



भारत सरकार
Government of India
पृथ्वी विज्ञान मंत्रालय (एम. ओ. ई. एस.)
Ministry of Earth Sciences (MoES)
भारत मौसम विज्ञान विभाग
INDIA METEOROLOGICAL DEPARTMENT
Climate Research and Services (CRS)

Climate Summary for the month of February 2023

1. Monthly Rainfall Scenario (01 to 28 February, 2023)

Rainfall over the country as a whole for the month of February 2023 shows that it has recorded 7.2 mm, which is 68% less than its Long Period Average (LPA) 22.7 mm.

Rainfall over all India (7.2 mm) was sixth lowest since 1901. Prior lowest rainfall years were 1960 (2.7mm), 1902 (4.1mm), 1918 (4.3mm), 1955 (4.4mm) and 1911 (5.5 mm).

Rainfall over homogeneous region of central India was nil which is lowest since 1901.

Daily variation of the rainfall over the country as a whole during the month of February 2023 with normal (1971-2020) and All India rainfall percentage departure from normal for February during 1901-2023 is shown in the figure 1(a) and 1(b) respectively.

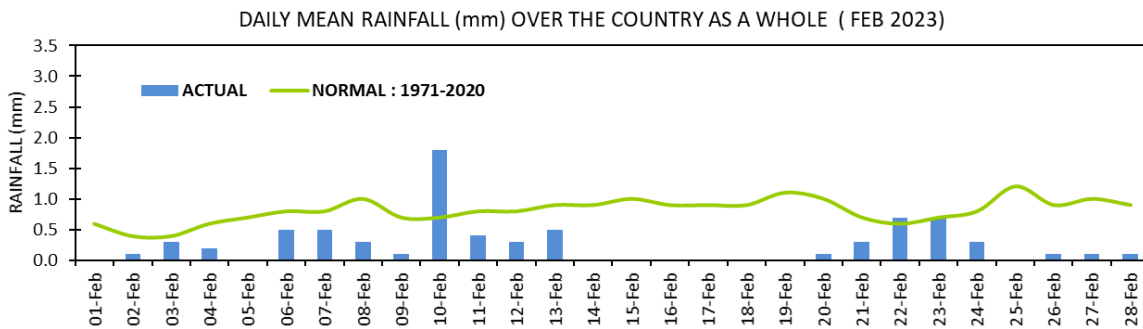


Fig.1 (a): Daily variation of rainfall over the country as a whole during February 2023.

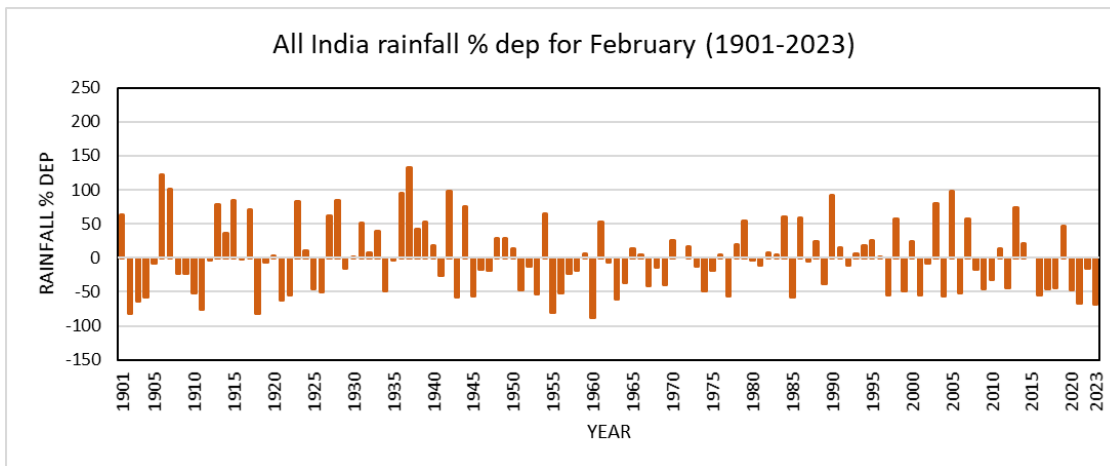


Fig 1(b). All India monthly rainfall percentage departure from normal (1971-2020) for February from 1901-2023.

The monthly rainfall for February 2023 is given in the table below:

Regions	Actual Rainfall (mm)	Normal Rainfall (mm)	% Departure from LPA
Country as a whole	7.2	22.7	-68.0
Northwest India	10.9	44.9	-76.0
Central India	0.0	7.5	-99.0
South Peninsula	3.6	7.9	-54.0
East & northeast India	19.6	30.0	-35.0

During this month, one sub division received excess, 3 normal, one deficient and 11 received large deficient rainfall and 20 subdivisions did not receive any rain.

The observed spatial rainfall, normal rainfall for the period 1971 to 2020 and its departures from normal for the month of February 2023 is shown in the figure2.

