INDIAN JOURNAL
OF
METEOROLOGY AND GEOPHYSICS

VOL. 5 | APRIL 1954 | NO. 2

551.5 : 96 (54)

Growth of Meteorological Service in India with the development of communication facilities during the last hundred years*

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(*Received 1 November 1953*)

1. Introduction

The fact that large-scale weather patterns travel from place to place, forms the basis of the successful application of the art and science of weather forecasting in aid of mankind. A pre-monsoon or a post-monsoon cyclone associated with a core of hurricane winds and mountainous seas, today over the mid-Bay of Bengal in the neighbourhood of the Andamans several hundred miles away from the Indian coast, may strike any part of the coast in two or three days' time and cause heavy loss in life and extensive damage to property over an area covering thousands of square miles. An eastern monsoon depression which is at the head of the Bay of Bengal today may cause heavy rain and disastrous floods over the Nerbada and Tapti valley in a few days as the depression travels westwards. Similarly, a western disturbance in the winter, located today over the east Mediterranean Sea, may enter India after two or three days' travel over the highlands of Persia and Afghanistan, and cause snowfall over the western Himalayas and light to moderate precipitation over the Indo-Gangetic plain. It is, therefore, not difficult to see why the growth of an efficient meteorological service is so largely dependent on the development of communication facilities both for collection of observational data and dissemination of weather forecasts and warnings. Despite the importance to human economy, welfare and warfare, little progress could be made in weather forecasting until the development of telegraphic network in India during the latter half of the 19th century.

In the following paragraphs, I have endeavoured to give a brief history of the growth of meteorological service in India with the progressive development in communication facilities.

2. Early history of the establishment of Meteorological Department in India

Prior to 1865, India had no organised meteorological service. Although a few administrative and medical officers sprinkled about the country tried to collect meteorological observations in the earliest days of British interest in India, the old observations were of little value as the instruments with which observations were taken were not standardized and the observers not properly

* Issued on the occasion of Telegraph Centenary Celebrations in appreciation of the most valuable co-operation extended by the P. & T. Department in the development of the Meteorological Organisation during the last 100 years

trained. Little attempts were also made then to turn the data to account or even to find out if they were of any scientific interest. Observations of value were, however, recorded at a few first-class observatories set up chiefly by the East India Company and missionaries. The Madras Observatory commenced to take valuable meteorological observations since 1796 and the Colaba Observatory, Bombay, since 1841. The Trivandrum Observatory, which owed its origin to the enlightened interest of His Highness Rama Vermah, started taking meteorological observations in 1842. In Calcutta, the Survey Office set up in 1853 an observatory in the Park Street where meteorological observations were recorded until the completion in 1875 of the present Alipore Observatory. In 1857, Sir Richard Strachey called the attention of the Asiatic Society of Bengal to the need of a controlling authority capable of directing and collating the meteorological observations taken in India. A committee was accordingly appointed with this object but its work remained in abeyance owing to the outbreak of the Sepoy Mutiny.

On 5 October 1864, Calcutta was struck by one of the most destructive cyclones on record. It was a full moon day, the high tide time being at noon : a storm wave, about 40 ft high, followed the passage of the cyclone and rushed up the Hooghly river about this time, flooding the neighbouring low lands ; more than 80,000 human beings were drowned or died of exposure. The destruction to shipping in the port of Calcutta was unprecedented. The Calcutta Cyclone was followed within a few weeks by another severe cyclone which passed over Masulipatam, and the associated storm wave again cost the lives of about 40,000 persons. The attention of the mercantile and shipping community was naturally aroused, and the Bengal Chamber of Commerce called the attention of Government to the urgent need to set up a meteorological organisation to warn ships against incidence of cyclonic storms. Mr. H. F. Blanford, Professor of Science, Presidency College, who became in 1864 one of the Honorary Secretaries of the Asiatic Society, drew up a report recommending the establishment of a meteorological department in Bengal to organise a system of storm signals for warning the port of Calcutta of cyclones approaching from the Bay of Bengal. This report was laid before the Government in the beginning of 1865. Following this report, the Bengal Government set on foot a provincial meteorological organisation in 1865 under the management of Mr. Blanford with the twofold purpose, to record and collect systematic meteorological observations in Bengal and to provide a machinery to give cyclone warnings for the protection of shipping at the port of Calcutta. Meanwhile, other provincial meteorological organisations were established in the Punjab and Northwest Provinces in 1865, Madras in 1866, the Central Provinces in 1868 and in Bombay in 1871 on the recommendations of the Sanitary Commission set up by the Govt. of India to suggest ways and means for the collection of systematic meteorological observations with a view to investigate the incidence of disease with climate and weather in India.

