Indian J. Met. Geophys. (1971), 22, 241-246

Weather

POST MONSOON SEASON (OCTOBER — DECEMBER 1970)

CHIEF FEATURES

The southwest monsoon

The southwest monsoon, which had earlier withdrawn from northwest India by the end of September, widhdrew from the rest of north India and the Peninsula north of 15° N by 12 of October. The withdrawal of the monsoon from many parts of north India was delayed by about a week.

Cyclonic storms/depressions

Two severe cyclonic storms (one in October and one in November) and one deep depression (in November) formed in the Bay of Bengal. In the Arabian Sea one cyclonic storm (in November) and one depression (in October) developed during the season. The tracks of these storms/depressions are shown in Fig. 1. Both the severe cyclonic storms in the Bay moved northnortheastwards towards East Pakistan. While the severe cyclonic storm in November did not affect India seriously, it caused very considerable devastation in East Pakistan. The October storm caused damage to houses and crops in the coastal districts of West Bengal. The deep depression in the Bay, which moved westwards across the Tamil Nadu coast towards the end of the third week of November, caused very heavy rainfall in coastal Tamil Nadu. The cyclonic storm and the depression in the Arabian Sea did not affect the country.

Rainfall

There was also good rainfall in the south Peninsular India, in the first three weeks of October, leading to floods in Kerala and in Kanyakumari district. But the season's rainfall in the south

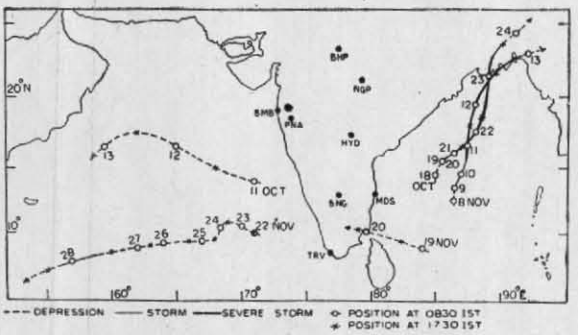

Fig. 1. Tracks of storms/depressions during October to December 1970

Peninsula was just normal or slightly below normal. The total rainfall for the period from 1 October to 31 December 1970, in terms of percentage departures from normal, is shown in Figs. 2(a) and 2(b).

Western disturbances

Six western disturbances affected northwest India during this season, but they were generally weak systems. The rainfall associated with these systems was scanty for the season.

Cold spell

There was an unusually lengthy cold spell in most parts of the Peninsula and the central parts of the country from the last week of November to the third week of December. Moderate cold wave conditions prevailed in north Interior Mysore, Madhya Maharashtra, Andhra Pradesh and Madhya Pradesh on many days during this period.

The important weather features for each month are as follows :

OCTOBER

The southwest monsoon withdrew from northwest India by the end of September. This was about 10 days later than the normal date of withdrawal for this part of the country. Its subsequent withdrawal was fairly regular. By the 12th of October the monsoon had withdrawn from the whole of north India and the Peninsula north of 15°N.

