Notes and News

THIRD SESSION OF THE COMMISSION FOR INSTRUMENTS AND METHODS OF OBSERVATION OF THE WORLD METEOROLOGICAL ORGANISATION

The Third Session of the Commission for Instruments and Methods of Observation of the World Meteorological Organisation was held at Vigyan Bhavan, New Delhi from 29 January to 15 February 1962. The Session was inaugurated by Shri Ahmed Mohiuddin, Deputy Minister for Civil Aviation and was attended by delegates and observers from about 30 countries and 5 International Organisations. Mr. D. A. Davies, Secretary General of WMO was also present and spoke on the occasion. An exhibition of meteorological instruments arranged on the occasion at Vigyan Bhavan was also inaugurated by the Deputy Minister.

The Session discussed several matters in the field of meteorological instrumentation and observation, of which the more important were those on the uses of radar in meteorology, measurement of evaporation, instruments for the measurement of radiation, radiosonde instruments and atmospheric electricity. The Session also decided to form Working Groups of experts on various subjects like uses of radar, evaporations, measurement, development of radiosonde and radiation instruments, etc.

At the close of the Session, Dr. L. S. Mathur, Deputy Director General of Observatories (Instruments) was elected as the President of the Commission. Dr. Mathur is the first Indian to be the President of a Technical Commission of the World Meteorological Organisation.

Shri M. Gangopadhyaya, Director, Agricultural Meteorology and Miss A. M. Mani, Director, Instruments, were elected to serve as Chairmen of Working Groups of evaporation and radiation instruments. Dr. L. S. Mathur, Miss A. M. Mani and Shri H. Mitra were nominated to serve as members on four other Working Groups of the Commission.

THIRD SESSION OF THE COMMISSION FOR SYNOPTIC METEOROLOGY OF THE WORLD METEOROLOGICAL ORGANISATION

The Third Session of the Commission for Synoptic Meteorology is being held at Washington, U.S.A., from 26 March to 20 April 1962. India is represented at the Session by a delegation consisting of Shri C. Ramaswamy Deputy Director General of Observatories (Leader) and Dr. S. N. Sen, Director, Regional Meteorological Centre, Calcutta.

COMMISSION FOR AEROLOGY OF THE WORLD METEOROLOGICAL ORGANISATION

The following officers of the India Meteorological Department have been nominated to serve as representatives of India on the Working Groups of the above Commission:

Shri P. R. Krishna Rao, Director General of Observatories	*Working Group on International Research Projects in Meteorology*
Dr. R. Ananthakrishnan, Deputy Director General of Observatories	*Working Group on Synthesis of High Atmosphere Data*

Dr. P. K. Sen Gupta, Director, Radio-Meteorology	*Working Group on the ISY Meteorological Programme*
Dr. P. S. Pant, Meteorologist	*Working Group on the Definition of Conventional Tropopause*

W.M.O.—REGIONAL ASSOCIATION II

The following officers from the India Meteorological department have been elected as Chairmen of the Working Groups of RA-II mentioned below :

Shri A. K. Mallik, Deputy Director General of Observatories	*Working Group on Agricultural Meteorology*
Miss. A. Mani, Director, Instruments	*Working Group on Radiation*
Shri N. C. Dhar, Meteorologist	*Working Group on Sferics*

Dr. P. K. Sen Gupta, Director, Radiometeorology has been nominated to represent India on the RA-II Working Group on Atmospheric Ozone in place of Shri M. Rama Rao, Meteorologist.

WORLD METEOROLOGICAL DAY

The Second World Meteorological Day was celebrated on 23 March 1962 at the various offices of the India Meteorological Department. The special theme for this year being 'Meteorology in relation to agriculture and food production,' the main national ceremony was held at Poona where the Headquarters of the Agricultural Meteorology Division of this Department is located. A new edition of the publication "Weather and the Indian Farmer" was issued on the occasion. Shri S. K. Patil, Minister for Food and Agriculture presided. Shri R. T. Joshi, an agriculturist from Nasik (Maharashtra) who saved his crop of grapes from destruction by frost by taking timely measures, gave an account of the practical utility of weather service to the farmers. An exhibition containing exhibits of special interest to agriculturistsand other users, as well as a film show, wasattended by more than 4000 visitors.

At Delhi, a meeting was held under the presidentship of Shri Ahmed Mohiuddin, Deputy Minister for Transport and Communications at which Dr. L. A. Ramdas, who did pioneer work in agricultural meteorology in the department for over 21 years, delivered a lecture on 'Agricultural Meteorology'.

Similar functions were held at other important places in India. The State Ministers for Agriculture addressed the meetings at Bombay and Madras.

