Notes and News

WORLD METEOROLOGICAL ORGANISATION — COMMISSION FOR AERONAUTICAL METEOROLOGY

The meeting of the Working Group on Meteorological Aspects of Area Forecast Systems of the Commission for Aeronautical Meteorology of W.M.O. was held at Geneva from 13 to 22 June 1961. Shri P. R. Krishna Rao, Director General of Observatories, attended the above meeting from India.

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 will be held at New Delhi from 29 January to 18 February 1962. The Session will deal, among other items, with matters relating to the revision of the Technical Regulations and the Guide to International Meteorological Instruments and Observing Practices.

THIRD SESSION OF THE COMMISSION FOR AEROLOGY OF THE WORLD METEOROLOGICAL ORGANISATION

The Third Session of the Commission for Aerology of the World Meteorological Organisation was held at Rome from 18 September to 2 October 1961. Dr. R. Ananthakrishnan, Deputy Director General of Observatories, who is a member of the Commission attended the Session. The Session dealt with questions relating to researches in physics and dynamics of the atmosphere and scientific evaluation of technical meteorological procedure.

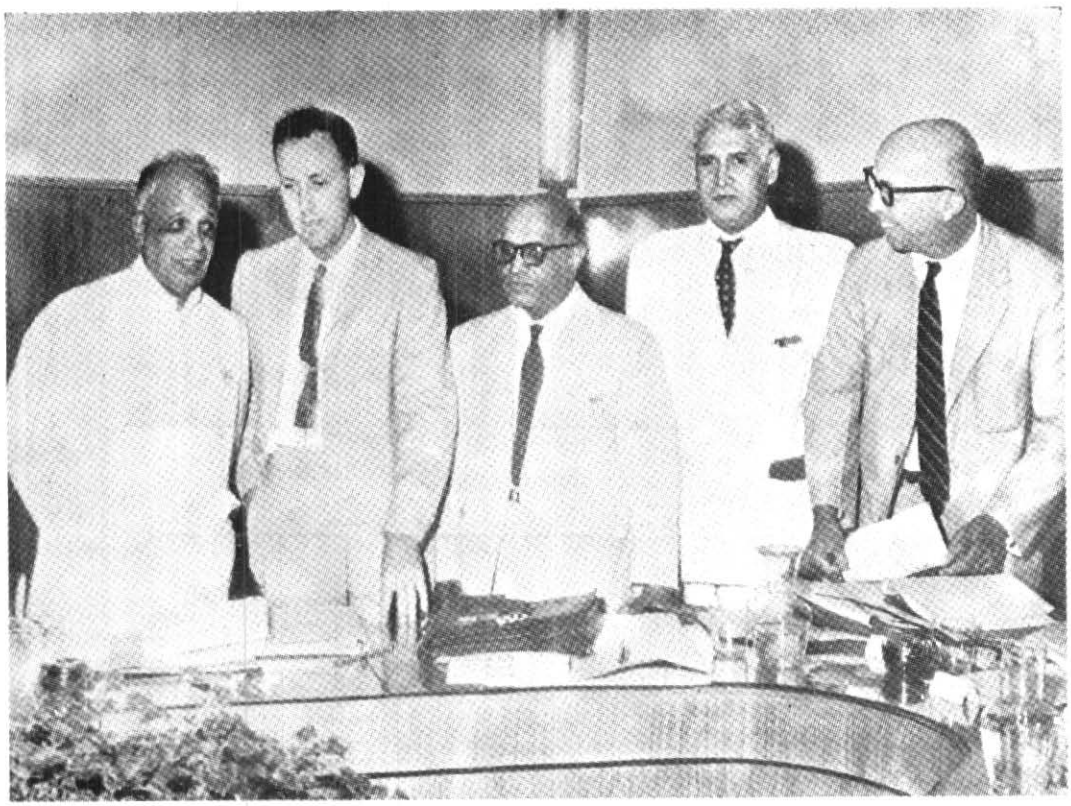
INTERNATIONAL ASTRONOMICAL UNION

The Eleventh General Assembly of the International Astronomical Union was held at Berkeley, California, U.S.A. from 15 to 24 August 1961. India was represented at the Assembly by a delegation of three members consisting of Dr. M. K. Vainu Bappu, Director, Kodaikanal Observatory (Leader), Dr. Sinhval, Director, U. P. State Observatory, Nainital and Shri T. Krishnan, Research Officer.

INTERNATIONAL INDIAN OCEAN EXPEDITION

Shri P. R. Krishna Rao, Director General of Observatories, Shri C. Ramaswamy and Dr. L. S. Mathur, Deputy Directors General, Shri K. N. Rao, Director Regional Meteorological Centre, Bombay and Dr. P. R. Pisharoty, Director, Colaba Observatory, Bombay, attended the Meteorological Planning Meeting convened by the Special Committee for Oceanic Research (SCOR) at Bombay from 18 to 20 July 1961. The meeting which was attended by meteorological representatives from U.S.A., Union of South Africa, Portugal, Kenya, W.M.O. (Special Fund), Pakistan, Japan, U. K., Singapore/Malaya, Indonesia, Mauritius, Thailand, Ceylon, U.S.S.R., Burma and India discussed the meteorology programme of the International Indian Ocean Expedition including the proposal for setting up of an International Meteorological Centre for the purpose. The meeting recommended that the International Meteorological Centre should be established at Bombay and that the Government of India should be requested to ask for assistance from U. N. Special Fund for establishing the Centre.

