



**Government of India
Earth System Science Organization
Ministry of Earth Sciences
India Meteorological Department**

Dated: 16 June, 2020

Subject: Weather Status for May, 2020 & its verification and Outlook for June, 2020

Significant Features of May, 2020

Super Cyclonic storm “AMPHAN”:

- The Super Cyclonic Storm (SuCS) “**AMPHAN**” originated from the remnant of a Low Pressure Area (LPA) which occurred in the near Equatorial Easterly wave trough over south Andaman Sea and adjoining southeast Bay of Bengal (BoB) during 1st – 5th May. Though the LPA had become less marked on 6th May, its remnant circulation meandered over south Andaman Sea and adjoining southeast BoB during 6th – 12th May. Under its influence, a fresh LPA formed over southeast BoB and adjoining south Andaman Sea in the morning (0830 IST) of 13th May.
- Under favourable environmental conditions, it concentrated into a depression (D) over southeast BoB in the early morning (0530 IST) of 16th May and further intensified into a deep depression (DD) in the afternoon (1430 IST) of the same day. It moved north- northwestwards and intensified into the **cyclonic storm “AMPHAN”** (pronounced as UM-PUN) over southeast BoB in the evening (1730 IST) of 16th May, 2020. Moving nearly northwards, it further intensified into a **severe cyclonic storm (SCS)** over southeast BoB in the morning (0830 IST) of 17th May. It underwent rapid intensification during subsequent twenty four hours and accordingly intensified into a **very severe cyclonic storm (VSCS)** by the afternoon (1430 IST) of 17th, **extremely severe cyclonic storm (ESCS)** in the early hours of 18th (0230 IST) and into a **super cyclonic storm (SuCS) around noon (1130 IST) of 18th May, 2020**. It maintained the intensity of SuCS over westcentral BoB for nearly 24 hours (during 1130 IST of 18th-19th), before weakening into an ESCS over westcentral BoB around noon (1130 IST) of 19th May. Thereafter, it weakened slightly and **crossed West Bengal – Bangladesh coasts as a VSCS, across Sundarbans, near latitude 21.65°N and longitude 88.3°E during 1530-1730 hrs IST of 20th May, with maximum sustained wind speed of 155 – 165 kmph gusting to 185 kmph**. Moving north-northeastwards, it weakened into an SCS over Bangladesh & adjoining West Bengal around mid-night (2330 IST) of 20th May, weakened further into a CS over Bangladesh in the early hours (0230 IST) of 21st May, into DD over Bangladesh around noon of 21st May and into a D over north Bangladesh in the evening (1730 IST) of the same day. The observed track of the system during 16th – 21st May is presented in **Annexure I**.

- The system caused heavy to very heavy rainfall at a few places over coastal Odisha & Gangetic West Bengal on 20th May, heavy rainfall at isolated places over Gangetic West Bengal & adjoining Bangladesh and Assam, Meghalaya & Arunachal Pradesh on 21st May and heavy rainfall at isolated places over Assam, Meghalaya, Arunachal Pradesh, Sikkim, Nagaland, Manipur & Mizoram on 22nd May. **Kolkata (Dum Dum) reported 130 kmph at 1855 hrs IST and Kolkata (Alipore) 112 kmph at 1752 hrs IST of 20th May.** As per the post cyclone landfall survey conducted by ACWC Kolkata, tidal waves of **15 feet height inundated low lying areas of the coastal Districts of West Bengal.**
- **The landfall point forecast errors for 24, 48 and 72 hrs lead period were 5.5, 11.0, and 37.4 km respectively against the Long Period Average errors of 44.7, 69.4 and 109.3 km during 2015-19 respectively.** The landfall time forecast errors for 24, 48 and 72 hrs lead period were 0.5, 0, and 2.0 hours respectively against the LPA errors of 3.0, 5.4 and 8.6 hours during 2015-19 respectively. **The track forecast errors for 24, 48 and 72 hrs lead period were 59.4, 59.9, and 61.0 km respectively against the LPA errors of 80.6, 125.5, and 171.2 km respectively.** Track forecast errors were exceptionally less than the past five years average errors for all lead periods. Similarly, track forecast skill was higher than the past five years average skill for all lead periods beyond 24 hours. In addition, all the three types of weather like heavy rainfall, gale wind and storm surge were well predicted. A total of 48 national bulletins were issued including 3 inforatory messages.

Advance of Southwest Monsoon 2020:

- All the criteria for onset of Monsoon had been satisfied over Nicobar Islands on 17 May 2020 and IMD had declared onset of monsoon in some parts of south Bay of Bengal, Nicobar Islands & Andaman Sea. The Northern Limit of Monsoon (NLM) passed through Lat.5°N/Long.85°E, Lat.8°N/Long.90°E, Car Nicobar, Lat.11°N/Long.95°E on 17th May 2020. Further advance happened after more than a week and accordingly Southwest Monsoon advanced into some more parts of South Bay of Bengal, most parts of Andaman Sea and Andaman & Nicobar Islands on 27th May 2020 and the NLM passed through Lat.5°N/Long.82°E, Lat.7°N/Long.86°E, Lat.10°N/Long.90°E, Port Blair, and Lat.15°N/Long.97°E on that day. It has further advanced into some parts of Maldives-Comorin area, some more parts of south Bay of Bengal, remaining parts of Andaman Sea and Andaman & Nicobar Islands on 28th May 2020 and the NLM passed through Lat.5°N/Long.72°E, Lat.6°N/Long.79°E, Lat.8°N/Long.86°E, Lat.11°N/Long.90°E, Lat.14°N/Long.93°E and Lat.16°N/Long.95°E on that day. It has further advanced into some parts of Southwest and Southeast Arabian Sea and some more parts of Maldives-Comorin area on 29th May 2020 and the NLM passed through Lat.7°N/Long.50°E, Lat.7°N/Long.60°E, Lat.7°N/Long.70°E, Lat.6°N/Long.75°E, Lat.6°N/Long.79°E, Lat.8°N/Long.86°E, Lat.11°N/Long.90°E, Lat.14°N/Long.93°E and Lat.16°N/Long.95°E on that day. There had been no further advance during the remaining two days hence the NLM remained like that till the end of the month. Advance of NLM till 31 May 2020 is shown in **Annexure II.**

Heavy Rainfall Events:

- **Heavy to very heavy rainfall with extremely heavy falls** at isolated places had been reported over Assam & Meghalaya on seven days and over Gangetic West Bengal, Odisha and Kerala on one day each during the month.
- **Heavy to very heavy rainfall** had been reported over Arunachal Pradesh, Nagaland, Manipur, Mizoram & Tripura, Tamilnadu, Puducherry & Karaikkal on three days each; over Sub Himalayan West Bengal & Sikkim and Kerala and Mahe on two days each; over Odisha, South Interior Karnataka and Jharkhand on one day each during the month.
- **Heavy rainfall** had been reported at isolated places over Sub Himalayan West Bengal & Sikkim on ten days; over Kerala & Mahe on eight days; over Tamilnadu, Puducherry & Karaikkal on six days; over Gangetic West Bengal on five days; over Odisha on four days; over Andaman & Nicobar Islands, Assam and Meghalaya, Coastal Karnataka, North Interior Karnataka and Arunachal Pradesh on three days each; over Bihar, Telangana, Rayalaseema, Nagaland, Manipur, Mizoram & Tripura on two days each; over Haryana, Chandigarh & Delhi, East Uttar Pradesh, Uttarakhand, Himachal Pradesh, Chhattisgarh, West Madhya Pradesh, South Interior Karnataka, and Lakshdeep on one day each during the month.

