

Weather

HOT WEATHER SEASON (MARCH-MAY 1989)*

1. Introduction

During the hot weather season the normal precipitation amount in the country is highest in Arunachal Pradesh (around 80 cm). The other areas of good thundershower activities are Andaman & Nicobar Islands, Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura, Sub-Himalayan West Bengal & Sikkim and Kerala, where normal rainfall for the season ranges from 50 cm to 65 cm. Normal rainfall is also significant, over Jammu & Kashmir (33 cm), Gangetic West Bengal, hills of west Uttar Pradesh, Himachal Pradesh, coastal and south interior Karnataka and Lakshadweep (16 to 20 cm), Tamil Nadu (12 cm) and Orissa and Bihar plateau (10 cm).

In describing the rainfall distribution over the country, two norms have been adopted for its classification, one for the month and the other for the season. This has been done because of the fact that the limits for describing normal rainfall are generally decided on the basis of variability or the standard deviation of the rainfall. Standard deviation generally decreases as the period increases. Thus, in case of monthly rainfall the limits of ± 19 per cent departures from the normal have been adopted as the normal rainfall. Whereas, in case of the seasonal rainfall the same have been taken as ± 10 per cent departures from the normal. The other norms adopted for defining the monthly rainfall distributions are excess, $+20$ per cent or above; deficient -20 to -59 per cent and scanty, -60 per cent or less. The legends for the seasonal rainfall are given in Fig. 1.

2. Chief features

- (i) Moderate to severe cold wave conditions over hills of west Uttar Pradesh, Himachal Pradesh, Jammu & Kashmir, Marathwada & Vidarbha during March.
- (ii) Abnormally below normal day temperatures over Gangetic West Bengal, Bihar plains, Uttar Pradesh, Gujarat region, Madhya Maharashtra, Marathwada, Vidarbha and Telangana during the last week of March.
- (iii) Heat wave conditions over plains of west Uttar Pradesh, Haryana, Punjab, Rajasthan, Madhya Pradesh, Gujarat region, Marathwada, Vidarbha and Telangana during May.
- (iv) Considerable damage due to severe squalls/hailstorms in some parts of the country during the season.

- (v) Good thundershower activity over Nagaland, Manipur, Mizoram & Tripura, West Bengal & Sikkim, Orissa and Bihar during May.

3. Season's (March-May) rainfall (Fig. 1)

Rainfall was moderately excess in Orissa and Marathwada and slightly excess in Jammu & Kashmir and north interior Karnataka. It was normal in Bihar plains, plains of west Uttar Pradesh, west Madhya Pradesh, Vidarbha, coastal Andhra Pradesh, Rayalseema and Lakshadweep. Rainfall was slightly deficient in Nagaland, Manipur, Mizoram & Tripura, Bihar plateau, Haryana and Madhya Maharashtra; moderately deficient in Andaman & Nicobar Islands, Arunachal Pradesh, Assam & Meghalaya, West Bengal & Sikkim, Punjab, Himachal Pradesh, east Madhya Pradesh, Telangana, Tamil Nadu, south interior Karnataka and Kerala, and was largely deficient over the rest of the country.

4. March

4.1. Weather and associated synoptic features

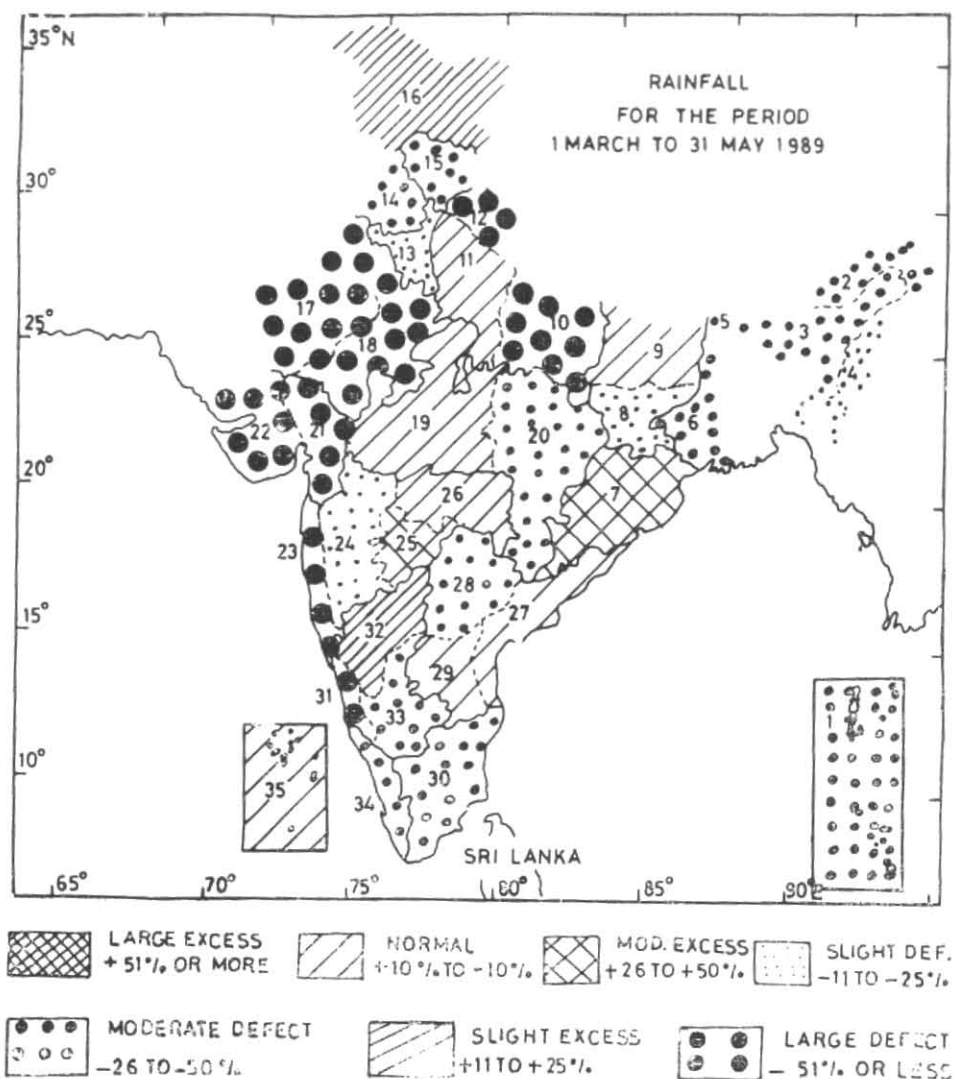
From the second week of March, trough/wind discontinuities in the lower levels were observed over Peninsular India, which prevailed during the remaining period of the month.

