

Notes and News

WORLD METEOROLOGICAL ORGANISATION

The Third Congress of the World Meteorological Organisation was held in Geneva at the Palais des Nations, from 1 to 28 April 1959, under the chairmanship of Mr. A. Viaut, President of the Organisation. It was attended by representatives of 88 member countries or territories (out of a total of 100—the highest in an International Organisation today), 2 non-member countries and 15 International Organisations. The total number of persons present in the capacity of delegates or advisors or observers was about 225. The Indian delegation was led by Shri S. Basu, Director General of Observatories, who is President of its Regional Association for Asia and also a member of the Executive Committee of WMO. Shri Basu was accompanied by Dr. P. R. Pisharoty, Dr. S. N. Sen and Dr. K. G. Vohra.

The main work of the Third Congress, namely, preparing the programme of work of the organisation for the next four years, was carried out through the Committee on Technical questions. The Committee on General and Legal questions and the Committee on Administrative and Financial questions studied the items on the agenda falling in their respective jurisdictions and formulated proposals for adoption at the Congress plenary. Nearly 60 agenda items were discussed, 187 documents were presented and about 50 resolutions were adopted. Some of the many items discussed in the Congress are highlighted below.

The Congress decided to establish a new Technical Commission for Hydrological Meteorology to deal with matters falling within the common ground between meteorology and hydrology. It also decided not to re-establish the Commission for Bibliography and Publications. It considered and adopted

a large number of proposed amendments to the Technical Regulations, arising out of the recommendations adopted by the Technical Commissions of the Organisation. A definite publication programme was decided upon. Besides the routine publications and the revision of existing publications, the programme envisages the publication of more than 25 technical notes, a few meteorological tables of common use, a few International Guides and an International Meteorological Vocabulary and an International Meteorological Nomenclature, within the next 4 years. The necessity of improving meteorological telecommunications as a whole was emphasised. Particular importance was attached to the installation of telecommunication centres at Tokyo and New Delhi for the exchange of Northern Hemisphere Meteorological Data.

The Congress was of opinion that in view of the fact that meteorological considerations are of importance in the use of atomic energy for peaceful purposes in the various branches of human activity, and that the use of radio-active isotopes can help the development of meteorology, WMO should co-operate in the planning of systems for measurements of radio-activity. A panel of experts including a representative from India would be established, for informing and advising Members on meteorological problems connected with the various activities related to the peaceful uses of atomic energy and applications of nuclear physics in meteorology.

The Congress emphasised the need for meteorological research, particularly over the tropics and decided that WMO should do everything possible to initiate, sponsor and encourage the establishment and operation of one or more research institutes for tropical meteorology.

The International Meteorological Organisation Prize, for outstanding work in the field

of Meteorology, was awarded this year to Prof. J. Bjerknes.

The following were elected to hold office until the Fourth Congress —

President—Mr. A. Viaut (France). First Vice-President—Mr. L. de Azcárraga (Spain) and Second Vice-President—Mr. M. F. Taha (Egypt).

This Congress decided to increase the number of elected members to the Executive Committee from six to nine.

CONFERENCE OF COMMONWEALTH METEOROLOGISTS

The Sixth Conference of Commonwealth Meteorologists was held at Air Ministry, Whitehall Gardens, London from 7 to 14 May 1959, under the Chairmanship of Sir Graham Sutton, Director General of the Meteorological Office, London. The Conference was attended by delegates from all Commonwealth countries and territories, an observer (Dr. M. Doperto) from the Republic of Ireland, and representatives of the Colonial Office and the Commonwealth Relations Office, in addition to various members of the Staff of the Meteorological Office. The Indian delegation was led by Shri S. Basu, Director General of Observatories, and Dr. P. R. Pisharoty was the other delegate.

There were about a dozen items on the agenda and eight resolutions were adopted by the Conference. Useful visits were arranged to the Instrument Division at Harrow and the Forecasting and Research Divisions at Dunstable. One afternoon was devoted to the scientific discussions on the Dynamics of Cumulonimbus, arranged under the auspices of the Royal Meteorological Society. (The Symons Memorial Gold Medal was awarded to Sir Graham Sutton at this meeting of the Society).

