

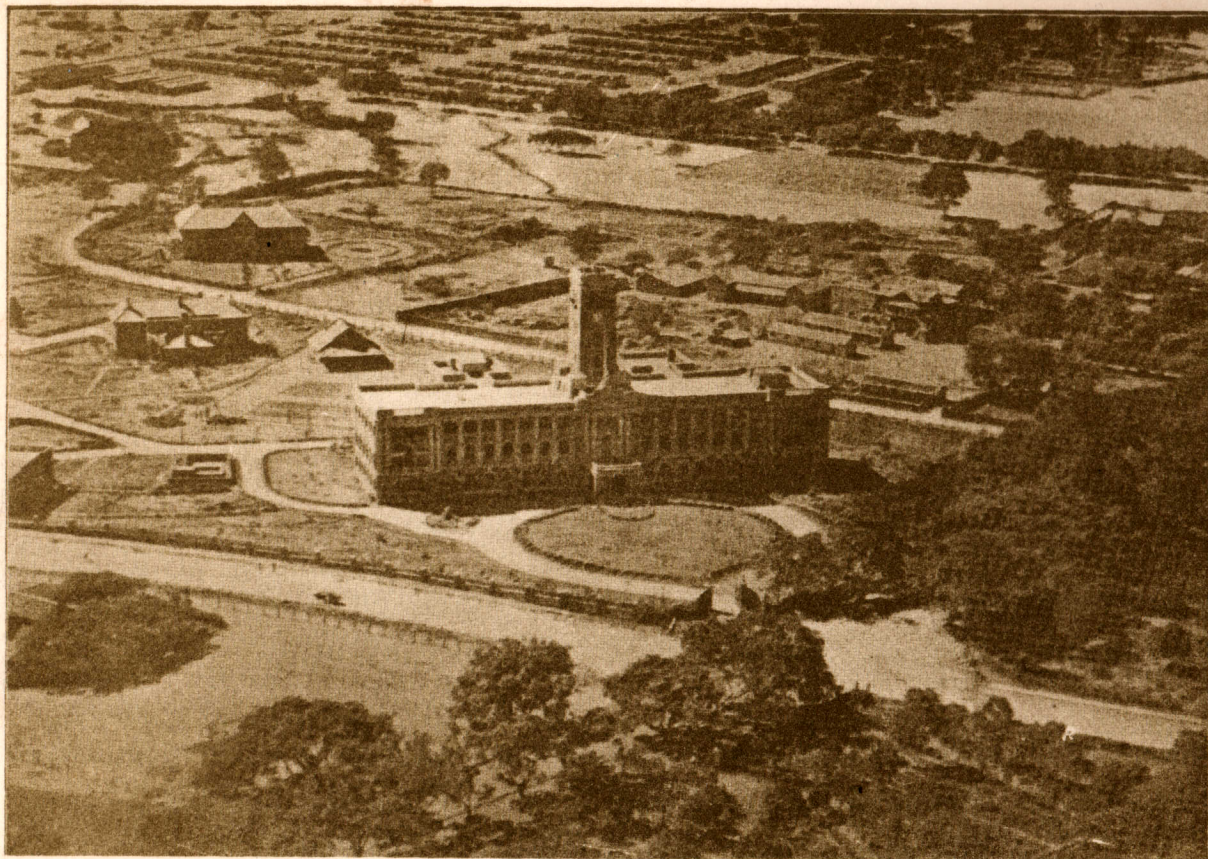


**GOLDEN  
JUBILEE  
(1928-1978)**



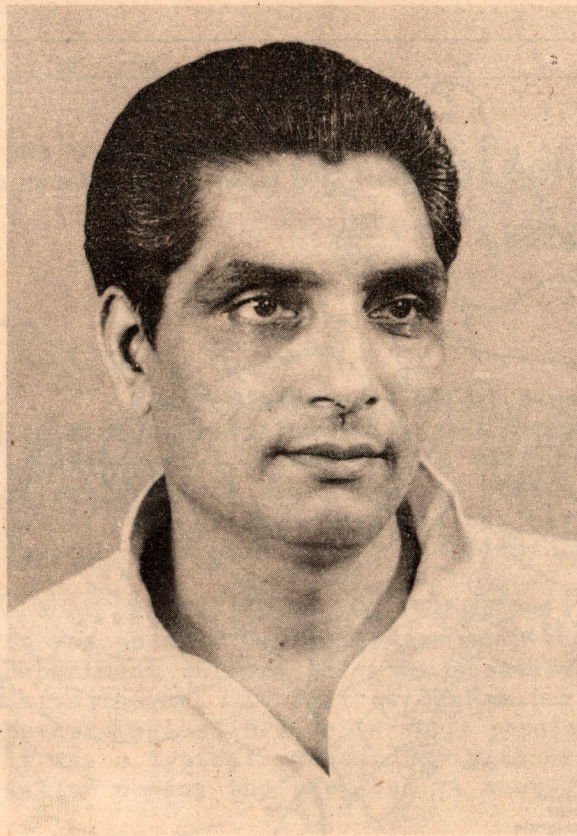
**METEOROLOGICAL OFFICE, PUNE**





AERIAL VIEW OF THE NEW HEADQUARTERS OF THE INDIA METEOROLOGICAL  
DEPARTEMENT AT POONA (R.A.F. Photo 1928)





Shri Purushottam Kaushik  
(Minister for Tourism and Civil  
Aviation, Govt. of India)



पर्यटन और नागर विमानन मंत्री

भारत

नई दिल्ली-११०००१

MINISTER OF  
TOURISM & CIVIL AVIATION  
INDIA  
New Delhi-110001

Dated : 6th December, 1978

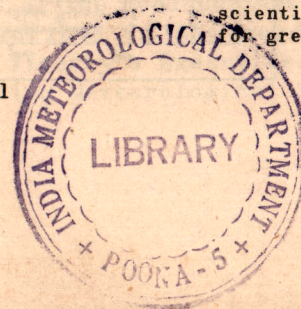
MESSAGE

I am very happy to learn that the Meteorological Department of India is celebrating the fiftieth anniversary of its office in Pune.

There is hardly any field of human activity which is not dependent upon the weather. In our own country much of our agriculture depends on the performance of the monsoon. The Centres for Climatology and Geophysics, Forecasting, Agricultural Meteorology and the manufacture of surface Instruments are located in Pune. The Indian Institute of Tropical Meteorology is also located nearby. Very recently a third generation computer has been also installed here. This centre is thus very well equipped for research on both the fundamental and applied aspects of Meteorology. It is my hope that this work will continue to grow from strength to strength in the coming years.

On this happy occasion I wish to send my felicitations to the Director General of Meteorology, and to the other scientists and workers in the Department for greater success in the years to come.

