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भारत मौसम विज्ञान विभाग / INDIA METEOROLOGICAL DEPARTMENT







वार्षिक जलवायु सारांश - 2017

ANNUAL CLIMATE SUMMARY - 2017

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COVER PHOTOS

① Photo 1: A man uses a makeshift raft to move out of a flooded neighbourhood after heavy rains in Ahmedabad, July 28, 2017. (http://www.hindustantimes.com)

② Photo 2 : Avalanches struck an army camp and a patrol team in Tulail area of Gurez sector in Bandipora district resulting in multiple casualties, January 26, 2017. (http://www.hindustantimes.com)

③ Photo 3 : A woman carries home a pot of water, while taking a shortcut across the dry bed of the Usmansagar lake, in Andhra Pradesh, March 1, 2017. (https://thirdpole.n.openearth.net/wp-content)

④ Photo 4 : Mumbai rains : Heavy rains left the financial capital crippled. The city had been getting heavy rains due to incessant rains, August 31, 2017.(https://timesofindia.indiatimes.com)

⑤ Photo 5 : The landslide occurred in Laptap village in Papum Pare district of Arunachal Pradesh, July 11, 2017 (https://www.hindustantimes.com)

⑥ Photo 6 : Villagers use a boat as they row past partially submerged houses at a flood-affected village in Morigaon district in Assam, July, 26, 2017.(http://www.hindustantimes.com)

वार्षिक जलवायु सारांश - 2017

विशेषताएं

वर्ष 2017 में देश का औसत तापमान, सन 1971-2010 के औसत से 0.71 डिग्री सेलशियस (डि.से.) से अधिक रहा। यह साल 1901 से अब तक का चौथा सबसे ऊष्ण साल रहा । जाडे की ऋतु के औसत तापमान में वृध्दि (+0.94 डि.से. एवं 1901 से अब तक का चौथा सबसे ऊष्ण ऋतु) और मानसूनोत्तर ऋतु के तापमान में वृध्दि (+0.77 डि.से. एवं 1901 से अब तक की तीसरी सबसे ऊष्ण ऋतु) वार्षिक तापमान में वृध्दि का मुख्य कारण है। अब तक के 10 सबसे ऊष्ण साल इस क्रम से है : 2016 (विसंगति +0.87), 2009(+0.85), 2010(+0.82), 2017(+0.71), 2015(+0.59), 2006(+0.56), 2002(+0.45), 2007(+0.417), 2014(+0.415) और 1998(+0.41) ।

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 काालावधि औसत के 95%)। 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 86%) रही ।

वर्षा

2017 में देश भर में वार्षिक वर्षा साधारण थी । वर्षा का परिमाण दीर्घ कालावधि औसत के 95% रहा । देश के 36 प्रभागों में से 3 प्रभाग (नागालँड, मणिपुर, मिझोराम, त्रिपुरा, पश्चिम राजस्थान तथा सौराष्ट्र और कच्छ) मे वर्षा अधिक रही, 26 प्रभागों में वर्षा सामान्य रही और 7 प्रभागों में वर्षा कम रही ।

तापमान

देश के अधिकतर भागों में अधिकतम, न्यूनतम और औसत तापमान की विसंगति -0.5 डि. सें. से + 1.0 डि. सें. की श्रेणी में रही । मगर देश के उत्तर, उत्तर-पश्चिम और पूर्व तथा उत्तर-पूर्व के कुछ भागों में औसत तापमान 1 से 2 डि. सें. से अधिक रहा ।

चक्रवाती तूफान

2017 मे बंगाल की खाडी में एक चक्रवाती तूफान (एप्रिल) और दो तीव्र चक्रवाती तूफान (मई और दिसंबर में प्रतिमाह एक) हुए । इनके अलावा मानसून ऋतु मे 14 कम दबाव के क्षेत्र बने (1 अति तीव्र कम दबाव क्षेत्र, 2 तीव्र कम दबाव क्षेत्र, 6 अच्छी तरह से चिन्हित कम दबाव क्षेत्र और 5 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 750 लोगों की मृत्यु की सूचना (मानसून पूर्व और मानसूनोत्तर ऋतुओं में), देश के विभिन्न भागों से प्राप्त हुई जो अधिकतर मध्य, उत्तर-पूर्व, उत्तर पश्चिमी तथा दक्षिण प्रायद्विप से थी । ओडिशा मे इसकी संख्या (408) सबसे अधिक थी । महाराष्ट्र से 85, बिहार से 68, कर्नाटक से 51, उत्तर प्रदेश से 37 तथा बाकी शेष देश के अन्य भागों से लोगों की मृत्यु की सूचना प्राप्त हुई ।

भारी वर्षा और बाढ संबंधी घटनाओं से मानसून ऋतु में करीब 830 से ज्यादा लोगों की मृत्यु की सूचना प्राप्त हुई । 142 लोगों की मृत्यु की सूचना, 13 जून से 11 सितंबर कि कालावधि में आसाम से प्राप्त हुई । उत्तर प्रदेश में 138 लोगों की मृत्यु की सूचना प्राप्त हुई जिस में 138 लोगों की मृत्यु, 4-10 सितंबर कि कालावधि में हुई । 13-23 अगस्त के दौरान गुजरात से 120 और बिहार से 107 लोगों की मृत्यु की सूचना मिली ।

भूस्खलन से , 11 जुलाई को अरुणाचल प्रदेश से 15 और 13 अगस्त को हिमाचल प्रदेश से 46 लोगों की मृत्यु की सूचना मिली ।

उष्ण लहर कि चपेट में करीब 375 लोगों की मृत्यु की सूचना देश के विभिन्न भागों से प्राप्त हुई, जिसमे आँध्र प्रदेश से 236 और तेलंगाणा से 100 लोगों की मृत्यु की सूचना शामिल है।

HIGHLIGHTS

ANNUAL CLIMATE SUMMARY 2017

HIGHLIGHTS

Climate during 2017 over India was substantially warmer. The annual mean temperature for the country this year was +0.71°C above the 1971-2000 average, thus making the year 2017 as the fourth warmest year on record since the nation-wide records commenced in 1901. Higher mean temperatures during the winter season (January- February, with anomaly +0.94°C, fourth warmest since 1901) and the post-monsoon season (Oct-Dec, with anomaly +0.77°C, third 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 [95 % 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 (86 % of Long Period Average (LPA))

TEMPERATURE

A) All India :

Annual :

Spatial pattern of annual mean, maximum and minimum temperature anomalies for 2017 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 -0.5 to 1.0°C. However, the mean temperatures over some parts of northern/northwestern and east/northeastern regions was above normal by about 1 to 2°C.

The annual mean temperature for the country was +0.71°C above the 1971-2000 average, thus making the year 2017 as the fourth warmest year on record since 1901 (Fig. 2a). The other 9 warmest years on record in order were: 2016 (anomaly +0.87°C), 2009 (0.85), 2010 (0.82), 2015 0.59), 2006(0.56), 2002(0.45), 2007 (0.417), 2014(0.415) and 1998(0.41). It may be mentioned that 11 out of the 15 warmest years were from the recent past fifteen years (2003-2017). Also the past decade (2001-2010/ 2008-2017) was the warmest decade on record with anomalies of 0.46°C / 0.54°C above average. During 1901-2017, the annual mean temperature showed an increasing trend of 0.66 °C/100 years with significant increasing trend in the maximum temperature (1.06°C /100 years), and relatively lower increasing trend (0.26°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 1901-2017 are shown in Figs 2b, 2c, 2d and 2e respectively. The mean temperature for the winter season (with anomaly +0.94°C above average) this year was the fourth highest since 1901. The 5 warmest winter years with anomaly in order were: 2006 (+1.76 °C), 2009(1.45°C), 2016(1.36°C), 2017 (0.94°C) and 2010 (0.83°C). January month (with anomaly +0.59°C) was the ninth warmest and February (with anomaly, +1.3°C) this year was the fourth warmest since 1901.

The pre-monsoon season (March-May) this year was also warmer. The season this year (with anomaly +0.77°C above average) was the sixth warmest since 1901. The five warmest pre-monsoon years with anomaly in order are: 2010(1.72°C), 2016(1.22°C), 1921(0.97°C), 2009(0.82°C) and 1953(0.78°C). The mean temperature was above normal during March (0.5°C), April (1.04°C) and May (0.77°C). April and May months were the fourth and fifth warmest respectively since 1901.

Monsoon season this year (with anomaly +0.51°C above average) was the 5th warmest since 1901. The 5 warmest monsoon years with anomaly on record in order are: 2009 (0.76°C), 2014(0.69°C), 1987(0.67°C), 2015(0.58°C), 2017(0.51°C). The mean temperature was above normal during June (0.2°C), July (0.39°C), August (0.63°C) and September (0.82°C). August was the fourth warmest and September was the warmest since 1901.

The Post-monsoon season this year (with anomaly +0.77°C above average) was the 3rd warmest since 1901. The 5 warmest post-monsoon years with anomaly on record in order are: 2015 (0.98°C), 2008(0.88°C), 2017(0.77°C), 2016(0.75°C) and 2011(0.64°C). The mean temperature was above normal during October (1.11°C), November (0.49°C) and December (0.69°C). October was the warmest and December was the fifth warmest since 1901.

Spatial pattern of trend in mean annual temperature anomalies based on the data for the period 1901-2017 (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, 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 most parts of northeast India. Minimum temperature was above normal by about 2 to 3°C, over parts Punjab, west Uttar Pradesh, west Rajasthan and Kutch.

During February, maximum temperature was above normal by about 2 to 3°C, over most parts of northern / northwestern, central and northeastern regions of the country. Over parts of Jammu & Kashmir, Himachal Pradesh, Uttarakhand and Kutch region, 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, Uttarakhand, Punjab, Haryana, West Uttar Pradesh, West Rajasthan, Gujarat state, Sikkim, Andaman & Nicobar Islands and at some isolated places over Madhya Pradesh, and Arunachal Pradesh.

March- May (Pre-monsoon season):

During March, maximum temperature was above normal by about 2°C over parts of Jammu & Kashmir, Himachal Pradesh and west Rajasthan. Minimum temperature was also above normal by about 2°C over parts of West Rajasthan and Gujarat region.

During April, maximum temperature was above normal by about 2°C, over most parts of northern/northwestern and adjoining central region and some parts of south peninsula. It was above normal over parts of Jammu & Kashmir, Himachal Pradesh, Punjab and West Rajasthan by about 3^{0}C. Minimum temperature was also above normal by about 2°C, over most parts of Himachal Pradesh and Punjab and some parts of Jammu & Kashmir, Uttarakhand, east Uttar Pradesh, Rajasthan, Madhya Pradesh and Gangetic West Bengal.

During May, minimum temperature was above normal by about 2°C, at isolated places over Punjab, west Rajasthan and Gangetic West Bengal.

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 July, maximum temperature was below normal by 2°C over parts of Gujarat Region and during September, it was above normal by about 2 to 3°C over parts of Jammu & Kashmir, Himachal Pradesh, Bihar, Jharkhand and Madhya Pradesh.

The minimum temperatures were warmer by about 2°C, during August, over some parts of Jammu & Kashmir, Himachal Pradesh, Uttarakhand and Sikkim and during September, over parts of Uttarakhand, Sikkim, Gangetic West Bengal and Andaman & Nicobar Islands.

October-December (Post-monsoon season):

During October, both maximum and minimum temperatures were above normal over most parts of the country. Maximum temperature was above normal by about 2 to 3°C, over extreme northern and northwestern and adjoining central parts and it exceeded 3°C over parts of Jammu & Kashmir and west Rajasthan. Minimum temperature was above normal by about 2 to 3°C over parts of Manipur, Sikkim, Andaman & Nicobar Islands, Uttarakhand, Punjab, west Rajasthan, east Uttar Pradesh and adjoining east Madhya Pradesh.

During November, maximum and minimum temperature anomalies were generally within ±1°C range. However, the minimum temperature was above normal by about 2 to 3°C, over some parts of west Rajasthan and Andaman & Nicobar Islands.

During December, in respect of maximum and minimum temperature, the anomaly was generally within -1 to 2°C range. Maximum temperature was above normal by about 2°C, over some parts of Arunachal Pradesh, Assam & Meghalaya, Jammu & Kashmir, Himachal Pradesh, Chattisgarh & adjoining East Madhya Pradesh and Uttarakhand. It was below normal by about 2°C, over some parts of Gujarat region and Gangetic West Bengal. Minimum temperature was above normal by about 2 to 3°C, over parts of Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Rajasthan, Arunachal Pradesh, Sikkim, Madhya Maharashtra, west Madhya Pradesh and Assam and exceeded 3°C, over some parts of Nagaland, Manipur, Mizoram & Tripura.

Fig.5 (a, b) shows the monthly minimum and maximum temperature anomaly for the country as a whole during past five years, 2013-2017 respectively. It can be seen that in respect of maximum temperature, the month of May was the warmest in the last five years, while September was the warmest in respect of minimum temperature during the last five years.

Cold Wave / Cold day / conditions

Cold wave conditions were rather moderate and prevailed mainly over some parts northwest and adjoining central India during the month of January. Severe cold wave/cold wave conditions prevailed over parts of northern plains, northwest and central India during mid-January (11-18 Jan.). Fig 14 show the minimum temperature anomaly diagram for the duration when cold wave condition was at its peak.

Most parts of the country experienced above normal minimum temperatures during the month of February.

Heat Wave Conditions

Abnormally high maximum temperatures were observed over northern, northwestern, central and adjoining eastern parts of the country during the last week of March which broke many previous records during the month.

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) and again from 10 - 21 April over northern, northwestern, central and adjoining eastern parts of the country. Both maximum and minimum temperature was above normal by more than 5°C, over many stations of these regions during this period. Severity of heat wave was confined generally to north and northwestern parts, however during the later part of the period heat wave conditions spread to parts of southeastern India.

Heat wave conditions were again observed on one or two days during 6-10 May at isolated places over west Rajasthan, Vidarbha, east Madhya Pradesh, Haryana, Chandigarh & Delhi. During 13 – 25 May, the heat wave conditions were confined to central, east and southeast India, with Odisha and Vidarbha most affected during this period. It was then observed over Vidarbha, west Rajasthan and Haryana, Chandigarh & Delhi on 26 - 27 May.

With the onset of southwest monsoon over Kerala on 30 May, the severity and spatial extent of heat wave conditions reduced gradually and was observed only in parts of central and north & northwest India viz., west Rajasthan, Uttar Pradesh, Madhya Pradesh and experienced heat wave conditions during 3-6 June.

