



IPGA Knowledge Series Webinar on  
KHARIF SOWING REVIEW 27 August 2021

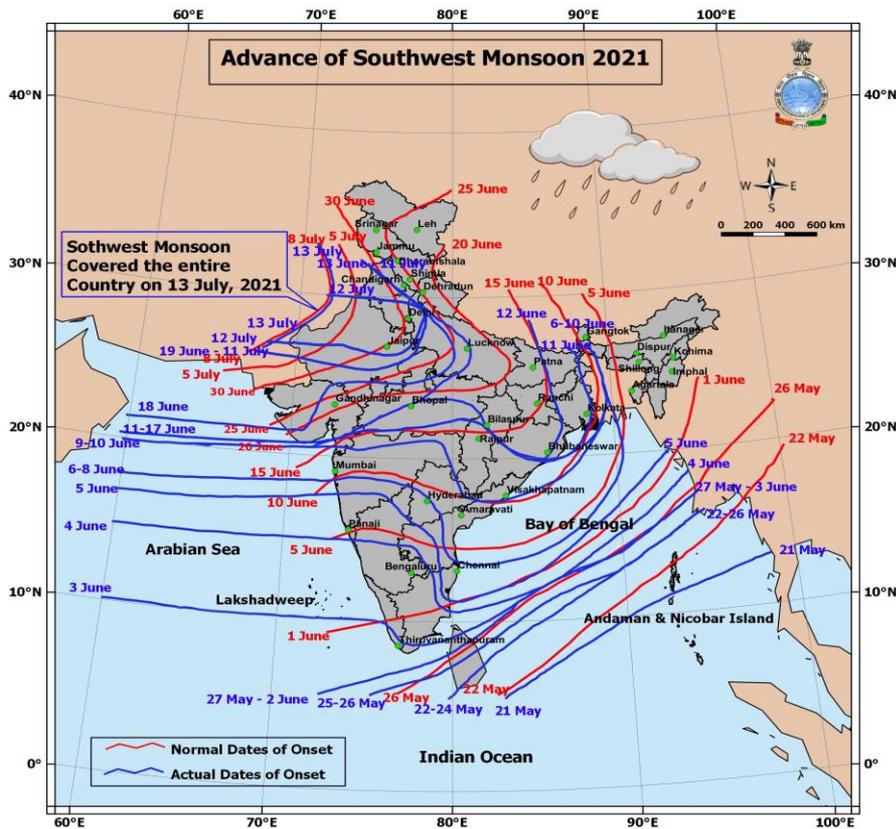
# Southwest Monsoon 2021: Status & Forecast Outlook

D. S. Pai

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भारत मौसम विज्ञान विभाग  
INDIA METEOROLOGICAL DEPARTMENT

# Progress of Monsoon 2021: So far



- Southwest Monsoon set in over Kerala on 3rd June, 2021, against normal date of 1st June against.
- IMD forecast (issued 15th May 2021) for the onset of southwest monsoon over Kerala was 31st May with a model error of  $\pm 4$  days.
- Covered most parts of country except parts of Rajasthan, Delhi, Haryana and Punjab by 19<sup>th</sup> June.
- Advance of Monsoon has been nearer to its normal date over south, east and northeast India, early by 7-10 days over central and extreme north India and being delayed by about one/two weeks over parts of Rajasthan, Delhi, Haryana and Punjab
- Monsoon advanced into remaining parts of country from 11<sup>th</sup> July onwards and covered entire country by 13<sup>th</sup> July (5 days delayed).



# Rainfall Performance Till 26<sup>th</sup> August, 2021

## RAINFALL STATISTICS - MONSOON 2021

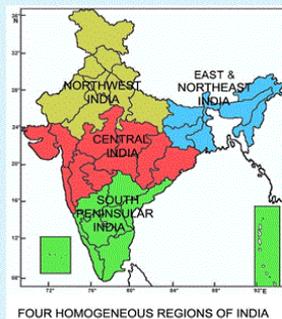
JUNE 2021			
REGION	ACTUAL	NORMAL	% DEP
COUNTRY AS A WHOLE	182.9	166.9	9.6
NORTHWEST INDIA	85.7	75.3	13.9
EAST & NORTHEAST INDIA	357.3	347.1	2.9
CENTRAL INDIA	198.8	169.2	17.5
SOUTH PENINSULA	166.2	160.2	3.7

JULY 2021			
REGION	ACTUAL	NORMAL	% DEP
COUNTRY AS A WHOLE	266.0	285.3	-6.8
NORTHWEST INDIA	196.8	212.2	-7.3
EAST & NORTHEAST INDIA	320.6	432.0	-25.8
CENTRAL INDIA	298.9	322.8	-7.4
SOUTH PENINSULA	273.8	216.7	26.3

AUGUST 2021			
REGION	ACTUAL	NORMAL	% DEP
COUNTRY AS A WHOLE	160.1	222.4	-28.0
NORTHWEST INDIA	125.9	177.5	-29.1
EAST & NORTHEAST INDIA	285.8	296.1	-3.5
CENTRAL INDIA	155.7	263.0	-40.8
SOUTH PENINSULA	119.1	163.0	-26.9

CUMULATIVE SEASONAL RAINFALL			
REGION	ACTUAL	NORMAL	% DEP
COUNTRY AS A WHOLE	609.0	674.7	-10.0
NORTHWEST INDIA	408.3	465.1	-12.0
EAST & NORTHEAST INDIA	963.4	1075.2	-10.0
CENTRAL INDIA	653.7	755.0	-13.0
SOUTH PENINSULA	559.1	540.4	3.0

(Based on real time data)

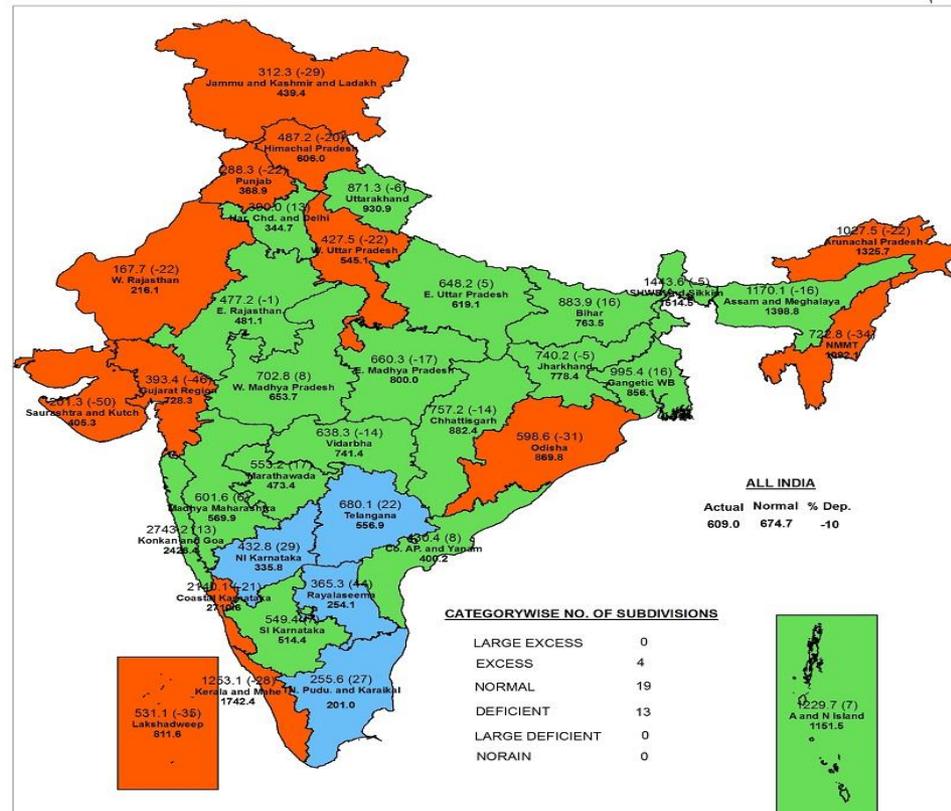


भारत मौसम विज्ञान विभाग  
INDIA METEOROLOGICAL DEPARTMENT

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

## SUBDIVISION RAINFALL MAP

Period : 01-06-2021 To 26-08-2021



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 :

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

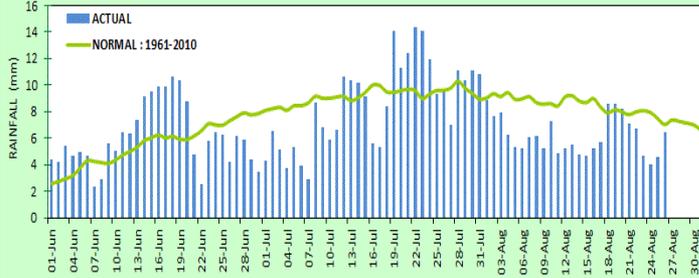


# Daily Rainfall Variation Over the Country as a Whole and Four Homogenous Regions

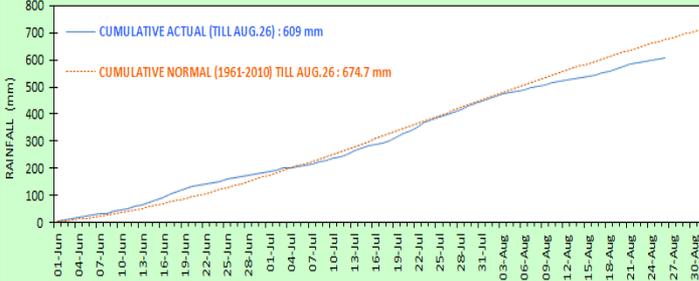
## All India

## Homogenous Regions

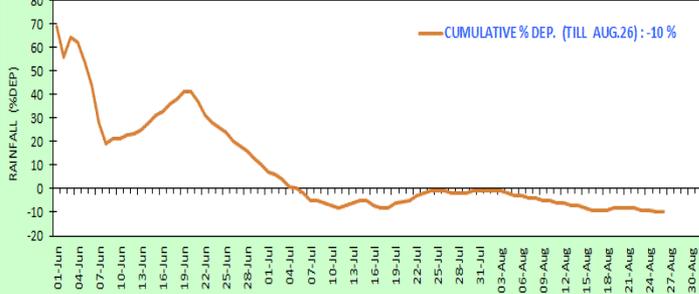
DAILY MEAN RAINFALL (mm) OVER THE COUNTRY AS A WHOLE (2021)