INTERNATIONAL METEOROLOGICAL PRIZE

The Sixth International Meteorological Prize for 1961 has been awarded to Dr. K. R Ramanathan, Director, Physical Research Laboratory, Ahmedabad; President, Indian Meteorological Society and a former Deputy Director General of the India Meteorological Department. Formal presentation of the prize was made by Mr. D. A Davies, Secretary General, World Meteorological Organisation, at a special function held before the inauguration of the Third Session of the Commission for Instruments and Methods of Observation at New Delhi. The prize consists of a gold medal, a scroll containing the citation and a cheque for $ 1200. Dr. K. R. Ramanathan is the first Indian to be awarded this prize. An article on Dr. Ramanathan and his scientific work appeared in the July 1961 issue of this journal.

ICAO/WMO SEMINAR ON FORECASTING FOR TURBINE ENGINED OPERATIONS, BANGKOK

The joint ICAO/WMO Seminar which was to have been held at Bangkok in February/March 1962 has been postponed to the second half of 1962.

WMO—INTER-REGIONAL SEMINAR ON TROPICAL CYCLONES

An Inter-Regional Seminar on Tropical Cyclones was arranged by the W.M.O. at Tokyo between 18 to 31 January 1962. H. E. Mr. M. Saito, Minister of Transportation, Japan, opened the Seminar and Dr. K. Wadati, Director General of the Japan Meteorological Agency acted as the Director. Dr. J. F. Gabites of the New Zealand Meteorological Service, Mr. R. C. Gentry of the U.S. Weather Bureau and Dr. P. Koteswaram of the India Meteorological Department were invited by the W.M.O. to act as Consultants to the Seminar and to deliver a series of lectures on the origin, development, movement and decay of the tropical cyclones in the South Pacific, Atlantic and the Indian Oceans respectively. Prof. S. Syano, Dr. H. Arakawa, Dr. K. Takahashi and Mr. T. Kume of the Japan Meteorological Agency and Mr. L. W. Vanderman of the U. S. Weather Bureau were invited to deliver individual lectures. National delegates from 15 countries including the U.S.A. and Australia participated in the Seminar and representatives of Spain and U.S.S.R. and other International Organisations attended as Observers. Shri K. L. Sinha, Meteorologist, Regional Meteorological Centre, Calcutta, attended the Seminar as India's participant. Apart from the lectures from the invited Consultants and Lecturers, a number of papers were submitted for discussion by the national participants. Practical analysis classes were also held by the Consultants and the Japan Meteorological Agency with regard to cyclones in their respective areas.

The Seminar dealt with various aspects of tropical cyclones including the use of modern methods like the aircraft reconnaissance, radar, numerical computations and satellites. The proceedings of the Seminar will be issued as a publication by the Japan Meteorological Agency in a short time and will be of great interest to Meteorologists.

SYMPOSIUM ON HUMIDITY AND MOISTURE

An International Symposium on 'Humi dity and Moisture—Measurement and contr o in Science and Industry' will be held fro m 20-23 May 1963 in Washington. The symposium is jointly sponsored by two U.S. Government agencies, the National Bureau of Standards and Weather Bureau of the U. S. Department of Commerce, and three technical societies—the Instrument Society of America, American Meteorological Society and the American Society of Heating, Refrigerating and Air Conditioning Engineers. This will be the first international conference devoted exclusively to this subject and the first symposium since 25 November 1921.

It is planned to arrange the meeting into sessions, devoted to (1) Fundamentals, (2) Standards, (3) Hygrometers and Moisture Detectors, (4) Applications and (5) Methods of Control.

Those interested in presenting papers are invited to submit two copies of an abstract to Arnold Wexler, Chairman of the Program Committee, National Bureau of Standards, Washington 25, D. C.

COSPAR(ICSU)

The Committee for Space Research of the International Council of Scientific Unions is to hold a meeting from 30 April to 9 May 1962 at Washington, U.S.A. for discussion on the various aspects of space research. Prior to this meeting, the Committee will hold two symposia, the first on 'Meteorological uses of Rockets and Satellites' from 23-25 April 1962 organised jointly with W.M.O. and the International Association of Meteorology of I.U.G.G. and the second on 'Use of artificial satellites for Geodesy' from 26-28 April 1962. A delegation from India is expected to attend the meeting and the symposia.

I.T.U.—INTERNATIONAL TELEGRAPH AND TELEPHONE CONSULTATIVE COMMITTEE (CCITT)

Shri C. Ramaswamy, Deputy Director General of Observatories, India Meteorological Department, has been nominated to represent the World Meteorological Organisation on the CCITT Plan Sub-Committee for Asia of the International Telecommunications Union.

