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भारत मौसम विज्ञान विभाग / INDIA METEOROLOGICAL DEPARTMENT



वार्षिक जलवायु सारांश - 2022

ANNUAL CLIMATE SUMMARY - 2022

द्वारा जारी / ISSUED BY
जलवायु निगरानी एवं प्रागुक्ती समूह
Climate Monitoring & Prediction Group

जलवायु अनुसंधान एवं सेवाएँ
CLIMATE RESEARCH & SERVICES,

भारत मौसम विज्ञान विभाग
INDIA METEOROLOGICAL DEPARTMENT

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COVER PHOTOS

- ① **Cyclone Mandous :**
As Cyclone Mandous crossed the north Tamil Nadu coast close to Mamallapuram around Friday midnight, it triggered very heavy rains and gusty winds in Chennai bringing down trees and disrupting electricity supply. This image shows the damage at Kannaiah Street, T. Nagar in Chennai.
https://thi.thgim.com/public/incoming/2f04km/article66246795.ece/alternates/FREE_730/2782_10_12_2022_9_34_39_1_TREEUPROOTED.JPG
- ② **Cyclone Mandous :**
After the landfall of Cyclone Mandous, vendors along the beach are seen trying to salvage their shop after some damages caused due to heavy rainfall and wind at Marina beach in Chennai.
https://thi.thgim.com/public/incoming/3qedik/article66246844.ece/alternates/FREE_730/PTI12_10_2022_000025B.jpg
- ③ **HEAVY RAINS :**
A scene at the New Halflong train station in Dima Hasao district of Assam on Monday, while one train has been uprooted from the track due to landslides another is stranded due to debris.
(Northeastern Frontier Railway.)
https://images.hindustantimes.com/img/2022/05/16/550x309/b76415c4-d532-11ec-ace9-5ee6ff21344d_1652720433207.jpg
- ④ **Flood :**
Flooding in Cachar District, Assam, India, 14 May 2022. Photo: Assam Rifles
<https://floodlist.com/wp-content/uploads/2022/05/Flooding-in-Cachar-District-Assam-14-May-2022-Assam-Rifles-e1652621609455-768x626.jpeg>
- ⑤ **HEAT WAVE :**
Pedestrians shield their faces from the heat with a scarf, in Gurugram, Thursday, April 28, 2022.
(PTI Photo)
<https://img.onmanorama.com/content/dam/mm/en/kerala/topnews/images/2022/4/28/summer-heatwave.jpg.transform/onm-articleimage/image.jpg>
- ⑥ **SNOWFALL :**
West Kameng district in Arunachal Pradesh received season's first snowfall after 15 years on February 5, 2022. (Photo: India Today)
https://akmin.tosshub.com/indiatoday/images/story/202202/ap1_1200x768.png?rS250_hqdlqxu7jpXth8.GNRxTa7Dmim&size=770:433



वार्षिक जलवायु सारांश - २०२२

ANNUAL CLIMATE SUMMARY - 2022

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वार्षिक जलवायु सारांश - २०२२

विशेषताएं :

वर्ष 2022 में देश का औसत तापमान, सन 1981-2010 के औसत से 0.51 डिग्री सेल्शियस (डि.से.) से अधिक रहा। यह साल 1901 से अब तक का पाचवाँ सबसे ऊष्ण साल रहा। मानसून पूर्व ऋतु के औसत तापमान में वृद्धि (1.06 डि.से.), और उत्तर-पूर्व मानसून ऋतु के औसत तापमान में वृद्धि (+0.52 डि.से.) वार्षिक तापमान में वृद्धि का मुख्य कारण है। अब तक के 5 सबसे ऊष्ण साल इस क्रम से हैं : 2016 (विसंगति +0.71 डि.से.), 2009 (+0.55 डि.से.), 2017 (+0.541 डि.से.), 2010 (+0.539 डि.से.), 2022 (0.51 डि.से.)।

दक्षिणी पश्चिमी मानसून ऋतु (जून-सितंबर, जो देश की वर्षा ऋतु का प्रमुख काल माना जाता है) में देशभर में व्यापक रूप से वर्षा सामान्य रही (दीर्घ कालावधि औसत के 106%)। हालांकि सामयिक रूप से वर्षा अस्थायी थी लेकिन फिर भी देश भर में वर्षा का वितरण काफी अच्छा रहा।

मार्च और अप्रैल के महिनों के दौरान मध्य, उत्तर-पश्चिम भारत और पूर्व और पूर्वोत्तर भारत के अधिकांश हिस्सों में ऊष्ण लहर की स्थिति देखी गई।

दक्षिण प्रायद्वीप (जिसमें 5 प्रभाग आते हैं, और जो उत्तर-पूर्व मानसून वर्षा का मुख्य क्षेत्र है, नामतः तटीय आन्ध्रप्रदेश, रायलसीमा, तमिलनाडु और पुडुचेरी, दक्षिणी आंतरिक कर्नाटक और केरल) में अक्टूबर से दिसंबर तक पड़ने वाली उत्तर-पूर्व मानसून वर्षा, सामान्य से अधिक (दीर्घ कालावधि औसत के 110%) रही। जो 1901 से सबसे अधिक रही।

वर्षा :

2022 में देश भर में वार्षिक वर्षा सामान्य थी। वर्षा का परिमाण दीर्घ कालावधि औसत के 108% रहा। देश के 36 प्रभागों में से 13 प्रभागों में अधिक, 20 प्रभागों में वर्षा सामान्य रही और 3 प्रभागों में वर्षा कम रही।

तापमान :

देश के अधिकतर भागों में अधिकतम, न्यूनतम और औसत तापमान की विसंगति -0.1 डि. से. से + 1.0 डि. से. की श्रेणी में रही। मगर देश के उत्तर भागों में औसत तापमान 2 डि. से. से अधिक रहा।

चक्रवाती तूफान :

2022 में बंगाल की खाड़ी में तीन चक्रवाती तूफान हुए। यह चक्रवाती तूफान मई (असनी), अक्टूबर (सितरंग) और दिसंबर (मंदौस) में प्रतिमाह एक हुए। मानसून ऋतु में 12 कम दबाव के क्षेत्र बने (1 तीव्र अवदाब, 5 अवदाब, 2 सुस्पष्ट निम्न दाब क्षेत्र और 2 निम्न दाब क्षेत्र, और 2 भूमिगत निम्न दाब)। इन सभी कम दबाव की प्रणालियों की वजह से संबन्धित स्थानों में अच्छी वर्षा हुई।

महत्वपूर्ण मौसम संबंधी घटनाएं :

भारी वर्षा और बाढ़ संबंधी घटनाओं से करीब 1040 से ज्यादा लोगों की मृत्यु की सूचना प्राप्त हुई। आकाशीय बिजली /गर्ज के साथ तूफान से 1480 से ज्यादा लोगों की मृत्यु की सूचना (मानसून पूर्व, मानसून और मानसूनोत्तर ऋतुओं में), देश के विभिन्न भागों से प्राप्त हुई। हिमताप की वजह से जम्मू कश्मीर और लदाख, उत्तराखंड, अरुणाचल प्रदेश और हिमाचल प्रदेश से 37 लोगों की मृत्यु की सूचना मिली। आंधी की वजह से उत्तर प्रदेश से 32, ऊष्ण लहर की वजह से महाराष्ट्र, ओडिशा, छत्तीसगढ़ और झारखंड से 30 लोगों की मृत्यु की सूचना मिली।

Annual Climate Summary 2022

HIGHLIGHTS

The annual mean land surface air temperature averaged over India during 2022 was +0.51°C above the long-term average (1981-2010 period). The year 2022 was the fifth warmest year on record since nationwide records commenced in 1901. However, this is lower than the highest warming observed over India during 2016 (anomaly of +0.71°C) and higher than the previous year 2021 (anomaly of +0.44°C).

The all India mean temperatures during the winter (January to February) season was normal with anomaly of -0.04°C, while during other seasons, it was above normal Pre-monsoon (March to May) season (anomaly of +1.06°C), monsoon (June to September) season (anomaly of +0.36°C) and post-monsoon (October to December) season (anomaly of +0.52°C). The Pre-monsoon period and December month was exceptionally hot in 2022.

Heat wave conditions were observed over most parts of central, northwest India and East & Northeast India during the months of March and April.

The 2022 annual rainfall over the country as a whole was 108% of its Long Period Average (LPA) value for the period 1971-2020. The monsoon season rainfall over the country as a whole was 106% of its LPA. The seasonal rainfall during the Northeast monsoon season (October – December) over the NE Monsoon core region of the south peninsula was 110% of its LPA.

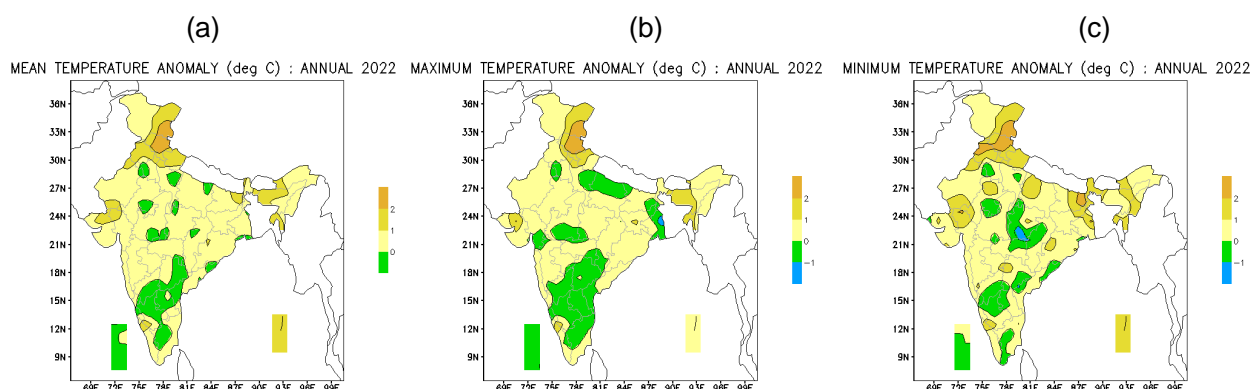
During 2022, three cyclonic storms formed over the North Indian Ocean. Of these, two were Severe Cyclonic Storms “ASANI (7 - 12 May)” and “MANDOUS (6 - 10 December)” and one was Cyclonic Storm “SITRANG (22 - 25 October)”. All the cyclones formed over the Bay of Bengal.

Various parts of the country experienced extreme weather events like extremely heavy rainfall, floods, landslides, lightning, thunderstorms, hailstorms, dust storms, etc which caused 2767 deaths, out of which 1580 were due to lightning and thunderstorms.

A) TEMPERATURE

Annual:

Spatial pattern of annual mean, maximum and minimum temperature anomalies for 2022 are shown in (Fig. 1). During 2022, mean, minimum and maximum temperature anomaly over many parts of the country was generally in the range of $\pm 1.0^\circ\text{C}$. Mean temperature over parts of Ladakh and Himachal Pradesh was above normal by about 2°C . Maximum temperature over parts of Ladakh and Himachal Pradesh was above normal by about 2°C . However, maximum temperature over parts of Gangetic West Bengal was below normal by about 1°C . Minimum temperature over parts of Ladakh, Himachal Pradesh, Punjab, Gujrat region, Gangetic West Bengal and Bihar was above normal by about 2°C . However, minimum temperature over parts of East Madhya Pradesh, Vidarbha and Coastal Andhra Pradesh & Yanam was below normal by about 1°C .



चित्र. १: २०२२ के लिए वार्षिक तापमान विसंगतियां (डिग्री सेल्सियस), (ए) औसत (बी) अधिकतम और (सी) न्यूनतम तापमान (1981-2010 के औसत के आधार पर)

Fig. 1: Annual temperature anomalies ($^\circ\text{C}$) for 2022 (a) Mean temperature (b) Maximum temperature and (c) Minimum temperature. (Based on 1981-2010 Average)

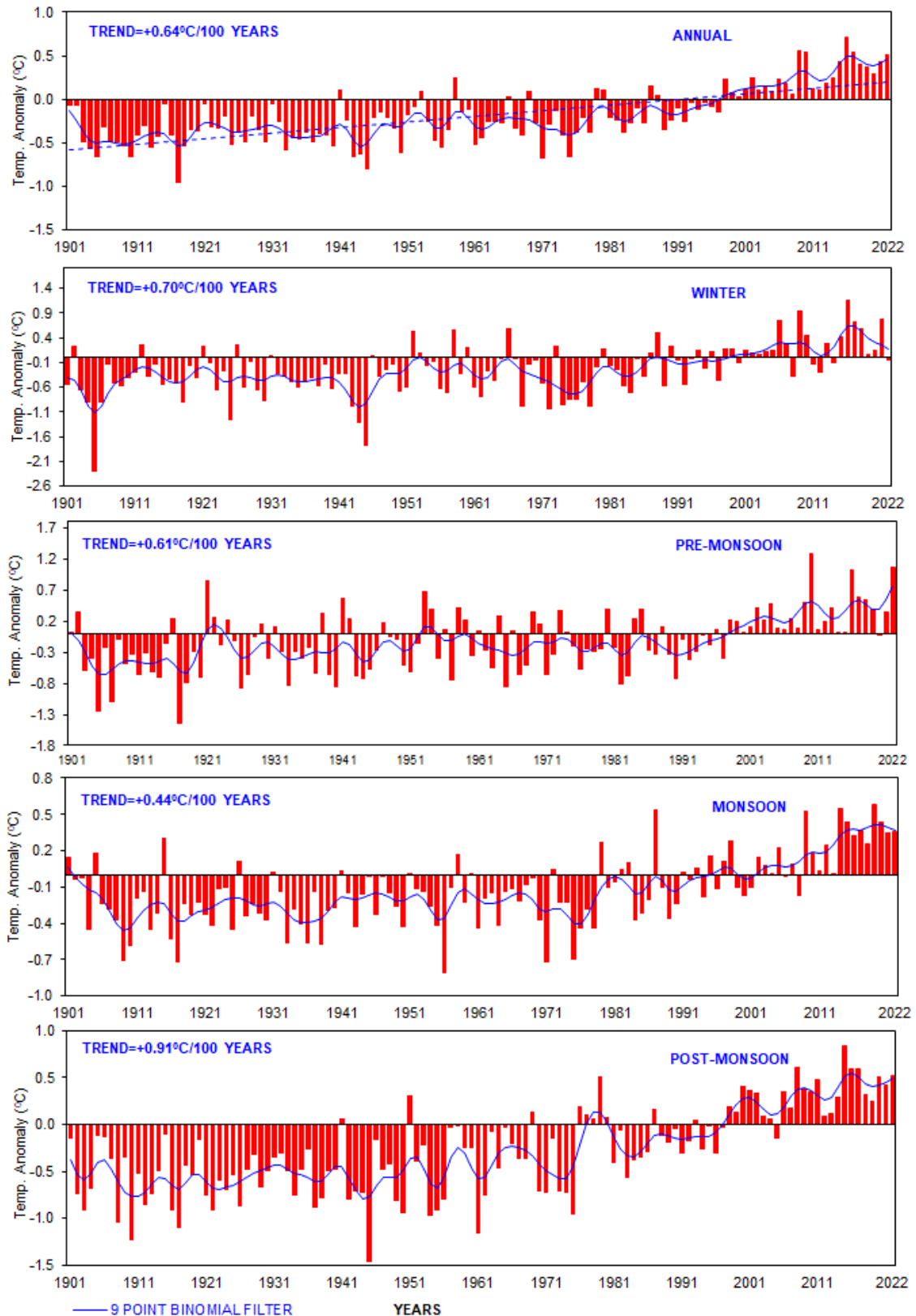
The annual mean land surface air temperature for the country during the year 2022 was +0.51°C above the 1981-2010 average, thus making the year 2022 the fifth warmest year on record since 1901 (Fig. 2). The five warmest years on record, in descending order were 2016 (+0.71°C), 2009(+0.55°C), 2017 (+0.541°C), 2010 (+0.539°C) and 2022 (+0.51°C). It may be mentioned that 11 out of the 15 warmest years were during the recent fifteen years (2008-2022). The past decade (2012-2021 / 2013-2022) was also the warmest decade on record with the decadal averaged annual mean temperature anomaly (Actual-LPA) of +0.37°C / +0.41°C. The country averaged annual mean temperature during 1901-2022 showed a significant increasing trend of 0.64°C / 100 years (Fig. 2), while a significant increasing trend was observed in maximum temperature (1.0°C / 100 years) and a relatively lower increasing trend (0.28°C / 100 years) in minimum temperature.

The Pre-monsoon period was exceptionally hot in 2022. The country averaged seasonal mean temperature was normal during the winter season (January- February, with an anomaly of -0.04°C) while the pre-monsoon season (March-May, with an anomaly of +1.06°C), monsoon season (June-September, with an anomaly of +0.36°C) and post-monsoon season (October- December, with anomaly +0.52°C) were above normal.

The country averaged 2022, monthly mean temperatures for the country during 2022 were above normal for the ten months of the year except for January and February (anomaly 0.09°C, -0.16°C respectively) where it was normal. The All India mean temperature during the month of March with an anomaly of +1.61°C and April with an anomaly of +1.36°C were second highest and December with an anomaly of +1.00°C was the highest since 1901. The maximum temperature was the highest and the minimum temperature was the third highest for the month of March since 1901. The maximum temperature was the third highest and the minimum temperature was the second highest for the month of April since 1901. Both the maximum temperature and minimum temperature was the second highest for the month of December since 1901.

The temperature was consistently 3°C-8°C above normal for more than 6 days during the month of March and April 2022 breaking many decadal and some all-time records in several parts of the country, including the western Himalayas, the plains of Punjab, Haryana, Delhi, Rajasthan and Uttar Pradesh. The states of Odisha, Madhya Pradesh, Gujarat, Chhattisgarh, Telangana and Jharkhand also experienced heatwaves, in some areas severe, with temperatures ranging from 40°C–44°C towards end of March. The heatwave conditions continued into April, reaching its preliminary peak towards the end of the month. Heatwaves also increase the risk of forest-fires. By April 29, almost 70 percent of India was affected by the heatwave. Towards the end of April and in May, the heatwave extended into the coastal areas and eastern parts of India.

Anomalously high temperatures during these months adversely affected grain filling and caused early senescence, thus reducing crop yields, especially wheat.

