

APPENDIX.

ROYAL OBSERVATORY, GREENWICH.

SUMMARY AND ANALYSIS

OF THE

PHOTOGRAPHIC RECORDS OF THE
BAROMETER, 1854 to 1913.

SUMMARY AND ANALYSIS OF THE PHOTOGRAPHIC RECORDS OF THE BAROMETER, 1854 TO 1913.

Tables I, II and III contain Monthly and Yearly Mean Readings of the Photographic Barometer at every hour of the day through the ranges of years 1854 to 1873, 1874 to 1893, and 1894 to 1913 respectively.

Table IV gives the first four pairs of Fourier Coefficients derived from analysis of the separate monthly mean diurnal inequalities, the mean being given for each period of 20 years. The formula employed is

$$B_t = B + a_1 \cos t + b_1 \sin t + a_2 \cos 2t + b_2 \sin 2t + a_3 \cos 3t + b_3 \sin 3t + a_4 \cos 4t + b_4 \sin 4t$$

in which t is the time from Greenwich mean midnight converted into arc at the rate of 15° to each hour, B_t the mean value of the atmospheric pressure at the time, t for each month and B the mean value for the month or year.

Table V gives the result of a similar analysis for the whole period, taking all the years together instead of separately, and Table VI expresses Table V in terms of amplitude and phase-angle.

TABLE I.—MONTHLY MEAN READING of the BAROMETER at every HOUR of the DAY through the RANGE of YEARS 1854 to 1873.

Hour, Greenwich Mean Solar Time (Civil Reckoning).	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Yearly Means.
Midnight	in. 29.732	in. 29.835	in. 29.732	in. 29.809	in. 29.788	in. 29.836	in. 29.817	in. 29.806	in. 29.794	in. 29.729	in. 29.771	in. 29.792	in. 29.787
1 ^h a.m.	29.727	29.833	29.730	29.806	29.784	29.833	29.814	29.803	29.790	29.726	29.767	29.790	29.784
2 "	29.727	29.830	29.725	29.802	29.781	29.830	29.810	29.799	29.786	29.722	29.765	29.791	29.781
3 "	29.725	29.826	29.719	29.799	29.778	29.827	29.806	29.795	29.781	29.716	29.760	29.790	29.777
4 "	29.721	29.823	29.716	29.797	29.776	29.826	29.806	29.792	29.778	29.713	29.757	29.787	29.774
5 "	29.717	29.823	29.715	29.798	29.777	29.828	29.807	29.793	29.777	29.712	29.756	29.784	29.774
6 "	29.716	29.823	29.718	29.802	29.780	29.830	29.809	29.798	29.781	29.713	29.756	29.785	29.776
7 "	29.720	29.828	29.723	29.807	29.782	29.834	29.813	29.802	29.787	29.718	29.760	29.787	29.780
8 "	29.726	29.835	29.727	29.811	29.784	29.838	29.816	29.806	29.793	29.725	29.767	29.794	29.785
9 "	29.734	29.840	29.731	29.815	29.785	29.839	29.817	29.810	29.799	29.729	29.771	29.801	29.789
10 "	29.740	29.843	29.733	29.816	29.784	29.838	29.817	29.810	29.799	29.730	29.774	29.808	29.791
11 "	29.741	29.845	29.732	29.814	29.782	29.836	29.816	29.807	29.796	29.728	29.773	29.805	29.790
Noon	29.732	29.840	29.729	29.810	29.778	29.833	29.813	29.803	29.793	29.721	29.765	29.794	29.784
1 ^h p.m.	29.723	29.831	29.722	29.805	29.774	29.828	29.809	29.799	29.788	29.712	29.757	29.784	29.778
2 "	29.721	29.824	29.714	29.800	29.770	29.825	29.806	29.795	29.784	29.708	29.752	29.780	29.773
3 "	29.724	29.821	29.709	29.793	29.765	29.820	29.802	29.790	29.779	29.706	29.751	29.782	29.770
4 "	29.728	29.821	29.707	29.791	29.763	29.817	29.798	29.788	29.776	29.706	29.753	29.784	29.769
5 "	29.731	29.824	29.707	29.790	29.762	29.815	29.795	29.785	29.776	29.710	29.757	29.787	29.770
6 "	29.734	29.830	29.712	29.792	29.763	29.815	29.795	29.786	29.779	29.717	29.761	29.789	29.773
7 "	29.737	29.835	29.717	29.798	29.767	29.819	29.798	29.791	29.785	29.722	29.764	29.792	29.777
8 "	29.738	29.837	29.722	29.805	29.774	29.825	29.804	29.799	29.791	29.726	29.765	29.794	29.782
9 "	29.738	29.840	29.727	29.811	29.783	29.835	29.812	29.805	29.794	29.730	29.767	29.795	29.787
10 "	29.737	29.841	29.728	29.813	29.786	29.838	29.816	29.808	29.795	29.730	29.767	29.796	29.788
11 "	29.736	29.840	29.728	29.813	29.787	29.839	29.817	29.809	29.794	29.730	29.766	29.797	29.788
Means	29.729	29.832	29.722	29.804	29.777	29.829	29.809	29.799	29.787	29.720	29.763	29.791	29.780

TABLE II.—MONTHLY MEAN READINGS of the BAROMETER at every HOUR of the DAY through the RANGE of YEARS 1874 to 1893.