The Conference was inaugurated by the Rt. Hon'ble George R. Ward, M. P., Secretary of State for Air. The business of the Conference consisted mostly in the discussion of the thirteen papers prepared as Conference

documents. This Conference reviewed the action on the fourteen resolutions of the previous Conference (1955), the decisions of the Third Congress of WMO (1959), as well as the Commonwealth participation in the IGY and IGC. Tropical Meteorology and Co-ordination and Standardisation of instrument specifications were two items discussed at some length. The Conference decided that a Commonwealth Committee should be set up to co-ordinate and advise on meteorological research in tropics. It strongly recommended that as an aid for the understanding of the nature of tropical weather systems, close experimental synoptic networks (mesh size about 250 km) of radiosonde and rawin stations be set up for limited period in as many different regions as possible. The increasing importance of arriving at common specifications for instruments and the considerable lowering of cost achieved by standardisation were noted. The Conference resolved that the Commonwealth Meteorological Services should co-operate in the exchange of specifications and the development of standardised instruments and, whenever possible, should arrive at a general agreement on the specifications for the more expensive equipment such as automatic weather stations, radio wind-finding equipment and storm-warning radar.

The problem of familiarisation flight and inter-office visits by forecasters, was discussed and it was resolved that British Commonwealth countries should make every effort to remove any existing difficulties, connected with familiarisation flights and visits of brief duration to other forecasting offices.

Mr. J. S. Sawyer gave a critical review of the present position of numerical forecasting and described the *experimental* work that was being done at the Dunstable Office with the electronic computer METEOR, since January 1959. The experiments consist of applying different techniques of analysis, objective and subjective, to a two-parameter model of the atmosphere, in order to evolve a suitable method for *routine* use.

A discussion on the "Artificial control of rainfall" was opened by Mr. B. C. V. Oddie (U. K.). He quoted the conclusion reported by the U. S. Advisory Committee on Weather Control, namely, the possibility of increasing orographic rain in winter by silver iodide seeding from ground generators, and pointed out that the Swiss were trying experiments to prevent over-precipitation in summer by using the same quantities of silver iodide which commercial undertakings were using elsewhere in their attempts to increase rain. In the United Kingdom, experiments on seeding of frontal clouds, during the last three years, on about a score of suitable occasions, appear to show a decrease of rainfall of the order of 17 per cent and certainly no increase. According to him there is no justification for making any claims at present, until the physical processes which are involved are thoroughly investigated. Dr. Thomson (Canada) outlined a Project on Precipitation Physics, proposed to be undertaken in his country.

ICAO JOINT MIDDLE EAST AND SOUTH EAST ASIA REGIONAL AIR NAVIGATION MEETING

The Joint Middle East and South East Asia Regional Air Navigation Meeting of the International Civil Aviation Organisation was held at Rome from 7 January to 3 February 1959. The main purpose of the meeting was to revise the Regional plans under which international flights are carried on safely and regularly. In the eight ICAO flying regions, these plans specify the provision and location of more than 40,000 air navigation facilities and services, such as airports, communication, meteorological facilities, navigational aids, flight information regions, search and rescue bases.

Twentyeight Member States of the two Regions, one non-member State and five international organisations were represented at the meeting. India was represented by a delegation of four officers—Dr. P. Koteswaram of the India Meteorological Department as the leader and three others from the Civil Aviation Department. The Chairman of the

meeting was Mr. Badruddin Ahmad of Pakistan. Besides the General Committee, four other committees were formed to consider the various technical problems. Mr. M. H. Gidanuj (UAR) and Dr. P. Koteswaram (India) were elected Chairman and Vice-Chairman respectively of the meteorological committee.

Some of the items of importance in the agenda of the meeting were—Reassessment of the basic operational requirements of the MID/SEA Regions, taking into account the new types of aircraft to be introduced into service, paying particular attention to the needs of turbo-propeller and turbo-jet aircraft and helicopters; Consideration of altimeter setting procedures; Communication aspects of the aeronautical meteorological broadcast plan, including possible transition to VOLMET broadcasts by radiotelephony only; and Discontinuance of flight meteorological watch procedures. In addition, various problems connected with the provision of air navigation facilities in the specific fields of communication, navigational aids, aerodromes, meteorology, rules of the air and air traffic services, search and rescue were considered in detail. The meeting adopted 174 recommendations in all.

