

APPENDIX III.

ROYAL OBSERVATORY, GREENWICH.

(a) RECOMPUTATION OF THE POSITION OF THE ECLIPTIC FROM
OBSERVATIONS OF THE SUN, IN THE YEARS 1877-1886.

(b) CORRECTIONS TO REFRACTION IN MERIDIAN OBSERVATIONS
OF STARS, SUN, MOON, AND PLANETS, FOR REVISED
READINGS OF THE EXTERIOR THERMOMETER, AND OF
THE BAROMETER, IN THE YEARS 1877-1886.

(a) RECOMPUTATION OF THE POSITION OF THE ECLIPTIC FROM OBSERVATIONS OF THE SUN, IN THE YEARS 1877 TO 1886.

In the course of the Computations for the Ten-Year Catalogue it was found necessary to revise the several "Investigations of the Position of the Ecliptic from Observations of the Sun" which are given in the Annual Volumes from 1877 to 1886. The N.P.D.'s of the Sun therein employed are not reduced to a uniform system of refraction and co-latitude, R—D correction, and thermometer correction, and the deduced quantities for correction of the position of the Ecliptic are thus not comparable *inter se*.

The N.P.D.'s have accordingly been corrected as follows :—

(1.) Corrections have been applied in the year 1877 to reduce to co-latitude $38^{\circ} 31' 21''.90$ and to Bessel's Mean Refractions of the *Tabulæ Regiomontanæ*. The co-latitude used for the daily reduction of observations in 1877 was $38^{\circ} 31' 21''.60$ and the refractions those of the *Tabulæ Regiomontanæ* diminished in the proportion of 1 : 0.99469. But in the Introduction to the Greenwich Observations for 1877, p. lxxv. it is remarked :—"From the result of investigations given in an *Addendum* to the *Introduction to the Nine-Year Catalogue* it appears that these refractions are too small, and that the mean refractions of Bessel's *Tabulæ Regiomontanæ* do not require any correction. In the year 1877, the N.P.D.'s have been corrected in the Annual Star Catalogue for reduction to Bessel's Refractions of the *Tabulæ Regiomontanæ* and to the corresponding co-latitude $38^{\circ} 31' 21''.90$. In the other sections, including the planetary results, the diminished refractions have been used, the calculations being too far advanced at the time of the alteration in the adopted refractions to allow of corrections being applied."

(2.) Corrections have been applied to the refractions in the years 1877 and 1878 on account of an index error of $+ 0^{\circ}.7$ in the exterior thermometer (as determined by comparisons with the standard on 1879 April 3). The thermometer readings from 1879 January 1 had been corrected for this index error, although it might appear from the Introduction to the Greenwich Observations for 1879, p. lxxvi., that this correction had not been applied to the observations before 1879 April 3.

(3.) Corrections to eliminate the flexure correction — $0''.12 \sin Z.D.$ applied in 1877, 1878 and in the first four months of 1879 (to April 19), have been applied to the N.P.D.'s.

(4.) Corrections have been applied to the N.P.D.'s in the years 1877–1882 to reduce them to the same system of R—D as that used in the years 1883–1886. See Introduction to Ten-Year Catalogue, p. 11.

(4) RECOMPUTATION OF THE POSITION OF THE ECLIPTIC FROM

The formulæ for R—D correction originally used in the reduction of the observations in the several years are as follows :—

Year.	Correction to Direct Observations.
1877 ...	+ 0 ^o 015 + 0 ^o 279 sin Z.D. cos ² Z.D.
1878 ...	— 0 ^o 010 + 0 ^o 639 sin Z.D. cos ² Z.D.
1879 ...	+ 0 ^o 034 + 0 ^o 386 sin Z.D. cos ² Z.D.
1880 ...	+ 0 ^o 068 + 0 ^o 538 sin Z.D. cos ² Z.D.
1881 ...	+ 0 ^o 018 + 0 ^o 550 sin Z.D.
1882 ...	+ 0 ^o 052 + 0 ^o 436 sin Z.D.
1883 ...	— 0 ^o 019 + 0 ^o 693 sin Z.D.
1884 ...	— 0 ^o 026 + 0 ^o 658 sin Z.D.
1885 ...	— 0 ^o 018 + 0 ^o 687 sin Z.D.
1886 ...	0 ^o 000 + 0 ^o 692 sin Z.D.

In view of the close accordance of the results in the years 1883–1886, after the extension of the available range of stars (consequent on the alteration in the mounting of the collimators), the mean variable term for these years + 0^o692 sin Z.D. was adopted for the whole ten years, the constant term peculiar to each year being retained.

(5.) Corrections have been applied to the refractions in all the years 1877–1886, representing the effect of substituting readings of the thermometer in the front court for those of the exterior thermometer placed near the north wall of the transit-circle room. The reason for this change is explained in the following passage of the *Report of the Astronomer Royal to the Board of Visitors* for 1887 June 4, p. (7) :—“ It has appeared doubtful whether the reading of the exterior thermometer placed near the north wall of the transit-circle room represents the true temperature of the external air as affecting the refraction for the sun and other southern objects in the day-time. A discussion of simultaneous readings of the exterior, front court, and meteorological standard thermometers, which is being made by Mr. Thackeray, shows systematic differences between the first and last at the time of observation of the sun, the mean monthly excess of the meteorological standard over the exterior thermometer for the ten years 1877–1886 ranging from + 0^o7 in December to + 2^o1 in May and August, and + 2^o6 in September. The reading of the front court thermometer (which is at a distance from any building) appears to agree closely with that of the meteorological standard, and it has been adopted, from the beginning of this year (1887), in computing refractions for the sun, moon, planets, and stars south of the zenith observed in the day-time, the exterior thermometer being still used for northern stars as probably representing better the temperature of the air on the north side of the transit-circle. The systematic differences in thermometer readings have a sensible effect on the position of the ecliptic as deduced from observations of the sun, the discordance in the results between the summer and winter solstices found when the readings of the exterior thermometer are used being rendered insensible when corrections are applied to reduce to the reading of the meteorological standard thermometer.”

OBSERVATIONS OF THE SUN, IN THE YEARS 1877 TO 1886.

(5)

The corrections applied to the refractions in the years 1877–1886 represent the effect on the refraction for the Z.D. of the sun on the mean day of each group corresponding to the monthly mean differences between the exterior and front court thermometers as found from observations made from 1887 Jan. 1 to 1888 Sept. 30, at the transit of the sun, which were the only set of observations available.

The adopted monthly mean differences were as follows :—

Month.	Front Court—Ext.	Month.	Front Court—Ext.
January ...	+ 0°5	July ...	+ 2°8
February ...	+ 1°6	August ...	+ 3°5
March ...	+ 1°5	September ...	+ 2°7
April ...	+ 2°2	October ...	+ 2°7
May ...	+ 3°5	November ...	+ 1°7
June ...	+ 4°3	December ...	+ 1°1

In the following tables are given the various corrections to N.P.D., the corrected error of N.P.D., and the deduced corrected error of E.N.P.D. These new errors have been substituted in the equations already formed in the annual volumes for each year, and the equations have been re-solved. In the year 1879 there was originally a mistake in computation, the error in E.N.P.D. for July having been taken with the wrong sign.

It will be convenient here to compare the original and corrected values of the quantities, x , y , z ; and of the correction to epoch depending on x .

Year.	x .		Correction to Epoch.		y .		z .	
	Original Value.	Corrected Value.	Original Value.	Corrected Value.	Original Value.	Corrected Value.	Original Value.	Corrected Value.
1877	+ 0°35	+ 0°26	+ 0°59	+ 0°44	— 0°25	+ 0°36	+ 1°13	— 0°15
1878	— 0°21	— 0°29	— 0°35	— 0°49	+ 0°23	+ 0°52	+ 0°31	+ 0°09
1879	+ 0°43	+ 0°15	+ 0°72	+ 0°25	0°00	+ 0°26	+ 0°42	+ 0°40
1880	— 0°46	— 0°55	— 0°77	— 0°92	— 0°08	+ 0°05	— 0°03	— 0°07
1881	— 0°11	— 0°21	— 0°19	— 0°35	+ 0°13	+ 0°06	+ 0°03	+ 0°26
1882	— 0°08	— 0°16	— 0°14	— 0°27	+ 0°48	+ 0°42	+ 0°38	+ 0°53
1883	+ 0°07	— 0°01	+ 0°12	— 0°02	+ 0°22	+ 0°10	— 0°22	+ 0°12
1884	+ 0°58	+ 0°50	+ 0°96	+ 0°84	+ 0°45	+ 0°34	— 0°50	— 0°18
1885	+ 0°01	— 0°05	+ 0°02	— 0°09	+ 0°75	+ 0°65	— 0°45	— 0°12
1886	+ 0°65	+ 0°56	+ 0°109	+ 0°94	+ 0°46	+ 0°35	— 0°13	+ 0°20
Mean ...	+ 0°12	+ 0°02	+ 0°21	+ 0°03	+ 0°24	+ 0°31	+ 0°09	+ 0°11

It will be noticed that the values of z in the years 1879 and 1882 are somewhat large. There is evidence that these discrepancies are due to changes in the staff of regular observers in those years.

OBSERVATIONS OF THE SUN, IN THE YEARS 1877 TO 1886. (7)

Equations formed by assuming the Error in Ecliptic North Polar Distance to be represented by the Formula—

$$x \times \cos \text{Sun's longitude} + y \times \sin \text{Sun's longitude} + z,$$

and altering the number of observations so as to make the assumed weights of opposite parts of the year equal :

$$\begin{aligned} & \text{Spring.....} \begin{cases} + 0.30 = + 0.4628 \times x - 0.8865 \times y + z & \text{Weight } 7 \\ - 0.37 = + 0.8746 \times x - 0.4848 \times y + z & ,, \quad 4 \\ - 0.93 = + 0.9976 \times x - 0.0692 \times y + z & ,, \quad 5 \end{cases} \\ & \text{Summer...} \begin{cases} + 0.16 = + 0.8347 \times x + 0.5507 \times y + z & ,, \quad 2 \\ + 0.21 = + 0.5913 \times x + 0.8064 \times y + z & ,, \quad 4 \\ + 0.43 = + 0.0640 \times x + 0.9980 \times y + z & ,, \quad 10 \end{cases} \\ & \text{Autumn...} \begin{cases} - 0.21 = - 0.4065 \times x + 0.9137 \times y + z & ,, \quad 7 \\ - 0.44 = - 0.8524 \times x + 0.5228 \times y + z & ,, \quad 5 \\ + 0.07 = - 0.9870 \times x + 0.1605 \times y + z & ,, \quad 4 \end{cases} \\ & \text{Winter ...} \begin{cases} - 0.24 = - 0.8893 \times x - 0.4573 \times y + z & ,, \quad 6 \\ - 0.45 = - 0.6120 \times x - 0.7908 \times y + z & ,, \quad 5 \\ - 0.73 = - 0.0213 \times x - 0.9998 \times y + z & ,, \quad 5 \end{cases} \end{aligned}$$

Equations multiplied by the Weights :

$$\begin{aligned} & \text{Spring.....} \begin{cases} + 2.10 = + 3.2396 \times x - 6.2055 \times y + 7z \\ - 1.48 = + 3.4984 \times x - 1.9392 \times y + 4z \\ - 4.65 = + 4.9880 \times x - 0.3460 \times y + 5z \end{cases} \\ & \text{Summer...} \begin{cases} + 0.32 = + 1.6694 \times x + 1.1014 \times y + 2z \\ + 0.84 = + 2.3652 \times x + 3.2256 \times y + 4z \\ + 4.30 = + 0.6400 \times x + 9.9800 \times y + 10z \end{cases} \\ & \text{Autumn...} \begin{cases} - 1.47 = - 2.8455 \times x + 6.3959 \times y + 7z \\ - 2.20 = - 4.2620 \times x + 2.6140 \times y + 5z \\ + 0.28 = - 3.9480 \times x + 0.6420 \times y + 4z \end{cases} \\ & \text{Winter ...} \begin{cases} - 1.44 = - 5.3358 \times x - 2.7438 \times y + 6z \\ - 2.25 = - 3.0600 \times x - 3.9540 \times y + 5z \\ - 3.65 = - 0.1065 \times x - 4.9990 \times y + 5z \end{cases} \end{aligned}$$

(8) RECOMPUTATION OF THE POSITION OF THE ECLIPTIC FROM

New Equations formed by adding and subtracting those above, as indicated below :

$$\begin{aligned} &\text{Spring} + \text{Summer} + \text{Autumn} + \text{Winter} \\ - 9''30 &= - 3'1572 \times x + 3'7714 \times y + 64 z \end{aligned}$$

$$\begin{aligned} &\text{Spring} + \text{Summer} - \text{Autumn} - \text{Winter} \\ + 12'16 &= + 35'9584 \times x + 7'8612 \times y \end{aligned}$$

$$\begin{aligned} &\text{Spring} - \text{Summer} - \text{Autumn} + \text{Winter} \\ - 13'44 &= + 9'6046 \times x - 44'1464 \times y \end{aligned}$$

Solution of these Equations :

$$x = + 0''26$$

$$y = + 0''36$$

$$z = - 0''15$$

The first term, taken alone, indicates that, at the first point of Aries, the error of tabular Ecliptic N.P.D. is positive, or that the assumed Ecliptic is south of the Sun's true path by $0''26$, and therefore that the right ascensions of all stars ought to be increased by $\frac{0''260}{15 \times \sin 23^\circ. 27'} = 0''044$.

The second term, taken alone, indicates that the obliquity assumed in the Nautical Almanac ought to be increased by $0''36$.

The third term indicates that the obliquity deduced from the southern solstice is greater than that deduced from the northern solstice by $0''30$; or that the mean of the observed distances from the Pole to the Ecliptic is too great by $0''15$.

OBSERVATIONS OF THE SUN, IN THE YEARS 1877 TO 1886.

(9)

Mean Day 1878.	Sun's Approx. R.A.	Sun's Approx. N.P.D.	Error in R.A.	Error in N.P.D.	Corrections to Error in N.P.D.					Corrected Error in N.P.D.	Corrected Error in Ecliptic N.P.D.	Apparent Error of Formula.
					R-D.	Flexure.	Index Error of Thermometer.	Reduction to Front Court Thermometer.	Sum.			
Jan. 18	^h 20. 2	^m 110. 30	+ 0.082	- 0.06	- 0.60	- 0.12	- 0.24	+ 0.19	- 0.77	- 0.83	- 0.58	+ 0.07
Feb. 11	21. 40	103. 58	+ 0.018	+ 0.27	- 0.52	- 0.11	- 0.17	+ 0.40	- 0.40	- 0.13	- 0.03	- 0.43
Mar. 12	23. 30	93. 15	+ 0.010	- 0.44	- 0.39	- 0.10	- 0.11	+ 0.24	- 0.36	- 0.80	- 0.68	+ 0.41
Apr. 17	1. 41	79. 28	+ 0.010	+ 0.09	- 0.21	- 0.08	- 0.07	+ 0.23	- 0.13	- 0.04	+ 0.01	+ 0.06
May 15	3. 28	71. 6	- 0.022	+ 0.16	- 0.13	- 0.06	- 0.05	+ 0.28	+ 0.04	+ 0.20	+ 0.11	+ 0.24
June 22	6. 4	66. 33	+ 0.057	+ 0.64	- 0.09	- 0.05	- 0.04	+ 0.28	+ 0.10	+ 0.74	+ 0.73	- 0.12
July 19	7. 55	69. 9	+ 0.087	+ 0.82	- 0.11	- 0.06	- 0.05	+ 0.20	- 0.02	+ 0.80	+ 0.54	+ 0.15
Aug. 15	9. 39	75. 58	+ 0.059	+ 1.21	- 0.18	- 0.07	- 0.06	+ 0.32	+ 0.01	+ 1.22	+ 0.87	- 0.23
Sept. 10	11. 14	85. 6	+ 0.053	+ 0.96	- 0.29	- 0.08	- 0.09	+ 0.37	- 0.09	+ 0.87	+ 0.51	- 0.03
Oct. 17	13. 29	99. 19	+ 0.047	+ 0.62	- 0.47	- 0.11	- 0.15	+ 0.57	- 0.16	+ 0.46	+ 0.16	- 0.02
Nov. 16	15. 27	108. 48	+ 0.124	+ 0.53	- 0.58	- 0.12	- 0.23	+ 0.55	- 0.38	+ 0.15	- 0.27	+ 0.11
Dec. 15	17. 31	113. 18	+ 0.072	+ 0.23	- 0.62	- 0.12	- 0.29	+ 0.47	- 0.56	- 0.33	- 0.38	- 0.01

GREENWICH OBSERVATIONS, 1887.

15

(10) RECOMPUTATION OF THE POSITION OF THE ECLIPTIC FROM

Equations formed by assuming the Error in Ecliptic North Polar Distance to be represented by the Formula—

$$x \times \cos \text{Sun's longitude} + y \times \sin \text{Sun's longitude} + z,$$

and altering the number of observations so as to make the assumed weights of opposite parts of the year equal :

$$\begin{array}{l}
 \text{Spring.....} \left\{ \begin{array}{l} -0.58 = +0.4746 \times x - 0.8802 \times y + z \text{ Weight } 8 \\ -0.03 = +0.7953 \times x - 0.6062 \times y + z \quad ,, \quad 10 \\ -0.68 = +0.9898 \times x - 0.1423 \times y + z \quad ,, \quad 7 \end{array} \right. \\
 \\
 \text{Summer ...} \left\{ \begin{array}{l} +0.01 = +0.8884 \times x + 0.4592 \times y + z \quad ,, \quad 9 \\ +0.11 = +0.5809 \times x + 0.8139 \times y + z \quad ,, \quad 6 \\ +0.73 = -0.0151 \times x + 0.9999 \times y + z \quad ,, \quad 10 \end{array} \right. \\
 \\
 \text{Autumn ...} \left\{ \begin{array}{l} +0.54 = -0.4480 \times x + 0.8940 \times y + z \quad ,, \quad 8 \\ +0.87 = -0.7932 \times x + 0.6090 \times y + z \quad ,, \quad 8 \\ +0.51 = -0.9767 \times x + 0.2145 \times y + z \quad ,, \quad 9 \end{array} \right. \\
 \\
 \text{Winter ...} \left\{ \begin{array}{l} +0.16 = -0.9137 \times x - 0.4065 \times y + z \quad ,, \quad 9 \\ -0.27 = -0.5873 \times x - 0.8094 \times y + z \quad ,, \quad 9 \\ -0.38 = -0.1144 \times x - 0.9934 \times y + z \quad ,, \quad 7 \end{array} \right.
 \end{array}$$

Equations multiplied by the Weights :

$$\begin{array}{l}
 \text{Spring.....} \left\{ \begin{array}{l} -4.64 = +3.7968 \times x - 7.0416 \times y + 8z \\ -0.30 = +7.9530 \times x - 6.0620 \times y + 10z \\ -4.76 = +6.9286 \times x - 0.9961 \times y + 7z \end{array} \right. \\
 \\
 \text{Summer ...} \left\{ \begin{array}{l} +0.09 = +7.9956 \times x + 4.1328 \times y + 9z \\ +0.66 = +3.4854 \times x + 4.8834 \times y + 6z \\ +7.30 = -0.1510 \times x + 9.9990 \times y + 10z \end{array} \right. \\
 \\
 \text{Autumn ...} \left\{ \begin{array}{l} +4.32 = -3.5840 \times x + 7.1520 \times y + 8z \\ +6.96 = -6.3456 \times x + 4.8720 \times y + 8z \\ +4.59 = -8.7903 \times x + 1.9305 \times y + 9z \end{array} \right. \\
 \\
 \text{Winter ...} \left\{ \begin{array}{l} +1.44 = -8.2233 \times x - 3.6585 \times y + 9z \\ -2.43 = -5.2857 \times x - 7.2846 \times y + 9z \\ -2.66 = -0.8008 \times x - 6.9538 \times y + 7z \end{array} \right.
 \end{array}$$

OBSERVATIONS OF THE SUN, IN THE YEARS 1877 TO 1886. (11)

New Equations formed by adding and subtracting those above, as indicated below :

$$\begin{aligned} &\text{Spring} + \text{Summer} + \text{Autumn} + \text{Winter} \\ &+ 10''.57 = - 3''.0213 \times x + 0''.9731 \times y + 100 z \end{aligned}$$

$$\begin{aligned} &\text{Spring} + \text{Summer} - \text{Autumn} - \text{Winter} \\ &- 13''.87 = + 63''.0381 \times x + 8''.8579 \times y \end{aligned}$$

$$\begin{aligned} &\text{Spring} - \text{Summer} - \text{Autumn} + \text{Winter} \\ &- 37''.27 = + 11''.7585 \times x - 64''.9663 \times y \end{aligned}$$

Solution of these Equations :

$$x = - 0''.29$$

$$y = + 0''.52$$

$$z = + 0''.09$$

The first term, taken alone, indicates that, at the first point of Aries, the Error of the tabular Ecliptic N.P.D. is negative, or that the assumed Ecliptic is north of the Sun's true path, by $0''.29$, and therefore that the right ascensions of all stars ought to be diminished by $\frac{0''.29}{15 \times \sin 23^\circ. 27'} = 0''.049$.

The second term, taken alone, indicates that the obliquity assumed in the Nautical Almanac ought to be increased by $0''.52$.

The third term indicates that the obliquity deduced from the southern solstice is less than that deduced from the northern solstice by $0''.18$; or that the mean of observed distances from the Pole to the Ecliptic is too small by $0''.09$.

(12)

RECOMPUTATION OF THE POSITION OF THE ECLIPTIC FROM

Mean Day 1879.	Sun's Approx. R.A.	Sun's Approx. N.P.D.	Error in R.A.	Error in N.P.D.	Corrections to Error in N.P.D.				Corrected Error in N.P.D.	Corrected Error in Ecliptic N.P.D.	Apparent Error in Formula
					R—D.	Flexure.	Reduction to Front Court Thermometer.	Sum.			
Jan. 5	h 19. 4	o 112. 38	+ 0.040	+ 1.85	— 0.63	— 0.12	+ 0.19	— 0.56	+ 1.29	+ 1.34	— 1.15
Feb. 20	22. 14	100. 56	+ 0.033	+ 1.16	— 0.54	— 0.11	+ 0.40	— 0.25	+ 0.91	+ 1.02	— 0.61
Mar. 16	23. 44	91. 46	+ 0.010	— 0.43	— 0.45	— 0.09	+ 0.24	— 0.30	— 0.73	— 0.61	+ 1.14
Apr. 3	0. 49	84. 44	+ 0.040	+ 0.75	— 0.37	— 0.08	+ 0.23	— 0.22	+ 0.53	+ 0.72	— 0.11
May 14	3. 24	71. 24	— 0.008	+ 0.90	— 0.23	.....	+ 0.28	+ 0.05	+ 0.95	+ 0.88	— 0.18
June 14	5. 30	66. 44	+ 0.017	+ 1.14	— 0.18	.....	+ 0.28	+ 0.10	+ 1.24	+ 1.25	— 0.57
July 30	8. 37	71. 26	+ 0.060	+ 1.90	— 0.24	.....	+ 0.20	— 0.04	+ 1.86	+ 1.59	— 1.07
Aug. 14	9. 35	75. 35	+ 0.051	+ 1.05	— 0.27	.....	+ 0.32	+ 0.05	+ 1.10	+ 0.80	— 0.35
Sept. 17	11. 39	87. 42	+ 0.028	— 1.20	— 0.40	.....	+ 0.37	— 0.03	— 1.23	— 1.30	+ 1.58
Oct. 12	13. 9	97. 21	+ 0.107	+ 1.04	— 0.50	.....	+ 0.57	+ 0.07	+ 1.11	+ 0.42	— 0.25
Nov. 18	15. 34	109. 13	+ 0.104	+ 1.28	— 0.61	.....	+ 0.55	— 0.06	+ 1.22	+ 0.83	— 0.73
Dec. 10	17. 8	112. 55	+ 0.095	+ 0.06	— 0.64	.....	+ 0.47	— 0.17	— 0.11	— 0.23	+ 0.35

OBSERVATIONS OF THE SUN, IN THE YEARS 1877 TO 1886. (13)

Equations formed by assuming the Error in Ecliptic North Polar Distance to be represented by the Formula—

$$x \times \cos \text{Sun's longitude} + y \times \sin \text{Sun's longitude} + z,$$

and altering the number of observations so as to make the assumed weights of opposite parts of the year equal :

$$\begin{array}{l} \text{Spring.....} \left\{ \begin{array}{l} + 1.34 = + 0.2560 \times x - 0.9667 \times y + z \text{ Weight } 4 \\ + 1.02 = + 0.8790 \times x - 0.4769 \times y + z \quad ,, \quad 4 \\ - 0.61 = + 0.9970 \times x - 0.0776 \times y + z \quad ,, \quad 11 \end{array} \right. \\ \\ \text{Summer ...} \left\{ \begin{array}{l} + 0.72 = + 0.9729 \times x + 0.2312 \times y + z \quad ,, \quad 5 \\ + 0.88 = + 0.5979 \times x + 0.8016 \times y + z \quad ,, \quad 8 \\ + 1.25 = + 0.1216 \times x + 0.9926 \times y + z \quad ,, \quad 6 \end{array} \right. \\ \\ \text{Autumn ...} \left\{ \begin{array}{l} + 1.59 = - 0.6004 \times x + 0.7997 \times y + z \quad ,, \quad 2 \\ + 0.80 = - 0.7802 \times x + 0.6255 \times y + z \quad ,, \quad 10 \\ - 1.30 = - 0.9949 \times x + 0.1011 \times y + z \quad ,, \quad 7 \end{array} \right. \\ \\ \text{Winter ...} \left\{ \begin{array}{l} + 0.42 = - 0.9467 \times x - 0.3220 \times y + z \quad ,, \quad 6 \\ + 0.83 = - 0.5618 \times x - 0.8272 \times y + z \quad ,, \quad 8 \\ - 0.23 = - 0.2062 \times x - 0.9785 \times y + z \quad ,, \quad 5 \end{array} \right. \end{array}$$

Equations multiplied by the Weights :

$$\begin{array}{l} \text{Spring.....} \left\{ \begin{array}{l} + 5.36 = + 1.0240 \times x - 3.8668 \times y + 4 z \\ + 4.08 = + 3.5160 \times x - 1.9076 \times y + 4 z \\ - 6.71 = + 10.9670 \times x - 0.8536 \times y + 11 z \end{array} \right. \\ \\ \text{Summer ...} \left\{ \begin{array}{l} + 3.60 = + 4.8545 \times x + 1.1560 \times y + 5 z \\ + 7.04 = + 4.7832 \times x + 6.4128 \times y + 8 z \\ + 7.50 = + 0.7296 \times x + 5.9556 \times y + 6 z \end{array} \right. \\ \\ \text{Autumn ...} \left\{ \begin{array}{l} + 3.18 = - 1.2008 \times x + 1.5994 \times y + 2 z \\ + 8.00 = - 7.8020 \times x + 6.2550 \times y + 10 z \\ - 9.10 = - 6.9643 \times x + 0.7077 \times y + 7 z \end{array} \right. \\ \\ \text{Winter ...} \left\{ \begin{array}{l} + 2.52 = - 5.6802 \times x - 1.9320 \times y + 6 z \\ + 6.64 = - 4.4944 \times x - 6.6176 \times y + 8 z \\ - 1.15 = - 1.0310 \times x - 4.8925 \times y + 5 z \end{array} \right. \end{array}$$

(14) RECOMPUTATION OF THE POSITION OF THE ECLIPTIC FROM

New Equations formed by adding and subtracting those above, as indicated below :

$$\begin{aligned} & \text{Spring} + \text{Summer} + \text{Autumn} + \text{Winter} \\ & + 30''.96 = - 1'.2884 \times x + 2'.0164 \times y + 76 z \end{aligned}$$

$$\begin{aligned} & \text{Spring} + \text{Summer} - \text{Autumn} - \text{Winter} \\ & + 10''.78 = + 53'.0570 \times x + 11'.7764 \times y \end{aligned}$$

$$\begin{aligned} & \text{Spring} - \text{Summer} - \text{Autumn} + \text{Winter} \\ & - 9''.48 = + 9'.8912 \times x - 42'.1566 \times y \end{aligned}$$

Solution of these Equations :

$$x = + 0'.15$$

$$y = + 0'.26$$

$$z = + 0'.40$$

The first term, taken alone, indicates that, at the first point of Aries, the Error of the tabular Ecliptic N.P.D. is positive, or that the assumed Ecliptic is south of the Sun's true path, by $0''.15$, and therefore that the right ascensions of all stars ought to be increased by $\frac{0''.15}{15 \times \sin 23^\circ. 27'} = 0''.025$.

The second term, taken alone, indicates that the obliquity assumed in the Nautical Almanac ought to be increased by $0''.26$.

The third term indicates the obliquity deduced from the southern solstice is less than that deduced from the northern solstice by $0''.80$; or that the mean of observed distances from the Pole to the Ecliptic is too small by $0''.40$.

OBSERVATIONS OF THE SUN, IN THE YEARS 1877 TO 1886.