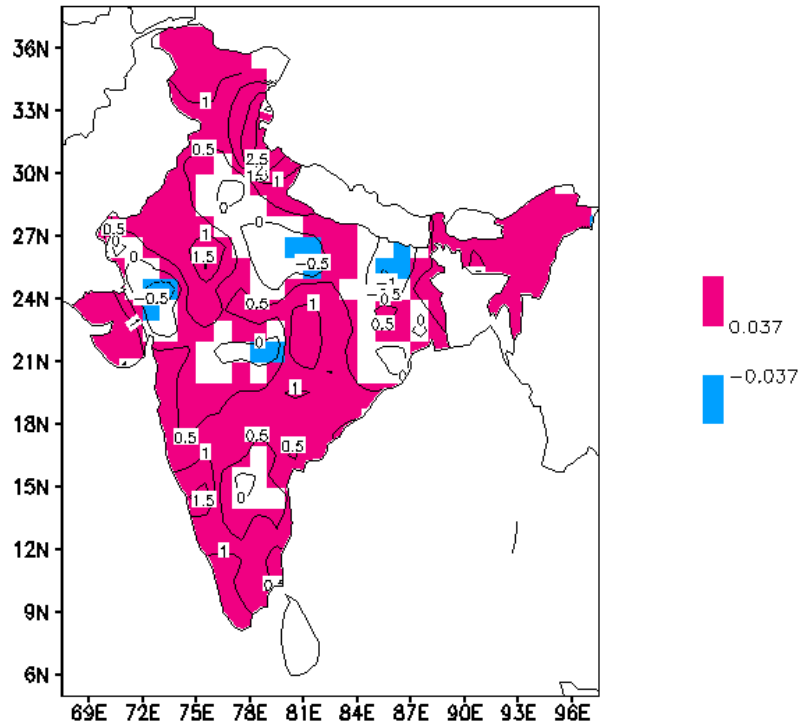


चित्र. २: पुरे भारत की औसत तापमान विसंगतियां (ए) वार्षिक (बी) शीतकालीन (सी) प्री-मानसून (डी) मानसून (ई) पोस्ट मानसून 1901 - 2022 की अवधि के लिए ऊर्ध्वाधर सलाखों के रूप में दिखाया गया है। ठोस नीले वक्र में द्विपद फिल्टर (1981 - 2010 के औसत से विचलन) के साथ उप-दशकीय समय पैमाने में बदलाव थे।

Fig. 2: All India mean temperature anomalies (a) Annual (b) Winter (c) Pre-monsoon (d) SW-monsoon (e) Post-monsoon for the period 1901 - 2022 shown as vertical bars. The solid blue curve had sub-decadal time scale variations smoothed with a Binomial Filter (Departures from the 1981 - 2010 average)

Spatial pattern of trend in mean annual temperature anomalies based on the data for the period 1901-2022 (Fig. 3) suggests significant positive (increasing) trend over most parts of the country except for some parts of Bihar, East Uttar Pradesh, East Madhya Pradesh, Vidarbha, Gujarat region and adjoining southern parts of Rajasthan, where significant negative (decreasing) trend was observed.

ANNUAL MEAN TEMP ANOM TREND(1901–2022)



चित्र. 3: वार्षिक औसत तापमान विसंगति रुझान (डिग्री सेल्सियस / 100 वर्ष) को समोच्च रेखाओं के रूप में दिखाया गया है। 95% स्तर पर महत्वपूर्ण रुझान रंगों के साथ छायांकित हैं। सकारात्मक रुझान लाल रंग में दिखाए जाते हैं जबकि नकारात्मक रुझान नीले रंग में दिखाए जाते हैं।

विश्लेषण की अवधि: 1901-2022

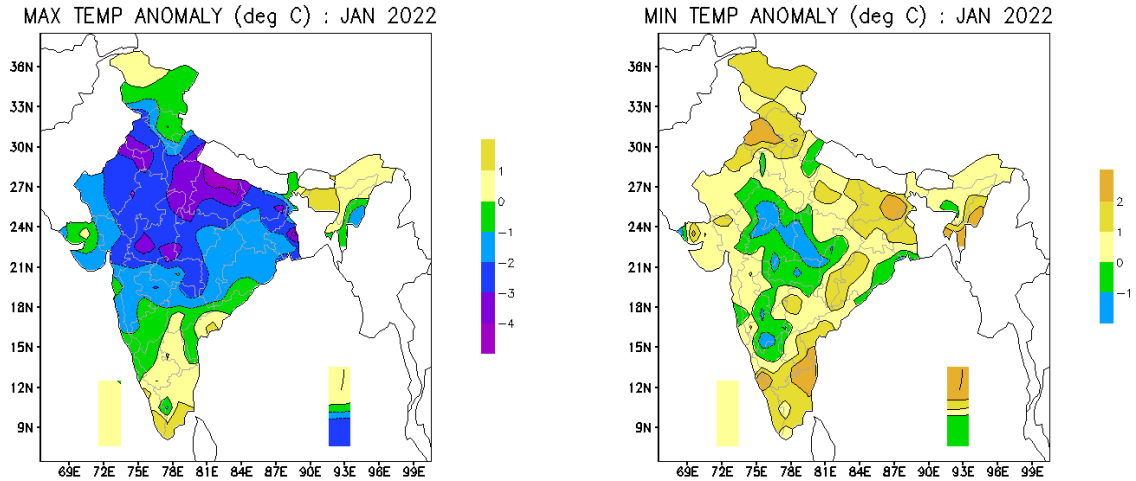
Fig. 3: Annual mean temperature anomaly trends ($^{\circ}\text{C} / 100$ years) are shown as contour lines. The trends significant at 95% level are shaded with colours. Positive trends are shown in red while the negative trends are shown in blue. Period of analysis: 1901 -2022

The spatial pattern of monthly maximum and minimum temperature anomalies during each month of the season are discussed below (Figures 4(a) to 4(l)).

January-February (Winter Season):

During January, the maximum temperature anomaly was more than 1°C over parts of Assam & Meghalaya, Sub Himalayan West Bengal, Coastal Andhra Pradesh & Yanam, Tamil Nadu, Puducherry & Karaikal and Kerala & Mahe. The maximum temperature anomaly was less than -3°C over parts of Uttar Pradesh state, Punjab, Haryana, Chandigarh & Delhi, West Rajasthan, Uttarakhand, Madhya Pradesh state, Bihar, and Gangetic West Bengal. The maximum temperature anomaly was less than -4°C over parts of East Uttar Pradesh and Gangetic West Bengal.

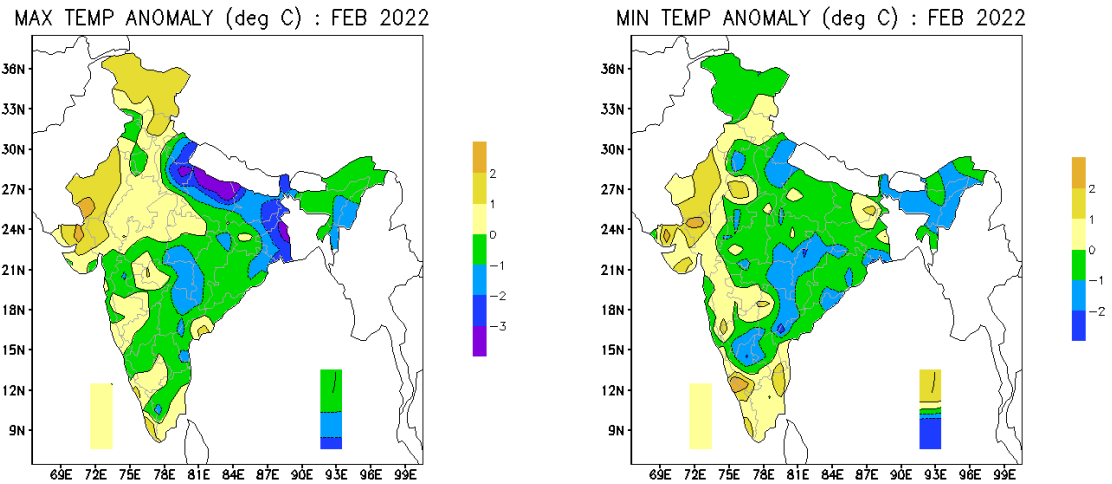
The minimum temperature anomaly was more than 2°C over parts of Manipur, Mizoram, Tripura, Bihar, Jharkhand, Punjab, Coastal Andhra Pradesh & Yanam, Rayalaseema, South Interior Karnataka, Tamil Nadu, Puducherry & Karaikal, Kerala & Mahe, and Andaman & Nicobar Islands. The minimum temperature anomaly was less than -1°C over parts of East Rajasthan, Madhya Pradesh state, Saurashtra & Kutch, Chhattisgarh, Vidarbha, Madhya Maharashtra, and North Interior Karnataka.



चित्र ४(ए): जनवरी 2022 के लिए अधिकतम और न्यूनतम तापमान विसंगतियां ($^{\circ}\text{C}$) स्थानिक आलेख
 Fig. 4(a): Maximum and Minimum temperature anomalies ($^{\circ}\text{C}$) spatial plots for January 2022

During February, the maximum temperature anomaly was more than 2°C over parts of west Rajasthan and Saurashtra & Kutch. The maximum temperature anomaly was less than -2°C over parts of Uttarakhand, Uttar Pradesh state, Bihar, West Bengal state, and Andaman & Nicobar Islands. The maximum temperature anomaly was less than -3°C over parts of Uttar Pradesh state and Gangetic West Bengal.

The minimum temperature anomaly was more than 2°C over parts of the extreme northern Gujarat region, northern Saurashtra & Kutch, South Interior Karnataka, and extreme northern Kerala & Mahe. The minimum temperature anomaly was less than -2°C over parts of Chhattisgarh, Telangana, Coastal Andhra Pradesh & Yanam, North Interior Karnataka and Andaman & Nicobar Islands.

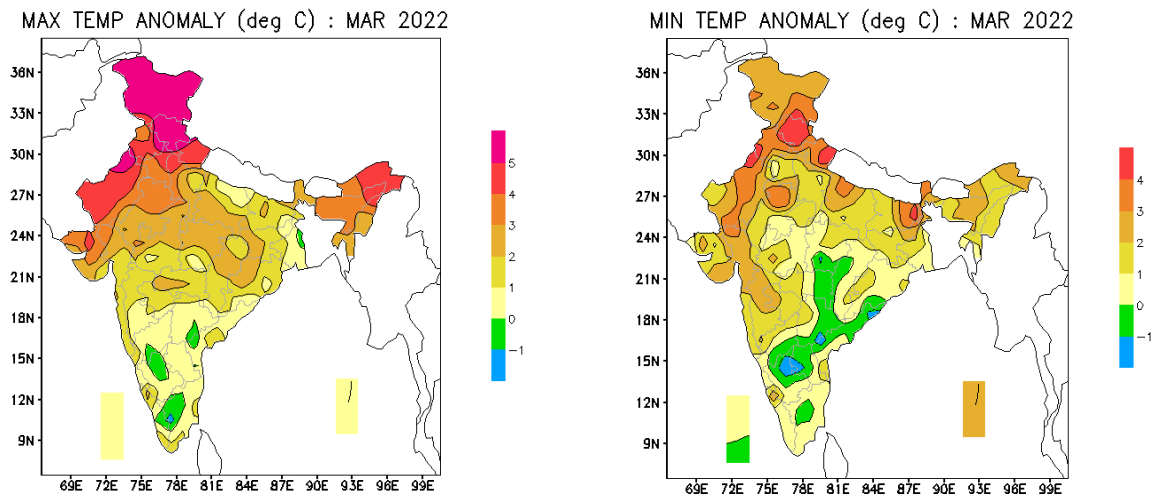


चित्र ४(बी): फरवरी 2022 के लिए अधिकतम और न्यूनतम तापमान विसंगतियां ($^{\circ}\text{C}$) स्थानिक आलेख
 Fig. 4(b): Maximum and Minimum temperature anomalies ($^{\circ}\text{C}$) spatial plots for February 2022

March - May (Pre-Monsoon Season):

During March, the maximum temperature anomaly was more than 4°C over parts of Jammu, Kashmir & Ladakh, Himachal Pradesh, Uttarakhand, Punjab, Haryana, Chandigarh & Delhi, West Uttar Pradesh, West Rajasthan, northern Saurashtra & Kutch, Arunachal Pradesh, Assam & Meghalaya, and Nagaland. The maximum temperature anomaly was more than 5°C over parts of Jammu, Kashmir & Ladakh, Himachal Pradesh, Uttarakhand, and West Rajasthan. The maximum temperature anomaly was less than -1°C over parts of Tamil Nadu, Puducherry & Karaikal.

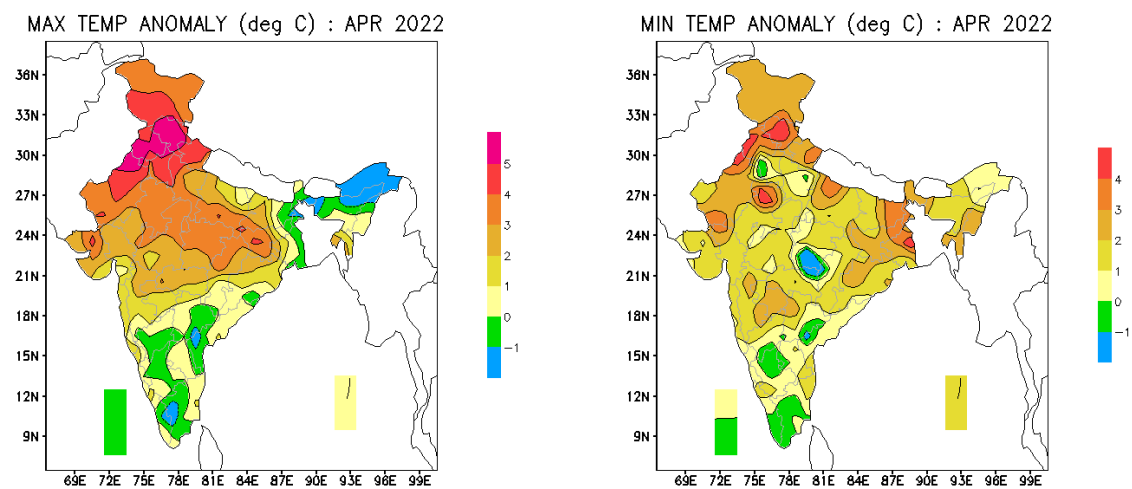
The minimum temperature anomaly was more than 3°C over parts of Jammu, Kashmir & Ladakh, Himachal Pradesh, Uttarakhand, Punjab, Rajasthan state, East Uttar Pradesh, Bihar and Sikkim. The minimum temperature anomaly was more than 4°C over parts of Ladakh, Himachal Pradesh, Uttarakhand, Punjab, West Rajasthan and Bihar. The minimum temperature anomaly was less than -1°C over parts of Andhra Pradesh state, Telangana and South Interior Karnataka.



चित्र ४ (सी): मार्च 2022 के लिए अधिकतम और न्यूनतम तापमान विसंगतियां (°C) स्थानिक आलेख
 Fig. 4(c): Maximum and Minimum temperature anomalies (°C) spatial plots for March 2022

During April, the maximum temperature anomaly was more than 4°C over parts of Jammu & Kashmir & Ladakh, Uttarakhand, Punjab, Haryana, Chandigarh & Delhi, West Uttar Pradesh, West Rajasthan, northern Saurashtra & Kutch, and Jharkhand. The maximum temperature anomaly was more than 5°C over parts of Himachal Pradesh, Punjab, and West Rajasthan. The maximum temperature anomaly was less than -1°C over parts of Arunachal Pradesh, Assam & Meghalaya, Sub Himalayan West Bengal, Telangana, Coastal Andhra Pradesh & Yanam, Tamil Nadu, Puducherry & Karaikal, and Kerala & Mahe.

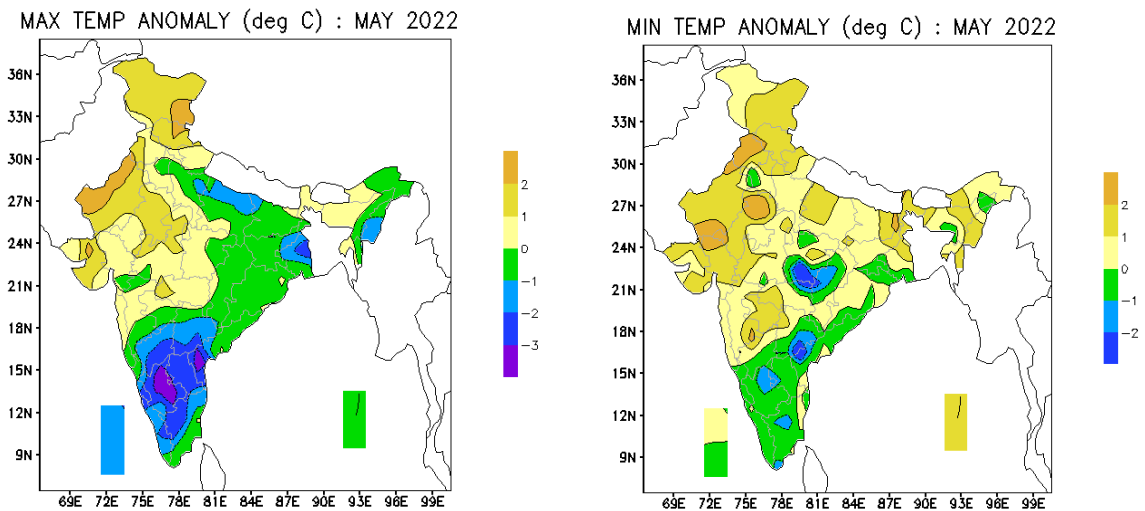
The minimum temperature anomaly was more than 3°C over parts of Ladakh, Himachal Pradesh, Uttarakhand, Punjab, Rajasthan state, East Uttar Pradesh, Bihar, Jharkhand, and West Bengal state. The minimum temperature anomaly was more than 4°C over parts of Himachal Pradesh, Punjab, Rajasthan state, and Gangetic West Bengal. The minimum temperature anomaly was less than -1°C over parts of East Madhya Pradesh, Chhattisgarh, Vidarbha, and Coastal Andhra Pradesh & Yanam.



चित्र ४ (डी): अप्रैल 2022 के लिए अधिकतम और न्यूनतम तापमान विसंगतियां (°C) स्थानिक आलेख
 Fig. 4(d): Maximum and Minimum temperature anomalies (°C) spatial plots for April 2022

During May, the maximum temperature anomaly was more than 2°C over parts of Ladakh, Himachal Pradesh, Punjab, West Rajasthan and Saurashtra & Kutch. Maximum temperature anomaly was less than -3°C over parts of Coastal Andhra Pradesh & Yanam, and South Interior Karnataka. Maximum temperature anomaly was less than -2°C over parts of Andhra Pradesh state, Telangana, Karnataka state, Kerala & Mahe, Tamil Nadu, Puducherry & Karaikal, and Gangetic West Bengal.

The minimum temperature anomaly was more than 2°C over parts of Punjab, Rajasthan state, Gujarat region, Bihar and Madhya Maharashtra. The minimum temperature anomaly was less than -2°C over parts of East Madhya Pradesh, Chhattisgarh, Vidarbha, Coastal Andhra Pradesh & Yanam and Telangana.