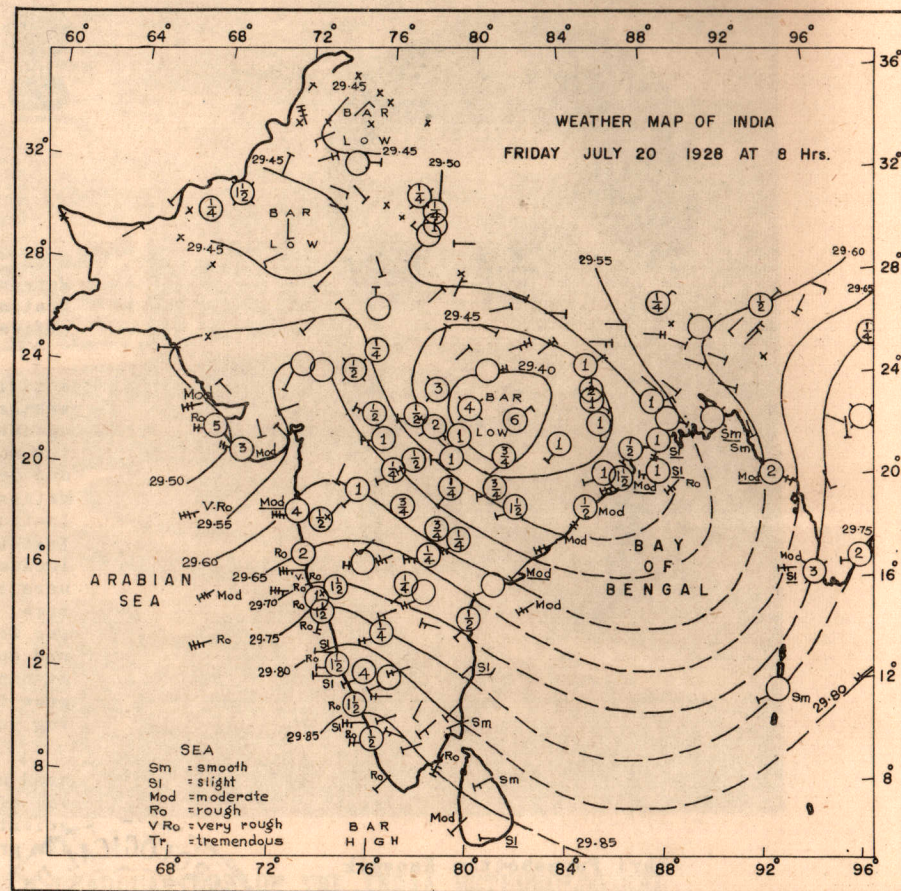
(Purushottam Kaushik)







Sir C.W.B. Normand, C.I.E.  
Director General of Observatories  
(1928 - 1944)





## METEOROLOGICAL OFFICE, PUNE

(1928-1978)

The India Meteorological Department, which was established in 1875, had its Headquarters initially at Calcutta with a branch office in Simla. In 1905 it was decided to make Simla Office the Headquarters of the Department and Calcutta Office was given the status of a branch office. During this entire period, the Headquarters did not have a building of its own. It was only in Pune in 1928 that it had its first home befitting its functions and size.

Friday, July 20, 1928, is a red letter day in the history of Pune City. It was on this day, 50 years ago; that the Headquarters of the Meteorological Department shifted into the scantily populated suburbs of Pune, now known as Shivajinagar. It felt as though part of Simla virtually moved to Pune. The Meteorological Office is still popularly known as "Simla Office". Weatherwise, it was a typical monsoon day with overcast sky, 3 millimeters of rain having fallen during the previous 24 hours.

The reasons for the shift of the Headquarters of the India Meteorological Department to Pune are best described in the words of Honourable Sir Cecil McWatters, Acting Member of the Viceroy's Executive Council, on the occasion of the formal opening of this imposing Meteorological Office building at Pune.



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"Ever since the foundations of Indian Meteorology were laid by Mr. Henry Blanford 53 years ago, as opposed to the fragmentary studies of weather that had been made before that date in various provincial offices, the Department has had no permanent official home and today marks for ever the relinquishment of a series of temporary headquarters which from their unsuitability have undoubtedly retarded progress ...

"But there are other advantages also which we expect to result from the transfer from Simla to Pune. One duty of Headquarters is to warn ports and shipping on the west coast of India about storms or cyclones in the Arabian Sea, and we feel that our proximity to Bombay and the consequent possibility of maintaining close touch with shipping interests cannot but lead to great efficiency in the storm warning system. This new building too, lies between the Colleges of Agriculture and Engineering; to both of these subjects the Meteorological Department is frequently called upon to apply the results of meteorological knowledge and we look forward to a healthy interplay of ideas between these institutions ...

"We are celebrating today the opening of the Department's new home in a building worthy of its record and what we hope for its future."

His Excellency Sir Orme Leslie Wilson, Governor of Bombay, in declaring open the new headquarters building of the India Meteorological Department, said :-

"The establishment in Pune of the first permanent headquarters of the Meteorological Department of the Government of India is an event of considerable importance and I should like to assure you, on behalf of my Government and myself, that we very heartily welcome the Department here and to request you, Mr. McWatters to convey to the Government of India this expression of our sentiments ...



## IMPORTANT LANDMARKS

- \* 1928      Establishment of the Meteorological Office, Pune, as the Headquarters of the India Meteorological Department.  
Sounding Balloon ascents commenced at Pune.  
Prof. K.R.Ramanathan's diagram of distribution of upper atmospheric distribution over the globe was prepared.  
First All India Weather Summary and forecast issued from Pune on 1-4-1928.
- \* 1932      Agricultural Meteorology Section established.
- \* 1937      Pune Office issued forecasts to aircraft flying over South India including Tata Air Mail Service between Ahmedabad and Madras and between Bombay and Trivandrum.
- \* 1942      Office of the Director General of Observatories shifted from Pune to Delhi.  
Training School was set up at Pune.
- \* 1943      Radiosonde Observations commenced.



- \* 1945      Superintending Meteorologist (Forecasting) who was till then functioning from Karachi, was shifted to Pune and the Weather Section at Pune began functioning as Weather Central.  
Hollerith machine for processing data was installed.  
Regional Meteorological Directorates were established.
- \* 1946      Hydrology Section established.  
Designation of Superintending Meteorologist changed to Deputy Director General of Observatories, Pune.
- \* 1947      Directorate of Agricultural Meteorology was established.
- \* 1948      Upper air data started being included in the Indian Daily Weather Report with a lag of one month.
- \* 1950      Preparation of Constant Pressure charts and broadcast of their analysis commenced.
- \* 1953      Occupation of New Agrimet Building.
- \* 1955      Radio Wind Observations commenced.
- \* 1957      Radiation Observations commenced.
- \* 1961      Meteorology for Airmen-Part III published.
- \* 1962      Institute of Tropical Meteorology established.
- \* 1963      Meteorology for Airmen-Parts I and II published.  
Acquiring of the Ramdurg House for Institute of Tropical Meteorology.



- \* 1964 New Instruments Division Building opened.
- \* 1966 Indian Ocean and Southern Hemisphere Analysis Centre (INOSHAC) established at Pune.
- \* 1968 Data processing on IBM-1620 Computer commenced.
- \* 1969 Issue of Quantitative Crop Yield forecasts commenced.
- \* 1970 An Automatic Picture Taking (APT) ground station to receive satellite cloud pictures set up at Pune.
- \* 1971 Indian Institute of Tropical Meteorology established as an autonomous body.  
Rainfall Atlas of India and abridged Climatological Atlas of India published.
- \* 1972 Air Pollution Unit established.
- \* 1973 INOSHAC functioned as the Analysis Centre for the Indo-Soviet Monsoon Experiment (ISMEX-M3).
- \* 1975 Meteorological Department organised the Control room and to organised the preparation of Agromet Advisories for farmers
- \* 1976 and their broadcast as part of the Satellite Instructional Television Experiment (SITE).
- \* 1977 A new era in data processing commenced with installation of a Third Generation Computer EC-1040 in the Meteorological Office, Pune.  
First Climatological Conference held.
- \* 1978 Agroclimatic Atlas of India published.



**METEOROLOGICAL OFFICE, PUNE**

**IN**

**THE SERVICE OF THE NATION**



## FORECASTING SERVICES

Almost every aspect of human activity for agriculture to aviation and spaceflight to sports is dependent on weather. Issue of warnings and forecasts is perhaps the most important activity of any meteorological service. Nearly a hundred years ago, the India Meteorological Department was established with a view to give forewarnings about tropical storms and monsoon rains. Administrators, Planners and Economists now recognise that adequate meteorological information by way of weather forecasts (and other types of meteorological resources; it is a must both at the planning and operational stages of most development programmes. Loss of human lives and property due to tropical storms and floods, damage to crops because of droughts and incidence of pests and diseases caused by unfavourable weather are some examples of the adverse effects of weather. The India Meteorological Department has grown and expanded its activities to cater to the needs of the development of the nation and people. Its services have not only grown in number and volume but also in effectiveness to meet the more exacting demands placed on it.

