

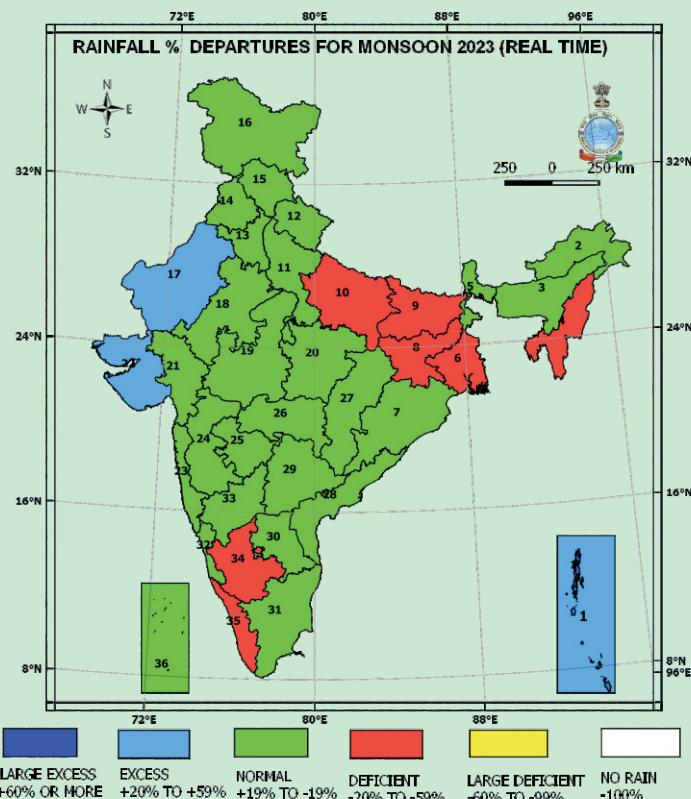


भारत सरकार / GOVERNMENT OF INDIA
पृथ्वी विज्ञान मंत्रालय / MINISTRY OF EARTH SCIENCES
पृथ्वी प्रणाली विज्ञान संगठन / EARTH SYSTEM SCIENCE ORGANIZATION
भारत मौसम विज्ञान विभाग / INDIA METEOROLOGICAL DEPARTMENT

भारत का जलवायु नैदानिक बुलेटिन CLIMATE DIAGNOSTICS BULLETIN OF INDIA

मानसुन ऋतु (जून - सितंबर 2023)
MONSOON SEASON (JUNE - SEPTEMBER 2023)

वास्तविक समय के निकट विश्लेषण NEAR REAL - TIME ANALYSES



राष्ट्रीय जलवायु केन्द्र, पुणे
NATIONAL CLIMATE CENTRE, PUNE

मानसून 2023 (जून से सितम्बर) (सारांश)

ऋतु की मुख्य विशेषताएं

प्रमुख बिंदु:

मानसून ऋतु में पूरे भारत का माध्य तापमान (28.77°C) 1901 से सबसे अधिक रहा। अधिकतम तापमान (32.73°C) 1901 से दुसरा सबसे अधिक रहा। न्यूनतम तापमान (24.80°C) 1901 से सबसे अधिक रहा। पूर्व और उत्तर-पूर्व भारत का न्यूनतम तापमान (25.23°C) और अधिकतम तापमान (33.21°C) 1901 से सबसे अधिक रहा। उत्तर-पश्चिम भारत का न्यूनतम तापमान (23.44°C) 1901 से दुसरा सबसे अधिक रहा। मध्य भारत का न्यूनतम तापमान (25.13°C) 1901 से सबसे अधिक रहा। दक्षिण प्रायद्विप का न्यूनतम तापमान (25.26°C) और अधिकतम तापमान (32.43°C) 1901 से सबसे अधिक रहा।

दक्षिणी-पश्चिमी मानसून की आगमन, प्रगति और वापसी :

दक्षिणी-पश्चिमी मानसून की आगमन और प्रगति आकृति 1(ए) में और दक्षिणी-पश्चिमी मानसून की वापसी आकृती 1(बी) में दर्शायी गयी है।

वर्षा की विशेषताएं:

36 मौसम उप मंडलों में से 3 में अधिक, 26 में सामान्य, 7 में सामान्य से कम वर्षा हुई। तालिका 1 में, मानसून ऋतु 2023 के उप मंडल-वार वर्षा के आँकड़े (मि. मी.) में दर्शाएं गए हैं। आकृती 2 में जून-सितम्बर ऋतु के संचित उप मंडल-वार वर्षा के आँकड़े (मि. मी.) में दर्शाएं गए हैं। आकृती 3 में जून, जुलाई, अगस्त, सितम्बर 2023 के उप मंडल-वार वर्षा के आँकड़े (मि. मी.) में दर्शाएं गए हैं।

आकृती 4(ए) में मानसून ऋतु के दौरान देश के विभिन्न भाग में हुई वर्षा (मि. मी.) दर्शायी गयी है।

आकृती 4(बी) में मानसून ऋतु के दौरान देश के विभिन्न भाग में हुई वर्षा विसंगति (मि. मी.) दर्शायी गयी है। आकृती 5 में ऋतु के दौरान पूरे भारत और चार समरूप क्षेत्रों में दैनिक वर्षा भिन्नता दर्शाता है।

आकृती 6 में मानसून ऋतु के सप्ताह का और सप्ताहिक संचित वर्षा का प्रतिशत विचलन दर्शाया गया है। आकृती 7 में वर्ष 1951 से अब तक के सम्पूर्ण भारत और चार समरूपी क्षेत्रों की क्षेत्र भारित वर्षा की श्रृंखला दर्शाई गयी है। पूरे भारत की वर्षा ऋतु में एल.पी.ए. का 94.4 % रही।

मानसून ऋतु की वर्षा भारत के दक्षिण प्रायद्विप में (एल.पी.ए. का 92%), मध्य भारत (एल.पी.ए. का 100%), उत्तर-पश्चिम भारत में (एल.पी.ए. का 101%) तथा पूर्व उत्तर-पूर्व भारत में (एल.पी.ए. का 81%) और रही।

मानकीकृत वर्षण सूचकांक (एस.पी.आई.):

मानकीकृत वर्षण सूचकांक अनावृष्टि मापने का एक सूचकांक है जो केवल वर्षा पर आधारित होता है। यह सूचकांक शुष्क स्थिति में ऋणात्मक और आर्द्र स्थिति में धनात्मक होता है। जब शुष्क या आर्द्र मौसम की स्थिति अधिक भीषण होती है, तब सूचकांक अधिक ऋणात्मक या धनात्मक होता है। आकृती 8(ए,बी) में जून से सितम्बर 2023 (4 माह के संचित) तथा जनवरी 2023 से सितम्बर 2023 (9 माह के संचित) के मानकीकृत वर्षण सूचकांक दर्शाएं गए हैं।

मानसून ऋतु के दौरान, अन्दमान और निकोबार द्वीपसमूह, नागालैंड मणिपुर मिझोराम, त्रिपुरा, पश्चिम उत्तर प्रदेश, उत्तराखण्ड, हरयाणा, चंदिगढ़, दिल्ली, हिमाचल प्रदेश, पश्चिम मध्य प्रदेश, सौराष्ट्र और कच्छ, छत्तीसगढ़ और तामिलनाडु पुदुचेरी और करायकल के कुछ भाग में चरम आर्द्ध / प्रचंड आर्द्ध स्थितियाँ रहीं, जबकि असाम और मेघालय, नागालैंड मणिपुर मिझोराम, त्रिपुरा, गांगीय पश्चिम बंगाल, झारखण्ड, बिहार, उत्तर प्रदेश राज्य, मध्य महाराष्ट्र, छत्तीसगढ़, दक्षिणी आंतरिक कर्नाटक और केरल और माहे के कुछ भाग में चरम शुष्क प्रचंड शुष्क स्थितियाँ रहीं।

दाब: आकृती 9(ए) तथा 9(बी) क्रमशः माध्य समुद्र तल दाब तथा इसकी विसंगति दर्शाते हैं। अधोरेखा द्वारा ऋणात्मक मान दर्शाए गए हैं।

पवन: आकृती 10(ए) तथा 10(बी), 11(ए) तथा 11(बी), 12(ए) तथा 12(बी) में क्रमशः पवन का 850, 500 और 250 एच.पी.ए. स्तरों पर माध्य परिसंचरण स्वरूप तथा इसकी विसंगति को दर्शाता है।

वेग विभव तथा धारा कृत्य (स्ट्रीम फंक्शन और वेलोसिटी पोटेन्शियल):

आकृती 13(ए) तथा 13(बी) में 250 एच.पी.ए. स्तर पर माध्य वेग विभव तथा इसकी विसंगति को दर्शाया गया है। इसी प्रकार आकृती 14(ए) तथा 14(बी) में माध्य धारा कृत्य तथा इसकी विसंगति को दर्शाते हैं। अधोरेखा द्वारा ऋणात्मक मान दर्शाये गए हैं।

बहिर्गमी दीर्घतरंग विकिरण (ओ.एल.आर.):

भारत के क्षेत्रों तथा आसपास की बहिर्गमी दीर्घतरंग विकिरण ($\text{वॉट}/\text{मी}^2$) आकृती 15 में दर्शाई गई है।

तापमान: मानसून ऋतु की माध्य अधिकतम तथा न्यूनतम तापमान विसंगति आकृती 16(ए) तथा 16(बी) में दर्शाई गई है।

उष्ण दिनों / शीत रात्रियों का प्रतिशत:

आकृती 17(ए) तथा 17(बी) में अधिकतम (न्यूनतम) तापमान जब 90वें (10 वें) पर्सेटाइल से अधिक (कम) वाले दिनों का प्रतिशत दर्शाया गया है।

आकृती 18 में पूरे देश में मानसून ऋतु में 1971 से अब तक के औसत तापमान दर्शाये गए हैं। 5 वर्ष के चल औसत भी दर्शाये गए हैं। इस वर्ष के मानसून ऋतु में सम्पूर्ण भारत का औसत तापमान 28.77°से. रहा, जो सामान्य से 0.74° से. अधिक था।

आकृती 19(ए) तथा 19(बी) में पूरे देश और चारों समरूपी क्षेत्रों के वर्ष 1971 से अब तक के मानसून ऋतु के दौरान रहे अधिकतम और न्यूनतम तापमानों की श्रृंखला दर्शाई गई है। तालिका 2 में ऋतु के दौरान की तापमान विसंगती दर्शाई गई है।

निम्न दाब प्रणालियाँ : इस मानसून ऋतु में कुल चौदह निम्न दाब क्षेत्र (1 बहुत तीव्र चक्रवाती तुफान, 1 तीव्र अवदाब, 1 अवदाब, 5 सुस्पष्ट निम्न दाब क्षेत्र और 5 निम्न दाब क्षेत्र, और 1 भुमीय निम्न दाब) बने। आकृती 20 मानसून ऋतु में बना निम्न दाब प्रणालि का मार्ग दर्शाता है।

आकृती 21 में पिछले दस साल (2014-2023) में बने अवदाब और चक्रवातों की संख्या दर्शाई गई है।

आपत्कालीन घटनाएँ : आकृती 22 आपत्कालीन घटनाएँ दर्शाता है।

MONSOON SEASON - 2023 (JUNE TO SEPTEMBER)

MAIN FEATURES OF THE SEASON

Highlights:

During Monsoon, over the country, the mean temperature was 28.77°C with an anomaly of 0.74°C , the highest since 1901. Over the country as a whole the maximum temperature was 2nd highest (32.73°C with an anomaly of 0.78°C) after the year 1987(32.76°C) and the minimum temperature was highest (24.80°C with an anomaly of 0.71°C) since 1901.

Among the four homogeneous regions, over Northwest India, the minimum temperature was 2nd highest (23.44°C with an anomaly of 0.72°C) after the year 2022(23.44°C) since 1901. Over East & Northeast India the maximum temperature was highest (33.21°C with an anomaly of 1.58°C) and the minimum temperature was also highest (25.23°C with an anomaly of 1.04°C) since 1901. Over Central India, the minimum temperature was highest (25.13°C with an anomaly of 0.49°C) since 1901. Over South Peninsular India the maximum temperature was highest (32.43°C with an anomaly of 0.99°C) and the minimum temperature was also highest (25.26°C with an anomaly of 0.68°C) since 1901.

Onset, Advance, and Withdrawal of Southwest Monsoon:

Fig. 1(a) depicts the isochrones of the advance of the southwest monsoon and Fig. 1(b) depicts the isochrones of withdrawal of the southwest monsoon. The advance of the Southwest Monsoon began on May 19th in the southeast Bay of Bengal, Nicobar Islands, and south Andaman Sea. By May 30th, it had extended its reach to the southwest Bay of Bengal, more parts of the southeast Bay of Bengal, the Andaman Sea, Andaman and Nicobar Islands, and portions of the east-central Bay of Bengal. Continuing its advance, the monsoon covered areas such as the south Arabian Sea, Maldives, and the Comorin region on June 1st, followed by additional parts of the south Bay of Bengal and east-central Bay of Bengal on June 2nd.

The monsoon reached Kerala on June 8th, 7 days later than the normal date of onset over Kerala. From there, it progressed further, encompassing the central Arabian Sea, remaining parts of Kerala, portions of Karnataka, southwest Bay of Bengal, east-central Bay of Bengal, northeast Bay of Bengal, northwest Bay of Bengal, most of the north-eastern states, Goa, Konkan, Tamil Nadu, Puducherry, southwest Bay of Bengal, parts of west-central Bay of Bengal, and more parts of Andhra Pradesh, among others, by the second week of June. On June 19th, it extended to more areas, including parts of Karnataka, Andhra Pradesh, west-central and northwest Bay of Bengal, and parts of Gangetic West Bengal and Jharkhand. During the last week of June, it covered a vast expanse, including Odisha, Telangana, Chhattisgarh, Jammu and Kashmir, Ladakh, Uttar Pradesh, Himachal Pradesh, Vidarbha, Haryana, north Arabian Sea, Gujarat, Rajasthan, and more. Finally, on July 2nd, it encompassed the remaining parts of Rajasthan, Haryana, and Punjab, effectively covering the entire country, a remarkable six days ahead of the usual date of July 8th.

The withdrawal of the SW-monsoon 2023 began on 25th September (Fig. 1b).

Rainfall Features:

Most sub-divisions of the country received excess/normal rainfall except Nagaland, Manipur, Mizoram & Tripura, Jharkhand, Bihar, Gangetic West Bengal, East Uttar Pradesh, South Interior Karnataka and Kerala & Mahe. During the season, out of 36 meteorological subdivisions, 3 subdivisions received excess rainfall, 26 received normal rainfall and the remaining 7 subdivisions received deficient rainfall (Fig.2). Table 1 shows the subdivision-wise rainfall statistics (mm) for the Southwest Monsoon Season 2023.

Fig. 3 shows the subdivision-wise distribution of rainfall percentage departures for the four months of the monsoon season (June to September) 2023.

The number of subdivisions that received excess, normal, deficient, or scanty rainfall during each month of the season, actual and Long Period Average (LPA) rainfall, and the percentage of LPA for the country as a whole for each month and season is given in the following table:

MONTH		JUNE	JULY	AUGUST	SEPTEMBER	SEASON
Number of subdivisions in different categories	Large Excess	3	7	0	3	0
	Excess	8	12	3	15	3
	Normal	6	10	11	12	26
	Deficient	17	7	7	6	7
	Large Deficient	2	0	15	0	0
	No Rain	0	0	0	0	0
	Actual (mm)	151.2	315.9	162.7	190.0	820
LPA (mm)		165.3	280.5	254.9	167.9	869
Rainfall (% of LPA)		91	113	64	113	94.4

Fig. 4(a) and 4(b) show the spatial pattern of rainfall received during the season and its anomaly (mm) respectively. Most parts of northeast India, central India, north India, west coast, and Andaman & Nicobar Islands received more than 1000 mm rainfall. Parts of Arunachal Pradesh, Assam & Meghalaya, Sub Himalayan West Bengal & Sikkim, the entire west coast, and Andaman & Nicobar Islands received more than 2000 mm of rainfall. Parts of Assam & Meghalaya, Andaman & Nicobar Islands, and the west coast received more than 3000 mm of rainfall.

