7	2	1	0
RAYALASEEMA	4	4	0	0	0	0
TELANGANA	33	13	13	7	0	0
TAMIL NADU, PDC and KKL	34	6	15	11	2	0
COASTAL KARNATAKA	3	0	2	1	0	0
NORTH INTERIOR KARNATAKA	11	2	8	1	0	0
SOUTH INTERIOR KARNATAKA	16	2	9	5	0	0
KERALA and MAHE	15	0	6	9	0	0
LAKSHADWEEP	1	0	1	0	0	0

Of the 127 districts in the SP region [Andhra Pradesh: 14 (CAP-10 & RYS-4), Telangana: 33, TamilNadu, Puducherry and Karaikal: 34, Karnataka: 30 (CK-3, NIK-11 & SIK-16), Kerala and Mahe:15 and Lakshadweep: 1], 124 districts received *normal to large excess* rainfall during the season. All four districts in RYS received *large excess* rainfall with Cuddapah district reporting +110% *excess* rainfall during the season. All the districts in Kerala, Karnataka and Telangana received *normal to large excess* rainfall. Srikakulam in CAP, Villupuram and Puducherry in TN subdivision came under *deficient* category.

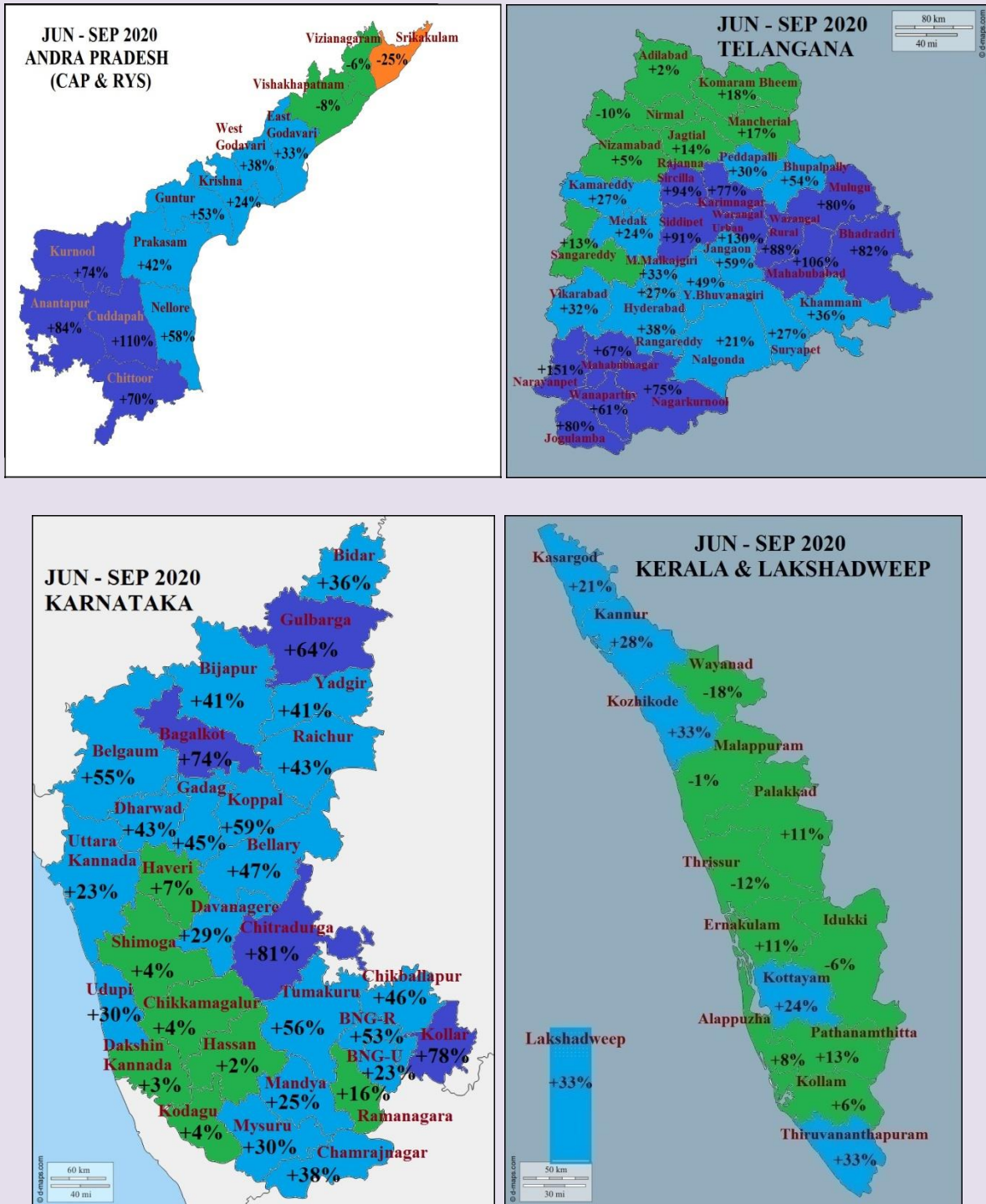


Fig.4: District-wise seasonal rainfall (percentage departure from normal) over various states and union territories in the SP region

days of *heavy* rainfall events with 25 days of *very heavy* rainfall and 4 days of *extremely heavy* rainfall events. CAP also recorded 50 days of *heavy* rainfall events with 12 days of *very heavy* rainfall events. RYS, NIK and LAK recorded, 37, 29 and 8 days respectively of *heavy* rainfall events. List of *very heavy* to *extremely heavy* rainfall events is presented in Table 7c.

Table-7a: Subdivision-wise frequency of heavy rainfall days over the SP region during 1st June-30th Sep 2020

Subdivision	No. of days of Heavy rainfall (Rainfall ≥ 7 cm/day)		
	<i>Extremely Heavy</i> (≥ 21 cm/day)	<i>Very Heavy</i> (≥ 12 cm/day)	<i>Heavy</i> (≥ 7 cm/day)
COASTAL AP and YANAM	0	12	50
TELANGANA	2	26	62
RAYALASEEMA	0	10	37
TAMIL NADU, PDC and KKL	6	27	72
COASTAL KARNATAKA	6	30	70
NORTH INTERIOR KARNATAKA	0	10	29
SOUTH INTERIOR KARNATAKA	8	23	61
KERALA and MAHE	4	25	53
LAKSHADWEEP	0	1	8

Note: Kindly refer Appendix-(ii) for explanations on various terminologies used for description of rainfall intensity.

Table-7b: Month-wise frequency of heavy rainfall days during June-Sep 2020

Sub-division	No. of days of Heavy rainfall (Rainfall ≥ 7 cm/day)											
	June			July			Aug			Sep		
	<i>ExH</i>	<i>VH</i>	<i>H</i>	<i>ExH</i>	<i>VH</i>	<i>H</i>	<i>ExH</i>	<i>VH</i>	<i>H</i>	<i>ExH</i>	<i>VH</i>	<i>H</i>
CAP	0	2	8	0	3	17	0	1	11	0	6	14
TEL	0	2	10	0	6	18	2	11	18	0	7	16
RYS	0	1	4	0	3	13	0	1	6	0	5	14
TN	0	5	13	0	2	19	5	10	20	1	10	20
CK	0	6	18	0	8	19	1	9	20	5	7	13
NIK	0	1	3	0	2	9	0	2	5	0	5	12
SIK	0	1	8	0	4	16	6	11	20	2	7	17
KER	1	7	15	0	4	13	2	8	12	1	6	13
LAK	0	0	1	0	1	2	0	0	2	0	0	3

ExH:Extremely Heavy (≥ 21 cm/day); *VH*: Very Heavy (≥ 12 cm/day); *H*: Heavy (≥ 7 cm/day)

In the monthly scale, *heavy* rainfall events on more than 15 days during the month was reported in 5 subdivisions (CK & TN: 19 days each, TEL, CAP & SIK:18, 17 & 16 days respectively) in July and in 4 subdivisions (CK, SIK & TN: 20 days each and TEL: 18 days) in August. In September, excepting LAK, all the subdivisions in the region experienced *heavy* rainfall events on more than 10 days during the month.

Considering the *heavy* rainfall activity on daily basis, it may be mentioned that there were two major intense spells of *very heavy -extremely heavy* rainfall events – (i) 04th -08th August over CK and ghats areas of SIK, KER and TN (ii) 15th-17th August over TEL.

(i) Intense rainfall activity during 04th-08th Aug 2020 over CK and ghats areas of SIK, KER and TN: INSAT-3D infra red imageries depicting the cloudiness associated with the intense rainfall activity during 04th-8th August 2020 are presented in Fig.5a(i). GPM sat – gauge merged rainfall maps and IMD gridded rainfall maps depicting the rainfall events during the above period are presented in Fig. 5b(i). Gauge observed point rainfall plots for Kerala, Karnataka and Tamil Nadu depicting the rainfall distribution are presented in Fig. 5c(i). It is noted that this extreme rainfall activity occurred over the western ghat areas of Kerala, Karnataka and Tamil Nadu under the influence of Orography along with the favourable synoptic situation.

Avalanche and Upper Bavani in the Nilgirs district in TN reported *extremely heavy* rainfall on four consecutive days on 04th, 05th, 06th & 07th August with Avalanche recording 58 cm of rain on 06th August. Bagamandala in Kodagu district and Kottigehara in Chikkamagaluru district in SIK recorded *extremely heavy* rainfall on three consecutive days during 05th-08th August with Bagamandala recording 49 cm of rain on 06th August. Peermade, Idukki and Munnar in Idukki district and Mananthavady in Wyanad district of Kerala recorded *extremely heavy* rainfall (21-26 cm) on 07th August 2020.

Associated with recurrent intense rainfall activity during 04th-08th August, rise of water levels in rivers, lakes and reservoirs, inland flooding, landslides and uprooting of trees, damages to roads and bridges were reported in the western ghat areas of KER, TN and SIK. Some media reports on this intense rainfall activity and associated impacts are presented in Fig.5d(i).

(ii) Intense rainfall activity during 15th-17th August over TEL: INSAT-3D infra red imageries depicting the cloudiness associated with the intense rainfall activity during 15th-17th August 2020 over Telangana are presented in Fig.5a(ii). GPM sat – gauge merged rainfall maps and IMD gridded rainfall maps depicting the rainfall events during the above period are presented in Fig. 5b(ii). Gauge observed point rainfall plots for Telangana depicting the rainfall distribution are presented in Fig. 5c(ii). It is noted that this extreme rainfall activity occurred in association with an east-west shear zone over peninsular India and a low pressure area that formed over the northwest Bay of Bengal and moved inland during 13th -18th August 2020. Associated with this intense rainfall activity inland flooding and inundation was reported in Warangal, Karimnagar and Khammam districts in Telangana [Fig.5d(ii)].