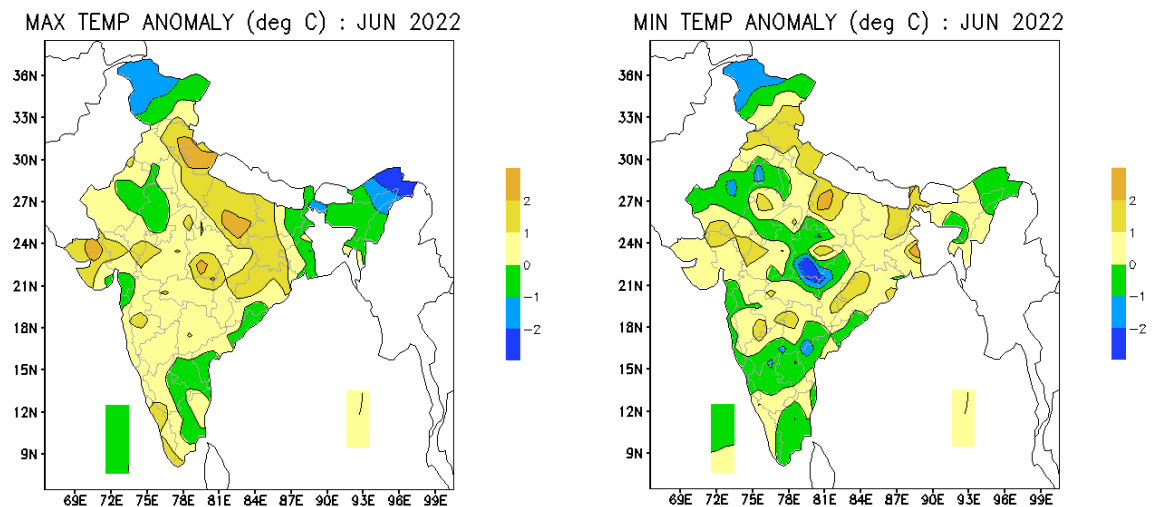


चित्र ४ (ई): मई 2022 के लिए अधिकतम और न्यूनतम तापमान विसंगतियां (°C) स्थानिक आलेख
 Fig. 4(e): Maximum and Minimum temperature anomalies (°C) spatial plots for May 2022

June - September (South-west Monsoon Season):

During June, the maximum temperature anomaly was more than 2°C over parts of Himachal Pradesh, Uttarakhand, East Uttar Pradesh, East Madhya Pradesh and Saurashtra & Kutch. The maximum temperature anomaly was less than -2°C over parts of Arunachal Pradesh.

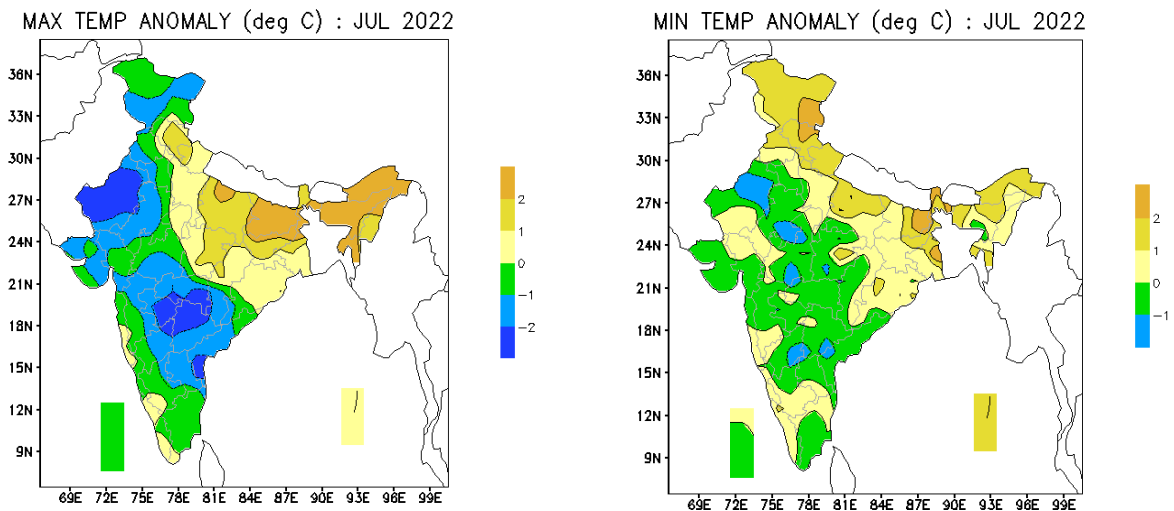
The minimum temperature anomaly was more than 2°C over parts of East Uttar Pradesh, Sikkim and Gangetic West Bengal. The minimum temperature anomaly was less than -2°C over parts of East Madhya Pradesh, Chhattisgarh and Vidarbha.



चित्र ४ (एफ): जून 2022 के लिए अधिकतम और न्यूनतम तापमान विसंगतियां (°C) स्थानिक आलेख
 Fig. 4(f): Maximum and Minimum temperature anomalies (°C) spatial plots for JUNE 2022

During July, the maximum temperature anomaly was more than 2°C over parts of Arunachal Pradesh, Assam & Meghalaya, Nagaland, Mizoram, Tripura, West Bengal state, Bihar, Jharkhand and East Uttar Pradesh. The maximum temperature anomaly was less than -2°C over parts of West Rajasthan, Vidarbha, Chhattisgarh, Marathawada, Telangana, North Interior Karnataka and Coastal Andhra Pradesh & Yanam.

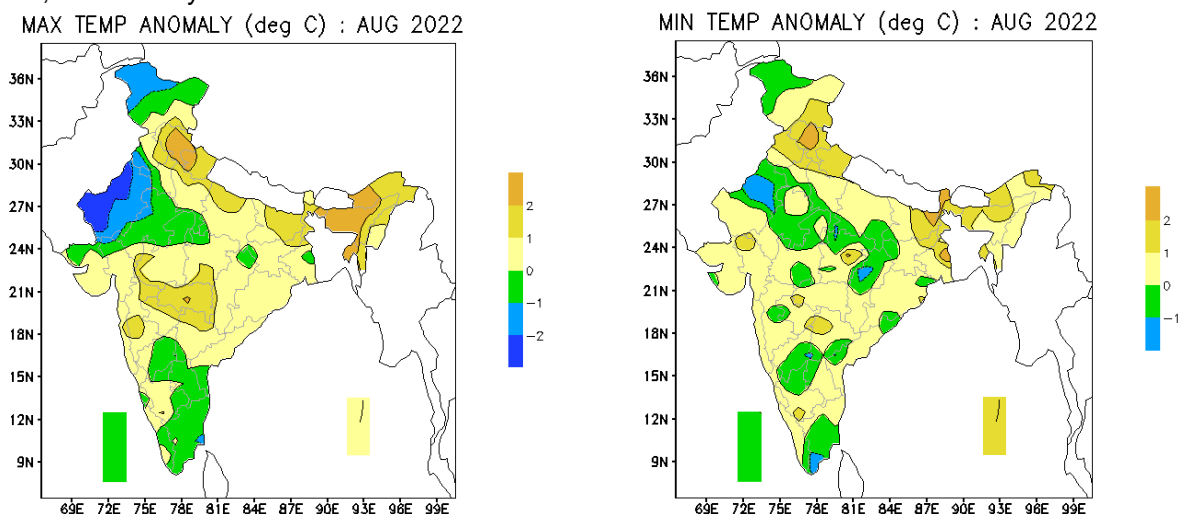
The minimum temperature anomaly was more than 2°C over parts of Ladakh, Himachal Pradesh, Bihar, Jharkhand and West Bengal state. The minimum temperature anomaly was less than -1°C over parts of Rajasthan state, Madhya Pradesh state, Vidarbha, Telangana, North Interior Karnataka and Coastal Andhra Pradesh & Yanam.



चित्र ४ (जी): जुलाई 2022 के लिए अधिकतम और न्यूनतम तापमान विसंगतियां (°C) स्थानिक आलेख
 Fig. 4(g): Maximum and Minimum temperature anomalies (°C) spatial plots for July 2022

During August, the maximum temperature anomaly was more than 2°C over parts of Arunachal Pradesh, Assam & Meghalaya, Tripura, Himachal Pradesh, Uttarakhand and Vidarbha. The maximum temperature anomaly was less than -2°C over parts of West Rajasthan.

The minimum temperature anomaly was more than 2°C over parts of Himachal Pradesh, Bihar, West Bengal state and Sikkim. The minimum temperature anomaly was less than -1°C over parts of West Rajasthan, East Uttar Pradesh, East Madhya Pradesh, Chhattisgarh, North Interior Karnataka and Tamilnadu, Puducherry & Karaikal.

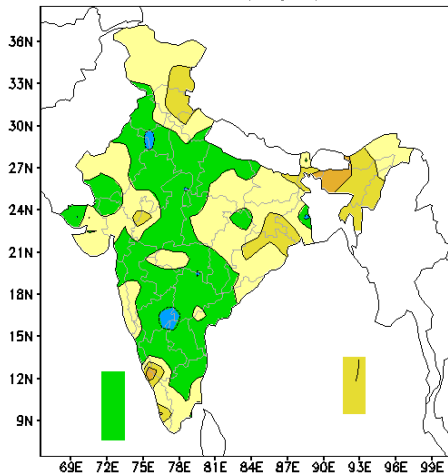


चित्र ४ (एच): अगस्त 2022 के लिए अधिकतम और न्यूनतम तापमान विसंगतियां (°C) स्थानिक आलेख
 Fig. 4(h): Maximum and Minimum temperature anomalies (°C) spatial plots for August 2022

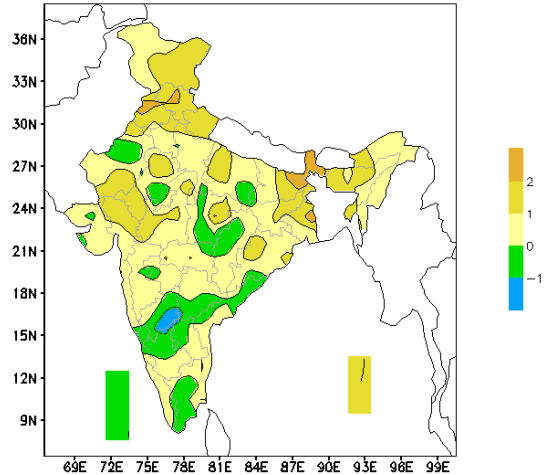
During September, the maximum temperature anomaly was more than 2°C over parts of Arunachal Pradesh, Assam & Meghalaya, Sub Himalayan West Bengal & Sikkim, South Interior Karnataka and Kerala & Mahe. The maximum temperature anomaly was less than -1°C over parts of West Rajasthan, Haryana, Chandigarh & Delhi, Gangetic West Bengal, South Interior Karnataka, North Interior Karnataka, Telangana and Rayalaseema.

The minimum temperature anomaly was more than 2°C over parts of Himachal Pradesh, Punjab, Bihar, West Bengal state and Sikkim. The minimum temperature anomaly was less than -1°C over parts of North Interior Karnataka, South Interior Karnataka, Telangana and Rayalaseema.

MAX TEMP ANOMALY (deg C) : SEP 2022



MIN TEMP ANOMALY (deg C) : SEP 2022



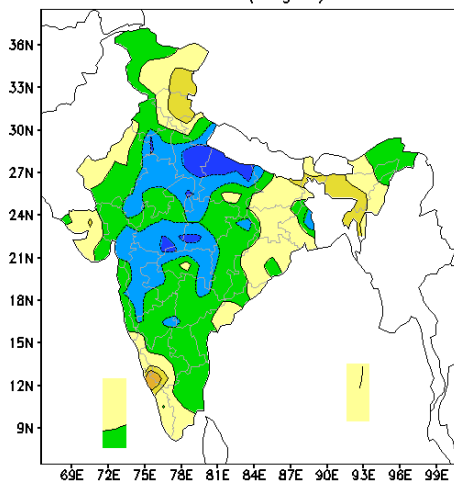
चित्र ४ (आय): सितंबर 2022 के लिए अधिकतम और न्यूनतम तापमान विसंगतियां (°C) स्थानिक आलेख
Fig. (4i): Maximum and Minimum temperature anomalies (°C) spatial plots for September 2022

October - December (Post-Monsoon Season):

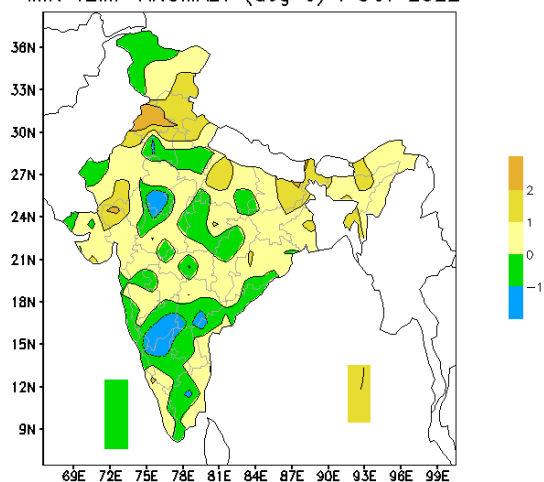
During October, the maximum temperature anomaly was more than 2°C over parts of Kerala & Mahe, coastal Karnataka and North Interior Karnataka. The maximum temperature anomaly was less than -2°C over parts of Uttar Pradesh state, Haryana, Chandigarh & Delhi and Madhya Pradesh state.

The minimum temperature anomaly was more than 2°C over parts of Punjab, extreme southern parts of Haryana, Chandigarh & Delhi, Bihar, Sikkim and Gujarat region. The minimum temperature anomaly was less than -1°C over parts of East Rajasthan, Haryana, Chandigarh & Delhi, West Madhya Pradesh, Andhra Pradesh state, Telangana, Karnataka state and Tamil Nadu, Puducherry & Karaikal.

MAX TEMP ANOMALY (deg C) : OCT 2022



MIN TEMP ANOMALY (deg C) : OCT 2022

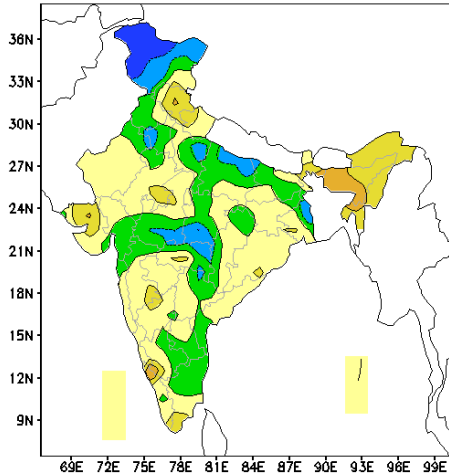


चित्र ४ (जे): अक्टूबर 2022 के लिए अधिकतम और न्यूनतम तापमान विसंगतियां (°C) स्थानिक आलेख
Fig. 4(j): Maximum and Minimum temperature anomalies (°C) spatial plots for October 2022

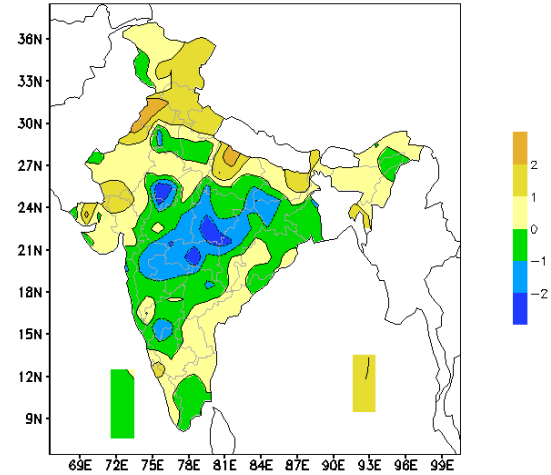
During November, the maximum anomaly was more than 2°C over parts of Assam & Meghalaya, Sub Himalayan West Bengal, Himachal Pradesh, Mizoram, Tripura, Saurashtra & Kutch, Kerala & Mahe and South Interior Karnataka. The maximum temperature anomaly was less than -2°C over parts of Jammu & Kashmir state.

The minimum temperature anomaly was more than 2°C over parts of Punjab, extreme southern parts of West Rajasthan, East Uttar Pradesh and northern Saurashtra & Kutch. The minimum temperature anomaly was less than -2°C over parts of East Rajasthan, East Madhya Pradesh, Chhattisgarh and Vidarbha.

MAX TEMP ANOMALY (deg C) : NOV 2022



MIN TEMP ANOMALY (deg C) : NOV 2022



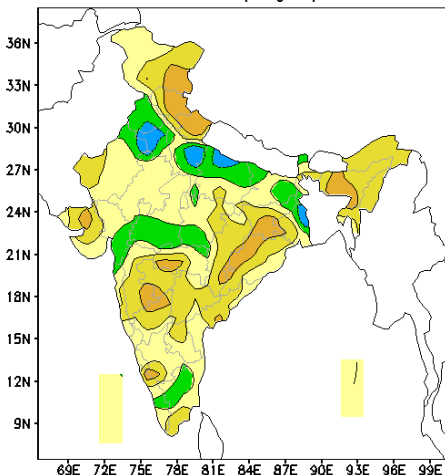
चित्र ४ (के): नवंबर 2022 के लिए अधिकतम और न्यूनतम तापमान विसंगतियां (°C) स्थानिक आलेख

Fig. 4(k): Maximum and Minimum temperature anomalies (°C) spatial plots for November 2022

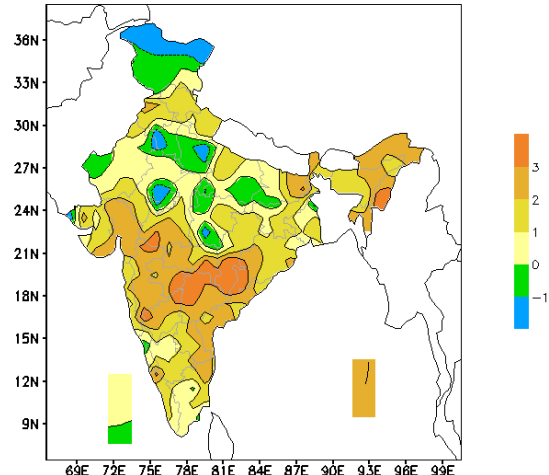
During December, the maximum temperature anomaly was more than 2°C over parts of Assam & Meghalaya, Ladakh state, Himachal Pradesh, Uttarakhand, Jharkhand, Chhattisgarh, Odisha, Saurashtra & Kutch, Madhya Maharashtra, Marathawada, Vidarbha, South Interior Karnataka, North Interior Karnataka, Kerala & Mahe and Coastal Andhra Pradesh & Yanam. The maximum temperature anomaly was less than -1°C over parts of Punjab, Haryana, Chandigarh & Delhi, West Rajasthan, Uttar Pradesh state and Gangatic West Bengal.

The minimum temperature anomaly was more than 3°C over parts of Manipur, West Madhya Pradesh, Madhya Maharashtra, Marathawada, Vidarbha, Chhattisgarh, Odisha, Telangana and North Interior Karnataka. The minimum temperature anomaly was less than -1°C over parts of Jammu, Kashmir & Ladakh, Haryana, Chandigarh & Delhi, West Uttar Pradesh, Rajasthan state, Saurashtra & Kutch and East Madhya Pradesh.

