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Climate Research and Services (CRS)

Climate Summary for the month of July 2022

1. Monthly Rainfall Scenario (01 to 31 July, 2022)

Rainfall over the country as a whole for the month of July 2022 shows that it has recorded 327.7 mm, which is 17% more than its Long Period Average (LPA) 280.5 mm. This Rainfall over all India (327.7 mm) is second highest since 2001 after the year 2005 (333.4 mm).

Rainfall over homogeneous region of South Peninsula (328.1 mm) is second highest since 1901 after the year 1961 (344 mm). Rainfall over homogeneous region of Central India (458.7 mm) is fifth highest since 1901 after the years 1944 (521.8 mm), 1932 (489.4 mm), 1942 (475.7 mm) and 1956 (468.9 mm). Rainfall over homogeneous region of east and northeast India (234.6 mm) is lowest since 1901

The monthly rainfall for July 2022 is given in the table below:

Regions	Actual Rainfall (mm)	Normal Rainfall (mm)	% Departure from LPA
Country as a whole	327.7	280.5	16.8
Northwest India	232.3	209.7	10.8
Central India	458.7	321.3	42.8
South Peninsula	328.1	204.5	60.4
East & northeast India	234.6	424.1	- 44.7

During this month, 10 sub-divisions received large excess, 9 excess, 8 normal and 8 deficient and one received large deficient rainfall.

The observed spatial rainfall (normal rainfall for the period 1971 to 2020) and its departures from normal for the month of July 2022 is given in Figure 1.

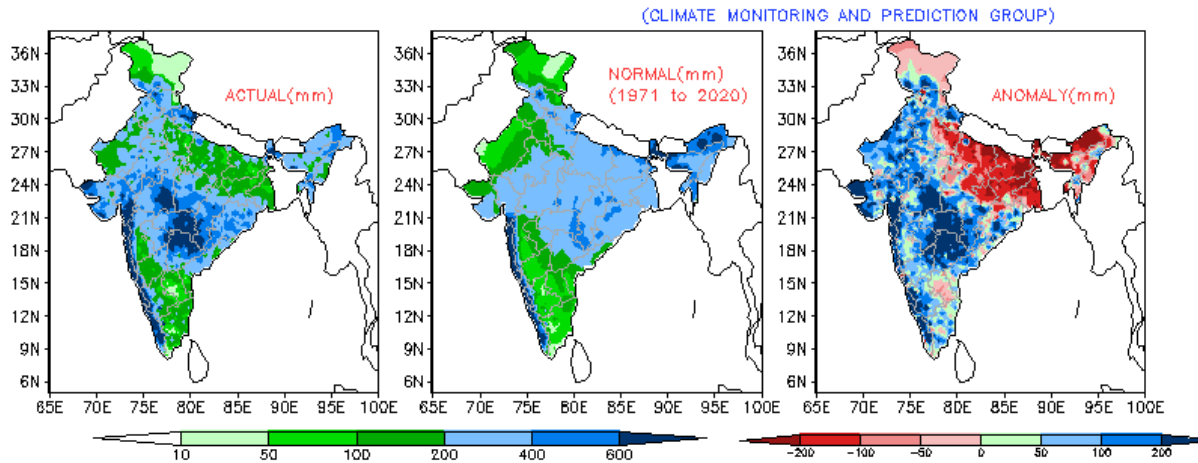


Fig 1: Observed spatial Rainfall pattern for the month of July 2022 over India and their departure from normal (1971 to 2020 period).

2. Advance of southwest monsoon over the country

On 02nd July 2022, the southwest monsoon further advanced into remaining parts of Arabian Sea, Gujarat and Rajasthan states and thus covered the entire country on 02nd July 2022 against the normal date of 08th July (6 days ahead of the normal date of monsoon coverage for entire India) as shown in Fig.2.

