

SEVENTH ANNUAL REPORT  
OF THE  
METEOROLOGICAL COMMITTEE

TO THE  
LORDS COMMISSIONERS OF HIS MAJESTY'S  
TREASURY.

For the Year ended 31st March, 1912  
(the Fifty-seventh Year of the Meteorological Office).

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Presented to both Houses of Parliament by Command of His Majesty.

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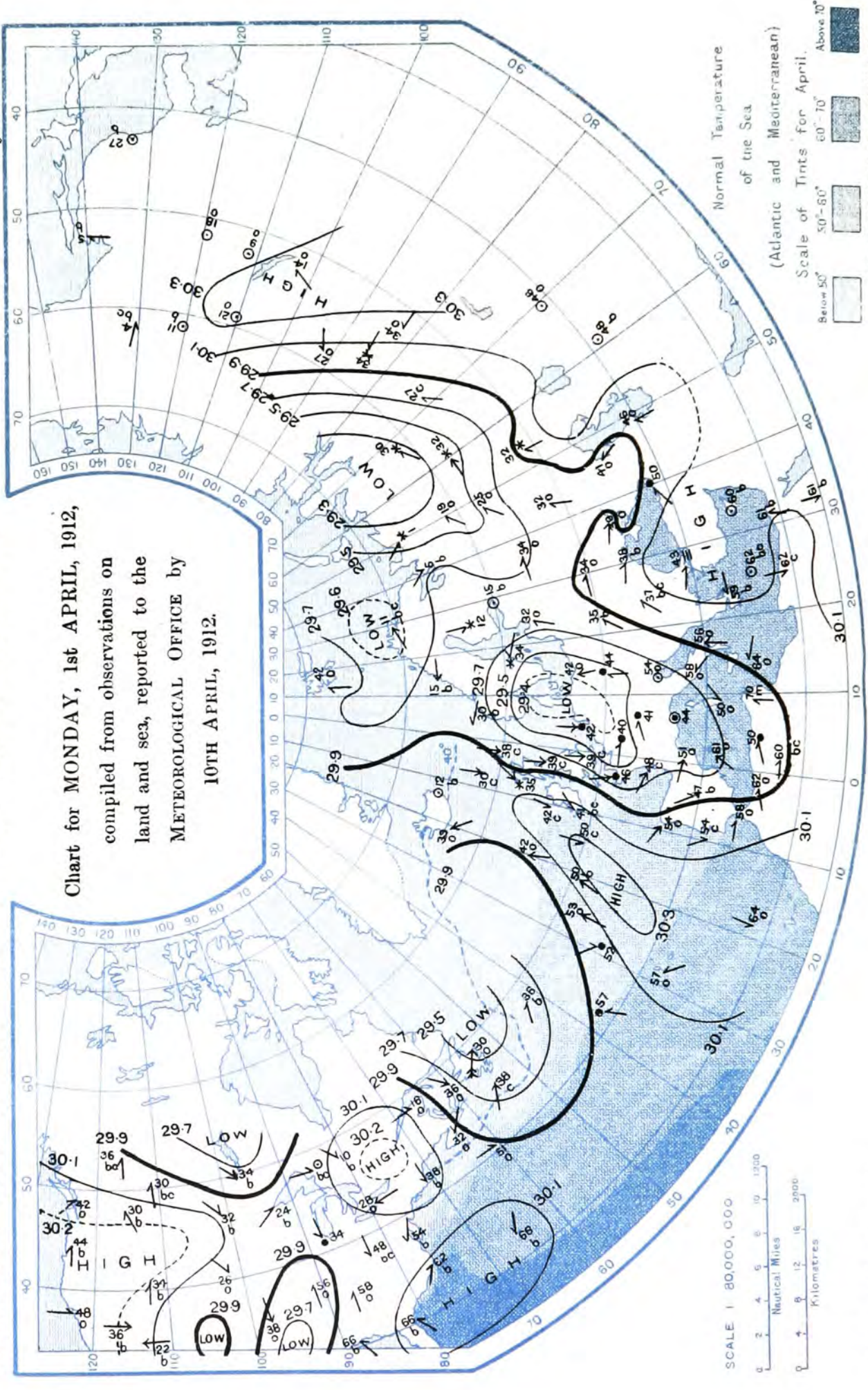
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Chart for MONDAY, 1st APRIL, 1912,  
compiled from observations on  
land and sea, reported to the  
METEOROLOGICAL OFFICE by  
10TH APRIL, 1912.



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## THE METEOROLOGICAL COMMITTEE, 1911-12,

*Constituted by Minutes of the Lords Commissioners of H.M.  
Treasury, dated 20th May, 1905, and 31st March, 1910.*

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Date of Appointment.	
April 1, 1910	... Mr. W. N. SHAW, Sc.D., F.R.S., Director, <i>Chairman.</i>
" "	... Rear - Admiral H. E. PUREY CUST, R.N. Hydrographer to the Navy.
" "	... Captain J. M. HARVEY, Principal Examiner of Masters and Mates, Board of Trade, Nominated by the Board of Trade.
" "	... T. H. MIDDLETON, M.A., M.Sc., Assistant Secretary of the Board of Agriculture and Fisheries. Nominated by the Board of Agriculture.
" "	... Sir GEORGE H. DARWIN, K.C.B., F.R.S., University of Cambridge. Nominated by the Royal Society.
" "	... Professor ARTHUR SCHUSTER, F.R.S., Uni- versity of Manchester. Nominated by the Royal Society.
" "	... Mr. G. L. BARSTOW. Nominated by the Treasury.

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Subject to the discretion of the authorities by which they were respectively nominated, the members of the Committee hold office for a period not exceeding five years, but are eligible for reappointment.

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## THE GASSIOT COMMITTEE OF THE ROYAL SOCIETY, 1911-12.

*Appointed in accordance with Treasury Letter of 26th February, 1910, by the Royal Society on 17th March, 1910, to administer the Gassiot Trust, and to promote the scientific study of the branches of science to which the Trust relates, viz., Meteorology, Terrestrial Magnetism, Atmospheric Electricity, Seismology, and the cognate subjects.*

---

### The Officers of the Royal Society :—

*President*    ...    ...    Sir Archibald Geikie, K.C.B.

*Treasurer*    ...    ...    Sir A. B. Kempe.

*Secretaries*    ...    ...    Sir Joseph Larmor, M.P.  
Sir J. Rose Bradford.

*Foreign Secretary*    ...    Sir William Crookes, O.M.

Dr. C. Chree.

Sir George Darwin, K.C.B.

Mr. W. H. Dines.

Mr. F. W. Dyson (*Astronomer Royal*).

Dr. R. T. Glazebrook, C.B.

Captain H. G. Lyons.

Prof. H. F. Newall.

Prof. J. H. Poynting.

Sir Arthur Rücker.

Prof. E. Rutherford.

Prof. A. Schuster.

Dr. W. N. Shaw.

Dr. G. T. Walker.

Mr. G. W. Walker.

Mr. C. T. R. Wilson.

*Secretaries :* Dr. C. Chree.

Mr. R. W. F. Harrison.

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# THE STAFF OF THE METEOROLOGICAL OFFICE AND OF THE OBSERVATORIES OF THE METEOROLOGICAL COMMITTEE, 1911-12.

## DIRECTOR.

William Napier Shaw, LL.D., Sc.D., F.R.S.

## METEOROLOGICAL OFFICE.

### MARINE DIVISION.

<i>Marine Superintendent</i>	...	M. W. Campbell Hepworth,* C.B., R.D., Commander, R.N.R.
<i>Principal Assistant</i>	...	W. Allingham.
<i>Assistants</i>	...	W. G. James, C. H. Thompson.
<i>Clerks</i>	...	J. T. Williams, H. Keeton. Misses E. D. Anderson, D. Buckeridge, R. E. Smith.
<i>Boy Clerks</i>	...	A. Lovie,† A. J. Tabor.†

### FORECAST DIVISION.

<i>Superintendent</i>	...	R. G. K. Lempfert,* M.A.
<i>Principal Assistant</i>	...	F. J. Brodie.*
<i>Forecast Assistants</i>	...	H. Harries,* R. Sargeant.*
<i>Clerks</i>	...	A. R. Simpkins, F. W. Snell; A. T. Bench, W. Hayes,† A. G. W. Howard.†
<i>Boy Clerk</i>	...	R. Pyser.†

### STATISTICS AND LIBRARY DIVISION.

<i>Superintendent</i>	...	E. Gold,* M.A.
<i>Principal Assistant</i>	...	T. Duncan Bell.
<i>Assistants</i>	...	A. H. Bell, A. J. Rigby, J. Sheerman.
<i>Clerks</i>	...	C. A. Bracey, C. W. Heinemann, L. H. Powers.
<i>Clerk Assistants</i>	...	C. E. P. Brooks,† P. N. Skelton.†
<i>Supernumerary Clerks</i>	...	A. E. Pycock, W. Tomkins.†
<i>Probationer</i>	...	M. T. Spence.
<i>Boy Clerk</i>	...	M. H. Megrah.

### INSTRUMENTS DIVISION.

<i>Superintendent</i>	...	R. H. Curtis.
<i>Assistant</i>	...	R. F. Wallace.
<i>Boy Clerk</i>	...	C. G. West.

\* Inspectors of Meteorological Stations.

† Members of the corps of observers for the instruments installed at the office.

# LABORATORY, WORKSHOP, AND DRAWING OFFICE.

<i>Mechanical Assistant</i>	...	J. H. James.†
<i>Photographic Assistant</i>	...	Miss E. C. Humphreys.
<i>Attendant</i>	...	B. G. Brame.

## CORRESPONDENCE AND ACCOUNTS.

<i>Chief Clerk and Cashier</i>	...	John A. Curtis.
<i>Clerk</i>	...	E. J. Hood.
<i>Clerk Assistants</i>	...	E. L. Ardley, H. L. B. Tarrant.
<i>Typist</i>	...	Miss A. Turney.
<i>Boy Clerk</i>	...	N. C. Bradnock.
<i>Office Keepers</i>	...	W. H. Parsons, A. G. Goad.
<i>Senior Messenger</i>	...	C. E. Goad.
<i>Office Messenger</i>	...	W. J. Winter.

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4 Boy Messengers, 4 Cleaners.

---

<i>Secretary to the Director and Clerk of Publications.</i>	} R. Corless,* M.A.	
<i>Graduate Assistants</i>	...	H. W. Braby,† B.A. (South Kensington), G. Dobson, B.A. (Kew).
<i>Additional Inspector</i>	...	A. Watt,* M.A., Secretary Scottish Meteorological Society.

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*Lithographers*—Messrs. Wyman & Sons, Ltd. (A. G. King, *Artist*).

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\* Inspectors of Meteorological Stations.

† Member of the corps of observers for the instruments installed at the Office.

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## OBSERVATORIES.

### CENTRAL OBSERVATORY.

Kew Observatory, Old Deer Park, Richmond, Surrey.

---

<i>Superintendent</i>	...	...	{ C. Chree, Sc.D., LL.D. F.R.S., <i>Assistant-Director</i> <i>of Observatories.</i>
<i>Clerk Assistants</i>	...	...	E. Boxall, B. Francis.
<i>Supernumerary Clerk</i>	...	...	G. Harris.
<i>Boy Clerk</i>	...	'...	F. Levin.
<i>Observer and Caretaker</i>	...	...	W. R. Corrin.

### MAGNETIC OBSERVATORY.

Eskdalemuir Observatory, Langholm, Dumfries-shire, N.B.

---

<i>Superintendent</i>	...	...	G. W. Walker, M.A., A.R.C.Sc.
<i>Professional Assistant for</i>			{ L. Southern, B.A.
<i>Seismology.</i>			
<i>Clerk Assistant</i>	...	...	A. E. Gendle.
<i>Clerk Computer</i>	...	...	W. C. Parkinson.
<i>Mechanic</i>	...	...	...
1 handyman.			

### WESTERN OBSERVATORY.

Valencia Observatory, Cahirciveen, co. Kerry.

---

<i>Superintendent</i>	...	...	J. E. Cullum.
<i>Assistant</i>	...	...	M. Sugrue.
1 handyman.			

### BRANCH METEOROLOGICAL OFFICE.

[South Farnborough, Hants.]

---

<i>Meteorologist</i>	...	...	J. S. Dines, M.A.
<i>Clerk Computer</i>	...	...	H. Wise.

### INVESTIGATION OF THE UPPER AIR.

Pyrton Hill, Watlington, Oxon.

---

<i>Director of Experiments in connexion with the Investigation of the Upper Air,</i>	{ W. H. Dines, F.R.S.		
<i>Mechanical Assistant</i>	...	...	H. W. Baker.

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# SEVENTH ANNUAL REPORT

## OF THE

# METEOROLOGICAL COMMITTEE

TO

THE LORDS COMMISSIONERS OF HIS  
MAJESTY'S TREASURY,

For the Year ended 31st March, 1912—the Fifty-seventh  
year of the Meteorological Office.

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MAY IT PLEASE YOUR LORDSHIPS,

Meetings of the Committee have been held on 5th April, 5th July, 1st November, 6th December, 1911, and on 7th February, 20th March, 1912. No change has taken place in the membership of the Committee during the year.

The organisation of the work of the Office in the new premises has claimed a good deal of attention. Other important items which have also occupied the attention of the Committee have been (1) the reconsideration of the intimate relations between the Meteorological Office and the Post Office with regard to the international exchange of telegraphic weather reports from stations in this country and abroad, which has eventuated in priority, under the Telegraph Acts, being given to certain classes of meteorological telegrams and to storm warnings; (2) the incorporation in the official network of stations, by agreement with the Royal Meteorological Society, of the normal and auxiliary climatological stations which have hitherto reported their observations to the Society and since the beginning of 1912 have been transferred to the Office; (3) the revision of the scheme of publications in order to provide for these new stations and also for the results of observations in Terrestrial Magnetism, Atmospheric Electricity and Seismology recorded at the Observatories in connexion with the Office; and (4) the revision of the rules under which daily telegraphic reports from Health Resorts are accepted for communication to the Press, in order to secure greater efficiency and to relieve the Office of part of the increasing expense of dealing with that service. Efforts have also been made to provide greater facilities for the distribution of forecasts to rural post offices in the interests of agriculture and the fisheries on the one hand, and to local authorities for the use of municipal surveyors and engineers on the other, but so far without any substantial result.



**Office and Observatory Staff.**—The staff has been enlarged in the course of the year by the appointment of Mr. L. Southern, B.A., of Emmanuel College, Cambridge, as Professional Assistant in Seismology at Eskdalemuir in connection with the installation of an Omori Seismograph lent for two years by the Japanese Government at the suggestion of Professor J. Milne, F.R.S. For this appointment and for incidental expenses within the two years, the Royal Society, at the request of the Gassiot Committee, provided the sum of £450, on the understanding that at the termination of the period no further grant would be made. For the purpose of advanced study and research in atmospheric electricity, chiefly at Kew Observatory, Mr. G. Dobson, B.A., Research Student of Gonville and Caius College, has been accepted for one year from 1st October, 1911, as Graduate Assistant. Mr. H. W. Braby, B.A., has been accepted as Graduate Assistant for one year at the Office with special reference to the examination of the manuscript records from British Colonies and their co-ordination with the reports received at the Office from various parts of the Empire. In connexion with the additional work in the statistical division, Mr. T. H. Spence, whose father, Mr. Magnus Spence, master of the public school at Deerness, Orkney, has acted as curator of an anemometer and has contributed observations to the Office for many years, has been accepted as probationer, and an additional boy messenger has been appointed therein. Otherwise the numbers of the staff have remained the same, but there are two retirements on superannuation allowance to which reference should be made. In both cases the officials whose tenure has now come to an end originally joined the staff of Admiral Fitz Roy's office in Parliament Street more than fifty years ago.

Mr. Charles Harding, who retired on 30th September, was principal assistant in the Marine Division of the Office for 37 years, and Mr. Richard Henry Curtis, whose retirement dates from the close of the year, was largely concerned with the mechanical processes devised by the Meteorological Committee of the Royal Society for reproducing the autographic records of the observatories, and took a large personal share in the work of the office in connexion with the automatic recording of wind and sunshine. For many years he prepared for the press the results of the work of Observatories, and in 1907 he became Superintendent of the Instruments and Observatories Division of the Office, the operations of which have become very important, as the Division has to deal with the supply of large numbers of meteorological instruments to the Navy, the Dominions and Colonies, and the Office stations.

Both these officials contributed a number of important papers to the *Journal of the Royal Meteorological Society* and other scientific publications which have taken a recognised position in meteorological literature.

Mr. William Allingham, Nautical Assistant, has succeeded Mr. Charles Harding as Principal Assistant in the Marine Division. Mr. Curtis's successor has not yet been appointed.

**The New Premises.**—The fitting of the rooms at the new Office with ordinary furniture by H.M. Office of Works has been completed as indicated in last year's report. A number of items of special

furniture, fittings and instruments, among which may be mentioned various stands and screens for apparatus on the roof, and a relief map of the British Isles on the scale of one millionth with a glass case for it in the ante-room, have been provided out of the accumulated balance of Office funds.

There are still a large number of bundles of documents and records for which the Committee have been unable to provide suitable accommodation, and some additional accommodation for the display of objects of interest in the museum and the storage of working forms is required, but the available funds have been exhausted.

Early in the year it appeared that difficulties were likely to arise about the regular production of the Daily Weather Report from the Meteorological Office Press, unless a duplicate machine were provided to meet the requirements in case of breakdown. The contract for the printing of the Weekly Weather Report and Monthly Weather Report was due for renewal or alteration at the close of 1911, and H.M. Stationery Office urged the advantage of having the lithography of these reports also carried out on the Office premises. The Committee accordingly made arrangements for setting free the portion of the large room in the basement which they had reserved for a workshop, in order to accommodate another lithographic machine. This necessitated the transfer of the clerical staff concerned with the work of the observatories to one of the bays in the Library, so that a room on the second floor under the Laboratory might be set free for a workshop. To do this the Committee have had to rely on the courtesy of the Director of the Science Museum, who has stored for them temporarily the large glass case which occupied the bay now required for clerks. The Office is therefore still somewhat hampered for accommodation. After the surrender of the necessary space a good deal of delay took place in installing the second lithographic machine, but it is now in operation and the charts for the Weekly and Monthly Reports have been produced at the Meteorological Office Press since the beginning of 1912.

The display of instruments, records, &c., in the new premises has been received with a good deal of appreciation by the public. Judging by occasional communications received at the Office, the maps in the case outside the Office and the recording instruments in the street lobby are objects of interest to the public on various grounds; and a considerable number of parties of visitors from Polytechnics and other educational bodies have visited the Office by appointment on Saturday afternoons. The convenience of a mechanical workshop on the premises is of the greatest assistance, not only for the local work of the Office but in dealing with many of the varied questions which arise in connexion with the supervision of a large number of stations at a distance.

Rules have been drawn up for the use of the Library under the new conditions.

Yielding to the representations of H.M. Office of Works, and in pursuance of the terms of the lease, the Committee have found it necessary to make provision for the night watching of the premises, regular attention to the appliances for heating and



lighting, and regular attendance on the lift, on a scale somewhat out of keeping with the traditional practice of the Office during its occupation of premises in Victoria Street.

Before passing from the consideration of the new premises the Committee desire to place on record their thanks for the contribution by private subscription of three bronze memorial tablets for the show cases in the hall of the first floor of the Office, and also for two carvings of a device bearing the Office monogram over the main door on either side of it. All these were executed by the Bromsgrove Guild under the supervision of the architects' department of the Office of Works. The bronzes include medallions in low relief of Admiral R. FitzRoy, Superintendent of the Meteorological Department of the Board of Trade; General Sir R. Sabine, President of the Royal Society, Chairman of the Meteorological Committee of the Royal Society, and Dr. R. H. Scott, Director of the Office; Professor H. J. S. Smith and Sir Richard Strachey, Chairmen in succession of the Meteorological Council. For contributions toward the cost of these valuable additions to the decoration of the Office the Committee are indebted to Mr. F. C. Bayard, Professor L. Becker, Mr. C. J. P. Cave, Dr. H. N. Dickson, Vice-Admiral Sir A. Mostyn Field, Mr. R. Inwards, Mr. E. Kitto, Mr. W. Marriott, Mr. H. Mellish, Mr. R. E. Middleton, Professor C. Niven, Professor J. H. Poynting, Colonel H. E. Rawson, Sir A. W. Rücker, Rev. W. Sidgreaves, Sir J. Wrench Towse, as well as to a large number of past and present members of the staff of the Office. The balance of the cost has been met by contributions from members of the Committee.

**Meteorological Telegrams.**—One of the reasons put forward for the removal of the work of the Office from Victoria Street to South Kensington was that it would enable the meteorological work to be associated with the telegraphic work, upon which it depends for the Daily Weather Service, in one building on the site belonging to the Commissioners for the Exhibition of 1851. As the Meteorological Office deals with some 200 telegrams a day, on the average, telegraphic facilities are essential for its success. The removal to new premises has resulted in some unexpected developments. As noted in last year's Report, arrangement was made with the Post Office while the building was being erected for the delivery of the meteorological telegrams to be effected by pneumatic tube from the floor below the Forecast Room instead of by private wire from the Central Telegraph Office or by messenger from a neighbouring telegraph office in Victoria Street. After the new system had been in operation for some months the Post Office notified its intention of making a substantial charge for delivering the telegrams before 8 a.m., or after Post Office closing time on Sundays, and reduced the facilities for communication with the Central Telegraph Office, which had been enjoyed for many years with the private wire at Victoria Street, to those afforded to any other "private person." The Post Office offered to revert to the traditional practice if the Meteorological Committee were willing to give up delivery by tube and substitute a private wire.

The Committee remained, however, of the opinion that from the general point of view it is uneconomical for the Meteorological

Office to include in its technical staff a sufficiently large number of expert telegraphists to be ready to attend to the instruments at any time between 7.15 a.m. and 8.30 p.m., who could only be fully occupied with telegraphy for two or three hours a day in the aggregate. Since both the Post Office and the Meteorological Office were Government institutions it seemed to them better for the telegraphy to be done by post office telegraphists in the same building, leaving the Meteorological Office staff excused from adding telegraphy to its accomplishments.

They therefore prepared a memorandum setting out the complicated international relationships involved on behalf of this country in the exchange of meteorological telegrams with the various governments or government institutes of Europe, and appealed on the one hand to Your Lordships for special consideration under the Telegraph Acts to be given to the telegrams, and to the Post Office on the other, pointing out the advantages of the delivery by tube as arranged in the new building, and asking for exception to be made in the case of the Meteorological Office in regard to the communication with headquarters about the working of the telegraphic business.

To Your Lordships the Committee are gratefully indebted for having requested the Postmaster-General to arrange for priority to be given, under the Telegraphs Acts, to certain classes of meteorological telegrams and to storm warning telegrams, and to the Postmaster-General they are equally indebted for giving effect to Your Lordships' request.

They were looking forward to an equally favourable reply from the Postmaster-General on the other points, but it had not arrived when the year closed. On May 1st of the current year, however, a reply was received intimating that a careful examination had disclosed that by having the foreign telegrams sent to the South Kensington Office by wires which the public may use, instead of by wire reserved for the private use of the Office, charges amounting to £400 a year additional to those which have been customary since 1879 had become payable. They are informed that the charge will be waived if the Office hires two telephone circuits for its special use between the Central Telegraph Office and the Meteorological Office. The matter is still under consideration.

**The Distribution of Weather Forecasts.**—In view of the fact that forecasts have been prepared in the Office twice a day, and during the summer months three times a day, since 1879, and that evidence as to the improved accuracy and the occasional utility of the forecasts has been accumulating in recent years, the Committee have thought it desirable to seek a considerable extension of the means of distribution of the forecasts in order to make an adequate test of the utility of the system. The experience of the Office in regard to the Admiralty in this respect is reassuring. Commencing in January, 1911, in compliance with a request from their Lordships, an abbreviated report and general forecast have been drawn up each evening for distribution by radio-telegraphy to H.M. ships in home waters, and before the end of the year a letter was received stating that the evening message had been found useful and asking on that ground for a corresponding message each morning; this



also has been supplied since 1st March, 1912. It is, however, notorious that the facilities afforded by the preparation of the forecasts are not used to nearly their full extent. The method of distribution by supplying type-written copies overnight for publication in the morning papers lacks utility because the forecast is not in the hands of the reader until a large part of its period has already expired. Distribution must be by telegraph if the full advantage is to be secured. The Committee are of opinion that a satisfactory judgment as to the utility of forecasts can only be arrived at by their regular daily use for a long period. The use of forecasts distributed from a central office as a practical guide in arranging the day's work, in place of the customary signs of the sky, requires practice and habit which cannot be obtained by an occasional inquiry on special occasions or by regular transmission for short periods. According to the most recent Office figures, out of 365 forecasts issued in a year 343 are more nearly right than wrong, but on the average 22 are failures, partial or complete. In some circumstances the impression produced by one failure may easily outweigh that of 15 complete or partial successes; there is a better chance of 22 failures being estimated at their true value in relation to 343 successes; still more of 1,715 successes being brought into proper relation with 110 failures. On that account the Committee decided to ask for a trial extending over five years.

In order to provide for the telegraphic distribution of forecasts for the use of agriculturists and others, application was made through the Treasury for a grant of £5,000 from the Development Fund to be spent on telegraphy. With the view of preparing a scheme of distribution inquiry was made of the Postmaster-General as to the cost of distributing a forecast message to all the post offices in Great Britain and Ireland. The reply was to the effect that, taking the number of post offices at 8,218 and the number of words in a forecast at 15, the cost of the telegrams would be £106,234 a year, and reference was made to a reply of similar tenour by Mr. Fawcett, Postmaster-General in 1882.

The Committee are unable to accept this as an adequate representation of the position, because if £100,000 appeared on the expenditure side of the Meteorological Office account for telegrams it would also appear on the receipt side of the Post Office accounts, and so far as the actual figures are concerned the two items in the accounts presented by the Comptroller and Auditor-General would cancel out and leave no real information as to cost. The Committee were thus disappointed to find that even if the application for £5,000 had been approved it would only have been available for the distribution of forecasts to the same area as a "private person" could reach with telegrams on private business for the same sum.

In the end, after consideration, the Development Commissioners ruled that the grant was not within their powers under the Development Act because the application, as set out by the Committee, was partly based on the ground of general public utility and not essentially on that of the development of Agriculture or Fisheries.

While this application was under consideration by the Commissioners a deputation consisting of Mr. A. T. Davis, M. Inst. C.E., M.I.Mun.Cy.E., F.S.I., County Engineer of Shropshire;

Mr. R. A. Ryves, A.M.Inst.,C.E., F.R.Met.Soc.; and Mr. H. G. Turner, A.M.Inst.C.E., Assistant Engineer and Surveyor, Surbiton District Council, waited on the Director of the Meteorological Office on 12th October, 1911, for the purpose of submitting the following resolution adopted at a conference of Municipal and County Engineers, 29th April, 1911 :—

“That this Conference of road engineers and others interested in the improvement of the roads of this country is strongly of opinion that it would be a facility and economy in connection with the branch of Local Government work referred to, as well as in relation to other branches of Municipal Engineering, if His Majesty's Meteorological Department could establish a system of weather forecasts, localised as far as practicable, and telegraphed daily to Municipal and County Offices or Post Offices in as many districts as practicable throughout the country.”

The resolution has been supported by the communication of resolutions from the following :—

The Borough Surveyor, Douglas, Isle of Man.

The Surbiton District Council.

The Liversedge Urban District Council.

The Spen Valley Literary and Scientific Society.

The Irish County Councils' Officials' Association.

The Institution of Water Engineers.

The Teddington Urban District Council.

The Ruislip-Northwood Urban District Council.

The Corporation of the City of Gloucester.

The Merton Urban District Council.

The Town Council, Felixstowe.

A copy of the resolution with a letter setting out the position was forwarded to the Road Board on 2nd November, 1911, but a final reply had not been received at the close of the year.

The movement which was initiated by the Conference of Road Engineers elicited a certain amount of support for the proposal to undertake the distribution of the forecasts and also incidentally a certain amount of adverse opinion which was based mainly upon considerations of the inaccuracy of forecasts and the reasons for it. That, however, does not fully represent the point at issue. There are comparatively few people in the country to whom the weather is always a matter of indifference, so that in making plans for to-morrow the greater number have, somehow or other, to take account of what the weather is going to be. They may of course form their judgment by their own or their friends' experience, or make no provision of their own, but protect themselves by insurance or otherwise against the consequences. The real question is whether, with forecasts which are substantially correct nine times out of ten, the public would in the long run and in the aggregate be better off by more than the cost of distributing the information. To the Committee it seems that such a point can only be properly determined by an adequate trial, for which at present the facilities do not exist.

**Daily Reports to the Newspaper Press from Health Resorts.**—A development which is concerned with the voluntary contribution of



data to the office, but which was initiated quite independently of the negotiations with the Royal Meteorological Society, to be referred to later, is the reorganisation of the supply of the information contributed by the health resorts for communication to the newspaper press. When the recording of sunshine was a novelty some twenty-five years ago the office accepted telegrams giving the records of sunshine up to 6 p.m. daily and communicated them, with the evening reports and forecasts, to newspapers and press agencies. For many years only sunshine was reported, but recently the available space in the telegram has been used for the other meteorological data of a 6 p.m. report, on the same lines as those of the telegraphic reporting stations. Of the data thus communicated the figures for sunshine have been reported to the newspapers and the remainder have formed an interesting table on the fourth page of the Daily Weather Report.

The official publication of data involves the supervision of the stations to see that the international conventions are understood and complied with, and this again involves the periodical inspection of the stations. It is the rule of the Office for its own stations which supply information for the Daily Weather Report to be visited by an inspector from the Office each year, but it has not been regarded as necessary to visit the voluntary stations more than once in three years. The communication of data from health resorts has grown in recent years to such an extent that the Committee thought it desirable to issue officially a schedule of observations received each evening and not simply extract the figures for sunshine. This has become possible owing to the change in the method of delivering telegrams. But the juxtaposition of figures from various parts of the country implies careful supervision of the methods and instruments employed and to carry out the supervision effectively annual inspection is indispensable. This puts the Office to considerable additional expense for which no return is made because the information is supplied to newspapers without charge. The Committee have therefore decided to make a charge of £4 per annum against the stations, as being the sum which they estimate to represent the average cost of an inspection visit. The arrangements are complete for the commencement of the new scheme on 1st May, 1912, and there is every prospect that the system will be generally accepted.

**Relations with the Royal Meteorological Society.**—For many years it has been customary for the Meteorological Office to make a contribution to the funds of the Royal Meteorological Society and the Scottish Meteorological Society in consideration of the supply of schedules of observations, ready for printing in official publications, from stations which were associated with the societies, and of the periodical inspection of the stations. The origin of the custom is of some interest. The Meteorological Office as reorganised in 1867, after Admiral FitzRoy's death, was expected to deal with the meteorology of the ocean, with telegraphic reports from stations in the British Isles and the Continent, and with the explanation of the phenomena disclosed therein on a scientific basis, by means of the records of observatories with self-recording instruments similar to those which had then recently been established at Kew Observatory.

The Societies were already occupying themselves with the collection and discussion by their members of the meteorological data of amateur observers in all parts of the country, and the Office had no responsibilities in that direction. The data collected were published in the journals of the societies and others by the Registrars-General of Births, Deaths and Marriages, who were closely associated with the work of the Societies. Then came two International Congresses—one at Vienna in 1874, and another at Rome in 1879—which dealt with the organisation of meteorological work for the study of climate in all parts of the globe, and initiated the official publication of data from stations similar to those which the societies had organised.

Only few private observers contributed their observations to the Office, and to meet the international requirements the Office paid to the societies an annual sum on account of the expense of inspecting the selected stations and of preparing the schedules for publication. In 1878 the Office, under the Meteorological Council, began the issue of a Weekly Weather Report for agricultural and sanitary purposes, which was intended to develop the practical application of meteorological statistics. This required information from representative stations in all districts. Among the statistics were those of sunshine, for the measurement of which, with Sir G. G. Stokes's assistance, the Office had introduced an instrument. A large number of health resorts gradually became interested in the subject, and as a novelty the Office included the daily totals in their evening reports to newspapers, and thus by degrees the Office became an important centre for the collection of data from what are still known as voluntary stations, though in many cases they are maintained by local authorities. Meanwhile the societies developed independently their own system of publication, using in many cases the same data. Endeavours were made in 1905-6 to come to some understanding that would unify the independent schemes and avoid overlapping, but the negotiations fell through. All this time the payments by the Office to the Societies had been maintained, but in 1910 the Office gave notice to discontinue the payment for monthly schedules and for inspections in the case of the Royal Meteorological Society. The President and Council of the Society then decided that it would be best for the Society to discontinue its publication of the Meteorological Record, and ask its observers to contribute their information to the Office, which thenceforth would undertake the necessary inspection and supervision, with the understanding that a summary of the observations would be included in the Monthly Weather Report and that a copy of the report for official use would be presented to the contributors.

This proposal has been accepted by the Committee, who have also arranged with the Controller of H.M. Stationery Office for the supply to the Society, at cost price of printing and paper, of copies of the Monthly Report for distribution to the Fellows of the Society. The staff of the Society's office is thus relieved from the work of supervising and editing the results for stations which have been transferred to the Office, and the Office is relieved of the corresponding payment. But the Society propose to use their staff for the



preparation of climatological tables and charts for the British Isles, which have long been recognised as urgently required. They have asked for pecuniary help from the Committee in carrying out this scheme, and the Committee have included £50 in the estimate for 1912-13 on that account.

**Branch Office at South Farnborough.**—The arrangement for experimental work in the investigation of wind structure for the Advisory Committee for Aeronautics under the direction of the Office has continued during the year, and the work has been carried on at Pyrton Hill, the headquarters of the work for the Office in connexion with the investigation of the upper air. The work will be transferred to South Farnborough as soon as the necessary accommodation is provided. In the meantime Mr. J. S. Dines, meteorologist in charge of the experiments, has been engaged upon the completion of designs for a wind-recorder to give both direction and velocity upon the same sheet, and upon the observation of vertical velocity by means of pilot balloons or tethered balloons. The results of the investigation have been communicated to the Advisory Committee for Aeronautics and incorporated in its report.

**Auxiliary Observatories.**—In 1868 the Meteorological Committee of the Royal Society initiated the system of making annual grants to independent institutions in consideration of the maintenance of observatories with self-recording meteorological instruments similar to those which had at that time been brought into operation at Kew Observatory. In addition to that at Kew, five observatories were established on these terms at Aberdeen, Glasgow, Stonyhurst, Falmouth, and Armagh. An Observatory on similar lines at Valencia was administered directly from the Office. In 1883 the Meteorological Council reduced its contribution in the case of Glasgow, Stonyhurst, and Armagh, but after some negotiations continued the allowance for the Falmouth Observatory, which was provided with a new site and buildings and to which was added, by means of funds provided by the Government Grant Committee of the Royal Society, an equipment for recording the terrestrial magnetic elements. With increasing difficulty the continuous records of the meteorological and magnetic elements have been maintained by the Royal Cornwall Polytechnic Society by the aid of grants from the British Association for the Advancement of Science and the Government Grant Committee of the Royal Society.

In the autumn of 1911 the Society took the whole question of the maintenance of the Observatory into consideration, and on 9th December of that year Mr. Wilson Lloyd Fox, Honorary Secretary of the Observatory Committee, addressed a letter to the Office in which he announced the decision of the Society. "In view of matters connected both with the finances and the personnel of the Observatory this Committee [of the Royal Cornwall Polytechnic Society] do not see their way to continue the observations after the close of 1912, and feel it only due to the scientific authorities who

have so long and so consistently supported the Falmouth Observatory that they be at once apprised of the fact."

This decision on the part of the Falmouth Observatory has raised the whole question of the continuance of the methods of recording on the model of Kew Observatory. The Committee are informed that the point of application of active meteorological inquiry has passed away from the questions for which the old form of recording instrument were alone suitable and that the urgency of questions connected with the upper air necessitates a new kind of activity of which the Observatories of 1868 took no account. They have therefore decided to withdraw the grants which are devoted simply to the continuance of observations in the old form, considering that the maintenance of continuity in the case of Kew, Valencia, Aberdeen, and in future of Eskdalemuir will be sufficient for the important questions of secular variations.

**Publications.**—The most important matters in connexion with publications which have come before the Committee are the arrangements for the presentation of the monthly and annual results obtained at the Observatories. The representation of daily values had already been provided for by the monthly issue of the *Geophysical Journal*, of which seven monthly issues beginning with January, 1911, were completed at the end of the year. The arrangements for *Hourly Values, Geophysical Section*, intended to embody the hourly readings of the magnetic instruments at Eskdalemuir and summaries of the hourly values of all other automatic recording instruments at Observatories in connexion with the Office, have been the subject of further prolonged consideration with the assistance of the Gassiot Committee of the Royal Society. The compilation of the data was not complete at the close of the year, but it is hoped that a proof of the results for the first year, 1911, may be ready for the meeting of the Gassiot Committee which is due to be held before the 1st July.

The issue of *Geophysical Memoirs* as a supplement to the *Geophysical Journal*, containing official reports and papers on meteorological and geophysical subjects, has been begun with three papers by Commander Hepworth, Mr. W. H. Dines, and Mr. G. W. Walker.

The form of the Monthly Weather Report has been remodelled in order to take in the data for the large number of additional stations transferred from the Royal Meteorological Society.

These changes and enlargements have thrown much additional work upon the statistical division of the Office which prepares the publications for the press, and in consequence the publications are not so nearly up to date as they were last year. The delay, though unavoidable, is unintentional. The amount of material which passes through the Office for publication, coming from all parts of the country and from a number of colonies, is very large, and elaborate precautions for avoiding confusion are necessary unless the work of preparation for publication keeps pace with the receipt of the material.



The official publications issued or signed for press during the year are as follows :—

**PERIODICAL.**—The Daily Weather Report.

Monthly Meteorological Charts of the Atlantic Ocean and the Mediterranean.

Monthly Meteorological Charts of the Indian Ocean and the Red Sea.

The British Meteorological and Magnetic Year Book for 1911, comprising :—

Part I.—The Weekly Weather Report with Quarterly and Annual Summaries, A wind-force Supplement, and two Special Supplements giving additional results of the investigation of the upper air in the British Isles, and summaries for the year of the records obtained with kites and registering balloons and of the observations of sea temperature.

Part II.—The Monthly Weather Report with a summary for the year.

Part III. (1).—Daily Readings at Stations of the First and Second Orders.

Part III. (2).—Geophysical Journal. Daily readings in Meteorology, Solar Radiation, Seismology, Atmospheric Electricity, and Terrestrial Magnetism.

Part IV. (1).—Hourly Values : Meteorological Section (pressure, temperature, humidity, rainfall, and sunshine) for Kew, Eskdalemuir, and Valencia.

Part IV. (2).—Hourly Values : Geophysical Section (Terrestrial magnetism, atmospheric electricity, and meteorology) for five Observatories.

The Observer's Handbook. 1911 Edition.

**OCCASIONAL.**—Report of the Ninth Meeting of the International Meteorological Committee, Berlin, September 26-29, 1910.

**GEOPHYSICAL MEMOIRS.**—Vol. I., Part I. :—

No. 1. The Effect of the Labrador Current upon the Surface Temperature of the North Atlantic ; and of the latter upon Air Temperature and Pressure over the British Isles. By M. W. Campbell Hepworth, C.B., R.D., Commander, R.N.R., Marine Superintendent.

No. 2. The Free Atmosphere in the Region of the British Isles. Second Report by W. H. Dines, F.R.S., with a Preface by W. N. Shaw, Sc.D., F.R.S., Director.

No. 3. Graphical Construction for the Epicentre of an Earthquake, by G. W. Walker, M.A., Superintendent of Eskdale Observatory.

A book by the Director entitled *Forecasting Weather* and embodying the work of the Office in connexion with dynamical meteorology during the past twelve years was published in November, 1911, by Messrs. Constable & Co.

Other publications for which authority has been given and which are in preparation, but have not yet been issued, are as follows :—

Barometer manual for the use of Seamen—Seventh Edition.

Climatological Report for certain British Stations overseas.

The Computer's Handbook.

The Tabulator's Handbook.

The Seaman's Handbook of Meteorology.

The Fisherman's Handbook.

Gales on the British Coasts. A revised edition of the Fishery Barometer Manual.

The Seasons in the British Isles.

Normals for the four Observatories, and tables for their application in climatology.

Atlas of Tropical Hurricanes.

The publication of the following papers, &c., may also be mentioned :—

By Mr. W. H. Dines, F.R.S.—

*The statical changes of pressure and temperature in a column of air that accompany changes of pressure at the bottom.* Q.J. Roy. Met. Soc., vol. 38, p. 41, 1912.

By Dr. C. Chree, F.R.S., Superintendent of Kew Observatory—

*Studies in Terrestrial Magnetism.* Macmillan & Co.

*The Diurnal Inequality of Barometric Pressure at Castle O'er, Dumfriesshire.* Q.J., Roy. Met. Soc., vol. 37, p. 325, 1911.

By Mr. R. G. K. Lempfert, Superintendent of the Forecast Division—

*The Thunderstorms of July 29, 1911.* Q.J. Roy. Met. Soc., vol. 38, p. 121, 1912.

By Mr. R. G. K. Lempfert and Mr. H. W. Braby—

*A method of summarising anemograms.* Q.J. Roy. Met. Soc., vol. 38, 1912.

By Mr. Charles Harding—

*The Abnormal Summer of 1911.* Q.J. Roy. Met. Soc., vol. 38, p. 1, 1912.

The reports of the work of the several Divisions of the office are as follows :—

#### I.—MARINE DIVISION.

*Report by Campbell Hepworth, C.B., R.D., Commander, R.N.R., Superintendent.*

**Collection of Information.**—The arrangements for the systematic collection of data, for the purposes of marine meteorology, from officers of the Royal Navy and the Mercantile Marine, have been continued as in previous years. The number of vessels entered in the Office books as equipped with meteorological instruments lent by the Office, for the purpose of keeping a meteorological log, was 181 as compared with 186 last year. In addition there are 15 steamships from which reports are received by radio-telegraphy that are provided with mercury barometers lent by this Office. Meteorological four-hourly log books, registers, and other documents, to the number of 2,791 were received during the year. A list of these is given in Appendix IV. Of the meteorological log books which contain four-hourly observations, 206 have been classed as "excellent," or "very good," as compared with 211 for the year 1910-11.

**Supplementary Information.**—The arrangements for obtaining meteorological registers from the captains and officers of ocean-going ships who use their own instruments have been continued, and a large amount of information has thereby been collected,

which is immediately utilised in the Monthly Meteorological Charts of the North Atlantic and Mediterranean, and of the Indian Ocean and Red Sea, when possible.

A series of barograms have been received from ships of H.M. Navy and the Mercantile Marine which give a continuous record of pressure in various parts of the world.

The following lists show the number of contributions classified according to the different lines of route :—

*Four-hourly Logs.*

Greenland	...	Whaling	...	3
Cable Ships	...	{ United Kingdom	...	1
		{ North Atlantic	...	3
		{ Canada	...	6
North Atlantic	...	{ United States	...	19
		{ Gulf of Mexico	...	24
		{ West Indies	...	4
Mediterranean	...	...	...	2
Black Sea	...	...	...	4
Africa, S.E. and E. Coasts	...	...	...	7
China. Coasting	...	...	...	1
East Indies	...	{ viâ Cape	...	16
		{ viâ Suez	...	49
China and Japan	{ viâ Cape	...	5	
	{ viâ Suez	...	17	
Australia	...	{ viâ Cape	...	35
		{ viâ Suez	...	40
Trans-Pacific	...	...	...	6
New Zealand	...	{ viâ Capes	...	23
		{ viâ Suez	...	3
South America	...	{ East Coast	...	22
		{ West Coast	...	6
United States, West Coast	...	...	...	10
		{ China Sea	...	1
Surveying	...	{ Australia	...	1
		{ W. C. Africa	...	4
River Thames	...	...	...	1

*"Short" Logs.*

East Indies viâ Suez	...	..	...	1
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*North Atlantic Registers (Form No. 121), Indian Ocean Registers (Form No. 122), and Radio-telegraphy Registers (Form No. 138).*

Routes.	North Atlantic Registers. Form No. 121.	Indian Ocean Registers. Form No. 122.	Radio- telegraphy Registers. Form No. 138.
United Kingdom Coasts ... ..	2	—	—
{ Canada ... ..	378	—	329
{ United States ... ..	598	—	397
North Atlantic... { Gulf of Mexico ... ..	61	—	—
{ West Indies ... ..	120	—	—
{ Bermuda ... ..	27	—	—
Mediterranean ... ..	229	—	—
Black Sea ... ..	9	—	—
Africa ... .. S.E. and E. Coasts	5	3	—
{ viâ Cape ... ..	3	13	—
East Indies ... { viâ Suez ... ..	—	169	—
{ Coasting ... ..	—	4	—
China and Japan { viâ Cape ... ..	4	2	—
{ viâ Suez ... ..	—	48	—
China. Coasting ... ..	—	15	—
{ viâ Cape ... ..	9	5	—
Australia ... { viâ Suez ... ..	—	12	—
{ Coasting ... ..	—	4	—
South America... East Coast ... ..	29	—	—
North America West Coast ... ..	1	—	—
Vancouver—Japan ... ..	—	1	—
Total ... ..	1,475	276	726

Recognition of "excellent" observers.—Appendix III. (p. 122) contains a list of the captains who, during the past year, have contributed logs classed as "excellent." Several of these observers have co-operated with the Office for many years. The names which appear in the list for the first time are as follow :—

Captain's Name.	Steamship.
Collins, P. J. ... ..	Marathon.
Gillman, L. B. ... ..	Matatua.
Haddock, R. L., Comm. R.N.R. ...	Mooltan.
Hutchison, J. S., Comm. R.N.R. ...	Waipara.
Linklater, T. B. ... ..	Marere.
McClure, W. H. ... ..	Garryvale.
Rae, J. R. ... ..	City of Calcutta.
Robin, E. ... ..	Herefordshire.

As a mark of recognition of valuable co-operation, the Director has presented various publications of the Office to observers who have returned well-kept meteorological log books.

Obituary.—The Committee have noted with regret the deaths of three of their old observers during 1911-12 :—Captain R. Inglis, Marine Superintendent, Cunard S.S. Co., in May; Captain R. J. Garrick, S.S. *Assyria*, in August; and Captain A. Mackay, F.R.G.S., S.S. *Campania*, in January, 1912.



**Use of Information received.**—The information collected has been used in the preparation of the monthly meteorological charts of the North Atlantic and Mediterranean, and of the Indian Ocean and Red Sea, as in previous years. The monthly chart for the Atlantic Ocean and the Mediterranean Sea has not been altered except in detail during the year. The weekly issue with daily maps on the back showing the distribution of pressure, &c., over the Atlantic Ocean, as prepared by the incorporation of the reports by radio-telegraphy from the ocean with the information received by telegraph from either side, has been continued. The scale of the monthly charts for the Indian Ocean has been reduced to make the size uniform with that of the Atlantic chart, and the area has been extended to cover the whole region from South Africa to Australia ( $30^{\circ}$  E. to  $125^{\circ}$  E.), and from the Red Sea as far south as the Australian continent ( $30^{\circ}$  N. to  $35^{\circ}$  S.). The distribution of the meteorological elements, pressure, and temperature of the air and sea are now shown on an inset chart as well as on the face of the chart. In order to avoid confusion the sea temperature is indicated by tints of blue colour, the isobars by red lines, and the air isotherms by black dotted lines, and the routes recommended between principal ports are shown by green lines. Information as to the frequency of fog and mist in different parts of the Atlantic has been prepared, and is now appearing in successive issues of the Atlantic charts. Information was supplied to Professor Hergesell in connexion with International Balloon ascents, data from ships over the Northern Hemisphere at 8 a.m., 6th to 11th December, 1909; and to the Director-General of Observatories, Simla, meteorological observations from the log-books of ships navigating the Indian Ocean between  $6^{\circ}$  N. and  $45^{\circ}$  S. from  $20^{\circ}$  E. to  $130^{\circ}$  E. Twelve small globes were prepared for, and exhibited at, the Coronation Exhibition, illustrating (1) the distribution of average pressure and wind; (2) of air temperature and relative humidity; (3) of sea temperature, and the flow of ocean currents. Information with respect to ice was also sent regularly to the *Shipping Gazette* during the season.

**Information supplied to the Admiralty.**—Climatological tables have been compiled for various places on the shores of the China Sea, the Baltic, Eastern Archipelago, South Indian Ocean Islands, the Mediterranean, and in the Yangtse Kiang; and surface currents of the Yellow Sea.

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## II.—FORECAST AND STORM WARNING DIVISION.

*Report by R. G. K. Lempfert, M.A., Superintendent.*

**Daily Weather Report.**—The arrangements for the issue of the Daily Weather Report and Forecasts, and for the preparation of information for publication in the newspapers, have remained generally the same as those which were in operation last year. The Report has been issued each day at about 12.30 p.m. The only changes to note in the form of the Report are (1) The omission of the wet-bulb reading and the inclusion in its place of the so-called barometric tendency, the amount of change of the barometer in the three hours preceding the hour of observation.

This change was introduced on May 1st, in accordance with the resolutions adopted at the meeting of the International Committee held at Berlin in the preceding September; (2) the use of a faint stipple to indicate on the synoptic chart for 6 p.m. the area within which precipitation has occurred during the 24-hour period to which the daily measurements of rainfall refer; (3) the inclusion of the duration and the extreme force of gales recorded at British coast stations; (4) the publication of information regarding "past weather" for each of the intervals 7 a.m. to 1 p.m., 1 p.m. to 6 p.m., and 6 p.m. to 7 a.m., separately, in place of a single group of letters summarising the weather for the complete 24-hour period.

**Weekly Weather Report.**—At the beginning of the year 1912, the form of the synoptic charts included in the Weekly Weather Report was entirely modified. In place of three maps for each day, showing respectively the distribution of pressure and wind over Europe at 7 a.m. and 6 p.m., and the distribution of temperature and weather at 7 a.m., a single map is now shown for each day. It embraces a much larger area than that included hitherto. It includes the whole of Europe, the North Atlantic Ocean north of latitude  $28^{\circ}$  N., and a portion of the North American Continent as far west as the great lakes. The maps show the distribution of pressure, wind, weather and temperature at the hour of morning observation. They are on the scale  $1 : 4 \times 10^7$ . The information for Europe is derived from the telegraphic reports received at the Office and from the Bulletin International issued by the Bureau Central Météorologique of Paris. The information for the Atlantic Ocean is derived from reports received by wireless telegraphy, supplemented by reports received by post. The extension of the area included in the chart affords an opportunity of rendering available the information received by wireless telegraphy. By delaying the issue of the maps for one week it is possible to include for the portion of the American Continent shown on the map the information published in the Daily Weather Reports of the Canadian Meteorological Service.

**Charts for the Northern Hemisphere.**—Since the beginning of the year 1912, the synoptic charts published in the Daily Weather Report of the Russian Meteorological Service, have been extended to include the Siberian as well as the European portion of the Russian Empire. Advantage has been taken of this to extend the area of the daily synoptic charts published in the weekly issues of "Monthly Meteorological Charts of the North Atlantic Ocean." It now extends eastward as far as the Pacific coast. The positions of the main areas of high and low pressure over the American Continent are also indicated, the information given in the Bulletin International of the Bureau Central Météorologique being used for the purpose.

**Telegraphic Reporting Stations.**—The stations from which daily telegraphic reports are received are shown in the lists given on pp. 82 to 109 and on Map (Fig. 4, p. 108).

In consequence of the retirement of the Reverend W. Brand and of Miss Jessie Sinclair, the observers at Sumburgh Head and Wick, the arrangements for observing at these two stations have



had to be modified. In both cases it has been possible to arrange with the Admiral Commanding Coastguards and Reserves for the work to be undertaken by the Coastguard. This has involved a transfer of the station at Sumburgh Head to Lerwick. Climatological observations are being continued at Sumburgh Head (Dunrossness) by the Reverend W. Fotheringham.

Daily reports of observations at 7 a.m. and at 6 p.m. have been received from Bath, Clacton-on-Sea, Dover and Newquay by the courtesy of the respective local authorities, as in previous years.

**Inspection of the Stations.**—The stations indicated in the list in Appendix VI., p. 143, have been inspected during the year. The reports of the inspectors show that efficiency has been maintained.

**Wireless Telegrams.**—During the year ended March 31st, 68 wireless telegrams were received from the ships of His Majesty's Navy; 16 of these messages reached the Office in time to be included in the issue of the Daily Weather Report for the same day. All but seven were in time to be included in one or other of the maps of the report.

In the course of the twelve months ending with March, 1911, 4,922 wireless reports were received from Atlantic liners. The numbers in the several months ranged from 497 in October to 303 in February. Particulars of the number of messages received from each ship are given on p. 136. The number of messages is greater by nearly 1,000 than the corresponding figure for the twelve months ending with March, 1911.

Only 232 out of the total of nearly 5,000 messages reached the Office in time to be included in "to-day's" map in the Daily Weather Report, *i.e.*, within about four hours of the time of taking the morning observations; 2,352 messages, or rather less than half the total, reached the Office in time to be included in one of the two maps for "yesterday" shown in the Daily Weather Report. As the forecasts are prepared within about two hours of the time of observing, it is evident that very few messages reached the Office in time to be of direct and immediate application in the preparation of forecasts or the issue of storm warnings. Nevertheless there were again a number of occasions on which the messages were of great assistance to the forecaster. They often gave the earliest observations of the westerly or north-westerly winds in the rear of a depression, and so put him in a position to forecast the early extension of these winds to our western districts. Such cases occurred on May 2nd, July 14th, July 24th, September 1st, November 28th, January 15th. On other occasions the extension of southerly winds to some distance from our western coasts increases the probability of a continuance of southerly winds over the British Isles for the whole 24-hour period covered by a forecast. Such cases occurred on December 1st, January 8th, and March 1st. Wireless reports have also proved valuable in connexion with the issue of a "further outlook," especially when it takes the form of a notification of a probable spell of fair weather. Such a notification would not be issued if wireless reports showed the existence of important disturbances over the ocean.

The number of occasions on which wireless reports conveying information which would have been useful to the forecaster came



to hand after the issue of the forecasts is unfortunately considerable. A conspicuous example occurred in connexion with the gale experienced in the night from November 29th to 30th. Wireless reports received subsequently indicated a very deep disturbance in longitude  $25^{\circ}$  W. Had this information been in the hands of the forecaster sufficiently early, storm warnings would have been issued to all Scottish coasts. As it was, a severe gale occurred for which no warnings were issued.

**Reports from Auxiliary Stations.**—The information as to the weather in the British Islands has been supplemented by postal and telegraphic reports sent daily from stations belonging to various local authorities. The information supplied has been included in the Daily Weather Report.

**Discussion of Information.**—A detailed account of the manner in which the meteorological information received by telegraph is utilised for the preparation of the Daily Weather Report is given in Appendix II., p. 63.

**Weather Forecasts.**—The means adopted for the distribution of the forecasts drawn up in the Office have been continued during the past year. They are detailed in Appendix II., p. 65. The forecasts have been supplemented by a "further outlook," extending the period covered by the forecasts beyond the normal 24 hours whenever the conditions were sufficiently definite to warrant it.

**Forecasts for H.M. Ships.**—Forecasts have been supplied regularly to the Commander-in-Chief of the Home Fleet, to the Officers in Command at Devonport, Portland, and the Nore, and to the Naval Aeronautical Department at Barrow-in-Furness. The arrangements made last year, at the request of the Lords Commissioners of the Admiralty, for the preparation daily of a forecast message to be transmitted by wireless telegraphy to such of H.M. ships as may be within range have been continued. Since March 1st such messages have been prepared twice a day.

**Harvest Forecasts.**—The special service of afternoon forecasts for the benefit of agriculturists and others was arranged on lines similar to those followed in previous years, and special telegraphic reports of observations at 1 p.m. were obtained for this purpose. The forecasts referred to the period from 6 a.m. to 9 p.m. of the following day, these being regarded as the usual limits of an agricultural working day. On occasions when the conditions seemed favourable the ordinary forecast was supplemented by a "further outlook," giving the probable weather for one or more days beyond the usual period.

The service covered the four months, June to September, but early in May the weather assumed an unusually settled type, which was maintained, with comparatively slight variations, for about six months. Long spells of drought, brightness and warmth were the characteristics of this remarkable period, the result being an unusually early harvest. Under such exceptionally favourable conditions there was not much inducement for farmers to ask for forecasts, and the influence of the season is, therefore, reflected in the list of subscribers.

