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







वार्षिक जलवायु सारांश - 2018

ANNUAL CLIMATE SUMMARY - 2018

द्वारा जारी / ISSUED BY

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NATIONAL CLIMATE CENTRE, CLIMATE SERVICES DIVISION

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COVER PHOTOS

① Photo 1 : North India reels under cold wave, fog disrupts flights at Delhi airport, December 25, 2018.(http://www.tribuneindia.com)

② Photo 2 : Cold wave again grips Kashmir Valley, Ladakh, December 31, 2018, (http://www.tribuneindia.com)

③ Photo 3 : Madhya Pradesh sweltered under the continuing heat wave with hot winds accompanying the scorching sun, while the state's famed tourist destination of Khajuraho was hottest in the country on Thursday at 47.5 degrees Celsius May 25, 2018.(https://www.thestatesman.com)

④ Photo 4 : There seems to be no respite for people of Delhi or nearby areas as intense heatwave continues to batter the region. North India continues to remain under the grip of an intense heat wave with temperatures even crossing the 45-degree Celsius mark in some places,May 28, 2018. (https://www.financialexpress.com)

⑤ Photo 5 : Mumbai received heavy rainfall on Saturday following the onset of the southwest monsoon. Waterlogged roads disrupted traffic in the city, local train services slowed down and flights were delayed by the rains,June 9, 2018. (https://www.hindustantimes.com)

⑥ Photo 6 : Continuous heavy rains have cut off several road links across state of Kerala. Water levels are continuously rising in rivers and reservoirs due to heavy rains.Shutters of at least 22 reservoirs have been opened to drain out excess water, August 10, 2018. (https://www.indiatoday.in)

वार्षिक जलवायु सारांश - 2018

विशेषताएं:

वर्ष 2018 में देश का औसत तापमान, सन 1981-2010 के औसत से 0.4डिग्री सेलशियस (डि.से.) से अधिक रहा। यह साल 1901 से अब तक का छटा सबसे ऊष्ण साल रहा । जाडे की ऋतु के औसत तापमान में वृध्दि (+0.59 डि.से. एवं 1901 से अब तक का पाँचवा सबसे ऊष्ण ऋतु) और मानसूनपूर्व ऋतु के तापमान में वृध्दि (+0.55 डि.से. एवं 1901 से अब तक की साँतवा सबसे ऊष्ण ऋतु) वार्षिक तापमान में वृध्दि का मुख्य कारण है। अब तक के 10 सबसे ऊष्ण साल इस क्रम से है : 2016 (विसंगति +0.707), 2009(+0.552), 2017(+0.541), 2010(+0.539), 2015(+0.424), 2018(+.40), 1958(+0.250), 2002(+0.245), 2014(+0.238) और 2006(+0.228) ।

दक्षिणी पश्चिमी मानसून ऋतु (जून-सितंबर, जो देश की वर्षा ऋतु का प्रमुख काल माना जाता है) में देशभर में व्यापक रुप से वर्षा सामान्य रही (दीर्घ कालावधि औसत के 91%)। हालांकि सामयिक रुप से वर्षा अस्थाई थी लेकिन फिर भी देश भर में वर्षा का वितरण काफी अच्छा रहा।

दक्षिण प्रायद्वीप (जिसमे 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 अक्तूबर से दिसंबर तक पडने वाली उत्तर-पूर्व मानसून वर्षा, सामान्य से कम (दीर्घ कालावधि औसत के 66%) रही ।

वर्षा

2018 में देश भर में वार्षिक वर्षा सामान्य से कम थी । वर्षा का परिमाण दीर्घ कालावधि औसत के 85.3% रहा । देश के 36 प्रभागों में से 1 प्रभाग केरल मे वर्षा अधिक रही, 23 प्रभागों में वर्षा सामान्य रही और 12 प्रभागों में वर्षा कम रही ।

तापमान

देश के अधिकतर भागों में अधिकतम, न्यूनतम और औसत तापमान की विसंगति $\pm$ 1.0 डि. सें. की श्रेणी में रही । मगर देश के उत्तर और उत्तर-पश्चिम भागों में औसत तापमान 1 डि. सें. से अधिक रहा ।

चक्रवाती तूफान

2018 मे बंगाल की खाडी में चार चक्रवाती तूफान हुए । इनमे से 1 बहुत तीव्र चक्रवाती तूफान अक्तुबर मे,2 तीव्र चक्रवाती तूफान (नवंबर,दिसंबर में प्रतिमाह एक) और सितंबर में 1 चक्रवाती तूफान हुए । अरबी समुद्र में तीन चक्रवाती तूफान हुए । मानसून ऋतु मे 10 कम दबाव के क्षेत्र बने (1 चक्रवाती तूफान,1 अति तीव्र कम दबाव क्षेत्र, 4 तीव्र कम दबाव क्षेत्र, 2 अच्छी तरह से चिन्हित कम दबाव क्षेत्र और 2 कम दबाव के क्षेत्र) । इन सभी कम दबाव की प्रणालियों की वजह से संबन्धित स्थानों मे अच्छी वर्षा हुई ।

महत्वपूर्ण मौसम संबंधी घटनाएं

आकाशीय बिजली से 198 लोगों की मृत्यु की सूचना (मानसून पूर्व और मानसूनोत्तर ऋतुओं में), देश के विभिन्न भागों से प्राप्त हुई । उत्तर प्रदेश मे इसकी संख्या 74 सबसे अधिक थी । ओडिशा से 61, मध्य प्रदेश से 16, महाराष्ट्र और राजस्थान से 11 लोगों की मृत्यु की सूचना प्राप्त हुई । शीत लहर कि चपेट में 279 लोगों की मृत्यु की सूचना प्राप्त हुई । आंधी तुफान से 225 लोगों की मृत्यु की सूचना देश के विभिन्न भागों से प्राप्त हुई । भारी वर्षा और बाढ संबंधी घटनाओं से मानसून ऋतु में करीब 612 से ज्यादा लोगों की मृत्यु की सूचना प्राप्त हुई । गर्ज के साथ तुफान के कारण 496 लोगों की मृत्यु की सूचना देश के विभिन्न भागों से प्राप्त हुई । हिमताप की वजह से जम्मु कश्मीर मे 18 लोगों की मृत्यु की सूचना मिली ।

HIGHLIGHTS

ANNUAL CLIMATE SUMMARY 2018

HIGHLIGHTS

Climate over India during 2018 was significantly warm in respect of temperature. The annual mean temperature for the country this year was +0.40°C above the 1981-2010 average, thus making the year 2018 as the sixth warmest year on record since the nation-wide records commenced in 1901. Higher mean temperatures during the winter season (January-February, with anomaly +0.59°C, fifth warmest since 1901) and the pre-monsoon season (Mar-May, with anomaly +0.55°C, seventh warmest since 1901) mainly accounted for the above normal annual temperature for the year.

Rainfall during the principal rainy season [Southwest (summer) monsoon season (June-September)] for the country as a whole was normal [91 % of Long Period average (LPA)].

The Northeast monsoon rainfall activity, over the south peninsula (core region of northeast monsoon rainfall activity comprising of 5 subdivisions viz. Coastal Andhra Pradesh, Rayalaseema, Tamil Nadu & Pondicherry, South Interior Karnataka and Kerala) was below normal (66 % of Long Period Average (LPA)).

TEMPERATURE

A) All India :

Annual :

Spatial pattern of annual mean, maximum and minimum temperature anomalies for 2018 is shown in Fig.1. Anomaly in the maximum, minimum and mean temperature over many parts of the country was generally in the range of $\pm$ 1.0°C. However, the maximum temperatures anomaly over some parts of Jammu and Kashmir, Himachal Pradesh, Uttarakhand, West Rajasthan and Gujarat state was above normal by about 1°C.

The annual mean temperature for the country was +0.40°C above the 1971-2000 average, thus making the year 2018 as the sixth warmest year on record since 1901 (Fig. 2A). The other 9 warmest years on record in order were: 2016 (anomaly +0.707°C), 2009 (0.552), 2017 (0.541), 2010(0.539), 2015(0.424), 1958(0.250), 2002(0.245), 2014(0.238), 2006(0.228). It may be mentioned that 11 out of the 15 warmest years were from the recent past fifteen years (2004-2018). In addition, the past decade (2001-2010/ 2009-2018) was the warmest decade on record with anomalies of 0.23°C / 0.38°C above average. During 1901-2018, the annual mean temperature showed an increasing trend of 0.60°C/100 years with significant increasing trend in the maximum temperature (1.0°C /100 years), and relatively lower increasing trend (0.20°C/100 years) in the minimum temperature.

Time series and trend in mean temperature anomalies for different seasons viz. winter (Jan to Feb), pre-monsoon (Mar to May), monsoon (June to Sept) and post-monsoon (Oct to Dec) seasons for the period 1901-2018 are shown in Figs 2B, 2C, 2D and 2E respectively. The mean temperature for the winter season (with anomaly +0.59°C above average) this year was the fifth highest since 1901. The 4 warmest winter years with anomaly in order were: 2016(+1.15°C), 2009(0.93°C), 2006(0.747°C) and 2017 (0.727°C). The mean temperature was above normal during January(0.25°C) and February(0.93°C). February was fifth warmest year since 1901.

The pre-monsoon season (March-May) this year was also warmer. The season this year (with anomaly +0.55°C above average) was the seventh warmest since 1901. The six warmest pre-monsoon years with anomaly in order are 2010(1.28°C), 2016(1.03°C), 1921(0.849°C), 1953(0.66°C), 2017(0.588°C) and 1941(0.56°C). The mean temperature was above normal during March (0.96°C), April (0.44°C) and May (0.25°C). March was the sixth warmest since 1901.

Monsoon season this year (with anomaly +0.26°C above average) was the tenth warmest since 1901. The 5 warmest monsoon years with anomaly on record in order are: 2014 (0.55°C), 1987(0.53°C), 2009(0.53°C), 2015(0.43°C), 2017(0.37°C). The mean temperature was above normal during June (0.3°C), July (0.2°C), August (0.18°C) and September (0.31°C). September was the sixth warmest since 1901.

The Post-monsoon season this year (with anomaly +0.31°C above average) was the thirteenth warmest since 1901. The 5 warmest post-monsoon years with anomaly on record in order are: 2015 (0.83), 2008(0.61), 2017(0.595°C), 2016(0.593) and 1979(0.5). The mean temperature was above normal during October (0.39°C), November (0.62°C) and below normal during December (-0.08°C). November was the sixth warmest since 1901.

Spatial pattern of trend in mean annual temperature anomalies based on the data for the period 1901-2018 (Fig.3) suggests significant positive (increasing) trend over most parts of the country except for some parts of Bihar, Gujarat and adjoining southern parts of Rajasthan, East Uttar Pradesh where significant negative (decreasing) trend was observed.

B) Spatial pattern:

Fig.4 shows the spatial pattern of monthly maximum and minimum temperature anomalies. Regions with significant temperature anomaly (> or < $\pm$ 2°C) during each concerned month are discussed below.

January-February (winter season):

During January, maximum temperature was above normal by about 2 to 3°C, over parts of north/northwest India. Minimum temperature was below normal by about 2 to 3°C, over parts of Gangetic West Bengal, Odisha, Jharakhand, Chhatisgarh, east Madhya Pradesh, Vidarbha and east Uttar Pradesh.

During February, maximum temperature was above normal by about 2 to 3°C, over most parts of northern / northwestern and some parts of eastcentral regions of the country. Over parts of Jammu & Kashmir and Himachal Pradesh it was above normal by more than 4 ^{0}C. Minimum temperature was above normal by about 2 to 3°C over parts of Jammu & Kashmir, Himachal Pradesh, west and east Rajasthan, Gujarat state, and at some isolated places over west Madhya Pradesh.

March- May (Pre-monsoon season):

During March, maximum temperature was above normal by about 2°C over parts of northwest, northern parts of central India. Over parts of Jammu & Kashmir, Himachal Pradesh, it was above normal by more than 4 ^{0}C. Minimum temperature was also above normal by about 2°C over parts of northwest region and some isolated places of Bihar, Madhya Maharashtra and west Madhya Pradesh .

During April, maximum temperature was above normal by about 2°C, over parts of west Rajasthan and Saurashtra and Kutch. It was below normal by about 2°C, over parts of Gangetic West Bengal. Minimum temperature was also above normal by about 2°C, over parts of west and east Rajasthan and Punjab.

During May, maximum temperature was above normal by about 2°C over parts of Himachal Pradesh, Uttarakhand, west Madhya Pradesh, Saurashtra and Kutch, Madhya Maharashtra, Marathwada and Vidarbha. Minimum temperature was above normal by about 2°C, over Jammu and Kashmir, west Rajasthan, Madhya Maharashtra and Vidarbha. Minimum temperature was below normal by about 2 to 3°C, over parts of east Uttar Pradesh and Lakshadweep.

June-September (Monsoon season):

During all the months of monsoon season, in respect of maximum and minimum temperature, the anomaly was generally within ±1°C range.

However, during August minimum temperature was below normal by 2°C over parts of east Uttar Pradesh.

During September, maximum temperature was below normal by about 2°C over parts of east Rajsthan. Similarly, minimum temperature was below normal by about 2°C over parts of east Uttar Pradesh

October-December (Post-monsoon season):

During October, maximum temperature was above normal by about 2 to 3°C, over parts of Saurashtra and Kutch, Madhya Pradesh, Maharashtra, Chhattisgarh, North Interior Karnataka, Telangana, coastal Andhra Pradesh and Rayalseema. Minimum temperature was below normal by about 2°C over parts of Uttar Pradesh and Marathwada.

During November, maximum and minimum temperature anomalies were generally within ±1°C range. However, the minimum temperature was below normal by about 2 to 3°C, over some parts of west Uttar Pradesh.

During December, maximum temperature was below normal by about 2°C, over some parts of west Madhya Pradesh, Gangetic West Bengal and adjoining Odisha. Minimum temperature was above normal by about 2 to 3°C, over parts of Telangana and adjoining north Interior Karnataka. Minimum temperature was below normal by about 2 to 3°C, over some parts of west Uttar Pradesh, Haryana, Chandigarh and Delhi & Madhya Pradesh.

Fig.5 (a, b) shows the monthly minimum and maximum temperature anomaly for the country as a whole during past five years, 2014-2018 respectively. It can be seen that in respect of maximum temperature, the month of March was the warmest in the last five years, while March and November were the second warmest in respect of minimum temperature during the last five years.

Cold Wave conditions:

Severe Cold wave/cold wave conditions prevailed over most parts of the country on most of the days during the month of January. Severe cold day/cold day conditions also prevailed at few places over Bihar and Uttar Pradesh on most of the days during the month.

During 17 – 31 December, Severe Cold wave/cold wave conditions prevailed majorly over north, northwestern and central parts of the country on many days and on isolated days over some parts of Bihar, Jharkhand, Madhya Maharashtra, Marathwada, north Interior Karnataka and north coastal Andhra Pradesh.

Fig 14 a, b show the minimum temperature anomaly diagrams for the duration when cold wave condition was at its peak.

Heat Wave Conditions:

Severe heat wave/heat wave conditions prevailed over parts of north and central India during March to May and then extended spatially to east India in the month of June.

