

REPORT
OF THE
METEOROLOGICAL COMMITTEE OF THE
ROYAL SOCIETY,

For the Period of Seventeen Months, ending
31st May 1877.

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



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CONTENTS.

	PAGE
PREFACE	4
PART I.	
REPORT (Introductory) -	5
Ocean Meteorology	6
Weather Telegraphy	14
Land Meteorology of the British Islands	21
Library -	27
Expenditure	27
Summary	28
PART II.	
INDEX OF THE INFORMATION EXISTING IN THE OFFICE FOR THE OCEAN	31
APPENDIX :	
I. Financial Statement	33
II. Presentation of Pilot Charts	34
III. List of Documents	38
IV. Contents of Publications	48
V. Disposal of Instruments (Admiralty)	49
VI. Disposal of Instruments (Mercantile Marine)	50
VII. Telegraphic Reporting Stations	51
VIII. Supply of Daily Weather Reports	52
IX. Supply of Telegraphic Weather Intelligence, with Board of Trade Circular. No. 717, 1874	54
X. List of Stations from which daily Synchronous Observations have been received	57
XI. Supply of Fishery Barometers	59
XII. Donations to Library	60
XIII. Staff of Office	72
List of Publications	73

P R E F A C E.

THE Meteorological Committee has consisted of Fellows of the Royal Society who have been nominated by its President and Council, at the request of the Board of Trade, for the purpose of superintending the Meteorological duties formerly undertaken by a Government Department, under the charge of Admiral FitzRoy.

The Committee have been credited with a sum of £10,000, voted annually in the Estimates since 1866, for the administration of which they have been wholly responsible.

The services of the Committee have been *entirely gratuitous*.

The Meetings of the Committee have been held regularly once a fortnight, or oftener when necessary, when every subject on which action has to be taken by their executive officers has received their careful consideration.

MEMBERS OF THE COMMITTEE FROM THE COMMENCEMENT :—

	Appointed.	
GENERAL SIR E. SABINE, R.A., K.C.B., <i>Chairman</i> - - -	1866.	
Mr. DE LA RUE - - -	1866.	
Captain F. J. O. EVANS, C.B., Hydro- grapher to the Admiralty - -	1874.	
Mr. FRANCIS GALTON - - -	1866.	
Mr. GASSIOT - - -	1866.	
Prof. W. A. MILLER - - -	1866.	Deceased 1870.
Rear-Admiral G. H. RICHARDS, C.B. -	1866.	
The EARL of ROSSE - - -	1873.	
Major-General W. J. SMYTHE, R.A. -	1866.	
Mr. W. SPOTTISWOODE - - -	1866.	Resigned 1873.
Lieut.-General R. STRACHEY, R.E., C.S.I.	1873.	
Sir C. Wheatstone - - -	1871.	Deceased 1875.

May 1877.

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R E P O R T

For the Period of Seventeen Months, ending 31st May 1877.

PART I.

At the close of the last Annual Report it was announced that the Treasury had, in the month of November 1875, appointed a Committee to inquire, firstly, into the results hitherto attained by the Office, and, secondly, into the best method of administration of the funds supplied by the Government for the service of Meteorology. Introductory.
Report of
Treasury
Committee.

The Committee, as finally constituted, consisted of the following gentlemen:—

Sir W. Stirling Maxwell, Bt., K.T., M.P.	J. D. Hooker, M.D., C.B., President R.S.
T. Brassey, Esq., M.P.	R. R. W. Lingen, Esq., C.B.
T. H. Farrer, Esq.	D. Milne Home, Esq., F.R.S.E.
Fras. Galton, Esq., F.R.S.	Lieut.-General R. Strachey, R.E., C.S.I., F.R.S.

The Committee sat for the first seven months of 1876, and their Report, with Evidence, &c., was presented to Parliament in February 1877. One of the principal recommendations of this Report is to the effect that the future management of the Office should be vested in a paid Council. The Committee, having been informed that the Treasury intended to adopt this recommendation, tendered to the Royal Society their resignation at the end of March 1877, this being the close of the financial year. The President and Council of the Society having requested them to retain office for the space of two months longer, it has been necessary to embrace, in the present Report, the entire period from January 1, 1876, to May 31, 1877. Resignation of
Committee.

The administration of the Office has remained unaltered during that period, being vested in Mr. Robert H. Scott as Director, and Captain Henry Toynbee as Marine Superintendent.

The only event requiring special notice during the period under review has been the meeting of the Permanent Committee of the Vienna Congress which took place at the Office in the month of April 1876. It was attended by the following gentlemen:— Meeting of
Permanent
Committee.

Monsieur Bruhns	-	-	Saxony.
„ Buys Ballot	-	-	Holland. (President.)
„ Cantoni	-	-	Italy.
„ Mohn	-	-	Norway.
„ Scott	-	-	England. (Secretary.)
„ Wild	-	-	Russia.

The only member absent was Prof. Jelinek (Austria), and it has been a matter of deep regret to all Meteorologists that the illness which prevented his undertaking the journey to London at Easter, had a fatal issue in October of the same year.

The work of the Office will, as usual, be considered under its three subdivisions:—

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

I.—OCEAN METEOROLOGY.

Issue of
instruments.

The method which has been followed by the Office, as in preceding years, in the study of the Meteorology of the Sea has been to supply instruments of the best quality, and duly verified at Kew Observatory, to captains of merchant vessels on loan, on condition of their returning the instruments, and the log of the observations made with them, to the Office at the completion of the voyage. The regular outfit of a ship consists of—

- 1 Barometer (Kew pattern).
- 6 Thermometers, with a thermometer screen.
- 4 Hydrometers.

The observations are recorded in a regular Form of Log, which is supplied with the instruments, while for the actual entry of the observations a Rough Book is supplied, which is retained by the captain, its contents having been copied into the Meteorological Log.

Supply to the
Royal Navy.

As regards the Royal Navy, Her Majesty's ships have been supplied by the Office since its foundation in 1854, with all the Meteorological instruments used in the service, there being no condition as to the return of observations to the Meteorological Office, for as a matter of course the records of observations made by naval officers are returned to the Admiralty. It is therefore perfectly optional with the observers whether or not they keep the Meteorological Log of the Office in addition to the regular record of observations required by the rules of the service. The Committee are, however, glad to say that they have received eleven Logs (Weather Book Registers) of very high value from Her Majesty's ships during the year.

Agencies.

In order to meet the requirements of this system of supply to the Merchant Service, a stock of instruments is kept at the Office in London, and in addition to the supply of instruments direct from the Office in London, a stock is also kept at some of the more important seaports, *e.g.*, at, Liverpool, Glasgow, Aberdeen, Hull, Dundee, and Southampton, the Agents in charge of them receiving a fee for each case of issue and return, and a further fee for each observer obtained through them who furnishes first-class observations. The names of all applicants for instruments are submitted to Captain Toynbee for approval prior to the supply.

As soon as a log is received at the Office it is examined and classified, and an acknowledgment is immediately made to the

captain sending it. At the same time, if explanations on any points arising out of the inspection of the log are considered to be desirable, the captain or other officer who has charge of the instruments is requested to furnish the information while the circumstances are still fresh in his memory. Replies received from the captain are at once noted in the log for future reference when the observations are discussed.

Such hydrographical notices (eleven in number) as were contained in the logs received during the year have been, as usual, copied and transmitted to the Hydrographical Department of the Admiralty.

Logs are classified according to their quality into 4 grades. "Excellent," "Very good," "Good," "Middling."

Up the end of 1876 to each observer who has obtained the mark "excellent," a copy of the Atlantic Pilot Charts, or of the Wind and Weather Charts of the Atlantic, Pacific, and Indian Oceans, published by the Admiralty, has been presented. Observers who have already received these Charts, and who may have continued to observe for the Office, have had the special thanks of the Committee for each register which has received the mark of "excellent." They have also received such publications of the Office as were likely to be of interest to them.

The names which have been added since March 31st, 1876, to the lists given in previous reports, are as follow :

Examination
of logs.

Presentation
of charts to
observers.

Presentation of Charts.

Captain's Name.			Ship.
* Allen, Frederick W.	-	-	"Collingwood."
Blomfield, Henry	-	-	"Thomas Stephens."
Brown, Alfred John	-	-	"Maroon."
Buchan, James	-	-	"Commewyne."
Churchill, Orford, R.N.	-	-	H.M.S. "Ariel."
† Frederick, George C., R.N.	-	-	H.M.S. "Fawn."
Gordon, James	-	-	S.S. "City of Oxford."
Innes, George	-	-	"Silistria."
Jackson, J. N.	-	-	"Knowsley Hall."
Marshall, David	-	-	"Ardgowan."
Murdoch, Henry	-	-	"Denbighshire."
Napier, Richard Henry, R.N.	-	-	H.M.S. "Nassau."
North, William George	-	-	S.S. "West Riding."
Owen, Robert	-	-	"Victoria Cross."
Peebles, R.	-	-	"Margaret Galbraith."
‡ Pritchard, Charles E., R.N.	-	-	H.M.S. "Ariel."
Raeburn, John, R.N.R.	-	-	"Airlie."
Ruthven, Jocelyn Fitzgerald	-	-	"Whittington."
Shearer, George	-	-	"Early Morn."
Turner, Edward Wrake	-	-	"Mertola."
Wharton, William J. L., R.N.	-	-	H.M.S. "Fawn."

* Chief Officer. † Sub-Lieutenant. ‡ Navigating Sub-Lieutenant.

Presentation
of charts to
observers.

The Committee have not considered it to come within their functions to present Admiralty Charts to officers in the Royal Navy; but have not failed to send letters of thanks to those gentlemen.

Since the appearance of the Charts for the Equatorial region of the Atlantic* which were published in the month of February 1877, the Committee have presented copies of this work for observations classed "excellent," instead of the Admiralty Charts. Such charts are issued with a special label bearing a complimentary inscription, and have been given to officers in the Royal Navy as well as in the Mercantile Marine. The distribution of these charts has not, however, been limited to the observers for whom the mark "excellent" has been recorded, but has been extended to those who have merited the class "very good," in order in some measure to carry out an implied understanding that observers who are entirely unpaid should at least receive such published results as may be derived from the discussion of their records.

In Appendix II. will be found a list of the observers whose logs have been classed as "excellent," since the beginning of the year 1869. Some of the names in the list are those of observers who have regularly supplied information to the Office for many years.

Quality of logs.

The following figures show the total number of logs, and the number of first-class logs, marked "excellent," which have been received each year from the *Mercantile Marine* since the management of the Office has been under the Meteorological Committee.

Year.	Total No. of Logs received.	No. of Excellent Logs.	% of Excellent Logs.	Year.	Total No. of Logs received.	No. of Excellent Logs.	% of Excellent Logs.
1867	21	7	33	1873	92	52	57
1868	50	10	20	1874	88	56	64
1869	67	21	31	1875	78	56	72
1870	81	41	51	1876	92	67	73
1871	150	72	48	1877	21	17	81
1872	110	64	58	3 months.			

These figures show a steady and unmistakeable improvement in the quality of the information received by the Office.

The geographical distribution of the voyages on which observa-

* 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. 2s. London, Potter & Stanford.

tions were being taken at the close of each of the years 1870-5, and on the 16th May 1877, was as follows :

Localities
whence obser-
vations are
obtained.

—	Dec. 31 1870.	Dec. 31 1871.	Dec. 31 1872.	Dec. 31 1873.	Dec. 31 1874.	Dec. 31 1875.	May 16 1877.
To Baffin's Bay or Greenland	5	3	7	5	3	6	3
„ East Coast, North America	22	17	10	9	10	9	14
On East - - -	3	3	3	3	4	2	4
To West - - -	—	—	5	3	4	3	3
To West Indies - -	5	8	4	5	4	3	3
„ East Coast, South America	4	3	1	3	2	—	4
„ West - - -	11	10	10	5	7	8	7
„ West Coast of Africa -	2	3	3	3	—	—	—
On East - - -	—	—	—	1	1	—	—
To Australia and New Zealand	15	7	10	8	17	18	21
„ India, viâ the Cape -	29	26	24	19	16	25	37
„ „ „ Suez -	4	3	3	1	3	2	6
In Indian Seas - -	2	2	3	2	1	—	—
To China Seas, viâ the Cape -	11	6	3	2	—	—	—
„ „ „ Suez -	2	1	1	3	3	3	4
To Mediterranean Ports -	—	2	2	1	1	3	3
„ Home Ports - -	—	3	4	2	2	3	4
„ the White Sea, or Kara Sea	—	—	—	—	1	—	1
„ the Baltic - -	—	—	—	—	—	1	3
	115	97	93	75	79	86	117

The Committee cannot but regret that the number of observers co-operating with them still remains small when compared with the strength of the Merchant navy of England, as will be seen from the figures just quoted, but it must be remembered that the duty of observing regularly and frequently entails a considerable amount of attention and responsibility, so that it is necessary that the captain should be supported by a zealous staff of officers, to enable him to keep a full log. It is not, however, to be inferred that the goodness of the log depends on the size of the vessel.

In order to bring before the notice of possible observers the nature of the work of the Office, circulars were issued in 1876, as in preceding years, to the various shipping offices, &c., in connexion with the Board of Trade, and by these means much valuable co-operation in the work of observing has been secured. Collection of observations.

It has been frequently remarked that the efforts of the Office should be principally directed to the procuring of observations from the less frequented parts of the sea, but it has been hitherto impracticable to carry out the suggestion, because observations at sea are only obtainable in sufficient numbers from the tracks of the regular voyages, and when the comparatively small proportion of ships at sea whose commanders take observations, is taken into account, it will easily be seen that there is little chance of amassing material for any district not comprised in the main ocean highways. Irregular distribution of materials.

The number of observers, however, shows a steady and satisfactory increase, and this increase has not been attained at the cost of a falling off in the quality of the observation, as is seen from the table on page 8.

Irregular distribution of materials.

The table just given shows that practically the information is only being collected for the routes to India and Australia, to New York, and to the West Coast of South America. Of these routes three follow identical lines from England to the equator, whereas the entire regions of the Central and Northern Pacific, of the North Coast of South America, and the Caribbean Sea are all but utterly unrepresented.

Appendix III. gives a list of all the logs and other documents received at the Office during the year, and in Part II. will be found a complete analysis of the information existing in the Office for each district of the ocean, and for each month.

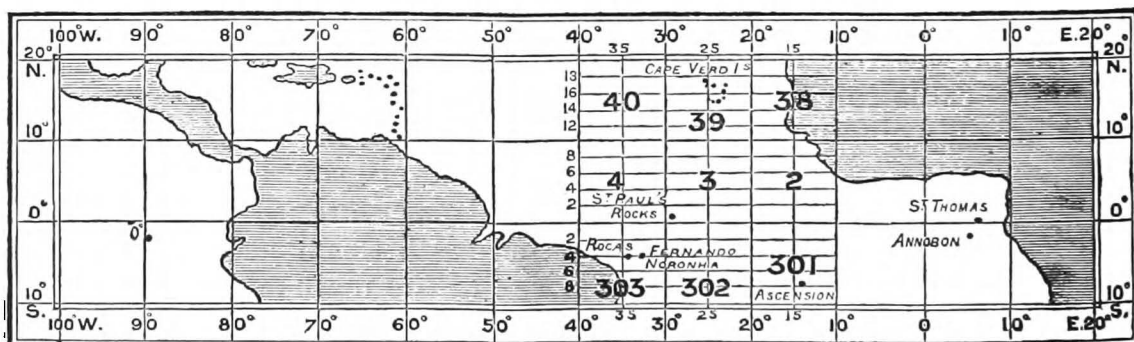
Charts of distribution of existing materials.

The whole surface of the globe has been divided into squares of 10 degrees of latitude and longitude, and the charts show the number of days' observations existing for each square and for each month in the first 4,000 documents in the Office. The Committee would venture to point out that these charts give a more correct idea of the amount of material really available for the discussion of Ocean Meteorology—a most important branch of terrestrial physics—than anything which has as yet been published. The only other Office which contains a mass of material of high character comparable in amount with that existing in the Meteorological Office is that of the Royal Meteorological Institution of the Netherlands at Utrecht, but these latter observations principally refer to the routes between Holland and the Dutch East Indies.

The Pacific at least is and is likely to remain a region comparatively little known as regards its meteorology, from want of observations, for many years to come.

Progress of the work.
Equatorial region of the Atlantic.

As regards the progress of the discussions carried on by the staff during the period of this report, the charts for the entire district of nine ten-degree squares extending from Latitude 20° N. to 10° S. and from Longitude 10° to 40° W. have been published. This district is shown in the subjoined woodcut. The charts are subdivided into areas of 5° of Longitude and 2° of Latitude, as indicated in the diagram, and each chart contains the data of three ten degree squares for one month. It is hardly necessary to say that the reason for taking minuter subdivisions as to latitude than as to longitude is that the changes are much more pronounced in that direction than in the other.



In addition to the charts now under consideration, stretching from shore to shore of the Atlantic, there are given also diagrams

showing the direction of wind in connexion with atmospherical pressure and temperature, and of ocean currents with sea-temperature. Equatorial region of the Atlantic.

In the Remarks, which refer to single degree Squares, copious quotations are made from the logs in relation to the various phenomena which come under the seaman's observation, such as the weather, the wind, the motion of the clouds in relation to the lower wind, the direction of the swell, the colour and luminosity of the sea, and the current rips; as well as information relating to the birds, fish, and insects that are met with, and the variation from month to month of the localities in which they are seen, and also appearances of submarine volcanic action in certain localities. The Remarks compose a 4to volume of 550 pp.

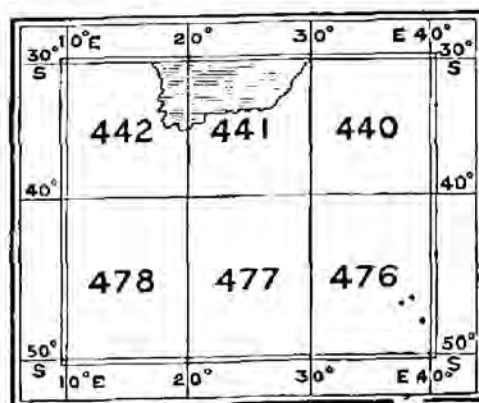
By these investigations it is believed that important light has been thrown on several subjects of general as well as of special interest.

In these discussions the object of the Meteorological Office has been to determine the meteorological statistics of limited portions of the ocean in each separate month by means of results obtained by the discussion of original observations extracted from the logs in the Office.

The material available for the part of the Atlantic, between the parallels of 20° N. and 10° S., which lies east and west of the nine Squares which have been dealt with is so scanty that its discussion would not be likely to lead to any practical results; this will easily be conceived from the fact that 91 per cent. of the entire information in the Office for the entire Atlantic between the parallels of latitude which have been named was concentrated in the nine Squares in question.

The Office having thus completed the examination of the district close to the Equator in the Atlantic Ocean, about the most important and interesting to the navigator and meteorologist of any region in the world, commenced in 1875 the investigation of the meteorology of another great district lying on the high road between Europe and the Indian and Australian seas, that of the Cape of Good Hope. This work is now fully in operation, and the preliminary correction and extraction of the observations into Data Books will probably be completed by about August 1878. South point of Africa.

The actual district to be worked upon is shown in the subjoined chart, and the degree of minuteness to which the discussion will be carried will be determined when the work is in a more advanced stage than is at present the case.



Investigation
into weather
of August
1873 in the
Atlantic.

In addition to the regular work of the Office the Marine Branch has been for some time engaged on the discussion of the weather over the North Atlantic during the month of August, 1873. This inquiry has already been mentioned in the recent Reports of the Office. All British shipowners were invited to send in materials, and the result has been that 280 logs were collected, a larger number than has ever before been available for any similar discussion.

The object of the investigation has been to illustrate the rise and progress of a very severe hurricane which caused the loss of upwards of 500 lives, and the destruction or damage of more than 1,000 ships and of nearly as many buildings in Cape Breton, Nova Scotia, and Labrador, and which was reported finally to have crossed the Atlantic.

Daily synchronous charts for the whole month for 0 h. 43 p.m. Greenwich time have been constructed, and these are also intended to give a general idea of the normal winds and weather over the Atlantic in the month of August. For each day about 200 observations taken at sea have been charted in connection with the land observations taken in Europe and America, and much light has been thrown on the important subject of the propagation of storms across the Atlantic.

These charts prove unquestionably :—

- I. That the particular hurricane which was so destructive on the American coast died out in the neighbourhood of Newfoundland.
- II. That at the time that it was raging two other cyclonic disturbances existed between Europe and America.
- III. That during the month of August 1873 not a single American storm is traceable to Europe, although our storms probably originated over the Atlantic Ocean.

The charts and explanatory letterpress are now in the press.

Division of
work.

The Committee, in concluding the portion of their Report which refers to Ocean Meteorology would observe that a glance at the figures on any one of the charts in Part II. is sufficient to show that the amount of material existing in the Office enormously exceeds anything with which the staff could have a prospect of coping within a reasonable time. Suggestions have been made in various quarters for meeting this difficulty and rendering the information accessible to those who have leisure and ability to deal with it.

One of the most obvious of these is, that the original documents, the logs themselves, when the material in them for any particular district has been copied, should be sent from place to place for use in discussions relating to other areas. This is, however, entirely impracticable. The first step in the discussion, the copying into Data Books, sifts the material according to geographical locality and to time. By this means all the information for each month, and for each degree of latitude and longitude, is shown in its proper opening in the data book as explained in the Report of

the Office for 1867, pp. 8 and 60. It is, however, obvious that by such a process the consecutive observations in each log are taken out of their natural relation to each other, and, as in the course of the discussion, questions frequently arise as to the correctness of individual figures, &c., which can only be answered by a comparison of the observations in question with those which have immediately preceded or followed them, it is indispensable that the original logs should be retained in the Office, so that they may be at all times accessible. Division of work.

There is, therefore, no other way than to supply copies of the data to applicants. This is, however, a costly process, for the proportion which the expense of preparation of the material and copying it into data books, as above described, bears to the final cost of discussion and charting, is very large. In fact, the experience of the Office goes to show that on an average 1,000 sets of observations can be corrected and copied for about 8*l.*, while they can subsequently be discussed and charted in the same way as is done in the Office for about 5*l.* Cost of copying.

The India Office has undertaken the discussion of the meteorology of the Northern Indian Ocean, and the Bay of Bengal, and a copy of the information for that region existing in the Office for the month of January was sent to Mr. Blanford in July 1876. The expense of copying, exclusive of the cost of data books, &c., was 94*l.* 8*s.* 4*d.*, and was borne by the India Office. As the number of observations copied was about 11,400, the expense has been in very close accordance with the estimate quoted. Information supplied to India office.

In the Report it was mentioned that the Committee had made proposals to the Offices at Utrecht and Hamburg to supply them with information on similar terms to those just mentioned, and on the 9th of January 1877 Dr. Neumayer, the Director of the Deutsche Seewarte at Hamburg, made an application for a copy of the information existing in the Office for the western part of the Atlantic from 20° to 50° N., and from 0° to 30° W. The Committee at once signified their readiness to meet his wishes, but as the amount of work would be very serious, (nearly 200,000 sets of observations), and the cost proportionately heavy, they intimated to him that it would be advisable that the negotiations for an international operation of such magnitude should be conducted in a more formal way through the respective Governments than by a simple arrangement between the two Offices. Proposed supply of information to Hamburg.

Appendix IV. contains a list of the contents of the publications issued by the Office during the year, in continuation of that given in the Report for 1875, p. 37.

In Appendix V. will be found a list of all the instruments supplied 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 1876. This latter statement is prepared from the latest returns furnished by the storekeepers at the respective dockyards, &c. Stock of instruments.

Appendix VI. gives similar information with regard to the Board of Trade instruments.

II.—WEATHER TELEGRAPHY.

Condition of
stations.

Some changes of considerable importance have been made in this department of the Office in the year 1876: the maintenance of a daily service at 6 p.m., as will be more fully explained later on, and the temporary institution of a Sunday morning service, which was set on foot early in November 1876.

The communication with all the stations has been maintained regularly throughout the year, with the exceptions of Sumburgh Head and Scilly. In the last report it was stated that the communication with Shetland was at that time most imperfect. This was rectified in the month of August, to be, however, again interrupted early in November and had not been restored up to the end of May 1877. It will easily be seen that the great difficulty experienced in keeping the cable to Shetland in working order, furnishes strong grounds for fearing that a cable to the Faroes or Iceland will never be laid, so that we shall practically remain dependent on our own stations for information from the northward.

The cable to Scilly parted at the end of 1875, and was repaired in August 1876, to break again in the beginning of 1877; since that date the Office has been again deprived of its reports from that very important outpost. It may be hoped, however, that this line may soon again be restored.

Extension of
system.

In this connexion it may be observed that one direction in which a material improvement of the reporting service might be attained, were more funds available for the purpose, is that of the establishment of new stations on the more exposed parts of the coast.

The desirability of obtaining information from the North-West coast of Ireland has been mentioned more than once in the reports of the Office, for the existing station of Greencastle, or rather Moville, on Lough Foyle is much sheltered from westerly winds, and from all but a northerly sea. The Committee would now point out that the coast of Devon and Cornwall is but poorly represented on the Daily Weather Charts by Plymouth, especially during the hitherto too-frequent suspension of the intelligence from Scilly. To establish stations at the Lizard, Prawle Point, the Start, or even Rame Head would entail serious additional expenditure; and considering the importance of Plymouth as a naval station, it seems hardly advisable to omit that port from the list of reporting stations, as would be done if any of those named were substituted for it.

When the telegraphic service was first organized by Admiral FitzRoy, reports were regularly received from Jersey; and now that Postal Telegraphic communication has been established with the Channel Islands, the Committee have authorised the recommencement of these reports from Jersey, which have been interrupted for 12 years. Negotiations are now in progress for the reorganisation of the service.

The Office has not been forgetful of the importance of information from stations at high levels, if this were at all procurable. Such stations would be the summit level of the Midland

Railway near Hawes' Junction, 1,167 feet above the sea, and Princetown, Dartmoor, at the elevation of 1,372 feet. Here, however, as usual the want of money has prohibited any action. Stations at high levels.

The stations were all inspected in the course of the year, with the exception of Oxford and Dover. The list of the stations, with the observers' names, will be found in Appendix VII.

The most important changes in the reporting stations since the date of the last report have been at Valencia, where the former Observer, E. O'Sullivan, resigned in June 1876, and the duty of reporting was at once transferred to the Superintendent of the Observatory, a special wire being erected to connect the Observatory with the post office at Knightstown. This change has been advantageous in some ways, particularly as it ensures a better exposure for the thermometer screen and rain gauge than was available in the former situation, but the Observatory is not as well suited for observations of sea disturbance, or of the force of north-west winds, as might be wished. Changes of observers.