Positive rainfall anomaly of more than 300 mm was observed over Assam & Meghalaya, Uttarakhand, West Uttar Pradesh, Himachal Pradesh, Saurashtra & Kutch, West Rajasthan, Konkan & Goa, Telangana and Andaman & Nicobar Islands. The magnitude of negative rainfall anomaly was more than 300 mm over parts of Arunachal Pradesh, Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura, Gangetic West Bengal, Bihar, Jharkhand, East Uttar Pradesh, West Rajasthan, South Interior Karnataka, Coastal Karnataka and Kerala & Mahe.

Fig. 5 shows the daily area-weight averaged rainfall (in mm) and its long-term normal over the country as a whole and the four homogeneous regions during the season. For the country as a whole, the average rainfall was above or near normal on 10 days during June, 19 days during July, 4 days during August, and 18 days during September.

On almost 13 occasions including the continuous periods of 7 - 9 July, 8 - 9 September, and 15 - 17 September it was more than one and a half times its normal value. It was below normal at a stretch on 2-16 June, 20-24 June, 4 – 18 August, 24 August – 6 September, and 26 - 29 September.

Fig. 6 shows the area weight averaged weekly and cumulative rainfall percentage departure respectively for the country as a whole during the season. Of the seventeen weeks of monsoon season, rainfall was above normal ($>+10\%$) on seven occasions, below normal ($<-10\%$) on seven occasions, and near normal on three occasions. Cumulative rainfall departure was negative during June, Aug, and September and was positive during July. **The area-weight averaged rainfall for the monsoon season for All India this year was 94.4% of its LPA value.**

The realized rainfall for the season this year was 101% of its LPA over northwest India, 100 % of its LPA over central India, 81% of its LPA over east & northeast India, and 92% of its LPA over south peninsula.

Fig. 7 shows area weighted rainfall series for the monsoon season over all India and four homogeneous regions since 1951.

Standardized Precipitation Index:

The Standardized Precipitation Index (SPI) is an index used for monitoring drought and is based only 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 8 (a & b) give the SPI values for the monsoon season (four months) and the year since January 2023 (nine months) respectively. Cumulative past four months' SPI values indicate, extremely wet/severely wet conditions over parts of Andaman & Nicobar Islands, Nagaland, Manipur, Mizoram & Tripura, West Uttar Pradesh, Uttarakhand, Haryana, Chandigarh & Delhi, Himachal Pradesh, West Madhya Pradesh, Saurashtra & Kutch, Chhattisgarh, and Tamil Nadu & Karaikal while, extremely dry/severely dry conditions were observed over parts of Arunachal Pradesh, Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura, Gangetic West Bengal, Jharkhand, Bihar, Uttar Pradesh state, Madhya Maharashtra, Chhattisgarh, South Interior Karnataka, and Kerala & Mahe.

Cumulative SPI values of the nine months indicate, extremely wet/severely wet conditions over parts of Andaman & Nicobar Islands, Uttar Pradesh state, Uttarakhand, Haryana, Chandigarh & Delhi, Himachal Pradesh, Rajasthan state, West Madhya Pradesh, Saurashtra & Kutch, Chhattisgarh, Andhra Pradesh state, Telangana, and Tamil Nadu & Karaikal while, extremely dry/severely dry conditions were observed over parts of Arunachal Pradesh, Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura, Gangetic West Bengal, Jharkhand, Bihar, East Uttar Pradesh, Madhya Maharashtra, Chhattisgarh, Coastal Karnataka, South Interior Karnataka and Kerala & Mahe.

Pressure & Wind:

Figs. 9(a) and 9(b) show the mean sea level pressure & its anomalies respectively. The pressure anomaly was positive over most parts of the country, except the northern parts of the south peninsula and extreme northeastern parts. Pressure anomaly was within range ± 1.5 hPa over most parts of the country. Pressure anomaly was more than 1.5 hPa over extreme northeastern parts, central parts, and extreme northern parts.

Figs. 10(a) and 10(b), 11(a) and 11(b) and 12(a) and 12(b) show the mean circulation pattern and its anomalies at 850, 500, and 250 hPa levels respectively. At 850 hPa level, anomalous low level jet was observed. At 500 hPa level, an anomalous anti cyclonic circulation was observed over South Arabian Sea. At 250 hPa level, anomalous easterlies were observed over northern parts of India.

Velocity Potential & Stream Function:

Figs. 13(a) and 13(b) show the 250 hPa mean Velocity Potential & its anomaly respectively. Similarly, Figs. 14(a) and 14(b) show the mean Stream Function & its anomalies at 850 hPa level respectively. Negative values are indicated by dashed lines. Anomaly in the Velocity Potential at 250 hPa level was positive (divergence) throughout the country and anomaly in the Stream Function at 850 hPa level was positive over most parts except the extreme south peninsula.

Outgoing Long Wave Radiation (OLR):

OLR anomaly (W/m^2) over the Indian region and neighbourhood is shown in Fig 15. OLR anomaly was negative throughout the country, except in extreme northern, east & northeastern parts, northern parts of the Bay, and southern parts of the Arabian Sea. OLR anomaly was within the normal range $\pm 10 \text{ W/m}^2$. OLR anomaly was less than -20 W/m^2 over parts of West Rajasthan.

Temperature:

The mean seasonal maximum and minimum temperature anomaly is shown in Figs. 16(a) & 16(b) respectively.

Maximum temperature was above normal over most parts of the country, except some parts of northwest India. Maximum temperature anomaly was more than 2°C over parts of northeastern Assam state, Bihar, Sub Himalayan West Bengal & Sikkim, South Interior Karnataka and Kerala & Mahe. Maximum temperature anomaly was less than -1°C over parts of Punjab and Rajasthan.

The minimum temperature was above normal over most parts of the country, except for some parts of northwest India, central India, and some pockets of South Peninsular India. The minimum temperature anomaly was more than 2°C over parts of West Bengal state, Sikkim state, Bihar, Jharkhand, East Madhya Pradesh, and South Interior Karnataka. The minimum temperature anomaly was less than -1°C over parts of southern West Madhya Pradesh.

Percentage of Warm days / Cold nights:

Fig 17(a) and 17(b) show the percentage of days when the maximum (minimum) temperature was more (less) than the 90th (10th) percentile. Over parts of Arunachal Pradesh, Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura, Sub Himalayan West Bengal & Sikkim, Bihar, South Interior Karnataka, Kerala & Mahe and Lakshadweep maximum temperature was greater than 90th percentile for more than 40% of the days of the season. The minimum temperature was less than the 10th percentile for more than 40% of the days of the month over parts of North Interior Karnataka.

Fig.18 shows the mean temperature for the country as a whole for Monsoon since 1971. Five-year moving average values are also shown. The mean temperature for the season this year over the country as a whole was 28.77°C with an anomaly of 0.74°C and the highest since 1901. Over Northwest India, the mean temperature was 8th highest (28.29°C with an anomaly of 0.40°C) and in East & Northeast India the mean temperature was highest (29.22°C with an anomaly of 1.31°C) since 1901. Over Central India, the mean temperature was 3rd highest (28.78°C with an anomaly of 0.51°C) since 1901. Over South Peninsular India the mean temperature was highest (28.85°C with an anomaly of 0.83°C) since 1901.

Fig. 19(a) and 19(b) the maximum and minimum temperature series respectively for the country as a whole and the four homogeneous regions during Monsoon 2023 since 1971. Both the maximum and minimum temperatures were above normal over all the homogeneous regions. Among the four homogeneous regions, over Northwest India, the minimum temperature was 2nd highest (23.442°C with an anomaly of 0.72°C) after the year 2022(23.444°C) since 1901. Over East & Northeast India the maximum temperature was highest (33.21°C with an anomaly of 1.58°C) and the minimum temperature was also highest (25.23°C with an anomaly of 1.04°C) since 1901. Over Central India, the maximum temperature was 7th highest (32.43°C with an anomaly of 0.53°C) and the minimum temperature was highest (25.13°C with an anomaly of 0.49°C) since 1901. Over South Peninsular India the maximum temperature was highest (32.43°C with an anomaly of 0.99°C) and the minimum temperature was also highest (25.26°C with an anomaly of 0.68°C) since 1901.

Over the country as a whole the maximum temperature was 2nd highest (32.73°C with an anomaly of 0.78°C) after the year 1987(32.76°C) and the minimum temperature was highest (24.80°C with an anomaly of 0.71°C) since 1901.

Table 2 gives temperature anomalies over India and four homogeneous regions during the monsoon season.

Low-Pressure Systems:

During the season, fourteen low-pressure systems (one Extremely Severe Cyclonic Storm (ESCS), one Deep Depression, one Depression, 5 well-marked low-pressure areas, 5 low-pressure areas, and 1 land low-pressure area) were formed. The frequency and place of origin of these low-pressure systems formed over the Indian region during the monsoon season are shown in the table below.

Month /Systems	CS and above	DD	D	WML	LPA	LAND LPA	TOTAL
June	1 (AR SEA)	0	0	2(BOB)	0	0	3
July	0	1(BOB)	0	1	2(BOB)	1	5
August	0	0	0	0	1(BOB)	0	1
September	0	0	1(AR SEA)	2(BOB)	2(BOB)	0	5
	(AS : Arabian Sea)			(BOB: Bay of Bengal)			

Fig. 20 shows the track of the intense low-pressure system formed during the season.

Fig. 21 shows the number of depressions and cyclonic storms formed during the monsoon season since the last 10-year period (2014-2023).

Significant Weather events during Monsoon season:

Fig. 22 shows significant weather events during the monsoon season (based on real-time media reports)

During the Monsoon Season, a total of 1105 persons were reportedly claimed dead, more than 380 persons injured, more than 100 persons missing & more than 2200 livestock perished. The details of causalities are given below, which are based on real-time media reports.

Lightning: A total of 428 persons reportedly claimed dead, more than 260 persons injured & more than 620 livestock perished, during the Monsoon Season, because of Lightning. The details of the area affected by the events are summarized and given in the table below;

DATE	DEATH	INJURED	MISSING	LIVESTOCK	DISTRICT (STATE / UT) AFFECTED
29, 30 Jun.; 4, 11, 12, 14 Jul.; 18 Sep.	85	7			Arwal, Aurangabad, Banka, Bhagalpur, Buxar, East Champaran, Gaya, Gopalganj, Jamui, Jehanabad, Kaimur/Bhabua, Katihar, Khagaria, Kishanganj, Madhepura, Muzaffarpur, Nalanda, Nawada, Patna, Purnia, Rohtas, Saran, Siwan, Vaishali, West Champaran (Bihar)

DATE	DEATH	INJURED	MISSING	LIVESTOCK	DISTRICT (STATE / UT) AFFECTED
22, 24, 25, 29 Jun.; 1, 2, 4, 6, 9, 10, 11, 15 Jul.; 8, 10, 11, 13, 15, 17 Sep.	81	43			Agra, Allahabad / Prayagraj, AmbedkarNagar, Azamgarh, Baghpat, Ballia, Balrampur, Banda, Barabanki, Budaun, Deoria, Etah, Etawah, Ghaziabad, Ghazipur, Jalaun, Jaunpur, Kannauj, Kanpur Dehat (Ramabai Nagar), Kaushambi, Kushinagar, Lalitpur, Mahoba, Mainpuri, Mirzapur, Pilibhit, Pratapgarh, Raebareli, Sitapur, Unnao, Sambhal / Bhimnagar (Uttar Pradesh)
14, 19, 20, 21 Jun.; 2, 3, 4, 6, 26, 31 Jul.; 23 Aug.; 23 Sep.	62	32		Several	Bokaro, Chatra, Dumka, East Singhbhum, Garhwa, Giridih, Godda, Gumla, Hazaribagh, Koderma, Latehar, Lohardaga, Pakur, Palamu, Ramgarh, Ranchi, Sahibganj, Simdega (Jharkhand)
3, 4, 6, 12, 22, 23, 24, 26 Jun.; 18, 19, 20, 21, 25, 27 Jul.; 2, 3, 4, 20, 21, 24, 26 Sep.	47	36		48	Akola, Amravati, Chatrapati Sambajinagar /Aurangabad, Beed, Bhandara, Chandrapur, Gadchiroli, Gondia, Jalgaon, Latur, Nagpur, Nanded, Parbhani, Wardha, Washim, Yavatmal (Maharashtra)
12 Jun.; 10, 30, 31 Jul.; 12, 16 Aug.; 1, 2, 26 Sep.	36	52		8	Angul, Balasore, Bhadrak, Balangir, Boudh, Cuttack, Dhenkanal, Gajapati, Ganjam, Jagatsinghpur, Kalahandi, Kandhamal, Kendrapara, Keonjhar, Khordha, Koraput, Mayurbhanj, Puri (Odisha)
24, 27 Jun.; 6, 7, 8, 20, 22 Jul.	35	12		82	Agar Malwa, Ashoknagar, Bhind, Chhatarpur, Damoh, Dhar, Dindori, Gwalior, Jabalpur, Katni, Mandla, Narsinghpur, Panna, Raisen, Sagar, Sehore, Seoni, Shahdol, Shajapur, Sheopur, Shivpuri, Tikamgarh, Umaria (Madhya Pradesh)
4, 22, 23, 24,26 Jun.; 1, 21, 23, 24, 29 Jul.; 1, 3, 17,18 Aug.19Sep.	26	26		22	Balrampur, Bilaspur, Janjgir _Champa, Jashpur, Rajnandgaon, Gaurella-Pendra-Marwahi, Manebedragarh-Chirmiri-Bharatpur [MCB], Shakti (Chhattisgarh)
19, 25, 27 Jun.; 7, 19, 22, 28 Jul.	20	4			Baran, Banswara, Chittorgarh, Churu, Kota, Nagaur, Pali, Sirohi (Rajasthan)
9, 11, 21 Jun.;2 Sep.	11	25		9	Kolkata, Malda (West Bengal)
9, 13 Jun.	5	5			Biswanath, Hailakandi, Sivasagar (Assam)

DATE	DEATH	INJURED	MISSING	LIVESTOCK	DISTRICT (STATE / UT) AFFECTED
3, 5 Sep.	4	4			Jayashankar Bhoopalpally, Medak (Telangana)
8, 17 Jun.	3	9			Sepahijala, South Tripura (Tripura)
1 Jun.	2	4			Kurnool (Andhra Pradesh)
15 Sep.	2	1		60	Kangra (Himachal Pradesh)
8 Sep.	2				Banaskantha (Gujarat)
7 Jul., 17 Sep.	2				Kulgam, Udhampur (Jammu & Kashmir)
3, 7 Jun.	2				Kozikode, Wayanad (Kerala)
25 Jun.	1	3		400	Bageshwar, Uttarkashi (Uttarakhand)
22 Aug.	1				Charkhi Dadri (Haryana)
10 Jul.	1				Dindigul (Tamil Nadu)

Thunderstorm: A total of 10 persons were reportedly claimed dead, 5 persons injured & 30 livestock perished during the Monsoon season, because of the Thunderstorm. 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
9 Jun.	1				Dhemaji (Assam)
4 Jun.	2	5		30	Beed, Jalgaon, Nandurbar (Maharashtra)
5, 25 Jun.	7				Ayodhya/Faizabad, Bareilly, Lucknow, Muzafarnagar (Uttar Pradesh)

While,

- a) Jammu district of UT-Jammu & Kashmir was also affected on 18 June.
- b) Chatrapati Sambhajinagar / Aurangabad, Amaravati, Buldhana, Gadchiroli, Hingoli, Latur, Parbhani, and Washim districts of Maharashtra were also affected on 4 & 11 June.