CUMULATIVE RAINFALL (mm) OVER THE COUNTRY AS A WHOLE (2021)

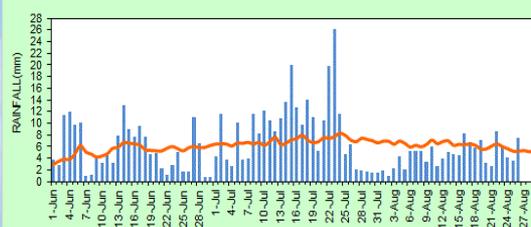
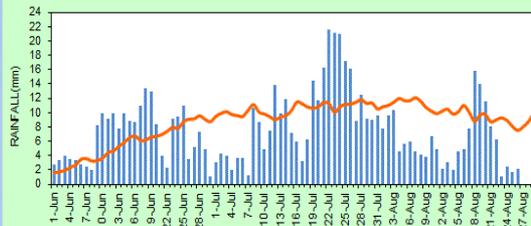
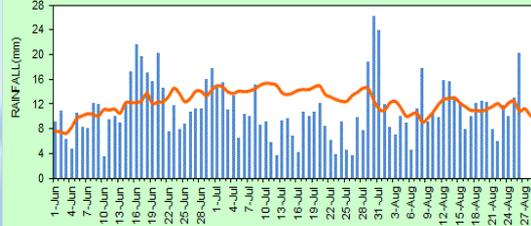
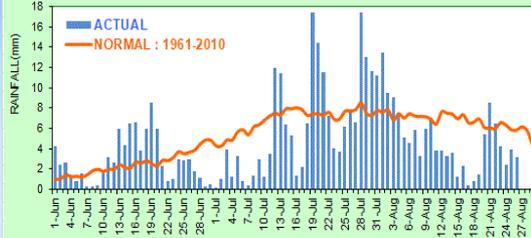


CUMULATIVE RAINFALL (% DEP) OVER THE COUNTRY AS A WHOLE (2021)



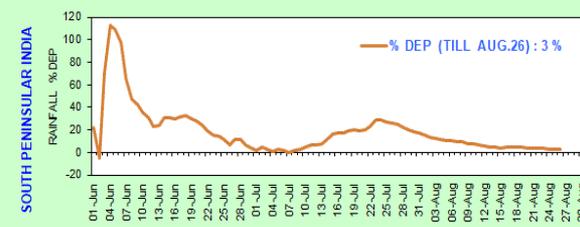
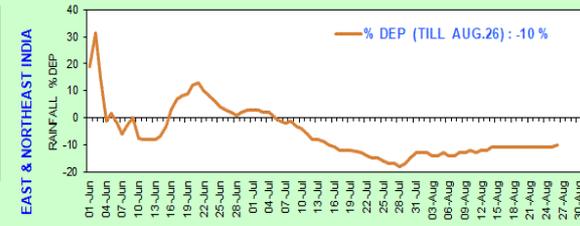
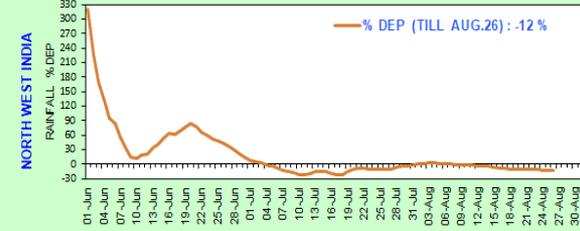
(घान्तिक समय के आंकड़ों पर आधारित) (Based on realtime data)

(2021) DAILY MEAN RAINFALL (mm) OVER THE FOUR HOMOGENEOUS REGIONS



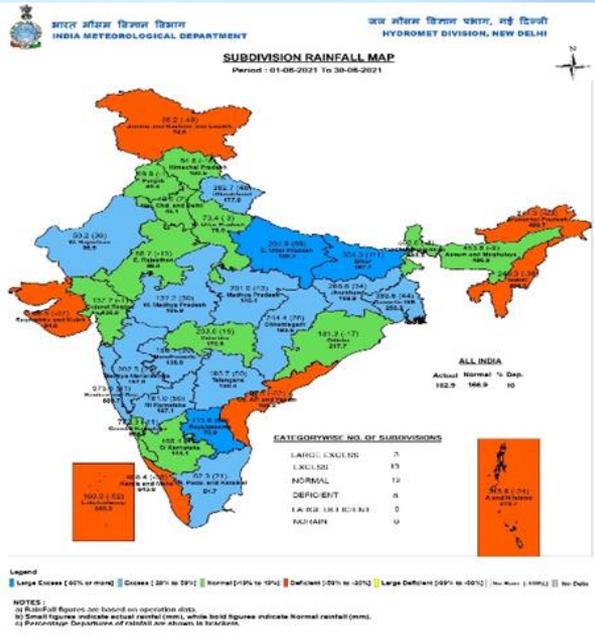
(घान्तिक समय के आंकड़ों पर आधारित) (based on realtime data)

CUMULATIVE RAINFALL (% DEPARTURE) OVER THE FOUR HOMOGENEOUS REGIONS (2021)

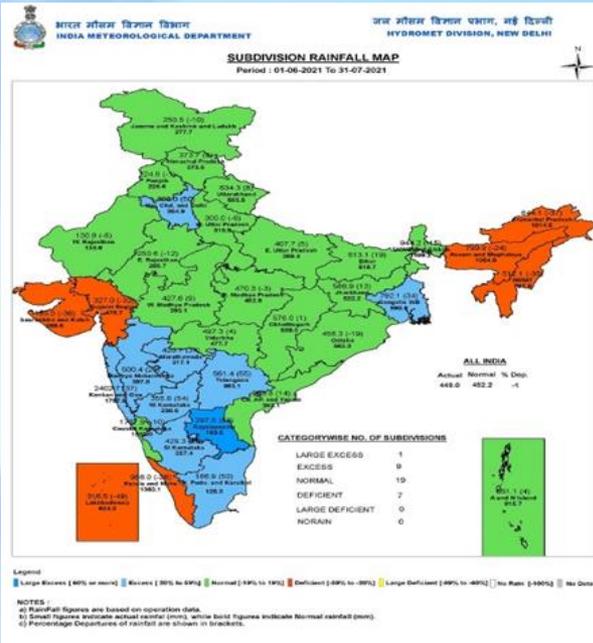


# Monthly Rainfall Distribution

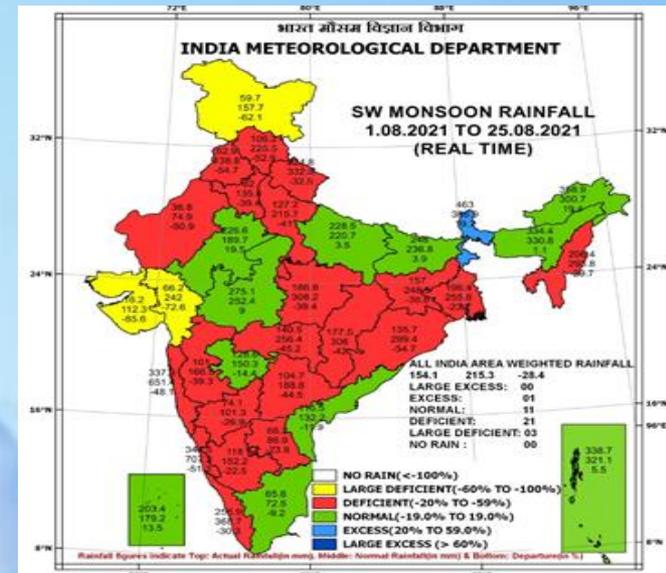
June 2021



July 2021



1-25 August 2021



# Week by Week Progress of Monsoon



India Meteorological Department  
Hydromet Division, New Delhi

**LEGEND:**

<span style="color: blue;">■</span> LARGE EXCESS +60% OR MORE	<span style="color: lightblue;">■</span> EXCESS +20% TO +59%	<span style="color: green;">■</span> NORMAL +19% TO -19%
<span style="color: red;">■</span> DEFICIENT -20% TO -59%	<span style="color: yellow;">■</span> LARGE DEFICIENT -60% OR LESS	<span style="border: 1px solid black; display: inline-block; width: 10px; height: 10px;"></span> NO RAIN

SUBDIVISION - WEEK BY WEEK DEPARTURES

Period: 01-06-2021 To 25-08-2021

SUBDIVISION - WEEK BY WEEK DEPARTURES (CUMULATIVE)

