meteorological service

annual report 1978

DEPARTMENT OF TOURISM AND TRANSPORT

METEOROLOGICAL SERVICE
ANNUAL REPORT
1978

METEOROLOGICAL SERVICE
DUBLIN

U.D.C
551.5 (417)

Price 75p

INTRODUCTION

The Meteorological Office at Foynes

Ireland figured as starting point or as landfall of most of the pioneering transatlantic flights which took place prior to the nineteen thirties, e.g. Alcock and Brown (1919), Lindbergh (1927) and the first successful westbound flight, the 'Bremen' (1928). The success of these flights demonstrated the feasibility of commercial air services across the Atlantic. By the early nineteen thirties, a number of governments were interested in the possibilities of such services.

Realising Ireland's geographical advantage as a terminal for transatlantic flights, the Irish Government sought the technical advice of Colonel Lindbergh and surveys were carried out of possible land and sea bases in Ireland. A number of locations such as Galway Bay and Cork Harbour were surveyed as well as the Shannon estuary. At that time there were doubts as to the respective merits of seaplanes and land planes and the Shannon estuary offered the possibility of developing facilities for both types of operation. In the event, Foynes was chosen as a seaplane base pending the development of Rineanna as both a land and sea airbase. As well as being on the direct air routes to Europe it had the important advantage of being relatively fog-free and unobstructed by mountains.

Weather information was a vital requirement for transatlantic operations. There was no Meteorological Service in Ireland and it was necessary to set one up if the country was to take its full part in the programme. Towards the end of 1935 and early 1936, there were a number of meetings between officials of the British and Irish administrations and, on 16 June, 1936, the Irish Government formally proposed a transfer of Valentia Observatory and the observing stations in Ireland to the Irish administration. The British Government conveyed its agreement in principle on 27 August, 1936. Steps to establish an Irish Meteorological Service quickly followed.

The British Meteorological Office was extremely helpful in the early years of the Meteorological Service. That Office released Mr. Austen H. Nagle, to become the first Director of the Irish Service.

Mr. Nagle took up duty on 8 December, 1936. The new Service's first priority was to set up a forecasting office and synoptic observing station at Foynes to serve the experimental transatlantic flights. A similar forecasting office was set up by the Canadian Government at Botwood in Newfoundland.

The forecasting office at Foynes was in operation temporarily for the first time from 15 February to 17 March 1937 in connection with the planning of flights, and local operations in the Foynes area. The forecasting office was located in the upper storey of the former Monteagle Arms Hotel.

The forecast office was reopened on 15 April 1937 with a skeleton staff loaned by the British Meteorological Office. Mr. S.P. Peters was in charge and was assisted by two other professional officers, Messrs. J. Harding and S. Proud. Two more officers were attached subsequently to gain experience of the work. A pilot balloon enclosure and a hydrogen store were erected by the Foynes Harbour Trustees on their property, at no charge to the State. For landings and take-offs of flying boats, special weather observations were provided by experienced observers aboard the Control Launch.

A full meteorological organisation was in operation from 5 July. On 6 July, survey flights by Imperial Airways and Pan American Airways took place. Captain Arthur Wilcockson commanded the Imperial Airways flying boat Caledonia, which made the flight from Foynes to Botwood. On the following morning Captain Harold Gray landed the Pan American Clipper III at Foynes having completed the west to east crossing. Three further flights took place during September.

Most of the professional meteorological staff returned to Britain on 15 October, leaving three assistants at Foynes for the winter with Mr. Proud in temporary charge of the station. The radio staff also remained on over the winter and new equipment for the reception of broadcasts of synoptic weather reports was brought into operation in February 1938. This resulted in considerable improvement in the reception of weather reports from the North Atlantic area. Improved accommodation for meteorological staff was also provided in time for the 1938 flight programme.

C O N T E N T S

FUNCTIONS OF THE METEOROLOGICAL SERVICE

The functions of the Meteorological Service are summarised as follows:-

(i) The collection, analysis and publication of meteorological, geophysical and geochemical data;

(ii) the carrying out of research in fundamental and applied meteorology;

(iii) the supply of forecasts, statistical information and scientific advice on the application of meteorology in various fields to agricultural, industrial and public utility undertakings, the press, radio and television, maritime interests, individual members of the public, etc.

(iv) the supply of similar information to Government Departments and the Defence Forces;

(v) the provision of meteorological facilities for civil airlines operating to and from airports in Ireland and/or flying over Irish territory and the supply of advice on the meteorological aspects of civil aviation problems generally;

(vi) co-operation with other State Meteorological Services and with meteorological workers in other countries in the development of meteorological science and of the international meteorological organisation; and the representation of Ireland at international meteorological conferences.

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Mr. Harding returned to Foynes in June 1938. Mr. D.A. Davies*, another British meteorologist, also arrived at that time. Mr. Peters returned as officer in charge on 1 July. As Mr. Proud had returned to Britain in April, the staff strength at Foynes at that stage was 3 professional officers and 3 assistants. Because of the burden which the workload imposed on this limited staff, with some duties lasting up to fourteen hours a day, Peters pressed for additional professional officers and assistants. Messrs. Peters, Harding and Davies returned to Britain at the end of September. A meteorological station was opened at Rineanna in November; the observations there were made by personnel of the Office of Public Works who had been trained at Foynes. Seven flights (two transatlantic) took place at Foynes during the month of July and, on the whole, the volume of traffic fell short of expectations.

