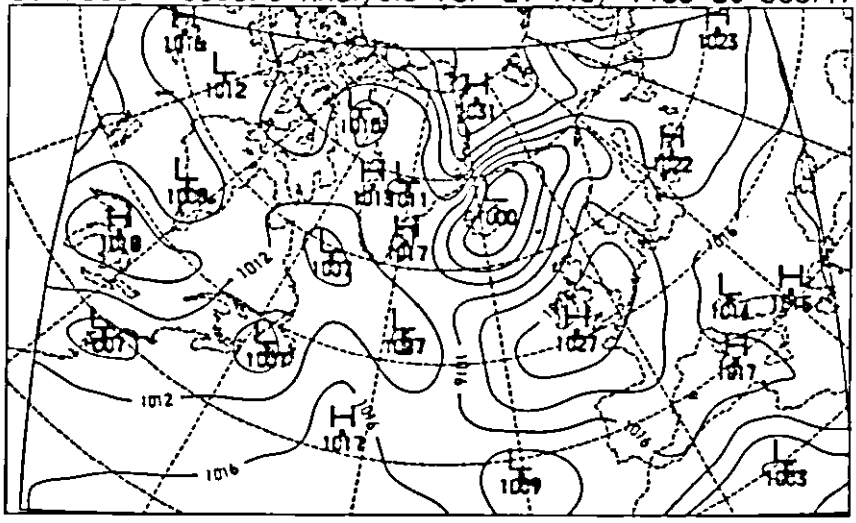
Meteorological Service

Surface Pressure Analysis for 29 May 1985 at 00GMT



Annual Report 1985

Dept. of Tourism and Transport

Meteorological Service
Annual Report
1985

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FOREWARD

Nineteen Eighty-Five has not been an easy year for the Meteorological Service. The limitations which it has been necessary to place on the resources made available to it, particularly in terms of staff numbers, have meant that the Service has had to look to retrenchment rather than seeking to extend its activities into new areas. Fortunately, however, the difficulties have not affected to any significant degree the level of service which we have been able to provide to users of meteorological information.

These users continue to increase in number. For example the number of callers using the Automatic Telephone Weather Service (ATWS) in 1985 was 74% higher than that for the previous year, the greatest annual increase in the histroy of the system. Available evidence suggests that the popularity of the ATWS, and indeed of many of the other forecasts issued by the Service stems from the greatly improved accuracy in recent years of 2 to 5 day forecasts. Much of the credit for this improvement must go to the European Centre for Medium Range Weather Forecasts, whose contribution to our forecasting capability is dealt with in the body of the Report.

Despite the difficult financial climate, the Service succeeded in taking delivery during the year of the first module of its new Communications Computer System. The impact of computers on the development of meteorology in the last two decades has been dramatic. The Service has been fortunate to have been able to acquire the desired equipment over the years, and even more fortunate in the calibre of its systems analysis and computer development personnel. Their skill has been recognised by such international organisations as WMO which requested the Service to make some of its graphics software available to a number of countries contemplating similar installations. The arrival of the new communications computers will do much to relieve our anxiety at the level of traffic accommodated by the old system, which is now almost ten years old.

The fifieth anniversary of the Meteorological Service takes place on 8th December 1986. Many readers of the Report will have already had an opportunity of seeing our special publication to mark the event. The first article in this Report gives a brief outline of the history of the Meteorological Service from its establishment in 1936 to the present day.

D.L. Linehan

Director

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Tables and Figures

FUNCTIONS OF THE METEOROLOGICAL SERVICE

The functions of the Meteorological Service may be summarised as follows;-

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

(ii) Research in fundamental and applied meteorology;

(iii) The supply of weather forecasts, statistical information and scientific advice on meteorological matters to agricultural, industrial and public utility undertakings, the press, radio and television, maritime interests, and the general public;

(iv) The supply of similar information to Government Departments, Semi-State Bodies and the Defence Forces;

(v) The provision of meteorological facilities for civil airlines and general aviation interests operating to and from airports in Ireland and/or flying over Irish territory, and the supply of general advice on the meteorological aspects of civil aviation.

(vi) Cooperation with the Meteorological Services of other countries on matters related to meteorology and the representation of Ireland at international conferences.

The Meteorological Service - The First 50 Years

On 8th December 1986 the Meteorological Service will celebrate the 50th anniversary of its establishment. The event is being marked by a number of public activities - exhibitions, Open Days at synoptic stations, social functions and the publication of an anniversary booklet which traces the development of the Service and describes its work.

From 1922, when the State was founded, until 1936, the British Meteorological Office (BMO) continued to supervise the Irish meteorological network which then comprised 4 telegraphic reporting stations, 18 climatological stations and 172 rainfall stations; in addition the BMO handled requests for Irish meteorological information on an agency basis. The oldest established station was Valentia Observatory which takes its name from Valentia Island in County Kerry where observations commenced as far back as 1860. In 1892 the Observatory was transferred to its present site on the mainland near Cahirciveen, and in 1936 was the only station manned by official meteorological personnel.

In the mid-1930s it was clear that aviation was poised for rapid development and that Ireland because of its strategic position on the western edge of Europe would play a major role as an intermediate stop on air routes between Europe and North America. It was considered essential, therefore, that the services required by aviation - Air Traffic Control, Radio and Meteorology be organised on a national basis. On the meteorological side, the first step in the establishment of a national meteorological service was taken on 8th December 1936 by the appointment of its first Director, Mr. Austen Nagle, who had occupied a senior post in the BMO. Mr. Nagle's immediate tasks were to take over the existing observing network from the BMO and to recruit staff which would be competent to supply the necessary meteorological services for the flying boats which would would soon be using the base at Foynes in Co. Limerick as an intermediate stop in transatlantic flights.

In keeping with the best traditions of cooperation in meteorology, the British Meteorological Office provided invaluable assistance in the establishment of the new Irish Service both in the smooth transition of the network from British to Irish control and in making available, on loan, professional staff pending the training of Irish meteorologists. These staff included some who were later to become well-known in world meteorological circles: S.P. Peters and J. Harding, later Assistant Directors of the BMO, H.H. Lamb, the renowned climatologist and D.A. Davies later to become Secretary-General of WMO. The newly-founded Service was extremely fortunate that such first-class meteorologists were available to it at that crucial time and fortunate, too, that two distinguished meteorologists from Continental Europe - Dr. Mariano Doporto from Spain and Dr. Leo Wenzel Pollak from Czechoslovakia joined it shortly after its foundation. By degrees, the first batches of Irish meteorologists were recruited, trained and incorporated into the operational activities of the Meteorological Service. By March 1941, the last of the British meteorologists on loan had returned to Britain. Dr. Doporto remained, later to become Mr. Nagle's successor as Director in 1943 and Dr. Pollak remained in Ireland also, later to become Senior Professor at the Dublin Institute for Advanced Studies.

As in the case of many Meteorological Services, the expansion of aviation was a major factor in the development of the Irish Service. The seaplane base, first at Foynes, and later Shannon Airport, were major refuelling bases for transatlantic flights from 1937 onwards and there were onerous demands on the Meteorological Service for comprehensive meteorological services for such flights. Such indeed was the pressure in the field of aviation meteorology that for the first 20 years of its existence, the activities of the Service were almost exclusively in the aviation field.
Gradually, however, as the demands from that sector lessened somewhat, it became possible to devote more attention to other aspects of meteorology.

In 1948 the Service assumed responsibility for the weather forecasts broadcast by Radio Eireann, and in 1952 forecasts were supplied to

daily newspapers for the first time on a routine basis. A major milestone was the opening of the Central Analysis and Forecast Office in O'Connell Street Dublin, in 1961, and the first presentation of the weather forecast on television by a meteorologist in the same year. The forties and early fifties also saw the establishment of a balanced network of synoptic reporting stations manned on a full-time basis by Meteorological Service Staff. The improved facilities, and the increasing demands from users for weather information resulted in the Service expanding its activities in public forecasting, environmental monitoring, agricultural, marine and industrial meteorology, climatological investigations and, latterly, research in the field of Numerical Weather Prediction (NWP). A notable development was the introduction of the Automatic Telephone Weather Service in the late 1960's, on which almost 2 million calls per year are now received, and which increased dramatically the availability of weather information to those who need it.

The ability of the Service to meet the demands made upon it was enhanced by the acquisition of its first computers, two DEC PDP 11/40's, in 1975. These were, and still are, used mainly for communications purposes, and enabled the Service to handle the vast amount of data which is now exchanged internationally but are due to be replaced shortly by VAX 780's. The Service acquired a mainframe computer in 1978, which enabled it to produce forecasts using NWP techniques.

Today the Service, with a well-balanced structure, caters for the demands of the various social and economic interests. Backed by an observing network of 750 stations, comprising 15 synoptic stations, 70 climatological stations and 665 rainfall stations and aided by a modern communications network which is in turn computer-linked to the Global Telecommunications System of the World Meteorological Organisation (WMO), and to the European Centre for Medium Range Weather Forecasts - it has been moulded into an efficient organisation geared to deal with the various aspects of meteorology.

In the sphere of international meteorology, the Irish Meteorological Service has played an honourable role over the past 50 years. Staff members have been active in the work of IMO and WMO Technical Commissions and their Working Groups and some have been honoured by being elected President and vice-President of various Technical Commissions. The first Director, Austen Nagle, served as President of the IMO Commission for Aeronautical Meteorology, Dr. Austin Bourke served as President of the Commission for Agricultural Meteorology, Shane Tierney as President of Commission for Marine Meteorology and Killian Rohan as vice-President of Commission for Aeronautical Meteorology. On a regional level, the Service has been closely associated with the establishment and development of the European Centre for Medium Range Weather Forecasts (ECMWF), whose forecast products are of great assistance in the preparation of forecasts issued by the Irish Meteorological Service, and with EUMETSAT, the European Organisation for the Exploitation of Meteorological Satellites.

The Meteorological Service is proud of its achievements over the past 50 years and of its standing in the international meteorological community. Although a relatively small Service with very limited financial resources, it believes that its standards of service to the nation and to world meteorology have been consistently high and that its staff have followed faithfully in the high traditions of Irish meteorologists of the past - Boyle (of Boyle's law), Beaufort (of the Beaufort Scale of Wind), Robinson (of the Robinson Cup Anemometer), Apjohn (of the Apjohn wetbulb equation), Stokes (of the Stokes Equations) and R.H. Scott, first Director of the British Meteorological Office and a leading light in the establishment of the IMO in 1873. It is therefore with well-based optimism that the Service enters into its second half-century.

THE WEATHER OF 1985

Ireland in 1985 was cooler and duller than normal. In many places rainfall was a good deal above average. The year was notable for the disappointing summer which followed a dull wet spring. August was the wettest month of the year, and was also the wettest August on record at many stations. Rainfall records of one hundred years' standing were broken at Malin Head in July, August and September, and Belmullet had the wettest year since records began at that station in 1956. In some parts of the country it was not, however, a particularly wet year taken as a whole, because the months of January, February, October and November were drier than normal. Rainfall amounts for the year ranged from 118% of normal at Belmullet and Claremorris to 93% at Casement Aerodrome.

The mean annual air temperatures over the country varied from 0.8°C. below normal at Belmullet to 0.2°C. below at Dublin and Shannon Airports, and ranged from 10.3°C. at Cahirciveen to 8.4°C at Mullingar. Mean air temperatures in August were below those usually experienced in September, and means for November were likewise lower than those usual in December. The highest air temperature recorded occurred unusually late in 1985, when 25.9°C. was observed at Cahirciveen on September 28th. The lowest air temperature, -8.9°C. was recorded at Birr on 18th January. It was the coolest year since 1979.