The heat wave conditions got abated from the entire country by 7 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 2017, annual rainfall over the country as a whole was 95 % of its LPA value. Season wise rainfall distribution over the country as a whole is listed below :

Winter (January to February): **95% of LPA**

Pre-monsoon (March to May): **98% of LPA**

Monsoon (June to September): **95% of LPA**

Post-monsoon (Oct to Dec): **88% 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 normal (95 % of LPA) during the year. Out of 36 meteorological subdivisions, three sub-divisions (Nagaland-Manipur-Mizoram-Tripura, west Rajasthan and Saurashtra & Kutch) received excess rainfall, 26 received normal rainfall and remaining 7 subdivisions received deficient rainfall.

At the end of year, of the four homogeneous regions, East & Northeast India received 101% and south peninsular India received 96 % of their respective normal rainfall. While central India and Northwest India received 92 % and 91 % of their respective normal rainfall.

Winter season:

Rainfall activity over the country during the season as a whole was normal. It was above normal during January (140% of LPA) and below normal during February (56% of LPA). Rainfall activity was mainly observed over northern/northwestern, south peninsular and northeastern parts of the country. Jammu & Kashmir and Andaman & Nicobar Islands received large excess rainfall while Tamil Nadu and Coastal Karnataka received excess rainfall. Many subdivisions of north peninsula, central and eastern region received large deficient or no rainfall.

During the season, out of 36 meteorological subdivisions, 2 received large excess rainfall, 2 received excess rainfall, 6 received normal rainfall, 8 received deficient rainfall, 13 received large deficient rainfall. Five subdivisions did not receive any rain.

Pre-monsoon season:

Rainfall activity over the country during the season as a whole was normal (98 % of its LPA value). It was above normal during the month of April (116% of LPA) and normal during March and May (94 % and 90 % of LPA respectively). Sub divisions of north, northeast, south peninsular India and islands in general received large excess/excess/normal rainfall while, sub divisions of central and adjoining north peninsular India received deficient/large deficient rainfall. Bihar and West Rajasthan received about one and half times of their respective normal rainfall.

During the season, out of 36 meteorological subdivisions, 2 received large excess rainfall, 5 received excess rainfall, 12 received normal rainfall, 14 received deficient rainfall and 3 received large deficient rainfall.

Monsoon season:

The southwest monsoon season rainfall over the country as a whole was normal. However, the season observed intra seasonal variation where the first half of the season received normal rainfall [June (105 % of LPA) & July (100 % of LPA)] and the second half received below normal rainfall [August & September (88 % of LPA each)]. The rainfall for the season was normal over all the homogenous regions of the country. Spatially, the highest rainfall (100% of LPA) was received by homogeneous region of South Peninsula and lowest rainfall (90% of LPA) was received by Northwest India. The homogeneous regions of East & Northeast India and Central India received seasonal rainfall of 98% and 94% of LPA respectively. The rainfall received during the first half (1 June to 31 July) was normal (102% of LPA), while second half (1 August to 30 September) was below normal (88% of LPA).

Most of the subdivisions of the country received excess/ normal rainfall. However, some subdivisions of north and central India viz. Punjab, Haryana, Chandigarh & Delhi, East & West Uttar Pradesh, East Madhya Pradesh and Vidarbha received deficient rainfall. During the season, out of 36 meteorological subdivisions, 5 subdivisions received excess rainfall, 25 received normal rainfall and the remaining 6 subdivisions received deficient rainfall.

Daily area weighted rainfall (mm) over the country as a whole during the monsoon season 2017 (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. On only about 8 occasions, it was more than one and half times its normal value. During third week of June, second week of July and from August to mid of September, it was almost below normal.

Post-monsoon season:

Rainfall activity over the country during the season as a whole was below normal (88% of LPA). It was normal during the months of October and December (101% and 98 % of its LPA respectively) and below normal during November (49% of LPA). Eastern/northeastern region, south peninsular region and islands received

large excess/excess/normal rainfall, while remaining parts of the country 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 (86% of Long Period Average (LPA)). It was normal during October and December (96% of LPA and 89% of LPA respectively) and was below normal during November (69% of LPA).

Out of 36 meteorological subdivisions, one subdivision received large excess rainfall, 4 received excess rainfall, 14 received normal rainfall, 8 subdivisions received deficient rainfall and remaining 9 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 2017.

Cumulative SPI values of the year indicate, extremely wet/severely wet conditions over parts of Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura, Gangetic West Bengal, Jharkhand, Bihar, Jammu & Kashmir, Rajasthan, Gujarat Region, Konkan & Goa, Madhya Maharashtra, Chhattisgarh, Tamil Nadu and South Interior Karnataka while extremely dry/severely dry conditions were observed over parts of Assam & Meghalaya, Odisha, Jharkhand, Bihar, Uttar Pradesh, Haryana, Chandigarh & Delhi, Punjab, East Rajasthan, Madhya Pradesh, Vidarbha, Chhattisgarh, Coastal Karnataka and Kerala

TROPICAL STORMS / DEPRESSIONS IN THE INDIAN SEAS

During 2017, a Cyclonic Storm (CS, Marutha), a Severe Cyclonic Storm (SCS, Mora) and a Very Severe Cyclonic Storm (VSCS, Ockhi) formed in the month of April, May and December respectively over the Bay of Bengal. Though VSCS (Ockhi) formed in the Bay of Bengal, it attained its maximum intensity over Arabian Sea.

The first cyclonic storm of the year '**Marutha**' (15-17 April) formed over eastcentral Bay of Bengal on 15 April. The system moved in a northeasterly direction, away from the Indian region and crossed Myanmar coast and weakened over central parts of Myanmar and neighbourhood on 17 April. Though the system did not cause significant weather over the mainland, it caused light to moderate rain over the Andaman & Nicobar Islands during its formative stage. The second cyclonic storm of the year **'Mora'** (28-30 May) formed over the southeast Bay of Bengal on 28 May and intensified into a Severe Cyclonic Storm. It moved in a northeasterly direction initially and after attaining the intensity of CS, it moved north-northeastwards and crossed Bangladesh coast on 30 May. After landfall, the system caused moderate to Heavy rain over many parts of the northeastern region of the country on 30 May. The last cyclonic storm of the year **'Ockhi'** (29 Nov.-5 Dec) intensified into a Very Severe Cyclonic Storm and dissipated over eastcentral and adjoining northeast Arabian Sea. Thus, it became the system of most severe intensity during the current year. The system initially moved in northwest direction and recurved clockwise towards north Maharashtra-south Gujarat coast. Though it weakened over the Sea, during its course, the system caused heavy to very heavy rainfall over south Tamil Nadu, south Kerala, Lakshadweep, north coastal Maharashtra and adjoining south coastal Gujarat. It also caused extremely heavy rainfall at isolated places in south Tamil Nadu.

During pre-monsoon season, apart from the storms described above, no depression formed over north Indian Ocean.

During the monsoon season, fourteen low pressure systems (1 Deep Depressions, 2 Depressions, 6 well marked low pressure areas & 5 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	DD	D	WML	LPA
June	1 (BOB)	0	2 (AS,BOB)	2 (BOB)
July	0	2 (BOB, LAND)	1 (LAND)	3 (LAND)
August	0	0	2 (BOB, LAND)	0
September	0	0	1 (BOB)	0
(AS: Arabian Sea)			(BOB): Bay of Bengal	

The first intense system of the monsoon season formed as a Deep Depression (11–12 June) over northwest and adjoining northeast Bay of Bengal and dissipated over Bangladesh. The second Depression (18–19 July) which formed over northwest and adjoining westcentral Bay of Bengal and coastal areas of Odisha and dissipated over coastal Odisha and neighbourhood. The last system of July formed as a Land Depression (26–27 July) over northwest Jharkhand and neighbourhood and dissipated over southeast Uttar Pradesh and neighbourhood. Most of these depressions and the low pressure areas moved in a westerly/north-westerly direction across western, eastern, central parts of the country and caused above normal rainfall over these regions.

During the post monsoon season, apart from the storm mentioned above, four depressions (one Deep Depression and 3 Depressions) were formed. The Deep Depression (9-10 Oct.) formed over Land while the depressions, one each in the month of October (19-21 Oct.), November (15-17 Nov.) and December (6-9 Dec.) formed over the Bay of Bengal. The tracks of these cyclonic storms and depressions formed during the year is shown in figures 12 (a) and 12(b).

Frequency of depressions and cyclonic storms formed over the north Indian Ocean (1951-2017) during the monsoon and post-monsoon season is shown in figures.13 (a) and 13(b).

SIGNIFICANT WEATHER EVENTS

Lightning reportedly claimed over 750 lives from different parts of the country (central, northeastern, peninsular & northwestern India) during pre monsoon, monsoon & post monsoon seasons. Of these, 408 deaths were reported from Odisha alone while, 85 deaths were reported from Maharashtra, 68 from Bihar, 51 from Karnataka, 37 from Uttar Pradesh and rest from other parts of the country.

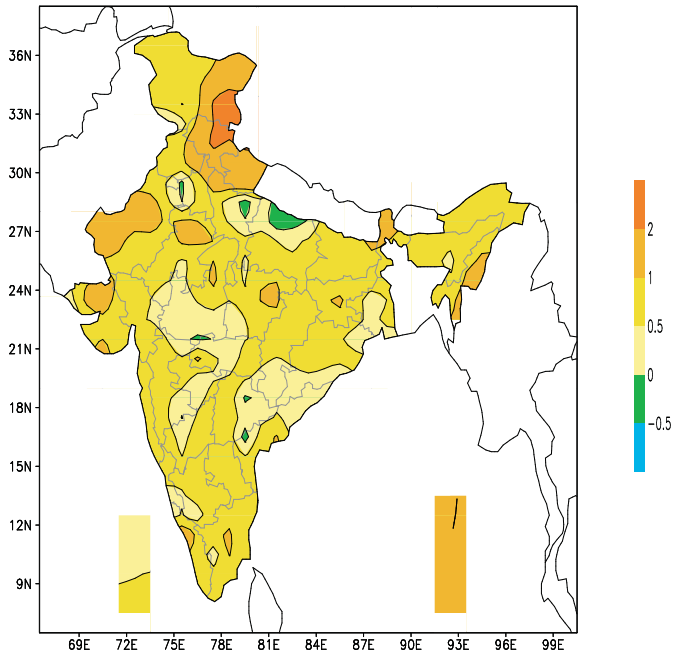
Heavy rain & flood related incidents during the monsoon season claimed at least 830 lives from different parts of the country. 142 persons were reported dead from Assam during the period of 13th June to 11th September. 138 persons were reported dead from Uttar Pradesh during 8th July to 10th September, of which 110 persons died due to heavy rain & flood in Ghaghara, Gomati & Rapti rivers during 4th September to 10th September. About 120 persons were reported dead from western industrial state Gujrat during the month of July and 107 from Bihar during 13th August to 23rd August.

On 13th August, 46 persons were reported dead due to massive landslide at Kotrupi on the Mandi-Pathankot National Highway near Jogindernagar in Himachal Pradesh, while 15 persons were reported dead in Papum Pare, Arunachal Pradesh on 11th July.

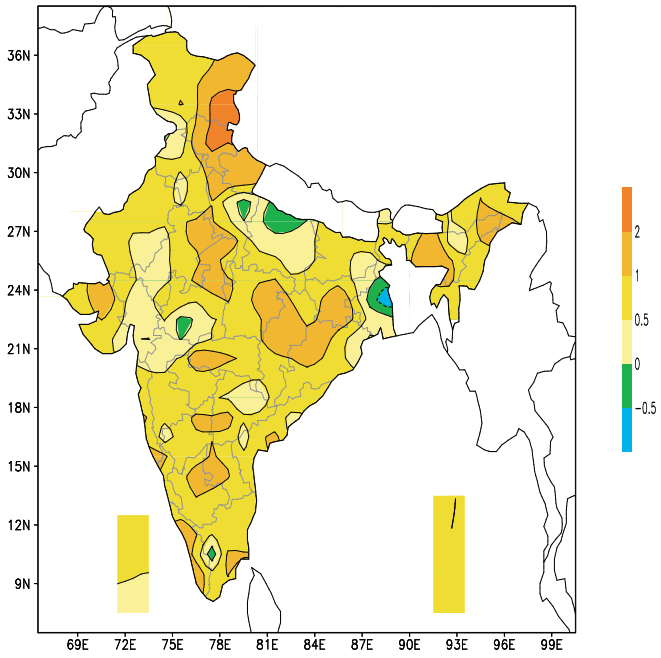
Heat wave conditions took a toll of 375 lives throughout the country, of which 236 were reported dead from Andhra Pradesh and 100 from Telangana.

Significant weather events during 2017 and associated loss of lives are shown in Fig.16

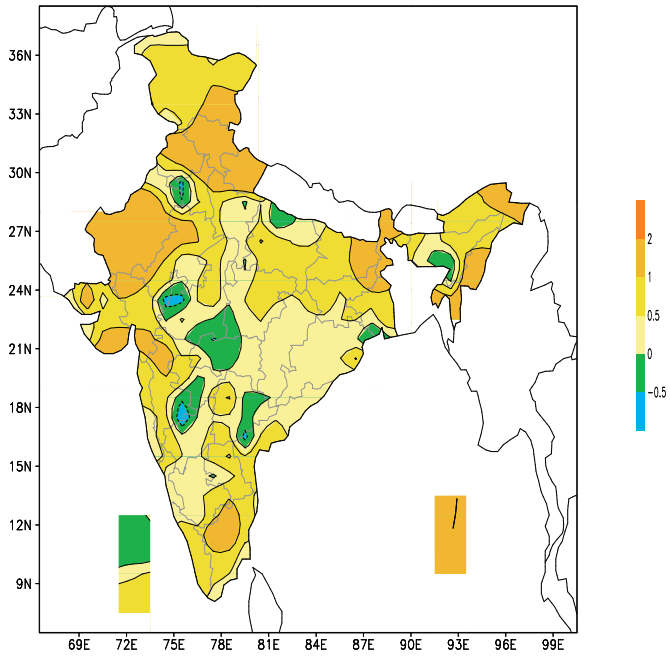
The highest maximum & lowest minimum temperature and highest rainfall in 24 hours recorded over a station during the year 2017 with the dates of occurrences are given in Table 2.