Applications for series of harvest forecasts were received from 50 persons—34 for the special afternoon issues, while nine

preferred the morning series, and seven the evening series. Of the 50 applicants :—

1	resided in District 0.	Scotland, N.
10	”	3. England, E.
7	”	4. Midland Counties.
13	”	5. England, S.E.
5	”	7. England, N.W.
12	”	8. England, S.W.
2	”	10. Ireland, S.

The applicant in Scotland, N., was interested in the harvest of the sea.

Arrangements were again made for the issue of notifications of probable spells of fine weather in connexion with the harvest forecast service. The experience of previous years had shown the desirability of keeping the recipients of these notices informed of the course of events from the time of the issue of the first notification up to the definite break up of the spell. It was therefore decided to make each spell-notification consist of a series of telegrams, the minimum number being two. Seventy-four applications for spell notifications on these lines were received.

Daily records of weather were kept on forms supplied by the Office by 27 subscribers for harvest forecasts, for the purpose of checking the accuracy of the forecasts. A comparison of the forecasts issued with these records shows that of the daily forecasts 55 per cent. were correct in all particulars and 35 per cent. correct as regards more than half the elements referred to in the forecast. In England, N.W., the complete successes were 58 per cent. and in England, S.W., 60 per cent. As regards the “further outlook,” 75 per cent. were entirely successful and only 14 per cent. failures. In both classes of forecasts the results were better than the corresponding ones of the previous year.

The special notifications of spells of weather were regarded as successful when the conditions were in accordance with the forecast through at least three days, and on this reckoning 74 per cent. proved correct.

**Inquiries for Forecasts.**—The following are the numbers of inquiries for forecasts of various kinds dealt with during the year :—Telegraphic prepaid replies 348, other inquiries answered by telegram 108, telephonic inquiries 67, personal inquiries 12. In addition regular forecasts have been telegraphed to private subscribers for varying periods. The numbers of such applicants have varied between 6 and 14.

Arising out of a suggestion put forward by “Lloyds,” arrangements have been made with the Post Office for the captains of ships equipped with wireless apparatus to obtain forecasts of the weather anticipated on the British coasts by this means. Three inquiries of this nature were received during the year.

Forecasts in anticipation of special conditions have been sent on various occasions in connexion with snowfall, night frosts, or smooth sea.

**Results of Forecasts.**—A comparison for the year of the forecasts for the United Kingdom issued at 8.30 p.m., with the subsequent weather, is given below. The complete success, partial success, partial failure, and complete failure of the forecast as regards both

wind and weather, are estimated according to definite rules which are designed to eliminate bias as far as possible.

The term "partial success" is applied to cases in which more than half the details included in the forecast are justified by subsequent events. With regard to *wind* the details comprise direction and force, and anticipated changes in either particular. With regard to *weather* they comprise temperature, the state of the sky (clear, cloudy, or overcast), and the probability of rain, snow, fog, thunder, &c., with occasional indications as to the duration or intensity of any or all of the phenomena mentioned. The term "partial failure" is applied in a similar way to a forecast in which more than half the details given are incorrect.

### SUMMARY of RESULTS of 8.30 p.m. FORECASTS in 1911.

#### (a.) Results for the various Months.

Months.		Percentages.												Sum of Successes, Complete and Partial.
		Complete Success.			Partial Success.			Partial Failure.			Complete Failure.			
		Wind.	Weather.	Average.	Wind.	Weather.	Average.	Wind.	Weather.	Average.	Wind.	Weather.	Average.	
January	...	68	57	63	28	38	33	3	5	4	1	-	-	96
February	...	59	44	52	31	46	38	9	9	9	1	1	1	90
March	...	70	62	66	29	34	32	1	3	2	-	1	-	98
April	...	64	58	61	32	39	35	3	3	3	1	-	1	96
May	...	62	50	56	28	36	32	7	11	9	3	3	3	88
June	...	77	68	73	22	29	25	1	3	2	-	-	-	98
July	...	51	68	60	37	25	31	9	4	6	3	3	3	91
August	...	69	56	63	26	40	33	3	4	3	2	-	1	96
September	...	59	60	60	34	32	33	2	7	4	5	1	3	93
October	...	64	53	59	26	35	30	5	9	7	5	3	4	89
November	...	73	70	72	21	25	23	1	5	3	5	-	2	95
December	...	49	63	56	41	32	37	4	5	4	6	-	3	93
The entire Year		64	59	62	29	34	32	4	6	4	3	1	2	94

#### (b.) Results for the various Districts.

Districts.	Percentages.												Sum of Successes, Complete and Partial.
	Complete Success.			Partial Success.			Partial Failure.			Complete Failure.			
	Wind.	Weather.	Average.	Wind.	Weather.	Average.	Wind.	Weather.	Average.	Wind.	Weather.	Average.	
0. Scotland, N.:													
Islands ...	62	60	61	29	36	32	6	3	5	3	1	2	93
Mainland ...	62	60	61	28	36	32	7	4	6	3	1	1	93
1. Scotland, E. ...	60	53	57	31	38	34	6	8	7	3	1	2	91
2. England, N.E.:													
Northern part	63	54	59	32	40	36	3	5	4	2	1	1	95
Southern part	66	54	60	30	39	34	3	6	5	1	1	1	94
3. England, E. ...	63	56	60	31	36	33	4	6	5	2	2	2	93
4. Midland Coun- ties:													
Eastern part	67	58	63	28	31	31	2	7	4	3	1	2	94
Western part	67	57	62	29	35	32	2	6	4	2	2	2	94



## (b.) Results for the various Districts—continued.

Districts.	Percentages.												
	Complete Success.			Partial Success.			Partial Failure.			Complete Failure.			Sum of Successes, Complete and Partial.
	Wind.	Weather.	Average.	Wind.	Weather.	Average.	Wind.	Weather.	Average.	Wind.	Weather.	Average.	
5. England, S.E....	67	54	60	28	36	32	2	9	6	3	1	2	92
6. Scotland, W.:													
Mainland ...	62	63	63	31	32	31	4	4	4	3	1	2	94
Isle of Man ...	60	59	60	32	37	31	4	3	4	4	1	2	91
7. England, N.W.:													
England, N.W.	65	60	63	29	32	30	3	7	5	3	1	2	93
North Wales	64	61	63	30	33	31	3	5	4	3	1	2	91
8. England, S.W.:													
South Wales...	68	59	64	25	34	29	5	5	5	2	2	2	93
England, S.W.	69	59	64	25	35	30	4	4	4	2	2	2	94
9. Ireland, N.:													
Western part	63	67	64	28	29	29	5	4	5	4	0	2	93
Eastern part	61	65	63	29	31	30	8	4	6	2	—	1	93
10. Ireland, S.:													
Eastern part	60	63	62	33	31	32	4	6	5	3	—	1	94
Western part	60	64	62	34	30	32	4	5	5	2	1	1	94
Summary ...	64	59	62	29	34	32	4	6	4	3	1	2	94

The following table shows the success of the forecasts of the year in comparison with those of previous years. It gives for each year of the decade 1902–1911 the percentages of complete and partial successes of the Forecasts issued at 8.30 p.m. Until the year 1905 the annual period included was that for the 12 months ending with March. The results for 1905 to 1911, given below, are for the calendar year. The percentage of complete success and the sum of successes (complete and partial) were both higher than in any year since 1879, when the present service of daily forecasts was inaugurated.

PERCENTAGES of SUCCESS in the FORECASTS for the whole of the BRITISH ISLES.

Year.	Complete Success.	Partial Success.	Sum of Successes, Complete and Partial.
1902–03 ...	53	35	88
1903–04 ...	56	30	86
1904–05 ...	57	31	88
1905 ...	56	32	88
1906 ...	61	30	91
1907 ...	54	37	91
1908 ...	58	34	92
1909 ...	58	35	93
1910 ...	60	33	93
1911 ...	62	32	94
Average ...	57.5	32.9	90.4

A "further outlook" was appended to the forecasts for 24 hours on 173 occasions; 78 of these notifications were issued in connexion with morning forecasts, and 95 in connexion with evening forecasts; 14 referred to a change or a partial change of the type of weather; the remainder notified the probable continuance of existing conditions. 83 per cent. of the notifications were completely justified by the subsequent weather, and 8 per cent. were partially justified. 9 per cent. of the notifications proved to be incorrect.

**Tables of Wind Frequency.**—Tables of wind frequency have been prepared from the hourly tabulations of the anemograms for publication in Appendix III. to the Weekly Weather Report, as in previous years. Mr. H. W. Braby, B.A., who worked in the division as voluntary assistant from April until September, devoted some of his time to the preparation of wind-normals for some of the Office anemometer stations. The results are being published in the Quarterly Journal of the Royal Meteorological Society in a paper to be read on April 17th. It is proposed to prepare monthly wind roses showing the frequency for directions as well as force for selected stations for 1912, in place of the tables of force-frequency prepared hitherto for all stations.

### STORM WARNING SERVICE.

Arrangements have been made with the Post Office for the introduction of a new system for the distribution of the telegrams sent out from the Office containing instructions to hoist or lower storm cones. These are now practically completed, and it is proposed to bring the new Service into operation at an early date. It is hoped that it will reduce the time required for the circulation of the messages, especially in the case of remote stations with which telegraphic communication involves the frequent re-transmission of the messages.

Concurrently with this modification of the telegraphic arrangements, the list of stations to which warnings are circulated has been revised. A slight modification has also been made in the grouping of the stations on the British coasts into districts for storm warning purposes, in order to bring into harmony the storm warning districts and the districts used for other forecasts for the sea. A complete list of places to which storm warnings are sent is given in Appendix II., p. 69. In spite of the fine summer, the number of warnings issued in 1911 was unusually large, owing to the very disturbed character of the last three months. Warnings were issued on 877 distinct occasions as compared with 820 in the previous year; an average of 63 for each district as compared with 59 in 1910 and 33 in 1909.

A comparison between the warnings issued during the year and the subsequent weather is given in the following table. Appended to the table are notes respecting the gales for which no warnings were issued, with brief statements of the circumstances in which they occurred.

## STORM WARNING CHECKING.

*Comparison between the Warnings issued and the subsequent Weather in 1911.*

Districts and Number of Stations.		Total No. of Issues to each District.	Issues justified by subsequent Gales. Force 8 and upwards.	Issues justified by subsequent strong Winds. Forces 6 & 7.	Issues not justified by subsequent Weather.	Issues late. Force 9 reached at two Stations before issue.	Issues partially late. Force 9 reached at one Station before issue.	Storms for which no Warning was issued.
Scotland, N.E.	31	29	12	12	4	—	1	Nov. 30. June 24.
		41	22	13	6	—	—	
" E.	23	15	5	9	1	—	—	Feb. 26; May 7. Nov. 30.
		29	9	14	6	—	—	
" N.W.	5	28	8	13	5	—	2	Feb. 26; Mar. 18; June 24.
		36	17	8	11	—	—	
" W.	16	25	8	11	6	—	—	Feb. 26; Mar. 6; May 3.
		39	10	13	16	—	—	
Irish Sea ...	7	29	15	12	1	—	1	Dec. 13. Feb. 26; May 3; June 24.
		40	22	11	6	—	1	
Ireland, N. ...	18	35	24	7	3	—	1	Jan. 2; Feb. 26; Mar. 14; Mar. 25.
		42	31	9	1	1	—	
" S. ...	29	34	20	9	3	1	1	Sept. 30; Nov. 23-24; Dec. 20.
		41	30	8	2	—	1	
St. George's Channel	1	25	15	6	4	—	—	Jan. 2; Feb. 26; Mar. 14; Mar. 25.
		36	25	9	1	1	—	
Bristol Channel	23	30	24	6	—	—	—	Jan. 2; Feb. 26; Mar. 14.
		38	31	5	1	—	1	
England, S.W.	21	28	22	6	—	—	—	Sept. 30.
		39	26	8	2	1	2	
" S.	17	26	15	8	3	—	—	Sept. 30.
		38	22	12	3	1	—	
" S.E.	14	26	10	10	5	—	1	Sept. 30.
		33	20	8	4	1	—	
" N.E.	12	19	11	2	5	1	—	Sept. 30.
		23	13	10	4	1	—	
" E.	16	23	7	11	4	1	—	Sept. 30.
		25	13	11	1	—	—	
Average per District...		27	14	9	3	0.2	0.5	
		36	21	10	5	0.4	0.4	
Percentages		—	52.7	32.8	11.8	0.8	1.9	
		—	57.6	27.5	12.7	1.2	1.0	
For whole year	Average per District...	63	35	19	8	0.6	0.9	
	Percentages	—	55.5	29.8	12.3	1.0	1.4	

NOTE.—In order to facilitate comparison with the statistical tables of the Board of Trade which are made up for the year ending June 30, the figures for the two halves of the year 1911—January 1 to June 30, and July 1 to December 31—are given separately for each district. The upper line of figures in each case gives the particulars for the first half of the year.



GALES EXPERIENCED in 1911 WITHOUT WARNING.

*January 2nd. England, N.E., and E., and part of Irish Sea.*

A depression situated over Scandinavia on morning of January 1st moved on a track slightly West of South, instead of South-Eastward, as expected, and became deeper in the process.

*February 26th. Scotland, N.W., Irish Sea, Ireland, S., Ireland, N., St. George's Channel, Bristol Channel, England, S.E., England, N.E., England, E.*

Warnings expired on evening of February 25th, and the signals were not kept up. A further development of a secondary depression over the North Sea, and the northerly extension of the high pressure over the Bay, gave rise to North-Westerly gales over the British Isles during the morning of February 26th.

*March 6th. Ireland, N., St. George's Channel, Bristol Channel.*

A Northerly gale developed in the rear of a "V" shaped depression which passed rapidly over the country during the night of March 5th-6th.

*March 14th. England, N.E., and England, E.*

A depression which had passed eastward along the Channel became stationary during the night of the 13th-14th, and as the barometer continued to rise in the West, a severe Northerly gale developed on the East Coast early on 14th. No warnings were issued to these districts on the 13th, as it was anticipated that the depression would continue to move eastward.

*March 18th. Irish Sea.*

An Easterly gale caused by a depression in the south-west spread rather further northward than was anticipated.

*March 25th. England N.E.*

A North-Easterly gale spread rather further northward than was anticipated.

*May 3rd. Ireland, S., and Ireland, N.*

An Atlantic depression, of which there was no indication on the evening map for May 2nd, caused a South-Westerly gale on the Irish coasts early on May 3rd.

*May 7th. Scotland, N.W.*

A South-Easterly gale, of limited extent, during the night of May 7th-8th. No warnings could be issued as telegraph offices in this district are not open on Sunday evenings. There were no indications of the approach of the gale on the morning of the 7th.

*June 24th. Scotland E., Ireland, S., Irish Sea.*

A depression from the east of England moved northward and developed more strongly than was anticipated.

*September, 30th. Bristol Channel, England, S.E., England, N.E., England, E.*

A shallow disturbance off the north-west of Scotland on the evening of the 29th moved rapidly south-eastward and became much deeper. Warnings were issued to the western districts only. On the morning of September 30th the depression was centred on the Humber. It continued to grow much deeper as it passed away to Holland. Severe Northerly gales resulted on our

east coast, for which no warnings were issued. Even on the morning of the 30th there was no reason to anticipate the great increase in depth of the depression.

*November, 23rd-24th. St. George's Channel, Bristol Channel, England, S.E.*

A depression, shown over Spain on the evening of 22nd, moved northward rather unexpectedly during the night, and caused North-Easterly gales on the east of the Channel early on the 23rd. The gale subsequently extended to the Bristol and St. George's Channels, to which no warnings were issued.

*November, 30th. Scotland, N.E., Scotland, N.W.*

Warnings were issued to Ireland and the south-west of England on the afternoon of November 29th, but there were no indications in the evening that the Scottish districts were threatened. Wireless reports received subsequently revealed a very deep depression centred in Latitude  $50^{\circ}$  N., Longitude  $25^{\circ}$  W. The steep gradient of this depression caused a severe gale on the Scottish coasts early in the morning of November 30th. The warnings issued at 8.30 a.m. were thus too late.

*December, 13th. Ireland, N., St. George's Channel, England, S.W.*

A depression appeared unexpectedly over the mouth of the Channel on the morning of December 13th. Warnings were immediately issued, but they were too late in these districts.

*December, 20th. England, S.E.*

A rapidly moving "V" shaped depression, shown on the morning map of December 20th, did not appear sufficiently intense to justify the issue of warnings. The North-Westerly wind in its rear reached gale force in the east of the English Channel.

*December 21st. England, S.*

A depression developed unexpectedly in the south-west during the night of December 20th. The warnings issued on the morning of the 21st were too late in the English Channel.

Comparison of results for 1911 with previous years.—The following table contains a statement of the amount of success of storm warnings in each year, and the average, for the decade 1902-1911:—

Years.	Average No. of Warnings per District.	Warnings justified by subsequent Gales.	Warnings justified by subsequent strong Winds.	Total Warnings justified.	Warnings not followed by increase of Wind.
		p.c.	p.c.	p.c.	p.c.
1902 ... ..	38	55.5	32.0	87.5	9.0
1903 ... ..	54	62.6	27.3	89.9	7.3
1904 ... ..	39	59.4	30.4	89.8	6.7
1905 ... ..	45	52.5	35.9	88.4	9.5
1906 ... ..	53	54.7	33.3	88.0	8.5
1907 ... ..	41	55.2	37.0	92.2	5.9
1908 ... ..	45	53.4	32.3	85.7	10.7
1909 ... ..	33	48.9	36.9	85.8	8.5
1910* ... ..	59	51.1	35.5	86.6	11.0
1911* ... ..	63	55.5	29.8	85.3	12.3
1902-11 ...	47	54.9	33.0	87.9	8.9

\* Beginning from 1910 the period covered by a warning was reduced from 48 hours to 36 hours or less, according to the time of issue. A second warning is issued if the stormy condition is maintained.

**Averages.**—The corresponding figures, giving the average results for the four preceding decades, are as follows:—

Period.	Average Annual No. of Warnings per District.	Warnings justified by subsequent Gales.	Warnings justified by subsequent strong Winds.	Total Warnings justified.	Warnings not followed by increase of Wind.
		p.c.	p.c.	p.c.	p.c.
1871-80 ...	40	51·9	25·7	77·6	16·8
1881-90 ...	52	57·3	25·1	82·4	15·5
1891-1900 ...	37	62·7	27·5	90·2	5·8
1901-10 ...	44	55·6	32·7	88·2	8·5

### III.—STATISTICS AND LIBRARY DIVISION.

*Report by E. Gold, M.A., Superintendent.*

#### CLIMATOLOGY OF THE BRITISH ISLES.

**Distribution of Stations.**—A list of stations in connexion with the Office, in which particulars are given of the orders of the stations and of the Official publications for which the returns have been prepared, will be found in Appendix II. on pp. 82 to 107.

The names of stations which have been added to the list in the course of the year are printed in **clarendon** type.

The distribution of these stations in the various districts may be summarised as follows:—

	Observatories.	Normal Climatological.	Auxiliary Climatological.	Telegraphic Reporting.	Sunshine (including Observatories).	Additional Rainfall.	Additional Anemograph.	Additional Barograph.
0. Scotland, N. ...	0	8	2	5	7	4	1	7
1. " E. ...	1	6	7	3	10	2	1	4
2. England, N.E. ...	0	9	11	2	14	8	1	3
3. " E. ...	0	8	10	2	13	14	3	3
4. " Midlands ...	0	13	28	3	22	21	2	5
5. " S.E. ...	0	8	34	2	31	18	3	4
London District ...	1	4	9	1	9	8	1	2
6. Scotland, W., and Isle Man.	2	7	4	0	8	3	0	2
7. England, N.W., and N. Wales.	1	13	20	2	22	6	5	4
8. England, S.W., and S. Wales.	1	5	28	3	26	24	2	1
9. Ireland, N. ...	0	4	2	3	2	6	1	4
10. " S. ...	1	8	9	3	8	8	4	4
11. Western Channel ...	0	1	1	2	4	0	1	1
Total ...	7	94	165	31*	176	122	25	44

\* Of these, 14 observe at 7 a.m., 1 p.m., and 9 p.m., and thus come under the international definition of a station of the second order. These stations have not been included in the 94 normal climatological stations. Aberdeen, Kew, and Valencia are given under Observatories and under Telegraphic Reporting Stations.

Records have also been received from 5 additional thermograph stations, 10 additional autographic raingauge stations, 1 hygrograph station, 60 sea temperature stations. Daily reports are received by telegraph from 46 foreign stations (*see* p. 108).



Observatories are also maintained at Greenwich (The Royal Observatory), Oxford (Radcliffe Observatory), Bidston (Mersey Docks and Harbour Board), Southport (the Corporation), and Berkhamsted (E. Mawley, Esq.), and from these, records for occasions of special interest have been courteously supplied when asked for.

#### NORMAL METEOROLOGICAL OBSERVATORIES, ANEMOGRAPH AND SUNSHINE STATIONS.

**Observatories.**—The work of the three normal observatories of the office is reported upon separately, pp. 45 to 53.

The work of the normal observatories at Aberdeen and Falmouth has been carried on as usual. At Aberdeen theodolite observations of pilot balloons are made regularly to determine the velocity and direction of the upper wind currents, and, if possible, to furnish information as to the vertical currents of the atmosphere.

In connexion with the publication of the records from the observatories in absolute units it has been necessary to convert the tabulated values from degrees Fahrenheit, inches of mercury and miles per hour into degrees absolute, millibars and metres per second. Tables are in course of preparation for the direct conversion of the original measurements into absolute units. Those for wind velocity have already been issued to the observatories, and those for pressure are nearly completed. Before direct tabulation of the dry and wet bulb thermograms in degrees absolute can be undertaken, it will be necessary to prepare hygrometric tables in the new units.

**Anemograph Stations.**—The number of anemograph stations which are maintained by the Office, or from which records are regularly received at the Office, is now 29. The autograph records are tabulated week by week, so that the information they contain may become available for public use without delay. Information from four of them is published monthly in the *Geophysical Journal* (*British Meteorological Year Book*, Part III. (2)), and an annual summary of gales is published as an appendix to the *Weekly Report* (*Year Book*, Part I.).

From the beginning of January, 1912, the anemograms from instruments belonging to the Office have been summarised under the general headings gales, strong winds, fresh or moderate breezes, and light winds or calms, with special notes of exceptional gusts, the range of variation and the character of the curve. For these stations hourly tabulations are no longer made. The hourly tabulations are continued for certain additional stations for which the curves are returned to the observers after tabulation.

**Records of Sunshine.**—The number of stations from which returns of "bright" sunshine are received continues to increase, and at the close of the year amounted to 179, or 23 more than last year. With three exceptions they are all situated in the British Isles, the exceptions being Georgetown, British Guiana; the Falkland Islands; and Chin-kiang, China. The original records from 122 stations are retained in the Office, whilst those from the remainder are sent to the Office monthly for examination and are then returned.

**Changes in Stations.**—The normal climatological station at Birr Castle, which contributed data to the annual volumes of "Observations at stations of the second order" from 1873 to March, 1911, has discontinued the observations at 9 a.m. and 9 p.m. Its place in the volume of "Daily Readings at Stations of the First and Second Orders" has been taken by Mungret College, Limerick. The observations at Braemar have been recommenced, and the results are contributed to the Monthly Weather Report through the Scottish Meteorological Society.

Among the stations which have been started or have come into connexion with the Office during the year, must be mentioned normal climatological stations at Newtownforbes, co. Longford, and Donabate, co. Dublin. The following auxiliary climatological stations have been added to the list: Kettins, Carnoustie, West Witton, Hemel Hempstead, Hampstead (Redington Road), Lisburn, Wexford.

The following observers, who had hitherto contributed returns to the Royal Meteorological Society, have sent records of their observations to the Office since January 1, 1912. Summaries of the observations from the stations marked with an asterisk had been contributed by the Society in previous years for publication in the Monthly Weather Report:—

R. Shafto Adair, Minehead; E. T. Adams, Halstead; E. Heron Allen, Selsey Bill; Sir R. A. Allison, D.L., J.P., Scaleby; J. S. Amery, Ashburton; F. C. Bayard, LL.M., Wallington; Capt. C. Morrison Bell, Bellingham; \*Sir Hugh L. Bell, Bart, J.P., Rounton; G. Berry, Princetown; C. E. de Bertodano, Malmesbury; C. L. Brook, Meltham; G. F. Carter, Borough Engineer, Croydon; W. J. Carter, New Malden; Capt. H. Ashton Case, Beckford Hall; \*Miss Chichester, Woolacombe; J. Dale, Macclesfield; J. W. Duncan, Golder's Green; T. L. K. Edge, M.A., Strelley; \*C. W. Edwards, Lowestoft; S. M. Egar, Eye, Peterborough; \*Rev. F. Ehlers, Shaftesbury; J. D. Evans, Matlock; T. L. Evans, M.R.C.S., Midhurst; \*Rev. W. L. W. Eyre, M.A., Swarraton; H. Nowell Farrington, Leyland; \*Rev. H. E. B. Ffolkes, M.A., Hillington; \*M. T. Foster, Cullompton; \*F. H. French, Worthing; Rev. C. Gelderd, Ushaw, Durham; \*G. Hamlin, Brighton; \*C. D. Hanan, M.B., Newcastle, Co. Wicklow; J. Hunter, Belper, Quarry Bank; A. P. Jenkin, Redruth; \*E. W. Rees Jones, M.D., Blackpool; \*John Knight, M.D., Scarborough; \*G. H. Lee, Raunds; A. Lockwood, Llanberis; Mrs. C. Lyndon, Grayshott; \*Rev. J. C. Maddock, O.S.B., Hereford; A. Mander, Malvern; \*E. Mawley, Berkhamsted; W. J. Monk, Tavistock; \*H. Mellish, J.P., D.L., Hodsock, Worksop; \*T. Midgley, Bolton; J. W. Nowell, Wellington; \*Miss F. E. A. P. Parker, and Miss A. H. T. P. Parker, Bennington; \*The Hon. Lady Peek, Rousdon; Mrs. A. Pepper, Seathwaite; E. N. Plevins, Thrapston; \*A. W. Preston, Eaton, Norwich; O. M. Prowse, Ilfracombe; Miss Radford, Sidmouth; A. Roebuck, Caistor; E. W. Routley, M.D., M.R.C.P., Aldershot; J. A. Saner,

Northwich; \*A. C. Saxby, Cheltenham; J. W. Sherwin, Egremont; G. C. H. Simmonds, Brookwood, Woking; \*F. G. Smart, M.B., Tunbridge Wells; S. C. Smith, Clerk to U.D.C., Weston-super-Mare; H. Southall, J.P., Ross, Hereford; H. D. Strange, Dorchester; \*A. Thomas, M.D., Aberystwyth; J. C. Thresh, D.Sc., Chelmsford; W. P. Warren, Enfield; W. E. Whitehouse, Welshpool; J. H. Willis, Southwell, Norwich; \*R. H. Wilshaw, M.B., Worthing.

The normal climatological and anemograph station previously maintained by Mr. W. E. Sotheby at Llanelugrad has been transferred to Dwyran since July, 1911.

**Obituary.**—The Committee record with regret the death of the following observers:—

Dr. Henry Cullinan, who had recently established a station at Portrane Asylum, Donabate. The observations are being continued by the authorities of the Asylum.

Rev. H. E. B. Ffolkes, of Hillington.

General Sir Mildmay Willson, of Rauceby Hall. The observations are being continued by his brother, Rev. V. F. Willson.

Rev. S. Lewin, of Tealby.

**Inspections.**—A list of stations inspected during the year by representatives of the Office is given in Appendix VI., p. 143.

**Publications.**—The statistical publications of the Office have been grouped together under the general title "The British Meteorological and Magnetical Year Book."

Part I., the Weekly Weather Report, has been issued with three appendices in the same form as in the previous year. A special supplement has been prepared which includes summaries of the year's observations in the upper air for Pyrton Hill, Ditcham Park, Brighton and Manchester, and the observations of Sea Temperature for all the stations for which weekly values are published.

From the beginning of January, 1912, the temperatures on the grass and in the ground, which had previously been given in a separate table, were included with the other data in the principal table of results. Averages of the temperature in the ground for each week were computed from the results already published during the five years 1907–1911, and columns giving the difference of the weekly values from the averages were also included.

The observations of sea temperatures continued to be published in a separate table, but averages for the five years 1907–1911 were computed and the differences of the weekly values from the averages are now included in the table.

The values for the duration of bright sunshine which had previously been expressed as the total duration for the week are now given as the mean daily duration during the week.



Part II., the Monthly Weather Report. Since January, 1912, the form of the report has been changed, and the data published in it considerably increased. The changes in Table A are, briefly :—

- (1.) The introduction of a column for the actual hours of observation at each station, which renders unnecessary the variations of type which were used in previous years to indicate differences in this respect.
- (2.) The omission of the column containing the correction for diurnal range to be applied to the mean pressures. A column containing the mean pressures at Sea level, *corrected* for diurnal range, has been substituted. The values at Station level corresponding with the hours given in the column "Hours of Observation" are also included.
- (3.) For the duration of bright sunshine a similar change to that mentioned in connexion with the Weekly Report was made in the Monthly Report, the mean daily values being substituted for the monthly totals.
- (4.) Under "Weather" a column giving the number of days on which the rainfall was 0·04 in. (1 mm.) or more has been added.

In Table B. the columns giving the number of days of rainfall and of ground frost have been put, with additional columns for snow, hail, thunderstorms, and fog, under the general heading "Weather." In this way a considerable increase in the publication of summaries of the information contributed to the Office has been achieved without increasing the size of the report.

The values for the different districts which were previously included in Table A. have been collected together into a single table, and values for earth temperature and for extremes of pressure have been added to the table.

The addition of the stations which had previously contributed to the Royal Meteorological Society alone rendered necessary a considerable increase in Table B. This was obtained by utilizing the last page of the Report, which had hitherto been blank, for the table of district values and the notes on the tables, thus setting free the space previously devoted to notes for an extension of Table B. Results from about 50 additional stations were included in the Report.

It ought to be mentioned here that the work of the Department was increased not only by the work of reducing the observations from these additional stations, but also by the work of reduction for nine stations in Table A. and nine stations in Table B. previously done by the Society, as well as by the necessary correspondence and queries regarding the observations.

The rainfall maps have been supplied as in previous years by the Director of the British Rainfall Organization. They are constructed from data from nearly 1,000 stations, and form a most important feature of the Reports.

Part III. (1) "Daily Readings at Meteorological Stations of the First and Second Orders" has been issued regularly about six weeks after the end of each month. It contains daily observations at 16 Climatological Stations. From the beginning of 1912 the results have been expressed in absolute units, and, in consequence of the

questions which arose in the course of preparation and the extra work in connexion with Part II., the publication is less nearly up to date than previously. At present, however, the copy for March is in proof, and that for April sent to the printers. (2) "Geophysical Journal" has been issued with less promptitude, but all the monthly parts for 1911 are now completed. It contains daily meteorological, magnetic, electrical, solar and seismic data for Kew and Eskdalemuir, meteorological and magnetic data for Valencia and values of the wind components for four hours each day for Deerness, Holyhead, Scilly and Yarmouth.

Part IV. (1) Hourly Values. Meteorological Section. The preparation for publication of the hourly values of the meteorological elements at the normal observatories in connexion with the Office was transferred to Division III. from the beginning of 1912. From the beginning of 1911 the values were published in absolute units and the observations were published in extenso only for Kew, Valencia, and Eskdalemuir. Owing to the increased work in connexion with the necessary conversion from the units in which the results were tabulated the publication was delayed considerably. At present the monthly issues for 1911 have been completed, and the monthly summaries for the three observatories mentioned, and for Falmouth and Aberdeen, are in course of preparation.

**Returns for Registrars-General.**—Weekly and quarterly summaries have been prepared regularly for the Registrars-General of Births, Deaths and Marriages for England and Wales and for Ireland.

As the quarterly summaries supplied to the Registrars-General are compiled from the statistical tables in the Monthly Weather Report, the changes in the latter affected the preparation of the summaries. In the course of correspondence on this subject with the Registrar-General of Births, Deaths and Marriages for England and Wales, the Office raised the question of the necessity for continuing the separate publication in the Registrar's Returns of data already included in the Monthly Weather Report, and it was eventually arranged to discontinue the extended summaries as from the end of 1911. The Office continues to supply weekly returns and a quarterly return of rainfall with general remarks upon the weather of the quarter.

The Registrar-General for Ireland expressed a desire to incorporate the changes in the Monthly Weather Report in the summaries supplied to him, and the preparation of these still forms part of the work of the Department.

**Seasons in the British Isles.**—Further progress has been made with the preparation of the Report on the Seasons in the British Isles, referred to on p. 35 of the report for last year, but it has been impossible to complete the work.

Information based upon the weekly values of rainfall, temperature, and sunshine for the past 30 years has been sent regularly to the different agricultural shows at the request of the Board of Agriculture. The information has included a note of the weather of the week preceding the date of the show in the current year, and an indication of the statistical connexion between the weather of the corresponding week and of the following week during preceding years.

An exhibit of climatological statistics was prepared for the Coronation Exhibition.

# CLIMATOLOGY. FOREIGN AND COLONIAL STATIONS.

A list of Foreign and Colonial Stations from which documents have been received in the course of the year is given in Appendix II., p. 111.

Among the additions to the list during the year under review may be mentioned stations started in Uganda at Bombo and Gulu.

The returns received from 15 stations have been examined and summarised month by month.

The copies of meteorological returns reprinted from Colonial Government publications and sent to the Office for distribution have been issued for the year 1909. The reprints for the year 1910 have not yet been received from all the Colonies.

# INQUIRIES.

The inquiries dealt with in the Statistics and Library Division during the year were 887, of which 457 were by letter and the rest personal inquiries. The following table gives a classification of the inquiries with the corresponding figures for previous years :—

		For Scientific or Commercial Purposes.	For Evidence in Legal Proceedings.	For Forecasts of Weather.	From Newspaper Correspondents for Special In- formation.	Miscellaneous.	Answered by Letter.	Answered Personally.
1903-4	...	258	94	158	217	65	166	626
1904-5	...	259	116	89	221	70	136	619
1905-6	...	293	99	77	206	84	160	599
1906-7	...	427	73	79	166	24	247	522
1907-8	...	503	83	108	175	24	305	588
1908-9	...	540	99	83	99	87	301	607
1909-10	...	469	98	104	112	39	305	517
1910-11	...	516	107	76	115	62	351	525
1911-12	...	582	129	30	113	33	457	430

The inquiries included in the table under the heading "for forecasts of weather" are personal inquiries for information supplementary to that contained in the official forecasts and exhibited at the entrance to the Office and in St. James's Park.

# EXCHANGE OF PUBLICATIONS.

Exchanges of publications, principally geophysical, have been arranged with the following :—

Geophysikalisches Institut der Universität, Göttingen; Hauptstation für Erdbebenforschung, Hamburg; Russian Seismological Station, Pulkova; Observatorio Meteorologico, Morelia, Mexico; Hadley Climatological Laboratory of the University of New Mexico, Albuquerque; University of California, Berkeley; Blue Hill Observatory, Cambridge, Mass.; Observatoire de Ksara (Libau); Academia Polytechnica, Oporto; Observatorio Meteorologico, Cartuja, Granada;



Oficina Meteorologica Argentina, Seccion Cordoba ; Observatorio Astronomico Nacional, Tacubaya ; Observatorio Meteorologico, Leon, Mexico.

#### LIBRARY.

The Author Card Catalogue has been kept up to date. The index numbers corresponding with the classification adopted in the International Catalogue of Scientific Literature are entered on the cards so that the subject-catalogue can be prepared directly from them.

The subject card catalogue for the books added to the library since the last list of additions was printed *in extenso*, as an appendix to the Report of the Meteorological Council for the year 1904-5, has been completed up to the end of 1910. The additions to the library received during the past year include about 600 books and pamphlets. The total number of books in the library is now about 22,600.

In Appendix VII., p. 145, will be found (1) a list of persons and institutions from whom publications containing meteorological data have been received during the last nine years with a brief indication of the nature of the information given ; (2) a list of periodicals containing memoirs on meteorological subjects, which are received by the Office.

Among the most important additions to the library during the past year may be mentioned :—

Charts of the atmosphere for aeronauts and aviators, by A. L. Rotch and A. H. Palmer ; Der Kompass. I., von A. Schück ; Forecasting weather, by W. N. Shaw ; Smithsonian physical tables, 5th, rev. ed. ; Results of meteorological observations at the Radcliffe Observatory, Oxford, 1900-1905 ; Campagne Arctique de 1907 par le Duc d'Orléans ; Die Helligkeit des klaren Himmels, hrsg. von H. Wiener, O. Wiener and W. Mobius ; The Climate of the Continent of Africa, by A. Knox ; Internationaler meteorologischer Kodex, 2. Aufl. ; Atlas international des nuages, 2nd éd. ; Scientific results of a journey in Central Asia, 1899-1902, by Dr. Sven Hedin ; Dynamic meteorology and hydrography, by V. Bjerknes et alii ; Rainfall of the Bombay Presidency for the years previous to 1891 ; Rainfall of India 1910 ; Atlas météorologique, 1910, par G. Eiffel ; Deutsche Südpolar-Expedition, 1901-1903, 1. Teil.

Among those acquired by purchase have been :—

Tägliche synoptische Wetterkarten für den nordatlantischen Ozean, 1904-5 ; La sismologie moderne, par le Comte de Montessus de Ballore ; The tides and kindred phenomena in the solar system, by Sir G. H. Darwin ; Mathematical and physical papers, vol. 5, by Sir Wm. Thomson, Baron Kelvin ; Etude sur les phénomènes périodiques de la végétation dans leur rapports avec les variations climatiques, par E. Vanderlinden ; Contribution à l'étude des relations existant entre les circulations atmosphériques, l'électricité atmosphérique et le magnétisme terrestre, par A. Vialay ; The sugar industry of Mauritius : a study in correlation, by A. Walter ; Thermodynamik der Atmosphäre, von A. Wegener ; The physics of earthquake phenomena, by C. G. Knott ; L'aurore

boréale, par H. de Kerillis; Weather science, by F. W. Henkel; Handbuch der Klimatologie, Band 3, von J. von Hann; Das Gewitter, 2. Aufl., von A. Gockel; The influence of strong, prevalent, rain-bearing winds on the prevalence of phthisis, by W. Gordon; and a selection of the volumes of the International Catalogue of Scientific Literature.

The library is available for the use of students and others between the hours of 10 a.m. and 4 p.m. A number of persons have availed themselves of this accommodation.

#### IV.—INSTRUMENTS DIVISION.

##### SUPPLY OF INSTRUMENTS.

**Supply to the Navy.**—The number of instruments supplied to ships of the Royal Navy during the year was 1,024, as compared with 1,047 last year.

**The Mercantile Marine.**—To the Mercantile Marine 547 instruments were issued during the year, a decrease of 129 compared with the number supplied in the previous year. 148 thermometers, 62 hydrometers, and 5 screens have been written off the books as broken, lost, or irrecoverable.

**The Australasian Antarctic Expedition.**—A set of marine instruments and a special sunshine recorder with cards were lent to Dr. Mawson, of the S.S. "Aurora." Three additional marine barometers and a Besson nephoscope were supplied, on repayment, to the Committee of the Expedition.

Sets of instruments, charts and diagrams have been lent for exhibition at the Coronation Exhibition, London, and at the conversazione of the Cardiff Naturalist Society, and of the Birmingham and Midland Institute.

**Colonial Governments.**—The number of instruments of all kinds supplied on repayment through the Crown Agents for the Colonies, or direct to Colonial Governments, amounted to 1,233 as compared with 1,465 in the preceding year, whilst charts for recording instruments, registers, and other books amounted to 17,034, as compared with 7,352.

Requisitions from the following Colonies were complied with:—

The Commonwealth of Australia (7), Union of S. Africa (6), Fiji (2), Hong Kong, Gibraltar, Federated Malay States (6), Mauritius, Falkland Islands, Bahamas, Gold Coast, Uganda (2), Barbados, Trinidad, South Nigeria (4), East Africa Protectorate (2), Malta, Sierra Leone (3), Cyprus (3), Basutoland, British Guiana.

**Local Authorities and Institutions.**—Among those to whom instruments were supplied on repayment were included:—

Carnoustie Borough Council; Clacton District Council; Department of Agriculture, Barbados; Superintendent of Experiments, Shoberyness; Department of Agriculture, Leeds; H.M. War Office; Dover Corporation; Newquay District Council; H.M. Dockyard, Rosyth (Works Dept.); Chopwellwood College; Aspatria College; Ilfracombe Urban District Council.

**Private Observers.**—Instruments have also been supplied on repayment to a number of private stations in connexion with the Office, viz. :—Station Hotel, Aviemore ; J. H. Scott, Esq., Wantage ; Gordon Castle, Fochabers ; Dr. Henry Cullinan, Donabate ; E. Kitchener, Esq., Hemel Hempstead ; Rev. J. S. Begg, West Linton ; Rev. M. J. Healy, B.Sc., Waterford ; J. Sherwin, Esq., Cumberland ; the Earl of Granard, Castle Forbes, Ireland ; W. W. Holdgate, Esq., Sutton Valence.

**Telegraphic Reporting Stations.**—The instrumental equipment of the telegraphic reporting stations has been maintained.

**Storm Cones.**—Storm warning cones have been replaced at 30 stations.

**Fishery Barometers.**—Inspectors of the Fishery Board for Scotland, the Department of Agriculture and Technical Instruction for Ireland, and of the Board of Agriculture and Fisheries in England and Wales have continued to examine and report upon the barometers supplied for the use of fishermen in their respective districts. The stations supplied with these barometers now number 225, of which 64 are in England, 6 in Wales, 60 in Ireland, 90 in Scotland, 4 in the Isle of Man, and 1 in Jersey. The fishery barometer at Port Guarra, Cornwall, has been withdrawn.

**Instruments in use at the Office.**—In addition to the climatological stations which have been maintained on the roof of the Office and in the grounds of the Natural History Museum, the latter by kind permission of the Trustees of the British Museum, the following instruments have been in regular operation at the Office :—

**Daily Records :—**

Pressure Tube Anemometer.	Callendar's Radiation Recorder.
Halliwell Recording Rain Gauge.	Callendar's Electrical Thermograph.
Campbell-Stokes Sunshine Recorder.	Dines Mercurial Barograph.
	Micro-barograph.

A wind direction recorder is in process of erection, and also a Robinson anemograph with electrical registration, according to the designs of Mr. H. R. Kempe of the Engineer's Department of the Post Office.

**Weekly Records :—**

Three barographs.	Thermograph.
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The routine observations and the work of changing the charts of the recording instruments have been undertaken by the junior members of the staff who constitute the corps of observers.

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## THE OBSERVATORIES.

Meetings of the Gassiot Committee were held on May 31, 1911, for the consideration of the Report and Accounts for the year ended 31st March, 1911, and on 25th October for the consideration of the programme and estimates for 1912-13.

The Committee regret to record the death at Kew Observatory of W. R. Corrin, son of the resident caretaker, a member of the staff of the National Physical Laboratory employed there. Plans have been approved for the remodelling of the interior of the building as soon as the work of testing instruments now carried on at the Observatory is removed to Teddington. The necessary buildings have already been commenced at Teddington, and it is expected that the transfer will be effected this year.

At Eskdalemuir some further operations have been undertaken by H.M. Office of Works for keeping the water out of the resident quarters during driving rain. Some alterations in the Superintendent's house have been carried out at the expense of the Committee, and a window suitable for observing the pole star has been inserted in the roof of the eastern magnetic hut.

An instrument designed by Prince Boris Galitzin for recording the vertical movements of the earth has been presented to the Observatory by Dr. Schuster, for which the Committee desire to express their thanks. Dr. Schuster had previously presented instruments of Prince Galitzin's design for recording the horizontal components, so that all three components are now regularly recorded at the Observatory.

Piers have been provided in the Laboratory for the installation of the two seismographs of the Omori and Wiechert types, for which smoked paper is used. The moving parts of these can be watched during the progress of a seismic disturbance.

Reports on the work of the several observatories are given below:—

V.—CENTRAL OBSERVATORY—KEW OBSERVATORY,  
RICHMOND, SURREY.

*Report on the work of the Observatory.*

*Drawn up by C. Chree, Sc.D., LL.D., F.R.S., Superintendent,  
Assistant-Director of Observatories.*

**Buildings.**—Preparations are in progress for the removal to Teddington of the work of testing instruments which has been carried on as heretofore at the Observatory for the National Physical Laboratory. The work thus done up to the end of December, 1911, is described in the Report of the Laboratory for that year.

**Staff.**—The staff employed has continued as last year, with the addition of Mr. Gordon Dobson, B.A., Research Student of Gonville and Caius College, Cambridge, who joined the Observatory staff in October, 1911 as Graduate Assistant for Advanced Study and Research in Atmospheric Electricity.

**Self-recording Instruments and Eye Observations.**—The magnetographs for the continuous record of declination, horizontal force and

vertical force, have been maintained in regular operation. Continuous records have been obtained of the meteorological elements barometric pressure, temperature of the dry bulb and wet bulb, direction and velocity of the wind (by the Robinson cup standard anemograph and the Dines pressure tube), rainfall (by the Beckley gauge) and bright sunshine (by the Campbell-Stokes recorder). The Kelvin water-dropping electrograph, recording the electric potential in the atmosphere, and the Milne seismograph, recording variations of level in the east-west direction, have also been maintained in continuous operation.

The continuous records have been supplemented by the usual eye readings and observations required to determine the scale values and the base line values of the curves.

All the meteorological records obtained—except those from the pressure-tube anemometer, which have been measured at the office—have been tabulated for each hour at the observatory. The electrograms have been measured at four fixed hours every day, and at each hour on ten days a month selected as representative of quiet conditions. Every day of the year has had its electrical character assigned on an arbitrary scale. The declination and horizontal force magnetograms have been measured at each hour on the five quiet days of each month selected by Professor van Everdingen, of the Royal Netherlands Meteorological Institute, at de Bilt, in pursuance of international agreement. The maximum and minimum values of these two magnetic elements have also been measured for each day, and the times of their occurrence have been determined. The magnetic character of each day on the international scale has also been assigned. The magnetographs were run at the higher speed—twelve times the normal—during the term hours arranged for the National Antarctic and the Australasian Antarctic Expeditions. The seismograms have been studied and measurements made of the times and amplitudes of the principal movements. Regular cloud observations have been made with the Fineman nephoscope and contributed to the international scheme of investigation of the upper air for publication at Strassburg. On days of bright sunshine observations of the intensity of the solar radiation have been made with the Ångström pyrheliometer, within half an hour of noon.

A considerable number of observations of the air-earth vertical electrical current have been made with the Wilson apparatus, and a similar number of observations of the number and mobility of the positive and negative electric ions (of higher mobility) have been taken with the aspiration apparatus of Ebert. These electrical observations have been taken as a rule on fine afternoons between 2 and 4 p.m.

In addition to the work represented by the tables of results published in the British Meteorological and Magnetic Year Book, the following experimental work has been conducted at the Observatory:—

**Fog and Mist.**—The observations of a series of distant objects have been continued as in previous years. The table summarising previous results, referred to in last year's Report, has been concluded.

**Comparison of Marine Barometers.**—A careful comparison was carried out between two marine barometers in which the contraction of the tube is different, from which conclusions were drawn as to the difference between the “lag” in these two barometers when used under the ordinary conditions of a land station. The barometers have since, by the kindness of Captain Main, of the “S.S. Hesperian,” been read regularly during several voyages across the Atlantic, with a view to ascertaining their relative behaviour at sea. The results obtained are now under consideration.

**Sudden Commencements of Magnetic Storms.**—At the request of Dr. Bauer, measurements were made of the times of occurrence of the rapid movements which sometimes precede magnetic storms. This was done for fifteen specified storms; particulars were also given of the direction and amplitude of the movements. The results, which were given partly in graphical form, were published by Dr. Bauer in *Terrestrial Magnetism*, vol. 16, No. 3, September, 1911.

**Electrical Observations.**—A number of observations have been made by Mr. Gordon Dobson, Graduate Assistant, since his appointment in October, with a view to improving the several electrical instruments and securing greater certainty in the interpretation of the results obtained with them.

**Contributions to Scientific Journals, &c.**—A list of contributions to Scientific Journals, &c. is given on p. 21.

**Inspections.**—Mr. Constable has acted, as in previous years, as inspector of several Meteorological Observatories and Anemograph Stations.

**Publication of the Results.**—The *Geophysical Journal* (*British Meteorological and Magnetic Year Book, Part III., Section 2*) gives month by month particulars of barometric pressure, air temperature, humidity, wind direction and velocity, amount of cloud and weather at two fixed hours daily, also the daily totals of rainfall and duration of bright sunshine. It further includes for each day the minimum temperature on the grass, earth temperatures at two depths, values of the potential gradient at 4 fixed hours, the electric and magnetic “character,” the extreme values of declination and horizontal force, and the ranges of these elements. The results are also given of all the observations of solar radiation with the Ångström pyrheliometer, and of electrical observations made near 3 p.m. with the Ebert and the Wilson apparatus.

Monthly summaries of the diurnal and seasonal variation of the magnetic declination and horizontal force and of the electric potential gradient in the atmosphere are given, with corresponding data for other Meteorological Office Observatories when they are available, in *Hourly Values, Geophysical Section, Part IV., Section 2*, of the same publication, which also contains mean monthly values of magnetic inclination, total force, vertical force, and north and west components, along with a table giving recent mean annual values of the magnetic elements at the Observatories whose publications are received at Kew.



**Library.**—The Library has received publications from 21 Scientific Societies and Institutions of Great Britain and Ireland, and 131 Colonial and Foreign Scientific Establishments. The card catalogue has been proceeded with.

**Requisitions.**—Prepared photographic paper, as used at Kew, has been supplied, on requisition, from the other Observatories of the Meteorological Office; the Radcliffe Observatory, Oxford; Hong Kong Government, and the Indian Government.

**Educational.**—At the request of the India Office a course of magnetic instruction has been given to Lieutenant R. A. Melhuish, R.I.M.

Parties of naval officers from the Navigation School, H.M. Dockyard, Portsmouth, were shown over the Observatory on May 25th and November 9th.

**Gassiot Committee Meeting.**—The annual meeting of the Gassiot Committee to be held at the Observatory took place on May 31, 1911. The afternoon was the occasion of a remarkable thunderstorm, which has recently been discussed before the Royal Meteorological Society by Mr. J. Fairgrieve.

**Loan of Instruments.**—The following instruments, apparatus, &c., the property of the Meteorological Office, are at the present date out of the custody of the Superintendent on loan from the Observatory:—

To whom Lent.	Articles.	Date of Loan.
The Science and Art Department, South Kensington.	Articles specified in the list given in the Annual Report of the Kew Committee for 1893.	1876
New Zealand Government.	Dip Circle, by Barrow, with one pair of needles and bar magnets, and a tripod stand.	1899
" "	Unifilar Magnetometer, by Jones, marked N. A. B. C.	1909

## VI.—MAGNETIC OBSERVATORY.—ESKDALE OBSERVATORY, LANGHOLM, DUMFRIES-SHIRE.

### *Report on the work of the Observatory.*

*By George W. Walker, M.A., A.R.C.Sc., Superintendent.*

**Observatory time.**—The time used is Greenwich mean time as given by a telegraphic signal at 10 h. daily, except on Sundays and Post Office holidays.

**Azimuth of Fixed Mark.**—The Pole Star window and theodolite have proved of great service. A number of observations were made to determine the errors of the theodolite, and in May an excellent series of results was obtained, viz. :—

#### *Azimuth of Mark.*

11th May	...	8° 12' 22"	...	W. of S.	...	6 observations.
18th May	...	8° 12' 42"	...	W. of S.	...	4 observations.
20th May	...	8° 12' 26"	...	W. of S.	...	6 observations.

The mean 8° 12' 30" is the value that has hitherto been used and we may now accept this as the correct value. The error is considered to be not greater than 5".

The general work of the Observatory may be dealt with under the following heads :—

1. Terrestrial Magnetism.
2. Meteorology.
3. Seismology.
4. Other Observations and Experimental Work.
5. Miscellaneous.

**1. Terrestrial magnetism.**—Absolute observations of Horizontal Force, Declination and Inclination have been made weekly in the East Hut during the year. They were made in a manner considered suitable for obtaining relative base values of the magnetographs in a short time, while enabling one to assign final values, when sufficient data have been obtained. Details will be found in the Magnetic Tables in Part IV., Section 2, of the Year Book.

The tabulation of hourly values  $N$ ,  $W$ ,  $V$  has proceeded day by day. Provisional values of the maximum and minimum in each component with the times of occurrence have appeared month by month in the *Geophysical Journal*. The final tables of hourly values for  $N$ ,  $W$ , and  $V$ , tables of diurnal inequality for each month of  $N$ ,  $W$ , and  $V$  as observed;  $H$ ,  $D$ , and  $I$ , as computed; a table of Fourier Coefficients containing 24 hr. and 12 hr. terms for  $N$ ,  $W$ ,  $V$ , and a table of mean monthly values of  $N$ ,  $W$ ,  $V$ ,  $H$ ,  $D$ ,  $I$  and  $T$  have been completed.

The behaviour of the Adie magnetographs recording  $N$  and  $W$  has been satisfactory. Details will be found in the notes on the Magnetic Tables. The  $V$  recorder has, however, been a great source of trouble. A daily discontinuity of zero occurred at the time of changing the papers and lights. This probably arose from a temporary strain in the slate slab connecting the pier and clock work pier. In April the Director approved of cutting the instrument pier quite free, so that no mechanical shock should occur. The result was completely successful.

The instrument, however, continues to drift and to lose in sensitiveness after any re-adjustment. Steps will be taken to improve matters as soon as the experiments to be described have been completed.

An experimental magnetograph for recording  $W$  has been run for a considerable part of the year. The needle is 4 cms. long, 1 mm. diam., and is carried by two quartz fibres. Beneath the needle, and attached to it by a short platinum rod, is a horizontal disc of aluminium moving in paraffin oil. The instrument is approximately aperiodic. The results obtained have been most gratifying, and, somewhat contrary to what might have been expected, there has been no evidence of clogging by the oil. On one occasion the dish containing the oil had been moved and the rim of the aluminium disc caught on the side of the dish, but when this had been readjusted the system resumed its normal behaviour. In general the curves are quite similar to those got from the Adie instrument, but in the details of very small vibrations there is a little difference. This may arise partly from the fact that the experimental instrument is, rather more sensitive and the time scale more open, but possibly the

heavy damping has an influence. In fact, one of the objects is to ascertain if heavy damping is desirable or the reverse.

Work with this instrument has been interrupted, as the recording drum was required for examining the behaviour of a new form of V recorder on the principle mentioned last year. The needle is 6 cm. long and 2 mm. diameter and is hung by a pair of quartz fibres so that it is quite insensitive to horizontal forces but sensitive in the vertical plane. The instrument has been made by Messrs. W. G. Pye & Co., with the aid of a grant from the Government Grant Committee. It has been tried for a short time and it will take several months to test fully, but so far the results give promise of success.

The Adie instruments were set to record N and W in July 1910, and in December 1910, readjusted so that their axes lay along and at right angles to what was supposed to be the astronomical meridian. Unfortunately no astronomical meridian had been laid down in the underground house at the time it was made. It would appear that the walls of the house were set parallel and at right angles to what was presumably the average magnetic meridian in 1905. This formed the basis of the provisional line, but little confidence about it could be held. It was rather difficult to know how to get a true meridian in the room, until on 10th January, 1911, it was noticed that the sun shone the whole length of the central passage (over 10 metres). Accordingly, the two outer windows of the porch were removed and the time of transit of the sun's image through a circular hole in a square of black paper stuck on the door was observed at the extreme end of the passage. A line was laid down and a check observation was secured on 12th January. The Astronomer Royal was good enough to check the calculations of the azimuth of the sun and the two observations agreed to 1'. The N.S. line was drawn off on the floor and a parallel line was measured off in the room, by working through the door. The result then showed that the provisional line was not quite correct. The net result according to these observations is that the axis of the W. magnet points 50' to the West of North and the axis of the N. magnet points 52' to the South of West.

It was considered undesirable to readjust the magnets as the astronomical meridian should be properly laid down using really good theodolites before doing so. The reduction of the curves has been carried out as if they had been recording the true N. and W. components.

Quick runs were made on the recorders at the times arranged in conjunction with the British Antarctic Expedition, and several very interesting results have been obtained.