Sunshine was below average and ranged from 94% of normal at Galway to 81% at Birr. At Rosslare and Roche's Point it was the dullest year since recording began there nearly 30 years ago.

Widespread thunderstorms on 25th. and 26th. of July caused considerable damage and disruption.

A Climatological Summary of conditions at the Meteorological Service's 15 Synoptic Reporting Stations during 1985 is given in Table 1.

METEOROLOGICAL SERVICE

WEATHER SUMMARY FOR YEAR 1985

Table I.

STATION	RAINFALL (mm)				AIR TEMPERATURE (°C)							SUNSHINE DURATION (hr)			
	Total Fall	Rain-days*	Most in a day		Means of		Monthly mean	Extreme Temperature				Monthly Total	Daily Mean	Most in a day	
			Amount	Date	Max.	Min.		Highest	Date	Lowest	Date			Amount	Date
Belmullet	1295.8	246	55.4	20 Sept.	11.9	6.1	9.0	22.1	28 Sept.	-6.4	18 Jan.	1232.0	3.38	15.3	1 June
Birr	826.6	204	22.5	3 Oct.	12.4	5.4	8.9	23.9	4 June	-8.9	18 Jan.	1053.1	2.89	14.5	31 May 1&2 June
Cahirciveen	1616.7	238	50.1	4 Nov.	13.1	7.4	10.3	25.9	28 Sept.	-4.7	15&18 Jan.	1201.3	3.29	14.7	1 June
Casement Aerodrome	680.4	184	34.3	15 May	12.6	5.4	9.0	25.6	4 July	-6.6	28 Dec.	1215.0	3.33	15.4	1 June
Claremorris	1313.7	229	42.0	26 May	12.1	4.9	8.5	22.8	28 Sept.	-8.5	18 Jan.	1008.2	2.76	15.1	1 June
Clones	914.6	220	18.6	18 Sept.	11.9	5.0	8.5	23.3	4 July	-8.4	4 Jan.	1125.9	3.08	15.3	1&2 June
Cork Airport	1234.3	209	33.2	20 June	11.9	6.3	9.1	22.1	8 July	-7.2	18 Jan.	1251.0	3.43	15.5	1 June
Dublin Airport	775.4	190	26.1	26 July	12.5	6.3	9.4	23.9	30 Sept.	-5.1	28 Dec.	1320.4	3.62	15.5	1&2 June
Galway	1075.0	224	34.9	18 Sept.	12.4	6.3	9.4	23.9	28 Sept.	-7.0	17&18 Jan.	1311.6	3.59	15.3	1 June
Kilkenny	840.2	193	30.0	26 July	12.8	5.3	9.1	24.1	4 July	-8.2	3 Jan.	1163.1	3.19	15.5	1&2 June
Malin Head	1175.7	243	53.8	7 Sept.	11.6	6.6	9.1	23.2	28 Sept.	-4.6	29 Dec.	1156.9	3.17	15.6	1 June
Mullingar	1023.5	216	39.0	18 Sept.	11.9	4.9	8.4	22.9	4 July	-7.1	3 Jan.	1168.7	3.20	15.6	2 June
Roche's Point	1008.2	185	27.8	23 Aug.	12.3	7.4	9.9	20.2	3 June	-4.4	18 Jan.	1269.4	3.48	15.3	1 June
Roeslare	876.1	183	32.1	8 Feb.	12.1	7.5	9.8	22.0	4 July	-3.0	29 Dec.	1359.4	3.72	15.4	31 May 1 June
Shannon Airport	897.3	204	34.1	24 July	13.0	6.8	9.9	23.4	2 June	-6.5	1&18 Jan.	1199.1	3.29	15.5	1 June

* = Days with 0.2 mm or more

OBSERVING PROGRAMME

Surface Observations

The network of Synoptic Reporting Stations continued unchanged throughout 1985. 15 stations operated continuously during the year, each manned throughout the 24 hours by Meteorological Service personnel. Their locations and dates of establishment are shown in Figure 1. on page 8.

These stations provide hourly reports of wind, temperature, pressure, humidity and cloud, and details of the weather at the station. Their reports are distributed both nationally and internationally in an internationally recognised Synoptic Code, and are used for operational weather forecasting, as well as for climatological purposes. Many of the stations are also involved in specialised observing programmes, details of which are to be found in sections of the Annual Report dealing with particular aspects of Meteorology.

The network of Synoptic Reporting Stations was supplemented by returns of climatological data from a network of Climatological and Rainfall Stations. On 31st December 1985, 749 stations were reporting rainfall data, and of these 86 were full Climatological Stations. Reports from lighthouses were resumed on 1st September, with 6 reports being received daily from each of 5 lighthouses (Kish, Wicklow Head, Fastnet Rock, Loop Head and Tory Island). Weather data were also received from ships of the Irish Naval Service, from cross-channel and merchant ships, and from a number of drifting buoys in the Atlantic. The locations of the main elements in the observing network are shown in Figure 2. on page 9.

The Service has not yet become involved in the use of Automatic Weather Stations (AWS) for the acquisition of synoptic reports in real time, but it is hoped to acquire prototypes of such equipment in the next few years with a view to exploring ways in which the existing synoptic network might ultimately be augmented or partially replaced. In common with most other Meteorological Services however, the

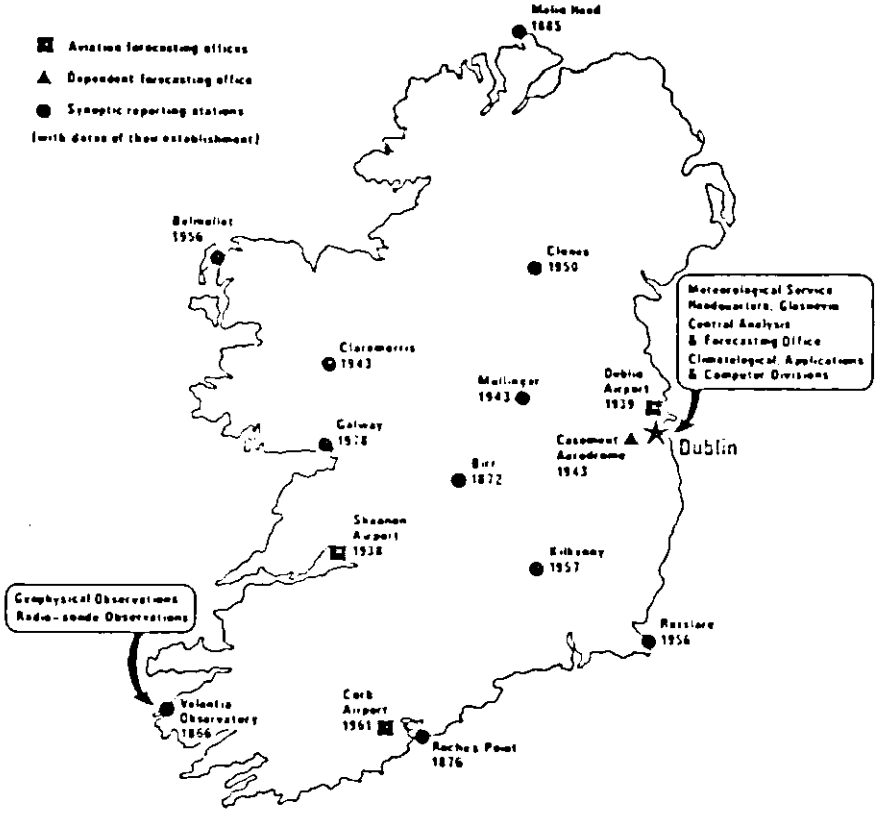
Aviation forecasting offices
Dependent forecasting office
Synoptic reporting stations
(with dates of their establishment)
Malin Head
1885
Belmullet
1956
Clones
1950
Claremorris
1943
Mullingar
1943
Dublin
Airport
1939
Galway
1958
Casement
Aerodrome
1943
Dublin
Birr
1872
Shannon
Airport
1938
Kilkenny
1957
Rosslare
1956
Geophysical Observations
Radio-sonde Observations
Valentia
Observatory
1866
Cork
Airport
1961
Roches Point
1876
Meteorological Service
Headquarters, Glasnevin
Central Analysis
& Forecasting Office
Climatological Applications
& Computer Divisions

Figure I.

Climatological Stations

Meteorological Service feels that the technology is not yet sufficiently developed to contemplate radical changes in the foreseable future.

Upper Air Observations

At Valentia Observatory, upper air observations by radio-sonde were continued during the year. The routine procedure of two ascents per day at 0000 and 1200 G.M.T. was maintained. All but two of the ascents were satisfactorily completed to schedule.

The radiosonde consists of a package containing sensors for the measurement of temperature, pressure and humidity, together with a small radio transmitter, and is carried aloft attached to a hydrogen-filled balloon. Values of the three elements are transmitted to the ground-station at regular intervals during the ascent. The path of the balloon is followed using a ground-based radar installation, and from its track the wind at various levels in the atmosphere can be computed.

In addition to the full ascents at 0000 and 1200, wind-only observations were carried out at 0600 and 1800 each day.

Geophysical Observations at Valentia

The general organisation of the Observatory at Valentia remained the same. A full summary of the station's operations, with photographs showing the general layout, instruments' enclosure, observing huts and recording huts etc. can be found in the pamphlet "Valentia Observatory" published by the Meteorological Service.

1) Geomagnetism

No changes were made under the absolute observing procedure during 1985. Instruments used for base line data were:

Declination	Ruska Observatory Magnetometer
Total Force	Proton Precession Magnetometer
Horizontal Force	Proton Vector Magnetometer
Vertical Force	Proton Vector Magnetometer

The two sets of La Cour Variometers with Quick-Run and Standard recorders continued to operate satisfactorily during the year.

A Magnetic Survey was carried out during the period 23rd. September to 16th. October, measurements being made at Birr, Clones, Glencolumkille, Belmullet, Claremorris, Shannon and Charleville, all of which are classified as "Repeat Stations" for this purpose. In addition, new sites were surveyed at Malin Head, Mullingar, Roches Point and Galway.

Computer programs for processing magnetic data were completed during the year, and data for 1983, 1984 and 1985 entered. Development of programs for processing and analysing upper-air data for balloon ascents continued.

II) Seismology

Continuous recordings of seismic activity were maintained. Regular routine preventive maintenance resulted in satisfactory continuous operation with only minor electronic failures in the timing system being encountered. North-South, East-West and Vertical long-period and short-period components of seismic activity were recorded up to 1st. May. From that date recording of the N-S and E-W short-period was discontinued by agreement with the U.S. Geological Survey. Requests for seismological data for Valentia were dealt with as required. Original seismograms were sent to the U.S. Geological Survey on a monthly basis for microfilming.

III) Solar Radiation

Measurements of Global and Diffuse Radiation on a horizontal surface together with other observations as detailed in previous Annual Reports were continued. All recording equipment was calibrated against the Linke-Feussner Actinometer which in turn was calibrated against the Angstrom Pyrheliometer which is maintained as the National Standard, and which is compared regularly with other National Standards at WMO International and Regional Comparisons.

Global and Diffuse Radiation measurements from Dublin Airport, Birr, Kilkenny, Clones and Malin Head, and Global measurements from Belmullet continued and were supervised from Valentia. All six solar radiation stations were inspected, and the equipment calibrated during the Magnetic Survey in September and October.