Table 7c: District-wise list of very to extremely heavy rainfall events over various subdivisions in the SP region during Jun-Sep 2020

District	Date, Station and 24-hr accumulated rainfall (in cm) (ending 0830 IST of the specified date)
Subdivision: COASTAL ANDHRA PRADESH	
East Godavari	Aug: 13 th : Vararamachandrapur-19, Kunavaram-12; Sep: 13 th : Amalapuram -15;
West Godavari	Jul: 09 th : Bhimadole-13, Tadepalligudem-13; Aug: 13 th : Kukunoor-16, Velairpad-15; Sep: 13 th : Tanuku -18; 14 th : Narsapuram -14; 15 th : Chintalapudi -12;
Krishna	Jun: 12 th : Avanigada-13; Jul: 09 th : Vijayawada A.p-13; 10 th : Kaikalur -12; 14 th : Tiruvuru-17; Sep: 13 th : Tiruvuru -16;
Prakasam	Jul: 09 th : Karamchedu -16; Sep: 02 nd : Markapur -17; 26 th : Racherla-19, Addanki-15;
Guntur	Jun: 30 th : Macherla -12; Jul: 09 th : Tenali-15; Sep: 26 th : Bapatla -15;
Nellore	Sep: 26 th : Sullurpeta-12;
Srikakulam	Sep: 02 nd : Ichchapuram-14; 21 st : Palakonda -15;
Subdivision: TELANGANA	
Kamareddy	Jul: 02 nd : Jukkal-12; 16 th : Jukkal -18; Aug: 10 th : Jukkal-14, Banswada-13; Sep: 17 th : Jukkal-16;
Nizamabad	Aug: 10 th : Navipet-19, Ranjal-14, Velpur-13, Makloor-12; Sep: 18 th : Navipet-12;
KumaramBheem	Aug: 16 th : Bejjur-18; 19 th : Dahegaon-17, Kagaznagar-13;
Medak	Sep: 17 th : Tekmal-20;
Bhupalpally	Jul: 10 th : Venkatapuram-13; Aug: 13 th : Venkatapuram-15; 14 th : Venkatapuram -16; 15 th : Venkatapuram-19 , Mulug-17, Venkatapur-16, Govindaraopet-13; 16 th : Venkatapuram-23, Venkatapur-13; 17 th : Venkatapuram-18; 20 th : Mulug-17, Mogullapalle-14, Venkatapur-14, Venkatapuram-13, Bhupalpalle-12; 21 st : Venkatapuram-14; Sep: 14 th : Govindaraopet-12;
Sangareddy	Jul: 16 th : Jogipet-15;
Rangareddy	Sep: 19 th : Ibrahimpatnam-13; 26 th : Shadnagar-15;
Karimnagar	Aug: 10 th : Huzurabad-12; 15 th : Huzurabad-19;

Adilabad	Jul :06 th : Utnur-13;
Kothagudem	Jun: 30 th :Mulakalapalle-14; Aug:12 th : Burgampadu-12; 13 th : Burgampadu-17, Palawancha-14, Bhadrachalam-13, Mulakalapalle-12, Yellandu -12; 15 th :Gundala -19, Aswapuram-15, Manuguru-15, Dummagudem(arg) -13; 16 th : Pinapaka-14, Manuguru-13; 20 th : Manuguru-12; 21 st : Pinapaka-19;
Peddapalle	Jun: 12 th :Sultanabad -13;
Vikarabad	Jul :03 rd : Peddemul-20;
Mahabubnagar	Jul :03 rd : Mahbubnagar-13; Sep:18 th : Kosgi-12; 26 th : Damaragidda-12;
Mahabubabad	Aug:15 th : Gudurwrgl-15; 16 th : Kothaguda-12; 20 th : Kothaguda-13; 21 st : Kothaguda-13; 27 th : Bayyaram-12, Gudurwrgl-12;
Warangal (Rural)	Jul :15 th : Khanapur-12; Aug:10 th : Nallabelly-13; 15 th : Nallabelly-27, Shayampet-23, Atmakurwrgl-21, Narsampet-20, Khanapur-19, Parkal-17, Chennaraopet-15; 16 th : Shayampet- 16, Parkal-14, Nallabelly-13; 17 th :Nallabelly -12; 20 th :Nallabelly-14, Shayampet-13; Sep:26 th : Chennaraopet-13;
Warangal (Urban)	Aug:15 th : Hanamkonda-21, Hasanparthy-21, Bheemadevarpalle-20, Dharmasagar -14;
Siddipet	Aug:15 th : Bejjanki-14; Sep:16 th : Bejjanki-12; 26 th : Wargal-13, Bejjanki-13;
Jagtial	Sep:15 th : Jagtial-13, Mallial-12;
Nagarkurnool	Sep:16 th : Nagar Kurnool -19, Kollapur-17, Thimmajipeta-12;
Jangaon	Sep:26 th : Palakurthi-15;
Mancherial	Jul :15 th :Bheemini-12; Aug :19 th : Bheemini-13;
Suryapet	Sep:26 th : Suryapet-12;
Subdivision: RAYALASEEMA	
Kurnool	Jun: 30 th :Aspari -14; Jul: 30 th : Nandyal-15; Sep:13 th :Atmakur-17, Nandyal-12; 14 th : Atmakur-13; 19 th :Banaganapalle -12; 26 th :Allagadda -15;
Chittoor	Jul: 09 th :Thambalapalle-13; Aug :24 th :Palamaner -13;
Cuddapah	Jun: 30 th :Royachoti -13; Sep:14 th : Duvvur-12; 19 th :Vallur -18, Kamalapuram-18, Simhadripuram-15, Jammalamadugu-15, Proddutur-14, Chapad-12; 26 th :Proddutur-13, Lakkireddipalle-13, Jammalamadugu-12;
Anantapur	Jul: 23 th : Pamidi-13; Sep:01 st :Rolla -18;

Subdivision: TAMIL NADU, PUDUCHERRY & KARAIKAL

Nilgiris	<p>Jun :07th:Devala-13;</p> <p>Aug :03rd:Devala -15; 04th: Upper Bhavani-31, Avalanche-22, G Bazar-20, Upper Gudalur-19; 05th:Avalanche-39,Upper Bhavani-31,Pandhalur-16;Naduvattam-15, Emerald-15, Glenmorgan-14, Harison Estate-14, G Bazar-13 , Devala-13; 06th:Avalanche -58,G Bazar -33,Upper Bhavani-32,Upper Gudalur-31,Naduvattam -23, Devala-22, Glenmorgan-21, Pandhalur-18 , Harison Estate-18,Emerald -17; 07th:Devala -36,Avalanche-35,Gudalur Bazar -35, Upper Gudalur-33, Braiyar Estate-33, Cherumulle-32,Upper Bhavani-26,Pandhalur -25,Barwood Estate-25,Naduvattam-22, Glenmorgan-19; 08th: Devala-34, Taluk Office Pandalur-19, Harisan Malayalam Ltd. Went worth Estate Cher-18; 10th:Devala-12;</p> <p>Sep :07th:Devala-18; 08th:Devala-13; 20th: Avalanche-21, Taluk Office Pandalur-14, Upper Bhavani-13; 21th:Avalanche-18, Upper Bhavani-12;</p>
Coimbatore	<p>Jun :30th: Valparai PTO-13;</p> <p>Jul :24th: Solaiyar-14;</p> <p>Aug :04th:Valparai PTO-13, Solaiyar-13; 05th:Solaiyar -18, Chinnakalar-16; 07th:Chinnakalar-31, Cincona-29,Solaiyar-24,ValparaiTaluk Office-23, Valaparai PAP -23; 08th:Chinnakalar -13;</p> <p>Sep : 20th: Valparai Pto-12;</p>
Theni	Aug :04 th :Periyar-12; 07 th :Periyaru-20, Thekkadi16;
Vellore	Jul :10 th :Arakonam-13,Virinjipuram AWS -12; 24 th : VCS Mill Ammundi-14;
Cuddalore	Sep :29 th : Annamalai Nagar-13, Chidambaram Aws-13; 30 th :Veppur-13;
Tirupattur	Sep :29 th : Vadaputhupattu-13;
Sivaganga	Jun :25 th : Devakottai-12;
Trichi	<p>Aug :24th:Pullambadi -12;</p> <p>Sep :09th: Vathalai Anicut-14;</p>
Madurai	Sep :03 rd : Usilampatti-13;
Tiruppur	Jul :24 th : Tiruppur-13;
Chengalpattu	Jul :10 th : Cheyyur-12;
Dindigul	<p>Jul :24th: Vedasandur-15,Tabacco Station (VDR) -15;</p> <p>Aug :25th:Vedasandur -13, Tobacco Vedasandur-13;</p>
Villupuram	<p>Jun :29th: Vallam-12;</p> <p>Sep :02nd: Mundiampakkam-15;</p>
Salem	Jul :10 th :Yercaud AWS -20,Danishpet-13;
Pudukottai	<p>Jun :26th: Karaiyur-13;</p> <p>Jul :10th: Keeranur-13;</p> <p>Sep :07th: Alangudi-12;</p>
Perambalur	Jun :29 th : Agaram Seegoor-12;
Kancheepuram	Jul :10 th : Sriperumbudur-12;
Ramanathapuram	<p>Aug :09th:Pamban-12;</p> <p>Sep :01st: Paramakudi-13;</p>

Subdivision: COASTAL KARNATAKA	
Uttar Kannada	<p>Jun :03rd: Karwar-15; 04th:Karwar -15; 13th:Ankola -20; 17th: Ankola-16, Karwar-14, Gokarna-12, Honavar-12;</p> <p>Jul :03rd: Honavar-17,Ankola-13; 04th:KarwarObsy. -12; 08th:Manki-17,Gokarna-13 , Honavar-12; 09th: Kadra-17; 18th:Honavar-13; 19th: Karwar-13; 30th:Kumta-16;</p> <p>Aug :04th:Siddapura -15, Ankola-12, Kadra-12; 05th: Manchikere-19, Siddapura-14; 06th:Siddapur-20, Kadra-19, Yellapur-18; 09th:HonavarObsy-14 ; 10th: Shirali-17, Honavar-15, Gokarna-13; 11th: Kumta-15; HonavarObsy-14 ; 17th: Bhatkal-15, ShiraliPto-14, Manki-13;</p> <p>Sep :03rd: Jagalbet-14; 12th: Bhatkal-15, Manki-13, ShiraliPto-12; 21st:Ankola -22, Manki-21, Kadra-16,Shirali Pto-15, Gokarna-12,HonavarObsy-12; 22nd: SirsiAgro -14, Kadra-13;</p>
Udupi	<p>Jun :17th: Kundapur-12, Kota -12; 18th: Kota-12 ;</p> <p>Jul :03rd:Karkala-12, ShiraliPto-12; 04th: Kota-14; 08th: Kollur-20, Kota-15, Karkala-13, Siddapura ARG-13; 10th: Kolluru-17; 17th: Kollur-12; 18th: Kollur; 19th: Kundapur-13;</p> <p>Aug :04th: Kollur-20; 05th: Kollur-18, Siddapura-15; Siddapura ARG-14; 08th: SiddapuraArg-14, Kundapur-13; 09th: Kota-16; 10th: Kundapur-19, Kollur-18, SiddapuraArg-15, Siddapura-14, Kota -14; 17th: Kollur-21, Siddapura-19, SiddapuraArg-15, Kundapur-12; 18th: Kollur-12;</p> <p>Sep :07th: Kollur-24; 11th: Kota -13, Kundapur-13, Karkala-13; 12th: Kollur-22, Kundapur-17,Kota -14; 20th: BrahmavarAws-39, Karkala-28, Udupi-27, Kota -18; 21st:Kollur-24, Siddapura-17, SiddapuraArg-16, Karkala-14,</p>
Dakshina Kannada	<p>Jun :17th: Mudubidre-15, Panambur-12;</p> <p>Jul :03rd:MangaluruAp-16, Mudubidre-16, Panambur-15; 04th: Mulki-15; 08th: Puttur-13; 18th: Mani-15; Aug: 05th: Belthangady-12; 08th: Sulya-19, Dharmasthala-17, Uppinangadi-12; 09th: Mulki-12, Mani-12; 10th: Mudubidre-13, Mangaluru Airport -12;</p> <p>Sep :11th: Mulki-30, MangaluruApObsy-26, Panambur-23, Mangaluru-19, Mudubidre-13,Belthangadi -12; 12th: Mulki-16; 20th: Mulki-27, MangaluruAp Obsy-22, Mudubidre-19, PanamburObsy-18, Subramanya-17,Mangaluru -15, Uppinangadi-15, PutturHms-15, VitlaArg-14, Dharmasthala-13, Sulya-12; 21st:Mulki-16;</p>
Subdivision: SOUTH INTERIOR KARNATAKA	
Tumakuru	Jun :26th : Kunigal-14;
Chikkamagaluru	<p>Jul :07th: Kottigehara15;</p> <p>Aug :04th: Kammaradi-17; 05th: Kottigehara-31,Kamamdai-17, Kalasa-16 , Jayapura-16,Sringeri -13,Koppa -13,Mudigere -12; 06th:Kottigehara-39,Mudigere-19, Kammardi-16, JayapuraSringeriHms-15; 07th:Kottigehara-36, Mudigere-21, Jayapura-20 , Sringeri-18, Kalasa-17; Koppa-15; Balehonnur-14; 08th: Kalasa-17, Kammardi-14, Sringeri-14, Kottigehara-12, Jayapura-12;</p>