There was a wind discontinuity in the lower

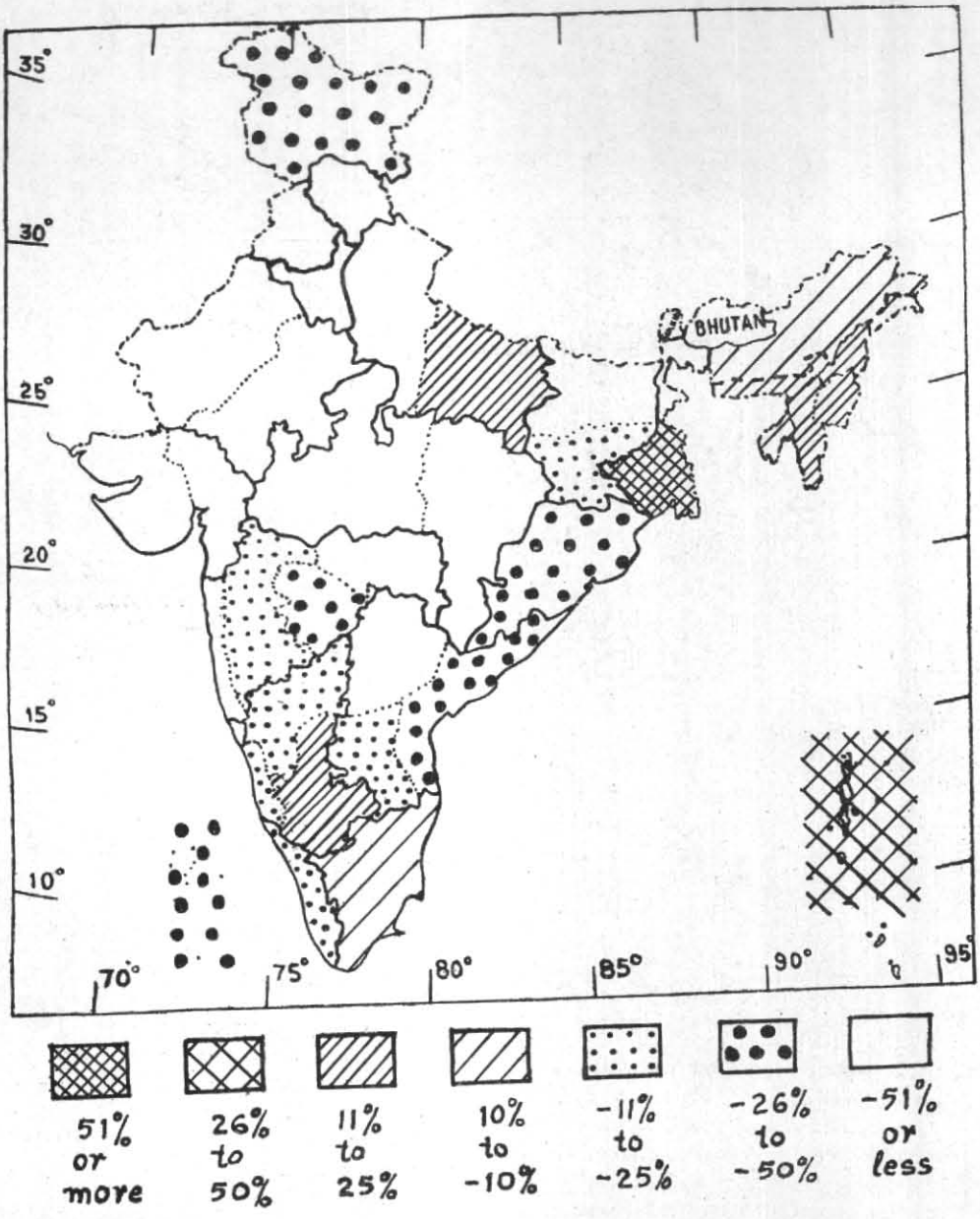

Fig. 2 (a). Rainfall for the period 1 October to 31 December 1970
(Percentage departure from normal)