Under the able guidance of Mr. Blanford, Meteorological Reporter to the Govt. of Bengal, the observational organisation in the Presidency was greatly improved, and a system of storm signals for warning the port of Calcutta was brought into operation since 1868 on the basis of weather observations from a few coastal observatories round the head of the Bay of Bengal. Progress in other provincial meteorological organisations was not, however, as satisfactory. In the absence of a central authority to co-ordinate the activities of the provincial systems, the meteorological organisation during the decade 1865-1874 lacked unity of aim and direction. After prolonged consideration by the Government of India and the Secretary of State of the report of the Commission of enquiry into the Orissa and Bengal famine in 1866, it was finally decided in 1875 to consolidate the meteorological organisation over the whole of India under a central authority. Accordingly, the India Meteorological Department was officially established by the order of the Government of India in the Department of Revenue and Agriculture and Commerce, No. 76 dated 27th September 1875, in which

sanction was accorded to the scheme of re-organisation recommended in Mr. Blanford's report dated the 26th July 1875. Mr. Blanford was appointed as the first Imperial Meteorological Reporter in 1875 and was entrusted with the task of evolving a co-ordinated organisation out of the provincial systems. The local meteorological reporters were retained in Bengal, the Northwest Provinces, the Punjab and Madras, and a further reporter was appointed for Bombay and Rajputana, each being subordinate to the Imperial Reporter. The chief object of the re-organisation was to adopt uniform methods of observations all over India, collect and collate data at a central headquarters and to apply the knowledge thus gained to the issue of storm and other warnings and daily weather forecasts.

3. Postal and Telegraphic Communications in aid of the early growth of synoptic meteorology in India

The machinery of the newly-created Meteorological Department had to concentrate on improving the observational set-up in the country during the first two years, 1875 and 1876, by extending the network of observatories, equipping them with standardized instruments and by training observers to read the instruments correctly. A beginning was also made to work out means and averages of the observational data received periodically by post. The system of collection of observations through periodical returns by post was too slow for the object of studying the weather changes from day to day, as they occur, and also for exercising a regular check on the accuracy of the observations recorded daily. Plans were, therefore, made in 1876 to utilise the daily postal system for more expeditious collection of observations and were actually put into operation in 1877. The use of the daily postal system brought every observing station into regular contact with the central office which could now exercise continuous supervision of the daily work of each observer. But this step could be regarded only as a transitional one for the ultimate object of synoptic meteorology as the collection of data by post from all parts of India and Burma took 10 to 15 days and the system was useless for affording information of the current weather changes.

Meanwhile, the year 1876 came to be associated with the occurrence of multiform natural disasters and consequent suffering in India. The two Peninsular Presidencies of Madras and Bombay suffered a heavy mortality due to famine as a result of the failure of the annual rains. Bengal escaped this agonising form of calamity but was visited by a severe cyclone associated with a stormwave of enormous magnitude, which was directly or indirectly responsible for the death of not less than a quarter million of people. The cyclone struck the mouth of the Meghna and the Backergunje district on a full-moon night of 31st October-1st November 1876. The spring tide which was unusually high, had already flooded the low lying coastal areas at the northeast angle of the Bay of Bengal, and the inundation resulting from the simultaneous incidence of the stormwave were so overpowering that history can furnish few instances of a natural calamity equally destructive of life.

The disasters of 1876 were not without their useful lessons. Although the Bengal system of storm warning was set on foot in 1865, the system had to depend even in 1876 and 1877 on telegraphic weather reports from only 5 observatories, Madras, Cuttack, Saugor Island, Chittagong and Akyab,—observations from other stations being obtained by post. With such meagre observational data received telegraphically, it was hardly possible to evolve an expeditious and effective storm warning service. Addition of weather telegrams from 4 more observatories, Colombo, Vizagapatam, False Point and Diamond Island in 1878 was a step forward in improving the Bengal storm warning organisation. Diamond Island, where a telegraph station was opened in February 1878, was a very desirable addition to other telegraphic stations round the coast of the Bay of Bengal because of the strategic position of the observatory with reference to the regions of frequent genesis of cyclones in the neighbourhood of the Andamans.

The system of telegraphing weather observations for storm warning had hitherto been rather cumbrous and expensive. Mr. John Eliot, who succeeded Mr. Blanford in 1875 as Meteorological Reporter to the Govt. of Bengal, drew up in 1878 a telegraphic weather code based on the system in use in the American Weather Signal Service. This weather code consisted of only 6 words exclusive of the address, and contributed greatly to economy and simplicity in the use of tele-communication for weather service in India. The year 1878 is noteworthy for another great advance in the field of synoptic meteorology in India,—namely, the establishment of an All-India Daily Weather Report based on weather charts prepared from the coded weather telegrams from 84 observatories during the monsoon and from 50 observatories in the rest of the year. The first All-India Report, describing the chief features of the weather over the whole of India, appeared on the 15th June 1878 at Simla under the direction of Mr. J. Eliot who came there with a small band of staff from Calcutta for the purpose. The reports were printed and issued at Simla from the middle of May to the middle of October and at Calcutta during the remaining months. The All India weather charts showing distribution of pressure, temperature, rainfall and winds were daily drawn up immediately on receipt of weather telegrams, and were completed by the addition of observations from the non-telegraphing stations when received by post. The charts so prepared gave a graphic picture of the weather situations all over India and Burma for every day of the year, which was a great landmark in the history of progress of meteorology in India.