Two troughs in the middle and upper tropospheric westerlies moved eastwards across north India. The first one was over east Afghanistan on 9th and moved away eastwards by 13th. The second one was also first located over the same area and moved away by 31st.

The weather over the country during the month was affected by ten cyclonic circulations of which four were induced systems, and by seven western disturbances. The details of these synoptic features are given in Table 1.

The areas of major precipitation (5 cm or more) during the month were Assam & adjoining States, Sub-Himalayan West Bengal & Sikkim, hills of west Uttar Pradesh, Himachal Pradesh, Jammu & Kashmir and Kerala. In the northeastern States, the thundershower activities were subdued outside Arunachal Pradesh, where they occurred at many places on 4 days. They occurred at many places on 6 to 9 days in Himachal Pradesh and Jammu & Kashmir, on 3 to 5 days in Andaman & Nicobar Islands, Punjab and Vidarbha and

* Prepared by S/Shri Nootan Das, D. S. Desai and N. C. Biswas, Meteorological Office, Pune-411005



<i>Sub-division</i>	<i>Dep. from normal</i>	<i>Sub-division</i>	<i>Dep. from normal</i>	<i>Sub-division</i>	<i>Dep. from normal</i>
1. A & N Islands	-29	13. Haryana	-20	25. Marathwada	31
2. Arunachal Pradesh	-50	14. Punjab	-32	26. Vidarbha	-1
3. Assam & Megha.	-39	15. Himachal Pradesh	-27	27. Coastal A.P.	-3
4. N.M.M. & T.	-19	16. Jammu & Kashmir	11	28. Telangana	-32
5. S.H.W.B. Sikkim	-49	17. West Rajasthan	-81	29. Rayalaseema	-10
6. G. West Bengal	-28	18. East Rajasthan	-55	30. Tamil Nadu	-28
7. Orissa	40	19. West M.P.	-1	31. Cot. Karnataka	-56
8. Bihar Plateau	-25	20. East M.P.	-39	32. N.I. Karnataka	14
9. Bihar Plains	6	21. Gujarat Region	-99	33. S.I. Karnataka	-29
10. East U.P.	-54	22. Saurashtra & Kutch	-84	34. Kerala	-28
11. Plains of W. U.P.	-5	23. Konkan & Goa	-82	35. Lakshadweep	-7
12. Hills of W. U.P.	-77	24. Madhya Maha.	-17		

Fig. 1. Rainfall for the period, 1 March to 31 May 1989 (Percentage departure from normal)