With particular reference to meteorology the meeting drew up plans for development of basic observational network with a view to remedy serious deficiencies. Improved arrangements were recommended for the exchange and dissemination of meteorological information for individual states and for the Regions as a whole. The Meteorological Committee recognised the importance of aircraft weather reports to both operational and meteorological services and accordingly adequate air-reporting procedures were recommended by the meeting.

In regards to communications, new plans were drawn up for Aeronautical Fixed Services with a view to increasing the capacity of message handling and reducing the transit times between various communication stations in the Regions. Institution of a revised VOLMET broadcast plan on radiotelephony was also recommended.

ADVISORY COMMITTEE ON RAIN AND CLOUD PHYSICS RESEARCH

The Council of Scientific and Industrial Research have reconstituted the Advisory Committee on Rain and Cloud Physics Research for a period of three years with effect from 1 April 1959. Dr. K. R. Ramanathan, Director, Physical Research Laboratory, Ahmedabad, has been nominated as the Chairman of the Committee. The other members of the Committee are—Shri S. Basu, Director General of Observatories; Dr. K. S. Krishnan, Director, National Physical Laboratory; Shri S. Ramanritham, Deputy Director, Research and Development, Civil Aviation Department; Sqn. Ldr. S. Das Sarma, Deputy Director of Meteorology, Air Headquarters; Shri P. R. Abuja, Director, Hydrology and Statistics, Central Water and Power Commission; Shri Baleshwar Nath, Secretary, Central Board of Irrigation and Power; Shri C. Balasubramanian, Agricultural Meteorologist, Coimbatore; Dr. D. S. Kothari, Scientific Adviser to the Minister of Defence.

PHYSICAL RESEARCH COMMITTEE

The Council of Scientific and Industrial Research have reconstituted the Physical Research Committee for a period of 3 years with effect from 1 April 1959. Dr. Vikram A. Sarabhai of the Physical Research Laboratory, Ahmedabad, has been nominated as the Chairman of the Committee. The following are the other members of the Committee: Dr. D. S. Kothari, Scientific Adviser to the Minister of Defence; Director General of Observatories; Dr. M. W. Chiplonkar, Head of the Department of Physics, Poona University; Dr. B. D. Nag Chowdhury, Palit Professor of Physics, Institute of Nuclear Physics, Calcutta; Dr. K. Banerji, Head of the Department of Physics, Allahabad University; Dr. P. Venkateswarlu, Aligarh University; Dr. S. K. Chakravarty, Head of the Department of Mathematics and Geophysics, Bengal Engineering College, Howrah; Dr. M. G. K. Menon, Associate Professor, Tata Institute of Fundamental Research, Bombay; Dr. S. Bhagavantam, Director, Indian

Institute of Science, Bangalore; Dr. P. S. Gill, Aligarh University; Dr. G. N. Ramachandran, Professor of Physics, Madras University; Dr. N. L. Singh, Head of the Department of Spectroscopy, Banaras Hindu University; Dr. A. K. Saha, University College of Science and Technology, Calcutta; Dr. R. C. Majumdar, Professor of Physics, Delhi University; Director, National Physical Laboratory, New Delhi; Director General, Council of Scientific and Industrial Research (*ex-officio*).

OCEANOGRAPHY COMMITTEE

The first meeting of the Oceanography Committee of the Central Board of Geophysics was held at Bombay on 30 December 1958. The meeting reviewed the work now being done on oceanography by different agencies in India and additional facilities that are likely to be available in the near future. The programme of work of the Oceanographic Research Wing of the Central Board of Geophysics and procurement of equipment for the Wing were also considered at the meeting.

WEATHER RADAR CONFERENCE

The eighth weather radar conference will be held at San Francisco in April 1960 under the joint auspices of the American Meteorological Society and the Stanford Research Institute, according to a news release issued by the latter. Papers will be invited from scientists on such subjects as radar cloud physics, and the use of radar for weather forecasting, severe storm warning, hydrology and flood warning.