Heavy Rains, Floods & Landslide: A total of 544 persons were reportedly claimed dead, 112 persons injured, more than 100 persons missing & more than 1600 livestock perished, during the Monsoon season, because of heavy rains, floods & Landslides. The details of the area affected by the events are summarized and given in the table below;

DATE	DEATH	INJURED	MISSING	LIVESTOCK	DISTRICT (STATE) AFFECTED
24 & 25 Jun.; 6, 9 to 11, 16, 18, 22 Jul.; 9, 11, 13, 14, 23 Aug.	123	17	6	35	Chamba, Hamirpur, Kangra, Kullu, Lahaul & Spiti, Mandi, Shimla, Sirmaur, Solan & Parts of Himachal Pradesh
24, 25, 26, 28, 29 Jun.; 12, 19 to 23, 26, 27 Jul.; 19 Aug.; 9, 23, 26 Sep.	69	18	57	33	Akola, Amaravati, Buldhana, Chandrapur, Gadchiroli, Gondia, Kolhapur, Mumbai City, Mumbai Suburban, Nagpur, Nanded, Palghar, Raigad, Ratnagiri, Sindhudurg, Thane, Wardha, Washim, Yavatmal (Maharashtra)
25 Jun.; 9, 10, 11, 16, 17 Jul.; 4, 6, 7, 9, 10, 14, 15, 21, 23, 26 Aug.	68	32	44		Chamoli, Dehradun, Pauri Garhwal, Pithoragarh, Rudraprayag, Tehri Garhwal, Udhampur Singh Nagar, Uttarkashi (Uttarakhand)

DATE	DEATH	INJURED	MISSING	LIVESTOCK	DISTRICT (STATE / UT) AFFECTED
7 to 9, 11 to 16 , 19 Jul.; 4, 7 Aug.; 10 & 11 Sep.	57	6			Amroha [Jyotibaphule Nagar], Badaun, Baghpat, Balrampur, Bareilly, Bijnor, Deoria, Farrukhabad, Gazipur, Gautam Buddh Nagar, Hardoi, Hathras, Kanpur Nagar, Kannauj, Mathura, Muzaffarnagar, Rampur Raibareilly, Sant Kabir Nagar (Uttar Pradesh)
18, 19, 20, 21, 26, 27 Jun.; 7, 9, 10, 20, 24, 26, 30 Jul.	45				Ajmer, Bikaner, Dholpur, Jaipur, Jalore, Jodhpur, Kota, Nagaur, Rajsamand, Pali, Pratapgarh, Sawai Madhopur, Sikar, Sirohi, Tonk, Udaipur (Rajasthan)
2 Jun.; 9, 15, 19, 23, 25, 28 Jul.; 18 & 19 Aug.; 12 Sep.	31	11	1	7	Doda, Kathua, Kishtwar, Kupwara, Poonch, Rajouri, Ramban, Udhampur (UT-Jammu & Kashmir)
22 to 29 Jul.	29		0		Bhadrari Kothagudem, Hanamkonda / Warangal Urban, Jayashankar Bhupalapally, Khammam, Mahabubabad, Mahabubnagar, Mulugu, Warangal Rural (Telangana)
3 to 7, 10, 23 Jul.	24				Alappuzha, Kannur, Kottayam, Kozhikode, Malappuram, Pathanamthitta, Thrissur, Wayanad (Kerala)
17,21,22,23,24,25,26,27Jun.; 5,16,18 Jul.; 7,10,12,13,27,30 Aug.; 1, 2 Sep.	20			1494	Bajali, Baksa, Barpeta, Chirang, Darrang, Dibrugarh, Goalpara, Golaghat, Kamrup Rural, Lakhimpur, Nalbari, Sivasagar, Sonitpur, Tamulpur (Assam)
Jun.; 1, 2, 10, 14, 30 Jul.; 21 Aug.	14	6	1	10	Agar Malwa, Alirajpur, Ashoknagar, Bhopal, Barwani, Damoh, Dhar, Dindori, Indore, Jabalpur, Katni, Mandla, Narshimapura, Rajgarh, Seoni, Shahdol, Ujjain, Umaria (Madhya Pradesh)
3, 10 to 19 Jun.	9	3		23	East Jaintia Hills, East Khasi Hills, North Garo Hills, Ri Bhoi, South West Garo Hills, West Garo Hills, West Khasi Hills (Meghalaya)
19, 23 Jun.	8				Upper Siang (Arunachal Pradesh)
5 to 11 Jul.	8				Amritsar, Bathinda, Fatehgarh Sahib, Ferozpur, Hoshiarpur, Kapurthala, Mohali, Patiala, Rupnagar (Punjab)

DATE	DEATH	INJURED	MISSING	LIVESTOCK	DISTRICT (STATE / UT) AFFECTED
25 Jun.; 8 to 11 Jul.	7	5			Ambala, Bhiwani, Faridabad, Gurgaon, Karnal, Kurukshetra, Panchkula, Panipat, Yamunanagar & Parts of Haryana
5, 23, 25 Jul.	7	1			Bijapur, Dakshina Kannada, Udupi (Karnataka)
9 Jul.	5				Parts of Ladakh
20 & 21 Aug.	4				Balasore, Keonjhar, Mayurbhanj (Odisha)
21 to 23 Jul.; 8 Sep.	3			some	Ahmedabad, Anand, Bharuch, Bhavnagar, Dwarka, Junagarh, Navsari (Gujarat)
13 Jul.; 25 Aug.	3				Alipurduar, Darjeeling (West Bengal)
9 Jul.	2	10			North Delhi, North East Delhi, West Delhi (UT-Delhi)
15Jun.; 25 Aug.	2				Gyalshing/West Sikkim (Sikkim)
21 Jul.	2				Dadra and Nagar Haveli (UT-Dadar and Nagar Haveli)
4 Jul.	1	2			Munger (Bihar)
10 Sep.	1	1			Serchhip (Mizoram)
9 Jul.	1				Chandigarh (UT-Chandigarh)
26 Jun.	1				Koriya (Chhattisgarh)

While,

- a) East Siang, Lohit, Papum Pare, Tawang, Upper Subansiri, West Kameng districts of Arunachal Pradesh were also affected on 1, 2, 12, 14, 15, 19, 27, 29 June.
- b) Biswanath, Bongaigaon, Charaideo, Dhemaji, Dhubri, Hojai, Jorhat, Kamrup Metro, Kokrajhar, Majuli, Morigaon, Nagaon, Udaguri districts of Assam were also affected on 21 to 27 June; 5, 16, 18 July; 7, 10, 12, 13, 27, 30 August; 1, 2 September.
- c) Bijapur district of Chhattisgarh was also affected on 27 July.
- d) Anand, Bharuch, Dahod, Gandhinagar, Gir Somnath, Junagadh, Narmada, Panchmahal, Rajkot, Surat, Vadodara districts of Gujarat were also affected on 18, 19 July; 17 & 18 September.
- e) Karnal districts of Haryana affected on 28 July.
- f) Bilaspur, Una districts of Himachal Pradesh were also affected on 6, 9 to 11 July; and 23 & 24 August.
- g) Pulwama, Ramban districts of UT-Jammu & Kashmir are also affected on 1 June & 10 July.
- h) Chikkamagaluru, Kodagu, Udupi, Uttara Kannada districts of Karnataka were also affected on 5 July.
- i) Angul, Bargarh, Cuttack, Deogarh, Dhenkanal, Sundargarh districts of Odisha were also affected during June.
- j) North Sikkim, Gyalshing/West Sikkim districts of Sikkim were also affected on 17 June.
- k) Amethi, Barabanki, Jalaun, Mirzapur, Prayagraj, Pratapgarh, Sambhal, Sitapur, Sultanpur, Unnao districts of Uttar Pradesh were also affected on 10 & 11 September.
- l) North & Middle Andaman district of Andaman & Nicobar; Begusarai, Bhagalpur, East Champaran, Katihar, Kishanganj, Madhepura, Munger, Muzaffarpur, Purnia, Samastipur, Supaul districts of Bihar, Balod, Raigarh districts of Chhattisgarh, Aravalli, Chhota Udaipur, Junagadh, Kutch, Mahisagar, Sabarkantha, Tapi, Valsad districts of Gujarat; Reasi district of

Jammu & Kashmir, Balaghat, Betul, Datia, Dewas, Hoshangabad Narmadapuram, Jhabua, Khandwa (East Nimar), Khargone (West Nimar), Mandla, Panna, Ratlam districts of Madhya Pradesh, Hingoli, Nashik, Pune, Satara districts of Maharashtra; South West Khasi Hills district of Meghalaya, Angul, Balangir, Boudh, Jharsuguda, Kandhamal, Khordha, Koraput, Rayagada, Sambalpur, Subranapur district of Odisha, Banswara, Barmer, Dungarpur districts of Rajasthan, Nilgiri district of Tamil Nadu, Adilabad, Jangaon, Karimnagar, Kumuram Bheem (Asifabad), Nirmal, Nizamabad districts of Telangana, Bahraich, Barabanki, Etawah, Gorakhpur, Kheri, Moradabad, Saharanpur, Sambhal/Bhimnagar, Siddharthnagar districts of Uttar Pradesh, Bageshwar, Champawat, Haridwar, Nainital districts of Uttarakhand, Jalpaiguri, Malda, Uttar Dinajpur, South 24 Parganas districts of West Bengal also affected due to Extremely Heavy Rains.

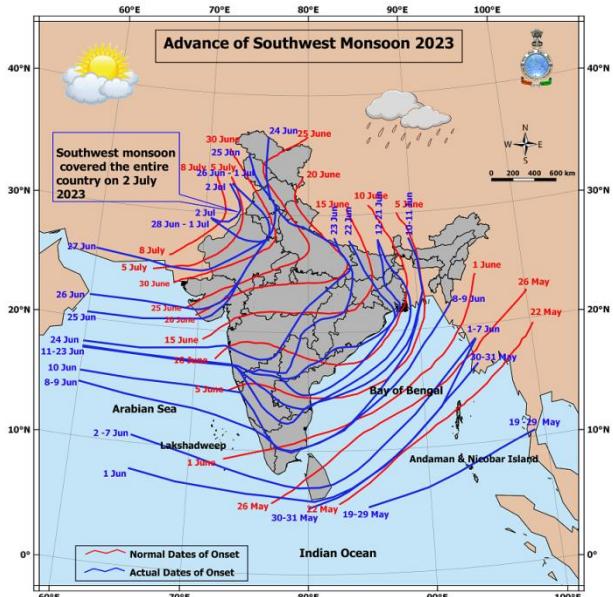
Heat Wave: A total of 114 persons were reportedly claimed dead because of Heat waves during the Monsoon season. The details are summarized and given in the table below;

DATE	DEATH	INJURED	MISSING	LIVESTOCK	DISTRICT (STATE) AFFECTED
15, 16, 17 June	83				Ballia, Gorakhpur, Kanpur Dehat (Ramabai Nagar), Kanpur Nagar, Varanasi & adjacent districts of Uttar Pradesh
17, 18, 19 June	25				Chatra, Dhanbad, Dumka, East Singhbhum, Garhwa, Hazaribag, Palamu, Ramgarh, Ranchi (Jharkhand)
11, 18, 20 June	3				Latur, Yavatmal (Maharashtra)
20 June	2				Surguja (Chhattisgarh)
17 June	1				Balasore (Odisha)

Cyclonic Storm: 7 persons reportedly claimed dead due to heavy rain-related incidents associated with Extremely Severe Cyclonic Storm "BIPARJOY" [6 to 19 June] from Rajsamand, Jalore districts & parts of Rajasthan. While no death was reportedly claimed from Gujarat. But Heavy rains, Floods, and Strong winds affected Banaskantha, Bhavnagar, Devbhoomi Dwarka, Gandhinagar, Jamnagar, Junagadh, Kutch districts of Gujarat and Ajmer, Barmer, Jalore, Jodhpur, Pali, Sirohi districts of Rajasthan.

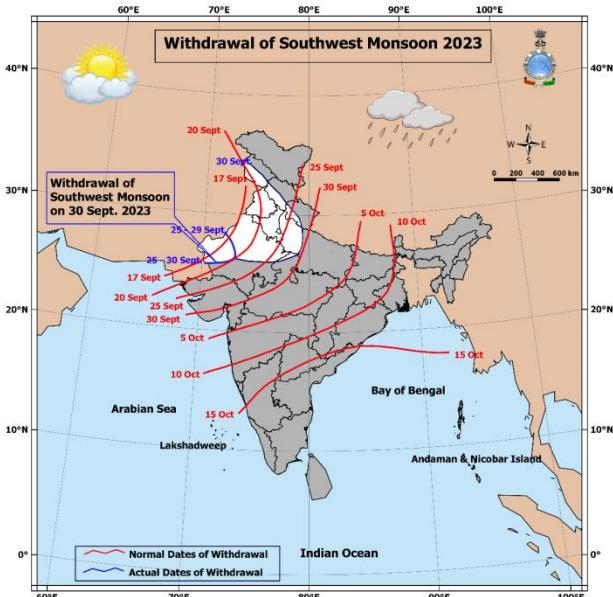
Gale: A total of 1 person was reportedly claimed dead in the Chandrapur district of Maharashtra on 10 June & 1 person injured in Wardha district of Maharashtra on 11 Jun. Also, Dakshina Kannada district of Karnataka was affected because of Gale on 5 July. Damage to buildings & vehicles was reported from Dakshina Kannada district of Karnataka on 5 July.

Snowfall: One person died & 5 others were injured in the Chamoli district of Uttarakhand on 4 June due to snow avalanche.



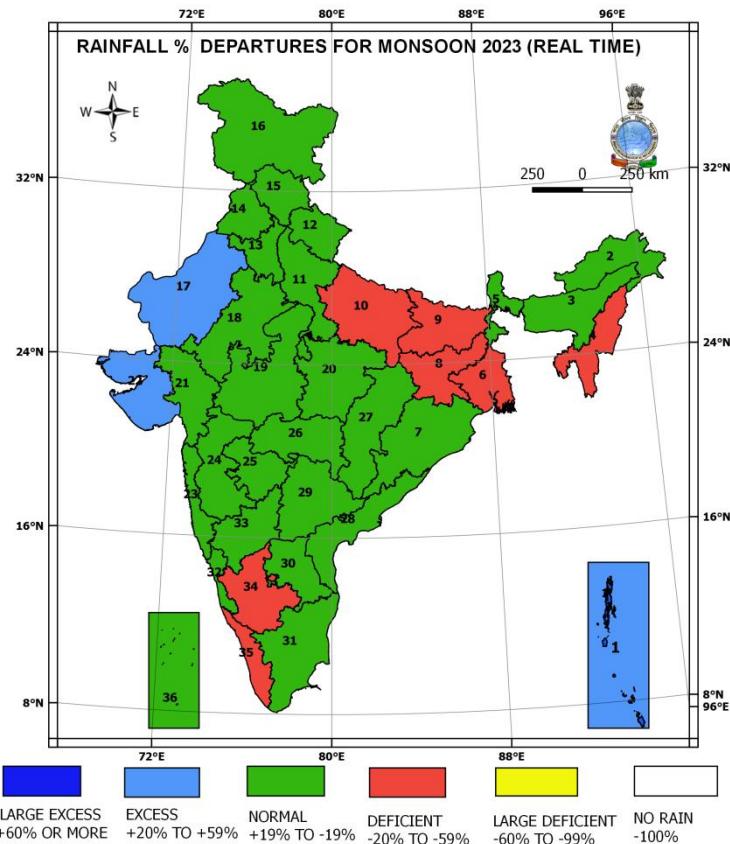
आकृती १(ए): मानसून २०२३ के दौरान दक्षिण-पश्चिम मानसून का आगमन और प्रगति