The Observer at Hurst Castle, R. T. Jobbins, was unfortunately drowned in February 1877, and his place has been temporarily filled by Mr. Albert James.

At present 17 out of the 29 stations are provided with Stevenson's thermometer screens, and only 10 of the reporters are telegraph clerks, all of them being distinctly and immediately responsible to the Office.

The Committee, as in former years, have still the same tale to tell of constantly recurring inaccuracy in the transmission of telegrams, the effects of which are frequently of a serious nature. As usual, however, corrections have frequently been elicited by repetitions of the message, and correspondence with the Observers. Such corrections are regularly included in the Monthly Supplemental Sheets issued with the Daily Weather Report. Telegraphic errors.

The practice of the Office in the collection, discussion, and dissemination of Meteorological information obtained by telegraphic reports has proceeded as in former years. The following is a brief abstract of the process.

The Office receives, or would receive, were the telegraphic communications with Corunna, the Shetlands, and Scilly perfect, 51 reports every morning, and nine every afternoon, except on Sundays. The observations are taken on Sundays as on other days, but are not received at the Meteorological Office until Monday morning, when the report for Sunday is made out.* The stations are situated along the entire coast of the Continent from Christiansund, in lat. 63° N., to Corunna, in lat. 43° N., with four stations on the coast of the Baltic, and one at Cap Sicié in the Mediterranean. Organization of the system.

The information received from the Continent in accordance with various arrangements is obtained from France, Holland, Hamburg, Denmark, Norway, and Sweden.

* This statement has been temporarily modified since November 1876, as will be seen further on.

Cost of
information.

Any cost incurred in transmission of these telegrams over the British lines falls on the Office; but, as regards the French telegrams, their transmission is free over the French wires; while in the case of the messages crossing the North Sea to Norway and Denmark, a free transit has been most liberally granted by the Great Northern Telegraph Company.

The Committee of late have paid at press rates for the transmission of reports to the Office, in consideration of their allowing the Post Office to extract from the messages *en route* any information it may require.

Process
of discussion
and issue of
information.

The daily observations are taken at 8 a.m., Greenwich time, and most of the telegrams arrive in London 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 at once transmitted to the Office by the private wire, where the majority of them usually arrive between 9 and 10 a.m. About two hours are required for their reduction, discussion, and the preparation of the Daily Weather Report, copies of which are ready by about 11 a.m., and are at once supplied for the afternoon issue of several of the London papers. Charts are then drawn for publication in the newspapers.

An idea of the development which the drawing of charts and diagrams for the daily press has assumed may be gathered from the following statements:

Supply charts
and diagrams
to newspapers.

Daily charts are drawn for the "Times" twice (for 8 a.m. and 6 p.m.) for "The Shipping and Mercantile Gazette," and for the Patent Type Founding Company who supply blocks to several other newspapers. Explanatory remarks are furnished with each chart.

Diagrams showing pressure, temperature, wind, and rain are drawn for the Patent Type Founding Company who supply them daily to the "Daily Chronicle," weekly to the "Observer," the "Graphic," "Lloyd's newspaper," and the "Agricultural Gazette," and monthly diagrams of a similar nature are supplied to the same firm for the "Miller."

In every case of such supply a small charge is made sufficient to cover the time occupied in drawing the chart or diagram. No charge is made for the explanatory remarks.

Issue of warn-
ings, &c. &c.

A brief telegraphic resumé of the weather is despatched to the Marine Ministry in Paris which is afterwards transmitted from Paris to Florence, for the benefit of the Italian naval service; and if necessary, telegraphic intelligence of storms or of atmospherical disturbance is sent to our own coasts and to foreign countries. Later in the day the afternoon reports come in. The Daily Weather Charts are drawn by noon, and forwarded to the lithographers to be printed. The copies for postal distribution are received at the Office at about 3.30 p.m.

Daily weather
charts.

The list of institutions and persons receiving the charts free will be found at Appendix VIII.

Since the 1st January 1876, arrangements have been made with the "Times" by which the Office is kept open daily until

9 p.m., and on Sunday evenings also from 6 to 9 p.m., and reports are received from certain stations for 6 p.m., so as to admit of the preparation of a special chart by that journal for its morning edition. The extra expense incurred by these operations is borne by the "Times," and the cost has not been far short of 500*l.* for the year 1876. The arrangement has been approved by the Board of Trade.

Special arrangements with the "Times."

It is scarcely necessary to remark that the charts for 2 p.m. and for 6 p.m. are necessarily far less complete than that for 8 a.m. That for 2 p.m. is drawn on the information received from seven home stations supplemented by that from two foreign ones, whenever these latter arrive in time to be used, which is a rare occurrence. The material for the charts for 6 p.m. is supplied by reports from 11 stations in the United Kingdom. Here then it is quite evident that all that is wanted to render the service more efficient is the power to expend more money on the collection and transmission of reports.

The Committee must here express their warmest recognition of the liberality of the "Times" which has allowed the Office the free use for scientific purposes of the 6 p.m. reports of which the entire cost has been borne by that journal. Accordingly the information received at night has frequently enabled the Office to issue timely warnings of storms which could not otherwise have been sent out until 11 a.m. next morning. It is to a great extent to this advantage, enjoyed for the first time in 1876, that the improvement in the results of storm warnings in the past year indicated on p. 20 is attributable.

This appears to be the most fitting place to explain the temporary arrangement made by the Committee for a Sunday service during the winter of 1876-7.

Sunday service.

The Treasury Committee having in their report most strongly recommended the institution of such a service, the Committee resolved to expend a portion of the available balance in their hands in making the experiment. On the 12th of November a commencement was made, two of the clerks attending at the General Post Office for two hours on Sunday morning. This arrangement was continued up to the end of April 1877, and the advantage derived by the Office from it was obviously very great. It is to be hoped that the Government will authorise the resumption of this Sunday service at an early date.

The intelligence of storms which is sent out from the Office varies in character, according to the requirements of the place which receives it. In Appendix IX. will be found a list of the stations which are furnished with signals, in accordance with Circular 717 of the Board of Trade, issued in February 1874.

Storm warnings.

These stations were, at the end of March 1877, 130 in number, situated:

64 in England,	13 in Ireland,
15 in Wales,	3 in the Isle of Man, and,
32 in Scotland,	3 in the Channel Islands.

Storm
warnings.

Lamps for night use are supplied to a few of the stations. All the stations have been established under, and are in accordance with, the terms laid down in the Circular, excepting the Royal Dockyards, which are of course under Admiralty management.

Telegrams to
Liverpool.

In addition to the foregoing, a telegram of 75 words consisting of reports of the atmospherical pressure and the wind at 14 of the most important stations, was sent as usual daily to the Underwriters' Rooms, Liverpool, the entire expense of the transmission being borne by that association, and a very similar message was forwarded up to the end of 1876 to the editor of "Saunders' News Letter," Dublin.

In addition there are sent daily to the Central News two messages, one short one of 75 words for the evening papers, and a longer message of 200 words for next morning's issue. This latter is sent at 6 p.m. The service commenced at the end of November 1876. All these telegrams are charged for at a rate to cover the cost of time occupied in preparation and transmission.

All intelligence sent to the coasts is also forwarded to Lloyd's Rooms, where it is at once posted up for the information of the members.

Intelligence to
the Continent.

The intelligence of storms which is supplied to foreign countries is of a two-fold character.

To the *Ministère de la Marine* at Paris warnings are issued in the same form as to our own coasts, but these are only destined for the portion of the French coast which lies within a reasonable distance of our own shores. The Committee, when the arrangement in question was originally set in action, stipulated that their warnings were not to extend farther to the southward than Nantes, and accordingly for the purposes of these telegrams the coast of France is divided into two districts. North, from Dunkerque to Cap la Hague, and West, from Cap la Hague to Nantes.

To the Meteorological establishments of the other countries which exchange information with the Office no direct warnings of storms are issued, unless in rare instances, but a regular service of cautionary telegrams is in action, by which the London Office transmits to Utrecht and Copenhagen, and to Christiania (when necessary), a telegram containing the most important barometrical readings and wind observations, whenever the total amount of barometer difference over the area covered by the network of the British system amounts to 0.7 in. or upwards.

Mode of testing
the warnings.

A comparison has been instituted between the warnings issued in 1876 and the weather experienced on our coasts, as was the case in the five previous years. The method of testing the warnings is as follows: The intelligence issued has usually been compared with the weather experienced on the coasts, as recorded by the various continuously self-recording anemometers established by the Committee by the telegraphic reporters, and by the several gentlemen who have volunteered to observe for the Office, and whose names will be found at pp. 25, 26.

In the last Report it was mentioned that by the new International Telegraphic code which was introduced in February 1875, the observers no longer necessarily report the strongest wind which has been felt by them, but only the wind actually blowing at definite hours of the day. By this means several strong breezes undoubtedly escaped notice in 1875. Mode of testing warnings.

In order to meet this difficulty and to render the information in the possession of the Office as to the weather experienced on our coasts more complete, the Committee made application to the various Lighthouse Boards, and have obtained from them the original logbooks from some of the best exposed lightships and lighthouses. They would here express their cordial thanks for the co-operation so readily granted to them especially by the Trinity House, and the Board of Irish Lights which sent their documents at once. The Scotch records were received through the Scottish Meteorological Society to whom the meteorological journals of all the Scotch lighthouses are regularly sent by the Board of Northern Lights. Lighthouse logs.

The coasts were subdivided into nine districts, as will be seen in the subjoined table. Two large tracts of coast are entirely omitted. 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 coasts in question 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 one single report either of force 9, or of the velocity of 50 miles an hour, have been specially noted in the remarks and marked with a *p*.

All telegrams which have been late, owing to the intervention of a Sunday, or owing to telegraphic errors, are marked with an *s*.

RETURN of the Result of the Comparison between the Warnings issued and the Weather experienced in 1876.

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 late, owing to Sundays, or Telegraphic Errors.	Storms for which no Warning was issued.
Ireland, South	30	14	7	3	2	4	—	Jan. 22 _p , Feb. 18 _p , Feb. 23.
" East	36	21	10	5	—	—	—	Feb. 18 _p , Mar. 6 _p , Mar. 18 _p .
Scotland, East	27	20	5	2	—	—	—	Feb. 15, Feb. 18 _p , Feb. 23,
								Mar. 6 _p , Mar. 8, Mar. 18,
" West (Clyde)	26	18	3	5	—	—	—	Oct. 30 _p , Dec. 31.
England, North-west	27	19	5	2	—	1	—	Feb. 23, Mar. 6.
" West	28	17	8	3	—	—	—	Mar. 18, Aug. 31 _p .
" South	39	23	7	3	2	4	—	Apl. 10, Apl. 14 _p , Aug. 31 _p .
								Feb. 18 _p , Feb. 26, Mar. 6 _p .
								Mar. 12 _p , Apl. 10 _p , Apl.
								14 _p , Sept. 24 _p .
								Entrance of Channel only,
England, South-east-	19	11	3	4	—	1	—	Feb. 23 _p , Aug. 2 _p , Dec. 20.
" East	33	19	9	4	—	1	—	Mar. 12 _p .
								Feb. 18 _p , Mar. 6 _p , Mar. 18.
Totals -	265	162	57	31	4	11	—	
Per-centages -	—	61·1	21·5	11·7	1·5	4·1	—	

Analysis of results 1870-76.

If these figures be compared with those for the previous years in which the system has been checked, we arrive at the following result in per-centages:

	Warnings justified			Warnings not justified by subsequent Weather.
	By subsequent Gales.	By subsequent strong Winds.	Total.	
1870	46·7	21·7	68·4	22·4
1871	46	17·7	63·7	22·0
1872	61	19·5	80·5	11·9
1873	45·2	34·0	79·2	16·8
1874	45·4	32·8	78·2	16·4
1875	41·1	35·1	76·2	21·0
1876	61·1	21·5	82·6	11·7

The exceptionally favourable character of the result for the year 1876 is mainly attributable to two causes. Firstly, the Office has been kept open daily till 9 p.m., instead of closing at 4 p.m. as was formerly the case, while reports from 6 p.m. have been received regularly as already explained. Secondly, the light-keepers on the whole have reported stronger winds than are felt by the telegraphic observers, so that several warnings which would in 1875 have been placed in the 2nd or last columns respectively have appeared in the first or the second columns in 1876. The effect of the extra Sunday service is hardly appreciable. This system was only in operation for eight weeks during 1876, and

not more than six or eight warnings out of a total of 265 were issued on Sundays. Analysis of results.

It must always be remembered that as the Office has to issue its warnings on the appearance of the first premonitory symptoms of a gale, it frequently has only winds of forces 6 and 7 to show in justification of its warnings. These winds are, however, quite as much as ordinary yachts and coasting craft can easily face, especially if they come suddenly and with a considerable change in the direction of the wind.

The Office has from the first entered cordially into the proposal made at the Vienna Congress in 1873, by Brigadier-General Myer, in relation to the organization of a system of really synchronous observations at Oh. 43m. p.m. Greenwich time. Synchronous observations. The invitation issued to British observers to join in the scheme was at once responded to, and upwards of 60 observers resident in the United Kingdom joined in the work, while the Army Medical Department has from some of its foreign stations supplied most valuable contributions to the stock of materials. In addition the Office has inserted in its new form of log, a sheet for the special entry of these observations at sea. The list of observers who have co-operated in the work during the period of this Report will be found in Appendix X.

The committee have subscribed regularly during the year for a number of copies of Captain Hoffmeyer's Synoptic charts for the Atlantic Ocean, and have distributed them among their observers who have kept excellent logs. Hoffmeyer's charts.

The Office has calculated for all its telegraphic stations the mean results for the "lustrum" 1871-5, for the following elements:— Mean results for stations.

Pressure	mean for 8 a.m.
Temperature	mean for 8 a.m.
"	mean of maximum.
"	mean of minimum.
"	mean of max. and min.
Rainfall	mean monthly fall.
"	No. of rainy days.

These tables will be published in the Quarterly Weather Report, and will be combined with the means published in the Quarterly Weather Report for 1870 for the preceding "lustrum" 1866-70, wherever practicable.

In addition the mean results for amount of Cloud have been prepared for all years for which the information is obtainable from the Telegraphic Reports.

Fishery Barometers are issued on loan to small ports and fishing stations,—and up to the end of 1876,—139 stations on our coasts had been supplied by the Office with barometers for public use. They were situated, 54 in England, 5 in Wales, 46 in Scotland, 32 in Ireland, and 2 in the Isle of Man. See Appendix XI. Fishery barometers.

III.—LAND METEOROLOGY OF THE BRITISH ISLANDS.

The seven observatories, Aberdeen, Glasgow, Armagh, Valencia, Stonyhurst, Falmouth, and Kew, have been maintained

Observatories. in regular action since the date of last Report. They were all inspected in 1876 by Mr. Whipple, Superintendent of Kew Observatory, when the instrumental arrangements were thoroughly examined, and, where found in any way defective through their eight years' wear, were set right.

Examination of the records. The only change of importance which has been made in the entire system has been that during the year 1876 the duty of examining the records of all the Observatories was transferred from Kew to the Office in London, inasmuch as experience has led to the conviction that this work can be most efficiently and economically performed in connexion with that of the preparation of the plates for the Quarterly Weather Report.

Accordingly from November 1876 Kew has ceased to receive the extra allowance of 400*l.* a year for the examination of these records, but on the other hand a special sum of 100*l.* a year is allotted to that Observatory for the purpose of enabling it to retain the services of an extra assistant who shall be available to take temporary charge of any of the other Observatories in case of absence of their staff from illness or other causes.

Preparation of tabulating scales. A considerable amount of time has been expended during the year on the preparation of new tabulating scales for the thermographs at several of the Observatories. One of the greatest difficulties in the practical management of photographic apparatus is found in the preparation of the scales for tabulation of the records. This can only be done by the comparison of a great number of curves, embracing a wide range of temperature. Accordingly it will be easily seen that the scales at first prepared might possibly require modification in some instances, and such has been found to be the case.

It was also at first thought possible to supply two thermometers for each instrument, a dry bulb and a wet bulb, which should differ so slightly in their proportions as to be capable of tabulation by the same glass scale. Maturer experience has, however, shown that this degree of accuracy has only been attained in two instances, and that in all the others separate scales were required. In all 16 new glass scales were engraved during the year.

The necessary measurements of the curves and the preparation of the glass scales have all been effected in the Office, and the unavoidable consequence has been a delay in the production of the plates for the Quarterly Weather Report.

The attention of the Office has now been directed to the re-examination of the existing barograph scales, and a large number of measurements have already been made.

Calculation of mean results. As regards the numerical discussions, the calculations of Daily, Five Day, and Monthly Means for Temperature, Dry and Wet, and for Pressure are complete up to the end of 1876.

In accordance with the general adoption of periods of five years, "*lustra*," ending with years which are multiples of five, for the calculation of average values, the Committee have had the means for the *lustrum* 1871-5 calculated, and the results will appear in the Quarterly Weather Report for 1875.

It will be remembered that the computations carried out in

the Office are simply the calculation of mean results for five-day and monthly periods, and the extraction of maximum and minimum values for temperature, which are published in the Quarterly Weather Report. There are no funds available for more elaborate discussion of the materials.

Since January 1874 the hourly tabulations have been lithographed and distributed. The cost in time of preparing and copying these for the lithographer, including the calculation of hourly vapour tension, is 21 days per month for one person. Practically it occupies the entire time of one person. Issue of hourly tabulations.

The methods of preparation of the plates of the Report are fully described in the Annual Reports of the Committee for 1870 and 1871. The accuracy aimed at is 0·02 in. for the barometer and 0°·5 F. for the thermometer. Plates for the Quarterly Weather Report.

Inasmuch as some misconception appears to exist as to the meaning of this last statement, it may be explained that it simply implies that it has not been deemed necessary that the published curves should be made to agree with the measurements obtained by tabulation from the original photographs within closer limits of accuracy than have been stated. It may, however, be remarked that at the scales at which the curves are reproduced in the plates differences of 0·02 in. or of 0°·5 F. are scarcely appreciable.

The photographic curves themselves are, of course, tabulated to 0·001 in. and 0°·1 F.

The instrumental appliances employed in the reproduction of the curves are in great measure perfectly unique, and have been invented specially for the work by Mr. Galton and Mr. De La Rue. The copper-plates are supplied by the Stationery Office with the standing portion produced by the electrotyping process, and are engraved and etched in the Meteorological Office.

In addition to the information derived from the seven observatories anemograms are received from the following stations which are all provided with anemographs similar to those erected at the observatories. In the case of Halifax, Mr. Crossley supplies also barograms and thermograms, in addition to most liberally lending to the Committee the anemometer which has been erected at Seaham, free of charge, by the kindness of Mr. Eminson, and with the sanction of the Marquis of Londonderry. Extra stations.

Station.		Supplied by.	Superintended by.
Aluwick Castle	-	Duke of Northumberland, K.G.	Major F. Holland,
Halifax	-	L. J. Crossley, Esq.	L. J. Crossley, Esq.
Holyhead	-	Meteorological Committee	Harbour authorities.
Orkney	-	"	Rev. C. Clouston, LL.D.
Seaham	-	L. J. Crossley, Esq.	G. H. Aird.
Yarmouth	-	Meteorological Committee	Secretary Sailors' Home.

In addition to the foregoing observatories the Office is in connexion with a number of other stations, whence returns of various degrees of completeness are received.

The Office has not in the first years of its existence published results from such stations, as it did not seem necessary to do so,

Stations of
second order.

and such a measure would give an appearance of rivalry in publication between itself and the General Register Office, but since the Permanent Committee of the Vienna Congress in 1874 have called for the publication of returns of this nature for international objects, the Committee have commenced such a publication.

The Vienna Congress undertook the task of attempting to call into existence a real international publication, and the members of the Permanent Committee have deemed it advisable, as a first step, to propose that at least it should be recommended to publish the observations and mean results, on definite forms, and on the same size of paper, so that the returns for different countries could be bound up together.

International
stations.

Each country was to be invited to contribute its quota to the common stock of information, by publishing actual observations from a number of stations proportional to its territorial area.

The carrying out of this course of action fell to the Permanent Committee who have devised the forms which are published in its Report (p. 47), and have proposed an inferior limit for the number of stations publishing returns in full (form A.) for the several European governments, as shown in the first column in the subjoined table.

It remains open for the directors of the individual systems not only to select the stations which are best suited for the purpose, but also to increase at pleasure the number above given.

Adoption of the
proposal in
Europe.

The extent to which the proposed method of publication has already been adopted will be found in the following tabular statement showing the number of stations in each country for which the returns are already published either in full (Form A), or as monthly summaries (Form B), and the year to which the statements respectively refer.

	Proposed Minimum No. of Stations.	No. Returns published.			Year to which reference is made.
		Form A.	Form A.	Form B.	
Austria with Hungary. - }	15 }	10 ^a	79	1874	
Belgium - - - - -	2	4	63	1874	
Denmark, with Iceland and Faroe. - - - - -	6	15	?	1877	
Holland - - - - -	2	4	16	1875	
France - - - - -	12	4	?	1877	
Germany - - - - -	12	6	—	—	
Great Britain and Ireland - - - - -	15	—	—	—	
Greece - - - - -	3	15	30	1876	
Italy - - - - -	12	—	—	—	
Norway - - - - -	10	24	?	1877	
Russia - - - - -	150	12	27	1874	
Spain and Portugal - - - - -	12	80	98	1875	
Sweden - - - - -	10	5	?	1877	
Switzerland - - - - -	5	18	—	1874	
Turkey - - - - -	10	13	—	1877	

^a Austria has also published returns for five stations in the East for 1877.

^b The French Meteorological Society has just commenced the publication of lithographed returns on Form A for the year 1877.

It is naturally of importance that these 15 stations, which fall to our share over and above the seven observatories in connexion with the Office, should be distributed pretty uniformly over these islands; and accordingly the opportunity seemed to be offered, by this proposed international publication, for instituting satisfactory relations of co-operation between the Office and the several independent organizations of observers in the United Kingdom, in order that the information to be published should be as fairly representative of our climate as possible.

Arrangements with the Meteorological Society.

Arrangements were therefore entered into between the Office and the Meteorological Society, as explained in the Report for 1874, in virtue of which the Society supplies certain returns from some of its stations for publication by the Office with similar returns from its own stations, the cost of copying these returns being defrayed by the Meteorological Office.

With the year 1875 the arrangements in question with the Meteorological Society came into operation, and for the year 1876 the following is the list of stations whose returns are being published, either in full, or as monthly summaries of mean results.

Stations of second order in connexion with the office.

Names of Stations.					Observers.
ENGLAND.					
Chatham, Kent	-	-	-	-	Captain J. Fellowes, R.E.
Chigwell Row, Essex	-	-	-	-	J. Campbell, R.N.
Durham	-	-	-	-	G. A. Goldney.
Folkestone	-	-	-	-	Rev. C. H. Taylor.
A Hastings, Sussex	-	-	-	-	A. E. Murray, F.M.S.
Hull, Yorkshire	-	-	-	-	Rev. W. P. Mackay, D.D.
Leicester	-	-	-	-	W. J. Harrison, F.G.S.
A Oscott, Warwickshire	-	-	-	-	Rev. S. J. Whitty, B.A.
Seaham, Durham	-	-	-	-	G. H. Aird.
A St. Aubin's, Jersey	-	-	-	-	J. E. Vibert, M.A.
Uppingham, Rutlandshire	-	-	-	-	Rev. G. Mullins.
SCOTLAND.					
A Glenalmond, Perthshire	-	-	-	-	Rev. W. P. Robinson, M.A.
IRELAND.					
Dublin	-	-	-	-	J. W. Moore, M.D.
A Markree Castle, Sligo	-	-	-	-	Anna Doberek, for Col. Cooper, F.R.A.S.
A Parsonstown (Birr Castle), King's Co.	-	-	-	-	J. Dreyer, M.A., for the Earl of Rosse, F.R.S.

The stations marked A in the preceding list are those for which the observations are being published for 1875 *in extenso*.

The following is the list of stations in connexion with the Meteorological Society whence returns are received for publication on Forms A or B, as already explained.

Returns supplied by the Meteorological Society.

STATIONS, A.

Buxton, Derbyshire	-	-	-	E. J. Sykes, F.R.A.S.
				F.M.S.
Calcethorpe, Lincolnshire	-	-	-	D. G. Briggs, F.M.S.
Carmarthen	-	-	-	G. J. Hearder, M.D.
Churchstoke, Montgomeryshire	-	-	-	Philip Wright, F.M.S.
Dartmoor Prison, Devonshire	-	-	-	R. E. Power, L.R.C.P.

STATIONS, A.—*cont.*

Hawes, Yorkshire	-	-	Rev. J. D. Parker, LL.D.
Hereford	-	-	T. Algernon Chapman, Esq.
Ramsgate, Kent	-	-	Rev. T. Hugh Quelch, O.S.B.
Strathfield Turgiss, Hants	-	-	Rev. C. H. Griffith.

STATIONS, B.

Audley End, Essex	-	-	Mr. J. Bryan.
Bath	-	-	C. S. Barter, M.B.
Cheadle, Cheshire	-	-	J. C. Philips, Esq.
Crowborough Beacon, Kent	-	-	C. L. Prince, M.R.C.S.
Hillington, Norfolk	-	-	Rev. H. Ffolkes, F.M.S.
Llandudno	-	-	J. Nicoll, M.D., F.M.S.
Marlborough, Wiltshire	-	-	Rev. T. A. Preston, M.A., F.M.S.

The returns from these stations are published in the form of Appendices to the Quarterly Weather Reports, and the detailed Returns on Form A. are issued separately, so that they can be bound up with similar Returns from other countries, and thus form an International Summary of Meteorological records.

It will be seen that by these tables the climate of England and Ireland is already fairly well represented. As regards Scotland, only one station is available, inasmuch as the Scottish Meteorological Society have declined to enter into an arrangement similar to that accepted by the Meteorological Society (London) for the supply of information from their stations to the Meteorological Committee.

Extra stations.

Returns of various degrees of completeness are received from the following observers, in addition to the monthly copies of the observations taken at all the telegraphic stations.