From the beginning of the year 1880 a further improvement was effected in the Bengal storm warning system. The number of stations sending daily weather telegrams to Calcutta for the storm warning service was increased to 15 and the Bengal Meteorological Reporter commenced to include in his daily weather bulletins a lithograph weather chart every afternoon.

The year 1880 is also notable for another progress in the meteorological organisation in India. Mr. F. Chambers, Meteorological Reporter for Western India at Bombay, brought into operation a system of storm warning service on 30th June 1880 for the Bombay coast, on the basis of weather telegrams received from the observatories in his area : and the ports and fishing stations on the Bombay coast now started getting telegraphic warnings of atmospheric disturbances likely to affect the coast.

In 1881, additional telegraph facilities were provided to improve the All-India weather map : all the observatories at stations provided with telegraph offices, numbering 96, started sending weather telegrams daily throughout the year, these being supplemented by telegraphic reports of rainfall from 28 additional stations during the monsoon months. Arrangements were also made in 1881 to telegraph a summary of weather over the whole of India to all the seats of central and local governments and to the principal daily newspapers who cared to publish them. There was another noteworthy advance in 1881 in the matter of communication facilities extended by the Telegraph Department to the meteorological service. The new Telegraph rules permitted an increase in the number of words from 6 to 8 in a weather telegram so that additional observational data could be included in the revised weather code without increase in cost. Extension of telegraph facilities made it possible in 1882 to effect two improvements in the Bengal organisation. Bengal system of storm warning which was originally designed only to forewarn the port of Calcutta of the approach of severe cyclones, was extended in August 1882 to Diamond Harbour, Mud Point and Saugor Island, which started getting telegraphic advice to hoist signals when any cyclonic storm likely to be a source of danger to shipping entering or leaving the mouth of the Hooghly river, lay over the head of the Bay of Bengal. The Bengal Reporter also commenced in 1882 to issue daily a regional telegraphic weather summary for speedy information to the local Government and other interests in Bengal.

On the 18th May 1884, the port of Akyab on the Arakan coast was visited by a cyclone and the associated stormwave inflicted much loss to paddy crop and stored up grain and also some loss in life. On 22 September 1885, another cyclone accompanied by high stormwave devastated the settlement of Hookeytolla at False Point in Orissa. The occurrence of these storms aroused public attention to the need for extending the system of stormwarnings to all ports on the Bay of Bengal coast. This need was recognised by the Government in 1886 and the Bengal Reporter undertook in 1887 the responsibility to warn all the ports on the Madras and Burma coasts. The most distant ports to be warned now from Calcutta were Moulmein, 750 miles away and Tuticorin 1200 miles away from Calcutta in a direct line. It was, therefore, obvious that an efficient storm-warning service could not be maintained unless special arrangements were made for quick and dependable telegraphic communication between the Calcutta Weather Office and the distant observatories and ports. This was made evident by the event of the Balasore cyclone in May 1887. During the formation and growth of this cyclone near the Andamans, no observations were received from Diamond Island, the only observatory which could give valuable advance intelligence about the disturbance. In the absence of observations from Diamond Island, there was then no way of knowing the intensity and course of the cyclone until it was about to strike the coast near Balasore, and so the hoisting of signals at the Hooghly river ports was delayed. The Telegraph Department recognised the necessity for speedy transmission of weather telegrams on such occasions and agreed to give precedence to XXW telegrams from observatories and to storm signal telegrams to port offices. This concession by the Telegraph Department was a very valuable one, and was one of the instances of its readiness to afford every aid and facility to the Meteorological Department to enable it to fulfil its mission to render expeditious meteorological service.

The Balasore cyclone led to another important measure for the expeditious issue of storm warnings and weather reports. Hitherto observations in the morning were taken at 10 A.M. and the Telegraph Department had to deal with weather telegrams in the peak period of telegraph traffic with the result that the weather telegrams were received very late by the weather offices at Simla, Calcutta and Bombay. From 1st April 1888, the morning hour of observation was advanced from 10 A.M. to 8 A.M., when the telegraph wires in India were most free from traffic. This resulted in great expedition in handling of the weather traffic, and majority of the 98 weather telegrams sent off daily from the observatories started being received at the Simla Weather Office by 10 A.M., and at the Calcutta office by 9 A.M. This measure, thus, greatly expedited the issue of weather reports and warnings, correspondingly enhancing their usefulness.