FIG. 1(a): ADVANCE OF SOUTHWEST MONSOON 2023



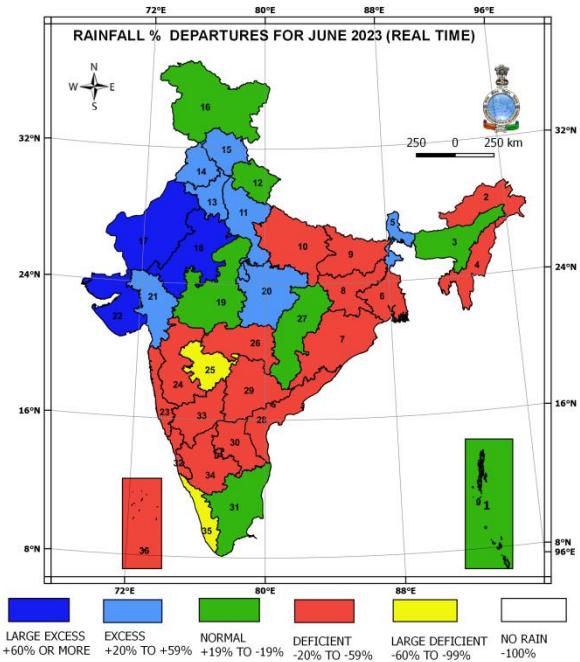
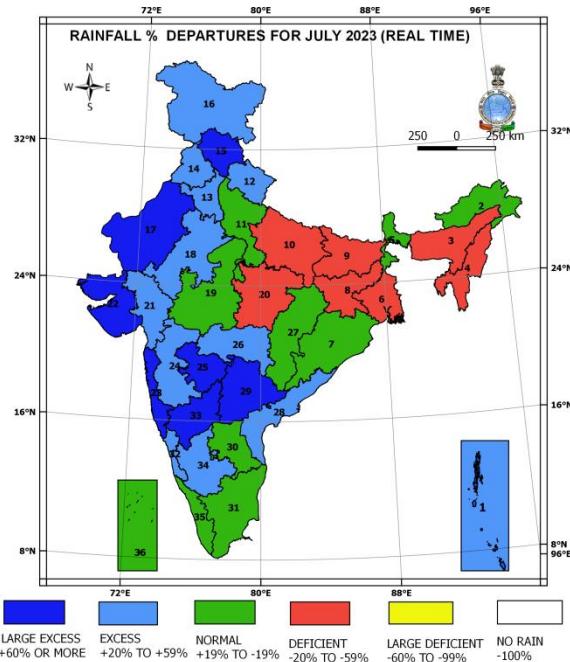
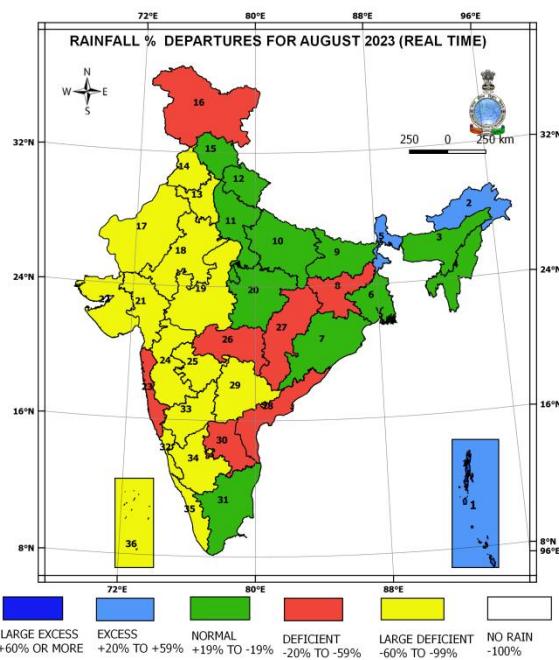
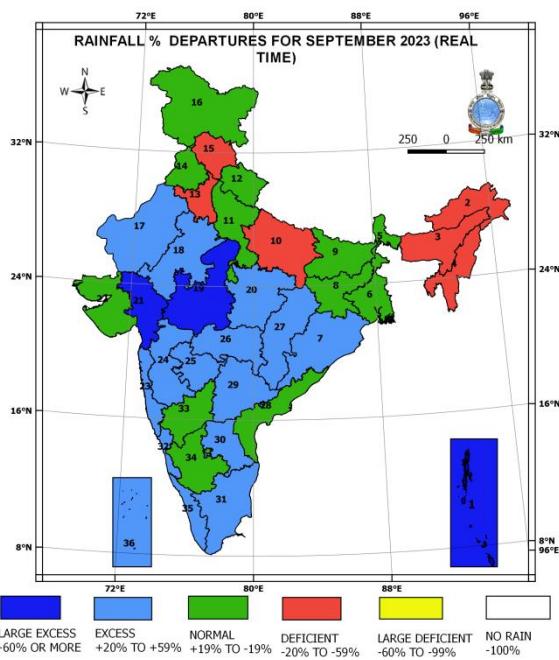
आकृती १(बी): मानसून २०२३ के दौरान दक्षिण-पश्चिम मानसून का आगमन और प्रगति

FIG. 1(b): WITHDRAWAL OF SOUTHWEST MONSOON 2023 TILL 30 SEPT



आकृती २ : मानसून २०२३ के लिए वर्षा प्रतिशत विचलन

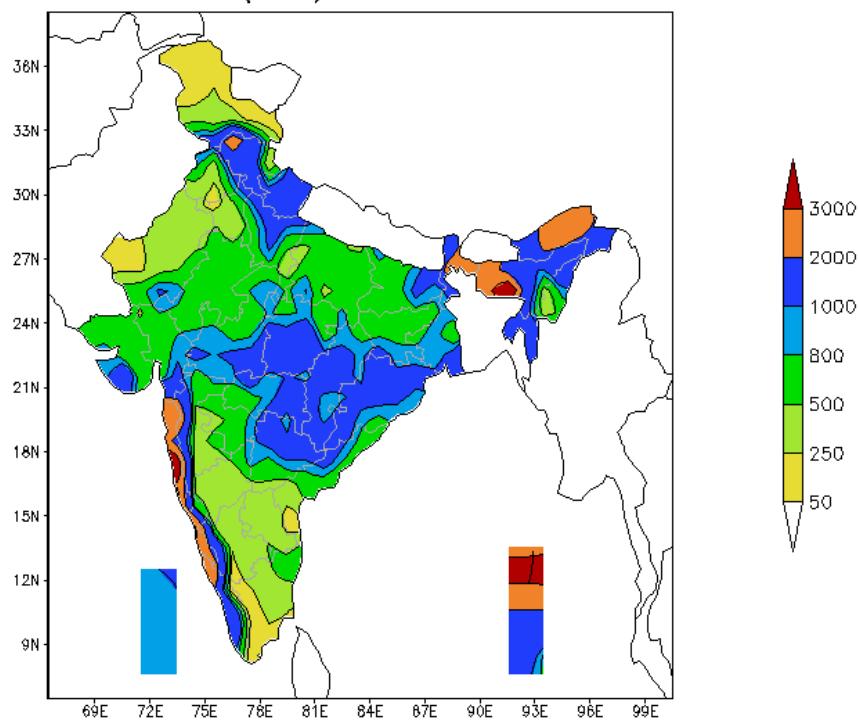
FIG. 2: SUB-DIVISION WISE RAINFALL PERCENTAGE DEPARTURES FOR THE MONSOON 2023

JUNE**JULY****AUGUST****SEPTEMBER**

आकृति ३ :वर्षा प्रतिशत प्रस्थान का मासिक उप-प्रभागवार विचलन

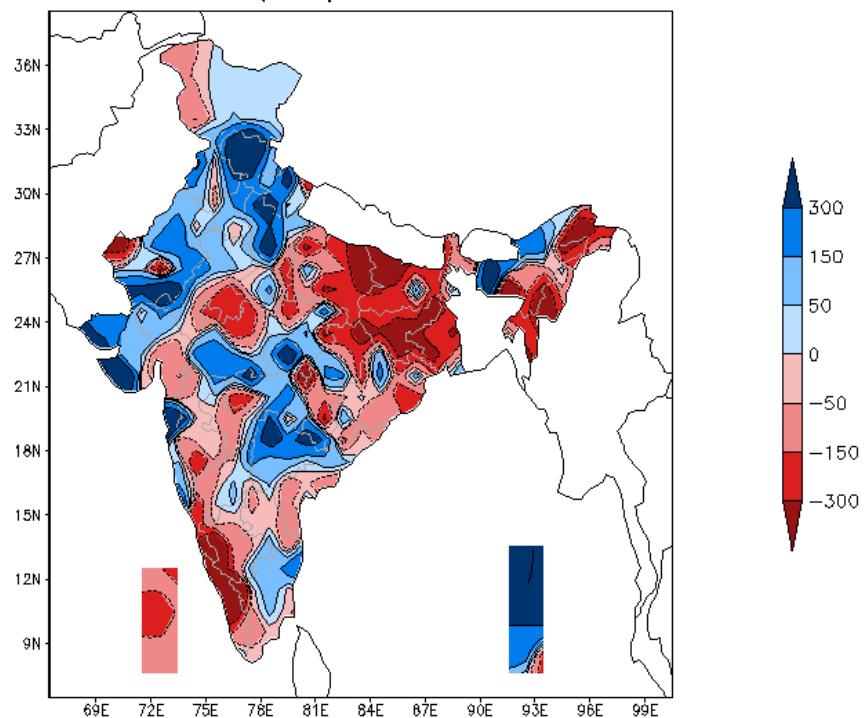
FIG. 3: MONTHLY SUB-DIVISIONWISE DISTRIBUTION OF RAINFALL PERCENTAGE DEPARTURES

RF ACTUAL (mm) : JUN– SEPT 2023



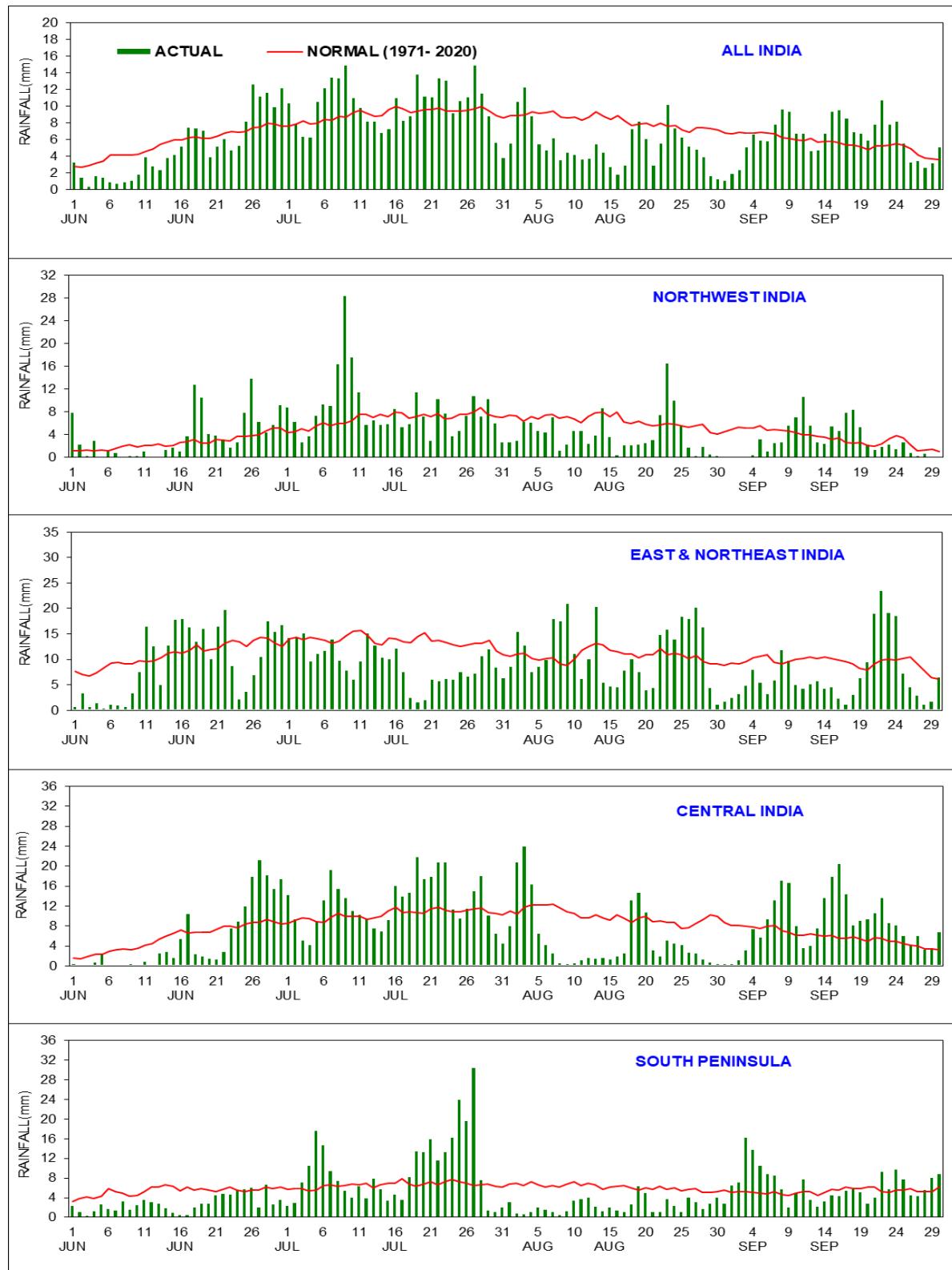
आकृती ४(ए) : (मानसून २०२३ वर्षा) सिमी
Fig. 4(a): SEASONAL RAINFALL (mm)

RF ANOMALY (mm) : JUN– SEPT 2023



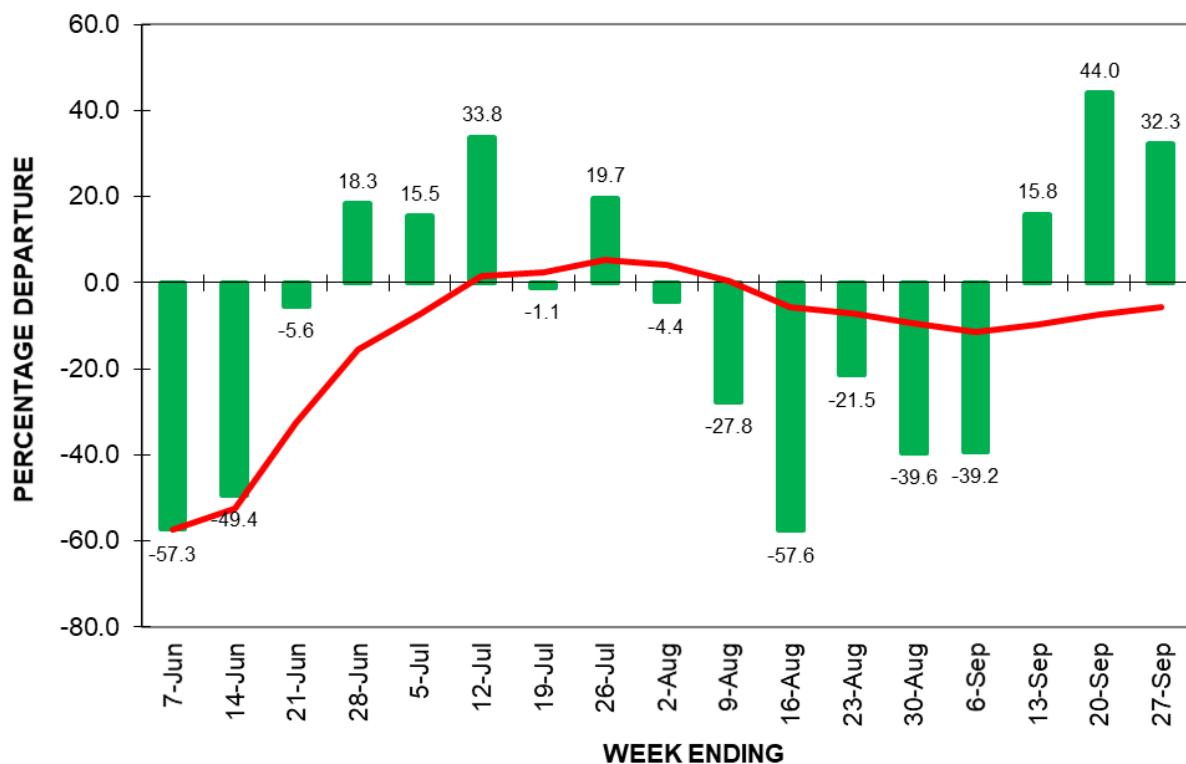
आकृती ४ (बी): मानसून २०२३ वर्षा विसंगतिया (सि मी)

Fig. 4(b) SEASONAL RAINFALL ANOMALY (mm)
(BASED ON 1971-2020 NORMALS)