- **Heavy / Very Heavy Rainfall Warning Skill:**

No. of Heavy/Very Heavy Rainfall Events (>64.4 mm) and Warning Skill (correctness in %) of spatial distribution in issued warnings during the month is given below:

warning issued for	No. of days with Heavy/Very Heavy Rainfall Events (>64.4 mm): 98
	Percentage correct (in %) for Rainfall >64.4mm
Day1 / 24 Hours	89%
Day2 / 48 Hours	89%
Day3 / 72 Hours	89%

Monthly Maximum Temperature Scenario (01 to 31 May, 2020)

- **Severe heat wave conditions** had been reported at a few places over West Rajasthan on one day; **heat wave conditions** at a few places **with severe heat wave conditions** at isolated pockets had been observed over West Rajasthan on three days and over Haryana, Chandigarh & Delhi, East Uttar Pradesh, Saurashtra & Kutch and Vidharbha on one day each; **Heat wave to severe heat wave** conditions had been occurred at isolated places over East Rajasthan on one day during the month (**mainly was during 21st to 27th May, 2020**).
- **Heat wave conditions** had been observed at most places over Vidharbha on two days and over northern parts of Madhya Pradesh and West Uttar Pradesh on one day each; **heat wave conditions** had been observed at many places over Vidharbha on three days and over East Uttar Pradesh and West Rajasthan on one day each; heat wave conditions had been observed at some parts over Haryana, Chandigarh & Delhi and East Madhya Pradesh on two days each and over East Uttar Pradesh, West Rajasthan, West Madhya Pradesh, East Rajasthan and Marathawada on one day each; **heat wave conditions** had been observed at isolated pockets over Telagana on five days, over West Madhya Pradesh, East Rajasthan and Saurashtra & Kutch on four days each, over West Uttar Pradesh, West Rajasthan and Gujarat Region on three days each, over East Uttar Pradesh, East Madhya Pradesh, Marathawada, Haryana, Chandigarh &

Delhi and Chhattisgarh on two days each and over Coastal Andhra Pradesh & Yanam, Madhya Maharashtra and Vidharbha on one day each during the month.

- Maximum temperatures were above normal over parts of Jammu & Kashmir and Ladakh, southern parts of Rajasthan & Madhya Pradesh, Gujarat, Maharashtra, Kerala & Tamilnadu. These were below normal over east & adjoining northwest India and over most parts of northeastern states during May.
- In general, average maximum temperatures of May month were more 42°C over some parts of Rajasthan, Madhya Pradesh and Maharashtra. These were above 40°C over rest parts of Rajasthan, Madhya Pradesh and Maharashtra, some parts of Chhattisgarh, Telagana, Andhra Pradesh, North Interior Karnataka, Gujarat and southern parts of Punjab, Haryana and Uttar Pradesh (**Annexure III**).
- The **highest maximum temperature of 50.0°C** had been recorded at **Churu (West Rajasthan)** on **26th May 2020**, over the plains of the country during the month.
- The first indication about coming heat wave spell was indicated in the **All India Weather Bulletin on dated 17th May, 2020**. Thereafter, on **23rd**, a press release on “Heat wave to severe heat wave conditions over Northwest, Central and adjoining Peninsular India during next 5 days’ was issued. On **24th May, 2020**, red alert for heat wave was issued for parts of northwest & central India for **25th & 26th May, 2020**. Finally, in All India Weather Bulletin on dated **25th May, 2020**, likely abatement of heat wave from **28th onwards**.

Thundersquall & Hailstorm activity:

- **Thundersquall & Hailstorm** activity during the month (till 0830 IST of 31-05-2020) is given in the table below:

S. No.	Region	TS Days	Date of Maximum TS Activity	Hail Events	Squall Events
1.	South Peninsular India	29	02-05-20	Nil	Bengaluru city on 26-05-20)
2.	Northwest India	28	10-05-20	Kanpur City on 01-05-20) (Pilani, Dehradun on 03-05-20) (Mt. Abu on 04-05-20) 04(Kupwara, Karnal, Kheri, Hamirpur on 05-05-20) (Kupwara on 09-05-20) (Bhaderwah on 13-05-20) (Kukernag on 19-05-20) (Bhaderwah, Mukteswar on 29-05-20) (Ajmer 31-05-20)	Ambala, Safdarjung on 10-05-20) Ambala, Safdarjung on 14-05-20) Jodhpur, Jaisalmer on 31-05-20)
3.	Northeast India	29	13-05-20	Nil	Agartala on 07-05-20) (Guwahati on 26-05-20) Agartala on 27-05-20)
4.	East India	27	01-05-20	(Gaya on 05-05-20) (Sriniketan 14-05-20)	(Alipur, Dum Dum, Gaya, Daltonganj on 05-05-20) (Malda, Sriniketan 07-

					05-20) (Asansol, Gaya on 10-05-20) (Sriniketan 14-05-20) (Dum Dum 20-05-20) (Bhubaneswa 29-05-20) (Alipore on 31-05-20) (Port Blair 12-05-20 & 13-05-20)
5.	Central India	23	16-05-20	Nil	(Nagpur 01-05-20, 10-05-20, 13-05-20, 30-05-20) (Satna on 10-05-20, 27 05-20, 28-05-20)
6.	West India	10	14-05-20	Media Report: Osmanabad, Nashik, Dindori 13-05-20 Media Report: Aurangabad 14-05-20	Nil

- **The convective activities mentioned above had been predicted and corresponding warnings were issued about 4-5 days in advance of the occurrence of the event. In addition to that, nowcasts were also given by corresponding RMCs/MCs with respect to these events.**

Monthly Rainfall Scenario (01 to 31 May, 2020)

During the week, rainfall was ABOVE Long Period Average (LPA) by 14% over the country as a whole. Details are given below:

Regions	Actual Rainfall (mm)	Normal Rainfall (mm)	% Departure from LPA
Country as a whole	70.9	62.0	14%
Northwest India	39.5	35.0	13%
Central India	25.8	20.1	28%
South Peninsula	62.0	73.5	-16%
East & northeast India	237.8	188.5	26%

The Meteorological sub-division-wise rainfall for the week is given in **Annexure IV**.

Seasonal Rainfall Scenario (01 March to 31 May, 2020)

For the country as a whole, cumulative rainfall during this year's pre- monsoon season upto 31 May, 2020 is above LPA by 20%. Details of the rainfall distribution over the four broad geographical regions of India are given below:

Regions	Actual Rainfall (mm)	Normal Rainfall (mm)	% Departure from LPA
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Country as a whole	158.5	131.7	20
Northwest India	149.4	114.4	31
Central India	76.5	37.5	104
South Peninsula	116.6	121.3	-4
East & northeast India	401.2	376.8	06

Cumulative seasonal rainfall is given in **Annexure V**.