SYMPOSIUM ON THE CYCLE AND THE ISOTOPIC COMPOSITION OF ATMOSPHERIC GASES

The Commission on Atmospheric Chemistry and Radioactivity of the International Association for Meteorology and Atmospheric Physics (IAMAP) of the International Union of Geodesy and Geophysics in co-operation with World Meteorological Organization is organising a Symposium on the cycle and the isotopic composition of atmospheric gases to be held at Utrecht, Netherlands from 8-14 August 1962.

INDIAN NATIONAL COMMITTEE FOR SPACE RESEARCH (INCOSPAR)

The Department of Atomic Energy, Government of India, has constituted an Indian National Committee for Space Research (INCOSPAR) in which besides the Director General of Observatories, Dr. P. R. Pisharoty, Director, Colaba and Alibag Observatories and Dr. M. K. Vainu Bappu, Director, Kodaikanal, have been included as members. The first meeting of the above Committee was held at Bombay on 22 February 1962. A report on the activities of the department in the field of Satellite Meteorology was submitted to the Committee.

INDIAN NATIONAL COMMITTEE FOR THE WORLD POWER CONFERENCE

A meeting of the Indian National Committee for the World Power Conference was held at Calcutta on 2 February 1962. The meeting discussed amongst other matters the reconstitution of the Indian National Committee from March 1962 onwards. Shri P. R. Krishna Rao, Director General of Observatories, continues to be a member on the Committee.

CENTRAL BOARD OF IRRIGATION AND POWER

Shri P. R. Krishna Rao, Director General of Observatories and Shri S. Banerji, Meteorologist attended the 33rd Annual Meeting of the Central Board of Irrigation and Power held at New Delhi from 13-15 November 1961.

CENTRAL FLOOD CONTROL BOARD

Shri P. R. Krishna Rao, Director General of Observatories attended the 11th meeting of the Central Flood Control Board held at New Delhi on 17 November 1961.

STANDING ADVISORY BOARD FOR ASTRONOMY

Dr. A. L. Narayan, Vice-Chancellor, Andhra University has been nominated by the Government of India as a member of the Standing Advisory Board for Astronomy in place of late Dr. K. S. Krishnan.

TRITIUM COMMITTEE—DEPARTMENT OF ATOMIC ENERGY

Dr. P. R. Pisharoty, Director, Colaba, has been nominated to serve as a member on the Tritium Committee of the Department of Atomic Energy of the Government of India.

PLANNING COMMISSION—COMMITTEE ON NATURAL RESOURCES

The Director General of Observatories has been nominated as *ex-officio* member of the Natural Resources Committee (Main Committee) and its technical committies on Energy and Water.

FORTYNINTH SESSION OF THE INDIAN SCIENCE CONGRESS AT CUTTACK IN JANUARY 1962

The Fortyninth Session of the Indian Science Congress Association was inaugurated by Shri Jawaharlal Nehru, the Prime Minister of India, on 3 January 1962 at Cuttack, the venue of the Session. In his speech the Prime Minister appealed to the scientists assembled to spread the influence and temper of science all over India, because it was only through science that the basic problems of this country could be solved. He also exhorted the senior scientists to encourage their younger colleagues and help them attain greater heights of scientific achievement. The Presidential address on the "Impact of Life-Sciences on Man" was delivered by Dr. B. Mukherji, Director, Central Drug Research Institute, Lucknow. He stressed on the possible mastery over our destiny through the fitting of the biological knowledge so far gained, into a framework of practical Eugenics. However, the reporter doubts whether the uncontrolled release of fissionable material in the atmosphere will allow man to control his destiny for the better.

The Session was attended by nearly 1200 delegates from all over India and nearly 30 foreign visiting scientists. The India Meteorological Department was represented by six officers.

The scientific deliberations of the Congress were held in thirteen different sections, which were respectively presided by : Dr. P. L. Bhatnagar (Mathematics) ; Dr. C. Chandrasekhar (Statistics); Prof. V. A. Sarbhai (Physics); Dr. R. P. Mitra (Chemistry); Dr. R. P. Rode (Geology); Prof. J. Venkateswarlu (Botany); Dr. L. S. Ramaswami (Zoology); Dr. S. C. Sinha (Anthropology); Dr. J. C. Banerjea (Medicine); Dr. P. K. Sen (Agriculture); Dr. G. C. Esh (Physiology); Dr. G. D. Bhoaz (Psychology) and Dr. V. Cadambe (Engineering). Besides the presentation of more than a thousand scientific papers (nearly 1500 had been communicated), 34 symposia and 4 joint sessions were held under the aegis of the various sections. There were popular evening lectures on every day by distinguished scientists, Indian and foreign. These were well attended, particularly as they were followed by cultural programmes, where the artists of Orissa presented some exquisite programmes.