Mr. John Eliot, who succeeded Mr. Blanford as Director General of Observatories in May 1889, concentrated on the problem of extending the network of observatories in India. In 1890, he arranged to start a number of observatories in the States of Hyderabad and Mysore and a few years later in the State of Kashmir. He was also able to increase the number of observatories in Burma, and establish extra-Indian observatories at Teheran, Ispahan, Gwador and Jask on the line of the Indo-European Telegraph Department through the willing co-operation of the Indian Telegraph Department. In that expansion programme, Eliot followed the policy to have observatories set up at Telegraph Offices as telegraph masters and signallers were accustomed to use delicate instruments and could be relied on for accurate and trustworthy observations. A further great advantage was that the observations taken at such stations could be despatched by weather telegrams immediately after they were recorded.

The Eastern Telegraph Company arranged to transmit free of cost daily observations of Aden to the weather office at Bombay in 1893. Similarly, Indo-European Telegraph Line arranged in March 1896 for the free transmission to the India Meteorological Department of weather telegrams from Ispahan,

Tehran, Bushire and Jask. Observations of these extra-Indian stations proved to be of great value in following the course of the western disturbances which enter India through Persia and Afghanistan and cause snowfall over the western Himalayas and rain on the Indo-Gangetic plain in the winter months.

By 1903, when Eliot retired, the India Meteorological Department was in a position to prepare a weather map based on observations received telegraphically from nearly 200 Indian and extra-Indian stations. The strenuous efforts of Blanford and Eliot increased the efficiency and usefulness of the India Meteorological Department in the field of synoptic meteorology which could compare favourably with the best in the world in 1903. The success attained by them was not in a small measure due to the co-operation extended by the Telegraph Department.

4. Radio-communication in aid of Meteorological Service in India

The advent of radio-communication in the beginning of the present century permitted the collection of meteorological observations from ships at sea and from outlying observatories not connected by landline. This constituted a great advance in the field of synoptic meteorology. The International Radio-Telecommunication Conference, which was held in London in 1912, recommended that the Indian coastal radio stations should be supplied with weather bulletins for transmission to ships at sea. Dr. Gilbert Walker, who succeeded Sir John Eliot in January 1904 as Director General of Observatories, took immediate steps to implement this recommendation. The coastal radio stations at Karachi (VWK) and Bombay (VWB) started communicating weather bulletins to shipping at sea from December 10, 1912 and Calcutta (VWC) from January 2, 1913. Rangoon (VWR) and Madras (VWM) also commenced transmitting weather bulletins to ships in 1915. Services of the radio station at Victoria Point became available in 1913 and that at Port Blair in 1915 to enable the weather offices to obtain daily meteorological observations from these outlying stations. Advantage was also taken of the coastal radio stations to collect ship's weather observations in a figure code from the beginning of 1914, when word codes were replaced by figure codes for transmission of weather telegrams. But the newly introduced system of collection of ship's observations had soon to be kept in abeyance with the outbreak of the World War I, until it was resumed in 1920. With the re-opening of the system, ship's observations so vital to the storm warning service, became again available to the weather offices, and the shipping at sea was now able to get the latest weather bulletins issued by the India Meteorological Department on the basis of fresh observations from the sea areas. The bulletins were now broadcast regularly twice daily by the coastal radio stations at Rangoon, Calcutta, Madras, Bombay, Karachi, Matara (Ceylon) and Aden—the two last-named stations being included in the system since 20th March 1920 at the instance of the British Admiralty.

In the use of radio-communication for the advancement of meteorological service, the Telegraph Department extended liberal facilities and full co-operation, as in the past. The Marconi Company also helped by agreeing to transmit ship's weather observations free of ship's charges. This concession took effect from July 1921, and was of material aid in obtaining ship's weather messages in increasing numbers in a period of slender financial resources of this Department.

With improved financial position and the advent of air navigation, there were important developments in the meteorological organisation since 1926. The shipping and mercantile community in Bengal had expressed dissatisfaction with the system of stormwarning service done from Simla for the Bay of Bengal since 1922. The loss of *S. S. Okara* on the night of 5th May 1923, while caught in a severe cyclone in the north of the Bay, laid further stress on the need to retransfer the Bengal storm warning service to Calcutta. This was effected in April 1926.

Mr. J. H. Field, who succeeded Dr. Walker in December 1924, and Dr. C. W. B. Normand, who succeeded Mr. Field in March 1927 as Director General of Observatories, were able to impress upon the Government the need to provide adequate meteorological service for airmen in the early stage of air transport in India, as a few disasters due to scanty meteorological facilities might retard progress in air service for a generation. A meteorological office was organised in 1926 at Drigh Road (Karachi) in aid of the Cairo-Karachi air service, and two local forecasting offices were established by R.A.F. at Quetta and Peshawar to cater to the meteorological needs of the squadrons on the western frontier of India. The Weather Central, then in my charge, was transferred from Simla to its new home at Poona in April 1928 and the shift to Poona of the other sections of the Headquarters Office at Simla was completed by the middle of June. In November 1929, a new meteorological office was organised at New Delhi to provide meteorological facilities for the eastward extension of the London-Karachi airline across India.

