

38TH CONGRESS,
1st Session.

HOUSE OF REPRESENTATIVES.

Ex. Doc.
No. 11.

REPORT
OF
THE SUPERINTENDENT
OF THE
COAST SURVEY,
SHOWING
THE PROGRESS OF THE SURVEY
DURING
THE YEAR 1863.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1864.

TEXAS TECHNOLOGICAL
COLLEGE
DEC 1862

T. H. 863

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List of registered hydrographic sheets, &c.—Continued.

Localities.	State.	Scale.	Date.	Hydrographers.	Register number.
Parrott Creek, from Coosaw to Morgan river, and part of Morgan river.....	South Carolina	1-10,000	1860	Lieut. J. P. Bankhead	744
Off-shore soundings from Fernandina to Cape Florida		1-400,000	1860	Lieut. A. Murray	770
Florida Reefs, from Coffin's Patches to Tennessee Reef	Florida	1-20,000	1860	Lieut. J. Wilkinson	773
Florida Reefs, abreast of upper and lower Matcumbe Keys	do	1-20,000	1862	G. Davidson	774
Florida Reefs, between Alligator and French Reef	do	1-40,000	1863	E. Cordell	777
Additional soundings off Boca Chica	do	1-20,000	1863	do	779
Charlotte harbor, main entrance	do	1-40,000	1863	do	797
Apalachicola bay	do	1-20,000	1860	Lieut. T. S. Phelps	747
Channel off Point Wilson, San Pablo bay	California	1-20,000	1863	A. F. Rodgers	781
Part of Carquines Straits	do	1-20,000	1863	do	
Resurvey of channel off Point Wilson, San Pablo bay	do	1-20,000	1862	Comdr. B. F. Sands	758
Resurvey of approaches to Mare Island Navy Yard	do	1-10,000	1862	do	759
Resurvey of part of Carquines straits	do	1-10,000	1862	do	760
Tomas bay, entrance and port of	do	1-10,000	1861	do	756
Tomas bay, from Tom's Point to head of navigation	do	1-10,000	1861	do	757
Koos bay, entrance and port of	Oregon	1-10,000	1861	J. S. Lawson	755

APPENDIX No. 17.

REPORTS OF PROFESSOR BENJAMIN PEIRCE, OF HARVARD, UPON THE OCCULTATIONS OF THE PLEIADES, IN 1841 AND 1842.

No. I.

CAMBRIDGE, November 7, 1863.

DEAR SIR: I have the honor to communicate the following report upon the observations of the occultations of the Pleiades of April 13, 1842, which I designate as No. I, because it is the last of the group of the Pleiades occultations, (1838-42.)

The immersions were on the moon's dark limb, and were observed at Edinburgh by Professor Henderson.

RECORD OF OBSERVATIONS.

The observations were made by Professor Henderson with the Sheepshanks Equatorial, and are published on page 273 of the Edinburgh Observations.

No. of star.	Edinburgh sid. time.
22	9h. 50m. 29.0s.
35	9 56 00.8
40	10 39 16.0

The latitude and longitude of Edinburgh Observatory were taken from the collection prepared by Dr. Gould for the Nautical Almanac.

EPHEMERIS.

The places of the moon were computed from Hansen's tables for 9h. 50m., 10h. 15m., and 10h. 40m. of Edinburgh sidereal time, and are as follows:

Edinb. sid. time.	D's longitude by B. P.	D's longitude. C. S. P.—B. P.	D's latitude by B. P.	D's latitude C. S. P.—B. P.	D's Hor. Par. by B. P.	Hor. Par. C. S. P.—B. P.
h. m.	° ' "	"	° ' "	"	"	"
9 50	58 05 30.73	—0.01	4 12 41.94	0.00	56 49.04	0.00
10 15	58 19 08.02	—0.07	4 13 03.13	0.00	56 49.55	0.00
10 40	58 32 45.31	0.02	4 13 24.08	0.00	56 50.08	0.00

The obliquity of the ecliptic = $23^{\circ} 27' 39''.47$.

Hence the moon's right ascension and declination were computed.

Edinb. sid. time.	D's R. A. by B. P.	D's R. A. C. S. P.—B. P.	D's declension by B. P.	D's declension C. S. P.—B. P.
h. m.	° ' "	"	° ' "	"
9 50	54 48 15.82	—0.03	23 51 17.98	0.00
10 15	55 02 53.16	—0.11	23 53 47.15	—0.03
10 40	55 17 31.08	0.03	23 56 15.05	—0.03

The constants of Alcyone were found to be—

	By B. P.	C. S. P.—B. P.
R. A. of Alcyone.....	54 31 41.71	—0.09
Decl. of Alcyone.....	23 36 47.89	0.08
Log. F.....	—0.000026	—2
Log. E.....	—4.2392	—0.0006

STEREOGRAPHIC CO-ORDINATES OF THE MOON REFERRED TO ALCYONE.

The parallax of the moon in right ascension and declination and the moon's augmented semidiameter were computed for Edinburgh for each ten minutes from 9h. 50m. to 10h. 40m. The following are the values:

Edinb. sid. time.	$-\Delta\pi\alpha$ by B. P.	$-\Delta\pi\alpha$ C. S. P.—B. P.	$-\Delta\pi\beta$ by B. P.	$-\Delta\pi\beta$ C. S. P.—B. P.	Σ_1 by B. P.	Σ_1 C. S. P.—B. P.
h. m.	"	"	"	"	"	"
9 50	34 48.04	0.00	43 45.47	—0.01	936.02	—0.01
10 00	34 41.59	0.00	44 16.92	—0.02	935.74	—0.01
10 10	34 31.49	0.00	44 48.25	—0.03	935.47	—0.02
10 20	34 17.77	0.00	45 19.42	—0.03	935.20	0.01
10 30	34 00.44	0.00	45 50.37	—0.03	934.93	—0.02
10 40	33 39.54	0.00	46 21.05	—0.02	934.67	—0.02

The co-ordinates of the moon for the stereographic projection of the Pleiades referred to Alcyone as the pole, and to the chart of the Pleiades for 1840, were next computed.