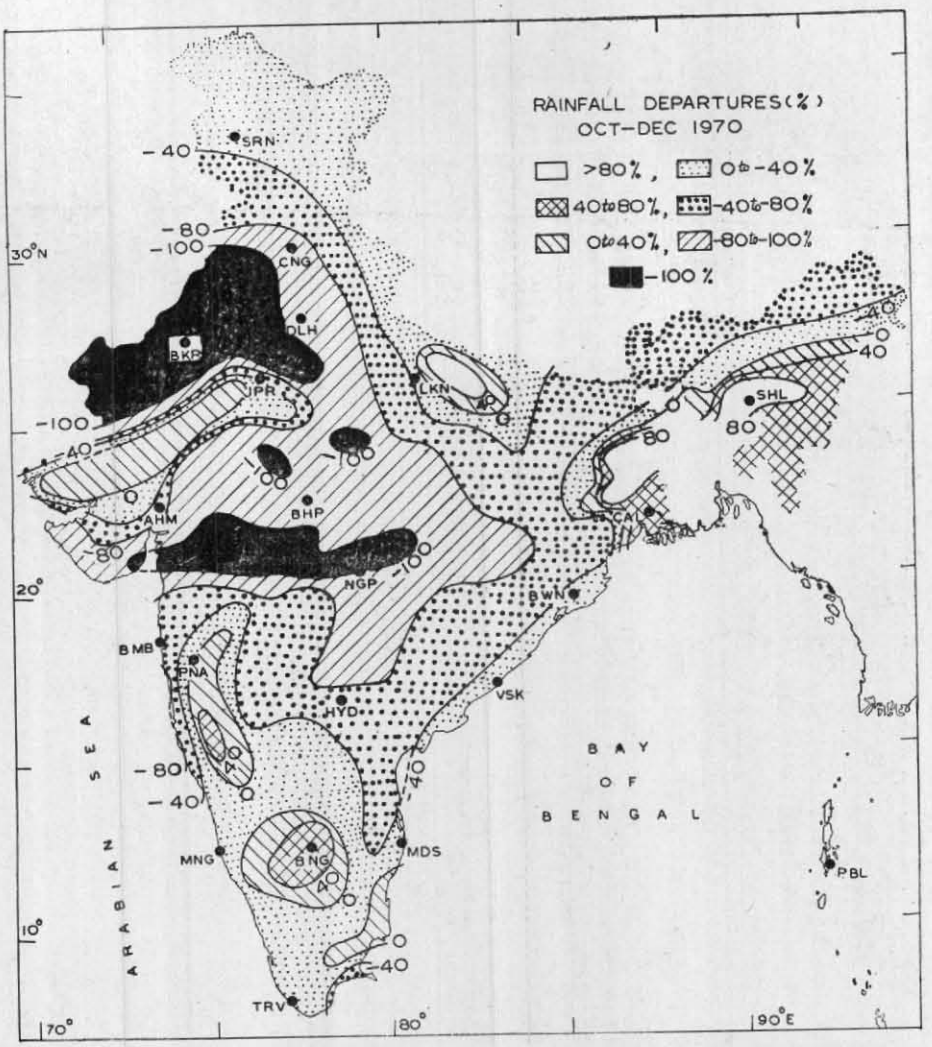

Fig. 2 (b). Percentage departure from normal of rainfall occurred during the period 1 October to 31 December 1970

troposphere (1·5 km a.s.l.) extending from the interior parts of south Peninsula to northeast India across coastal Andhra Pradesh during the first week of October. During the first week of the month, there was yet another wind discontinuity from Uttar Pradesh to northeast India. In addition, two cyclonic circulations extending to 3 km lay over Gangetic West Bengal and central Uttar Pradesh during this period. These systems caused fairly widespread rain, with isolated heavy to very heavy falls in many parts of northeast India, east Uttar Pradesh and the Peninsula. There were reports of floods in the *Brahmaputra* and the NEFA rivers. Low lying areas were inundated in some parts of north Assam. The rivers in Manipur Valley inundated many parts of Imphal and large areas of paddy fields were affected. The principal amounts of very heavy rainfall were : On 2nd, 17cm at Berhampore; on 4th, 15 cm at Sagar Island; on 6th, 26 cm at Gonda; on 7th 24 cm at Berhampore and 13 cm at Nautanwa.

A low pressure area which lay over Andaman Sea on the 4th, moved westwards across the Peninsula and emerged into east central Arabian Sea off the Mysore-south Maharashtra coast on the 11th morning. Subsequently, it concentrated into depression near 14°N, 71°E and moved away westnorthwestwards. By the 13th evening it had weakened into a low pressure area off Saudi Arabia. This caused widespread rain with isolated heavy falls in the Bay Islands from the 4th to 6th, and in many parts of the Peninsula from the 9th to 11th. A number of stations in coastal Andhra Pradesh reported 8 to 9 cm of rain on the 10th. Kakinada reported 12 cm on the 11th.

Another low pressure area which lay over north Andaman Sea on the 16th moved into west central

Bay and concentrated into a depression on the morning of 18th near 14·5°N, 85·0°E. Moving slowly northnortheastwards, it intensified into a cyclonic storm on the morning of 20th, and into a severe cyclonic storm on the morning of 21st when it was centred near 16°N, 86·5°E. Thereafter, moving rapidly northnortheastwards, it crossed the Sundarbans coast near border between West Bengal and East Pakistan on the forenoon of the 23rd. It then moved across East Pakistan and weakened into a low pressure area over south Assam and adjoining regions on the evening of the 24th. The passage of this system caused widespread rain in the Bay Islands, Tamil Nadu, Gangetic West Bengal and Assam, with scattered heavy to very heavy falls in Gangetic West Bengal on the 23rd. The cyclone disrupted communications and caused damage to houses and crops in the coastal districts of West Bengal. The life of Calcutta City was paralysed on the 23rd, by fallen trees and the failure of power supply. Calcutta (Alipore) recorded a maximum wind speed of 105 kmph on the 23rd. The cyclone also caused considerable damage to East Pakistan and took a toll of 200 to 300 human lives. The principal amounts of very heavy rainfall were : On the 21st, 9 cm at Maya Bandar; on the 23rd, 15 cm at Contai, 13 cm at Sagar Island, 11 cm at Bagati and 9 cm at Calcutta (Alipore); on the 24th, 22 cm at Shillong and 10 cm at Tura.