Coming of aviation to India called for a new orientation to synoptic meteorology necessitating a more or less complete overhaul of the then existing system. Hitherto, the requirements of various interests for weather reports and forecasts mainly pertained to rainfall, temperature and ground wind and warning against the incidence of cyclones and heavy rainfall. The need of the airmen is, however, much more. The airmen are also vitally interested in the incidence of local storms, like duststorms and thunderstorms, fog and dust causing poor visibility, clouds with low ceiling and other weather hazards to aviation. They require information regarding winds and temperature aloft to choose the best height to fly and also detailed forecasts of weather and wind at the time of landing. It, therefore, became necessary for the observers to learn to record many more items of meteorological observations and include them in the weather telegrams sent daily to the various forecasting centres. In the past, the Indian observers used to report in the weather telegrams unreduced readings of the barometer, thermometers and the wind instruments, the necessary reductions and corrections being made at the forecasting offices. This practice had double disadvantage; the length of the weather telegram was unduly long compared to the matter carried by it, and the reduction of the readings required to be done before plotting, necessarily delayed the preparation of the weather charts by the forecasting offices. The observers were now trained to do the reduction work, and a new weather code was designed by me in 1929 to incorporate all the additional observations required by airmen without increasing the length of the weather telegram. This measure not only effected economy in telegraph cost, but also prevented an undesirable increase in the load of weather traffic at certain hours on the communication system (landline and W/T) designed for general purposes. By bringing into use the new code in 1929, it became possible through the co-operation of the Telegraph Department to provide the necessary observational data to the various regional forecasting centres to enable them to prepare weather charts expeditiously. This code was brought more in line with the international weather code in 1931, and subsequently was replaced by the international code.

With the installation of a shortwave wireless by the Director General, Posts & Telegraphs at the Karachi Civil W/T Station in April 1929, arrangements could be made for wireless exchange of synoptic weather data between the Karachi Meteorological Office and the R. A. F. forecasting centres at Quetta and Peshawar and also with those in Egypt and Iraq. The aeronautical wireless chain set up by the Director General, Posts & Telegraphs along the trans-India air route was also taken advantage of in 1932 for the distribution of aviation forecasts and current weather and upper air reports for the benefit of airmen.

As air services began to grow steadily, it became necessary in 1937 to introduce a system of wireless exchange of synoptic data twice daily by regional broadcasts. The shortwave aeronautical W/T at Karachi and

Calcutta commenced these broadcasts with effect from 1 August 1937. The Burma Meteorological Department, organised by me in July 1937 on separation of Burma from India, also commenced to broadcast data of Burma stations through the Rangoon W/T from October 1937. A "Met-W/T" station was also established by D.G.P.T. in April 1939 at the Weather Central, Poona, which commenced broadcasting "collective synop", fleet synoptics, etc. The forecast centres, however, still continued to obtain much of their requirements of synoptic data by direct landline telegrams from observing stations, each observatory sending out several telegrams to different forecast centres in respect of a single observation.

The indiscriminate application of the economy axe in 1931 and inadequate provision of finance in subsequent years prevented many desirable improvements to be made in the meteorological organisation in India. With the outbreak of the World War II in September 1939 and its extension to the eastern borders of our homeland by 1942, the then existing organisation was found thoroughly inadequate to meet the requirements of the army, navy and the air force operating from bases in our homeland and over our seas. It became, therefore, urgent to rectify the past mistake and develop the organisation rapidly to a reasonable standard. It was realised that the headquarters of the Meteorological Department should be located at the seat of the Central Government in close contact with the Army and the Air Force Headquarters, and the Directorates of Civil Aviation, and Posts and Telegraphs. Accordingly, the office of the Director General of Observatories was shifted from Poona to New Delhi in October 1942, and a large number of forecasting offices were established in the country with the greatest expedition. The number of observations per day had also to be increased. With the wartime increase in forecast centres and the volume of weather traffic, the necessity arose to set up exclusively for this traffic a "Met-W/T" organisation consisting of a "Central Broadcasting Station" at Nagpur and 8 "Regional Broadcasting Stations" located at Karachi, Chaklala, Delhi, Calcutta, Bombay, Madras, Nagpur and Colombo.

5. Teletype in aid of war meteorological organisation and postwar re-organisation

Although the organisation of the Met. Broadcasting Reseau partially solved the problem of dissemination of synoptic data, it was soon found necessary to take the aid of the teletype network of the War Department to deal with the volume of weather traffic. Later in 1944, a scheme was drawn up by Dr. Normand to develop in India in stages a "Met. Teletype System" exclusively for met. traffic. In planning the "Met. Teletype System", Dr. Normand kept in view that the postwar air transport in India will be on a much larger scale than before the war, both on the international and national airways. The system was so designed that its transition from wartime to peacetime could be effected with the minimum change.

Dr. S. K. Banerji, who succeeded Dr. Normand in September 1944, arranged with the Director General, Posts and Telegraphs to take over and run the Met-Teletype channels provided during the war by the South East Asia Command, and put into effect the first phase of Met-Teletype organisation by connecting the regional centres to a Central Met. Communication Unit at Bombay.