(15)

Mean Day 1880.	Sun's Approx. R.A.	Sun's Approx. N.P.D.	Error in R.A.	Error in N.P.D.	Corrections to Error in N.P.D.			Corrected Error in Ecliptic N.P.D.	Apparent Error of Formula.
					R-D.	Reduction to Front Court Thermometer.	Sum.		
Jan. 22	^h 20. 17 ^m 109. 45	^s 109. 45	+ 0.056	- 0.24	- 0.60	+ 0.19	- 0.41	- 0.45	+ 0.05
Feb. 14	^h 21. 50 ^m 103. 7	^s 103. 7	+ 0.045	- 0.21	- 0.53	+ 0.40	- 0.13	- 0.10	- 0.45
Mar. 18	^h 23. 54 ^m 90. 41	^s 90. 41	- 0.048	- 0.65	- 0.39	+ 0.24	- 0.15	- 1.02	+ 0.40
Apr. 21	^h 1. 58 ^m 77. 55	^s 77. 55	- 0.004	- 0.06	- 0.24	+ 0.23	- 0.01	- 0.09	- 0.42
May 17	^h 3. 38 ^m 70. 31	^s 70. 31	+ 0.033	- 0.23	- 0.17	+ 0.28	+ 0.11	- 0.01	- 0.32
June 21	^h 6. 2 ^m 66. 33	^s 66. 33	+ 0.110	- 0.67	- 0.13	+ 0.28	+ 0.15	- 0.52	+ 0.50
July 17	^h 7. 49 ^m 68. 54	^s 68. 54	+ 0.032	+ 0.72	- 0.15	+ 0.20	+ 0.05	+ 0.68	- 0.47
Aug. 22	^h 10. 7 ^m 78. 25	^s 78. 25	+ 0.064	+ 0.21	- 0.24	+ 0.32	+ 0.08	- 0.06	+ 0.49
Sept. 17	^h 11. 41 ^m 88. 0	^s 88. 0	+ 0.073	+ 0.67	- 0.36	+ 0.37	+ 0.01	+ 0.19	+ 0.29
Oct. 15	^h 13. 23 ^m 98. 46	^s 98. 46	+ 0.049	+ 0.33	- 0.48	+ 0.57	+ 0.09	+ 0.12	+ 0.30
Nov. 12	^h 15. 12 ^m 107. 53	^s 107. 53	+ 0.119	+ 0.77	- 0.58	+ 0.55	- 0.03	+ 0.26	- 0.02
Dec. 12	^h 17. 20 ^m 113. 9	^s 113. 9	+ 0.193	+ 0.82	- 0.62	+ 0.47	- 0.15	+ 0.48	- 0.51

(16) RECOMPUTATION OF THE POSITION OF THE ECLIPTIC FROM

Equations formed by assuming the Error in Ecliptic North Polar Distance to be represented by the Formula—

$$x \times \cos \text{Sun's longitude} + y \times \sin \text{Sun's longitude} + z,$$

and altering the number of observations so as to make the assumed weights of opposite parts of the year equal :

$$\begin{aligned} \text{Spring.....} & \begin{cases} -0.45 = +0.5284 \times x - 0.8490 \times y + z & \text{Weight } 9 \\ -0.10 = +0.8215 \times x - 0.5702 \times y + z & ,, \quad 8 \\ -1.02 = +0.9996 \times x - 0.0297 \times y + z & ,, \quad 12 \end{cases} \\ \text{Summer ...} & \begin{cases} -0.09 = +0.8505 \times x + 0.5260 \times y + z & ,, \quad 9 \\ -0.01 = +0.5459 \times x + 0.8379 \times y + z & ,, \quad 10 \\ -0.52 = -0.0073 \times x + 1.0000 \times y + z & ,, \quad 10 \end{cases} \\ \text{Autumn ...} & \begin{cases} +0.68 = -0.4260 \times x + 0.9047 \times y + z & ,, \quad 11 \\ -0.06 = -0.8635 \times x + 0.5043 \times y + z & ,, \quad 8 \\ +0.19 = -0.9961 \times x + 0.0880 \times y + z & ,, \quad 10 \end{cases} \\ \text{Winter ...} & \begin{cases} +0.12 = -0.9238 \times x - 0.3830 \times y + z & ,, \quad 9 \\ +0.26 = -0.6359 \times x - 0.7718 \times y + z & ,, \quad 12 \\ +0.48 = -0.1579 \times x - 0.9875 \times y + z & ,, \quad 8 \end{cases} \end{aligned}$$

Equations multiplied by the Weights :

$$\begin{aligned} \text{Spring.....} & \begin{cases} -4.05 = +4.7556 \times x - 7.6410 \times y + 9z \\ -0.80 = +6.5720 \times x - 4.5616 \times y + 8z \\ -12.24 = +11.9952 \times x - 0.3564 \times y + 12z \end{cases} \\ \text{Summer ...} & \begin{cases} -0.81 = +7.6545 \times x + 4.7340 \times y + 9z \\ -0.10 = +5.4590 \times x + 8.3790 \times y + 10z \\ -5.20 = -0.0730 \times x + 10.0000 \times y + 10z \end{cases} \\ \text{Autumn ...} & \begin{cases} +7.48 = -4.6860 \times x + 9.9517 \times y + 11z \\ -0.48 = -6.9080 \times x + 4.0344 \times y + 8z \\ +1.90 = -9.9610 \times x + 0.8800 \times y + 10z \end{cases} \\ \text{Winter ...} & \begin{cases} +1.08 = -8.3142 \times x - 3.4470 \times y + 9z \\ +3.12 = -7.6308 \times x - 9.2616 \times y + 12z \\ +3.84 = -1.2632 \times x - 7.9000 \times y + 8z \end{cases} \end{aligned}$$

OBSERVATIONS OF THE SUN, IN THE YEARS 1877 TO 1886. (17)

New Equations formed by adding and subtracting those above, as indicated below :

$$\begin{aligned} &\text{Spring} + \text{Summer} + \text{Autumn} + \text{Winter} \\ - 6''.26 &= - 2.3999 \times x + 4.8115 \times y + 116 z \end{aligned}$$

$$\begin{aligned} &\text{Spring} + \text{Summer} - \text{Autumn} - \text{Winter} \\ - 40''.14 &= + 75.1265 \times x + 16.2965 \times y \end{aligned}$$

$$\begin{aligned} &\text{Spring} - \text{Summer} - \text{Autumn} + \text{Winter} \\ - 11''.84 &= + 14.6291 \times x - 71.1467 \times y \end{aligned}$$

Solution of these Equations :

$$\begin{aligned} x &= - 0.55 \\ y &= + 0.05 \\ z &= - 0.07 \end{aligned}$$

The first term, taken alone, indicates that, at the first point of Aries, the Error of the tabular Ecliptic N.P.D. is negative, or the assumed Ecliptic is north of the Sun's true path, by $0''.55$, and therefore that the right ascensions of all stars ought to be diminished by $\frac{0''.55}{15 \times \sin 23^\circ.27'} = 0^s.092$.

The second term, taken alone, indicates that the obliquity assumed in the Nautical Almanac ought to be increased by $0''.05$.

The third term indicates that the obliquity deduced from the southern solstice is greater than that deduced from the northern solstice by $0''.14$; or that the mean of observed distances from the Pole to the Ecliptic is too great by $0''.07$.

(18)

RECOMPUTATION OF THE POSITION OF THE ECLIPTIC FROM

Mean Day 1881.	Sun's Approx. R.A.	Sun's Approx. N.P.D.	Error in R.A.	Error in N.P.D.	Corrections to Error in N.P.D.			Corrected Error in N.P.D.	Corrected Error in Ecliptic N.P.D.	Apparent Error of Formula.
					R—D.	Reduction to Front Court Thermometer.	Sum.			
Jan. 13	^h 19.42 ^m	^o 111.24 [']	^s + 0.059	" + 0.38	" — 0.13	" + 0.19	" + 0.06	+ 0.44	+ 0.57	" — 0.45
Feb. 21	22.20	100.24	+ 0.060	— 1.16	— 0.13	+ 0.40	+ 0.27	— 0.89	— 0.51	+ 0.56
March 18	23.53	90.47	+ 0.027	— 0.42	— 0.11	+ 0.24	+ 0.13	— 0.29	— 0.11	+ 0.16
April 13	1.28	80.48	+ 0.002	— 0.35	— 0.10	+ 0.23	+ 0.13	— 0.22	— 0.19	+ 0.28
May 17	3.37	70.35	+ 0.042	— 0.11	— 0.07	+ 0.28	+ 0.21	+ 0.10	+ 0.24	— 0.05
June 15	5.36	66.40	+ 0.030	+ 0.37	— 0.06	+ 0.28	+ 0.22	+ 0.59	+ 0.61	— 0.31
July 12	7.27	68.4	+ 0.093	+ 1.12	— 0.07	+ 0.20	+ 0.13	+ 1.25	+ 1.05	— 0.66
Aug. 15	9.40	76.3	+ 0.049	— 0.01	— 0.09	+ 0.32	+ 0.23	+ 0.22	— 0.02	+ 0.48
Sept. 18	11.44	88.18	+ 0.041	+ 0.18	— 0.11	+ 0.37	+ 0.26	+ 0.44	+ 0.16	+ 0.31
Oct. 20	13.41	100.30	+ 0.067	+ 0.51	— 0.13	+ 0.57	+ 0.44	+ 0.95	+ 0.53	— 0.11
Nov. 18	15.36	109.21	+ 0.080	+ 0.10	— 0.13	+ 0.55	+ 0.42	+ 0.52	+ 0.24	+ 0.09
Dec. 15	17.33	113.18	+ 0.043	— 0.02	— 0.13	+ 0.47	+ 0.34	+ 0.32	+ 0.29	— 0.07

OBSERVATIONS OF THE SUN, IN THE YEARS 1877 TO 1886. (19)

Equations formed by assuming the Error in Ecliptic North Polar Distance to be represented by the Formula—

$$x \times \cos \text{Sun's longitude} + y \times \sin \text{Sun's longitude} + z,$$

and altering the number of observations so as to make the assumed weights of opposite parts of the year equal :

$$\begin{aligned}
 & \text{Spring.....} \begin{cases} + 0.57 = + 0.3990 \times x - 0.9169 \times y + z & \text{Weight } 8 \\ - 0.51 = + 0.8914 \times x - 0.4532 \times y + z & ,, \quad 5 \\ - 0.11 = + 0.9994 \times x - 0.0340 \times y + z & ,, \quad 10 \end{cases} \\
 & \text{Summer ...} \begin{cases} - 0.19 = + 0.9158 \times x + 0.4017 \times y + z & ,, \quad 7 \\ + 0.24 = + 0.5495 \times x + 0.8355 \times y + z & ,, \quad 8 \\ + 0.61 = + 0.0967 \times x + 0.9953 \times y + z & ,, \quad 8 \end{cases} \\
 & \text{Autumn ...} \begin{cases} + 1.05 = - 0.3453 \times x + 0.9385 \times y + z & ,, \quad 8 \\ - 0.02 = - 0.7958 \times x + 0.6055 \times y + z & ,, \quad 8 \\ + 0.16 = - 0.9972 \times x + 0.0753 \times y + z & ,, \quad 7 \end{cases} \\
 & \text{Winter ...} \begin{cases} + 0.53 = - 0.8890 \times x - 0.4579 \times y + z & ,, \quad 8 \\ + 0.24 = - 0.5544 \times x - 0.8323 \times y + z & ,, \quad 8 \\ + 0.29 = - 0.1094 \times x - 0.9940 \times y + z & ,, \quad 7 \end{cases}
 \end{aligned}$$

Equations multiplied by the Weights :

$$\begin{aligned}
 & \text{Spring.....} \begin{cases} + 4.56 = + 3.1920 \times x - 7.3352 \times y + 8z \\ - 2.55 = + 4.4570 \times x - 2.2660 \times y + 5z \\ - 1.10 = + 9.9940 \times x - 0.3400 \times y + 10z \end{cases} \\
 & \text{Summer ..} \begin{cases} - 1.33 = + 6.4106 \times x + 2.8119 \times y + 7z \\ + 1.92 = + 4.3960 \times x + 6.6840 \times y + 8z \\ + 4.88 = + 0.7736 \times x + 7.9624 \times y + 8z \end{cases} \\
 & \text{Autumn ...} \begin{cases} + 8.40 = - 2.7624 \times x + 7.5080 \times y + 8z \\ - 0.16 = - 6.3664 \times x + 4.8440 \times y + 8z \\ + 1.12 = - 6.9804 \times x + 0.5271 \times y + 7z \end{cases} \\
 & \text{Winter ...} \begin{cases} + 4.24 = - 7.1120 \times x - 3.6632 \times y + 8z \\ + 1.92 = - 4.4352 \times x - 6.6584 \times y + 8z \\ + 2.03 = - 0.7658 \times x - 6.9580 \times y + 7z \end{cases}
 \end{aligned}$$

C 2

(20) RECOMPUTATION OF THE POSITION OF THE ECLIPTIC FROM

New Equations formed by adding and subtracting those above, as indicated below :

$$\begin{aligned} & \text{Spring} + \text{Summer} + \text{Autumn} + \text{Winter} \\ & + 23''.93 = + 0''.8010 \times x + 3''.1166 \times y + 92 z \end{aligned}$$

$$\begin{aligned} & \text{Spring} + \text{Summer} - \text{Autumn} - \text{Winter} \\ & - 11''.17 = + 57''.6454 \times x + 11''.9176 \times y \end{aligned}$$

$$\begin{aligned} & \text{Spring} - \text{Summer} - \text{Autumn} + \text{Winter} \\ & - 5''.73 = + 9''.8590 \times x - 57''.5582 \times y \end{aligned}$$

Solution of these Equations :

$$x = - 0''.21$$

$$y = + 0''.06$$

$$z = + 0''.26$$

The first term, taken alone, indicates that, at the first point of Aries, the Error of the tabular Ecliptic N.P.D. is negative, or the assumed Ecliptic is north of the Sun's true path, by $0''.21$, and therefore that the right ascensions of all stars ought to be diminished by $\frac{0''.21}{15 \times \sin 23^\circ.27'} = 0''.035$.

The second term, taken alone, indicates that the obliquity assumed in the Nautical Almanac ought to be increased by $0''.06$.

The third term indicates that the obliquity deduced from the southern solstice is less than that deduced from the northern solstice by $0''.52$; or that the mean of observed distances from the Pole to the Ecliptic is too small by $0''.26$.

OBSERVATIONS OF THE SUN, IN THE YEARS 1877 TO 1886.

(21)

Mean Day 1882.	Sun's Approx. R.A.	Sun's Approx. N.P.D.	Error in R.A.	Error in N.P.D.	Corrections to Error in N.P.D.			Corrected Error in N.P.D.	Corrected Error in Ecliptic N.P.D.	Apparent Error of Formula.
					R—D.	Reduction to Front Court Thermometer.	Sum.			
Jan. 12	^h 19.36 ^m	^o 111.37 [']	+ 0.071	+ 0.12	— 0.24	+ 0.19	— 0.05	+ 0.07	+ 0.23	— 0.15
Feb. 18	22. 8	101.33	+ 0.016	+ 0.22	— 0.22	+ 0.40	+ 0.18	+ 0.40	+ 0.45	— 0.27
March 20	23. 59	90. 5	+ 0.004	0.00	— 0.20	+ 0.24	+ 0.04	+ 0.04	+ 0.06	+ 0.31
April 12	1. 23	81. 15	— 0.007	+ 0.19	— 0.17	+ 0.23	+ 0.06	+ 0.25	+ 0.19	+ 0.35
May 18	3. 40	70. 25	+ 0.008	+ 0.94	— 0.13	+ 0.28	+ 0.15	+ 1.09	+ 1.09	— 0.29
June 19	5. 51	66. 34	+ 0.078	+ 0.41	— 0.12	+ 0.28	+ 0.16	+ 0.57	+ 0.59	+ 0.36
July 16	7. 43	68. 39	+ 0.025	+ 1.13	— 0.13	+ 0.20	+ 0.07	+ 1.20	+ 1.12	— 0.14
Aug. 13	9. 32	75. 22	+ 0.025	+ 0.89	— 0.15	+ 0.32	+ 0.17	+ 1.06	+ 0.88	+ 0.04
Sept. 15	11. 33	87. 2	+ 0.033	+ 0.85	— 0.19	+ 0.37	+ 0.18	+ 1.03	+ 0.75	— 0.01
Oct. 18	13. 33	99. 41	+ 0.043	+ 0.28	— 0.22	+ 0.57	+ 0.35	+ 0.63	+ 0.36	+ 0.14
Nov. 16	15. 27	108. 48	+ 0.078	+ 0.26	— 0.24	+ 0.55	+ 0.31	+ 0.57	+ 0.28	0.00
Dec. 15	17. 32	113. 17	+ 0.053	— 0.05	— 0.25	+ 0.47	+ 0.22	+ 0.17	+ 0.13	0.00

(22) RECOMPUTATION OF THE POSITION OF THE ECLIPTIC FROM

Equations formed by assuming the Error in Ecliptic North Polar Distance to be represented by the Formula—

$$x \times \cos \text{Sun's longitude} + y \times \sin \text{Sun's longitude} + z,$$

and altering the number of observations so as to make the assumed weights of opposite parts of the year equal :

$$\begin{array}{lcl}
 \text{Spring.....} & \left\{ \begin{array}{l} + 0.23 = + 0.3786 \times x - 0.9255 \times y + z \\ + 0.45 = + 0.8642 \times x - 0.5033 \times y + z \\ + 0.06 = + 1.0000 \times x - 0.0038 \times y + z \end{array} \right. & \begin{array}{l} \text{Weight 6} \\ ,, 8 \\ ,, 7 \end{array} \\
 \text{Summer ...} & \left\{ \begin{array}{l} + 0.19 = + 0.9241 \times x + 0.3821 \times y + z \\ + 1.09 = + 0.5388 \times x + 0.8424 \times y + z \\ + 0.59 = + 0.0343 \times x + 0.9994 \times y + z \end{array} \right. & \begin{array}{l} ,, 6 \\ ,, 10 \\ ,, 5 \end{array} \\
 \text{Autumn ...} & \left\{ \begin{array}{l} + 1.12 = - 0.4033 \times x + 0.9151 \times y + z \\ + 0.88 = - 0.7725 \times x + 0.6350 \times y + z \\ + 0.75 = - 0.9915 \times x + 0.1302 \times y + z \end{array} \right. & \begin{array}{l} ,, 8 \\ ,, 5 \\ ,, 8 \end{array} \\
 \text{Winter ...} & \left\{ \begin{array}{l} + 0.36 = - 0.9061 \times x - 0.4229 \times y + z \\ + 0.28 = - 0.5868 \times x - 0.8097 \times y + z \\ + 0.13 = - 0.1138 \times x - 0.9935 \times y + z \end{array} \right. & \begin{array}{l} ,, 7 \\ ,, 9 \\ ,, 5 \end{array}
 \end{array}$$

Equations multiplied by the Weights :

$$\begin{array}{lcl}
 \text{Spring.....} & \left\{ \begin{array}{l} + 1.38 = + 2.2716 \times x - 5.5530 \times y + 6z \\ + 3.60 = + 6.9136 \times x - 4.0264 \times y + 8z \\ + 0.42 = + 7.0000 \times x - 0.0266 \times y + 7z \end{array} \right. \\
 \text{Summer ...} & \left\{ \begin{array}{l} + 1.14 = + 5.5446 \times x + 2.2926 \times y + 6z \\ + 10.90 = + 5.3880 \times x + 8.4240 \times y + 10z \\ + 2.95 = + 0.1715 \times x + 4.9970 \times y + 5z \end{array} \right. \\
 \text{Autumn ...} & \left\{ \begin{array}{l} + 8.96 = - 3.2264 \times x + 7.3208 \times y + 8z \\ + 4.40 = - 3.8625 \times x + 3.1750 \times y + 5z \\ + 6.00 = - 7.9320 \times x + 1.0416 \times y + 8z \end{array} \right. \\
 \text{Winter ...} & \left\{ \begin{array}{l} + 2.52 = - 6.3427 \times x - 2.9603 \times y + 7z \\ + 2.52 = - 5.2812 \times x - 7.2873 \times y + 9z \\ + 0.65 = - 0.5690 \times x - 4.9675 \times y + 5z \end{array} \right.
 \end{array}$$

OBSERVATIONS OF THE SUN, IN THE YEARS 1877 TO 1886. (23)

New Equations formed by adding and subtracting those above, as indicated below :

$$\begin{aligned} &\text{Spring} + \text{Summer} + \text{Autumn} + \text{Winter} \\ &+ 45''.44 = + 0.0755 \times x + 2.4299 \times y + 84 z \end{aligned}$$

$$\begin{aligned} &\text{Spring} + \text{Summer} - \text{Autumn} - \text{Winter} \\ &- 4''.66 = + 54.5031 \times x + 9.7853 \times y \end{aligned}$$

$$\begin{aligned} &\text{Spring} - \text{Summer} - \text{Autumn} + \text{Winter} \\ &- 23''.26 = + 7.9091 \times x - 52.0721 \times y \end{aligned}$$

Solution of these Equations :

$$\begin{aligned} x &= - 0.16 \\ y &= + 0.42 \\ z &= + 0.53 \end{aligned}$$

The first term, taken alone, indicates that, at the first point of Aries, the Error of the tabular Ecliptic N.P.D. is negative, or that the assumed Ecliptic is north of the Sun's true path, by $0''.16$, and therefore that the right ascensions of all stars ought to be diminished by $\frac{0.16}{15 \times \sin 23^\circ.27'} = 0.027$.

The second term, taken alone, indicates that the obliquity assumed in the Nautical Almanac ought to be increased by $0''.42$.

The third term indicates that the obliquity deduced from the southern solstice is less than that deduced from the northern solstice by $1''.06$; or that the mean of observed distances from the Pole to the Ecliptic is too small by $0''.53$.

(24)

RECOMPUTATION OF THE POSITION OF THE ECLIPTIC FROM

Mean Day 1883.	Sun's Approx. R.A.	Sun's Approx. N.P.D.	Error in R.A.	Error in N.P.D.	Corrections to Error in N.P.D.			Corrected Error in N.P.D.	Corrected Error in Ecliptic N.P.D.	Apparent Error of Formula.
					R-D.	Reduction to Front Court Thermometer.	Sum.			
Jan. 18	^h 20. 1 ^m	^o 110. 33 [']	+ 0.071	- 0.04	" 0.00	+ 0.19	.....	+ 0.15	+ 0.35	" - 0.32
Feb. 12	21. 43	103. 42	+ 0.035	- 0.69	0.00	+ 0.40	.....	- 0.29	- 0.10	+ 0.15
March 16	23. 44	91. 45	+ 0.037	- 0.45	0.00	+ 0.24	.....	- 0.21	+ 0.03	+ 0.07
April 14	1. 30	80. 37	+ 0.024	- 0.16	0.00	+ 0.23	.....	+ 0.07	+ 0.20	- 0.05
May 20	3. 47	70. 2	+ 0.047	- 0.36	0.00	+ 0.28	.....	- 0.08	+ 0.06	+ 0.14
June 13	5. 26	66. 47	- 0.001	+ 0.07	0.00	+ 0.28	.....	+ 0.35	+ 0.35	- 0.13
July 24	8. 14	70. 6	+ 0.061	+ 0.59	0.00	+ 0.20	.....	+ 0.79	+ 0.58	- 0.37
Aug. 19	9. 54	77. 11	+ 0.051	+ 0.34	0.00	+ 0.32	.....	+ 0.66	+ 0.37	- 0.19
Sept. 16	11. 35	87. 19	+ 0.045	- 0.37	0.00	+ 0.37	.....	0.00	- 0.27	+ 0.41
Oct. 14	13. 17	98. 7	+ 0.050	- 0.29	0.00	+ 0.57	.....	+ 0.28	- 0.02	+ 0.11
Nov. 18	15. 34	109. 13	+ 0.060	- 0.30	0.00	+ 0.55	.....	+ 0.25	+ 0.04	+ 0.00
Dec. 11	17. 13	113. 0	+ 0.061	- 0.28	0.00	+ 0.47	.....	+ 0.19	+ 0.12	- 0.10

OBSERVATIONS OF THE SUN, IN THE YEARS 1877 TO 1886. (25)

Equations formed by assuming the Error in Ecliptic North Polar Distance to be represented by the Formula—

$$x \times \cos \text{Sun's longitude} + y \times \sin \text{Sun's longitude} + z,$$

and altering the number of observations so as to make the assumed weights of opposite parts of the year equal :

$$\text{Spring.....} \begin{cases} + 0.35 = + 0.4713 \times x - 0.8820 \times y + z & \text{Weight } 6 \\ - 0.10 = + 0.8037 \times x - 0.5951 \times y + z & ,, \quad 8 \\ + 0.03 = + 0.9970 \times x - 0.0770 \times y + z & ,, \quad 10 \end{cases}$$

$$\text{Summer ...} \begin{cases} + 0.20 = + 0.9122 \times x + 0.4097 \times y + z & ,, \quad 8 \\ + 0.06 = + 0.5135 \times x + 0.8581 \times y + z & ,, \quad 10 \\ + 0.35 = + 0.1377 \times x + 0.9905 \times y + z & ,, \quad 6 \end{cases}$$

$$\text{Autumn ...} \begin{cases} + 0.58 = - 0.5180 \times x + 0.8554 \times y + z & ,, \quad 5 \\ + 0.37 = - 0.8302 \times x + 0.5575 \times y + z & ,, \quad 10 \\ - 0.27 = - 0.9931 \times x + 0.1175 \times y + z & ,, \quad 9 \end{cases}$$

$$\text{Winter ...} \begin{cases} - 0.02 = - 0.9348 \times x - 0.3551 \times y + z & ,, \quad 7 \\ + 0.04 = - 0.5616 \times x - 0.8274 \times y + z & ,, \quad 11 \\ + 0.12 = - 0.1882 \times x - 0.9821 \times y + z & ,, \quad 6 \end{cases}$$

Equations multiplied by the Weights :

$$\text{Spring.....} \begin{cases} + 2.10 = + 2.8278 \times x - 5.2920 \times y + 6z \\ - 0.80 = + 6.4296 \times x - 4.7608 \times y + 8z \\ + 0.30 = + 9.9700 \times x - 0.7700 \times y + 10z \end{cases}$$

$$\text{Summer ...} \begin{cases} + 1.60 = + 7.2976 \times x + 3.2776 \times y + 8z \\ + 0.60 = + 5.1350 \times x + 8.5810 \times y + 10z \\ + 2.10 = + 0.8262 \times x + 5.9430 \times y + 6z \end{cases}$$

$$\text{Autumn ...} \begin{cases} + 2.90 = - 2.5900 \times x + 4.2770 \times y + 5z \\ + 3.70 = - 8.3020 \times x + 5.5750 \times y + 10z \\ - 2.43 = - 8.9379 \times x + 1.0575 \times y + 9z \end{cases}$$

$$\text{Winter ...} \begin{cases} - 0.14 = - 6.5436 \times x - 2.4857 \times y + 7z \\ + 0.44 = - 6.1776 \times x - 9.1014 \times y + 11z \\ + 0.72 = - 1.1292 \times x - 5.8926 \times y + 6z \end{cases}$$

GREENWICH OBSERVATIONS, 1887.

D

(26) RECOMPUTATION OF THE POSITION OF THE ECLIPTIC FROM

New Equations formed by adding and subtracting those above, as indicated below :

$$\begin{aligned} &\text{Spring} + \text{Summer} + \text{Autumn} + \text{Winter} \\ &+ 11''.09 = - 1'.1941 \times x + 0'.4086 \times y + 96 z \end{aligned}$$

$$\begin{aligned} &\text{Spring} + \text{Summer} - \text{Autumn} - \text{Winter} \\ &+ 0''.71 = + 66'.1665 \times x + 13'.5490 \times y \end{aligned}$$

$$\begin{aligned} &\text{Spring} - \text{Summer} - \text{Autumn} + \text{Winter} \\ &- 5''.85 = 11'.9481 \times x - 57'.0136 \times y \end{aligned}$$

Solution of these Equations :

$$x = - 0''.01$$

$$y = + 0''.10$$

$$z = + 0''.12$$

The first term, taken alone, indicates that, at the first point of Aries, the Error of the tabular Ecliptic N.P.D. is negative, or that the assumed Ecliptic is north of the Sun's true path, by $0''.01$, and therefore that the right ascensions of all stars ought to be diminished by $\frac{0''.010}{15 \times \sin 23^\circ. 27'} = 0''.002$.

The second term, taken alone, indicates that the obliquity assumed in the Nautical Almanac ought to be increased by $0''.10$.

The third term indicates that the obliquity deduced from the southern solstice is less than that deduced from the northern solstice by $0''.24$; or that the mean of observed distances from the Pole to the Ecliptic is too small by $0''.12$.

OBSERVATIONS OF THE SUN, IN THE YEARS 1877 TO 1886.