INTERNATIONAL INDIAN OCEAN EXPEDITION



A photograph of some delegates of the Meteorological Planning Meeting convened by the Special Commiitee for Oceanic Research at Bombay

(Photo : By courtesy of USIS, New Delhi)

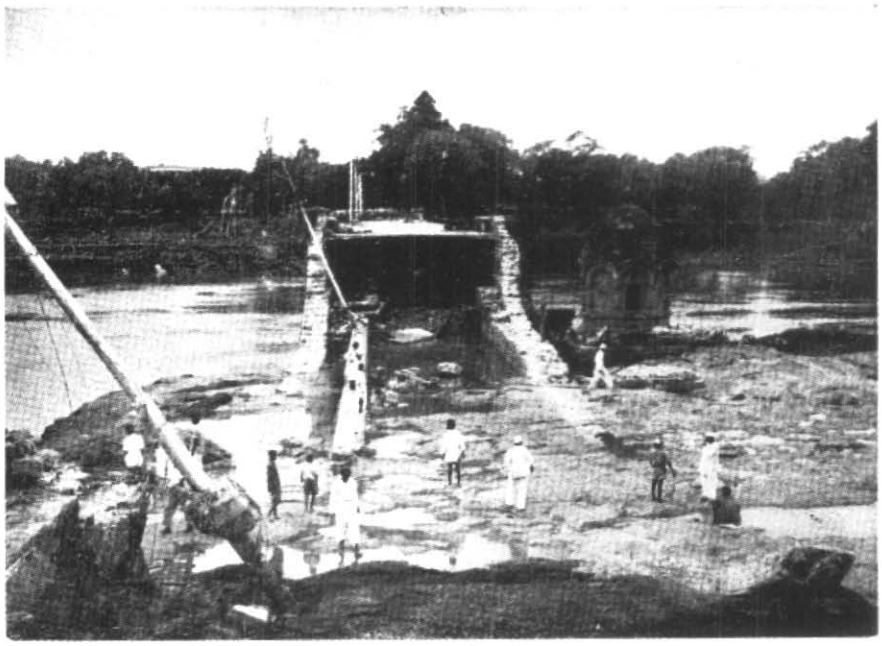


Fig. 2. Broken Sangam Bridge on the Poona-Bombay road (13 July 1961)

Fig. 3. Broken telegraph poles and flood debris in Deccan Gymkhana area (13 July 1961)

I.U.G.G.—WORKING GROUP ON THE INTERACTION OF THE SEA AND ATMOSPHERE

Shri C. Ramaswamy, Deputy Director General of Observatories has been nominated as a member of the Working Group on the interaction of the sea and atmosphere of the I.U.G.G.

WMO—UNESCO SYMPOSIUM ON CLIMATIC CHANGES

Under the auspices of WMO/UNESCO a Symposium on Changes of Climate was held in Rome from 2 to 7 October 1961. Sri K. N. Rao, Director, Regional Meteorological Centre, Bombay, who contributed three papers, was invited by the UNESCO to participate in the Symposium. The Symposium discussed changes of climate with special reference to the arid zones and also topics of practical significance relating to the subject.

WMO REGIONAL SEMINAR ON TROPICAL CYCLONES

A regional Seminar on Tropical Cyclones organised by the World Meteorological Organisation is to be held in Tokyo from 12 to 29 January 1962. The purpose of the Seminar is to disseminate to the participants the latest knowledge on the phemomenon of tropical cyclones and to give them training in the study and analysis of tropical cyclones and issue of forecasts and warnings for them.

INTER-REGIONAL HYDROLOGIC SEMINAR

The World Meteorological Organisation in co-operation with the United Nations Economic Commission for Asia and the Far East and the United Nations Bureau of Technical Assistance Operations will hold the second Inter-regional Hydrologic Seminar on field methods and equipment used in hydrology and hydrometeorology at Bangkok from 27 November to 11 December 1961. The seminar is expected to be attended by all technical organisations of countries in the region which have water resources development projects. After the seminar, a study tour of various places in India of interest to the participants of the seminar, has also been arranged.

INTERNATIONAL SYMPOSIUM ON VOLCANOLOGY

An International Symposium on Volcanology, organised by the Science Council of Japan in co-operation with the Volcanological Society of Japan will be held in Tokyo from 9-19 May 1962 under the sponsorship of the International Association of Volcanology (IAV) of the International Union of Geodesy and Geophysics (IUGG) as approved at the 1960 Helsinki General Assembly of the Union. The subjects to be discussed at the Symposium will be: (*i*) Prediction of time and place of volcanic eruption, and (*ii*) Relation between magmas and the nature of volcanic eruption.

UNESCO REGIONAL SEISMOLOGICAL SEMINAR

Under the auspices of UNESCO, a Regional Seismological Seminar was held at Tokyo from 18 to 25 July 1961. Dr. A. N. Tandon, Director (Seismology), attended the seminar as an expert from India on an invitation by UNESCO.