Mr. V. V. Sohoni, who succeeded Dr. Banerji in April 1950, arranged with the Director General, Posts and Telegraphs to have the old wartime teleprinters repaired or replaced by new machines. He also arranged to build in the Colaba observatory compound a permanent home for the Bombay Central Met. Communication Unit, which was temporarily located in the Telephone Exchange Building.

6. Present met. communications and future

Lack of tele-communication channels specifically reserved for meteorological traffic was one of the serious deficiencies of the prewar meteorological organisation in India. The position has been greatly improved. The present set-up of the met. communication system in India is shown in Figs. 1 and 2.

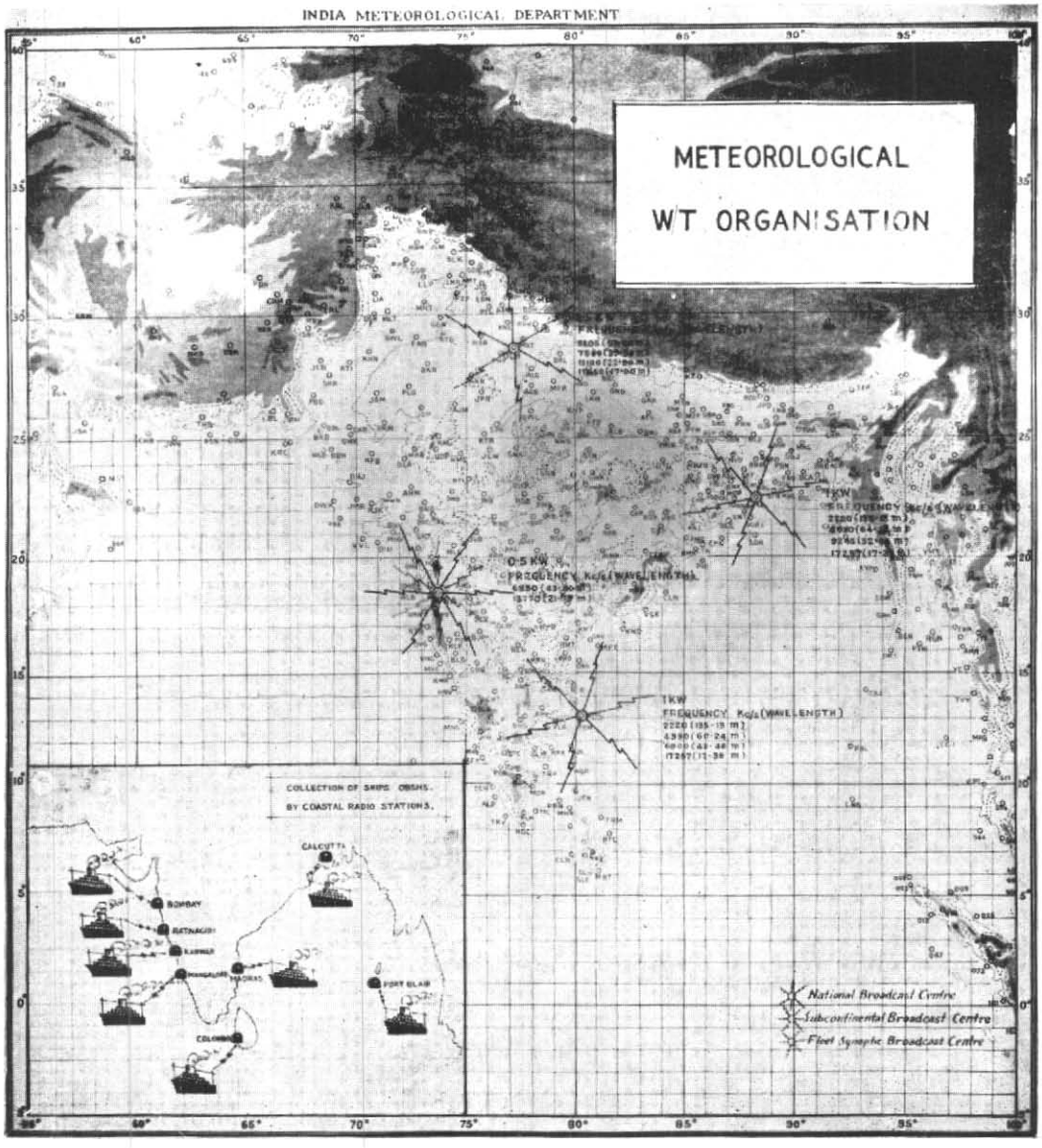
INDIA METEOROLOGICAL DEPARTMENT
METEOROLOGICAL
WT ORGANISATION
0.5KW
FREQUENCY Kc/s (WAVE LENGTHS)
1KW
FREQUENCY Kc/s (WAVE LENGTH)
COLLECTION OF SHIPS OBSNS.
BY COASTAL RADIO STATIONS.
CALCUTTA
BOMBAY
RATNAGIRI
KARWAR
MANGALORE
MADRAS
PORT BLAIR
COLOMBO
National Broadcast Centre
Subcontinental Broadcast Centre
Fleet Synoptic Broadcast Centre