(27)

Mean Day 1884.	Sun's Approx. R.A.	Sun's Approx. N.P.D.	Error in R.A.	Error in N.P.D.	Corrections to Error in N.P.D.			Corrected Error in N.P.D.	Corrected Error in Ecliptic N.P.D.	Apparent Error of Formula.
					R—D.	Reduction to Front Court Thermometer	Sum.			
Jan. 20	^h 20. 8	^m 110. 11	+ 0'026	+ 0'28	" — 0'03	+ 0'19	+ 0'16	+ 0'44	+ 0'51	" — 0'74
Feb. 17	22. 2	102. 5	+ 0'009	— 0'82	" — 0'03	+ 0'40	+ 0'37	— 0'45	— 0'37	+ 0'44
March 12	23. 32	93. 2	+ 0'021	+ 0'12	" — 0'03	+ 0'24	+ 0'21	+ 0'33	+ 0'42	— 0'15
April 15	1. 36	79. 59	+ 0'022	— 0'30	" — 0'02	+ 0'23	+ 0'21	— 0'09	+ 0'04	+ 0'38
May 18	3. 43	70. 18	+ 0'032	+ 0'15	" — 0'02	+ 0'28	+ 0'26	+ 0'41	+ 0'50	— 0'13
June 21	6. 2	66. 33	+ 0'118	— 0'08	" — 0'02	+ 0'28	+ 0'26	+ 0'18	+ 0'18	— 0'02
July 16	7. 45	68. 44	+ 0'015	— 0'04	" — 0'02	+ 0'20	+ 0'18	+ 0'14	+ 0'10	— 0'18
Aug. 16	9. 45	76. 28	+ 0'081	— 0'16	" — 0'02	+ 0'32	+ 0'30	+ 0'14	— 0'26	— 0'12
Sept. 16	11. 38	87. 37	+ 0'078	— 0'63	" — 0'03	+ 0'37	+ 0'34	— 0'29	— 0'73	+ 0'09
Oct. 18	13. 35	99. 52	+ 0'060	— 0'91	" — 0'03	+ 0'57	+ 0'54	— 0'37	— 0'66	— 0'12
Nov. 9	15. 0	107. 4	+ 0'135	— 1'00	" — 0'03	+ 0'55	+ 0'52	— 0'48	— 1'01	+ 0'24
Dec. 5	16. 50	112. 28	+ 0'120	— 1'29	" — 0'03	+ 0'47	+ 0'44	— 0'85	— 1'05	+ 0'40

D 2

(28) RECOMPUTATION OF THE POSITION OF THE ECLIPTIC FROM

Equations formed by assuming the Error in Ecliptic North Polar Distance to be represented by the Formula—

$$x \times \cos \text{Sun's longitude} + y \times \sin \text{Sun's longitude} + z,$$

and altering the number of observations so as to make the assumed weights of opposite parts of the year equal :

$$\begin{array}{lcl}
 \text{Spring.....} & \left\{ \begin{array}{l} + 0.51 = + 0.4985 \times x - 0.8669 \times y + z \\ - 0.37 = + 0.8507 \times x - 0.5257 \times y + z \\ + 0.42 = + 0.9911 \times x - 0.1331 \times y + z \end{array} \right. & \begin{array}{l} \text{Weight 6} \\ ,, 9 \\ ,, 7 \end{array} \\
 \\
 \text{Summer ...} & \left\{ \begin{array}{l} + 0.04 = + 0.8996 \times x + 0.4368 \times y + z \\ + 0.50 = + 0.5314 \times x + 0.8471 \times y + z \\ + 0.18 = - 0.0076 \times x + 1.0000 \times y + z \end{array} \right. & \begin{array}{l} ,, 8 \\ ,, 8 \\ ,, 6 \end{array} \\
 \\
 \text{Autumn ...} & \left\{ \begin{array}{l} + 0.10 = - 0.4112 \times x + 0.9115 \times y + z \\ - 0.26 = - 0.8085 \times x + 0.5885 \times y + z \\ - 0.73 = - 0.9945 \times x + 0.1045 \times y + z \end{array} \right. & \begin{array}{l} ,, 7 \\ ,, 8 \\ ,, 7 \end{array} \\
 \\
 \text{Winter ...} & \left\{ \begin{array}{l} - 0.66 = - 0.9023 \times x - 0.4310 \times y + z \\ - 1.01 = - 0.6752 \times x - 0.7377 \times y + z \\ - 1.05 = - 0.2787 \times x - 0.9604 \times y + z \end{array} \right. & \begin{array}{l} ,, 12 \\ ,, 6 \\ ,, 4 \end{array}
 \end{array}$$

Equations multiplied by the Weights :

$$\begin{array}{lcl}
 \text{Spring.....} & \left\{ \begin{array}{l} + 3.06 = + 2.9910 \times x - 5.2014 \times y + 6z \\ - 3.33 = + 7.6563 \times x - 4.7313 \times y + 9z \\ + 2.94 = + 6.9377 \times x - 0.9317 \times y + 7z \end{array} \right. & \\
 \\
 \text{Summer ...} & \left\{ \begin{array}{l} + 0.32 = + 7.1968 \times x + 3.4944 \times y + 8z \\ + 4.00 = + 4.2512 \times x + 6.7768 \times y + 8z \\ + 1.08 = - 0.0456 \times x + 6.0000 \times y + 6z \end{array} \right. & \\
 \\
 \text{Autumn ...} & \left\{ \begin{array}{l} + 0.70 = - 2.8784 \times x + 6.3805 \times y + 7z \\ - 2.08 = - 6.4680 \times x + 4.7080 \times y + 8z \\ - 5.11 = - 6.9615 \times x + 0.7315 \times y + 7z \end{array} \right. & \\
 \\
 \text{Winter ...} & \left\{ \begin{array}{l} - 7.92 = - 10.8276 \times x - 5.1720 \times y + 12z \\ - 6.06 = - 4.0512 \times x - 4.4262 \times y + 6z \\ - 4.20 = - 1.1148 \times x - 3.8416 \times y + 4z \end{array} \right. &
 \end{array}$$

OBSERVATIONS OF THE SUN, IN THE YEARS 1877 TO 1886. (29)

New Equations formed by adding and subtracting those above, as indicated below :

$$\begin{aligned} &\text{Spring} + \text{Summer} + \text{Autumn} + \text{Winter} \\ - 16''.60 &= - 3.3141 \times x + 3.7870 \times y + 88 z \end{aligned}$$

$$\begin{aligned} &\text{Spring} + \text{Summer} - \text{Autumn} - \text{Winter} \\ + 32''.74 &= + 61.2889 \times x + 7.0266 \times y \end{aligned}$$

$$\begin{aligned} &\text{Spring} - \text{Summer} - \text{Autumn} + \text{Winter} \\ - 14''.42 &= + 6.4969 \times x - 52.3954 \times y \end{aligned}$$

Solution of these Equations :

$$x = + 0.50$$

$$y = + 0.34$$

$$z = - 0.18$$

The first term, taken alone, indicates that, at the first point of Aries, the Error of the tabular Ecliptic N.P.D. is positive, or that the assumed Ecliptic is south of the Sun's true path, by $0''.50$, and therefore that the right ascensions of all stars ought to be increased by $\frac{0''.50}{15 \times \sin 23^\circ.27'} = 0''.084$.

The second term, taken alone, indicates that the obliquity assumed in the Nautical Almanac ought to be increased by $0''.34$.

The third term indicates that the obliquity deduced from the southern solstice is greater than that deduced from the northern solstice by $0''.36$; or that the mean of observed distances from the Pole to the Ecliptic is too great by $0''.18$.

(30)

RECOMPUTATION OF THE POSITION OF THE ECLIPTIC FROM

Mean Day 1885.	Sun's Approx. R.A.	Sun's Approx. N.P.D.	Error in R.A.	Error in N.P.D.	Corrections to Error in N.P.D.			Corrected Error in N.P.D.	Corrected Error in Ecliptic N.P.D.	Apparent Error in Ecliptic Formula.
					R-D.	Reduction to Front Court Thermometer.	Sum.			
Jan. 11	^h 19.33 ^m 111.44	^s 111.44	+ 0'093	- 0'47*	- 0'01	+ 0'19	+ 0'18	- 0'29*	- 0'09	" - 0'65
Feb. 15	^h 21.57 ^m 102.30	^s 102.30	- 0'040	- 0'51	0'00	+ 0'40	+ 0'40	- 0'11	- 0'30	" - 0'22
March 19	^h 23.57 ^m 90.22	^s 90.22	+ 0'028	- 1'06	0'00	+ 0'24	+ 0'24	- 0'82	- 0'58	" + 0'40
April 16	^h 1.39 ^m 79.43	^s 79.43	+ 0'047	- 0'01	0'00	+ 0'23	+ 0'23	+ 0'22	+ 0'46	" - 0'33
May 16	^h 3.34 ^m 70.48	^s 70.48	+ 0'012	- 0'17	0'00	+ 0'28	+ 0'28	+ 0'11	+ 0'15	" + 0'24
June 14	^h 5.32 ^m 66.42	^s 66.42	+ 0'067	+ 0'03	0'00	+ 0'28	+ 0'28	+ 0'31	+ 0'36	" + 0'16
July 18	^h 7.52 ^m 69.2	^s 69.2	+ 0'021	+ 0'48	0'00	+ 0'20	+ 0'20	+ 0'68	+ 0'61	" - 0'12
Aug. 16	^h 9.44 ^m 76.23	^s 76.23	+ 0'014	+ 0'29	0'00	+ 0'32	+ 0'32	+ 0'61	+ 0'51	" - 0'21
Sept. 19	^h 11.48 ^m 88.41	^s 88.41	+ 0'088	- 0'22	0'00	+ 0'37	+ 0'37	+ 0'15	- 0'39	" + 0'36
Oct. 16	^h 13.26 ^m 99.3	^s 99.3	+ 0'085	- 0'61	0'00	+ 0'37	+ 0'37	- 0'04	- 0'51	" + 0'18
Nov. 16	^h 15.28 ^m 108.52	^s 108.52	+ 0'129	- 1'18	- 0'01	+ 0'55	+ 0'54	- 0'64	- 1'07	" + 0'45
Dec. 14	^h 17.28 ^m 113.15	^s 113.15	+ 0'073	- 0'78	- 0'01	+ 0'47	+ 0'46	- 0'32	- 0'38	" - 0'38

* Corrected for a revised reading of the Exterior Thermometer on January 6. See Section (2) of this Appendix.

OBSERVATIONS OF THE SUN, IN THE YEARS 1877 TO 1886. (31)

Equations formed by assuming the Error in Ecliptic North Polar Distance to be represented by the Formula—

$$x \times \cos \text{Sun's longitude} + y \times \sin \text{Sun's longitude} + z,$$

and altering the number of observations so as to make the assumed weights of opposite parts of the year equal :

$$\begin{aligned} \text{Spring.....} & \begin{cases} -0.09 = +0.3665 \times x - 0.9304 \times y + z & \text{Weight } 3 \\ -0.30 = +0.8390 \times x - 0.5442 \times y + z & ,, \quad 8 \\ -0.58 = +0.9999 \times x - 0.0163 \times y + z & ,, \quad 9 \end{cases} \\ \\ \text{Summer ...} & \begin{cases} +0.46 = +0.8938 \times x + 0.4485 \times y + z & ,, \quad 6 \\ +0.15 = +0.5630 \times x + 0.8264 \times y + z & ,, \quad 7 \\ +0.36 = +0.1129 \times x + 0.9936 \times y + z & ,, \quad 7 \end{cases} \\ \\ \text{Autumn ...} & \begin{cases} +0.61 = -0.4376 \times x + 0.8992 \times y + z & ,, \quad 9 \\ +0.51 = -0.8061 \times x + 0.5918 \times y + z & ,, \quad 6 \\ -0.39 = -0.9983 \times x + 0.0579 \times y + z & ,, \quad 5 \end{cases} \\ \\ \text{Winter ...} & \begin{cases} -0.51 = -0.9184 \times x - 0.3955 \times y + z & ,, \quad 8 \\ -1.07 = -0.5831 \times x - 0.8124 \times y + z & ,, \quad 4 \\ -0.38 = -0.1441 \times x - 0.9896 \times y + z & ,, \quad 8 \end{cases} \end{aligned}$$

Equations multiplied by the Weights :

$$\begin{aligned} \text{Spring.....} & \begin{cases} -0.27 = +1.0995 \times x - 2.7912 \times y + 3z \\ -2.40 = +6.7120 \times x - 4.3536 \times y + 8z \\ -5.22 = +8.9991 \times x - 0.1467 \times y + 9z \end{cases} \\ \\ \text{Summer ...} & \begin{cases} +2.76 = +5.3628 \times x + 2.6910 \times y + 6z \\ +1.05 = +3.9410 \times x + 5.7848 \times y + 7z \\ +2.52 = +0.7903 \times x + 6.9552 \times y + 7z \end{cases} \\ \\ \text{Autumn ...} & \begin{cases} +5.49 = -3.9384 \times x + 8.0928 \times y + 9z \\ +3.06 = -4.8366 \times x + 3.5508 \times y + 6z \\ -1.95 = -4.9915 \times x + 0.2895 \times y + 5z \end{cases} \\ \\ \text{Winter ...} & \begin{cases} -4.08 = -7.3472 \times x - 3.1640 \times y + 8z \\ -4.28 = -2.3324 \times x - 3.2496 \times y + 4z \\ -3.04 = -1.1528 \times x - 7.9168 \times y + 8z \end{cases} \end{aligned}$$

(32) RECOMPUTATION OF THE POSITION OF THE ECLIPTIC FROM

New Equations formed by adding and subtracting those above, as indicated below :

$$\begin{aligned} &\text{Spring} + \text{Summer} + \text{Autumn} + \text{Winter} \\ - 6''.26 &= + 2.3058 \times x + 5.7422 \times y + 80 z \end{aligned}$$

$$\begin{aligned} &\text{Spring} + \text{Summer} - \text{Autumn} - \text{Winter} \\ + 3''.14 &= + 51.5036 \times x + 10.5368 \times y \end{aligned}$$

$$\begin{aligned} &\text{Spring} - \text{Summer} - \text{Autumn} + \text{Winter} \\ - 32''.32 &= + 9.6506 \times x - 48.9860 \times y \end{aligned}$$

Solution of these Equations :

$$x = - 0.05$$

$$y = + 0.65$$

$$z = - 0.12$$

The first term, taken alone, indicates that, at the first point of Aries, the Error of the tabular Ecliptic N.P.D. is negative, or that the assumed Ecliptic is north of the Sun's true path, by $0''.05$; and therefore that the right ascensions of all stars ought to be diminished by $\frac{0.05}{15 \times \sin 23^\circ.27'} = 0.009$.

The second term, taken alone, indicates that the obliquity assumed in the Nautical Almanac ought to be increased by $0''.65$.

The third term indicates that the obliquity deduced from the southern solstice is greater than that deduced from the northern solstice by $0''.24$; or that the mean of observed distances from the Pole to the Ecliptic is too great by $0''.12$.

OBSERVATIONS OF THE SUN, IN THE YEARS 1877 TO 1886.

(33)

Mean Day 1886.	Sun's Approx. R.A.	Sun's Approx. N.P.D.	Error in R.A.	Error in N.P.D.	Corrections to Error in N.P.D.			Corrected Error in N.P.D.	Corrected Error in Ecliptic N.P.D.	Apparent Error of Formula.
					R—D.	Reduction to Front Court Thermometer.	Sum.			
Jan. 17	^h 19.58	^m 110.42	+ 0.101	+ 0.21	0.00	+ 0.19	"	+ 0.40	+ 0.66	— 0.51
Feb. 14	^h 21.52	^m 102.56	+ 0.031	+ 0.32	0.00	+ 0.40	"	+ 0.72	+ 0.83	— 0.36
March 13	^h 23.34	^m 92.50	+ 0.025	— 0.57	0.00	+ 0.24	"	— 0.33	— 0.15	+ 0.86
April 17	^h 1.42	^m 79.27	+ 0.044	+ 0.01	0.00	+ 0.23	"	+ 0.24	+ 0.45	+ 0.41
May 15	^h 3.29	^m 71.5	+ 0.035	+ 0.87	0.00	+ 0.28	"	+ 1.15	+ 1.23	— 0.42
June 16	^h 5.39	^m 66.38	+ 0.072	+ 0.41	0.00	+ 0.28	"	+ 0.69	+ 0.73	— 0.13
July 12	^h 7.27	^m 68.2	+ 0.077	0.00	0.00	+ 0.20	"	+ 0.20	+ 0.04	+ 0.30
Aug. 20	^h 9.58	^m 77.36	+ 0.047	— 0.14	0.00	+ 0.32	"	+ 0.18	— 0.07	— 0.01
Sept. 15	^h 11.33	^m 87.2	+ 0.089	— 0.06	0.00	+ 0.37	"	+ 0.31	— 0.25	— 0.06
Oct. 13	^h 13.14	^m 97.51	+ 0.085	— 0.32	0.00	+ 0.57	"	+ 0.25	— 0.25	— 0.20
Nov. 17	^h 15.31	^m 109.3	+ 0.115	— 0.70	0.00	+ 0.55	"	— 0.15	— 0.54	+ 0.13
Dec. 17	^h 17.41	^m 113.23	+ 0.070	— 0.49	0.00	+ 0.47	"	— 0.02	— 0.05	— 0.14

GREENWICH OBSERVATIONS, 1887.

E

(34) RECOMPUTATION OF THE POSITION OF THE ECLIPTIC FROM

Equations formed by assuming the Error in Ecliptic North Polar Distance to be represented by the Formula—

$$x \times \cos \text{Sun's longitude} + y \times \sin \text{Sun's longitude} + z,$$

and altering the number of observations so as to make the assumed weights of opposite parts of the year equal :

$$\begin{array}{l}
 \text{Spring.....} \left\{ \begin{array}{l} + 0.66 = + 0.4597 \times x - 0.8881 \times y + z \text{ Weight } 10 \\ + 0.83 = + 0.8268 \times x - 0.5626 \times y + z \quad ,, \quad 8 \\ - 0.15 = + 0.9922 \times x - 0.1245 \times y + z \quad ,, \quad 12 \end{array} \right. \\
 \\
 \text{Summer...} \left\{ \begin{array}{l} + 0.45 = + 0.8879 \times x + 0.4599 \times y + z \quad ,, \quad 8 \\ + 1.23 = + 0.5802 \times x + 0.8145 \times y + z \quad ,, \quad 9 \\ + 0.73 = + 0.0837 \times x + 0.9965 \times y + z \quad ,, \quad 13 \end{array} \right. \\
 \\
 \text{Autumn...} \left\{ \begin{array}{l} + 0.04 = - 0.3420 \times x + 0.9397 \times y + z \quad ,, \quad 10 \\ - 0.07 = - 0.8418 \times x + 0.5398 \times y + z \quad ,, \quad 10 \\ - 0.25 = - 0.9916 \times x + 0.1297 \times y + z \quad ,, \quad 10 \end{array} \right. \\
 \\
 \text{Winter ...} \left\{ \begin{array}{l} - 0.25 = - 0.9392 \times x - 0.3434 \times y + z \quad ,, \quad 10 \\ - 0.54 = - 0.5721 \times x - 0.8202 \times y + z \quad ,, \quad 10 \\ - 0.05 = - 0.0779 \times x - 0.9970 \times y + z \quad ,, \quad 10 \end{array} \right.
 \end{array}$$

Equations multiplied by the Weights :

$$\begin{array}{l}
 \text{Spring.....} \left\{ \begin{array}{l} + 6.60 = + 4.5970 \times x - 8.8810 \times y + 10 z \\ + 6.64 = + 6.6144 \times x - 4.5008 \times y + 8 z \\ - 1.80 = + 11.9064 \times x - 1.4940 \times y + 12 z \end{array} \right. \\
 \\
 \text{Summer...} \left\{ \begin{array}{l} + 3.60 = + 7.1032 \times x + 3.6792 \times y + 8 z \\ + 11.07 = + 5.2218 \times x + 7.3305 \times y + 9 z \\ + 9.49 = + 1.0881 \times x + 12.9545 \times y + 13 z \end{array} \right. \\
 \\
 \text{Autumn...} \left\{ \begin{array}{l} + 0.40 = - 3.4200 \times x + 9.3970 \times y + 10 z \\ - 0.70 = - 8.4180 \times x + 5.3980 \times y + 10 z \\ - 2.50 = - 9.9160 \times x + 1.2970 \times y + 10 z \end{array} \right. \\
 \\
 \text{Winter ...} \left\{ \begin{array}{l} - 2.50 = - 9.3920 \times x - 3.4340 \times y + 10 z \\ - 5.40 = - 5.7210 \times x - 8.2020 \times y + 10 z \\ - 0.50 = - 0.7790 \times x - 9.9700 \times y + 10 z \end{array} \right.
 \end{array}$$

OBSERVATIONS OF THE SUN, IN THE YEARS 1877 TO 1886. (35)

New Equations formed by adding and subtracting those above, as indicated below :

$$\begin{aligned} &\text{Spring} + \text{Summer} + \text{Autumn} + \text{Winter} \\ + 24''.40 &= - 1''.1151 \times x + 3''.5744 \times y + 120 z \end{aligned}$$

$$\begin{aligned} &\text{Spring} + \text{Summer} - \text{Autumn} - \text{Winter} \\ + 46''.80 &= + 74''.1769 \times x + 14''.6024 \times y \end{aligned}$$

$$\begin{aligned} &\text{Spring} - \text{Summer} - \text{Autumn} + \text{Winter} \\ - 18''.32 &= + 15''.5667 \times x - 76''.5380 \times y \end{aligned}$$

Solution of these Equations :

$$x = + 0''.56$$

$$y = + 0''.35$$

$$z = + 0''.20$$

The first term, taken alone, indicates that, at the first point of Aries, the Error of the tabular Ecliptic N.P.D. is positive, or that the assumed Ecliptic is south of the Sun's true path, by $0''.56$, and therefore that the right ascensions of all stars ought to be increased by $\frac{0''.56}{15 \times \sin 23^\circ.27'} = 0''.094$.

The second term, taken alone, indicates that the obliquity assumed in the Nautical Almanac ought to be increased by $0''.35$.

The third term indicates that the obliquity deduced from the southern solstice is less than that deduced from the northern solstice by $0''.40$; or that the mean of observed distances from the Pole to the Ecliptic is too small by $0''.20$.

(b) CORRECTIONS TO REFRACTION IN MERIDIAN OBSERVATIONS FOR REVISED
READINGS OF THE EXTERIOR THERMOMETER AND OF THE BAROMETER,
IN THE YEARS 1877 TO 1886.

In examining the computations for the Ten-Year Catalogue several instances were found in which the exterior thermometer (or sometimes the barometer) was not read sufficiently near the observation of a star, and the usual practice of using the reading immediately preceding each observation did not therefore give a sufficiently accurate value of the refraction for the time of observation. A careful list has been made of these cases, and the reading of the thermometer or barometer has been inferred from comparison of neighbouring readings with the meteorological register; or, in some cases, on referring to the original observers' books, an actual reading of the exterior thermometer was found, which had hitherto been overlooked. With the new readings the refractions were recalculated in the original zenith distance computations. The following is a list of all such cases of corrections to the refraction of stars in the years 1877-1885 arranged in order of Right Ascension. The year 1886 is treated separately at the end.

Column 1 gives the date.

Column 2 the Star's name.

Column 3 the approximate right ascension for 1880.0.

Column 4 the reading of the thermometer used in the original computation of refraction.

Column 5 the correct reading, either as found from the original books, or as inferred from the meteorological register. When it appeared that the new reading did not differ more than $0^{\circ}.5$ from the old, the case was not investigated further.

Column 6 the approximate refraction, in seconds of arc.

Column 7 the correction to refraction, *i.e.*, the difference between the original refractions and those recomputed with the corrected thermometer readings.

All corrections less than $0''.10$ have been neglected.

These corrections have been applied in forming the Mean N.P.D's. in the Ten-Year Catalogue, with the exception of a few which were inadvertently neglected and which have been incorporated in the errata prefixed to the Ten-Year Catalogue.

THE EXTERIOR THERMOMETER, IN THE YEARS 1877 TO 1886.

(37)

CORRECTIONS TO REFRACTION OF STARS FOR REVISED READINGS OF EXTERIOR
THERMOMETER AND BAROMETER IN THE YEARS 1877 TO 1885.

Date.	Star's Name.	R.A. 1880°0.	Thermometer.		Refraction.	Correction to Refraction.
			Used.	Corrected.		
		h m s	°	°	"	"
1884 April 22	10 Cassiopeiæ S.P.....	0. 0. 13	36.7	36.0	127	+ 0.19
1877 Nov. 16	α Andromedæ... ..R.	0. 2. 11	48.9	44.1	25	+ 0.24
	D.		"	"	"	"
1882 April 8	β Cassiopeiæ S.P.	0. 2. 47	41.5	40.7	162	+ 0.26
1882 May 26	"		62.8	57.8	154	+ 1.54
1885 Dec. 8	γ Pegasi	0. 7. 3	31.9	30.6	45	+ 0.13
1884 May 20	Bradley 6 S.P.	0. 9. 27	53.1	52.1	75	+ 0.16
1884 April 22	Piazzi 0. 25 S.P.....R.	0. 10. 31	36.7	35.6	144	+ 0.33
	D.		"	"	"	"
1884 April 22	Bradley 23 S.P.	0. 18. 37	36.7	35.3	236	+ 0.69
1884 Sept. 29	44 Piscium	0. 19. 15	52.9	51.8	69	+ 0.16
	D.		"	"	"	"
1884 May 13	Bradley 34 S.P. ....R.	0. 23. 15	55.9	54.9	73	+ 0.15
	D.		"	"	"	"
1882 Sept. 12	12 Ceti.....	0. 23. 55	48.8	47.1	85	+ 0.30
1885 May 2	Groombridge 96 S.P.	0. 28. 49	45.9	45.2	211	+ 0.30
1885 May 2	Bradley 49 S.P.	0. 29. 28	45.9	45.2	212	+ 0.30
1880 June 18	α Cassiopeiæ S.P.	0. 33. 42	66.5	65.0	177	+ 0.53
1884 April 9	Groombridge 120 S.P. ....R.	0. 34. 55	40.8	39.9	115	+ 0.22
	D.		"	"	"	"
1884 Oct. 28	δ Piscium	0. 42. 27	46.7	43.3	57	+ 0.40
1884 April 9	Bradley 82 S.P.	0. 43. 27	40.8	39.6	125	+ 0.31
1879 Nov. 7	W. B. 0. 775	0. 45. 45	41.9	41.0	67	+ 0.13
1879 June 10	γ Cassiopeiæ S.P.	0. 49. 29	60.1	59.2	143	+ 0.26
1881 April 9	"		36.7	35.9	150	+ 0.26
1883 May 17	Groombridge 215 S.P.	0. 56. 14	53.9	53.1	82	+ 0.13
1884 April 22	Bradley 109 S.P.	0. 59. 1	34.8	34.1	69	+ 0.11
1883 May 23	32 Cassiopeiæ S.P.....	1. 3. 53	63.3	65.3	116	- 0.46
1885 Sept. 5	33 Ceti.....	1. 4. 23	53.0	52.3	67	+ 0.10
1884 Nov. 20	37 Ceti.....	1. 8. 21	40.2	39.4	102	+ 0.17
1882 April 6	α Ursæ Minoris S.P.....	1. 14. 18	42.6	41.3	50	+ 0.13
1877 Sept. 29	Polaris.....	1. 14. 45	48.7	46.4	44	+ 0.21
1877 Nov. 14	"		42.4	44.0	45	- 0.15
	R.		"	"	"	"
	D.		"	"	"	"
1879 Nov. 18	"		44.9	43.6	45	+ 0.12
1877 Nov. 7	Polaris S.P.....		48.4	50.3	48	- 0.14
1878 April 23	"		52.9	49.1	47	+ 0.30
1879 June 10	"		60.1	58.0	48	+ 0.20
1880 June 8	"		54.8	51.8	48	+ 0.29
1880 Sept. 22	"		64.1	66.6	47	- 0.23
1881 May 6	"		54.3	53.1	49	+ 0.12
	R.		"	"	"	"
	D.		"	"	"	"

β Cassiopeiæ S.P. (1882 May 26). It is assumed that an error of 5° was made in the reading of the thermometer.

γ Pegasi. The automatic register having failed on this day, the reading of the thermometer has been interpolated from neighbouring readings.

32 Cassiopeiæ S.P. The correction for index error of the thermometer had been erroneously applied.

Polaris S.P. (1877 November 7). The reading of the barometer (29ⁱⁿ.74) has also been supplied from the meteorological register, the reading previously used being 29ⁱⁿ.71.

CORRECTIONS TO REFRACTION OF STARS, &c.—*continued*.