On 17 August, 1938, the Minister for Industry and Commerce announced in the Dail that Ireland's youngest Government service, the Meteorological Service, was to play an important part in aviation developments and that that Service was seeking six meteorological officer cadets. He asked the Dail to approve an estimate of £6,000 for staffing for the financial year 1938/39. Control of staff, he continued, would be handed over to Irish personnel, trained by British experts, in preparation for the opening of the North Atlantic Air Service in the Spring of 1939.

The first group of 5 meteorological officer cadets reported for duty at the Foynes Meteorological Office on 16 January 1939 and were joined by another recruit on 26 January; a seventh cadet reported on 3 March. Messrs. Peters and Davies had been re-posted to Foynes within three weeks of their re-call in September 1938 and from 16 January the training of meteorological officer cadets occupied a large part of the time of these two officers. In the meantime, the first assistant course had been planned, and got under way on 27 March with 9 entrants.

The meteorological officer cadet training course at Foynes was interrupted on 22 April when the cadets were posted to London for attachment to the Meteorological Department of the Imperial College under

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*Mr. Davies is now the Secretary-General of the World Meteorological Organisation.

Professor Brunt. Returning on 27 June, the cadets were provided with opportunities to work on chart analysis in the operations room while they awaited return to the Imperial College, a return which never took place because of the outbreak of World War II. A further development at Foynes in July was the return of Mr. Harding from England and the arrival of Mr. H.H. Lamb (also of the British Meteorological Office). The assistant course was completed on 7 July. Assistants from this course were put on roster duties which were extended to 24-hour coverage for the first time.

The outbreak of hostilities in Europe at the beginning of September, 1939 changed the scene considerably for Foynes. Not only their return to the Imperial College but also a plan to send the cadets for further training to Bergen in Norway was abandoned. The British Meteorological Office was anxious to have its staff return for war service. Mr. Davies was the first to leave and he was followed by Mr. Harding. In anticipation of these developments, the Meteorological Service had been seeking senior staff during the summer of 1939 to replace the staff on loan from Britain. As a result of these efforts, Dr. L.W. Pollak* was recruited as a Senior Meteorological Officer on 16 October, 1939 and Dr. M. Doporto* was recruited in a similar capacity on 21 November 1939. Both of these officers took up duty at Foynes in late 1939.

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*Dr. Pollak was a native of Prague. During the first world war, he served as Director of The German XI Army Weather Service in the south Tyrol where he pioneered aircraft upper air observations. He was professor in the German university of Prague until he left Czecho-Slovakia before the German occupation of that country. He resigned from the Meteorological Service in 1947 to take up a post as Senior Professor in The Dublin School of Cosmic Physics.

*Dr. Doporto was a native of Caceres. He joined the Spanish Meteorological Service in 1921. He was in charge of the weather forecasting office at Barcelona on the outbreak of the Spanish civil war, after which he went into exile. On the resignation of Mr. Nagle in 1948, Dr. Doporto became the Service's second Director. He died in 1964.

Dr. Pollak conducted a lecture course for the meteorological officer cadets while Dr. Doporto was assigned to research on the problems of upper level winds over the Atlantic. The British Meteorological Office continued to press very hard for the return of Mr. Peters. He finally returned in mid-March, 1941 and, in anticipation of his recall, Dr. Doporto had been appointed officer in charge at Foynes on 7th January, 1941.

During the summer of 1939 it had become increasingly apparent that the outbreak of hostilities in Europe was imminent. It was clear that, in the event of war, the dissemination of weather reports and forecasts by wireless and other means would be severely restricted. If such restrictions could not be circumvented, the Meteorological Office at Foynes would be in an extremely difficult position. Discussions on these matters took place in London in April, 1939 and a final meeting was held on 1st September. Special arrangements were made for the exchange of meteorological information between the two countries and some General Service staff were seconded to Foynes for ciphering duties. To make up as far as possible for the scarcity of data in war-time conditions, hourly weather observations throughout the 24 hours of the day were introduced at Foynes and Valentia and later at Dublin Airport. The observing programme at the other synoptic stations was expanded as circumstances permitted. From mid-1940, the Foynes forecasting office was able to provide an essential service of forecasts to the Electricity Supply Board in addition to the service provided to the Defence Forces.

The late recruitment of additional Meteorological Officer cadets and Meteorological Assistants placed a new strain on the already stretched resources of the experienced personnel at Foynes. In these circumstances, it was planned that training of further new entrants should take place at Valentia Observatory. The second group of cadets reported at Valentia in March 1940. A second course for Meteorological Assistants also got under way there at the beginning of July. The Cadet course at Valentia was conducted by Mr. Lamb, who joined the Irish Service as a Meteorological Research Officer in June, with the assistance of Mr. S. McWilliams, one of the first group of cadets, for the Assistants course.

Air traffic through Foynes in 1940 showed a substantial increase over the previous year. Transatlantic and cross-channel flights for the three months August to October totalled 27, almost double that of 1939.

During the autumn, a British research aircraft, the M3, was stationed at Rineanna and made daily flights over the North Atlantic collecting weather information. These were later superseded by daily meteorological flights by the (Irish) Air Corps.