Fig. 1

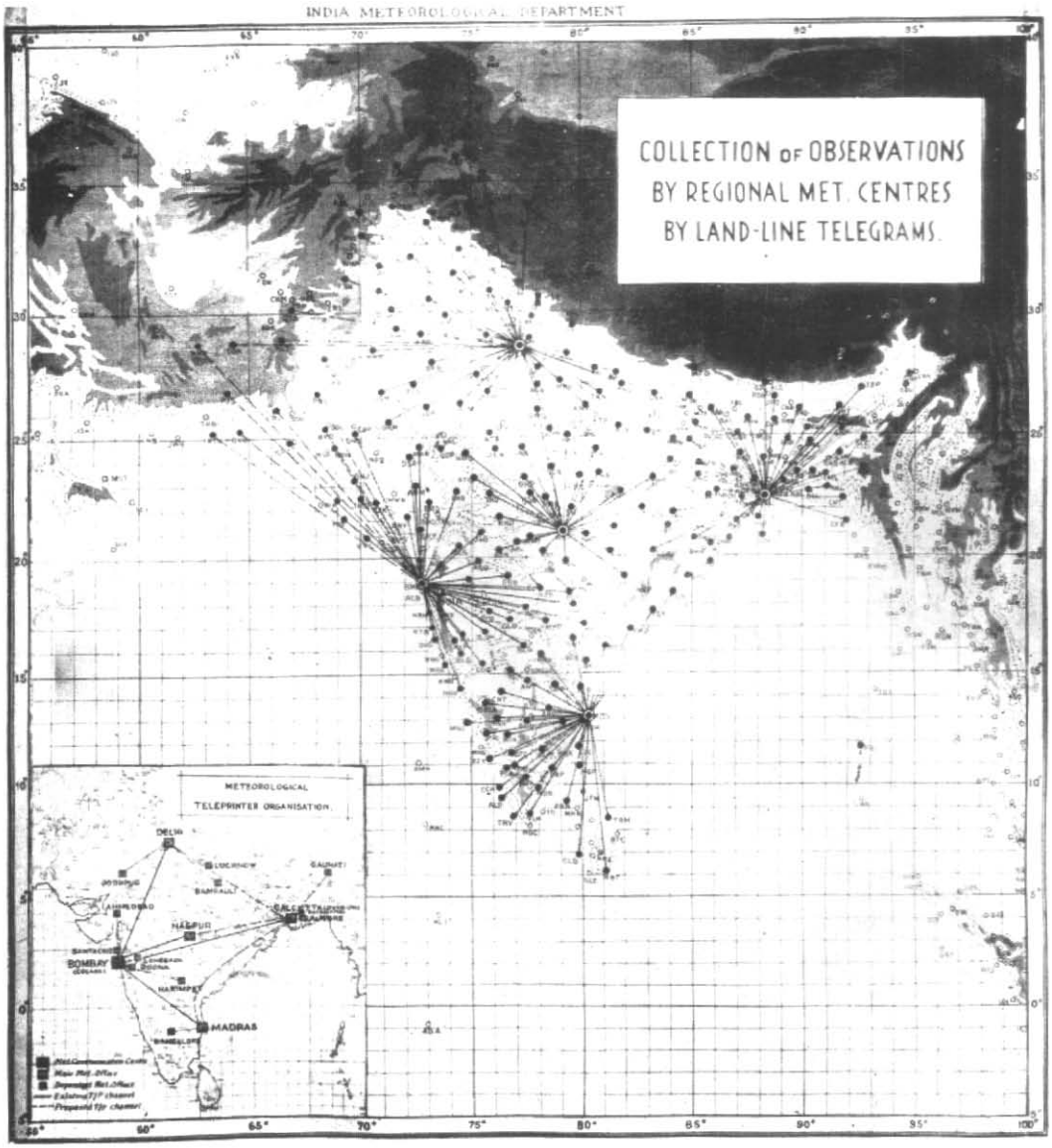
INDIA METEOROLOGICAL DEPARTMENT
COLLECTION OF OBSERVATIONS
BY REGIONAL MET. CENTRES
BY LAND-LINE TELEGRAMS.
METEOROLOGICAL
TELEPRINTER ORGANISATION
DELHI
LUCKNOW
GAUHATI
JODHPUR
BARRAULI
AHMEDABAD
HABSPUR
CALCUTTA (DUM DUM)
BOMBAY
SANTACRUZ
COLABA
NAGPUR
MADRAS
TRIVANDRUM

Fig. 2

There is little doubt that the main telecommunication channels for weather traffic should be teletype lines. The use of the landline telegraph system should be only for the collection of synoptic data at regional centres from observatories in the respective regions and for the issue of weather bulletins and warnings against cyclones, heavy rainfall and other adverse weather.