CENTRAL BOARD OF GEOPHYSICS

Dr. K. R. Ramanathan, Director, Physical Research Laboratory, Ahmedabad, has been nominated as the Chairman of the Central Board of Geophysics. Dr. M. S. Krishnan, Retired Director, Indian School of Mines and Applied Geology, Dhanbad, has been nominated as a member of the Board.

UNESCO TRAINING COURSE IN ARID ZONE MICRO-CLIMATOLOGY

A regional training course in Arid Zone Micro-climatology will be held at Quetta (Pakistan) in July 1959. The course is being organised jointly by the Pakistan Meteorological Service and the UNESCO under the latter's major project on scientific research on arid lands.

Participants for the course will be chosen from Afghanistan, Burma, Ceylon, India, Iran, Pakistan and Turkey. The purpose of the course is to acquaint the participants with the most recent techniques applied to the study of micro-meteorology with particular emphasis on the interpretation of climatic and micro-climatic factors through the water balance and plant response. The level of the course will be for younger graduate staff members of Universities and Agricultural Departments and institutions who have interest in geography, physics, agronomy and botany, and will consist of a series of lectures on the following topics: physics of the hydrologic cycle in arid and semi-arid regions; physics of cloud and precipitation—artificial rainfall; physics of dew formation; evaporation and use of mono-molecular layers to reduce evaporation; evapotranspiration and the evaluation of the water and energy balance; micro-climatics of arid and semi-arid vegetative communities in relation to the water and the energy balance; reactions of plants to various micro-environmental situations, including physiological aspects of dew utilisation; application of micro-climatic information for the development of arid and semi-arid lands.

The practical work covered by the syllabus includes principles, designs, maintenance and use of autographic and totalising radiation and meteorological equipment; measurement of evaporation, dew, wind, temperature, radiation etc.

SYMPOSIUM ON SCIENTIFIC INSTRUMENTS

A Symposium on Scientific Instruments will be held under the auspices of the Defence Research and Development Organisation from 18 to 20 October 1959 at the Technical Development Establishment (Instruments), Dehra Dun. It has tentatively been proposed that the subjects to be discussed at the Symposium will include design, development, manufacture, inspection and standardisation of optical instruments, electrical and electronic instruments, survey and drawing instruments, medical and surgical instruments, meteorological instruments, navigational instruments for sea and aircraft, horological and industrial instruments.

INDIAN STANDARDS CONVENTION—1959

The Indian Standards Institution will hold their Fifth Convention at Hyderabad from 27 December 1959 to 2 January 1960.

According to the tentative programme the following is the scope of the Convention: (i) Implementation of Indian Standards, (ii) Certification for Small Industries Products, (iii) Standardization as a pre-requisite to Productivity, (iv) Preparation of Standards in terms of Metric Units, (v) Design for Industrial Experimentation, (vi) Tropicalization of Electrical and Electronic Equipment, (vii) Latest Techniques in Chemical Analysis, (viii) Non-Ferrous Metals Industry and Standardization, and (ix) Documentation.

Invitation for participating in the above Convention has been extended to all members of Indian Standards Institution and other technical institutions. Contributions of technical papers have been invited from the participants, the synopsis and titles of which should reach the Director of the Institution by 15 July 1959 and the full papers by 1 September 1959.

GLASSY SEA

Vessel : S. S. Jalarajendra
Captain : L. J. E. Gooding
Voyage : Aden to Karachi
Observers : J. S. Lamba, 2nd Officer
 A. S. Purandare, 3rd Officer

20 August 1958, 2000 GMT. Ship's position— $16^{\circ}58\frac{1}{2}'N$, $57^{\circ}35\frac{1}{2}'E$. Course $048^{\circ}(T)$, speed $13\frac{1}{2}$ knots.

Wind SW'ly, Force 2. Sea 2', swell SW'ly, height of waves 12 feet. Bar—1002.5 mb. Temp. $77^{\circ}F$. Wet bulb $76^{\circ}F$. Past weather—Altostratus and Stratocumulus clouds gradually spreading over the sky. Present weather—Ugly, threatening sky, overcast with Nimbostratus and Altostratus clouds. Visibility—Moderate, poor.