Large scale features as on 15 June, 2020

- The Madden Julian Oscillation (MJO) index lies currently in Phase 3 with amplitude nearly 1. It is very likely to move in Phase 2 over Indian Ocean with amplitude remaining close to 1 during next 15 days.
- Currently, warm El Niño-Southern Oscillation (ENSO)-neutral conditions are prevailing over equatorial Pacific Ocean. The latest Monsoon Mission Climate Forecasting System (MMCFS) model forecast indicates that SSTs over region are likely to cool further and conditions are likely to turn to cool ENSO-neutral conditions from June, July & August season onwards and most likely to persist during the entire forecast period.
- At present, neutral Indian Ocean Dipole (IOD) conditions are observed over Indian Ocean and the latest MMCFS forecast indicates neutral IOD conditions are likely to continue in June & July months.

Forecast for 16-30 June, 2020

Rainfall Forecast

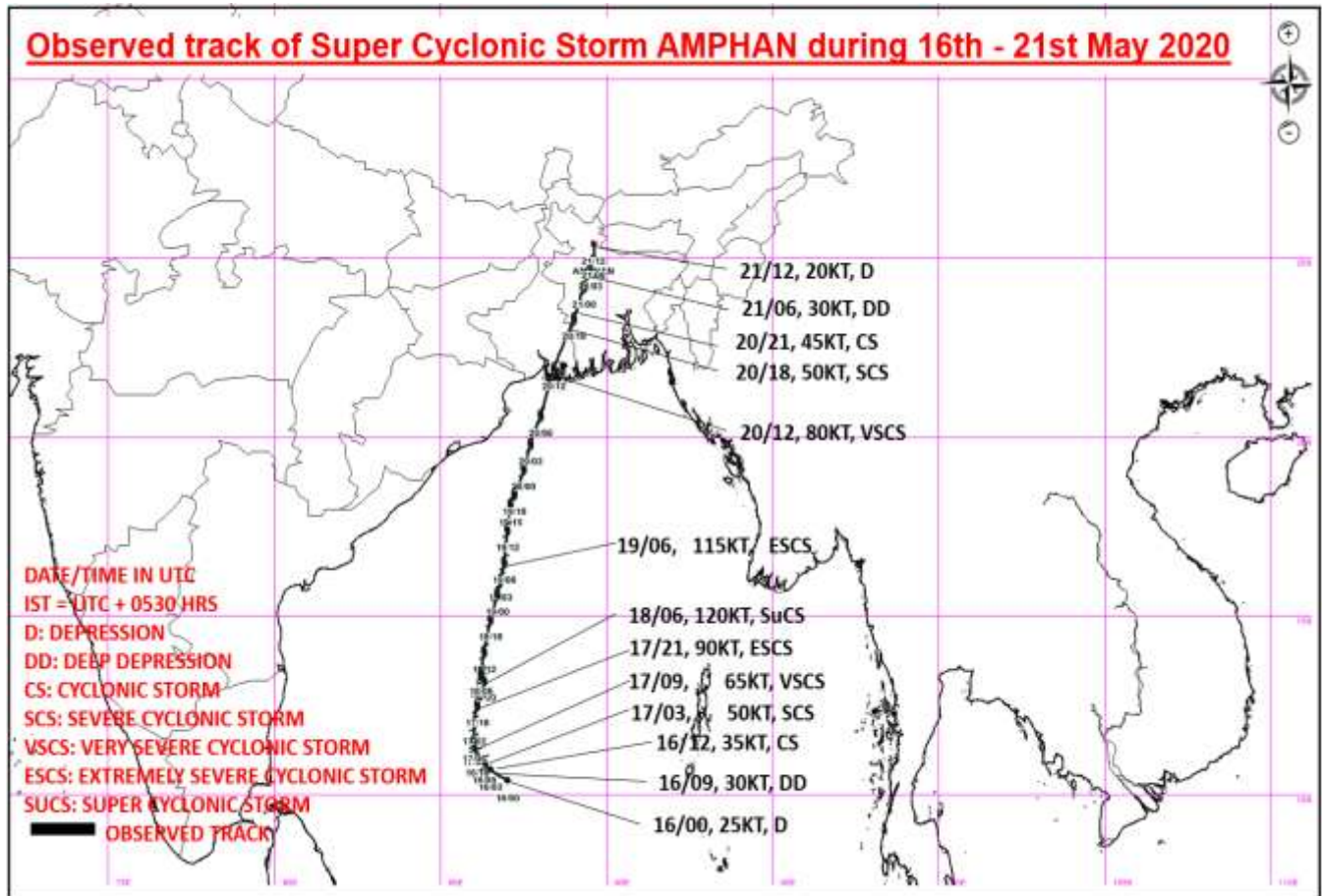
- As on today, the 16th June, 2020, a cyclonic circulation lies over East Uttar Pradesh & neighbourhood upto mid-tropospheric levels and a trough runs from northwest Rajasthan to the cyclonic circulation over East Uttar Pradesh at lower tropospheric levels. Another cyclonic circulation lies over north Konkan & neighbourhood at mid-tropospheric levels. A Low Pressure Area is also very likely to form over north Bay of Bengal & neighbourhood around 19th June.
- Under the influence of these systems:
 - i) Scattered heavy to very heavy falls and isolated **extremely heavy falls** over Konkan & Goa during next 2 days and isolated heavy to very heavy falls over Madhya Maharashtra during next 2 days.
 - ii) Rainfall intensity over East India is likely to increase and isolated heavy to very rainfall is likely over the region during 17th-19th June, 2020 and isolated heavy to very heavy rainfall is likely over Sub-Himalayan West Bengal & Sikkim during next 5 days.