Severe heat wave/Heat wave conditions were observed from the last week of March to the first week of April (26 March to 4 April) over Rajasthan and Gujarat State and on one or two days in Uttarakhand, Himachal Pradesh & north Konkan. Its spatial extent and severity started to diminish gradually from 5 April. The heat wave conditions re-emerged on 28 April, and till 18 May, it was mainly confined to some parts of Rajasthan and Vidarbha. From 19- 30 May, it was also observed over Madhya Pradesh on many days and over Haryana, Chandigarh & Delhi, Uttar Pradesh, Saurashtra & Kutch on a few days. During 31 May to 5 June, heat wave conditions was confined to west Rajasthan and then from 16 to 20 June, it was observed over some parts of east India viz., Jharkhand, Bihar, Odisha and Gangetic West Bengal and coastal Andhra Pradesh. It was observed over parts of north and central region during 22-25 June.

The heat wave conditions got abated from the entire country by 26 June. Fig 15a, b show the maximum temperature anomaly diagrams for the duration when heat wave condition was at its peak.

RAINFALL

Time series of percentage departure of area weighted seasonal and annual rainfall over the country as a whole are shown in Fig. 6. In 2018, annual rainfall over the country as a whole was 85.9 % of its LPA value. Season wise rainfall distribution over the country as a whole is listed below:

Winter (January to February): **37.6% of LPA**

Pre-monsoon (March to May): **92.6% of LPA**

Monsoon (June to September): **91% of LPA**

Post-monsoon (Oct to Dec): **56.1% of LPA**

Sub-division wise seasonal and annual rainfall statistics are given in Table 1 and spatial distribution is shown in Fig. 7. Month wise rainfall distribution is shown in Fig. 8.

Annual:

Rainfall activity over the country as a whole was below normal (85.3 % of LPA) during the year. Out of 36 meteorological subdivisions, one sub-division Kerala received excess rainfall, 23 received normal rainfall and remaining 12 subdivisions received deficient rainfall.

At the end of year, of the four homogeneous regions, south peninsular India received 93 % and central India received 90 % of their respective normal rainfall. While, East & Northeast India received 77% and Northwest India received 86 % of their respective normal rainfall.

Winter season:

Rainfall activity over the country during the season as a whole was substantially below normal. It was below normal during January and February as well (14.9% of LPA and 57.2% of LPA) respectively. Rainfall activity was mainly observed over Andaman & Nicobar Islands, parts of Marathwada and Vidarbha. Except these three subdivisions all other subdivisions received large deficient /deficient or no rainfall.

During the season, out of 36 meteorological subdivisions, 1 received large excess rainfall, 1 received excess rainfall, 1 received normal rainfall, 10 received deficient rainfall, 22 received large deficient rainfall. One subdivision did not receive any rain.

Pre-monsoon season:

Rainfall activity over the country during the season as a whole was normal (92.6 % of its LPA value). It was normal during the month of April and May (102.7% of LPA, 103.6% of LPA respectively) and below during March (53.3 % of LPA). Coastal Karnataka, south interior Karnataka and Lakshadweep received about one and half times of their respective normal rainfall. During the season, out of 36 meteorological subdivisions, 3 received large excess rainfall, 7 received excess rainfall, 10 received

Monsoon season:

The southwest monsoon season rainfall over the country as a whole was normal. However during the season June, July and August observed normal rainfall (95.1 % of LPA, 94.8 % of LPA and 91.9 % of LPA respectively), whereas September received below normal rainfall (76.5% of LPA). The rainfall for the season was normal over all the homogenous regions of the country except east and northeast India. Spatially, the highest rainfall (98% of LPA) was received by homogeneous region of South Peninsula and Northwest India and lowest rainfall (75% of LPA) was received by East and northeast India. The homogeneous regions of Central India received seasonal rainfall of 93% of LPA. The rainfall received during the first half (1 June to 31 July) was normal (95% of LPA), while second half (1 August to 30 September) was below normal (86% of LPA).

Most of the subdivisions of the country received excess/ normal rainfall. However, some subdivisions of western, eastern and south peninsula viz. Arunachal Pradesh, Assam and Meghalaya, Jharakhand, Bihar, west Rajasthan, Gujarat region, Saurashtra and Kutch, Marathwada, north Interior Karnataka, Rayalseema and Lakshdweep island received deficient rainfall. During the season, out of 36 meteorological subdivisions, 1 subdivisions received excess rainfall, 24 received normal rainfall and the remaining 11 subdivisions received deficient rainfall.

Daily area weighted rainfall (mm) over the country as a whole during the monsoon season 2018 (1st Jun. to 30th Sep.) and its long term average values are shown in Fig. 9. For the country as a whole, rainfall averaged was below or near normal on many days during the season. Only on few occasions (around 9) it was nearly one and half times its normal value During 14 -25 June, 4 -10 July, 27 July- 7 August and almost entire September, it was almost below normal.

Post-monsoon season:

Rainfall activity over the country during the season as a whole was substantially below normal (56.1% of LPA). It was below normal during all the months viz. October, November and December (43.9%, 70.5% and 88.3 % of its LPA respectively). Except both the islands, Odisha, Jammu & Kashmir and Kerala, all the subdivisions received deficient/large deficient rainfall.

Rainfall activity over core region of the south peninsula (comprising of 5 subdivisions viz. Coastal Andhra Pradesh, Rayalaseema, Tamil Nadu & Puducherry, South Interior Karnataka and Kerala) was below normal (66% of Long Period Average (LPA)). It was below normal during October November and December (65%of LPA, 71.3% of LPA and 55.2% of LPA respectively).

Out of 36 meteorological subdivisions, 2 received excess rainfall, 3 received normal rainfall, 13 subdivisions received deficient rainfall and remaining 18 subdivisions received large deficient rainfall. Time series of northeast monsoon seasonal rainfall over the south peninsula is shown in Fig 10.

Standardized Precipitation Index

The Standardized Precipitation Index (SPI) is an index used for 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.11 gives the SPI values for the year 2018.

Cumulative SPI values of the past twelve months indicate extremely wet/severely wet conditions over parts of S.H. West Bengal & Sikkim, Odisha, Punjab, Jammu & Kashmir, Saurashtra & Kutch, Telangana, Tamil Nadu, South Interior Karnataka and Kerala, while extremely dry/severely dry conditions were observed over parts of Arunachal Pradesh, Assam & Meghalaya, S.H. West Bengal & Sikkim, Gangetic West Bengal, Jharkhand, Bihar, Uttar Pradesh state, Punjab, Himachal Pradesh, West Rajasthan, Madhya Pradesh state, Gujarat state, Madhya Maharashtra, Marathawada, Vidarbha, Chhattisgarh, Andhra Pradesh state, Telangana, Tamil Nadu, North Interior Karnataka and South Interior Karnataka.

TROPICAL STORMS / DEPRESSIONS IN THE INDIAN SEAS

During 2018, 7 cyclonic storms formed over the north Indian Ocean. Out of these 7 systems, 3 systems forming over the Arabian Sea (2 during the pre-monsoon season and one during the post-monsoon season), did not have landfall over the Indian region. One cyclonic storm formed over Bay of Bengal in monsoon season (September) and crossed north Andhra Pradesh-Odisha coast near Gopalpur on 20th September. The remaining three systems, which formed over the Bay of Bengal during the post monsoon season crossed Indian coast. The first system VSCS "Titli" formed over the east central Bay of Bengal on 8th October and crossed Odisha coast on 11th. This storm claimed over 70 lives from coastal districts of Odisha. The second one SCS " Gaja" which formed over the east central Bay on 10th November, crossed Tamil Nadu coast on 15th and after moving across the south peninsula, it re-emerged into Arabian Sea as a deep depression. This storm claimed over 40 lives from coastal districts of Tamil Nadu. The last cyclonic storm of the year SCS "Phethai", which formed over the southeast Bay of Bengal on 13th December, crossed the Andhra Pradesh coast on 17th.

During pre-monsoon season, apart from the storms described above, two depression formed over north Indian Ocean (one in the month of March and the other in the month of May).

During the monsoon season, ten low pressure systems (1 cyclonic storm, 1 Deep Depression, 4 Depressions, 2 well marked low pressure areas & 2 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.

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

The first intense system of the monsoon season formed as a Depression (10–11 June) over northeast Bay of Bengal and adjoining Bangladesh coast and dissipated over Bangladesh and neighbourhood. The second Depression (21-22 July) that formed over northwest Bay of Bengal and neighbourhood and dissipated over Jharakhand and neighbourhood. The third depressions which formed in the month of August(7-8 Aug), had origin over northwest Bay of Bengal and dissipated over Chhatisgarh. The fourth depression formed in the same month (15-17 Aug), had origin over northwest Bay of Bengal and dissipated over Madhya Pradesh. The last system formed as a Deep Depression in the month of September (6-7 Sep), had origin over northwest Bay of Bengal and dissipated over Chhattisgarh. Most of these depressions and the low pressure areas moved in a westerly/north-westerly direction across western, eastern, central parts of the country.

During the post monsoon season, apart from the storm mentioned above, two well marked low pressure aeas formed in the month of November. The tracks of these storms and depression formed during the year is shown in Fig.12(a) and Fig.12(b).

Frequency of depressions and cyclonic storms formed over the north Indian Ocean (1951-2018) during the monsoon and post-monsoon season is shown in figures.13 (a) and 13(b).

SIGNIFICANT WEATHER EVENTS

Snowfall reportedly claimed more than 18 lives from Jammu and Kashmir of which 11 were reportedly claimed dead on 5th Jan 2018. 279 persons were reported dead due to Cold Wave during 2-14 Jan. Of these, 135 persons were reported from Uttar Pradesh and 121 from Bihar.

Dust Storm took a toll of 225 lives throughout the country. Of this 150 were reported from Uttar Pradesh during the period 6 May to 13 Jun, 74 from Rajasthan and one from Madhya Pradesh.

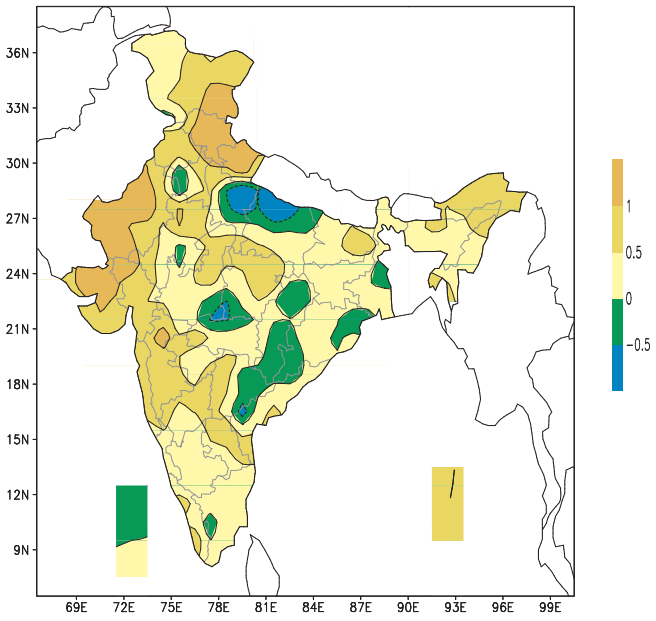
Lightning reportedly claimed over 198 lives from different parts of the country. Of these, 74 deaths were reported from Uttar Pradesh, 61 in Odisha, 16 in Madhya Pradesh, 11 each from Maharashtra and Rajasthan.

Thunderstorm reportedly claimed over 496 lives throughout the country during pre monsoon season Jun and July, of which 87 were reported dead from Andhra Pradesh, 121 from Jharkhand and 163 from Jharkhand.

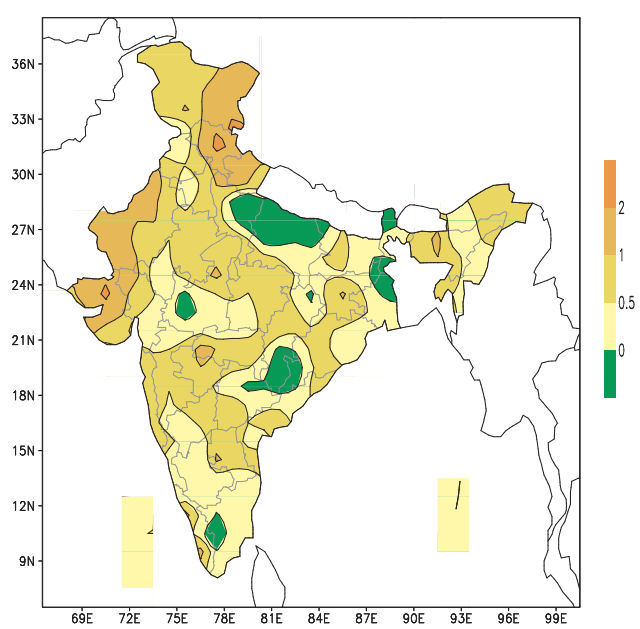
Heavy Rain & Flood related incidents during the monsoon season claimed at least 612 lives from different parts of the country. Of these,149 persons were reported dead from Kerala and 189 persons from Uttar Pradesh. 77 lives were claimed dead due to Cyclone (SCS) “TITLI” during 12th to 14th October. 45 lives reported dead due to Cyclone (SCS) “GAJA” during 10th to 17th November.

Significant weather events during 2018 and associated loss of lives are shown in Fig.16

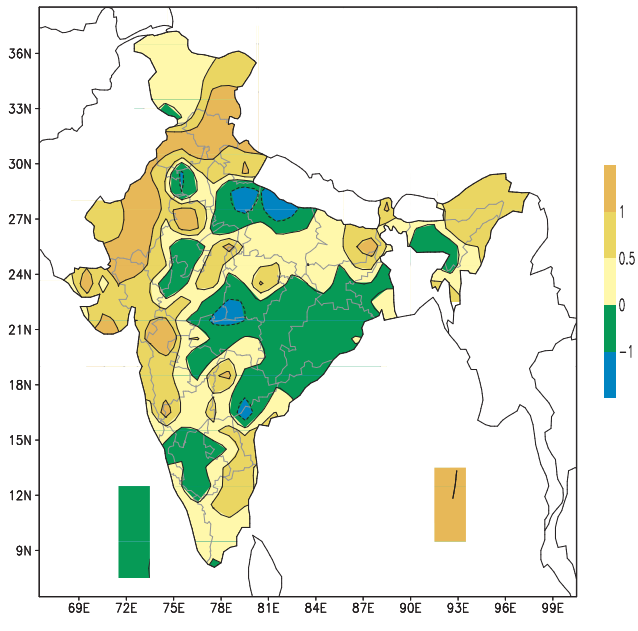
The highest maximum & lowest minimum temperature and highest rainfall in 24 hours recorded over a station during the year 2018 with the dates of occurrences are given in Table 2.