The appearance of sea was peculiarly glassy. Although the sky was completely covered with clouds, a diffused light was seen all over the sea, giving it an appearance of ground-glass. The phenomenon lasted for about 20 minutes, after which the sea became dark (the colour of the sky).

PHOSPHORESCENCE

Vessel : M. V. Jalazad
Captain : A. T. Goodwin
Voyage : Aden to Bombay
Observers : R. Gangahar, 3rd Officer
 P. S. Barve, Chief Officer

9 November 1958, 1922 GMT. Position— $15^{\circ}13'N$, $55^{\circ}46'E$.

Bar—1011.2 mb. Temp. $28^{\circ}C$. Wind—NE, Force 1. Sea temp. $27.2^{\circ}C$.

Passed white phosphorescence band bearing direct 090° — 270° , about 100 ft wide and about 2 cables length.

HEAVY RAINFALL AT VISAKHAPATNAM DURING OCTOBER 1958

Visakhapatnam Observatory recorded an unprecedented heavy rainfall of 29.3 cm during the 24 hours ending 0830 IST of 20 October 1958, which surpassed the previous maximum rainfall of 27.0 cm on 18 November 1923. Nearly half of the total amount of this rainfall was recorded during the 3-hour period between 0230 and 0530 IST of 20th. The previous 24-hour maximum rainfall for Visakhapatnam for October, which was recorded on 22 October 1928, was 25.9 cm, the normal for the month being 19.9 cm.

As a result of this very heavy rain, large areas of Visakhapatnam and Srikakulam districts were inundated, communications were disrupted and villages isolated due to floods and breaching of tanks. The Hindustan Shipyard, the Oil Refinery and the Naval Base were marooned and Visakhapatnam airfield was submerged under 5 feet of floodwater. The Grand Trunk Road became un-serviceable due to collapse of a bridge near Aganpudi. The railway track was breached at a number of places between Kottapalem and Waltair.

The very heavy downpour occurred under the influence of a shallow Bay depression, which was centred at 0830 IST of 19 October 1958, about 200 km south of Kakinada. The associated cyclonic circulation extended upto 6 km a.s.l. A westerly upper air trough extending upto 10 km a.s.l. lay over north-west India and West Pakistan. The shallow depression remained practically stationary upto 0830 IST of 20 October but the westerly trough moved eastwards and lay above 4.5 km a.s.l., superposed over the low level cyclonic circulation associated with the shallow depression.

It is of interest to mention here that Kakinada recorded 22 cm of rainfall during the 24 hours ending 0830 IST of 20 October 1958.

WEATHER—WINTER SEASON (JANUARY—FEBRUARY 1959)

Good rainfall in the northern and the central parts of the country during January and also in beginning of February, in association with western disturbances, was the chief feature of this year's winter season.

The main features of weather during January and February 1959 are given below—

January—Five well-marked western disturbances moved across northwest India during the month and were responsible for good amount of rainfall over the northern and the central parts of the country.

The first western disturbance of this season appeared over Baluchistan on the 2nd, lay over the Punjab(P) and the neighbourhood on the 4th and moved away across the extreme north of the country on the 5th. Under its influence, rain or snow occurred locally in Jammu and Kashmir and Himachal Pradesh on the 4th and became fairly widespread in these areas on the 5th. Punjab hills experienced fairly widespread rain or snow on the 5th. The plains of the Punjab(I) as well as of northwest Uttar Pradesh also experienced local showers on the 5th. The second western disturbance arrived after about ten days. It lay over north Baluchistan on the 15th and moved away across Kashmir by the 17th, causing local or scattered thundershowers in east Rajasthan and southwest Uttar Pradesh on the 16th and 17th. The third western disturbance arrived soon after and was relatively more active. It was located over northwest Rajasthan on the 19th, over the Punjab hills on the 20th and over northeast Assam on the 23rd. It caused fairly widespread or local snowfall in Jammu and Kashmir, Himachal Pradesh and the Punjab hills between the 19th and 21st and widespread snowfall in the Kumaon hills on the 21st. As the western disturbance moved eastwards, fairly widespread thundershowers were reported from Bihar on the 22nd and from Sub-Himalayan West Bengal