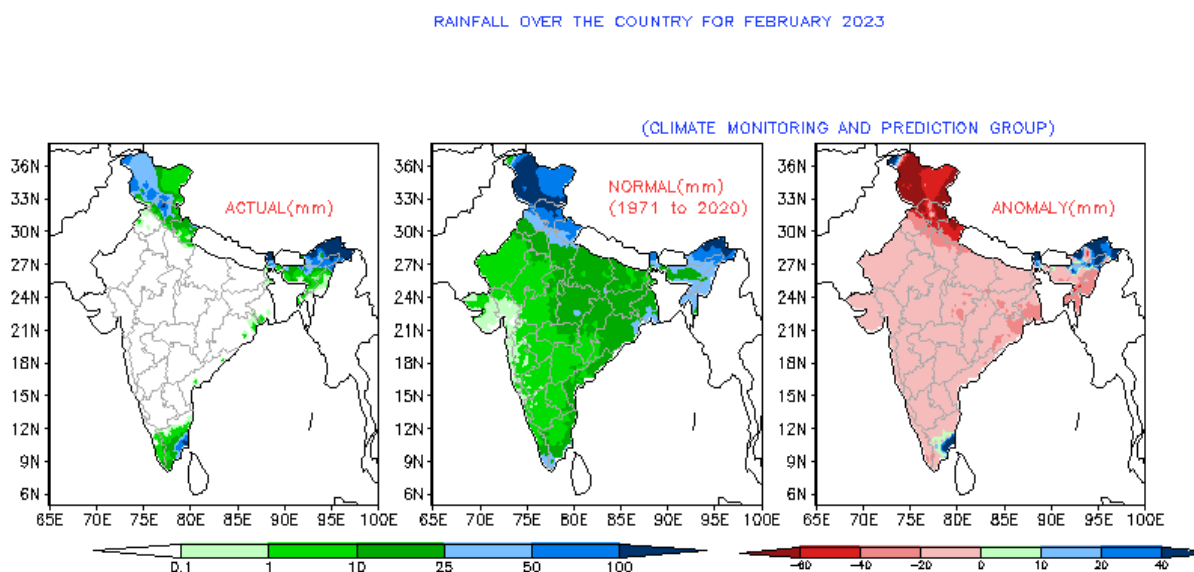
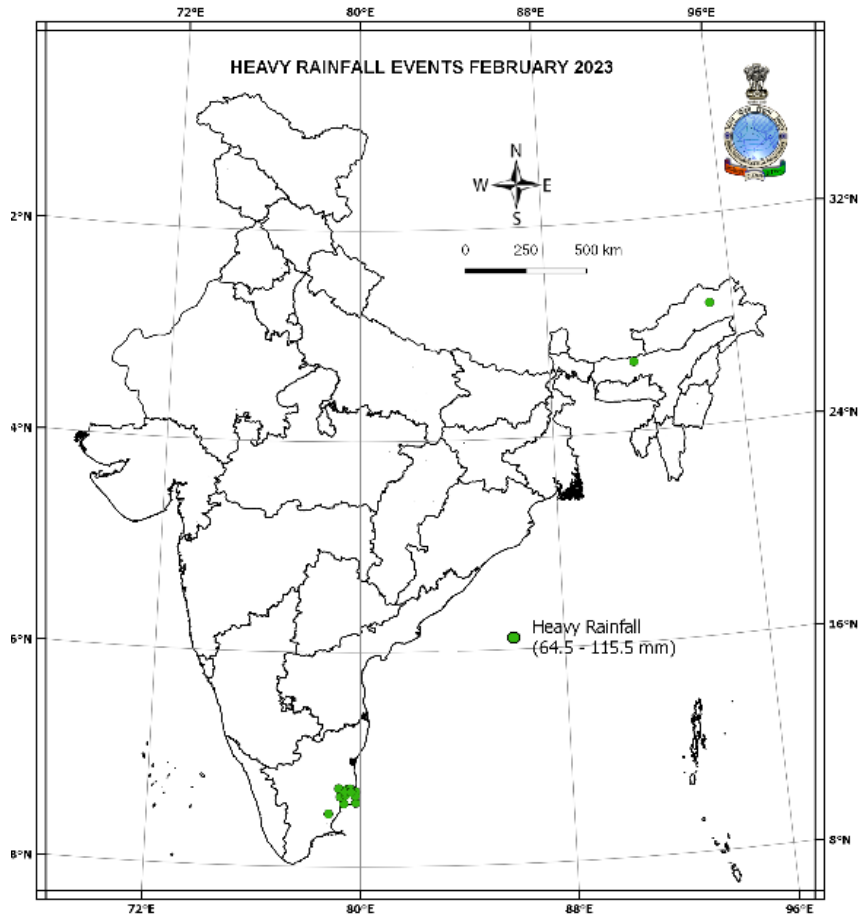


Fig 2: Observed spatial Rainfall pattern for the month of February 2023 over India and their departure from normal (1971 to 2020 period).