(a) MEAN



(b) MAXIMUM



(c) MINIMUM

FIG. 1 : ANNUAL TEMPERATURE ANOMALIES (°C) FOR 2017 WITH RESPECT TO 1971 - 2000 AVERAGE

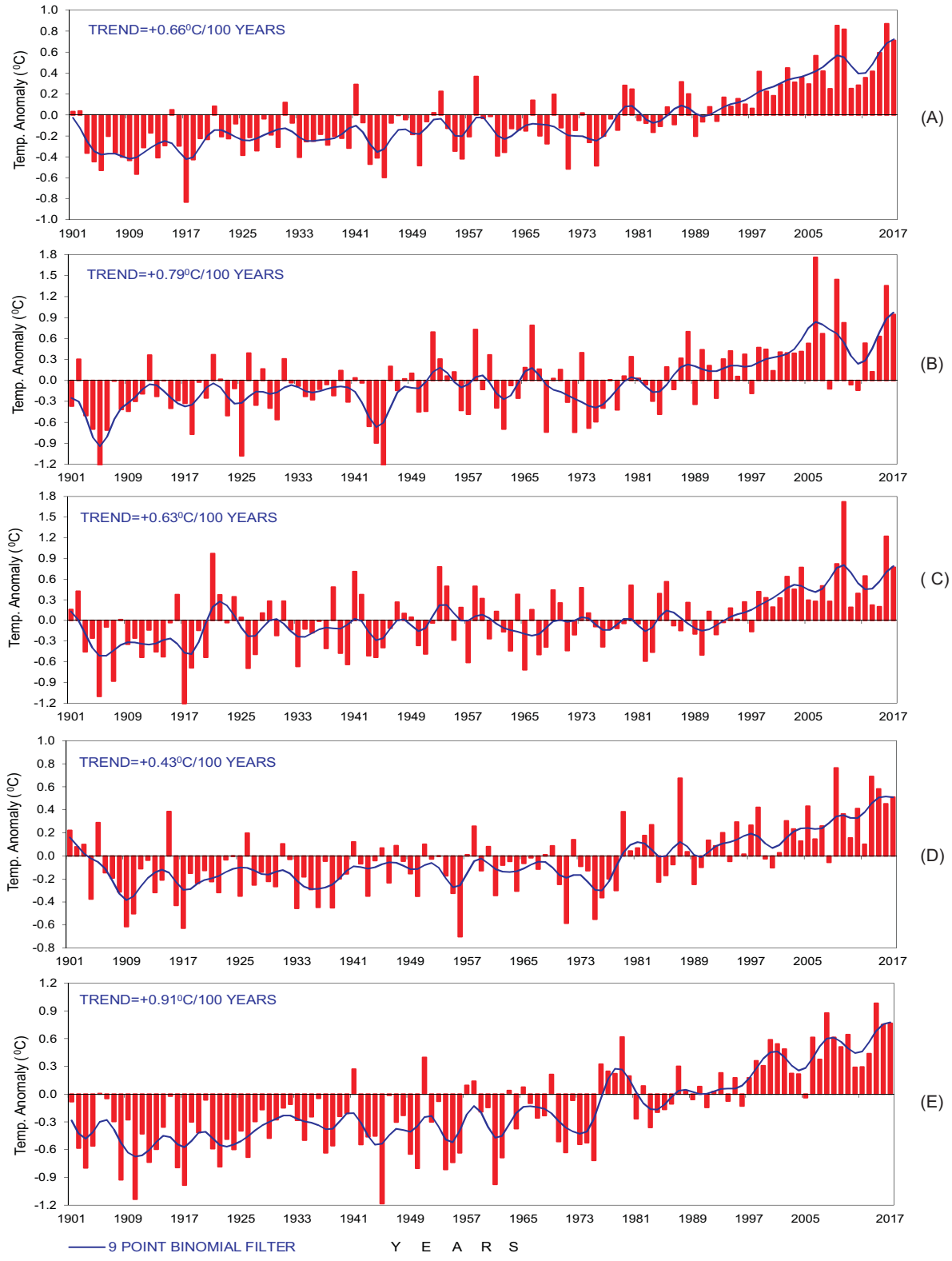


FIG. 2 : ALL INDIA MEAN TEMPERATURE ANOMALIES (A) ANNUAL, (B) WINTER, (C) PRE MONSOON, (D) MONSOON AND (E) POST MONSOON FOR THE PERIOD 1901 - 2017 SHOWN AS VERTICAL BARS. THE SOLID BLUE CURVE HAD SUB-DECADAL TIME SCALE VARIATIONS SMOOTHED WITH A BINOMIAL FILTER
(DEPARTURES FROM THE 1971 - 2000 AVERAGE)

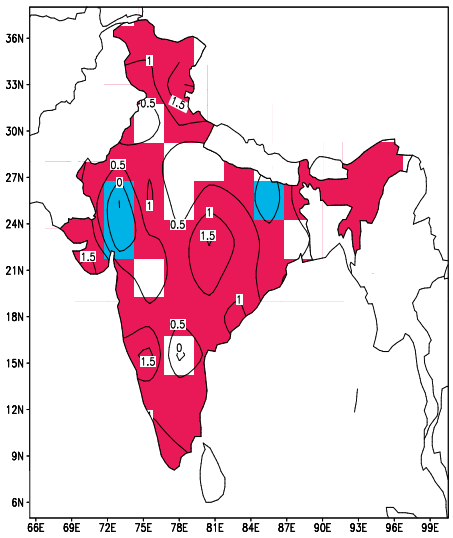


FIG. 3 : ANNUAL MEAN TEMPERATURE TRENDS (°C / 100 YEARS) ARE SHOWN AS CONTOUR LINES. THE TRENDS SIGNIFICANT AT 95% LEVEL ARE SHADED. POSITIVE TRENDS ARE SHOWN IN RED WHILE THE NEGATIVE TRENDS ARE SHOWN IN BLUE. PERIOD OF ANALYSIS : 1901 - 2017

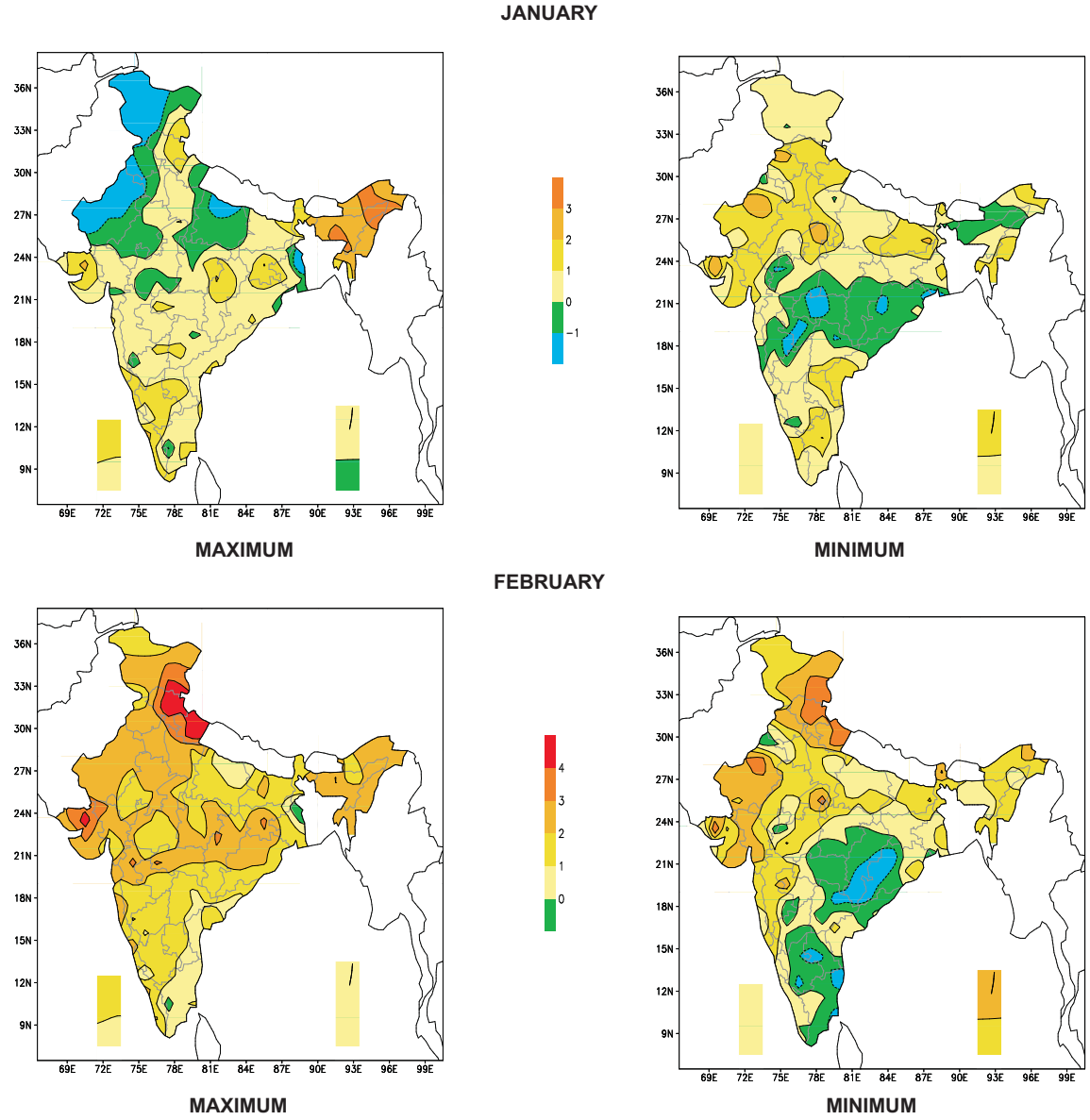
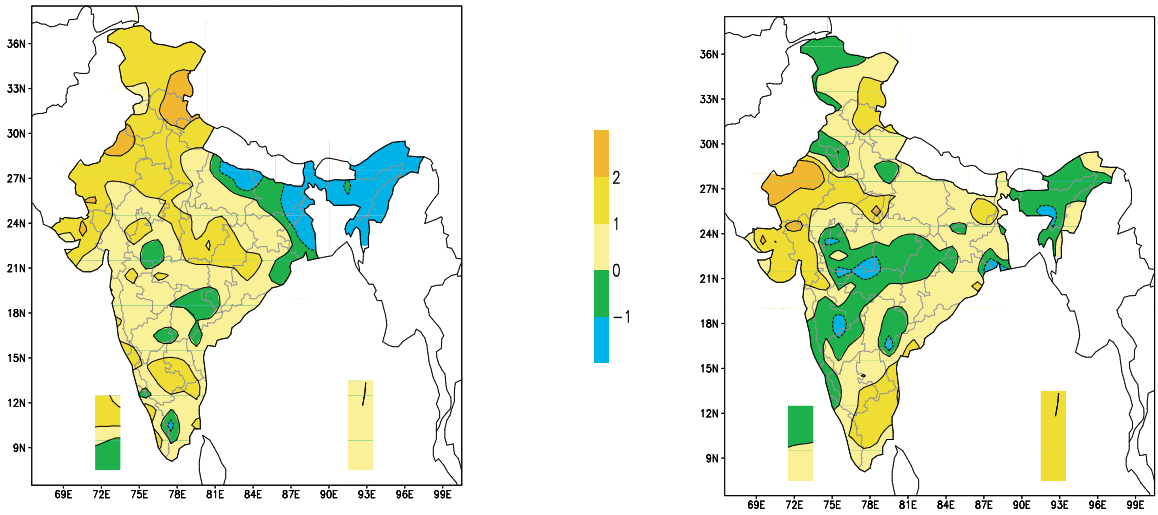


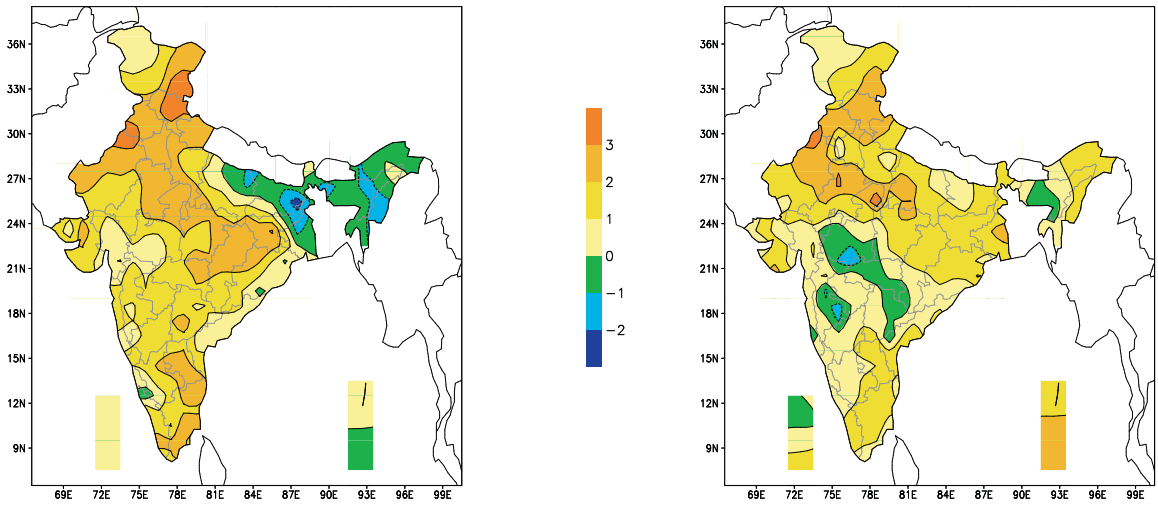
FIG. 4 : MONTHLY MEAN MAXIMUM AND MINIMUM TEMPERATURE ANOMALIES(°C) IN 2017 WITH RESPECT TO 1971 - 2000 AVERAGE