The presidential address in the Mathematics Section was on "Non-Newtonian Fluids"; that in the Physics Section was on "Cosmic Rays and Interplanetary Space". Symposia on "Astrophysics", on "Radio and Microwave Spectroscopy" and on "Magneto-hydrodynamics" were of particular interest to physicists and geophysicists. A thought provoking special lecture on "Modern Trends in Field Theory and Quantum Theory" was delivered by Prof. I. Tamm. Similar special lectures were delivered by Prof. P. M. S. Blackett on Rock Magnetism' and by Dame Kathaleen Lonsdale on "Thermal Vibrations in Crystals".

On this occasion, the Utkal University, under whose auspices the Congress was held, brought out an illustrated Souvenier—Orissa Past and Present—, which was highly informative. The hospitality and other physical arrangements for the holding of the Session at the small township of Cuttack were good.

The Fiftieth (Golden Jubilee) Session of the Indian Science Congress will be held at Delhi in January 1963, under the General Presidentship of our distinguished astrophysicist, Prof. D. S. Kothari, Chairman, University Grants Commission.

AGRONOMY COMMITTEE OF THE INDIAN COUNCIL OF AGRICULTURAL RESEARCH

The meetings of the Agronomy Committee of the Indian Council of Agricultural Research were held at New Delhi on 15-16 November 1961. Shri A. K. Mallik, Deput6 Director General of Observatories, attendey the above meetings and presented a repord on the results obtained during the last fifteen years of work on crop-weather schemes

regarding paddy, wheat and jowar. The committee recommended that a small sub-committee consisting of an Agronomist, a Statistician and representatives of India Meteorological Department may examine the available data and see whether any information can be obtained from these data for the immediate use of agronomists. The committee also recommended that a hand book on Agricultural Meteorology for use by under-graduate students in Agricultural Colleges should be prepared by Shri A. K. Mallik for publication by the Indian Council of Agricultural Research.

IJMG AWARD

It may be recalled that on the occasion of the first World Meteorological Day celebration on 23 March 1961, the Minister for Transport and Communications, announced the institution of a biennial award for the best paper published in the *Indian Journal of Meteorology and Geophysics*. The first IJMG award for the best paper published in the journal in 1960 and 1961 was made to Dr. M.V. Sivaramakrishnan, Meteorologist, at the national ceremony held at Poona on the Second World Meteorological Day on 23 March 1962.

NORTHERN HEMISPHERE ANALYSIS CENTRE

The nucleus of the Northern Hemisphere Analysis Centre was established in the Headquarters Office of the India Meteorological Department on 27 January 1962. Meteorological data are being obtained through a T/P link with the Main Meteorological Office at Safdarjung and 00 GMT surface and upper air charts are being prepared and analysed.

INDIAN EPHEMERIS AND NAUTICAL ALMANAC

The sixth issue of the Indian Ephemeris and Nautical Almanac for the year 1963 has been published. The present issue contains a new table showing precessional elements for reduction of mean places of stars to some back epochs.

ARTIFICIAL RAIN-MAKING SCHEME, COIMBATORE CENTRE, MADRAS STATE

In connection with artificial rain-making trials being conducted at Coimbatore Centre by the Food and Agriculture Department of the Government of Madras, the India Meteorological Department has agreed to help them in the installation of raingauges in and around Coimbatore and to arrange pibal ascents.

TIROS—IV

U.S.A. launched a fourth weather satellite (TIROS-IV—Television and Infra-red observation Satellite) into orbit on 8 February 1962 from Cape Canaveral, Florida, U.S.A. Arrangements have been made by the India Meteorological Department for the recording of meteorological observations of cloud cover etc. and for recording of upper air observation upto as high levels as possible by the various departmental observatories at the same time as the satellite takes photographs over India and neighbourhood.

INDIAN METEOROLOGICAL SOCIETY

Dr. E. Eriksson of the International Institute of Meteorology, Stockholm, spoke on 'Meteorology and Atmospheric Chemistry' in the Library Hall of the Meteorological Office, New Delhi on 3 March 1962.

Six films of meteorological interest including those on 'Science in Space and 'Research by Rockets' were shown in the Meteorological Offices at Lodi Road, New Delhi and Poona on the World Meteorological Day (23 March 1962).

Prof. C. V. Raman gave a talk on 'Infra-red Absorption' in the Meteorological Office, New Delhi on 17 March 1962.

Shri C. Ramaswamy gave a talk on 'The Application of Optimum Routing Techniques during the Movement of Cyclones in the Indian Seas' on 19 March 1962 in the Meteorological Office, Lodi Road, New Delhi.

