GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
INDIA METEOROLOGICAL DEPARTMENT

ANNUAL CLIMATE SUMMARY 2010

ISSUED BY
NATIONAL CLIMATE CENTRE
OFFICE OF THE
ADDITIONAL DIRECTOR GENERAL OF METEOROLOGY (RESEARCH)
INDIA METEOROLOGICAL DEPARTMENT
PUNE - 411 005

HIGHLIGHTS

The year 2010 was characterized by record high mean annual temperature for the country. The southwest (summer) monsoon season although was near normal, there was large spatial and temporal variability. Northwestern and peninsular parts of the country received considerably above normal rainfall, while eastern and northeastern region received below normal rainfall. Northeast monsoon activity over the south peninsula (northeast monsoon region comprising of 5 subdivisions viz. Coastal Andhra Pradesh, Rayalaseema, Tamil Nadu & Pondicherry, South Interior Karnataka and Kerala) was above normal. The northeast monsoon rainfall over the south peninsula was 154% of its Long Period Average (LPA), which is the second highest since 1901 after 2005 (164%).

TEMPERATURE

Spatial pattern of annual mean, maximum and minimum temperature anomalies for 2010 are shown in Fig.1. Maximum, minimum and mean temperatures were above normal over most parts of the country. Maximum temperatures were above normal by more than 1.5 to 2^{0}C over parts of Himachal Pradesh, Uttaranchal, Jharkhand and northern parts of Chattisgarh. Minimum temperatures were above normal by more than 2^{0}C over parts of northwestern, northern and central regions of the country and parts of Marathwada.

The annual mean temperature for the country as a whole during 2010 was +0.93 ^{0}C above average, thus making the year 2010 the warmest year on record since 1901 (Fig. 2a). This superceded the previous five warmest years, which have all occurred since the turn of the century, notably 2009 (0.92), 2002(0.71), 2006(0.60), 2003(0.56), 2007(0.55). Mean monthly temperature over the country as a whole was the highest since 1901 for March (*+2.27 ^{0}C above average)*, April (*+2.03^{0}C*) and November *(+1.16 ^{0}C)* and the second highest for May 2010 (*+1.17 ^{0}C),* since records began. The recent decade (2001-2010) was the warmest decade on record over India with decadal mean temperature anomaly of + 0.60^{0}C.

Time series and trends 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 1901-2010 are shown in Figs 2b, 2c, 2d and 2e respectively. ***The mean temperature for the pre-monsoon season was 1.8^{0}C above average, thus making the season the warmest on record since 1901.***

Spatial pattern of trends in mean annual temperature anomalies (Fig.3) suggests significant positive (increasing) trend over most parts of the country except some parts of Rajasthan, Gujarat and Bihar, where significant negative (decreasing) trends were observed.

Fig.4 shows the spatial pattern of monthly maximum and minimum temperature anomalies. All seasons except the monsoon season were noticeably warmer.

During the winter season, maximum temperatures were above normal by 3 to 4 ^{0}C over extreme northern and northeastern region in January while same were above normal by 2^{0}C over northwestern parts of the country and by 3^{0}C over some parts of Himachal Pradesh in February However, maximum temperatures were below normal by 2 to 5 ^{0}C over most parts of Gangetic plains in January. Minimum temperatures over different parts of the country were generally above normal by 1 to 2 ^{0}C during both the months.

During pre-monsoon months, maximum temperatures were above normal by 2 to 4 ^{0}C over central and eastern parts of the country and by 4 to 6 ^{0}C over northwestern /northern parts of the country, while minimum temperatures were also above normal by about 2 to 6^{0}C over central/ northwestern and hilly areas of western Himalayan in March. During April, maximum temperatures were above normal by about 2 to 4 ^{0}C and over northern/ northwestern parts of the country by 4 to 5 ^{0}C.

Minimum temperatures were above normal by 2 ^{0}C over most parts of peninsula and some parts of northeastern region. Over northwestern/ northern parts of the country, minimum temperatures were above normal by nearly 3 to 5 ^{0}C. During May, over most parts of northwestern and adjoining northern/central region and over parts of Vidarbha & Marathwada, maximum temperatures were above normal by 2^{0}C. Over some parts Himachal Pradesh, these were above normal by more than 3^{0}C. Minimum temperatures were also above normal l by 2 to 3^{0}C over northwestern, adjoining central and some northern parts of the country in the month.

During monsoon season (June, July, August and September), anomalies in maximum and minimum temperature over most parts of the country were generally within $\pm$ 2^{0}C.

During post-monsoon season, maximum temperatures were generally above normal by about 1^{0}C over most parts of the country in October, while minimum temperatures were above normal by 2^{0}C over some parts of Rajasthan, Gujarat, West Madhya Pradesh and Nagaland, Mizoram, Manipur & Tripura in the month. During November, anomalies in maximum temperatures were generally of the order of 1^{0}C, while minimum temperatures were above normal throughout the country and were more than 3 to 4^{0}C over the north peninsula and adjoining central parts of the country. During December, maximum temperatures were below normal over most parts of the country except some parts of northern and northeastern region. Minimum temperatures were above normal over most parts of the country except parts of northern/northwestern and eastern region and parts of peninsula. However, these anomalies were generally of the order of 1^{0}C.

Fig.5 shows the mean monthly minimum and maximum temperature anomalies for the country as a whole during past five years, 2006-2010. It may be seen that positive anomaly in both the maximum and minimum temperature during 2010 was the highest in the last five years for March, April and May months. Also, the minimum temperature anomaly during June, October and November was the highest in last five years.

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 2010, the annual rainfall over the country as a whole was 101 % of its Long Period Average (LPA) value. Season wise rainfall distribution over the country as a whole was as follows:

Winter (January to February) : **56% of LPA**
Pre-monsoon (March to May): **95% of LPA**
Monsoon (June to September) : **102% of LPA**
Post-monsoon (Oct to Dec): **121% 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 near normal (101 % of LPA). Except for subdivisions of northeast India, East Madhya Pradesh and Punjab, entire country received excess/normal rainfall. Out of 36 meteorological subdivisions, 10 received excess rainfall, 20 received normal rainfall and remaining 6 subdivisions received deficient rainfall.

Winter (January-February)

During the season, out of 36 meteorological subdivisions, 8 received excess rainfall, 3 received normal rainfall, 9 received deficient rainfall and 16 received scanty rainfall.

Pre-monsoon (March-May)

During the season, out of 36 meteorological subdivisions, 5 received excess rainfall, 10 received normal rainfall, 8 received deficient rainfall and 12 received scanty rainfall**. Remaining one subdivision viz.** Gujarat Region did not receive any rain.

Monsoon (June-September)

The 2010 southwest monsoon rainfall over the country as a whole was normal. Many subdivisions of south peninsula and northwest India received excess rainfall, while central parts of the country received normal rainfall. However, subdivisions of east/northeast India generally received less rainfall. Rainfall deficiency was near /exceeded 20 % over Gangetic West Bengal, Jharkhand and Bihar during all the four months of the season.

During the season, out of 36 meteorological subdivisions, 14 received excess rainfall, 17 received normal rainfall and remaining 5 subdivisions received deficient rainfall. For the country as a whole, seasonal rainfall at the end of southwest monsoon season was 102% of its Long Period Average (LPA) value. The LPA value of southwest monsoon rainfall calculated with the data of the period 1941-1990, is 89 cm.

Daily area weighted rainfall (mm) over the country as a whole during the monsoon season 2010 (1st Jun. to 30th Sep.) and its long term normal is shown in Fig. 9. For the country as a whole, rainfall was generally near to above normal on most of the days during the season, except for some days, during the last 10 days of June, middle of July, first week of August and last week of September.

Post-monsoon (October-December)

During the season, out of 36 meteorological subdivisions, 18 received excess rainfall, 7 received normal rainfall, 10 received deficient rainfall and the remaining 1 subdivision (East Uttar Pradesh) received scanty rainfall.

Rainfall activity over the south peninsula (northeast monsoon region, comprising of 5 subdivisions viz. Coastal Andhra Pradesh, Rayalaseema, Tamil Nadu & Pondicherry, South Interior Karnataka and Kerala) during the season as a whole was above normal (154% of LPA, which is the second highest since 1901 after 2005 (164%)). It was normal during October (100% of LPA) and above normal during November and December (231% and 182% of LPA respectively). During the season, all the five subdivisions of south peninsula received excess rainfall (nearly one and half times of their respective normal rainfall).

Time series of northeast monsoon seasonal rainfall over the south peninsula is shown in Fig. 10.

TROPICAL STORMS IN THE INDIAN SEAS

During 2010, 4 cyclonic storms (maximum wind speed exceeding 33 knots), one each in the pre-monsoon and the monsoon season and 2 during the post-monsoon season, formed over the Indian Seas. Decreasing trend in the frequency of intense systems continued during the year. Three depressions also formed over the Indian seas during the post-monsoon season. The details of these systems are given below:

The first severe cyclonic storm of the year ***(Laila)*** formed during the pre-monsoon season in May. It was first seen as a low pressure area over the southeast Bay of Bengal and neighbourhood on 16th May. It rapidly concentrated into a ***depression*** on the same day and then into a ***deep depression*** on 17th. Subsequently moving west northwestwards, it intensified into a ***cyclonic storm (Laila)*** at 0000 UTC of 18th, near Lat. 11.5^{0}N/Long. 86.5^0 E (about 700 km southeast of Chennai). Moving in a northwesterly direction, it further intensified into a ***severe cyclonic storm*** at 0600 UTC of 19th near Lat. 13.5^{0}N/Long. 81.5^0 E. Moving initially in a northwesterly direction and then in a northerly direction, it crossed the Andhra Pradesh coast near Bapatla, between 1100 and 1200 UTC of 20th. It weakened into a ***cyclonic Storm*** close to Bapatla and after remaining stationary for some time, it re-curved and moved in a north northeasterly direction. It weakened into a ***deep depression*** on 21st close to Machilipatnam and then into a ***depression*** close to Kakinada. Thereafter, it rapidly weakened into a low pressure area and became less marked in the evening of 22.

The second cyclonic storm of the year, a ***very severe cyclonic storm (Phet)*** formed over the Arabian Sea during the monsoon season in the beginning of June. The cyclonic storm was first seen as a low pressure area over the east central and adjoining west central Arabian Sea on 31st May. It rapidly concentrated into a ***depression*** at 0600 UTC of 31st near Lat. 15.0^{0}N/Long. 64.0^0 E and then into a ***deep depression*** at 0000 UTC of 1 June. It moved northwestwards and further intensified into a ***cyclonic storm (Phet)*** at 0900 UTC of the same day and lay centred near Lat. 16.0^{0}N/Long. 63.0^0 E. Continuing its northwestward movement, it intensified into a ***severe cyclonic storm*** at 0000 UTC of 2nd and lay centred near Lat. 17.5^{0}N/Long. 61.5^0 E. Moving slightly westwards, it further intensified in to a ***very severe cyclonic storm*** at 0600 UTC of the same day. It continued its northwesterly movement till 0300 hrs. UTC of 3rd and then moved in a northerly direction and crossed the Oman coast near Lat.21.5^{0}N between 0000 & 0200 UTC of 4th and weakened into a ***severe cyclonic storm.*** Continuing its northward movement, it emerged into the northwest Arabian Sea and further weakened in to a ***cyclonic Storm* on** 5th. Re-curving northeastwards it weakened in to a ***deep depression*** on 5th and then into a ***depression*** on 6th. Moving east northeastwards, it crossed Pakistan coast close to Karachi between 1230 &1330 UTC of 6th and lay centred at 1500 UTC, near Lat.25.0^{0}N / Long.68.0^{0}E (about 220 km northnortwest of Naliya). Further moving eastwards, it lay centred at 0300 UTC of 7th over west Rajasthan, close to Barmer. It weakened into a well marked low pressure area over east Rajasthan and adjoining northwest Madhya Pradesh in the evening of 7th and became less marked on 8th morning.

The third Cyclonic Storm ***(Giri)*** (first of the post-monsoon season) formed over the Bay of Bengal on 21st October and crossed the Myanmar coast on 22nd. It was first seen as a low pressure area over the east central Bay of Bengal and neighbourhood on 19th. It concentrated into a ***depression*** at 1200 UTC of 20th near Lat. 17.5^{o}N / Long.91.5^{o}E and then into a ***cyclonic storm (Giri)*** at 0600 UTC of 21st. Subsequently, moving northeastwards, it intensified into a ***severe cyclonic storm*** at 00 UTC of 22nd, (near Lat. 18.5^o N / Long. 92.5^o E) and further intensified into a ***very severe cyclonic storm*** at 0300 UTC of same day near Lat. 19.0^o N / Long. 93.0^o E. Continuing its north northeasterly movement, it crossed the Myanmar coast at around 1400 UTC of 22nd. Further moving northeastwards, it weakened into a Cyclonic storm at 00 UTC and then into a ***depression*** at 0600 hrs. UTC of 23rd and became less marked on 24th.

