



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

**Dated: 07 July, 2020**

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

**Salient features of June, 2020**

- The Southwest Monsoon has covered the entire country on 26<sup>th</sup> June 2020 against the normal date of 8<sup>th</sup> July. If the onset & advance of Southwest Monsoon over the country is considered, the progress was normal over South & East India, about a week delay in advance over Northeast India and about 7-12 days early advance over Central & Northwest India. In the recent past, such early coverage of Southwest Monsoon over the entire country occurred in 2013, when, it covered the entire country on 16<sup>th</sup> June during 2013.
- During June, 2020, the rainfall was 196.2 mm and was 18% above Long Period Average (LPA) over the country as a whole. It was 31% & 16% above LPA over Central and East & northeast India respectively.
- Major weather systems, which affected the country during June, 2020 are as follow:
  - ✓ The severe cyclonic storm, '**NISARGA**' crossed north Maharashtra coast close to south of Alibag with a maximum sustained wind speed of 110-120 kmph gusting to 130 kmph between 1230 & 1430 hrs IST of 03<sup>rd</sup> June, 2020.
  - ✓ A Low pressure area has formed over Eastcentral Bay of Bengal on 9<sup>th</sup> June 2020. The Low Pressure & its associated cyclonic circulation moved across east & central India and caused fairly widespread to widespread rainfall activity with isolated heavy to very heavy falls over the region.
  - ✓ A cyclonic circulation developed over central part of the country during 3<sup>rd</sup> week of the June, persisted for about one week leading to advance of southwest monsoon over northwest India.
- Northward shifting of eastern part of the monsoon trough caused excess rainfall activity over northeastern states, Sub-Himalayan West Bengal & Sikkim, Bihar and

East Uttar Pradesh along with extremely heavy falls ( $\geq 20$  cm) over Assam & Meghalaya and Sub-Himalayan West Bengal & Sikkim towards last week of June 2020.

- Currently, Madden Julian Oscillation (MJO) index lies over Indian Ocean (Phase 2) with amplitude  $\geq 1$  and El Niño-Southern Oscillation (ENSO)-neutral conditions are prevailing over equatorial Pacific Ocean.

### Major features of June, 2020

#### Onset & Advance of Southwest Monsoon:

- Southwest Monsoon has advanced into entire South Arabian Sea and Lakshadweep- Maldives area and most parts of Kerala & Mahe and some parts of Tamilnadu, Puducherry & Karaikal on 1<sup>st</sup> June 2020; Thus, Southwest Monsoon has set in over Kerala on 1<sup>st</sup> June, 2020 coinciding with its normal date of onset over Kerala; it has covered entire Kerala & Mahe on 4<sup>th</sup> June 2020 and entire Tamil Nadu, Puducherry & Karaikkal on 10<sup>th</sup> June, 2020. Monsoon has entered Northeast India and covered most parts of Mizoram, Manipur and Tripura and some parts of Assam & Nagaland also on 10<sup>th</sup> June, 2020.
- Southwest Monsoon has covered entire Karnataka, Rayalaseema & Coastal Andhra Pradesh and progressed into Maharashtra, Telangana, Chhattisgarh and Odisha on 11<sup>th</sup> June, 2020; it has covered entire Telangana, Bay of Bengal and northeastern states on 12<sup>th</sup>; it covered entire Odisha & West Bengal on 13<sup>th</sup> and covered entire Maharashtra (including Mumbai) and entered Gujarat and Madhya Pradesh on 14<sup>th</sup> June; it covered entire Chhattisgarh, Jharkhand and Bihar and entered East Uttar Pradesh on 15<sup>th</sup>; it has further advanced into some more parts of West Madhya Pradesh, most parts of East Madhya Pradesh, and some more parts of East Uttar Pradesh on 16<sup>th</sup> June, 2020; there had been a hiatus from then in advance of monsoon till 22<sup>nd</sup>; from 23<sup>rd</sup> onwards it started progressing further and thus covered entire Arabian Sea, entire Gujarat and Madhya Pradesh, most parts of Uttar Pradesh and Himachal Pradesh, entire Uttarakhand and Jammu & Kashmir, Ladakh, Gilgit-Baltistan & Muzaffarabad on 24<sup>th</sup> June 2020; advancing further, it covered entire Uttar Pradesh and Himachal Pradesh, entire Delhi, some parts of Haryana and most parts of Punjab on 25<sup>th</sup> June, 2020; progressing further, the Southwest Monsoon has covered the entire country on 26<sup>th</sup> June 2020 against the normal date of 8<sup>th</sup> July (Annexure I).

- If the onset and advance of Southwest Monsoon over the country is considered, the progress had been normal over South and East India, about a week delay occurred in advance over Northeast India and there had been about 7-12 days early advance over Central & Northwest India.

### Monthly Rainfall Scenario (01 to 30 June, 2020)

During June, 2020, rainfall was above Long Period Average (LPA) by 18% over the country as a whole. Details are given below:

Regions	Actual Rainfall (mm)	Normal Rainfall (mm)	% Departure from LPA
Country as a whole	196.2	166.9	18%
Northwest India	77.9	75.3	4%
Central India	220.9	169.2	31%
South Peninsula	172.6	160.2	8%
East & northeast India	401.4	347.1	16%

- During this month, 4 sub-divisions received large excess, 10 excess, 16 normal and 6 deficient. Thus, the rainfall has been well distributed over the country with 30 sub-divisions with normal to excess. Out of 6 deficient sub-divisions, 3 are from northwest India (**Annexure II**).