	17 th :Kammardi-12 ; Sep :20 th : Kalasa-12; 21 st : Kottigehara-21;
Kodagu	Jul :07 th : Bhagamandala-13; 17 th : Bhagamandala-12; Aug :04 th :Bhagamandala-19; 05 th :Madikeri-23,Bhagamandala -19 , Ponnampet-19, Napoklu-13, Somawarpet-12; 06 th :Bhagamandala-49, Murnadu-16, Somwarpet14; 07 th : Bhagamandala-40, Madikeri-23, Murnadu-22; 08 th : Bhagamandala-21, Murnadu-18; 09 th :Murnadu-17 ; Sep :20 th : Bhagamandala-17; 22 nd : Bhagamandala-12;
Shivamogga	Jul :09 th : Hosanagara-15; 17 th : AgumbeEmo-19; 18 th : AgumbeEmo-13; Aug :04 th : Hosanagar-21,Agumbe-14, Hunchadakatte-12; 05 th : Hosanagar-22, Agumbe-21,Thirthahalli-19, Linganamakki-16, Talaguppa-16,Humchadakatte-13; 06 th :Hosanagar-19,Linganamakki Hms-16,Hunchadakatte -16, Agumbe-14, Sagar-12; 07 th :Hosanagara-20, Agumbe-19, Hunchadakatte-13, Linganamakki-12, Thirthahalli -12; 08 th : Agumbe-22, Hosanagar-15; 10 th :Agumbe-13; 12 th :Agumbe -15; 17 th : Hosanagar-23,Agumbe Emo-17; 19 th : Agumbe EMO-12;21 st : AgumbeEmo-15 ; Sep :07 th : Hosanagar-13 ; 12 th : Hosanagar-13;18 th : AgumbeEmo-15; 20 th : AgumbeEmo-22; 21 st : AgumbeEmo-27;
Kolar	Jul :09 th : Rayalpad13;
Chikkaballapura	Aug :01 st : Gowribidanur-15;
Hassan	Aug :07 th :Sakaleshpura-13 ;
Bengaluru Urban	Sep :09 th : Hesaraghatta-15;
Subdivision: NORTH INTERIOR KARNATAKA	
Yadgir	Jun :28 th : Bhimarayanagudi ARG-12; Sep :26 th : Bhimarayanagudi-16;
Kalaburgi	Jul :03 rd :Chincholi12; Sep :15 th :Kamalapur -14;Santhapur (Bidardt)-12; 17 th :Chincholi-18; 18 th :Sedam-13;
Koppal	Jul :24 th : Yelburga-12;
Belagavi	Aug :05 th : Londa -20,Khanapura -18, Kittur-12; 17 th : Londa-14, Khanapur-13;
Bidar	Sep :15 th : Santhapur-12; 16 th : Saigaon-12;
Subdivision: KERALA & MAHE	
Kozhikode	Jun :01 st :Vadakara-15; 02 nd : Vadakara-19; 04 th : Vadakara-12; 14 th : Vadakara-12; 22 nd : Vadakara-25,Quilandy-13; Aug :03 rd :Vadakara-16; 08 th :Vadakara-33,Quilandy-16; Sep :12 th :Vadakara-14; 20 th :Vadakara-21,Quilandy-12;
Thiruvananthapuram	Jun :02 nd :Thiruvananthapuram AP-13, Neyyattinkara-12; Sep :09 th :Thiruvananthapuram AP -14;
Kannur	Jun :02 nd : Kannur-13; 03 rd :Taliparamba-12; 22 nd :Thalassery-18, Taliparamba-15; Jul:17 th : Kannur-15 ; 24 th :Taliparamba-13; 30 th :Kannur-16; Aug :08 th :Irikkur -15; 09 th :Kannur -16,Taliparamba -12;

	Sep :20 th :Taliparamba -17,Irrikur-13,Thalassery-12;
Kollam	Jun: 30 th :Aryankavu-13;
Ernakulam	Jul :29 th : Kochi AP -15,Ernakulam South-13; 30 th :Ernakulam South-18, Kochi AP-14, Aluva-14, Piravom-14; Aug :07 th :Perumbavur-13, C.I.A.L. Kochi-12; 08 th :Piravom-14,Ernakulam South-13; 09 th : Kochi AP-12, Perumbavur-12,Ernakulam South-12; Sep :07 th :Kochi AP -15, Piravom-13,Ernakulam South-12;
Kottayam	Jul :29 th :Kottayam-20, Vaikom-19,Kumarakom-17, Kanjirappally-12; 30 th :Kumarakom-13,Kottayam-12; Aug :08 th : Kozha-18,Kanjirappally-16; Sep :07 th :Kumarakom-17,Vaikom-13;
Alapuzha	Jul :29 th :Cherthala-18; 30 th :Cherthala-19; Aug :08 th : MAVELIKKARA-15, Sep :07 th :Cherthala-18,Haripad -17,Mancompu-16; 09 th :Chengannur-14,Haripad -13;
Pathanamthitta	Jul :29 th :Kurudamannil-12;
Thrissur	Jul :30 th :Vellanikkara -15; Aug :08 th :Vellanikkara -16; Sep :07 th :Chalakydy-17, Kodungallur-17,Irinjalakuda-12;
Malappuram	Jul :30 th :Ponnani-13; Aug :08 th :Perinthalmanna-16,Angadippuram-13; Sep :07 th :Nilambur-13;
Idukki	Aug :04 th : Peermade-14, Idukki-12, Munnar-12; 05 th : Munnar-12; 07 th : Peermade-26, Idukki-23, Munnar-23, Myladumpara-18; 08 th :Peermade-19; 10 th :Thodupuzha -12; Sep :20 th :Munnar-14;
Wayanad	Aug :04 th :Vythiri-13,Mananthavady -12; 05 th :Mananthavady-15; 06 th :Mananthavady-19,Vythiri-18; 07 th : Mananthavady-21, Vythiri-19,Kuppady -17,Ambalavayal -12; 08 th :Vythiri-19;
Palakkad	Aug :07 th :Palakkad-14,Alathur-12, Ottappalam-12; 08 th :Palakkad-13;
Kasargod	Aug :09 th :Hosdurg-12; Sep :11 th :Hosdurg-13; 12 th :Hosdurg-14; 13 th :Kudulu -13; 20 th : Kudulu-13;
Subdivision: LAKSHADWEEP	
Lakshadweep	Jul :20 th :Minicoy -14;

Legend: **Very heavy**rain (12-20 cm/day); **Extremely heavy**rain (≥ 21 cm/day)

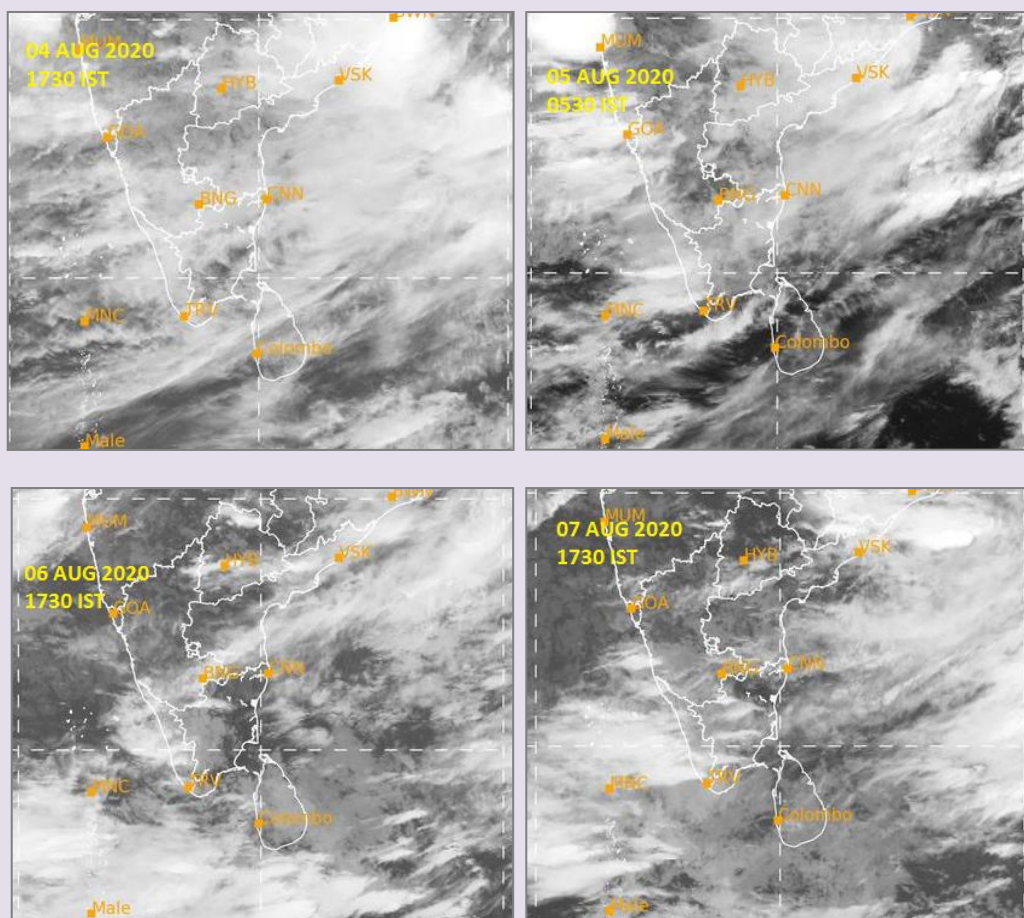


Fig.5a(i) :INSAT-3D infrared imageries 04th/1730, 05th/0530, 06th/1730 & 07th/1730 IST of August 2020 depicting cloudiness associated with intense rainfall activity over the CK, SIK, KER & TN during 04th- 08th August 2020

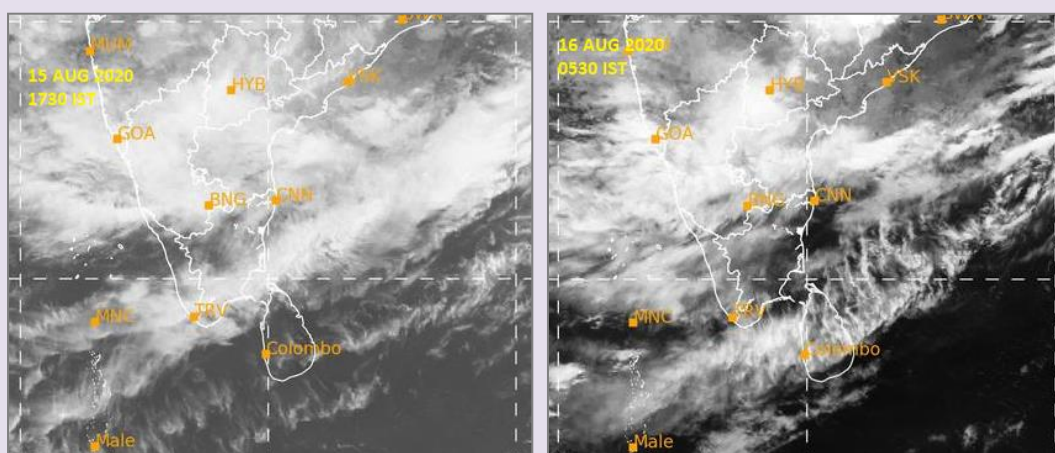


Fig.5a(ii): INSAT-3D infrared imageries as on 15th/1730 and 16th/0530 IST of August 2020 depicting cloudiness associated with intense rainfall activity over TEL during 15th-17th August 2020

