

R E P O R T
OF THE
METEOROLOGICAL COUNCIL

TO THE
ROYAL SOCIETY,

For the Year ending 31st of March 1886.

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



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THE METEOROLOGICAL COUNCIL,

1885-86.

Lieutenant-General RICHARD STRACHEY, C.S.I., F.R.S., Chairman.

Professor GEORGE HOWARD DARWIN, M.A., LL.D., F.R.S.

MR. FRANCIS GALTON, M.A., F.R.S.

Professor GEORGE GABRIEL STOKES, LL.D., P.R.S.

MR. EDWARD J. STONE, M.A., F.R.S.

Captain WILLIAM J. L. WHARTON, Hydrographer of the Admiralty.

REPORT

OF THE

METEOROLOGICAL COUNCIL

TO THE

ROYAL SOCIETY,

For the Year ending March 31, 1886.

No change has taken place in the Council during the year, and its executive officers continue as before :—

Mr. R. H. Scott, M.A., F.R.S., Secretary.

Captain H. Toynbee, F.R.A.S., Marine Superintendent.

Navigating-Lieutenant C. W. Baillie, F.R.A.S., Assistant do.

A scheme for the future organization of the clerical staff of the office has been adopted, with a view to regulating the scale of salaries and the rate of increments, and to avoiding the inconvenience found to arise from having to deal with individual claims for increases.

The classification adopted is as follows :—

6 clerks in Class	I. from 225 <i>l.</i> to 275 <i>l.</i>
6 " "	II. " 175 <i>l.</i> to 200 <i>l.</i>
6 " "	III. " 125 <i>l.</i> to 150 <i>l.</i>
7 " "	IV. " 75 <i>l.</i> to 110 <i>l.</i>

The chief clerkship is not considered as coming within these classes.

The salaries are for eight hours' work daily ; the increments allowed are 5*l.* yearly, until the maximum is reached, and are only granted on a report that the clerk's conduct has been in all respects satisfactory.

The present Report is as usual arranged under three headings :—

- I. Ocean Meteorology.
- II. Weather Telegraphy.
- III. Land Meteorology of the British Isles.

PART I.

OCEAN METEOROLOGY.

Collection of Information.—The practice followed by the Office as regards its dealing with observers at sea has not been changed, and is described in former Reports. Collection of information.

Appendix I. (p. 25) contains a list of all the observers who have contributed "excellent" logs during the past year. Some Recognition of "excellent" observers.

of them have regularly co-operated with the Office for many years; the names which now appear in the list for the first time are as follows:—

Captain's Name.	Ship.
Adamson, A. W. - -	S.S. "Brindisi."
Atkinson, S. P. H. - -	"Edmonton."
Brown, E. - -	"Moorhill."
Carr, H. C. - -	"Superb."
Clapp, Staff-Comr. E. S., R.N.	L.H. Tender "Richmond."
Cummings, William - -	S.S. "Dracona."
Davies, Joseph - -	S.S. "Archimedes" and S.S. "Flaxman."
Flinton, Benjamin - -	"Dartmouth."
Fraser, W. D. - -	"Thomas S. Stowe."
Freeman, G. A. - -	"Hannah and Mary."
Heyman, Sub-Lieut. G. A., R.N.	H.M.S. "Myrmidon."
Hird, William - -	"Marlborough."
Lambert, Sub-Lieut. H. M., R.N.R.	S.S. "Brindisi."
Lewis, B. C. - -	"British Merchant."
Lowe, James - -	"Agnes Muir."
Lugar, W. R. - -	S.S. "Mackay-Bennett."
Lyne, Sub-Lieut. W. O., R.N.	H.M.S. "Flying Fish."
McLean, Archibald - -	S.S. "Titania."
McMillan, John - -	"Canterbury."
Maxwell, Joseph - -	"Oamaru."
Moignard, P. - -	"Allonby."
Plater, H. R. F. - -	"Patriarch."
Quaile, D. W. A. - -	"Orissa."
Sangster, William - -	S.S. "Dracona."
Sargent, A. H. - -	"Glenlora."
Scott, George - -	"Iolanthe."
Sheldrake, J. W. - -	"Iron Cross."
Sturdee, H. King - -	L.H. Tender "Richmond."
Tindall, W. A. - -	S.S. "International."
Wilson, John - -	S.S. "Ethiopia."

The Council regret to have to record the death of Staff-Commr. W. M. Savage, R.N., and of Mr. Thomas Goodwin Partington,* who were "excellent" observers.

The following is the total number of logs received from April 1, 1885, to March 31, 1886, and the number of logs which have been classed as "excellent":—

Proportion of
"excellent" to
total number of
logs received.

Total No. of Logs received.	No. of Excellent Logs.	Per-centage of Excellent Logs.
189	138	73

The average number of logs received annually during the five years, 1880–84, was 164, and the per-centage of excellent logs among these was 72.

The Council take this opportunity of expressing their best thanks to the observers who have assisted them during the past year.

* Mr. Partington obtained the prize for Meteorology, given by the Council for the best answers in meteorology, on board the "Conway" in 1881. He had helped to keep three "excellent" logs for the Office. He was lost overboard in a gale of wind, December 22, 1885.

On the 31st of March 1886 the ships observing for the Office were pursuing the following voyages:—

To Baffin's Bay or Greenland	-	-	-	6
„ North America, East Coast	-	-	-	12
„ „ „ West „	-	-	-	9
Off East Coast of North America	-	-	-	4
To South America, East Coast	-	-	-	10
„ „ „ West „	-	-	-	3
„ Australia and New Zealand, viâ Cape of Good Hope	-	-	-	31
„ „ „ „ Suez	-	-	-	2
„ India, viâ Suez	-	-	-	6
„ India, viâ Cape of Good Hope	-	-	-	26
„ China Seas, viâ Cape of Good Hope	-	-	-	3
„ „ „ Suez	-	-	-	4
„ West Coast of Africa	-	-	-	1
„ Mediterranean Ports	-	-	-	6
„ Cape of Good Hope	-	-	-	6
„ West Indies	-	-	-	10
Between British Ports	-	-	-	4
Unknown	-	-	-	8
Total number of ships	-	-	-	151

Districts from which observations are obtained.

Appendix II. (p. 28) supplies a list of the logs and of all the documents from stations abroad received at the Office during the year.

North Atlantic Weather Charts.—The investigation of the weather over the North Atlantic Ocean for the 13 months, beginning August 1st, 1882, and ending August 31st, 1883, the period during which the International System of Circumpolar Observations was carried out, has still continued to employ nearly the whole Marine Branch of the Office, and steady progress has been made with the work. Nearly 3,000 ships co-operated, and 11,236 forms have been received, yielding an average of 864 for each of the 13 months, and upwards of 400 observations for each day. These figures are exclusive of the returns from land stations, which number about 300, so that there are in all about 700 sets of observations for each day. As seven of the circum-polar stations fell within the limits of the area dealt with (30° E. to 120° W.), their observations have been incorporated, and have rendered the charts for the higher latitudes far more complete than they would otherwise have been.

Synchronous weather charts.

The principal features of the method adopted for carrying out the investigation, with specimen charts, will be found at pp. 8–10 of the Report for 1883. It is intended to publish the whole series of these daily charts on a reduced scale in pairs, one chart representing the pressure and wind, the others the air and sea temperature, for each day, together with the record of weather (rain, &c.) which is reproduced on each chart, and the first part of this publication, containing 33 sheets, will probably appear during the summer. The charts of three consecutive days will be printed on each sheet.

Synchronous
weather
charts.

The labour and time occupied in preparing the charts, and in carrying out this investigation, have been very great, but the progress already made gives sure indications that the results obtained from it will be of great value and novelty, and of a nature that could not be obtained in any other way.

The following statement shows the stage at which the work had arrived by the end of March 1886:—

The charts for November were ready for the lithographer.

The whole of the observations for sea and land, had been entered on the large scale original charts, and all isobars and isotherms had been drawn.

The generalized wind arrows had been entered up to the end of April, and the weather areas drawn up to the end of February 1883. The reduced drawings from which the lithographed charts are reproduced by help of photography had been completed up to the end of November. The charts for three months, August to October 1882, were in the lithographer's hands.

Red Sea Charts.

Red Sea Charts.—It is proposed to take up the preparation of monthly charts of the meteorology, currents, surface temperature, and specific gravity of the Red Sea, according as the Atlantic work progresses towards completion. Specimen charts for one month have been drawn. The Indian Meteorological Department has undertaken to deal with the corresponding data for the Indian Ocean, and their charts are understood to be in progress.

The Royal Meteorological Institute of the Netherlands having applied for assistance from the Office in the preparation of a Meteorological Atlas of the Indian Ocean; the Council have sanctioned the temporary loan to the Utrecht Institute of the data books relating to the Indian Ocean which are in their possession.

Barometric
Pressure
Charts.

Charts of Barometric Pressure for the Atlantic, Pacific, and Indian Oceans.—These charts, which were referred to in the Report for 1884, have been completed, and are now in the hands of the engraver.

Current
Charts.

Current Charts for the Atlantic, Pacific, and Indian Oceans.—The series of charts showing the temperature and barometer pressure over these oceans having been completed, the Council have decided to supplement them with charts of the currents, the materials for which are contained in the logs stored in the Office. These charts were commenced in January of the present year by Lieutenant Baillie and an assistant. It is hoped that they will not only be of great practical service to the mariner, but also of scientific interest in connexion with the charts of mean temperatures of the sea surface recently published. The charts are to be for each month of the year, and, in addition to the data available in the Office, a large amount of information will be obtained from the logs of H.M.'s ships and other documents.

Arctic
meteorology.

Contributions to our Knowledge of the Meteorology of the Arctic Regions.—Part IV. of this work, completing the first volume,

was published during the year; a summary of its contents will be found in the last Report. The records now under discussion relate to the region situated near Behring's Straits.

Supply and Stock of Instruments.—In Appendix III. (p. 43) will be found a list of the meteorological instruments supplied by the Office to ships in the Royal Navy during the year, with a statement of the entire stock and distribution of instruments standing on the books, to the account of the Admiralty, on the 31st March 1886.

Instruments
belonging to
the Office.

Appendix IV. (p. 44) gives similar information with regard to the disposal of the other instruments belonging to the Office, which are mainly supplied to the Mercantile Marine.

PART II.

WEATHER TELEGRAPHY.

The service has been conducted without any serious interruption to its efficiency during the year.

Changes at
stations.

The Council have to regret the death of Mr. W. D. Penny, who had been reporter at Nairn for 25 years, having commenced the work at Christmas 1860.

The supply of self-recording aneroids to certain important stations, viz., Valencia, Scilly, Stornoway, Aberdeen, and Yarmouth, has been found to be very beneficial, as the reporters have by their use been enabled to note approximately the times of occurrence of considerable changes in pressure, and to keep an almost continuous record of their progress.

It is in contemplation to supply small hand anemometers on Robinson's pattern to some of the stations with a view to testing the expediency of substituting instrumental determinations of the velocity of the wind, for the non-instrumental estimates of force hitherto recorded.

A list of the telegraphic reporters will be found in Appendix V. (p. 45).

Inspection of the Telegraphic Reporting Stations.—The telegraphic reporting stations have been inspected during the year, in England (including Jersey and the Isle of Man) by the Rev. W. Clement Ley; in Scotland by Mr. Buchan; and in Ireland and Wales by Mr. Scott. The reports submitted by the Inspectors to the Council, which are printed in Appendix VI. (p. 46), show that the efficiency of the service has been fairly maintained.

Inspection
of the stations.

Discussion and Publication of the Information received.—A description of the practice of the Office in the collection, discussion, and dissemination of the meteorological information received by telegraph is given in Appendix VII. (p. 59). A list of the institutions and persons who received the Daily Weather Reports and Charts free of cost in 1885-6 forms Appendix VIII. (p. 69).

Discussion of
the reports.

Weather Forecasts.—There has been no material change in the system of preparation and issue of the forecasts during the year.

Forecasts.

Forecasts.

Forecasts are prepared three times a day, at 11h. a.m., and at 3h. 30m., and 8h. 30m. p.m. The Forecasts prepared at 11 a.m., on the information derived from the 8 a.m. reports, refer to the probable weather between noon on the day of issue and noon on the day following, and are publicly posted up in several places in London,* and supplied to the afternoon editions of the newspapers. The forecasts prepared at 8h. 30m. p.m. are mainly for the newspapers, but any of the forecasts are available for the information of persons requiring them.

Inquiries at the Office.

The inquiries received through the Post Office for special forecasts during the year amounted to 54, and the personal applications to 47. The rules of the Office relating to such inquiries continue the same as in previous years, and are given in Appendix VII. (p. 68).

Testing of the forecasts.

The results of a comparison of the Forecasts issued at 8 p.m. during the year with the weather actually experienced is given in Appendix XI. (p. 75), and the following summary of successes and failures, estimated in the manner explained in that Appendix, shows that the average of success over the whole United Kingdom has been 83 per cent, the figure being almost identical with that for the previous year, 82 per cent.

SUMMARY OF RESULTS OF 8 P.M. FORECASTS, 1885.

Districts.	Percentages.				Total percentage of Success.
	Complete Success.	Partial* Success.	Partial* Failure.	Total Failure.	
SCOTLAND, N. - -	55	31	9	5	86
" E. - -	50	25	10	5	85
ENGLAND, N.E. - -	53	34	10	3	87
" E. - -	53	31	11	5	84
MIDLAND COUNTIES -	51	34	11	4	85
ENGLAND, S. - -	57	31	9	3	88
SCOTLAND, W. - -	48	30	12	10	78
ENGLAND, N.W. - -	48	32	12	8	80
" S.W. - -	50	32	12	6	82
IRELAND, N. - -	46	35	11	8	81
" S. - -	46	33	12	9	79
Summary - -	51	32	11	6	83

* Note "partial" implies "more than half."

Hay Harvest Forecasts.

Hay Harvest Forecasts.—The Council renewed in 1885 the offer made in the four previous years to the Royal Agricultural Society, the Royal Dublin Society, and the Highland Society to send daily Forecasts *gratis* during the hay season to a number

* Viz., in the City, at the Mansion House, Lloyd's Rooms, Messrs. R. & J. Beck's, Cornhill, and Messrs. Thos. de la Rue & Co's., Bunhill Row; in the West End, in the Libraries of the House of Lords and House of Commons; at Messrs. Elliot's, Strand; Messrs. Stanford's, Charing Cross; Messrs. Negretti & Zambra's, Regent Street; and Messrs. Pastorelli's, New Bond Street.

of observers selected by the Councils of those Societies, on the two conditions, that the information should be made as widely known as possible, and that a record should be kept of the value of each prediction and sent in weekly to the Office. The Societies again cordially accepted the proposal, and the following list of recipients was prepared:—

Hay Harvest
Forecasts.

LIST of those who received HAY HARVEST FORECASTS
in 1885.

Districts.	To whom sent.	Address.
0. SCOTLAND, N.	Rev. Dr. Joass - Major Smith -	Golspie. Munlochy, Inverness.
1. SCOTLAND, E.	G. Johnstone - W. S. Macdonald - A. F. Leslie - C. W. L. Forbes -	Glamis, by Forfar. Craigielaw, Longniddry. Braes Grange, Banffshire. Aberfeldy.
2. ENGLAND, N.E.	J. Wilson - J. Turner -	Chillingham Barns, Belford, Northumberland. The Grange, Ulceby.
3. ENGLAND, E.	W. Birkbeck - Sir J. B. Lawes, Bt., and J. H. Gilbert, Ph.D. F. Morrice -	High House, Thorpe, Norwich. Rothamsted, Harpenden. Ditchingham Hall, Bungay.
4. MIDLAND COUNTIES	Royal Agricultural College. The Duke of Somerset	Cirencester. Gerrard's Cross, Bucks.
5. ENGLAND, S.	C. Whitehead - E. P. Squarey -	Barming House, Maidstone. The Moot, Downton, Wilts.
6. SCOTLAND, W.	W. Calder - M. J. Stewart - J. S. R. Ballingal -	Castle Hill, Dalreoch, Dum- barton. Ardwell, Stranraer. Eallabus House, Islay.
7. ENGLAND, N.W.	G. W. Wray - The Earl of Derby - The Lord Egerton of Tatton.	Leyburn, Yorkshire. Knowsley Hall, Prescott. Tatton Park, Knutsford.
8. ENGLAND, S.W.	Colonel J. B. Turbervill The Earl of Ducie - T. Dyke - R. Neville -	Ewenny Priory, Bridgend, Glamorganshire. Whitfield, Falfeld, R.S.O. Long Ashton, Clifton, Bristol. Butleigh Court, Glastonbury.
9. IRELAND, N.	Viscount Massereene and Ferrard. Rev. A. Brown - E. F. Farrell -	Antrim Castle, Antrim. The Manse, Hollymount, Co. Mayo. Moynalty, Co. Meath.
10. IRELAND, S.	D. A. McCreedy - D. A. Milward - W. Talbot Crosbie, D.L.	Larchvale, Moneygall, King's Co. Lavistown, Kilkenny. Ardfert Abbey, Tralee, Co. Kerry.

Hay Harvest
Forecasts.

The issue of the forecasts commenced on June 15 with those for England, E., the Midland counties, and England, S., and later those for other districts were added. The forecasts were issued daily (excepting on Sundays), and in most instances they were continued for about five weeks. In two or three cases, however, they were continued until the close of the wheat harvest; the additional expense of this extension being borne in one instance by the recipient.

The general result of this repetition of the issue of these forecasts, which began in 1879, is shown by the subjoined table, which has been compiled solely from the reports of the above-mentioned gentlemen, and is entirely independent of any estimate formed within the Office itself:—

SUMMARY of RESULTS. HAY HARVEST FORECASTS, 1885.

Districts.	Names of Stations.	Percentages.				Total percentage of Success.
		Complete Success.	Partial Success.	Partial Failure.	Total Failure.	
SCOTLAND, N.	Golspie and Munlochy - - -	48	49	6	6	88
" E.	Grange, Glamis Aberfeldy, and Longmaddy.	57	31	11	1	88
ENGLAND, N.E.	Belford and Uleoby - - -	60	18	19	3	78
" E.	Thorpe, Ditchingham, and Rothamsted	64	24	10	2	88
MIDLAND COUNTIES	Cirencester and Gerrard's Cross -	63	23	12	2	86
ENGLAND, S.	Maidstone and Downton - -	60	23	12	—	88
SCOTLAND, W.	Dumbarton, Islay, and Stranraer -	51	23	21	5	74
ENGLAND, N.W.	Leyburn, Prescott, and Knutsford -	51	23	21	5	74
" S.W.	Bridgend (Glamorgan), Falfield, Clifton, and Glastonbury.	63	24	11	2	87
IRELAND, N.	Autrim, Moynalty, and Hollymount -	49	27	17	7	76
" S.	Moneygall, Kilkenny, and Ardferf -	50	27	18	5	77
Mean for all districts, 1885 - - -		56	26	15	3	82
" " 1884 - - -		43	42	12	3	85

The result of this year's checking shows that while, owing to a falling off in the number of *partial* successes, the general percentage was a little lower than in the preceding year, the proportion of *completely* successful forecasts (56 per cent.) was much greater than in 1884. The largest general per-centage (88) was reached in Scotland, N., Scotland, E., England, E., and England, S., while the smallest (74) was in Scotland, W., and England, N.W.

Two features in the forecast service of the year are deserving of special mention. The first of these was the establishment at

Ditchingham, in Norfolk, of a system of weather signalling, by means of which the forecasts were made known over a considerable area. The signals consisted of a ball, a drum, and a double cone, and were hoisted at about 5.30 p.m. each day, on the summit of Ditchingham Church tower, and remained up until the forenoon of the following day. The entire arrangements were organised and the expenses arranged for by F. Morrice, Esq., of Ditchingham Hall, who at the close of the time wrote as follows:—"The signals caused a wide difference of opinion as to their utility, and some fierce opposition. On the whole I think they were a great success. During the last week I shall call a meeting of farmers and others interested, and if they agree, I hope another year to extend the system considerably, paying for our own telegrams by subscription, and copying from one church tower to another."

Hay Harvest
Forecasts.

The other feature of interest in connexion with the service was the fact that there were this year several subscribers for the forecasts, one in England, E., two in the Midland counties, and one in England, N.W. These persons were unanimous in their testimony to the success and value of the system. The subscriber in England, E. (Mr. Fergusson), wrote:—"There has not been one mistake during the time I have had them." From the Midland counties one of the recipients (Mr. Harcourt Vernon) wrote:—"My agent informs me that they were wonderfully accurate, and of the greatest help to him and those of my tenants who live near enough to use them." The other subscriber in this district (Lord Vernon) gave practical proof of his appreciation of the forecasts by depositing with the Office at the close of the time a sum of money towards defraying the cost of similar telegrams next year. The subscriber in England, N.W. (Mr. Earle), remarked that the forecasts had "answered every purpose."

Similar testimony to the value of the intelligence was borne by Mr. Jacob Wilson (Northumberland), and Mr. W. Birkbeck (Norfolk), while from Ireland (Co. Meath) Mr. Farrell wrote to say "they have been most useful in regulating farming operations."

In reply to a question by Sir R. Paget, in the House of Commons on March 11th, 1886, Mr. Fowler stated that the Post Office had no objection to the exhibition of forecasts at local post offices, provided space was available, if the persons to whom these forecasts were addressed desired them to be so exhibited instead of being delivered.

Exhibition of
Forecasts at
post offices.

Storm Warnings for the Coasts of the United Kingdom.—In Appendix X. (p. 73) will be found the names of the stations which are furnished with signals for Storm Warnings, in accordance with Circular 717 of the Board of Trade issued in February 1874.

Storm warn-
ings.

These stations were, at the end of March 1886, 141 in number, situated:—

68 in England, 14 in Wales, 38 in Scotland, 15 in Ireland, 3 in the Isle of Man, and 3 in the Channel Islands.

Storm warn-
ings.

The usual comparison has been instituted in the Office between the warnings issued in 1885 and the weather experienced on our coasts, the warnings being tested by the method explained in Appendix VII. (p. 69). The results of the comparison are shown in the following tables:—

RETURN of the Result of the Comparison between the Warnings issued and the Weather experienced in 1885.

Coasts.	Total No. of Orders to hoist and repetitions.	Warnings justified by subsequent Gales. Force 8 and upwards.	Warnings justified by subsequent strong Winds. Forces 6 and 7.	Warnings not justified by subsequent Weather.	Warnings late. Force 9 reached at two Stations before issue.	Warnings partially late. Force 9 reached at one Station before issue.	Warnings in Error owing to telegraphic mistakes.	Storms for which no Warning was issued.
Ireland, South -	74	47	16	10	—	1	—	Jan. 28, Feb. 6, April 5.
„ East -	79	32	27	20	—	—	—	April 5.
Scotland, East -	65	42	13	9	—	1	—	April 20,* Sept. 30, Oct 1.*
„ West -	56	29	14	12	—	1	—	—
England, North-west	78	39	18	19	1	1	—	Jan. 28.†
„ West -	65	41	10	12	—	2	—	Oct. 4.
„ South -	79	46	18	15	—	—	—	Feb. 8,‡ Aug. 12‡, Oct. 4.
„ South-east	36	24	6	6	—	—	—	—
„ East -	59	27	20	12	—	—	—	—
Totals -	591	327	142	115	1	6	—	
Per-centages -	—	55·3	24·0	19·5	0·2	1·0	—	

* These gales were not felt south of Aberdeen.

† Warnings too late to be of practical use.

‡ Warnings issued to Devon and Cornwall; gale extended up Channel.

NOTES, as to the GALES NOT WARNED for, in 1885.

January 28.—Gale in Ireland, S., and England, N.W.—There was no definite indication of this at 6 p.m. 27th, and its advance was so rapid that at 8 a.m. 28th, the centre of depression was close to Mullaghmore. At Valencia the maximum force occurred at 4 a.m. 28th.

February 6.—Gale in Ireland, S.—No indication at 6 p.m. 5th, when the barometer was still rising in the West, with moderate Westerly breezes. Depression advanced so rapidly that Valencia had extreme force at 3 a.m. 6th.

February 8.—Gales in England, S.—The south-west coasts of England were warned on 7th, and at 8 a.m. there was no indication of the gale spreading up-Channel. During the day, however, a remarkable local disturbance was developed over the Irish Sea, and the gale subsequently spread all over England. The 8th, being a Sunday, there were no 2 p.m. reports, and no “special” telegrams could be obtained, or the Channel might have been warned.

April 5.—Gale in Ireland, S. and E.—There were no indications whatever at 6 p.m. 4th, of advance of this gale. Storm warn-
ings.

April 20.—Gale in Scotland, E. (north of Nairn).—Strong winds were anticipated, and mentioned in the forecasts; the forecaster can see no sufficient reason in the conditions prevailing prior to the gale for anticipating its occurrence to the northward of Nairn.

August 12.—Southerly Gale in England, S.—Strong winds were anticipated, and mentioned in the forecasts; the depression, however, moved in a more easterly direction than was anticipated, and the gale spread up the Channel.

September 30 and October 1.—Gale in Scotland, E.—The depression advanced so much more rapidly than was expected that, although the west of Scotland was warned on 29th, the east was not, and the gale spread to that coast during the earlier part of the 30th.

October 4 (night).—Gale in England, S.—The forecaster reports:—"On looking over the charts again I cannot see why the gale should have occurred. Apparently a very shallow local depression moved eastwards over our southern counties, but could scarcely have been expected to cause so much wind with the moderate gradients which existed previously."

The following table contains a comparative statement of the storm warnings and their results in 1885, and in the ten preceding years. It will be seen that the percentage of warnings justified is seven less than in the preceding year:— Comparison of
results for
1885 with
previous years.

Years.	Total No. of Warnings issued.	Warnings justified by subsequent Gales.	Warnings justified by subsequent strong Winds.	Total Warnings justified.	Warnings not justified by subsequent Weather.
1875	248	41·1	35·1	76·2	21·0
1876	265	61·1	21·5	82·6	11·7
1877	475	53·3	25·9	79·2	16·4
1878	485	56·7	20·8	77·5	17·9
1879	509	50·5	25·1	75·6	20·6
1880	390	58·2	24·6	82·8	13·3
1881	454	58·6	23·3	81·9	14·8
1882	503	61·4	21·1	82·5	14·9
1883	610	56·2	21·6	77·8	20·8
1884	461	66·4	20·0	86·4	12·1
1885	591	55·3	24·0	79·3	19·5

The Prevalence of Gales on different Parts of the Coast.—At the suggestion of the Hydrographer tables have been prepared giving the relative frequency of gales according to four quadrants (N. to E., E. to S., &c.) on different districts of the coast. The tables refer to the period of 15 years, 1871–1885.

Fishery Barometers.—In connexion with the subject of storm warnings, the supply of public barometers to fishing stations and other places on the coast may be mentioned. The whole number Fishery.
barometers.

Fishery
barometers.

of stations supplied with these instruments by the Office is at present 169. Of these stations, 60 are in England, 5 in Wales, 46 in Ireland, 54 in Scotland, 3 in the Isle of Man, and 1 in Jersey. The list is given in Appendix IX., p. 72.

Observations
on Ben Nevis.

Observations on Ben Nevis.—The arrangements with the Directors of the observatory established on the summit of Ben Nevis, at a height of 4,000 feet above the sea, detailed in the last Report, have been continued during the year. The Council have continued the annual grant of 100*l.* towards the expenses of the observatory, and have received MS. copies of all the meteorological observations taken, and in addition occasional telegrams, 20 in number.

Atlantic tele-
grams.

Atlantic Telegrams.—The service as described in the last Report has been maintained during the year, and some improvements have been made in the system of reporting (*see* Appendix VII., p. 61).

It may be interesting to repeat here that the expense of these telegrams is borne conjointly by the Central Meteorological Office in Paris, and by the Council. The Chief Signal Office at Washington, under General Hazen, co-operates cordially in the scheme, and has instructed its agents at New York and Boston to collect from incoming steamers, and to transmit to London by telegraph, reports of storms met with west of the meridian of 45° W., as well as of ice or derelict ships seen on any part of the voyage, the latter classes of information being of especial importance to seamen.

Forms are issued to captains of the fast steamers that cross the Atlantic from England, which they are requested to forward to the Signal Office agent on arrival at either of the ports named, and a system of telegraphing has been arranged with the Signal Office. The service was commenced in November 1884.

During the twelve months ending with March 1886, 161 telegrams have been received, of which 83 contained reports of weather, 85 of ice, and 7 of derelict ships.

The general question of the utility of these telegrams as aids to the forecasts of weather is under consideration, and a proposal for their extension so as to embrace a general view of the chief meteorological data over the whole of the United States of America, for every day, which may be made available for all European meteorological administrations, is receiving attention.

The Chief Signal Office has applied for a daily telegraphic report from Valencia, to be forwarded to Washington, and the Council have given instructions for this to be sent.

Publications.

Publications.—The Weekly Weather Report has appeared in its enlarged form, as explained in the last Report, and has been further improved by the addition since 1st January 1885, of two new columns on the last page of each report, giving the number of day-degrees of accumulated heat, both above and below 42° F.,

for each station, in addition to the values for each district which appear on the first page. Publications.

Since January 1, 1886, several other columns have been added to the summary on the first page, showing the difference between the aggregate values for Accumulated Heat, Rainfall, and Bright Sunshine during the current year, and the means for the corresponding periods during the eight years 1878–85. The Rainfall averages have also been greatly improved, as they now refer to the observations for 20 years (1866–85). The Quarterly Summary, issued as an Appendix, gives the Weekly and Progressive values of the same elements for all the districts in each month of the current year—in continuation of the Tables published in Appendices I. and II. for 1884.

The Monthly Weather Report has also appeared regularly.