(a) MEAN



(b) MAXIMUM



(c) MINIMUM

FIG. 1 : ANNUAL TEMPERATURE ANOMALIES (°C) FOR 2018 WITH RESPECT TO 1981 - 2010 AVERAGE

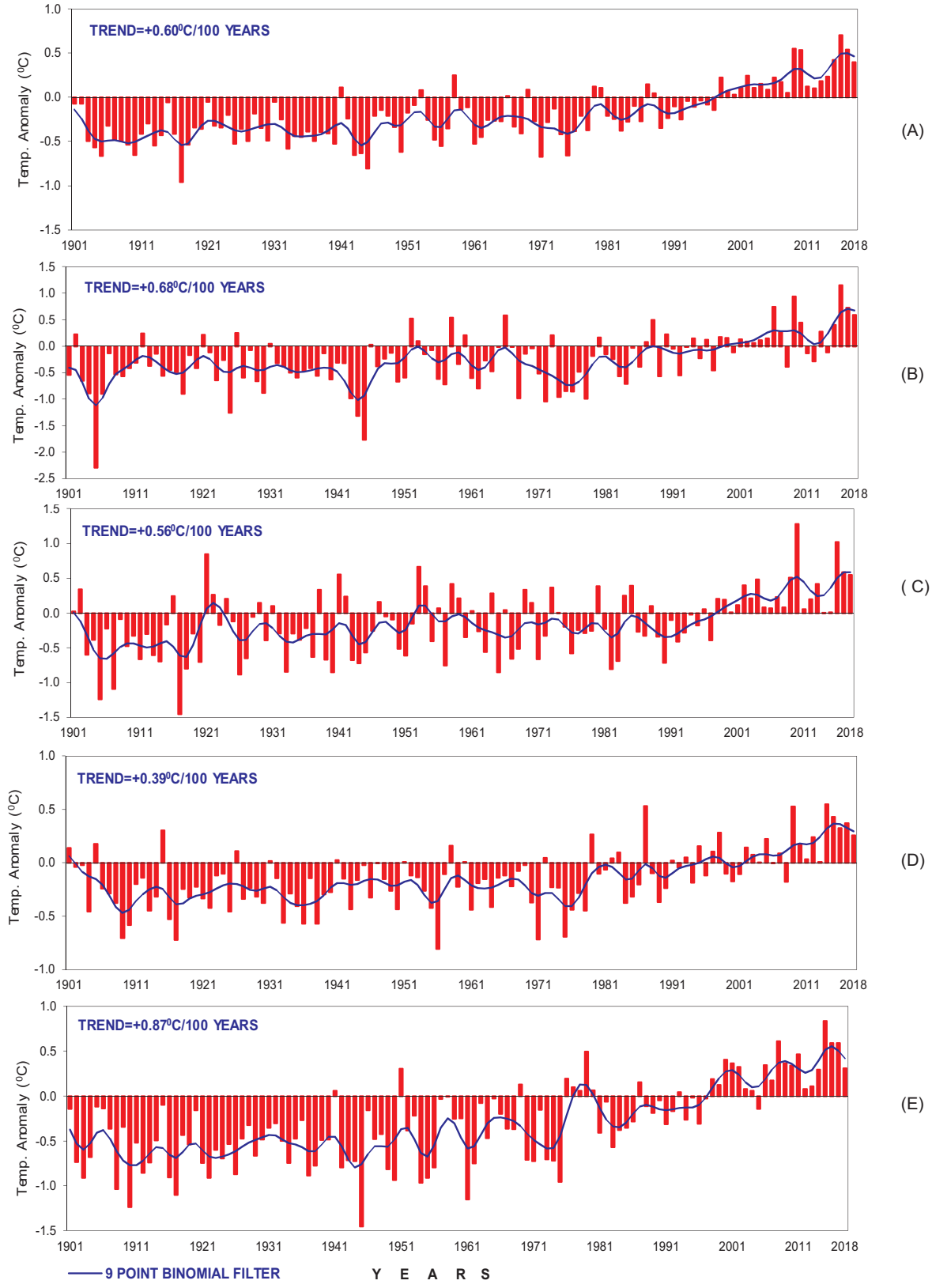


FIG. 2 : ALL INDIA MEAN TEMPERATURE ANOMALIES (A) ANNUAL, (B) WINTER, (C) PRE MONSOON, (D) MONSOON AND (E) POST MONSOON FOR THE PERIOD 1901 - 2018 SHOWN AS VERTICAL BARS. THE SOLID BLUE CURVE HAD SUB-DECADAL TIME SCALE VARIATIONS SMOOTHED WITH A BINOMIAL FILTER
(DEPARTURES FROM THE 1981 - 2010 AVERAGE)

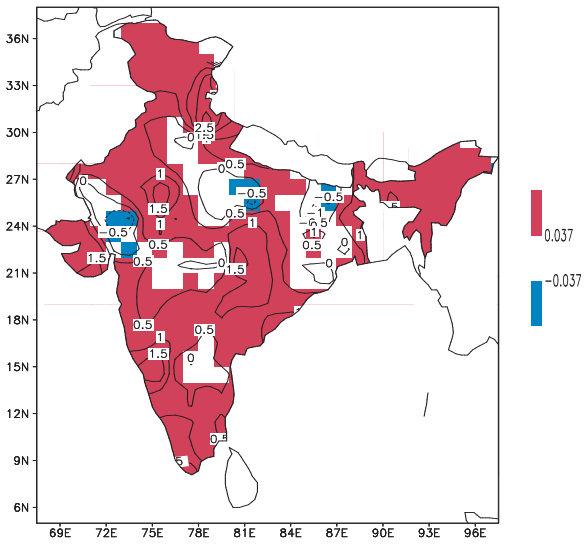
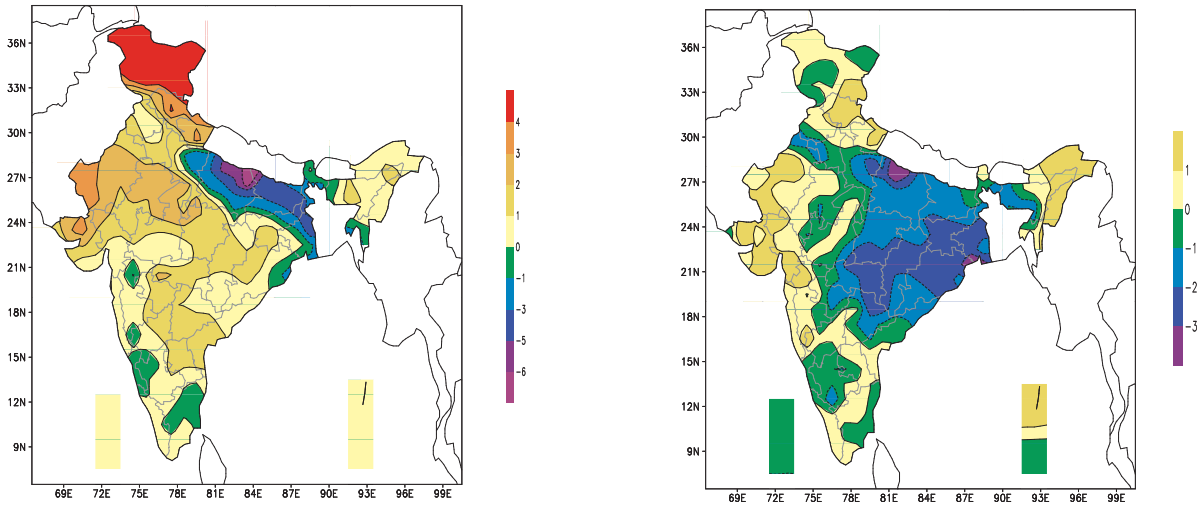


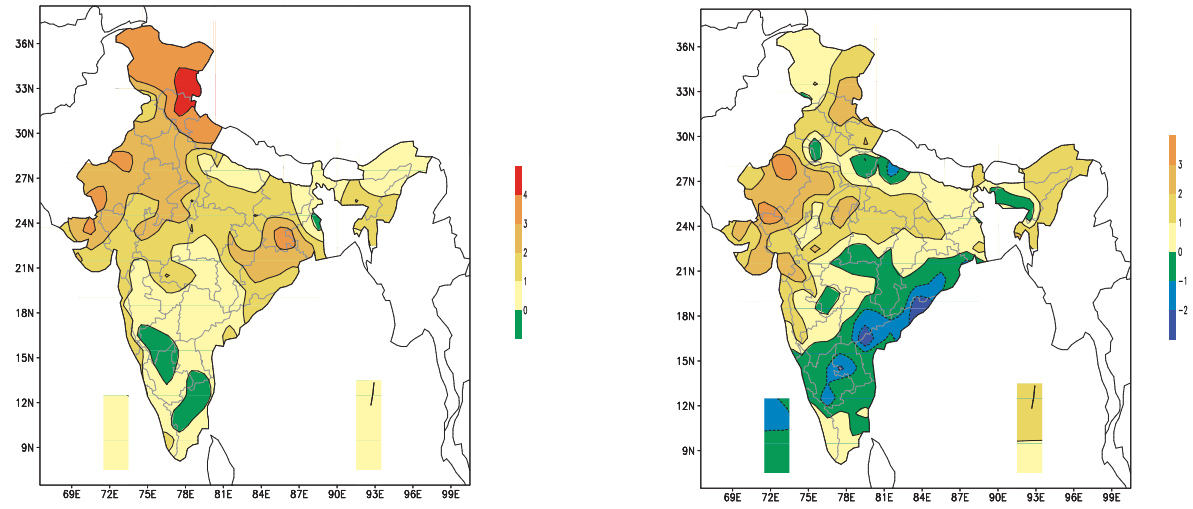
FIG. 3 : ANNUAL MEAN ANOMALY TEMPERATURE TRENDS (°C / 100 YEARS) ARE SHOWN AS CONTOUR LINES. THE TRENDS SIGNIFICANT AT 95% LEVEL ARE SHADED. POSITIVE TRENDS ARE SHOWN IN RED WHILE THE NEGATIVE TRENDS ARE SHOWN IN BLUE. PERIOD OF ANALYSIS : 1901 - 2018

JANUARY



MAXIMUM **MINIMUM**

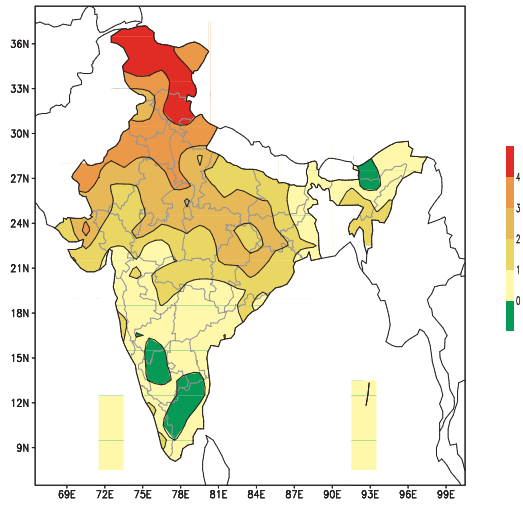
FEBRUARY



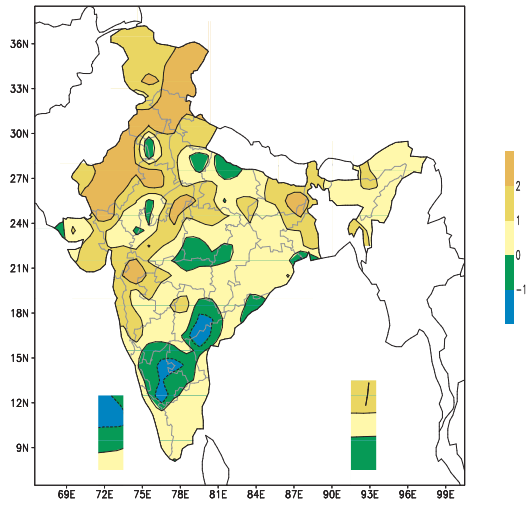
MAXIMUM **MINIMUM**

FIG. 4 : MONTHLY MEAN MAXIMUM AND MINIMUM TEMPERATURE ANOMALIES(°C) IN 2018 WITH RESPECT TO 1981 - 2010 AVERAGE

MARCH

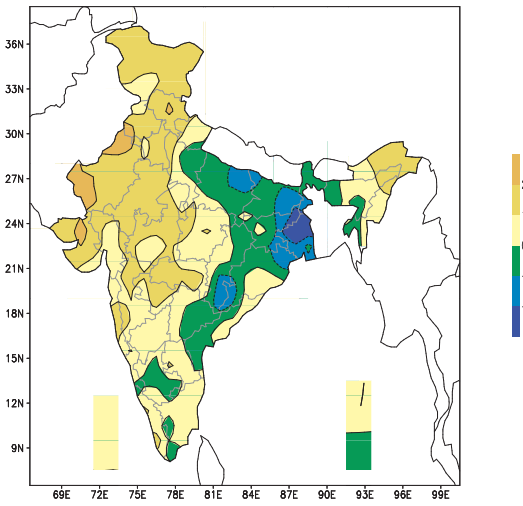


MAXIMUM

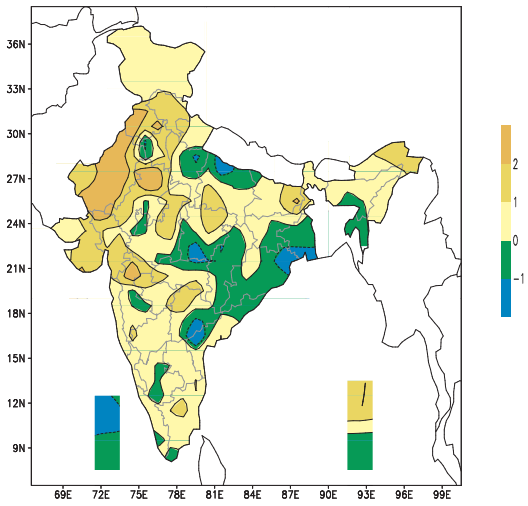


MINIMUM

APRIL

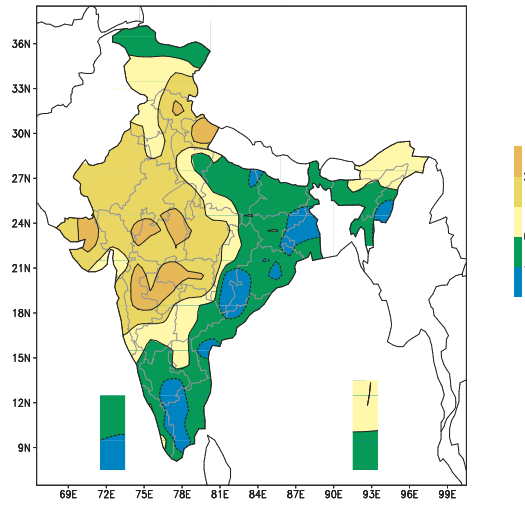


MAXIMUM

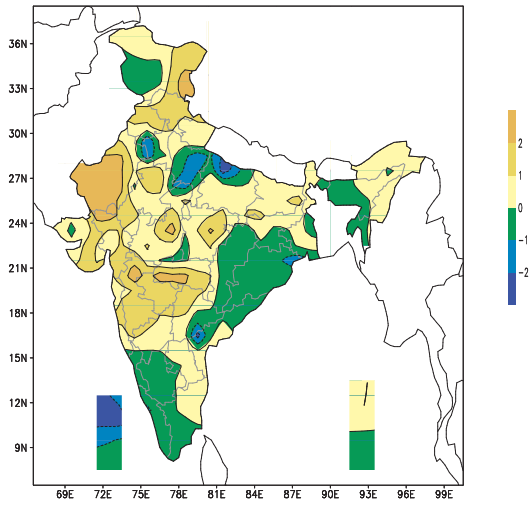


MINIMUM

MAY



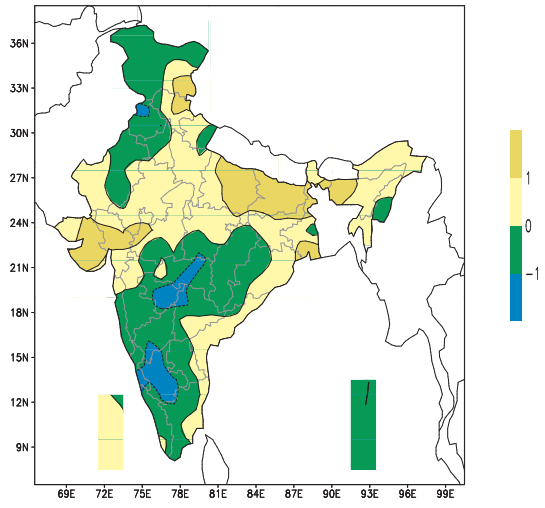
MAXIMUM



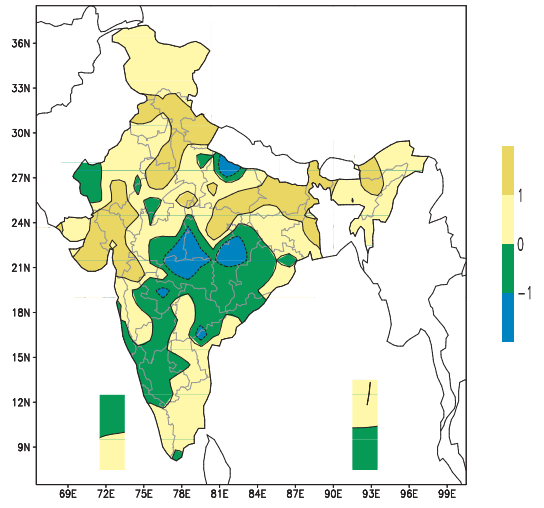
MINIMUM

FIG. 4 : Contd...