The technical control and co-ordination of Forecasting Service in the country is exercised by the Deputy Director General of Meteorology (Weather Forecasting) located at Pune. He discharges this responsibility through the Weather Central, Aviation Section and the Indian Ocean and Southern Hemisphere Analysis Centre located at Pune.

Following are some important events during the last 50 years.

- \* 1928 First All India Weather Summary and Forecast for the following 24 hours was issued from Pune on 1.4.1928. 71 Weather forecasts were issued for Aviation during the year.
- \* 1932 Arrangements were made for supply of Current Weather Reports to along the air routes.
- \* 1934 Pune started collecting data from observatories under its control.



Routine transmission of weather forecast and upper wind report to Aviators twice daily for the Karachi-Victoria Point route started on 1.10.1934.

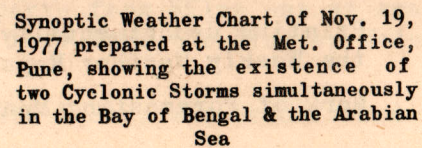
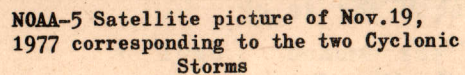
- \* 1937 Daily preparation of additional afternoon Weather Chart commenced at Pune with effect from 1.4.1937.
- \* 1939 International Codes in full were adopted for all current weather reports issued by stations on the air routes from 1939.  
A wireless station attached to the Pune Meteorological Office was opened on 15.4.1939 and synoptic broadcasts from Pune commenced.
- \* 1941 Issue of forecast in PREVI Code commenced from 1.4.1941.
- \* 1944 Broadcast of Weather Map Analysis for the region 10°N to 35°N and 40°E to 92°E commenced.
- \* 1945 Department re-organised establishing seven Regional Meteorological Centres at Bombay, Calcutta, Delhi, Karachi, Lahore, Madras and Nagpur.  
Teleprinter circuits provided linking Pune with Bombay where Meteorological Communication Centre was established, for quick exchange of weather data between different Forecasting Offices in the country.  
The Office of the Superintending Meteorologist (Forecasting) was transferred to Pune and the Weather Section became Weather Central under his charge from November 1945.  
Technical control and coordination of the forecasting activities at the Departmental Forecasting Offices commenced at Pune.
- \* 1946 Scheme for obtaining Weather reports from Ships out at sea introduced. Ships enrolled for this, form the "Indian Voluntary Observing Fleet".
- \* 1947 Issue of warnings for heavy rainfall etc. was transferred to the Regional Centres.



Storm Warning work for Arabian Sea was transferred to the Colaba Meteorological Office.

- \* 1948 Scrutinised Radiosonde and Upper Wind data with a lag of one calendar month commenced to be included in the Indian Daily Weather Report.
- \* 1950 Introduction of revised scheme of combined sub-area and current weather broadcast.  
Introduction of broadcast of upper air analysis.  
Preparation of upper air charts for 700 and 500 mb levels and broadcast of analysis based on these charts commenced.
- \* 1951 The First Conference of Forecasting Officers was held.  
System of giving excellent awards for voluntary work done by ships introduced.
- \* 1952 The first Port Met. Liaison Office started functioning at Calcutta. Four more Port Met. Offices started functioning at Madras and Visakhapatnam (1971), Goa (1972) and Paradip (1974).
- \* 1959 Weekly Map Discussion commenced in Weather Central, Pune with effect from 15.10.1959.
- \* 1963 Extended Analysis and Prognosis Centres established at Bombay, Calcutta and Delhi and Chart form flight documentation introduced.
- \* 1966 On the completion of the International Indian Ocean Expedition, the International Meteorological Centre established at Bombay was shifted to Pune where it started functioning as Indian Ocean and Southern Hemisphere Analysis Centre from 1.4.1966.
- \* 1967 Forecasting Manual Unit started functioning.
- \* 1968 Printing departmentally of the Indian Daily Weather Report and the Weekly Weather Report commenced.
- \* 1975 Work of Forecasting Manual Unit completed. 32 reports published.







## CLIMATOLOGICAL SERVICES

India is one of the few countries in the World where long series of meteorological data covering over a period of about 100 years are available. The wealth of information contained in these valuable data is the source for Climatological Service of the India Meteorological Department. Climatology, one of the most important branches of the science of meteorology connotes the study of synthesis of weather and its changes. It serves as the basic foundation for the understanding of the climate of a region/place and forecasting of the day-to-day weather.

Every human endeavour is greatly influenced by climate and weather directly or indirectly. A large amount of climatological information in space and time is needed for effective planning in many fields of activity of the country like Agriculture; Aviation; Industrial Development; Telecommunication; Strategic and Tactical Defence Planning; Promotion of Tourism and Control and Prevention of Diseases. Exploitation of Solar and Wind Power energy as alternatives to the dwindling fossil fuels in tropical countries is yet another modern field where Climatology has a great potential role to play. It is in this context the Climatological Division of this Department has been, through its wide and steadily rising net work of observatories, collecting, processing and publishing meteorological data over the years. Monthly Weather Review, Annual Summary, Pentad Rainfall Data, Accumulated Rainfall Data, Climatological normals, Aviation Weather Summary, Climatological Atlas and District Weather Summary are some of the important publications that are being brought out by this Division. Further, every year Long Range Forecasts in respect of the prospects of the SW Monsoon over Peninsula and NW India and Winter precipitation over NW India are issued for the benefit of agriculturists and planners. The head of this Service is the Deputy Director General of Meteorology (Climatology and Geophysics).

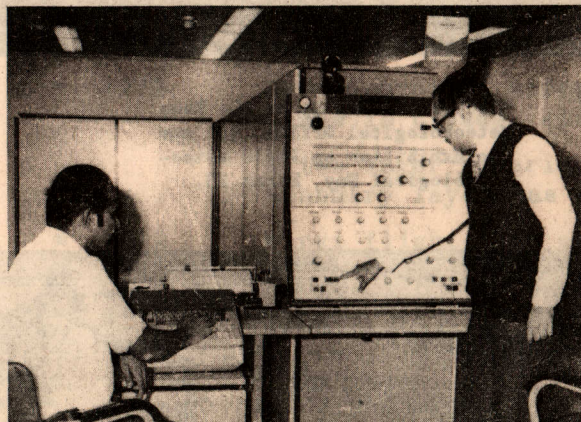
Following are some of the important events during the last 50 years.



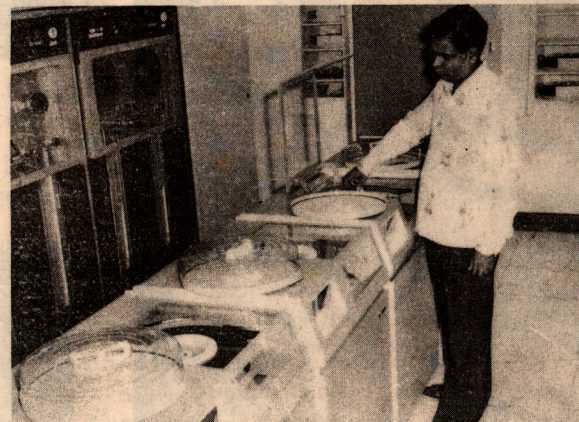
- \* 1936 Publication on 'Meteorology for Airmen in India' published.
- \* 1944 Based on data upto 1940 (i) 5-day normals of Pressure, Humidity and Temperature (ii) Aviation Climatological Tables were published.
- \* 1946 'Climatological Charts of India and Neighbourhood for Meteorologists and Airmen' was published.
- \* 1953 'Climatological Tables of Observatories in India' based on data upto 1940 was published.
- \* 1961 Rainfall registration pamphlet for use of State Government Officials and other agencies printed.
- \* 1962 Publication on 'Monthly and Annual Rainfall normals and Rainy days' based on 1901-1950 data published.
- \* 1967 Publication of maps and reports on 'Disastrous Events' for distribution commenced.  
  