2. Frequency of Heavy Rainfall events

The February 2023 witnessed heavy rainfall events (64.5 to 115.5 mm of rainfall) over fifteen stations mainly from Tamil Nadu, Puducherry & Karaikal, Arunachal Pradesh and Assam & Meghalaya. The location of occurrences of heavy rainfall events is shown in the Figure 3.



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

Fig 3: The location of occurrences of heavy rainfall events in the month February 2023.

Chief synoptic features during February 2023

During the month, one depression formed over Bay of Bengal on 30 January and it became less marked on 2 February. Track of this system is shown in figure 4.

During February month there were five number of Western Disturbances (WD) formed (1-5, 5-7, 8-12, 18-22 and 26-28 February) which moved across north India. But, most of the systems were feeble (weak) and only caused light to moderate rain or snowfall over WHR. They were at locations north of 30°N and did not affect the region except isolated very light rain over east Rajasthan. The main reason for record monthly temperature observed in the month of February 2023 are absence of active Western Disturbances, less rainfall activity with clear skies over most part of the country, presence of anti-cyclonic wind pattern over Gujarat and adjoining parts of northwest and adjoining central India in most dates in the month.

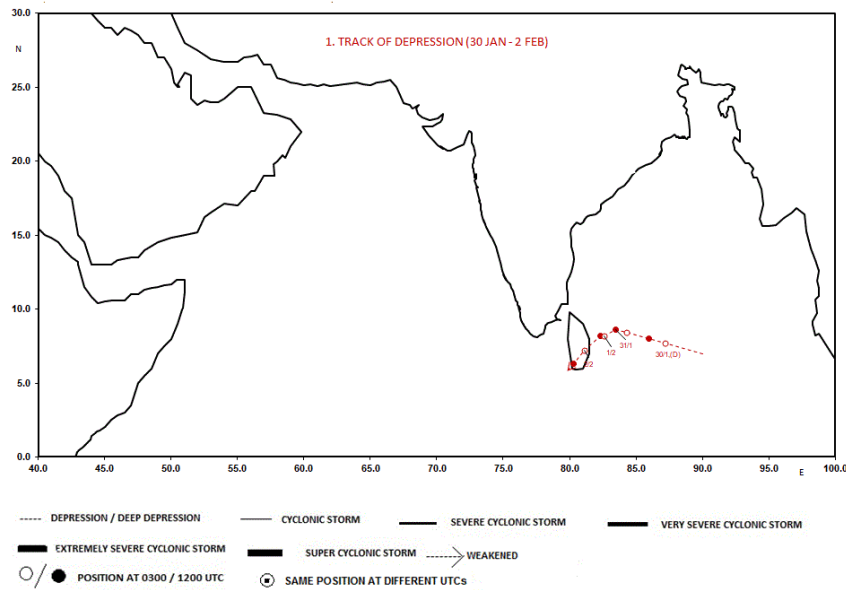


Fig 4: Track of intense low-pressure system formed during February 2023.

4. Characteristics of Temperatures for the month of February 2023

The average maximum, average minimum and mean temperature for the country as a whole during February 2023 are 29.66 °C, 16.37 °C and 23.01 °C respectively, against the normal of 27.80 °C, 15.49 °C and 21.65 °C based on period 1981-2010. Thus, the average maximum temperature, average minimum temperature and mean temperature are above normal by 1.86 °C, 0.87 °C and 1.36 °C respectively 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). The daily variation of maximum and minimum temperature anomaly over the country as a whole for February 2023 is shown in the figure 5(a) and (b).

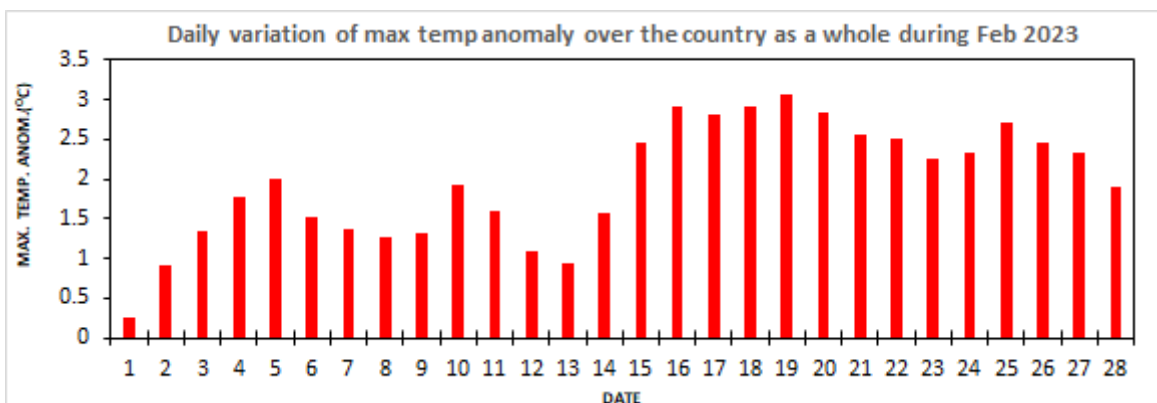


Fig 5(a): Daily variation of maximum temperature anomaly over the country as a whole for February 2023.