TABLE 1
Details of weather systems during March 1989

S.N.	Weather system	Period (Dates)	Place of first location	Direction of movement	Place of dissipation
<i>(A) Cyclonic circulation</i>					
(1)	Lower tropospheric levels	2-3	Assam and Meghalaya and neighbourhood	—	<i>In situ</i>
(2)	Lower levels	4-10	Sub-Himalayan West Bengal & Sikkim & neighbourhood	—	Do.
(3)	Lower tropospheric levels	4 even-6	North Madhya Maharashtra & adjoining Gujarat	Quasi-stationary	Madhya Maharashtra
(4)	Lower levels	7-12	South Gujarat & north Madhya Maharashtra	Northeasterly	North Madhya Pradesh & neighbourhood
(5)	Lower tropospheric levels	18-23	Sub-Himalayan West Bengal & Sikkim & neighbourhood	Easterly	Moved away across Assam & adjoining States
(6)	Do.	22-23	Vidarbha & neighbourhood	—	<i>In situ</i>
<i>(B) Western disturbance</i>					
(1)	Upper air system	28 Feb-3 Mar	North Pakistan	Easterly	Moved away across Jammu & Kashmir & neighbourhood
(2)	Do.	9-11	North Pakistan & adjoining Jammu & Kashmir	Eastnortheasterly	Do.
(3)	Do.	11-14	North Pakistan & neighbourhood	Easterly	Do.
(4)	Do.	13-17	East Afghanistan	Do.	Do.
(5)	Do.	17 even-20	North Pakistan & neighbourhood	Do.	Do.
(6)	Do.	20-26	East Afghanistan	Do.	Do.
(7)	Do.	29-31	North Pakistan & adjoining east Afghanistan	Do.	Do.
<i>(C) Induced cyclonic circulation</i>					
(1)	Lower tropospheric levels	9-13	Central Pakistan & adjoining northwest Rajasthan	Easterly	Himachal Pradesh and neighbourhood
(2)	Lower levels	13-15	Northwest Rajasthan and neighbourhood	Do.	Haryana and neighbourhood
(3)	Lower tropospheric levels	18-19	Northwest Rajasthan	Quasi-stationary	Punjab and neighbourhood
(4)	Do.	27-29 evening	Northwest Rajasthan and neighbourhood	Easterly	Hills of west Uttar Pradesh & adjoining Himachal Pradesh

on 1 to 2 days in Nagaland, Manipur, Mizoram & Tripura, Orissa, west Uttar Pradesh, Madhya Maharashtra, Marathwada, Andhra Pradesh, Tamil Nadu, coastal and north interior Karnataka. Rain or thunder-showers occurred at a few places or at one or two places on 10 to 12 days in Andaman & Nicobar Islands, Assam & Meghalaya, west Madhya Pradesh and Kerala; on 5 to 9 days in Sub-Himalayan West Bengal & Sikkim, Orissa, plains of Uttar Pradesh, Haryana, Punjab, Himachal Pradesh, Jammu & Kashmir, east Rajasthan, east Madhya Pradesh, Madhya Maharashtra, Marathwada, Vidarbha, coastal Andhra Pradesh, Telangana, Tamil Nadu and interior Karnataka and on 1 to 4 days over the rest of the country outside Gujarat region, where there was no rainy day during the month.

4.2. Rainfall

Rainfall during the month was excess in Andaman & Nicobar Islands, plains of west Uttar Pradesh, Haryana, east Rajasthan, Madhya Pradesh, Maharashtra, Andhra

Pradesh, Tamil Nadu, Karnataka and Lakshadweep; normal in Arunachal Pradesh, east Uttar Pradesh, Punjab, Himachal Pradesh, Jammu & Kashmir; deficient in Orissa, west Rajasthan and Kerala and scanty over the rest of the country.

The significant amounts of rainfall (cm) during the month were :

4th : Kondul 3

8th : Nancowry 4, Kondul 3

9th : Coonoor 9, Kodaikanal & Palayam Kottai 7 each, Bhilwara 6, Jhansi & Long Islands 5 each, Kupwara 3, Kota AP 2

10th : Coonoor 11, Billoli & Sironcha 6 each, Kondul 5, Alleppey 4, Cochin AP, Nizambad & Srinagar AP 3 each

- 11th : Meerut 10, Bapatla & Satyamangalam 8 each, Kurnool 7, Kalingapatnam 6, Hyderabad & Ongole 5 each, Anantpur, Coimbatore, Khammam & Parbhani 4 each
- 12th : Sivaganga 12, Tondi 8, Cuddalore 5, Car Nicobar 4, Gangtok, Madras & Trivandrum AP 3 each
- 13th : Usilampatti 6, Alleppey & Peermade 3 each, Kupwara 2
- 14th : Krishnanagar, Tissa & Verinag 3 each
- 15th : Mandi 7, Suni 6, Long Island 5, Ambala AP, Banihal, Jullundur, Keonjargarh, Manali & Shajahpur 2 each
- 16th : Hut Bay & Shillong 2 each
- 18th : Manali 5, Bilaspur 4, Kondul 2
- 19th : Tadong 4, Gangtok 3
- 20th : Kalimpong, Kupwara & Shillong 2 each
- 22nd : Batote 6, Gulmarg & Halwar 5 each, Belgaum, Bhunter AP & Katra 3 each
- 23rd : Tissa 6, Silchar 5, Manali 4, Batote & Dalhousie 3 each
- 24th : Belgaum 3
- 25th : Nidadavole 5, Nandyal 4
- 26th : Paratur 6, Nagpur & Puna AP 4 each, Amravati 3
- 27th : Mathura 9, Sirpur 8, Solapur 4, Chamba, Dalhousie, Nagpur AP & Yeotmal 3 each
- 28th : Mana 6, Dharamsala 5, Bhaderwah, Chamba, Uttarkashi & Udampur AP 4 each, Ambala, Hardoi & Quazigund 3 each
- 29th : Mainpuri & Vijayawada AP 5 each, Nahar, Nidadavole, Tumkur 4 each, Dharampuri & Kodaikanal 3 each

4.3. Temperature

Severe cold wave conditions prevailed over hills of west Uttar Pradesh on 16th and during the last four days of the month and over Himachal Pradesh on 3rd, 14th and 16th. Cold wave conditions also prevailed over Jammu & Kashmir from 2nd to 5th of the month.