A low pressure area, lay off the Kerala-Mysore coast from the 15th to 17th. It extended northwards and was a well marked trough off the west coast from the 18th to 22nd. It became unimportant on the 23rd. This system caused fairly widespread rain in Kerala and the Arabian Sea Islands from the 15th to 22nd with active to vigorous winter monsoon conditions in Kerala from the 18th to 21st. There were reports of floods in parts of Kerala and in Kanyakumari district. The principal amounts of heavy rainfall were : On the 18th, 9 cm at Trivandrum City and Airport; on the 19th, 12 cm at Trivandrum City, 9 cm at Trivandrum Airport and Punalur, 8 cm at Alleppey; on the 21st, 11 cm at Fort Cochin, 10 cm at Trivandrum City and Alleppey and 8 cm at Punalur and Trivandrum Airport. Kanyakumari recorded 8 cm of rain on the 19th as well as on the 20th.

Two western disturbances moved eastwards across the Western Himalayas in the last week causing scattered rain and snow in the Western Himalayas and isolated light rain in the adjoining plains. On the 23rd, Quazigund recorded 6 cm of rain, and Udhampur, Srinagar City and Airport 4 cm each.

A well marked low, which formed over east central Bay and adjoining north Andaman Sea on the 28th, moved northwards to East Pakistan and adjoining south Assam by the end of the month and caused widespread rain in south Assam on the 30th.

NOVEMBER

But for isolated light precipitation in Himachal Pradesh on the 17th caused by a western disturbance during the middle of the month, the weather was mainly dry in northwest India, Uttar Pradesh and central parts of the country. In the south Peninsula, there was only scattered light to moderate rain in the first fortnight. No well marked trough in the easterlies moved across this region during this period.

A depression formed in the south and adjoining central Bay of Bengal on the morning of 8th with its centre near 12·5°N, 86·5°E, approximately 650 km west of Port Blair. Moving very slowly northwards, it intensified into a cyclonic storm on the morning of 9th near 13·5°N, 86·5° E. It was practically stationary near 14·5°N, 87°E from the 9th evening to the 10th evening. Later moving northnortheastwards, it intensified into a severe cyclonic storm which was centred on the morning of 11th near 16·5°N, 87·5° E. It crossed East Pakistan coast during the early part of the night on the 12th. It was centred about 100 km southsoutheast of Agartala on the morning of 13th as a cyclonic storm. Thereafter it weakened rapidly into a low pressure area over south Assam by the same evening. This system caused widespread rain in the Bay Islands from 8th to 11th with scattered very heavy falls on the 8th and 9th. There was also fairly widespread rain in Gangetic West Bengal on the 12th and 13th and in south Assam on the 13th and 14th. Press reports indicated that this cyclone caused unprecedented havoc on the off-shore islands and in the coastal districts of East Pakistan. The damage was mostly on account of storm surges, resulting in the death of a few lakhs of people with damage to crops and property. This cyclone did not affect India seriously. However the heavy rain, which it caused in the Bay Islands on the 8th and 9th resulted in floods and damage to property. There was also considerable damage

to houses and crops in the Mizo hills district of south Assam. Some damage to houses and crops was also reported from the southern parts of 24-Parganas. Paradeep port in Orissa was reported to have suffered damage. The ship M.V. *Mahajagamitra* with cargo and 50 persons on board was reported to have been lost in the storm. The principal amounts of heavy rainfall were: On 8th, 21 cm at Hut Bay, 13 cm at Port Blair and 8 cm at Long Island and Nancowry; on the 9th, 22 cm at Maya Bandar, 12 cm at Long Island and 10 cm at Port Blair.

A low pressure area moving westwards from south Andaman Sea, concentrated into a depression on the morning of 19th near 9°N, 84°E. The depression became deep on that evening and moving westnorthwest, crossed the Tamil Nadu coast near Vedaranniyam on the forenoon of 20th. Thereafter, it weakened into a low over Tamil Nadu by night. It caused fairly widespread rain in Tamil Nadu from the 19th to 21st with scattered heavy to very heavy falls in coastal Tamil Nadu. Low lying areas in coastal belt from Pondicherry to Atirampattinam were reported to have inundated. There was also damage to houses and crops in Thanjavur district. Heavy rain in Madras on the 21st, paralysed the life in the city, flooding low lying areas and rendering many people homeless. Rameswaram and Pamban experienced squally weather. The principal amounts of heavy rainfall were : On the 19th, 13 cm at Cuddalore; on the 20th, 21 cm at Nagapattinam, Pondicherry and Vedaranniyam and 13 cm at Atirampattinam; on the 21st, 19 cm at Madras Airport and 15 cm at Madras City. Cuddalore recorded an exceptionally heavy rainfall of 31 cm on the 20th.

A low which lay over Tamil Nadu on the night of 20th, emerged near the Laccadive Islands on the 21st and concentrated into a depression on the morning of 22nd near 10°N, 71° E. Moving westwards, it became deep on the morning of 26th when it was centred near 9·5°N, 64·0°E. Subsequently, moving westsouthwestwards it intensified into a cyclonic storm on the morning of 28th near 8°N, 57°E and, thereafter, rapidly weakened into a low pressure off the Somalia coast by the next day. It caused fairly widspread rain over the Arabian Sea Islands from the 22nd to 24th.