MAX TEMP ANOMALY (deg C) : DEC 2022



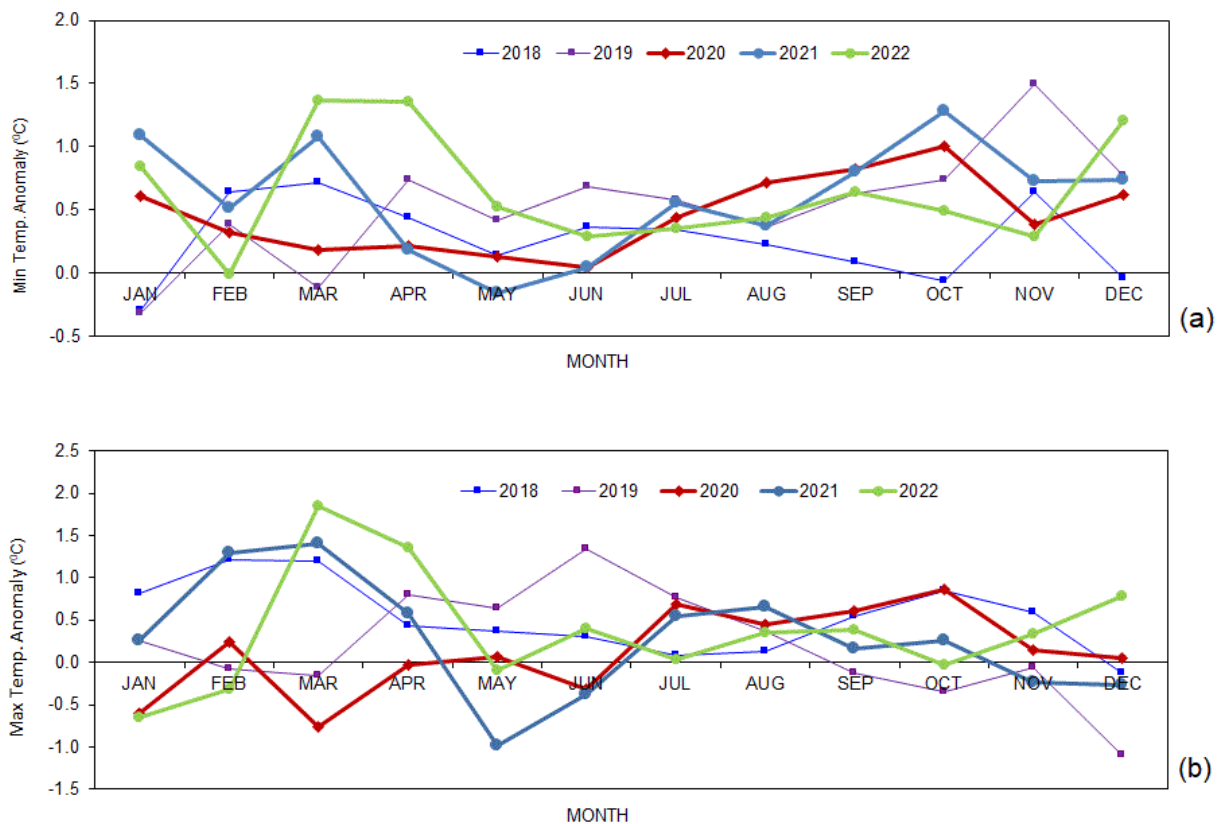
MIN TEMP ANOMALY (deg C) : DEC 2022



चित्र ४ (एल): दिसम्बर 2022 के लिए अधिकतम और न्यूनतम तापमान विसंगतियां (°C) स्थानिक आलेख

Fig. 4(l): Maximum and Minimum temperature anomalies (°C) spatial plots for December 2022

Fig. 5 (a) and (b) respectively shows the monthly minimum and maximum temperature anomaly for the country as a whole during past five years (2018-2022). In respect of maximum temperature, month of March, April and December were warmest in last five years, while March, April, May and December were warmest in respect of minimum temperature during the last five years.



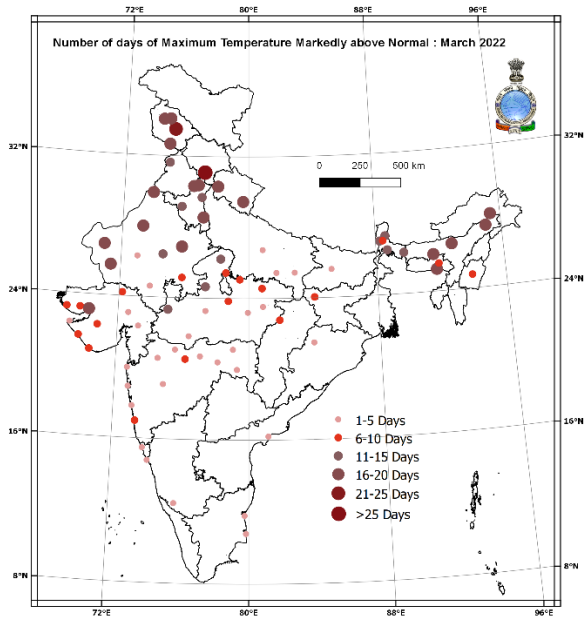
चित्र ५: औसत मासिक (ए) न्यूनतम (बी) अधिकतम तापमान विसंगतियां (2018-2022)
 Fig. 5: Mean monthly (a) minimum (b) maximum temperature anomalies (2018-2022)

Heat Wave Conditions:

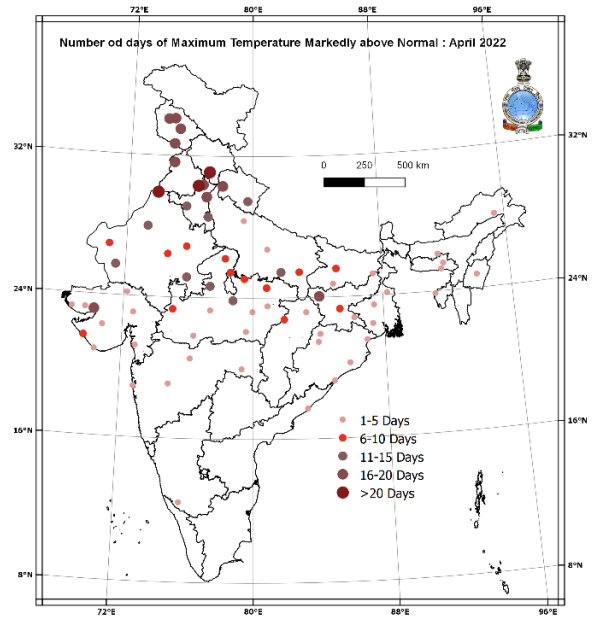
In the month of March, heat wave conditions were observed over most parts of central and northwest India. Severe heat wave conditions were observed over parts of Haryana, Chandigarh & Delhi, Himachal Pradesh, Jammu & Kashmir, Rajasthan state, Gujarat state during second fortnight of the month.

In the month of April, heat wave conditions were observed over parts of Jharkhand, Bihar, Uttar Pradesh state, Haryana, Chandigarh & Delhi, Jammu & Kashmir, East Rajasthan, Madhya Pradesh state, Gujarat Region and Saurashtra & Kutch. Severe heat wave conditions were observed over parts of Jharkhand, Uttar Pradesh state, Haryana, Chandigarh & Delhi, Punjab, Himachal Pradesh, Jammu & Kashmir, Rajasthan state, West Madhya Pradesh and Saurashtra & Kutch during first week of April.

Maximum temperature that was markedly above normal were observed mainly over most parts of Central India, Northwest India and East & Northeast India during March 2022. Maximum temperature that was markedly above normal were observed mainly over most parts of Central India, Northwest India and East India during April 2022. Figure 6(a) and 6(b) shows the stations with number of days, which were markedly above normal (>4.4°C) maximum temperatures during March and April.

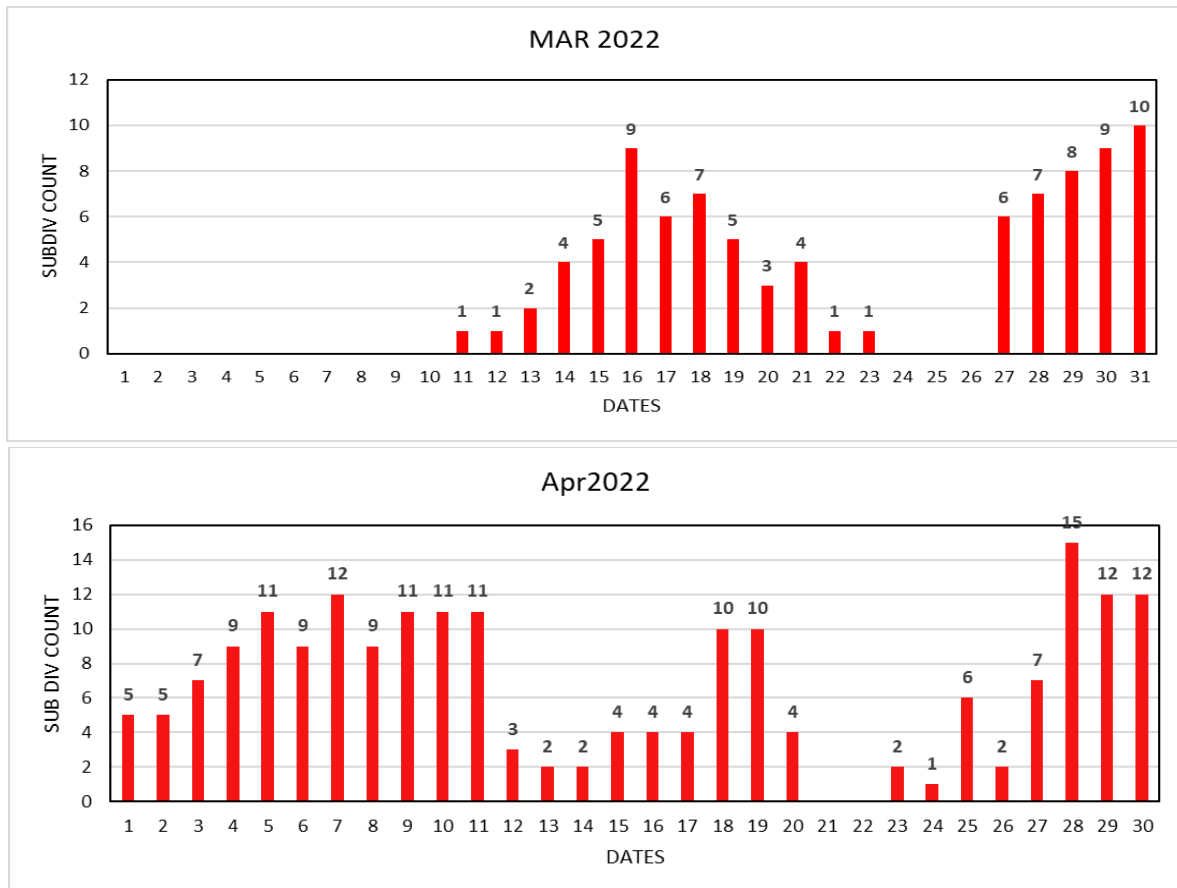


चित्र 6 (ए): मार्च 2022 के लिए पूरे देश में अधिकतम तापमान सामान्य (>4.4 डिग्री सेल्सियस) से ऊपर है
 Fig. 6 (a): The Maximum temperature markedly above normal (>4.4°C) over the country as a whole for March 2022



चित्र 6 (बी): अप्रैल 2022 के लिए पूरे देश में अधिकतम तापमान सामान्य (>4.4 डिग्री सेल्सियस) से ऊपर है
 Fig. 6 (b): The Maximum temperature markedly above normal (>4.4°C) over the country as a whole for April 2022

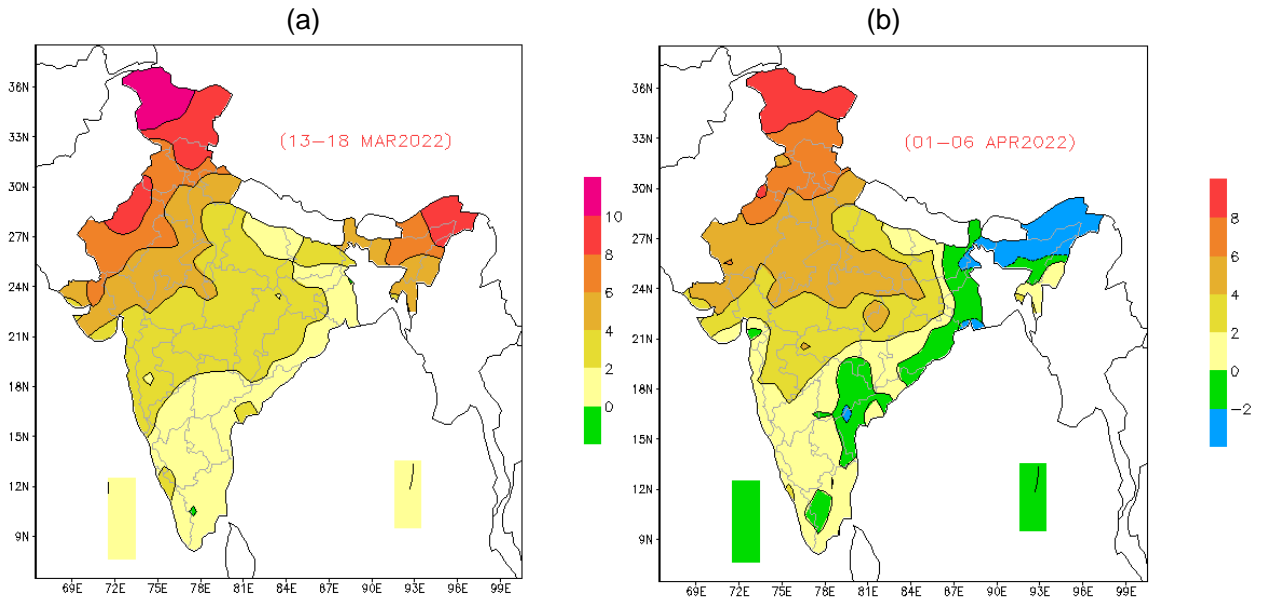
Number of subdivisions that reported heat wave / severe heat wave during March and April 2022 is shown in the fig. 7.



चित्र 7: मार्च और अप्रैल 2022 के दौरान उप-प्रभागवार हीट वेव की गिनती

Fig. 7: Number of subdivisions that reported heat wave / severe heat wave during March and April 2022.

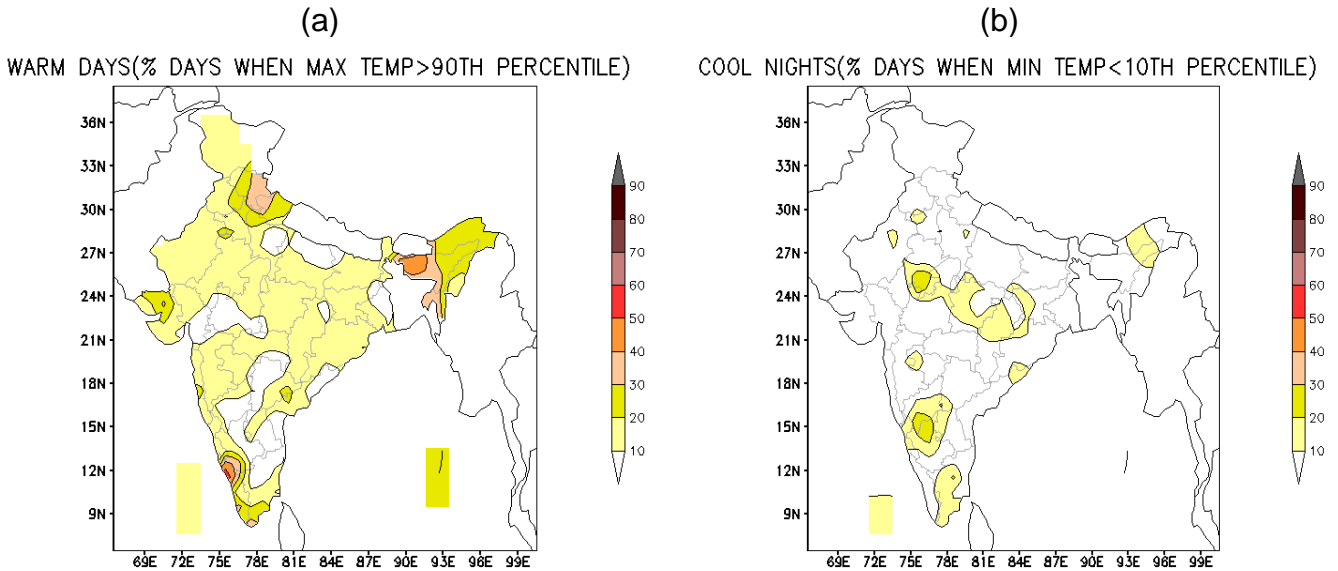
Fig. 8 (a,b) shows the maximum temperature anomaly diagram for the duration when heat wave condition was at its peak during 13-18 March 2022, 01 – 06 April 2022.



चित्र ८: हीट वेव अवधि के दौरान अधिकतम तापमान विसंगति ($^{\circ}\text{C}$) (ए) १३-१८ मार्च २०२२ (बी) ०१-०६ अप्रैल २०२२
 Fig. 8: Maximum temperature anomaly ($^{\circ}\text{C}$) during heat wave period (a) 13 -18 March 2022(b) 01-06 April 2022

WARM DAY AND COLD NIGHTS:

Fig. 9(a) and 9(b) show the percentage of days when maximum (minimum) temperature was more (less) than 90th (10th) percentile. Maximum temperature was more than 90th percentile over parts of Assam & Meghalaya and Kerala & Mahe for more than 40% of the days of the year. For minimum temperature no such significant distribution was observed.