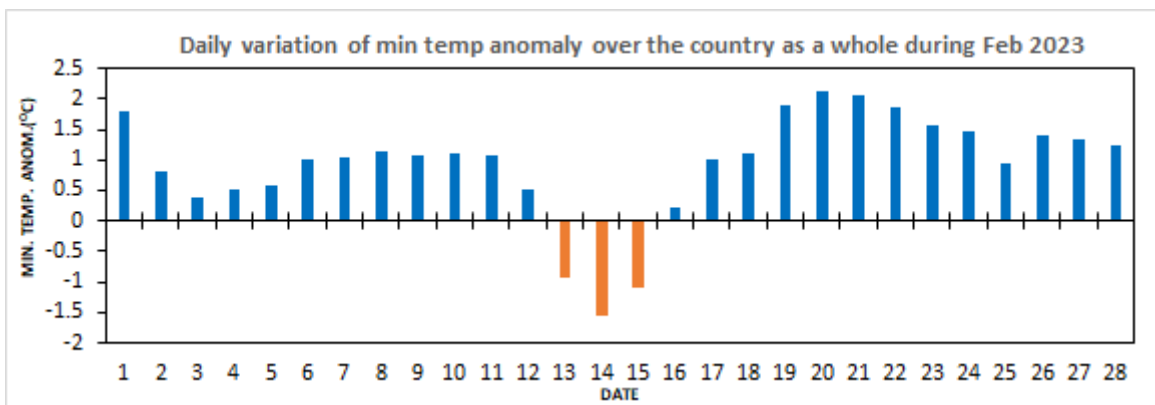


Fig 5(a):Daily variation of minimum temperature anomaly over the country as a whole for February 2023.

Figure 6 shows time series of monthly average maximum, average minimum and mean temperature over all India for the month of February 1901-2023. **All India wise, during February, the average maximum temperature is ever highest at 29.66 °C since 1901 and it has broken the earlier ever-highest record of 29.48 °C that was in 2016 for the month of February for the same period.** The average minimum temperature is the fifth highest (16.37 °C with an anomaly of 0.87 °C) after the years 2016(16.82 °C), 1912(16.49 °C), 1937(16.45 °C), 2006(16.42 °C) since 1901. All India wise, during February, the mean temperature is the second highest (23.01 °C with an anomaly of 1.36 °C) after the year 2016(23.15 °C) since 1901.