From June 1941, there was a steady increase in the number of flights using Foynes or needing meteorological information from Foynes. In July, the number of scheduled operations rose to 54 compared with 11 for August 1940, the busiest month of that year. While the preparation of meteorological reports and forecasts was only part of the workload at Foynes it was, nevertheless, a useful yardstick. Forecasting for transatlantic operations in those days was a difficult, time-consuming and onerous undertaking. The basic information available, especially from the ocean area, was sparse. The aircraft flew at levels between 2,000 and 4,000 feet at speeds between 110 and 140 knots and, therefore, accurate cloud, wind and temperature forecasts were vital to successful operations. The forecasts had to be in great detail, a separate forecast being prepared for every 5 degree zone of longitude across the Atlantic. The preparation of a flight forecast from the beginning of the analysis stage up to its final typing could take up to nine hours. The briefing, in which the entire operational crew took part, could take half an hour more.

The complement of meteorological staff at Foynes in August 1941 had reached 35 consisting of 1 Senior Meteorological Officer, 5 duty forecasters and 6 cadet forecasters, 16 Meteorological Assistants and 7 Clerical Officers. When the summer season ended, many of these had to be transferred because of the need to provide a round the clock forecasting service at Dublin Airport. Dr. Doporto was appointed officer in charge of the Dublin Airport Office and Mr. Lamb was promoted to take charge of the Foynes Office.

Operations at Foynes expanded considerably in 1942. Pan American Airways (PAA) operated regular flights through Foynes for the first time. In March there were 70 flights, in July, there were over 200 and, in August, over 180. The volume of traffic was such that extra moorings had to be built. Rineanna was opened during February for the use of land planes. Shuttle services from Bristol and elsewhere, connecting with flying boat operations at Foynes, were carried out from there.

A Transatlantic Air Conference was held in Dublin in 1942 to review the organisation for transatlantic and connecting air services. Representatives of the Governments of the U.S., Canada, Britain and Ireland, as well as of the airlines - PAA, American Export Airlines (AEA), British Overseas Airways Corporation (BOAC) and Aer Lingus - took part in the conference. A revised edition of the "Transatlantic Air Services Safety Organisation" commonly known as TASSO was drawn up.

In anticipation of another busy year at Foynes in 1943, additional staff were posted to the Meteorological Office there in February, including an additional five Clerical Officers. It became necessary to transfer back forecasting staff from Dublin Airport, which had to carry on with a skeleton organisation. The expected increase in operations materialised; the number of flights serviced was over 1,500. Foynes was equally busy in 1944.

A major disaster with which the Foynes Meteorological Office was concerned occurred on 28 July, 1943 when a Sunderland aircraft crashed on Mount Brandon, killing 10 of those on board and injuring many more.

Mr. Lamb resigned from the Meteorological Service in October 1944 and returned to the British Meteorological Office. He was succeeded at Foynes by Mr. P.M. Austin Bourke, whose retirement as Director of the Service is referred to elsewhere in this Report. Mr. Lamb subsequently became a Professor in the School of Environmental Sciences at the University of East Anglia and Director of the Climate Research Unit there.

Activities at Foynes reached their peak in 1943 and 1944. They tapered off and suddenly ended in 1945. The War in Europe had ended in May of that year and the changeover from seaplanes to landplanes over the Atlantic came about very quickly. Scheduled transatlantic flights to and from Rineanna commenced early in October 1945 and the last scheduled flight out of Foynes occurred on the 29th of that month. In the new situation, it became necessary to move the meteorological office from Foynes to Rineanna (now Shannon Airport).

THE WEATHER OF 1978

The year was dull with rain generally below average and temperatures about normal.

January was a cold month with temperatures below normal everywhere. February was wet with some heavy falls of snow, particularly in the south and southeast. March was very wet with rainfall about 60% above normal generally; it was the wettest March on record at several stations, notably Malin Head where rainfall records began in 1885. In general, April was rather cold and dull.

May was the driest month of the year with only 32% of normal rainfall. The period 28th May - 3rd June was warm with record high temperatures for May being reported at many stations. A temperature of 26.5°C. recorded at Boora, Co. Offaly on 31st May was the highest attained at any station during the year.

The summer season as a whole (June, July and August) was exceptionally dull. At Birr (64% of normal sunshine) and Malin Head (69% of normal) it was the dullest summer since sunshine records began at these stations in 1880 and 1914 respectively, while at Dublin (Phoenix Park) (73% of normal) it was the dullest since 1938. However, only in the southwest was it a wet summer as a whole; Cahirciveen had its wettest August (80% above normal) since 1930.

During the autumn (September, October and November) temperature was appreciably above normal, and it was generally dry with less than half the normal rainfall in parts of the southeast and south. September rainfall was very variable, Cahirciveen having its driest September since 1929 and Malin Head its wettest since 1950. Indeed, at Cahirciveen the total rainfall for September and October together was the lowest since records began in the area in 1866.

December was wet generally; eastern and southern areas had around twice the normal rainfall. Many stations reported record amounts of rainfall in this month; in fact Dublin (Phoenix Park) recorded the highest rainfall for any month (231.0 mm.) since continuous records began there in 1837.

STAFFING

The numbers of staff serving in the different grades on 31st December 1978 were:-

Director	1
Assistant Director	2
Senior Meteorologist	11
Meteorologist	45
Senior Meteorological Officer	42*
Meteorological Officer	159
Assistant Meteorological Officer	32
Other grades	41
TOTAL	333

*Includes 6 Meteorological Systems Analysts regraded as Senior Meteorological Officer in February.

This total represents an increase of 18 on the 1977 figure. During the year, approval was obtained for a second Assistant Director post, three additional Senior Meteorologist posts and twelve new posts of Principal Meteorological Officer which were in course of being filled at the end of the year.

