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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 January 2023

1. Monthly Rainfall Scenario (01 to 31 January, 2023)

Rainfall over the country as a whole for the month of January 2023 has received 14.8 mm, which is 13% less than its Long Period Average (LPA) 17.1 mm. Rainfall over homogeneous region of east & northeast India (1.9 mm) was fourth lowest since 1901. Prior lowest rainfall years were 1946 (0.3 mm), 2010 (0.7 mm), 2006 (1.4 mm) & 1923 (1.9 mm). The monthly rainfall for January 2023 is given in the table below:

Regions	Actual Rainfall (mm)	Normal Rainfall (mm)	% Departure from LPA
Country as a whole	**14.8**	**17.1**	**-13.0**
Northwest India	**43.4**	**33.8**	**28.0**
Central India	**1.9**	**7.4**	**-75.0**
South Peninsula	**2.7**	**7.8**	**-65.0**
East & northeast India	**1.9**	**17.2**	**-89.0**

During this month, 5 sub-division received large excess, 1 excess, 5 normal, 5 deficient and 17 received large deficient rainfall and 3 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 January 2023 is shown in the figure 1.

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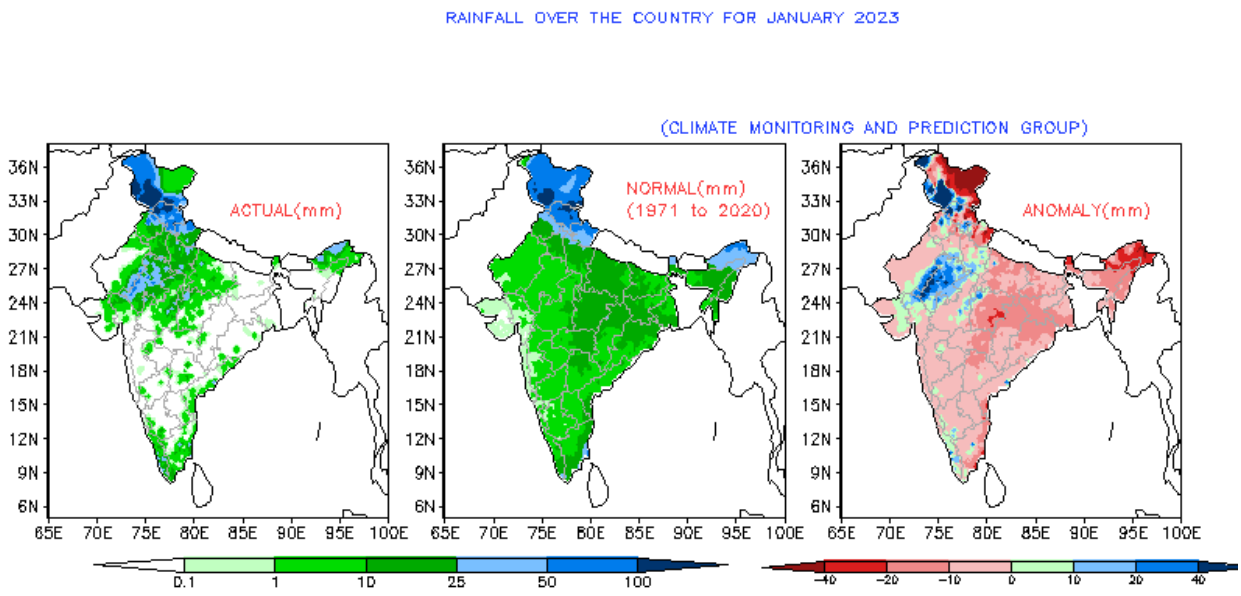
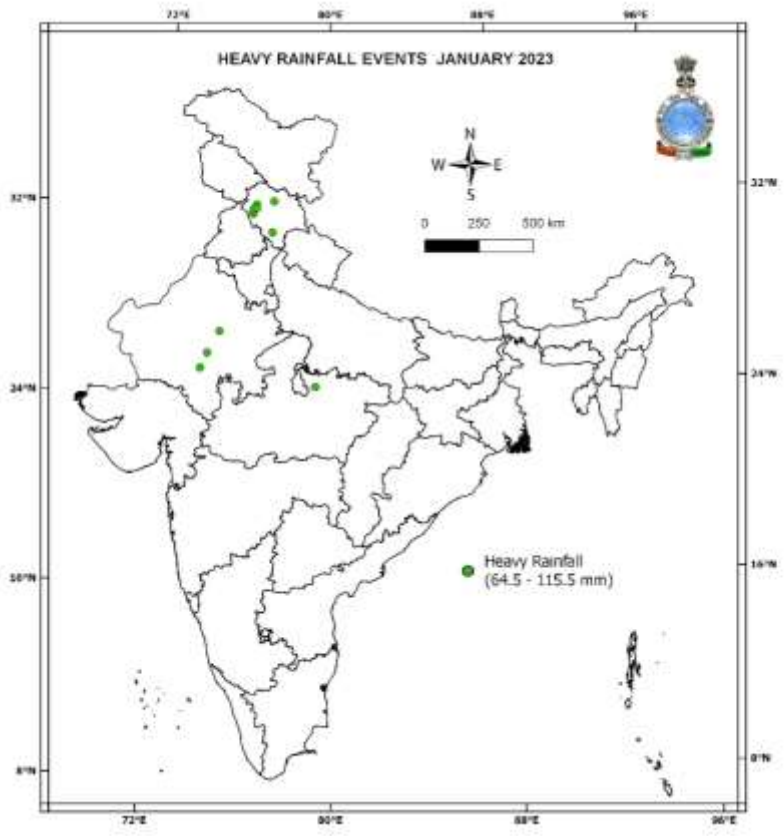