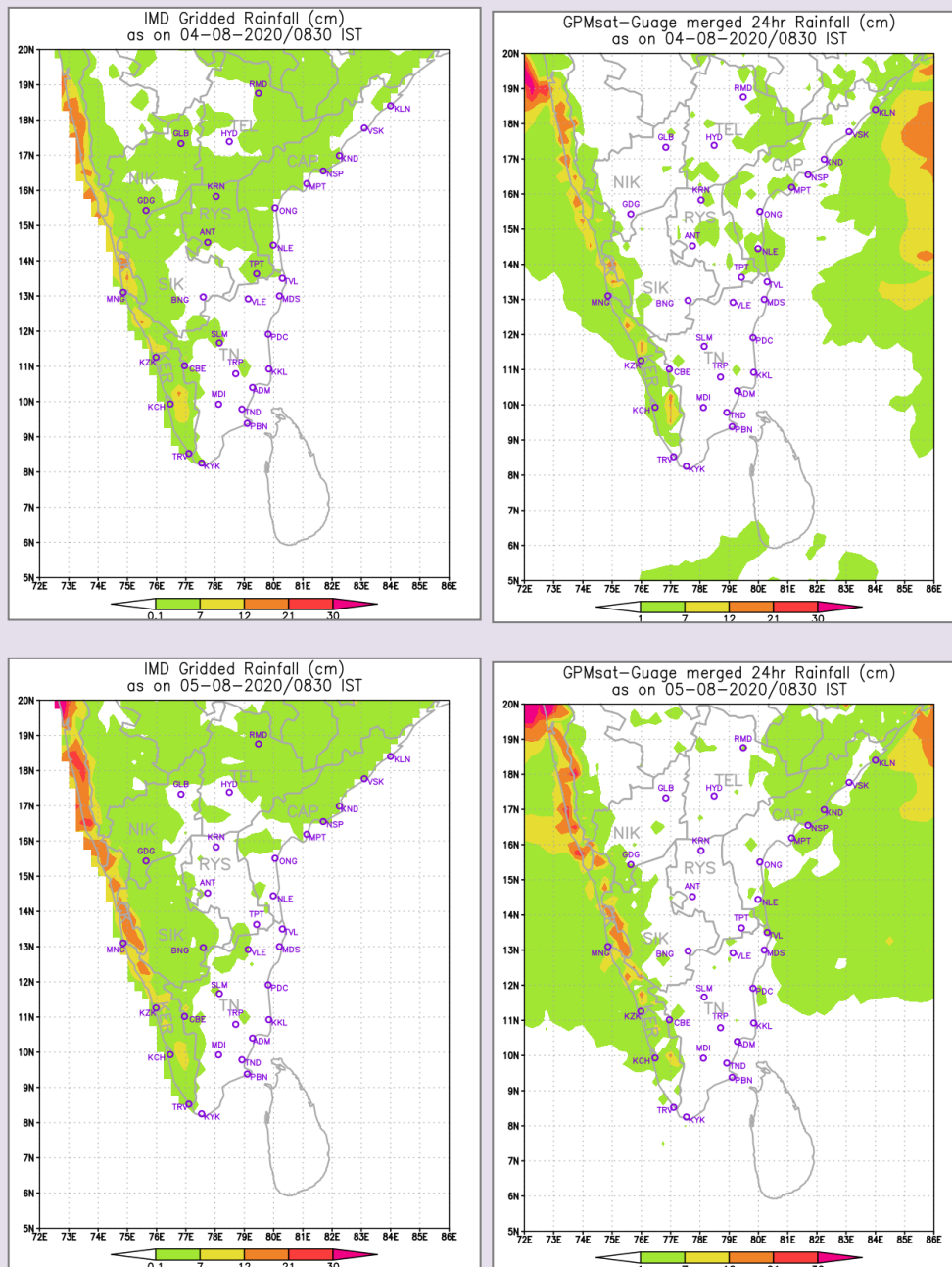


Fig.5b(i): Past 24-hour rainfall (IMD Gridded and GPM sat- gauge merged) in cm depicting the rainfall activity over KER, CK, SIK & TN as on 0830 IST of 04th-08th Aug 2020

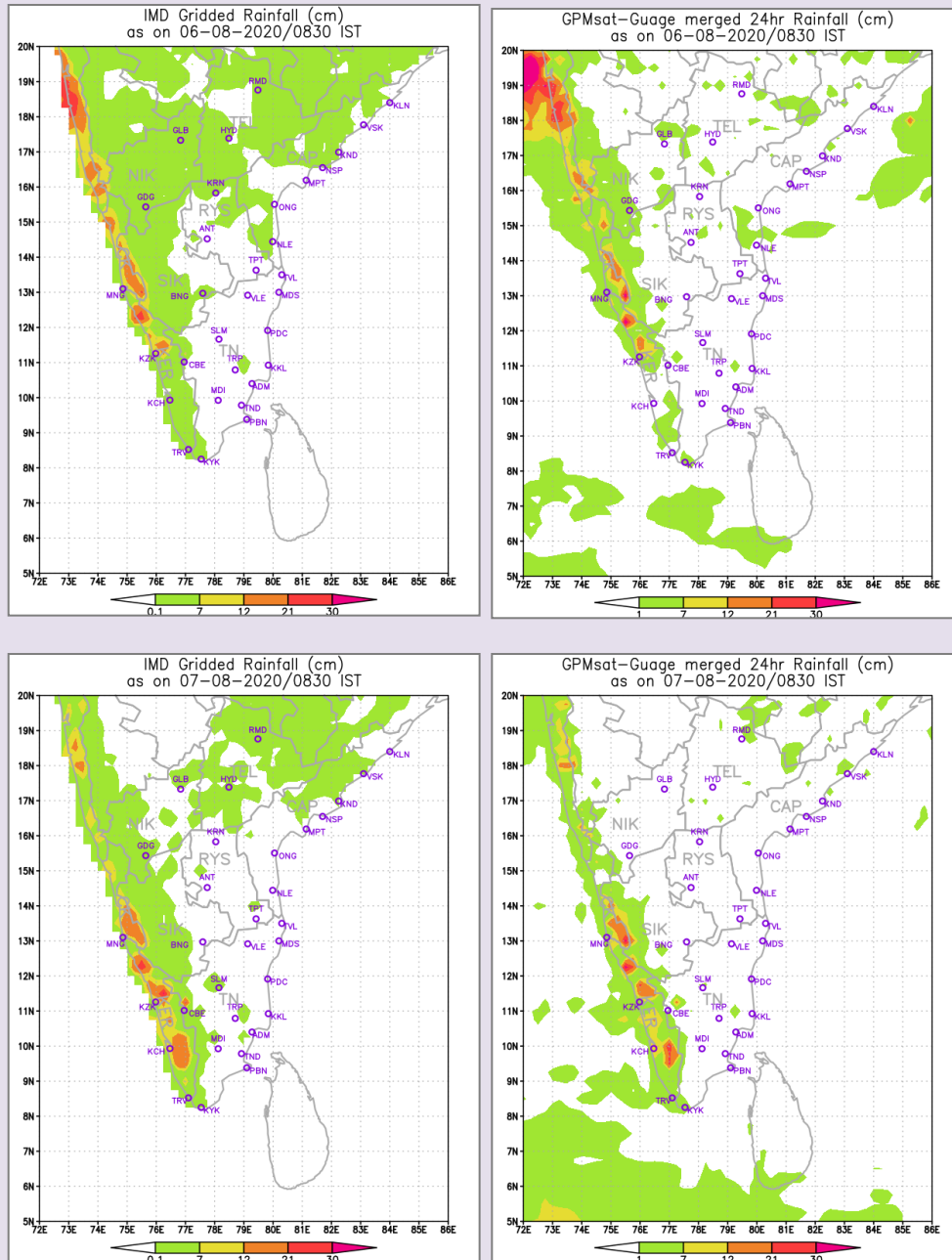


Fig.5b(i) contd....

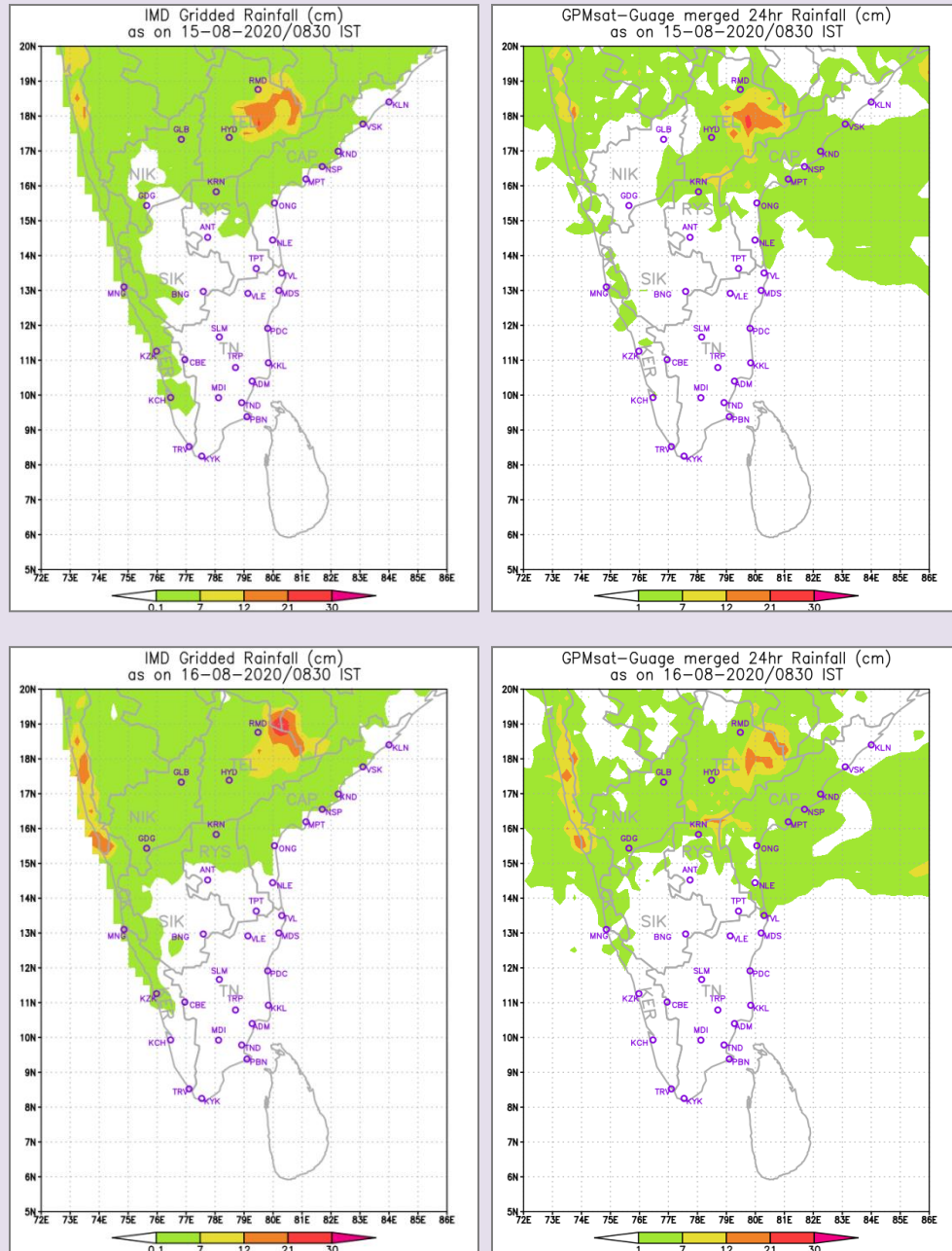


Fig.5b(ii): Past 24-hour rainfall (IMD Gridded and GPM sat- gauge merged) in cm depicting the rainfall activity over TEL as on 0830 IST of 15th-17th Aug 2020

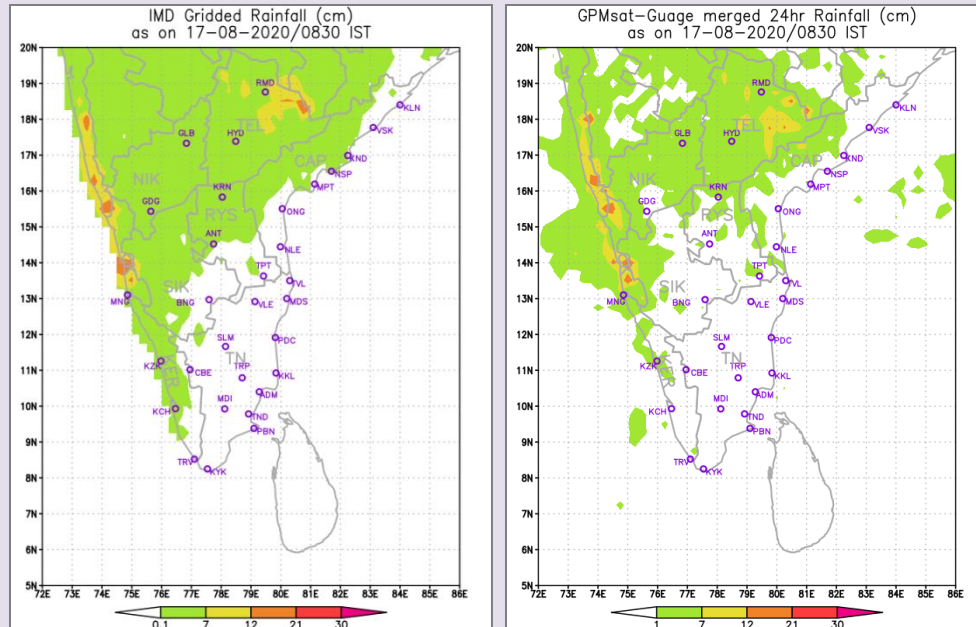


Fig.5b(ii) contd.