Drought Research Unit for Agroclimatic Study of Droughts and Crop Yield Formation created in the Division of Climatology.  
'Climatological Tables of Observatories in India' (1931-1960) published.
- \* 1968 Normals of Radiation data for 23 stations published.  
  
Publication of 'Aerological Data of India' containing Upper air and Radiation data commenced.
- \* 1969 Issues of Quantitative Crop Yield forecast commenced.  
  
Preparation of Rainfall anomaly charts introduced.
- \* 1971 Marine Climatological Section started functioning.  
  
Abridged version of 'Climatological Atlas of India' - published.
- \* 1974 Stratospheric and Mesospheric Unit started functioning.



- \* 1975 Aeronautical Climatological Summaries for four International Airports published.
- \* 1978 'Climatological Atlas of India - Part A (Rainfall)' in colour under print.



Computer Console Panel and  
Console Typewriter



Magnetic disc and tape  
drives

COMPUTER EC-1040

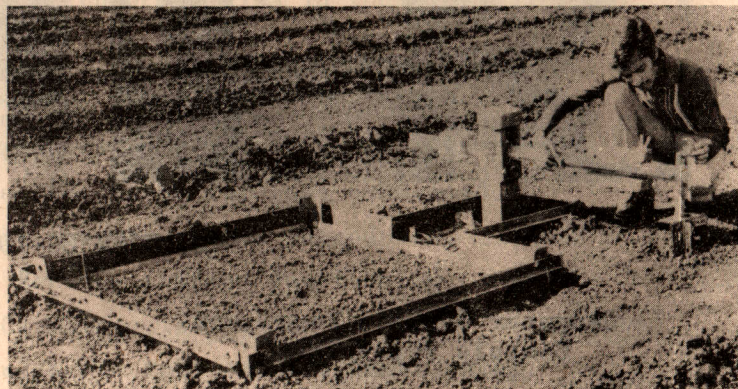




Members of the Public Accounts  
Committee of Parliament in the  
Library of the Meteorological  
Office, Pune (1963)



Visitors lining up at the Pune  
Meteorological Office to see  
the Exhibition on World Meteorological Day, March 23.



Lysimeter



## INDIAN INSTITUTE OF TROPICAL METEOROLOGY

- \* 1963 Participation in the research activities of the International Meteorological Centre Day II0E.
- \* 1964 IBM-1600 Computer installed.  
Development of computerised data processing.
- \* 1967 Transfer of Rain and Cloud Physics Research Unit of NPL to the Institute.
- \* 1970 Development of aircraft and surface instruments for experiments in clouds, started.  
A two layer Numerical Model for the study of Baroclinic boundary layer was developed.
- \* 1972 First flight-test of the meteorological rocket payload conducted.
- \* 1973 Aerial cloud seeding experiments over the Pune region arranged.  
Cloud seeding experiments, on operational basis jointly conducted by the Institute and India Meteorological Department over the catchment area of the Rihand reservoir in Uttar Pradesh.
- \* 1975 Similar cloud seeding experiments conducted over the Linga-namakki reservoir in the Sharavati Catchment area in Karnataka.



# RECOGNITION OF RESEARCH

## (AWARDS WON)

Desai Award	Dr. R.N.Keshavamurty	1968
Fifth Indian Journal of Meteorology and Geophysics Award	Dr. R.V. Godbole & Dr. R.R. Kelkar	1969
W.M.O. Research Award for encouragement of young scientists	Dr. B.M. Misra	1974
W.M.O. Research Award for encouragement of young scientists	Dr. A.K. Kamra	1976
Shri Hari Om Ashram Prerit Dr. Vikram Sarabhai Research Award	Dr. A.S.R. Murty	1976
Third Prize (Students' Technical Session) The Institution of Engineers (India).	Shri S.K. Sharma	1977



## AGRICULTURAL METEOROLOGY

In 1928 the Royal Commission on Agriculture had stressed the need for a separate division to deal with Agrometeorological problems. As a result the Agricultural Meteorology Division, was started on 22nd August, 1932.

Some important events in the development of this division are given below :-

- \* 1932 Starting of Division of Agricultural Meteorology with its attached farm observatory.
- \* 1936 Initiation of Weather Service for farmers in Bombay State on an experimental basis.
- \* 1939 Starting of the First Co-operating Agromet. Observatory.
- \* 1945 Commencement of issue of 'Crop outlooks'.  
Commencement of issue of 'Farmers' Weather Bulletins from Regional Meteorological Centres.  
Issue of Albums of Crop Weather Calendars.  
Initiation of schemes for studies on crop-weather relationships.
- \* 1946 Enhancement of Status of Division to a Directorate.  
Issue of the Hand book "Weather and the Indian Farmer".
- \* 1950 Training of a depute from Indonesia in Advanced Agricultural Meteorology.
- \* 1951 Commencement of recording of Phenological Observations by voluntary Observers.
- \* 1954 Commencement of research on development of techniques for studying water needs of crops.



- \* 1957 Silver Jubilee Celebration of Agrimet. Division presided over by Shri Lal Bahadur Shastri.  
Issue of Revised Handbook "Weather and Indian Farmer".
- \* 1961 Issue of first volume of Crop Weather Diagrams.
- \* 1967 Commencement of studies on drought climatology and crop-yield forecasting.  
Commencement of supply of meteorological data to Agricultural interests.
- \* 1970 Setting up of Ministerial Review Committee for re-organisation of the work and structure of Agricultural Meteorology Division.  
Setting up of working Groups in Agrometeorology by the National Commission on Agriculture.
- \* 1971 Commencement of efforts to provide weather aids for the forecasting and control of locust outbreaks.
- \* 1972 Commencement of studies on Meteorological aspects of Dry Farming.
- \* 1973 Commissioning of the first experimental, departmental station for daily measurement of water needs of crops.
- \* 1975 Participation of Agrimet. Division in Satellite Instructional Television Experiment (SITE) Programme.  
Commencement of studies on meteorological, aspects of pest and disease outbreaks.
- \* 1976 Commencement of training of teachers and research workers of agricultural universities in advanced Agricultural Meteorology.  
Commencement of Agrometeorological Advisory Services for Tamil Nadu from Regional Meteorological Centre, Madras.
- \* 1977 Commencement of scheme for augmenting network of Agromet. observatories.





CENTRAL AGRIMET OBSERVATORY, PUNE.



## METEOROLOGICAL INSTRUMENTS

From the small beginning that the Instrument Section had at Pune in 1928, it has grown up several times both in its size and the number of instruments it manufactures. From the stage of manufacturing barely three types of instruments at a total cost of about 2,000 rupees, it now manufactures annually 80 types of instruments worth 26 lakhs of rupees. In 1928 it had a total staff strength of 15 whereas today the strength is over 350. Its budget has grown up from a mere 20,000 rupees in 1928 to 120 lakhs of rupees in 1978. It has also started earning by selling instruments to other organisations and the value of such sales during 1978 is estimated at 7 lakhs of rupees.

A few significant developments in this field of activity are given below :-

- \* 1932      Technical responsibility of repairing and testing the surface meteorological instruments and their supply to all observatories transferred from Alipore to Pune I, S.
- \* 1933      Manufacture of simple meteorological instruments like Symon's pattern raingauge, Cup Counter Anemometer and Windvane commenced.
- \* 1941      Design and development of a Fan-type Radiosonde for the measurement of pressure, temperature and humidity in the upper atmosphere was taken up.
- \* 1943      First successful Radiosonde ascent reaching upto 200 mb. was taken at Pune.
- \* 1944      Establishment of a Radiosonde station at Veraval.
- \* 1948      Development and manufacture of recording raingauges hitherto imported from U.K. taken up and completed successfully.
- \* 1949      Manufacture of precision Pendulum Clock for use with the Seismograph and Milne-shaw Seismograph.