### Severe Cyclonic Storm 'NISARGA' (1-4 June, 2020):

- A low pressure area formed over southeast & adjoining eastcentral Arabian Sea and Lakshadweep area in the early morning (0530 hrs IST) of 31st May 2020. Under favourable environmental conditions, it concentrated into a **depression** over eastcentral and adjoining southeast Arabian Sea in the early morning (0530 hrs IST) of 1st June 2020. It intensified into into the cyclonic storm "**NISARGA**" in the noon (1130 hrs IST) of 2nd June over eastcentral Arabian Sea. It intensified into a severe cyclonic storm in the early morning (0530 hrs IST) of 3rd June 2020. It crossed Maharashtra coast close to south of Alibag (Maharashtra) as a **severe cyclonic storm** with a maximum sustained wind speed of 110-120 kmph gusting to 130 kmph during 1230-1430 hrs IST of 03rd June. It weakened into a **low pressure area** over southeast Uttar Pradesh and adjoining Bihar in the afternoon (1430 hrs IST) of 5th June. The observed track of the system during 1st - 4th June is presented in **Annexure III**.

○ **Genesis Forecast:**

- ❖ First information about development of low pressure area over southeast Arabian Sea was given in the extended range outlook issued on 21st May about 10 days prior to the formation of low pressure area over the southeast & adjoining eastcentral Arabian Sea and Lakshadweep on 31st May.
- ❖ First information about development of depression over southeast Arabian Sea was issued in the tropical weather outlook and national weather forecast bulletin issued at 1200 hrs IST of 29<sup>th</sup> May about 3 days prior to the formation of depression over southeast & adjoining eastcentral Arabian Sea on 1<sup>st</sup> June morning.

○ **Track, Intensity and Landfall Forecast:**

- ❖ With the formation of low pressure area over southeast & adjoining eastcentral Arabian Sea on 31st May morning, IMD issued first bulletin at 0855 hrs IST of 31st May and indicated that the system would intensify into a cyclonic storm and reach north Maharashtra and Gujarat coasts by 3rd June, (about 77 hours prior to landfall of severe cyclonic storm **NISARGA**).
- ❖ In the bulletin issued at 0920 hrs IST of 1st June, it was indicated that the system would intensify upto severe cyclonic storm stage with maximum sustained wind speed of 105-115 kmph gusting to 125 kmph and cross north Maharashtra and south Gujarat coasts between Harihareshwar (Raigad), Maharashtra and Daman during evening/ night of 3rd June (about 52 hours prior to landfall of severe cyclonic storm **NISARGA**).
- ❖ In the bulletin issued at 1130 hrs IST of 2nd June, it was indicated that the system would cross close to Alibag (Raigad District, Maharashtra) during the afternoon of 03rd June as a Severe Cyclonic Storm with a maximum sustained wind speed of 100-110 kmph gusting to 120 kmph (about 28 hours prior to landfall of severe cyclonic storm **NISARGA**).
- ❖ Actually, the severe cyclonic storm **NISARGA** crossed north Maharashtra coast close to south of Alibag with a maximum sustained wind speed of 110-120 kmph gusting to 130 kmph between 1230 & 1430 hrs IST of 03rd June.
- ❖ The landfall point forecast errors for 12, 24 and 48 hrs lead period were 7.8, 33.1 and 80.1 km respectively against the LPA errors of 25.4, 44.7 and 69.4 km during 2015-19 respectively.

- ❖ The landfall time forecast errors for 12, 24 and 48 & 72 hrs lead period were 0, 0.5, 0 & 1.0 hour respectively against the LPA errors of 2.0, 3.0 & 5.4 hours during 2015-19 respectively.
- ❖ The track forecast errors for 12, 24 & 48 hrs lead period were 59.7, 111.6, and 212.0 km respectively against the LPA errors of 49.6, 80.6 & 125.5 km respectively.

