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Weather

POST MONSOON SEASON (OCTOBER-DECEMBER 1975)

CHIEF FEATURES

Cyclonic storms/depressions

Three cyclonic storms of which one was severe and two depressions developed in the Bay of Bengal. One severe cyclonic storm and one depression formed in the Arabian Sea during the season. The severe cyclone which hit Saurashtra near Porbandar on 22 October caused considerable damage to property and some loss of life in Junagadh, Jamnagar and Rajkot districts. The severe cyclone which moved close to Tamil Nadu coast and recurved northeastwards in the last week of November caused heavy to very heavy rain in Tamil Nadu and extreme south coastal Andhra Pradesh. Heavy rain in Madras city and neighbourhood for 3 to 4 days continuously, paralysed the city life. The tracks of the depressions and cyclonic storms are shown in Fig. 1.

Withdrawal of southwest monsoon

The southwest monsoon withdrew from the country outside extreme south Peninsula by 27 October. The withdrawal of the southwest monsoon was delayed by one to two weeks from most parts of the country.

Western disturbances

Twentytwo western disturbances moved eastwards across northwest India during the season.

Rainfall

The rainfall for the season was in moderate or large defect in the Western Himalayas, Punjab, Haryana, Uttar Pradesh and Bihar Plains. It was generally normal or excess over the rest of the country. The rainfall for the period from 1 October to 31 December 1975 in terms of percentage departure from normal is shown in Figs. 2(a) and 2(b).

Temperature

Night temperatures were appreciably below normal in many parts of the country on many days during November and December.

The important features of weather during each month were as follows.

SIGNIFICANT MONTHLY FEATURES

OCTOBER

A low, which lay off Maharashtra coast on 30 September, concentrated into a depression on 2nd with its centre near 21·0°N, 67·5°E. The depression moved northeastwards and weakened into a low over Kutch by 5th evening. After persisting over north Gujarat upto 8th it dissipated later. In association with this system, the monsoon was active to vigorous in Gujarat State on 1st and 2nd and vigorous in Saurashtra & Kutch on 7th. Rajkot reported a record rainfall of 21 cm on 7th. Scattered or isolated heavy falls also occurred in Gujarat State on 1st, 2nd and 5th.

Another low developed over west central Bay on 15th and concentrated into a depression on 17th with its centre near 14·5°N, 83°E. The depression crossed Andhra coast near Ongole on 18th and weakened over interior Andhra Pradesh as a low the same evening. The low moved westwards into east central Arabian Sea on 19th. This system caused widespread rain in Andhra Pradesh from 17th to 19th with active to vigorous monsoon in coastal Andhra Pradesh and Rayalaseema during that period. Fairly widespread rainfall also occurred in north Interior Karnataka from 17th to 19th