The last cyclonic storm ***(Jal)*** of the year (second ***of the post-monsoon season)*** formed over the Bay of Bengal in November. It was first observed as a low pressure area over the south Andaman Sea and neighbourhood on 2nd November. It concentrated into a ***depression*** on 4th near Lat. 8.0^0 N/Long. 92.0^0 E and then into a ***deep depression*** on 5th. Moving in a northwesterly direction, it intensified into a ***cyclonic storm (Jal)*** and lay centred near Lat. 9.5^0 N/Long. 87.0^0 E at 1200 hrs UTC of 5th. Taking a westnorthwesterly course, it further intensified into a ***severe cyclonic storm*** at 2100 hrs UTC of 5th and lay centred near Lat. 10.0^0 N/ Long. 86.0^0 E. Moving in a northwesterly direction, it weakened into a ***cyclonic storm*** 0600 hrs UTC then into a ***deep depression*** at 1500 UTC of 7th. Moving northwestwards, it crossed north Tamil Nadu-south Andhra Pradesh coasts, close to north of Chennai between 1700 & 1800 hrs UTC of

7th and lay over coastal areas of north Tamil Nadu-south Andhra Pradesh, near Lat. 13.5^0 N/ Long. 80.0^0 E (about 60 kms northwest of Chennai). Moving westnorthwestwards, it weakened into a ***depression*** on 8th. It further weakened into a well marked low pressure area over south interior Karnataka and adjoining areas at 0600 hrs UTC. On 9th morning, the well marked low pressure area was seen over east central Arabian Sea. Moving northwards it crossed Saurashtra & Kutch on 10 & 11 and became less marked on 13th.

During the post-monsoon season, apart from these cyclonic storms, three depressions were also formed over the Bay of Bengal. Of these, two formed in October and one in December.

The tracks of the depressions and cyclonic storms formed during the monsoon season and remaining seasons is shown in Fig.11.

Frequency of depressions and cyclonic storms formed over the north Indian Ocean (1951-2010) during the monsoon and post-monsoon season is shown in Fig.12.

EXTREME WEATHER EVENTS

During the winter season, severe cold wave/cold wave conditions prevailed over the northern plains on most of the days during January. Maximum temperature over a number of stations of the northern plains was 5 to 10^{0}C below normal on many occasions. These conditions claimed more than 600 lives.

Severe heat wave / heat wave conditions prevailed over northern, northwestern and central parts of the country almost throughout the season from second fortnight of March to the end of May, thus making the season the warmest pre-monsoon season since 1901. These heat wave conditions claimed more than 300 lives.

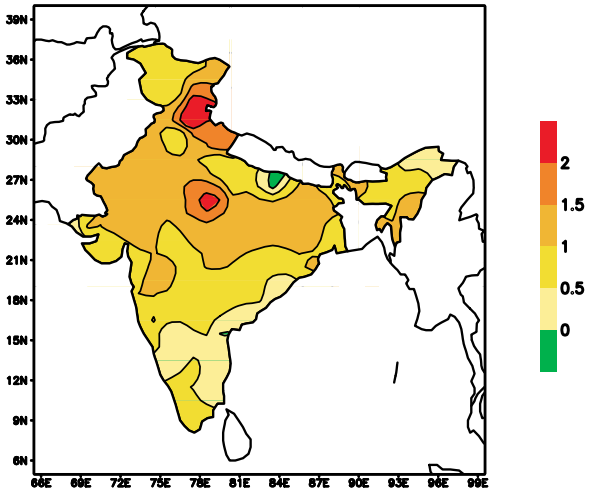
Death toll due to heavy rains / floods in different parts of the country, during the southwest monsoon season, was more than 500 (mostly from northern and northwestern parts). A cloud burst on 6 August in Leh (Jammu & Kashmir) claimed more than 150 lives and over 500 people were missing.

During the monsoon season, moderate drought conditions (rainfall deficiency of 25 % to 50%) prevailed over 2 meteorological sub-divisions viz. Jharkhand and Gangetic West Bengal.

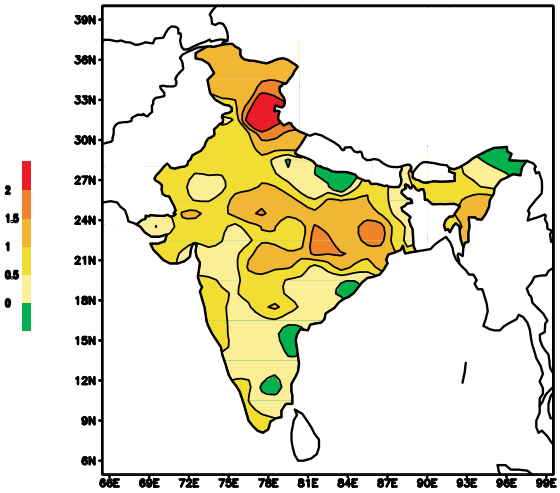
Northeast monsoon over the south peninsula was vigorous on many days during the season thus claiming over 150 lives from Tamil Nadu alone.

Significant weather events during 2010 and associated loss of lives and damages are shown in Fig. 16.

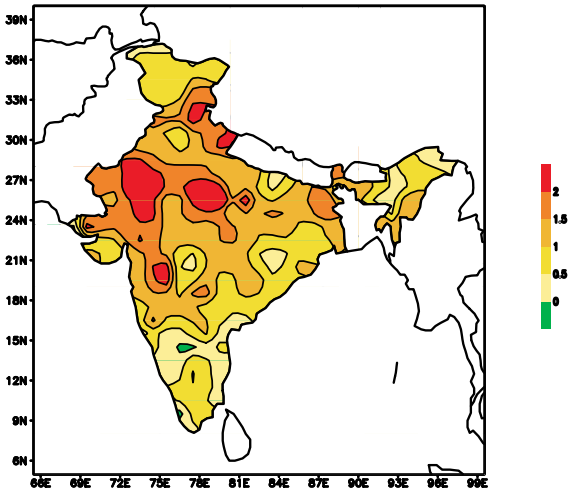
The highest maximum & lowest minimum temperature and highest rainfall in 24 hours recorded over a station during the year 2010 with the dates of occurrences (for 120 stations) are given in Table 2.



(a) MEAN

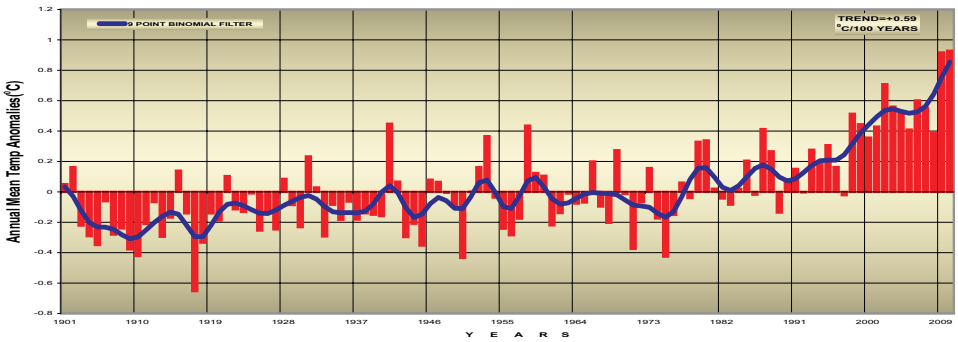


(b) MAXIMUM



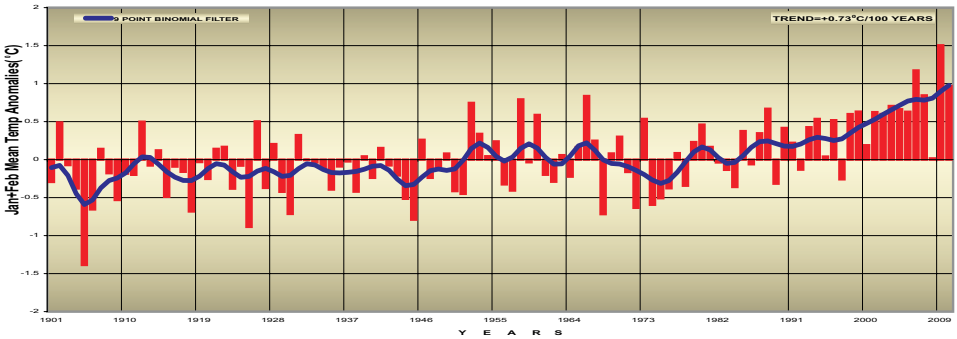
(c) MINIMUM

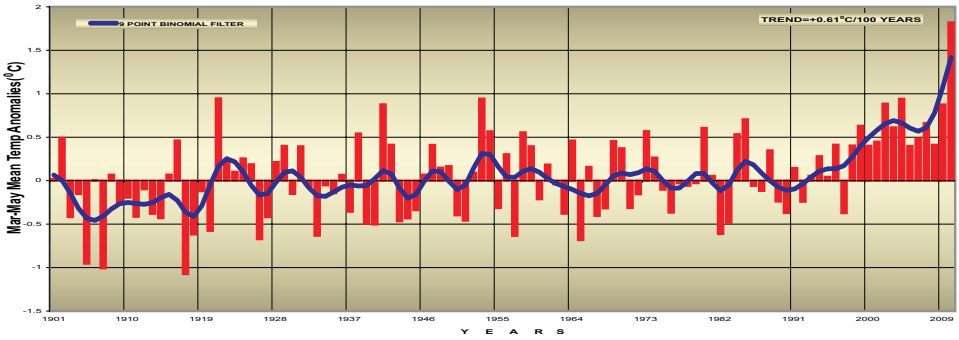
FIG. 1 : ANNUAL TEMPERATURE ANOMALIES (°C)
FOR 2010 WITH RESPECT TO 1971 - 2000 AVERAGE



(A) ANNUAL

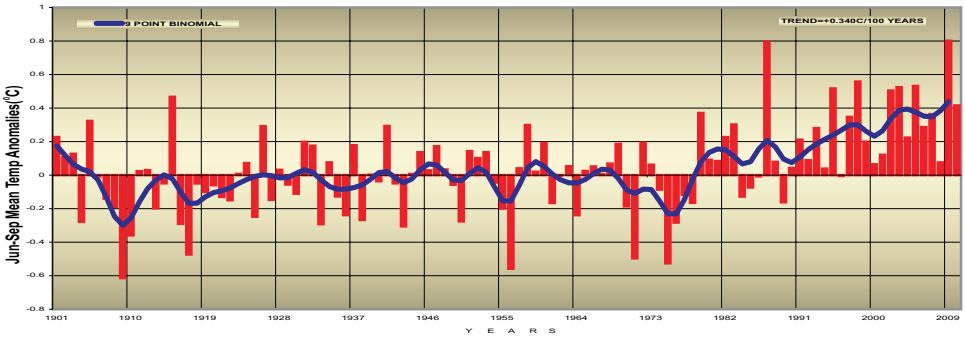
(B) WINTER
(Jan-Feb)

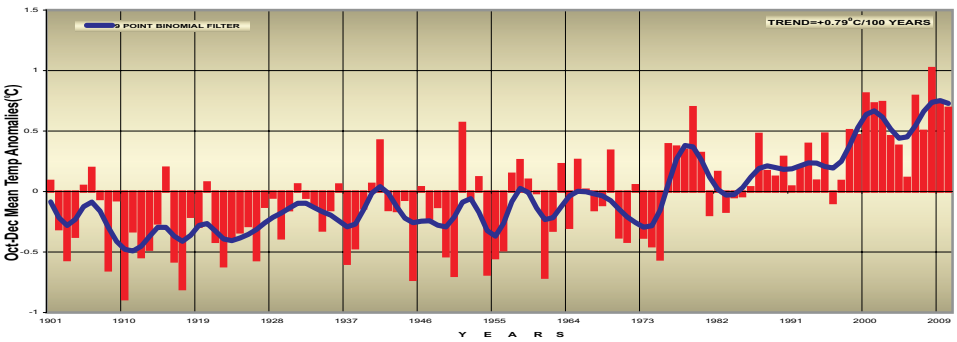




(C) PRE MONSOON
(Mar-May)

(D) MONSOON
(Jun-Sept)





(E) POST MONSOON
(Oct-Dec)

FIG. 2 : ALL INDIA MEAN TEMPERATURE ANOMALIES (A) ANNUAL, (B) WINTER, (C) PRE MONSOON, (D) MONSOON AND (E) POST MONSOON FOR THE PERIOD 1901 - 2010 SHOWN AS VERTICAL BARS. THE SOLID BLUE CURVE HAD SUB-DECADAL TIME SCALE VARIATIONS SMOOTHED WITH A BINOMIAL FILTER
(DEPARTURES FROM THE 1961 - 1990 AVERAGE)