Fig 1: Observed spatial Rainfall pattern for the month of January 2023 over India and their departure from normal (1971 to 2020 period).

2. Frequency of Heavy Rainfall events

The January 2023 witnessed heavy rainfall events (64.5 to 115.5 mm of rainfall) over eleven stations mainly from Himachal Pradesh, Rajasthan and Madhya Pradesh. The location of occurrences of heavy, very heavy and extremely heavy rainfall events is shown in the Figure 2.



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

Fig 2: The location of occurrences of heavy rainfall events in the month January 2023.

Chief synoptic features during January 2023

During the month, one depression formed over Bay of Bengal on 30 Jan. Track of this system is shown in figure 3. During January month, a total of seven Western Disturbances (WDs) (1-3 Jan, 3-5 Jan, 5-10 Jan, 11-14 Jan, 18-21 Jan, 23-27 Jan and 27-30 Jan) moved across north Indian region. Out of these, 4 WDs (11-14 Jan, 18-21 Jan, 23-27 Jan and 27-30 Jan) impacted weather over north India and caused rain or snowfall over Western Himalayan Region(WHR) and rainfall over adjoining plains while other 3 WDs (1-3, 3-5, 5-10 Jan) were feeble and moved northeast-wards at north of 30degN without affecting significantly the region, except isolated very light snow over the higher ridges of WHR. Two WDs which observed during 23-27 Jan and 27-30 Jan, were active and caused isolated heavy rainfall and isolated Hail storm in the Northwest India. A prolonged spell of extensive fog and low cloud coverage observed over Northern and central Parts of India during 1 to 11 Jan which also caused cold day to severe cold days during the period. It was followed by another shorter spell of Dense fog to very dense fog and Cold Day to severe cold day during 14-18 Jan. There were two major spells of cold wave to severe cold wave prevailed during 1-9 Jan and 14-18 Jan 2023 over Northern and central Parts of India. In the month, Delhi had experienced cold wave to severe cold wave mainly during 4-9 and 14-18 Jan.