2. *Meteorology.*—The work of a first order station has been carried on, except that we have no instrument recording wind direction. Control observations have been made at 9 h. 15 h. and 21 h. The tabulated results have been duly returned to the Meteorological Office, and the results have appeared in the *British Meteorological and Magnetic Year Book*. The turf dyke round the protected rain-gauge was reduced to the level of the rim of the gauge. Comparative results have been sent monthly to the Meteorological Office for examination and analysis.



3. *Seismology.*—The work in this department has developed rapidly and considerably. The Milne recorder has been continued and the results returned monthly to Dr. Milne. A modification of the optical arrangement was introduced, with the result of greatly improved definition.

The Galitzin horizontal seismographs have been in operation throughout the year, and a *Seismological Journal* of the results obtained goes on daily and has appeared in the *Geophysical Journal*. This contains a statement of the period and amplitude of the observed microseismic motion characteristic of each day as a whole. There is also a statement of recorded earthquakes in the Göttingen notation, and a column of remarks in which are given the times of occurrence of the phases and the computed epicentre when possible. This is not considered an adequate treatment of the results, but the very great pressure of work has prevented the attempt of what might be regarded as a complete analysis of the records.

In October, 1910, the Gassiot Committee recommended that the Omori Horizontal Seismograph lent by the Japanese Government should be installed here, and in July, 1911, Dr. Schuster supplemented his former gift by presenting the new Galitzin seismograph for the vertical component, exhibited at the meeting of the International Seismological Association at Manchester, July, 1911.

The accommodation of the new instruments in a temporary way (until a suitable seismograph house can be obtained) involved a rearrangement in the main building. The Galitzin vertical seismograph was placed in the original seismograph room along with the Galitzin horizontal seismographs and the Milne seismograph, while a portion of the general laboratory was partitioned off to hold the galvanometer and recording drum. Piers were also made in the laboratory for the Omori instrument and for the Wiechert 80kg. horizontal seismograph. The arrangements were completed in December, and the new instruments were started in January, 1912. The large amount of work involved in running so many instruments required the provision of more assistance, and in September Mr. L. Southern, B.A., was appointed Professional Assistant. The expense involved by this extension of seismological work has been provided for temporarily by the Royal Society. The new Galitzin seismograph has proved of great value. The zero of the pendulum is, however, very susceptible to change with changing temperature, and as the temperature of the present room is far from constant, continual readjustment is necessary to keep the pendulum free.

The only large earthquake that has occurred since the new instruments were set up occurred on 24th January. Excellent records were obtained on all the instruments except the Omori. In this instrument the multiplying lever appeared defective, and recently an improved device by Dr. Milne was introduced. There has been no large earthquake to test the arrangement, but the instrument is now showing the microseismic movement clearly, which is a favourable sign.

The Superintendent attended the Seismological Conference at Manchester in July, and on Saturday, 22nd July, a party of 20 British and foreign delegates visited the observatory on the invitation of the Director and Sir G. Darwin. The party travelled by train to Carlisle and by motor from Carlisle to Eskdalemair, returning to Manchester in the same way, after spending about two hours at the observatory. The party included:—Prof. A. Angot, Paris; Prince Boris Galitzin, St. Petersburg; Prof. O. Hecker, Strassburg; Dr. Kövesligethy, Budapest; Prof. Wiechert, Göttingen; Prof. Omori, Tokio; Prof. Reid, Baltimore; Dr. O. Klotz, Ottawa; Prof. L. Palazzo, Rome; Mr. R. D. Oldham; Prof. A. Schmidt, Stuttgart; Prof. E. Oddone, Italy; Prof. Haussmann; Dr. C. Zeissig; Dr. Mintrop; Prof. C. G. Knott, Edinburgh; and from the numerous letters received since from those who were present, the visit appears to have been greatly appreciated.

During his holiday in October the Superintendent visited Dr. Zeissig, of the seismological station at Jugenheim, who also took him to see the observatory at Heidelberg, Professor Hecker at Strassburg, and Dr. Messerschmidt at Munich. He was received with much kindness, and it was very valuable to see the excellent work going on in these observatories.

**4. Other Observational and Experimental Work. Atmospheric Electricity.**—The Ebert apparatus got damaged in the end of January, 1911, and had to be sent to the makers for repair. It was not returned till June, when observations were resumed when the weather was favourable. The results have appeared monthly in the *Geophysical Journal*.

The electrograph has been running continuously during the year. The tabulation of hourly values and of maximum and minimum with times has proceeded day by day. The computed values of potential gradient in the open at 3h., 9h., 15h. and 21h. have appeared in the *Geophysical Journal*.

The scale value is determined once a fortnight on the photographic sheet itself in terms of a calibrated Wulf high-potential electrometer. The recording electrometer is a Dolezalek used as a voltmeter with 3 Weston cells across the quadrants. The scale is about 100 volts per centimetre on the paper.

It was doubtful whether the Wulf electrometer had kept constant, and in December, 1910, a second Wulf electrometer was requisitioned so that we might have the means of re-testing at Bushy at intervals. Unfortunately, owing to a series of misunderstandings, the new electrometer did not arrive till September, 1911, and as a consequence several points could not be definitely ascertained until November. Details will be found in the notes to the hourly electric values. Briefly, the points finally established were (1) that the scale value is appreciably affected by change of temperature; (2) that owing to a settlement of the wall on which the apparatus is carried, the zero of the instrument changes; (3) that the zero changes owing to a temperature effect in the wall.

The first is sufficiently allowed for by the actual scale determinations, but the second and third can only be dealt with by frequent zeros. As soon as these points were established an arrangement was introduced for automatic zeros on the paper every three hours

instead of only at the start and finish of a record. The results, however, for 1911 are thus affected by a pure diurnal temperature effect that cannot be adequately allowed for.

The sulphur insulation has as before given highly satisfactory results. At certain seasons spiders have given great trouble and a number of records have had to be discarded for this reason.

The factor for converting the electrograph readings to potential gradient in the open has been determined by the method mentioned last year. There appears no reason to believe, when adequate attention is paid to the insulation, to the scale value, and the distance of the jet from the wall, that the factor is other than constant.

New quadrants were obtained for the zinc-copper voltmeter, and the instrument was run in connection with the Dolezalek galvanometer for several months. The results show that the instrument serves the purpose for which it was intended, viz., to give a knowledge of what occurs at the high potentials experienced during precipitation.

A new specimen has been made by Messrs. W. G. Pye & Co. by aid of a grant made by the Government Grant Committee. In this additional damping is introduced electromagnetically. The instrument satisfies ordinary laboratory tests and is in course of installation as a recorder.

**Solar Radiation.**—Ångström's pyrheliometer has been used as before on suitable occasions between 11h. and 13h. The question of a continuous recorder merits consideration.

**5. Miscellaneous.—Library.**—The Observatory has to acknowledge a large increase in the number of magnetic and seismological reports received from Observatories.

**Grounds.**—In order to secure protection for the buildings, 1600 young trees have been planted along the south side of the grounds. These have been supplied through the kindness of Mr. J. H. Milne Home, Chamberlain to the Duke of Buccleuch.

**Tabulation.**—As indicated in the preceding sections, tabulation of all results obtained has gone on day by day, month by month, and the aim has been to have the work ready for publication within a month of the time the observations are made.

The advantage to those engaged in the work is great, as in many cases defects in the instruments are detected and can be removed, which otherwise might not be recognised until serious error had been introduced and might even escape observation altogether.

## VII.—WESTERN OBSERVATORY.—VALENCIA OBSERVATORY, CAHIRCIVEEN, CO. KERRY.

All the self-recording apparatus of a first-order meteorological station have been kept in continuous operation throughout the year, and the hourly tabulations are being published as usual. Cloud observations in connexion with the International investigation of the upper air have been made on the prescribed days of each month.

The fortnightly absolute magnetic observations of declination, inclination and intensity, have been regularly made throughout the year by the Superintendent. The results have been published monthly in the *Geophysical Journal*.



**VIII.—AEROLOGICAL OBSERVATORY AT PYRTON HILL.**

The general scheme of operations at Pyrtan Hill under the direction of Mr. W. H. Dines, F.R.S., has remained unchanged during the year.

**International Co-operation.**—The dates fixed by the International Commission for Scientific Aeronautics as days of international co-operation in 1911 were :—January 5 ; February 2 ; March 1, 2, 3 ; April 6 ; May 4 ; June 7, 8, 9 ; July 6 ; August 3 ; September 11–16 ; October 5 ; November 9 ; December 6, 7, 8.

The dates in September constituted the special international week for upper air observations, for which the Office arranged to conduct observations at Crinan, Argyllshire, as well as at Pyrtan Hill.

During the year a station for the investigation of the upper air has been established at the Mungret College Observatory, Limerick, Ireland, by the Rev. W. O'Leary, S.J., with the aid of a grant from the Royal Meteorological Society and the British Association for the Advancement of Science. Registering balloons have been sent up from the observatory on some of the occasions arranged by the International Commission, and regular records from the observatory are becoming available for comparison with the English results obtained on the same dates.

Registering balloons were liberated from the Manchester University on the international days and the records supplied to the Office as in previous years.

Observations were continued by Mr. C. J. P. Cave at Ditcham Park, Petersfield, and by Mr. S. H. R. Salmon at Brighton, who co-operated in the international scheme throughout the year. Three balloons were sent up by Mr. Marriott on behalf of the Royal Meteorological Society at Liverpool on June 21st, 22nd, and 23rd. In all 81 successful ascents of registering balloons were made, giving satisfactory records to an average height of just under 15 km. Special observations of clouds on the days of international ascents and the days preceding were made at the observatories of Greenwich, Kew, Aberdeen, and Valencia.

The observations of the upper air for the Meteorological Office are partly by means of kites and partly by balloons carrying self-recording instruments, partly also by pilot balloons which are observed from below.

**Kite and Balloon Ascents at Pyrtan Hill and Crinan.**—At Pyrtan Hill kites carrying recording apparatus have been sent up regularly throughout the year 1911.

Thirty-two balloons carrying instruments recording temperature and height were sent up from Pyrtan Hill in 1911. Each balloon carried a card offering a reward of 5s. to the finder upon receipt of the instrument undamaged. In 25 cases out of the 32 the instrument was found and the reward claimed. Nine balloons were liberated from Crinan and five instruments were returned. One ascent only failed to reach the stratosphere and three to reach at least 12 km. One other balloon was reported as found, but the instrument could not be recovered from the finder.

**Publication and Discussion of Results.**—The results of all the kite and balloon ascents are published in the British Meteorological and Magnetic Year Book, Part I. (Weekly Weather Report). Observations made on the days appointed by the International Commission were forwarded to Professor Hergesell, of Strassburg, for publication also in international form along with the results obtained simultaneously in other countries.

The contribution to the publication of the results at Strassburg by international arrangement has been continued. The latest issue of the publication received before the close of the financial year, 31st March, 1912, was that for February, 1910.

Most of the recording instruments for use at the co-operating stations of the British Isles during the year were made at Pyrton Hill. Instruments have also been supplied for Dr. Simpson to take to the Antarctic and for the Canadian Meteorological Service. The whole number now (June, 1912) made at Pyrton Hill for use with balloons has reached 299.

Mr. W. H. Dines has continued his researches on the correlation of the meteorological elements for the upper air, and the results of his investigations have been printed in *Geophysical Memoirs*, No. 2 (*see p. 20*).

Mr. C. J. P. Cave, of Ditcham Park, made an expedition to the Scilly Islands in November, 1911, in order to study the structure of the air over a sea district by means of observations of pilot balloons. Mr. Cave was assisted by Mr. J. S. Dines. Two base stations were established on neighbouring islands of the group and a series of successful observations obtained. A paper embodying the results of the observations is in preparation.

#### IX.—ABERDEEN OBSERVATORY.

The work of a first order station has been continued as heretofore by Mr. Clarke, under the direction of Professor Charles Niven, F.R.S. The Dines pressure tube anemometer which was installed some years ago for the purpose of comparison with the Robinson anemometer, was lent for a time during the summer to Mr. E. M. Wedderburn for use in connexion with investigation of seiches in the Scottish lochs.

Mr. Clarke has presented to the Office from time to time numerous photographs and sketches of clouds, and has formed an admirable collection of photographs illustrating various cloud forms and phases of cloud formation from which lantern slides for the illustration of lectures can be prepared. A set of consecutive photographs included in this collection, taken within an hour and a half, was selected for reproduction in *Geophysical Memoirs*, No. 2, in illustration of the hypothesis of cloud formation there put forward.

By arrangement with Professor Niven, a pair of theodolites have been lent to the Observatory for the observation of pilot balloons. Suitable bases have been selected, and a number of soundings have already been made.

## X.—CORRESPONDENCE AND ACCOUNTS.

Appendix I., p. 57, shows the receipts and payments during the year ended 31st March, 1912. The amount of the Parliamentary vote for Meteorology was £16,850, and the miscellaneous receipts amounted to £6,831 6s. 8d. Besides these amounts £894 9s. 11d. has been expended out of the balance to the credit of the account at the beginning of the year in order to meet the cost of special instruments, furniture and fittings of the Office and to pay certain items of ordinary expenditure which were outstanding on 31st March, 1911.

The following abstract shows approximately the net payments of this and the preceding year, together with the increase or decrease in 1911-12, as compared with the previous year:—

NET EXPENDITURE.	1910-11.	1911-12.	Increase.	Decrease.
GENERAL ADMINISTRATION:	£	£	£	£
Director ... ..	1,000	1,000	—	—
Office Salaries ... ..	7,592	7,933	341	—
Rent, Fuel, and Lighting...	697	684	—	13
Alterations to premises and contingencies ... ..	576	361	—	215
Postage ... ..	635	656	21	—
TELEGRAMS, &c. ... ..	1,830	2,168	338	—
TRAVELLING EXPENSES ...	328	281	—	47
INSTRUMENTS ... ..	376	515	139	—
OBSERVATORIES:—				
Kew ... ..	555	678	123	—
Eskdalemuir ... ..	51	256	205	—
Valencia ... ..	457	454	—	3
Allowances to other Observatories, Observers, &c.	2,358	2,248	—	110
SUPERANNUATION ACCOUNT	1,060	677	—	383
Total ... .. £	17,515	17,911	1,167	771

In both the years for which the figures are here given the expenditure has exceeded the amount of the Parliamentary Grant by a large sum. The total excess for the two years, £1,802 8s. 4d., has been met out of the balance which on 31st March, 1910, stood at £2,206 14s. 8d. The expenditure has included the whole of the cost of the special furniture and fittings of the new office chargeable to the Committee (with the exception of some items repayable to the Office of Works for which the accounts had not been rendered at the close of the year) in so far as it has not been met by private donations. Much of the excess is therefore expenditure of a non-recurring character, but the whole of the difference cannot be so regarded and the balance on 31st March, 1912, is not more than sufficient to carry on the work of the Office on its present lines beyond the close of the current year.

W. N. SHAW,  
Chairman.

July 3, 1912.



## APPENDICES.

## APPENDIX I.

## ACCOUNT of RECEIPTS and PAYMENTS for the year ended 31st March, 1912 :—

RECEIPTS.				PAYMENTS.			
	£	s.	d.		£	s.	d.
Balance from year 1910-11	—	—	—	Director .. ..	—	—	—
					1,000	0	0
Parliamentary vote ..	—	—	—	OFFICE SALARIES:			
M.O. OBSERVATORIES:				Monthly .. ..	7,720	14	11
Kew .. ..	909	9	8	Weekly .. ..	680	12	1
Eskdalemuir .. ..	1,123	15	1				
Valencia .. ..	17	10	0		8,401	7	0
				M.O. OBSERVATORIES:			
	2,050	14	9	Kew .. ..	1,587	13	0
DEPARTMENTAL EXPENSES REPAID:				Eskdalemuir .. ..	1,379	18	7
Forecasts, &c. ..	207	10	9	Valencia .. ..	471	15	5
Marine, Statistics, and							
Observatories ..	126	13	11		3,439	7	0
Instruments ..	133	13	4	OFFICE EXPENSES:			
				Rent, Fuel, &c. ..	683	16	8
	467	18	0	Furniture, Fittings, &c.	538	9	10
INCIDENTAL EXPENSES				Incidental .. ..	400	3	0
REPAID:					1,622	9	6
Forecasts, &c. ..	397	6	10	POSTAGE AND TELE-			
Other Branches ..	66	6	5	GRAMS:			
Stationery Office Ac-				General Postage ..	306	16	2
count .. ..	52	5	11	Postage of Daily			
				Weather Reports ..	348	19	2
	515	19	2	Telegrams, &c. ..	2,831	13	5
TELEGRAPH CHARGES							
REPAID:					3,487	8	9
Home .. ..	229	12	11	TRAVELLING EXPENSES			
Telegrams sent abroad	433	16	7	AND INSPECTIONS ..	—	—	—
					280	13	9
	663	9	6	SUPERANNUATION ..	—	—	—
INSTRUMENTS:					1,382	2	0
Royal Navy .. ..	512	4	6	COST OF INSTRUMENTS:			
Mercantile Marine, Sta-				Royal Navy .. ..	510	8	6
tions, &c. ..	1,130	13	10	Mercantile Marine, Sta-			
				tions, &c. ..	1,647	15	6
	1,642	18	4				
OBSERVATORY FORMS, &c.	—	—	—		2,158	4	0
				AUXILIARY OBSERVA-			
SUPERANNUATION AC-				TORIES, &c. ..	—	—	—
COUNT:					2,386	11	3
Annuities .. ..	606	17	6	LECTURES AND EXPERI-			
Interest on Investment	80	15	10	MENTS .. ..	—	—	—
Income Tax—Returned	17	10	0		417	13	4
				BALANCE:			
	705	3	4	Cash at Bank .. ..	361	17	0
LECTURES AND EXPERI-				" at Office .. ..	42	9	4
MENTS .. ..	—	—	—				
	585	12	7		404	6	4
Donations for Memorial	—	—	—				
Bronzes.					£24,980	2	11
	61	9	0		£24,980	2	11
	£24,980	2	11				

Note.—On 31st March, 1912, the amount of  $2\frac{1}{2}$  per cent. Annuities held for the provision of Superannuation Annuities was £2,119 5s. 11d.

## APPENDIX II.

STATEMENT OF PROVISIONS FOR THE SUPPLY OF  
INFORMATION TO THE PUBLIC, 1911-12.

## THE METEOROLOGICAL OFFICE.

The office was established in 1854 as a department of the Board of Trade. From 1866 to 1877, with a Parliamentary Grant in Aid, it was under the management of a Committee, and from 1877 to 1905 under a Council appointed by the Royal Society. It is now under the control of a Director and Committee appointed by H.M. Treasury.

Kew Observatory and the Eskdalemuir Magnetic Observatory were transferred from the National Physical Laboratory, July 1, 1910, with subventions from the Royal Society. The Gassiot Committee appointed by the Royal Society consisting of the officers of the Society and fifteen other members acts as an Advisory Committee for the work at the Observatories.

*Director :*

WILLIAM NAPIER SHAW, LL.D., Sc.D., F.R.S.

*Marine Superintendent :*

Commander M. W. CAMPBELL HEPWORTH, C.B., R.D., R.N.R.

*Superintendent of Forecast Division :*

R. G. K. LEMPFERT, M.A.

*Superintendent of Statistics :*

E. GOLD, M.A.

*Superintendent of Instruments :**Chief Clerk and Cashier :*

JOHN A. CURTIS.

## OFFICE PREMISES.

Exhibition Road, South Kensington.

Telegraphic address—"Weather, London."

**Office hours and general arrangements.**—The Office is open for general inquiries between the hours of 10 a.m. and 4 p.m. on week days (Saturdays, 1 p.m.), and for inquiries for forecasts and for information concerning the present weather conditions (*see* Section

B, Telegraphic Information) from 8.30 a.m. to 8 p.m. on week days, and from 6 p.m. to 8 p.m. on Sundays.

All communications should be addressed to the Director.

Cheques, &c., should be crossed "Bank of England, Western Branch," and be made payable to the "Meteorological Committee."

**Supply of Information and Charges.**—The books and documents in the Office library, and the manuscript returns in the possession of the Office, may be consulted or copied at the Office, free of charge, by any person, by permission of the Director. Extracts from them are supplied to any person making written application to the Director specifying precisely the details of the information required. For these extracts a charge is made to cover the cost of the time required for selecting and making them. The usual minimum charge is 5s. There are certain special exceptions with a smaller charge; a schedule of these will be sent on application.

The extracts will, if required, be attested by a sworn declaration before a Commissioner for Oaths, at a fee of £1 1s. (in addition to the charge of 1s. 6d. made by the Commissioner for Oaths). A special fee of from £2 2s. for each day's attendance is charged if a representative is required to attend in court in London with reference to the statements contained in the extracts supplied.

The facilities for the supply of information have been classified under the following heads :—

A. Marine Information.

B. Telegraphic Information.

Daily Weather Reports, Forecasts and Storm Warnings.

C. Statistical Information.

The British Meteorological and Magnetic Year Book—

Part I., Weekly Weather Report.

Part II., Monthly Weather Report, with annual Summary.

Part III. (1), Daily Readings at Meteorological Stations of the First and Second Orders.

Part III. (2), Geophysical Journal. Daily Values for Meteorology, Solar Radiation, Seismology, Atmospheric Electricity and Terrestrial Magnetism, with supplements giving the results of observations in the upper air.

Part IV. (1), Hourly Values from Autographic Records. Meteorological Section (Pressure, Temperature, Humidity, Rainfall and Sunshine) at Valencia, Kew, and Eskdalemuir.

Part IV. (2), Hourly Values from Autographic Records. Geophysical Section (Terrestrial Magnetism, Atmospheric Electricity and Meteorology).

Unpublished Observations.

D. Information from land stations outside the British Isles.

E. The Library and Museum.

F. Supply of Instruments and Forms to Observers.

Fishery Barometers.

G. Publication of Observations contributed by Volunteer Observers or by the Representatives of Local Authorities.



- H. Regulations for the Supply of Information from Instruments belonging to the Meteorological Office by the Custodians of the Instruments.
  - I. Observatories and Stations in connexion with the Meteorological Office.
  - K. List of Publications of the Office.
  - L. Publications of the International Meteorological Committee.
- 

#### A.—MARINE INFORMATION.

**General Information.**—Observations have been forwarded to the Office, in special log books and registers, since 1855, by officers of the Royal Navy and the Mercantile Marine, and this valuable co-operation continues. In addition a large number of logs and remark books kept on board H.M. ships have been lent to the Office by the Admiralty, and by the large shipping firms, from time to time, for the purpose of extracting meteorological data. The information thus received is dealt with in various ways, and the results, which are published for the benefit of seamen and others, are indicated in Section K. Copies of these publications are presented from time to time to officers who contribute regular returns.

Information is given to seamen, upon application to the Meteorological Office, either in person or by letter, with respect to the meteorological conditions likely to prevail along a proposed route, either for sailing vessels or for steamships.

**Monthly Charts.**—Meteorological Charts of the North Atlantic and Mediterranean have appeared each month since 1901, and a similar monthly series for the Indian Ocean and Red Sea since May, 1906. In May, 1910, the latter series was extended southward, so as to include all parts of the ocean as far south as the parallel of 35° S. Commencing with the issue of May, 1911, this chart was extended eastward to the 125th meridian of east longitude; and its scale was altered to make the chart uniform with that of the Atlantic.

The temperature of the sea surface is differentiated by grades of colouring in blue; and isobars and isotherms are shown on the face of the chart, and by means of an inset chart. Magnetic variation curves are for 1912. On the face of these charts there are graphically represented, for the respective ocean areas, the normal winds, surface currents, distribution of atmospheric pressure, the magnetic variation, and the best routes for sailing vessels and steamships, according to the season. On the North Atlantic charts, in addition, there are given the average limits of trade winds, gales, fog, and ice; mean paths of centres of cyclones; storm signals, and radio-telegraphy stations; time of high water at Dover; recent reports of ice, including, in the months of April, May, June, November and December, the latest intelligence, by cablegram, from the Signal Service of Canada, in regard to the state of the ice in the Gulf of St. Lawrence and its approaches. A weekly edition of this series

has been issued since April, 1910. On the Indian Ocean charts there are given the average limits of trade winds and monsoons, surface temperature and currents near Cape Guardafui; information relative to the meteorology of the Red Sea; and tracks of cyclones in the Bay of Bengal, the Arabian Sea, and the South Indian Ocean, and storm-warning signals at Indian ports. During the south-west monsoon season, cable notices from the Director General of Indian Observatories, with respect to the weather conditions in the Arabian Sea and Bay of Bengal, are also given.

**Daily Synoptic Charts of the N. Atlantic. Weekly Charts of Sea Surface Temperature.**—Since April, 1910, the charts of the North Atlantic and Mediterranean have been issued in weekly instalments. This arrangement affords an opportunity for including on the backs of the charts seven maps giving the distribution of pressure and other elements on each day of the week ended on the day before the issue of the chart, over Europe, the North Atlantic, and the East of America. The charts are prepared from reports received from land stations in Europe in connexion with the telegraphic work of the Office, from reports from ships of His Majesty's navy and the mercantile marine received by wireless telegraphy, from Meteorological Office log-books and other nautical documents, and from the information for American stations published in the *Bulletin International*, issued by the Bureau Central Météorologique in Paris. Five charts are also shown giving for successive periods of seven days the most recent information regarding the temperature of the sea surface and of the air over the North Atlantic, also the geographical positions in which fog was recorded. On a similar chart there are given the normal distributions of air and sea temperature for the respective periods. The most recent information as to the occurrence of ice both in the Gulf of St. Lawrence and in the open ocean, and as to derelicts, is also included.

**Special Articles.**—The special features of the current issue of the Meteorological Charts of the North Atlantic and Mediterranean, include monthly inset charts showing the percentages of fog, mist, and gales over the North Atlantic for each month; the latest information to hand up to the time of going to press with respect to ice in the Southern Ocean; Arctic weather of 1911; phenomenal drifts and numbers of derelict ships; lists of submarine and radio-telegraphy stations on either side of the North Atlantic; phenomenal drifts and heights of icebergs; Eiffel Tower wireless weather report system; West India hurricanes; North Sea gales of September; and a description of rollers at Mogador.

On the backs of the Meteorological Charts of the Indian Ocean and Red Sea information has been given relative to various subjects which are of importance to navigators and others. Among the items dealt with, in some instances illustrated by diagrams, are the following:—Icebergs and field ice in the Southern Hemisphere; cyclonic storms of the Arabian Sea, the Bay of Bengal, and the China Sea; typhoons of the North Pacific; Fiji hurricanes of March, 1910; weather conditions between Cape and Australia in 1910; currents on the Bombay and Aden route; ocean waves; submarine seismic disturbances; and Eiffel Tower wireless signals.

**Terms of Subscription.**—Copies of both series of charts may be obtained from the Superintendents of the Mercantile Marine Offices at the principal ports of the United Kingdom, by captains and officers of merchant ships, price 6*d.* each. They may also be purchased from the Admiralty agents for the sale of charts, and from the agents for His Majesty's Stationery Office at Edinburgh, and at Dublin, at the rate of 5*s.* for an annual series of 12 charts, or 6*d.* for each chart, in addition to the cost of transmission. The Indian Ocean Charts are also obtainable on similar or equivalent terms from Messrs. James Murray and Company, at Calcutta, and at the shipping offices at Bombay and Madras. Captains and officers who co-operate with the Meteorological Office by sending regular reports receive copies of the Monthly Meteorological Charts free.

**Dates of Issue of the Charts.**—The weekly instalments of the Monthly Charts of the North Atlantic and Mediterranean appear on Thursday of each week. The Charts of the Indian Ocean are published on the Thursday nearest to the 1st day of the month preceding that to which the information refers.

**Instruments for Observers.**—Subject to certain regulations the instruments necessary for the keeping of a Meteorological Log Book will be lent by the Office to the captains of British ships who undertake to make regular four-hourly records during their voyages to and from foreign ports, enter them in the specially arranged log book provided for the purpose, and return the latter, on completion, to the Marine Superintendent. A rough book for entering up the observations when taken, is also supplied, and this becomes the property of the captain for future reference. The set of instruments lent to captains by the Meteorological Office comprises one mercury barometer, five thermometers, with screen, for registering the shade temperature of the external air and the temperature of the sea surface, and three hydrometers. The expenses incurred by the co-operating captains with respect to postage of log books and the transit of instruments, are borne by the Meteorological Office.

The ships are supplied either directly from the Meteorological Office or through the following agents :—

Cardiff—Captain J. Weir, Examiner of Masters and Mates, Local Marine Board.

Dundee—Captain J. A. S. Chalmers, Examiner of Masters and Mates, Local Marine Board.

Glasgow—Messrs. D. McGregor & Co., Ltd., 57, Bothwell Street.

Greenock—Messrs. D. McGregor & Co., Ltd., 33, Cathcart Street.

Hull—Captain W. Ellery, Examiner of Masters and Mates, Mercantile Marine Office.

Liverpool—Commander F. M. Sergeant, R.D., R.N.R., Chief Examiner and Secretary, Local Marine Board, Canning Place (E.).



Southampton—Captain D. Forbes, 169, High Street.

Sunderland—Messrs. J. J. Wilson & Son, 18, Hudson Road.

Sets of instruments are kept in working order at the Office in London, and at each agency, for the purpose of instructing observers in the method of observation.

## B.—TELEGRAPHIC INFORMATION.

### DAILY WEATHER REPORTS. FORECASTS AND STORM WARNINGS.

Between 7.15 a.m. and 9.30 a.m. telegraphic messages are received daily, reporting meteorological observations at 29 stations (marked T in list of stations, Section I) in the British Isles, chiefly on the coast, at 40 stations on the Continent of Europe and the islands of the North Atlantic (*see* p. 108). The observations are now made at 7 a.m. at all stations, except Oxford, Lisbon, and the Azores. A certain number of stations report evening observations (6 p.m.), also by telegraph, and those that do not report in the evening include the evening observations with the following morning reports, so that a complete schedule of morning and evening observations is drawn up daily. The information refers to the readings of the barometer, dry bulb thermometer, maximum and minimum thermometers, rainfall, and in some cases, sunshine, with estimates of the direction and force of the wind, and reports of the weather and state of the sea. The observations received from Iceland give only the readings of the barometer, the dry bulb thermometer, the direction and force of the wind, and the state of the weather.

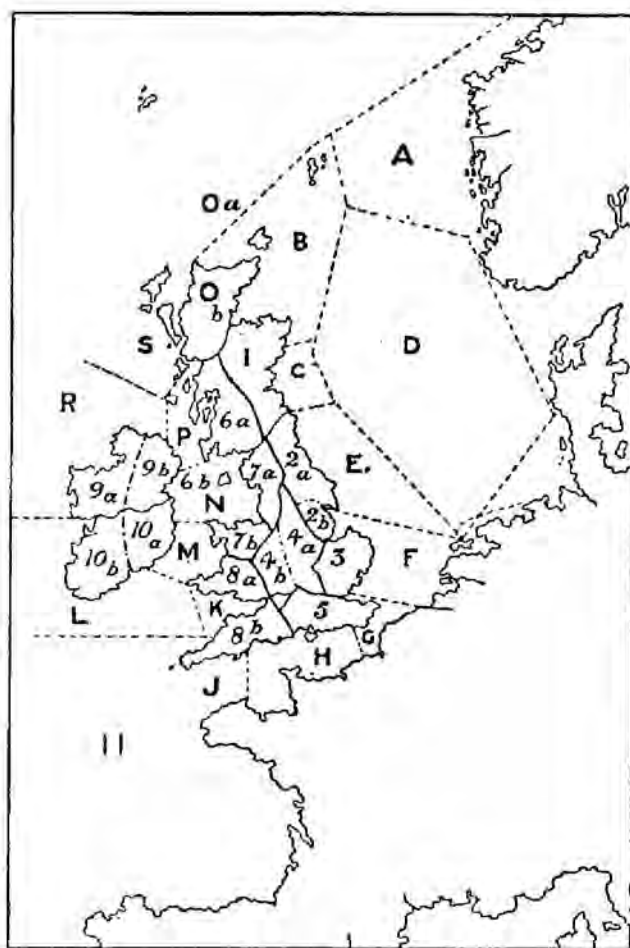
These reports are supplemented by a number of additional observations made at various stations in the United Kingdom and sent, either by telegram or by post, by private persons or local officials. Moreover, the "Bulletin International" published in Paris, reproducing meteorological telegrams from the whole of Europe, is received by post on the morning of the day after publication, and supplements the information previously received in the Office by telegram.

Through the courtesy of the Lords Commissioners of the Admiralty a daily report is received by "wireless" from Gibraltar and occasional reports of observations at sea off our southern and western coasts are transmitted by wireless telegraphy from the ships of H.M. Navy. Wireless reports are also received almost daily from ocean liners crossing the Atlantic.

The telegraphic information is tabulated and charted by about 9 a.m. for the morning observations, and 7 p.m. for the evening ones. A general report is then drawn up, and forecasts of the weather, for the twenty-four hours following the next noon, or midnight, as the case may be, are formulated; a note as to the further outlook is added if the meteorological conditions are such as to justify an anticipation for more than twenty-four hours ahead.

At a selection of stations additional observations are taken and telegraphed to the Office at 1 p.m., and occasionally modifications are made in the morning forecasts as a result of these observations. This information is usually available by 2 p.m.

**Forecast Districts.**—For the purposes of forecasts of weather the region of the British Isles is divided into land districts and sea districts, as indicated in the accompanying map.



### FORECAST DISTRICTS.

LAND.*	SEA.
0. SCOTLAND, { (a.) Islands. NORTH. { (b.) Mainland.	A. SHETLAND TO THE NAZE.
1. SCOTLAND, EAST.	B. SHETLAND AND ORKNEY.
2. ENGLAND, { (a.) North. NORTH-EAST. { (b.) South.	C. EAST OF SCOTLAND.
3. ENGLAND, EAST.	D. GREAT FISHERY AND DOGGER BANKS.
4. MIDLAND COUNTIES. { (a.) East. { (b.) West.	E. NORTH SEA, North of the Humber.
5. ENGLAND, SOUTH-EAST.	F. NORTH SEA, South of the Humber.
6. { (a.) SCOTLAND, WEST. { (b.) ISLE OF MAN.	G. STRAITS OF DOVER.
7. { (a.) ENGLAND, N.W. { (b.) NORTH WALES.	H. ENGLISH CHANNEL, Central Reach.
8. { (a.) SOUTH WALES. { (b.) ENGLAND, S.W.	J. ENGLISH CHANNEL, Western Portion.
9. IRELAND, { (a.) West. NORTH. { (b.) East.	K. BRISTOL CHANNEL.
10. IRELAND, { (a.) East. SOUTH. { (b.) West.	L. SOUTHWARD AND SOUTH-WEST- WARD OF IRELAND.
11. MOUTH OF CHANNEL and Bay of Biscay.	M. ST. GEORGE'S CHANNEL.
	N. IRISH SEA.
	P. NORTH CHANNEL.
	R. NORTH-WESTWARD OF IRELAND.
	S. THE MINCH.

\* For the grouping of the counties to represent approximately the forecast districts, see List of Stations (Section I).

## THE DISTRIBUTION OF FORECASTS AND TELEGRAPHIC INTELLIGENCE.

**Daily Weather Report.**—A Daily Weather Report, which includes a transcript of the observations for the day, with some of those for the previous day, illustrative charts, descriptive remarks on the state of the weather, and the weather prospects for the several districts of the British Isles and for the Bay of Biscay, is prepared for press at 11 a.m. daily, except on Sundays and Bank Holidays. Advance copies of the report can be obtained at the Office at noon, and the final copies are ready for issue by 1 p.m. The report is delivered by hand or posted at the G.P.O. at 1.30 p.m. to those addresses which can be reached in the regular course of post on the same day. Copies for those who are outside this limit are posted by the evening mails.

**Subscriptions.**—The Daily Weather Report may be obtained on payment in advance at the Meteorological Office of a subscription representing the cost of transmission (postage and wrappers). The subscription for this service, if for not less than a quarter of a year ending at the official quarter days, *e.g.*, March 31, June 30, &c., is at the rate of £1 per annum for delivery by book post; £2 for delivery, where feasible, by hand. Copies for other periods than the official quarters of a year are charged at the rate of 2s. for a calendar month, and 1d. per copy for periods of less than a month. When two copies are required to be sent by post each day, in the same envelope, the charge is 7s. per official quarter or £1 7s. 0d. per annum. Single copies, price 1d. each, can be obtained on the day of issue at the Office, and after 2 p.m. at the railway bookstalls at the following terminus stations:—Victoria (L.B.S.C., and S.E. & C. Railways), Charing Cross, King's Cross, St. Pancras, Euston.

**Supply of Reports for Educational Purposes.**—By arrangement with H.M. Stationery Office, upon giving the necessary notice, additional copies of the Daily Weather Report for one day, or a succession of days, will be printed off and supplied to School Authorities for class use at the rate of 7d. for 10 copies, exclusive of postage.

Surplus copies of charts prepared for exhibition, or of back numbers of the Daily Report, are available for educational purposes upon application to the Director. No charge is made for this service, but the cost of postage must be defrayed.

**Reports for the Press.**—Special advance copies of the descriptive remarks on the state of the weather and forecasts, based upon the morning or evening observations, are prepared at 10 a.m. and 8 p.m. respectively. These are supplied gratis to the representative of any newspaper or press agency calling for them at the Office at the hours named.

From May 1st, 1912, arrangements have been made to issue upon the same terms a schedule of the observations made at 6 p.m. at Health Resorts which have communicated to the Office by telegrams received up to 7 p.m. These schedules are ready for issue at 7.15 p.m. each evening.

As far as practicable the Director, upon application, will make arrangements for the transcription of the whole or a selection of



the morning or evening telegraphic reports, to be sent by telegraph, in code form, to newspapers or public associations desiring to make use of this means of accelerating the distribution of the latest information about the weather. The special terms for this service can be obtained on application to the Office.

The Director will also arrange for the supply of daily or weekly reports of the state of the weather, in special form, upon terms which may be had upon application at the Office personally or by letter.

**Forecasts by Telegraph.**—The *latest information for any district, or the latest forecast*, will be sent by telegraph to any address if a request be received by post stating when the information or forecast is to be sent, and enclosing 6*d.* in addition to the cost of a telegram, allowing for not less than ten words in addition to the address. To avoid delay, letters of request for telegraphic information or forecasts should be marked on the outside "Forecast Division."

By arrangement with H.M. Postmaster-General (*see* the Post-Office Guide, "Meteorological Telegrams"), the latest information as to the state of the weather in various parts of the United Kingdom, or the Continent, and forecasts for one day in advance, can be obtained from the Meteorological Office, upon payment at any Postal Telegraph Office of a fee of 6*d.* in addition to the cost of a telegram of inquiry addressed "Weather, London," and of the reply. At least ten words, in addition to the address, must be allowed for the reply.

Telegrams of inquiry should state the nature of the information required, and the name and address to which the information is to be sent, as in the following examples:—

To "Weather, London."

*Latest Information from [Straits of Dover].*

or,

*Latest Forecast for [Forfarshire].*

or,

*Next Forecast for [Dublin].*

From

(Name),

(Address).

**Forecasts by Telephone.**—Forecasts will be sent in reply to enquiries by telephone if a sum has been previously deposited with the Office to cover the authorised charges for departmental expenses. Further information as to the service by telephone can be obtained on application at the Office.\*

**Written Special Forecasts.**—A written copy of the latest forecasts for a single district can be obtained at the Office between 9.30 a.m. and 8 p.m. upon payment of 6*d.* A written copy of the latest

\* *Note.*—A forecast is a statement of the weather to be expected during the period to which the forecast refers, arranged, generally speaking, as follows:—Direction and force of the wind, state of the sky as regards cloud, prospect of rain, snow, or thunder, temperature, and, in the case of the sea districts, sea disturbance. For example, the forecast for a land district referring to the twenty-four hours from the following noon or midnight, according to the time of issue, may read: "Light south-easterly to easterly winds; fine at first, cloudy later, with local thunder showers. Becoming cooler." The forecast for a sea district may read: "Strong southerly and south-westerly winds, with squally, showery weather and a rough sea."

information in possession of the Office as to the state of the weather in any district of the British Isles, and for the neighbouring parts of the continent of Europe, can also be obtained.

**Forecasts in Anticipation of Special Conditions.**—The Office will send by telegraph or telephone forecasts in anticipation of special conditions, such as spell of frost or of dry weather, smooth sea, &c. If the time of sending the forecast be left to the discretion of the Office a fee of 2s. 6d., which includes the cost of the telegram, is charged for this service.

**Forecasts, &c., for Public Exhibition.**—The latest reports, with a map, and forecasts for the land districts and for the Western Channel and Bay of Biscay are exhibited as early as possible, for the information of the public, at the entrance to the Office, and, by the courtesy of His Majesty's Office of Works, in St. James's Park, opposite the Horse Guards.

Typewritten copies of the morning forecasts for all districts are ready at 10 a.m., and are distributed by hand to clubs and societies situated in or near Pall Mall at a charge of 10s. per annum. They are sent by post at a charge of 2s. 6d. per official quarter or any part thereof, in addition to the cost of transmission. Copies of the evening forecasts are sent by post for a similar charge.

Forecasts for a single district will be sent regularly by telegraph to public bodies for exhibition without any charge beyond the cost of the telegrams, and to private persons at an additional charge of 3d. per telegram for a forecast for a single district, and 6d. for two or more districts.

**Harvest Weather Forecasts.**—Arrangements have been made for a special service of afternoon reports during the season of the Hay and Corn Harvests (June 1st to September 30th), with a view to a special series of forecasts daily (Sundays excepted) at 2.30 p.m. The forecasts for any district are supplied by telegraph to agriculturists and others upon prepayment of the cost of the telegrams (sixteen words daily in addition to the address) for the period during which the forecasts are required. Forms of application for these forecasts can be obtained at the Office.

The Postmaster-General has sanctioned the exhibition of Forecasts at Local Post Offices, provided space is available, if the persons to whom they are addressed desire them to be so exhibited.

**Notification of Spell of Settled Weather.**—In order to make the fullest use of the information available, when the weather appears likely to be settled for some days, provision has been made for sending telegraphic notifications of the expected commencement of spells of fine weather, and such further notifications as may be necessary in order to keep the recipient informed of the course which is being followed. For this service a fee of 5s., which includes the cost of the telegrams, is payable in advance for each spell.

#### STORM WARNINGS.

The Office issues notices of threatening atmospherical disturbances on or near the coasts of the British Islands (free of charge) to ports and fishing stations recommended by responsible local authorities.

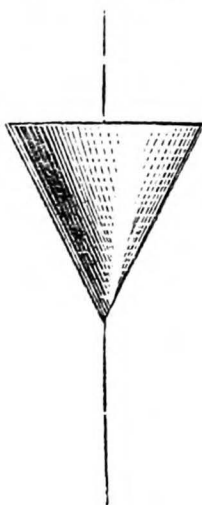
The issue of a warning indicates that an atmospheric disturbance is in existence which will *probably* cause a gale within a distance of (say) 50 miles of the place to which the warning is sent. The Signal Station itself is sometimes comparatively sheltered. The meaning of the warning is simply, "Look out! Bad weather of such and such a character is probably approaching you."

**Storm Signals.**—The fact that one of these notices has been received at any storm signal station is made known by hoisting a black canvas cone, 3 feet high, and 3 feet wide at base, which has the appearance of a triangle when hoisted.

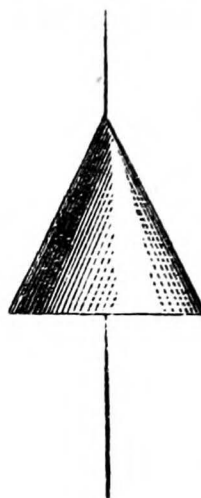
### STORM SIGNALS EXHIBITED.

#### DAY SIGNALS.

South Cone.



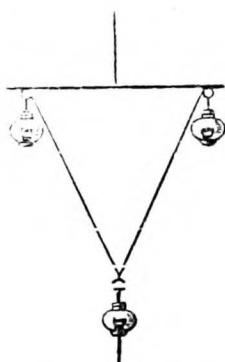
North Cone.



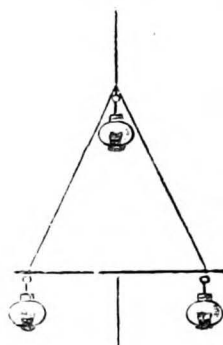
#### NIGHT SIGNALS

(Instead of the cone), Lights in Triangle.

For South Cone.



For North Cone.



Three lanterns and one yard, 4 ft. long, will be sufficient.

The "*South*" Cone (point downwards) is hoisted for gales and strong winds—

From S.E., veering to S.W., W., or N.W.,

„ S.W., veering to W. or N.W.,

„ W., veering to N.W.,

and also from E., veering to S. or S.W.



The “*North*” Cone (point upwards) is hoisted for gales and strong winds—

From S.E., E., or N.E., backing to N.,  
 „ N.W., veering to N., N.E., or E.,  
 „ N., veering to N.E. or E.,  
 „ N.E., veering to E.

**Sudden Shifts of Wind.**—A Southerly gale often *veers* quickly to a point North of West, but a gale from the Eastward is more likely to *back* to the *Northward*.

It is important to bear this in mind, especially in anchorages or harbours exposed to the Northward.

**Night Signals.**—At dusk, whenever a signal ought to be flying if it were daylight, a *Night Signal*, consisting of three lanterns hung on a triangular frame, may be hoisted in place of the cone, point downwards (for South Cone), or point upwards (for North Cone), as the case may be.

**Duration of Warning.**—The warning is intended to continue from the time the telegram leaves the Meteorological Office until 8 o'clock on the evening of the following day.

Gales sometimes follow one another in quick succession. An order to “*Keep up*” will be sent if the warning is to be continued beyond the ordinary limits ; and an order to “*Lower*” will be sent if there is reason to believe that danger is over before the regular time has lapsed.

If a gale has commenced before warnings are issued, notice to hoist the cone will still be sent if it is expected that the gale will continue, or increase in force, but not otherwise.

**Exhibition of Telegrams.**—The telegrams directing the cone to be hoisted should be exhibited near the signal staff. A card providing space for the exhibition of the telegrams and giving information as to the meaning of the signals is supplied for the purpose.

**Supply of Cones, &c.**—The Meteorological Office supplies the canvas cone and a card providing space for the exhibition of the telegrams and giving information as to the meaning of the warnings, but it does not supply the lanterns for night signals. In all cases the local authorities must undertake the charges incidental to the hoisting of the signal, such as the provision of a flagstaff and gear, oil, &c., and also those connected with the keeping of the apparatus in repair. Frames suitable for the exhibition of the telegrams in the card referred to above can be purchased on terms which can be obtained on application to the Office.

#### LIST OF STORM SIGNAL STATIONS.

The following is a LIST OF STATIONS to which STORM-WARNING telegrams are sent :—

I. *Scotland, N.E.*—A. *Northern Section.* *Shetland, Orkney and North Coast of Scotland.*—Lerwick, \*Scalloway, \*Dunrossness, Sumburgh Head L.H., Fair Isle L.H., Noup Head L.H., Stronness, Kirkwall, Cantick Head L.H., Thurso, Dunnet Head, Wick.

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\* Telegrams only exhibited.

*B. Southern Section. East Coast from Harril Head to Stonehaven.*—Tarbet Ness L.H., Cromarty, \*Avoch, Inverness, Nairn, Burghead, Lossiemouth, Buckie, Port Knockie, Cullen, Portsoy, Banff, Fraserburgh, Peterhead, Aberdeen, Girdleness L.H., Scurdy Ness L.H., Montrose, Stonehaven.

II. *Scotland, E.—Stonehaven to the Tweed.*—Broughty Ferry, Dundee, St. Andrews, Anstruther, Buckhaven, Methil, Wemyss West, Burntisland, Grangemouth, Bo'ness, Granton, Newhaven, †Leith, Fisherrow, Dunbar, Cockburnspath, St. Abb's Head, St. Abbs, Eyemouth, Berwick-on-Tweed.

III. *Scotland, N.W.—Kyle of Durness to Firth of Lorne.*—Cape Wrath L.H., Stoerhead L.H., \*Port of Ness, Stornoway, Island Glass L.H. (Scalpay).

IV. *Scotland, W. and North Channel.—From Firth of Lorne to Barrow Head, and from Fair Head to Strangford Lough.*—\*Glasgow, Greenock, \*Rothesay, Lamlash, Carradale, Campbeltown, Mull of Cantire L.H., Rhuvaal L.H., Rhinns of Islay L.H., Ardrossan, Ballantrae, Cairn Ryan, Corsewall Point L.H., Mull of Galloway L.H., Belfast, Donaghadee.

V. *Ireland, N.—Fair Head to Galway Bay.*—Killybegs L.H., Mulroy, Fanad Point (Lough Swilly) L.H., Rathmullen, Malin Head, Portrush, Port Ballintrae.

VI. *Ireland, S.—Galway Bay to Carnsore Point.*—Tuskar L.H., Dunmore East, Dungarvan, Helvick Head, Minehead L.H., Youghal, Queenstown, Cork, Passage, Kinsale, Kinsale (Old Head), Galley Head L.H., Castletownshend, Brow Head, Dingle, Tralee (Fenit), Limerick, Loophead L.H.

VII. *Irish Sea.—South of a line from Strangford Lough to Barrow Head and North of Lat. 53° N.*—Howth, Kingstown, Point of Ayre, Ramsey, Douglas, Silloth, Maryport, Workington, Whitehaven, Barrow, Walney Island L.H., Morecambe, Fleetwood, Blackpool, Lytham, Preston, Southport, Formby, Liverpool, Run-corn, New Brighton, Hoylake, New Ferry, Rhyl, Port Penrhyn, Point Lynas L.H., Holyhead, South Stack L.H., Carnarvon, Port Dinorwic.

VIII. *St. George's Channel.*—Aberystwyth.

IX. *Bristol Channel.—St. David's Head to River Camel.*—Smalls L.H., \*Milford, St. Ann's Head, Caldy L.H., Tenby, l'embrey (Burry Port), Llanelly, Swansea, Briton Ferry, Porthcawl, Nash L.H., Penarth, Cardiff (Bute Dock and Barry Dock), Newport, Weston-super-Mare, Burnham, Bridgwater, Minehead, Ilfracombe, Bull Point L.H., Barnstaple, Appledore, Hartland Point L.H., Lundy Island.

X. *England, S.W.—River Camel to River Exe.*—Port Isaac, Newquay, Godrevy L.H., Hayle, St. Ives, St. Sennen, Newlyn West, Padstow, Penzance, Porthleven, Scilly, the Lizard, Looe, Falmouth (Pendennis Castle), Fowey, Plymouth, Devonport (Mount Wise and the †Dockyard), Prawle Point, Salcombe, Teignmouth, Exmouth.

\* Telegrams only exhibited.

† Arrangements made for showing signals or illuminating the cone at night.

XI. *England, S.—River Exe to Beachy Head with Channel Isles.*—Guernsey, Jersey (St. Helier's), Portland Dockyard, Portland L.H., Weymouth, Anvil Point L.H., Poole, Hurst Castle L.H., Southampton, Yarmouth (I. of W.), Cowes, Ryde, St. Catherine's Point, Portsmouth (Dockyard and Horse Sand Fort), Littlehampton, Brighton, \*Newhaven.

XII. *England, S.E.—Beachy Head to Shoeburyness.*—Beachy Head, Eastbourne, \*Hastings, Rye, Sandgate, Dover, Deal, Ramsgate, Margate, Faversham, Sheerness, Chatham, Greenhithe, Shoeburyness.

XIII. *England, N.E.—From the Tweed to the Humber.*—Blyth, Tynemouth, South Shields, Souter Point L.H., Sunderland, Hartlepool, \*Middlesbrough, Redcar, Whitby, Filey, Flamborough (2 stations), Bridlington.

XIV. *England, E.—From the Humber to Shoeburyness.*—Hull, Goole, Grimsby, Boston, Sutton Bridge, Lynn, Sheringham, Cromer, Great Yarmouth, Gorleston, Southwold, Orford Ness L.H., Ipswich, Harwich, Gunfleet L.H., West Mersea.

### C.—STATISTICAL INFORMATION.

#### THE BRITISH METEOROLOGICAL AND MAGNETIC YEAR BOOK.

**Terms of Subscription.**—The Statistical Publications of the Office have been grouped together under the general title "British Meteorological and Magnetic Year Book." For 1912 the Year Book consists of four parts, as follows :—

Part I.—**The Weekly Weather Report.** Issued on Thursday of each week. Price 6*d.* per number. Annual subscription (which includes the Monthly Weather Report, *see* below) 30*s.* postage paid. The appendices to the report can be obtained separately, price from 4*d.* each.

Part II.—**The Monthly Weather Report with an annual summary.** Issued on the 27th of each month as a supplement to the Weekly Weather Report. Price 6*d.* each issue.

Part III.—(1) **Daily Readings at Meteorological Stations of the First and Second Orders.** Issued in monthly parts, within about five weeks of the close of each month. Price 1*s.* each issue. Annual Volume consisting of 12 monthly numbers with Introduction, Title Page and Map, 10*s.* 6*d.*

(2) **The Geophysical Journal.** Daily observations (Meteorology, Terrestrial Magnetism, Atmospheric Electricity, Seismology, &c.) at the Meteorological Office Observatories (Valencia, Kew, Eskdalemuir) and principal Anemograph Stations, together with records of Temperature, Humidity and Wind in the free atmosphere, obtained by means of kites, balloons and pilot balloons. Price 4*d.* each issue. Annual Volume consisting of 12 monthly numbers, with Introduction, Title Page, and Summary. Price 5*s.*

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\* Arrangements made for showing signals or illuminating the cone at night



**Part IV.—(1) Hourly Values from Autographic Records. Meteorological Section.** Hourly Readings of Pressure, Temperature, Wind, Rainfall, Humidity and Sunshine, at the Meteorological Office Observatories (Valencia, Kew, Eskdalemuir). Issued in monthly sections for each observatory. Price 6d. each section.

**(2) Hourly Values from Autographic Records. Geophysical Section.** Hourly Readings of the components of Terrestrial Magnetic force at Eskdalemuir, with monthly and annual Summaries of Hourly Values of Meteorological and Geophysical data at the five Observatories, Kew, Eskdalemuir, Valencia, Aberdeen, Falmouth. Annual Volume with Title Page and Introduction.

Parts I. and II. of the Year Book can be purchased either directly or through any bookseller from the Agents to H.M. Stationery Office, Messrs. Wyman & Sons, Fetter Lane, E.C., Oliver and Boyd, Edinburgh, and E. Ponsonby, 116, Grafton Street, Dublin. Parts III. and IV. are on sale at the Meteorological Office only. (For terms of subscription to the Daily Weather Report, see p. 65.)

Copies of the British Meteorological and Magnetic Year Book are sent to the following public libraries and private institutions:—

1. *The Complete British Meteorological and Magnetic Year Book*:—

London: The British Museum, London School of Economics, Royal Astronomical Society, Royal Meteorological Society, Royal Institution, Royal Observatory (Greenwich), Board of Education (Science Library, South Kensington), The Metropolitan Water Board, British Rainfall Organisation, University College for British Association Library, Kew Observatory; Birmingham, Public Library; Birmingham, University Library; Liverpool, Public Library; Edinburgh, University Library; Oxford, Radcliffe Observatory.

2. *Parts I., II., III. (1) and IV.*:—

London: Guildhall Library, Imperial Institute, Lloyd's, Royal United Service Institution, London Institution, Greenwich Royal Naval College, Institution of Civil Engineers.

3. *Parts I., II., and III. (1) (2)*:—

London: Board of Agriculture and Fisheries, The Admiralty, Royal Geographical Society.

4. *Parts I., II. and III. (2)*:—

Manchester University Physical Laboratory.

5. *Parts I. and II.*:—

London: Royal Botanic Gardens, The Royal Society of Arts, General Register Office, Local Government Board, Board of Trade; Aberystwyth, Public Library; Brighton, Public Library; Darwen, Public Library; Dumfries, Public Library; Guernsey, Guille-Alles Library; Huddersfield, Public Library; Middlesbrough, Public Library; Rhyl, Public Library; Stamford, Public Library; Shrewsbury, Public Library; Swansea, Public Library; Southend,

Public Library ; Great Yarmouth, Public Library ; Dublin Trinity College Library ; Belfast, Queen's College Library ; Leeds, University Library ; Cambridge, Philosophical Library.

6. *Part II. only* :—

Royal Society of Medicine ; Bradford, Public Library.

7. *Parts II. and III. (2)* :—

London, Institution of Mining Engineers.

8. *Parts III. (1) and (2) and IV.* :—

London, Solar Physics Observatory.

9. *Parts III. (1) and IV.* :—

London, Royal Society.