Date.	Star's Name.	R.A. 1880.0.	Thermometer.		Refraction.	Correction to Refraction.
			Used.	Corrected.		
		h m s	°	°	"	"
1882 April 6	Polaris S.P.	1. 14. 45	42.6	41.3	50	+ 0.13
1882 April 14	"		44.9	43.8	48	+ 0.11
"	"		"	"	"	"
1883 April 16	"		42.9	41.5	49	+ 0.14
1883 June 4	"		61.6	60.3	47	+ 0.13
1883 Sept. 14	"		65.2	69.0	47	- 0.38
1883 Oct. 17	"		50.7	52.0	48	- 0.13
1884 April 21	"		34.8	33.8	50	+ 0.17
1884 June 13	"		67.1	65.6	47	+ 0.14
1881 May 7	Lalande 2651-2 S.P.	1. 22. 30	55.8	51.7	115	+ 0.95
1883 May 21	40 Cassiopeiæ S.P.	1. 28. 57	53.5	52.3	86	+ 0.22
1883 Dec. 6	Piazzi I. 131	1. 31. 38	30.4	30.8	111	- 0.11
1881 May 7	ω Cassiopeiæ S.P.	1. 33. 28	55.8	51.4	106	+ 0.95
1881 May 11	"		40.8	39.6	108	+ 0.26
1883 Nov. 12	W. B. I. 664	1. 36. 39	35.7	34.8	87	+ 0.16
1882 Oct. 30	τ Ceti	1. 38. 30	48.6	47.5	142	+ 0.42
"	"		"	"	"	"
1882 Feb. 1	ο Piscium	1. 39. 3	33.8	32.9	57	+ 0.11
1883 Dec. 14	"		45.1	43.5	53	+ 0.18
1881 May 11	ε Cassiopeiæ S.P.	1. 45. 46	40.8	39.6	131	+ 0.32
1879 Nov. 14	ν Ceti	1. 54. 21	32.2	31.7	198	+ 0.34
1884 Nov. 7	α Arietis	2. 0. 25	46.8	44.6	32	+ 0.15
"	"		"	"	"	"
1883 June 6	Piazzi I. 256 S.P.	2. 2. 5	50.8	50.3	214	+ 0.21
1883 June 6	Lalande 3987 S.P.	2. 5. 55	50.8	50.3	105	+ 0.11
1884 May 24	"		55.9	55.3	105	+ 0.13
1885 May 15	"		47.7	47.2	106	+ 0.13
"	"		"	"	"	"
1881 May 12	ι Persei S.P.	2. 14. 0	46.0	44.8	193	+ 0.47
1885 Nov. 2	ξ Arietis	2. 18. 23	48.2	46.3	51	+ 0.20
"	"		"	"	"	"
1881 May 7	Bradley 332 S.P.	2. 19. 12	51.2	49.8	109	+ 0.31
1883 June 4	"		58.3	57.5	105	+ 0.16
"	"		"	"	"	"
1881 May 7	7-Year Cat. (1860) No. 156 S.P.	2. 19. 13	51.2	49.8	109	+ 0.31
1883 Oct. 13	Piazzi II. 122	2. 28. 35	51.0	47.7	322	+ 2.12
1883 June 6	Bradley 353 S.P.	2. 30. 48	50.8	49.3	90	+ 0.28
1883 Oct. 13	ε Ceti	2. 33. 46	51.0	47.7	117	+ 0.80

Polaris S.P. (1883 June 4). The correction for index error of the thermometer had been erroneously applied.
 Polaris S.P. (1883 July 2). The reading of the barometer (29ⁱⁿ.91) has been supplied from the meteorological register, the reading previously used being 29ⁱⁿ.99: the consequent correction to refraction is - 0.13.
 Polaris S.P. (1883 September 14). The reading of the barometer (29ⁱⁿ.97) has also been supplied from the meteorological register, the reading previously used being 29ⁱⁿ.99.
 Lalande 2651-2 S.P. It is assumed that the reading of the interior thermometer was entered by mistake.
 ω Cassiopeiæ S.P. It is assumed that the reading of the interior thermometer was entered by mistake.
 ν Ceti. The reading of the barometer (30ⁱⁿ.22) has also been supplied from the meteorological register, the reading previously used being (30ⁱⁿ.20).
 Piazzi I. 256 S.P., Lalande 3987 S.P. (1883 June 6). The automatic register having failed on this day, the reading of the thermometer has been interpolated from neighbouring readings.
 Piazzi II. 122. It is assumed that the reading of the interior thermometer was entered by mistake.
 Bradley 353 S.P. The automatic register having failed on these days, the readings of the thermometer have been interpolated from neighbouring observations.

THE EXTERIOR THERMOMETER, IN THE YEARS 1877 TO 1886. (39)

CORRECTIONS TO REFRACTION OF STARS, &c.—continued.

Date.	Star's Name.	R.A. 1880°.	Thermometer.		Refraction.	Correction to Refraction.
			Used.	Corrected.		
		h m s	°	°	"	"
1880 Nov. 2	γ^2 Ceti	2. 37. 5	34'1	33'4	68	+ 0'10
1884 Nov. 7	Piazzi II. 200	2. 44. 42	44'3	43'8	317	+ 0'33
1884 June 2	Lalande 5273-4 S.P. ....R.	2. 46. 27	52'7	51'4	136	+ 0'37
	D.		"	"	"	"
1883 Oct. 13	ρ^2 Arietis	2. 49. 4	51'0	47'7	39	+ 0'26
1883 May 7	Lalande 5579 S.P. ....R.	2. 57. 17	43'7	43'1	123	+ 0'15
	D.		"	"	"	"
1879 Jan. 15	W. B. II. 1033	2. 59. 48	39'9	38'6	47	+ 0'12
1881 May 23	ϵ Persei S.P.	3. 0. 25	54'1	53'1	297	+ 0'66
1883 May 31	"		53'0	50'9	297	+ 1'27
1883 May 23	Groombridge 612 S.P. ....R.	3. 2. 18	61'4	59'7	81	+ 0'28
	D.		"	"	"	"
1885 Nov. 30	95 Ceti.....	3. 12. 14	46'8	46'0	77	+ 0'13
1884 July 1	Piazzi III. 27 S.P.	3. 14. 16	64'8	64'1	118	+ 0'16
1884 July 1	Bradley 459 S.P.	3. 17. 54	64'8	64'1	87	+ 0'12
1884 May 8	Bradley 471 S.P. ....R.	3. 22. 5	50'8	50'1	85	+ 0'12
	D.		"	"	"	"
1883 Dec. 3	τ^5 Eridani	3. 28. 29	49'9	49'3	190	+ 0'24
1884 Nov. 7	Lalande 6661	3. 30. 15	43'8	43'0	115	+ 0'19
1883 May 24	Piazzi III. 94 S.P. ....R.	3. 31. 45	55'7	54'5	126	+ 0'31
	D.		"	"	"	"
1885 June 26	γ Camelopardi S.P.	3. 37. 43	53'1	52'3	91	+ 0'15
1881 Feb. 16	Piazzi III. 177	3. 46. 51	45'6	42'0	12	+ 0'13
	"		"	"	"	"
1884 June 27	"		61'9	61'2	126	+ 0'18
1885 May 20	Piazzi III. 160 S.P. ....R.	3. 50. 2	43'1	42'1	64	+ 0'13
	D.		"	"	"	"
1881 Jan. 4	γ^1 Eridani	3. 52. 26	37'6	36'6	130	+ 0'27
1881 Feb. 16	Lalande 7284	3. 54. 1	45'6	41'8	18	+ 0'18
1882 July 15	Lalande 7284 S.P.		61'6	60'3	97	+ 0'25
1884 May 29	Groombridge 771 S.P.	3. 55. 26	44'8	43'8	85	+ 0'17
1881 Jan. 4	Piazzi III. 238	3. 57. 53	37'6	36'2	38	+ 0'21
1885 Feb. 7	W. B. III. 1120	3. 58. 46	43'8	43'4	122	+ 0'10
1885 May 20	Groombridge 750 S.P. ....R.	3. 59. 23	43'1	42'1	54	+ 0'11
	D.		"	"	"	"
1881 June 22	ϵ Persei S.P.	3. 59. 57	55'3	54'6	347	+ 0'49
1881 Jan. 4	ω^1 Tauri	4. 2. 11	37'6	36'2	38	+ 0'11
1882 July 15	Groombridge 774 S.P.	4. 3. 45	61'6	59'9	57	+ 0'19
1877 May 15	Lalande 7721-2 S.P.	4. 5. 11	50'5	47'7	169	+ 0'98
1882 June 23	Groombridge 779 S.P.	4. 6. 14	54'3	53'0	64	+ 0'16
1884 July 1	Piazzi III. 260 S.P. ....R.	4. 6. 20	63'7	62'4	133	+ 0'34
	D.		"	"	"	"
1878 Jan. 10	σ^2 Eridani	4. 9. 45	36'4	34'4	101	+ 0'42
1881 Jan. 4	"		37'6	36'2	101	+ 0'30

ϵ Ceti, ρ^2 Arietis. It is assumed that the reading of the interior thermometer was entered by mistake.
W. B. II. 1033. The automatic register having failed on these days, the readings of the thermometer have been interpolated from neighbouring observations.
Lalande 5579 S.P., Piazzi III. 94 S.P., ϵ Persei S.P. The thermometer was read by the observer as above, but the reading had been accidentally omitted from the computation sheets.

CORRECTIONS TO REFRACTION OF STARS, &c.—*continued*.

Date.	Star's Name.	R.A. 1880.0.	Thermometer.		Refraction.	Correction to Refraction.
			Used.	Corrected.		
		h m s	°	°	'	'
1884 June 23	Piazzi IV. 22 S.P.	4. 11. 22	58.3	57.5	141	+ 0.23
1885 Feb. 7	Lalande 8154 .....R.	4. 14. 45	43.8	43.2	93	+ 0.12
	D.		"	"	"	"
1878 Jan. 10	κ^2 Tauri .....R.	4. 18. 16	36.4	34.1	34	+ 0.17
1882 Dec. 6	53 Eridani .....R.	4. 32. 41	29.9	29.4	131	+ 0.15
1883 June 16	Piazzi IV. 112 S.P. ....R.	4. 32. 43	48.4	47.1	76	+ 0.21
	D.		"	"	"	"
1885 June 13	"R.		56.7	55.7	76	+ 0.15
1878 Jan. 17	W. B. IV. 936 .....R.	4. 44. 34	42.2	41.2	72	+ 0.15
1882 Dec. 6	60 Eridani .....R.	4. 44. 47	29.9	29.1	143	+ 0.25
1882 June 27	Piazzi IV. 191 S.P. ....R.	4. 47. 8	60.1	59.2	80	+ 0.14
	D.		"	"	"	"
1883 June 16	"R.		48.4	46.9	81	+ 0.25
1885 June 26	Piazzi IV. 207 S.P. ....R.	4. 49. 33	50.6	49.7	82	+ 0.15
	D.		"	"	"	"
1882 Feb. 1	Piazzi IV. 289 .....R.	4. 57. 17	29.7	28.6	280	+ 0.66
1879 Mar. 6	ϵ Leporis .....R.	5. 0. 23	48.9	47.7	201	+ 0.49
1879 Dec. 1	103 Tauri .....R.	5. 0. 48	25.5	24.0	31	+ 0.10
	D.		"	"	"	"
1885 June 30	14 Camelopardi S.P. ....R.	5. 2. 22	54.7	53.5	128	+ 0.31
	D.		"	"	"	"
1878 Dec. 14	ρ Orionis .....R.	5. 7. 1	25.9	24.4	68	+ 0.21
1879 Mar. 6	Rigel .....R.	5. 8. 46	48.9	47.7	100	+ 0.25
1884 Aug. 12	15 Camelopardi S.P. ....R.	5. 9. 7	69.0	68.1	156	+ 0.28
1884 Aug. 7	Piazzi IV. 311 S.P. ....R.	5. 10. 0	70.1	69.1	67	+ 0.13
1878 Dec. 14	Bradley 750 .....R.	5. 15. 24	25.9	24.0	76	+ 0.31
1878 Dec. 14	σ Orionis .....R.	5. 15. 38	25.9	24.0	76	+ 0.31
1877 Dec. 6	8 Leporis .....R.	5. 18. 1	45.3	43.8	126	+ 0.51
1882 May 16	17 Camelopardi S.P. ....R.	5. 18. 50	38.5	38.1	132	+ 0.12
1885 July 6	"R.		64.9	63.3	124	+ 0.39
	D.		"	"	"	"
1885 Dec. 28	Lalande 10182 .....R.	5. 19. 8	40.0	39.1	148	+ 0.28
1883 Dec. 15	W. B. V. 413 .....R.	5. 19. 21	40.8	39.7	108	+ 0.24
1879 Dec. 1	Groombridge 966 .....R.	5. 23. 41	25.5	23.2	26	+ 0.13
	D.		"	"	"	"
1884 July 9	Groombridge 966 S.P. ....R.		65.5	64.3	75	+ 0.18
1882 May 16	19 Camelopardi S.P. ....R.	5. 25. 38	38.5	38.0	125	+ 0.13
1884 Aug. 1	"R.		64.9	64.2	117	+ 0.16
1879 Mar. 3	α Leporis .....R.	5. 27. 26	42.9	41.5	155	+ 0.46
1885 Mar. 11	"R.		40.0	39.6	158	+ 0.13
1884 Aug. 1	22 Camelopardi S.P. ....R.	5. 28. 57	64.9	64.0	174	+ 0.31
1883 July 26	23 Camelopardi S.P. ....R.	5. 33. 6	58.3	57.0	135	+ 0.34
1885 July 6	25 Camelopardi S.P. ....R.	5. 34. 3	64.9	62.5	191	+ 0.92
1879 Mar. 3	ζ Orionis .....R.	5. 34. 42	42.9	41.5	79	+ 0.23

ρ Orionis, Bradley 750, and σ Orionis. The automatic register having failed on this day, the readings of the thermometer have been interpolated from neighbouring readings.

8 Leporis. The reading of the barometer (29ⁱⁿ.56) has also been supplied from the meteorological register, the reading previously used being 29ⁱⁿ.53.

THE EXTERIOR THERMOMETER, IN THE YEARS 1877 TO 1886. (41)

CORRECTIONS TO REFRACTION OF STARS, &c.—continued.

Date.	Star's Name.	R.A. 1880°.	Thermometer.		Refraction.	Correction to Refraction.
			Used.	Corrected.		
		h m s	°	°	"	"
1885 Mar. 11	Piazzi V. 220	5. 40. 24	40°0	39°0	72	+ 0°16
1883 July 26	ξ Aurigæ S.P.	5. 44. 47	58°3	57°0	183	+ 0°48
1881 June 29	Piazzi V. 246 S.P.	5. 48. 22	56°9	55°7	106	+ 0°26
1884 July 9	37 Camelopardi S.P.	5. 59. 24	64°1	63°3	149	+ 0°24
1885 Dec. 11	Piazzi V. 342	6. 1. 32	25°6	25°2	220	+ 0°19
1881 Mar. 11	3 Geminorum.....	6. 2. 27	52°0	50°9	31	+ 0°07
1882 Aug. 8	40 Camelopardi S.P.	6. 4. 54	58°6	56°3	144	+ 0°66
1882 June 27	Piazzi V. 335 S.P.	6. 5. 37	58°5	56°6	96	+ 0°37
1884 Aug. 4	Piazzi V. 337 S.P.	6. 6. 17	62°3	61°1	94	+ 0°23
1884 July 5	3 Lyncis S.P.	6. 11. 1	61°8	60°1	131	+ 0°45
1884 Aug. 1	"		63°7	62°9	130	+ 0°22
1884 Aug. 16	46 Aurigæ S.P.	6. 15. 39	65°4	65°1	285	+ 0°17
1883 June 30	Piazzi VI. 61 S.P.	6. 16. 8	59°5	58°4	156	+ 0°34
	5 Lyncis S.P.	6. 16. 8	"	"	"	"
1882 July 26	Groombridge 1151 S.P.....R.	6. 21. 49	56°9	55°6	70	+ 0°19
	"		"	"	"	"
1880 Mar. 18	10 Monocerotis	6. 22. 2	41°9	40°9	89	+ 0°18
1880 Mar. 19	"		41°1	40°4	89	+ 0°13
1883 July 26	Radcliffe 1742 S.P. ....R.	6. 22. 45	56°3	55°2	81	+ 0°18
	"		"	"	"	"
1884 Aug. 5	"		59°4	58°0	81	+ 0°23
	"		"	"	"	"
1884 Mar. 10	Piazzi VI. 154.....R.	6. 27. 9	40°8	40°0	111	+ 0°19
	"		"	"	"	"
1885 Jan. 20	"		27°8	27°0	117	+ 0°20
1880 Mar. 18	W. B. VI. 775	6. 27. 32	41°9	40°9	78	+ 0°16
1881 Aug. 10	10 Lyncis S.P.	6. 27. 35	61°0	60°0	132	+ 0°26
1882 Aug. 7	Carrington 929 S.P.	6. 28. 12	57°1	56°1	55	+ 0°11
1882 Aug. 23	41 Camelopardi S.P.	6. 29. 25	54°1	52°7	129	+ 0°37
1884 Mar. 24	Lalande 12699	6. 30. 58	44°7	43°1	59	+ 0°20
1880 Mar. 24	v ² Canis Majoris.....	6. 31. 27	43°4	41°7	167	+ 0°59
1885 Jan. 20	W. B. VI. 999.....	6. 34. 37	27°8	26°8	224	+ 0°48
1882 Aug. 11	12 Lyncis S.P. (1st Star).....	6. 35. 37	57°4	57°0	148	+ 0°12
	12 Lyncis S.P. (2nd Star).....	6. 35. 38	"	"	"	"
1884 Mar. 10	W. B. VI. 1064	6. 36. 13	40°8	39°8	102	+ 0°21
	"		"	"	"	"
1880 Mar. 24	30 Geminorum	6. 37. 13	43°4	41°7	46	+ 0°16
1884 June 27	Lalande (F.) 968	6. 38. 12	56°9	56°0	182	+ 0°34
1879 Mar. 6	ξ Geminorum.....	6. 38. 33	47°7	44°3	47	+ 0°36
1885 Dec. 28	Sirius	6. 39. 52	38°1	37°2	145	+ 0°27
1885 Jan. 20	17 Monocerotis	6. 40. 49	27°8	26°8	57	+ 0°12
1884 Aug. 6	Piazzi VI. 201 S.P.	6. 42. 32	62°8	61°8	71	+ 0°14
1882 Mar. 16	Cephei 51	6. 43. 46	54°3	52°9	42	+ 0°12
1882 Mar. 31	"		49°4	47°2	41	+ 0°19
1884 Mar. 24	"		44°7	42°1	42	+ 0°23

ξ Geminorum. The reading of the barometer (30ⁱⁿ·17) has also been supplied from the meteorological register. the reading previously used being 30ⁱⁿ·15.

GREENWICH OBSERVATIONS, 1837.

A'

(42)

CORRECTIONS TO REFRACTION FOR REVISED READINGS OF

CORRECTIONS TO REFRACTION OF STARS, &c.—*continued*.

Date.	Star's Name.	R.A. 1880°.	Thermometer.		Refraction.	Correction to Refraction.
			Used.	Corrected.		
		h m s	°	°	"	"
1877 Sept. 5	Cephei 51 S.P.	6. 43. 46	56.3	52.6	50	+ 0.38
1881 May 31	"		54.3	52.8	51	+ 0.15
1882 May 29	"		55.5	54.0	51	+ 0.16
1882 Aug. 11	"		57.4	56.4	50	+ 0.11
1882 Aug. 21	"		57.4	56.1	50	+ 0.14
1882 Aug. 23	"		54.1	52.7	50	+ 0.14
1883 June 11	"		51.9	46.9	51	+ 0.59
1883 Sept. 19	"		61.1	60.0	50	+ 0.11
1884 July 9	"		62.7	61.4	49	+ 0.13
1884 Aug. 4	"		60.7	59.6	50	+ 0.11
1885 July 22	"		55.3	53.8	51	+ 0.15
1885 Aug. 14	"		56.1	51.9	51	+ 0.43
1885 Aug. 25	"		58.6	56.2	50	+ 0.24
1885 Oct. 1	"		53.6	52.0	50	+ 0.17
1884 Aug. 6	Groombridge 1228 S.P.	6. 47. 43	62.8	61.4	89	+ 0.25
1884 Mar. 24	37 Geminorum	6. 47. 56	44.7	42.0	29	+ 0.16
1884 Mar. 15	Piazzi VI. 303	6. 53. 41	54.9	54.0	238	+ 0.44
1883 Aug. 21	Piazzi VI. 293 S.P.	6. 55. 25	67.1	66.5	142	+ 0.17
1884 July 17	"	R.	57.7	56.8	144	+ 0.26
	"	D.	"	"	"	"
1884 Feb. 25	Lalande 13627	R. 6. 56. 3	42.6	41.7	90	+ 0.17
	"	D.	"	"	"	"
1884 Mar. 15	"		54.9	53.9	89	+ 0.18
1882 Aug. 9	17 Lynceis S.P.	6. 58. 52	57.3	56.7	138	+ 0.17
1883 Aug. 21	"		67.1	66.5	136	+ 0.17
1883 Mar. 15	Lalande 13781	7. 0. 44	29.9	28.4	63	+ 0.20
1884 Mar. 15	W. B. VI. 1877	7. 1. 20	54.9	53.8	55	+ 0.13
1882 Jan. 24	Piazzi VI. 285	7. 2. 32	33.4	32.1	35	+ 0.10
1880 Feb. 4	δ Canis Majoris	7. 3. 31	34.8	34.6	269	+ 0.12
1884 Feb. 21	Lalande 13928	7. 4. 9	43.2	43.6	140	- 0.11
1884 Feb. 25	"		42.6	41.8	141	+ 0.23
1884 Mar. 15	"		54.9	53.7	138	+ 0.34
1883 Mar. 15	Piazzi VII. 8	7. 5. 27	29.9	28.4	61	+ 0.20
1885 July 11	Piazzi II. 292 S.P.	7. 5. 44	62.2	61.3	58	+ 0.10
1880 Mar. 23	26 Canis Majoris	7. 7. 18	37.6	36.8	258	+ 0.43
1884 Feb. 25	Lalande 14091	R. 7. 8. 47	42.6	41.8	108	+ 0.18
	"	D.	"	"	"	"
1880 Feb. 4	Bradley 1061	7. 10. 0	34.8	34.2	283	+ 0.36
1882 Mar. 17	Lalande 14200	7. 11. 33	54.6	54.0	208	+ 0.29
1883 Mar. 30	"		48.7	48.1	204	+ 0.24
1882 April 6	δ Geminorum	R. 7. 12. 57	51.7	50.0	33	+ 0.11
	"	D.	"	"	"	"
1882 Mar. 18	29 Canis Majoris	7. 13. 41	51.0	50.0	226	+ 0.46
1880 Sept. 3	Groombridge 1299 S.P.	7. 15. 32	66.6	65.1	106	+ 0.30
1884 Mar. 24	Piazzi VII. 100	7. 19. 15	41.8	40.8	142	+ 0.30

Cephei 51 S.P. (1883 June 11). It is assumed that an error of 5° was made in the reading of the thermometer.
Groombridge 1299 S.P. The thermometer was read by the observer as above, but the reading had been
accidentally omitted from the computation sheets.

THE EXTERIOR THERMOMETER, IN THE YEARS 1877 TO 1886.

(43)

CORRECTIONS TO REFRACTION OF STARS, &c.—continued.

Date.	Star's Name.	R.A. 1880°.	Thermometer.		Refraction.	Correction to Refraction.
			Used.	Corrected.		
		h m s	°	°	"	"
1882 Jan. 24	Piazzi VII. 97	7. 19. 45	37.9	32.9	35	+ 0.37
1884 Mar. 29	Lalande 14545	7. 21. 47	41.3	40.5	153	+ 0.26
1882 April 6	α^1 Geminorum	7. 26. 56	51.7	49.2	20	+ 0.10
"	Castor	7. 26. 56	"	"	"	"
"	"	"	"	"	"	"
1882 Jan. 24	Bradley 1090	7. 27. 31	37.9	32.9	22	+ 0.24
1882 Mar. 2	Lalande 14810	7. 28. 55	39.8	39.2	193	+ 0.24
1883 Mar. 5	Procyon	7. 33. 1	46.1	44.8	61	+ 0.16
"	"	"	"	"	"	"
1885 April 22	"	"	63.0	58.3	58	+ 0.45
1884 Mar. 24	B. F. 1075	7. 34. 54	41.8	40.2	135	+ 0.45
1884 Feb. 25	γ Monocerotis	7. 35. 31	42.6	41.1	104	+ 0.33
1884 Mar. 20	"	"	43.8	43.0	104	+ 0.17
1884 Mar. 24	ϕ Puppis	7. 43. 6	41.8	40.2	253	+ 0.83
1880 Feb. 17	ξ Argus	7. 44. 15	41.1	41.5	227	- 0.19
1883 Feb. 23	W. B. VII. 1289	7. 44. 30	40.5	39.7	67	+ 0.11
"	W. B. VII. 1324-37	7. 45. 49	40.5	39.7	67	+ 0.11
1885 Mar. 12	Piazzi VII. 261	7. 51. 41	41.5	40.2	41	+ 0.11
1882 Jan. 23	ι Puppis	7. 51. 42	33.1	32.7	211	+ 0.18
1883 July 17	Piazzi VII. 251 S.P. ....R.	7. 51. 54	53.7	52.9	136	+ 0.22
"	"	"	"	"	"	"
1884 Mar. 7	δ Monocerotis	7. 53. 44	41.3	39.8	83	+ 0.26
"	γ Cancri	7. 56. 45	41.3	39.8	33	+ 0.10
1885 Oct. 8	Groombridge 1400 S.P.	7. 57. 53	49.6	48.7	93	+ 0.18
1880 Mar. 13	Groombridge 1403	8. 1. 40	44.8	43.1	27	+ 0.10
1882 Mar. 31	ρ Argus	8. 2. 26	46.9	44.3	218	+ 1.17
1884 Mar. 14	δ Monocerotis	8. 2. 34	48.6	47.8	81	+ 0.13
"	"	"	"	"	"	"
1885 Mar. 30	W. B. XIII. 84	8. 5. 43	43.8	40.6	98	+ 0.65
1884 April 10	δ Puppis	8. 7. 49	47.8	46.5	136	+ 0.36
1883 July 17	57 Camelopardi S.P. ....R.	8. 8. 50	53.7	52.9	126	+ 0.21
"	"	"	"	"	"	"
1883 Aug. 28	"	"	62.7	62.0	124	+ 0.17
"	"	"	"	"	"	"
1885 July 22	"	"	52.8	51.7	128	+ 0.29
"	"	"	"	"	"	"
1885 Aug. 15	"	"	56.7	55.3	127	+ 0.37
"	"	"	"	"	"	"
1885 Mar. 30	β Cancri	8. 10. 0	43.8	40.6	53	+ 0.36
1885 Mar. 30	B. D. — 22°. No. 2233	8. 15. 14	43.8	40.5	204	+ 1.39
1884 April 9	δ Monocerotis	8. 19. 40	45.1	43.5	83	+ 0.27
1884 April 10	"	"	47.8	46.1	83	+ 0.29
1882 Mar. 27	Groombridge 1418	8. 19. 48	47.7	45.7	39	+ 0.16
1884 April 9	W. B. VIII. 538	8. 21. 52	45.1	43.1	131	+ 0.54
1881 April 7	δ Cancri	8. 21. 55	40.8	39.1	44	+ 0.16

Piazzi VII. 97, Bradley 1090. It is assumed that an error of 5° was made in the reading of the thermometer.
Procyon (1885 April 22). The reading of the barometer (29ⁱⁿ.68) has also been supplied from the meteorological
register, the reading previously used being 29ⁱⁿ.73.

(44) CORRECTIONS TO REFRACTION FOR REVISED READINGS OF

CORRECTIONS TO REFRACTION OF STARS, &c.—*continued*.