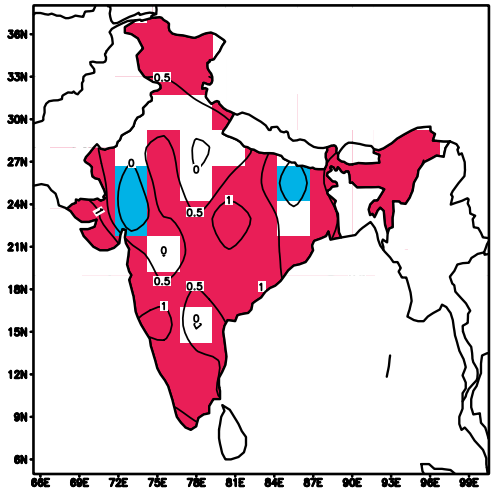
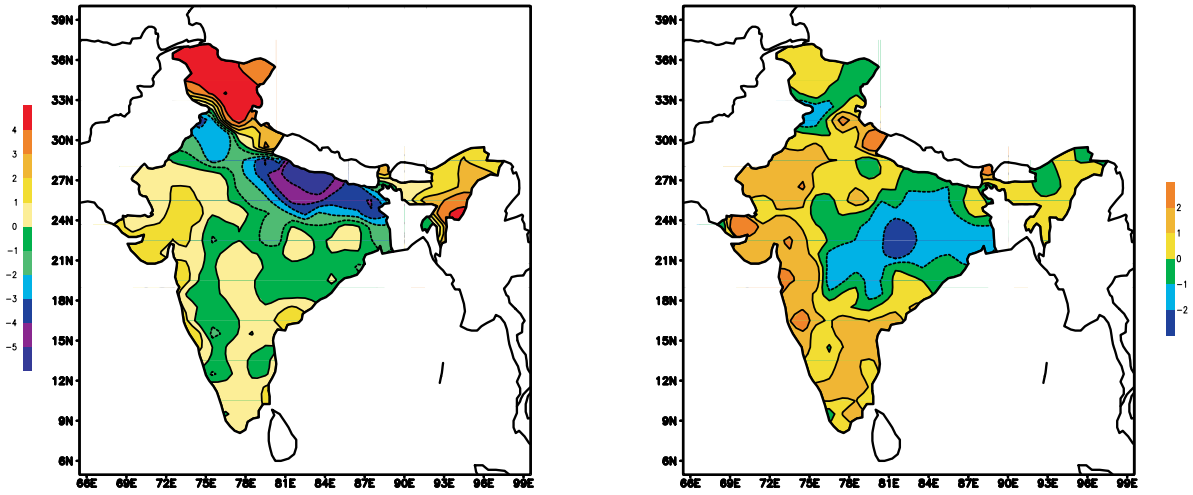


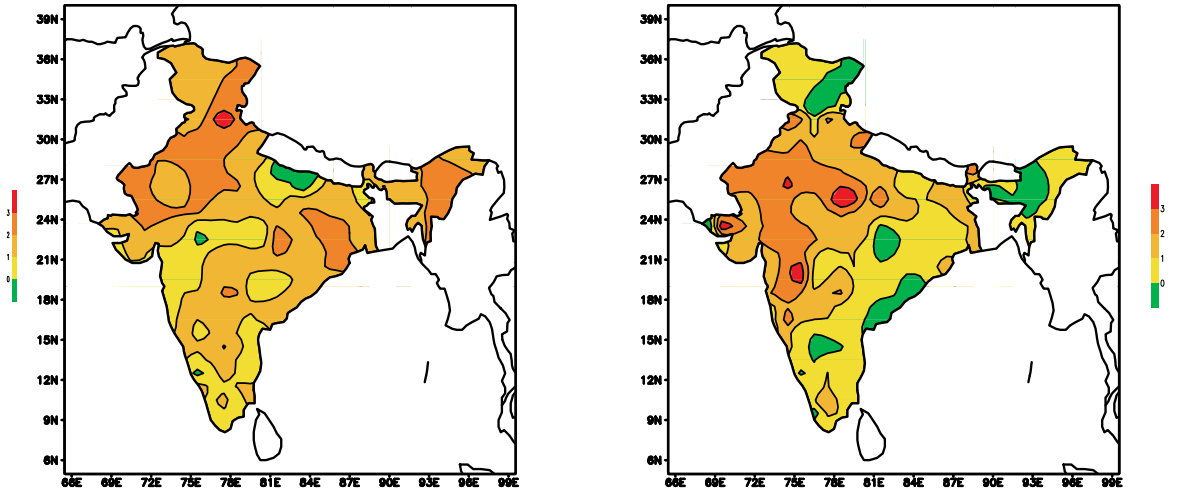
FIG. 3 : ANNUAL MEAN TEMPERATURE TRENDS (°C / 100 YEARS) ARE SHOWN AS CONTOUR LINES. THE TRENDS SIGNIFICANT AT 95% LEVEL ARE SHADED. POSITIVE TRENDS ARE SHOWN IN RED WHILE THE NEGATIVE TRENDS ARE SHOWN IN BLUE. PERIOD OF ANALYSIS : 1901 - 2010

JANUARY



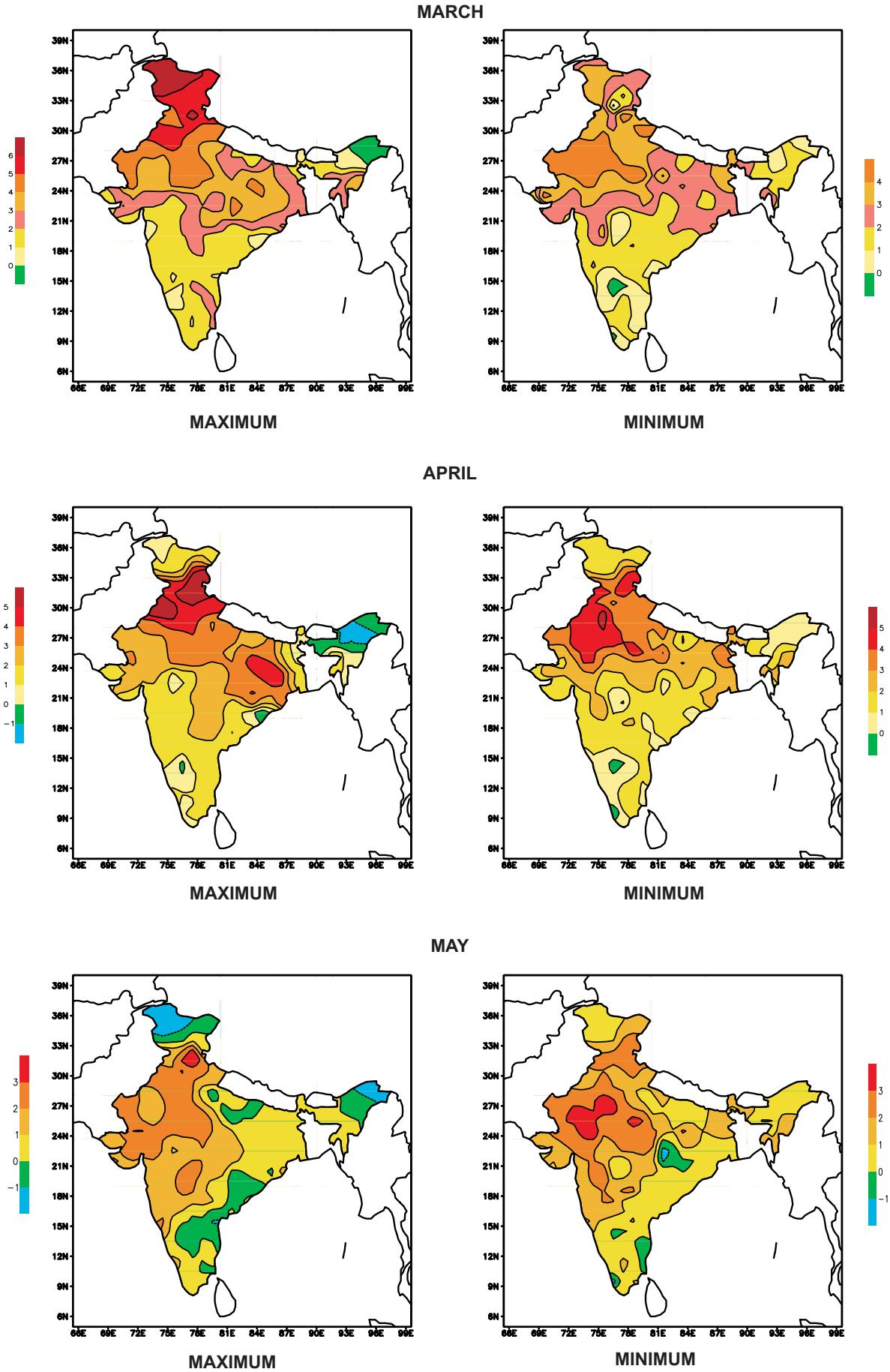
MAXIMUM MINIMUM

FEBRUARY



MAXIMUM MINIMUM

FIG. 4 : MONTHLY MEAN MAXIMUM AND MINIMUM TEMPERATURE ANOMALIES(°C) IN 2010 WITH RESPECT TO 1971 - 2000 AVERAGE



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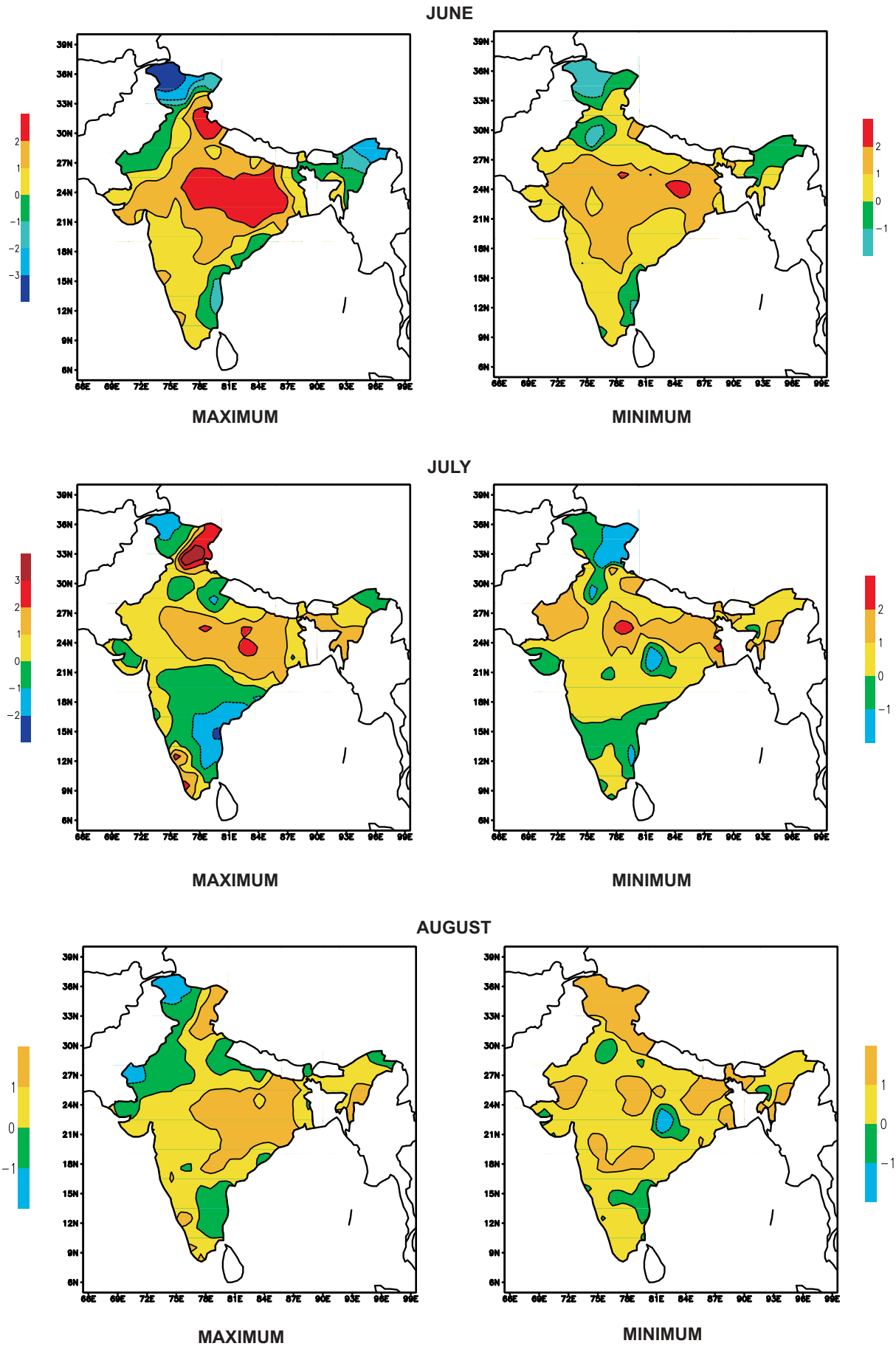