10. *Part III. (2) only* :—

Richmond, Free Public Library ; London, Science Museum, Institution of Electrical Engineers, Institution of Mechanical Engineers, Physical Society, Imperial College of Science and Technology ; Cardiff, University College ; Dundee, University College ; Glasgow, University Library ; Manchester, University.

11. *Parts II., III. (1) (2)* :—

London, National Physical Laboratory.

**PART I.—WEEKLY WEATHER REPORT WITH APPENDICES.**

**Weekly Summaries.**—The Weekly Weather Report gives a summary of the weather of the week ending with Saturday, intended principally for agricultural and sanitary purposes.

An advance copy of the MS. of the Weekly Report is prepared on Tuesday in each week, and is supplied free of charge to newspapers.

A division of the country into twelve districts, which are identical with the forecast districts of the Daily Weather Report, is adopted. The districts are further grouped into extreme north, eastern and western districts, and extreme south (islands in the English Channel).

From the beginning of 1912 the arrangement of the tables of data was changed, and in its present form the Report contains :—

I.—General remarks on the meteorological conditions of the week, with a table describing in words the divergence of the warmth, rainfall, and sunshine experienced in each district from the average for the district for the time of the year, and further tables summarising the weekly tables for the season and the four preceding seasons.

II.—A table containing the data from stations from which the values for districts are calculated.

III.—A table giving information of the temperature of the seawater at a selection of stations on the coasts of the British Isles.

IV.—A table summarising in numerical form the conditions of temperature, rainfall, and sunshine for each district for the week, the current season, and the calendar year.

V.—A series of maps showing the distribution of pressure, temperature, and wind over Europe, Iceland, the North Atlantic and the United States, at 7 a.m. on each day, and the temperature of the sea during the week. The maps for each day are accompanied by a brief account of the distribution of weather for that day, and the changes which have taken place.

The weekly statistical tables of values for districts have been prepared in their present form since 1878.

Since the beginning of the year 1912, the form of the maps has been entirely modified. In place of three maps for each day, a single map has been substituted. It embraces a much larger area than that covered by previous years' charts, and includes the whole of Europe, the North Atlantic Ocean north of  $28^{\circ}$  N., and a part of the North American continent as far west as the great lakes. The maps show the distribution of pressure, temperature, wind and weather at the hour of morning observation, as derived from information contained in the telegraphic reports to the Office, in the Bulletin International, already referred to (p. 63), in wireless reports from the Atlantic, and in the Canadian Daily Weather Reports.

For the statistical summaries, the information from the telegraphic reporting stations in the British Isles is supplemented by returns of daily observations supplied by volunteer observers from over 100 other stations. Of these 32 supply only the daily amounts of bright sunshine.

**Appendices.**—Subscribers for the Weekly Weather Report receive the following appendices:—

(a.) An *Appendix*, issued quarterly and annually, containing *quarterly and annual summaries of the rainfall, mean temperatures and bright sunshine* of each district for each of the six lustra from 1880 to 1910, and for the year 1911.

(b.) An *Appendix*, issued annually, giving *weekly and progressive totals of rain-days, rainfall, accumulated temperature, and duration of sunshine with percentage of its possible amount, for the several districts.*

(c.) An *Appendix*, issued annually, giving a summary of the *gales* experienced at anemograph stations in connexion with the Office.

(d.)\* An *Appendix* computed every fifth year, giving the *weekly values* of the different elements in the *five years*, and for the whole period, since 1881.

(e.)\* An *Appendix*, which is also prepared every fifth year, giving the *monthly averages* of rainfall, rain-days, maximum temperature, minimum temperature, mean temperature, duration of bright sunshine and percentage of possible bright sunshine, for as many as possible of the stations included in the Weekly Weather Report.

## PART II. MONTHLY WEATHER REPORT AND ANNUAL SUMMARY.

**Monthly and Annual Summaries.**—The Monthly Weather Report is issued as a supplement to the Weekly Weather Report. Each

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\* These appendices for the period ending with the lustra, 1906–1910, have not yet been issued.



number contains (1) a general account of the weather for the month; (2) a complete summary of the observations at the Telegraphic Reporting Stations, and at Normal Climatological Stations; (3) a summary of maximum and minimum temperature, temperature in the ground and on the grass, rainfall, and sunshine at auxiliary Climatological Stations; (4) the differences, where possible, from the average pressure, temperature, rainfall and sunshine; (5) four maps showing the monthly distribution of barometer and wind, the movements of barometric depressions the distribution of mean temperature, and the distribution of bright sunshine; (6) a full-page map prepared by the Director of the British Rainfall Organization from data from nearly 1,000 stations showing the distribution of Precipitation.

The number for March, 1912, contains tables of results for 262 stations, namely:—32 telegraphic stations and 91 normal climatological stations, together with a summary of temperature, rainfall, and sunshine, or one or more of these elements, at 139 other stations. For 14 of the 32 telegraphic stations summaries are given for the hours 7 a.m., 1 p.m., 9 p.m., a combination which entitles the stations to rank as normal climatological stations.

An Annual Summary on similar lines has been added since the year 1904.

### PART III. DAILY READINGS AT METEOROLOGICAL STATIONS OF THE FIRST AND SECOND ORDERS.

#### (1.) DAILY READINGS.

This publication contained, up to and including 1910, daily values for 20 stations in the British Islands of observations made at stations of the second order at 9 a.m. and 9 p.m. Particulars of the headings under which observations are taken are given in Section I., page 83. The publication also contained daily summaries of the records from 12 stations equipped with autographic anemometers. It contains for 1912 daily values at 16 stations for 9 h. and 21 h. A similar publication, containing meteorological observations but no data from anemograph stations, has been issued in annual volumes since 1876. These annual volumes, up to and including 1907, contain, in addition, monthly and annual summaries for a large number of stations which are now included in the Monthly Weather Report. The prices of the volumes vary from 10s. 6d. to 35s.

#### (2.) GEOPHYSICAL JOURNAL.

This publication which commenced with January, 1911, contains daily meteorological and magnetic data for the three Meteorological Office observatories, electrical and solar data for two observatories, seismic data for Eskdalemuir and wind components for four principal anemograph stations at 3, 9, 13, 21 h. Since January, 1912, values have been published from the records of temperature, humidity, and wind, in the free atmosphere, obtained by means of kites, balloons or pilot balloons. Monthly parts, price 4d. each; annual volume, 5s.

#### PART IV. HOURLY VALUES FROM AUTOGRAPHIC RECORDS AT THE METEOROLOGICAL OFFICE OBSERVATORIES.

##### (1.) METEOROLOGICAL SECTION.

This publication contains hourly values of pressure, dry bulb temperature, humidity, wind direction and velocity, rainfall and bright sunshine, for — Valencia, Kew and Eskdalemuir. Particulars of the corresponding publications for previous years are given in Section K, page 116.

##### (2.) GEOPHYSICAL SECTION.

This publication contains hourly readings of the components of terrestrial magnetic force at Eskdalemuir Observatory, with diurnal inequalities for terrestrial magnetism and atmospheric potential gradient, and monthly and annual summaries of hourly values of meteorological and geophysical data at the Meteorological Office observatories and stations of the first order. It is issued annually; the first volume, giving the results for 1911, will be completed in 1912.

The data in Parts III. and IV. of the Year-book are expressed throughout in units based upon the C.G.S. System.

##### UNPUBLISHED OBSERVATIONS.

The Office also receives, in return for an annual grant, duplicates of the curves from the autographic instruments at Glasgow\* and Stonyhurst\* observatories, and the tabulations of these curves are available, if required, as well as the hourly tabulations of the curves from these observatories.

Anemographic records are received from Alnwick Castle, Armagh,\* Brighton, Deerness,\*† Dover, Dublin,\* Falmouth (Pendennis Castle), Fleetwood, Gorleston, Holyhead,† Kingstown, Dwyran, The Groyne Lighthouse, South Shields, Plymouth, Pyrton Hill, Quilty, Roche's Point, Rosyth, Scilly,† Shoeburyness, South Kensington, Southport, Warlingham, and Yarmouth.†

The names of all stations in the British Isles from which information of any kind is received, and a statement of the order of the stations and of the publication for which the returns are prepared are given in the lists in Section I., p. 82. All the records are available for the use of the public on the conditions set forth on p. 59.

#### D.—INFORMATION FROM LAND STATIONS OUTSIDE THE BRITISH ISLES.

**Foreign and Colonial Stations.**—Periodical returns are received from certain stations in different British Colonies and dependencies, or in foreign countries.

A list of the stations, stating the character of the observations taken, is given in Section I., p. 82. It includes two anemometer stations, Gibraltar and St. Helena.

The information contained in these returns is available upon the same conditions as that contained in the returns of British Stations.

A summary of the observations at Gibraltar is now included in the Monthly Weather Report.

\* Results from anemographs at these stations are now published in "Daily Readings at Meteorological Stations of the First and Second Orders."

† Results from anemographs at these stations are now published in the "Geophysical Journal."

### E.—THE LIBRARY AND MUSEUM.

**Library.**—In return for copies of publications the Office receives the weather reports and other publications of the official meteorological organisations of the world, and of many private organisations. A list arranged geographically of the institutions sending periodical publications containing meteorological and magnetic data is given in Appendix VII., p. 145.

The library has also gradually acquired a large collection of pamphlets and books bearing upon meteorological subjects.

The terms on which books and documents in the library can be consulted are stated on p. 59.

**Museum.**—The museum of meteorological instruments, diagrams, &c., is open for inspection during office hours by permission of the Director.

### F.—SUPPLY OF INSTRUMENTS AND FORMS TO OBSERVERS.

**Loan of Instruments.**—In accordance with the terms of the Parliamentary grant the Office does not lend instruments for the use of observers except in the following cases :—

- (1.) To the Captains of vessels who undertake to keep a Meteorological log during their voyage and forward it to the Office. (*See* p. 62.)
- (2.) To the Telegraphic Reporting Stations in the British Isles.
- (3.) To the First Order Stations in connexion with the Office.
- (4.) To selected Stations in less frequented parts of the world where observations are deemed to be specially desirable.
- (5.) To a limited number (230) of fishing communities.

**Supply of instruments for observers at Land Stations.**—The Director is authorised to supply, at a cost of 5 per cent. in addition to the contract prices and the cost of carriage, trustworthy instruments for standard meteorological observations to those who are willing to send copies of their observations to the Office. The risk of breakage in transit must be undertaken by the consignee. The Director will also, if desired, give advice about the site and exposure of the instruments.

**Supply of forms.**—Forms for recording the observations, and tables for reducing them, are supplied to observers for the Office free of charge. The postage of returns, addressed to the Director of the Meteorological Office, need not be prepaid.

Blank sunshine cards are supplied without charge to a number of stations, not exceeding 10 in each district (including official stations), on condition that the cards are returned to the Office for filing. In other cases, cards are supplied, at a special price, to observers contributing returns. Forms for other self-recording instruments are supplied to a limited number of observers free of cost, provided that the records are deposited with the Office and that the forms required are of a type kept in stock by the Office for use at Official Stations.

For further information as to the supply of instruments, forms, &c., application should be made to the Office.



## FISHERY BAROMETERS.

The Office possesses a number of Barometers which it lends for the use of fishing communities, where it is shown that the instrument will be of material service. As a condition of the loan the community is required to provide for the housing of the instrument and to keep and forward to the Office a record of daily readings.

A copy of a manual specially compiled for the purpose accompanies the instrument, and is intended to point out in simple language the practical use of the Barometer, with a view to anticipating important changes in the weather in the neighbourhood of the fishing stations. The following is a list of stations that have been supplied with Fishery Barometers:—

## LIST OF STATIONS supplied with FISHERY BAROMETERS.

*Shetland Isles.*—Uya Sound, Burravoe, Nesting, Lerwick, Sandwick, Scalloway, Symbister, Hamnavoe, Walls.

*Orkney Isles.*—Westray, Papa Westray, Burray, Kirkwall, Barswick.

*Scotland, East coast.*—Duncansbay, Freswick, Auchengill, Keiss, Ackergill, Staxigoe, Wick, Lybster, Dunbeath, Hilton, Inver, Portmahomack, Ballintore, Cromarty, Avoch, Nairn, Burghead, Portessie, Port Knockie, Portsoy, Whitehills, Gardenstown, Roseheart, Pitullie, Fraserburgh, Inverallochy, Pointlaw, Portlethen, Skateraw, Stonehaven, Arbroath, Broughty Ferry, St. Andrews, Crail, Cellardyke, St. Monance, Burntisland, Newhaven.

*England, East coast.*—Berwick, Blyth, North Shields, South Shields, Sunderland (Roker), West Hartlepool, Staithes, Scarborough, Filey, Flamborough, Bridlington Quay, Withernsea, Hull, Lynn (2), Wells, Gorleston, Lowestoft, Walberswick, Harwich, Brightlingsea, West Mersea, Maldon, Leigh, Margate, Deal, Kingsdown, Dover.

*England, South coast.*—Bognor, Ryde, Bembridge, Brixton, Atherfield, Ventnor, Yarmouth (Isle of Wight), Poole, Weymouth, Portland.

*Channel Islands.*—Gorey (Jersey).

*England, South-West coast.*—Budleigh Salterton, Exmouth, Cawsand, Mevagissey, Gorranhaven, Devoran, Portscatho, Penryn, Durgan, Porthallow, Falmouth, Coverack, Newlyn (2), Mousehole, Penberth Cove, St. Ives, Hayle, Port Isaac, Bideford, Burnham, Highbridge, Weston-super-Mare.

*Wales.*—Briton Ferry, Swansea, Angle, Milford, Aberystwyth, Carnarvon.

*England, North-West coast.*—Fleetwood, Morecambe, Maryport.

*Isle of Man.*—Douglas, Port St. Mary, Peel (2).

*Scotland, South-West coast.*—Port Patrick, Cairn Ryan, Port William.

*Ireland, East coast.*—Belfast, Bangor, Groomsport, Portarogie, Donaghadee, Ballyhalbert, Cloghy, Ardglass, Carlingford, Glenarm, Greenore, Dundalk, Lough Shinny, Clogher Head, Malahide, Howth, Kingstown (2), Bray, Wicklow, Rosslare.

*Ireland, South coast.*—Dunmore East, Dungarvan, Kinsale, Union Hall, Castletownshend, Baltimore, Schull (2), Crookhaven, Castletown (Berehaven), Lawrence Cove, Ballydonegan, Ballycrovane.

*Ireland, West coast.*—Valencia, Dingle, Tralee, Kilronan, Galway, Spiddal, Cleggan, Elly Bay, Ballyglass, Ballycastle (Co. Mayo), Mullaghmore, Donegal, Tribane, Killybegs, Teelin, Malinmore, Port Noo, Burton Port, Kincashla, Bunbeg, Inniscree Island.

*Ireland, North coast.*—Dunfanaghy, Rathmullen, Buncrana, Malin Head, Moville, Greencastle, Port Stewart, Portrush, Port Ballintrae, Ballintoy, Ballycastle (Co. Antrim).

*Scotland, West coast.*—Lamlash, Tarbert (Loch Fyne), Loch Ranza, Campbeltown, Carradale; Portnahaven, Port Wemyss, Gruinard, and Bowmore (Islay); Mallaig; Portree and Armadale (Isle of Skye); Isle of Soay, Kyle of Lochalsh, Plockton, Ardneaskan, Shieldaig, Badachro, Ullapool, East Mey, Gills, Stroma (2).

*Hebrides.*—Ness, Carloway, Marvaig, Crossbost, Stornoway, Portnaguran, Valtos, Obb, Bernera, Boreray, Lemreway, Loch Boisdale.

#### G.—PUBLICATION OF OBSERVATIONS CONTRIBUTED BY VOLUNTEER OBSERVERS OR BY THE REPRESENTATIVES OF LOCAL AUTHORITIES.

**I. General Regulations.**—(a.) The observations must in all cases be taken by a competent observer, from approved instruments, satisfactorily exposed. Approval of the instruments and exposure is subject to periodical inspection by the Office.

Regularity in taking the observations and dispatching the reports is essential.

(b.) The sunshine cards upon which returns have been based must be sent to the Meteorological Office for examination at the close of each month. Cards supplied to observers at the special price referred to on p. 77 will be returned after examination.

(c.) The Director reserves the right to discontinue at any time, temporarily or permanently, the incorporation in the Official reports of information received from any station.

(d.) Observers contributing to one of the publications issued by the Office receive an official copy of the publication. It is requested that these copies may be filed in a public library or similar institution, or be returned to the Office when the observer has no further personal use for them.

**II. Publication in the Daily Weather Report.**—For publication in the Daily Weather Report, the information must be in accordance with one of the forms here specified:—

(a) **Full Telegraphic Report at 7 a.m.**—A complete record of barometer, temperature, wind, &c., based upon observations made at 7 a.m., and at 6 p.m. of the previous day, and telegraphed each morning in time to reach the Office not later than 9 a.m. This information must be sent in code, a copy of which, with other necessary instructions, will be supplied by the Office. A manuscript copy of the observations on a form provided for the purpose must be sent at the end of each month.

(b.) **Telegraphic Report at 6 p.m.**—*See V.*

(c.) **Postal Report at 9 p.m.**—A post card (Form 231) reporting observations taken at 9 p.m. of maximum and minimum temperature, and rainfall for the 24 hours ended at 9 p.m., and the duration of bright sunshine, together with brief notes on the general character of the weather during the day. Space is also provided on the cards for the entry of the remaining observations (barometer, wind, &c.), made at a normal climatological station at 9 p.m. This report can only be accepted if the postal arrangements are such that the card will be delivered at the Meteorological Office by 10 a.m. on the following morning if it be posted immediately after the observations have been taken.

**III. Publication in the Weekly Weather Report.**—Observations are accepted from a limited number of stations for publication in the Weekly Weather Report. The information should consist of observations taken once daily of the maximum and minimum temperature and of the rainfall, together with the duration of bright sunshine, and brief notes on the weather of each day.

Observations of the minimum temperature on the grass, and of underground temperature at the depths of 1 foot and 4 feet are also included. Each return should be posted as soon as possible after the Sunday morning reading, in order that it may reach London by Monday.

**IV. Publication in the Monthly Summary of the Weekly Weather Report, and in the Monthly Issue of Daily Readings at Meteorological Stations of the First and Second Orders.** For this purpose a monthly return must be sent so as to reach the Office *not later than the 10th* of the following month. Three forms of return are at present in use. In Form 355 provision is made for the complete set of observations made at a normal Climatological Station at which observations are recorded three times a day. Form 347 is similar to Form 355, but provision is made for the entry of observations made twice a day only. Form 348 is similar, but for one hour of observation only.

**V. Publication in the Evening Reports circulated to the Newspaper Press.**—Arrangements have been made for the issue to the Press of a daily report embodying the information received by telegraph from health resorts. The observations included in these schedules comprise the amount of bright sunshine and the maximum temperature for the day, the minimum temperature and the amount of rainfall for the 24 hours ended at 6 p.m., and, further, the observations of the barometer, wind, temperature and weather recorded at 6 p.m. This statistical information is supplemented by brief notes regarding the general character of the weather or any exceptional phenomena such as thunderstorms, unusually heavy rainfall, &c.

The schedules are issued to the press on the same terms as other reports of the Office, *i.e.*, they are supplied free of charge to the messengers of all newspapers and news agencies that call for them. They are ready for delivery at 7.15 p.m.

The reports from contributing stations must be sent in code form in time to reach the Office not later than 7 p.m. The inclusion of observations is conditional upon annual inspection of the station by a representative of the Office. For this service a fee of £4 is charged. The sunshine cards upon which the records of bright sunshine are based must be sent to the Meteorological Office for



examination at the close of each month. A manuscript copy of the observations must be sent on one of the forms described on p. 80, at the end of each month.

The cost of telegraphy must be borne locally.

The information regarding maximum and minimum temperature, sunshine and rainfall contained in the 6 p.m. telegrams is included in the following day's issue of the Daily Weather Report.

NOTE.—At auxiliary climatological stations, for which extremes of temperature and rainfall amounts for the 24 hours ending at 9 a.m. are required, as well as the data referred to in the messages dispatched at 6 p.m., separate minimum thermometers and raingauges should be provided for the two sets of observations. A single maximum thermometer will suffice, if the instrument be read, but not *set*, at 6 p.m. At normal climatological stations, when the extremes used for climatological purposes should be for the 24 hours ending 9 p.m., a double set of instruments is not required if both thermometers are *set* only once a day, viz., at 9 p.m.

#### H.—REGULATIONS FOR THE SUPPLY OF INFORMATION FROM INSTRUMENTS BELONGING TO THE METEOROLOGICAL OFFICE BY THE CUSTODIANS OF THE INSTRUMENTS.

The custodians of instruments maintained by the Meteorological Office are not allowed to supply information derived from the instruments in their charge without previous permission obtained from the Director.

Permission is not given when the information required can be obtained directly from the Office in the course of post. Applicants for information should in that case be referred to the Office.

In special circumstances the Director will give permission for information to be extracted by the custodian for the use of Local Authorities, provided—

- (1) That a note shall be appended to the information thus supplied to the effect that "The information is derived from instruments belonging to the Meteorological Office, and is subject to correction or modification";
- (2) That if the information be published, the note shall also be published;
- (3) That a copy be kept of the information supplied, to be forwarded to the Meteorological Office if required.

If arrangement is made for the payment of the custodian for this service the Director must be informed.

In cases in which the extraction of provisional information is permitted, instructions for observing or tabulating will be given to the custodian, which must be strictly followed.

# I.—OBSERVATORIES AND STATIONS IN CONNEXION WITH THE METEOROLOGICAL OFFICE.

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## CENTRAL OBSERVATORY.

Kew Observatory, Old Deer Park, Richmond, Surrey.

*Superintendent* : C. Chree, LL.D., Sc.D., F.R.S., *Assistant Director of Observatories.*

Telegraphic Address : "Weather, Richmond, Surrey."

## MAGNETIC OBSERVATORY.

Eskdalemuir Observatory, Langholm.

*Superintendent* : G. W. Walker, M.A.

## WESTERN OBSERVATORY.

Valencia Observatory, Cahirciveen, Ireland.

*Superintendent* : J. E. Cullum.

Kew Observatory was built in 1769 as a private observatory and an astronomical and physical laboratory for King George III. The building was placed at the disposal of the British Association in 1842 and taken over by the Royal Society of London in 1871. The Observatory formed a department of the National Physical Laboratory from 1900 to 1910, and passed under the management of the Meteorological Office from July 1, 1910. Besides the work of a normal meteorological observatory (station of the first order of the international classification), the observatory undertakes experimental and research work in Meteorology, including Atmospheric Electricity, Terrestrial Magnetism and Seismology.

Eskdalemuir Observatory was established by Government to continue the work of recording the magnetic elements which had been carried on at Kew Observatory and had been disturbed by electric tramways. It was opened in 1908. The work of the observatory includes routine work and experimental research in Terrestrial Magnetism, Atmospheric Electricity and Meteorology, as well as the maintenance of several Seismographs.

Valencia Observatory was established by the Meteorological Office in 1867 on Valencia Island. In 1891 it was transferred to Westwood House, Cahirciveen. Besides the work of a First Order Station and a Telegraphic Reporting Station, regular observations of magnetic force are made by arrangement with a committee organised by the late Earl of Rosse.

Other stations in connexion with the Office are shown in the list which follows.

The returns from stations marked "S" are supplied by the Scottish Meteorological Society. Stations marked "S" are in connexion with the Society as well as with the Office.

The list shows the order of classification of the stations and also the publication for which the returns are prepared in the Office.

In specifying the order of the station a distinction has been drawn between eye observations and the records of autographic instruments. In general the returns received have formed the basis for the classification, but in cases in which more extensive observations are taken, but not forwarded to the Office, the corresponding symbol has been enclosed in brackets. The list makes no pretence to completeness in respect of these. The symbols used are explained as follows :—

- I. Normal Meteorological Observatory : Station of the First Order.—Continuous records or hourly readings of pressure, temperature, wind, sunshine, and rain, with eye observations of the amount, form, and motion of the clouds, and notes on the weather. The autographic records are checked by frequent eye observations, and hence the symbol “I” has been entered in the table under both “Eye observations” and “Autographic.”
- II. Normal Climatological Station : Station of the Second Order.—Daily observations at 9 a.m. [3 p.m.] and 9 p.m. local time (or other accepted combinations of hours) of pressure, temperature (wet and dry-bulb), wind, amount of cloud, and weather, with the daily maximum and minimum of temperature, the daily rainfall, and remarks on the weather. Stations at which the additional observation at 3 p.m. is taken are distinguished by appending a suffix <sub>3</sub> to the symbol, thus—II<sub>3</sub>.
- III. Auxiliary Climatological Station : Station of the Third Order.—Observations similar in kind to those at the Normal Stations, but either (a) less full, (b) taken only once daily, (c) taken at hours other than 9 a.m. and 9 p.m.
- T. Telegraphic Reporting Station.—Daily observations at 7 a.m., 1 p.m., and 6 p.m. G.M.T., similar in general character to those taken at Normal Climatological Stations, reported to the Office each day by telegraph. At some telegraphic stations an additional observation is taken at 9 p.m., and as the combination of hours 7 a.m., 1 p.m., 9 p.m. is accepted as suitable for stations of the Second Order of the international classification, these stations are distinguished by the two symbols T II<sub>3</sub>.
- . (Eye Observations.) Additional Rainfall Station.—Daily observations, generally at 9 a.m., of the amount of rainfall.
- س. Additional Anemograph Station.—Continuous records of wind velocity (force) and, in most cases, also of wind direction.
- B. Additional Barograph Station.—Continuous record of atmospheric pressure.
- θ. Additional Thermograph Station.—Continuous record of atmospheric temperature.
- . (Autographic.) Additional Autographic Rain-gauge Station.—Continuous record of rainfall.



H. Hygrograph Station.—Continuous record of the relative humidity of the air.

☉. Sunshine Station.—Continuous record of bright sunshine taken with a Campbell-Stokes recorder.

K. Kite or Balloon Station.—Records of Temperature, Humidity and Wind in the upper air.

The publications for which the returns are prepared are indicated by the following letters :—

D. Published *in extenso* in the “Daily Weather Report.”

d. Published in abridged form in the “Daily Weather Report.”

W. Weekly summary of temperature and rainfall and, if available, of sunshine, published in the “Weekly Weather Report,” (British Meteorological and Magnetic Year Book. Part I.).

w. Weekly summary of bright sunshine only, or of grass minimum, or earth temperatures, published in the “Weekly Weather Report,” (British Meteorological and Magnetic Year Book. Part I.).

M. Full monthly summary in the international form published in the “Monthly Weather Report,” (British Meteorological and Magnetic Year Book. Part II.).

m. Abridged monthly summary published in the “Monthly Weather Report,” (British Meteorological and Magnetic Year Book. Part II.).

(m.) Monthly totals of bright sunshine only or of rainfall only, published in the “Monthly Weather Report,” (British Meteorological and Magnetic Year Book. Part II.).

S. Daily values published in “Daily Readings at Meteorological Stations of the First and Second Orders,” (British Meteorological and Magnetic Year Book. Part III. Section 1).

س. Daily summary of anemometer results certain of which are published in “Daily Readings at Meteorological Stations of the First and Second Orders,” (Part III., Section 1, of the British Meteorological and Magnetic Year Book). Or in the “Geophysical Journal,” (Part III., Section 2, of the Year Book).

k. Values for the upper air obtained by kites, pilot balloons and registering balloons, published in the Geophysical Journal, (British Meteorological and Magnetic Year Book. Part III. Section 2).

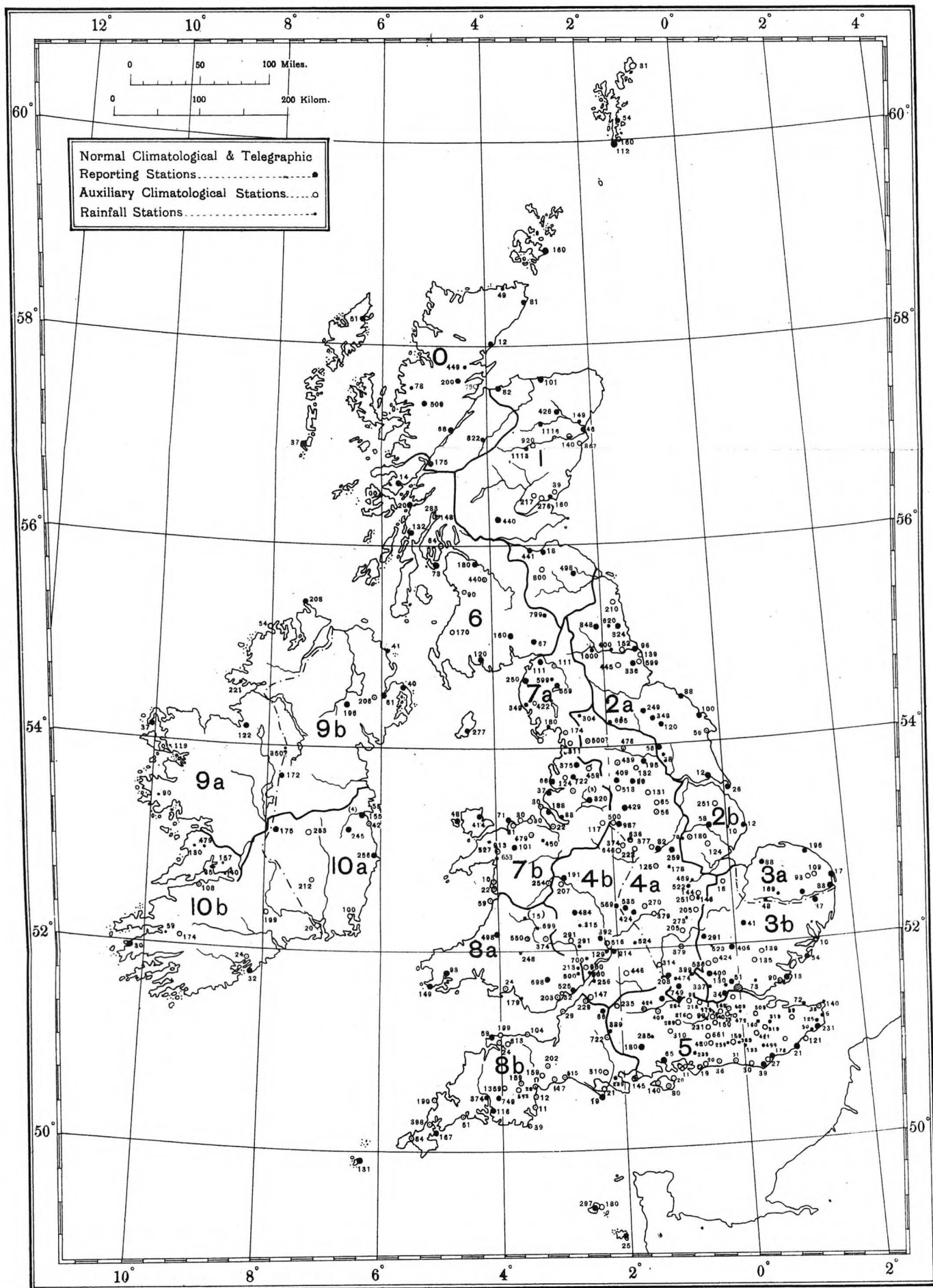
H<sub>1</sub>. Hourly readings of pressure, temperature, wind, rainfall, humidity and sunshine published in the British Meteorological and Magnetic Year Book. Part IV. Section 1.

H<sub>2</sub>. Hourly readings of the components of terrestrial magnetic force or diurnal inequalities of magnetic components and electric potential gradient, published in hourly values from autographic records—geophysical Section, (British Meteorological and Magnetic Year Book. Part IV. Section 2).



REPORT OF THE METEOROLOGICAL COMMITTEE 1911-1912.

Map showing Positions of Climatological Stations.



Scale 1:5,000,000.

Ordnance Survey, Southampton, 1912.

The heights of the Stations above Mean Sea Level are inserted against the positions, and will serve to identify the names of the stations as given in the List of Stations on pp. 86 to 107. The Stations in the London District are not all shown. Figures in brackets indicate the number of Rainfall Stations in the vicinity of the dot.



REPORT OF THE METEOROLOGICAL COMMITTEE 1911-1912

Map showing the Positions of the Stations having Self-Recording Instruments.



Scale 1:5,000,000.

Ordnance Survey, Southampton, 1912.

The Stations in the London District are not all shown.



- h. Hourly summaries of pressure, temperature, wind, rainfall, humidity and sunshine for each month and for the whole year, published in hourly values from autographic records—geophysical Section, (British Meteorological and Magnetic Year Book. Part IV. Section 2).
- R. Monthly summary published in the Reports of the Registrar General of Births, Deaths, and Marriages for Ireland.
- r. Weekly summary published in the Reports of the Registrar General for England and Wales, or for Ireland.

**Height above Mean Sea Level.**—The figures given in this column refer in general to the height of the ground on which the rain-gauge stands. At those stations which do not possess a rain-gauge, the figures refer to the height of the particular instrument in use.

The positions of the climatological and rainfall stations may be identified on the map, Fig. 2, p. 84, from the figures which give their heights above Mean Sea Level, as shown in the following list.

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\* \* From a number of stations in the British Isles printed summaries of observations are received. These have been included in the Geographical list of Institutions, &c., which issue publications (Appendix VII. to the Annual Report of the Meteorological Committee).

The following make monthly returns in a form similar to that in which observations are received from the normal or auxiliary climatological stations :—

- Bolton.—The Museums and Meteorological Observatory.
  - Croydon.—Natural History Society.
  - Northampton.—Natural History Society.
  - Truro.—Cornwall County Council Sanitary Committee.
-



## LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES.

The Counties are grouped in Districts which are numbered as follows :—

- |                     |                                            |                                            |                                        |                                          |
|---------------------|--------------------------------------------|--------------------------------------------|----------------------------------------|------------------------------------------|
| 0. Scotland, N.     | { (a) Islands.<br>(b) Mainland.            | 5. England, S.E.<br>London County.         | 9. Ireland, N.                         | { (a) Western Part.<br>(b) Eastern Part. |
| 1. Scotland, E.     |                                            | 6. (a) Scotland, W., and (b) Isle of Man.  | 10. Ireland, S.                        | { (a) Eastern Part.<br>(b) Western Part. |
| 2. England, N.E.    | { (a) Northern Part.<br>(b) Southern Part. | 7. (a) England, N.W., and (b) North Wales. | 11. English Channel (Western Section). |                                          |
| 3. England, E.      | { (a) Northern Part.<br>(b) Southern Part. | 8. (a) South Wales and (b) England, S.W.   |                                        |                                          |
| 4. Midland Counties | { (a) Eastern Part.<br>(b) Western Part.   |                                            |                                        |                                          |

County and Station.	Lat.	Long.	Height in feet above M.S.L.	Order of Station.		Publication.	Year of last Inspection.	Observer.
				Eye Obs.	Autographic.			
0. SCOTLAND, NORTH.*								
(a.) Islands.								
Hebrides:—								
Castlebay, Barra Isle ...	56 57	7 29 W.	37	T II <sub>3</sub>	B ⊙	D.W.M.	11	J. Smith, for M.O.
Glendrynoch, Skye ...	57 18	6 17 W.	—	●	—	—	—	Rev. H. Harbord.
Stornoway ...	58 11	6 22 W.	51	T II <sub>3</sub>	B ⊙	D.W.M.	11	W. Grant, for M.O.
S. Baltasound ...	60 44	0 48 W.	31	III	⊙	W.m.	11	T. Edmonston Saxby, F.R.C.S., Ed.
Dunrossness ...	59 51	1 17 W.	160	II	—	m.	—	Rev. W. Fotheringham.
Lerwick ...	60 9	1 8 W.	—	—	B	—	09	G. Gray, Harbour Master.
Lerwick ...	60 9	1 8 W.	54	T II <sub>3</sub>	B	D.W.M.	11	Coastguard, for M.O.
Sumburgh Head ...	59 51	1 17 W.	112	T II <sub>3</sub>	B	D.W.M.	10	Rev. W. Brand, for M.O.
Deerness ...	58 56	2 45 W.	160	II	☉	W.M.S.	11	M. Spence.
(b.) Mainland.								
Caithness:—								
Reay ...	58 34	3 48 W.	49	●	—	—	—	Rev. D Carmichael.
Wick ...	58 27	3 6 W.	81	T II <sub>3</sub>	B	D.W.M.	11	Coastguard, for M.O.

Cromarty :—	Strathpeffer Spa	...	57 37	4 28 W.	200	II	☉	W.M.d.	11	N. McLean, for H. W. Kaye, B.A., M.B.
Inverness :—	§Fort Augustus	...	57 8	4 40 W.	68	II	☉	W.M.	11	Rev. C. von Dieckhoff, O.S.B. and Rev. Ambrose Geoghegan, O.S.B.
	§Fort William	...	56 49	5 7 W.	175	II	—	W.M.S.	11	W. T. Kilgour.
	§Kingussie	...	57 5	4 2 W.	822	II	—	M.	11	W. de Watteville, M.D.
	Lochboisdale	...	57 10	7 20 W.	—	—	B	—	—	Arch. MacLennan.
Ross :—	Ardross Castle	...	57 45	4 21 W.	449	●	☉	—	—	W. Laing Minty.
	S. Fortrose	...	57 35	4 8 W.	79	III	—	m.	10	Archd. Thom, M.A.
	§Glencarron	...	57 30	5 14 W.	500	II	—	W.M.	10	D. D. Munro.
	<i>Kinlochewe</i>	...	57 36	5 24 W.	78	●	—	—	—	A. McLennan, for Hon. W. Peel, M.P.
Sutherland :—	§Dunrobin Castle	..	57 59	3 56 W.	12	II	—	M.	09	D. Melville, for the Duke of Sutherland, K.G.
1. SCOTLAND, EAST.										
Aberdeen :—	Aberdeen Observatory	...	57 10	2 6 W.	46	I, T	I, B	D W.M.S.h.	11	Professor C. Niven, F.R.S., and G. A. Clarke, for M.O.
	§Balmoral	...	57 2	3 12 W.	920	III	—	W.M.	11	J. Michie, M.V.O., and John M. Troup.
	§Braemar	...	57 0	3 24 W.	1,113	II	—	M.	—	A. M. Shirran.
	Dyce	...	57 13	2 10 W.	149	●	—	—	—	James E. Crombie, LL.D.
	<i>Inch</i>	...	57 20	2 37 W.	426	II	☉	m.	11	J. Bisset.
Banff :—	§Gordon Castle	...	57 37	3 5 W.	101	II	☉	W.M.	11	C. Webster, for the Duke of Richmond and Gordon, K.G.
	§Marchmont	...	55 44	2 25 W.	498	II	☉	W.M.	10	J. A. Wood, for Sir J. H. Hume Campbell, Bart.
Berwick :—	§Marchmont	...	55 44	2 25 W.	498	II	☉	—	—	The Astronomer Royal.
Clackmannan :—	No station.	...	55 57	3 12 W.	441	—	☉	—	—	
Edinburgh :—	Edinburgh, Royal Observ- atory.	...	55 58	3 10 W.	18	T	B	D.W.M.	11	D. Drummond and R. M. Hendrie, Post Office, for M.O.
Elgin :—	No station.	...	56 3	3 23 W.	—	●	☉	—	—	The Superintending C.E.
Fife :—	Rosyth (H.M. Dock- yard).	...	56 3	3 23 W.	—	●	☉	—	—	

\* *Note.*—The parts of this district forming section (a) Islands, include the Shetlands, the Orkneys, and the Hebrides. The latter form part of the counties Inverness and Ross.

The names of Stations added to the list since April, 1911, are printed in clarendon type. Those discontinued during the year are printed in italic type. The positions of the Stations can be identified on the map, Fig. 2, p. 84, from the figures which give their heights above Mean Sea Level.

LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—continued.

County and Station.	Lat.	Long.	Height in feet above M.S.L.	Order of Station.		Publication.	Year of last Inspection.	Observer.
				Eye Obs.	Autographic.			
1. SCOTLAND, EAST—cont.								
Forfar :— S. Balruddery ...	56 29	3 8 W.	276	III	☉	w.m.	10	G. Davie, for J. Martin White.
Carnoustie ...	56 30	2 42 W.	39	III	☉	m.	11	P. Sinclair, C.E.
Dundee ...	56 28	2 56 W.	160	II	—	M.S.	09	J. Carnochan.
Haddington :—No station.								
K i n c a r -								
dine :— S. Crathes ...	57 3	2 25 W.	140	III	☉ ⊕ B	w.m.	11	J. Smith.
Stonehaven ...	56 58	2 13 W.	786	III	☉	d.m.	11	J. Hart, for Town Clerk.
Kinross :— No station.								
Linlithgow :— No station.								
Nairn :—	57 36	3 52 W.	82	T	☉	D.W.M.	11	Miss Penny, for M.O. and Medical Officer of Health.
Peebles :— S. West Linton ...	55 45	3 4 W.	800	III	☉	W.M.	11	Rev. J. S. Begg.
(Kettle Hill)								
Perth :— *Crieff ...	56 22	3 50 W.	440	II	—	W.M.	10	George Reid, for Dr. Meikle.
Forquandenny ...	56 21	3 29 W.	175	—	B ●	—	—	Miss Frances Wood.
Roxburgh :— No station.								
Selkirk :— No station.								
2. ENGLAND, NORTH EAST.								
(a) Northern Part.								
Durham :— Chopwellwood ...	54 55	1 47 W.	445	III	☉	m.	11	J. F. Annand.
Durham ...	54 46	1 35 W.	336	II	☉	W.M.	09	F. C. H. Carpenter, M.A.
Ushaw College ...	54 47	1 39 W.	599	III	—	m.	—	Rev. C. Gelderd.
Northumber-								
land :— Allan's Green ...	54 59	2 20 W.	1,000	●	—	—	—	J. B. Lowe.
Alnwick Castle ...	55 25	1 43 W.	210	III	☉	W.m.	11	Robert Kyle, for the Duke of Northumberland, K.G.
Bellingham ...	55 13	2 18 W.	848	III	—	m.	11	Capt. C. Morrison Bell.



Cookle Park, Morpeth	55 13	1 41 W.	324	II	☉	W.M.S.	09	T. E. W. Dobson and R. Thornton, for the Northumberland County Council.
Font Watershed, Dam Site.	55 14	1 54 W.	620	●	—	—	—	H. G. Coventry, C.E., for the Corporation of Tynemouth.
Heddon-on-the-Wall ...	55 0	1 47 W.	400	●	—	—	—	Rev. W. G. Pringle.
Newcastle (Pendower).	55 0	1 36 W.	—	—	☉	w.	—	Mrs. H. M. Pease.
Newcastle-on-Tyne ...	54 59	1 36 W.	152	III	☉	w.m.	10	N. H. Martin, F.R.S.E., F.C.S.
North Shields ...	55 0	1 27 W.	95	T	B	D.W.M.r.	11	R. Moat, Post Office, for M.O.
South Shields ...	55 0	1 26 W.	—	—	☉	—	11	J. McDonald Manson, for the Tyne Improvement Commission.
Tynemouth ...	55 1	1 26 W.	90	II <sub>3</sub>	☉	d.m.	09	J. Edward Burnett.
Ampleforth ...	54 12	1 6 W.	349	II	—	m.	09	Rev. T. I. Barton, O.S.B., and Rev. R. C. Hesketh, O.S.B.
Hovingham Hall ...	54 10	0 59 W.	120	●	—	—	—	Bingley Day, for Sir W. H. A. Worsley, Bart.
Rounton ...	54 24	1 18 W.	249	II	—	W.M.	11	J. Hanagan, for Sir Hugh Bell, Bart.
M. Scarborough ...	54 18	0 24 W.	100	II	☉	d.W.M.	11	John Knight, M.D., D.P.H., for the Corporation.
West Witton ...	54 11	1 54 W.	605	III	—	W.m.	—	J. B. Espiner.
Whitby ...	54 29	0 37 W.	88	II	☉	M.	10	Thos. Newbitt, for the Literary and Philosophical Society.
York. Deighton Grove	53 54	1 3 W.	38	●	—	—	05	Miss M. L. Whitehead.
" The Museum ...	53 57	1 5 W.	56	II	—	W.M.r.	10	Oxley Grabbam, M.A., for the Yorkshire Philosophical Society.
" Bootham ...	53 57	1 5 W.	105	—	☉	—	07	Hugh Richardson, M.A.
Bridlington (Grammar School).	54 5	0 13 W.	56	III	(B) ☉	—	08	A. Thornton, M.A.
Hall ...	53 45	0 16 W.	12	II	☉	Mr.w.	11	H. B. Witty, for the Corporation.
Spurn Head ...	53 34	0 7 E.	26	T	B	D.W.M.	11	Principal Lightkeeper, for M.O.

The names of Stations added to the list since April, 1911, are printed in clarendon type. Those discontinued during the year are printed in italic type. The positions of the Stations can be identified on the map, Fig. 2, p. 84, from the figures which give their heights above Mean Sea Level.

## LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—continued.

County and Station.	Lat.	Long.	Height in feet above M.S.L.	Order of Station.		Publication.	Year of last Inspection.	Observer.
				Eye Obs.	Autographic.			
2. ENGLAND, NORTH EAST—cont.								
(b) <i>Southern Part.</i>								
Lincolnshire :—Claypole	53 2	0 46 W.	70	●	—	—	—	Rev. F. Hamilton.
Fulbeck	53 3	0 37 W.	180	III	B ⊙	W.m.	10	Rev. Vere F. Willson, M.A., and W. V. R. Fane.
Lincoln...	53 14	0 33 W.	58	III	—	W.M.	11	W. Barr. for the Corporation.
Marcham-le-Fen	53 8	0 5 W.	10	●	—	—	01	Mrs. G. L. Kime.
Rauceby Hall...	53 0	0 29 W.	124	III	⊙	w.m.	09	J. Hope, for the late General
Skegness	53 9	0 21 E.	12	III	⊙	d.w.M.	10	Sir M. Willson, K.C.B.
Temple Bruer...	53 4	0 30 W.	?	●	—	—	03	S. Coetmore Jones, for the Dis- trict Council. Miss Alice S. Morley.
3. ENGLAND, EAST.								
(a) <i>Northern Part.</i>								
Norfolk :—								
Cromer ...	52 56	1 17 E.	196	II	⊙	W.M.	10	W. H. Archer, for Urban District Council.
Geldeston	52 28	1 31 E.	37	II	⊙ (B ⊙)	W.M.	09	E. T. Dowson.
Hillington	52 48	0 33 E.	88	II	⊙	W.M.	11	The late Rev. H. E. B. Ffolkes, M.A.
Norwich	52 37	1 17 E.	93	III	—	W.r.m.	11	A. W. Preston.
Norwich (Southwell)	52 42	1 20 E.	109	III	⊙	M.	—	J. H. Willis.
Thetford	52 25	0 45 E.	169	●	—	—	—	E. S. Greenwood, for Town Council.
Yarmouth	52 37	1 43 E.	17	T, II,	B ⊙	D.W.M.	11	Coastguard, for M.O. and for Corporation.
" Gorleston ...	52 35	1 43 E.	10*	—	—	—	11	
(b) <i>Southern Part.</i>								
Bedford :—								
Aspley Guise ...	52 1	0 38 W.	410	—	⊙	m.	—	Mrs. Dymond.
Woburn, Ridgmont ...	52 1	0 36 W.	291	II	—	M.	11	H. M. Freear, F.C.S., for the Royal Agricultural Society.
Cambridge :—								R. Irwin Lynch, M.A.
Cambridge Bot. Garden	52 12	0 8 E.	41	II	⊙	W.M.S.	10	

Essex :—	Newham Coll.	52 13	0 5 E.	—	III	H	—	10	Miss Stephen.
	Clacton-on-Sea...	51 47	1 9 E.	54	T, II,	⊙ B	D.W.M.	11	A. W. Shadick, for Urban District Council.
	Chelmsford ...	51 45	0 28 E.	135	III	—	m.	—	Dr. Thresh.
	Halstead ...	51 57	0 38 E.	139	III	—	m.	—	E. T. Adams, F.R.A.S.
	Shoburyness ...	51 32	0 47 E.	137	III	—	W.m.	11	The Superintendent of Experiments.
	Southend-on-Sea ...	51 32	0 43 E.	90	III	⊙	W.m.	10	E. J. Elford, for the Corporation.
	Waterworks	51 32	0 43 E.	110	● (8)	—	—	10	E. C. Bilham.
	South "Hanningfield	51 39	0 31 E.	—	●	—	—	—	Walter Hill.
	Stifford ...	51 30	0 18 E.	73	●	—	—	—	Miss A. L. Scott.
	Bennington ...	51 54	0 5 W.	406	II	—	M.	09	The late Rev. J. Dunne Parker, LL.D., and Miss Parker.
	Berkhamsted ...	51 46	0 34 W.	400	II	⊙ (1)	M.	09	E. Mawley.
	Hemel Hempstead...	51 46	0 27 W.	536	III	—	m.	—	Elliott Kitchener, M.A.
	Offley Vicarage	51 56	0 21 W.	523	●	—	—	—	Rev. E. P. Gatty.
	Rothamsted ...	51 48	0 22 W.	424	III	⊙	W.m.	09	The Director, Lawes Agricultural Trust.
Huntingdon :—	No station.								
Middlesex :—	Harefield	51 36	0 29 W.	337	●	—	—	—	G. Eland.
	Wembley	51 33	0 17 W.	130	●	—	—	—	A. B. Johnson.
	Brandon	52 27	0 37 E.	487	●	—	—	—	Lt.-Col. B. Spragge, D.S.O.
Suffolk :—	Felixstowe	51 58	1 22 E.	10	III	⊙	d.W.m.	10	Montague Humphrey, for the District Council.
	Lowestoft	52 29	1 45 E.	83	II	⊙	w.d.M.	11	C. W. Edwards, for the Corporation.
4. MIDLAND COUNTIES.									
(a) Eastern Part.									
Buckingham :—	Beaconsfield ...	51 36	0 38 W.	360	●	—	—	—	C. T. Marcon, M.A.
	Butler's Cross	51 46	0 47 W.	399	●	—	—	—	G. Eland.
	High Wycombe	51 37	0 45 W.	—	III	—	—	—	R. O. Matthews.
	Winslow	51 57	0 53 W.	379	III	—	m.	10	R. A. Easton.

The names of Stations added to the list since April, 1911, are printed in clarendon type. Those discontinued during the year are printed in italic type. The positions of the Stations can be identified on the map, Fig. 2, p. 84, from the figures which give their heights above Mean Sea Level. \* Head of Anemometer 52 ft. above M.S.L. + Head of Anemometer 103 ft. above M.S.L.



## LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—continued.

County and Station.	Lat.	Long.	Height in feet above M.S.L.	Order of Station.		Publication.	Year of last Inspection.	Observer.
				Eye Obs.	Autographic.			
4. MIDLAND COUNTIES—cont.								
(a) Eastern Part—cont.								
Derby:—								
Belper ...	53 1	1° 29' W.	222	III	—	m.	—	W. W. Tunncliffe, B.Sc., F.C.S.
Belper (Quarry Bank).	53 2	1 29 W.	280	II	—	m.	—	John Hunter.
Buxton ...	53 16	1 55 W.	987	II <sub>3</sub>	⊙ (B)	d.W.M.	11	W. Pilkington.
Chatsworth ...	53 14	1 37 W.	—	III	B ⊕	—	02	J. P. Cockerell, for the Duke of Devonshire, K.G.
Derby ...	52 55	1 29 W.	208	—	B	—	—	John Stretton.
Matlock ...	53 7	1 30 W.	636	III	⊙	m.	—	J. D. Evans.
Belvoir Castle ...	52 54	0 47 W.	259	II	⊙	M.	09	W. H. Divers, for the Duke of Rutland, K.G.
Syston ...	52 43	1 5 W.	178	●	—	—	96	S. K. Daniels.
Northampton:—Great Billing ...	52 16	0 50 W.	273	●	—	—	—	Rev. G. H. Mullins, M.A.
Oundle (The School)...	52 29	0 28 W.	144	III	⊙	—	04	F. W. Sanderson, M.A., Headmaster.
Peterborough (Eye)	52 29	0 28 W.	146	●	—	—	04	N. E. Dixon, C.E.
Raunds ...	52 36	0 11 W.	—	III	—	m.	—	S. W. Egan.
Thrapston ...	52 22	0 33 W.	205	III	—	W.m.	11	Leon G. H. Lee.
Bawtry, Hesley Hall ...	52 22	0 35 W.	251	III	⊙	m.	—	E. N. Plevins.
Nottingham:—	53 27	1 4 W.	65	III	—	W.m.	09	B. I. Whitaker, J.P.
Kingston-on-Soar ...	52 51	1 14 W.	125	III	—	m.	11	Fred Wakerly.
Nottingham ...	52 56	1 9 W.	82	T, II <sub>3</sub>	⊙ (⊙ B ●)	D.W.M.r.	11	Arthur Brown, M.Inst.C.E., and Philip Boobyer, M.D., for the Corporation.
Strelley	52 58	1 15 W.	377	III	⊙	m.	—	T. L. K. Edge.
Workop (Hodsock) ...	53 22	1 5 W.	56	III	⊙ (B ●)	w.M.	11	H. Mellish, J.P.
Oxford ...	51 46	1 16 W.	208	[I] T	⊙ [I]	D.W.M.	11	The Radcliffe Observer.
Pyrton Hill ...	51 38	1 1 W.	500	—	⊙ K	k.	—	W. H. Dines, F.R.S., for M.O.

	Watlington (Howe Combe).	51 38	1 0 W.	474	●	—	—	—	A. H. Pawson
Rutland :—	Ridlington	52 37	0 45 W.	522	●	—	—	—	N. W. Wortley.
	Uppingham	52 38	0 43 W.	469	III	—	—	—	E. Hunter.
Warwick :—	Coventry	52 25	1 30 W.	270	III	⊙	M.	10	E. Hugh Snell, M.D., for the Corporation.
	Rugby School	52 22	1 15 W.	379	II	(B)	m.	11	Rev. D. E. Shorto, M.A.
	Birmingham, Edgbaston	52 28	1 56 W.	535	II	⊙	d. W. M. r.	10	Alfred Cresswell, for the Midland Institute.
	" Hagley Road	52 28	1 58 W.	612	●	—	—	—	Henry E. Stilgoe, M.Inst.C.E.
	Water Dept. :—								
	Frankley	52 25	1 59 W.	569	●	—	—	—	
	Whitacre	52 31	1 40 W.	268	●	—	—	—	
	Witton	52 32	1 52 W.	344	●	—	—	—	
Yorkshire,									
W. Riding :—	Bradford	53 49	1 46 W.	439	III	⊙	m. r.	09	H. Lander for the Corporation.
	Garforth	53 48	1 22 W.	195	II	⊙	M.	09	Prof. Seton, B.Sc., for the University of Leeds.
	Giggleswick	54 4	2 17 W.	500 ?	III	(B) ⊙	—	05	P. Haswell, B.A.
	Harrogate	54 0	1 33 W.	476	III	⊙	d. W. m.	11	C. E. Rivers, for the Corporation.
	Huddersfield	53 39	1 47 W.	409	II <sub>3</sub>	⊙ (●)	M. r.	09	J. Firth, Registrar, for the Corporation.
	Leeds	53 48	1 33 W.	132	III	(B)	—	08	H. Crowther, for the Leeds Philosophical Society.
	Meltham	53 36	1 50 W.	513	III	—	m.	—	C. L. Brook.
	Sheffield	53 23	1 29 W.	429	II	⊙	w. M.	11	E. Howarth, F.R.A.S.
	Wakefield	53 41	1 30 W.	96	II	—	M.	11	Alex. French, M.R.C.S., L.R.C.P.
(b) Western Part.									
Gloucester :—	Cheltenham	51 54	2 3 W.	214	II	⊙	M.	09	A. C. Saxby, for the Corporation.
	Cirencester	51 43	1 57 W.	446	III	⊙	W. m.	11	Prof. M. Kershaw, B.A., for the Royal Agricultural College.
	Dursley	51 41	2 21 W.	256	●	—	—	96	E. Fryer Smith.

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## LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—continued.