ASSIGNMENT OF INDIAN METEOROLOGIST TO INDONESIA

Shri P. S. Sreenivasan, Assistant Meteorologist, Agricultural Meteorology Division, proceeded to Djakarta (Indonesia) on deputation on foreign service to take up an assignment as Agricultural Meteorologist on the Technical Assistance Mission to Indonesia.

FOREIGN VISITORS

Dr. Tuzo Wilson, Director, Institute of Earth Sciences, University of Toronto, Canada, visited the Meteorological Office, New Delhi, and the Seismological Observatory at the Ridge on 10 January 1962.

Prof. Alexander M. Riabchikov, Dean of the Faculty of Geography of Moscow University visited the Agricultural Meteorology Division, Poona, on 11 January 1962.

Professor B. J. Bok, Director of the Mount Stromlo Observatory visited Kodaikanal Observatory on 26 and 27 January 1962.

Mr. Khiou Bonthom, Chief of Meteorology, and Mr. Satharanjsi, Chief of Climatology Division, Cambodia, visited the Meteorological Offices at New Delhi and Calcutta in January/February 1962.

A party comprising of 3 Italian Meteorologists, Lt. Col. Luccardi, Lt. Col. Rosini and Capt. Zancla visited the Meteorological Offices at Bombay and Poona in February 1962.

Dr. E. Eriksson of the International Institute of Meteorology, Stockholm, visited the Regional Meteorological Centre and Colaba Observatory, Bombay, on 23 February 1962 and the Meteorological Office, New Delhi, on 3 March 1962.

Mr. Laskharian of Iran Meteorological Service visited the Regional Meteorological Centre, Alipore, Calcutta, in March 1962 for comparison of barometers.

Mr. Norton, Meteorologist from Bahrein (Persian Gulf), visited the Forecasting Office, Safdarjung, New Delhi, on 10 March 1962.

INTER-REGIONAL SEMINAR ON FIELD METHODS AND EQUIPMENTS USED IN HYDROLOGY AND HYDRO-METEOROLOGY

Delegates to the above seminar held at Bangkok in November 1961 visited the Meteorological Offices at New Delhi and the Agricultural Meteorology Division at Poona on 14 and 18 December 1961 respectively in the course of their post-seminar study tour in India.

ESTABLISHMENT OF HYDROGRAPHIC SURVEY STATIONS ON THE EAST COAST OF INDIA

The Department of Transport of the Government of India, Ministry of Transport and Communications, have set up a Sub-committee to collect and co-ordinate information relating to littoral sand-drift, waves, swells etc, along the east and west coasts of India and prepare a working paper to decide the further steps necessary in connection with the establishment of more hydrographic survey stations on the east coast of India. Shri C. Ramaswamy, Deputy Director General of Observatories has been nominated to serve on the Sub-committee from the India Meteorological Department.

SYMPOSIUM ON CORROSION OF METALS

Under the auspices of the Defence Research and Development Organisation a Symposium on corrosion of metals is to be held at the Defence Research Laboratory, Kanpur from 7-10 November 1962.

WEATHER RADAR

A light weight weather radar (Bendix WTR-I type) was installed at the Agartala Airport, Tripura State on 8 January 1962. This radar will be used for locating thunderstorms within a radius of 150 miles and for providing this information to the aircraft. The Agartala radar is the seventh weather radar installation in the country.

COLD WAVE OF DECEMBER 1961

In the wake of an active western disturbance that moved across north India causing fairly widespread rains during the period 16-19 December, a severe cold wave gripped the Punjab, Delhi, Uttar Pradesh, Bihar and most parts of Rajasthan. The cold spell over these areas lasted for over 10 days and was most severe in Uttar Pradesh and Bihar where it took unprecedented toll of life and caused widespread damage to crops. In some places in south and central Uttar Pradesh, the night temperature went down to -1°C—an all time record for these places. In the Punjab and north Rajasthan also temperature reached freezing point at a number of places. Some stations in Madhya Pradesh and Bihar also registered the lowest ever temperatures on record during this spell.

A noteworthy feature accompanying this cold spell was the incidence of widespread thick fog over northwest India for almost ten consecutive days, dissipating only in the afternoons. This resulted in day temperatures also getting exceptionally below normal particularly in Uttar Pradesh and Bihar and added considerably to the severity of the cold spell.

