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MINUTES OF THE PROCEEDINGS

OF THE



METEOROLOGICAL COUNCIL,

1880—1881.



LONDON:

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Capt Jory

MINUTES OF THE PROCEEDINGS
OF THE
METEOROLOGICAL COUNCIL.

1880—81.

116, *Victoria Street*, April 4, 1880.

PRESENT :

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE.

PROFESSOR STOKES.

MR. GALTON.

GENERAL STRACHEY.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (March 20) were read and confirmed.

The Chairman submitted a list of subjects proposed to be included in the Report of the Council for the year 1879–80. The list was taken into consideration, and preliminary instructions were given for the preparation of the Report.

The draft specimen of the Quarterly Weather Report for 1876, as revised pursuant to directions given at last meeting (Minutes, 1879, p. 151), was submitted and considered. The draft was returned to Mr. Gaster with further instructions for its completion.

The Secretary reported, that having failed to obtain permission from the Office of Works to erect a sunshine recorder at Burlington House (Letters written 688, received 705), he had placed one on the roof of Queen Anne's Mansions, and he proposed to allow to one of the men employed in the building the sum of 1s. per week for attending to the instrument.—Approved.

Submitted—An estimate from Messrs. Beck (Letter 761), offering to connect the anemometer on Queen Anne's Mansions with the Office so as to give a record of every mile of velocity, for the sum of 15l. (Minutes, 1879, p. 44).—Accepted.

The Chairman submitted a reply from Mr. Symons (Letter 741) to his letter (652, Minutes, 1879, p. 143), and further correspondence between himself and Mr. Symons (Letters written 860, and received 887).

Resolved—That Mr. Symons' offer to furnish, for the sum of 400l., monthly rainfall values, in a state ready for publication, from 372 stations, for the three lustra ending December 31, 1880, be accepted on the following conditions: (1.) The work to be completed by April 1, 1881. (2.) Half the payment to be made during the current year as the work is sent in, and the remainder in April 1881. (3.) The work to appear as a publication of the Meteorological Council, with the recognition of the authorship of Mr. Symons.

Submitted.—The following draft letter and memorandum for Captain Templer (Minutes, 1879, p. 151), which were approved:—

DEAR SIR,

April 5, 1880.

As you are already aware, the Meteorological Council attach great importance to your observations of the winds, clouds, and general meteorological conditions prevailing at different heights above the earth's surface, and are very desirous that, in future balloon ascents, these observations should be continued in as systematic a manner as possible.

As proposed at the interview between yourself and the Council, I now enclose a memorandum of the observations which it is desirable should be made, and a suggested specimen form for recording them.

The Council would wish to know whether the memorandum and form meet your approval, and they would be ready to receive any comment from you on the subject.

They would be very glad if you would try, on one of your next ascents, the observations and form of record suggested by them, and forward the result to them by post, as soon as possible.

I am, &c.

Captain Templer,
R. Middlesex Rifles,
Woolwich.

ROBERT H. SCOTT,
Secretary.

MEMORANDUM relating to METEOROLOGICAL OBSERVATIONS in BALLOON ASCENTS.

The objects of the observations should be to ascertain for each layer of wind and also for each layer of cloud—

1. Its thickness, and its height above the earth's surface.
2. The direction and rate of its motion.
3. Its temperature and hygrometric condition.

The character of each layer of cloud should be also recorded; and the position of the layers of cloud with regard to layers of wind.

To effect these objects the observer should make—

1. A complete set of records on leaving the ground, and on alighting.
2. Barometer or aneroid observations each time that he enters and leaves a wind layer.
3. Barometer or aneroid observations each time that he enters and leaves a cloud layer.
4. A complete set of records, on at least one occasion, when well within each wind or cloud layer.
5. A complete set of records at such other times during the ascent as he may think desirable.

A complete set of records should consist of—

1. Position on chart.
2. Time of observation.
3. Reading of barometer or aneroid.
- 4 and 5. Readings of dry and wet-bulb thermometers in the shade.
6. Remarks, including description of clouds entered, or of clouds overhead or below, and of any occurrence having a meteorological interest.

In addition to these, the observations made before starting, and after alighting should include wind direction and velocity, and the remarks made at those times should include drift of clouds, distinguishing clouds at obviously different levels, and describing their character.

The character of a cloud should be described in the terms used by meteorologists and also in any which the observer may himself prefer.

Submitted—The following quarterly report :—

SIR,

Meteorological Office, March 31, 1880.

I HAVE the honour to report, for the information of the Council, on the work which has been done for the quarter ending 31st March 1880.

Sea Surface Temperatures of the Pacific Ocean.

For the month of February.—The General Chart, being that referred to in my last report (Minutes, p. 99), has been completed.

For the month of May.—A Chart similar to that for February has been constructed. I had the honour to submit it to the Council on the 6th instant (Minutes, p. 145).

For the month of August.—Extracts from all logs and remark books have been completed, and I hope that the General Chart will be finished by the end of April.

For the month of November.—Extracts as above are in progress; probably about one quarter of this work is done.

I have, &c.

C. W. BAILLIE,
Navigating Lieutenant, R.N.

To Capt. H. Toynbee, F.R.A.S., &c. &c.,
Marine Superintendent.

Read—The following letter :—

M.O. 922.

DEAR MR. SCOTT,

Meteorological Office, London,

November 6, 1879.

As we have had several cases in which ships have been supplied with instruments, &c., and no logs kept, I think it would be well to make the following alterations in the instructions to agents (Minutes, 1873, p. 79), and shall be glad if you will get the Council's opinion on the subject.

Instead of the present note to the 2nd Instruction, I beg to propose the following :—

"NOTE.—If an agent supplies a ship and gets no log, or one which is worthless, the Council reserve to themselves the right of deducting the fees for supplying and receiving the instruments from the account of the agent who supplied them. The Council's decision will depend on the circumstances of the case."

Yours, &c.

(Signed) HENRY TOYNBEE,
Marine Superintendent.

R. H. Scott, Esq., F.R.S.

Captain Toynbee's suggestion was approved, and the Secretary was directed to alter the instructions accordingly.

Read—A recommendation from Captain Toynbee (Letter 256, 1879), that the Office should employ an agent in the Port of London to visit the ships in dock, with the view of obtaining additional observers. Approved, especially with the view of obtaining observers in the less frequented parts of the ocean—Captain Toynbee to negotiate with a gentleman suitable for the duty. The fee to be 5s. for each observer approved by the Office.

Read—An application (Letter 850) from Mr. L. Allen, teacher of the Navigation School, Dundee, for the loan of a set of instruments for the instruction of his pupils.—Declined.

Submitted—The following report on the Forecasts for March (Minutes, p. 31) :—

The letters used have the following signification :—

a = complete success.

b = partial (i.e., more than half) success.

c = partial failure.

d = total failure.

2.30 P.M. FORECASTS.

DISTRICTS.		Percentages.			Percentage of Success a + b.
		Wind.	Weather.	Entire.	
SCOTLAND, N.	a	35	35	35	75
"	b	39	42	40	
"	c	10	13	12	
"	d	16	10	13	
SCOTLAND, E.	a	39	42	40	68
"	b	29	26	28	
"	c	13	16	14	
"	d	19	16	18	
ENGLAND, N.E.	a	36	32	34	73
"	b	32	45	39	
"	c	19	13	16	
"	d	13	10	11	
ENGLAND, E.	a	55	52	53	87
"	b	32	36	34	
"	c	7	6	7	
"	d	6	6	6	
MIDLAND COS.	a	35	35	35	77
"	b	45	39	42	
"	c	13	16	14	
"	d	7	10	9	
ENGLAND, S.	a	52	39	46	86
"	b	35	45	40	
"	c	10	10	10	
"	d	3	6	4	
SCOTLAND, W.	a	32	42	37	69
"	b	33	32	32	
"	c	19	13	16	
"	d	16	13	15	
ENGLAND, N.W.	a	61	35	48	78
"	b	26	33	30	
"	c	3	13	8	
"	d	10	19	14	
ENGLAND, S.W.	a	39	39	39	68
"	b	32	25	29	
"	c	16	26	21	
"	d	13	10	11	
IRELAND, N.	a	45	42	44	81
"	b	29	45	37	
"	c	16	13	14	
"	d	10	—	5	
IRELAND, S.	a	48	39	44	81
"	b	36	38	37	
"	c	3	10	6	
"	d	13	13	13	

8 P.M. FORECASTS.

DISTRICTS.		Percentages of Success.			Percentage of Success a + b.
		Wind.	Weather.	Entire.	
SCOTLAND, N.	a	41	55	48	84
"	b	41	30	36	
"	c	7	7	7	
"	d	11	8	9	
SCOTLAND, E.	a	37	44	41	84
"	b	44	41	43	
"	c	8	7	7	
"	d	11	8	9	
ENGLAND, N.E.	a	30	37	34	73
"	b	41	37	39	
"	c	22	11	16	
"	d	7	15	11	
ENGLAND, E.	a	44	44	44	88
"	b	45	44	44	
"	c	11	8	10	
"	d	—	4	2	
MIDLAND COS.	a	44	34	39	73
"	b	37	30	34	
"	c	11	25	18	
"	d	8	11	9	
ENGLAND, S.	a	55	44	50	89
"	b	41	37	39	
"	c	4	15	9	
"	d	—	4	2	
SCOTLAND, W.	a	30	30	30	64
"	b	30	37	34	
"	c	25	22	23	
"	d	15	11	13	
ENGLAND, N.W.	a	44	44	44	77
"	b	37	30	33	
"	c	—	15	8	
"	d	19	11	15	
ENGLAND, S.W.	a	33	48	41	78
"	b	41	33	37	
"	c	11	15	13	
"	d	15	4	9	
IRELAND, N.	a	41	41	41	84
"	b	48	37	43	
"	c	8	22	15	
"	d	3	—	1	
IRELAND, S.	a	44	37	40	83
"	b	48	37	43	
"	c	—	15	7	
"	d	8	11	10	

Submitted—The following reports :—

STATEMENT of WORK done in MARINE ROOM during March 1880.

New logs examined, 9 in number.

Cape of Good Hope District.

Wind.—Air isotherms copied on to Wind Charts for April, July, and October.
Wind-area Form drawn for working by lithographic process.

Barometer.—Working of means and range for single-degree squares completed for October, and commenced for August.

Frequency worked and plotted for April, July, and October.

Air Temperature.—Means and range for single-degree squares partially worked for May, June, and August.

Currents.—Sea isotherms copied on to Current Charts for January, April, and October.

Areas of extreme range of sea temperature entered by stippling on Current Chart for July.

Sea-Surface Temperature.—Means and range for single-degree squares obtained and plotted for June and September; working of results considerably advanced for May, August, November, and December.

Isotherms drawn for February.

Cape Gales.—Diagrams drawn to illustrate data for July.

R. H. Scott, Esq.

CHARLES HARDING,
April 2, 1880.

HENRY TOYNBEE,
Marine Superintendent.

March 31, 1880.

STATEMENT of WORK done in PANTAGRAPH ROOM during March 1880.

Copper Plates have been engraved as follows :—

1879, Plates 59 to 61, omitting wind and rain curves; 1879, Plates 49 to 54, wind and rain curves added.

Zinc Plates.—Barograms, 7 plates, Nos. 61 to 67, 1879; Thermograms, 7 plates, Nos. 65 to 71, 1879; Vapour Tension, 9 plates, Nos. 59 to 67, 1879; Anemograms, 7 plates, Nos. 50 to 56, 1879; Rain Curves, 5 plates, Nos. 50 to 54, 1879.

Photographic Curves are prepared for pantographing to Plate 72 for barograms, and Plate 73 for thermograms.

Experiments with the *Harmonic Analyser* occupied parts of eight days, and the tabulation of sunshine records a short time.

The December tabulations were examined, and passed to the Computing Room on the 9th. The January returns have not yet been received from Mr. Allen.

Mr. Allen's memorandum is attached.

R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

March 23, 1880.

STATEMENT of WORK done in the EXAMINATION ROOM since February 23, 1880.

The following curves and tabulations have been examined :—

December: *Barograms*, two stations; *Anemograms*, three stations.

January: *Thermograms*, all stations; *Barograms*, all stations; *Anemograms*, four stations.

T. E. ALLEN.

To R. H. Scott, Esq.,

Secretary, Meteorological Council.

Submitted—The following memorandum :—

TABULATION of ANEMOGRAMS.

SIR,

February 9, 1880.

I BEG to direct your attention to a point in connexion with the tabulation of anemograms which I think deserves notice, viz., the value of the *direction* trace in calms or very light airs.

Hitherto it has been the practice to tabulate the curve without any reference whatever to the force of the wind at the time, which implies the assumption that this force is always sufficient to cause the vane to act. This assumption leads, I believe, to occasional error. In very light airs, insufficient to act upon the vane, a direction may be recorded different to what the drift of smoke, &c. would show; or when there is still less movement, and the air is quite calm, it leads to a direction being registered for a wind which does not exist.

In two recent *Armagh* anemograms the total velocity recorded in 24 hours is, in one case 10 miles and in the other 12 miles. During the first period the total record for 15 hours was only one mile, and for several consecutive hours the cups do not appear to have moved at all; whilst in the second case only half-a-mile is shown in an interval of six hours.

It seems to me it would be correct to say that during these intervals there was no wind (at all events not enough to affect the vane in the least), and that therefore the direction column should be left blank, or filled with a sign to indicate a calm.

In some of the 6.45 p.m. weather records just received for transmission to Paris there are these entries "N.N.W. 0," "S. 0," &c., which read very much like contradictory statements.

On the Kew anemograms for end of January a steady direction of N.N.W. is shown for three consecutive days, the total velocity being 30 miles each day; the direction shown by smoke, for at least a part of the time, was W., and when at the end of the period the wind freshened the vane at once shifted to that point. Instances of this kind could easily be multiplied.

I would therefore beg to suggest that steps be taken to determine the minimum hourly velocity at which the vanes may be depended upon to act properly, and that when the recorded velocity is

less than that amount the observers be instructed to insert "Z" in the direction column, rejecting the indications of the instrument.

R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

Reported.—That the cost of erection of the anemometer at Scilly (Minutes, 1878, p. 109) had been 11*l.* 5*s.* (Letter 577).—Payment sanctioned.

The following cheques for March were drawn on the 31st of that month :—

Administration :			£	s.	d.	£	s.	d.
Professor H. J. S. Smith, salary	-	-	*291	19	5			
W. De La Rue, fees	-	-	*135	3	6			
Captain F. J. O. Evans, R.N., fees	-	-	*99	16	8			
F. Galton	-	-	*148	15	9			
Professor G. G. Stokes	-	-	*144	5	0			
General R. Strachey, R.E.	-	-	*148	19	0			
Council expenses, per J. S. Harding, jun.	-	-	3	8	3			
						972	7	7
R. H. Scott, salary	-	-	-	-	-	66	13	4
J. S. Harding, jun.	} Salaries and wages	-	27	15	6			
T. D. Bell		-	13	6	8			
J. S. Harding, sen.		-	†8	19	8			
						50	1	10
C. W. Jacques, rent, No. 116	-	-	133	13	0			
" " No. 113	-	-	18	0	6			
						151	13	6
Pall Mall Coal Co., coals	-	-	-	-	-	5	5	0
General Life and Fire Assurance Co., insurance	-	-	1	6	0			
" " "	-	-	1	2	0			
						2	8	0
Pickford & Co., carriages of parcels	-	-	-	-	-	2	11	6
W. G. Schoof, clock and repairs	-	-	4	12	6			
" repairing clock	-	-	0	4	6			
						4	17	0
Williams & Norgate, books	-	-	-	-	-	9	4	10
Special Researches :								
Chance Brothers & Co., glass spheres	-	-	-	-	-	30	0	0
R. J. Lecky, sunshine recorder frames	-	-	40	16	0			
" " cards	-	-	59	18	4			
						100	14	4
R. W. Munro, erection of S.R. instruments at Oxford	-	-	-	-	-	91	14	6
G. M. Whipple, wind integrator, electrometer, &c.	-	-	-	-	-	2	11	10
Land Meteorology :								
G. Pirie, Aberdeen	-	-	-	-	-	68	16	0
Rev. T. R. Robinson, Armagh	-	-	46	19	0			
" (expenses)	-	-	9	5	5			
						56	4	5
W. L. Fox, Falmouth	-	-	-	-	-	74	0	4
R. Grant, Glasgow	-	-	68	8	4			
" " postages	-	-	3	0	0			
						71	8	4
H. Williams, Holyhead	-	-	-	-	-	3	6	2
G. M. Whipple, Kew	-	-	100	0	0			
" " postages, &c.	-	-	2	0	2			
						102	0	2
Rev. C. Clouston, Orkney	-	-	-	-	-	2	10	0
Carried forward	-	-				£1,868	8	8

* Deductions made for income tax	-	-	£ 20	16	8
Expenses Sept. 29, 1879, per J. S. Harding, jun.	-	-	6	15	9
Payments this day as above	-	-	972	7	7

Total - £1,000 0 0

† Four weeks ending 27th March.

	£	s.	d.	£	s.	d.
Brought forward -	-	-	-	1,868	8	8
Land Meteorology— <i>continued</i> .						
G. H. Aird, Seaham -	-	-	-	2	13	9
Rev. S. J. Perry, Stonyhurst -	-	-	-	55	18	4
J. E. Cullum, Valencia -	46	4	11			
„ „ salary -	15	16	8			
				62	1	7
G. T. Watson, Yarmouth -	-	-	-	4	0	0
R. H. Curtis -	22	4	5			
J. A. Curtis -	15	11	1			
T. E. Allen -	15	11	1			
C. H. Thompson -	*9	4	0			
E. G. Aldridge -	*7	6	8			
Discussion, &c. of observations				69	17	3
Weather Information and Forecasts :						
G. Carrick, Ardrossan -	-	-	-	1	0	0
Postmaster, Bundoran -	-	-	-	1	8	0
H. Todd, Cambridge -	-	-	-	4	11	3
Postmaster, Cliffony -	-	-	-	1	1	0
J. C. McGowan, jun., Donaghadee -	-	-	-	0	14	0
J. Costello, Dover -	-	-	-	3	18	6
Rev. W. Brand, Dunrossness -	-	-	-	3	13	3
Postmaster, Enniskillen -	-	-	-	1	1	0
G. Wooding, Hawes Junction -	-	-	-	3	3	6
J. Tilston, Holyhead -	-	-	-	3	18	0
G. G. Appleton, Hurst Castle -	-	-	-	4	1	7
A. P. Hay, Inverness -	-	-	-	1	6	0
J. Fisher, Jersey -	-	-	-	4	5	6
T. Curtayne, Killarney -	-	-	-	0	14	0
J. Hutchison, Leith -	-	-	-	0	13	0
F. Gaster, London -	-	-	-	3	18	0
K. Kerr, Mullaghmore -	3	18	8			
„ (Conway's account) -	5	17	0			
				9	15	8
W. D. Penny, Nairn -	-	-	-	4	15	6
M. Mackintosh, Nairn -	-	-	-	0	13	0
J. W. Irvine, North Shields -	-	-	-	0	10	0
H. Mohn, Christiania -	-	-	-	5	10	0
E. J. Lowe, Notts -	-	-	-	3	18	0
H. E. C. Bellamy, Oxford -	-	-	-	3	11	6
W. Harding, Parsonstown -	-	-	-	3	5	0
G. Blackler, Prawle Point -	-	-	-	3	5	0
J. C. Walker, St. Ann's Head -	-	-	-	0	14	0
W. Thomas, Scilly -	-	-	-	4	18	11
R. W. Scaddard, Scilly -	-	-	-	0	14	0
J. Sibert, Spurn Head -	-	-	-	3	18	1
J. Sutherland, Stornoway -	-	-	-	5	18	3
W. Morison, „ -	-	-	-	1	6	0
J. Sinclair, Wick -	-	-	-	3	5	0
J. Murray, „ -	-	-	-	1	6	0
G. T. Watson, Yarmouth -	-	-	-	4	11	9
A. Guy, York -	-	-	-	3	18	0
Postmaster General, January account -	-	-	-	190	2	6
Spottiswoode & Co., wire from Prawle Point -	-	-	-	17	0	0
F. Gaster -	31	13	6			
W. L. Dallas -	19	15	1			
F. Brodie -	19	2	0			
H. W. Chivers -	6	12	0			
Preparation and issue of Reports, &c.				77	2	7
Carried forward -	-	-	-	£2,452	4	11

* Four weeks ending 27th March.

			£	s.	d.	£	s.	d.
	Brought forward	-	-	-	-	2,452	4	11
Inspections :								
A. Buchan, Scotland	-	-	-	-	-	37	10	0
Rev. W. C. Ley, England	-	-	-	-	-	37	10	0
Ocean Meteorology :								
Capt. H. Toynbee	Discussion, &c. of observations and care of instruments.	{	33	6	8			
R. Strachan			27	15	6			
C. Harding			22	4	5			
H. Harries			11	4	0			
C. W. Baillie			16	13	4			
			<hr/>			111	3	11
P. Adie, repairing "A." barometers	-	-	2	18	0			
„ „ „ B.T. „	-	-	3	6	6			
			<hr/>			6	4	6
E. Price Edwards, advertisements	-	-	-	-	-	1	2	6
R. Rivière, labels for captains	-	-	-	-	-	2	2	0
J. H. Woodstock, packing cases	-	-	-	-	-	5	4	0
A. G. Evans, Bermuda	-	-	-	-	-	4	11	0
T. Rossiter, Norfolk Island	-	-	-	-	-	5	19	10
Miscellaneous :								
P. Adie, commissions	-	-	-	-	-	38	15	0
J. S. Harding, jun., petty cash	-	-	100	0	0			
„ „ „ „	-	-	80	0	0			
			<hr/>			180	0	0
			<hr/>			£2,882	7	8
			<hr/>					

The Council then adjourned.

116, *Victoria Street*, April 15, 1880.

PRESENT :

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE.
MR. GALTON.

PROFESSOR STOKES.
GENERAL STRACHEY.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (April 4) were read and confirmed.

The Secretary reported that he had written to Mr. Symons (Letter 983) conveying to him the resolutions passed at last meeting, and had received from him a reply (Letter 967), with a draft form of agreement for the transaction.

It was agreed to accept Mr. Symons' agreement, with certain slight modifications. The Secretary was instructed to have it set up in type for signature.

The Secretary reported that he had forwarded to Captain Templer the draft instructions and form for observations in balloons, and stated that he had received a letter giving an account of observations taken on the 12th instant by Captain Elsdale over London.

The Chairman was requested to obtain permission from the War Office to communicate with Captain Templer with the view of ascertaining on what terms he could supply observations made on his ordinary ascents, and also on what terms he would undertake special ascents for the Meteorological Council, if they should require such ascents to be made.

Read—A letter from Mr. Munro (Letter 881), inquiring the length of shafting required for the bridled anemometer (Minutes, 1879, p. 83).

Mr. Scott was instructed to inquire at Queen Anne's Mansions if the instrument could be erected temporarily on the roof of that building. Failing this, he was instructed to write to Mr. Hugh Williams, C.E., of Holyhead, to ask if he could undertake to test the apparatus.

Read—A letter (No. 2976, 1879) from the Board of Works, Ireland, offering to supply to the Office the records of a Robinson's Anemometer (old pattern) at Kingstown Harbour for 20 years, and inquiring if the Office would undertake the tabulation of the records of a new instrument if such were procured.

Resolved—That the Board of Works be recommended to procure a new instrument, and that it be explained to them that the Office will supply methods of tabulation, which will render the process sufficiently easy to be carried out at Kingstown and that the Secretary ask for specimens of the records of the old anemometer and for information as to the method of reduction already employed at Kingstown.

The subject of evaporation was discussed (Minutes, 1879, p. 80), and the following memorandum by Mr. Scott was ordered to be printed:—

MEMORANDUM on the PRESENT STATE of the QUESTION of EVAPORATION.

This subject can hardly be said to have been as yet taken up seriously in England, as there are not more than three or four stations which record it at all, and of these no two follow the same method.

I believe that there is, or has been, a British Association Committee on the subject, of which Mr. Rogers Field was a member, but I have never seen a report, and know from Mr. Field that they have not arrived at any very definite conclusions. I may say that from Vienna and Rome also I carried away the same impression, that no very definite line of action could be pointed out for general adoption.

Of evaporation gauges there are two great classes : the first measures the *weight* of water removed ; the second measures its *volume*.

The first method is applicable to the measurement of evaporation from soils, plants, &c., as well as from a free water surface, and it acts as well in winter as in summer, being unaffected by frost.

Several arrangements of weight atmometers were exhibited at South Kensington in 1876. They all require mechanical appliances of some complication.

The apparatus of Mr. S. H. Miller, of Lowestoft, described in his recent Prize Essay on Evaporation, printed by the Haarlem Society, is of this type.

Of evaporation gauges measuring the volume of the removed water, there are numerous patterns. They may be divided into two great classes:—

A. Those destined to be exposed to weather, and to give the difference between rainfall and evaporation. Of these are :—

Dufour's Siccimeter, Bull. Soc. Vaud. Sci. Nat., tom. x. p. 233.

Greaves' gauges, of which drawings are now before Council.

B. Those destined to be sheltered from sun and rain in screens. Of these, again, there are two classes :—

a. Those measuring evaporation from a porous surface:—

Earthenware	-	-	-	Sir J. Leslie.
Paper -	-	-	-	Piche.
Parchment -	-	-	-	De La Rue.

β. Those measuring evaporation from a free water surface :—

v. Lamont's, and numerous others.

It is obvious that observations taken in a screen, or even in a small pond, can only give approximate data to the evaporation from a lake.

Evaporation is regularly recorded at the Greenwich Observatory.

The principal private observers of evaporation in England now are:—

Mr. Greaves.	Mr. G. Dines.
Rev. C. H. Griffiths.	Mr. S. H. Miller.

Messrs. Lawes and Gilbert measure evaporation in connexion with percolation.

The following are references to recent literature on the subject :—

v. Lamont, Zeitschrift, vol. iv. p. 81.

Dufour, „ „ vii. p. 114.

Fritsch, „ „ vii. p. 124.

N.B.—A useful summary of instruments up to date.

Osnaghi, Zeitschrift, vol. ix. p. 54.

Riegler, on *Piche*, Zeitschrift, vol. xiv. October.

Stelling, Repertorium, vol. v. No. 9.

Hough, Nature, vol. ix. p. 250.

Read—A Report by Mr. Whipple (Letter 966) on the performance of Mr. De La Rue's evaporation gauges (Minutes, 1879, p. 50). The report was referred to Mr. De La Rue. It was resolved that the indications of the instruments should be compared with those of some form of weight atmometer to be hereafter determined.

Read—A memorandum from Captain Toynbee reporting that since the last meeting 13 logs had been received, 5 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last Mention on Minutes.
Mr. D. W. Barker, 2nd Officer.	"Superb"	June 22, 1879— Apr. 1, 1880.	London to Melbourne and home.	—
Capt. W. M. Grieve	"City of Cash- mere."	March 31, 1879— Mar. 23, 1880.	London, Otago, Astoria, and home.	1878, p. 122.
Capt. W. H. Stuart	Schooner "Rich- mond."	July 24, 1876— Mar. 29, 1877.	Lighthouse Tender, Bahamas.	} 1879, p. 102.
"	"	Nov. 1, 1879—Mar. 3, 1880.		
Capt. Thos. Young -	"City of Agra"	June 4, 1879— Apr. 3, 1880.	London, Auckland, Mel- bourne, and home.	1879, p. 7.

Mr. Scott was instructed to present the Charts (O. 27) to Mr. Barker, and to convey the best thanks of the Council to the other observers.

Submitted—Captain Toynbee's Discussion of the Cape Gales (Minutes, 1879, p. 151).

SUBMITTED—The following STATEMENT respecting the RECORDS for January 1880, received from the SELF-RECORDING OBSERVATORIES,
(see Minutes, 21st December 1868 and 20th November 1876).

	Aberdeen.		Armagh.		Falmouth.		Glasgow.		Kew.		Stonyhurst.		Valencia.	
	Direction.	Velocity. Good.	Direction. Indifferent.	Velocity. Indifferent.	Direction. Good.	Velocity. Good.	Direction. Indifferent.	Velocity. Indifferent.	Direction. Good.	Velocity. Good.	Direction. Indifferent.	Velocity. Good.	Direction. Indifferent.	Velocity. Good.
ANEMOGRAPH:—														
Action - - -	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Records deficient, due to stoppage of clock -	0	0	0	0	0	0	0	0	‡37 hrs.	‡38 hrs.	‡13 hrs.	‡13 hrs.	0	0
” other causes -	31st	—	31st	—	12th	—	24th	—	3rd	—	28th	—	5th	—
Orientation verified - - -	0	0	0	2	0	0	0	0	0	0	0	0	0	0
No. of errors discovered by subsidiaries -	0	0	0	0	0	0	0	2	** Curves 6-14 re-tabu- lated.	5	0	0	0	1
” ” irregular differences														
Result of 40 Remeasurements:—														
Greatest difference - - -	0·0	1·0	0·0	1·0	1·0	1·0	1·0	1·0	1·0	1·0	1·0	1·0	1·0	2·0
Mean difference irrespective of sign -	0·0	0·4	0·0	0·4	0·1	0·3	0·0	0·4	0·6	0·3	0·0	0·4	0·0	0·7
Residual difference (— Meteorological Office) -	0·0	+0·1	0·0	+0·1	0·0	0·0	0·0	+0·1	−0·6	0·0	0·0	+0·2	0·0	+0·2
RAIN GAUGE:—														
Action - - -	Good		Good.		Bad.		Indifferent.		Good.		Good.		Good.	
Records deficient, due to stoppage of clock -	0		0		0		0		0		0		0	
” other causes -	0		0		0		0		0		0		0	
Errors in tabulation - - -	0		2		0		0		2		0		0	

Submitted—The following memorandum (Minutes, 1879, p. 145) :—

METEOROLOGY of ARCTIC REGIONS.

SIR,

HEREIN I submit replies to the following questions, which you have put to me :—

- "1. In the progress of Arctic discussions has any further development beyond that sketched out in your Memorandum (Minutes, 1877, p. 78) presented itself?
- "2. What British Polar Voyages or Land Expeditions will be left unrepresented?
- "3. Would you think it advisable to give, in a Fourth Contribution, a summary of results from other expeditions, such as to Point Barrow and to Franz Josef Land?"

1. It will be necessary to discuss separately the observations made by ships which have wintered in Cumberland Sound. Otherwise the work remains as sketched out in the Memorandum quoted.

2. Sir E. Parry's three voyages, Sir James Ross's, Mr. Saunders', Sir R. McClure's, Sir R. Collinson's, Sir H. Kellett's, Captain Pullen's, Sir G. Nares'. Besides these there were the voyages of the "Plover" and "Herald," 1848–50, which, however, are beyond the district under investigation. The land journeys of Sir John Franklin and of Sir G. Back would also yield data.

3. Yes, especially to give summaries of results obtained by the Americans under Kane, Hayes, and Hall. As to Point Barrow and Franz Josef's Land, and other expeditions beyond the district selected, I have nothing to say for or against. I shall, however, be glad to carry out any wishes of the Council respecting these places and expeditions.

Referring to question 2, and to my answer thereto, I beg to suggest that Part III. of the Arctic work should consist of a discussion of the Meteorological observations at the following wintering stations :—

Ships.	Commanders.	Years.	Wintering Stations.	What Information has been published.
1. "Hecla" and "Griper"	Parry -	1819–20	Melville Island	Abstracts published in Parry's first, second, and third voyages.
2. { "Fury" and "Hecla"	Do. -	1821–2	Lyon's Inlet	
Do. do.	Do. -	1822–3	Igloolik	
3. "Hecla" and "Fury" -	Do. -	1824–5	Port Bowen	Mean monthly temperatures published in the "Last of the Arctic Voyages."
4. "Enterprise" and "Investigator."	James Ross	1818–9	Port Leopold	
5. "North Star" -	Saunders -	1849–50	Whale Sound	Nothing published.
6. { "Enterprise" -	Collinson -	1851–2	Minto Inlet	
Do. -	Do. -	1852–3	Cambridge Bay	
Do. -	McClure -	1850–1	Prince of Wales's Strait.	Monthly means of Meteorological elements are given in Dr. Armstrong's "Personal Narrative."
7. { Do. -	Do. -	1851–2	Mercy Bay	
Do. -	Do. -	1852–3	Mercy Bay	
8. { "Resolute" and "Intrepid."	Kellett -	1852–3	Dealy Island	Abstracts in Capt. McDougall's "Voyage of the 'Resolute.'"
Do. do.	Do. -	1853–4	Barrow Strait	
9. "North Star" -	Pullen -	1852–3–4	Beechy Island	Nothing published.

The necessary documents could doubtless be obtained with little difficulty; Parry's from the Admiralty, the rest from the Admiralty Record Office.

It would be possible to work in with the preceding the results from the "Alert" and "Discovery," and from the American expeditions of Kane, Hayes, and Hall. The discussion would thus be complete, as it would include a reference to every wintering expedition. The probable extent of the work would be from 100 to 150 pages, and it must of course be understood that this is merely a rough estimate.

If the above suggestions should be adopted, the sea observations would remain to be dealt with as Part IV.

To the Secretary, Meteorological Council,
April 10, 1880.

R. STRACHAN.

Submitted—A criticism by Mr. C. Harding (Letter 1022) of some of the tables given in the Report on the Meteorology of Kerguelen Island (Minutes, 1879, p. 79).

The Secretary was instructed to request Mr. Perry to call at the Office when next in London to see this criticism upon his work.

The Secretary suggested that Mr. E. Douglas Archibald, M.A., might be a suitable person to undertake the plotting of constants on the physical globe proposed by Sir J. H. Lefroy (Minutes, 1879, p. 45). The Secretary was authorised to communicate with Mr. Archibald.

Submitted—A paper by Mr. Galton describing a method for observing clouds stereoscopically by means of reflections from a pool of water, and from a cup of water at a higher level. The paper was ordered to be copied by chromograph, and distributed to Council.

The Secretary reported that Mr. E. Johnson had offered to undertake the management of the instruments exhibited by the Office at the Fishery Exhibition at Berlin (Minutes, 1879, p. 30).

He was authorised to allow the sum of five guineas for the purpose.

The Council then adjourned.

116, *Victoria Street*, April 28, 1880.

PRESENT :

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE.
MR. GALTON.

LIEUT.-GENERAL STRACHEY.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (April 15) were read and confirmed.

The Secretary reported that the following agreement had been signed on the 23rd instant by Mr. Symons, and by the Chairman on behalf of the Council, as directed at last meeting.

MEMORANDUM OF AGREEMENT made this 23rd day of April 1880 between Professor H. J. S. Smith on behalf of the Meteorological Council, and George James Symons, whereby George James Symons undertakes to supply on or before July 1st, 1881, a series of tables giving the monthly and total annual rainfall in each of the three lustra 1866-70, 1871-5, and 1876-80, together with the average of each month and of the annual totals for each lustrum at each and all of those 372 stations whereof a list has been supplied to the Meteorological Council, and at which the records shall continue perfect up to December 31st, 1880, with the understanding that, if any of the records shall cease to be perfect, Mr. Symons shall endeavour to substitute for them records from contiguous stations, so as to make the work as complete as possible. It is further agreed that the form and arrangement of the tables shall be subject to the approval of the Meteorological Council, that the work shall appear as a publication of the Meteorological Office, with the recognition of the authorship of Mr. Symons, who will undertake to correct the proofs and see the work through press, and that the payment to him for the same shall be the sum of four hundred pounds, payable immediately after the completion of the work, or earlier, if preferred by the Meteorological Council.

Reported—That the following letter had been sent to the War Office, with reference to the proposed balloon ascents (Minutes, April 15).

SIR,

26th April 1880.

THE Meteorological Council, which is entrusted with the application of the annual Parliamentary grant for carrying out Meteorological observations, having learnt that balloon ascents are from time to time undertaken under the direction of officers of the Royal Engineers, with a view to their possible application to military purposes, is desirous of knowing whether it would be compatible with the military objects primarily in view, for the persons directing the ascents to record certain meteorological observations during their progress and supply them to the Council.

I am to explain that such observations might be of great scientific value, and that it appears to the Council that they could probably be made without interfering with other objects. A form is enclosed which will indicate the description of observations desired.

I am also to add that the Council would be prepared to meet any extra expense which might attend the record of such observations and to supply needful instruments.

The Council would likewise be glad to know whether it is probable that any arrangement could be made under which the trained officers of Royal Engineers might undertake ascents, at the charge of the Council, for scientific purposes. Should it be considered possible, the Council would be ready to communicate with any officer deputed for the purpose, as to the system under which such ascents should be arranged.

The Council desire me to explain that they have been in communication with Captain Templer on the subject of balloon ascents generally, but understanding that he is to some degree under engagements with the War Department in the matter, they think it right to make the present inquiry before proceeding further.

In conclusion I am requested to convey to the Under Secretary for War the opinion of the Meteorological Council that the study of the state of the atmosphere at some elevation above the earth's surface is of the greatest scientific importance in connexion with the branch of phenomena which it is their special province to investigate, while its prosecution is beset with very great difficulties. They feel satisfied therefore that such ascents as they understand are in the future likely to be undertaken by officers so eminently qualified to obtain valuable scientific results as those of the corps of Royal Engineers, will offer a means of carrying out such researches not otherwise attainable, and could not fail to throw much light on many very obscure questions connected with Meteorology.

They consequently trust that their request may receive the favourable consideration of the Department.

(Signed) I have, &c.
ROBERT H. SCOTT,
Secretary.

The Under Secretary of State for War.

Mr. Shaw (Minutes, 1879, p. 50) attended, and was requested to prepare and send to the Secretary a memorandum of the apparatus he proposed to employ in his experiments in hygrometry, and of the observations he proposed to make.

Submitted—The following statement of accounts for the year ending 31st March 1880 :—

INCOME.				EXPENDITURE.			
	£	s.	d.		£	s.	d.
Balance from year 1878-9	-	-	709 9 10	ADMINISTRATION :			
Vote for year 1879-80	-	-	14,500 0 0	Payment of Council	1,000	0	0
Repayment of expenses charged under—				Secretary	800	0	0
(1.) Incidental expenses	-		15 2 9	Salaries and wages	712	1	0
(2.) Special researches (Hoffmeyer's charts and Sun apparatus)	-		29 0 6	Rent, fuel, and lighting	778	1	2
(3.) Observatories and stations	-		8 12 6	Alteration of premises and furniture	195	10	10
SUPPLY OF INFORMATION :				Expenses incidental to International Meteorological Congress	104	8	1
Special reports for "Times," "Standard," and "Daily News"	837	14	6	Incidental and contingent expenses	324	8	10
D. W. Charts and ordinary Forecasts	363	15	8				3,914 9 11
Telegrams supplied to Hamburg	332	16	0	SPECIAL RESEARCHES AND EXPERIMENTS	970	4	4
Ordinary weather information for Press Agencies, &c.	137	17	2	LAND METEOROLOGY :			
			1,672 3 4	Observatories and stations	2,448	19	11
OCEAN STATISTICS (India Office, &c.)			374 15 3	Discussion and reduction of observations	1,406	17	8
Miscellaneous data	-	-	5 7 0				3,855 17 7
SALE OF INSTRUMENTS, &c. :				WEATHER INFORMATION AND FORECASTS :			
Royal Navy account	39	9	5	Telegraphic reports and storm warnings	3,455	19	9
Mercantile Marine do.	83	15	4	Preparation and issue of reports and forecasts	1,407	13	2
			123 4 9				4,863 12 11
Commission charged on work done for Colonies, &c.	-	-	15 4 10	INSPECTIONS :			
				Salaries and travelling expenses	-	-	508 15 7
				OCEAN METEOROLOGY :			
				Discussion and reduction of observations	1,819	10	5
				Expenses incidental to the supply of instruments :			
				Care and issue of instruments	200	0	0
				Royal Navy	271	6	2
				Mercantile Marine	521	4	8
				Distant island and coast stations	57	2	1
							2,869 3 4
				Balance	-	-	470 17 1
			£17,453 0 9				£17,453 0 9

LIABILITIES.				ASSETS.			
	£	s.	d.		£	s.	d.
To Post Office (partly estimated)	431	5	8	By cash at bank	1,111	17	8
„ sundry creditors	699	0	0	„ „ at Office	169	8	2
„ „ (contracts or work uncompleted)	207	19	6	„ „ at Valencia	50	0	0
„ balance	470	17	1	„ sundry debtors	477	16	5
			£1,809 2 3				£1,809 2 3

Captain Abney attended and reported (Minutes, 1879, p. 84) :—

1. As to the present condition of his apparatus for cloud photography.
2. As to the improvements suggested by him in the photographic processes at the self-recording observatories.
3. As to the apparatus proposed by Mr. H. Darwin and himself for the registration of the total chemical effect of daylight.

With reference to the subject of Arctic Meteorology (Minutes, April 15), it was resolved—

That Mr. Strachan's suggestions as to the contents of Part III. be accepted in principle, and that he be directed to inquire what original documents can be obtained for it, and, when he is in possession of this information, to report more specifically as to the plan of the work, it being the desire of the Council that the results should be published in a more condensed form than that which was adopted in Part II.

The subject of Sea Temperature Observations (Minutes, 1878, p. 125) was discussed, and it was resolved that letters be addressed to the Superintendent of Naval Reserves, the Trinity House, and the Commissioners of Irish Lights, requesting them to allow the observations to be continued until October 1881, and explaining that the Council attach great value to the observations which they have already received, and to which great attention appears to have been given on the part of the authorities, but that the Council consider that the value of the results would be greatly increased by the continuance of the system for a second year.

It was further resolved that Mr. Scott be instructed to entrust the provisional reduction of the Sea Temperature Observations already received to some competent person, the Monthly Means to be given to the nearest degree, and the cost not to exceed 10%.

Reported—That Mr. F. J. Clarke had been engaged on temporary employment in copying, in the place of Mr. Newton, who had recently resigned, at a salary of 12s. 6d. per week for 8 hours work. Approved.

The Council then adjourned.

116, Victoria Street, May 12, 1880.

PRESENT:

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE.
MR. GALTON.

LIEUT.-GENERAL STRACHEY.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (April 28) were read and confirmed.

Read—The following reply to the letter printed on the Minutes of last meeting :—
MO. 1212.

SIR,

War Office, May 12, 1880.

I AM directed to acknowledge the receipt of your letter of the 26th ultimo, inquiring whether the assistance of officers of Royal Engineers directing balloon ascents could be afforded in recording Meteorological observations for transmission to the Meteorological Council; and to inform you that the Secretary of State for War will have no objection to these officers recording such observations, provided that the Meteorological Department will furnish the necessary instruments. As regards the request in the fourth paragraph of your letter, I am to state that the Secretary of State for War cannot at present say whether arrangements can be made to undertake ascents for scientific purposes at the charge of the Council. Upon this point he must be guided by the results of the experiments which will be carried on during the summer, upon the completion of which a farther communication will be made to you.

I have, &c.
(Signed) J. L. A. SIMMONS,
General.

The Secretary of the Meteorological Council.

With reference to the typical cloud pictures intended to illustrate the "Aids to the Study and Forecast of Weather," (Minutes, 1879, pp. 49 and 96,) Mr. Galton reported that he had conferred with an artist, and had been advised that it would be difficult to obtain satisfactory drawings.

It was accordingly resolved—1. That the book be published without these illustrations, some additional description of cloud forms being introduced into the text where necessary. 2. That Captain Abney be consulted as to the probability of obtaining during the present summer a series of cloud photographs from which to select typical pictures for engraving.

Read—A report from Mr. Whipple (Letter 1210) on the nephoscopes devised by Mr. Galton and General Strachey. Mr. Galton reported that the instruments had been returned to Messrs. Beck for modification.

The discussion of the Cape Gales for July by Captain Toynbee (Minutes, 1879, p. 151) was considered, and it was resolved that Captain Toynbee be instructed to proceed (so far as can be done without interruption to the production of the Cape Charts) with the discussion of the January Gales on the same general method, for comparison with the July gales.

Read—A memorandum from Captain Toynbee reporting that since the meeting of April 15, 13 logs had been received, 8 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. P. Aldrich, R.N., assisted by Sub-Lieutenants G. W. Gubbins, E. C. Helby, A. J. Loane.	H.M.S. "Sylvia"	May 9, 1877— Jan. 11, 1880.	Surveying in China Seas.	—
Capt. J. Campbell -	Barque "Hope"	Nov. 6, 1879— April 22, 1880.	Liverpool to Galveston and home.	—
Capt. H. von Freeden	"W. von Freeden"	Oct. 10, 1879— April 22, 1880.	Glasgow to Monte Video and home.	1879, p. 60.
Capt. G. H. Jones -	SS. "Lamperts"	Oct. 14, 1879— April 3, 1880.	Newport, Alexandria, Cardiff, Bassein and Aden.	1879, p. 72.
Capt. H. Manning -	SS. "Seine" -	Nov. 17, 1879— May 2, 1880.	London, Java, &c. (laying cable).	1879, p. 74.
Capt. J. Seymour -	SS. "Kangaroo"	Nov. 15, 1879— May 3, 1880.	Aden, Mauritius, Hobart-town, New Zealand, and home.	1879, p. 61.
Capt. G. Shearer -	"Early Morn" -	June 14, 1879— April 19, 1880.	Greenock, Rangoon, &c.	1879, p. 19.
Capt. J. Smith -	"Naiad" -	June 7, 1878— April 18, 1880.	Liverpool, Calcutta, West Coast of America, and home.	1879, p. 61.
Capt. W. Waring -	SS. "Gordon Castle."	Oct. 22, 1879— April 21, 1880.	China and New York via Suez.	1879, p. 61.

Mr. Scott was instructed to present the charts (O. 27) to Captains Aldrich and Campbell and to Messrs. Gubbins, Helby, and Loane, and to convey the best thanks of the Council to the other observers.

Read—Letters 1140 and 1179 from Mr. H. Darwin with the working drawings of his apparatus for the registration of the total chemical effect of daylight (Minutes, p. 15). The Secretary was instructed to return the drawings, and to request Mr. Darwin to send instead a pen-and-ink sketch of his instrument with a description of it.

Mr. Scott submitted his report (Minutes, 1878, pp. 38, 98) on the observations made at the Pagoda in Kew Gardens, in order to test the influence of height on thermometer readings, &c. He reported that in Professor Stokes' opinion the paper was better suited for publication by the Office than by the Royal Society, as referring mainly to the results of a series of observations, without theoretical deductions. General Strachey reported that he had looked over the paper, and it was resolved, in accordance with his recommendation, that it be printed in a condensed form, and that it be referred to in the Annual Report.

Submitted—A correspondence with Mr. Perry relative to his discussion of the Kerguelen observations (Minutes, p. 12), (Letters received, 1184, 1200; written, 1224). Resolved—That Mr. Perry be informed that the Council propose to print errata for the Kerguelen paper on a separate leaf, to be inserted in each copy. A proof of these errata to be sent to Mr. Perry in due course.

Submitted—The following Report (Minutes, p. 14):—

ON THE DETERMINATION OF THE HUMIDITY OF THE ATMOSPHERE.

Preliminary Report.

TAKING the actual tension of aqueous vapour in the atmosphere at a definite point of time as the quantity sought to be determined by observations with hygrometers of all classes, the first point noticeable is that the determination by instruments of every kind is indirect, and therefore each instrument requires a formula of reduction by which the tension may be obtained from the observations made.

In the appended table, p. 18, the hygrometers which I have undertaken to compare are arranged in classes according to the quantities which are actually observed in each case, and I have thought it well to add a column showing the most advantageous state of the air in the neighbourhood of the instrument for obtaining reliable applications of the formulæ of reduction.

It will be seen that these conditions for some of the classes taken together are incompatible, and I therefore think it advisable that in comparing hygrometers of the same class, in order to form an idea of the value of each different method, I should endeavour in the first instance to obtain the air in the neighbourhood in its most advantageous state for that method. At the same time I think it should be kept in view that an instrument, to be practically useful and reliable, must be to a large extent capable of adapting itself to the changes to be expected in the external atmosphere, and that therefore a hygrometer which will determine under favourable conditions with great accuracy what it is intended to indicate may still be a comparatively useless instrument in practical meteorology, and I accordingly wish to compare the result of more or less rapid variation of atmospheric conditions upon instruments of different classes as well as their capacities for giving a concordant series of readings when the conditions are maintained constant and favourable.

Some of the rooms in the Cavendish laboratory are particularly well adapted to maintaining the air at a very nearly constant temperature for days, so that I expect but little difficulty in producing any atmospheric conditions that I wish. It will also be advisable, probably, to obtain small quantities of air in a known hygrometric state by means of evaporation from saline solutions in a closed space, more especially in order to test the hair hygrometers.

With regard to the psychrometer:—All psychrometer readings are reduced by the same tables, although from my own and the published experience of others the readings of two instruments are seldom identical. This may be due to the three following causes:—

- (1.) The difference in shape and dimensions of the bulbs.
- (2.) The method of moistening the bulb.
- (3.) The currents of air in the neighbourhood of the instrument.

I propose, then, before comparing the psychrometers with other instruments, to endeavour to determine what influence on the reading of the wet bulb the three causes above-mentioned exercise.

The first two causes have been investigated by Cantoni, but I think it will be necessary to repeat some of his observations with regard to the moistening, since, so far as I know, the method of moistening the bulb by a Mariotte's bottle has not been employed here, and was not employed by the authorities from whose observations the reduction tables are compiled.

With regard to the third cause, besides experimenting with the blowing apparatus (which I conclude to be that made by the Technical Institution at Milan, known as the Tecnomasio), I have made an arrangement, in which a current of air due to a gas jet passes over the bulbs of a series of thermometers on a screen in front of a chimney, where, by opening and closing holes behind the bulbs and placing the moistening apparatus on one side or other of the screen, I can ascertain with tolerable completeness the effects due to the possible disturbing causes, which, according to a considerable amount of evidence render the psychrometer at present an imperfect instrument.

My general line of investigation will then be—

- (1.) To compare instruments of the same class under the most favourable conditions, and determine their sensitiveness to variation of condition.
- (2.) To compare instruments of different classes which require similar conditions.
- (3.) To compare the whole range of instruments, accepting as the most reliable the result obtained from Schwachhöfer's instrument, if (a) on comparing that instrument with the ordinary chemical hygrometer, and (b) on determining by its means the moisture in an atmosphere artificially maintained in a known state, it shows itself worthy of the credit to which it seems to me at present entitled.