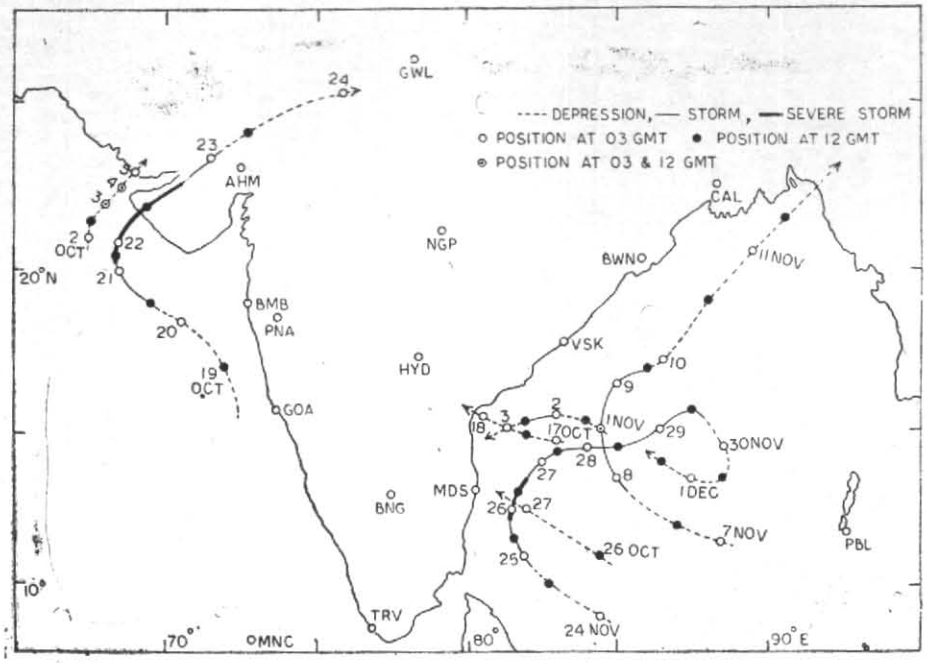

Fig. 1. Tracks of storms and depressions during October to December 1975

and in Madhya Maharashtra and Marathwada on 19th. This system also caused incursion of moisture into Orissa, Gangetic West Bengal, Bihar and Madhya Pradesh during the above period leading to scattered or isolated rainfall over these areas.

The third low, which lay over east central Arabian Sea off south Maharashtra coast on 18th, concentrated into a depression on 19th evening with its centre near 17°N, 72°E, under the influence of the earlier low moving into the east central Arabian Sea that day. The depression moved northwestwards and intensified into a severe cyclonic storm with a core of hurricane winds by 21st evening when it was centred near 20·5°N, 68·5°E. This storm recurved northeastwards, crossed Saurashtra coast near Porbandar on the afternoon of 22nd and lay as a cyclonic storm near Radhanpur on 23rd morning. Continuing to move northeast, it weakened into a low over northwest Madhya Pradesh and adjoining parts of east Rajasthan and west Uttar Pradesh by 24th evening. The low dissipated on 25th but the associated cyclonic circulation moved to northwest Uttar Pradesh by 26th and weakened there on 27th. A trough extended from the Arabian Sea system to Kerala at surface from 18th to 20th and to northwest Madhya Pradesh and east Rajasthan in the lower troposphere from 19th to 22nd. These systems caused widespread rain in Konkan on 19th and 20th, in Kerala from 18th to 20th, in Saurashtra & Kutch on 22nd and 23rd, in east Rajasthan on 24th and in Haryana and west Uttar Pradesh on 25th with isolated heavy or very heavy falls in Saurashtra & Kutch on 22nd and 23rd and in east Rajasthan on 24th. Jamnagar recorded a very heavy fall of 25 cm on 23rd. Scattered or isolated rainfall also occurred in Gujarat region and west Madhya Pradesh from 20th to 24th and in Rajasthan from 21st to 25th. According to press reports, this cyclone caused considerable damage to buildings, crops and other property in the districts of Junagadh, Jamnagar and Rajkot. The loss of human lives has been reported to be about 85. Several thousands of houses were damaged. This cyclone which had an inner core of hurricane winds, uprooted many trees and electric and telephone poles in these areas. A train was also blown off its rails near Jam-Kambhalia. Jamnagar recorded the highest wind speed of the order of 160 to 180 kmph on 22nd. Swells of 4 to 6 metres were reported off Saurashtra coast.

Under the influence of a trough of low pressure which moved westwards from Andaman Sea to southwest Bay between 23rd and 25th, the low lying off Tamil Nadu-Andhra coasts from 23rd to 25th concentrated into a depression on 26th with its centre near 11°N, 84·5°E, moved northwest and weakened into a low off north Tamil Nadu coast on 27th evening. The low subsequently moved inland and dissipated over Interior Karnataka on 29th. In association with these systems, rainfall was fairly widespread in the Bay Islands from 23rd to 26th, in