चित्र ९(ए,बी): (ए) उन दिनों का प्रतिशत जब अधिकतम तापमान > 90 वें प्रतिशत
 (बी) उन दिनों का प्रतिशत जब न्यूनतम तापमान < 10 वें प्रतिशत

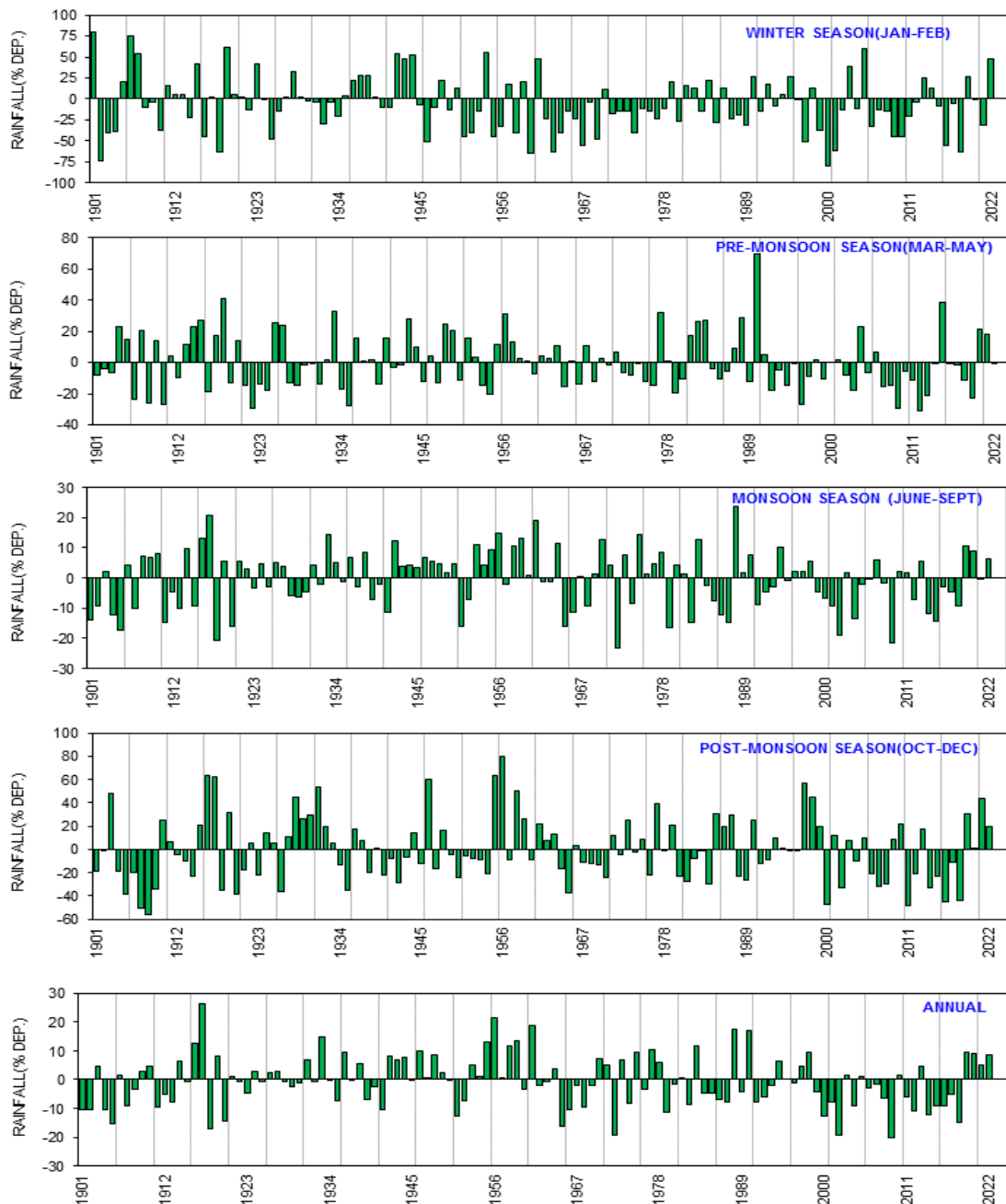
Fig. 9(a, b): (a) PERCENTAGE OF DAYS WHEN MAXIMUM TEMPERATURE > 90TH PERCENTILE
 (b) PERCENTAGE OF DAYS WHEN MINIMUM TEMPERATURE < 10TH PERCENTILE

B) RAINFALL

Time series of percentage departure of area weighted seasonal and annual rainfall over the country as a whole are shown in Fig. 10. In 2022, annual rainfall over the country as a whole was 108 % of its LPA value.

Season wise rainfall distribution over the country as a whole is listed below:

Winter (January to February): **147% of LPA**
 Pre-monsoon (March to May): **100% of LPA**
 Monsoon (June to September): **106% of LPA**
 Post-monsoon (Oct to Dec): **119 % of LPA**



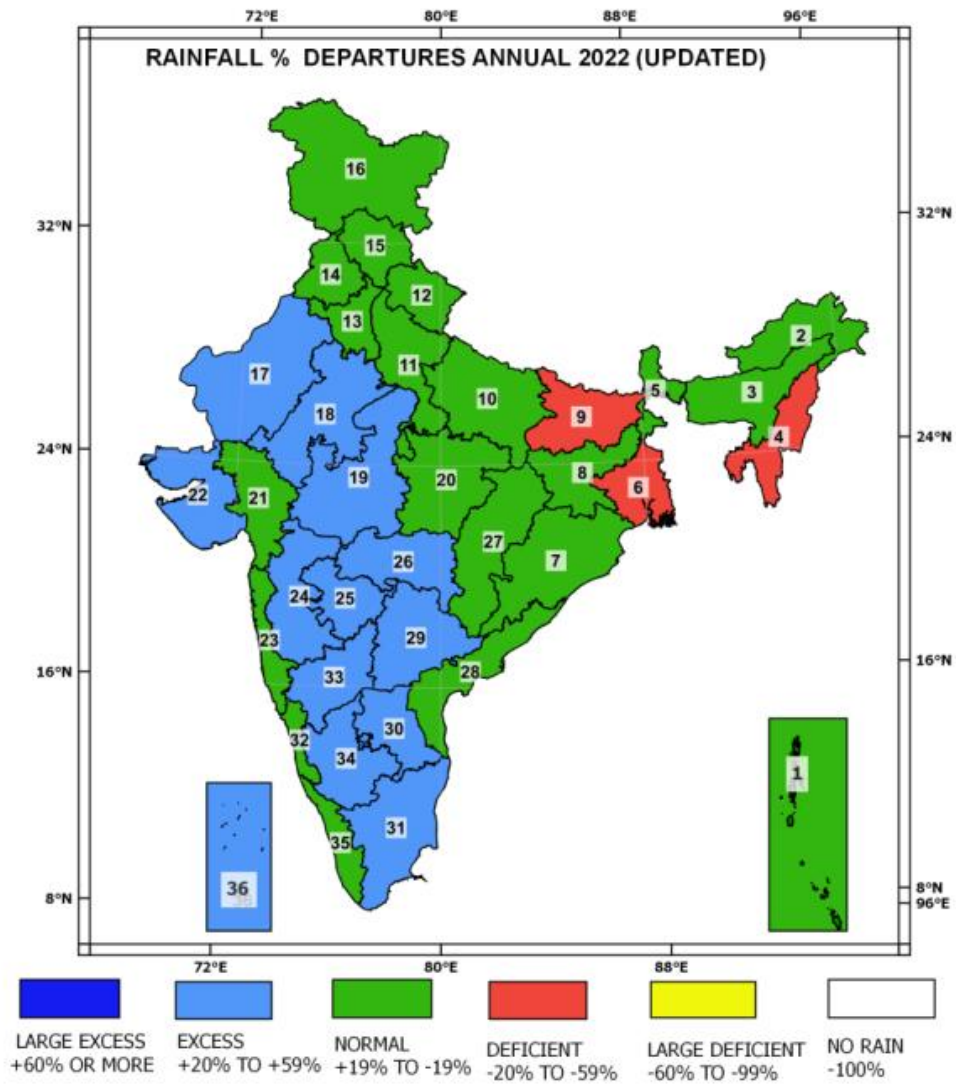
चित्र १०: पूरे देश में क्षेत्र भारित (मौसमी और वार्षिक) वर्षा का प्रतिशत विचलन (1901-2022)

Fig. 10: Percentage departure of area weighted (Seasonal and Annual) rainfall over the country as a whole for 1901-2022. (Climatology period 1971-2020)

Annual:

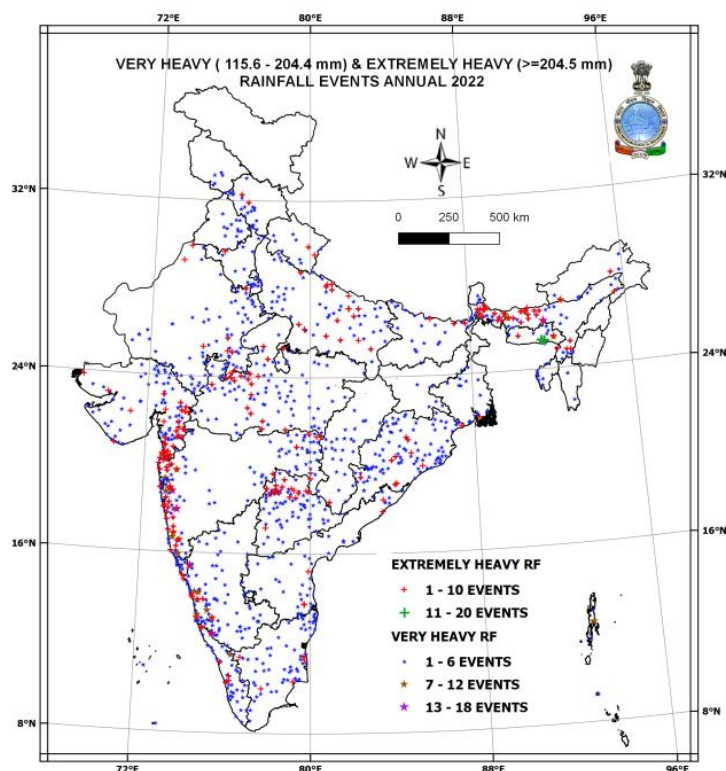
Rainfall activity over the country as a whole was 108% of LPA during the year. Out of 36 meteorological subdivisions, 13 received excess rainfall, 20 received normal rainfall and remaining 3 subdivisions received deficient rainfall. Fig 11 shows percentage departure for Annual 2022.

At the end of year, of the four homogeneous regions, South Peninsular India received 124% of its LPA, Central India received 118% of its LPA, Northwest India received 99% of its LPA, while East & Northeast India received 93% of its LPA rainfall.



चित्र ११: 2022 के लिए उप-प्रभागवार वार्षिक वर्षा प्रतिशत विचलन
 Fig. 11: Sub- division wise Annual rainfall percentage departure for 2022

Fig. 12 shows the location and frequency of occurrence of Very heavy (115.6-204.4 mm) & extremely heavy (more than 204.4 mm) rainfall events during the year.



चित्र १२: वार्षिक बहुत भारी और अत्यधिक भारी वर्षा की घटनाएं
Fig. 12: Annual very heavy and extremely heavy rainfall events

Season Wise Rainfall Distribution:

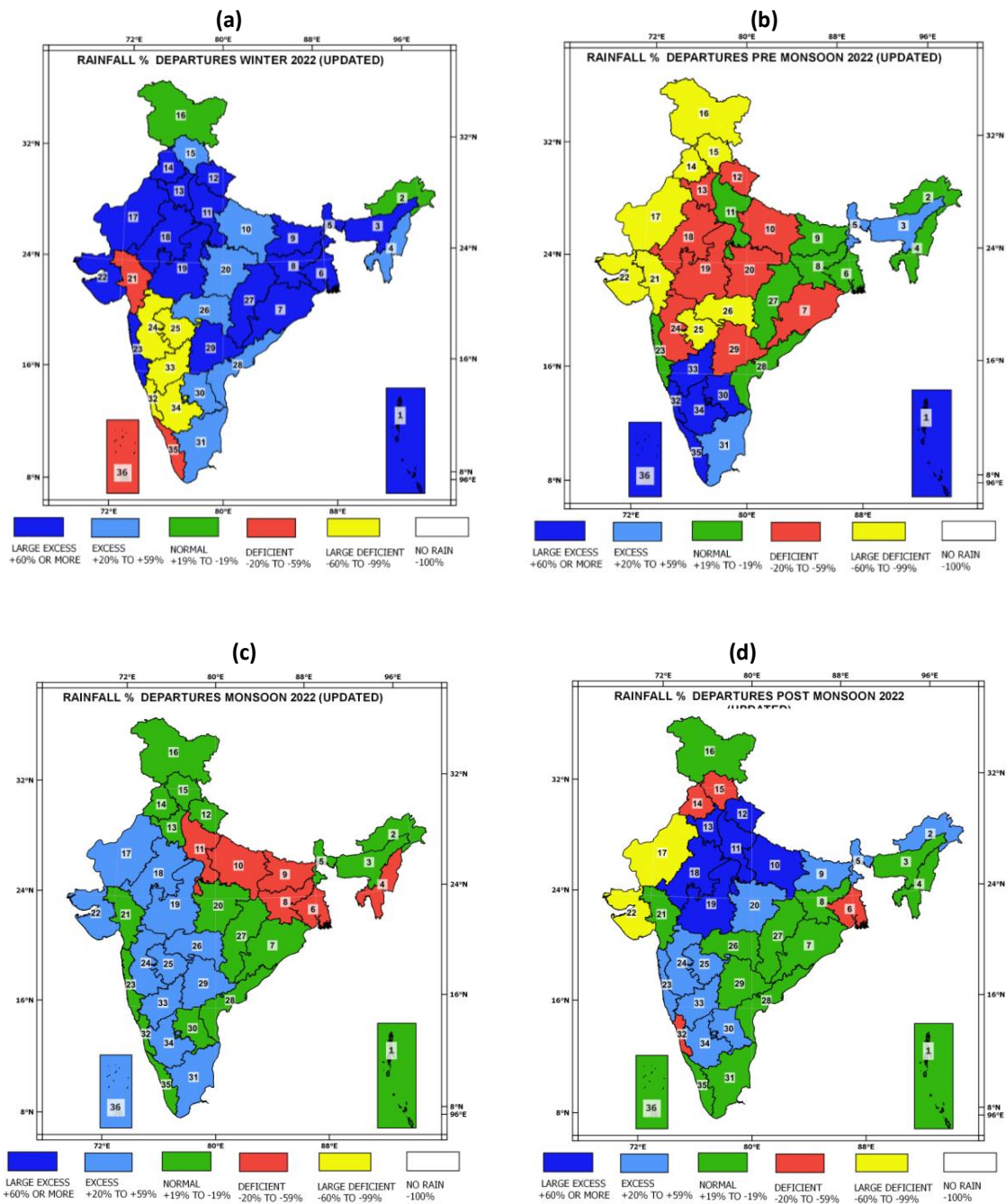
Rainfall realized during winter season was 147% of LPA. It was 231% of LPA during January and was 84% of LPA during February. During winter season, out of 36 meteorological subdivisions, 19 received large excess rainfall, 6 received excess rainfall, 3 normal rainfall, 3 received deficient rainfall, 5 received large deficient rainfall. Fig. 13(a) shows percentage departure for winter season 2022.

Rainfall realized during Pre-monsoon season was 100% of its LPA. It was 30% of its LPA, 97% of its LPA and 135% of its LPA during March, April and May respectively. During Pre-monsoon season, out of 36 meteorological subdivisions, 7 received large excess rainfall, 3 received excess rainfall, 9 received normal rainfall, 9 received deficient rainfall and 8 received large deficient rainfall. Fig 13(b) shows percentage departure for pre monsoon season 2022.

Rainfall realized during Monsoon season was 106% of its LPA. It was 92% of its LPA, 117% of its LPA, 104% of its LPA and 108% of its LPA during June, July, August and September respectively. Most sub-divisions of the country received excess/normal rainfall except Nagaland, Manipur, Mizoram & Tripura, Gangetic West Bengal, Jharakhand, Bihar, east & west Uttar Pradesh. During the season, out of 36 meteorological subdivisions, 12 subdivisions received excess rainfall, 18 received normal rainfall and the remaining 6 subdivisions received deficient rainfall. Fig 13(c) shows percentage departure for South west monsoon season 2022.

Rainfall realized over the country as a whole during the Post-monsoon season was 119% of its LPA. It was 148% of its LPA, 63% of its LPA and 85% of its LPA during October, November and December month respectively. During the season most of the subdivisions received large

excess/excess/normal rainfall except Gangetic West Bengal, Punjab, Himachal Pradesh, Coastal Karnataka, West Rajasthan and Saurashtra & Kutch. During the season, out of 36 meteorological subdivisions, 6 received large excess rainfall, 10 received excess rainfall, 14 received normal rainfall, 4 received deficient rainfall and 2 subdivisions received large deficient rainfall. Fig.13(d).

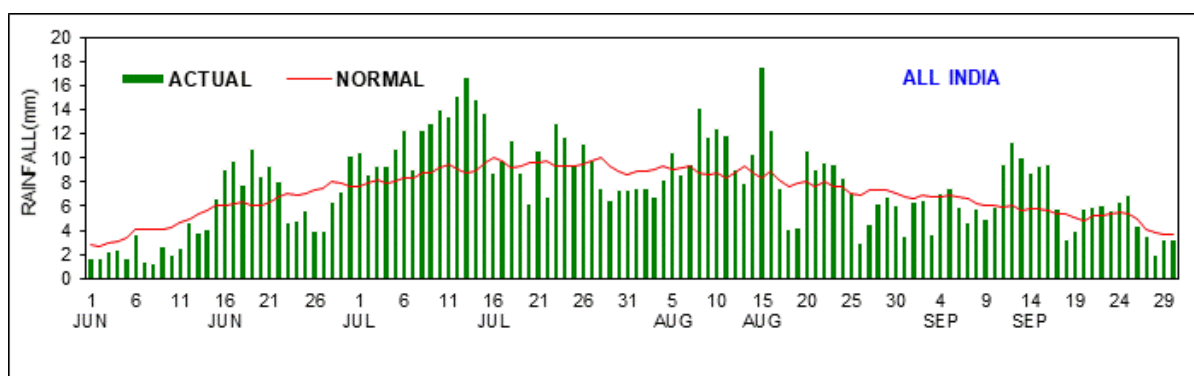


चित्र १३: (ए) शीतकालीन मौसम (बी) प्री-मानसून सीजन (सी) दक्षिण-पश्चिम मानसून (डी) मानसून पश्चात 2022 के लिए उप-प्रभागवार वर्षा प्रतिशत विचलन

Fig. 13: Sub-division wise rainfall percentage departure for(a) Winter Season (b) Pre-Monsoon Season (c) South-West Monsoon Season (d) Post-Monsoon Season 2022

Daily Rainfall variation during Monsoon Season:

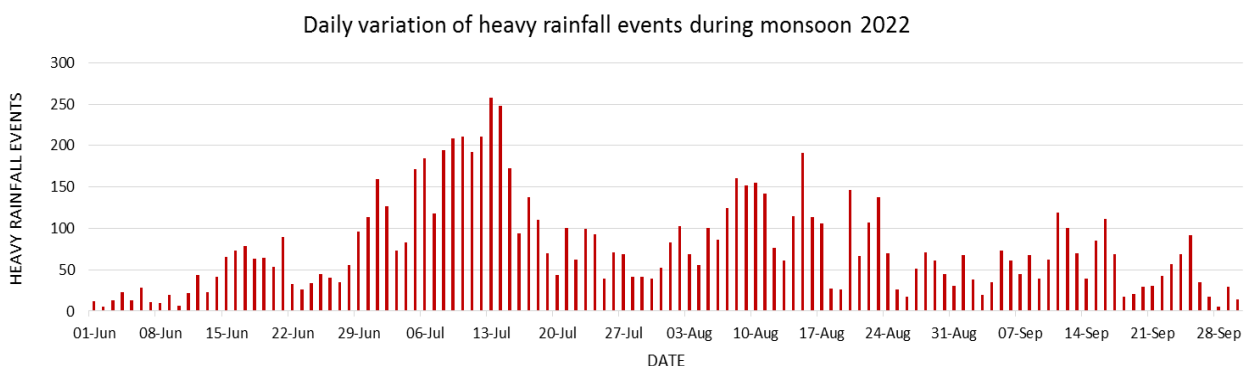
Daily area weighted rainfall (mm) over the country as a whole during the monsoon season 2022 (1st Jun. to 30th Sep.) and its long term average (1971-2020) values are shown in Fig. 14(a). For the country as a whole, rainfall averaged was generally above or near normal on many days during Season. On about 15 occasions in the whole season, it was nearly more than one & half times of its normal value. For the country as a whole, rainfall averaged was above normal on 9 days during June, 23 days during July, 15 days during August and 15 days during September. It was above normal at a stretch for few days viz. for the duration from 15–22 June, 30 June –15 July, 23–27 July, 7–12 August, 14–16 August, 20–24 August, 11–17 September and 2 –25 September. However, it was below normal for rainfall spells during 1–14 June, 23–29 June, 28 July – 4 August, 25 August–3 September, 6–10 September and 26–30 September.