### Heavy Rainfall Events:

- **Heavy to very heavy rainfall with extremely heavy rainfall ( $\geq 20$  cm)** at isolated places had been occurred over Assam & Meghalaya on six days; over Sub-Himalayan West Bengal & Sikkim on four days; over East Uttar Pradesh, Madhya Maharashtra, Konkan & Goa, Chhattisgarh and Arunachal Pradesh one day each during the month.
- **Heavy to very heavy rainfall ( $\geq 12$  cm)** had been observed at isolated places over Konkan & Goa on eleven days; Assam & Meghalaya on ten days; east Uttar Pradesh and Sub-Himalayan West Bengal & Sikkim on seven days each; over Madhya Maharashtra, Bihar and Odisha on six days each; over Kerala & Mahe, Coastal Karnataka and Chhattisgarh on five days each; over west Madhya Pradesh, Andaman & Nicobar Islands, Tamilnadu, Puducherry & Karaikkal on four days each; over West Uttar Pradesh, East Madhya Pradesh, Coastal Andhra Pradesh & Yanam and Telangana on three days each; over Nagaland, Mizoram, Manipur & Tripura, Gangetic West Bengal, Jharkhand, Arunachal Pradesh and Uttarakhand on two days each; over Punjab, Interior Karnataka, Rayalaseema, Marathawada and Gujarat State one day each during the month.
- **Heavy rainfall ( $\geq 6.5$  cm)** had been observed at isolated places over Odisha on sixteen days; over Arunachal Pradesh, Sub-Himalayan West Bengal & Sikkim and West Madhya Pradesh on fifteen days each; over Coastal Karnataka on fourteen days; over East Madhya Pradesh on thirteen days; over Nagaland, Mizoram, Manipur & Tripura, Kerala & Mahe, Saurashtra & Kutch and Madhya Maharashtra on twelve days each; over Bihar and Chhattisgarh on eleven days each; over Assam & Meghalaya and Tamilnadu, Puducherry & Karaikkal on nine days each; over Gangetic West Bengal and Telangana on eight days each; over South Interior Karnataka, East Uttar Pradesh and Marathawada on seven days each; over Coastal Andhra Pradesh & Yanam, Gujarat region and Konkan & Goa on six days each; over Jharkhand, Vidarbha, East Rajasthan and Punjab on five days each; over Rayalaseema, Haryana, Chandigarh & Delhi and Uttarakhand on four days each; over West Rajasthan on three days; over

Andaman & Nicobar, West Uttar Pradesh and Himachal Pradesh on two days each; over Lakshadweep, North Interior Karnataka on one day each during the month.

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

No. of Heavy/Very Heavy Rainfall Events (>64.4mm)and Warning Skill (Probability of Detection (POD), False Alarm Rate (FAR), Critical Success Rate (CSI) and Heidke skill score (HSS) in %) during the month is given below:

No. of days with Heavy/Very Heavy Rainfall Events (>64.4 mm): <b>408</b>				
warning issued for	<b>POD</b>	<b>FAR</b>	<b>CSI</b>	<b>HSS</b>
<b>Day 1 / 24 Hours</b>	<b>72</b>	<b>27</b>	<b>50</b>	<b>44</b>
<b>Day 2 / 48 Hours</b>	<b>67</b>	<b>25</b>	<b>47</b>	<b>41</b>
<b>Day 3 / 72 Hours</b>	<b>62</b>	<b>22</b>	<b>45</b>	<b>40</b>
<b>Day 4 / 96 Hours</b>	<b>55</b>	<b>21</b>	<b>41</b>	<b>34</b>
<b>Day 5 / 120 Hours</b>	<b>51</b>	<b>22</b>	<b>38</b>	<b>30</b>

### Monthly Maximum Temperature Scenario (01 to 30 June, 2020)

- **Heat Wave conditions** over some parts **with severe heat wave conditions** at isolated pockets had been observed over West Rajasthan on two days and Heat wave conditions at isolated pockets had been observed over West Rajasthan on two days during the month.
- In general, average maximum temperatures of June month were more than 40°C over most parts of West Rajasthan; more than 38°C over some parts of East Rajasthan, southern parts of Punjab, Haryana & West Uttar Pradesh and mainly below 36°C over remaining parts of the country (**Annexure IV**).
- Maximum temperatures were above normal over many parts of Jammu & Kashmir and Ladakh, West Rajasthan, Gujarat state, South Interior Karnataka, Kerala & Tamilnadu. These were below normal over remaining parts of the country during June (**Annexure IV**).
- The highest **maximum temperature of 47.8° C** had been recorded at Bikaner (West Rajasthan) on 17th June 2020, over the plains of the country during the month.
- **The heat Wave spell is predicted 3 to 4 days in advance.**

### Thundersquall & Hailstorm activity:

- **Thundersquall & Hailstorm** activity during the month (till 0830 IST of 30-06-2020) is given in the table below:

S. No	Region	TS Days	Date of Maximum TS Activity	Hail Events	Squall Events
1.	South Peninsular India	30	10/06/20	Nil	Nil
2.	Northwest India	30	28/06/20	01(Churu on 02/06/20)	Nil
3.	Northeast India	29	11/06/20	Nil	Nil
4.	East India	30	01/06/20	Nil	01(Alipur on 27/06/20)
5.	Central India	30	27/06/20	Nil	02(Nagpur 11/06/20, 14/06/20)
6.	West India	24	25/06/20 & 26/06/20	Nil	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.

### Large scale features as on 07 July, 2020

- The Madden Julian Oscillation (MJO) index lies currently over Indian Ocean (Phase 2) with amplitude greater than 1. It is very likely to over Indian Ocean with amplitude greater than 1 during next 15 days.
- Currently, 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 July & August season onwards. There is enhanced probability for development of weak La Niña conditions during end of the monsoon season or thereafter.
- 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 for most for the forecasted seasons.