- \* 1950      Manufacture of Kew Pattern Mercury Barometer.
- \* 1952      The first successful measurement of Atmospheric Electrical Potential Gradient and Conductivity in the free atmosphere, the first of its kind in Asia, using instruments developed at Pune.
- \* 1953      Design and development of fixed Beam Ceilometer for the measurement and recording of cloud ceilings.
- \* 1954      Participation in the experimental observations conducted at Phalodi in Total Eclipse of the Sun.
- \* 1956      Participation in the International Comparison of Radiosonde at Payrene, Switzerland.
- \* 1957      Establishment of Directorate of Instruments, Pune.  
Active participation by organising Radiation observations over an extended network during the International Geophysical Year (IGY) period.
- \* 1958      Manufacture of Solar Radiation measuring instruments commenced.
- \* 1961      Participation in the Indo-US, Equatorial High Altitude ascents organised at Hyderabad, in collaboration with Tata Institute of Fundamental Research (TIFR) and Atomic Energy Commission (AEC).
- \* 1962      Design and development of Electro-chemical Ozonesonde based on Brewer principle taken up and first successful ascent reaching up to a height of 25 Km taken in 1964.
- \* 1963      Design and development of unmanned Radio Reporting Raingauge system taken up and the first prototype model successfully tried at Sinhagarh.  
  
Participation in the scientific cruises organised during International Indian Ocean Expedition (IIOE).  
  
Participation in the first Rocket Firing Programme by Thumba Equatorial Rocket Launching Station by providing instrumental support.



- \* 1964 Instrument Division shifted to new building.  
Participation in the International Comparison of Pyrheliometer held at Davos.
- \* 1968 Designation of the Central Radiation Laboratory of the Division as National Radiation Centre for RA-II.
- \* 1969 Successful design and development of first APT ground receiving station for receiving cloud cover picture from orbitting Meteorological Satellites.  
  
Design and development of unmanned Radio Reporting Raingauge using solid state electronics in collaboration with the National Aeronautical Laboratory (NAL), Bangalore and installation of prototype in Gangtok in Teesta catchment.
- \* 1970 Participation in the International Comparison of Pyrheliometer held at Davos.  
  
Participation in the International Comparison of Ozonesonde held in Hohenpeissenberg, Germany.
- \* 1971 Collaboration with Indian Space Research Organisation (ISRO) in operating the four Ground Data Collection Platforms (DCPS) located at Pune, Calcutta, Trivandrum and New Delhi, with the French (CNES - EOLE) satellite for automatic meteorological data collection and dissemination.  
  
Supply and installation by IMD technical personnel of one complete set of Current Weather Instruments to Nepal Meteorological Service.
- \* 1972 Installation of Ceilograph and Skopograph at major International Airports in the country.
- \* 1975 Provision of instrument facilities for measuring wind speed and direction on Off-shore Drilling Platforms set up by the Oil and Natural Gas Commission (ONGC).



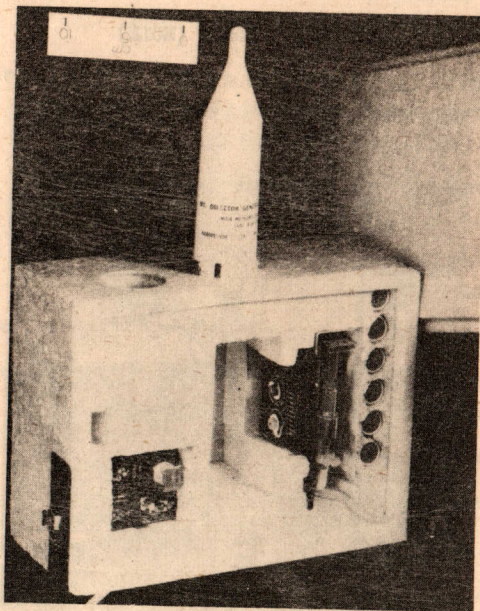
\* 1976

Provision of instrument facilities for Micro-meteorological investigation conducted at Mathura and Bharatpur Oil refinery.

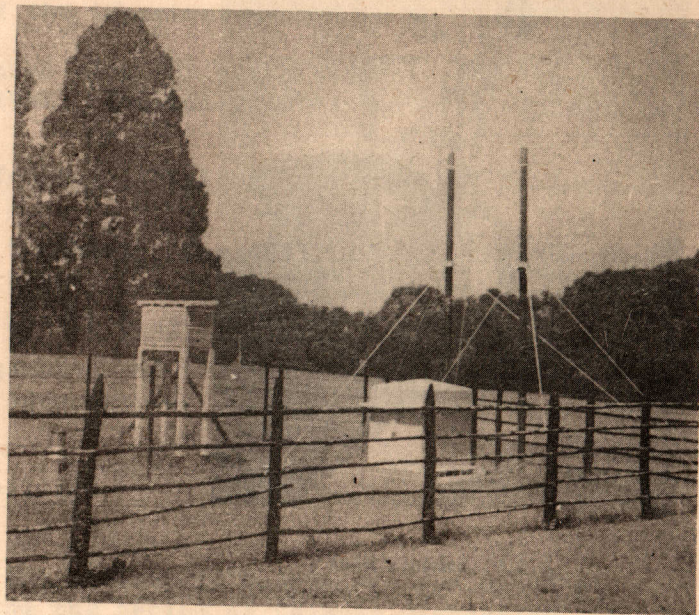
\* 1978

Equipping the 65 m. tower set up at Vizag. with meteorological sensors at seven different levels complete with recording devices on the ground.

Supply and installation by IMD technical personnel of one complete set of Current Weather Instrument Panel to Sri Lanka Meteorological Service under Voluntary Assistance Programme (VAP) sponsored by the World Meteorological Organisation (WMO).

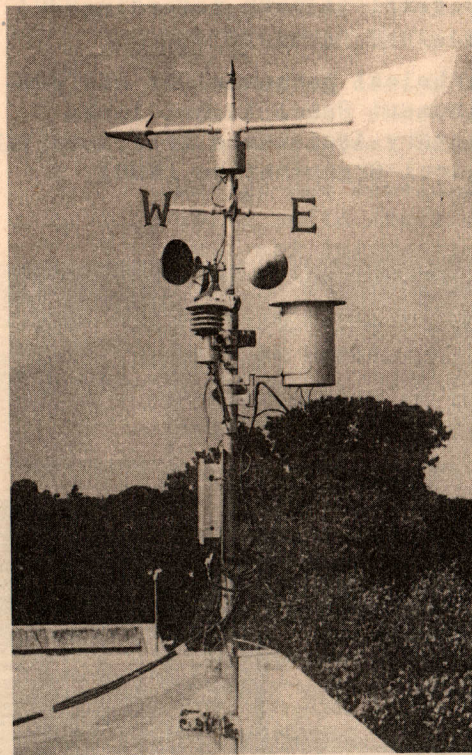


Ozone-sonde

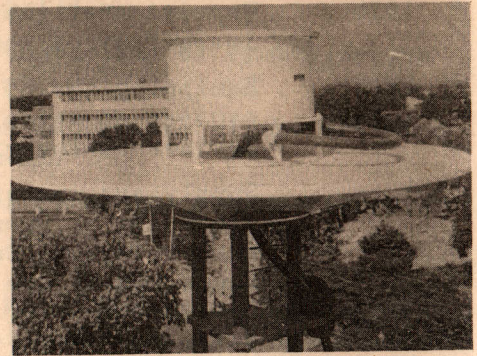


Automatic Telemetry Rain gauge  
(ATRG)

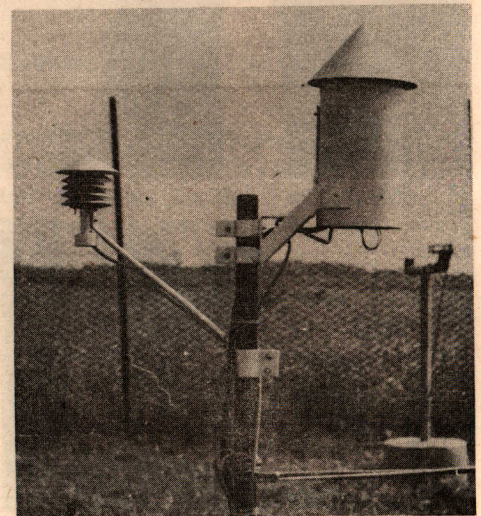




D.C.P. Sensors Mast



D.C.P. Antenna (E01E)



Temperature and Dewpoint  
Indicators at Airports



## METEOROLOGICAL TRAINING

During the 36 years of its existence, the Training Directorate imparted meteorological training to 6,675 persons, of whom 1,084 were from Defence Services and 52 were foreign trainees.