चित्र १४ (ए): पूरे देश में दैनिक क्षेत्र भारित वर्षा (मिमी) और इसका दीर्घकालिन औसत (1971-2020) (निरंतर रेखा) 1 जून - 30 सितंबर 2022

Fig. 14(a): Daily Area Weighted Rainfall (mm) over the country as a whole (vertical bars) and its long term average (1971-2020) (continuous line) 1 June - 30 September 2022

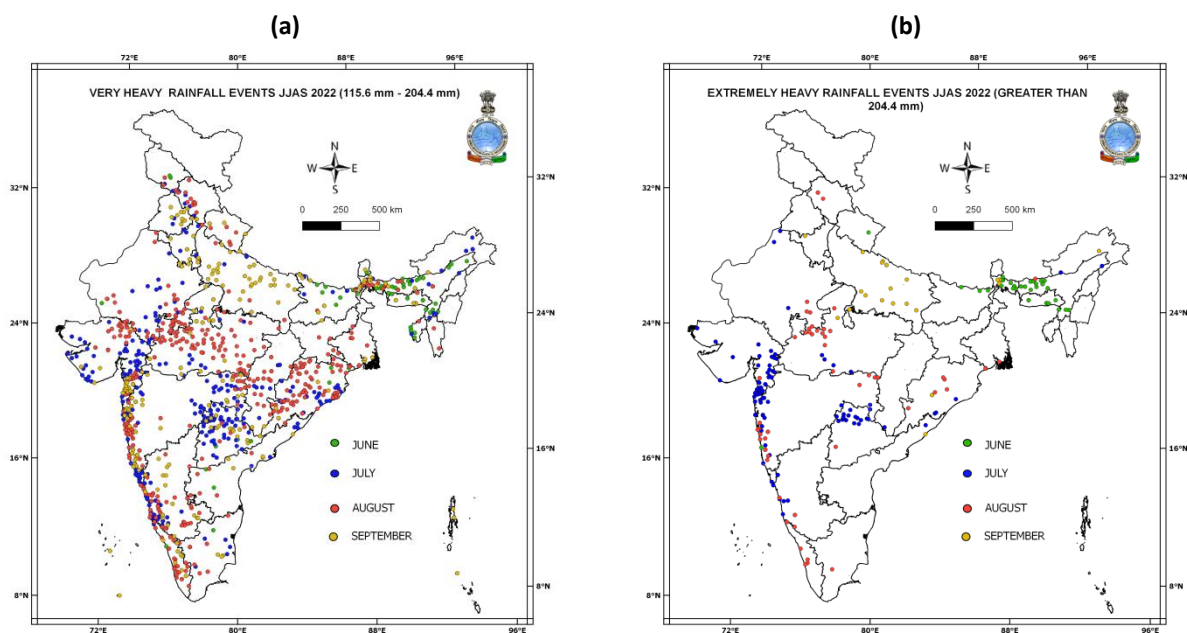
In the month of July and August 2022 country witnessed more number of heavy rainfall events show in figure 14 (b).



चित्र १४ (बी): 1 जून - 30 सितंबर 2022 के दौरान भारी वर्षा की घटनाओं की दैनिक भिन्नता

Fig. 14(b): Daily variation of heavy rainfall events during 1 June - 30 September 2022

Fig. 15(a,b) shows the location and frequency of occurrence of Very heavy (115.6-204.4 mm) & Extremely heavy (more than 204.4 mm) rainfall events during the monsoon season.

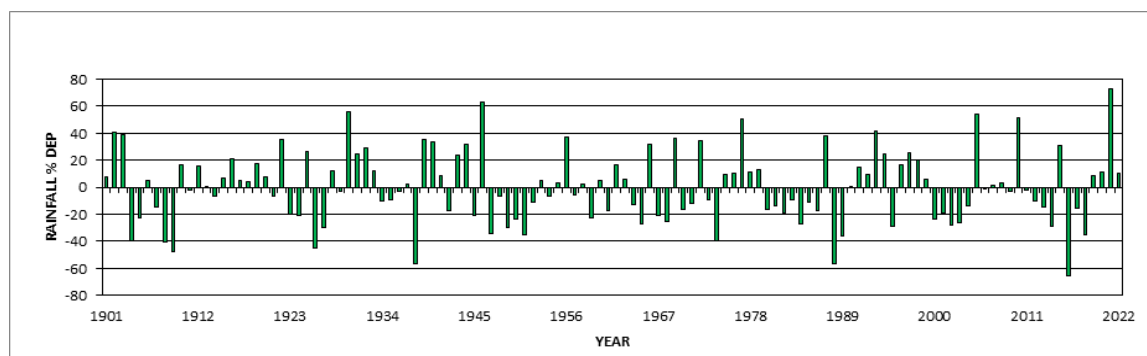


चित्र १५(ए,बी): मानसून के दौरान बहुत भारी और अत्यधिक भारी वर्षा की घटनाएं
 Fig. 15(a,b): Very heavy and extremely heavy rainfall events during monsoon

Rainfall during Post-monsoon season:

Rainfall activity over core region of the South Peninsular India (comprising of 5 subdivisions viz. Coastal Andhra Pradesh, Rayalaseema, Tamil Nadu, Puducherry & Karaikal, South Interior Karnataka and Kerala & Mahe) during the season as a whole was 110% of its LPA.

Time series of northeast monsoon seasonal rainfall over the core region of south peninsula is shown in Fig 16.



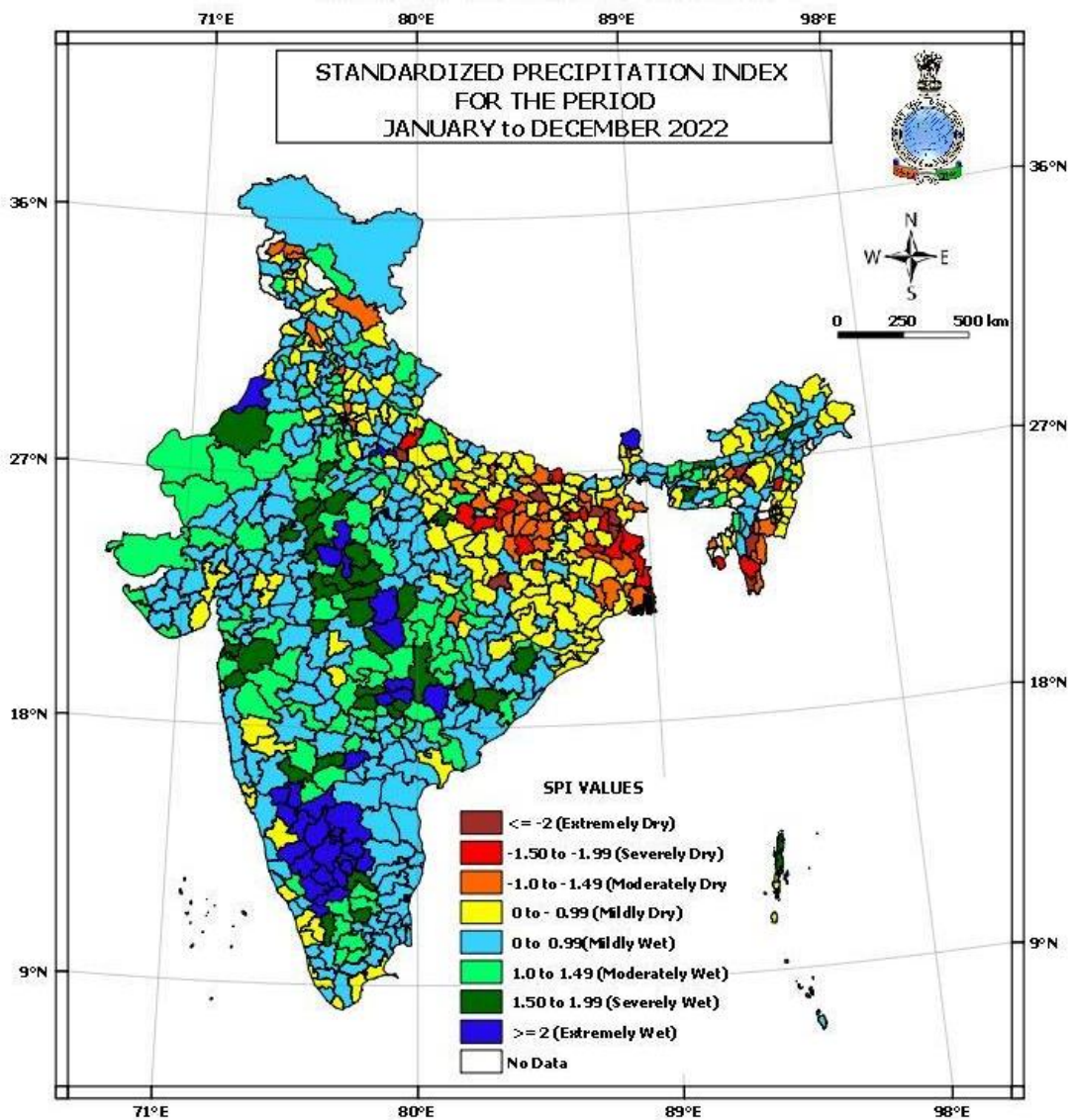
चित्र १६: दक्षिण प्रायद्वीप के कोर जोन (1901-2022) पर मानसून के बाद के मौसम (अक्टूबर से दिसंबर) के दौरान वर्षा का प्रतिशत विचलन

FIG. 16: Percentage departure of rainfall during the Post-monsoon season (October to December) over the core zone of South Peninsula (1901-2022)

C) Standardized Precipitation Index

The Standardized Precipitation Index (SPI) is an index used for measuring drought and is based on precipitation. This index is negative for dry, and positive for wet conditions. As the dry or wet conditions become more severe, the index becomes more negative or positive. Fig.17 gives the district wise SPI values for the year 2022.

Cumulative SPI values of January to December indicate extremely wet-severely wet conditions over parts of A & N Islands, Assam & Meghalaya, Sub Himalayan West Bengal & Sikkim, Odisha, Uttar Pradesh state, Rajasthan state, Madhya Pradesh state, Gujarat Region, Konkan & Goa, Madhya Maharashtra, Vidarbha, Chhattisgarh, Telangana, Rayalaseema, Tamil Nadu, North Interior Karnataka, South Interior Karnataka and Lakshadweep, while extremely dry-severely dry conditions were observed over parts of Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura, Gangetic West Bengal, Jharkhand, Bihar, Uttar Pradesh state and Chhattisgarh.



चित्र १७: जनवरी-दिसंबर 2022 की अवधि के लिए मानकीकृत वर्षा सूचकांक
 Fig. 17: Standardized Precipitation Index for the period January- December 2022

D) TROPICAL STORMS / DEPRESSIONS IN THE INDIAN SEAS

In 2022, three cyclones formed over the north Indian Ocean. Of these, two were Severe Cyclonic Storms “ASANI” and “MANDOUS” and one was Cyclonic Storm “SITRANG”. All the cyclones formed over the Bay of Bengal.

Among these 3 cyclones, the Severe Cyclonic Storm MANDOUS (6 December to 10 December) formed in the post-monsoon season over the Bay of Bengal, crossed north Tamil Nadu, Puducherry and adjoining south Andhra Pradesh coasts between Puducherry and Sriharikota, close to Mamallapuram (Mahabalipuram) on 9th December as a cyclonic storm, claimed 6 lives from Tamil Nadu, Andhra Pradesh & Puducherry.

The other Severe Cyclonic Storm ASANI, (7 May to 12 May) formed during the pre-monsoon season over the Bay of Bengal, crossed the Andhra Pradesh coast on 11th May as a deep depression, claimed 17 livestock & some damage in Andhra Pradesh.

The Cyclonic Storm SITRANG (22 October to 25 October), formed during the post-monsoon season & crossed the Bangladesh coast on 24th October as a cyclonic storm. It caused some damage in Assam & Mizoram.

During winter season, no intense low pressure system formed.

During pre-monsoon season, apart from severe cyclonic storm “ASANI” two depressions during the period 3 - 6 March, 20- 21 May and a deep depression during the period 20 - 23 March formed over Bay of Bengal.

During monsoon season, twelve low pressure systems (1 Deep Depression, 5 Depressions, 2 well marked low pressure areas, 2 low pressure areas and 2 land low pressure areas) were formed. The frequency and place of origin of these low pressure systems formed over the Indian region during the monsoon season is shown in the table below.

Month /Systems	DD	D	WML	LPA	LAND LPA
June	0	0	0	1(AS)	0
July	0	1 (AS)	1 (BOB),1 (LAND)	0	1
August	1(BOB)	2 (BOB),1 (AS)	0	0	0
September	0	1(BOB)	0	1(BOB)	1
	(AS : Arabian Sea)		(BOB : Bay of Bengal)		

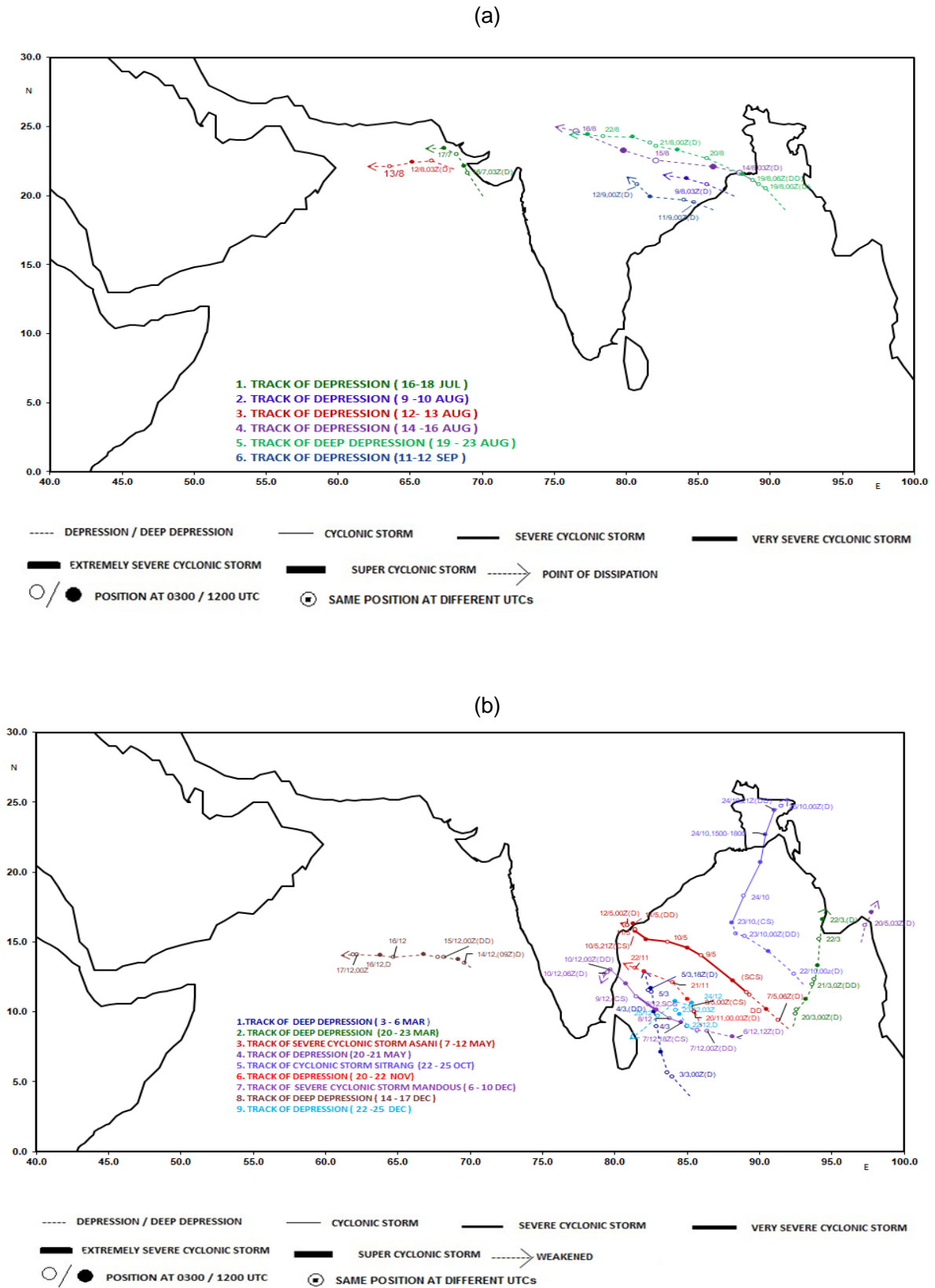
DD: Deep Depression, **D:** Depression, **WML:** Well Marked low, **LPA:** Low Pressure Area, **Land LPA:** Land low pressure Area

During post monsoon season, seven low pressure systems (2 Cyclonic Storms, 1 Deep Depression, 2 Depressions, 1 Well marked low & 1 low pressure area) were formed. The frequency and place of origin of these low pressure systems formed over the Indian region during the post monsoon season is shown in the table below.