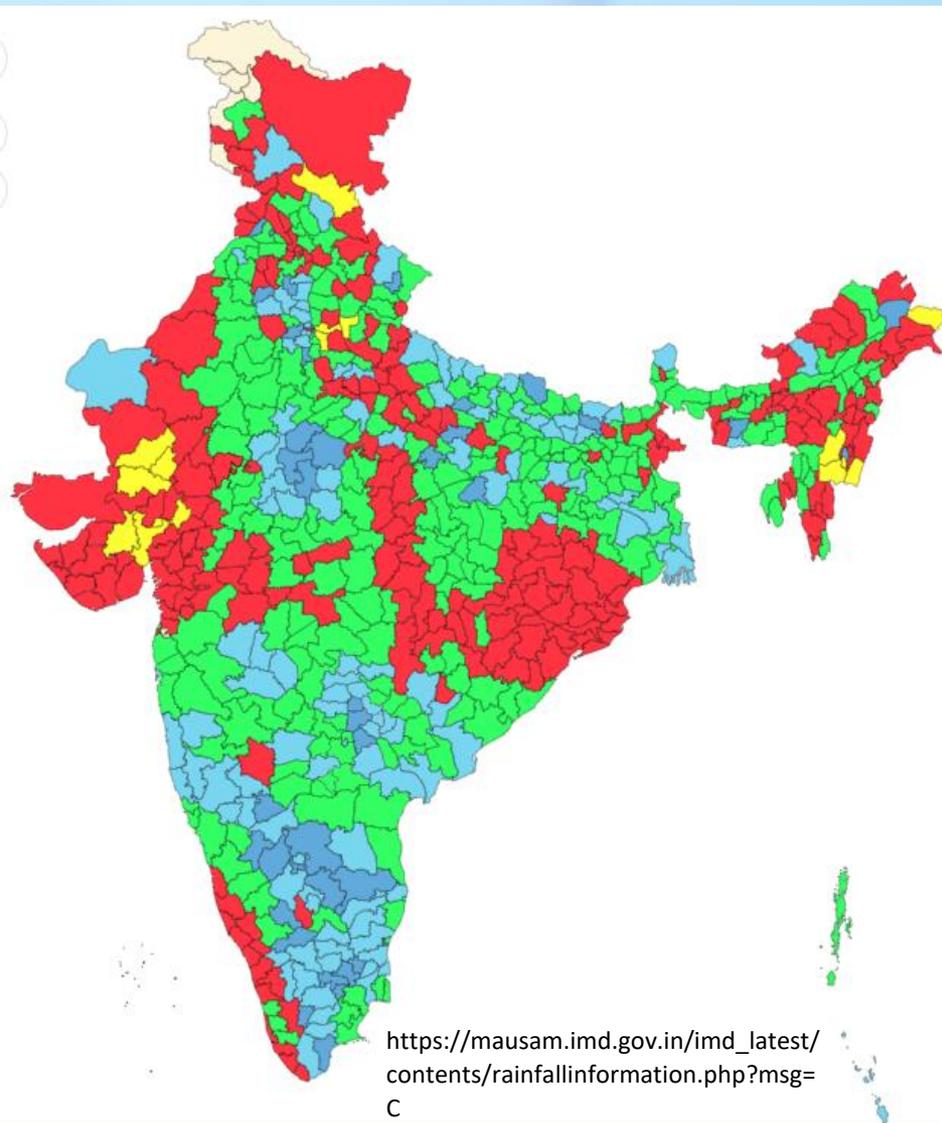
Period: 01-06-2021 To 25-08-2021

S NO.	MET. SUBDIVISION	Week End 2-6-2021	Week End 9-6-2021	Week End 16-6-2021	Week End 23-6-2021	Week End 30-6-2021	Week End 7-7-2021	Week End 14-7-2021	Week End 21-7-2021	Week End 28-7-2021	Week End 4-8-2021	Week End 11-8-2021	Week End 18-8-2021	Week End 25-8-2021
1	A & N ISLAND	-42	3	-2	-53	-19	-35	114	132	-29	-29	-3	31	-15
2	ARUNACHAL PRADESH	-9	28	-61	-36	-15	-13	-53	-59	-76	-47	-9	48	46
3	ASSAM & MEGHALAYA	-4	14	-47	-37	34	-29	-37	-41	-64	-6	-1	25	-10
4	N M M T	-52	-54	-27	-12	-66	-41	-23	-16	-48	-17	-20	-37	-49
5	SHWB & SIKKIM	65	16	-38	-29	34	-1	-24	-14	-61	-7	-21	33	58
6	GANGETIC WEST BENGAL	292	-19	108	142	-59	-17	-31	-27	1	150	32	43	-43
7	ODISHA	234	-8	30	-19	-65	-38	-12	-50	1	-38	-69	-19	-63
8	JHARKHAND	938	-56	155	94	-62	-29	-43	-42	-13	98	-7	-41	-59
9	BIHAR	1069	-29	241	200	29	16	-52	-34	-58	30	13	3	-9
10	EAST UTTAR PRADESH	825	-70	452	116	-29	-78	-77	11	3	13	11	-10	11
11	WEST UTTAR PRADESH	98	-99	156	66	-84	-85	-75	53	-13	70	-41	-96	-5
12	UTTARAKHAND	79	-80	131	211	-66	-80	-7	27	6	-25	-24	-61	-5
13	HAR. CHD & DELHI	198	-25	134	-56	-78	-69	-36	182	14	129	-43	-96	17
14	PUNJAB	275	96	74	-76	-69	-78	-13	27	-19	22	-56	-89	-19
15	HIMACHAL PRADESH	44	-42	41	9	-77	-85	50	6	-10	-22	-56	-73	-15
16	JAMMU & KASHMIR AND LADAKH	-22	-67	-13	-63	-80	-30	41	12	-13	-17	-66	-67	-71
17	WEST RAJASTHAN	21	207	23	36	-34	-83	40	-53	-6	22	-44	-100	-42
18	EAST RAJASTHAN	9	65	-39	15	-41	-82	-51	-30	38	246	24	-99	-84
19	WEST MADHYA PRADESH	144	61	85	-1	15	-87	-46	-27	118	101	21	-74	-18
20	EAST MADHYA PRADESH	136	54	226	25	-20	-76	-64	-51	88	4	-28	-76	-38
21	GUJARAT REGION	-85	2	-80	124	-43	-96	-47	-26	3	-81	-94	-68	-31
22	SAURASHTRA & KUTCH	-100	-51	-90	77	-73	-99	38	-57	9	-95	-98	-94	-32
23	KONKAN & GOA	-1	30	133	60	-36	-83	82	157	31	-55	-72	-35	-25
24	MADHYA MAHARASHTRA	62	44	-6	104	-22	-92	14	39	154	-48	-80	-24	14
25	MARATHWADA	135	85	57	-43	22	-69	251	37	16	-94	-92	51	46
26	VIDARBHA	92	60	139	-25	-33	-61	27	-32	43	-48	-75	-19	-16
27	CHHATTISGARH	146	54	126	16	-30	-23	-16	-51	26	-27	-56	-24	-32
28	COASTAL AP and YANAM	-55	30	-39	-70	3	25	113	49	24	-88	-39	59	-14
29	TELANGANA	119	121	116	-50	33	-2	133	66	94	-96	-78	6	-31
30	RAYALASEEMA	-19	314	-91	-69	90	236	88	225	-31	-83	-8	-57	14
31	TN PUDU and KARAİKAL	-37	110	-33	-2	7	252	94	66	-9	-85	13	-10	4
32	COASTAL KARNATAKA	27	-24	54	8	-78	-76	15	42	4	-47	-47	-58	-64
33	N. I. KARNATAKA	-36	100	9	97	15	-30	93	105	96	-76	-70	9	17
34	S. I. KARNATAKA	-69	74	41	59	-75	-39	-10	101	69	-44	-19	-49	12
35	KERALA & MAHE	1	-42	7	-42	-75	-78	20	6	2	-69	16	-45	-41
36	LAKSHADWEEP	-59	-6	-75	-53	-45	-82	-33	-93	13	-78	113	-16	-1

S NO.	MET. SUBDIVISION	Week End 2-6-2021	Week End 9-6-2021	Week End 16-6-2021	Week End 23-6-2021	Week End 30-6-2021	Week End 7-7-2021	Week End 14-7-2021	Week End 21-7-2021	Week End 28-7-2021	Week End 4-8-2021	Week End 11-8-2021	Week End 18-8-2021	Week End 25-8-2021
1	A & N ISLAND	-89	-17	-11	-25	-24	-26	-5	14	9	5	4	6	5
2	ARUNACHAL PRADESH	-10	20	-21	-26	-23	-21	-26	-31	-36	-37	-35	-29	-24
3	ASSAM & MEGHALAYA	29	17	-14	-22	-9	-13	-17	-21	-26	-24	-22	-19	-18
4	N M M T	-27	-49	-38	-30	-38	-39	-36	-33	-35	-33	-32	-32	-34
5	SHWB & SIKKIM	1	13	-12	-18	-4	-4	-8	-8	-15	-15	-15	-11	-6
6	GANGETIC WEST BENGAL	103	-3	52	88	44	30	19	11	10	28	29	22	17
7	ODISHA	159	17	25	7	-17	-22	-20	-26	-21	-24	-29	-28	-31
8	JHARKHAND	252	-19	82	87	34	18	4	-4	-6	6	7	2	-3
9	BIHAR	286	8	130	158	111	82	46	30	17	19	18	16	14
10	EAST UTTAR PRADESH	568	-11	227	177	89	38	1	3	3	5	5	3	4
11	WEST UTTAR PRADESH	416	-36	54	59	-3	-31	-46	-21	-19	-5	-10	-22	-20
12	UTTARAKHAND	169	-47	44	114	48	10	6	10	10	4	1	-7	-6
13	HAR. CHD & DELHI	1377	137	136	52	2	-21	-27	27	24	42	30	14	15
14	PUNJAB	1369	223	123	42	-1	-29	-24	-10	-12	-6	-13	-21	-21
15	HIMACHAL PRADESH	305	6	27	20	-16	-28	-4	-1	-3	-6	-13	-20	-20
16	JAMMU & KASHMIR AND LADAKH	100	-28	-20	-34	-48	-43	-19	-11	-11	-12	-20	-25	-29
17	WEST RAJASTHAN	150	197	97	70	36	-4	7	-9	-9	-4	-9	-20	-21
18	EAST RAJASTHAN	-33	45	-3	6	-15	-39	-43	-39	-23	22	22	7	0
19	WEST MADHYA PRADESH	-2	53	73	40	30	-9	-20	-21	8	24	23	12	9
20	EAST MADHYA PRADESH	255	78	170	90	44	3	-14	-22	-3	-2	-6	-15	-17
21	GUJARAT REGION	-96	-12	-51	30	-1	-34	-38	-35	-28	-37	-44	-47	-45
22	SAURASHTRA & KUTCH	-100	-58	-78	3	-27	-51	-35	-40	-32	-40	-47	-51	-50
23	KONKAN & GOA	19	28	92	78	41	7	21	45	43	31	20	16	14
24	MADHYA MAHARASHTRA	105	53	23	62	29	-2	2	8	30	20	9	6	7
25	MARATHWADA	149	95	74	34	30	9	50	48	43	26	12	15	18
26	VIDARBHA	112	67	116	52	19	-2	5	-2	5	-2	-12	-13	-13
27	CHHATTISGARH	175	68	108	64	26	12	6	-6	0	-4	-11	-12	-14
28	COASTAL AP and YANAM	-12	23	-12	-30	-22	-11	12	18	19	6	1	7	5
29	TELANGANA	260	141	126	57	50	37	59	60	66	43	28	26	21
30	RAYALASEEMA	48	267	95	54	60	92	92	115	91	70	61	49	45
31	TN PUDU and KARAİKAL	-48	78	32	24	21	67	72	71	58	40	37	31	28
32	COASTAL KARNATAKA	-19	-23	21	16	-11	-26	-18	-8	-7	-11	-15	-18	-21
33	N. I. KARNATAKA	-15	80	48	62	50	36	46	56	62	45	33	31	30
34	S. I. KARNATAKA	-76	43	42	48	15	2	0	18	25	16	13	7	7
35	KERALA & MAHE	-4	-37	-15	-24	-36	-46	-35	-29	-25	-30	-26	-28	-28
36	LAKSHADWEEP	-65	-18	-41	-53	-52	-52	-49	-54	-48	-50	-39	-38	-35