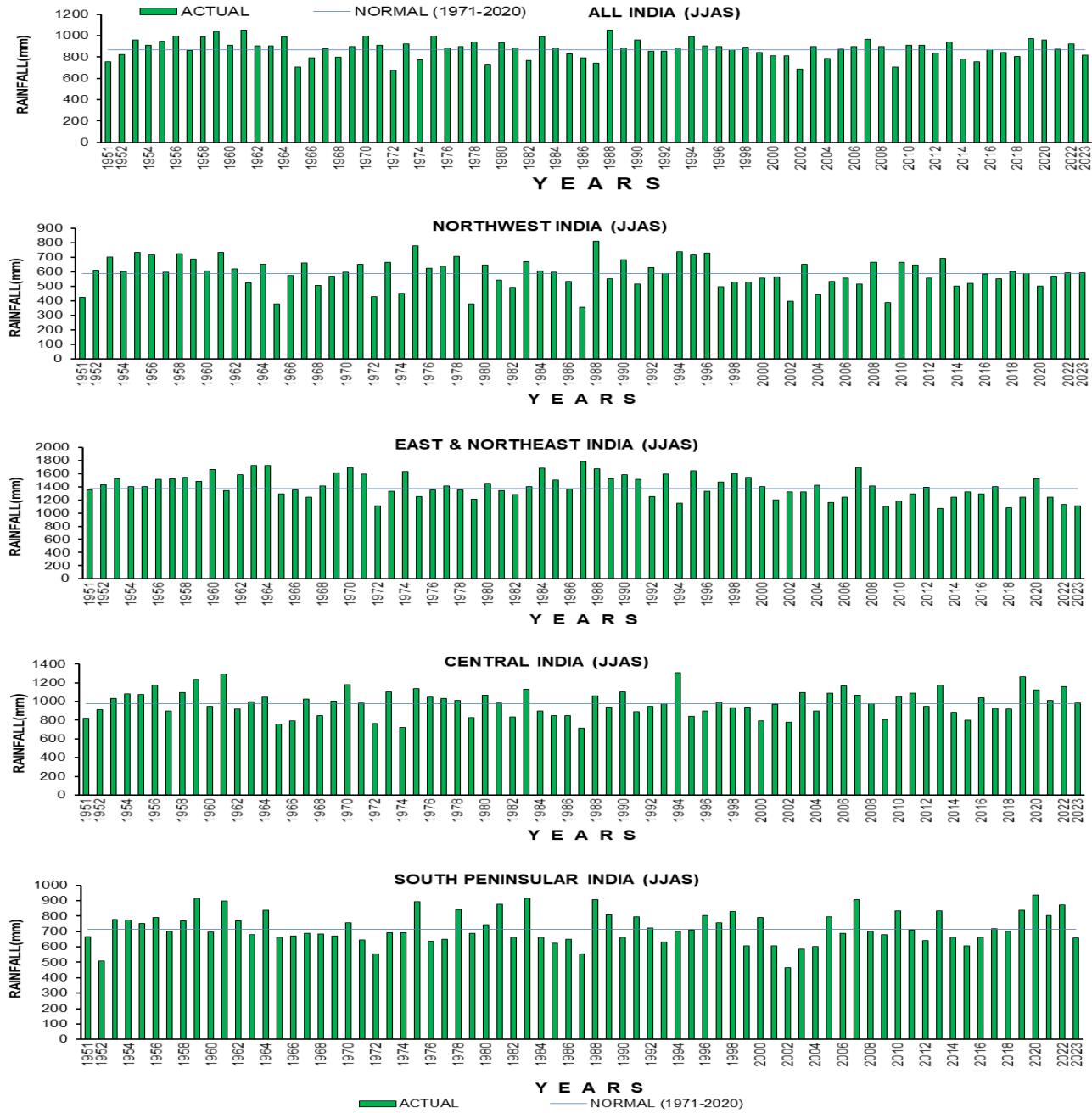
आकृति ५: पूरे देश और चार समरूपी क्षेत्रों के लिए दैनिक क्षेत्र भारित वर्षा (मिमी) और इसकी दीर्घकालिक सामान्य मानसून (१ जून - ३० सितम्बर)

FIG. 5: DAILY AREA WEIGHT AVERAGED RAINFALL (mm) AND ITS LONG TERM NORMAL FOR THE COUNTRY AS A WHOLE AND THE FOUR HOMOGENEOUS REGIONS (1st JUNE – 30th SEPTEMBER)



आकृती ६: मानसून २०२३ का पुरे भारत में क्षेत्र-भारित साप्ताहिक संचित वर्षा का प्रतिशत विचलन

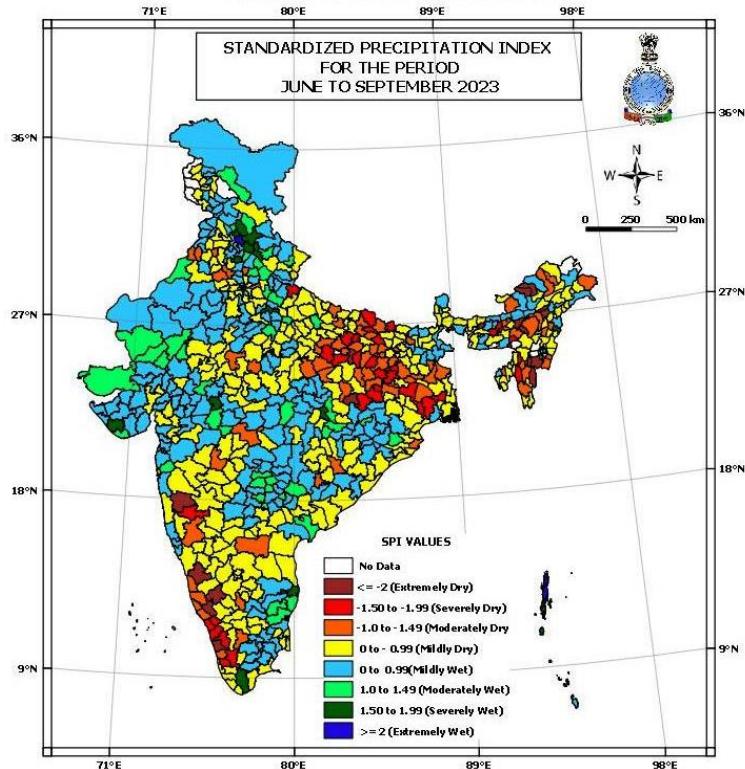
FIG. 6: WEEK-WISE AND CUMULATIVE PERCENTAGE DEPARTURE OF AREA WEIGHT AVERAGED RAINFALL OVER THE COUNTRY AS A WHOLE FROM JUNE TO SEPTEMBER 2023



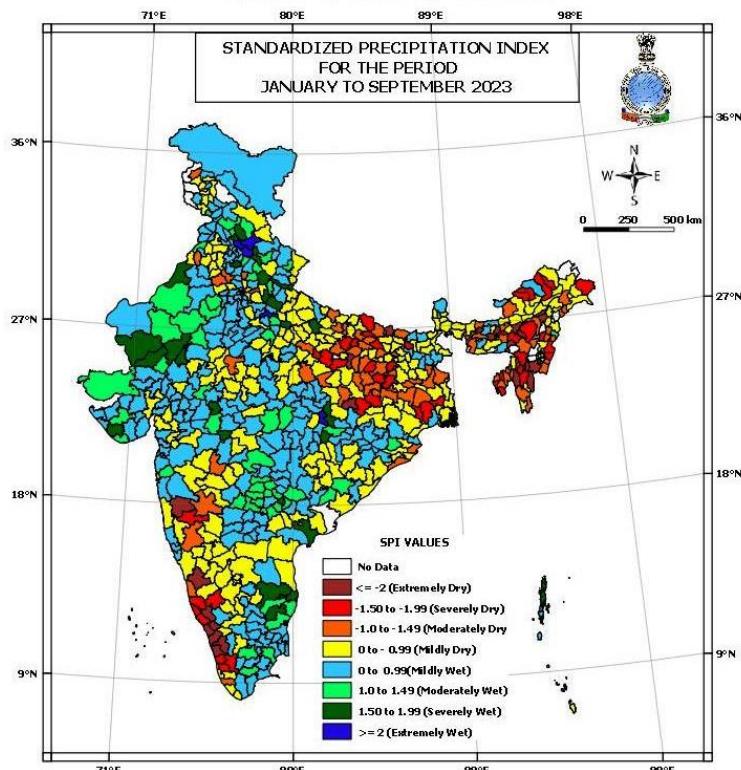
आकृति ७: १९५१ - २०२३ की अवधि के दौरान मानसून के लिए पूरे भारत में क्षेत्र भारित वर्षा की समय
श्रृंखला

FIG. 7: TIME SERIES OF AREA WEIGHT AVERAGED RAINFALL OVER ALL INDIA AND FOUR HOMOGENOUS REGIONS FOR THE MONSOON SEASON DURING THE PERIOD 1951 – 2023

(a) JUNE – SEPTEMBER 2023



(b) JANUARY 2023 – SEPTEMBER 2023



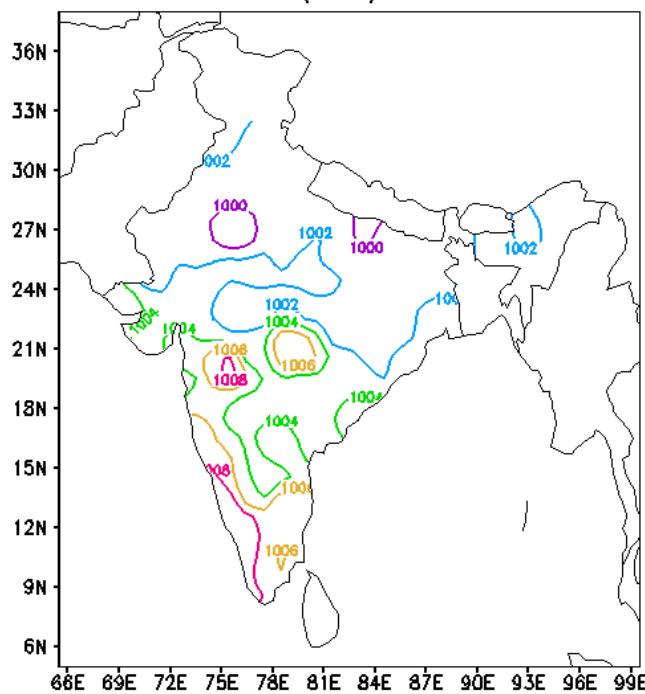
आकृती ८: मानकीकृत वर्षण सूचकांक (एसपीआई)

(ए) जून से सितम्बर (चार महीने) (बी) जनवरी से सितम्बर (नौ महीने)

**FIG. 8: STANDARDIZED PRECIPITATION INDEX (SPI) FOR
(a) FOUR MONTHS (b) NINE MONTHS**

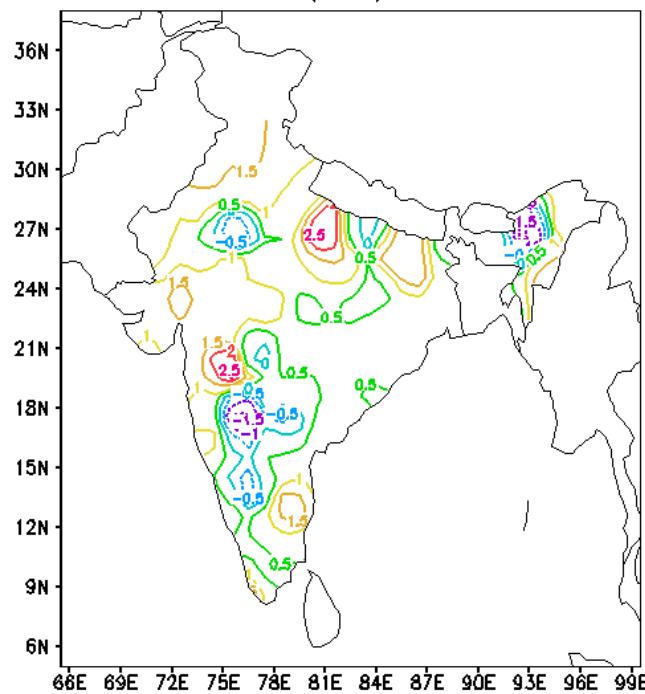
(a) MEAN SEA LEVEL PRESSURE (MSLP)

PRESSURE ACTUAL(hPa) JUN–SEPT 2023



(b) MSLP Anomaly

PRESSURE ANOM (hPa) JUN–SEPT 2023



आकृती ९: मानसून २०२३ के लिए मासिक औसत समुद्र स्तर दाब (एचपीए)

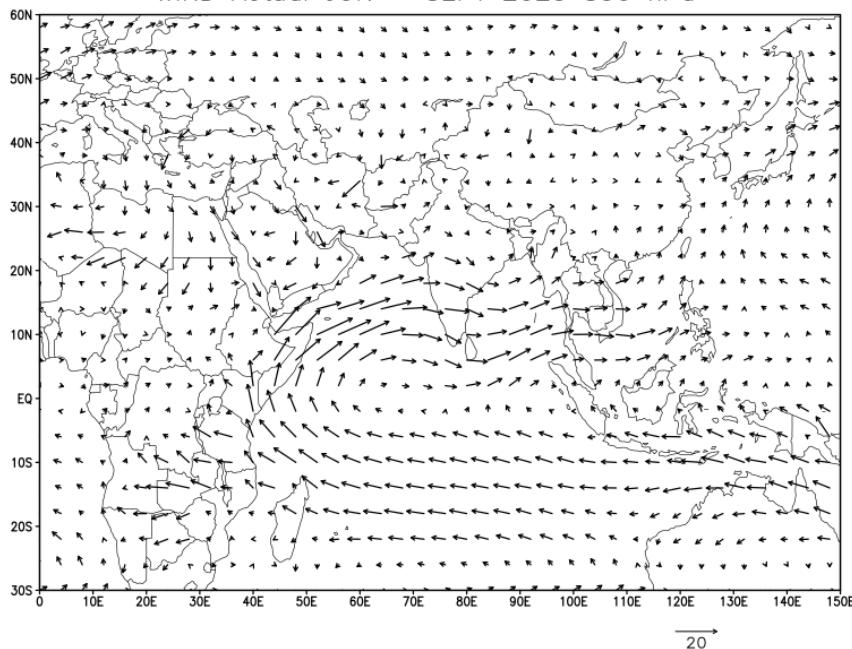
(ए) माध्य (बी) विसंगति (१९८१-२०१० सामान्य पर आधारित)

FIG. 9: MEAN SEA LEVEL PRESSURE (hPa) for MONSOON 2023

**(a) MEAN (b) ANOMALY
(BASED ON 1981 - 2010 NORMALS)**

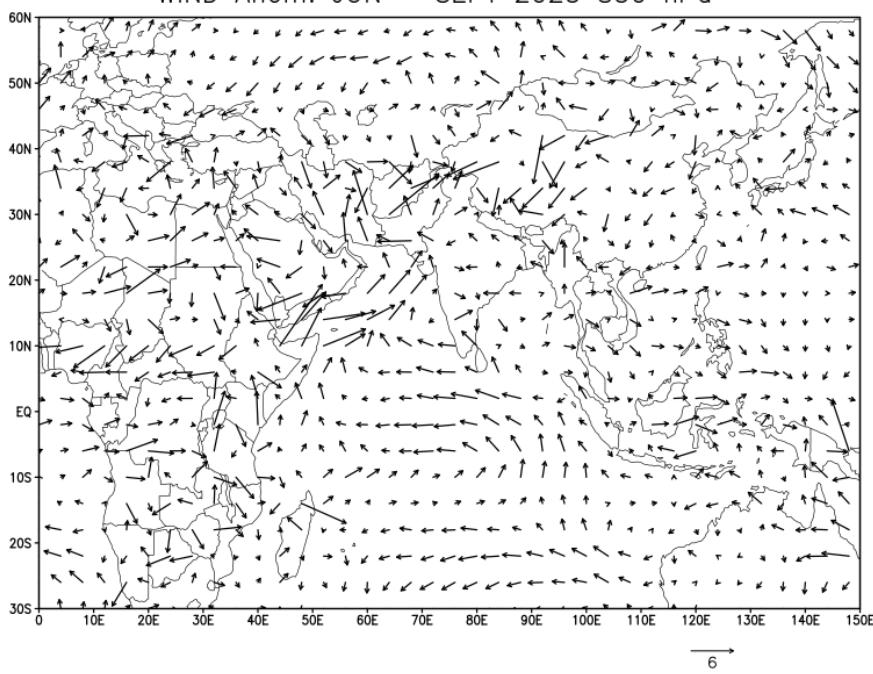
(a) MEAN WIND: 850 hPa

WIND Actual JUN – SEPT 2023 850 hPa



(b) WIND ANOMALY: 850 hPa

WIND Anom. JUN – SEPT 2023 850 hPa



आकृति १०: मानसून २०२३ के लिए मासिक पवन (मि/से)