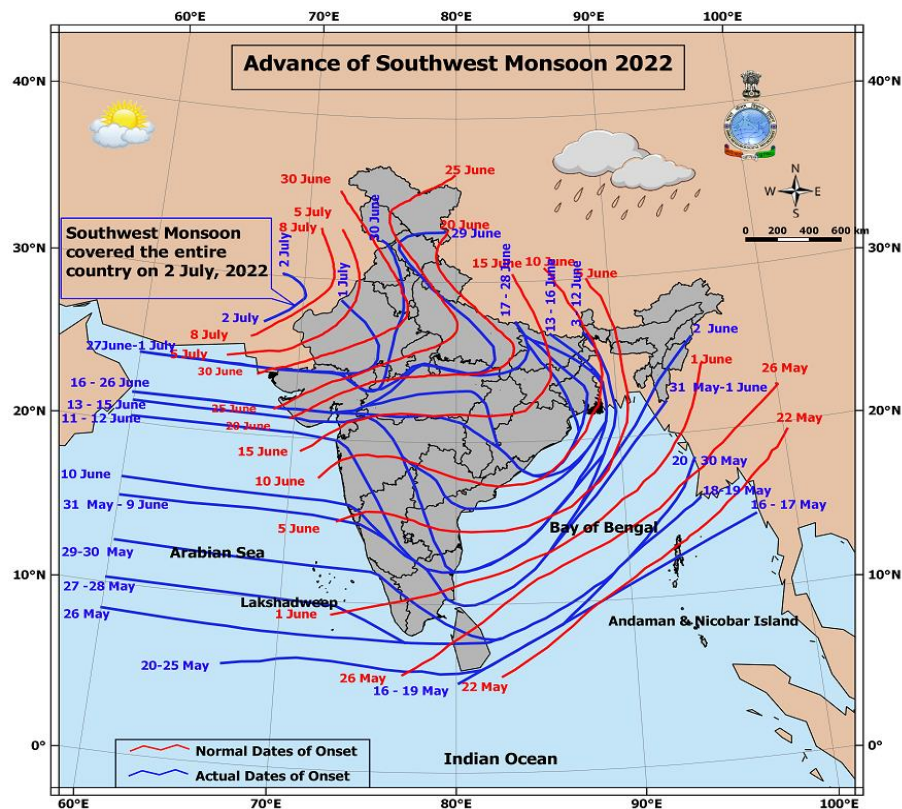


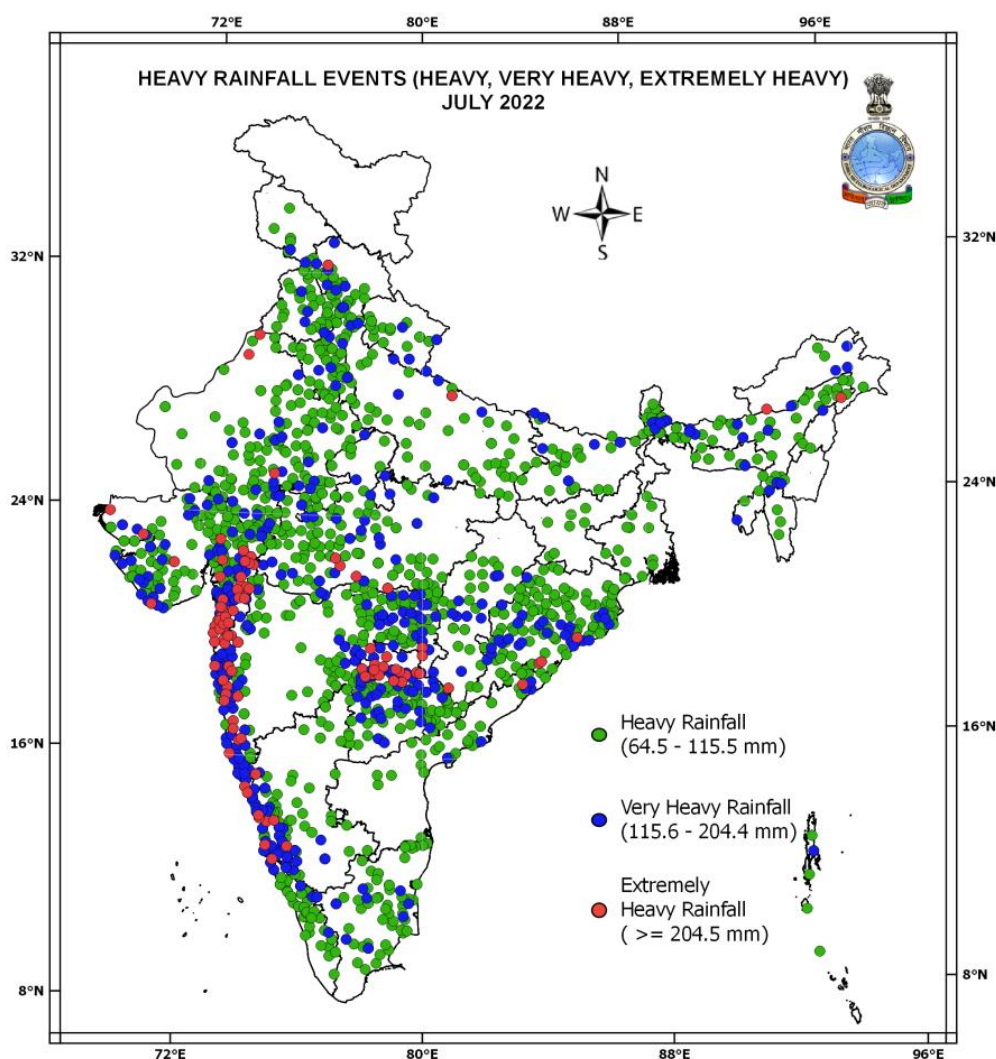
Fig.2 Coverage of Southwest Monsoon for entire India.

3. Frequency of Heavy Rainfall events

The July 2022 witnessed extremely heavy rainfall events mainly along west coast and over Telangana. The location of occurrences of heavy, very heavy and extremely heavy rainfall events is shown in the Figure 3. The details of heavy rainfall events occur in the month of July 2022 is given below.

July Month	extremely heavy rainfall (>204.5 mm)	very heavy rainfall (115.6 to 204.4 mm)	heavy rainfall (64.5 to 115.5 mm)
Number of stations reported	99	349	861
Number of stations reported multiple events	21	176	626

Out of total 1309 stations, 99 stations reported extremely heavy rainfall (>204.5 mm), 349 station reported very heavy rainfall (115.6 to 204.4 mm) and 861 stations reported heavy rainfall (64.5 to 115.5 mm of rainfall) during this month.



(Only highest category of rainfall event considered for a station)

Fig 3: The location of occurrences of extremely heavy rainfall events in the month July 2022.