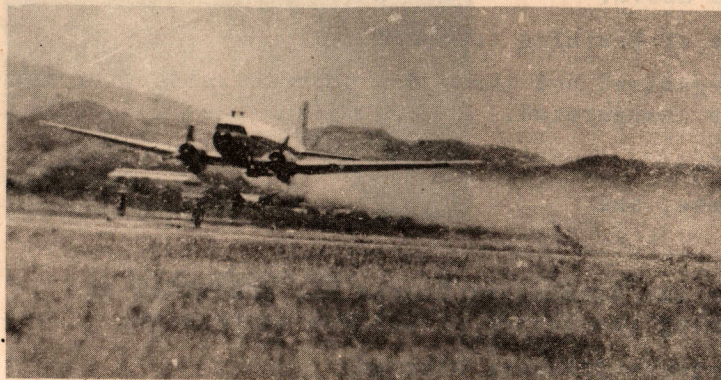
With the anticipated expansion of Departmental activities, the Training Directorate looks forward to a period of increased activity. It is also hoped that Training Directorate will have its own building and Trainees' Hostel in the Pashan Area in the not too distant future.

The following are some of the important events :-

- \* 1942 Formal training commenced with the establishment of a training Section in September 1942. Initially two types of training courses were given
  - (a) Course for Lower Technical Staff - Observers and Senior Observers.
  - (b) Course for Higher Technical Staff - Scientific Assistants (Met. Asstt.) and above.
- \* 1949 Issue of Certificates of Training commenced.
- \* 1952 Training Courses reorganised and three new courses instead of the old system of two was inaugurated.
  - (a) Elementary Course,
  - (b) Intermediate Course, and
  - (c) Advanced Course.
- \* 1962 Emergency Training in the Elementary Course was conducted at different centres during the period of Chinese aggression.
- \* 1963 Training of Naval/Airforce Officers started.

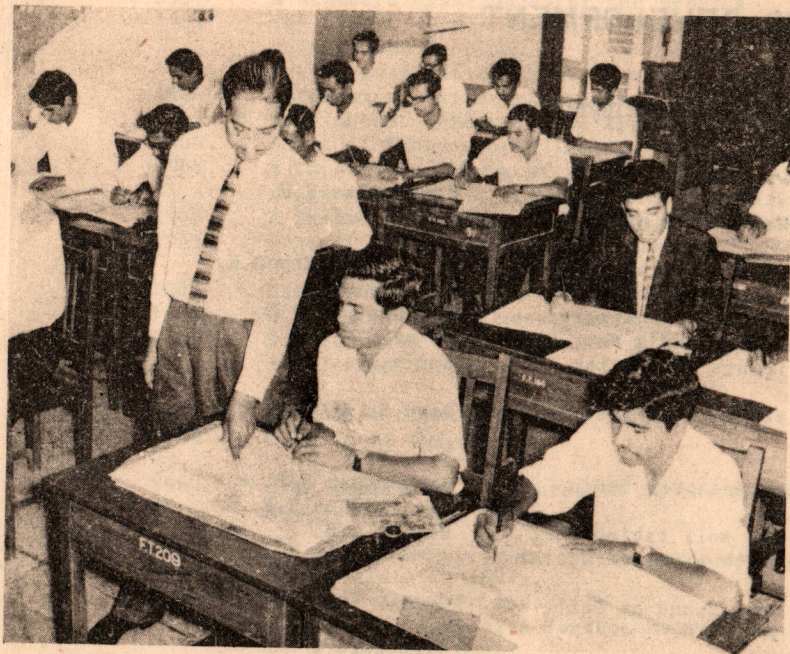


- \* 1965 Training Courses were further reorganised separating the Intermediate Course for Assistants from the Advanced Course for Professional Assistants and Officers.
- \* 1966 Training of Army officers and NCOs in the preparation of Meteor Reports commenced.
- \* 1967 Trainees from foreign countries accepted for training, first time.
- \* 1968 Silver Jubilee of the Training Section celebrated.
- \* 1969 Training Section reconstituted into a Directorate.
- \* 1970 Organisation of Advanced Refresher Courses in special subjects commenced. Participants from countries of WMO Region II (Asia) were also invited. So far 10 such courses were conducted during which 178 participants including 6 foreigners derived the benefit of these courses.
- \* 1975 Two Abridged Advanced Courses were run for the benefit of  
to experienced Departmental candidates.
- \* 1977



Aerial seeding Aircraft VT-CGA  
releasing plume of cloud seeding  
mixture (Common salt & soapstone)





A training class in meteorology in progress



Military personnel being  
trained in taking Pilot Balloon  
Observations



# RESEARCH AND DEVELOPMENT

## A SELECTION OF RESEARCH CONTRIBUTIONS

### Meteorological Office, Pune.

- |         |   |  |
|---------|---|--|
| 1930    | Discussion of results of sounding balloon ascents at Agra during the period July 1925 - March 1928 and some allied questions. | Ramanathan K.R.                                |
| 1930    | Structure and movement of cyclones in the Indian seas.  | Roy S.C. & Roy A.K.                            |
| 1930    | The effect of the Indian mountain ranges on air motion.   | Banerjee S.K.                                  |
| 1931    | Distribution of temperature in the lower stratosphere.  | Krishna Rao P.R.                               |
| 1932    | The Seasonal forecasting formulae used in India Met. Deptt.   | Savur S.R.                                     |
| 1933    | On the physical characteristics of fronts during the Indian Southwest Monsoon.  | Sur N.K.                                       |
| 1934    | A discussion of structure of inner storm area of some Indian Cyclones.  | Basu S. & Desai B.N.                           |
| 1936    | Typhoons and Indian Weather   | Iyer V.D.                                      |
| 1939    | The general circulation of the atmosphere over India and its neighbourhood.   | Ramanathan K.R. & Ramakrishna K.P.             |
| 1940    | The depth of the surface layers of the soil taking part in the diurnal exchange of moisture with air layers near the ground.  | Mallik A.K.                                    |
| 1943-45 | The Climate of the air layers near the ground at Pune, Parts I, II & III.   | Ramdas L.A.                                    |
| 1946    | Sunspot and Monsoon rainfall in India.  | Satakopan V.                                   |
| 1946    | Air masses over India.  | Roy A.K.                                       |
| 1947    | Inter-diurnal variation of Pressure and Temperature in the upper atmosphere over north India.                                 | Chiplonkar M.W.                                |
| 1950    | Growth of cloud droplets by coalescence.  | Das P.K.                                       |
| 1950    | Notes on analysis of Weather of India and neighbourhood.  | Malurkar S.L.                                  |
| 1950    | The upper winds at 10 kms and above over India and its neighbourhood.   | Venkiteswaran S.P.                             |
| 1953    | Equivalent and equivalent potential temperatures.   | Rao K.N.                                       |
| 1953    | The mean jet stream over India and Burma in winter.   | Koteswaram P., Raman C.R.V. & Parthasarathy S. |
| 1953    | Climatic changes in India - I Rainfall, II Temperature and III Pressure.  | Pramanik S.K. & Jagannathan P.                 |
| 1956    | Western disturbances and Indian weather.  | Pisharoty P.R. & Desai B.N.                    |
| 1958    | A preliminary study of the behaviour of Indian southwest monsoon in relation to the westerly jet stream.                      | Ramaswamy C.                                   |