Other Observations

At Mullingar Synoptic Station, the Agroclimatic Soil Project continued with temperature readings at various depths in four different soil-type plots being sent to the Agricultural Meteorology Unit. They were used to determine moisture evaporation in soil and peat (bare and grass covered). The results were published monthly in the "Agmet Bulletin".

On behalf of the Ordnance Survey Office, check-tide level readings were performed twice daily by the staff of Malin Head Synoptic Station using the OTT Electric Contact Gauge on the R16 Vertical OTT Water Level Recorder at the Tide Gauge Station at Portmore Pier, Co. Donegal.

Enquiries

Many enquiries for information about past or present local weather were dealt with at the Synoptic Reporting Stations during the year. In some cases, information was obtained from Headquarters to satisfy the needs of local enquirers. Mr. D. O'Regan of Malin Head Synoptic Station was interviewed by BBC Northern Ireland on 13th. November for a radio programme, intended for schools, on the functions of Malin Head Synoptic Station and some notable features of past weather in the area.

FORECASTING SERVICES

The main analysis and forecasting work of the Service was continued at the Central Analysis and Forecast Office (CAFO) during the year, with supplementary analysis for aviation and local forecasting purposes being performed at Dublin, Shannon and Cork Airports. The surface analysis is prepared manually by the forecaster, while upper air analyses are processed automatically by the computer. Numerical predictions for 24 hrs. and 36 hrs. at surface and 500 hPa. levels produced by the Service's own computer are available to the forecaster twice daily in real time, as an aid to the preparation of the forecasts. In addition products of the European Centre for Medium Range Weather Forecasts products, and U.S. National Weather Service numerical products are received at the forecasting offices. They cover periods up to seven days ahead, and are valuable additional aids to the forecaster. Forecast products, received in digitised form and displayed on a VDU with hard-copy option, are also available from the U.K. Meteorological Office for up to five days ahead.

Charts are produced in CAFO using two off-line Calcomp Plotters; data may also be called up on a Video Display Unit in CAFO, and hard-copy obtained if desired. Exchange of graphic data throughout the Service still relies largely on analogue facsimile supplemented by the use of VDUs at Shannon and Dublin Airports. It is proposed to extend the use of computerised methods for the transmission of graphic data over the coming years. Radar pictures from the Shannon Radar are also available in real time in CAFO being displayed on a Jasmin VDU.

The facilities available to the forecaster in CAFO were augmented in 1985 by an additional ECMWF data sheet, giving surface and 500 hPa forecasts from 168 to 240 hours ahead. 850 hPa Wet Bulb Potential Temperatures, and charts showing Snow Indicator Isopleths were also produced from both ECMWF and Meteorological Service forecast data, while an additional 12-hour forecast from the Meteorological Service computer also became available during the year. Composite displays showing echoes from European weather radars combined with METEOSAT satellite pictures were made available on the VDU from October onwards.

General Forecasts

The Automatic Telephone Weather Service (ATWS) operated by the Meteorological Service continued to be remarkably popular during 1985. The whole country is now served by ATWS with the exception of North Connaught and West Ulster, and it is planned to extend the system to these areas in due course. The total number of enquiries on all systems increased by 74% from 1,090,882 in 1984 to 1,895,260 in 1985. Details of the individual elements of the system are given in Table II, on page 15 while the overall performance of ATWS over the past ten years is shown in Figure 3 on page 16.

The 1199 (Dublin Area) automated forecast system is operated by Telecom Eireann, while the other systems are operated independently by the Meteorological Service. The ATWS at present generates no income for the Service, and while it provides a very valuable facility to the public, it also constitutes a substantial charge on the resources of the Service. It is hoped in the near future to devise a method by which some of these costs can be defrayed, either by means of a financial arrangement with Telecom Eireann, or by entering into a sponsorship arrangement with selected commercial concerns.

All the ATWS forecasts are prepared with the farming community very much in mind and give a forecast for 24 hours with an outlook for the following few days. 1199 provides a short term forecast, and in addition to the general public, caters for those interested in sailing in the Dublin Bay area.

As in previous years the demand for the ATWS facility was found to be strongly weather-dependent, and to have a marked seasonal variation. Changeable weather conditions, or weather of unusual severity, results in an increase in the number of calls, while fewer demands are made in periods of settled weather. Demand also generally increases during the summer months, due mainly to an increase in farming activity.

On 1st July 1985, just under 6000 calls were made to the Shannon ATWS, the greatest number so far recorded in one day.

Date of establishment	Responsible Met Office	Telephone No.	Area Served	Calls in 1984	Calls in 1985	Increase %
1. 1967	CAFO	1199	Dublin Area	526,670	905,947	72%
2. 1979	Shannon	(061) 62677	North Munster and South Connaught	270,561	413,496	53%
3. 1981	CAFO	(061) 425555	Leinster & Counties Cavan & Monaghan	105,263	204,273	94%
4. 1982	Cork	(021) 964600	South Munster	188,388	371,544	97%
5. Planned	CAFO	-	West Ulster and North Connaught	-	-	-
Total				1,090,882	1,895,260	74%

TABLE II: AUTOMATIC TELEPHONE WEATHER SERVICE

NON-AVIATION REQUESTS FOR FORECASTS BY TELEPHONE

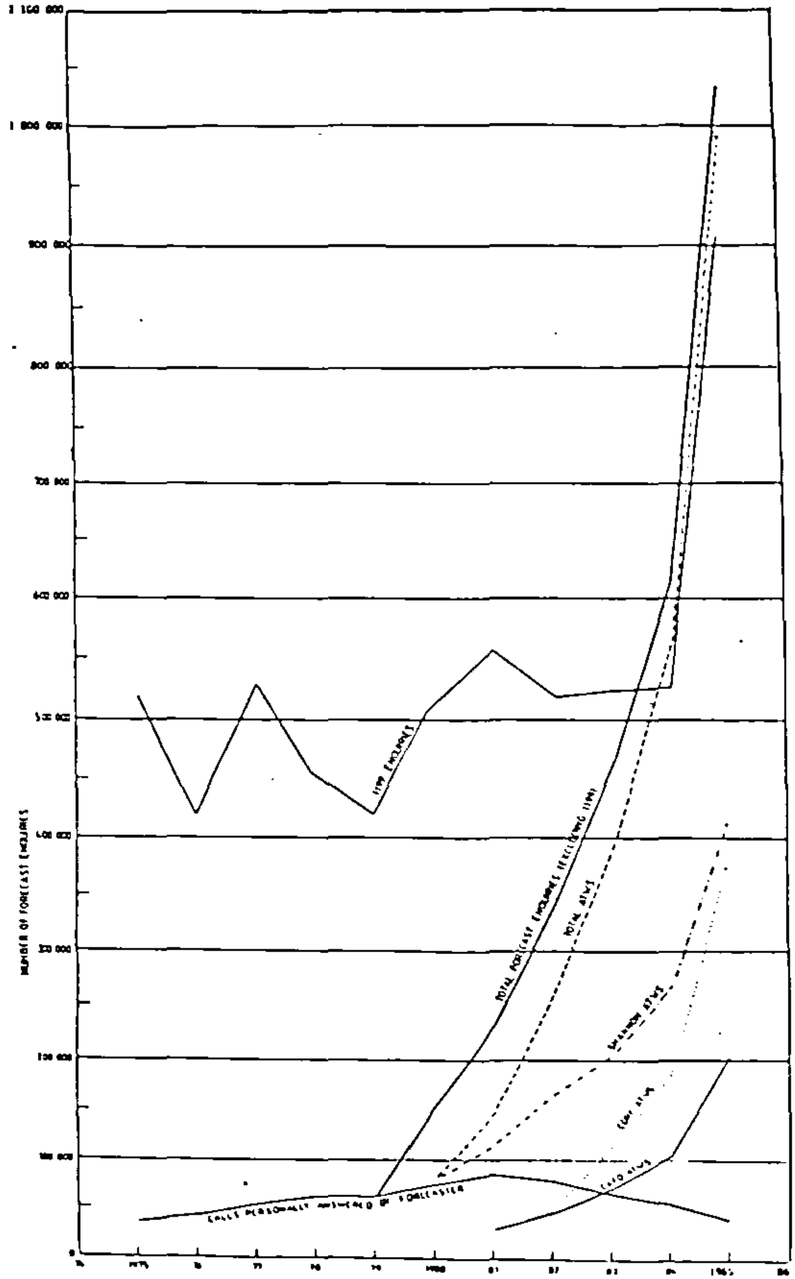

Figure 3.

The ATWS systems are intended to reduce, and ultimately to eliminate, the demands made on the forecaster for routine weather information, thereby allowing him to concentrate on more detailed analysis of the synoptic situation, and to give closer attention to enquiries of a more specialised nature. Direct telephone enquiries, additional to ATWS calls, to the various forecasting offices continued at a high rate in 1985 as shown in Table III on page 21.

During 1985 forecasters from CAFO continued to make a daily personal presentation of the weather forecast on RTE television after the main news bulletin of the day. Four radio broadcasts were also made each day at 0745, 1204, 1802 and 2352 by the forecaster from the radio studio in CAFO. The daily broadcasts consist of a general forecast, a detailed sea area forecast, weather reports from coastal stations at Malin Head, Rosslare, Roche's Point, Valentia and Belmullet, and gale warnings when necessry. Weather observations from the Kish Lighthouse were broadcast from November onwards. From August, sea area forecasts were sent to the Coastal Radio Stations at Malin and Valentia, from where it is planned that these forecasts will be broadcast eight times daily over the Marine VHF Network. Radio interviews about unusual weather conditions were given by CAFO staff on twenty-eight occasions during the year.

From 2nd December 1985 forecasts were entered four times daily by CAFO staff into a Videotex system operated jointly by ACOT and An Foras Taluntais, primarily for farming interests. Further details of the facility are given in the section of the Annual Report on "Agricultural Meteorology". Data were also provided during the month of March, April and May for another Videotex system operated on a trial basis by RTE.

Forecasts were issued throughout the year to the national morning and evening newspapers, to the Sunday papers and to a number of weekly provincial newspapers. The number of specialised forecasts and warnings issued by special arrangement to individual commercial, industrial, marine, local authority and public utility interests continues to increase. A daily forecast or warning service is supplied to some thirty commercial concerns, as well as 25 local authorities, the Defence Forces, and the major public utilities.

The periods of validity of the forecasts issued varies in length from a few hours to several days ahead, and due regard must be had in their preparation for the specific requirements of each particular customer. Some clients, for example, may be particularly interested in the expected occurrence of precipitation, but may regard temperature as irrelevant. Others may have quite the reverse requirements. Customers who subscribe to the warning service may wish to be advised of the expected occurrence of gales, frost, blizzards, floods, heavy rainfall, thunderstorms or snow. In all cases, not only accurate prediction of the particular phenomenon is required but also the timely dispatch of this information to the user, so that appropriate action can be taken.

A comprehensive forecasting and warning service to agricultural interests was provided during the year as detailed in the Chapter of this Report on "Agricultural Meteorology". 370 gale warnings for coastal waters of Ireland and the Irish Sea were issued by CAFO for broadcast on radio and television during 1985, accounting for a total of 2288 hours during which the wind was expected to be gale force or stronger.

Forecasts during the sailing season (June to August) were provided on request to 6 yacht clubs in the Dublin/Dun Laoghaire area, and the awareness of the value of meteorological services to marine interests was increasingly apparent from the level of interest in the forecasts. During the Winter-Spring period the scheme for co-operation with the Automobile Association proved very useful. The AA receives special forecasts from the Meteorological Service and transmits them to their clients through their various regional centres. In return, the Meteorological Service receives reports on road conditions throughout the country, updated when necessary, which are very useful when dealing with enquiries from the public.