Emmanuel College, May 11, 1880.

W. N. SHAW.

TABLE OF HYGROMETERS TO BE COMPARED.

Class of Instrument.	Name of Instrument.	By whom supplied.	Quantity which the Instrument is designed to measure.	Reduction Formula by which the tension of Aqueous Vapour e is obtained from the Quantity measured.	State of the Air surrounding the Instrument calculated to give the most reliable determination of e .
CHEMICAL HYGROMETERS.	1. Chemical Aspiration apparatus.	Constructed by the Observer.	Mass m of aqueous vapour which was combined with a volume v of dry air.	$e = \frac{h m (1 + .003665t)}{v d + m (1 + .003665t)}$ where t is the temperature of the air at the time of observation, h the barometric height, d the density of water vapour at 0° C. & 760mm.	Moisture and temperature uniform or uniformly varying during the observation. Best obtained by drawing the air from a closed space at a uniform temperature.
	2.* Schwackhöfer's apparatus.	From Schneider of Vienna, by Meteorological Office.	Percentage diminution of volume n of a given quantity of air when the aqueous vapour is removed, the pressure and temperature being maintained constant.	$e = \frac{n}{100} h$	Moisture uniform throughout the space in the neighbourhood at the moment when the air is taken into the apparatus for experiment.
DEWPOINT HYGROMETERS.	3. Regnault's	Committee of Kew Observatory.	The temperature t_0 to which a metallic surface must be cooled to cause a deposition of moisture upon itself; temperature reduced by evaporation of ether. The same as above, the metallic surface replaced by blackened glass, and the cooling effected by iced water.	$e = e_{t_0} \left\{ \frac{1 + \alpha t}{1 + \alpha t_0} \right\}$ where e_{t_0} is the vapour tension at t_0 C., and $\alpha = .003665$. t is the temperature of the air.	The pressure of the same mass of air remaining the same, the temperature of the dewpoint will always be the same. The air for these observations should therefore be still, and the two thermometers screened from each other.
	4. Alluard's	Meteorological Office			
	5. Dines's	Cavendish Laboratory			
PSYCHROMETERS	6. Psychrometer of usual construction by Casella.	Cavendish Laboratory	The cooling of a thermometer $t - t'$ due to enclosing its bulb in moist muslin.	(1.) Jelinek's tables calculated from the formulæ— $e = e' - \frac{.480 (t - t') h}{689 - t}$ if $t' < 0^\circ \text{C.}$ $e = e' - \frac{.480 (t - t') h}{610 - t'}$ if $t' > 0^\circ \text{C.}$ (2.) Empirical tables by Glaisher.	The air should be in motion, and some arrangement made to prevent the water evaporated from the wet bulb affecting the indication of the instrument.
	7. Psychrometer with apparatus for blowing a current of air past the bulb. Supposed to be made by the Tecnomasio at Milan.	Meteorological Office	Ditto		
HAIR HYGROMETERS	8. Saussure's modified	Meteorological Office	Extension of a hair by its absorbing moisture.	Graduated by an empirical scale of comparison with other hygrometers.	Constant relative humidity or nearly so; slow motion of the air.
	9. Klinkerfues's	Ditto	Ditto of a bundle of hairs		

* Schwackhöfer's apparatus arrived in Cambridge with all the most important glass parts broken. I have arranged with Mr. Hicks, of Hatton Garden, that he shall replace them precisely on Schwackhöfer's model. W. N. S.

Submitted—The following report on the Forecasts for April (Minutes, 1879-80, p. 31):—

The letters used have the following signification:—

a complete success.

b partial (*i.e.*, more than half) success.

c partial failure.

d total failure.

2.30 P.M.

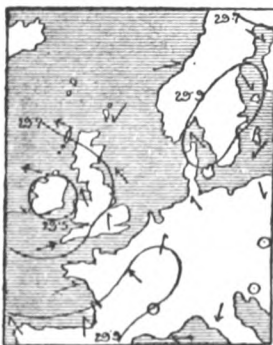
8 P.M.

DISTRICTS.		Percentages.			Percentage of Success a + b.
		Wind.	Weather.	Entire Forecast.	
SCOTLAND, N.	a	24	43	34	77
"	b	53	34	43	
"	c	10	10	10	
"	d	13	13	13	
SCOTLAND, E.	a	17	43	30	72
"	b	57	27	42	
"	c	16	17	17	
"	d	10	13	11	
ENGLAND, N.E.	a	27	37	32	69
"	b	47	27	37	
"	c	13	13	13	
"	d	13	23	18	
ENGLAND, E.	a	33	43	38	80
"	b	47	37	42	
"	c	20	10	15	
"	d	—	10	5	
MIDLAND COS.	a	43	37	40	77
"	b	37	36	37	
"	c	17	17	17	
"	d	3	10	6	
ENGLAND, S.	a	43	37	40	82
"	b	47	36	42	
"	c	10	17	13	
"	d	—	10	5	
SCOTLAND, W.	a	20	47	34	75
"	b	50	33	41	
"	c	10	10	10	
"	d	20	10	15	
ENGLAND, N.W.	a	30	57	44	77
"	b	40	26	33	
"	c	10	7	8	
"	d	20	10	15	
ENGLAND, S.W.	a	37	50	44	82
"	b	40	37	38	
"	c	13	3	8	
"	d	10	10	10	
IRELAND, N.	a	30	44	37	79
"	b	43	40	42	
"	c	7	3	5	
"	d	20	13	16	
IRELAND, S.	a	30	60	45	80
"	b	43	27	35	
"	c	10	7	9	
"	d	17	6	11	

DISTRICTS.		Percentages.			Percentage of Success a + b.
		Wind.	Weather.	Entire Forecast.	
SCOTLAND, N.	a	35	35	35	72
"	b	38	35	37	
"	c	19	19	19	
"	d	8	11	9	
SCOTLAND, E.	a	23	35	29	73
"	b	58	31	44	
"	c	4	19	12	
"	d	15	15	15	
ENGLAND, N.E.	a	31	27	29	78
"	b	54	43	49	
"	c	4	15	9	
"	d	11	15	13	
ENGLAND, E.	a	23	38	31	81
"	b	62	39	50	
"	c	11	19	15	
"	d	4	4	4	
MIDLAND COS.	a	31	35	33	77
"	b	38	50	44	
"	c	23	15	19	
"	d	8	—	4	
ENGLAND, S.	a	35	65	50	94
"	b	61	27	44	
"	c	—	4	2	
"	d	4	4	4	
SCOTLAND, W.	a	19	46	33	75
"	b	54	31	42	
"	c	4	19	11	
"	d	23	4	14	
ENGLAND, N.W.	a	28	46	37	74
"	b	42	31	37	
"	c	15	15	15	
"	d	15	8	11	
ENGLAND, S.W.	a	31	46	39	75
"	b	50	23	36	
"	c	11	16	14	
"	d	8	15	11	
IRELAND, N.	a	23	61	42	79
"	b	50	23	37	
"	c	4	8	6	
"	d	23	8	15	
IRELAND, S.	a	31	50	40	71
"	b	31	31	31	
"	c	19	11	15	
"	d	19	8	14	

SUMMARY.

BRITISH ISLES	a	30	45	37	77
"	b	46	33	40	
"	c	12	10	11	
"	d	11	12	12	
BRITISH ISLES	a	28	44	36	77
"	b	49	33	41	
"	c	10	14	12	
"	d	12	8	10	



Submitted—Specimens of weather charts for the Weekly Weather Report executed by Leitch's process, by means of zinc blocks.

The accompanying specimen was approved. The scale to be enlarged as much as possible.

Mr. Scott was directed to obtain an estimate for the supply of seven such blocks for the Weekly Weather Report, and to request the Stationery Office to employ them instead of those hitherto supplied.

April 30, 1880.

STATEMENT of WORK done in PANTAGRAPH ROOM during April 1880.

Copper Plates engraved:—1879, Nos. 62 to 65, omitting Wind curves; Nos. 55 to 60, Wind and Rain curves added.

Zinc Plates:—Barograms, 6 plates, Nos. 68 to 73, 1879; Thermograms, 5 plates, Nos. 72 to 73, 1879, Nos. 1 to 3, 1880; Vapour tension, 6 plates, Nos. 68 to 73, 1879; Anemograms, 6 plates, Nos. 57 to 62, 1879; Rain curves, 7 plates, Nos. 55 to 61, 1879.

Photographic Curves are ready for pantographing to Plate 7 (1880) for barograms; and Plate 6 for thermograms.

The engraving of a copper plate for the Marine Room occupied me and Mr. Thompson four days. Mr. Rigby has been at Westminster Hall under a subpoena three days; and a good deal of time has been taken up in connexion with evidence for the "Tay Bridge Inquiry."

The January tabulations were received on the 2nd, and passed to the Computing Room on the 8th. The February sheets have not yet been received from Mr. Allen.

Mr. Stodart has been away ill since the 12th.

Mr. Allen's memorandum is attached.

R. H. Scott, Esq., F.R.S.

R. H. CURTIS.

April 23, 1880.

STATEMENT of WORK done in the EXAMINATION ROOM since 23rd March 1880.

The following curves and tabulations have been examined:—January: *Anemograms*, three stations. February: *Thermograms*, all stations; *Barograms*, five stations; *Anemograms*, one station. March: Such portion of the Valentia and Armagh work as was required for the Registrar General of Ireland.

To R. H. Scott, Esq.,
Secretary, Meteorological Council.

T. E. ALLEN.

May 11, 1879.

STATEMENT of WORK done in MARINE ROOM during April 1880.

New logs examined, eighteen in number.

Noting letters in recent logs, replies to queries, &c., now posted to date.

Cape of Good Hope District.

Wind.—Various work in connexion with wind-rose form for drawing wind-chart. Preparing data for homogeneous areas for August and February.

Barometer.—Working means and range for single-degree squares, partially for August and February. October means and range plotted and isobars drawn.

Air Temperature.—Means and range for single-degree squares completed for August and partially worked for June and September. Isotherms drawn for February.

Sea Surface Temperature.—Means and range for single-degree squares completed for May, August, November, and December. Results plotted for March, May, August, September, November, and December. This completes the 12 months. Isotherms drawn for March, June, and September.

Cape Gales.—Checking proof of July letterpress, and preparing copies for Council.

Slight progress made in examination of Indian Government Data Books for July to December.

(Signed) CHAS. HARDING,
HENRY TOYNBEE,
Marine Superintendent.

R. H. Scott, Esq.

Resolved—That Mr. Cullum receive the increase of 10*l.* per annum, and Mr. Brodie the increase of 4*l.* per annum to which they are entitled (Minutes, 1875, pp. 77 and 32), to raise their salaries to their respective maxima.

Submitted applications for increase of salary (Letter 686) from several members of the staff. These applications were declined.

Reported that Mr. C. Stodart, who had been employed as engraver for 10 years, had died on the 5th inst. Resolved that under the special circumstances of the case the sum of 20*l.* be paid to his widow.

The following cheques for April were drawn on the 30th of that month:—

Administration :				£	s.	d.	£	s.	d.
R. H. Scott, Secretary	-	-	-	-	-	-	66	13	4
J. S. Harding, jun.	} Salaries and wages	-	-	{	27	15	6		
T. D. Bell					13	6	8		
J. S. Harding, sen.					*8	19	8		
							50	1	10
Carried forward				-	-	-	£116	15	2

* Four weeks to the 24th April.

			£	s.	d.	£	s.	d.
	Brought forward	-	-	-	-	116	15	2
Administration—continued.								
The Gas Light & Coke Co., gas	-	-	5	14	10			
" " "	-	-	0	4	4			
						5	19	2
The Pall Mall Coal Co., coals	-	-	-	-	-	3	0	0
Bond & Son, fittings, &c.	-	-	-	-	-	12	17	6
Jacob & Valentin, freight	-	-	-	-	-	1	2	6
Pickford & Co., carriage of parcels	-	-	-	-	-	3	11	4
Special Researches :								
R. W. Munro, balance due for harmonic analyser, &c.	-	-	-	-	-	36	19	6
Land Meteorology :								
Cashiers, Bank of England (forms supplied by Stationery Office)						2	3	11
J. E. Cullum, salary	-	-	-	-	-	15	16	8
Hopkin & Williams, chemicals	-	-	-	-	-	9	3	5
R. H. Curtis	-		22	4	5			
J. A. Curtis	-		15	11	1			
T. E. Allen	-		15	11	1			
C. H. Thompson	-		*9	4	0			
E. G. Aldridge	-		*7	6	8			
		Discussion, &c. of Observations.				69	17	3
Weather Information and Forecasts :								
F. Dangerfield, delivery of D. W. charts	-	-	-	-	-	11	19	4
Postmaster General, telegrams	-	-	-	-	-	206	7	4
L. Poulton, printing, &c. for hay forecasts	-	-	-	-	-	2	5	6
D. Cremin, Valencia Postmaster	-	-	-	-	-	0	14	0
F. Gaster	-		30	7	6			
W. L. Dallas	-		19	15	1			
F. Brodie	-		19	2	0			
H. W. Chivers	-		*6	12	0			
		Preparation and issue of Q. W. Reports, &c.				75	16	7
For Ocean Meteorology :								
Captain H. Toynbee	-	-	33	6	8			
R. Strachan	-		27	15	6			
C. Harding	-		22	4	5			
H. Harries	-		*11	4	0			
Lieut. C. W. Baillie	-		16	13	4			
		Discussion, &c. of ob- servations, and care of instruments.				111	3	11
Negretti & Zambra, "A." Instruments	-	-	-	-	-	94	10	6
G. M. Whipple, verifications	-	-	8	5	0			
" " "	-	-	20	5	0			
						28	10	0
J. R. Jones, Aberdeen agent	-	-	-	-	-	8	0	8
H. J. Thatcher, Cardiff	-	-	-	-	-	2	14	6
D. McGregor & Co., Glasgow	-	-	-	-	-	3	0	8
Z. Scaping, Hull	-	-	-	-	-	4	17	6
J. Gill, Liverpool	-	-	-	-	-	22	1	11
Miscellaneous :								
L. P. Casella, commissions	-	-	-	-	-	15	0	0
G. M. Whipple, "	-	-	-	-	-	7	8	0
J. S. Harding, jun., petty cash	-	-	120	0	0			
" " "	-	-	80	0	0			
						200	0	0
Total						£1,071	16	10

* Four weeks to the 24th April.

The Council then adjourned.

116, *Victoria Street*, May 26, 1880.

PRESENT :

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE.

MR. GALTON.

PROFESSOR STOKES.

LIEUT.-GENERAL STRACHEY.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (May 12) were read and confirmed.

Read—The following letter :—

6634/80.

M.O. 1248.

SIR,

Treasury Chambers, May 14, 1880.

I AM directed by the Lords Commissioners of Her Majesty's Treasury to request you to call the attention of your Council to the enclosed copy of a letter from the Comptroller and Auditor-General relating to a gratuity paid to the widow of a temporary clerk in your service.

My Lords, looking to the terms of the second paragraph in the letter of 23rd May 1877 from the Treasury to the President of the Royal Society, establishing the present Meteorological Council and defining its powers, do not propose to interfere with this particular payment, but I am at the same time to state that, except in certain cases of death due to accident incurred in the discharge of duty, no such payment is allowed in the Civil Service, and my Lords think it generally advisable that the same rule should be observed by your Council, and that no payment for service should in future be made out of the public grant except to the employes themselves according to agreement.

I am, &c.

The Chairman of the Meteorological Council,
116, *Victoria Street*.

(Signed) R. R. W. LINGEN.

483.

Exchequer and Audit Department, Somerset House,
London, W.C., April 9, 1880.

SIR,

I AM directed by the Comptroller and Auditor-General to state, for the information of the Lords Commissioners of Her Majesty's Treasury, that in the examination of the expenditure of the Meteorological Department for the quarter to 30th June 1879 it is observed that a gratuity of 27*l.* 6*s.* has been paid to the widow of a temporary clerk.

The Comptroller and Auditor-General would be glad to be informed, with regard to payments of this nature which would not be admissible in ordinary accounts without special authority, whether it is their Lordships' wish that they should be brought under their notice, or whether the authority of the Meteorological Office may be accepted as sufficient for them.

I have, &c.

Sir R. R. W. Lingen, K.C.B.,
Treasury.

(Signed) H. TREHERNE.

The Secretary was instructed to write to the Treasury explaining the circumstances under which the Minute relating to Mrs. Stodart was made at the last meeting.

Read—The following letters (*vide* Minutes, 1879, p. 150) :—

M.O. 1264.

War Department, Office of the Chief Signal Officer,
Washington, D.C., May 1, 1880.

SIR,

I HAVE read with much interest the communication of March 11, 1880, referring to the exchange of one simultaneous observation daily, to be had between the United States and the Royal Navy as requested by this Office.

The telegrams noted in the letter were to suggest a change of hours by a few minutes. It was understood the regular taking of simultaneous observations was about to be commenced for the first time on the vessels of Her Majesty's Navy, and an exchange of a single observation daily, some months ago suggested to the Council, would follow. The needs and contemplated undertakings of the United States were imperatively urging to do away with an irregularity of report, and of hours, forced in the early days of the service, by difficulties of telegraphic communication which have disappeared.

The change could not fail to be of benefit abroad by facilitating the labours of this Office. It would be to an hour not inconvenient for foreign correspondents and necessary for any purposes of international co-operation. A letter bearing upon the subject was about to issue to the different parties with whom the United States had separately arranged for co-operation in the exchange of the existing reports. (It will do so almost immediately.) It was not thought likely that they would hesitate to concede the courtesy of so slight a difference in a matter so essential to our labour here.

Capt. Myer

While it is not considered that there need be any absolute continuity of reports on board ships at sea (a number reporting), provided only they report simultaneously when they do report, and changes of the hours of observation can be easily made in disciplined naval forces, it was feared that unnecessary trouble might be caused if the orders directing the simultaneous observations in the Royal Navy were to issue, for the first time, when the request for the change of time would so soon be made. It would not injure the series if commencing a little earlier in the Royal Navy than in others which would be asked to co-operate in the change, and with which our relations are so cordial as to give every reason for compliance.

The telegrams which have received the courteous attention of the Council were therefore forwarded.

There are no nations so much interested in a complete co-operation as those which border upon the shores of the Atlantic, and we, upon this Continent, cannot but feel that any aid given our work must almost directly aid those charged with similar duties on the other side of the seas.

An expression of thanks is due the Council for the readiness of their compliance with the first request of this Office and with the hope that they may not be unwilling to give further co-operation,

Robert H. Scott, M.A., F.R.S.,
Secretary of the Meteorological Council,
116, Victoria Street, London, S.W.,
England.

I am, &c.
(Signed) ALBERT J. MYER,
Brig.-Gen. (Bvt. Assgd.)
Chief Signal Officer of the Army.

M.O. 1305.

War Department, Office of the Chief Signal Officer,
Washington, D.C., May 4, 1880.

SIR,

On January 20, 1874, the Chief Signal Officer had the honour to ask, in form of an especial request, the exchange between England and the United States of one meteorological report, to be taken daily and simultaneously. The request met with a pleasant concurrence.

The Chief Signal Officer has now the honour to request, on behalf of the United States, that the hour for taking this simultaneous meteorological observation (now had by exchange from the British system of stations under the courteous co-operation of the Council, as taken daily at 0h. 43m. p.m., Greenwich mean time), may be changed to a time 35 minutes earlier, that is, to 0h. 8m. (no hours eight minutes) p.m., Greenwich mean time.

The duties of this Office are of such a nature as to have rendered this change in the hours of making its observations necessary. The Chief Signal Officer is compelled to call upon the courtesy of its correspondents.

It is essential to the accuracy of the work here entered upon, to the best discharge of duty of the Signal Corps and for the interests of all the populations of the several States, that an irregularity in the time of report, forced upon the service in the early days by difficulties of telegraphic communication, which have disappeared, should cease. The times at which the Office reports, its warning signals, and the results of its work must daily issue on this Continent and for its foreign co-operation, are so fixed by circumstances, your concurrence is greatly desired.

In arranging for the change, it is endeavoured to consult the interest and convenience of all co-operating associates, and it is hoped the action to be taken will result in benefit to all.

Arrangements are made to continue the publications furnished by this Office to each separate correspondent in recognition of his aid, without an interruption by the change.

The Chief Signal Officer suggests that the change be made to take effect at 0h. 8m. p.m., on September 1, 1880, Greenwich mean time.

If a later date is needed to enable you to make any necessary arrangements, he begs you will at once advise him of the fact, and also of the date at which he may expect the change of hours as requested, if practicable.

It is desired observations be recorded on the blank forms similar to those heretofore used, and forwarded as heretofore under the original request for the exchange as made by this Office; the only alteration on the blanks being that for the changed hour of observation.

In the matter of the one simultaneous report hitherto exchanged with the Meteorological Office, the United States has borne much of the pecuniary expense; the Meteorological Office forwarding only the reports as prepared, written on the blanks by the land observers; the United States bearing all expense of printing and the exchange and furnishing to each observer in requital for his work, the Monthly Weather Review, bulletins, maps, &c., the publications of this Office, as known to the Council. The United States further pays for the copying of the naval reports copied at the Meteorological Office. No change is at this time sought in these particulars.

Renewing to you the assurances of my great personal desire to co-operate with you always in any work in which I can aid, and with many thanks for the valuable assistance rendered by you hitherto,

Robert H. Scott, M.A., F.R.S.,
Secretary of the Meteorological Council,
116, Victoria Street, London, S.W.,
England.

I remain, &c.
(Signed) ALBERT J. MYER,
Brig.-Gen. (Bvt. Assgd.)
Chief Signal Officer of the Army.

The Secretary was instructed to inform General Myer: (1.) That the Council are prepared to assent to the change of hour, as soon as he is in a position to inform them that it has been so far accepted in other countries as to enable him to carry out

the proposal. (2.) That the Council would in any case be able to give simultaneous observations at 0h. 8m. from their seven observatories, and, should further observations be required, from several volunteer observers, but that they could not undertake to require their telegraphic reporters to take the proposed extra readings at 0h. 8m. p.m.

The Secretary was also instructed: (1.) To request General Myer to communicate with the Council as speedily as possible upon the subject, and to inform him that the suspension of the synchronous observations on board the ships of Her Majesty's Navy would be continued until the receipt of such communication. (2.) To acquaint Professor Mascart and Professor Wild of the nature of the reply sent to General Myer.

Reported—That Mr. Darwin had forwarded the description of his apparatus (Letter 1292) as requested at last meeting.

Mr. De La Rue stated that Professor H. McLeod had invented an apparatus intended to answer a purpose similar to that of Mr. Darwin. The Secretary was instructed to communicate with Professor McLeod.

With reference to the subject of balloon ascents, the Secretary was instructed to write to Captain Eldsdale, R.E., enclosing a copy of the letter from the War Office (Minutes, p. 15), and asking for an interview with him.

He was also instructed to write to Captain Templer with reference to ascents to be made by him in his private capacity.

The circular to newspapers (Letter 277) proposed to be issued by the Central Press Association was re-submitted to the Council in an amended form. It was resolved that the Council offer no objection to the issue of the circular as thus amended.

Read—The following memorandum :—

MEMORANDUM respecting the WORK in the MARINE ROOM.

I shall be glad to know from the Council what work is to be taken up after the Charts now in hand are finished. It is hoped that those Charts will be finished by the end of August.

The following is the state of the work with reference to those data in the Cape district which have not yet been specially discussed.

Dry Bulb.—Isotherms have been drawn on the wind charts, but no discussion of maximum, minimum, or range has been undertaken.

<i>Wet Bulb</i>	-	-	-
<i>Specific Gravity of Sea</i>	-	-	-
<i>Weather</i>	-	-	-
<i>Sea</i>	-	-	-
<i>"Remarks"</i>	-	-	-
<i>Clouds and Motion of Upper Clouds</i>	-	-	-

The observations have been extracted into the data books, but nothing further has been done.

When the Charts now in hand are ready, we have the Council's sanction for the following work :—

(a.) Cape gales for January, similar to those for July.

(b.) Routes to Australia in higher and lower parallels of latitude, so far as the district now under discussion is concerned (*see* Minutes, 1879-80, pages 137 and 145).

Perhaps I may be allowed to suggest that the time is approaching when we ought to know what the next piece of marine work is to be.

I am, &c.

HENRY TOYNBEE,

Marine Superintendent,

May 26, 1880.

R. H. Scott, Secretary,
Meteorological Council.

The Council agreed: (1.) That for the present no investigation of the range of air temperature and no investigation of humidity should be undertaken. (2.) That the specific gravity of the sea should be tried in a certain number of small districts (say six) in different parts of the Cape squares for the months of January and July; each district to contain about 200 observations, the results to be meaned, and tabulated as to the frequency of different specific gravity values. (3.) That Captain Toynbee be instructed to report on the best method of dealing, summarily and compactly, for the months of January and July only, with the observations of weather (including rain), of the clouds and of the state of the sea, and with the remarks from the log books.

Reported—That the Admiral Superintendent of Naval Reserves, the Trinity House, and the Commissioners of Irish Lights had expressed their readiness to continue the sea temperature observations for a second year (Minutes, p. 15).

Reported—That the requisite consent had been obtained from the Board of Trade to the proposed testing of the bridled anemometer at Holyhead (Minutes, p. 8), and that Mr. Williams was prepared to undertake the experiments.

Read—A memorandum from Captain Toynbee, reporting that since the last meeting five logs had been received, four of them being “excellent.”

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. W. Barron -	S.S. “Sultan” -	Jan. 14—May 16, 1880.	Hull and Hamburg, eight voyages.	1879, p. 128.
Capt. W. Ellery -	“Majestic” -	Sept. 4, 1879—May 2, 1880.	To Calcutta and home -	1879, p. 60.
Capt. W. P. Hughes	Barque “Royal Alexandra.”	July 11, 1879—May 20, 1880.	Liverpool to Calcutta and home.	1879, p. 61.
Capt. H. Spalding -	Barque “Dochra”	Oct. 20, 1879—April 16, 1880.	New Zealand, Astoria, and home.	—

Mr. Scott was instructed to present the charts (O. 27) to Captain Spalding, and to convey the best thanks of the Council to the other observers.

Submitted—The terms of a proposed arrangement with Captain T. M. Almond authorising him to act as Agent for the Office in the Port of London. (Letter 1,335, Minutes, p. 3.)

Reported—That Daily Weather Charts had been supplied to—

The Rear-Admiral at Queenstown (on the free list).
D. G. Briggs, Esq. (in return for observations).

The Council then adjourned.

116, Victoria Street, June 11, 1880.

PRESENT:

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE.
PROFESSOR STOKES.

LIEUT.-GENERAL STRACHEY.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (May 26) were read and confirmed.

The Secretary reported that, as directed at last meeting, he had written (i) to the Treasury with reference to the grant of 20% to Mrs. Stodart (Minutes, p. 24), (Letters 1468 and 1542); (ii) to General Myer (Letters 1469 and 1478) and to Professors Mascart and Wild (Letter 1477) with reference to the proposed change of hour of the simultaneous observations.

The draft of the Report of the Council for 1879–80 was submitted and discussed, and the Secretary was directed to forward it to the Royal Society when amended by the Chairman.

Reported—That Captain Elsdale, R.E., had had an interview at the Office with the Chairman and Mr. De La Rue on the subject of the observations to be made by him in balloons (Minutes, p. 26), and that Captain Elsdale had explained that he would be most willing to make occasional and tentative observations for the Office, but that owing to the special nature of the duty of instructing officers assigned to him this year, he could not at present undertake a systematic series.

It was resolved that a double set of instruments be placed at Captain Elsdale's disposal for such observations as he might be able to make.

Read—Letter 1451 from Captain Templer expressing his readiness to take observations during his private ascents, whenever practicable.

Submitted—Letters 1362 and 1458 from Professor McLeod, and Letter 1456 from Dr. R. Angus Smith, relating to their respective methods for measuring the actinic power of daylight.—Mr. De La Rue was requested to report on these letters at the next meeting.

SUBMITTED—The following STATEMENT respecting the RECORDS for March 1880, received from the SELF-RECORDING OBSERVATORIES, which have been examined at the METEOROLOGICAL OFFICE (see Minutes, 21st December 1868, and 20th November 1876).

—	Aberdeen.	Armagh.	Falmouth.	Glasgow.	Kew.	Stonyhurst.	Valencia.
	Direction. Velocity. Good. Good.	Direction. Velocity. Good. Indifferent.	Direction. Velocity. Good. Good.	Direction. Velocity. Good. Good.	Direction. Velocity. Good. Good.	Direction. Velocity. Indifferent. Good.	
ANEMOGRAPH :—							
Action - - - - -	0	0	0	0	0	0	0
Records deficient, due to stoppage of clock -	0	0	0	0	+1 hr.	0	0
” ” other causes -	*	—	—	—	—	—	—
Orientation verified - - -	0	0	0	0	31st	16th	3rd
No. of errors discovered by subsidiaries -	0	0	0	0	0	0	0
” ” irregular differences	1	0	0	0	1	0	3
Result of 40 Remeasurements :—							
Greatest difference - - -	1·0	1·0	2·0	1·0	2·0	1·0	2·0
Mean difference irrespective of sign -	0·0	0·5	0·7	0·2	0·6	0·0	0·5
Residual difference (— Meteorological Office) -	0·0	+0·1	0·0	+0·1	+0·2	+0·2	+0·1
RAIN GAUGE :—							
Action - - - - -	Good.	Good.	Indifferent.	Indifferent.	Good.	Good.	Good.
Records deficient, due to stoppage of clock -	0	23 hrs.	0	0	0	0	0
” ” other causes -	0	0	0	0	0	0	0
Errors in tabulation - - -	0	0	0	1	0	0	2

Submitted—The following report on the Forecasts for May (Minutes, 1879-80, p. 31):—

The letters used have the following signification:—

a = complete success.

b = partial (*i.e.*, more than half) success.

c = partial failure.

d = total failure.

2.30 P.M. FORECASTS.

DISTRICTS.		Percentages.			Percentage of Success a + b.
		Wind.	Weather.	Entire.	
SCOTLAND, N.	a	36	45	41	78
"	b	42	32	37	
"	c	16	—	8	
"	d	6	23	14	
SCOTLAND, E.	a	23	45	34	73
"	b	45	33	39	
"	c	23	16	20	
"	d	9	6	7	
ENGLAND, N.E.	a	26	42	34	78
"	b	54	33	44	
"	c	10	9	9	
"	d	10	16	13	
ENGLAND, E.	a	55	55	50	76
"	b	23	29	26	
"	c	16	16	16	
"	d	6	10	8	
MIDLAND COS.	a	36	48	42	73
"	b	39	23	31	
"	c	16	13	15	
"	d	9	16	12	
ENGLAND, S.	a	55	45	50	83
"	b	29	36	33	
"	c	3	16	9	
"	d	13	3	8	
SCOTLAND, W.	a	26	42	34	81
"	b	45	48	47	
"	c	9	—	4	
"	d	20	10	15	
ENGLAND, N.W.	a	36	48	42	79
"	b	48	26	37	
"	c	13	13	13	
"	d	3	13	8	
ENGLAND, S.W.	a	39	36	38	75
"	b	32	42	37	
"	c	16	6	11	
"	d	13	16	14	
IRELAND, N.	a	39	26	33	75
"	b	29	55	42	
"	c	16	3	9	
"	d	16	16	16	
IRELAND, S.	a	29	42	36	67
"	b	26	36	31	
"	c	23	6	14	
"	d	22	16	19	

8 P.M. FORECASTS.

DISTRICTS.		Percentages of Success.			Percentage of Success a + b.
		Wind.	Weather.	Entire.	
SCOTLAND, N.	a	38	50	44	77
"	b	35	31	33	
"	c	15	11	13	
"	d	12	8	10	
SCOTLAND, E.	a	27	27	27	73
"	b	46	46	46	
"	c	12	15	14	
"	d	15	12	13	
ENGLAND, N.E.	a	23	38	31	75
"	b	54	35	44	
"	c	12	12	12	
"	d	11	15	13	
ENGLAND, E.	a	31	50	41	73
"	b	46	19	32	
"	c	19	23	21	
"	d	4	8	6	
MIDLAND COS.	a	31	54	43	86
"	b	54	31	43	
"	c	15	8	11	
"	d	—	7	3	
ENGLAND, S.	a	50	42	46	83
"	b	42	31	37	
"	c	4	19	11	
"	d	4	8	6	
SCOTLAND, W.	a	27	31	29	71
"	b	38	46	42	
"	c	27	19	23	
"	d	8	4	6	
ENGLAND, N.W.	a	42	46	44	81
"	b	38	35	37	
"	c	12	4	8	
"	d	8	15	11	
ENGLAND, S.W.	a	35	31	33	70
"	b	46	27	37	
"	c	4	23	13	
"	d	15	19	17	
IRELAND, N.	a	42	23	33	67
"	b	27	42	34	
"	c	19	23	21	
"	d	12	12	12	
IRELAND, S.	a	23	50	37	75
"	b	42	35	38	
"	c	16	4	13	
"	d	19	4	12	

SUMMARY.

British Isles	a	36	42	39	76
"	b	37	36	37	
"	c	15	9	12	
"	d	12	13	12	
British Isles	a	34	40	37	76
"	b	43	34	39	
"	c	14	15	14	
"	d	9	11	10	

Mr. Scott requested instructions from the Council as to the issue of Hay Harvest Forecasts during the present season (Minutes, 1879, p. 23). He was directed to ascertain whether the Royal Agricultural Society, the Royal Dublin Society, and the Scottish Meteorological Society would wish the service to be resumed this year; and if the answers should be in the affirmative, to make the necessary arrangements.

Mr. Scott was instructed to have the bridled anemometer erected at Holyhead (Minutes, p. 26).

Read—Letter 1243 from Mr. G. J. Symons, F.R.S., accompanying a paper on the results of the comparative observations on different forms of thermometer screens, made at Strathfield Turgiss (Minutes, 1878, p. 43).—The paper was referred to General Strachey for report.

Read—Letter 1477 from Mr. E. J. Lowe, F.R.S., stating that it was in contemplation to establish a meteorological observatory at Shire Newton, near Chepstow, a property which he had lately purchased, and requesting assistance from the Office in carrying out his project.

Mr. Scott was instructed to visit Shire Newton at an early date and report to the Council.

Read—A memorandum from Captain Toynbee, reporting that since the last meeting six logs had been received, three of them being “excellent.”

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. T. W. Freeman	SS. “Newton”	July 17, 1879— May 22, 1880.	Shanghai and home, viâ Suez.	1879, p. 60.
Capt. C. C. Prehn -	“Mikado” -	Aug. 22, 1878— May 30, 1880.	China, Australia, and home.	1878, p. 49.
Capt. Malcolm Nicholson.	“John Rennie”	Oct. 20, 1879— June 4, 1880.	Adelaide and home -	—

Mr. Scott was instructed to present the Charts (O. 27) to Captain Nicholson, and to convey the best thanks of the Council to the other observers.

Submitted—The following reports :—

May 31st, 1880.

STATEMENT of WORK done in PANTAGRAPH ROOM during May 1880.

Copper plates pantagraphed :—1879, Nos. 66 to 73, omitting wind curves ; Ditto, Nos. 61 to 63, wind and rain curves added.

Zinc plates :—Barograms, 3 plates, Nos. 1 to 3, 1880 ; Thermograms, 9 plates, Nos. 4 to 12, 1880 ; Vapour tension, 12 plates, Nos. 1 to 12, 1880 ; Anemograms, 5 plates, Nos. 63 to 67, 1879 ; Rain curves, 12 plates, Nos. 62 to 73, 1879.

Photographic curves are prepared to Plate 11 for barograms ; thermograms are not in advance of zinc plates.

Mr. Stodart's illness has thrown the engraver's work very much into arrear.

Sunshine records have given a good deal of extra work during the month owing to dates and names having been omitted by many observers.

The February examination work was received from Mr. Allen on May 7th, and after being checked passed to the Computing Room on the 13th. I append Mr. Allen's memorandum.

R. H. Scott, Esq., F.R.S.

R. H. CURTIS.

May 24th, 1880.

STATEMENT of WORK done in the EXAMINATION ROOM since April 23rd, 1880.

The following curves and tabulations have been examined :—February : *Barograms*, three stations ; *Anemograms*, six stations.

March : *Thermograms*, six stations ; *Barograms*, four stations ; *Anemograms*, two stations.

To R. H. Scott, Esq.

T. E. ALLEN.

June 8th, 1880.

STATEMENT of WORK done in MARINE ROOM during May 1880.

Examined, 12 new logs and 4 lighthouse registers.

Cape of Good Hope District.

Wind.—Working results for natural areas for February. Drawing Wind Charts for February and August.

Barometer.—Working range, &c. for February, March, August, and December ; also frequency for February and December.

Sea-surface Temperature.—Isotherms drawn for May, August, November, and December.

Isotherms checked and transferred to Current Charts for eight months, completing this part of the work for all the months of the year.

CHARLES HARDING.

HENRY TOYNBEE,

Marine Superintendent.

R. H. Scott, Esq.

The following cheques for May were drawn on the 31st of that month:—

Administration :				£	s.	d.	£	s.	d.
R. H. Scott, salary	-	-	-	-	-	-	66	13	4
J. S. Harding, jun.	} Salaries and wages	-	-	-	-	{	27	15	6
T. D. Bell							13	6	8
J. S. Harding, sen.							*11	4	7
							52	6	9
Pall Mall Coal Co., coals	-	-	-	-	-	-	2	0	0
Pickford and Co., carriage of parcels	-	-	-	-	-	-	1	6	10
Special Researches :									
Chance Brothers, glass spheres	-	-	-	-	-	-	7	10	0
Great Western Railway Co., carriage of Scilly anemometer	-	-	-	-	-	-	0	13	8
Thompson, Watts & Co., dismantling and re-erecting ditto	-	-	-	-	-	-	3	6	2
R. J. Lecky, sunshine cards	-	-	-	-	-	-	1	5	0
A. Shepherd, photographs of sunshine recorder	-	-	-	-	-	-	2	12	6
Trinity House, repair of a thermometer	-	-	-	-	-	-	1	10	0
H. Sharban, plan of hills of Cape Colony	-	-	-	-	-	-	2	15	0
Land Meteorology :									
J. E. Cullum, salary	-	-	-	-	-	-	†17	10	0
W. Marriott, Meteorological returns	-	-	-	-	-	-	27	10	0
R. H. Curtis	} Discussion, &c. of Observations	-	-	-	-	{	22	4	5
J. A. Curtis							15	11	1
T. E. Allen							15	11	1
C. H. Thompson							*11	10	0
E. G. Aldridge							9	3	4
							73	19	11
Weather Information and Forecasts :									
J. J. Hicks, thermometer screens	-	-	-	-	-	-	1	18	0
Postmaster General, telegrams	-	-	-	-	-	-	196	10	1
Wightman & Co., printing forecasts	-	-	-	-	-	-	11	9	6
F. Gaster	} Preparation and issue of Reports, &c.	-	-	-	-	{	30	7	6
W. L. Dallas							20	12	1
F. Brodie							†21	5	2
H. W. Chivers							*8	5	0
							80	9	9
Ocean Meteorology :									
Captain H. Toynbee	} Discussion, &c. of observations. instruments.	-	-	-	-	{	33	6	8
R. Strachan							27	15	6
C. Harding							22	4	5
H. Harries							*14	0	0
Lieut. C. W. Baillie							16	13	4
							113	19	11
Negretti & Zambra, instruments	-	-	-	-	-	-	79	17	6
Miscellaneous :									
J. J. Hicks, commissions	-	-	-	-	-	-	9	1	6
R. W. Munro	-	-	-	-	-	-	70	0	0
Negretti & Zambra	-	-	-	-	-	-	29	4	8
J. S. Harding, jun., petty cash	-	-	-	-	-	100	0	0	
"	-	-	-	-	-	80	0	0	
							180	0	0
							£1,033	10	1

* Five weeks ending 29th May.

† Including increment and arrears.

The Council then adjourned.

116, Victoria Street, June 26, 1880.

PRESENT :

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE.
MR. GALTON.

PROFESSOR STOKES.
LIEUT.-GENERAL STRACHEY.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (June 11) were read and confirmed.

The Secretary reported—(1.) That on the 19th inst. he had received a letter (No. 1540) from the Treasury with reference to a question to be put in the House of Commons by Mr. A. M. Sullivan, as to the possibility of telegraphing daily forecasts gratis “to the principal ports and fishing stations around the coasts,” and that he had replied (Letters 1548 and 1566) to the effect that the expense of issuing such telegraphic forecasts could not be borne by the Office without an increase in its annual vote.—Approved.

(2.) That on the 24th inst. he had had an interview with Lord F. Cavendish and Sir R. Lingen, in relation to the supply of the 8 p.m. forecasts to the Press generally, and that he had received a letter (No. 1619) stating the terms suggested by the Treasury for such supply (Minutes, p. 26, and Letter 277).

The Chairman was instructed to apply for an interview with Sir R. Lingen in order to confer with him as to the terms on which the 8 p.m. forecasts could be supplied to newspapers.

A letter (No. 1590) from the junior and temporary clerks in the Office was read, requesting the Council to apply to the Treasury for an increase in the annual grant to the Office in order to admit of an increase in their respective salaries (Minutes, p. 22).

Resolved—That the Council are not prepared to apply to the Government for an increase in the grant to the Office, and are consequently unable to accede to the request contained in the letter from the junior and temporary clerks.

Read—The following letter :—

M.O. 1544.

SIR,

The Royal Society, Burlington House, June 18, 1880.

I AM to request that you will lay the enclosed extract from the Minutes of the Council of the Royal Society before the next meeting of the Meteorological Council.

I have, &c.

The Secretary of the Meteorological Office.

(Signed) THOMAS H. HUXLEY,
Secretary, R.S.

May 13, 1880.

“At a Meeting of the Council of the Royal Society.

“Read—The following letter from the Secretary of the Royal Society of Edinburgh :—

“MY DEAR PROFESSOR STOKES,

April 21, 1880.

“SOME time ago the India Office, in answer to an application from the Council of this Society, sent a copy of your letter (addressed to the Maharajah of Travancore) referring to the publication of Mr. J. Allan Broun's Observations.

“At the same time it was represented to us by the India Office that we should ‘consult with the London Society on this subject, before replying.’

“The question has been very carefully considered by the Council of the Royal Society of Edinburgh, and the enclosed memorandum on the subject was approved at their meeting yesterday, when I was requested to forward it to the Royal Society of London.

“Yours truly,
P. G. TAIT.”

“Professor Stokes, Sec. R. S.

MEMORANDUM.

The meteorological observations made in Travancore under the direction of the late Mr. Allan Broun form two distinct series, viz. :—

“1. Those made at Trevandrum as part of the regular daily work of the Observatory ; and

“2. A distinct series made during a limited time or times at levels differing 6,000 feet, with the view of furnishing data which might lead to a better understanding of barometrical and other meteorological fluctuations, particularly the diurnal fluctuations of the barometer.

“A digest of the first series would probably satisfy meteorologists,—such a digest as would show the various diurnal meteorological phases of the months of the year, so far as the observations themselves could be made to show them.

“The second is a very different series, and as yet, quite unique in character. It was designed by Mr. Allan Broun with great ability, and carried out successfully with a fulness of detail in the

observations such as would in all likelihood lead to an explanation of some of the most difficult problems of terrestrial physics, more particularly the causes of the diurnal oscillations of the barometer.

"The Council is very decidedly of opinion that the only satisfactory form of publication will be the publication in all their details of the whole of this second series of observations, in a form similar to that which has been adopted in publishing the meteorological observations of the 'Challenger' Expedition.

"With the individual observations presented in this detailed form scientific men could set themselves to the problems Mr. Broun had in view in making the observations, as well as to an examination of many other physical problems, which could not be done if a digest only were published.

"Resolved--That this letter be referred to the Meteorological Council for their advice."

The Secretary was instructed to inform the Royal Society that the Council will endeavour to have Mr. Broun's papers examined, and that as soon as they have obtained the requisite information with regard to the extent of the observations which it is proposed by the Royal Society of Edinburgh to publish *in extenso*, they will communicate on the subject with the Royal Society.

Professor Stokes submitted the following Memoranda as to the use of the Harmonic Analyser:—

I. MEMORANDUM as to the EMPLOYMENT of the HARMONIC ANALYSER in the METEOROLOGICAL OFFICE.

It will facilitate the explanation of what is to follow if we take a particular example; but it is to be understood that the remarks to be made are of general application. Let us confine ourselves, therefore, in the first instance to the consideration of the daily fluctuation of atmospheric temperature at a particular place.

The main object of the harmonic analysis is the determination and representation of periodic inequalities; in the example chosen, the diurnal inequality of temperature. For this we should subject the records extending over a considerable time, such as a year, to the analysis, and thereby determine the constants in the expression. But it is obvious that if nothing of the record were preserved for publication except this final result, the information communicated would be extremely meagre. Not only would stated fluctuations of the variation, such as the seasonal inequality, be passed over, but it would be impossible for a meteorologist seeking after some hitherto unknown inequality (such as an inequality with a period of 24 days or thereabouts, which Professor Balfour Stewart thinks there is evidence of) to make any use of the result. Again, though the harmonic analysis is useless for following the history of the weather in all its details, it is not without use as presenting a succinct representation of the leading features; but this would not be presented if nothing but the final result were given.

The temperature for a single day is not a strictly periodic function. Even if we leave out of consideration those rapid and apparently casual fluctuations that appear to depend on alternations of cloud and sunshine, or on passing showers, the end does not fit on to the beginning. If, treating it as periodic, we were to repeat it day after day, we should be dealing with a function which, graphically represented, would exhibit a succession of curves all alike, but presenting breaches of continuity where the end of one curve joined on to the beginning of the next. At the place of junction there would in general be a sudden change in the ordinate, another in the direction of the tangent, another in the radius of curvature, and so on. Nevertheless, in anything of settled weather the discontinuity would be much smaller than the changes due to the normal diurnal change, especially if the record for the 24 hours began at midnight, or at some other hour when the sun is below the horizon.

The temperature for the day, regarded as a function of the time, may conveniently be divided into two parts, which we may call the *progressive part* and the *residual part* or *residue*, where the progressive part is a simple algebraic function of t (the time), linear, quadratic, cubic, . . . according to the order we please to go to, the constants being so chosen as to give to the residue, or the residue and its first derivative, or the residue and its first two derivatives, . . . the same values at the beginning and end of the day. The function will thus be cleared as far as may be of the effect of progressive change, and the residue will represent, more nearly than the function itself, the normal diurnal fluctuation.

Let the time-scale be so chosen that a day is represented by a period, or 2π , and let $f(t)$ be the temperature. The development of $f(t)$ in harmonic series will be, going to three orders after the mean,

$$A_0 + A_1 \cos t + A_2 \cos 2t + A_3 \cos 3t \\ + B_1 \sin t + B_2 \sin 2t + B_3 \sin 3t,$$

where

$$A_0 = \frac{1}{2\pi} \int_0^{2\pi} f(t) dt, \quad A_i = \frac{1}{\pi} \int_0^{2\pi} f(t) \cos it dt, \quad B_i = \frac{1}{\pi} \int_0^{2\pi} f(t) \sin it dt, \\ i \text{ being } 1, 2, \text{ or } 3, \text{ as the case may be.}$$

The several integrals will be given by the machine. To get the development of the residue we must deduct the development of the progressive part. According to the theory of these series this will be got from the above by integrating by parts, and retaining only the terms which are free from the integral sign, provided we assign, as we may, the mean term wholly to the residue.

Denoting by Δ , the increment of $f(t)$ or its derivatives in passing from $t = 0$ to $t = 2\pi$, it will accordingly be—

$$a_1 \cos t + a_2 \cos 2t + a_3 \cos 3t + b_1 \sin t + b_2 \sin 2t + b_3 \sin 3t,$$

where

$$a_i = \frac{1}{\pi i^2} \Delta f'(t) - \frac{1}{\pi i^4} \Delta f'''(t) + \dots$$

$$b_i = -\frac{1}{\pi i} \Delta f(t) + \frac{1}{\pi i^3} \Delta f''(t) - \dots$$

In correcting the constants A_0, A_1, B_1, \dots so as to get the expansion of the residue, it does not seem desirable to go beyond the function $f(t)$ itself. This comes to taking as the residue a function which would be represented graphically by the excess of the actual ordinate over that of a straight line drawn parallel to the line joining the extremities of the curve, and passing through the middle point in the axis of abscissæ. To this degree of accuracy the development of the residue would accordingly be (writing Δf for $\Delta f(t)$),—

$$A_0 + A_1 \cos t + A_2 \cos 2t + A_3 \cos 3t \\ + \left(B_1 + \frac{1}{\pi} \Delta f\right) \sin t + \left(B_2 + \frac{1}{2\pi} \Delta f\right) \sin 2t + \left(B_3 + \frac{1}{3\pi} \Delta f\right) \sin 3t.$$

The constants A_0, A_1, B_1 , are given by the increments of the numbers on the cylinders of the machine, and the corrections are similarly given by the increments of the function itself, supposed tabulated for the commencement of each day.

If, instead of applying the analysis to a single day, we apply it to n consecutive days, the increments of the numbers on the cylinders, and also the correction for reducing the development of the function to that of the residue, will each have to be divided by n , Δ now denoting the increment of the function in passing from the beginning of the first to the end of the last day in the group. Supposing the days on the average much alike, the increments of the numbers on the cylinders will increase nearly in proportion to n , and the quotient will tend to a limit in which irregular changes from day to day disappear. The increment of the function $f(t)$, however, instead of increasing nearly as n , will fluctuate in a casual manner, and when it is divided by n , the quotient will tend to vanish as n is taken greater. It is only therefore when days are considered individually, or grouped in some manner other than that of natural sequence, that the correction for reducing the actual function to the residue need be taken into account.

The seasonal inequality of mean diurnal temperature, or of diurnal fluctuations of temperature, may conveniently be got by subjecting the co-efficients, obtained as above, again to harmonic analysis, the period being now a year. For this it would not be necessary to take the increments of the numbers on the cylinders for each day. It would be amply sufficient to take the days in groups of 5, 10, or even more.

If the numbers on the mean cylinder and on the pair of cylinders of the first order, or what perhaps would be better, the increments of those numbers, as likewise the initial temperatures, were published for each day, and the numbers on the cylinders of higher orders for somewhat wide intervals, the tables would pack into small compass, and would nevertheless present a tolerably complete and partially digested record of the march of temperature throughout a year; and if curves were drawn representing, one the mean temperature, and the other the co-efficient of the resultant of the pair of terms of the first order, the whole could be represented to the eye, in its leading features, in a very small space.