Names of Stations.			Observers.
ENGLAND.			
Alnwick Castle, Northumberland	-	-	Major F. Holland, for the Duke of Northumberland, K.G.
Barnstaple, Devonshire	-	-	W. Knill.
Brixham, Devonshire	-	-	J. Scivill, Harbour Master.
Chiswick (Royal Horticultural Society), Middlesex	-	-	J. K. M. L. Farquhar.
Cooper's Hill (Indian Civil Engineering College) Surrey	-	-	H. McLeod, F.C.S.
Gorleston, Norfolk	-	-	R. J. C. Day, Piermaster
Harpenden, Hertfordshire	-	-	T. Wilson, F.M.S.
Helston, Cornwall	-	-	M. P. Moyle, M.D.
Killingholme, Lincolnshire	-	-	Rev. J. Byron, F.M.S.
Rugby, Warwickshire	-	-	J. M. Wilson, F.R.A.S.
Saffron Walden, Essex	-	-	J. G. Bellingham, Esq.
Sheffield, Yorkshire	-	-	W. F. Cooper, F.M.S.
Shipston-on-Stour, Warwickshire	-	-	Finlay Dun, Esq.
Silloth, Cumberland	-	-	Rev. F. Redford, F.R.S.E.
Southport, Lancashire	-	-	J. Baxendell, F.R.A.S.
Winchester, Hampshire	-	-	Rev. G. Richardson.
Fair Isle	-	-	W. Lawrence.
IRELAND.			
Dromore (Coleraine), Co. Derry	-	-	Mrs. Torrens.
Ennis, Co. Clare	-	-	J. Hill, C.E.

In conclusion, it should be said that the Registrar-General for Ireland having commenced with the year 1877 the publication of Meteorological Reports in his returns, has made application to the Committee to supply him with the requisite information, and accordingly returns from the stations connected with the Office are furnished to him regularly, viz., from four stations for his weekly, and from six for his Quarterly Returns.

Returns supplied to General Register Office, Dublin.

LIBRARY.

Appendix XII. contains a list of the donations made to the library during the year. Most of these have been received in return for the publications of the Office. In addition a few volumes have been purchased.

Library.

In consequence of the constant reference which is made to the Office for information on meteorological questions, it has been endeavoured to collect a small library containing the standard works on Meteorology, and the subjects allied to that science.

The library at present consists of 2,650 volumes, and 2,250 pamphlets, exclusive of charts and MS. records of observations. The pamphlets are bound in convenient volumes for reference. The books, &c. are lent to the staff of the Office, under the usual regulations.

EXPENDITURE.

The disbursements during the year ending 31st March 1877 have exceeded those of the preceding year by the amount of 673*l.* 16*s.* 3*d.* The following table shows the general distribution of the payments under the several heads of service :—

Analysis of expenditure.

ABSTRACT OF CASH ACCOUNT

—	1875-76.	1876-77.	Increase.	Decrease.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Office salaries, &c.	1,365 11 6	1,389 12 0	24 0 6	—
„ rent, attendance, and contingencies	890 16 6	971 5 4	80 8 10	—
Observatories, &c.	3,924 1 0	4,038 13 6	114 12 6	—
Telegraphy	3,007 1 4	3,423 15 9	416 14 5	—
Ocean Meteorology	2,203 0 4	2,241 0 4	38 0 0	—
Totals	£ 11,390 10 8	12,064 6 11	673 16 3	—

Net increase, 673*l.* 16*s.* 3*d.*

Further details will be found in Appendix I. The increase under the head of Observatories is chiefly owing to certain arrears of work being brought up to date. Under this head also is included the amounts paid on account of Meteorological establishments in our colonies and in foreign countries, the directors of which continue to avail themselves of the assistance of the Office in procuring instruments from London makers.

Analysis of
expenditure.

Under the head of Telegraphy, the increase is owing to Sunday Telegraphy, for the purpose of Storm Warnings during the past winter, and also to extra Evening Reports being received for drawing up the 6 p.m. charts which appear in the "Times," and the cost of which has been entirely defrayed by that journal.

It will be seen that the figures in the above abstract show only the payments actually made within the year, including any which may have been unpaid at the end of the previous year; it also contains payments which will be refunded to the Office.

The following abstract from the revenue account, shows the true charge for the year, and its distribution, without reference to whether payment has been made or not, all amounts also being deducted for which the Office will be reimbursed.

ABSTRACT OF REVENUE ACCOUNT.

			£	s.	d.
Office salaries, &c.	-	-	-	1,386	15 9
Rent, attendance, and contingencies	-	-	-	936	19 10
Observatories, &c.	-	-	-	3,646	6 1
Telegraphy	-	-	-	2,862	10 2
Ocean Meteorology	-	-	-	2,045	1 2
Total	-	-	-	10,877	13 0

The balance sheet at the foot of Appendix I. shows that the available funds on the 31st March 1877 were 67*l.* 7*s.* 8*d.* against 909*l.* 9*s.* 6*d.* at the corresponding period of 1876. These figures show that the expenditure of the year has exceeded the income by about 840*l.*

The surplus to the credit of the Committee is what, after ten years, remains of the unexpended balance of the Parliamentary grant in 1867-8, in which year, the first of the management of the Office by the Committee, the operations of the Office had not received their complete development.

SUMMARY.

There has been no change in the Committee or staff of the Office during the year.

The Treasury Committee presented their Report in February 1877, and at the close of the financial year the Committee tendered their resignation, and they were requested to hold office until the appointment of their successors, the Council, as proposed by the Treasury Committee in their Report.

The Permanent Committee of the Vienna Congress held a meeting at the Office in April 1876.

I.—*Ocean Meteorology*.—The Office has continued its practice of lending standard instruments to merchant captains willing to observe for it, and also has, as usual, supplied the Royal Navy with all Meteorological instruments used in the service.

The number of barometers afloat on the 1st April 1877, as compared with the number afloat on the 1st January 1876, is as follows :—

	1st April 1877.	1st January 1876.
Merchant service - -	111	93
Royal Navy (including aneroids)	569	577

Eighty-four observers in the Mercantile Marine alone have sent in logs which have been classed "excellent" during 15 months ending March 1877. A complete list of the documents received during that period will be found in Appendix III. The geographical distribution of the voyages on which observations are being taken will be found at page 9.

In Part II., after page 31, will be found 12 charts showing the amount of information bearing on Ocean Meteorology existing in the Office for each month, and its distribution over the entire Ocean. No similar charts to these have ever previously been published in any country.

The charts of Meteorological data for the equatorial portion of the Atlantic have been published, and a copy presented to each captain who has kept a log for the Office which has received the mark of "excellent" or "very good."

The discussion of the Meteorology of the sea near the Cape of Good Hope has made steady progress.

The investigation into the weather over the Atlantic in August 1873 has been completed and is now in the press. In connexion with this subject, it may be said that this inquiry proves conclusively that during that month no storm crossed the Atlantic from America to Europe, and that consequently a hurricane which visited the coasts of Nova Scotia on the 24th of that month, did not, as alleged, reach our coasts as a severe storm on the 31st.

The disbursements made during the year for this department have been 2,241*l.* 0*s.* 4*d.*

II.—*Weather Telegraphy.*—No change of much consequence has taken place in the stations since last Report. Almost all the stations have been inspected. The communication with the Shetlands and with Scilly has been subject to frequent interruptions during the year.

Mean values for barometrical pressure, temperature, and rainfall have been calculated for the five years 1871–5 for all the telegraphic stations, and will be published in the Quarterly Weather Report.

The Office has continued to exchange telegraphic information with nearly all adjacent continental nations, and to issue storm warnings to France, Holland, Denmark, and occasionally to Norway. A daily summary is sent by telegraph to France and forwarded thence to Italy.

The arrangement with the "Times" by which the Office has been kept open in the evening, at the expense of that journal, for the supply to it of a special chart for 6 p.m. have been main-

tained throughout the year, and the Office has derived much advantage therefrom.

In November 1876 the Committee made a temporary arrangement for a telegraphic service on Sunday mornings. This was continued up to the end of the financial year, and the Office received great benefit from it.

Storm warning signals are hoisted at 130 stations, namely,

64 in England.	13 in Ireland.
15 in Wales.	3 in the Isle of Man.
32 in Scotland.	3 in the Channel Islands.

The results of total success of the warnings have been 82·6 per cent. as compared with 76·2 in 1875 (*see* p. 20). Daily weather charts have been issued to the number of above 500 copies, and the publication of charts and diagrams in the London and country newspapers has received considerable development.

The supply of synchronous observations taken at Oh. 43m. Greenwich mean time to the chief signal office, Washington, has been continued. A list of observers joining in the work will be found in Appendix X.

The number of "Fishery" barometers supplied to coast stations for public use is 139, situated 54 in England, 5 in Wales, 46 in Scotland, 32 in Ireland, and 2 in the Isle of Man.

The disbursements made during the financial year for this department have been 3,423*l.* 15*s.* 9*d.*

III.—*Land Meteorology of the British Islands.*—The work of the seven Observatories has been continued as usual. The Quarterly Weather Report for 1874 has appeared, and that for 1875 is in an advanced state.

The hourly tabulated readings of the continuous curves have been lithographed and distributed monthly.

In addition to the seven Observatories the Office is in connexion with a number of other stations where eye observations are made by volunteer observers (p. 25), and the arrangements with the Meteorological Society have been maintained, whereby the Office, in consideration of an annual allowance, is supplied with copies of returns taken at the stations belonging to the Society.

Detailed observations from 15 of these stations and monthly summaries from 30, in accordance with the recommendations of the Permanent Committee of the Vienna Congress, are in course of publication for 1876.

The disbursements made on account of this department have been 4,038*l.* 13*s.* 6*d.*, but this sum includes the cost of a considerable number of instruments procured on commission for colonial and foreign institutions.

Office.—The usual interchange of publications with other meteorological establishments has been kept up, and in Appendix XII. will be found a catalogue of the additions made to the Library from this source during the year.

The expenses of management in salaries and wages have been 1,389*l.* 12*s.*

The other charges incident on the Office for rent, contingencies, postage, &c., have amounted to 971*l.* 5*s.* 4*d.*

PART II.

INDEX of the INFORMATION existing in the OFFICE for the entire OCEAN.

When the Committee first took charge of the Office in January 1867, it was acknowledged that the data collected by Admiral FitzRoy had not been indexed so as to show what materials were available for the discussion of the Meteorology of each individual district of the ocean.

Among the first operations undertaken by the staff subsequent to 1867 was the examination of the arrears of information existing in the office in order to classify it as to quality, &c. This was completed by the end of the year 1870, at which time the number of documents was 2,650.

This examination of the documents has, of course, kept pace with the rate at which they have since accumulated, as has been explained in successive Annual Reports.

Prior to handing over their functions to the future Council the Committee have directed the preparation of a complete index of the information in their possession for each month and for every ten degree square which embraces any portion of the sea, discriminating between the observations taken, (1.) on the Outward, (2.) on the Homeward Voyage, and (3.) at Anchor. The practical result has been that out of 4,000 documents 2,270 are found to be available for the discussion of Ocean Meteorology, the remaining 1,730, either referring to land stations, or else being of insufficient quality to be worth consideration. The general result is shown in the subjoined Charts, in which, however, the minuter subdivision of the information into three catalogues, as just described, has not been maintained. The figures refer to the number of *days* observations, at four-hourly intervals, which exist for each Square.

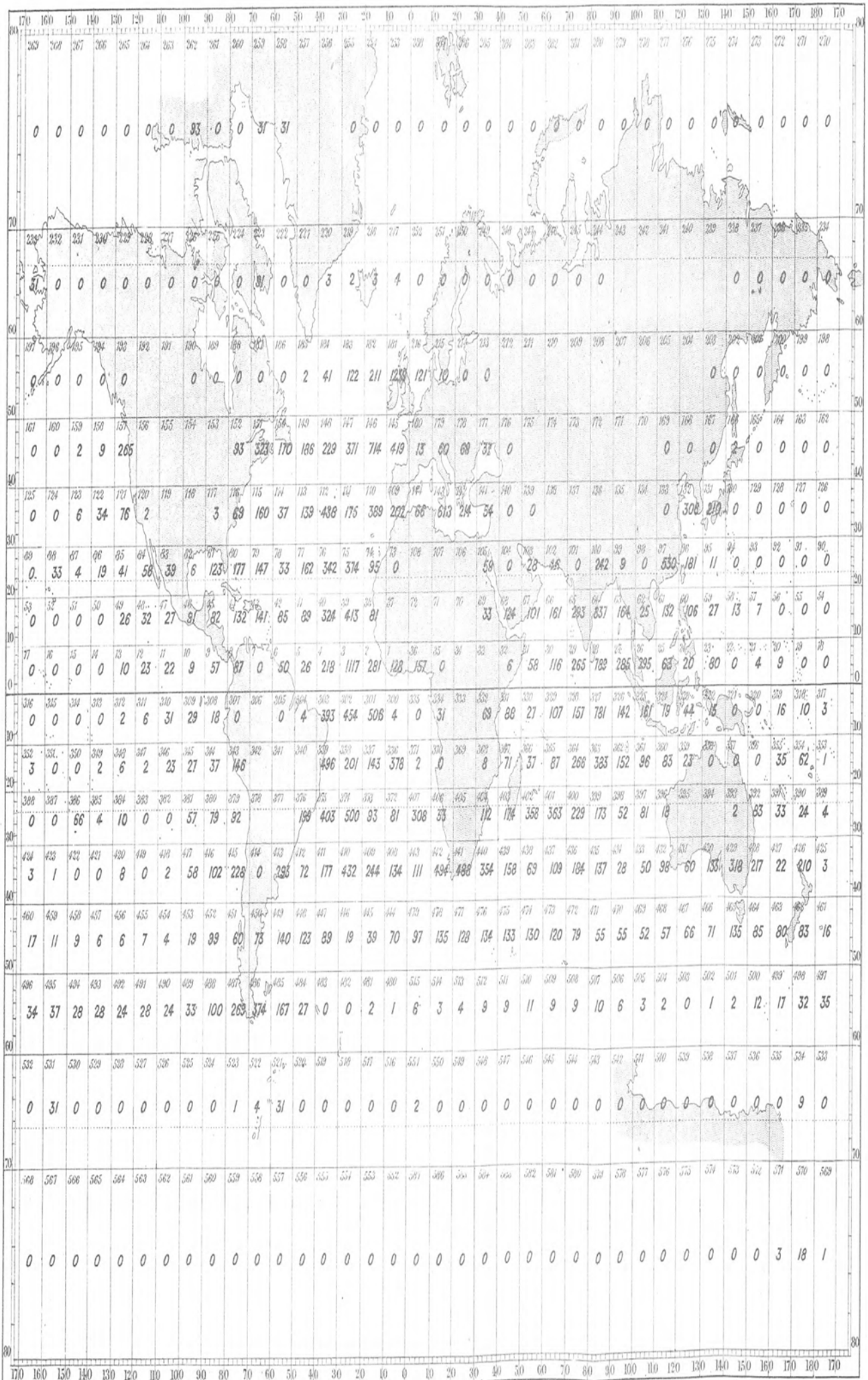
It will be obvious to any one that the unequal distribution of the materials renders it impracticable to undertake the discussion of any very extensive areas with the hope of obtaining mean results of equal value for the minuter subdivisions of those areas.

JANUARY.

DISTRIBUTION OF OCEAN METEOROLOGICAL OBSERVATIONS.

The faint figures show the numbers of the Squares; the dark figures the number of days observations for each Square contained in the first 4000 documents in the Meteorological Office.

These Charts to follow p. 31.

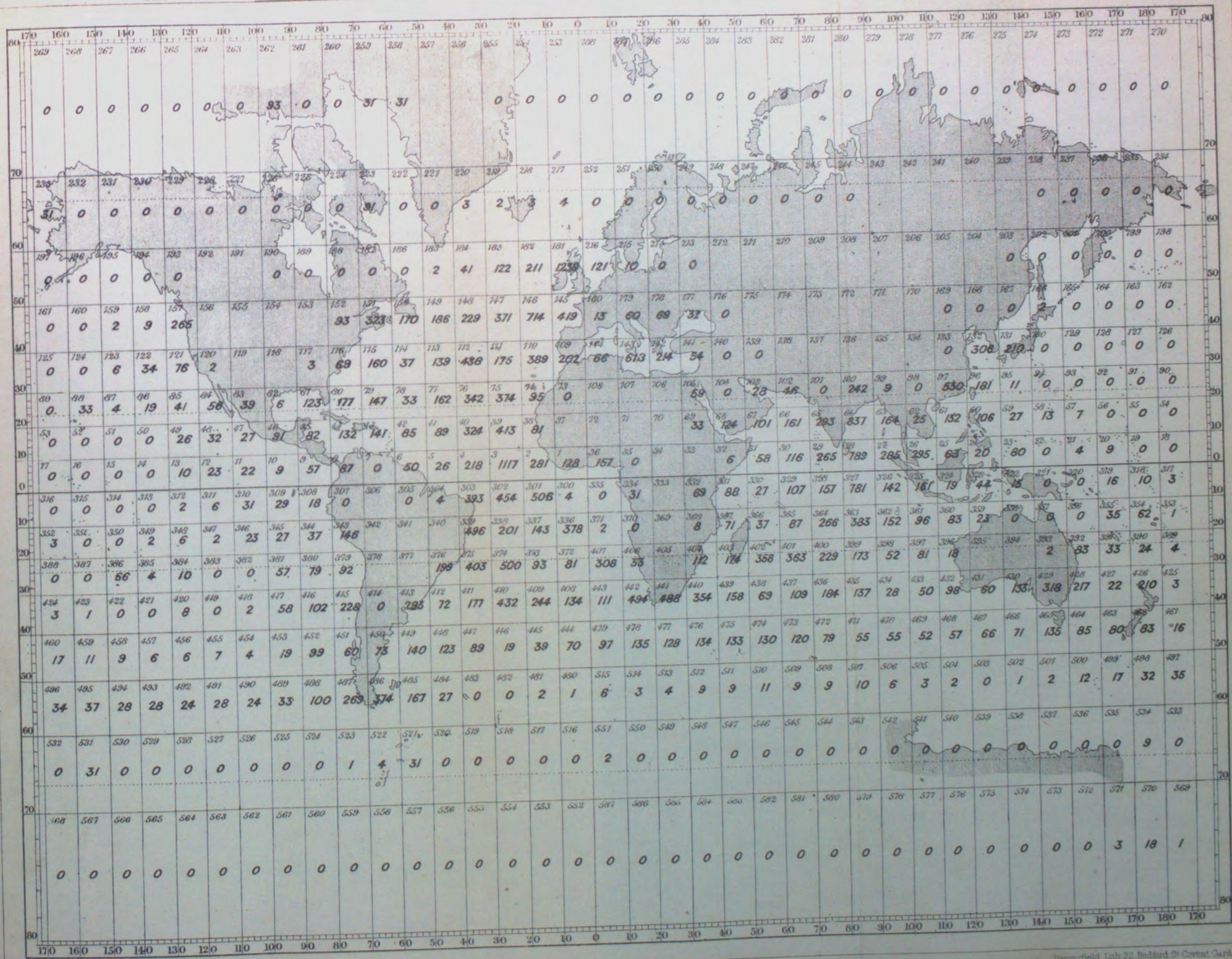


JANUARY.

DISTRIBUTION OF OCEAN METEOROLOGICAL OBSERVATIONS.

The faint figures show the numbers of the Squares; the dark figures the number of days' observations for each Square contained in the first 4000 documents in the Meteorological Office.

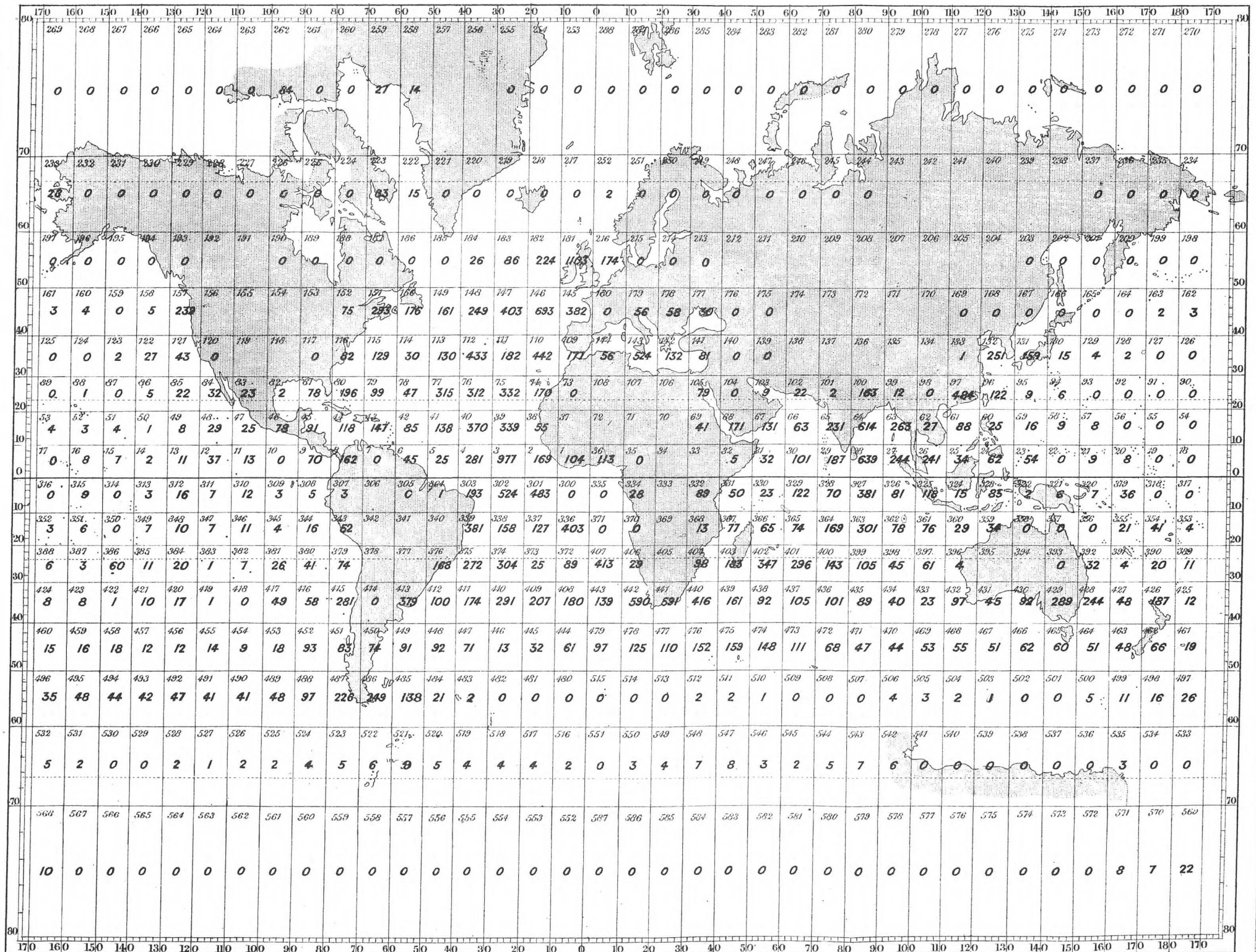
These Charts to follow p. 31.



FEBRUARY.

DISTRIBUTION OF OCEAN METEOROLOGICAL OBSERVATIONS.

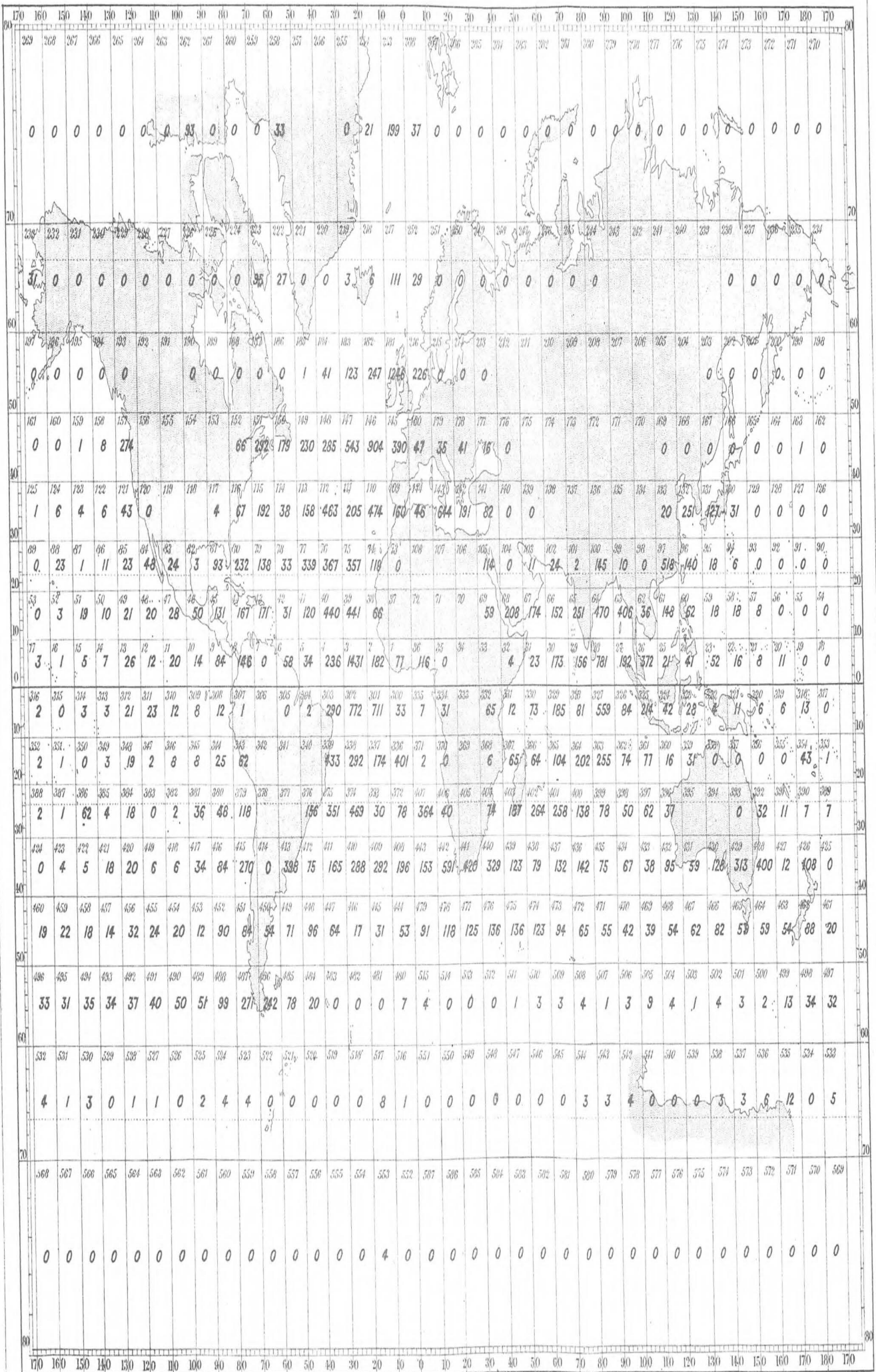
The faint figures show the numbers of the Squares; the dark figures the number of days' observations for each Square contained in the first 4000 documents in the Meteorological Office.