County and Station.	Lat.	Long.	Height in feet above M.S.L.	Order of Station.		Publication.	Year of last Inspection	Observer.
				Eye Obs.	Autographic.			
4. MIDLAND COUNTIES—cont.								
(b) Western Part—cont.								
Gloucester—cont.								
Forest of Dean :—								
Blakeney Hill	51 46	2 30 W.	500	●	—	—	—	John Tyler E. P. Popert Campbell Anderson John Morris William Morris William Morris Major W. Wright, R.A. T. V. Philpott, M.A. The Prior and Rev. J. C. Maddox, O.S.B.
Braceland	51 49	2 38 W.	500	●	—	—	—	
Edgehills Lodge	51 51	2 29 W.	700	●	—	—	—	
Ruardean Hill	51 50	2 32 W.	900	●	—	m.	05	
Whitemead Park	51 46	2 34 W.	200	●	—	m.	05	
Worcester Lodge	51 48	2 35 W.	700	●	—	—	—	
Hidcote	52 5	1 46 W.	524	●	—	—	97	
Bromyard	52 11	2 30 W.	392	II	—	M.	11	The Prior and Rev. J. C. Maddox, O.S.B.
Hereford (Belmont)	52 5	2 45 W.	291	III	—	W.m.	10	
Shropshire :—								
Ross	51 55	2 34 W.	213	III	—	m.	—	H. Southall.
Shrewsbury	52 43	2 45 W.	191	II	—	W.M.S.	09	Capt. C. S. Reid, R.E.
Wellington	52 42	2 45 W.	207	III	—	m.	—	J. W. Nowell.
Wistanstow	52 28	2 50 W.	484	II	—	M.	11	Rev. W. M. D. La Touche, B.A.
Bath	51 23	2 21 W.	66	T	☉	D.W.M.	11	W. H. Symons, M.D., for the Corporation.
Stafford :—								
Cheadle (Tea)	52 58	1 57 W.	646	III	—	W.m.	11	Col. B. H. Philips.
Beckford	51 58	2 10 W.	129	●	—	—	—	Capt. H. Ashton Case.
Mayfield	53 0	1 46 W.	374	III	(B ●) ☉	—	09	G. C. Lawson.
Birmingham, Sparkhill	52 27	1 52 W.	424	III	—	m.	10	D. H. Owen.
Malvern	52 8	2 18 W.	516	III	☉ B	m.	—	A. Mander, F.C.S.
Rochford	52 18	2 36 W.	315	●	—	—	01	Rev. John Tomson.
5. ENGLAND, SOUTH-EAST.								
Berkshire :—								
Bucklebury Place	51 26	1 24 W.	409	III	—	m.	11	J. W. Harris, for A. W. Sutton.
Reading (Leighton Park School).	51 26	0 57 W.	264	II	B ☉	M.	10	C. I. Evans, Headmaster.



Berkshire— <i>cont.</i>	Wantage (King Alfred's School).	...	51 53	1 26 W.	314	III	—	—	J. H. Scott.	—
	Wokingham	...	51 23	0 48 W.	216	III	B	m.	Medical Superintendent of Sanatorium.	10
Hampshire:—	Aldershot	...	51 15	0 46 W.	231	III	—	m.	G. W. Routley, M.D.	—
	Basingstoke	...	51 16	1 6 W.	289	III	—	m.	A. M. Pitkin, F.R.G.S.	10
	Bournemouth	...	50 43	1 53 W.	145	III	⊙	d.w.m.	C. Dales, for Town Council.	11
	Grayshott	...	51 7	0 46 W.	661	III	⊙	M.	Mrs. Charlotte Lyndon.	—
	Petersfield (Ditcham Park).	...	51 0	0 57 W.	550	—	⊙	k.	C. J. P. Cave, M.A.	—
	Portsmouth	...	50 48	1 6 W.	11	III	—	r.w.M.	A. Mearns Fraser, M.D., for the Corporation.	10
	Sandown	...	50 48	1 8 W.	20	III	⊙ (B)	m.	G. E. Gilchrist, for the Sandown Advancement Board.	—
	Southampton	...	50 55	1 24 W.	65	II	⊙	W.M.S.	A. Vaughan, for Director-General of Ordnance Survey.	09
	Southsea	...	50 47	1 6 W.	—	—	⊙	d.	A. Mearns Fraser, M.D., for the Corporation of Portsmouth.	10
	Stockbridge (Ashley)	...	51 5	1 27 W.	235	●	B	—	Legh S. Powell.	—
Kent:—	Swarraton	...	51 8	1 11 W.	310	III	—	W.m.	Rev. W. L. W. Eyre, M.A.	09
	Totland Bay	...	50 41	1 33 W.	140	III	⊙	m.	J. Dover, M.A.	10
	Ventnor	...	50 36	1 13 W.	80	III	⊙	W.M.	Miss M. Gibson, for Royal National Hospital for Consumption.	11
	Broadstairs	...	51 21	1 26 E.	140	●	⊙	(m.)	Howard Hurd, C.E., and Rev. H. C. V. Snowden, for District Council.	—
	Canterbury	...	51 17	1 5 E.	39	III	—	w.	A. Lander.	05
	Deal	...	51 13	1 24 E.	23	III	⊙	d.	S. Miller.	10
	Dover	...	51 7	1 18 E.	198	●	—	—	W. C. Hawke, C.E., for the Corporation of Dover.	96
	Dover	...	51 7	1 19 E.	231	T	⊙	D.M.	Lightkeeper, for M.O.	11
	Kearsney, Chilton Farm	...	51 8	1 17 E.	125	●	—	—	The Borough Engineer, for the Corporation.	—
	Dungeness	...	50 55	0 58 E.	21	T	B	D.W.M.		11
	Folkestone	...	51 5	1 11 E.	121	III	⊙ (●)	d.m.		11

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## LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—continued.

County and Station.	Lat.	Long.	Height in feet above M.S.L.	Order of Station.		Publication.	Year of last Inspection.	Observer.
				Eye Obs.	Autographic.			
<b>5. ENGLAND, SOUTH-EAST—cont.</b>								
<b>Kent—cont.</b>								
Hildenborough	51 13	0 15 E.	160	●	—	—	—	Charles H. Scott.
Littlestone-on-Sea	50 59	0 59 E.	—	—	⊙	d.w.(m.)	05	H. T. Tubbs.
Margate	51 24	1 24 E.	35	III	⊙	d.w.m.	11	J. Stokes, J.P., for the Corporation.
Matheld	51 9	0 22 E.	319	III	—	m.	10	D'Arcy Reeve.
Ramsgate	51 20	1 25 E.	—	—	⊙	d.w.(m.)	08	T. G. Taylor, C.E., for the Corporation.
Sandgate	51 4	1 9 E.	50	●	—	—	99	Chas. J. Conquest.
Sandwich	51 17	1 20 E.	6	●	—	—	03	Royal St. George's Golf Club.
Sevenoaks	51 16	0 12 E.	509	III	—	m.	11	W. Tattersall.
Tankerton	51 22	0 2 E.	72	●	—	—	—	F. Gaster.
Tonbridge	51 12	0 17 E.	319	●	—	—	—	J. Waley Cohen.
Tunbridge Wells	51 8	0 16 E.	421	III	⊙	W.m.	09	F. G. Stuart, M.B.
Croydon	51 22	0 4 W.	472	III	—	m.	—	Borough Engineer.
Epsom	51 20	0 17 W.	160	III	—	m.	—	S. C. Russell.
Newdigate	51 0	0 17 W.	259	●	(B)	—	—	R. J. Wallis.
New Malden	51 24	0 15 W.	39	III	⊙	m.	—	W. J. Carter.
Send	51 15	0 32 W.	99	●	(B)	—	—	J. W. G. Bond.
Wallington	51 22	0 9 W.	140	III	—	m.	—	F. C. Bayard.
Warlingham	51 18	0 3 W.	609	●	⊙	—	—	R. H. Curtis.
Wisley	51 17	0 26 W.	150	III	⊙	W.m.	09	The Superintendent, for the Royal Horticultural Society.
Woking	51 19	0 37 W.	179	III	—	m.	—	G. C. H. Simmonds.
Bexhill-on-Sea	50 50	0 33 E.	27	II	⊙	d.m.	11	G. Brisley, M.P.S., for the Corporation.
Bognor	50 47	0 40 W.	20	III	⊙	d.w.m.	10	A. G. Thompson, for the Bognor Climatological Society.
Brighton	50 49	0 8 W.	31	III	⊙	d.w.M.r.	09	H. Heasman, for the Medical Officer of Health.
Brighton (Preston)	50 51	0 8 W.	301	II	—	—	—	G. Hamlin.
Brighton	50 49	0 8 W.	380	—	K	k.	—	S. H. R. Salmon.
<b>Sussex:—</b>								

Cuckfield	...	...	51	1	0	9 W.	389	●	—	—	—	97	E. Gosden.
Eastbourne	...	...	50	46	0	17 E.	39	II	⊙	d.w.M.	11	S. R. Henderson, for the Medical Officer of Health.	
Hastings Cemetery	...	...	50	52	0	34 E.	499	●	—	—	—	—	Walter Field.
" Waterworks	...	...	50	51	0	34 E.	270	—	⊙	d.w.(m.)	06	J. Farnham, for the Corporation.	
Heathfield	...	...	50	58	0	16 E.	499	●	—	—	—	—	J. F. Leigh Clare.
Hove	...	...	50	47	0	10 W.	—	—	⊙	m.	—	—	A. Griffith, M.O.H., for the Corporation.
Midhurst	...	...	50	59	0	44 W.	480	III	⊙	m.	—	—	T. L. Evans, M.R.C.S.
Newick Rectory	...	...	50	58	0	1 E.	153	—	—	—	—	—	Mrs. E. O. Powell.
St. Leonards	...	...	50	51	0	33 E.	178	II	—	W.M.	11	H. Colborne, M.R.C.S., for the Corporation.	
" West Marina	...	...	50	51	0	32 E.	20?	III	—	—	06	T. Eldridge, for the Corporation.	
Seaford	...	...	50	46	0	6 E.	30	III	⊙	d.	09	Col. F. W. Savage, V.D.	
Selsey Bill	...	...	50	43	0	47 W.	19	III	⊙	m.	—	E. Heron Allen.	
Watergate Park	...	...	50	56	0	55 W.	239	●	—	—	99	W. M. Christy.	
Westbourne	...	...	50	52	0	55 W.	30	—	⊙	(m.)	07	Rev. L. B. Birkett.	
Worthing	...	...	50	49	0	22 W.	36	III	⊙	d.w.m.	11	R. H. W. Wilshaw, M.B., D.P.H., for the Corporation.	
Malmesbury	...	...	51	35	2	5 W.	235	III	—	m.	—	—	George Deadman for C. E. Bertodano.
Marlborough	...	...	51	25	1	44 W.	424	III	⊙	W.m.	11	G. G. Becher, M.A., and Meddows Taylor.	
Salisbury (Wilton)	...	...	51	4	1	51 W.	180	II	—	M.	10	Thos. Challis, for the Earl of Pembroke, G.C.V.O.	
Salisbury	...	...	51	5	1	50 W.	165	II	—	—	10	Capt. H. Tudor Williams.	
Sutton Veny	...	...	51	10	2	7 W.	389	●	—	—	—	—	R. W. Pretor Pinney.
LONDON DISTRICT.	...	...	51	39	0	10 W.	211	III	—	—	06	F. J. Bancroft, B.Sc., M.I.A.C.E., M.I.M.E.	
Barnet	...	...	51	28	0	5 W.	17	—	●	—	03	W. Oxtoby, M.I.C.E., for the Camberwell Borough Council.	
Camberwell—	...	...	51	26	0	4 W.	160	—	●	—	03		
The Green	...	...	51	29	0	4 W.	14	—	●	—	03		
Forest Hill	...	...	51	28	0	5 W.	21	—	●	—	03		
Leyton Square	...	...	51	28	0	5 W.		—	●	—			
Peckham Rd.	...	...	51	28	0	5 W.		—	●	—			

Wilts :—

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LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—continued.

County and Station.	Lat.	Long.	Height in feet above M.S.L.	Order of Station.		Publication.	Year of last Inspection.	Observer.
				Eye Obs.	Autographic.			
LONDON DISTRICT—cont.								
Camden Square	51° 33'	0° 8' W.	110	II	☉ (B ●)	M.d.	—	H. R. Mill, D.Sc., LL.D.
Chelsea...	51° 29'	0° 10' W.	24	●	—	—	—	T. W. E. Higgins, C.E., for the Chelsea Borough Council.
City (Bunhill Row)	51° 31'	0° 5' W.	80	—	☉	w.(m.) d.	—	Messrs. De la Rue.
East Ham	51° 32'	0° 3' E.	12	III	—	—	—	J. Banks, for the Corporation.
Eltham...	51° 28'	0° 4' E.	209	III	—	m.	—	Miss A. Bramwell, B.Sc.
Enfield	51° 50'	0° 10' W.	100	III	☉	m.	—	W. P. Warren.
Golder's Green	51° 34'	0° 12' W.	231	III	—	m.	—	J. W. Duncan.
Greenwich	51° 28'	0° 0'	155	I	(1) ☉	W.M.r.d.	—	The Astronomer Royal.
Hampstead	51° 33'	0° 11' W.	450	II	☉	M.d.	09	E. L. Hawke, for the Hampstead Scientific Society.
Hampstead	51° 33'	0° 11' W.	375	III	—	m.	—	H. W. Braby, B.A.
Isleworth	51° 29'	0° 20' W.	24	III	—	—	—	A. Worsley.
Kensal Green	51° 32'	0° 13' W.	100	●	—	—	—	C. W. Heinemann.
Kew ...	51° 28'	0° 19' W.	18	I, T	I	W.M.H., H.h.	—	C. Chree, Sc.D., F.R.S., Superin- tendent of the Observatory, for the Meteorological Office.
Manor Park	51° 33'	0° 3' E.	—	●	—	—	—	A. J. Wilmshurst.
Norwood	51° 26'	0° 6' W.	220	II	—	M.	09	W. Marriott.
Pall Mall	51° 30'	0° 7' W.	—	—	B	—	—	Athenaeum Club.
Plumstead	51° 29'	0° 6' E.	300	—	☉	m.	01	J. G. Waller.
South Kensington	51° 30'	0° 10' W.	31	9, 13, 15, 17, 18h.	☉ <sup>10</sup> B ●	M.	—	The Staff of the Meteorological Office.
Tottenham	51° 36'	0° 5' W.	51	II	☉	W.M.	10	The Medical Officer of Health for Urban District Council.
Westminster	51° 30'	0° 8' W.	27	III	●	W.M.	—	H.M. Office of Works.
" Training Coll.	51° 30'	0° 8' W.	107	—	☉	D.W.M.	—	J. H. Cowham and Rev. H. B. Workman, D.Lit.

6. (a) SCOTLAND, WEST.									
Argyleshire:—	Ardnadam	...	55 59	4 56 W.	64	III	(B)	m.	Rev. J. Cairns Mitchell, B.D. J. W. Melles.
	Gruline, Isle of Mull	...	56 30	6 0 W.	100	●	—	—	—
	Loch Awe:—								
	Cruchan Bothy	...	56 14	5 28 W.	283	●	—	—	John Boyd, Crown Forester.
	Ford	...	56 10	5 26 W.	148	●	—	—	Edwin Bailly, M.B., for District Council.
	Oban	...	56 25	5 30 W.	20	II	⊙	d.m.	—
Ayr:—	Poltalloch	...	56 8	5 30 W.	132	II	—	W.M.	D. S. Melville, for Col. Malcolm.
	Colmonell	...	55 8	4 53 W.	150	III	(B)	W.M.	A. Ogg, for J. W. McConnell.
	Kilmarnock	...	55 37	4 36 W.	90	III	⊙	W.m.	G. M. Stuart and Thomas Moffat, for the West of Scotland Agric. Coll.
Bute:—	Rothesay	...	55 50	5 4 W.	73	II	—	W.M.	D. Penney.
Dumbarton:—	No station.	...							
Dumfries:—	Dumfries	...	55 4	3 36 W.	160	II	⊙	W.M.	C. C. Easterbrook, M.D., for the Crichton R. Institution.
	Eskdalemuir	...	55 19	3 12 W.	799	I	I	M.S.H., H <sub>2</sub> h.	G. W. Walker, M.A., Superintendent of the Observatory.
	S. Ruthwell	...	55 0	3 26 W.	67	II	⊙	m.	W. H. Whellens, for A. Johnstone Douglas.
Kirkcudbright:—	Cally (Gatehouse)	...	54 52	4 12 W.	120	II	—	W.M.	W. Thomson, for Col. F. Murray Baillie.
Lanark:—	Glasgow	...	55 53	4 18 W.	180	I	I	W.M.S.	Prof. L. Becker, Ph.D., for M.O.
Renfrew:—	Thorntonhall	...	55 46	4 15 W.	440	III	⊙ B	m.	John Wilson, for A. Henderson Bishop.
Stirling:—	No station.								
Wigton:—	No station.								
6. (b) ISLE OF MAN.									
	Douglas	...	54 10	4 28 W.	277	II	⊙	W.M.S.	Frank Cottle, for the Corporation.
	"	...	54 10	4 29 W.	137	—	B	—	Mrs. A. W. Moore.

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## LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—continued.

County and Station.	Lat.	Long.	Height in feet above M.S.L.	Order of Station.		Publication.	Year of last Inspection.	Observer.
				Eye Obs.	Autographic.			
7. (a) ENGLAND, NORTH WEST.								
Cheshire:—								
Bidston	53° 24'	3° 4' W.	183	(I) T	(I) ☉	D.W.M.r.	10	W. E. Plummer, M.A., F.R.A.S., for the Mersey Docks and Har- bour Board.
Hawarden Bridge	53° 12'	3° 1' W.	22	III	—	W.m.	11	John Summers & Sons, Ltd.
Hoyle	53° 23'	3° 12' W.	30?	III	☉	w.m.	02	Tom Robinson and R. W. Fraser, for Urban District Council.
Macclesfield	53° 16'	2° 8' W.	500	III	—	m.	—	John Dale.
Northwich	53° 16'	2° 30' W.	117	III	—	—	—	J. A. Saner.
Aspatria	54° 46'	3° 21' W.	250	II	☉ (س)	W.M.	09	J. Smith Hill, B.A., B.Sc., Agri- cultural College.
Egremont	54° 29'	3° 30' W.	349	II	—	M.	—	J. W. Sherwen.
Newton Rigg	54° 40'	2° 49' W.	559	II	☉	W.M.	11	W. T. Lawrence, for the Cumber- land County Council.
Scalegby	54° 54'	2° 52' W.	41	III	—	m.	—	Sir R. A. Allison, J.P., D.L.
Seathwaite	54° 30'	3° 10' W.	422	III	—	m.	—	Mrs. A. Pepper, for M.O.
Udale (Chapel House Reservoir).	54° 43'	3° 9' W.	599	●	—	—	—	T. Strong, for Aspatria and Silloth Water Board.
Blackpool	53° 49'	3° 3' W.	66	II	☉ (B س ●)	d.W.M.	11	E. W. Rees Jones, M.D., D.P.H., for the Corporation.
Bolton	53° 35'	2° 27' W.	—	III	☉	m.	—	Thos. Midgley.
Burnley	53° 48'	2° 15' W.	459	III	☉ (B)	m.r.	11	Thos. Holt, M.D., for the Cor- poration.
Carnforth (Over Kel- let).	54° 8'	2° 44' W.	174	III	☉	m.	11	W. Farrer.
Darwen	53° 41'	2° 28' W.	722	II	☉	d.M.	11	F. G. Haworth, M.B., for the Corporation.
Fleetwood	53° 56'	3° 1' W.	—	—	س	—	11	The Urban District Council, for the Meteorological Office.



Graythwaite ...	...	54 19	3 0 W.	180	●	—	—	—	—	—	—	H. T. Gnosspelius. Neville Holden, F.R.A.S., for the Storey Institute.
Launceston ...	...	54 3	2 47 W.	311	III	○ (●)	—	m.	—	—	—	H. Nowell flarington. T. G. Benn.
Leyland ...	...	53 41	2 42 W.	124	III	○	—	m.	—	—	—	J. Niven, M.A., M.B., for the Corporation.
Rossall Beach	...	53 55	3 2 W.	0	III	B	—	d.	—	—	—	The University of Manchester.
Manchester (Oldham Road).	...	53 29	2 13 W.	190	II	○	—	M.w.	—	—	—	F. Gore, for Medical Superinten- dent of the Asylum.
" (Whitworth Park).	...	53 28	2 14 W.	125	II	K ○ (B ●)	—	d.M.	—	—	—	J. Bazendell, for the Corporation. Rev. W. Sidgreaves, S.J., for M.O. R. A. Clarke.
" (Prestwich)	...	53 32	2 17 W.	320	II	○	—	W.M.r.	—	—	—	W. E. Sotheby. F. M. Cotton, C.E., for M.O. T. Choze, for M.O. W. E. Sotheby. Wm. Jones, A.M.I.C.E., for Urban District Council. A. Lockwood. William Little, for the Town Council. W. J. Griffith, for Lord Penrhyn.
Southport ...	...	53 39	2 59 W.	37	II <sub>2</sub>	(I) ○ ●	—	d.w.M. ●	—	—	—	—
Stonyhurst ...	...	53 51	2 28 W.	375	I	Y	—	W.M.S. ●	—	—	—	—
Kirkby Lonsdale	...	54 12	2 36 W.	304	●	—	—	—	—	—	—	—
Westmorland:—												
7. (b) NORTH WALES.												
Anglesey:—	...	53 9	4 18 W.	16	II	○ ● (B)	—	M.	—	—	—	—
Dwyran ...	...	53 18	4 39 W.	57	—	●	—	—	—	—	—	—
Holyhead (Salt Island)	...	53 18	4 39 W.	48	T, II <sub>2</sub>	B	—	D.W.M.	—	—	—	—
" (town)	...	53 20	4 16 W.	414	II	○ ● (B)	—	M.	—	—	—	—
Llanegwad ...	...	53 16	3 44 W.	81	III	○	—	d.m.	—	—	—	—
Colwyn Bay ...	...	53 5	4 0 W.	913	III	—	—	m.	—	—	—	—
Llanberis ...	...	53 20	3 50 W.	71	II	○	—	d.W.M.	—	—	—	—
Llandudno ...	...	53 10	4 6 W.	527	●	—	—	—	—	—	—	—
Penrhyn Quarry	...	53 4	4 1 W.	309	●	—	—	—	—	—	—	—
Snowdonia:—	...	53 4	4 3 W.	1,479	●	—	—	—	—	—	—	—
Bungalow	...	53 4	4 2 W.	1,479	●	—	—	—	—	—	—	—
Copper Mill	...	53 4	4 0 W.	324	●	—	—	—	—	—	—	—
Intake ...	...	53 5	4 0 W.	913	●	—	—	—	—	—	—	—
Old Road...	...	53 7	3 53 W.	101	II	○	—	d.W.M.	—	—	—	—
Pen-y-Gwryd	...	53 8	3 17 W.	450	III	—	—	m.	—	—	—	—
Bettws-y-Coed	...	53 8	3 17 W.	450	III	—	—	m.	—	—	—	—
Ruthin (Llanbedr Hall)	...	53 8	3 17 W.	450	III	—	—	m.	—	—	—	—

The names of Stations added to the list since April, 1911, are printed in clarendon type. Those discontinued during the year are printed in italic type. The positions of the Stations can be identified on the map, Fig. 2, p. 84, from the figures which give their heights above Mean Sea Level.

## LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—continued.

County and Station.	Lat.	Long.	Height in feet above M.S.L.	Order of Station.		Publication.	Year of last Inspection.	Observer.
				Eye Obs.	Autographic.			
7. (b) NORTH WALES—cont.								
Flint:—								
Penbedw ...	53 12	3 11 W.	650	—	B	—	—	H. W. Buddicom.
Rhyl ...	53 19	3 29 W.	30	III	⊙	d.w.m.	11	A. A. Goodall, for District Council.
St. Asaph (St. Beuno's College).	53 15	3 23 W.	479	III	(B)	m.	10	Rev. J. Rowland, S.J. and Rev. C. Baillon, S.J., B.Sc.
Merioneth:—								
Aberdovey ...	52 33	4 4 W.	22	III	⊙	w.m.	10	W. J. Eves.
Towyn ...	52 35	4 5 W.	10	III	⊙	d.	10	Urban District Council.
Montgomery:—								
Welshpool ...	52 39	3 8 W.	254	III	—	m.	—	A. S. Whitehouse.
8. (a) SOUTH WALES.								
Brecknock:—								
Gwernyfed Park ...	52 5	3 15 W.	374	III	—	m.	—	James Slade, for Col. Wood.
Llangammarch Wells	52 7	3 32 W.	550	III	⊙	W.M.	09	W. Black Jones, M.D., B.Sc., D.P.H.
Cardigan:—								
Aberystwyth ...	52 25	4 4 W.	59	III	⊙	d.w.m.	10	A. Thomas, M.D., for the Urban Council.
Carmarthen:—								
Lampeter ...	52 7	4 5 W.	498	●	—	—	—	John C. Harford.
Llandovery ...	51 59	3 48 W.	218	●	—	—	—	Douglas T. M. Jones.
Glamorgan:—								
Cardiff ...	51 28	3 10 W.	203	III	⊙	W.m.r.	10	E. Walford, M.D., for the Cor- poration.
Pembroke:—								
Port Talbot ...	51 34	3 45 W.	179	●	⊙	(m.)	03	Miss Talbot; G. Lipscomb.
Swansea ...	51 37	2 55 W.	24	III	⊙	m.	10	D. Bliss, for the Corporation.
Haverfordwest ...	51 48	4 58 W.	93	(II)	⊙(B)	(m.)	10	J. W. Phillips.
Pembroke (St. Ann's Head).	51 41	5 11 W.	149	T, II <sub>3</sub>	⊙	D.W.M.	11	Lightkeepers, for M.O.
Tenby ...	51 41	4 42 W.	79	—	⊙	w.(m.)	03	Miss M. B. Truscott, for the Cor- poration.
Radnor:—								
Llandrindod Wells ...	52 14	3 23 W.	699	●	—	—	—	W. B. de Winton.
Rhayader Watershed	52 18	3 29 W.	*	(16) ●	—	—	—	Corporation of Birmingham, Water Department.

## 8. (b) ENGLAND, SOUTH WEST.

Cornwall:—	Falmouth	...	50	9	5	4	W.	167	I	I	W.M.S.H.b.	11	Royal Cornwall Polytechnic Society, for M.O. Coastguard, for M.O.
	"	Pendennis Castle.	50	8	5	3	W.	—	—	—	—	11	
	Fowey	...	50	21	4	38	W.	51	III	⊙	m.	10	Dr. W. H. Boger.
	Newquay	...	50	25	5	4	W.	190	T	⊙	w.m.	11	C. C. Vigurs, B.A., M.D., for Urban District Council.
	Penzance	...	50	7	5	32	W.	54	III	⊙ (B)	m.	10	Chas. H. Benn, for District Council.
Devonshire:—	Redruth	...	50	14	5	14	W.	398	III	—	m.	—	A. P. Jenkins.
	Arlington Court	...	51	8	3	58	W.	613	III	—	W.m.	10	W. W. Pike, for Miss Chichester.
	Ashburton	...	50	32	3	46	W.	583	III	—	m.	—	J. S. Amery.
	Barnstaple	...	51	6	4	3	W.	24	III	—	—	06	Thos. Wainwright, for the North Devon Athenæum.
	Cullompton	...	50	51	3	23	W.	202	III	⊙	W.m.	10	Murray T. Foster.
	Ilfracombe	...	51	12	4	8	W.	199	III	⊙	m.	—	O. M. Prouse, A.M.I.C.E.
	Killerton	...	50	44	3	32	W.	159	III	—	m.	—	John Wilson, for Sir T. Acland, Bt.
	Paignton	...	50	26	3	34	W.	11	II	⊙ (B)	m.d.	10	A. J. Holman, for Town Council.
	Plymouth	...	50	22	4	8	W.	116	II,	⊙ (B)	d.W.M.r.	11	H. Victor Prigg, A.M.I.C.E., for the Corporation.
	Princetown	...	50	33	3	59	W.	1,359	III	—	m.	—	G. Berry.
	Rousdon	...	50	43	3	0	W.	515	III	⊙	m.	—	C. Grover, for Hon. Lady Peek.
	Sidmouth	...	50	41	3	15	W.	147	III	—	m.	—	Miss C. Radford.
	Tavistock	...	50	33	4	10	W.	374	III	—	m.	—	W. J. Monk.
	Salcombe	...	50	14	3	46	W.	39	—	⊙	m.w.	04	The late J. Fairweather and Capt. John Partridge.
	Sheepstor	...	50	29	4	1	W.	749	II	—	M.	10	Rev. H. H. Breton, M.A.
	Teignmouth	...	50	33	3	29	W.	20	III	⊙	d.m.	10	G. Rossiter for M.O.H.
	Torquay	...	50	28	3	31	W.	12	III	⊙	d.w.m.	00	F. March, for the Corporation.
	Whitchurch	...	50	32	4	6	W.	593	II	—	M.	10	E. E. Glyde.
	Woolacombe	...	51	10	4	12	W.	59	II	⊙	M.	10	T. S. Watkinson, for Miss Chichester.

The names of Stations added to the list since April, 1911, are printed in clarendon type. Those discontinued during the year are printed in italic type. The positions of the Stations can be identified on the map, Fig. 2, p. 84, from the figures which give their heights above Mean Sea Level.

\* 15 Rainfall Stations.



LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—*continued*.

County and Station.	Lat.	Long.	Height in feet above M.S.L.	Order of Station.		Publication.	Year of last Inspection.	Observer.
				Eye Obs.	Autographic.			
8. (b) ENGLAND, SOUTH-WEST								
—cont.								
Dorset :—	50° 38'	2° 8' W.	239	●	—	—	—	J. W. G. Bond.
Creech Grange ...	50° 43'	2° 27' W.	310	III	⊙	m.	—	Borough Engineer.
Dorchester ...	50° 32'	2° 27' W.	19	T, II <sub>3</sub>	B	D.W.M.	11	Lightkeeper, for M.O.
Portland Bill...	51° 1'	2° 12' W.	722	III	—	W.m.	10	Rev. F. Ehlers.
Shaftesbury ...	50° 36'	2° 27' W.	21	III	⊙	d.m.	11	I. J. Brown and J. H. Bolam.
Weymouth ...	51° 32'	2° 35' W.	147	III	—	r.	07	R. C. Cann Lippincott.
Gloucester :—								
Bristol, Over Court Park.								
Clifton, Bristol	51° 27'	2° 37' W.	229	III	⊙	W.m.	09	D. Rintoul, M.A.
Abergavenny ...	51° 49'	3° 2' W.	178	●	—	—	—	A. V. Whitehead.
Abersychan ...	51° 44'	3° 5' W.	698	●	—	—	—	W. P. James.
Newchurch ...	51° 41'	2° 48' W.	525	●	—	—	—	
Newport ...	51° 35'	3° 0' W.	32	III	—	—	04	C. Cullum, for the Corporation of Newport.
Pant-yr-eos ...	51° 38'	3° 4' W.	449	●	—	—	00	
Ynis-y-fro ...	51° 38'	3° 3' W.	151	●	—	—	00	
Minehead ...	51° 12'	3° 29' W.	104	III	⊙	m.	—	R. Shafto Adair.
Weston - Super - Mare.	51° 21'	2° 59' W.	29	III	⊙	m.	—	Sydney C. Smith.
9. IRELAND, NORTH.								
(a) Western Part.								
Galway :—	53° 19'	9° 0' W.	—	—	B	—	—	W. M. Tattersall, for the Depart- ment of Agriculture for Ireland.
Ardfray ...	53° 28'	9° 44' W.	90	●	—	—	—	M. Macarthy, for the M. G. W. Railway.
Recess ...	53° 58'	7° 38' W.	350?	●	—	—	—	Miss Morrow.
Carrigallen ...	54° 6'	10° 4' W.	37	T, II <sub>3</sub>	B	D.W.M.R.r.	11	The Chief Officer, Coastguard, for M.O.
Blacksod Point				●	—	—	11	The Manageress of the Hotel for the M. G. W. Railway.
Mallaranny ...								

Roscommon :— Sligo :—	No station. Markree Castle	...	54 11	8 27 W.	122	II	☉	W.M.S.R.	09	J. R. Armstrong, for Captain Cooper.
(b) <i>Eastern Part.</i>										
Antrim :—	Belfast	...	54 35	5 56 W.	61	III	—	M.R.	09	John Wylie, B.A., and G. Robinson, for Prof. Morton.
	Glenarn	...	54 58	5 56 W.	41	●	—	—	—	The Earl of Antrim.
	Lisburn	...	54 31	6 3 W.	206	III	—	—	—	John Ridges, M.A.
Armagh :—	Armagh	...	54 21	6 39 W.	196	II	☉	W.M.S.R.	11	J. L. E. Dreyer, Ph.D., for M.O.
Cavan :—	No station.	...					☉			
Donegal :—	Dunfanaghy	...	55 11	7 58 W.	54	II	—	m.	11	J. J. MacGrath, L.R.C.P.
	Killybegs	...	54 40	8 27 W.	221	●	—	—	—	John C. Ward.
	Malin Head	...	55 23	7 24 W.	203	T	B	D.W.M.R.R.	11	Chief Officer, Coastguard, for M.O.
Down :—	Donaghadee	...	54 38	5 32 W.	40	T, II <sub>3</sub>	B	D.W.M.R.R.	11	Coastguard, for M.O.
Fermanagh :—	No station.	...					—	m.	—	L. A. Boyle, for the Earl of Granard.
Longferry :—	No station.	...	53 46	7 51 W.	?172	II	—			
Longford :—	Newtown Forbes	...								
Louth :—	No station.	...								
Meath :—	No station.	...								
Monaghan :—	No station.	...								
Tyrone :—	No station.	...								
Westmeath :—	No station.	...								
10. IRELAND, SOUTH.										
(a) <i>Eastern Part.</i>										
Carlow :—	No station.	...	53 29	6 7 W.	55	II	—	m.	—	<i>The late</i> Henry Cullinan, L.R.C.P.L.
Dublin :—	Donabate	...								Sir John W. Moore, M.D., D.Sc.
	Dublin City	...	53 20	6 15 W.	47	II	B	d.W.M.R.	07	
	" Phoenix Park	...	53 22	6 21 W.	155	II	☉	w.M.S.	11	Lt.-Col. C. C. J. Pery, R.E., Ordnance Survey Office.
	" Botanic Gardens.	...	53 23	6 16 W.	67	II	—	m.	07	F. W. Moore, M.R.I.A.

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LIST OF STATIONS ARRANGED ACCORDING TO DISTRICTS AND COUNTIES—*continued*.

County and Station.	Lat.	Long.	Height in feet above M.S.L.	Order of Station.		Publication.	Year of last Inspection.	Observer.
				Eye Obs.	Autographic.			
10. IRELAND, SOUTH— <i>cont.</i>								
(a) <i>Eastern Part—cont.</i>								
Dublin— <i>cont.</i>								
Dublin, Trinity College	53° 21'	6° 16' W.	12	II	☉	M.(R.)w.	07	W. J. Good and W. H. Clark, for Prof. Thrift.
Killiney	53° 16'	6° 7' W.	249	●	—	—	—	Mrs. G. B. Symes.
Kingstown	53° 17'	6° 8' W.	42	III	☉	m.	11	J. S. Vaughan, LL.D., Town Clerk, for the Corporation.
" Harbour	53° 17'	6° 8' W.	—	—	☞	☞	11	Captain A. F. Holmes, R.N., for H.M. Office of Works.
Kildare:—								
Clongowes Wood College.	53° 19'	6° 41' W.	245	II	(B θ) ☉	m.	09	Rev. J. J. Nerney, S.J., and Rev. C. J. Byrne, S.J.
Kilkenny:—								
Kilkenny	52° 39'	7° 14' W.	212	III	B	W.m.	09	E. Sutton, for the Marquis of Ormonde, K.P.
King's Co.:—								
Birr Castle	53° 6'	7° 55' W.	175	T	☉	D.W.M.S.R.r.	11	Dr. Boeddicker, for the Earl of Rosse.
Queen's Co.:—								
Mountmellick	53° 7'	7° 20' W.	253	III	—	m.	09	W. A. Robinson.
Waterford:—								
Waterford	52° 16'	7° 7' W.	—	—	B	—	02	Harbour Authorities.
"	52° 16'	7° 7' W.	20?	III	—	W.m.R.	11	J. N. White.
De La Salle Train- ing College.	52° 15'	7° 6' W.	20	III	—	—	—	Rev. M. J. Healey, B.Sc.
Wexford:—								
Wexford	53° 15'	6° 30' W.	100	III	—	m.	—	Charles Bain.
Wicklow:—								
Newcastle	53° 5'	6° 6' W.	256	II	—	m.	02	J. T. Crowe, M.D., and C. D. Hanan, M.B.
(b) <i>Western Part.</i>								
Clare:—								
Ennistymon	52° 57'	9° 17' W.	130	●	—	—	—	Rev. C. W. McDowell, M.A.
Hurdlestown	52° 48'	8° 38' W.	157	●	—	—	—	Lt.-Col. W. O. Bentley, R.A.



Mount Callan	52 53	9 16 W.	479	●	—	—	—	98	Lt. Col. Tottenham.
Newmarket-on-Fergus.	52 46	8 53 W.	85	●	—	—	—	98	Alfred Barker, for W. W. A. Fitzgerald.
Quilty...	52 50	9 28 W.	*	—	—	—	—	11	W. Barrington, M.L.C., for the West and South Clare Railway Co.
Ballinacurra...	51 52	8 10 W.	24	III	⊙	W.M.	W.M.	10	John H. Bennett.
Roche's Point	51 47	8 15 W.	32	T	—	—	D.W.M.R.r.	11	M. Fitzmahony, Post Office, for M.O.
" "	51 47	8 15 W.	—	—	—	—	—	10	Captain G. Usborne, for Cork Harbour Commissioners.
Caragh Lake...	52 3	9 53 W.	59	●	—	—	—	—	Admiral E. F. Jeffreys, C.V.O.
Killarney	52 4	9 30 W.	174	III	—	—	W.M.R.	09	E. W. Griffin, M.D.
Valencia	51 56	10 15 W.	30	I, T	I, B	—	D.W.M.R.r.H.h.	11	J. E. Cullum, for M.O.
" Glanleam	51 56	10 20 W.	—	●	—	—	—	01	Miss A. O'Donoghue.
Foynes	52 37	9 7 W.	108	III	—	—	W.m.	09	J. J. Alcorn, for Lord Monteagle, K.P.
Limerick (Derravoher)	52 38	8 40 W.	40	●	—	—	—	09	Sir A. W. Shaw.
" (Mungret Coll.).	52 38	8 41 W.	47	II	(B) K ⊙	—	M.R.k.	10	Rev. W. O'Leary, S.J.
Tipperary:— Cahir (Bengurragh)	52 22	7 56 W.	199	III	—	—	W.m.	10	R. W. Smith, Jun.
<b>11. ENGLISH CHANNEL</b>									
<b>(WESTERN SECTION).</b>									
Guernsey:— St. Peter Port, Villa Carey.	49 27	2 32 W.	180	III	⊙	—	W.m.	08	F. E. Carey, M.D.
St. Peter Port, Brooklyn.	49 27	2 31 W.	297	II	⊙ (B ⊙)	—	W.M.	08	Adolphus Colletette,
St. Aubin's	49 12	2 11 W.	25	T, II,	—	—	D.W.M.	10	J. Fisher, for M.O.
St. Helier's	49 11	2 6 W.	—	—	⊙	—	d.w.(m.)	10	Signal Officer, Fort Regent, for M.O.
Scilly:— St. Mary's	49 56	6 18 W.	131	T, II,	B ⊙	—	D.W.M.	11	The Coastguard, for M.O.

The names of Stations added to the list since April, 1911, are printed in clarendon type. Those discontinued during the year are printed in italic type. The positions of the Stations can be identified on the map, Fig. 2, p. 84, by the figures which give their heights above Mean Sea Level.

\* Height of anemometer head above ground 40 feet.

LIST OF FOREIGN STATIONS FROM WHICH REPORTS ARE  
RECEIVED DAILY BY TELEGRAPH.

Name of Station.				Authority.
<sup>3</sup> Vestmanna	} (Iceland)	...	...	Meteorological Institute, Copenhagen. Captain Ryder, <i>Director</i> .
<sup>2</sup> Reykjavik				
<sup>2</sup> *Blönduós				
<sup>2</sup> Ísafjörður				
<sup>2</sup> Seyðisfjörður				
<sup>2</sup> Thorshavn, Faeröe Islands		...	...	Meteorological Office, Stockholm. Dr. Hamberg, <i>Director</i> .
Haparanda		...	...	
Hernösand		...	...	
<sup>2</sup> Stockholm		...	...	
Wisby		...	...	
Karlstad		...	...	Meteorological Institute, Christiania. Professor Mohn, <i>Director</i> .
Bodö		...	...	
<sup>2</sup> Christiansund		...	...	
<sup>2</sup> Skudesnaes		...	...	
Færder		...	...	
<sup>2</sup> The Skaw		...	...	Meteorological Institute, Copenhagen. Captain Ryder, <i>Director</i> .
Blaavands Huk		...	...	
Cuxhaven		...	...	
Berlin		...	...	
Frankfurt		...	...	
Munich		...	...	Meteorological Institute, Utrecht. Dr. van Everdingen, <i>Director</i> .
<sup>2</sup> The Helder		...	...	
Brussels		...	...	
Cape Gris Nez		...	...	
La Hève		...	...	
*Ushant		...	...	Bureau Central Météorologique, Paris. M. Alfred Angot, <i>Director</i> .
<sup>2</sup> Brest (St. Mathieu)		...	...	
Lorient (Ile de Groix)		...	...	
*Er-Hastellie		...	...	
<sup>1</sup> <sup>2</sup> Rochefort (Ile d'Aix)		...	...	
*Chassiron		...	...	
*La Coubre		...	...	
<sup>2</sup> Biarritz		...	...	
<sup>2</sup> Paris		...	...	
Belfort		...	...	
Lyons		...	...	
Nice		...	...	
Perpignan		...	...	
*Cape Béarn		...	...	
Sanguinaire (Corsica)		...	...	
Corunna		...	...	Central Meteorological Institute, Madrid. M. J. Galbis, <i>Director</i> .
Gibraltar		...	...	
Lisbon		...	...	
Madeira (Funchal)		...	...	
<sup>2</sup> Azores (Ponta Delgada)		...	...	
„ (Horta)		...	...	Meteorological Service of the Azores. Major Chaves, <i>Director</i> .

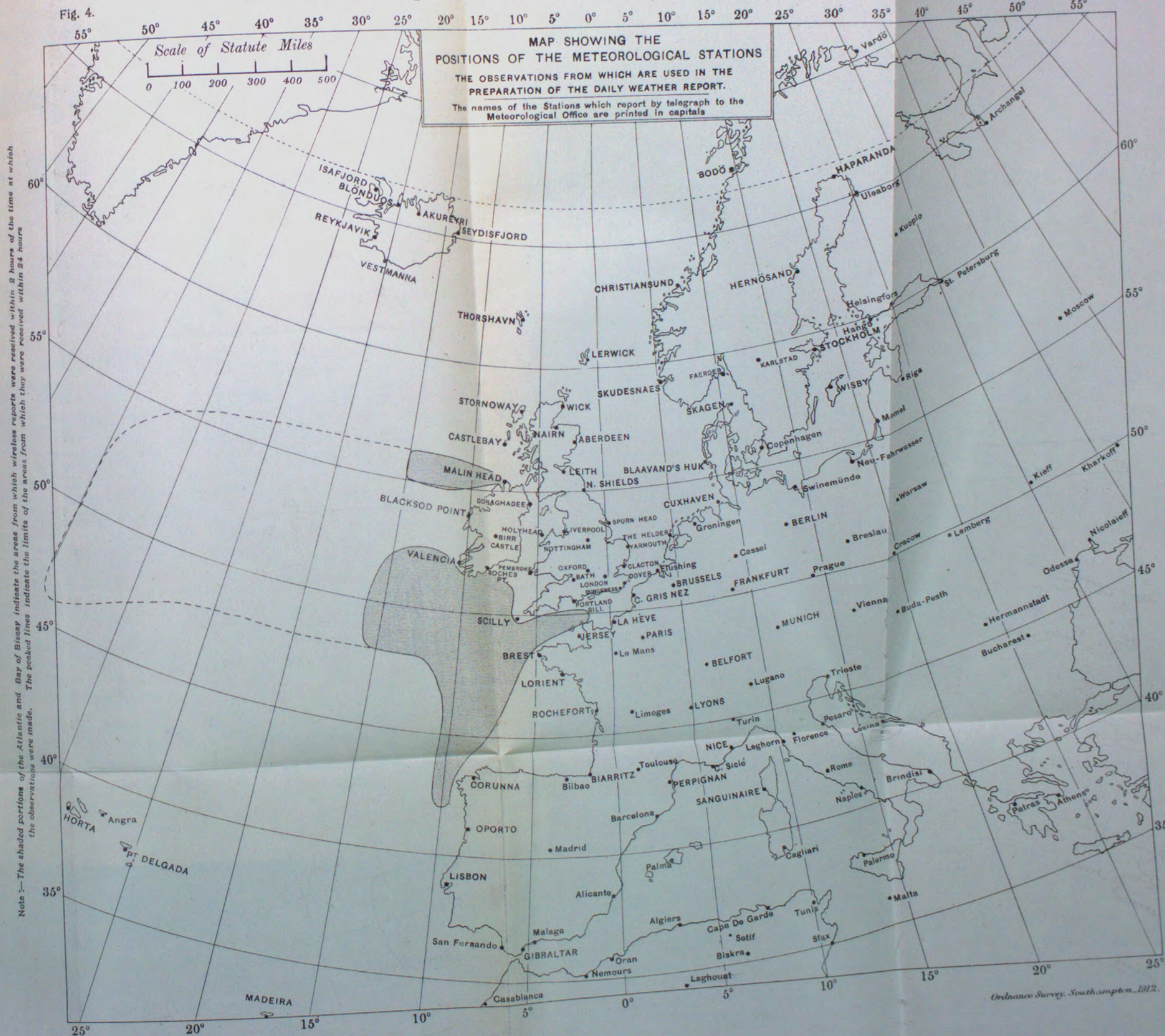
*Note.*—The stations marked (1) report also at 1h. p.m., and those marked (2) at 6h. p.m. Lisbon reports at 4h. p.m. instead of 6h. p.m., and Ponta Delgada at 3h. p.m.

\* The reports from these stations are not published in the Daily Weather Report.





Fig. 4.







LIST OF ADDITIONAL STATIONS CONTRIBUTING EVENING  
REPORTS, GENERALLY AT 6 P.M., TO THE DAILY WEATHER  
REPORT :—

Scotland	{ Oban. Stonehaven. Carnoustie.	England, E.	{ Walton-on- the-Naze. Lowestoft. Felixstowe. Southend- on-Sea.	England, S.W.	{ Weymouth. Teignmouth. Torquay. Paignton. Weston- super-Mare.
England, N.E.	{ Harrogate. Scarborough.				
England, N.W.	{ Blackpool. Southport. Buxton. Douglas.	England, S.E.	{ Ramsgate. Margate. Deal. Littlestone- on-Sea. Folkestone. Hastings. Bexhill-on- Sea. Eastbourne. Seaford. Brighton. Worthing. Bognor. Southsea. Bournemouth.	9 p.m. Reports.	{ Dublin. Plymouth. Darwen. Manchester. Birmingham.
Wales ...	{ Rhyl. Colwyn Bay. Llandudno. Bettws-y- Coed. Aberystwyth.				

LIST OF SEA TEMPERATURE STATIONS.

§* Aberdeen, Cove Bay.	² Holyhead Harbour Office.
* Arran, North, Galway.	§* Kirkwall.
† Bahama Bank Lightship.	† Kish Bank Lightship.
§ Ballantrae, Ayrshire.	§* Lamlash, Isle of Arran.
* Ballydonegan, Co. Cork.	† Leman and Ower Lightship.
† Barrels Rock Lightship.	§* Lerwick.
* Blacksod Point, Co. Mayo.	* Liscannor, Co. Clare.
† Blackwater Bank Lightship.	§³ Margate.
§* Burnmouth, Ayton, Berwick.	† Morecambe Bay Lightship.
* Burntisland.	† Newarp Lightship.
† Carnarvon Bay Lightship.	§* Newquay, Cornwall.
§* Cleggan, Co. Galway.	† North Arklow Lightship.
† Coningbeg Lightship.	* North Arran ( <i>see</i> Arran).
§* Cromarty.	† North-West Lightship.
† Daunts Rock Lightship.	† Outer Dowsing Lightship.
§¹ Eastbourne.	† Owers Lightship.
† East Goodwin Lightship.	§* Pennan Bay (Aberdour).
† English and Welsh Grounds Lightship.	§⁴ Plymouth.
† Fastnet Rock Lighthouse.	§⁵ Port Erin.
	* Portrush.

The observers are indicated thus :—\* Coastguard, † Lightkeepers, ¹ S. R. Henderson, ² F. M. Cotton, C.E., ³ W. J. Woodruff, ⁴ H. Victor Prigg, ⁵ Biological Station.

§ Stations marked thus send weekly returns for publication in the Weekly Weather Report.



LIST OF SEA TEMPERATURE STATIONS—*continued.*

†Royal Sovereign Lightship.	†Smith's Knoll Lightship.
*St. Ann's Head, Pembroke.	†Solway Lightship.
§*Salcombe, Devon.	†South Arklow Lightship.
§*Scarborough.	†South Rock Lightship.
*Scilly Islands (St. Mary's).	†Spurn Lightship.
§*Seafield, Co. Clare.	*Stornoway.
†Seven Stones Lightship.	*Sunderland.
†Shambles Lightship.	§*Teelin, Co. Donegal.
§*Sheephaven (Dunfanaghy).	*Usan (Montrose).
§†Shipwash Lightship.	†Varne Lightship.
†Skulmartin Lightship.	§ Wick.

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The observers are indicated thus :—\* Coastguard, † Lightkeepers.

§ Stations marked thus send weekly returns for publication in the Weekly Weather Report.

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LIST OF STATIONS in the COLONIES and DEPENDENCIES and in FOREIGN COUNTRIES from WHICH RETURNS are received in MANUSCRIPT.

NOTE.—Returns received in printed form are not included in this list.

Station.	Latitude.	Longitude.	Height in Feet above M.S.L.	Order of Station.	Year of Commencement of Observations.	Observer.
MEDITERRANEAN.						
Cyprus, * †Famagusta ...	35 7 N.	33 57 E.	34	II	1881	The Chief Medical Officer.
" " †Kyrenia ...	35 21 N.	33 19 E.	54	II	1881	
" " †Larnaca ...	34 55 N.	33 37 E.	19	II	1881	
" " †Limassol ...	34 40 N.	33 1 E.	26	II	1881	
" " †Nicosia ...	35 11 N.	33 22 E.	493	II	1881	
" " †Papho ...	34 46 N.	32 25 E.	202	II	1881	Colonial Secretary's Department, Edwin C. Hathaway, for Lloyds. H. B. Johnstone, H.B.M. Vice-Consul. N. A. de Silva. Abdullah Kasir and Zeki M. Heikal for the Director of the Syrian Protestant College. H. Echiboukdjian, for the President, International College.
Gibraltar ...	36 6 N.	5 21 W.	48	II	1883	
Morocco, †Cape Spartel ...	35 47 N.	5 55 W.	191	II	1893	
" " †Mogador ...	31 30 N.	9 42 W.	19	●	1903	
" " †Saffi ...	†32 17 N.	9 8 W.	40	●	1905	
Syria, Beyrout ...	33 54 N.	35 28 E.	172	II	1883	M. T. Dawe, Director of the Scientific Department.
" " Turkey, Smyrna ...	38 26 N.	27 9 E.	50	● § III	1908	
AFRICA.						
Central:—						
Uganda, Bombo ...	0 34 N.	32 36 E.	—	III	1911	M. T. Dawe, Director of the Scientific Department.
" " Entebbe ...	0 4 N.	32 28 E.	3,863	III	1896	
" " Fort Portal ...	0 43 N.	30 8 E.	5,299	III	1901	
" " Gondokoro ...	4 51 N.	31 42 E.	1,500	III	1901	
" " Gulu ...	3 18 N.	33 34 E.	—	III	1911	
" " Jinja ...	0 26 N.	33 11 E.	3,722	III	1901	

\* By arrangement with the Colonial Office and the Survey Department of Egypt the returns for these stations are sent in the first instance to the Survey Department for use in connexion with its Monthly Weather Report. They are sent to the Office for ultimate filing.

† The positions and heights of the stations are those given by the observers, except in cases marked †, for which the information given has been obtained from other sources.

‡ The Meteorological instruments in use at this Station are lent by the Meteorological Committee.

§ Rainfall Stations.

LIST OF STATIONS in the COLONIES, &c., from which RETURNS are received in MANUSCRIPT—*continued*.

Station.	Latitude.	Longitude.	Height in Feet above M.S.L.	Order of Station.	Year of Commencement of Observations.	Observer.
<i>AFRICA—continued.</i>						
<i>Central—continued.</i>						
Uganda, Kampala	0 19 N.	32 35 E.	3,905	III	1907	M. T. Dawe, Director of the Scientific Department. Returns have been received also from 24 stations in Uganda which record rainfall only.
" Kawolongoja	0 24 N.	32 11 E.	4,263	III	1910	
" Kivuvu Kyagwe	0 23 N.	32 47 E.	? 3,650	III	1910	
" Masaka	0 21 S.	31 47 E.	? 4,200	III	1902	
" Masindi	1 40 N.	31 50 E.	3,764	III	1906	
" Mbale	1 2 N.	34 6 E.	? 4,000	III	1907	
" Mbarara	0 31 S.	30 47 E.	4,500	III	1901	
" Nimule	3 39 N.	32 10 E.	2,034	III	1903	
<i>West:—</i>						
Gold Coast, Aburi	5 50 N.	0 10 W.	556	III	1893	Medical Department, Accra.
" Accra	+5 35 N.	0 6 W.	60	III	1893	
" Addah	5 50 N.	0 38 E.	—	III	1895	
" Axim	+4 50 N.	2 12 W.	—	III	1895	
" †Cape Coast Castle	+5 15 N.	0 30 W.?	—	III	1895	
" Gambaga	+10 31 N.	0 26 W.	—	III	1899	
" Kintampo	8 5 N.	1 30 W.	—	III	—	
" Kumasi (Coomassie)	+6 50 N.	2 16 W.	859	III	1899	The Secretariat, Zungeru.
" Kwitta (Keta)	+5 59 N.	0 59 E.	—	III	1895	
" Sekondi	5 0 N.	1 40 W.	20	III	1904	
" Sunyani	7 22 N.	2 19 W.	—	III	1908	
" Tamale	9 23 N.	0 50 W.	—	III	1908	
" Tarkwa (Tarquah)	5 11 N.	2 0 W.	245	III	1907	
<i>Nigeria:—</i>						
Bauchi	10 17 N.	9 49 E.	2,300	III	1907	The Secretariat, Zungeru.
Geidam (Dumjeri)	12 53 N.	11 57 E.	7,900	III	1907	
Ilorin	8 29 N.	4 32 E.	968	III	1907	
Kano	12 0 N.	8 33 E.	2,000	III	1907	
Katagum	12 17 N.	10 22 E.	108	III	1907	
Keffi	8 50 N.	7 52 E.	—	III	1907	
Kontagora	10 24 N.	5 24 E.	1,300	III	1907	



Lokoja ...	...	...	...	7	48 N.	6	44 E.	270	III	1907	The Secretariat, Zungeru.
Maifoni (Maiduguri) ...	...	...	...	11	48 N.	13	12 E.	1,200	III	1907	
Sokoto ...	...	...	...	13	1 N.	5	14 E.	1,160	III	1907	
Yola ...	...	...	...	9	12 N.	12	30 E.	850	III	1907	
Zaria ...	...	...	...	11	6 N.	7	43 E.	2,230	III	1907	
Zungeru ...	...	...	...	9	49 N.	6	10 E.	530	III	1907	The Principal Medical Officer.
Sierra Leone ...	...	...	...	8	30 N.	13	9 W.	179	II	1895	
Southern Rhodesia :—	...	...	...	20	0 S.	29	0 E.	4,496	●	1908	Mrs. C. E. Fripp.
Ringstead Reef (Essexvale) ...	...	...	...	10	22 N.	45	2 E.	30	III	1908	A. W. Sofly.
Somaliland—	...	...	...	9	50 N.	45	16 E.	4,500	III	1908	
Berbera ...	...	...	...	—	—	—	—	—	III	1910	
Sheik Camp Hospital ...	...	...	...	6	49 N.	58	8 W.	0	⊙	1906	F. A. Stockdale, Government Botanist.
Zaila ...	...	...	...	—	—	—	—	—	⊙	1908	
SOUTH AMERICA.											Dr. E. H. Griffen, for the Goldfields of Venezuela, Ltd.
British Guiana, Georgetown ...	...	...	...	7½	0 N.	62	0 W.	1,000?	II B θ	1910	
" " Mazaruni (Penal Settlement).	...	...	...	32	13 N.	119	27 E.	40	II ⊙	1905	Capt. Lewis H. Tamplin.
Venezuela, Guayanavièja (El Perú) ...	...	...	...	32	20 N.	64	51 W.	30	—	1889	Lieut. F. J. Evans, R.N. R. W. D. Albury. S. W. Roberts G. C. Pinder G. L. Rodgers E. J. Jones T. R. Thompson John R. Bovell, Superintendent Botanical Department. A. L. Richardson, Lightkeeper, for the Board of Trade.
CHINA.											
Chinkiang ...	...	...	...	+25	2 N.	77	25 W.	—	III	1895	
NORTH ATLANTIC OCEAN.											
Bermuda Dockyard	...	...	...	25	51 N.	77	11 W.	75	II	1859	
Bahamas, Nassau	...	...	...	22	22 N.	77	35 W.	—	II	1877	
" " * Abaco	...	...	...	23	42 N.	80	25 W.	40	II	1859	
" " ** Cay Lobos	...	...	...	20	56 N.	73	41 W.	40	II	1871	
" " * Cay Sal	...	...	...	24	8 N.	74	26 W.	120	II	1889	
" " * Inagua	...	...	...	+13	12 N.	59	35 W.	181	II	1895	
" " ** Watling's Island	...	...	...	18	36 N.	63	28 W.	34	II	1867	
Barbados ..	...	...	...	...	...	...	...	...	...	...	
**Sombbrero	...	...	...	...	...	...	...	...	...	...	