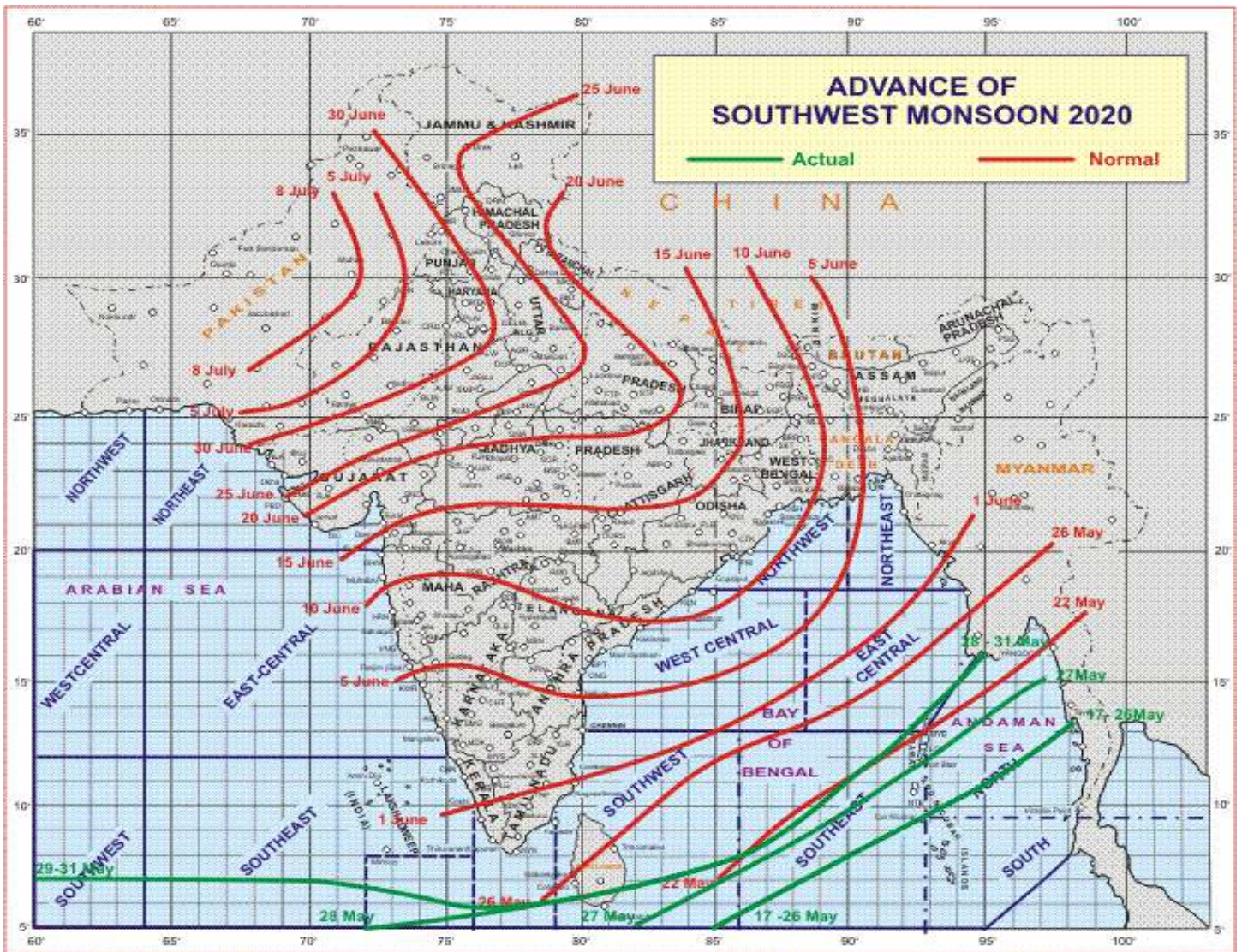
- iii) Widespread rainfall with isolated heavy falls likely to continue over Assam & Meghalaya and Tripura & Mizoram during next 5 days with isolated heavy to very heavy falls over west Assam & Meghalaya during next 3 days.
- Overall rainfall activity is very likely to be above normal over west, central & east and adjoining south Peninsular India till June end. However rainfall activity is also very likely to increase towards last week of June 2020 (**Annexure VI & VII**).

Maximum Temperature forecast

- Till 15th June, 2020, maximum temperatures were appreciably above normal (3.1°C to 5.0°C) at most places over west Rajasthan; they were normal to below normal over remaining parts of heat zone areas. Yesterday, the highest Maximum temperature of 46.2°C was reported at Bikaner (West Rajasthan). **The maximum temperatures are very likely to be above normal over many parts of plains of northwest India specifically over Rajasthan till 25th June, 2020 and fall thereafter.** These are very likely to be mainly below normal over remaining parts of the country during rest days of June 2020 (**Annexure VIII & IX**). **Heat wave conditions at isolated pockets very likely to occur over Rajasthan during next one week.**

Next monthly update will be issued on first week of July, 2020

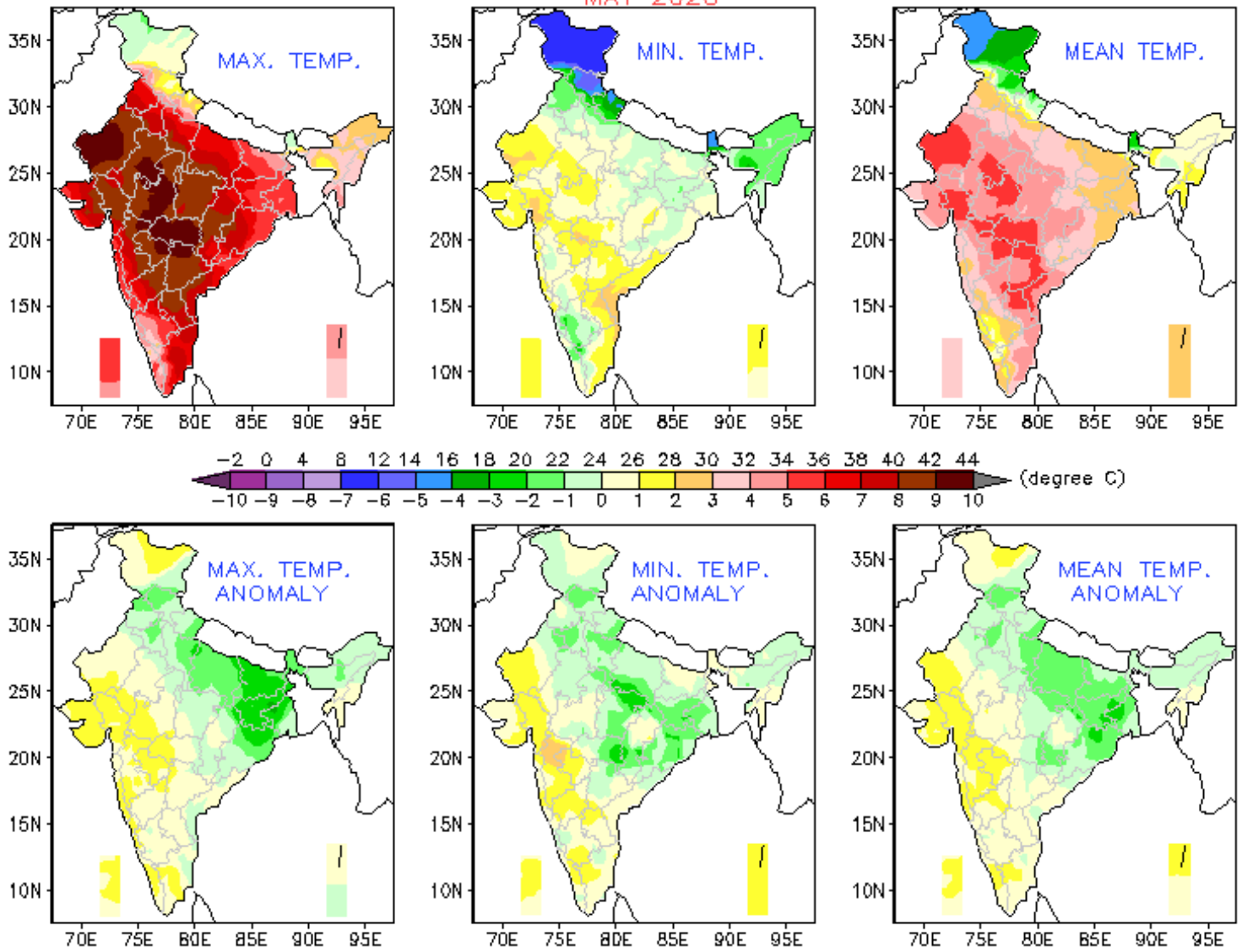




Annexure III

(CUMULATIVE TEMPERATURE FOR THE MONTH & ITS ANOMALY)