# District wise Rainfall: 1Jun-26<sup>th</sup> Aug, 2021

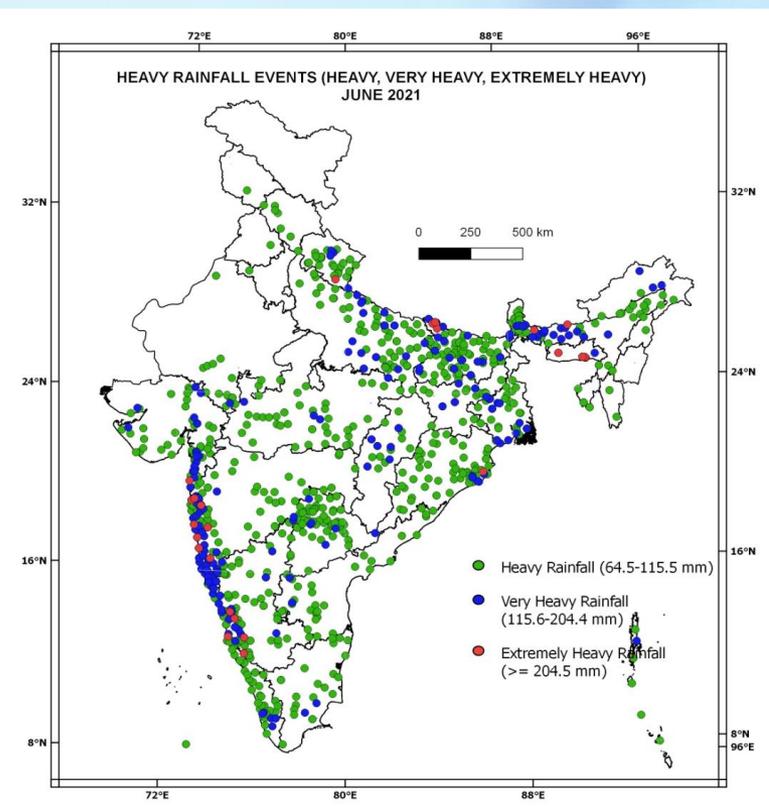


- |                            |                      |                                |
|----------------------------|----------------------|--------------------------------|
| No Data                    | No Rain [-100%]      | Large Deficient [-99% to -60%] |
| Deficient [-59% to -20%]   | Normal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



# Heavy Rainfall Events occurred in June 2021

## Location of Heavy Rainfall events occurred in the month of June 2021



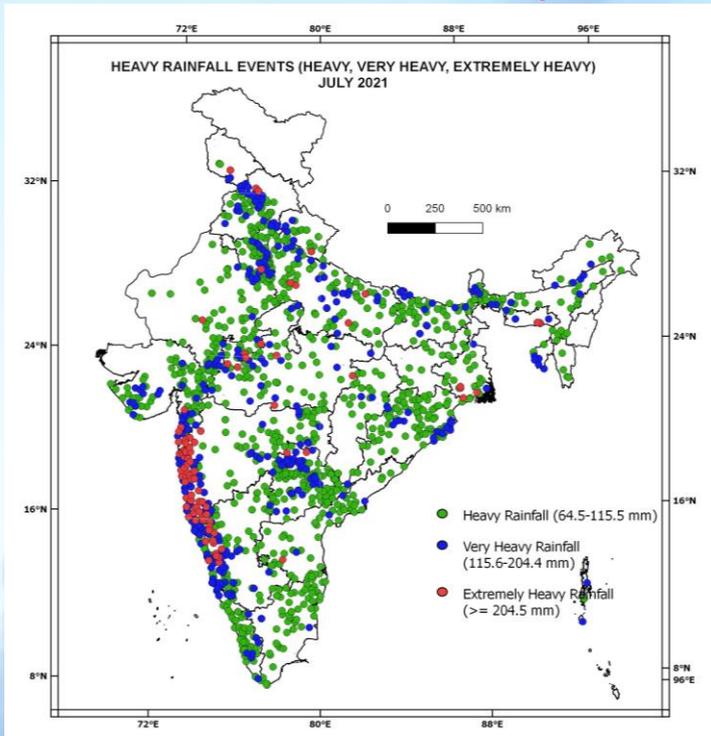
## Number of stations reported Heavy Rainfall events occurred in the month of June during last 5 years.

YEAR	Rainfall Category	Number of stations reported Events
2017	V. Heavy (115.6 to 204.5)	248
	Ext Heavy (more than 204.5)	36
2018	V. Heavy (115.6 to 204.5)	380
	Ext Heavy (more than 204.5)	64
2019	V. Heavy (115.6 to 204.5)	211
	Ext Heavy (more than 204.5)	52
2020	V. Heavy (115.6 to 204.5)	262
	Ext Heavy (more than 204.5)	36
2021	V. Heavy (115.6 to 204.5)	277
	Ext Heavy (more than 204.5)	35



## Heavy Rainfall Events occurred in July 2021

Location of Heavy Rainfall events occurred in the month of July 2021

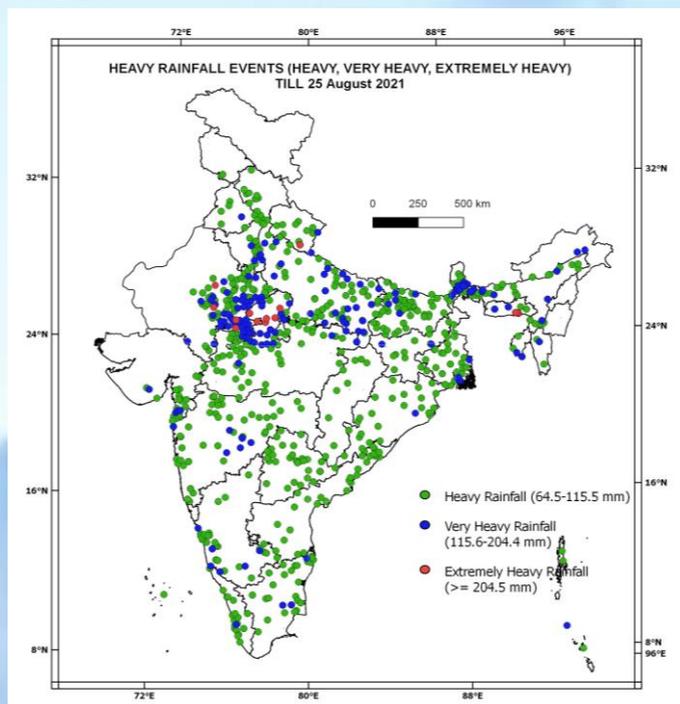


Number of stations reported Heavy Rainfall events occurred in the month of July during last 5 years.