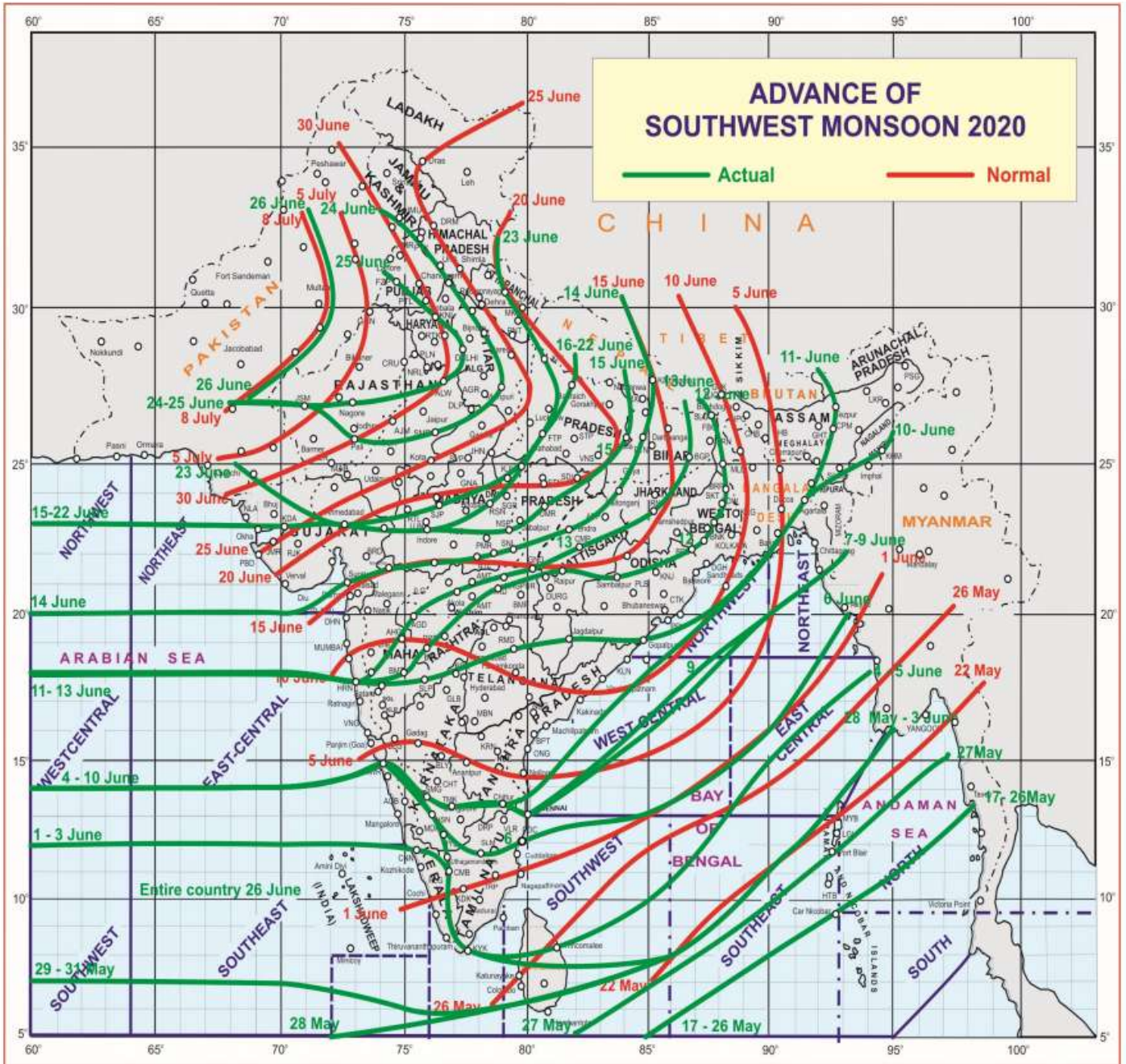
## Forecast for July, 2020

### Rainfall Forecast

- As on today, the 7<sup>th</sup> July, 2020, a Well Marked Low Pressure Area lies over Saurashtra & neighbourhood. It is very likely to cause widespread rainfall activity over Gujarat State on today and decrease significantly thereafter. Isolated heavy to very falls with **extremely heavy falls** very likely over Saurashtra & Kutch and heavy falls over Gujarat region on today.
- Currently, the monsoon trough is south of its normal position at lower tropospheric levels. It is very likely to shift gradually northwards along the foothills of Himalayas from tomorrow onwards. In addition, high Convergence of south westerlies/southerlies winds from Bay of Bengal at lower tropospheric levels very likely over northeast & east India from tomorrow onwards. Under its influence, widespread rainfall with isolated heavy to very heavy falls very likely over northeastern states, Sub-Himalayan West Bengal & Sikkim, Bihar and East Uttar Pradesh from 08<sup>th</sup> July, 2020 onwards. **Isolated extremely heavy falls are also very likely over Assam & Meghalaya during 8th to 11th, Arunachal Pradesh on 9<sup>th</sup> & 10<sup>th</sup>, Sub-Himalayan West Bengal & Sikkim and East Uttar Pradesh on 10<sup>th</sup> & 11<sup>th</sup> and over Bihar on 10th July, 2020.**
- Overall rainfall activity is very likely to be above normal over northern parts of the country outside Western Himalayan Region & west coast of India till 16<sup>th</sup> July, 2020. Thereafter, it is very likely to be normal to above normal most parts of the country outside Western Himalayan region, where it is likely to be below normal (**Annexure V & VI**).