FORECASTING FOR TURBINE-POWERED AIRCRAFT OPERATIONS

The WMO in collaboration with the ICAO will conduct two Seminars on 'Forecasting for turbine-powered aircraft operations over the northern half of Africa and the Middle East', one to be held in Cairo (UAR) from 30 October to 17 November and the other in Nicosia (Cyprus) from 21 November to 9 December 1961. These Seminars are intended primarily for training of practising aviation forecasters in appropriate forecasting techniques. The technical programme will include analysis of selected series of surface and upper air charts with the help of auxiliary data such as sferics. Sri D. V. Rao, Meteorologist in

charge of the Main Meteorological Office at Calcutta (Dum Dum) Airport has been invited by the WMO to be one of the lecturers at the above Seminar.

GEOPHYSICAL ALERTS AND SPECIAL WORLD INTERVALS 1961-62

The International World Day Service of the International Council of Scientific Unions has drawn up a plan for Geophysical Alerts (Geoalerts) and Special World Intervals (SWI) to be originated by the I.W.D.S. World Warning Agency at Fort Belovir, Virginia, U.S.A. daily at 1600 universal time. The proposed plan is similar to the earlier plans except for introduction of 'Predicted SWIS' to be included in the Geoalerts. The declarations of Geoalerts and SWIS are intended to assist the world-wide co-ordination of geophysical observations of phenomena which are significantly influenced by solar and geomagnetic disturbances.

REGIONAL CONFERENCE OF SOUTH-EAST ASIA GEOGRAPHERS

Under the auspices of the International Geographical Union and the University of Malaya, a Regional Conference of Southeast Asian Geographers will be held in Malaya and Singapore in April 1962. The Conference aims at focussing attention on geographical themes (including meteorology and climate) of immediate relevance to East and Southeast Asia, thereby providing data for assessing past practices and future policies in the region and in the humid tropics generally. Some of the topics expected to be discussed are—

(*i*) Demarcation of dry, arid and humid zones in Southeast Asia, (*ii*) Variability of rainfall and other meteorological elements in different localities, (*iii*) Rainfall and run-off, (*iv*) Synoptic weather analysis at low latitudes, (*v*) Variation of rainfall intensity with short periods of time, (*vi*) Methods of predicting typhoon movement and (*vii*) Influences of climate on human activities in different localities.

WEATHER SATELLITE—TIROS III

U.S.A. have launched another Weather Satellite (Television and Infra Red Observation Satellite—TIROS III) into the orbit on 12 July 1961. India is co-operating in the programme of concurrent meteorological observations by intensifying observations from the ground of cloud cover, weather etc and by taking the upper air observations up to as high a level as possible during the period of 9 weeks commencing 8 August 1961 when the satellite is stabilised in the orbit.

These intensive observations arranged by India, along with those of other co-operating countries, will be helpful in the study and interpretation of the cloud cover information provided by the satellite. The cloud cover information, as available from the satellite is already being disseminated by U.S.A. on the Meteorological Tele-communication Channels for use of all the countries of the world in 'Neph analysis' code.

ASSIGNMENTS OF INDIAN METEOROLOGISTS TO NIGERIA

Sarvashri D. K. Rao and R. K. S. Saxena, Meteorologists proceeded on deputation in July 1961 on foreign service to Nigeria as Meteorological Training Experts of the Technical Assistance Mission of the World Meteorological Organisation for a period of nine months.

INDIAN SCIENCE CONGRESS ASSOCIATION

The 49th Session of the Indian Science Congress Association will be held in Cuttack in January 1962. Symposia on the following topics, among others, will be held during the forthcoming Session.

(1) Astrophysics, (2) Magneto-hydrodynamics and its application to Astro and

Goephysical problems, (3) Radio and Microwave spectroscopy, (4) Fuel Energy Problems in India, and (5) Numerical analysis and Modern Computing Devices.

NATIONAL HARBOUR BOARD—HYDROGRAPHIC SURVEY SUB-COMMITTEE MEETING

A meeting of the Hydrographic Survey Sub-committee of the National Harbour Board was held at Dehra Dun on 9 and 10 August 1961. Shri C. Ramaswamy, Deputy Director General of Observatories attended the above meeting. One of the items discussed at the meeting related to the question of establishment of more hydrographic survey stations on the east coast of India.

INDIAN METEOROLOGICAL SOCIETY

Dr. Christian E. Junge, of the Air Force Cambridge Research Centre, Bedford (Mass.), U.S.A. gave a talk to the members of the Society at Poona on 4 April 1961 in which he mainly dealt with the following topics—

(*i*) Study of particles in the Stratosphere,

(*ii*) Utilisation of the U. S. Atomic Tests held in 1958 for the study of the circulation in the Stratosphere, and

(*iii*) Vertical distribution of water vapour in the Stratosphere.

Shri C. Ramaswamy, Deputy Director General of Observatories gave a talk on "Recent Trends in Meteorological Telecommunications" in the new Library Hall, Meteorological Office, New Delhi on 12 May 1961.

Shri G. B. Pant, Reader in Mathematics, National Defence Academy, Khadakvasla, gave lectures to the members of the Poona Branch of the Society on 23 and 27 June 1961, on "Guided Missiles". The lectures were largely attended. In his talks Shri Pant dealt with the history of the various types of Guided Missiles, and their tactical use. He also explained the principle of working of some of the main components of a Guided Missile.

MOUNTAINEERING TRAINING

In pursuance of the scheme sanctioned by the Government of India to get eight members of the India Meteorological Department trained at the Himalayan Mountaineering Institute, Darjeeling, Sarvashri B. K. Chawla and S. C. Sharma were deputed to join the preliminary course at the above Institute which started on 9 September 1961.