MARCH.

DISTRIBUTION OF OCEAN METEOROLOGICAL OBSERVATIONS.

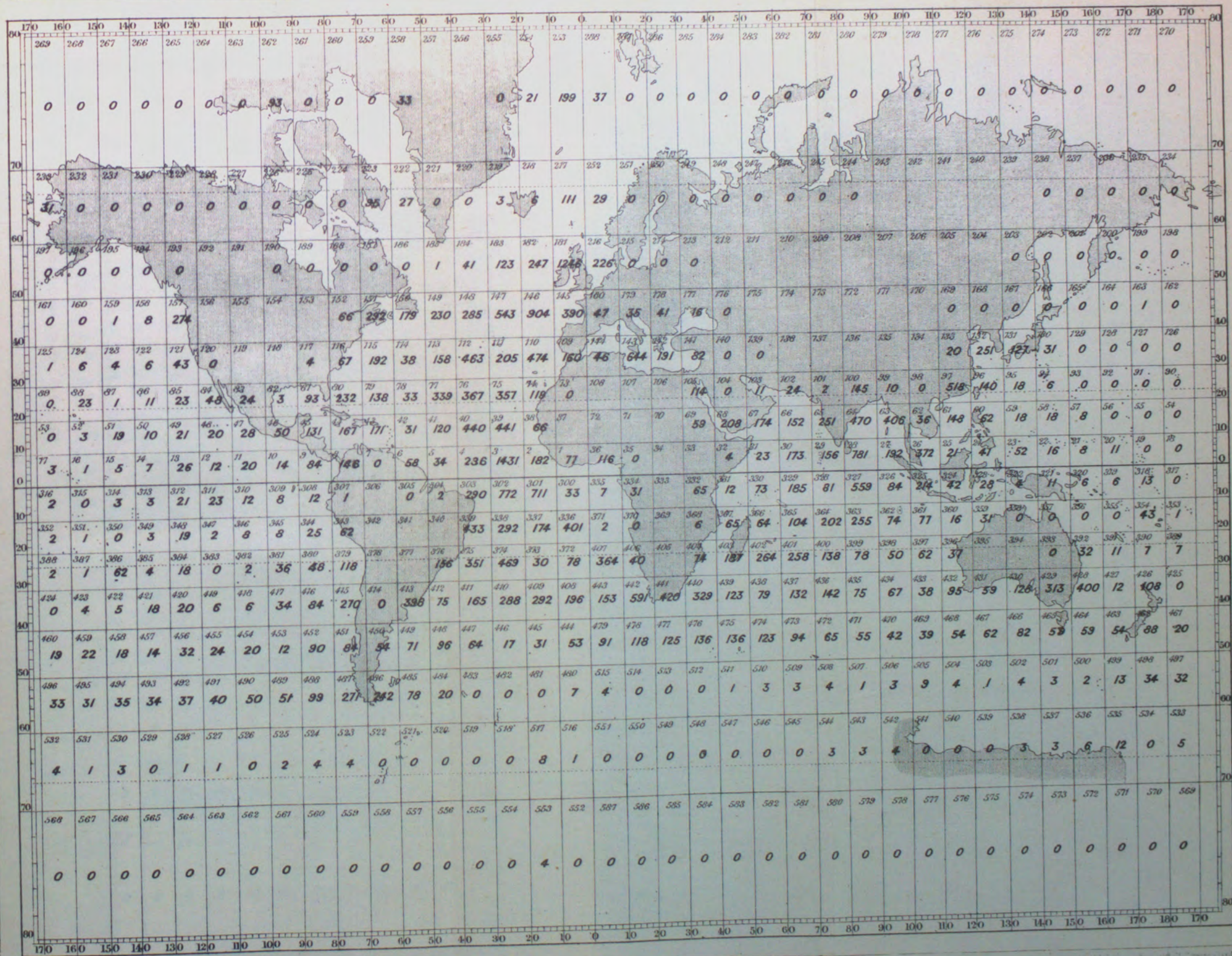
The faint figures show the numbers of the Squares; the dark figures the number of days' observations for each Square contained in the first 4000 documents in the Meteorological Office.



MARCH.

DISTRIBUTION OF OCEAN METEOROLOGICAL OBSERVATIONS.

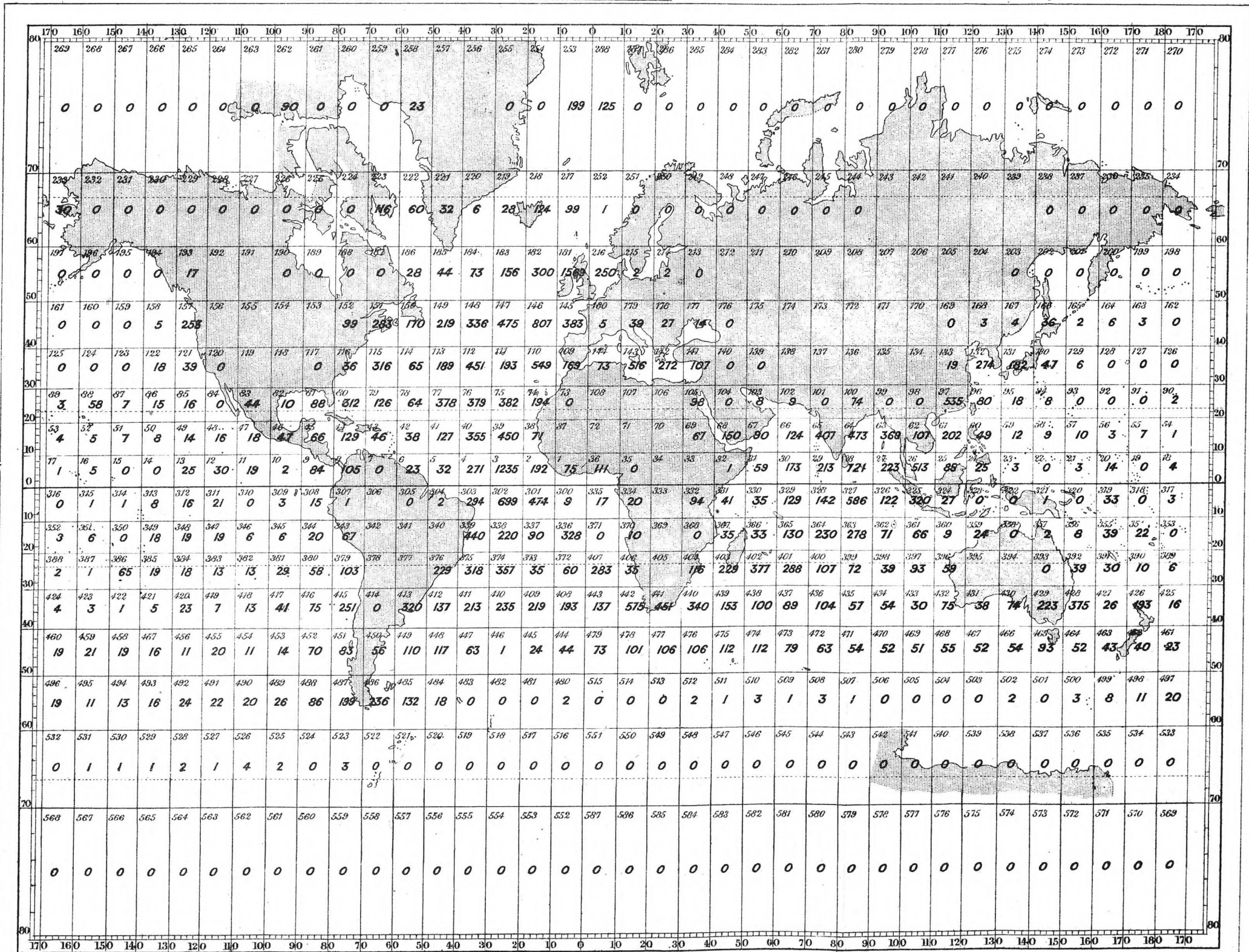
The faint figures show the numbers of the Squares: the dark figures the number of days' observations for each Square contained in the first 4000 documents in the Meteorological Office.



APRIL.

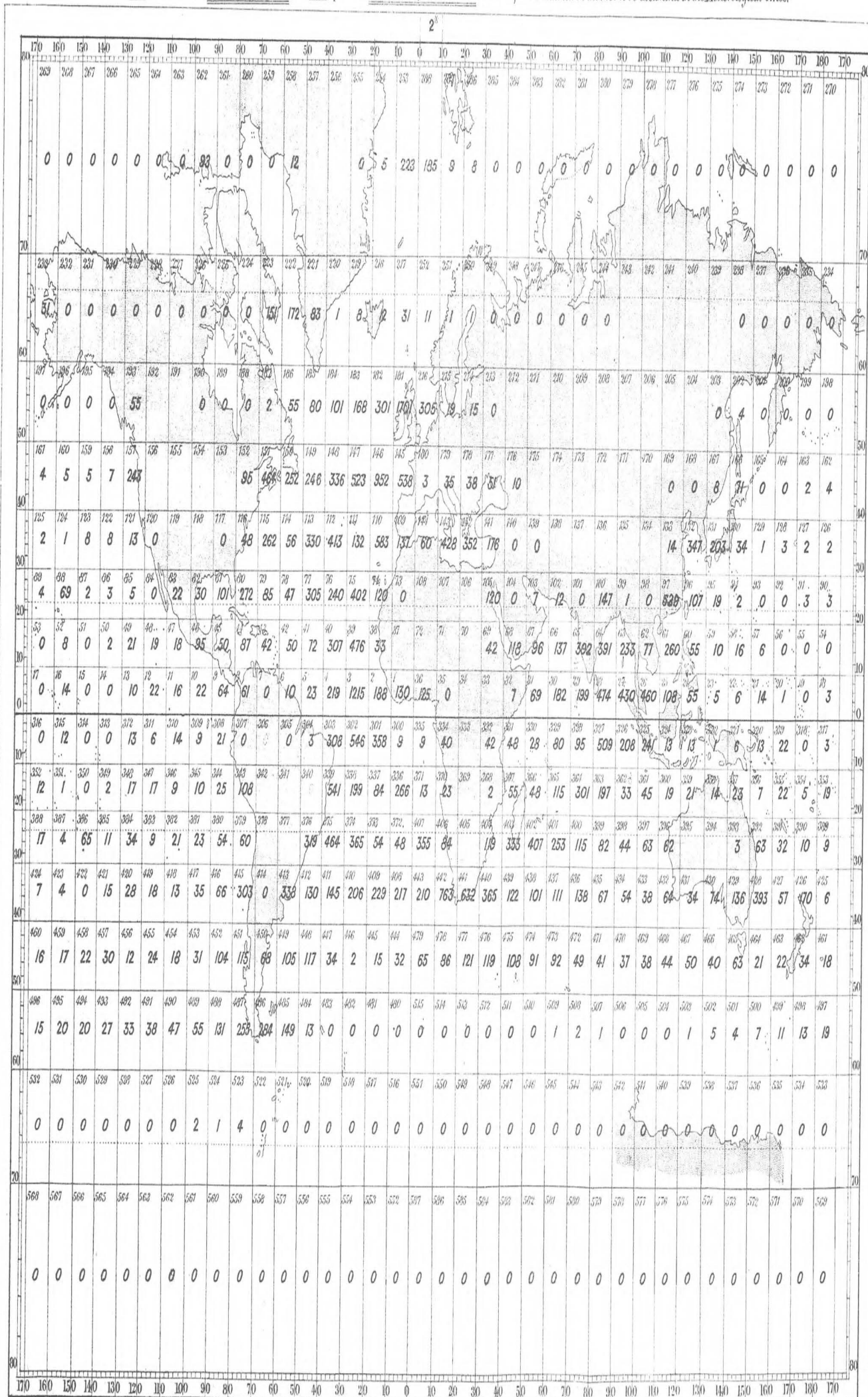
DISTRIBUTION OF OCEAN METEOROLOGICAL OBSERVATIONS.

The faint figures show the numbers of the Squares; the dark figures the number of days' observations for each Square contained in the first 4000 documents in the Meteorological Office.



DISTRIBUTION OF OCEAN METEOROLOGICAL OBSERVATIONS.

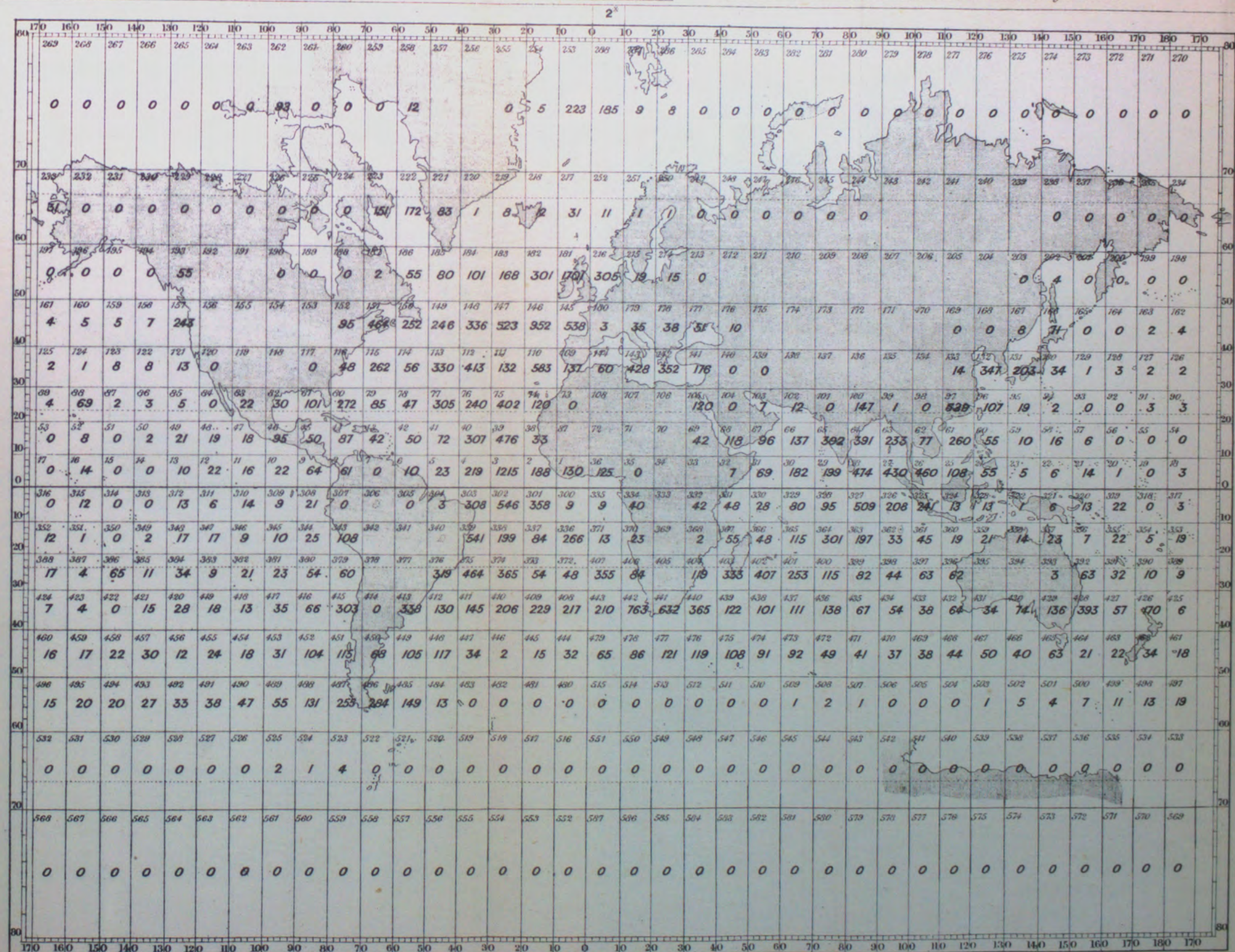
2



MAY.

DISTRIBUTION OF OCEAN METEOROLOGICAL OBSERVATIONS.

The faint figures show the numbers of the Squares: the dark figures the number of days' observations for each Square contained in the first 4000 documents in the Meteorological Office.



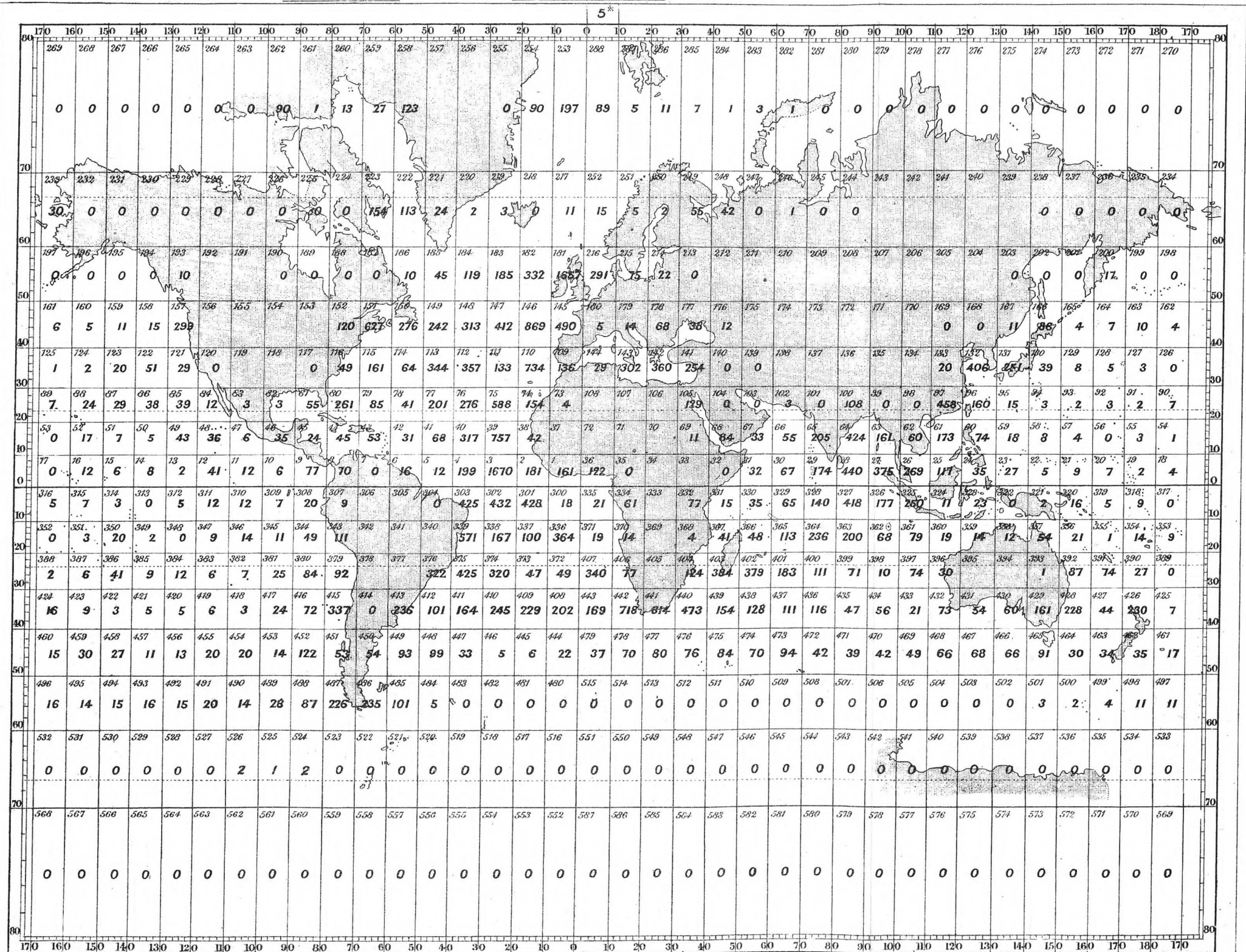
* Observations North of 80°N.

Printed by the Government Printer, London.

JUNE.

DISTRIBUTION OF OCEAN METEOROLOGICAL OBSERVATIONS.

The faint figures show the numbers of the Squares; the dark figures the number of days' observations for each Square contained in the first 4000 documents in the Meteorological Office.



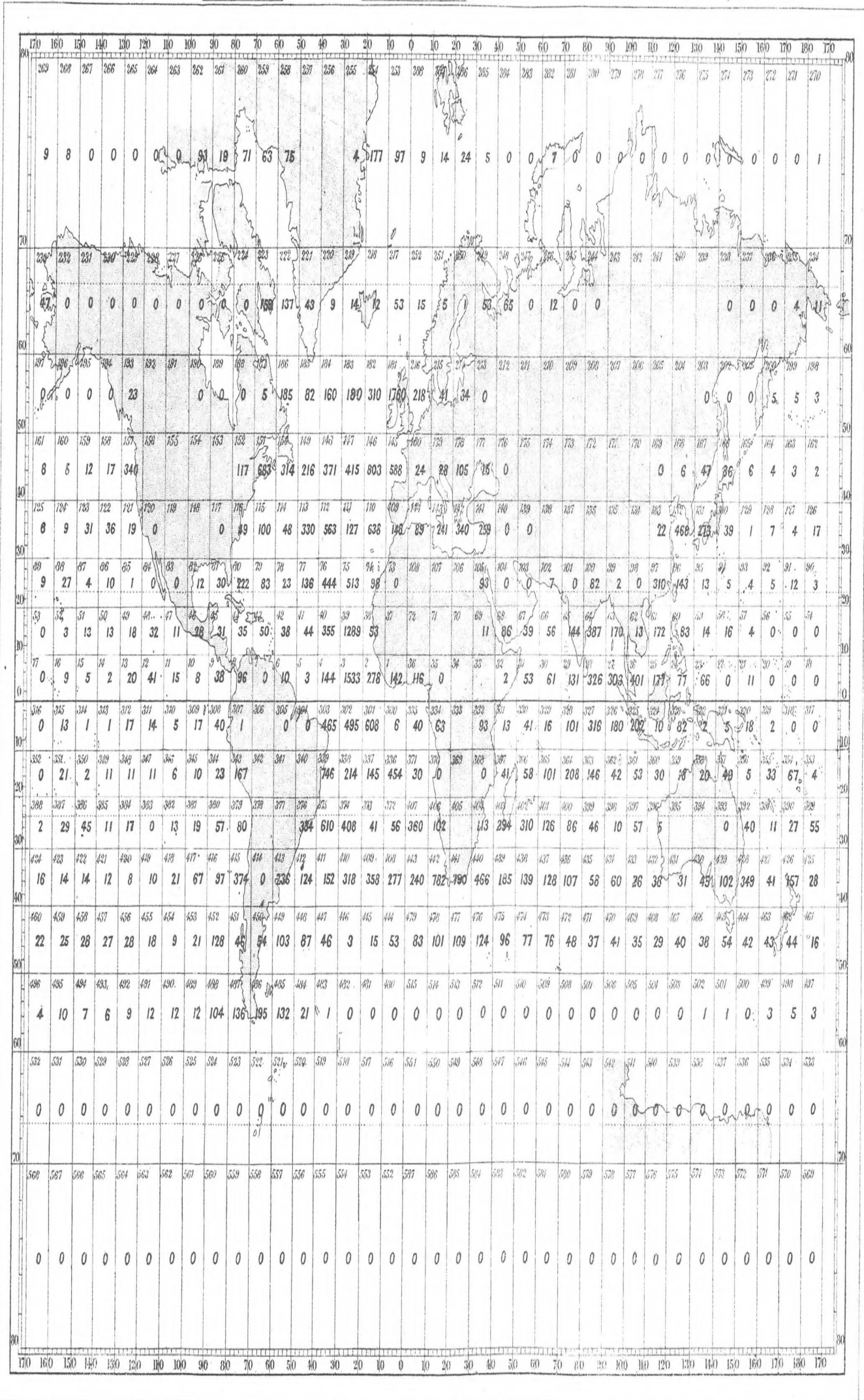
* Observations North of 30° N.

Drawn by J. H. St. John, Bedford St. Covent Garden.

JULY.

DISTRIBUTION OF OCEAN METEOROLOGICAL OBSERVATIONS.

The faint figures show the numbers of the Squares; the dark figures the number of days observations for each Square contained in the first 4000 documents in the Meteorological Atlas.



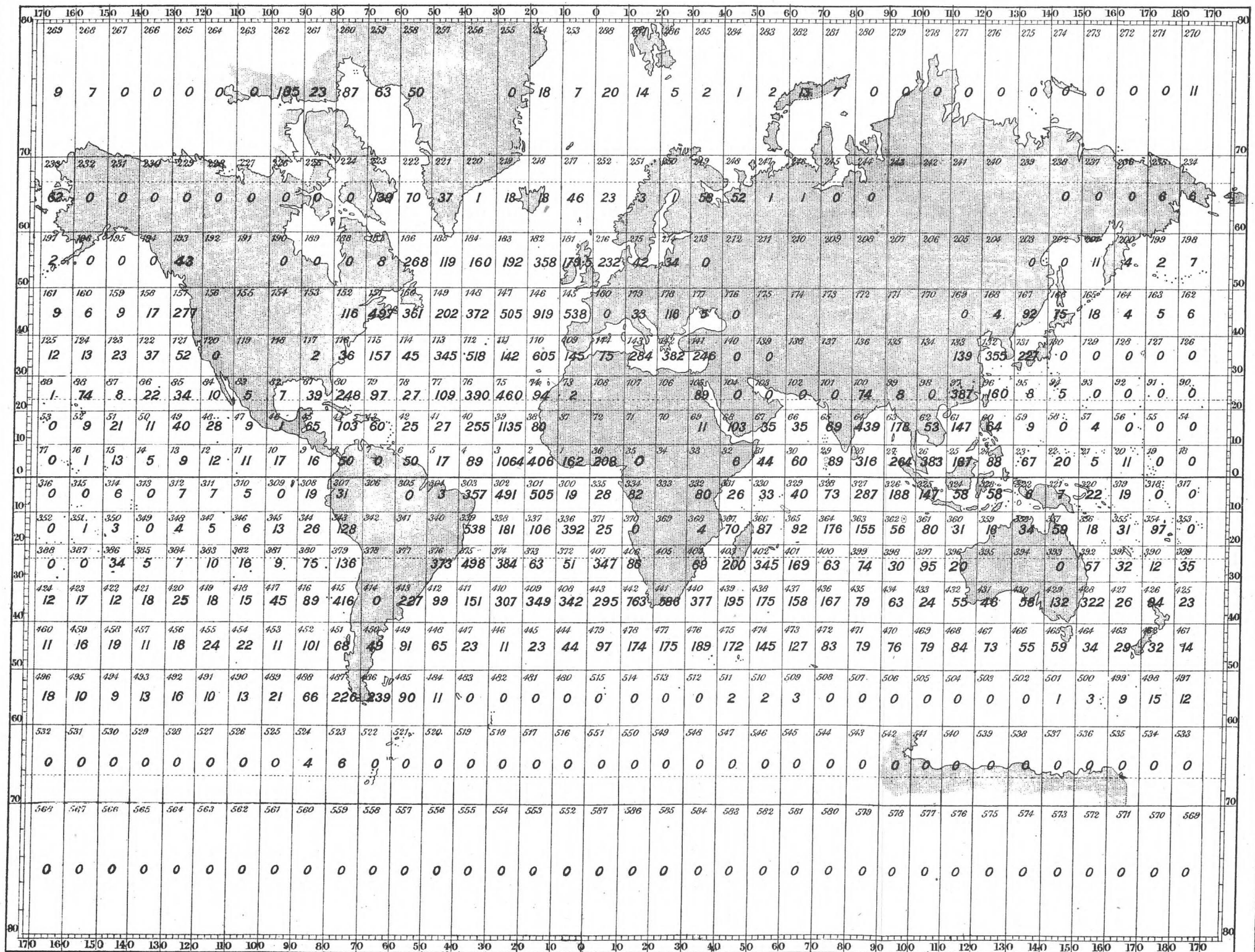
DISTRIBUTION OF OCEAN METEOROLOGICAL OBSERVATIONS.