JUNE

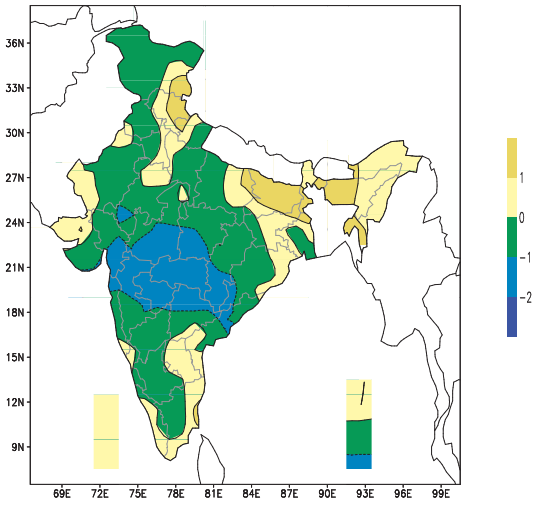


MAXIMUM

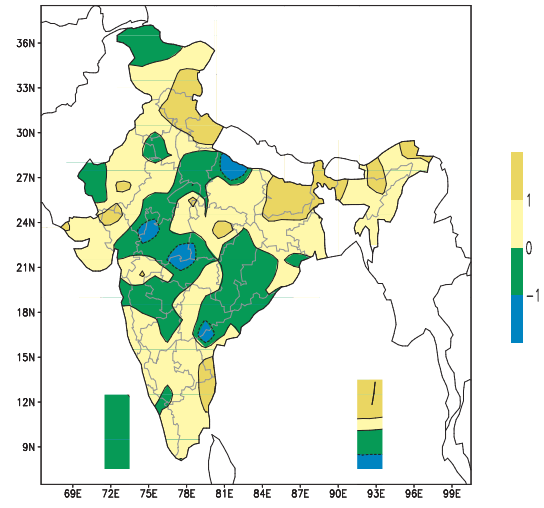


MINIMUM

JULY

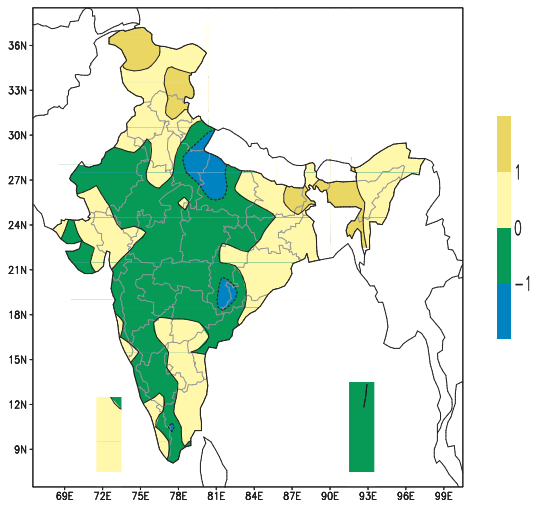


MAXIMUM

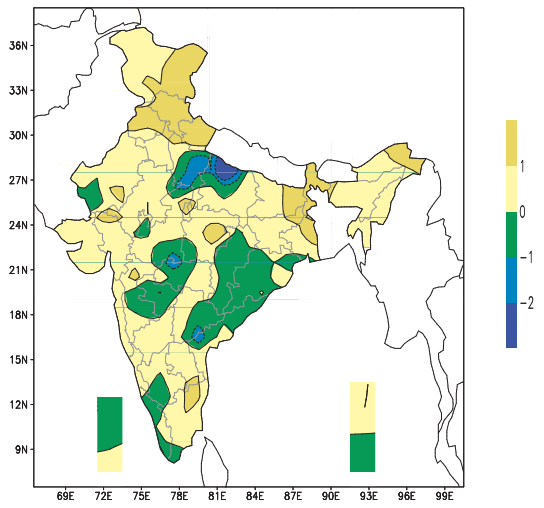


MINIMUM

AUGUST



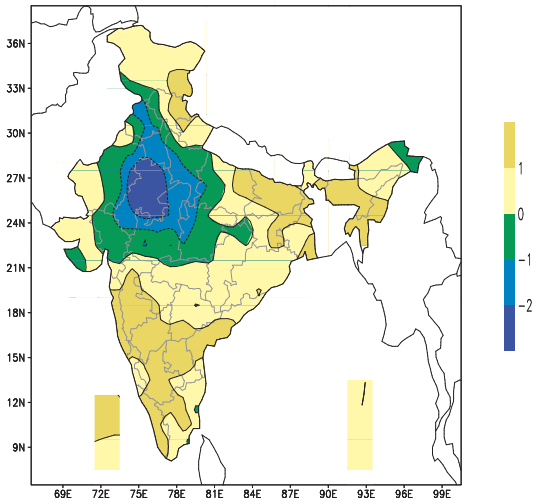
MAXIMUM



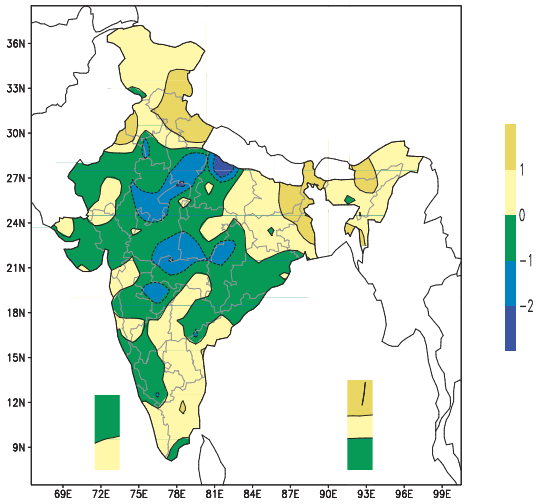
MINIMUM

FIG. 4 : Contd..

SEPTEMBER

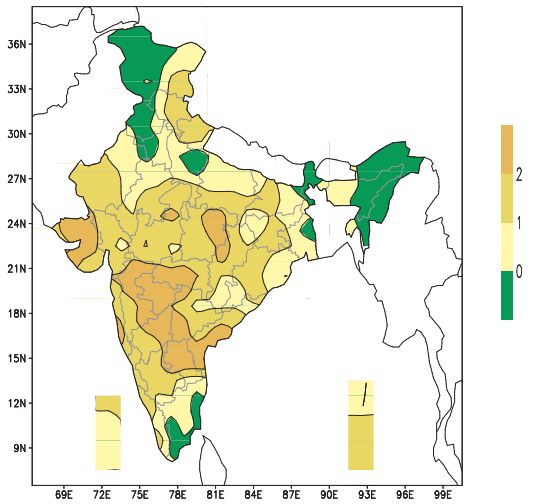


MAXIMUM

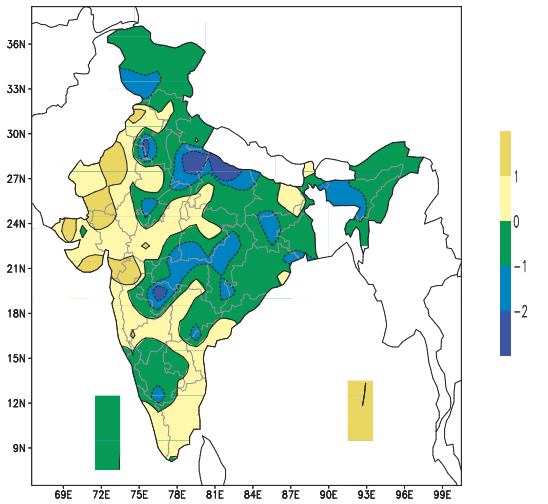


MINIMUM

OCTOBER

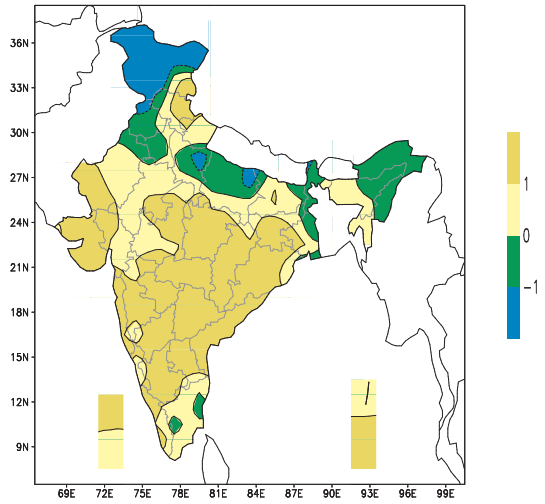


MAXIMUM

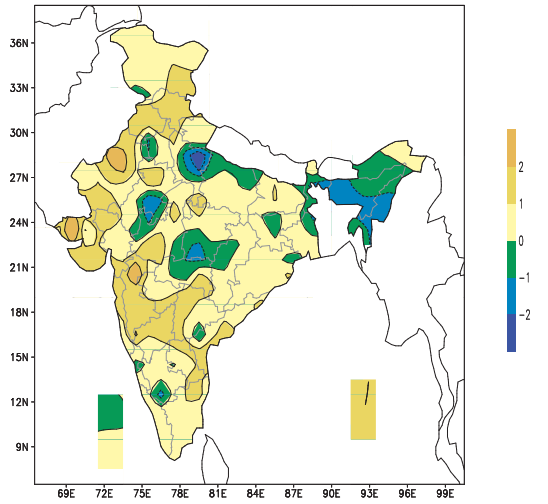


MINIMUM

NOVEMBER



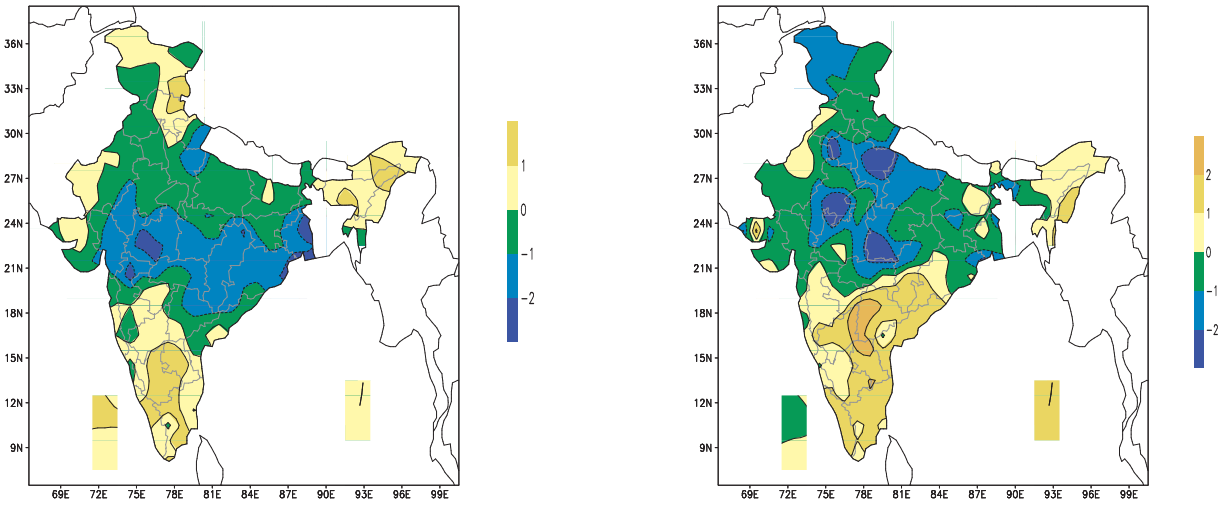
MAXIMUM



MINIMUM

FIG. 4 : Contd..

DECEMBER



MAXIMUM **MINIMUM**

FIG. 4 : Contd..

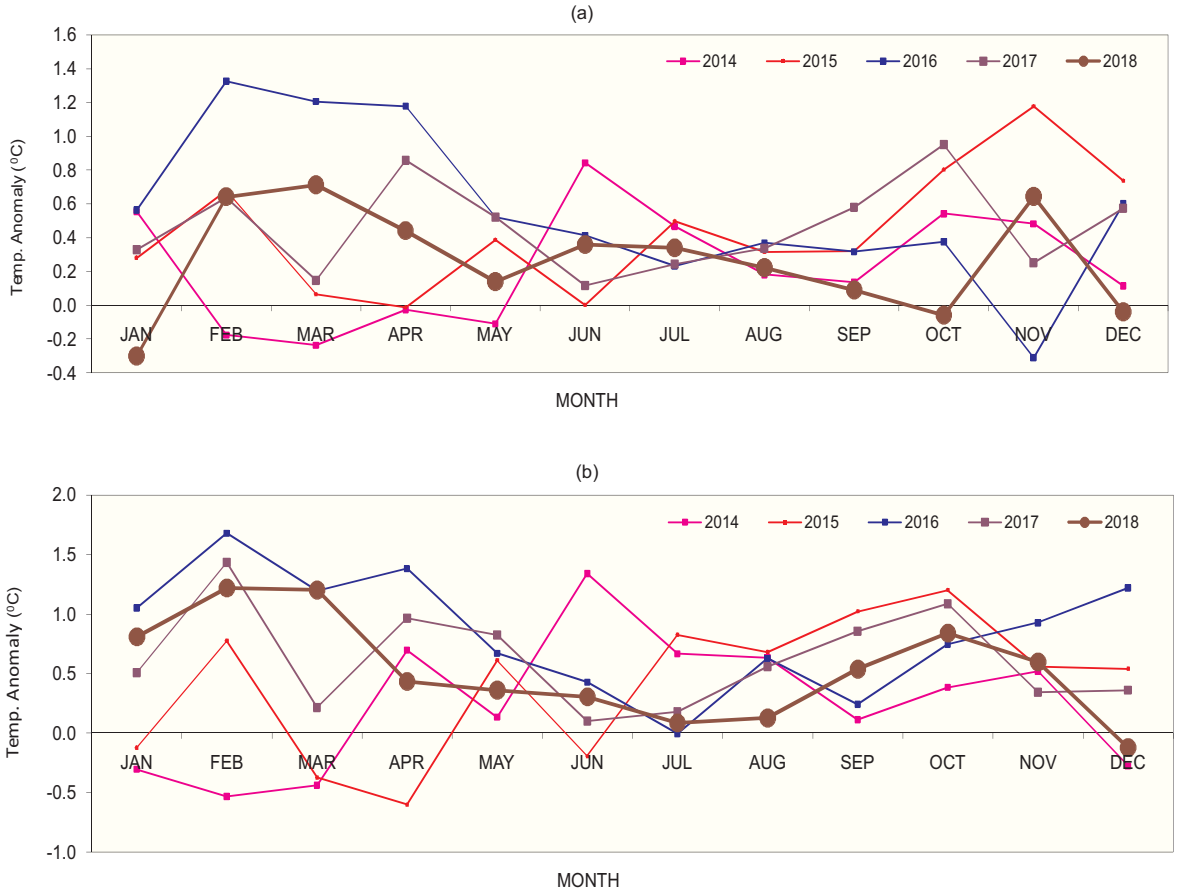


FIG. 5 : MEAN MONTHLY (a) MINIMUM AND (b) MAXIMUM TEMPERATURE ANOMALIES (2014 - 2018)