AGRONOMY COMMITTEE OF THE INDIAN COUNCIL OF AGRICULTURAL RESEARCH

Shri A.K. Mallik, Deputy Director General of Observatories attended the meetings of the Agronomy Committee of the ICAR held at New Delhi on 20 and 21 April 1961. Among the subjects discussed may be mentioned 'Wind breaks and Shelter beds.' Shri Mallik briefly explained to the meeting the meteorological aspects of the subject. The Committee recommended that the question of developing 'Wind breaks' on cultivator's fields needs to be further examined.

TIME WORK AT ALIBAG

The magnetic work at the Colaba Observatory, Bombay was shifted to the Magnetic Observatory, Alibag, when horse-drawn tramcars at Bombay were replaced by electrically powered tramcars. The determination of correct time at Alibag was an important factor for the magnetic work which, for the sake of comparative observations, began a few years before the actual introduction of electric traction at Bombay. Until the special non-magnetic transit telescope was received from England and set up at the Alibag Magnetic Observatory, correct time was obtained at Alibag by the following method which is of some historical interest.

The Kennery Island, which is almost due south of Colaba and northwest of Alibag, is at a distance of 13 miles and 5½ miles from Colaba and Alibag respectively. There is a lighthouse on this island which guides ships into the Bombay harbour. The flashes of this lighthouse which could be seen both at Colaba and Alibag (white flash towards Colaba and red flash towards the landward side at Alibag) were timed at both places simultaneously with the help of chronometers, four times a week. The timings of the first flash and a few succeeding flashes were noted down and communicated to Alibag by post for comparison.

After adjustments to the transit telescope at Alibag were over, correct time at Alibag was determined independently since 1904. A radio receiver has been added on in 1947 as an additional facility for receiving time signals broadcast by Colaba, B.B.C. etc.

For the benefit of the residents of Alibag, which is essentially a rural place, a wall clock facing the road was installed in 1939 and a continuous gong sounded every night at 9 P. M., for the duration of about half a minute.

ARTIFICIAL MODIFICATION OF A HURRICANE BY CLOUD-SEEDING

Dr. F. W. Reichelderfer, Chief of the U.S. Weather Bureau, Department of Commerce, announced recently that a team of scientists led by Mr. R. H. Simpson has completed a preliminary study of the recent cloud-seeding of Hurricane Esther on 16 and 17 September 1961. The main result of the experiment, Dr. Reichelderfer stated, was that large amounts of water droplets which existed in the sub-freezing layers of the hurricane clouds were converted to ice crystals after being treated with silver iodide. While such conversion of water clouds to ice clouds has been done before, this experiment represents the most complete documentation of such attempts within hurricanes.

Dr. Reichelderfer said that one of the primary objectives of the present experiment was to ensure thorough documentation of the results by use of numerous airplanes and different types of radars. "Previous statements regarding the triggering of sudden changes in the path of a hurricane by seeding were not confirmed in this storm" he said.

Bureau scientists calculate that probably 400 cubic miles of water cloud were converted to ice in a period of about 40 minutes, releasing energy (in the form of latent heat of fusion) equal to approximately 200 million kilowatt-hours of electrical energy or to about eight atomic bombs of the 20 kiloton variety. While this sounds like a large amount of energy, it is actually less than one tenth of one per cent of the energy released by the hurricane in the same 40-minute period.

Two U.S. Navy aircraft, one U.S. Air Force plane, and four planes of the Weather Bureau's Research Flight Facility participated in the seeding operation. Six of the seven planes carried radar to observe the effects of the seeding.

The portion of the storm selected for observation was a pie-shaped area extending 60 miles to the right of the storm center. This area was monitored for about three hours before and two hours after the seeding. The aircraft flew prescribed patterns through the storm, gathering data at altitudes of 7000, 10,000, 20,000, and 42,000 feet.

At 3-00 P.M. (Eastern Standard Time) on the 16th and again at 11-09 A.M. on the 17th the silver iodide was released into the cloud tops of Hurricane Esther near the point of maximum winds, ten to fifteen miles north of the storm center. The silver iodide smoke was injected rapidly downward from the cloud tops, where temperatures

were approximately –60°C, to the freezing level—travelling through an atmospheric layer six miles thick.

The conversion of liquid water to ice crystals was observed by radar. Long wavelength radar, which emits radiation with wavelengths of 10 centimeters or longer, "sees" weather patterns involving large water droplets, but rarely detects small snow or ice crystals. Radar with shorter wavelength emissions may see these smaller snow, sleet, and other frozen particles. Both types of radar were used in the experiment. Within half an hour after the seeding, most of the seeded sector of the storm had disappeared from the view of the long wavelength radar. But it was still clearly visible to short wavelength radar sets and to the human eye. It was later restored to the view of the long wavelength radar as fresh supplies of supercooled water replaced the converted cloud in the seeded sector.

Apart from the conversion of supercooled water to ice, no changes which can be attributed to the seeding operation were observed in the storm.

The limited objectives of the experiment were achieved, and detailed analyses of the recorded data will continue.

The experience gained will be used in planning a succession of additional experiments over a period of several more years.