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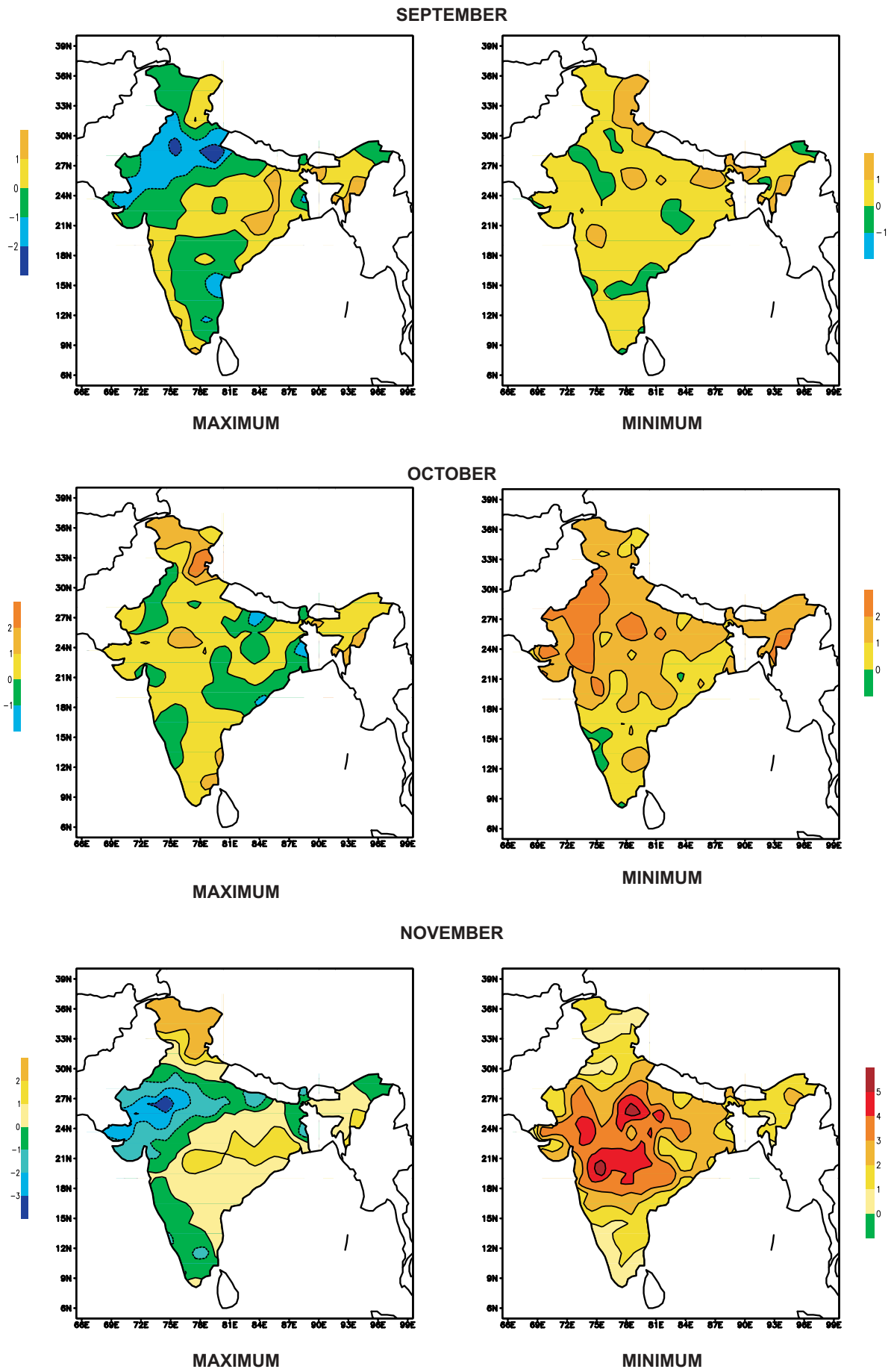
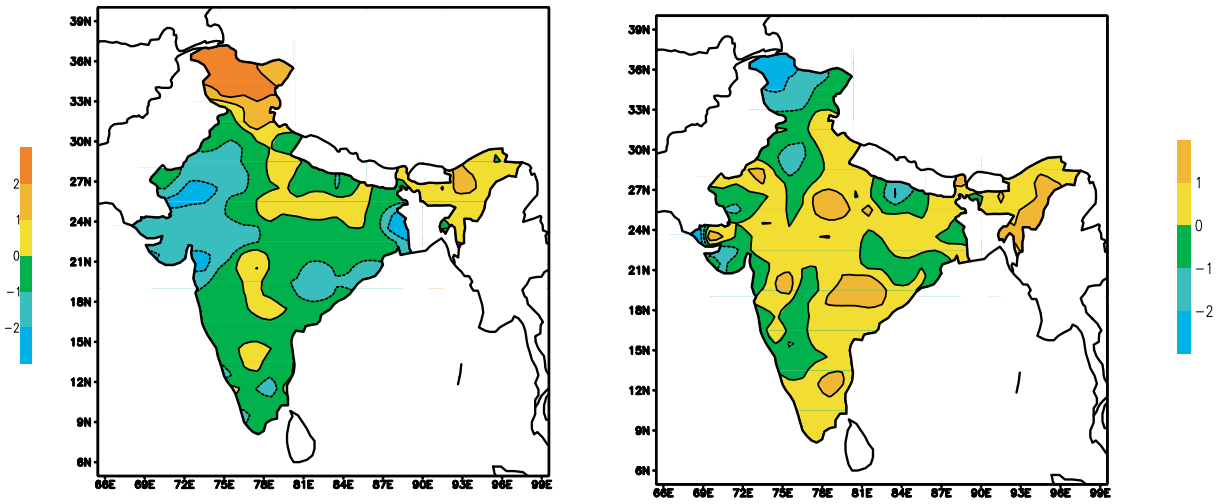


FIG. 4 : MONTHLY MEAN MAXIMUM AND MINIMUM TEMPERATURE ANOMALIES(°C) IN 2010 WITH RESPECT TO 1971 - 2000 AVERAGE

DECEMBER



MAXIMUM MINIMUM

FIG. 4 : MONTHLY MEAN MAXIMUM AND MINIMUM TEMPERATURE ANOMALIES(°C) IN 2010 WITH RESPECT TO 1971 - 2000 AVERAGE

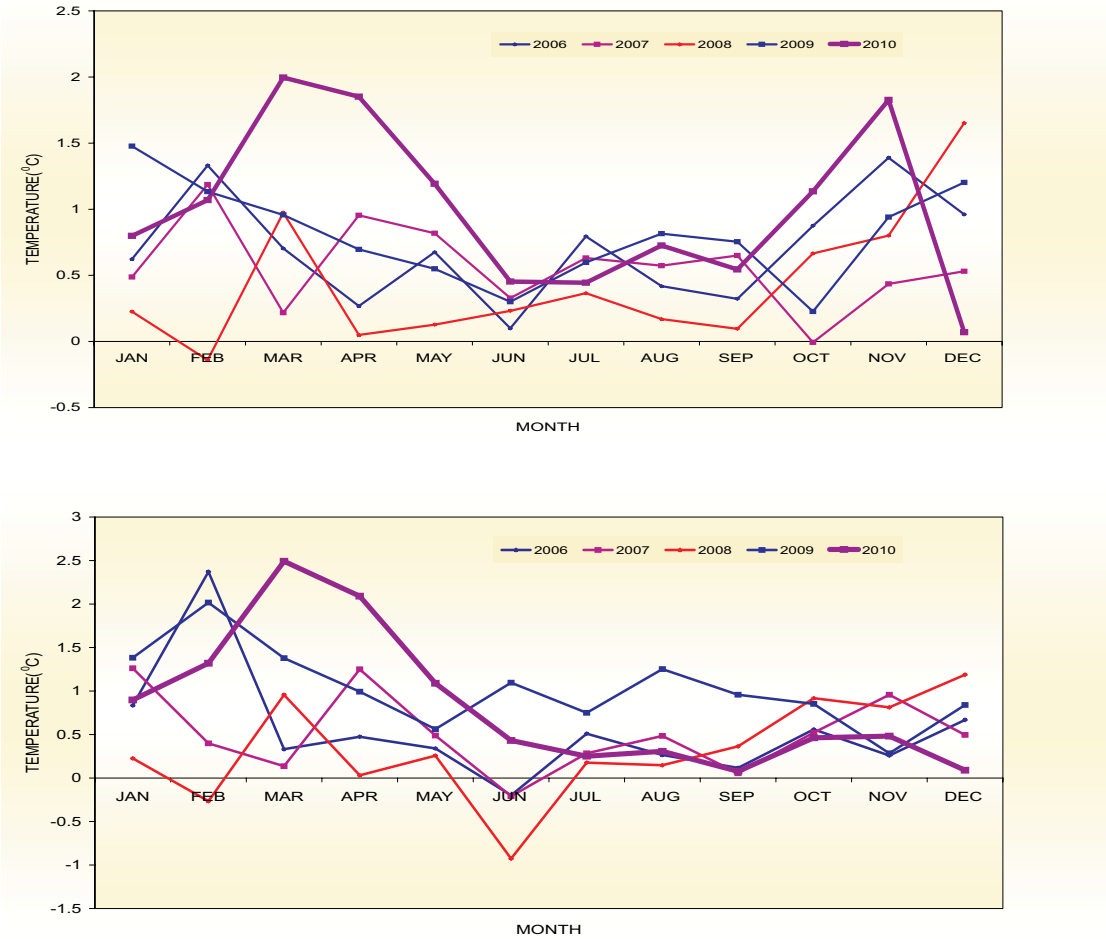


FIG. 5 : MEAN MONTHLY (a)MINIMUM AND (b)MAXIMUM TEMPERATURE ANOMALIES(2006 - 2010)

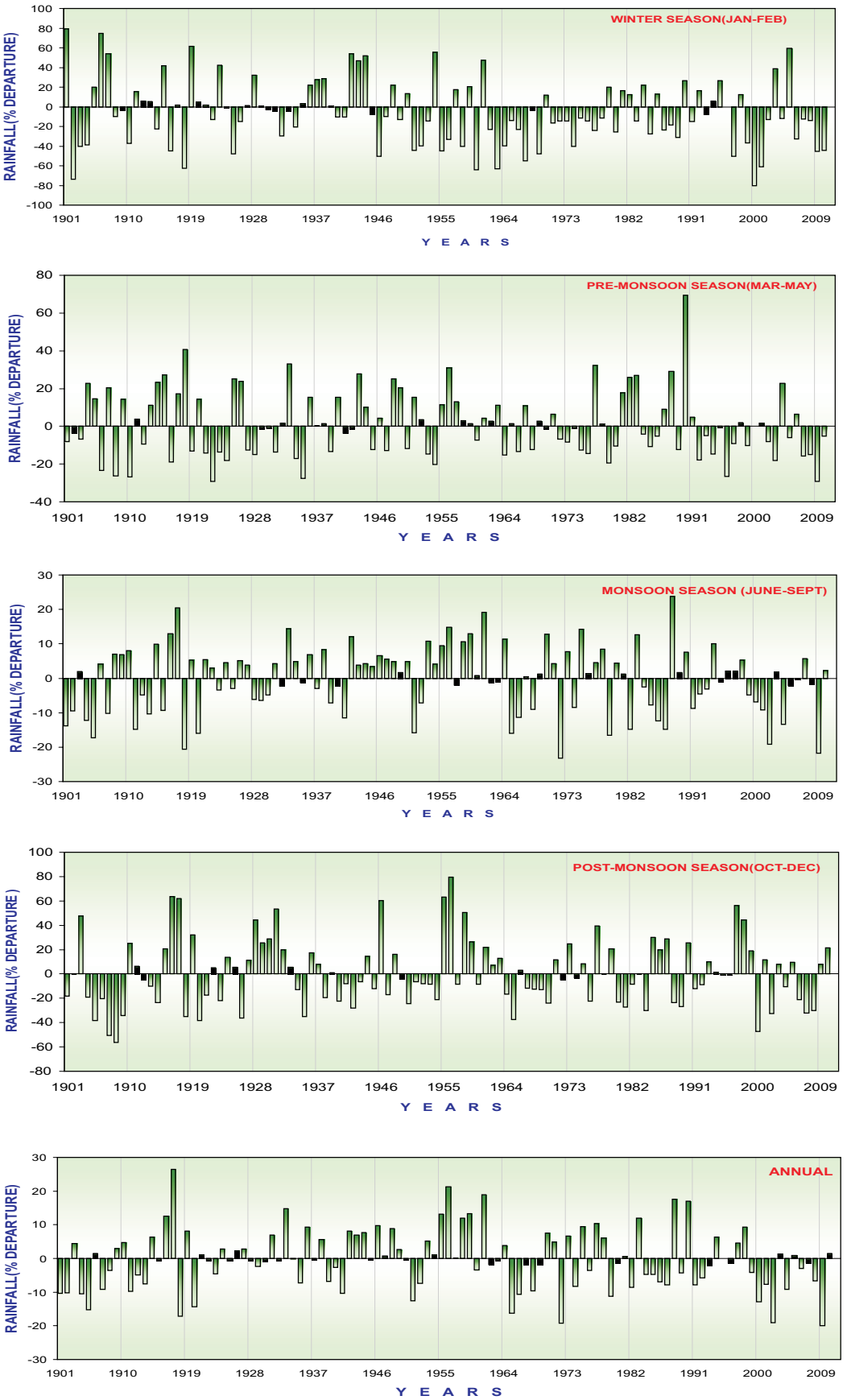
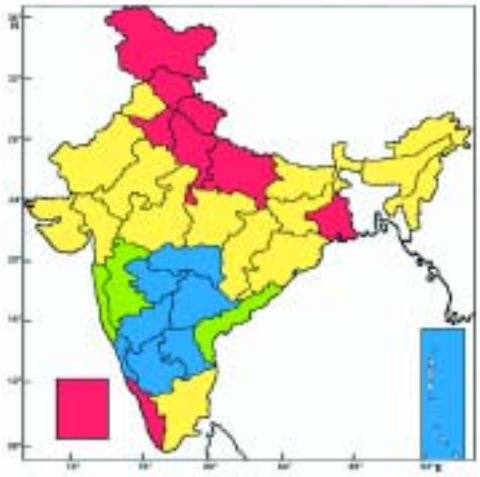