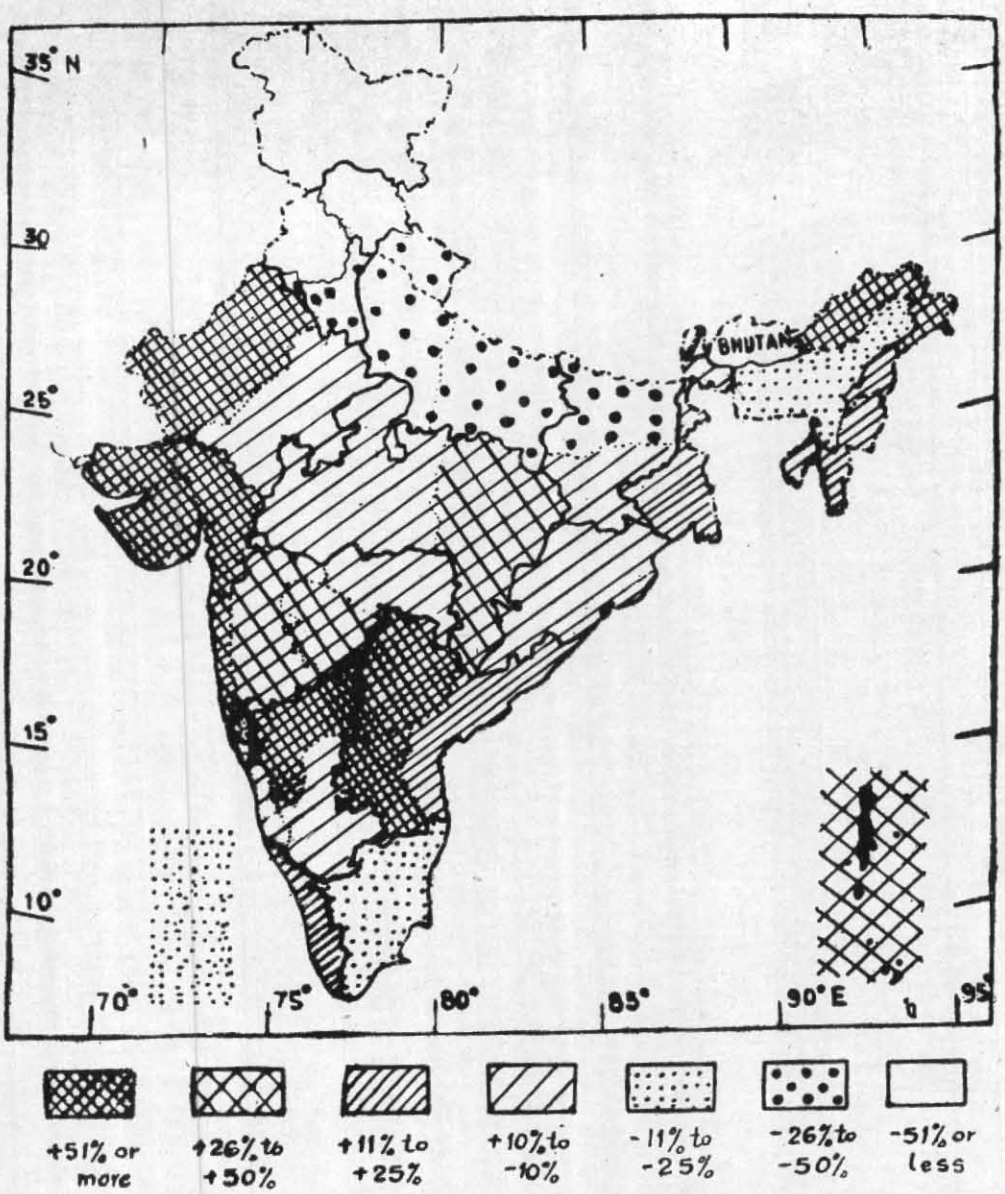

Fig. 2(a). Rainfall for the period 1 October to 31 December 1975
(Percentage departure from normal)

Tamil Nadu from 23rd to 28th, in Interior Karnataka from 25th to 30th and in Andhra Pradesh from 27th to 29th with isolated heavy to very heavy falls in Tamil Nadu and Andhra Pradesh on some days between 25th and 29th. Scattered or isolated rain or thundershowers also occurred in Maharashtra State and in east Madhya Pradesh on most days between 23rd and 29th and in west Madhya Pradesh on 28th and 29th. Madras recorded an exceptionally heavy fall of 21 cm on 27th, which was reported to have paralysed life in that city.