(Press release by the U.S. Department of Commerce on 4 October 1961)

SEVERE DUSTSTORM IN KARNAL AREA ON 13 APRIL 1961

A duststorm occurred in the district of Karnal on 13 April 1961 at 1930 hrs with a squall from westsouthwest in which the maximum wind speed was 60-65 miles per hour. The duststorm was followed by a short spell of thunderstorm and rain accompanied by hail. Strong winds continued for about an hour. The hailstones were of varying sizes, the maximum diameter being reported to be about $\frac{1}{2}$" from some villages in Tehsil Kaithal (Asandh Sub-Division) where the maximum damage to crops was also reported to have occurred.

The storm caused damage to the harvested wheat crop in some villages of Tehsil Kaithal and Karnal. A large number of trees were uprooted and 15 electric pylon towers, in a stretch from north to south, near Karnal on the transmission line feeding Bhakra-Nangal Power to Delhi collapsed due to impact of strong winds.

A map of the Karnal district showing the villages affected by the above storm and its course is given in Fig. 1 and a photograph of tower bent towards eastnortheast by strong winds is reproduced in Fig. 2. It appears that the villages reporting damage to crops lay, in the beginning of the storm, over a stretch of about 12 miles but as the storm moved northeastwards and entered Karnal Tehsil it started affecting a wider area. Considering its speed to be the maximum where the maximum crop damage had occurred, the starting point of the squall is thought to be not far beyond the western boundary of Tehsil Kaithal. The storm appears to have blown over a stretch of land about 25-30 miles wide and 50-60 miles long but its severity was over a strip of width of 15-20 miles and length 30-35 miles and was thus of a very localised nature.

Karnal weather was due to a meso-scale system of severity and extent much more than those usually associated with an ordinary duststorm. The synoptic chart showed a well marked trough line over the area in question on the evening – night of 13 April 1961. However, neither this chart nor the past weather and rain reported on the morning of 14 April 1961 would give one an idea of the severity of the weather experienced near Karnal.

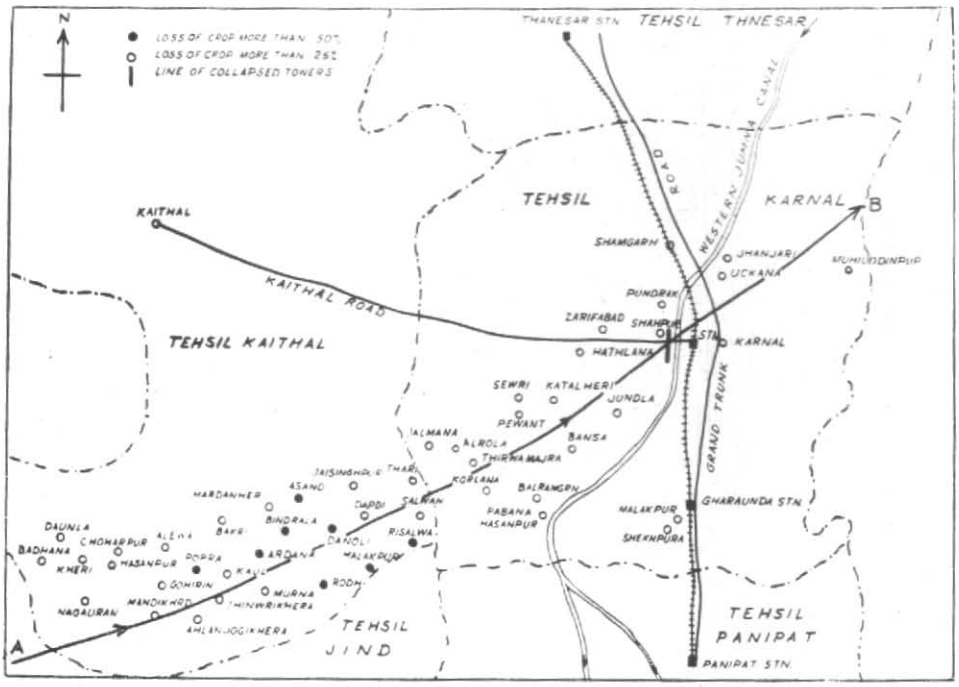


Fig. 1. A map of Karnal District showing the villages affected by the duststorm and its course (A—B)