Simultaneous Observations.—The Office has continued its co-operation in the system of simultaneous observations, taken once in every 24 hours, which was organised in 1874, at the request of the Chief Signal Officer of the United States. Simultaneous observations.

The list of observers on this system at land stations for 1885 is given in Appendix XII., p. 80.

A form for the entry of the simultaneous observations is bound up with every ship's log issued by the Office. In previous Reports it has been stated that the Lords Commissioners of the Admiralty had, at the request of the Council, issued instructions for these observations to be taken (in addition to those made by the Service Regulations) on board each detached ship-of-war on foreign service; or, in the case of a squadron acting together, on board the ship of the senior officer. The number of these observations which have been received during the year from the Royal Navy has been 7,580, and from the Mercantile Marine, 6,270.

PART III.

LAND METEOROLOGY OF THE BRITISH ISLES.

Observatories and Stations.—Records of the climate of the British Isles are received by the Office from certain stations with different degrees of fulness of organisation, which may be arranged in five classes.

1. The Observatories furnished with self-registering instruments by which all the principal meteorological phenomena are recorded continuously, and which thus afford materials for the study of the periodic variations of the meteorological elements. Self-recording observatories.

2. Anemographic stations furnished with instruments registering the wind only. The records from these stations relate to Anemographic stations.

weather as distinguished from climate, and are especially useful in connexion with the passage of storms, and as affording evidence available in the courts of law with respect to collisions at sea, and damage done by wind.

Stations of
Second Order.

3. Stations of the Second Order furnishing climatological information from eye observations taken twice a day. The observers at these stations are all volunteers.

Telegraphic
Reporting
Stations.

4. The Telegraphic Reporting Stations at which eye observations are taken, supplemented in some cases by self-recording aneroids, &c., forming the material upon which the daily weather reports and forecasts are based. The hours of observation at these stations are limited by the requirements of the telegraphic system, as explained in Part II., but the data which they furnish are utilized to afford climatological information for parts of the country where Stations of the Second Order do not exist.

Extra stations.

5. Extra stations furnishing returns with less completeness, and with less detail than those of class 3.

Sunshine
stations.

A continuous record of the amount of bright sunshine is also received from 35 stations in the British Isles, some of which are first or second order stations, whilst from others the sunshine record is alone received.

A fuller account of these several stations and of the methods employed by the Office in dealing with the records they respectively furnish will be found in Appendix XIII., p. 81.

Documents
received.

Appendix XIV., p. 85, contains a list of all documents relating to the land meteorology of the British Isles received at the Office during the year.

Changes in the
observatories.

The instruments were transferred from the old to the new observatory at Falmouth at the commencement of May 1885, and the records have been continued without more than a few days' interruption.

At Glasgow, Professor Grant has succeeded in completing the arrangements for continuing the records of the self-recording instruments by the aid of the Town Council and the Clyde Trustees. The observations have been maintained by Professor Grant since the end of the year 1884 at his own expense. The Meteorological Council have also undertaken to grant a sum of 75*l.* annually towards the cost of this observatory, in return for which they receive copies of the records, as well as returns for the Weekly Weather Reports and observations from a Second Order Station.

The anemograph at Sandwick was removed in December to Swanbister in the parish of Orphir, in the same island, where Mr. W. I. Fortescue has kindly undertaken to continue the record.

The anemograph at Seaham Harbour having been found to be out of order, the Council have determined to remove it from that

station, and to erect it, when repaired, at North Shields, where the Town Council have kindly offered them a suitable site.

Inspection of the Stations.—The self-recording observatories and the anemographic stations (Classes 1 and 2), as well as the Telegraphic Reporting Stations (Class 4), are regularly visited each year by the Inspectors of the Office, before mentioned (p. 9). The extra stations (Class 5) are inspected as opportunity offers. Of the Stations of the Second Order (Class 3), some belong to the Royal Meteorological Society; these are visited by an Inspector appointed by the Society, an allowance being made by the Office toward the cost of the inspection, in accordance with the recommendation of the Treasury Committee (1877). The remaining Stations of the Second Order, which are in immediate connexion with the Meteorological Office, are visited at least once in every two years by the Inspectors of the Office. The Superintendent of the Kew Observatory, Mr. G. M. Whipple, is specially employed to inspect and report on the self-registering apparatus, and on the photographic processes at the observatories. Extracts from the Reports of the Inspectors will be found in Appendix VI., p. 46.

Inspections.

Information supplied to the General Register Office, Dublin.—Reports from nine of the Irish stations of the Office have been regularly supplied to the Registrar General for Ireland, for use in his Weekly and Quarterly Returns.

Reports supplied to Registrar General for Ireland.

Quarterly Weather Report.—Part IV., completing the volume for 1877, has been issued, and good progress has been made with that for 1878.

Publications.

The volume of the Monthly Weather Report for 1885, and the parts of that for 1886 have appeared up to date. This publication takes the place of the Quarterly Weather Report.

The publication of the Hourly Readings for 1883 is nearly completed.

Reports from Stations of the Second Order.—The volume for 1881 has appeared, and that for 1882 is in hand.

The Harmonic Analyser.—The analysis of the thermograms for 1882 has been completed, and the results for the 12 years 1871–82 will appear in the volume of Hourly Readings for 1883. The barograms are now being dealt with and are finished up to the end of 1872.

Harmonic Analyser.

As it seems desirable that the success of the Harmonic Analyser should be generally known, a paper describing the principal results obtained, and a determination of the trustworthiness of the computations will shortly be read before the Royal Society.

Electric Anemometer.—Frequent alterations were necessary to meet the difficulties which occurred before the trial instrument could be made to work satisfactorily at Kew. Success has now been

Electric Anemometer.

attained, and the Council are endeavouring to arrange with the telegraph authorities for mounting it on the hill above the observatory at Valencia, and keeping its connexions with the station in repair. The observatory is much sheltered on the north-west side, and observations of wind taken there are not satisfactory, but it seems likely that the results obtained with the electric anemometer in the proposed position will be of much value for the weather forecasts.

Movement of Clouds.—See Note A., p. 22.

Eruption of
Krakatoa.

Eruption of Krakatoa—The discussion of the large amount of data which has been collected, relative to the remarkable air-wave caused by the great explosion that occurred at the end of the volcanic eruption of Krakatoa, in August 1883, is now completed, and the report, accompanied by several illustrative diagrams, will shortly be submitted to the Committee appointed by the Royal Society to collect information relating to the eruption.

The results may be accepted as indicating with considerable precision the moment of the final explosion, which is now determined to have occurred a few minutes before 10 a.m., local Krakatoa time, of the 27th August 1883; and they confirm generally the approximate determinations of the velocities of the wave's passage round the earth before obtained and laid before the Royal Society.

The Helm
Wind.

The Helm Wind Enquiry.—The Royal Meteorological Society having expressed a desire to institute observations into the phenomena accompanying the peculiar wind of the Eden Valley in Cumberland, called the "Helm Wind" of Cross Fell, and having applied to the Council for assistance in this research, a supply of instruments has been lent to the Society for use when the Helm Wind is prevalent.

LIBRARY.

Library.

The library contains standard works on Meteorology and the allied sciences. It consists at present of about 9,400 volumes and pamphlets, exclusive of charts and MS. records of observations. The books and other documents are accessible to scientific men.

Appendix XV., p. 90, contains a list of the accessions to the library during the year. These have been catalogued upon cards as before, besides being entered in the reference catalogues under (1) Authors, and (2) Subjects.

EXPENDITURE.

Financial.

Appendix XVI., p. 114, shows the receipts and payments during the year ending 31st March 1886. The amount voted by Parliament was 15,300*l.*, as in the previous year.

The following abstract of expenditure shows the amount *properly chargeable* to the year in question, and its distribution under the

various heads, together with the increase or decrease in 1885-86, as compared with the previous year :—

NET EXPENDITURE.	1884-85.	1885-86.	Increase.	Decrease.
<i>General Administration.</i>				
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Payment of Council -	1,000 0 0	1,000 0 0	—	—
Secretary -	800 0 0	800 0 0	—	—
Office -	758 16 0	769 19 0	11 3 0	—
Rent, fuel, and lighting -	716 8 2	707 5 10	—	9 2 4
Alterations to premises, attendance, and contingencies -	424 5 9	403 14 8	—	20 11 1
Expenses incidental to International Meteorological Congress -	—	17 13 4	17 13 4	—
Pensions -	42 16 4	42 16 4	—	—
Special Researches -	989 8 2	728 7 6	—	261 0 8
Land Meteorology -	3,051 1 9	3,160 1 6	108 19 9	—
Weather Information -	4,066 6 10	3,984 15 7	—	81 11 3
Inspections -	560 12 1	549 9 9	—	11 2 4
Ocean Meteorology -	2,445 6 2	2,845 18 3	400 12 1	—
Total -	£ 14,855 1 3	15,010 1 9	538 8 2	383 7 8

(Signed)

R. STRACHEY,
Chairman of the Council.

NOTE A.

MEMORANDUM ON CLOUD PHOTOGRAPHY
BY PROFESSOR STOKES, F.R.S.

The Council have now obtained a series of cloud photographs taken with cameras at two stations at a distance of 800 yards. Each observation involves four photographs, one pair taken simultaneously at the two stations respectively, and another pair taken about a minute after the former. The object was to determine the height, direction of motion, and velocity of various clouds.

In the observation the cameras are set to correspond, so that the lines of collimation in taking the four photographs are in the same direction, save as to certain small corrections of the nature of index errors. A selection is made of cloud-points which can be identified, and these are marked on the four photographs. The co-ordinates of the marked points, referred to vertical and horizontal lines shown on the photograph, can be measured, when it becomes a question of calculation only to determine the position of a cloud-point, both for the first and second moments of observation, and consequently to determine not only its height, but the direction and velocity of its motion. At either moment the photographs determine the two lines of sight for the cloud-point, as seen from the station respectively. If the identification be correct, these lines ought to intersect, which would give a relation between the four observed quantities, namely, the altitudes and azimuths of the cloud-point as seen from the two stations; accordingly three of these observed quantities suffice for the determination, and then the fourth affords a verification.

The requisite formulæ for the reduction are readily obtained from spherical trigonometry. The calculation is perfectly straightforward, and there would be no difficulty about it if we had only a small number of cloud-points to reduce.

It is very desirable, however, to have numerous observations, and to determine, at least at first, a considerable number of cloud-points for each. The calculation, however, as above indicated, though straightforward, is by no means short; and the labour and consequent expense of making very numerous reductions in this manner would be almost prohibitive. Accordingly an endeavour has been made to simplify the process, and a method has been devised which promises to give the results with very little trouble, and at the same time very accurately.

It would be premature to describe this method at length until it shall have been actually put in practice. Suffice it to say that paper positives are taken from the glass negatives, and the cloud-points are marked on them. The four positives are laid in succession on a piece of paper on which a pair of cross-lines had previously been drawn, a correction being made for index errors by slightly shifting the positive from the position in which the cross-lines on it would be in a line with the cross-lines on the paper below. The places are then copied by pricking through.

The lower paper now contains the record of the whole observation, cleared of index errors.

It is easy then to pass the projection of the cloud-points on a plane parallel to the plates, to a projection on a horizontal plane in the following manner:—A wooden frame is prepared containing (1) a lens or combination of short focus with its axis horizontal; (2) a vertical frame, or board with a window, at a horizontal distance from the focus of the lens equal to the focal length of the objective of the camera; (3) a drawing board moveable round a horizontal axis intersecting at right angles the axis of the instrument, and capable of being clamped at any desired angle to the vertical frame.

The drawing board is set at an angle to the vertical equal to the zenith distance of the line of collimation, in the set of observations to be reduced, and the pricked paper is fastened by drawing pins to the vertical frame, the four arms of the cross having been previously marked by pricking through. A piece of paper having been pinned on to the drawing board, the sun's light is reflected into the lens, and the operator marks the centres of the spots of light corresponding to the various holes. This can be done with the utmost precision, if the pin or needle used for pricking has the proper diameter to give, as a result of diffraction, a very fine black centre in the middle of the illuminated patch.

When the four marked points corresponding to the four observations on any one cloud-point are joined, a quadrilateral is formed, two opposite sides of which, if there be no error of observation, will be parallel to each other and to the line joining the stations. If, moreover, the cloud be not moving up or down, but only in a horizontal plane, the sides above mentioned will be equal, and the quadrilateral will be a parallelogram. Two opposite sides represent the drift on the same scale on which the other two sides represent the base line of 800 yards, so that the magnitude and direction of motion are in a manner represented to the eye. Moreover, the height is given by the simple expression $P \cos z_0 \div p$; where P is the product of the base and the horizontal distance from the focus of the lens to the drawing board, which accordingly is always the same, z_0 is the zenith distance of the line of collimation, and is therefore the same for all the cloud-points belonging to the same set, and p is the base side of the parallelogram belonging to any particular cloud-point which is parallel to the base. The calculation is accordingly extremely easy; and, moreover, an inspection of the different figures shows at once the relative heights of the different cloud-points, since the heights are inversely as the parallel sides of the corresponding parallelograms.

The photographs hold out the prospect of giving very good results. It is to be remembered that there is no object in extreme accuracy; what we want is rather numerous observations, so as to get a general insight into the movements of the air at different heights, and under different circumstances.

APPENDIX.

APPENDIX I.

LIST of CAPTAINS (and Officers) who have sent in Logs classed as "Excellent" during the year ending March 31, 1886. The figures opposite to each show the total number of such Logs which they have returned to the Office during the period that they have been observing.

Captain's Name.	Number of "Excellent" Logs.	Ship.
Adamson, A. W. - - -	1	S.S. "Brindisi."
Aldrich, Pelham, R.N. - -	10	H.M.S. "Sylvia."
Atkinson, S. P. H. - - -	1	"Edmonton."
Balfour, Lieut. Andrew, R.N. -	16	H.M.S. "Magpie" and H.M.S. "Rambler."
Barker, Mr. D. W., F.R.Met.Soc.	8	"Superb," S.S. "International," and S.S. "Dacia."
Barlow, B. J. - - -	11	S.S. "Tainui."
Becket, Alexander - - -	8	"Amana."
Bennett, E. C. - - -	11	"Thessalus."
Beresford, Lieut. C. de la Poer, R.N.	7	H.M.S. "Dart."
Bouchette, Francis Baines -	6	S.S. "Montreal."
Brown, E. - - -	1	"Moorhill."
Buchan, James - - -	18	"Coppename."
Burton, George - - -	3	"British Prince" and "British Crown."
Campbell, Archibald - - -	15	S.S. "Circassia."
Campbell, James - - -	4	"Florence."
Carr, H. C. - - -	1	"Superb."
Clapp, Staff Comr. E. S., R.N.	1	L.H. Tender "Richmond."
Clarke, James - - -	5	S.S. "Olbers."
Crutchley, William Caius, R.N.R.	10	S.S. "Ruapehu" and S.S. "Kai-koura."
Cummings, William - - -	1	S.S. "Dracona."
Dart, Leonard C. - - -	6	"Alester."
Davies, Joseph - - -	1	S.S. "Archimedes" and S.S. "Flaxman."
Davison, H. - - -	2	S.S. "Oceanic."
Denham, George - - -	7	S.S. "Erl King" and S.S. "Ocean King."
Deuchars, William - - -	4	S.S. "Jan Mayen."
Donaldson, R. A. - - -	3	S.S. "Glenavon."
Dunbar, John Ivor - - -	5	S.S. "Arracan."
East, Lieut. James H. C., R.N.	5	H.M.S. "Myrmidon."
Ellery, William - - -	15	"Majestic."
England, Thomas - - -	4	"Jane."
Fraser, W. D. - - -	1	"Thomas S. Stowe."
Freeman, G. A. - - -	1	"Hannah and Mary."
Freeman, Thomas William -	20	S.S. "Bellerophon."
Flinton, Benjamin - - -	1	"Dartmouth."
Fullarton, D. - - -	2	"Timaru."

Captain's Name.	Number of "Ex- cellent" Logs.	Ship.
Gordon, James - - -	8	S.S. "City of Agra."
Graham, W. Vincent - - -	2	"Bowfell."
Gray, David - - -	12	S.S. "Eclipse."
Grey, Charles - - -	2	"MacMillan."
Halley, Edward - - -	2	"City of Madras."
Havergal, Lieut. A., R.N. - - -	7	H.M.S. "Sylvia."
Hayward, G. O. - - -	3	S.S. "Durley" and S.S. "Dunrobin Castle."
Heyman, Sub.-Lieut. G. A., R.N. - - -	2	H.M.S. "Myrmidon."
Hird, William - - -	2	"Marlborough."
Holdich, John Peach, R.N.R. - - -	10	"British Envoy."
Hoskyn, R. F., R.N. - - -	10	H.M.S. "Myrmidon."
Howard, Lieut. W. Van Sittart, R.N. - - -	4	H.M.S. "Flying Fish."
Hughes, W. P. - - -	7	"Laomene."
Irving, P. J. - - -	3	S.S. "Republic."
Jeffery, Arthur W. - - -	8	S.S. "Teniers."
Kellett, Arthur - - -	2	S.S. "Calabria."
Kennedy, C. W. - - -	3	S.S. "Germanic."
Ladd, Mr. Richard, F.R.A.S., F.R.Met.Soc. - - -	14	S.S. "Scotia" and S.S. "Minia."
Lalley, William Nicholson - - -	7	S.S. "Derwent" and S.S. "Boyne."
Lambert, H. M., Sub-Lieut., R.N.R. - - -	1	S.S. "Brindisi."
Lewis, B. C. - - -	1	"British Merchant."
Lowe, James - - -	1	"Agnes Muir."
Lugar, W. R. - - -	2	S.S. "Mackay-Bennett."
Lyne, Sub.-Lieut. W. O., R.N. - - -	2	H.M.S. "Flying Fish."
McDougall, Alexander - - -	4	"Auckland" and S.S. "Chittagong."
McLean, Archibald - - -	1	S.S. "Titania."
Maclear, J. F. L. P., R.N. - - -	13	H.M.S. "Flying Fish."
McMillan, John - - -	1	"Canterbury."
Manning, Henry - - -	9	S.S. "Seine."
Maxwell, Joseph - - -	1	"Oamaru."
Mesnard, Thomas - - -	4	"Sierra Miranda."
Metcalfe, John - - -	9	S.S. "Oceanic."
Milne, W. F. - - -	3	S.S. "Esquimaux."
Moignard, P. - - -	1	"Allonby."
Molony, E. J. - - -	4	"British Merchant."
Moore, W. U., R.N. - - -	6	H.M.S. "Dart" and H.M.S. "Ram- bler."
Murdoch, Peter - - -	7	"Sierra Estrella."
Nicholson, Malcolm - - -	4	"St. Vincent."
Norman, Francis - - -	4	"Polestar."
Parry, Moses - - -	8	S.S. "Prydain."
Parsell, Henry - - -	9	S.S. "Adriatic."
Parson, George Fry - - -	5	"Earnock."
Pearson, Charles William - - -	25	S.S. "Strathleven."
Peebles, Robert - - -	10	"Tweeddale."
Plater, H. R. F. - - -	1	"Patriarch."
Pomeroy, H. - - -	2	"Elissa."
Potter, Thomas - - -	3	S.S. "Durham."
Prout, John Cawse - - -	4	"Cape St. Vincent."

Captain's Name.	Number of "Ex- cellent" Logs.	Ship.
Quaile, D. W. A. - -	1	"Orissa."
Randall, William - -	8	"Dynomene."
Renaut, Charles Henry -	15	"Pleione."
Rosseter, William Lawrence -	6	"St. Kilda."
Russell, Charles James -	5	"Candahar."
Sangster, William - -	3	S.S. "Dracona."
Sargent, A. H. - -	1	"Glenlora."
<i>Savage, Lieut. W. M., R.N.</i> -	3	L.H. Tender "Richmond."
Scott, George - -	2	"Iolanthe."
Scott, William - -	16	"Commewyne."
Sheldrake, J. W. - -	1	"Iron Cross."
Simpson, Alexander - -	3	S.S. "Australasian."
Simpson, Alexander - -	16	"Traveller."
Spratley, W. - -	7	S.S. "Mozart."
Sturdee, H. King - -	4	L.H. Tender "Richmond."
Thomson, A. S. - -	6	S.S. "Dacia."
Tindall, W. A. - -	1	S.S. "International."
Trant, W. H. - -	3	S.S. "Venetian."
Travers, H. de la Cour -	3	S.S. "Tartar."
Trott, Samuel - -	6	S.S. "Minia."
Vereker, Comr. Hon. Foley C. P., R.N.	7	H.M.S. "Magpie" and H.M.S. "Rambler."
Walker, Henry - -	5	S.S. "Cephalonia."
Watson, Alexander - -	2	"Elvira."
Whall, W. B. - -	2	S.S. "Lapland."
Wheaton, N. J. - -	3	"Eliza."
Wilson, John - -	1	S.S. "Ethiopia."
Wilson, William - -	2	"Horsa."
Youlden, H. - -	5	"May Hulse."

Names of observers deceased printed in italics.

APPENDIX II.—SHIPS supplied and DOCUMENTS returned during the year ending 31st March 1886.

The number of merchant ships supplied with standard instruments and meteorological logs during the above period was 141. The number of meteorological logs, and documents from Foreign Stations, received during the same period, and registered in the Office, amounted altogether to 290, of which 194 were returned from ships, and the remainder from land stations, outside the British Isles.

List of DOCUMENTS received from FOREIGN LAND STATIONS.

Place.	Observer.	No. of Documents.	Nature of Observations.
Abaco (Bahamas)	G. L. Nairn, Lightkeeper	1	" Lighthouse " Register, January to June 1885.
Aden	Capt. W. K. Thynne, Port Officer.	1	Report on cyclone in Gulf of Aden on June 3, 1885.
Barbados (Commercial Hall)	C. T. Clark and T. L. Ince	2	" Lighthouse " Register, January to December 1885.
" (Joe's River House)	R. B. Walcott, M.D., F.R. Met. Soc.	2	" " " " "
Bermuda	Sergt. J. Green, Medical Staff Corps.	5	Anemograms, March to December 1885.
Beyrout (Lee Observatory)	R. H. West	12	Two observations daily, March 1885 to February 1886.
Breaksea Island (King George's Sound).	W. Lindfield, Lightkeeper	1	" Lighthouse " Register, January 1884 to June 1885.
Cape Juby (North-West Africa)	S. Morris	11	Two observations daily, February 1885 to February 1886.
Cape Pembroke (Falkland Islands)	G. K. Broom, Lightkeeper	2	" Lighthouse " Register, January to December 1885.
Cay Lobos (Bahamas)	R. A. A. Espie and H. J. Fountain, Lightkeepers.	2	" " " " July to December 1884, and July to December 1885.
Cay Sal (Bahamas)	T. R. Thompson, Lightkeeper	3	" " " " July 1884 to December 1885.
Famagusta (Cyprus)	G. Eliades	2	Two observations daily, May and June 1883.

LIST of DOCUMENTS—continued.

Place.	Observer.	No. of Documents.	Nature of Observations.
Gibraltar -	Corpl. T. W. Jent, Med. Staff Corps.	12	Two observations daily, March 1885 to February 1886.
Heligoland -	Lightkeepers -	11	Eight observations daily, March 1885 to February 1886 (except May 1885).
Inagua (Bahamas) -	N. H. E. Garner, Lightkeeper	1	"Lighthouse" Register, January to June 1885.
Indian Ocean -	C. Meldrum, LL.D., F.R.S.	1	Tracks of cyclones in the Indian Ocean in the years 1856-57; 1860-61; 1867-68; 1871-72; 1879-80; and 1884.
Kyrenia (Cyprus) -	E. Joannides -	2	Two observations daily, May and June 1883.
Larnaca (Cyprus) -	A. Tsepis -	2	" " " " " "
Limassol (Cyprus) -	Luigi Bérard -	2	" " " " " "
Nicosia (Cyprus) -	A. Kyriakides -	2	" " " " " "
Papho (Cyprus) -	E. A. Malliotis -	2	" " " " " "
Point King (King George's Sound). -	S. Mitchell -	1	"Lighthouse" Register, January 1884 to June 1885.
Sombrero -	J. A. Richardson, Lightkeeper	2	" " December 1884 to November 1885.
Suva (Fiji) -	J. D. W. Vaughan -	12	One observation daily, December 1884 to December 1885.
Tonga (Tubou College) -	J. E. Moulton -	1	Three observations daily, June 1875 to November 1880.
Trebizond -	—	1	Monthly abstract of three observations daily, 1880-84.

List of Documents received from SHIPS.

Captain's Name.	Ship.	Tons.	Owners.	Voyage.	Year.
¹ Adamson, A. W.	S.S. Brindisi	2,143	P. & O. Steam Navigation Co., London.	To and from Calcutta, via Suez	1885-86
² Alderton, Thomas	S.S. Nepal	1,988	"	Two voyages between Gibraltar and Calcutta, via Suez	1884-85 1885
³ Aldrich, Pelham, R.N.	" Sylvia	" 1,050	" H.M.S.	To Bombay, China, and home, via Suez	
"	"	"	"	Abstract of observations, and remarks on wind and weather on the coast from Durban to Delagoa Bay	1884
"	"	"	"	Surveying off Cape of Good Hope, and voyage to St. Helena, Gibraltar, and Malta	1884-85
"	"	"	"	Surveying off Cape of Good Hope, and voyage to St. Helena	1885
"	"	"	"	From St. Helena to Gibraltar and Malta, and observations while in port	1885
Atkinson, S. P. H.	Barque Edmondton	1,298	J. Ross, Liverpool	To Acapulco, Iquique, and home	1884-86
Balderston, R. J.	Belfast	1,865	R. Brocklebank, Liverpool	To and from Calcutta	1884-85
⁵ Barker, D. W., F.R. Met. Soc.	S.S. Dacia	1,473	India Rubber and Gutta Percha Tel. Works Co., London.	To Karachi and Antwerp, via Suez	1885-86
⁶ Barlow, Brabazon J., R.N.R.	S.S. Tainui	3,231	Shaw Savill and Albion Co., Lim., London.	To Cape Town, Hobart, Lyttelton, Rio Janeiro, and home	1885
"	"	"	"	To Cape Town, Hobart, Port Chalmers, Rio Janeiro, and home	1885
"	"	"	"	To Cape Town, Wellington, Rio Janeiro, and home	1885-86 1885-86
⁷ Barrett, Thomas	Barque Craighurn	1,997	R. Shankland, Greenock	To and from Calcutta	1884-85
"	Glenburn	1,476	"	"	

List of Documents, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage.	Year.
Becket, Alexander	Amana	1,299	J. Smith, Glasgow	To Portland (Oregon), Havre, and home	1884-85
"	"	"	"	To Colombo, Cochin, and home	1885-86
Belding, Rawstin	Barque Pacific	429	B. R. Hennessy, Swansea	To and from Chile	1884-85
Bence, J. F.	Barque Caldbeck	747	W. H. Nicholson, Liverpool	From Lat. 0° 1 N. Long. 26° W. to Valparaiso	1883
Bennett, E. C.	Thessalus	1,782	T. Carmichael, Greenock	To Sydney, San Francisco, Newcastle (N.S.W.), San Francisco, Queens-town, and Hull	1884-85
Bennett, W. H.	Loch Venachar	1,485	J. P. Kidston, Glasgow	To and from Melbourne	1885-86
Bouchette, F. B.	S.S. Montreal	3,308	Mississippi & Dominion S.S. Co., Lim., Liverpool.	Four voyages to and from Halifax (N.S.)	1884-85
"	"	"	"	Five voyages to and from Quebec	1885
Brehant, G. J.	Barque Achievement	499	J. Barker, Liverpool	To Autofagusta and Trieste	1884-85
Brown, E.	Barque Moorhill	484	E. Brown, Liverpool	To Colon (Aspinwall), Galveston, and home	1885-86
Brown, James	S.S. Elysia	1,745	A. C. Henderson, Glasgow	Two voyages to and from Boston	1885
Buchan, James	Barque Coppename	316	J. C. Pearson, Glasgow	To and from Bahia	1885
"	"	"	"	" Surinam	1885-86
Burton, George	S.S. British Crown	2,548	British Shipowners Co., Lim., Liverpool.	Five voyages to and from Philadelphia	1884-85
"	"	"	"	Three "	1885
Calligan, M.	S.S. a	471	Waterford S.S. Co., Lim., Waterford.	Trading between Liverpool, Waterford, and Bristol	1885
"	S.S. Zephyr	411	"	"	1885
"	"	"	"	"	1885
* Campbell, Archibald	S.S. Circassia	4,272	The Barrow Steam Ship Co., London.	Four voyages to and from New York	1884-85

List of Documents, &c.—continued.