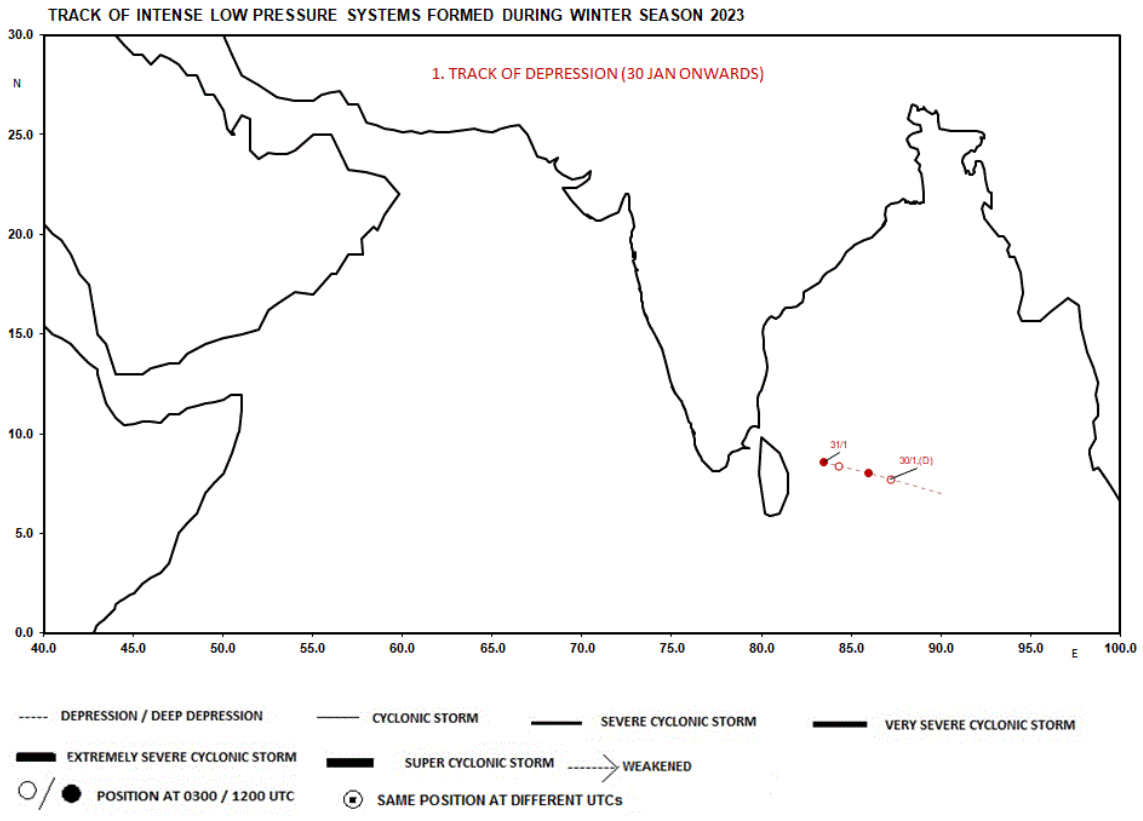


Fig 3: Track of intense low-pressure system formed during January 2023.

4. Characteristics of Temperatures for the month of January 2023

The average maximum, average minimum and mean temperature for the country as a whole during January 2023 are 25.79 ºC, 14.07 ºC and 19.93 ºC respectively, against the normal of 25.60 ºC, 13.69 ºC and 19.64 ºC based on period 1981-2010. Thus, the average maximum, average minimum and mean temperature are above normal by 0.19 ºC, 0.38 ºC and 0.29 ºC 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 2023 - normal temperature based on data of 1981-2010). Figure 4 shows time series of monthly average maximum, average minimum and mean temperature over all India for the month of January during 1901-2023 and the numbers above the bar indicate the ranking since 1901.