MARCH



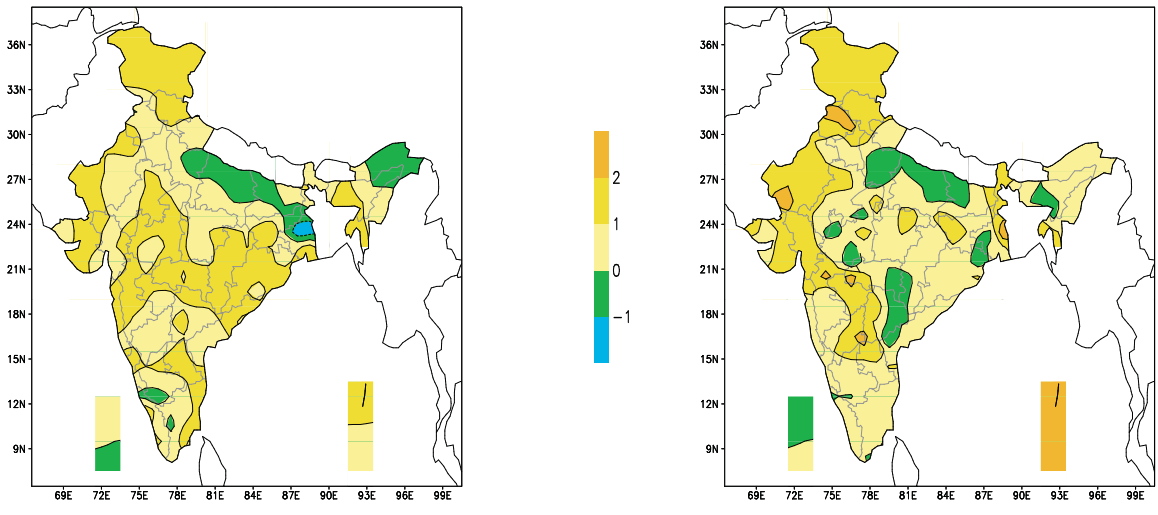
MAXIMUM **MINIMUM**

APRIL



MAXIMUM **MINIMUM**

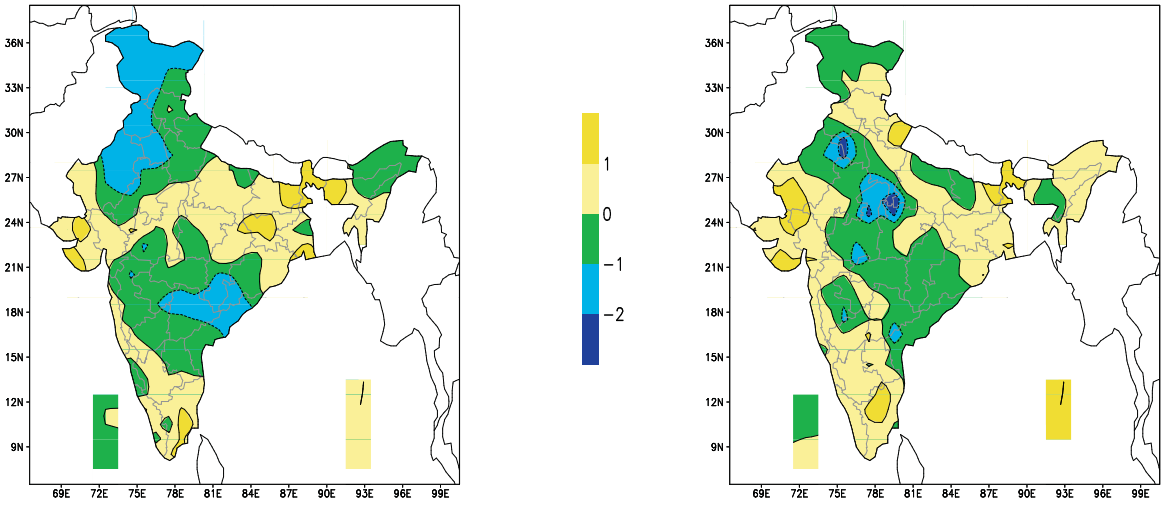
MAY



MAXIMUM **MINIMUM**

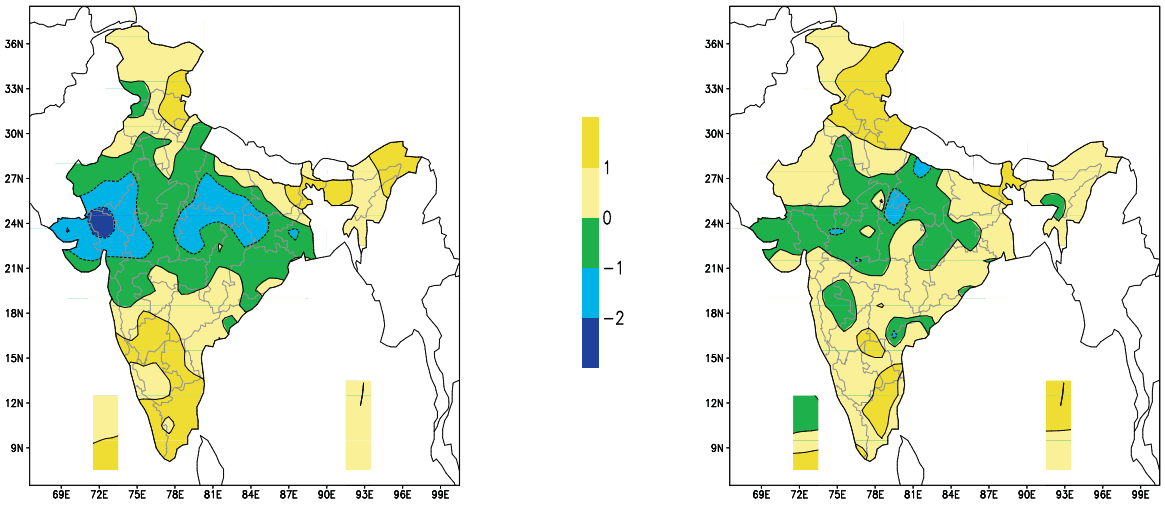
FIG. 4 : Contd...

JUNE



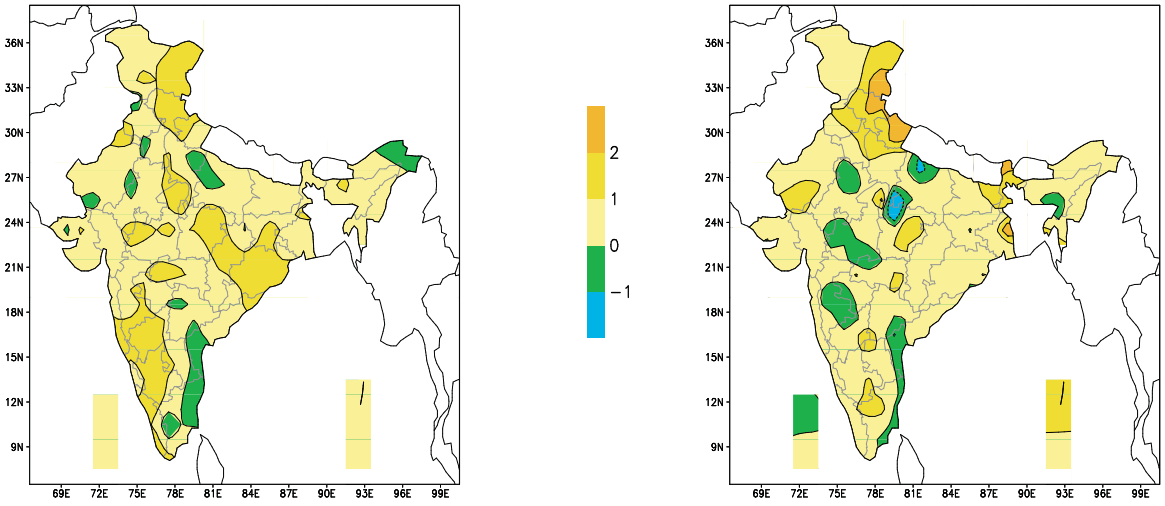
MAXIMUM MINIMUM

JULY



MAXIMUM MINIMUM

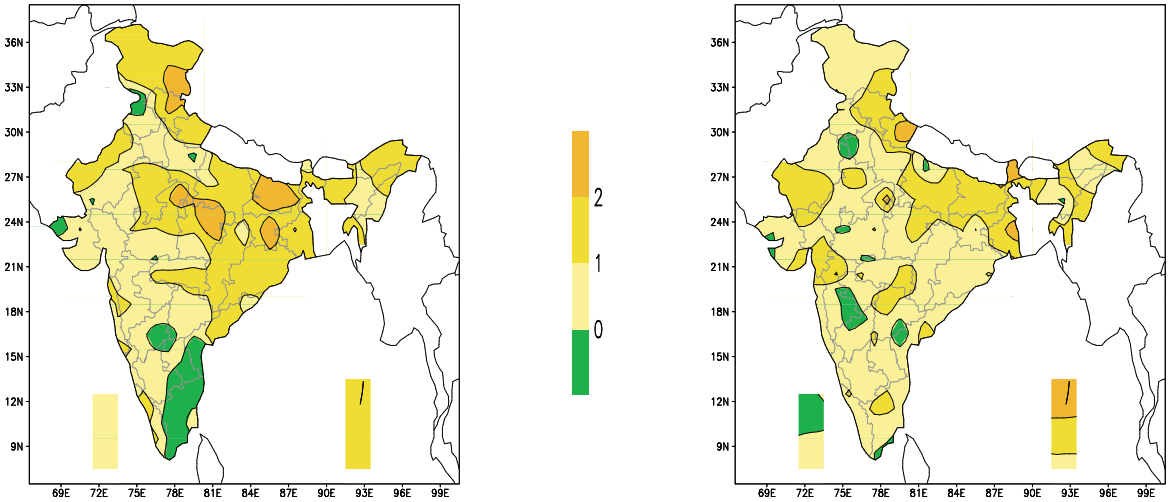
AUGUST



MAXIMUM MINIMUM

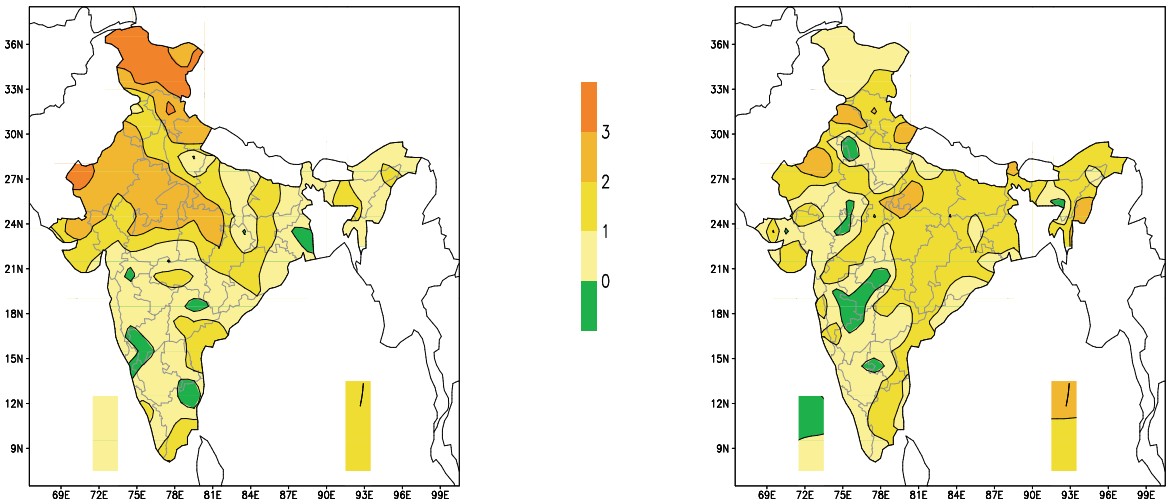
FIG. 4 : Contd..

SEPTEMBER



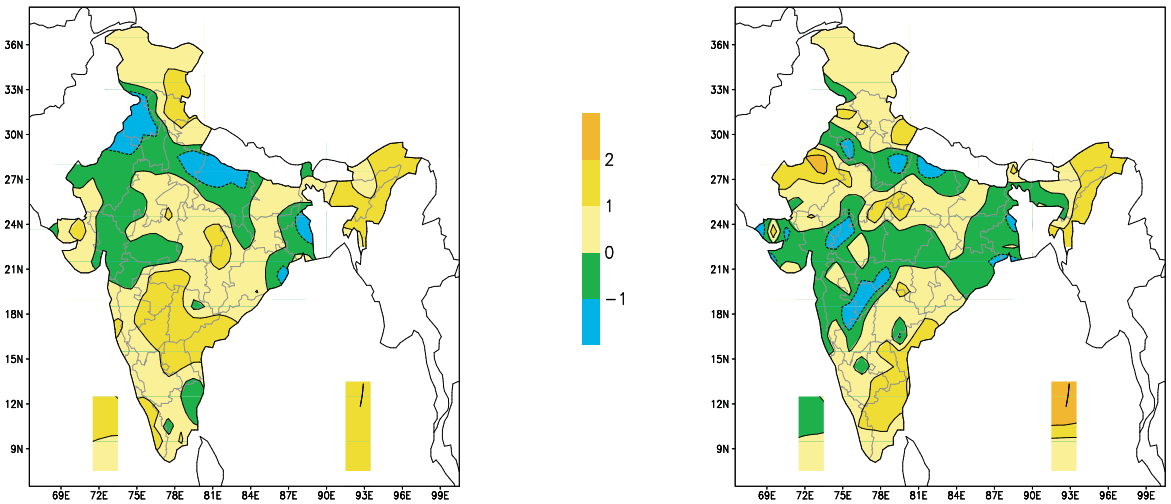
MAXIMUM **MINIMUM**

OCTOBER



MAXIMUM **MINIMUM**

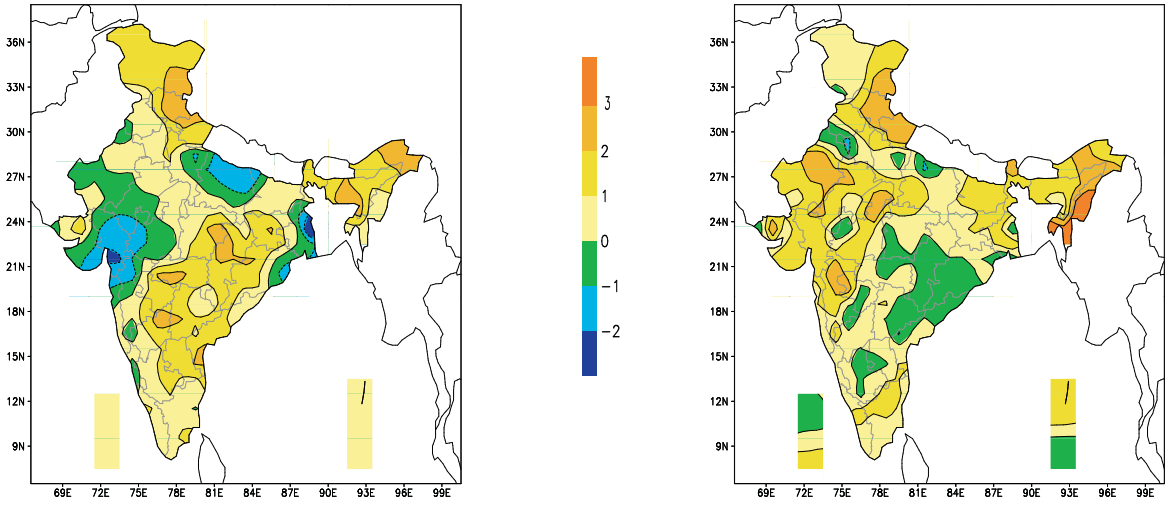
NOVEMBER



MAXIMUM **MINIMUM**

FIG. 4 : Contd..

DECEMBER



MAXIMUM **MINIMUM**

FIG. 4 : Contd..