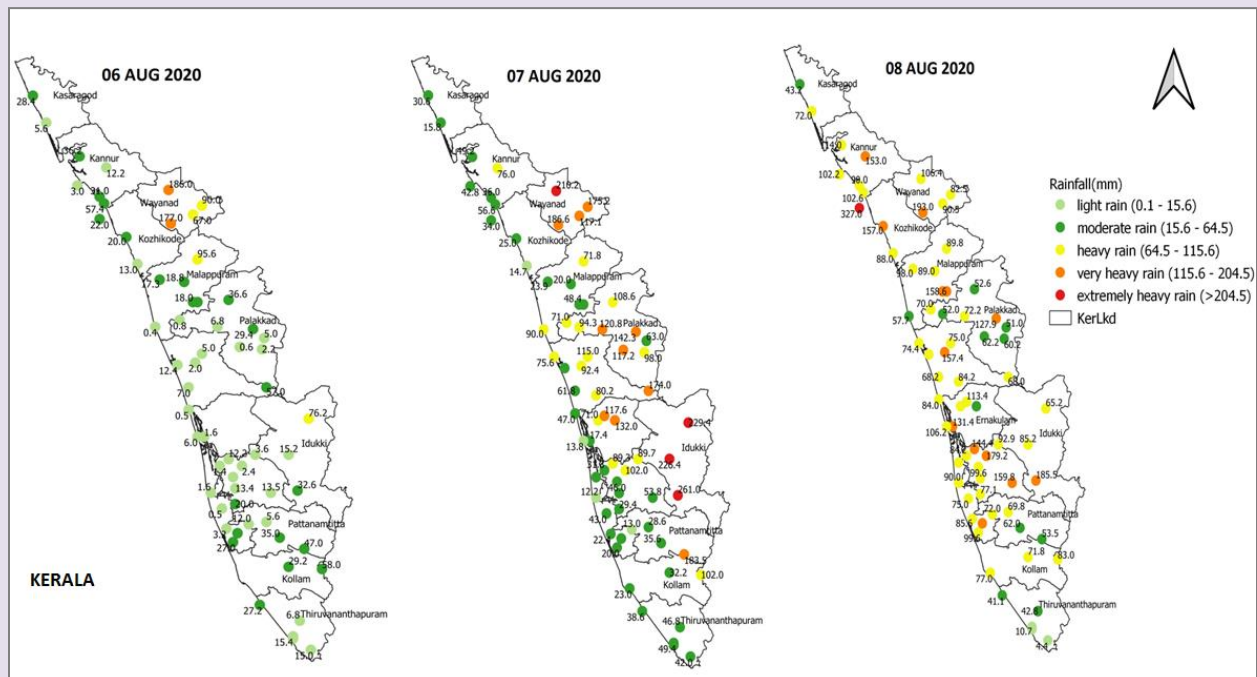


Fig.5c(i): Gauge observed rainfall (mm) depicting the spatial distribution of heavy rainfall activity over Kerala, Karnataka and Tamil Nadu during 5th-8th Aug 2020

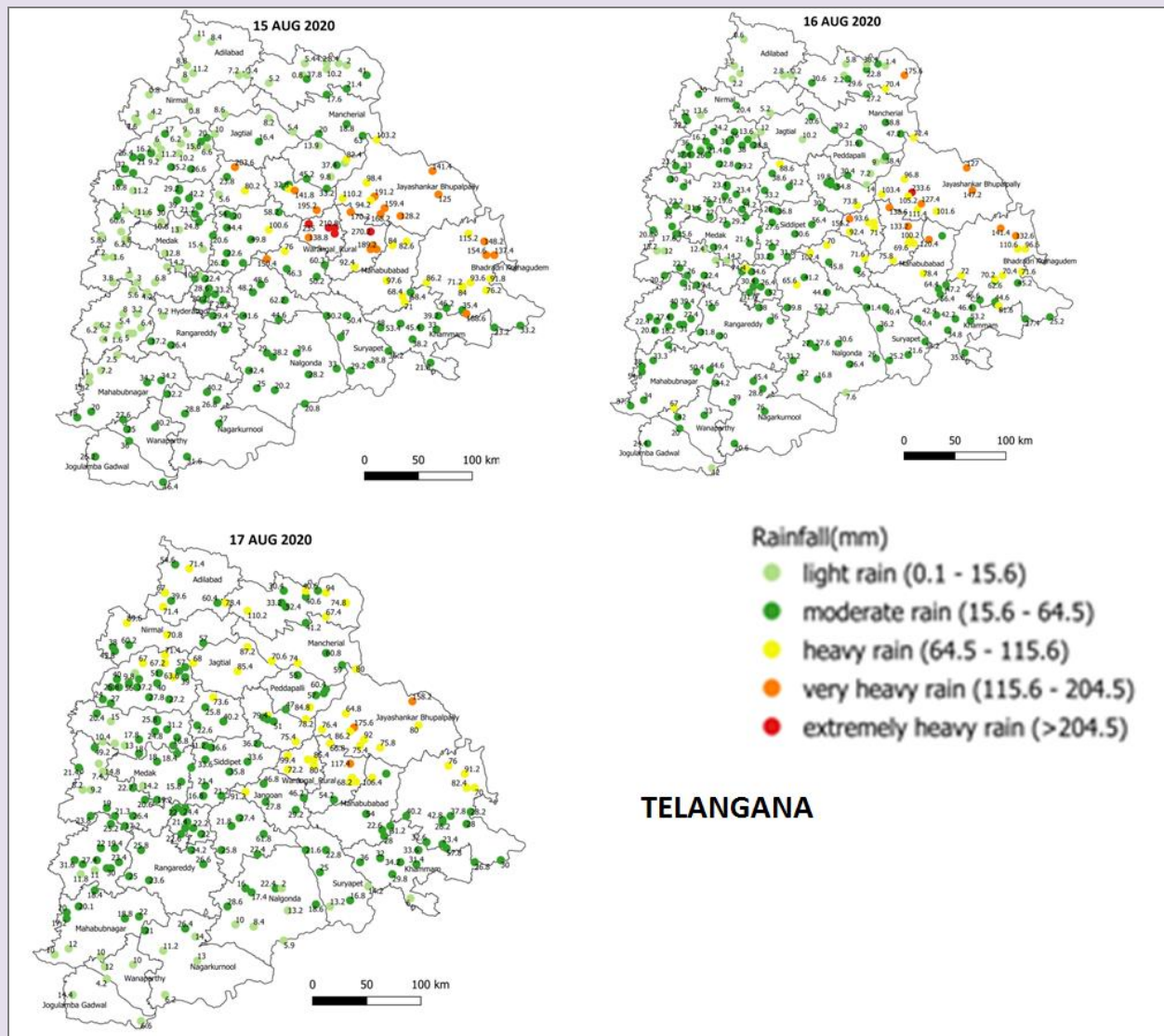
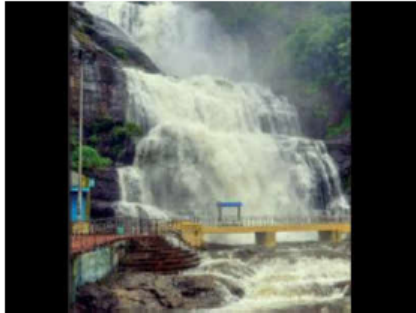


Fig.5c (ii): Gauge observed rainfall (mm) depicting the spatial distribution of heavy rainfall activity during 15th-17th Aug 2020 over Telangana

Heavy rain wreaks havoc in Nilgiris, Coimbatore

TNN | Aug 7, 2020, 10:41 AM IST



CHENNAI: Heavy downpour in the Nilgiris and Coimbatore districts for the second successive day on Thursday wreaked havoc, triggering landslides, uprooting trees and damaging crops. The Nilgiris district experienced an average of 111mm rainfall on Thursday against 77mm on Wednesday. Avalanche registered 581mm while Upper Bhavani and Gudalur received 319mm and 335mm rain. As of Thursday evening, 900 people were lodged in various relief camps in the Nilgiris district.

Emerald and Avalanche areas reported several landslips. About 120 people from SDFR and 22 personnel attached to NDFR were carrying out relief work across the Nilgiris district, said collector J Innocent Divya. Ooty, Gudalur and surrounding areas plunged into darkness as the main line,

supplying power to the 110KV Sandynallah sub station, was down. Tangedco has pressed into service 40 workers and engineers to restore power supply. Kundha taluk suffered maximum damage owing to landslides. Scores of trees got uprooted in the region in the last two days. Frequent disruption of power supply was reported in many parts of Coonoor and Kothagiri also.

08 August, 2020
by ANI

Print this article
Font size - 16 +

Bengaluru (Karnataka) [India], Aug 8 (ANI): Calling the flood situation as challenging due to excessive rains, waterlogging and landslides, Karnataka Deputy Chief Minister Dr CN Ashwath Narayan on Saturday said that the government has swung into action to ensure the safety of the people.

"The situation is very challenging due to excessive rains, waterlogging and landslides. The government and the concerned administration has swung into action, reaching out to all the affected people and rescuing people to ensure their safety. The required financial assistance has been provided to respective districts," Narayan told ANI.

"All the required measures are being taken. There are no financial constraints. We all are geared to face all the situations. Compensation will be given to affected people after evaluation of the damage," he added.

Various parts of the state continue to reel under flood-like situation due to incessant rainfall.

According to the Central Water Commission, the water level of river Cauvery is slowly rising while the rainfall continued in Bhagamandala and its surrounding areas. (ANI)

Disclaimer: The views expressed in the article above are those of the authors' and do not necessarily represent or reflect the views of this publishing house. Unless otherwise noted, the author is writing in his/her personal capacity. They are not intended and should not be thought to represent official ideas, attitudes, or policies of any agency or institution.

Business world

Fig.5d(i) : Media reports on the impacts of intense rainfall activity over Karnataka, Kerala and Tamil Nadu during 04th-08th Aug 2020

Kerala: Idukki landslide death toll rises to 63

ANI | Aug 20, 2020, 04:51 PM IST



IDUKKI : The death toll in Rajamala landslide rose to 63 on Thursday after a woman's body was found lying on the river bank at Poothakuzhi, 14 km away from the disaster site.

The incident occurred in Idukki district on **August 7**.

Tamil Nadu chief minister Edappadi Palaniswami on Wednesday announced ex-gratia of Rs 3 lakh each to the kin of deceased in Rajamala landslide.

Financial assistance of Rs 1 lakh each was also announced for the severely injured people in the landslide.

Fig.5d(i) contd.

Telangana: Warangal on high alert, relief camps set up

TNN | Aug 17, 2020, 09:29 AM IST



HYDERABAD: District administrations have been put on high alert in Warangal and elsewhere, as monsoon rains lashed various on Sunday. In Warangal city, several localities have been inundated, while hilly streams in Karimnagar and Mahabubabad are filled to the brim. Relief camps have been set up several places, while minister Puvvada Ajay Kumar inspected arrangement in Khammam.