This map displays the North Pacific Ocean with a grid of latitude and longitude. The map includes the coastlines of North America, Alaska, and the Pacific Islands. A numerical data grid is overlaid on the map, with values ranging from 0 to 500. The grid is organized by latitude (from 10°N to 60°N) and longitude (from 170°W to 170°E). The data values are printed in a small font within the grid cells.

AUGUST.

DISTRIBUTION OF OCEAN METEOROLOGICAL OBSERVATIONS.

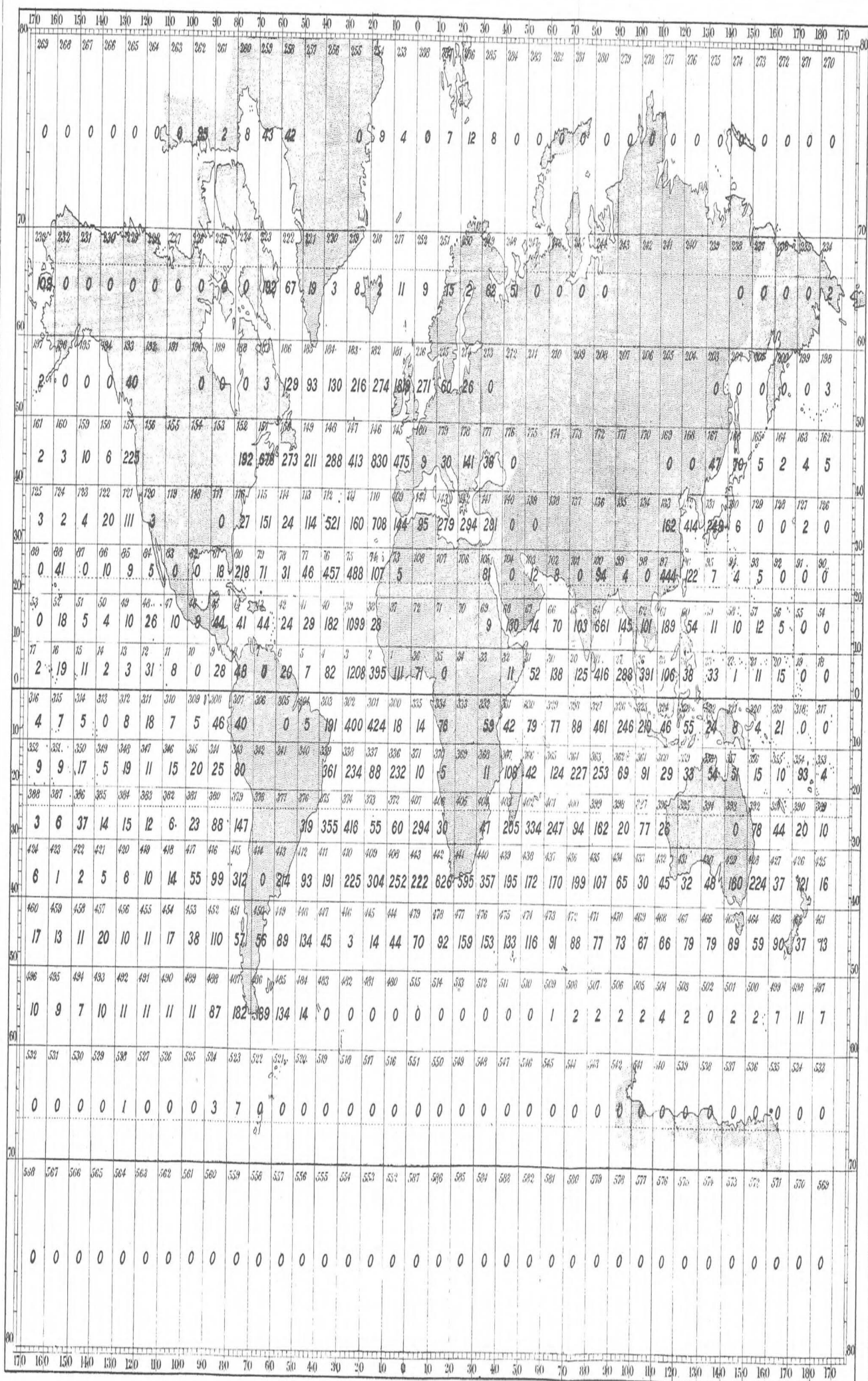
The faint figures show the numbers of the Squares: the dark figures the number of days' observations for each Square contained in the first 4000 documents in the Meteorological Office.



SEPTEMBER.

DISTRIBUTION OF OCEAN METEOROLOGICAL OBSERVATIONS.

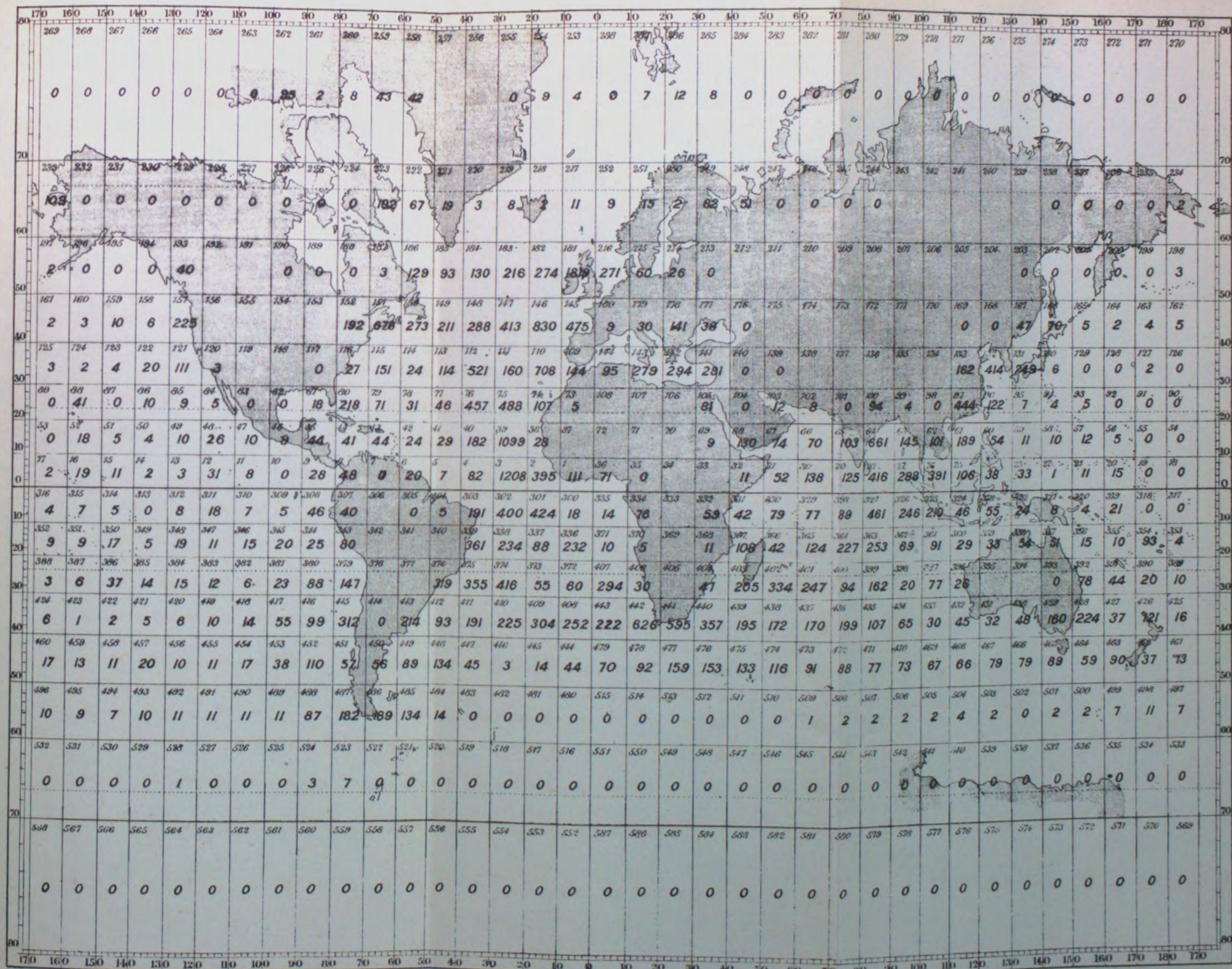
The faint figures show the numbers of the Squares: the dark figures the number of days observations for each Square contained in the first 4000 documents in the Meteorological Office.



SEPTEMBER.

DISTRIBUTION OF OCEAN METEOROLOGICAL OBSERVATIONS.

The faint figures show the numbers of the Squares: the dark figures the number of days' observations for each Square contained in the first 4000 documents in the Meteorological Office.



OCTOBER.

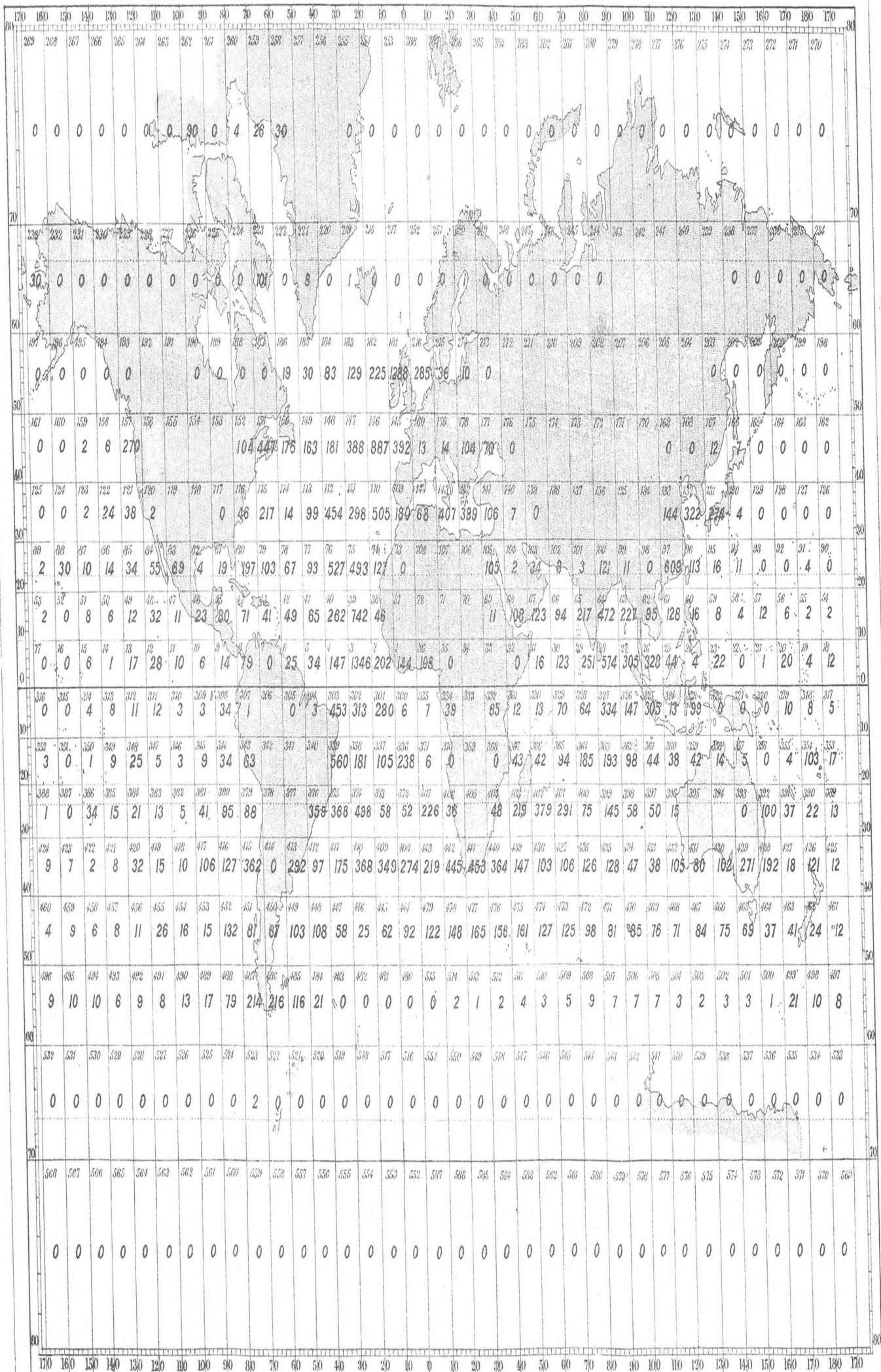
DISTRIBUTION OF OCEAN METEOROLOGICAL OBSERVATIONS.

The faint figures show the numbers of the Squares: the dark figures the number of days' observations for each Square contained in the first 4000 documents in the Meteorological Office.



DISTRIBUTION OF OCEAN METEOROLOGICAL OBSERVATIONS.

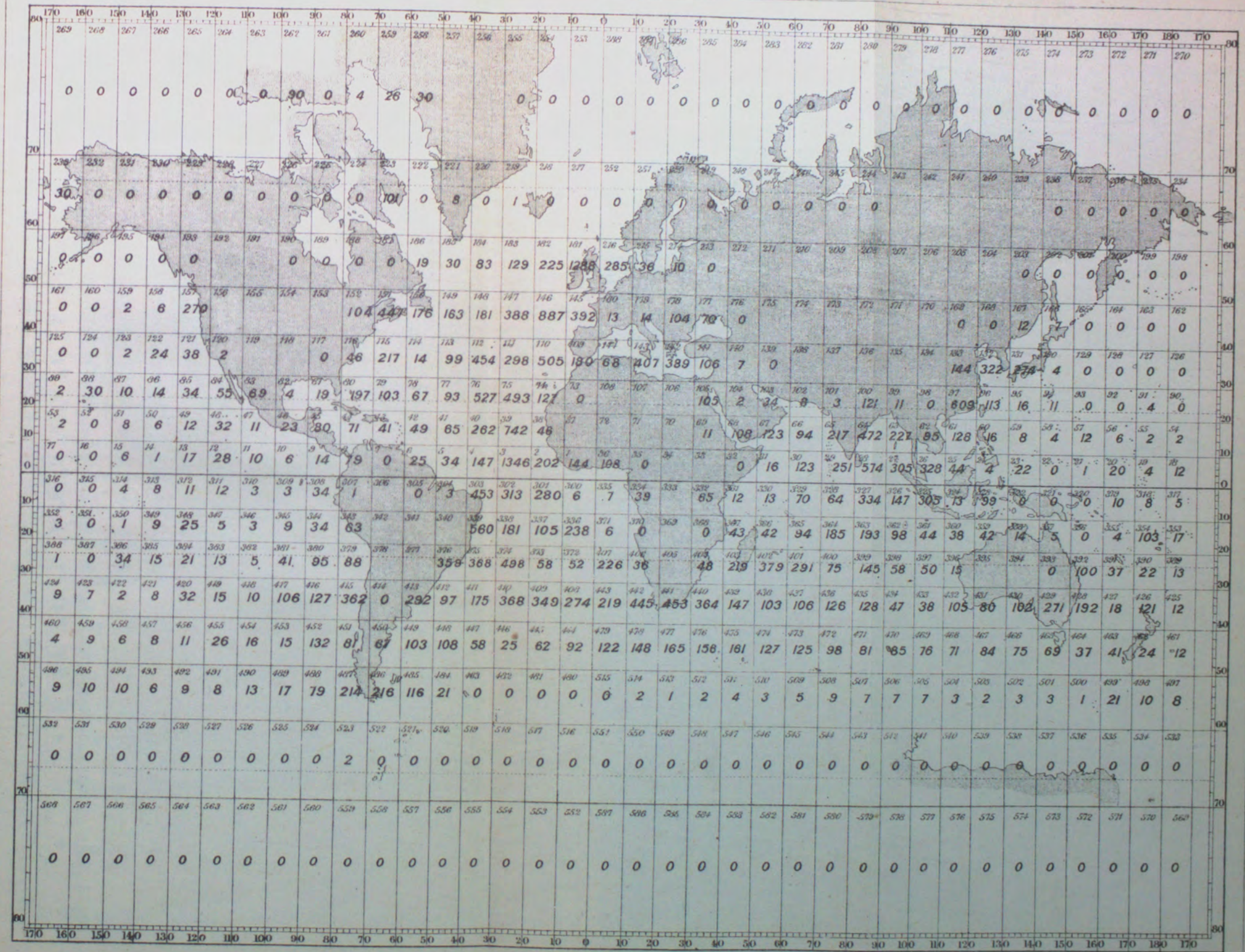
The faint figures show the numbers of the Squares: the dark figures the number of days' observations for each Square contained in the first 4000 documents in the Meteorological Office



NOVEMBER.

DISTRIBUTION OF OCEAN METEOROLOGICAL OBSERVATIONS.

The faint figures show the numbers of the Squares: the dark figures the number of days' observations for each Square contained in the first 4000 documents in the Meteorological Office.



DECEMBER.

DISTRIBUTION OF OCEAN METEOROLOGICAL OBSERVATIONS.

The faint figures show the numbers of the Squares; the dark figures the number of days' observations for each Square contained in the first 4000 documents in the Meteorological Office.



METEOROLOGICAL OFFICE : ACCOUNT of RECEIPTS and PAYMENTS for the year ending 31st March 1877.

RECEIPTS.		PAYMENTS.	
Balance from year 1875-6	- £1,278 9 1	OFFICE:	
Parliamentary Vote	- 10,000 0 0	Salary of Director	- 800 0 0
Receipts from various sources:—		Clerks, Office-keeper and Messenger	- 589 12 0
Commissions for Instruments, &c.	509 2 11		£1,389 12 0
Subscriptions for D. W. Charts	- 250 8 8	Rent of Office	- 534 12 0
Subscriptions for Hourly Obsns.	9 0 0	Fuel and gas	- 33 0 4
Subscriptions for Danish Synoptic Charts	- 28 14 4	Furniture, fittings, fire insurance, &c.	- 79 3 6
Supply of Meteorological Information, &c.	629 18 9		646 15 10
Sundry small amounts	- 2 5 6	Postage	- 70 18 7
	1,429 10 2	Printing and books	- 49 7 6
Interest on Depo-it Account	2 7 2	Attendance, repairs, and other Contingencies	- 204 3 5
			324 9 6
		LAND METEOROLOGY:	
		Expenses at Observatories	- 2,437 2 3
		New instruments (commissions, &c.)	- 388 2 10
		Computations	- 1,213 8 5
			4,038 13 6
		Telegraphy	- 1,825 9 2
		Inspections, issue of D. W. Charts, &c.	- 480 0 6
		Computations	- 1,118 6 1
			3,423 15 9
		OCEAN METEOROLOGY:	
		Marine Superintendent	400 0 0
		Supply and Return of Instruments, &c.:	
		Royal Navy	- 326 13 9
		Mercantile Marine	371 10 11
		Computations and Care of Instruments	- 1,142 15 8
			2,241 0 4
			12,064 6 11
		Cash in hand	- 127 14 1
		Advance to Valencia Observatory	- 50 0 0
		Bank of England	- 236 7 1
		London and Westminster Bank	- 231 18 4
			645 19 6
			£12,710 6 5
			£12,710 6 5

Examined and compared with the vouchers and found correct.

(Signed)

WARREN DE LA RUE, } Auditors.
W. J. SMYTHE, }

June 11, 1877.

42234.

C

BALANCE SHEET, 31st March 1877.*

LIABILITIES.		ASSETS.	
To sundry creditors -	897 6 1	By balance of re-	
probable net sur-		ceipts and pay-	
plus on 1st		ments account -	645 19 6
April 1877 -	67 7 8	„ sundry debtors -	318 14 3
	<u>964 13 9</u>		<u>964 13 9</u>
(Signed)		WARREN DE LA RUE, } Auditors.	
		W. J. SMYTHE,	

APPENDIX II.

LIST of CAPTAINS (and Officers) who have received from the Committee a Presentation Copy of Charts, to 31st March 1877 (see Report, p. 8). The figures opposite to each show the number of Special Letters of Thanks written to each Observer in acknowledgment of "Excellent" Registers returned to the Office.

Captain's Name.	Letters of Thanks.	Ship.
† Aird, A. D. - - -	1	S.S. "Prussian."
† Allen, F. W. - - -	1	"Collingwood."
Almond, Thomas Michael, F.R.A.S.	4	"Decapolis."
Angel, John Fry - - -	1	"Twilight."
Balderston, Richard James - - -	3	"Rajmahal."
Banner, Frederick William - - -	4	"Lady of the Lake," and "Kenilworth."
† Baker, Thomas - - -	1	"Zoroaster"
Barwood, William Richford - - -	2	"Fugitive."
Becket, Alexander - - -	3	"City of Perth."
Bennett, E. C. - - -	3	"Thessalus."
Blackie, A. H., R.N.R. - - -	2	"Melpomene."
Blair, J. - - -	2	"Arouca."
Blake, Edwin John - - -	5	"Gilbert Thompson," "Gitana," and "Sydney Daeres."
Blomfield, H. - - -	1	"Thomas Stevens."
Bouchette, Francis Baines - - -	2	S.S. "European."
Broad, G. A., Nav. Lt., R.N. - - -	1	H.M.S. "Valorous."
Brooks, Samuel - - -	3	S.S. "City of Brooklyn."
Brown, A. J. - - -	2	"Maroon."
Brown, Robert - - -	2	S.S. "Moravian."
Bruce, John - - -	4	"City of Adelaide," and S.S. "Australian."
Buchan, James - - -	1	"Commewyne."
Bythesea, John (V. C.), R.N. - - -	2	H.M.S. "Phœbe."
Campbell, Archibald - - -	5	S.S. "Britannia," and S.S. "Europa."
Campbell, H. - - -	2	"Burdwan."
Capper, Edward Hall - - -	2	"Palm Tree."
Carruthers, Forrest Priest - - -	3	"Minero."
Churchill, Orford, Lt., R.N. - - -	1	H.M.S. "Ariel."
Comley, William Guise, R.N.R. - - -	2	S.S. "Hong Kong."

* The value of stock of instruments, &c., is not included in this statement; for particulars see Appendices V. and VI.

† Charts not presented.

‡ Chief Officer.

Names of Officers, deceased, in italics.

Captain's Name.	Letters of Thanks.	Ship.
<i>Cruikshank, William</i> - -	1	"Richard Wright."
<i>Davidson, Charles</i> - -	1	"Perseverance."
Dobson, Charles Meadows -	4	S.S. "Beta."
<i>Donkin, Thomas, R.N.R.</i> -	3	"Inverness."
Ellery, William - - -	6	"Bowfell."
Faithfull, Henry - - -	1	"Haddon Hall."
Fernie, Alexander Durward -	1	"Sir John Lawrence."
Finlay, James - - -	3	"Duncairn."
Frederick, George C., Sub. Lt., R.N.	1	H.M.S. "Fawn."
Freeman, Thomas W. - -	4	S.S. "Wisconsin."
Fry, Alfred - - -	3	"Foam."
Gales, I. C. - - -	1	"Flechero."
Gaye, Gerrard - - -	4	"Eliza Shaw."
* <i>Goodenough, Commodore James G., R.N.</i>	1	H.M.S. "Pearl."
*† <i>Goodsall, W.</i> - - -	1	S.S. "Kangaroo."
Gordon, James - - -	1	"City of Oxford."
Grange, James - - -	1	S.S. "Acantha."
Gray, David - - -	4	S.S. "Eclipse."
* <i>Gray, F. J., R.N.</i> - - -	1	H.M.S. "Nassau."
Gray, John - - -	4	S.S. "Mazinthien" and S.S. "Hope."
Gray, John McDonald - -	8	"Speranza."
Greenwood, William - -	7	S.S. "Scotia" and "Assaye."
<i>Grigs, George, R.N.R.</i> - -	3	S.S. "Helvetia," and S.S. "France."
Haran, Dr. T. J., R.N. - -	1	H.M.S. "Agincourt."
<i>Harris, David</i> - - -	2	S.S. "Medway."
<i>Hassell, Thomas Edward</i> -	3	"Mervyn."
Hayes, James - - -	7	S.S. "Ptolemy" and S.S. "Camoens."
Hayward, George Olive - -	2	S.S. "Durley."
Hayward, J. J., Paymaster, R.N.	1	H.M.S. "Hydra."
Heggum, Edward Carl V. -	9	"Czar" and "Rozelle."
Henderson, Henry - - -	5	"Hope," and S.S. "Cleveland."
† <i>Hodding, Samuel White</i> -	3	"Indus."
<i>Holdich, John Peach, R.N.R.</i>	3	"Agra."
Hopkins, John O., R.N. - -	1	H.M.S. "Liverpool."
Horner, Mr. A. C., M.R.C.S. -	1	S.S. "Pandora."
Hosken, H., Staff Com., R.N. -	1	H.M.S. "Pearl."
*† <i>Hunt, J.</i> - - -	1	"Avonside."
Hunter, David - - -	3	S.S. "Alpha" and S.S. "Delta."
Innes, George - - -	1	"Silistria."
Jackson, J. N. - - -	1	"Knowsley Hall."
Jackson, Robert, Staff Com., R.N.	1	H.M.S. "Glasgow."
Johnson, Charles, R.N.R. -	4	"St. Lawrence."
Jones, Arthur Arundel - -	3	"Victoria Nyanza," and "Chevy-chase."
Jones, George Henry - - -	7	S.S. "Nile," and S.S. "Niger."
Jones, L. F., R.N. - - -	1	H.M.S. "Valorous."
Jones, Theodore Morton, R.N. -	3	H.M.S. "Glasgow."
Kennedy, Charles William -	3	S.S. "Scotia," and S.S. "Baltic."
Kennedy, James Branch, R.N.R. -	1	S.S. "Blue Cross."