The "Fair Spells" advisory service, whereby corporate or individual customers could arrange to be advised by telegram whenever an extended dry period was expected during the summer months, and similarly advised at its termination, was discontinued during 1985. It was felt that the information provided by the scheme was now available from other sources, such as ATWS, Radio and TV, and Videotex in the form of 4 to 5 day extended forecasts, and that the facility is no longer appropriate. This view was strengthened by the declining number of subscribers in recent times. The scheme had been in operation for some thirty years.

The Model Output Statistics (MOS) scheme, introduced in 1983, continued in use during 1985, to assist in the forecasting of daily maximum temperatures in Dublin for up to five days ahead. The programs are based on a software package developed at ECMWF and use correlations between climatological data for Dublin Airport and past ECMWF forecasts. The ECMWF model output is used to produce temperature forecasts which are then employed by the forecasters as an aid. Two sets of correlations are used, one for the summer and one for the winter.

A regular early morning conference between forecasters in CAFO, Shannon Airport and Dublin Airport was introduced in April, with a view to ensuring consistency between the forecasts issued from the three offices.

Most of the services supplied by CAFO are provided free as a public service. Where, however, specialised forecasts are provided to commercial interests, they are supplied on a repayment basis. Income to the Meteorological Service from charges for forecasts supplied by CAFO on a repayment basis in 1985 (excluding those provided to offshore oil exploration interests), amounted to £14,600.

Aviation Forecasts

Routine services to civil aviation were maintained at the three airports at Shannon, Dublin and Cork. At Dublin Airport some 29,000 flights were given full meteorological service before departure, a level of activity very similar to 1984. Of these 23,865 were commercial aviation flights, while some 5,000 were general aviation or military air traffic. In addition about 7,000 telephone enquiries or requests for briefing were dealt with at the Airport from pilots of light aircraft, Air Traffic Control, airline personnel, etc.

At Shannon during 1985 the level of forecasting services provided for the aviation sector was also similar to that of 1984. Some 6,000 flights were supplied with documentation, with additional requests for aviation weather briefing, both locally and for flights operating out of other Irish airfields, amounting to slightly over 4,000. A meteorological observer from Shannon was sent to Connaught Regional Airport on 25th. October to provide meteorological facilities for the inaugural flights from the airport, and provided continuous observations as required by the control authorities on the spot, while also maintaining liaison with the Meteorological Office at Dublin Airport. A similar service was provided for the return flights on 1st. November. 226 warnings of hazardous weather conditions for aviation, termed SIGMETS, were issued by the Meteorological Office, Shannon Airport, which acts as the Meteorological Watch Office for the Shannon Flight Information Region. Local aerodrome warnings were also provided as necessary. At Cork Airport 1,506 commercial flights were supplied with documentation.

The supply of forecast winds and temperatures in grid point form to Aer Lingus for flight planning purposes continued, data being supplied twice-daily on a routine basis. These data are extracted from the output of the numerical weather prediction models and sent to Aer Lingus at Dublin Airport in digital form by means of a computer to computer link.

Interests Originating Enquiries	Telephone calls made to				
	CAFO Airport	Shannon	Cork	Dublin	Totals
Agriculture	12,100	2,251	227	267	14,845
Industrial & Commercial	1,650	911	139	17	2,717
Marine	4,056	1,516	71	76	5,719
Defence Forces	14	12	4	42	72
Other Government Departments	467	661	3	-	1,131
Press	206	11	13	2	232
Sporting	619	832	129	30	1,610
Private	8,388	3,036	715	54	12,193
Local Radio	-	-	259	-	259
Miscellaneous	-	-	120	40	160
TOTALS	27,500	9,230	1,680	528	38,938

Table III: Telephone Enquiries to Forecaster (Estimated)

In addition to the routine needs of aviation, the usual selection of special events in the aviation world, such as gliding and hot-air balloon activities, was catered for by means of detailed special forecasts as necessary. Forecasts were also provided for nine airlines who operated crew training schedules at Shannon during the year.

The 24-hour service provided to the Air Corps at the Meteorological Office at Casement Aerodrome was continued. Flight documentation and direct briefing were provided for basic and advanced flight training of Air Corps pilots, and for helicopter and fixed wing flights. The activities involved included search and rescue, air ambulance, national security, air exercises, fisheries patrol flights and national and international flights for the transport of government ministers and officials. Briefing was provided locally during the hours of duty of the Casement forecaster, and otherwise by the Dublin Airport forecaster. During September and October, briefings were provided for preliminary training exercises involving the helicopter-carrying ship "LE Eithne" and one of the new Dauphine helicopters due for formal delivery in 1986. Valentia Observatory continued to supply facilities to the Air Corps as a base for air/sea rescue helicopters when necessary. Landings took place on two occasions during the year.

Towards the end of 1985 work began on the development of a system for the provision of computer generated route winds and temperatures for manual flight planning for European routes, using digital gridpoint data from the World Area Forecast System (WAFS). It is expected that the system will become operational in the early part of 1986. The Head of the Computer Division and the Officer-in-Charge of the Meteorological Office at Shannon Airport together with senior personnel from Aer Lingus visited the U.K. Meteorological Office in Bracknell in December to discuss the use of WAFS data for this purpose.

Work continued during the year on plans for the centralisation of the aviation forecasting function by the establishment of a Central Aviation Office (CAO) at Shannon Airport. It is hoped to install a computerised self-briefing system for air-crew at Dublin Airport and to have documentation available on a "self-service" basis. It is planned by this means to reduce or even to eliminate the requirement for forecasters at Dublin Airport, with briefing and consultation available as required by telephone from the duty forecaster at Shannon. When the new system is operational, staffing requirements at Dublin will be re-assessed, with a view to releasing staff for use in other Divisions of the Service. Meetings took place with Aer Lingus operations staff on a number of occasions during the year to discuss the proposed developments, and officers of the Meteorological Service visited a number of European Airports to view at first-hand the facilities available.

On 21st November the term "Co-ordinated Universal Time" (UTC) became the standard for use in aviation communications instead of Greenwich Mean Time (GMT). The unit Hectopaschal (hPa) also replaced the Millibar (mb) as the unit used for the reporting of values of atmospheric pressure.

Expenditure on meteorological services supplied to Civil Aviation (but not military or general aviation) are recouped from the user airlines by means of Route Charges collected through the agency of EUROCONTROL. Expenditure for recoupment under this arrangement was assessed at IR£2.7 million in 1985.

CLIMATOLOGY

The Climatological Division continued its work of compiling and processing statistical information on the weather, and making it available in a form suitable for use by other branches of the Service and by outside agencies. A large volume of enquiries about past weather was received from legal, commercial, industrial and other interests. Many of the queries from legal and insurance interests entailed attendance in court by Meteorological Service personnel. A total of 4548 enquiries was dealt with during the year, fees being charged for 723 of them. Receipts in 1985 from the supply of climatological information and professional services on a repayment basis, and the sale of climatological publications, amounted to some £14,000.

Part of the resources of the Climatological Division is directed towards the publication of the Monthly Weather Report which provides for each month detailed tabulations of the various parameters available from locations throughout the country. The Report is published in three separate parts, viz.,

Part 1: "General Weather Report" which gives values of air and soil temperature, pressure, visibility and wind at a large number of stations around the country. The locations of these stations are given in Figure 2 on page 9.

Part 11: "Rainfall" which gives the rainfall for the month at some 750 rainfall stations, and only published annually from January 1985.

Part 111: "Selected Data for Synoptic Stations" which gives detailed hourly values of the more important parameters at the Service's 15 Synoptic Reporting Stations.

During 1985 Parts I and II of the Monthly Weather Reports from August 1984 to April 1985, and Part III from December 1984 to November 1985 were published. Monthly Weather Summaries and an Annual Summary for 1984 were supplied to the press. Current data for the synoptic, climatological and rainfall stations were keyed-in to the data-entry station and then transferred to the main-frame computer on a routine basis, and global and diffuse solar radiation data up to the end of 1984 were put on tape and quality-controlled, as were Climatological Station data for the years 1980 to 1983.

Other work done by the Climatological Division during 1985 included:

I) completion of the programme of the re-producing on micro-fiche the climatological data from the Synoptic Stations for as long as they are available.

II) completion of maps and tables of the 1-day, 2-day and 5-day extreme rainfalls with return periods of 2, 5 and 10 years for the use of those involved in the drainage of land.

III) A first draft of the rewrite of "The Climate of Ireland" was prepared in association with Mr. P.K. Rohan.

Iv) The use of discrete autoregressive processes in the modelling of daily rainfall sequences was investigated and considerable progress made.

During 1985, the Climatological Division was represented at meetings of the Irish Committee of the International Hydrological Programme, the Solar Energy Society of Ireland, and the Agmet Group.

COMMUNICATIONS AND COMPUTERS

Equipment

The Meteorological Service's computer system at its Headquarters in Glasnevin has for some years been based on a DEC-2050 mainframe computer (used for numerical weather prediction, graphics, climatological data processing, research projects and as the Service's general purpose computer), and two DEC PDP 11/40 minicomputers (used mainly for meteorological telecommunications). During 1985 considerable effort was devoted to the acquisition of a replacement for the DEC PDP 11/40 system. In July permission was obtained from the Department of the Public Service to issue invitations to tender. Twelve proposals were received and the order was eventually given to Digital Equipment, Ireland, Ltd. for a dual VAX 11/780 system.

The first part of the system was delivered and installed in December, the remainder to be installed in 1986. A great deal of software development will be necessary by the Computer Division before the new system can be introduced operationally.

The existing equipment - the two PDP 11/40 computers, the DEC-2050 mainframe computer and the two CalComp 960 pen plotters - continued in operation. In general the level of performance was normal but the PDP 11/40 machines again proved prone to breakdown.

Among the additions to existing equipment were:-

(a) A BBC+ microcomputer for Valentia Observatory which will enhance the COMART CP200 system already in use, will facilitate graphics work, and will allow for the use of the COMART from two locations.

(b) A VT220 Visual Display Unit and an LA50 printer, both supplied by Digital Equipment, for use with the proposed computerised self-briefing system for pilots at Dublin Airport.

(c) The replacement of modems on the graphics circuit to Shannon Airport by 4800bps. synchronous modems with statistical multiplexors for error control.

(d) Equipment for allowing data from the meteorological databank to be displayed on a VDU screen for flight briefing at Shannon.

Telecommunications System

The PDP 11/40 computers control the reception of meteorological data from the international and domestic networks, identification and storage of the data, and routeing to the various forecast offices or to the international circuits. These functions will be taken over by the new VAX 11/780 system in due course.

In June 1985 a facility for the interrogation of the Irish OPMET databank by telex was implemented. Some new features were incorporated into the databank system e.g. the availability of aerodrome warnings and of synoptic reports from meteorological stations converted into the aviation METAR format.

Data lines for graphics use were connected between Dublin and Shannon Airports and Glasnevin in June. By means of a graphics terminal the forecasters at both Airports can now interrogate the database of weather displays available on the DEC-2050 computer. Also in 1985 reception of European radar data from the COST 72 project began. The data are received every three hours on the GTS and are available in graphics form on the DEC-2050 computer.

In February one of the two EMTN lines to Shannon was upgraded to 100 bauds so that it would be capable of carrying all basic data. The other line was then discontinued. Also at Shannon, new VDU's with keyboards were installed in May, making it possible to request data for the briefing of aircrew and other purposes and have it displayed on the VDU. Hardcopy is also available simultaneously.