Captain's Name,	Ship,	Tons.	Owners,	Voyage.	Year
⁸ Campbell, Archibald	S.S. Circassia -	4,272	The Barrow Steam Ship Co., London.	Five voyages to and from New York -	1885
Campbell, James	Barque Florence	436	J. T. Cowley, London	To Buenos Ayres, Valparaiso, Manzanillo (Mexico), and home -	1883-84
Carr, H. C. -	Superb -	1,451	H. Green, Blackwall	To and from Melbourne -	1884-85
⁹ Chaddock, George	Barque Elissa -	409	H. F. Watt, Liverpool	Home from Cape Town -	1885
¹⁰ Clapp, Staff-Comr. E. S., R.N.	Schooner Richmond -	183	Board of Trade, London	At the Bahamas -	1885-86
Clarke, James	S.S. Olbers -	2,168	Liverpool, Brazil, and River Plate Steam Navigation Co., Liverpool.	Two voyages to Lisbon, Madeira, Bahia, Rio Janeiro, New York, and home -	1885
" "	" "	"	" "	Two voyages to Lisbon, Rio Janeiro, New York, and home -	1885-86
Collingwood, John	Barque Asterion -	509	R. H. Penney, Brighton	To and from New Zealand -	1884-85
Crowell, S. O.	S.S. Alpha -	653	W. Cunard, London	Between Halifax and Jamaica, via Bermuda -	1885
" "	" "	"	" "	Two voyages between Halifax and Jamaica, via Bermuda -	1885
¹¹ Crutchley, W. C., R.N.R.	S.S. Kaikoura	2,885	New Zealand Shipping Co., Christchurch, N.Z.	To Cape Town, Wellington, Rio Janeiro, and home -	1885
" "	" "	"	" "	To Santa Cruz, Cape Town, New Zealand, Rio Janeiro, and home -	1885
¹² Cummings, Wm.	S.S. Dracona -	1,245	W. Thomson, Dundee	To and from New Zealand, via Cape -	1885-86
Dark, Samuel	Blaigowrie -	1,550	G. W. Gray, Glasgow	To and from Montreal -	1885
Dart, L. C. -	Alcester -	1,597	R. C. Haws, Liverpool	To Melbourne, Calcutta, and home -	1885-86
Davies, Joseph	S.S. Archimedes	966	Liverpool, Brazil, and River Plate Steam Navigation Co., Linn., Liverpool.	To Bombay, Rangoon, and home -	1884-85
				To Rio Janeiro, Santos, New York, and home -	1885

List of Documents, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage.	Year.
Davies, Joseph	S.S. Flaxman	1,418	Liverpool, Brazil, and River Plate Steam Navigation Co., Lim., Liverpool.	Two voyages to and from River Plate, &c.	1885
Davison, H.	S.S. Oceanic	2,440	Oceanic Steam Navigation Co., Lim., Liverpool.	From Yokohama to San Francisco	1884
Denham, George	S.S. Ocean King	1,606	W. Ross, Glasgow	Three voyages to and from Quebec	1885
Deuchars, William	S.S. Jan Mayen	469	The Dundee Polar Fishing Co., Dundee.	To St. John's, Greenland, and home	1885
Donaldson, James	Gareloch	1,177	P. Rintoul, Glasgow	To Melbourne, Port Pirie, and home	1884-85
Donaldson, R. A.	S.S. Glenavon	2,985	J. McGregor, London	To China, Japan, New York, via Suez, and home	1885
"	"	"	"	To and from China, via Suez	1885-86
Dunbar, J. I.	S.S. Arracan	1,856	British and Burmese Steam Navigation Co., Glasgow.	To and from Hongkong, via Suez	1885
"	"	"	"	"	"
Dunn, James	Lord Wolseley	2,518	Irish Shipowners Co., Lim., Belfast.	One voyage to and from Philadelphia; one to Philadelphia, Hogo (Japan), and towards San Francisco	1883-84
Ellery, William	Majestic	1,884	T. and R. Brocklebank, Liverpool.	To and from Calcutta	1884-85
England, Thomas	Barque Jane	636	P. Sutherland, Liverpool	One voyage to and from Quebec; one to and from Dalhousie	1885
Flinton, Benjamin	Barque Dartmouth	915	Merchant Shipping Co., Lim., London.	To Hong-Kong and Havre	1864-85
Fraser, W. D.	Barque Thomas S. Stowe	686	A. Horsfall, Liverpool	To Buenos Ayres, Adelaide, Port Pirie, and home	1884-85
Freeman, G. A.	Barque Hannah and Mary.	380	J. Paul, Lynn	To Demerara, Darien (U.S.A.), and home	1884-85

LIST of DOCUMENTS, &c.—continued.

Captain's Name,	Ship.	Tons.	Owners.	Voyage.	Year.
16 Freeman, T. W.	S.S. Bellerophon	1,397	Oceanic Steam Navigation Co., Liverpool.	To and from China, via Suez	1885
16 " "	" "	"	" "	" "	1885
Fullarton, D.	Timaru	1,306	Shaw, Savill, and Albion Co., Lim., London.	To and from Otago	1885-86
17 Gay, W.	S.S. Newington	713	R. Mackie, Leith	To and from Algoa Bay, &c.	1885-86
Gordon, James	S.S. City of Agra	2,133	G. Smith, Glasgow	To and from Calcutta, via Suez	1886
7 Graham, W. V.	Barque Bowfell	1,002	R. Brocklebank, Liverpool	To and from Manila	1884-85
Gray, David	S.S. Eclipse	435	D. Gray, Peterhead	To and from Greenland	1885
Grey, Charles, R.N.R.	Mac Millan	1,450	J. McMillan, Jun., Dumbarton	To Calcutta	1884-85
Halley, Edward	City of Madras	1,577	G. Smith, Glasgow	To and from San Francisco	1884-85
Hayward, G. O.	S.S. Dunrobin Castle	1,797	Sir T. Brassey, M.P., Westminster	To and from Natal, &c.	1885-86
Hird, William	Marlborough	1,124	J. Leslie, London	To and from Otago	1884-85
" "	" "	"	" "	" "	1885-86
Holdich, J. P., R.N.R.	British Envoy	1,265	J. Coupland, Leicester	To and from San Francisco	1884-85
Horne, James	Loch Sloy	1,225	H. J. Watson, Glasgow	To and from Melbourne	1884-85
18 Hoskyn, R. F., Commr. R.N.	Myrmidon	877	H.M.S.	Surveying in the Red Sea	1884-85
19 " "	" "	"	" "	From Java to Port Darwin, Thursday Island, Townsville (Queensland), and Sydney	1885
Hughes, W. P.	Laomene	1,746	D. Fernie, Liverpool	To and from Rangoon	1884-85
Irving, P. J.	S.S. Republic	2,187	Oceanic Steam Navigation Co., Liverpool.	Five voyages to and from New York	1884-85
" "	" "	"	" "	Six voyages to and from New York	1885-86
Jack, Alexander	Clan Robertson	1,625	T. Dunlop, Glasgow	To and from San Francisco	1884-85
Jameson, John	S.S. India	1,592	T. Henderson, Glasgow	To Mediterranean Ports, New York, and home	1885
Janes, George	Middlesex	1,742	G. Marshall, London	To Sydney, Chittagong, and home	1885-86

LIST of DOCUMENTS, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage.	Year.
Jeffery, A. W., F.R. Met. Soc.	S.S. Temiers -	-	-	Two voyages from Antwerp to River Plate and back -	1884-85
Johnson, Daniel	Barque Dumfriesshire -	1,321	J. Goffey, Liverpool	To Sydney, and home from San Francisco -	1885
Jones, Richard	Thomas Hilyard -	1,500	D. V. Roberts, St. John, N.B.	To Simon's Town and South Pass, U.S.A. -	1885
²⁰ Kellett, Arthur	S.S. Calabria -	2,031	Telegraphic Construction and Maintenance Co., London.	To and from Suakim, via Suez -	1885
²¹ Kennedy, C. W.	S.S. Germanic -	3,150	Oceanic Steam Navigation Co., Liverpool.	Six voyages to, and five from New York -	1885
King, J. W.	Philomene -	1,423	D. Fernie, Liverpool	To Calcutta and New York -	1884-85
Lailey, W. N.	S.S. Boyne -	1,306	Mercantile S. S. Co., Lim., London.	One voyage to and from Port Said; one to Point de Galle, Akyab, and back to Malta, via Suez -	1884-85
"	" -	"	"	From Malta to Liverpool. To Port Said, Odessa, and Amsterdam. Two voyages to and from Alexandria -	1885
Lassesen, Peter	Barque Colin Archer -	-	-	To Algoa Bay, Alleppy (Malabar Coast), and Oran (Algeria) -	1884-85
Lewis, B. C.	British Merchant -	1,696	British Shipowners Co., Lim., London.	From Simon's Bay to Calcutta, and home -	1885-86
Livermore, A. P.	Barque Kingdom of Saxony.	538	J. R. Anderson, London -	From lat. 35° S., long. 108° E., to Freemantle, Rangoon, Valparaiso, &c., and towards home to lat. 54° S., long. 77° W. -	1884-85
Livingstone, Alexander.	Mount Carmel -	1,596	W. Service, Glasgow -	To Sydney, Newcastle (N.S.W.), Bassein, and home -	1884-85
²² Lloyd, R. S.	S.S. Buccaneer -	460	C. J. D. Christie, Newcastle-on-Tyne.	To West Coast of Africa, and cable laying off the Coast -	1885

List of Documents, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage.	Year.
²³ Lowe, James	Barque Agnes Muir	851	J. Killick, London	To Yokohama, Swatow, Hong-Kong, Manila, and home	1883-85
²⁴ Lugar, W. R.	S.S. Mackay-Bennett	1,013	J. De Castro, London	To Halifax, and lying in harbour	1885
²⁴ " "	" "	"	" "	In Halifax Harbour and North Atlantic, then to St. John's, and home	1885
²⁵ Lunham, R. D.	S.S. Ceylon	2,149	J. L. Clark, London	To Madeira, West Indies, New Orleans, Havana, Azores, and home; two voyages to and from Trondjem; two voyages round coast of British Isles	1885
²⁶ " "	" "	"	" "	Round coast of British Isles	1885
McDougall, A.	S.S. Chittagong	1,241	Indian S.S. Co., Lim., Glasgow	To and from Suakim, via Suez	1885
McGonnell, James	Barque Forest Queen	549	S. Lowther, Belfast	To and from Miramichi	1885
McLean, Archibald	S.S. Titania	1,406	J. Donaldson, Glasgow	Five voyages to and from Montreal	1885
²⁷ Maclear, J. F. L. P., R.N.	Flying Fish	940	H.M.S.	At Hong-Kong and Manila	1884-85
²⁸ " "	" "	"	"	Surveying in China Sea, and thence to Arros Islands	1885
McMillan, John	Canterbury	1,245	Shaw, Savill, and Albion Co., Lim., London.	To and from Lyttelton	1884-85
²⁹ Manning, Henry	S.S. Seine	3,579	Telegraph Construction and Maintenance Co., Lim., London.	To Perim, Zanzibar, Mozambique, and home, via Suez	1885
Maxwell, Joseph	Oamaru	1,306	Shaw, Savill, and Albion Co., Lim., London.	To and from Wellington	1884-85
Meredith, John	Brigantine Meg Merries.	—	"	From Fiji to the New Hebrides, Solomon Islands, and back	1884-85
" "	" "	—	"	Two voyages from Fiji to the New Hebrides, and back.	1885
Mesnard, Thomas	Sierra Miranda	1,808	A. M. Anderson, Liverpool	To Madras, Rangoon, and home	1885

List of Documents, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage.	Year.
Metcalfe, J. -	S.S. Oceanic -	2,440	Oceanic Steam Navigation Co., Lim., Liverpool.	Between San Francisco and Hong- Kong, via Yokohama -	1884-85
³⁰ Miller, A. T., R.N. -	Conway -	-	Training Ship -	Off Birkenhead -	1885
³¹ Milne, W. F. -	S.S. Esquimaux -	466	Dundee Whale and Seal Fishing Co., Dundee.	To St. John's, Davis Straits, and home	1885
Mitchell, George -	S.S. Trinaeria -	1,466	T. Henderson, Glasgow -	One voyage to Mediterranean ports, New York, and home; one voyage to Malaga -	1885
Moffatt, H. Y. -	S.S. City of Venice -	2,092	G. Smith, Glasgow -	In the Red Sea -	1885
Moignard, Ph. -	Barque Allonby -	1,400	P. Iredale, Liverpool -	To Sydney, San Francisco, and home -	1884-85
Molony, E. J. -	British Merchant -	1,696	British Shipowners Co., Lim., London.	To Melbourne, Newcastle (N.S.W.), San Francisco, Newcastle (N.S.W.), Wilmington, San Francisco, and Havre -	1883-85
" Moodie, G. -	" S.S. State of Georgia -	" 1,507	" The State S.S. Co., Lim., Glasgow	To Simon's Bay -	1885
³² Moore, W. U., R.N. -	Dart -	470	H.M.S. -	Seven voyages to and from New York - From Sydney to Fiji, Gilbert Islands, Marshall Islands, and back to Sydney	1884-85
" -	" -	"	" -	At Australian station -	1884
" -	" Rambler -	835	" -	Surveying in China Sea -	1884-85
³³ Murdoch, Peter -	Sierra Estrella -	1,436	A. M. Anderson, Liverpool -	To Bombay, Rangoon, and home	1885
N.W., George -	S.S. Annie -	1,247	J. Gray, Whitby -	Two voyages to and from Baltimore -	1885
³⁴ Nicholson, Malcolm -	St. Vincent -	891	T. L. Devitt, London -	To and from Adelaide -	1885-86
Norman, F. -	Barque Polestar -	625	J. Lyne, Liverpool -	To and from Callao, &c. -	1884-85

LIST OF DOCUMENTS, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage.	Year.
Paury, Moses	S.S. Prydain	1,252	Prydain S.S. Co., Lim., Nevin	One voyage to and from Odessa; one to and from New York; one to Genoa, and New York	1884-85
"	"	"	"	From Palermo to New York, Leith, Trieste, Marseilles, New York, Copenhagen, Helsingfors, and home.	1885
35 Parsell, Henry	S.S. Adriatic	2,458	Oceanic Steam Navigation Co., Liverpool.	Five voyages from and to New York	1885
"	"	"	"	Six voyages from, and five to, New York	1885
Parson, G. F.	Earnock	1,198	W. Fraser, London	To and from Launceston, Tasmania	1884-85
36 Pearson, C. W.	S.S. Strathleven	2,436	W. Burrell, Glasgow	From New York to China and Japan, via Suez	1885
"	"	"	"	From Hong-Kong to Yokohama, Shanghai, New York, via Suez, and Gibraltar	1885-86
Peebles, Robert	Barque Tweedsdale	1,403	J. Roxburgh, Glasgow	To Melbourne, Java, and home	1885
Plater, H. R. F.	Patriarch	1,339	W. Henderson, Aberdeen	To and from Sydney	1885-86
Pomeroy, Herbert	Barque Elissa	409	H. F. Watt, Wavertree, Liverpool.	To and from Galveston	1883-84
37 Potter, Thomas	S.S. Durham	1,466	W. S. Bailey, Hull	Trading to and from Mediterranean Ports	1885
38 Powles, F. W.	S.S. Essequibo	1,341	R. Mail Steam Packet Co., London.	To and from West Indies	1885-86
Prout, J. C.	Cape St. Vincent	1,422	A. P. Lyle, Greenock	To and from Java	1884-85
Quaile, D. W. A.	Orissa	1,199	R. Kerr, Greenock	To and from Java	1884-85
Randall, W.	Dynomene	1,900	D. Fernie, Liverpool	From New York to Bombay, Calcutta, and home	1884-85

List of DOCUMENTS &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage.	Year.
⁹⁹ Reed, W. J.	The Hahnemann	1,937	The Hahnemann Ship Co., Liverpool.	To Singapore, Calcutta, and towards home to lat. 20° N., long. 36° W.	1884-85
Renaut, C. H.	Pleione	1,092	The Shaw, Savill, and Albion Co., Lim., London.	To and from Wellington (N.Z.)	1884-85
Rosseter, W. L.	Barque St. Kilda	865	A. T. Parker, Liverpool	To and from Demerara	1885
"	"	"	"	"	1885-86
Russell, C. J.	Candahar	1,418	R. Brocklebank, Liverpool	To and from Calcutta	1884-85
Sangster, William	S.S. Dracona	1,245	W. Thomson, Dundee	One voyage to and from Montreal, one to Genoa, Halifax (N.S.), and home; one to Ceylon, via Suez	1884-85
"	"	"	"	One voyage home from Ceylon, via Suez; one to and from Montreal	1885
"	"	"	"	One voyage to and from Montreal; one to and from Kurrachee, via Suez	1885-86
Sargent, A. H.	Barque Glenlora	774	Shaw, Savill, and Albion Co., Lim., London.	To and from Auckland	1884-85
¹⁰ Savage, W. M., R.N.	Schooner Richmond	183	Board of Trade, London	At the Bahamas	1885
¹⁰ Scott, George	"	"	"	"	1885
"	Iolanthe	1,593	J. F. Cruickshank, Liverpool	From New York to Shanghai	1884-85
"	"	"	"	From lat. 0°-45° N., long. 105° E., to Shanghai, Maula, and San Francisco	1885
Scott, William	Barque Commewyne	315	J. Grierson, Glasgow	To Surinam, Barbados, and home	1885
Shaw, Gilbert	S.S. Beta	1,087	W. Cunard, London	Between Halifax and Jamaica, via Bermuda	1885
"	"	"	"	Four voyages between Halifax and Jamaica, via Bermuda	1885-86
Sheldrake, J. W.	Iron Cross	1,508	D. Fernie, Liverpool	To Calcutta, New York, and home	1884-85

List of Documents, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage.	Year.
Simpson, Alexander	S.S. Australasian	2,343	W. Henderson, Aberdeen	To Cape Town, Adelaide, Sydney, Suakim, Bombay, and home via Suez	1884-85
"	"	"	"	To and from Hobart, via Cape Town	1885
"	Schooner Traveller	196	A. Simpson, Peterhead	From Copenhagen to Ivigtut, Copenhagen, Dantzic, Dunkirk, and Peterhead	1885
Sinclair, J.	Barque City of Tanjore	768	T. C. Guthrie, Glasgow	From lat. 39° S., long. 5° E., to Mauritius	1884
³⁰ Smith, J. H., R.N.R.	Worcester	—	Training Ship	Off Greenhithe	1884-85
Spradly, W.	S.S. Mozart	1,304	Liverpool, Brazil, and River Plate Steam Nav. Co., Liverpool.	One voyage to and from Monte Video; one to Rio Janeiro, New York, and home	1885
Stealey, John	Barque Emily Waters	446	G. S. Richardson, Swansea	To and from Valparaiso	1885
Stewart, J. R.	S.S. Ayreshire	871	J. Turnbull, Glasgow	To Aspinwall, New Orleans, Lisbon, and home	1884-85
Sturdee, H. K.	Schooner Richmond	183	Board of Trade, London	At the Bahamas	1885
"	"	"	"	"	1885
⁷ Thomson, A. S.	S.S. Dacia	1,473	The India Rubber, Gutta Percha, and Tel. Works Co., London.	To and from Cay West, Florida, U.S.A.	1885
Thompson, R. D.	Cosmo	1,220	J. G. Ross, Quebec	To Callao, Newcastle (N.S.W.), Manila, and Sandy Hook	1883-85
⁴⁰ Tindall, W. A.	S.S. International	1,004	"	To and from Suakim, via Suez, and observations at Suakim	1885
⁴¹ Tomlin, P. S.	S.S. Ballarat	4,752	P. & O. Steam Navigation Co., London.	To and from Melbourne, via Suez	1885
Trant, W. H.	S.S. Venetian	2,733	S.S. Venetian Co., Liverpool	Five voyages to and from Boston	1884-85
"	"	"	"	"	1885-86

List of Documents, &c.—continued.

Captain's Name,	Shi	Tons.	Owners.	Voyage.	Year.
⁴² Travers, H. do la Cour.	S.S. Tartar	2,755	Union S.S. Co., Lim., Southampton	To and from Cape Town, &c.	1885
⁴³ Trott, Samuel	" S.S. Minia	1,350	" Anglo-American Telegraph Co., London.	Two voyages to and from Cape Town - At Halifax, thence to Falmouth and Brest	1885
⁴³ "	"	"	"	Cable laying in North Atlantic	1885
⁴³ "	"	"	"	"	1885-86
Trunks, H.	Barque Aldborough	1,425	British and Eastern Shipping Co., Lim., Liverpool.	To and from San Francisco	1884-85
³³ Vereker, Hon. F. C. P., R.N.	Rambler	835	H.M.S.	To Diego Garcia, via Suez	1885
³³ "	"	"	"	From Diego Garcia to Singapore and China, and surveying in China Sea	1885
³³ "	"	"	"	Surveying in China Sea	1885
Wait, A. McLean, R.N.R.	S.S. Spartan	2,223	Union S.S. Co., Lim., Southampton	Two voyages to and from Cape Town &c.	1884-85
⁴⁴ "	"	"	"	"	1885
Walker, Henry	S.S. Cephalonia	3,490	Cunard S.S. Co., Lim., Liverpool	Five voyages to and from Boston	1885
⁴⁵ Ward, John	Pegasus	2,564	T. C. Wilkinson, Liverpool	To and from Calcutta	1884-85
⁴⁶ Watson, Alexander	Barque Elvira	404	H. R. Watt, Wavertree, Liverpool	To Monte Video, Mauritius, Rangoon, Chittagong, Barbados, Jamaica, and home	1884-86
⁹ Watt, H. F.	Barque Elissa	409	"	From Rangoon to Cape Town	1885
⁴⁷ West, Frederick	S.S. Port Adelaide	1,783	Anglo-Australasian Steam Nav. Co., London.	To and from Australia, via Suez	1885-86
⁴⁸ Whall, W. B.	S.S. Lapland	823	Sir T. Brassey, M.P., Westminster	Trading between Liverpool and Hamburg	1885

List of DOCUMENTS, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage.	Year.
Wheaton, N. J.	Barquentine Eliza	299	J. H. Goodyear, Liverpool	To Rio Grand do Sul, Pernambuco, Barbadoes, Guadeloupe, Nantes, and home. One voyage also to and from Madeira	1884-85
"	"	"	"	To and from Demerara	1885-86
White, J.	Barque Guyana	593	A. Crum Ewing, Glasgow	To and from Mauritius	1884-85
Wilson, John	S.S. Ethiopia	2,604	Barrow S.S. Co. Lim., Barrow	Five voyages to and from New York	1884-85
"	"	"	"	"	1885
Wilson, William	Barque Horsa	1,128	Star Nav. Co., Liverpool	To and from Java	1884-85
Youlden, H.	Barque May Hulse	463	J. Ransom, Southampton	To Buenos Ayres, Pisagua, and home	1884-85

In cases distinguished by marginal numbers the Meteorological Registers were kept chiefly by Officers, as follows:—

1 Kept by H. M. Lambert, R.N.R., 2nd Officer.	37 Assisted by W. H. Ross, 2nd Officer.
2 Kept by Alfred Baker and G. Philipps, 4th Officers.	38 Kept by W. H. Bennett Trieg, 3rd Officer.
3 Kept by G. Philipps, 4th Officer.	39 Assisted by Mr. Kendrick, 2nd Officer.
4 Kept by Walter Folgate, R.M.L.I., under the direction of Lieut. A. Haverall, R.N.	40 Kept by D. Wilson Barker, F.R.Met. Soc., Chief Officer, assisted by S. C. Poland, 3rd Officer.
5 Assisted by Messrs. Morton, Broom, and Poland.	41 Kept by S. de B. Lockyer, 2nd Officer.
6 Kept by E. J. Evans, 2nd Officer.	42 Kept by G. C. Gordon, 2nd Officer.
7 Assisted by Officers.	43 Kept by Richard Ladd, F.R.A.S., F.R.Met.Soc.
8 Kept by Thomas Stewart, 3rd Officer.	44 Kept by G. F. Weedon, 4th Officer.
9 Kept by G. Macpherson and T. Calver.	45 Assisted by E. Morris, 3rd Mate.
10 Kept by H. King Sturdee.	46 Kept by Frank Edge, 1st Officer, and T. G. Partington, 3rd Officer.
11 Kept by R. W. Trenaman, 2nd Mate.	47 Kept by D. E. Jaruleson, 2nd Officer, and W. H. Guy, 3rd Officer.
12 Kept by H. J. Blanchard, 4th Officer.	48 Assisted by J. Ross, 1st Officer.
13 Kept by H. W. Bennett, 4th Officer.	
14 Kept by Officers.	
15 Kept by Henry Hayes, 3rd Officer.	
16 Kept by Robert Inkster.	
17 Kept by Capt. George Scott, Passenger.	
18 Kept by Lieutenant James East, R.N., and Sub-Lieutenant Gerald A. Heyman, R.N.	

APPENDIX III.

INSTRUMENTS supplied, &c. to the Royal Navy.

Per Account.	Baro- meters.	Ane- roids.	Thermometers.				Hydro- meters.
			Ordinary.	Max.	Min.	Screens.	
April 1st, 1885, afloat -	184	377	1,097	164	135	108	126
Issued since -	66	123	363	73	64	28	88
Returned since -	250	500	1,460	237	199	136	214
	59	103	245	34	36	17	80
April 1st, 1886, afloat -	191	397	1,215	203	163	119	134

INSTRUMENTS supplied, &c. for use at Naval Stations.

April 1st, 1885, in use -	74	113	255	21	33	5	16
Issued since -	8	5	42	4	3	2	4
Returned since -	82	118	297	25	36	7	20
	3	8	38	7	6	—	—
April 1st, 1886, in use -	79	110	259	18	30	7	20

DISPOSITION of ADMIRALTY INSTRUMENTS on April 1st, 1886.

Afloat in Royal Navy -	191	397	1,215	203	163	119	134
In use at stations -	79	110	259	18	30	7	20
In store at M.O. -	71	54	107	40	72	8	44
Chatham -	7	7	4	5	5	6	4
Sheerness -	4	7	26	5	4	3	9
Portsmouth -	6	7	10	12	13	6	8
Devonport -	5	4	12	9	15	1	28
Queenstown -	3	3	1	1	1	—	8
Gibraltar -	1	4	2	—	—	—	4
Malta -	5	11	11	2	4	—	18
Halifax -	5	10	28	5	6	—	14
Bermuda -	6	10	34	2	4	—	15
Jamaica -	3	2	12	2	2	—	—
Cape of Good Hope -	5	10	47	8	9	3	31
Trincomalee -	2	3	21	3	3	—	—
Hong Kong -	13	13	51	4	4	2	9
Coquimbo -	1	6	24	3	2	—	19
Sydney -	6	5	32	5	5	—	—
Esquimalt -	6	4	10	2	2	—	—
Total, April 1st, 1886 -	419	667	1,906	329	344	155	365
Lost, &c. since April 1st, 1885 -	—	7	139	9	—	8	6
Under repair -	8	—	—	—	—	—	—

APPENDIX IV.

INSTRUMENTS supplied, &c. to Mercantile Marine.

Per Account.	Baro- meters.	Com- passes.	Thermometers.				Hydro- meters.
			Ordinary.	Max.	Min.	Screens.	
April 1st, 1885, afloat -	139	—	768	—	1	144	453
Issued since -	107	—	631	1	—	101	274
Returned since -	246	—	1,399	1	1	245	727
	107	—	625	—	—	103	324
April 1st, 1886, afloat -	139	—	774	1	1	142	403

INSTRUMENTS at Stations, viz., Telegraph Offices, Observatories,
Navigation Schools, &c.

April 1st, 1885, in use -	113	4	261	64	61	36	41
Issued since -	14	—	36	5	2	2	—
Returned since -	127	4	297	69	63	38	41
	13	—	14	3	2	—	16
April 1st, 1886, in use -	114	4	283	66	61	38	25

DISPOSITION of Board of Trade Instruments on April 1st, 1886.

In merchant ships -	139	—	774	1	1	142	403
In use at stations -	114	4	283	66	61	38	25
In store at M.O. -	15	1	98	1	36	65	80
At Liverpool Agency -	9	7	47	—	—	14	20
„ Aberdeen „ -	5	—	33	—	—	3	21
„ Glasgow „ -	7	—	30	—	—	6	18
„ Dundee „ -	11	—	44	—	—	12	36
„ Hull „ -	5	—	27	—	—	8	20
„ Southampton „ -	6	—	28	—	—	8	25
„ Cardiff „ -	2	—	13	—	—	4	14
Total, April 1st, 1886 -	313	12	1,377	68	98	300	662
Lost, &c. since April 1st, 1885	—	—	144	—	—	19	62

APPENDIX V.

LIST of STATIONS reporting Meteorological Observations by Telegraph to the Office on 31st March 1886, with the Names of Observers.

*†Sumburgh Head -	Rev. W. Brand - - -	Minister of Dunrosness.
*†Stornoway - -	D. MacDonald - - -	Late Officer S.S. "Great Eastern."
Wick - - -	J. Sinclair - - -	Watchmaker.
Nairn - - -	Miss Penny - - -	Schoolmistress. §
*†Aberdeen - -	J. McCormack - - -	Telegraph Clerk.
Leith - - -	W. Hay - - -	Do.
*†Shields - - -	J. W. Irvine - - -	Do.
Spurn Head - -	J. B. Smith - - -	Assistant Lightkeeper.
†York - - -	H. M. Platnauer, F.G.S. -	Curator of Museum.
Loughboro' - -	W. Berridge, F.R.Met.Soc. -	
†Ardrossan - -	J. W. Mayes - - -	Telegraph Clerk.
Malin Head - -	P. O'D. Farren - - -	Signalman, Lloyd's.
*†Muliaghmore -	K. Kerr - - -	Retired Coastguard Officer.
*†Belmullet - -	Miss M. J. Tolan - - -	Telegraphist.
Donaghadee - -	T. MacGowan - - -	Telegraph Clerk.
Parsonstown - -	B. Budds - - -	Assistant Observer at Lord Rosse's Observatory.
Barrow-in-Furness -	W. S. Whitworth - - -	Engineer, Barrow-in-Furness Railway.
*†Holyhead - -	Capt. Richards - - -	Keeper of Sailors' Home.
Liverpool - - -	J. Hartnup, F.R.Met.Soc. -	Bidston Observatory.
*†Valencia - - -	J. E. Cullum - - -	Superintendent of the Observatory.
Roche's Point - -	W. Kennedy - - -	Telegraph Clerk.
Pembroke - - -	Messrs. Blake and Spicer -	Lightkeepers.
*†Scilly - - -	W. Thomas - - -	Signalman.
Prawle Point - -	J. John - - -	Coastguard Officer.
†Hurst Castle - -	G. G. Appleton - - -	Lightkeeper.
†Jersey - - -	J. Fisher - - -	Signalman.
*†Dungeness - -	P. Curuow - - -	Lightkeeper.
*†London - - -	F. Gaster, F.R.Met.Soc - -	Clerk, Meteorological Office.
Oxford - - -	W. Wickham - - -	Radcliffe Observatory.
Cambridge - - -	H. Todd - - -	Observatory.
*†Yarmouth - -	G. T. Watson - - -	Secretary, Sailors' Home.
†Haves Junction -	W. H. Bunce - - -	Station Master.