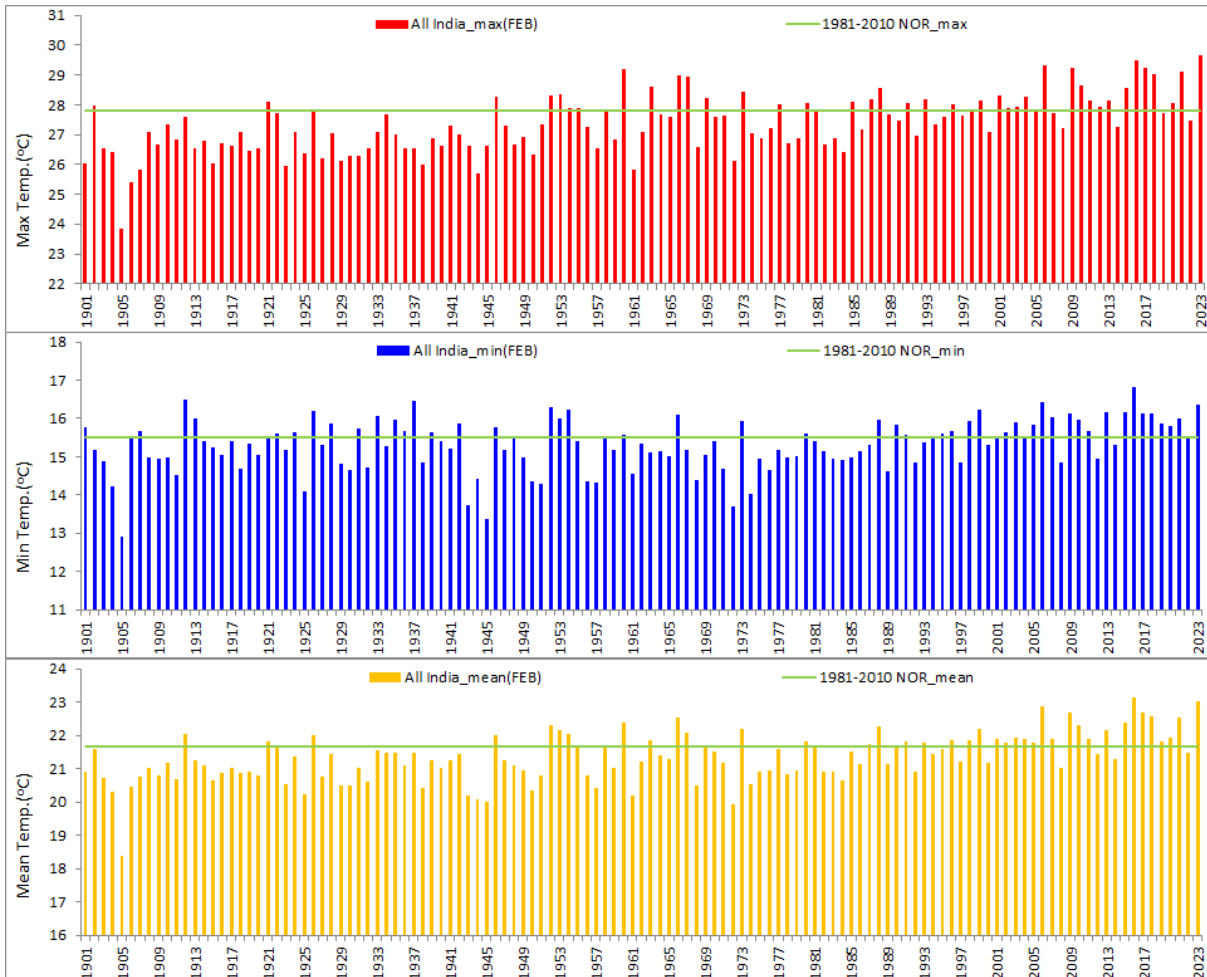


Fig 6: Time series of monthly average maximum, average minimum and mean temperature over all India for the month of February 1901-2023

Figure 7 shows time series of monthly average maximum, average minimum and mean temperature over Northwest India for the month of February 1901-2023. Over Northwest India, during February, the average maximum temperature is ever highest at 25.04 °C since 1901 and it has broken the earlier ever-highest record of 24.55 °C that was in 1960 for the month of February for the same period. The average minimum temperature is the second highest (10.16 °C with an anomaly of 1.99 °C) after the year 2006(10.82 °C) since 1901. The mean temperature is ever highest at 17.60 °C since 1901 and it has broken the earlier ever-highest record of 17.44 °C that was in 2006 for the month of February for the same period.