\* Lighthouse; contributes register containing observations every 4 hours.

† The positions and heights of the stations are those given by the observers, except in cases marked ‡, for which the information given has been obtained from other sources.

‡ The Meteorological instruments in use at this Station are lent by the Meteorological Committee.

LIST OF STATIONS in the COLONIES, &amp;c., from which RETURNS are received in MANUSCRIPT—continued.

Station.	Latitude.	Longitude.	Height in Feet above M.S.L.	Order of Station.	Year of Commencement of Observations.	Observer.
SOUTH ATLANTIC OCEAN.						
Falkland Islands :—						
*†Cape Pembroke ... ..	51 41 S.	57 42 W.	70	II	1859	J. Pearce, Lightkeeper, for the Board of Trade.
†Stanley... ..	—	—	—	⊙ B	—	His Excellency the Governor.
†St. Helena; St. Matthew's Vicarage ...	16 0 S.	5 40 W.	1,887	II	1885	A. L. C. Hands.
" Central, Oak Bank ... ..	—	—	1,696	●	1902	J. Homagee.
" St. Paul's Vicarage ... ..	—	—	1,694	●	1905	Alfred Porter.
South Georgia, Grytviken ... ..	54 14 S.	36 33 W.	10	II	1906	R. MacDougall, for the Argentine Fishery Company, transmitted by the Governor of the Falkland Islands through the Board of Trade.
PACIFIC OCEAN.						
British Solomon Islands :—						
Tulagi ... ..	9 5 S.	160 8 E.	7	III	1907	F. J. Barnett.
Fiji :—						
Suva ... ..	18 8 S.	178 0 E.	44	II	1906	C. H. Knowles, Superintendent Department of Agriculture.
Fanning Island ... ..	3 54 N.	159 23 W.	—	III	1903	The Pacific Cable Board.
Malden Island ... ..	3 59 S.	155 0 W.	—	II	—	C. Karlson and P. E. Usher.
† Ocean Island ... ..	0 52 S.	169 36 E.	91	II B.	1905	J. S. Marsh, for the Pacific Phosphate Company.
INDIAN OCEAN.						
Madagascar :—						
Antananarivo ... ..	18 55 S.	47 30 E.	—	●	1903	T. P. Porter, H.B.M. Consul.
Mauritius, Royal Alfred Observatory ...	20 6 S.	57 31 E.	181	(I)	1901	T. F. Claxton, Director.

\* Lighthouse; contributes register containing observations every 4 hours.

† The Meteorological instruments in use at this Station are lent by the Meteorological Committee.

**K.—LIST OF PUBLICATIONS ISSUED UNDER THE AUTHORITY OF THE METEOROLOGICAL COMMITTEE OF THE ROYAL SOCIETY (1867 TO 1876), THE METEOROLOGICAL COUNCIL (1877 TO 1905), OR THE METEOROLOGICAL COMMITTEE APPOINTED BY TREASURY MINUTES, MAY 20TH, 1905, AND 31ST MARCH, 1910.\***

The list is arranged under the following headings :—

1. Reports of the Meteorological Office and of International Meetings.
2. Observations and Data for Stations in the United Kingdom.
3. Observations and Data for Colonial and Foreign Stations.
4. Marine Meteorology, Atlases and Memoirs.
5. Reports of Investigations in Dynamical and Statistical Meteorology and other Memoirs. Geophysical Memoirs.
6. Handbooks, Text-books and Tables.

**1. Reports of the Meteorological Office and of International Meetings.**

(P) Reports of the *Meteorological Committee* of the Royal Society (8vo.) :—  
1867–1877. At prices varying from 4d. to 1s. per Report, except 1876–1877, 3s. 5d.

(P) Reports of the *Meteorological Council* (8vo.) :—  
1878–1905. At prices varying from 5d. to 1s. 5d., except 1884–5, 4s. 4d.

(P) Reports of the *Meteorological Committee* (8vo.) :—  
1905–06 to 1911–12. Prices from 1s. 4d. to 2s. 3d.

International Codex of Resolutions adopted at Congresses, Conferences, and at Meetings of the Permanent International Committee 1872–1907 (No. 200). 1s. 3d. (8vo.)

Reports of Proceedings at International Meetings (8vo.). (Prices ranging from 6d. to 3s.) :—

1872. Leipzig Conference.

1873. Vienna Congress. Protocols and Appendices.

— Report on Weather Telegraphy and Storm Warnings.

— Report on Atmospheric Electricity, Maritime Meteorology, Weather Telegraphy.

1873 and 1874. Vienna and Utrecht.

1874. London. Maritime Meteorology.

1876. London. Second Meeting. Permanent Meteorological Committee.

1878. Utrecht. Third Meeting " " "

1879. Rome Congress.

1880. Berne. First Meeting. International Meteorological Committee.

1882. Copenhagen. Second Meeting of Committee.

1885. Paris. Third " "

1888. Zürich. Fourth " "

1891. Munich. First Conference.

1894. Upsala. Fifth Meeting of Committee.

1896. Paris. Second Conference.

1899. St. Petersburg. Sixth Meeting of Committee.

1903. Southport. Seventh " "

\* Unless otherwise indicated the publication is by the authority of the Meteorological Committee or its predecessors. (P) signifies a Parliamentary publication on sale by the Parliamentary Booksellers; (A) an Admiralty publication on sale by J. D. Potter, from whom the Monthly Meteorological Charts can also be obtained. Publications marked (¶) are on sale by the publishers named in the titles; those marked (M) are on sale only at the Meteorological Office. The remaining publications are on sale by Messrs. Wyman & Sons, Limited, and other agents for the sale of the publications of H.M. Stationery Office.



# 1. Reports of the Meteorological Office and of International Meetings

—continued.

## Reports of Proceedings at International Meetings, &c.—continued.

- 1905. Innsbruck. Third Conference.
- 1907. Paris. Eighth Meeting of Committee.
- 1909. London. Weather Telegraphy Commission.
- 1909. London. Maritime Weather Signals Commission.
- London. " " " Summary of Signals in use
- 1910. Berlin. Ninth Meeting of Committee.

## 2. Observations and Data for Stations in the United Kingdom.

- (M) *Daily Weather Report*, including Meteorological Observations for 7 a.m. and 6 p.m. at 30 stations, and supplementary data from about 40 additional stations in the British Isles, together with data from 40 foreign stations, and Weather Charts of North-Western Europe and the Eastern Atlantic. Issued daily, post free, to any address in the United Kingdom for 5s. per official quarter. (4to.)
- \*BRITISH METEOROLOGICAL AND MAGNETIC YEAR BOOK from 1908. (4to.)  
 Part I.—†*Weekly Weather Report*. 6d. per week. With Appendices priced separately.  
 Part II.—*Monthly and Annual Supplements*: Monthly Weather Report: summaries of observations from about 250 stations in the British Isles, and charts. 6d. each part. Subscription for Parts I. and II. inclusive, including postage, 30s. per annum.
- (M) Part III.—(1) *Daily Readings* at 16 meteorological stations of the First and Second Orders. 1s. per issue of a month. Annual Volume 10s. 6d.  
 (2) *Geophysical Journal*, comprising daily values in C.G.S. units of meteorological and magnetical data for the three Meteorological Office Observatories—Valencia, Kew, and Eskdalemuir; Electrical data for Kew and Eskdalemuir; Seismological data for Eskdalemuir; wind components for Holyhead, Scilly, Orkney, and Yarmouth; and supplements giving the results of observations in the upper air. 4d. per issue of a month. Annual issue, 5s.
- (M) Part IV.—(1) *Hourly values* in C.G.S. units from autographic records; Meteorological Section: Hourly values of the meteorological elements at the three Meteorological Office Observatories—Valencia, Kew, and Eskdalemuir. 6d. per issue of a month for each Observatory.  
 (2) *Hourly values* in C.G.S. units from autographic records; Geophysical Section: Hourly Readings of Terrestrial Magnetic Force at Eskdalemuir; with diurnal inequalities for terrestrial magnetism and atmospheric potential gradient, and monthly and annual summaries of hourly values of meteorological and geophysical data at the Meteorological Office Observatories. Annual issue. Price not yet ascertained.

### Monthly Weather Reports (4to):—

1884–1887.† In Monthly Parts 1s. 6d. to 2s. 6d. each, except May to December, 1887, which is in wrapper, price 12s.

### Quarterly Weather Report (4to):—

1869–1880. At prices varying from 4s. to 10s. each Quarterly Part.  
 1877–1880:—Appendices and Plates are published for these years at 27s. or 28s. per Yearly set.

\* The publication of Geophysical data (terrestrial magnetism, atmospheric electricity, seismology and solar radiation) for the Observatories Kew, Eskdalemuir, Falmouth and Valencia, began in Parts III. and IV. of the Year Book as from Jan., 1911. The title of the publication from 1908 to 1910 was "The British Meteorological Year Book."

† The publication of the Weekly Weather Report began in February, 1878. Annual subscription, including Supplements and Appendices, post paid, 1878–1883, 12s. 6d.; 1884–1888, 21s. 2d.; 1889–1911, 30s.

‡ The publication of the Monthly Weather Report was continued after 1887 as a Supplement to the Weekly Weather Report.

2. Observations and Data for Stations—*continued*.

\**Hourly Readings* from the Self-Recording Instruments at the . . . .  
Observatories (4to) :—

1881–1886. In Parts, varying in price from 10s. to 30s. each.

1900–1910. 25s. each, or 6d. per month each station. (*Continued under*  
British Meteorological and Magnetic Year Book. Part IV.)

*Hourly Means* (for *Five-days and Calendar months*) of the Readings obtained  
from the Self-Recording Instruments at the . . . . Observatories under  
the Meteorological Council (4to) :—

1887–1899. In Annual Volumes, at prices varying from 15s. to 38s.

*Meteorological Observations* at Stations of the Second Order (4to) :—

†1876–1907. At prices varying from 20s. to 35s.

1908–1910, 16s. each.

(*Continued under* British Meteorological and Magnetic Year Book. Part III.)

(M) *Geophysical and Meteorological Observations* for 1910 at Kew, Falmouth,  
Eskdalemuir and Valencia Observatories. 1s. 6d.

AVERAGES :—

Quinquennial table of averages of Temperature, Rainfall, and Sunshine at  
Stations in the British Isles. Latest issue, for the period ended 1905  
(about 150 Stations). 1s. (4to.) Forms Appendix III. to Weekly Weather  
Report, 1906.

*Rainfall* :—

Diurnal Range of Rain at the Seven Observatories in connexion with the  
Meteorological Office, 1871–1890. (No. 143. 1900.) 2s. 6d. (8vo.)

Rainfall Tables of the British Isles for 1866–80. Compiled by G. J. Symons,  
F.R.S. (No. 47. 1883.) 7s. 6d. (8vo.)

Rainfall Tables of the British Islands, 1866–90. (No. 114. 1897.) 6s. (8vo.)

*Sunshine* :—

Sunshine Records of the United Kingdom for 1881. (No. 56. 1883.) 4s.  
(8vo.)

Ten Years' Sunshine in the British Isles, 1881–90. (No. 98. 1891.) 2s.  
(8vo.)

*Temperature* :—

Temperature Tables for the British Islands. (No. 154. 1902.) 10s. 6d.  
Supplement :—Difference Tables for each Five Years for the Extrapolation  
of Mean Values. 3s. (4to.)

ATLAS :—

Meteorological Atlas of the British Isles. (No. 53. 1883.) 5s. 6d. (4to.)

3. Observations and Data for Colonial and Foreign Stations.

\* Contribution to the Meteorology of Japan.—By Staff-Com. Thomas H. Tizard,  
H.M.S. "Challenger." (No. 28. 1876.) [Out of Print.]

Meteorological Observations at the Foreign and Colonial Stations of the  
Royal Engineers, and the Army Medical Department, 1852–1886. (No. 83.  
1890.) 23s.

Meteorological Observations made at Sanchez, Samaná Bay, St. Domingo,  
1886–1888.—By the late W. Reid, M.D. (No. 89. 1890.) 8s. 6d.

Report on the Meteorology of Kerguelen Island.—By Rev. S. J. Perry, S.J.,  
F.R.S. (No. 37. 1879.) 3s.

Climatological Observations at Colonial and Foreign Stations :—

I. :—Tropical Africa, 1900–1902, with Summaries and Map.—By E. G.  
Ravenstein, F.R.G.S. (No. 165. 1904.) 6s. (4to.)

\* For the years 1874–1880 the Hourly Readings were issued in lithographed form. Price 20s. per annum. Hourly Readings for Kew and Valencia are published also for the years 1895–1899 in the corresponding volumes of "Hourly Means."

† The Observations at Stations of the Second Order for 1873–75 will be found in the Quarterly Weather Report for the respective years.

**4. Marine Meteorology, Atlases and Memoirs.****CHARTS :—***Arabian Sea :—*

Daily Weather Charts for the period of six weeks ending June 25, 1885, to illustrate the tracks of two cyclones in the Arabian Sea. (No. 80. 1891.) 10s. (4to.)

*Atlantic :—*

Charts of Meteorological Data for the Nine 10° Squares of the Atlantic, which lie between 20° N. and 10° S., and extend from 10° to 40° W., with accompanying Remarks, ending with the Best Routes across the Equator. (No. 27. 1876.) 24s. (17 × 20 ins.)

(A) Monthly Current Charts for the Atlantic Ocean. From information collated and prepared in the Meteorological Office. (No. 132. 1897.) 10s. (22½ × 18 ins.)

*Atlantic (North) :—*

Charts of Meteorological Data for Square 3, Lat. 0°–10° N., Long. 20°–30° W. (20 × 13½ ins.) and Remarks to accompany the Monthly Charts, which show the Best Routes across the Equator for each Month, &c. (17 × 16½ ins.) (No. 20. 1874.) 20s.

Charts illustrating the Weather of the North Atlantic Ocean in the Winter of 1898–99. (No. 142. 1901.) 6s. 6d. [Out of Print.]

Currents and Surface Temperature of the North Atlantic Ocean, from the Equator to Latitude 40° N., for each Month of the Year. With a General Current Chart. (No. 12. 1872.) 2s. 6d. (4to.)

Discussion of the Meteorology of that Part of the Atlantic lying North of 30° N., for the eleven days ending 8th February, 1870. With Charts. (No. 13. 1872.) 5s. (4to.)

Meteorology of the North Atlantic during August, 1873, with 31 Synoptic Charts. (No. 32. 1873.) With book of Charts, 15s. (15 × 22 ins.)

Synchronous Weather Charts of the North Atlantic and the adjacent Continents, 1st August, 1882, to 3rd September, 1883. Parts I. to IV. (33 sheets each). (No. 71. 1886.) 17s. each Part. (26 × 22 ins.)

*Atlantic (South) :—*

Charts showing the Surface Temperature of the South Atlantic Ocean in each month of the Year. (No. 4. 1869.) 2s. 6d. (18½ × 12½ ins.)

(A) Wind Charts for the Coastal Regions of South America, from information collated and prepared in the Meteorological Office. (No. 159. 1902.) 7s. (27 × 20½ ins.)

(A) Monthly Wind Charts of the South Atlantic. (No. 168. 1903.) (20 × 27 ins.) 6d. each.

The relation between Pressure, Temperature, and Air Circulation over the South Atlantic Ocean. By M. W. Campbell Hepworth, C.B., Commander R.N.R., Marine Superintendent. (No. 177. 1905.) 9d. (8vo.)

*Atlantic, Indian, and Pacific Oceans :—*

Charts showing the Surface Temperature of the Atlantic, Indian, and Pacific Oceans. (No. 59. Second Edition, 1903.) 4s. 6d. (19½ × 14½ ins.)

Charts showing the Mean Barometric Pressure over the Atlantic, Indian, and Pacific Oceans. (No. 76. 1887.) 10s. 6d. Supplementary Chart. 6d. (27 × 20½ ins.)

*Atlantic (North) and Mediterranean :—*

Monthly Meteorological Charts, commencing April, 1901. (No. 149.) 6d. each. Subscription for one year, 5s. (exclusive of postage). (22 × 30 ins.)

*Indian Ocean :—*

(A) Monthly Current Charts for the Indian Ocean, from information collated and prepared in the Meteorological Office. (No. 124. 1896.) 7s. (20 × 24½ ins.)



4. Marine Meteorology, &c.—continued.

CHARTS—continued.

*Indian Ocean*—continued.

Monthly Meteorological Charts of the Indian Ocean and Red Sea. Commencing May, 1906. (No. 181.) 6*d.* each. Subscription for one year, 5*s.* (exclusive of postage). (1906–10, 30 × 22 ins., 1910–11, 30 × 30 ins., 1911–12, 30 × 22 ins.)

*Indian Ocean (North)* :—

Meteorological Charts of the portion of the Indian Ocean adjacent to Cape Guardafui and Ras-Hafun. (No. 92. 1891.) 6*s.* (17½ × 23½ ins.)

*Indian Ocean (South)* :—

Cyclone Tracks in the South Indian Ocean, from information compiled by Dr. Meldrum, C.M.G., F.R.S. (No. 90. 1891.) [Out of print.]\*

Meteorological Charts for the Ocean District adjacent to the Cape of Good Hope, with accompanying Remarks. (No. 43. 1882.) Charts, 25*s.* Remarks, 7*s.* (19½ × 24 ins.)

*Pacific Ocean* :—

(A) Quarterly Current Charts for the Pacific Ocean, from information collated and prepared in the Meteorological Office. (No. 134. 1897.) 5*s.* (26½ × 28½ ins.)

(A) Wind Charts for the Coastal Regions of South America, from information collated and prepared in the Meteorological Office. (No. 159. 1902.) 7*s.* (27 × 20½ ins.)

*Red Sea* :—

Meteorological Charts of the Red Sea. (No. 106. 1895.) 21*s.* (22 × 13½ ins.)

*Southern Ocean* :—

Meteorological Charts of the Southern Ocean between the Cape of Good Hope and New Zealand. (No. 123. 1899.) [New Edition, 1907.] 6*s.* (17½ × 19½ ins.)

OTHER PUBLICATIONS ON MARINE METEOROLOGY :—

Contributions to our Knowledge of the Meteorology of the Arctic Regions. (Official, No. 34. 1885.) Vol. 1 : Part I., 2*s.* ; II., 10*s.* ; III., 6*s.* ; IV., 5*s.* ; V., 6*s.* (4to.)

Contributions to our Knowledge of the Meteorology of the Antarctic Regions. (No. 18. 1873.) 2*s.* (4to.)

Contributions to our Knowledge of the Meteorology of Cape Horn and the West Coast of South America. (No. 11. 1871.) 2*s.* 6*d.* (4to.)

Notes on the Form of Cyclones in the Southern Indian Ocean.—By C. Meldrum, M.A., F.R.S. (Non-Official, No. 7. 1873.) [Out of print.]

On the Physical Geography of the part of the Atlantic which lies between 20° N and 10° S. and extends from 10° to 40° W. A Paper read before the British Association at Bristol, in August, 1875.—By Capt. H. Toynbee, F.R.A.S. (Non-Official, No. 10. 1876.) [Out of print.]

On the Winds, &c., of the North Atlantic along the Tracks of Steamers from the Channel to New York. Translated from a Paper issued by the Deutsche Seewarte, Hamburg. (Non-Official, No. 5. 1872.) 6*d.* (8vo.)

Report to the Committee of the Meteorological Office on the Meteorology of the North Atlantic.—By Capt. H. Toynbee, F.R.A.S. (Non-Official, No. 2. 1869.) 1*s.* (8vo.)

Report on the Gales experienced in the Ocean District adjacent to the Cape of Good Hope between Lat. 30° and 50° S., and Long. 10° and 40° E.—By Capt. H. Toynbee, F.R.A.S. (No. 44. 1882.) 7*s.* 6*d.* (4to.)

Routes for Steamers from Aden to the Straits of Sunda and back. Translated from a Paper issued by the R. Meteor. Inst. of the Netherlands. (Non-Official, No. 4. 1872.) [Out of print.]

\* Reproduced upon the Meteorological Charts for the Indian Ocean (No. 181).

## 5. Reports of Investigations in Dynamical and Statistical Meteorology and other Memoirs.

London Fog Inquiry, 1901-03 :—

Report of the Council, with Report by R. G. K. Lempfert, M.A. 1904. (No. 160. 1904.) 2s. 6d. (4to.)

Report by Captain Alfred Carpenter, R.N., D.S.O. (1903.) 2s. (4to.)

### DYNAMICAL METEOROLOGY :—

Report on the Storm of October 13-14, 1881.—By Robert H. Scott, F.R.S. (No. 46. 1882.) 1s. 6d. [Out of print.]

Report of an Inquiry into the Connexion between Strong Winds and Barometric Differences.—By Robert H. Scott. (Non-Official, No. 1. 1868.) 6d. (8vo.)

Report to the Committee of the Meteorological Office on the use of Isobaric Curves.—By Captain H. Toynbee, F.R.A.S. (Non-Official, No. 3. 1869.) [Out of print.]

Barometric Gradient and Wind Force. Report to the Director of the Meteorological Office by E. Gold, M.A., Fellow of St. John's College, Cambridge, Superintendent of Instruments. (No. 190. 1908.) Price 2s. 6d. (4to.)

Life History of Surface Air Currents. A Study of the Surface Trajectories of Moving Air.—By W. N. Shaw, Sc.D., F.R.S. (Director of the Meteorological Office) and R. G. K. Lempfert, M.A. (No. 174. 1906.) 7s. 6d. (4to.)

The Free Atmosphere in the Region of the British Isles. Contributions to the Investigation of the Upper Air. (No. 202. 1909.) Price 2s. 6d. (4to.)

### STATISTICAL METEOROLOGY :—

The Beaufort Scale of Wind-force. Report of the Director of the Meteorological Office upon an Inquiry, with a Paper by G. C. Simpson, M.Sc., and Notes by Sir G. H. Darwin, K.C.B., F.R.S., W. H. Dines, F.R.S., and Commander Campbell Hepworth, C.B., R.N.R., Marine Superintendent. (No. 180. 1906.) 1s. 6d. (4to.)

Harmonic Analysis of Hourly Observations of Air Temperature and of Pressure at British Observatories. (No. 93. 1891.) 12s. (4to.)

The Trade Winds of the Atlantic Ocean. Contributions to the Study of the North-East and South-East Trade Winds. (No. 203. 1910.) Price 3s. (4to.)

### (M) AERONAUTICS :—

Report on Wind Structure. (8vo.) (No. 1. 1909.) 4s.

" " " " (No. 2. 1910-11.) 1s.

From Reports of the Advisory Committee for Aeronautics.

### (M) GEOPHYSICAL MEMOIRS (4to):—

Vol. I., Part I., for 1911 :—

1. The Effect of the Labrador Current upon the surface temperature of the North Atlantic; and of the latter upon air temperature and pressure over the British Isles. By M. W. Campbell Hepworth, C.B., R.D., Commander R.N.R., Marine Superintendent. (No. 210a. 1912.) 9d.

2. The Free Atmosphere in the Region of the British Isles. Second Report by W. H. Dines, F.R.S., with a Preface by W. N. Shaw, Sc.D., F.R.S., Director. (No. 210b. 1912.) 1s.

3. Graphical Construction for the Epicentre of an Earthquake, by G. W. Walker, M.A., Superintendent of Eskdale Observatory. (No. 210c. 1912.) 3d.

Part II., for 1912 :—

4. On the Radiation Records obtained in 1911 at South Kensington, together with a comparison between them and the corresponding absolute observations of Radiation made at Kew Observatory, by R. Corless, M.A., Secretary to the Director. (No. 210d. 1912.) 3d.

6. Handbooks, Text-books, and Tables. (8vo.)

- Barometer Manual. (No. 8. 1871.) [Out of Print.]  
 Barometer Manual for the Use of Seamen. A Text Book of Marine Meteorology. With an Appendix on the Thermometer, Hygrometer, and Hydrometer. Seventh Edition. [In the press.] (No. 61.) 3d.  
 Fishery Barometer Manual. New Edition, 1887. (No. 3.) 6d.  
 Instructions for Meteorological Telegraphy. New Edition, 1906. (No. 2.) Prepared for the use of Observers exclusively.  
 The Observer's Handbook. A new Edition of Dr. Scott's Instructions in the use of Meteorological Instruments. (No. 191.) Issued annually. 3s.  
 Hints to Meteorological Observers in Tropical Africa, with Instructions for taking Observations, and Notes on Methods of recording Lake Levels. Second Edition, revised 1907. (No. 162.) 9d.  
 (M) Hygrometrical Tables, based on Glaisher's Tables. 1904. 4s. 6d.  
 (¶) Tables for the reduction of Meteorological Observations, published by the Indian Meteorological Department. 2s.

FORECASTING :—

- Aids to the Study and Forecast of Weather.—By W. Clement Ley, M.A. (No. 40. 1880.) 1s.  
 Principles of Forecasting by means of Weather Charts.—By the Hon. Ralph Abercromby, F.R.Met.Soc. Second Edition, Revised, 1885. (No. 60.) [Out of Print.]  
 (¶) Forecasting Weather.—By W. N. Shaw, Sc.D., F.R.S. Constable and Co., Ltd. 12s. 6d.

L.—PUBLICATIONS OF THE INTERNATIONAL METEOROLOGICAL COMMITTEE.

INTERNATIONAL METEOROLOGICAL COMMITTEE :—

- (¶) *International Meteorological Tables*. With introduction in French, English and German. Gauthier-Villars et Fils, Paris. (4to.) (1890.) 40s.  
 (¶) *International Cloud Atlas*.—By H. H. Hildebrandsson and L. Teisserenc de Bort. With introduction in French, English and German, and 14 coloured plates. Gauthier-Villars et Fils, Paris. (4to.) (Second Edition, 1910.) 10s.

INTERNATIONAL COMMISSION FOR SCIENTIFIC AERONAUTICS :—

- Observations derived from International Ascents and from Mountain Stations, &c. 1904-1909. (4to.) £1 per year.

The prices of *Forms for Observers*, *Sunshine Cards*, &c., can be obtained on application.



## APPENDIX III.

LIST of CAPTAINS who have sent in Logs classed as "Excellent" during the year ending March 31, 1912. Figures are attached to the name of each observer to show the number of "Excellent" logs which he has supplied during the whole time of his co-operation with the Office.

Name of Captain.	Number of "Ex- cellent" Logs.	Ship.
Bennett, C. D., R.D., Comm. R.N.R.	17	S.S. "Macedonia."
Collins, P. J. ... ..	1	S.S. "Marathon."
Gillman, L. B. ... ..	2	S.S. "Matatua."
Griffiths, A. M. ... ..	5	S.S. "Hillmere."
Grindlay, G. ... ..	3	S.S. "Crown of Arragon."
Haddock, R. L., Comm. R.N.R. ...	1	S.S. "Mooltan."
Harris, G. H., Lieut. R.N.R. ...	19	S.S. "Gloucestershire."
Hutchison, J. S., R.D., Comm. R.N.R.	1	S.S. "Waipara."
Knox, W. H. ... ..	1	S.S. "Shadwell."
Lingham, W. G., F.R.A.S., F.R. Met Soc.	10	S.S. "Wakool."
Linklater, T. B. ... ..		S.S. "Ballarat."
Mais, E. ... ..	2	S.S. "Marere."
McClure, W. H. ... ..	4	S.S. "York Castle."
Millington, G. A. ... ..	1	S.S. "Garryvale."
Moodie, J. ... ..	4	S.S. "Narrung."
Mullan, F. C., F.R.G.S. ... ..	5	S.S. "Campbell."
Rae, J. R. ... ..	33	S.S. "Ramsay."
Robin, E. ... ..	1	S.S. "City of Calcutta."
Stanley, W. ... ..	1	S.S. "Herefordshire."
Steeves, T. G. ... ..	3	S.S. "Derbyshire."
Tait, T. A. ... ..	5	S.S. "Jason."
Taylor, L. F., Lieut. R.N.R. ...	1	S.S. "Collingham."
	3	S.S. "Singapore."

## APPENDIX IV.

## METEOROLOGICAL REGISTERS received during the Year 1911-12.

(1.)—From the ROYAL NAVY.—*Meteorological Logs* (7).

H.M. Ship.	Commanding Officer.	Officers Observing.	No. of Registers received.	Duration of Observations.	Voyage.
"Cornwallis," H.M.S.	R. H. Anstruther, Capt. R.N., C.M.G.	Lieut. C. D. C. Shakespear, R.N.	1	Mths. Days. 1 14	Mediterranean Station.
"Fantome," H.M.S. ...	J. D. Nares, Lieut. and Commr. R.N.	Sub-Lieut. J. G. Bowles, R.N.	1	5 20	Surveying, N.W. Australia.
"Merlin," H.M.S. ...	B. O. M. Davy, Commr. R.N.	Sub-Lieut. H. V. Silk R.N.	1	7 0	Surveying, British North Borneo.
"Mutine," H.M.S. ...	E. C. Hardy, Capt. R.N.; J. A. Edgell, Lieut. R.N.	Lieut. T. Lundholm, R.N.; Sub-Lieut. G. K. Rylands, R.N.	4	12 14	Surveying, West Coast of Africa.
(2.)—SPECIAL SERVICE.—Uncommissioned Ships (1).					
"Worcester," H.M.S.	D. Wilson Barker, Commr. R.N.R., F.R.S.E., F.R.A.S., &c.	Cadets ...	1	3 28	Moored off Greenhithe, Kent.

## METEOROLOGICAL REGISTERS received during the Year 1911-12—continued.

(3.)—From the MERCANTILE MARINE.—*Meteorological Logs* (305).

Ship.	Captain.	Officers Observing.	No. of Registers received.	Duration of Observations.	Voyage.
"African Prince," S.S.	C. B. Andersson	H. C. Jefferson	2	Mths. Days. 3 19	New York, Rio Janeiro.
"Amazon," S.S.	H. Doughty	"	1	2 3	Pernambuco.
"Apollo," S.S.	H. W. Reay	A. Jones, J. L. Williams, G. Sinclair	1	6 9	Mauritius, China, W.I., W.C.S.A., viâ Cape and Magellan.
"Arabie," S.S.	W. Finch, Lieut. R.N.R.	A. Tyrer, Sub-Lieut. R.N.R., E. K. Irving, Sub-Lieut. R.N.R., J. Morrow, R. M. Porter, Lieut. R.N.R.	2	6 22	New York.
"Ariosto," S.S.	H. Bradley	E. Hall	1	2 10	Karachi, viâ Suez.
"Arctic Stream," Ship	C. C. Dixon	H. V. Rogers, A. G. Bray	1	3 24	West Coast of America.
"Armada de S.S.	John Tyson S. C. Brown	B. Ray, E. Calder, W. L. Wilson, H. M. Rogers, J. R. Strange, Sub-Lieut. R.N.R., G. W. Smith, F. Smith, C. E. Pilkington, A. W. Bigsworth, Sub-Lieut. R.N.R.	2	4 13	Cape Town.
"Asuncion de Lar- rinaga," S.S.	J. V. de A. Echevarria Ernest Fox	E. Fox, D. de Arriandiaga	1	7 19	East and West Coasts of N. and S. America.
"Athenic," S.S.	C. H. Kempson, Lieut. R.N.R.	E. K. Irving, Sub-Lieut. R.N.R., P. A. Bell, S. B. Page, G. Fowler.	3	8 28	New Zealand, viâ Cape.
"Avon," S.S.	L. R. Dickinson J. Pope	"	1	4 13	River Plate, New York, West Indies.
"Ballarat," S.S.	W. G. Lingham, F.R.A.S., F.R. Met. Soc.	C. Lay, A. E. Stephens, E. Holmes	1	4 5	Australia, viâ C.G.H.
"Balmoral," Barque	C. Johnson	"	1	4 4	Oregon.
"Bance," S.S.	A. Collyer	L. M. Kelly, J. E. Genge, Sub-Lieut. R.N.R., — Fitzpatrick.	2	2 19	Bombay and Calcutta, viâ Suez.
"Baron Minto," S.S.	T. Baillie	T. H. Johnson, E. T. Davies, J. Carr	2	5 18	Rio, New York, China, Japan, viâ Suez.



"Baron Ogilvy," S.S.	H. H. Bridger ...	J. Brusher, T. Moore, J. Hooper, W. Mur- chison.	2	10	28	East Indies, Puget Sound, Japan, Rio, Florida, <i>viâ</i> Cape and Suez, Central America.
"Barranca," S.S.	S. H. Simmons ...	G. E. Martin, C. Hake, Sub-Lieut. R.N.R., H. S. Daniel, Mid. R.N.R.	2	6	26	
"Benvenue," S.S.	R. Kroble ...	C. F. Marsh, W. Murray, N. McLeod, J. H. Logan.	2	7	10	China, Japan, Bassin, <i>viâ</i> Suez.
"Blackwell," S.S.	T. W. Scurr ...	R. Mallett, E. Bush, J. E. Letbe ...	2	4	21	Calcutta, <i>viâ</i> Suez.
"Bostonian," S.S.	J. Parry ...	J. Trickey, J. Arkle, J. Davis, — Quick ...	2	7	10	U.S.A.
"Boyne," S.S.	S. G. Dale ...	A. Groom, S. Richards, T. Seabrook, A. E. Staples, V. Grantham.	1	3	21	Buenos Aires, Straits Settlements, Sumatra, and Java, <i>viâ</i> Suez.
"Braemar Castle," S.S.	S. Henderson, Lieut. R.N.R., R.D.	C. Vincent, S. Symons, H. Calder, Lieut., R.N.R., W. S. Colbourne, Sub-Lieut. R.N.R., H. A. Reed.	1	4	15	Alexandria, Capetown.
"Bucrania," S.S.	A. H. Raymer, Lieut. R.N.R.	E. E. Bulkeley, E. A. Winkworth, A. Mac- luran.	1	3	10	Beira, Australia, <i>viâ</i> C.G.H.
"Campbell," S.S.	John Moodie ...	J. Horne, J. Johnstone ...	2	7	9	Buenos Aires, New York and Aus- tralia, Valparaiso, <i>viâ</i> C.G.H. and Magellan.
"Canadian," S.S.	W. H. Bullock, Lieut. R.N.R.	T. B. Knight ...	1	3	19	Boston, U.S.A.
"Carlton," S.S.	A. Heron ...	R. P. Spoor, J. R. Harvey, C. Stokes ...	2	6	29	Monte Video, Karachi, Samarang, <i>viâ</i> Cape and Suez.
"Carpentaria," S.S.	E. G. Davis ...	A. Williams, A. Self, C. E. Parkes ...	2	6	28	Australia, <i>viâ</i> Suez.
"Catania," S.S.	A. S. Gibb, Lieut. R.N.R., R.D.	B. Southcott ...	2	8	2	Mediterranean, U.S.A., Canada.
"China," S.S.	E. Street ...	L. Unicum, A. Keith-Yates, T. C. A. Black, Mid. R.N.R., E. Wilder, G. P. Shaw, C. L. de Guerin, J. S. Harvey, Mid. R.N.R.	2	4	24	Australia, <i>viâ</i> Suez.
"Chirripo," S.S.	W. R. Rowe, F.R.Met. Soc.	E. A. Brown, T. N. Rodick, Sub-Lieut. R.N.R., R. C. Warren.	1	3	22	Santa Marta.
"Circassia," S.S.	C. F. Osborne, Commr. R.N.R., R.D.	W. Gemmell, — Cowan, F. W. Banks, A. S. Hannan, A. S. Anderson, A. Andrew, R. Spilsbury, C. Warltire.	2	7	2	Bombay, <i>viâ</i> Suez.
"City of Calcutta," S.S.	J. R. Rae ...	J. McArthur ...	3	6	8	East Indies, <i>viâ</i> Suez.
"City of Colombo," S.S.	Benjamin Dowse ...	R. R. Jones, L. Adams, C. Taylor ...	1	3	20	Philadelphia, Whampoa, Saigon, <i>viâ</i> Cape and Suez.

## METEOROLOGICAL REGISTERS received during the Year 1911-12—continued.

(3.)—From the MERCANTILE MARINE.—*Meteorological Logs*—continued.

Ship.	Captain.	Officers Observing.	No. of Registers received.	Duration of Observations.	Voyage.
"Clan Buchanan," S.S.	A. W. Simpson ...	D. Macfarlane, R. P. Elliot, Sub-Lieut. R.N.R., W. Beaton, V. S. Armstrong, D. Mackinnon, A. Randle, A. Henderson, M. McGowan, — Kilgour, — Allen, W. Shearer, — Burrington, C. V. Groves, F. Beresford.	2	Mths. 5 Days. 9	East Indies, <i>via</i> Cape and Suez.
"Clan Forbes," S.S. ...	R. G. Becket ...	A. H. Young, J. R. Andrew, A. R. Hair, J. H. Bain.	3	7 13	East Indies, <i>via</i> Cape and Suez.
"Clan Lindsay," S.S.	A. Scotland ...	A. H. Young, H. Evans, H. Hughes, R. Davey.	2	5 21	East Indies, <i>via</i> Cape and Suez.
"Clan Macdougall," S.S.	W. H. Price ...	R. Mackie, S. B. Watson, A. L. Tessier, P. Macfarlane, Sub-Lieut. R.N.R., C. A. Cahill.	1	3 18	Mauritius, Australia, <i>via</i> Cape and Suez.
"Clan Macfadyen," S.S. {	W. Wright ...	D. MacKinnon, P. Hart, T. Hatton, Sub-Lieut. R.N.R., F. J. E. Houghton.	2	5 27	Zanzibar, Mauritius, East Indies, <i>via</i> Cape and Suez.
"Clan Macfarlane," S.S.	W. I. Mason, Lieut. R.N.R. W. H. Price ...		1	2 23	Mauritius, Bombay, <i>via</i> Cape and Suez.
"Clan Macintosh," S.S.	W. J. Lennox ...	F. J. Stenson, Lieut. R.N.R., H. E. G. Scott-Smith, Sub-Lieut. R.N.R., E. H. Saxton, H. S. Gage, Sub-Lieut. R.N.R., C. E. Williams, K. L. MacKenzie, Mid. R.N.R., E. W. Baker, — Lambie, — Barr, — Wilmoughby.	2	6 14	East Indies, <i>via</i> Cape and Suez.
"Clan Macleod," S.S.	A. R. Weir ...	H. Southward, J. Harley, W. Roberts, R. Leslie.	2	4 16	East Indies, <i>via</i> Suez.
"Clan Urquhart," S.S.	C. Sommerfelt ...	G. Niell, P. Macfarlane, J. R. Letts, — Jennings.	1	3 27	Australia, <i>via</i> Cape and Suez.
"Collingham," S.S. ...	T. A. Tait ...	W. F. Beavan, W. Yeatts, C. M. A. Smith ...	2	8 4	East and West Coasts of North and South America.

"Coulson," S.S.	I. M. Welford	...	A. Hudson-Scott	...	...	2	7	1	East and West Coasts of North America, <i>viâ</i> Magellan, Australia, East Indies and Home.
"Counsellor," S.S.	W. J. Simmons	...	A. de Legh, G. R. Windsor, W. A. Hall, J. Gunson, W. Wilford.	...	...	1	4	2	East Indies, <i>viâ</i> Cape and Suez, U.S.A.
"Crown of Arragon," S.S.	G. Grindlay	...	D. M. Matheson, D. J. Thomson, D. McKinnon, J. R. Roberts, D. Cook, E. A. Brown.	...	...	2	5	18	South America, U.S.A., Canada, West Indies.
"Cuthbert," S.S.	Wm. Baird	...	A. Carpenter, D. Williams, F. Hempsted	...	...	1	2	21	East Coast of North and South America.
"Derbyshire," S.S.	W. Stanley	...	S. Makepeace, G. English, R. H. Wood, J. Morefield, C. E. Stone, L. Pirie, P. de Legh, C. Calvert, T. S. Veail, H. Giles.	...	...	4	7	28	Calcutta, Rangoon, <i>viâ</i> Suez.
"Diana," S.S.	A. E. Adams	...	J. McIntosh	...	...	1	6	8	Davis Strait and Baffins Bay (Whaling).
"Dominic," S.S.	J. Martin	...	G. Parry, W. Briscoe	...	...	2	7	19	East Coast of South America, New York.
"Dunbar Moor," S.S.	J. A. Burns	...	E. J. Collins, G. W. Watkins, R. Blake, — Blakey.	...	...	2	3	11	Bombay, <i>viâ</i> Suez, St. Vincent (C. V.), Huelva.
"Durham Castle," S.S.	O. G. Owens	...	A. O. Morgan, Lieut. R.N.R., — Lovegrove, H. Bergen, J. Densham, J. C. Brown, Lieut. R.N.R., H. Kershaw.	...	...	4	7	17	Delagoa Bay, <i>viâ</i> Cape.
"East Point," S.S.	T. Choze, Lieut. R.N.R.	...	C. H. Bouch, J. Scott, R. Bailes	...	...	1	4	1	U.S.A.
"Egypt," S.S.	H. J. Young	...	P. L. Sandberg, H. A. Mouro, A. Martell	...	...	3	8	26	Bombay, <i>viâ</i> Suez.
"El Argentino," S.S.	F. R. Summers	...	F. B. Driscoll, A. H. Furlong, R. Loughnan, R. Irvine, A. J. Densham.	...	...	2	6	12	River Plate.
"Empress of China," S.S.	D. Asbury	...	A. V. R. Lovegrove, Lieut. R.N.R., H. T. M. Watkins, Lieut. R.N.R., R. D., J. G. Watson, Lieut. R.N.R., D. J. Wade.	...	...	1	3	24	Trans-Pacific (North).
"Empress of India," S.S.	W. R. Coleman	...	M. Mayall, E. P. Green, N. H. G. Montagnon, H. Caldwell, A. Hailey, C. H. Oxlade, H. James.	...	...	3	11	19	Trans-Pacific (North).
"Empress of Japan," S.S.	R. Archibald, Commr. R.N.R.	...	A. H. Bird, Lieut. R.N.R., A. G. Gardiner, L. D. Douglas, Sub-Lieut. R.N.R., L. M. Goddard, F. Fleming, W. O. Hanlon, F. W. N. Higgins, Lieut. R.N.R., A. V. R. Lovegrove, Lieut. R.N.R., J. J. Hunt.	...	...	2	7	23	Trans-Pacific (North).



## METEOROLOGICAL REGISTERS received during the Year 1911-12—continued.

(3.)—From the MERCANTILE MARINE.—*Meteorological Logs*—continued.

Ship.	Captain.	Officers Observing.	No. of Registers received.	Duration of Observations.	Voyage.
"Fitzclarence," S.S. ...	J. H. Blair ...	W. E. Edwards, W. Haddow, A. H. Gardner, G. Morgan.	2	Mths. Days. 13 6	Rio, New York, China, Japan, <i>viâ</i> Cape and Suez, East and West Coasts of North America, and Australia, <i>viâ</i> Magellan, Calcutta, <i>viâ</i> Suez.
"Fulwell," S.S. { "Garryvale," S.S. ...	G. C. Douglas ... S. C. Smiles ... Wm. Hy. McClure ...	H. R. Sharpe, W. L. Charlton, G. R. Taylor, J. W. Pettigrew, — Yates, G. E. Patterson, J. W. D. Kearney ...	4	10 12	
"Georgic," S.S. ...	J. Roberts, Lieut. R.N.R.	W. H. G. Yates, G. Davey, Sub-Lieut. R.N.R., B. Behrman, H. H. McFadyen, T. Holmes, H. T. Angus, J. W. Maughan, E. E. Sharp, G. N. Cochran, W. C. Oxbrow, W. A. D. Nelson ...	1	3 26	Rio Janeiro, India, <i>viâ</i> Cape.
"Glamorganshire," S.S. { "Glenaffric," S.S. ...	H. C. Norris ... J. M. Tomlinson ... W. Lane ...	W. H. G. Yates, G. Davey, Sub-Lieut. R.N.R., B. Behrman, H. H. McFadyen, T. Holmes, H. T. Angus, J. W. Maughan, E. E. Sharp, G. N. Cochran, W. C. Oxbrow, W. A. D. Nelson ...	2	6 1	Australia, <i>viâ</i> C.G.H.
"Glenelg," S.S. { "Glenshiel," S.S. ...	A. Hart ... D. L. Muirhead ... D. G. Griffiths ...	D. L. Muirhead, W. Brooks, J. Macintyre, L. L. Lawrance, W. Irvine, A. K. Fleck, J. Gray, D. A. Addison, J. J. Jones, R. Lewis ...	1	3 15	China, Japan, <i>viâ</i> Suez.
"Gloucestershire," S.S. { "Gryfevale," S.S. { "Hangchow," S.S. ...	G. H. Harris, Lieut. R.N.R. J. W. Steele ... B. Collie ... Gerald Byers ...	F. W. L. Midgley, C. E. Stone, C. Hill, — Speakman, G. English, — Kershaw, S. Makepeace, — Foster, P. de. Legh, C. Calvert, B. Collie, G. P. Pearson, J. S. Campbell, D. Clinton, A. C. Davidson, R. A. Smith, A. McMillan, W. Tonkin, J. Pringle ...	2	4 12	Buenos Aires, Durban, Java, U.S.A., <i>viâ</i> Suez.
			2	6 22	South America, Australia, East Indies, <i>viâ</i> Cape and Suez.
			1	6 7	East Coast of North and South America, Japan, Sabang, <i>viâ</i> Cape and Suez.
			4	8 1	Rangoon, <i>viâ</i> Suez.
			3	9 28	River Plate, Australia, Japan, <i>viâ</i> Cape.
			1	3 4	Coasting, China.

"Herefordshire," S.S.	E. Robin...	...	...	3	6	5	Rangoon, <i>viâ</i> Suez.
"Hesione," S.S.	H. R. C. Lockyer	...	...	2	5	12	Monte Video.
"Hesperian," S.S.	W. S. Main, F.R.G.S.	...	...	1	3	25	Canada.
"Hillmere," S.S.	A. M. Griffiths	...	...	2	7	14	River Plate, Durban, Australia, U.S.A., <i>viâ</i> Cape.
"India," S.S....	G. W. Gordon, Lieut. R.N.R.	...	...	3	8	14	Australia, <i>viâ</i> Suez.
"Indian Monarch," S.S.	K. P. T. Wood	...	...	2	5	2	Dakar, Monte Video, W.C.S.A., <i>viâ</i> Magellan, U.S.A.
"Ionic," S.S. ...	E. C. Roberts	...	...	2	6	1	New Zealand, <i>viâ</i> Capes.
"Jason," S.S....	T. G. Steeves	...	...	2	5	21	China, Australia, <i>viâ</i> Cape and Suez.
"Kaikoura," S.S.	A. W. McKellar, Commr. R.N.R.	...	...	2	6	12	New Zealand, <i>viâ</i> Capes.
"Kaipara," S.S.	N. R. de la Cour Corn- wall, Commr. R.N.R.	...	...	1	3	5	Australia, New Zealand, <i>viâ</i> Capes.
"Kincraig," S.S.	A. G. Reid	...	...	2	5	19	East Indies, South America, <i>viâ</i> Cape and Suez.
"King Idwal," S.S. ...	Brin L. Coats	...	...	1	2	1	Karachi, <i>viâ</i> Suez.
"Kumara," S.S.	A. Morton	...	...	3	8	14	Canada, Australia, New Zealand, <i>viâ</i> Capes, River Plate.
"Lake Michigan," S.S.	H. Parry	...	...	1	3	7	Canada.
"Laurentic," S.S.	J. Mathias, Lieut. R.N.R.	...	...	1	3	8	New York and Canada.
"Leander," S.S.	H. R. Ketley	...	...	3	4	15	River Plate, Black Sea.
"Le Coq," S.S.	J. H. Williams	...	...	2	8	15	New York, Black Sea.
"Macedonia," S.S.	F. W. Peterson	...	...	4	11	9	Australia, New Zealand, <i>viâ</i> Suez.
	C. D. Bennett, Commr. R.N.R., R.D.	...	...				
	J. D. Andrews, Commr. R.N.R., R.D.	...	...				
	E. Peterson, H. Bryce, R. H. A. Dunn, Sub- Lieut. R.N.R., J. Moffatt, T. S. Veail, M. I. Pirie, F. Deller.	...	...				
	H. Duffries, W. Bebington, P. Capper	...	...				
	W. W. Hipkin, J. B. Robinson, W. J. Jones	...	...				
	G. W. Taylor, Sub-Lieut. R.N.R., C. G. Gordon, G. R. Gilbert, Mid. R.N.R., C. W. Fisher, E. Huddy, W. Jackson, C. E. Lawther, Mid. R.N.R.	...	...				
	F. Ramsay, J. Gibson, A. Moffatt	...	...				
	C. Alexandre, A. E. Bowles, E. J. French	...	...				
	G. J. B. Rogers, J. H. Jones, C. R. Cooper	...	...				
	H. J. Wilde, W. D. Croudace, F. P. Haines, R. R. Neale, — Hancock, — Olifford.	...	...				
	A. G. Barnett, H. R. Hamilton, G. P. Parkinson.	...	...				
	E. Bossaers, G. S. Patterson, P. S. Bailey	...	...				
	Captain Coats	...	...				
	A. C. Reid, K. J. Manners, Sub-Lieut. R.N.R., J. S. Fisher, H. S. Nicholas, J. F. Givison, H. Langburn.	...	...				
	G. F. McCombie, Lieut. R.N.R., R. K. Watkins, J. Murphy.	...	...				
	A. S. Gilbert, Lieut. R.N.R., Geo. Davey, Sub-Lieut. R.N.R.	...	...				
	J. H. Williams, L. Thompson	...	...				
	A. S. Leach, A. H. Dean, F. G. Osbiston, J. A. Mein.	...	...				
	A. H. Ayres, Sub-Lieut. R.N.R., G. G. Randall, E. P. Lyndon, Sub-Lieut. R.N.R., F. M. Roxby, C. G. Byron, Sub-Lieut. R.N.R., G. E. Butler, M. W. Dowling, A. A. Gunnery.	...	...				

## METEOROLOGICAL REGISTERS received during the Year 1911-12—continued.

(3.)—From the MERCANTILE MARINE.—*Meteorological Logs*—continued.

Ship.	Captain.	Officers Observing.	No. of Registers received.	Duration of Observations.	Voyage.
"Magdalena," S.S. ...	W. H. B. Trigge, Lieut. R.N.R.	...	1	Mths. Days. 1 12	West Indies, New York.
"Malta," S.S. ...	G. M. Montford, Commr. R.N.R., R.D.	B. J. Smith, H. L. Quick, Sub-Lieut. R.N.R., D. Stuart.	3	7 22	East Indies, China, Japan, <i>via</i> Suez.
"Manchester Commerce," S.S. ...	P. J. Heath ...	W. Henderson, G. Earlam, C. Bird ...	1	3 12	U.S.A. and Canada.
"Manchester Exchange," S.S. ...	W. P. Couch ...	R. Smith, W. Date, D. Ramsdale, H. Williams.	2	5 29	U.S.A. and Canada.
"Manica," S.S. ...	T. A. Adamson ...	...	1	5 12	Australia, Calcutta, <i>via</i> Cape and Suez.
"Manistee," S.S. ...	F. O. Potts ...	...	2	7 9	Central America.
"Marathon," S.S. ...	E. J. S. West ...	F. McCollu, J. E. Sandham ...	3	8 7	Australia, <i>via</i> C.G.H.
"Marere," S.S. ...	P. J. Collins ...	H. C. Allingham, Sub-Lieut. R.N.R., E. J. Legge, W. R. Rutt.	2	5 27	Australia, New Zealand, <i>via</i> Capes.
"Mascotte," Barque ...	T. B. Linklater ...	F. A. Renaud, R. S. Burham, H. E. Higgs, F. G. Williams, N. S. Marks, R. J. Harding.	1	5 24	River Plate and West Indies.
"Matatua," S.S. ...	G. B. Serra ...	...	2	6 14	New Zealand, <i>via</i> Cape.
"Matina," S.S. ...	L. B. Gillman ...	J. J. Allsopp, L. D. McKirdy, Sub-Lieut. R.N.R., W. C. Sussams, F. W. Edwards, H. M. Thompson.	3	9 23	Gulf of Mexico.
"Miami," S.S. ...	F. H. Swain ...	P. H. Tallack, Sub-Lieut. R.N.R., R. C. Warren, J. E. Walker, G. E. Ryan, H. Steidelman.	2	6 15	Central America.
"Minia," S.S. ...	A. D. Riseley ...	W. B. Davis, O. Pitts, W. B. Woodward ...	3	13 12	Cable work, North Atlantic.
"Monarch," H.M.T.S. ...	A. E. Johnson ...	J. Adams, P. D. Bates, J. N. Tinniswoode, E. E. Burt.	1	3 29	Cable work, Coasts of U.K.
"Monkstone," S.S. ...	W. G. S. De Carteret ...	W. Blyth, S. G. Gorton, E. Firmin ...	1	5 21	Black Sea, South America.



"Montrose," S.S.	...	H. G. Kendall, Lieut. R.N.R.	G. Robinson-Hudson, Lieut. R.N.R., R.D., W. Russell, J. Mackenzie, J. Chambers.	2	3	18	Canada and Bermuda.
"Mooltan," S.S.	...	E. L. Haddock, Commr. R.N.R.	E. H. Orchard, Lieut. R.N.R., F. E. French, Sub-Lieut. R.N.R., R. J. Hamlin, Sub- Lieut. R.N.R., R. C. Warden, Lieut. R.N.R., J. M. M. Tickell, E. A. J. W. Carter, Sub-Lieut. R.N.R.	3	8	16	Australia, New Zealand, <i>via</i> Suez.
"Morning," S.S.	...	W. Adams ...	...	1	6	9	Davis Strait and Baffin's Bay (Whaling).
"Narrung," S.S.	...	G. A. Millington ...	G. F. Ward, T. C. Bayard, L. V. Harvey, W. G. Dean, W. C. Postle, Sub-Lieut. R.N.R., D. N. Hulton, T. M. Goddard, Mid. R.N.R., T. Raine.	2	7	13	Australia, <i>via</i> Cape.
"Nicoya," S.S.	{	S. H. Simmons ... E. W. Castle ...	F. G. Downes, E. W. A. Kelsall, H. S. Daniel, Mid. R.N.R., G. Gower-Castell, A. B. Hardy.	3	11	7	Gulf of Mexico.
"Niwaru," S.S.	{	J. E. L. Compton ... P. E. Mello ...	G. A. H. Wilson, Mid. R.N.R.	2	6	6	New Zealand, Australia, <i>via</i> Capes and Suez.
"Nonsuch," S.S.	...	J. Goulding ...	H. Cooper, — Howes, N. Oswald	2	5	24	Japan, Ocean Island, <i>via</i> Suez.
"Nubia," S.S.	...	Francis J. Fox ...	H. Williams ...	2	5	12	China, Japan, East Indies, <i>via</i> Suez.
"Olympia," S.S.	{	G. Mitchell ... R. H. Browne, Lieut. R.N.R.	G. S. Salmon, D. Macdonald, N. Doig, J. Stewart.	2	6	1	Bombay, <i>via</i> Suez.
"Omrah," S.S.	...	P. N. Layton, Lieut. R.N.R., R.D.	H. G. Thomson, Lieut. R.N.R., R. M. Ward, Lieut. R.N.R., T. H. Wilson, V. Symons, H. C. Groom, H. Phillips, Lieut. R.N.R., R. L. Dearden, Sub-Lieut. R.N.R.	3	6	12	Australia, <i>via</i> Suez.
"Opawa," S.S.	...	J. J. Cameron, Lieut. R.N.R.	F. J. Gaulton ...	1	3	10	New Zealand, <i>via</i> Capes.
"Ophir," S.S.	...	W. de M. Baynham, Lieut. R.N.R.	R. W. I. Marshall, Sub-Lieut. R.N.R., F. O'Sullivan, Sub-Lieut. R.N.R., R. L. Dearden, Sub-Lieut. R.N.R., S. J. Cun- ningham, Sub-Lieut. R.N.R.	1	2	9	Australia, <i>via</i> Suez.
"Orama," S.S.	...	A. J. Coad, Commr. R.N.R.	F. Holmes ...	1	2	5	Australia, <i>via</i> Suez.