Automatic Data Extraction, Numerical Weather Prediction and Automatic Plotting

The twice-daily numerical analysis and forecast runs, and the eight-times daily automatic plotting of charts continued. The automatic data extraction system for decoding and checking international weather reports for use in the Service's Numerical Weather Prediction and Automatic Chart Plotting systems was radically overhauled and a new version installed in July. The new system is more efficient, much faster, has a lower rejection rate, and for the first time incorporates drifting buoy information.

Gridpoint Data Processing

The set of products received daily from ECMWF was expanded in June to include filtered products (i.e., products from which all but the long-wave features have been extracted), and data for the production of meteograms (of pressure, temperature etc. against time for specific locations).

In December reception of limited amounts of World Area Forecasts System data from Bracknell began. These data are intended for use in the production of route winds and temperatures for Dublin Airport in place of the manually prepared tabular winds at present in use.

AGRICULTURAL METEOROLOGY

General

The Agricultural Meteorology Unit of the Meteorological Service was established in 1966. Since then the Unit has investigated agroclimatic matters and published a considerable amount of material in the form of agrometeorological memoranda. Studies have included analysis of soil temperatures, occurrences of frost, the grass growing season and the climate susceptibility of potato blight in Ireland. The Unit cooperates closely with agricultural scientists and advisers in the Agricultural Institute (An Foras Taluntais), ACOT, the Department of Agriculture, and the relevant University Departments and Agricultural Colleges. Throughout 1985 the Agricultural Meteorology Unit continued to provide expert advice on matters related to agriculture to agricultural researchers and advisers, to the farming community in general, and the Central Analysis and Forecast Office (CAFO).

Agriculture continues to be a major user of meteorological information, particularly of weather forecasts. Calls to the regional automatic telephone weather services (ATWS) in 1985 increased by some 40%, compared with the 1984 totals, and it is estimated that a high proportion of these calls originated from agricultural interests. Copies of the Agrometeorological Bulletin were circulated monthly to agricultural scientsts, to agricultural advisers and to a number of commercial enterprises. The "Special Topic" page included contributions by members of the Agricultural Institute and the Meteorological Service.

Forecast & Warning Service

The Unit has responsibility for monitoring conditions favourable to the spread of potato blight during the active growing season. The 1985 season was particularly severe in terms of 'blight weather' and very wet conditions. Blight infection levels by mid-season were reported to be unusually high and spraying was exceptionally difficult because of the very wet soil conditions. Six blight warnings were issued during the season.

Cooperation continued with the Department of Agriculture in a programme aimed at reducing the incidence of Liver Fluke. Weather information is an important indicator (in addition to field observations and faecal and liver examinations) of the likely prevalence of the disease. The 1985 weather indices suggested a higher than usual liver fluke disease threat to animals during the autumn and winter. Persistent wet weather had favoured the build up of this parasite in pastures and there were early signs of acute liver fluke in lambs resulting in severe illness and death.

An expanded programme of Fire Danger Warnings (meteorological conditions indicating the existence of fire hazard) was operated in 1985. This followed pilot trials in 1983 and 1984. The warning service was provided by a number of appropriate synoptic weather stations (Casement Aerodrome, Kilkenny, Cork Airport, Shannon Airport, Claremorris and Mullingar). A preliminary analysis of the data for 1985 indicates a good correlation between the occasions of issue of warnings and the reported fires. This may lead to more efficient protective measures being adopted in future.

Weekly forecasts of certain weather parameters were sent to the Johnstown Castle Research Centre of An Foras Taluntais (The Agricultural Institute), for input into a computer grass production simulation model. Weather parameters from six stations were provided, and predictions from the model were published in the Farm Management section of the "Farmers' Journal".

In December 1985 a joint AFT/ACOT Agricultural Videotex Project (Agriline), which is partly EEC funded, was initiated in two areas of the country (East Leinster and South Munster). The aim of Agriline is to provide a practical data base of current agricultural and meteorological information for farmers and agricultural advisers. The meteorological information available in the system is considered to be of great importance and is the one most frequently accessed by users. Regional one-day forecasts are renewed three times daily, national five-day forecasts are provided daily and a number of pertinent agroclimatological tables are updated weekly.

Phenological Observations

The observations from the four Irish Phenological Gardens were collected and the results transmitted to the International Directorate of the Phenological Gardens Programme (IPG). Low temperatures in March and cold spells during the middle and end of April retarded spring growth; new leaves and buds were burned off several species at Valentia Observatory by strong northerly winds. Above normal rainfall during the summer months combined with below normal temperatures was also unfavourable for growth.

AGMET Group

The Agricultural Meteorology Unit makes an important contribution to the deliberations and work of the AGMET Group. This Joint Working Group on Applied Meteorology was established in 1983 (c.f. 1983 Annual Report) and its members are drawn from the various agricultural departments, institutes and advisory services in Ireland. The first Report of the AGMET Group was published in March.

The Group noted that the absence of a suitable textbook on agricultural meteorology in an Irish context hampered progress on the educational front. Sponsorship for such a publication has been secured from the Agricultural Credit Corporation (ACC) and preparations are in hand to produce a suitable work. The Group is also compiling (on the Meteorological Service Computer) an index of scientists in Ireland working in, or concerned with, agricultural meteorology.

MARINE METEOROLOGY

Offshore Operations

Activity in offshore drilling operations has tended to fluctuate considerably since the Meteorological Service began providing forecasts in 1977. Receipts for forecasts in the various years have varied from IR£46,000 in 1978 to a low of IR£13,000 in 1980. Total income to the Meteorological Service from these sources in 1985 was £29,400, an increase of about £7,000 on the figure for 1984. Forecasts of wind, weather, waves and swell were provided (usually twice daily at 0800 and 1600 hours) during the drilling season to five oil companies. Four of these were engaged in operations off the south coast; the remaining concern drilling to the west of Ireland in the Porcupine Basin.

Marine Observations

The automatic weather station on the Marathon Gas Platform south of Cork was out of service from late May to mid-August. No wave-data were available from the platform throughout the year. Computer programmes were developed to quality-control wind and temperature data, and to printout summaries on a monthly basis.

The lighthouse at Loop Head, in addition to providing synoptic weather reports from 1st September onwards, also provided wave heights twice daily from 1st December. This information was obtained from a Waverider Buoy moored some 10 km. to the east, and owned by the Limerick Harbour Commissioners.

The liquidation of Irish Shipping Ltd. reduced to thirteen the number of Irish vessels providing weather observations. Included in this number were five Fishery Patrol Vessels of the Department of Defence. During the year 1,900 reports from Irish vessels were quality-controlled and sent to the "Responsible Members" of WMO. The Coastal Radio Stations at Valentia and Malin Head relayed to CAFO, for insertion on the GTS, some 2,200 synoptic reports from Voluntary

Observing ships, almost all of them being of foreign registration. A further 115 reports from Irish vessels were received in CAFO through British Coastal Radio Stations.

Port Meteorological Officers from the Meteorological Service paid thirty-five visits to ships in Dublin Port during the year to check or replace meteorological equipment. Eight visits were made at Cork and two at Rosslare.

Other Activities

The vast majority of marine-orientated enquiries came from yachtsmen and professional mariners, who required weather forecasts which were supplied by CAFO. However, enquiries of a legal nature for marine weather conditions arising out of accidents around the coast and dealt with by the Marine Unit increased during the year. Requests were also received for information to complete feasibility studies for fish farming at a number of locations. A scheme for forecasting waves at Roonagh Point, Co. Mayo, for an Office of Public Works pier construction job was developed for use in CAFO and the results monitored.

The complete archive of old ship reports in Irish waters (out to 200 miles) was purchased from the U.K. Meteorological Office during the year. Computer programes were developed to extract the most relevant information and to break down these data into different sea areas.

Spectral estimates of wave energy for selected grid points near Ireland were computed during the year, and a climatology of wave direction, significant height and period at seven points around the coast was developed for archiving on a monthly basis. The comparison check between the output of the wave Model used by the Service and wave heights reported by the Ocean Weather Stations was discontinued during 1985, having been in operation for two years.

INDUSTRIAL METEOROLOGY

The EEC Project aimed at producing a Wind Energy Atlas for the Community was revived for one year with effect from September 1985. Ireland contributes to the project, and during 1985 provided detailed descriptions, including panoramic photographs, for the Synoptic Stations at Rosslare, Roche's Point, Valentia, Kilkenny and Malin Head. A computer program was developed to calculate and print-out the Pasquill Index for each hour of any day or series of days at any Irish synoptic station. Several other programs were developed to extract or combine data from climatological files in forms more appropriate to energy statistics. Ireland's participation in the project will result in revenue of IR£10,500 for the Service in 1986.

Progress during 1986 on the Department of Energy Wind Programme, intended to provide a Wind Energy Survey of Ireland, was slow. Difficulty was encountered in obtaining data from the various windmill sites, which are necessary for compiling the required statistics.

METEOROLOGICAL SERVICE LIBRARY

The Library continued to provide the usual facilities to staff at headquarters and other stations, and to provide reading facilities on request to outside researchers.

Considerable progress has been made in computerisation; the computer catalogue contains all accessions since January 1982, and older material is being added as time permits. A faster version of the retrieval program "BOOKS" has been perfected and the automation of more than a thousand loan records has been successfully completed, with a link to the retrieval program.

The search for early meteorological manuscripts continues and some interesting items have come to light. A special visit was made in June by the Librarian to Cambridge University Library to examine microfilms of weather registers made by Samuel Molyneux in the eighteenth century.

The Meteorological Service Library has taken an active part in the newly-formed Government Libraries Group of the Library Association. This Group has been established to promote and develop the role of libraries within the Civil Service, and to encourage cooperation among Government Libraries.

INSTRUMENTS & EQUIPMENT

Satellite Receiving Stations

At Shannon Airport and CAFO pictures were received on a regular basis from the METEOSAT geostationary satellites and from the American polar orbiting satellites. The quality of the pictures was satisfactory in general, but varied somewhat with the seasons, the amount of radio interference, and the conditions of the equipment.

Satellite signals received in CAFO were routinely relayed to Dublin Airport and Casement Aerodrome; those received at Shannon were relayed to Cork Airport. Pictures received in CAFO, mainly from the American polar-orbiting satellites, continued to be used nightly on Radio Telefis Eireann as part of the television weather presentation.

Anemometers

The Dansk Impulsfysik anemometer at Dublin Airport suffered severe damage during the electrical storms on July 25th and 26th. The wind speed sensor was destroyed and the sensor station was almost completely burnt out. A spare system was used to replace it. Essential repair work was delayed considerably because most of the components were extremely difficult to acquire and some were obsolete. The lightning strike highlighted the vulnerability of the airport anemometer systems and work is in hand on methods of improving lightning protection on the instruments.

The Malling sensors, which were bought to replace the Impulsfysik sensors, were tested during the year, and initial difficulties were overcome. A Didcot wind monitoring system for use at Cork Airport was delivered late in the year.

The programme of overhaul and calibration of the Dines Anemometers was again delayed because of staff shortages and the difficulty of acquiring essential spare parts. The distant reading Dines Anemometer at Shannon Airport was, however, overhauled.

Searchlights

The lamps hitherto used in the cloud Height searchlights at the Service's Synoptic Reporting Stations are no longer available. Consequently it was necessary to fabricate a modification for the searchlights for use with halogen lamps. In 1985 this modification was carried out at Shannon Airport, Valentia, Rosslare, Mullingar, Birr, Roche's Point, Claremorris and Galway.

Weather Surveillance Radar

The Shannon Digitised Radar System operated satisfactorily during the year. Digitised pictures are now being received in Shannon and CAFO and are also transmitted to the United Kingdom Meteorological Office.