After the passage of the western disturbance on the 18th, the night temperatures started falling appreciably in most parts of the Punjab and in east and northwest Rajasthan on 19th. By the 21st, the fall extended into southwest Rajasthan and west Uttar Pradesh while there was a further fall in the areas already mentioned. The lowest temperatures (in the plains) at this stage were 0°C in Rajasthan, 1°C in the Punjab and 2°C in west Uttar Pradesh. The cold spell was severe over northwest Madhya Pradesh and some of the adjoining districts of northeast Madhya Pradesh during 23-26 December. Gwalior and Nowgong reported minimum tempratures of 1°C or less on six days. The lowest minimum temperature of -3°C was recorded in Madhya Pradesh at Shivpuri on 26 December and Sheopur Kalan on 27 December. By the 22nd the cold spell extended into east Uttar Pradesh, while in southwest Rajasthan the temperatures started rising. The cold wave spread eastwards into Bihar by 24th where the lowest temperature was 2°C on the subsequent three days. In the Punjab and east and northwest Rajasthan the cold spell persisted till 27th and the lowest temperatures continued to be around the freezing point. Thereafter the temperatures started rising and by 30th they were nearly normal or slightly below normal.

In Uttar Pradesh the cold spell persisted till 28th. The most severe phase was on 26th and 27th when temperature at some places was - 1°C. By 29th, however, the night temperatures at most places rose to nearly normal or only slightly below normal. In Bihar also the cold spell persisted till 28th, after which the temperature started rising.

The main feature of the synoptic situation during this period was the existence of a rather diffuse surface high which remained practically stationary over Uttar Pradesh and neighbourhood throughout the period. As a result, over most of these areas surface winds were nearly calm and winds in the lower levels of the atmosphere upto 1 km a.s. l. very light. The air in the lower levels which was comparatively moist due to the preceding rain spell remained practically stagnant and turbulent mixing with the drier air aloft was prevented by very stable stratification. The remarkable persistence of the ill-defined wind field and the consequent stagnation of the air in the lower levels in these areas was helped by the absence of any well marked western disturbance during this period. The one or two feeble western disturbances which did occur, moved too far to the north and also took a northeasterly course and so had no effect on conditions over the Punjab and U.P.

On 19th, in the wake of the western disturbance, there was a good rise of pressures

over the northwest of the country, but before a steep pressure gradient could build up in the rear pressures again started falling in the above area. Thereafter there was no significant progression of the pressure system. The temperatures fell appreciably over the Punjab and Rajasthan by 19th, and there was widespread radiation fog over north India. Because of very light winds in the lower levels the fog dissipated only in the afternoon, effectively preventing surface heating. The day temperatures, therefore were abnormally low being at places 10 to 12° C below normal. During the subsequent days also the condition remained unchanged so that the dry northerly air was confined to the Punjab and Rajasthan only. Thick fog over Uttar Pradesh and neighbourhood recurred for nearly ten consecutive days and day temperatures in some parts of U. P. were 17° C below normal. This resulted in a systematic lowering of the minimum temperature which in the south and central parts of Uttar Pradesh fell below freezing point.

The cold spell resulted in unprecedented hardship to people in northern India. Particularly in Uttar Pradesh and Bihar it was reported to have caused a havoc taking a toll of about seven hundred lives. Thousands of heads of cattle and birds were reported to have perished in the cold and the damage to crops was considerable. In Delhi itself, 14 people were reported to have died due to cold. The persistent fog resulted in complete dislocation of air and rail traffic.

HAILSTORM OVER CENTRAL PARTS OF THE COUNTRY

A spell of severe hailstorm activity occurred over the central parts of the country towards the end of October and during the first week of November. About 46 villages in the district of Bhind were lashed on 30 October 1961 by heavy showers accompanied by hail. It is reported that twelve persons lost their lives, about 100 persons suffered severe injuries and 1000 heads of cattle perished in this hailstorm. Hailstorms were also reported from Ujjain district on 1 November, from the districts of Ujjain and Sagar on 5th, from the districts of Ujjain, Jabalpur, Indore and Damoh on 6th and from Rewa district on 7th. Some of these hailstorms lasted about 10 to 20 minutes. The hailstones ranged in size from a few millimetre to that of a tennis ball. The bigger ones were reported to have weighed more than a quarter kilo. Extensive damange to crops resulted.

A western disturbance lay over north Rajasthan and neighbourhood on 30 October and moved away eastwards across Western Himalayas on 2 November. An upper air trough persisted over west Uttar Pradesh and neighbourhood till the 7th and then moved away eastwards across Assam. The hailstorms over the central parts of the country were associated with the above system. It may be mentioned that hailstorms are rather rare over Madhya Pradesh during this part of the year.

HAILSTORM IN ASSAM DURING WINTER

In India hailstorms occur in pre-monsoon and post-monsoon seasons. Hail is not known to have occurred during December and January. Recently a news of hailstorm in some parts of Kamrup district was received from Agricultural Research Officers. On enquiry, it was learnt from the Sub-Deputy Collector of Nalbari Sub-Division that hailstorm occurred at Nalbari in the morning of 13 December 1961. This hailstorm approached from the west and was associated with strong wind. Hailstones were, in general, small. The largest one being of the weight about 12 to 13 grams. The duration of hailstorm was half an hour. Since it occurred in the harvesting season of paddy, the main crop of the area, this

hailstorm caused a severe damage to crops. According to official report about 1700 acres of land were affected causing an estimated damage of about 2½ lakhs.