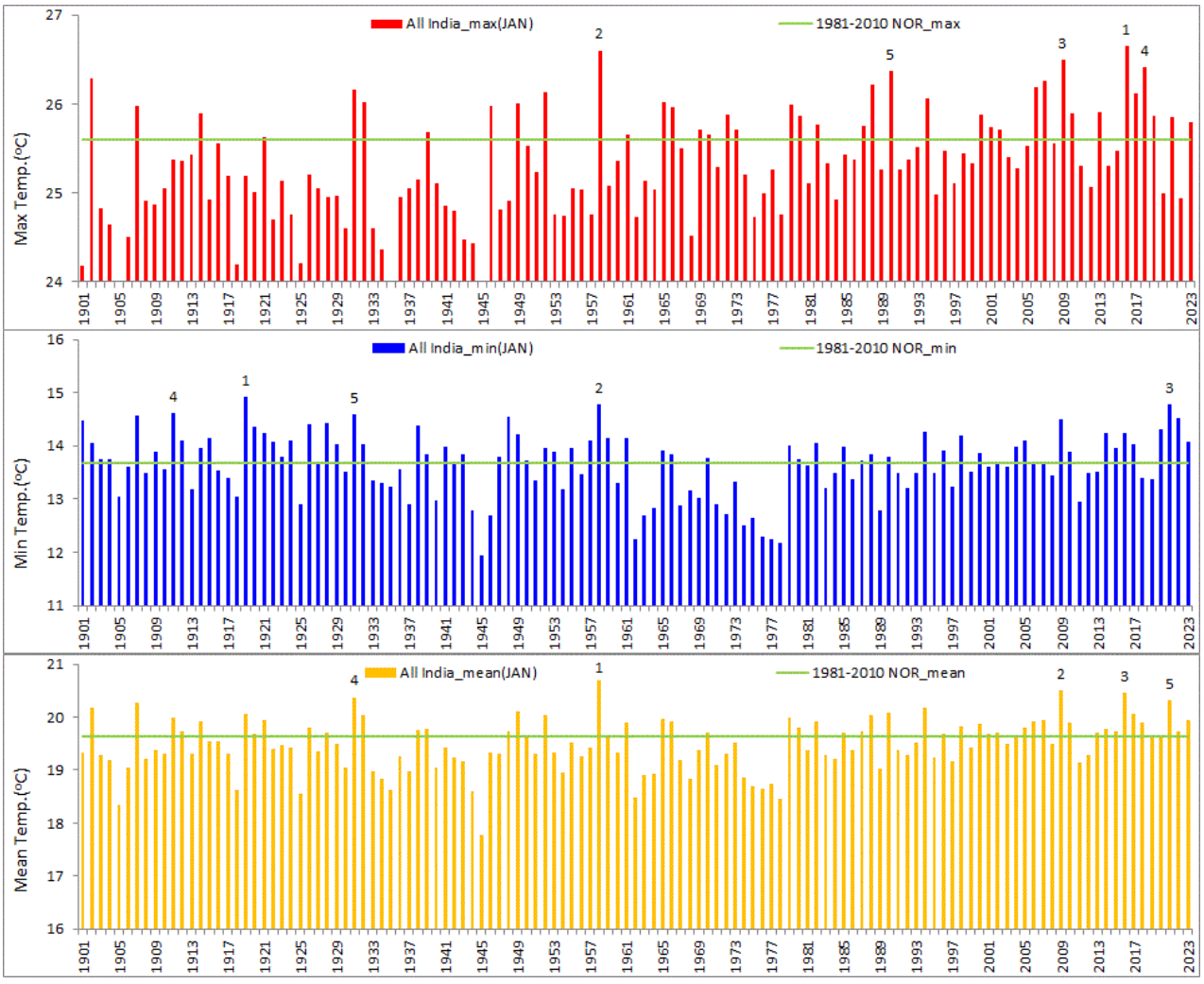


Fig 4: Time series of monthly average maximum, average minimum and mean temperature over all India for the month of January during 1901-2023. The numbers above the bar indicate the ranking since 1901.