FIG. 5 : MEAN MONTHLY (a) MINIMUM AND (b) MAXIMUM TEMPERATURE ANOMALIES (2013 - 2017)

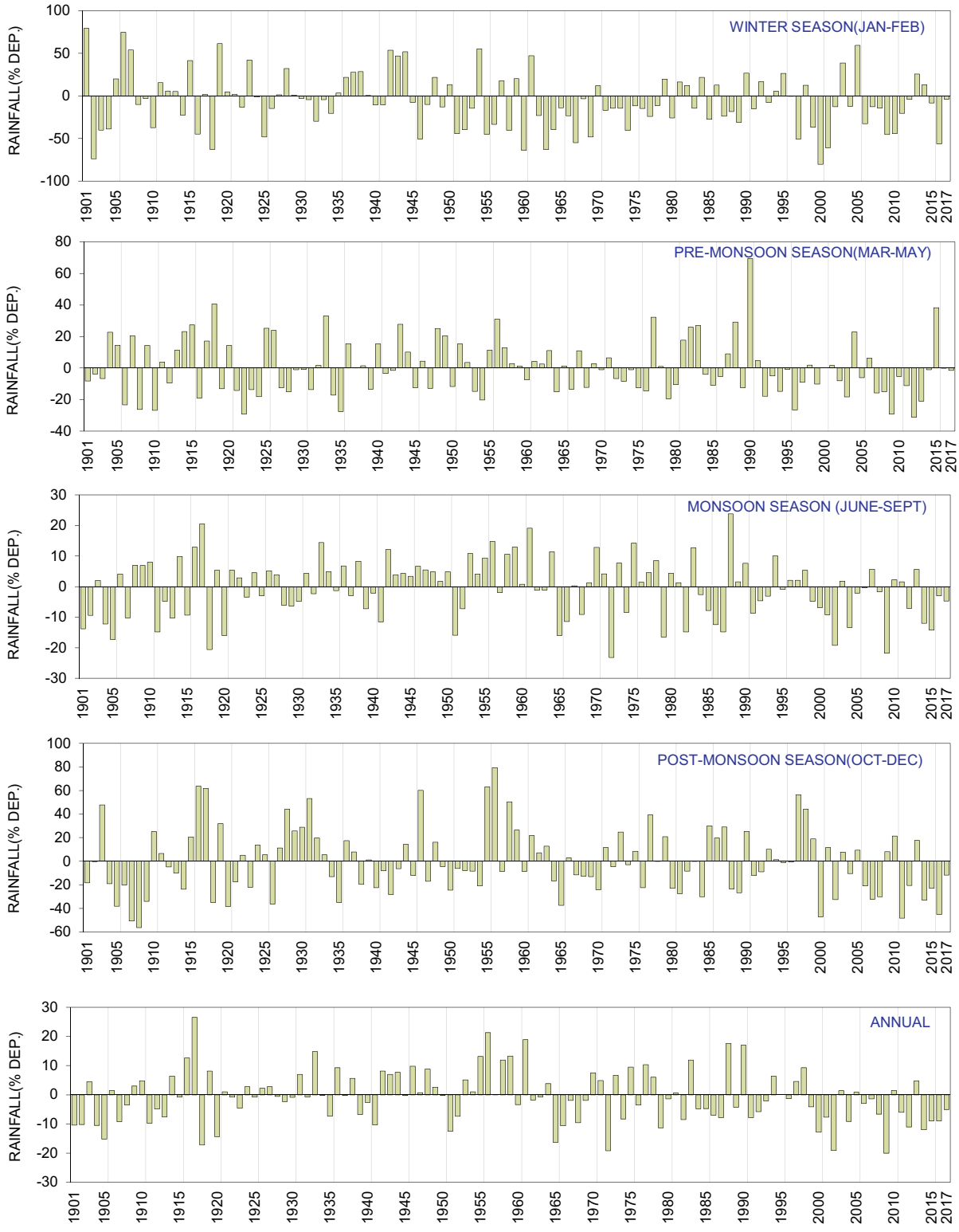
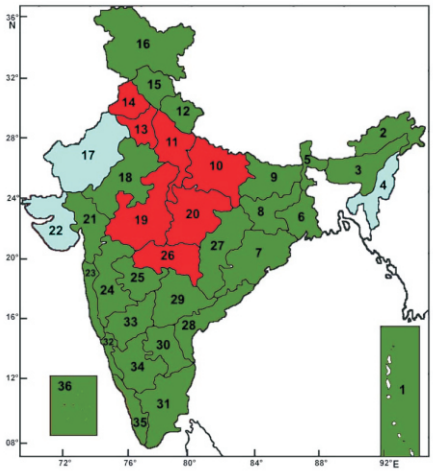
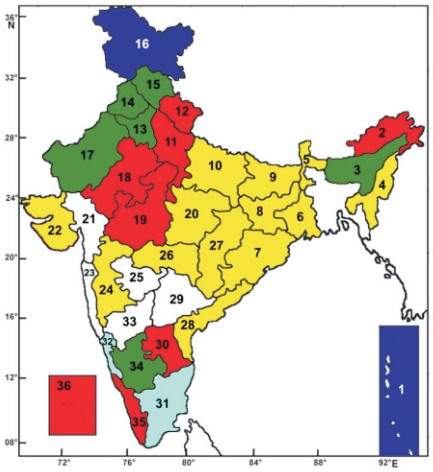


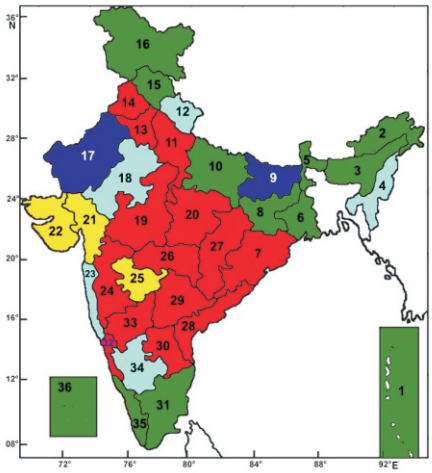
FIG. 6 : PERCENTAGE DEPARTURE OF AREA WEIGHTED SEASONAL AND ANNUAL RAINFALL OVER THE COUNTRY AS A WHOLE (1901-2017)



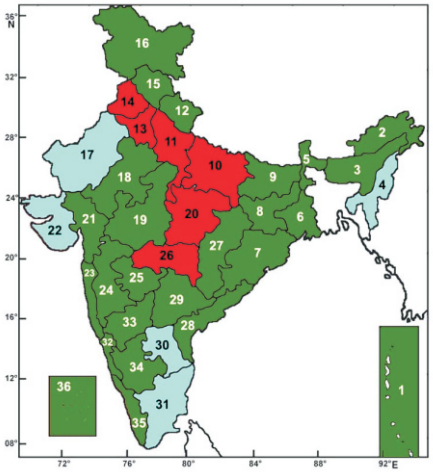
ANNUAL



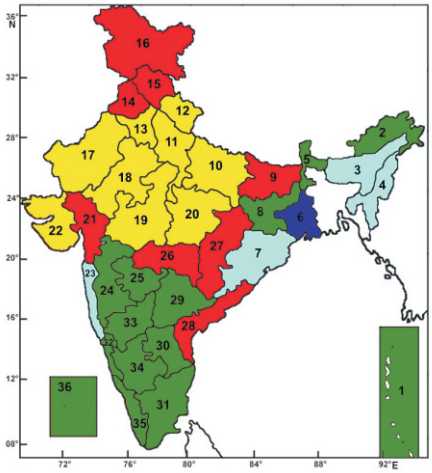
WINTER



PRE-MONSOON



MONSOON



POST-MONSOON

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%

(Figures indicates subdivision numbers)

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

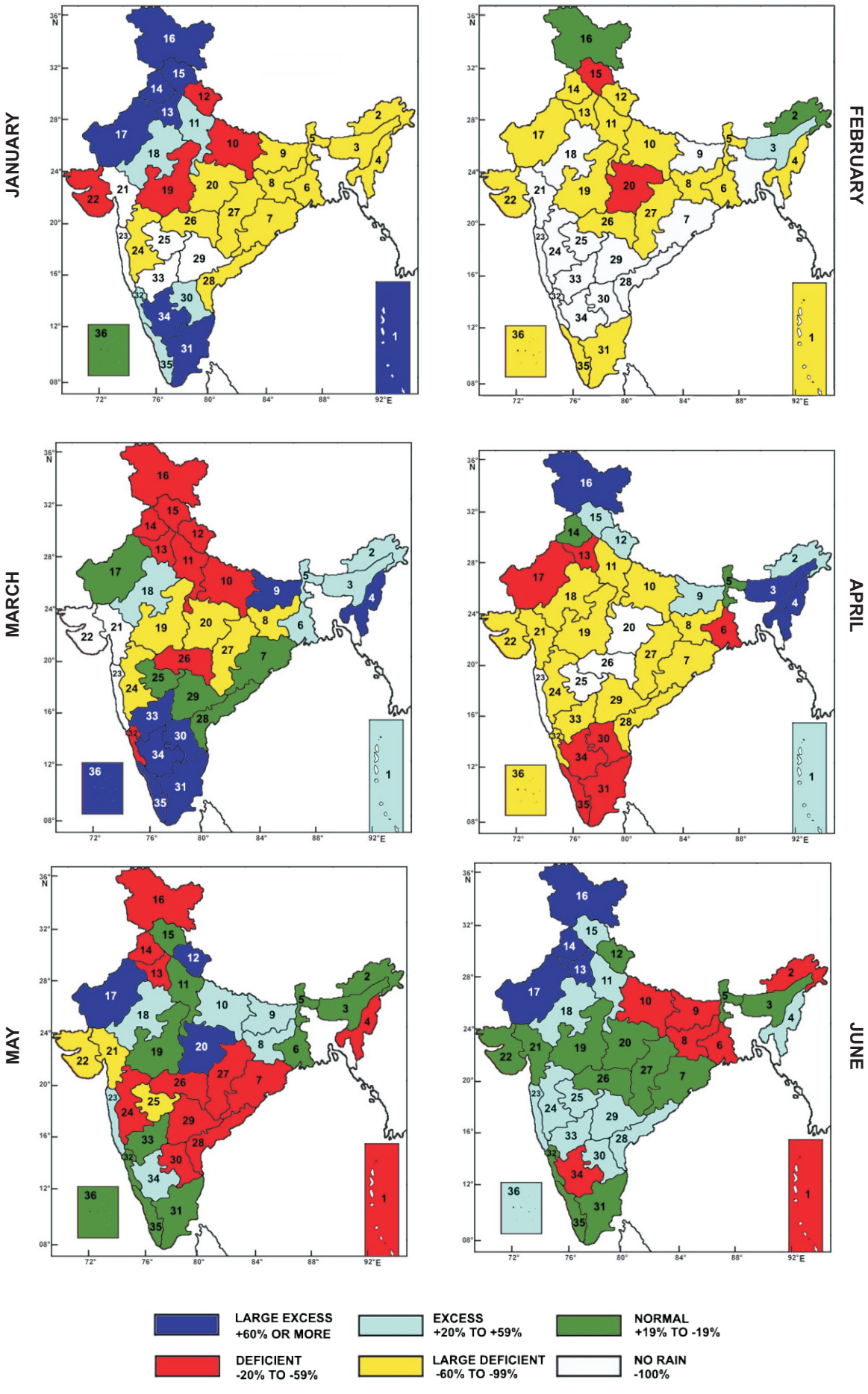


FIG.8 : SUB-DIVISIONWISE MONTHLY RAINFALL PERCENTAGE DEPARTURES FOR 2017

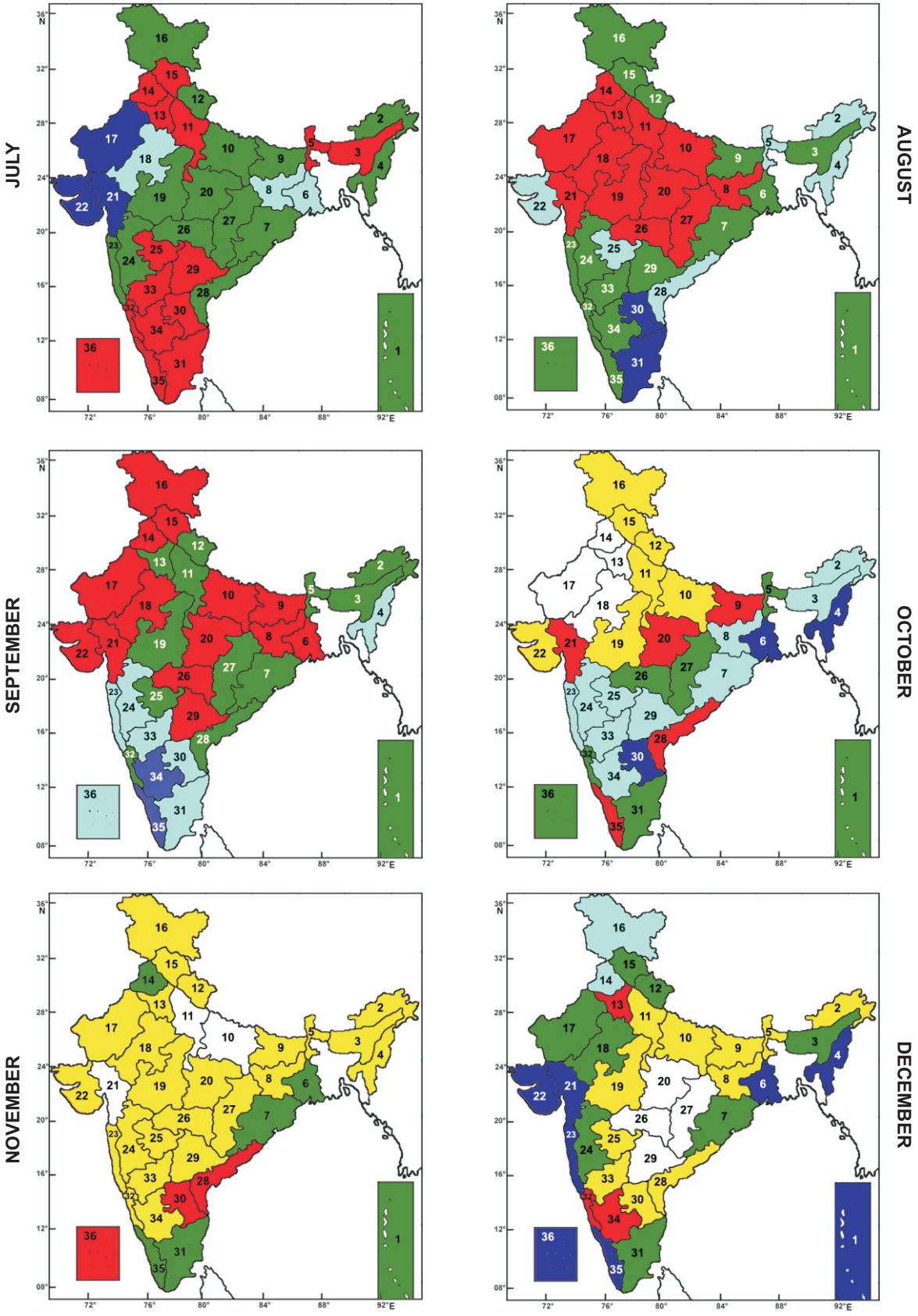

JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
LARGE EXCESS
+60% OR MORE
EXCESS
+20% TO +59%
NORMAL
+19% TO -19%
DEFICIENT
-20% TO -59%
LARGE DEFICIENT
-60% TO -99%
NO RAIN
-100%

FIG.8 : Contd.....