With the IMD forecasting moderate to heavy rainfall till Tuesday, people living in low-lying areas along Godavari and its rivulets — known for flash flooding — have been shifted to safety. CM K Chandrasekhar Rao reviewed the flood situation and instructed officials to take up relief operations. NDRF teams have been rushed to vulnerable spots and kept

on standby for emergencies. Rainfall data for Sunday shows that except Adilabad — which recorded deficit rainfall, and Jagtial — which recorded normal rainfall, all other districts have received average rainfall in excess of 60%.

Among the worst-hit are the erstwhile composite districts of Warangal, Karimnagar and Khammam. The rain has resulted in overflowing of water bodies which resulted in several villages being inundated, disrupting several lives in the process. Several villages have been cut off as water overflowed on roads, causeways and low bridges. In Siddipet's Raghavpur, one person was washed away while fishing.

Fig.5d(ii) Media reports on the impacts of intense rainfall activity over Telangana during 15th-17th Aug 2020

2.7 Dry and Wet conditions

Based on Standardized Precipitation Index (SPI), a widely accepted index used for drought monitoring world-wide, which is based on rainfall, *mildly/moderately/severely/extremely dry* or *wet* situations over various districts of the region during June-Sep 2020 are depicted in Fig.6. The SPI indicates generally wet conditions over 113 out of 127 districts in the SP region (*mildly/moderately/severely/extremely wet* category) with all the four districts in RYS coming under *extremely wet* category. Shivamogga district in SIK and Srikakulam district in CAP came under *severely dry* and *moderately dry* categories respectively. *Mildly dry* situation prevailed in Visakhapatnam and Vizianagaram districts in CAP, Kanchipuram, Thiruvannamalai, Villupuram, Puducherry, Cuddalore and Thoothukudi districts in TN, Thrissur, Mallapuram and Wyanad districts in KER and Hassan district in SIK. Area weighted SPI of the States calculated from the district SPI values indicate *severely wet* conditions over Andhra Pradesh (SPI: 1.58), *moderately wet* conditions over Telangana (SPI: 1.43) and Karnataka (CK, NIK, SIK) (SPI: 1.17) and *mildly wet* conditions over Kerala (SPI:0.55) and Tamil Nadu: (SPI: 0.78).

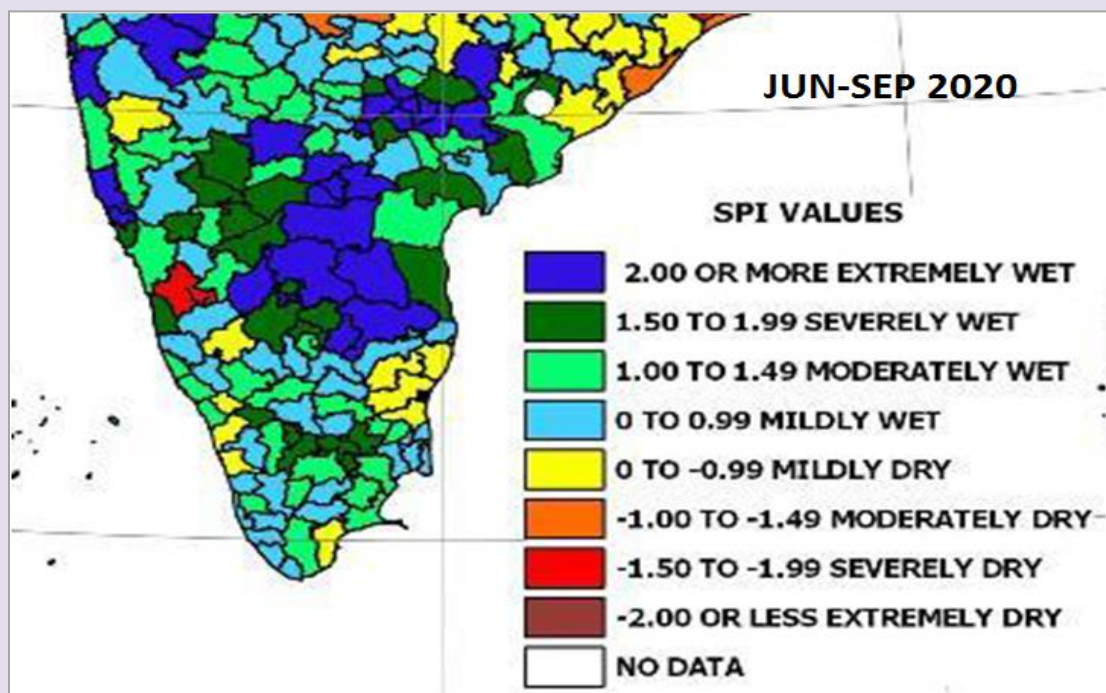


Fig.6: Standardised Precipitation Index (SPI) over the SP region for Jun-Sep 2020
(Source: Standardised Precipitation Index product, IMD Pune)

2.8 Chief synoptic features

Monthly features: Fig.7a depicts the 850, 500 and 250 hPa wind anomaly during the months of June, July August and September 2020.

It is observed that in June, at 850 hPa level, anomalous easterlies prevailed over the SP region. At 500 hPa level, anomalous anticyclone was observed over the north Bay of Bengal and adjoining east and central India. At the same level, an anomalous cyclonic circulation was also seen over the west-central Arabian Sea. An anomalous anticyclonic circulation is also seen at 250 hPa level over the same area.

In July, at 850 hPa level, an anticyclonic circulation was observed over north Bay of Bengal and adjoining areas and anomalous ridge was also seen over north and central Arabian Sea. To the south of this anticyclonic circulation and the ridge, anomalous easterlies and south easterlies prevailed over Bay of Bengal, most parts of southeast Arabian Sea and central & south peninsular India indicating weak cross equatorial flow. The anomalous anticyclonic circulation was more pronounced at 500 hPa level and spread over most parts of India, north and central Arabian Sea. At 250 hPa level, an anomalous anticyclonic circulation was seen to the northeast of Indian region and hence anomalous easterly winds were observed over central India.

In August, at 850 hPa level, anomalous strong westerlies prevailed over entire Arabian Sea, peninsula and adjoining central India indicating strong cross equatorial flow. The anomalous easterlies over northern parts indicated that monsoon trough was active and south of its normal position. These anomalous circulation features extended upto 500 hPa level also. At 250 hPa level, an anomalous ridge prevailed over Bay of Bengal and anomalous strong easterlies prevailed over northern and adjoining central parts of the country.

In September, the wind anomaly at 850 hPa level shows strong anomalous cross equatorial flow. An anomalous cyclonic circulation was also observed over the central Arabian Sea and a trough extending from it to west central Bay in the month of September. This trough extended upto 500 hPa level as well. At 200 hPa level, stronger than normal tropical easterly jet was observed.

Daily synoptic situations: In the daily scale, off-shore trough at mean sea level along the west coast of peninsular India, upper air cyclonic circulations over the various parts of the SP region and over Bay of Bengal and neighbourhood, east-west shear zone in the lower-mid troposphere

running along the 10-18°N latitudes, low pressure areas that formed over the Bay of Bengal coast with their associated upper air cyclonic circulation extending upto mid tropospheric levels tilting southwest-wards with height, troughs on sea level chart that ran from SIK to Tamil Nadu / Comorin area across interior Tamil Nadu and troughs in the monsoon westerlies in the lower tropospheric levels were associated with rainfall activity over the SP region.

The intense rain spell during 04-08 August 2020 over Kerala, Karnataka and TN was associated with strong pressure gradient, well marked off shore trough, strong monsoon westerlies and upper air cyclonic circulation in the mid-upper troposphere. Active to vigorous monsoon conditions prevailed over KER / KAR during this period. The mean sea level isobaric analysis as on 06 Aug 2020, 0830 IST indicating strong pressure gradient and offshore trough is presented in Fig.7b(i). Fig.7b(ii) presents the upper air streamline analysis as on 06 Aug 2020, 0530 IST. It is observed an upper air cyclonic circulation prevailed in the mid-upper troposphere. Aside from that, orography enhanced the monsoon activity.

The intense rainfall activity over Telangana during 15-17 August 2020 was associated with a low pressure area that formed over the northwest Bay of Bengal on 13th August which became well marked on 14th and moved inland. The mean sea level isobaric analysis as on 16 Aug 2020, 0830 IST indicating the low pressure area is presented in Fig.7c(i). Fig.7c(ii) presents the upper air streamline analysis as on 16 Aug 2020, 0530 IST. The associated upper air cyclonic circulation extended upto the upper troposphere tilting southwestwards with height. Associated with the passage of this system, active to vigorous monsoon conditions prevailed over CAP / TEL / NIK during the period 13th-17th August 2020.

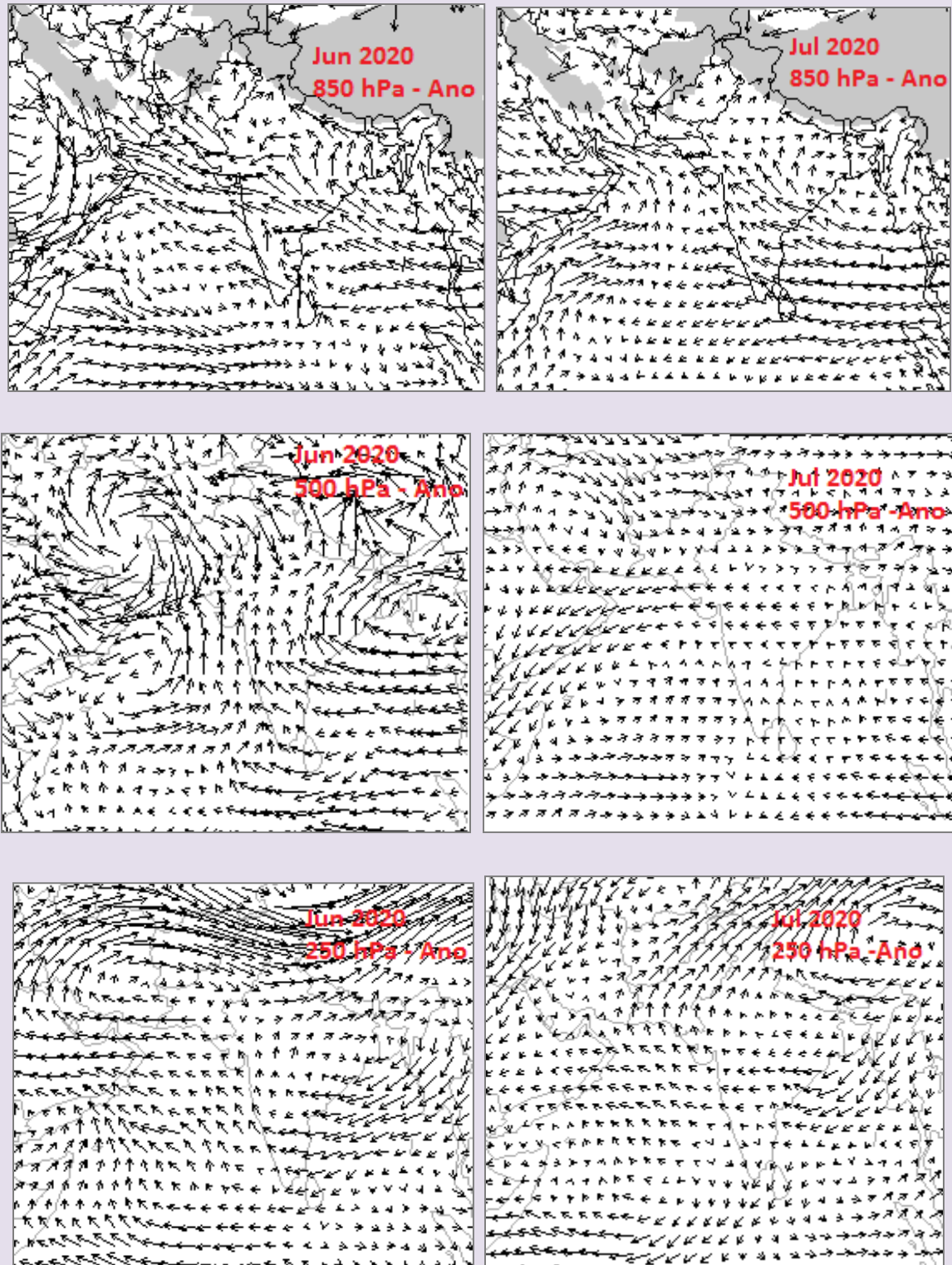


Fig.7a: 850hPa, 500 hPa& 250 hPa wind anomalies over Indian region during SWM 2020
 (Source: Climate Diagnostic Bulletin of India, IMD Pune)