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





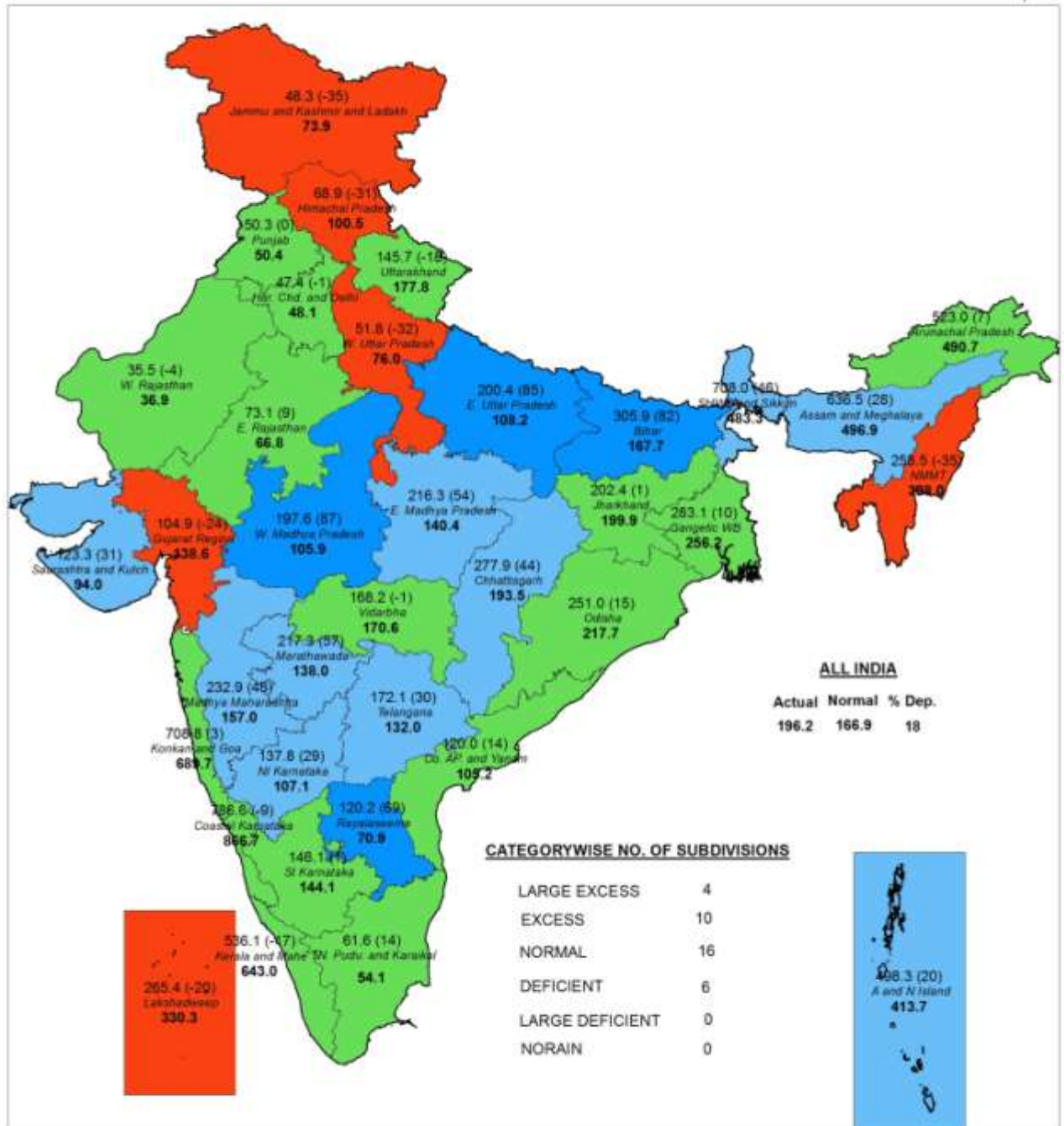


भारत मौसम विज्ञान विभाग  
INDIA METEOROLOGICAL DEPARTMENT

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

**SUBDIVISION RAINFALL MAP**

Period : 01-06-2020 To 30-06-2020