It is seen from the morning charts of 13 December 1961 that a western disturbance was approaching N.E.F.A. from Nepal. This hailstorm occurred from an isolated *Cb* cell. Radar observation reveals that only one *Cb* cell existed within 100 n. miles around Gauhati at the time of occurrence of this hailstorm.

CIRRUS CLOUD OVER MADRAS*

On 15 June 1961 at Meenambakkam Airport high cloud was noticed moving fast and changing in structure. Fig. 1 shows cirrocumulus cloud towards SE at 1045 IST. By 1135 this cloud had moved to NW. Figs. 2 and 3 show the structure at elevations of 30° and 15° respectively. By this time the cloud had changed to predominantly filament structure. Nephoscope observations at 1130 IST gave the movement as from 98° and 11 radians. The speed of the cloud works to 59 and 71 knots, assuming heights of 10·0 and 12·0 km respectively. The 0530 and 1730 rawin data showed strong winds of 100°/110°, 45 knots at 12 km, with weak winds below. The 1130 pibals indicated strong wind (100°/43 kt) even at 10·5 km. The wind data would suggest that the easterly jet was running this day nearer Trivandrum at about 18 km. The association between the jet and the cirrus cloud is not clear.

Fig. 1. 15 June 1961 at 1045 IST

*The above report was received from Shri G. S. Iyer, Meteorological Office, Airport, Madras