The details of the mode of treatment and publication of records to which the harmonic analysis is applied can hardly be fixed till some substantial experience has been gained in the regular use of the instrument, as distinguished from trials having for object to test whether the instrument was in thoroughly good working order. The above is given as indicating the general direction which the changes in the mode of reducing and publishing the records seem likely to take in consequence of the introduction of the instrument. The same general principles which apply to the discussion of temperatures will apply of course to the other elements, but each element must be considered by itself as to the features which it may be most desirable to bring into prominence.

II.—SUGGESTED FIRST APPLICATION of the HARMONIC ANALYSER, and RULES for the USE of the same.

I think the first application had best be to temperature for some year, say, in the first instance, to the records of the dry bulb thermometer, but the same remarks will apply to the wet bulb, which perhaps might be taken up next.

The civil reckoning of time should be followed (Minutes, 1873, p. 76), each day commencing, at midnight. As the sheets commence at 10 a.m. and go on for two days, the record of every second day will be divided, part being on one sheet and part on another. The readings on the cylinders need not be attended to when the sheets are changed, further than to see that they are not accidentally disturbed in the process of changing.

The cylinders being set to zero for the midnight with which the work is commenced, should at first all be read for every midnight, and the readings registered. The mean cylinder and (in the case of the thermometer) the pair of the first order should continue to be read for each day, but for the others readings at intervals of several days will probably be sufficient, as may be determined by subsequent orders.

Should a record exhibit a small or moderate gap, which can be filled in by the eye with tolerable certainty, it should be so filled in pencil before the sheet is put on.

Should the gap be more serious, so that in the judgment of the operator it would be better to reject the day altogether and interpolate, the process should be as follows:—

Suppose that the record for the 7th of a month is rejected, those for the 6th and 8th being good. Let A, B, C, D be the four readings concerned as they would have been if the records of the three

days had been perfect, these readings being those of any one of the cylinders. The readings are those for the midnights of the 5th, 6th, 7th, and 8th, so that $B-A$ gives the increment for the 6th, and so in the other cases. Then A and B are read on the cylinders, but as the record for the 7th is missing we start with the number B in commencing the paying off of the record for the 8th, and at the end of the day arrive at a provisional reading, say P . Then in default of the record for the 7th we may take the increment for that day of the number on the cylinder as the mean of the increments for the 6th and 8th. This gives $B + \frac{1}{2}(P-A)$, $P + \frac{1}{2}(P-A)$ as the numbers which are to be taken for C , D , respectively. These numbers are to be entered in the register and the cylinder set by hand to the last of them before paying out the record for the 9th. If the gap should extend over two days, the records should be supplied by a process founded on similar principles.

If the readings of the records of the subordinate cylinders for every day should have been discontinued, the cylinders should be read for the purpose of making the interpolation even though the reading might not have been otherwise demanded.

The preservation of the records on the cylinders not only supplies information as to the element analysed, which would be lost if nothing but the final results were retained, but also affords the means of re-examining any step of the process where an error might be suspected.

A blank column should be left in the register for the subsequent entry of the midnight values of the element analysed.

Mr. De La Rue submitted the following Report on the subject of measurement of the actinic power of daylight (Minutes, June 11).

The method proposed by Professor McLeod if worked out would effect its object very well, but does not appear to present any advantages over the sunshine recorder as regards bright sunshine, and in respect of diffused daylight over the method proposed by Mr. Darwin.

Dr. Angus Smith's proposed method for determining the actinism of the sun's rays and of diffused daylight under different atmospheric conditions is a quantitative one, and has special reference to the absorption or dispersion of the total light by vapours and floating solids. It is likely to prove of value in sanitary investigations, but would require a laboratory and the assistance of a qualified operator, and might therefore be taken up as a special research to include the determination of fog impurities.

(Signed) W. DE LA RUE.

General Strachey submitted a Report on Mr. Symons' paper, referred to him at last meeting (Minutes, June 11). Resolved—That the paper be bound and preserved in the Office for reference, and that a sufficient abstract of the contents be made and published.

Read—The following Report (Minutes, p. 15):—

GENTLEMEN,

June 14, 1880.

IN compliance with your resolution on the subject of Arctic Meteorology (see Minutes, p. 15), I have to report that, having duly searched for original documents at the Public Record Office, at the Admiralty Record Office, at the Hydrographic Office, and at the Kensington Museum, I find those mentioned in the following list available for the purpose in view. The marginal number has reference to the list given on the Minutes, p. 12.

1. The Meteorological Register cannot be traced.
2. Meteorological Register kept on board "Hecla," No. 61, is in charge of Librarian, Hydrographic Office; and Official Journals of "Fury," Nos. 37 and 38, which must be consulted for positions, &c., are now in the Museum, Kensington.
3. The Meteorological Register cannot be traced.
4. The logs of "Investigator," Nos. 2728 to 2731, at the Public Record Office, contain a meteorological register kept hourly.
5. The Captain's Journal of the "North Star," No. 2610, at Admiralty Record Office, contains the observations made every four hours.
6. The Captain's Journal of the "Enterprise," No. 1419, at Public Record Office, contains observations made every four hours.
7. A series of MSS. signed by Captain McClure, containing the four-hourly observations made on board the "Investigator," is at the Admiralty Record Office, and Sir R. Collinson has kindly offered to lend the Meteorological Register of the Expedition.
8. The Captain's Journal of the "Resolute" is at the Admiralty Record Office. It is probable that a more complete log kept by the master is in existence.
9. The logs of the "North Star," Nos. 1198 to 1203, at the Public Record Office, contain four-hourly observations.

It appears, therefore, that documents are available for all the stations except Nos. 1 and 3.

I propose to work up the observations of the "Investigator" at Port Leopold for every two hours; and those at all the other stations for every four hours, on the plan hitherto followed in Parts I. and II., unless the data on a closer examination should be found not to be worth the trouble.

I am, &c.

To the Council, Meteorological Office.

R. STRACHAN.

The subject of the draft of the Quarterly Weather Report (Minutes, p. 1) was considered, and it was resolved that the Report be illustrated by a series of small charts, two for each day, to run on consecutively on quarto plates, without regard to the calendar months.

The Council then adjourned.

116, *Victoria Street*, July 10, 1880.

PRESENT:

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE.

PROFESSOR STOKES.

MR. GALTON.

LIEUT.-GENERAL STRACHEY.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (June 26) were read and confirmed.

The Chairman reported that, in accordance with the instructions of the Council given at last meeting, the Secretary and himself had had, on the 1st instant, an interview with Lord F. Cavendish and Sir R. Lingen on the subject of the supply of the 8 p.m. forecasts to newspapers, and that certain modifications in the terms originally suggested by the Treasury (Letter 1619) had been proposed by Mr. Scott and himself on behalf of the Council (Letter, written, 1651), and had been accepted by the Treasury.

Read—The following letter :—

M.O. 1735.

10569/80.

SIR,

Treasury Chambers, July 5, 1880.

I HAVE laid before the Lords Commissioners of Her Majesty's Treasury Mr. Scott's letters of the 10th and 18th ultimo stating that prior to the receipt of the letter from this Board of the 14th ultimo (6634) your Council had voted a grant of 20*l.* to the widow of one of their clerks who had recently died, and requesting, both for reasons special to that case, and also for reasons common to the whole of your Council's Office, that the Exchequer and Audit Department may be advised on this and similar occasions to pass the vouchers for such payments as the one in question when presented, and I am directed by My Lords to acquaint you that, although under the circumstances of this special case they will offer no objection to the payment, nevertheless they must adhere to the principle affirmed in the letter (6634) from this Board of 14th May last, and are not prepared to agree to further exceptions to it.

I am, &c.

R. R. W. LINGEN.

The Chairman of the Meteorological Council.

Read—A letter (No. 1729) from the Hydrographer to the Admiralty, asking for the opinion of the Council on a proposal for an automatic clock for meteorological registration, invented by Herr F. Helling of Berlin.

The Secretary was instructed to reply that the method proposed by Herr Helling does not appear to possess any special advantages over other methods available for the same purpose (Letter 1725).

With reference to the subject of the publication of the Trevandrum Observations (Minutes, p. 33) General Strachey reported, as the result of a correspondence with Mrs. Broun that the manuscript observations of the late Mr. Allan Broun were in her hands, and that she would be willing to have them reported on with the view of ascertaining whether Mr. Blanford would be willing to undertake the duty of dealing with them.

Resolved—That Mr. Strachan be instructed to make a preliminary report on the extent and condition of the manuscript observations of Mr. Broun.

With reference to the subject of the Harmonic Analyser, it was resolved that the suggestions contained in Professor Stokes' memorandum No. II. (Minutes, p. 35) be adopted, and that the curves for the dry-bulb thermometer be at once commenced for a year to be selected by the Secretary; the arrangements for working the analyser being also left to the discretion of the Secretary.

Read—Letter 1696 from General Myer, stating that the date proposed for the change of the hour of simultaneous observations (Minutes, 1879, p. 150) was postponed until January 1, 1881.

The Secretary reported that Professor Wild (Letter 1662) and Professor Mascart (Letter 1737) had informed him that they had replied to General Myer in the same sense as the Council had already done.

Submitted—The following report :—

QUARTERLY REPORT.—SEA SURFACE TEMPERATURE of the PACIFIC OCEAN.

SIR,

Meteorological Office, June 30, 1880.

I HAVE the honour to report, for the information of the Council, on the work which has been done for the quarter ending 30th June 1880.

For the month of August.—The general chart referred to in my last report (Minute sp. 2) has been completed, and I had the honour to submit it to the Council on 28th April.

Currents (extracts) are in progress; probably about one half of this work is done.

For the month of November.—A general chart, similar to that for August, was completed on 27th June, and is submitted herewith.

The charts for the representative months of the year, viz., February, May, August, and November, are accordingly completed so far as the data contained in the logs of this Office are concerned, but a large number of Admiralty remark books, and other documents deposited in the Hydrographic Office and elsewhere have still to be examined.

I have, &c.

To Captain H. Toynbee, F.R.A.S., &c.

C. W. BAILLIE,

Nav.-Lieutenant, R.N.

The chart of the sea-temperature of the Pacific for November was submitted.

With reference to the subject of Arctic Meteorology, the proposal in Mr. Strachan's memorandum (Minutes, pp. 12 and 36) was generally approved. It was agreed: I. That, as regards the original registers which cannot be found, the published abstracts be utilised with a view of presenting the whole of the information as far as possible in a comparable form; II. That Mr. Strachan prepare a memorandum showing the form of the tables he proposes to publish; this memorandum to be submitted to General Strachey; and III. That a sum of 30% be granted for providing assistance to Mr. Strachan in the work.

Read—A memorandum from Captain Toynbee reporting that since the meeting of the 11th ultimo 10 logs had been received, 9 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. Archibald Campbell.	S.S. "Ethiopia"	Jan. 18—June 27, 1880.	Glasgow to New York and home, 5 voyages.	1879, p. 122.
Capt. C. D. Coxwell, assisted by Mr. R. Ladd.	S.S. "German"	Mar. 26—June 14, 1880.	Table Bay, &c. and home.	1879, p. 96.
Capt. C. Johnson, R.N.R.	"St. Lawrence"	July 30, 1879—April 17, 1880.	Sydney and home	1877 (Committee), p. 6.
Capt. S. Griff Jones	"Victoria Nyanza."	July 19, 1879—June 11, 1880.	San Francisco and home	—
Capt. Allan McKenzie	"Candahar"	Oct. 6, 1879—June 25, 1880.	Calcutta and home.	—
Capt. C. H. Renaut	"Pleione"	April 9, 1879—June 6, 1880.	New Zealand, San Francisco, and home.	1878, p. 112
Capt. J. H. Stiven	"Arethusa"	Mar. 13—June 20, 1880.	New Zealand to London	1879, p. 61.
Capt. J. W. Thorne	"British Commdore."	June 28, 1879—June 15, 1880.	Calcutta, New York, and home.	—
Capt. H. P. Wight	"Taranaki"	Oct. 1, 1879—June 24, 1880.	New Zealand, Australia, and home.	1879, p. 61.

Mr. Scott was instructed to present the charts (O. 27) to Captains Jones, McKenzie,* and Thorne, and to convey the best thanks of the Council to the other observers.

The subject of the Cape Square charts was further considered (Minutes, 1879, p. 145), and Mr. Galton was requested, during the recess, to obtain artistic assistance in settling the charts for publication.

The Secretary reported that he had visited Shirenewton on the 8th instant (Minutes, p. 31), and had found the locality well suited for a Meteorological observatory. He

* McKenzie got O 32

had already informed Mr. Lowe (Letter 1606) that the Council could not offer any pecuniary assistance towards his project.—Approved.

Reported—That the issue of Hay Harvest Forecasts had commenced on the 1st instant (Minutes, p. 30). The following was the list of recipients, as at present arranged:—

No.		
0.	SCOTLAND, N.	- { Rev. Dr. Joass, Golspie. J. R. Mitchell, Drynie, Inverness.
1.	SCOTLAND, E.	- { J. Annand, Inverurie. G. Johnstone, The Gardens, Glamis by Forfar. W. S. McDonald, Craigielaw, Longniddry.
2.	ENGLAND, N.E.	- { Jacob Wilson, Woodhorn Manor, Morpeth. J. Turner, Ulceby.
3.	ENGLAND, E.	- { J. B. Lawes, F.R.S., Rothamsted. W. T. Carrington, Croxden Abbey, Uttoxeter.
4.	MIDLAND COUNTIES	- { E. W. Prevost, Royal Agricultural College, Cirencester. The Duke of Somerset, Bulstrode, Bucks.
5.	ENGLAND, S.	- { C. Whitehead, Barming House, Maidstone. E. P. Squarey, The Moot, Downton, Wilts.
6.	SCOTLAND, W.	- { J. S. R. Ballingall, Eallabus House, Islay. C. H. H. Wilson, of Dalnair, Drymen Station, N.B. J. Chisholm, Chapel Rossan, Stranraer.
7.	ENGLAND, N.W.	- { The Earl of Derby, Knowsley. G. W. Wray, Leyburn, Yorkshire. D. R. Davies, Agden Hall, Lymm, Warrington.
8.	ENGLAND, S.W.	- { The Earl of Ducie, Tortworth Park, Gloucestershire. T. Dyke, Long Ashton, Clifton, Bristol.
9.	IRELAND, N.	- { R. Neville, Butleigh Court, Glastonbury. J. Simson, Cloona Castle, Ballinrobe.
10.	IRELAND, S.	- { D. A. Milward, New Ross.

The Quarterly Weather Report was taken into consideration (Minutes, p. 36), and it was resolved that the chronicle of the weather and the tables of depressions be arranged (like the plates of charts) without reference to the calendar months. It was also agreed that the isotherms should be placed on a chart without contour lines, inasmuch as Mr. Scott had ascertained from the Ordnance Survey Office (Letter 1689) that no contour map of the British Isles is in existence.

Mr. Scott reported that he had engaged Mr. Edmund Wall, as engraver in the place of Mr. Stodart, at a salary of 2*l.* 12*s.* 6*d.* per week for 8 hours work, to rise to 3*l.* 3*s.* if the work proved to be satisfactory (Letter 1714).—Approved.

Mr. Scott reported with reference to the proposed stations in Cyprus (Minutes, 1879, p. 80) that General Biddulph had forwarded plans for two stations at Nicosia and Famagusta (Letters 885 and 1204). He was instructed to forward the requisite instruments for these stations and for that at Larnaca.

Read—A letter (No. 1742) from Mr. Parkinson, in the Samoan Islands asking for a supply of instruments to stations in the Pacific. The Secretary was instructed to communicate with Sir A. Gordon as to the establishment of one or two stations in Fiji, and to inform Mr. Parkinson of the action taken.

Mr. Symons' report on the comparison of thermometer screens (Minutes, p. 36), and his letter (No. 1243) were again brought under the notice of the Council, and it was resolved that a grant of 10*l.* 10*s.* be made to Mr. Gaster, and that he be requested to complete the report by the addition of some extra notes, as suggested by him in a memorandum (dated May 15) appended to Mr. Symons' letter.

The subject of evaporation was taken into consideration (Minutes, p. 8), and it was agreed to communicate with Mr. Shaw with a view of ascertaining whether he could undertake (at the same time with the research on hygrometry) a comparison of the different evaporimeters suggested, or in use.

Mr. Scott reported that the Academy of Science at Vienna had forwarded a second report by Dr. Wex on the subject of the alleged decrease of water in rivers and springs (Minutes, 1875, pp. 28 and 32), and that the joint committee of the Meteorological Society and this Office (Minutes, *l.c.*) had collected a considerable amount of information as to the records of English rivers and springs. Mr. Scott further stated that the Chelsea Waterworks possessed a long continued series of records of the Thames near Kingston, which they were ready to grant permission to have copied. He was authorised to procure a copy of such of these records as he might think valuable.

The subject of atmospheric electricity (Minutes, 1879, p. 144) was referred to Mr. De La Rue and Professor Stokes for a preliminary report.

A letter from Mr. Munro (No. 1250), with the plans for an integrating anemometer, proposed by him, was referred to Professor Stokes.

Submitted—The following financial statement for the quarter ending 30th June 1880:—

INCOME.				EXPENDITURE.			
	£	s.	d.		£	s.	d.
Balance from year 1879-80 -	-	-	470 17 1	ADMINISTRATION :			
Proportion of vote for quarter -	-	-	3,625 0 0	Payment of Council -	250	0	0
Repayment of expenses charged under—				Secretary -	200	0	0
(1.) Incidental expenses -	-	-	1 11 3	Salaries and wages -	177	17	5
(2.) Special researches (Hoffmeyer's charts, Sun apparatus, &c.) -	-	-	26 18 6	Rent, fuel, and lighting -	169	15	0
(3.) Observatories and stations -	-	-	9 0 0	Furniture and fittings -	12	17	6
				Incidental and contingent expenses -	78	19	5
						889	9 4
SUPPLY OF INFORMATION :				*SPECIAL RESEARCHES AND EXPERIMENTS :			
Special reports for "Times," "Standard," and "Daily News" -	225	0	0	Rainfall observations -	200	0	0
D. W. Charts and ordinary Forecasts -	92	11	9	Sundry charges -	55	2	2
Telegrams supplied -	47	10	3			255	2 2
Ordinary weather information for Press Agencies, &c. -	32	2	6				
			397 4 6	LAND METEOROLOGY :			
Miscellaneous data -	-	-	0 10 0	Observatories and stations -	581	9	1
SALE OF INSTRUMENTS, &c. :				Discussion and reduction of observations -	358	15	11
Royal Navy account -	1	12	3			940	5 0
Mercantile Marine do. -	5	9	6				
			7 1 9	WEATHER INFORMATION AND FORECASTS :			
Commission charged on work done for Colonies, &c. -	-	-	5 17 5	Telegraphic reports and storm warnings -	804	16	3
				Preparation and issue of reports and forecasts -	276	6	2
						1,081	2 5
				INSPECTIONS :			
				Salaries and travelling expenses -	-	-	95 13 4
				OCEAN METEOROLOGY :			
				Discussion and reduction of observations -	403	15	5
				Expenses incidental to the supply of instruments :			
				Care and issue of instruments -	50	0	0
				Royal Navy -	44	15	6
				Mercantile Marine -	89	15	8
				Distant island and coast stations -	9	2	0
						597	8 7
				Balance -	-	-	684 19 8
			£4,544 0 6			£4,544	0 6
LIABILITIES.				ASSETS.			
	£	s.	d.		£	s.	d.
To Post Office (partly estimated) -	299	7	0	By cash at bank -	-	-	1,303 12 0
„ sundry creditors -	770	6	6	„ „ at Office -	-	-	160 3 5
„ „ (contracts or work uncompleted) -	422	0	6	„ „ at Valencia -	-	-	50 0 0
„ balance -	684	19	8	„ sundry debtors -	-	-	412 18 3
			£2,176 13 8	„ Her Majesty's Exchequer -	-	-	250 0 0
						£2,176	13 8

* The sum of 150*l.* will be eventually transferred to this head from other accounts, in accordance with Chairman's Memorandum of June 1879.

Submitted—The following reports of work done in the Office during June 1880 :—

PANTAGRAPH ROOM.

June 30, 1880.

Copper Plates pantagraphed.—1879, Nos. 64 to 73; wind and rain curves added: 1880, Nos. 1-2.

Zinc Plates.—Barograms, 9 plates, Nos. 4 to 12, 1880; Thermograms, 1 plate, No. 13, 1880; Anemograms, 10 plates, Nos. 68 to 73, 1879, Nos. 1 to 4, 1880; Rain Curves, 6 plates, Nos. 1 to 6, 1880.

Photographic Curves are prepared to plate 18 for barograms; thermograms are not in advance of zinc plates.

The values of the upper zero lines on the thermograms have been redetermined for all observatories, and alterations made where necessary.

The *March* examination work was received on the 5th, and passed to the Computing Room on the 11th. Mr. Allen's report is attached.

R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

June 24, 1880.

The following curves and tabulations have been examined since 23rd May :—

March: *Thermograms*, one station: *Barograms*, three stations: *Anemograms*, five stations.

April: *Thermograms*, all stations; *Barograms*, four stations; *Anemograms*, two stations.

T. E. ALLEN.

MARINE ROOM.

Examined 11 new logs, and 4 lighthouse registers.

Cape of Good Hope District.

Wind.—Working results for natural areas for December; also drawing wind-roses for December.

Fixing February and August wind-roses into position on Charts.

Barometer.—Working range, &c. for March and December; also frequency for February, August, and December.

Drawing frequency diagrams for February and December.

Air Temperature.—Working range and means for May, June, September, November, and December.

Plotting results for May, June, and August.

Drawing isotherms for March and August.

Currents.—Drawing general current-lines.

Sea Temperature.—Deciding areas of extreme range.

Meteorological examination of training ships, writing questions, &c.

CHAS. HARDING,
9th July 1880.

R. H. Scott, Esq.

Reported—That the cash accounts for the six months ended 31st March 1880 were audited by the Chairman and General Strachey on the 3rd instant, and had been sent to the Treasury for the Audit Office. The receipts for the six months, exclusive of a balance of 1,664*l.* 9*s.* 11*d.* on the 1st October 1879, amounted to 8,913*l.* 15*s.* The payments amounted to 9,246*l.* 19*s.* 1*d.*, leaving a balance of 1,331*l.* 5*s.* 10*d.* in hand and at the Bank on the 1st April 1880.

The following cheques for June were drawn on the 30th instant :—

Administration :	£	s.	d.	£	s.	d.
R. H. Scott, Secretary - - - -	-	-	-	66	13	4
J. S. Harding, jun. } Salaries and wages -	27	15	6			
T. D. Bell - - - -	13	6	8			
J. S. Harding, sen. } -	*8	19	8			
				50	1	10
C. W. Jacques, rent, No. 116 - - -	133	13	0			
„ „ No. 113 - - -	18	0	6			
				151	13	6
Pall Mall Coal Co., coals - - -	-	-	-	11	8	0
J. Wheldon, books - - -	-	-	-	1	18	0
Williams & Norgate, books - - -	-	-	-	2	6	8
Special Researches :						
Capt. N. Hoffmeyer, charts - - -	-	-	-	14	15	3
R. W. Munro, M. v. Oettingen's wind integrator - - -	-	-	-	7	12	0
Negretti & Zambra, Mr. De La Rue's evaporator - - -	-	-	-	1	3	0
W. Thomas, Scilly anemometer - - -	-	-	-	1	19	5
Carried forward -				£309	11	0

* Four weeks ending 26th June.

		£	s.	d.	£	s.	d.
	Brought forward -	-	-	-	309	11	0
Land Meteorology :							
G. Pirie, Aberdeen	-	68	4	6			
„ (postages, &c.)	-	1	4	7			
					69	9	1
Rev. T. R. Robinson, D.D., Armagh	-	46	19	0			
„ „ „ (expenses)	-	9	8	4			
					56	7	4
W. L. Fox, Falmouth	-	-	-	-	72	3	4
R. Grant, Glasgow	-	-	-	-	68	15	0
H. Williams, Holyhead	-	-	-	-	2	13	9
G. M. Whipple, Kew	-	-	-	-	100	0	0
Rev. C. Clouston, Orkney	-	-	-	-	3	4	10
G. H. Aird, Seaham	-	-	-	-	2	13	9
Rev. S. J. Perry, S.J. Stonyhurst	-	-	-	-	57	1	4
J. E. Cullum, Valencia	-	16	13	4			
„ „ (expenses)	-	46	0	3			
					62	13	7
G. T. Watson, Yarmouth	-	-	-	-	4	2	0
J. O'Driscoll, rent at Valencia	-	-	-	-	25	0	6
Hopkin & Williams, chemicals	-	-	-	-	1	0	1
R. H. Curtis	-	22	4	5			
J. A. Curtis	-	15	11	1			
T. E. Allen	-	15	11	1			
C. H. Thompson	-	*9	4	0			
E. G. Aldridge	-	*7	6	8			
					69	17	3
Weather Information and Forecasts :							
G. Carrick, Ardrossan	-	-	-	-	1	12	3
Postmaster, Bundoran	-	-	-	-	1	6	0
H. Todd, Cambridge	-	-	-	-	4	11	0
Postmaster, Cliffony	-	-	-	-	0	19	6
H. Mohn, Christiania	-	-	-	-	5	10	0
J. C. McGowan, Donaghadee	-	-	-	-	0	13	0
J. Costello, Dover	-	-	-	-	3	18	6
Rev. W. Brand, Dunrossness	-	-	-	-	3	18	3
Postmaster, Enniskillen	-	-	-	-	0	19	6
G. Wooding, Hawes	-	-	-	-	3	18	2
J. Tilston, Holyhead	-	-	-	-	4	1	6
G. G. Appleton, Hurst Castle	-	-	-	-	3	18	8
A. P. Hay, Inverness	-	-	-	-	1	6	0
J. Fisher, Jersey	-	-	-	-	4	5	6
T. Curtayne, Killarney	-	-	-	-	0	19	6
J. Hutchison, Leith	-	-	-	-	0	13	0
F. Gaster, London	-	-	-	-	3	18	0
K. Kerr, Mullaghmore	-	3	18	8			
„ (Conway's account)	-	5	17	0			
„ (Hannon's account, fitting up station)	-	0	16	0			
					10	11	8
W. D. Penny, Nairn	-	-	-	-	4	4	6
M. Mackintosh, Nairn	-	-	-	-	0	13	0
E. J. Lowe, Notts	-	-	-	-	3	18	0
H. E. C. Bellamy, Oxford	-	-	-	-	3	11	6
W. Harding, Parsonstown	-	-	-	-	3	7	8
G. Blackler, Prawle Point	-	-	-	-	3	7	6
J. C. Walker, St. Ann's Head	-	-	-	-	0	13	0
W. Thomas, Scilly	-	-	-	-	4	18	9
R. W. Scaddard, Scilly	-	-	-	-	0	13	0
Carried forward	-	-	-	-	£986	19	9

* Four weeks ending 26th June.

Capt. Toynbee

			£	s.	d.	£	s.	d.
	Brought forward	-	-	-	-	986	19	9
Weather Information and Forecasts—continued.								
J. Sibert, Spurn Head	-	-	-	-	-	3	5	8
J. Sutherland, Stornoway	-	-	-	-	-	5	13	0
W. Morison, „	-	-	-	-	-	1	6	0
Postmaster, Valencia	-	-	-	-	-	0	13	0
J. Sinclair, Wick	-	-	-	-	-	3	5	0
Postmaster, „	-	-	-	-	-	1	6	0
G. T. Watson, Yarmouth	-	-	-	-	-	4	9	9
A. Guy, York	-	-	-	-	-	3	18	0
P. Adie, station barometers	-	-	-	-	-	40	10	0
Postmaster General, telegrams	-	-	-	-	-	173	9	11
F. Gaster	-	-	30	7	6			
W. L. Dallas	-	-	19	15	1			
F. Brodie	-	-	19	15	1			
H. W. Chivers	-	-	*6	12	0			
Preparation and issue of Reports, &c.						76	9	8
Inspections :								
A. Buchan, Scotland	-	-	37	10	0			
„ (expenses)	-	-	1	17	6			
						39	7	6
Rev. W. C. Ley, England	-	-	37	10	0			
„ (expenses)	-	-	18	15	10			
						56	5	10
Ocean Meteorology :								
Capt. H. Toynbee	-	-	33	6	8			
R. Strachan	-	-	27	15	6			
C. Harding	-	-	22	4	5			
H. Harries	-	-	*11	4	0			
Nav.-Lieut. C. W. Baillie, R.N.	-	-	16	13	4			
Discussion, &c. of observations and care of instruments.						111	3	11
P. Adie, repairing „ A. „ barometers	-	-	7	17	6			
„ „ B.T. „	-	-	5	9	9			
„ stone for Bermuda anemometer	-	-	1	1	0			
						14	8	3
Hottinger & Co., aneroids	-	-	-	-	-	15	9	6
J. H. Woodstock, packing cases	-	-	-	-	-	3	5	0
R. Munro, Sombro anemometer	-	-	28	10	0			
„ packing „	-	-	2	5	0			
						30	15	0
Miscellaneous :								
W. Allingham, commissions	-	-	-	-	-	2	6	10
C. Harding, „	-	-	-	-	-	0	19	5
J. S. Harding, jun., petty cash	-	-	100	0	0			
„ „	-	-	60	0	0			
						160	0	0
						£1,735	7	0
<hr/>								
Cheque drawn for Mrs. Stodart, on 7th July	-	-	-	-	-	21	1	0

* Four weeks ending 26th June.

The Council then adjourned.

116, *Victoria Street*, July 26, 1880.

PRESENT :

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE.

MR. GALTON.

PROFESSOR STOKES.

LIEUT.-GENERAL STRACHEY.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (July 10) were read and confirmed.

Read—The following letter :—

M.O. 1901.

SIR,

Treasury Chambers, July 24, 1880.

IN reply to Mr. Scott's letter of the 1st instant, addressed to Mr. Kempe, I am desired by the Lords Commissioners of Her Majesty's Treasury to state that their Lordships see no objection to the alterations suggested by your Council in the draft scheme discussed at an interview between the Secretaries of this Board and yourself, with Mr. Scott, for the supply of the 8 p.m. Forecast to the newspapers; your Council therefore will be acting with the concurrence of the Treasury if it sees fit to take the necessary steps for carrying the scheme into effect.

If it should be found that the expenses of this arrangement up to the 31st December exceed the receipts, my Lords will be willing to sanction a supplementary estimate for the amount of such excess, provided it does not exceed 250*l*.

A copy of the draft scheme, as finally agreed upon, is returned herewith.

I am, &c.

WILLIAM LAW.

The Chairman of the Meteorological Council.

METEOROLOGICAL FORECASTS.

The preparation of the 8 p.m. Forecast (which is based upon special telegrams involving extra attendance at several post offices, at some of the observing stations, and at the Meteorological Office itself) costs a very considerable sum per annum. The Meteorological vote will not bear this expense without curtailing operations connected with observation.

It is proposed to supply the 8 p.m. Forecast to newspapers according to the following tariff of payments in advance, viz. :

Delivered the same night in London to the office of a single newspaper, 25*l*. per annum.

Telegraphed the same night from the Meteorological Office, extra per day of telegraphing, 1*s*.

(This charge of 1*s*. per day of telegraphing may be paid either to the Meteorological Office or directly to the General Post Office.)

Delivered the same night in London to the office of a news agency, for 10 newspapers, or any greater number, per newspaper, 22*l*. 10*s*. per annum.

These rates will hold up to 31st December 1880, and the payment to be made by any newspaper or newspapers will be the proportional payment up to that date. After that date, if in the meantime the above rates do not seem likely to cover the expense, they will be reviewed.

The Secretary submitted the following memorandum on the subject of the foregoing letter :—

SUPPLY of INFORMATION to the PRESS.

I beg to suggest that the cost should be—

I. For one copy of all forecasts and of remarks as now appearing in the "Times"

Annually, 25*l*.

In the case of individual papers, a complete copy to be supplied. In the case of Press Associations bringing in over 10 subscribers, one copy to be supplied for every three subscribers, leaving to the Press Associations the task of "manifolding" the copies for telegraphic purposes.

II. For a copy of the chart as now supplied to the "Times," "Standard," and "Daily News," but only published by the "Times"

Annually, 25*l*.

This charge to be entirely extra to the charge for the forecasts and remarks. Each of these charts takes at least 30 minutes' time of a good clerk, owing to the impossibility of multiplying them in the Office, and if the number of these charts required were to increase, a special staff must be employed to draw them, and so this money must not be counted against the 1,000*l*. required.

ROBERT H. SCOTT.

The Secretary was instructed to act in accordance with the memorandum forwarded by the Treasury, and with that submitted by himself.

Mr. De La Rue was requested to consider the possibility of multiplying impressions of a chart for issue to newspapers.

Submitted—The following Report, by Mr. Strachan, on the Broun MSS. (Minutes, p. 37):—

M.O. 1876.

MEMORANDUM.

SIR,

July 17, 1880.

I HAVE examined documents containing meteorological observations made in Travancore, in possession of Mrs. J. Allan Broun, and have to report as follows:—

1st. The observations made at Trevandrum Observatory are contained in eleven large volumes, and are for the period 1853 January 1st to 1858 July 9th. (Mrs. Broun by letter dated to-day states that the series is complete to 1865 March.)

The observations comprise barometer (reduced to 32°), dry and wet bulb thermometers, anemometer (force and direction), cloud (amount and motion), rain, state of weather, made hourly. The magnetical and meteorological observations are back to back and inseparable.

2nd. The observations made at Agustia, 6,600 feet above the sea, are contained in six large volumes, and are for the periods 1855 July 1st to 1858 December 31st, and 1864 May 19th, to 1865 February 28th. They were made hourly, and are similar and similarly recorded to those made at Trevandrum.

At both observatories extra observations on the temperature of the soil, maximum and minimum, &c. are recorded.

3rd. *Manuscripts*.—Note book for observations made at Kalliad, 1865 January 2nd to 28th (all in pencil).

Comparison of the term day observations made at Trevandrum, Agustia, and the east and west stations, 1857 April.

Station observations, 1864 September.

Station observations, 1865 January.

Barometer observations (reduced to 32°) made at Trevandrum, Compittathoda in Kalliad, Chundanamudu in Carathakey, Camalamudy on the south-south-west slope of Agustia, and Agustia Peak, 1859 January 20th to February 19th. (Marked in pencil "All these observations should be published;" they are for the most part hourly.)

Another MS. of the above, but very rough.

Tables of Barometers (with means) 1859 January 20 to February 19, made at the stations.

"	Dry Thermometer	"	"	"	"	Trevandrum.
"	"	"	"	"	"	Agustia.
"	"	"	"	"	"	Kalliad.
"	"	"	"	"	"	Carutha.
"	"	"	"	"	"	Camala.

Abstracts of observations (with means) made at Agustia 1864 September 9th to October 9th, and 1865 January 2nd to 28th. Also at Vanatheerthum and Kalliad for the same periods.

Agustia barometer differences, 1857 April to 1858 May.

Abstract of hourly observations at Cape Comorin 1858 October (means computed).

MS. of barometer observations on a voyage from Red Sea to Madras; and, on a separate paper, dry, wet, and sea thermometers (very rough).

Tables.—Barometer at Trevandrum, with means, for 1859 to 1864, inclusive.

An account of the rainfall at Trevandrum, from 1838 to 1875, inclusive.

Various tables of rainfall at different places in Travancore.

Tables of hourly amount of evaporation, 1857 to 1863, inclusive, with daily means of temperature of evaporators and of evaporation.

Adie's balance thermometer at Trevandrum (means computed) for 1855 to 1864, inclusive.

4th. A large mass of rough computations, principally, if not entirely, relating to memoirs already published.

REMARKS.—As regards the 1st and 2nd, it seems that the documents are complete for the entire period of Mr. Broun's work.

The MSS. in the 3rd division do not appear to have been set discussions of the observations, but prepared for special purposes. They would probably be of little use in the methodical reduction of the whole series.

The MSS. in the 4th division are probably of no use now.

Your obedient Servant,

(Signed) R. STRACHAN.

R. H. Scott, Esq., F.R.S.,

Secretary, Meteorological Council.

Mr. Strachan was directed further to report as to the space which the simultaneous observations at Trevandrum and Agustia would occupy if printed in full, but in as compact a form as possible.

The Wind Chart of the Cape Squares for January and the Current Chart for July were submitted, and various suggestions were made as to the ultimate form of the charts.

The Secretary reported that he was about to attend the meeting of the International Meteorological Committee to be held at Berne, August 9th (Letter 1542).

Submitted—A report (Letter 1907) from Mr. Whipple on the nephoscope devised by Mr. Galton and General Strachey (Minutes, p. 16).

Resolved—That the instrument be returned to Messrs. Beck, to have the suggestions in paragraphs 2–4 of Mr. Whipple's report carried out.

Submitted—The following Report on the action of Mr. De La Rue's anemograph, giving hourly values directly (Minutes, 1879, p. 50) :—

M.O. 1906.

Kew Observatory, Richmond, Surrey,
July 24, 1880.

DEAR SIR,

I HAVE to report that, in accordance with your letter of the 21st July 1879, we have been experimenting with Mr. De La Rue's anemometer for giving hourly records separately.

These experiments have now lasted sufficiently long to enable us to state that the instrument as fitted by Mr. Munro with the electrical detaching arrangement, works in a most satisfactory manner.

The time now lost every hour is reduced from 4 or 5 minutes to from 20 to 30 seconds only, the battery power requisite being six Leclanché cells.

With a view of preventing the rusting of parts of the mechanism and clock, they have been electroplated with nickel, the small cost of which operation has, I think, been incurred with great advantage to the instrument, and in the event of other instruments being altered to the pattern of this one, I would suggest that this point should receive consideration.

I enclose a specimen anemogram,

And remain, &c.

G. M. WHIPPLE,
Superintendent.

R. H. Scott, Esq., F.R.S.,
Secretary, Meteorological Council.

The Secretary reported that the cost of the bridled anemometer (Minutes, p. 30), including two cast-iron pillars as supports, was 78*l.* 17*s.*, and he submitted an estimate (Letter 1904), amounting to 35*l.* 10*s.*, for the erection of a wooden house at Holyhead for the reception of the instrument.

The Secretary was instructed to accept the estimate for the wooden house, if he should learn from Mr. Munro that it would be suitable for the erection of other experimental anemometers.

Professor Stokes made a preliminary report on Munro's proposed integrating anemometer (Minutes, p. 42), and the sum of 5*l.* was placed at his disposal for experiments relating to the principle of the instrument.

Reported—That the Kew Committee had intimated their readiness to allow Mr. Whipple to visit the observatories in 1880 as usual.

Read (Letter 1867) from Mr. Whipple, inquiring if the Council would sanction the continuance of the observations on different thermometer screens (Minutes, 1879, p. 2) for another year up to June 30, 1881, and applying for some allowance to the observatory for the duty of taking the observations.

Resolved—That the experiments be continued for another year, and that the sum of 10*l.* per annum be allowed for them from the commencement of the observations.

Submitted—The following report (Minutes, p. 41) :—

REPORT as to the PROBABLE COST of COPYING the REGISTER of the HEIGHT of the RIVER THAMES, kept by the CHELSEA WATER COMPANY.

THE register is in two parts. The first series extends from October 1841 to August 1857, a period of 16 years, and comprises the height of each *tide*, as compared with the Trinity high-water mark on Vauxhall Bridge, together with the time, in hours and minutes, of each high water.

The place of observation was Chelsea Reach, on the northern bank of the river opposite the end of Turpentine Lane.

A specimen of the form in which the observations are recorded is given below :—

1846.			MORNING.						EVENING.					
			Time.		Above.		Below.		Time.		Above.		Below.	
			H.	M.	Ft.	In.	Ft.	In.	H.	M.	Ft.	In.	Ft.	In.
Sunday	November	1	12	20	—	—	—	10	12	30	—	—	—	7
Monday	„	2	1	—	—	—	—	6	1	20	—	—	—	3
Tuesday &c.	„	3 &c.	1	50	Trinity				2	30	—	—	—	3

The second series began in September 1854, and is still being continued. It shows the height of the river at Surbiton (which is above the influence of the tide) in feet and tenths of a foot, as compared with "Summer Level." It gives also the daily rainfall and the temperature of the river water, with, since 1866, the temperature of the air as well. The hour of observation for this series has always been 9 a.m.

The rainfall returns have been supplied to Mr. Symons, and published by him in "British Rainfall."

A specimen of the form in which these observations are recorded is given below :—

1854.		S. L. +	S. L. —	Rainfall.	Temperature.	
May	1	—	—	·01	63	
"	2	—	·6	·08	63	
"	3	—	·5	—	63·5	
"	4	—	·5	·10	61·5	68·5
"	5	—	·4	·03	57	62·5
	&c.		&c.		&c.	

} From 1866.

The books cannot be removed from the Company's office, but access will be allowed from 9 a.m. till 5 p.m.

NOTE.—I was informed that a considerable part of the data has been published in the report of a Commission which sat in 1868, presided over by the Duke of Richmond.

In copying the register I should advise that forms be printed as above, one month on a page; this being done, I estimate—

- That a *complete* copy of the register would (including checking), occupy one person for 100 hours, *i.e.*, for the first series 48 hours, and for the second series 52 hours.
- That if the times of the occurrence of high water given in the first series be not required, the time would be reduced to 76 hours.
- That if the rainfall and temperatures given in the second series be not required, the time would be still further reduced to 50 hours.
- That if the first series be rejected and the height of the stream only be taken from the second series, the time required to copy and check would be for one person 26 hours.

J. A. CURTIS,
July 19, 1880.

The Secretary was authorised to have a copy made of the height and temperature of the water, excluding the tidal observations.

Resolved—That a honorarium of thirty guineas be given to Mr. Strachan for his work in the compilation of Part II. of "Contributions to Arctic Meteorology" (Minutes, p. 40).

The Secretary asked for instructions as to the continuance of the Hay Harvest Forecasts, and was directed to close their issue early in August.

Reported—That Professor C. Niven, who has been recently appointed to the vacancy at Aberdeen caused by the death of Professor D. Thomson, had visited the Office on the 25th ultimo, and had also visited Kew Observatory.

The Council then adjourned.

116, *Victoria Street*, October 29, 1880.

PRESENT :

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE.
MR. GALTON.

PROFESSOR STOKES.
LIEUT.-GENERAL STRACHEY.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (July 26) were read and confirmed.

Read—The following letters (Minutes, 1879, p. 68) :—

M.O. 2018.

SIR,

Downin Street, August 9, 1880.

I AM directed by the Earl of Kimberley to acquaint you that, on receipt of your letter of the 16th October last, the plan proposed by the Meteorological Council for an observatory in the West Indies was submitted to the Governors of the British Colonies concerned, and that some correspondence on the subject has since taken place. But Lord Kimberley has now received a despatch from the Governor of Jamaica, a copy of which is annexed, enclosing a letter from Mr. Maxwell Hall, in which he proposes a more economical arrangement, which he is enabled to do through the liberality of the Government of the United States.

Lord Kimberley has sanctioned the adoption of Mr. Hall's scheme, and has informed the Governors of the other Colonies concerned that the scheme will, for the present at least, be substituted for the more elaborate proposals contained in your letter of the 10th of April 1879.

I am, &c.

(Signed) ROBERT G. W. HERBERT.

The Secretary to the Meteorological Office.

Jamaica, No. 150.

M.O. 2018.

MY LORD,

King's House, Jamaica, June 22, 1880.

REFERRING to Sir M. Hicks Beach's Despatch No. 241, of 19th November 1879, I have the honor to forward, for your information, a further letter from Mr. Maxwell Hall on the subject of his proposed system of storm warnings, containing a proposal which I think it will be more advantageous to this Government to accept in the first instance, than to join in the scheme submitted in the despatch to which I have referred.

2. The purchase of the site for the central station near Kingston, mentioned by Mr. Hall, may be deferred for the present until the plan is tested, as he rents the premises mentioned. Apart from this, all that he asks is a contribution of 150*l.* per annum towards the maintenance of the central station, which will enjoy all the advantages of communication with the several stations of observation established and maintained by the Government of the United States in different parts of the West Indies, in the interests of meteorological science, of which there are now six at Havana, Santiago de Cuba, St. Thomas, Porto Rico, Guadaloupe, Barbados. These stations have hitherto been maintained solely for the benefit of the United States, but Mr. M. Hall will be allowed to use them for local purposes, that is to say, he can use the telegrams which may be sent to him from the stations, for guarding the West Indies, as well as for condensation and transmission to Washington.

3. With regard to Jamaica, the United States Signal Service pays (1) all the telegrams; (2) the clerks for transmitting the right telegrams when sent; (3) the travelling expenses Mr. Hall may incur on their behalf; and (4) as observer they pay him 120*l.* a year.

4. General Myer, the Chief Officer of the United States Signal Service, approves of the position of the central station at Jamaica, because it is the telegraphic centre of the West Indies, and as the Americans are at least our equals in meteorological science, I am disposed to regard their arrangements as likely to be as good as those suggested by the Meteorological Officer in London, while our participations in their benefits will be much less costly.

5. I have only to add that Mr. Maxwell Hall is a gentleman belonging to Jamaica whose scientific attainments are well known, who has some independent means of living, and is not in this matter seeking his own profit, though he cannot carry out the service without money.

6. The annual contribution of 150*l.* now sought is not large, and will in fact be dependent upon "results" or performance of the service, and I therefore ask your sanction to place it on the estimates.

I am, &c.

(Signed) A. MUSGRAVE.

The Right Hon. The Earl of Kimberley,
&c. &c. &c.

Read—The following letters (Minutes, p. 41) :—

No. 14567.
M.O. 1980.

Board of Trade, (Marine Department,) Whitehall Gardens, S.W.,
August 5, 1880.

SIR,

I AM directed by the Board of Trade to forward copy of a letter and inclosure received from the Foreign Office, suggesting the supply of certain instruments for meteorological purpose to the Ports of Paphos and Kyrenia, Cyprus.

R. H. Scott, Esq.,
Meteorological Office, Victoria Street, S.W.

I am, &c.
(Signed) THOMAS GRAY.

No. 14567.
M.O. 1980.

SIR,

Foreign Office, July 30, 1880.

I AM directed by Earl Granville to transmit to you the accompanying copy of a despatch from Her Majesty's High Commissioner in Cyprus, suggesting that the Board of Trade might be willing to supply instruments for meteorological observations at Paphos and Kyrenia, thus establishing a complete series of observing stations, as the Meteorological Society have offered to furnish instruments to the other towns in the Island where English officials reside, and I am to request you, in laying this letter before the Committee of Privy Council for Trade, to recommend Sir R. Biddulph's suggestion to their favourable consideration.

The Secretary of the Board of Trade.

I am, &c.
(Signed) TENTERDEN.

No. 14567.
M.O. 1980.

MY LORD,

Nicosia, June 25, 1880.

THE Meteorological Society has offered to supply instruments for meteorological observations at some of the principal places in Cyprus.

There are, however, two other places where English officials reside, viz., the Ports of Papho and Kyrenia, and it has been suggested to me that the Board of Trade might be willing to supply instruments for those two stations, so that complete observations might be rendered from all places in Cyprus occupied by Englishmen.

Should the Board of Trade be able to comply with this request, the observations will be conducted in accordance with the instructions already given by the Meteorological Society, and copies of observations from all stations shall be sent to the Board of Trade, if it is so desired.

The Right Hon. the Earl Granville, K.G.
&c. &c. &c.

I have, &c.
(Signed) ROBT. BIDDULPH.

M.O. 2084.

Office of the Sanitary Commissioner with the Government of Cyprus,
August 14, 1880.

MY DEAR SIR,

I HAVE to acknowledge the receipt of your letter of the 2nd instant, and to state that I hope to be able to forward plans of the proposed stations at Limassol and Larnaca by next mail.

I am directed by his Excellency the High Commissioner to state, that as, in his opinion, it is advisable to have all the observations conducted by members of the same Department, he suggests that the station at Larnaca should be under the charge of the Civil Surgeon instead of the Captain of the Port, as originally proposed. An excellent site for the station will be obtained in the grounds of the hospital, a plan of which will be forwarded as early as possible.

In this case all the four stations will be ready for instruments as soon as they arrive, and I hope you will be able to send the whole four sets at the same time.

I am extremely anxious to get the stations in working order as soon as possible, so that correct observations may be ensured from the first day of next year (1881).

The cases of instruments should be sent direct by one of Papayanni's steamers from Liverpool and addressed to—

The High Commissioner,
c/o Government Store Keeper,
Larnaca,
Cyprus.

This will ensure the cases not being opened at the Custom House.

If at the time of sending them you will kindly advise me of the marks and numbers of the cases with their contents, I shall be able to make the necessary arrangements on their arrival here.

R. H. Scott, Esq.,
Secretary of the Meteorological Council.

Yours, &c.
(Signed) FRED. W. BARRY.

The Secretary reported that by direction of the Chairman he had replied (Letters 2379 and 2381) to the effect that instruments would be supplied for the proposed new stations at Papho and Kyrenia, and that the change of observer at Larnaca had been

noted. The action taken was approved, and the Secretary stated that a complete outfit for the six stations would be sent out by the next steamer.

Read—The following letter (Minutes, p. 25) :—

M.O. 2393.

War Department, Office of the Chief Signal Officer,

SIR,

Washington, D.C., September 23, 1880.

I HAVE the honor to inform you that the following countries have agreed to accept the change of hour of simultaneous meteorological observations, from 7h. 35m. to 7h. 0m. a.m., Washington mean time, as proposed by letter of General A. J. Myer, late Chief Signal Officer, dated May 4, 1880, and telegram of July 1, 1880 :—

Algiers, Canada, Costa Rica, Denmark, Greece, Japan, Mexico, Portugal, Porto Rico, Spain, Switzerland, Turkey, Australia, Cape of Good Hope, Cuba, Granada, Martinique, and Mauritius. France and Russia have accepted on condition that the change will be accepted by the other co-operating countries.

This change has been deferred until January 1, 1881.

This Office relies on your valuable co-operation, and begs it may be advised at an early date that you concur in the proposed change.

Very respectfully, &c.

(Signed) R. C. DRUM,

Adjutant General, and

Acting Chief Signal Officer of the Army.