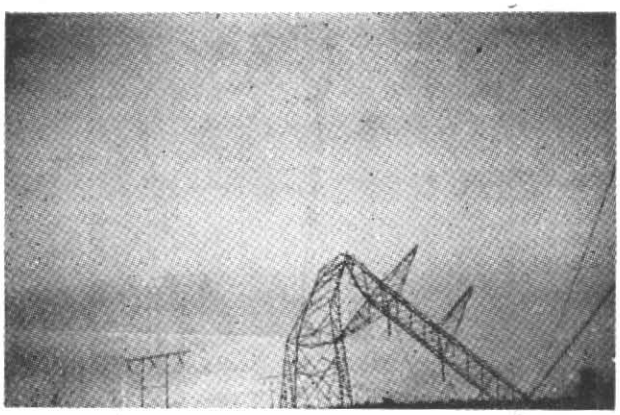


Fig. 2. Collapsed tower bent towards eastnortheast

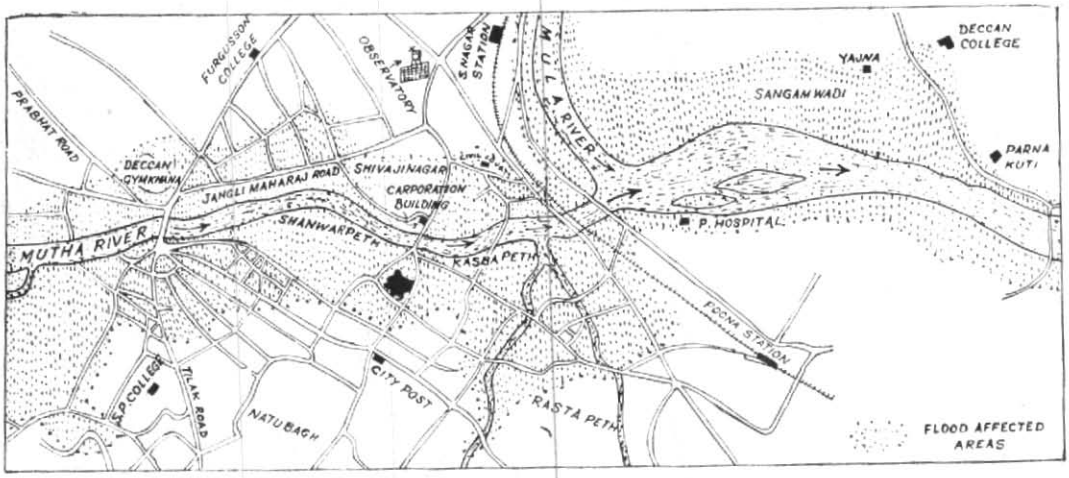


Fig. 1. Map showing the flood-affected areas in Poona City on 12 July 1961
(After *Sakal*, 24 July 1961)

UNPRECEDENTED FLOODS IN POONA

On 12 July 1961, Poona City experienced catastrophic floods caused by the bursting of two dams, the Panshet dam and Khadakvasla dam built on the Mutha river at a distance of about 26 and 11 miles from Poona respectively. Mutha flows through the heart of the City.

Below Panshet, the Mutha river runs into a wide valley, overlooked from one side by the Sinhagad Fort, and from the other by the National Defence Academy. As a result of a wide breach that had occurred in the dam by about 7 A.M. flood waters raced through this 20 miles long valley causing great destruction on either side. At Khadakvasla itself the current of water was checked by the dam, but only for a very short time. The waters rose above the dam level, and began to pour down on the other side of the dam. By about 1 P.M. the eighty-year old Khadakvasla dam (a concrete dam) also gave way.

By 11 A.M. the waters reached Poona City, and for four hours, the waters of the Mutha river, coursed through the streets of river side Poona. The level of water rose at an alarming rate of one foot in 10 minutes, and the flood reached its highest mark at around 3 P.M. in the afternoon when some of the residential areas were submerged under more than twenty feet of water. By about 6 P.M. the waters had receded completely from the streets and were confined to the river channel. By next morning there was nothing more than a trickle of water down the river bed while the city presented a scene of great devastation.

The city's normal life—water supply, transport system, electricity supply—was completely paralysed. According to newspaper reports, an estimated 4000 houses had been destroyed or rendered too dangerous to live in. Nearly a hundred thousand people had been rendered homeless and twice that number had lost most of their belongings.

It may be mentioned that as a result of active monsoon conditions very heavy rainfall occurred in the catchment areas of the Mutha river from 1 to 6 July and again from 8 to 11 July.

Fig. 1 shows the flood affected areas in the city and Figs. 2 and 3 (p. 650) some devastation caused by the flood.

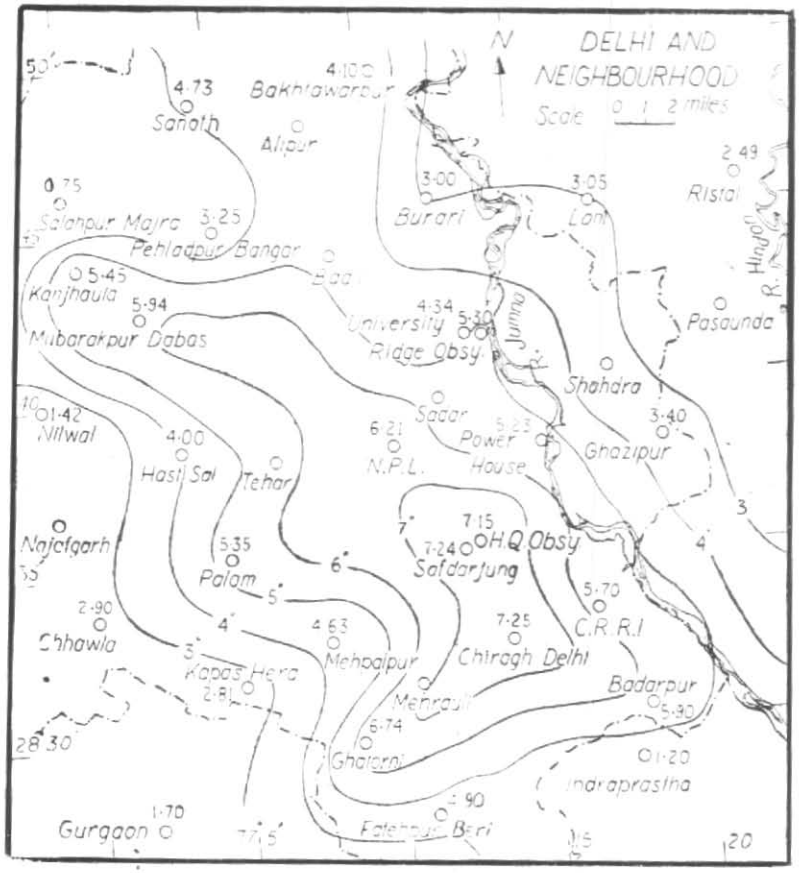


Fig. 1. Isohyetal pattern of 24 hours rainfall over Delhi and neighbourhood on 2 August 1961