(ए) माध्य (बी) विसंगति ८५० एचपीए स्तरपर

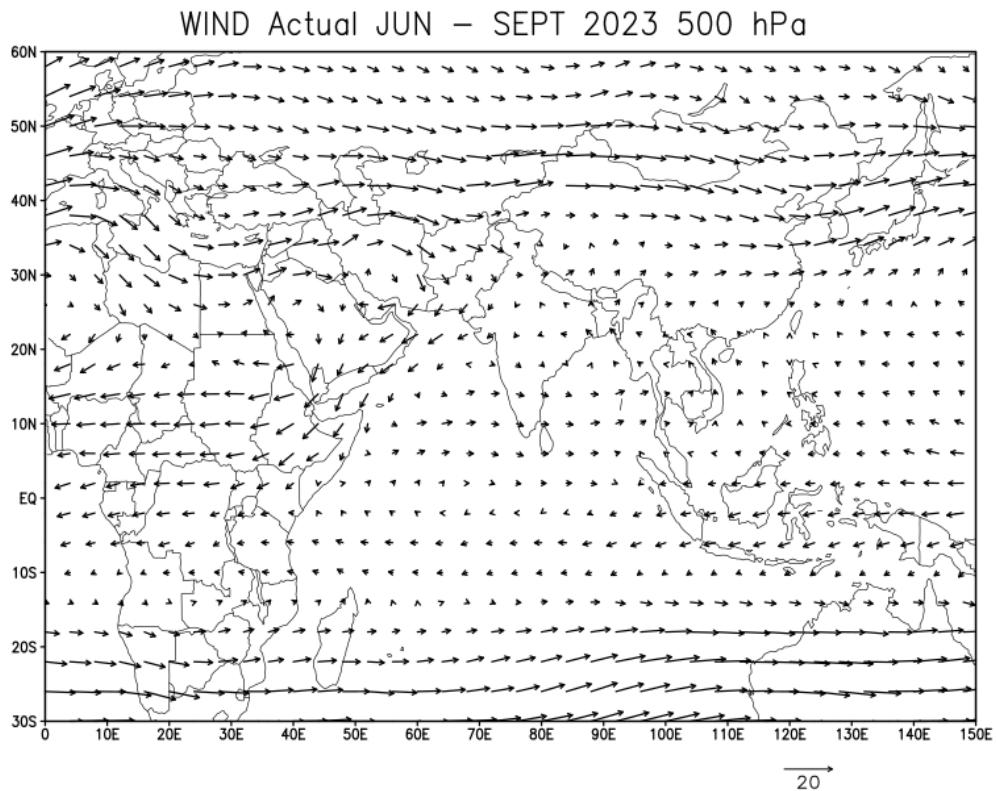
FIG. 10: SEASONAL WIND (m/s) FOR MONSOON 2023

(a) MEAN (b) ANOMALY AT 850 hPa

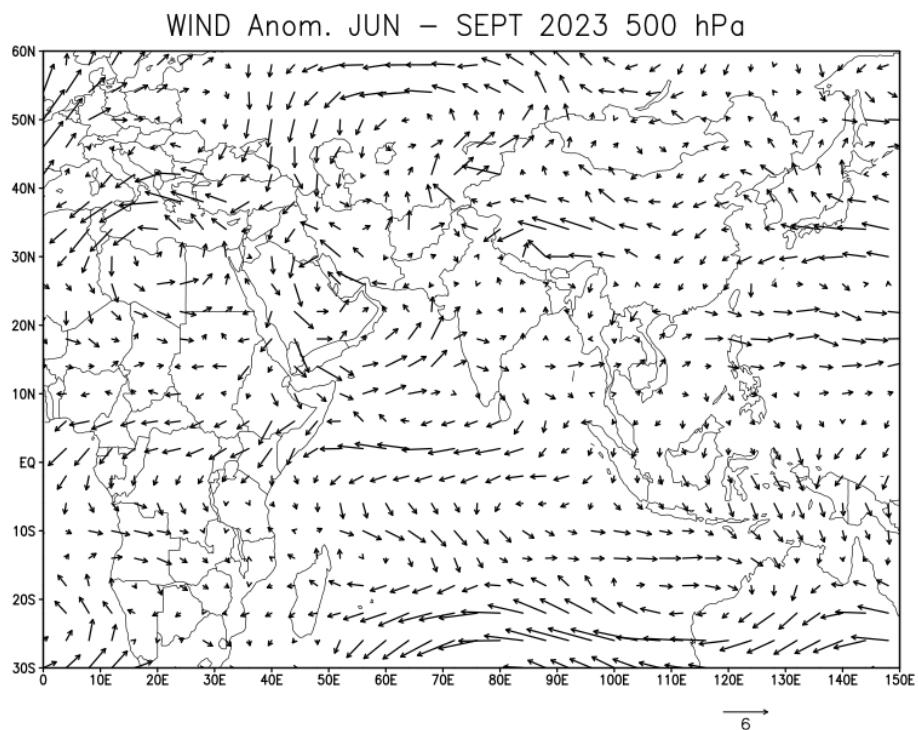
(OPERATIONAL NWP ANALYSIS OF IMD GFS T-574

(ANOMALY IS BASED ON 2000-2018 Climatology, Source: NCMRWF)

(a) MEAN WIND: 500 hPa



(b) WIND ANOMALY: 500 hPa



आकृति ११: मानसून २०२३ के लिए मासिक पवन (मि /से)

(ए) माध्य (बी) विसंगति ५०० एचपीए स्तरपर

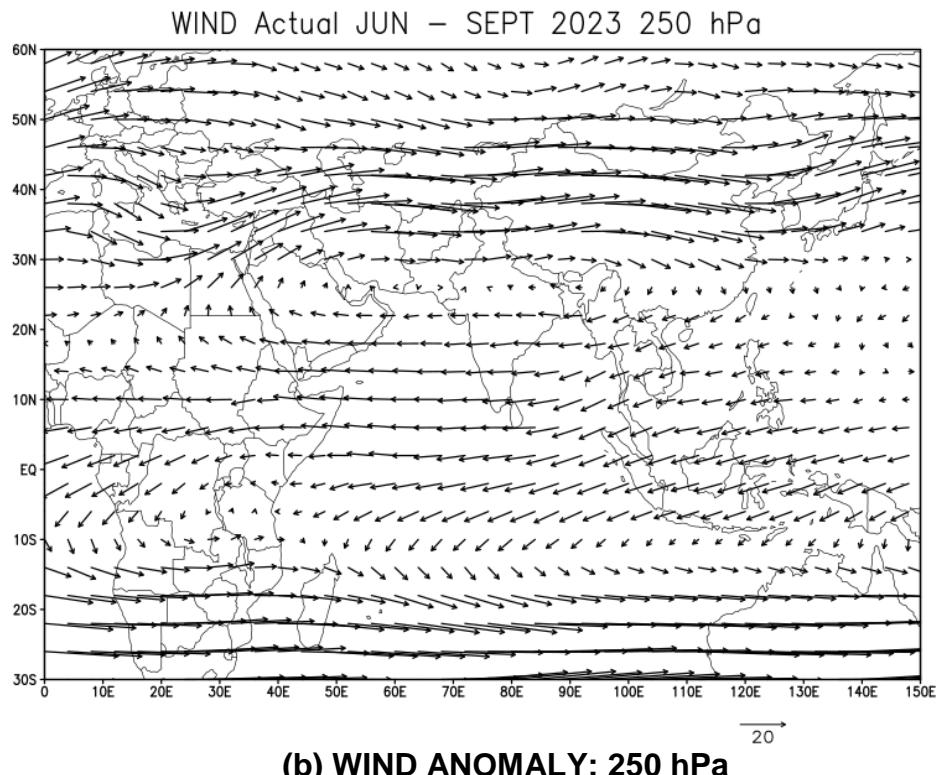
FIG. 11: SEASONAL WIND (m/s) FOR MONSOON 2023

(a) MEAN (b) ANOMALY AT 500 hPa

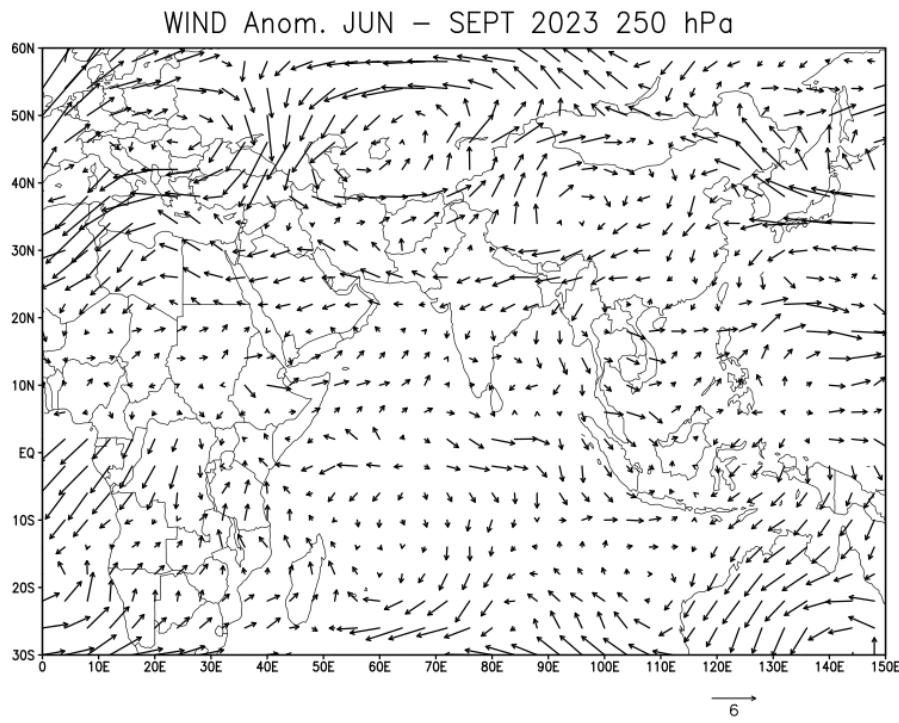
(OPERATIONAL NWP ANALYSIS OF IMD GFS T-574

(ANOMALY IS BASED ON 2000-2018 Climatology, Source: NCMRWF)

(a) MEAN WIND: 250 hPa



(b) WIND ANOMALY: 250 hPa



आकृति १२: मानसून २०२३ के लिए मासिक पवन (मि /से)

(ए) माध्य (बी) विसंगति २५० एचपीए स्तरपर

FIG. 12: SEASONAL WIND (m/s) FOR MONSOON 2023

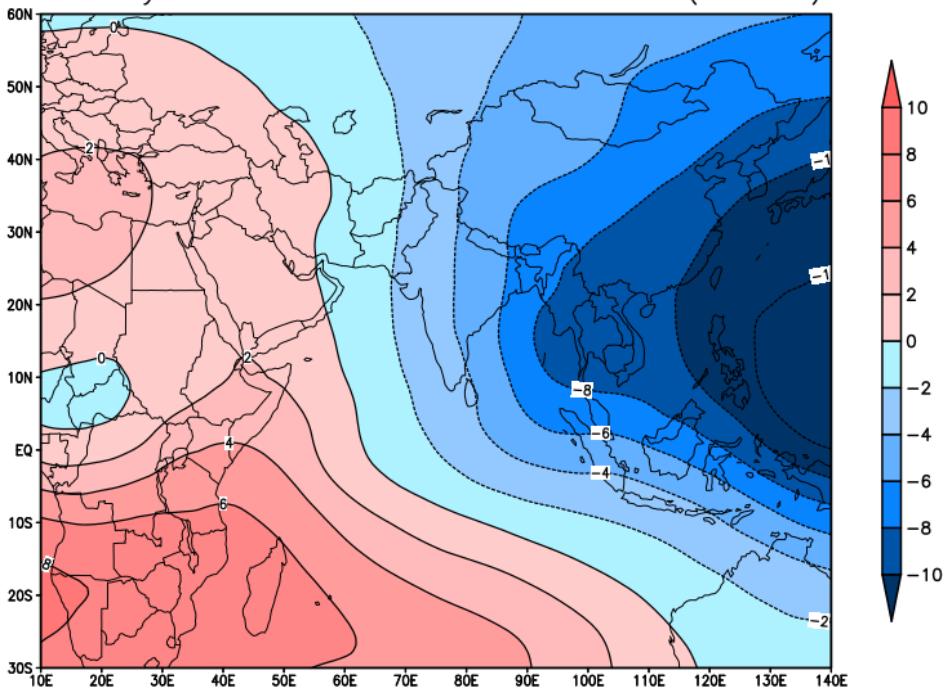
(a) MEAN (b) ANOMALY AT 250 hPa

(OPERATIONAL NWP ANALYSIS OF IMD GFS T-574)

(ANOMALY IS BASED ON 2000-2018 Climatology, Source: NCMRWF)

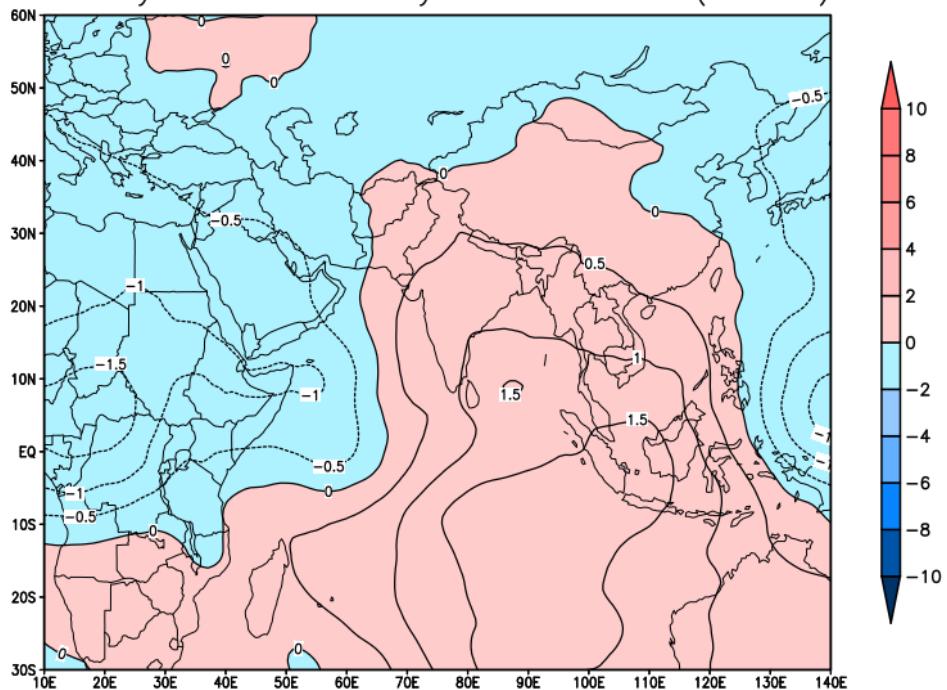
(a) VELOCITY POTENTIAL: 250 hPa

Velocity Potential Actual JUN–SEPT 2023 (250hPa)



(b) VELOCITY POTENTIAL ANOMALY: 250 hPa

Velocity Potential Anomaly JUN–SEPT 2023(250hPa)



आकृति १३: मानसून २०२३ के लिए मासिक पवन (मि /से)