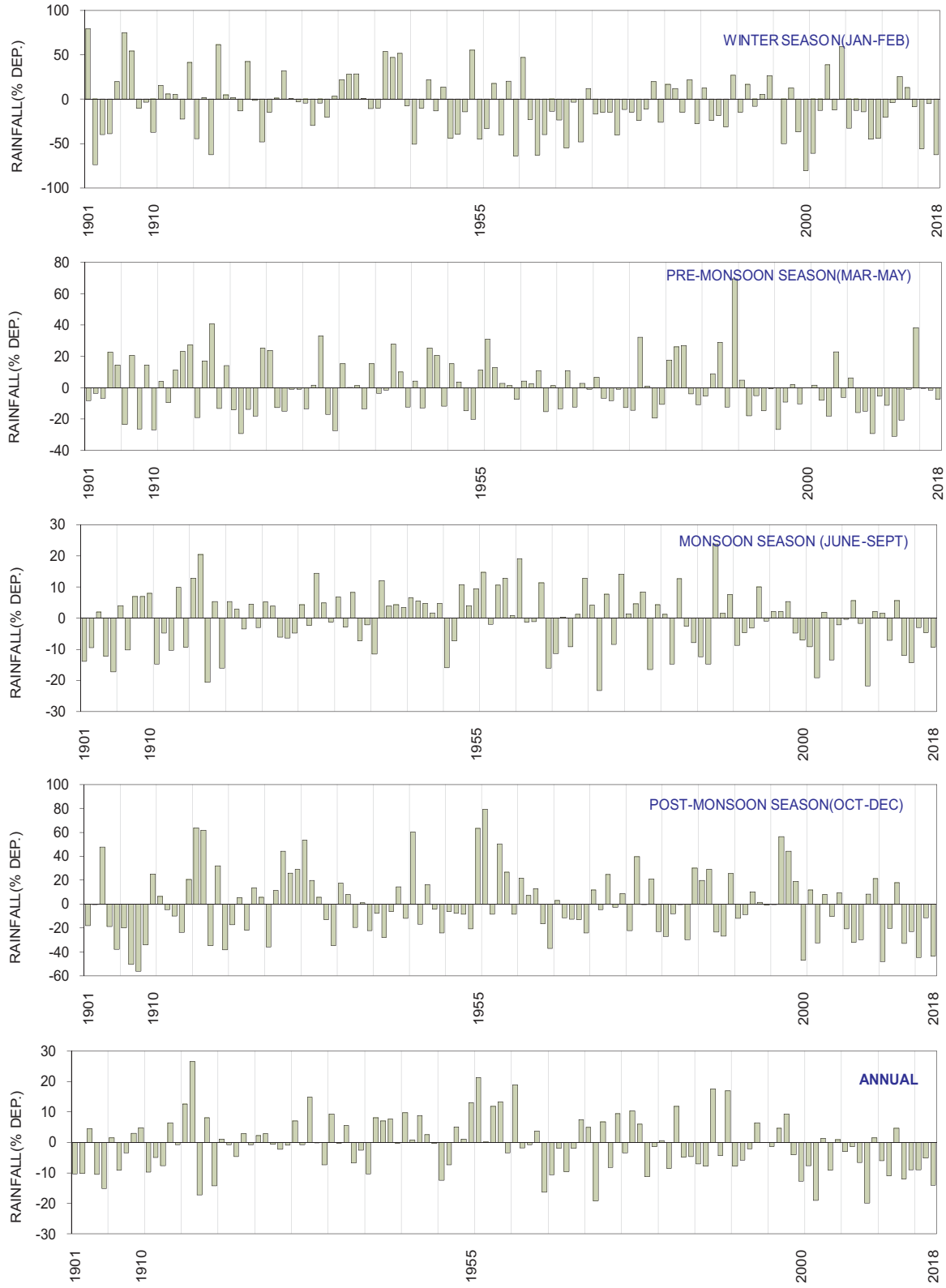
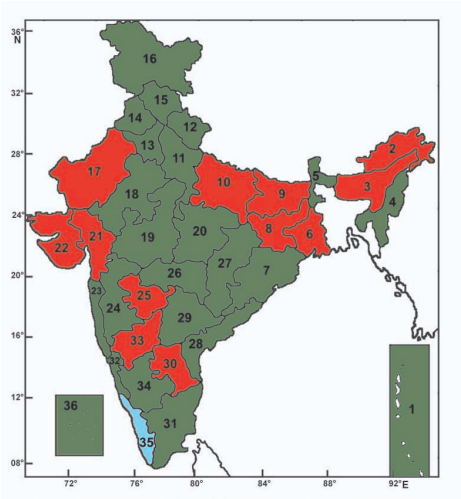
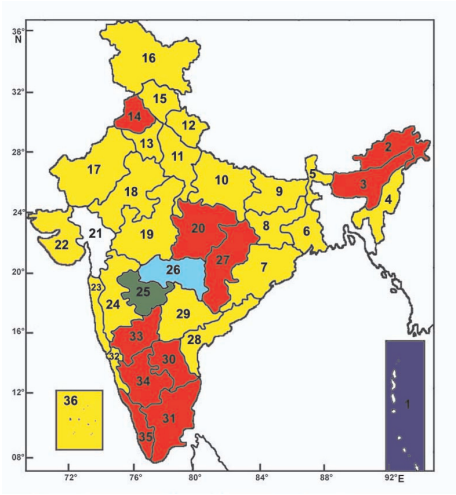


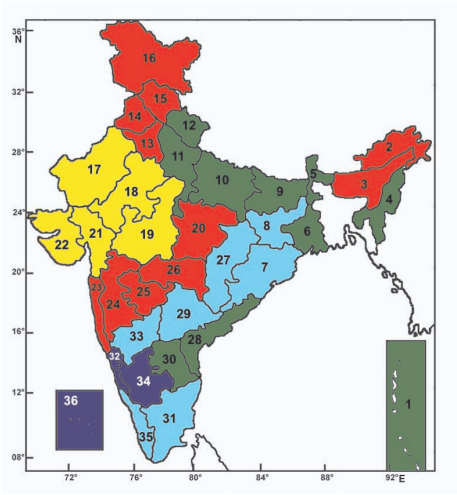
FIG. 6 : PERCENTAGE DEPARTURE OF AREA WEIGHTED SEASONAL AND ANNUAL RAINFALL OVER THE COUNTRY AS A WHOLE (1901-2018)



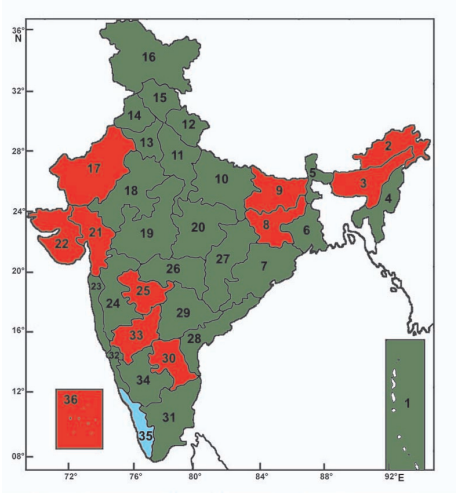
ANNUAL



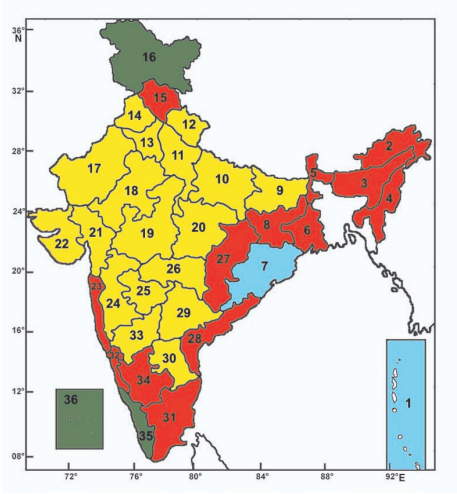
WINTER



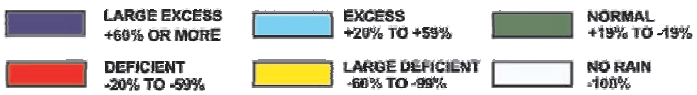
PRE-MONSOON



MONSOON



POST-MONSOON



(Figures indicates subdivision numbers)

FIG. 7 : SUB-DIVISIONWISE ANNUAL & SEASONAL RAINFALL PERCENTAGE DEPARTURES

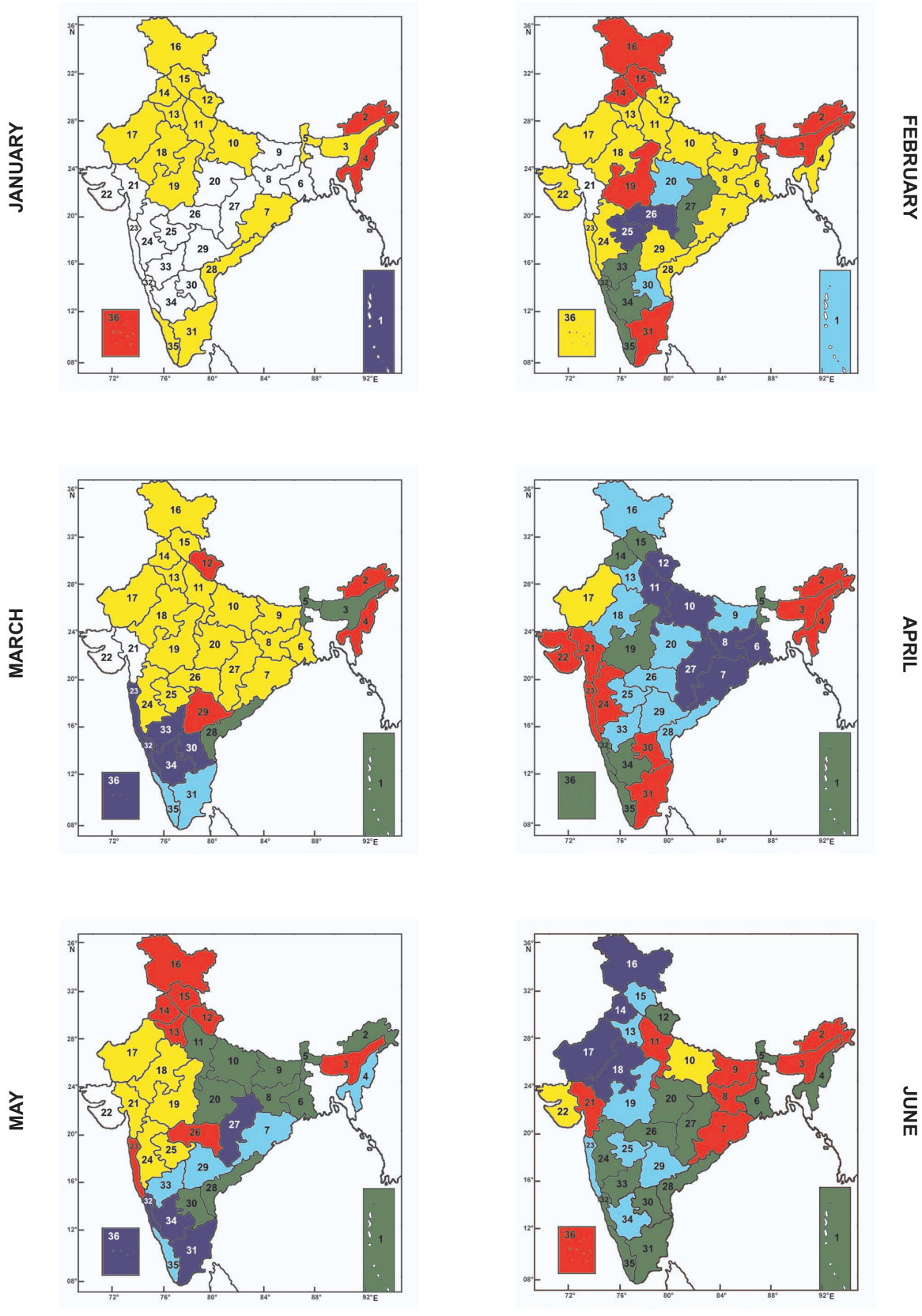


FIG.8 : SUB-DIVISIONWISE MONTHLY RAINFALL PERCENTAGE DEPARTURES FOR 2018

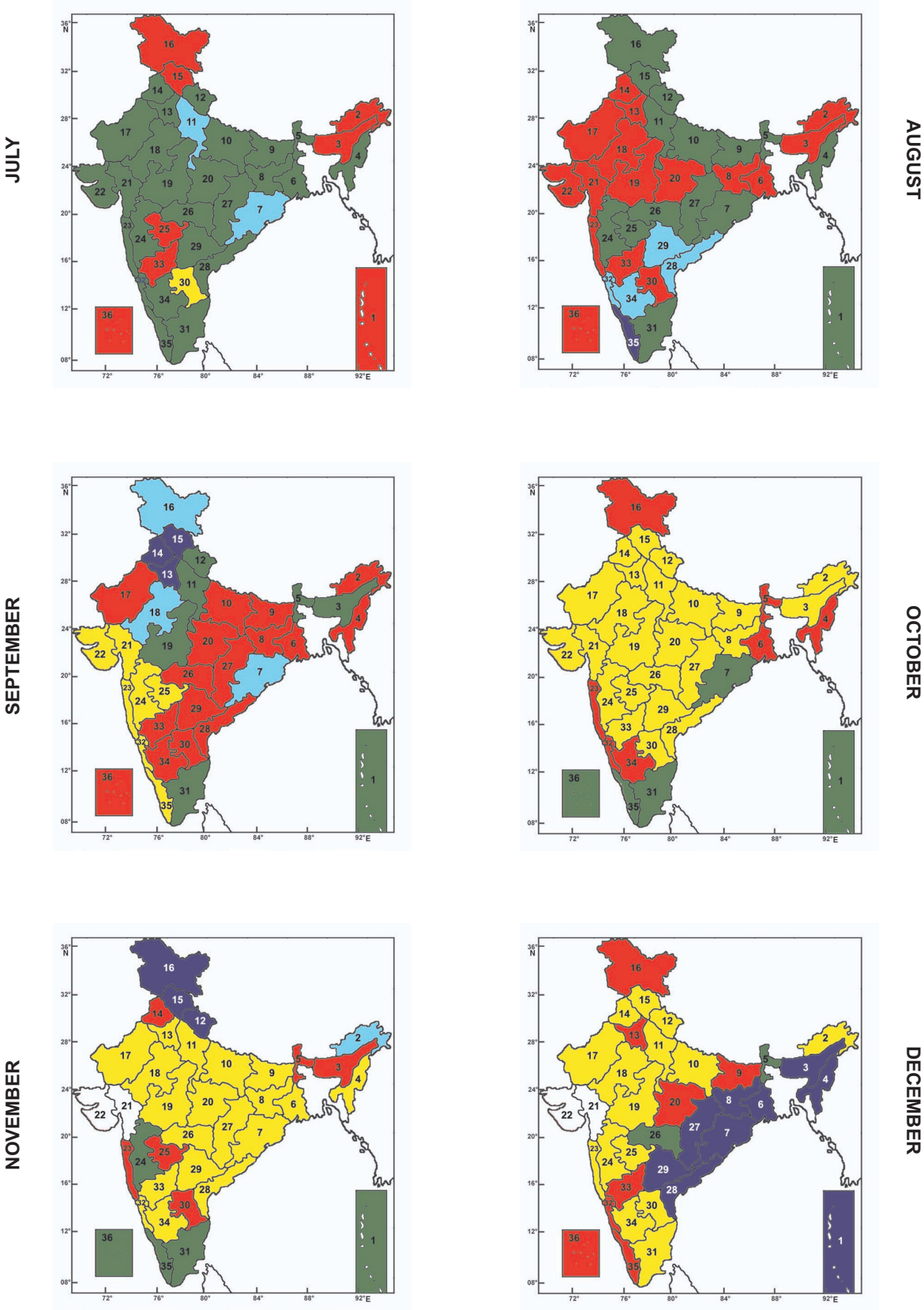

JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
LARGE EXCESS +60% OR MORE
EXCESS +20% TO +59%
NORMAL +19% TO -19%
DEFICIENT -20% TO -59%
LARGE DEFICIENT -60% TO -99%
NO RAIN -100%

FIG.8 : Contd.....