The International Conventions require that contracting States shall arrange for the international dissemination of observational data by radio broadcasts of collective messages, which may be regional, national or multinational. In the present set-up, the regional met. W/T stations at Madras and Calcutta issue regional collectives and the met. W/T at Poona issues national broadcasts and fleet synoptics. The Central Met. W/T, which was located at Nagpur during the war and was shifted in 1946 to New Delhi, now functions as the All India Met. Broadcast Centre (AIMBC) and is also the Sub-Continental Broadcast Centre for South Asia. The Delhi AIMBC collects synoptic data and weather bulletins from all countries in South Asia as well as from coastal Africa and Australia and re-broadcasts them for international benefit. The aeronautical wireless chain on the Indian airways deal mainly with meteorological traffic for the benefit of the airmen. The coastal radio stations maintained by the Telegraph Department collect ship's weather observations and transmit daily weather bulletins to shipping at sea. The provision of facilities for radio communication has also greatly improved the meteorological organisation over our seas. Until 1952, the only reporting observatory on the Andaman and Nicobar Islands was Port Blair. While officiating as Director General of Observatories in the beginning of 1952, I was able, with the co-operation of the Chief Commissioner, Andaman and Nicobar Islands, to obtain W/T communication facilities of police outposts to start six reporting observatories at Table Island, Mayabandar, Long Island, Car Nicobar, Nancowrie and Kondul. Addition of these island observatories effected a long looked-for improvement in the met. organisation over the Bay of Bengal, as rainfall and weather affecting the economic life of India are largely influenced by cyclones and depressions originating in the neighbourhood of the Andaman and Nicobar Islands. It is also desirable to have a few reporting observatories established on the Laccadive group of islands on the Arabian Sea side of the Indian waters. The only reporting observatory there at present is Minicoy, where a W/T station was established by the P. & T. Department in 1941. Radio communication facilities are still awaited for establishing more observatories there, particularly one at Amini Devi.

With the development of aviation, the primary concern of meteorology in India, as in all other progressive countries of the world, has come to be the organisation of weather service on airways, but the improved meteorological organisation needed to meet the aviation requirements also enables improved weather service to be rendered to other interests. In addition to the civil requirements, the organisation also covers the basic needs of the Defence Services, the special requirements of meteorological service of the latter being arranged by themselves.

Although the postwar meteorological organisation in India is a great advance on the pre-war organisation, there are still certain areas, like Assam, Rajasthan and Kashmir, where the existing organisation is thoroughly inadequate to meet the growing needs of aviation, agriculture, flood control and water-power projects.

Since the partition of India, a network of airlines have come into regular operation in Assam which is one of the most difficult flying areas because of its orographic feature and because of the incidence of weather hazards to flying, such as thick fog in winter, high frequency of overcast low clouds and heavy rainfall in the rainy season and the occurrence of thunderstorms attended by squalls during the pre-monsoon period. We need additional communication facilities for the development of the meteorological organisation there. An extension of the teletype system connecting the Gauhati airfield with Calcutta has already been taken in hand by the Director General, Posts and Telegraphs. Further

extension of the network of teletype system in Assam and of more radio communication facilities are desirable in that State.

On the western frontier, the observational organisation as well as met. communication facilities are very deficient, particularly in the western parts of Rajasthan. Duststorms and dust-fog over Rajasthan in the hot weather months constitute great hazards to aviation. Then, there are other problems of meteorology in an arid and semi-arid region. It is, therefore, important that India should have adequate meteorological organisation in that area. For this purpose also, we shall need provision of more communication facilities.

Kashmir and the neighbouring belt of the East Punjab, Himachal Pradesh and the north Uttar Pradesh also need strengthening of meteorological organisation and met. communication.

With the development of broadcasting organisation in the country, arrangements were made for the first time in July 1945 to broadcast weather bulletins for farmers in the rural programmes of the All-India Radio. These bulletins are originated from the regional meteorological centres at Bombay, Calcutta, Madras, Nagpur and Delhi and are sent out in the air once daily in the evening in 17 different local languages by 22 stations of the All-India Radio in their daily " Villagers' Programme ". These bulletins take into account the needs of farmers for each principal crop, district by district. After Independence, the State Governments have come to recognise the importance of fuller and wider dissemination of weather news to the farmers, and it is hoped that more community radio receiving sets will be provided in the rural areas in near future to enable the farmers to use fore-knowledge of on-coming weather in agricultural operations. It is further hoped that the All-India Radio will provide facilities for more frequent broadcast of Farmers' Weather Bulletins by their stations in near future.

The India Meteorological Department owes a large part of its usefulness to the liberal assistance which it received from various other Departments in performing its mission of service to the country. During the past 100 years, the facilities offered by the Post & Telegraph Department have been most fruitful in the growth of the meteorological organisation to its present stage and we can confidently look forward to greater and closer co-operation for the further development of the meteorological organisation to serve the various interests of the country.