A low with associated cyclonic circulation extending to the middle troposphere lay over southwest and adjoining west central Bay off north Tamil Nadu-south Andhra coasts from 1st to 4th. It moved northwards and lay off Andhra coast from 5th to 8th. From this system a trough in the lower troposphere extended to Bihar and adjoining east Uttar Pradesh on many days during the above period. The low off Andhra coast weakened and lay as a trough extending from Orissa to Tamil Nadu from 9th to 11th and over northwest and west central Bay from 12th to 15th. A trough of low also lay off the west coast from 1st to 12th and became less marked later. In association with the above mentioned systems, scattered to fairly widespread rain or thundershowers occurred in most parts of the Peninsula, east Madhya Pradesh, Orissa and Bihar Plateau and scattered or isolated

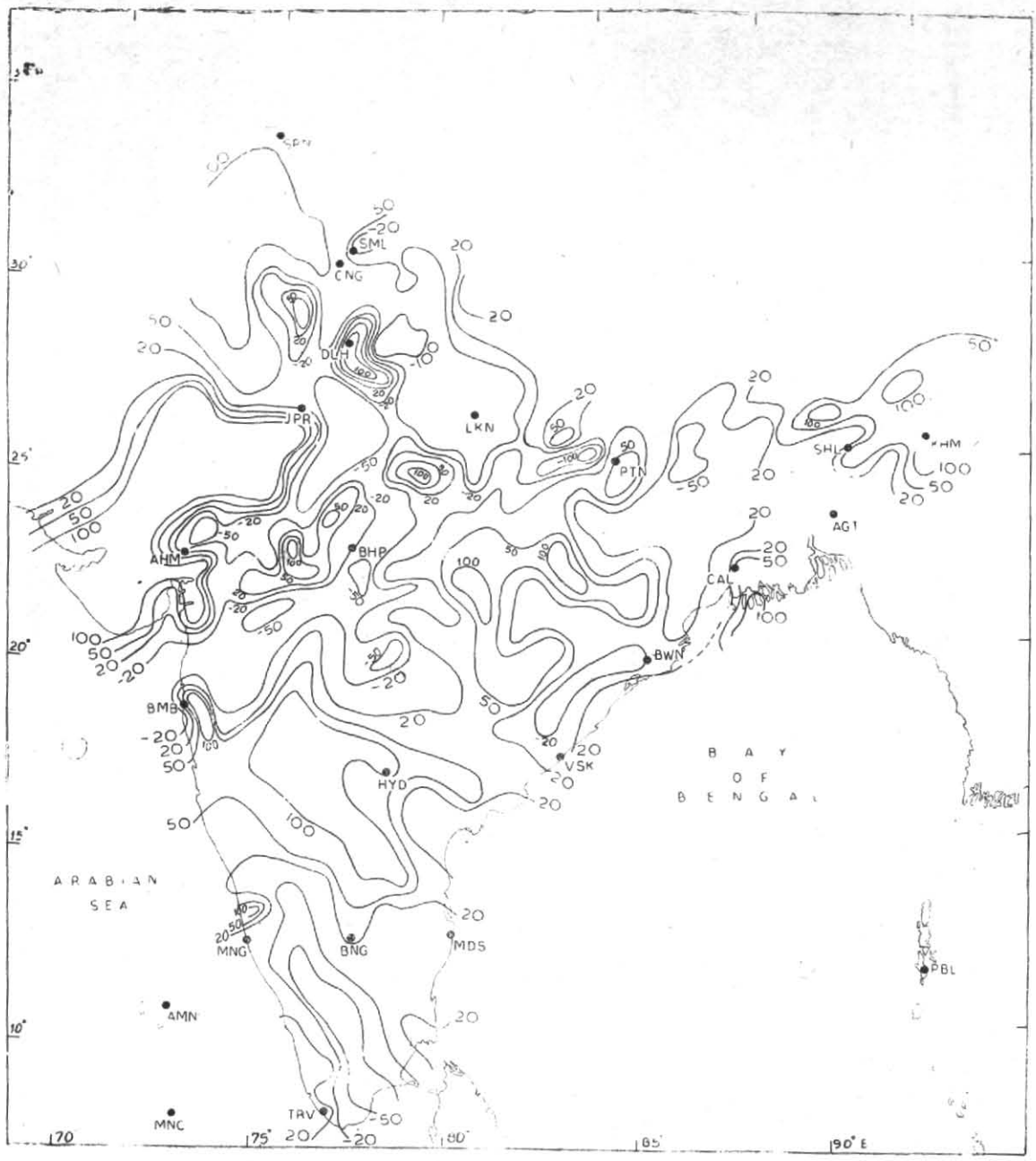

Fig. 2(b). Percentage departure from normal rainfall during 1 October to 31 December 1975

thundershowers in Gangetic West Bengal, Bihar Plains and east Uttar Pradesh on may days in the first fortnight. Raichur reported an exceptionally heavy fall of 17 cm on 7th.

A trough of low lay over Andaman Sea on most days during the first three weeks. A low with associated cyclonic circulation in the lower troposphere moved from east into the Andaman Sea on 28th. It moved further westwards to central Bay by 31st. From this low a trough extended to north Bay in the lower troposphere. In association with these, rain or thundershowers were fairly widespread in the Bay Islands on many days during the month and scattered over Gangetic West Bengal, Orissa and Bihar Plateau from 28th to 31st.

A trough of low developed off Karnataka-south Maharashtra coasts on 26th. A low formed in this trough on 28th and persisted there upto 31st. In association with this system, scattered or fairly widespread rain occurred in coastal Karnataka

and Kerala during this period with heavy to very heavy falls in Kerala on some days. Fairly widespread rainfall also occurred in Maharashtra State on 30th and 31st.

The principal amounts of heavy rainfall (12 cm or more) over the country associated with the above mentioned systems were —