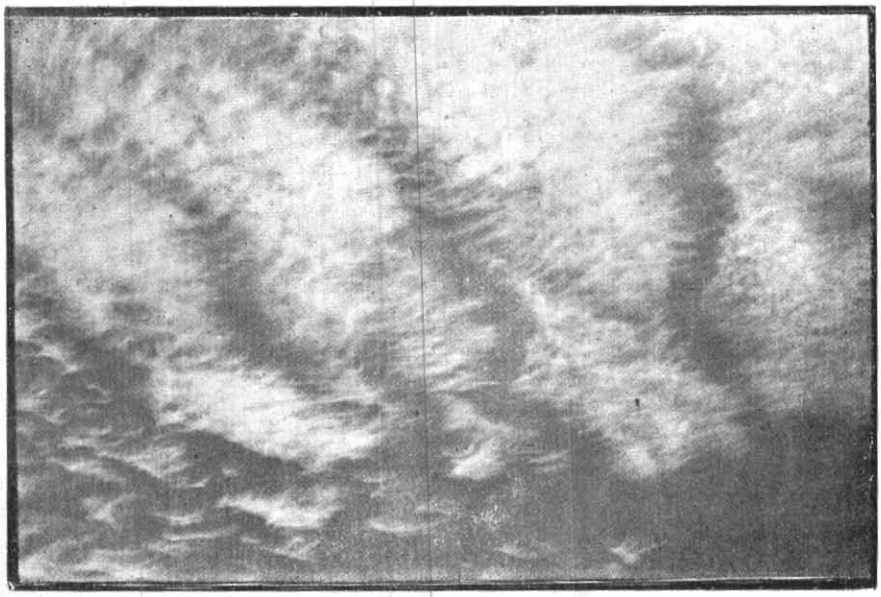

Fig. 2. 15 June 1961 at 1135 IST
NW Sky, elevation about 30°

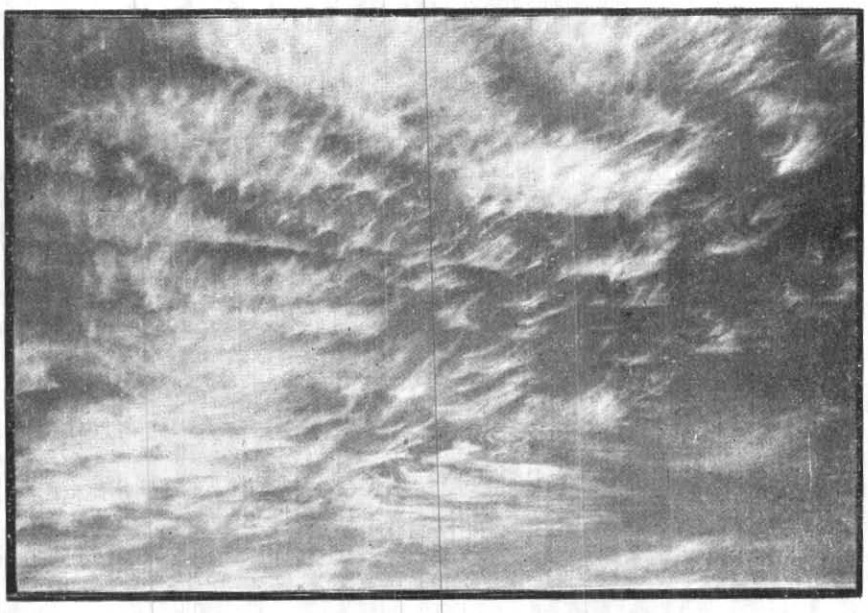

Fig. 3. 15 June 1961 at 1135 IST
NW Sky, elevation about 15°

AWARDS TO VOLUNTARY OBSERVING SHIPS

The following ships of the voluntary observing fleet of the India Meteorological Department were selected for "Excellent Awards" for outstanding meteorological work during the year 1960-61. The awards which were in the form of books, were sent to Captains, Observing Officers and Radio Officers who had been on the ships concerned for six months or more during the award year. Details of the recipients are given below—

S. S. *Rajula* (British India Steam Navigation Co. Ltd.)—G. A. Brignall (Captain), D. H. Cain (Observing Officer) and I. Jeffery and A. R. Steel (Radio Officers).

S. S. *State of Bombay* (The Shipping Corporation of India Ltd.)—S.K. Kaikobad (Captain), K. B. Trilokikar and G. S. Rangar (Observing Officers), C. D. Joshi and S. M. Valliat (Radio Officers).

S. S. *Mozaffari* (The Mougal Line Ltd.)—J. W. Mountford (Captain), B. J. Nazareth and E. G. Dawes (Observing Officers), S. D. Warke and B. S. Kher (Radio Officers).

S. S. *Amra* (British India Steam Navigation Co. Ltd.) —N. C. Bruce (Captain), A. M. Barker, A. M. Simpson and L. M. T. Goodwin (Observing Officers), K. J. Bourke and J. G. Mc. Kechnie (Radio Officers).

M. V. *Jaladharma* (The Scindia Steam Navigation Co. Ltd.)—C.B. Sutherland (Captain), P.K. Seth and A.D. Divekar (Observing Officers), P. D'Souza (Radio Officer).

S. S. *Mahadevi* (Asiatic Steam Navigation Co. Ltd.)—T. C. Kelsey, D. J. Daniels and J. S. Woollen (Observing Officers), C. L. Bertram (Radio Officer).

S. S. *Mohammedi* (The Mougal Line Ltd.)-H. J. Palmer (Captain), S. H. Khojotia and K. S. Sultan (Observing Officers), V. N. Kalle and B. Sowani (Radio Officers).

S. S. *Kampala* (British India Steam Navigation Co. Ltd.)—D. Hutton (Captain), W. Macdonald, D. C. Price and J. C. Briggs (Observing Officers), I. J. Evans and H. C. Berry (Radio Officers).

S. S. *Jag Rani* (The Great Eastern Shipping Co. Ltd.)—M. R. Hussain (Captain), D. N. Chawala (Observing Officer), R. Sequeria (Radio Officer).

S. S. *Bharatrani* (The Bharat Line Ltd.)—A. E. Sampson (Captain), K. R. Surendran and R. K. Sinha (Observing Officers), M. N. Manalar (Radio Officer).

The useful work put in by the other officers who served on the ships listed above for lesser periods than six months is also very much appreciated.

WATERSPOUT

Vessel	:	S. S. *Jalamanjari*
Captain	:	N.E. Wickham
Voyage	:	Tuapse to Odessa
Observing Officers	:	R. Balasubramanian and C. R. P. Narula
Position	:	Lat. 44° 37·5′ N, Long. 32° 52·0′ E (Black Sea)

On 30 September 1961, Vessel coasting in Black Sea and on a voyage from Tuapse to Odessa. A clearly defined funnel-shaped waterspout was observed by the Master and officers at 1212 hrs (Russian standard time) and 1442 hrs IST, 25½ miles off Cape Khersonese on the west coast of Crimea. There was a distinct turbulence on the sea level and the spout was found to be seen to last for 8 minutes and then disappeared in the Nimbostratus type, heavy cloud banking. The edge of the cloud banking as seen by radar was 2·1 miles from the centre of display and the banking extended for 4·9 miles. The height estimated to be 2500-3000 ft. The spout was too far off to define clearly the motion of water in its length of the funnel.

Barometer corrected : 1021·8 mb, Air temperature : 59°F, Sea temperature: 54° F and Weather: Overcast with slight drizzle, Thunder and lightning ; Slight sea and swell.