Date.	Star's Name.	R.A. 1880°.	Thermometer.		Refraction.	Correction to Refraction.
			Used.	Corrected.		
1885 Aug. 15	A Ursæ Majoris S.P. ....R.	8. 23. 50	56.7	54.5	113	+ 0.51
1884 " April 9	Piazzi VIII. 86 .....D.	8. 24. 48	45.1	43.0	37	+ 0.16
1884 April 9	W. B. VIII. 671.....	8. 27. 45	45.1	43.0	54	+ 0.23
1879 Feb. 24	σ Hydræ .....R.	8. 32. 29	28.7	29.4	66	- 0.10
1882 Mar. 2	γ Cancrî .....R.	8. 36. 20	39.8	38.4	33	+ 0.10
1882 Mar. 6	"D.		43.3	40.2	34	+ 0.22
1882 Mar. 27	"R.		47.7	45.3	33	+ 0.16
1885 " April 6	η Hydræ .....D.	8. 36. 57	42.7	41.6	63	+ 0.15
1878 Mar. 26	ζ Hydræ .....R.	8. 49. 3	38.6	37.7	59	+ 0.11
1878 Mar. 26	B. F. 1267 .....R.	8. 51. 14	38.6	37.5	52	+ 0.12
1882 Jan. 6	α Cancrî .....R.	8. 51. 55	41.1	40.0	48	+ 0.11
1885 Mar. 12	W. B. VIII. 1406 .....R.	8. 55. 50	39.9	38.9	75	+ 0.16
1885 Sept. 11	σ Ursæ Majoris S.P. ....R.	8. 57. 50	52.9	52.2	104	+ 0.14
1884 " April 9	Lacaille 3652 .....D.	8. 57. 54	42.7	42.0	240	+ 0.35
1879 Aug. 1	σ Ursæ Majoris S.P. ....R.	8. 59. 49	56.1	55.3	103	+ 0.17
1878 Mar. 26	κ Cancrî .....R.	9. 1. 15	38.6	37.0	50	+ 0.17
1882 Jan. 6	"D.		41.1	40.0	50	+ 0.12
1878 Mar. 26	Piazzi. VIII. 263 .....R.	9. 3. 15	38.6	37.0	49	+ 0.17
1884 April 9	W. B. IX. 28 .....R.	9. 3. 26	42.7	41.7	117	+ 0.25
1884 April 10	"D.		45.5	44.7	116	+ 0.19
1884 " April 5	Oeltz. Arg. (S.) 9575-6.....R.	9. 13. 27	47.1	46.0	216	+ 0.49
1879 April 17	α Hydræ .....R.	9. 21. 41	42.8	41.7	99	+ 0.22
1880 May 14	"D.		62.8	67.8	96	- 0.95
1883 Aug. 25	λ Ursæ Majoris S.P. ....R.	9. 22. 3	57.7	56.7	122	+ 0.25
1883 Nov. 13	d Ursæ Majoris S.P. ....R.	9. 23. 51	41.7	41.0	95	+ 0.14
1885 April 17	Lacaille 3928 .....R.	9. 31. 36	49.8	49.4	233	+ 0.18
1884 Sept. 4	Groombridge 1562 S.P. ....R.	9. 32. 59	52.2	51.3	65	+ 0.12
1885 Feb. 23	Bradley 1361 .....R.	9. 34. 29	38.6	43.6	110	- 0.87
1885 April 17	Oeltz. Arg. (S.) 10011 .....R.	9. 35. 30	49.8	49.1	215	+ 0.31
1884 Sept. 4	Bradley 1363 S.P. ....R.	9. 38. 23	52.2	51.3	120	+ 0.22
1885 April 17	Lalande 19154 .....R.	9. 39. 10	49.8	49.1	206	+ 0.29
1880 Mar. 1	μ Leonis .....R.	9. 45. 56	43.7	39.2	27	+ 0.25
1885 April 17	Bradley 1393 .....R.	9. 50. 4	49.8	48.9	52	+ 0.10
1880 Mar. 1	π Leonis .....R.	9. 53. 52	43.7	39.2	53	+ 0.50
1884 Sept. 20	Groombridge 1609 S.P. ....R.	10. 0. 18	55.5	54.9	117	+ 0.14
1884 " April 22	Lalande 19750 .....R.	10. 1. 23	39.8	39.5	146	+ 0.10
1878 April 6	λ Hydræ .....R.	10. 4. 44	42.5	41.8	116	+ 0.17
1884 Sept. 20	32 Ursæ Majoris S.P. ....R.	10. 9. 18	55.5	54.1	111	+ 0.32
1880 Mar. 1	37 Leonis .....R.	10. 10. 14	43.7	38.7	44	+ 0.46

λ Ursæ Majoris S.P. The correction for index error of the thermometer had been erroneously applied.
 μ Leonis, π Leonis, 37 Leonis. The thermometer readings previously used appear to be erroneous. The new readings have been supplied from the meteorological register.

THE EXTERIOR THERMOMETER, IN THE YEARS 1877 TO 1886.

(45)

CORRECTIONS TO REFRACTION OF STARS, &c.—continued.

Date.	Star's Name.	R.A. 1880°.	Thermometer.		Refraction.	Correction to Refraction.
			Used.	Corrected.		
1883 April 9	W. B. X. 204	h m s 10. 13. 23	43°9	43°3	118	+ 0°15
1880 Jan. 26	B. F. 1464	10. 14. 15	23°4	21°6	61	+ 0°24
1880 Mar. 1	"		42°3	38°7	57	+ 0°43
1878 April 26	42 Leonis	10. 15. 23	49°3	47°9	42	+ 0°12
1878 April 6	44 Leonis	10. 18. 56	42°5	41°2	53	+ 0°15
1878 April 26	"		49°3	47°9	52	+ 0°15
"	Piazzi X. 67	10. 19. 16	49°3	47°9	52	+ 0°15
1881 May 7	μ Hydræ	10. 20. 17	60°7	59°4	140	+ 0°36
1882 Mar. 18	"		47°4	46°7	142	+ 0°21
1880 Mar. 1	45 Leonis	10. 21. 19	42°3	38°0	50	+ 0°45
1882 Feb. 8	α Antilæ	10. 21. 40	33°1	30°8	404	+ 1°98
1884 Sept. 10	36 Ursæ Majoris S.P.	10. 22. 56	53°7	52°7	176	+ 0°36
1880 Mar. 1	ρ Leonis	10. 26. 29	42°3	38°0	51	+ 0°46
1885 Feb. 19	"		37°7	32°8	52	+ 0°54
1878 April 6	50 Leonis	10. 32. 28	42°5	40°5	41	+ 0°17
1878 April 6	34 Sextantis	10. 36. 26	42°5	40°5	64	+ 0°27
1878 April 26	"		47°6	46°8	63	+ 0°11
1880 Mar. 1	36 Sextantis	10. 38. 58	42°7	37°7	65	+ 0°68
1878 April 26	37 Sextantis	10. 39. 51	47°6	46°8	57	+ 0°10
1878 April 6	m Leonis	10. 39. 56	42°5	40°5	37	+ 0°15
1883 Mar. 8	W. B. X. 760	10. 43. 43	25°8	25°2	107	+ 0°13
1878 April 26	B. F. 1549	10. 46. 4	47°6	46°2	69	+ 0°20
1883 Mar. 8	W. B. X. 844	10. 47. 37	25°8	25°2	80	+ 0°10
1880 Mar. 1	54 Leonis	10. 49. 7	42°7	37°7	28	+ 0°30
"	"	D.	"	"	"	"
1878 April 6	55 Leonis	10. 49. 32	42°5	40°5	70	+ 0°29
1879 April 24	"		43°1	42°0	70	+ 0°16
1885 April 25	Lalande 21110	R. 10. 53. 35	49°9	48°6	135	+ 0°35
"	"	D.	"	"	"	"
1879 May 2	α Crateris	10. 53. 56	41°9	40°9	155	+ 0°33
1883 April 9	W. B. X. 951	10. 54. 14	42°6	41°6	126	+ 0°28
1878 April 26	d Leonis	10. 54. 22	47°6	46°0	63	+ 0°21
1880 May 11	"		50°2	49°0	62	+ 0°15
1884 Sept. 10	α Ursæ Majoris S.P.	10. 56. 19	52°7	52°3	131	+ 0°11
1880 May 11	χ Leonis	10. 58. 50	50°2	49°0	55	+ 0°13
1882 Mar. 6	Lalande (F.) 1729	10. 59. 33	39°4	36°8	45	+ 0°24
1879 Mar. 29	Bradley 1544	11. 2. 56	42°9	41°8	288	+ 0°66
1884 April 10	Piazzi XI. 2	11. 4. 8	42°0	41°6	455	+ 0°38
1882 Aug. 8	Oeltz. Arg. (N.) 11509 S.P.	11. 4. 30	49°9	49°3	99	+ 0°12
1883 April 9	Lalande 21445	11. 6. 33	42°6	41°9	156	+ 0°22
1880 Mar. 1	δ Leonis	R. 11. 7. 43	42°7	37°7	34	+ 0°35
"	"	D.	"	"	"	"
1880 May 11	θ Leonis	11. 7. 57	50°2	48°5	41	+ 0°14
1879 Nov. 18	Piazzi XI. 43 S.P.	11. 15. 43	48°0	47°0	118	+ 0°24
1879 Mar. 7	79 Leonis	11. 17. 53	37°4	36°4	71	+ 0°14
1879 Mar. 8	"		37°1	38°2	71	- 0°17

B. F. 1464, 45 Leonis (1880 March 1). The thermometer readings previously used appear to be erroneous. The new readings have been supplied from the meteorological register.

(46)

CORRECTIONS TO REFRACTION FOR REVISED READINGS OF

CORRECTIONS TO REFRACTION OF STARS, &c.—continued.

Date.	Star's Name.	R.A. 1880°.	Thermometer.		Refraction.	Correction to Refraction.
			Used.	Corrected.		
1879 April 4	79 Leonis	^{h m s} 11. 17. 53	[°] 41°0	[°] 39°7	["] 69	+ 0°18
1879 April 4	83 Leonis	11. 20. 41	41°0	39°7	65	+ 0°18
"	Piazzi XI. 71	11. 20. 42	"	"	"	"
1879 Mar. 8	τ Leonis	11. 21. 46	37°1	38°2	67	— 0°15
1879 April 4	"	"	41°0	39°7	65	+ 0°17
1879 Mar. 8	W. B. XI. 349.....	11. 21. 47	37°1	38°2	67	— 0°16
1879 April 4	"	"	41°0	39°7	65	+ 0°17
1880 Mar. 1	Piazzi XI. 74	11. 22. 13	42°7	38°0	11	+ 0°11
"	"	"	"	"	"	"
1880 April 22	ε Leonis	11. 24. 11	46°4	45°4	79	+ 0°18
1885 Dec. 8	λ Draconis S.P.	11. 24. 16	31°9	31°1	99	+ 0°17
1877 May 8	88 Leonis	11. 25. 33	59°5	49°6	41	+ 0°76
1882 Mar. 2	Bradley 1580	11. 27. 6	37°2	36°8	422	+ 0°35
1879 April 4	υ Leonis	11. 30. 48	41°0	39°7	74	+ 0°20
1885 Mar. 20	W. B. XI. 563	11. 33. 47	46°3	45°8	126	+ 0°13
1885 April 13	"	"	38°6	37°7	128	+ 0°22
1880 Mar. 1	3 Draconis	11. 35. 46	42°7	38°1	16	+ 0°16
"	"	"	"	"	"	"
1879 May 9	Piazzi XI. 148	11. 37. 47	40°2	39°3	92	+ 0°17
1879 May 6	ζ Crateris.....	11. 38. 41	40°3	39°3	154	+ 0°32
1882 Aug. 8	Groombridge 1826 S.P.....	11. 40. 39	49°9	49°2	133	+ 0°19
1885 April 27	B. F. 1658	11. 43. 3	52°3	50°9	40	+ 0°12
1882 May 26	Piazzi XI. 167.....	11. 44. 54	63°3	58°3	84	+ 0°84
1884 Oct. 3	γ Ursæ Majoris S.P.	11. 47. 31	49°9	48°9	203	+ 0°42
1884 April 21	Lalande 22439	11. 48. 36	38°7	36°7	243	+ 1°02
1879 May 30	π Virginis	11. 54. 43	56°5	54°4	55	+ 0°24
1882 May 26	"	"	63°1	58°1	55	+ 0°55
1879 April 18	Piazzi XI. 227	11. 58. 34	38°5	37°5	64	+ 0°13
1879 July 24	ε Corvi	12. 3. 57	72°1	70°8	184	+ 0°46
1882 April 4	"	"	41°9	41°4	196	+ 0°20
1880 Mar. 24	W. B. XII. 69.....	12. 6. 25	35°9	34°8	82	+ 0°19
1884 May 13	W. B. XII. 107	12. 9. 0	55°9	55°2	103	+ 0°15
"	"	"	"	"	"	"
1877 Oct. 2	Groombridge 1863 S.P.....	12. 9. 25	44°6	43°7	92	+ 0°17
1882 May 26	7 Comæ	12. 10. 16	62°8	57°2	29	+ 0°32
1883 Mar. 31	Piazzi XII. 32.....	12. 12. 0	39°5	38°8	84	+ 0°24
1882 May 26	13 Virginis	12. 12. 31	62°8	57°2	71	+ 0°80
1879 May 2	14 Virginis	12. 13. 10	40°3	39°6	102	+ 0°15
1877 May 29	η Virginis	12. 13. 46	53°1	52°1	71	+ 0°14
1879 Mar. 6	"	"	37°1	36°5	76	+ 0°10
1882 April 10	"	"	42°9	42°1	74	+ 0°12
1879 May 2	δ° Corvi	12. 23. 38	40°3	39°6	142	+ 0°21
"	δ° Corvi	12. 23. 39	"	"	"	"
1880 June 18	"	12. 23. 39	66°5	65°5	133	+ 0°27

λ Draconis S.P. The automatic register having failed on this day, the reading of the thermometer has been interpolated from neighbouring readings.
88 Leonis. The thermometer was read by the observer as above, but the reading had been accidentally omitted from the computation sheets.
Piazzi XI. 167, π Virginis (1882 May 26). It is assumed that an error of 5° was made in the reading of the thermometer.

THE EXTERIOR THERMOMETER, IN THE YEARS 1877 TO 1886.

(47)

CORRECTIONS TO REFRACTION OF STARS, &c.—continued.

Date.	Star's Name.	R.A. 1880.0.	Thermometer.		Refraction.	Correction to Refraction.
			Used.	Corrected.		
1884 April 21	δ^2 Corvi .....R.	h m s	36°0	35°4	142	+ 0°18
	D.		36°0	35°4	142	+ 0°18
1882 May 26	γ Draconis	12. 24. 51	62°8	55°9	19	+ 0°26
1877 May 3	β Corvi	12. 28. 5	38°0	37°5	206	+ 0°21
1882 April 4	"		41°9	40°6	206	+ 0°56
1884 Sept. 29	Groombridge 1909 S.P.....R.	12. 30. 28	52°9	51°6	64	+ 0°17
	D.		52°9	51°6	64	+ 0°17
1882 May 27	χ Virginis	12. 33. 3	59°3	58°8	94	+ 0°10
1880 May 29	γ Virginis (both Stars).....	12. 35. 35	53°9	53°3	75	+ 0°10
1881 Mar. 25	"		32°8	31°9	77	+ 0°14
1884 May 20	28 Virginis	12. 35. 45	52°1	51°3	94	+ 0°15
1882 Jan. 9	Groombridge 1926 S.P.	12. 42. 11	42°0	41°4	127	+ 0°16
1884 May 13	W. B. XII. 793	12. 48. 4	54°4	53°6	110	+ 0°18
1884 May 20	"		52°1	50°8	111	+ 0°29
	D.		52°1	50°8	111	+ 0°29
1883 Mar. 23	ψ Virginis	12. 48. 7	25°6	25°0	107	+ 0°14
1883 May 17	"		53°9	53°4	102	+ 0°10
1882 Jan. 9	ϵ Ursæ Majoris S.P.	12. 48. 45	42°0	41°4	180	+ 0°22
1879 Mar. 6	δ Virginis	12. 49. 34	37°1	35°9	66	+ 0°17
1884 May 13	ϵ Virginis	12. 56. 12	54°4	53°4	48	+ 0°10
1882 Jan. 9	Piazzi XII. 255 S.P.	12. 57. 5	42°0	41°1	123	+ 0°22
1881 May 11	Lalande 24277	12. 57. 21	42°0	41°2	176	+ 0°29
1885 Mar. 2	48 Virginis	12. 57. 44	36°5	35°4	83	+ 0°19
1885 May 15	"		49°9	49°0	81	+ 0°15
	D.		49°9	49°0	81	+ 0°15
1883 May 23	Lacaille 5400	13. 0. 14	63°3	65°3	756	— 3°39
1881 May 11	g Virginis	13. 1. 37	42°0	41°2	110	+ 0°19
1883 May 17	"		53°9	52°9	107	+ 0°22
1880 April 23	B. F. 1805	13. 2. 17	47°9	47°2	100	+ 0°14
1879 June 9	θ Virginis	13. 3. 44	56°7	56°1	86	+ 0°11
1883 June 4	"		61°6	60°6	85	+ 0°17
1881 May 7	γ Hydræ	13. 12. 24	55°8	52°1	201	+ 1°51
1883 April 4	"		48°9	48°2	201	+ 0°28
1884 Sept. 29	Lalande (F.) 2236 S.P.	13. 12. 32	50°9	50°0	99	+ 0°18
1879 May 31	Spica	13. 18. 52	51°5	50°5	107	+ 0°22
1881 July 4	"		86°0	84°5	102	+ 0°30
1882 April 4	"		40°5	41°0	111	— 0°11
1883 April 3	"		47°3	47°8	110	— 0°11
1883 May 24	69 Virginis	13. 21. 3	58°2	57°2	133	+ 0°27
1883 Dec. 14	Piazzi XIII. 96 S.P.	13. 21. 54	45°1	45°8	122	— 0°18
1881 May 7	75 Virginis	13. 26. 27	55°8	51°5	132	+ 1°15
1879 June 9	78 Virginis	13. 28. 3	55°3	54°4	62	+ 0°11
1885 April 17	ζ Virginis	13. 28. 35	43°8	42°5	74	+ 0°20
1885 May 2	Cape (1880) 7454	13. 30. 9	44°7	43°3	252	+ 0°73
1885 May 2	Piazzi XIII. 135.....	13. 30. 9	44°7	43°3	252	+ 0°73

γ^1 and γ^2 Virginis (1880 May 29 and 1881 March 25). The thermometer was read by the observer, but the reading had been accidentally omitted from the computation sheets.
 Lacaille 5400. The correction for index error of the thermometer had been erroneously applied.
 γ Hydræ, 75 Virginis. It is assumed that the reading of the interior thermometer was entered by mistake.

(48) CORRECTIONS TO REFRACTION FOR REVISED READINGS OF
CORRECTIONS TO REFRACTION OF STARS, &c.—*continued.*

Date.	Star's Name.	R.A. 1880 ^o .	Thermometer.		Refraction.	Correction to Refraction.
			Used.	Corrected.		
1885 May 2	<i>m</i> Virginis	^h ^m ^s 13. 35. 19	^o 44.7	^o 43.1	["] 99	["] + 0.33
1881 May 11	85 Virginis	13. 39. 7	40.8	39.6	138	+ 0.35
1883 May 24	B. F. 1886	13. 40. 53	57.0	56.3	101	+ 0.15
1884 May 23	"		57.1	56.1	102	+ 0.21
1878 June 10	87 Virginis	13. 40. 54	56.3	55.6	144	+ 0.21
1877 Nov. 14	η Ursæ Majoris S.P.	13. 42. 49	42.4	44.4	283	— 1.17
1883 May 23	<i>h</i> Centauri	13. 46. 18	63.6	62.8	416	+ 0.67
1884 May 29	Piazzi XIII. 230	13. 47. 29	47.8	46.9	303	+ 0.56
1880 Feb. 4	<i>i</i> Draconis S.P.	13. 47. 56	38.1	38.8	118	— 0.18
1883 May 24	Bradley 1820	13. 48. 41	57.0	55.9	95	+ 0.14
1884 June 14	η Boötis	R. 13. 48. 58	60.5	59.1	37	+ 0.12
	"	D.	"	"	"	"
1879 May 19	10 Boötis	R. 13. 53. 2	49.4	47.5	32	+ 0.13
	"	D.	"	"	"	"
1882 May 19	"		50.4	48.3	32	+ 0.14
1879 May 30	W. B. XIII. 932	13. 55. 24	51.0	49.5	52	+ 0.16
1882 May 16	τ Virginis	13. 55. 32	46.1	42.1	69	+ 0.57
1883 May 23	Lacaille 5791	13. 56. 4	63.6	62.0	405	+ 1.30
1879 June 4	94 Virginis	13. 59. 57	51.6	50.7	99	+ 0.18
1882 Feb. 1	Groombridge 2099 S.P.	14. 1. 51	33.8	32.0	55	+ 0.21
1877 May 3	96 Virginis	14. 2. 37	34.6	34.1	108	+ 0.11
1878 Oct. 14	3 Ursæ Minoris S.P.	14. 6. 0	50.0	49.1	77	+ 0.15
1882 May 16	κ Virginis	14. 6. 30	46.1	43.2	107	+ 0.65
1881 May 12	Piazzi XIV. 22	14. 8. 47	46.0	45.1	154	+ 0.29
1880 Feb. 13	4 Ursæ Minoris S.P.	14. 9. 20	43.7	42.3	71	+ 0.21
1880 July 15	Arcturus	14. 10. 11	69.8	67.0	34	+ 0.19
1881 May 7	Lalande 26150	14. 12. 0	51.2	50.6	158	+ 0.20
1882 May 29	λ Virginis	14. 12. 37	61.8	61.3	118	+ 0.12
1883 June 1	W. B. (2) XIV. 213	14. 13. 33	58.3	57.4	69	+ 0.10
1885 May 15	2 Libræ	14. 16. 58	47.7	46.7	112	+ 0.23
1883 June 8	Piazzi XIV. 69 (N. & S. Stars)...	14. 17. 29	55.3	54.1	52	+ 0.13
1885 May 15	<i>f</i> Boötis	14. 20. 52	47.7	46.3	36	+ 0.11
1885 June 2	"	R. 14. 20. 52	59.7	57.3	35	+ 0.17
	"	D.	"	"	"	"
1880 Feb. 13	5 Ursæ Minoris S.P.	14. 27. 48	43.7	40.9	76	+ 0.44
1881 May 3	Piazzi XIV. 116	14. 28. 6	39.0	38.4	175	+ 0.21
1881 May 11	"		39.3	38.6	177	+ 0.25
1885 June 2	ζ Boötis	R. 14. 35. 25	59.7	56.7	44	+ 0.26
	"	D.	"	"	"	"
1885 June 12	54 Hydræ (1st Star)	14. 39. 3	59.9	59.0	232	+ 0.42
1883 May 7	54 Hydræ (1st and 2nd Stars)...	14. 39. 4	43.7	43.3	235	+ 0.19
1885 May 20	Lalande 26855	14. 39. 14	44.9	44.0	199	+ 0.38
1880 May 28	109 Virginis	14. 40. 11	51.9	49.9	67	+ 0.27
1885 Jan. 8	μ Libræ	14. 42. 45	29.5	28.7	129	+ 0.22
<i>i</i> Draconis S.P. The automatic register having failed on this day, the reading of the thermometer has been interpolated from neighbouring readings. η Boötis. The reading of the barometer (30ⁱⁿ.17) has also been supplied from the meteorological register, the reading previously used being 30ⁱⁿ.16. 54 Hydræ (1883 May 7). The correction for index error of the thermometer had been erroneously applied.						

CORRECTIONS TO REFRACTION OF STARS, &c.—continued.

Date.	Star's Name.	R.A. 1880.0.	Thermometer.		Refraction.	Correction to Refraction
			Used.	Corrected.		
		h m s	°	°	"	"
1877 May 3	8 Libræ	14. 44. 3	34.6	32.8	139	+ 0.53
1879 June 9	"		52.6	51.9	135	+ 0.19
	α Libræ	14. 44. 14	"	"	"	"
1882 June 27	"		66.2	64.1	132	+ 0.55
1883 June 4	"	R.	57.1	56.3	134	+ 0.22
	"	D.	"	"	"	"
1883 June 8	"	R.	54.0	53.0	134	+ 0.28
	"	D.	"	"	"	"
1883 July 13	"		63.1	62.1	131	+ 0.26
1884 May 29	"	R.	46.6	45.9	137	+ 0.20
	"	D.	"	"	"	"
1885 May 23	"		48.0	47.3	136	+ 0.20
1881 May 12	Bradley 1895	14. 44. 52	44.5	43.8	151	+ 0.22
1883 Dec. 14	6 Ursæ Minoris S.P.	14. 45. 14	43.5	44.6	86	- 0.20
1883 July 13	β Ursæ Minoris	14. 51. 4	58.5	62.1	24	- 0.18
1883 June 8	17 Libræ	R. 14. 51. 43	54.0	53.0	108	+ 0.22
	"	D.	"	"	"	"
1884 May 29	Piazzi XIV. 239.....	R. 14. 55. 6	46.6	45.1	80	+ 0.25
	"	D.	"	"	"	"
1885 June 9	ν ² Libræ	15. 0. 7	53.4	52.5	139	+ 0.25
1885 May 15	ι ¹ Libræ	15. 5. 23	45.6	44.5	166	+ 0.38
1883 May 31	W. B. (2) XV. 106.....	15. 6. 37	53.0	50.9	36	+ 0.16
1883 July 6	β Libræ	R. 15. 10. 33	65.3	64.0	98	+ 0.25
	"	D.	"	"	"	"
1884 June 14	"		56.1	55.0	102	+ 0.23
1884 May 8	ο ¹ Libræ	15. 14. 19	50.8	50.4	134	+ 0.11
1881 April 30	ο ² Libræ	15. 16. 20	46.3	44.8	130	+ 0.40
1881 June 2	"		57.7	56.9	129	+ 0.21
1882 June 23	"		56.4	56.0	129	+ 0.10
1884 June 25	Piazzi XV. 54.....	15. 17. 17	63.7	62.7	113	+ 0.23
1885 June 17	μ Boötis	15. 19. 57	55.9	52.0	14	+ 0.11
1880 April 30	γ Ursæ Minoris S.P.	15. 20. 56	51.3	52.1	88	- 0.15
1881 April 30	ζ ¹ Libræ	15. 21. 29	46.3	44.6	140	+ 0.49
1881 June 2	"		57.7	56.9	140	+ 0.22
1882 June 23	"		56.4	55.6	139	+ 0.22
1884 June 2	B. F. 2110	15. 27. 58	51.0	50.1	100	+ 0.19
1885 June 18	γ Libræ	R. 15. 28. 49	56.6	56.0	127	+ 0.15
	"	D.	"	"	"	"
1884 July 1	16 Serpentis	15. 30. 44	64.8	63.7	49	+ 0.10
1881 May 3	41 Libræ	15. 32. 0	37.9	36.4	165	+ 0.62
1885 May 23	"		46.7	46.2	161	+ 0.17
1883 June 16	η Libræ	15. 37. 19	50.0	48.6	134	+ 0.38
1884 June 2	α Serpentis	15. 38. 21	51.0	50.1	56	+ 0.11
β Ursæ Minoris. The reading of the barometer (29ⁱⁿ.66) has also been supplied from the meteorological register, the reading previously used being 29ⁱⁿ.67. β Libræ (1883 July 6). The thermometer was read by the observer as above, but accidentally omitted from the computation sheets.						

GREENWICH OBSERVATIONS, 1887.

G

(50)

CORRECTIONS TO REFRACTION FOR REVISED READINGS OF

CORRECTIONS TO REFRACTION OF STARS, &c.—continued.

Date.	Star's Name.	R.A. 1880°.	Thermometer.		Refraction.	Correction to Refraction.
			Used.	Corrected.		
		h m s	°	°	"	"
1879 April 28	Groombridge 2286.....	15. 39. 54	38.8	37.3	36	+ 0.11
1883 June 4	ν Serpentis	15. 41. 43	55.7	54.0	43	+ 0.15
1885 Nov. 30	Oeltz. Arg. (N.) 15662 S.P.	15. 44. 20	45.8	45.1	186	+ 0.26
"	Oeltz. Arg. (N.) 15666 S.P.	15. 44. 44	"	"	"	"
1881 June 22	A Scorpii	15. 46. 25	55.3	54.8	231	+ 0.23
1884 June 14	"	"	54.9	54.0	235	+ 0.43
1885 June 12	Bradley 2009	15. 46. 44	57.9	56.9	221	+ 0.45
1882 June 27	Piazzi XV. 192	15. 46. 47	62.9	62.0	209	+ 0.37
1885 May 16	θ Libræ	15. 47. 0	44.5	43.7	142	+ 0.23
1884 June 12	B. F. 2173	15. 50. 40	58.2	55.7	177	+ 0.90
1879 July 28	γ Serpentis	15. 50. 55	67.0	65.7	40	+ 0.10
1882 June 27	δ Scorpii	15. 53. 14	62.9	61.6	192	+ 0.50
1885 June 2	49 Libræ	15. 53. 36	56.4	55.2	139	+ 0.34
1884 June 14	3 Herculis	15. 54. 54	54.9	53.8	62	+ 0.14
1882 June 23	ω ² Scorpii	16. 0. 22	54.3	53.0	175	+ 0.45
1879 May 20	Piazzi XVI. 3	16. 5. 0	51.0	50.0	163	+ 0.34
"	ν Scorpii	16. 5. 1	"	"	"	"
1878 June 7	ψ Scorpii	16. 5. 26	56.1	55.4	103	+ 0.14
1883 July 13	16 Scorpii	16. 5. 37	58.3	57.7	97	+ 0.11
1882 July 15	δ Ophiuchi	16. 8. 3	61.6	58.9	79	+ 0.42
1879 June 10	γ Herculis	16. 16. 38	53.0	51.4	36	+ 0.12
1878 June 26	ω Herculis	16. 19. 53	70.8	68.9	42	+ 0.16
1885 June 27	Antares	16. 22. 3	52.9	52.3	258	+ 0.32
1885 June 13	φ Ophiuchi	16. 24. 16	56.7	55.9	140	+ 0.23
1885 June 26	λ Ophiuchi	16. 24. 52	51.7	50.8	68	+ 0.12
1881 June 2	12 Ophiuchi	16. 30. 3	56.1	55.3	78	+ 0.12
1885 July 14	m ¹ Herculis	16. 34. 38	58.7	57.7	62	+ 0.12
1885 July 14	m ² Herculis	16. 34. 41	58.7	57.7	62	+ 0.12
1879 June 11	53 Herculis	16. 48. 25	58.7	52.3	20	+ 0.26
1883 July 2	Piazzi XVI. 232	16. 49. 6	68.7	66.7	138	+ 0.12
1884 July 7	Piazzi XVI. 255	16. 54. 7	61.9	61.3	449	+ 0.54
1880 Aug. 9	ε Herculis	16. 55. 42	65.9	63.2	21	+ 0.12
"	"	"	"	"	"	"
1884 July 7	W. B. XVI. 1125	17. 0. 40	61.9	60.9	75	+ 0.15
1885 July 22	Piazzi XVI. 297	17. 1. 17	57.9	56.8	149	+ 0.32
1883 July 17	Piazzi XVI. 303	17. 2. 2	56.6	55.3	74	+ 0.19
1884 Aug. 1	η Ophiuchi	17. 3. 30	65.9	65.3	132	+ 0.16
1885 June 2	"	"	54.6	53.4	136	+ 0.32
1885 Sept. 3	"	"	63.9	62.8	131	+ 0.30
1885 July 22	37 Ophiuchi	17. 6. 48	57.9	56.3	50	+ 0.17
1883 July 4	Oeltz. Arg. (S.) 16505	17. 7. 46	55.8	55.4	258	+ 0.20
1877 June 23	A Ophiuchi (both Stars)	17. 7. 58	51.0	50.2	261	+ 0.48
1883 July 4	"	"	55.8	55.4	259	+ 0.20
1880 Aug. 9	ζ Draconis	17. 8. 26	65.9	62.4	15	+ 0.10
"	"	"	"	"	"	"

A Scorpii (1881 June 22). The thermometer was read by the observer, but the reading had been accidentally omitted in the computation sheets.