HEAVY RAINFALL OVER DELHI ON 2 AUGUST 1961

There was a heavy rainfall commencing in the early hours of 2 August 1961 at Delhi. The rainfall measured at 0830 IST on 2nd was 184·0 mm (7·2 inches), a record fall for the month of August for Delhi, recalling the all time record of 24 hours rainfall of 266·2 mm (10·48″) which fell over the Capital on 20/21 July 1958. This was reported on page 386 of Vol. 9 of this Journal. As in the present case the downpour continued beyond 0830 IST, the rainfall associated with this occurrence was actually more than 184·0 (7·2 inches). The rainfall recorded during the 48 hours period ending 0830 IST of the 3rd is 262 mm (10·31″) which fell during the period 0350 of 2nd to 0530 IST of 3rd.

The rainfall recorded at 0830 IST of 2nd at six meteorological observatories along

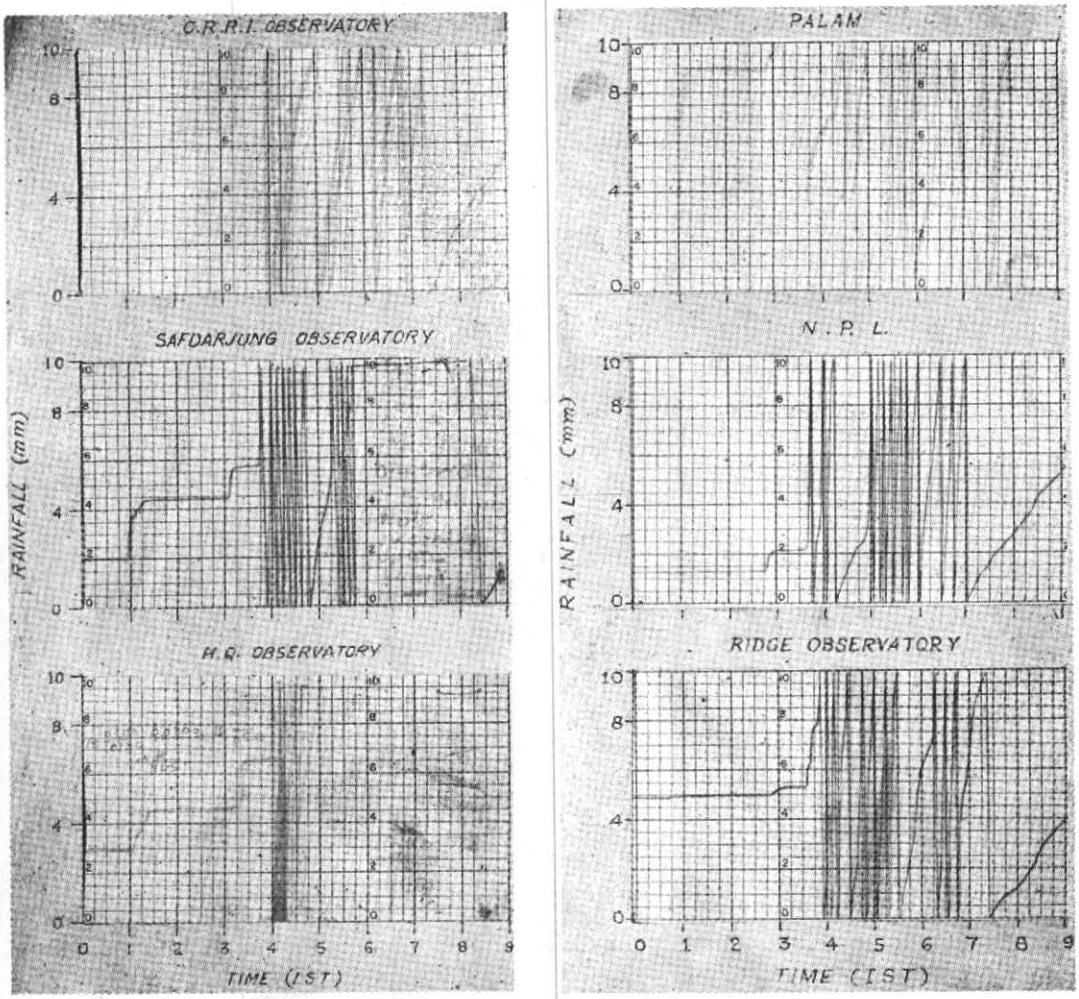


Fig. 2. Records of S. R. Raingauges at Central Road Research Institute (C.R.R.I.), Safdarjung F.O., H.Q. Observatory, Palam Airport, National Physical Laboratory (N.P.L.) and Ridge Observatory on 2 August 1961 for the period 0000 to 0900 IST