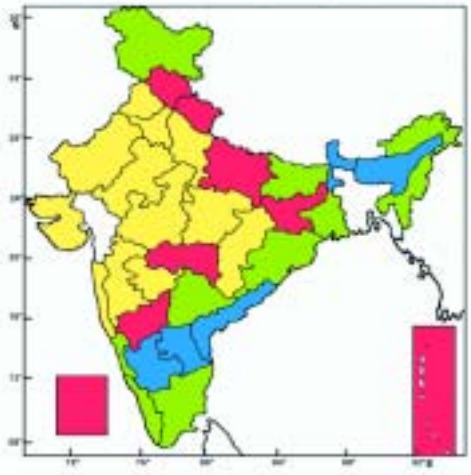
FIG. 6 : PERCENTAGE DEPARTURE OF AREA WEIGHTED SEASONAL AND ANNUAL RAINFALL OVER THE COUNTRY AS A WHOLE (1901-2010)

(NORMAL IS BASED ON THE DATA FOR THE PERIOD 1941 - 1990)

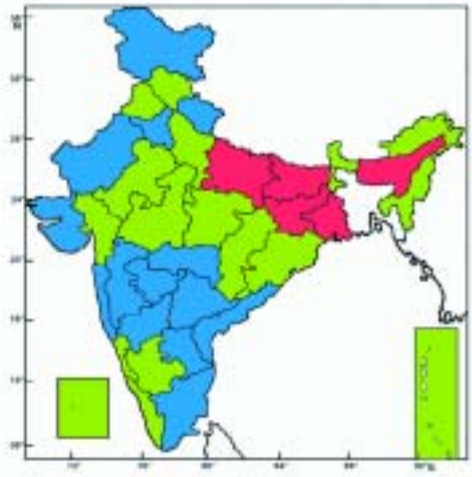
ANNUAL



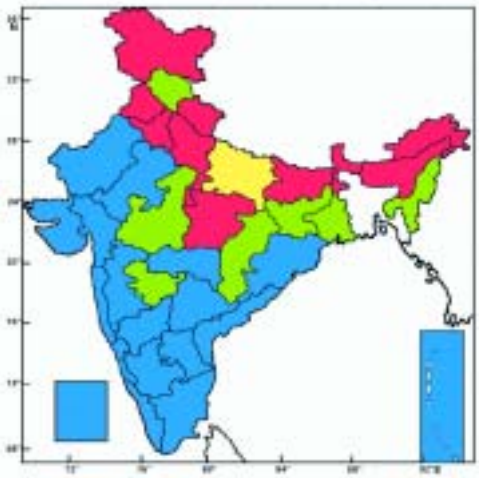
WINTER



PRE-MONSOON



MONSOON



POST-MONSOON

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

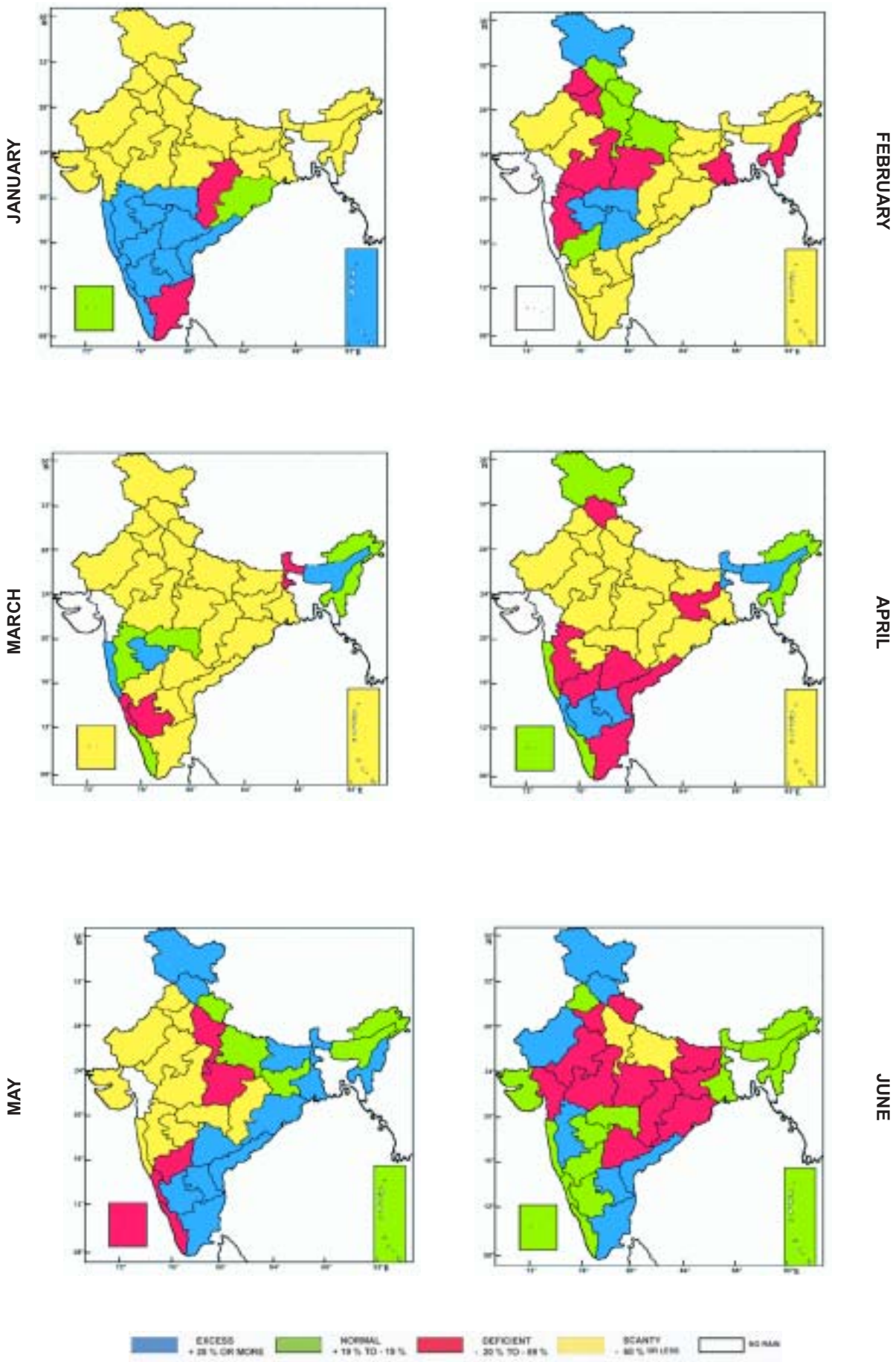


FIG.8 : SUB-DIVISIONWISE MONTHLY RAINFALL PERCENTAGE DEPARTURES FOR 2010

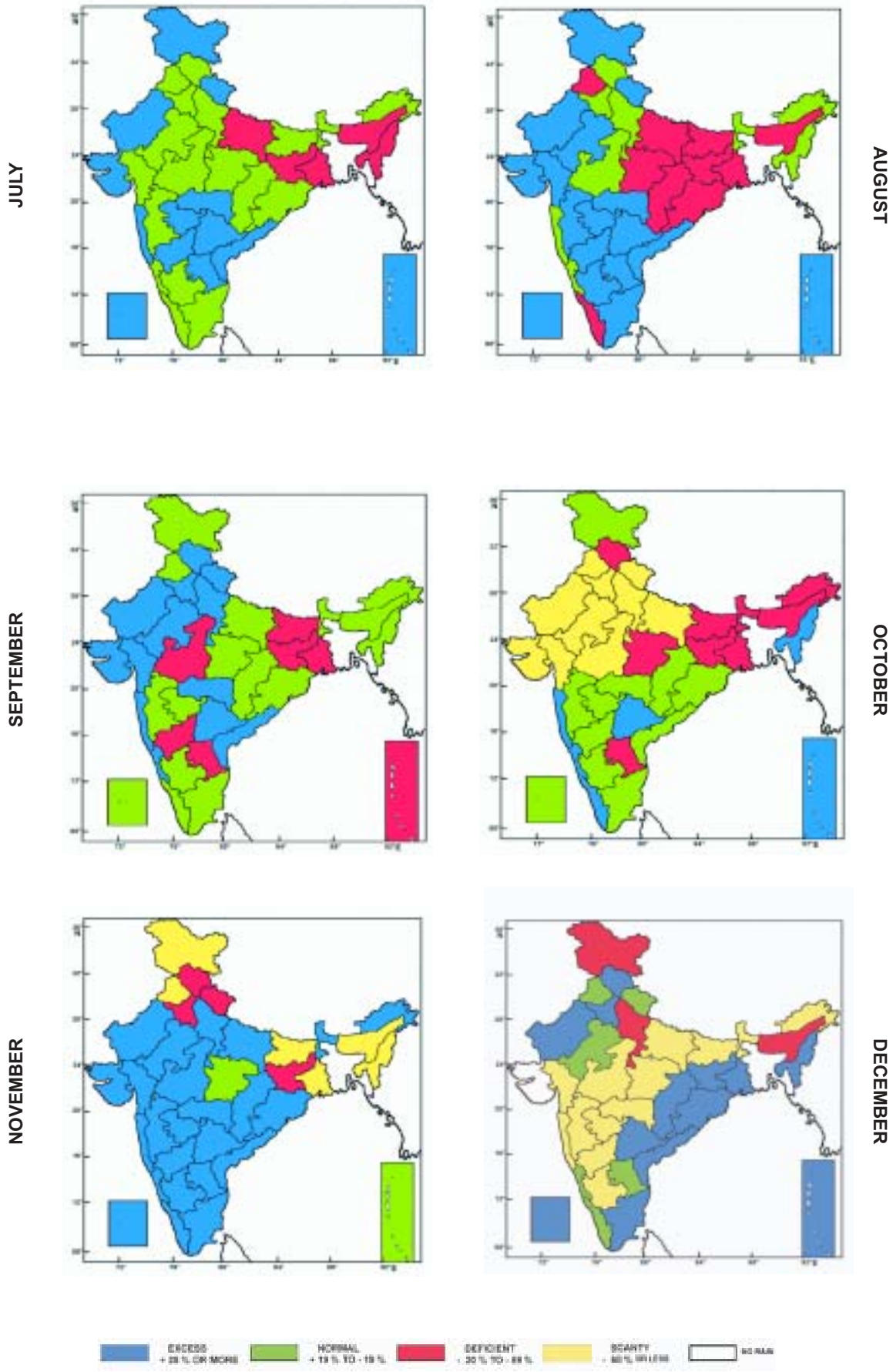


FIG.8 : SUB-DIVISIONWISE MONTHLY RAINFALL PERCENTAGE DEPARTURES

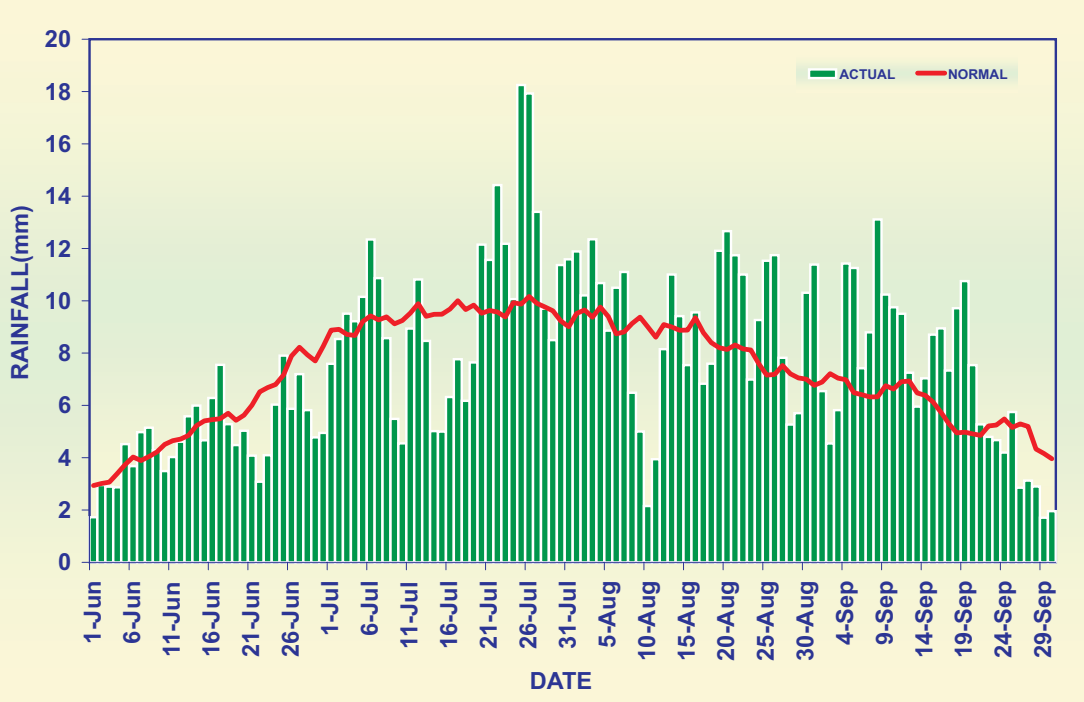