MAY 2020



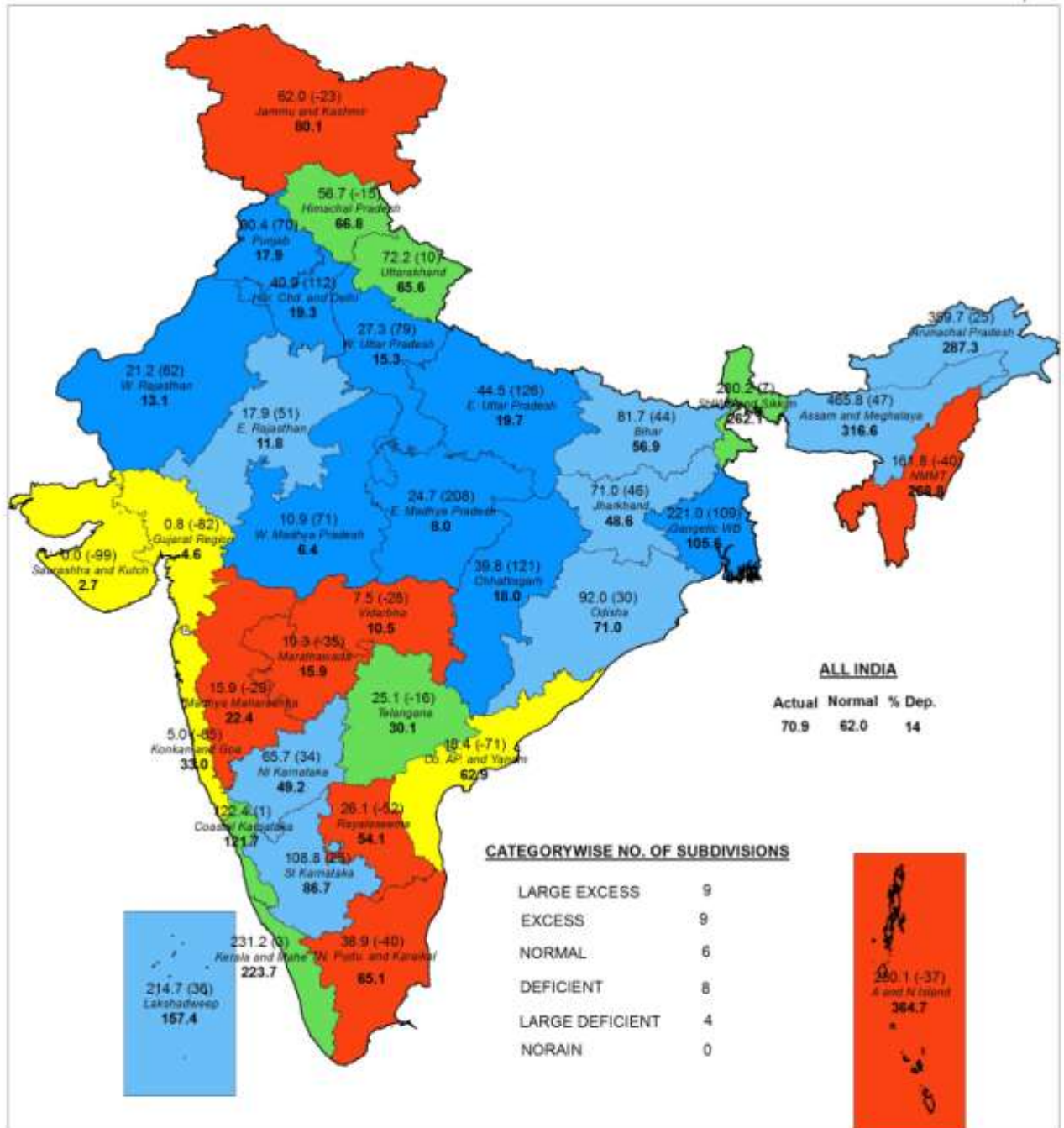


भारत मौसम विज्ञान विभाग
INDIA METEOROLOGICAL DEPARTMENT

जल मौसम विज्ञान पभाग, नई दिल्ली
HYDROMET DIVISION, NEW DELHI

SUBDIVISION RAINFALL MAP

Period : 01-05-2020 To 31-05-2020



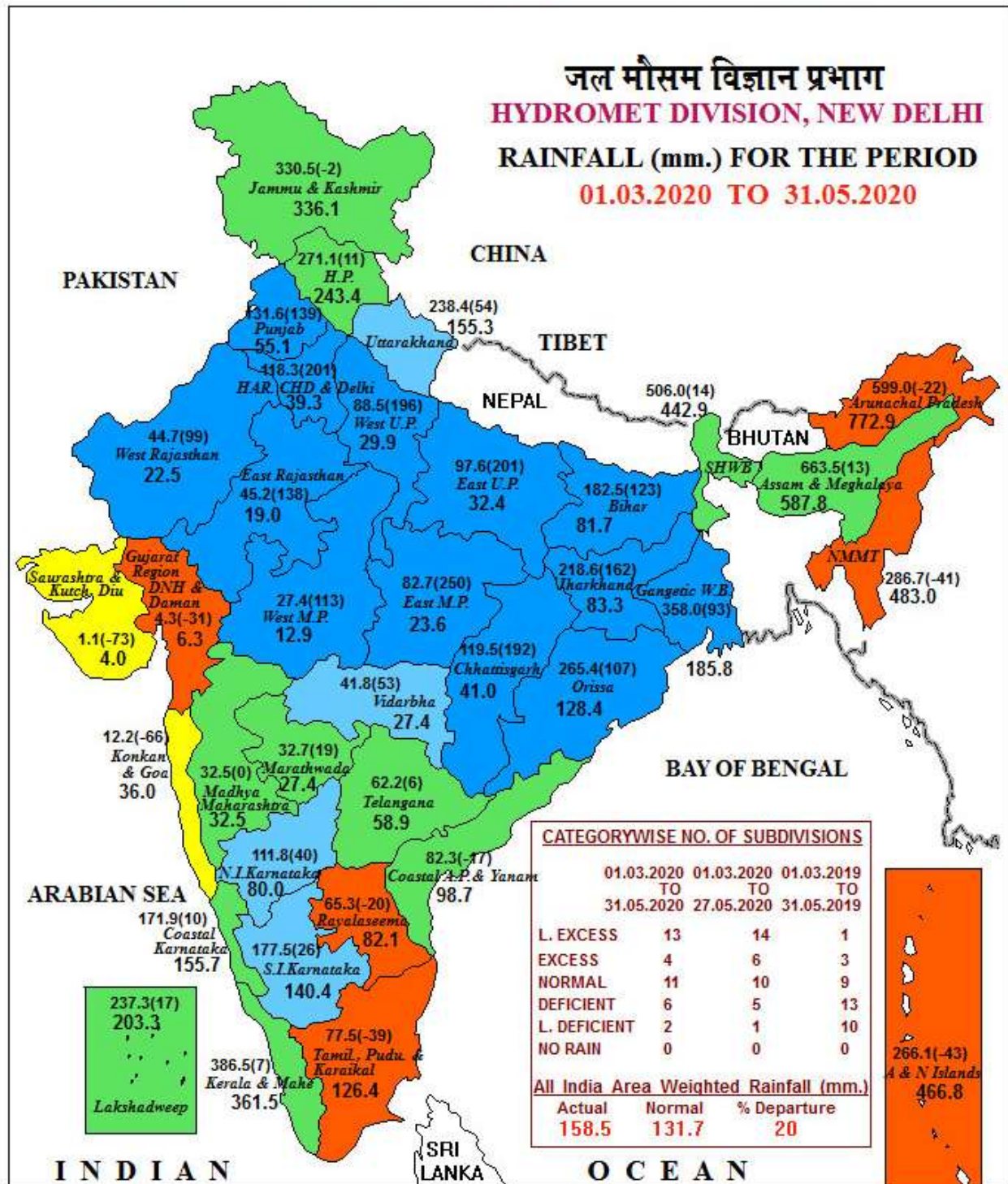
Legend

Large Excess [60% or more] Excess [20% to 59%] Normal [-19% to 19%] Deficient [-59% to -20%] Large Deficient [-99% to -60%] No Rain [-100%] No Data

NOTES :

- a) Rainfall figures are based on operation data.
- b) Small figures indicate actual rainfall (mm), while bold figures indicate Normal rainfall (mm).
- c) Percentage Departures of rainfall are shown in brackets.