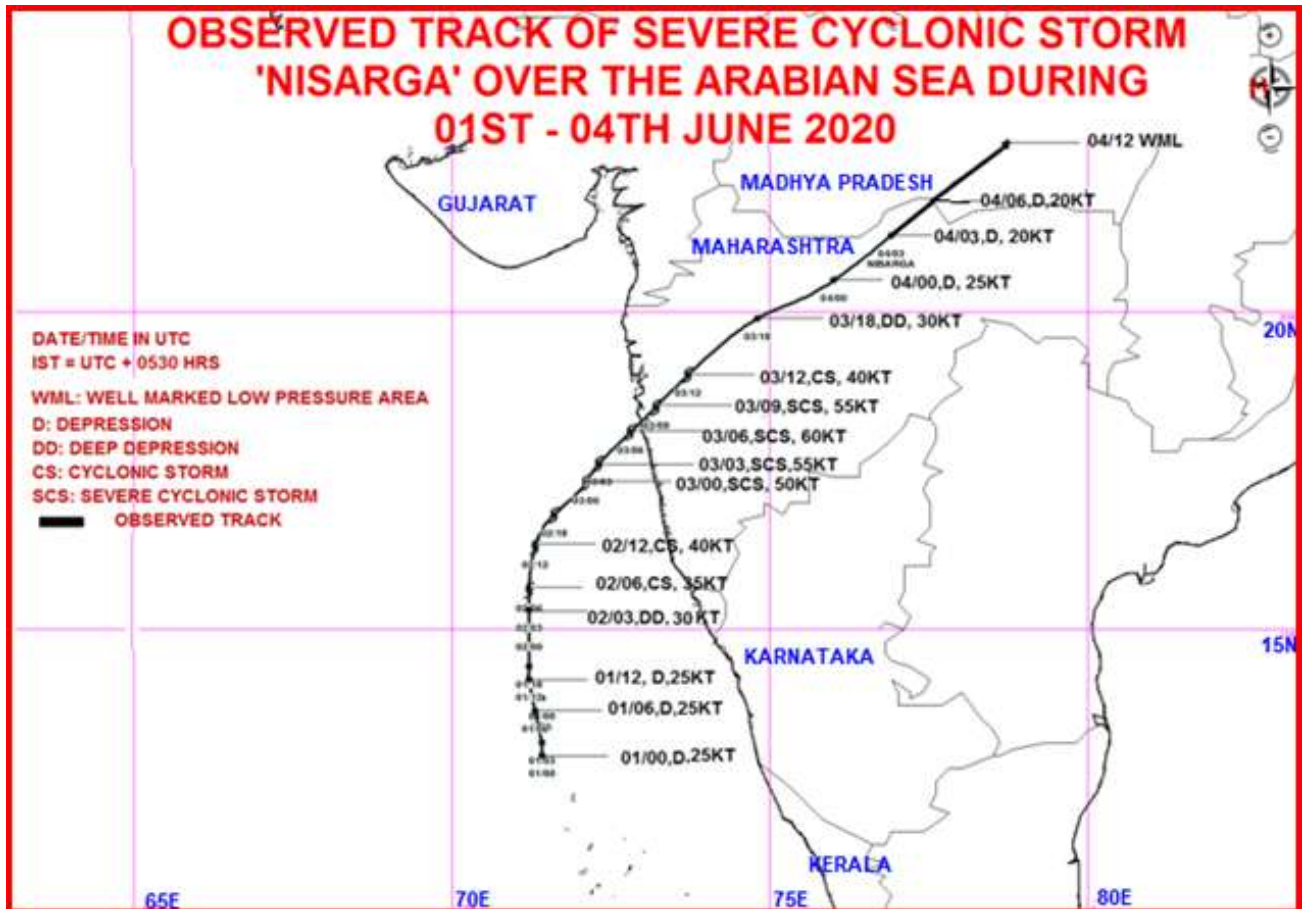


**Legend**

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

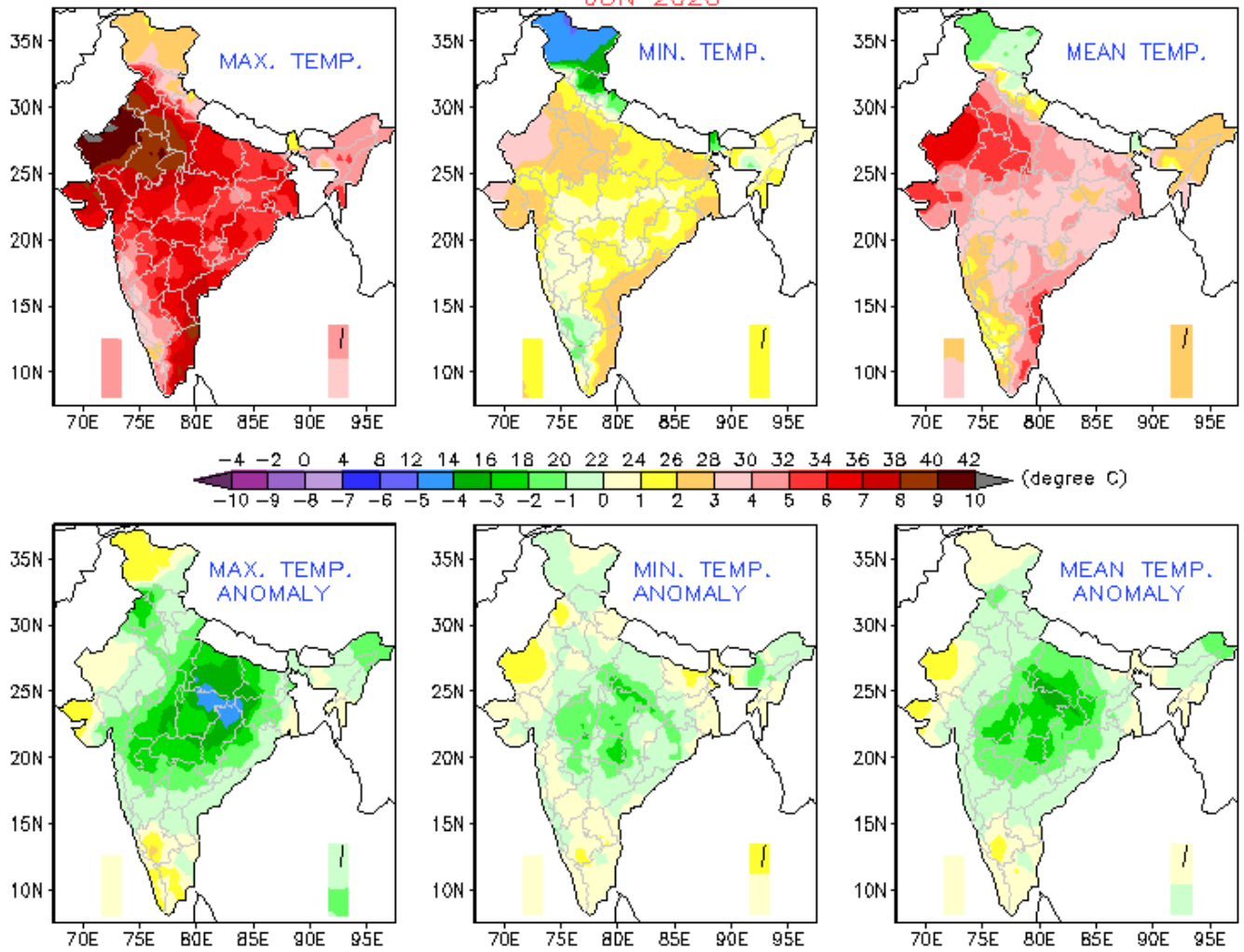
**NOTES :**

- 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.