YEAR	Rainfall Category	Number of stations reported Events
2017	V. Heavy (115.6 to 204.5)	709
	Ext Heavy (more than 204.5)	106
2018	V. Heavy (115.6 to 204.5)	741
	Ext Heavy (more than 204.5)	117
2019	V. Heavy (115.6 to 204.5)	753
	Ext Heavy (more than 204.5)	161
2020	V. Heavy (115.6 to 204.5)	447
	Ext Heavy (more than 204.5)	90
2021	V. Heavy (115.6 to 204.5)	567
	Ext Heavy (more than 204.5)	112

## Heavy Rainfall Events occurred in August 2021

Location of Heavy Rainfall events occurred in the month of August 2021

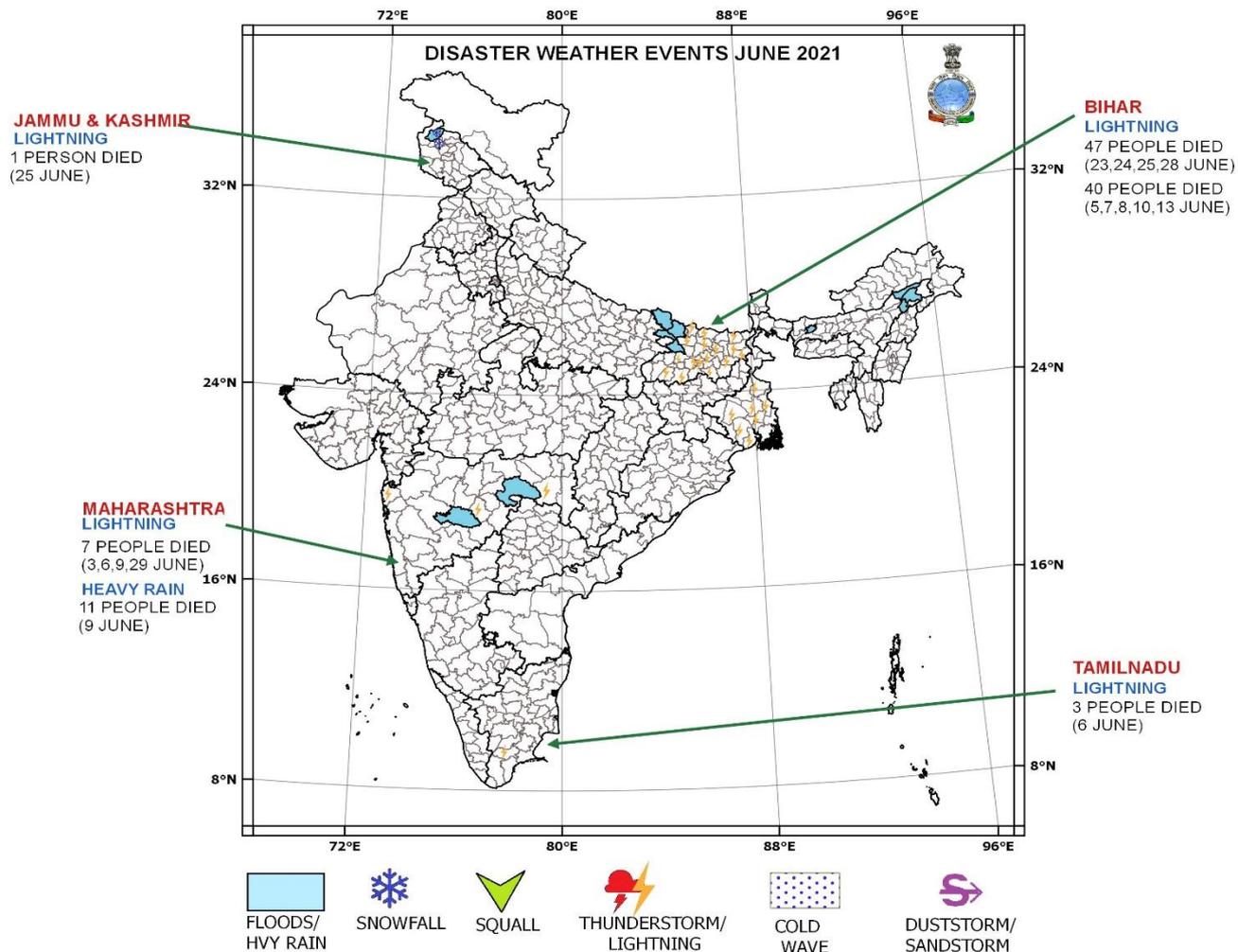


Number of stations reported Heavy Rainfall events occurred in the month of August during last 5 years.

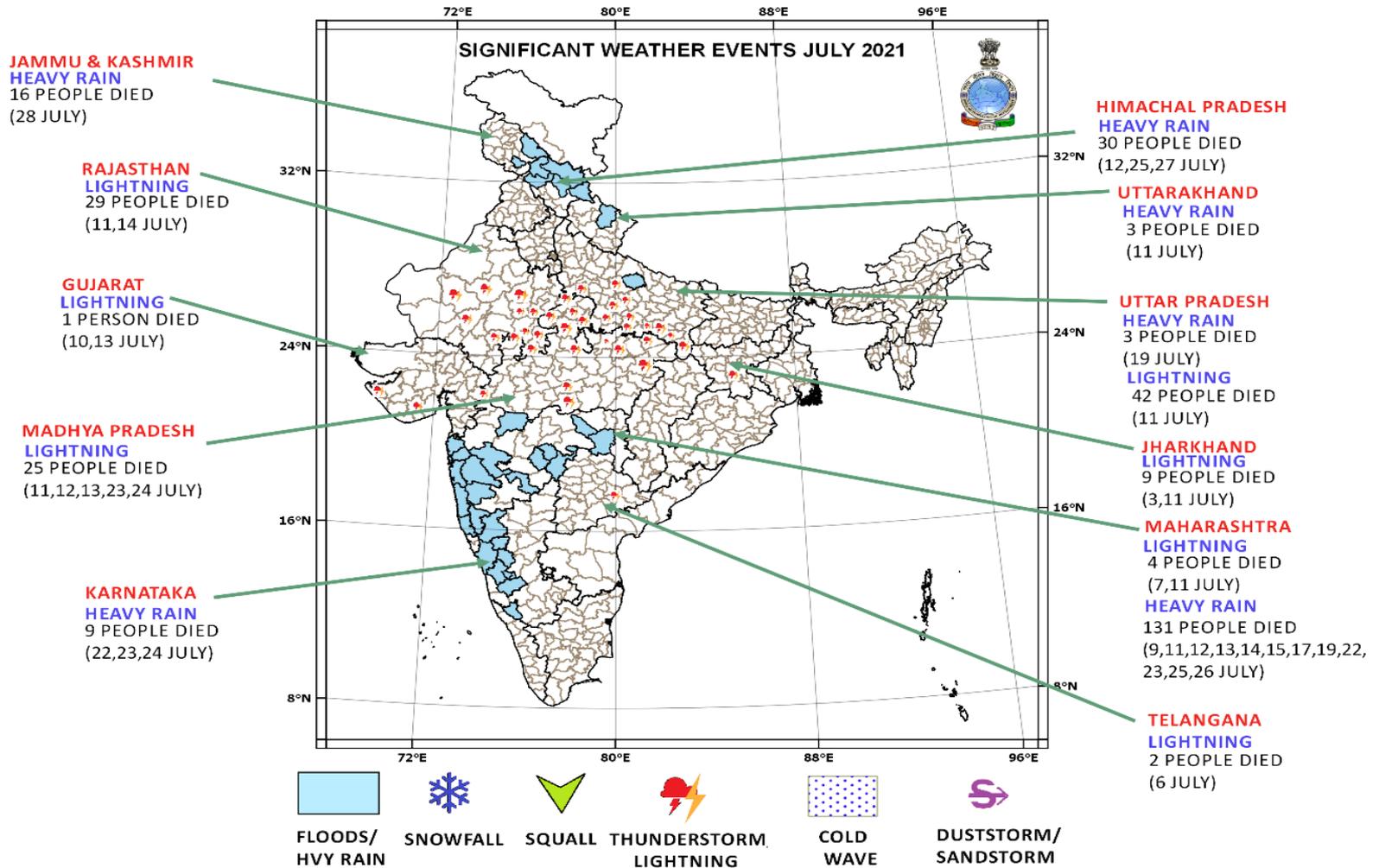
YEAR	Rainfall Category	Number of stations reported Events
2017	V. Heavy (115.6 to 204.5)	401
	Ext Heavy (more than 204.5)	90
2018	V. Heavy (115.6 to 204.5)	510
	Ext Heavy (more than 204.5)	96
2019	V. Heavy (115.6 to 204.5)	987
	Ext Heavy (more than 204.5)	282
2020	V. Heavy (115.6 to 204.5)	1008
	Ext Heavy (more than 204.5)	165
2021	V. Heavy (115.6 to 204.5)	221
	Ext Heavy (more than 204.5)	24



# Significant Weather Events June 2021



# Significant Weather Events July 2021



# IMD's Seamless Forecasting Strategy

IMD has a seamless forecasting strategy. IMD issues forecasts and warnings on different time scales and for different spatial scales:

- Nowcasting- up to six hours for all types of severe weather at all districts and 1085 stations
- Short to medium range (up to 10 days) forecasts for rainfall over cities, Blocks, districts and meteorological subdivisions
- Extended range (up to 4 weeks) forecasts for All India, homogenous regions and meteorological subdivisions
- Seasonal Forecasts (one season in advance) for All India and homogenous regions and Monsoon Core Zone.

<https://mausam.imd.gov.in>

The screenshot displays the homepage of the India Meteorological Department (IMD) website. The header includes the department's name, logo, and navigation links. The main content area is divided into several sections:

- Current Weather:** A map of India showing weather conditions across various cities like Gangtok, Panaji, Amravati, Miraj, and Port Blair.
- New Delhi Weather:** A detailed weather card for New Delhi showing a temperature of 34.2°C, 46% humidity, and a southerly wind of 7.5 km/h. It also lists sunrise (05:24 IST) and sunset (19:14 IST) times.
- Our Services:** A grid of service categories including Rainfall Information, Monsoon, Cyclone, Agromet Advisory Services, Climate Services, and City Forecast.
- Forecasts:** A list of forecast types such as Short to Medium Range Model Guidance, Extended Range Model Guidance, Seasonal Forecast, Quantitative Precipitation Forecast, All India Weather Forecast Bulletin, 5-day Sub-Divisional Rainfall Forecast, and 5-day District-Wise Rainfall Forecast.
- Current Weather across Major Cities:** A table providing weather data for eight major Indian cities.