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

Secretary to the Meteorological Council,

116, Victoria Street, London, S.W.,

England.

The Secretary was instructed to reply that the Council were prepared to agree to the proposed change of hour for the simultaneous observation, under the conditions laid down in their last letter to the Chief Signal Office (Minutes, *l.c.*)

Read—Letter 2333 from the Chief Signal Office, Washington, announcing the death of General Myer on the 24th of August.

The Secretary was instructed to express to the Acting Chief Signal Officer, on behalf of the Council, their sense of the high value of the services of General Myer to meteorology, and their regret for the loss which the Signal Office has sustained by his death.

Submitted—The following report :—

SIR,

October 1880.

I BEG to report that the work connected with the collection of meteorological data for the Indian Government is now finished, the data books for the six months July to December, containing observations extracted from the Office logs for the Northern Indian Ocean and for the Bay of Bengal, were passed out of Marine Room on the 9th instant for transmission to India.

We have supplied the Indian Government with about 120,000 *sets* of observations for the whole year.

The information was forwarded to the India Store Department for transmission to Calcutta on the 8th instant.

(Signed) CHAS. HARDING.

R. H. Scott, Esq.

Submitted—The following reports :—

CAPE OF GOOD HOPE DISCUSSION.

STATEMENT of WORK yet to be done, with ESTIMATE of TIME necessary for its COMPLETION.

SIR,

THE following is a rough statement of the outstanding work for the Cape of Good Hope District, with an estimate of the probable time necessary for its completion, drawn up by the direction of the Chairman for the information of the Council.

There is also the *completion* of Wind, Barometer, and Air Temperature Charts, placing barometer frequency diagrams, drawing final isobars, drawing prevailing wind-arrows, entering air temperature isotherms (originals yet to be checked), &c., seven months yet to be done.

This with the general supervision of work of room will fully occupy me during the time that others are engaged on the ordinary computations.

The examination of new logs, posting index of data in Ocean 10° squares, indexing instrumental corrections, &c., with assistance, in *completion* of wind, &c. charts, will occupy the full time of one person, so that there are but three persons* available for the computations, &c. of Cape District.

Entries printed in roman type refer to work fully sanctioned by Council.

Entries printed in italics refer to work only partially sanctioned by Council, or for which full arrangements have not yet been made.

Nature of Work to be done.	Months to do.	Time necessary to complete (one Person's Time.) Days.	—
WIND, working homogeneous areas and charting -	1 partially	7	—
WEATHER, CLOUD FORM AND AMOUNT, AND STATE OF SEA, Tabulation, &c.	8	105	—
WEATHER, CLOUD FORM AND AMOUNT, AND STATE OF SEA, Charting.	11	6	—
<i>SPECIFIC GRAVITY OF SEA.—Working mean results for homogeneous areas, tabulating frequency of different values.</i>	11	33	—
ICE AND PASSAGES.— <i>Considerations having regard to Minute of Council Feb. 21, "respecting routes to Australia in higher and lower parallels of latitude, so far as the district now under discussion is concerned, with the view of placing upon the chart any important results bearing upon this question that may be obtained."</i>	Ice. 12	Ice. 6	<i>The method of dealing with passages not fully considered. The individual data of the number of days occupied in certain crossings at different latitudes fairly complete.</i>
LOCI OF HIGH, VERY HIGH, LOW AND VERY LOW BAROMETER.— <i>Prepared with the view of obtaining an idea of the paths along which the centres of disturbance most commonly travel.</i>	10	8	
Total for one person - -		165 days.	<i>Prior to this being done for all months the highest and lowest barometer readings have to be charted (already obtained) for seven months. Allowance made for this in time (eight days) estimated.</i>
* For three persons available - -		55 "	

The preparation of certain results for January Cape Gales, necessary for Captain Toynbee's consideration, will occupy one person about a week.

If the staff of Marine Room is steadily engaged on the above work, there is every reason to believe it will be completed by the end of the year.

R. H. Scott, Esq.

CHAS. HARDING.
28th October 1880.
HENRY TOYNBEE.

SIR, Meteorological Office, September 30, 1880.
I HAVE the honour to report, for the information of the Council, on the work which has been done for the quarter ending 30th September, 1880.

For the Month of August.—Current extracts from Office logs to No. 4400 have been completed.

For the Month of November.—Current extracts will be completed by the end of October.

Sea Temperatures.—Numerous additions have been made to the Sea-Surface Temperature Charts of the Pacific Ocean from—

- The Old Voyagers,
- Maury's Wind and Current Charts,
- Wyman's Meteorological Charts,
- Remark Books of H.M. Ships and other documents deposited at the Admiralty and Public Record Office.

To Capt. H. Toynbee, F.R.A.S.,
Marine Superintendent.

I am, &c.
(Signed) C. W. BAILLIE,
Navigating Lieut., R.N.

Read—Letters 2426 and 2427 from Captain Toynbee applying for six months leave of absence, on account of the illness of his wife.

Resolved:—I. That six months leave of absence, without pay, be granted to Captain Toynbee in consideration of the circumstances set forth in his letter. II. That if Captain Toynbee, on his return to the Office, continues to serve till the end of 1881 without any further leave, he be allowed to count his holiday of a month and a half as a part of the six months.

The Secretary having reported that Captain Toynbee could be advantageously employed during his absence to carry on certain parts of the scientific work of the Marine Department, and that this could be done without sending away from the Office

any original documents, it was resolved that Captain Toynbee be requested, during his absence from the Office, to undertake—

- A. The general revision of the various charts for the Cape District, now in preparation in the Marine Department.
- B. The discussion of the gales for the Cape District.

And that a sum of 50*l.* from the fund for scientific research be offered to him as remuneration for each of these pieces of work, upon its completion.

Captain Toynbee attended the Council, and the foregoing resolutions were communicated to him, with an expression of regret on the part of the Council that his absence from the Office should have become necessary.

The Secretary was instructed to report at next meeting as to the arrangements to be made for the work of the Marine Department during Captain Toynbee's absence.

Read—A memorandum from Captain Toynbee reporting that since the last meeting 45 logs had been received, 29 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. W. Bainbridge, Log kept by Mr. R. Ladd.	S.S. "German"	July 2—Sept. 5, 1880.	Plymouth to the Cape and back.	1880, p. 40. (Mr. Ladd.)
Capt. W. Barron -	S.S. "Sultan" -	May 17—Sept. 17, 1880.	Hull and Hamburg, eight voyages.	1880, p. 27.
Capt. A. J. Brown -	Barque "Belleisle"	March 16—Sept. 3, 1880.	London to Jamaica and home.	1879, p. 128.
Capt. W. F. Caborne, R.N.R., F.M.S.	S.S. "Oakdale"	June 4—Sept. 18, 1880.	London to Rangoon and home, via Suez.	1879, p. 60.
Capt. R. Chitham -	S.S. "Torrington"	March 25—July 27, 1880.	Southampton, Batavia, Rotterdam.	1879, p. 151.
Capt. C. M. Dobson	S.S. "Sunbeam"	Feb. 21—Aug. 25, 1880.	London, China, Japan, Hamburg, via Suez.	1879, p. 122.
Capt. D. Gray -	S.S. "Eclipse" -	March 13—Aug. 9, 1880.	Whaling in Arctic Regions	1879, p. 60.
Capt. J. Gray -	S.S. "Hope" -	March 1—Aug. 11, 1880.	Do. do.	Do.
Capt. S. B. Gray -	Barque "Letterewe"	Sept. 13, 1879— June 9, 1880.	Liverpool, Adelaide, Walleroo, and home.	1879, p. 60.
Capt. J. G. Greig -	"British Peer"	July 24, 1879— April 30, 1880.	London, Rangoon, Chittagong, and Akyab.	1879, p. 60.
Capt. J. P. Holdich, R.N.R.	Barque "Overdale"	Sept. 1, 1879— Sept. 4, 1880.	London, Bombay, Akyab, Falmouth, Copenhagen.	1879, p. 60.
Capt. J. Kidder -	S.S. "Fleurs Castle."	Sept. 20, 1879— Sept. 14, 1880.	London, China, New York, London, China, Suez.	1879, p. 61.
Capt. T. Mesnard -	"Eaton Hall" -	Sept. 10, 1879— Sept. 14, 1880.	Liverpool, Calcutta, and home.	1879, p. 7.
Capt. H. Murdoch -	"Denbighshire"	Aug. 12, 1879— July 23, 1880.	London, Singapore, Bassein, and Hamburg.	1879, p. 7.
Capt. A. Murray -	S.S. "Windward"	Feb. 28—Aug. 13, 1880.	Whaling in Arctic Seas -	—
Capt. M. Parry -	Barque "Queen of Cambria."	March 10, 1879— July 1, 1880.	London, Australia, India, and Schiedam.	1878, p. 104.
Capt. C. W. Pearson	S.S. "Strathleven"	March 16—Oct. 6, 1880.	London, China, Batavia, and home, via Suez.	1879, p. 137.
Capt. C. A. F. Powell, Log kept by Mr. A. S. Thomson.	S.S. "Lusitania"	May 3—Aug. 27, 1880.	London, Australia, and home, via Suez.	1878, p. 9. (Mr. Thomson.)
Capt. J. Raeburn, R.N.R.	"Lochee" -	Dec. 14, 1879— Sept. 1, 1880.	London, Calcutta, and home.	1879, p. 74.
Capt. W. Randall -	"Iron Cross" -	Jan. 25—July 24, 1880.	Liverpool, New Orleans, and home.	1879, p. 102.
Capt. C. T. Raymond	"Theophane" -	Oct. 21, 1879— June 12, 1880.	Liverpool, Melbourne, and home.	1879, p. 61.
Capt. W. Scott -	Barque "Com- mewyne."	Feb. 22—Aug. 6, 1880.	Glasgow, Surinam, and home.	1879, p. 102.
Capt. G. R. Stuart -	"Oamaru" -	Dec. 12, 1879— Aug. 30, 1880.	Glasgow, New Zealand, and home.	1879, p. 61.
Capt. W. Symington	S.S. "Hankow"	March 31—Aug. 8, 1880.	London, China, and home, via Suez.	1879, p. 137.
Capt. E. W. Turner	Barque "Mertola"	Jan. 19—Aug. 15, 1880.	Liverpool to Pomaron and home, three voyages.	1879, p. 102.

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. W. Warden -	S.S. "Elizabeth Martin."	Oct. 5, 1879— Aug. 10, 1880.	Between Natal and Mauritius.	1877, p. 17.
Capt. W. Legg -	"Star of Greece"	Oct. 2, 1879— Oct. 5, 1880.	London, New York, Liverpool, Calcutta, and home.	—
Capt. W. Olver -	Barque "Prince Hassan."	July 11, 1878— Sept. 1, 1880.	Cardiff, Cape of Good Hope, Mauritius, Australia, New Zealand, and home.	—
Capt. H. Parsell -	S.S. "Baltic" -	Feb. 25—Aug. 6, 1880.	Liverpool to New York and home, five voyages.	—

Mr. Scott was instructed to present the Charts (O. 27) to Captains Legg and Olver, and (O. 32) to Captain Parsell, and to convey the best thanks of the Council to the other observers.

Submitted—An application (Letter 2286) from M. Mascart asking for copies of observations taken in the North Atlantic during the winter of 1879–80.

The Secretary was authorised to supply the information on condition of the cost of copying being defrayed by the French Government.

Submitted—The following report :—

GENTLEMEN,

I HAVE to report that, in accordance with your instructions (Minutes, p. 47), I attended the meeting of the International Meteorological Committee at Berne in the month of August. All the members of the Committee were present, and the sittings lasted from the 9th to the 12th of the month.

The following are the most important points on which resolutions were adopted :—

The International Comparison of Standard Instruments (Minutes, 1879, p. 144).—The original scheme for this undertaking was framed on the supposition that 36 European observatories would take part in it, each paying a quota of 15*l*. The number of adhesions to the proposal up to the date of the meeting (20) was, however, insufficient to justify the Committee in commencing the comparison, and it was determined to recommend each country to carry on a careful comparison of its own standard instruments with those of neighbouring countries.

The International simultaneous Observation.—It was resolved to accede to the proposal of the Chief Signal Office, Washington, and to change the time of taking this observation to 0*h*. 8*m*. p*m*., notwithstanding the inconvenience which the change might entail in some instances.

The Proposal for concerted Arctic Observations.—The International Polar Commission, appointed at Hamburg in October 1879, presented a report of a meeting it had recently held at Berne, and announced that Count Wilczek and Lieutenant Weyprecht had consented to postpone their expedition to Nova Zembla until 1882, in order to allow of more time for the organisation of the other expeditions destined to co-operate with them. The International Committee resolved to aid the scheme by all the means in their power.

The Publication of Mean Values for Meteorological Stations.—At Captain Hoffmeyer's suggestion, the Committee recommended that all meteorological organisations should publish regularly the mean values for the most important elements for the international telegraphic stations.

I may state, for the information of the Council, that since the meeting of the International Committee I have requested Captain Hoffmeyer to specify more precisely the mean values which he wishes to see in print, and he has replied (Letter 2492) as follows :—

"I think we ought to have the following data :—

Pressure (reduced to 32° and sea level)-				Mean for 8 a.m.
"	"	"	"	- Highest and lowest readings.
Temperature	-	-	-	- Mean for 8 a.m.
"	-	-	-	- Mean of maxima.
"	-	-	-	- Mean of minima.
"	-	-	-	- Absolute maxima and minima.
Relative Humidity	-	-	-	- Mean for 8 a.m.
Rainfall	-	-	-	- Total amount.
"	-	-	-	- Number of days of rain.
"	-	-	-	- Greatest fall in 24 hours.
Wind	-	-	-	- Number of observations for eight points and of calms, for 8 a.m.

It would be very useful to have these values for each month, but if the publication is to be commenced, I should prefer to have them for decades, *i.e.*, 1—10, 11—20, 21 to end of month."

The Catalogue of Meteorological Literature.—The proposal made by Dr. Hellmann, of Berlin, for the preparation of such a catalogue was considered. Dr. Hellmann stated that he had calculated the cost of preparation of the catalogue of printed books and memoirs at 500*l*., and that of printing and publication (1,000 copies) at about 750*l*.

Several of the members of the Committee promised to aid in carrying out the scheme, if it was seriously undertaken, by the preparation of catalogues of the literature which exists in their own individual languages. The subject was finally referred to Mr. Scott and Dr. Hellmann, with power to act if they found sufficient encouragement.

As to the catalogue of MS. records of observations no definite resolution was adopted.

International Tables for the Reduction of Observations.—It was stated that a publishing firm in Leipzig was prepared to print and publish such tables, at its own risk, if the "copy" was delivered to them. The subject was referred to Professor Mascart and Professor Wild for the preparation of a definite plan for the calculation of the tables.

In conclusion, I beg leave to state that the report of the meeting is nearly ready to go to press, and I have to ask for your authorisation to publish the English edition.

Yours, &c.
(Signed) ROBERT H. SCOTT.

Submitted—The following reports:—

GENTLEMEN,

I HAVE the honour to report that I have completed the inspection of the Irish and Welsh stations, and that I have found nothing calling for serious alteration in the way of amendment of the methods of observing, &c.

I shall deal first with the Observatories, next with the Telegraph Stations, and finally with the Stations of the Second Order.

OBSERVATORIES.

Valencia.—Was visited on the 23rd ultimo. There was nothing calling for special remark as regards the instruments; the repairs to the house seem to have been effectively carried out, but I regret to say that it will be necessary to lay a tiled drain to carry off the surface water and the house sewage, which have hitherto been allowed to flow into a so-called French drain in actual contact with the walls of the house. I have directed Mr. Cullum to procure an estimate for this work, which I anticipate can be effected cheaply.

Armagh, visited on the 4th inst.—There is nothing calling for remark at this observatory.

TELEGRAPHIC STATIONS.

The barometers at St. Ann's Head, Roche's Point, Donaghadee and Mullaghmore, have all been changed, as I took a supply of the new instruments with uncontracted tubes with me.

St. Ann's Head, visited September 20th.—At this station Mr. Walker, the old observer, having been promoted to a postmastership at Exmouth, the duty of reporting has, with the sanction of the Trinity House, been transferred to two of the light-keepers, Messrs. Blake and Baker. The only change in the instrumental arrangements has been the removal of the barometers to the upper lighthouse, which is an improvement as regards illumination, &c.

The thermometer screen, rain-gauge, and sunshine recorder are, as formerly, placed on the open ground near the lighthouse.

The new observers seem intelligent and careful.

Valencia, visited September 23rd.—This station is in good order. The sunshine recorder has been erected at the S.E. corner of the house, where it commands an uninterrupted view of the sun as far as the mountains, close to the horizon, will permit; but their influence is slight.

Roche's Point, visited September 24th.—At this station the observer, W. Kennedy, is very clever, but does not pay sufficient attention to the condition of the instruments. The exposure of the thermometer and rain-gauge has been seriously interfered with by recent building operations on the Point, and I have directed Kennedy to ascertain whether Lord Fermoy would be willing to grant a site for these instruments on the headland close to the station. Since my visit I have learned that his Lordship has granted the necessary permission.

Parsonstown, visited October 1st.—The observer at this station, W. Harding, is attentive and diligent. The only matters calling for remark are that I am informed that the barometer (on Fortin's principle), will not register correctly below 29 inches, as there is too much mercury in the cistern. I hope this may soon be set to rights. The thermometer screen was rather too low. The sunshine recorder is placed on one of the walls of the six-foot reflector building.

Donaghadee, visited October 4th.—At this station Mr. J. McGowan has resigned the post as observer, and has been replaced by his brother Thomas, who seems very intelligent and willing. An improvement has been effected in the arrangements, as the new barometers can both be suspended in the Post Office, whereas formerly the check instrument was placed in an inconvenient position in another room.

The exposure of the thermometer screen and rain-gauge is not satisfactory, as they are in a narrow garden, but no better site is obtainable in the town.

Mullaghmore, visited October 8th.—This station is very satisfactory, but I think it may, perhaps, be advisable to lay a private wire to it from Clifony, as the expense of the foot messenger three times a day (24*l.* per annum) is considerable, and the Post Office may possibly reduce the proposed annual rent of the wire (38*l.* per annum).

Holyhead, visited October 12th.—At this station the barometers had been changed before my visit. I have to recommend the Council to send down a Stevenson's screen to be set up in the garden. The wall screens hitherto in use are not quite satisfactory.

Mr. Tilston is very willing and attentive, but is now at an advanced age. It would not be easy to find a successor to him, because at Holyhead there are few educated residents besides those who are employed on the railway or harbour staff, and who would therefore be unable to undertake the duty of observing three times a day.

STATIONS OF THE SECOND ORDER.

St. David's, visited September 18th.—This station calls for no special remarks. The instruments were in good order.

Waterford.—The station at the Friend's School, Newtown, was visited September 21st. This station is not thoroughly efficient, for although Mr. Neale is fairly attentive, the continuity of the observations is interrupted in vacation time. The situation of the thermometers and rain-gauge is pretty good, but the latter instrument is not of a good pattern.

Cork (Queen's College).—At this station verified instruments have been procured. The situation is good, and Professor A. Jack, the Registrar, hopes to begin observing with the year 1881.

Foynes (Mount Trenchard), visited September 29th.—This station simply supplies readings for the Weekly Weather Report.

The thermometers and rain-gauge are in good order, and well placed on the side of a hill, no level ground being obtainable in the demesne.

Parsonstown.—This station has already been mentioned in the list of telegraphic stations.

Dublin (Mountjoy Observatory).—This station was visited on the 2nd of October. It is in very good order, the observer, Sergeant Gwynne, being very attentive. Lieut.-Colonel Martin takes great interest in the observations. The sunshine recorder is placed on the lofty scaffolding mentioned in my last year's report.

Dublin (Fitzwilliam Square).—This station was visited October 11th. Dr. Moore, the observer, sends in the fullest returns we receive from any of the Second Order stations, but as his house is in the town, the exposure is not open enough.

Dublin (Glasnevin Gardens).—This is a recent station maintained at the Botanic Gardens in connexion with the Science and Art Department. The thermometer exposure is far from satisfactory, as the instruments are in a large closed shed, with very little ventilation. A Stevenson's screen is required. The barometer was placed in the screen, but this I at once removed to the library.

I have great hopes that this station may be rendered efficient by the end of the year.

Londonderry.—The observer, Sergeant Conroy, late R.E., is very careful. His situation is as good as a town garden can be expected to afford, but it does not satisfy all the requirements of a complete station, and his occupation, that of Assistant to the County Surveyor, interferes to some extent with the regularity of his own observations. The readings are, however, taken by his assistant in his absence.

Colebrooke, visited October 6th.—The instruments here are in good order, but the observer, Mr. Ferguson, gardener and forester to Sir Victor Brooke, finds himself unable to keep up the reductions, so that the schedules are not completely filled up.

Markree Observatory.—At this station the observations are taken by Mrs. Salles, the housekeeper, as Dr. Doberck declines to take any part in them. The instruments are well placed, with the exception of the rain-gauge, which might have a better exposure. The sunshine recorder is situated on the wall of the observatory in a perfectly open position. The condition of the station on the whole was satisfactory.

Colonel Cooper is anxious to retain the original sunshine cards if the Council will consent to his doing so.

Your obedient servant,
ROBERT SCOTT.

October 13th, 1880.

REPORT on the SCOTTISH METEOROLOGICAL STATIONS of the METEOROLOGICAL OFFICE for 1880. BAROMETERS.

The barometers at the stations were compared with the small pocket aneroid No. 11, and those at Nairn, Laudale, Ardrossan, Glasgow, Leith, and Glenalmond, also with the mercurial marine standard barometer No. 456. It is believed that this standard barometer was entirely free from air during the whole time of the inspection.

The small aneroid, No. 11, had since the inspection of 1879 been sent for repair to London, with an improvement, undoubtedly, in the readings made from it; but these readings still are far from satisfactory. Such as they were they are given in this report.

The following table gives the corrected readings of inspector's standard No. 456; the readings of aneroid No. 11; and the uncorrected readings of the reporting and check barometers at each of the

stations, to which is added a column showing the readings of the attached thermometers, which may be useful in connexion with the readings of the aneroid:—

TELEGRAPH REPORTING STATIONS.	Insp. St. No. 456.	Aneroid, No. 11.	Reporting Barometer.	Check Barometer.	Att. Therm.	REMARKS.
Aberdeen - - -	—	29·495	29·555	—	64	In house.
Do. - - -	—	—	—	29·542	66	In office.
Nairn - - -	30·081	30·035	30·060	30·068	69	
Wick - - -	—	30·385	30·396	—	70	In shop.
Do. - - -	—	30·320	—	30·331	67	In house.
Dunrossness - - -	—	30·215	30·218	30·215	65	
Sandwick - - -	—	30·230	30·218	—	64	
Stornoway - - -	—	30·260	30·230	30·230	61	
Laudale - - -	29·730	29·700	29·718	—	58	In ground floor.
Do. - - -	—	29·690	—	29·718	58	In upper floor, 8 feet higher.
Ardrossan - - -	29·842	29·825	29·837	29·840	59	
Glenalmond - - -	29·551	29·570	29·550	—	52	
Leith - - -	30·557	30·565	30·553	30·552	66	
OBSERVATORIES.						
Aberdeen - - -	—	29·470	29·530	—	66	
Glasgow - - -	29·677	29·670	29·659	—	55	

Since last inspection new barometers have been supplied to the reporting stations, with tubes less contracted than those formerly used at the stations.

Two sets of these I took with me, one set being for Wick and the other for Dunrossness, and returned the old barometers to the Meteorological Office, *via* Mr. Jones, Aberdeen. At Wick readings were taken of the two sets after the new had hung beside the old barometer at the house (check barometer) 1h. 20m. and at the shop (reporting barometer) 2h. 30m.—

	New.	Old
Reporting barometer - - -	30·396	30·396
Check barometer - - -	30·331	30·327

And at Dunrossness after the two sets had been hanging together upwards of two hours—

	New.	Old.
Reporting barometer - - -	30·218	30·218
Check barometer - - -	30·215	30·216

These results show that the new barometers at Wick and Dunrossness are in good order.

I drew attention in last report to the barometric means of the stations at Stornoway, Leith, Ardrossan, and the observatories at Glasgow and Aberdeen, on which I make a few additional brief remarks.

Stornoway Barometer.—Since last year, Mr. Sutherland has, as requested, re-levelled his barometer with the result that the height of its cistern had been previously understated, which accounts for part of the suspected error of the instrument. As regards the readings of the instrument, Mr. McDonald, assistant observer, set and read it accurately. Unfortunately Mr. Sutherland was accidentally detained at Ullapool and did not arrive at Stornoway till I was on the point of leaving. The following are the means at 32° and sea-level for the stations at Stornoway Castle and Nicolson's Institution for last three months:—

	Stornoway Castle.	Nicolson's Institution.
July - - -	29·850	29·822
August - - -	30·003	29·969
September - - -	29·838	29·792

To an inquiry into the cause of this difference, I shall give very special attention next inspection, before which a comparison, month by month and day by day, will be instituted so as to ascertain under what observer it arises. I am convinced that the difference arises in the setting of the instrument before reading it.

Leith Barometer.—I have been several times at Leith since last year, and now understand that the barometer there has been set too low. Mr. Hutchinson, the new observer, informs me that he was instructed by the late observer to bring the vernier down till the two specks of light were just visible, in other words, were brought near the point of being shut off. If I was correct in last report in supposing that the means of this barometer were 0·020 inch too low, the greater part of the error of the past observations, if not the whole of it, will now be accounted for.

Ardrossan Barometer.—This is the station at which the barometer was systematically set too low. At this inspection the new observer, Mr. Carrick, set and read the one barometer, with an error of −0·003 inch and the other correctly. It is highly probable that this barometer is now set and read correctly.

Glasgow Barometer.—As the work on which I have been engaged for some time proceeds, viz. an investigation of the atmospheric pressure of the British Islands, it seems clear that Glasgow barometer is a little more than 0·010 inch lower than Kew standard. During this year's inspection

after standard No. 456 had hung beside the station standard barometer for two hours the readings were—

Standard No. 456	-	-	-	29·677
Observatory standard-	-	-	-	29·659

I am inclined to think it extremely probable that this standard instrument to which the photographic records are reduced, reads about 0·015 inch too low, and has done so throughout. As the instrument, besides, is an old one, and the scale not easily read from, it might be worth considering whether a new standard might not be supplied to the Glasgow Observatory.

As regards the *Barometer* at the *Aberdeen Observatory* about which I expressed an opinion that it reads 0·010 inch too high, the following are the means for the first six months of 1879 at sea-level compared with those for the Telegraph Reporting Station, and the station at Gordon Hospital :—

		Observatory Barometers. 9 a.m. and p.m.	Telegraph Re- porting Station. 8 a.m.	Gordon's Hospital. 9 a.m. and p.m.
January	- -	30·066	30·032	30·055
February	- -	29·535	29·524	29·519
March	- -	29·920	29·896	29·908
April	- -	29·785	29·753	29·767
May	- -	29·986	29·974	29·972
June	- -	29·725	29·704	29·713

From this comparison it is probable that the standard barometer of this observatory reads about 0·010 inch too high. The error is not in the setting of the instrument. A comparison with a standard barometer whose movements are not sluggish is therefore very desirable.

As I shall probably require to be two or three times in Aberdeen from January to March next, I may then take an opportunity of making this comparison.

The table of the results of comparisons made during inspection (page 58) shows from the readings of the reporting and check barometers that these instruments at the stations are generally in a very satisfactory state. The difference of the two is always small, and would no doubt be still smaller if the readings themselves were corrected for instrumental errors.

Inspector's Standard Barometer.—This is one of the ordinary marine barometers, the movements of which being sluggish, it follows that when atmospheric pressure at the time of inspection happens to be rising or falling, it cannot serve as a satisfactory inspector's standard. An instance illustrative of this will be seen in the table, for the station at Laudale. The results for Nairn also point in the same direction the difference being in all likelihood due not to errors in the station's barometers, but merely to the sluggish movement of the inspector's standard.

May I take the liberty of suggesting to the Meteorological Council that the standard barometer for the Inspector's use might be of the same description as the barometers supplied to the Telegraphic Reporting Stations, constructed in as handy and light a form as may be consistent with the efficiency of the instrument.

THERMOMETERS.

The following table gives the results of the comparison with inspector's standard No. 2420, of the thermometers at the various stations, the readings of the standard being corrected for instrumental errors, whilst those at the stations are not corrected :—

Telegraph Reporting Stations.			Insp. Stand. No. 2420 Corrected.	Dry Bulb.	Wet Bulb.	Spare do.	Max.	Min.	Time in Water in Minutes.	Change of Tempera- ture of Water.
Aberdeen	-	-	64·3	+0·4	+0·6	+0·5	+0·6	+0·8	105	-0·2
Nairn	-	-	68·9	+0·2	+0·6	+0·5	+0·1	+0·9	—	—
Wick	-	-	66·9	+0·4	+0·3	+0·3	+0·1	-0·1	75	uniform
Sandwick	-	-	61·5	+0·4	-0·1	—	+0·0	-0·7	120	-0·3
Dunrossness	-	-	62·4	+0·2	+0·2	+0·2	+0·3	-0·3	150	-0·2
Stornoway	-	-	61·3	+0·6	+0·4	+0·5	-0·1	-0·4	140	+0·1
Laudale	-	-	60·8	+0·1	+0·1	—	+0·1	-0·1	60	uniform
Glenalmond	-	-	51·7	+0·2	+0·2	—	+0·2	0·0	80	do.
Ardrossan	-	-	55·8	+0·2	+0·2	+0·4	0·0	-0·2	110	-0·2
Leith	-	-	60·6	+0·3	+0·5	+1·5	-0·2	—	100	-0·3
OBSERVATORIES.				Max. No. 48.	Min. No. 89.	Eye Obsns.				
						Dry.	Wet.			
Aberdeen	-	-	52·1 No. 10.	+0·5 No. 5433.	-0·1	0·0	+0·5		90	uniform.
Glasgow	-	-	54·5	+0·3	+0·2	+0·3	+0·1		120	uniform.

The above corrected readings of standard No. 2420 were obtained by subtracting $0^{\circ}\cdot3$ from each reading, in accordance with the certificate of errors received from the Office.

As explained in "*Inspection Notes*" already forwarded to the Office, the minimum thermometer at Sandwick was found to be out of order, and that at Stornoway considerably so. Both were put right by the observers themselves under my immediate instructions; and directions, very special, were given occasionally to examine the instrument.

The minimum thermometer at Aberdeen Telegraphic Reporting Station reads no lower than $+10^{\circ}\cdot0$, and that at Landale than $+26^{\circ}\cdot0$. In both cases it is desirable that new thermometers, going down to say $-20^{\circ}\cdot0$, were sent to replace the old ones. In December the temperature at Aberdeen fell to $+12^{\circ}\cdot0$. If the great frost of the 4th of that month had extended to this station, its thermometer could not have registered it. On that night the temperature at Springwood Park, Kelso, fell to $-16^{\circ}\cdot0$, the thermometer there being well protected in a Stevenson's screen. I inspected this station in May last, and from the state of the thermometer and its position there can be no doubt of the correctness of the observation, which the unexampled destruction to vegetation all round only too faithfully confirmed. As it is desirable to record such low readings at the telegraphic reporting stations when they do occur, a thermometer reading to about $-20^{\circ}\cdot0$ is most desirable, at least at all inland and eastern stations.

When the Stevenson's box has been properly placed at Nicolson's Institution, Stornoway, I shall be able to report that all the telegraphic reporting stations have their thermometers so placed that they may be regarded, with the exception of Sandwick the peculiarity of which has been referred to in a previous report, as good, and some of them as first-class climatological stations.

Reading of the Thermometers.—I learned during this inspection from Mr. McDonald, assistant observer at Stornoway, that he has been in the practice of reading the thermometers only to that degree which the temperature has passed or reached. Thus $40^{\circ}\cdot0$, $40^{\circ}\cdot1$, $40^{\circ}\cdot2$, . . . $40^{\circ}\cdot8$, and $40^{\circ}\cdot9$ are all read as $40^{\circ}\cdot0$. I thought I had specially drawn attention to this point, but next year I shall again state to the observers, very particularly, to read off the nearest degree, and, as regards the wet bulb, to endeavour to make their daily report show the approximate difference in degrees between the dry and the wet bulbs. I believe such readings as these have been sent:—

Actual Readings.				Readings sent.	
Dry.	Wet.			Dry.	Wet.
$40^{\circ}\cdot6$	$39^{\circ}\cdot4$	-	-	41°	39°
$40^{\circ}\cdot9$	$40^{\circ}\cdot0$	-	-	40	40°

RAIN-GAUGES.

According to instructions received from the Office, I ordered all the rain-gauges to be placed at the uniform height of 12 inches above the ground.

SUNSHINE RECORDERS.

These extremely valuable additions to the observing instruments were placed in either good or excellent positions, except at Stornoway, where the position and fixing of the instrument were not good. I gave orders to have its position and fixing made satisfactory.

I have the greatest pleasure in reporting a growing interest in the work of observing on the part of all the observers and a readiness to make such additional observations for the Office as are asked for.

Glasgow Observatory.—The tree referred to in a previous report as interfering in some degree with the rain-gauge, has been cut down. The hitch in the tracing of the anemometer referred to last year still remains visible in most of the lines traced by the instrument, but the curious point is that the hitch is not always found in the sheets. With certain velocities it perhaps occurs invariably. It is a point of considerable interest to discover the cause of it, particularly from its bearing on the important practical question of extreme recorded velocities spread over short intervals of time.

I again looked at the question of the anemometer appearing to fail in registering what seems to be the true direction of the wind, as that is estimated from the general drift, of the smoke all around. As it seemed possible that it might be due to the form of the building taken in connection with the comparatively low height of the anemometer above the extended flat roof of the transit room, &c., Mr. Maclean, the observer, has kindly agreed to note all occasions on which any deviation occurs, together with the force and direction of the wind at the time. The results I shall refer to in next report.

At the time of inspection four drops of water were falling each minute from the wet-bulb of the self-recording thermometers.

Aberdeen Observatory.—There is no remark to be made regarding the instruments at this observatory, excepting the barometer which has been already referred to.

Mr. Boswell kindly directed my attention to the photographic records of the thunderstorm of August 2nd as showing very remarkable meteorological changes, accompanying it, which are of the greatest interest.

(Signed) ALEXANDER BUCHAN,
Inspector.

M.O. 2485.

REPORT of INSPECTION of SELF-RECORDING OBSERVATORIES of the METEOROLOGICAL COUNCIL, 1880.

Falmouth Observatory, visited August 25–27.—The instruments were all in good condition, and the photography was good.

The instrument clocks were all cleaned and oiled, and the lenses wiped.

During my visit, at the desire of W. Fox, Esq., a new gas governor was fitted, with the view of reducing the consumption of gas in the observatory; and at the same time I had new connections fitted to the burners, the old ones having become defective.

The external part of the anemograph was in good order, as was also the registering apparatus, with exception of the velocity pencil, which does not mark quite satisfactorily, although improved slightly by the filing and polishing by Mr. Olive.

The Beckley rain-gauge was in good order.

The sunshine recorder was found to be well placed, but the card appears to be slightly out of focus.

The minimum thermometer reads low, but was not defective from evaporation of alcohol.

The maximum was in good order.

At the desire of Mr. Curtis I noted the method employed by Mr. Squire in making subsidiary measurements. Both ivory and glass scales are used according to instructions, but the readings are first entered in a rough form, fair copies of which are transmitted to the Office.

Valencia Observatory, visited September 1-3.—Both barograph and thermograph at this observatory were in good order, and merely had their lenses cleaned and clocks oiled.

I examined the wet-bulb tube of the thermograph, and found that the defective definition which is observed when the photographic trace is between 35° and 45° is due to some accidental roughening of the surface of the glass which I could not remove. The black varnish had also been scraped off part of the tube: this I replaced. It is possible that the defect may have been caused by the workmen who have painted the building internally since my last visit.

The thermometers for eye observations were all in good order, with the exception of the maximum, which I exchanged for one I took out with me. As Mr. Cullum was of opinion that the ventilation of his thermometer screen was somewhat defective at times of great heat, owing to its closed top, I bored several holes in the upper part of the woodwork to enable a current of air to pass through.

The anemograph was in good order both inside and out, with the exception of a loose joint in the velocity shaft. This was remedied by the insertion of a brass pin.

The rain-gauge was quite right. The sunshine recorder is firmly fixed on the top of a wall, the situation being the best available. Subsidiary measurements are made by Mr. Cullum's assistant, and the tabulation by Mr. Cullum himself independently and in accordance with the regulations.

Armagh Observatory, visited September 8-9.—The thermograph and barograph were found in good order; both clocks were cleaned, and the lever of the barograph shutter weighted to improve its action, which was somewhat uncertain. A new mirror is required for the dry-bulb thermograph, the present one being much dimmed (size $5\frac{1}{4} \times 2\frac{3}{4} \times \frac{1}{8}$ in.).

We cleaned and oiled the anemograph throughout, and eased the fitting of the velocity pencil, which was a little too tight; otherwise the instrument was in good order.

The rain-gauge was also examined, and the capacity of its bottle receiver re-adjusted, as it was found to have become slightly increased. The cause of the defective going of the clock, which had been noted for some time, was detected and removed.

The photography was in a very unsatisfactory condition. Suggestions were offered for its improvement, and Mr. Call has since obtained better results.

The barograph tabulator, which was not working well, was oiled and re-adjusted. A new ivory scale is, however, wanted for the subsidiary measurement of the barogram, the present being almost worn out.

The subsidiary measurements of the thermograms are made by Mr. Hunter, who uses the glass scales, setting them, however, independently of Mr. Call, who makes the tabulations.

Aberdeen Observatory, visited September 14-16.—The barograph, thermograph, and anemograph at this observatory were all in very good order, and the photography was good. After cleaning the barograph clock, the re-adjustment of the light shutter was somewhat difficult, but it was left in proper action.

The Beckley rain-gauge was in good order, with the exception of the clock spindle, which is defective, having been acted on by the mercury; a new one is required. A spare gauge and funnel is also wanted for measuring amount of snow. The practice of the observer hitherto has been to estimate it from the weight of the snowball formed by snow collected in the funnel of the Beckley gauge.

The thermometers for eye observations were also in good order.

The subsidiary tabulations are made in accordance with the method laid down in the regulations.

Glasgow Observatory.—This observatory was visited on September 11th, but owing to absence of Professor Grant I did not inspect it until the 18th, 20th, and 21st.

I found the instruments all in good order, and the usual cleaning operations only were performed.

The mounting of the sunshine recorder is somewhat rougher than at the other observatories, and the adjustment for latitude did not appear to have been quite satisfactorily performed. Professor Grant promised to rectify it when suitable opportunity occurred.

The tabulating is correctly performed, but copies, not originals, are forwarded to the Meteorological Office.

The minimum thermometer for eye observations was found to have a little alcohol in its chamber and was set right.

The photography was excellent.

Stonyhurst Observatory, visited September 22.—All the instruments at this observatory were found in excellent condition. The anemograph still possesses the slight defect alluded to last year,

which appears inherent in the form of instrument, but does not appear to detract from the value of its indications. Owing to the illness of the former photographic assistant the photography was for a time somewhat less satisfactory than usual, but his successor is now producing good results.

The subsidiary measurements were properly made, but only copies are sent to the Office.

Radcliffe Observatory, visited September 25.—The instruments lent by the Council to this observatory, having been very recently set up, were all found to be in thorough order, and the photography was good. The exposure of the rain-gauge is not altogether satisfactory, but Mr. Stone has placed it in the most suitable locality at his disposal.

The copper chimneys of the gas burners are burned through, and new ones are necessary.

(Signed) G. M. WHIPPLE.

Kew Observatory, October 1880.

Submitted—The following report:

REPORT on the HAY HARVEST FORECASTS, 1880.

I BEG to submit herewith a report on the result of the Hay Harvest Forecasts for 1880.

To most of the recipients the forecasts were telegraphed daily for a space of about five weeks, but in three instances, viz., Golspie, Uttoxeter and Leyburn, the telegrams were, by request, continued for a further period of a fortnight.

In order to render the returns more complete and more easily comparable, a printed form was issued to each recipient, the work of checking being thereby rendered considerably more simple than it was last year. The majority of the observers have filled up the form with great regularity and detail, but in some instances the value of the return has been considerably impaired owing to the observer having filled in only one observation daily, such observation being apparently taken at some definite hour. This, of course, gives but a faint idea of the weather experienced during the day, and it is feared that in consequence of this practice the percentages of success have in some cases been lower than they would otherwise have been.

The final result of the checking shows that a percentage of successes has been attained, varying from 56 in "Ireland N." to a little above 80 in "Scotland E.," "England E.," and the Midland Counties, 86 in "England S.W.," and 90 in "Scotland N." The percentage of completely successful forecasts is somewhat smaller than last year, and that of partial successes is higher, while the proportion of total failures is lower. The general result is therefore about the same as it was in 1879.

The following is a brief resumé of the larger table on p. 63.

SUMMARY OF RESULTS.

Districts.	Names of Stations.	Percentages.				Total Percentage of Success.
		Complete Success.	Partial Success.	Partial Failure.	Total Failure.	
SCOTLAND, N. -	Golspie and Drynie -	48	42	8	2	90
" E. -	Inverurie, Glamis, and Longniddry -	52	29	16	3	81
ENGLAND, N.E. -	Morpeth and Ulceby -	39	31	24	6	70
" E. -	Rothamsted (two observers) -	44	40	12	4	84
MIDLAND COUNTIES -	Uttoxeter, Cirencester, and Gerrard's Cross (Bucks). -	49	34	15	2	83
ENGLAND, S. -	Maidstone and Downton -	32	41	22	5	73
SCOTLAND, W. -	Drymen, Islay, and Stranraer -	31	37	18	14	68
ENGLAND, N.W. -	Leyburn, Prescott, and Warrington -	29	42	25	4	71
" S.W. -	Falfield, Clifton, and Glastonbury -	42	44	11	3	86
IRELAND, N. -	Ballinrobe -	17	39	39	5	56
" S. -	New Ross -	36	36	28	—	72
	Mean for all Districts -	38	38	20	4	76

The values for "Scotland W." have been greatly modified by the very low percentage of success shown by Stranraer. The weather at this place seems to have been most exceptional, and exhibits very little agreement with the general character of the weather in the district, as shown by our own charts.

Dr. Prevost, of Cirencester, has been at some pains to ascertain the opinion formed concerning the forecasts by the farmers in his neighbourhood, and as the result of his inquiries he observes that the forecasts were considered useful and accurate upon the whole, but that in many instances the farmers preferred to see the 8 p.m. Forecasts published in the morning newspapers, as they considered these the more reliable of the two.

Mr. Lawes again reports that the weather experienced at Rothamsted is frequently very different from that felt at places a few miles distant.

(Signed) FREDK. BRODIE.

The above report has been drawn up entirely by Mr. Brodie, and has been handed to me to-day.

R. H. Scott, Esq.

(Signed) FREDC. GASTER.

October 25, 1880.

HAY HARVEST FORECASTS, 1880.

RETURN showing the NUMBER of FORECASTS sent to each of the under-mentioned PERSONS, with the SUCCESS or otherwise of the FORECASTS.

Districts.	To whom sent	Address.	No. of Forecasts sent.	No. of Forecasts checked.	Percentages.			Remarks.
					Complete Success.	Partial Success.	Partial Failure.	Total Failure.
0. SCOTLAND, N.	{ Rev. Dr. Joass J. R. Mitchell	- Golspie - Drynie, Inverness	42 30	42 29	50.0 44.8	35.7 48.3	9.5 6.9	4.8 —
1. SCOTLAND, E.	{ J. Armand - G. Johnstone - W. S. Macdonald	- Inverurie - Glamis, by Forfar - Craigielaw, Longniddry -	30 30 30	28 29 29	64.3 51.7 37.9	35.7 20.7 31.0	— 24.2 24.2	— 3.4 6.9
2. ENGLAND, N.E.	{ J. Wilson - J. Turner -	- Woodhorn Manor, Morpeth - The Grange, Uiscey -	33 33	32 32	31.3 46.9	31.2 31.3	28.1 18.7	9.4 3.1
3. ENGLAND, E.	{ J. B. Lawes - W. T. Carrington - E. W. Prevost, per J. Tanner.	- Rothamsted, Harpenden - Croxdon Abbey, Uttoxeter - Roy. Agr. College, Cirencester -	33 45 33	26 44 32	{ 34.6 53.9 54.5 43.8	46.2 34.6 31.8 34.4	15.4 7.7 11.4 18.7	3.8 3.8 2.3 3.1
4. MIDLAND COUNTIES	{ C. King, for the Duke of Somerset.	- Gerrard's Cross, Bucks -	33	19	47.4	36.8	15.8	—
5. ENGLAND, S.	{ C. Whitehead - E. P. Squarey -	- Barming House, Maidstone - The Moot, Downton, Wilts -	33 32	32 31	25.0 38.7	50.0 32.3	21.9 22.6	3.1 6.4
6. SCOTLAND, W.	{ C. H. H. Wilson, of Dalnair.	- Endrick Bank, Drymen -	30	23	30.5	39.1	17.4	13.0
7. ENGLAND, N.W.	{ G. W. Wray - The Earl of Derby, per F. Harrison.	- Eallabus House, Islay - Chapel Rossan, Stranraer - Leyburn, Yorkshire - Knowsley Hall, Prescott -	45 33	29 23 31 33	48.3 13.1 29.0 30.3	41.4 30.4 32.3 51.5	10.3 26.1 32.3 15.2	— 50.4 6.4 3.0
8. ENGLAND, S.W.	{ J. Harle, for the Earl of Ducie.	- Agden Hall, Lymm, Warrington - Whitfield, Falfeld, R.S.O. -	33 33	32 33	28.2 39.4	40.6 45.5	28.1 12.1	3.1 3.0
9. IRELAND, N. -	{ T. Dyke - R. Neville -	- Long Ashton, Clifton, Bristol - Butleigh Court, Glastonbury -	33 33	32 32	40.6 43.8	46.9 40.6	9.4 12.5	3.1 3.1
10. IRELAND, S. -	{ J. Simson - D. A. Milward	- Cloona Castle, Ballinrobe - New Ross -	25 28	18 28	16.7 35.7	39.8 35.7	38.9 28.6	5.5 —

Return somewhat incomplete during latter part of time.

Return incomplete, especially during latter part of time.

From observations made by Mr. Lawes.

From observations taken in the village.

Return very incomplete.

Return somewhat incomplete.

Weather most exceptional.

Return not very complete.

Submitted—The following report (Minutes, p. 47) :—

M.O. 2035.

Meteorological Office, 116, Victoria Street, London, S.W.,

August 9, 1880.

DEAR SIR,

IN accordance with the desire of the Council, I have considered the quantity of printing which would be required to publish in full the observations made under the direction of the late J. Allan Broun at Travancore, and I beg to hand you the accompanying report.

R. H. Scott, Esq., F.R.S.,
Secretary to the Meteorological Council.

Yours, &c.
(Signed) R. STRACHAN.

M.O. 2035.

SIR,

August 9, 1880.

I HAVE examined the documents referred to in Mrs. Broun's letter dated 1880, July 17, They consist of 14 volumes bound in stiff paper, and embrace the observations made at Trevandrum Observatory between 1859, July 9, and 1865, March 4.

1st. It thus appears that Mr. Broun's observations at the Trevandrum Observatory commence 1853, January 1st, and terminate 1865, March 4, thus embracing a period of 12 years, 2 months, and 4 days. Leaving the odd days out of the account, the printing of the observations, on the usual quarto size paper, would require as follows :—

Barometer observations, reduced to 32° F, 1 month to a page	=	146	pages.
Dry and wet thermometers	-	1	" = 146 "
Wind, direction and force	-	1	" = 146 "
Cloud, amount and motion	-	1	" = 146 "
Evaporation and temperature	-	1	" = 146 "
Vapour tension	-	2	" = 73 "
Rain, and other observations, with remarks	1		" = 146 "
Total	-	949	"

2nd. The observations at Agustia extend altogether over 4 years, 3 months, and 9 days. Allowing for 52 months, the printing of these will occupy as follows :—

Barometer	-	-	-	-	-	52	pages.
Dry and wet thermometers	-	-	-	-	-	52	"
Wind, direction and velocity	-	-	-	-	-	52	"
Cloud, amount and motion	-	-	-	-	-	52	"
Weather, &c.	-	-	-	-	-	52	"
Vapour, tension	-	-	-	-	-	26	"
Total	-	-	-	-	-	286	"

3rd. Observations for short periods at hill stations, probably - - 100 "
Add previous total - - - - 949 "

Grand total - 1,335 "

At the Trevandrum Observatory a barometer by Newman was recorded for the greater part of the period, the readings from which are about .02 lower than those from Adie's standard, though this difference is not the same year after year. The estimate is only for the printing of one set of barometer observations. Vapour tension has not been computed, but I have thought it right to provide for it in the estimate.

R. H. Scott, Esq., F.R.S.,
Secretary, Meteorological Council.

Yours, &c.
(Signed) R. STRACHAN.

P.S.—If the simultaneous observations only be considered, the estimate would stand thus :—

Trevandrum	-	-	-	286	pages.
Agustia	-	-	-	286	"
Hill stations	-	-	-	100	"
Total	-	-	-	<u>672</u>	

R. S., 1880, October 28.

The Secretary reported that, at the request of the widow of the late John Allan Broun, he had consented to her depositing at the Office for safe keeping the original MS. records from Trevandrum and Agustia (31 volumes).—Approved.

Reported—That the records of the Chelsea Waterworks Company had been copied (Minutes, p. 49 ; Letter 2353)

The Council inspected the Harmonic Analyser, and Mr. De La Rue and Professor Stokes were requested to investigate the cause of certain small irregularities in the indications of the instrument, and advise with Mr. Munro upon the subject.

Reported—That the Secretary of the London Institution had returned the sunshine recorder supplied to him (Letter 1969, Minutes, 1879, p. 140). Mr. Scott was instructed to apply to Messrs. De La Rue & Co. (Minutes, 1879, p. 148), who had expressed their readiness to erect one of these instruments at Bunhill Row, at an elevation of 70 feet from the ground.

Submitted—The following statements :—

October 28th, 1880.

STATEMENT of WORK done in MARINE ROOM during three months ended 30th September 1880.

Examined, 37 new logs, also various lighthouse registers.

Cape of Good Hope District.

Winds.—Preparing results and drawing charts for March, May, June, and September.