Date	*Station*	*Rainfall* (cm)
7	Rajkot	21
	Raichur	17
10	Cherrapunji	31
11	Cherrapunji	59
	Holalagundi (Rayalaseema)	15
15	Kondul	13
19	Sangola (Maharashtra)	20
	Jath, Vita (Maharashtra)	14 each
23	Jamnagar	25
	New Kandla	15
26	Sangola	18
27	Madras	21
	Nellore	20
	Woolapalem	19
	Madurantakam	16
	Kanchipuram	15
	Kuttiyadi	13
	Venkatagiri	12
28	Kalingapatam	14
	Woolapalem	13

Seven western disturbances moved eastwards across the Western Himalayas as upper air troughs, four in the first fortnight and three in the second fortnight. The first two caused generally scattered or isolated rainfall in west Uttar Pradesh, Haryana and Himachal Pradesh in the first week while the next two caused isolated rainfall in the hills of west Uttar Pradesh on a few days in the second week. No precipitation was reported in association with the two western disturbances which moved across the Western Himalayas in the third week. The last one which moved across the Western Himalayas between 23rd and 27th caused scattered to fairly widespread rain in Himachal Pradesh from 24th to 26th. Simla recorded 6 cm of rain, Uttar Kashi, Manna 4 each, Manali, Bhuntar 3 each on 25th and Dharmsala 3 cm on 26th.

The southwest monsoon which had withdrawn from most parts of northwest India in the last week of September, further withdrew from Uttar Pradesh, Madhya Pradesh and Gujarat State between 8th and 13th and from Bihar State, sub-Himalayan West Bengal & Sikkim, Maharashtra State, north Interior Karnataka and Telangana between 14th and 16th. It withdrew from Assam and adjacent States, Gangetic West Bengal, Orissa and rest of the Peninsula outside Tamil Nadu and Kerala between 25th and 27th. The withdrawal of the monsoon from most of these areas was delayed by one to two weeks.

Day temperatures were appreciably above normal in some parts of Uttar Pradesh on many days in the third week and in Punjab and Western Himalayas on a few days in that week. Night temperatures were appreciably above normal in Madhya Pradesh on many days in the month, in Gujarat State and Uttar Pradesh on many days in the first three weeks and in the plains of northwest India on a few days in the first week.