City	Temperature	Wind	Humidity	Weather Icon
Mumbai	35°	Northwesterly 11.1km/h	56%	Sunny
Bengaluru	28.6°	Northeasterly 5.4km/h	49%	Partly Cloudy
Chennai	36.8°	Easterly 15.5km/h	58%	Partly Cloudy
Hyderabad	37.8°	Northerly 5.4km/h	43%	Partly Cloudy
Kolkata	35.2°	West-southwesterly 11.1km/h	53%	Sunny
Ahmedabad	40.4°	Southerly 9.3km/h	38%	Partly Cloudy
Pune	37.6°	Southerly 1.8km/h	34%	Partly Cloudy
Delhi	34.2°	Southerly 7.5km/h	46%	Partly Cloudy

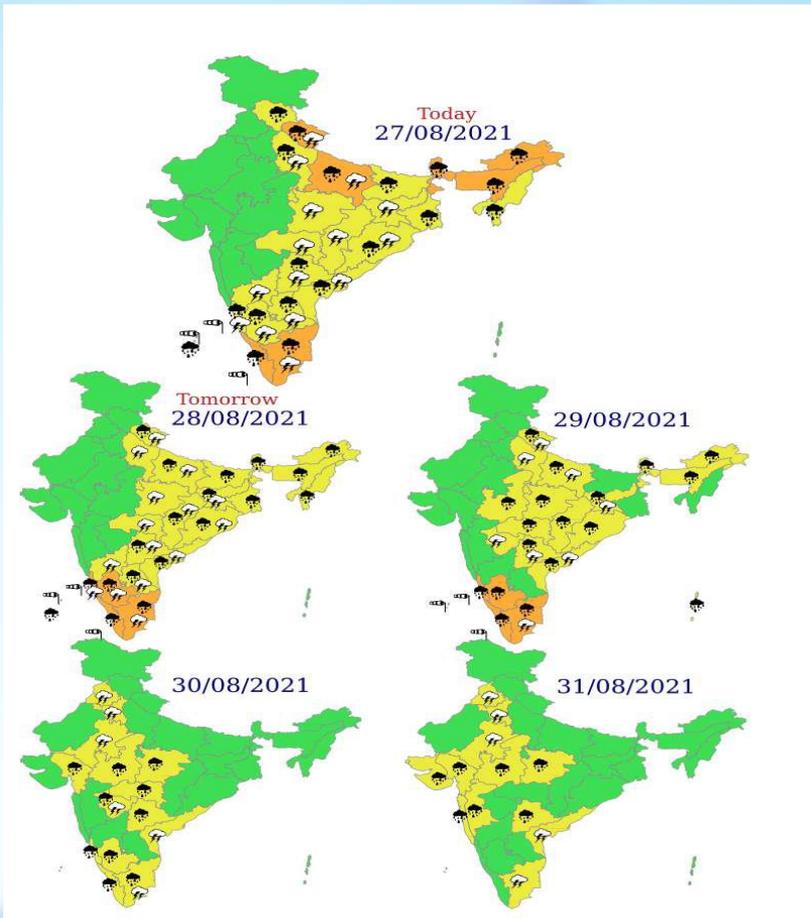
# Forecast For Next Five Days

Fairly widespread to widespread rainfall activity with isolated heavy falls very likely over Odisha, Andhra Pradesh during 27-29; Telangana during 27-31; Chhattisgarh & Jharkhand 28th-29th; Vidarbha & Madhya Pradesh 29-31; Gujarat region 30-31; Marathwada on 30; north Konkan and north Madhya Maharashtra on 31 August.

Widespread rainfall activity with isolated heavy to very heavy falls very likely to continue over Northeast India, Sub-Himalayan West Bengal & Sikkim till 27th August and reduce thereafter with isolated heavy rainfall over the region.

Fairly widespread to widespread rainfall activity with isolated heavy to very heavy falls very likely over Coastal & SI Karnataka, Tamilnadu and Kerala & Mahe during next 3 days. Isolated extremely heavy falls also likely over ghat areas of Tamilnadu and Kerala & Mahe on 28th & 29th August.

Fairly widespread to widespread rainfall activity with isolated heavy falls very likely to continue over Uttarakhand, Bihar and East Uttar Pradesh till 29th August. Isolated heavy to very heavy falls likely over Uttarakhand and East Uttar Pradesh during next 24 hours. Light/moderate isolated to scattered rainfall activity likely over rest parts of Northwest India during 28th-31st August



**WARNING**

WARNING (TAKE ACTION)  
ALERT (BE PREPARED)  
WATCH (BE UPDATED)  
NO WARNING (NO ACTION)

**Probabilistic Forecast**

Terms	Probability of Occurrence (%)
Unlikely	< 25
Likely	25 - 50
Very Likely	50 - 75
Most Likely	> 75

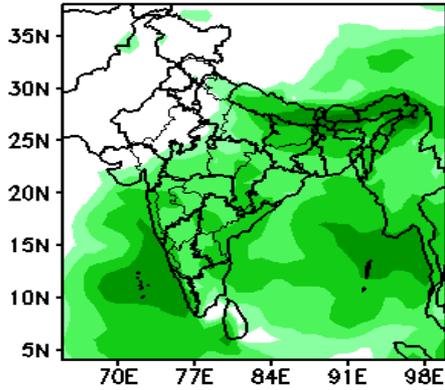
Heavy Rain   
 Heavy Snow   
 Thunderstorm   
 Dust Storm  
 Strong Winds   
 Visibility   
 Cyclone   
 Squall/ Hail  
 Frost   
 Cold Wave   
 Heat Wave   
 Sea State



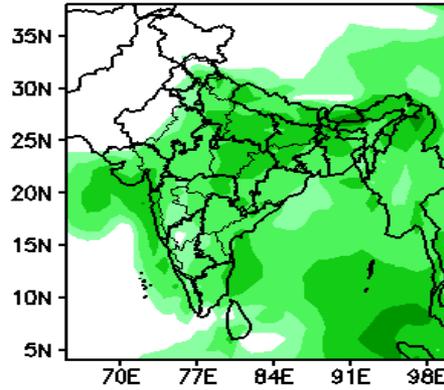
# Forecast For Next Four Weeks: Rainfall

## Forecast Rainfall (mm/day)

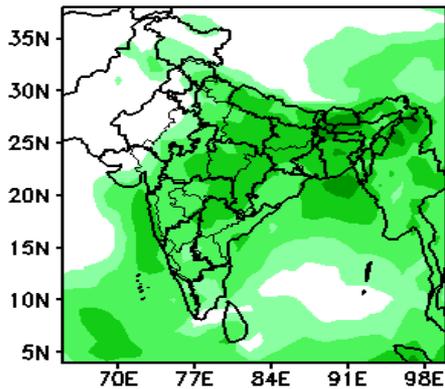
(Week1: 27Aug-02Sep)



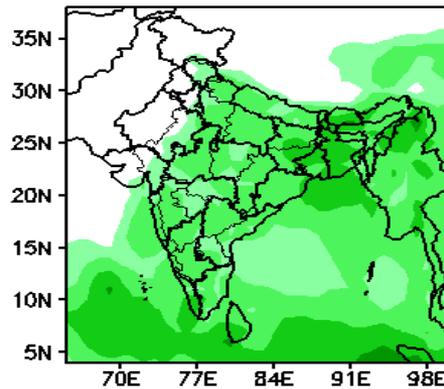
(Week2: 03Sep-09Sep)



(Week3: 10Sep-16Sep)



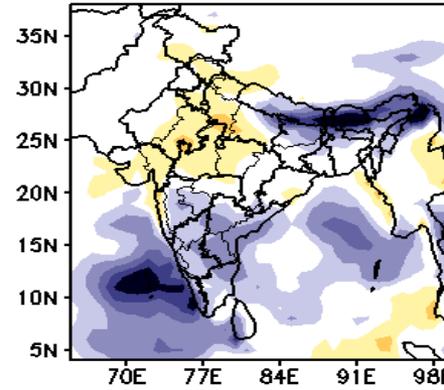
(Week4: 17Sep-23Sep)



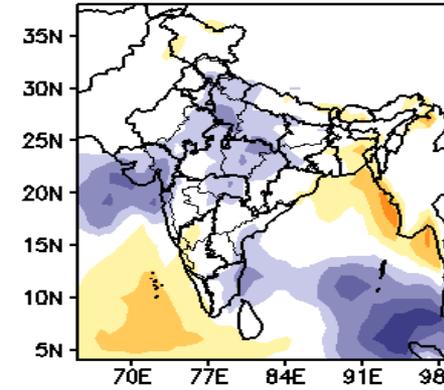
2.5 5 10 20 40

## Forecast Rainfall Anomaly (mm/day)

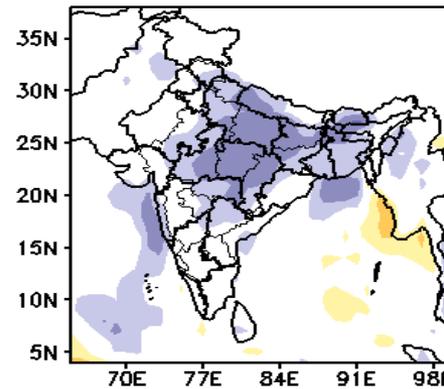
(Week1: 27Aug-02Sep)



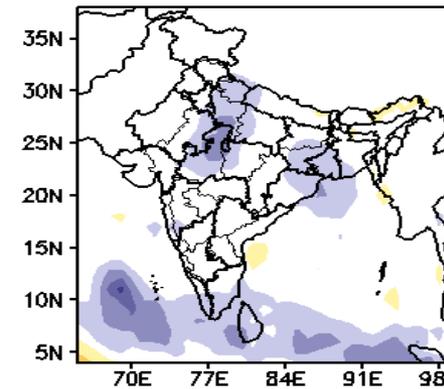
(Week2: 03Sep-09Sep)



(Week3: 10Sep-16Sep)



(Week4: 17Sep-23Sep)



-20 -15 -10 -5 -2 2 5 10 15 20

Overall rainfall activity during week 1, is very likely to be near normal.