Drawing various specimen charts for January, and experimenting with regard to final form of chart to be adopted for publication.

Barometer.—Working means and range and charting for single-degree squares for March, May, June, August, September, and November. Working frequency results and drawing diagrams for March, May, June, August, September, and November. Drawing isobars from single-degree means for February, March, April, May, June, August, September, November, and December.

Air Temperature.—Drawing isotherms for May, June, September, November, and December.

Currents.—Drawing lines of prevailing currents for all months, and rectifying the same by comparison with *adjacent* months.

Experimenting with regard to final form of chart to be adopted for publication.

Sea-surface Temperature.—Obtaining areas of extreme range for all months, and rectifying the same by comparison with *adjacent* months.

Specific Gravity.—Obtaining mean results for certain selected areas for January and July.

Weather, Clouds, and State of Sea.—January tabulated, also April and July partially tabulated.

Experimenting with regard to method of discussion.

GENERAL.

Index of Data in Ocean Ten-Degree Squares posted to date.

Collection of Data for the Indian Government.—Examination of work completed, and books for July to December ready for transmission to India.

Various other minor pieces of work, which can be seen by referring to Journal of Room.

CHAS. HARDING.

HENRY TOYNBEE,

Marine Superintendent.

R. H. Scott, Esq.

September 30th, 1880.

STATEMENT of WORK done in PANTAGRAPH ROOM during July, August, and September 1880.

Copper Plates pantographed :—1880, Plates 1 and 2 have had wind and rain curves added ; Ditto, Plates 3 to 14 (omitting Plate 12), all curves ; Ditto, Plates 15 to 17, omitting wind and rain curves.

Zinc Plates :—Barograms, 12 plates, Nos. 13 to 24, 1880 ; Thermograms, 11 plates, Nos. 14 to 24, 1880 ; Vapour tension 9 plates, Nos. 13 to 21, 1880 ; Anemograms, 14 plates, Nos. 5 to 18, 1880 ; Rain curves, 12 plates, Nos. 7 to 18, 1879.

Photographic curves are prepared to Plate 30 for barograms, and Plate 25 for thermograms. Rain curves to Plate 30.

A new scale plate containing *six* days—to accommodate the 29th February—has been completely engraved, as has also a plate containing 36 outline charts. Both these plates are now being electrotyped.

The values of the thermogram *lower* zero lines have been re-determined for all observatories, as far as could be done from last winter's curves ; when the lines are changed, a very little time will suffice to verify the results.

Some time has been spent on the Harmonic Analyser in re-determining its constants, as directed by Professor Stokes.

In the interval covered by this report the usual summer vacation has been taken.

The examination work for *April* was passed to the Computing Room on July 8th, and that for *May* on September 11th ; the *June* work has not yet been forwarded, and the work required for the Irish Registrar General's return will delay it a few days.

Mr. Allen's report is attached.

R. H. Scott, Esq., F.R.S.

R. H. CURTIS.

September 30th, 1880.

EXAMINATION ROOM.

The following curves and tabulations have been examined since 24th June last :—April : *Barograms*, three stations ; *Anemograms*, five stations.

May : *Thermograms*, *Barograms*, and *Anemograms* for all stations.

June : *Thermograms*, *Barograms*, and *Anemograms* for all stations.

T. E. ALLEN.

SUBMITTED—The following STATEMENT respecting the RECORDS for May 1880, received from the SELF-RECORDING OBSERVATORIES,
(see Minutes, 21st December 1868 and 20th November 1876).

—	Aberdeen.		Armagh.		Falmouth.		Glasgow.		Kew.		Stonyhurst.		Valencia.	
	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Indifferent.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Indifferent.	Velocity. Good.
ANEMOGRAPH :—														
Action - - -	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	*3 hrs.	*3 hrs.	0	0	0
” other causes -	0	0	0	0	0	0	0	0	0	—	—	0	0	0
Orientation verified - -	31st	—	14th	—	1st	—	4th	—	0	0	0	8th	—	—
No. of errors discovered by subsidiaries	0	0	0	0	0	0	0	0	0	0	0	0	0	0
” irregular differences -	0	0	0	6	0	0	0	2	8	5	0	1	7	7
Result of 40 Remeasurements :—														
Greatest difference - -	0·0	2·0	0·0	1·0	1·0	1·0	0·0	1·0	0·0	2·0	0·0	1·0	1·0	2·0
Mean difference irrespective of sign -	0·0	0·6	0·0	0·2	0·0	0·3	0·0	0·4	0·0	0·4	0·0	0·3	0·0	0·6
Residual difference (—Meteorological Office) -	0·0	+0·1	0·0	+0·1	0·0	0·0	0·0	+0·2	0·0	+0·1	0·0	+0·1	0·0	+0·2
RAIN GAUGE :—														
Action - - -	Good.		Good.		Indifferent.		Good.		Good.		Good.		Good.	
Records deficient, due to stoppage of clock	0		0		8 hrs.		0		0		0		0	
” other causes -	0		0		0		0		0		0		0	
Errors in tabulation - -	0		1		0		1		0		0		1	

BAROGRAPH:—

Action	Good. Do.	Good. Indifferent.	Good. Do.	Good. Indifferent.	Good. Do.	Good. Do.
Photography	-	-	-	-	-	-
Records deficient, due to stoppage of clock	-	-	-	-	-	-
failure of light	-	-	-	-	-	-
"	-	-	-	-	-	-
"	-	-	-	-	-	-
"	-	-	-	-	-	-
No. of errors discovered—	-	-	-	-	-	-
In entry of standard	-	-	-	-	-	-
" calculating residual correction	-	-	-	-	-	-
" applying residual correction	-	-	-	-	-	-
" subtraction in subsidiary tables	-	-	-	-	-	-
" tabulation by subsidiaries	-	-	-	-	-	-
" irregular differences	-	-	-	-	-	-
<i>Result of 40 Remasurements :—</i>						
Greatest difference	-	-	-	-	-	-
Mean difference irrespective of sign	-	-	-	-	-	-
Residual difference (— Meteorological Office)	-	-	-	-	-	-
Mean monthly difference between simultaneous	-	-	-	-	-	-
Barograph and Barometer readings	-	-	-	-	-	-

THERMOGRAPH:—

Action - Photography -	Good. Do.		Good. Indifferent.		Good. Do.		Good. Indifferent.		Good. Do.		Good. Do.	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0	0	0
" " failure of light	0	0	0	0	0	0	0	0	0	0	0	0
" " imperfectly moistened bulbs	—	0	—	0	—	6 hrs.	—	2 hrs.	—	—	—	1 hr.
" " partially frozen bulbs	—	0	—	0	—	0	—	0	—	—	—	0
" " other causes	—	0	—	0	—	0	0	0	0	0	0	0
No. of errors discovered in entry of Standard	0	0	0	0	0	0	0	0	0	0	0	1
" " by subsidiary measurements	0	0	0	0	0	0	0	0	0	0	0	0
" " of subtraction in do. tables	0	0	0	0	0	0	0	0	0	0	0	0
" " detected under glass scale	1	0	11	4	4	4	4	5	0	0	0	4
<i>Result of 40 Remasurements :-</i>												
Greatest difference	0.2	0.2	0.3	0.3	0.2	0.3	0.2	0.3	0.2	0.2	0.2	0.2
Mean difference irrespective of sign	0.11	0.07	0.09	0.11	0.08	0.09	0.10	0.10	0.10	0.11	0.10	0.10
Residual difference (— Meteorological Office)	—0.09	+0.06	—0.06	+0.05	0.00	—0.04	—0.04	+0.01	—0.01	0.00	—0.07	—0.07
Mean monthly difference between simultaneous Thermograph and Thermometer readings	0.22	0.18	0.20	0.21	0.23	0.19	0.17	0.26	0.13	0.17	0.23	0.20
No. of errors in maxima and minima	1	—	4	—	3	—	12	—	1	—	6	—

• Cleaning instrument.

† Bad photography.

§ Owing to bad action of light stop.

ted. § Owing to bad acc-
for 3½ days had to be re-tabulated.

|| In consequence of bad tabulation at Falmouth the curves

SUBMITTED—The following STATEMENT respecting the RECORDS for June 1880, received from the SELF-RECORDING OBSERVATORIES
(see Minutes, 21st December 1868, and 20th November, 1876).

—	Aberdeen.	Armagh.	Falmouth.	Glasgow.	Kew.	Stonyhurst.	Valencia.
ANEMOGRAPH :—							
Action - - - -	Direction. Good.	Direction. Good.	Direction. Good.	Direction. Good.	Direction. Good.	Direction. Good.	Direction. Good.
Records deficient, due to stoppage of clock	Velocity. Good.	Velocity. Indifferent.	Velocity. Good.	Velocity. Good.	Velocity. Good.	Velocity. Good.	Velocity. Good.
" " other causes - -	0	0	0	0	0	0	0
Orientation verified - -	0	0	0	*8 hrs.	0	*2 hrs.	*1 hr.
No. of errors discovered by subsidiaries	30th	30th	11th	12th	9th	25th	5th
" " irregular differences	0	1	0	0	0	0	0
" " "	1	0	0	1	0	1	0
Result of 40 Remeasurements :—							
Greatest difference - -	1.0	1.0	1.0	2.0	1.0	1.0	3.0
Mean difference irrespective of sign - -	0.0	0.1	0.3	0.5	0.0	0.0	0.7
Residual difference (— Meteorological Office) -	0.0	-0.1	0.0	+0.2	0.0	+0.1	+0.2
RAIN GAUGE :—							
Action - - - -	Indifferent.	Indifferent.	Indifferent.	Good.	Good.	Good.	Good.
Records deficient, due to stoppage of clock	35 hrs.	0	0	0	0	0	0
" " other causes - -	0	0	0	0	0	0	0
Errors in tabulation - -	0	0	1	0	0	0	0

BAROGRAPH :—

Action	Good. Do.	Good. Bad.	Good. Indifferent.	Good. Do.	Good. Indifferent.	Good. Do.	Good. Do.
Photography -	0	0	0	0	0	0	0
Records deficient, due to stoppage of clock	0	7 hrs.	3 hrs.	0	0	0	4 hrs.
" " failure of light	0	57 hrs.	0	0	0	0	0
" " other causes -	0			0	0	0	0
No. of errors discovered—							
In entry of standard	0	4	1	2	4	0	0
" calculating residual correction	0	0	0	0	0	0	0
" applying residual correction -	1	0	0	3	6	0	0
" subtraction in subsidiary tables	0	0	0	0	3	1	1
" tabulation by subsidiaries -	0	0	0	0	0	0	0
" " irregular differences	0	6	0	2	2	0	1
<i>Result of 40 Remeasurements :—</i>							
Greatest difference -	0·005	0·007	0·008	0·006	0·006	0·005	0·006
Mean difference irrespective of sign -	0·0014	0·0032	0·0026	0·0021	0·0020	0·0020	0·0033
Residual difference (— Meteorological Office) -	—0·0003	+0·0003	+0·0014	—0·0004	—0·0007	+0·0004	+0·0006
Mean monthly difference between simultaneous barograph and barometer readings -	0·0015	0·0027	0·0010	0·0009	0·0024	0·0011	0·0017

THERMOGRAPH:—

Action	-	-	-	-
Photography	-	-	-	-
Records deficient, due to stoppage of clock	-	-	-	-
" failure of light	-	-	-	-
" imperfectly moistened bulbs	-	-	-	-
" partially frozen bulbs	-	-	-	-
" other causes	-	-	-	-
No. of errors discovered in entry of standard	-	-	-	-
" by subsidiary measurements	-	-	-	-
" of subtraction in do. tables	-	-	-	-
" detected under glass scale	-	-	-	-
Result of 40 Remeasurements :-				
Greatest difference	-	-	-	-
Mean difference irrespective of sign	-	-	-	-
Residual difference (- Meteorological Office)	-	-	-	-
Mean monthly difference between simultaneous thermograph and thermometer readings	-	-	-	-
No. of errors in maxima and minima	-	-	-	-

• Cylinder unclamped.

† Pencils not lowered sufficiently.

† Cleaning instrument.

§ Defective photography.

|| Owing to defective action of clock-stop.

**** Owing to bad tabulation at Glasgow 19 days' record had to be re-tabulated at this Office; the errors noted above were found in those days which were not remeasured.**

Submitted—The following statement of accounts for the six months ending 30th September 1880:—

INCOME.						EXPENDITURE.								
	£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.	
Balance from year 1879-80	-	-	-	470	17	1	ADMINISTRATION :							
Proportion of vote for six months	-	-	-	7,250	0	0	Payment of Council	-	500	0	0			
Repayment of expenses charged under—							Secretary	-	400	0	0			
(1.) Incidental expenses	-	-	-	12	12	3	Salaries and wages	-	356	5	1			
(2.) Special researches*	-	-	-	35	13	6	Rent, fuel, and lighting	-	321	8	6			
(3.) Observatories and stations	-	-	-	9	0	0	Furniture and fittings	-	22	9	6			
SUPPLY OF WEATHER INFORMATION :							Incidental and contingent expenses	-	192	2	1			
Special 8h. p.m. reports	377	7	5				Expenses incidental to International Meteorological Congress	-	25	11	6	1,817	16	8
Charts and ordinary forecasts	-	191	2	5			SPECIAL RESEARCHES :†							
Ordinary information for Press Agencies, &c.	-	-	67	0	2		Rainfall observations	-	200	0	0			
Telegrams	-	117	16	9	753	6	Erection of bridled anemometer	-	57	19	9			
Miscellaneous data	-	-	-	11	15	0	Sundry charges	-	112	3	8	370	3	5
SALE OF INSTRUMENTS, &c. :							LAND METEOROLOGY :							
Royal Navy account	-	12	2	3			Observatories and stations	-	1,206	19	8			
Mercantile Marine do.	-	47	1	6	59	3	Discussion and reduction of observations	-	701	18	4	1,908	18	0
Commission charged on work done for Colonies, &c.	-	-	-	11	8	1	WEATHER INFORMATION AND FORECASTS :							
							Telegraphic reports and storm warnings	-	1,632	14	9			
							Preparation and issue of reports and forecasts†	-	562	10	10	2,195	5	7
							INSPECTIONS :							
							Salaries and travelling expenses	-	-	-	250	0	2	
							OCEAN METEOROLOGY :							
							Discussion and reduction of observations	-	806	9	2			
							Expenses incidental to the supply of instruments :							
							Care and issue of instruments	-	100	0	0			
							Royal Navy	-	71	2	5			
							Mercantile Marine	-	183	0	5			
							Distant island and coast stations	-	11	18	0	1,172	10	0
							Balance	-	-	-	899	2	7	
											£8,613	16	5	

LIABILITIES.						ASSETS.							
	£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.
To Council	-	-	-	500	0	0	By cash at bank	-	-	-	1,360	17	10
„ Post Office (partly estimated)	-	-	-	332	6	1	„ „ at Office	-	-	-	207	19	0
„ sundry creditors	-	-	-	708	3	11	„ „ at Valencia	-	-	-	50	0	0
„ „ (contracts or work uncompleted)	-	-	-	206	5	0	„ sundry debtors	-	-	-	527	0	9
„ balance	-	-	-	899	2	7	„ Her Majesty's Exchequer	-	-	-	500	0	0
											£2,645	17	7

* For Hoffmeyer's charts, Sun apparatus, &c.

† The sum of 150*l.* will be eventually transferred to this head from other accounts.

‡ 175*l.* 3*s.* for late Evening service charged in previous item.

Reported—That the work “Aids to the Study and Forecast of Weather” (Official, No. 40) had been published in the month of August (Minutes, p. 16).

Resolved—That an honorarium of 60% be given to Mr. Ley for the preparation of the work.

Read—Letter 2523 from the Press Association (Limited), inquiring what would be the terms for forecasts for the year 1881 (Minutes, p. 46). The Secretary was instructed to call on Mr. Kempe at the Treasury on the subject.

Reported—That R. Ashley had resigned his post as telegraphic messenger, &c. on the 25th ultimo, and that H. Heinemann had been appointed in his place at 8s. per week for eight hours work daily.—Approved.

Submitted—Applications for the supply of the Daily Weather Report to Wisbech and Lancaster.—Granted.

Reported—That the following cheques for July were drawn on the 31st of that month:—

Administration :				£	s.	d.	£	s.	d.
R. H. Scott, salary	-	-	-	-	-	-	66	13	4
J. S. Harding, jun.	} Salaries and wages	-	-	-	27	15	6		
T. D. Bell					13	6	8		
J. S. Harding, sen.					*11	4	7		
<hr/>					52	6	9		
Gas Light Co., gas	-	-	-	-	-	-	1	6	8
Pickford & Co., carriage of parcels	-	-	-	-	-	-	1	12	4
Joel Rowsell, books	-	-	-	-	-	-	3	18	0
R. Mustart, indexing	-	-	-	-	-	-	2	0	6
Special Researches :									
Post Office, rental of wire	-	-	-	-	-	-	9	0	0
E. I. Strachan, Arctic work, Part III.	-	-	-	-	-	-	13	7	0
Land Meteorology :									
J. E. Cullum, salary	-	-	-	-	-	-	16	13	4
R. H. Curtis	} Discussion, &c. of Observations	-	-	-	22	4	5		
J. A. Curtis					15	11	1		
T. E. Allen					15	11	1		
C. H. Thompson					*11	10	0		
E. G. Aldridge					*9	3	4		
<hr/>			73	19	11				
Weather Information and Forecasts :									
R. Strachan, Pitkin's aneroids	-	-	-	-	-	-	4	10	0
Wightman & Co., printing	-	-	-	-	-	-	12	13	0
F. Dangerfield, delivery of charts	-	-	-	-	-	-	11	19	9
F. Gaster	} Preparation, &c. of Weather Reports.	-	-	-	30	7	6		
W. L. Dallas					19	15	1		
F. Brodie					19	15	1		
H. W. Chivers					*8	5	0		
<hr/>					78	2	8		
R. Sargeant, do., to July 17th	-	-	-	-	-	-	9	9	0
Ocean Meteorology :									
Captain H. Toynbee	} Discussion, &c. of observations and care of instruments.	-	-	-	33	6	8		
R. Strachan					27	15	6		
C. Harding					22	4	5		
H. Harries					*14	0	0		
Lieut. C. W. Baillie					16	13	4		
<hr/>			113	19	11				
G. M. Whipple, verifications of "A." instruments					6	0	0		
" " " "B. T." "					3	12	0		
<hr/>			9	12	0				
Carried forward				-	-	-	£181	4	2

Five weeks to 31st.

		£	s.	d.	£	s.	d.
	Brought forward -	.	.	.	481	4	2
Ocean Meteorology— <i>cont.</i>							
Nautical Magazine, advertisements	-	-	-	-	1	2	6
J. Pattison, glass water-holders	-	-	-	-	2	12	8
P. A. Feathers, agent, Dundee	-	-	-	-	3	19	0
J. Gill „ Liverpool	-	-	-	-	13	3	0
Z. Scaping „ Hull	-	-	-	-	2	6	0
Pewtress & Co., printing	-	-	-	-	3	15	0
Miscellaneous :							
L. P. Casella, commissions	-	-	-	-	2	5	0
G. M. Whipple „	-	-	-	-	2	15	0
Hopkins & Williams, commissions	-	-	-	-	1	2	7
R. H. Scott, Berne Committee	-	-	-	-	25	0	0
J. S. Harding, jun., petty cash	-	-	-	-	100	0	0
„ „	-	-	-	-	60	0	0
					<u>£699</u>	<u>4</u>	<u>11</u>

The following cheques for August were drawn on the 31st of that month :—

Administration :

R. H. Scott, Secretary	-	-	-	-	-	66	13	4
J. S. Harding, jun.	} Salaries and wages -	-	{	27	15	6		
T. D. Bell				13	6	8		
J. S. Harding, sen.				* 8	19	8		
						<u>50</u>	<u>1</u>	<u>10</u>
Pickford & Co., carriage of parcels	-	-	-	2	2	3		
„ „	-	-	-	3	0	4		
						<u>5</u>	<u>2</u>	<u>7</u>
A. J. Rigby, proportion of subpcena fees	-	-	-	-	-	2	2	0

Special Researches :

F. Gaster, experiments with thermometer screens	-	-	-	-	-	10	10	0
R. W. Munro, respecting Scilly anemometer	-	-	-	6	5	0		
„ bridled anemometer	-	-	-	78	17	0		
						<u>85</u>	<u>2</u>	<u>0</u>

Land Meteorology :

R. H. Curtis	-	} Discussion, &c. of Observations.	{	22	4	5		
J. A. Curtis	-			15	11	1		
T. E. Allen	-			15	11	1		
C. H. Thompson	-			*9	4	0		
E. G. Aldridge	-			*7	6	8		
						<u>69</u>	<u>17</u>	<u>3</u>
J. E. Cullum, Valencia	-	-	-	-	-	16	13	4

Weather Information and Forecasts :

Postmaster General, telegrams for May	-	140	1	8				
„ „ June	-	165	17	11				
					<u>305</u>	<u>19</u>	<u>7</u>	
F. Gaster	-	} Preparation &c. of Weather Reports.	{	32	19	6		
W. L. Dallas	-			18	18	1		
F. Brodie	-			18	18	1		
H. W. Chivers	-			*6	12	0		
						<u>77</u>	<u>7</u>	<u>8</u>

For Ocean Meteorology :

Captain H. Toynbee	-	} Discussion, &c. of observations, and care of instruments.	{	33	6	8		
R. Strachan	-			27	15	6		
C. Harding	-			22	4	5		
H. Harries	-			*11	4	0		
Lieut. C. W. Baillie	-			16	13	4		
						<u>111</u>	<u>3</u>	<u>11</u>
Carried forward	-	-	-	-	-	<u>£800</u>	<u>13</u>	<u>6</u>

* Four weeks ending 28th August.

	£	s.	d.	£	s.	d.
Brought forward -	-	-	-	800	13	6
For Ocean Meteorology— <i>cont.</i>						
D. McGregor & Co., Glasgow, agents -	-	-	-	5	7	9
King, Seymour, & Co., Southampton, agents -	-	-	-	6	17	0
Miscellaneous :						
R. W. Munro, commissions -	-	-	-	5	5	0
J. S. Harding, junr., petty cash -	100	0	0			
„ „ -	80	0	0			
				180	0	0
Total	-	-	-	£998	3	3

On the 13th September—

Rev. W. C. Ley, inspections -	-	-	-	26	15	3
R. H. Scott, inspections, on account -	-	-	-	50	0	0
Total	-	-	-	£76	15	3

The following cheques for September were drawn on the 30th of that month :—

Administration :

R. H. Scott, salary -	-	-	-	66	13	4
J. S. Harding, junr. } -	-	-	-	27	15	6
T. D. Bell - } -	-	-	-	13	6	8
J. S. Harding, senr. } -	-	-	-	*8	19	8
				50	1	10
C. W. Jacques, rent -	-	-	-	133	13	0
„ rent at No. 113 -	-	-	-	18	0	6
				151	13	6
Atkinson & Co., linoleum -	-	-	-	9	12	0
H. Bond & Son, office repairs -	-	-	-	17	4	9
Bank of England account of Stationery Office -	-	-	-	7	7	7
Pickford & Co., carriage of parcels -	-	-	-	1	4	10
Williams and Norgate, books -	-	-	-	2	8	9

Special Researches :

H. Williams, erection of bridled anemometer -	-	-	-	40	2	9
W. Thomas, for care of Scilly anemometer -	-	-	-	1	13	7

Land Meteorology (Quarterly Allowances, &c.) :

C. Niven, Aberdeen Observatory -	-	-	-	67	12	5
T. R. Robinson, Armagh „ -	46	19	0			
„ „ „ (expenses) -	8	4	6			
				55	3	6
W. L. Fox, Falmouth „ -	-	-	-	73	5	0
R. Grant, Glasgow „ -	-	-	-	68	8	4
H. Williams, Holyhead -	-	-	-	3	9	10
G. M. Whipple, Kew Observatory -	-	-	-	100	0	0
C. Clouston, Orkney -	-	-	-	2	10	0
G. H. Aird, Seaham -	-	-	-	2	16	4
S. J. Perry, Stonyhurst Observatory -	-	-	-	55	11	8
J. E. Cullum (Valencia), salary -	16	13	4			
„ „ expenses -	51	9	4			
				68	2	8
G. T. Watson, Yarmouth -	-	-	-	4	2	8
R. & J. Beck, zinc plates -	-	-	-	26	3	10
T. Galvin, repairs at Valencia -	60	7	9			
„ „ -	17	0	5			
				77	8	2
Carried forward -	-	-	-	£952	17	4

* Four weeks ending 25th September.

	£	s.	d.	£	s.	d.
Brought forward -	-	-	-	952	17	4
Land Meteorology (Quarterly Allowances, &c.)— <i>cont.</i>						
R. H. Curtis -	22	4	5			
J. A. Curtis -	15	11	1			
T. E. Allen -	15	11	1			
C. H. Thompson -	9	4	0			
E. G. Aldridge -	*7	6	8			
Discussion, &c. of observations				69	17	3
Weather Information (Quarterly Allowances, &c.):						
Postmaster, Bundoran -	-	-	-	1	6	0
C. Todd, Cambridge -	-	-	-	4	11	0
H. Mohn, Christiania -	-	-	-	5	10	0
J. Costello, Dover -	-	-	-	3	18	6
W. Brand, Dunrossness -	-	-	-	3	18	3
G. Wooding, Hawes Junction -	-	-	-	3	18	2
J. Tilston, Holyhead -	-	-	-	3	18	0
G. G. Appleton, Hurst Castle -	-	-	-	3	18	8
A. P. Hay, Inverness -	-	-	-	1	6	0
J. Fisher, Jersey -	-	-	-	4	5	6
F. Gaster, London -	-	-	-	3	18	0
Postmaster General, P.O.O. for K. Kerr, Mullaghmore	3	18	10			
„ „ (Conway's account)	5	17	8			
				9	16	6
W. D. Penny, Nairn -	-	-	-	4	10	2
E. J. Lowe, Notts -	-	-	-	3	18	0
H. E. C. Bellamy, Oxford -	-	-	-	3	11	6
W. Harding, Parsonstown -	-	-	-	3	7	9
G. Blackler, Prawle Point -	-	-	-	3	5	0
S. Blake, St. Ann's Head -	-	-	-	3	6	11
W. Thomas, Scilly -	-	-	-	4	18	4
J. Sibert, Spurn -	-	-	-	3	5	4
J. Sutherland, Stornoway -	-	-	-	9	5	0
Postmaster „ -	-	-	-	1	6	0
J. Sinclair, Wick -	-	-	-	3	5	0
Postmaster „ -	-	-	-	1	6	0
G. T. Watson, Yarmouth -	-	-	-	4	2	0
A. Guy, York -	-	-	-	3	18	0
P. Adie, station barometer -	-	-	-	40	10	0
Postmaster General, telegrams -	165	17	6			
„ private wire (Valencia) -	23	10	0			
				189	7	6
Wightman & Co., printing, &c. -	-	-	-	41	17	6
F. Gaster -	31	13	6			
W. L. Dallas -	18	18	1			
F. Brodie -	19	15	1			
H. W. Chivers -	*6	12	0			
Preparation, &c. of Weather Reports.				76	18	8
Inspections:						
A. Buchan, salary -	-	-	-	37	10	0
W. C. Ley „ -	-	-	-	37	10	0
Ocean Meteorology:						
Captain H. Toynbee -	33	6	8			
R. Strachan -	27	15	6			
C. Harding -	22	4	5			
H. Harries -	*11	4	0			
Lieut. C. W. Baillie, R.N. -	16	13	4			
Discussion, &c. of observations and care of instruments.				111	3	11
Carried forward -	-	-	-	1,661	1	9

* Four weeks ending 25th September.

		£	s.	d.	£	s.	d.
Brought forward	-	-	-	-	1,661	1	9
Ocean Meteorology— <i>cont.</i>							
P. Adie, repairing "A." barometers	-	15	4	0			
" " "B.T." "	-	15	4	6			
					30	8	6
Negretti & Zambra, "A." instruments	-	5	2	3			
" " "B. T." "	-	1	8	6			
					6	10	9
R. Riviere, labels for captains	-	-	-	-	1	19	0
H. J. Thatcher, Cardiff, agent	-	-	-	-	5	8	0
J. H. Woodstock, packing cases	-	-	-	-	3	15	0
Miscellaneous :							
Negretti & Zambra, commissions	-	-	-	-	41	0	6
J. S. Harding, petty cash	-	150	0	0			
" "	-	50	0	0			
					200	0	0
Total	-	-	-	-	£1,950	3	6

The Council then adjourned.

116, Victoria Street, November 5, 1880.

PRESENT :

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE.

PROFESSOR STOKES.

MR. GALTON.

LIEUT.-GENERAL STRACHEY.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Secretary was instructed to write to the Secretary of the Admiralty, requesting that the simultaneous observations at 0h. 8m. p.m. G. M. T., may be commenced as soon as convenient, this being the hour now agreed upon in lieu of 0h. 43m. p.m., the hour formerly proposed (Minutes, 1879, p. 124; 1880, p. 26). He was also instructed to forward the requisite supply of forms.

The following memorandum was submitted by the Secretary, as directed at last meeting, and was approved :—

GENTLEMEN,

November 3, 1880.

IN accordance with your instructions, I submit the following suggestions for conducting the work of the Marine Department during the absence of the Superintendent.

Mr. Baillie to sit in the Marine Superintendent's room—

- To open and answer all letters, referring to myself or to Messrs. Strachan or C. Harding on any points about which he is in doubt.
- To see all captains who call, and to explain to them the instruments and methods of observation and entry of data in the Rough Book and Log Book.
- To consider all new logs after they have been examined in the Marine Room, and to acknowledge them.
- To take the superintendence of any new work ordered by the Council.
- To check the quarterly accounts of the agents.

Mr. C. Harding to complete the Cape work now in hand under direct instructions from Mr. Galton; keeping Captain Toynbee informed of the progress made in this work, and in the work of the Department generally.

Yours, &c.

ROBERT H. SCOTT.

Submitted — The following report on the Forecasts for June and July 1880 (Minutes, p. 31) :—

The letters used have the following signification :—

a complete success.

b partial (i.e., more than half) success.

c partial failure.

d total failure.

JUNE.

2.30 P.M.					
DISTRICTS.		Percentages.			Percentage of Success a + b.
		Wind.	Weather.	Entire Forecast.	
SCOTLAND, N.	a	27	23	25	77
"	b	43	60	52	
"	c	13	14	13	
"	d	17	3	10	
SCOTLAND, E.	a	20	33	27	72
"	b	46	43	45	
"	c	17	20	18	
"	d	17	4	10	
ENGLAND, N.E.	a	27	20	24	83
"	b	57	60	59	
"	c	6	13	9	
"	d	10	7	8	
ENGLAND, E.	a	37	47	42	84
"	b	53	30	42	
"	c	10	10	10	
"	d	—	13	6	
MIDLAND COS.	a	53	40	47	79
"	b	30	33	32	
"	c	10	17	13	
"	d	7	10	8	
ENGLAND, S.	a	47	30	39	79
"	b	50	30	40	
"	c	—	27	13	
"	d	3	13	8	
SCOTLAND, W.	a	37	47	42	77
"	b	37	33	35	
"	c	20	10	15	
"	d	6	10	8	
ENGLAND, N.W.	a	33	27	30	71
"	b	44	37	41	
"	c	23	26	24	
"	d	—	10	5	
ENGLAND, S.W.	a	27	23	25	80
"	b	53	57	55	
"	c	10	17	14	
"	d	10	3	6	
IRELAND, N.	a	27	27	27	69
"	b	40	43	42	
"	c	30	20	25	
"	d	3	10	6	
IRELAND, S.	a	27	30	29	73
"	b	47	40	44	
"	c	10	23	16	
"	d	16	7	11	

8 P.M.					
DISTRICTS.		Percentages.			Percentage of Success a + b.
		Wind.	Weather.	Entire Forecast.	
SCOTLAND, N.	a	42	34	38	82
"	b	38	50	44	
"	c	12	16	14	
"	d	8	—	4	
SCOTLAND, E.	a	19	54	37	83
"	b	61	31	46	
"	c	16	15	15	
"	d	4	—	2	
ENGLAND, N.E.	a	42	54	48	84
"	b	38	34	36	
"	c	16	8	12	
"	d	4	4	4	
ENGLAND, E.	a	38	34	36	80
"	b	38	50	44	
"	c	12	12	12	
"	d	12	4	8	
MIDLAND COS.	a	38	38	8	88
"	b	50	50	50	
"	c	12	8	10	
"	d	—	4	2	
ENGLAND, S.	a	50	46	48	86
"	b	46	30	38	
"	c	4	16	10	
"	d	—	8	4	
SCOTLAND, W.	a	58	61	60	85
"	b	35	16	25	
"	c	3	19	11	
"	d	4	4	4	
ENGLAND, N.W.	a	34	27	31	81
"	b	58	42	50	
"	c	8	23	15	
"	d	—	8	4	
ENGLAND, S.W.	a	35	34	35	77
"	b	42	42	42	
"	c	19	12	15	
"	d	4	12	8	
IRELAND, N.	a	22	26	24	78
"	b	58	50	54	
"	c	16	16	16	
"	d	4	8	6	
IRELAND, S.	a	42	46	44	88
"	b	46	42	44	
"	c	8	8	8	
"	d	4	4	4	

SUMMARY.

BRITISH ISLES	a	33	32	3	76	BRITISH ISLES	a	38	41	40	83
"	b	45	42	43		"	b	47	40	43	
"	c	14	18	16		"	c	11	14	13	
"	d	8	8	8		"	d	4	5	4	

JULY.

2.30 P.M.

DISTRICTS.		Percentages.			Percentage of Success a + b.
		Wind.	Weather.	Entire Forecast.	
SCOTLAND, N.	a	35	42	39	69
"	b	32	29	30	
"	c	23	13	18	
"	d	10	16	13	
SCOTLAND, E.	a	35	45	40	74
"	b	39	29	34	
"	c	10	13	12	
"	d	16	13	14	
ENGLAND, N.E.	a	36	42	39	65
"	b	32	19	26	
"	c	32	32	32	
"	d	0	7	3	
ENGLAND, E.	a	39	45	42	84
"	b	45	39	42	
"	c	16	13	15	
"	d	0	3	1	
MIDLAND COS.	a	42	39	41	76
"	b	29	42	35	
"	c	26	16	21	
"	d	3	3	8	
ENGLAND, S.	a	49	45	47	84
"	b	32	42	37	
"	c	16	10	13	
"	d	3	3	3	
SCOTLAND, W.	a	32	42	37	74
"	b	42	32	37	
"	c	23	19	21	
"	d	3	7	5	
ENGLAND, N.W.	a	16	39	28	76
"	b	61	35	48	
"	c	20	16	18	
"	d	3	10	6	
ENGLAND, S.W.	a	19	39	29	68
"	b	49	29	39	
"	c	26	22	24	
"	d	6	10	8	
IRELAND, N.	a	19	36	28	66
"	b	45	32	38	
"	c	26	26	26	
"	d	10	6	8	
IRELAND, S.	a	19	13	16	78
"	b	65	58	62	
"	c	10	16	13	
"	d	6	13	9	

8 P.M.

DISTRICTS.		Percentages of Success.			Percentage of Success a + b.
		Wind.	Weather.	Entire Forecast.	
SCOTLAND, N.	a	50	42	46	83
"	b	42	31	37	
"	c	4	19	11	
"	d	4	8	6	
SCOTLAND, E.	a	42	46	44	77
"	b	42	23	33	
"	c	12	19	15	
"	d	4	12	8	
ENGLAND, N.E.	a	38	31	35	62
"	b	27	27	27	
"	c	35	34	34	
"	d	0	8	4	
ENGLAND, E.	a	42	42	42	77
"	b	31	38	35	
"	c	27	8	17	
"	d	0	12	6	
MIDLAND COS.	a	46	27	37	81
"	b	31	58	44	
"	c	19	11	15	
"	d	4	4	4	
ENGLAND, S.	a	50	38	44	88
"	b	38	50	44	
"	c	8	8	8	
"	d	4	4	4	
SCOTLAND, W.	a	39	42	41	81
"	b	42	38	40	
"	c	15	8	11	
"	d	4	12	8	
ENGLAND, N.W.	a	19	31	25	64
"	b	50	27	39	
"	c	19	38	28	
"	d	12	4	8	
ENGLAND, S.W.	a	31	38	35	75
"	b	42	38	40	
"	c	15	12	13	
"	d	12	12	12	
IRELAND, N.	a	23	42	33	75
"	b	38	46	42	
"	c	27	2	19	
"	d	12	0	6	
IRELAND, S.	a	35	27	31	75
"	b	42	46	44	
"	c	4	19	12	
"	d	19	8	13	

SUMMARY.

British Isles	a	31	39	35	74
"	b	43	35	39	
"	c	21	18	20	
"	d	5	8	6	
British Isles	a	38	37	38	76
"	b	38	38	38	
"	c	17	17	17	
"	d	7	8	7	

The Secretary reported that the results for the months August—October would be submitted as soon as completed, their preparation having been delayed by the vacation.

The subject of the Cape Charts was again considered, and a memorandum (Letter 2565) from Mr. Galton, on the interpretation of Mean Charts having been read, it was agreed that the letterpress to accompany the Cape Charts, when published, should include—

- A. A historical part, showing what has been done by former investigators.
- B. A general description of the Charts, and an account of the way in which they have been constructed from the observations.
- C. Considerations relating to some parts the theory of Mean Meteorological Charts, showing their relation to actual phenomena.

D. General conclusions as to the Meteorology of the district, including those which can be placed on the charts, but entering more into detail, and having special reference to any new results which may be suggested by the Charts.

Read—A memorandum from Captain Toynbee, reporting that since the last meeting three logs had been received, two of them being “excellent.”

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. R. H. Napier, R.N.	H.M.S. “Magpie”	Jan. 1—April 30, 1880.	Surveying in China Seas	1879, p. 151.
Capt. W. H. Smith, R.N.R.	S.S. “Peruvian”	Dec. 27, 1879— Oct. 13, 1880.	Liverpool, Halifax, &c. five voyages.	1879, p. 157.

Mr. Scott was instructed to convey the best thanks of the Council to the above-named observers.

The Council next entered on a preliminary consideration of the work to be undertaken in the Marine Department of the Office, on the completion of the Cape Charts :

A. With reference to a proposal made by the Hydrographer that the Office should undertake the preparation of Sea Temperature Charts for the whole globe, the Secretary was instructed—

- I. To obtain an estimate of the amount of materials in the Office, and of the length of time which it would take to work them up in the way in which the data for the Pacific Ocean are at present being treated (*a*) for the four cardinal months, (*b*) for all twelve months.
- II. To request Lieutenant Baillie to state to what extent he considers the variations in the Sea Temperature of the Pacific shown in the four cardinal months to be such as to render it desirable to complete the intermediate charts.

B. With reference to a suggestion made by the Chairman that the Office should undertake the preparation of Synoptic Charts for the North Atlantic, the Secretary submitted letters from M. Mascart (2522), and from Captain Hoffmeyer (2492), and a memorandum from Dr. Neumayer addressed to the International Meteorological Committee, showing what is being done at present in France and Germany in the way of preparing such charts. The Secretary was instructed to request Dr. Neumayer to lend to the Council, for inspection by its members, a set of his Synoptic Charts for one month.

With reference to the arrangements requisite for using the Harmonic Analyser, Mr. Scott stated that Mr. C. E. Burton, who was formerly in the Office (Minutes, 1870, p. 59), had applied to him for employment, and had forwarded testimonials from the Astronomer Royal (Letter 2096).

He was authorised to appoint Mr. Burton, at a salary of 2*l.* 2*s.* per week, for six hours work, with a view to his working the Analyser.

The Chairman reported that he and the Secretary had had an interview with Lord F. Cavendish, at the Treasury, with reference to the letter from the Press Association (Minutes, p. 71).

Submitted—An application (Letter 2559) for a Fishery Barometer for Portmagee, co. Kerry.—Granted.

STATEMENT of WORK done in MARINE ROOM during the month of October 1880.

New logs examined, 11. Lighthouse registers, 3.

Cape of Good Hope District.

Wind.—Preparing final Charts for February, April, July, and October ; also somewhat advancing final charts for other months.

Currents.—General current lines reconsidered with Captain Toynbee's suggestions. General current arrows and range areas added to all charts. A new Current Chart for July prepared, owing to change in style of arrow, &c.

Weather, Cloud, and Sea.—Tabulating April, July, and October, also February and March partially. Specimen weather, &c. chart drawn, and results for January plotted.

Cape Gales.—Some diagrams of individual gales drawn for January.

General.

Index of data in ocean Ten-degree Squares posted to date. Various other minor pieces of work which can be seen by referring to Journal of Room.

R. H. Scott, Esq.,
4th November 1880.

(Signed) CHAS. HARDING.
HENRY TOYNBEE,
Marine Superintendent.

October 30, 1880.

STATEMENT of WORK done in the PANTAGRAPH ROOM during October 1880.

Copper Plates pantagraphed:—1880, Plates 15 to 17 have had wind and rain curves added; Plates 12 and 18 to 20, all curves. 1876, chart-plates, Nos. 1 and 2.

Zinc Plates:—Barograms—Thermograms 7 plates, Nos. 25 to 31, 1880; Vapour tension, 7 plates, Nos. 22 to 28, 1880; Anemograms, 10 plates, Nos. 19 to 28, 1880; Rain curves, 12 plates, Nos. 19 to 30, 1880.

Photographic Curves are prepared to Plate 36 for barograms, and Plate 33 for thermograms.

New templates have been prepared for use with the new form of Chart-plates.

The engraver has been working steadily at the large arrears of work which had accumulated.

The examination work was forwarded to the Computing Room on October 19th.

Mr. Allen's report is attached.

R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

October 30, 1880.

EXAMINATION ROOM.—Land Observatories.

The following curves and tabulations have been examined since 30th September:—July: *Thermograms*, five stations; *Barograms*, two stations; August, *Thermograms*, two stations; *Barograms*, two stations; September, *Thermograms*, two stations; *Barograms*, two stations.

T. E. ALLEN.

The following cheques for October were drawn on the 30th of that month:—

Administration :		£	s.	d.	£	s.	d.
R. H. Scott, salary	- - - -	-	-	-	66	13	4
J. S. Harding, jun.	} Salaries and wages	27	15	6			
T. D. Bell -		13	6	8			
J. S. Harding, sen.		*11	4	7			
		<hr/>			52	6	9
The Gas Light and Coke Company, gas	-	-	-	-	1	1	10
G. A. Gillett, wood	-	-	-	-	2	1	8
E. Higgs, cleaning windows	-	-	-	-	3	1	6
Society of Telegraph Engineers, book	-	-	-	-	1	3	6
Special Researches :							
E. I. Strachan, Arctic work	-	-	-	-	11	15	6
G. M. Whipple, Thermometer experiments, &c.	-	-	-	-	11	13	7
Land Meteorology :							
T. Culleton, stencils	-	-	-	-	1	6	0
J. E. Cullum, salary	-	-	-	-	16	13	4
W. Marriott, Meteorological Observations :							
Feb.—April.	-	-	-	-	25	0	0
W. Marriott, Meteorological Observations :							
May—July	-	-	-	-	25	0	0
		<hr/>			50	0	0
G. M. Whipple, postages, &c.	-	-	-	-	2	0	8
R. H. Curtis	} Discussion, &c. of observations	22	4	5			
J. A. Curtis		15	11	1			
T. E. Allen		15	11	1			
C. H. Thompson		*11	10	0			
E. G. Aldridge		*9	3	4			
		<hr/>			73	19	11
Carried forward		-	-	-	£293	17	7

• Five weeks ending 30th October.

			£	s.	d.	£	s.	d.
	Brought forward	-	-	-	-	293	17	7
Weather Information and Forecasts :								
G. Carrick, Ardrossan	-	-	-	-	-	0	19	11
Postmaster, Clifony	-	-	-	-	-	0	19	6
Do. Donaghadee	-	-	-	-	-	0	13	0
Do. Enniskillen	-	-	-	-	-	0	19	6
J. Hutchison, Leith	-	-	-	-	-	0	13	0
Postmaster, Killarney	-	-	-	-	-	0	19	6
Postmistress, Nairn	-	-	-	-	-	0	13	0
Postmaster, Scilly	-	-	-	-	-	0	13	0
Do. Valencia	-	-	-	-	-	0	13	0
J. Cunningham & Sons, repairs at Leith	-	-	-	-	-	1	1	7
F. Dangerfield, delivery of Charts	-	-	-	-	-	11	15	4
Postmaster General, telegrams	-	-	-	-	-	142	5	9
G. M. Whipple, verifications	-	-	-	-	-	3	12	0
F. Gaster	-	-	30	7	6			
W. L. Dallas	-	-	20	12	1			
F. Brodie	-	-	21	9	1			
H. W. Chivers	-	-	*8	5	0			
Preparations, &c. of Weather Reports.								
						80	13	8
Inspections :								
A. Buchan, expenses	-	-	-	-	-	42	0	10
G. M. Whipple	-	-	-	-	-	43	6	4
Ocean Meteorology :								
Captain H. Toynbee	-	-	33	6	8			
R. Strachan	-	-	27	15	6			
C. Harding	-	-	22	4	5			
H. Harries	-	-	*14	0	0			
Lieut. C. W. Baillie, R.N.	-	-	16	13	4			
						113	19	11
G. M. Whipple, verifications	-	-	5	10	0			
Do. Do.	-	-	12	10	0			
						18	0	0
The "Nautical Magazine," advertisements	-	-	-	-	-	1	2	6
J. R. Jones, Aberdeen agent	-	-	-	-	-	8	16	4
H. J. Thatcher, Cardiff agent	-	-	-	-	-	4	10	3
J. Gill, Liverpool agent	-	-	-	-	-	19	4	11
King, Seymour, & Co., Southampton agents	-	-	-	-	-	4	18	0
F. Tallack & Son, freight	-	-	-	-	-	1	2	1
Miscellaneous :								
Chance Brothers, commissions	-	-	-	-	-	3	15	0
R. W. Munro, Do.	-	-	-	-	-	83	6	6
G. M. Whipple, Do.	-	-	-	-	-	1	10	6
J. S. Harding, junr., petty cash	-	-	150	0	0			
Do. Do.	-	-	50	0	0			
						200	0	0
						£1,086	2	6

* Five weeks ending 30th October.

The Council then adjourned.

116, *Victoria Street*, November 19, 1880.

PRESENT :

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE.

MR. GALTON.

PROFESSOR STOKES.

LIEUT.-GENERAL STRACHEY.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last two meetings (October 29 and November 5) were read and confirmed.

The Chairman reported that he, in company with the Secretary, had had an interview with Lord F. Cavendish at the Treasury that morning, with reference to the supply of the 8 p.m. Forecasts to newspapers (Minutes, November 5), and that Lord Frederick had inquired whether the Council could not undertake to defray some portion of the cost of the supply, if it were made gratuitous, by curtailing their expenditure in other directions.

He was instructed to explain that the greater part of the charges on the annual grant made to the Office are such as cannot be diminished at very short notice, and that the loss which the Office would sustain by the proposed change must fall on the 1,000% appropriated to scientific researches; a result which the Council would greatly regret.

Reported—That a letter to the Admiralty relating to the simultaneous observations had been written as directed (Letter 2559).

Mr. Strachan's Report on the extent of the Trevandrum Meteorological MSS. (Minutes, October 19) was considered, and Mr. Scott was instructed, in reply to Professor Huxley's Letter of June 18, (Minutes, p. 33), to inform the Royal Society of the result of Mr. Strachan's examination of the documents, and further to state that he had been directed to ask Mr. Blanford, Meteorological Reporter to the Government of India, whether he would be willing to undertake the discussion and publication of the observations.

Mr. Scott was also instructed to write to Mr. Blanford in the sense of the foregoing paragraph.

Mr. De La Rue submitted to the Council a proposal for an investigation into the nature of London fogs.

It was agreed that the Chairman should request Dr. Abel, Professor Frankland, and Dr. W. J. Russell to act as a committee for the purpose of undertaking an investigation of the chemical and physical properties of London fog, with especial reference to an inquiry, which the Council might subsequently undertake, into the conditions under which fog is produced and into its effects upon health.

Submitted—Specimen Charts for the Cape District on a reduced scale, which were approved.

Submitted—The following Reports—

ESTIMATE in ACCORDANCE with DIRECTIONS of MINUTES, 5th November 1880.

The number of days observations made on board ship, over the whole globe and for all years, is about - - - - - 540,000
The number of days observations in the Pacific for all years is about - - - - - 63,000
so that the observations in the Pacific represent only about one ninth of the observations over the whole globe.

Experience shows that it occupies one person about 30 days to plot the observations of sea temperature for one month for the Pacific, so that it would occupy about 10 months for one person to plot the sea temperature for the remaining part of the globe *for one month*.

It seems probable that, taking the whole globe, the amount of the work for the *various months* would be very similar, so that it would probably occupy about

3 years	4 months	for one person	to plot the sea temperature	for the 4 cardinal months.
10 "	0 "	"	"	12 months.

Lieutenant Baillie states that to *work up* the data for *one month* for the remaining part of the globe in the way which those for the Pacific are at present being treated would occupy about

1 year 1 month for one person, so that it would occupy about
 4 " 4 " for one person to work up the 4 cardinal months.
 13 " 0 " " " 12 months.

Thus the total estimate for the first charting and working up combined is—

7 years 8 months for one person for the 4 cardinal months.
 23 " 0 " " " 12 months.

No allowance has been made for vacations in the above statement.

18th November 1880.

C. HARDING.
 C. W. BAILLIE.

WITH reference to the question No. II. contained in the Minutes of November 5th, I beg to state that I do not think it desirable to complete the intermediate charts of the sea-surface temperature of the Pacific Ocean; should the Council, however, consider it necessary to add to the series, I would suggest that a preference be given to those months on either side of the month of February, viz., December, January, March, and April.

The greatest variations in the sea-surface temperatures of the Pacific Ocean appear to exist in the month of February.

18th November 1880.

C. W. BAILLIE,
 Nav.-Lieutenant, R.N.

It was resolved that Mr. Baillie should undertake the preparation of Sea-Surface Temperature Charts for the Indian Ocean, to be on the same scale and comparable with those already prepared for the Pacific Ocean, and that he should receive such additional assistance as the state of the work in the Marine Branch of the Office may render possible from time to time.