Dr. P.M. Austin Bourke, Director, retired on 10th May.

Mr. P.K. Rohan was appointed Director on 11th May.

Mr. M.G. Granville was appointed Assistant Director on 7th June.

Mr. D.L. Linehan was appointed to the second Assistant Director post on 19th September.

Dr. A. Woods, Meteorologist, resigned on 8th May.

Miss M. Murphy, Clerical Officer, retired on 12th July.

Dr. Bourke was one of the first batch of seven meteorologist cadets recruited to the newly formed Meteorological Service early in 1939. Before joining the Meteorological Service, Dr. Bourke worked as an assistant in the Mathematics Department of University College Cork, following his graduation with an honours degree from that college in 1933. He was awarded the Graduates' Gold Medal and the Peel Memorial Prize on the results of his degree examination. Dr. Bourke was awarded a Ph.D. in 1967 for his study of the epidemiology of potato blight in the years 1845-1847 and he was conferred with the honorary degree of Doctor of Science by the National University of Ireland in 1973.

Dr. Bourke served as meteorologist at Foynes, Rineanna and Dublin Airport. He was promoted in 1944 and served as officer-in-charge at Dublin and Shannon Airports. Dr. Bourke was appointed Assistant Director in 1948 and Director in 1965. He is known internationally as an expert in agricultural meteorology and especially for his work on potato blight.

Miss Murphy came to the Meteorological Service in 1952 and served in the library for the following 26 years. During that time every member of the staff was indebted to her for her devoted and helpful service.

The best wishes of the staff are tendered to Dr. Bourke and to Miss Murphy for many happy years in retirement.

Dr. Woods resigned to take up a post with the European Centre for Medium-range Weather Forecasts.

Mr. M.J. Connaughton, Meteorologist, continued on leave of absence with the World Meteorological Organisation in Geneva and was appointed chief of the newly-formed Agricultural Division of the W.M.O. in October.

Mr. P. Lynch, Meteorologist, continued with his research for a Ph.D. degree in the School of Mathematics T.C.D.

Mr. P. O'Sullivan, Senior Meteorological Officer, went to the European Centre for Medium-range Weather Forecasting (ECMWF) on leave of absence in February, joining Mr. John Hennessy, Senior Meteorological Officer, who continued on leave of absence with that organisation.

Mr. R. Kavanagh, Senior Meteorological Officer, completed the third year of a 4 year B.Sc. course in Computer Science in T.C.D. Messrs. N. Fitzpatrick and M. Murphy, Meteorological Officers, passed the first year examination of this course.

Messrs. B. Flanagan and O. Veale, Meteorological Officers, successfully completed the third year of a four year course leading to a diploma in administrative science from the I.P.A.

Messrs. M. Baker, M.J. Brennan and M.G. O'Meara, Meteorological Officers, were conferred with B.A. degrees during the year.

Mr. M.J. Kingston, Meteorological Officer, passed the first year of a telecommunication technician's course at Limerick Technical College.

Mr. D. Blair, Meteorological Officer, passed the first part of the final B.Sc. course at U.C.D.

Principal officers of the Meteorological Service on 31st December 1978

DIRECTOR - P.K. Rohan, M.A.
ASSISTANT DIRECTORS - M.G. Granville, B.Sc.
D.L. Linehan, B.Sc., B.E.
SENIOR METEOROLOGISTS - S. McWilliams, B.Sc.
C.J. Gillman, M.Sc.
L.S. Leech, B.Sc.
C. O'Connor, B.Sc.
W.H. Wann, B.A., M.Sc.
P.A. Lyons, B.Sc.
J.R. Bates, B.Sc., Ph.D.
W.G. Callaghan, B.A., B.Sc.
S.G. Miller, M.Sc.
B.E. McWilliams, B.Sc.
D. O'Connor, B.A.

ACCOMMODATION

(i) Headquarters

As in 1977, headquarters staff were located in four buildings in the Dublin city centre area.

(ii) New Headquarters Building

Work on the new headquarters building at Glasnevin made steady progress during the year and it is likely that the 1979 Annual Report will record its completion and occupation.

(iii) New Training School

The new training centre and synoptic weather station at Galway was occupied in February and weather observations on a 24-hour basis commenced on 1st April. It is envisaged that training courses will commence in Galway before the end of 1979.

(iv) New Synoptic and Agricultural Meteorological Station at Johnstown Castle

There were no new developments in the proposed acquisition of a site at Johnstown Castle and the situation remains as at the end of 1977.

(v) New Building at Claremorris Synoptic Station

The new building was occupied in mid-July and the old building, which had been in use for over 30 years, was demolished to make way for a staff carpark.

OBSERVING PROGRAMME

Surface Observations

The following 14 surface synoptic observing stations operated continuously on a 24-hour basis throughout the year:

Malin Head	Birr
Belmullet	Shannon Airport
Clones	Kilkenny
Claremorris	Rosslare
Mullingar	Valentia Observatory
Dublin Airport	Cork Airport
Casement Aerodrome	Roche's Point

The new synoptic station at Dublin Road, Galway commenced observations on a 24-hour basis on 1st April.

The positions and dates of establishment of these stations are shown on Figure 1.

The network of surface synoptic stations was supplemented by the following networks which sent regular returns to the Climatological Division during the year:

67 climatological stations;
45 rain recorder stations; and
639 rain-gauge stations

Upper Air Observations

At Valentia Observatory, upper air observations of pressure, temperature and humidity by radio-sonde and upper wind observations by radar were continued during the year.