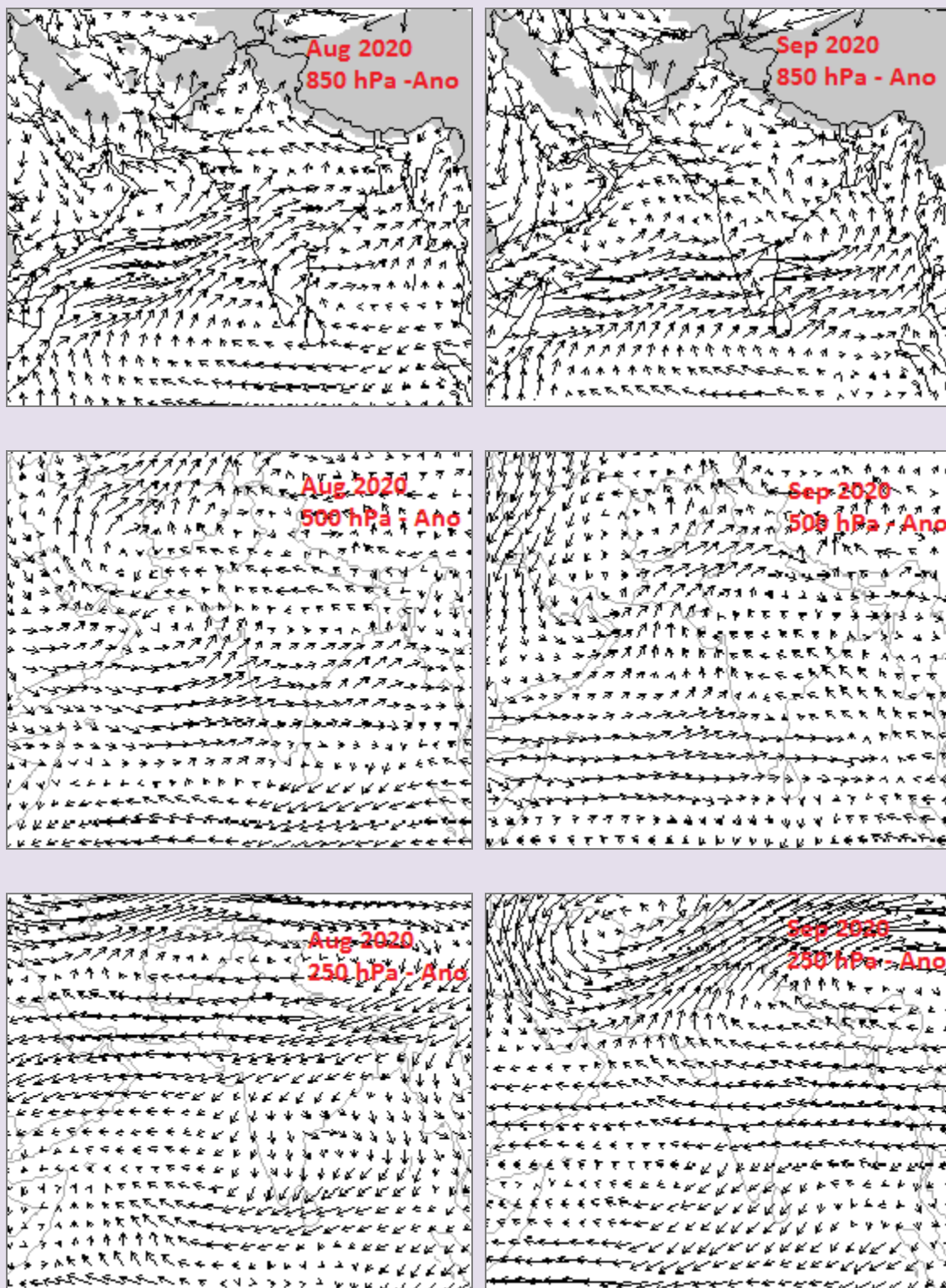


Fig.7a (contd.)

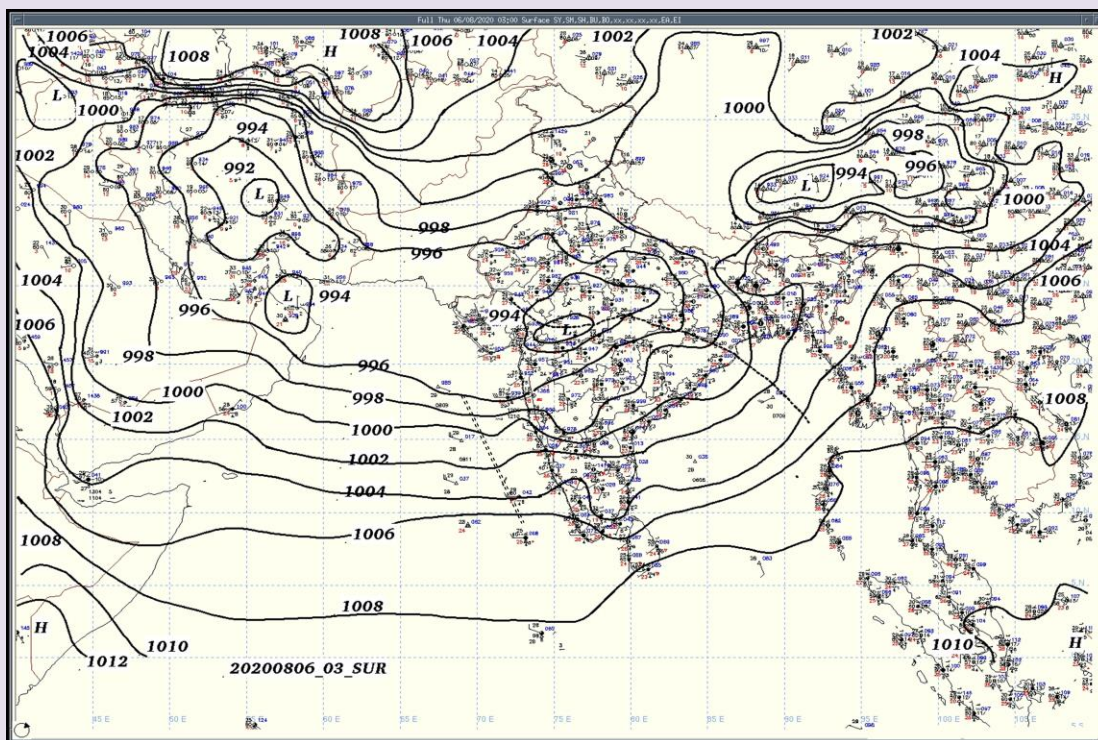


Fig.7b(i) Mean sea level pressure analysis chart based on 06/08/2020 / 0830 IST

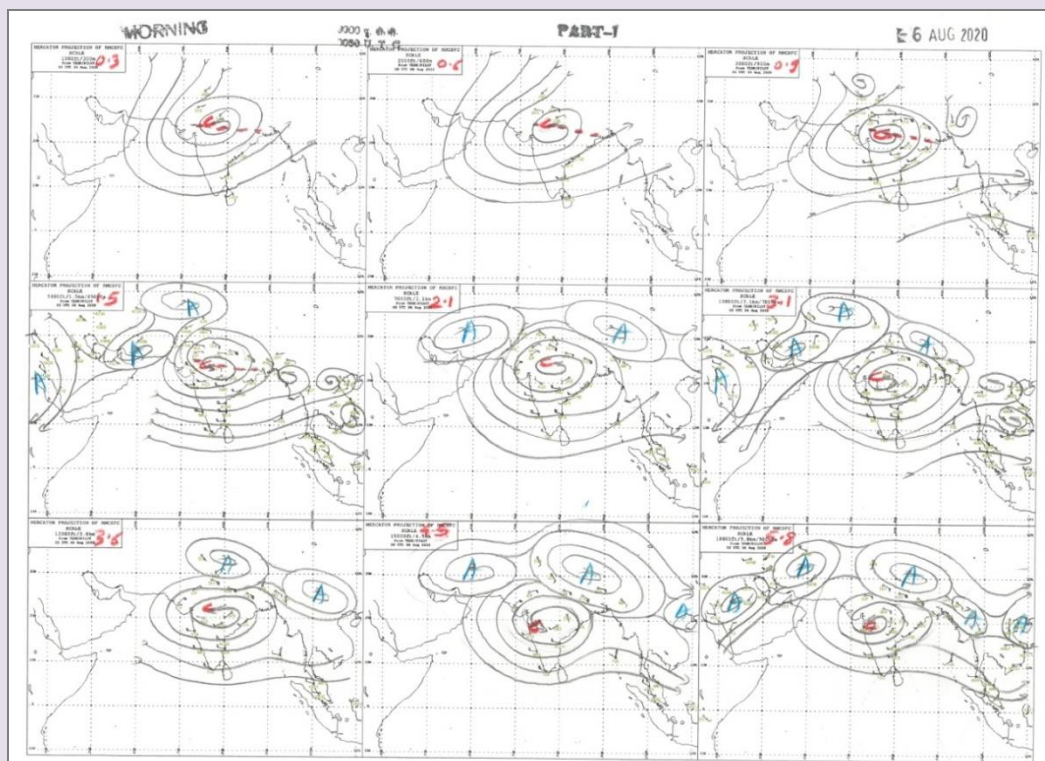


Fig.7b(ii) Upper air streamline analysis as on 06/08/2020, 0530 IST

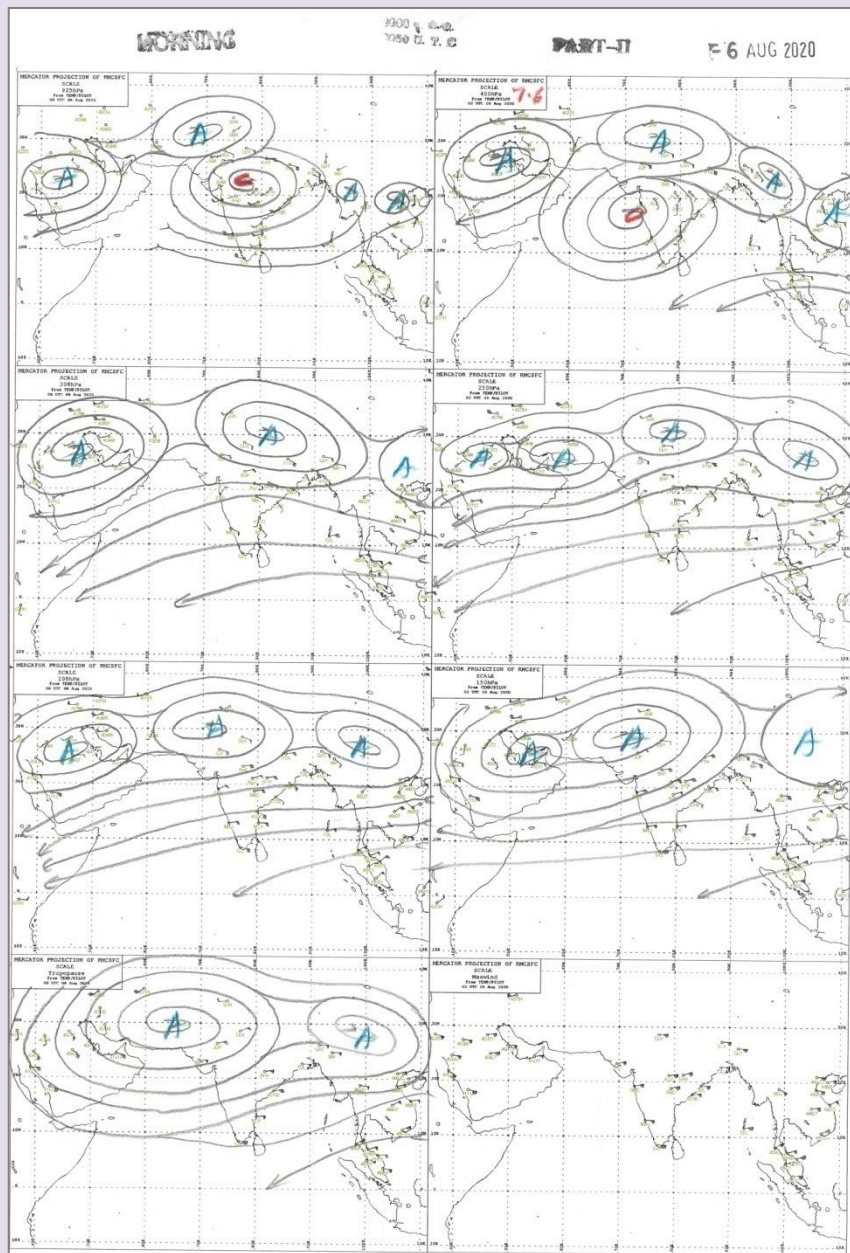


Fig.7b(ii) .. contd.