It was suggested by Mr. Galton that it would be desirable to examine the sea-surface temperature of some limited district in which there are numerous observations for some one and the same month in successive years, in order to ascertain whether that element has undergone any change during the period for which observations exist, with the view of hereafter undertaking a wider inquiry if there should be sufficient indications of a change.

It was agreed that a trial should be made of this suggestion for Square III. for the month of January and for the years 1856 to 1879 inclusive.

Mr. Scott submitted a provisional report (Letter 2667) by Mr. W. Marriott, Secretary to the Meteorological Society, to whom he had entrusted the discussion of the sea-temperature observations on the coasts of the British Isles (Minutes, p. 15). The report was accompanied by two specimen charts, on a small scale, for the month of July 1879.

Mr. Scott was instructed to request Mr. Marriott to plot the mean values for each station on a chart large enough to show all the stations, and also to prepare, on the same larger scale, a coloured chart similar to that exhibited, showing the generalized results for the month of January.

Read—A memorandum from Captain Toynbee reporting that since the last meeting eight logs had been received, seven of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Comr. P. Aldrich, Lieut. A. Haver- gal, assisted by Sub-Lieut. G. H. Gubbins.	H.M.S. " Sylvia "	Jan. 12—Oct. 29, 1880.	Surveying in China Seas and voyage home.	1880, p. 16.
Capt. J. M'Donald Gray.	Barque " Shun Lee."	Jan. 18—Oct. 26, 1880.	To Algoa Bay and Cochin and home.	1879, p. 74.
Capt. H. Longley -	S.S. " Yorkshire "	May 27, 1879— April 26, 1880.	From European ports to the United States, &c.	1877, p. 17.
Capt. A. J. Miller -	Ship " Canna- nore."	March 26, 1879— Sept. 15, 1880.	To Calcutta, San Fran- cisco, and home.	1877, p. 17.
Capt. W. C. Smith -	Barque " King- dom of Sweden."	April 24, 1879— Nov. 1, 1880.	London to Madras, and trading in Indian Seas.	1878, p. 122.
Capt. W. Waring -	S.S. " Gordon Castle."	May 27—Nov. 8, 1880.	China, New York, and home.	1880, p. 16.
Capt. H. Youlden -	Barque " Chin Yang."	May 29, 1878— Nov. 1, 1880.	China, India, Mauritius, and home.	—

Mr. Scott was instructed to present the charts (O. 27) to Captain Youlden, and to convey the best thanks of the Council to the other observers.

The Secretary was instructed to carry out the requisite alterations at the different stations as suggested in the several Inspector's reports printed in the last Minutes.

Submitted—Applications for the loan of fishery barometers to Groomsport and Donaghadee (Letter 2669).—Granted.

Mr. Scott reported that the proprietors of Queen Anne's Mansions (Letters 2625, 2628) were desirous of removing the telegraphic wire between that building and the Office, which had been erected in 1878 (Minutes, 1878, pp. 3 and 6), and that he had failed in his endeavour to utilize the wire by establishing within the Office an electrical registration of the indications of the large anemometer on the building (Minutes, 1879, p. 73).—He was authorised to consent to the removal of the wire.

The Council then adjourned.

116, *Victoria Street*, November 26, 1880.

PRESENT :

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE.
MR. GALTON.

LIEUT.-GENERAL STRACHEY.
THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (November 19) were read and confirmed.

The Secretary reported that on the 10th instant he had had a visit from Captain Elsdale, R.E., and Captain Templer, and had learnt that they were now ready to undertake balloon ascents, and to make observations during them, for the Meteorological Office, if the Council could obtain the consent of the War Office (Minutes, p. 15) and would defray the cost, estimated at about seven guineas per ascent.

He further reported that four series of balloon observations had been received, made during the ascents on June 10, 17, and 21, and September 30.

The Secretary was instructed to inquire what would be the probable height and duration of the ascents which it was proposed to undertake.

Read—Letter 2667 from Dr. Neumayer, stating that he had great pleasure in lending a set of his Synoptic Charts of the Atlantic for inspection by the Council (Minutes, November 5).

The Chairman reported that he had written to Mr. Abel, Professor Frankland, and Dr. Russell, as agreed at last meeting.

The Hydrographer submitted the following Memorandum :—

METEOROLOGICAL MAPS for BRITISH ISLANDS.

I WOULD wish to bring under the consideration of the Council the desirability of preparing for publication a small collection of meteorological maps, giving the normal values, or constants, of certain of the elements for the British Islands.

I should propose that the *maximum* size of each map did not exceed a page of the Phil. Trans., and that simplicity in the arrangement of details and the cheap price of the whole publication be points prominently kept in view.

As to the maps :—I propose that the mean barometric pressure, as represented by isobars, should be given on *two* maps for two extreme months in the year, say, January and July, with the alternative of giving *one* map with mean values for the whole year, placing against the isobars, if necessary, their values for four cardinal months in the year (January, April, July, October), this on the assumption that the direction of the yearly isobar is a constant, or nearly so, throughout the year. Barometer values to be reduced to the sea level and 32° F. ; necessary tables for these corrections to be placed on the map.

Also 12 maps of the air temperature, arranged in lines of equal temperature, one for each month ; to be reduced to sea level by an assumed arbitrary value for every 100 or more feet. These values to be placed on each map.

I should propose that the sea temperatures round the coast be placed on the same air temperature maps, the distinction being made by the sea values being given by Roman figures, isolated.

One or more rain maps would be desirable, compiled on some simple plan. I am not now prepared with suggestions on this head.

A cloud or sunshine map would be useful, but if the compilation of this map or maps involved much delay, I should be disposed to let them come into a second edition.

It might be a matter for consideration, the introduction of a map giving the lines of equal magnetic declination.

The maximum number of maps would not, I assume, exceed 20, the minimum 15 or 16.

The first process, after the size of the map is determined, is to have the map of the British Islands engraved in good style on copper, [suggested that the rivers in their larger features be introduced, and perhaps the names of the chief towns of counties and the chief seaports]; then proofs given to those engaged in preparing the meteorological details.

When the maps are finished, transfers to stone from the original copper-plate would be made, and on the several stones the MS. material neatly drawn.

Apart from a title-page and brief advertisement, each map should contain all the particulars relative to the symbols (if any) employed, and all necessary tabular corrections.

Assuming a large number would be sold, two shillings or half-a-crown for the complete set would probably be a remunerative price.

FREDK. JNO. EVANS,

Hydrographer.

November 26, 1880.

It was agreed that the Council undertake the preparation of Physical Charts for the British Isles, in general accordance with the foregoing Memorandum. The Secretary was instructed to communicate with Mr. Marriott with the view of ascertaining whether he would be willing to undertake the work.

Submitted the following memoranda:—

MATERIALS for preparing ESTIMATES for Year 1881-82.

<i>Administration :</i>						£	s.	d.	£	s.	d.
(1.)	Council	-	-	-	-	-	-	-	1,000	0	0
(2.)	Secretary	-	-	-	-	-	-	-	800	0	0
(3.)	Salaries and Wages :										
	Three clerks, office-keeper, and messenger	-				708	16	0	710	0	0
(4.)	Rent, Fuel, and Lighting :										
	Expenditure for one year ending 30th September 1880*	-	-	-	-	661	3	4	650	0	0
(5.)	Incidental and contingent Expenses :										
	Expenditure for one year ending 30th September 1880*	-	-	-	-	355	16	10			
	A deduction has been made of items of new furniture, alterations, and expenses incidental to International Congress. An addition of (say) 70 <i>l.</i> might at least be made for probable expenditure under these heads					70	0	0			
						425	16	10	420	0	0
<i>Special Researches and Experiments</i>						-	-	-	1,000	0	0
<i>Land Meteorology :</i>											
(1.)	Observatories and other Stations :										
	Expenditure for one year ending 30th September 1880*	-	-	-	-	2,431	13	2			
	Deduct exceptional expense of repair of Valencia Observatory	-	-	-	-	77	8	2			
	(Further repairs anticipated.)					2,354	5	0	2,380	0	0
(2.)	Discussion and reduction of Observations :										
	11 clerks and engraver	-	-	-	-	1,450	6	8	1,450	0	0
<i>Weather Information and Forecasts :</i>											
(1.)	Telegraphic Reports and Storm Warnings :										
	Expenditure for one year ending 30th September 1880*	-	-	-	-	3,216	14	5			
(2.)	Preparation and issue of Reports and Forecasts :										
	Eight clerks and one messenger	-	-	-	-	1,465	10	8			
						4,682	5	1			
Carried forward						-	-	-	£8,410	0	0

* Minutes, p. 71 (1879); p. 14 (1880); 29th October (1880).

	£	s.	d.	£	s.	d.
Brought forward -	-	-	-	8,410	0	0
The repayments under this head <i>at present rates</i> are—						
(i.) For 8h. p.m. service 532 <i>l.</i> , in lieu of which it is proposed to increase vote by 500 <i>l.</i> The amount charged for <i>drawing</i> "Times" 8 p.m. Chart is -	-	-	-	£25		
(ii.) For ordinary reports, telegrams, &c., as per Minutes 29th October (for last half year) -	-	-	-	750		
(iii.) Amount to be charged against "Research," as per Chairman's Memorandum of June 1879 -	-	-	-	50		
				<u>£825</u>		

Of these repayments 775*l.* is charged against (1), and 50*l.* against (2), the 500*l.* by which the vote is increased being carried to this account, and these heads of expense will stand as follows:

(1.) Telegraphic reports, &c. -	-	-	3,217	0	0		
Less repayments -	-	-	775	0	0		
			<u>2,442</u>	<u>0</u>	<u>0</u>	2,420	0 0
(2.) Preparation, &c. of reports -	-	-	1,466	0	0		
Less transfer -	-	-	50	0	0		
			<u>1,416</u>	<u>0</u>	<u>0</u>	1,420	0 0

Inspections :

Salaries and expenses -	-	-	*463	12	2		
Irish inspections, paid in October -	-	-	53	1	6		
			<u>516</u>	<u>13</u>	<u>8</u>	500	0 0
N.B.—An allowance to Meteorological Society of 25 <i>l.</i> (for the year 1880) is included in the above amount.							

Ocean Meteorology :

(1.) Discussion and Reduction of Observations:

Marine Superintendent, assistant, and eight clerks -	-	-	1,818	16	0		
Proportion chargeable to care and issue of instruments (say) -	-	-	200	0	0		
			<u>1,618</u>	<u>16</u>	<u>0</u>		

Deductions, as per Chairman's Memorandum of June 1879:

Amount to be charged against "Research," for proportion of Mr. Baillie's salary -	-	-	£100				
Deduct from balance in year 1878-9 -	-	-	200				
			<u>300</u>	<u>0</u>	<u>0</u>		

Allowance made for payment of full salary to Marine Superintendent.			<u>1,318</u>	<u>16</u>	<u>0</u>	1,320	0 0
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Carried forward - - - £11,070 0 0

* Minutes, p. 71 (1879); p. 14 (1880); 29th October (1880).

	£	s.	d.	£	s.	d.
Brought forward -	-	-	-	14,070	0	0
(2.) Proportion chargeable to care and issue of instruments -	-	-	-	200	0	0
(3.) Supply of instruments to Royal Navy* -	199	8	2			

N.B.—There is little comparison between the expence in one year and in another. The mean of 10 years' payments gives 250%.

(4.) Supply of instruments to the Mercantile Marine*-	523	0	5	250	0	0
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N.B.—Above remark holds good here; the mean of 10 years' payments gives 468%.

(5.) Distant Island (or Coast) Stations : Observer at Bermuda and Norfolk Island and margin for petty expenses -	52	12	6	450	0	0
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There is little comparison under this head as under (3) between one year and another.

£15,000 0 0

N.B.—There being but little variation under the different heads—except Weather Information—the following estimate is (by direction of the Chairman) submitted without change, excepting under the head specified.

METEOROLOGICAL OFFICE: ESTIMATES for the Year 1881–82.

	Proposed for 1881–82.		Voted for 1880–81.		1881–82.	
					Increase.	Decrease.
<i>Administration :</i>	£	£	£	£	£	£
Payment of Council -	1,000	-	1,000			
Secretary -	800	-	800			
Salaries and wages -	710	-	710			
Rent, fuel, and lighting -	650	-	650			
Incidental and contingent expenses -	420	-	420			
		3,580		3,580		
<i>Special Researches and Experiments</i> -	-	1,000	-	1,000		
<i>Land Meteorology :</i>						
Observatories and stations -	2,380	-	2,400			
Discussion and reduction of observations -	1,450	-	1,430			
		3,830		3,830		
<i>Weather Information and Forecasts :</i>						
Telegraphic reports and storm warnings -	2,420	-	2,420			
Preparation and issue of Reports and Forecasts -	1,420	-	920			
		3,840		3,340	500	
<i>Inspections :</i>						
Salaries and travelling expenses -	-	500	-	500		
<i>Ocean Meteorology :</i>						
Discussion and reduction of observations -	1,320	-	1,320			
Expenses incidental to the supply of instruments :						
Care and issue of instruments -	200	-	200			
Royal Navy -	250	-	250			
Mercantile Marine -	450	-	450			
Distant islands (and coast stations) -	30	-	30			
		2,250		2,250		
Totals -	-	£15,000	-	£14,500	£500	

* Minutes, p. 71 (1879); p. 14 (1880); 29th October (1880).

The Secretary submitted a letter (No. 2649) from Mr. Douglass, C.E., inclosing a return (Minutes, 1879, pp. 47 and 81) of simultaneous readings of aneroid and mercurial barometers made between Plymouth and the Eddystone on board the S.S. "Hercules," attending on the Eddystone Lighthouse works.

Mr. Galton reported that he had examined this return. He found that the sets of observations were only 19 in number, but were distributed pretty equally under the entries of sea disturbance 2, 3, 4, 5, and 6 (9 being the maximum of the scale). The observations seemed distinctly to show that the mercurial barometer stood between 0.01 and 0.02 inches higher when the sea was rough than it did under the same conditions of atmospheric pressure when the sea was calm; in other words, that the statical effect due to the inclination to the vertical of the mean position of the tube (as it swung to and fro) was not wholly compensated by the lowering of the mercurial column through centrifugal action. He recommended that opportunity should be taken of repeating the experiments in other vessels.

The Hydrographer having inquired to what extent marine barometers deteriorate with use at sea, the Secretary was instructed to obtain from Mr. Strachan a memorandum as to the exact condition of the barometers recently returned from H.M.S. "Sylvia," which had been in service for several years.

Read—A letter (No. 2696) from the Meteorological Society, inquiring if the allowance of 25% towards the expenses of inspection would be continued for the current year. The Secretary was instructed to reply in the affirmative.

Reported—That Mr. C. E. Burton had commenced work on the 19th instant.

SUBMITTED—The following STATEMENT respecting the RECORDS for July 1880, received from the SELF-RECORDING OBSERVATORIES
(see Minutes, 21st December 1868, and 20th November 1876).

—	Aberdeen.	Armagh.	Falmouth.	Glasgow.	Kew.	Stonyhurst.	Valencia.
	Direction. Good.	Direction. Good.	Direction. Good.	Direction. Good.	Direction. Good.	Direction. Good.	Direction. Indifferent.
	Velocity. Good.	Velocity. Indifferent.	Velocity. Good.	Velocity. Good.	Velocity. Good.	Velocity. Good.	Velocity. Good.
ANEMOGRAPH :—							
Action - - - -	0	0	0	0	0	0	0
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0
” other causes -	0	0	0	0	0	0	0
Orientation verified - - -	24th	31st	*	*	16th	28th	—
No. of errors discovered by subsidiaries	0	0	0	0	0	0	0
” ” irregular differences	0	2	0	0	2	0	13
Result of 40 Remasurements :—							
Greatest difference - - -	1·0	1·0	1·0	1·0	1·0	1·0	2·0
Mean difference irrespective of sign -	0·1	0·0	0·0	0·0	0·0	0·0	0·7
Residual difference (— Meteorological Office) -	+0·1	0·0	+0·1	+0·2	+0·1	0·0	0·0
RAIN GAUGE :—							
Action - - - -	Good.	Good.	Indifferent.	Indifferent.	Good.	Good.	Good.
Records deficient, due to stoppage of clock	0	0	0	0	0	18 hrs.	6 hrs.
” other causes -	0	0	0	0	0	0	0
Errors in tabulation - - -	0	5	0	3	3	2	0

BAROGRAPH :—									
Action -	-	-	-	-	Good. Do.	Good. Do.	Good. Indifferent.	Good. Do.	Good. Do.
Photography -	-	-	-	-	0	0	0	0	0
Records deficient, due to stoppage of clock	-	-	-	-	3 hrs.	3 hrs.	0	0	0
failure of light	-	-	-	-	0	0	0	0	0
" other causes	-	-	-	-	†5 hrs.	0	‡3 hrs.	0	0
No. of errors discovered—	-	-	-	-					
In entry of standard	-	-	-	-	1	0	4	1	0
" calculating residual correction	-	-	-	-	1	2	1	1	0
" applying residual correction	-	-	-	-	0	1	7	3	0
" subtraction in subsidiary tables	-	-	-	-	0	0	3	4	1
" tabulation by subsidiaries	-	-	-	-	0	0	0	0	0
" irregular differences	-	-	-	-	1	2	4	1	1
Result of 40 Remeasurements :—									
Greatest difference	-	-	-	-	0·008	0·006	0·005	0·005	0·005
Mean difference irrespective of sign	-	-	-	-	0·0028	0·0023	0·0019	0·0024	0·0016
Residual difference (— Meteorological Office)	-	-	-	-	0·0000	+0·0001	—0·0003	+0·0003	+0·0001
Mean monthly difference between simultaneous barograph and barometer readings	-	-	-	-	0·0013	0·0008	0·0028	0·0014	0·0016
THERMOGRAPH :—									
Action -	-	-	-	-	Good. Do.	Good. Do.	Good. Indifferent.	Good. Do.	Good. Do.
Photography -	-	-	-	-	Dry.	Dry.	Dry.	Dry.	Wet.
Records deficient, due to stoppage of clock	-	-	-	-	0	0	0	0	0
failure of light	-	-	-	-	0	0	0	0	0
" imperfectly moistened	-	-	-	-	3 hrs.	—	—	—	1 hr.
" bulbs	-	-	-	-	—	—	—	—	—
" partially frozen bulbs	-	-	-	-	5 hrs.	1 hr.	3 hrs.	0	0
" other causes	-	-	-	-	0	0	0	0	0
No. of errors discovered in entry of standard	-	-	-	-	0	0	0	0	0
by subsidiary measurements	-	-	-	-	0	0	1	0	0
" of subtraction in do. tables	-	-	-	-	0	0	0	0	0
" detected under glass scale	-	-	-	-	1	4	1	1	2
Result of 40 Remeasurements :—	-	-	-	-	11	24	3	1	2
Greatest difference	-	-	-	-	0·4	0·3	0·3	0·2	0·3
Mean difference irrespective of sign	-	-	-	-	0·12	0·08	0·08	0·06	0·12
Residual difference (— Meteorological Office)	-	-	-	-	+0·10	+0·18	—0·01	+0·04	—0·06
Mean monthly difference between simultaneous thermograph and thermometer readings	-	-	-	-	0·09	0·18	0·14	0·13	0·15
No. of errors in maxima and minima	-	-	-	-	4	9	11	2	3

* There is no note of the Orientation having been tested during the month. † Lamp-glass blackened. § Owing to bad photography.

† Cylinder started with light on wrong side of binding rods.

The Council then adjourned.

116, *Victoria Street*, December 17, 1880.

PRESENT :

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE.
MR. GALTON.

PROFESSOR STOKES.
LIEUT.-GENERAL STRACHEY.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (November 26) were read and confirmed.

The Secretary was instructed to forward the estimates adopted at last meeting to the Treasury.

Read—The following letter (Minutes, p. 81):—

M.O. 2764.

SIR,

Treasury Chambers, December 3, 1880.

THE Lords Commissioners of Her Majesty's Treasury have had under their consideration the proposals submitted by you in your letter to the Financial Secretary of the 20th ultimo (M.O. 2684), in reference to the provision to be made for the cost of the 8 p.m. forecasts issued by the Meteorological Office, in view of the limited funds at the disposal of the Council.

I am to state that, looking to all the circumstances of the case, my Lords consider that it will be preferable to supply these forecasts gratis to all newspapers which apply for them, and they have accordingly decided to propose to Parliament a supplementary grant of 500*l.* for the Meteorological Council for the current year 1880–81, and to increase the grant in 1881–82 and in subsequent years to 15,000*l.* instead of 14,500*l.*, so as to enable you to supply these forecasts to the newspapers in future free of charge.

I am, &c.

(Signed) R. R. W. LINGEN.

Professor Henry J. S. Smith,
&c. &c. &c.
Meteorological Department,
116, *Victoria Street*, S.W.

The Secretary reported that on receipt of the foregoing letter he had at once communicated the decision of the Treasury to the various newspapers and Press Associations with which the Office had been previously in communication on the subject of the supply of forecasts.

The Secretary submitted the following memorandum on the changes which it might be advisable to make in the weather service on the introduction of the system now sanctioned by the Treasury, together with a specimen of a proposed improvement in the form of the Daily Weather Report.

MEMORANDUM.

THE following suggestions as to the plan for preparing and issuing forecasts during the ensuing year are submitted to the consideration of the Meteorological Council, under the belief that, if adopted, they will greatly facilitate the work of the Telegraphic Weather Report Branch.

(Signed) FREDC. GASTER.

To R. H. Scott, Esq.

11 A.M. FORECASTS.

- (1.) To be prepared as at present.
- (2.) Copies to be forwarded for exhibition to the Mansion House, Clubs, &c., in lieu of those which are now so issued at 2.30 p.m.
- (3.) These forecasts also to appear as part of the Daily Weather Report, which must be remodelled so as to include them.

A specimen copy of the proposed amended form of the Daily Weather Report is herewith submitted.

It will be seen further on that it is proposed to cease publishing the afternoon forecasts.

The change in the Daily Weather Report should, if possible, be made, chiefly for the following reasons:—

- A. Our present charts are not so well executed as those published by other countries.
- B. The change would enable us to combine the 11 a.m. forecasts (based on the 8 a.m. observations) with the Daily Weather Report, which is very desirable.

3.30 P.M. (in lieu of 2.30 p.m.) FORECASTS.

1. The afternoon observations to be taken at 2 p.m. in future instead of 0.45 p.m., the last-named time being no longer that required by the United States Signal Office for their synchronous observations, and 2 p.m. being a better hour for the Office.

2. Jersey and Ardrossan not to report by wire at 2 p.m., but to include their 2 p.m. observations in their 6 p.m. report.

3. The 3.30 p.m. forecasts (based on the 2 p.m. reports) to be drawn up, registered, and checked as at present, in order to insure the proper study of the weather at that hour for the purpose of issuing (or not issuing) warnings; these forecasts to be suspended at the door of the Office and communicated to inquirers, but not to be printed.

These changes are proposed for the following reasons :—

A. It is undesirable for the Office to publish two distinct forecasts for the same period of time.

B. If the publication of the afternoon forecasts should cease, the services of the printers can be dispensed with (thus saving some 46*l.* per annum, and, in addition, a good deal of the clerks' time).

C. For purposes of storm warning the Jersey and Ardrossan 2 p.m. telegrams can well be spared, and this will effect a further saving of about 32*l.* per annum, while by including the 2 p.m. observations with those for 6 p.m. in the 6 p.m. reports we shall still have the advantage of using them in preparing the 8 p.m. forecasts.

8 P.M. (or 8.30 P.M.) FORECASTS. (Prepared from 6 p.m. reports.)

1. To be prepared as at present, and to be termed 8.30 p.m. forecasts.

2. A copy to be suspended at the door of the Office, and copies to be supplied gratis under such regulations as the Office may from time to time find necessary, to the London newspapers, to provincial newspapers having offices in London, and to the various Press Agencies; but the newspaper proprietors and Press Agents must arrange to send their own messengers for the "copy," which will be ready between 8.30 p.m. and 9 p.m. daily, the Office closing at the last-named hour.

It is proposed to delay the hour of issue of the forecasts from 8 p.m. to 8.30 p.m. in order to allow sufficient time for their preparation.

PREPARATION of DAILY WEATHER MAPS.

In order to meet the demand on the part of newspapers for maps, but at the same time to prevent undue pressure on the department occasioned by the multiplication of different maps, containing virtually the same information, it is proposed that the supply of forms be limited to those already furnished.

DAILY, WEEKLY, and MONTHLY DIAGRAMS.

It is not proposed to make any change in these at present unless the demand for such diagrams should increase unexpectedly. They take little time to prepare, and are only few in number.

F. G.

The Secretary was instructed to submit to the Treasury the proposed amended draft of the Daily Weather Report, and to apply for instructions on the subject.

The Secretary submitted a proposal from Mr. Gaster (Letter 2867) to the effect that columns showing the weekly averages of the maximum and minimum thermometer readings should be inserted in the Weekly Weather Report.—Approved.

The Chairman reported that Mr. De La Rue and himself had had an interview with Dr. Russell on the subject of the proposed investigation (Minutes, p. 81) into the nature of London fogs. Dr. Russell stated at this interview that he had already consulted with Mr. Abel and Professor Frankland, and that they had agreed as to the preliminary course of experimentation to be adopted. They proposed that the research should consist of two distinct branches :—

(a.) An analytical investigation of both the solid and liquid, and also of the gaseous constituents of foggy air.

(b.) A series of synthetical experiments, undertaken with a view of determining the conditions which conduce to the production of fog.

Dr. Russell described the processes proposed to be employed in each of these two branches, and several suggestions relating to them were made by Mr. De La Rue. Dr. Russell explained that in the first instance, and at any rate for the preliminary experiments, no driving engine would be required. He anticipated, however, that it might eventually be desirable to operate on larger quantities of air, and that for this purpose a gas engine or some hydraulic motor would probably be necessary.

Mr. Scott reported that Captain Templer had informed him that balloon ascents could without difficulty be made to an altitude of 20,000 feet, and that the duration of such an ascent would be four hours (Letter 2762; Minutes, p. 83). He further reported that he had had a visit from Captain Elsdale, who had told him that, as a balloon shelter was in existence at Aldershot, ascents at short intervals, with a captive balloon, to an altitude of 1,000 feet could be made at an expense of about 1*l.* each.

He was instructed to apply to the War Office for leave to have ascents made on behalf of the Council, the Office undertaking to defray all expenses.

Captain Abney attended (Minutes, 1879, p. 85), and submitted the cameras designed by him for simultaneous cloud photography. He was requested to commence a series of observations with the instruments at South Kensington.

Reported—That the synoptic charts of the Atlantic lent by Dr. Neumayer (Minutes, p. 83) had been received.

Submitted—The following reports on the forecasts for August—October, 1880.

The letters used have the following signification :—

a complete success.

b partial (*i.e.*, more than half) success.

c partial failure.

d total failure.

AUGUST.

2.30 P.M.					
DISTRICTS.		Percentages.			Percentage of Success a + b.
		Wind.	Weather.	Entire Forecast.	
SCOTLAND, N.	a	55	39	47	81
"	b	32	35	34	
"	c	—	16	8	
"	d	13	10	11	
SCOTLAND, E.	a	48	52	50	77
"	b	29	25	27	
"	c	16	7	11	
"	d	7	16	12	
ENGLAND, N.E.	a	65	42	54	75
"	b	23	19	21	
"	c	6	23	14	
"	d	6	16	11	
ENGLAND, E.	a	48	45	47	79
"	b	39	26	32	
"	c	7	19	13	
"	d	6	10	8	
MIDLAND COS.	a	45	23	34	71
"	b	32	42	37	
"	c	10	26	18	
"	d	13	9	11	
ENGLAND, S.	a	58	35	47	81
"	b	29	39	34	
"	c	3	16	9	
"	d	10	10	10	
SCOTLAND, W.	a	32	29	31	60
"	b	29	29	29	
"	c	23	23	23	
"	d	16	19	17	
ENGLAND, N.W.	a	45	42	44	68
"	b	19	29	24	
"	c	23	19	21	
"	d	13	10	11	
ENGLAND, S.W.	a	42	32	37	76
"	b	42	36	39	
"	c	9	16	13	
"	d	7	16	11	
IRELAND, N.	a	32	29	31	63
"	b	35	29	32	
"	c	23	29	26	
"	d	10	13	11	
IRELAND, S.	a	29	32	31	60
"	b	29	29	29	
"	c	23	23	23	
"	d	19	16	17	

8 P.M.					
DISTRICTS.		Percentages.			Percentage of Success a + b.
		Wind.	Weather.	Entire Forecast.	
SCOTLAND, N.	a	44	30	37	72
"	b	37	33	35	
"	c	15	26	21	
"	d	4	11	7	
SCOTLAND, E.	a	52	44	48	84
"	b	37	34	36	
"	c	7	15	11	
"	d	4	7	5	
ENGLAND, N.E.	a	59	33	46	68
"	b	22	22	22	
"	c	15	30	23	
"	d	4	15	9	
ENGLAND, E.	a	44	33	39	71
"	b	37	26	32	
"	c	11	30	20	
"	d	8	11	9	
MIDLAND COS.	a	41	26	34	71
"	b	37	37	37	
"	c	11	33	22	
"	d	11	4	7	
ENGLAND, S.	a	59	30	45	73
"	b	26	30	28	
"	c	11	25	18	
"	d	4	15	9	
SCOTLAND, W.	a	30	30	30	52
"	b	26	18	22	
"	c	26	48	37	
"	d	18	4	11	
ENGLAND, N.W.	a	48	48	48	74
"	b	33	19	26	
"	c	15	22	19	
"	d	4	11	7	
ENGLAND, S.W.	a	41	15	28	54
"	b	25	26	26	
"	c	30	33	31	
"	d	4	26	15	
IRELAND, N.	a	26	30	28	57
"	b	37	22	29	
"	c	30	41	36	
"	d	7	7	7	
IRELAND, S.	a	26	33	29	57
"	b	30	26	28	
"	c	26	30	28	
"	d	18	11	15	

SUMMARY.

BRITISH ISLES	a	45	36	41	72	BRITISH ISLES	a	43	32	38	67
"	b	31	31	31		"	b	31	27	29	
"	c	13	20	16		"	c	18	30	24	
"	d	11	13	12		"	d	8	11	9	

The letters used have the following signification :—
a complete success.
b partial (i.e., more than half) success.
c partial failure.
d total failure.

SEPTEMBER.

2.30 P.M.					
DISTRICTS.		Percentages.			Percentage of Success a + b.
		Wind.	Weather.	Entire Forecast.	
SCOTLAND, N.	a	27	27	27	69
"	b	47	37	42	
"	c	16	20	18	
"	d	10	16	13	
SCOTLAND, E.	a	33	40	37	68
"	b	33	30	31	
"	c	23	13	18	
"	d	11	17	14	
ENGLAND, N.E.	a	40	50	45	70
"	b	33	17	25	
"	c	20	20	20	
"	d	7	13	10	
ENGLAND, E.	a	23	53	38	74
"	b	44	27	36	
"	c	20	13	16	
"	d	13	7	10	
MIDLAND COS.	a	37	33	35	82
"	b	43	50	47	
"	c	10	17	13	
"	d	10	—	5	
ENGLAND, S.	a	23	40	32	63
"	b	33	30	31	
"	c	40	17	29	
"	d	4	13	8	
SCOTLAND, W.	a	27	23	25	58
"	b	33	33	33	
"	c	23	37	30	
"	d	17	7	12	
ENGLAND, N.W.	a	27	33	30	65
"	b	33	37	35	
"	c	17	30	24	
"	d	23	—	11	
ENGLAND, S.W.	a	23	20	22	65
"	b	40	47	43	
"	c	23	20	22	
"	d	14	13	13	
IRELAND, N.	a	17	37	27	67
"	b	46	33	40	
"	c	27	20	23	
"	d	10	10	10	
IRELAND, S.	a	23	30	27	72
"	b	43	47	45	
"	c	24	17	20	
"	d	10	6	8	

8 P.M.					
DISTRICTS.		Percentages.			Percentage of Success a + b.
		Wind.	Weather.	Entire Forecast.	
SCOTLAND, N.	a	15	38	27	68
"	b	58	24	41	
"	c	19	23	21	
"	d	8	15	11	
SCOTLAND, E.	a	31	27	29	61
"	b	31	43	32	
"	c	31	23	27	
"	d	7	7	7	
ENGLAND, N.E.	a	31	43	37	62
"	b	31	19	25	
"	c	19	27	23	
"	d	19	11	15	
ENGLAND, E.	a	38	54	46	79
"	b	31	35	33	
"	c	8	4	6	
"	d	23	7	15	
MIDLAND COS.	a	50	27	39	81
"	b	27	58	42	
"	c	8	8	8	
"	d	15	7	11	
ENGLAND, S.	a	38	50	44	77
"	b	39	27	33	
"	c	8	15	11	
"	d	15	8	12	
SCOTLAND, W.	a	23	19	21	62
"	b	43	39	41	
"	c	19	27	23	
"	d	15	15	15	
ENGLAND, N.W.	a	19	23	21	68
"	b	43	50	47	
"	c	23	12	17	
"	d	15	15	15	
ENGLAND, S.W.	a	27	39	33	72
"	b	50	27	39	
"	c	12	27	19	
"	d	11	7	9	
IRELAND, N.	a	27	31	29	74
"	b	50	39	45	
"	c	8	23	15	
"	d	15	7	11	
IRELAND, S.	a	23	31	27	78
"	b	58	43	51	
"	c	12	19	15	
"	d	7	7	7	

SUMMARY.

BRITISH ISLES	a	27	35	32	69	BRITISH ISLES	a	29	35	32	71
"	b	39	36	37		"	b	42	37	39	
"	c	22	20	21		"	c	15	19	17	
"	d	12	9	10		"	d	14	9	12	

The letters used have the following signification :—

a complete success.

b partial (i.e., more than half) success.

c partial failure.

d total failure.

OCTOBER.

2.30 P.M.

DISTRICTS.		Percentages.			Percentages of Success a + b.
		Wind.	Weather.	Entire Forecast.	
SCOTLAND, N.	a	29	42	36	81
"	b	58	32	45	
"	c	10	16	13	
"	d	3	10	6	
SCOTLAND, E.	a	36	32	34	75
"	b	45	36	41	
"	c	16	13	14	
"	d	3	19	11	
ENGLAND, N.E.	a	36	42	39	76
"	b	42	32	37	
"	c	19	23	21	
"	d	3	3	3	
ENGLAND, E.	a	22	39	31	73
"	b	52	32	42	
"	c	19	23	21	
"	d	7	6	6	
MIDLAND COS.	a	22	32	27	77
"	b	58	42	50	
"	c	10	16	13	
"	d	10	10	10	
ENGLAND, S.	a	32	23	28	74
"	b	45	48	46	
"	c	7	19	13	
"	d	16	10	13	
SCOTLAND, W.	a	29	35	32	71
"	b	39	39	39	
"	c	19	13	16	
"	d	13	13	13	
ENGLAND, N.W.	a	26	55	41	81
"	b	45	35	40	
"	c	16	10	13	
"	d	13	0	6	
ENGLAND, S.W.	a	35	55	45	71
"	b	39	13	26	
"	c	19	29	24	
"	d	7	3	5	
IRELAND, N.	a	36	42	39	74
"	b	35	35	35	
"	c	16	10	13	
"	d	13	13	13	
IRELAND, S.	a	32	48	40	73
"	b	42	23	33	
"	c	16	16	16	
"	d	10	13	11	

8 P.M.

DISTRICTS.		Percentages.			Percentages of Success a + b.
		Wind.	Weather.	Entire Forecast.	
SCOTLAND, N.	a	42	54	48	90
"	b	50	34	42	
"	c	8	8	8	
"	d	0	4	2	
SCOTLAND, E.	a	38	35	37	89
"	b	54	50	52	
"	c	4	11	7	
"	d	4	4	4	
ENGLAND, N.E.	a	27	46	37	81
"	b	54	35	44	
"	c	19	19	19	
"	d	0	0	0	
ENGLAND, E.	a	15	38	27	75
"	b	62	35	48	
"	c	12	19	16	
"	d	11	8	9	
MIDLAND COS.	a	31	27	29	75
"	b	50	42	46	
"	c	19	12	16	
"	d	0	19	9	
ENGLAND, S.	a	31	35	33	75
"	b	50	34	42	
"	c	8	27	18	
"	d	11	4	7	
SCOTLAND, W.	a	27	31	29	72
"	b	50	35	43	
"	c	15	19	17	
"	d	8	15	11	
ENGLAND, N.W.	a	39	46	43	76
"	b	31	35	33	
"	c	15	8	11	
"	d	15	11	13	
ENGLAND, S.W.	a	39	54	47	77
"	b	38	23	30	
"	c	15	19	17	
"	d	8	4	6	
IRELAND, N.	a	31	31	31	73
"	b	42	38	40	
"	c	12	12	12	
"	d	15	19	17	
IRELAND, S.	a	50	42	46	67
"	b	27	15	21	
"	c	8	31	20	
"	d	15	12	13	

SUMMARY.

BRITISH ISLES	a	31	41	36	75
"	b	45	33	39	
"	c	15	17	16	
"	d	9	9	9	
BRITISH ISLES	a	34	40	37	77
"	b	46	34	40	
"	c	12	17	15	
"	d	8	9	8	

Read—The following letter :—

M.O. 1545.

DEAR SIR,

Meteorological Society, 21, Great George Street,
Westminster, S.W., June 17, 1880.

AT the meeting of this Society last month a paper was read on the winds and weather experienced in the North Atlantic during February and March 1880, and in the discussion which followed a strong feeling was expressed that the meteorology of the North Atlantic for these two months ought to be thoroughly discussed, and that the work should be undertaken by the Meteorological Office.

The subject was brought before the Council last evening, when they unanimously resolved that the Meteorological Council should be requested to undertake this discussion.

I should be glad if you would kindly communicate to your Council at their next meeting the views of the Meteorological Society on this subject.

Yours, &c.
(Signed) JOHN W. TRIPE, M.D.,
Council Secretary.

R. H. Scott, Esq., F.R.S.,
Secretary, Meteorological Office.

The Secretary was instructed to reply that a proposal to prepare synoptic charts of the Atlantic for some definite period has been under the consideration of the Council, that they have not yet arrived at any definite conclusion on the subject, but that they see some reasons for preferring a future to a past period, as a greater number of observations might probably be obtained if a special appeal to observers were made beforehand.

Reported—That Mr. Marriott had completed the discussion of the sea temperatures round the coasts of the United Kingdom for the year, July 1879—June 1880 (Minutes, p. 82; Letter 2855).

The Secretary reported that he had communicated with Mr. Marriott, as directed (p. 84), with reference to the preparation of a meteorological atlas of the British Isles, and submitted the following reply:—

METEOROLOGICAL MAPS for the BRITISH ISLANDS.

M.O. 2804.

Meteorological Society, 30, Great George Street,
Westminster, S.W., December 9, 1880.

DEAR SIR,

I BEG to report that, with the permission of the Council of this Society, I shall be willing to undertake the preparation of the meteorological charts for the British Islands, referred to in the memorandum of the Hydrographer.

The Council of this Society last year decided upon the collection of monthly summaries of observations for any year during the last decade from as many stations as possible, with the view of arranging them in such a manner as to exhibit the comparative climate of the country for the decennial period ending December 1880. This decade not being complete until the end of the present year, the former decade 1861–70 was commenced upon, and summaries of observations from over 50 stations have been collected. These would be available for the preparation of the proposed charts, and the Council of this Society would, I believe, if applied to, give me permission to use this material.

I would recommend that the observations to be used in the preparation of the charts should be confined to the 20 years 1861–80, as the records during that time are more numerous and continuous than if a longer period were taken, and also as the International Meteorological Congress has recommended that the meteorological elements should be calculated in decades. A period of 20 years is, I believe, sufficiently long to give a fair average.

With regard to the maps:—

I. *Barometric Pressure*.—As it is doubtful whether the direction of the yearly isobar is a constant throughout the year, I would recommend that there should be at least four monthly charts, viz., January, April, July, and October, and also one for the year.

As the question of the corrections for the reduction to sea level is not in a very satisfactory condition, I think it is undesirable to have these corrections placed on the maps.

II. *Air Temperature*.—In addition to the maps of air temperature for each month, I would recommend that another one should be added for the year.

I should propose to employ the arithmetical mean of the maximum and minimum to represent *Mean Temperature*.

With regard to the reduction to sea level the generally adopted arbitrary value of 1° for every 300 feet might be used.

III. *Sea Temperature*.—The mean sea temperatures might with advantage, when available for any reasonable length of time, be inserted on the same map as the air temperature.

IV. *Rain*.—The most recent rain map is now several years old, it would therefore perhaps be well for the Council to defer the publication of a rain map until the Office is in possession of the rainfall statistics that will shortly be furnished to it by Mr. Symons.

V. *Cloud or Sunshine*.—The observations of the amount of cloud are not sufficiently numerous to be of use in the preparation of a cloud map. The same remark applies also to the duration of sunshine, as the sunshine recorders have only come into general use within the last two or three years.

VI. *Magnetic Declination*.—This question I must leave to the Council, as I am unable to give an opinion on the subject.

Yours, &c.
(Signed) WILLIAM MARRIOTT.

R. H. Scott, Esq., F.R.S.,
Secretary, Meteorological Office.

The Secretary reported that on receipt of the foregoing letter he had at once communicated with the Meteorological Society, and he submitted his letter and the reply thereto:—

P.C. 2822.

DEAR SIR,

Meteorological Office, London,
December 13, 1880.

I BEG to inform you that the Council of the Office are contemplating the preparation of an atlas showing the mean meteorological features of the British Isles.

As Mr. Marriott has been already engaged in dealing with sea temperature for the Council, I was instructed to ask him if he could undertake the preparation of these charts.

At that time it had escaped my memory that the Council of the Meteorological Society had commenced a similar work last year.

Mr. Marriott has reminded me of this, and I now write to explain that I did not mean to ignore the fact by writing to Mr. Marriott, and I shall be glad to know whether the Council will kindly sanction his undertaking the work, due recognition being made.

I am, &c.

J. W. Tripe, Esq., M.D.,
Secretary, Meteorological Society.

(Signed) ROBERT H. SCOTT,
Secretary.

M.O. 2849.

DEAR SIR,

Meteorological Society, 30, Great George Street,
Westminster, S.W., December 10, 1880.

IN reply to yours of the 13th instant, respecting Mr. Marriott undertaking the preparation of an atlas showing the mean meteorological features of the British Isles, I have to inform you that your letter was laid before the Council, and that he has been allowed to work overtime on the atlas, and to use all of the materials collected by the Society.

I remain, &c.

R. H. Scott, Esq.,
Secretary of the Meteorological Council.

(Signed) JOHN W. TRIPE,
Council Secretary.

The Secretary was instructed to return the thanks of the Council to the Council of the Meteorological Society, and to request Mr. Marriott to undertake the work, and to commence it immediately. It was agreed that the size of the maps should be 4to.

Read—A memorandum from Mr. Baillie, reporting that since the last meeting ten logs had been received, eight of them being “excellent.”

Observer.	Ship.	Period.	Voyage.	Last Mention on Minutes.
Captain E. J. Blake	“Tilkhurst” -	Feb. 23—Nov. 29, 1880.	Bombay, Bassein, and home.	1879, p. 102.
Captain Jas. Buchan	Barque “Coppe- name.”	May 12—Nov. 20, 1880.	Surinam and home -	1879, p. 137.
Captain W. F. Car- borne, R.N.R.	S.S. “Oakdale”	Oct. 15—Nov. 23, 1880.	Demerara and home -	1880, p. 54.
Captain H. W. Dyke	“Markland” -	Aug. 29—Nov. 30, 1880.	Baltimore and home -	1879, p. 60.
Captain T. W. Free- man.	S.S. “Belle- rophon.”	Aug. 5—Dec. 4, 1880.	China and home -	1879, p. 60.
Captain R. H. Na- pier, R.N. (Lieutenant Balfour.)	H.M.S. “Mag- pie.”	May 1—Aug. 31, 1880.	Surveying in Hainan Straits.	1879, p. 151.
Captain R. Peebles -	“Otago” -	May 5—Nov. 28, 1880.	Otago and home -	1879, p. 137.
Staff - Commander T. H. Tizard -	Hired vessel “Knight Er- rant.”	July 11—Oct. 9, 1880.	Surveying the West Coast of the United Kingdom.	1876, p. 107.

Mr. Scott was instructed to present the charts (O. 27) to Mr. Balfour and to Mr. Havergal (Minutes, p. 82), and to convey the best thanks of the Council to the other observers.

Reported—That the Admiralty had acknowledged the receipt of the forms for the simultaneous observations (Letter 2813; Minutes, p. 81).

Submitted—The following report on the state of the barometers received from H.M.S. “Sylvia,” as directed at last meeting (p. 87):—

SIR,

Meteorological Office, December 8, 1880.

As directed by you, I have to report that H.M.S. “Sylvia” was supplied, in May 1877, at Hong Kong, with two marine barometers, Casella 8 and Negretti 654; and both were returned to this Office in November 1880.

Casella 8 was verified at Kew Observatory in September 1876, when the correction found for 30 inches was $-.001$, and for the attached thermometer $-1^{\circ}.0$. It has just been compared with the standard barometer in the Office, and at 30 inches its correction is $-.004$, attached thermometer $-0^{\circ}.8$, falling time 6m. 0s. Its corrections have remained practically unaltered, though owing

to exposure to damp climates the frame was clammy, and very much corroded. The tube shows no sign of oxidation of the mercury. The action is sluggish, otherwise the instrument acts as well as it ever did.

Negretti 654 was left at Hong-Kong in October 1874, *ex* H.M.S. "Thistle." It appears to have had two spare tubes. All three tubes were broken when received from "Sylvia," but the frame was in good condition. It was not supplied by this Office, and does not appear to have been verified or compared anywhere.

R. H. Scott, Esq.,

Yours, &c.
(Signed) R. STRACHAN.

Submitted—The following reports :—

December 16, 1880.

STATEMENT of WORK done in the MARINE ROOM during November 1880.

New logs examined, 14.

Cape of Good Hope District.

Wind.—Fixing wind-roses for homogeneous areas on September chart.

Currents.—Final examination and arrangement of charts, also various work connected with the reduction in size of charts, and preparing instructions for lithographer.

The complete series of current charts (12) sent to lithographer for reduction.

Air Temperature.—Checking March isotherms and transferring same to wind chart.

Weather, Cloud, and Sea.—Tabulating February, March, May, June, and September; also August, November, and December partially.

Examining Dutch method of entering cloud-form observations, and making alteration in work done consequent on Dutch method differing from English.

Cape Gales.—Classifying gales for January and working mean results; also drawing diagrams, Plates I. and III.

General.

Making a list of the principal steamship companies whose vessels traverse the North Atlantic.

Obtaining the approximate number of days observations in each month for each year, 1860—1870, for Squares 302, 477, 499, and 485.

Preparing a statement of the number of January and July observations in each and every year for Square 3, and in all years for 10 other squares.

Preparing an estimate of the amount of material in Office logs for the whole Globe, and of the length of time it would take to work them up in the way in which the data for the Pacific Ocean are at present being treated.

Questions with regard to the discussion of sea temperature by Lieutenant Baillie.

Correspondence with Captain Toynbee.

(Signed) CHAS. HARDING.
C. W. BAILLIE.

R. H. Scott, Esq.

November 30th, 1880.

STATEMENT of WORK done in the PANTAGRAPH ROOM during November 1880.

Copper plates pantographed :—1880, Plates Nos. 21 to 27. 1876, Chart Plates Nos. 3 to 5.

Zinc Plates:—Barograms, 6 plates, Nos. 32 to 37, 1880; Thermograms, 7 plates, Nos. 32 to 38, 1880; Vapour tension, 3 plates, Nos. 29 to 31, 1880; Anemograms, 10 plates, Nos. 29 to 38, 1880; Rain curves, none.

Photographic curves are prepared to Plate 42 for barograms and thermograms.

The re-determination of the lower zero line values for the thermograms of all observations has been completed.

The *July* examination work was forwarded to the Computing Room on the 24th.

Mr. Allen's report is attached.

R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

November 30, 1880.

EXAMINATION ROOM.—Land Observatories Department.

The following curves and tabulations have been examined since 30th October :—July : *Thermograms*, two stations; *Barograms*, five stations; *Anemograms*, all stations. August : *Thermograms*, three stations; *Barograms*, two stations; *Anemograms*, one station.

In addition to the above the *July* remark sheets have been written out.

T. E. ALLEN.

Reported—That the following instruments had been forwarded to Cyprus on the 19th November (Minutes, p. 51) :—

					£	s.	d.
6 barometers, B. T. a/c	-	-	-	- at 4 <i>l.</i> each	24	0	0
24 thermometers, B. T. a/c	-	-	-	- at 6 <i>s.</i> each	7	4	0
6 rain-gauges, B. T. a/c	-	-	-	- at 2 <i>l.</i> each	12	0	0
3 maximum thermometers, B. T. a/c	-	-	-	at 19 <i>s.</i> 6 <i>d.</i> each	2	18	6
3 maximum thermometers, A. a/c	-	-	-	at 19 <i>s.</i> 6 <i>d.</i> each	2	18	6
3 minimum thermometers, B. T. a/c	-	-	-	- at 1 <i>l.</i> each	3	0	0
3 minimum thermometers, A. a/c	-	-	-	- at 1 <i>l.</i> each	3	0	0
Instructions, forms, &c.	-	-	-	-	-	-	-

The Secretary was instructed to give the bonus of 3*l.* 3*s.* to the telegraphic reporters under the same conditions as in previous years.