## METEOROLOGICAL REGISTERS received during the Year 1911-12—continued.

(3.)—From the MERCANTILE MARINE.—*Meteorological Logs*—continued.

Ship.	Captain.	Officers Observing.	No. of Registers received.	Duration of Observations.	Voyage.
"Orari," S.S. ...	J. P. Forsdick ... E. T. Smith, Lieut. R.N.R.	A. E. Rivers, H. E. Martin, — Wood, W. T. Point.	2	Mths. Days. 5 12	New Zealand, <i>viâ</i> Capes and Suez.
"Ormuz," S.S. ...	W. T. Cox, Lieut. R.N.R.	H. D. Groom, H. Phillips, Lieut. R.N.R., W. C. Weston, I. J. Hayes, Lieut. R.N.R., A. W. Bigsworth, Sub-Lieut. R.N.R.	2	4 26	Australia, <i>viâ</i> Suez.
"Orontes," S.S. ...	J. F. H. Healey, Commr. R.N.R., R.D. W. de M. Baynham, Lieut. R.N.R.	A. H. Fraser, Lieut. R.N.R., G. L. Sinner, Lieut. R.N.R., H. Phillips, Lieut. R.N.R., G. H. Harding, R. C. Glazebrook, Lieut. R.N.R., I. J. Hayes, Lieut. R.N.R., R. L. F. Hubbard, Sub-Lieut. R.N.R., H. S. Gillett, Sub-Lieut. R.N.R.	4	8 4	Australia, <i>viâ</i> Suez.
"Orsova," S.S. ...	D. R. W. Parsons, Lieut. R.N.R. H. G. Staunton, Lieut. R.N.R.	H. S. Seale, G. R. Renshaw, Lieut. R.N.R., I. Norman Jones, W. Gordon Bennett, Sub-Lieut. R.N.R., W. C. Weston, H. G. Adams, A. Edgar, Sub-Lieut. R.N.R., C. J. P. Hill, Sub-Lieut. R.N.R., J. Jackson, W. S. Jackson, Sub-Lieut. R.N.R.	3	7 0	Australia, <i>viâ</i> Suez.
"Orvieto," S.S. ...	W. S. Shelford, Lieut. R.N.R.	A. L. Owens, Sub-Lieut. R.N.R., M. J. Sarson, W. Harrison, Lieut. R.N.R., G. G. Thorne, Sub-Lieut. R.N.R., W. G. Hender- son, P. D. Crowther, C. G. Matheson, Lieut. R.N.R., A. Pryke.	3	7 4	Australia, <i>viâ</i> Suez.
"Osterley," S.S. ...	W. J. Jenks, Lieut. R.N.R. D. R. W. Parsons, Lieut. R.N.R.	F. Holmes, R. B. Thomson, Lieut. R.N.R., W. H. Dowman, C. J. R. Webb, Lieut. R.N.R.	3	7 5	Australia, <i>viâ</i> Suez.

"Otranto," S.S.	{ A. J. Coad, Commr. R.N.R. W. J. Jenks, Lieut. R.N.R. F. S. Symons ...	E. E. Smith, Sub-Lieut. R.N.R., A. Pryke ...	2	5	5	Australia, <i>viâ</i> Suez.
"Otway," S.S.	{ L. Cubitt ...	C. A. Bullock, Lieut. R.N.R., C. F. Halliday, Lieut. R.N.R., J. C. Collie, Sub-Lieut. R.N.R., J. C. Wilson, Sub-Lieut. R.N.R., R. B. Maycock, Sub-Lieut. R.N.R., G. H. Wylie. W. E. Thomas, G. S. Kennedy ...	3	7	1	Australia, <i>viâ</i> Suez.
"Ovid," S.S. ...	{ J. H. H. Scudamore, Lieut. R.N.R. W. T. Forrester... H. W. A. Clark, Commr. R.N.R.	R. B. Drake, R. A. Thorburn, Sub-Lieut. R.N.R., B. Hope, D. McInnes, P. R. St. John. F. Sudell, Lieut. R.N.R., — Corbyn, — Gray, B. Worthington, G. Steele, S. Chapman, J. Elliott. C. Vickers ...	2	5	19	U.S.A., Rangoon, Karachi, <i>viâ</i> Suez. Gulf of Mexico.
"Pacuaire," S.S.	{ J. Williams ...	G. T. Walker, B. J. Davies, A. E. Gudgeon, B. K. Berry, Mid. R.N.R., J. G. B. Harrison, P. R. Burnham.	3	9	19	Japan and Australia, <i>viâ</i> Suez.
"Palma," S.S.	{ R. Hayes ... W. C. Barrett ...	T. Jones ...	1	2	12	Buenos Aires. Japan, Vladivostok, <i>viâ</i> Suez.
"Peerless," S.S.	{ W. F. Morgan, Lieut. R.N.R. A. H. Summers ... G. B. Woolfenden ...	R. Watson, J. Crowley, J. Kennedy, E. Hocking. A. N. Mackay, N. Bateson, R. C. Watson ...	2	3	29	Australia, <i>viâ</i> Cape.
"Pembroke," S.S.	{ C. Maitland ...	— Galloway, — Jones, — Lawson, — Stowe	3	6	6	Calcutta, <i>viâ</i> Suez.
"Politician," S.S.	{ A. T. D. Pearson, A.I.N.A. F. C. Mullan, F.R.G.S. ...	R. Bailey, J. L. Durkee, A. S. Thomas, A. C. Knight, R. S. Tozer. W. J. Geh, T. A. Thwaite, E. H. Brice ...	1	6	11	Australia, <i>viâ</i> Capes.
"Port Jackson," Barque	{ J. G. Parsons ... J. Clarke ... T. Kerri, Lieut. R.N.R.	— Galloway, — Jones, — Lawson, — Stowe	2	10	16	W.C. South America, <i>viâ</i> Magellan.
"Potosi," S.S.	{ J. G. Parsons ... J. Clarke ... T. Kerri, Lieut. R.N.R.	R. Bailey, J. L. Durkee, A. S. Thomas, A. C. Knight, R. S. Tozer. W. J. Geh, T. A. Thwaite, E. H. Brice ...	2	9	16	Singapore, Bassein, <i>viâ</i> Suez, U.S.A., W.C.S.A.
"Ramsay," S.S.	{ J. G. Parsons ... J. Clarke ... T. Kerri, Lieut. R.N.R.	— Galloway, — Jones, — Lawson, — Stowe	3	10	12	Gulf of Mexico.
"Reventazon," S.S.	{ J. G. Parsons ... J. Clarke ... T. Kerri, Lieut. R.N.R.	F. G. Bright, P. H. Beaching, J. C. Henderson, <sup>802</sup> D. Gordon-Stables, A. B. McKinstry, H. R. Hamilton, C. H. Furlong, R. Hughes, H. Harold Bate, J. Twyman.	1	3	24	Karachi, <i>viâ</i> Suez.
"Rena," S.S. ...	{ E. T. Smith, Lieut. R.N.R. F. A. Hemming	— Galloway, — Jones, — Lawson, — Stowe	2	5	26	New Zealand, <i>viâ</i> Capes.
"Rimutaka," S.S.	{ E. T. Smith, Lieut. R.N.R. F. A. Hemming	— Galloway, — Jones, — Lawson, — Stowe	2	5	26	New Zealand, <i>viâ</i> Capes.



METEOROLOGICAL REGISTERS received during the Year 1911-12—continued.  
(3.)—From the MERCANTILE MARINE.—*Meteorological Logs*—continued.

Ship.	Captain.	Officers Observing.	No. of Registers received.	Duration of Observations.	Voyage.
"Runic," S.S.	G. R. Metcalfe, Lieut. R.N.R.	A. Freeman, E. W. R. Avery ...	3	Mths. Days. 10 26	Australia, <i>viâ</i> C.G.H.
"Saxon Prince," S.S.	W. S. Jameson ...	R. Milliken, J. Smith, F. Marshall ...	2	5 17	East Coast, N. and S. America.
"Scotia," S.S.	T. Robertson ...	... ..	1	4 2	Greenland, Whaling.
"Segura," Ship	J. Davies ...	... ..	1	9 22	Tacoma, <i>viâ</i> Cape Horn.
"Shadwell," S.S.	W. H. Knox ...	C. C. Lee, J. E. Martin, W. M. Henderson, W. L. Charlton.	2	4 27	Calcutta, <i>viâ</i> Suez.
"Singapore," S.S.	L. F. Taylor, Lieut. R.N.R.	J. Martin, J. Simpson ...	2	4 12	U.S.A., Mediterranean.
"Suevic," S.S.	C. E. Starek, Lieut. R.N.R.	H. P. Grindrod, Sub-Lieut. R.N.R., G. N. Jones, — Flett.	3	7 16	Australia, <i>viâ</i> Cape.
"Suffolk," S.S.	P. Davies ...	F. Blacker, R. Gard, F. Whiteley, J. Watkins.	2	5 1	Australia, <i>viâ</i> Cape and Suez.
"Thames," S.S.	G. S. Gillard, Lieut. R.N.R.	F. Newton, A. H. Dobree, H. Lennox Taylor.	2	6 12	Buenos Aires, West Indies, and New York.
"Tongariro," S.S.	W. G. Mason ...	P. G. Hyde, P. J. Ballard, J. G. Holmes, F. M. Stephenson.	2	6 13	New Zealand, <i>viâ</i> Capes.
"Tortuguero," S.S.	C. E. Down ...	R. B. Drake, J. W. Gallop, R. Hobson, J. H. Parsons.	2	6 10	Central America.
"Ultonia," S.S.	V. C. White Parsons ...	E. Edkin, Lieut. R.N.R., F. C. Howard, Lieut. R.N.R.	1	2 2	New York, Mediterranean.
"Waipara," S.S.	G. W. Melsom, Lieut. R.N.R.	S. N. Rowe, L. Broadbent, A. W. Webster, W. W. Wilson, J. A. Wright, A. E. Harvey.	2	6 20	Australia, <i>viâ</i> Suez.
"Wakool," S.S.	J. S. Hutchison, Commr. R.N.R., R.D.	R. H. Ashby, H. E. Carson, T. Neilson, C. Harvey, H. F. Kent.	2	8 25	Australia, <i>viâ</i> Cape.
"Wanderer," S.S.	W. G. Lingham, F.R.A.S., F.R.Met.Soc.	J. T. Baker, E. Jones ...	1	3 12	Gulf of Mexico.
	H. C. T. Melling ...	...			
	R. Pugh ...	...			

"Wandsworth," S.S. ...	W. H. Bloomfield	...	W. J. Hall, G. Sinclair	...	...	1	4	17	East Coast, South America, Gulf of Mexico.
"Waverley," S.S. ...	H. R. Wheatley	...	R. Robertson, P. Henderson, W. J. Baker, J. Walls.	...	...	2	7	4	Black Sea, U.S.A., E.C.S.A.
"Whakarna," S.S. ...	J. Firth	...	J. C. Clayton, C. H. Purkis, L. H. Swan, Sub-Lieut. R.N.R.	...	...	1	2	24	New Zealand, <i>viâ</i> Capes.
"Whakatane," S.S. ...	F. A. Hemming	...	R. R. Neale, J. Makepeace, C. H. Furlong, M. W. Rosse.	...	...	1	3	22	St. John, N.B., Australia, <i>viâ</i> Capes.
"Wilcaunia," S.S. ...	F. W. A. Hanson, Lieut. R.N.R.	...	J. S. Sheepwash, D. E. Hotchkiss, F. Berry, A. Grove, Lieut. R.N.R., F. N. Wyatt.	...	...	3	11	3	Australia, <i>viâ</i> Cape.
"Winkfield," S.S. ...	P. J. Greenhill	...	F. Carter	...	...	1	6	9	Buenos Aires, Calcutta, W.C.S.A., Gulf of Mexico, <i>viâ</i> Cape and Magellan.
"York Castle," S.S. ...	E. Mais	...	W. Williams, G. R. Parker, G. W. Beckh, W. Pace.	...	...	2	6	28	New York, Mauritius, Bombay, <i>viâ</i> Cape and Suez.
"Zent," S.S. ...	J. H. H. Scudamore, Lieut. R.N.R.	...	W. G. Preece, F. H. Gale, E. T. Grayston, R. H. Smith, P. H. Tallack, Sub-Lieut. R.N.R.	...	...	2	6	9	Port Limon.

## (4.)—ABBREVIATED METEOROLOGICAL REGISTERS.

(a.) *From the Royal Navy (—).*(b.) *From the Mercantile Marine (1).*

Ship.	Captain.	Officers Observing.	No. of Registers received.	Duration of Observations.	Voyage.
"Tambora," S.S. ...	W. Bagchus	...	A. H. Brach	...	...
			1	Mths. Days. 1 26	Jav. <i>viâ</i> Suez.

METEOROLOGICAL REGISTERS received during the year 1911-12  
—continued.

(5.)—NORTH ATLANTIC REGISTERS—FORM No. 121 (1,495).

INDIAN OCEAN REGISTERS—FORM No. 122 (276).

RADIOTELEGRAPHY REGISTERS—FORM No. 138 (726).

Ships from which Radiotelegraphy Registers have been received are shown by the symbol †.

Line.	Ship.	Captain and No. of Registers.
Allan ... ..	†Carthaginian ... ..	R. G. Bamber, 17.
	†Corinthian ... ..	A. Rennie, 18.
	†Corsican ... ..	E. Cook, 10.
	Grampian ... ..	J. Williams, 20.
	†Hesperian ... ..	W. S. Main, F.R.G.S., 44.
	Ionian ... ..	B. T. Eastaway, 19.
	*†Lake Erie ... ..	{ H. G. Kendall, Lieut. R.N.R. } 30. F. Carey
	†Mongolian ... ..	A. J. Peters, 13.
	Numidian ... ..	J. Hall, 6.
	Pomeranian ... ..	{ J. Henderson } A. Braid } 18. W. P. Hains }
	†Pretorian ... ..	B. Henry, 4.
	†Sardinian ... ..	{ G. Hamilton } R. McKillop } 10.
	†Scotian ... ..	T. Moar, 20.
	†Sicilian ... ..	{ D. Tannock } W. P. Hains } 25. A. J. Peters }
	†Tunisian ... ..	J. A. Fairfull, 17.
	†Victorian ... ..	E. Outram, 30.
	†Virginian ... ..	J. T. Gambell, 30.
American ... ..	Friesland ... ..	C. J. Rogers, 4.
	†Haverford ... ..	{ J. H. W. Thornton } 23. J. Evans
	†Merion ... ..	J. B. Hill, 13.
	†New York ... ..	W. J. Roberts, 5.
	†Philadelphia ... ..	A. R. Mills, 3.
	†St. Louis ... ..	J. C. Jamison, 22.
	†St. Paul ... ..	{ W. J. Roberts } 18. F. M. Passow }
	Algeria ... ..	P. McLean, 12.
Anchor ... ..	{ Caledonia ... ..	{ W. Baxter } F. H. Wadsworth } 17.
	†California ... ..	J. Blaikie, 34.
	†Cameronia ... ..	W. Baxter.
	{ Columbia ... ..	{ F. H. Wadsworth } G. Mitchell } 11. J. Black }
	Elysia ... ..	{ W. Robertson } 12. A. Haig }
	†Furnessia ... ..	{ J. Black } 14. A. Collie }
	Olympia ... ..	{ G. Mitchell } R. H. Browne, Lieut. R.N.R. } 10.
	Scindia ... ..	W. Kelso, 16.
	Mackinaw ... ..	W. F. Pollard, Lieut. R.N.R., 2.
	Manhattan ... ..	W. Johnston, 11.
Atlantic Transport ...	Maryland ... ..	J. McMath, 4.
	†Mesaba ... ..	O. P. Clarke, 6.
	†Minneapolis ... ..	F. O. Hasker, 31.

\* Chartered.



METEOROLOGICAL REGISTERS received during the year 1911-12  
—continued.

Line.	Ship.	Captain and No. of Registers.
Atlantic Transport— <i>cont.</i>	†Minnehaha ...	{ T. F. Gates. F. H. Claret, Lieut. R.N.R. } 30.
	Minnesota ...	{ F. W. Lazell } 14.
	†Minnetonka ...	{ J. T. J. Wylie } 14.
	†Minnewaska ...	{ E. G. Cannons, 32. F. H. Claret, Lieut. R.N.R. } 29.
	Mobile ...	{ T. F. Gates } 29.
	Montana ...	{ J. T. J. Wylie, 7. P. Laverock, 4.
Austin Friars S.S. Co.	Haileybury ...	{ G. H. Sheppard, 5.
Bibby ...	Gloucestershire ...	{ G. H. Harris, Lieut. R.N.R., 19.
Bolton S.S. Co.	Ramsay ...	{ F. C. Mullan, F.R.G.S., 1.
Booth ...	Anselm ...	{ A. W. Stoker, 4.
	Francis ...	{ R. G. Williamson, 3.
Bowring, C. T. & Co.	Gafsa ...	{ G. Boulter } 4.
	Huelva ...	{ E. E. Cooper } 4.
	Pola ...	{ F. J. Tamlin, 2.
	Tafna ...	{ H. Hughes, 1.
	Chanda ...	{ G. Boulter, 3.
	Colaba ...	{ J. C. Tice, 14.
British India Steam Navigation Co.	Culna ...	{ J. Robertson, Lieut. R.N.R., 16.
	Obra ...	{ J. Farquharson, 12.
	Pentakota ...	{ H. A. G. Foster (3rd Officer), Ob- server.
		{ H. A. G. Foster (2nd Officer), Ob- server.
	Malakand ...	{ T. G. Legg, 8.
	Kalomo ...	{ W. Keasley, 3.
Brocklebank, T. & J. Bucknall Steamship Lines.	Katuna ...	{ A. Lee, 10.
	Koranna ...	{ J. H. Beare } 6.
		{ F. S. Gulston } 6.
	Strathendrick ...	{ R. Crabb (Chief Officer) 5.
	Ningpo ...	{ T. W. Pickard, 15.
	Cervona ...	{ C. T. Stooke, 10.
Burrell & Son ... Butterfield and Swire Cairn ...	Devona ...	{ D. R. Murray, 11.
	Fremona ...	{ J. Cunningham } 5.
		{ D. Ritchie } 5.
	Hurona ...	{ D. Ritchie } 4.
		{ W. Lindsay } 4.
	Jacona ...	{ O. Grund, 7.
Canadian Northern S.S. Co.	Royal Edward ...	{ W. Roberts, 12.
	Royal George ...	{ J. Harrison, 20.
	†Empress of Britain ...	{ J. A. Murray, 23.
	†Empress of Ireland ...	{ J. V. Forster, Lieut. R.N.R., 40.
	†Lake Champlain ...	{ G. S. Webster, Lieut. R.N.R., 26.
	†Lake Manitoba ...	{ G. C. Evans, 17.
Canadian-Pacific Rail- way Co.	†Lake Michigan ...	{ H. Parry, 14.
	†Monmouth ...	{ J. Turnbull, Lieut. R.N.R., 9.
	†Montcalm ...	{ C. W. Hodder, 22.
	†Montezuma ...	{ E. Griffiths, Lieut. R.N.R., 20.
	†Montfort ...	{ W. M. Davidson, 16.
	†Montreal ...	{ R. H. McNeill, 23.
	†Montrose ...	{ H. G. Kendall, Lieut. R.N.R. } 10.
		{ G. S. Webster, Lieut. R.N.R., } 10.
		{ R.D. } 10.
	†Mount Temple ...	{ J. H. Moore, 16.
	Clan Macintosh ...	{ W. J. Lennox, 23.
	Clan ...	{ E. C. Tuckwell, 8.
Clyde Shipping Co. ...	Spithead ...	{ J. M. Hart, 5.
	Star of Canada ...	{ S. G. S. McNeill, Lieut. R.N.R.
Corry, J. P., & Co. ...	†Albania ...	{ W. R. D. Irvine, R.D., } 10.
Cunard ...	†Ascania ...	{ Commr. R.N.R. } 10.
		{ G. W. Melsom, Lieut. R.N.R. } 10.

METEOROLOGICAL REGISTERS received during the year 1911-12  
—continued.

Line.	Ship.	Captain and No. of Registers
Cunard—cont.	†Ausonia ...	E. G. Diggle, Lieut. R.N.R., 4.
	Brescia ...	O. Morison, 7.
	†Campania ...	R. C. Warr, 21.
	†Carmania ...	D. Dow, R.D., Commr. R.N.R. } 21.
	†Caronia ...	W. T. Turner
	Carpathia ...	J. C. Barr, 15.
	Cypria ...	D. S. Miller, Lieut. R.N.R., 11.
	†Franconia ...	E. G. Diggle, Lieut. R.N.R. } 8.
		T. W. Hankinson, Lieut. R.N.R.
		W. H. Hossack, Lieut. R.N.R.
		C. A. Smith, R.D., Commr. R.N.R., 14.
	†Ivernia ...	T. Potter
		W. R. D. Irvine, R.D., Commr. R.N.R. } 13.
	†Laconia ...	H. M. Benison, Lieut. R.N.R.
	†Lusitania ...	W. R. D. Irvine, R.D., Commr. R.N.R., 2.
		J. T. W. Charles, C.B., R.D., Commr. R.N.R., 21.
	Lycia ...	T. W. Hankinson, Lieut. R.N.R. } 10.
		J. F. Simpson
	†Mauretania ...	W. T. Turner, 10.
	Pannonia ...	A. H. Rostron, R.D., Commr. R.N.R. } 15.
		R. Capper, Lieut. R.N.R.
	Phrygia ...	R. Capper, Lieut. R.N.R. } 5.
		R. G. Malin, Lieut. R.N.R.
	†Saxonia ...	H. M. Benison, Lieut. R.N.R. } 12.
		E. G. Diggle, Lieut. R.N.R.
	Tyria ...	W. B. Cresser, Lieut. R.N.R., 8.
	Veria ...	S. Jones
(Danish) ...	Dania ...	G. F. Jeffries } 10.
Dominion ..	†Canada ...	H. L. Pedersen, 10.
	†Dominion	R. O. Jones, 21.
Elders & Fyffes ...	Irishman ...	W. L. Mendus, 3.
	Barranca ...	T. Howell, 1.
	Manistee ...	S. H. Simmons, 12.
		E. J. S. West, 10.
	Matina ...	F. H. Swain } 16.
		A. D. Riseley
	Miami ...	A. E. Johnson, 12.
	Nicoya ...	E. W. Castle, 16.
	Pacuare ...	W. T. Forrester, 16.
Elswick S.S. Co. ...	Tortuguero ...	J. G. Parsons, 16.
	Zent ...	J. H. H. Scudamore, Lieut. R.N.R., 12.
	Elswick Grange ...	G. Wilson, 10.
Furness, Withy ...	Crown Point ...	J. C. Walker, 13.
	Potomac ...	P. B. Wamsley, 3.
Glenroy S.S. Co. ...	Glenroy ...	S. Freeman, 5.
Gulf Transport ...	Imani ...	S. C. Penberthy, } 12.
		W. J. Rosewarne
	Inkula ...	E. A. Alcide, 3.
	Inkum ...	W. E. Price, 4.
H.M.S. ...	Istrar ...	C. M. M. Jacob, 12.
	Terror ...	B. H. Fanshawe, Capt. R.N. } 27.
Harrison ...		G. E. Corbett, Commr. R.N.
	Artist ...	E. T. Sawyer, 8.

METEOROLOGICAL REGISTERS received during the year 1911-12  
—continued.

Line.	Ship.	Captain and No. of Registers.
Harrison—cont.	Custodian ... ..	D. G. Cownie, 1.
	Historian ... ..	H. H. Pyle, 12.
	Logician ... ..	F. E. Westhorp, 12.
	Merchant ... ..	C. S. Rhodes, 4.
	Orator ... ..	H. C. T. Melling, 1.
Henderson, P. & Co...	Amarapura ... ..	J. Reid, 6.
	Martaban ... ..	W. J. Hamilton } 12. W. Duguid }
Hogarth S.S. Co. ...	Baron Minto ... ..	Thos. Baillie, 1.
(Italian) ... ..	Barque Silverstream ...	D. Garziano, 2.
Leyland, F. ... ..	Antillian ... ..	W. Japha, 9.
	Atlantian ... ..	A. H. Highton, 9.
	Barbadian ... ..	C. H. Manning, 7.
	Belgian ... ..	G. Williams, 5.
	Bohemian ... ..	N. MacCallum, 20.
	Caledonian ... ..	J. R. Carnon, Lieut. R.N.R., 2.
	Etonian ... ..	W. E. Wood, 5.
	Michigan ... ..	S. W. Watkins, 9.
	Oxonian ... ..	J. A. Baker } 4. J. Robb. }
Manchester Liners ...	Knutsford ... ..	A. Richardson, 3.
	Manchester Corporation	P. J. Heath, 7.
	Manchester Port ... ..	C. H. Stott, 4.
	Manchester Spinner ...	C. Payne, 2.
Mercantile S.S. Co. ...	Boyne ... ..	S. G. Dale, 11.
	Lena ... ..	H. J. Charters, 8.
Peninsular and Oriental,	Assaye ... ..	G. W. Cockman, R.D., Commr. R.N.R., 11.
	Banca ... ..	A. Collyer H. W. Potter, R.D., Lieut. } 7. R.N.R. }
	Caledonia ... ..	W. Hayward, Lieut. R.N.R. } 13. B. W. Snow }
	Delta ... ..	E. P. Martin, Lieut. R.N.R., 9.
	Egypt ... ..	D. Asbury F. R. Summers } 18.
	Malta ... ..	G. M. Montford, R.D., Commr. R.N.R., 3.
	Mongolia ... ..	C. H. S. Tocque, Commr. } R.N.R. } C. F. Preston, Commr. } 7. R.N.R. }
	Persia ... ..	W. Hayward, Lieut. R.N.R. } W. H. Haughton, R.D., } 19. Commr. R.N.R. }
	Salsetto ... ..	H. G. H. Lewellin, Lieut. R.N.R., 9.
Prince... ..	Ocean Prince ... ..	W. C. Barrett, 3.
	Saxon Prince ... ..	W. S. Jameson, 3.
	Welsh Prince ... ..	A. B. W. Sheppard, Lieut. } 10. R.N.R. }
Pyman ... ..	Waverley ... ..	T. Hodson. H. R. Wheatley, 9.
Red Star ... ..	†Finland ... ..	J. S. Ball } 23. T. G. Barnan }
	†Kroonland ... ..	T. Bradshaw, 10.
	†Lapland ... ..	P. Breibohm } 23. H. D. Doxrud }
	†Manitou ... ..	W. F. Pollard, Lieut. R.N.R. } 15. F. W. Lazell }
	†Marquette ... ..	A. E. Tribe, Lieut. R.N.R. } 6. A. E. Tribe, Lieut. R.N.R. }
		J. B. Findlay }



METEOROLOGICAL REGISTERS received during the year 1911-12  
—continued.

Line.	Ship.	Captain and No. of Registers.
Red Star—cont.	†Menominee ... ..	S. Anfindsen, 11.
	†Samland ... ..	J. C. C. Moller, 2.
	†Vaderland ... ..	T. G. Barman } 48. R. Prager }
	†Zeeland ... ..	J. B. Kelk } 8. J. C. C. Moller }
Rickinson Bros. ...	Agenoria ... ..	W. Kirkwood, 4.
Rotterdam Lloyd ...	Goentoer ... ..	M. van der Putte, 16.
	Tambora... ..	W. Bagchus, 13.
Smith, Geo., & Sons	City of Athens ... ..	W. Knaut, 9.
	City of Benares ... ..	A. J. Elliott, 5.
Stoomvaart Maat- schappij Nederland.	Karimoen ... ..	J. Alberts, 3.
	Konig Willem III. ... ..	J. Alberts, 1.
	Prinses Juliana ... ..	J. Teensma, 3.
	Vondel ... ..	J. R. de Brouwers, 4.
Thomson, W., & Co. ...	Benarty ... ..	J. D. Sarchet, 13.
	Bengloe ... ..	W. A. Guy, 8.
	Benvenue ... ..	R. Kroble, 8.
Trechmann S.S. Co.	Frieda ... ..	R. C. Hill, 5.
	Wilster ... ..	T. Martin, 3.
Union-Castle ... ..	Galeka ... ..	T. H. Wilford, 2.
	Galway Castle ... ..	T. H. Wilford, 1.
White Star ... ..	†Adriatic ... ..	B. F. Hayes, R.D., Commr. R.N.R., 28.
	Afric ... ..	J. Stivey, Lieut. R.N.R., 3.
	†Arabic ... ..	W. Finch, Lieut. R.N.R., 25.
	†Baltic ... ..	J. B. Ranson, Lieut. R.N.R., 15.
	Bovic ... ..	J. J. Kearney, Lieut. R.N.R., 5.
	Canopic ... ..	J. O. Carter, Commr. R.N.R., 15.
	†Cedric ... ..	{ C. A. Bartlett, R.D., } Commr. R.N.R. } 16.
	†Celtic ... ..	{ H. Smith, Lieut. R.N.R. } A. E. S. Hamblton, Lieut. R.N.R., 38.
	Cretic ... ..	{ J. B. Kelk } R. Lobez, Lieut. R.N.R. } 11.
	†Cymric ... ..	F. B. Howarth, Commr. R.N.R., 16.
	†Laurentic ... ..	J. Mathias, Lieut. R.N.R., 15.
	†Majestic ... ..	F. E. Beadnell, Lieut. R.N.R., 12.
	†Megantic ... ..	{ H. Smith, Lieut. R.N.R. } H. F. David, R.D., Commr. } 22. R.N.R. }
	†Oceanic ... ..	H. J. Haddock, C.B., R.D., Commr. R.N.R., 15.
	†Olympic ... ..	E. J. Smith, R.D., Commr. R.N.R., 34.
	Romanic... ..	H. F. David, R.D., Commr. R.N.R., 11.

# APPENDIX V.

## INSTRUMENTS supplied, &c., to the MERCANTILE MARINE.

Particulars.	Baro- meters.	Ther- mometers.	Hydro- meters.	Screens.
April 1st, 1911, afloat ... ..	192	1,020	629	178
Issued since ... ..	54	309	149	35
Returned since ... ..	246 45	1,329 278	778 125	213 30
Written off as lost, &c. ... ..	201 3	1,051 148	653 62	183 5
April 1st, 1912, afloat ... ..	198	903	591	178

## DISPOSITION of MERCANTILE MARINE INSTRUMENTS, April 1st, 1912.

Particulars.	Baro- meters.	Ther- mometers.	Hydro- meters.	Screens.
In merchant ships ... ..	198	903	591	178
„ store at M.O. ... ..	3	2	40	1
At Liverpool Agency ... ..	3	23	9	3
„ Glasgow „ ... ..	3	4	6	2
„ Dundee „ ... ..	3	21	6	3
„ Hull „ ... ..	1	12	6	4
„ Cardiff „ ... ..	1	6	9	3
„ Southampton „ ... ..	4	19	30	8
„ Sunderland „ ... ..	5	23	18	7
Total, April 1st, 1912 ... ..	221	1,013	715	209
Under repair, April 1st, 1912 ... ..	11	14	13	—

## INSTRUMENTS at STATIONS, viz.: Telegraphic Reporting Stations, Observatories, Fishing Villages, &c.

### (a.) THERMOMETERS AND SCREENS.

—	Thermometers.					Screens.
	Ordin- ary.	Maxi- mum.	Mini- mum.	Solar.	Glass Mini- mum.	
April 1st, 1911, in use ... ..	393	80	73	11	13	122
Issued since ... ..	48	8	14	2	3	4
Returned since ... ..	446 38	88 4	87 8	13 —	16 —	126 1
Written off ... ..	27	2	5	—	—	—
April 1st, 1912, in use ... ..	381	82	74	13	16	125

## (b.) OTHER INSTRUMENTS.

	Baro- meters.	Aneroids and Baro- graphs.	Sun- shine Re- corders.	Rain Gauges.	Anemo- meters.	Storm Signal Cones
April 1st, 1911, in use ...	320	39	36	101	30	225
Issued since ... ..	3	1	1	5	1	30
Returned since ... ..	323	40	37	106	31	255
Written off ... ..	7	3	—	2	1	—
April 1st, 1912, in use ...	—	—	—	—	—	30
April 1st, 1912, in use ...	*316	37	37	104	30	225

\* 224 barometers (mercurial) and 1 barograph are lent for the use of seafaring communities at fishing villages and ports.

STOCK ACCOUNT of INSTRUMENTS received and issued on repayment to the Crown Agents for the Colonies, Colonial Governments, and other Observers, from 1st April, 1911, to 31st March, 1912.

	Thermometers.					Thermo- graph.	Steven- son's Screens.	Tropical Screens.
	Ordin- ary.	Maxi- mum.	Mini- mum.	Solar.	Grass Min.			
Stock, April 1st, 1911	119	23	13	5	7	1	6	6
Received since ...	312	64	53	42	49	29	12	6
Issued since ...	431	87	71	47	56	30	18	12
Stock, April 1st, 1912	252	68	60	40	56	29	15	8
Stock, April 1st, 1912	179	19	11	7	—	1	3	4

	Barometers.		Rain- gauges.	8 inch glasses.	5 inch glasses.	Sun- shine Frames.	Sun- shine Ball.	Cones.	Hygro- graphs.
	Mer- curial.	Graphs.							
Stock, April 1st, 1911	10	—	13	12	11	4	5	12	1
Received since ...	29	14	328	49	360	8	6	36	14
Issued since ...	39	14	341	61	371	12	11	48	15
Stock, April 1st, 1912	35	13	321	51	352	9	8	31	2
Stock, April 1st, 1912	4	1	20	10	19	3	3	17	13

In addition, the following miscellaneous instruments were received and issued during the period :—

3 Besson Nephoscopes.	2 Lander Anemometers.
6 5-inch Aneroids.	1 Spectroscope.
3 Clinometer Compasses.	1 Assmann Aspiration Psychrometer.
12 Sprung-Fuess Pens.	1 Anemo-Biograph.
1 Astronomical Clock.	1 "Peander" Anemometer.
8 Surveying Theodolites.	3 Hyetographs.
3 Special Earth Thermometers.	1 Recording Psychrometer.
1 Wind Vane.	300 Sheets Bromide Paper.
5 Recording Raingauges.	1 Casella Rainfall Recorder.



## APPENDIX VI.

REPORT ON THE INSPECTION OF STATIONS IN CONNEXION  
WITH THE OFFICE IN 1911.

The inspectors were as follows :—

Districts 0, 1 and 6	...	...	Mr. A. Watt, Mr. R. G. K Lempfert.
District 2	...	...	Mr. R. H. Curtis.
" 3	...	...	Mr. R. H. Curtis.
" 4	...	...	Mr. F. J. Brodie.
" 5	...	...	Mr. R. Corless.
" 7	...	...	Mr. A. Watt, Mr. F. J. Brodie.
" 8	...	...	Mr. E. Gold.
" 9	...	...	Mr. H. Harries.
" 10	...	...	Mr. E. G. Constable.
Observatories and Anemograph Stations.	{ Mr. R. H. Curtis, Mr. R. Corless, and Mr. E. G. Constable, Mr. E. Gold.		

At the observatories and anemograph stations the instruments were dismantled and cleaned, and all necessary repairs were carried out. At those observatories which are also climatological or telegraphic reporting stations the arrangements for this work were examined.

The reports show that efficiency has been maintained on the whole; in a number of cases the inspectors were able to make suggestions for improving the observations by bringing them more into line with recognized conventions. Points requiring attention which could not be settled on the spot have been dealt with by correspondence.

The following is a list of the stations visited :—

## OBSERVATORIES.

Aberdeen.	Oxford.
Armagh.	Stonyhurst.
Falmouth.	Valencia.
Glasgow.	

## ADDITIONAL ANEMOGRAPH STATIONS.

Alnwick Castle.	Pendennis Castle (Falmouth).
Deerness.	Plymouth.
Dover.	Quilty.
Dublin (Phoenix Park).	Roche's Point.
Fleetwood.	Scilly.
Gorleston.	Shoeburyness.
Holyhead.	Yarmouth.
Kingstown.	

## NORMAL CLIMATOLOGICAL STATIONS.

Armagh.	Deerness.
Bettws-y-coed.	Dublin (Phoenix Park).
Darwen.	Eastbourne.

NORMAL CLIMATOLOGICAL STATIONS—*continued.*

Fort William.	Newton Rigg.
Fort Augustus.	Plymouth.
Glasgow.	Rugby.
Gordon Castle.	St. Leonards.
Hull.	Sheffield.
Kingussie.	Stonyhurst.
Manchester (City).	Strathpeffer Spa.
Manchester (Prestwich).	Wistanstow.
Manchester (Whitworth Park).	Woburn.

## AUXILIARY CLIMATOLOGICAL STATIONS.

Alnwick Castle.	Kilmarnock.
Balmoral.	Kingston-on-Soar.
Baltasound.	Kingstown.
Bexhill-on-Sea.	Margate.
Bournemouth.	Marlborough.
Bromyard.	Oban.
Bucklebury Place.	Rhyl.
Burnley.	Sevenoaks.
Carnforth.	Shoeburyness.
Carnoustie.	Stonehaven.
Chopwellwood.	Thorntonhall.
Cirencester.	Ventnor.
Crathes.	Waterford.
Dunfanaghy.	West Linton.
Folkestone.	Weymouth.
Hawarden Bridge.	Worthing.
Insch.	Wymondham.

## TELEGRAPHIC REPORTING STATIONS.

Aberdeen.	Newquay.
Bath.	North Shields.
Birr Castle.	Nottingham.
Blacksod Point.	Oxford.
Castlebay.	Portland Bill.
Clacton-on-Sea.	Roche's Point.
Donaghadee.	St. Ann's Head.
Dover.	Scilly.
Dungeness.	Spurn Head.
Holyhead.	Stornoway.
Leith.	Valencia.
Lerwick.	Wick.
Malin Head.	Yarmouth.
Nairn.	

Mr. W. Marriott visited the following stations which are in connexion with the Royal Meteorological Society, as well as with the Office :—

Blackpool, Buxton, Cheadle, Harrogate, Hillingdon, Worksop (Hodsock), Lancaster, Lowestoft, Norwich, Raunds, Rounton, Scarborough, Southport, Wakefield.

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## APPENDIX VII.

### GEOGRAPHICAL LIST OF INSTITUTIONS AND PERSONS FROM WHOM PUBLICATIONS CONTAINING Meteorological Data HAVE BEEN RECEIVED DURING THE LAST NINE YEARS.

The list is arranged in accordance with the revised topographical classification adopted in the International Catalogue of Scientific Literature. *In each section the names of institutions which collect observations from a network of stations, or which publish observations on an extended scale, have been placed first.* In a number of instances, particularly in the case of tropical countries, observations are published by authorities not domiciled in the country. In these instances the names of the places of observation have been given as far as space permits, and the names of the institutions issuing the publications have been printed in *italic* type. If no names of places are quoted, it may be assumed that returns from a number of stations are given.

The character of the information available has been indicated by quoting the numbers in the International Catalogue under which the publications have been classified.

The year quoted is the last complete year for which the information has been received.

The classification numbers employed are as follows :—

- 1710 and 1730. Climatology—Agricultural and Hygienic.
- 1180. Rainfall Tables.
- 1800. Meteorological Observations—General.
- 1810. Hourly Values.
- 1820. Daily Values.
- 1825. Monthly and Yearly Mean Values.
- 1830. Daily Weather Reports.
- 1840. Weather Reports—Weekly, Monthly, &c.

† Indicates publications which give information for the upper air, obtained with balloons or kites.



# GEOGRAPHICAL LIST OF INSTITUTIONS AND PERSONS SUPPLYING PUBLISHED METEOROLOGICAL DATA.

NAME OF INSTITUTION, &C.	Climatology—Agri- cultural and Hy- gienic. 1710 & 1730	Rainfall Tables. 1180.	Meteorological Observations —General. 1800.	Hourly Values. 1810.	Daily Values. 1820.	Monthly and Yearly Mean Values. 1825.	Daily Weather Re- ports and Charts. 1830.	Weekly or Monthly Weather Reports 1840.
<b>GENERAL.</b>								
International Committee for Scientific Aeronautics, Strassburg.	—	—	1908	—	—	—	—	—
Board of Trade, London—Commercial, Labour, and Statistical Department.	—	—	—	—	—	1907	—	—
Symons's Meteorological Magazine ..	—	—	—	—	—	1911	—	—
<b>d. EUROPE AND MEDITER- RANEAN SEA AND ISLANDS.</b>								
<i>Deutsche Seewarte, Hamburg</i> .. ..	—	—	—	—	—	—	—	1910
<b>da. Scandinavia: Sweden, Norway, Denmark, Iceland, Faeroes:—</b>								
Dansk Meteorologisk Institut (Copenhagen).	—	—	1908	—	1911	1908	1911	1911
Norsk Meteorologisk Institut (Christiania).	—	1910	1910	1910	1910	1910	—	—
Svensk Meteorologisk Institut (Stockholm).	—	—	—	—	—	—	—	1911
K. Svenska Vetenskaps-Akademie (Stockholm).	—	1910	1910	—	1910	1910	—	—
Hydrografiska Byrån (Stockholm)	—	1909	—	—	—	—	—	—
Stockholm (H. E. Hamberg) ..	—	—	—	—	—	—	—	—
Upsala, Observatoire Météorolo- gique de l'Université.	—	—	1911	1911	1911	—	—	—
Vassijaure, K. Svenska Ventensks, Akademie, Stockholm.	—	—	—	1907	—	—	—	—
<b>db. Russia in Europe:—</b>								
Observatoire Physique Central Nicolas (St. Petersburg).	—	—	1907	1907	1907	1907	1911†	1911
Finland, Meteorologische Zentralanstalt (Helsingfors).	—	—	1906	1906	1906	1906	—	1907
Kaiserliche Livländische Ge- meinnützige u. Ökonomische Sozietät, Dorpat (Jurjel).	—	1905	—	—	—	—	—	—
Dorpat, Meteorologisches Obser- vatorium.	—	—	1910	1910	1910	—	—	—
Dorpat, Station Météorologique de l'Ecole Reale.	—	—	—	—	1906	—	—	—
Kazan, Observatoire Météoro- logique.	—	—	—	—	1911	—	—	—
Kieff, Observatoire Météorol- ogique.	—	—	—	1908	1908	—	—	—
Moscow (E. Leyst) .. ..	—	—	1909	—	—	—	—	—
Moscow, Meteorologisches Ob- servatorium der K. Universität	—	—	1909	1909	1909	—	—	—
Nijni-Oldchedaef, Observatoire Météorologique.	—	—	1911	1911	1911	1909	—	—
Odessa, Observatoire Météoro- logique et Magnétique de l'Uni- versité Impériale.	—	1905	1905	—	1910†	1906	—	—
St. Petersburg, Observatoire Météorologique de l'Institut Forestier Impériale.	—	—	—	—	1909	—	—	—
Tiflis, Physical Observatory ..	—	—	1904	1904	—	—	—	1909†
Warsaw, Station Centrale Météor- ologique du Musée de l'Indus- trie et de l'Agriculture.	—	—	1908	—	1908	1908	—	—

\* Means of temperature in Stockholm for 1756 to 1905 and in Sweden for 1856 to 1907.

GEOGRAPHICAL LIST—continued.

NAME OF INSTITUTION, &c.	Climatology—Agri- cultural and Hy- gienic. 1710 & 1730.	Rainfall Tables. 1180.	Meteorological Observations —General. 1800.	Hourly Values. 1810.	Daily Values. 1820.	Monthly and Yearly Mean Values. 1825.	Daily Weather Re- ports and Charts. 1830.	Weekly or Monthly Weather Reports. 1840.
<b>d. EUROPE AND MEDITER- RANEAN ISLANDS—cont.</b>								
<b>dc. German Empire:—</b>								
Deutsche Seewarte (Hamburg)	—	—	1910	1910	1910	1910	1911†	1911
Prussia, K. Meteorologisches Institut (Berlin).	—	1909	1907	1907	1907	1911	—	1911
Alsace-Lorraine, Meteorolo- gischer Landesdienst (Strass- burg).	—	—	1905	1905	1905	1911	—	—
Baden, Central Bureau für Meteorologie und Hydro- graphie (Carlsruhe).	—	1911	1910	—	1910	1910	—	1911
Bavaria, K. Meteorologische Central Station (Munich).	—	—	1910†	1910	1910	1910	1911	—
Hessen, G. Hydrographisches Bureau (Darmstadt).	—	1910	1910	1910	1910	1910	—	1911
Saxony, K. Sächs. Landes- Wetterwarte (Dresden).	—	—	1907	1907	1907	1907	1911	1909
Württemberg, K. Statistisches Landesamt und Meteorolo- gische Central Station (Stutt- gart).	—	—	1910	1900	1910	1910	—	1911
Aachen, Meteorologisches Obser- vatorium.	—	—	1909	1909	1909	1909	1911	—
Berlin, Wetter Bureau .. ..	—	—	—	—	—	—	1911	—
Bremen, Meteorologische Station	—	—	1910	1910	1910	1910	—	—
Eberswalde, Meteorologische Station.	—	—	—	—	—	—	—	1903
Emden, Naturforschende Gesell- schaft.	—	—	—	—	—	1907	—	—
Frankfurt am Main, Physika- lischer Verein.	—	—	—	—	1908	—	1911	—
Lindenberg, K. Preussisches Aeronautisches Observatorium.	—	—	1908†	—	—	—	—	—
Potsdam, K. Preuss. Met. Institut	—	—	1910	1910	1910	—	—	—
<b>dd. Holland; Belgium; Luxem- burg:—</b>								
K. Nederlandsch Meteorologisch Institut (de Bilt).	—	1909	1909	1909	1909	1909	1911	1911
Observatoire Royal, Uccle, Brus- sels.	—	—	1904	1904	1904	1904	1911	—
Mons (A. Bracke) .. ..	—	—	—	—	1905	—	—	—
<b>de. British Islands:—</b>								
Meteorological Office (London)	—	—	—	1911	1911	1911	1911	1911†
British Rainfall (H. R. Mill) ..	—	1910	—	—	1910	1910	—	—
R. Meteorological Society (Lon- don).	—	—	1910	—	—	1910	—	—
Scottish Meteorological Society (Edinburgh).	—	1910	1910	—	—	1910	—	—
Board of Agriculture and Fisheries, London.	1910	—	—	—	—	—	—	—
General Register Office, Dublin	1911	—	—	—	1911	1911	—	1911
General Register Office, London	1911	—	—	—	1911	1911	—	1911
Registrar General's Office, Edin- burgh.	1911	—	—	—	—	1911	—	1911
Royal Observatory, Greenwich	—	—	1909	1909	1909	—	—	—
Royal Society of Edinburgh [Fort William and Ben Nevis].	—	—	—	1897	—	—	—	—
Bath, Medical Officer of Health	1910	—	—	—	—	1910	—	—
Birmingham Scientific Society..	—	—	1910	—	—	—	—	—
Blackpool, Public Health Office	1910	—	—	—	—	1910	—	—
Bognor, Medical Officer of Health	1909	—	—	—	—	1908	—	—
Bolton, The Museums and Meteorological Observatory.	—	—	—	—	—	1911	—	1911

## GEOGRAPHICAL LIST—continued.

NAME OF INSTITUTION, &C.	Climatology—Agri- cultural and Hy- gienic. 1710 & 1730.	Rainfall Tables. 1180.	Meteorological Observations —General. 1800.	Hourly Values. 1810.	Daily Values. 1820.	Monthly and Yearly Mean Values. 1825.	Daily Weather Re- ports and Charts. 1830.	Weekly or Monthly Weather Reports. 1840.
<i>d</i> EUROPE AND MEDITER- RANEAN ISLANDS— <i>cont.</i>								
<i>de</i> British Islands— <i>cont.</i>								
Borden Wood, Sussex (E. Lamb)	—	—	—	—	—	1911	—	—
Bournemouth (C. Dales) ..	—	—	—	—	—	1907	—	—
Brighton, Medical Officer of Health.	1802	—	—	—	—	—	—	—
Burnley, Medical Officer of Health.	1910	—	1910	—	—	—	—	—
Buxton, Devonshire Hospital ..	—	—	—	—	—	1910	—	—
Canterbury (A. Lander) ..	—	—	—	—	—	1909	—	—
Cardiff, Naturalists' Society ..	—	1907	—	—	—	1907	—	—
Cardiff, Waterworks Engineer's Office.	—	1905	—	—	—	—	—	—
Chester (J. C. Mitchell) ..	—	—	—	—	—	1905	—	—
Clongowes Wood College ..	—	—	—	—	—	1910	—	—
Cockle Park, Morpeth ..	—	—	—	—	—	1904	—	—
Coventry, Medical Officer of Health.	1910	—	—	—	—	1910	—	—
Croydon, Natural History and Scientific Society.	—	1910	—	—	1910	—	—	—
Devon, North (T. Wainwright) ..	—	—	—	—	—	1911	—	—
Dorset (H. Stilwell) ..	—	1910	—	—	—	—	—	—
Eastbourne, Borough Meteorol- ogist.	—	—	—	—	—	1910	—	—
East Ham, Public Health De- partment.	1907	—	—	—	—	1909	—	—
Falmouth, R. Cornwall Poly- technic Society.	—	—	—	—	—	1910	—	—
Great Central Railway ..	—	1911	—	—	—	—	—	—
Great Yarmouth, Urban Sani- tary Authority.	1910	—	—	—	—	1910	—	—
Hampstead Scientific Society ..	—	—	—	—	—	1910	—	—
Harrogate, Harlow Moor Ob- servatory.	—	—	—	—	—	1907	—	—
Hastings, Borough Meteorologist.	—	—	—	—	—	1910	—	—
Hertfordshire (J. Hopkinson) ..	—	1906	—	—	—	1906	—	—
Hoyle and West Kirby, Urban District Council.	—	—	—	—	—	1910	—	—
Isle of Man ( <i>late</i> A. W. Moore) ..	—	—	—	—	—	1904	—	—
Kew, National Physical Labora- tory.	—	—	—	—	—	1910	—	—
Kingston-on-Thames, Surrey County Council.	1908	—	—	—	—	1908	—	—
Liverpool Observatory, Bidston.	—	—	—	—	1908	—	—	—
London, Royal Botanic Society	—	—	—	—	1909	—	—	—
Lowestoft, Medical Officer of Health.	1910	—	—	—	—	1910	—	—
Manchester, Godlee Observatory	—	—	—	—	1909	—	—	—
Manchester, Public Health Office	1904	—	—	—	1904	—	—	—
Margate, Borough Meteorologist	1910	—	—	—	—	1910	—	—
[Netley.] Army Medical Depart- ment, London.	—	—	—	—	—	1906	—	—
Northampton, Natural History Society.	—	1910	—	—	—	—	—	1910
Norwich (A. W. Preston) ..	—	—	—	—	—	1910	—	—
Nottingham (A. Brown and P. Boobyer).	—	1911	1911	—	—	—	—	—
Nottingham, Rural District Council of Basford.	1903	—	—	—	—	1903	—	—
Oxford, Radcliffe Observatory ..	—	—	—	—	1905	—	—	—
Paisley, Coats Observatory ..	—	—	—	—	—	1905	—	—
Perth, Natural History Museum	—	—	—	—	—	1911	—	—
Portsmouth, Medical Officer of Health.	1909	—	1909	—	—	—	—	—
Rousdon Observatory ..	—	—	—	—	—	1903	—	—
Rugby School Natural History Society.	—	—	—	—	—	1910	—	—
Scarborough, Medical Officer of Health.	1909	—	—	—	—	1909	—	—
Seaham Harbour, Medical Officer of Health.	1907	—	—	—	—	1907	—	—



GEOGRAPHICAL LIST—continued.

NAME OF INSTITUTION, &c.	Climatology—Agri- cultural and Hy- gienic. 1710 & 1730.	Rainfall Tables. 1180.	Meteorological Observations —General. 1800.	Hourly Values. 1810.	Daily Values. 1820.	Monthly and Yearly Mean Values. 1825.	Daily Weather Re- ports and Charts. 1830.	Weekly or Monthly Weather Reports. 1840.
<b>d. EUROPE AND MEDITER- RANEAN ISLANDS—cont.</b>								
<b>de. British Islands—cont.</b>								
Sevenoaks (W. W. Wagstaffe) ..	—	—	—	—	—	1905	—	—
Shropshire (W. M. D. La Touche)	—	1910	—	—	—	—	—	—
Southampton, Medical Officer of Health.	1906	—	—	—	—	1906	—	—
Southport, Fernley Observatory	—	—	1910	1910	1911	1910	—	—
Stonyhurst College Observatory	—	—	—	—	—	1911	—	—
Teignmouth, Urban District Council.	—	1909	—	—	—	1911	—	—
Throcking (C. W. Harvey) ..	—	1909	—	—	—	1909	—	—
Totland Bay, Isle of Wight (J. Dover).	—	—	—	—	—	1910	—	—
Truro, Cornwall County Council, Sanitary Committee.	1911	—	—	—	—	1910	—	1911
Truro (G. Penrose) ..	—	—	—	—	—	1900	—	—
Waterford (C. E. Perceval Bolton)	—	—	—	—	—	—	—	1911
Weymouth and Melcombe Regis	—	—	—	—	—	1909	—	—
Whitchurch (E. E. Glyde) ..	—	—	1910	—	—	—	—	—
Worksop (H. Mellish) ..	—	—	—	—	—	1911	—	—
York, Yorkshire Philosophical Society.	—	—	—	—	—	1910	—	—
<b>df. France and Corsica:—</b>								
Bureau Central Météorologique de France (Paris).	—	1908	1908	1908	1908	1908	1911	1911
Avignon, Commission Météorol- ogique du Département de Vaucluse.	—	—	1903	—	—	1903	—	—
Beaulieu, Sèvres et Vacquey (G. Eiffel).	—	—	1910	—	1905	1910	—	—
Bordeaux, Commission Météor- ologique de la Gironde.	—	1909	—	—	1909	—	—	—
Chevreuse, Observatoire ..	—	—	—	—	1907	—	—	—
Lyons, Commission Départe- mentale de Météorologie du Rhône.	—	1908	1908	—	—	—	—	—
Marseilles, Commission de Mé- térologie du Département des Bouches-du-Rhône.	—	—	1910	—	1910	—	—	—
Paris, Observatoire Municipal (Observatoire de Montsouris).	—	—	—	—	1907	—	—	—
Paris, Service Hydrométrique du Bassin de la Seine.	—	1909	—	—	—	—	—	—
Perpignan, Commission Mé- térologique.	—	—	1908	—	1908	1908	—	—
Puy-de-Dôme, Observatoire ..	—	—	—	—	1905	—	—	—
<b>dg. Iberian Peninsula (including Pyrenees): Spain (with Balearic Islands); Portugal:—</b>								
Instituto Central Meteorológico (Madrid).	—	—	—	—	—	1908	—	—
Observatorio Do Infante D. Luiz (Lisbon).	—	—	—	—	1910	1910	1911	—
Observatorio, Madrid ..	—	—	—	—	1910	1900	1911	—
Coimbra, Observatorio Meteor- ológico e Magnético da Uni- versidade.	—	—	1910	1910	1910	—	—	—
Gibraltar, Army Medical Dep., London.	—	—	—	—	—	1906	—	—
Gibraltar (Blue Book) ..	—	—	—	—	—	1911	—	—
Granada, Observatorio Meteor- ológico de Cartuja.	—	—	1910	1908	1911	—	—	—
Llinas, Observatorio Belloch ..	—	—	1904	—	—	—	—	—
Madrid, Chamartin de la Rosa, Observatorio Meteorológico.	—	—	—	—	1906	—	—	—
Malaga, Sociedad Malagüeña de Ciencias.	—	—	—	—	—	1911	—	—

## GEOGRAPHICAL LIST—continued.

NAME OF INSTITUTION, &C.	Climatology—Agri- cultural and Hy- gienic.	Rainfall Tables.	Meteorological Observations —General.	Hourly Values.	Daily Values.	Monthly and Yearly Mean Values	Daily Weather Re- ports and Charts.	Weekly or Monthly Weather Reports.
	1710 & 1730.	1180.	1800.	1810.	1820.	1825.	1830.	1840.
<b>d. EUROPE AND MEDITER- RANEAN ISLANDS—cont.</b>								
<b>dg. Iberian Peninsula—cont.</b>								
Mahon (Minorca). Bureau Central Mét., Paris.	—	—	—	—	—	1908	—	—
Oña, Observatorio ..	—	—	—	—	1911	—	—	—
Oporto, Observatorio Meteorol- ogico da Princesa D. Amelia.	—	—	—	—	1911	—	—	—
San Fernando, Instituto y Obser- vatorio de Marina.	—	—	1909	1909	1909	—	—	—
Tortosa, Observatorio del Ebro..	—	—	—	—	1910	—	—	1910
<b>dh. Italy: Sicily and Sardinia:—</b>								
Ufficio Centrale Meteorologico e Geodinamico Italiano (Rome).	1911	—	1908	—	—	1908	1911	—
Bologna, Osservatorio della R. Università.	—	—	—	—	1910	—	—	—
Catania, R. Osservatorio ..	—	—	—	—	—	1908	—	—
Florence, R. Museo di Fisica e Storia Naturale.	—	—	—	—	1909	—	—	—
Florence, Osservatorio Ximeniano	—	—	—	—	—	1907	—	—
Messina, Osservatorio ..	—	—	—	—	1907	—	—	—
Milan, R. Osservatorio Astrono- mico di Brera.	—	—	—	—	1910	—	—	—
Modena, R. Osservatorio (Geo- fisico).	—	—	—	—	1908	—	—	—
Moncalieri, Osservatorio del Real Collegio Carlo Alberto.	—	—	—	—	1910	—	—	—
Naples, Istituto di Fisica Ter- restre.	—	—	—	—	1910	—	—	—
Naples, R. Osservatorio di Capo- dimonte.	—	—	—	—	1909	1908	—	—
Riposto, Osservatorio Meteorol- ogico del R. Istituto Nautico.	—	—	—	—	1911	—	—	—
Rome, Specola Vaticana ..	—	—	—	—	1905	—	—	—
Turin, Osservatorio della R. Uni- versità.	—	—	—	—	1910	—	—	—
Venice, Osservatorio Meteoro- logico del Seminario Patri- arcale.	—	—	—	—	1908	—	—	—
Venice, Ufficio Idrografico ..	—	1910	—	1910	1910	—	—	—
<b>di. Switzerland:—</b>								
Schweizerische Meteorologische Central Anstalt (Zürich).	—	1907	1910+	1910	1910	1910	1911	—
Berne, Abteilung für Landes- hydrographie.	—	1909	1909	1904	1909	—	—	—
Davos Traffic Association ..	—	—	—	—	1911	—	—	1911
Geneve et le Grand St. Bernard (R. Gautier).	—	—	—	—	1910	—	—	—
Lausanne, Institut Agricole ..	—	—	—	—	1908	—	—	—
St. Moritz (R. Gautier et H. Duaimé).	—	—	—	—	1910	—	—	—
<b>dk. Austria-Hungary, with Bosnia and Herzegovina:—</b>								
K. K. Central Anstalt für Meteor- ologie und Erdmagnetismus (Vienna).	—	—	1907	1907	1911+	1907	1911	1911
K. K. Hydrographischer Dienst in Oesterreich (Vienna).	—	1908	—	—	1908	—	—	1911
Hydrographisches Amt der K. K. Kriegs-Marine (Pola).	—	—	1910	1910	1910	1906	—	—
K. Ung. Reichs-Anstalt für Meteor. und Erdmagn. (Buda- pest).	—	1907	1907	1907	1911	1907	1911	—
Bosnisch-Hercegovinische Lan- desregierung (Sarajevo).	—	—	1909	1909	1909	1909	—	—

GEOGRAPHICAL LIST—continued.