Some stations received record rainfall (24 hour).The table below shows stations received 24-hour record rainfall and its previous record.

STATION	24 HOUR RECORD RAINFALL IN July 2022(mm)#	DATE	PREVIOUS RAINFALL RECORD(mm)	DATE
PAURI	67	22	64.3	03-07-1983
PATHANKOT	73	21	47	16-07-2017
SRIGANGANAGAR	260	15	242.5	18-07-1978
VIDISHA	200	11	129	22-07-1971
ARVI	123.2	5	36.6	03-07-1980
CHAMPA	170	4	142	28-07-1952
MEDAK	192	23	168	23-07-1989
HAKIMPET	117.4	23	95	21-07-2012
RAMGUNDAM	228.3	10	177.4	19-07-2013
BHILWARA	205	26	139.8	14-07-1975
CHAMARAJANAGAR	38.5	31	36.6	25-07-2007
SRINAGAR	89.0	28	59.4	28-07-2003

based on real time available data

4. Chief synoptic features during July 2022

During July, 4 low pressure areas formed over North Indian Ocean. Out of this, one depression formed over Arabian Sea (16 -17 July), One well marked low pressure area formed over Bay (9 -19 July) and two over land {one well marked low pressure area (4 – 8 July) and one low pressure area (24 – 27 July)}. Track of the depression is shown in figure 4.

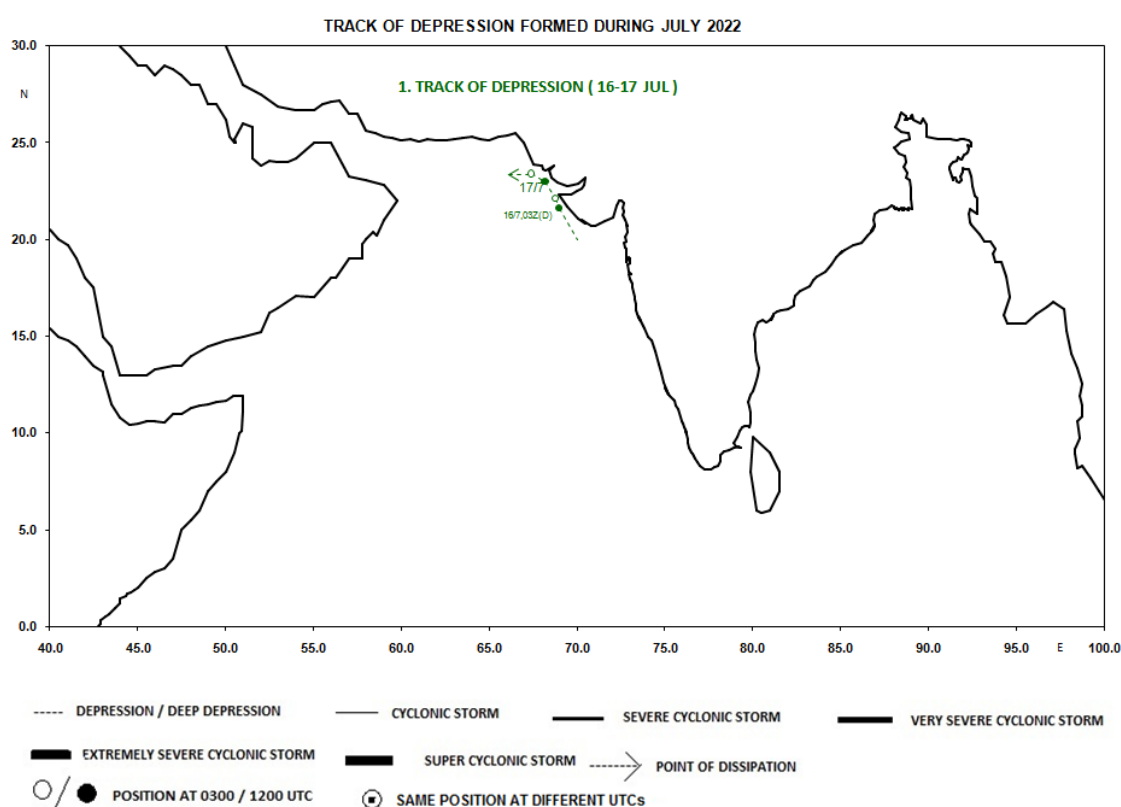


Figure 4: Tracks of Depression formed during July 2022.

The low-pressure systems formed during the monsoon season contribute heavy and very heavy rainfall over many parts of the country. The figure 5 shows number of low-pressure systems during July from 2000 to 2022.