The following cheques for November were drawn on the 30th of that month :—

Administration :			£	s.	d.	£	s.	d.
R. H. Scott, Secretary	-	-	-	-	-	66	13	4
J. S. Harding, jun.	} Salaries and wages -	-	-	-	-			
T. D. Bell								
J. S. Harding, sen.								
			<hr/>			50	1	10
Malby and Sons, printing, &c.	-	-	-	-	-	3	10	0
Special Researches :								
N. Hoffmeyer, synoptic charts	-	-	-	-	-	14	15	3
W. C. Ley, honorarium	-	-	-	-	-	60	0	0
R. W. Munro, fitting up bridled anemometer	-	-	-	-	-	11	7	6
R. Strachan, honorarium	-	-	-	-	-	31	10	0
Land Meteorology :								
R. & J. Beck, repairing Yarmouth anemometer	-	-	-	-	-	3	17	6
J. E. Cullum, salary	-	-	-	-	-	16	13	4
R. W. Munro, cleaning Holyhead anemometer	-	-	3	0	0			
„ copper chimneys	-	-	1	15	9			
			<hr/>			4	15	9
R. Strachan, pocket registers	-	-	-	-	-	4	7	6
R. H. Curtis	} Discussion, &c. of Observations.	-	-	-	-			
J. A. Curtis								
T. E. Allen								
C. H. Thompson								
E. G. Aldridge								
			<hr/>			69	17	3
Weather Information and Forecasts :								
Postmaster General, telegrams	-	-	-	-	-	170	18	4
F. Gaster	} Preparation &c. of Weather Reports.	-	-	-	-			
W. L. Dallas								
F. Brodie								
H. W. Chivers								
			<hr/>			76	0	8
For Ocean Meteorology :								
R. Strachan	} Reduction, &c. of observations, and care of instruments.	-	-	-	-			
C. Harding								
H. Harries								
Lieut. C. W. Baillie, R.N.								
			<hr/>			77	17	3
J. Moss & Co., freight	-	-	-	-	-	1	6	6
P. Riddle, Bermuda anemometer	-	-	-	-	-	2	16	0
Miscellaneous :								
R. J. Lecky, commissions	-	-	-	-	-	7	11	2
R. W. Munro	-	-	-	-	-	5	8	5
J. S. Harding, jun., petty cash	-	-	-	-	-	200	0	0
Total			-	-	-	£879	7	7

* Four weeks ending 27th November.

The Council then adjourned until the 23rd instant, at 2.30 p.m.

116, *Victoria Street*, December 23, 1880.

PRESENT :

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE.

PROFESSOR STOKES.

MR. GALTON.

LIEUT.-GENERAL STRACHEY.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (December 17) were read and confirmed.

The Chairman reported that in company with the Secretary he had had an interview with Sir R. Lingen at the Treasury on the 18th inst., and had gathered that if the proposed change in the Daily Weather Report did not involve an increase in the estimate of the Stationery Office the Treasury would not object to it.

The Secretary reported that he had subsequently had an interview with the Controller of the Stationery Office, who had informed him that it would not be necessary to alter the estimates of that office to provide for the increased cost of the proposed Daily Weather Report.

The memorandum submitted by Mr. Gaster (Minutes, p. 90) was taken into consideration and approved.

Amended circulars relating to the supply of weather information to newspapers and to the public were ordered to be issued as soon as possible.

The draft of the Daily Weather Report was also considered and approved, subject to certain amendments, for issue January 1, 1881.

The Secretary was instructed to inform Capt. Hoffmeyer (Minutes, p. 55) that the Council were prepared to publish the mean values which he requests (Letter 2492) for the telegraphic stations, for months, but not for decades, and that they do not consider it advisable to print tables of extreme barometrical readings for stations at which the instruments are read only twice or three times daily.

Read—A memorandum from Mr. Baillie reporting that since the last meeting three logs had been received, one of them being “excellent.”

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. W. Symington	S.S. “Hankow”	Sept. 1—Dec. 12, 1880.	To Calcutta and home	1880, p. 54.

Mr. Scott was instructed to convey the best thanks of the Council to Capt. Symington.

A cheque was drawn for 50*l.* in favour of J. S. Harding, jun., for petty cash.

The Council then adjourned till Wednesday, January 12, 1881, at 2.30 p.m.

116, *Victoria Street*, January 12, 1881.

PRESENT :

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE.

MR. GALTON.

PROFESSOR STOKES.

LIEUT.-GENERAL STRACHEY.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (December 23) were read and confirmed.

Read—The following letter :—

M.O. 2913.

SIR,

Treasury Chambers, December 28, 1880.

ADVERTING to your letter to the Controller of the Stationery Office of the 18th instant, I am directed by the Lords Commissioners of Her Majesty's Treasury to acquaint you that my Lords have requested that officer to forward, so far as he is able, the proposed alterations in the form of the lithographed Daily Weather Charts of the Meteorological Council.

I am, however, to request that in view of the increased expenditure to the amount of about 200*l.* a year that will be thus occasioned, you will state to the Council that these successive additions to the cost of their service would all tend to make my Lords less willing to continue it in the votes at the end of the five years, for which the experiment, approved by the letter from this Board of the 3rd instant, was to last, and at the end of which period it will come on for consideration in the Estimates 1882-3.

I am, &c.

Robert H. Scott, Esq.,
Meteorological Office.

(Signed) R. R. W. LINGEN.

The Secretary was instructed to send the following reply :—

M.O. 2913/80.

SIR,

January 13, 1881.

REFERRING to your letter of the 28th ultimo (No. 22,010), the Council beg respectfully to state that the recent augmentation in the Estimates of this Office, which has been approved by the Treasury, became necessary solely in consequence of the desire expressed by their Lordships that the Council should furnish *gratis* to the newspapers, and to the public, information which had hitherto been paid for.

It was in connexion with this change that the Council proposed to incur some increased expense for the improvement of the Daily Weather Report ; but for this step they sought, and are glad to find they have obtained, the previous sanction of their Lordships.

It is not for the Council to express any opinion as to the expediency or otherwise of continuing the service of this Department, to which a reference is made in your letter, but they beg to assure you that as long as the administration of this Office is in their hands, they will continue to endeavour to render it as efficient as possible within the limits of the funds placed at their disposal, and will (as heretofore) take the most scrupulous care not to incur any outlay beyond those limits, without the previous sanction of the Treasury.

I have, &c.

(Signed) ROBERT H. SCOTT,
Secretary.

The Secretary of the Treasury.

Reported—That the Treasury had signified their general approval of the estimate for the Office forwarded on the 17th ultimo (Minutes, p. 90 ; Letter 82).

The drafts of the amended circulars relating to the supply of weather information (Minutes, p. 99) were approved and ordered to be issued.

Read—The following Report :—

DEAR SIR,

I HAVE the honour to submit to the attention of the Meteorological Council the following report of the stations in England inspected by me in the course of 1880 :—

TELEGRAPHIC REPORTING STATIONS.

I have inspected all the telegraphic reporting stations, with the exception of Nottingham, Cambridge, and Yarmouth. It did not appear to be worth while to visit Nottingham, as the reports from that station will be shortly discontinued. As Cambridge and Yarmouth were inspected by me last winter, and as I intend to inspect them in the earlier part of 1881, I hope that their omission this year will not be considered of serious importance.

Altitude.—The only station whose altitude above mean sea level, as previously determined, I have found it necessary to correct is Prawle Point. The height of this station I have this year determined from simultaneous barometric observations taken at the station, and on the beach beneath it, as about 335 feet.

Barometers.—New sets of these instruments with uncontracted tubes have been taken to Spurn Head, Hurst Point, and Prawle Point.

At Spurn Head the old and new barometers were compared with the inspector's standard, the results showing that both sets were in good order. The results of the readings of the old and new reporting barometers, and of the standard (the Kew corrections being applied to each) were as follows :—

Old reporting barometer, B.T. 450	-	-	-	-	29.793
New reporting barometer, M.O. 542	-	-	-	-	29.803
Inspector's standard, B.T. 405	-	-	-	-	29.799

The new reporting and new check barometers (M.O. 542 and M.O. 541) agree perfectly.

Similar comparisons of the old and new barometers were made at Hurst Point, before the old barometers were finally dismantled and the new substituted. I mentioned in my last year's report that the old barometers at Hurst gave readings as much as .020 too low. The result of the comparison made this year confirmed this. Squalls were passing at the time of my visit, and the barometers were much agitated. The mean result of several comparisons, made at intervals of 15 minutes, was that the new reporting barometer read .004 below the new spare barometer, and .004 above the inspector's standard; being also .023 above the old reporting barometer, and .022 above the old check barometer.

The set of new barometers for Prawle Point have been sent by Mr. Scott to that station since my visit of inspection.

At the telegraphic reporting stations the results of the comparisons of the barometers with the standard have been generally satisfactory.

The largest discrepancies were as follows: At Scilly the barometer reads .010 too high, and at Oxford the barometer reads .007 too low as compared with the inspector's standard.

Several observers were found to have relapsed into the habit of setting the verniers too low. From this cause the observer at Dover read his barometer .003 too low. At Noirmont, Jersey, the error in reading, due to this cause, amounted to —.004, at Prawle to —.002, and at Scilly to —.003 at the times of my visits of inspection.

At Dover a serious error, which I failed to discover last year, was noted in the observer's mode of reading the barometer. The observer regarded each short line on the vernier as representing *one* thousandth of an inch, and informed me that he had been in the habit of doing so since the commencement of the observations.

Thermometers.—At all the telegraphic reporting stations these instruments were found to be in good order, except that at Barrow-in-Furness the maximum No. 494 at 64°, read, without the Kew correction, .3, and with the Kew correction 1.2 too low; that at Shields the minimum 2493, at 60° read 1° too high, and that at Spurn Head the minimum at 55° read 1.1 too low.

At Hurst Point the observer had, from the date of his appointment at the end of last year up to the time of my visit, July 27, 1880, regarded the tenths of a degree in the table of instrumental corrections as whole degrees, and had so applied them. As he does not appear to understand decimals, to prevent the repetition of so serious a mistake, I ordered him for the future to apply no corrections to the readings of the thermometers.

Thermometer Screens.—No change has been made in the screens at any of the telegraphic reporting stations since my last report. At Prawle Point the observer has undertaken to lay down turf round the screen this winter.

Rain Gauges.—At Prawle Point the rain gauge has been slightly shifted in accordance with my previous recommendation. At Noirmont, Jersey, the gauge was found to be almost entirely worn out, and a new instrument to be requisite, which has since been supplied. At Dover the rain gauge was greatly inclined. The position of the instrument on the top of the railway station is very objectionable, and I think that the gauge is not well attended to, owing to its difficulty of access in wet and slippery weather. I regret to say that I failed to find any other available site.

Observations of Wind.—It is not possible, in my opinion, to form, from the most careful survey of the position of a station, anything approaching to a reliable estimate of the degree in which the winds, passing over the station, are either retarded or deflected by the inequalities of the earth's surface. Neither can such an estimate be obtained from the resident observer, for the latter confounds the question of exposure with the really distinct question of the prevalence of winds from some, as compared with those from other directions; and often with the further question, from which points the severest gales have been experienced. The results of computing, from some years reports from each station, the mean estimated force of the wind accompanying given amounts of barometric gradient in each azimuth, when graphically represented and examined with reference to the mean angle of deviation of the winds at the station, afford an interesting survey of the exposure of each station, in so far as the observer's estimates of wind force have been reliable. And in so far as they have not been so, the forms and relative areas of the polygons of mean estimated wind-forces thus constructed, indicate, in some instances, the character and amount of the observer's errors.

I therefore ask permission to lay before the Council the accompanying diagrams, showing the mean estimated wind-forces accompanying given amounts of barometric gradient in each direction, at Shields, York, Nottingham, Liverpool, Scilly, Hurst, Dover, London, Oxford, Cambridge, Yarmouth, and Jersey. A scale line is given for measurement of the mean estimated wind forces. (The radius of the dotted circle = force 7.) The distance of each coloured line from the centre at N.,

N.N.E., &c., is the mean estimated wind force, with isobars lying N. and S. (lowest pressure in the E.), with isobars lying N.N.E. and S.S.W. (lowest pressure in E.S.E.), and so forth. The innermost (red) line corresponds to gradients of from $\cdot 001$ to $\cdot 005$; the second (violet) line to gradients between $\cdot 005$ and $\cdot 010$; the third (black) to gradients between $\cdot 010$ to $\cdot 015$; the fourth (red) to gradients between $\cdot 015$ and $\cdot 020$; and the exterior (violet) line to gradients between $\cdot 020$ and $\cdot 025$.

In pointing out the principal results indicated by these diagrams, I must ask leave to employ the expressions "northerly isobars," "N.N.Easterly isobars," instead of the longer expressions, "isobars lying N. and S., with lower pressures in the E.;" "isobars lying N.N.E. and S.S.W., with lower pressures in E.S.E.," &c.; and also instead of the usual expression, "gradients for northerly," "gradients for N.N.Easterly" winds, an expression against which there lies, at least for the present purpose, a grave objection.

SHIELDS.

The wind reports from this station are fairly good. The mean angle of deviation of the winds reported is higher than that of the winds reported from the other stations to which the diagrams refer; it is highest with northerly and with southerly isobars; with the former the wind as often blows from N.N.E. as from N.N.W.; and with the latter, instances in which a S.S.W. wind is reported are very common. The lowest deviation in the case of moderately high gradients is with S.E. isobars, which are usually accompanied by strong winds from E.S.E. or E. It is to these last mentioned winds that the station may be said to be most fully exposed. The lines of mean estimated force are also found to bend outwards in a marked manner at W.N.W. and N.W., this curve being the result of occasional exceptionally strong W. winds, which, as mentioned in last year's report, blow seawards down the valley of the Tyne.

The wind-forces reported from this station are, in relation to gradient, exceptionally variable. This is especially the case when the isobars are N.W., or W.N.W.; steep gradients are here often accompanied by light winds, the strong wind down the Tyne, while frequent enough to affect the mean results, occurring only at intervals, and being due to circumstances which have not, as far as I know, been investigated. The force of the sea winds for each gradient at this station is also remarkably variable. Thus when E. or N.E. isobars, with steep gradients, occur all up our N.E. coasts as far as the Firth of Forth, gales which are felt at Spurn Head and Flamborough Head, are in numerous instances not reported from Shields.

The curves show that the lightest winds, in relation to gradient, are felt when the isobars are southerly.

YORK.

The wind-forces reported from this station are not satisfactory, but there is no reason to doubt that the observers have been right in reporting much higher wind-forces, with isobars N.W., W.N.W., W., and W.S.W. (and especially with isobars W.N.W.) than with those in any other direction. I suspect that this phenomenon is purely local, and is due to the free flow of the current of the air down the valley of the Ouse. It seems not very improbable that on the opposite side of the town to that in which the observations are taken, a totally dissimilar set of curves would be obtained, if the materials for them existed.

The mean deviation appears to be greatest at this station with N.W. winds, and to be slightly greater, generally, than at the majority of the inland stations; but I think that implicit faith cannot be accorded to the reports of the wind direction from York.

NOTTINGHAM.

I give the diagram for this station because it is dissimilar to those for most other inland stations, a great increment of wind-force being reported when gradients rise from $\cdot 010$ to $\cdot 015$, except when isobars are N.Wly. The reported wind-forces are far less variable for each given condition of gradient at this station than at York, Oxford, and Cambridge. The angle of deviation is less variable than at the other inland stations, and lower than at any of them. With westerly isobars (even when the gradients are steep) a S.W. wind blows, and with easterly isobars N.E., and it is to the winds from these two quarters that the station appears to be most fully exposed.

LIVERPOOL (Bidston).

The wind observations from this station appear to me remarkably good. The reports both of the direction and force differ less under distributions of barometric pressure, than at any other station. The mean deviation is low; exceptionally so when the isobars are S.S.W. In this case the wind in nearly all instances, except when the gradient is very high, blows from S.E., evidently following the course of the Mersey; as on the other hand the mean deviation is rather high with S.E. isobars at this station, S.E. winds appear to be more prevalent at Bidston than any other telegraphic reporting station in England. Much the strongest winds in relation to gradient are with N.W. isobars when gradients are low, and with W.N.W. when they are high. In the majority of instances in which (the isobars being W.N.W.), the gradient amounts to $\cdot 030$, or upwards, a W. wind of force 8 or upwards is reported from Bidston.

SCILLY.

An extraordinary number of gales being reported from this splendidly exposed station, the lines showing the relation of estimated wind-forces to barometric gradient would be of special interest, if it were possible, in the first place to measure the gradients over Scilly correctly, and in the second

to be sure that the observer correctly estimates the wind-forces. The first of these conditions cannot be strictly fulfilled; the isobars over Scilly can rarely be drawn with anything approaching to precision, unless in drawing them, we make use of the reported wind-forces, a process which would of course vitiate our results in the present inquiry. I have calculated the gradients, as carefully as I could, from the barometric reports of the nearest stations, with that of Scilly itself; but in the case of this station, I have not as yet attempted to go beyond the gradient $\cdot 020$, and there are therefore only four lines shown in the diagram.

As regards the second question, it is true that the observer's estimated wind-forces appear frequently to imply velocities in the movements of the air considerably in excess of those registered by the anemometer. The diagram, however, indicates that with W.N.W. isobars, and with a gradient of from $\cdot 015$ to $\cdot 020$ the mean estimated wind-force is but slightly in excess of that which occurs under similar conditions at Liverpool, while with W. and W.S.W. isobars, and with the above-mentioned gradient, the mean estimated wind-force is nearly the same as that obtained from Jersey.

From the diagram it would appear that, with moderate gradients, the S.W. winds are, on the average, less strong at Scilly than those from other quarters. I do not think that this is due to erroneous estimation of the gradients, care having been taken, in computing the latter, to make allowance for the opening out of the isobars outside the Channel entrance, on those occasions (frequent with S.W. winds) in which there is a probability of this opening out.

The mean angle of deviation is high at Scilly, but with N.W. isobars it is far in excess of that which occurs with S.E. and E. isobars.

HURST POINT.

The results worked out for the Hurst indicate that when the isobars are southerly the winds at this station, which are then S.S.E. or S.E., are materially retarded by the high land in the Isle of Wight, while with northerly isobars the north winds are stronger than might have been expected. The opening out of the lines at S.E. and E.S.E. is, no doubt, due to the strength of the easterly winds blowing through the Solent. The mean angle of deviation is very high with the north-westerly isobars at Hurst, and I am surprised that the W. winds reported from this station should be, with moderate gradients, stronger than the S.W.

The calculations for Hurst were only carried on to the end of 1879. The reports from the new observer are not, in my opinion, so reliable as those from Mr. Lanceley, whose removal from the station has been a considerable loss.

LONDON (Brixton).

The curves for this station indicate that the winds from all easterly points blow here with much greater force for any given moderate gradient than the westerlies. W.N.W. isobars, however, when the gradients are low, and westerly, when they are moderate, afford rather numerous instances of a fresh breeze, which affect, to some degree, the curves on this side. There is a rather well-marked defect in the force of the wind at this station when the isobar is S.S.E. The curves in general bear a rather marked resemblance to those for Nottingham, and a striking want of resemblance to those for the other inland stations.

OXFORD.

A very large number of calms are reported from this station, and also a very large number of force 1, even with rather steep gradients. The reported wind-forces are more variable for the same gradients, in every direction, than those at London and Nottingham. The figures approach very closely to equiangular polygons, and present little worthy of comment, except that, in common with most stations, very low gradients, with easterly winds, are accompanied with a higher mean estimated wind-force than gradients of the same value with westerly winds.

CAMBRIDGE.

The observer at this station has, in my opinion, a most undue predilection for force 1, which is reported with great frequency when gradients are much higher than those to which the diagram refers, and also, as I think, on many occasions when most observers would report a calm.

The diagram only shows that moderate gradients of the northern half give us higher estimated forces at this station than moderate gradients of the southern half, and, secondly, that with W.N.W. isobars, and rather steep gradients, the mean estimated wind-force at this station is the highest. This latter result is still more apparent with gradients which are higher than those referred to in the diagram.

The reported winds give a low mean angle of deviation; this angle being greatest when the isobars are N. and N.N.W.

One result of some importance has come out in the inquiry, viz. that the mean estimated wind-forces reported from this station are now considerably lower than they were in 1873 and 1874.

YARMOUTH.

The curves for this station bear a general resemblance to those for Shields, but the relative areas of the figures are somewhat better, and there is also far less variability in the reports from which the diagram has been constructed. The mean angle of deviation is lower than at Shields, especially with S.W. and S.S.W. isobars. When isobars are S.S.W. and gradients low, there is a marked defect in the mean force of the wind at this station, while isobars S.S.E. and S.E., when gradients are low or moderate, are accompanied by stronger winds than gradients of similar value with other

isobars. On the whole there is less difference between the estimated forces of the easterly and westerly winds than might have been anticipated.

DOVER.

That the innermost line (that representing wind-forces with gradients from .001 to .005) in the diagram for this station is correct, seems very probable; but that the regularity of the exterior lines is partly owing to an undue predilection of the observer for the figures 4 and 5 in the estimation of wind-force, I think there can be little doubt: these figures are too numerous in his reports; and he certainly under-estimates a strong breeze. The diagram is, however, altogether unlike what I should have anticipated; and it is possible that the high land above the town may check the winds blowing towards it from the sea (as felt on the pier where the observations are taken), to the extent indicated by the diagram. The difference between the estimated wind-forces at Dover and Cape Gris Nez is enormous.

JERSEY.

The reports from this well-exposed station have not been received for a sufficient length of time to yield perfectly reliable results, and gradients above .02 are (except the N.W., W., and S.W.), so few in number that I have not thought it worth while to compute the accompanying mean wind-forces. The diagram bears some resemblance to that for Scilly, but very low gradients are not accompanied by nearly as strong winds as those reported from Scilly. The northerly and north-easterly winds blowing over the island appear to be (with the gradients examined) about as strong as the winds which reach the station immediately from the sea.

Results cannot yet be computed for the remaining Telegraphic Reporting Stations in England.

My conjecture, expressed in my report last year, that the winds at Hawes Junction would be subject to remarkable deflections, has proved incorrect, except in so far as S.E. winds are intercepted by the high land on this side. Wind-forces are by no means over estimated at this station. When I inspected it (and found the instruments in admirable order and the observer most attentive) I was shown indications that winds which most observers would regard as "hurricanes" occasionally blow at this station.

Barrow-in-Furness is a notoriously windy locality. The observer's residence is well exposed, and I think that the wind-forces are by no means over-estimated.

STATIONS of the SECOND ORDER and those furnishing DATA for WEEKLY WEATHER REPORT.

Douglas, Isle of Man.—The observer, Mr. Moore, is very careful and attentive. The instruments are in excellent order. The Sunshine Recorder is truly fixed, and has a perfect exposure.

Silloth.—The observer, the Reverend F. Redford, is very painstaking. The instruments are in good order. The screen (a Stevenson) stands over grass. The Sunshine Recorder stands on a sandbank, in the grounds of the Convalescent Hospital, and has a perfect exposure.

Seaham.—Mr. Aird was absent at the time of my visit (June 21). I found that his son, who occasionally under these circumstances takes the observations, is very incompetent. None of the instruments at the station are satisfactorily placed. The work of observation is carried on in a negligent manner, and I think there is no prospect of improvement while it is in the hands of Mr. Aird.

Durham.—The observing barometer at this station reads .008 too low. The rain-gauge readings have always to be taken at 10 a.m. The thermometers are in good order. Sunshine can reach the recorder at all hours, except about one hour before sunset in summer when some trees interfere. The observer promised me to have the trees cropped this winter. I found the Sunshine Recorder to be not quite correctly mounted.

Fork.—The late observer, Dr. Purves (whose resignation was imminent at the time of my visit, June 23rd), always left the meteorological observations to the gardener of the museum grounds, who is scarcely competent for this work. Mr. Noble, Honorary Secretary of the Museum Council, promised that upon the appointment of Dr. Purves' successor the council would insist on thorough attention being paid to the observations. The sunshine recorder (on the roof of the Friends School, Bootham Street), I found to be not quite correctly mounted. I think that shortly before sunset in April and August the sunshine will be cut off by a chimney stack, but the exposure is otherwise good. The instrument is attended to by Mr. Clarke.

Hull.—The instruments were in good order at the time of my visit, June 23rd. The remarks sent from this station are very scanty, and are not likely to become more satisfactory, as the observer is under the necessity of frequent absence, and (though much interested in meteorological work) can devote but little time to the matter.

Southampton.—(Northam.) No station possesses an observer more careful and accurate than this one. The instruments were in perfect order. No unexceptionable places can be found for the thermometers and rain-gauge at this station. At the time of my visit (July 27th) the observer intended to make a change of position of the thermometer screen, which will be desirable. I found the sunshine recorder to be sheltered to some extent by a chimney, but a higher stage was in process of erection, and the instrument is now (I think) unsheltered at all hours.

Southampton.—(Netley.) There was a serious interruption of the observations in the earlier part of 1880, owing to a change of observer. The new observer is, I think, an improvement. A new barometer has been in use since July 1st. This instrument at the date of my visit was found to have, without the Kew corrections, an error of $-.042$, and with the Kew corrections, of $-.046$.

Jersey.—(St. Aubins.) The instruments at the date of my inspection, July 28th, were all in good order. A hill on the W.N.W. must, I think, prevent sunshine from reaching the recorder after 6.45 p.m.

Plymouth.—The observer, Dr. Merrifield, is very attentive, but the position of the instruments is very unsatisfactory. At the top of the rain-gauge the house on the N.W. subtends 43° , and a tree on the S.E. 53° . The gauge stands 9 feet 2 inches above the ground. A wall-screen is employed for the thermometers.

Barnstaple.—The instruments are in good order, but are not very correctly read by the observer, and are most disadvantageously situated. The rain-gauge is considerably sheltered. The thermometer-screen is a louvre-boarded shed 6 feet by 5 feet in the clear, and 8 feet in height. The roof is of black tarred felt. This shed stands over gravel, with walls and buildings all round, and the readings of the thermometers therein are necessarily much too high. There is a prospect that the Literary and Philosophical Institute will shortly be moved to another locality on the outskirts of the town, where a good exposure (and it is to be hoped a Stevenson's screen) will be obtained.

Leicester.—The instruments were in fairly good order at the date of my last visit. I could not obtain the corrections for the thermometers; the grass minimum, 25221, reads, uncorrected, at the temperature of 60° , as much as $2^\circ.5$ too low. There is a slight instrumental defect in the sunshine recorder, M.O. 3, the ring of which has not been correctly cut. The instrument must, I think, be sheltered by chimneys, about the equinoxes, a little after sunrise and before sunset.

Loughborough.—The instruments at the date of my inspection, September 26, were in good order, but a very good exposure cannot be obtained. The observer, Mr. Berridge, is very careful and painstaking.

Cirencester.—The outdoor instruments have been removed about 85 yards north-west of their previous position. Here their exposure is complete. The screen, a modification of Stevenson's, is rather too high, and stands over bare soil. Turf will be laid down this winter. I ordered some changes to be made in the fixing of the sunshine recorder. The exposure of this instrument is perfect. And the atmosphere here being remarkably free from dust, the sun burns when very close to the horizon.

Stokesey.—At the date of my visit, November 26, the observer's barometer (corrected for index error) read 103 too low as compared with the inspector's standard, and gave indications of air in the tube. The thermometer screen stands on bare soil. The rim of the rain-gauge I found to be greatly indented; this defect the observer promised to have immediately rectified. The position of the station, shut in by wooded hills, is exceptional, and the winds suffer extreme deflections.

I remain, &c.

W. CLEMENT LEY.

December 31, 1880.

The Secretary of the Meteorological Council.

The Secretary stated that Mr. Ley had applied for permission to use his wind diagrams, if they were not to be published by the Council. It was agreed to allow Mr. Ley to use the diagrams, and to ask him to consider the advisability of employing instruments, such as Hagemann's Anemometer, at the telegraphic reporting stations.

Submitted—A proof of the Current Charts for the Cape Squares on a reduced scale, showing the twelve months on a single sheet. The chart was approved.

Submitted—The following Report:—

SIR,

Meteorological Office, December 31, 1880.

I HAVE the honour to report, for the information of the Council, on the work which has been done for the quarter ending 31st December 1880.

I commenced the discharge of the Marine Superintendent's duties on the 9th of November.

Pacific Ocean.—The Sea Surface Temperature Charts for the four representative months of the year, and the current extracts from all Office logs up to No. 4,716, have been completed.

Indian Ocean.—The Sea Surface Temperature Charts (*vide* Minutes, 19th November 1880) are in progress. This work was commenced on 23rd November 1880.

I am, &c.

(Signed)

C. W. BAILLIE,

Nav. Lieut. R.N.

R. H. Scott, Esq., M.A., F.R.S.

The subject of the suggested catalogue of meteorological literature proposed by Dr. Hellmann (Minutes, p. 55) was considered (Letters 246, 1902, and 2823, 1880), and the Secretary was instructed to inform Dr. Hellmann that, while the Council think it very desirable that such a catalogue should be prepared, they regret that they are not in a position to contribute to its compilation, as the funds placed at their disposal are appropriated to special purposes.

Read—A letter (No. 59) from Inspector-General Lawson, requesting to be allowed access to the original records of observations made at Ascension by the late Lieut. Rokeby, R.M.

The Secretary was authorised to allow Mr. Lawson to consult the documents.

SUBMITTED—The following STATEMENT respecting the RECORDS for August 1880, received from the SELF-RECORDING OBSERVATORIES
(see Minutes 21st December 1868 and 20th November 1876).

—	Aberdeen.		Armagh.		Falmouth.		Glasgow.		Kew.		Stonyhurst.		Valencia.	
	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Indifferent.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Indifferent.	Velocity. Good.
ANEMOGRAPH :—														
Action - - - - -	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Records deficient, due to stoppage of clock	0	0	0	0	*4 hrs.	*4 hrs.	0	0	0	0	0	0	0	0
" " other causes - -	7th	—	31st	—	26th	—	9th	—	7th	—	26th	—	11th	—
Orientation verified - - -	0	0	0	0	0	0	0	0	0	0	0	0	0	0
No. of errors discovered by subsidiaries	0	3	1	0	1	5	0	1	1	2	0	0	2	5
" " irregular differences -														
Result of 40 Remeasurements :—														
Greatest difference - - -	1·0	1·0	0·0	1·0	0·0	1·0	1·0	1·0	0·0	2·0	1·0	1·0	0·0	1·0
Mean difference irrespective of sign -	0·1	0·3	0·0	0·2	0·0	0·4	0·1	0·2	0·0	0·3	0·1	0·2	0·0	0·4
Residual difference (—Meteorological Office) -	+0·1	+0·1	0·0	+0·1	0·0	+0·2	0·0	0·0	0·0	+0·2	0·0	+0·1	0·0	+0·1
RAIN GAUGE :—														
Action - - - - -	Good.		Good.		Good.		Good.		Good.		Good.		Good.	
Records deficient, due to stoppage of clock	0		0		0		0		0		0		0	
" " other causes - -	0		0		0		0		0		0		0	
Errors in tabulation - - -	0		0		2		0		0		0		0	

Read a letter (No. 14) from Mr. Stone, asking for permission to retain for another year the set of self-recording instruments lent to him (Minutes, 1879, p. 96). The application was granted.

Read—A letter from Captain Abney (No. 76), stating that the cost of his two cameras had been 86*l.* 14*s.* 3*d.*, being in excess of the amount (50*l.*) provisionally placed at his disposal by the Council (Minutes, 1879, p. 85). The Secretary was instructed to pay the account.

Submitted—The following report on the forecasts for November 1880 (Minutes, p. 31):—

The letters used have the following signification:—

a complete success.

b partial (*i.e.*, more than half) success.

c partial failure.

d total failure.

NOVEMBER.

2.30 P.M.

DISTRICTS.		Percentages.			Percentage of Success a + b.
		Wind.	Weather.	Entire Forecast.	
SCOTLAND, N.	a	30	57	44	85
"	b	53	30	41	
"	c	10	13	12	
"	d	7	—	3	
SCOTLAND, E.	a	23	50	37	77
"	b	50	30	40	
"	c	17	17	17	
"	d	10	3	6	
ENGLAND, N.E.	a	30	30	30	80
"	b	43	57	50	
"	c	13	13	13	
"	d	14	—	7	
ENGLAND, E.	a	20	27	24	71
"	b	47	47	47	
"	c	23	20	21	
"	d	10	6	8	
MIDLAND COS.	a	40	37	39	75
"	b	33	40	36	
"	c	13	17	15	
"	d	14	6	10	
ENGLAND, S.	a	33	37	35	75
"	b	47	33	40	
"	c	7	20	14	
"	d	13	10	11	
SCOTLAND, W.	a	20	43	32	69
"	b	37	37	37	
"	c	33	10	21	
"	d	10	10	10	
ENGLAND, N.W.	a	20	40	30	69
"	b	40	37	39	
"	c	20	13	16	
"	d	20	10	15	
ENGLAND, S.W.	a	40	57	49	79
"	b	37	23	30	
"	c	10	13	11	
"	d	13	7	10	
IRELAND, N.	a	40	60	50	77
"	b	30	24	27	
"	c	20	3	12	
"	d	10	13	11	
IRELAND, S.	a	23	57	40	75
"	b	43	27	35	
"	c	17	10	14	
"	d	17	6	11	

8 P.M.

DISTRICTS.		Percentages.			Percentage of Success a + b.
		Wind.	Weather.	Entire Forecast.	
SCOTLAND, N.	a	43	43	43	80
"	b	39	35	37	
"	c	3	15	9	
"	d	15	7	11	
SCOTLAND, E.	a	43	31	37	82
"	b	35	54	45	
"	c	7	8	7	
"	d	15	7	11	
ENGLAND, N.E.	a	43	19	31	84
"	b	39	66	53	
"	c	15	11	13	
"	d	3	4	3	
ENGLAND, E.	a	43	19	31	70
"	b	35	43	39	
"	c	19	35	27	
"	d	3	3	3	
MIDLAND COS.	a	39	27	33	64
"	b	23	39	31	
"	c	23	23	23	
"	d	15	11	13	
ENGLAND, S.	a	47	27	37	76
"	b	31	47	39	
"	c	15	15	15	
"	d	7	11	9	
SCOTLAND, W.	a	19	35	27	66
"	b	39	39	39	
"	c	27	19	23	
"	d	15	7	11	
ENGLAND, N.W.	a	27	47	37	74
"	b	43	31	37	
"	c	19	19	19	
"	d	11	3	7	
ENGLAND, S.W.	a	43	35	39	89
"	b	46	54	50	
"	c	4	11	8	
"	d	7	—	3	
IRELAND, N.	a	35	39	37	76
"	b	39	39	39	
"	c	11	19	15	
"	d	15	3	9	
IRELAND, S.	a	27	47	37	68
"	b	35	27	31	
"	c	23	23	23	
"	d	15	3	9	

SUMMARY.

BRITISH ISLES	a	29	45	37	76	BRITISH ISLES	a	37	34	36	76
"	b	42	35	39		"	b	37	43	40	
"	c	17	14	15		"	c	15	18	16	
"	d	12	6	9		"	d	11	5	8	

Read—A memorandum from Mr. Baillie reporting that since the last meeting eight logs had been received, four of them being “excellent.”

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. W. Bainbridge (assisted by Mr. R. Ladd).	S.S. “Nubian” -	Oct. 22—Dec. 29, 1880.	Cape Town and back -	1880, p. 54.
Capt. G. H. Jones -	S.S. “Lamperts”	April 4—Oct. 20, 1880.	To India and back -	1880, p. 16.
Capt. G. F. Parson -	Barque “Astarte”	Sept. 20, 1879— Dec. 31, 1880.	China, Manilla, San Francisco, and home.	—
Capt. A. Simpson -	Schooner “Traveller.”	April 8—Nov. 26, 1880.	To Greenland and Philadelphia and home, two voyages.	1879, p. 102.

Mr. Scott was instructed to present the charts (O. 27) to Captains Bainbridge and Parson, and the charts (O. 20) to Mr. Ladd, and to convey the best thanks of the Council to the other observers.

Reported that the reflecting nephoscope (Minutes, p. 48) had been sent to Mr. E. E. Glyde, F.M.S., at Torquay. Mr. Galton undertook to write instructions for its use (Letter P.C. 98).

Submitted the following Reports:—

January 11, 1881.

STATEMENT of WORK done in MARINE ROOM during December 1880.

New logs examined, 15. Lighthouse registers examined, 3.

Cape of Good Hope District.

Wind.—November wind-roses drawn and placed in position on Chart. Arranged for plotting land observations from “Report of the Cape of Good Hope Meteorological Commission for the year 1879.”

Barometer.—Locs charts of high and low barometer for representative month drawn.

Frequency diagrams for March, May, June, September, November, and December transferred to Wind Charts.

Air Temperature.—Checking isotherms for May, June, August, September, November, and December, and transferring same to Wind Charts.

Weather, Cloud, and Sea.—Tabulating July, August, November, and December. Rough Chart forms prepared, and Weather, Cloud, and Sea results plotted.

Making alteration in work done consequent on Dutch method of recording Cloud Form.

Specific Gravity.—Means for January and July completed and checked.

Ice Charts.—Data books examined for ice, and observations of same charted. Commenced obtaining ice information from rejected logs

Crossings of outward-bound ships worked for Cape District.

GENERAL.

Correspondence with Captain Toynbee.

Posting index of data in Ocean 10° Squares.

Air and Sea Temperature for 1879 on British coasts placed on charts prepared by Mr. Marriott.

Various minor matters not considered of sufficient importance to include in statement.

CHAS. HARDING.

C. W. BAILLIE.

R. H. Scott, Esq.

December 31, 1880.

STATEMENT of WORK done in the PANTAGRAPH ROOM during December 1880.

Copper Plates pantographed :—8 plates, Nos. 28 to 35, 1880.

Zinc Plates :—Barograms, 8 plates. Nos. 38 to 42, 1880; Nos. 40 to 42, 1876; Thermograms, 9 plates, Nos. 39 to 42, 1880; Nos. 40 to 44, 1876; Vapour Tension, 11 plates, Nos. 32 to 42, 1880; Anemograms, 7 plates, Nos. 39 to 42, 1880; Nos. 40 to 42, 1876; Rain Curves, 12 plates, Nos. 31 to 42, 1880.

Photographic Curves for 1876 have been prepared to Plate 45 for barograms, and Plate 48 for thermograms; the 1880 curves are not in advance of the plates.

Mr. Burton has been practising with the Harmonic Analyser, and preparing curves, &c. for testing it; during the past week he has been adjusting the instrument after the addition of the quartz discs to the forks.

The August examination work is just ready to be forwarded to the Computing Room. Mr. Allen's report is attached.

R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

December 31, 1880.

EXAMINATION ROOM.

The following curves and tabulations have been examined since 30th November :—August: *Thermograms*, two stations; *Barograms*, three stations; *Anemograms*, six stations.

September: *Thermograms*, three stations; *Barograms*, one station.

T. E. ALLEN.

Reported—That the following cheques for December were drawn on the 31st of that month :—

Administration :				£	s.	d.	£	s.	d.		
R. H. Scott, salary	-	-	-	-	-	-	66	13	4		
J. S. Harding, jun.	} Salaries and wages	-	-	-	{	27	15	6	50	1	10
T. D. Bell						13	6	8			
J. S. Harding, sen.						*8	19	8			
				<hr/>							
C. W. Jacques, rent, No. 116	-	-	-	-	133	13	0				
„ „ No. 113	-	-	-	-	18	0	6				
				<hr/>							
The Pall Mall Coal Co., coals	-	-	-	-	-	-	151	13	6		
H. Bond & Son, office repairs, &c.	-	-	-	-	-	-	5	10	0		
J. Jackson, copying ink	-	-	-	-	-	-	13	1	6		
Williams and Norgate, books	-	-	-	-	-	-	2	5	0		
							3	2	8		
Special Researches :											
W. Marriott, discussion of sea temperatures	-	-	-	-	-	-	7	10	0		
W. Thomas, care of Scilly anemometer	-	-	-	-	-	-	1	13	8		
G. M. Whipple, additions to electrometer and Mr. De La Rue's anemometer	-	-	-	-	-	-	29	16	2		
Observatories and Stations.—Quarterly Allowances, &c. :											
C. Niven, Aberdeen	-	-	-	-	-	-	68	19	10		
T. R. Robinson, Armagh	-	-	-	-	-	46	19	0			
„ „ (expenses)	-	-	-	-	-	8	10	3			
				<hr/>			55	9	3		
W. L. Fox, Falmouth	-	-	-	-	-	-	72	3	8		
R. Grant, Glasgow	-	-	-	-	-	68	8	4			
„ „ postages	-	-	-	-	-	1	10	0			
				<hr/>			69	18	4		
H. Williams, Holyhead	-	-	-	-	-	-	3	0	10		
G. M. Whipple, Kew	-	-	-	-	-	100	0	0			
„ „ postages	-	-	-	-	-	0	13	2			
				<hr/>			100	13	2		
C. Clouston, Orkney	-	-	-	-	-	-	4	1	4		
G. H. Aird, Seaham	-	-	-	-	-	-	2	14	10		
S. J. Perry, Stonyhurst	-	-	-	-	-	-	56	14	2		
J. E. Cullum, Valencia	-	-	-	-	-	43	18	5			
„ „ salary	-	-	-	-	-	16	13	4			
				<hr/>			60	11	9		
G. T. Watson, Yarmouth	-	-	-	-	-	-	4	16	5		
Hopkin & Williams, chemicals	-	-	-	-	-	-	3	5	4		
W. Marriott, Meteorological Society's returns	-	-	-	-	-	-	25	0	0		
J. O'Driscoll, rent at Valencia	-	-	-	-	-	-	25	0	6		
R. H. Curtis	-	} Discussion, &c. of Observations	-	-	{	22	4	5	69	17	3
J. A. Curtis	-					15	11	.1			
T. E. Allen	-					15	11	1			
C. H. Thompson	-					*9	4	0			
E. G. Aldridge	-					*7	6	8			
				<hr/>							
Carried forward				-	-	-	£953	14	4		

* Four weeks ending 25th December.

			£	s.	d.	£	s.	d.
	Brought forward	-	-	-	-	953	14	4
Weather Information and Forecasts.—Quarterly Allowances, &c. :								
J. McCormack, Aberdeen	-	-	-	-	-	3	3	0
G. Carrick, Ardrossan	-	-	1	0	1			
„ „ (bonus)	-	-	3	3	0			
						4	3	1
The Postmaster, Bundoran	-	-	-	-	-	1	8	0
H. Todd, Cambridge	-	-	4	15	3			
„ „ (bonus)	-	-	3	3	0			
						7	18	3
The Postmaster, Cliffony	-	-	-	-	-	1	1	0
H. Mohn, Christiania	-	-	-	-	-	5	10	0
T. MacGowan, Donaghadee	-	-	-	-	-	0	14	0
J. Costello, Dover	-	-	3	18	6			
„ „ (bonus)	-	-	3	3	0			
						7	1	6
W. Brand, Dunrossness	-	-	3	18	3			
„ „ (bonus)	-	-	3	3	0			
						7	1	3
The Postmaster, Enniskillen	-	-	-	-	-	1	1	0
G. Wooding, Hawes	-	-	-	-	-	3	19	2
J. Tilston, Holyhead	-	-	3	19	6			
„ „ (bonus)	-	-	3	3	0			
						7	2	6
G. G. Appleton, Hurst Castle	-	-	4	0	7			
„ „ (bonus)	-	-	3	3	0			
						7	3	7
The Postmaster, Inverness	-	-	-	-	-	1	6	0
J. Fisher, Jersey	-	-	4	10	0			
„ „ (bonus)	-	-	3	3	0			
						7	13	0
The Postmaster, Killarney	-	-	-	-	-	1	1	0
J. Hutchison, Leith	-	-	-	-	-	0	13	0
F. Gaster, London	-	-	3	18	0			
„ „ (bonus)	-	-	3	3	0			
						7	1	0
K. Kerr, Mullaghmore	-	-	3	19	11			
„ „ (bonus)	-	-	3	3	5			
„ „ Conways' account	-	-	5	17	7			
						13	0	11
W. D. Penny, Nairn	-	-	4	4	6			
„ „ (bonus)	-	-	3	3	0			
						7	7	6
M. Mackintosh, Nairn	-	-	-	-	-	0	13	0
J. W. Irvine, North Shields	-	-	-	-	-	3	3	0
E. J. Lowe, Notts	-	-	-	-	-	3	18	0
H. E. Bellamy, Oxford	-	-	3	12	6			
„ „ (bonus)	-	-	3	3	0			
						6	15	6
W. Harding, Parsonstown	-	-	3	7	9			
„ „ (bonus)	-	-	3	3	0			
						6	10	9
G. Blackler, Prawle Point	-	-	2	5	0			
„ „ (bonus)	-	-	2	2	0			
						4	7	0
J. John, Prawle Point	-	-	-	-	-	1	0	0
W. Kennedy, Roche's Point	-	-	0	7	0			
„ „ (bonus)	-	-	3	3	0			
						3	10	0
G. Baker, St. Ann's Head	-	-	-	-	-	4	10	9
W. Thomas, Scilly	-	-	4	18	11			
„ „ (bonus)	-	-	3	3	0			
						8	1	11
Carried forward	-	-	-	-	-	£1,091	13	0

			£	s.	d.	£	s.	d.
	Brought forward	-	-	-	-	1,091	13	0
Weather Information, &c.—Quarterly Allowances— <i>cont.</i>								
The Postmaster, Scilly	-	-	-	-	-	0	14	0
J. Sibert, Spurn	-	-	3	5	6			
„ „ (bonus)	-	-	3	3	0			
						6	8	6
J. Sutherland, Stornoway	-	-	5	12	7			
„ „ (bonus)	-	-	3	3	0			
						8	15	7
The Postmaster, Stornoway	-	-	-	-	-	1	6	0
J. Sinclair, Wick	-	-	3	5	0			
„ „ (bonus)	-	-	3	3	0			
						6	8	0
J. Murray, Wick	-	-	-	-	-	1	6	0
The Postmaster, Valencia	-	-	-	-	-	0	14	0
G. T. Watson, Yarmouth	-	-	4	12	4			
„ „ (bonus)	-	-	3	3	0			
						7	15	4
A. Guy, York	-	-	-	-	-	3	18	0
Postmaster General, telegrams	-	-	-	-	-	199	2	3
G. R. Woodward, conveyance of barometers to Prawle Point	-	-	-	-	-	1	1	0
F. Gaster	-	-	30	7	6			
W. L. Dallas	-	-	20	12	1			
F. Brodie	-	-	20	12	1			
H. W. Chivers	-	-	*6	12	0			
						78	3	8
Inspections :								
W. C. Ley, salary	-	-	-	-	-	37	10	0
A. Buchan „	-	-	-	-	-	37	10	0
W. Marriott, contribution	-	-	-	-	-	25	0	0
Ocean Meteorology :								
R. Strachan	-	-	27	15	6			
C. Harding	-	-	22	4	5			
H. Harries	-	-	*11	4	0			
Lieut. C. W. Baillie, R.N.	-	-	16	13	4			
						77	17	3
P. A. Feathers, Dundee Agency	-	-	-	-	-	2	12	6
D. MacGregor & Co., Glasgow Agency	-	-	-	-	-	4	13	6
J. Gill, Liverpool Agency	-	-	-	-	-	11	19	6
T. M. Almond, London Agency	-	-	-	-	-	3	0	0
J. H. Woodstock, packing cases	-	-	-	-	-	8	2	0
Miscellaneous :								
E. J. Strachan, commissions	-	-	-	-	-	8	14	0
G. M. Whipple „	-	-	42	5	0			
„ „	-	-	9	10	0			
						51	15	0
J. S. Harding, jun., petty cash	-	-	130	0	0			
„ „	-	-	50	0	0			
						180	0	0
						£1,855	19	1

* Four weeks ending 25th December.

The Council then adjourned.

116, *Victoria Street*, January 26, 1881.

PRESENT:

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE.

PROFESSOR STOKES.

MR. GALTON.

LIEUT.-GENERAL STRACHEY.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (January 12) were read and confirmed.

Read—A letter from Dr. Russell (No. 204), drawing the attention of the Council to the notice given in the House of Commons by Mr. Cubitt of a motion for the appointment of a Select Committee to inquire into London fogs.

It was agreed to inform the Treasury that the Council had already (on the 19th of November 1880) entrusted an inquiry into the constituents of London fog, and into the conditions under which fog is produced, to Professor Abel, Dr. Frankland, and Dr. Russell.

Dr. Russell attended the meeting and gave some account of his preliminary experiments on the nature of fog.

The Secretary reported that he had received intimation from Washington that General W. B. Hazen had been appointed Chief Signal Officer in the place of the late General A. Myer (Minutes, p. 52).

Read—The following letter (Minutes, p. 91):—

M.O. 139.

SIR,

War Office, January 17, 1881.

WITH reference to your letter of the 18th ultimo, M.O. 1212, inquiring whether the War Office are prepared to instruct the officer entrusted with balloon observations at Aldershot to make observations for the Meteorological Office, the Council bearing all expense incurred thereby, I am to request that you will be good enough to furnish some particulars of what is required as to the height and duration of the ascents proposed to be made for scientific purposes, and generally, the nature and extent of the observations contemplated in the proposed arrangements.

I am, &c.

The Secretary of the Meteorological Council
116, Victoria Street, S.W.

(Signed) T. L. J. GALLWEY,
I.G.F.

The Secretary was instructed to reply to the effect that—

The Office would require:—

- (a.) Ascents and descents by a captive balloon, perhaps several on each of one or more days, observations being made at intervals of 200 or 300 feet of altitude.
- (b.) A certain number of ascents by a free balloon to 20,000 feet, each ascent estimated to last about four hours.
- (c.) Experimental ascents by a captive balloon, not manned, but provided with self-recording instruments.

The form of register to be submitted also.

The subject of Mr. Marriott's discussion of the sea temperatures round the coasts of the British Isles (p. 95) was considered, and it was resolved that Mr. Marriott be requested to make a general comparison of the sea temperature observations now discussed by him with those discussed by Mr. Strachan, and with the results of Mr. Buchan's work, adding any remarks which may be suggested by these comparisons, or by a comparison of the different stations *inter se*.

The subject of the preparation of an abstract of the contents of the discussion of the experiments on thermometer screens at Strathfield Turgiss (Minutes, p. 36) was considered, and it was resolved that the Secretary be instructed to ascertain from Mr. G. T. Kingston whether he would be willing to undertake the preparation of a very condensed account of the discussion. A memorandum to be first submitted by Mr. Kingston showing in what manner he proposes to carry out the required abbreviation.

The Secretary reported that on the 21st instant he had received from Dr. Lorenz von Liburnau a circular asking for information as to the arrangements for the study of

agricultural and forest meteorology in these islands, and that he had replied thereto (Letter 173).

Read—A letter (No. 2830, 1880) from Mr. Williams at Holyhead, asking for an allowance to be made to him for the care of the bridled anemometer at Holyhead (Minutes, p. 26).

The Secretary was instructed to offer Mr. Williams 10% annually (in addition to the similar sum allowed him for the care of the ordinary anemometer at the station) for superintending such anemometrical observations as the Council may from time to time request.