Hour, Greenwich Mean Solar Time (Civil Reckoning).	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Yearly Means.
Midnight	in. 29·870	in. 29·816	in. 29·788	in. 29·725	in. 29·798	in. 29·822	in. 29·785	in. 29·777	in. 29·807	in. 29·736	in. 29·742	in. 29·779	in. 29·787
1 ^h a.m.	29·865	29·812	29·786	29·720	29·794	29·818	29·781	29·772	29·804	29·733	29·735	29·775	29·783
2 "	29·865	29·809	29·781	29·715	29·789	29·813	29·776	29·768	29·799	29·728	29·732	29·774	29·779
3 "	29·863	29·803	29·775	29·711	29·786	29·810	29·773	29·764	29·794	29·722	29·727	29·772	29·775
4 "	29·858	29·799	29·772	29·708	29·784	29·810	29·772	29·761	29·790	29·720	29·724	29·767	29·772
5 "	29·855	29·799	29·772	29·709	29·787	29·813	29·775	29·763	29·791	29·720	29·723	29·765	29·773
6 "	29·855	29·800	29·775	29·715	29·792	29·817	29·779	29·767	29·797	29·722	29·724	29·766	29·776
7 "	29·860	29·803	29·781	29·720	29·796	29·822	29·784	29·772	29·803	29·730	29·729	29·770	29·781
8 "	29·868	29·811	29·787	29·723	29·799	29·825	29·787	29·776	29·808	29·737	29·736	29·777	29·786
9 "	29·874	29·815	29·791	29·724	29·798	29·825	29·786	29·778	29·813	29·741	29·740	29·784	29·789
10 "	29·879	29·818	29·793	29·725	29·798	29·824	29·785	29·778	29·813	29·742	29·744	29·790	29·791
11 "	29·879	29·821	29·792	29·722	29·795	29·823	29·784	29·776	29·809	29·741	29·743	29·786	29·789
Noon	29·869	29·816	29·789	29·718	29·792	29·819	29·787	29·773	29·806	29·735	29·736	29·778	29·784
1 ^h p.m.	29·858	29·808	29·781	29·712	29·787	29·814	29·777	29·769	29·801	29·729	29·730	29·769	29·778
2 "	29·853	29·801	29·772	29·706	29·783	29·810	29·774	29·765	29·795	29·725	29·724	29·765	29·773
3 "	29·853	29·797	29·766	29·699	29·778	29·805	29·769	29·760	29·791	29·722	29·725	29·766	29·769
4 "	29·855	29·796	29·763	29·697	29·775	29·801	29·766	29·757	29·788	29·722	29·727	29·768	29·768
5 "	29·857	29·800	29·765	29·698	29·774	29·799	29·763	29·754	29·789	29·728	29·731	29·771	29·769
6 "	29·860	29·806	29·772	29·701	29·777	29·800	29·764	29·755	29·793	29·736	29·737	29·775	29·773
7 "	29·864	29·810	29·779	29·709	29·782	29·804	29·768	29·761	29·800	29·739	29·739	29·779	29·778
8 "	29·866	29·812	29·783	29·719	29·792	29·810	29·774	29·770	29·806	29·742	29·740	29·782	29·783
9 "	29·866	29·814	29·785	29·723	29·800	29·820	29·782	29·775	29·808	29·745	29·742	29·784	29·787
10 "	29·866	29·815	29·787	29·725	29·803	29·823	29·785	29·777	29·808	29·745	29·741	29·785	29·788
11 "	29·866	29·816	29·787	29·726	29·804	29·824	29·786	29·778	29·807	29·744	29·740	29·787	29·789
Means.	29·864	29·808	29·780	29·715	29·790	29·815	29·777	29·769	29·801	29·733	29·734	29·776	29·780

TABLE III.—MONTHLY MEAN READINGS of the BAROMETER at every HOUR of the DAY through the RANGE of YEARS 1894 to 1913.