The Selenia weather surveillance radar at Dublin Airport continued to operate satisfactorily. However its age (it was installed in 1966) makes spare parts increasingly difficult to come by, and some have to be specially manufactured.

Facsimile and Communications Network

A microprocessor-controlled facsimile switchboard was installed in CAFO during the year to facilitate the transmission and reception of charts and satellite signals to and from the airports. The design of this switchboard was undertaken to eliminate incorrect switching which often passed unnoticed with the old jack-plug system.

The transmission and reception of facsimile charts and pictures was generally good during the year and all faults were dealt with promptly. One of the two lines from Dublin Airport to Casement was upgraded to M1020 standard in March. The Dublin Airport to Gormanston full duplex dedicated line became fully serviceable in July.

A 12-Channel Radio receiver was installed in CAFO in September to provide back-up chart reception. Signals from Offenbach are normally of very high quality. Those from Bracknell and Paris are not of the same standard.

Barometers

A number of precision aneroid barometers were re-calibrated and any necessary repairs were carried out. A Vaisala digital PA11 barometer was installed in Dublin Airport in December. A second PA11 barometer was purchased the same month.

Radioactivity

At a meeting with personnel from the Nuclear Energy Board (NEB) in March it was agreed that the Meteorological Service would continue the present programme of collecting and processing precipitation, tap water, total fallout and airborne dust samples for radioactivity measurement by the Nuclear Energy Board. While the Board was not in a position to take over the full operation of the programme, it hoped, in the near future, to be able to test unprocessed samples for their radioactivity content. Meanwhile some minor changes in the collection system of monthly precipitation samples, aimed at reducing postal costs, were agreed. Payment of £570 was received from the NEB towards the Laboratory expenses in 1984. Additional samples were collected and processed as a result of a fire in the Nuclear Power Station at Gwynedd, North Wales in October.

Atmospheric Chemistry

A network of sampling sites for the collection of monthly precipitation samples was set up early in the year in the area surrounding Birr Synoptic Station. Sampling began in April. The equipment for the project was supplied by the European Air Chemistry Network Centre in Sweden. The purpose of the project was to gain information on the variability of the concentrations of the constituents analysed, in order to select the most representative of the sites for long term sampling purposes.

The measurement of certain chemical constituents (described in the 1980 Annual Report) in monthly and daily air samples and in monthly, weekly and daily precipitation samples collected at Synoptic Stations continued during the year. The Meteorological Service agreed, at a meeting organised by the Department of the Environment in July, to act as National Coordinator of the European Monitoring and Evaluation Programme (EMEP) in Ireland and to implement, for Valentia Observatory, the expanded measurement activity proposed for 1986. In December the Department of the Environmewnt purchased an atomic absorption spectrophotometer for use in the Meteorological Service Laboratory in order to assist in the expanded programme of EMEP measurements.

The programme of measurements for the European Air Chemistry Network and WMO's Background Air Pollution Monitoring Programme was unchanged during the year.

Acid Rain

Data already published on acid rain were updated. The results of Ph measurements carried out on monthly precipitation samples collected at nine meteorological stations showed an overall increase when compared to 1984 measurements. 54.8% of samples tested had a Ph value below 5.5, compared to 46.3% in 1984. The median Ph value changed from 5.72 in 1984 to 5.44 in 1985. This increase in acidity may have been caused by the wet summer months when the buffering effect from dry deposition (usually of an alkaline nature) was reduced. Many enquiries were received during the year seeking information on acid rain, especially from students doing "projects", and in connection with the operation of the ESB coal-burning generating station at Moneypoint.

The collection of daily precipitation samples continued at Casement and Dublin Airport in connection with a project on acid rain in the Dublin Area being carried out by An Foras Forbartha.

The Meteorological Service Laboratory participated in the eighth WMO interlaboratory calibration test on reference samples in September. Results of previous tests, received during the year, were satisfactory.

Air, tapwater and rainwater samples from Valentia Observatory were transmitted twice-weekly for radio-activity counting to the National Radiation Monitoring Service, in Dublin. Also, samples of rainwater, collected monthly, were sent early in the following month for Tritium analysis to the Isotope Hydrology Laboratory, of the International Atomic Energy Authority in Vienna.

RESEARCH & INVESTIGATION

The Research Division of the Meteorological Service at present comprises three Meteorologists and one Meteorological Officer, and has had a fundamental impact on the practical work of the Service in recent years. The forecasters both in the Central Analysis and Forecast Office (CAFO) and at the airports now rely more and more on the output of the computer to aid them in producing forecasts. Analysis of upper air data is now performed on the computer and plotted automatically. The Research Division has played a vital role in bringing about the computerisation which now encompasses so much of the work of the Service.

Numerical Weather Analysis and Prediction

The main advance in this area has been the development of two new numerical schemes for integrating the equations of motion. Both are highly efficient and have an accuracy comparable to or greater than the present operational model. One method employs a semi-implicit scheme for the gravity wave terms; the other uses an alternating direction implicit technique. Both use the semi-Lagrangian advection scheme. It is hoped to introduce a new model into operational use during 1986, based on one of these schemes.

The refinement of the analysis suite is continuing. All fields and observations are now held in core during the analysis, reducing the run-time by about 10 per cent. It is hoped to investigate soon the impact of replacing the Gaussian structure functions by Bessel functions.

The Laplace transform method of initialization has been implemented in the context of a baroclinic model, and compared to the normal mode and bounded derivative methods. The three methods yield very similar results, which increases confidence in all the methods. Since the bounded derivative method requires signficantly less computer time, it has been implemented on the Meteorological Service system, and is working well.

Miscellaneous Activities

Several projects have been carried out in cooperation with other Divisions. Among these are: (1) (with CAFO) the calculation and plotting of snow indicators based on the Meteorological Service and ECMWF forecasts, and the development of objective frontal indicators; (2) (with Computer Division) the extension of the range of products provided to Aer Lingus, and of the data received from ECMWF (to derive meteograms, tephigrams, etc.) and the United Kingdom Meteorological Office; (3) (for Climatological Division) extension of the contouring package to allow shading of rainfall maps, etc.; (4) (for Shannon Airport) development of programs for extraction and tabulation of winds and temperatures on specified flight-paths, for use in aviation forecasting; (5) (with the Library and Computer Division) computerisation of the Library catalogue to provide automatic search and retrieval and production of accession lists.

The CHARTS program has been modified in response to user requests and suggestions. A program (RADAR) has been written and is available for the display of European radar data on the online graphics Visual Display Units. Verification programs continue to run, accumulating scores which allow the Service to monitor forecast improvements and to compare its own forecasts with those originating elsewhere.

Future Plans

Testing and comparison of the new numerical schemes is expected to continue to determine the best choice for the Service's next model. It is hoped to unify the analysis-initialisation-forecast system by running all programs on the same grid. The frequency of data assimilation will be reduced to six hours as soon as the new VAX computer system is linked to the mainframe.

The current forecast model has minimal physics. It is hoped therefore to start work soon on the parameterisation of moist physical processes into the model. This is of obvious importance in view of Ireland's maritime situation.

The data analysis techniques in current use are essentially statistical; it is hoped to develop a more dynamical approach to the problem of data assimilation, using numerical schemes which suppress high frequency gravity wave oscillations.

Work has begun on a Monte-Carlo system, which combines forecasts from various sources to produce a composite forecast which should be more accurate than the individual forecasts comprising the input. This work will be continued.

In addition to the work of the Research Division, the following research work was in hand, or was completed, by other members of the staff of the Service:

Gleeson, S. (Meteorological Office, Shannon Airport)
- An investigation into the systematic error in the measurement of rainfall using gauges exposed in the conventional manner.

Heussaff, P.A. (Meteorological Office, Dublin Airport)
- "A Survey of References to Weather in Historical Records in Ireland 1200 - 1840 A.D."

O'Laoghog, S. (Training Division)
- Research into the comparability of data from a pressure-tube anemometer and a rotating-cups anemometer was continued and a report on the findings was completed and submitted to The Meteorological Magazine at the end of August. This research is relevant to the estimation of available wind power and to the comparability of long-term wind records.

McGrath R. (Computer Division)

- Comparison of "Perfect Prog" and Model Output Statistics
- Methods for Objective Interpretation of Maximum and Minimum Temperatures.
- Setting up a Model for Heat Loss in Sheep due to Meteorological Conditions.

Murphy E.) (Valentia Observatory)
Keane T.) (Agricultural Meteorology Unit)

- A paper on the history of the Phenological Garden at Valentia was prepared for publication, and will appear as the main cover article in the 1986 Annual Report of the IPG 'Arboreta Phaenologica" No 30.

Keane T.

- "Meteorological Parameters in Ireland" - a chapter for the handbook "Climate, Weather and Irish Agriculture" to be published in 1986.

INTERNATIONAL COOPERATION

European Centre for Medium Range Weather Forecasts (ECMWF)

ECMWF is a cooperative venture by 17 European countries, established in an effort to improve the quality of weather forecasts for periods ranging from 3 to 10 days. The products of the Centre, which is located at Reading in the United Kingdom, are available to all Member States, including Ireland, by direct computer link, and are now used on a routine daily basis at the forecasting offices of the Irish Meteorological Service. By means of Graphics Display Units an extensive range of ECMWF products is readily available to the forecaster, while a Graphics Printer linked to the system gives a hard copy option.

The Director, represented Ireland at meetings of the ECMWF Council in May and November. Mr. W.H. Wann, Assistant Director, and Chairman of the ECMWF Technical Advisory Committee (TAC) attended meetings of the ECMWF Council, TAC, Scientific Advisory Committee and Finance Committee during the year. At the November Session of the ECMWF Council it was decided that Ireland would represent the interests of Norway, Sweden, Denmark, and Ireland on the Finance Committee for the years 1986 and 1987.

Mr. L. Campbell (Computer Division) continued his three-year tour of duty at the Centre on leave of absence from the Meteorological Service.

International Civil Aviation Organisation (ICAO)

Mr. P.A. Lyons Officer-in-Charge of the Meteorological Office at Shannon Airport attended a meeting of the Meteorological Advisory Group (METAG) of the European Air Navigation Planning Group (EANPG) at the ICAO European Office in Paris from 23rd - 27th September. METAG concerns itself with the meteorological content of the regulatory material which governs the operation of Civil Aviation throughout Europe. The work of the group during 1984 was concerned, inter alia with the implementation of the new World Area Forecast System (WAFS)

in Europe, with warnings of low-level wind shear, especially their dissemination and content and format, with the observing and reporting of visibility, and the dissemination of Special Air Reports.

Mr. D.J. Murphy, Head of the Computer Division attended the 16th. Meeting of the MOTNE Regional Planning Group at the ICAO European Office in Paris from 21st to 29th March. MOTNE (Meteorological Operational Telecommunications Network - Europe) is a system for the exchange of meteorological information for aviation purposes throughout Europe.

World Meteorological Organisation (WMO)

WMO is the international body responsible for coordinating the activities of national meteorological services throughout the world. During 1985, Ireland was represented at a number of meetings held under the auspices of the Organisation. The Director attended a meeting in Geneva in April concerned with the establishment of the Operational World Weather Watch Systems Evaluation for the North Atlantic (OWSE-NA). The programme is concerned with the evaluation of the cost-benefits of the various means by which weather observations are made over the sea (e.g. satellites, buoys, weather-ships, etc) with a view to finding the most cost-effective mix.