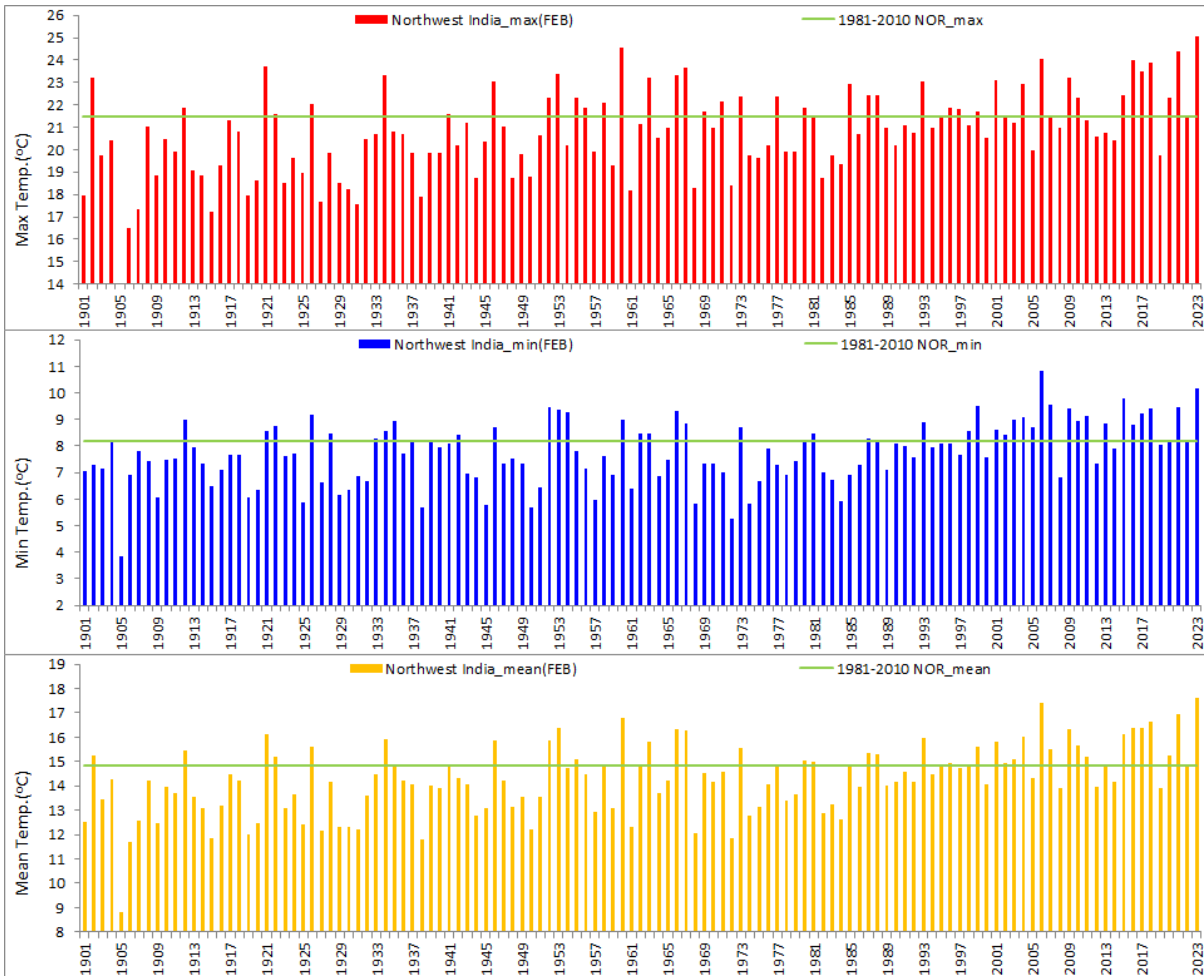


Fig 7: Time series of monthly average maximum, average minimum and mean temperature over Northwest India for the month of February 1901-2023

Figure 8 shows time series of monthly average maximum, average minimum and mean temperature over Central India for the month of February 1901-2023. Over Central India during February, the average maximum temperature is the second highest (32.04 °C with an anomaly of 2.16 °C) after the year 2006(32.13 °C) since 1901. The mean temperature is the third highest (24.08 °C with an anomaly of 1.32 °C) after the years 2006(24.42 °C), 2016(24.38 °C) since 1901.

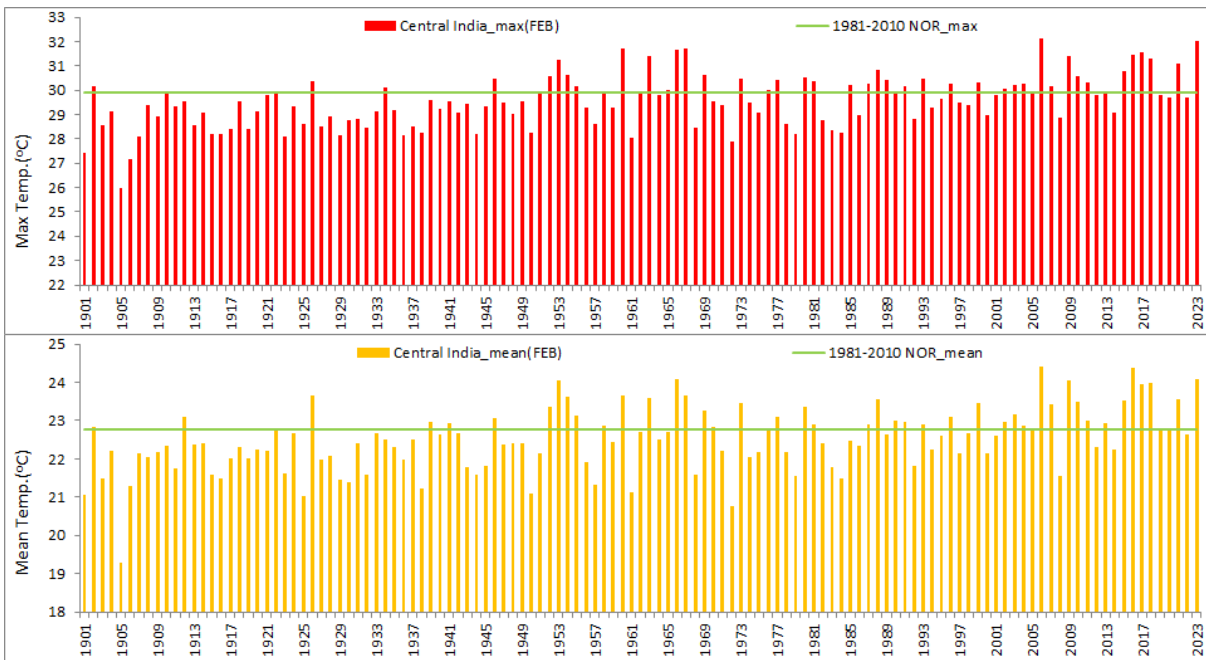


Fig 8: Time series of monthly average maximum and mean temperature over Central India for the month of February 1901-2023.

Figure 9 shows time series of monthly average maximum, average minimum and mean temperature over East & Northeast India for the month of February 1901-2023. Over East & Northeast India during February, the average minimum temperature is the second highest (14.04 °C with an anomaly of 1.72 °C) after the year 2016(14.06 °C) since 1901. The mean temperature is the third highest (20.778 °C with anomaly 1.616 °C) after the years 1946(20.92 °C), 2016(20.781 °C) since 1901.