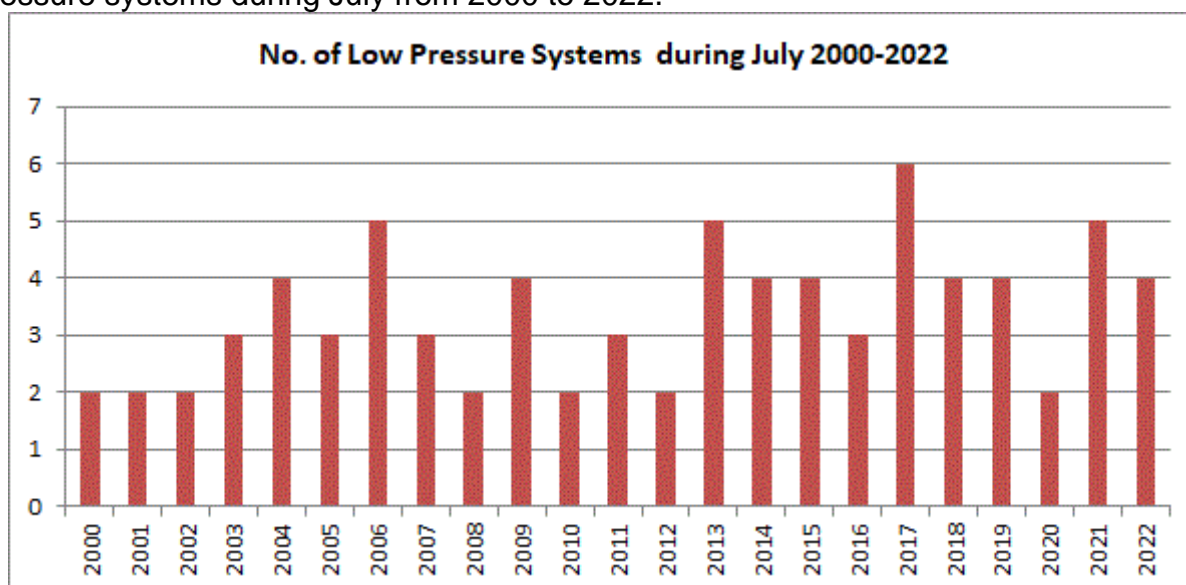


Figure 5. Number of low-pressure systems during July from 2000 to 2022.

The number of Low-Pressure System days had been 21 in July 2022 against the normal of 13.56. The low-pressure system, which developed in July month for the year 2017 to 2022 given in the table below;

Year	No. of Low-Pressure Systems	Low-Pressure System days
2017	6	14
2018	4	13
2019	4	11
2020	2	6
2021	5	19
2022	4	21
Climatology (1901-2020)	3.28	13.48

5. Characteristics of Temperatures for the month of July 2022

The observed average maximum, average minimum and mean temperature for the country as a whole during July 2022 are 31.65 °C, 24.68 °C and 28.17 °C respectively, against the normal of 31.62 °C, 24.33 °C and 27.98 °C based on period 1981-2010. Thus, the average minimum temperature, mean temperature are above normal by 0.36 °C, 0.19 °C respectively and average maximum temperature is normal by 0.02 °C for the country as a whole. The climatological data based on the period of 1981 to 2010 are used to calculate the normal and hence the anomaly (Actual average temperature in 2022 - normal temperature based on data of 1981-2010). Figure 6 shows time series of monthly average maximum, average minimum and mean temperature over all India for the month of July during 1901-2022. The temperatures during July 2022 for all India and homogeneous regions with its ranks since 1901 is given in table 1 and the five extremes for temperature along with year occurrence is given in table 2.