NOVEMBER

The low which lay over southeast and adjoining east central Bay on 31 October, concentrated into a depresion over west central Bay on 1 November, with its centre at 0830 IST near 15°N, 84·5° E. Moving westwards, it intensified into a cylconic storm on the morning of 2nd with centre near 15·5°N, 83°E. Continuing to move westwards, it weakened into a low off south Andhra coast by the evening of 3rd. The low moved inland that night and dissipated the next morning. A trough in the lower troposphere extended from this system to north Bay upto 3rd. In association with these systems, fairly widespread rain or thundershowers occurred in coastal Andhra Pradesh from 1st to 3rd and in Rayalaseema from 2nd to 4th, with isolated heavy falls in coastal Andhra Pradesh on 1st and 3rd. Scattered or isolated rainfall also occurred in Tamil Nadu Orissa and Gangetic West Bengal between 1st and 4th.

A low which lay over Andaman Sea from 3rd to 5th moved into southeast Bay on 6th and concentrated into a depression on the morning of 7th with its centre near 11·5°N, 88·5°E. A trough extended from this system to coastal Tamil Nadu on 6th and 7th. The depression moved northwest and intensified into a cyclonic storm on 8th morning with its centre about 500 km southeast of Masulipatnam. Moving in a northnorthwesterly direction, it was near about 400 km eastsoutheast of Masulipatnam on the evening of 8th. Later it recurved northeastwards and weakened into a depression by

10th morning, when it was centred about 300 km southeast of Gopalpur. The recurvature took place under the influence of a trough in the westerlies which moved across northeast India. The depression continued to move northeastwards and crossed Bangla Desh coast on 11th night near Chittagong. Thereafter, it weakened into a low and moved away across Assam and adjacent States by 13th. Under the influence of this storm, fairly widespread rain or thundershowers occurred in Bay Islands from 3rd to 10th and scattered to fairly widespread rain or thundershowers in Tamil Nadu from 6th to 8th, in Rayalaseema on 6th and 7th, in coastal Andhra Pradesh on 9th, in Orissa and Gangetic West Bengal from 9th to 11th and in Nagaland, Manipur, Mizoram and Tripura on 11th and 12th, with isolated heavy falls in Tamil Nadu on 6th and 7th, in Orissa on 10th and in Gangetic West Bengal on 10th and 11th. Scattered or isolated rain or thundershowers also occurred in Assam and Meghalaya from 11th to 13th and in Arunachal Pradesh on 13th.

A low lying over Andaman Sea from 20th to 22nd moved westwards to southwest Bay by 24th morning and concentrated into a depression with its centre near 9·0°N, 84·5°E. Then moving northwest, it intensified into a cyclonic storm on 25th morning with its centre near 11°N, 82°E. It became severe on the morning of 26th with centre about 100 km southeast of Madras. Then it slowly recurved northeastwards and weakened into a depression over the central parts of the Bay by 30th. This system caused fairly widespread rain or thundershowers in Bay Islands from 20th to 23rd and in Tamil Nadu from 24th to 27th with isolated heavy falls in Bay Islands on 23rd and heavy to very heavy falls in Tamil Nadu from 24th to 27th. Isolated heavy to very heavy falls also occurred in south coastal Andhra Pradesh from 25th to 27th. Rainfall was also fairly widespread in Orissa on 28th and scattered or isolated in Orissa on 27th and 29th, in coastal Andhra Pradesh on 28th and 29th and in Rayalaseema from 25th to 28th. Very heavy rain in Madras city and neighbourhood for 3 to 4 days continuously paralysed the city life. Low lying areas in the city were flooded rendering many thousands homeless. About a thousand huts were damaged.