Night temperatures during the month were appreciably to markedly below normal on 10 to 13 days in Bihar plains, Himachal Pradesh and Marathwada; on 4 to 8 days in Nagaland, Manipur, Mizoram & Tripura, Sub-Himalayan West Bengal & Sikkim, Bihar plateau, Uttar Pradesh, Punjab, Jammu, east Rajasthan, Saurashtra & Kutch, Vidarbha, Telangana and north interior Karnataka and on 2 to 3 days in Orissa, west Rajasthan, Madhya Pradesh and Gujarat region. They were appreciably to markedly above normal on 4 to 8 days in Nagaland, Manipur, Mizoram & Tripura, Sub-Himalayan West Bengal & Sikkim, east Madhya Pradesh, Gujarat region and Madhya Maharashtra between 18th and 29th of this month.

Day temperatures were appreciably to markedly above normal on 2 to 3 days in Nagaland, Manipur, Mizoram & Tripura, Orissa, Bihar, Jammu, east Madhya Pradesh, Saurashtra & Kutch and coastal Andhra Pradesh during the first week, from 6th to 9th in west Rajasthan and on 3 to 4 days in Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura, Gangetic West Bengal, Orissa, Bihar plateau, east Madhya Pradesh and Tamil Nadu between 20th and 28th. Himachal Pradesh recorded appreciably to markedly below normal day temperatures during the second fortnight of the month. They were as such on most days in plains of Uttar Pradesh, Haryana, Punjab, Rajasthan, west Madhya Pradesh, Gujarat, Maharashtra, Telangana and north interior Karnataka during the period from 23rd to 31st of this month. Day temperatures as much as 8°C to 14°C below normal were recorded on 1 to 3 days in Bihar, Gujarat region, Madhya Maharashtra, Marathwada, Vidarbha and Telangana during the above mentioned period.

4.4. Disastrous weather events

Hailstorms occurred in two spells during March, one between 9th and 11th and the other between 25th and 29th. During the first spell it affected 15 villages of Anantpur district and 8 villages of Mahabubnagar district of Andhra Pradesh and some parts of Maharashtra causing widespread damage to crops and cattle heads. In Andhra Pradesh the damage was estimated to be Rs. 1.04 crores. During the second spell, Banda in Ganjam district of Orissa was affected where one person was killed and four others were seriously injured. During this spell some parts of north Madhya Maharashtra, Marathwada, west Vidarbha, Gadag and Dharwad districts of north interior Karnataka were affected, causing widespread damage to crops and properties. It had been reported in the press that 5 persons were killed and many others were injured in Nanded and Parbhani district of Marathwada on 11th due to torrential rain and hailstorms.

5. April

5.1. Weather and associated synoptic features

During this month the Peninsular trough/wind discontinuities in the lower levels were not prominent. An east-west trough in the lower levels running from Assam to Bihar plains was observed between 14th and 16th.

Eleven cyclonic circulations and six western disturbances affected the weather over Indian sub-continent during this month. The seventh western disturbance of the month lay over north Pakistan and neighbourhood on the last day of the month. The details of the synoptic features are given in Table 2.

The areas of major precipitations (7 cm or more) during the month were Andaman & Nicobar Islands, Assam & adjacent States, Sub-Himalayan West Bengal & Sikkim, Jammu & Kashmir and Kerala. Also the normal rainfall during the month in Gangetic West Bengal, hills of west Uttar Pradesh, Himachal Pradesh, Tamil Nadu and south interior Karnataka was between 4 and 5 cm. Thundershower activities during the month were quite subdued in West Bengal & Sikkim, hills of west Uttar Pradesh, Himachal Pradesh, Tamil Nadu and south interior Karnataka.

TABLE 2
Details of weather systems during April 1989

S.N.	Weather system	Period (Dates)	Place of first location	Direction of movement	Place of dissipation
<i>(A) Cyclonic circulation</i>					
(1)	Lower levels	2-5	Sub-Himalayan West Bengal & Sikkim	—	<i>In situ</i>
(2)	Lower tropospheric levels	8-12	Do.	—	Do.
(3)	Do.	17-20	Bihar Plains & adjoining Sub-Himalayan West Bengal & Sikkim	Easterly	Assam and Meghalaya
(4)	Do.	19-21	South Konkan & Goa and neighbourhood	—	<i>In situ</i>
(5)	Lower levels	22-24	Lakshadweep & neighbourhood	Westerly	Moved away over southeast Arabian Sea
(6)	Do.	24-28	Bihar Plateau & neighbourhood	Eastnorth-easterly	Moved away across Assam & Meghalaya & neighbourhood
(7)	Do.	28 Apr-1 May	Gangetic West Bengal and adjoining Orissa	Easterly	Bangladesh
<i>(B) Western disturbance</i>					
(1)	Upper air system	31 Mar-3 Apr	East Afghanistan	Do.	Moved away across Jammu & Kashmir and neighbourhood
(2)	Do.	3-6	North Pakistan and neighbourhood	Do.	Do.
(3)	Do.	8-11	Do.	Do.	Do.
(4)	Upper air system	16-19	North Pakistan & neighbourhood	Easterly	Do.
(5)	Do.	24-27	Northeast Afghanistan & adjoining north Pakistan	Do.	Do.
(6)	Do.	30*	North Pakistan and neighbourhood	—	—
<i>(C) Induced cyclonic circulation</i>					
(1)	Lower tropospheric levels	9-10	Northwest Rajasthan & neighbourhood	Quasi-stationary	Punjab and Haryana
(2)	Do.	15-16 evening	Southwest Rajasthan	Northeasterly	Northeast Rajasthan and neighbourhood
(3)	Do.	17-19	Northwest Rajasthan and neighbourhood	Quasi-stationary	Haryana & neighbourhood
(4)	Do.	23-25	Northwest Rajasthan and adjoining Haryana and Punjab	Do.	Do.