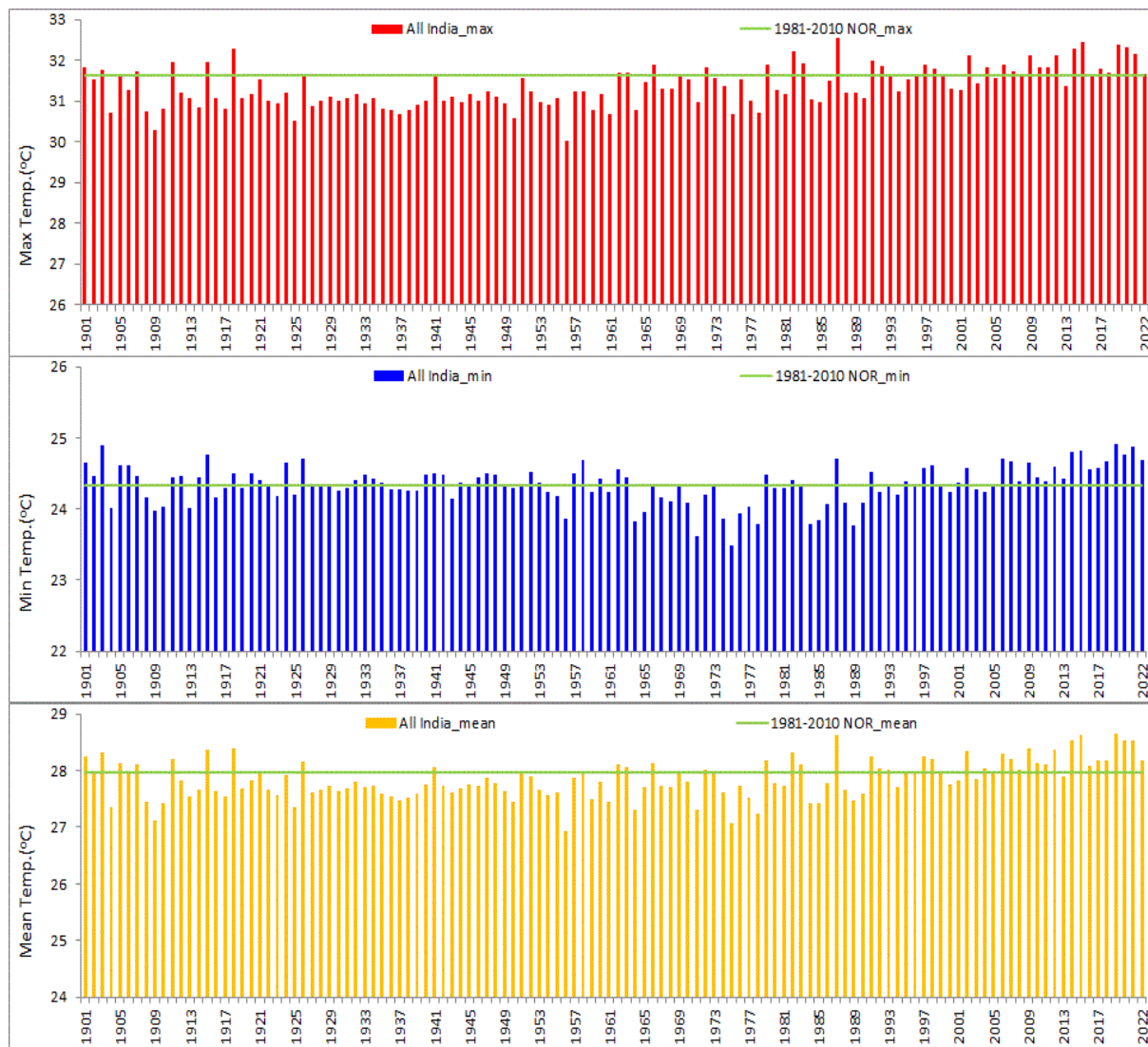


Fig 6: Time series of monthly average maximum, average minimum and mean temperature over all India for the month of July during 1901-2022.

Figure 7 shows time series of monthly average maximum, average minimum and mean temperature over East & Northeast India for the month of July during 1901-2022. Over East & Northeast India during July, the average maximum temperature is ever highest with 33.75 °C in last 122 years for the period 1901-2022 and it broken the earlier ever highest record of 32.66 °C which was in 2009 for the month of the July for the same period. The average minimum temperature is also ever highest with 25.40 °C since 1901 and it broken the earlier ever highest record of 25.25 °C which was in 1942 for the month of the July for the same period and mean temperature is ever highest with 29.57 °C since 1901 and it broken the earlier ever highest record of 28.89 °C which was in 2014 for the month of the July for the same period.