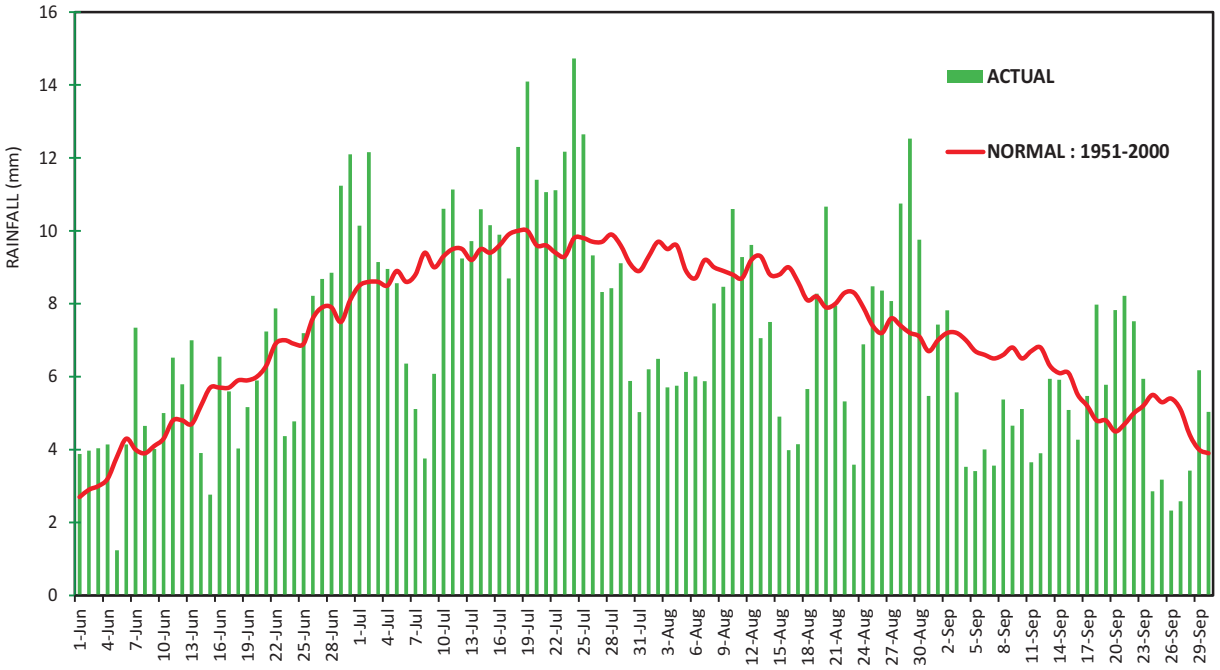


FIG. 9 : DAILY AREA WEIGHTED RAINFALL (mm) OVER THE COUNTRY AS A WHOLE (VERTICAL BARS) AND ITS LONG TERM AVERAGE (1951-2000) (CONTINUOUS LINE) 1 JUNE - 30 SEPTEMBER 2017

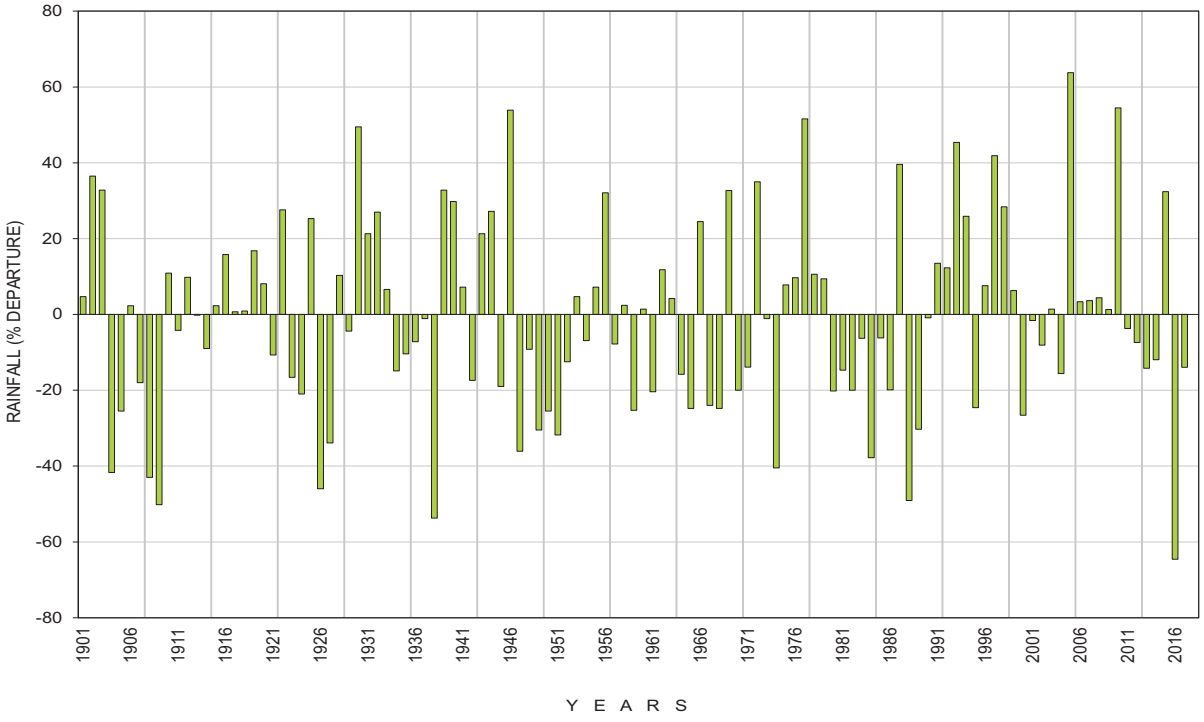


FIG. 10 : PERCENTAGE DEPARTURE OF RAINFALL DURING THE POST-MONSOON SEASON (OCTOBER TO DECEMBER) OVER THE SOUTH PENINSULA (1901-2017)

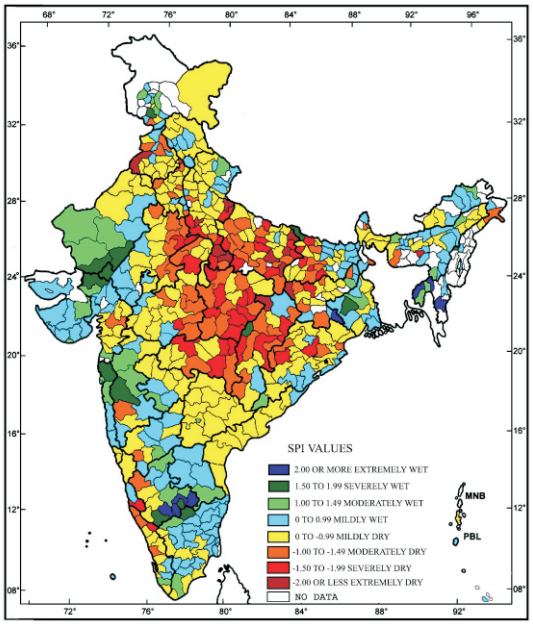
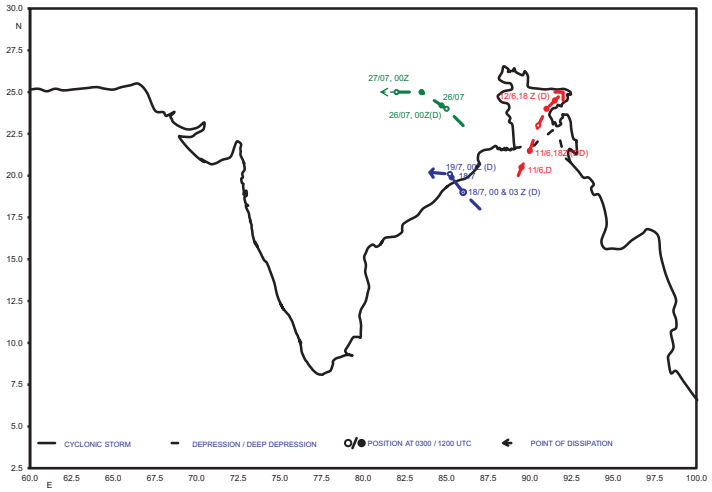
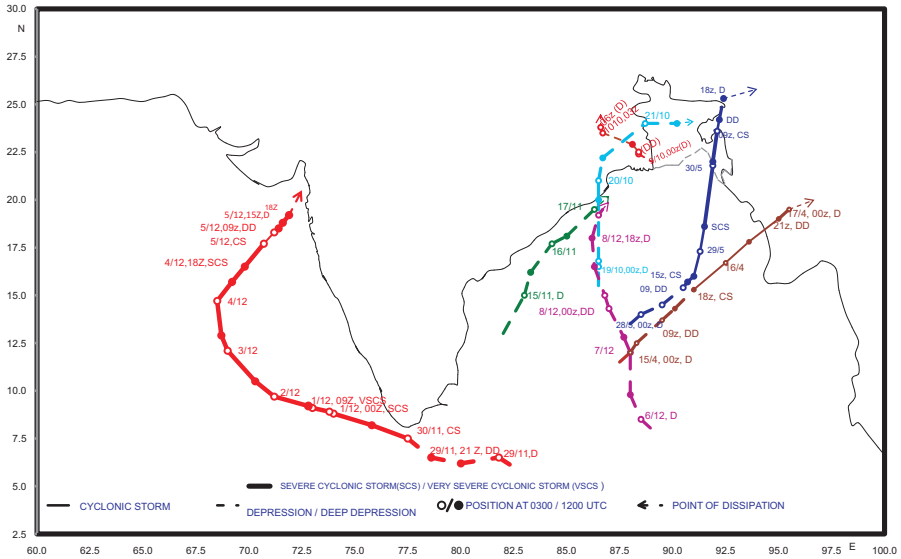


FIG. 11 : STANDARDIZED PRECIPITATION INDEX JAN - DEC 2017

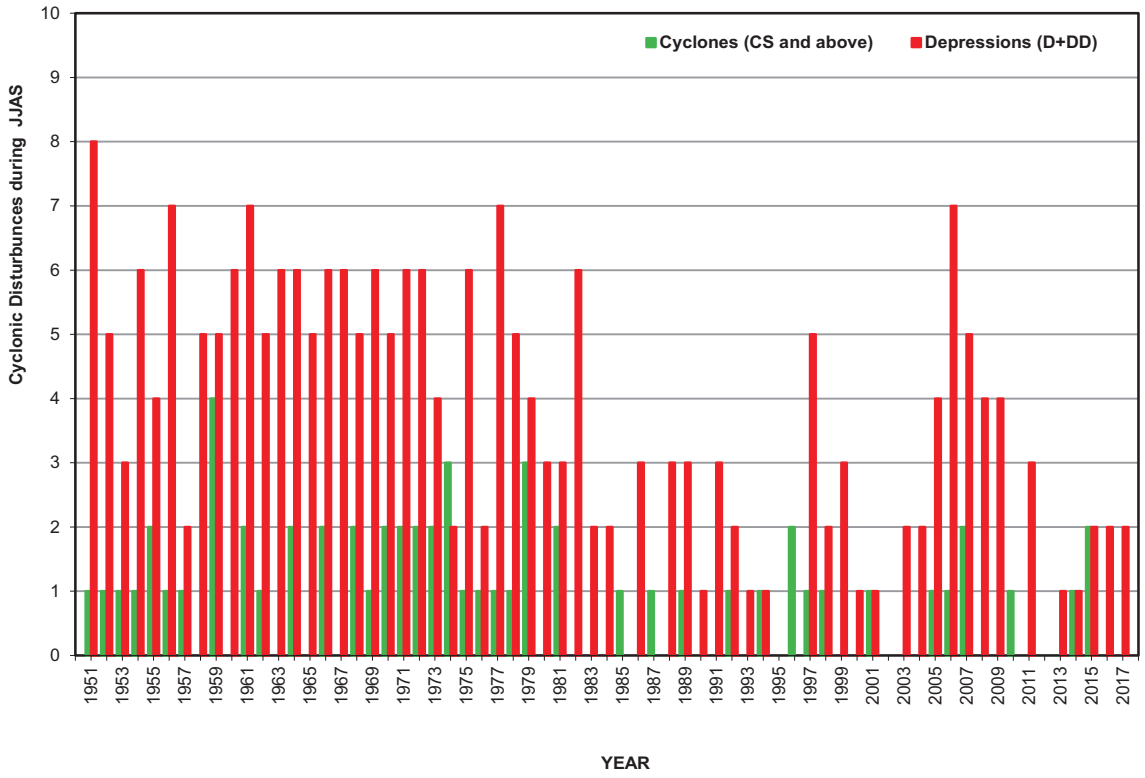


(a)