Other Observations

The aurora, solar radiation, satellite, atmospheric nuclei, geomagnetic, seismological, weather surveillance radar, tidal and other special observations outlined in previous annual reports were continued during the year.

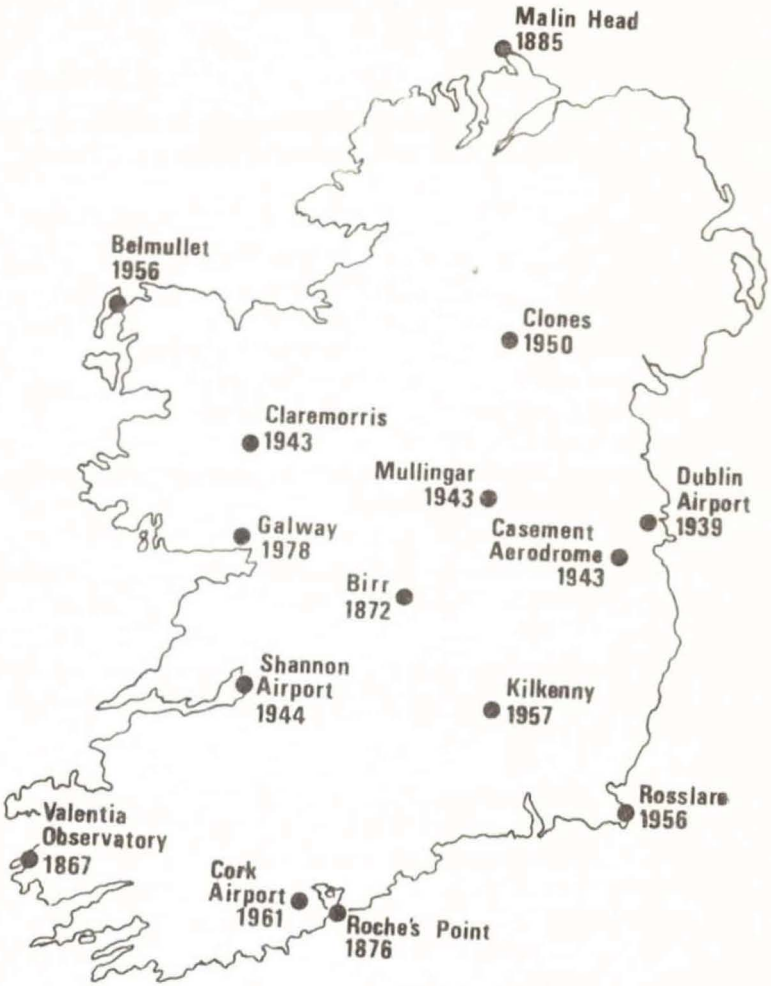

Fig. 1. The synoptic observing stations and dates of their establishment

FORECASTING SERVICES

The analysis and forecasting work of the Service was continued at the Central Analysis and Forecasting Office (CAFO) during the year. The forecasting offices at the airports continued their assistance to the CAFO by dealing with enquiries from local agricultural, industrial, commercial and other non-aviation interests as well as the general public. A number of the synoptic stations also continued their assistance by relaying the CAFO forecasts to local enquirers.

Over 455,000 calls for forecasts for the Dublin area were made during the year to the Post Office automatic telephone weather service (Dublin 1199). The number of direct telephone calls made to the forecasting offices during the year by various interested parties were as follows:-

Interests originating Enquiries	Telephone calls made to				Totals
	CAFO	Shannon	Cork	Dublin	
Agricultural	10,938	10,916	2,731	132	24,717
Industrial & Commercial	2,814	1,149	2,219	59	6,241
Marine	6,290	1,228	359	124	8,001
Defence Forces	5	12	37	6	60
Other Government Departments	888	228	76	40	1,232
Press	289	96	59	6	450
Sporting	825	370	687	56	1,938
Private	8,919	6,102	3,100	512	18,633
Totals	30,968	20,101	9,268	935	61,272

In addition over 1,300 requests for forecasts were dealt with by the synoptic stations.

The routine services to the Air Corps and to civil aviation were continued during the year. The numbers of civil flights serviced were 18,800 at Dublin, 5,980 at Shannon and 2,310 at Cork - total 27,090. In addition 567 briefings were given to airline training crews. Light aircraft were provided with 12,310 briefings. 110 warnings of hazardous conditions in the Shannon Flight Information Region were issued. During the summer months, the Dublin, Shannon and Cork forecast offices provided briefings and forecasts for helicopters servicing the oil-exploration installations operating in Irish coastal waters.

Forecasting for offshore oil exploration operations was resumed in late March and continued to early November. Wind, weather and wave forecasts were provided to rigs drilling in the seas around the Irish coast.

CLIMATOLOGICAL ACTIVITIES

The punching on cards of the current data from synoptic, climatological and rainfall stations, and of upper air data for Valentia Observatory was continued. The data were transferred via computer to magnetic tape and quality controlled.

Over 10 station years of hourly data prior to 1947 were transferred to magnetic tape and over 9 station years of these were quality controlled. Upper air data for Valentia Observatory back to October, 1964 have been quality controlled and put on magnetic tape.

All available ships' data for Irish Ships (18 ships) for the period 1951-1977 were transferred from cards to tape and programs have been written to perform minor quality control on the data.