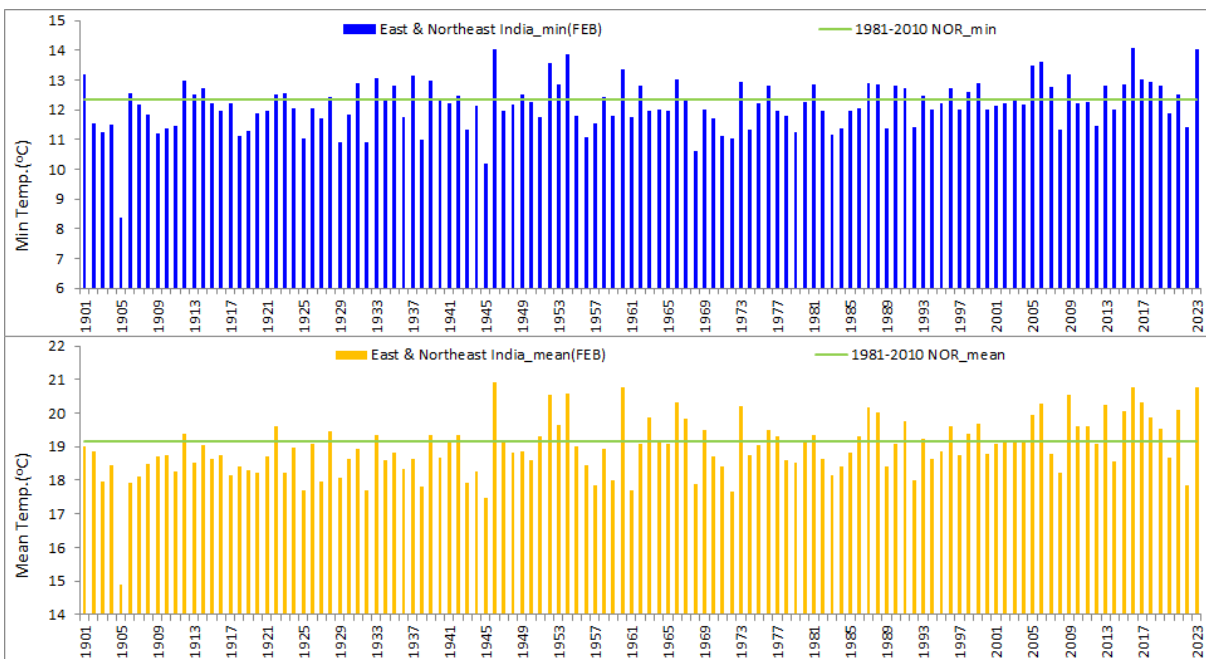


Fig 9: Time series of monthly average minimum and mean temperature over East & Northeast India for the month of February 1901-2023.

The Temperatures during February 2023 for all India and homogeneous regions with its ranks since 1901 are given in the table below;

FEB 2023		Max Temp (°C)	Min Temp (°C)	Mean Temp (°C)
ALL INDIA	ACTUAL	29.66	16.37	23.01
	NORMAL	27.80	15.49	21.65
	ANOMALY	1.86	0.87	1.36
	TOP RANK	1	5	2
NORTHWEST INDIA	ACTUAL	25.04	10.16	17.60
	NORMAL	21.46	8.17	14.82
	ANOMALY	3.58	1.99	2.78
	TOP RANK	1	2	1
EAST & NORTHEAST INDIA	ACTUAL	27.52	14.04	20.78
	NORMAL	26.00	12.32	19.16
	ANOMALY	1.51	1.72	1.62
	TOP RANK	9	2	3
	BOT RANK	115	122	121
CENTRAL INDIA	ACTUAL	32.04	16.13	24.08
	NORMAL	29.88	15.64	22.76
	ANOMALY	2.16	0.49	1.32
	TOP RANK	2	29	3
SOUTH PENINSULAR INDIA	ACTUAL	32.04	21.49	26.76
	NORMAL	31.35	21.50	26.43
	ANOMALY	0.68	-0.01	0.34
	TOP RANK	6	61	11

Note: Values are rounded off to nearest two decimal

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

All India (February 2023)					Northwest India (February 2023)				
Year	TMax	Normal	Anomaly	Rank	Year	TMax	Normal	Anomaly	Rank
2023	29.66	27.80	1.856	1	2023	25.04	21.46	3.58	1
2016	29.48		1.679	2	1960	24.55		3.09	2
2006	29.31		1.512	3	2021	24.40		2.94	3
2017	29.24		1.434	4	2006	24.06		2.60	4
2009	29.23		1.433	5	2016	24.00		2.54	5

All India (February 2023)					Northwest India (February 2023)					East & Northeast India (February 2023)				
Year	TMin	Normal	Anomaly	Rank	Year	TMin	Normal	Anomaly	Rank	Year	TMin	Normal	Anomaly	Rank
2016	16.82	15.49	1.33	1	2006	10.82	8.17	2.64	1	2016	14.06	12.32	1.73	1
1912	16.49		0.99	2	2023	10.16		1.99	2	2023	14.04		1.72	2
1937	16.45		0.96	3	2015	9.80		1.62	3	1946	14.03		1.71	3
2006	16.42		0.93	4	2007	9.54		1.36	4	1954	13.88		1.56	4
2023	16.37		0.87	5	1999	9.53		1.35	5	2006	13.60		1.28	5