Piazzi XVI. 232. The reading of the barometer (29ⁱⁿ.90) has also been supplied from the meteorological register, the reading previously used being 29ⁱⁿ.99.

THE EXTERIOR THERMOMETER, IN THE YEARS 1877 TO 1886.

(51)

CORRECTIONS TO REFRACTION OF STARS, &c.—continued.

Date.	Star's Name.	R.A. 1880°.	Thermometer.		Refraction.	Correction to Refraction.
			Used.	Corrected.		
		h m s	°	°	"	"
1883 July 4	Piazzi XVII. 45	17. 12. 35	55.8	55.1	79	+ 0.11
1882 June 27	θ Ophiuchi	17. 14. 38	58.5	58.2	231	+ 0.13
1884 July 9	"		65.5	64.5	225	+ 0.44
1877 June 23	43 Ophiuchi	17. 15. 49	51.0	50.1	299	+ 0.61
1883 July 4	Piazzi XVII. 84	17. 18. 14	55.8	54.7	52	+ 0.12
1884 Aug. 11	Piazzi XVII. 99	17. 20. 16	77.9	77.0	82	+ 0.14
	"					
1885 July 14	47 Ophiuchi	17. 20. 18	56.9	56.2	117	+ 0.17
	"					
1878 Oct. 7	σ Ophiuchi	17. 20. 34	63.0	62.0	60	+ 0.12
1879 Aug. 6	ϵ^2 Ophiuchi	17. 24. 6	56.7	55.7	213	+ 0.44
1885 July 14	W. B. XVII. 493	17. 28. 6	56.9	56.0	111	+ 0.21
	"					
1883 July 4	α Ophiuchi	17. 29. 22	55.8	54.3	46	+ 0.13
	"					
1883 Nov. 23	"		40.6	44.0	47	- 0.34
1884 July 5	58 Ophiuchi	17. 36. 14	61.8	61.1	183	+ 0.25
1883 July 4	β Ophiuchi	17. 37. 33	55.8	54.3	61	+ 0.18
	"					
1883 Dec. 15	ω Draconis S.P.	17. 37. 39	40.8	39.5	99	+ 0.27
	"					
1884 July 7	Piazzi XVII. 266	17. 46. 31	60.6	59.6	68	+ 0.14
1884 July 7	Piazzi XVII. 277	17. 48. 51	60.6	59.6	156	+ 0.31
1884 Aug. 1	Piazzi XVII. 304	17. 52. 52	63.7	63.3	170	+ 0.14
1884 Sept. 10	ζ Serpentis	17. 54. 9	58.8	57.7	82	+ 0.18
1884 Aug. 1	6 Sagittarii	17. 54. 25	63.7	63.3	143	+ 0.12
1877 Aug. 14	Piazzi XVII. 359	18. 0. 29	63.5	62.4	302	+ 0.66
1883 Aug. 13	"		66.2	65.7	302	+ 0.31
1885 July 11	Oeltz. Arg. (S.) 17670	18. 0. 51	63.4	62.5	143	+ 0.26
1878 Sept. 26	72 Ophiuchi	18. 1. 40	55.8	54.4	51	+ 0.14
1880 July 15	"		63.0	61.0	51	+ 0.19
1885 June 18	"		54.0	53.0	51	+ 0.11
1881 May 15	μ Sagittarii	18. 6. 35	47.5	46.7	180	+ 0.30
1882 Aug. 23	"		54.1	53.7	178	+ 0.14
1885 June 26	"		49.0	48.5	184	+ 0.19
1884 Aug. 5	Piazzi XVIII. 24	18. 10. 32	59.4	58.6	274	+ 0.45
1877 Aug. 14	δ Ursæ Minoris	18. 11. 2	63.5	62.1	39	+ 0.11
1878 June 18	"		54.2	52.1	40	+ 0.17
1878 Aug. 7	"		64.4	62.8	39	+ 0.12
	"					
1880 July 15	"		63.0	61.0	40	+ 0.16
1880 July 22	"		58.6	57.3	40	+ 0.11
	"					
1880 Aug. 9	"		65.9	60.5	40	+ 0.43

(52)

CORRECTIONS TO REFRACTION FOR REVISED READINGS OF

CORRECTIONS TO REFRACTION OF STARS, &c.—continued.

Date.	Star's Name.	R.A. 1880°.	Thermometer.		Refraction.	Correct on to Refraction.
			Used.	Corrected.		
		h m s	°	°	"	"
1881 June 25	δ Ursæ Minoris	18. 11. 2	53'4	51'8	41	+ 0'13
1881 Sept. 14	"		60'5	58'0	40	+ 0'20
1883 Aug. 25	"		62'7	60'4	40	+ 0'18
1883 Sept. 19	"	R.	69'3	61'8	39	+ 0'46
	"	D.	"	"	"	"
1880 Dec. 30	δ Ursæ Minoris S.P.		34'3	33'1	53	+ 0'33
1885 July 6	"		64'9	61'8	40	+ 0'24
1885 June 26	Bradley 2296	18. 13. 14	49'0	48'3	140	+ 0'20
1882 Aug. 7	Lalande 33738	18. 14. 25	57'1	56'6	312	+ 0'32
1882 Aug. 21	"		57'4	57'0	307	+ 0'24
1884 Aug. 16	"		65'4	65'1	305	+ 0'18
1884 Aug. 5	η Serpentis	R. 18. 15. 6	59'4	58'6	80	+ 0'13
	"	D.	"	"	"	"
1883 July 17	21 Sagittarii	18. 18. 12	54'7	54'0	175	+ 0'24
1881 Sept. 14	109 Herculis	18. 18. 35	60'5	57'5	33	+ 0'19
1884 June 27	λ Sagittarii	18. 20. 34	56'9	56'6	243	+ 0'15
1884 Aug. 11	"		74'6	74'2	232	+ 0'18
1885 Sept. 1	"		53'1	52'7	244	+ 0'19
1885 Aug. 14	d Serpentis	R. 18. 21. 4	56'1	53'3	72	+ 0'41
	"	D.	"	"	"	"
1885 July 24	Lalande 34128	18. 22. 7	60'9	60'0	58	+ 0'10
1885 June 26	"		49'0	48'0	59	+ 0'12
1883 Feb. 23	b Draconis S.P.	18. 22. 9	41'7	40'7	163	+ 0'34
1884 Feb. 18	"	R.	33'9	32'4	160	+ 0'51
	"	D.	"	"	"	"
1882 Aug. 7	Piazzi XVIII. 82	18. 23. 9	57'1	56'3	159	+ 0'26
1882 Aug. 21	"		57'4	56'8	157	+ 0'19
1883 July 4	"		53'9	53'4	158	+ 0'16
1881 July 18	Piazzi XVIII. 92	18. 24. 24	68'7	67'7	152	+ 0'30
1882 Sept. 20	"		53'7	53'1	155	+ 0'19
1885 Aug. 15	Bradley 2323	18. 25. 52	58'8	58'4	131	+ 0'12
1885 Sept. 22	"		61'0	57'8	130	+ 0'84
1885 Oct. 1	"		53'6	52'4	130	+ 0'32
1885 Aug. 15	Bradley 2327	18. 26. 48	58'8	58'4	131	+ 0'12
1885 Sept. 22	"		61'0	57'8	130	+ 0'84
1885 Oct. 1	"		53'6	52'4	130	+ 0'32
1883 July 4	1 Aquilæ	18. 28. 41	53'9	53'4	98	+ 0'10
1881 July 10	Bradley 2332	18. 30. 43	60'4	59'2	184	+ 0'44
1882 July 26	Lalande 34486	18. 30. 49	56'9	55'4	58	+ 0'18
1879 July 8	Bradley 2335	18. 31. 44	53'9	53'2	178	+ 0'26
1882 Aug. 12	"		64'4	62'7	177	+ 0'60
1883 Sept. 27	α Lyrae	18. 32. 53	50'8	56'6	13	— 0'15
1884 Mar. 24	Groombridge 2655 S.P.	18. 35. 32	44'7	42'5	73	+ 0'33
1882 Sept. 7	2 Aquilæ	18. 35. 42	54'9	53'5	103	+ 0'29
δ Ursæ Minoris (1883 September 19). It is assumed that an error of 0'11.1 was made in the reading of the barometer. δ Ursæ Minoris S.P. (1880 Dec. 30.) The reading of the barometer (29ⁱⁿ.65) has also been supplied from the meteorological register, the reading previously used being 29ⁱⁿ.54.						

THE EXTERIOR THERMOMETER, IN THE YEARS 1877 TO 1886.

(53)

CORRECTIONS TO REFRACTION OF STARS, &c.—continued.

Date.	Star's Name.	R.A. 1880.	Thermometer.		Refraction.	Correction to Refraction.
			Used.	Corrected.		
		h m s	°	°	"	"
1883 July 17	α Aquilæ.....R.	18. 35. 42	54.7	53.7	102	+ 0.21
1884 July 9	".....D.		62.7	61.4	99	+ 0.26
1885 Sept. 1	".....R.		53.1	52.1	102	+ 0.21
1885 Sept. 22	".....D.		61.0	57.3	101	+ 0.75
1885 Oct. 1	".....R.		53.6	52.0	101	+ 0.33
1877 May 28	ϕ Sagittarii.....	18. 38. 10	47.9	47.3	273	+ 0.33
1879 Aug. 18	".....		58.0	57.4	271	+ 0.31
1884 Aug. 6	δ Aquilæ.....	18. 40. 48	62.8	61.8	85	+ 0.17
1879 June 6	R Scuti.....	18. 41. 5	54.0	53.0	89	+ 0.18
1884 June 27	γ Sagittarii.....	18. 46. 50	56.9	55.9	185	+ 0.38
1877 May 28	σ Sagittarii.....	18. 47. 49	47.9	47.2	258	+ 0.37
1883 Aug. 3	Oeltz. Arg. (S.) 18841-2.....	18. 48. 36	59.6	58.5	141	+ 0.32
1883 Aug. 3	Oeltz. Arg. (S.) 18847.....	18. 48. 49	59.6	58.5	141	+ 0.32
1883 Sept. 19	Lalande 35281.....R.	18. 50. 9	61.1	60.0	76	+ 0.17
1884 Oct. 24	".....D.		58.9	58.0	184	+ 0.33
1880 Sept. 3	Piazzi XVIII. 261.....	18. 55. 7	66.6	66.3	230	+ 0.14
1879 July 8	α Sagittarii.....	18. 57. 30	53.9	53.0	187	+ 0.34
1884 Sept. 25	Bradley 2398.....	18. 58. 36	55.9	55.0	84	+ 0.15
1884 Sept. 25	η Aquilæ.....	18. 58. 37	55.9	55.0	84	+ 0.16
1885 July 8	B. D. — 15° No. 5223.....	18. 58. 49	57.6	56.6	136	+ 0.28
1881 July 12	τ Sagittarii.....	18. 59. 27	63.3	62.4	290	+ 0.52
1880 Sept. 3	Piazzi XVIII. 294.....	18. 59. 45	66.6	66.0	196	+ 0.24
1882 Oct. 2	λ Aquilæ.....R.	18. 59. 53	56.4	55.8	87	+ 0.10
1879 Aug. 18	".....D.		58.0	56.7	44	+ 0.11
1883 Aug. 16	".....R.	18. 59. 54	55.6	54.2	45	+ 0.13
1885 Aug. 8	".....D.		59.9	59.3	139	+ 0.17
1884 July 1	Lalande 35693.....	18. 59. 58	59.9	59.3	139	+ 0.17
1884 July 1	ψ Sagittarii.....	19. 8. 11	58.9	58.0	241	+ 0.43
1880 Sept. 3	Piazzi XIX. 22.....	19. 8. 15	66.6	65.4	219	+ 0.53
1883 Aug. 21	W. B. XIX. 197.....	19. 9. 46	67.1	65.7	42	+ 0.12
1883 Aug. 16	W. B. XIX. 200.....R.	19. 9. 52	55.6	53.5	43	+ 0.18
1883 Aug. 21	".....D.		67.1	65.7	42	+ 0.12
1883 Aug. 28	".....		64.0	63.0	60	+ 0.12
1885 Aug. 24	δ Sagittarii.....	19. 10. 35	56.8	56.0	161	+ 0.27
1879 July 8	ω Aquilæ.....	19. 12. 11	53.9	52.5	48	+ 0.13
1881 July 12	".....		63.3	61.8	48	+ 0.14
1885 June 2	f Aquilæ.....	19. 14. 8	50.7	52.8	90	— 0.39
1884 Feb. 21	κ Cygni S.P.	19. 14. 20	43.2	44.0	219	— 0.36

(54)

CORRECTIONS TO REFRACTION FOR REVISED READINGS OF

CORRECTIONS TO REFRACTION OF STARS, &c.—continued.

Date.	Star's Name.	R.A. 1880°.	Thermometer.		Refraction.	Correction to Refraction.
			Used.	Corrected.		
		h m s	°	°	"	"
1885 Aug. 24	<i>d</i> Aquilæ.....	19. 14. 24	56.8	55.6	75	+ 0.18
1884 July 17	<i>v</i> Sagittarii	19. 14. 51	57.7	55.9	138	+ 0.51
1884 Aug. 6	"R.		61.2	60.3	137	+ 0.24
	"D.		"	"	"	"
1878 Sept. 3	W. B. XIX. 357.....	19. 16. 11	60.4	58.8	73	+ 0.23
1879 Mar. 13	<i>τ</i> Draconis S.P.	19. 17. 51	39.5	38.9	87	+ 0.12
1883 Jan. 18	Groombridge 2827 S.P.	19. 18. 4	45.2	44.8	171	+ 0.13
1878 Oct. 8	<i>χ</i> ³ Sagittarii	19. 18. 14	57.8	57.2	214	+ 0.26
1879 July 8	"R.		53.9	52.5	217	+ 0.62
1883 Aug. 21	<i>z</i> Sagittæ.....	19. 18. 59	67.1	65.5	39	+ 0.13
1885 Sept. 28	Piazzi XIX. 107.....	19. 19. 21	47.3	46.4	135	+ 0.25
1883 Aug. 21	<i>z</i> Sagittæ.....	19. 19. 22	67.1	65.5	39	+ 0.13
1881 July 12	<i>δ</i> Aquilæ.....	19. 19. 27	63.3	61.8	64	+ 0.20
1882 Sept. 23	"R.		54.3	52.9	65	+ 0.18
1884 July 5	"D.		59.1	58.1	65	+ 0.13
	"R.		"	"	"	"
1885 July 22	"D.		55.3	53.2	66	+ 0.28
	"D.		"	"	"	"
1885 Aug. 24	"D.		56.8	55.3	65	+ 0.20
1878 June 26	Lalande 36688	19. 21. 6	66.7	65.0	153	+ 0.53
1883 Aug. 22	<i>c</i> Aquilæ.....	19. 22. 57	63.7	63.0	67	+ 0.10
1881 July 12	<i>e</i> Aquilæ.....	19. 24. 23	63.3	61.3	80	+ 0.32
1877 Sept. 5	<i>β</i> Cygni .....R.	19. 25. 53	56.3	51.5	25	+ 0.24
	"D.		"	"	"	"
1881 Sept. 14	Groombridge 2900.....R.	19. 28. 55	57.5	55.0	30	+ 0.16
	"D.		"	"	"	"
1882 Mar. 17	Groombridge 2900 S.P.		53.3	52.6	68	+ 0.10
1880 Sept. 3	W. B. (2) XIX. 852	19. 29. 4	66.6	64.6	27	+ 0.11
1882 Sept. 6	<i>κ</i> Aquilæ.....R.	19. 30. 26	55.5	54.6	95	+ 0.17
	"D.		"	"	"	"
1882 Sept. 7	"R.		53.2	52.5	96	+ 0.14
	"D.		"	"	"	"
1877 July 2	<i>ε</i> ¹ Sagittarii	19. 33. 51	57.0	54.3	140	+ 0.77
1879 July 10	Groombridge 2917.....R.	19. 35. 37	54.1	50.0	21	+ 0.17
	"D.		"	"	"	"
1883 Feb. 22	Groombridge 2917 S.P. ....R.		45.2	44.4	93	+ 0.15
	"D.		"	"	"	"
1883 Mar. 3	"R.		37.1	36.3	94	+ 0.15
	"D.		"	"	"	"
1881 Aug. 7	<i>f</i> Sagittarii	19. 39. 22	58.3	57.1	169	+ 0.40
1883 Aug. 21	<i>γ</i> Aquilæ.....R.	19. 40. 33	67.1	65.3	49	+ 0.18
	"D.		"	"	"	"
1877 June 27	<i>λ</i> Ursæ Minoris.....	19. 44. 10	58.0	56.8	44	+ 0.11
1878 June 26	"R.		66.7	64.4	43	+ 0.20

THE EXTERIOR THERMOMETER, IN THE YEARS 1877 TO 1886.

(55)

CORRECTIONS TO REFRACTION OF STARS, &c.—*continued*.

Date.	Star's Name.	R.A. 1880°.	Thermometer.		Refracton.	Correction to Refraction.
			Used.	Corrected.		
		h m s	°	°	"	"
1880 Sept. 3	λ Ursæ Minoris .....R.	19. 44. 10	66.6	64.0	43	+ 0.22
	"D.		"	"	"	"
1881 July 20	"D.		59.5	58.4	44	+ 0.10
1881 Aug. 7	"D.		58.3	57.1	44	+ 0.10
1881 Sept. 4	"D.		54.7	53.3	44	+ 0.12
1881 Sept. 26	"D.		56.9	55.0	44	+ 0.17
1881 Oct. 31	"D.		33.6	35.3	46	- 0.26
1882 Sept. 23	"D.		54.3	50.5	44	+ 0.34
1883 Sept. 5	"D.		52.7	51.5	44	+ 0.11
1884 June 25	"D.		56.1	54.9	44	+ 0.11
1884 Sept. 5	"D.		54.8	53.2	44	+ 0.14
1885 Sept. 22	"D.		56.9	55.3	44	+ 0.15
1880 Mar. 13	λ Ursæ Minoris S.P. ....R.		44.8	43.8	49	+ 0.10
	"D.		"	"	"	"
1882 Jan. 24	"D.		37.9	32.4	50	+ 0.53
1882 April 4	"D.		46.5	45.5	48	+ 0.10
1884 Mar. 29	"D.		41.3	40.1	49	+ 0.12
1885 Jan. 6	"D.		33.8	32.8	50	+ 0.11
1879 Sept. 25	α Aquilæ .....R.	19. 44. 56	51.7	50.2	54	+ 0.26
1883 Aug. 21	"D.		67.1	65.2	52	+ 0.20
	"D.		"	"	"	"
1882 Sept. 23	W. B. (2) XIX. 1617 .....R.	19. 50. 6	54.3	50.5	14	+ 0.11
1885 Sept. 4	W. B. XIX. 1300 .....R.	19. 53. 16	56.2	55.6	105	+ 0.13
1879 Sept. 25	ϵ Sagittarii .....R.	19. 55. 17	51.7	49.8	303	+ 1.46
1883 Aug. 28	ϵ Sagittarii .....R.	19. 58. 46	62.7	62.3	118	+ 0.10
1880 July 15	θ Aquilæ .....R.	20. 5. 7	59.3	57.9	75	+ 0.21
1883 July 17	"R.		53.7	52.9	75	+ 0.12
1883 Oct. 6	"D.		50.6	49.6	77	+ 0.15
	"D.		"	"	"	"
1884 Feb. 25	δ Draconis S.P. ....R.	20. 9. 37	41.1	40.4	136	+ 0.20
	"D.		"	"	"	"
1877 June 27	δ Capricorni .....R.	20. 10. 58	58.0	56.0	194	+ 0.78
1883 Feb. 15	Oeltz. Arg. (N.) 20313 S.P. ....R.	20. 11. 47	40.8	40.2	114	+ 0.14
1882 Mar. 27	κ Cephei S.P. ....R.	20. 12. 54	47.7	46.1	73	+ 0.24
1883 July 19	ν Capricorni .....R.	20. 14. 0	51.8	50.9	120	+ 0.22
1884 Aug. 25	"R.		54.8	54.4	121	+ 0.10
1881 July 11	β Capricorni .....R.	20. 14. 16	61.0	60.2	131	+ 0.21
1882 Sept. 23	"R.		50.5	50.0	133	+ 0.13
1882 Jan. 6	B. D. + 63° No. 1618 S.P. ....R.	20. 19. 29	41.1	40.5	125	+ 0.16
1883 Aug. 21	Piazzi XX. 145 .....R.	20. 22. 9	64.8	64.2	149	+ 0.18
1882 July 29	Bradley 2627 .....R.	20. 22. 10	58.3	57.8	154	+ 0.14
1883 Aug. 21	B. A. C. 7063 .....R.	20. 24. 21	64.8	64.2	132	+ 0.15
1883 Feb. 15	B. D. + 67° No. 1248 S.P. ....R.	20. 24. 42	40.8	40.0	105	+ 0.17
1883 Aug. 21	W. B. XX. 664 .....R.	20. 28. 3	64.8	64.0	128	+ 0.20

λ Ursæ Minoris (1881 October 31). The barometer and thermometer were read by the observer, but the readings had been accidentally omitted from the computation sheets. The barometer reading was 29ⁱⁿ.97, that previously used being 30ⁱⁿ.03.

α Aquilæ and ϵ Sagittarii (1879 Sept. 25). The reading of the barometer (30ⁱⁿ.15) has also been supplied from the meteorological register, the reading previously used being 30ⁱⁿ.14.

CORRECTIONS TO REFRACTION OF STARS, &c.—*continued.*

Date.	Star's Name.	R.A. 1880.0.	Thermometer.		Refraction.	Correction to Refraction.
			Used.	Corrected.		
		h m s	°	°	"	"
1882 July 29	Piazzi XX. 194	20. 28. 45	58.3	57.8	144	+ 0.13
1882 Sept. 23	"		50.5	49.7	145	+ 0.25
1879 July 24	70 Aquilæ	20. 30. 29	56.0	55.1	80	+ 0.15
1881 July 11	72 Capricorni	20. 32. 34	61.0	60.2	132	+ 0.22
1881 July 12	"		59.9	58.6	133	+ 0.34
1882 July 29	"		58.3	57.8	133	+ 0.13
1881 July 12	α Delphini	20. 34. 4	59.9	58.6	42	+ 0.11
1881 July 12	17 Capricorni	20. 39. 12	59.9	58.6	189	+ 0.49
1879 Aug. 18	μ Aquarii	20. 46. 11	55.3	54.7	102	+ 0.13
1884 Feb. 29	76 Draconis S.P. ....R.	20. 51. 11	33.5	32.4	63	+ 0.15
	"					
1883 Nov. 19	Piazzi XX. 411	20. 54. 38	44.0	43.2	287	+ 0.47
1884 Aug. 15	θ Capricorni	20. 59. 12	60.3	59.5	149	+ 0.23
1884 Sept. 14	77 Draconis	21. 7. 52	59.4	56.7	28	+ 0.15
	"					
1877 Oct. 16	ι Capricorni	21. 15. 34	43.0	42.5	151	+ 0.16
1879 Sept. 25	"		49.1	48.6	150	+ 0.16
1880 May 14	α Cephei S.P.	21. 15. 43	62.8	67.8	129	— 1.28
1884 April 5	Oeltz. Arg. (N.) 22131 S.P.	21. 16. 57	47.1	46.0	87	+ 0.20
1885 April 17	Oeltz. Arg. (N.) 22261 S.P.	21. 21. 1	50.5	49.8	89	+ 0.13
1884 Sept. 14	2 Pegasi	21. 24. 31	59.4	56.2	31	+ 0.20
	"					
1877 Mar. 14	β Cephei S.P.	21. 27. 6	49.5	48.3	94	+ 0.24
1883 Aug. 25	Piazzi XXI. 190	21. 29. 2	57.7	56.7	85	+ 0.17
1881 July 12	ξ Aquarii	21. 31. 22	58.3	57.0	99	+ 0.23
1883 July 20	"		52.7	52.1	98	+ 0.12
1883 Nov. 13	B. F. 2941	21. 31. 24	41.7	41.0	77	+ 0.12
1880 June 25	42 Capricorni	21. 35. 1	53.7	52.8	128	+ 0.23
1883 Nov. 26	"		44.8	44.3	128	+ 0.14
	"					
1883 Aug. 29	ε Pegasi	21. 38. 18	59.4	58.0	51	+ 0.15
	"					
1884 Sept. 14	κ Pegasi	21. 39. 13	59.4	56.4	28	+ 0.17
	"					
1884 April 10	Groombridge 3588 S.P.	21. 45. 14	43.8	43.2	119	+ 0.15
1885 Sept. 20	B. F. 2988	21. 47. 11	55.5	55.0	109	+ 0.11
1883 Aug. 25	Piazzi XXI. 320	21. 47. 54	57.7	56.7	86	+ 0.17
1884 April 10	μ Cephei S.P.	21. 50. 51	43.8	42.9	183	+ 0.34
1882 Mar. 18	Piazzi XXI. 360 S.P.	21. 53. 16	48.5	47.6	128	+ 0.23
1884 Sept. 4	30 Aquarii	21. 56. 58	52.2	51.3	93	+ 0.17
1879 Sept. 26	ι Aquarii	21. 59. 57	51.9	51.0	130	+ 0.23
1882 Mar. 4	18 Cephei S.P.	22. 0. 17	39.9	39.4	131	+ 0.14
1881 Sept. 9	ε Aquarii	22. 4. 8	51.4	50.8	112	+ 0.14
1882 Feb. 8	ζ Cephei S.P.	22. 6. 42	33.1	31.9	174	+ 0.44
Piazzi XXI. 190, Piazzi XXI. 320. The correction for index error of the thermometer had been erroneously applied.						

THE EXTERIOR THERMOMETER, IN THE YEARS 1877 TO 1886.

(57)

CORRECTIONS TO REFRACTION OF STARS, &c.—*continued*.

Date.	Star's Name.	R.A. 1880°.	Thermometer.		Refraction.	Correction to Refraction.
			Used.	Corrected.		
1880 Jan. 26	Bradley 2934 S.P.	^h 22. ^m 7. ^s 54	[°] 23'4	[°] 21'6	["] 95	+ 0'37
1879 Sept. 26	θ Aquarii	22. 10. 30	51'9	51'0	100	+ 0'18
1880 June 25	"		55'9	52'7	98	+ 0'64
1884 Sept. 4	"		52'2	51'0	97	+ 0'24
1881 Sept. 14	44 Aquarii	22. 10. 51	53'3	52'3	90	+ 0'19
1882 Mar. 14	25 Cephei S.P.	22. 14. 18	45'8	44'5	134	+ 0'36
1883 Aug. 19	51 Aquarii	22. 17. 52	53'4	52'7	89	+ 0'12
1884 Sept. 10	"		53'7	52'7	89	+ 0'18
1881 Feb. 28	Groombridge 3760 S.P.	22. 18. 11	30'6	29'3	114	+ 0'32
1882 Mar. 4	"		39'9	39'0	112	+ 0'21
1881 Feb. 28	Radcliffe 5671 S.P.	22. 18. 12	30'6	29'3	114	+ 0'32
1882 Mar. 4	"		39'9	39'0	112	+ 0'21
1883 April 9	"		43'9	43'1	113	+ 0'19
1885 Mar. 11	Bradley 2993 S.P.	22. 22. 38	35'8	34'1	57	+ 0'21
1880 April 29	Lalande (F.) 4151 S.P.	22. 22. 54	43'0	42'0	96	+ 0'20
1883 Mar. 15	"		28'8	28'3	97	+ 0'11
1884 Oct. 24	σ Aquarii	22. 24. 18	44'0	43'4	113	+ 0'14
1878 April 6	Bradley 2972 S.P.	22. 24. 42	42'5	41'2	167	+ 0'45
1878 April 6	δ Cephei S.P.	22. 24. 43	42'5	41'2	167	+ 0'45
1880 April 29	Lalande (F.) 4162 S.P.	22. 24. 44	43'0	42'0	96	+ 0'20
1883 April 9	ρ Cephei S.P.	22. 28. 48	43'9	42'7	71	+ 0'18
1881 Sept. 14	η Aquarii	22. 29. 11	53'3	51'6	75	+ 0'26
1883 Aug. 19	κ Aquarii	22. 31. 32	53'4	52'7	87	+ 0'12
1885 Oct. 1	Lacaille 9204	22. 33. 3	48'9	48'1	327	+ 0'55
1883 April 4	30 Cephei S.P.	22. 34. 24	51'1	50'6	127	+ 0'13
1880 Sept. 24	μ Pegasi	22. 44. 13	58'9	57'0	30	+ 0'11
1877 Oct. 18	λ Aquarii	22. 46. 21	38'0	36'8	102	+ 0'26
1883 Dec. 14	"		47'1	46'6	98	+ 0'10
1877 Sept. 6	74 Aquarii	22. 47. 10	51'1	50'3	116	+ 0'19
1877 Oct. 27	75 Aquarii	22. 47. 47	51'0	49'6	118	+ 0'34
1877 Dec. 10	Bradley 3038	22. 47. 54	38'1	35'6	35	+ 0'19
1882 Mar. 2	Bradley 3038 S.P.		38'3	37'5	60	+ 0'10
1877 Oct. 15	W. B. XXII. 1047	22. 51. 49	46'4	45'8	115	+ 0'15
1877 Oct. 27	"		51'0	49'6	113	+ 0'33
1877 Sept. 6	Piazzi XXII. 264	22. 53. 16	51'1	50'2	123	+ 0'23
1877 Oct. 15	W. B. XXII. 1204	22. 58. 12	46'4	45'6	120	+ 0'20
1877 Sept. 6	W. B. XXII. 1232	22. 59. 37	51'1	49'8	110	+ 0'30
1877 Oct. 27	W. B. XXII. 1249	23. 0. 41	51'0	49'6	121	+ 0'35
1882 Mar. 13	π Cephei S.P.	23. 4. 5	43'1	40'9	82	+ 0'37
1879 Nov. 13	φ Aquarii	23. 8. 6	39'3	38'5	96	+ 0'16
1877 Oct. 15	Lalande 45504	23. 9. 5	46'4	45'5	117	+ 0'22
1879 Sept. 1	γ Piscium	23. 10. 57	48'3	46'9	68	+ 0'19
1877 Oct. 27	W. B. XXIII. 185	23. 11. 24	51'0	49'7	116	+ 0'31
1883 Sept. 15	"		53'5	53'0	117	+ 0'12

51 Aquarii (1883 August 19). The correction for index error of the thermometer had been erroneously applied.
κ Aquarii. The correction for index error of the thermometer had not been applied.