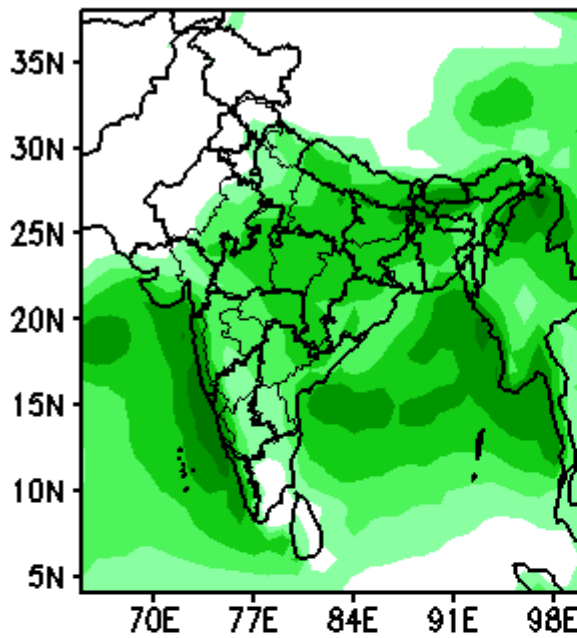
(CUMULATIVE TEMPERATURE FOR THE MONTH & ITS ANOMALY)

JUN 2020

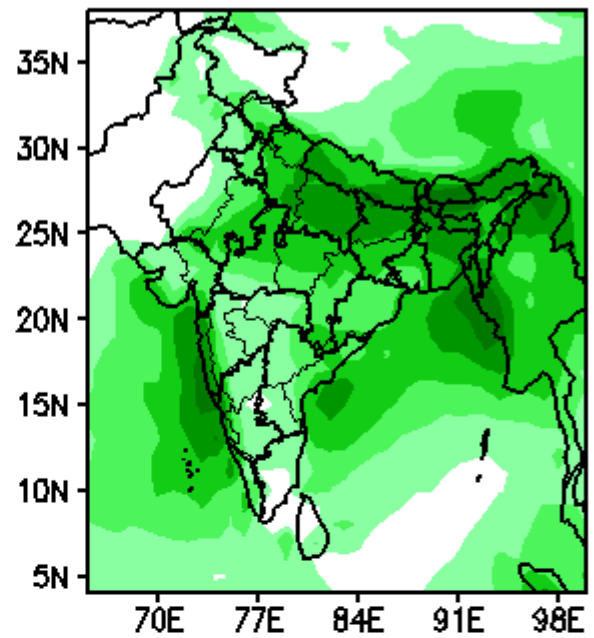


### Forecast Rainfall (mm/day)

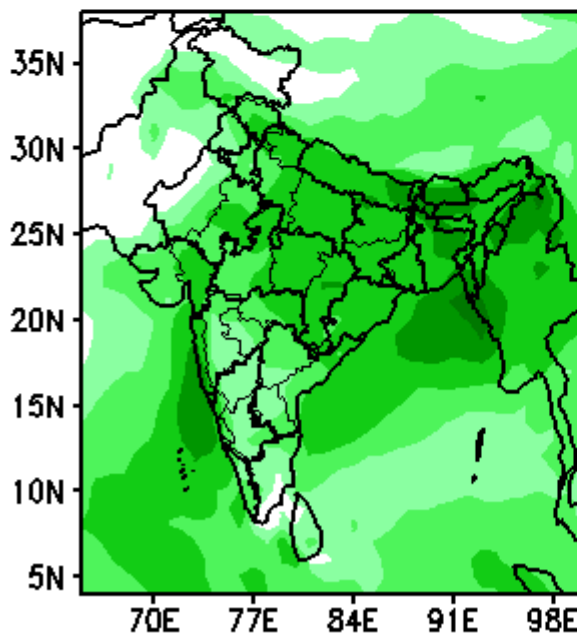
(Week1: 03Jul-09Jul)