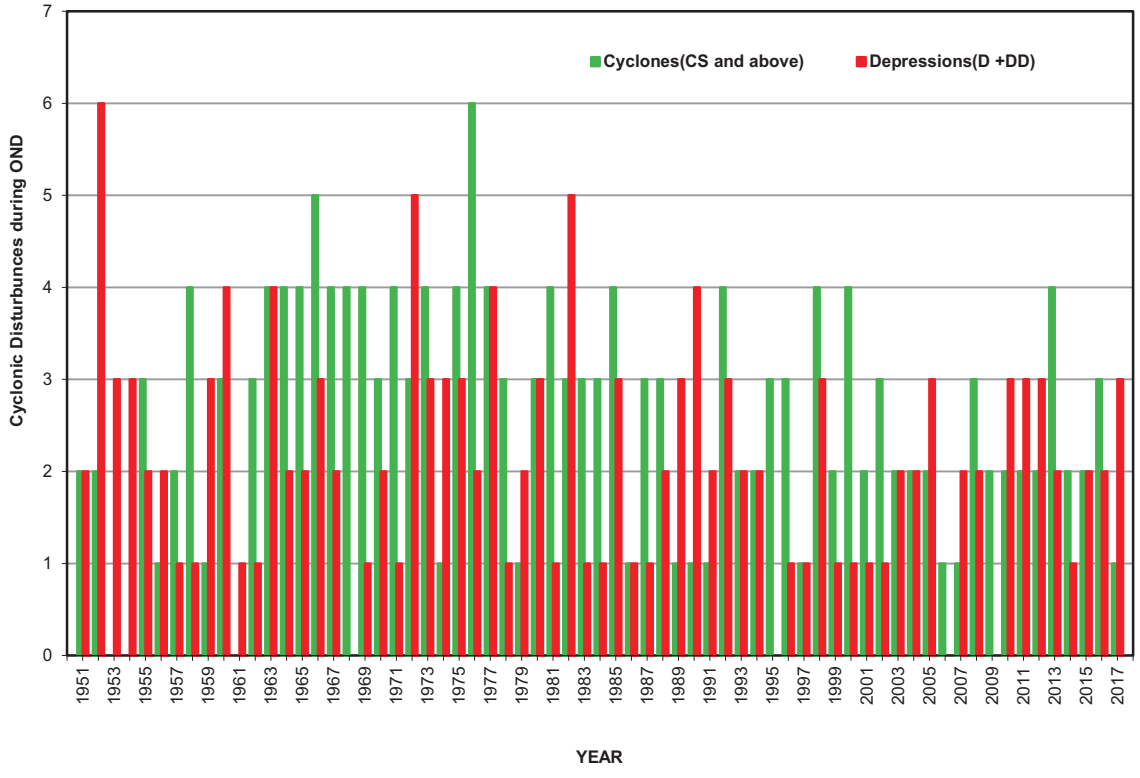


(b)

FIG. 12 : TRACKS OF DEPRESSIONS AND CYCLONIC STORMS FORMED DURING 2017
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 (1951-2017)

(a) 11 - 14 JANUARY

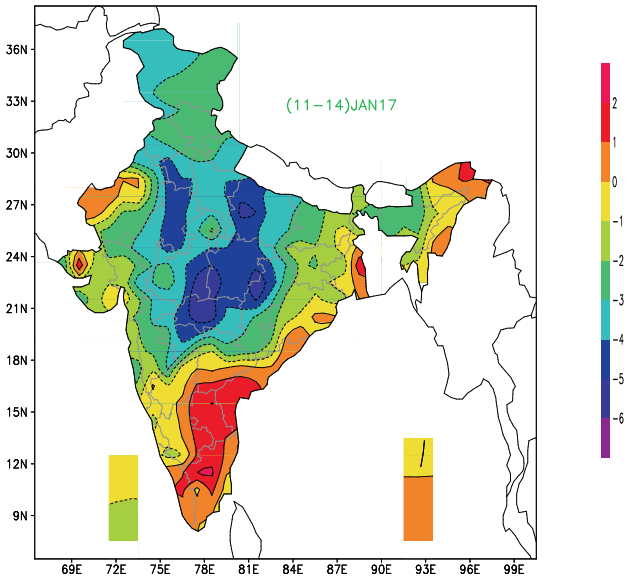
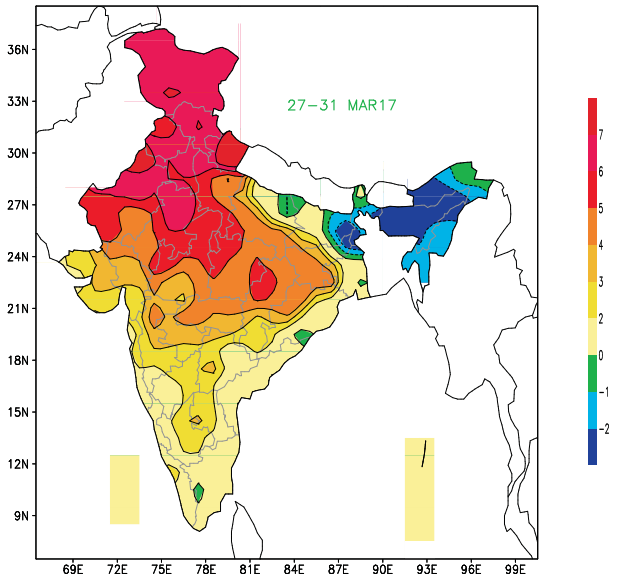


FIG. 14: MINIMUM TEMPERATURE ANOMALY (°C) DURING THE COLD WAVE PERIOD
(WITH RESPECT TO 1971 - 2000 AVERAGE)

(b) 27 - 31 MAR



(a) 14 - 19 APRIL

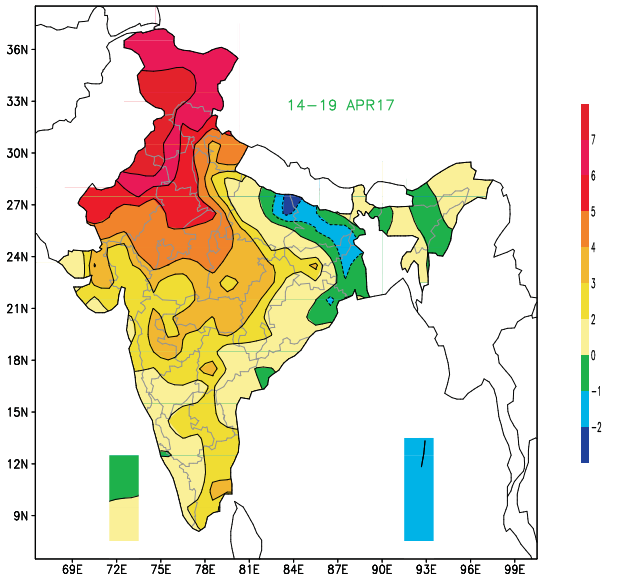


FIG. 15: MAXIMUM TEMPERATURE ANOMALY (°C)DURING THE HEAT WAVE PERIOD
(WITH RESPECT TO 1971 - 2000 AVERAGE)

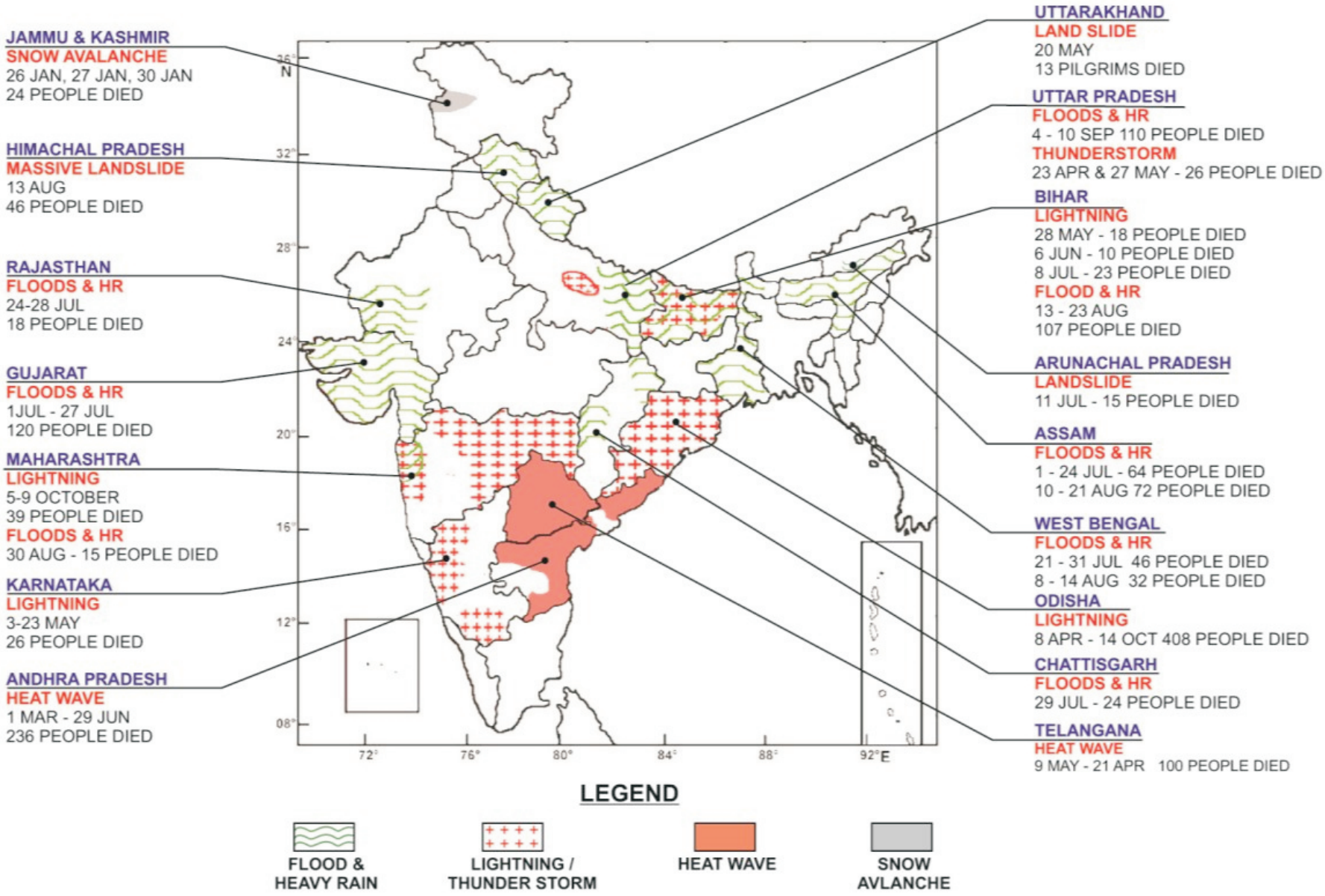


FIG.16 : SIGNIFICANT WEATHER EVENTS DURING 2017

TABLE - 1

METEOROLOGICAL SUB-DIVISION WISE SEASONAL AND ANNUAL RAINFALL STATISTICS FOR THE YEAR 2017 BASED ON OPERATIONAL DATA

S.NO	SUB-DIVISION	WINTER updated			PRE MONSOON updated			MONSOON updated			POST MONSOON updated			ANNUAL updated		
		ACT	NORMAL	%DEP	ACT	NORMAL	%DEP	ACT	NORMAL	%DEP	ACT	NORMAL	%DEP	ACT	NORMAL	%DEP
1	A & N ISLANDS	234.2	82.9	183	417.1	465.0	-10	1526.0	1682.5	-9	712.6	695.9	2	2890.0	2926.3	-1
2	ARUNACHAL PRADESH	94.4	148.1	-36	827.0	750.4	10	1583.5	1768.0	-10	240.3	267.2	-10	2745.3	2933.7	-6
3	ASSAM &MEGHALAYA	39.5	46.9	-16	695.9	590.2	18	1742.7	1792.8	-3	233.5	195.0	20	2711.7	2624.9	3
4	NAG.,MANI.,MIZO.,TRIP	12.7	44.0	-71	599.7	494.1	21	1829.8	1496.9	22	363.3	243.0	50	2805.4	2278.0	23
5	S.H.W.B.& SIKKIM	8.1	60.3	-87	458.2	457.1	0	2047.3	2006.2	2	171.3	185.3	-8	2684.9	2708.9	-1
6	GANGATIC W.B.	1.4	34.4	-96	167.3	164.8	2	1138.9	1167.9	-2	261.1	160.1	63	1568.6	1527.2	3
7	ODISHA	1.7	31.8	-95	93.8	134.7	-30	1053.1	1149.9	-8	195.9	144.1	36	1344.5	1460.5	-8
8	JHARKHAND	5.2	33.4	-84	66.6	79.4	-16	988.2	1091.9	-9	105.9	91.6	16	1165.8	1296.3	-10
9	BIHAR	0.7	23.0	-97	124.3	77.5	60	936.8	1027.6	-9	50.2	77.5	-35	1112.0	1205.6	-8
10	EAST U.P.	9.8	28.9	-66	32.2	31.7	2	650.0	897.6	-28	3.0	60.4	-95	695.0	1018.6	-32
11	WEST U.P.	23.1	33.3	-31	23.4	29.1	-20	536.5	769.4	-30	2.2	54.4	-96	585.2	886.2	-34
12	UTTARAKHAND	50.1	106.2	-53	205.6	156.0	32	1199.0	1229.1	-2	21.3	89.6	-76	1476.0	1580.9	-7
13	HAR., CHANDI. & DELHI	34.5	32.9	5	21.8	34.2	-36	359.4	466.3	-23	6.0	29.4	-80	421.6	562.8	-25
14	PUNJAB	45.5	49.5	-8	39.1	53.5	-27	390.1	491.9	-21	22.9	41.0	-44	497.5	635.9	-22
15	HIMACHAL PRADESH	204.0	195.5	4	207.3	244.9	-15	715.7	825.3	-13	55.2	108.2	-49	1182.2	1373.9	-14
16	JAMMU & KASHMIR	361.8	212.9	70	280.1	326.0	-14	543.9	534.6	2	93.1	131.8	-29	1278.9	1205.3	6
17	WEST RAJASTHAN	6.3	7.4	-15	33.6	19.1	76	365.9	263.2	39	2.4	9.5	-74	408.3	299.2	36
18	EAST RAJASTHAN	8.4	10.5	-20	21.3	17.4	23	566.9	615.8	-8	3.8	27.6	-86	600.3	671.3	-11
19	WEST M.P.	6.5	13.6	-52	8.5	13.5	-37	738.0	876.1	-16	16.0	53.1	-70	769.0	956.3	-20
20	EAST M.P.	11.3	35.3	-68	13.4	25.1	-46	795.8	1051.2	-24	19.5	57.8	-66	840.1	1169.4	-28
21	GUJARAT REGION	0.0	1.0	-100	0.21	6.7	-97	997.7	914.7	9	26.6	34.5	-23	1024.4	956.9	7
22	SAURASHTRA & KUTCH	0.1	0.3	-68	0.1	4.0	-96	645.8	477.5	35	6.1	29.5	-79	652.1	511.3	28
23	KONKAN & GOA	0.0	0.1	-100	47.0	37.2	26	3213.8	2914.7	10	182.6	149.1	22	3443.4	3101.1	11
24	MADHYA M'RASHTRA	0.0	1.9	-98	19.2	37.8	-49	852.3	729.3	17	122.9	107.8	14	994.4	876.8	13
25	MARATHAWADA	0.0	6.8	-100	8.1	30.3	-73	642.1	682.9	-6	105.4	101.6	4	755.6	821.6	-8
26	VIDARBHA	0.2	17.2	-99	13.4	30.9	-57	731.5	954.6	-23	57.9	81.8	-29	803.0	1084.5	-26
27	CHATTISGARH	1.6	20.8	-92	19.8	46.8	-58	1041.2	1153.3	-10	61.8	78.0	-21	1124.4	1298.9	-13
28	COASTAL A.P.	1.0	18.7	-95	52.0	97.0	-46	668.8	581.1	15	170.9	327.4	-48	892.7	1024.2	-13
29	TELANGANA	0.0	11.3	-100	34.3	56.8	-40	664.9	755.2	-12	116.4	119.3	-2	815.7	942.6	-13
30	RAYALASEEMA	3.9	6.6	-41	61.5	82.0	-25	507.2	398.3	27	261.8	219.2	19	834.5	706.1	18
31	TAMIL NADU & PUDU.	38.4	30.9	24	126.1	128.1	-2	414.6	317.2	31	393.9	438.2	-10	973.0	914.4	6
32	COASTAL KARNATAKA	1.1	0.9	20	141.0	178.8	-21	2593.2	3083.8	-16	212.3	262.8	-19	2947.6	3526.3	-16
33	N.I.KARNATAKA	0.0	3.9	-100	65.5	85.1	-23	520.5	506.0	3	153.7	145.3	6	739.6	740.3	0
34	S.I.KARNATAKA	5.0	4.4	13	191.8	145.2	32	665.2	660.0	1	199.8	209.6	-5	1061.7	1019.2	4
35	KERALA	13.0	24.3	-46	353.9	379.7	-7	1856.5	2039.6	-9	441.5	480.7	-8	2664.9	2924.3	-9
36	LAKSHADWEEP	22.2	35.5	-38	247.8	232.4	7	1108.3	998.5	11	360.7	333.6	8	1738.9	1600.0	9