FIG. 9 : DAILY AREA WEIGHTED RAINFALL (mm) OVER THE COUNTRY AS A WHOLE (VERTICAL BARS) AND ITS LONG TERM AVERAGE (1941-1990) (CONTINUOUS LINE) 1 JUNE - 30 SEPTEMBER 2010

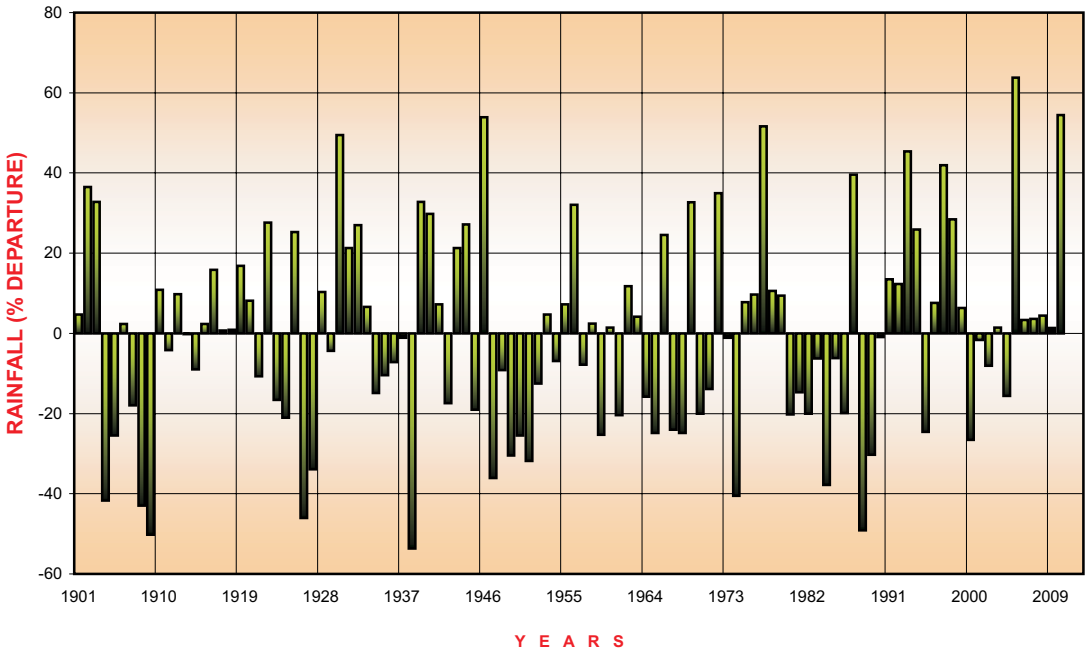
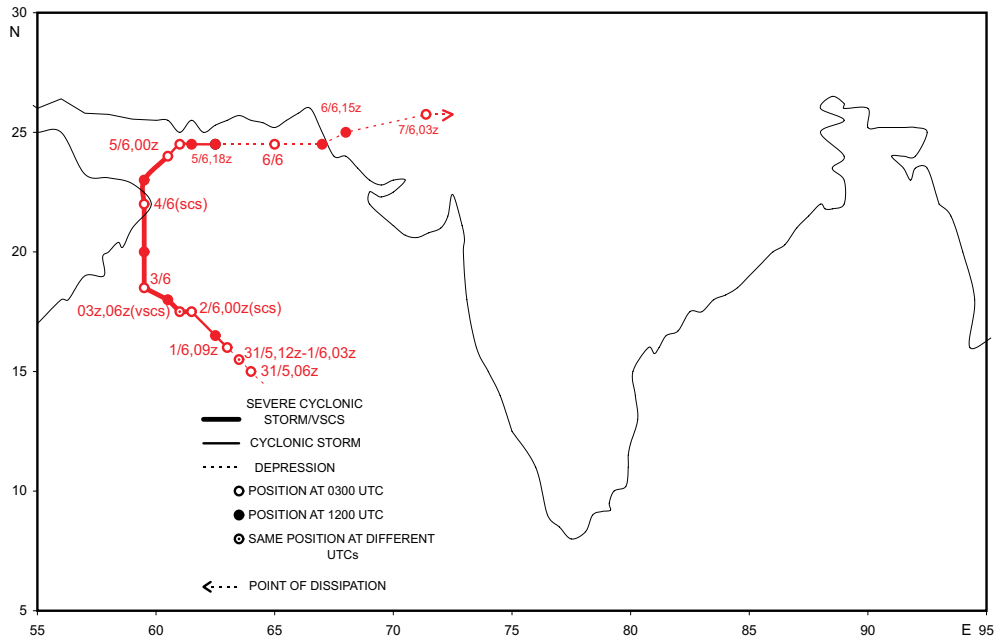
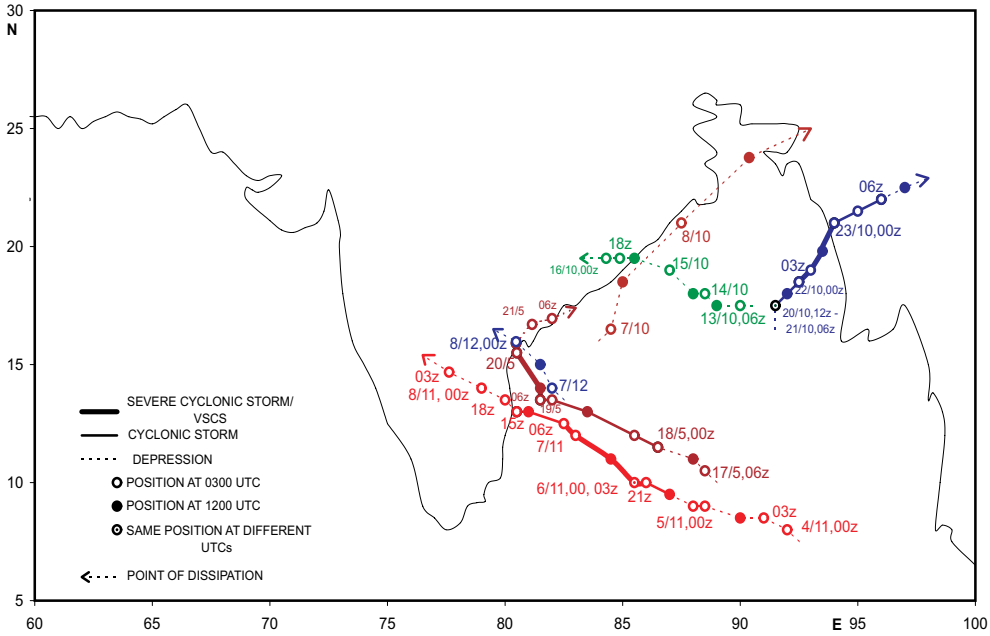


FIG. 10 : PERCENTAGE DEPARTURE OF RAINFALL DURING THE POST-MONSOON SEASON (OCTOBER TO DECEMBER) OVER THE SOUTH PENINSULA (1901-2010)

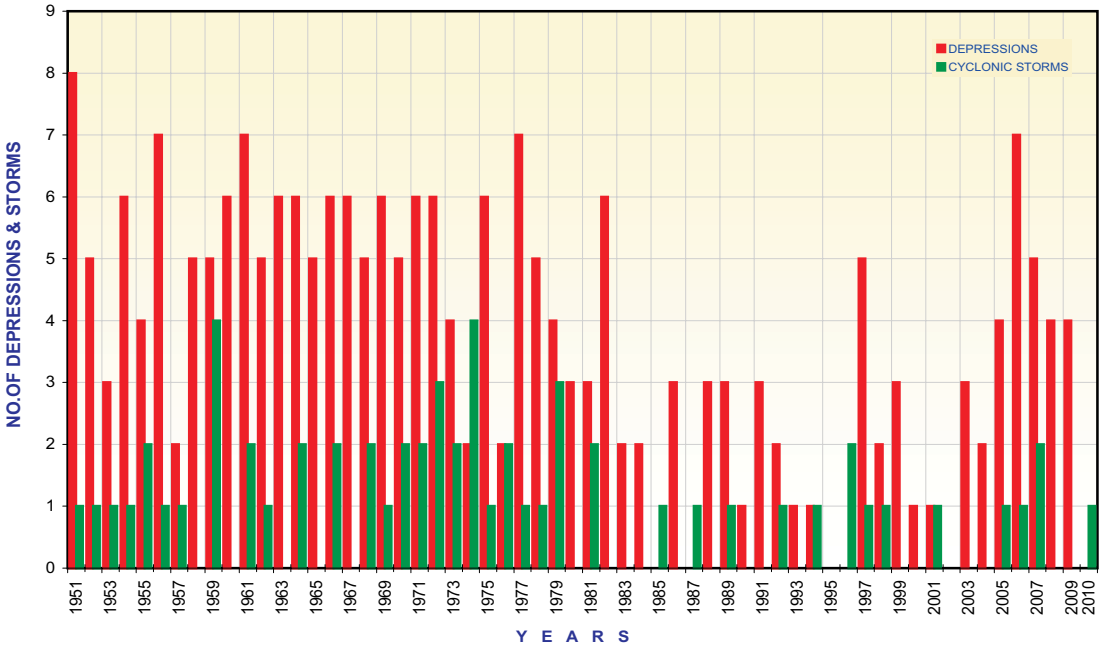


(a) MONSOON SEASON (JUNE TO SEPTEMBER)

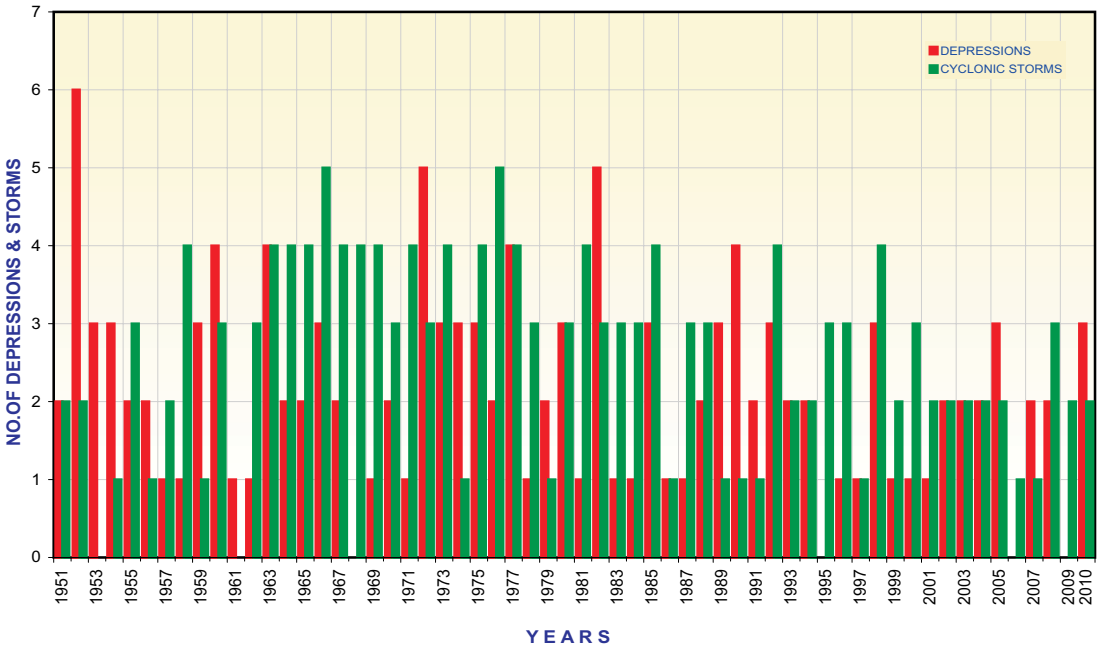


(b) REMAINING SEASONS

FIG. 11 : TRACKS OF DEPRESSIONS AND CYCLONIC STORMS



(a) MONSOON SEASON (JUNE TO SEPTEMBER)