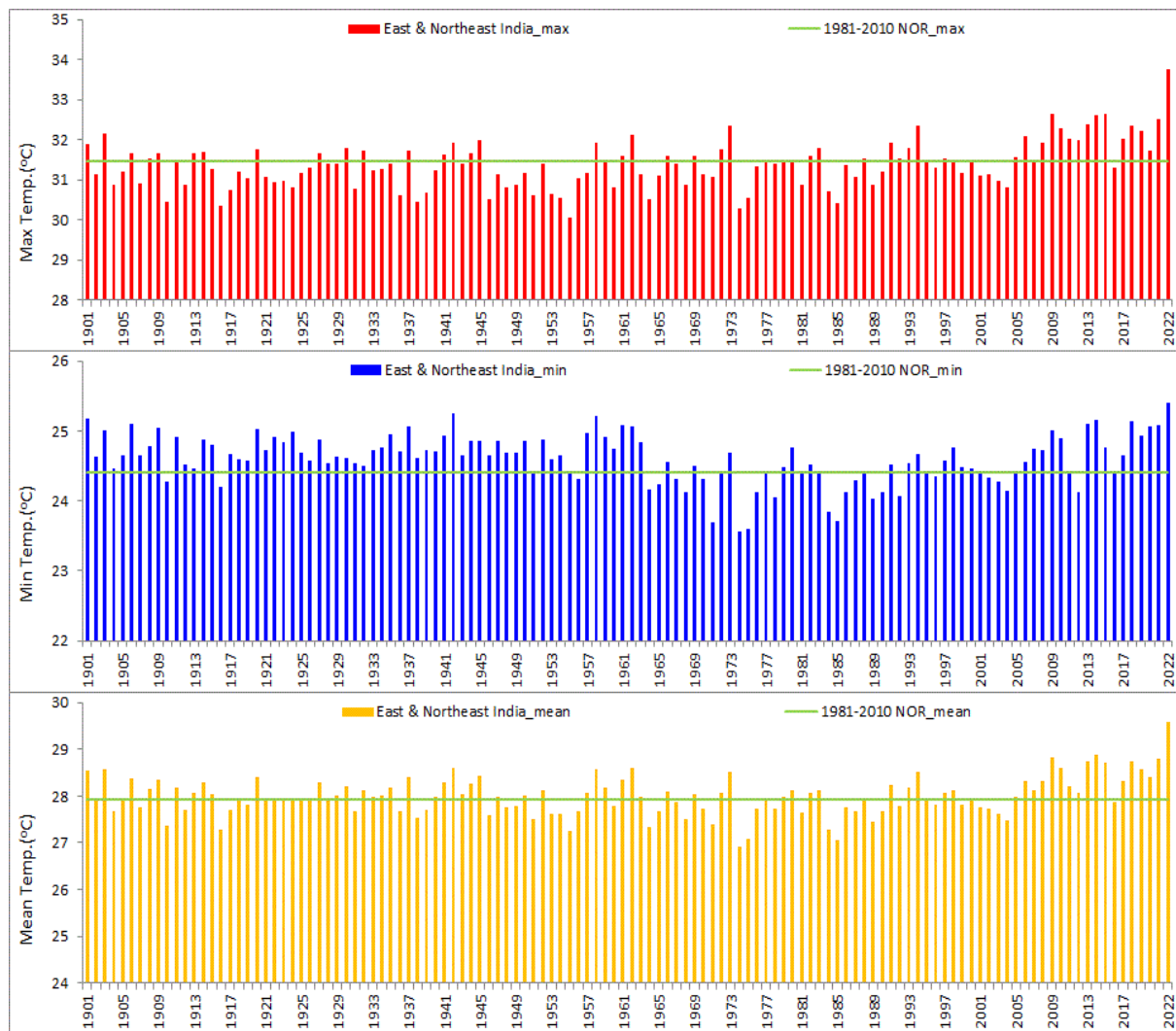


Fig 7: Time series of monthly average maximum, average minimum and mean temperature over East & Northeast India for the month of July during 1901-2022.

Figure 8 shows time series of monthly average minimum temperature over Northwest India for the month of July during 1901-2022. Over Northwest India during July, the average minimum temperature is third highest with 24.37 °C after the years 1903(25.20 °C), 2021(24.42 °C) since 1901.

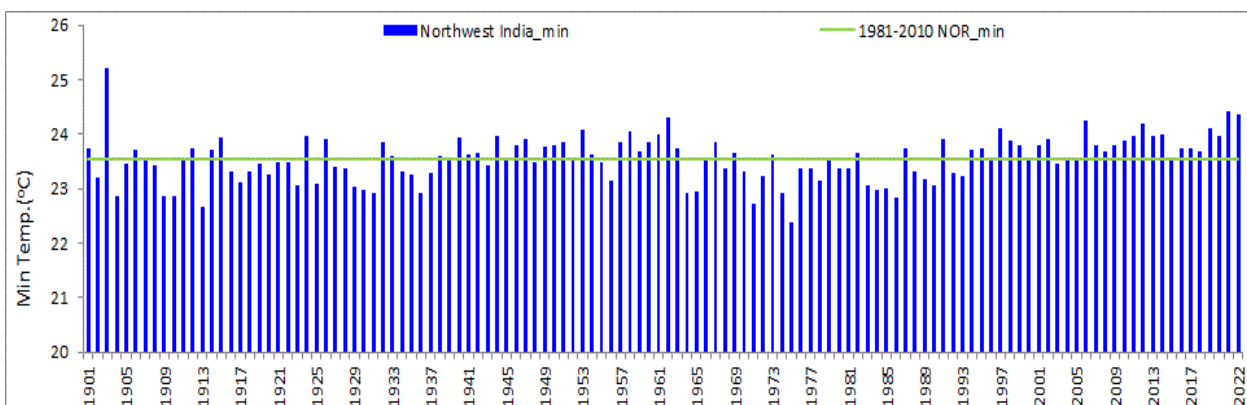


Fig 8: Time series of monthly average minimum temperature over Northwest India for the month of July during 1901-2022.

Table1. The Temperatures during July 2022 for all India and homogeneous regions with its ranks since 1901 are given bellow;

JUL 2022		Max Temp (⁰ C)	Min Temp (⁰ C)	Mean Temp (⁰ C)
ALL INDIA	ACTUAL	31.65	24.68	28.17
	NORMAL	31.62	24.33	27.98
	ANOMALY	0.02	0.36	0.19
	TOP RANK	37	11	24
	BOT RANK	86	112	99
NORTHWEST INDIA	ACTUAL	32.46	24.37	28.41
	NORMAL	32.85	23.56	28.20
	ANOMALY	-0.40	0.81	0.21
	TOP RANK	71	3	38
	BOT RANK	52	120	85
EAST & NORTHEAST INDIA	ACTUAL	33.75	25.40	29.57
	NORMAL	31.45	24.41	27.93
	ANOMALY	2.30	0.99	1.64
	TOP RANK	1	1	1
	BOT RANK	122	122	122
CENTRAL INDIA	ACTUAL	30.63	24.57	27.60
	NORMAL	31.19	24.72	27.96
	ANOMALY	-0.56	-0.15	-0.36
	TOP RANK	69	70	74
	BOT RANK	54	53	49
SOUTH PENINSULAR INDIA	ACTUAL	30.82	24.63	27.73
	NORMAL	31.20	24.54	27.87
	ANOMALY	-0.38	0.09	-0.15
	TOP RANK	61	50	56
	BOT RANK	62	73	67

Note: Values are rounded off to nearest two decimal

Table2. The five highest temperature records with corresponding ranks since 1901 along with year occurrence for East & Northeast India (TMax, TMin, TMean) and Northwest India (TMin) are given in the table below;

East & Northeast India (July 2022)					East & Northeast India (July 2022)					East & Northeast India (July 2022)				
Year	TMax	Normal	Anomaly	Rank	Year	TMin	Normal	Anomaly	Rank	Year	TMean	Normal	Anomaly	Rank
2022	33.75	31.45	2.30	1	2022	25.40	24.41	0.99	1	2022	29.57	27.93	1.64	1
2009	32.66		1.21	2	1942	25.25		0.85	2	2014	28.89		0.96	2
2015	32.64		1.19	3	1958	25.21		0.80	3	2009	28.83		0.90	3
2014	32.62		1.17	4	1901	25.18		0.77	4	2021	28.80		0.87	4
2021	32.51		1.06	5	2014	25.15		0.75	5	2013	28.74		0.82	5

Northwest India (July 2022)				
Year	TMin	Normal	Anomaly	Rank
1903	25.20	23.56	1.64	1
2021	24.42		0.87	2
2022	24.37		0.81	3
1962	24.30		0.74	4
2006	24.26		0.70	5

The observed spatial temperature pattern of monthly average maximum, average minimum and mean temperature over India and their departures from normal (1981 to 2010 period) for the month of July 2022 is given in Figure 9.