The Temperatures during January 2023 for all India and homogeneous regions with its ranks since 1901 are given bellow;

JAN 2023		Max Temp (^{0}C)	Min Temp (^{0}C)	Mean Temp (^{0}C)
ALL INDIA	ACTUAL	25.79	14.07	19.93
	NORMAL	25.60	13.69	19.64
	ANOMALY	0.19	0.38	0.29
	TOP RANK	29	30	21
	BOT RANK	95	94	103
NORTHWEST INDIA	ACTUAL	17.53	5.90	11.71
	NORMAL	18.33	5.61	11.97
	ANOMALY	-0.80	0.28	-0.26
	TOP RANK	77	36	56
	BOT RANK	47	88	68
EAST & NORTHEAST INDIA	ACTUAL	24.23	10.64	17.44
	NORMAL	23.04	9.96	16.50
	ANOMALY	1.19	0.68	0.94
	TOP RANK	15	18	12
	BOT RANK	109	106	112
CENTRAL INDIA	ACTUAL	27.60	13.97	20.78
	NORMAL	27.80	13.56	20.68
	ANOMALY	-0.20	0.41	0.10
	TOP RANK	60	36	44
	BOT RANK	64	88	80
SOUTH PENNINSULAR INDIA	ACTUAL	30.59	20.85	25.72
	NORMAL	30.00	20.59	25.30
	ANOMALY	0.59	0.27	0.43
	TOP RANK	8	47	13
	BOT RANK	116	77	111

Note : Values are rounded off to nearest two decimal

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 January 2023 is given in Figure 5.

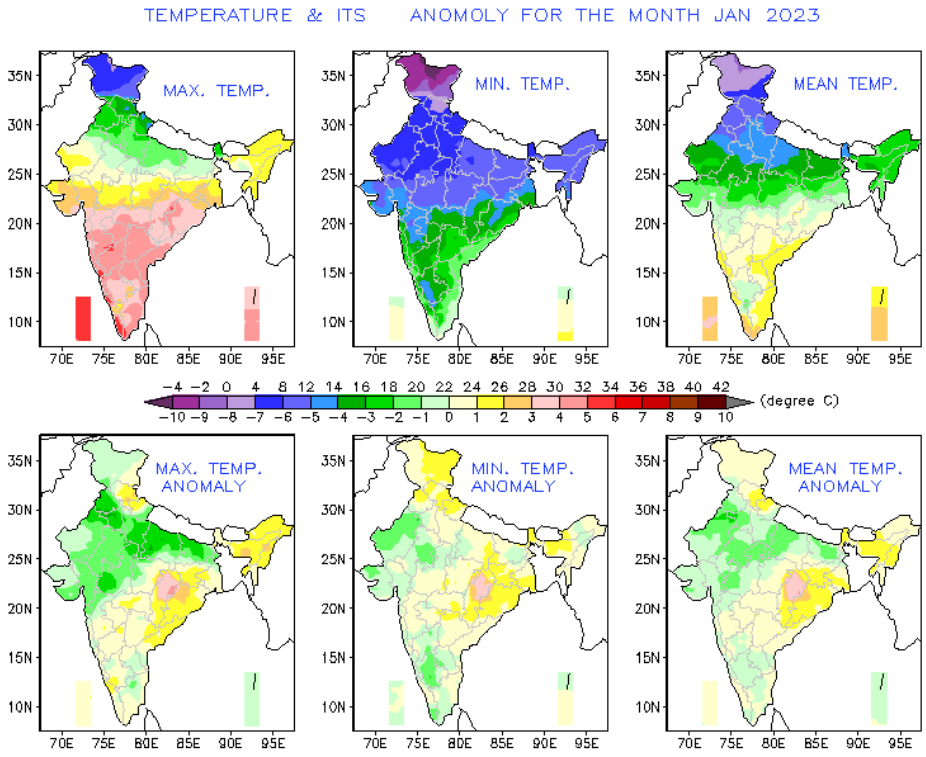


Fig 5: Observed spatial temperature pattern of monthly average maximum, average minimum and mean temperature over India (top three from left to right) and their departure from normal (1981 to 2010 period) for January 2023 (lower three from left to right).

5. Significant Weather Events for the month of January 2023:

During January 2023, total 8 persons reportedly claimed dead & one person missing. The details of causalities given below, which are based on real time media reports.

Fig. 6 shows deaths due to significant weather events during January 2023. (Based on real time media reports.)