Note.—Those stations marked with an asterisk (*) report also at 2h. p.m.; and those with a dagger (†) at 6h. p.m.

‡ This station now reports by post only.

§ Mr. Penny died in 1825.

APPENDIX VI.

REPORT OF THE INSPECTION OF THE IRISH AND WELSH STATIONS.

I HAVE the honour to report that I have completed the inspection of the Irish and Welsh stations, with the following exceptions:—*Telegraphic stations*—Roche's Point, Donaghadee, and Malin Head (the last visited by Captain Toynbee in July). *Stations of the Second Order*—St. David's, Armagh, and Londonderry (Captain Toynbee), and *Weekly Weather Report Station* Foynes; the last-named being omitted owing to inconvenience in the train arrangements.

TELEGRAPHIC STATIONS.

St. Ann's Head, September 30.—The only point calling for remark is the appointment of a new observer, J. F. Spicer, in place of Baker, promoted to another lighthouse.

Parsonstown, October 2.—Here also there is a new assistant observer, W. Harding, junior. A slight change was required here, the sunshine recorder being somewhat shaded on summer evenings by a tree. It was removed by me a few feet southwards.

Valencia, October 7.—The station was as usual in good order. Some details as to the observatory will be found below.

Mullaghmore, October 12.—The instruments here have been removed to a fresh site. The exposure does not differ appreciably from that previously existing. The thermometer screen and rain-gauge are erected in a small enclosure surrounded by a stone wall 3 feet high.

Belmullet, October 14.—I find this station in a much better condition than previously. The wind reports are, however, not quite satisfactory as yet. The vane has been supplied, but has not yet been erected, as the telegraph workmen have not been in the town lately.

Holyhead, October 19.—The new observer, Captain Richards, seems very capable. The instruments are in good order.

STATIONS OF THE SECOND ORDER.

Parsonstown, October 2.—See above.

Dublin, Fitzwilliam Square, October 9.—The rain-gauge and thermometers have been placed on a mound 5 feet high, which raises them nearly on a level with the top of the garden wall.

Dublin, Glasnevin, October 9.—The station is in good order. It is proposed to move the thermometers, &c. a little further from the conservatory. They are very conspicuous, and are much interfered with by visitors, three grass minimum thermometers having been stolen or broken.

Dublin, Mountjoy, October 9.—The only matter calling for remark is that I discovered that the sunshine recorder was not level. This was suspected by the observer, but the fact had not been proved. The defect has existed for the last two years, and has affected the indications close to the summer solstice. It is now corrected.

Colebrooke, October 10.—The question about the level of this station has apparently been set at rest by the running of a set of levels from the Ordnance B.M. to the site. The level shown on the map is apparently 31 feet too low.

Markree, October 13.—This station calls for no remark. Mr. Marth has at last succeeded in finding an assistant observer, whom he is training.

WEEKLY WEATHER REPORT STATIONS.

Llandoverly, September 29.—The thermometers have now been removed to the garden, and erected in a screen, which only requires a slight change to be satisfactory. This will be carried out.

Waterford, October 1.—The station calls for no remark.

Kilkenny Castle, October 1.—The thermometer screens and rain-gauge have been moved to the lawn, and are well exposed, excepting that they are rather near trees on the north.

Killarney, October 6.—This station is considered to give exceptionally low minimum readings. I believe that this arises from its being situated near the foot of a slope, down which the cold air descends.

Currygrane, Edgeworthstown.—This is a new station. Mr. J. M. Wilson has organised it. The thermometers are in a Stevenson screen, fairly well exposed on a lawn. There are no trees very close, and none to the southward.

OBSERVATORY.

Valencia, October 7.—At this observatory I find, as usual, some repairs wanting. The stove for distilling water is out of order, and requires to be reset. The sea wall has also suffered from storms and requires repair. I have directed Mr. Cullum to send in estimates for both of these works.

October 21, 1885.

(Signed) ROBERT H. SCOTT.

The following table shows the results of thermometric comparisons:—

STATIONS.	Dry Bulb.	Wet Bulb.	Max.	Min.	Spare Therm.	Remarks.
STATIONS OF THE SECOND ORDER.						
Birr Castle -	-0.3	0.0	-0.3	-0.1	—	Grass min. not graduated on stem. Grass min. -0.07.
Colebrooke -	-0.6	-0.4	-0.4	-0.1	—	
Dublin (City) -	-0.5	-0.5	-0.8	+0.2	-0.3	
Dublin (Phoenix Park O.S.O.)	-0.3	-0.5	-0.3	+0.1	—	Grass min. +1.9.
Glasnevin -	0.0	-0.3	-0.3	+1.1	—	New instrument by Yeates.
Markree Castle -	0.0	+0.1	+0.1	+0.6	—	

TELEGRAPHIC REPORTING STATIONS.

Mullaghmore -	+0.1	+0.3	+0.4	+0.2	—	Instruments shifted since last inspection.
Belmullet -	+0.2	+0.2	0.0	+0.2	—	
Parsonstown -	+0.3	0.0	+0.2	+0.1	—	Spirit in min. found detached.
Valencia -	+0.2	+0.2	+0.1	-0.7	+0.4	
St. Ann's Head -	+0.3	+0.3	-0.3	+0.3	+0.3	Spare ther. substituted for dry bulb.
Holyhead -	+0.6	+0.3	+0.3	+0.5	-0.3	

WEEKLY WEATHER REPORT STATIONS.

Edgeworthstown -	+0.6	+0.7	+0.8	+0.1	-0.3*	*Grass min. ther.
Waterford -	+0.2	+0.2	+0.6	-0.4	-1.4*	* Do. do.
Kilkenny -	+0.5	0.0	-0.3	0.0	—	Screen shifted since last inspection.
Killarney -	+0.5	+0.6	+0.4	+0.3	—	

SIR,

Port Stewart, June 26, 1885.

I HAVE the honour to report, for the information of the Meteorological Council, that on June 22nd I inspected Mr. Conroy's station, at No. 40, Clooney Terrace, Londonderry. The station was in very good order.

On June 23 I proceeded to Malin Head, where I found Mr. P. O'D. Farren (who is Lloyd's signalman) in charge of the station. His brother, Mr. J. O'D. Farren (who is Lloyd's agent), acts for him when occasion requires.

I remain, &c.

(Signed) HENRY TOYNBEE,

R. H. Scott, Esq.,
Meteorological Office,
116, Victoria Street, London, S.W.
Marine Superintendent.

REPORT of INSPECTION of the SCOTTISH STATIONS for 1885.

BAROMETERS.

The barometers at the stations were compared with inspector's mercurial standard barometer No. 588. The results are shown in the following table, which gives the corrected readings of standard No. 588, and the uncorrected readings of the reporting and check barometers at each of the stations. It thus appears that each of the instruments continue to be in excellent order:—

STATIONS.	Inspector's Standard No. 588, corrected.	Reporting Barometer, not corrected.	Check Barometer, not corrected.	REMARKS.
Laudale . . .	Inches. 29·843	Inches. 29·845	Inches. 29·835	Check barometer is 5 feet higher Reduced to same temperature.
Stornoway . . .	30·189	30·188	30·190	
Sandwick . . .	30·158	30·169	—	
Dunrossness . . .	29·868	29·866	29·866	
Wick . . .	30·222	30·224	—	In shop.
Do. . .	30·144	—	30·144	In house.
Dunrobin . . .	30·251	30·252	—	
Inverness . . .	30·102	30·160	—	
Nairn . . .	30·031	30·031	30·032	
Aberdeen . . .	29·733	—	29·735	In house, Braemar Place.
Do. . .	29·787	29·787	—	In post office.
Braemar . . .	28·405	28·414	—	
Dundee . . .	28·883	28·880	—	
Glenalmond . . .	28·811	28·808	—	Reduced to same temperature.
Pinmore . . .	29·865	29·866	—	
Ardrossan . . .	30·040	30·037	—	In post office.
Do. . .	30·024	—	30·022	In house at Saltecats.
Rothsay . . .	30·078	30·080	—	
Leith . . .	29·973	29·960	—	In post office.
Do. . .	29·942	—	29·935	In house, 52, Great Junction Street.
King's College, Aberdeen . . .	29·695	29·693	—	

The difference between the inspector's and observer's readings was generally nil, and, excepting in two cases, did not exceed 0·002 inch.

The assistant at Stornoway read 0·005 inch, and the assistant at Wick 0·004 inch too low, owing to their method of setting the vernier. After being shown the proper method they read correctly.

THERMOMETERS.

The results of comparisons made with inspector's standard thermometer No. 2,522, and the thermometers at the different stations, and at Aberdeen Observatory, are given in the following table, the readings of the standard have been corrected for instrumental errors, but the thermometers at the stations are uncorrected:—

STATIONS.	Standard No. 2,522, Corrected.	Dry Bulb.	Wet Bulb.	Spare Ther- mometer.	Maximum Thermo- meter.	Minimum Thermo- meter.	Time in Water in Minutes.	Change of Tempera- ture of Water.	Notes.
Laudale .	60·1	+0·1	+0·1	—	+0·2	+0·2	90	Uniform	New hygro- meter not yet got.
Stornoway .	52·3	+0·6	+0·5	+0·3	-0·4	-0·5	100	Do.	
Sandwick .	52·7	+0·3	0·0	—	+0·5	-0·5	90	+0·3	
Dunrossness	60·5	+0·3	+0·3	+0·2	+0·2	-0·7	100	+0·3	
Wick .	56·9	+0·3	+0·4	—	-0·2	0·0	80	-0·2	
Dunrobin .	56·1	-0·4	-0·6	—	+0·5	-0·8	105	+0·2	
Inverness .	53·8	—	—	—	0·0	+0·1	100	Uniform	
Nairn .	52·9	+0·6	+0·7	+0·2	-0·2	+1·0	70	Do.	
Aberdeen .	60·7	+0·3	+0·4	—	+0·6	+0·1	90	-0·2	
Braemar .	51·3	+0·5	+0·5	—	+0·6	0·0	95	+0·3	
Dundee .	50·2	+0·4	+0·5	—	+1·3	-0·3	80	+0·4	
Glenalmond	48·6	+0·1	+0·2	—	+0·2	-0·2	120	Uniform	
Pinnore .	44·8	+0·2	+0·3	—	-0·2	-0·3	75	+0·3	
Ardrossan .	48·1	+0·3	+0·4	—	0·0	-0·3	105	Uniform	
Rothessay .	47·3	-0·1	-0·1	—	0·0	-0·4	120	Do.	
Leith .	48·0	+0·1	+0·5	—	0·0	-0·3	70	+0·2	

NOTES ON THE STATIONS.

Laudale, August 7.—The observations appear to continue to be carefully made. The discrepancies in the barometric readings of March 8 and 20 were examined, and the liability to make errors of observations of one-tenth and half-tenth inch was explained. Attention will be more fully given in future to avoid these errors. It is satisfactory to report that during the extensive alterations in the building made last year, neither of the two barometers sustained any damage in the removals which took place.

Stornoway, August 14.—The instruments were well observed by Mr. M'Donald, and in very good order, except the rain-gauge which was slightly elliptical, but which was put right.

Annabella M'Donald, the assistant, on my first visit on Thursday read the barometer 0·005 inch too low, and had great difficulty in making up the telegram from the observations, but on Saturday she read all the instruments correctly and expeditiously, and made up the telegram with despatch and accuracy. As regards the winds at this station, the observer is of opinion that South-east winds tend to draw more to Southward, and North winds to Westward. The reported rarity of Northerly gales from Stornoway may be explained, at least in part, by the physical configuration of the ground towards the North.

The barograph was fully explained and set agoing, and to secure the firm support required, a little shelf is to be made for it on the wall.

Sandwich, August 19.—The instruments were in the same positions they had when under the late Dr. Clouston's care, and Mr. and Mrs. Anderson made the observations fairly well. The sunshine recorder was very slightly out of position, but was put right and its proper position shown. The Rev. Mr. Anderson, who had been appointed observer here, intimated his resolution to cease being observer, as his duties as clergyman left him no time to attend to the observations.

Dunrossness, August 22.—The instruments were in good order and correctly observed. Though thunder occurred three or four times and hail two or three times during the year, they are not in the observation book. No aurora was observed; it is, however, probable that the hill to north of the Manse prevents many auroræ being seen. A note with directions as to the notes of weather which it is necessary to make and enter in his diary, was left with the observer. During my visits to this station, the estimations of wind force have been correctly given. All instances of wind force 7 and upwards recorded since inspection of August 1884 were extracted. These have since been compared with the wind observations at the lighthouses at Sumburgh Head and Bressay with the result that the general correctness of the Dunrossness observations is confirmed by the lighthouse records. Indeed the only gale recorded at Sumburgh Head, and not noticed in the Dunrossness register, was one of short duration on the nights of November 9-10.

Wick, August 25.—The thermometer screen had been repaired and repainted, and the instruments were all in good order and the observations made very accurately by Mr. Sinclair. His assistant, Jesse Sinclair, read the barometer 0·004 inch too low. The proper method for setting the vernier was explained, after which she read the barometer correctly.

Dunrobin, August 26.—A new Stevenson screen has replaced the old one since January 1, which was considered to be the most suitable time to make the change. The rain-gauge, which was slightly deformed, was put right. As the scale of the hygrometer is now rather indistinct a new one is very desirable for this station, and has been recommended.

Inverness, August 27.—A new hygrometer has not yet been obtained for this station, but I was informed it would shortly be had. The observations which were to have been resumed on October 1, 1884, were not resumed till July 23, 1885, and then only for a few days. The thermometer screen was found to be out of repair and at the time of inspection was undergoing repair. No rainfall observations were made during the year. The barometer, maximum and minimum thermometers and rain-gauge were in good order, and the observations were expected to be resumed on September 1.

Nairn, August 29.—The thermometer screen had been repainted and repaired and the rain-gauge removed to the new position referred to in last year's report. The instruments were in good working order. Miss Penny, who, in the absence of her father, was in charge of the station, made the observations and prepared the telegram with despatch and intelligence. A large additional portion of the neighbouring wood has been cut down; and now only a small portion to westward remains to interfere in any material degree with the observations, and this patch is being cut down as required.

Aberdeen, September 7.—The Stevenson screen had been recently repainted and all the instruments were in excellent order and observed with much intelligence. The spare thermometer had recently been accidentally broken.

The barograph had been some weeks at work and Mr. McCormack understood and handled it properly. It has been placed in a good firm position on a shelf on the wall.

Braemar, September 8.—The instruments were all in good order and well observed. A Stevenson screen had been added since October 1, 1884, and a comparison will shortly be made between the observations made in this screen and those in the old thermometer screen of the station.

Dundee, September 30.—The instruments were all in good order and the observations were intelligently made. The hygrometer is very well attended to.

Glenalmond, October 1.—The instruments were in excellent order, and the new observer, Mr. A. S. Reid, M.A., F.G.S., mathematical master in the College, is a careful observer, and takes much interest in the observations. The outside observations are made only at 9 a.m. and the maximum temperature then read is entered for the previous day and the minimum temperature for the day it is read.

Pinmore, October 13.—The hygrometer and other instruments were in very good order, and the observations intelligently made. The observer continues to take a good deal of trouble to observe the direction and force of the wind in positions which give results as little influenced by the valley of the Stinchar as circumstances permit.

Ardrossan, October 14.—The thermometer screen was painted and the rain-gauge firmly fixed shortly after last inspection, and these instruments were in a very satisfactory state. The minimum thermometer had nearly a degree of spirit separated about half-way up the tube. The observer, under direction, set it right. The cloth of the wet bulb was rather dirty, probably from the soot and dust of the railway, from which towards the station an easterly wind with mist had been blowing for some time. Otherwise the instruments were in fairly good order, the readings on opening the screen being dry bulb $50^{\circ}\cdot2$ and wet $46^{\circ}\cdot9$. The cloth had been changed 10 days previously. For the future the observer was directed to change the cloth at least once a week, proximity to the railway rendering a frequent change of the muslin necessary. The observer and assistant made the observations carefully and intelligently. The code for cirrus cloud observations, and methods for making the observations and preparing the cirrus telegram were gone over in detail, and reports of cirrus cloud will commence forthwith to be sent.

Rothsay, October 14.—The instruments were in good order, and the observations made with much intelligence. At the end of the year a new pole 50 feet in height is to be erected for the vane, which at this station is kept in excellent order.

Leith, October 20.—In July 1885 the gate of the fence round the thermometers and rain-gauge was repaired, and the thermometer screen made secure. As the glass measure of the rain-gauge is cracked half-way down a new one is desirable. There is no spare thermometer at this station. The cloth of the wet bulb was rather dirty with the soot and dust of Leith. The cloth, however, was quite wet, as shown by the dry bulb reading $44^{\circ}\cdot8$ and the wet $41^{\circ}\cdot3$ at 3 p.m., with a dull foggy atmosphere. Instructions were given to have the muslin changed more frequently. In May last the observer removed to 52, Great Junction Street; a comparison of the barometer showed that it had sustained no damage during the removal to its new position.

The pamphlet giving directions regarding the cirrus observations and the code relative thereto were minutely gone over and explained to the observer. He had had considerable difficulty with these observations,

but after the explanations given he quite understood the cirrus code, and will commence to send the reports when the cirrus is noticed by him.

The Observatory, Aberdeen, September 7.—All the instruments were in excellent order. The ground where the Stevenson screen has been placed in the University grounds, has been turfed for some distance round it. The dry and wet bulbs and the maximum thermometer in the screen were lowered 3 inches each; they now stand, dry and wet bulbs 4 feet above ground, maximum thermometer 4 feet 6 inches, and minimum thermometer 3 feet 10 inches.

All the thermometers were again compared with the greatest care with standard thermometer No. 2522, and after several comparisons by Mr. Boswell and myself, substantially the same result was obtained as from the comparison of 1884.

(Signed) ALEXANDER BUCHAN.

November 3, 1885.

(M.O. 2360.)

INSPECTIONS OF OBSERVATORIES AND ANEMOGRAPHS, 1885.

Yarmouth, August 10 and 13.—The anemograph at the station having been working very inefficiently for some time, I was instructed by Mr. Scott to examine it, and, if possible, determine the causes of its failure. The defective action was in the velocity pencil, which frequently ceased to make a trace upon the paper. On examining the recording apparatus, the supporting arms of the pencil appeared stiff, and I filed the discs of the coupling clutch to give them more play. Having done this I ran the pencil round a great many times upon the curve, and found this defect was entirely removed. Two days later Mr. Watson, the observer, informed me the trace had again failed. I then discovered that the pencil had not been completely lowered on the paper after changing, and as the lifter was too tight to allow of the pencil falling by its own weight no trace was being produced. I accordingly instructed Mr. Watson in future always to press the lifter down as far as it would go after changing. Since he has done this the action of the instrument has been quite satisfactory. The external apparatus was somewhat out of repair, not having been looked to for some years; one cup was loose and would soon have been blown away, and the oil holder had slipped down the cup shaft. These and other defects I set right, and the instrument is now in good order.

Sandwich, Orkney.—The anemograph at this station was inspected on September 5. Not having been cleaned for some years, I found the recording part very clogged and stiff, although the clock was going quite well. The external gear was in good repair, with the exception of the counter shaft, which was much cut and jammed in its bearing. I took it out and filed it up true, and also cleaned it as far as possible without dismounting. As the observer has resigned charge of the instrument and it will have to be taken down and re-erected elsewhere very shortly, I did not think it desirable to thoroughly overhaul it, as that operation would have necessitated my remaining in the place for an uncertain time on account of the weather, which was quite unsuitable on the day of inspection.

Aberdeen, September 11-16.—I thoroughly examined and cleaned all the instruments at this observatory, finding them in good order. The anemograph required some external repairs which I had executed.

Glasgow, September 18 and 19, October 1 and 2.—The two thermograph tubes and the wet bulb standard thermometer having been

accidentally broken, as well as the supporting frame, I took a set of new thermometers down with me from the stock preserved at the Kew Observatory and set them up. The brass work having been repaired by Mr. White, I had the clock, lenses, &c. all cleaned, and the barograph was similarly treated.

The anemograph was dismantled, thoroughly cleaned, and certain trivial defects made good before it was again started. The rain-gauge was found in good order and was cleaned.

Being compelled by a domestic bereavement to leave Glasgow somewhat hurriedly, I had no time to see to the working of the instruments properly after setting them up, and therefore failed to detect a serious defect in the dry bulb thermograph tube which was brought to my notice by Professor Grant soon after I had returned to Kew. I accordingly went back to Glasgow and found that the mercury in the bore of the thermometer had united at the air speck, which consequently remained at a fixed point in the tube, giving a straight line instead of a temperature curve. I dismantled the tube, and after considerable trouble, succeeded in separating the column, re-blackening the tube, and again setting it up. It has since acted perfectly. The operation will necessitate fresh determination of the thermometer scale and zero values.

Stonyhurst Observatory, visited September 21.—The instruments at this observatory were all found to be in excellent order, and the anemograph well oiled and cared for.

The thermometers were compared and their correction found to be as follows:—

At 55°: Dry bulb	0·0	Maximum	− 0·2
Wet bulb	− 0·3	Minimum	+ 0·1

Mr. Baker's report is subjoined.

(Signed) G. M. WHIPPLE.

October 1885.

Valencia, visited October 9-13.—At this observatory the whole of the instruments were working in a satisfactory manner.

The barograph and thermograph clocks were taken entirely to pieces and cleaned, and the lenses, condensers, and mirrors carefully wiped.

The zero lines were changed to the winter position and the standard thermometers were compared and found to require the following corrections; namely,—

Dry bulb, No. 399 − 0·6. Wet, No. 398 − 0·5.

The maximum and minimum thermometers were also examined and found in good order, but the scales were re-blackened.

The anemometer was going well and the clock did not require special cleaning. I examined the external parts, but the weather at the time of my visit was too squally to permit of the withdrawal of the velocity shaft; however, care was taken to oil the various bearings well.

The rain-gauge was taken to pieces and the clock thoroughly cleaned.

My attention was called to the small self-recording aneroid recently received at the observatory, which read approximately 0·2 inch higher than the standard mercurial barometer; this was set right and the method of adjustment pointed out to Mr. Cullum.

As regards the old anemometer which was dismantled last year the clock appears in a good state and also the recording parts, with the exception of the pencils, which would require re-grinding or new spirals attached. The cups and direction vane are completely worn out and

quite useless, but the reducing gearing and pillar are in a satisfactory condition.

Falmouth, visited October 19.—All the self-recording instruments were in good order and none of the clocks required cleaning, the whole of them having been done in May last under the direction of Mr. Whipple at the time of shifting them from the old to the new observatory.

A comparison of the standard thermometers gave the following corrections :—

Dry, No. 383 $-0^{\circ}\cdot6$. Wet, No. 388 $-0^{\circ}\cdot3$.

My attention having been called to an irregularity in the temperature trace of the barograph, I made a special examination. I found that it had been rectified the day preceding my visit. The superintendent discovered that the end of the temperature compensation lever had caught in the zero line supporting frame, for cutting off the light. It had probably received a jar which caused its displacement, but he was not aware of such an accident having occurred.

October 29, 1885.

(Signed) T. W. BAKER.

REPORT of INSPECTION of the ENGLISH STATIONS, 1885.

I HAVE the honour to submit the following report of the stations in England inspected by me in 1885 :—

Jersey (Noirmont), September 14.—All the instruments at this station are in good order, and the observer is very careful and intelligent. He shows considerable aptitude for the taking of upper current observations. There are no means of taking observations during Mr. Fisher's absence. A new block will be required for the rain-gauge next year.

Hurst Castle, inspected September 19.—The instruments at this station are all in perfect order. The observer's readings of the barometers are good, but his handling and reading of the thermometers are rough. The maximum temperatures recorded are sometimes much too high; the heat radiated from the white gravel near the instruments may perhaps cause rather high readings, but the errors of the maximum occasionally reported are probably due to carelessness in the setting of the instruments. The substitute who has occasionally taken the readings is inefficient.

On the day of my visit the observer estimated the wind-force correctly, but over-estimated the sea disturbance by one figure. Both the wind-force and sea disturbance appear to be occasionally over-estimated at this station.

Dungeness, inspected September 29.—The instruments at this station were in good order, but the thermometer screen is not very well placed. The barometers are in a very small porch in the house of one of the lightkeepers, which is rather an inconvenient situation.

Yarmouth, inspected October 3.—The instruments were all in good order, and the observations are very carefully taken. I gave instructions for the adjustment of the self-registering aneroid.

Cambridge, October 4.—The barometer was in good order, and the observer reads with perfect correctness, but it may be noted that in winter, at times when the astronomical observations are being taken, the changes of temperature where the instrument is situated are very rapid and great. The minimum thermometer gives low readings, but the other thermometers read well together. Branches of trees slightly interfere, in November, December, and January, and again in June,

with the records of the sunshine recorder. I have reason to hope that the obstruction, which is somewhat on the increase, may be removed.

Loughborough, October 6.—All the instruments at this station were in excellent order, and the observer is exceedingly careful. Although Mr. Berridge has paid great attention to the subject of wind-force, I continue to believe that the number of gales reported from this station is excessive.

York, October 7.—The instruments at this station were not in very good order. The barometer frame was rusty, and required a thorough cleaning, the milled head of the vernier-pinion working with extreme difficulty. This I rectified. The observer read the instrument too high. The thermometer screen required a fresh coat of paint and the rain-gauge was quite worn out. The latter instrument has been moved a few feet for better exposure, but the exposure is still unsatisfactory.

North Shields, October 10.—The thermometer screen and rain-gauge have been shifted to the northward of the former position, but their exposure is still satisfactory. The instruments were all in good condition, and the observer is very painstaking. He estimated the sea disturbance one figure too low on the day of my visit.

Scilly (St. Mary's), October 24–30.—I found the instruments at this well-exposed station to be in good condition, excepting that the clock of the self-registering aneroid was out of order.

Praule Point, November 2.—The observations at this station seem to be very carefully conducted. The instruments were in very good order, but the minimum thermometer reads a trifle too low. The 8 a.m. temperatures during calm summer weather appear to be occasionally somewhat too high, which I am inclined to attribute to the position of the screens.

STATIONS FURNISHING WEEKLY OR MONTHLY REPORTS.

Southampton, inspected September 18.—The observations at this station continue to be very carefully made, and the records are very complete. It has been found necessary to surround the out-of-door instruments with a fence, which does not, however, as I think, affect the readings. The screen required to be re-painted.

St. Leonard's, September 26.—Dr. Colborne had changed his residence a week before the date of my inspection, and a great improvement had just been made in the position of the out-door instruments, which, as now placed in the Gensing Gardens, have a good exposure. The observer was absent at the time of my visit, and I was unable to ascertain the exact altitude of the barometer above sea-level. The instruments were all in good order, and the observations appear to be carefully conducted.

Uppingham, October 5.—The instruments at this station were in good order. The Kew corrections for the maximum appear to be now unreliable, and the readings of all the thermometers require no correction. The screen is a modification of Glaisher's, and is double louvred. The returns from this station are unexceptionable.

Leicester, October 6.—The observer was absent at the time of my visit. Both the dry and the wet-bulb thermometers gave high readings. The instruments generally were in fairly good order, but the rim of the rain-gauge was not horizontal.

Sheffield (Weston Park), October 7.—This is a good station, and the exposure of the instruments is excellent. The observations are accurately conducted. I hope that the Park Committee will, in

accordance with my request, permit the screen to be painted white instead of green, as it is at present. A building is about to be erected on the west of the screen, and the latter will then be shifted further to the eastward, when the curator has promised that it shall open to the north, instead of to the east, as it now does. The exposure in the new position will be perfect. The minimum thermometer reads too low, and will be sent to Kew for new corrections. For the present, 9 p.m. observations cannot be taken at this station.

York, October 7.—The observations at this station appear to be fairly well conducted, but a well-situated vane is a desideratum.

Durham, inspected October 8.—Mr. H. J. Carpenter had just commenced the observations here. The readings of the instruments were satisfactory. The cases of the thermometers in use are in bad condition. The observations taken here will in future be at 9 a.m. and 9 p.m.

Seaham, inspected October 9.—The thermometer screen had just been repainted, unfortunately of a dark colour. It is sheltered to some extent by shrubs. The maximum thermometer reads low. There was a considerable deposit of copper on the wet bulb. The rain-gauge required some slight repairs. I think that the observations at this station are more accurately made than was the case a few years ago.

Hawes Junction, inspected October 13.—The observer, Mr. Foster, continues to take the observations carefully. The instruments were in good order, but the dry-bulb read somewhat high. The barometer is in an inconvenient place, but no better site seems to be available.

Stonyhurst, October 15.—The instruments were all in good condition, except that the self-registering rain-gauge required some repairs.

Prestwich (Manchester), October 16.—The instruments were in good order, and the work of observation appears to be carefully conducted. The barometer is still unfavourably placed.

Cirencester, October 20.—All the instruments were in a satisfactory condition, and the observer, Professor Ohm, appears to make careful returns.

Arlington Court, October 22.—A new screen has been erected for the convenience of the observer, gardener to Lady Chichester, near to his house, and the 9 p.m. observations of temperature are taken from new thermometers in this screen. It has not so good an exposure as the screen employed for the 9 a.m. readings. The observations are roughly taken, and the returns made from this station are as yet unsatisfactory. This is unfortunate, as the station is well situated.