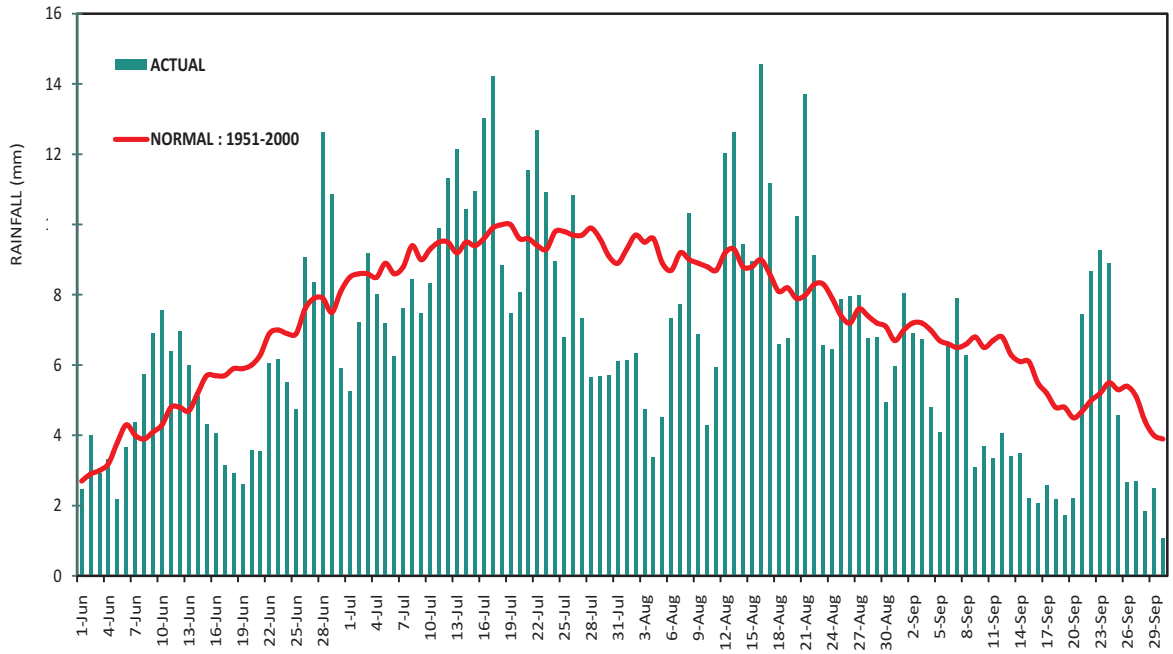


FIG. 9 : DAILY AREA WEIGHTED RAINFALL (mm) OVER THE COUNTRY AS A WHOLE (VERTICAL BARS) AND ITS LONG TERM AVERAGE (1951-2000) (CONTINUOUS LINE) 1 JUNE - 30 SEPTEMBER 2018

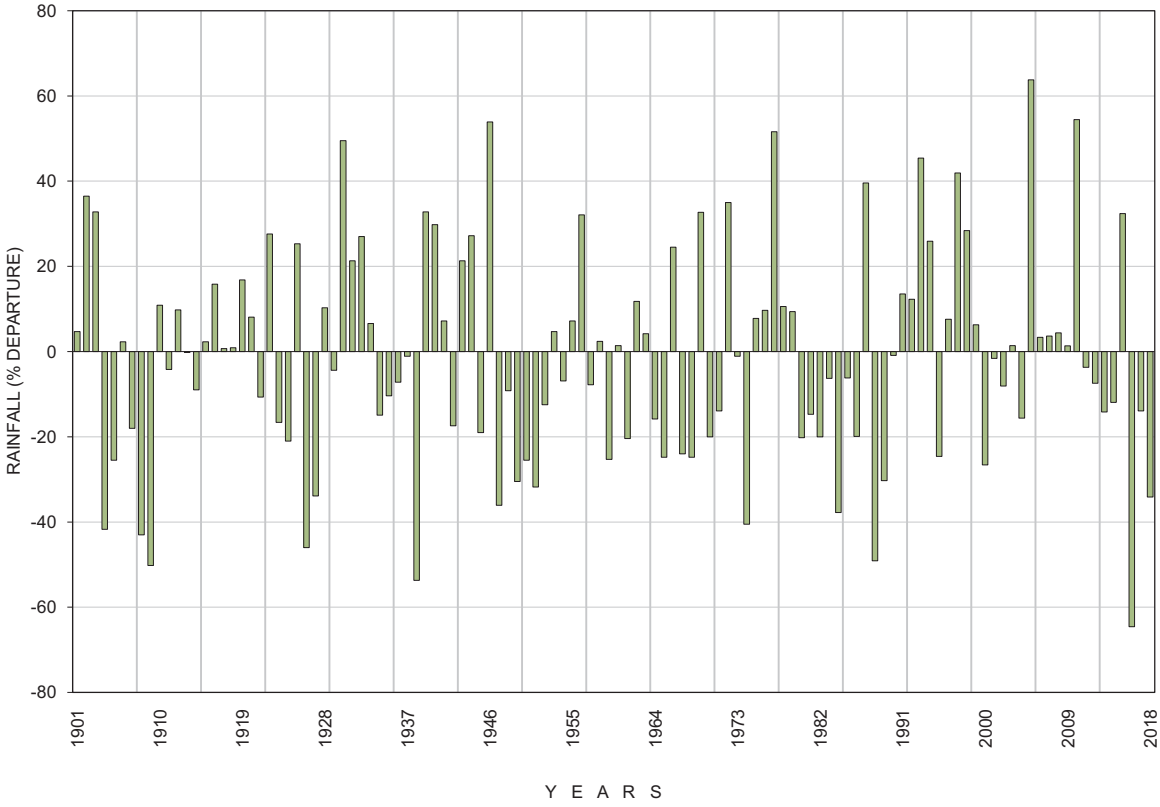


FIG. 10 : PERCENTAGE DEPARTURE OF RAINFALL DURING THE POST-MONSOON SEASON (OCTOBER TO DECEMBER) OVER THE SOUTH PENINSULA (1901-2018)

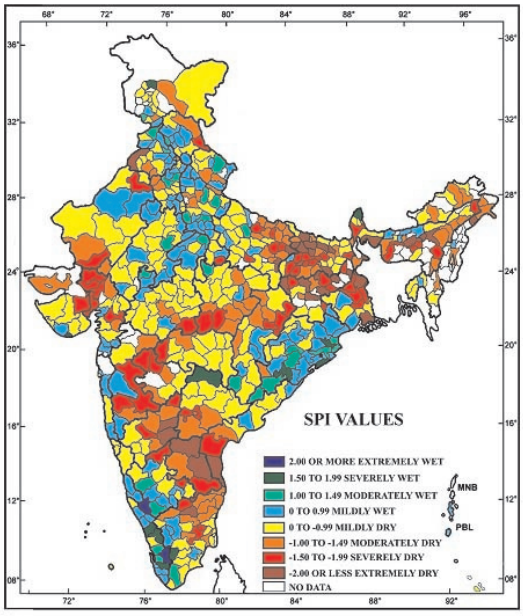
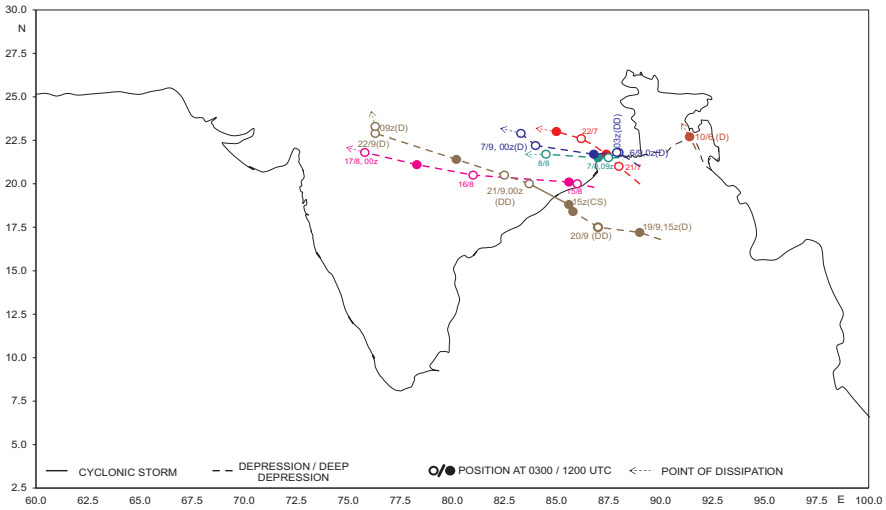
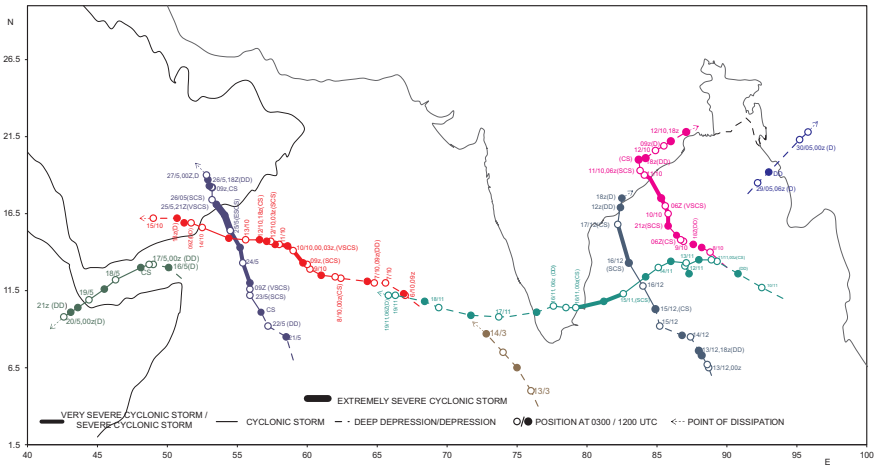


FIG. 11 : STANDARDIZED PRECIPITATION INDEX JAN - DEC 2018

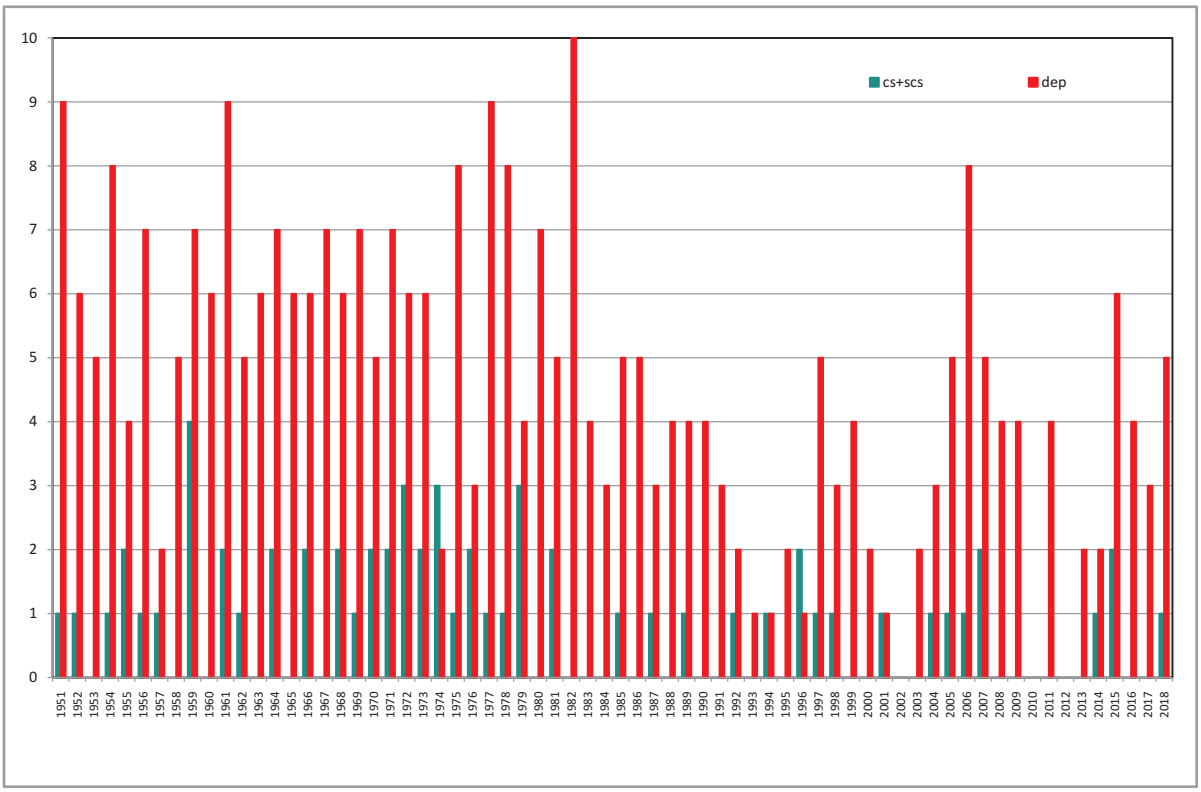


(a)