भारत मौसम विज्ञान विभाग INDIA METEOROLOGICAL DEPARTMENT



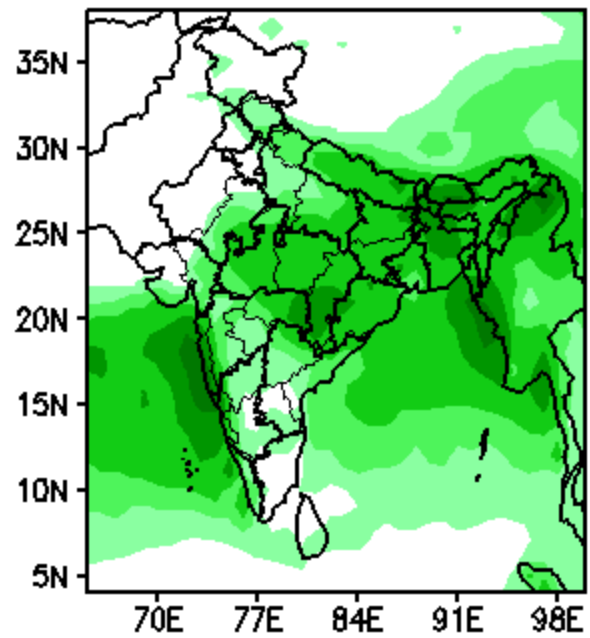
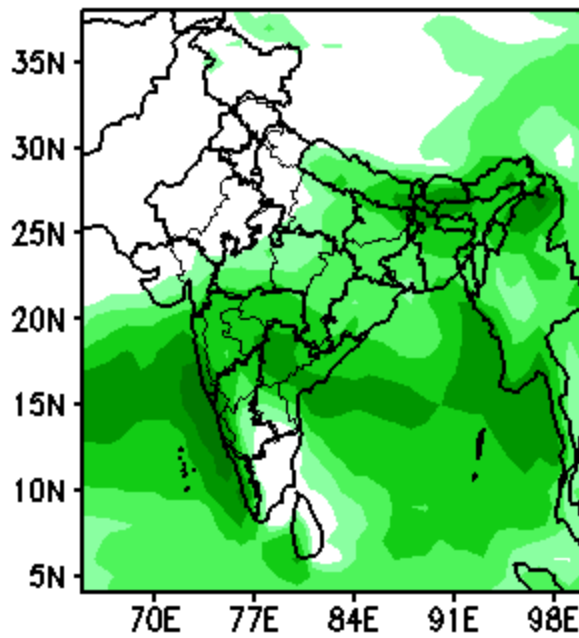
LEGEND: ■ L. EXCESS (+60% OR MORE) ■ EXCESS (+20% TO +59%) ■ NORMAL (+19% TO -19%)
 ■ DEFICIENT (-20% TO -59%) ■ L. DEFICIENT (-60% TO -99%) ■ NO RAIN (-100%) ■ NO DATA

NOTES:
 [a] Rainfall figures are based on operational data.
 [b] Small figures indicate actual rainfall (mm.), while bold figures indicate Normal rainfall (mm.)
 Percentage Departures of Rainfall are shown in Brackets.

Forecast Rainfall (mm/day)

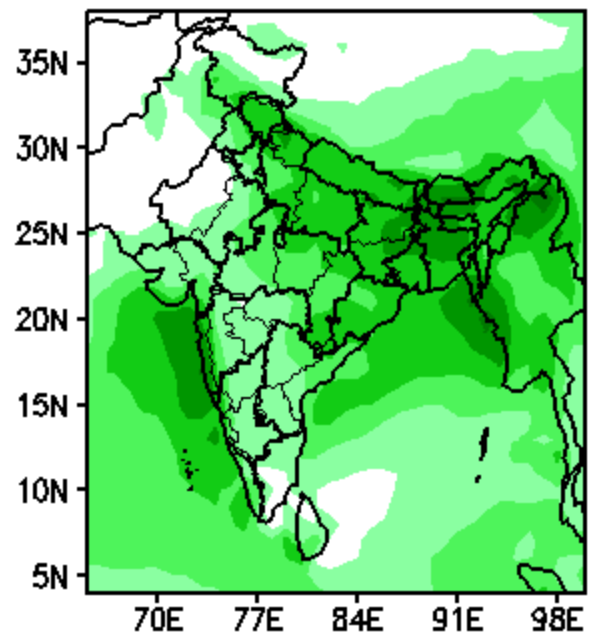
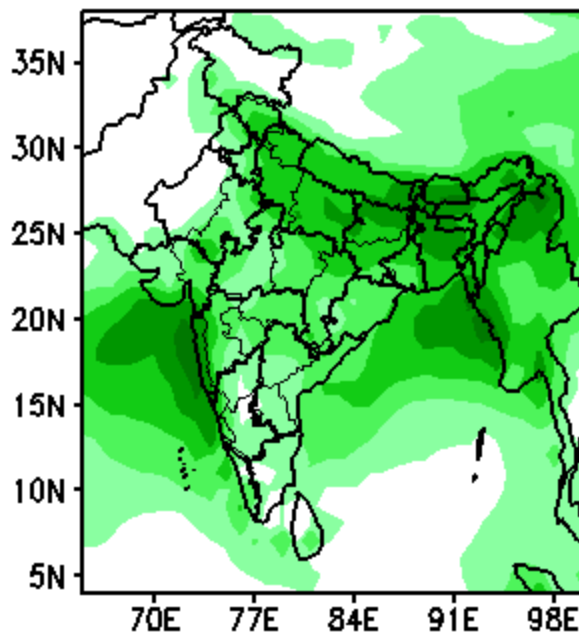
(Week1: 12Jun-18Jun)