GREENWICH OBSERVATIONS, 1887.

11

(58)

CORRECTIONS TO REFRACTION FOR REVISED READINGS OF

CORRECTIONS TO REFRACTION OF STARS, &c.—concluded.

Date.	Star's Name.	R.A. 1880°.	Thermometer.		Refraction.	Correction to Refraction.
			Used.	Corrected.		
		h m s	°	°	"	"
1877 Oct. 15	ψ^3 Aquarii	23. 12. 43	46'4	45'5	108	+ 0'20
1884 Mar. 24	α Cephei S.P. ....R.	23. 13. 42	36'8	35'4	108	+ 0'31
	D.		"	"	"	"
1877 Oct. 27	W. B. XXIII. 265	23. 14. 38	51'0	49'7	110	+ 0'29
1880 Sept. 24	τ Pegasi	23. 14. 42	58'9	57'0	31	+ 0'12
1883 April 9	Bradley 3104 S.P.	23. 15. 20	42'6	41'9	139	+ 0'21
1877 Oct. 27	Piazzi XXIII. 64	23. 16. 47	51'0	49'7	112	+ 0'30
1877 Oct. 15	W. B. XXIII. 315	23. 17. 4	46'4	45'4	107	+ 0'22
1879 Sept. 1	κ Piscium	23. 20. 47	48'3	46'9	73	+ 0'21
1877 Oct. 15	W. B. XXIII. 402	23. 21. 50	46'4	45'4	116	+ 0'24
1884 Mar. 24	Bradley 3125 S.P. ....R.	23. 22. 13	36'8	35'4	99	+ 0'29
	D.		"	"	"	"
1885 April 17	"		46'7	46'2	96	+ 0'10
	R.		"	"	"	"
	D.		"	"	"	"
1880 Sept. 24	η Pegasi	23. 23. 5	58'9	57'0	47	+ 0'18
	R.		"	"	"	"
	D.		"	"	"	"
1877 Oct. 20	ι Piscium	23. 23. 17	47'6	46'5	80	+ 0'18
1877 Oct. 15	W. B. XXIII. 497	23. 26. 13	46'4	45'4	114	+ 0'24
1883 Sept. 15	"		53'5	52'9	113	+ 0'14
1877 Sept. 5	W. B. XXIII. 571	23. 29. 15	49'2	48'5	112	+ 0'17
1877 Nov. 16	W. B. XXIII. 583	23. 29. 45	48'9	47'0	114	+ 0'44
1884 April 21	γ Cephei S.P.	23. 34. 26	38'7	37'4	75	+ 0'20
1877 Sept. 5	Piazzi XXIII. 153	23. 34. 56	49'2	48'0	118	+ 0'29
1877 Nov. 16	76 Pegasi	23. 36. 38	48'9	46'3	42	+ 0'23
	R.		"	"	"	"
	D.		"	"	"	"
1885 Sept. 5	19 Piscium	23. 40. 16	54'7	53'7	64	+ 0'14
1883 Sept. 15	W. B. XXIII. 853	23. 42. 56	53'5	52'7	68	+ 0'11
1877 Nov. 16	21 Piscium	23. 43. 19	48'9	45'1	72	+ 0'57
1877 Nov. 16	25 Piscium	23. 46. 56	48'9	44'8	70	+ 0'59
1882 Mar. 2	Groombridge 4163 S.P.	23. 49. 0	37'2	36'6	82	+ 0'11
1882 April 8	Bradley 3202 S.P.	23. 56. 28	41'5	40'9	117	+ 0'14
1882 April 8	Oeltz. Arg. (N.) 26322 S.P.	23. 56. 30	41'5	40'9	117	+ 0'14
1883 May 16	Groombridge 4220 S.P.	23. 58. 29	56'3	55'5	108	+ 0'18

The following is a list of the similar corrections for planetary observations during the same period.

THE EXTERIOR THERMOMETER, IN THE YEARS 1877 TO 1886.

(59)

CORRECTIONS TO REFRACTION OF SUN, MOON, AND PLANETS FOR REVISED READINGS OF THE EXTERIOR THERMOMETER AND BAROMETER IN THE YEARS 1877 TO 1885.

Date.	Planet.	Thermometer		Refraction.	Correction to Refraction.
		Used.	Corrected.		
1880 August 11	Sun	69.9	73.8	41	— 0.32
1883 May 25	"	66.9	71.4	33	— 0.34
1883 June 5	"	65.8	69.1	31	— 0.22
1880 July 15	Moon.....	69.8	69.0	137	+ 0.22
1881 May 11	"	40.8	40.0	132	+ 0.23
1881 June 1	"	73.3	77.1	40	— 0.30
1882 May 26	"	63.3	58.3	78	+ 0.79
1884 May 11	"	55.1	54.5	160	+ 0.19
1885 June 26	"	49.0	48.5	164	+ 0.17
1885 July 22	"	57.9	57.2	154	+ 0.22
1879 September 2	Venus	62.4	64.7	103	— 0.45
1883 April 8	"	46.9	44.9	105	+ 0.43
1883 May 22	"	62.5	65.5	50	— 0.30
1883 August 13	"	68.9	72.3	36	— 0.26
1883 November 23	"	40.6	42.9	214	— 1.02
1885 April 17	"	57.0	58.0	54	— 0.10
1877 October 15	Mars	46.4	45.8	112	+ 0.14
1877 October 18	"	38.0	36.5	113	+ 0.35
1877 October 27	"	51.0	49.6	103	+ 0.29
1877 November 16	"	48.9	48.0	91	+ 0.16
1884 April 22	"	43.8	40.8	36	+ 0.23
1885 May 23	Ceres (1)	50.4	49.3	54	+ 0.12
1882 August 11	Pallas (2)	55.9	54.0	45	+ 0.17
1885 April 27	"	52.3	50.9	38	+ 0.10
1881 May 7	Juno (3)	49.9	47.9	80	+ 0.32
1877 October 15	Vesta (4)	46.4	45.4	134	+ 0.28
1884 August 5	"	54.7	53.0	200	+ 0.69
1877 May 15	Hebe (6)	50.5	47.5	67	+ 0.41
1885 July 22	"	55.3	53.2	111	+ 0.47
1879 July 24	Flora (8)	59.2	58.3	201	+ 0.36
1883 May 24	Hygeia (10)	55.7	54.5	202	+ 0.49
1883 May 31	"	53.0	50.3	197	+ 1.09
1884 April 9	Irene (14)	40.8	39.6	49	+ 0.12
1883 June 4	Melpomene (18)	55.7	54.0	79	+ 0.27
1883 May 24	Amphitrite (29)	55.7	54.5	277	+ 0.67
1882 September 12	Sappho (80)	48.8	47.5	43	+ 0.12
1884 March 24	Alcmene (82)	36.8	35.4	61	+ 0.17
1884 March 24	Jupiter	41.8	40.2	34	+ 0.11
1885 February 19	"	37.7	32.7	48	+ 0.50
1885 February 23	"	38.6	43.6	48	— 0.50
1877 October 15	Saturn	46.4	45.5	99	+ 0.19

Sun. 1883 May 25. The reading of the barometer has also been altered from 29ⁱⁿ.84 to 29ⁱⁿ.80.
 1883 June 5. The reading of the barometer has also been altered from 29ⁱⁿ.77 to 29ⁱⁿ.76.

H 2

THE EXTERIOR THERMOMETER, IN THE YEARS 1877 TO 1886.

(61)

CORRECTIONS TO REFRACTION OF SUN, MOON, PLANETS, &c.—*continued*.

Date, 1886.	Star's Name.	R.A. 1880°.	Thermometer.		Refraction.	Correction to Refraction.
			Used.	Corrected.		
		h m s	°	°	"	"
April 12	28 Cephei S.P.	22. 25. 48	46.5	45.9	71	+ 0.11
	U Hydrae	10. 31. 38	46.5	45.9	121	+ 0.19
April 27	Groombridge 96 S.P.	0. 28. 49	48.8	47.6	211	+ 0.44
	Bradley 49 S.P.	0. 29. 28	48.8	47.6	211	+ 0.44
April 30	61 Virginis	13. 12. 8	39.2	37.1	156	+ 0.73
	Polaris S.P.	1. 14. 45	39.2	37.1	50	+ 0.23
May 1	Uranus.	12. 16	41.5	40.9	78	+ 0.10
May 13	75 Virginis .....R. & D.	13. 26. 27	45.9	45.0	129	+ 0.25
May 18	W. B. XII. 429 .....R. & D.	12. 27. 21	53.9	53.1	115	+ 0.18
	B. D. + 59° No. 176 S.P.	0. 57. 14	52.6	51.9	147	+ 0.20
	B. D. + 59° No. 180 S.P.	0. 58. 44	52.6	51.9	147	+ 0.21
	Groombridge 244 S.P.	1. 1. 13	52.6	51.9	164	+ 0.24
	θ Cassiopeiæ S.P.	1. 3. 48	52.6	51.9	197	+ 0.29
	58 Virginis	13. 11. 9	52.6	51.3	105	+ 0.28
	61 Virginis	13. 12. 8	52.6	51.3	150	+ 0.40
	ξ Andromedæ S.P.	1. 15. 17	52.6	51.3	465	+ 1.23
	ψ Cassiopeiæ S.P.	1. 17. 28	52.6	51.3	103	+ 0.27
	Piazzi XIII. 180.	13. 38. 55	50.9	50.4	244	+ 0.25
	g Persei S.P.	1. 44. 32	50.9	50.4	270	+ 0.27
May 28	η Virginis .....R. & D.	12. 13. 46	52.0	51.0	72	+ 0.14
	γ^1 Virginis .....R. & D.	12. 35. 35	52.0	49.8	74	+ 0.33
May 29	32 Cassiopeiæ S.P.	1. 3. 53	51.8	51.0	118	+ 0.20
	Piazzi I. 139 S.P.	1. 34. 31	50.1	49.1	146	+ 0.30
	B. F. 222 S.P.	1. 50. 48	50.1	48.7	121	+ 0.34
June 4	Piazzi XIII. 276.	13. 55. 56	48.6	47.7	166	+ 0.31
	95 Virginis	14. 0. 22	48.6	47.7	102	+ 0.20
	κ Virginis	14. 6. 30	48.6	47.2	106	+ 0.31
	α Libræ .....R. & D.	14. 44. 14	47.0	46.0	138	+ 0.28
	Bradley 396 S.P. ....R. & D.	2. 53. 13	47.0	46.0	64	+ 0.13
June 25	η Boötis	13. 48. 58	66.0	64.3	36	+ 0.12
	τ Virginis	13. 55. 32	66.0	64.3	66	+ 0.22
	β Libræ .....R. & D.	15. 10. 33	60.9	60.1	100	+ 0.16
April 12. The reading of the barometer has also been altered from 29ⁱⁿ.97 to 29ⁱⁿ.98. April 27. The reading of the barometer has also been altered from 29ⁱⁿ.64 to 29ⁱⁿ.63. April 30. The reading of the barometer has also been altered from 30ⁱⁿ.02 to 30ⁱⁿ.03.						

CORRECTIONS TO REFRACTION OF SUN, MOON, PLANETS, &c.—*continued.*

Date, 1886.	Star's Name.	R.A. 1880's.	Thermometer.		Refraction.	Correction to Refraction.
			Used.	Corrected.		
		h m s	°	°	"	"
June 29	Piazzi IV. 254 S.P. R. & D.	4. 57. 15	61°0	59°8	81	+ 0°20
June 30	γ^1 Sagittarii	17. 57. 21	52°4	51°9	352	+ 0°35
	15 Sagittarii	18. 8. 8	52°4	51°8	180	+ 0°23
	Lalande 33537	18. 9. 48	52°4	51°8	322	+ 0°39
	Lalande 33642	18. 11. 40	52°4	51°8	160	+ 0°14
	Oeltz. Arg. (S.) 18017-8	18. 11. 41	52°4	51°8	160	+ 0°14
	Lalande 33748	18. 14. 25	52°4	51°8	162	+ 0°19
	Lalande 33873	18. 17. 15	52°4	51°8	120	+ 0°15
July 3	α Serpentis	15. 38. 21	72°7	71°5	56	+ 0°14
	λ Ophiuchi R. & D.	16. 24. 52	69°9	69°0	65	+ 0°11
July 6	17 Camelopardi S.P. R. & D.	5. 18. 50	69°0	67°9	123	+ 0°26
	Groombridge 944 S.P.	5. 23. 41	69°0	67°9	53	+ 0°12
	Juno	17. 38.	69°0	66°9	84	+ 0°35
July 10	Lalande 33642	18. 11. 40	56°2	55°5	158	+ 0°23
	Oeltz. Arg. (S.) 18017-8	18. 11. 41	56°2	55°5	158	+ 0°23
	Lalande 33873	18. 17. 15	56°2	55°5	119	+ 0°17
	Lalande 34128	18. 22. 7	56°2	55°0	58	+ 0°15
	Bradley 2323	18. 25. 52	56°2	55°0	132	+ 0°31
	Bradley 2327	18. 26. 48	56°2	55°0	131	+ 0°31
July 16	A ¹ Ophiuchi	17. 7. 58	62°1	61°0	257	+ 0°66
	Piazzi XVII. 31	17. 10. 42	62°1	61°0	217	+ 0°45
	39 Ophiuchi	17. 10. 42	62°1	61°0	217	+ 0°45
	Piazzi V. 117 S.P.	5. 26. 44	62°1	60°4	197	+ 0°80
July 20	Piazzi IV. 254 S.P.	4. 57. 15	61°7	60°7	80	+ 0°16
	Groombridge 928 S.P.	5. 3. 26	61°7	60°7	82	+ 0°16
	Piazzi XVII. 277 R. & D.	17. 48. 51	60°6	60°0	157	+ 0°18
	43 Camelopardi S.P.	6. 40. 46	59°7	58°8	97	+ 0°14
	17 Lyncis S.P. R. & D.	6. 58. 52	59°7	58°8	137	+ 0°21
July 22	τ Scorpii	16. 28. 25	62°1	61°3	292	+ 0°47
August 2	σ Ophiuchi	17. 20. 34	57°7	56°9	62	+ 0°12
	W. B. XVII. 751	17. 39. 24	57°7	56°5	59	+ 0°14
	Bradley 2323 R. & D.	18. 25. 52	55°8	55°3	130	+ 0°13
	Ceres	19. 23.	54°9	54°3	415	+ 0°50
	Piazzi VII. 251 S.P. R. & D.	7. 51. 54	54°9	53°3	136	+ 0°44
	Groombridge 1407 S.P.	8. 0. 12	54°9	53°3	156	+ 0°50
July 16. For A¹ Ophiuchi, Piazzi XVII. 31 and 39 Ophiuchi, the reading of the barometer has also been altered from 29ⁱⁿ·85 to 29ⁱⁿ·86 and for Piazzi V. 117 S.P. to 29ⁱⁿ·87. July 20. 43 Camelopardi S.P. and 17 Lyncis S.P. The reading of the barometer has also been altered from 29ⁱⁿ·98 to 29ⁱⁿ·97. Aug. 2. σ Ophiuchi. The reading of the barometer has also been altered from 29ⁱⁿ·81 to 29ⁱⁿ·82; for W. B. XVII. 751, to 29ⁱⁿ·83; for 57 Camelopardi S.P., σ Capricorni and Piazzi VIII. 105 S.P. from 29ⁱⁿ·84 to 29ⁱⁿ·87, the corrections to Refraction being + 0°·11, + 0°·16 and + 0°·21, respectively.						

CORRECTIONS TO REFRACTION OF SUN, MOON, PLANETS, &c.—concluded.

Date, 1886.	Star's Name.	R.A. 1880°0.	Thermometer.		Refraction.	Correction to Refraction.
			Used.	Corrected.		
		h m s	°	°	"	"
August 4	Piazzi VIII. 40 S.P.	8. 14. 43	53'5	52'8	211	+ 0'30
	Bradley 2659 R. & D.	20. 32. 59	53'5	52'5	81	+ 0'16
	Piazzi VIII. 137 S.P.	8. 37. 56	53'5	52'5	106	+ 0'20
August 10	Piazzi XVII. 277 R. & D.	17. 48. 51	61'5	60'1	155	+ 0'47
	17 Lyncis S.P.	6. 58. 52	58'4	57'8	136	+ 0'16
	δ Aquilæ R. & D.	19. 19. 27	58'4	57'3	64	+ 0'16
	θ Aquilæ R. & D.	20. 5. 7	56'9	55'9	74	+ 0'18
	θ Capricorni R. & D.	20. 59. 12	55'1	54'5	149	+ 0'19
	26 Ursæ Majoris S.P.	9. 26. 36	55'1	54'4	224	+ 0'32
August 11	29 Sagittarii R. & D.	18. 42. 33	56'4	55'5	174	+ 0'32
	Piazzi VI. 293 S.P.	6. 55. 25	56'4	55'5	145	+ 0'26
	e' Sagittarii R. & D.	19. 33. 51	54'9	54'3	141	+ 0'19
	Oeltz. Arg. (S.) 19857 R. & D.	19. 33. 53	54'9	54'3	141	+ 0'18
	W. B. XIX. 1300 R. & D.	19. 53. 16	54'9	53'4	107	+ 0'33
August 26	A Ursæ Majoris S.P. R. & D.	8. 23. 50	60'7	60'2	111	+ 0'12
	π Ursæ Majoris S.P. R. & D.	8. 29. 43	60'7	60'2	115	+ 0'12
	ρ Ursæ Majoris S.P. R. & D.	8. 51. 42	60'7	59'9	100	+ 0'16
	Aglaia R. & D.	21. 6. 6	60'7	59'9	193	+ 0'30
August 28	43 Camelopardi S.P. R. & D.	6. 40. 46	64'5	63'9	96	+ 0'11
	Piazzi VI. 285 S.P. R. & D.	7. 2. 32	64'5	62'5	61	+ 0'24
August 30	A Ursæ Majoris S.P. R. & D.	8. 23. 50	63'5	62'9	111	+ 0'16
	34 Lyncis S.P. R. & D.	8. 32. 43	63'5	62'5	390	+ 0'91
	Piazzi VIII. 137 S.P. R. & D.	8. 37. 56	63'5	62'5	103	+ 0'25
	Groombridge 1508 S.P. R. & D.	8. 57. 7	63'5	61'4	296	+ 1'44
Sept. 7	29 Sagittarii R. & D.	18. 42. 33	59'9	59'1	172	+ 0'28
	Lalande 36688 R. & D.	19. 21. 62	58'7	58'1	156	+ 0'18
	β Aquilæ R. & D.	19. 49. 25	58'7	56'9	58	+ 0'23
	Piazzi VIII. 105 S.P. R. & D.	8. 30. 24	56'9	55'6	216	+ 0'57
	28 Ursæ Majoris S.P. R. & D.	9. 36. 40	55'1	54'6	119	+ 0'12
	Piazzi IV. 187 S.P. R. & D.	9. 47. 37	55'1	54'3	82	+ 0'14
October 4	δ N. L. R. & D.	18. 36. 6	66'4	65'4	160	+ 0'32
Aug. 10. Piazzi XVII. 277. The reading of the barometer has also been altered from 29ⁱⁿ·63 to 29ⁱⁿ·65; for δ Aquilæ, from 29ⁱⁿ·67 to 29ⁱⁿ·68; for θ Aquilæ R. & D., from 29ⁱⁿ·69 to 29ⁱⁿ·70. Aug. 30. A Ursæ Majoris S.P. R. & D. The reading of the barometer has also been altered from 29ⁱⁿ·92 to 29ⁱⁿ·93, and for the observation of Groombridge 1508 S.P. to 29ⁱⁿ·94. Sept. 7. β Aquilæ. For this observation the reading of the barometer has also been altered from 29ⁱⁿ·90 to 29ⁱⁿ·91.						

The above corrections for the years 1877 to 1885 affect the planetary reductions in subsequent sections. The corresponding errata are as follows :—

ERRATA.

GREENWICH OBSERVATIONS, 1877.

PAGE.

- (27) No. 30. Refraction, for $1'. 6'' 68$, read $1'. 7'' 09$; Geocentric N.P.D. of Centre, for $87^\circ. 41'. 41'' 36$, read $87^\circ. 41'. 41'' 77$.
- (70) No. 2. Refraction, for $1'. 52'' 01$, read $1'. 52'' 15$; Geocentric N.P.D. of Centre, for $101^\circ. 13'. 22'' 29$, read $101^\circ. 13'. 22'' 43$.
- (70) No. 3. Refraction, for $1'. 51'' 98$, read $1'. 52'' 12$; Geocentric N.P.D. of Centre, for $101^\circ. 13'. 21'' 97$, read $101^\circ. 13'. 22'' 11$.
- (70) No. 6. Refraction, for $1'. 38'' 87$, read $1'. 39'' 06$; Geocentric N.P.D. of Centre, for $98^\circ. 11'. 0'' 21$, read $98^\circ. 11'. 0'' 40$.
- (70) No. 7. Refraction, for $1'. 38'' 87$, read $1'. 39'' 06$; Geocentric N.P.D. of Centre, for $98^\circ. 10'. 56'' 80$, read $98^\circ. 10'. 56'' 99$.
- (70) No. 13. Refraction, for $2'. 14'' 44$, read $2'. 14'' 72$; Geocentric N.P.D. of Centre, for $105^\circ. 18'. 32'' 24$, read $105^\circ. 18'. 32'' 52$.
- (71) No. 36. Refraction, for $1'. 53'' 33$, read $1'. 53'' 73$; Geocentric N.P.D. of Centre, for $100^\circ. 50'. 26'' 92$, read $100^\circ. 50'. 27'' 27$.
- (71) No. 37. Refraction, for $1'. 53'' 40$, read $1'. 53'' 75$; Geocentric N.P.D. of Centre, for $100^\circ. 50'. 26'' 27$, read $100^\circ. 50'. 26'' 62$.
- (75) No. 9. Refraction, for $1'. 42'' 88$, read $1'. 43'' 17$; Geocentric N.P.D. of Centre, for $99^\circ. 30'. 17'' 42$, read $99^\circ. 30'. 17'' 71$.
- (75) No. 10. Refraction, for $1'. 42'' 88$, read $1'. 43'' 17$; Geocentric N.P.D. of Centre, for $99^\circ. 30'. 17'' 62$, read $99^\circ. 30'. 17'' 91$.
- (75) No. 12. Refraction, for $1'. 38'' 23$, read $1'. 38'' 52$; Geocentric N.P.D. of Centre, for $98^\circ. 21'. 34'' 56$, read $98^\circ. 21'. 34'' 85$.
- (75) No. 13. Refraction, for $1'. 38'' 23$, read $1'. 38'' 52$; Geocentric N.P.D. of Centre, for $98^\circ. 21'. 31'' 96$, read $98^\circ. 21'. 32'' 25$.
- (82) No. 9. Refraction, for $1'. 30'' 72$, read $1'. 30'' 88$; Geocentric N.P.D. of Centre, for $95^\circ. 43'. 51'' 03$, read $95^\circ. 43'. 51'' 19$.
- (82) No. 10. Refraction, for $1'. 30'' 72$, read $1'. 30'' 88$; Geocentric N.P.D. of Centre, for $95^\circ. 43'. 50'' 98$, read $95^\circ. 43'. 51'' 14$.
- 33 Mars. Oct. 15. N.P.D. from Observation, for $101^\circ. 13'. 22'' 00$, read $101^\circ. 13'. 22'' 14$; Apparent Error of Nautical Almanac in N.P.D., for $-0'' 80$, read $-0'' 94$.
- 33 Mars. Oct. 18. N.P.D. from Observation, for $100^\circ. 50'. 26'' 47$, read $100^\circ. 50'. 26'' 82$; Apparent Error of Nautical Almanac in N.P.D., for $-0'' 47$, read $-0'' 82$.
- 33 Mars. Oct. 27. N.P.D. from Observation, for $99^\circ. 30'. 17'' 39$, read $99^\circ. 30'. 17'' 68$; Apparent Error of Nautical Almanac in N.P.D., for $-1'' 19$, read $-1'' 48$.
- 33 Mars. Nov. 16. N.P.D. from Observation, for $95^\circ. 43'. 50'' 89$, read $95^\circ. 43'. 51'' 05$; Apparent Error of Nautical Almanac in N.P.D., for $-0'' 59$, read $-0'' 75$.

GREENWICH OBSERVATIONS, 1877—continued.

PAGE.

- 34 Vesta. Oct. 15. N.P.D. from Observation, for $105^\circ. 18'. 32'' 10$, read $105^\circ. 18'. 32'' 38$; Apparent Error of Nautical Almanac in N.P.D., for $+4'' 30$, read $+4'' 02$.
- 34 Hebe. May 15. N.P.D. from Observation, for $87^\circ. 41'. 41'' 27$, read $87^\circ. 41'. 41'' 68$; Apparent Error of Berliner Jahrbuch in N.P.D., for $-18'' 97$, read $-19'' 38$.
- 40 Saturn. Oct. 15. N.P.D. from Observation, for $98^\circ. 10'. 58'' 39$, read $98^\circ. 10'. 58'' 58$; Apparent Error of Nautical Almanac in N.P.D., for $-8'' 49$, read $-8'' 68$.
- 40 Saturn. Oct. 27. N.P.D. from Observation, for $98^\circ. 21'. 33'' 13$, read $98^\circ. 21'. 33'' 42$; Apparent Error of Nautical Almanac in N.P.D., for $-11'' 13$, read $-11'' 42$.
- 45 Mars. Oct. 23. Mean Error in N.P.D., for $-1'' 41$, read $-1'' 50$; Error in Longitude, for $+5'' 48$, read $+5'' 51$; Error in E.N.P.D., for $+0'' 73$, read $+0'' 65$.
- 45 Vesta. Oct. 15. Mean Error in N.P.D., for $+5'' 88$, read $+5'' 79$; Error in Longitude, for $-13'' 22$, read $-13'' 17$; Error in E.N.P.D., for $+0'' 77$, read $+0'' 70$.
- 46 Saturn. Oct. 13. Mean Error in N.P.D., for $-9'' 35$, read $-9'' 40$; Error in Longitude, for $-1'' 85$, read $-1'' 83$; Error in E.N.P.D., for $-10'' 93$, read $-10'' 97$.
- 47 Mars. Oct. 23. Error of Tables in Hel. E.P.D., for $+0'' 28$, read $+0'' 25$.
- 48 Vesta. Oct. 15. Error of Tables in Hel. E.P.D., for $+0'' 90$, read $+0'' 85$.
- 49 Saturn. Oct. 13. Error of Tables in Hel. E.P.D., for $-9'' 99$, read $-10'' 03$.

GREENWICH OBSERVATIONS, 1879.