NAME OF INSTITUTION, &c.	Climatology—Agri- cultural and Hy- gienic.	Rainfall Tables.	Meteorological Observations —General.	Hourly Values.	Daily Values.	Monthly and Yearly Mean Values.	Daily Weather Re- ports and Charts.	Weekly or Monthly Weather Reports.
	1710 & 1730.	1180.	1800.	1810.	1820.	1825.	1830.	1840.
<b>d. EUROPE AND MEDITER- RANEAN ISLANDS—cont.</b>								
<b>dk. Austria-Hungary, with Bosnia and Herzegovina—cont.</b>								
Agram, Meteorologisches Obser- vatorium.	—	1908	1904	1904	1904	—	—	—
Brünn, Meteorologische Com- mission des naturforschenden Vereines.	—	—	1906	—	—	1906	—	—
Cracow, C. K. Akademii Umiejęt- nosci u. Krakowie.	—	—	—	—	1902	—	—	—
Cracow, K. K. Sternwarte ..	—	—	—	—	1911	—	—	—
Cracow, Observatorium ..	—	—	—	—	—	1910	—	—
Fiume, K. K. Marine-Akademie	—	—	—	—	—	1906	—	—
Innsbruck, Meteorologisches Observatorium.	—	—	1909	1909	1909	—	—	—
Klagenfurt (F. Jäger) ..	—	—	—	—	1907	1907	—	—
Kremsmünster, Sternwarte ..	—	—	1906	1906	—	—	—	—
Prague, K. K. Sternwarte ..	—	—	—	—	1910	—	—	—
Trieste, [I.R.] Osservatorio Astro- nomico-Meteorologico.	—	—	1907	1907	1907	1907	—	—
Trieste, I.R. Osservatorio Marit- timo.	—	—	—	—	—	—	1911	—
Vienna, K. K. Sternwarte ..	—	—	—	—	1903	—	—	—
<b>dl. Balkan Peninsula:—</b>								
Observatorul Astronomic si Meteorologic (Bucharest).	1911	1911	1902	1902	1902	1902	1911	1910
Observatoire National (Athens)	—	—	—	—	—	1908	—	—
Belgrade, Observatoire Central	—	—	—	1903	—	—	—	1903
Monastir and Cavalla. Bureau Central Mët., Paris.	—	1905	—	—	—	1908	—	—
Roumania (S.C. Hepites) ..	—	1903	—	—	—	—	—	—
Salonika, Gymnase Bulgare ..	—	—	—	—	—	1908	—	—
Salonika and Scutari. K. K. Central-Anstalt für Meteorologie, Vienna.	—	—	—	—	—	1907	—	—
Salonika. Observatoire Physique Central Nicolas, St. Petersburg.	—	—	—	—	—	1910	—	—
Sofia, Institut Météorologique Central de Bulgarie.	—	1911	1908	1908	1911	1908	—	1911
Thera. (F. Frhr. Hiller von Gaertringen.)	—	—	1902	1902	1902	1902	—	—
<b>dm. Mediterranean and Islands:—</b>								
Cyprus (Blue Book) ..	—	—	—	—	—	1910	—	—
Cyprus Public Works Depart- ment (Nicosia).	—	1911	—	—	—	—	—	—
Heraklion. Survey Department, Cairo.	—	—	—	—	—	1908	—	—
Malta Observatory ..	—	—	—	—	—	1910	—	—
Malta and Cyprus. Army Medical Dep., London.	—	—	—	—	—	1906	—	—
Malta. Bureau Central Mët., Paris	—	—	—	—	—	1902	—	—
Survey Department, Cairo ..	—	—	—	—	—	—	—	1910
<b>dq. English Channel, including Channel Islands:—</b>								
Guernsey (A. Collenette) ..	—	1910	—	—	—	1911	—	—
Jersey, Observatoire St. Louis ..	—	—	1911	1911	1911	—	—	—
<b>e. ASIA AND MALAY ARCHI- PELAGO.</b>								
<b>ea. Asiatic Russia:—</b>								
Observatoire Physique Central Nicolas (St. Petersburg).	—	—	1907	1905	1907	1907	—	—



## GEOGRAPHICAL LIST—continued.

NAME OF INSTITUTION, &c.	Climatology—Agri- cultural and Hy- gienic.	Rainfall Tables.	Meteorological Observations —General.	Hourly Values.	Daily Values.	Monthly and Yearly Mean Values.	Daily Weather Re- ports and Charts.	Weekly or Monthly Weather Reports.
	1710 & 1730.	1180.	1800.	1810.	1820.	1825.	1830.	1840.
<i>e.</i> ASIA AND MALAY ARCHI- PELAGO—cont.								
<i>ea.</i> West Siberia :—								
Tobolsk, Tomsk. <i>Observatoire Physique Central Nicolas, St. Petersburg.</i>	—	—	—	—	1907	1907	—	—
<i>ea.</i> East Siberia :—								
Irkutsk, <i>Observatoire Magné- tique et Météorologique.</i>	—	—	1905	1905	1905	1905	—	—
<i>Observatoire Physique Central Nicolas, St. Petersburg.</i>	—	—	—	—	1907	1907	—	—
<i>ea.</i> Central Asiatic Russia :—								
<i>Observatoire Physique Central Nico- las, St. Petersburg.</i>	—	—	—	—	1907	1907	—	—
<i>eb.</i> China and Dependencies : Tibet, Corea :—								
Hong-Kong, Observatory ..	—	—	1910	1910	1911	1911	1910	—
Chimulpo, Meteorological Ob- servatory.	—	—	1909	—	1909	—	—	—
Ouroumtshi, Peking. <i>Observa- toire Physique Central Nicolas, St. Petersburg.</i>	—	—	—	—	—	1907	—	—
<i>Deutsche Seewarte, Hamburg ..</i>	—	—	—	1909	1901	1909	—	—
Hong-Kong and Weibaiwei. <i>Army Medical Dep., London.</i>	—	—	—	—	—	1906	—	—
Kashgar, &c. <i>Meteorological Office, India (Simla).</i>	—	—	—	—	—	1910	—	—
Kharbin (Manchuria), <i>Société du chemin de fer Chinois de l'Est.</i>	—	—	1906	1906	1906	1906	—	—
Ou-tschang. <i>K. K. Central-Ans- talt für Meteorologie, Vienna.</i>	—	—	—	—	—	1907	—	—
Peking, Inspectorate General of Customs.	1904	—	—	—	—	—	—	—
Tokio, <i>Central Meteorological Ob- servatory.</i>	—	—	—	—	1906	—	—	—
Tchen-Tou, Tien-Tsin, Yunnan- Sen, &c. <i>Bureau Central Mët., Paris.</i>	—	1907	—	—	1908	1908	—	—
Weihowei, Medical Officer ..	—	—	—	—	—	1906	—	—
Zikawei, <i>Observatoire Mag- nétique et Météorologique.</i>	—	—	1908	1908	1908	1908	1911	—
<i>ec.</i> Japanese Islands, Formosa :—								
Central Meteorological Observa- tory (Tokio).	—	—	1910	1910	1910	1910	1911	—
Mizusawa, International Lati- tude Observatory.	—	—	1910	—	1910	1910	—	—
Tsukubasan, Observatorium ..	—	—	1907	1907	1907	—	—	—
<i>ed.</i> French Indo-China : Tonquin, Annam, &c. :—								
<i>Bureau Central Mët., Paris ..</i>	—	1908	1908	—	1908	1908	—	—
<i>ee.</i> Siam :—								
Battambang, Pnom-Penh, Vien- Tiane (Laos), &c. <i>Bureau Cen- tral Mët., Paris.</i>	—	—	—	—	—	1908	—	—

GEOGRAPHICAL LIST—continued.

NAME OF INSTITUTION, &c.	Climatology—Agri- cultural and Hy- gienic.	Rainfall Tables.	Meteorological Observations —General.	Hourly Values.	Daily Values.	Monthly and Yearly Mean Values.	Daily Weather Re- ports and Charts.	Weekly or Monthly Weather Reports.
	1710 & 1730.	1180.	1800.	1810.	1820.	1825.	1830.	1840.
<i>c. ASIA AND MALAY ARCHI- PELAGO—cont.</i>								
<i>ef. British India: Himalaya, Bur- mah, Ceylon:—</i>								
Meteorological Office, India, (Simla).	—	1910	1910	—	1910	1910	1911	1910
Agricultural Department, Cal- cutta.	—	1909	—	—	—	—	—	—
Meteorological Office, Bengal, Calcutta.	—	1907	1909	—	—	1909	1911	1909
Observatory, Colombo ..	—	—	1910	—	—	1911	—	—
Allahabad, Meteorological Office	—	1910	—	—	—	1910	—	—
Bangalore, Mysore Government Meteorological Department.	—	1909	1909	—	1909	1909	—	—
Bombay, Government Observa- tory.	—	—	1905	—	1905	—	—	—
Ceylon, Royal Botanic Gardens	—	1903	—	—	—	—	—	—
Kodaikanal, Observatory ..	—	—	—	—	—	1910	—	—
Meteorological Reporter to Government, Punjab.	—	—	—	—	—	1910	—	1910
Karikal, Pondichery, Yanaon (Madras Pres.), &c. Bureau Central Mët., Paris.	—	—	—	—	—	1908	—	—
<i>eg. Malay Peninsula and Archi- pelago, Philippines, &amp;c.:—</i>								
Royal Magnetical and Meteoro- logical Observatory (Batavia).	—	1909	1907	1907	—	1907	—	—
Philippine Weather Bureau, Manila Central Observatory.	—	—	1907	1907	1910	—	—	1910
Principal Civil Medical Officer, Straits Settlements (Singapore).	—	1904	1909	—	1909	1909	—	—
British North Borneo (British N. Borneo Herald).	—	—	—	—	1911	—	—	—
Buitenzorg, Institut Botanique de l'Etat.	—	—	—	—	1909	—	—	—
Federated Malay States (Govt. Gazette).	—	—	—	—	—	1910	—	—
Penang, Singapore. Meteoro- logical Office, India (Simla).	—	—	—	—	—	1910	—	—
Singapore. Army Medical Dep., London.	—	—	—	—	—	1906	—	—
<i>eh. Persia, Afghanistan, Baluchi- stan, Pamirs:—</i>								
Bushire, Ispahan, Jask, Kabul, Quetta, &c. Meteorological Office, India (Simla).	—	—	—	—	—	1910	—	—
Bushire. Bureau Central Mët., Paris.	—	—	—	—	—	1905	—	—
Enzeli, Khousseinabad (Seis- tan). Observatoire Physique Central Nicolas, St. Petersburg.	—	—	—	—	—	1907	—	—
<i>ei. Asiatic Turkey, Arabia, Syria:—</i>								
Aden, Baghdad, Bahrein, Busrah, Muscat, Beyrout. Meteoro- logical Office, India (Simla).	—	—	—	—	—	1910	—	—
Babylon. Deutsche Seewarte, Hamburg.	—	—	—	—	—	1909	—	—
Beyrout, Jerusalem, &c. K. K. Central-Anstalt für Meteorologie, Vienna.	—	—	1907	—	1907	1907	—	—

## GEOGRAPHICAL LIST—continued.

NAME OF INSTITUTION, &C.	Climatology—Agri- cultural and Hy- gienic.	Rainfall Tables.	Meteorological Observations —General.	Hourly Values.	Daily Values.	Monthly and Yearly Mean Values.	Daily Weather Re- ports and Charts.	Weekly or Monthly Weather Reports.
	1710 & 1730.	1180.	1800.	1810.	1820.	1825.	1830.	1840
<b>e. ASIA AND MALAY ARCHI- PELAGO—cont.</b>								
<b>ei. Asiatic Turkey, Arabia, Syria —cont.</b>								
Hebron. <i>Scottish Met. Soc., Edin- burgh.</i>	—	—	—	—	—	1910	—	—
Ksara (Liban), Observatoire ..	—	—	—	—	1911	—	—	—
El Athroun, Le Krey (Syria), Smyrna, and other stations. <i>Bureau Central Met., Paris.</i>	—	—	—	—	1908	1908	—	—
Scutari. <i>Army Medical Dep., London.</i>	—	—	—	—	—	1906	—	—
Sinope. <i>Observatoire Physique Central Nicolas, St. Petersburg.</i>	—	—	—	—	—	1907	—	—
Smyrna. <i>Survey Department, Cairo.</i>	—	—	—	—	—	1908	—	—
<b>f. AFRICA AND MADAGASCAR.</b>								
<b>fa. Mediterranean States: Moroc- co, Algiers, Tunis, Tripoli:—</b>								
Service Météorologique du Gouvernement Général de l'Algérie.	—	—	—	—	—	—	1911	—
Algeria and Tunis, Benghazi (Tripoli), Tangier, Mazagan. <i>Bureau Central Met., Paris.</i>	—	—	1908	—	1908	1908	—	—
Casablanca, Mogador, Saffi, Marrakesch. <i>Deutsche See- warte, Hamburg.</i>	—	—	—	—	—	1909	—	—
Tripoli. <i>Ufficio Centrale Met. e Gradiam. Ital., Rome.</i>	—	—	—	—	—	1905	—	—
<b>fb. North-east Africa: Egypt, Nile Valley to 5° N., Abyssinia:—</b>								
Survey Department, Cairo ..	—	1908	1908	1908	1908	1908	1911	1910
Department of Public Health, Cairo.	1911	—	—	—	1911	—	—	1911
Egyptian Sudan. <i>Meteorological Office, London.</i>	—	—	—	—	—	1902	—	—
Adis-Abeba (Abyssinia). <i>Obser- vatoire Physique Central Nicolas, St. Petersburg.</i>	—	—	—	—	1906	1906	—	—
Berbera, Somaliland .. ..	—	—	1910	—	1910	1910	—	—
Khartoum. <i>Army Medical Dep., London.</i>	—	—	—	—	—	1904	—	—
Ismailia, Port Said, Suez, Adis- Abeba (Abyssinia). <i>Bureau Central Met., Paris.</i>	—	—	—	—	1908	1908	—	—
<b>fc. Sahara and the Central Sudan:—</b>								
Fort Lamv (Tchad), &c. <i>Bureau Central Met., Paris.</i>	—	—	—	—	—	1908	—	—
<b>fd. West Africa, including French Sudan, from Morocco to the Congo:—</b>								
<i>Mitteilungen aus den Deutschen Schutzgebieten.</i>	—	—	—	—	—	1909	—	—
Accra, Observatory .. ..	—	—	—	—	—	1910	—	—
Gambia, Medical Officer .. ..	—	—	—	—	1911	—	—	—
Gambia. (Blue Book) .. ..	—	—	1910	—	1910	1910	—	—



GEOGRAPHICAL LIST—continued.

NAME OF INSTITUTION, &c	Climatology—Agri- cultural and Hy- gienic.	Rainfall Tables.	Meteorological Observations —General	Hourly Values.	Daily Values.	Monthly and Yearly Mean Values.	Daily Weather Re- ports and Charts.	Weekly or Monthly Weather Reports.
	1710 & 1730.	1180.	1800.	1810.	1820.	1825.	1830.	1840.
<b>f. AFRICA AND MADAGASCAR</b> —cont.								
<b>fd. West Africa, including French Sudan, from Morocco to the Congo—cont.</b>								
Lagos, Survey Department ..	1910	—	—	—	—	1911	—	—
Northern Nigeria. (Blue Book)	—	—	1910	—	1910	1910	—	—
Sierra Leone (Freetown) ..	—	—	1910	—	1910	1910	—	—
Southern Nigeria Government Gazette.	1909	—	—	—	—	—	—	—
Togo (P. Heidke) ..	—	—	—	—	—	1910	—	—
Zungeru (Northern Nigeria), Principal Medical Officer.	1909	—	1909	—	1909	1909	—	—
Sierra Leone, Accra, Cape Coast, Kumasi. <i>Army Medical Dep., London.</i>	—	—	—	—	—	1906	—	—
Dahomey, French Guinea, French Sudan, Ivory Coast, Senegal. <i>Bureau Central Mët., Paris.</i>	—	—	—	—	1908	1908	—	—
Dahomey, Mundame (Cameroon). <i>Deutsche Seewarte, Hamburg.</i>	—	—	—	—	1909	1909	—	—
<b>fe. Congo State and Angola:—</b>								
Akka ( <i>Meteorological Office, Lon- don.</i> )	—	—	—	—	—	1902	—	—
Ka-Tanga, Mission Scientifique Lambaréné, Libreville and other stations. <i>Bureau Central Mët., Paris.</i>	—	—	1899	1899	1908	1908	—	—
<b>ff. East Africa; British (with Uganda); German; Portu- guese (north of the Zam- besi); British Central Africa; Lake Region.</b>								
<i>Mitteilungen aus den Deutschen Schutzgebieten.</i>	—	—	—	—	—	1909	—	—
British East Africa .. } <i>Meteoro-</i>	—	—	—	—	—	1902	—	—
British Central Africa .. } <i>logical</i>	—	—	—	—	—	1902	—	—
Rhodesia .. .. } <i>Office,</i>	—	—	—	—	—	1902	—	—
Uganda .. .. } <i>London.</i>	—	—	—	—	—	1902	—	—
German East Africa. <i>Deutsche Seewarte, Hamburg.</i>	—	—	—	1909	1909	1908	—	—
British East Africa Agricultural Department (Nairobi).	—	—	—	—	—	1910	—	1905
Boroma and Zumba. <i>Hagvald Observatorium, Kaloesa.</i>	—	—	1897	1897	1897	—	—	—
Entebbe, Uganda Protectorate. (Blue Book).	—	—	—	—	—	1910	—	—
Mombasa. <i>Army Medical Dep., London.</i>	—	—	—	—	—	1903	—	—
Rhodesia. <i>Government Statist and Agricultural Department.</i>	—	—	—	—	—	1908	—	—
Uganda Protectorate, Scientific and Forestry Department (Entebbe).	—	—	—	—	1905	1910	—	—
Zanzibar. <i>Meteorological Office, India (Simla).</i>	—	—	—	—	—	1910	—	—
Zomba, Forestry and Botanical Department.	—	1903	—	—	1910	1909	—	—
<b>fg. South Africa—South of Angola and the Zambesi:—</b>								
Meteorological Commission (Cape Town).	—	1908	1908	1902	—	1908	—	—
Transvaal Meteorological De- partment (Johannesburg).	—	1911	1910	1910	1910	—	1911	1911

## GEOGRAPHICAL LIST—continued.

NAME OF INSTITUTION, &C.	Climatology—Agri- cultural and Hy- gienic. 1710 & 1730.	Rainfall Tables. 1180.	Meteorological Observations —General. 1800.	Hourly Values. 1810.	Daily Values. 1820.	Monthly and Yearly Mean Values. 1825.	Daily Weather Re- ports and Charts 1830.	Weekly or Monthly Weather Reports 1840.
<b>f. AFRICA AND MADAGASCAR</b> —cont.								
<b>fg. South Africa—South of Angola and the Zambesi—cont.</b>								
Beira, Observatorio Meteorologico.	—	—	—	—	1910	—	—	—
Bulawayo (E. Goetz) .. ..	—	—	—	—	—	1904	—	—
Durban, Natal Observatory ..	—	1902	1908	—	1908	1908	—	—
Farm Otjikango, Damara, <i>Deutsche Seewarte, Hamburg.</i>	—	—	—	—	1909	—	—	—
Fort Napier (Natal), Pretoria. <i>Army Medical Dep., London.</i>	—	—	—	—	—	1906	—	—
German S.W. Africa (E. Ottweiler).	—	1905	—	—	—	—	—	—
Loanda, Observatorio .. ..	—	—	—	—	—	1909	—	—
Southern Rhodesia, &c. <i>Meteorological Office, London.</i>	—	—	—	—	—	1902	—	—
<i>Mitteilungen aus den Deutschen Schutzgebieten.</i>	—	—	—	—	—	1909	—	—
<b>fh. Madagascar and Comoro Group:—</b>								
Tananarive, Observatoire ..	—	—	1910	1910	1910	1910	—	—
Bureau Central Met., Paris ..	—	1908	—	—	1908	1908	—	—
<b>fi. Red Sea and Islands:—</b>								
K. Akademie der Wissenschaften, Vienna.	—	—	—	[1903]	[1903]	—	—	—
Perim. <i>Meteorological Office, India (Simla).</i>	—	—	—	—	—	1910	—	—
<b>g. NORTH AMERICA.</b>								
<b>gb. Canada as a whole:—</b>								
Meteorological Service, Dominion of Canada (Toronto).	—	—	1907	1907	1907	1907	1911	1911
Toronto Observatory .. ..	—	—	—	—	—	1908	—	—
U.S. Weather Bureau, Washington	—	—	—	—	—	1910	—	—
<b>gc. Canadian Dominion West.</b>								
Alberta (Official Handbook) ..	—	—	—	—	—	1906	—	—
Edmonton, Department of Agriculture,	—	—	—	—	—	1909	—	—
Regina, Department of Agriculture.	—	—	—	—	—	1905	—	—
<b>gd. Canadian Dominion East: New- foundland, Labrador:—</b>								
Toronto, Bureau of Industries ..	—	—	1904	—	—	—	—	—
Hebron, Nain, <i>Deutsche Seewarte, Hamburg.</i>	—	—	—	—	—	1909	—	—
St. Pierre and Miquelon, Bureau Central Met., Paris.	—	1905	—	—	—	1902	—	—
St. Croix, <i>Dansk Meteorologisk Institut, Copenhagen.</i>	—	—	—	—	—	1908	—	—
<b>ge. United States as a whole:—</b>								
U.S. Weather Bureau, Depart- ment of Agriculture, Wash- ington.	—	—	1910	1901	1907	1910	1911	1910

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<i>g. NORTH AMERICA—cont.</i>								
<i>gg. North-Eastern United States, East of Mississippi:—</i>								
Cambridge (Mass.), Astronomical Observatory of Harvard Col- lege.	—	—	—	—	1808	—	—	—
New York, Meteorological Ob- servatory.	—	—	—	1811	—	—	—	—
Washington, United States Naval Observatory.	—	—	—	—	1802	—	—	—
<i>gl. Western United States, West of Mississippi:—</i>								
Colorado Springs, Colorado Col- lege, Observatory.	—	—	—	—	1807	1807	—	—
<i>gl. Mexico:—</i>								
Dirección General de Telégrafos Federales (Mexico).	—	—	—	—	—	—	1804	—
Observatorio Meteorológico Central (Mexico).	—	—	1810	1810	1810	—	—	1810
Guadalajara, Observatorio del Seminario Conciliar.	—	—	—	—	1808	—	—	—
Leon, Observatorio Meteorol- ógico.	—	—	—	—	1811	—	—	1811
Morelia, Observatorio Meteorol- ógico.	—	—	1810	—	1810	1810	—	—
Oaxaca (A. M. Dominguez) ..	—	1803	—	—	—	—	—	—
Oaxaca, Observatorio Meteorol- ógico.	—	—	—	—	1808	—	—	1808
Puebla, Boletín de Estadística..	1810	—	—	—	1810	—	—	—
Saltillo, Observatorio Meteorol- ógico del Colegio de San Juan Nepomucino.	—	—	—	—	1805	—	—	—
Tacubaya, Observatorio Astrón- omico Nacional.	—	—	1897	—	1897	1897	—	—
U.S. Weather Bureau, Washington.	—	—	—	—	—	1810	—	—
Zacatecas, Observatorio ..	—	—	1811	—	1811	1811	—	—
<i>h. CENTRAL AND SOUTH AMER- ICA AND WEST INDIES.</i>								
<i>hb. Central America, &amp;c.:—</i>								
Belize, Colonial Surgeon .. ..	1811	—	—	—	1811	—	—	—
Costa Rica, U.S. Weather Bureau, Washington.	—	—	—	1810	—	—	—	—
San Salvador, Observatorio Meteorológico y Astronómico.	—	—	—	—	—	1802	—	—
Tegucigalpa, Laboratorio Central	—	—	—	—	1805	—	—	—
<i>hc. West Indian Islands, Carib- bean Sea, Gulf of Mexico:—</i>								
Antigua, Government Labora- tory.	—	1810	—	—	1811	1810	—	—
Bahamas .. ..	—	—	—	—	1802	1810	—	—
Barbados, Department of Agri- culture.	—	—	—	—	—	1809	—	—
Barbados, St. Lucia, Jamaica, Bermuda. Army Medical Dep., London.	—	—	—	—	—	1808	—	—
Bermuda, Meteorological Service of Canada, Toronto.	—	—	—	—	—	1807	—	—



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<b>h. CENTRAL AND SOUTH AMER- ICA AND WEST INDIES—cont.</b>								
<b>hc. West Indian Islands, Carib- bean Sea, Gulf of Mexico— cont.</b>								
Bermuda, Registrar-General ..	1909	—	—	—	—	1909	—	—
Bermuda (Prospect) ..	—	—	—	—	1911	—	—	—
Dominica, Botanic Station ..	—	1907	—	—	—	—	—	—
Grenada, Carriacou Observatory ..	—	—	—	—	1910	—	—	—
Grenada, Richmond Hill Ob- servatory.	—	1910	—	—	1911	1910	—	—
Guadeloupe, Haiti, Martinique. <i>Bureau Central Mët., Paris.</i>	—	—	—	—	1908	1908	—	—
Havana, Observatorio del Colegio de Belen.	—	—	1910	—	1910	1910	—	—
Havana, Secretaria de Agricul- tura, &c.	1910	—	1910	—	1910	1910	—	—
Jamaica, Weather Office, Kings- ton.	—	1910	1910	—	—	1910	—	1910
Port-au-Prince, (Haiti.) <i>K. K. Central-Anstalt für Meteorologie, Vienna.</i>	—	—	1907	—	1907	1907	—	—
St. Lucia, Agricultural Superin- tendent.	—	1911	—	—	—	—	—	—
St. Lucia Botanic Gardens ..	—	1910	—	—	—	1910	—	—
St. Lucia, Harbour Master ..	—	—	—	—	1911	—	—	—
St. Vincent, Botanic Gardens ..	—	1907	1903	—	—	1911	—	—
U.S. Weather Bureau, Washington	—	—	—	—	—	1910	—	—
<b>hd. Guiana—British, Dutch, and French; Venezuela; Trini- dad:—</b>								
Cayenne. <i>Bureau Central Mët., Paris.</i>	—	—	—	—	1908	1908	—	—
Georgetown, Demerara, Botanic Gardens.	—	—	—	—	1911	1911	—	—
Paramaribo. <i>K. Nederlandsch Meteorologisch Instituut, de Bilt.</i>	—	—	—	—	1904	—	—	—
Trinidad, Royal Botanic Gardens	—	1908	1910	—	1910	1910	—	—
<b>hf. Peru:—</b>								
<i>Astronomical Observatory of Har- vard College, Cambridge (Mass.).</i>	—	—	—	1895	1895	—	—	—
Piura. <i>Deutsche Seewarte, Ham- burg.</i>	—	—	—	—	—	1906	—	—
<b>hg. Bolivia:—</b>								
Madidi. <i>Bureau Central Mët., Paris.</i>	—	—	—	—	—	1903	—	—
Puerto Cobija, <i>Deutsche Seewarte, Hamburg.</i>	—	—	—	—	—	1909	—	—
<b>hh. Brazil:—</b>								
Ministerio de Marinha, Direc- toria de Meteorologia, Rio Janeiro.	—	—	1904	1904	1906	—	—	—
Curityba, Observatorio Meteor- ologico.	—	—	—	—	—	1910	—	—
Cuyabá, Observatorio Meteor- ologico "D. Bosco."	—	—	—	—	1910	—	—	—
Descalvados. <i>Deutsche Seewarte, Hamburg.</i>	—	—	—	1906	—	1906	—	—
Para Prata. <i>K. K. Central-Anstalt für Meteorologie, Vienna.</i>	—	—	—	—	1906	—	—	—
Rio Janeiro, Observatorio ..	—	—	1908	—	1908	1908	—	—
São Paulo, Secretaria da Agricul- tura, &c.	—	—	—	—	—	1906	—	—

GEOGRAPHICAL LIST—continued.

NAME OF INSTITUTION, &c.	Climatology—Agri- cultural and Hy- gienic. 1710 & 1730.	Rainfall Tables. 1180.	Meteorological Observations —General. 1800.	Hourly Values. 1810.	Daily Values. 1820.	Monthly and Yearly Mean Values. 1825.	Daily Weather Re- ports and Charts. 1830.	Weekly or Monthly Weather Reports. 1840.
<b>h. CENTRAL AND SOUTH AMER- ICA AND WEST INDIES—cont.</b>								
<b>hi. Argentina, Uruguay, and Paraguay:—</b>								
Oficina Meteorológica Argentina (Buenos Aires).	—	—	—	—	—	—	1911	—
Dirección General del Servicio Meteorológico Nacional, Monte Video.	—	1905	—	—	—	1905	—	—
Dirección General de Estadística del Uruguay, Monte Video.	1906	—	—	—	—	1906	—	—
Fray Bentos. <i>Deutsche Seewarte, Hamburg.</i>	—	—	—	—	—	1893	—	—
Monte Video, Observatorio Nacional Físico-Climatológico.	—	—	—	1909	1909	—	—	1909
Monte Video, Instituto Meteoro- lógico Nacional.	—	—	—	—	—	1910	—	—
Villa Colón, Observatorio Meteorológico.	—	—	—	1902	1902	1906	—	1902
<b>hk. Chili:—</b>								
Servicio Meteorológico de la Dirección del Territorio Marítimo (Valparaíso.)	—	—	1908	—	1908	1908	—	—
Punta Arenas, Observatorio Meteorológico del Colegio Salesiano "S. José."	—	1902	1907	1907	1910	1907	—	—
Santiago, Observatorio Astro- nómico.	—	—	1909	—	—	1909	—	—
<b>hl. Falkland Islands:—</b>								
Stanley .. .. .	—	—	—	—	—	1911	—	—
<b>i. AUSTRALASIA.</b>								
Sydney Observatory .. ..	—	—	—	—	—	—	1909	—
<b>ia. New Guinea:—</b>								
Papua (Government Gazette) ..	—	—	—	—	—	1909	—	—
<b>ib. Bismarck Archipelago:—</b>								
Rakuranga. <i>Deutsche Seewarte, Hamburg.</i>	—	—	—	—	—	1909	—	—
<b>ic. Australia:—</b>								
Central Weather Bureau, Mel- bourne.	—	1908	—	—	—	—	1911	—
<b>id. Queensland:—</b>								
Brisbane, Government Statis- tician's Office.	1905	—	—	—	—	1905	—	—
Brisbane, Weather Bureau ..	—	—	—	—	—	1907	—	—
<b>ie. New South Wales:—</b>								
Sydney, Department of Public Instruction.	—	1902	—	—	1902	1902	—	—
Central Weather Bureau, Mel- bourne.	—	1908	1908	—	—	—	—	—
Windsor (John Tebbutt) .. ..	—	—	—	—	—	1903	—	—

## GEOGRAPHICAL LIST—continued.

NAME OF INSTITUTION, &C.	Climatology—Agri- cultural and Hy- gienic. 1710 & 1730.	Rainfall Tables. 1180.	Meteorological Observations —General. 1800.	Hourly Values. 1810.	Daily Values. 1820.	Monthly and Yearly Mean Values. 1825.	Daily Weather Re- ports and Charts. 1830.	Weekly or Monthly Weather Reports. 1840.
<b>i. AUSTRALASIA—cont.</b>								
<b>ig. South Australia:—</b>								
Adelaide Observatory .. ..	—	1905	1905	—	1905	1905	—	—
<b>ih. West Australia:—</b>								
Perth, Observatory .. ..	—	1908	1907	—	1907	1907	—	1908
Perth, Government Statistician's Office.	—	1909	1909	—	—	1909	—	—
<b>ik. New Zealand:—</b>								
Wellington, Meteorological Office	—	1908	1908	—	1908	1910	1905	—
Wellington, Government Obser- vatory.	—	—	—	—	1904	—	—	—
<b>il. New Caledonia, New Hebrides, and Loyalty Islands:—</b>								
Noumea, Paita (N. Cal.), Port Vila (New Hebrides). <i>Bureau Central Mët., Paris.</i>	—	1908	—	—	1908	1908	—	—
<b>k. ARCTIC.</b>								
<b>ka. Arctic Ocean:—</b>								
<i>Ziegler Polar Expedition, 1903-5 ..</i>	—	—	—	—	1905	—	—	—
<i>Netherlands Polar Expedition ..</i>	—	—	1882-3	1882-3	—	—	—	—
<b>kb. Greenland:—</b>								
<i>Dansk Meteorologisk Institut (Co- penhagen).</i>	—	—	1908	—	1908	1908	—	—
<b>kd. Islands north of Europe and Asia:—</b>								
<i>Norwegian North Polar Expedition [H. Mohn].</i>	—	—	1896	1896	1896	—	—	—
Spitzbergen (J. Westman) ..	—	—	—	1900	—	—	—	—
<b>l. ATLANTIC.</b>								
<b>lb. Azores, Canaries, Madeira, Cape Verde:—</b>								
Service Météorologique des Açores, Ponta Delgada.	—	—	1909	1909	—	1909	—	—
Teneriffe, Las Palmas. <i>Instituto Central Meteorológico, Madrid.</i>	—	—	—	—	—	1908	—	—
Teneriffe, Las Palmas. <i>Observa- torio Do Infante D. Lutz, Lisbon.</i>	—	—	—	—	—	1905	—	—
Teneriffe, Las Palmas. <i>Bureau Central Mët., Paris.</i>	—	—	—	—	—	1908	—	—
Teneriffe (Puerto de Orotava), <i>Deutsche Seewarte, Hamburg.</i>	—	—	—	—	—	1909	—	—
<b>m. INDIAN OCEAN.</b>								
<b>ma. Ocean and Islands north of Equator:—</b>								
Amini Divi, Minicoy. <i>Meteoro- logical Office, India (Simla).</i>	—	—	—	—	—	1910	—	—
<b>mb. Ocean and Islands south of Equator:—</b>								
Christmas Island. <i>Scottish Met. Soc., Edinburgh.</i>	—	—	—	—	—	1910	—	—
Christmas Island. Straits Settle- ments Gazette.	—	—	—	—	1910	—	—	—



## GEOGRAPHICAL LIST—continued.

NAME OF INSTITUTION, &c.	Climatology—Agricultural and Hygienic. 1710 & 1730.	Rainfall Tables. 1180.	Meteorological Observations —General. 1800.	Hourly Values. 1810.	Daily Values. 1820.	Monthly and Yearly Mean Values 1825.	Daily Weather Reports and Charts. 1830.	Weekly or Monthly Weather Reports. 1840.
<b>m. INDIAN OCEAN—cont.</b>								
<i>mb.</i> Ocean and Islands south of Equator— <i>cont.</i>								
Cocos, Keeling Islands. <i>Observatory, Perth, W.A.</i>	—	—	—	—	—	1907	—	—
Mauritius, Royal Alfred Observatory.	—	—	1910	1905	1910	—	—	1910
Mauritius. <i>Army Medical Dep., London.</i>	—	—	—	—	—	1903	—	—
Mauritius, Seychelles, Diego Garcia. <i>Meteorological Office, India (Simla).</i>	—	—	—	—	—	1910	—	—
Réunion. <i>Bureau Central Mët., Paris.</i>	—	1907	—	—	—	1908	—	—
Seychelles (Blue Book) .. ..	—	—	1910	—	1910	1910	—	—
<b>n. PACIFIC.</b>								
<i>nd, ne.</i> Pacific Islands North of Equator:—								
Honolulu (R. C. Lydecker) ..	—	—	—	—	1903	—	—	—
Honolulu. <i>U.S. Weather Bureau, Washington.</i>	—	—	—	—	1910	—	—	—
Caroline, Gilbert and Marshall Islands. <i>Deutsche Seewarte, Hamburg.</i>	—	—	—	—	—	1900	—	—
<i>nf, nh.</i> Pacific Islands South of Equator:—								
Samoa Observatory .. ..	—	—	1906	1906	—	1906	—	—
Samoa and Cook Islands. <i>Deutsche Seewarte, Hamburg.</i>	—	—	—	—	1906	1909	—	—
Suva, Department of Agriculture	—	—	—	—	—	1909	—	—
Suva, Fiji (J. D. W. Vaughan) ..	—	—	—	—	1905	—	—	—
Tahiti, Rikitea (Mangareva). <i>Bureau Central Mët., Paris.</i>	—	1908	—	—	1904	1907	—	—
<b>o. ANTARCTIC.</b>								
<i>ob.</i> S. Georgia, and Islands S. of S. Atlantic:—								
<i>Schwedische Südpolar Expedition (Snow Hill).</i>	—	—	1903	1903	—	—	—	—
Petermann Island (J. Rouch) ..	—	—	—	—	—	1909	—	—
<i>oc.</i> Islands South of Indian Ocean:—								
<i>Deutsche Südpolar Expedition, Winterstation des "Gauss."</i>	—	—	1903	1903	1903	—	—	—
<i>od.</i> Islands to Southward and South-East of New Zealand:—								
<i>National Antaretic Expedition, 1901-1904.</i>	—	—	1904	1904	1904	—	—	—

LIST OF CURRENT METEOROLOGICAL PERIODICALS AND  
JOURNALS CONTAINING OCCASIONAL ARTICLES ON METE-  
OROLOGICAL SUBJECTS RECEIVED FOR THE OFFICE  
LIBRARY.

Annales de l'Observatoire Municipal, Paris.

Annales du Bureau Central Météorologique de France.

† Annalen der Hydrographie und maritimen Meteorologie.

Annali dell' Ufficio Centrale Meteorologico e Geodinamico Italiano.

Annuaire de la Société Météorologique de France.

- †*Annuaire Météorologique de l'Observatoire Royal de Belgique.*  
*Astrophysical Journal.*  
 Aus dem Archiv der Deutschen Seewarte.  
*Australian Monthly Weather Report.*  
 †*Beiträge zur Physik der freien Atmosphäre.*  
*Boletín mensual del Observatorio meteorológico central de Mexico.*  
*Bollettino bimensuale della Società Meteorologica Italiana.*  
*Botanical Journal.*  
 †*Bulletin of the Mount Weather Observatory.*  
*Bulletin of the Philippine Weather Bureau.*  
 †*Bulletin de l'Institut Aerodynamique de Koutchino.*  
*Cairo Scientific Journal.*  
 †*Ciel et Terre.*  
*Comptes rendus hebdomadaires des séances de l'Académie des Sciences, Paris.*  
 †*Das Wetter.*  
*Geographical Journal.*  
*Globe (Le), Journal Géographique.*  
*Indian Meteorological Memoirs.*  
*Jahrbuch der Astronomie und Geophysik (H. J. Klein)*  
*Journal of the Franklin Institute.*  
*Journal of the Meteorological Society of Japan.*  
*Journal of the Royal United Service Institution.*  
*Journal of the Scottish Meteorological Society.*  
*Journal of the Royal Society of Arts.*  
*London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science.*  
*Memoirs and Proceedings of the Manchester Literary and Philosophical Society.*  
*Memorias de Sociedad Científica "Antonio Alzate," Mexico.*  
*Meteorologische Zeitschrift.*  
*Mitteilungen aus dem Gebiete des Seewesens, Pola.*  
*Monthly Meteorological Bulletin of the Nicolas Central Physical Observatory.*  
*Monthly Notices of the Royal Astronomical Society.*  
*Monthly Weather Review of the U.S. Weather Bureau.*  
*Nature.*  
*Nature (La).*  
*Nautical Magazine.*  
*Oversigt over det Kongelige danske Videnskabernes Selskab Forhandling.*  
*Petermann's (Dr. A.) Mitteilungen aus Justus Perthes' Geographischer Anstalt.*  
*Proceedings of the American Philosophical Society.*  
*Proceedings of the Cambridge Philosophical Society.*  
*Proceedings of the Royal Institution.*  
*Proceedings of the Royal Irish Academy.*  
*Proceedings of the Royal Society of Edinburgh.*  
*Proceedings of the Royal Society of London.*  
*Quarterly Journal of the Royal Meteorological Society.*  
*Scientific Proceedings of the Royal Dublin Society.*  
*Scottish Geographical Magazine.*  
*Smithsonian Contributions to Knowledge.*  
*Smithsonian Miscellaneous Collections.*  
 †*Symons's Meteorological Magazine.*  
*Tijdschrift van het Koninklijk Nederlandsch Aardrijkskundig Genootschap.*

In addition to the works summarised in the above lists, a large number of books and pamphlets dealing with meteorological subjects have been received. Some of the more important are referred to on p. 42 of the Report.

The compilation of a complete bibliography of meteorological literature is included in the objects of the International Catalogue of Scientific Literature, and the necessity for the publication in full of the titles of all books and pamphlets received at the office is thereby obviated. It is intended to deal with the matter in due course in connexion with the catalogue of the Library.

# APPENDIX VIII.

## LIST of INSTITUTIONS receiving PUBLICATIONS issued by the COMMITTEE.

OBSERVERS contributing returns printed in one of the periodical publications receive a copy of the publication. The Committee request that the copies may be returned to the Office after the observer has no personal use for them, in cases where they are not filed in a public library or other institution where the public can consult them.

The *Daily Weather Report* is sent to seaports and to a few places in London for exhibition.

The *Annual Report* is sent to all observers at land stations in connexion with the Office who express a wish to receive it.

Periodical or occasional publications are sent to the institutions named in the following list, generally speaking, in exchange for publications received.

UNITED KINGDOM.		UNITED KINGDOM—cont.	
Public Offices:		Public Offices	
Aberdeen ...	B.T., Supt. M.M.O.	—cont.	
Avonmouth	B.T., Supt. M.M.O.	London ...	Admiralty, Superintendent of Compasses.
Barrow-in-Furness.	Sueter, Capt. R.N.		Army Medical Department.
Barry ...	B.T. Surveyor.		Board of Agriculture.
Belfast ...	B.T., Supt. M.M.O.		— (Fisheries Division).
Blyth ...	B.T., Supt. M.M.O.		*†Board of Education, Science Library.
Bristol ...	B.T., Supt. M.M.O.		— Science Museum.
Cardiff ...	B.T., Supt. M.M.O.		— Solar Physics Observatory.
Dartmouth	Admiralty, Royal Naval College.		Board of Trade, Consultative Branch.
	B.T., Supt. M.M.O.		— Fisheries and Harbour Department.
Dublin ...	Board of Agriculture and Technical Instruction.		— Marine Department.
	General Register Office.		— Standard Weights and Measures Department.
Dundee ...	Ordnance Survey Office.		— Supt. M.M.O. Dock Street.
Edinburgh...	B.T., Supt. M.M.O.		— Supt. M.M.O. Poplar.
	Board of Fisheries.		— Supt. M.M.O. Tilbury.
	General Register Office.		— Supt. M.M.O. Victoria Docks.
	H.M. Office of Works.		— Surveyor.
	Royal Observatory.		British Museum, Dept. of Printed Books.
	*†Royal Scottish Museum.		Chinese Maritime Customs.
Farnborough	School of Ballooning.		General Post Office.
	Balloon Factory.		General Register Office.
Glasgow ...	B.T., Supt. M.M.O.		*Imperial Institute.
Gloucester	B.T., Supt. M.M.O.		Kew Gardens.
Greenock ...	B.T., Supt. M.M.O.		Local Government Board.
Grimsby ...	B.T., Supt. M.M.O.		
Hartlepool	B.T., Supt. M.M.O.		
Hull ...	B.T., Supt. M.M.O.		
Leith ...	B.T., Supt. M.M.O.		
Liverpool ...	B.T., Supt. M.M.O.		
London ...	Admiralty, Hydrographer.		
	— Librarian.		
	*†— Greenwich Royal Naval College.		
	— Greenwich Royal Observatory.		

\* Receive all publications, including the *Daily Weather Report* in those cases which are also marked †.



LIST OF INSTITUTIONS receiving PUBLICATIONS—*cont.*

UNITED KINGDOM— <i>cont.</i>		UNITED KINGDOM— <i>cont.</i>	
Public Offices — <i>cont.</i>		Institutions— <i>cont.</i>	
London ...	National Physical Laboratory (Bushy House). — (Kew Obs.). — (Eskdalemuir). Trinity House. B.T., Supt. M.M.O. B.T., Supt. M.M.O.	Edinburgh...	Royal Botanic Garden. Royal Observatory. Royal Scottish Geographical Society. Royal Society. *†Scottish Meteorological Society. University Library. University, Physical Laboratory.
Manchester	B.T., Supt. M.M.O.	Falmouth ...	Observatory. Royal Cornwall Polytechnic Society.
Middlebrough.	B.T., Supt. M.M.O.	Glasgow ...	"Nautical Magazine." Observatory. University Library.
Newcastle-on-Tyne.	B.T., Supt. M.M.O.	Greenhithe	"Worcester" Training Ship.
Newport ...	B.T., Supt. M.M.O.	Hull ...	Shipmasters' Association.
Plymouth ...	B.T., Supt. M.M.O.	Jersey ...	St. Louis Observatory.
Shields	B.T., Supt. M.M.O.	Kingstown...	Municipal Library.
Shields North.	B.T., Supt. M.M.O.	Leeds ...	University, Librarian.
Shields South.	B.T., Supt. M.M.O.	Leith ...	Nautical College.
Shrewsbury	Ordnance Survey Office	Liverpool ...	Free Public Library. Mercantile Marine Service Association. Nautical College. Richardson, Spence & Co. Sergeant, Capt. (Agent). Underwriters' Rooms. University, Physical Laboratory. University, Zoological Department.
Southampton.	B.T., Supt. M.M.O. Ordnance Survey Office.	London ...	Aeronautical Journal. Aeronautical Society. British Association. *†British Rainfall Organisation. Eastern Telegraph Co. "Engineering." *Guildhall Library. Institution of Civil Engineers. Institution of Electrical Engineers. Institution of Mechanical Engineers. Institution of Mining Engineers. Institution of Naval Architects. Iron and Steel Institute. *†Lloyd's. London Institution. London School of Economics. Metropolitan Water Board. "Nature." Navigation School.
Sunderland	B.T., Supt. M.M.O.		
Swansea ...	B.T., Supt. M.M.O.		
Institutions:			
Aberdeen ...	Observatory.		
Aberystwyth	The University.		
Alnwick ...	Duke of Northumberland's Observatory.		
Armagh ...	Observatory.		
Aspatia ...	Royal Agricultural College.		
Belfast ...	Queen's College. University.		
BexleyHeath	Editor, Findlay's Sailing Directions.		
Bidston ...	Liverpool Observatory.		
Birkenhead	"Conway" Training Ship.		
Birmingham	Central Free Library. Midland Institute. University, Librarian.		
Birr Castle...	Observatory.		
Cambridge...	The Agricultural Department. Botanic Garden. Cavendish Laboratory. Observatory. Philosophical Society. University Library.		
Cardiff ...	University College.		
Cirencester...	Royal Agricultural College.		
Dublin ...	Astronomer Royal. Dunsink Observatory. Royal Dublin Society. Royal Irish Academy. Trinity College.		
Dundee ...	Chalmers, Capt. (Agent). International Commission for Investigation of North Sea. University College.		
Durham ...	Observatory.		

\* Receive all publications, including the Daily Weather Report in those cases which are also marked †.

LIST OF INSTITUTIONS receiving PUBLICATIONS—*cont.*

UNITED KINGDOM— <i>cont.</i>		BRITISH COLONIES AND DEPENDENCIES— <i>cont.</i>	
Institutions— <i>cont.</i>		<i>Australasia—cont.</i>	
London ...	Physical Society. Richmond Free Public Library. Royal Astronomical Society. Royal Botanic Society. Royal College of Science. Royal Geographical Society. Royal Institution of Great Britain. *†Royal Meteorological Society. Royal National Lifeboat Institution. Royal Society. Royal Society of Arts. Royal Society of Medicine. *Royal United Service Institution. "Shipping Gazette." University College, Librarian. University College, Physical Department.	Adelaide ... Brisbane ...  Christchurch... Hobart ...  Melbourne ...     Perth ...     Sydney ...     Wellington ... Windsor ...	Public Library. Commonwealth Bureau of Meteorology. Public Library. Observatory. Commonwealth Bureau of Meteorology. *†Commonwealth Bureau of Meteorology. Commonwealth Statistical Bureau. Department of Agriculture. Observatory. Public Library. Astronomical Observatory. Commonwealth Bureau of Meteorology. Land and Survey Department. Commonwealth Bureau of Meteorology. Government Observatory. Public Library. Royal Society of New South Wales. Colonial Museum. Observatory.
Manchester	Philosophical Society. The University. University, Meteorological Department.		
Markree ...	Observatory.		
Newcastle-on-Tyne.	Armstrong College.		
Northampton	Natural History Society.		
Oxford ...	Bodleian Library. Clifton, Prof. R. B. Radcliffe Observatory. School of Geography. University Observatory.	Halifax (Nova Scotia). Montreal ... Ottawa ... Toronto ... Victoria (B.C.)	Nova Scotian Institute of Science. McGill University. Observatory. *†Meteorological Office. Meteorological Office.
Pais'ey ...	Coats Observatory.		
Plymouth ...	Incorporated Chamber of Commerce. Marine Biological Laboratory.		
Redruth ...	Free Public Library.	Allahabad ... Bangalore ...	Meteorological Reporter. Meteorological Department.
Southampton	Forbes, Capt. (Agent).	Bombay ...	Observatory.
Southport ...	Fernley Observatory.	Calcutta ...	Director General of Observatories. Surveyor General.
South Shields.	Marine Schools.	Colombo ...	Observatory.
Stamford ...	Free Library.	Dehra Dun ...	Trigonometrical Survey.
Stonyhurst	Observatory.	Hong Kong ...	Observatory.
Torquay ...	Natural History Society.	Kodaikanal ...	Observatory.
Valencia ...	Observatory.	Simla ...	Director General of Observatories.
York ...	Philosophical Society.	Singapore ...	Principal Civil Medical Officer.
BRITISH COLONIES AND DEPENDENCIES.			
<i>Australasia.</i>			
Adelaide ...	Commonwealth Bureau of Meteorology. Government Astronomer.		
		<i>Mediterranean.</i>	
		Malta ...	Observatory.

\* Receive all publications, including the Daily Weather Report in those cases which are also marked †.

LIST OF INSTITUTIONS receiving PUBLICATIONS—*cont.*

BRITISH COLONIES AND DEPENDENCIES— <i>cont.</i>		EUROPE— <i>cont.</i>	
<i>South Africa.</i>		<i>France.</i>	
Bloemfontein	Grey College.	Besançon ...	National Observatory.
Cape Town ...	Observatory.	Bordeaux ...	Society of Oceanography of the Gulf of Gascony.
	Meteorological Commission.	Chevreuse à Jagny.	Observatory.
Johannesburg	The Union Observatory.	Lyons ...	Observatory.
Pretoria ...	Chief Meteorologist, Department of Irrigation.	Marseilles ...	Meteorological Commission.
<i>Indian Ocean.</i>			Observatory.
Mauritius ...	Meteorological Society.	Nice ...	Observatory on Mont Blanc.
	Royal Alfred Observatory.	Paris ...	Bureau des Longitudes.
<i>West India Islands.</i>			*† Central Meteorological Office.
Jamaica ...	Government Meteorologist.		Hydrographic Office.
<i>EUROPE.</i>			Hydrometric Service.
<i>Austria-Hungary.</i>			Institute of France.
Agram ...	Landes Anstalt.		Meteorological Society.
Brünn ...	Natural History Society.		Municipal Observatory.
Buda-Pesth ...	Central Meteorological Institute.		National Observatory.
Cracow ...	Observatory.	Perpignan ...	Observatory of Parc St. Maur.
Fiume ...	Nautical Academy.		Meteorological Commission.
Innsbruck ...	Observatory.	Puy-de-Dôme	Observatory.
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	Magnetical Observatory of the Physical Insti- tute of the University.		<i>Portugal.</i>
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	Observatory.	Ponta Delgada	Observatory.
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	<i>Greece.</i>	Kazan ...	Observatory.
Athens ... ..	Observatory.	Kieff ...	Observatory.
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	<i>Netherlands.</i>	Warsaw ...	Meteorological Bureau.
Amsterdam ...	Geographical Society.		<i>Servia.</i>
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		New York ...	American Geographical Society. Central Park Obser- vatory.
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Geneva ...	Geographical Society. Observatory.		
Lausanne ...	Society of the Vaudoise.		
Neuchâtel ...	Observatory.		
Zürich ...	Central Meteorological Office. Helvetic Observatory.		
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Cairo ...	Sanitary Department. *† Survey Department.		
Madagascar ...	Royal Observatory, Antananarivo.		
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São Paulo ...	Secretary of Agriculture, &c.	Zi-ka-wei ...	University.
			*Observatory.

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