*Taken over in May for details

Rain or thundershowers occurred almost at all the places or at many places on 7 to 9 days in Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura, Jammu & Kashmir and Kerala and on 1 to 3 days in Andaman & Nicobar Islands, Arunachal Pradesh, Himachal Pradesh, coastal Karnataka and Lakshadweep. These occurred at a few places or at one or two places on 6 to 12 days in Andaman & Nicobar Islands, Arunachal Pradesh, Assam & Meghalaya, Sub-Himalayan West Bengal & Sikkim, Orissa, Himachal Pradesh, Tamil Nadu, interior Karnataka and Kerala and on 1 to 5 days over Nagaland, Manipur, Mizoram & Tripura, Gangetic West Bengal, hills of west Uttar Pradesh, Haryana, Punjab, Jammu & Kashmir, Maharashtra, Andhra Pradesh, coastal Karnataka and Lakshadweep. There were no rainy days in Bihar, plains of Uttar Pradesh, Rajasthan, Madhya Pradesh and Gujarat during this month.

5.2. Rainfall

Rainfall during the month was excess in Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura, and Lakshadweep; normal in Andaman & Nicobar Islands, Arunachal Pradesh, Jammu & Kashmir, coastal Karnataka and Kerala and deficient in Konkan & Goa, Madhya Maharashtra, Marathwada, Tamil Nadu and interior Karnataka. It was scanty over the rest of the country outside Gujarat where there was no rain.

The significant amounts of rainfall (cm) during the month were :

1st : Banihal 6, Kupwara 5, Karkala & Srinagar 3 each

2nd : Cherrapunji 10, Silchar 7; North Lakhimpur & Pahalgam 3 each

- 3rd : Silchar 5, Car Nicobar, Imphal AP & Mokokchung 3 each
- 4th : Holenarsipur & Kodaikanal 4 each, Car Nicobar & Silchar 3 each
- 5th : Bhagamandala 4
- 9th : Banihal & Pahalgam 3 each
- 10th : Banihal 5, Dharamsala & Kukernag 3 each
- 12th : Tezu 4, Pasighat 3
- 13th : Namakkal, Punalur & Silchar 5 each
- 14th : Punalur 4
- 17th : Batote & Nedumangad 3 each
- 18th : Cherrapunji 7
- 19th : Cherrapunji 12, Usilampatti 7, Kodaikanal 6, Alleppey, Coonoor & Kanyakumari 4 each, Kottayam, Majbat & Punalur 3 each
- 20th : Mavelikara 7, Agatti 5, Vridhunagar 4, Cochin AP, Kodaikanal, Palghat, Pune AP & Thanjavur 3 each
- 21st : Cherrapunji 13, Namakkal 11, Pamban 9, Coonoor 8, Coimbatore & Karkala 6 each, Tondi 5, Belgaum AP, Kottayam & Minicoy 3 each
- 22nd : Kayamkulam & Nedumangad 6 each, Mavelikara 4, Kondul 3
- 23rd : Kasargode 8, Belthangady & Cannanore 3 each
- 24th : Belgaum AP 5
- 25th : Chamarajnaragar 7, Mysore & Pahalgam 5 each, Banihal, Batote & Kukernag 4 each, Nancowry 3
- 26th : Gauhati AP 5, Visakhapatnam 4, Balehon-nur & Silchar 3 each
- 27th : Cannanore 17, Silchar 12, Car Nicobar 7, Nancowry 6, Imphal AP 5, Alleppey & Kottayam 3 each
- 28th : Cherrapunji 10, Silchar 9, Quilon 7, Imphal AP 6, Kailashahar 5, Alleppey, Hosur & Nancowry 3 each
- 29th : Agartala AP 9, Alleppey, Imphal AP, North Lakhimpur & Silchar 5 each, Car Nicobar, Gangtok & Gauhati AP 3 each
- 30th : Car Nicobar 7, Agartala AP 5, Nadumangad 4

5.3. Temperature

Day temperatures were, in general, appreciably to markedly above normal in Sub-Himalayan West Bengal & Sikkim between 8th and 23rd, in Bihar and east Madhya Pradesh between 14th and 27th and in Gujarat between 6th and 8th and between 18th and 20th. They were above or appreciably above normal on most of the days during the period from 3rd to 18th of this month in Vidarbha, Rayalaseema, Tamil Nadu, interior Karnataka and Kerala. They were appreciably to markedly below