- 1959 A standard atmosphere for the tropics  
 1961 The origin of electric charges carried by thunderstorm rain in the tropics.  
 1961 Evapotranspiration as an Agronomic Factor.  
 1964 Forecasting winter precipitation over north India 3-7 days ahead - the synoptic approach.  
 1964 Onset of Monsoon over India.  
 1964 A Curvilinear study of yield with reference to crop characteristics - sugarcane.  
 1965 A Theoretical study of mountain waves on western Ghats.  
 1965 General circulation of the atmosphere over Indian Ocean and adjoining areas.  
 1965 Measurement of infrared radiative fluxes over India.  
 1965 Evaporation - its measurement and estimation.  
 1967 Distribution of global and net solar radiation over the Indian Ocean.  
 1968 An Indian electrochemical Ozonesonde.  
 1968 Climate of India.  
 1969 Some Aspects of the "breaks" in the southwest monsoon during July and August.  
 1969 A Study of Angstrom turbidity parameters from solar measurements in India.  
 1970 The Indian summer monsoon.  
 1970 Diagnostic Study of a monsoon depression by geostrophic and baroclinic model.  
 1970 A remote temperature and dewpoint indicating and recording device.  
 1970 Forecasting the yield of principal crops in India on the basis of weather paddy/rice - Part-3, Sub-Himalayan West Bengal, Coastal Andhra Pradesh, Tamil Nadu.  
 1971 A new non-reactive gas sampling pump.  
 1973 Atmospheric electricity measurements in the free atmosphere over India.  
 1973 Studies of the electrical activity of thunderstorms with lightning flash - counters.  
 1974 The axis of the tropical easterly jet stream over India and Ceylon.  
 1974 Storm surges in the Bay of Bengal.
- Pisharoty P.R.  
 Sivaramakrishnan M.V.  
 Venkataraman S.  
 Pant P.S.  
 Pant P.S.  
 Gangopadhyaya M. &  
 Sarker R.P.  
 Sarker R.P.  
 Ananthakrishnan R.  
 Mani A.  
 Gangopadhyaya M.  
 Mani A., Chacko O.  
 Desikan V. &  
 Krishnamurthy V.  
 Sreedharan C.R.  
 Rao Y.P. &  
 Ramamurti K.S.  
 Ramamurti K.  
 Mani A, Chacko O. &  
 Hariharan S.  
 Rao Y.P. & Desai B.N.  
 Rao K.V. & Rajamani S  
 Datar S.V. &  
 Pakkir Mohammed P.M.  
 Das J.C. &  
 Madnani M.L.  
 Sreedharan C.R.  
 Srivastava G.P.,  
 Huddar B.B. & Mani A.  
 Srivastava G.P.,  
 Srinivasan V. & Joseph  
 C.P.  
 Mokashi R.Y.  
 Das P.K., Sinha M.C.  
 Balasubramanian V.



- 1974 Analysis of commencement of monsoon rains over Maharashtra State for agricultural planning. Raman C.R.V.
- ✓ 1975 Thermodynamic structure of the atmosphere over India during southwest monsoon season. Srinivasan V. & Sadasivan V.
- 1975 Sea air temperature distribution over Arabian Sea during southwest monsoon 1973. Jambunathan R. & Ramamurthi K.
- 1975 Measurement of soil moisture in Poona black cotton soil using an infra-red moisture balance. Kelkar R.R. & Chevate
- ✓ 1977 Derivation of cloud top heights using HRIR data. Rao N.S.B. & Saxena V.P.
- 1977 An automatic telemetering rain gauge system. Datar S.V., Gangopadhyaya A.K. & Roychoudhury D.K.
- 1977 A digital continuously up-dated two minutes mean wind speed indicator for use at Airports. Venugopal G. & Srivastava G.P.
- 1977 Estimation of soil moisture deficit from meteorological factors. Biswas B.C. & Mahiskar P.R.

#### Indian Institute of Tropical Meteorology

- 1968 Equatorial cell in general circulation. Asnani G.C.
- 1968 On the maintenance of the mean zonal motion in the Indian summer monsoon. Keshavamurty R.N.
- 1969 Net terrestrial radiative heat fluxes over India during monsoon. Godbole R.V. & Kelkar R.R.
- 1969 Theoretical study of cup and vane anemometers. Ramachandran S.
- 1970 Application of non-divergent barotropic model to predict flow patterns in the Indian Region. Shukla J. & Saha K.R.
- 1971 Vertical wind measuring anemometer. Vernekar K.G.
- 1972 High-level warnings over a tropical station. Mukherjee B.K. & Bh.V. Ramanamurty
- 1972 Planetary pressure wave of 4 to 5 day period in the Tropics. Mishra B.M.
- 1973 Areal and point distribution of rainfall associated with depressions/cyclonic storms on the day of crossing the east coast of India. Dhar O.N. & Mhaskar P.R.
- 1973 Break monsoon over India. Raghavan K.
- 1973 Evaporation over the Indian Ocean during I.I.O.E. period. Suryanarayana R. & Sikka D.R.
- 1973 Gamma distribution probability model for Asian Summer Monsoon Monthly Rainfall. Mooley D.A.
- 1973 On a study of wind structure at 500 mb during winter season over India and neighbourhood for use in objective analysis of wind field. Ramanathan Y., Kulkarni P. & Sikka D.R.