Plymouth, October 23.—The instruments at this station were all, as usual, in good order, but the maximum thermometer reads high.

Helston, November 1.—The returns from this station have been greatly in arrears, the observer having been repeatedly ill. He expresses himself, however, as anxious to keep on the work. The position of none of the instruments has been altered. The thermometer screen was shaky. I requested Mr. Gill to remedy this at once. The minimum thermometer had 4°·5 of detached spirit, which, being colourless, was not very easily discernible. The other instruments were in good order.

Totnes, inspected November 2.—I found everything, as usual, in excellent order at this station. This is a good station, and the observations are carefully conducted.

St. Aubin's, Jersey.—The returns from this station are admirable. I did not this year compare the thermometers with my own standards, as from time to time Mr. Vibert compares them with a Kew standard of his own.

In the accompanying table (see p. 58) the stations the names of which are printed in italics are those which furnish weekly or monthly reports. In the last column the letter A is employed to signify that the instruments were in perfect condition and well attended to; B that they were in moderately good condition; while C denotes that they were in an unsatisfactory state. These letters do not refer to the correctness or otherwise of the instrumental indications which are shown in the preceding columns, but to the amount of care apparently bestowed on the instruments themselves. The table is otherwise self-explanatory. The general result of the comparisons made is, I think, satisfactory.

(Signed) W. CLEMENT LEY.

December 28, 1885.

Name of Station.	Thermometer.										Barometer.	Name of Station.			
	Difference of Observers from Inspector's Readings.	Dry Bulb.		Wet Bulb.		Maximum.		Minimum.		Spare or Grass.			General Condition.		
		Temp. of Water.	Correction to reduce to Inspector's Standard.	Correction hitherto applied.	Correction to reduce to Inspector's Standard.	Correction hitherto applied.	Correction to reduce to Inspector's Standard.	Correction hitherto applied.	Correction to reduce to Inspector's Standard.	Correction hitherto applied.					
Arlington Court	+0.005	49	+0.15	—	—0.05	+0.2	+0.35	—	+0.35	—	+0.35	—	C	Arlington Court.	
Cambridge	+0.000	53	—0.1	—0.1	0.0	+0.2	—0.2	—0.8	+0.9	+0.4	—	—	—	A	Cambridge.
Cheneston	—	53	+0.1	—	0.0	—	—0.15	—0.1	0.0	0.0	—	—	—	A	Cheneston.
Dungeness	+0.003	57	+0.15	—	+0.25	—	+0.35	—	+0.35	—	—	—	—	A	Dungeness.
Dayham	+0.000	59	+0.2	—	+0.2	—	—0.2	—	+0.5	—	—	—	—	A	Dayham.
Haves Junction	+0.001	59	—0.35	—	+0.25	—	+0.05	—0.1	+0.6	—	—	—	—	A	Haves Junction.
Helston	+0.002	57	0.0	—0.1	+0.2	—	+0.05	—	+0.15	+0.5	—	—	—	B	Helston.
Hurst Point	—	59	+0.05	—	—0.15	—	+0.05	—	+0.25	—	—	—	—	A	Hurst Point.
Jersey (Normant)	+0.001	62	+0.35	—	—0.35	—	+0.15	—0.1	+0.05	—	—	—	—	A	Jersey (Normant).
Leicester	+0.000	53	+0.0	—	—0.9	—	—0.05	—0.0	+0.2	—	—	—	—	B	Leicester.
Loughborough	—	59	+0.05	—0.2	—0.05	—	0.0	—0.1	+0.05	+0.35	—	—	—	A	Loughborough.
Plymouth	—	49	—	—	—	—	—0.65	—0.7	+0.95	—0.15	—	—	—0.3	A	Plymouth.
Pringle Point	+0.000	48	—0.1	—	—0.2	—	—0.2	—	+0.5	—	—	—	—	A	Pringle Point.
Prestwich	—	50	+0.1	—	—0.1	—	—0.3	—	0.0	+1.7	—	—	—	A	Prestwich.
St. Aubin's	+0.000	42	—	—0.0	—	—	—	—0.3	—	—	—	—	+0.1	A	St. Aubin's.
St. Leonard's	—	50	—0.2	—	—0.4	—	+0.1	—	0.0	+0.05	—	—	—	A	St. Leonard's.
Scilly	+0.000	53	+0.05	—	+0.25	—	+0.05	—	+0.45	—	—	—	—	A	Scilly.
Seaham	+0.001	49	—0.3	—	0.0	—	+0.7	—	+0.2	—	—	—	—	B	Seaham.
Sheffield	+0.002	57	0.0	—	—0.1	—	+0.2	+0.1	+0.5	—	—	—	—	A	Sheffield.
Shields	+0.001	48	+0.4	—	—0.3	—	0.0	—0.6	+0.3	—	—	—	—	A	Shields.
Southampton	—	62	—0.4	—0.3	—0.3	—0.1	—1.1	—0.6	0.0	—	—	—	0.0	A	Southampton.
Stonham	+0.001	46	—0.1	—0.1	+0.15	—0.35	+0.2	—0.3	+0.35	—	—	—	—	A	Stonham.
Totnes	+0.001	48	—0.1	—0.1	—0.15	—0.1	—0.2	—0.0	+0.1	+0.6	—	—	+0.3	A	Totnes.
Upington	—	53	0.0	—	—0.05	—	—0.15	—	0.0	—	—	—	—	A	Upington.
Yarmouth	+0.003	53	—0.05	—	+0.45	—	+0.25	—	+0.15	—	—	—	—	A	Yarmouth.
York	+0.004	59	—0.45	—	—0.35	—	+0.45	—	+0.35	—	—	—	—	B	York.
York	+0.004	50	—0.45	—	—0.35	—	+0.25	—	+0.45	—	—	—	—	B	York.

Name of Station.	Barometer.	Thermometer.										Name of Station.			
		Difference of Observer's Readings.	Dry Bulb.			Wet Bulb.		Maximum.		Minimum.			Spare or Grass.		General Condition.
			Temp. of Water.	Correction to re-inspector's Standard.	Correction hitherto applied.	Correction to re-inspector's Standard.	Correction hitherto applied.	Correction to re-inspector's Standard.	Correction hitherto applied.	Correction to re-inspector's Standard.	Correction hitherto applied.		Correction to re-inspector's Standard.	Correction hitherto applied.	
Arlington Court	-	005	49	+0.15	-	-	-0.05	+0.35	-	+0.35	+0.4	-	-	C	Arlington Court.
Cambridge	000	53	59	-0.1	-0.1	-	0.0	-0.2	-0.8	+0.9	0.0	-	-	A	Cambridge.
Cirencester	-	003	57	+0.15	-	-	+0.25	+0.35	-0.15	0.0	0.0	-	-	A	Cirencester.
Dunsmess	000	50	50	-0.2	-	-	-0.2	+0.35	+0.35	-	-	-	-	A	Dunsmess.
Durham	001	41	50	-0.55	-	-	-0.25	-0.2	-0.2	-	-	-	-	A	Durham.
Hawes Junction	002	51	59	0.0	-0.1	-	+0.2	+0.05	-0.1	+0.5	-	-	-	A	Hawes Junction.
Heldston	001	62	59	-0.05	-	-	-0.15	+0.05	-0.05	+0.6	+0.5	-	-	B	Heldston.
Hurst Point	002	53	50	-0.35	-	-	-0.35	+0.15	-0.1	+0.25	-	-	-	A	Hurst Point.
Jersey (Noirmont)	001	53	50	-0.9	-0.2	-	-0.05	0.0	0.0	+0.2	-0.2	-	-	A	Jersey (Noirmont).
Leicester	000	49	50	-0.05	-0.2	-	-0.05	0.0	-0.3	+0.2	-0.3	-	-	B	Leicester.
Loughborough	000	48	49	-0.1	-	-	-0.2	-0.65	-0.7	+0.35	+0.5	-	-	A	Loughborough.
Plymouth	000	50	50	-0.1	-	-	-0.1	-0.2	-0.2	+0.5	-	-	-	A	Plymouth.
Prawle Point	000	42	50	-	-	-	-	-	-	+1.7	-	-	-	A	Prawle Point.
Prestwich	000	50	42	-	-	-	-	-	-	-	-	-	-	A	Prestwich.
St. Aubin's	000	50	50	-0.2	0.0	-	-0.4	-	-0.5	-	0.0	-	-	A	St. Aubin's.
Selly	000	53	50	-0.3	-	-	+0.25	+0.1	-	0.0	-	-	-	A	Selly.
Seaham	001	49	49	-0.3	-	-	0.0	+0.05	-	-	-	-	-	A	Seaham.
Sheffield	002	55	48	0.0	0.0	-	-0.4	+0.7	+0.1	+0.5	-	-	-	B	Sheffield.
Shields	001	48	48	+0.4	-	-	-0.2	-0.2	-	-	-	-	-	A	Shields.
Southampton	001	62	46	-0.4	-0.3	-	-0.3	0.0	-0.6	-	-	-	-	A	Southampton.
Stonyhurst	001	46	48	-0.1	-0.1	-	+0.15	-1.1	-0.3	+0.3	-0.1	-	-	A	Stonyhurst.
Totnes	001	48	48	-0.1	-0.1	-	-0.15	-0.2	-0.3	0.0	-0.1	-	-	A	Totnes.
Uppingham	000	53	50	0.0	-	-	-0.05	-0.15	-0.3	+0.1	+0.25	-	-	A	Uppingham.
Yarmouth	002	53	50	-0.05	-	-	+0.45	+0.25	-0.45	0.0	+0.6	-	-	A	Yarmouth.
York	004	50	50	-0.45	-	-	-0.35	+0.25	-	+0.35	-	-	-	B	York.
York	004	50	50	-0.45	-	-	-0.35	+0.25	-	+0.45	-	-	-	B	York.

APPENDIX VII.

METHOD of DEALING with TELEGRAPHIC WEATHER
INTELLIGENCE.

The operations connected with the preparation and issue of the Forecasts and Storm Warnings have not undergone any material change so far as the home stations are concerned, but the arrangements made by which information of storms met with to the westward of Long. 45° West, is forwarded telegraphically to the Meteorological Office by the Chief Signal Officer of the United States have been improved. These arrangements are referred to more fully further on. The Daily Weather Report also has been improved by the substitution, in the margin, of greatly improved means for the Rainfall.

The Office now receives, when the telegraphic communications are perfect, fifty-four reports every morning, fourteen every afternoon (except on Sundays), and twenty each evening. The interruptions which have occurred at times in the communication with Sumburgh Head and Stornoway have been very slight. The instructions to the observers have been altered during the year, on account of the introduction of sixpenny telegrams.

The foreign reporting stations, 23 in number, extend along the entire western coast of the Continent, from Bodö in Lat. 67° N. to Corunna in Lat. 43° N., and include four stations on the coast of the Baltic, and one in the Mediterranean. The information is received in accordance with arrangements made with the various Meteorological organisations in France, Holland, Germany, Denmark, Norway, and Sweden.

At the British and Irish stations the morning observations are taken at 8 a.m. Greenwich time, and most of the telegrams arrive in London at about 9 o'clock, when the Intelligence Department of the Post Office extracts from them the portions required for its wind and weather reports. They are then transmitted to the Meteorological Office by its private wire, where the majority of them usually arrive between 9 a.m. and 10 a.m.

As the reports come in, the information is entered on a chart, showing for each station at 8 a.m. the barometrical and thermometrical readings, with their respective alterations during the preceding 24 hours, the direction and force of the wind, and the state of the weather, together with any changes of importance which may have been noticed in the course of the preceding day. From this chart, which is preserved in the Office, other charts are drawn for publication in the newspapers, as described further on.

If necessary, telegraphic warnings of storms or of atmospherical disturbance is immediately sent to our own coasts and to foreign countries. A brief telegraphic resumé of the weather is despatched shortly after 11 a.m. to the Harbour Authorities in Jersey. Another telegraphic message, of about 75 words, is sent to the Underwriters'

Association, Liverpool, containing reports of the pressure, wind and weather at 14 stations on the coasts of the British Islands; and a third message of about the same length is forwarded to the Central News and to the Exchange Telegraph Company for despatch to the provinces. The last of these messages consists of a brief statement of the general condition of weather over Western Europe, as shown by the morning reports. It is, however, not in the morning only that storm warnings are issued to the coasts, a constant watch being kept during the day, and whenever on the receipt of the regular or of special telegrams the condition of the weather appears to be threatening, cautionary messages are at once issued to such parts of the coast as are thought to be menaced by a gale.

During the year 1885, there were prepared each morning, afternoon, and evening, Forecasts of the weather, for a day in advance; these were drawn up for eleven districts in the British Islands, and issued to subscribers, to certain Clubs, and to many of the London and Provincial newspapers. The districts for which the Forecasts were prepared are those into which the returns for the Weekly Weather Report are divided (p. 67).

About an hour and a quarter is occupied in the preparation and transmission of the provincial and foreign telegrams, and in the drawing up of the "Remarks" and 11 a.m. Forecasts for the London newspapers, so that the MS. copies for the "Times" and other papers are ready for issue soon after 11 a.m.

Charts are prepared daily for newspaper publication as follows:—

For the "Times," -	-	two daily, viz. : for 8 a.m. and 6 p.m.
For the Patent Type-found- ing Company, on behalf of the "Shipping Gazette," and for distribution to the provincial press	} one	,, for 8 a.m.

The 8 a.m. charts are sent out at about 10.15 a.m. and the 6 p.m. chart at about 8.30 p.m. In addition charts are drawn for 8 a.m. and 6 p.m. daily for exhibition at the Office door, together with some remarks and the latest Forecasts issued.

In addition to the charts here referred to, the Patent Type-founding Company are supplied with various diagrams showing the changes in pressure, temperature, rainfall, wind, and weather for the London district. These are engraved *daily* for the "Daily Chronicle," *weekly* for the "Observer" and "Graphic," and *monthly* for the "Miller," and are all accompanied by remarks on the phenomena exhibited.

The draft of the Daily Weather Report, with two charts attached, is drawn on transfer paper, and is ready by noon, when it is at once sent to the lithographer to be printed. The copies for delivery by hand and by early post in London are issued at about 1.30 p.m., while the remainder are received at the Meteorological Office at about 3.30 p.m., whence they are transmitted by post to the subscribers and others.

At about 3 o'clock the 2 p.m. observations taken at twelve home stations, and two foreign stations (Skudesnaes and Rochefort), are received. Copies of these reports are issued, together with the 8 a.m. report, to certain newspapers and subscribers, and two copies of the

"Remarks" (8 a.m. and 2 p.m.) are sent to the Type-founding Company for issue to provincial newspapers, in order to explain the 8 a.m. charts.

From 7 to 7.30 p.m. the twenty evening (6 p.m.) reports arrive and are charted and discussed for the morning daily papers. The forecasts and remarks are usually ready by 8.30 p.m., but in bad weather, owing to the delay of the reports and the additional care which is necessary in dealing with them, it is occasionally 9 p.m. before they are issued. The "Times" publishes in its First Edition the map showing the distribution of pressure, the winds, temperature, and weather at 6 p.m. on the previous day, and in its Second Edition a similar map for 8 a.m. on the day of issue.

The official chart for 2 p.m. and for 6 p.m. is still much less complete than that for 8 a.m.* That for 2 p.m. is drawn on the information received from twelve home stations, supplemented by two foreign ones, whenever the latter arrive in time to be used. The material for the 6 p.m. charts is now supplied by reports from sixteen stations in the United Kingdom, supplemented by four from continental stations, but the latter frequently arrive late at the very time when they are most wanted, *i.e.*, during bad weather.

The Sunday duty is still conducted as follows:—Two of the clerks attend on Sunday mornings at the Central Telegraph Station from 8.30 a.m. to about 10.15 a.m. By an arrangement with the Post Office these clerks are supplied with the telegrams immediately they arrive in London. These are examined and charted, with the view of issuing, when necessary, warnings of coming storms, to our own and neighbouring coasts. It is necessary that promptitude should be observed in this service, as the observations must be dealt with and the warnings issued so that the latter may reach the coast before the telegraph offices close for the day, which is usually at about 10 a.m. No work of any kind is transacted for the newspapers on Sunday mornings, the main object of the service being to give prompt information of storms to our coasts; but a telegram is sent to Jersey in the same way as on week days, and there is the ordinary interchange of messages with foreign countries. At 6 p.m. the same clerks attend at the Meteorological Office to receive the evening reports and to prepare the 8.30 p.m. Forecasts, and another opportunity is thus afforded for the correction or extension of any warnings which may have been issued in the morning.

Atlantic Telegrams.

In the course of the year the arrangements for forwarding from the United States occasional reports of gales, icebergs, and derelict ships, which have been met with by passenger steamers of the principal lines running from various European ports to New York or Boston have been improved by the addition of the latitude in which the lowest barometer was observed. The facts are then sent by cable to the Meteorological Office in an abbreviated form, as follows:—

* Steps are being taken to improve both the 8 a.m. and the 6 p.m. charts by obtaining observations from a more extended area.

REPORT of a STORM, and EXPLANATION.

(Say, From New York) to Weather, London.

"Scotia."	19.	Fifteen.	43.	64.	South-west	North-west.	293.	Nine.
Name of steamer supplying the information.	Date of lowest barometer.	Hour of lowest barometer. (= 3 p.m.)	In which lowest barometer was observed.		Direction of change of wind, about time of lowest barometer. (= S.W. to N.W.)		Lowest barometer observed. (= 29.3 inches.)	Extreme force of wind during the storm. (= 9, Beaufort's scale.)
			Lat. N.	Long. W.				

Reports of ice and derelict ships relate to ice or derelicts seen on any part of the passage, and are worded thus:—

"Scotia."	Icebergs.*	Thirteen.	Forty-three.	Fifty-four.
Name of steamer supplying the information.	Nature of ice observed.	Day of month when observed.	In which the ice or derelict was ob- served.	
			Lat. N.	Long. W.

When a report of ice or of derelict ships is appended to one of a storm, the ship's name is not inserted unless the report of the storm and that of the derelict (or ice) be from different ships.

This information is published in the Daily Weather Report, and is also transmitted to the Meteorological Institute of France. A copy is sent regularly to Lloyd's.

Daily Weather Report.

Some little change has been made in the form of the Daily Weather Report since 1st January 1885, by the addition for each month of means of the daily maximum and minimum temperatures at 22 stations during the nine years 1872–80. The information now fills four large quarto pages, and is arranged as follows:—

Page 1 contains the whole of the reports from which the maps for the day (given on page 2) are prepared; and also the 6 p.m. reports of the previous day; page 2 contains (1) a map of North-western Europe showing for 8 a.m. on the date of publication, the distribution of pressure, the prevalent winds, and the sea disturbance, with necessary explanations; together with a table showing the mean atmospheric pressure for the month at 22 stations; (2) a similar map showing the distribution of temperature at 8 a.m., the weather at each station, and the distribution of rainfall during the past 24 hours; together with a table of the mean temperature of the air and of evaporation at 8 a.m., the means of the

* "Derelict" is substituted for icebergs when necessary.

daily maximum and minimum temperatures, and the mean rainfall for the month at a large number of stations over the United Kingdom.

Page 3 contains (1) remarks on the principal features exhibited by the reports for the day; and (2) the forecasts drawn up for each district at 11 a.m., relating to the weather likely to be experienced during the 24 hours ending at noon on the day succeeding that of publication.

Page 4 contains the reports and remarks for 2 p.m. on the previous day, and there is space for the insertion of a Weekly Summary on Mondays, and any other brief information which it is deemed necessary to print at once.

The standing portion of the report (the maps, &c.) is printed in blue, while the information for each day is in black.

Weekly Summary.

On Monday in each week a brief Summary of the Weather experienced over our Islands during the preceding week is given on p. 4 of the Daily Weather Report. It refers only to the principal changes which have occurred, and is intended to serve as an aid to the study of the Daily Reports, the main meteorological features of the week being presented as a connected story, affording greater facility for future reference.

Correction and Addition List.

Additional steps are taken to insure accuracy in the Daily Weather Report. At the close of each month a return is received from nearly all of the telegraphic reporting stations, containing a copy of all the observations which have been transmitted to London by wire during the month. These schedules are used for checking the daily telegrams, for the preparation of the average and other values of the different elements, and also as evidence in the case of legal proceedings. About the middle of every month a lithographic sheet has for many years past been issued with the Daily Weather Report, containing corrections for all discrepancies which have been discovered, and supplying any observations which have been omitted in the published reports. This monthly sheet also contains tables showing the mean values for pressure, temperature, and humidity, together with the total rainfall, and the prevalence of various kinds of weather and of winds from each of the eight principal points during the month, for each telegraphic reporting station within our Islands.

Weekly Weather Report.

The Weekly Weather Report, which has appeared since the beginning of February 1878, has been further improved by the insertion on the first page, for each district, the difference between the aggregate number of day-degrees of accumulated heat above and below 42° F., as well as of rainfall and bright sunshine between the beginning of the year and the end of each week, and the means for the corresponding period of the eight years 1878-85.

The tables of Accumulated Temperature are designed to give persons engaged in agriculture better means of estimating the manner in which

vegetation is affected by temperature than that afforded by the more usual methods of treating the readings of the thermometer. They show for each week, and for the whole period from the beginning of the year, the weekly and progressive values respectively, of the combined amount and duration of the excess or defect of the air temperature, above or below a suitably fixed standard or *base temperature*. The base adopted is 42° F., as being nearly equivalent to 6° Cent., which has been considered by Continental writers on these subjects to be the critical value, the temperature above which is mainly effectual in starting and maintaining the growth, and in completing the ripening, of agricultural crops in a European climate. This base is also convenient as being 10° F. above the Freezing Point.

The Report thus contains the average and extreme temperatures and the rainfall values and the total amount of bright sunshine in each week, for seventy stations grouped into eleven districts in Great Britain and Ireland, together with the difference between them and their respective mean values for the corresponding weeks in previous years. In addition to this, the district values for Accumulated Temperature, Rainfall, and Bright Sunshine are given, both for the week and for the whole period since the beginning of the year, with their difference from the average values.

The accumulated Temperature is expressed in Day-degrees; a Day-degree signifying 1° F. of excess or defect of temperature above or below 42° F. and continued for 24 hours, or any other number of degrees for an inversely proportional number of hours.

It has been ascertained by calculation from a considerable series of hourly observations at various places, that the accumulated temperature may be computed, with a very tolerable approximation to the truth, from the observed daily maximum and minimum temperatures alone.

When the temperature during any period remains either wholly above or below the base temperature, the difference between the base and the mean temperature gives the correct accumulated value. In other cases this difference gives an approximate value of the accumulated temperature which does not depart greatly from the truth, the deviation depending on the greater or less extent of the daily variations of the temperature above or below the base. Further, since the mean between the maximum and minimum of any day is nearly equal to the mean temperature of the day, the difference of the mean of the maximum and minimum from the base also will give directly a fair approximation to the accumulated temperature for the day.

The following rules, however, supply a still closer approximation to the true values sought, and they have been adopted for the preparation of the table in the Weekly Weather Report. They may be applied to any other base temperature as well as to 42° F., with the slight modification of the numerical coefficients.

RULES for computing for a WEEKLY PERIOD the ACCUMULATED TEMPERATURE above or below 42° F. from the observed MAXIMA and MINIMA.

1. Obtain the mean temperature from the means of the seven observed maxima and minima by multiplying the difference between them by the proper coefficient for the month, and adding the result to the mean of the minima.

2. In obtaining the accumulated temperature four cases may occur, to which the following rules will apply :—

Conditions of Temperature	To obtain the Accumulated Temperature.	
	Above 42° F.	Below 42° F.
If the minimum is <i>above</i> 42° F. or <i>equal</i> to 42° F.	Subtract 42° F. from the mean.	There is none.
If the minimum is <i>below</i> 42° F., but the mean for the day is <i>above</i> 42° F.	From the difference between the mean for the day and the minimum deduct the accumulated temperature below 42° F., calculated as stated in the next column.	The required quantity is the excess of 42° F. over the minimum multiplied by the coefficient 0·4.
If the mean for the day is <i>below</i> 42° F., but the maximum is <i>above</i> 42° F.	The required quantity is the excess of the maximum over 42° F. multiplied by the coefficient 0·4.	From the difference between the mean for the day and the minimum deduct the accumulated temperature above 42° F., calculated as stated in the preceding column.
If the maximum is <i>below</i> 42° F., or <i>equal</i> to 42° F.	There is none.	Subtract the mean from 42° F.

In each case the result will be the mean *daily* value for the week, and must be multiplied by 7 in order to obtain the value for the whole week.

The coefficient varies both with the length of the period and the value of the base line. In the above instance the base is 42°; when it is 32° the coefficient is 0·4; when 52° it is 0·33; and when 62° it is 0·25.

A full explanation of these rules will be found in Appendix II. to the Quarterly Weather Report for 1878.

The temperature means derived from the daily maxima and minima are corrected so as to agree as closely as possible with the true mean daily value, and, the average values for the corresponding period in former years having been recomputed, those now in use are :—

For Temperature - - 20 years 1861-80
 „ Rainfall - - 15 „ 1866-80

These statistics are given on page 1 of the publication, the temperature, accumulated heat, rainfall, and sunshine values for *each station** being given on page 4.

In addition to the telegraphic reports, and the returns from the self-recording observatories, weekly returns from 34 volunteer observers are used in preparing this report, the names of the observers at each station being as under—

Names of Stations.	Names of Authorities.
Alnwick Castle - - -	Lieut.-Col. F. Holland, for the Duke of Northumberland, K.G.
Arlington (N. Devon) - -	J. Carter, for Lady Chichester.
Bawtry (Hesley Hall) - -	B. I. Whitaker, F.R. Met. Soc.
Blackpool - - -	C. T. Ward, F.R. Met. Soc.

* The sunshine values are furnished for only a limited number of carefully selected stations.

Names of Stations.	Names of Authorities.
Brookeborough - - -	Mr. Ferguson, for Sir Victor Brooke, Bt., F.L.S.
Cheadle - - -	J. C. Philips.
Churchstoke - - -	P. Wright, F.C.S., F.R. Met. Soc.
Cirencester - - -	The Royal Agricultural College.
Cullompton - - -	T. Turner, J.P., F.R. Met. Soc.
Douglas (Isle of Man) - - -	A. W. Moore, M.A., J.P., Cronkbourne.
Dublin - - -	J. W. Moore, M.D., F.R. Met. Soc.
Durham - - -	J. H. Carpenter.
Edgeworthstown (Currygrane) - - -	J. M. Wilson, J.P.
Foynes - - -	T. J. Carey, for Lord Monteagle, K.P.
Geldeston - - -	E. T. Dowson, F.R. Met. Soc.
Hastings (St. Leonard's) - - -	H. Colborne, M.R.C.S.
Hereford - - -	T. A. Chapman, M.D.
Hillington - - -	Rev. H. E. B. Ffolkes, M.A., F.R. Met. Soc.
Ingatestone - - -	L. Petre.
Kilkenny - - -	H. Carlton, for the Marquis of Ormonde.
Killarney - - -	The Ven. Archdeacon Wynne, M.A., F.R. Met. Soc.
Laudale (Loch Sunart) - - -	A. Fletcher, for T. H. G. Newton, F.R. Met. Soc.
Leicester - - -	J. C. Smith, the Museum.
Llandovery - - -	J. Watkins.
Llandudno - - -	J. Nicol, M.D., F.R. Met. Soc.
Londonderry - - -	J. Conroy, F.R. Met. Soc.
Manchester (Prestwich) - - -	T. B. H. Clunn, M.D., F.R. Met. Soc.
Markree Castle (Sligo) - - -	A. Marth, F.R.A.S., for Colonel Cooper, F.R.A.S.
Newton Reigny (Penrith) - - -	T. G. Benn, F.R. Met. Soc.
Plymouth - - -	J. Merrifield, LL.D., F.R.A.S.
Rothamsted - - -	Rainfall by Sir J. B. Lawes, Bart., LL.D., F.R.S., and J. H. Gilbert, Ph.D., F.R.S., temperature by T. Wilson, F.R. Met. Soc.
Scarborough - - -	A. Rowntree, F.R. Met. Soc.
Southampton - - -	J. T. Cook, R.E., Ordnance Survey Office.
Stowell - - -	Rev. H. J. Poole, F.R. Met. Soc.
Strathfield Turgiss - - -	Rev. C. H. Griffith, F.R. Met. Soc.
Waterford (Brook Lodge) - - -	C. Percival Bolton.

The returns marked "R" are supplied through the Royal Meteorological Society.

Owing to the removal to another part of the country of the Reverend T. A. Preston, M.A., F.R. Met. Soc., the returns from Marlborough have ceased, and those from Stowell have been substituted.

The report is prepared on Wednesday in every week, and is ready for sale early on Saturday morning, but the summary on its first page is sent to the "Times," "Daily News," and some other papers on Wednesday evening.

A *Quarterly Summary* of the Weekly Weather Report has been also issued as an Appendix, giving for each of the 12 districts before referred to (1) the Mean Temperature for each Quarter and for the Whole Year in each year from 1878 to 1885 inclusive, and the means for certain groups of years; (2) the Total Rainfall for the same periods; and (3) the Accumulated Temperature, Rainfall, and Bright Sunshine for the Quarter.

MONTHLY WEATHER REPORT.

During 1885 the issue of the *Monthly Weather Report* has been continued. It contains (1) A General Summary for the Month of the weather experienced over the United Kingdom and its neighbourhood; (2) Tables of the principal Cyclonic and Anticyclonic Systems which have passed over our area during the month; and (3) Tables of Pressure, Temperature, Hygrometric Deductions, Rainfall, Weather, Wind, and Bright Sunshine experienced at a large number of stations scattered over the United Kingdom, together with remarks thereon, and is illustrated by two plates. The report is, therefore, as far as possible, similar to the Quarterly Weather Report, but owing to its prompt issue, it cannot contain either the Gale Tables, or the Tables of Mean Values for the Observatories, which are found in its predecessor. The volume for 1885 has two appendices.