TABLE - 2

STATION WISE TEMPERATURE AND RAINFALL EXTREMES FOR THE YEAR 2017

S.NO.	STATION NAME	MIN (0C)	DATE (MONTH_DATE)	MAX (0C)	DATE (MONTH_DATE)	HIGHEST 24 Hr. RAINFALL(mm)	DATE (MONTH_DATE)
1	Agartala AP	6.3	1_14	37.0	5_25, 6_7	125.1	9_11
2	Cherrapunji*	5.0	1_14	29.8	9_16	638.2	6_17
3	Dibrugarh AP	5.7	1_16	37.9	9_19	77.4	6_26
4	Guwahati AP	6.6	1_15	38.4	7_18	120.0	7_6
5	Imphal AP	3.0	1_20	33.6	6_8	97.6	3_31
6	Passighat	10.0	12_31	37.4	8_27	227.6	8_11
7	Shillong*	2.0	1_14	28.9	7_18	201.0	8_11
8	Tezpur	8.5	1_15	38.2	8_31	98.8	7_2
9	Baghdogra AP	4.7	1_13	39.4	7_18	189.2	7_10
10	Berhampore	9.2	1_6, 21	43.2	6_7	84.0	8_1
11	Kolkata	11.2	1_15	38.7	4_26	107.3	7_11
12	Cooch Behar AP	4.7	1_14	37.6	7_18	246.6	8_11
13	Contai	6.5	1_15, 16	38.0	4_28	158.6	9_18
14	Darjeeling*	1.0	1_7, 17	22.5	5_22, 23, 6_5, 6	34.7	5_15
15	Gangtok*	2.5	1_13	26.4	7_18	114.6	5_13
16	Jalpaiguri	6.2	1_13	37.6	7_16, 18	295.2	8_12
17	Kalimgpong*	5.5	1_13	29.0	7_18	71.0	8_12
18	Krishnanagar	10.0	1_1	40.0	3_30	67.0	5_27
19	Midnapore	9.8	1_16	41.0	5_20	87.2	6_24
20	Panagarh	6.7	1_14	41.8	3_30	162.6	10_10
21	Balasore	9.4	1_15	40.0	4_25	150.6	10_20
22	Bhubaneshwar AP	11.2	12_28	43.6	6_4	105.8	7_20
23	Chandbali	11.5	1_15	41.9	6_4	120.3	10_20
24	Gopalpur	14.5	1_16	35.5	9_17, 27	96.0	7_17
25	Jharsugda AP	8.4	1_15, 16	46.0	5_15, 17	80.9	9_19
26	Puri	13.2	1_15	36.0	5_21	156.8	10_20
27	Sambalpur	7.8	1_15	45.7	5_15	84.7	8_17
28	Daltonganj	4.7	1_14	45.9	6_4	125.2	7_26
29	Gaya AP	4.2	1_13	46.1	6_4	107.2	7_5
30	Jamshedpur AP	6.7	1_16	43.9	4_25	227.0	7_24
31	Patna AP	4.8	1_14	43.4	5_21	106.6	8_4
32	Purnea	4.3	1_13	38.0	4_28	150.8	8_13
33	Ranchi AP	5.1	1_15	43.2	5_15	205.8	7_26
34	Bahraich	3.8	1_13	41.6	5_25	75.6	7_11
35	Bareilly	3.3	1_11	42.9	5_25	70.0	7_7
36	Dehar Dun	2.9	1_11, 14	39.8	6_4	177.5	6_26
37	Gorakhpur	2.4	1_13	43.7	5_25	180.3	8_14
38	Jhansi	4.8	1_13	47.2	6_5	67.6	8_9
39	Lucknow AP	0.1	1_13	45.3	6_4	162.0	8_28
40	Mukteshwar**	-3.4	3_12	29.5	5_15	113.0	9_23
41	Varansai	4.9	1_14	46.5	6_4	119.2	7_25
42	Ambala	4.4	1_11	45.1	6_4	77.4	8_22
43	Chandigarh	2.7	1_11	45.4	6_4	120.8	7_28
44	Hissar	0.7	1_18	47.1	5_26	103.8	6_29
45	Karnal	5.5	12_27	43.8	6_5	140.4	6_28
46	New Delhi AP	3.2	1_14	44.6	6_4, 5	77.8	9_23
47	Amritsar AP	0.8	1_12	47.5	6_4	152.9	7_12
48	Patiala	2.7	1_11	46.3	6_4	184.0	8_28
49	Shimla*	-3.2	1_11	30.1	6_4	57.2	8_20
50	Banihal*	-6.7	1_19	35.5	6_4	139.0	1_26
51	Gulmarg*	-14.4	1_14	14.0	3_30	87.2	1_25
52	Jammu AP	3.1	1_13	45.1	6_4	83.0	7_26
53	Srinagar*	-6.8	1_14	33.7	8_6	83.9	4_6
54	Ajmer	3.0	1_13	44.0	5_8	61.4	5_30
55	Barmer	7.0	1_10, 11	46.4	6_3	64.2	7_1
56	Bikaner	2.0	1_10	46.4	5_27	43.7	8_25
57	Ganganagar	-1.1	1_12	48.3	5_26, 27	36.2	9_1
58	Jaipur AP	3.8	1_11	45.1	5_27	65.0	7_24
59	Jaisalmer	5.0	1_11	47.0	5_26	36.8	7_18
60	Jodhpur AP	4.3	1_12	45.0	6_3	71.8	7_23
61	Kota AP	5.8	1_13	47.2	5_27	102.6	8_8
62	Udaipur	2.2	1_13	43.8	4_15	53.8	6_27
63	Ambikapur	4.2	1_14	44.0	5_15	156.0	6_30
64	Betul	2.5	1_13	43.7	5_14, 27	81.7	7_20
65	Bhopal(AP)	4.0	1_13	45.1	5_27	87.2	7_21
66	Guna	4.0	1_12	46.5	5_27	96.4	7_28
67	Gwalior	3.0	1_12	46.5	6_4	107.6	8_28
68	Indore(AP)	6.3	1_13	42.7	5_14	65.6	6_6
69	Jabalpur	4.6	1_14	44.1	5_27	122.6	7_21
70	Jagdalpur	6.9	12_28	42.4	5_18	191.4	7_19
71	Khandwa	7.0	1_13	45.1	5_14	162.0	7_13
72	Nowgong	2.6	1_14	46.6	5_8	130.0	8_8
73	Pendra	4.8	1_13	43.5	5_15	94.0	8_10
74	Ratlam	4.5	1_14	43.9	4_16	107.4	7_14
75	Sagar	4.8	1_13	45.1	5_27	132.0	9_21

TABLE - 2 (CONTD.)

S.NO.	STATION NAME	MIN (0C)	DATE (MONTH_DATE)	MAX (0C)	DATE (MONTH_DATE)	HIGHEST 24 Hr. RAINFALL(mm)	DATE (MONTH_DATE)
76	Satna	4.3	1_14	46.0	6_4	136.0	7_12
77	Seoni	6.4	1_13, 14	43.4	5_27	92.0	8_29
78	Umaria	1.9	1_13	44.6	5_16	70.7	7_5
79	Ahmedabad AP	9.5	1_17	43.6	4_13, 14, 5_13, 19	179.6	7_27
80	Baroda	6.5	1_13	43.4	4_13	141.8	7_22
81	Bhavnagar AP	11.0	1_12	44.2	4_17	96.0	8_29
82	Bhuj AP	9.4	1_12	45.8	4_13	92.4	7_16
83	Deesa	6.0	1_12	44.4	4_13	268.8	7_25
84	Dwarka	13.2	2_7	39.2	4_10	61.4	8_30
85	Naliya	4.8	2_7	43.0	4_11	294.0	7_16
86	New Kandala	9.4	1_11	45.1	4_14	238.4	7_18
87	Porbandar AP	8.0	1_11	43.4	4_13	115.6	6_30
88	Rajkot AP	8.3	1_11	44.8	4_13	347.6	7_15
89	Surat	12.2	1_12	43.0	4_12	126.0	6_10
90	Veraval	11.8	1_10	42.8	4_11	151.5	7_21
91	Akola	8.0	1_12, 13	45.7	5_14, 25	66.2	8_29
92	Ahmadnagar	4.9	1_4	44.3	4_18	126.8	8_21
93	Aurangabad AP	7.6	1_11	41.8	5_8	87.8	9_16
94	Buldhana	8.8	1_12	42.6	5_25	92.0	9_16
95	Chandrapur	10.0	1_13	47.2	5_24	96.0	7_19
96	Dahanu	12.6	1_13	37.6	2_16, 6_3	304.6	9_20
97	Harnai	16.3	1_12	36.7	10_30	373.6	9_19
98	Jalgaon	7.4	1_13	44.6	4_17	137.0	6_11
99	Kolhapur	12.1	1_7	40.0	4_18	65.2	9_25
100	Mahabaleshwar*	9.0	3_12	35.9	3_27, 4_13	248.4	9_20
101	Malegaon	7.0	1_12	44.6	4_18	67.0	6_4
102	Mumbai	16.5	1_12	38.2	2_18	210.0	9_20
103	Nagpur AP	7.2	1_13	46.2	5_15	141.9	8_19
104	Panjim	17.5	1_7	36.9	3_1	140.9	6_1
105	Parbhani	8.4	1_12, 12_28	44.2	4_16, 18	97.0	8_20
106	Pune	7.4	1_12	41.1	5_5, 12	101.3	10_14
107	Ratnagiri	15.4	1_5, 13, 12_29	39.3	2_24	132.9	6_10
108	Sholapur	10.4	1_4	43.8	4_18	61.0	6_12
109	Yeotmal	8.4	1_12	45.0	5_25	48.8	8_15
110	Anantpur	13.6	12_29	43.7	4_27	104.3	10_2
111	Hyderabad AP	10.8	12_20	43.2	5_24	113.7	8_26
112	Kakinada	17.6	1_18	42.6	5_31	61.8	7_1
113	Kalingapatnam	13.5	12_28	42.6	5_30	104.5	11_16
114	Kurnool	16.2	12_21, 29	44.3	5_20	64.4	10_10
115	Machilipatnam	17.9	1_20	47.3	5_18	56.6	6_8
116	Nellore	19.9	1_18	45.2	5_18	75.4	9_4
117	Nizamabad	11.3	12_20	45.0	5_24, 25	96.0	8_20
118	Ongole	19.1	12_21	46.1	5_18	55.2	10_2
119	Ramgundam	9.9	12_29	46.0	5_18	72.2	6_11
120	Chennai AP	18.4	1_8, 2_7	43.6	5_18	168.7	10_31
121	Coimbatore	17.4	1_1	39.0	4_1, 27	112.9	9_2
122	Cuddalore	18.0	2_8	41.9	5_18	140.4	10_31
123	Kanyakumari	20.4	12_2	36.2	7_25	96.3	12_1
124	Kodaikanal*	6.0	12_30, 31	23.1	5_17, 19	131.2	12_1
125	Madurai AP	11.3	2_21	42.0	7_26	95.0	8_13
126	Nagapattinam	19.0	2_7	41.1	5_17	119.8	11_5
127	Palayamkottai	20.4	2_17, 18	41.5	4_17, 5_17	134.0	11_2
128	Pamban	19.0	2_7	35.8	4_8, 16	131.3	1_28
129	Salem	18.9	1_19	41.0	4_15	64.8	8_1
130	Tiruchirapalli AP	18.2	2_7, 11	42.1	5_16	45.0	9_3
131	Vellore	14.6	2_10	44.1	4_23	74.0	8_2
132	Bangalore*	14.2	12_29	37.2	3_25	83.4	5_27
133	Chitradurga	13.7	12_29	39.2	4_25	106.8	10_12
134	Gadag	12.2	12_29	39.8	4_18	52.3	10_4
135	Gulbarga	12.8	12_29	43.8	4_17	101.6	9_14
136	Honavar	16.5	1_8	37.6	1_22, 23, 2_18	151.4	6_10
137	Karwar	15.5	1_4	38.4	1_23, 2_15	106.2	7_19
138	Mangalore AP	19.0	1_10	37.9	3_1	84.3	9_16
139	Medikeri*	8.3	12_25	32.5	3_31	119.2	7_20
140	Mysore	10.4	1_1	36.8	4_2	137.0	9_27
141	Raichur	11.8	1_5	43.4	5_24	56.0	9_6
142	Alapuzha	20.2	12_29	37.5	2_15, 4_2	95.2	5_30
143	Cochi AP	21.6	2_18	34.4	2_15	148.6	10_28
144	Kozhikode	20.5	12_29	38.6	5_6	100.0	9_17
145	Thiruvananthapuram	20.5	12_3	37.2	2_16	73.4	6_3
146	Car Nicobar	18.4	2_10, 3_10	35.6	4_26	147.0	12_5
147	Port Blair	19.1	1_15	34.6	5_20	214.7	6_6
148	Amini Divi	21.5	12_26, 31	35.6	4_29	98.5	3_16
149	Minicoy	21.2	1_12	34.3	5_5	191.1	12_1

(:Hill stations)*







वार्षिक जलवायु सारांश - 2017

ANNUAL CLIMATE SUMMARY - 2017

जलवायु निगरानी तथा विश्लेषण समूह
Climate Monitoring & Analysis Group

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

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