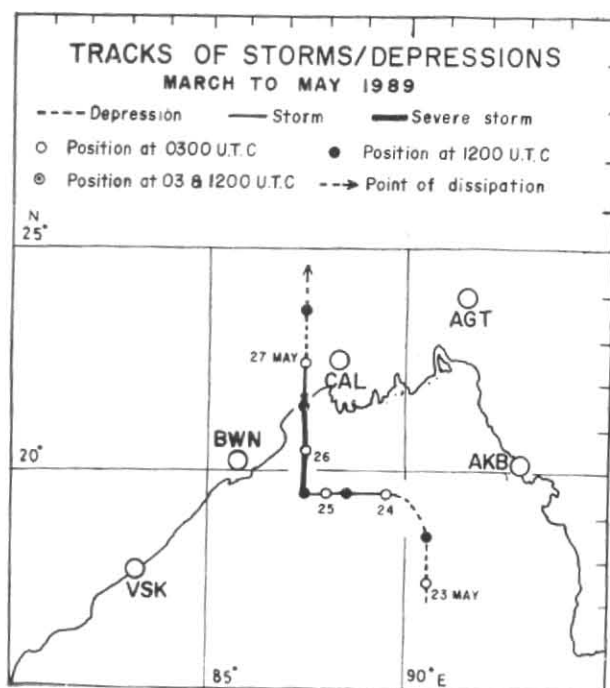


Fig. 2. Track of storm/depression during March-May 1989

normal in Assam & Meghalaya on 1st and 2nd and from 24th to 29th and on most days of the first week of the month in plains of west Uttar Pradesh, Haryana, Punjab, Himachal Pradesh, Jammu & Kashmir and west Rajasthan.

5.4. Disastrous weather events

Severe thundersqualls/hailstorms affected some parts of Sibsagar district of Assam on 18th and on 26th. These claimed four human lives and damaged 800 houses and several electric and telephone poles. Hailstorms, that occurred on 26th in some parts of Shimoga district of south interior Karnataka, caused extensive damages to coconut and banana gardens. Severe thundersqualls between 27 and 29 April claimed ten lives in Howrah, Hooghly, Nadia and Midnapore districts of West Bengal and fourteen lives in Balasore district of Orissa.

6. May

6.1. Weather and associated synoptic features

Trough/wind discontinuities in the lower levels over Peninsular India were observed during the first fortnight of the month.

During the last week of the month a severe cyclonic storm with a core of hurricane winds developed over the Bay of Bengal and crossed West Bengal-Orissa coast north of Balasore on 26th evening. Track of this storm has been shown in Fig. 2. Besides the hurricane, the weather over the Indian subcontinent during the month was affected by a low pressure area, nine cyclonic circulations and four western disturbances.

The details of these synoptic features are given in Table 3.

TABLE 3

Details of weather systems during May 1989

S.N.	Weather system	Period (Dates)	Place of first location	Direction of movement	Place of dissipation	Remarks
<i>(A) Low pressure area/depression/cyclonic storm</i>						
(1)	Low pressure area	11-13	North Andaman Sea	Westerly	East central and adjoining southeast Bay	
(2)	Severe cyclonic storm with core of hurricane winds	23-28 evening	Northeast & adjoining northwest & central Bay	Westerly to northerly	Northern parts of Gangetic West Bengal & neighbourhood	Appeared as mid-tropospheric levels cyclonic circulation over central Bay on 18th
<i>(B) Cyclonic circulation</i>						
(1)	Lower tropospheric levels	1-4	East Madhya Pradesh	—	<i>In situ</i>	
(2)	Lower levels	11-15	Central parts of Bihar	Easterly	Assam and Meghalaya	
(3)	Do. /Lower tropospheric levels	14-18	Southeast Madhya Pradesh	Eastnorth-easterly	Orissa, Bangladesh and neighbourhood	
(4)	Lower tropospheric levels	16-19	Southeast Madhya Pradesh and neighbourhood	Do.	Orissa	
(5)	Lower levels	18-20	Vidarbha & neighbourhood	Easterly	Southeast Madhya Pradesh and neighbourhood	
(6)	Middle tropospheric levels	28-29 evening	East central Arabian Sea off Maharashtra coast	—	<i>In situ</i>	
<i>(C) Western disturbance</i>						
1(a)	Upper air system*	1-4	Jammu & Kashmir and adjoining north Pakistan	Easterly	Moved away across Jammu & Kashmir	*brought over from last month
1(b)	Do.	4-8 evening	North Pakistan & neighbourhood	Do.	Do.	
(2)	Do.	10-13 evening	Jammu & Kashmir	Do.	Do.	
(3)	Do.	17-19	Jammu & Kashmir and adjoining north Pakistan	Do.	Do.	
<i>(D) Induced cyclonic circulation</i>						
(1)	Lower tropospheric levels	1-4	Northwest Rajasthan and neighbourhood	Easterly	Haryana & neighbourhood	
(2)	Do.	17-19	Do.	Do.	Northwest Uttar Pradesh	
(3)	Do.	23-25	Northwest Rajasthan and adjoining Haryana and Punjab	Quasi-stationary	Haryana and neighbourhood	