(Week2: 19Jun-25Jun)



(Week3: 26Jun-02Jul)

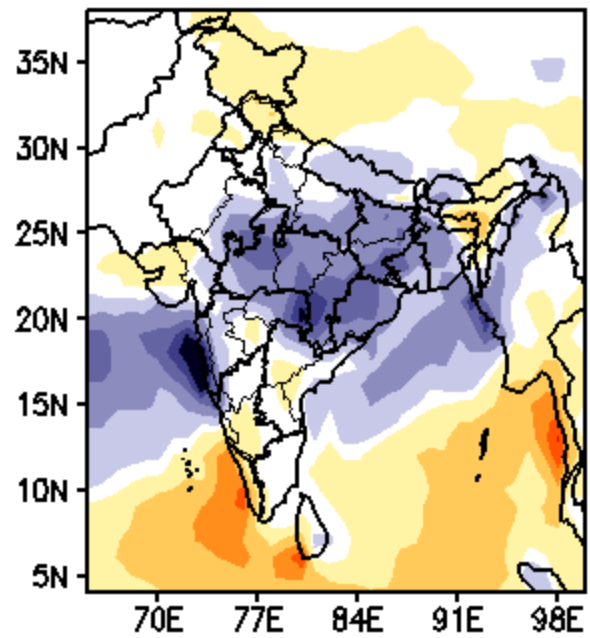
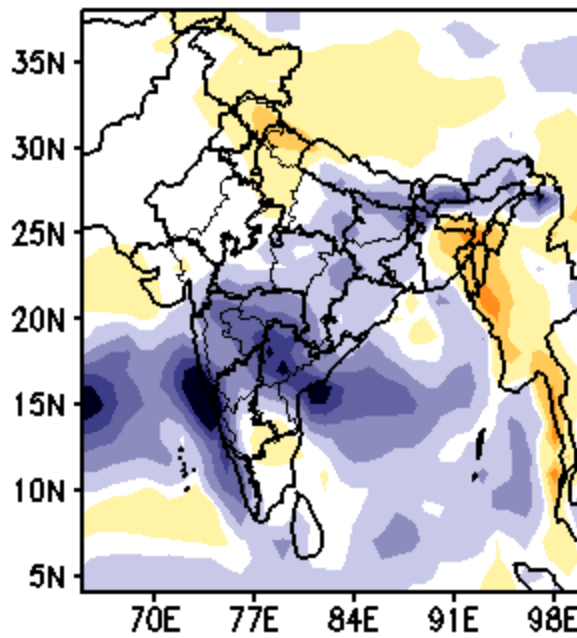
(Week4: 03Jul-09Jul)



Forecast Rainfall Anomaly (mm/day)

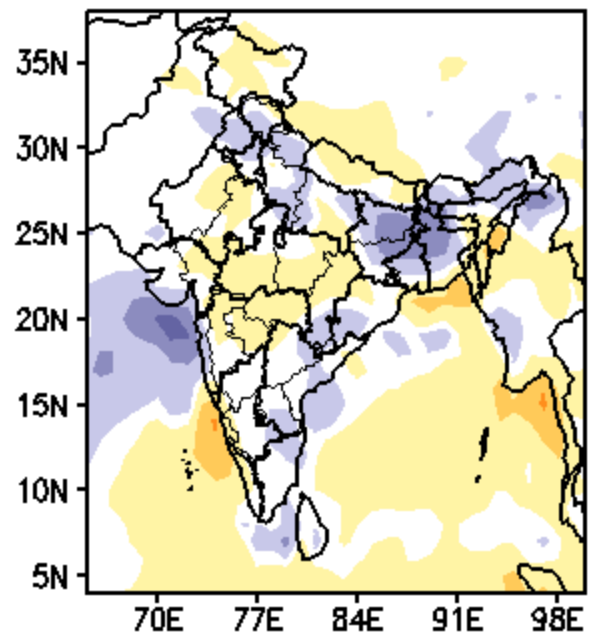
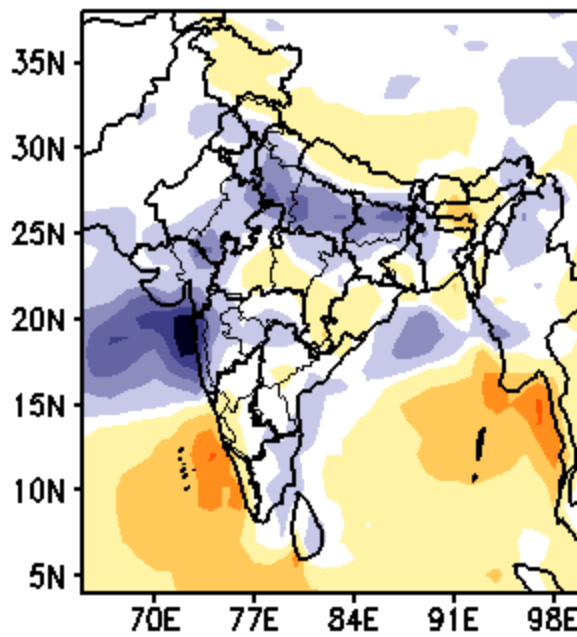
(Week1: 12Jun-18Jun)

(Week2: 19Jun-25Jun)



(Week3: 26Jun-02Jul)