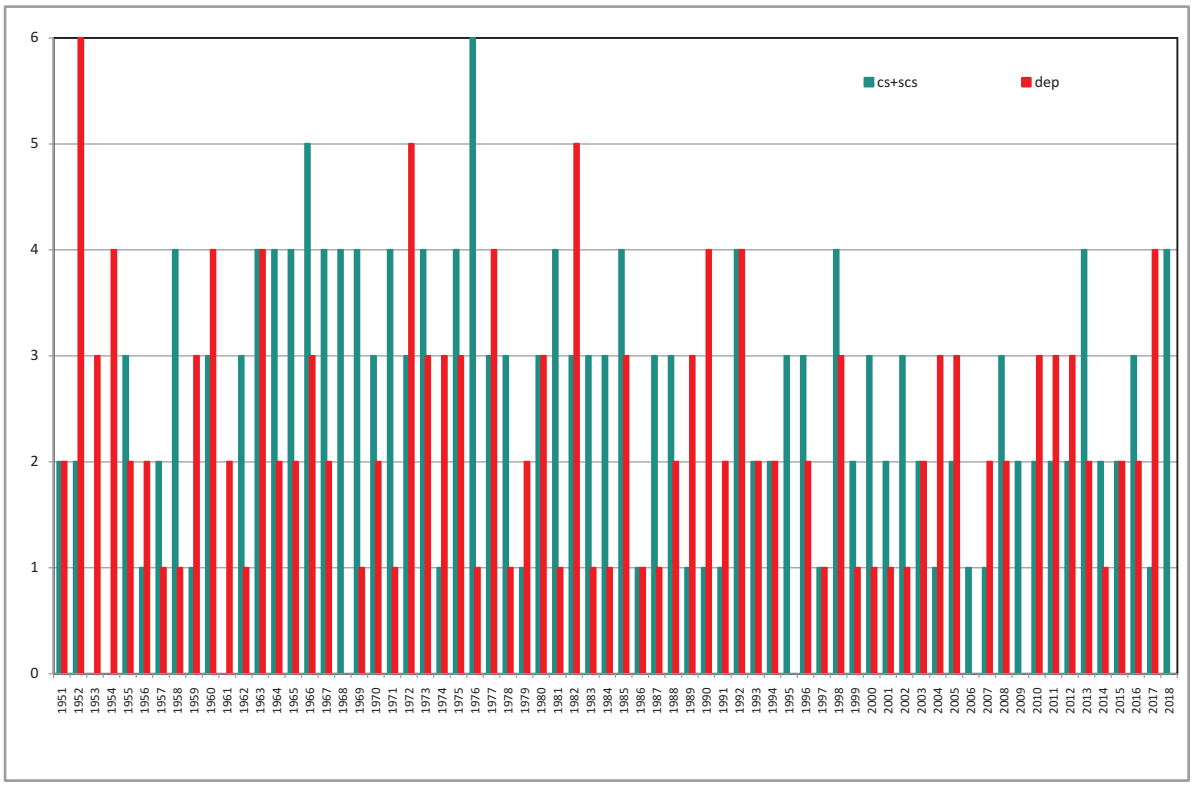


(b)

FIG. 12 : TRACKS OF DEPRESSIONS AND CYCLONIC STORMS FORMED DURING 2018
a) MONSOON SEASON b) OTHER SEASONS



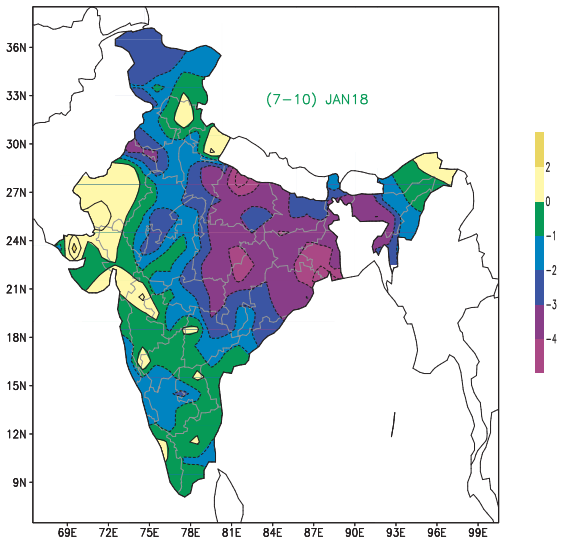
(a) MONSOON SEASON (JUNE TO SEPTEMBER)



(b) POST MONSOON SEASON (OCTOBER TO DECEMBER)

FIG. 13 : FREQUENCY OF DEPRESSIONS AND CYCLONIC STORMS FORMED OVER THE NORTH INDIAN OCEAN (1951-2018)

(a) 7 - 10 JANUARY 2018



(b) 27 - 31 DECEMBER 2018

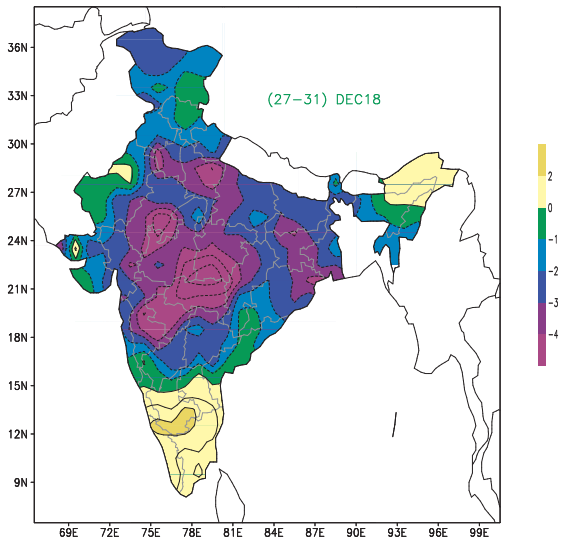
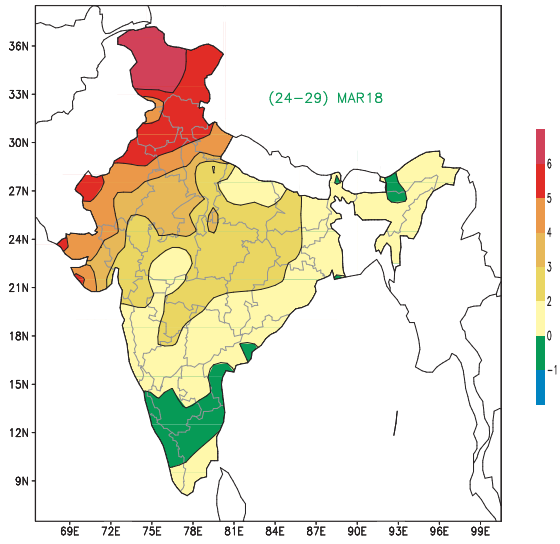


FIG. 14: MINIMUM TEMPERATURE ANOMALY (°C) DURING THE COLD WAVE PERIOD
(WITH RESPECT TO 1981 - 2010 AVERAGE)

(a) 24 - 29 MARCH 2018



(b) 18 - 22 JUNE 2018

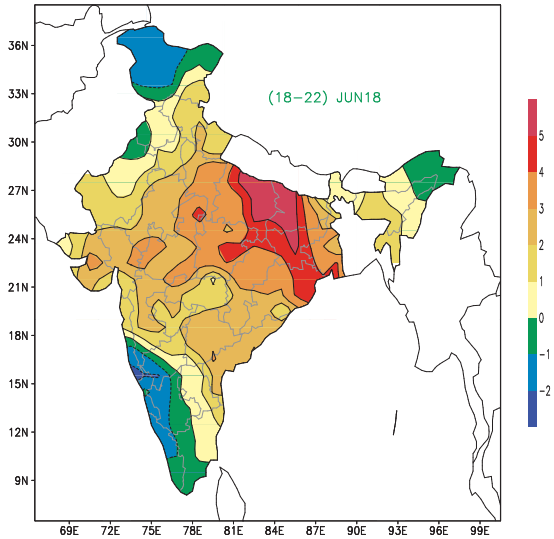


FIG. 15: MAXIMUM TEMPERATURE ANOMALY (°C)DURING THE HEAT WAVE PERIOD
(WITH RESPECT TO 1981 - 2010 AVERAGE)

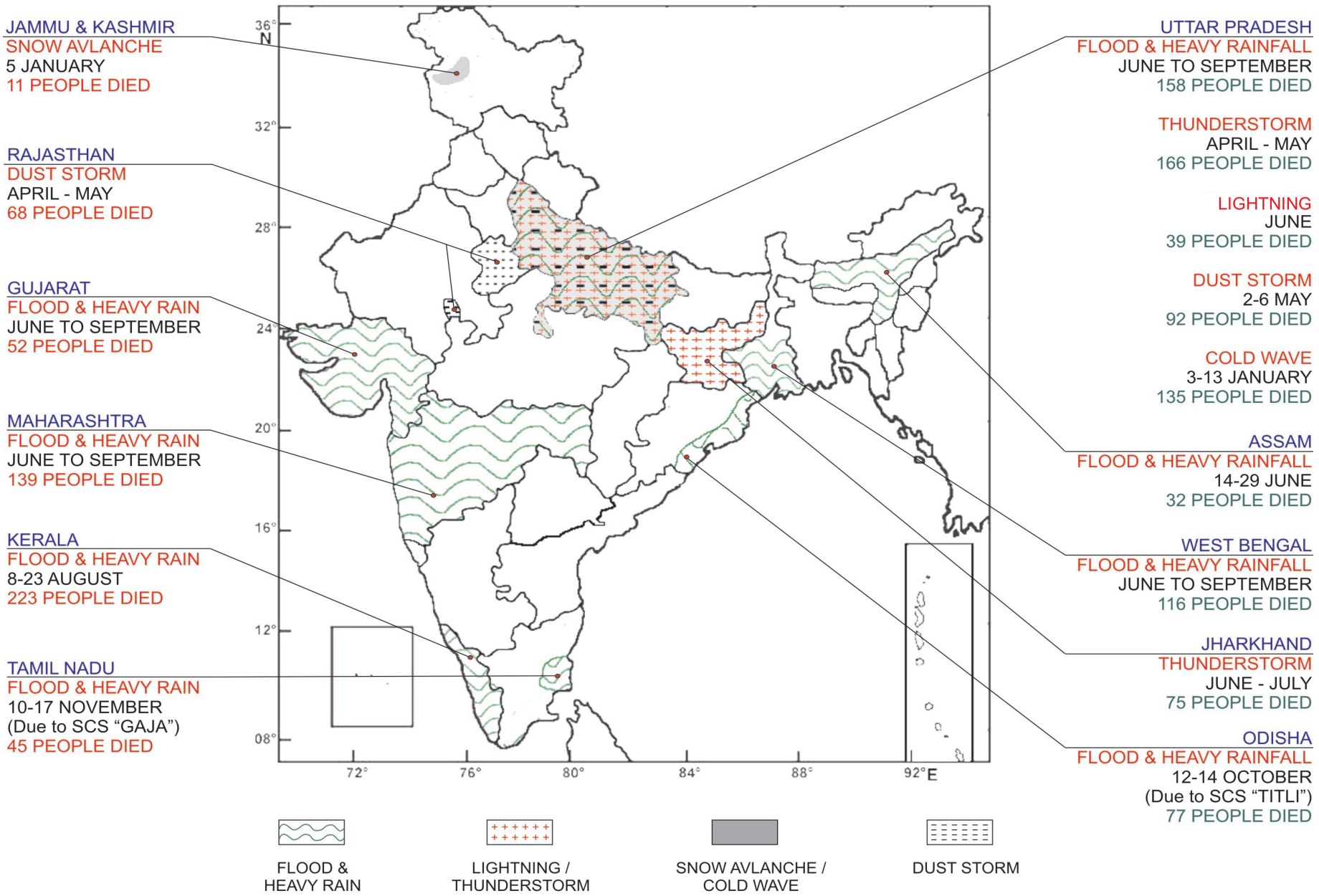


FIG.16 : SIGNIFICANT WEATHER EVENTS DURING 2018

TABLE - 1

METEOROLOGICAL SUB-DIVISION WISE SEASONAL AND ANNUAL RAINFALL STATISTICS FOR THE YEAR 2018 BASED ON UPDATED DATA

		winter updated			premonsoon updated			monsoon updated			post monsoon updated			annual		
S.NO	SUB-DIVISION	ACT	NORMAL	%DEP	ACT	NORMAL	%DEP	ACT	NORMAL	%DEP	ACT	NORMAL	%DEP	ACT	NORMAL	%DEP
1	A & N ISLANDS	203.5	82.9	145	483.9	465.0	4	1569.2	1682.5	-7	856.9	695.9	23	3113.4	2926.3	6
2	ARUNACHAL PRADESH	98.6	148.1	-33	577.2	750.4	-23	1198.5	1768.0	-32	133.1	267.2	-50	2007.4	2933.7	-32
3	ASSAM &MEGHALAYA	23.0	46.9	-51	466.7	590.2	-21	1320.7	1792.8	-26	89.2	195.0	-54	1899.6	2624.9	-28
4	NAG.,MANI.,MIZO.,TRIP	12.7	44.0	-71	528.0	494.1	7	1215.6	1496.9	-19	116.2	243.0	-52	1872.5	2278.0	-18
5	S.H.W.B.&SIKKIM	16.9	60.3	-72	476.7	457.1	4	1768.3	2006.2	-12	93.4	185.3	-50	2355.3	2708.9	-13
6	GANGATIC W.B.	2.2	34.4	-94	170.2	164.8	3	959.2	1167.9	-18	94.3	160.1	-41	1225.9	1527.2	-20
7	ORISSA	0.4	31.8	-99	162.0	134.7	20	1290.1	1149.9	12	177.6	144.1	23	1630.0	1460.5	12
8	JHARKHAND	3.8	33.4	-88	106.5	79.4	34	785.0	1091.9	-28	52.3	91.6	-43	947.6	1296.3	-27
9	BIHAR	0.4	23.0	-98	67.4	77.5	-13	770.8	1027.6	-25	22.0	77.5	-72	860.6	1205.6	-29
10	EAST U.P.	4.8	28.9	-84	34.3	31.7	8	758.5	897.6	-15	0.4	60.4	-99	798.0	1018.6	-22
11	WEST U.P.	6.7	33.3	-80	26.7	29.1	-8	776.1	769.4	1	7.6	54.4	-86	817.1	886.2	-8
12	UTTARANCHAL	33.7	106.2	-68	137.2	156.0	-12	1196.1	1229.1	-3	25.1	89.6	-72	1392.2	1580.9	-12
13	HAR., CHANDI., DELHI	10.4	32.9	-68	22.0	34.2	-36	443.3	466.3	-5	9.9	29.4	-66	485.7	562.8	-14
14	PUNJAB	24.1	49.5	-51	25.2	53.5	-53	569.1	491.9	16	10.6	41.0	-74	629.0	635.9	-1
15	HIMACHAL PRADESH	55.5	195.5	-72	143.2	244.9	-42	926.9	825.3	12	56.4	108.2	-48	1182.1	1373.9	-14
16	JAMMU & KASHMIR	80.0	212.9	-62	242.7	326.0	-26	589.1	534.6	10	128.7	131.8	-2	1040.5	1205.3	-14
17	WEST RAJASTHAN	0.3	7.4	-97	4.9	19.1	-75	201.8	263.2	-23	0.5	9.5	-95	207.4	299.2	-31
18	EAST RAJASTHAN	0.2	10.5	-98	6.9	17.4	-60	635.3	615.8	3	2.2	27.6	-92	644.5	671.3	-4
19	WEST M.P.	3.5	13.6	-74	4.6	13.5	-66	837.6	876.1	-4	2.1	53.1	-96	847.8	956.3	-11
20	EAST M.P.	19.7	35.3	-44	14.7	25.1	-41	919.1	1051.2	-13	7.9	57.8	-86	961.5	1169.4	-18
21	GUJARAT REGION	0.0	1.0	-100	0.18	6.7	-97	695.8	914.7	-24	0.5	34.5	-99	696.5	956.9	-27
22	SAURASHTRA & KUTCH	0.001	0.3	-99.5	0.1	4.0	-96	316.0	477.5	-34	0.9	29.5	-97	317.0	511.3	-38
23	KONKAN & GOA	0.0	0.1	-99	24.3	37.2	-35	2878.4	2914.7	-1	73.6	149.1	-51	2976.3	3101.1	-4
24	MADHYA M'RASHTRA	0.1	1.9	-94	15.8	37.8	-58	660.3	729.3	-9	42.7	107.8	-60	719.0	876.8	-18
25	MARATHAWADA	6.9	6.8	2	15.3	30.3	-50	538.1	682.9	-21	19.7	101.6	-81	580.0	821.6	-29
26	VIDARBHA	20.6	17.2	20	17.9	30.9	-42	875.4	954.6	-8	10.0	81.8	-88	923.9	1084.5	-15
27	CHATTISGARH	12.3	20.8	-41	59.8	46.8	28	1104.1	1153.3	-4	35.6	78.0	-54	1211.9	1298.9	-7
28	COASTAL A.P.	0.2	18.7	-99	97.0	97.0	0	586.9	581.1	1	**149.3**	**327.4**	-54	833.4	1024.2	-19
29	TELANGANA	2.1	11.9	-83	69.3	56.3	23	732.9	759.2	-3	41.7	118.6	-65	845.9	946.0	-11
30	RAYALASEEMA	4.6	6.6	-30	88.1	82.0	7	253.1	398.3	-36	**83.8**	**219.2**	-62	429.6	706.1	-39
31	TAMIL NADU	16.8	30.9	-46	158.6	128.1	24	290.7	317.2	-8	**336.0**	**438.2**	-23	802.2	914.4	-12
32	COASTAL KARNATAKA	0.2	0.9	-81	327.5	178.8	83	3060.2	3083.8	-1	180.3	262.8	-31	3568.2	3526.3	1
33	N.I.KARNATAKA	1.9	3.9	-52	122.8	85.1	44	356.5	506.0	-30	50.3	145.3	-65	531.5	740.3	-28
34	S.I.KARNATAKA	3.1	4.4	-29	233.7	145.2	61	685.6	660.0	4	**121.2**	**209.6**	-42	1043.6	1019.2	2
35	KERALA	17.1	24.3	-30	521.8	379.7	37	2516.1	2039.6	23	**464.0**	**480.7**	-3	3518.9	2924.3	20
36	LAKSHADWEEP	12.8	35.5	-64	595.8	232.4	156	541.7	998.5	-46	287.9	333.6	-14	1438.2	1600.0	-10