The sub-divisions, whose normal precipitation during the month is 10 cm or more, are Andaman & Nicobar Islands, Assam & adjacent States, West Bengal & Sikkim, coastal and south interior Karnataka, Kerala and Lakshadweep. The normal rainfall for the month over Orissa, Bihar, hills of west Uttar Pradesh, Himachal Pradesh, Jammu & Kashmir, coastal Andhra Pradesh, Rayalaseema, Tamil Nadu and north interior Karnataka ranges between 5 cm & 7 cm. Rainfall activities were rather good over Gangetic West Bengal, Orissa, Bihar and Jammu & Kashmir and were normal over Nagaland, Manipur, Mizoram & Tripura, Sub-Himalayan West Bengal & Sikkim and north interior Karnataka.

Rain or thundershowers occurred almost at all the places or at many places on 19 days in Andaman & Nicobar Islands, on 13 days in Kerala; on 3 to 6 days in Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura, West Bengal & Sikkim, Bihar plateau, Jammu & Kashmir, Karnataka and Lakshadweep and on 1 to 2 days in Arunachal Pradesh, Orissa, Bihar plains, Punjab, Himachal Pradesh and Rayalaseema. They occurred at a few places or at one or two places on 15 to 22 days in Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura, Sub-Himalayan West Bengal & Sikkim, Tamil Nadu and South interior Karnataka; on 5 to 12 days in Andaman & Nicobar Islands, Arunachal Pradesh Gangetic West Bengal, Orissa, Bihar plains, east Uttar Pradesh, hills of west Uttar Pradesh, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Madhya Maharashtra, coastal Andhra Pradesh, Telangana, Kerala and Lakshadweep and on 1 to 4 days over the rest of the country outside Gujarat, where there was no rainy day.

6.2. Rainfall

Rainfall during the month was excess in Gangetic West Bengal, Orissa, Bihar and Jammu & Kashmir; normal in Nagaland, Manipur, Mizoram & Tripura, Sub-Himalayan West Bengal & Sikkim, Punjab and north interior Karnataka; deficient in Andaman & Nicobar Islands, Assam & Meghalaya, hills of west Uttar Pradesh, Himachal Pradesh, Madhya Pradesh, Madhya Maharashtra, Rayalaseema, Tamil Nadu, south interior Karnataka, Kerala and Lakshadweep and scanty over the rest of the country.

The significant amounts of rainfall (cm) during the month were :

- | | | | |
|-----|---|------|---|
| 2nd | : Car Nicobar 7, Baderwah & Silchar 4 each, Bhuntar AP & Rupsi 3 each | 8th | : Belthangady & Dibrugarh AP 4 each, Madikeri 3 |
| 3rd | : Chickmagalur 6, Silchar 5, Aijal, Bangalore AP, Bijapur, Chaparmukh, Manali, Mandya & Rupsi 3 each | 9th | : Cannanore 5, Car Nicobar, Kayamkulam & Madikeri 3 each |
| 4th | : Mannarghat 7, Kundapur & Bhagamandala 5 each, Karwar & Mandya 4 each, Chittur, Kottayam, Pahalgam & Panambur 3 each | 10th | : Nanjangudu & Uthagamandalam 4 each, Chickmagalur, Holenarsipur & Hunsur 3 each |
| 5th | : Hungund & Jintoor 3 each | 11th | : Car Nicobar 8, Gulmarg 5, Pahalgam 4, Usilampatti 3 |
| 6th | : Mahabaleshwar 7, Nancowry & Tezpur 5 each, Mangalore AP 4, Alatur, Car Nicobar, Kodaikanal & Madikeri 3 each | 12th | : Car Nicobar & Tadong 8 each, Alleppey & Cooch Behar 7 each, Quazigund 4, Kukernag 3 |
| 7th | : Dibrugarh AP 7 | 13th | : Hut Bay & Tiptur 5 each, Car Nicobar & Mysore 3 each |
| | | 14th | : Sri Niketan 6, Car Nicobar, Digha & Jalpaiguri 4 each, Balurghat, Diamond Harbour, Midnapore, Rajghat & Tezpur 3 each |
| | | 15th | : Dharampuri 7, Kailashahar 6, Chaparmukh 5, Car Nicobar 4, Cuddalore, Jagdalpur, Silchar & Sivaganga 3 each |
| | | 16th | : Agartala AP 5, Calcutta 4, Darjeeling & Krishnanagar 3 each |
| | | 17th | : Krishnagar 16, Berhampore 11, Bhagalpur, Parmathy & Mysore 4 each, Coimbatore, Chittur, Hosur, Jagdalpur & Trivandrum 3 each |
| | | 18th | : Digha & Nagamangala 7 each, Bhatkal & Canning Town 6 each, Bangalore, Chitradurga, Kanpur, Kundapur & Shirali 5 each, Hut Bay & Sirsi 4 each, Bijapur, Gadag, Goa AP, Karwar & Vellore 3 each |
| | | 19th | : Bhubaneswar AP 9, Karaikal & Tondi 6 each, Sivaganga 5, Madurai AP 4, Balasore, Machilipatnam, Puri & Quilong 3 each |
| | | 20th | : Baghdogra 8, Ariyalur & Port Blair 5 each, Minicoy 4, Salem & Tiruvalla 3 each |
| | | 21st | : Kozhikode 11, Alleppey, Cochin AP & Port Blair 6 each, Namakkal 5, Cooch Behar & Silchar 3 each |
| | | 22nd | : Cuddapah 7, Eluru 6, Car Nicobar & Pondicherry 5 each, Bapatla, Gauhati AP, Imphal & Kailashahar 3 each |
| | | 23rd | : Kozhikode 10, Mancompur 5, Port Blair 4, Car Nicobar, Mavelikara & Minicoy 3 each |
| | | 24th | : Visakhapatnam 5, Kathua 4 |
| | | 25th | : Quilon 11, Cochin AP & Cooch Behar 7 each, Paradip 6, Malda, Peermade & Sandheads 5 each, Kukernag, Quazigund & Tiruvilla 4 each, Balasore, Gangtok, Kanpur, Midnapore & Purnea 3 each |
| | | 26th | : Paradip 22, Sandheads 15, Chandbali 12, Puri 8, Long Island 6, Bhubaneswar & Darjeeling 5 each, Kayamkulam 4 |