and Assam on the 23rd. A few stations in Bihar also experienced hailstorms. According to newspapers reports, hailstones fell so thick at Tundoo and Sinidih in Bihar that fields and wastes lay under a 4-inch deep white mantle. The passage of this western disturbance also induced a pronounced incursion of moist air from the Bay of Bengal into the central parts of the country between the 19th and 22nd. This caused fairly widespread thundershowers in northwest Madhya Pradesh on the 19th and 20th and in east Vidarbha and east Madhya Pradesh on the 21st. A few hailstorms were also reported from Vidarbha on the 21st and from north Madhya Pradesh on the 21st and 22nd. The fourth western disturbance appeared over north Baluchistan and the adjoining Afghanistan on the 24th morning and induced a low pressure area over Sind and adjoining west Rajasthan the same evening. The western disturbance moved away across Kashmir on the 26th and the induced low moved away across the eastern Himalayas by the 28th. These were responsible for fairly widespread rain or snow in Kashmir and Himachal Pradesh on the 26th, local showers in west Uttar Pradesh and Bihar Plains on the 27th and scattered showers in Assam on the 27th and 28th. While the last western disturbance of the month lay over the northern divisions of West Pakistan, a low appeared over northwest Madhya Pradesh and adjoining east Rajasthan on the 28th. The western disturbance moved away across Kashmir by 30 January and the low moved away across Assam by 1 February. In association with these, fairly widespread rain or snow occurred in Jammu and Kashmir on the 29th and in Himachal Pradesh and the Punjab-Kumaon hills on the 29th and 30th. Fairly widespread thundershowers were also reported from the plains of the Punjab (I) and of west Uttar Pradesh on the 29th, from east Uttar Pradesh and Bihar Plateau on the 30th and from Assam on the 31st.

Night temperatures during the month were either normal or above normal over large