* Charts not presented.

† Second Officer.

† Chief Officer.

Names of Officers, deceased, in italics.

Captain's Name.	Letters of Thanks.	Ship.
Kerr, Alexander -	3	"Ardgowan."
Kerr, Thomas Coulter, R.N.R. -	2	"Durham."
Latham, Frederick W. -	1	"Sumatra."
Lecky, Squire Thornton Stratford, R.N.R., F.R.G.S.	3	S.S. "Uruguay" and S.S. "Halley."
Leportier, Theodore -	2	"Kate."
Lewis, John Thomas, R.N.R. -	2	S.S. "Scotia," and S.S. "Chaldea."
Lindsay, Henry Kay -	2	"Valparaiso."
Longley, Herbert -	4	S.S. "Yorkshire."
Lunham, Robert Dowe -	7	S.S. "Berar," S.S. "Durley" and S.S. "Charles Howard."
*MacDonald, John -	1	S.S. "Europa."
McKechnie, Duncan Ferguson -	5	"Cottica."
Mackellar, D. E. -	1	Observations at Rapa Island.
Mackie, Thomas -	1	S.S. "Mazinthien."
Maddison, John, R.N.R. -	1	"Anglesey."
Manning, Henry -	1	S.S. "Kangaroo."
Maples, Charles -	3	"Genii."
Marshall, D. -	1	"Lady Octavia."
Martyn, John Artis -	14	S.S. "Siberia" and S.S. "Samaria."
*Mayne, Richard C., R.N., C.B. -	1	H.M.S. "Nassau."
†Menzies, Charles James -	1	S.S. "Austrian" and S.S. "Sarmat- tian."
Miller, A. John -	1	"Camperdown."
Moore, Thomas -	1	"W. E. Gladstone."
Morton, John D'Arcy -	1	"Henry Bath."
Mossop, Clement -	3	"Candahar."
Moulard, John Elsey -	5	S.S. "Batavia."
Murphy, Michael -	1	S.S. "Tarifa."
Napier, Richard H., R.N. -	2	H.M.S. "Nassau."
Nares, Sir George Strong, R.N., F.R.S.	2	H.M.S. "Challenger."
Newton, James William -	1	S.S. "Grenadier."
North, W.G. -	1	S.S. "West Riding."
Owen, John -	2	"W. G. Russell."
Owen, Robert -	1	"Victoria Cross."
†Paterson, James Forrest -	2	S.S. "Moravian."
Pearson, Charles William -	9	S.S. "Strathclyde."
Peebles, Robert -	1	"Margaret Galbraith."
Perry, John L., R.N. -	2	H.M.S. "Orontes."
Petch, John A. R., Staff Com., R.N.	2	H.M.S. "Phœbe."
Petrie, Peter Conrad -	2	S.S. "Patagonia."
Pollard, Lt., G.N., R.N. -	4	H.M.S. "Nassau."
Potts, Thomas Crosby -	8	"Tenasserim."
Prelm, Carl Christian -	2	"Eleanor."
Price, James John -	9	"Sorata."
†Pritchard, Charles E. -	1	H.M.S. "Ariel."
Raeburn, John, R.N.R. -	1	"Airlie."
Rawle, Charles, R.N.R. -	1	"Star of the North."
Raymond, Charles Tenzer -	6	"British India" and "British Consul."

* Charts not presented.

† Chief Officer.

‡ Navigating Sub-Lieutenant.

Names of officers deceased, in italics.

Captain's Name.	Letters of Thanks.	Ship.
Reid, Carson William - -	2	"Lord Strathnairn."
Renaut, Charles Henry - -	6	"Celaeno" and "Glenlora."
Ruthven, Jocelyn Fitzgerald -	1	"Whittington."
St. John, H. C., R.N. - -	2	H.M.S. "Sylvia."
†Scott, Fergus - -	1	S.S. "Hotspur."
†Scott, George Alexander Brown -	1	S.S. "Nestorian."
Sharp, William H., Staff Com., R.N.	1	H.M.S. "Liverpool."
Shaw, Gilbert - -	4	S.S. "Beta."
Shearer, George - -	1	"Early Morn."
Shortland, R. Adm. P. F., R.N. -	1	H.M.S. "Hydra."
Simpson, Alexander - -	7	"Traveller."
<i>Smith, David, F.R.A.S.</i> -	1	"Wiltshire."
Smith, William Charles -	3	"Kingdom of Saxony."
Smith, William Henry, R.N.R. -	10	S.S. "Hibernian," S.S. "Peruvian," and S.S. "Scandinavian."
Stanhope, John - -	1	"Decision."
Steele, John - -	2	S.S. "Erl King."
Stephen, John George - -	2	S.S. "Moravian" and S.S. "St. Patrick."
Stuart, George Rennie - -	6	"Otago."
Stuart, William Henry - -	5	"Richmond."
Sutherland, James Taylor -	3	"Maggie" and "Glenesk."
Symington, William - -	10	"Northfleet," "Flying Venus," and S.S. "Hong Kong."
*Tandy, Comr. Dashwood G., R.N.	1	H.M.S. "Nassau."
Thomson, F. T., R.N. - -	3	H.M.S. "Challenger."
Tilmouth, Robert J. C. - -	1	"Peeress."
Tizard, Staff-Com. T.H. - -	1	H.M.S. "Challenger."
Townsend, William Henry -	1	"Valentine and Helene."
Trench, Chas. E. Le Poer -	5	"Newcastle."
<i>Tucker, John Worth</i> - -	1	"John Temperley."
Tully, Thomas - -	2	"Baroda."
Vine, William W., Staff Com., R.N.	3	H.M.S. "Orontes."
Vowell, Michael - -	2	"Kelso" and "Undine."
Wadham, Thomas Littleford -	5	"Vere."
Walker, John Burnett - -	1	S.S. "Erik."
Warden, William - -	3	S.S. "Alpha."
Watkins, Thomas - -	1	"Emulation."
Watson, William - -	14	S.S. "Palmyra" and S.S. "Parthia."
Wharton, William J. L., R.N. -	1	H.M.S. "Fawn."
†Wheeler, F. S., R.N. - -	2	H.M.S. "Sylvia."
Wherland, Frederick, R.N.R. -	6	"Galatea."
Wight, Henry Potts - -	5	"Gosforth."
Wilcox, Henry George, R.N.R. -	3	"St. Lawrence."
Williams, James Agnew - -	1	S.S. "Wisconsin."
Wylie, James - -	2	S.S. "Austrian" and S.S. "Sarma- tian."
Young, Sir Allen - -	2	S.S. "Pandora."

In addition the Committee have presented barometers to two gentlemen who have formerly kept registers for the Office, but have now retired from the sea, viz., to Capt. A. D. Wood in 1867, and to Capt. Isaac Gales in 1870. A set of instruments was also presented to Capt. Alfred Fry in 1868.

* Charts not presented.

† Chief Officer.

‡ Navigating Sub-Lieutenant.

Names of officers deceased, in italics.

APPENDIX III.—SHIPS SUPPLIED AND DOCUMENTS RETURNED DURING THE YEAR 1876 AND JANUARY-MARCH 1877.

The number of ships supplied with standard instruments and meteorological registers during the above period was 130. This number does not include ships in the Royal Navy, all of which are supplied with instruments by the Meteorological office, but in which the keeping of a special meteorological register is optional.

The number of meteorological registers and documents received during the same period, and registered in the Office, amounted altogether to 318, of which 134 were returned from ships, 175 from land stations, generally outside the British Isles, and 9 miscellaneous documents.

List of Documents received from LAND STATIONS.

Place.	Observer.	No. of Documents.	Nature of Observations.
Abaco (Bahamas)	- : Lightkeeper	2	"Lighthouse" Register, July 1875 to July 1876.
Angra do Heroismo, Azores	-	15	Three observations daily, October 1875 to December 1876.
Ascension	-	1	Notes on "Rollers," March 1854 to June 1865.
Bermuda	-	15	Anemometrical Records, November 1875 to February 1877.
Do.	Dockyard Authorities	1	"Lighthouse" Register, July to December 1875.
Beyrout (Lee Obsy.)	-	16	Two observations daily, November 1875 to February 1877.
Binfield (Barbados)	Rev. C. V. Van Dyck, D.D., M.D.	2	"Lighthouse" Register, January to December 1876.
Breaksea Island	R. B. Walcott, M.D.	2	"Lighthouse" Register, July 1875 to June 1876.
Campo Maior	Lightkeeper	14	Three observations daily, November 1875 to December 1876.
Cape of Good Hope	-	1	One Observation daily, September 1847 to April 1852. (Thermometer and wind only.)
Cape Pembroke (Falklands)	Lightkeeper	2	"Lighthouse" Register, July 1875 to June 1876.
Cay Sul (Bahamas)	Lightkeeper	2	"Lighthouse" Register, September 1875 to March 1876.
Funchal (Madeira)	-	15	Three observations daily, October 1875 to December 1876.
Gibraltar	-	15	Two observations daily and monthly means, December 1875 to February 1877.

List of Documents—continued.

Place.	Observer.	No. of Documents.	Nature of Observations.
Heligoland	Lightkeeper -	17	Eight observations daily, December 1875 to February 1877.
Kerguelen (Royal Sound)	Officers of Transit of Venus party.	1	Observations from November 1, 1874, to February 21, 1875.
Kouka (Central Africa)	Dr. E. Vogel -	1	Four observations daily, June 30, 1854, to January 19, 1855.
Levuka (Fiji)	Lt.-Col. Pratt, R.E. -	2	Two observations daily, January to November 1876.
Lisbon	- - -	14	Three observations daily, November 1875 to December 1876.
Manitoba	R. Bourne, M.A. -	9	Two observations daily, January to December 1876.
Monte Video	J. W. H. Pim -	1	One observation daily, December 1875 to December 1876.
New York (Central Park)	Professor D. Draper -	1	Observations from S.R. instruments, January 1875 to January 1876.
Point King	Lightkeeper -	2	"Lighthouse" Register, July 1875 to November 1876.
Ponta Delgada (Azores)	- - -	6	Three observations daily, January to December 1876.
Rodriguez	Serjeant J. Youtten -	1	Two observations daily, September 14 to November 30, 1874.
St. Helena	- - -	1	Daily Record of the state of the surf, January 1856 to December 1875.
St. John's (Newfoundland)	J. Delany -	12	Two observations daily, December 1875 to November 1876.
Sokoto (Central Africa)	T. Maguire -	1	Thermometer observations at various places, February 16 to September 9, 1876.
Sombrero	Lightkeeper -	2	"Lighthouse" Register, November 1875 to September 1876.
		175	

List of Documents received from SHIPS.

Captain's Name.	Ship.	Tons.	Owners.	Voyage.	Months of Register.
Almond, T. M.	Decapolis	632	T. Walker, London	Brisbane	7
Balderston, R. J.	Tenasserim	1,419	T. & R. Brocklebank, Liverpool	Calcutta	8
¹ Balderston, R. J.	"	"	"	"	8
Bateman, L. J.	Zetland	305	O. T. Ilearn, London	Rio Janeiro, Aspinwall, and Charleston	5
Becket, A.	Amara	1,299	J. Smith, Glasgow	To Lat. 41° S., Long. 53° W., and from San Francisco.	6
Belcher, Sir E., R.N.	Sulphur	-	H.M.S.	Bay of Magdalena, Mexico	8 days.
Bennett, E. C.	Thessalus	1,782	J. Carmichael, Greenock	Melbourne and Calcutta	9
² Black, P.	"	"	"	Calcutta	6
Blackie, A. H., R.N. R.	Collingwood	1,011	T. Devitt, London	Melbourne	6
Blackstone, T. W.	Melpomene	1,439	H. Fernie, Liverpool	Calcutta	7
Blair, John	Beulah	887	M. Willis, Liverpool	To Hong Kong. From Bangkok	10
Blomfield, H.	Firth of Clyde	824	J. Spencer, Glasgow	Adelaide and San Francisco	6
Bowman, H.	Thomas Stephens	1,507	T. Stephens, London	Sydney	7
Bristow, R. J. W.	Cambray	1,000	R. Brocklebank, Liverpool	Calcutta	5 days.
Brown, A. J.	S.S. Othello	1,941	A. Wilson, Hull	Towards New York	3
"	Maroon	362	Anderson & Co., London	Jamaica	3
"	"	"	"	"	3
Brown, J. J.	Caldbeck	761	W. Nicholson, Liverpool	Towards Valparaiso	3
Buchan, J.	Alliance	300	J. Grierson, Glasgow	Surinam	2
"	Commenwyne	315	"	Demerara and Surinam	2
"	"	"	"	Surinam	2
Caborne, W. F.	Waitara	833	New Zealand Shipping Co.	From New Zealand	3
Campbell, G.	Janet Cowan	1,278	R. Shankland, Greenock	Calcutta and New York	3
Campbell, H.	Rajmahal	1,302	T. & R. Brocklebank, Liverpool	Calcutta	8
Campbell, J. H.	Charles Murdoch	677	R. Miller, London	Cuba and Nova Scotia	4

List of DOCUMENTS, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage.	Months of Register.
Cato, W. R. -	S.S. Hibernia -	3,183	Telegraph Construction and Maintenance Co., London.	Aden via Suez	2
³ Churchill, Lt. O., R.N.	Ariel -	436	H.M.S. -	Off West Coast of Africa	4
"	" -	"	" -	"	4
"	" -	"	" -	"	4
Cruickshank, W. -	Richard Wright -	1,353	J. Nevius, St. John's, N.B.	From West Coast of Africa To Aden	2
Denis, W. C. -	Royal Diadem -	475	C. Phillips, Haverfordwest	Mauritius, New Zealand, and N. S. Wales.	4
Deveraux, Commr. W., R.N.	Snake -	-	H.M.S. -	In Mediterranean	10
Dobson, C. M. -	S.S. Beta -	1,014	Smith, Hill, & Co. Hull	Port Said, &c.	12
Downie, J. -	Pannure -	1,505	B. Bruce, Dundee	Calcutta	4
Eaton, J. D. -	SS. Strathclyde -	1,951	Burrell & McLaren, Glasgow	" via Suez	7
Ellery, W. -	Bowfell -	1,002	T. & R. Brocklebank, Liverpool	Calcutta	3
⁴ Fairfax, Henry, R.N.	Volage -	3,078	H.M.S. -	Cape of Good Hope to Kerguelen	6
Faithfull, H. -	Haddon Hall -	1,416	L. Young, London	Otago, Sydney, and San Francisco	1
⁵ Franklin, E. B. H. -	Conway -	-	School Frigate	Off Liverpool	11
Freeman, T. W. -	SS. Wisconsin -	2,386	Liverpool and Great Western Shipping Co., Liverpool.	New York, five voyages	4
"	SS. Nevada -	"	"	" two voyages	4
"	Enone -	2,020	"	"	1½
Gaye, G. -	Margaret Wilkie -	1,437	W. Battersby, Liverpool	Melbourne	1
Gibbs, N. N. -	Melpomene -	348	H. Watt, Liverpool	Mauritius	6
⁶ Gillmore, J. J. -	S.S. City of Oxford -	1,439	H. Fernie, Liverpool	Melbourne and Rangoon	6
Gordon, J. -	"	1,497	G. Smith, Glasgow	Calcutta via Suez, two voyages	8
"	"	"	"	"	7
"	"	"	"	"	3

LIST OF DOCUMENTS, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage.	Months of Register.
Gray, D.	S.S. Eclipse	246	D. Gray, Peterhead	Greenland	5
Gray, F. J., R.N.	Nassau	877	H.M.S.	Off East Coast of Africa	4
Gray, J.	S.S. Hope	452	R. Kidd, Peterhead	Greenland	5
Gray, J. M.	Speranza	455	W. Nicholson, Sunderland	Valparaiso and Pisagua	6
"	Gareloch	1,177	P. Rintoul, Glasgow	Monte Video, Valparaiso, Iquique	7
Greenwood, W.	"	"	"	Otago, San Francisco, &c.	10
"	"	"	"	San Francisco	18
Heggen, E. C. V.	Rozelle	1,286	R. Cuthbert, Greenock	Calcutta and New York	8
Hilliard, A. J.	S.S. Dacia	1,170	India Rubber, &c. Co., London	Valparaiso	6
Jackson, J. N.	Knowsley Hall	1,770	San Shipping Co., Liverpool	Calcutta and New York	8
"	"	"	"	Calcutta	6
Johnson, C., R.N.R.	St. Lawrence	1,034	J. Lawrence, London	Kurrachee and Madras	7
Jones, G. H.	S.S. Craigforth	1,100	C. Williamson, Leith	Smyrna	1
"	S.S. Quang Se	2,788	J. McGregor, London	Hong Kong, via Suez, Japan, San Francisco, and New York.	7
"	"	"	"	West Coast of Greenland	3
8 Jones, L. F., R.N.	Valorous	2,300	H.M.S.	"	8
Kempe, E. A.	Golden Gate	899	J. Lyne, Liverpool	San Francisco	2
Lamont, D.	Lake Michigan	880	Canada Shipping Co., Glasgow	New Orleans	8
Latham, F. W.	Sumatra	774	T. & R. Brocklebank, Liverpool	Calcutta	3
Longley, H.	S.S. Yorkshire	1,771	W. Tindall, London	Calcutta, via Suez	3
"	"	"	"	"	4
Lunham, R. D.	S.S. Sumatra	774	T. & R. Brocklebank, Liverpool	China and Japan, via Suez	8
McBride, A.	Frank Flint	1,402	P. McKellar, Greenock	Melbourne and Calcutta	8

LIST OF DOCUMENTS, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage.	Months of Register.
Gray, D.	S.S. Eclipse	296	D. Gray, Peterhead	Greenland	5
Gray, F. J., R.N.	Nassau	877	H.M.S.	Off East Coast of Africa	4
Gray, J.	S.S. Hope	452	R. Kidd, Peterhead	Greenland	5
Gray, J. M.	Speranza	455	W. Nicholson, Sunderland	Valparaiso and Pisagua	6
"	"	"	"	Monte Video, Valparaiso, Iquique	7
Greenwood, W.	Gareloch	1,177	P. Rintoul, Glasgow	Otago, San Francisco, &c.	10
"	"	"	"	San Francisco	18
Heggum, E. C. V.	Rozelle	1,286	R. Cuthbert, Greenock	Calcutta and New York	8
Hilliard, A. J.	S.S. Dacia	1,470	India Rubber, &c. Co., London	Valparaiso	6
Jackson, J. N.	Knowsley Hall	1,770	Sun Shipping Co., Liverpool	Calcutta and New York	8
"	"	"	"	Calcutta	6
Johnson, C., R.N.R.	St. Lawrence	1,034	J. Lawrence, London	Kurrachee and Madras	7
Jones, G. H.	S.S. Craigforth	1,109	C. Williamson, Leith	Smyrna	1
"	S.S. Quang Se	2,788	J. McGregor, London	Hong Kong, via Suez, Japan, San Francisco, and New York.	7
s Jones, L. F., R.N.	Valorous	2,300	H.M.S.	West Coast of Greenland	3
Kempe, E. A.	Golden Gate	899	J. Lyne, Liverpool	San Francisco	8
Lamont, D.	Lake Michigan	880	Canada Shipping Co., Glasgow	New Orleans	2
Latham, F. W.	Sumatra	774	T. & R. Brocklebank, Liverpool	Calcutta	8
Longley, H.	S.S. Yorkshire	1,771	W. Tindall, London	Calcutta, via Suez	3
"	"	"	"	China and Japan, via Suez	3
Lunham, R. D.	S.S. Sumatra	774	T. & R. Brocklebank, Liverpool	"	4
McBride, A.	Frank Flint	1,402	P. McKellar, Greenock	Melbourne and Calcutta	8

List of Documents, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage.	Months of Register.
McKay, J. R.	S.S. Australia -	1,384	J. Henderson, Glasgow -	New York -	1
"	S.S. Alexandria -	1,056	" -	To New York, two voyages -	1
⁹ McKenzie, A.	Candahar -	1,418	R. Brocklebank, Liverpool -	Calcutta -	6
¹⁰ Manning, H.	S.S. Seine -	3,493	Telegraph Construction and Maintenance Co., London. -	Bombay, via Suez -	3
Maples, C.	Riversdale -	1,430	J. McIntyre, Liverpool -	To Melbourne -	3
Marshall, D.	Ardgowan -	1,283	G. Adam, Greenock -	Calcutta -	7
Martyn, J. A.	S.S. Samaria -	1,695	" -	Boston -	21 days.
"	S.S. Cuba -	845	" -	New York, two voyages -	1
"	S.S. Siberia -	1,698	C. MacIver, Liverpool -	Boston -	24 days.
"	S.S. Java -	1,761	" -	New York, two voyages -	1
"	" -	"	" -	" -	1
Moulton, J. E.	S.S. Batavia -	2,553	J. Burns, Glasgow -	Boston, four voyages -	3
Murdoch, H.	Denbighshire -	1,367	C. Peirce, Carnarvon -	San Francisco -	8
Murray, A.	Perseverance -	164	D. Baxter, Aberdeen -	Cumberland Gulf -	12
⁷ Napier, R. H., R.N.	Nassau -	877	H.M.S. -	Cape of Good Hope to Singapore	4
"	" -	"	" -	In China Seas and Malacca Straits	4
North, W. G.	S.S. West Riding -	576	The Pope and Pearson Co., Hull -	Between Hull and Calais	4
"	" -	"	" -	In English Channel -	2
Owen, R.	Victoria Cross -	669	W. Hope, Glasgow -	Valparaiso -	8
Pashy, E. V.	Ceres -	909	H. Briggs, Hull -	Odessa -	2
Pearson, C. W.	S.S. Strathleven -	1,588	W. Burrell, Glasgow -	Bombay, via Suez -	2
Peebles, A.	Margaret Galbraith -	841	W. Savill, London -	Otago -	6
¹¹ Potts, T. C.	Majestic -	1,884	T. & R. Brocklebank, Liverpool -	Calcutta -	5
Prehn, Carl C.	Eleanor -	428	J. Holdsworth, London -	Colombo -	9
Prehn, Conrad	Ambassador -	692	W. Lund, London -	Shanghai and New York -	8

LIST OF DOCUMENTS, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage.	Months of Register.
Price, J. J. -	Sorata -	332	C. C. Dawson, London -	Jamaica -	3
" -	" -	"	" -	" -	3
" -	" -	"	" -	" -	3
¹² Putt, F. -	Eaton Hall -	1,779	Suu Shipping Co., Liverpool -	Sydney and Bassein -	8
Raeburn, J., R.N.R. -	Airlie -	1,500	D. Bruce, Dundee -	Melbourne, Madras, and Calcutta -	8
Raymond, C. T. -	Cicero -	1,115	G. Clover, Liverpool -	Lyttleton, N.Z., and Phillipine Is. -	10
Renaut C. H. -	Crusader -	1,058	Savill and Temple, London -	Lyttleton, N.Z. -	6
¹³ Rose, H. -	Waikato -	1,021	New Zealand Shipping Co. -	To Canterbury, N.Z. -	3
Ruthven, J. F. -	Whittington -	970	Lancashire Shipowners Co., Lancaster. -	Calcutta and New York -	8
¹⁴ St. John, H. C., R.N. -	Sylvia -	877	H.M.S. -	Off Coast of Japan -	12
Scott, W. -	Alliance -	300	J. Grierson, Glasgow -	Demerara -	3
Shaw, G. -	S.S. Beta -	677	W. Cunard, London -	Between Halifax, Bermuda, and St. Thomas, four voyages. -	2
" -	" -	"	" -	" -	2
" -	" -	"	" -	" -	4
Simpson, A. -	Traveller -	195	A. Simpson, Peterhead -	Greenland, two voyages -	6
¹⁵ Smith, J. H., R.N.R. -	Worcester -	-	Training ship -	Off Greenhithe -	4
Smith W. C. -	Kingdom of Sweden -	788	A. Gosman, London -	Negapatam -	6
" -	" -	"	Allan, Bros., Glasgow -	Otago, Astoria and towards home -	9
Smith, W. H., R.N.R. -	S.S. Scandinavian -	1,811	" -	Quebec, three voyages; and Portland -	3
" -	S.S. Circassian -	2,356	" -	Portland, one voyage; Quebec -	3
" -	S.S. Peruvian -	1,845	" -	Quebec -	20 days.
" -	" -	"	" -	two voyages; Portland, three voyages. -	3
Spratt, W. -	Summer Cloud -	698	South Lancashire Ship Owners Co., Liverpool. -	Sydney, Valparaiso, and Iquique -	11

LIST OF DOCUMENTS, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage.	Months of Register.
Stuart, G. R.	Oamaru	1,306	Albion Shipping Co., Glasgow	Otago	6
Stuart, W. H.	Richmond	183	Board of Trade, London	At Bahamas	16
Sutherland, J. T.	Glencesk	191	J. Warrack, Leith	Port Natal and Zambesi River	8
Symington, W.	S.S. Hankow	2,331	E. H. Watts, London	Hong Kong, via Suez	5
Tainock, R. S.	Pomona	1,200	A. Allen, Glasgow	Lyttleton, N.Z., to Astoria and home	6
Thompson, M.	Carn Tual	526	J. Thompson, Liverpool	Sandwich Islands	9
Thomson, F. T., R.N.	Challenger	2,305	H.M.S.	Hongkong, Manila, Yokohama, Valparaiso, &c.	12
"	"	"	"	From Valparaiso to Falkland Islands, Monte Video, and home.	6
Trench, C. E. Le Pogre	Newcastle	1,137	H. Green, Blackwall	Bahia and Melbourne	6
Turner, E. W.	Mertola	392	F. Barry, London	River Guardiana	3
"	"	"	"	two voyages	3
Wadham, T. L.	The Murray	903	Anderson & Co., London	Adelaide	6
Warden, W.	S.S. Alpha	514	W. Cunard, Halifax	Between Halifax, Bermuda, and St. Thomas.	1
Waring, W.	S.S. Atalanta	1,743	H. Hughes, Liverpool	Bombay, via Suez	1
Watson, G. W., E.N.	Victor Emmanuel	5,157	H.M.S.	Hong Kong	3
Watson, W.	S.S. Parthia	2,035	C. MacIver, Liverpool	Boston, two voyages; New York, two voyages.	3
Watts, J. S., Staff Commr. R.N.	S.S. Algeria	2,193	H.M.S.	New York, five voyages.	3
	Bellerophon	7,551	"	West India Station	35

List of Documents, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage.	Months of Register.
15 Wharton, W. J. L., R.N.	Fawn -	-	H.M.S. -	To Suez, &c. -	3
Wiggins, J. -	S.S. Diana -	-	-	In Kara Sea -	2
Wight, H. P. -	Dunalistair -	-	W. Grondacc, Dundee -	Melbourne and Calcutta -	9
Wilcox, H. G., R.N.R.	S.S. Glenfinlas -	-	J. McGregor, London -	China, Calcutta, and Madras, via Suez -	3
16 Young, Sir Allen -	S.S. Pandora -	115	Sir A. Young, London -	From Cape Farewell to Baffins Bay and home. -	3
"	" -	"	" -	To and from Smith Sound -	5

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

- 1 Assisted by Messrs. Graham, Schank, and Wilson.
2 Kept by F. W. Allen, Chief Officer.
3 Kept by C. E. Pritchard, Navigating Sub-Lieutenant.
4 Kept by Rev. S. J. Perry, S.J., F.R.S.
5 Kept by the Boys.
6 Kept by A. H. Blackie, R.N.R., Chief Officer.
7 Kept by G. N. A. Pollard, Lieutenant.
8 Kept by G. A. Broad, Navigating Lieutenant.
9 Kept by T. Hadzson Tommswood.
10 Kept by A. Kellett, 2nd Officer.