All India (February 2023)					Northwest India (February 2023)					East & Northeast India (February 2023)				
Year	TMean	Normal	Anomaly	Rank	Year	TMean	Normal	Anomaly	Rank	Year	TMean	Normal	Anomaly	Rank
2016	23.15	21.65	1.50	1	2023	17.60	14.82	2.78	1	1946	20.92	19.16	1.76	1
2023	23.01		1.36	2	2006	17.44		2.62	2	2016	20.781		1.618	2
2006	22.87		1.22	3	2021	16.92		2.11	3	2023	20.778		1.616	3
2017	22.68		1.04	4	1960	16.78		1.96	4	1960	20.76		1.60	4
2009	22.67		1.03	5	2018	16.65		1.84	5	1954	20.60		1.43	5

Central India (February 2023)					Central India (February 2023)				
Year	TMax	Normal	Anomaly	Rank	Year	TMean	Normal	Anomaly	Rank
2006	32.13	29.88	2.24	1	2006	24.42	22.76	1.66	1
2023	32.04		2.16	2	2016	24.38		1.62	2
1967	31.73		1.85	3	2023	24.084		1.323	3
1960	31.72		1.84	4	1966	24.077		1.315	4
1966	31.68		1.80	5	2009	24.04		1.28	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 February 2023 is given in Figure 10.

TEMPERATURE & ITS ANOMALY FOR THE MONTH FEB 2023

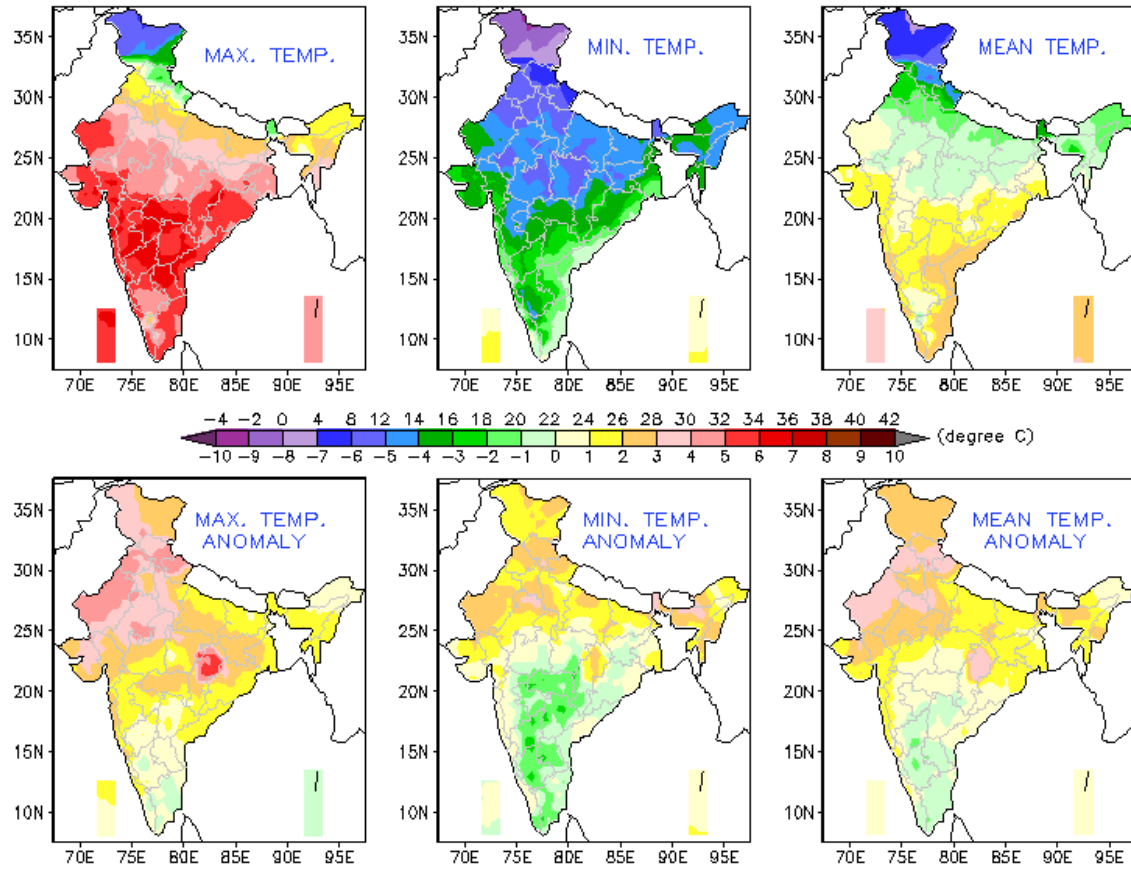


Fig 10: Observed spatial temperature pattern of monthly average maximum, average minimum and mean temperature over India (top three from left to right) and their departure from normal (1981 to 2010 period) for February 2023 (lower three from left to right).