Hour, Greenwich Mean Solar Time (Civil Reckoning).	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Yearly Means.
Midnight	in. 29·869	in. 29·813	in. 29·712	in. 29·765	in. 29·819	in. 29·828	in. 29·837	in. 29·798	in. 29·877	in. 29·752	in. 29·781	in. 29·726	in. 29·798
1 ^h a.m.	29·865	29·809	29·710	29·761	29·814	29·824	29·833	29·795	29·874	29·749	29·777	29·721	29·794
2 "	29·865	29·805	29·705	29·756	29·810	29·820	29·829	29·791	29·870	29·744	29·775	29·720	29·791
3 "	29·864	29·799	29·698	29·752	29·806	29·816	29·825	29·787	29·866	29·739	29·771	29·718	29·787
4 "	29·859	29·795	29·694	29·750	29·804	29·816	29·825	29·784	29·863	29·737	29·768	29·713	29·784
5 "	29·856	29·794	29·695	29·751	29·807	29·819	29·827	29·786	29·864	29·737	29·769	29·708	29·784
6 "	29·856	29·796	29·699	29·757	29·812	29·823	29·831	29·790	29·869	29·739	29·770	29·709	29·787
7 "	29·860	29·798	29·704	29·763	29·816	29·826	29·835	29·795	29·874	29·745	29·775	29·713	29·792
8 "	29·867	29·805	29·710	29·766	29·818	29·829	29·838	29·798	29·880	29·753	29·783	29·719	29·797
9 "	29·875	29·810	29·714	29·768	29·817	29·828	29·838	29·800	29·883	29·756	29·788	29·726	29·800
10 "	29·880	29·812	29·715	29·768	29·816	29·828	29·837	29·800	29·884	29·757	29·791	29·732	29·802
11 "	29·879	29·814	29·714	29·765	29·813	29·827	29·836	29·797	29·880	29·756	29·788	29·729	29·800
Noon	29·870	29·808	29·711	29·760	29·809	29·824	29·833	29·792	29·876	29·749	29·779	29·720	29·794
1 ^h p.m.	29·859	29·799	29·704	29·756	29·805	29·819	29·829	29·788	29·870	29·742	29·772	29·713	29·788
2 "	29·854	29·791	29·698	29·750	29·800	29·816	29·825	29·784	29·864	29·738	29·766	29·709	29·783
3 "	29·855	29·789	29·693	29·743	29·795	29·811	29·821	29·780	29·858	29·734	29·765	29·711	29·780
4 "	29·857	29·788	29·691	29·739	29·791	29·807	29·817	29·776	29·855	29·734	29·766	29·714	29·778
5 "	29·860	29·792	29·694	29·740	29·789	29·805	29·814	29·774	29·855	29·738	29·770	29·717	29·779
6 "	29·864	29·799	29·700	29·744	29·792	29·807	29·814	29·775	29·858	29·745	29·775	29·720	29·783
7 "	29·867	29·804	29·707	29·751	29·797	29·810	29·818	29·780	29·865	29·749	29·778	29·724	29·788
8 "	29·869	29·806	29·711	29·761	29·805	29·817	29·825	29·789	29·872	29·752	29·780	29·727	29·793
9 "	29·871	29·810	29·714	29·766	29·815	29·828	29·836	29·796	29·876	29·755	29·782	29·729	29·798
10 "	29·871	29·811	29·715	29·767	29·818	29·831	29·839	29·798	29·877	29·755	29·782	29·729	29·799
11 "	29·871	29·810	29·714	29·768	29·818	29·831	29·841	29·799	29·877	29·754	29·782	29·729	29·799
Means.	29·865	29·802	29·705	29·757	29·808	29·820	29·829	29·790	29·870	29·746	29·776	29·720	29·791

TABLE IV.—FOURIER COEFFICIENTS from ANALYSIS in THREE 20-YEAR PERIODS.

(1) 1854 to 1873. (2) 1874 to 1893. (3) 1894 to 1913.