ISSUE OF FORECASTS.

Descriptions of the actual state of the weather, and forecasts *for not more than one day in advance*, are prepared at the Meteorological Office as under:—

On Week Days.

- (1.) At 11 a.m. (from the morning reports), for the 24 hours ending at Noon on the day following the date of issue. This issue is intended especially for the early editions of the evening papers, for the clubs, and for exhibition at certain selected stations. See note, p. 10.
- (2.) At 3.30 p.m. (from the morning and afternoon reports), for the day following that of issue. This set of Forecasts is not intended for general publication, but a copy is exhibited regularly at the door of the Meteorological Office.
- (3.) At 8.30 p.m. (from the 6 p.m. reports), for the day following that of issue. These are now supplied gratis to any newspaper or news agency which may apply for them, and send for them regularly. A very large number of the most important papers avail themselves of this advantage.

The forecasts are made for the following districts:—



0. SCOTLAND, NORTH.
1. SCOTLAND, EAST.
2. ENGLAND, N.E.
3. ENGLAND, EAST.
4. MIDLAND COUNTIES.
5. ENGLAND, SOUTH.
6. SCOTLAND, WEST (with Isle of Man).
7. ENGLAND, N.W. (with North Wales).
8. ENGLAND, S.W. (with South Wales).
9. IRELAND, NORTH.
10. IRELAND, SOUTH.

The descriptions and forecasts are posted at the doors of the Meteorological Office, 116, Victoria Street, S.W., on week days, for the inspection of the public. Copies, or extracts from them, are communicated under the conditions stated on next page, but no information which is not substantially included in them can be supplied.

FORECASTS FOR PRIVATE SUBSCRIBERS.—Any person can be supplied with a copy of the 11 a.m. Forecasts, once on each week day,* on payment of a subscription of ten shillings per annum, or 2s. 6d. per official quarter *or any part thereof, in addition to the cost of transmission*; the charges will therefore be, by *letter post*, 9s., by *book post*, 5s. 9d. per quarter.

FORECASTS FOR CLUBS.—Forecasts, drawn up at 11 a.m., for all the districts, are supplied to Clubs, for a subscription of ten shillings per annum. These are delivered free, by hand, to Clubs situated in or near Pall Mall. Special arrangements can be made for delivery at a greater distance by hand or by post.

SUBSCRIBERS FOR THE LITHOGRAPHED COPY OF THE DAILY REPORT have the 11 a.m. Forecast incorporated with their Report on each week day. The subscription for the Report is—

For delivery by hand, where feasible, £2 per annum;

Do. by book post £1 „

N.B.—Subscriptions must be paid in advance, and end at the usual official quarter day. The subscription for any part of an official quarter is charged as a complete quarter.

Unless otherwise arranged, all forecasts transmitted by post are sent by book post, not as letters.

INQUIRIES AS TO THE WEATHER.

INQUIRIES PERSONALLY OR BY MESSENGER.—Any person applying at the Meteorological Office between 11 a.m. and 8 p.m. on week days, and between 7 p.m. and 8 p.m. on Sundays, can be supplied in writing with the latest information in the possession of the Office and with the latest forecast issued for any specified district, on payment of one shilling for each inquiry.

INQUIRIES BY LETTER.—Application may be made by letter, enclosing thirteen pence in stamps if the reply is to be *by post*, and one shilling in stamps in addition to the cost of the reply, consisting of ten words, exclusive of the address, if the reply is to be *by telegraph*.

INQUIRIES BY TELEGRAPH.—Any person may obtain *by telegraph* from the Meteorological Office the latest information as to the weather in any district of the United Kingdom by payment of a fee of 1s. In addition to the cost of a telegram and reply to any post office, the telegram containing the inquiry must be addressed as follows:

WEATHER,
LONDON.

The payment for the reply should be for ten words in addition to the address.

Application may also be made for similar information to be sent either *by telegraph* or *post* on some future specified day.

CHECKING OF FORECASTS.

In order to test the accuracy of the forecasts they have been compared carefully with the weather reported in the various districts on the days to which they referred, and the results of this checking for 8.30 p.m. have been already given in the Report (p. 10). The details will be found in Appendix XI.

In carrying out this comparison the portions of the forecasts which referred to wind have been carefully separated from those relating to weather. The detailed results of the comparison will be found in Appendix XI., p. 75.

* Good Friday and Christmas Day are reckoned as Sundays.

CHECKING OF STORM WARNINGS.

The testing of the warnings is conducted in the following manner. The intelligence issued is compared with the weather experienced on the coasts, as indicated by the various self-recording anemometers, by the telegraphic reporters, and by several gentlemen who have volunteered to observe for the Office, and whose names will be found in Appendix XIV.

In order to render the information in the possession of the Office as to the weather experienced on our coasts still more complete, the Council have, as in preceding years, made application to the various Lighthouse Boards, and have obtained from them the original log-books from some of the most exposed lightships and lighthouses. They would here express their cordial thanks for the co-operation so readily granted to them by these Boards.

The result of the checking for 1885 will be found on p. 14.

The coasts are subdivided into nine districts, as will be seen in the table. Two large tracts of coast are entirely omitted: viz., the west of Ireland from the Shannon to Malin Head, and the West of Scotland from the Mull of Cantyre to Cape Wrath. No warnings are issued to any place within the limits indicated, except to Galway, and the amount of information as to the weather received from the omitted tracts of coast is, as yet, very scanty.

It should be remembered that in analysing the reports, all observations of the wind in which the force *exceeded* 7 (a "moderate gale") or the velocity exceeded 40 miles an hour, have been quoted as instances of the occurrence of a gale; but it has not been considered that the signal was hoisted late or was hauled down too soon, unless the force of 9 (a "strong gale") or the velocity of 50 miles an hour, was reached prior to the issue of the order to hoist, or subsequent to the issue of the order to lower.

In the Summaries all cases in which the signal has been shown to be late by a single report either of force 9, or of a velocity of 50 miles an hour, have been specially noted.

APPENDIX VIII.

LIST of PERSONS, PLACES, &c. to which the Lithographed Daily Weather Report is supplied, free of cost.

Newspapers :

Lloyd's Shipping List.
New York Herald.
Times (1st and 2nd editions).

For Exhibition at Seaports :

Banff.
Belfast.
Blackpool.
Bo'ness.
Boscastle.
Brighton.
Briton Ferry.
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 APPENDIX IX.

FISHERY BAROMETERS.

LIST of PLACES supplied with FISHERY BAROMETERS.

Shetland Isles.—Balta Sound, Uya Sound, Lerwick, Sandsair, Symbister, Scalloway.

Orkney Isles.—Burray. Kirkwall.

Scotland, east coast.—Stroma, Keiss, Staxigoe, Wick, Sarclet, Lybster, Dunbeath, Portmahomack, Cromarty, Avoch, Nairn, Burghead, Portessie, Port Knockie, Portsoy, Whitehills, Gardenstown, Roseheart, Pitullic, Inverallochy, Pointlaw, Port Erroll, Findon, Portlethen, Muchals, Stonehaven, Arbroath, Broughty Ferry, St. Andrews, Crail, Cellardyke, St. Monance, Burntisland, Newhaven.

England, east coast.—Berwick, Beadnell, North Shields, South Shields, West Sunderland, Hartlepool, Staithes, Scarborough, Filey, Flamborough, Bridlington Quay, Withernsea, Hull, Lynn (2), Wells, Gorleston, Harwich, Brightlingsea, Wivenhoe, Margate, Deal (2), Kingsdown, Dover.

England, south coast.—Bognor, Portsea, Ryde and Ventnor (2) (Isle of Wight), Gorey (Jersey), Haslar Hospital, Poole, Weymouth, Portland, Budleigh-Salterton, Cawsand, Charlestown, Mevagissey, Gorranhaven, Devoran, Portscath, Penryn, Durgan, Porthallow, Falmouth, Coverack, Newlyn, Mousehole.

England, south-west coast.—St. Ives, Hayle, Padstow, Port Isaac, Boscastle, Fremington, Burnham, Highbidge, Weston-super-Mare.

Wales.—Briton Ferry, Swansea, Angle, Milford, Abersoch.

England, north-west coast.—Fleetwood, Morecambe, Maryport.

Isle of Man.—Douglas, Port St. Mary, Peel.

Scotland, south-west coast.—Port Patrick, Stranraer.

Ireland, east coast.—Cushendall, Belfast, Bangor, Groomsport, Donaghadee, Strangford, Ardglass, Carlingford, Greenore, Dundalk, Malahide, Howth, Kingstown (2), Bray.

Ireland, south coast.—Dunmore, Dungarvan, Crosshaven, Kinsale, Union Hall, Castletownsend, Baltimore, Schull, Crookhaven.

Ireland, west coast.—Valencia, Dingle, Tralee, Tarbert, Kilcredane, Barna, Elly Bay, Ballyglass, Ballycastle (Co. Mayo), Donegal, Tribane, Killybegs, Teelin, Portnoo, Burton Port, Bunbeg.

Ireland, north coast.—Dunfanaghy, Rathmullen, Buncrana, Greencastle, Portrush, Portstewart.

Scotland, west coast.—Tarbert, Campbeltown, Carradale, Portree (Isle of Skye), Plockton.

Hebrides.—Stornoway, Cromore, Babyle, Obb, Ness.

SUMMARY of STATIONS supplied with INSTRUMENTS.

England and Wales -	-	-	-	-	69
Scotland -	-	-	-	-	54
Ireland -	-	-	-	-	46
					<hr/>
					169
					<hr/>

APPENDIX X.

TELEGRAPHIC WEATHER INTELLIGENCE.

The following stations are supplied with telegraphic information of storms, free of expense, and signal "cones" have been furnished to most of them, all further expenses attendant on the maintenance and repair of the apparatus being borne locally. The stations are situated.

82 in England and Wales, 38 in Scotland, 15 in Ireland, 3 in the Isle of Man, and 3 in the Channel Islands.

NORTH.	WEST.	SOUTH.	EAST.
SCOTLAND. EAST COAST. Dunrossness. Lerwick. Scalloway. Kirkwall. Holborn Head. Wick. Inverness. Nairn. Burghead. Lossiemouth. Buckie. Portsoy. Banff. Fraserburgh. Peterhead. Aberdeen. Stonehaven. Montrose. Broughty Ferry. St. Andrews. Dundee. Bo'ness. Grangemouth. Anstruther. Pittenweem. Burntisland. Granton. Newhaven. Leith. Fisherrow. Dunbar. Cockburnspath.	ENGLAND, N.W. Ramsey. Douglas. Castletown. Silloth. Maryport. Workington. Whitehaven. Barrow. Morecambe. Fleetwood. Blackpool. Lytham. Southport. Runcorn. Liverpool. ENGLAND, W. Connah's Quay. Port Penrbyn. Holyhead. Port Dinorwic. Carnarvon. Aberystwith. Milford. Pembrey. Swansea. Llanelly. Briton Ferry. Porthcawl. Penarth. Cardiff. Newport. Weston-super-Mare. Burnham. Bridgwater. IRELAND, E. Belfast. Donaghadee. Howth. Kingstown. IRELAND, S. and W. New Ross. Dunmore East. Dungarvan. Youghal. Queenstown. Passage. Kinsale. Cork. Tralee. Limerick. Galway.	ENGLAND, S.W. Ilfracombe. Barnstaple. Appledore. Boscastle. Port Isaac. Newquay. Hayle. Scilly. St. Sennen. St. Just. Penzance. Falmouth. Pendennis. Mevagissey. Plymouth. Teignmouth. Exmouth. ENGLAND, S. Guernsey. St. Helier's (Jersey). Gorey (Jersey). Weymouth. Poole. Cowes. Ryde. Portsmouth. Littlehampton. Brighton. Newhaven. Hastings. Rye. Dover. Margate.	ENGLAND, E. Eyemouth. Berwick-on-Tweed. Tynemouth. S. Shields. Sunderland. Middlesbrough. Redcar. Whitby. Filey. Bridlington Quay. Hull. Goole. Grimsby. Boston. Sutton Bridge. Lynn. Sheringham. Cromer. ENGLAND, S.E. Yarmouth. Southwold. Ipswich. Harwich. Chatham. Sheerness. Faversham.

The signals used consist of:—

1. Cone, point downwards for Southerly gales; S.E. round by S. to N.W.
2. Cone, point upwards for Northerly gales; N.W. round by N. to S.E.

The signals are to be kept hoisted *during the daylight only*, until 48 hours have elapsed from the time *the telegram was despatched*, unless countermanded. At night, lanterns may be used wherever the local authorities deem it desirable to do so.

The meaning of the signals is that an atmospherical disturbance exists (which will be explained in the telegram), and will probably, but not *necessarily*, cause a gale at the place warned, *from the direction* indicated by the signal.

The Meteorological Office supplies the canvas shapes and lanterns to such places as require them, on loan, but in all cases the local authorities must undertake the charges incidental to the hoisting of the signal, such as flagstaff and gear, oil, &c., and also to the keeping of the apparatus in repair, painting, &c.

APPENDIX XI.

REPORT ON THE COMPARISON OF THE FORECASTS ISSUED AT 8.30 p.m.
WITH THE WEATHER SUBSEQUENTLY EXPERIENCED, for the 12
Months, April 1885 to March 1886.

The letters used have the following signification:—

a = complete success.		c = partial failure.
b = partial (more than half) success.		d = total failure.

The checking has been conducted on the same system as that employed in previous years, *i. e.*, each forecast has been considered under the separate headings of "Wind" and "Weather," but the results of the 8 p.m. Forecasts only are here published.

The first column gives the percentage of success in "Wind," the second in "Weather," and the third the average of the two.

The Summary for the whole year is given at page 10.

DISTRICTS.		APRIL 1885.				MAY 1885.				JUNE 1885.			
		Percentages.				Percentages.				Percentages.			
		Wind.	Weather.	Average.	a + b.	Wind.	Weather.	Average.	a + b.	Wind.	Weather.	Average.	a + b.
SCOTLAND, N.	a	64	63	61	90	50	68	59	89	43	64	54	85
"	b	33	20	26		30	29	30		30	33	31	
"	c	3	10	7		17	0	8		20	3	12	
"	d	6	7	3		3	3	3		7	0	3	
SCOTLAND, E.	a	37	60	49	96	42	68	55	89	39	64	47	87
"	b	57	37	47		45	23	34		47	33	40	
"	c	6	0	3		10	0	5		17	0	9	
"	d	0	3	1		3	9	6		6	3	4	
ENGLAND, N.E.	a	60	53	57	90	45	68	57	88	37	70	54	84
"	b	30	37	33		36	26	31		37	24	30	
"	c	10	10	10		16	6	11		23	3	13	
"	d	0	0	0		3	0	1		3	3	3	
ENGLAND, E.	a	54	23	39	80	61	65	63	89	43	70	57	80
"	b	33	50	41		29	23	26		27	20	23	
"	c	7	17	12		10	6	8		23	7	16	
"	d	6	19	8		0	6	3		7	3	5	
MIDLAND COS.	a	37	43	40	79	62	58	60	88	43	57	50	87
"	b	37	40	39		32	23	28		37	37	37	
"	c	16	10	13		3	16	9		13	6	10	
"	d	10	7	8		3	3	3		7	0	3	
ENGLAND, S.	a	53	43	48	88	78	65	72	94	44	73	59	94
"	b	30	50	40		16	29	22		43	27	35	
"	c	10	0	5		6	3	5		10	0	5	
"	d	7	7	7		0	3	1		3	0	1	
SCOTLAND, W.	a	44	60	52	82	49	58	54	85	30	60	45	70
"	b	33	27	30		39	23	31		27	23	25	
"	c	10	3	7		6	3	4		0	10	20	
"	d	13	10	11		6	16	11		13	7	10	
ENGLAND, N.W.	a	44	60	52	87	42	55	49	86	33	60	47	82
"	b	43	27	35		42	32	37		47	23	35	
"	c	7	10	9		13	7	10		13	10	11	
"	d	6	3	4		3	6	4		7	7	7	
ENGLAND, S.W.	a	54	37	46	84	58	55	57	91	50	60	55	82
"	b	40	37	38		29	39	34		30	23	27	
"	c	3	20	12		10	3	6		10	10	10	
"	d	3	6	4		3	3	3		10	7	8	
IRELAND, N.	a	44	60	52	87	36	71	54	81	45	60	53	80
"	b	43	27	35		35	20	27		31	23	27	
"	c	7	7	7		23	3	13		21	10	15	
"	d	6	6	6		6	6	6		3	7	5	
IRELAND, S.	a	30	50	40	80	52	68	60	83	38	63	51	78
"	b	43	37	40		32	23	28		38	17	27	
"	c	10	10	10		16	9	12		17	10	14	
"	d	17	3	10		0	0	0		7	10	8	
SUMMARY.													
BRITISH ISLES	a	48	50	49	86	52	64	58	88	40	64	52	83
"	b	38	35	37		33	26	30		36	26	31	
"	c	8	9	8		12	5	8		18	6	12	
"	d	6	6	6		3	8	4		6	4	5	

DISTRICTS.		JULY 1885.				AUGUST 1885.				SEPTEMBER 1885.			
		Percentages.				Percentages.				Percentages.			
		Wind.	Weather.	Average.	a+b.	Wind.	Weather.	Average.	a+b.	Wind.	Weather.	Average.	a+b.
SCOTLAND, N.	a	55	45	50	84	42	61	52	86	30	44	37	84
"	b	28	43	34		39	29	34		54	40	47	
"	c	16	3	10		13	3	8		13	13	13	
"	d	3	10	6		6	7	6		3	3	3	
SCOTLAND, E.	a	48	68	58	88	39	55	47	83	43	37	40	77
"	b	39	20	30		45	26	36		37	37	37	
"	c	13	6	9		13	13	13		13	16	15	
"	d	0	6	3		3	8	4		7	10	8	
ENGLAND, N.E.	a	45	58	52	94	49	61	55	84	47	40	44	89
"	b	55	29	42		32	23	29		43	47	45	
"	c	0	10	5		13	10	12		3	10	6	
"	d	0	3	1		6	3	4		7	3	6	
ENGLAND, E.	a	52	77	65	92	65	58	62	84	50	57	54	91
"	b	32	23	27		19	28	22		47	27	37	
"	c	16	0	8		10	10	10		3	16	9	
"	d	0	0	0		6	6	6		0	0	0	
MIDLAND COS.	a	61	71	66	99	71	55	63	89	48	47	48	87
"	b	38	29	33		19	32	26		45	33	39	
"	c	3	0	1		10	13	11		7	17	12	
"	d	0	0	0		0	0	0		0	3	1	
ENGLAND, S.	a	68	71	70	97	58	65	62	89	57	40	40	81
"	b	29	26	27		28	29	27		27	37	32	
"	c	3	3	3		6	6	6		16	23	19	
"	d	0	0	0		10	0	5		0	0	0	
SCOTLAND, W.	a	49	58	54	81	42	49	46	78	20	43	32	75
"	b	32	23	27		29	35	32		50	57	43	
"	c	13	6	10		10	6	8		17	7	12	
"	d	6	13	9		19	10	14		13	13	13	
ENGLAND, N.W.	a	58	45	52	80	48	53	52	79	37	53	45	77
"	b	36	20	28		26	29	27		43	20	32	
"	c	6	19	12		10	6	8		10	17	13	
"	d	0	16	8		16	10	13		10	10	10	
ENGLAND, S.W.	a	68	65	67	81	23	61	42	78	37	41	41	84
"	b	23	6	14		45	26	36		43	43	43	
"	c	9	13	11		26	10	18		10	10	10	
"	d	0	16	8		6	3	4		10	3	6	
IRELAND, N.	a	32	65	49	84	29	52	41	81	27	40	34	84
"	b	45	26	35		55	26	40		53	47	50	
"	c	20	9	15		3	6	5		10	13	11	
"	d	3	0	1		13	16	14		10	0	5	
IRELAND, S.	a	42	49	46	81	29	55	42	75	33	47	40	77
"	b	42	29	35		42	23	33		41	30	37	
"	c	13	3	8		19	6	12		13	23	18	
"	d	3	19	11		10	16	13		10	0	5	

SUMMARY.

BRITISH ISLES	a	53	61	57	88	45	57	51	82	39	45	42	82
"	b	36	25	31		34	28	31		44	36	40	
"	c	10	7	8		12	8	10		11	15	13	
"	d	1	7	4		9	7	8		6	4	5	

DISTRICTS.		OCTOBER 1885.				NOVEMBER 1885.				DECEMBER 1885.			
		Percentages.				Percentages.				Percentages.			
		Wind.	Weather.	Average.	a+b.	Wind.	Weather.	Average.	a+b.	Wind.	Weather.	Average.	a+b.
SCOTLAND, N.	a	48	58	53	78	50	54	52	87	52	71	62	91
"	b	23	26	25		30	40	35		39	20	29	
"	c	16	6	11		10	3	7		9	3	6	
"	d	13	10	11		10	3	6		0	6	3	
SCOTLAND, E.	a	45	55	50	84	50	44	47	89	61	61	61	84
"	b	39	29	34		40	43	42		23	23	23	
"	c	6	10	8		7	10	8		10	6	8	
"	d	10	6	8		3	3	3		6	10	8	
ENGLAND, N.E.	a	39	61	50	89	33	57	45	77	58	55	57	89
"	b	55	23	39		40	23	32		32	32	32	
"	c	3	6	5		17	13	15		10	7	8	
"	d	3	10	6		10	7	8		0	6	3	
ENGLAND, E.	a	32	45	39	78	37	47	42	84	53	58	58	86
"	b	39	39	39		50	33	42		29	26	28	
"	c	26	3	14		10	10	10		13	16	14	
"	d	3	13	8		3	10	6		6	0	0	
MIDLAND COS.	a	35	61	48	81	33	57	45	79	45	33	41	84
"	b	39	26	34		40	27	34		42	45	43	
"	c	16	10	13		24	6	15		10	13	12	
"	d	10	3	6		3	10	6		3	6	4	
ENGLAND, S.	a	42	45	44	84	47	60	54	87	58	55	57	91
"	b	42	39	40		43	24	33		32	36	34	
"	c	10	10	10		7	13	10		10	3	6	
"	d	6	6	6		3	3	3		0	6	3	
SCOTLAND, W.	a	35	42	39	74	47	50	49	84	61	52	57	84
"	b	42	29	35		30	40	35		29	26	27	
"	c	10	6	8		17	10	13		7	9	8	
"	d	13	23	18		6	0	3		3	13	8	
ENGLAND, N.W.	a	35	32	34	76	50	37	44	82	45	58	52	79
"	b	45	39	42		30	47	38		39	16	27	
"	c	10	23	16		17	13	15		16	13	15	
"	d	10	6	8		3	3	3		0	13	6	
ENGLAND, S.W.	a	48	55	52	87	33	47	40	85	68	45	57	85
"	b	39	32	35		50	40	45		20	36	28	
"	c	10	10	10		7	13	10		6	13	9	
"	d	3	3	3		10	0	5		6	6	6	
IRELAND, N.	a	19	45	32	77	43	60	52	82	26	52	39	78
"	b	55	35	45		37	23	30		52	26	39	
"	c	10	10	10		17	10	13		19	13	16	
"	d	16	10	13		3	7	5		3	9	6	
IRELAND, S.	a	32	58	45	83	43	64	54	79	23	52	38	85
"	b	49	20	38		37	13	25		58	36	47	
"	c	13	3	8		7	13	10		13	6	9	
"	d	6	13	9		13	10	11		6	6	6	

SUMMARY.

BRITISH ISLES	a	37	51	44	81	42	53	48	83	50	54	52	85
"	b	42	31	37		39	32	35		37	29	33	
"	c	12	9	10		13	10	12		11	9	10	
"	d	9	9	9		6	5	5		2	8	5	

DISTRICTS.		JANUARY 1886.				FEBRUARY 1886.				MARCH 1886.			
		Percentages.				Percentages.				Percentages.			
		Wind.	Weather.	Average.	a+b.	Wind.	Weather.	Average.	a+b.	Wind.	Weather.	Average.	a+b.
SCOTLAND, N.	a	35	77	56	82	54	57	56	86	58	68	63	94
"	b	29	23	26		29	52	30		36	26	31	
"	c	23	0	12		14	7	11		6	3	6	
"	d	13	0	6		3	4	3		0	3	1	
SCOTLAND, E.	a	42	45	44	79	54	46	50	80	42	65	54	86
"	b	26	45	35		21	39	30		42	23	32	
"	c	19	7	13		25	4	15		13	6	10	
"	d	13	3	8		0	11	6		3	6	4	
ENGLAND, N.E.	a	55	61	53	89	72	46	59	88	49	55	49	79
"	b	32	29	31		14	43	29		35	26	30	
"	c	7	7	7		14	7	10		23	13	18	
"	d	6	3	4		0	4	2		0	6	3	
ENGLAND, E.	a	32	45	39	79	64	71	68	86	49	45	47	84
"	b	42	39	40		18	18	18		42	32	37	
"	c	16	10	13		18	7	12		6	13	10	
"	d	10	6	8		0	4	2		3	10	6	
MIDLAND COS.	a	32	55	44	86	68	54	61	86	39	49	44	78
"	b	42	42	42		11	39	25		39	29	34	
"	c	16	0	8		21	7	14		16	16	16	
"	d	10	3	6		0	0	0		6	6	6	
ENGLAND, S.	a	65	68	62	88	57	57	57	86	61	47	54	82
"	b	23	29	26		22	36	29		23	33	28	
"	c	6	7	6		21	7	14		13	13	13	
"	d	6	6	6		0	0	0		3	7	5	
SCOTLAND, W.	a	42	55	49	73	50	47	49	74	45	43	47	78
"	b	26	23	24		25	25	25		36	26	31	
"	c	26	9	18		18	14	16		19	13	16	
"	d	6	13	9		7	14	10		0	13	6	
ENGLAND, N.W.	a	39	61	50	78	46	50	48	74	40	61	55	80
"	b	32	23	28		29	22	26		29	20	25	
"	c	23	6	14		18	7	12		19	0	9	
"	d	6	10	8		7	21	14		3	19	11	
ENGLAND, S.W.	a	40	65	53	80	37	57	47	74	55	42	49	75
"	b	33	22	27		33	21	27		26	26	26	
"	c	20	13	17		11	4	8		19	16	17	
"	d	7	0	3		19	18	18		0	16	8	
IRELAND, N.	a	32	61	47	72	39	43	41	75	52	55	54	85
"	b	35	16	25		36	32	34		36	26	31	
"	c	23	16	20		4	11	8		6	6	6	
"	d	10	7	8		21	14	17		6	13	9	
IRELAND, S.	a	52	52	52	75	22	36	29	61	47	60	54	84
"	b	23	22	23		32	32	32		40	20	30	
"	c	19	13	16		21	14	18		3	17	10	
"	d	6	13	9		25	19	21		10	3	6	

SUMMARY.

BRITISH ISLES	a	43	58	51	80	51	51	51	79	49	54	52	82
"	b	31	28	29		25	31	28		35	26	30	
"	c	13	8	13		17	8	13		13	11	12	
"	d	8	6	7		7	10	8		3	9	6	

APPENDIX XII.

LIST of STATIONS from which DAILY SIMULTANEOUS OBSERVATIONS
(at 0h. 8m. p.m. G. M. T.) have been received in 1885.

Stations.	Observers.	Remarks.
ENGLAND AND WALES.		
Bolton - - -	Rev. T. Mackereth, F.R.A.S.	--
Bradford - - -	J. McLandsborough, F.R.A.S., F.R. Met. Soc., and A. E. Preston.	--
Chatham, School of Military Engineering.	The Instructor in Surveying, R.E.	--
Falmouth Observatory -	The Staff.	--
Greenwich Observatory -	The Staff, for the Astronomer Royal.	--
Guernsey - - -	A. Collenette, F.R. Met. Soc.	--
Kew Observatory -	The Staff.	--
Leicester (Museum) -	J. C. Smith.	--
Liverpool Observatory (Bidston).	J. Hartnup, F.R. Met. Soc.	--
Oxford, Radcliffe Obs. -	The Staff.	--
Plymouth - - -	J. Merrifield, LL.D., F.R.A.S.	--
Silloth - - -	Rev. F. Redford, M.A., F.R.S.E., since deceased.	Ceased in June 1885.
Stonyhurst Observatory -	The Staff.	--
SCOTLAND.		
Aberdeen Observatory -	The Staff.	--
Orkney, Sandwick Manse	Rev. J. R. Anderson.	--
IRELAND.		
Galway, Queen's College	W. Ryan.	--
Valencia Observatory -	The Staff.	--
BRITISH COLONIES, POSSESSIONS, &c.		
Adelaide - - -	Clement L. Wragge, F.R. Met. Soc.	--
Barbados, W. I. -	Surgeon-Maj. in charge.	--
Gibraltar - - -	Surgeon-Gen. in charge.	--
Malta - - -	Surgeon-Major in charge.	--
Nassau (Bahamas) -	C. L. Dunscombe.	--
Natal - - -	Surgeon-Maj. in charge.	--
Scutari, British Cemetery	Serg. W. H. Lyne, R.E.	--
Sierra Leone - - -	Surgeon-Maj. in charge.	--

SUMMARY.

England and Wales -	13
Scotland - - -	2
Ireland - - -	2
British Colonies and Possessions - - -	8
Total	25

APPENDIX XIII.

METHODS FOLLOWED IN DEALING WITH METEOROLOGICAL RETURNS FROM LAND STATIONS IN THE BRITISH ISLES.

These stations are of five classes, as stated on page 17.