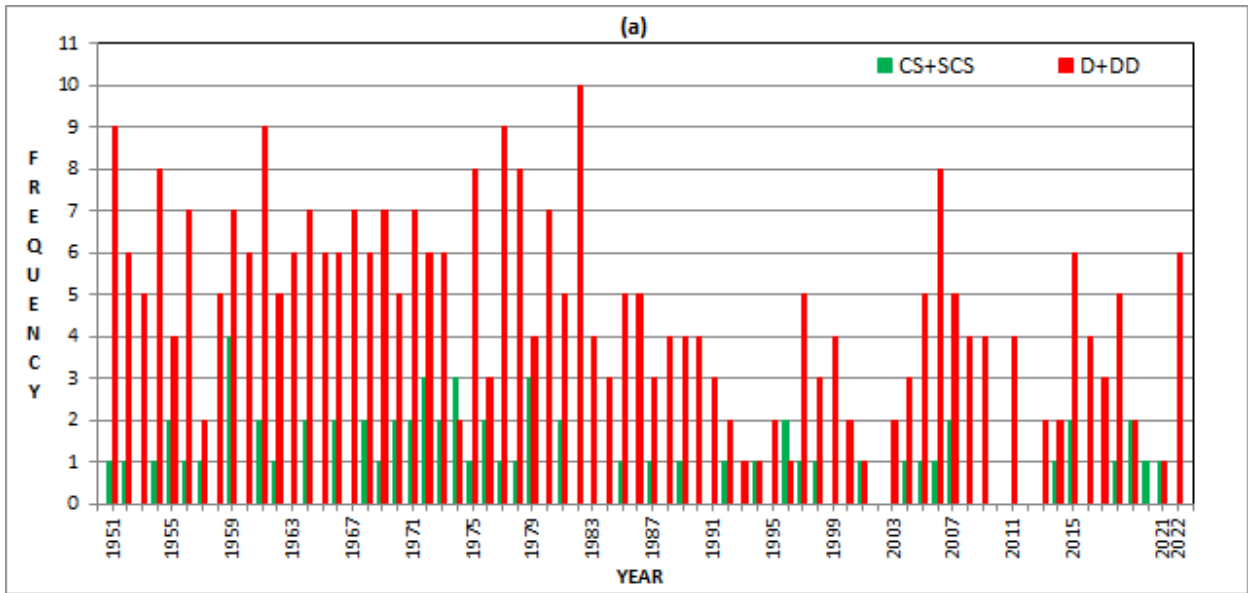
Month /Systems	CS and above	DD	D	WML	LPA
October	1 (BOB)	0	0	0	1(BOB)
November	0	0	1(BOB)	1 (BOB)	0
December	1 (BOB)	1 (AR SEA)	1 (BOB)	0	0
	(AS : Arabian Sea)		(BOB : Bay of Bengal)		

CS: Cyclonic Storm, **DD:** Deep Depression, **D:** Depression, **WML:** Well Marked low, **LPA:** Low Pressure Area

Fig. 18(a) and 18(b) respectively show track of these systems formed during the monsoon and other seasons in the year 2022.

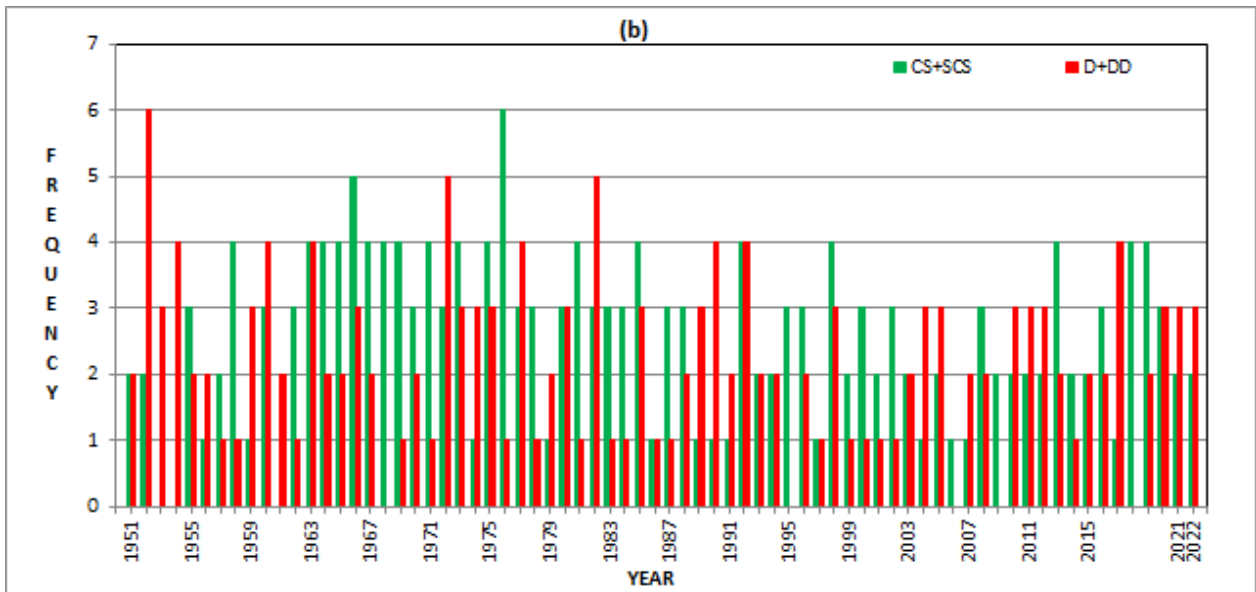


Frequency of depressions and cyclonic storms formed over the north Indian Ocean and Land (1951-2022) during the monsoon and post monsoon is shown in Fig.19(a) and 19(b) respectively.



चित्र १९(ए): मानसून का मौसम (जून-सितंबर)

Fig. 19(a): MONSOON SEASON (JUNE-SEPTEMBER)



चित्र १९(बी): मानसून के बाद का मौसम (अक्टूबर-दिसंबर)

Fig. 19(b): POST MONSOON SEASON (OCTOBER-DECEMBER)

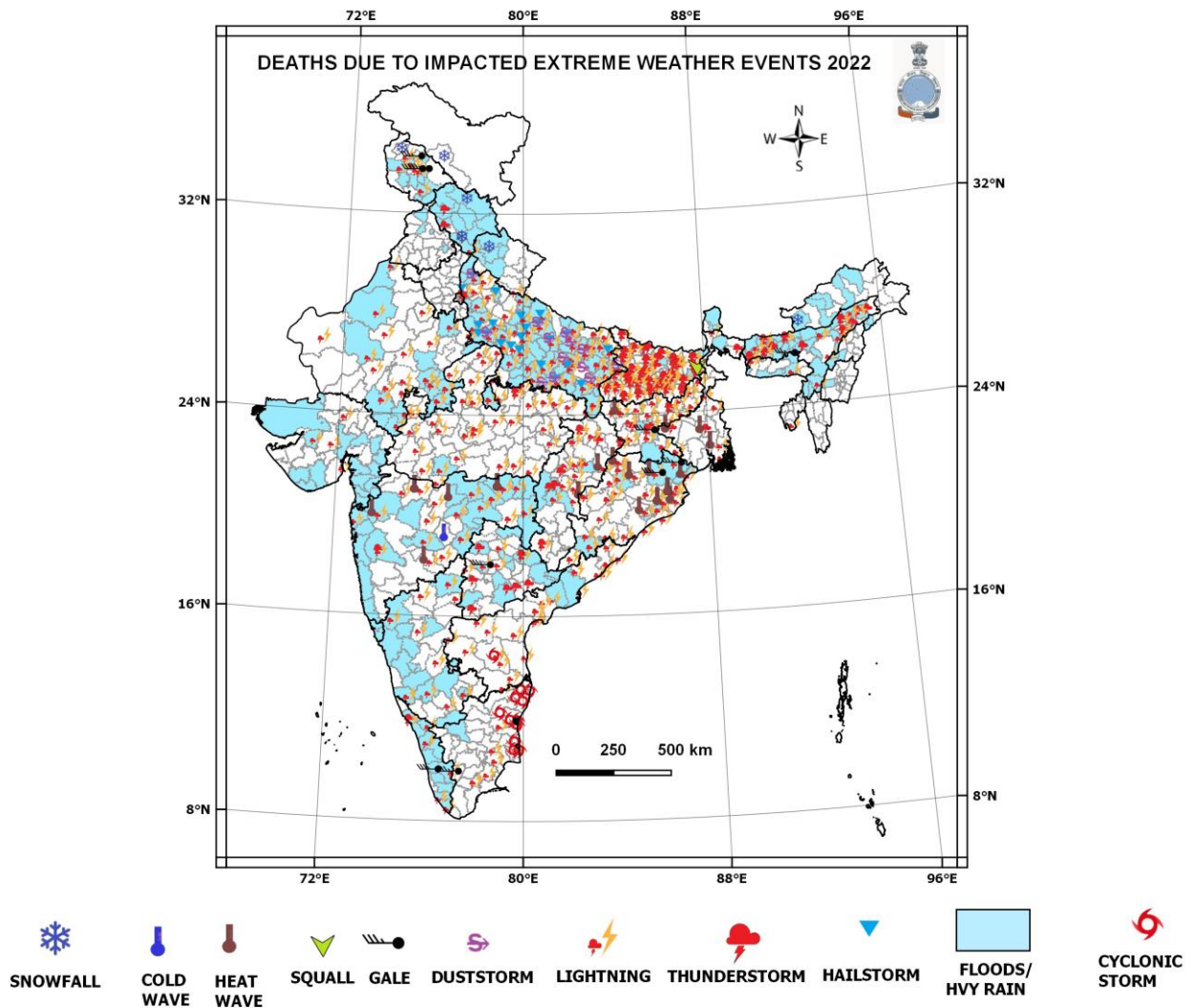
चित्र १९(ए ,बी) : उत्तर हिंद महासागर और भूमि पर बने दबाव और चक्रवाती तूफानों की वारंवरीता (1951-2022)
 Fig. 19 (a, b): Frequency of depressions and cyclonic storms formed over the North Indian Ocean & land (1951-2022)

(Source : Cyclone e-atlas, RSMC New Delhi)

E) Impacted Extreme Weather Events:

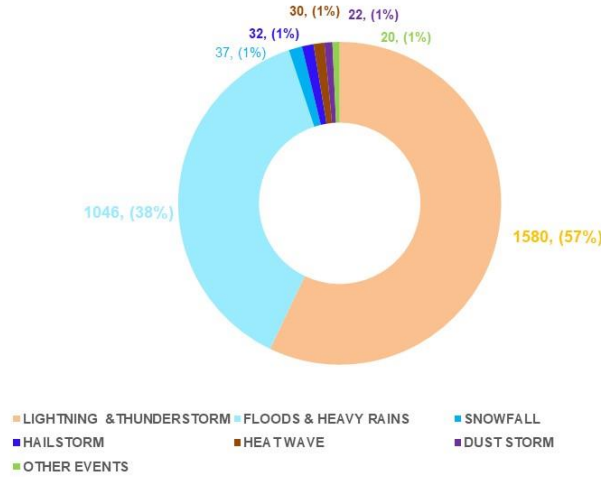
Other than Tropical Cyclones, various parts of the country also experienced Extreme Weather Events like extremely heavy rainfall, floods, landslide, lightning, thunderstorm, hailstorm, dust storm, etc. Few of them are listed below and given in the Table No 3. The casualties caused by these extreme events mentioned here are based on the media and the government reports from disaster Management Authorities.

Deaths due to Impacted Extreme Weather Events & associated loss of life, Distribution of the Number of Deaths & its percentage, State-wise Distribution of the Number of Deaths and State-wise Number of Districts affected during 2022 are shown in Fig 20, 21, 22, 23 respectively.



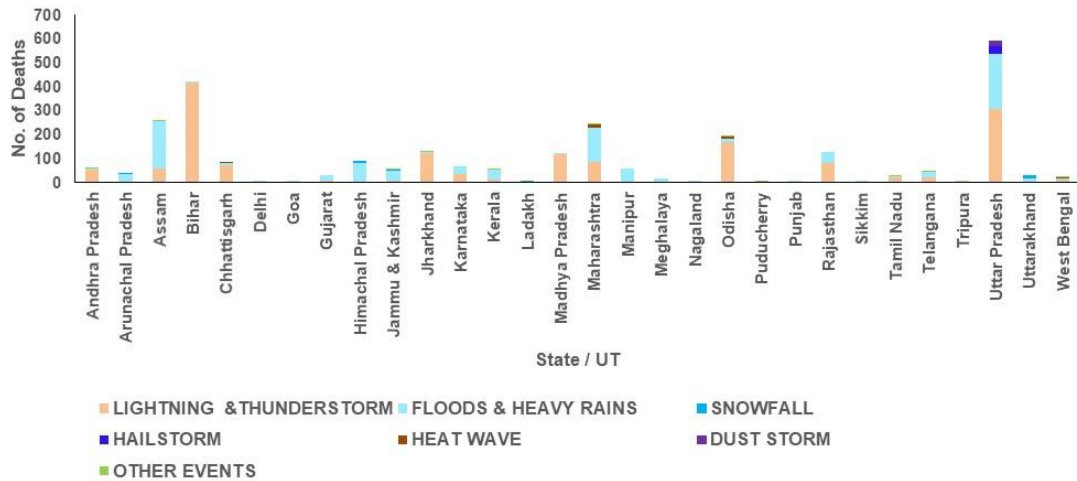
चित्र २०: 2022 के दौरान प्रभावित चरम मौसम की घटनाओं के कारण मौतें हुईं
 Fig. 20: Deaths due to Impacted Extreme Weather Events occurred during 2022

Distribution of Number of Deaths & its percentage during 2022 for Impacted Extreme Weather Events



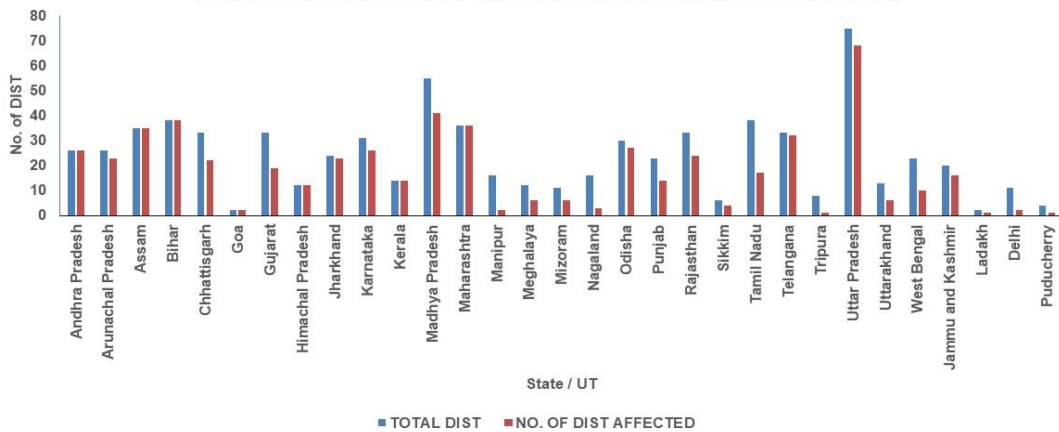
चित्र २१: प्रभावित चरम मौसम की घटनाओं के कारण 2022 के दौरान मौतों की संख्या और इसके प्रतिशत का वितरण
 Fig. 21: Distribution of the Number of Deaths & its percentage during 2022 due to Impacted Extreme Weather Events

Statewise Distribution of number of Deaths during 2022 for Impacted Extreme Weather Events



चित्र २२: प्रभावित चरम मौसम की घटनाओं के कारण 2022 के दौरान मौतों की संख्या का राज्य-वार वितरण
 Fig.22: State-wise Distribution of the Number of Deaths during 2022 due to Impacted Extreme Weather Events

Statewise Number of Districts affected during 2022 due to Various Extreme Weather Events (Flood, Heavy Rain, Landslide, Lightning, Thunderstorm, Tropical Cyclone, etc.)



चित्र २३: विभिन्न चरम मौसम की घटनाओं के कारण 2022 के दौरान प्रभावित जिलों की राज्यवार संख्या
 Fig. 23: State-wise Number of Districts affected during 2022 due to various Extreme Weather Events

Sub-division wise seasonal and annual rainfall statistic is given in Table 1 and its spatial distribution is shown

तालिका-१ / TABLE -1

वर्ष २०२२ के लिए मौसम संबंधी उप-प्रभागवार मौसमी और वार्षिक वर्षा के आंकड़े

METEOROLOGICAL SUB-DIVISIONWISE SEASONAL AND ANNUAL RAINFALL STATISTICS FOR THE YEAR 2022

S.NO	SUB-DIVISION	WINTER UPDATED				PREMONSOON UPDATED				MONSOON UPDATED				POST MONSOON UPDATED				ANNUAL UPDATED			
		ACT	NORMAL	%DEP	CAT	ACT	NORMAL	%DEP	CAT	ACT	NORMAL	%DEP	CAT	ACT	NORMAL	%DEP	CAT	ACT	NORMAL	%DEP	CAT
1	A & N ISLANDS	197.1	80.1	146	LE	783.3	455.9	72	LE	1591.3	1631.7	-2	E	666.9	670.5	-1	N	3238.7	2838.2	14	N
2	ARUNACHAL PRADESH	132.8	133.1	0	N	838.2	757.3	11	N	1430.3	1675.1	-15	D	359.4	241.5	49	E	2810.6	2807.0	0	N
3	ASSAM &MEGHALAYA	75.5	42.1	79	LE	905.4	582.6	55	E	1600.7	1762.2	-9	D	226.2	190.1	19	N	2752.3	2577.0	7	N
4	NAG.,MANI.,MIZO.,TRIP	49.1	31.9	54	E	419.2	477.0	-12	N	943.4	1301.7	-28	D	162.3	199.1	-18	N	1564.6	2009.7	-22	D
5	S.H.W.B.&SIKKIM	84.8	43.6	95	LE	589.3	438.4	34	E	1887.0	1889.5	0	N	203.1	168.3	21	E	2764.1	2539.8	9	N
6	GANGATIC W.B.	73.4	29.3	150	LE	153.5	187.9	-18	N	885.7	1166.8	-24	E	109.3	175.0	-38	D	1222.0	1559.0	-22	D
7	ORISSA	53.4	25.1	113	LE	90.8	128.6	-29	D	1196.6	1150.2	4	N	125.8	140.8	-11	N	1466.7	1444.7	2	N
8	JHARKHAND	63.1	25.4	149	LE	72.2	83.3	-13	N	817.6	1022.9	-20	N	91.7	89.1	3	N	1044.5	1220.7	-14	N
9	BIHAR	40.0	19.8	102	LE	88.9	85.3	4	N	683.7	992.2	-31	N	81.9	67.1	22	E	894.5	1164.4	-23	D
10	EAST U.P.	37.9	25.2	50	E	23.7	33.6	-29	D	556.2	799.2	-30	N	149.5	42.3	253	LE	767.3	900.3	-15	N
11	WEST U.P.	80.8	30.5	165	LE	27.9	32.7	-15	N	500.8	672.0	-25	D	140.4	30.1	366	LE	749.9	765.3	-2	N
12	UTTARANCHAL	162.1	101.7	59	LE	107.5	158.2	-32	D	1128.0	1162.7	-3	N	119.7	55.0	118	LE	1517.3	1477.6	3	N
13	HAR., CHANDI., DELHI	85.3	32.0	166	LE	35.9	45.0	-20	D	465.4	430.7	8	E	37.1	19.4	91	LE	623.6	527.1	18	N
14	PUNJAB	127.4	47.4	169	LE	20.9	54.2	-62	LD	414.0	439.8	-6	N	11.0	24.1	-54	D	573.2	565.5	1	N
15	HIMACHAL PRADESH	247.6	187.1	32	E	68.1	240.7	-72	LD	706.9	734.4	-4	N	63.9	82.9	-23	D	1086.4	1245.1	-13	N
16	JAMMU & KASHMIR	245.9	225.5	9	N	99.5	330.0	-70	LD	580.5	549.1	6	D	114.5	127.7	-10	N	1040.4	1232.3	-16	N
17	WEST RAJASTHAN	25.3	8.5	198	LE	5.4	24.7	-78	LD	449.0	283.6	58	E	3.5	12.1	-71	LD	483.2	328.9	47	E
18	EAST RAJASTHAN	26.0	10.9	138	LE	11.2	21.2	-47	D	780.7	626.6	25	N	69.0	25.9	166	LE	886.8	684.6	30	E
19	WEST M.P.	22.8	14.0	63	LE	6.5	13.5	-52	D	1188.2	877.3	35	N	103.8	46.5	123	LE	1321.3	951.3	39	E
20	EAST M.P.	47.5	33.4	42	E	12.8	23.7	-46	D	1145.2	1043.4	10	N	87.9	55.7	58	E	1293.4	1156.2	12	N
21	GUJARAT REGION	1.0	1.5	-35	D	0.0	5.5	-99.0	LD	1104.7	927.5	19	N	37.3	32.8	14	N	1143.0	967.3	18	N
22	SAURASHTRA & KUTCH	2.4	0.8	206	LE	0.1	3.1	-97	LD	752.7	539.9	39	E	6.7	28.6	-77	LD	761.9	572.4	33	E
23	KONKAN & GOA	2.5	0.6	321	LE	26.4	29.4	-10	N	3136.8	2870.8	9	E	171.7	140.7	22	E	3337.4	3041.5	10	N
24	MADHYA MRASHTRA	0.7	2.8	-74	LD	17.0	26.4	-36	D	942.5	747.4	26	N	161.0	103.5	56	E	1121.3	880.1	27	E
25	MARATHAWADA	0.3	6.4	-95	LD	4.2	25.6	-84	LD	794.2	642.8	24	E	134.2	96.7	39	E	932.9	771.5	21	E
26	VIDARBHA	27.9	16.9	65	E	4.1	27.0	-85	LD	1227.8	937.3	31	N	87.6	76.2	15	N	1347.3	1057.4	27	E
27	CHATTISGARH	53.9	21.9	146	LE	33.6	37.0	-9	N	1276.3	1132.2	13	N	74.3	75.5	-2	N	1438.1	1266.6	14	N
28	COASTAL A.P.	31.5	22.2	42	E	114.7	96.2	19	N	640.2	601.4	6	E	341.7	322.9	6	N	1128.1	1042.7	8	N
29	TELANGANA	36.0	16.0	125	LE	42.9	63.8	-33	D	1072.7	734.8	46	E	119.0	124.1	-4	N	1270.6	938.7	35	E
30	RAYALASEEMA	10.3	8.8	17	E	126.9	79.5	60	LE	486.5	408.6	19	N	288.1	236.4	22	E	911.8	733.3	24	E
31	TAMIL NADU	42.6	24.8	72	E	166.6	124.9	33	E	476.2	328.4	45	N	445.7	443.3	1	N	1131.0	921.4	23	E
32	COASTAL KARNATAKA	0.6	3.0	-80	LD	330.9	155.2	113	LE	3235.4	3093.9	5	N	196.4	264.0	-26	D	3763.2	3516.1	7	N
33	N.I.KARNATAKA	0.4	4.4	-90	LD	162.9	79.6	105	LE	647.3	480.8	35	E	168.6	131.5	28	E	979.3	696.3	41	E
34	S.I.KARNATAKA	0.5	5.7	-90	LD	319.5	142.8	124	LE	1008.1	678.4	49	N	300.1	199.0	51	E	1628.3	1025.9	59	E
35	KERALA	14.9	21.1	-29	D	669.3	359.0	86	LE	1736.7	2018.7	-14	N	476.1	491.9	-3	N	2897.0	2890.7	0	N
36	LAKSHADWEEP	17.8	25.8	-31	D	384.2	197.0	95	LE	1391.2	1026.6	36	D	302.7	334.9	-10	N	2095.9	1584.3	32	E