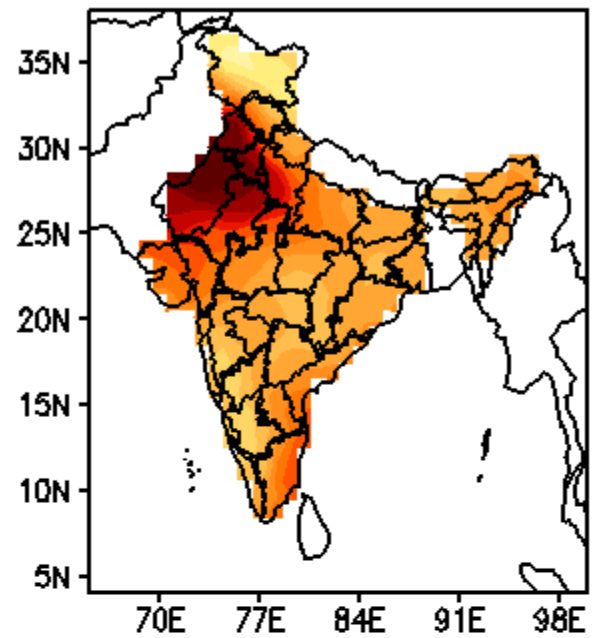
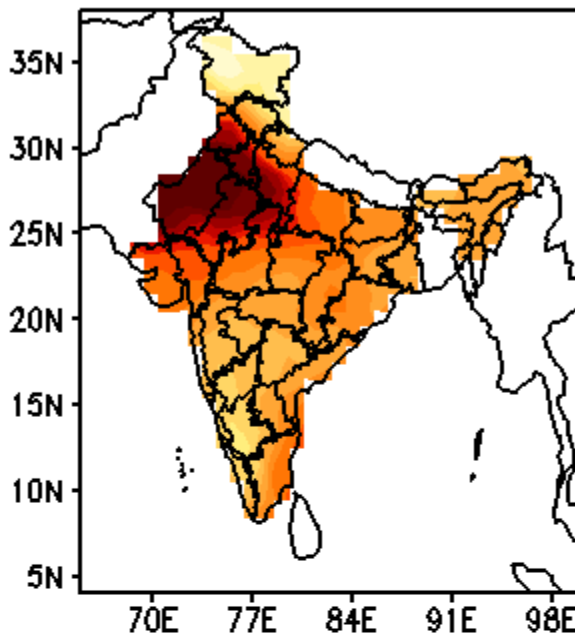
(Week4: 03Jul-09Jul)



MME Bias corrected forecast Tmax (Deg)

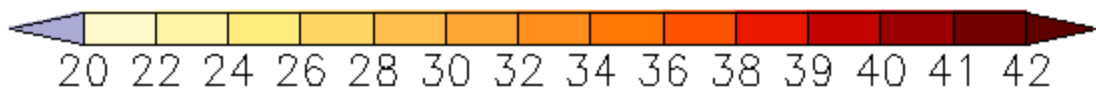
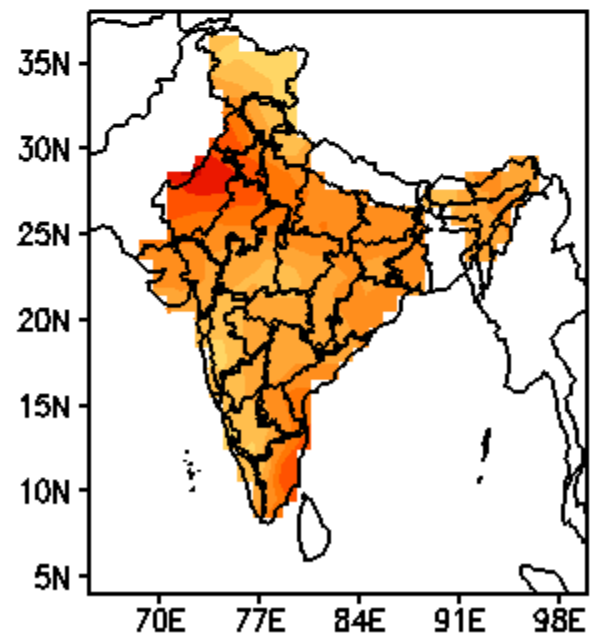
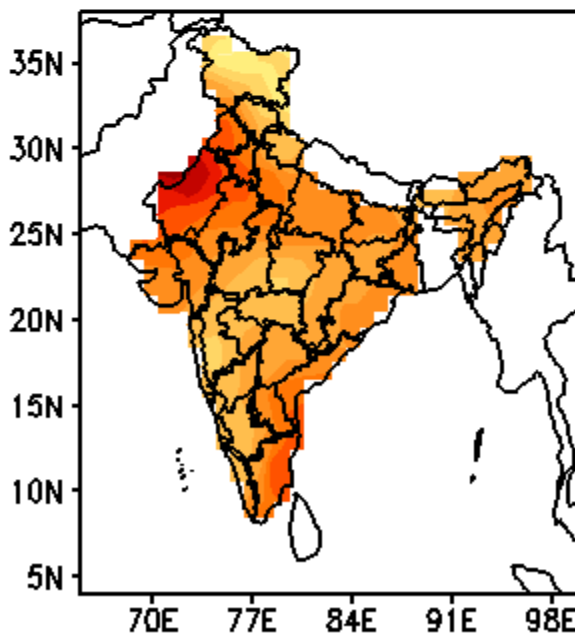
(Week1: 12Jun-18Jun)

(Week2: 19Jun-25Jun)



(Week3: 26Jun-02Jul)

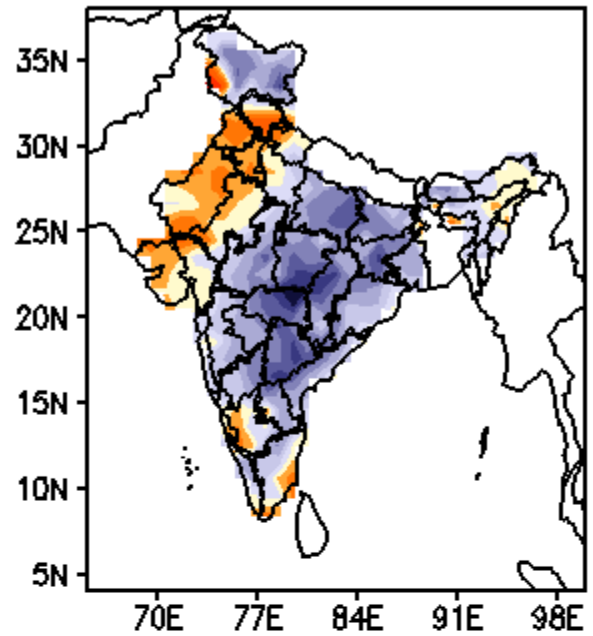
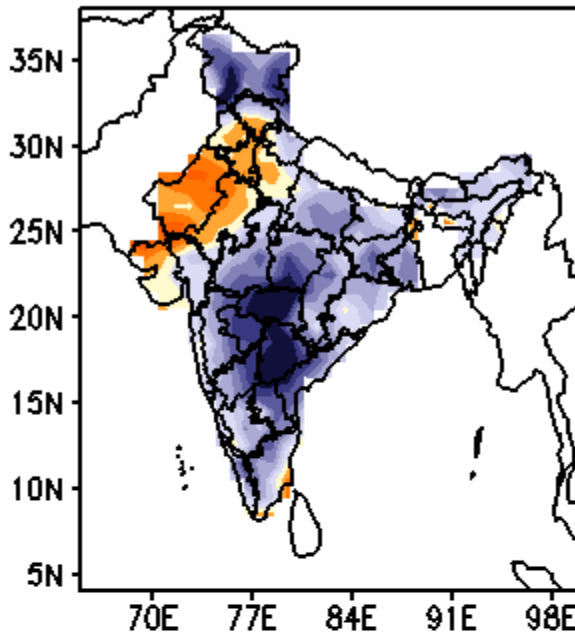
(Week4: 03Jul-09Jul)



MME forecast Tmax anomaly (Deg C)

(Week1: 12Jun-18Jun)

(Week2: 19Jun-25Jun)



(Week3: 26Jun-02Jul)

(Week4: 03Jul-09Jul)