I.—*Observatories continuously observing all the Meteorological Elements.*

Hourly measurements of the curves obtained from the self-recording instruments at the observatories of the Office are made by the observers at each station, on printed forms supplied for the purpose, which, together with the curves, are forwarded to the Office weekly. They comprise measurements of the barograms, of the dry-bulb and wet-bulb thermograms, of the anemograms, and of Beckley's rain-gauge curves. Returns from observatories.

The measurements are subjected to a careful examination in order to ensure as far as possible their accuracy, and the regulations which have been adopted to secure this end will be found fully detailed in the Report of the Office for 1868. They comprise rules for the guidance of observers, as well as of the assistants charged with the examination of the work at the Office. Attention need be called here to only two of these rules, viz.: (a) the use of subsidiary sheets on which are entered the results of a second set of measurements of the curves, made after, and quite independently of, the first set and with a different scale, the two sets of measurements being afterwards compared together, and any differences found inquired into and set right; and (b) the re-measurements made by the assistants at the Meteorological Office, and which always amount to 40, and in doubtful cases to many more, per month, for each element. The attention of the observers is always drawn to such errors as may be detected, and to any failures in the continuity of the curves arising from failure of the light, stoppage of the clock, defective photography, faulty action of the wet-bulb thermometer, &c.; a report containing the results of the examination of each Observatory being also submitted to the Council each month and printed in their Minutes. The curves and tabulations are eventually bound and stored in the Office. Examination of returns.

In connexion with this work should be mentioned the general watch which has to be kept over the working of the observatories and of the instruments, not only to secure uniformity amongst them and observance of rules, but also to guard against small changes which are liable to occur at certain times, especially with the thermographs, and which may affect the scale-values of the instrument or the datum lines used for the tabulation of the curves. About twice a year this work calls for special examination, entailing some considerable time and occasionally the engraving of new scales for measuring the curves. Results of examination and report to Council.

The photographic curves are also used in the harmonic analyser; for this purpose they require very little preparation. General supervision of observatory work.

METHOD OF DEALING WITH THE NUMERICAL RESULTS FROM THE SELF-RECORDING OBSERVATORIES.

In dealing with the tabulations the first step is to go over the sheets and fill up by interpolation, wherever possible, any gaps or breaks in the continuity of the record. Interpolations.

The record having been made as complete as possible, the daily, five-daily, and monthly means of the barometer and of the dry-bulb and wet-bulb thermometers are deduced. Means.

Vapour tension. The hourly vapour tension is then computed by an expansion of Glaisher's Hygrometrical Tables, prepared in the Office, and the work is independently checked.

Hourly Readings. A copy is next prepared of the above-mentioned hourly measurements of the barometer, dry-bulb and wet-bulb thermometers, wind and rain curves, and of the computed hourly values of vapour tension. To these are added the daily means of the three first-mentioned elements, the extremes and daily range of pressure and temperature, and the daily totals of rainfall, and the whole series is printed and published under the title of "Hourly Readings from the Self-recording Instruments at the Four Observatories under the Meteorological Council."

To ensure accuracy the sheets are read over in proof with the originals. The interpolated readings are printed in *italic* type, but no distinguishing mark is affixed to means which are partly based on them. When the gap in the record is too long to be dealt with by an interpolation of the missing hourly readings, the mean for the day is obtained by an interpolation from the adjacent daily means, and the result thus obtained is printed as an approximation.

Monthly and Annual Tables. The five-daily, monthly, and annual means, together with the absolute extremes of pressure and temperature for each month, were formerly published as an appendix to the Quarterly Weather Report, but, beginning with the volume for 1881, they have been printed instead at the end of the "Hourly Readings." As before the tables are repeated in French measures.

Gale tables. The gale tables printed in the text of the Quarterly Weather Report, which show the extent, duration, and degree of severity of all the stronger gales, are prepared from the tabulations of the anemograms received from the self-recording observatories, together with those received from the extra anemographic stations.

II.—*Anemographic Stations at which the Wind is recorded continuously.*

The anemograms received from the stations enumerated on page 85 are regularly examined and tabulated in the Office, and the sheets bound up in volumes. Besides special inquiries on legal and other points that from time to time arise, and in which these documents are of the highest importance, the tabulations are always employed in the preparation of the chronicle and gale tables for the Quarterly Weather Report. They are also regularly used in the checking of the storm warnings issued by the Office.

III.—*Method followed with regard to the Returns from Land Stations of the Second Order.*

Origin and progress of system.

Ever since the year 1866 returns of more or less completeness have been received from land stations in the United Kingdom. In that year there was only one station, but by 1871 the number had increased to 15, and five years later to 49, including 14 stations belonging to the Royal Meteorological Society, copies of the returns from which were sent to the Office under a special arrangement with the Society.

At the end of the present year the total number of stations was 69, including 15 belonging to the Royal Meteorological Society and 5 belonging to the Scottish Meteorological Society.

This number is exclusive of the self-recording observatories, and of the anemographic stations, but it includes several from which only very scanty information is received.

The stations are distributed as follows: 40 in England, 3 in Wales 10 in Scotland, and 16 in Ireland.

The returns are received at the Office monthly, and are duly entered and stored.

The publication of the returns is carried out in the following way: For a certain number of stations the observations of pressure, temperature, wind, cloud amount, and weather, at 9 a.m. and 9 p.m. each day, together with the computed vapour tension and relative humidity at those hours, and the daily maxima and minima of temperature, and daily rainfall, are published *in extenso* on the Form, A., proposed by the Permanent Committee of the First International Meteorological Congress at Vienna in 1874, and adopted for international use by the Second International Meteorological Congress at Rome in 1879. Publication on Form A.

The Permanent Committee assigned an inferior limit to the number of stations from which returns should be published *in extenso*, varying from two for Belgium to 100 for Russia in Asia, the number in the case of the United Kingdom being 15. In 1875, when the systematic publication of returns from Stations of the Second Order began, only nine British stations were available, but this number has steadily grown, until for 1880 returns from 33 stations were published on the A. Form. Though this list could be extended if desired, it has been thought better to curtail it somewhat on account of the size of the publication. The volume for 1882, now passing through the press, will therefore, like that for 1881, contain returns, *in extenso*, from only 30 stations.

Care is taken in adding to the list for publication to see, first, that the station is satisfactory as regards its instruments, their exposure, &c.; secondly, that the returns bear internal evidence of accuracy and care in their preparation; and thirdly, that the district represented by the station is one for which information is needed. Additions to the list for publication.

Full particulars as to the methods adopted in the examination of the returns will be found in previous reports. Examination.

Besides this publication in full, the monthly means of the various elements, together with summaries of the wind direction and of the weather, are published on the Form, B., also devised by the Permanent Committee of the Vienna Congress, and adopted by the Roman Congress. Publication on Form B.

Returns from six stations were published in this manner for the year 1873, and from nine stations for the year 1874. In 1875 the list included the names of 26 stations. This number has grown to 45 for the year 1882, and might be even further increased.

All the stations, returns from which are published *in extenso* on Form A., are included in the Form B. list. But this list also includes others, either not quite so good, not so representative, or not so long established. The method of preparation is in the main the same as in the case of the Form A. But the summaries of wind and weather are specially prepared for this publication. For wind, the summary shows the number of observations at 9 a.m. and 9 p.m. under each of the bi-quadrantal points N., N.E., E., &c., the observations under intermediate points being thrown alternately forward and backward. For weather, the summary gives the number of days of rain, snow, hail, thunderstorm, clear sky, overcast, and gale. The days of clear sky and overcast are those when the mean of the cloud amounts at 9 a.m. and 9 p.m. are less than 2, and more than 8 respectively. The days of gale are those when force 7 or upwards, by Beaufort scale, is recorded.

The monthly rainfall values (total, number of rainy days, and maximum) for the observatories and all the Stations of the Second Order are supplied each year to Mr. Symons, F.R.S., for publication in his "British Rainfall." British rainfall.

The observations are taken at 9 a.m. and 9 p.m. local time each day. It sometimes happens, however, that strict punctuality cannot be observed. In such cases, if the difference in time does not exceed 30 minutes, the Unpunctual observations.

observations are, in most cases, printed without alteration. When the difference exceeds 15 minutes, a note is inserted in the remarks showing the exact time of observation. If the difference in time is more than half-an-hour, the readings are usually rejected and an interpolation made.

New stations.

When an application for the adoption of a new station is received, a schedule is forwarded to the observer containing a series of questions as to the outfit of the station, the exposure of the instruments, and the influence likely to be exerted on their indications by surrounding objects, such as houses and trees. Only mercurial barometers are accepted, and only such as have been duly verified. All thermometers must have been tested at Kew. A plan of the station, showing the positions of the instruments with regard to neighbouring objects is also required.

On the return of this schedule the answers are considered, and, where necessary, alterations are advised.

If, however, the existing arrangements are satisfactory, tables for reducing the barometer readings to 32° Fahrenheit at mean sea level are prepared and duplicates sent to the observer, together with a set of Hygrometrical Tables, and a copy of "Instructions in the Use of Meteorological Instruments."

The first returns are compared and examined with special care, and a report of the result of the examination is forwarded to the observer, with instructions how best to complete and perfect the returns.

Sunshine records.

The daily records of sunshine which are now received from 35 Stations in the British Islands are examined generally to guard against accidental changes in the adjustment of the instrument. After their receipt has been acknowledged, the cards are duly stamped and dated and then stored in the Office.

Weekly totals.

A tabulation of these curves is published as part of the Weekly Weather Report, mentioned in Appendix VII., and for those stations which are also Stations of the Second Order the monthly totals of bright sunshine in hours, together with the percentage of its possible duration, is published as Part IV. of "Returns from Stations of the Second Order." A table showing the daily amount of sunshine at Bunhill Row, one of the London stations, is also prepared quarterly for the Royal Meteorological Society.

INSPECTION.

The Stations of the Second Order are regularly inspected, the attention of the inspector being directed by the Office to any special point which may require investigation.

IV.—*Telegraphic Reporting Stations.*

Full particulars relating to these stations, the information received from them, and the method of dealing with that information, will be found in Appendix VII. A paragraph in that Appendix (p. 63) explains the use that is made of the monthly schedules sent in by the observers.

V.—*Extra Stations.*

No returns from Stations of the Fifth Class are published by the Office, but some of them are regularly used in the checking of the storm-warnings, and all are available for any special investigation that may be taken up.

The rainfall values at these stations are, however, copied and supplied to Mr. Symons, F.R.S., for publication in "British Rainfall."

observations are, in most cases, printed without alteration. When the difference exceeds 15 minutes, a note is inserted in the remarks showing the exact time of observation. If the difference in time is more than half-an-hour, the readings are usually rejected and an interpolation made.

New stations.

When an application for the adoption of a new station is received, a schedule is forwarded to the observer containing a series of questions as to the outfit of the station, the exposure of the instruments, and the influence likely to be exerted on their indications by surrounding objects, such as houses and trees. Only mercurial barometers are accepted, and only such as have been duly verified. All thermometers must have been tested at Kew. A plan of the station, showing the positions of the instruments with regard to neighbouring objects is also required.

On the return of this schedule the answers are considered, and, where necessary, alterations are advised.

If, however, the existing arrangements are satisfactory, tables for reducing the barometer readings to 32° Fahrenheit at mean sea level are prepared and duplicates sent to the observer, together with a set of Hygrometrical Tables, and a copy of "Instructions in the Use of Meteorological Instruments."

The first returns are compared and examined with special care, and a report of the result of the examination is forwarded to the observer, with instructions how best to complete and perfect the returns.

Sunshine records.

The daily records of sunshine which are now received from 35 Stations in the British Islands are examined generally to guard against accidental changes in the adjustment of the instrument. After their receipt has been acknowledged, the cards are duly stamped and dated and then stored in the Office.

Weekly totals.

A tabulation of these curves is published as part of the Weekly Weather Report, mentioned in Appendix VII., and for those stations which are also Stations of the Second Order the monthly totals of bright sunshine in hours, together with the percentage of its possible duration, is published as Part IV. of "Returns from Stations of the Second Order." A table showing the daily amount of sunshine at Bunhill Row, one of the London stations, is also prepared quarterly for the Royal Meteorological Society.

INSPECTION.

The Stations of the Second Order are regularly inspected, the attention of the inspector being directed by the Office to any special point which may require investigation.

IV.—Telegraphic Reporting Stations.

Full particulars relating to these stations, the information received from them, and the method of dealing with that information, will be found in Appendix VII. A paragraph in that Appendix (p. 63) explains the use that is made of the monthly schedules sent in by the observers.

V.—Extra Stations.

No returns from Stations of the Fifth Class are published by the Office, but some of them are regularly used in the checking of the storm-warnings, and all are available for any special investigation that may be taken up.

The rainfall values at these stations are, however, copied and supplied to Mr. Symons, F.R.S., for publication in "British Rainfall."

APPENDIX XIV.

LIST OF DOCUMENTS RELATING TO THE LAND METEOROLOGY OF THE BRITISH ISLANDS, RECEIVED DURING THE YEAR ENDING
MARCH 31ST, 1886.

Stations.	Observers.	Nature of Information received.	Notes.
I. †Valencia	J. E. Callum -	-	From January 1886.
†Glasgow	Prof. R. Grant, M.A., LL.D., F.R.S. -	-	
†Aberdeen	Prof. C. Niven, M.A., F.R.S. -	-	
†Falmouth	E. Kitro, F.R. Met. Soc. -	-	
†Stonyhurst	Rev. S. J. Perry, M.A., F.R.S. -	-	
†Kew	G. M. Whipple, B.Sc., F.R.A.S., F.R. Met. Soc. -	-	
II. Armagh	J. L. E. Dreyer, Ph.D., F.R.A.S. -	-	Till December 1885. From December 1885.
Alwrick Castle	Lt.-Col. F. Holland, for the Duke of Northumberland, K.G. -	-	
†Holyhead	Hugh Williams, C.E. -	-	
†Sandwick	Miss Clouston and the Rev. J. R. Anderson -	-	
†Swanbister	W. I. Fortescue, Esq. -	-	
†Silly	W. Thomas -	-	
†Yarmouth	G. T. Watson -	-	
†Kilkenny Castle	The Marquis of Ormonde -	-	
Waterford	The Harbour Authorities -	-	
Armagh	J. L. E. Dreyer, Ph.D., F.R.A.S. -	-	
Aysgarth	Rev. Fenwick W. Stow, M.A., F.R. Met. Soc. -	-	
†Babbacombe	E. E. Glyde, F.R. Met. Soc. -	-	
†Braemar	James Aitken, J.P. -	-	
†Buxton	E. J. Sykes, M.B., F.R.A.S., F.R. Met. Soc. -	-	
†Carmarthen	G. J. Hearder, M.D. -	-	
Chatham	W. Skipper and P. McHugo for Instructor in Surveying. -	-	
†Chaddle	J. C. Phillips, Esq. -	-	Regular observations at 9 a.m. and 9 p.m. of pressure, temperature, wind, cloud and weather, with the daily maxima and minima of temperature, the daily rainfall, and general remarks on the weather.
†Cheltenham	R. Tyrer, B.A., F.R. Met. Soc. -	-	
†Churchstoke	Philip Wright, F.C.S., F.R. Met. Soc. -	-	

LIST OF DOCUMENTS—continued.

Stations.	Observers.	Nature of Information received.	Notes.
† Brodickborough Cronkbourne, Isle of Man.	W. Ferguson, for Sir Victor Brooke, Bt., F.L.S. A. W. Moore, M.A., J.P. - - -		
† Dublin (Botanic Gar- dens, Glasnevin).	F. W. Moore, Esq., F.L.S. - - -		
† Dublin (City)	J. W. Moore, M.D., F.R. Met. Soc. - - -		
† Dublin (Mountjoy Observatory).	Col. Sir C. W. Wilson, R.E., K.C.B., F.R.S., Ordnance Survey Office.		
†† Dundee - - -	W. Ross McKelvie, Esq. - - -		
†† Dunrobin Castle - - -	D. Melville - - -		
† Durham - - -	H. J. Carpenter, Esq. - - -		
††† Dundee (Buccles) - - -	E. F. Dawson, F.R. Met. Soc. - - -		
††† Glendunod - - -	Arthur S. Reid, M.A., F.G.S. - - -		
††† Hillington - - -	Rev. H. E. B. Ffolkes, M.A., F.R. Met. Soc. - - -		
††† Jersey (St. Aubin's) - - -	J. E. Vibert, M.A. - - -		
††† Killarney - - -	Ven. Archdeacon Wynne, M.A., F.R. Met. Soc.	Regular observations at 9 a.m. and 9 p.m. of pressure, temperature, wind, cloud and weather, with the daily maxima and minima of temperature, the daily rainfall, and general remarks on the weather.	Mr. Vibert died March 1886.
††††† Llandale (Argyleshire)	A. Fletcher, for T. H. G. Newton, M.A., J.P., F.R. Met. Soc.		
††††† Llandudno - - -	J. Nicol, M.D., J.P., F.R. Met. Soc. - - -		
††††† Leicester - - -	J. C. Smith, for Museum Authorities - - -		
††††† Londonderry - - -	J. Conroy, F.R. Met. Soc. - - -		
††††† Margate - - -	J. Stokes, F.R. Met. Soc. - - -		
††††† Markree Castle, Sligo - - -	A. Marth, F.R.A.S., for Col. Cooper, F.R.A.S.		
††††† Marlborough - - -	Rev. T. A. Preston, M.A., F.R. Met. Soc. - - -		
††††† Newton Reigny (Pen- zith).	T. G. Benn, F.R. Met. Soc. - - -		
††††† Parsonstown - - -	W. Harding, for the Earl of Rosse, F.R.S. - - -		
††††† Plinmore - - -	Peter Donald - - -		

LIST OF DOCUMENTS—continued.

Stations.	Observers.	Nature of Information received.	Notes.
† Brookborough Cronkbourne, Isle of Man.	W. Ferguson, for Sir Victor Brooke, Bt., F.L.S. A. W. Moore, M.A., J.P.		
† Dublin (Botanic Gar- dens, Glasnevin).	F. W. Moore, Esq., F.L.S.		
† Dublin (City)	J. W. Moore, M.D., F.R. Met. Soc.		
† Dublin (Mountjoy Observatory).	Col. Sir C. W. Wilson, R.E., K.C.B., F.R.S., Ordnance Survey Office.		
† Dundee	W. Ross McKelvie, Esq.		
† Dunrobin Castle	D. Melville		
† Durham	H. J. Carpenter, Esq.		
† Geldeston (Beccles)	E. T. Dowson, F.R. Met. Soc.		
† Glenalmond	Arthur S. Reid, M.A., F.G.S.		
† Hillington	Rev. H. E. B. Folkes, M.A., F.R. Met. Soc.		
† Jersey (St. Aubin's)	Rev. E. Vibert, M.A.		
† Killarney	Ven. Archdeacon Wynne, M.A., F.R. Met. Soc.	Regular observations at 9 a.m. and 9 p.m. of pressure, temperature, wind, cloud and weather, with the daily maxima and minima of temperature, the daily rainfall, and general remarks on the weather.	Mr. Vibert died March 1886.
† Llandale (Argyleshire)	A. Fletcher, for T. H. G. Newton, M.A., J.P., F.R. Met. Soc.		
† Llandudno	J. Nicol, M.D., J.P., F.R. Met. Soc.		
† Leicester	J. C. Smith, for Museum Authorities		
† Londonderry	J. Conroy, F.R. Met. Soc.		
† Margate	J. Stokes, F.R. Met. Soc.		
† Markree Castle, Sligo	A. Marth, F.R.A.S., for Col. Cooper, F.R.A.S.		
† Marlborough	Rev. T. A. Preston, M.A., F.R. Met. Soc.		
† Newton Reigny (Pen- rith).	T. G. Benn, F.R. Met. Soc.		
† Parsonstown	W. Harding, for the Earl of Rosse, F.R.S.		
† Pinmore	Peter Donald		

LIST OF DOCUMENTS—continued.

Stations.	Observers.	Nature of Information received.	Notes.
† Prestwich	T. R. H. Clunn, M.D., F.R. Met. Soc.	-	Till November 1885.
‡ Rothley	James Kay, Esq.	-	
† Sandwick	Miss Clouston and Rev. J. R. Anderson	-	
‡ Sealeby	R. A. Allison, M.P., F.R. Met. Soc.	-	
‡ Scarborough	Allan Rowntree, F.R. Met. Soc.	-	Regular observations at 9 a.m. and 9 p.m. of pressure, temperature, wind, cloud and weather, with the daily maxima and minima of temperature, the daily rainfall, and general remarks on the weather.
† Seaham	G. H. Aird	-	
† Southampton	J. T. Cook, R.E., for Director General of the Ordnance Survey.	-	
‡ Southbourne	T. A. Compton, B.A., M.D., F.R. Met. Soc.	-	
Stokesay	Miss M. A. Digges La Touche	-	
† Stonyhurst	Rev. S. J. Perry, F.R.S.	-	
St. David's, Pembroke	W. P. Probert, LL.D., F.G.S., F.R. Met. Soc.	-	
† St. Leonards	H. Colborne, M.R.C.S.	-	
† Swanbister	W. I. Fortescue	-	
† Totnes	T. H. Edmunds, Esq.	-	
† Uppingham	Rev. G. H. Mullins, M.A., F.R. Met. Soc.	-	From January 1886. Till December 1885.
‡ Wakefield	H. Clarke, L.R.C.P., F.S.S., F.R. Met. Soc.	-	
Ware, Herts	Rev. B. Ward	-	
Whitby (Lighthouse).	E. J. W. Powell	-	Till May 1885. From January 1886.
† York	H. M. Plataner, F.G.S.	-	
IV. The Telegraphic Stations, see List on p. 45	-	-	Regular observations twice (and in some cases three times) daily of pressure, temperature, wind, weather, and sea disturbance. Pressure, temperature (dry-bulb, wet-bulb, max., min.), wind and rainfall, once daily. Pressure, temperature, wind, and weather, once daily. Pressure and temperature four times daily, and wind twice daily.
V. † Arlington Court, Devon	J. Carter, for Lady Chichester	-	
Baltimore	J. Halsey	-	
Castletownsend	Lieut. T. W. Cobb, R.N.	-	
Crookhaven	"	-	

LIST OF DOCUMENTS—continued.

Stations.	Observers.	Nature of Information received.	Notes.
Crosshaven - Cooper's Hill (Egham) Delph, Yorkshire -	J. W. Bridle - Prof. H. McLeod, F.R.S. - W. K. Inglis -	- - - Pressure, temperature, and wind, twice daily. Full return for 9 a.m. and 3 p.m. Pressure, wind, and weather twice daily, with max. and min. temperatures, and rainfall.	From January 1886.
Ennis -	J. Hill, C.E., F.R. Met. Soc. -	- Daily rainfall.	
Gosleston, Norfolk -	R. C. J. Day -	- Pressure and wind twice daily.	
Harpenden -	T. Wilson, F.R. Met. Soc. -	- Pressure, temperature, and wind, twice daily, with rainfall.	
Haslar -	G. Coppen -	- Pressure and temperature four times daily.	
Rugby -	C. H. Hodges, M.A. -	- Full set of 9 a.m. observations with 9 p.m. temperatures.	
Saffron Walden -	J. G. Bellingham -	- Pressure and temperature twice daily, with 9 a.m. wind and rainfall.	
Schull -	Lieut. T. W. Cobb, R.N. -	- Pressure, temperature, and wind twice daily.	
†Sheffield (Weston Park) Stamford (Ketton Hall) Sudbury -	Elijah Howarth, F.R.A.S. - Fred. Coventry, F.R. Met. Soc. - W. Bayley Ransom -	- Full returns for 9 a.m. and 6 p.m. Full monthly summary. Pressure, temperature (dry-bulb, max., min.), wind, cloud, and rainfall, once daily, with general remarks.	
Symbister, Wharfedale, Shetland.	J. Bruce, Esq. -	- Pressure and temperature twice daily.	
Tarbert (Harris) Union Hall -	Donald Bethune - Lieut. T. W. Cobb, R.N. -	- Pressure and wind twice daily. Pressure, temperature, and wind, twice daily.	

NOTE.—The Stations marked "H" belong to the Royal Meteorological Society; those marked "S" belong to the Scottish Meteorological Society; those marked thus † have been inspected during the year.

CONTINUOUS RECORDS of BRIGHT SUNSHINE have also been received from the following Stations, in addition to those already mentioned on p. 85.

Station.	Observer.
Blackpool - - - -	C. T. Ward, M.A., F.R. Met. Soc.
Cambridge - - - -	H. Todd.
Churchstoke - - - -	P. Wright, F.C.S., F.R. Met. Soc.
Cirencester - - - -	Prof. Ohm., B.A., F.R. Met. Soc.
Cronkbourne, Isle of Man - - - -	A. W. Moore, M.A., J.P.
Cullompton - - - -	Thos. Turner, J.P., F.R. Met. Soc.
Dublin - - - -	Sir C. Wilson, Col. R.E., K.C.B., F.R.S.
Durham - - - -	H. J. Carpenter.
Geldeston - - - -	E. T. Dowson, F.R. Met. Soc.
Hastings - - - -	H. Colborne, M.R.C.S.
Hillington - - - -	Rev. H. E. B. Ffolkes, M.A., F.R. Met. Soc.
Jersey - - - -	J. Fisher.
Leicester - - - -	J. C. Smith.
Llandudno - - - -	J. Nicol, M.D., J.P., F.R. Met. Soc.
London, Bunhill Row - - - -	Messrs. de La Rue.
„ Westminster - - - -	The Staff, Meteorological Office.
Markree Castle - - - -	A. Marth, F.R.A.S. for, Col. E. H. Cooper.
Oxford - - - -	E. J. Stone, F.R.S.
Oswald Kirk, Yorkshire - - - -	R. Thompson.
Parsonstown - - - -	Dr. Boeddicker, for the Earl of Rosse, F.R.S.
Penrith - - - -	T. G. Benn, F.R. Met. Soc.
Plymouth - - - -	J. Merrifield, L.L.D., F.R.A.S.
St. Ann's Head - - - -	Messrs. Blake & Spicer.
Southampton - - - -	R. H. Stotherd, Col. R.E., C.B.
Stornoway - - - -	D. Macdonald.
Swanbister (Orkney) - - - -	W. Irvine Fortescue.
Worksop - - - -	H. Mellish, F.R. Met. Soc.
York - - - -	J. E. Clarke, B.A., B.Sc.

APPENDIX XV.

ACCESSIONS TO THE LIBRARY DURING THE YEAR ENDING
31ST MARCH 1886.

A--AGRICULTURE AND BOTANY.

Commissioner of Agriculture, Washington.—Report . . . for the year 1884. 581 pp., 71 plates, la. 8°. Washington, 1884.

|| **Hamberg, H. E.**—Om skogarnes inflytande på Sveriges klimat. (De l'influence des forêts sur le climat de la Suède.) I. & II. 76 pp., 1 plate, la. 4°. Stockholm, 1895. (*Bihang till Domänstyrelsens underdåniga berättelse rörande skogsväsendet för år, 1884.*)

In the French language also.

Ufficio centrale di Meteorologia, Roma.—Rivista Meteorico-Agraria. Anno VI., 1885, Nos. 1-36. la. 8°. (Roma, 1885-86.)

|| **Wollny, E.**—Beiträge zur Frage der Schwankungen im Kohlensäuregehalt der atmosphärischen Luft. 19 pp. 8°. (*Forschungen auf dem Geb. Agrik.-phys., Heidelberg. Bd. viii., Heft 5.*)

|| ———. —Untersuchungen über den Einfluss des Bodens und der landwirthschaftlichen Kulturen auf die Temperatur- und Feuchtigkeitsverhältnisse der atmosphärischen Luft. 28 pp. 8°. (*Forschungen auf dem Geb. Agrik.-phys., Heidelberg. Bd. viii., Heft 3/4.*)

E--ASTRONOMY.

|| **Boeddicker, O.**—On the changes of the radiation of heat from the moon during the total eclipse of 1884, October 4, as measured at the Observatory, Birr Castle. Communicated with a note by the **Earl of Rosse**. 12 pp., 2 plates, 4°. Dublin, 1885. (*Sci. Trans. R. Dublin Soc., N.S., III., p. 321.*)

|| **Luvini, G.**—Sulla rifrazione atmosferica laterale. 4 pp. la. 8°. (*Riv. scient.-industr., 1885, n. 18-19.*)

Royal Astronomical Society, London.—Memoirs. Vol. xlviii., Part ii., 1884. 1 vol., with plates, 4°. London, 1885.

———. —Monthly Notices . . . from November 1884 to November 1885. Vol. xlv., with plates, 8°. London, 1885.

Royal Observatory, Greenwich.—Report of the Astronomer Royal to the Board of Visitors of the Royal Observatory, Greenwich, read at the annual visitation of the Royal Observatory, 1885, June 6. (By **W. H. M. Christie**.) 18 pp. la. 4°. s.l.e.a.

|| **Smyth, C. P.**—The visual (grating and glass lens) solar spectrum in 1884. 25 pp., 61 plates, 4°. Edinburgh, 1886. (*Trans. R. Soc. Edinb., xxxii., Part iii., p. 519.*)

Società meteorologica italiana.—L'astronomia, la fisica terrestre e la meteorologia alla Esposizione generale italiana in Torino, 1884. 31 pp. sm. 8°. Torino, 1885.

United States Naval Observatory.—Astronomical and meteorological observations made . . . at the United States Naval Observatory. 1876 (Parts i. and ii.)—1881. 7 vols, with plates, la. 4°. Washington, 1880-85.

|| **Van der Stok, J. P.**—On lunar atmospheric tide. 6 pp. fo. (*Obs. made at the Observatory at Batavia, VI., App. ii.*)

|| **Zenger, C. V.**—L'astronomie électrique. 6 pp. la. 8°. (*Assoc. franç. avanc. sc., Congrès de Rouen, 1883.*)

NOTE.—Books marked * have been acquired by purchase; the others are donations from institutions, societies, or authors. Those marked || are excerpt papers, extra copies of which have been separately printed.