Mr. E.J. Murphy, Officer-in-Charge of Valentia Observatory, attended the Ninth Session of the Commission for Instruments and Observations in Ottawa, Canada, from 15th to 26th July. Mr. W.H. Wann, Assistant Director, attended an Extraordinary Meeting of the WMO Commission for Basic Systems in Hamburg in November, and Dr. J.R. Bates, Assistant Director, attended a conference on the results of the Global Weather Experiment in Geneva in May. Dr. Bates also attended a meeting of a Working Group on Weather Prediction Research organised by the Commission for Atmospheric Science of WMO in Belgrade in August.

Shannon Weather Surveillance Radar

In cooperation with the U.K. Meteorological Office, the Weather Surveillance Radar at Shannon has been enhanced and the output digitised. The output is now displayed on Video Display Units in the forecasting offices in Shannon and CAFO, and is also relayed by land-line to the U.K. Radar Network. It is expected that in due course composite radar pictures available on the U.K. Network will be received in the forecasting offices of the Irish Service.

The system gave good service during the year. Two officers of the U.K. Meteorological Office visited Shannon during the year in connection with the project.

Other International Activities

The Director attended the Conference of Directors of Western European Meteorological Services in April, and also attended the conference of Directors of Commonwealth Meteorological Services (as an observer) in Bracknell in June.

In April Ireland acceeded to the COST-43 Agreement which concerns the setting up of an experimental network of ocean stations in the waters around the North Atlantic to report environmental data in real-time. Letters of Agreement had previously been exchanged between the Director and heads of other national meteorological authorities (France, Iceland, Netherlands, Norway and the United Kingdom) concerning a drifting buoy programme in the vicinity of Iceland. Ireland contributed two pressure sensors to this programme. Similar contributions are intended in 1986 and 1987.

Preparations continued during the year to expedite Ireland's membership of the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT). EUMETSAT is an organisation of European States, set up for the purpose of implementing an operational meteorological satellite programme for Europe. The initial programme

covering the period up to 1995, envisages the continued operation of the present METEOSAT series of satellites and the deployment of three new satellites which will be launched in 1987, 1988 and 1990. The EUMETSAT Convention was ratified by Ireland in 1985, and during the year Mr. B.E. McWilliams, Head of the Services Division, attended three meetings of a Working Group in Paris charged with drafting the Financial, Staffing and other Regulations for the new Organisation.

The Meteorological Service suite of Numerical Weather Prediction programs has attracted attention internationally. Details have been published in a World Meteorological Organisation (WMO) catalogue of such modules, and copies of the programs have been requested by the Meteorological Services of Korea, Italy and Iceland. The graphics programs have also been requested by WMO as part of the Voluntary Cooperation Programme, whereby they will be made available to developing countries. WMO has estimated that the cost of developing this software using alternative sources would be US$250,000.

Mr. P.A. Lyons, Officer-in-Charge of the Meteorological Office at Shannon Airport attended a Conference on the Aviation Weather System, organised by the American Meteorological Society, in Montreal in June. Dr. Peter Lynch returned to the Service in October, having completed a twelve month tour of duty as visiting scientist with the Royal Netherlands Meteorological Institute, in De Bilt, Holland. Dr. Lynch also attended conferences on Numerical Weather Prediction in Copenhagen and Zurich in September and October respectively.

Mr. P. MacHugh, Head of the Central Analysis and Forecast Office, attended an International meeting on Television Forecast Presentation Techniques in Brussels in December. Mr. T. Keane, head of the Agricultural Meteorology Unit, attended a Joint Meeting of the British Society of Soil Science and the Agricultural Meteorology Group on "Climate and Soil Interactions", in York in April. Dr. J.R. Bates, Assistant Director, attended a meeting of the EEC Climatological Programme in Brussels in March.

STAFF TRAINING

Government restrictions on recruitment resulted in no training courses for newly recruited staff in the early part of the year, but a course for three newly recruited Meteorological Officers began on 12th November. A refresher course for a recently promoted Senior Meteorological Officer was held in May. In October, a student from the Lesotho Meteorological Service began the Meteorologists' course, the first time that an overseas student has been trained in Galway.

The following training courses in Meteorology were provided for Air Corps personnel at Casement Aerodrome, Baldonnel:

I) Air Corps Young Officers' 'Wings' Course in meteorology to Commercial Pilots Licence level, with final examination in November.

II) Naval Officers' Course in basic aviation meteorology for four officers associated with the helicopter-carrying ship "LE Eithne".

III) Maritime Squadron Captain's Course of eight lectures in meteorology appropriate to fishery patrol activities.

During 1984 Mr. C. O'Connor, Officer-in-Charge of the Meteorological Office at Cork Airport, continued to act as Examiner in Meteorology for the examinations for the Airline Transport Pilot's Licence and Commercial Pilot's Licence conducted by the Department of Communications. Examinations were held twice during the year.

The involvement of some individual staff members in educational or training activities is given below.

1. Ms. J. Byrne, Meteorological Officer, CAFO, began a B.A. Degree course at Trinity College Dublin.

2. Ms. A. Clifton, Meteorological Officer, Applications Division, continued with a B.Sc (Computer Science) course at Trinity College Dublin.

3. Mr. R. Cotter, Meteorological Officer, CAFO, continued with a B.A. Degree course at University College, Dublin.

4. Mr. R.G. Kavanagh, Senior Meteorological Officer, Computer Division, attended an IPA course on "Training and Instructional Techniques", and also a course on "Computer Project Management".

5. Mr. R.G. Kavanagh, Senior Meteorological Officer, and Mr. C. MacGabhann Meteorological Officer, both of the Computer Division, attended seminars on Computer networking, and on Data Communications.

6. Mr. R. McDermott, Meteorologist, CAFO, attended a 6-week course in numerical weather prediction at ECMWF, Reading.

7. Mr. R. McGrath, Meteorologist, Computer Division attended a training course on the use and interpretation of ECMWF products at ECMWF, Reading in June.

8. Mr. Peter O'Shea, Meteorological Officer, Computer Division, successfully completed a four year course, and was conferred with a B.Sc Computer Science Degree from Trinity College, Dublin.

9. Mr. J. Ryan, Meteorological Officer, Shannon Airport, completed a 20 week course in basic electronics, and progressed to a City and Guilds Course in Electronics & Electronic Principles at Moylish College.

10. Courses in Radio and Television presentation, organised by RTE, were attended by eight meteorologists from CAFO at various times during the year.

11. Messrs. Halton, Lee, Lennon, McCarthy and Healy, Meteorological Officers in CAFO, attended computer related courses at the National Institute for Higher Education at Glasnevin.

12. A Fortran Computer Programming Course for eight staff members was organised by the Computer Division at the Meteorological Service Headquarters in June.

ADMINISTRATION

Staffing

Government restrictions on recruitment and promotion continued to affect the Service during 1985 causing considerable difficulties in areas of the Service where redeployment is not possible. The Meteorological Office at Dublin Airport, and the Research Division, both continue to operate without a permanent Officer-in-Charge, while at many of the Service's stations, shortage of staff at the supervisory level led to difficulties in maintaining the required levels of service during the year.

The Government restrictions on payable overtime, which began in 1982 continued during 1985 and in some cases minor curtailments of service were necessary in order to stay within the prescribed allocation.

The efficient organisation of some areas of the Service is still hampered by an inadequate grading structure, a problem which has been in evidence for some years, and which has been exacerbated in recent times by reductions in the numbers of staff serving in higher grades. It was decided during the year that a comprehensive Review of the Meteorological Service should be undertaken to examine its structure, and to advise on its staffing and equipment needs. The Review will be undertaken by a body on which the Meteorological Service, the Department of Public Service, and the Department of Communications will be represented, and will get under way in early 1986.

Plans for services to aviation matured during the year and are expected to be implemented from 1986 onwards. These will involve the centralisation of the aviation forecasting function by the establishment of a Central Aviation Office at Shannon. It is also proposed to provide comprehensive self-briefing facilities for air-crew at Dublin Airport, incorporating the use of sophisticated computerised aids. Work on this latter aspect of the project is now well advanced, and it is expected that it will become operational during the coming year.

The members of staff serving in the Meteorological Service on 31st December 1985 were:

Director	1
Assistant Director	2
Senior Meteorologist	9
Meteorologist	42
Principal Meteorological Officer	7
Senior Meteorological Officer	35
Meteorological Officer	145
Assistant Meteorological Officer	31
Other grades	35
Total	307
Part-time staff	14
Overall Total	321

The total of 307 full-time staff represents a decrease of 6 on the equivalent figure for 1984.

The recently introduced facility which allows staff to opt for a 1 to 3 year "Career-Break" has proved very popular, and on 31st December 1985 was being availed of by 9 Officers. The scheme has created some difficulties for the Service, since while in theory replacements are available immediately, in practice it takes some considerable time to organise recruitment and training.

The activities of the Service were affected to a considerable extent by the Public Service one-day strike which took place on 15 October. Reports from most of the Services' Synoptic Reporting Stations were not available in real time for the 24 hour period, but it was possible to reconstruct them later with the help of autographic records. Forecasting and other services were considerably disrupted.

The Service was saddened during 1985 by the deaths of three of its members. Mr. Michael Duhig, Meteorological Officer died in January after a short illness. Particular sympathy was felt for his young family, since his wife had predeceased him only a few years before. Michael Duhig joined the Service as a Meteorological Officer in 1952 and served for most of his career at Valentia Observatory.

The death of Miss Vera Slevin, Clerical Officer, in December recalled to many staff members their time at Shannon Airport, where Vera Slevin had organised the General Office for so many years. Less well known throughout the Service, but respected and very well liked by his colleagues in Headquarters was messenger Danny Drennan who died on 12th October.

There were nine retirements during the year.

Mr. Norman Watson retired on 3rd October. Norman Watson joined the Service as a meteorologist in October 1948, having qualified as an electrical engineer at Manchester College of Technology. After training at Dublin Airport and Valentia, he spent his entire career in the aviation sector, where his forecasting skills were greatly respected. In later years he was deputy to the Officer-in-Charge of the Meteorological Office at Shannon Airport.

Mr. Joseph Hardy joined the Meteorological Service in 1940 as a Meteorological Officer. He served at a number of stations before being posted to Valentia Observatory in 1954 where he served for the remainder of his career. He was promoted Senior Meteorological Officer in 1947 and Principal Meteorological Officer in 1978. Joe Hardy's technical abilities were highly valued, particularly his contributions to the magnetic observations programme at Valentia. He retired on 30th May.

Mr. U.N. Egan retired in September. After joining the Service in 1940, Ultan Egan served at Foynes, Shannon Airport, Dublin Airport and Headquarters, where in recent years he headed the Instruments Unit of the Meteorological Service.

Mr. Egan worked for a number of years with WMO in Geneva, from 1957 to 1963, and again for a brief period in 1965. He was promoted Senior Meteorological Officer in 1957 and Principal Meteorological Officer in 1978.

Mr. J.N. Graham, Principal Meteorological Officer, served for nineteen years at Valentia Observatory, and for a further nineteen at the Meteorological Office, Dublin Airport, before transferring to CAFO in August 1981. He joined the service in 1940. Joe Graham played a key role in the administration of all three stations at which he served, and his methodical approach and grasp of detail has been greatly missed since his departure on retirement in September 1985.