- (49) No. 20. Refraction, for $3'. 21'' 27$, read $3'. 21'' 63$; Geocentric N.P.D. of Centre, for $112^\circ. 55'. 38'' 28$, read $112^\circ. 55'. 38'' 64$.
- (63) No. 16. Refraction, for $1'. 43'' 32$, read $1'. 42'' 87$; Geocentric N.P.D. of Centre, for $99^\circ. 35'. 47'' 28$, read $99^\circ. 35'. 46'' 83$.
- 37 Venus. Sept. 2. N.P.D. from Observation, for $99^\circ. 35'. 47'' 39$, read $99^\circ. 35'. 46'' 94$; Apparent Error of Nautical Almanac in N.P.D., for $-0'' 19$, read $+0'' 26$.
- 38 Flora. July 24. N.P.D. from Observation, for $112^\circ. 55'. 38'' 35$, read $112^\circ. 55'. 38'' 71$.
- 50 Venus. September 1. Mean Error in N.P.D., for $-0'' 21$, read $-0'' 09$; Error in Longitude, for $+1'' 60$, read $+1'' 65$; Error in E.N.P.D., for $-0'' 92$, read $-0'' 81$.
- 52 Venus. Sept. 1. Error of Tables in Hel. E.N.P.D., for $-0'' 44$, read $-0'' 39$.

ERRATA—APPENDIX III.

(65)

GREENWICH OBSERVATIONS, 1880.

PAGE.

- (19) No. 34. Refraction, for $51^{\circ}39'$, read $51^{\circ}88'$; Geocentric N.P.D. of Centre, for $80^{\circ}13'25''40$, read $80^{\circ}13'25''89$.
- (65) Nos. 29 & 30. Refraction, for $2^{\circ}17'37''$, read $2^{\circ}17'59''$; Geocentric N.P.D. of Centre, for $105^{\circ}57'17''47$, read $105^{\circ}57'17''69$.
- (73) No. 3. Refraction, for $41^{\circ}07'$, read $40^{\circ}75'$; Geocentric N.P.D. of Centre, for $74^{\circ}54'16''65$, read $74^{\circ}54'16''33$.
- 39 Sun. Aug. 11. N.P.D. from Observation, for $74^{\circ}54'16''92$, read $74^{\circ}54'16''60$; Apparent Error of Nautical Almanac in N.P.D., for $-2^{\circ}02'$, read $-1^{\circ}70'$.
- 41 Moon. July 15. N.P.D. from Observation, for $105^{\circ}57'17''61$, read $105^{\circ}57'17''83$; Apparent Error of Nautical Almanac in N.P.D., for $+3^{\circ}59'$, read $+3^{\circ}37'$.
- 48 Uranus. March 1. N.P.D. from Observation, for $80^{\circ}12'25''67$, read $80^{\circ}12'26''16$; Apparent Error of Nautical Almanac in N.P.D., for $-2^{\circ}47'$, read $-2^{\circ}96'$.
- 52 Sun. August 22. Mean Error in N.P.D., for $+0^{\circ}21'$, read $+0^{\circ}25'$; Error in Longitude, for $+0^{\circ}96'$, read $+0^{\circ}97'$; Error in E.N.P.D., for $-0^{\circ}13'$, read $-0^{\circ}10'$.
- 54 Uranus. February 23. Mean Error in N.P.D., for $-1^{\circ}24'$, read $-1^{\circ}32'$; Error in Longitude, for $-1^{\circ}88'$, read $-1^{\circ}77'$; Error in E.N.P.D., for $-0^{\circ}59'$, read $-0^{\circ}66'$.
- 57 Uranus. February 23. Error of Tables in Hel. E.N.P.D., for $-0^{\circ}55'$, read $-0^{\circ}62'$.
- 60 Moon. July 15. Error in N.P.D., for $+3^{\circ}59'$, read $+3^{\circ}37'$; in Longitude, for $+11^{\circ}43'$, read $+11^{\circ}35'$; in E.N.P.D., for $-0^{\circ}53'$, read $-0^{\circ}73'$.

GREENWICH OBSERVATIONS, 1881.

- (18) No. 31. Refraction, for $56^{\circ}61'$, read $56^{\circ}82'$; Geocentric N.P.D. of Centre, for $81^{\circ}51'20''55$, read $81^{\circ}51'20''76$.
- (36) No. 28. Refraction, for $1^{\circ}20'49'$, read $1^{\circ}20'81'$; Geocentric N.P.D. of Centre, for $92^{\circ}11'34''83$, read $92^{\circ}11'35''15$.
- (38) Nos. 4 & 5. Refraction, for $2^{\circ}12'36'$, read $2^{\circ}12'59'$; Geocentric N.P.D. of Centre, for $103^{\circ}39'58''45$, read $103^{\circ}39'58''68$.
- (46) Nos. 26 & 27. Refraction, for $40^{\circ}30'$, read $40^{\circ}00'$; Geocentric N.P.D. of Centre, for $74^{\circ}5'12''50$, read $74^{\circ}5'12''20$.
- (58) No. 13. Refraction, for $1^{\circ}1'87'$, read $1^{\circ}1'97'$; Geocentric N.P.D. of Centre, for $-8^{\circ}48'52''28$, read $-8^{\circ}48'52''38$.
- 36 Moon. May 11. N.P.D. from Observation, for $103^{\circ}39'58''97$, read $103^{\circ}39'59''20$; Apparent Error of Nautical Almanac in N.P.D., for $+4^{\circ}68'$, read $+4^{\circ}40'$.
- 37 Moon. June 1. N.P.D. from Observation, for $74^{\circ}5'12''85$, read $74^{\circ}5'12''55$; Apparent Error of Nautical Almanac in N.P.D., for $-4^{\circ}15'$, read $-3^{\circ}85'$.
- 41 Juno. May 7. N.P.D. from Observation, for $92^{\circ}11'35''30$, read $92^{\circ}11'35''62$; Apparent Error of Nautical Almanac in N.P.D., for $-7^{\circ}50'$, read $-7^{\circ}82'$.
- 45 Comet δ 1881 S.P. July 11. N.P.D. from Observation, for $-8^{\circ}48'52''64$, read $-8^{\circ}48'52''74$; Apparent Error of Ephemeris in N.P.D., for $+2^{\circ}89'$, read $+2^{\circ}79'$.
- 47 Uranus. March 15. N.P.D. from Observation, for $81^{\circ}51'20''95$, read $81^{\circ}51'21''16$; Apparent Error of Nautical Almanac in N.P.D., for $-2^{\circ}05'$, read $-2^{\circ}26'$.

GREENWICH OBSERVATIONS, 1887.

GREENWICH OBSERVATIONS, 1881—continued.

PAGE.

- 53 Juno. May 12. Mean Error in N.P.D., for $-5^{\circ}28'$, read $-5^{\circ}36'$; Error in Longitude, for $-45^{\circ}18'$, read $-45^{\circ}20'$; Error in E.N.P.D., for $+6^{\circ}62'$, read $+6^{\circ}56'$.
- 53 Uranus. March 18. Mean Error in N.P.D., for $-1^{\circ}87'$, read $-1^{\circ}89'$; Error in Longitude, for $-2^{\circ}29'$, read $-2^{\circ}30'$; Error in E.N.P.D., for $-1^{\circ}08'$, read $-1^{\circ}10'$.
- 56 Juno. May 12. Error of Tables in Hel. E.N.P.D., for $+4^{\circ}57'$, read $+4^{\circ}53'$.
- 57 Uranus. March 18. Error of Tables in Hel. E.N.P.D., for $-1^{\circ}02'$, read $-1^{\circ}04'$.
- 59 Moon. May 11. Error in N.P.D., for $+4^{\circ}63'$, read $+4^{\circ}40'$; in Longitude, for $+10^{\circ}68'$, read $+10^{\circ}59'$; in E.N.P.D., for $+0^{\circ}74'$, read $+0^{\circ}52'$.
- 59 Moon. June 1. Error in N.P.D., for $-4^{\circ}15'$, read $-3^{\circ}85'$; in Longitude, for $+3^{\circ}87'$, read $+3^{\circ}94'$; in E.N.P.D., for $-5^{\circ}14'$, read $-4^{\circ}85'$.

GREENWICH OBSERVATIONS, 1882.

- (10) No. 6. Refraction, for $46^{\circ}54'$, read $46^{\circ}65'$; Geocentric N.P.D. of Centre, for $75^{\circ}42'21''03$, read $75^{\circ}42'21''14$.
- (19) No. 22. Refraction, for $1^{\circ}0'50'$, read $1^{\circ}0'86'$; Geocentric N.P.D. of Centre, for $83^{\circ}55'52''62$, read $83^{\circ}55'52''98$.
- (21) No. 15. Refraction, for $1^{\circ}0'44'$, read $1^{\circ}0'72'$; Geocentric N.P.D. of Centre, for $83^{\circ}48'47''54$, read $83^{\circ}48'47''82$.
- (21) No. 16. Refraction, for $1^{\circ}0'44'$, read $1^{\circ}0'72'$; Geocentric N.P.D. of Centre, for $83^{\circ}48'45''69$, read $83^{\circ}48'45''97$.
- (43) Nos. 13 & 14. Refraction, for $1^{\circ}20'79'$, read $1^{\circ}21'03'$; Geocentric N.P.D. of Centre, for $-15^{\circ}32'38''46$, read $-15^{\circ}32'38''70$.
- (50) Nos. 31 & 32. Refraction, for $1^{\circ}18'20'$, read $1^{\circ}18'99'$; Geocentric N.P.D. of Centre, for $92^{\circ}19'32''89$, read $92^{\circ}19'33''68$.
- (74) No. 14. Refraction, for $44^{\circ}67'$, read $44^{\circ}84'$; Geocentric N.P.D. of Centre, for $76^{\circ}19'45''81$, read $76^{\circ}19'45''98$.
- (84) No. 13. Refraction, for $43^{\circ}17'$, read $43^{\circ}29'$; Geocentric N.P.D. of Centre, for $75^{\circ}26'16''36$, read $75^{\circ}26'16''48$.
- 40 Moon. May 26. N.P.D. from Observation, for $92^{\circ}19'33''29$, read $92^{\circ}19'34''08$; Apparent Error of N.P.D. in Nautical Almanac, for $+1^{\circ}51'$, read $+0^{\circ}72'$.
- 44 Pallas. Aug. 11. N.P.D. from Observation, for $76^{\circ}19'46''13$, read $76^{\circ}19'46''30$; Apparent Error of N.P.D. in Nautical Almanac, for $-0^{\circ}63'$, read $-0^{\circ}80'$.
- 47 Sappho. Sept. 12. N.P.D. from Observation, for $75^{\circ}26'16''68$, read $75^{\circ}26'16''80$; Apparent Error of N.P.D. in Berliner Jahrbuch, for $+1^{\circ}33'71'$, read $+1^{\circ}33'59'$.
- 49 Uranus. Mar. 6. N.P.D. from Observation, for $83^{\circ}55'52''98$, read $83^{\circ}55'53''34$; Apparent Error of N.P.D. in Nautical Almanac, for $+0^{\circ}92'$, read $+0^{\circ}56'$.
- 49 Uranus. Mar. 13. N.P.D. from Observation, for $83^{\circ}48'46''98$, read $83^{\circ}48'47''26$; Apparent Error of N.P.D. in Nautical Almanac, for $+1^{\circ}72'$, read $+1^{\circ}44'$.
- 49 Neptune. Feb. 1. N.P.D. from Observation, for $75^{\circ}42'21''35$, read $75^{\circ}42'21''46$; Apparent Error of N.P.D. in Nautical Almanac, for $-1^{\circ}65'$, read $-1^{\circ}76'$.

I

(66)

ERRATA—APPENDIX III.

GREENWICH OBSERVATIONS, 1882—*continued*.

PAGE.

- 50 Comet *a* 1882 S.P. May 12. N.P.D. from Observation, for — 15°. 32'. 38"·72, read — 15°. 32'. 38"·96.
- 55 Uranus. March 13. Mean Error in N.P.D., for + 1"·62, read + 1"·57; Error in Longitude, for + 3"·23, read + 3"·21; Error in E.N.P.D., for + 0"·39, read + 0"·35.
- 58 Uranus. March 13. Error of Tables in Hel. E.N.P.D., for + 0"·37, read + 0"·33.
- 60 Moon. May 26. Error in N.P.D., for + 1"·51, read + 0"·72; In Longitude, for + 7"·67, read + 7"·36; In E.N.P.D., for — 1"·64, read — 2"·37.

GREENWICH OBSERVATIONS, 1883.

- (17) No. 32. Refraction, for 42"·92, read 43"·13; Geocentric N.P.D. of Centre, for 74°. 14'. 55"·33, read 74°. 14'. 55"·54.
- (17) No. 33. Refraction, for 42"·92, read 43"·13; Geocentric N.P.D. of Centre, for 74°. 14'. 54"·58, read 74°. 14'. 54"·79.
- (41) No. 1. Refraction, for 1'. 44"·69, read 1'. 45"·12; Geocentric N.P.D. of Centre, for 99°. 8'. 19"·24, read 99°. 8'. 19"·67.
- (41) No. 2. Refraction, for 1'. 44"·69, read 1'. 45"·12; Geocentric N.P.D. of Centre, for 99°. 8'. 16"·77, read 99°. 8'. 17"·20.
- (55) No. 34. Refraction, for 50"·44, read 50"·14; Geocentric N.P.D. of Centre, for 80°. 6'. 30"·37, read 80°. 6'. 30"·07.
- (57) No. 30. Refraction, for 3'. 21"·64, read 3'. 22"·13; Geocentric N.P.D. of Centre, for 112°. 52'. 50"·16, read 112°. 52'. 50"·65.
- (57) No. 31. Refraction, for 4'. 36"·61, read 4'. 37"·28; Geocentric N.P.D. of Centre, for 117°. 9'. 53"·96, read 117°. 9'. 54"·63.
- (58) No. 3. Refraction, for 33"·39, read 33"·05; Geocentric N.P.D. of Centre, for 69°. 3'. 34"·47, read 69°. 3'. 34"·13.
- (58) No. 4. Refraction, for 32"·70, read 32"·36; Geocentric N.P.D. of Centre, for 69°. 3'. 37"·44, read 69°. 3'. 37"·10.
- (61) No. 29. Refraction, for 3'. 17"·34, read 3'. 18"·43; Geocentric N.P.D. of Centre, for 112°. 23'. 39"·47, read 112°. 23'. 40"·56.
- (63) No. 23. Refraction, for 1'. 19"·33, read 1'. 19"·60; Geocentric N.P.D. of Centre, for 92°. 45'. 56"·36, read 92°. 45'. 56"·63.
- (64) No. 1. Refraction, for 31"·30, read 31"·08; Geocentric N.P.D. of Centre, for 67°. 27'. 23"·65, read 67°. 27'. 23"·43.
- (64) No. 2. Refraction, for 30"·62, read 30"·40; Geocentric N.P.D. of Centre, for 67°. 27'. 23"·30, read 67°. 27'. 23"·08.
- (88) No. 16. Refraction, for 36"·26, read 36"·00; Geocentric N.P.D. of Centre, for 71°. 38'. 40"·80, read 71°. 38'. 40"·54.
- (134) No. 18. Refraction, for 3'. 33"·63, read 3'. 32"·61; Geocentric N.P.D. of Centre, for 113°. 25'. 43"·64, read 113°. 25'. 42"·62.
- (134) No. 19. Refraction, for 3'. 33"·58, read 3'. 32"·56; Geocentric N.P.D. of Centre, for 113°. 25'. 45"·59, read 113°. 25'. 44"·57.
- 56 Sun. May 24. N.P.D. from Observation, for 69°. 3'. 36"·29, read 69°. 3'. 35"·95; Apparent Error of N.P.D. in Nautical Almanac, for + 1"·11, read + 1"·45.
- 57 Sun. June 4. N.P.D. from Observation, for 67°. 27'. 23"·79, read 67°. 27'. 23"·57; Apparent Error of Nautical Almanac in N.P.D., for — 1"·69, read — 1"·47.

GREENWICH OBSERVATIONS, 1883—*continued*.

PAGE.

- 61 Venus. April 8. N.P.D. from Observation, for 99°. 8'. 18"·59, read 99°. 8'. 19"·02; Apparent Error of N.P.D. in Nautical Almanac, for — 1"·79, read — 2"·22.
- 61 Venus. May 22. N.P.D. from Observation, for 80°. 6'. 30"·81, read 80°. 6'. 30"·51; Apparent Error of N.P.D. in Nautical Almanac, for — 4"·71, read — 4"·41.
- 62 Venus. Aug. 13. N.P.D. from Observation, for 71°. 38'. 41"·16, read 71°. 38'. 40"·90; Apparent Error of N.P.D. in Nautical Almanac, for — 1"·86, read — 1"·60.
- 62 Venus. Nov. 23. N.P.D. from Observation, for 113°. 25'. 45"·27, read 113°. 25'. 44"·25; Apparent Error of Nautical Almanac in N.P.D., for — 1"·57, read — 0"·55.
- 64 Hygeia. May 24. N.P.D. from Observation, for 112°. 52'. 50"·81, read 112°. 52'. 51"·30; Apparent Error of N.P.D. in Berliner Jahrbuch, for + 0'. 32"·45, read + 0'. 31"·96.
- 64 Hygeia. May 31. N.P.D. from Observation, for 112°. 23'. 40"·12, read 112°. 23'. 41"·21; Apparent Error of N.P.D. in Berliner Jahrbuch, for + 0'. 34"·22, read + 0'. 33"·13.
- 64 Melpomene. June 4. N.P.D. from Observation, for 92°. 45'. 56"·90, read 92°. 45'. (57"·17); Minutes and Seconds of N.P.D. in Berliner Jahrbuch, for 45'. (42"·66), read 45'. 42"·66; Apparent Error of N.P.D. in Berliner Jahrbuch, for — 0'. 14"·24, read — 0'. 14"·51.
- 64 Amphitrite. May 24. N.P.D. from Observation, for 117°. 9'. 54"·62, read 117°. 9'. 55"·29; Apparent Error of N.P.D. in Berliner Jahrbuch, for — 0'. 2"·44, read — 0'. 3"·11.
- 66 Saturn. Feb. 16. N.P.D. from Observation, for 74°. 14'. 55"·34, read 74°. 14'. 55"·55; Apparent Error of N.P.D. in Nautical Almanac, for — 1"·64, read — 1"·85.
- 72 Venus. April 2. Mean Error in N.P.D., for — 1"·80, read — 1"·86; Error in Longitude, for + 1"·09, read + 1"·11; Error in E.N.P.D., for — 1"·51, read — 1"·57.
- 72 Venus. Aug. 19. Mean Error in N.P.D., for + 0"·13, read + 0"·08; Error in Longitude, for + 0"·82, read + 0"·80; Error in E.N.P.D., for — 0"·13, read — 0"·17.
- 72 Venus. Nov. 30. Mean Error in N.P.D., for — 1"·99, read — 1"·78; Error in E.N.P.D., for — 2"·04, read — 1"·83.
- 74 Venus. April 2. Error of Tables in Hel. E.N.P.D., for — 2"·12, read — 2"·21.
- 74 Venus. Aug. 19. Error of Tables in Hel. E.N.P.D., for — 0"·31, read — 0"·41.
- 74 Venus. Nov. 30. Error of Tables in Hel. E.N.P.D., for — 4"·48, read — 4"·03.

GREENWICH OBSERVATIONS, 1884.

- (24) No. 30. Refraction, for 1'. 8"·83, read 1'. 9"·02; Geocentric N.P.D. of Centre, for 87°. 51'. 48"·11, read 87°. 51'. 48"·30.
- (32) No. 16. Refraction, for 33"·74, read 33"·85; Geocentric N.P.D. of Centre, for 68°. 10'. 9"·33, read 68°. 10'. 9"·44.
- (32) No. 17. Refraction, for 33"·72, read 33"·83; Geocentric N.P.D. of Centre, for 68°. 10'. 7"·53, read 68°. 10'. 7"·64.
- (32) No. 30. Refraction, for 1'. 0"·55, read 1'. 0"·72; Geocentric N.P.D. of Centre, for 83°. 51'. 7"·63, read 83°. 51'. 7"·80.

ERRATA—APPENDIX III.

(67)

GREENWICH OBSERVATIONS, 1884—continued.

PAGE.

- (32) No. 31. Refraction, for $1'. 8''$ ·94, read $1'. 9''$ ·14; Geocentric N.P.D. of Centre, for $87^\circ. 34'. 19''$ ·20, read $87^\circ. 34'. 19''$ ·40.
- (37) No. 14. Refraction, for $48''$ ·50, read $48''$ ·62; Geocentric N.P.D. of Centre, for $77^\circ. 56'. 29''$ ·56, read $77^\circ. 56'. 29''$ ·68.
- (39) No. 27. Refraction, for $1'. 7''$ ·40, read $1'. 7''$ ·63; Geocentric N.P.D. of Centre, for $87^\circ. 9'. 25''$ ·46, read $87^\circ. 9'. 25''$ ·69.
- (40) No. 7. Refraction, for $36''$ ·38, read $36''$ ·61; Geocentric N.P.D. of Centre, for $70^\circ. 18'. 18''$ ·27, read $70^\circ. 18'. 18''$ ·50.
- (40) No. 8. Refraction, for $36''$ ·37, read $36''$ ·60; Geocentric N.P.D. of Centre, for $70^\circ. 18'. 17''$ ·72, read $70^\circ. 18'. 17''$ ·95.
- (47) Nos. 15 & 16. Refraction, for $2'. 39''$ ·66, read $2'. 39''$ ·85; Geocentric N.P.D. of Centre, for $108^\circ. 20'. 30''$ ·38, read $108^\circ. 20'. 30''$ ·57.
- (86) No. 12. Refraction, for $3'. 20''$ ·16, read $3'. 20''$ ·85; Geocentric N.P.D. of Centre, for $112^\circ. 38'. 32''$ ·29, read $112^\circ. 38'. 32''$ ·98.
- 53 Moon. May 11. N.P.D. from Observation, for $108^\circ. 20'. 30''$ ·97, read $108^\circ. 20'. 31''$ ·16; Apparent Error of N.P.D. in Nautical Almanac, for $- 4''$ ·27, read $- 4''$ ·46.
- 56 Mars. April 22. N.P.D. from Observation, for $70^\circ. 18'. 18''$ ·32, read $70^\circ. 18'. 18''$ ·55; Apparent Error of N.P.D. in Nautical Almanac, for $+ 0''$ ·38, read $+ 0''$ ·15.
- 57 Vesta. August 5. N.P.D. from Observation, for $112^\circ. 38'. 32''$ ·89, read $112^\circ. 38'. 33''$ ·58; Apparent Error of N.P.D. in Nautical Almanac, for $+ 4''$ ·71, read $+ 4''$ ·02.
- 58 Irene. April 9. N.P.D. from Observation, for $77^\circ. 56'. 29''$ ·95, read $77^\circ. 56'. 30''$ ·07; Apparent Error of N.P.D. in Berliner Jahrbuch, for $- 0''$ ·29·98, read $- 0''$ ·30·10.
- 60 Alcmene. Mar. 24. N.P.D. from Observation, for $83^\circ. 51'. 8''$ ·07, read $83^\circ. 51'. 8''$ ·24; Apparent Error of N.P.D. in Berliner Jahrbuch, for $- 0''$ ·5·79, read $- 0''$ ·5·96.
- 61 Jupiter. Mar. 11. N.P.D. from Observation, for $68^\circ. 10'. 8''$ ·73, read $68^\circ. 10'. 8''$ ·84; Apparent Error of N.P.D. in Nautical Almanac, for $+ 0''$ ·67, read $+ 0''$ ·56.
- 62 Uranus. Mar. 7. N.P.D. from Observation, for $87^\circ. 51'. 48''$ ·58, read $87^\circ. 51'. 48''$ ·77; Apparent Error of N.P.D. in Nautical Almanac, for $+ 1''$ ·92, read $+ 1''$ ·73.
- 62 Uranus. Mar. 24. N.P.D. from Observations, for $87^\circ. 34'. 19''$ ·67, read $87^\circ. 34'. 19''$ ·87; Apparent Error of N.P.D. in Nautical Almanac, for $+ 2''$ ·03, read $+ 1''$ ·83.
- 62 Uranus. April 21. N.P.D. from Observation, for $87^\circ. 9'. 25''$ ·93, read $87^\circ. 9'. 26''$ ·16; Apparent Error of N.P.D. in Nautical Almanac, for $- 0''$ ·33, read $- 0''$ ·56.
- 73 Moon. May 11. Error in N.P.D., for $- 4''$ ·27, read $- 4''$ ·46; In Longitude, for $+ 0''$ ·43, read $+ 0''$ ·41; In E.N.P.D., for $- 4''$ ·37, read $- 4''$ ·55.

GREENWICH OBSERVATIONS, 1885.

- (15) No. 15. Refraction, for $47''$ ·88, read $48''$ ·38; Geocentric N.P.D. of Centre, for $77^\circ. 37'. 32''$ ·35, read $77^\circ. 37'. 32''$ ·85.

GREENWICH OBSERVATIONS, 1885—continued.

PAGE.

- (15) No. 16. Refraction, for $47''$ ·88, read $48''$ ·38; Geocentric N.P.D. of Centre, for $77^\circ. 37'. 29''$ ·91, read $77^\circ. 37'. 30''$ ·41.
- (39) No. 14. Refraction, for $53''$ ·85, read $53''$ ·75; Geocentric N.P.D. of Centre, for $81^\circ. 40'. 56''$ ·09, read $81^\circ. 40'. 55''$ ·99.
- (39) No. 15. Refraction, for $53''$ ·85, read $53''$ ·75; Geocentric N.P.D. of Centre, for $81^\circ. 40'. 57''$ ·12, read $81^\circ. 40'. 57''$ ·02.
- (44) No. 2. Refraction, for $37''$ ·79, read $37''$ ·89; Geocentric N.P.D. of Centre, for $71^\circ. 55'. 2''$ ·15, read $71^\circ. 55'. 2''$ ·25.
- (53) No. 27. Refraction, for $54''$ ·02, read $54''$ ·14; Geocentric N.P.D. of Centre, for $81^\circ. 42'. 45''$ ·67, read $81^\circ. 42'. 45''$ ·79.
- (66) Nos. 19 & 20. Refraction, for $2'. 44''$ ·29, read $2'. 44''$ ·46; Geocentric N.P.D. of Centre, for $108^\circ. 27'. 20''$ ·85, read $108^\circ. 27'. 21''$ ·02.
- (75) Nos. 17 & 18. Refraction, for $2'. 34''$ ·39, read $2'. 34''$ ·61; Geocentric N.P.D. of Centre, for $107^\circ. 33'. 57''$ ·88, read $107^\circ. 33'. 58''$ ·10.
- (75) No. 29. Refraction, for $1'. 50''$ ·50, read $1'. 50''$ ·97; Geocentric N.P.D. of Centre, for $100^\circ. 51'. 34''$ ·19, read $100^\circ. 51'. 34''$ ·66.
- 50 Moon. June 26. N.P.D. from Observation, for $108^\circ. 27'. 21''$ ·47, read $108^\circ. 27'. 21''$ ·64; Apparent Error of N.P.D. in Nautical Almanac, for $+ 0''$ ·13, read $- 0''$ ·04.
- 50 Moon. July 22. N.P.D. from Observation, for $107^\circ. 33'. 58''$ ·50, read $107^\circ. 33'. 58''$ ·72; Apparent Error of N.P.D. in Nautical Almanac, for $- 0''$ ·60, read $- 0''$ ·82.
- 52 Venus. April 17. N.P.D. from Observation, for $81^\circ. 40'. 56''$ ·06, read $81^\circ. 40'. 56''$ ·06; Apparent Error of N.P.D. in Nautical Almanac, for $- 1''$ ·16, read $- 1''$ ·06.
- 54 Ceres. May 23. N.P.D. from Observation, for $81^\circ. 42'. 46''$ ·12, read $81^\circ. 42'. 46''$ ·24; Apparent Error of N.P.D. in Nautical Almanac, for $- 7''$ ·02, read $- 7''$ ·14.
- 54 Pallas. April 27. N.P.D. from Observation, for $71^\circ. 55'. 2''$ ·51, read $71^\circ. 55'. 2''$ ·61; Apparent Error of N.P.D. in Nautical Almanac, for $- 1''$ ·21, read $- 1''$ ·31.
- 55 Hebe. July 22. N.P.D. from Observation, for $100^\circ. 51'. 34''$ ·78, read $100^\circ. 51'. 35''$ ·25; Apparent Error of N.P.D. in Berliner Jahrbuch, for $- 0''$ ·55, read $- 1''$ ·02.
- 57 Jupiter. February 19. N.P.D. from Observation, for $77^\circ. 37'. 31''$ ·55, read $77^\circ. 37'. 32''$ ·05; Apparent Error of N.P.D. in Nautical Almanac, for $+ 1''$ ·95, read $+ 1''$ ·45.
- 64 Jupiter. February 23. Mean Error in N.P.D., for $+ 0''$ ·06, read $- 0''$ ·02; Error in Longitude, for $+ 0''$ ·20, read $+ 0''$ ·17; Error in E.N.P.D., for $- 0''$ ·01, read $- 0''$ ·09.
- 68 Jupiter. February 23. Error of Tables in Hel. E.N.P.D., for $- 0''$ ·01, read $- 0''$ ·07.
- 70 Moon. June 26. Error in N.P.D., for $+ 0''$ ·13, read $- 0''$ ·04; In E.N.P.D., for $+ 0''$ ·13, read $- 0''$ ·04.
- 70 Moon. July 22. Error in N.P.D., for $- 0''$ ·62, read $- 0''$ ·84; In Longitude, for $+ 4''$ ·78, read $+ 4''$ ·75; In E.N.P.D., for $- 1''$ ·18, read $- 1''$ ·40.