During week 2, overall normal to above normal rainfall activity likely over central & adjoining northwest and north Peninsular India; near normal rainfall activity likely over most parts of east & northeast India and below normal rainfall activity likely over most parts of south Peninsular India



# Minimum Temperature

MME Bias corrected forecast Tmin (Deg

(Week1: 27Aug-02Sep)

(Week2: 03Sep-09Sep)

MME forecast Tmin anomaly (Deg C)

(Week1: 27Aug-02Sep)

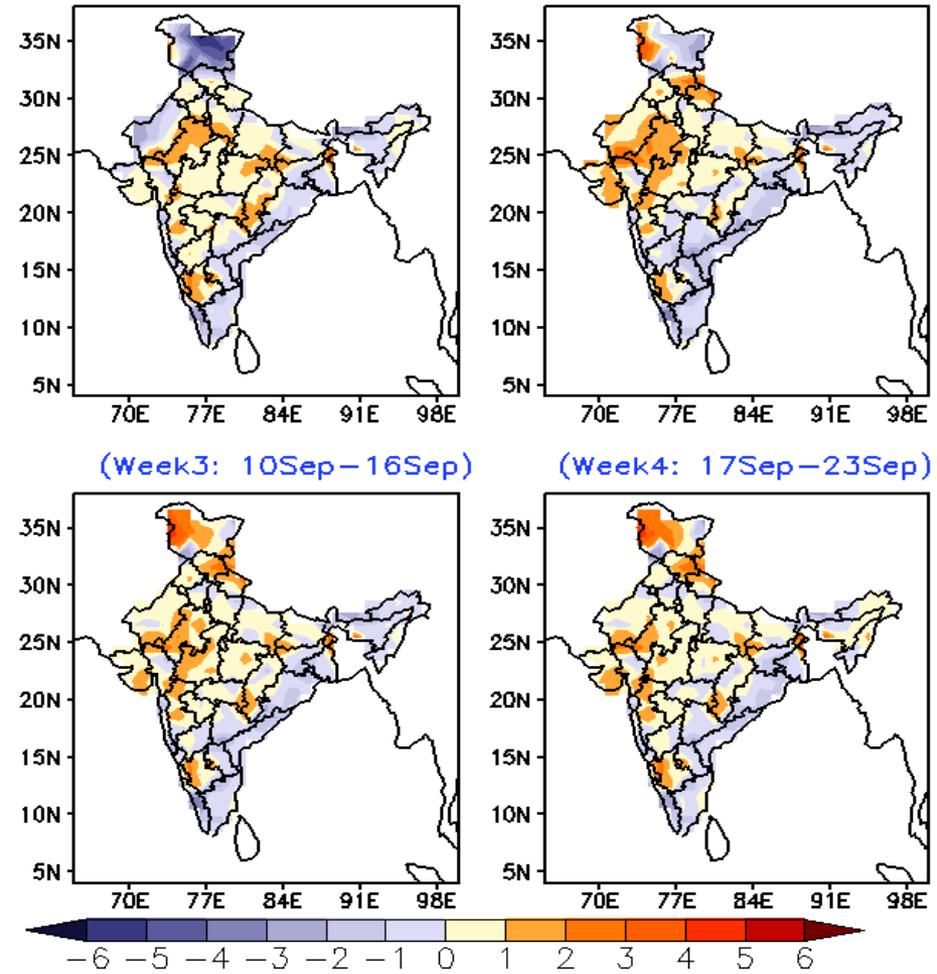
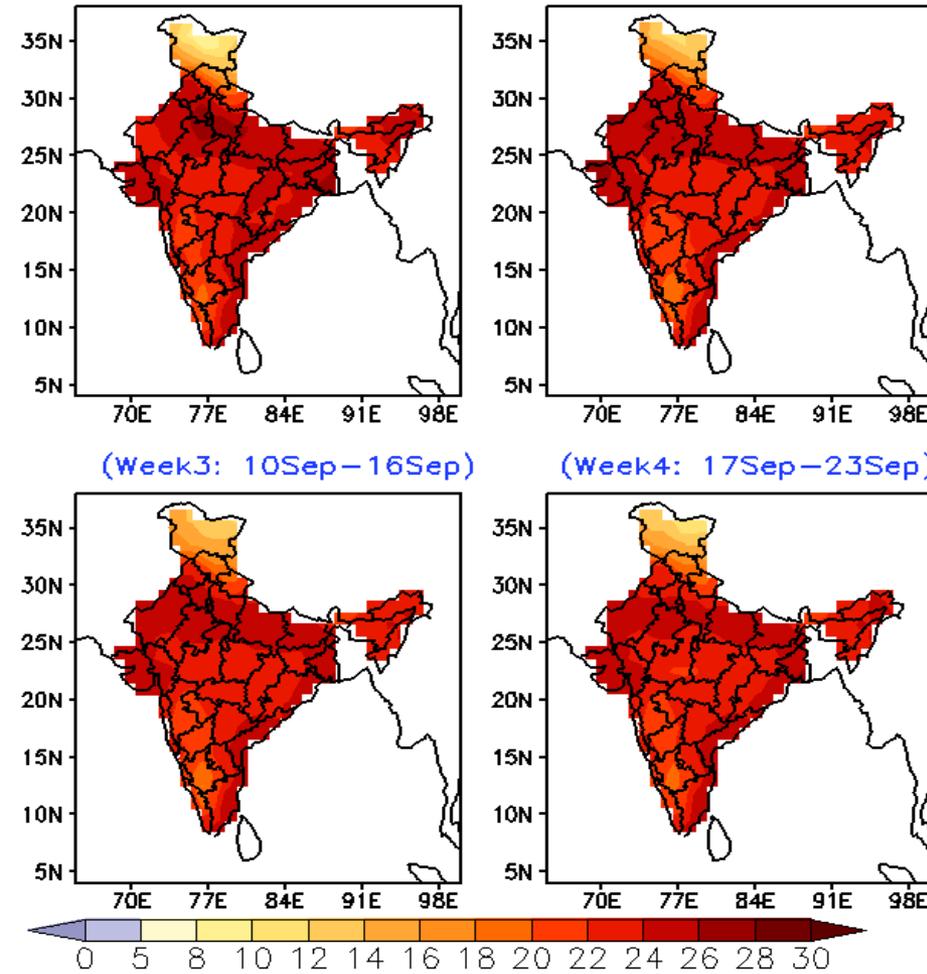
(Week2: 03Sep-09Sep)

(Week3: 10Sep-16Sep)

(Week4: 17Sep-23Sep)

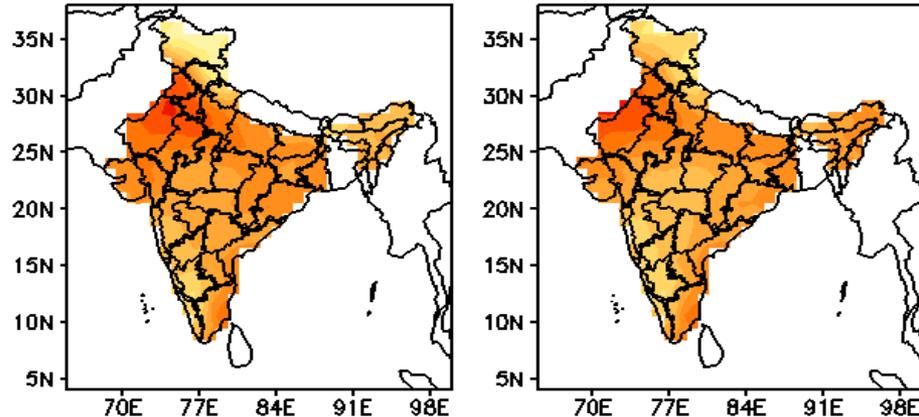
(Week3: 10Sep-16Sep)

(Week4: 17Sep-23Sep)

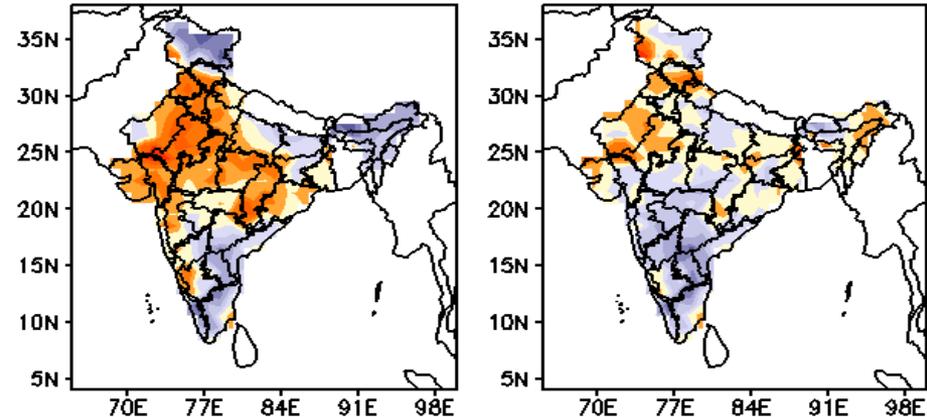


# Maximum Temperature

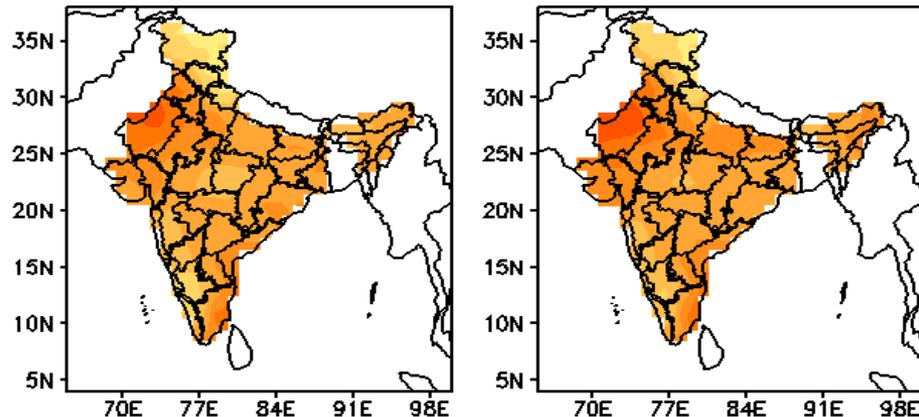
MME Bias corrected forecast Tmax (Deg)  
(Week1: 27Aug-02Sep) (Week2: 03Sep-09Sep)