Three Senior Meteorological Officers retired during the year. Mr. Joseph O'Brien retired in July, having joined as a Meteorological Officer in 1944 and served for almost all of his career at Valentia Observatory. He was promoted in 1964. Mr. Thomas Reynolds joined the Service in 1940, and was promoted in 1951. He will be best remembered for his work in the Training Division, where he imparted his skills in weather observing to the many staff members who passed through his hands during his twenty-two years at Rosslare. His former pupils now occupy all grades from Assistant Meteorological Officer to Assistant Director. Mr. Frank Meenan joined the Service as a Meteorological Officer in 1945, was promoted in 1979, and served at Valentia, Belmullet, Kilkenny, Headquarters and Casement Aerodrome. He retired on 13th September.

Mr. Fred Dunn, Technical Assistant, retired in February, having made his considerable skills available to the Service for eighteen years as a metalworker at Valentia Observatory. Equally skilful in another discipline was Mr. James Logue who retired in December, having been the Meteorological Service's draftsman for over forty years.

A number of officers of the Service saw their talents and abilities rewarded in the form of promotion during 1985. Mr. Eugene Hardy, Senior Meteorological Officer was promoted Principal Meteorological Officer in December, while Mr. Vincent Harmon, Mr. A. MacMaghnusa, Mr. P.D. Hearne and Mr. P. Barry, all Meteorological Officers, were promoted to the rank of Senior Meteorological Officer.

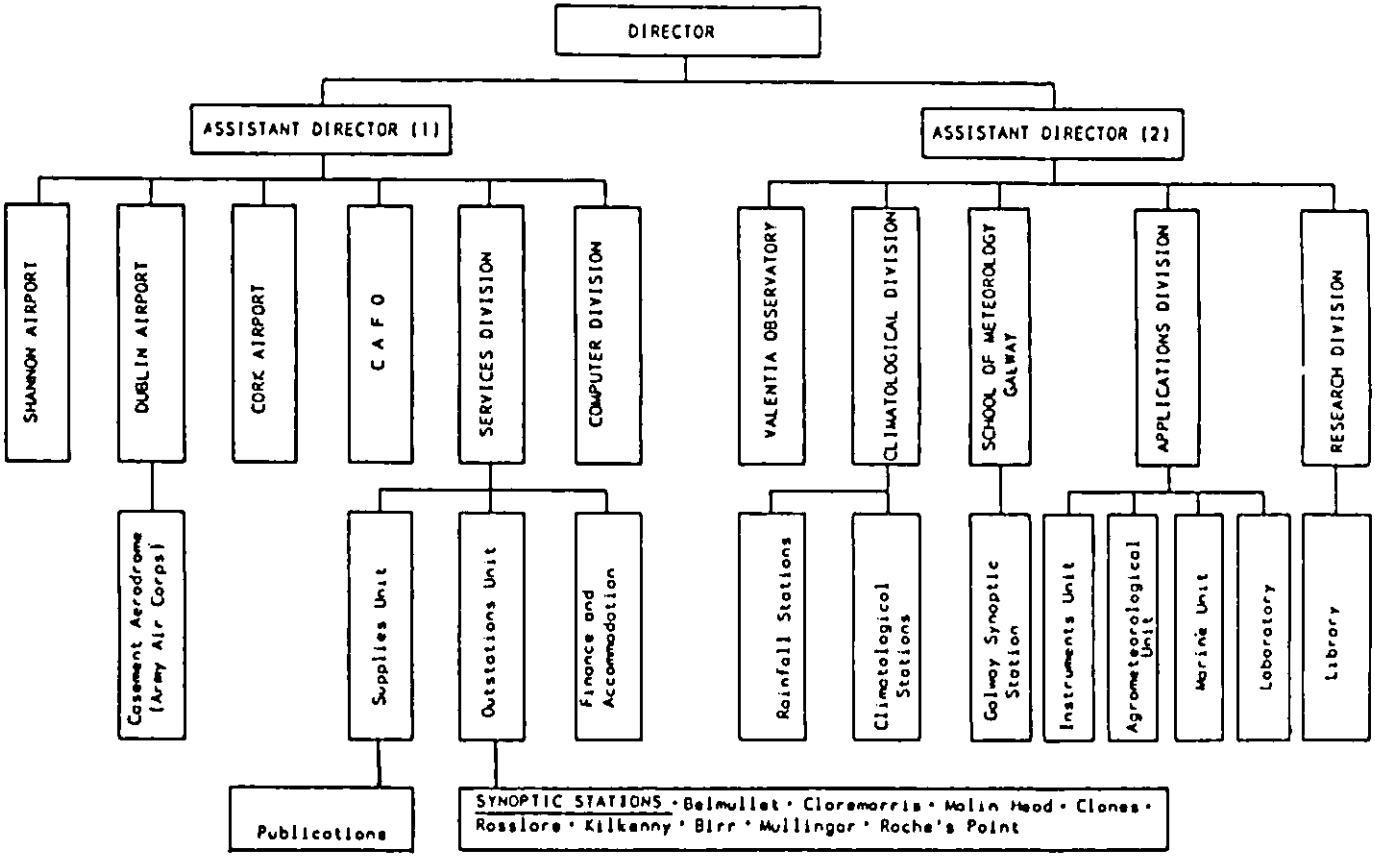

Figure 4. Organisation of the Meteorological Service

PRINCIPAL OFFICERS OF THE METEOROLOGICAL SERVICE

ON 31st DECEMBER 1985

DIRECTOR	D.L. Linehan B.E., B.Sc.
ASSISTANT DIRECTORS	W.H. Wann B.A., M.Sc
	J.R. Bates B.Sc.,Ph.D

SENIOR METEOROLOGISTS

C O'Connor B.Sc.	Meteorological Office, Cork Airport
P.A. Lyons B.Sc.	Meteorological Office, Shannon Airport
W.G. Callaghan B.Sc.	Applications & Instruments Division
B.E. McWilliams B.Sc.	Services Division
E.J. Murphy B.Sc.	Valentia Observatory
S.S. O Laoghog B.Sc.	Training Division
D.J. Murphy M.Sc.	Computer Division
D.L. Fitzgerald B.Sc.	Climatological Division
P. MacHugh, B.Sc.	Central Analysis & Forecast Office
Vacant	Research Division
Vacant	Meteorological Office, Dublin Airport

Accommodation

The Headquarters Building continued to be generally satisfactory. The central-heating boilers were modified for the burning of natural gas during the year with an option of changing back to oil should this appear more attractive at a later date. The Un-interruptable Power Supply (UPS) received a major overhaul following problems with the system early in the year.

At the Meteorological Office, Shannon Airport, the refurbishing of the Operations area - floor coverings, desks, and chairs - was completed. The refurbishing of the observer's penthouse, including the provision of a new cabinet for the Tonnelot Barometer, was also completed, resulting in a considerable overall improvement in the accommodation at that station.

"Answercall" telephones incorporating alarms systems were installed at most of the Services' Synoptic Stations to improve security for the observers who spend long hours on their own at these stations, sometimes in remote areas.

APPENDIX 1

PUBLICATIONS DURING 1985

(a) Meteorological Service Publications

1. Climatological Note No. 8. - "Air Temperature in Ireland 1951-1980. Monthly, Seasonal, and Annual Mean and Extreme Values" by D. Keane.

2. Climatological Note No 9. - "Monthly, Seasonal and Annual Mean Extreme Values of Duration of Bright Sunshine in Ireland 1951-1980" by D. Keane.

3. Technical Note No. 47. - "A Provisional Assessment of the Recreational Quality of Weather in Summer in Terms of Thermal Comfort and the Adverse Effect of Rainfall" by L.S. Leech, B.Sc.

4. AGMET - Joint Working Group on Applied Agricultural Meteorology - 1st Report, March 1985.

5. Internal Memorandum 106/85 - "Objective Verification of Numerical Forecasts for 1980" by J.E.M. Hamilton, B.Sc.,Ph.D.

6. Internal Memorandum 107/85 - "PGRAPH; Graph Plotting Package (DEC-2050 User Manual)" by J.E.M. Hamilton, B.Sc.,Ph.D.

7. Internal Memorandum 108/85 - "PCONTR; Contour Plotting Package (Revised Dec-2050 User Manual)" by J.E.M. Hamilton, B.Sc.,Ph.D.

8. Internal Memorandum 109/85 - "PLTMAP : ECMWF Background Map Package (user Manual for the Dec-2050 Implementation)" by J.E.M. Hamilton B.Sc.,Ph.D.

9. Monthly Weather Report, Parts I, II and III, January 1984 to December 1984.

10. Annual Weather Report, Parts I, II and III 1984.

11. Monthly Weather Summary, December 1984 to November 1985.

12. Agricultural Meteorological Bulletin, January 1985 to December 1985.

13. Meteorological Service Annual Report 1984.

(b) Other Publications

Bates, J.R. - "Semi-Lagrangian Advective Schemes and their Use in Meteorological Modeling". Lectures in Applied Mathematics (Amer. Math. Soc.) Vol. 22, Part 1, 1-29.

- Review of "Problems and Prospects in Long and Medium Range Weather forecasting", Eds. D.M. Burridge and E. Kallen. Earth-Science Reviews, (Elsevier, Amsterdam) 1985, 22, 162-163.

Bates, J.R. and MacDonald A. - Comments on "Some properties and comparative performance on the semi-Lagrangian method of Robert in the solution of the advection-diffusion equation". Atmosphere - Ocean 23, 193-194.

Lynch, P. - "Forecast Updating: Theory and Applications to a Simple Model. Scientific Report WR 85-04. KNMI, De Bilt Netherlands.

- "Initialization using Laplace Transforms". Q.J.R. Met. Soc. 111, 243-258.

- Initialization of a Barotropic Limited-Area Model using the Laplace Transform Technique". Mon. Weather Rev. 113, 1338-1344.

MacHugh, P. - "World Meteorological Day" - an article in "The Irish Times", 23rd March 1985.

O'Reilly, G. - A review of "Climate of the Ocean", a volume of the World Survey of Climatology.

A SELECTION OF LECTURES GIVEN BY MEMBERS OF THE STAFF

Bates, J.R. - "Climatic Consequences of a Nuclear War". Mathematics Dept., Trinity College, Dublin, 28th January.

- "Semi-Lagrangian Models for Weather Prediction" Meteorologie Nationale, Paris, 2nd September.

Blackburn, J. - "The Importance of Weather for Low Level Flights and the Service Provided by the Meteorological Service" to the Irish Organisation of Air Pilots on 26th January.

Byrne, C.M. - A talk and film, followed by a question and answer session at a one day seminar on General Aviation organised by the Limerick Flying Club.

O'Reilly, G. - A lecture entitled 'The Climate of Killarney' at Muckross House, Killarney at the request of the Parks Department of the Office of Public Works.

Hamilton, J. - Talk of Computer Graphics to the Mathematics Society of Technology - February.

Keane, T. - "Climate and its Effects on Windthrow", - a paper delivered to a symposium organised by the Society of Irish Forecasters, Dublin 29th March.

- "Weather and Climate in Agriculture" a lecture to ACOT School for Young Farmers, New Ross, 12th March.

Kingston, M.J. - A lecture on "Technical Aspects of Satellite Signal Acquisition" to 3rd. year electronic technician students at the School of Engineering, Limerick.

Lynch, P. - A lecture on "Laplace Transform Initialization" to EERM, Paris, May, 1985.

APPENDIX 2

SPECIAL TOPICS IN PREVIOUS ANNUAL REPORTS

1975	Development of the Meteorological Service
1976	Valentia Observatory
1977	Our Voluntary Observers
1978	The Meteorological Office at Foynes
1979	The New Headquarters Building
1980	The Use of Computers in the Meteorological Service
1981	The Use of Satellites in the Meteorological Service
1982	Telecommunications in the Meteorological Service
1983	The World Climate Programme
1984	The Central Analysis & Forecast Office