- 27th : Balasore 26, Midnapore 20, Digha 15, Paradip 11, Panagarh 8, Contai, Daltonganj, Jamshedpur & Purulia 7 each, Bankura & Bhagalpur 6 each
- 28th : Malda 9, Gangtok 7, Shillong 6, Bankura, Minicoy & Panagarh 4 each, Gauhati AP & Quilon 3 each
- 29th : Silchar 9, Peermade & Shillong 7 each, Tezpur 6, Cochin AP, Gangtok & Gauhati AP 3 each
- 30th : Car Nicobar 7, Kottayam 5, Cooch Behar 4, Sherthala 3
- 31st : Car Nicobar & Mavelikara 7 each, Kondul, Madurai AP, Malegaon, Malavalli & Uluberia 3 each

6.3. Temperature

The days were quite hot in Rajasthan, Madhya Pradesh, Gujarat region, Marathwada, Vidarbha, Telangana, Rayalaseema, Tamil Nadu and north interior Karnataka between 9th and 24th of the month. Heat wave conditions prevailed on 8 to 12 days in Rajasthan, Madhya Pradesh and Vidarbha and on 4 to 7 days in Gujarat region, Marathwada and Rayalaseema during the same period. These were severe on a couple of days over Rajasthan, east Madhya Pradesh, Vidarbha and Marathwada. Heat wave conditions also prevailed on 1 to 3 days in plains of west Uttar Pradesh, Haryana and Punjab during the above mentioned period.

Day temperatures were, in general, appreciably to markedly above normal in Assam & Meghalaya between 5th and 11th and between 17th and 27th in Nagaland, Manipur, Mizoram & Tripura, West Bengal & Sikkim and Bihar between 3rd and 12th and were so in Rayalaseema, Tamil Nadu and north interior Karnataka between 10th and 20th of this month. They were appreciably to markedly below normal on 8 days in Kashmir

and on 2 to 4 days in Nagaland, Manipur, Mizoram & Tripura, Haryana, Punjab, Himachal Pradesh, Jammu, east Rajasthan, east Madhya Pradesh, Marathwada, Vidarbha and north interior Karnataka between 1st and 9th. They were generally so over Gangetic West Bengal, Bihar and east Uttar Pradesh between 26th and 31st.

6.4. Disastrous weather and damages

As per reports 10 persons died and over 100 persons suffered sun-stroke in Vidarbha during the month due to heat-wave conditions. Severe hailstorm in Nasik city on 2nd claimed the lives of 2 persons. A landslide in Kohima on 7th killed 4 persons and injured several others. Pre-monsoon thunderstorms/squalls during 3rd to 9th May took a toll of 26 lives in Kerala. A severe squall which hit Cannanore on 8th evening, damaged several buildings and uprooted a large number of coconut trees. The total loss in the district was estimated at about Rs. 60 lakhs.

The cyclonic storm claimed 33 lives in Midnapore district of West Bengal and 16 lives in Balasore district of Orissa. Three persons were killed in landslides in Darjeeling district. Heavy rains associated with the storm caused floods in *Kaleghai* river, which inundated vast areas in Midnapore district and also caused floods in river *Bagne* at Khakurda. It disrupted power supply and telecommunication in Midnapore district and damaged houses, paddy crops in West Bengal. It sunk three Barges at Haldia port.

As per reports, about 200 people were feared killed and several thousands injured in the southern districts of Bangladesh due to the impact of the storm. It wiped off 17 villages in Manikganj and Munshiat bazar of Faridpur district. Low lying areas were inundated by 5 to 6 feet due to tidal wave in Bagerhat, Khulna, Satkhira and Patuakhali districts. Sandwips Island town was inundated due to the breach in embankment.