Daily values of rainfall for about 30 remaining stations which were in operation during the period 1941-1970 were punched, transferred to tape and quality-controlled. Data files for about 1350 rainfall stations operating for all or part of the period 1941-1977 are now complete, the number in operation in any one year being 600-700 during the last 25 years.

Total effective use of the Revenue Commissioners' computer was 756 hours for the year - an average of 14½ hours per week.

Programs for the processing of climatological data were updated to cater for changes which occurred during the year - notably the opening of the new synoptic station in Galway. A number of programs were written in response to particular enquiries.

Non-routine computer jobs included the production of daily rainfall frequency tables, maximum rainfalls in periods of from one day up to one month and an up-to-date list of rainfall stations.

A non-routine computer job carried out under contract with the EEC was the statistical analysis of sunshine and solar radiation data for a number of Irish and British stations. This job involved the co-operation of the Computer Division.

Tables for all elements for all synoptic stations for 1977 were printed and bound and tables for 21 station years for back years were printed and bound while a further 8 station years were printed and are in process of binding.

Tables for all elements for all synoptic stations for each of the months January, 1978 to November 1978 (incl.) were printed and bound, including the new Galway station from April 1978 onwards.

Monthly Weather Reports (MWR) for August, 1977 to April, 1978 inclusive and the Annual Summary for 1977 were issued. Monthly weather summaries and an annual summary were issued to the newspapers.

The staff of most outstations continued to help in processing back data. 215 station months of hourly wind data were tabulated and 27 station months of synoptic data in the pre-1949 code were prepared for punching in the current form by the outstations.

Routine inspections of 499 stations were carried out during the year. Five new raingauge stations, one rain recorder station and four climatological stations were opened, and two climatological stations and four raingauge stations were closed.

3,524 enquiries were dealt with during the year.

AGRICULTURAL METEOROLOGY

Publication of the monthly agrometeorological bulletin was continued.

Three warnings of weather conditions suitable for the spread of potato blight were sent to RTE during the June-August period; three bulletins detailing the progress of the disease were issued.

An assessment of the suitability of the summer weather for the spread of liver fluke was supplied to the veterinary authorities of the Department of Agriculture.

The likely effect of the previous week's weather on the level of cereal disease together with a forecast for the coming week was issued each Monday between mid-May and the end of July, for use in the Department of Agriculture's cereal disease bulletin.

The processing of data from the Irish phenological gardens was continued; the results were forwarded to the international directorate of the programme.

Data from the weather stations in the orchard areas of the east and southeast were analysed and forwarded to the orchard study group of An Foras Taluntais.

Over one hundred requests for specialist information were dealt with. More than 24,000 of the requests for forecasts received by the forecasting offices came from agricultural interests.

MARINE METEOROLOGY

The following ships co-operated with the Service by making weather observations during the year -

Irish Shipping (8) - Irish Cedar, Irish Elm, Irish Larch, Irish Maple, Irish Oak, Irish Pine, Irish Rowan and Irish Star

B. and I. (4) - Munster, Leinster, Innisfallen, Kilkenny

Irish Continental Line (1) - Saint Patrick

In addition, some reports were received from the research vessel, Lough Beltra.

During August, the Irish Star was sold, reducing to 12 the total number of ships making regular weather observations.

The Selected Ships' Award for 1977 - a barograph - was presented to Captain B. Reilly of Irish Shipping Ltd. at that company's offices on 3 April 1978.

Port meteorological officers visited ships in port to check and replace equipment during the year as follows:-

Dublin	-	21 occasions
Rosslare	-	4 "
Cork	-	4 "

To fulfil the Meteorological Service's obligations under the First GARP (Global Atmospheric Research Programme) Global Experiment (FGGE) of the W.M.O., arrangements were made with the masters of voluntary observing ships to send their weather log-books to Dublin by air mail. With the assistance of the Climatological Division, 2886 reports were processed and despatched to the FGGE Mobile Ship Data Centre in Hamburg. (To be of value to FGGE, reports had to reach the Hamburg Centre not later than 4 months after the observation date).

In collaboration with the CAFO, a forecast service was provided for oil exploration rigs operating in Irish waters from late March to early November. Eight operating companies were involved, drilling a total of 14 holes. At the height of the drilling season forecasts were being supplied simultaneously to seven companies drilling in four different areas.

The time and labour required in typing and issuing so many individual forecasts were greatly reduced by the use of a programme prepared by the Computer Division. This permitted rapid alterations of the text where forecast values were dissimilar in different areas, while retaining values common to one or more forecasts.

Members of the staff visited several of the rigs for the purpose of checking meteorological equipment and observational procedures.

At the request of the Meteorological Service, an automatic weather station was installed on the Kinsale Head gas platform to transmit meteorological reports to the Roche's Point synoptic station, from which they would be sent manually by telex to the CAFO. Reports were first transmitted in the autumn but, for various reasons, data reception became erratic soon after and, at the end of 1978, the system was completely out of action.

By arrangement with the Commissioners for Irish Lights, weather reports were supplied by the Kish Light (outside Dublin Bay) twice daily from February onwards. These reports were included with the coastal station reports in the R.T.E. Shipping Forecasts from June onwards. Reports from Eeragh Light ceased during December when it changed to unmanned operation.

A precision aneroid barometer was installed at Loop Head lighthouse in November and other lighthouses will be selected for similar installations during 1979.

Investigations continued into the working of the Norwegian numerical wave model for sea and swell.