TEMPERATURE & ITS ANOMOLY FOR THE MONTH JULY 2022

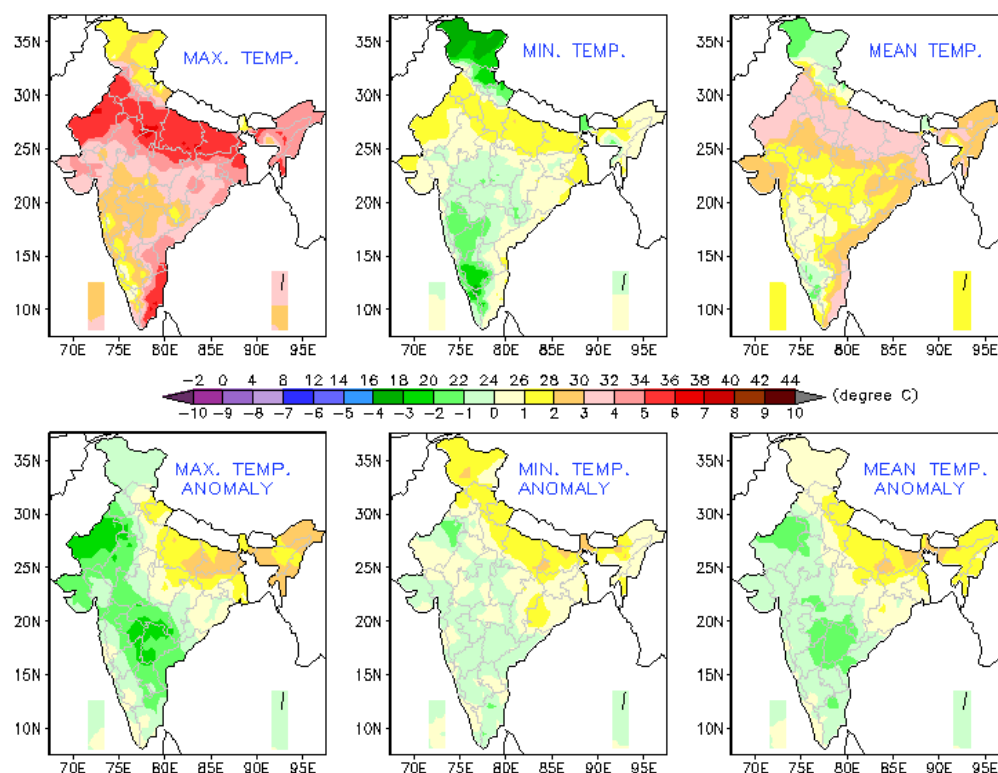


Fig 9: Observed spatial temperature pattern of monthly average maximum, average minimum, and mean temperature over India (top three from left to right) and their departure from normal (1981 to 2010 period) for July 2022 (lower three from left to right).

6. Significant Weather Events for the month of July 2022:

During the month, total 245 persons reportedly claimed dead, 129 persons injured, 56 persons missing & more than 39,000 livestock perished. The details of casualties given below, which are based on real time media reports and other state government agencies.

Fig.10 shows significant weather events during the month. (Based on real time media reports.)

Floods, Heavy Rains & Landslide: Total 128 persons reportedly claimed dead, 55 persons injured, 56 persons missing & 39089 livestock perished, during July 2022, due to Floods, Heavy Rains & Landslide. The details of the area effected by the events are summarized and given in the table below;

DATE	DEATH	INJURED	MISSING	LIVESTOCK	DISTRICT (STATE) AFFECTED
1 to 9 & 12, 14, 17, 19 Jul.	23		1	39045	Cachar, Dibrugarh, Hailakandi, Kamrup Metro, Karimganj, Lakhimpur, Morigaon, Nagaon, Sivasagar (Assam)
11 to 13 Jul.	21				Ahmedabad, Amreli, Bharuch, Chhota Udepur, Dangs, , Gir Somnath, Junagadh, Kheda, Kutch, Narmada, Navsari, Panchmahal, Surat, Tapi, Valsad & parts of Gujarat
6, 9, 11, 12, 13, 19 Jul.	20	14	4	39	Amravati, Gadchiroli, Mumbai Suburban, Nagpur, Nashik, Palghar, Pune, Sindhudurg, Thane (Maharashtra)
8 & 31 Jul.	19	21	40		Anantnag, Kathua (Jammu & Kashmir)
8, 12, 14, 22, 23 Jul.	11	3			Kumaram Bheem Asifabad, Nalgonda, Karimnagar, Medak, Warangal Urban, Yadadri Bhuvanagiri