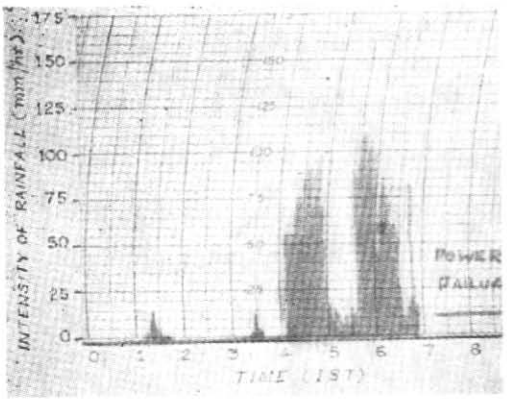


Fig. 2(a). Record of Bibby type intensity raingauge at Safdarjung F.O. on 2 August 1961

with a number of raingauge stations in and around the Capital maintained by Rain and Cloud Physics Research Unit of the National Physical Laboratory and some other organisations were used to plot the isohyetal pattern of 24 hours rainfall and is reproduced in Fig. 1. The 48 hours isohyetal pattern was also examined and was found to be very similar. These isohyetal patterns may be compared with the pattern of the July 1958 rainfall reproduced on p. 387 of Vol. 9 of the Journal. It will be seen that in the present case the core of the heaviest rainfall lies in the SE sector of New Delhi and extends as far south as Chiragh Delhi. In the 1958 case the core of the heaviest fall was somewhat similar but much more extensive in lateral dimensions. The comparison may be of interest to city drainage engineers and hydrologists in general.

The six meteorological stations at Central Road Research Institute, Safdarjung F.O., H.Q. Observatory, Palam Airport, National Physical Laboratory and Ridge Observatory are located approximately within an equilateral triangular area of sides 16 km. Self-recording raingauges are maintained at these places. An intensity raingauge is also functioning at one of the stations. The records of the S.R. raingauges (Fig.2) show that the rainfall was mainly in two downpours. The first beginning from 0350 IST and lasting upto 0445 IST, closely followed by a second spell which ended at 0612 IST. The record of the intensity recorder available at Safdarjung F.O. [Fig. 2 (a)] which unfortunately stopped functioning after 0650 IST on 2 August 1961 due to power failure shows that there were a few peaks upto 95 mm/hr in the first spell. The intensity in the second spell touched an isolated peak of 160mm/hr but otherwise was about 100mm/hr decreasing gradually to zero at the cessation of the spell. It is seen that the pattern of rainfall is similar at all the places except for a slight difference in the case of the one recorded at the Ridge Observatory where the two spells are not so clearly separated as in the other cases. No organized lateral movement of the core of the downpour can be detected from these records.

SOLAR HALO

A very bright solar halo was observed at Gauhati airport at 1200 IST on 29 June 1961, when the sun was overhead. The halo was first observed at about 1145 IST and it completely disappeared at 1235 IST. The ring of the halo was coloured brightly. Colours seen were mainly blue, orange, red and yellow. Other shades were not bright and it appeared that the remaining colours of the rainbow were also present. The colour sequence was blue to red, starting with blue from the outer side. The whole area excepting the sun's disc inside the halo was relatively dark, whereas outside the halo circle, thin *Cs* clouds appeared to be very bright.

Angular radius of the halo was measured with the help of a the odolite and was found to be 23°40′ from the edge of the sun's disc to the outer edge of the blue ring.

GLORY SEEN FROM AN AIRCRAFT IN FLIGHT

Route : Bhavnagar—Bombay

Observer: S. I. T. Thomas, Assistant Meteorologist

The Dakota took off from Bhavnagar at 0755 IST on 27 July 1961 and about 20 minutes afterwards a sheet layer of low clouds was seen below the aircraft. As there were not much of high or medium clouds, the sun's rays fell on the aircraft and on the sheet of clouds below was a clear shadow of the aircraft. Around the shadow was a beautiful GLORY (*vide, International Cloud Atlas*, Vol. I, 1956, p. 73). The outer ring was red and the inner ring was violet. The Glory could be seen for about 45 seconds after which the aircraft entered a region of bad weather with clouds all around.

CLOUD OF SAND

Vessel : M. V. *Dwarka*

Captain : Hamilton

Voyage : Bushire to Kuwait

Observer : T. Bogie

12 May 1961, 2300 GMT. Position: Lat. 29°10′ N, Long. 49° E

An echo appeared on the radar screen similar to the echo received from a cloud of sand. When the vessel reached the echo, the wind dropped and the rise in temperature was estimated to be 15°F. 2 to 3 minutes later the temperature dropped back to the previous level but the wind did not get up again. At the time there was 6/8 cloud and lights had a loom around them as normally seen in fog. Earlier in the evening there had been some lightning observed, but no thunder was heard.

METEOR

Vessel : S. S. *Jalprakash*

Captain: V. P. Sharma

Voyage : Calcutta to Tuticorin

Observer: S. K. Singh

D. R. Position—Lat. 07°20′ N, Long. 79°12′ E.

Course—147° (T)

On 11 May 1961 at 0146 IST, observed a Meteor of exceptional brilliance (Magnitude 4 approx. as compared with Jupitor) moving in a sloping arc through 170°–225° approx.; initial altitude 17°; final altitude 9°. Time of travel about 2 seconds. Persistance of a fairly tail 20°–25° long for about further 2 seconds. culminated in a flash of brilliance. Range of height between orange to white.