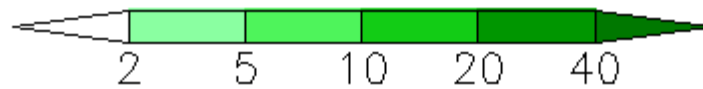
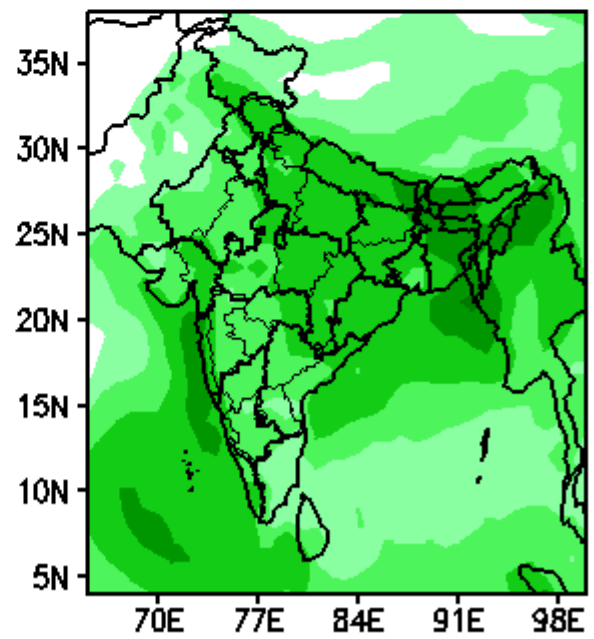
(Week2: 10Jul-16Jul)



(Week3: 17Jul-23Jul)

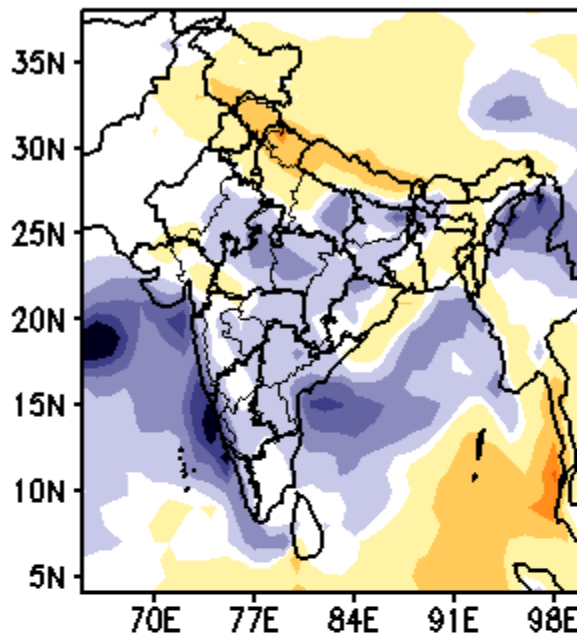


(Week4: 24Jul-30Jul)

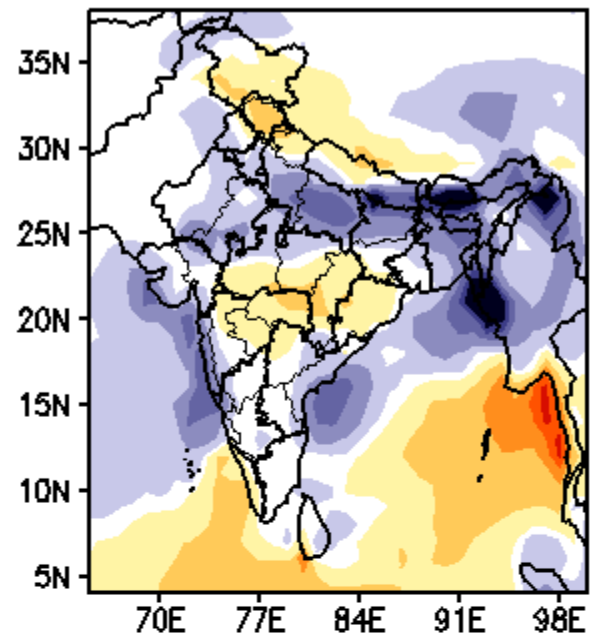


### Forecast Rainfall Anomaly (mm/day)

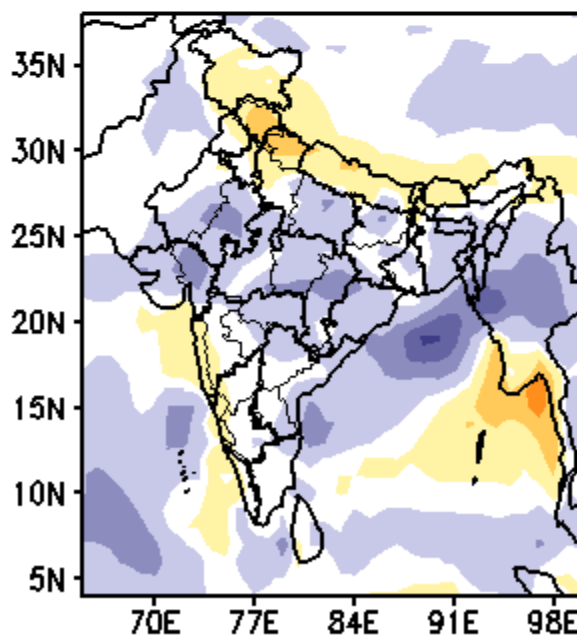
(Week1: 03Jul-09Jul)



(Week2: 10Jul-16Jul)



(Week3: 17Jul-23Jul)



(Week4: 24Jul-30Jul)