					(Telangana)
6 Jul.	9	2	11	5	Kullu, Shimla (Himachal Pradesh)
18 to 25 Jul.	7				Eluru, Konaseema, West Godavari (Andhra Pradesh)
19 & 25 Jul.	7				Jodhpur, Pratapgarh (Rajasthan)
4, 6, 22 Jul.	5	9			Chikmagalur, Dakshina Kannada, Gulbarga (Karnataka)
16 Jul.	4				Palakkad, Thrissur (Kerala)
19 Jul.	2	6			Rudraprayag (Uttarakhand)

Lightning: Total 116 persons reportedly claimed dead, 74 persons injured & 43 livestock perished, in this month, because of Lightning. The details of the area effected by the events are summarized and given in the table below;

DATE	DEATH	INJURED	LIVESTOCK	DISTRICT (STATE) AFFECTED
3, 4, 6, 8, 23, 26 Jul.	10	5	3	Baksa, Biswanath, Chirang, Golaghat, Karbi Anglong, South Salmara (Assam)
1, 2, 25, 27 Jul.	41			Arwal, Aurangabad, Banka, Bhojpur, Buxar, Gaya, Gopalganj, Jehanabad, Kamiur, Madhepura, Madhubani, Nalanda, Nawada, Patna, Rohtas, Siwan (Bihar)
11 & 12 Jul.	4	5		Agar Malwa, Mandsaur (Madhya Pradesh)
9 & 30 Jul.	5	1		Chandrapur, Nanded (Maharashtra)
22 Jul.	5	5		Bargarh, Dhenkanal, Keonjhar (Odisha)
5, 6, 8 Jul.	6	4	40	Bundi, Jaipur, Kota (Rajasthan)
3, 20, 25, 26 Jul.	36	28		Amethi, Budaun, Banda, Balrampur, Bulandshahr, Chandauli, Chitrakoot, Fatehpur, Ghazipur, Kaushambi, Prayagraj, Raebareli, Sitapur, Sultanpur (Uttar Pradesh)
30 Jul.	2	20		Giridih (Jharkhand)
26 & 29 Jul.	7	6		Jashpur, Mahasamund (Chhattisgarh)

Thunderstorm: One person reportedly claimed dead on 15th July in Sivasagar district of Assam due to Thunderstorm.

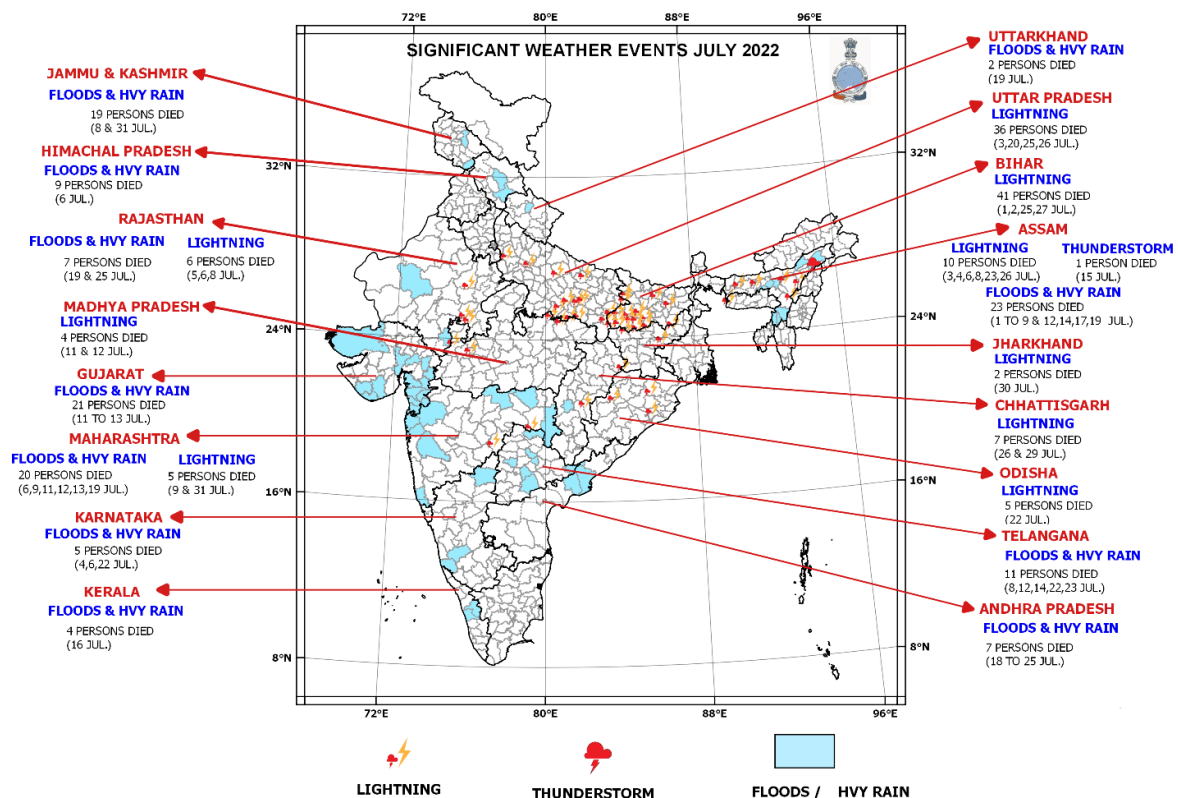


Fig 10: Significant weather events during July 2022 (Based on real-time media report)