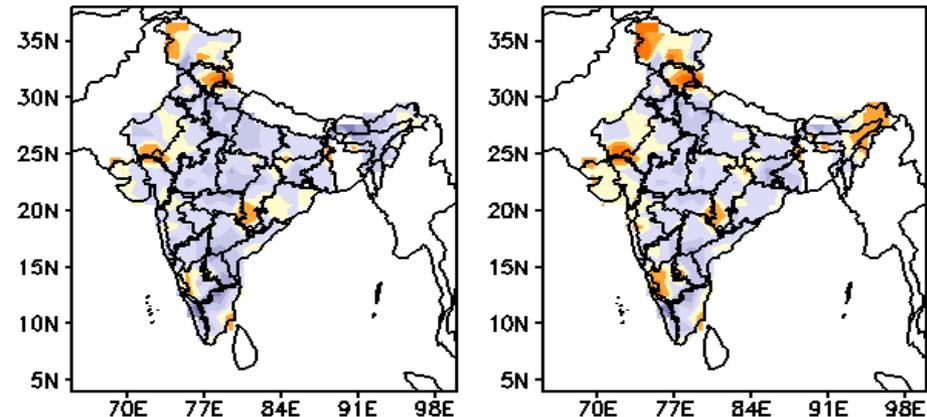
MME forecast Tmax anomaly (Deg C)  
(Week1: 27Aug-02Sep) (Week2: 03Sep-09Sep)



(Week3: 10Sep-16Sep) (Week4: 17Sep-23Sep)



(Week3: 10Sep-16Sep) (Week4: 17Sep-23Sep)

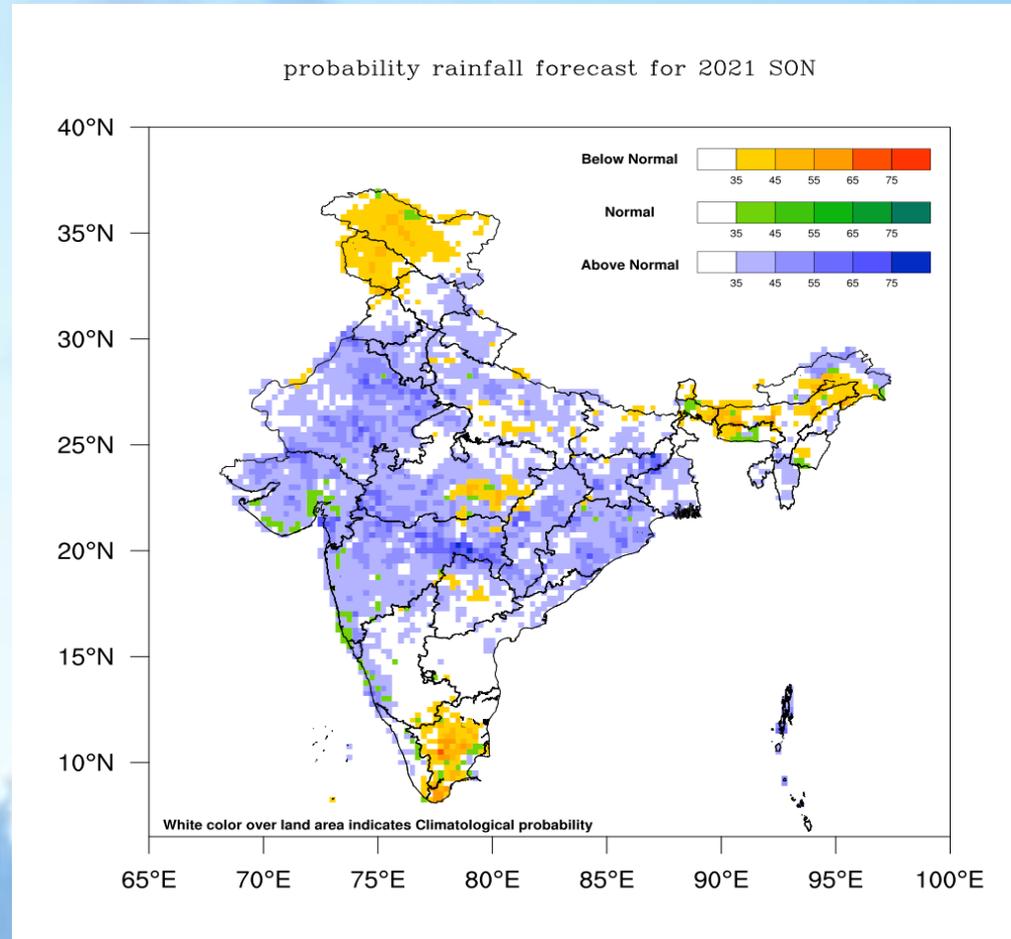


20 22 24 26 28 30 32 34 36 38 39 40 41 42

-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

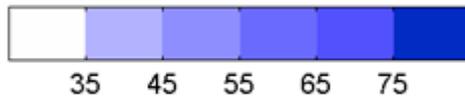
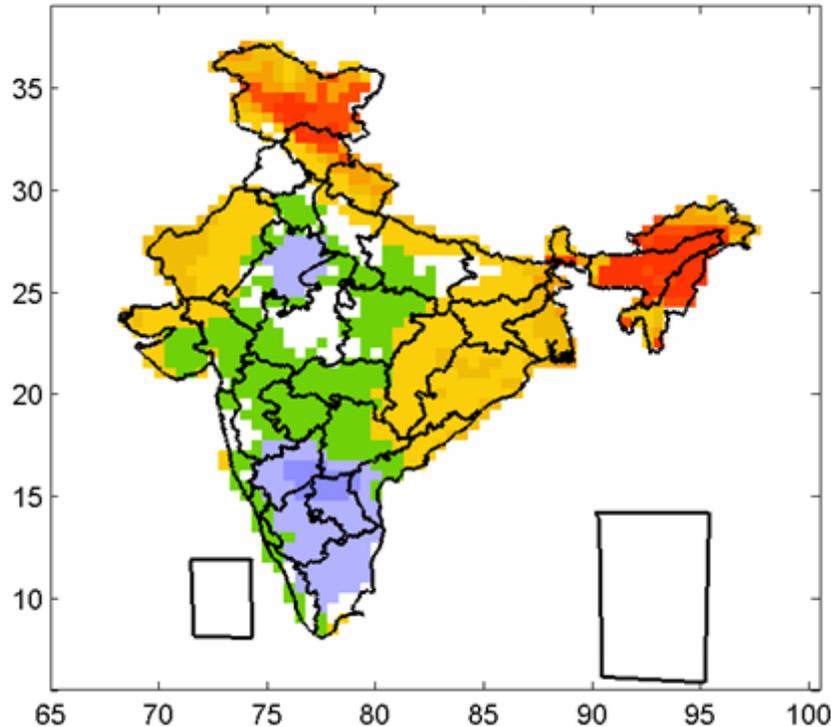


# Probability Forecast For Next Three Months (September to November): Rainfall

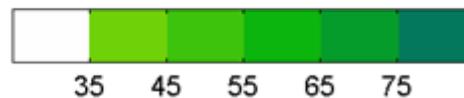


# Probability Forecast For Next Three Months (September to November): Temperature

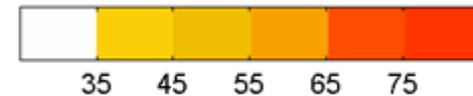
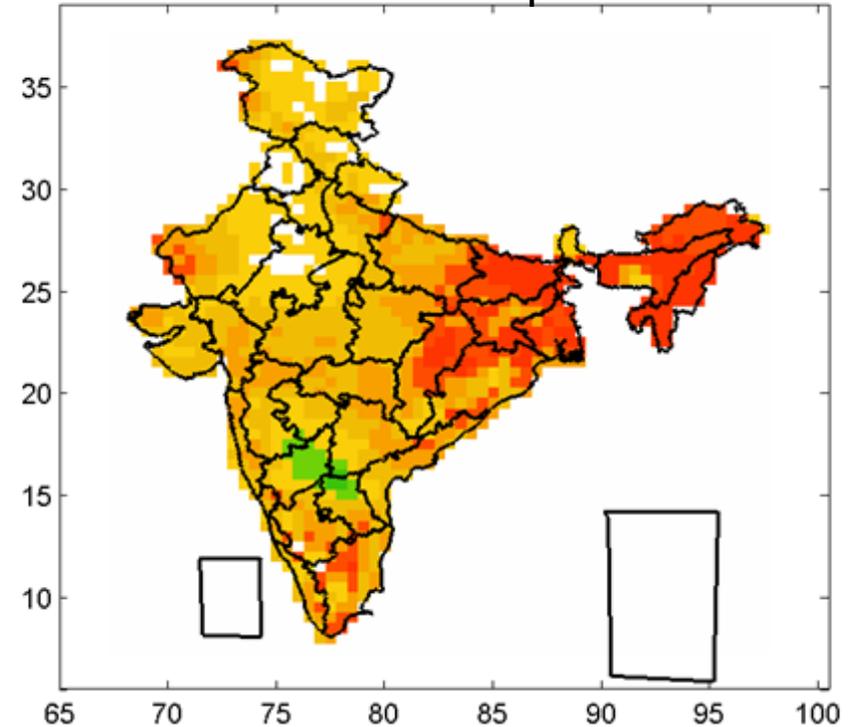
## Maximum Temperature



Below Normal



## Minimum Temperature



Above Normal





**Thank you**



**भारत मौसम विज्ञान विभाग  
INDIA METEOROLOGICAL DEPARTMENT**