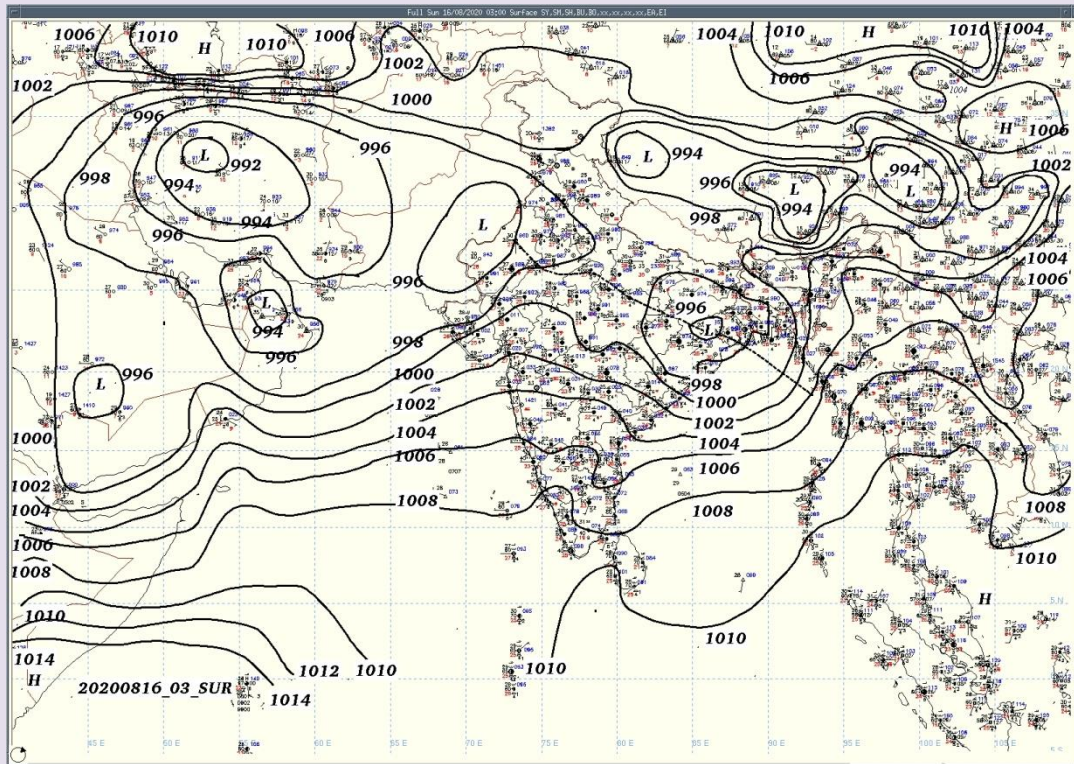


Fig.7c(i) Mean sea level pressure analysis chart based on 16/08/2020 / 0830 IST

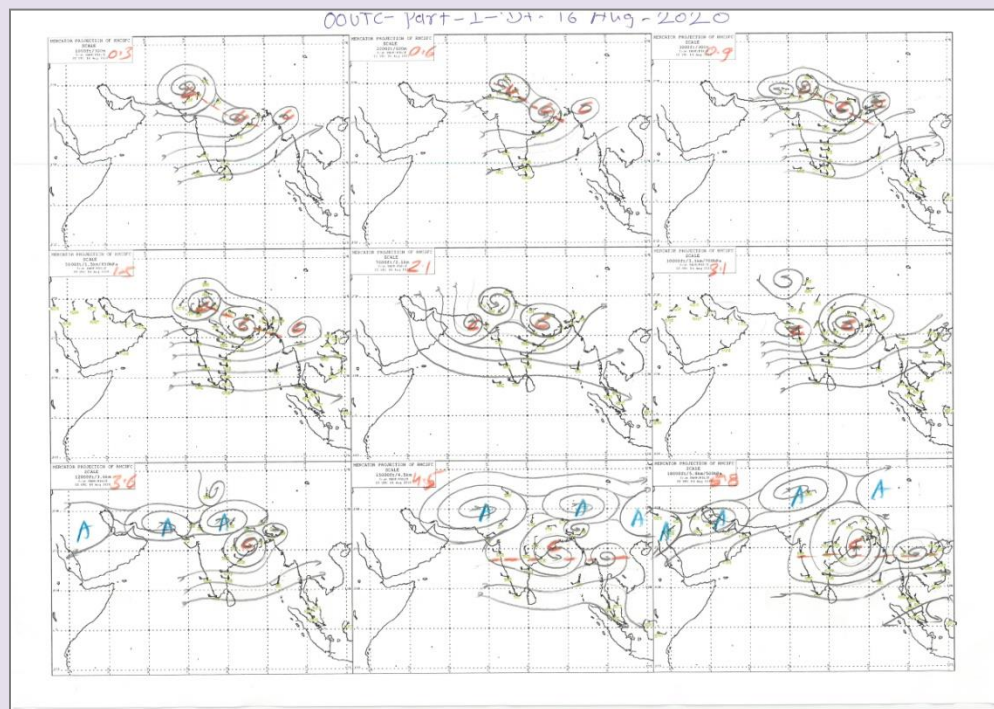


Fig.7c(ii) Upper air streamline analysis as on 16/08/2020, 0530 IST

3. Withdrawal of SWM 2020 from the SP region

The withdrawal of SWM 2020 commenced from the northwest India on 28th September, a delay by about 11 days (normal date – 17th September). It withdrew from the SP region during 26th – 28th October 2020 and hence from the entire country on 28th October 2020. Fig.8 depicts the isolines of dates of withdrawal of SWM 2020 from the SP region.

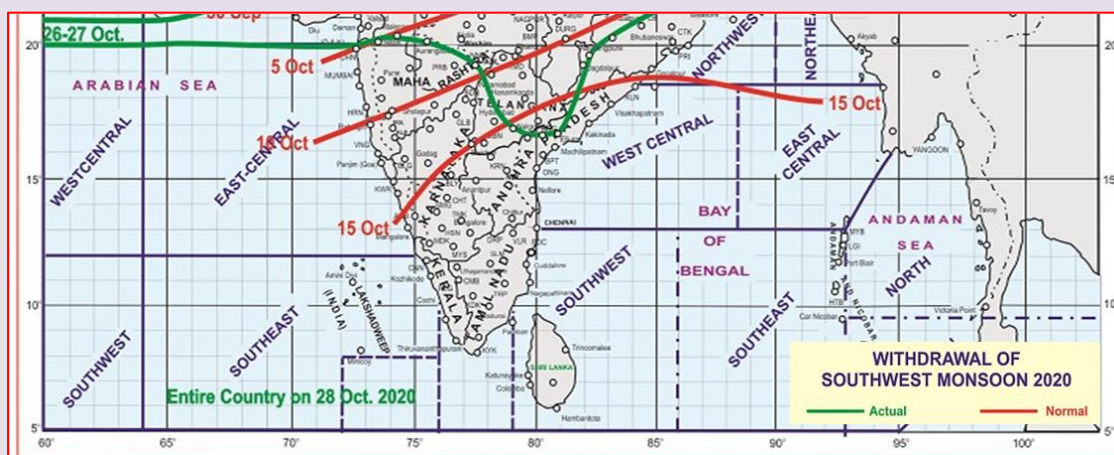


Fig.8: Isolines of dates of withdrawal of SWM 2020 over the SP region

4. Summary

During 2020, the SWM advanced over Andaman Sea on 17th May, five days ahead of its normal date. However, its further advancement over the Bay of Bengal was delayed due to the formation and movement of super cyclonic storm AMPHAN over the Bay of Bengal during the period 16th-21st May. However, it arrived over Kerala on its normal date of onset (01st June) and covered the entire SP region by 12th June. Rainfall during the SWM season of June-September 2020 over the SP region comprising of the five states of Andhra Pradesh, Telangana, Karnataka, Kerala and Tamil Nadu and two union territories of Puducherry and Lakshadweep was 939.9 mm which is 30% more than its long period average (LPA) of 726.2 mm. The seasonal rainfall over the nine meteorological subdivisions covering five states and two union territories in the region was large excess in one sub division - RYS, excess in six sub divisions [NIK, SIK, TN, CAP, TEL and LAK] and normal in 2 sub divisions – KER and CK. The seasonal rainfall figures

over CAP, RYS, TEL, TN, CK, NIK, SIK, KER and LAK were +24%, +84%, +46%, +24%, +19%, +49%, +20%, +9% and +33% respectively.

Under the influence of strong southwesterlies in the lower-mid tropospheric levels over the peninsular region coupled with orographic effect recurrent heavy rainfall activity occurred over Kerala, Karnataka and adjoining hilly regions of Tamil Nadu in the first week of August causing landslides and inland flooding in many areas. Further, under the influence of a well marked low pressure area, intense rainfall activity occurred over parts of Telangana during 15th-17th August.

The withdrawal of SWM 2020 commenced from the northwest India on 28th September against the normal date of 17th September. The monsoon withdrew from the SP region during 26th-28th October 2020. It withdrew from the entire country on 28th October with the simultaneous commencement of northeast monsoon rains over Tamil Nadu, Kerala and adjoining areas of Andhra Pradesh and Karnataka on 28th October 2020.

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APPENDIX-(i): Terminologies for Spatial rainfall distribution

WS - Widespread (Most places): 75 % or more number of stations of a region (sub-division) reporting at least 2.5 mm rainfall.

FWS- Fairly widespread (Many places): 51% to 74 % number of stations of a region (sub-division) reporting at least 2.5 mm rainfall.

SCT- Scattered (at a few places): 26 % to 50% number of stations of a region (sub-division) reporting at least 2.5 mm rainfall.

ISOL- Isolated (At isolated places): 25% or less number of stations of a region (sub-division) reporting at least 2.5 mm rainfall.

DRY: No station of a region reported rainfall

APPENDIX-(ii): Terminologies for description of intensity of rainfall

S No.	Terminology	Rainfall range In mm	Rainfall range In cm	Percentile
1	Very light rainfall	Trace -2.4		
2	Light rainfall	2.5-15.5	Upto 1	Upto 65
3	Moderate rainfall	15.6-64.4	02-06	65-95
4	Heavy Rainfall	64.5- 115.5	07-11	95-99
5	Very Heavy Rainfall	115.6-204.4	12-20	99.0-99.9
6	Extremely heavy rainfall	Greater or equal to 204.5 mm	21 cm or more	>99.9
7	Exceptionally Heavy Rainfall	When the amount is a value near about the highest recorded rainfall at or near the station for the month or season. However, this term will be used only when the actual rainfall amount exceeds 12 cm.		