Submitted—The following report on the forecasts for December (Minutes, p. 31) :—

The letters used have the following signification :—

a complete success.

b partial (*i.e.*, more than half) success.

c partial failure.

d total failure.

2.30 P.M.					
DISTRICTS.		Percentages.			Percentage of Success a + b.
		Wind.	Weather.	Entire Forecast.	
SCOTLAND, N.	a	29	35	32	65
"	b	39	26	33	
"	c	16	23	19	
"	d	16	16	16	
SCOTLAND, E.	a	14	35	25	60
"	b	45	26	35	
"	c	16	32	24	
"	d	25	7	16	
ENGLAND, N.E.	a	20	29	25	70
"	b	32	59	45	
"	c	32	9	21	
"	d	16	3	9	
ENGLAND, E.	a	39	39	39	73
"	b	36	32	34	
"	c	16	16	16	
"	d	9	13	11	
MIDLAND COS.	a	35	39	37	69
"	b	22	32	32	
"	c	24	23	24	
"	d	9	6	7	
ENGLAND, S.	a	29	39	34	82
"	b	49	46	48	
"	c	16	9	12	
"	d	6	6	6	
SCOTLAND, W.	a	13	26	20	62
"	b	42	42	42	
"	c	29	26	27	
"	d	16	6	11	
ENGLAND, N.W.	a	32	46	39	81
"	b	42	42	42	
"	c	23	9	16	
"	d	3	3	3	
ENGLAND, S.W.	a	39	58	49	81
"	b	32	33	32	
"	c	6	9	8	
"	d	23	—	11	
IRELAND, N.	a	23	45	34	77
"	b	51	35	43	
"	c	13	16	15	
"	d	13	4	8	
IRELAND, S.	a	16	46	31	77
"	b	52	39	46	
"	c	19	9	14	
"	d	13	6	9	

8 P.M.					
DISTRICTS.		Percentages.			Percentage of Success a + b.
		Wind.	Weather.	Entire Forecast.	
SCOTLAND, N.	a	26	33	30	74
"	b	44	45	44	
"	c	19	11	15	
"	d	11	11	11	
SCOTLAND, E.	a	30	22	26	65
"	b	41	37	39	
"	c	22	37	30	
"	d	7	4	5	
ENGLAND, N.E.	a	15		17	63
"	b	44	48	46	
"	c	30	30	30	
"	d	11	3	7	
ENGLAND, E.	a	38	19	26	78
"	b	45	59	52	
"	c	11	19	15	
"	d	11	3	7	
MIDLAND COS.	a	48	22	35	82
"	b	34	59	47	
"	c	11	19	15	
"	d	7	—	3	
ENGLAND, S.	a	48	33	41	86
"	b	38	52	45	
"	c	7	11	9	
"	d	7	4	5	
SCOTLAND, W.	a	7	15	11	62
"	b	56	45	51	
"	c	22	33	27	
"	d	15	7	11	
ENGLAND, N.W.	a	33	48	41	76
"	b	33	37	35	
"	c	26	11	19	
"	d	7	4	5	
ENGLAND, S.W.	a	41	33	37	82
"	b	45	45	45	
"	c	7	19	13	
"	d	7	3	5	
IRELAND, N.	a	19	41	30	69
"	b	44	33	39	
"	c	22	22	22	
"	d	15	4	9	
IRELAND, S.	a	30	37	34	73
"	b	37	41	39	
"	c	15	7	11	
"	d	18	15	16	

SUMMARY.

BRITISH ISLES	a	26	40	33	72
"	b	41	38	39	
"	c	19	16	18	
"	d	14	6	10	
BRITISH ISLES	a	30	29	30	74
"	b	42	46	44	
"	c	17	20	18	
"	d	11	5	8	

Submitted—The following statement of accounts for the nine months ending 31st December 1880 :—

INCOME.				EXPENDITURE.			
	£	s.	d.		£	s.	d.
Balance from year 1879-80 -	-	-	470 17 1	ADMINISTRATION :			
Proportion of vote for nine months -	10,875	0	0	Payment of Council -	750	0	0
Repayment of expenses charged under—				Secretary -	600	0	0
(1.) Incidental expenses -	16	9	11	Salaries and wages -	533	19	6
(2.) Special researches -	36	7	4	Rent, fuel, and lighting -	488	14	4
(3.) Observatories and stations -	9	0	0	Furniture and fittings -	22	9	6
			61 17 3	Incidental and contingent expenses -	293	18	3
SUPPLY OF WEATHER INFORMATION :				Expenses incidental to International Meteorological Congress -	33	3	3
Special 8h. p.m. reports -	510	9	11				2,722 4 10
Charts and ordinary forecasts -	278	17	5	SPECIAL RESEARCHES :*			
Ordinary information (Press Agencies, &c.) -	98	14	4	Mr. Burton's salary -	11	4	0
Telegrams -	169	4	5	Rainfall observations -	200	0	0
			1,057 6 1	Additions to Mr. De La Rue's anemometer -	26	13	0
Supply of Ocean Statistics -	-	-	18 13 6	Bridled anemometer, (erection, &c.) -	69	7	3
Miscellaneous data -	-	-	14 3 6	Aids to Study and Forecast of Weather -	66	6	6
SALE OF INSTRUMENTS, &c. :				Discussion of Arctic Observations -	56	12	6
Royal Navy account -	12	2	3	Sundry charges -	120	12	2
Mercantile Marine do. -	61	5	6				550 15 5
			73 7 9	LAND METEOROLOGY :			
Commission charged on work done for Colonies, &c. -	-	-	23 6 11	Observatories and stations -	1,823	5	5
				Discussion and reduction of observations -	1,057	13	3
							2,880 18 8
				WEATHER INFORMATION AND FORECASTS :			
				Telegraphic reports and storm warnings -	2,375	5	6
				Preparation and issue of reports and forecasts -	1,105	6	9
							3,480 12 3
				INSPECTIONS -	-	-	445 2 6
				OCEAN METEOROLOGY :			
				Discussion and reduction of observations -	1,146	9	7
				Expenses incidental to the supply of instruments :			
				Care and issue of instruments -	150	0	0
				Royal Navy -	105	5	3
				Mercantile Marine -	221	0	8
				Distant island and coast stations -	91	10	7
							1,714 6 1
				Balance -	-	-	800 12 4
							£12,594 12 1
			£12,594 12 1				£12,594 12 1
LIABILITIES.				ASSETS.			
	£	s.	d.		£	s.	d.
To Council -	750	0	0	By cash at bank -	1,293	9	10
„ Post Office (partly estimated) -	452	0	9	„ „ at Office -	194	7	1
„ sundry creditors -	760	15	8	„ „ at Valencia -	50	0	0
„ „ (contracts or work uncompleted) -	200	14	0	„ sundry debtors -	676	5	10
„ balance -	800	12	4	„ Her Majesty's Exchequer -	750	0	0
			£2,964 2 9				£2,964 2 9

* The sum of 150*l.* will be eventually transferred to this head from other accounts.

Read—A memorandum from Mr. Baillie reporting that since the last meeting seven logs had been received, six of them being “excellent.”

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. R. J. Blacklin, assisted by Mr. E. Collis.	S.S. “Wyberton”	Aug. 12—Dec. 17, 1880.	To Australia and home.	—
Capt. R. Chitham -	S.S. “Torrington”	Sept. 8—Dec. 29, 1880.	Batavia and home -	1880, p. 54.
Capt. J. P. Maclear, R.N., assisted by Lieut. C. W. Beresford.	H.M.S. “Alert”	Feb. 1—Sept. 21, 1880.	Surveying in Straits of Magellan.	1879, p. 151.
Capt. C. A. F. Powell. Log kept by Mr. A. S. Thomson.	S.S. “Lusitania”	Oct. 7, 1880—Jan. 7, 1881.	To Australia and home -	1880, p. 54.
Capt. W. Randall -	Ship “Iron Cross”	Aug. 20, 1880—Jan. 9, 1881.	To New Orleans and home.	1879, p. 102.
Capt. W. H. Stuart	Schooner “Richmond.”	Mar. 3—July 28, 1880.	Cruising among the Bahamas, &c.	1880, p. 9.

Mr. Scott was instructed to present the charts (O. 27) to Captain Blacklin, and to convey the best thanks of the Council to the other observers.

Reported that Mr. Hugh Lynn had resigned his temporary clerkship on the 17th instant, and that Mr. A. J. Strahan had been appointed to the vacant place at the same salary as Mr. Lynn, viz., 13s. per week for 8 hours daily work.

The Council then adjourned.

116, Victoria Street, February 9, 1881.

PRESENT :

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE.

PROFESSOR STOKES.

MR. GALTON.

LIEUT.-GENERAL STRACHEY.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (January 26) were read and confirmed.

The Secretary reported that on the 7th instant he had received from the Local Government Board a letter (No. 271) asking for particulars as to the mean rainfall of the United Kingdom, with reference to a question to be asked in the House of Commons by Mr. Magniac, and that he had furnished such information as existed in the Office (Letter 277).

Read—A letter (No. 210) from Mr. Ley stating that he had not sufficient experience of the working of Hagemann's anemometer to warrant his recommending its employment at the Telegraphic Reporting Stations (Minutes, p. 105).

The Secretary reported that during the recent severe frost the staff of the Observatory at Glasgow had maintained hourly eye-readings so long as there was any risk of failure of the photographic process, owing to the choking of the gas-pipes by naphthaline in consequence of the frost.

He was instructed to express the thanks of the Council to Professor Grant, and to inform him that the Council would make an extra allowance of 5s. per night to the gentlemen who had taken the observations.

Read—A memorandum from Mr. Baillie reporting that since the last meeting one log had been received, which was "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. Wm. Barron -	S.S. "Sultan" -	Sept. 18, 1880—Jan. 19, 1881.	Hamburg (coasting) -	1880, p. 54.

Mr. Scott was instructed to convey the best thanks of the Council to Captain Barron.

The Hydrographer submitted to the Council nine sets of daily simultaneous observations, being the first received from the ships of the Royal Navy in accordance with the request of the Council (Minutes, p. 75).

It was agreed to ask the Signal Office at Washington how soon the observations would be wanted for use, at what intervals they should be sent to America, and whether the forms could be returned after having been used.

With reference to the work to be undertaken by the Marine Department, after the completion of the discussion of the district adjacent to the Cape of Good Hope, it was agreed :—

1. That the discussion of sea-surface temperatures now in progress be extended to all the oceans of the globe (Minutes, pp. 78 and 82), and be carried out for the four cardinal months upon the plan already adopted for the Pacific and Indian Oceans.

2. That a discussion of the barometer observations analogous to that of the sea surface temperatures be undertaken for all the oceans of the globe.

3. That in accordance with the Minute of November 19 (p. 82), the mean sea-surface temperatures for January and July in Square III. be separately calculated for each and every year over which the records extend.

4. It was further resolved that the preparation of synoptic charts of the Atlantic be not undertaken for the present, but that preliminary inquiries be made as to the number of observations per day which could be obtained and which could be dealt with in the Office. The general outline of a plan for eventually carrying out the work to be taken into consideration at a future meeting of the Council.

SUBMITTED.--The following STATEMENT respecting the RECORDS for September 1880, received from the SELF-RECORDING OBSERVATORIES (see Minutes, 21st December 1868, and 20th November, 1876).

—	Aberdeen.	Armagh.	Palmouth.	Glasgow.	Kew.	Stonyhurst.	Valencia.
ANEMOGRAPH :--							
Action - - - - -	Direction. Good.	Direction. Good.	Direction. Good.	Direction. Good.	Direction. Good.	Direction. Good.	Direction. Good.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0
" " other causes - -	0	*3 hrs.	0	*2 hrs.	*6 hrs.	*14 hrs.	*22 hrs.
Orientation verified - -	16th	9th	†--	4th	6th	22nd	1st
No. of errors discovered by subsidiaries	0	0	0	0	0	0	0
" " irregular differences	0	0	1	0	2	1	2
Result of 40 Remeasurements :--							
Greatest difference - - -	0·0	0·0	0·0	0·0	0·0	1·0	1·0
Mean difference irrespective of sign -	0·0	0·0	0·0	0·0	0·2	0·4	0·6
Residual difference (—Meteorological Office) -	0·0	+0·2	0·0	+0·1	+0·1	+0·1	-0·1
RAIN GAUGE :--							
Action - - - - -	Good.	Good.	Indifferent.	Indifferent.	Good.	Good.	Good.
Records deficient, due to stoppage of clock	3 hrs.	0	0	0	0	0	0
" " other causes - -	0	0	0	0	0	0	0
Errors in tabulation - - -	0	0	3	1	0	0	0

BABOGRAPH :—

Action	Good. Do.	Good. Indifferent. 2 hrs.	Good. Indifferent. ††17 hrs.	Good. Do.	Good. Indifferent.	Good. Do.	Good. Do.
Photography	0	0	0	0	0	0	0
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0
" " failure of light	0	0	0	0	0	0	0
" " other causes	0	0	0	0	0	0	0
No. of errors discovered—							
In entry of standard	0	0	0	0	0	0	0
" calculating residual correction	0	0	0	0	0	0	0
" applying residual correction	3	0	0	3	0	0	0
" subtraction in subsidiary tables	1	0	0	6	0	0	0
" tabulation by subsidiaries	0	0	0	0	0	0	0
" " irregular differences	0	5	0	0	0	0	0
<i>Result of 40 Remeasurements :—</i>							
Greatest difference	0·005	0·007	0·005	0·005	0·005	0·004	0·005
Mean difference irrespective of sign	0·0016	0·0024	0·0031	0·0022	0·0019	0·0017	0·0017
Residual difference (— Meteorological Office)	—0·0001	—0·0001	—0·0024	—0·0008	+0·0005	—0·0004	—0·0001
Mean monthly difference between simultaneous barograph and barometer readings	0·0017	0·0025	0·0007	0·0011	0·0023	0·0013	0·0016

THERMOGRAPH :—

Action	Good. Do.	Good. Do.	Good. Do.	Good. Do.	Good. Do.	Good. Do.	Good. Do.
Photography	0	0	0	0	0	0	0
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0
" " failure of light	0	0	0	0	0	0	0
" " imperfectly moistened bulbs	0	0	0	0	0	0	0
" " partially frozen bulbs	0	0	0	0	0	0	0
" " other causes	0	0	0	0	0	0	0
No. of errors discovered in entry of standard	0	0	0	0	0	0	0
" " by subsidiary measurements	0	0	0	0	0	0	0
" " of subtraction in do. tables	0	0	0	0	0	0	0
" " detected under glass scale	1	0	0	1	0	1	0
<i>Result of 40 Remeasurements :—</i>							
Greatest difference	0·2	0·2	0·3	0·4	0·2	0·3	0·3
Mean difference irrespective of sign	0·08	0·05	0·11	0·14	0·09	0·10	0·08
Residual difference (— Meteorological Office)	—0·07	+0·01	+0·11	—0·10	—0·06	+0·05	—0·01
Mean monthly difference between simultaneous thermograph and thermometer readings	0·12	0·16	0·09	0·19	0·14	0·12	0·22
No. of errors in maxima and minima	2	—	3	4	6	1	—

* Instrument undergoing inspection and cleaning.
† There is no note of the orientation having been tested during the month.
‡ Pencil not sufficiently lowered upon the paper.

§ During the first part of the month the photography was bad, but it improved later on.
** Changing zero lines.

† Pin in direction shaft worked loose.
†† Bad photography.

February, 1881.

STATEMENT of WORK done in MARINE ROOM during January 1881.

New logs examined, 13. Lighthouse register examined, 1.

*Cape of Good Hope District.**Wind.*—Synchronous wind observations for 1879 obtained from the Report of the Meteorological Commission, charted for each day of the year.

Deciding the prevailing direction for final charts.

Barometer.—Frequency diagrams transferred to Wind Chart for August.*Currents.*—Reduction of charts partly examined.

Writing instructions to Mr. Dangerfield on lithography of charts (as well as interviews).

January, April, July, and October (large charts) sent for lithography.

Ice Charts.—Preparing charts of ice for all months; examining rejected logs.*Weather, Cloud, and Sea.*—Examination of results.*Cape Gales.*—Drawing diagrams of individual gales for April.*Specific Gravity.*—Working results for April.*General.*

Index of data in Ocean 10° Squares posted to date.

Correspondence with Captain Toynbee.

From January 19th, Mr. Green assisting Lieutenant Baillie on sea temperature.

(Signed) CHAS. HARDING.

R. H. Scott, Esq.

C. W. BAILLIE.

January 31, 1881.

STATEMENT of WORK done in the PANTAGRAPH ROOM during January 1881.

Copper Plates pantographed :—11 plates, Nos. 36 to 42, 1880; Nos. 40 to 43, 1876.*Zinc Plates* :—Barograms, 7 plates, Nos. 43 to 49, 1876; Thermograms, 12 plates, Nos. 43 to 44, 1880; Nos. 45 to 54, 1876; Vapour Tension, 10 plates, Nos. 40 to 49, 1876; Anemograms, 12 plates, Nos. 43 to 54, 1876; Rain Curves, 15 plates, Nos. 40 to 54, 1876.*Photographic Curves* for 1876 are not ruled in advance of the zinc plates pantographed; for 1880 barograms and thermograms are ruled to Plate 45.

The proofs of plates for first quarter of 1876 have been measured, and sent to press.

On the 14th Mr. Burton commenced work with the Harmonic Analyser on the Valencia temperature curves (dry bulb only) for 1871; about three fourths of the curves have been passed through the instrument up to this date.

The examination work for September 1880 was completed to day, the necessary work for the Registrar-General's (Ireland) return having delayed it somewhat. Mr. Allen's report is attached.

R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

January 31, 1881.

EXAMINATION ROOM.—Land Observatories Department.

The following curves and tabulations have been examined since 31st December :—

September.—*Thermograms*, two stations; *Barograms*, four stations; *Anemograms*, all stations.October, November, December.—Such portion of the *Valencia* and *Armagh* work as was required for the Registrar-General of Ireland.

T. E. ALLEN.

Reported—That the cash accounts for the six months ended the 30th September 1880 were audited by the Chairman and General Strachey on the 2nd instant, and had been sent to the Treasury for the Audit Office. The receipts for the six months, exclusive of a balance of 1,331*l.* 5*s.* 10*d.* on the 1st April 1880 amounted to 7,837*l.* 3*s.* 8*d.* The payments amounted to 7,549*l.* 12*s.* 8*d.*, leaving a balance of 1,618*l.* 16*s.* 10*d.* in hand and at the bank on the 1st October 1880.

The following cheques for January were drawn on the 31st of that month :—

Administration :

Administration :				£	s.	d.	£	s.	d.
A. J. Hodges, income tax	-	-	-	-	-	-	25	0	0
J. S. Harding, jun., petty expenses of Council	-	-	-	-	-	-	3	13	5
R. H. Scott, salary	-	-	-	-	-	-	66	13	4
J. S. Harding, jun.	} Salaries and wages	-	-	{	27	15	6		
T. D. Bell					13	6	8		
J. S. Harding, sen.					*11	4	7		
							52	6	9
Carried forward				-	-	-	£147	13	6

* Five weeks ending 29th January.

		£	s.	d.	£	s.	d.
	Brought forward -	-	-	-	147	13	6
Administration—cont.							
Gas Light and Coke Company, gas (No. 116) -		5	9	2			
Do. do. (No. 113) -		0	2	8			
					5	11	10
Pall Mall Coal Company, coals -		-	-	-	5	10	0
Pickford & Co., carriage of parcels -		-	-	-	4	1	7
Land Meteorology :							
J. E. Cullum (Valencia), salary -		-	-	-	16	13	4
R. H. Curtis -	Discussion, &c. of observations.	22	4	5			
J. A. Curtis -		15	11	1			
T. E. Allen -		15	11	1			
C. H. Thompson -		*11	10	0			
E. G. Aldridge -		*9	3	4			
					73	19	11
Weather Information and Forecasts :							
F. Dangerfield, delivery of D.W. Charts -		-	-	-	12	7	2
W. Marriott, "Agricultural" returns -		-	-	-	3	18	2
Spottiswoode & Co., private wire at Prawle Point -		-	-	-	17	0	0
Postmaster General, telegrams -		-	-	-	222	4	9
F. Gaster -	Preparation, &c. of Weather Reports.	31	13	6			
W. L. Dallas -		19	15	1			
F. Brodie -		19	15	1			
H. W. Chivers -		*8	5	0			
					79	8	8
Ocean Meteorology :							
R. Strachan -	Discussion, &c. of Observations and care of Instruments.*	27	15	6			
C. Harding -		22	4	5			
H. Harries -		*14	0	0			
Lieut. C. W. Baillie, R.N. -		16	13	4			
					80	13	3
P. Adie, repairing "A." barometers -		4	19	6			
Do. "B. T." do. -		19	13	0			
					24	12	6
G. M. Whipple, verifications "A." -		6	7	6			
Do. do. "B. T." -		4	9	0			
					10	16	6
A. Adie, repairing barometer for Portree -		-	-	-	1	10	0
"Nautical Magazine," insertion of advertisements -		-	-	-	1	2	6
Pewtress & Co., printing do. -		-	-	-	3	15	0
H. J. Thatcher, Cardiff agent -		-	-	-	6	2	6
Z. Scaping, Hull agent -		-	-	-	7	7	6
J. J. Hicks, thermometer screens -		-	-	-	12	0	0
P. Ridder, care of Bermuda anemometer -		-	-	-	4	12	0
Miscellaneous :							
J. J. Hicks, commissions -		-	-	-	3	10	0
Hopkin and Williams, commissions -		-	-	-	3	19	4
E. I. Strachan, commissions -		-	-	-	8	16	0
J. S. Harding, junr., petty cash -		150	0	0			
Do. do. -		50	0	0			
					200	0	0
Total -					£957	6	0

* Five weeks ending 29th January.

The Council then adjourned.

116, *Victoria Street*, February 23, 1881.

PRESENT :

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE.

PROFESSOR STOKES.

MR. GALTON.

LIEUT.-GENERAL STRACHEY.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (February 9) were read and confirmed.

Read—A letter (No. 345) from the Colonial Office, enclosing a copy of a communication from Sir Rawson Rawson to Lord Kimberley, recommending the establishment of a meteorological observatory at Barbadoes (Minutes, 1878, p. 80), and referring, in connexion with this recommendation, to a paper by Mr. F. Chambers ("Nature," vol. 23, pp. 88 and 107) "On Abnormal Variations of Atmospheric Pressure in the Tropics."

Read—The following letter :—

M.O. 300.

SIR,

War Office, February 9, 1881.

WITH reference to your letter dated 31st ultimo, M.O. 139, I am directed by the Secretary of State for War to acquaint you, for the information of the Meteorological Council, that further experiments by officers of this Department with balloons have been postponed for the present, and that the balloon equipment is about to be returned to store.

I am to express the Secretary of State's regret that the assistance in carrying out the proposed observations asked for by the Council cannot now be afforded.

I have, &c.

The Secretary to the Meteorological Council,
116, Victoria Street, S.W.

(Signed) T. G. GALLWEY,

I. of F.

The Secretary was instructed to reply that the Council request to be informed when the experiments with balloons are recommenced, as they entertain the hope that they may be allowed the same opportunities of having observations taken which have been afforded to them in the past year.

Read—A letter (No. 397) from Mr. E. Birkbeck, M.P., requesting the Council to exhibit a collection of instruments, &c. at the forthcoming National Fisheries Exhibition at Norwich in April.

The Secretary was instructed to accede to the request, and to make such arrangements for rendering the collection interesting to the public as he should think advisable.

Read—A memorandum from Mr. Baillie, reporting that since the last meeting six logs had been received, all of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last Mention on Minv'es.
Captain H. v. Freeden	Brig "W. von Freeden."	July 10, 1880— Jan. 31, 1881.	To Pernambuco and home.	1880, p. 16.
Captain Jas. Gordon	S.S. "City of Agra."	Nov. 18, 1880— Feb. 6, 1881.	Calcutta and home -	1877 (Council), p. 71.
Captain John Metcalfe.	S.S. "Oceanic"	May 23—Nov. 6, 1880.	Hong Kong, Yokohama, and San Francisco.	1879, p. 96.
Captain C. W. Pearson (assisted by Mr. J. Kirkpatrick, 3rd officer).	S.S. "Strathleven."	Nov. 7, 1880— Jan. 28, 1881.	Bombay and home -	1880, p. 54.
Captain W. Candler	Barque "Decapolis."	March 23, 1880— Jan. 31, 1881.	Brisbane and home.	—
Captain W. C. Crutchley, R.N.R.	S.S. "African"	Oct. 30, 1880— Jan. 28, 1881.	The Cape of Good Hope and home.	—

Mr. Scott was instructed to present the charts (O. 27) to Captains Candler and Crutchley and to Mr. Kirkpatrick, and to convey the best thanks of the Council to the other observers.

Submitted—The MS. of Captain Toynbee’s Discussion of the Cape Gales for January (Minutes, p. 16).

The Secretary was instructed to have it set up in type for comparison with the previous paper on the Gales for July (Minutes, *l.c.*).

Submitted—The following report on the forecasts for January 1881 (Minutes p. 31):—

The letters used have the following signification:—

- a** complete success.

b partial (*i.e.*, more than half) success.
- c** partial failure.

d total failure.

2.30 P.M.						8 P.M.					
DISTRICTS.		Percentages.			Percentages of Success a + b.	DISTRICTS.		Percentages.			Percentages of Success a + b.
		Wind.	Weather.	Entire Forecast.				Wind.	Weather.	Entire Forecast.	
SCOTLAND, N.	a	43	43	43	74	SCOTLAND, N.	a	36	39	38	78
"	b	39	23	31		"	b	39	42	40	
"	c	8	23	16		"	c	9	16	13	
"	d	10	11	10		"	d	16	3	9	
SCOTLAND, E.	a	27	39	33	74	SCOTLAND, E.	a	29	32	31	81
"	b	50	31	41		"	b	48	52	50	
"	c	19	19	19		"	c	10	13	11	
"	d	4	11	7		"	d	13	3	8	
ENGLAND, N.E.	a	31	43	37	74	ENGLAND, N.E.	a	23	19	21	69
"	b	39	35	37		"	b	52	43	48	
"	c	19	14	17		"	c	16	29	22	
"	d	11	8	9		"	d	9	9	9	
ENGLAND, E.	a	31	54	43	70	ENGLAND, E.	a	26	29	28	58
"	b	35	19	27		"	b	32	29	30	
"	c	23	15	19		"	c	19	26	23	
"	d	11	12	11		"	d	23	16	19	
MIDLAND COS.	a	38	31	35	79	MIDLAND COS.	a	26	19	23	68
"	b	50	39	44		"	b	52	39	45	
"	c	4	22	13		"	c	13	23	18	
"	d	8	8	8		"	d	9	19	14	
ENGLAND, S.	a	35	16	26	66	ENGLAND, S.	a	39	29	34	76
"	b	31	50	40		"	b	39	45	42	
"	c	26	23	25		"	c	16	13	15	
"	d	8	11	9		"	d	6	13	9	
SCOTLAND, W.	a	11	23	17	56	SCOTLAND, W.	a	16	2	21	66
"	b	31	47	39		"	b	45	45	45	
"	c	23	22	23		"	c	13	13	13	
"	d	35	8	21		"	d	26	16	21	
ENGLAND, N.W.	a	19	35	27	57	ENGLAND, N.W.	a	19	26	23	52
"	b	31	30	30		"	b	29	29	29	
"	c	23	27	25		"	c	29	29	29	
"	d	27	8	18		"	d	23	16	19	
ENGLAND, S.W.	a	15	31	23	74	ENGLAND, S.W.	a	24	24	24	71
"	b	47	54	51		"	b	43	50	47	
"	c	11	8	9		"	c	13	16	14	
"	d	27	7	17		"	d	20	10	15	
IRELAND, N.	a	15	19	17	58	IRELAND, N.	a	7	29	18	64
"	b	39	43	41		"	b	48	43	46	
"	c	23	27	25		"	c	26	19	22	
"	d	23	11	17		"	d	19	9	14	
IRELAND, S.	a	23	26	25	62	IRELAND, S.	a	26	33	30	73
"	b	35	39	37		"	b	42	45	43	
"	c	27	31	29		"	c	9	13	11	
"	d	15	4	9		"	d	23	9	16	

SUMMARY.

BRITISH ISLES	a	26	33	30	68	BRITISH ISLES	a	25	28	27	69
"	b	39	37	38		"	b	42	42	42	
"	c	19	31	20		"	c	16	19	17	
"	d	16	9	12		"	d	17	11	14	

SUBMITTED—The following STATEMENT respecting the RECORDS for October 1880, received from the SELF-RECORDING OBSERVATORIES (see Minutes, 21st December 1868, and 20th November 1876).

—		Aberdeen.		Armagh.		Falmouth.		Glasgow.		Kew.		Stonyhurst.		Valencia.	
ANEMOGRAPH :—		Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Indifferent.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Indifferent.	Velocity. Good.	Direction. Indifferent.	Velocity. Good.
Action -	-	0	0	0	0	0	0	0	3 hrs.	3 hrs.	0	0	0	0	0
Records deficient, due to stoppage of clock	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0
" other causes -	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orientation verified -	-	30th	—	29th	—	18th	—	30th	—	*	—	19th	—	10th	—
No. of errors discovered by subsidiaries	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0
" irregular differences	-	0	3	0	1	1	1	0	2	0	0	2	2	2	4
Result of 40 Remeasurements :—															
Greatest difference -	-	1·0	2·0	0·0	2·0	1·0	1·0	0·0	1·0	0·0	1·0	0·0	1·0	2·0	1·0
Mean difference irrespective of sign -	-	0·0	0·5	0·0	0·3	0·0	0·3	0·0	0·4	0·0	0·4	0·0	0·3	0·1	0·4
Residual difference (— Meteorological Office)	-	0·0	0·0	0·0	—0·1	0·0	0·0	0·0	+0·1	0·0	+0·1	0·0	0·0	0·0	0·0
RAIN GAUGE :—		Good.		Good.		Indifferent.		Good.		Good.		Good.		Good.	
Action -	-	0		0		7 hrs.		0		0		0		0	
Records deficient, due to stoppage of clock	-	0		0		0		0		0		0		0	
" other causes -	-	0		0		0		0		0		0		0	
Errors in tabulation -	-	0		2		0		0		1		0		1	

Submitted—The following memorandum, which was generally approved and ordered to be placed on the Minutes:—

MEMORANDUM.

WITH reference to the resolution of the Council, "That a discussion of the barometer observations over all the oceans of the globe be undertaken in a manner analogous to that adopted for the sea-surface temperatures," the following suggestions are made:—

1. To obtain mean results for spaces of 2° of lat. by 2° of long., making provision for means being required for larger spaces.
2. To obtain a mean (generally by eye) of all the barometer observations for a day, and use that as one observation for the area decided by noon position.
3. After all the observations have been thus dealt with, a mean result can be obtained for the barometer, and a corresponding mean for the attached thermometer. The latter will give the necessary correction for temperature.
4. Assuming that the approximate average height above the sea level of the barometer on board ship is 10 feet, and also that the index error is as often + as —, a constant correction of + .01 in. might be applied to all mean results.

CHAS. HARDING.
C. W. BAILLIE.

Feb. 14, 1881.

The subject of the Annual Report for 1880–81 was discussed, and preliminary instructions were given with regard to it.

Read—An application (Letter 376) from Mr. E. Wall for an increase of salary to 3*l.* 3*s.* per week, in accordance with the terms of his engagement (Minutes, p. 41). The application was acceded to, Mr. R. Curtis reporting Mr. Wall's work to be satisfactory.

The Secretary obtained permission to engage a boy for the Land Meteorology Room to replace H. Newton, who had resigned in November 1879 (Minutes, 1879, p. 80).

Reported—That a cheque had been drawn in favour of J. S. Harding, jun., for petty cash for the amount of 50*l.*

The Council then adjourned.

116, Victoria Street, March 16, 1881.

PRESENT :

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE.
MR. GALTON.

PROFESSOR STOKES.
LIEUT.-GENERAL STRACHEY.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (February 23) were read and confirmed.

With reference to the communication from the Colonial Office (Minutes, p. 122) relating to a proposal by Sir Rawson Rawson, K.C.M.G., for the establishment of an observatory at Barbadoes, a draft reply was ordered to be prepared.

Read—The following letter (Minutes, p. 122):—

M.O. 430.

SIR,

War Office, 1st March 1881.

WITH reference to your letter, dated 24th February 1881, M.O. 300, on the subject of the War Office experiments with balloons, I am directed by the Secretary of State for War to acquaint you, for the information of the Meteorological Council, that when the experiments with the balloons are recommenced, notification will be duly sent to them.

I have, &c.

J. H. SMITH,
for Inspector General of Fortifications.

The Secretary, Meteorological Council,
116, Victoria Street, S.W.

The Secretary submitted a return of the weather observations taken by Messrs. Meeking & Co., Holborn Circus, during the years 1874–80, with reference to the prevalence of fogs (Minutes, p. 113). It was resolved that a summary of the register be prepared, and also of the Kew and Greenwich records, a communication being previously addressed to the Astronomer Royal with respect to the latter.

Submitted—The following report on the forecasts for February 1881 (Minutes, p. 31):—

The letters used have the following signification:—

a complete success.

b partial (i.e., more than half) success.

c partial failure.

d total failure.

3.30 P.M.

DISTRICTS.		Percentages.			Percentage of Success a + b.
		Wind.	Weather.	Average Forecast.	
*SCOTLAND, N.	a	25	38	32	65
"	b	33	33	33	
"	c	25	21	23	
"	d	17	8	12	
SCOTLAND, E.	a	29	46	38	69
"	b	25	38	31	
"	c	21	12	17	
"	d	25	4	14	
ENGLAND, N.E.	a	34	58	46	78
"	b	33	30	32	
"	c	29	8	18	
"	d	4	4	4	
ENGLAND, E.	a	38	42	40	88
"	b	54	42	48	
"	c	8	12	10	
"	d	—	4	2	
MIDLAND COS.	a	25	42	34	84
"	b	54	46	50	
"	c	17	4	10	
"	d	4	8	6	
ENGLAND, S.	a	38	33	36	80
"	b	46	42	44	
"	c	12	17	14	
"	d	4	8	6	
SCOTLAND, W.	a	21	25	23	59
"	b	21	50	36	
"	c	29	17	23	
"	d	29	8	18	
ENGLAND, N.W.	a	21	50	36	76
"	b	38	42	40	
"	c	37	8	22	
"	d	4	—	2	
ENGLAND, S.W.	a	50	46	48	86
"	b	25	50	38	
"	c	12	4	8	
"	d	13	—	6	
IRELAND, N.	a	25	50	38	59
"	b	21	21	21	
"	c	29	29	29	
"	d	25	—	12	
IRELAND, S.	a	17	41	29	65
"	b	38	34	36	
"	c	4	4	4	
"	d	41	21	31	

8.30 P.M.

DISTRICTS.		Percentages.			Percentage of Success a + b.
		Wind.	Weather.	Average Forecast.	
SCOTLAND, N.	a	39	43	41	75
"	b	29	39	34	
"	c	18	14	16	
"	d	14	4	9	
SCOTLAND, E.	a	36	46	41	81
"	b	36	43	40	
"	c	21	7	14	
"	d	7	4	5	
ENGLAND, N.E.	a	25	48	37	77
"	b	43	37	40	
"	c	21	8	14	
"	d	11	7	9	
ENGLAND, E.	a	25	44	35	82
"	b	64	29	47	
"	c	—	19	9	
"	d	11	8	9	
MIDLAND COS.	a	18	44	31	76
"	b	46	44	45	
"	c	25	—	13	
"	d	11	12	11	
ENGLAND, S.	a	25	29	27	85
"	b	64	52	58	
"	c	7	7	7	
"	d	4	12	8	
SCOTLAND, W.	a	25	39	32	63
"	b	25	36	31	
"	c	21	14	17	
"	d	29	11	20	
ENGLAND, N.W.	a	22	39	31	77
"	b	46	47	46	
"	c	25	14	20	
"	d	7	—	3	
ENGLAND, S.W.	a	43	46	45	82
"	b	36	39	37	
"	c	18	11	15	
"	d	3	4	3	
IRELAND, N.	a	21	50	36	70
"	b	36	32	34	
"	c	32	18	25	
"	d	11	—	5	
IRELAND, S.	a	21	36	29	73
"	b	46	43	44	
"	c	4	18	11	
"	d	29	3	16	

SUMMARY.

BRITISH ISLES	a	30	44	37	74
"	b	35	39	37	
"	c	20	11	16	
"	d	15	6	10	
BRITISH ISLES	a	28	42	35	76
"	b	43	40	41	
"	c	17	12	15	
"	d	12	6	9	

* The only station available for checking Scotland N. was Wick,—communication with the other stations being interrupted.

Read—The following letter (Minutes, p. 113):—

M.O. 441.

Meteorological Society,

30, Great George Street,

Westminster, S.W., March 3, 1881.

DEAR SIR,

IN accordance with your letter of January 28th, I have made a comparison of the sea-temperature observations from July 1879 to June 1880 with those discussed by Mr. Strachan, and find that there is a general agreement between them. The period 1879–80 was cold and dull, and as similar conditions of weather did not prevail during the time over which the observations, discussed by Mr. Strachan extended, a very rigid comparison could not be made.

It was not possible to compare the temperatures with those in Mr. Buchan's paper, "On the Temperature of the Sea on the Coast of Scotland," as the latter only gives mean results.

By a comparison of the different stations *inter se*, the results seem to confirm each other. The temperature of the sea at the various stations is affected by the temperature of the air, the current of the sea, and also the position of the station, *e.g.*, whether a coastguard station, or a lightship near a sand-bank, or in deep water. At the stations near the mouth of a river, as Cromarty and Helwick, the temperature of the sea more nearly approaches that of the river.

I would suggest that in addition to the tables in Mr. Strachan's discussion previously recommended for publication, others (similar to Tables XVII. to XIX.) be given, showing the temperature of the sea at the bottom together with the difference between the temperature at the surface and at the bottom.

R. H. Scott, Esq., F.R.S., Secretary.

Yours, &c.
(Signed) WILLIAM MARRIOTT.

Read—An application (Letter 434) from Mr. Whipple for a grant of 5*l.* for experiments in the reduction of the Kew electrograms for one year.—Granted.

Read—A memorandum from Mr. Baillie reporting that since the last meeting 12 logs had been received, eight of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. W. Berridge (D. W. Barker, Esq.)	Ship "Superb" -	June 26, 1880—	Melbourne and home -	1880, p. 9.
Capt. Archibald Campbell (Thos. Mitchell, 2nd Officer).	S.S. "Ethiopia"	March 7, 1881. Sept. 3, 1880— Feb. 15, 1881.	New York and home -	1880, p. 40.
Capt. William Ellery	Ship "Majestic"	June 23, 1880— Feb. 19, 1881.	Calcutta and home -	1880, p. 27.
Capt. R. H. Napier, R.N. (A. Balfour, Esq., Lieut., R.N.)	H.M.S. "Magpie"	Sept. 1—Dec. 31, 1880.	Surveying in China Seas	1880, p. 96.
Capt. H. Parsell (H. N. Goulden, 3rd Officer).	S.S. "Baltic" -	Sept. 12, 1880— Feb. 19, 1881.	New York and home -	1880, p. 55.
Capt. W. Warden -	S.S. "Elizabeth Martin."	Nov. 21, 1880— Feb. 15, 1881.	Cape Town and home -	1880, p. 55.
Commander Edmund Bourke, R.N.	H.M.S. "Gannet"	Jan. 1—Dec. 31, 1880.	Cruising in the Pacific.	—
Capt. J. Swan -	Ship "City of Madrid."	March 1, 1880— Feb. 4, 1881.	Honolulu, Oregon, and home.	—

Mr. Scott was instructed to present the Charts (O. 27) to Captains Bourke and Swan, and to Mr. Mitchell, and the Charts (O. 20) to Mr. Goulden, and to convey the best thanks of the Council to the other observers.

Read—A letter (No. 527) from Mr. Buchan in which he stated that he had satisfied himself that the standard barometer at the Aberdeen Observatory, which he had reported to read 0.010 in. too high (Minutes, p. 59), "agreed entirely with a barometer, No. 538, which was recently compared with the Kew standard."

Submitted—A chart of sea-surface temperatures for the Indian Ocean for August, by Mr. C. W. Baillie (Minutes, p. 82).

Submitted—The following reports:—

March 15, 1881.

STATEMENT of WORK done in the MARINE ROOM during February 1881.

New logs examined, 9.

Cape of Good Hope District.

Wind.—Charts completed and forwarded to Mr. Malby, with instructions, for reduction.

Charts for January, April, July, and October returned from Mr. Malby, and forwarded, with instructions, to Mr. Dangerfield to be lithographed.

Currents.—Charts completed and those for February, June, August, September, November, and December sent to lithographer.

Mr. Malby's proof of reduced current charts examined.

Proof of April large current chart received and examined.

Ice Charts.—Ascertaining number of logs, &c. used.

Weather, Cloud, and Sea.—Examination of results completed.

Cape Gales.—Diagrams of individual gales for April and October in hand.

Reading Captain Toynbee's MS. on January gales.

Specific Gravity.—Results for January, April, July, and October completed and examined.

Frequency diagrams drawn for April and placed on first proof of current chart as specimen.

General.

Considering method to be followed in working barometer means for all seas.
 Either Mr. James or Mr. Green assisting Lieutenant Baillie on sea temperature.
 Correspondence with Captain Toynbee.

R. H. Scott, Esq.

(Signed) CHAS. HARDING.
 C. W. BAILLIE.

February 28th, 1881.

STATEMENT of WORK done in the PANTAGRAPH ROOM during February 1881.

Copper Plates pantographed :—7 plates Nos. 44 to 46, 1876; chart plates, Nos. 1 to 4, 1879.

Zinc Plates :—Barograms, 7 plates, Nos. 43 to 49, 1880; Thermograms, 5 plates, Nos. 45 to 49, 1880; Vapour tension, 6 plates, Nos. 43 to 48, 1880; Anemograms, 6 plates, Nos. 43 to 48, 1880.

Photographic curves are prepared for pantographing to Plate 51 for barograms and Plate 54 for thermograms, 1880.

The analysis of the Valentia temperature curves (1871) has been completed and seven months of the Armagh curves have been passed through the analyser.

The examination work for October was passed to the Computing Room on the 25th. Mr. Allen's note is attached.

R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

February 28, 1881.

EXAMINATION ROOM.—Land Observatories Department.

The following curves and tabulations have been examined since 31st January :—October : *Thermograms*, six stations; *Barograms*, six stations; *Anemograms*, all stations. November : *Thermograms*, three stations.

The "Remark Sheets" for the October work have also been written out.

T. E. ALLEN.

Reported that the following cheques for February were drawn on the 28th of that month :—

Administration :				£	s.	d.	£	s.	d.
R. H. Scott, Secretary	-	-	-	-	-	-	66	13	4
J. S. Harding, jun.	} Salaries and wages -	-	-	{	27	15	6		
T. D. Bell					13	6	8		
J. S. Harding, sen.					*8	19	8		
							50	1	10
Pall Mall Coal Company, coals	-	-	-	-	-	-	5	15	0
Pickford & Co., carriage of parcels	-	-	-	-	-	-	1	12	0
Special Researches :									
R. W. Munro, quartz discs	-	-	-	-	-	-	3	8	0
Land Meteorology :									
J. E. Cullum, salary	-	-	-	-	-	-	16	13	4
R. H. Curtis	} Discussion, &c. of Observations.	-	-	{	22	4	5		
J. A. Curtis					15	11	1		
T. E. Allen					15	11	1		
C. H. Thompson					*9	4	0		
E. G. Aldridge					*7	6	8		
							69	17	3
Weather Information and Forecasts :									
Postmaster General, telegrams	-	-	-	203	0	3	225	0	3
„ rent of Office wire	-	-	-	22	0	0			
F. Gaster	} Preparation &c. of Weather Reports.	-	-	{	30	7	6		
W. L. Dallas					19	15	1		
F. Brodie					19	15	1		
H. W. Chivers					*6	12	0		
							76	9	8
Carried forward				-	-	-	£515	10	8

• Four weeks ending 26th February.

	£	s.	d.	£	s.	d.
Brought forward -	-	-	-	515	10	8
For Ocean Meteorology :						
R. Strachan -	-	-	-	27	15	6
C. Harding -	-	-	-	22	4	5
H. Harries -	-	-	-	*11	4	0
Lieut. C. W. Baillie, R.N. }				16	13	4
Discussion, &c. of ob- servations, and care of instruments.						
					77	17 3
Miscellaneous :						
E. J. Strachan, commissions -	-	-	-	-	7	19 0
J. S. Harding, jun., petty cash -	-	-	-	100	0	0
" " -	-	-	-	80	0	0
					180	0 0
Total -	-	-	-	£781	6	11

Reported—That the supplementary estimate for 500*l.* (Minutes, p. 90) had been passed on the 14th inst. The Secretary was instructed to apply as usual for the money.

The Council then adjourned.

116, *Victoria Street*, March 23, 1881.

PRESENT :

PROFESSOR H. J. S. SMITH IN THE CHAIR.

MR. DE LA RUE.

PROFESSOR STOKES.

MR. GALTON.

LIEUT.-GENERAL STRACHEY.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of last meeting (March 16) were read and confirmed.

The following reply to the Colonial Office to their letter of the 14th ultimo (Minutes, p 122), was adopted and the Secretary was instructed to forward it:—

DEAR SIR,

REFERRING to your letter of the 14th ultimo, enclosing, for the information of the Council, a letter from Sir Rawson Rawson addressed to the Colonial Office, I am instructed to inform you that the Council have directed an inquiry to be made into the subject, and that in accordance with their instructions the inclosed resumé of the facts bearing upon it has been prepared.

The Council consider that in the present state of Meteorological science there is no evidence which would justify them in expressing an opinion in favour of Mr. Chambers' hypothesis, or of the suggestion made by Sir Rawson Rawson, so far as it is founded on that hypothesis.

But, on grounds quite apart from the hypothesis of Mr. Chambers, the Council believe that the establishment of an observatory at Barbadoes would be useful to science, and if such an observatory should be established they would attach great importance to a regular transmission of its records to this Office.

RESUMÉ.

Mr. F. Chambers, in his two papers in "*Nature*," for November 25th and December 2nd, 1880, endeavours to prove—

1. That waves of atmospheric pressure travel slowly round the earth from West to East;
2. That these waves determine the amount of rainfall.
3. That the famines of India which result from a failure of rainfall could therefore be foreseen, if the state of pressure prevailing to the westward were regularly communicated to the countries likely to suffer from them.

He suggests the establishment of regular observatories lying to the West of Hindostan, in the Indian Ocean and Atlantic, as at the Seychelles, St. Helena, and Ascension.

Sir Rawson Rawson, formerly Governor of Barbadoes, who in 1878 had written to the Colonial Office to suggest that Barbadoes might with advantage be the principal observatory for the then contemplated West Indian Meteorological system (Minutes, 1878, p. 80), has again written to suggest, in connexion with Mr. Chambers' views, the importance of establishing an observatory on that island, which is not quite so far west of Ascension as Ascension is of Seychelles.

* Four weeks ending 26th February.

Mr. De La Rue, on the part of the Kew Committee, stated, in anticipation of an official communication to be forwarded shortly, that the Colonial Office had informed that Committee that the Colonial Government of Hong Kong had determined to establish a self-recording meteorological and magnetic observatory at that place.

The Secretary was instructed to inform the Colonial Office that the Council have learnt with great satisfaction, from the Kew Committee, that it has been determined to establish a self-recording meteorological and magnetic observatory at Hong Kong, and that they take this opportunity of expressing their desire that copies of the records should be sent regularly to their Office.

The Secretary submitted the following correspondence (Minutes, March 16):—

Meteorological Office, 116, Victoria Street, S.W.,
March 18, 1881.

MY DEAR SIR,
I AM instructed by the Council to inform you that they are engaged in an inquiry respecting fog, of which one part relates to the frequency of fogs during past years, with especial reference to its increase or decrease in recent times.
The Council would be greatly obliged if you could place at their disposal any tabulated monthly statements of fogs which may be in existence for the period during which the meteorology of Greenwich has been recorded under your direction, and if no such tabulation exists, they would venture to ask whether you could give directions to have one prepared.
Such a statement, they presume, would refer to the Observatory, and not to the town of Greenwich.
(Signed) ROBERT H. SCOTT,
Secretary.

Sir G. B. Airy, K.C.B.

Royal Observatory, Greenwich,
London, S.E., March 21, 1881.

MY DEAR SIR,
We have no collection in a tabular form of observed fogs. But we have regularly recorded them in our printed meteorological observations. In former years they are not referred to classes, and bear simply the word *fog*, but in later years we have distinguished between *fog* and *thick fog*. You will find them in the last column of our monthly records of weather.
The mere extraction of these from the printed volumes would not occupy many days, but instruction would be necessary as to the form in which the exhibition of them is desired.
(Signed) G. B. AIRY.

Robert H. Scott, Esq.

The Secretary was instructed to express the thanks of the Council to Sir G. B. Airy for his readiness to tabulate the observations of fog, and to inform him that they would themselves have the requisite information extracted from the Greenwich volumes.

The Secretary exhibited a silver medal and diploma awarded to the Council by the Commissioners of the International Fishery Exhibition at Berlin (Minutes, 1879, p. 30).

With reference to the Fishery Exhibition at Norwich (Minutes, p. 122), the Secretary reported that he had been in communication with Mr. Birkbeck, and had arranged to exhibit a set of instruments, storm signals, and weather charts, and that he had, at Mr. Birkbeck's request, applied to Dr. Neumayer and Professor Buys Ballot to exhibit their respective storm-warning apparatus, in each case with a satisfactory result. He proposed to go down to Norwich for a day to arrange the case.
—Approved.

Submitted—A report by Mr. Kingston on Mr. Gaster's discussion of the Strathfield Turgiss experiments on thermometer exposure (Minutes, p. 113).

General Strachey was requested to examine the papers and report to the Council thereon.

Read—A memorandum from Mr. Baillie reporting that since the last meeting five logs had been received, one of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. J. F. Maclear (Sub.-Lieut. C. W. De la Poer Beresford).	H.M.S. "Alert"	Sept. 22—Dec. 31, 1880.	Surveying in the Southern Pacific Ocean.	1880, p. 116.

Mr. Scott was instructed to convey the best thanks of the Council to Captain Maclear and Mr. Beresford.

The Council then adjourned.

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