SNOWFALL: Total 4 persons reportedly claimed dead & one person missing, during 1st January to 31st January, due to Snowfall. The details of the area effected by the events are summarized and given in the table below;

DATE	DEATH	INJURED	MISSING	LIVESTOCK	DISTRICT (STATE / UT) AFFECTED
12 Jan.	2		1		Ganderbal (Jammu & Kashmir)
30 Jan.	2				Kargil (Ladakh)

COLD WAVE: 4 persons reportedly claimed dead due to cold wave in Fatehpur district of Uttar Pradesh on 10th January.

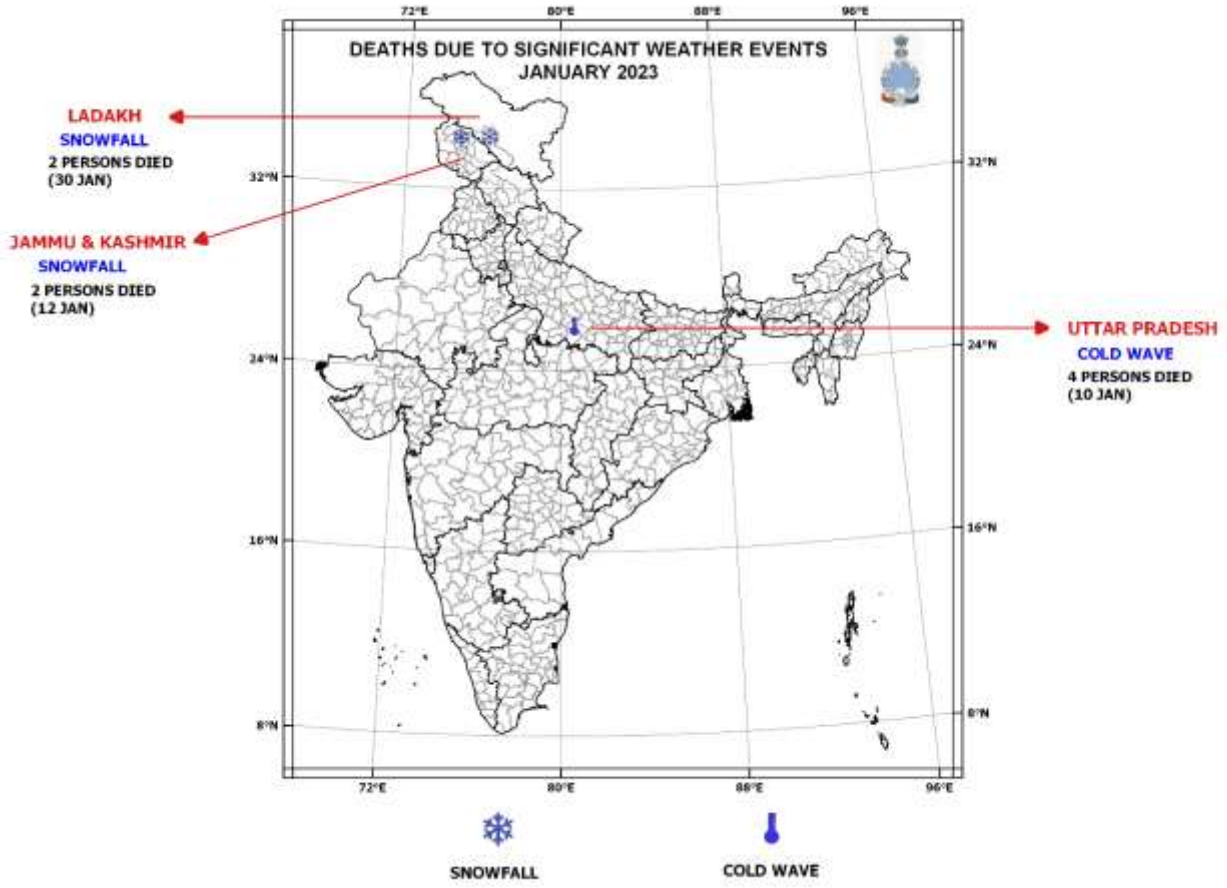


Fig 6: Significant weather events during January 2023 (Based on real-time media report)