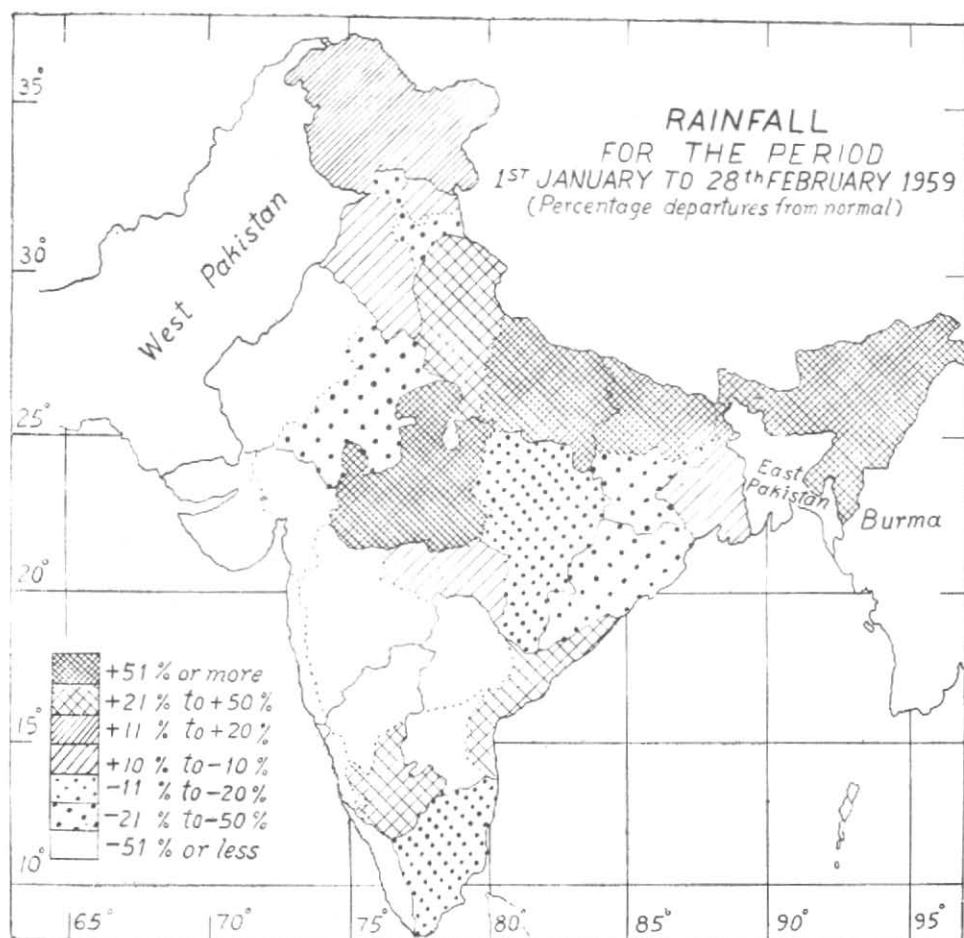


Fig. 1

parts of the country on most of the days, being appreciably above normal over Gangetic West Bengal, north Orissa and east Madhya Pradesh between the 9th and 20th. However, the temperatures were appreciably below normal in north and southeast Rajasthan, southwest Uttar Pradesh and the south Punjab (I) between the 12th and 15th and in Rajasthan, northwest Madhya Pradesh, north Gujarat, Saurashtra and Kutch and parts of Maharashtra on 31 January and 1 February.

February—The activity of the western disturbances generally decreased over the country, particularly during the latter half of the month.

Five western disturbances moved across northwest India during this month also. The first western disturbance moved through the extreme north of the country on 3 February, inducing a low pressure area over northwest Rajasthan and the neighbourhood on the same day. The latter was over the north Punjab (P) on the 4th and moved away through the extreme north of the country by the 5th. Fairly widespread rain or snow occurred in Jammu and Kashmir, Himachal Pradesh and the Punjab-Kumaon hills on the 4th and 5th. Rain or thundershowers were also fairly widespread in the plains of the Punjab (I) and occurred locally in the plains of west Uttar Pradesh on the 4th. The second western disturbance also induced a low pressure area while it moved through the extreme north of the country on the 10th. The induced low was over Sind and adjoining Rajasthan on the 10th and moved away through upper Assam by the 14th. In association with these, rain or snow was fairly widespread in Jammu and Kashmir from the 10th to 12th and occurred locally in Himachal Pradesh and the Punjab-Kumaon hills between the 10th and 13th. Local thundershowers were also reported from the plains of the Punjab (I) and of west

Uttar Pradesh on the 12th, from Gangetic West Bengal on the 13th and from Assam on the 14th. The third western disturbance of the month moved across the extreme north of the country on the 15th, inducing a low over west Rajasthan on the same day. The induced low took an easterly course and moved away through upper Assam by the 17th. Rain or snow occurred locally in Jammu and Kashmir on the 15th while thundershowers were reported from a few places in the Punjab (I) and northwest Madhya Pradesh on the 16th and from Assam between the 16th and 18th. The fourth western disturbance which moved from upper Sind on the 18th to Kashmir on the 19th was responsible for widespread rain or snow in the Punjab-Kumaon hills, Himachal Pradesh and Jammu and Kashmir on the 19th. The fifth western disturbance while moving through the extreme north of the country caused fairly widespread rain or snow in Jammu and Kashmir and local rain or snow in Himachal Pradesh and the Punjab Kumaon hills on the 23rd.

An easterly wave moving westwards across the Comorin-Maldiva areas was responsible for local rain in Kerala on the 5th.

Night temperatures were below normal in northwest India, northwest Madhya Pradesh, north Gujarat and Saurashtra and Kutch on the 1st and also between the 6th and 9th. For the rest of the month, the temperatures were generally normal or above normal over most parts of the country, being appreciably above normal in Telangana and Maharashtra on the 10th, in east Madhya Pradesh and east Uttar Pradesh on the 12th and 13th, in Gangetic West Bengal from the 13th to 15th, in east Rajasthan, Gujarat and Saurashtra and Kutch on the 19th and in the central parts of the country on the 24th.

The distribution of rainfall over the various sub-divisions of the country during the period under review is shown in Fig. 1.