(b) POST MONSOON SEASON (OCTOBER TO DECEMBER)

FIG. 12 : FREQUENCY OF DEPRESSIONS AND CYCLONIC STORMS FORMED OVER THE NORTH INDIAN OCEAN (1951-2010)

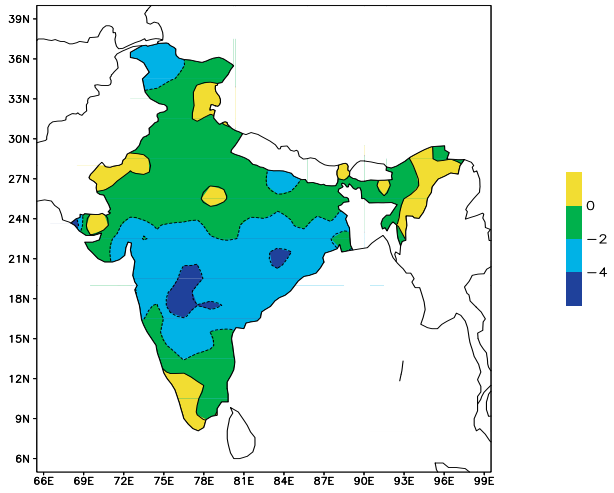


FIG. 13: MINIMUM TEMPERATURE ANOMALY (°C) DURING THE COLD WAVE 18 - 24 DECEMBER WITH RESPECT TO 1971 - 2000 AVERAGE

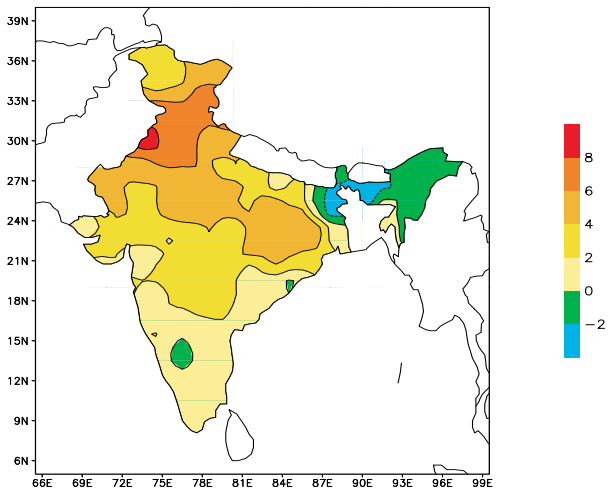


FIG. 14: MAXIMUM TEMPERATURE ANOMALY (°C) DURING THE HEAT WAVE 14 - 20 APRIL WITH RESPECT TO 1971 - 2000 AVERAGE

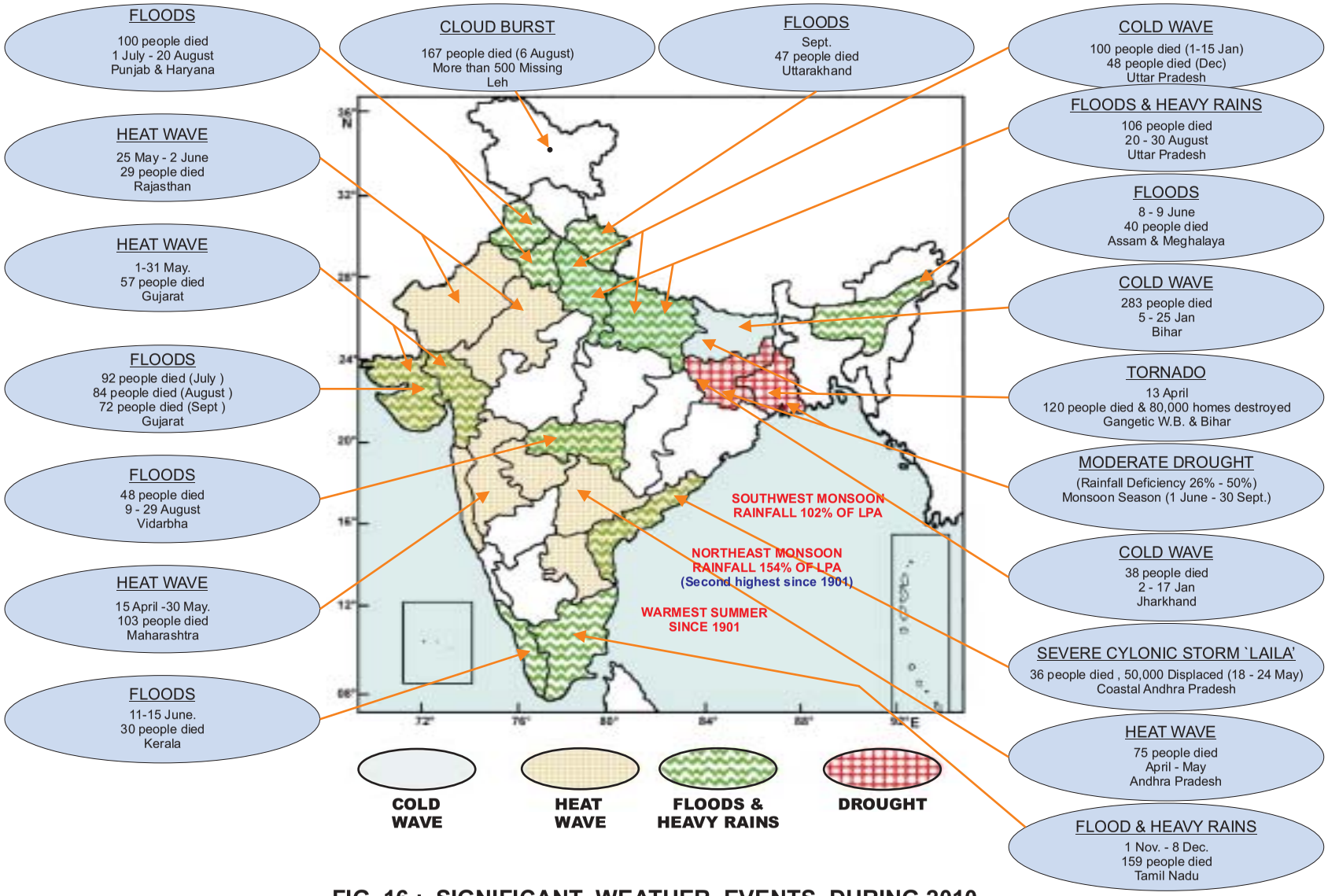


FIG. 16 : SIGNIFICANT WEATHER EVENTS DURING 2010

TABLE - 1

METEOROLOGICAL SUB-DIVISION WISE SEASONAL AND ANNUAL RAINFALL STATISTICS FOR THE YEAR 2010 BASED ON OPERATIONAL DATA

S.NO.	SUBDIVISION NAME	WINTER SEASON			PRE-MONSOON			MONSOON			POST MONSOON SEASON			ANNUAL 2010		
		ACTUAL	NORMAL	%DEP	ACTUAL	NORMAL	%DEP	ACTUAL	NORMAL	%DEP	ACTUAL	NORMAL	%DEP	ACTUAL	NORMAL	%DEP
1	A & N ISLANDS	104.0	85.1	22	323.8	472.7	-31	1768.4	1693.1	4	951.0	723.5	31	3147.8	2980.1	6
2	ARUNACHAL PRADESH	10.4	137.8	-92	663.2	695.2	-5	1574.0	1709.5	-8	150.1	240.7	-38	2397.6	2785.9	-14
3	ASSAM &MEGHALAYA	3.6	45.4	-92	851.9	695.5	22	1523.2	1951.6	-22	120.7	205.7	-41	2499.7	2897.7	-14
4	NAG.,MANI.,MIZO.,TRIP	11.8	41.0	-71	541.9	474.1	14	1237.4	1398.7	-12	236.1	225.7	5	2023.3	2142.9	-6
5	S.H.W.B.&SIKKIM	8.2	48.9	-83	533.8	437.9	22	2186.6	1925.7	14	120.7	188.4	-36	2844.0	2603.8	9
6	GANGATIC W.B.	16.6	32.3	-49	143.7	164.9	-13	787.4	1140.6	-31	136.8	155.1	-12	1081.4	1493.4	-28
7	ORISSA	12.4	31.9	-61	107.5	121.4	-11	991.8	1169.3	-15	220.6	156.0	41	1332.3	1478.6	-10
8	JHARKHAND	2.9	38.5	-93	54.3	86.1	-37	648.1	1084.4	-40	98.5	97.6	1	806.1	1307.4	-38
9	BIHAR	2.1	28.3	-92	88.3	82.1	8	795.8	1024.3	-22	55.7	78.9	-29	943.4	1213.7	-22
10	EAST U.P.	15.8	33.3	-52	18.1	32.5	-44	702.5	909.6	-23	22.0	60.8	-64	758.5	1035.9	-27
11	WEST U.P.	16.3	36.2	-55	9.4	28.1	-67	772.3	771.0	0	20.7	50.2	-59	818.9	885.0	-7
12	UTTARAKHAND	61.8	115.8	-47	77.6	154.7	-50	1686.0	1208.1	40	38.9	85.9	-55	1863.9	1562.8	19
13	HAR., CHANDI., DELHI	15.3	35.7	-57	3.3	33.3	-90	565.5	467.3	21	14.2	27.2	-48	597.7	562.6	6
14	PUNJAB	14.9	51.1	-71	4.3	53.7	-92	459.0	495.7	-7	22.9	41.1	-44	502.1	640.4	-22
15	HIMACHAL PRADESH	103.9	192.0	-46	158.4	246.6	-36	875.1	773.9	13	90.6	111.1	-18	1220.2	1323.8	-8
16	JAMMU & KASHMIR	187.7	234.1	-20	295.0	329.7	-11	673.7	524.2	29	101.3	146.3	-31	1240.7	1227.6	1
17	WEST RAJASTHAN	2.4	8.2	-71	2.5	17.4	-86	439.7	262.5	68	28.6	8.3	244	473.2	295.7	60
18	EAST RAJASTHAN	3.2	11.3	-72	0.8	17.1	-95	659.5	630.3	5	78.0	26.0	200	741.5	684.7	8
19	WEST M.P.	5.9	17.1	-65	1.0	14.4	-93	752.2	903.4	-17	59.0	52.7	12	818.2	987.8	-17
20	EAST M.P.	10.8	44.8	-76	4.7	27.8	-83	919.9	1087.5	-15	31.0	60.3	-49	966.6	1219.3	-21
21	GUJARAT REGION	0.1	2.1	-93	0.0	8.0	-100	1011.1	910.4	11	48.4	33.8	43	1059.7	954.1	11
22	SAURASHTRA & KUTCH	0.2	1.9	-90	0.1	4.3	-98	1005.9	487.1	107	67.7	26.0	160	1073.9	519.2	107
23	KONKAN & GOA	1.1	1.0	11	11.9	39.7	-70	3437.5	2799.5	23	299.1	135.5	121	3749.0	2975.4	26
24	MADHYA MRASHTRA	3.4	3.6	-6	11.4	41.0	-72	838.8	701.1	20	152.5	104.4	46	1006.1	849.7	18
25	MARATHAWADA	18.4	6.7	174	11.3	32.8	-66	904.3	711.1	27	105.3	95.7	10	1039.3	845.9	23
26	VIDARBHA	31.5	21.8	45	14.5	31.1	-53	1214.7	974.9	25	94.5	75.5	25	1355.2	1103.7	23
27	CHATTISGARH	8.1	27.3	-70	12.3	51.7	-76	1034.6	1203.2	-14	92.8	81.1	14	1145.7	1363.8	-16
28	COASTAL A.P.	17.0	15.4	10	197.2	94.0	110	836.6	575.3	45	574.1	326.6	76	1614.0	1011.6	60
29	TELANGANA	18.5	10.2	81	52.4	55.8	-6	1013.1	766.6	32	165.1	109.1	51	1247.6	941.7	32
30	RAYALASEEMA	9.7	6.7	44	102.7	78.3	31	519.5	380.8	36	275.1	212.2	30	915.8	677.8	35
31	TAMIL NADU	11.5	35.3	-68	124.1	130.2	-5	379.2	313.7	21	607.3	429.6	41	1118.8	908.7	23
32	COASTAL KARNATAKA	11.7	2.0	500	153.6	179.2	-14	3247.6	3174.1	2	594.8	257.9	131	4007.6	3612.8	11
33	N.I.KARNATAKA	12.0	4.6	160	64.8	88.0	-26	615.2	491.0	25	165.3	136.8	21	857.3	719.9	19
34	S.I.KARNATAKA	9.6	5.4	77	226.0	151.3	49	740.7	672.2	10	332.3	200.6	66	1308.7	1029.5	27
35	KERALA	19.4	28.1	-31	362.0	429.0	-16	1931.1	2139.7	-10	829.4	498.1	67	3141.9	3094.6	2
36	LAKSHADWEEP	18.8	36.9	-49	116.0	233.7	-50	1154.9	985.2	17	435.7	328.9	32	1725.4	1584.7	9