(ए) माध्य (बी) विसंगति २५० एचपीए स्तरपर

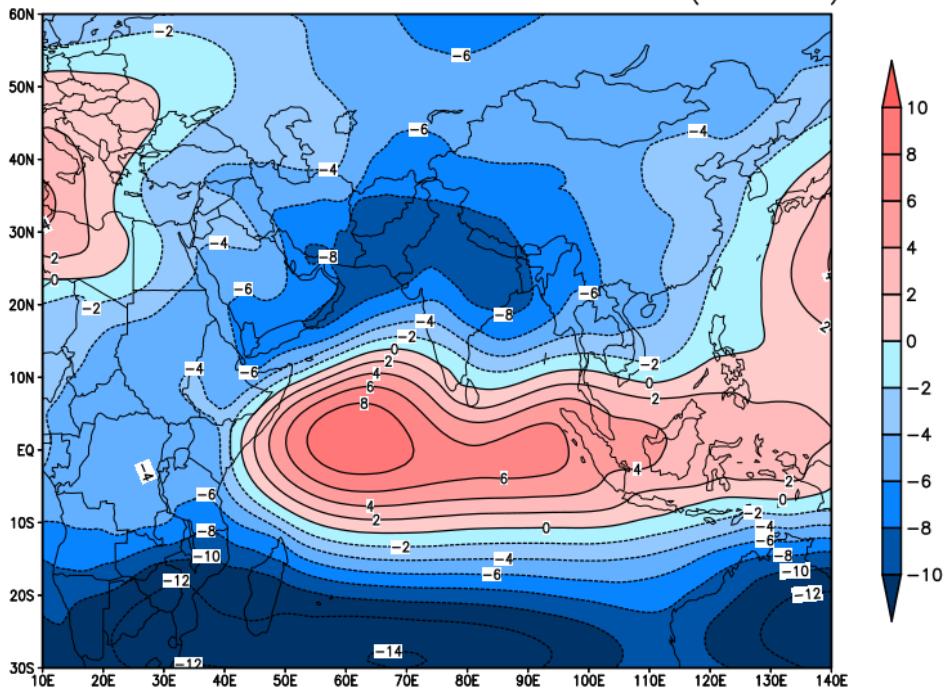
FIG. 13: VELOCITY POTENTIAL ($10^6 \text{m}^2/\text{s}$) FOR MONSOON 2023

(a) MEAN (b) ANOMALY AT 250 hPa

(OPERATIONAL NWP ANALYSIS OF IMD GFS T-574)
(ANOMALY IS BASED ON 2000-2018 Climatology, Source: NCMRWF)

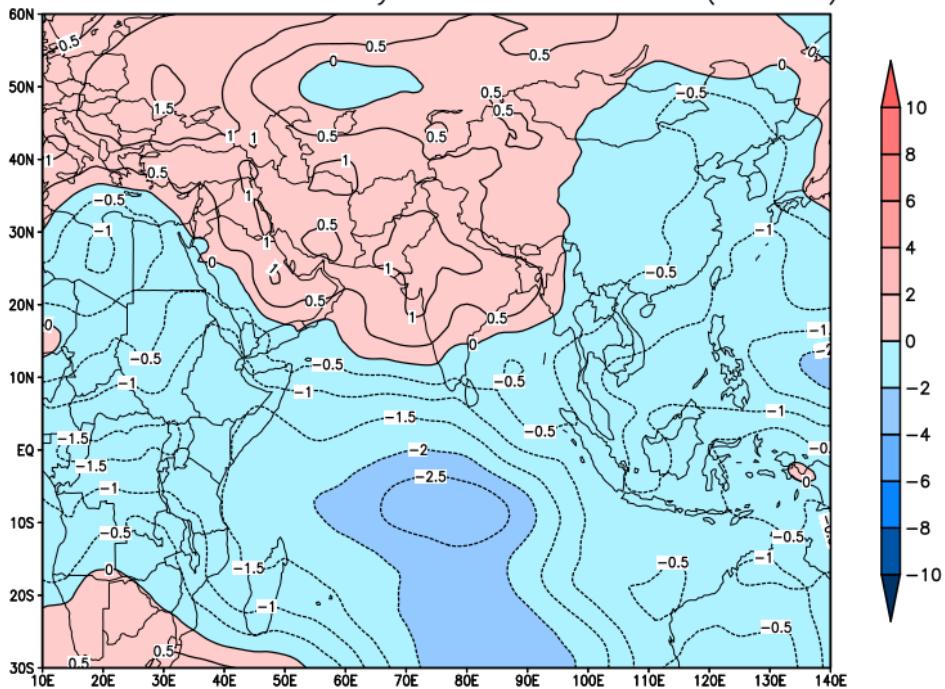
(a) STREAM FUNCTION: 850 hPa

Streamfunction Actual JUN – SEPT 2023 (850 hPa)



(b) STREAM FUNCTION ANOMALY: 850 hPa

Streamfunction Anomaly JUN – SEPT 2023(850hPa)



आकृति १४: मानसून २०२३ के लिए मासिक पवन (मि /से)

(ए) माध्य (बी) विसंगति ८५० एचपीए स्तरपर

FIG. 14: STREAM FUNCTION ($10^6 \text{ m}^2/\text{s}$) FOR MONSOON 2023

(a) MEAN (b) ANOMALY AT 850 hPa

(OPERATIONAL NWP ANALYSIS OF IMD GFS T-574)

(ANOMALY IS BASED ON 2000-2018 Climatology, Source: NCMRWF)

OLR Anom JUN–SEPT. 2023

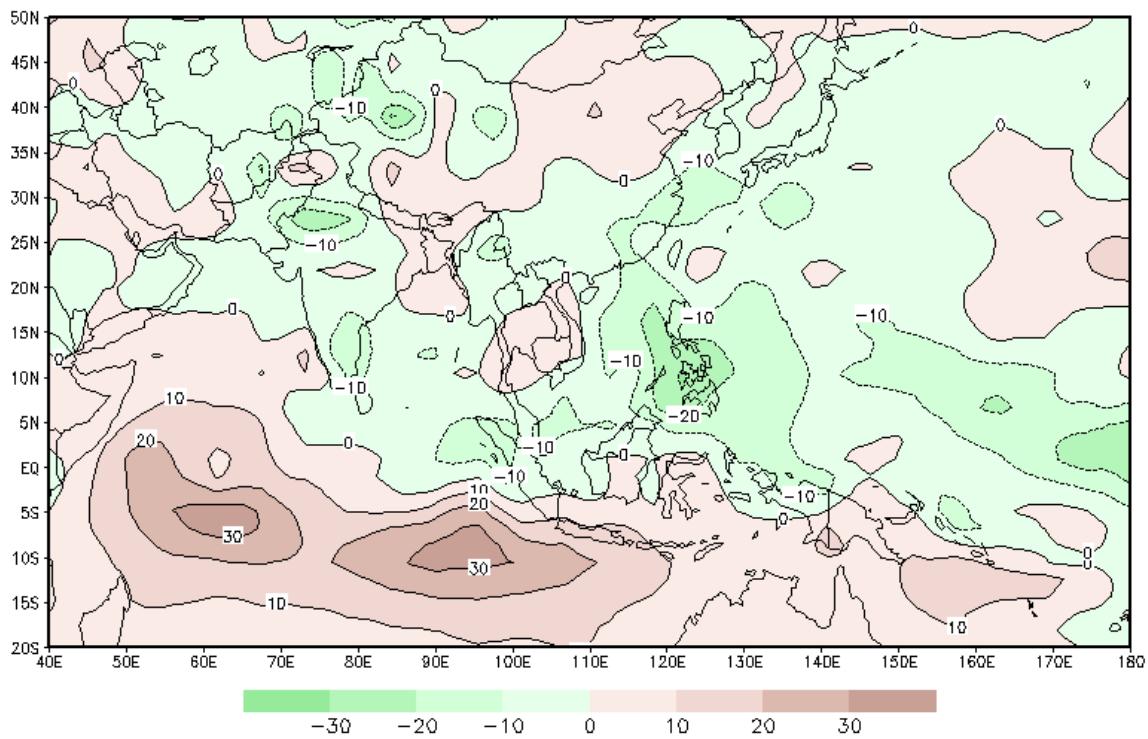
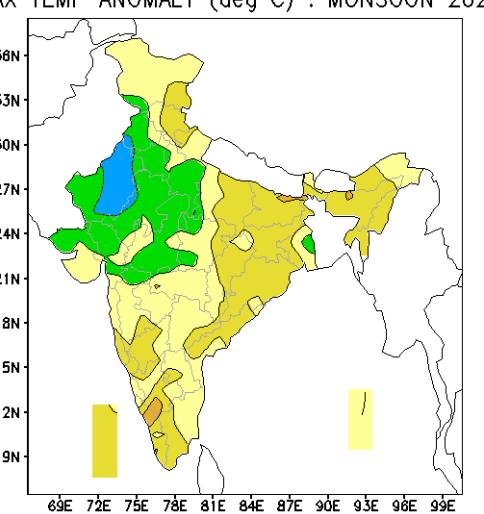
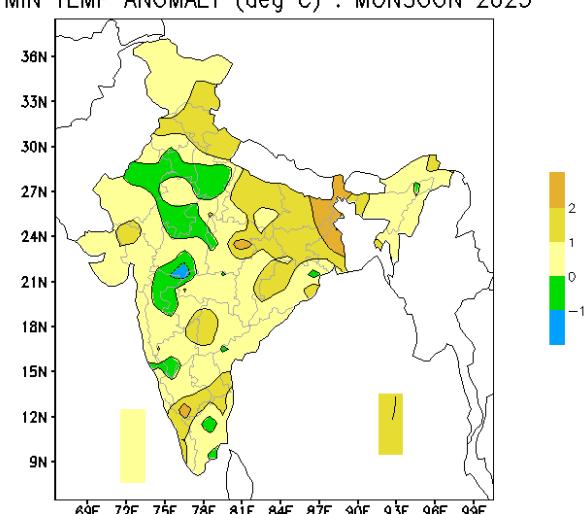


FIG. 15: OLR ANOMALY (W/m²) FOR THE MONSOON SEASON 2023
(DATA SOURCE: CDC / NOAA, USA)
(BASED ON 1991 - 2020 CLIMATOLOGY)

MAX TEMP ANOMALY (deg C) : MONSOON 2023



MIN TEMP ANOMALY (deg C) : MONSOON 2023

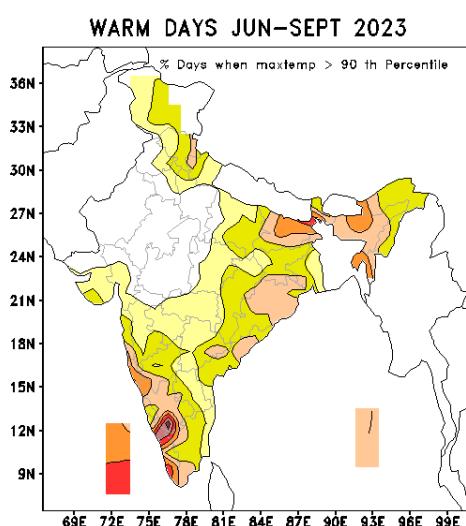


आकृति १६: मानसून २०२३ के लिए औसत मासिक तापमान विसंगतियां (डिग्री सेल्सियस)

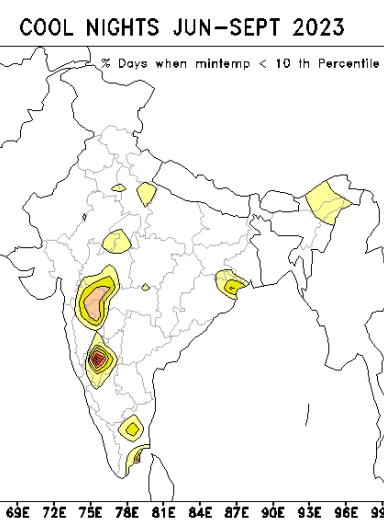
(ए) अधिकतम (बी) न्यूनतम

FIG. 16: MEAN SEASONAL TEMPERATURE ANOMALIES (°C) FOR MONSOON 2023
(a) MAXIMUM (b) MINIMUM
(BASED ON 1981-2010 NORMALS)

(a) WARM DAYS



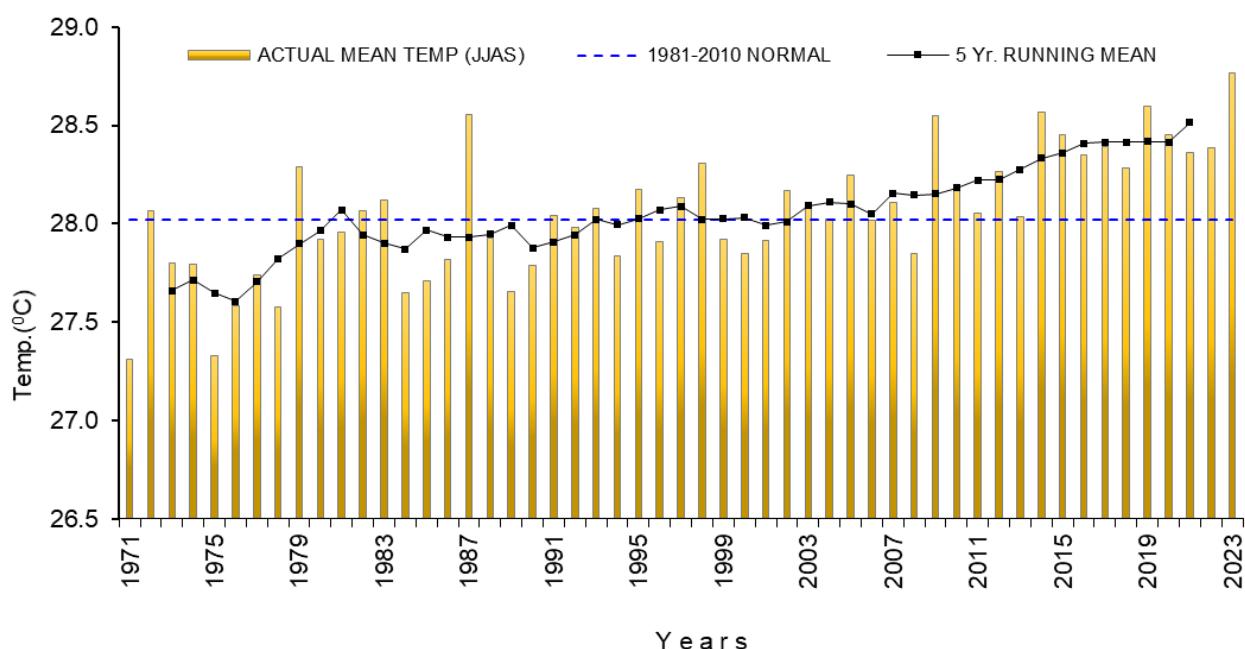
(b) COLD NIGHTS



आकृती १६: (ए) उन दिनों का प्रतिशत जब अधिकतम तापमान > 90 वें प्रतिशत

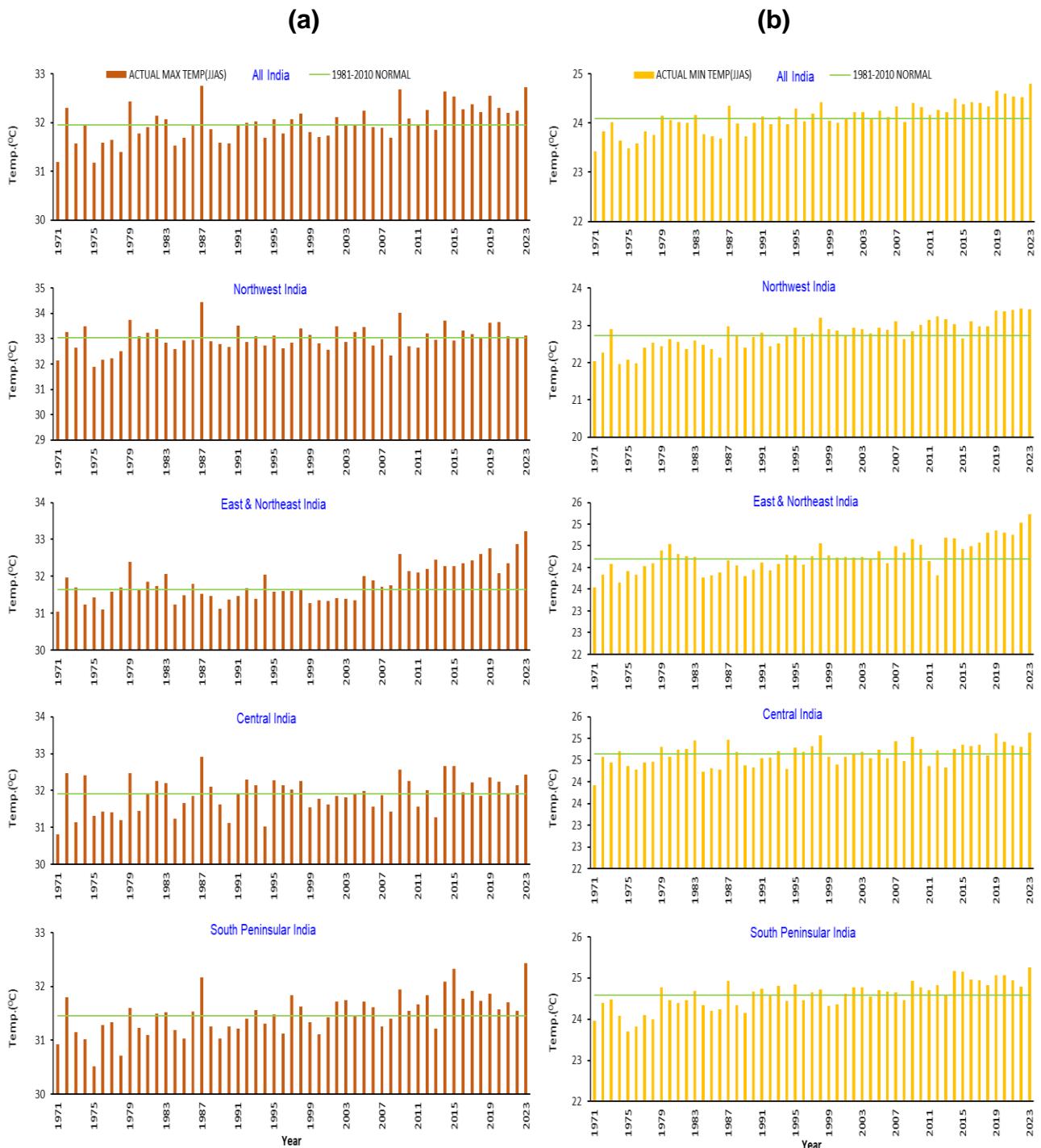
(बी) उन दिनों का प्रतिशत जब न्यूनतम तापमान < 10 वें प्रतिशत