Meetings attended during the year included one concerned with the setting up of a European Network of Ocean Stations, the North Atlantic Ocean Station Board, the meteorological panel for the North Sea and adjacent waters and an informal meeting of European Meteorological Services on data buoys. Seminars on offshore activities, held in London, the Hague, Dublin and Lisbon were attended by staff of the Marine Section.

Over 8,000 of the enquiries received at the forecast offices came from maritime interests.

LABORATORY WORK

The programmes of sampling and measurement of

(a) artificial radioactivity in air and precipitation, etc. and

(b) atmospheric chemistry

were continued throughout the year.

(a) Radioactivity Measurements

Slightly higher values of radioactivity over Ireland were observed in January, February and March 1978, than those in the same period in 1976 and 1977, due to the nuclear test in China in late 1977. Another nuclear test, "low-level", was carried out in China in mid-March 1978, and gave rise to short-lived but noticeably increased values in April and May 1978. From June 1978 onwards values declined more or less steadily and, by December, the average radioactivity in rain at Dublin was the lowest measured for several years. It is believed that a further nuclear test was carried out in China on 14th December 1978, but no effect from it was discernible up to the end of that month.

(b) Atmospheric chemistry - measurements of certain chemical elements in air and precipitation

At the headquarters laboratory, the daily measurement of sulphur dioxide was continued as a routine. The decline in the average concentration of sulphur dioxide, referred to in 1976 and 1977, was arrested in 1978; due to increased values in the period February to May, the average for the year was slightly higher than that for 1977, though below the 1976 average.

Co-operation by the Valentia and headquarters laboratories in international atmospheric chemistry and turbidity programmes continued in 1978 as outlined in the 1975 report.

The results of the second WMO interlaboratory calibration test carried out in 1977 on reference precipitation samples were received in 1978 and the results for the Meteorological Service's laboratory analyses

were very satisfactory. The third test in this series was completed in December 1978; results are expected in 1979.

A Perkin-Elmer Model 55 Spectrophotometer and an Orion digital pH-meter model 701A were purchased for the laboratory in August 1978. It is hoped that, when the relevant analysis procedures have been fully developed, an appreciable gain in time taken and accuracy of results will be effected.

INSTRUMENTS AND EQUIPMENT

Work at the Dublin and Shannon airports on the installation of digital anemometer systems progressed but was not completed by the end of the year; no progress was made on the installation of a similar anemometer at Cork Airport because of an industrial dispute there.

Ten Negretti and Zambra Mk II precision aneroid barometers were purchased in April. One of these was installed at Loop Head Lighthouse in November and similar installations are to be made in 1979 at the Kish, Fastnet and Tory Island lighthouses.

In September, it was decided to install precision aneroid barometers as the official pressure-measuring instruments at Cork, Dublin and Shannon airports and at Casement Aerodrome from 1st January, 1979. A Tonnelot mercurial barometer will be retained at each station for daily comparison.

Precision aneroid barometers were also used on oil exploration rigs during the drilling season.

The annual check of Aer Lingus pressure-measuring instruments was carried out in June.

As part of the Meteorological Service's participation in an E.E.C. research contract, a pyrheliometer and solar tracker for direct sun measurements and an infra-red radiometer, purchased from Eppley Laboratories, were installed at Valentia Observatory and brought into routine operation at the beginning of November. Two Kipp and Zonen solarimeters and recorders were ordered for delivery early in 1979, in connection with the same contract. They will be used for monitoring diffuse sky radiation at Birr and Kilkenny.

Due to a continuing industrial dispute at Cork Airport, no progress was made with the installation there of the Decca 41 weather radar.

COMPUTER DEVELOPMENTS

Notwithstanding difficulties and delays caused by industrial disputes in the telecommunications field, development work progressed during the year. In September, the hardware of the communications computer was upgraded by doubling the core capacity of both processors and adding a 5 megabyte disc to each system. A further double density disc for each system is due for delivery in 1979. The improved performance resulting from this upgrading appears to have eliminated the few remaining known faults in the system which is now working satisfactorily.

The upgrading takes into account core and disc requirements for interfacing with the mainframe computer and plotters and for the link-up with the European Meteorological Telecommunications Network (EMTN) and the European Centre for Medium Range Weather Forecasting (ECMWF).

Due to delays caused by the telecommunications dispute, test transmissions on the 1200 baud EMTN link through Bracknell did not begin until May. Extra core was found to be necessary and, as a result, it was not possible to bring the system into operation on a test basis until October. The EMTN link to Shannon Airport became operational in October and that to Cork Airport in November. The links to Dublin Airport and the CAFO were still not operational by the end of the year due to the non-availability of the necessary circuits.

During the year a study was made of the protocols required for the link with the ECMWF.

Sanction was obtained in September for the acquisition of a DEC (Digital Equipment Corporation) 2050 mainframe computer system. Delivery is due in 1979. Initially the DEC 2050 installation will be used operationally for running numerical weather prediction programmes, including programmes for forecasting sea waves and swell.

In collaboration with the Research Division, development work and planning for the mainframe computer continued. A VDU link with a DEC 2040 computer in Trinity College Dublin was set up in December and is being used for programme development. Broadly speaking, the automatic data extraction scheme (ADE) is being developed by the Computer Division and the objective analysis (OA) and numerical weather

prediction (NWP) by the Research Division, although, of course, there has to be the closest collaboration between the two Divisions. Development of the ADE scheme is progressing on two fronts: (i) development of upper air and surface data quality control, that for the upper air being based mainly on programmes obtained from the Swedish Meteorological Service and that for the surface being developed completely within the Meteorological Service and (ii) development of programmes for extraction of reports and decoding.