- 11 Assisted by S. de B. Lockyer, 3rd Officer.
12 Kept by W. Burnet, Chief Mate.
13 Kept by W. F. Caborne, Chief Officer.
14 Kept by F. S. Wheeler, Navigating Sub-Lieutenant.
15 Kept by the Boys.
16 Kept by T. H. Tizard, Staff Commander, and A. Havergal, Navigating Sub-Lieutenant.
17 Kept by Jesse Dixon, Navigating Sub-Lieutenant.
18 Kept by G. C. Frederick, Sub-Lieutenant.
19 Kept by A. C. Horner, M.R.C.S.

LIST OF DOCUMENTS, &c.—continued.

Captain's Name.	Ship.	Tons.	Owners.	Voyage.	Months of Register.
18 Wharton, W. J. L., R.N.	Fawn -	-	H.M.S. -	To Suez, &c. -	3
Wiggins, J. -	S.S. Diana -	1,045	-	In Kara Sea -	2
Wight, H. P. -	Dunalistair -	1,086	W. Crondace, Dundee	Melbourne and Calcutta -	9
Wilcox, H. G., R.N.R.	S.S. Glenfulas -	1,366	J. McGregor, London	China, Calcutta, and Madras, via Suez -	3
19 Young, Sir Allen -	S.S. Pandora -	115	Sir A. Young, London	From Cape Farewell to Baffins Bay and home.	3
" -	" -	"	"	To and from Smith Sound -	5

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

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- ³ Kept by C. E. Pritchard, Navigating Sub-Lieutenant.
- ⁴ Kept by Rev. S. J. Perry, S.J., P.R.S.
- ⁵ Kept by the Boys.
- ⁶ Kept by A. H. Blackie, R.N.R., Chief Officer.
- ⁷ Kept by G. N. A. Pollard, Lieutenant.
- ⁸ Kept by G. A. Broad, Navigating Lieutenant.
- ⁹ Kept by T. Hodgeson Tenniswood.
- ¹⁰ Kept by A. Kellert, 2nd Officer.
- ¹¹ Assisted by S. de B. Lockyer, 3rd Officer.
- ¹² Kept by W. Burnet, Chief Mate.
- ¹³ Kept by W. P. Cabornue, Chief Officer.
- ¹⁴ Kept by P. S. Wheeler, Navigating Sub-Lieutenant.
- ¹⁵ Kept by the Boys.
- ¹⁶ Kept by T. H. Fizard, Staff Commander, and A. Havergal, Navigating Sub-Lieutenant.
- ¹⁷ Kept by Jesse Dixon, Navigating Sub-Lieutenant.
- ¹⁸ Kept by G. C. Frederick, Sub-Lieutenant.
- ¹⁹ Kept by A. C. Horner, M.R.C.S.

MISCELLANEOUS DOCUMENTS.

Observations taken on board five French ships off the West Coast of Africa, and also at St. Louis (Senegal) during the month of August 1873.

Extracts from logs of seven German ships relating to the gale in the Atlantic in August 1873.

Account of the typhoon which occurred on May 10th, 1876, off the coast of Formosa.

Meteorological register attached to the Transit of Venus Expedition to the Sandwich Isles, 16th November 1874 to 21st January 1875, kept by H. G. Barnacle, F.R.A.S.

Account of the cyclones which occurred off the island of St. Thomas, West Indies, from 9-17th September 1875, by F. H. Jahneke.

Charts, &c. relating to cyclone in China Seas in September 1870, by Captain A. Schück.

Extracts from Chinese newspapers relating to typhoons of July to September 1874, and May, July, and August 1875.

Extracts from ships logs relating to typhoons in the China Seas during May 1876.

Observations made at various places in Northern Africa, from June to September 1853, by Dr. E. Vogel.

APPENDIX IV.

CONTENTS of the PRINCIPAL PUBLICATIONS issued up to
May 31st, 1877.*Continued from Report for 1875.*Official
No.

25. QUARTERLY WEATHER REPORT for 1874. 4to.
Parts I.-III., January-September 1874. (Part IV. in the press.)
Containing the continuous traces of the self-recording instruments at the seven British and Irish Observatories, with a chronicle of the weather. Also tables showing monthly rainfall for the period at the stations in connexion with the Office.

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. 1876. Folio and Quarto.

A summary of this paper has appeared (Non-Official No. 10) under the title "Physical Geography of the Atlantic," being a paper read by Captain H. Toynbee, Marine Superintendent, Meteorological Office, before the British Association at Bristol in August 1875, and it shows the best routes across the Equator in each month of the year, with discussions of the pressure, temperature, winds, &c. for the district included in the above limits, with charts for each month.

The explanatory text occupies 586 pp. 4to., and the Appendices contain:—

A. Discussion of Meteorological Observations taken at Ascension by the late Lieutenant Rokeby, R.M., from September 1863 to August 1865, with diurnal and annual range.

B. Rules for observing swells and "rollers," by Professor G. G. Stokes, Sec. R.S.

28. CONTRIBUTIONS to the METEOROLOGY of JAPAN. 1876. 4to., pp. 24, with Diagrams and Charts.

Containing the results of Observations made at the Lighthouses on the S.E. and S.W. coasts of Japan and in the Inland Sea, for the years 1871-74, collected and collated by Staff-Commander T. H. Tizard, H.M.S. "Challenger." An Appendix also contains the results of all Observations made in the seas of China and Japan, which existed in the Office and had been collected by directions of Admiral FitzRoy.

30. QUARTERLY WEATHER REPORT for 1875. (In the press.)

The Appendices to this Report have already been issued, and they contain detailed observations, taken twice a day, at 10 stations, and monthly summaries for 26 stations on the International Form proposed by the Permanent Committee of the Vienna Congress.

APPENDIX V.

INSTRUMENTS supplied, &c. to the Royal Navy.

Per Account.	Baro- meters.	Ane- roids.	Thermometers.				Hydro- meters.
			Ordinary.	Max.	Min.	Screens.	
January 1st, 1876, afloat	- 191	386	1,040	43	78	44	152
Issued since -	- 65	105	303	37	40	24	42
Returned since -	- 256	491	1,343	80	118	68	194
	- 72	106	384	59	54	11	63
April 1st, 1877, afloat	- 184	385	959	21	64	57	131

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

January 1st, 1876, in use	- 48	86	73	17	14	5	17
Issued since -	- 4	4	5	7	13	1	1
Returned since -	- 52	90	78	24	27	6	18
	- 4	6	13	8	16	2	4
April 1st, 1876, in use -	- 48	84	65	16	11	4	14

DISPOSITION of ADMIRALTY INSTRUMENTS on April 1st, 1877.

Afloat in Royal Navy -	- 184	385	959	21	64	57	131
In use at stations -	- 48	84	65	16	11	4	14
In store at M.O. -	- 117	52	214	46	27	2	83
" Chatham -	- 6	7	30	5	5	8	16
" Sheerness -	- 10	11	27	7	10	11	23
" Portsmouth -	- 4	4	28	7	7	8	18
" Devonport -	- 7	10	67	12	12	8	16
" Queenstown -	- 1	3	4	1	1	—	8
" Gibraltar -	- 2	3	12	—	—	—	4
" Malta -	- 5	11	17	2	—	4	24
" Halifax -	- 1	1	28	4	6	—	13
" Bermuda -	- 4	10	9	2	2	—	16
" Jamaica -	- 2	4	16	2	3	—	8
" Cape of Good Hope -	- 5	4	15	—	—	—	21
" Trincomalee -	- 1	1	3	—	—	—	—
" Hong Kong -	- 13	19	51	5	5	1	21
" Coquimbo -	- 1	—	1	1	—	—	23
" Sydney -	- 4	7	24	2	2	—	—
" Esquimalt -	- 4	5	24	—	—	—	—
Under repair -	- 6	1	1	—	—	—	—
At Kew Observatory -	- —	1	—	—	—	—	—
Total -	- 425	623	1,595	133	155	103	439
Destroyed and lost since January 1st 1876.	- 2	6	211	16	21	3	16
On way to Hong Kong -	- 8	6	24	3	3	—	—
" Trincomalee -	- 4	6	24	—	—	—	—
" from Malta -	- 1	1	3	—	1	—	4
" Cape of Good Hope.	- 2	—	9	—	—	—	—

APPENDIX VI.

INSTRUMENTS, &c. supplied to Mercantile Marine.

Per Account.	Baro- meters.	Com- passes.	Thermometers.				Hydro- meters.
			Ordinary.	Max.	Min.	Screens.	
January 1st, 1876, afloat	- 93	1	555	—	—	89	370
Issued since	- 118	—	708	—	6	107	418
	211	1	1,263	—	6	196	788
Returned since	- 100	—	596	—	5	91	367
April 1st, 1877, afloat	- 111	1	667	—	1	105	421

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

January 1st, 1876, in use	-	98	3	246	46	49	52	50
Issued since	-	13	1	42	11	12	6	10
		111	4	288	57	61	58	60
Returned since	-	22	1	54	10	11	18	18
April 1st, 1877, in use	-	89	3	234	47	50	40	42

DISPOSITION of Board of Trade Instruments, on April 1st, 1877.

In merchant ships	-	111	1	667	—	1	105	421
In use at stations	-	89	3	234	47	50	40	42
In store at M.O.	-	23	45	73	4	12	20	89
At Liverpool agency	-	9	8	42	—	—	5	30
„ Aberdeen	-	7	—	40	—	—	6	31
„ Glasgow	-	4	—	5	—	—	1	2
„ Dundee	-	2	—	16	—	—	3	11
„ Hull	-	4	—	24	—	—	2	16
Under repair	-	7	—	2	—	—	—	—
At Kew	-	—	—	—	1	—	—	—
Total, April 1st, 1877	-	256	57	1,103	52	63	182	642
Lost, &c. since Jan. 1st, 1876	-	4	—	128	2	2	24	55

APPENDIX VII.

LIST of STATIONS reporting Meteorological Observations by Telegraph to the Office, with the Observers.

Sumburgh Head	-	Rev. W. Brand	-	-	-	Minister of Dunrossness.
Stornoway	-	J. Smith	-	-	-	Gardener.
*Thurso	-	J. Trotter	-	-	-	—
Wick	-	J. Sinclair	-	-	-	Watchmaker.
Nairn	-	W. D. Penny	-	-	-	Schoolmaster.
Aberdeen	-	J. McCormack	-	-	-	Telegraph Clerk.
Leith	-	J. Turnbull	-	-	-	Do.
Shields	-	J. Irvine	-	-	-	Do.
*Scarborough	-	F. Shaw, F.M.S.	-	-	-	Do.
York	-	C. Wakefield	-	-	-	Curator of Museum.
Nottingham	-	E. J. Lowe, F.R.S.	-	-	-	Highfield Ho. Observatory.
Ardrossan	-	W. McNeil	-	-	-	Telegraph Clerk.
*Greencastle(Moville)	-	J. Lowry	-	-	-	Schoolmaster.
Donaghadee	-	J. MacGowan, jr.	-	-	-	Telegraph Clerk.
Kingstown	-	G. Mitchell	-	-	-	Keeper of Sailors' Home.
*Holyhead	-	J. Tilston	-	-	-	Do.
Liverpool	-	J. Hartnup, junr.	-	-	-	Bidston Observatory.
*Valencia	-	† J. E. Cullum	-	-	-	Superintendent of the Observatory.
Roche's Point	-	W. Kennedy	-	-	-	Telegraph Clerk.
Pembroke	-	J. C. Walker	-	-	-	Do.
Portishead	-	W. Sandford	-	-	-	Station master.
*Scilly	-	W. Thomas	-	-	-	Signalman.
Plymouth	-	J. Merrifield, LL.D., F.R.A.S.	-	-	-	Teacher of Navigation.
Hurst Castle	-	A. James	-	-	-	Telegraph Clerk.
Dover	-	J. Costello	-	-	-	Telegraph Clerk.
*London	-	F. Gaster, F.M.S.	-	-	-	—
Oxford	-	J. Lucas	-	-	-	Radcliffe Observatory.
Cambridge	-	H. Todd	-	-	-	Observatory.
Yarmouth	-	G. T. Watson	-	-	-	Secretary, Sailors' Home.

† E. O'Sullivan, the former Observer, resigned in June 1876.

Summary :

England and Wales	-	-	-	16
Scotland	-	-	-	8
Ireland	-	-	-	5

Those marked with an asterisk, report twice daily. The office also receives daily reports from 22 places on the Continent.

APPENDIX VIII.

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

Newspapers :

Daily News.
Echo.
Express.
Globe.
Hour.
Irish Times.
Lloyd's Shipping List.
Mark Lane Express.
Morning Advertiser.
Observer.
Pall Mall Gazette.
Shipping and Mercantile Gazette (with special daily chart).
Standard (Morning and Evening).
Times (1st and 2nd editions).*

For Exhibition at following Seaports :

Banff.	Hull.
Barrow-in-Furness.	Kingstown.
Belfast.	Lancaster.
Blackpool.	Margate.
Boscastle.	Nairn.
Bournemouth.	Newquay.
Broughty Ferry.	Penarth.
Buckie.	Plymouth.
Budehaven.	„ G. W. Docks.
Carnarvon.	Port Dinorwic.
Cork.	Porthcawl.
Cowes.	Portland.
Cromer.	Queenstown.
Cullercoats.	St. Ann's Head.
Deptford Yard.	Scarboro'.
Dover.	Silloth.
Exeter (2 copies).	Teignmouth.
Falmouth.	Thurso.
Great Grimsby (2 copies).	Ventnor.
Hastings.	Weston-super-Mare.
Hayle.	Wick.
Holyhead.	Yarmouth.

In exchange for Observations, &c. :

Aird, G. H., Seaham.
Barnstaple Meteorological Committee.
Cambridge Observatory.

* The new arrangements with the "Times," in virtue of which special charts for 6 p.m. are supplied to that paper, commenced January 1st, 1876.

In exchange for Observations, &c.—cont. :

- Clouston, Rev. C., Sandwick, Orkney.
 *Conroy, J., Rosenallis.
 Cooper, Col., F.R.A.S., Markree, nr. Sligo.
 Cooper, W. F., F.M.S., Sheffield.
 Crossley, L. J., Halifax.
 Durham University Observatory.
 Fernley Observatory, Southport.
 Greenwich Observatory.
 Griffith, Rev. C., F.M.S., Strathfield Turgiss.
 Hoskins, Dr. S. E., F.R.S., Guernsey.
 Indian C.E. College, Staines.
 *Jersey, Submarine Telegraph Company.
 Kingston, G. T., M.A., Toronto.
 Liverpool Observatory.
 Lowe, E. J., F.R.S., Nottingham.
 McCormack, J., Aberdeen.
 Mackay, Rev. W. P., D.D., Hull.
 Miller, S. H., F.R.A.S., Lowestoft.
 Moore, Dr. J. W., Dublin.
 Moyle, M. P., F.R.C.S., Helston.
 Mullins, Rev. J. G., Uppingham.
 Murray, A. E., F.M.S., Hastings.
 Northumberland, Duke of, Alnwick.
 Quinton, J., Jr., Norwich.
 Radcliffe Observatory, Oxford.
 Richards, W. H., Penzance.
 Robinson, Rev. W. P., Glenalmond.
 Rosse, Earl of, F.R.S., Parsonstown.
 Royal Horticultural Society.
 Rugby Natural History Society.
 Stewart, Dr. Balfour, F.R.S., Manchester.
 Stow, Rev. F. W., F.M.S., Aysgarth, Yorkshire.
 *Sutherland, A., Carrickfergus.
 *Style, Rev. G. J., Giggleswick, near Settle.
 Taylor, Rev. C. J., Folkestone.
 Walker, J. C., St. Ann's Head.
 Whitty, Rev. S., Oscott.
 Yorkshire Philosophical Society.

Government Offices, Societies, &c. :

- The Queen.
 The Principal Government Offices : 50 copies.
 "Achilles," H.M.S., Portland.
 Association of Underwriters, Liverpool.
 Do. Lloyd's.
 "Britannia," H.M.S., Dartmouth.
 British Museum.
 Calcutta, Meteorological Committee.
 Devonport Dockyard, 3 copies.
 " Commander-in-Chief.
 Greenwich, R.N. College.
 Ireland, Lord Lieutenant.
 " Geological Survey.
 " Royal College of Science.
 Meteorological Society, London.

Government Offices, Societies, &c.—cont. :

“ Nankin,” H.M.S., Milford Haven.
 Patent Office.
 Pembroke, Captain Superintendent.
 Portsmouth, Commander-in-Chief.
 Reuter's Telegram Company.
 Royal Artillery Institution.
 Royal Military Academy.
 Royal Society.
 Royal United Service Institution.
 Scottish Meteorological Society.
 Sheerness Dockyard.
 Staff College.

Foreign Places :

Algiers, Meteorological Service.
 Brussels, Royal Observatory.
 Christiania, Meteorological Institute.
 Constantinople, Imperial Meteorological Observatory.
 Copenhagen, Meteorological Institute.
 Emden, Dr. Prestel.
 Florence, Meteorological Office.
 Hamburg, German Ocean Observatory.
 Lisbon, Observatory.
 Madrid, Royal Observatory.
 Nice, Société de Médecine.
 Paris, Meteorological Observatory, Montsouris.
 „ Meteorological Society.
 „ Ministry of Marine.
 „ Observatory.
 „ M. Harold Tarry.
 Rome, Ministry of Agriculture.
 St. Petersburg, Central Physical Observatory.
 Stockholm, Meteorological Institute.
 Upsala, University Observatory.
 Utrecht, Royal Meteorological Institute.
 Vienna, Imperial Meteorological Institute.
 Washington, Smithsonian Institution.
 „ United States Naval Observatory.
 „ Chief Signal Officer, War Office.

APPENDIX IX.

TELEGRAPHIC WEATHER INTELLIGENCE.

The following stations, having been approved by the Board of Trade, are supplied with telegraphic information of storms free of expense, and “ drum ” and “ cone ” signal shapes 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, 80 in England and Wales, 30 in Scotland, 13 in Ireland, 3 in the Isle of Man, and 3 in the Channel Islands.

NORTH.	WEST.	SOUTH.	EAST.
SCOTLAND. EAST COAST. Kirkwall. Inverness. Nairn. Burghead. Lossiemouth. Buckie. Portsoy. Banff. Fraserburgh. Peterhead. Aberdeen. Stonehaven. Montrose. Broughty Ferry. St. Andrews. Dundee. Anstruther. Burntisland. Alloa. Grangemouth. Bo'ness. Granton. Leith. Fisherrow. Dunbar. Eyemouth.	ENGLAND, N.W. Silloth. Maryport. Workington. Whitehaven. Ramsey. Douglas. Castletown. Barrow. Morecambe. Fleetwood. Blackpool. Lytham. Runcorn. Southport. Liverpool. Hawarden. Mostyn. ENGLAND, W. Bangor. Port Penrhyn. Holyhead. Carnarvon. Port Dinorwic. Aberystwith. Milford. Pembrey. Llanelly. Briton Ferry. Porthcawl. Penarth. Cardiff. Newport. Weston-super-Mare. Burnham. IRELAND, E. Belfast. Howth. Kingstown. IRELAND, S. and W. New Ross. Dunmore, East. Dungarvan. Youghal. Queenstown. Passage. Cork. Tralee. Limerick. Galway.	ENGLAND, S.W. Ilfracombe. Barnstaple. Port Isaac. Boscastle. Newquay. Hayle. Pendennis. Scilly. Penzance. Falmouth. Plymouth, four stations. Teignmouth. Exeter. Exmouth. ENGLAND, S. Guernsey. St. Helier, Jersey. Gorey, Jersey. Weymouth. Poole. Cowes. Ventnor. Portsmouth. Littlehampton. Brighton. Newhaven. Hastings. Rye. Dover. Margate.	ENGLAND, E. Berwick-on-Tweed. Tynemouth. S. Shields. Sunderland. Middlesborough. Redcar. Whithy. Filey. Withernsea. Hull. Goole. Grimsby. Boston. Sutton Bridge. Lynn. Cromer. ENGLAND, S.E. Yarmouth. Southwold. Ipswich. Harwich. Chatham. Sheerness. Faversham.

Circular No. 717.

TELEGRAPHIC WEATHER INTELLIGENCE.

Board of Trade, February 14th, 1874.

THE Board of Trade have been informed by the Meteorological Committee that they are now prepared to re-introduce the use of Admiral FitzRoy's signals (cones and drum) with slightly modified significations, and that the change will take effect on and after 15th March 1874.

The signals to be used will 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.
- 3°. Drum, *with cone*, to indicate the probable approach of a *very heavy gale* from the direction indicated by the cone.

The drum will not be used without the cone.

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, as pointed out in the explanatory pamphlet* sent herewith, copies of which are supplied for gratuitous distribution.

It will be seen from the pamphlet in question that 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 will supply 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., as directed by the Circular No. 278, dated 30th November 1867.

THOMAS GRAY.

* The "explanatory pamphlet" referred to is a circular entitled "Telegraphic Weather Intelligence," printed in large type on four pages, so as to be posted up on a board.

APPENDIX X.

LIST of STATIONS from which DAILY SYNCHRONOUS OBSERVATIONS
(at Oh. 43m. p.m. G. M. T.) have been received.

Stations.	Observers.	Remarks.
ENGLAND AND WALES.		
Bradford - - -	J. McLandsborough	—
Cambridge - - -	H. Todd.	—
Cardington - - -	J. McLaren.	—
Carlisle - - -	J. Beil, for J. Cartmell.	Ceased Sept. 1876.
Chatham, School of Military Engineering.	J. Fellowes, Capt., R.E. -	—
Dartmoor - - -	R. E. Power, L.R.C.P.	—
Dover - - -	J. Costello.	—
Eccles - - -	T. Mackereth.	—
Falmouth Observatory -	The Staff.	—
Greenwich Observatory -	The Staff, for Sir G.B.Airy.	—
Guernsey - - -	Dr. Hoskins, F.R.S.	—
Halifax, Moorside - - -	L. J. Crossley - - -	Ceased June 1876.
Helston - - -	Dr. Moyle.	—
Holyhead - - -	J. Tilston.	—
Jersey (St. Helier's) -	A. P. Amy.	—
Kew Observatory - - -	The Staff.	—
Leicester (Museum) - -	W. J. Harrison, F.G.S.	—
Liverpool Observatory (Bidston).	J. Hartnup, Jun.	—
Nottingham - - -	E. J. Lowe, F.R.S.	—
Oscott (St. Mary's Col.)	Rev. S. Whitty.	—
Oxford, Radcliffe Obs. -	J. Lucas, for Rev. R. Main, F.R.S.	—
Plymouth - - -	J. Merrifield, LL.D., F.R.A.S.	—
Scarborough - - -	F. Shaw, F.M.S. - - -	Ceased 15th August 1876.
Sheffield - - -	W. F. Cooper, F.M.S.	—
Silloth - - -	Rev. F. Redford, M.A., F.R.S.E.	—
St. Ann's Head (Milford Haven).	J. C. Walker.	—
Stonyhurst Observatory -	The Staff.	—
Strathfield Turgiss - -	Rev. C. H. Griffith, M.A.	—
Truro (Royal Institution)	W. Newcombe.	—
Yarmouth (Norfolk) -	G. T. Watson.	—
SCOTLAND.		
Aberdeen Observatory -	The Staff.	—
Ardrossan - - -	W. McNeil.	—
Glasgow Observatory -	The Staff.	—
Nairn - - -	W. D. Penny.	—
Orkneys, Sandwick - -	Rev. C. Clouston, LL.D.	—
Sornoway - - -	J. Smith.	—
Thurso - - -	J. Trotter.	—
IRELAND.		
Armagh Observatory -	S. Call for Dr. Robinson.	—
Donaghadee - - -	J. McGowan.	—
Galway, Queen's College	B. G. Clare, for Professor Curtis.	—
Kingstown - - -	G. Mitchell.	—
Parsonstown - - -	J. Dreyer for Lord Rosse.	—
Roche's Point - - -	W. Kennedy.	—
Valencia Observatory -	The Staff.	—

Stations.	Observers.	Remarks.
BRITISH COLONIES, POSSESSIONS, &c.		
Gibraltar - - -	C. Aitken, Corp. A.H.C.*	—
Malta - - -	Corp. Bravis, A.H.C.	—
Nassau (Bahamas) -	Surgeon-Maj. J. Jamieson, M.D.	—
Natal - - -	Priv. G. Salmon, A.H.C.	—
Scutari, British Cemetery	Serg. W. H. Lyne, R.E.	—
Davos (Switzerland) -	Rev. F. Redford, M.A. -	From Oct. 1876.