FIG:17 (a) PERCENTAGE OF DAYS WHEN MAXIMUM TEMPERATURE > 90 TH PERCENTILE
 (b) PERCENTAGE OF DAYS WHEN MINIMUM TEMPERATURE < 10 TH PERCENTILE



आकृती १८: मानसून १९७१-२०२३ की अवधि के दौरान भारत में औसत तापमान की समय शृंखला और
 महीने के लिए पांच साल चलने वाला औसत तापमान

FIG. 18: TIME SERIES OF MEAN TEMPERATURE AVERAGED OVER INDIA (VERTICAL BARS AND FIVE YEAR RUNNING MEAN (CONTINUOUS LINE) FOR THE MONSOON SEASON (1971-2023))

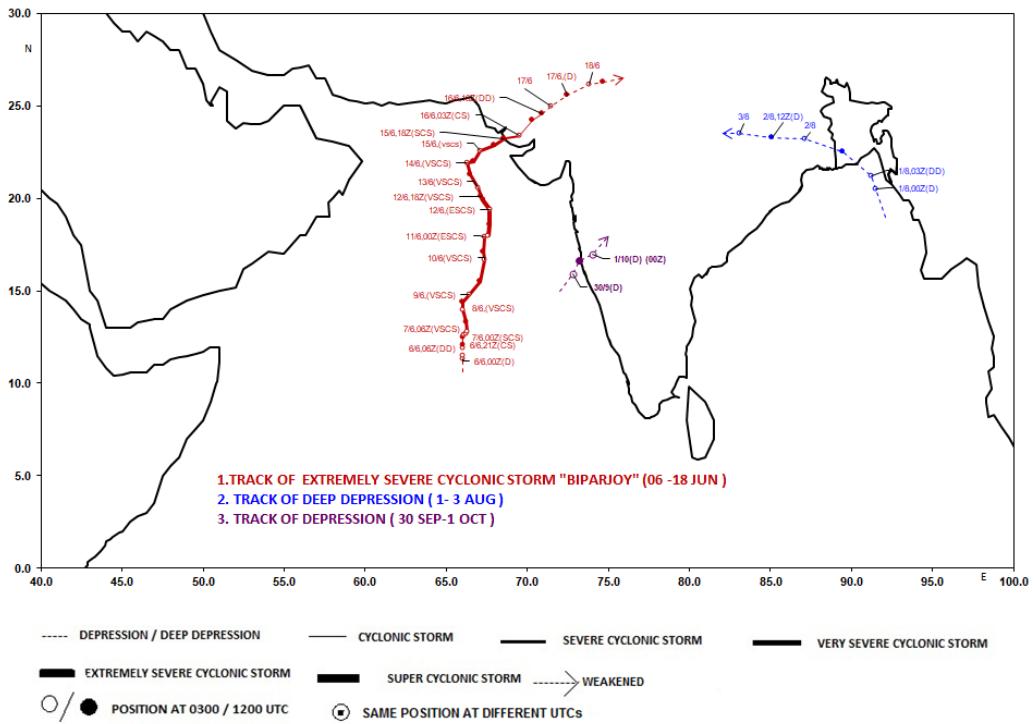


आकृती १९: मानसून २०२३ के लिए १९७१-२०२३ अवधि के दौरान

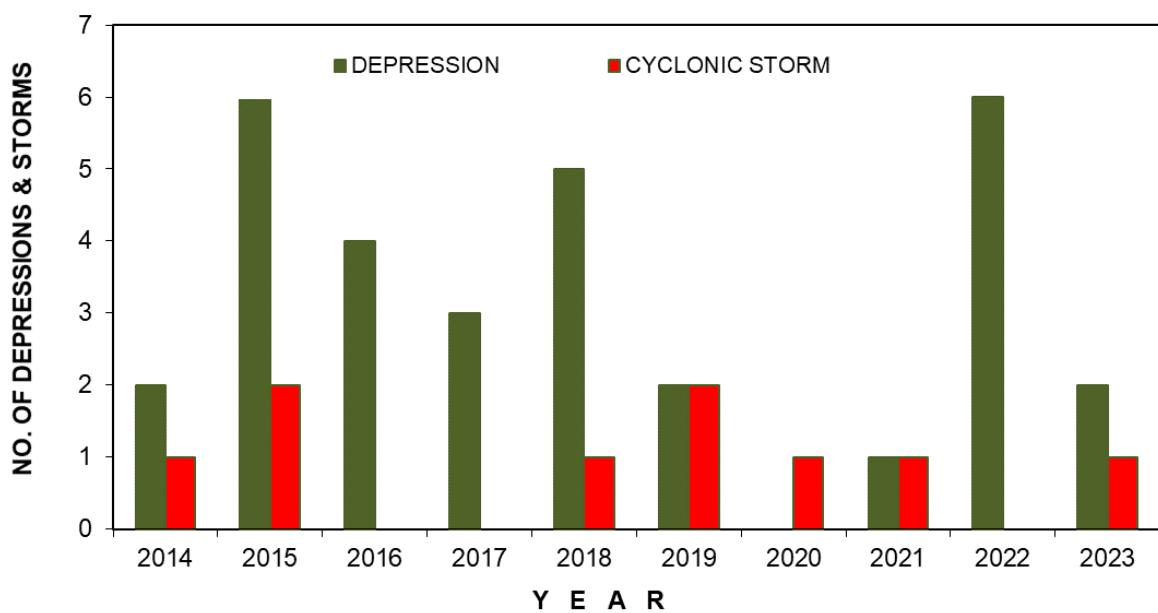
(ए) अधिकतम (बी) न्यूनतम तापमान की समय श्रृंखला पूरे देश और चार सजातीय क्षेत्र के लिए

FIG. 19: TIME SERIES OF TEMPERATURE FOR THE COUNTRY AS A WHOLE AND THE FOUR HOMOGENEOUS REGIONS FOR THE MONSOON SEASON (1971 - 2023)

(a) MAXIMUM (b) MINIMUM

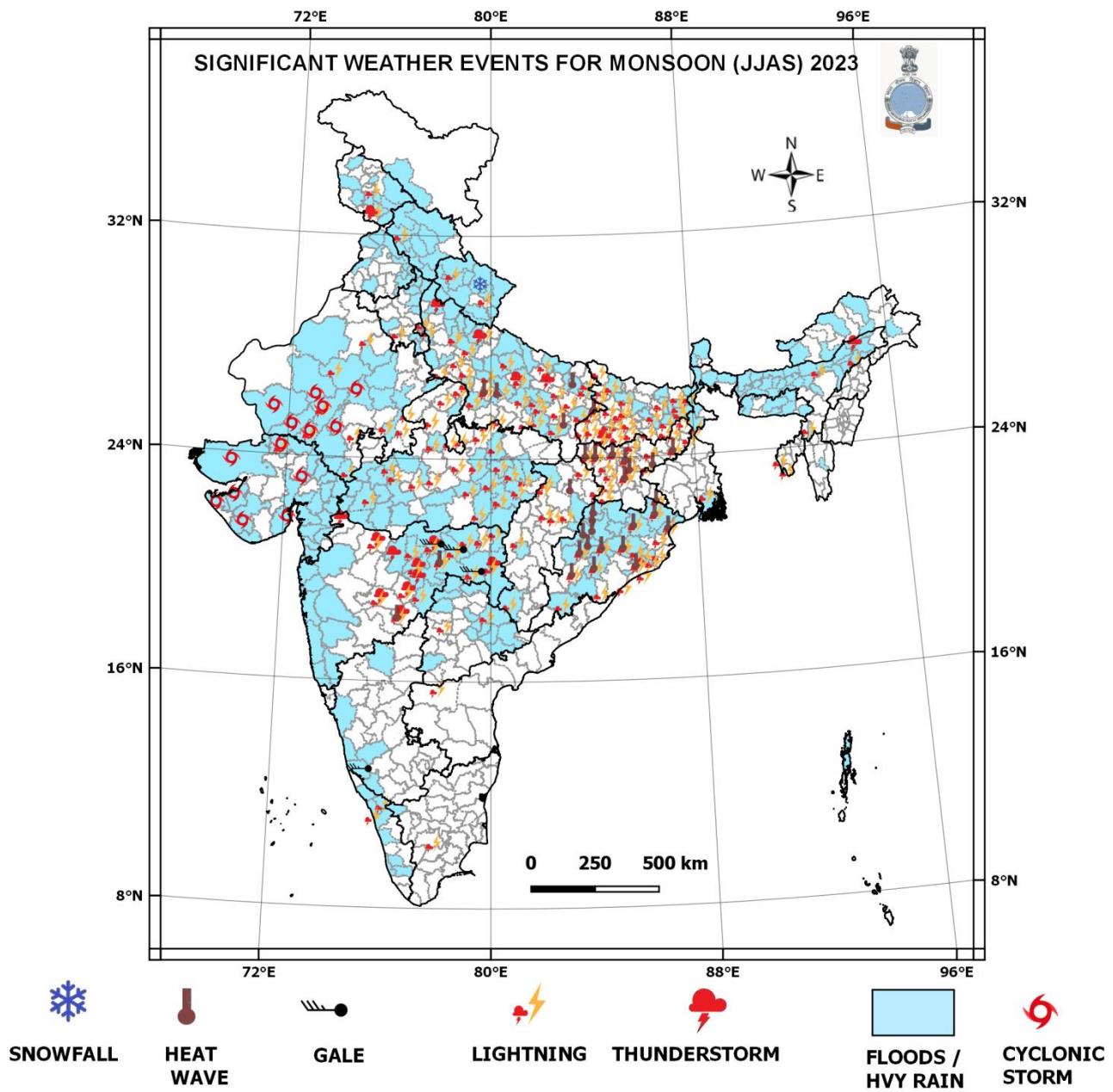


आकृती २०: मानसून २०२३ के दौरान गठित तीव्र निम्न दाब प्रणाली का ट्रैक
FIG. 20: TRACKS OF INTENSE LOW PRESSURE SYSTEMS FORMED DURING THE MONSOON SEASON



आकृती २१: दक्षिण-पश्चिम मानसून के मौसम (२०१४ - २०२३) के दौरान बने दाब और चक्रवाती तूफानों की संख्या

FIG. 21: NUMBER OF DEPRESSIONS & CYCLONIC STORMS FORMED DURING THE SOUTHWEST MONSOON SEASON (2014 - 2023)



आकृती २२: मानसून २०२३ के दौरान महत्वपूर्ण मौसम की घटनाएं
(वास्तविक समय मीडिया रिपोर्ट के आधार पर)

**Fig. 22: SIGNIFICANT WEATHER EVENTS DURING THE MONSOON SEASON 2023
(BASED ON REAL TIME MEDIA REPORT)**

तालिका १ / TABLE 1

मानसून २०२३ के लिए उपमंडल वार वर्षा के आकड़े METEOROLOGICAL SUBDIVISION WISE RAINFALL STATISTICS FOR THE MONSOON SEASON 2023 BASED ON OPERATIONAL DATA

MET. SUBDIVISION	ACTUAL	NORMAL	%
	(mm)	(mm)	DEP
1 A & N ISLAND	2528.8	1631.7	55
2 ARUNACHAL PRADESH	1466.3	1675.1	-12
3 ASSAM & MEGHALAYA	1427.6	1762.2	-19
4 N M M T	953.9	1301.7	-27
5 SHWB & SIKKIM	2023.5	1889.5	7
6 GANGETIC WEST BENGAL	905.6	1166.8	-22
7 ODISHA	1115.4	1150.2	-3
8 JHARKHAND	755.7	1022.9	-26
9 BIHAR	760.6	992.2	-23
10 EAST U.P.	569.5	799.2	-29
11 WEST U.P.	693.9	672.0	3
12 UTTARAKHAND	1210.8	1162.7	4
13 HAR. CHD & DELHI	425.3	430.7	-1
14 PUNJAB	417.5	439.8	-5
15 HIMACHAL PRADESH	876.4	734.4	19
16 JAMMU & KASHMIR & LADAKH	574.2	549.1	5
17 WEST RAJASTHAN	401.7	283.6	42
18 EAST RAJASTHAN	622.7	626.6	-1
19 WEST MADHYA PRADESH	907.3	877.3	3
20 EAST MADHYA PRADESH	999.3	1043.4	-4
21 GUJARAT REGION	908.4	927.5	-2
22 SAURASHTRA & KUTCH	795.7	539.9	47
23 KONKAN & GOA	3177.6	2870.8	11
24 MADHYA MAHARASHTRA	655.7	747.4	-12
25 MARATHWADA	573.2	642.8	-11
26 VIDARBHA	921.2	937.3	-2
27 CHHATTISGARH	1061.3	1132.2	-6
28 COASTAL A. P.& YANAM	584.2	601.4	-3
29 TELANGANA	846.8	734.8	15
30 RAYALASEEMA	357.0	408.6	-13
31 TAMIL., PUDU. & KARAikal	354.2	328.4	8
32 COASTAL KARNATAKA	2708.1	3093.9	-12
33 N. I. KARNATAKA	430.7	480.8	-10
34 S. I. KARNATAKA	491.7	678.4	-28
35 KERALA & MAHE	1327.5	2018.7	-34
36 LAKSHADWEEP	872.7	1026.6	-15

तालिका २ / TABLE 2

मानसून २०२३ के दौरान की तापमान विसंगति

**TEMPERATURE ANOMALIES OVER INDIA AND FOUR HOMOGENEOUS REGIONS DURING
MONSOON 2023**

MONSOON 2023		Max Temp ($^{\circ}\text{C}$)	Min Temp ($^{\circ}\text{C}$)	Mean Temp ($^{\circ}\text{C}$)
ALL INDIA	ACTUAL	32.73	24.80	28.77
	NORMAL	31.95	24.09	28.02
	ANOMALY	0.78	0.71	0.74
NORTHWEST INDIA	ACTUAL	33.13	23.44	28.29
	NORMAL	33.04	22.73	27.88
	ANOMALY	0.09	0.72	0.40
EAST & NORTHEAST INDIA	ACTUAL	33.21	25.23	29.22
	NORMAL	31.63	24.19	27.91
	ANOMALY	1.58	1.04	1.31
CENTRAL INDIA	ACTUAL	32.43	25.13	28.78
	NORMAL	31.91	24.64	28.27
	ANOMALY	0.53	0.49	0.51
SOUTH PENINSULAR INDIA	ACTUAL	32.43	25.26	28.85
	NORMAL	31.45	24.58	28.01
	ANOMALY	0.99	0.68	0.83

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