Application programmes developed during the year on the communications installation included, inter alia, wave and swell forecast programmes, modifications of programmes obtained from the Norwegian Meteorological Service, and text editing programmes used to streamline the dissemination on telex of forecasts of sea conditions for oil rigs.

RESEARCH AND INVESTIGATION

The Research Division continued work on the preparation of a numerical weather prediction model for operational use when the Service obtains its mainframe computer. The basic model will be the primitive equation model developed by Professor F. Mesinger of the University of Belgrade in conjunction with the Yugoslavian Hydrometeorological Institute. This model will be modified to suit Irish conditions. The objective analysis scheme which prepares the data for the model will be based on a program obtained from the Swedish Meteorological and Hydrological Institute.

Research work on the dynamics of planetary waves in the atmosphere was continued. This work has implications for possible variations in climate which might occur as a result of changes in the ozone layer due to man's activities. Work was also continued on the baroclinic instability of planetary waves.

Investigations of Irish historical records, of winds and weather at the Kish lighthouse and of weather effects on the apple crop continued. Studies were carried out on ocean wave spectra, on a method of calculating the refraction of waves in shallowing water and into the statistical relationship between the maximum wave height in a sample and the significant wave height using collected data.

Other studies dealt with an investigation of lee waves over mountains and an examination of the climatology of turbulence near Ireland. Two contracts relating to research into the availability and distribution of solar energy were negotiated with the E.E.C. Directorate for Research, Science and Education. One contract involved the statistical analysis of solar radiation data at 3 Irish and 4 British stations for the period 1966-1975. The second contract provided for the extension of the solar radiation measurements at Valentia, Birr and Kilkenny. The total E.E.C. contribution amounted to approximately £14,000.

During the year, an officer of the Service (Dr. J.R. Bates) was appointed chairman of the scientific advisory committee of the European Centre for Medium-range Weather Forecasts. Liaison continued with the British universities' global modelling group, the advisory committee on marine science of the National Board for Science and Technology (N.B.S.T.), the N.B.S.T.'s working group on wave power, the water resources advisory committee of An Foras Forbartha and the EEC solar radiation study group.

The Service continued its co-operation with several overseas research institutes by exchanging data and information during the year.

TRAINING COURSES

The following courses in meteorology were conducted at the Training School at Rosslare and/or at Casement Aerodrome

- A course for meteorologists
- A course for meteorological officers
- A course for assistant meteorological officers
- A course for Air Corps cadets to Commercial Pilot Licence level

The first female meteorological officers were appointed in 1978.

THE LIBRARY

The most important development during the year was an offer by the librarian of the Royal Irish Academy to transfer the Academy's extensive and valuable collection of meteorological and seismological publications to the Meteorological Service library on a permanent loan basis. This generous offer has been accepted, and will consolidate the role of the library as the main national centre of meteorological material.

Work is continuing on the selective recataloguing of old stocks so that the new UDC catalogue will also contain material published before 1977. The library in the new headquarters building in Glasnevin will be arranged to allow a certain degree of 'self-service'. It is hoped that the move to a permanent headquarters will enable the library to develop its considerable potential and allow a fuller and more active use to be made of it by all members of staff.

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APPENDIX

PUBLICATIONS BY MEMBERS OF THE STAFF

(a) Meteorological Service Publications

(1) Technical Note No. 43 - The Annual Cycle of Rainfall in Ireland - J.J. Logue

(2) Internal Memorandum 86/78 - The Weather and the First Successful Non-stop East to West Transatlantic Flight of 1928 - T. Keane

(3) Internal Memorandum 87/78 - 'A Sea-Breeze Front at Cork Airport' - F. Fitzgerald

(4) Breivik, K.L. - Some aspects of the Weather Behaviour at Dublin Airport, particularly as regards Poor Landing Conditions

(b) Other Publications

Bates, J.R. - 'On the Application of the Arakawa-Schubert Convective Parameterisation Scheme' (with A.M. Lasheen and A.F. Hanna). Journal of Atmospheric Science

Donaldson, F. 'Irish Weather', a booklet written and illustrated by Mr. Donaldson, published by Foleñs Ltd. in the Irish Environmental Library Series, December 1978

Murphy, E. 'National Energy Resources' in Proceedings of 'Wind, Wave and Water' Conference, Dublin 1978

A SELECTION OF LECTURES GIVEN BY MEMBERS OF THE STAFF

J.R. Bates

Oxford University: "Effects of Radiative Damping on Planetary Waves in the Stratosphere" (16 February)

University of Bristol: "Dynamics of Planetary Waves in the Atmosphere" (27 April)

Royal Meteorological Society, London: "On the CISK Modes of a 2-level Model" (23 August)

American Meteorological Society, Boston: "On the Interaction between a Radiatively Damped Planetary Wave and the Zonally Averaged Circulation in the Stratosphere" (25 October)

C.M. Byrne

Limerick: Six lectures to the Adult Education Group, leading towards the yacht master certificate of the R.Y.A.

W.G. Callaghan

Dublin: Lecture to the Irish Mechanics Group on the forecasting of sea and swell by the Irish Meteorological Service (19 September)

P. Lynch

European Geophysical Society, Strasbourg: "The Baroclinic Instability of Ultra-long Waves modelled by the Planetary Geostrophic Equations" (30 August)

E. Murphy

Birr: "Meteorology and Environment" to an Irish National Teachers Organisation Summer School (4 July)