SUMMARY.

	—	—
England and Wales -	30	
Scotland - - -	7	
Ireland - - -	7	
Colonies and British Possessions - - -	7	
Total -	51	

* A.H.C.—Army Hospital Corps.

APPENDIX XI.

FISHERY BAROMETERS.

LIST of PLACES supplied with FISHERY BAROMETERS.

Those supplied during the years 1876-7 are distinguished by an asterisk.

Shetland Isles.—Sandsair, Lerwick.

Orkney Isles.—Burray. Kirkwall.*

Scotland, east coast.—Stroma, Staxigoe, Wick, Sarclet, Lybster, Dunbeath,* Portmahomack, Cromarty, Avoch, Nairn, Burghead, Portessie, Port Knockie, Portsoy,* Whitehills, Gardenstown, Roseheart, Pitullie, Inverallochy,* Pointlaw,* Findon, Portlethen, 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, Wells, Gorleston, Harwich,* Brightlingsea,* Wivenhoe,* Margate, Deal, Kingsdown, Dover.

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

England, south-west coast.—St. Ives, Hayle, Padstow,* Port Isaac, Boscastle,* Fremington, Burham, Highbridge.

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

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

Isle of Man.—Port St. Mary,* Peel.

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

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

Ireland, south coast.—Dungarvan, Kinsale,* Crookhaven.*

Ireland, west coast.—Valencia, Dingle, Tralee, Tarbert,* Kilcredane,* Elly Bay,* Ballina,* Tribane,* Killybegs,* Teelin,* Burton Port, Bunbeg.

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

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

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

SUMMARY of INSTRUMENTS ON SERVICE.

England and Wales -	-	-	-	-	61
Scotland -	-	-	-	-	46
Ireland -	-	-	-	-	32
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					139
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APPENDIX XII.

DONATIONS RECEIVED DURING THE YEAR 1876, AND TO 31 MARCH 1877.

Presented by Societies, Institutions, &c.

Adelaide	-	Observatory - -	Observatory and Climate of South Australia. By C. Todd, C.M.G., F.R.A.S.
Adelaide	-	South Australian Institute	Diagrams showing: (1.) depth of rain in Adelaide on each day from January 1st, 1839 to October 31st, 1874. (2.) Total rainfall in Adelaide in each year from 1839 to 1873. (3.) Average monthly rainfall in Adelaide, Melbourne, and Sydney. (4.) Maximum and Minimum rainfall in each month for— Adelaide, Jan. 1839 to Oct. 1874. Melbourne, Jan. 1855 to July 1874. Sydney, April 1840 to July 1874.
Algiers	-	Service météorologique de l'Algérie.	Bulletin Mensuel, 1875, Part II, pp. 1-228. "Le Mobacher." Notice sur le service météorologique du Gouvernement général de l'Algérie; by General Farre. By Captain H. Brocard.
Allahabad	-	Met. Reporter of the N.W. Provinces.	Annual statement of rainfall, 1876.
Aschaffenburg	-	K. Först-academie - -	Beobachtungs-Ergebnisse der im Königreich Bayern zu fürstlichen Zwecken errichteten meteorologischen Stationen, 1873, 1874, 1875. By Professor E. Ebermayer.
Berlin	-	Hauptstation des fürstlichen Versuchswesens. K. Hydrographisches Bureau.	Jahresbericht, 1875. Nachrichten für Seefahrer. Vol. VII., Vol. VIII., Nos. 1-12. Annalen der Hydrographie und Maritimen Meteorologie, 1876; Vol. IV., 1877; Vol. V., Parts 1-3. By Dr. G. Neumayer. (See also Hamburg.)
		K. Statistisches Bureau -	Preussische Statistik. No. 37: Monthly means of Pressure, Temperature, &c. for 1875. Über die Witterung des Jahres, 1875 und Anfang 1876. By H. W. Dove, F.R.S. (See also Dove.)
		" "	
Berne	-	Sternwarte - -	Resultate der meteor. Beobachtungen, 1875. By Dr. A. Forster.
Bombay	-	Colaba Observatory	Report for year ending 30th June 1876.
		" "	Administration Report, 1875-6. By C. Chambers, F.R.S.
Brisbane	-	Government Meteorological Reporter.	Rainfall in Queensland, 1874. Summary of meteorological observations at Brisbane, Somerset, Cape York, Toowoomba, and Cape Moreton, 1875. Report for 1874-5. By H. McDonnell.

Brussels -	Observatoire Royal	Annales, 1876, pp. 33-96. Bulletin Météorologique. Cartes des pressions barométriques. By MM. E. Quetelet & Houzeau.
	" "	
Calcutta -	Meteorological Office	Abstract of observations, Aug. 1875 to Nov. 1876. Weekly report of Rainfall, Nov. 1875 to Feb. 1877. Telegraphic reports, Nov. 1875 to Feb. 1877. An account of experiments made in 1875-6 in various parts of India, for the purpose of comparing the observed temperature of the dew point with that computed from the psychrometer by different methods of reduction. On the physical explanation of the inequality of the two semi-diurnal oscillations of barometric pressure. On certain protracted irregularities of atmospheric pressure in the Indian Monsoon Region, and their relation to variations of the local rainfall. By H. F. Blanford.
	"	
	"	
	"	
	Surveyor General's Office	Abstracts of the Results of Hourly Observations, Sept. 1875 to Dec. 1876. By Col. Thuillier, F.R.S.
Cape of Good Hope.	Royal Observatory -	Magnetical and Meteorological Observations, Vol. II., 1841-6.
Carlsruhe	Meteorologische Central-Station.	Beobachtungen der badischen Stationen, Nov. 1875 to Dec. 1876. Bericht 1875. By Dr. F. Sohncke.
Chatham	School of Military Engineering.	Abstract of Observations for 1875 and 1876, with Diagrams.
Christiania	Norske Meteorologiske Institut.	Meteorologisk Aarbog, 1874.
	" "	Vejledning til Udførelse af de Meteorologiske Jagttagelser.
	" "	Études sur les Mouvements de l'Atmosphère. By C. M. Guldberg & H. Mohn.
	" "	Oversigt over Veirforholdene i Norge, 1875. By Professor H. Mohn.
	R. University -	Die Pflanzenwelt Norwegens. By Dr. Schübeler.
Coimbra	Observatorio -	Observações, 1875. By M. da Sousa.
Colombo (Ceylon).	Surveyor General's Office	Results of Meteorological Observations at Ceylon. Oct. 1875 to Nov. 1876. Results of observations in Colombo during 1875-6. Rainfall in Ceylon, during 1875; and Means during previous five years. By Lt.-Col. A. B. Fyers, R.E.
Copenhagen	Danske Meteorologiske Institut.	Bulletin Météorologique du Nord, 1876. Weather Charts, Dec. 1875 to Dec. 1876. Maanedsoversigt over Veirforholdene, Nov. 1875 to Feb. 1877. Meteorologisk Aarbog, 1874-75. By Capt. H. Hoffmeyer.
	K. Danske Videnskabsnernes Selskab.	Forhandlinger, 1875, parts 2, 3. 1876, part 1.

Copenhagen	-	K. Danske Videnskabsnernes Selskab.	-	Rapport sur le mémoire de M. Wex, "Ueber die Wasserabnahme in den Quellen," &c. By M. M. A. Colding, C. Holten, and F. Johnstrup.
Cracow	-	K. K. Sternwarte	-	Meteorologische Beobachtungen, Nov. 1875 to Jan. 1877.
	-	"	-	Materyaly do Klimatografii Galicyi. Rok, 1875.
	-	"	-	Über die periodischen Aenderungen der Lufttemperatur. By Dr. F. Karlinski.
Dublin	-	R. Dublin Society	-	Journal, Vol. VII. No. 44.
Edinburgh	-	Royal Society	-	Proceedings, Sessions 1874-5, and 1875-6.
	-	Scottish Meteorological Society.	-	Journal, Nos. 47-50.
Falmouth	-	R. Cornwall Polytechnic Society.	-	Report, 1875.
Fiume	-	I. R. Academia di Marina	-	Osservazioni delle Stazioni Meteorologiche, Oct. 1875 to Jan. 1877.
Florence	-	R. Museo di Fisica e Storia Naturale.	-	Annali, 1808 (Tome 1-2), 1865.
	-	"	-	Archivio Meteorologico centrale Italiano, 1657-70, and 1832-52.
Frankfort o/M.	-	Physikalisches Verein	-	Jahresbericht, 1874-5.
Geneva	-	Bibliothèque Universelle Société Géographique	-	Archives des Sciences, Vols. 55 to 58. Le Globe, Vol. XIII., Nos. 5-6. Vols. XIV. and XV.
Gorizia	-	Osservatorio	-	Osservazioni della Stazione Meteorologica, July 1875 to Dec. 1876.
Greenwich	-	Royal Observatory	-	Report of the Astronomer Royal to the Board of Visitors, 1876.
	-	"	-	Magnetical and meteorological observations for 1873-4.
	-	"	-	Weekly Returns to the Registrar-General, Vol. XXXVII. Vol. XXXVIII, Nos. 1-11.
	-	"	-	Daily Weather Report. By Sir G. B. Airy, K.C.B.
Hamburg	-	Deutsche Seewarte	-	Wetterbericht.
	-	"	-	Monatliche Übersicht der Witterung, Jan. to Apl. 1876. Tabellarischer Morgenbericht der Deutschen Stationen, 1876. Regulation für das Chronometer-Prüfungs-Institut. Regulation für die Prüfung von nautischen und meteor. Instrumenten. Instruction über die Führung des Journals. Instruction für die Signalstellen. Einiges über die physikalischen Verhältnisse von Hamburg und Umgebung. By Dr. G. Neumayer. (See also Berlin.)
Helsingfors	-	Société des Sciences de Finlande.	-	Forhandlinger, Vol. XVII. (1874-5). Observations météorologiques, 1873.
Hobarton	-	R. Society of Tasmania	-	Monthly Notices of Papers and Proceedings, 1874. Meteorology, 1876. Synchronous Observations, 1876. Results, 1876. By F. Abbott, F.R.A.S.

Hong Kong	Government Civil Hospital	Meteorological Observations made at Victoria, Oct. 1875 to Dec. 1876.
	Harbour Office - - -	China Coast, Meteorological Register, Dec. 1875 to Jan. 1877.
		Weather Tables, 1874, May-Dec.
		" " 1875.
		" " 1876, Jan.-Oct.
		By Captain H. G. Thomsett, R.N.
Kew - - -	Observatory - - -	Report for year ending 31st Oct. 1876.
Kiel - - -	Ministerial-Commission zur Untersuchung der deutschen Meere.	Ergebnisse der Beobachtungs-Stationen an den deutschen Küsten, Jan. 1875, to June 1876.
Kremsmünster	Sternwarte - - -	Resultate der meteor. Beobachtungen in dem Triennium, 1873, 1874, und 1875.
		By G. Strasser.
Leicester -	Literary and Philosophical Society.	Report, 1876.
	Town Museum - - -	Report of Committee to 31st March 1876.
Leipzig -	Sternwarte - - -	Resultate aus den meteorologischen Beobachtungen, 1872-3. Monatliche Übersicht der Resultate, Sept. to Dec. 1875. Meteorologische Beobachtungen, 1874-5.
		By Dr. C. Brubns.
Lisbon - - -	Observatory - - -	Annaes, Vols. 9-11.
		By Sr. Capello.
Liverpool -	Mercantile Marine Association.	Monthly Reporter, Oct. 1876 to Feb. 1877.
London - - -	Admiralty - - -	Tide Tables for 1877.
		Hydrographic Notices, 1876.
		Journals and Proceedings of the Arctic Expedition, 1875-6.
		Reports on Ocean Soundings and Temperature.
		Remarks on Revolving Storms. Papers on the "Valorous" and "Challenger" Expeditions.
		Report, 1874.
	Army Medical Department.	
	Board of Trade - - -	Report of Wrecks, Casualties, &c. from July 1874 to June 1875.
		Report for 1875.
	British Association - - -	Report for 1875.
	Colonial Office - - -	Extract from Blue Book on Falkland Isles.
		By Col. D'Arcy.
		Returns from various colonies and settlements.
	India Office - - -	Report on the operations connected with the observation of the Total Solar Eclipse of April 6th 1875 at Nicobar Islands.
		By Capt. Waterhouse.
		Catalogue of Maps, &c., of India and other parts of Asia.
		Returns from various Observers in India.
	Institution of Civil Engineers.	Address of Geo. Rbt. Stephenson, Esq. on his Election as President, 11th Jan. 1876.
		Rainfall and Evaporation.
		By Messrs. Symons, Greaves, and Evans.
	London Institution -	Journal, No. 27.

London -	-	Medical Department of the Navy.	Report for 1875.
		Meteorological Society -	Quarterly Journal, Parts 17-21.
		Royal Astronomical Society	Catalogue of Library.
			Monthly Notices, Vol. XXXVII., Nos. 2-9. Vol. XXXVIII., No. 1-4.
		Royal Geographical Society	Memoirs, Vol. XLII.
			Proceedings, Vol. XX., Nos. 1-6. Vol. XXI., Nos. 1-3.
		Royal Horticultural Society.	Journal, Vol. IV., Part 16.
		Royal Institution of Great Britain.	Proceedings, Vol. VIII., Nos. 64-65.
		Royal National Lifeboat Institution.	Journal, Nos. 99-103.
		Royal Society - -	Proceedings, Vol. XXIV., Nos. 165-170.
			" Vol. XXIV., No. 171-177.
		Royal United Service Institution.	Journal Nos. 83-88.
			On the best Types for War Vessels for the British Navy.
Madrid -	-		By Comm. G. H. U. Noel.
		Society of Arts - -	Journal Nos. 1207-1271.
		South Kensington Museum	Handbook to the Special Loan Collection of Scientific Apparatus and Catalogue.
		Standards Department -	Reports 1874-5, 1875-6.
		R. Observatorio - -	Daily Weather Reports, 1876.
Manchester -	-		Observaciones Meteorologicas de Madrid, 1869-73.
			Resumen de las Observaciones Meteorologicas de Provincias, 1869 to 1873.
			Anuario, 1875-76.
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		Literary and Philosophical Society.	Proceedings, Vol. XIV. Memoirs 3rd Series. Catalogue of Library.
Melbourne -	-	Meteorological Society -	Meteorological Observations for 1874-5.
	-		By C. Meldrum, M.A.
	-	Flagstaff Observatory -	Monthly Record of Results of Observations in Meteorology, &c., June 1875 to July 1876.
	-	" - -	Results of Observations, 1874 Vol. III.
	-		By R. J. Ellery, F.R.S.
Modena -	-	R. Observatorio - -	Andamento Annuale della Temperatura.
	-	" - -	Comunicazioni alla R. Accademia di Scienze Lettere et Arti di Modena (as to periodicity of meteorological phenomena).
	-	" - -	Progetto di Una Società Meteorologica Italiana.
	-		By Sr. D. Ragona.
Moncalieri -	-	Observatory - -	Bulletino Meteorologico:
	-		Vol. VII., Nos. 8-12.
	-		" IX., Nos. 10-12.
	-		" X.
	-	" - -	Osservazioni Meteor. fatte nelle stazioni presso le Alpi Italiane, July 1875 to Nov. 1876.
	-	" - -	Osservazioni della declinazione magnetica.
	-	" - -	Sulla distribuzioni della Pioggia in Italia, 1871-2.
	-	" - -	Confronti dei Barometri delle Stazioni Meteor. Italiane.
	-		By M. F. Denza.

Munich	-	K. Sternwarte	-	Meteorologische und magnetische Beobachtungen, July 1874 to Dec. 1875.
				By Dr. J. v. Lamont.
Naples	-	Specola Reale	-	Bulletino Meteorologico, Oct. 1875 to March 1876.
				By Sr. Brioschi.
Neuchatel	-	Société des Sciences Naturelles.	-	Bulletin, Vols. IV. to V.
New York	-	Central Park Observatory	-	Abstract of Registers from S. R. Instruments. 1876.
		" "	-	Report 1874-5.
				By Prof. D. Draper.
Oxford	-	Radcliffe Observatory	-	Results of Meteorological Observations, 1873-4.
		" "	-	On the Rainfall for 25 years, 1851-75, at Radcliffe Observatory.
		" "	-	Report 1875-6.
				By the Rev. R. Main, F.R.S.
Palermo	-	R. Osservatorio	-	Bullettino Meteorologico:—
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				Vol. XI., Nos. 1-8.
				By Sr. G. Cacciatore.
Paris	-	Académie des Sciences	-	Comptes-Rendus Hebdomadaires.
				Vol. LXXXI., Nos. 25-26.
				" LXXXII.
				" LXXXIII.
				" LXXXIV., Nos. 1-11.
		Association Scientifique de France.	-	Bulletin Hebdomadaire, Nos. 426-490.
		Bureau des Longitudes	-	Annuaire, 1876.
		Dépôt des Cartes et Plans	-	Annales Hydrographiques:
				Part 4 of 1875.
		" "		Parts 1-4 of 1876.
		" "		Phares des Côtes.
				Recherches sur les Chronomètres, 10th Number.
				By Captain A. Le Gras.
		Ministère de la Marine, &c.	-	Revue Maritime et Coloniale. Vols. 48-52.
		Observatoire de Paris	-	Bulletin International.
				Atlas Météorologique, 1872-74.
				By M. U. J. Le Verrier.
		Observatoire de Montsouris.	-	Annuaire Météorologique, 1876-77.
		" "		Bulletin Mensuel, Nos. 48-61.
				By M. Marié-Davy.
		Service Hydrométrique, (Seine.)	-	Résumé des Observations Centralisées, 1874.
		" "		Observations sur les Cours d'Eau et de la Pluie, 1874.
				By M. E. Belgrand.
		Société Météorologique	-	Nouvelles Météorologiques, December 1875 to October 1876.
		" "	-	Annuaire:
				Vols. Bulletin. Tab. Met.
				20 19-21 5-14
				21 ... 1-4
				22 ... 10-19
				23 8-32 1-4
				24 1-18 1-4
				25 1-11 ...
Pavia	-	R. University	-	Description of Physical Apparatus and Geological Profiles at the University.
				By M. Cantoni.

Perpignan	-	Commission Météorologique des Pyrénées Orientales.	Bulletin Météorologique, 1876.
Pesaro	-	Observatorio Meteorico e Magnetico.	Bullettino Mensile, 1875, pp. 1-32. Diagram of Mag. and Met. Observations, January 1876 to February 1877.
Pesth	-	K. Ung. Central-Anstalt für Meteorologie und Erdmagnetismus.	Jahrbuch, Vol. III., 1873.
Philadelphia	-	American Phil. Society	Proceedings, Vol. XIV., No. 95. Vol. XVI., No. 97.
	-	Franklin Institute	Journal, Vol. CI, CII., and CIII., Nos. 613-615.
Pola	-	K.K. Hydrographisches Amt.	Meteorologische Beobachtungen, December 1875 to February 1877.
	-	" "	Mittheilungen aus dem Gebiete des Seewesens. Vol. III., No. 12. Vols. IV. and V., Nos. 1-2.
	-	" "	Deviations-Coefficienten der Schiffe. By Dr. R. Müller.
Prague	-	K.K. Sternwarte	Magnetische und meteorologische Beobachtungen, 1875, pp. 25-40. 1876, pp. 1-32.
	-	" "	Astronomische, magnetische und meteorologische Beobachtungen, 1874, 1875. By Dr. C. Hornstein.
Punjab	-	Sanitary Administration	Report, 1875.
Rome	-	Ministero d'Agricoltura, &c.	Bollettino Decadico— 1875, pp. 401-436. 1876, Nos. 1-36. 1877, Nos. 1-3.
	-	" "	Meteorologia Italiana,— 1875, pp. 125-248. 1876, pp. 1-244.
	-	" "	Supplemento alla Meteorologia Italiana, 1874, III. 1875, I.-IV. 1876, I.-III.
	-	" "	Atti riguardanti la Meteorologia Italiana. By M. G. Cantoni.
	-	Osservatorio del Collegio Romano.	Bullettino Meteorologico— Vol. XIV., No. 12. Vol. XV., Nos. 1-12. Vol. XVI., Vol. I. By Sr. A. Secchi.
Rugby	-	Natural History Society	Report, 1875.
St. Petersburg	-	Central Physical Observatory.	Annalen, 1874. Meteor. Bulletin, 1876. Photometrische Bestimmung des diffusen Himmelslichtes. Meteorologische Studien. Über den gegenwärtigen Zustand der Anemometrie und über Anemometer-Verification. Über Normalbarometer und ihre Vergleichung. Bericht der zur Begutachtung der Abhandlung des Hrn. Wex über die Wasserabnahme, &c. eingesetzten Commission. Repertorium für Meteorologie, Vol. IV., part 2. Vol. V., part 1. Windfahne mit einfachem Windstärkemesser für meteor. Stationen. By Dr. H. Wild.

Utrecht -	-	K. Nederlandsch Meteor. Instituut.	Jaarboek, 1871-2.
		" "	Rapport du Comité Permanent du premier Congrès Météor. international de Vienne, 1876.
		" "	Des hauteurs barométriques moyennes dans l'Océan Atlantique.
		" "	Nog een Woord over Asteroïden-invloed op de temperaturen in Mei en Feb.
		" "	Marche Annuelle du thermomètre et du baromètre en Néerlande, déduite d'observations simultanées de 1843 à 1875.
Vienna -	-	K. K. Central-Anstalt für Meteorologie, &c.	Maandelijksche Windkaarten van den Noord-Atlantischen Ocean Dec.-May. By Prof. H. Buys Ballot.
		" "	Beobachtungen, November 1875 to January 1877. Jahrbuch, 1874.
		" "	Telegraphische Witterungsberichte, 1876. Meteor. Beobachtungen, an 10 Stationen in Oesterreich, 1876.
		" "	Telegraphische Wetterbericht 1877.
		" "	Über die Constanten der Aneroide, und über Aneroide mit Höhenscalen. By Drs. Jelinek and Hann. (See also Hann.)
Washington -	-	Oesterreichische Gesellschaft für Meteorologie.	Zeitschrift. Bd. XI., Bd. XII., Nos. 1-6.
	-	K. K. Sternwarte	Meteor. Beobachtungen, 1872-3. By Dr. C. Littrow.
	-	K. K. Geogr. Gesellschaft	Mittheilungen, 1875.
	-	Hydrographic Office	Coasts and Islands of the Mediterranean Sea. Part I. By Commodore R. H. Wyman, U.S.N.
	-	Smithsonian Institution	Report for 1874. By Prof. J. Henry.
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Zürich	-	Meteor. Central-Anstalt der schweizerischen naturforschenden Gesellschaft.	Meteorologische Beobachtungen, Aug. 1875 to January 1877. Instructionen für die Beobachter der meteor. Stationen der Schweiz. By Drs. Wolf and Billwiller.

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Perry, Rev. S. J.	-	Notes of a Voyage to Kergulen, Id. to observe the Transit of Venus, 8th December 1874.
"	-	Notes on a simultaneous Disturbance of the Barometer and the Magnetic Needle. See also Stonyhurst.
Petermann, Dr. A.	-	Mittheilungen, Vol. 21, No. 12, Vol. 22. Ergänzungsheft, Nos. 44-49.

Plantamour, Prof. E	-	Nouvelles Études sur le Climat de Genève.
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Puckle, Major J.	-	Meteorological Memoranda for Bangalore and the provinces of Mysore.
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Schück, Capt. A.	-	Technological Dictionary.
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"	-	Remarks on the present condition of Maritime Meteorology.
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"	-	Bidrag till Kännedomen om vindförhållandena i de Spitsbergen, &c.
"	-	Observations Météorologiques de l'Expédition Arctique Suédoise, 1872-3.
Young, Sir Allen	-	Cruise of the "Pandora."
Zurcher and Margollé, M.M.	-	Trombes et Cyclones.

APPENDIX XIII.

LIST of PERSONS in the EMPLOYMENT of the METEOROLOGICAL COMMITTEE on 1st April 1877, with their Occupations and Amount of Salary.

Name.	Duties.	Salary					
		Yearly.		Weekly.			
<i>Office.</i>		£	s.	d.	£	s.	d.
Robert H. Scott	Director of the Office	800	0	0	—	—	—
J. S. Harding, jun.	Correspondence, Accounts, Library	250	0	0	—	—	—
T. D. Bell	Registering of documents, publications, &c.	100	0	0	—	—	—
J. S. Harding, senr.	Office keeper	—	—	—	1	18	6
Commissionaire	Messenger	—	—	—	1	1	0
<i>Land Meteorology (Observatories).</i>							
R. H. Curtis	Reproduction of observatory curves by pantographs, and preparation for publication.	170	0	0	—	—	—
A. J. Rigby		—	—	—	1	18	6
C. H. Thompson		—	—	—	1	12	0
H. N. Cobley		—	—	—	1	9	0
C. Stodart	Examination of Observatory Returns.	—	—	—	2	2	0
E. G. Aldridge		—	—	—	1	5	0
H. H. Bourne		—	—	—	1	5	0
J. A. Curtis		—	—	—	—	—	—
*W. E. Brodie	Discussion of returns, and computations.	130	0	0	—	—	—
A. H. Bell		—	—	—	1	0	0
<i>Land Meteorology (Telegraphy).</i>							
F. Gaster	Preparation of weather reports and computations.	190	0	0	—	—	—
W. L. Dallas		120	0	0	—	—	—
F. Brodie		106	0	0	—	—	—
G. G. Francis		100	0	0	—	—	—
R. Sargeant		—	—	—	1	9	0
A. R. Simpkins		—	—	—	1	2	0
H. Chivers		—	—	—	0	19	6
<i>Ocean Meteorology.</i>							
Capt. H. Toynbee	Marine Superintendent	400	0	0	—	—	—
R. Strachan	Charge and disposal of instruments and reduction of meteorological returns.	250	0	0	—	—	—
C. Harding	Discussion of data and computations.	180	0	0	—	—	—
T. E. Allen		130	0	0	—	—	—
H. Harries		—	—	—	1	18	6
W. Allingham		—	—	—	1	18	6
H. J. Green		—	—	—	0	17	6
J. E. Cullum	Superintendent of Valencia Observatory.	170	0	0	—	—	—

* Mr. H. Newton has been engaged since 9th April, at a weekly salary of 12s. 6d., in place of Mr. W. E. Brodie, deceased.

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of the Meteorological Committee.**

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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. Barometer Manual. 1s. [New Edition in the Press.]
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.
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