TABLE - 2

STATION WISE TEMPERATURE AND RAINFALL EXTREMES FOR THE YEAR 2010

S.NO.	STATION NAME	MIN (^{0}C)	DATE (MONTH/DAY)	MAX (^{0}C)	DATE (MONTH/DAY)	HIGHEST 24 Hr. RAINFALL(mm)	DATE (MONTH/DAY)
1	Agartala AP	7	1/13	36	5/17,6/11	181.9	10/9
2	Cherrapunji*	4	12/24,25	26	4/8,5/17,6/15,25	365.8	6/9
3	Dibrugarh AP	9	1/2,4-8,11,12,17,18,24,26,12/20,22,23,27,29	35	6/24,25	96.4	9/9
4	Guwahati AP	9	1/2-4	35	5/6,18,6/1,7,15	130.3	9/2
5	Imphal AP	2	1/13	34	4/9	97.0	10/9
6	Passighat	8	1/16,17	34	6/24,25	178.4	6/7
7	Shillong*	4	1/1,2,11,2/2-6,12/24	28	4/7	133.8	6/28
8	Tezpur	10	1/2-4,6-10,17,18,21-24,26,28-30,2/6-8,12/26-30	35	6/15	98.8	8/18
9	Kolkata	11	1/3,4,18,23,12/22,23	40	4/9,10	97.1	7/31
10	Cooch Behar AP	7	1/7,2/3,4	37	4/6	219.8	7/22
11	Gangtok*	3	1/1	27	6/19	97.2	4/18
12	Jalpaiguri	7	1/6,23,24	37	5/13	219.8	7/21
13	Balasore	9	1/3	45	4/20	107.7	9/20
14	Bhubaneshwar AP	11	1/3,12/21,22	44	4/9	106.7	8/6
15	Chandbali	9	12/21,22	43	4/9,10,4/20,22	136.5	10/8
16	Gopalpur	13	12/21,22	36	5/28	130.0	8/27
17	Jharsugda AP	7	1/3	46	4/19,5/12	76.7	6/30
18	Puri	13	12/22	35	5/27-29,6/6,6/9-11	96.3	10/8
19	Sambalpur	6	1/3,12/21,22	47	6/3	99.0	6/26
20	Daltonganj	5	1/7,21-23	47	4/18	87.8	9/15
21	Gaya AP	4	1/7,25	46	5/14,15,6/2	46.2	7/13
22	Jamshedpur AP	7	1/7,8,12/21-23	46	4/18,19,21	52.0	9/19
23	Patna AP	5	1/7,13	44	5/12,13,6/8	82.8	7/12
24	Purnea	5	1/13	42	5/13	161.0	7/20
25	Ranchi AP	5	1/3	42	4/13,17-20, 5/17,26, 6/2,3	205.8	9/12
26	Allahabad AP	4	1/22	46	5/17	46.1	7/21
27	Bahraich	6	1/23	45	5/13	80.5	8/22
28	Bareilly	5	1/3,7,23	43	4/12,5/13,16,17,20,6/2	90.0	9/2
29	Dehra Dun	3	1/2	41	6/1-3	363.7	7/31
30	Gorakhpur	5	1/7,13,22	44	5/13	189.3	7/12
31	Jhansi	6	1/12,15	47	5/17,18,23,24,26, 6/1	73.8	9/3
32	Lucknow AP	3	1/22	45	5/13	90.4	7/19
33	Mukteshwar*	-1	1/14	30	4/9,18,5/17,18, 6/3	235.8	9/19
34	Varansai AP	4	1/8,11,12	46	5/14,6/1,2	61.4	8/4
35	Ambala	2	12/26	44	5/26	196.7	7/7
36	Hissar	3	12/7,13,22	48	5/22,25,26,6/20,21	96.1	7/23
37	New Delhi AP	5	12/22	45	5/17,18,22,25,26,6/20	110.0	8/20
38	Amritsar AP	-1	1/19,21-23,26	47	5/26	78.8	7/21
39	Ludhiana	1	12/28	47	5/26	95.0	7/12
40	Patiala	3	12/22,26,29	46	5/26	98.0	9/12
41	Shimla*	-1	1/13	32	5/27	104.6	7/21
42	Banihal*	-3	1/11,14, 2/10, 12/27	32	6/19,21-23	131.0	2/9
43	Jammu	3	1/12	45	5/25,26,6/20	98.4	8/5
44	Srinagar*	-7	12/27	33	6/22	58.0	5/29
45	Ajmer	6	1/5,9,10	46	5/22	53.4	9/15
46	Barmer	6	1/9-11,14,12/12	48	5/21,22, 6/20	58.0	9/2
47	Bikaner	1	1/11	48	5/22,27	58.2	6/8
48	Ganganagar	2	1/14,12/27	49	5/22,26,6/21	83.8	8/16
49	Jaipur AP	2	1/11	46	5/23,24,6/20	76.5	7/19
50	Jaisalmer	4	1/9	48	5/22,25,26	106.9	6/7
51	Jodhpur AP	5	12/11,12	46	5/21-23,6/20	49.1	9/13
52	Kota AP	7	1/9,10	48	5/24,25	68.3	8/19
53	Udaipur	3	1/31	45	5/21-24	92.8	8/9
54	Ambikapur	4	1/2,3,12/21	44	5/26,30,6/2	53.4	7/12
55	Bhopal AP	5	1/18	46	5/24	48.2	11/16
56	Guna	5	1/10,11,15	48	5/24	115.2	7/26
57	Gwalior	4	1/11	47	5/23,24,6/21	159.8	9/20
58	Indore AP	7	1/6,7,29,12/17,18	44	5/21-23	103.3	8/7
59	Jabalpur	6	1/8,16,19,20,12/21	46	5/24	160.4	7/26
60	Jagdalpur	7	12/18-22	42	6/1,2	160.5	8/5
61	Pendra	5	1/1,3,7,17,18,21	44	5/17,24,25	79.7	9/8
62	Sagar	7	1/5,6	46	5/24	130.4	7/26
63	Satna	3	1/2,19	46	5/16-18,5/25	79.9	7/13
64	Ahmedabad AP	8	12/22	47	5/21	237.4	8/8
65	Baroda	11	1/14,12/12,13, 21-23	45	5/19,21,22,24	123.0	9/9
66	Bhavnagar AP	10	12/12,13	45	5/19,20,25,27	80.0	9/10
67	Bhuj AP	10	12/25,26	46	5/21	70.0	8/27
68	Deesa	8	1/14,16,12/12,19,22	47	5/20,21	207.5	7/25
69	Dwarka	13	12/11,31	34	5/9,17,31,6/1,3-5,6/14-18,6/27	147.0	8/3
70	Naliya	3	2/18,12/10,11	39	4/8	164.1	8/3
71	Porbandar AP	11	1/5,12/11	39	4/9	157.0	7/23
72	Rajkot AP	8	12/11	45	5/20-22	107.6	7/23
73	Surat	11	12/12,14,22	43	5/10,18,19	143.0	9/5
74	Veraval	11	12/11,12,31	38	4/8	208.1	8/2
75	Akola	9	1/22-24,12/16-22	47	5/18-20, 23	77.0	8/14
76	Aurangabad AP	8	12/20,21	43	4/15,16, 5/17-24	94.6	7/3
77	Dahanu	15	12/11,13,14,19,20,22,23	37	5/10,6/1,2,6	236.0	6/24
78	Harnai	19	2/25,12/13,12/14,12/23,12/24	39	5/20	421.3	6/19
79	Kolhapur	13	12/19,20,25	41	4/11,12,22,26,27, 5/9,10	66.3	7/26
80	Mahabaleshwar*	8	12/13	39	5/10	290.8	7/26

TABLE - 2(CONTD.)

S.NO.	STATION NAME	MIN (^{0}C)	DATE (MONTH/DAY)	MAX (^{0}C)	DATE (MONTH/DAY)	HIGHEST 24 Hr. RAINFALL(mm)	DATE (MONTH/DAY)
81	Mumbai	17	12/20	37	4/17,5/26,27, 6/5	210.0	6/25
82	Nagpur AP	7	1/7	47	5/24,25	70.7	8/25
83	Panjim	18	1/19,2/25,12/19,23-25	37	5/30	234.6	6/26
84	Parbhani	7	12/19-21	47	5/19	166.2	8/7
85	Pune	7	12/19-21	42	5/18	181.3	10/5
86	Ratnagiri	15	12/24	37	4/3,23,30	206.3	7/24
87	Sholapur	9	12/20	45	5/18	70.8	7/2
88	Anantpur	9	12/23	43	4/11,12, 5/11,13,14	122.9	7/11
89	Hyderabad AP	9	12/21,22	45	5/11	82.7	6/19
90	Kakinada	16	12/21	45	6/7	184.6	11/1
91	Kalingapatnam	13	1/4,5,12/21-23	39	5/27	125.8	10/31
92	Kurnool	13	12/19,22,23	44	5/11	101.9	7/6
93	Machilipatnam	15	12/22	43	5/28,30,6/1-3, 7	196.9	10/31
94	Nellore	19	1/23,12/22,23	43	6/3,4	168.5	10/30
95	Ongole	17	12/22,23	43	5/28,30, 6/1,3	323.0	5/20
96	Ramgundam	9	1/21-23	47	5/25,29	107.2	9/8
97	Visakhapatnam AP	15	1/4,22,12/21-24,31	40	5/26,6/6,8	182.7	11/1
98	Chennai AP	19	1/5,22,23,2/9,12/6,22,23,27	41	5/26-29	104.4	12/6
99	Coimbatore AP	17	1/6,23,2/6,12/23-25	39	4/10,11,13,16	56.0	8/21
100	Cuddalore	18	1/22,2/9	42	6/4	203.8	11/27
101	Kanyakumari	21	12/13	37	5/6	73.0	11/27
102	Madurai AP	19	12/23,24	41	5/27	87.2	11/6
103	Nagapattinam	20	1/5,22,23,2/3,12/23,27	39	5/27,31,6/1,3,5	159.9	11/27
104	Pamban	21	1/5	39	5/15	157.6	11/25
105	Salem	16	12/23	42	4/11	98.0	5/29
106	Tiruchirapalli AP	18	1/22,23,12/23	41	5/27	106.4	11/29
107	Vellore	14	1/22,23	43	4/20,5/13,15,17	70.8	11/8
108	Bangalore*	13	12/23,24	38	4/11	114.1	9/25
109	Chitradurga	10	12/23,24	39	4/7	153.1	11/3
110	Gadag	10	12/22,24,25	40	4/11-13,5/11,12,18	59.6	11/9
111	Honavar	16	1/19	36	4/27,5/9	202.4	7/2
112	Karwar	17	1/22,12/22,23,25	38	4/15	207.4	11/9
113	Mangalore AP	19	1/22-24,2/8	36	4/23,26,5/3	181.2	7/30
114	Cochi AP	21	1/7,2/7	35	4/17,5/12,13	183.5	9/24
115	Kozhikode	21	1/24,12/7	37	4/22	176.3	6/12
116	Thiruvananthapuram	21	1/6,1/23-26,2/6,12/15	35	4/8,4/10-12, 20,22, 5/2,3,5,6,8	183.2	3/27
117	Car Nicobar	20	1/22,12/15-17	35	4/13	96.4	6/17
118	Port Blair	20	2/22,23,12/16	36	5/10-12	95.3	6/22
119	Amini Divi	22	1/26,11/27,12/3,13,27,28	36	4/20,28,29,5/2-5, 8, 10,17	87.7	8/15
120	Minicoy	21	12/14,16	35	4/18-22,24,5/6,12,14,16	136.4	12/31

: Hill Stations