		a ₁	b ₁	a ₂	b ₂	a ₃	b ₃	a ₄	b ₄			a ₁	b ₁	a ₂	b ₂	a ₃	b ₃	a ₄	b ₄
Jan.	{(1)	+ 8	-50	+32	-69	- 9	+43	- 7	-23	July	{(1)	+ 7	+54	+62	-52	+12	-17	- 7	- 2
	(2)	- 2	+21	+50	-69	- 6	+51	- 4	-12		(2)	+ 6	+52	+57	-64	+15	-22	- 2	+ 2
	(3)	+ 3	+ 2	+46	-74	- 8	+47	- 7	-18		(3)	+13	+53	+64	-66	+14	-28	- 4	- 2
Feb.	{(1)	+ 5	+11	+57	-78	-15	+30	+ 6	- 2	Aug.	{(1)	+ 6	+47	+66	-71	+11	- 9	-10	+ 1
	(2)	+10	+ 1	+64	-75	-11	+28	+11	+ 1		(2)	+ 9	+38	+66	-73	+10	-14	- 7	+ 7
	(3)	+29	+12	+66	-80	-10	+33	+ 9	+ 1		(3)	+16	+58	+62	-71	+10	-13	- 9	+ 6
March	{(1)	+14	+25	+70	-78	- 6	+10	+ 2	+ 6	Sept.	{(1)	- 3	+ 2	+64	-87	+ 1	+ 5	-10	+ 7
	(2)	+ 6	+35	+72	-89	- 9	+20	+ 9	+14		(2)	- 1	+19	+56	-89	+ 3	+ 9	- 3	+15
	(3)	+17	+ 6	+63	-92	- 5	+14	+ 4	+12		(3)	+ 4	+52	+64	-87	+ 2	+ 4	- 5	+11
April	{(1)	0	+50	+66	-77	+ 1	- 4	- 6	+ 4	Oct.	{(1)	+41	+10	+50	-92	- 1	+27	- 2	0
	(2)	+30	+52	+65	-95	+ 1	- 7	0	+11		(2)	+15	-32	+40	-100	0	+20	0	+ 1
	(3)	+20	+51	+64	-97	+ 2	-11	- 3	+ 6		(3)	+12	+ 2	+45	-93	+ 1	+25	0	+ 4
May	{(1)	+36	+64	+57	-60	+ 8	-15	- 4	+ 1	Nov.	{(1)	+14	- 7	+39	-79	- 2	+34	- 1	-11
	(2)	+32	+49	+59	-86	+ 8	-26	- 4	+ 2		(2)	+13	-24	+39	-77	0	+34	+ 4	- 5
	(3)	+31	+78	+60	-74	+12	-21	- 3	+ 6		(3)	+ 1	+14	+42	-88	+ 1	+35	- 2	- 8
June	{(1)	+11	+63	+60	-60	+12	-18	- 5	- 3	Dec.	{(1)	0	+24	+38	-68	- 6	+45	- 9	-24
	(2)	+ 7	+65	+59	-73	+12	-22	- 2	- 2		(2)	+16	-15	+43	-86	- 5	+35	- 9	-22
	(3)	+16	+56	+60	-68	+10	-26	- 2	- 2		(3)	+27	-23	+41	-71	- 2	+41	- 9	-19
										Year	{(1)	+12	+24	+55	-73	+ 1	+11	- 4	- 4
											(2)	+12	+22	+56	-81	+ 2	+ 9	- 1	+ 1
											(3)	+16	+30	+56	-80	+ 2	+ 8	- 3	0

TABLE V.

	a ₁	b ₁	a ₂	b ₂	a ₃	b ₃	a ₄	b ₄
Jan.	+ 3	- 9	+43	-70	- 8	+47	- 6	-18
Feb.	+14	+ 2	+62	-80	-12	+29	+ 9	- 1
March	+13	+28	+69	-84	- 6	+17	+ 5	+12
April	+17	+48	+65	-91	+ 1	- 8	- 3	+ 8
May	+34	+65	+59	-73	+10	-20	- 4	+ 2
June	+11	+60	+60	-68	+11	-22	- 3	- 2
July	+ 9	+57	+61	-60	+14	-22	- 4	- 1
Aug.	+10	+46	+64	-73	+10	-12	- 9	+ 4
Sept.	+ 0	+28	+62	-86	+ 3	+ 7	- 5	+12
Oct.	+23	- 6	+45	-97	- 0	+24	- 0	+ 2
Nov.	+10	+ 2	+41	-77	+ 1	+38	+ 2	- 6
Dec.	+14	- 8	+40	-77	- 5	+39	-10	-22
Year	+13	+26	+56	-78	+ 2	+10	- 2	- 1

TABLE VI.

	c ₁	α ₁	c ₂	α ₂	c ₃	α ₃	c ₄	α ₄
Jan.	9	161.6	82	148.4	48	350.3	19	198.4
Feb.	14	81.8	101	142.2	31	337.5	9	263.7
March	31	24.9	109	140.6	18	340.6	13	22.6
April	51	19.5	112	144.5	8	172.8	9	339.4
May	73	27.6	94	141.1	22	153.4	4	296.6
June	61	10.4	91	138.6	25	153.4	4	236.3
July	58	9.0	86	134.5	26	147.5	4	256.0
August	47	12.3	97	138.8	16	140.2	10	294.0
Sept.	28	0.8	106	144.2	8	23.2	13	337.4
Oct.	24	104.6	107	155.1	24	359.8	2	354.0
Nov.	10	78.7	87	152.0	38	1.5	6	161.6
Dec.	16	119.7	87	152.5	39	352.7	24	204.4
Year	29	26.6	96	144.3	10	11.3	2	243.6