The principal amounts of hevay rainfall (8 cm or more) associated with the depressions and cyclones were —

Date	*Station*	*Rainfall* (cm)
3	Venkatagiri (CAP)	12
	Sandheads	9
10	Sandheads	8
	Sagar Island	8
11	Sandheads	10
24	Mayuram (Tamil Nadu)	14
	Pondicherry	13
	Vedaranniyam	8
	Madras	8
25	Sriperumbudur (Tamil Nadu)	13
25	Sulurpet (CAP)	11
26	Nellore	21
	Madras	12
	Pondicherry	12
	Cuddalore	11
27	Madras	14
	Sriperumbudur (Tamil Nadu)	14
	Maduranthakam (Tamil Nadu)	12
	Tiruvallur (Tamil Nadu)	12
	Sulurpet (CAP)	10

A low pressure area lay over Lakshadweep and adjoining parts of southeast and east central Arabian Sea off Kerala-Karnataka coasts from 1st to 9th and weakened by 10th. It caused fairly widespread rain or thundershowers in Kerala and south Interior Karnataka on most days during this period, in Lakshadweep on many days, in coastal Karnataka on 5th and 7th and in Konkan and Madhya Maharashtra on 1st, with heavy to very heavy falls in Kerala on most days and in south Interior Karnataka and Lakshadweep on one or two days during the above period. Scattered or isolated rainfall also occurred in north Interior Karnataka on many days and in Konkan and Madhya Maharashtra between 5th and 7th. According to press reports, heavy rain in Kerala caused floods which inundated low lying areas and paddy fields in some parts of Kerala. Landslides and house-collapses were reported to have caused a few deaths in that State.

A low pressure area lay over south Bay from 10th to 14th. It moved to extreme southwest Bay off Sri Lanka coast on 15th and persisted there upto 22nd with a trough extending northwards to off Tamil Nadu coast. This system moved further westwards across Comorin to Maldive-Lakshadweep area on 23rd and weakened by 26th. A trough of low also lay off Kerala coast from 13th to 17th. A cyclonic circulation in the lower troposphere moved westwards across extreme south Peninsula between 15th and 16th. These systems caused fairly widespread rain with isolated very heavy falls in Tamil Nadu on 16th and 23rd and in Kerala on 16th. Isolated heavy falls also occurred in Tamil Nadu on 15th, 20th and 22nd. Scattered or isolated rainfall occurred in Bay Islands from 11th to 15th and in Kerala on most days betweeen 13th and 27th.

A low moved from south Andaman Sea to extreme south Bay between 24th and 26th and weakened the next day. It caused fairly widespread rain or thundershowers in Bay Islands from 24th to 26th with heavy to very heavy falls on 24th and 25th.

The principal amounts of heavy rainfall (10 cm or more) associated with the above mentioned systems were :

Date	*Station*	*Rainfall* (cm)
1	Trivandrum	11
	Peermedu (Kerala)	10
	Thumba	10
2	Quilon (Kerala)	12
3	Manjeri (Kerala)	19
	Perintalamanna (Kerala)	11
4	Peermedu (Kerala)	10
7	Quilon (Kerala)	10
16	Vedaranniyam	18
	Irinjalakuda (Kerala)	13
	Atirampattinam	11
23	Cuddalore	13
24	Car Nicobar	10
25	Car Nicobar	16
	Kondul	12

Six western disturbances moved eastwards across the Western Himalayas during the month, as troughs in the lower and middle troposphere. The first one moved across the Western Himalayas on 1 November causing isolated rainfall in Himachal Pradesh on that day. The second one that moved across the Western Himalayas between 7th and 9th, caused widepsread rainfall in Jammu & Kashmir on 8th. No precipitation was reported in association with the subsequent four western disturbances that moved across the Western Himalayas during the periods 9th to 11th, 15th to 17th, 18th to 22nd and 25th to 28th.

Moderate cold wave conditions prevailed in north Madhya Maharashtra from 28th to 30th. Night temperatures were markedly below normal in some parts of Madhya Maharashtra from 12th to 16th. They were appreciably below normal in some parts of Rajasthan, Gujarat State and north Madhya Maharashtra on many days in the first week. They were also appreciably below normal in interior Maharashtra, Interior Karnataka and some parts of Gujarat State and Madhya Pradesh on many days between 10th and 30th, in some parts of Andhra Pradesh on many days between 12th and 24th, in Jammu & Kashmir and Punjab between 10th and 19th, in many parts of northwest India between 20th and 30th, in some parts of Uttar Pradesh on 13th and 14th and again from 21st to 26th and in Bihar, Gangetic West Bengal and Orissa on many days in the second fortnight.