तालिका-२ / TABLE -2

वर्ष 2022 के लिए स्टेशनवार वार्षिक तापमान और वर्षा चरम सीमा #

STATION WISE ANNUAL TEMPERATURE AND RAINFALL EXTREMES# FOR THE YEAR 2022

S.NO.	STATION NAME	MIN	DATE	MAX	DATE	HIGHEST 24 Hr.	DATE
		(°C)	(MONTH_DATE)	(°C)	(MONTH_DATE)	RAINFALL(mm)	(MONTH_DATE)
1	Agartala AP	9.4	01_29	37.3	04_19	165	06_18
2	Cherrapunji*	2.4	01_29	31	09_09	972	06_17
3	Dibrugarh AP	6.5	01_30	37.9	07_15	98.1	07_01
4	Guwahati AP	6.8	02_03	38.1	07_14	78.5	06_15
5	Imphal AP	2.3	01_29	33.6	03_22,06_08	101.2	06_23
6	Passighat	10.2	01_29	38.1	07_15	221.1	10_11
7	Shillong*	1.7	02_06	28.5	07_15	196.7	10_25
8	Tezpur	9.3	01_30	37.7	07_15	83.4	05_16
9	Baghdogra AP	5.4	01_30	39.1	08_18	186.6	08_06
10	Berhampore	10	01_03,01_05,12_17,12_31	42	04_27	71	07_29
11	Kolkata	11.7	01_30	39.6	04_24	71.9	09_13
12	Cooch Behar AP	5.6	01_28,01_30	39.1	08_18	231.5	06_28
13	Contai	8.5	01_30	39.6	05_31	145	08_20
14	Darjeeling*	0	02_05,02_06	25.6	07_15	75.8	07_25
15	Gangtok*	1.1	02_06	28	05_31	127.2	06_28
16	Jalpaiguri	6.5	01_30,02_06	38	07_14,07_15	208	06_28
17	Kalimpong*	4	02_07	31	07_15	90	07_25
18	Krishnanagar	10	01_05	40.6	04_24	47	05_04
19	Midnapore	11.1	01_18,01_29,01_30	42	04_24	48.2	07_02
20	Panagarh	7.9	01_05	43.5	04_26	131	08_19
21	Balasore	11.4	01_29	40.4	05_21	146.8	08_20
22	Bhubaneshwar AP	11.2	01_29,01_30	43.3	04_24	76	08_09
23	Chandbali	10.8	01_18	41.2	04_24	84.6	07_03
24	Gopalpur	13.9	01_30	38	05_06	98.9	10_05
25	Jharsugda AP	7.6	01_30	44.9	04_30	159.4	08_15
26	Puri	14.5	01_29	36.9	05_25	158.5	07_17
27	Sambalpur	10.2	01_30	44.7	06_04	146	08_14
28	Daltonganj	6.4	01_20	46.1	05_15	40.6	07_31
29	Gaya AP	4.6	01_20	45.6	05_15	56	08_24
30	Jamshedpur AP	8.2	01_30	44.6	04_28	92.6	08_20
31	Patna AP	6.6	01_20	43	04_26	126.5	06_30
32	Purnea	7.6	01_29	40.6	04_25	110.7	06_18
33	Ranchi AP	6.6	01_28	42.3	04_25	79.8	08_13
34	Allahabad AP	5	01_20	46.9	05_15	65	07_25
35	Bahraich	6.4	01_18	42	06_14	113	10_05
36	Bareilly	4.8	01_28,12_28	43.4	06_04	100.2	10_09
37	Dehar Dun	4.9	12_15	41.6	06_05	113	07_03
38	Gorakhpur	6.2	01_20	42.4	04_24	178.2	10_06
39	Jhansi	5.1	01_17,12_26	47.6	05_13,05_15,05_20	93.3	09_15
40	Lucknow AP	4.5	01_18	45.1	04_29	160.3	09_16
41	Mukteshwar**	-4.3	02_05	30.7	06_06	103.8	10_09
42	Varansai	5	01_18,01_20	45.8	06_04,06_09	94.2	08_06
43	Ambala	4.6	12_24	44.6	06_09	107.2	09_25
44	Chandigarh		NOT AVAILABLE		NOT AVAILABLE	120.6	09_25
45	Hissar	1.6	01_02	47.5	05_20	80.8	07_22
46	Karnal	3.8	01_01	43.7	06_05	191.6	07_29
47	New Delhi AP	4.2	01_01	45.6	05_15	117.2	07_01
48	Amritsar AP	2.6	01_30	46.1	05_15	67.2	07_21
49	Patiala	4.7	01_01,02_05	45.2	06_09	99.7	09_25
50	Shimla*	-2.1	02_05	30.5	05_15	89.6	09_12
51	Banihal*	-4.4	01_09	35.6	06_28	100	06_22
52	Gulmarg*	-12	02_04	24.2	06_30	69.6	06_22
53	Jammu AP	2.5	12_27	43.9	05_15	189.6	08_11
54	Srinagar*	-5.8	12_25	34.2	06_30	59.2	02_23
55	Ajmer	4.6	01_17	45.2	05_13	134.1	07_02
56	Barmer	7.8	01_29	48.1	05_12	122.6	08_14
57	Bikaner	2.4	12_26	48.2	05_14	63.5	07_10
58	Ganganagar	4.3	01_26	48.3	05_14	224.1	07_15
59	Jaipur AP	5.5	01_13	45.6	05_14	89.2	07_23
60	Jaisalmer	5.4	01_25	47.5	05_13	64.2	08_24
61	Jodhpur AP	6.2	01_26	46.3	05_13	118.8	07_26
62	Kota AP	5.8	01_13	47.2	05_13	224.2	08_22
63	Udaipur	3.6	01_27,01_28	44	05_12	74	07_15
64	Ambikapur	6	01_28	42.3	04_29	90.2	08_25
65	Betul	4.2	01_28	43.7	05_14	140.6	07_13
66	Bhopal(AP)	5	01_28	45.1	05_13	190.5	08_22
67	Guna	4.4	01_28	46	05_13	174.9	08_22
68	Gwalior	2.9	01_16	46.6	05_15	76.2	08_16
69	Indore(AP)	5	01_25	43.4	05_12	108.9	08_10
70	Jabalpur	6	01_29	44.6	06_05	160	08_22
71	Jagdulpur	7.9	01_29	41.8	06_08	161.2	08_15
72	Khandwa	5	01_28	46.1	05_13	186	09_22
73	Nowgong	2.6	01_29	48	05_13	69.8	07_23
74	Pendra	5.4	01_29	43.1	06_08	108.4	06_19
75	Ratlam	5.4	01_28	46	05_09	133	08_23
76	Sagar	5	01_17	46.1	05_14	173.8	08_22

TABLE -2 (contd.)

S.NO.	STATION NAME	MIN	DATE	MAX	DATE	HIGHEST 24 Hr.	DATE
		(°C)	(MONTH_DATE)	(°C)	(MONTH_DATE)	RAINFALL(mm)	(MONTH_DATE)
77	Satna	5.7	01_29	46.2	05_14	139	08_13
78	Seoni	7.2	01_12	44.4	05_21	94.4	07_18
79	Umaria	3.2	01_29	45	06_06	142.6	08_21
80	Ahmedabad AP	6.7	01_24	45.8	05_11	100.2	07_11
81	Baroda	8.4	01_24, 01_28	43.6	04_28, 05_08	90	07_19
82	Bhavnagar AP	10.1	01_12	44.5	05_11	67.2	10_08
83	Bhuj AP	9.6	01_15	43.8	05_11	122.9	07_13
84	Deesa	7.2	01_27	45	05_11	130.6	08_17
85	Dwarka	13.1	01_13	35.8	10_13	137.8	07_08
86	Naliya	3.6	01_14	46.1	05_14	92.1	07_11
87	New Kandala	9.6	01_25	44.5	04_08	84.5	07_08
88	Porbandar AP	9.4	01_25, 01_29	41	04_07	87.7	07_14
89	Rajkot AP	8.5	01_13, 01_26	44.3	05_12	197.4	07_12
90	Surat	10.2	01_24	42	04_28	120.6	07_01
91	Veraval	11.2	01_12	40.8	04_23	133.6	07_15
92	Akola	9.1	01_29	45.8	04_29, 05_09	95.3	06_17
93	Ahmadnagar		NOT AVAILABLE		NOT AVAILABLE	77.2	08_04
94	Aurangabad AP	7.5	12_10	43.2	05_09	62.2	07_10
95	Buldhana	8.5	01_28	42.8	04_29	54.7	09_02
96	Chandrapur	9.4	01_29	46.8	05_15, 06_02	117.2	09_12
97	Dahanu	13.6	01_24	38	03_13	225.7	07_14
98	Harnai	16.7	01_25	36.1	10_27	180.8	08_08
99	Jalgaon	5	01_30	45.6	04_28	78	07_10
100	Kolhapur	12.8	01_12	40.3	05_08	63.4	08_04
101	Mahabaleshwar*	6.5	01_24	33.8	04_28	294.2	07_14
102	Malegaon		NOT AVAILABLE		NOT AVAILABLE	81	07_12
103	Mumbai	15.2	01_10, 01_25	39.4	03_14	227.8	07_01
104	Nagpur AP	7.6	01_29	46.2	06_03	127.6	09_13
105	Panjim	17.2	01_12	37.8	03_14	151.3	07_08
106	Parbhani	9.4	12_09	44.4	05_09	89.7	07_09
107	Pune	8.5	01_25	41.8	04_28	104.6	10_18
108	Ratnagiri	14.1	01_25	40.2	03_14	222	06_26
109	Sholapur	10.7	12_09	44.3	05_09	52.8	06_22
110	Yeotmal	9	01_28	45.5	05_16	70.1	07_18
111	Anantpur	14.6	01_20, 12_22	43.5	04_28	75.7	06_15
112	Hyderabad AP	11.4	01_29	41.9	06_05	84.6	07_23
113	Kakinada	18.1	01_05	42.5	06_01	85.6	10_15
114	Kalingapatnam	12.7	01_30	37.4	04_22	81.6	09_11
115	Kurnool	15.5	01_29	43.4	04_27, 05_01	143.5	06_15
116	Machilipatnam	18.6	12_24	43.3	06_02	106.5	10_01
117	Nellore	20.5	01_29	41.9	04_30	134	12_10
118	Nizamabad	12.2	01_30	44	04_30	138.4	07_13
119	Ongole	19	01_29	41.2	06_05	118.8	05_12
120	Ramgundam	9.8	01_29	44.8	06_07	228.3	07_10
121	Rentachintala	12	01_29	43.2	06_05		NOT AVAILABLE
122	Visakhapatnam AP	16.2	01_30	40	04_24	113.6	05_25
123	Chennai AP	19.2	12_09	40.4	05_24	115.7	12_10
124	Coimbatore	17.4	12_22	38.2	03_17	51.1	11_12
125	Cuddalore	20	02_03	40.1	05_26	89.1	11_12
126	Kanyakumari	21.4	08_08	36.6	05_06	88.6	08_08
127	Kodaikanal*	4.9	12_09	22.6	07_02	168.8	08_31
128	Madurai AP	19.1	11_20	40.5	05_08	64.1	08_01
129	Nagapattinam	18.5	12_09	38.8	06_03	103.3	08_23
130	Palayamkottai	22.2	07_11	38	05_03	63	04_12
131	Pamban	17.4	12_09	36.8	05_06	75.1	04_13
132	Salem	16	12_22	39.5	04_29	73.6	10_20
133	Tiruchirapalli AP	19	03_02	40.7	04_29, 05_01	101.9	09_26
134	Vellore	16.9	03_02	42.3	05_01	63	09_27
135	Bangalore*	13.9	11_21	36.7	04_29	131.6	09_05
136	Chitradurga	12	11_21	37.4	04_04	93	05_19
137	Gadag	10.5	11_21	39.2	04_25	122.3	09_06
138	Gulbarga	14.1	12_09	43.5	05_01	68.3	08_05
139	Honavar	16.1	12_24	35.9	02_01	198.7	07_08
140	Karwar	17.6	01_26	37.6	03_05, 04_29, 05_03, 05_04	205.2	07_08
141	Mangalore AP	18.4	01_14	37.5	03_04	144.6	07_05
142	Mysore	12.6	12_24, 12_25	37	04_30	87	05_17
143	Raichur	11.4	01_31	43	03_31	74.8	09_08
144	Alapuzha	21.8	12_15	36.4	01_03	158.2	05_15
145	Cochi AP	21	04_07	34	04_27	150.4	05_15
146	Kozhikode	21	02_05, 12_23	37.2	04_28	134.4	06_01
147	Thiruvananthapuram	21.2	12_31	36.1	03_14, 03_22	124.6	05_15
148	Car Nicobar		NOT AVAILABLE		NOT AVAILABLE	138	09_23
149	Port Blair	19.3	01_31	34.6	04_28	139.1	05_18
150	Amini Divi	20.9	01_26	35.8	05_04	89.6	09_06
151	Minicoy	19.8	05_15	35	04_28	127.6	09_02

(*: Hill Stations)

(#: Based on Real-time data)

तालिका - ३ / TABLE - 3

HIGH IMPACTED WEATHER EVENTS OCCURRED DURING 2022 ALONG WITH ASSOCIATED LOSS OF LIFE AND DATES

Event	Number of Casualties	Season	Date	State / Union Territory Affected
Lightning & Thunderstorm	1580	Whole year	8 Jan to 13 Dec.	Andhra Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Rajasthan, Sikkim, Tamil Nadu, Telangana, Tripura, Uttar Pradesh, Uttarakhand, West Bengal, Delhi, Jammu & Kashmir
Floods & Heavy Rain	1046	Whole year	5 Jan. to 30 Nov.	Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Goa, Gujarat, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Telangana, Uttar Pradesh, Uttarakhand, West Bengal, Delhi, Jammu & Kashmir
Snowfall	37	Winter, Pre Monsoon & Post Monsoon	5, 10 Jan.; 6, 12, 22 Feb.; 17, 26 Apr.; 4 Oct.; 18 Nov.	Arunachal Pradesh, Himachal Pradesh, Uttarakhand, Jammu & Kashmir, Ladakh
Hailstorm	32	Pre Monsoon & Monsoon	15, 26 Apr.; 1, 4, 9, 18, 21, 24, 29 May; 3, 16, 7, 26 Jun.; 16 Jul.; 15 Aug.; 20 Aug.	Uttar Pradesh
Heat Wave	30	Pre Monsoon & Monsoon	22, 29, 30, 31 Mar.; 6, 12, 14, 25 to 30 Apr.; 3, 5, 10, 21 May; 7, 8, 13 Jun.	Chhattisgarh, Jharkhand, Maharashtra, Odisha, West Bengal
Dust Storm	22	Pre Monsoon	23 May	Uttar Pradesh
Gale	12	Pre Monsoon & Monsoon	6, 17, 28 Apr.; 3, 9, 12 May; 7, 10, 15 Jun.; 2 Aug.	Assam, Jharkhand, Kerala, Odisha, Telangana, Jammu & Kashmir
Severe Cyclonic Storm (MANDOUS)	6	Post Monsoon	6 to 10 Dec.	Andhra Pradesh, Tamil Nadu, Puducherry
Cold Wave	1	Post Monsoon	21 Nov.	Maharashtra
Squall	1	Pre Monsoon	10 Apr.	West Bengal



वार्षिक जलवायु सारांश - 2022

ANNUAL CLIMATE SUMMARY - 2022

जलवायु निगरानी एवं प्रागुक्ती समूह
Climate Monitoring & Prediction Group

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Note : This Bulletin is based on operational data and is subject to updating