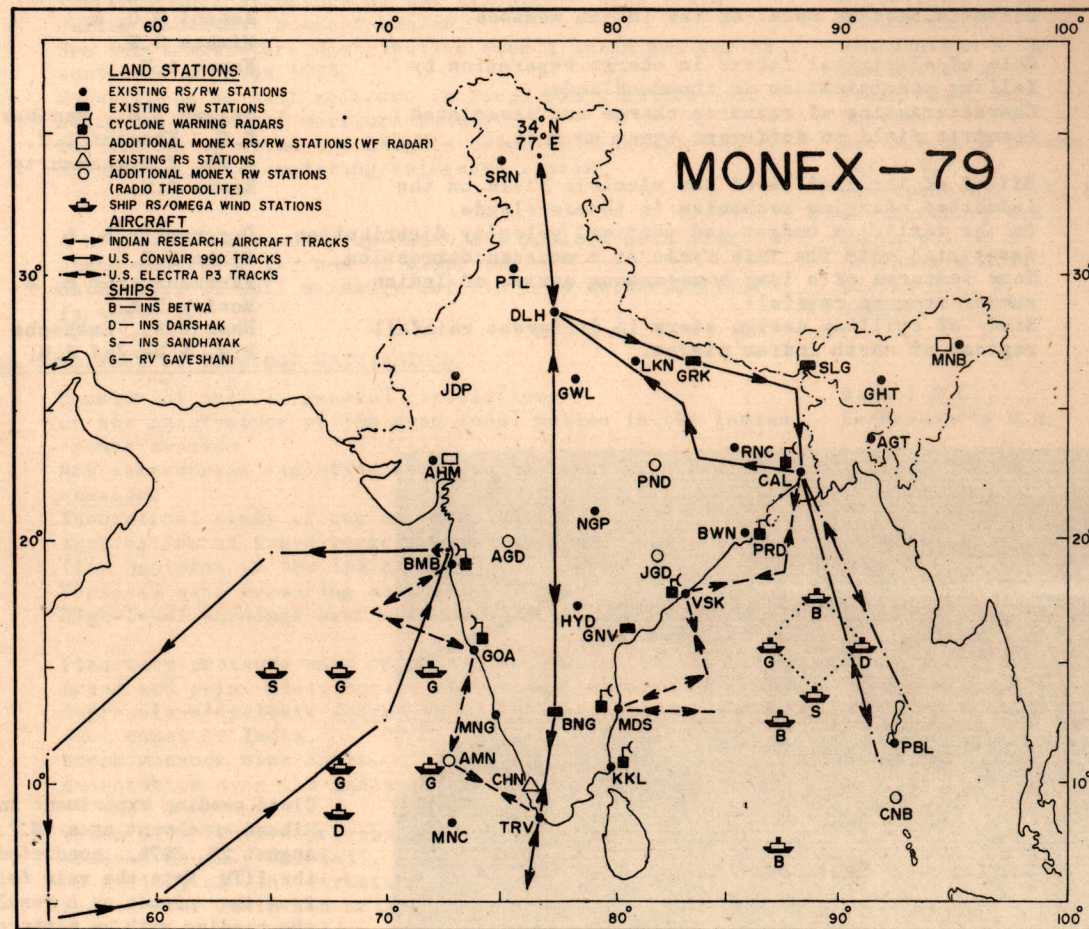


- |      |  |   |
|------|--|---|
| 1974 | Results of warm cloud seeding experiments in three different regions in India during the summer monsoon of 1973.   | Krishna K., Murty A.S.R., Kapoor B.K. & Bh.V.Ramanamurty.   |
| 1975 | Diabatic heating model of the Indian monsoon.  | Asnani G.C. & Mishra S.K.                                   |
| 1975 | Role of electrical forces in charge separation by falling precipitation in thunderclouds.                          | Kamra A.K.  |
| 1977 | Characteristics of raindrop charge and associated electric field in different types of rain.                       | Selvam A.M., Manohar G.K., Khemani L.T. & Bh. V.Ramanamurty |
| 1977 | Effect of inclination of the electric field on the inductive charging mechanism in thunderclouds.                  | Kamra A.K.  |
| 1977 | On the vorticity budget and vertical velocity distribution associated with the life cycle of a monsoon depression. | Daggupatty S. & Sikka D.R.                                  |
| 1978 | Some features of a long homogeneous series of Indian summer monsoon rainfall.                                      | Parthasarathy B. & Mooley D.A.                              |
| 1978 | Study of spillway design storm in different rainfall regions of north Indian plains.                               | Dhar O.N., Rakhecha P.R. & Mandal B.N.                      |

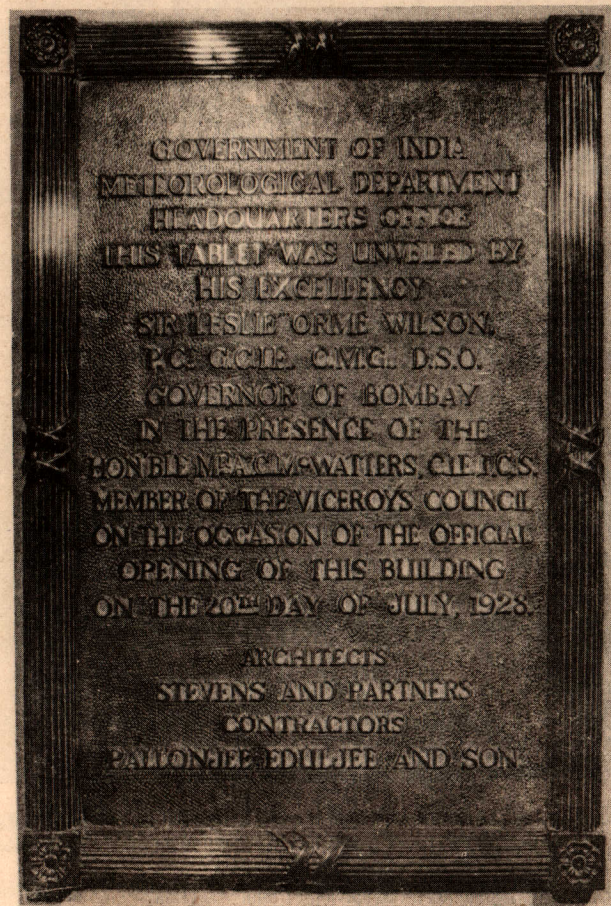


Cloud seeding experiment in the Rihand catchment area (M.P.) on August 23, 1974, conducted by the IITM. Note the rain falling from the clouds as a result of the seeding with a mixture of finely powdered common salt and soapstone









Plaque unveiled by Sir Leslie Orme Wilson, Governor of Bombay on July 20, 1928, inaugurating the new headquarters of the India Meteorological Department at Pune.



METEOROLOGICAL OFFICE, PUNE

(Awards)

Indian Journal of Meteorology and Geophysics Award

Dr. M.V. Sivaramakrishnan 1960 - 1961

Shri V. Srinivasan and Shri V. Sadasivan 1974 - 1975

Dr. B.N. Desai Award

Shri V. Srinivasan, Shri S. Raman and Shri S. Mukerji 1974 - 1975

Hari Om Award

Dr. R.N. Keshavamurty 1975

Institution of Telecommunications Award (Prof. S.K. Mitra Memorial Award)

Shri S.V. Datar and Shri P.M. Pakkir Mohammed May 1970

National Research Development Corporation of India (National Invention Promotion Award)

Shri C.R. Sreedharan 1974

Rafi Ahmed Kidwai Award

Shri C.R.V. Raman 1976



OFFICERS PRESENT ON THE OCCASION OF THE OPENING OF THE NEW HEADQUARTERS  
BUILDING OF THE INDIA METEOROLOGICAL DEPARTMENT AT POONA

(July 20, 1928)



Squatting:- (L-R) Dr. S.C. Roy, Shri A.K. Roy, Dr. S.R. Savur, Shri P.R. Krishna Rao  
Sitting:- (L-R) Dr. S.N. Sen, Shri V.V. Sohoni, Dr. S.K. Banerji, Dr. C.W.B. Normand (Director  
 General of Observatories), Dr. T. Royds, Shri G. Chatterji, Shri J.M. Sil  
Standing:- (L-R) Dr.K.R. Ramanathan, Dr. S.K. Pramanik, Shri M.V. Unakar, Dr. K.J. Kabraji,  
 Shri S. Basu, Dr. B.N. Desai



**EIGHTH CONFERENCE OF FORECASTING OFFICERS, PUNE.**  
**16 - 23 JANUARY, 1978.**



Sitting (From left) : S.D.S.Abbi, P.K.Misra, V.Srinivasan, Dr.Bh.V.Ramanamurty, C.E.J.Daniel, C.P.Rao, Sq.Ldr. J.M.Seth, Dr.P.S.Pant(DDGF), Prof Y.P.Rao(DGO), Dr.R.P.Sarker, Air Cdr.S.Lakshiminarayanan K.V.Rao, Cdr.P.W.Godbole, T.S.S.Anjaneyulu, S.Venkataraman, D.V.Rao, A.K.Sen Sarma.

Standing - 1st Row (From left) : B.M.Chhabra, Lt.Cdr.N.S.Padmanabhan, G.P.Srivastava, K.Soundararajan, A.R.Ramakrishnan, M.S.Singh, A.V.R.Krishna Rao, D.K.Mishra, S.M.A.Alvi, D.R.Sikka, H.N.Gupta, S.K.Pradhan, A.K.Choudhary, M.G.Gupta, S.I.T.Thomas, C.M.Barma, P.E. Morey.

Standing - 2nd Row (From left) : S. Jayaraman, S.S.Singh, M.Hariprasad, Dr.V.Thapliyal, A.Thiruvengadathan, M.C. Sharma, P.V. Joseph, B.K.Sridhar, M.L. Basandra, S.R. Kalsi, Dr. R.R. Kelkar, K.Veeraraghavan, Dr. M.K. Guha, S.V. Singh, R. Chellappa, V. Surya Rao.