Another low lay over southwest Bay off the Ceylon-Tamil Nadu coasts from the 21st to 25th. It moved westwards across Comorin and adjoining south Tamil Nadu by the 27th and became less marked the next day. Yet another low formed over southwest Bay off the Ceylon-Tamil Nadu coasts and persisted there upto the 30th. These systems provided good rainfall in Tamil Nadu in the last week with scattered heavy to very heavy falls in coastal Tamil Nadu. The principal amounts of heavy rainfall were : On the 23rd, 17 cm at Pondicherry, 15 cm at Cuddalore, 14 cm at Madras City and 10 cm at Madras Airport; on the 27th, 13 cm at Vedaranniyam; on the 28th, 27 cm at Vedaranniyam and 24 cm at Nagapattinam; on the 29th, 13 cm at Nagapattinam and 12 cm at Vedaranniyam.

The daily minimum temperatures were below normal in many parts of north Peninsula, Gujarat, Madhya Pradesh and the adjoining parts of Rajasthan during the first fortnight of this month. They were appreciably below normal in Saurashtra and Kutch, Madhya Maharashtra and Telangana. During the second fortnight, the minimum temperatures were below normal in most parts of north India and the north Peninsula, being appreciably so in many parts of north Peninsula, Madhya Pradesh, Bihar and West Bengal. Moderate cold wave conditions prevailed in north Andhra Pradesh, Madhya Maharashtra and Madhya Pradesh on the last two days of the month.

DECEMBER

Three feeble western disturbances moved eastwards across the Western Himalayas as upper air systems extending upto the middle troposphere, between 3rd and 5th, 16th and 19th and 20th to 22nd. They caused isolated light rain and snow in the Western Himalayas. Weather remained dry over the rest of north India and in north Peninsula during this month. The principal amounts of rainfall were : Gulmarg 1 cm on the 17th and Garbyang 1 cm on the 23rd.

A well marked low pressure area moved from the east into Andaman Sea on the morning of 30 November. It moved slowly northwestwards into north Andaman Sea by the morning of 1 December and became less marked. Another well marked low lay over southwest Bay on 30 November, moved eastnortheastwards to the north Andaman Sea on the morning of 2 December and persisted there upto the 4th. It became unimportant by the 5th. A well marked trough

in the middle and upper tropospheric westerlies extended from Bihar to the interior parts of Tamil Nadu on 30 November. It moved eastwards and extended from Assam to east central Bay on 2 December and became less marked the next day. These systems caused widespread rain with isolated heavy falls in the Bay Islands on the 1st and 2nd. Rainfall was scattered in the Bay Islands on the 3rd and 4th. The Bay Islands continued to have good rainfall during the second and last weeks, mainly in association with a low moving from south Andaman Sea to the south Bay, resulting in an excess of rainfall for the month. The principal amounts of rainfall were : Maya Bandar 17 cm on the 1st; Hut Bay 6 cm, Long Island 5 cm, Kondul and Car Nicobar Airport 4 cm on the 2nd; Car Nicobar 7 cm on the 10th; Hut Bay 5 cm on the 25th and 8 cm on the 26th; Car Nicobar 9 cm, Nancowry 8 cm and Car Nicobar Airport 7 cm on the 28th; and Kondul 8 cm on the 29th.

Two troughs of low pressure moved westwards across Ceylon and adjoining south Peninsula, one during the second week and the other during the last week. They caused scattered light to moderate rain in extreme south Peninsula during that period. The principal amounts of rainfall were : Nagapattinam 4 cm and Tuticorin 2 cm on the 11th; Nagapattinam 3 cm and Kodaikanal 2 cm on the 12th; Minicoy 3 cm on the 26th; and Cuddalore, Coonoor and Pondicherry 4 cm on the 28th.

There was a prolonged cold spell in many parts of the Peninsula and the central parts of the country during the first three weeks, with the daily minimum temperatures remaining appreciably below normal. Moderate cold wave conditions again prevailed in many parts of Madhya Pradesh, north Interior Mysore and north Andhra Pradesh upto the 13th and in Kutch and adjoining south-west Rajasthan on the 18th. The daily minimum temperatures were also appreciably below normal in north Andhra Pradesh, Orissa, Madhya Pradesh, Bihar State, Gangetic West Bengal, Punjab, west Uttar Pradesh and Saurashtra & Kutch on some days in the last week.