DECEMBER

Nine western disturbances moved eastwards across northwest India as upper air troughs or cyclonic circulations, four in the first fortnight and five in the second fortnight. No precipitation was reported in association with six of these systems. Isolated light rain occurred over Jammu & Kashmir on 4th and 6th in association with the two western disturbances that moved across the Western Himalayas between 3rd and 7th. The western disturbance which moved across the plains of northwest India between 27th and 29th as a well marked cyclonic circulation upto the middle troposphere with a trough aloft, caused isolated rain or thundershowers over west Rajathan on 28th, isolated very light rain in Punjab on 29th and in the hills of west Uttar Pradesh on 30th.

An upper air trough with embedded cyclonic circulations upto 2·1 km a.s. l. lay over Assam and adjacent States, sub-Himalayan West Bengal & Sikkim on many days during the month. It caused fairly widespread rain on 7th and 8th and scattered rain on 6th over Arunachal Pradesh. Isolated rainfall also occurred in Assam and Meghalaya from 6th to 8th and again on 14th and 19th and in sub-Himalayan West Bengal & Sikkim from 8th to 10th and again on 13th. According to press reports tourists' spots of Sandakphu and Phalut, about 64 km from Darjeeling recorded the first snowfall on 14th while Tiger hill and Ghoom near Darjeeling had hailstorms and sleet.

A depression which was over central Bay on 30 November moved westwards and weakened into a trough of low over west central and adjoining southwest Bay on 3rd, moved further westwards to Sri Lanka-Tamil Nadu-Andhra coasts on 4th and became less marked on 5th. This system caused fairly widespread rain in Rayalaseema on 4th and isolated rainfall in coastal Andhra

Pradesh and Tamil Nadu from 4th to 6th and in Rayalaseema on 5th.

Six troughs in the low level easterlies moved from Andaman Sea to southwest Bay during the month. In association with these systems, scattered to fairly widespread rain with isolated heavy to very heavy falls occurred in Tamil Nadu from 15th to 19th. Rainfall was isolated over Tamil Nadu on 7th, 14th, 20th and 23rd. Rain or thundershowers were fairly widespread in the Bay Islands from 11th to 15th and scattered or isolated on many days during the rest of the month.

A trough of low lay over Lakshadweep off Kerala-Karnataka coasts on many days from 1st to 10th and again from 15th to 20th. Under its influence, rain or thundershowers were fairly widespread in Kerala on 16th and 18th and scattered or isolated in Kerala on 5th, 7th, 8th, 9th, 15th and 19th, in Lakshadweep from 7th to 9th and on 17th, 18th and 20th and in Interior Karnataka on 4th and 5th.

The principal amounts of rainfall (6 cm or more) associated with the above mentioned systems during the month were—

Date	*Station*	*Rainfall* (cm)
11	Car Nicobar	6
13	Hut Bay	8
15	Vedaranniyam	9
16	Vedaranniyam	14
	Nagapattinam	8
	Karaikal	6
17	Cuddalore	7
	Parangipettai	6
18	Karaikal	8
	Karaikudi	8
	Ariyalur	8
	Kumbhakonam	8
	Mayuram	8
	Mannargudi	8
	Thanjavur	6
	Alleppey	6
19	Pamban	7
23	Kondul	6

Moderate cold wave conditions prevailed in north Madhya Maharashtra on 1st, in south Madhya Maharashtra on 26th and in Rayalaseema on 2nd and 3rd. Night temperatures were appreciably below normal in Gujarat State from 1st to 12th, in Madhya Pradesh from 1st to 12th and again from 18th to 24th, in Gangetic West Bengal, Orissa and Bihar State on many days between 8th and 27th, in interior parts of Maharashtra and Andhra Pradesh from 1st to 3rd and again on most days between 11th and 31st, in Interior Karnataka from 1st to 3rd, 10th to 15th and from 22nd to 29th, in Jammu & Kashmir from 7th to 16th and in Punjab and Haryana on some days between 11th and 16th.