In some cases additional publications have been received besides those specified, but only completed volumes or years are given here.

C—ATMOSPHERIC PRESSURE.

|| **Doering, O.**—La presión atmosférica de Córdoba de media en media hora. 43 pp. la. 8°. Buenos Aires, 1885. (*Bol. Acad. Nac. Cienc., Córdoba, VII., p. 393.*)

|| **Hann, J.**—Beiträge zur Kenntniss der Vertheilung des Luftdruckes auf der Erdoberfläche. 16 pp. sm. 4°. (*Meteor. Zeitschr., 1886, März, p. 97.*)

|| **Liznar, J.**—Über den Stand des Normalbarometers des meteorologischen Institutes in Wien gegenüber den Normalbarometern der anderen meteorologischen Centralstellen Europa's. 23 pp. la. 8°. (*Sitzb. k. Akad. Wissensch., Wien, xciii., ii Abth., 1886, p. 130.*)

|| **Van der Stok, J. P.**—On the relation between the diurnal range of the barometer and the diurnal ranges of the temperature of the air and the tension of the atmospheric vapour. 6 pp. f°. (*Obsns. made at the Observatory at Batavia, VI. App. iii.*)

|| **Wild, H.**—Bemerkungen über die barometrisch bestimmten Meereshöhen des Onega- und Ladoga-Sees. 4 pp. la. 4°. (*Repert. Meteor., IX.*)

|| ————Vergleich der durch Nivellement und der barometrisch bestimmten Meereshöhe des Ladoga-Sees. 4 pp. la. 8°. (*Mél. phys. chim., St. Pétersb., XII., p. 355.*)

D—AURORA.

Office of the Chief Signal Officer, Washington.—The aurora in its relations to meteorology. Prepared under the direction of **W. B. Hazen** by **A. McAdie**, Signal Service Notes, No. XVIII. 21 pp., 14 plates, la. 8°. Washington, 1885.

E—BIBLIOGRAPHY.

New York State Library.—Sixty-sixth annual report of the Trustees . . . for the year 1883. 145 pp. la. 8°. Albany, 1884.

Phillips, H., Jr.—Register of papers published in the Transactions and Proceedings of the American Philosophical Society. 56 pp. 8°. Philadelphia, 1884.

|| **Wheatley, H. B.**—A list of English indexes. 36 pp. 8°. London, 1879. (*From "What is an Index?"*)

F—CLIMATE AND HYGIENE.

Dixon, E. M.—Reports on the air of Glasgow, with tables of wind, temperature, and rain-fall, for the months of May 1877 to April 1878. 7 parts, with plates, 4°. Glasgow, 1877-78.

Presented by Dr. J. B. Russell.

Draper, D.—Pneumonia and ozone. 4 pp. la. 8°. s.l.e.a.

Dunnachie, W. J.—Report on the air of Glasgow, chiefly relative to enclosed spaces and smoke. 18 pp., 1 plate, 4°. Glasgow, 1879.

Presented by Dr. J. B. Russell.

Finska Vetenskaps-Societeten.—Bidrag till kännedom af Finlands natur och Folk. Häftet 41. Klimatologiska iakttagelser i Finland föranstaltade och utgifna af Finska vetenskaps-societeten. Andra delen. År 1856-1875. I. Fenologiska anteckningar ordnade och sammanställda af **A. Moberg**. xi. + 322 pp. 8°. Helsingfors, 1885.

Inspector General of Customs, Peking.—Medical reports, for the half-years ended 30th September 1884 and 31st March 1885. 28th and 29th Issues. 2 vols. 2 plates, 4°. Shanghai, 1885.

Lang, C.—Eine klimatologische Studie über die Eiszeit. 19 pp. la. 8°. (*Das Wetter, Jahrg. II., 1885, Nov., p. 209.*)

Physiographical Commission of the I. R. Academy of Science at Cracow.—Materials for Galician climatology, collected by the meteorological section . . . 1884. 301 pp. la. 8°. Cracow, 1885. (*Extract Rep. Physiogr. Comm.*)

In the Polish language.

Prince, C. L.—Observations upon the topography and climate of Crowborough Hill, Sussex, together with other subjects of collateral interest. ii. + 104 pp., 2 plates, 8°. Lewes, s.a.

Registrar General, London.—Weekly return of births and deaths in London and in twenty-seven other great towns. Vol. XLVI., 1885. Nos. 1-52. la. 8°. London, 1885.

Registrar General of Births, Deaths and Marriages in Ireland.—Quarterly returns of the marriages, births, and deaths registered in . . . Ireland; . . . 1885. 1st—4th quarters, Nos. 85-88. la. 8°. Dublin, 1885-86.

—Weekly returns of births and deaths in Dublin (including its suburban districts), and in fifteen of the principal urban sanitary districts in Ireland, 1885. Vol. XXII. la. 8°. Dublin, 1886.

Royal Meteorological Society.—Climatological observations and their relation to health, with a list of new instruments introduced since 1862. Prepared for the International Inventions Exhibition. 1885. 8 pp. 8°. (London, 1885.)

(Sanitary Commissioner, Punjab.)—Report on the Sanitary Administration of the Punjab, for the year 1884. 1 vol., with plates, 4°. Lahore, 1885.

Société de Médecine et de Climatologie de Nice.—Nice-Médical. 9^e Année, 1884-85, Nos. 1-12. la. 8°. Nice, 1884-85.

Tripe, J. W.—Report on the sanitary condition of the Hackney district, for the year 1884. 53 pp., 1 plate, 8°. London, 1885.

|| **Woeikof, A.**—Klima an der Lenamündung nach einjährigen Beobachtungen. 7 pp. sm. 8°. (*Meteor. Zeitschr.*, 1886, Jan.)

|| —On the influence of accumulations of snow on climate. 11 pp. la. 8°. (*Quart. Journ. R. Meteor. Soc.*, XI., 1885, Oct., p. 299.)

|| —On the influence of forests upon climate. Translated from Petermann's Mith., 1885, No. 3, and communicated by **J. S. Harding**. 12 pp. la. 8°. (*Quart. Journ. R. Meteor. Soc.*, XII., 1886, p. 26.)

H—ELECTRICITY AND MAGNETISM.

Beall, G.—Hand-book to Beall's compass deviascope [provisionally protected], together with a few explanatory and practical remarks on magnetism and the deviation of the compass in iron ships. 47 pp., 2 plates, 8°. London, 1886.

Edlund, E.—Sur l'origine de l'électricité atmosphérique, du tonnerre et de l'aurore boréale. 83 pp. 8°. Stockholm, 1884.

Ce mémoire est le résumé, avec quelques additions, de deux travaux publiés . . . dans les Actes (Handl.) de l'acad. sc. de Suède . . . T. 16 (1878) et T. 20 (1884).

* **Eeles, H.**—Philosophical essays: in several letters to the Royal Society, containing a discovery of the cause of thunder, . . . The cause of the ascent, station, and descent of vapours and exhalations; the cause of winds; and, an explanation of the general phenomena of the weather, barometer, &c. The true rudiments and theory of electricity and magnetism. An attempt to show that the electrical powers are the cause of the reflection and refraction of light. Some mention of the wonderful medicinal effects of electricity . . . xlix. + 190 pp. 8°. London, 1771.

|| **Ferrari, C.**—Risultati ottenuti dalle ricerche del Dott. Ciro Ferrari sulle osservazioni dei temporali pervenute nel 1881 all' Ufficio centrale di meteorologia. 79 pp., 6 plates, sm. 8°. Roma, 1885. (*Annali di meteor.*, V., parte i., 1883.)

Government Observatory, Bombay.—Magnetical and meteorological observations made at the Government Observatory, Bombay, in the year 1883. Under the superintendence of **C. Chambers**, **Rev. Fr. Dreckman**, and **V. N. Nene**, and **F. Chambers**. 1884, under the superintendence of **F. Chambers** and **C. Chambers**. 2 vols. 8°. Bombay, 1884-85.

Isomakiona, F. M.—Magnetical observations taken at Kasan during the year 1883. 5 + 223 + ii pp. la. 8°. Kasan, 1884.

In the Russian language.

K. K. Sternwarte zu Prag.—Magnetische und meteorologische Beobachtungen an der k. k. Sternwarte zu Prag im Jahre 1884. Auf öffentliche Kosten herausgegeben von **L. Weinek**. 45 Jahrg. xvii. + 52 pp. la. 4°. Prag, s.a.

|| **Liznar, J.**—Über den täglichen und jährlichen Gang sowie über die Störungsperioden der magnetischen Declination zu Wien. 22 pp., 3 plates, la. 8°. (*Sitzb. h. Akad. Wissensch., Bd. xci., ii. Abth.*, 1885, p. 455.)

Madras Observatory.—Magnetical observations made at the Honourable East India Company's observatory at Madras, under the superintendence of **W. S. Jacob**, in the years 1851–1855. Introduction by **N. R. Pogson**. vi. + 247 pp. la. 4°. Madras, 1884.

(**Madras Observatory.**)—Magnetical observations made at the Honourable East India Company's magnetical observatory at Singapore. By Captain **C. M. Elliott**. In the years 1841–1845. 25 + 43 + 43 + 43 + 43 + 42 pp. la. 4°. Madras, 1851.

|| **Mielberg, J.**—Über die absolute Bestimmung der Horizontal-Intensität des Erdmagnetismus. 33 pp. sm. 8°. (St. Petersburg), 1885. (*Repert. Meteor.*, No. 1.)

Office of the Chief Signal Officer, Washington.—Thunder-storms of May 1884. Prepared under the direction of **W. B. Hazen** by **H. A. Hazen**. Signal Service Notes, No. xx. 8 pp., 2 plates, la. 8°. Washington, 1885.

Royal Observatory, Greenwich.—Diagrams representing the diurnal change in magnitude and direction of the magnetic forces in the horizontal plane, at the Royal Observatory, Greenwich, for each month of the several years 1841 to 1876. By Sir **G. B. Airy**. Appendix to Greenwich observations, 1884. 11 pp., 36 plates. la. 4°. s.l.e.a.

———Results of the magnetical and meteorological observations made at the Royal Observatory, Greenwich, in the year 1883: under the direction of **W. H. M. Christie**. v. + lii. + lxxxii. pp., 18 plates. la. 4°. London, 1885.

Seeland, F.—Magnetische und meteorologische Beobachtungen zu Klagenuft. Dec. 1884—Nov. 1885, and year. 8°. s.l.e.a.

Sohncke, L.—Der Ursprung der Gewitter-Elektricität und der gewöhnlichen Elektricität der Atmosphäre. v. + 74 pp., la. 8°. Jena, 1885.

|| **Sohncke, [L.]**—Ueber den Ursprung der Gewitter-Elektricität. 6 pp. 8°. (*Sitzungsb. Jenaisch. Gesellsch. Med. Naturw.*, 1885. *Sitz. vom 1 Mai.*)

|| ———Ueber den Ursprung der gewöhnlichen Luftelektricität. 4 pp. 8°. (*Sitzungsb. Jenaisch. Gesellsch. Med. Naturw.*, 1885, *Juni 5.*)

|| **Stewart, B.**—Report of the Committee, consisting of Prof. B. Stewart (Secretary), Sir W. Thomson, Sir J. H. Lefroy, Sir F. Evans, Prof. G. H. Darwin, Prof. G. Chrystal, Prof. S. J. Perry, Mr. C. H. Carpmael, and Prof. Schuster, appointed for the purpose of considering the best means of comparing and reducing magnetic observations. 25 pp. 8°. (*Rep. Brit. Assoc. advanc. sc.*, 1885.)

Tifiser physikalisches Observatorium.—Magnetische Beobachtungen . . . im Jahre 1883. Herausgegeben von **J. Mielberg**. xxvi. + 172 pp. la. 8°. Tiflis, 1885.

Tôkiô University.—Measurement of the force of gravity and magnetic constants at Ogasawarajima (Bonin Island), reported by **A. Tanakadate**. Appendix to the Memoir No. 5 of Tôkiô Daigaku (Tôkiô University). 31 pp., 1 plate, la. 8°. Tôkiô, 2545 (1885).

|| **Wild, H.**—Termins-Beobachtungen der erdmagnetischen Elemente und Erdströme im Observatorium zu Pawlowsk vom September 1882 bis August 1883. 49 + cxli. pp., 14 plates, sm. 8°. St. Pétersbourg, 1885. (*Mém. Acad. Imp. Sc., St. Pétersb.*, vii^e série, T. xxxiii., No. 5.)

|| ———Über die Beziehungen zwischen den Variationen des Erdmagnetismus und den Vorgängen auf der Sonne. 10 pp., 1 plate, la. 8°. (*Mél. phys. chim. St. Pétersb.*, xii., p. 329.)

I—GEODESY.

Associazione meteorologica italiana.—Materiali per l'altimetria italiana. Fasc. I. Contribuzione all' ipsometria della provincia di Bergamo per **A. Curò**. 24 pp. la. 8°. Torino, 1882. (*Cosmos di G. Cora*, vi., 1880–81, fasc. xi.–xii.)

———Materiali per l'altimetria italiana. Fase. II. Saggio di altimetria della regione Veneto-Orientale e paesi confluanti tra il Piave, il Dravo, l'Isone e il Mare. Raccolta di 3864 quote altimetriche, in buona parte originali, riferite a 2768 località differenti compiuta da **G. Marinelli**. 187 pp. la. 8°. Torino, 1884 (*I^o Suppl. al Cosmos di G. Cora*, 1884.)

Colonial Secretary's Office, Hong-Kong.—On the height of Victoria Peak. (By W. Doberck.) sm. 8°. Sheet. Dated Hong-Kong, 1885.

* **Kitchener, H. H.**—A trigonometrical survey of the Island of Cyprus, executed and published by command of H. E. Major-General Sir R. Biddulph . . . under the direction of Capt. H. H. Kitchener, R.E., Director of Survey. Hill-shading by Lieut. S. C. N. Grant, R.E. 1882. 17 sheets, oblong la. 8°. London, 1885.

Pogson, N. R.—Telegraphic determinations of the difference of longitude between Karachi, Avanshi, Roorkee, Pondicherry, Colombo, Jaffna, Muddapur and Singapore, and the Government Observatory, Madras. 82 pp. 4°. Madras, 1884.

Surveyor General of India.—General report on the operations of the Survey of India Department, administered under the Government of India during 1883-84. Prepared under the direction of Colonel G. C. De Prée. 1 vol., with plates, sm. 8°. Calcutta, 1885.

J—HAIL.

Service météorologique algérien.—Statistique de la grêle tombée en Algérie pendant les dix dernières années (de 1876 à 1885). 1 chart and 1 sheet. la. 8°.

K—HYDRAULICS, HYDROLOGY, AND TIDES.

Admiralty, London.—Tide tables for the British and Irish Ports, for the year 1886; also the times and heights of high water at full and change for the principal places on the Globe. Computed by H. R. Harris. vi. + 234 pp. la. 8°. London, (1885).

Centralbureau für Meteorologie und Hydrographie, Karlsruhe.—Beiträge zur Hydrographie des Grossherzogthums Baden. Heft I.—II. 2 vols., with plates, 4°. Karlsruhe, 1884—85.

Heft II. contains:—"Die Niederschlagsverhältnisse des Grossherzogthums Baden."

Greenwood, W. [N.]—A tide table for Glasdon Dock and Lancaster for the first six months of the year 1885 included. 27 pp., 4 diagrams, 8°. s.l.e.a.

G[reenwood], W. N.—(Tide tables for Glasdon Dock and Lancaster for the last six months of 1885.) 9 pp. 8°. s.l.e.a.

Service hydrométrique du Bassin de la Seine.—Observations sur les cours d'eau et la pluie centralisées pendant l'année 1883, sous la direction de C. L. De Fourcy par G. Lemoine et H. Heude. 7 plates, 8°. Versailles, s.a.

|| ———.—Résumé des observations centralisées . . . pendant l'année 1883 par H. Heude, sous la direction de [Ch.] L. De Fourcy et G. Lemoine. 37 pp. la. 8°. Versailles, 1885. (*Ann. Soc. météor. de France*, xxxii., 1884, Oct.)

|| **Woeikof, A.**—Flüsse und Landseen als Produkte des Klima's. Auszugsweise Übersetzung von Kapitel 8 aus dem Buche "Die Klimate des Erdballs." St. Petersburg, 1884. Verlag von A. Iljin. 18 pp. 8°. (*Zeitschr. Gesellsch. Erdk.* Berlin, 1885, No. 2.)

|| ———.—Les rivières et les lacs de la Russie. 13 pp., 1 plate, 8°. (*Arch. sc. phys. nat. Genève*, 3^e période, xiii., 1885, p. 34.)

This is a translation of a portion of Chap. xxxv. of "Les climats du globe terrestre" published by A. Woeikof.

L—METEOROLOGY.—MISCELLANEOUS.

|| **Augustin, F.**—[De la nécessité d'organiser les observations météorologiques en Bohême.] 20 pp. la. 8°. Prague, 1885. (*Athenaum, Prague*.)
In the Polish language.

Bárcena, M. y Pérez, M.—Estudios de meteorología comparada. Tomo I. xii. + 437 pp., la. 8°. Mexico, 1885.

Bassler, S. S.—The weather: a practical guide to its changes, showing Signal Service system and how to foretell local weather. 54 pp., 1 plate, 8°. Cincinnati, 1883.

* **Bebber, W. J. van.**—Handbuch der ausübenden Witterungskunde. Geschichte und gegenwärtiger Zustand der Wetterprognose. I. Theil. Geschichte der Wetterprognose. x. + 392 pp., la. 8°. Stuttgart, 1885.

Bolger, O.—Über die Dämmerungs-Erscheinungen seit dem Jahre 1883. 2 pp. sm. f°. (*Sonderabdruck aus Nr. 225, 226, und 227 der Offenbacher Zeitung.* 25-27 Sept., 1885.)

* **Boyle, R.**—Tracts consisting of observations about the saltiness of the sea : an account of a statical hygroscope and its uses : together with an appendix about the force of the air's moisture : a fragment about the natural and preternatural state of bodies. By the Honourable R. Boyle. To all of which is premis'd a sceptical dialogue about the positive or privative nature of cold : with some experiments of Mr. Boyle's referr'd to in the discourse. By a member of the Royal Society. iii. + 51 + 6 + 5 + ii. + 11 + ii. + 39 + ii. + 5 + ii. + 11 + 27 + ii. + 14 pp. 8°. London, 1674.

* **Browne, W. L.**—The moon and the weather. The probability of lunar influence reconsidered. And containing predictions of storms for April, May, and June, 1885. 120 pp. 8°. London, s.a.

(**Capello, J. C. de B., Hildebrandsson, H. H.**) [et **Ley, W. C.**]—Rapport au comité météorologique internationale concernant les observations des mouvements supérieurs de l'atmosphère. 23 pp. la. 8°. (*Upsala*, 1885.)

|| **Deutsche meteorologische Gesellschaft.**—Zweite Jahresversammlung der deutschen meteorologischen Gesellschaft in München am 9, 10, und 11 August 1885. Vereinsnachrichten. 12 pp. la. 8°. (*Metcor. Zeitschr. deutsche meteor. Gesellsch.*, 1885, Sept.)

|| **Dorna, A.**—Sulla possibilità che il vulcano di Krakatoa possa avere proiettato materie fuori dell'atmosfera. 3 pp. la. 8°. Torino, 1884. (*Atti. R. Accad. Sc. Torino*, xix.)

|| **Ekholm, N. et Hagström, K. L.**—Mesures des hauteurs et des mouvements des nuages. Présenté à la Soc. R. des Sc. d'Upsal le 15 Nov. 1884. 64 pp., 1 p'ate, 4°. Upsal, 1885. (*Nova Acta Reg. Soc. Sc. Ups.*, Ser. iii.)

|| **Folie, F.**—Quelques remarques sur les marées atmosphériques à l'occasion du flux solsticial signalé par Baeyer. 7 pp. 8°. Bruxelles, 1885. (*Ciel et Terre*, vi., 1885, No. 20.)

|| **Hann, J.**—Bericht über die Fortschritte der geographischen Meteorologie. 58 pp. sm. 4°. (*Geogr. Jahrb. von Behm, Gotha*, x., p. 57.)

|| **Harding, C.**—Maritime losses and casualties for 1883, considered in connection with the weather. 4 pp. la. 8°. (*Quart. Journ. R. Meteor. Soc.*, x., 1884, p. 250.)

|| **Harding, C.**—Note on the weather of January 1881. 8 pp. la. 8°. (*Quart. Journ. R. Meteor. Soc.*, xi., 1885, p. 292.)

Hinrichs, G.—The seasons in Iowa, and a Calendar for 1884. 16 pp., 1 plate, la. 8°. Iowa City, 1884.

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Zeitsignal-Stationen, 1885.—27 pp. 1a. 8°. (Berlin, s.a.)

APPENDIX XVII.

LIST OF PUBLICATIONS, &c. issued under the Authority
of the Meteorological Council.

OFFICIAL.

- No. 1. Report for 1867. Presented to Parliament. 1s.
2. Instructions for Meteorological Telegraphy. New Edition. (1875.) 6d.
3. Fishery Barometer Manual. 6d.
4. Charts of Surface Temperature, South Atlantic Ocean. 2s. 6d.
5. Report for 1868. Presented to Parliament. 5d.
6. Report for 1869. Presented to Parliament. 10d.
7. Quarterly Weather Report for 1869.—Parts I. to IV. 5s. each.
8. The Barometer Manual (out of print, see Nos. 24, 40, 60, and 61).
9. Quarterly Weather Report for 1870.—Parts I. to IV. 5s. each.
10. Report for 1870. Presented to Parliament. 10d.
11. Contributions to our Knowledge of the Meteorology of Cape Horn and the West Coast of South America. 2s. 6d.
12. Currents and Surface Temperature of the North Atlantic Ocean, from the Equator to Lat. 40° N., for each month of the year, with a General Current Chart. 2s. 6d.
13. A Discussion of the Meteorology of the Part of the Atlantic lying North of 30° N., for the Eleven Days ending 8th February 1870. Price, with Book of Charts, 5s.
14. Quarterly Weather Report for 1871.—Parts I. to IV. 5s. each.
15. Report for 1871. Presented to Parliament. 10d.
16. Quarterly Weather Report for 1872.—Parts I. to IV. 5s. each.
17. Report for 1872. Presented to Parliament. 1s.
18. Contributions to our Knowledge of the Meteorology of the Antarctic Regions. 2s.
19. Quarterly Weather Report, 1873.—Parts I. to IV. 5s. each.
20. Charts of Meteorological Data for Square 3. Lat. 0°—10° N. Long. 20°—30° W., and Remarks to accompany the Monthly Charts, which show the Best Routes across the Equator for each Month, &c. 20s.
21. Report of the Proceedings of the Meteorological Congress at Vienna. 1s.
22. Report for 1873. Presented to Parliament. 4d.

LIST OF PUBLICATIONS, &c.—continued.

- No. 23. Report of the Proceedings of the Conference on Maritime Meteorology held in London, 1874. 2s.
24. Instructions in the Use of Meteorological Instruments. [Reprinted 1885. 6s.]
25. Quarterly Weather Report for 1874.—Parts I., II., and IV. 5s. each. Part III., 5s. 9d.
26. Report for 1874. Presented to Parliament. 6d.
27. 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. 24s.
28. Contributions to our Knowledge of the Meteorology of Japan. By Staff-Commander Thomas H. Tizard, H.M.S. *Challenger*. 1s.
29. Report for 1875. Presented to Parliament. 4d.
30. Quarterly Weather Report for 1875.—Parts I.—IV. 5s. each.
31. Report for 1876-7. Presented to Parliament. 3s. 5d.
32. A Discussion of the Meteorology of the North Atlantic during August 1873, with 31 Synoptic Charts. 15s.
33. Quarterly Weather Report for 1876.—Part I., 6s.; Parts II.—IV., 5s. each.
34. Contributions to our Knowledge of the Meteorology of the Arctic Regions.—Vol. I., Part I., 2s.; Part II., 10s.; Part III., 6s.; Part IV., 5s.
35. Report for 1877-8. Presented to Parliament. 1s.
36. Report of the Proceedings of the Meteorological Congress at Rome, 1879. 1s. 6d.
37. Report on the Meteorology of Kerguelen Island. By the Rev. S. J. Perry, S.J., F.R.S. 3s.
38. Report for 1878-9. Presented to Parliament. 5d.
39. Meteorological Observations at Stations of the Second Order for the year 1878. 20s.
40. Aids to the Study and Forecast of Weather, by the Rev. W. Clement Ley, M.A. 1s.
41. Report for 1879-80. Presented to Parliament. 1s.
42. Report for 1880-81. Presented to Parliament. 1s. 2d.
43. Charts of Meteorological Data for the Ocean District adjacent to the Cape of Good Hope, with accompanying Remarks. Price of the Charts, 25s.; of the Remarks, 7s.
44. 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. Toynebee, F.R.A.S. 7s. 6d.
45. Meteorological Observations at Stations of the Second Order for the year 1879. 20s.
46. Report on the Storm of October 13-14, 1881. By Robert H. Scott, F.R.S. 1s. 6d.

LIST OF PUBLICATIONS, &c.—*continued.*

- No. 47. Rainfall Tables of the British Isles for 1866-80. Compiled by G. J. Symons, F.R.S. 7s. 6d.
48. Report for 1881-2. Presented to Parliament. 1s.
49. Quarterly Weather Report for 1879. (New Series.) Appendices and Plates. 27s.
50. Quarterly Weather Report for 1880. (New Series.) Appendices and Plates. 28s.
51. Hourly Readings, 1881. (New Series.) Part I., 10s. 6d. Parts II., III., and IV., 21s. each.
52. Quarterly Weather Report for 1877. (New Series.) Appendices and Plates. 27s. Part I., 10s.; Part II., 5s.; Part III., 4s. 6d.; Part IV., 6s.
53. Meteorological Atlas of the British Isles. 5s. 6d.
54. Hourly Readings, 1882. (New Series.) Parts I. and II. 20s. Part III. 22s. 6d. Part IV. 26s.
55. Quarterly Weather Report for 1878. (New Series.) Appendices and Plates. 28s. Part I., 6s. (Part II., in the Press.)
56. Sunshine Records of the United Kingdom for 1881. 4s.
57. Meteorological Observations at Stations of the Second Order for the year 1880. 34s. 6d.
58. Report for 1882-3. Presented to Parliament. 10½d.
59. Sea Temperature Charts for the Atlantic, Indian, and Pacific Oceans. 21s.
60. Principles of Forecasting by Means of Weather Charts. By the Hon. Ralph Abercromby, F.R. Met. Soc. (Second edition, revised), 2s.
61. The Barometer Manual for the Use of Seamen. 1s. 3d.
62. Monthly Weather Report, 1884.
63. Hourly Readings, 1883 (New Series). Parts I., II., and III., 21s. each. Part IV. Price 30s.
64. Report for 1883-4. Presented to Parliament. 1s. 2d.
65. Monthly Weather Report, 1885.
66. Meteorological Observations at Stations of the Second Order for 1881. Price 35s.
67. Report for 1884-5. Presented to Parliament. 4s. 4d.
68. Monthly Weather Reports for 1886. Jan.-September, 1s. 6d. each. (October and November in the Press.)
69. Meteorological Observations at Stations of the Second Order for the year 1882. Price 35s.
70. Hourly Readings, 1884. Part I. Price 12s. (Part II., in the Press.)
71. Synchronous Weather Charts of the North Atlantic and the adjacent Continents. Aug. 1, 1882 to Aug. 31, 1883. Part I. Charts, price 16s.; with Portfolio, price 24s.
72. Report for 1885-86. 8d.
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LIST OF PUBLICATIONS, &c.—continued.**NON-OFFICIAL.**

- No. 1. Report to the Committee on the Connexion between Strong Winds and Barometrical Differences.—By Robert H. Scott, Director of the Office. 6*d*.
 2. Report to the Committee on the Meteorology of the North Atlantic.—By Captain H. Toynbee, Marine Superintendent. 1*s*.
 3. Report to the Committee on the Use of Isobaric Curves.—By Captain H. Toynbee, Marine Superintendent. 1*s*.
 4. Routes for Steamers from Aden to the Straits of Sunda and back. Translated from a Paper issued by the Royal Meteorological Institute of the Netherlands. 6*d*.
 5. 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. 6*d*.
 6. Report of the Proceedings of the Meteorological Conference at Leipzig. 1*s*.
 7. Notes on the Form of Cyclones in the Southern Indian Ocean.—By C. Meldrum, Esq., M.A., F.R.S. 6*d*.
 8. Report on Weather Telegraphy and Storm Warnings. Presented to the Meteorological Congress at Vienna. 6*d*.
 9. Report of the Permanent Committee of the Vienna Congress for 1874. 1*s*. 6*d*.
 10. 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. Toynbee, F.R.A.S., F.R.G.S., Marine Superintendent. 1*s*. 6*d*.
 11. Report of the Permanent Committee of the Vienna Congress for 1876. 2*s*.
 12. Reports to the Permanent Committee of the Vienna Congress on Atmospheric Electricity, Maritime Meteorology, and Weather Telegraphy, 1878. 2*s*.
 13. Report of the Permanent Committee of the Vienna Congress for 1878. 6*d*.
 14. Report of the International Meteorological Committee, Meeting at Berne, 1880. 1*s*.
 15. Report of the Second Meeting of the International Meteorological Committee, held at Copenhagen, August 1882. 2*s*. 6*d*.
 16. Report of the Third Meeting of the International Meteorological Committee, held at Paris, September 1885. 1*s*.
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