TABLE - 2

STATION WISE TEMPERATURE AND RAINFALL EXTREMES# FOR THE YEAR 2018

S.NO.	STATION NAME	MIN (°C)	DATE (MONTH_DATE)	MAX (°C)	DATE (MONTH_DATE)	HIGHEST 24 Hr. RAINFALL(mm)	DATE (MONTH_DATE)
1	Agartala AP	6.3	1_9	36.6	7_19	242.6	5_18
2	Cherrapunji*	1.8	1_28	30.3	8_19	281.7	6_14
3	Dibrugarh AP	7.2	12_31	38.0	6_10	123.2	7_17
4	Guwahati AP	6.9	1_8	38.4	6_10	94.5	8_28
5	Imphal AP	1.6	12_31	33.0	8_18,9_18	63.7	6_13
6	Passighat	9.5	1_1	38.4	7_20	150.8	7_2
7	Shillong*	-0.7	1_8,1_28	28.2	8_19	60.1	6_13
8	Tezpur	9.0	1_9	38.1	4_23	78.8	7_28
9	Baghdogra AP	1.9	1_8	38.4	7_19	154.6	9_10
10	Berhampore	7.0	1_8	39.2	6_18	83.0	9_3
11	Kolkata	10.5	1_8	40.6	6_18	162.6	6_26
12	Cooch Behar AP	3.9	1_8	37.9	6_10	212.2	6_22
13	Contai	6.8	1_10,1_15	41.2	6_18	251.8	9_21
14	Darjeeling*	-1.0	12_29	31.8	11_2	82.0	6_25
15	Gangtok*	2.1	1_8,12_29	26.8	7_19	86.6	6_12
16	Jalpaiguri	3.8	1_8	37.9	6_10	214.6	7_1
17	Kalimgpong*	3.5	12_29	30.0	6_6,6_10,7_19,8_19	94.0	8_3
18	Krishnanagar	6.0	1_9	39.6	6_18	67.8	6_2
19	Midnapore	8.6	1_7	40.4	6_15,6_18,6_19	80.0	9_21
20	Panagarh	5.2	1_7	41.4	6_18	103.2	7_10
21	Balasore	7.8	12_30	41.2	6_18	140.6	9_21
22	Bhubaneshwar AP	8.2	12_30	42.3	6_17,6_19	194.8	7_21
23	Chandbali	9.5	12_30	41.7	6_18	192.8	9_6
24	Gopalpur	11.6	12_30	36.8	10_3,10_7	99.2	5_1
25	Jharsugda AP	6.8	12_31	44.4	5_8	107.7	7_17
26	Puri	12.1	12_30	36.6	6_8,6_18	394.0	8_7
27	Sambalpur	7.3	12_30	43.8	5_9	567.0	7_22
28	Daltonganj	4.0	1_6	44.6	5_28	78.4	9_3
29	Gaya AP	2.7	12_30	44.6	5_26	92.4	8_13
30	Jamshedpur AP	5.3	12_28	42.1	6_17,6_18,6_20	112.4	8_6
31	Patna AP	4.7	1_5	43.0	6_16	132.1	7_29
32	Purnea	1.2	1_8	38.6	7_19	114.9	6_8
33	Ranchi AP	4.6	12_30	40.5	5_7,5_8	102.0	8_26
34	Allahabad AP	4.5	12_30	46.6	5_26	122.4	7_12
35	Bahraich	2.2	1_7	43.0	5_26	140.4	8_2
36	Bareilly	3.2	12_30	44.0	5_26	205.9	8_25
37	Dehar Dun	2.8	12_28	40.7	5_22	127.7	8_4
38	Gorakhpur	3.4	1_8	42.8	6_20	232.6	6_27
39	Jhansi	3.4	1_6	46.6	5_24,5_27,5_28	141.4	8_24
40	Lucknow AP	2.6	1_7	44.8	5_26	114.3	8_3
41	Mukteshwar**	-4.7	12_27	31.2	5_22	55.4	7_26
42	Varansai	4.6	1_7	44.6	5_26	97.0	7_30
43	Ambala	2.3	1_9	44.0	5_26	73.6	7_11
44	Chandigarh	1.8	1_6	43.8	5_22	77.7	9_23
45	Hissar	-1.0	12_26	46.6	5_29	61.3	9_24
46	Karnal	0.0	12_22	44.0	5_22,5_26	142.0	9_24
47	New Delhi AP	2.6	12_29	45.0	5_26	53.6	7_14
48	Amritsar AP	0.0	12_28	44.4	6_13	203.1	9_24
49	Patiala	3.4	12_30	46.2	6_13	87.6	9_25
50	Shimla*	-1.0	12_27	28.8	5_26,5_30	172.6	8_13
51	Banihal*	-3.5	12_27	34.6	6_3	67.5	2_13
52	Gulmarg*	-11.5	12_15	25.4	6_4	40.6	4_11
53	Jammu AP	2.6	12_28	43.5	5_29	94.8	7_10
54	Srinagar*	-7.7	12_28	35.1	8_4	49.8	11_3
55	Ajmer	4.0	12_28	44.7	6_1	50.6	7_18
56	Barmer	4.8	12_23	46.9	5_28	56.8	6_29
57	Bikaner	3.5	12_25	47.7	6_1	92.0	7_21
58	Ganganagar	1.3	1_10	49.1	6_1	64.8	7_21
59	Jaipur AP	5.0	12_30	45.4	5_23	85.4	7_25
60	Jaisalmer	6.0	12_25	46.8	6_2	72.0	8_18
61	Jodhpur AP	4.6	12_29	45.1	5_28	70.0	7_20
62	Kota AP	4.2	12_29	46.5	5_28	109.7	8_22
63	Udaipur	1.8	12_29	44.4	5_27	71.0	7_11
64	Ambikapur	4.0	12_31	40.8	5_8,5_12	116.0	8_11
65	Betul	1.0	12_29	44.7	5_28	100.2	9_22
66	Bhopal(AP)	4.9	12_28	45.3	5_27,5_29	153.9	8_21
67	Guna	4.5	12_30	46.2	5_27	110.6	9_8
68	Gwalior	1.9	1_4	46.6	5_27	90.0	7_19
69	Indore(AP)	6.6	12_29	43.2	5_28	83.2	9_22
70	Jabalpur	3.8	12_29	45.3	5_28	91.7	8_8
71	Jagdalpur	5.5	12_31	39.0	5_28	91.2	8_20
72	Khandwa	6.0	12_30	45.5	5_27	336.0	9_22
73	Nowgong	2.4	12_30	47.0	5_24	120.2	7_19
74	Pendra	4.5	12_30	42.2	5_22	67.5	8_29
75	Ratlam	5.1	12_29	46.0	5_27	105.2	7_23
76	Sagar	6.0	12_17,12_29	45.7	5_24	94.6	9_6
77	Satna	4.0	1_4	45.5	5_27	81.4	9_5

TABLE - 2 (CONTD.)

S.NO.	STATION NAME	MIN (°C)	DATE (MONTH_DATE)	MAX (°C)	DATE (MONTH_DATE)	HIGHEST 24 Hr. RAINFALL(mm)	DATE (MONTH_DATE)
78	Seoni	4.8	12_30	43.2	5_29	104.6	8_29
79	Umaria	1.0	12_30	45.6	5_22	159.6	9_8
80	Ahmedabad AP	8.0	12_27	44.8	5_27	91.2	8_18
81	Baroda	7.2	12_29	43.7	5_28	108.8	7_12
82	Bhavnagar AP	10.2	12_28,12_30	44.1	5_1	97.4	7_16
83	Bhuj AP	9.5	1_2	44.2	5_23	20.7	7_18
84	Deesa	7.5	12_30	45.8	5_27	45.4	7_16
85	Dwarka	13.8	1_2	38.8	10_7	81.6	7_18
86	Naliya	4.0	1_2	44.2	5_22	19.6	7_18
87	New Kandala	9.4	12_19	44.6	5_18	109.8	8_18
88	Porbandar AP	10.1	12_28	42.5	3_26	200.3	7_18
89	Rajkot AP	8.7	12_26	44.4	5_23	188.8	7_17
90	Surat	10.6	12_27	41.8	3_26	130.9	7_16
91	Veraval	13.7	1_4,12_26	41.0	3_25	182.5	7_17
92	Akola	5.9	12_29,12_30	46.9	5_28	78.7	8_17
93	Ahmadnagar	4.5	12_30	44.0	5_12	59.4	8_17
94	Aurangabad AP	5.8	12_29	42.6	5_28	156.7	8_17
95	Buldhana	7.5	12_30	43.0	5_28	123.6	8_17
96	Chandrapur	7.0	12_31	47.9	5_30	88.2	8_16
97	Dahanu	13.0	12_29	37.8	10_5	353.6	7_9
98	Harnai	18.0	1_8,1_24	36.9	11_2	190.0	6_24
99	Jalgaon	6.0	12_29,12_31	45.0	5_11,5_28	125.5	8_17
100	Kolhapur	13.6	12_30,12_31	39.6	4_27	92.8	7_17
101	Mahabaleshwar*	9.6	12_28	35.6	4_24	298.7	7_16
102	Malegaon	5.4	12_29	44.8	4_27,5_20,5_21	58.0	8_17
103	Mumbai	17.0	12_27	38.0	3_25	170.6	7_9
104	Nagpur AP	3.5	12_29	46.7	5_29	282.0	7_7
105	Panjim	17.6	2_2	36.6	11_17	166.0	7_6
106	Parbhani	6.4	12_29	45.6	5_12	93.0	8_21
107	Pune	5.9	12_29	40.8	5_10,5_17	64.7	6_22
108	Ratnagiri	15.4	12_11	38.3	2_25	270.5	6_10
109	Sholapur	10.4	12_29,12_30	43.7	5_2	95.5	6_8
110	Yeotmal	8.4	12_21	45.5	5_21,5_28	61.0	6_10
111	Anantpur	11.3	2_5	42.3	4_29	170.6	9_17
112	Hyderabad AP	9.5	12_31	42.5	5_1,5_29	63.9	6_23
113	Kakinada	16.3	12_31	40.7	6_17	73.9	12_18
114	Kalingapatnam	12.0	12_31	41.5	6_19	113.4	12_6
115	Kurnool	16.0	2_4	43.3	4_30	72.7	8_4
116	Machilipatnam	17.3	12_31	41.4	6_5	105.6	6_7
117	Nellore	19.2	2_1	42.6	5_29	54.6	11_22
118	Nizamabad	10.2	12_31	44.5	5_20	116.9	8_21
119	Ongole	18.3	12_29	42.4	5_30	127.7	12_17
120	Ramgundam	8.6	12_31	44.4	5_19,5_28,5_29	264.8	8_12
121	Visakhapatnam AP	12.2	12_31	41.6	6_18	86.2	8_20
122	Chennai AP	17.2	2_1	40.8	5_29	87.5	11_22
123	Coimbatore	16.5	2_3	39.0	4_23	44.1	9_28
124	Cuddalore	17.9	2_2	42.1	5_29	87.0	11_16
125	Kanyakumari	20.8	8_15	35.5	8_29	64.4	5_18
126	Kodaikanal*	5.3	1_5,1_6	22.5	4_30	141.1	11_17
127	Madurai AP	17.2	2_3	40.6	5_2	62.8	8_3
128	Nagapattinam	19.3	1_8	39.4	5_29	166.7	11_24
129	Palayamkottai	20.4	10_23	39.1	9_8	70.2	10_5
130	Pamban	22.4	2_21,12_17	37.0	4_15	154.6	11_24
131	Salem	17.0	1_19	40.6	4_23	133.8	7_2
132	Tiruchirapalli AP	16.8	2_3	41.3	5_2	76.0	5_10
133	Vellore	14.1	2_1,2_3	42.2	4_30	89.6	6_7
134	Bangalore*	13.2	2_1	35.2	4_30	53.1	9_24
135	Chitradurga	11.1	6_9	37.8	4_18	54.4	5_15
136	Gadag	12.5	12_31	39.4	4_24	66.8	9_18
137	Gulbarga	12.5	12_31	43.4	5_2,5_3	76.7	10_17
138	Honavar	16.1	2_26	37.1	4_8	167.2	6_9
139	Karwar	16.7	2_5	38.2	10_27	140.4	6_10
140	Mangalore AP	18.6	12_18	37.2	3_11	283.8	5_30
141	Medikeri*	7.3	2_5	31.1	3_26	300.2	8_17
142	Mysore	9.6	1_22	35.7	4_20	45.6	9_24
143	Raichur	11.6	1_31	42.9	5_1	44.9	12_14
144	Alapuzha	21.2	1_21	36.6	4_7	122.8	10_4
145	Cochi AP	21.2	7_16	34.8	10_28	230.8	7_16
146	Kozhikode	20.0	2_3	37.2	3_29	197.2	8_15
147	Thiruvananthapuram	20.6	11_16	35.9	3_30	138.6	8_15
148	Car Nicobar	20.8	9_30	34.9	9_15	98.0	4_29
149	Port Blair	20.3	2_16	34.9	4_24	230.5	5_30
150	Amini Divi	16.7	5_28	35.3	5_2,5_5	263.8	5_28
151	Minicoy	20.7	1_3	34.6	3_24	167.4	3_15

(:Hill stations) (# : Based on Realtime data)*







वार्षिक जलवायु सारांश - 2018

ANNUAL CLIMATE SUMMARY - 2018

जलवायु निगरानी तथा विश्लेषण समूह
Climate Monitoring & Analysis Group

(Website : http://www.imdpune.gov.in)

डिजाइन एवं मुद्रित - मुद्रण विभाग,
जलवायु अनुसंधान तथा सेवाएँ का कार्यालय
पुणे

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