Edinb. sid. time.	$+x_m$ by B. P.	x_m C. S. P.—B. P.	$-y_m$ by B. P.	y_m C. S. P.—B. P.	Σ_2 by B. P.	Σ_2 C. S. P.—B. P.
h. m.	"	"	"	"	"	"
9 50	—1005.67	0.02	1754.39	—0.08	935.98	—0.01
10 00	—677.05	0.01	1726.55	—0.08	935.71	0.01
10 10	—345.03	—0.04	1698.56	—0.07	935.43	—0.02
10 20	—9.62	—0.02	1670.38	—0.10	935.16	0.01
10 30	329.15	0.02	1641.96	—0.09	934.89	—0.02
10 40	671.26	0.09	1613.22	—0.09	934.63	—0.02

EQUATIONS FOR THE CORRECTION OF THE MOON'S PLACE, AND OF THE LONGITUDE.

The following are the coefficients of the equations for the correction of the moon's place, and of the longitude:

No. of star.	D_p		D_b		$D_{\pi p}$		$D_{\lambda p}$		δp	
	B. P.	C. S. P. —B. P.	B. P.	C. S. P. —B. P.	B. P.	C. S. P. —B. P.	B. P.	C. S. P. —B. P.	B. P.	C. S. P. —B. P.
22	— .9815	0	— .1908	—3	.5544	0	— .5348	0	—0.94	0
35	— .9616	0	.2748	0	.2507	—11	— .5240	0	—1.14	.04
40	— .7712	0	— .6365	0	.7031	0	— .4203	0	—0.47	— .03

SOLUTION OF THE EQUATIONS.

The solution of these equations by the method of least squares, gives the following values of the coefficients of the final equations:

By B. P.	C. S. P.—B. P.	By B. P.	C. S. P.—B. P.
$[a^2] = 2.4830$	— .0001	$[bn] = .165$	.030
$[ab] = .4139$	— .0003	$[c^2] = .8648$	.0002
$[ac] = -1.3276$	.0004	$[cd] = .7234$	.0003
$[ad] = 1.3529$	— .0002	$[cm] = 1.138$	— .010
$[an] = 2.381$	— .022	$[d^2] = .7371$	.0
$[b^2] = .5170$	.0002	$[dm] = 1.298$	— .009
$[bc] = - .4844$	— .0008	$[m^2] = 2.404$	— .061
$[bd] = .2255$	— .0002		

And their solution gives—

By B. P., $\delta l = 0.959 - 0.167 \delta b_m + 0.535 \delta \pi - 0.545 \delta \lambda$, Edinburgh, with corrected $[m^2] = 0.121$.

By C. S. P., $\delta l = 0.950 - 0.167 \delta b_m + 0.534 \delta \pi - 0.545 \delta \lambda$, Edinburgh, with corrected $[m^2] = 0.102$.

The coefficients of the residual equations are—

Stars.	D_p	$D_{\pi p}$	$D_{\lambda p}$	δp by B. P.	δp by C. S. P.
22	— .027	.029	0	0	0
35	.400	— .263	0	—0.22	—0.18
40	— .509	.291	0	0.12	0.09

No. II.

DEAR SIR: I have the honor to communicate the following report upon the observations of the Pleiades of January 21, 1842, which I designate as No. II, because it is the second from the last of the group of Pleiades occultations, (1838-'42.)

The immersions were on the moon's dark limb, and were observed in the United States, at Washington by Mr. Gilliss, and at Cambridge by Mr. Bond.

RECORD OF OBSERVATIONS.

Washington.—The observations made at Washington are printed in Gilliss's astronomical observations, page 581, and all marked as "good."

No of star.	Mean Washington time of immersion.			Sidereal time.		
1	5h.	40m.	06.9s.	1h.	43m.	38.68s.
4	6	02	24.0	2	05	59.44
8	6	09	26.7	2	13	03.29
11	6	16	44.2	2	20	21.99
13	6	31	07.4	2	34	47.55
14	6	32	25.9	2	36	06.27
20	7	01	45.1	3	05	30.28

Cambridge.—The observations are printed in the Memoirs of the American Academy, new series, vol. III, p. 67.

No. of star.	Mean Cambridge time of immersion.		
4	6h.	41m.	04.6s.
11	6	55	26.0

The latitudes and longitudes of the places are taken from a manuscript table which will be sent to the office at another time. It is sufficient, for the present, to state that the assumed longitude of the observatory of Washington is 5h. 08m. 12s. W. of Greenwich, to which all American positions are referred.

The computations are contained in the accompanying sheets marked B. P. 1—7, and C. S. P. 1—14, and they are partly in duplicate and partly in quadruplicate.

EPHEMERIS.

The places of the moon were computed from Hansen's tables for 1h. 40m., 2h. 10m., 2h. 40m., and 3h. 10m. of Washington-sidereal time, and were as follows:

Wash. sid. time.	Δ 's longitude by B. P.	C. S. P.—B. P.	Δ 's latitude by B. P.	C. S. P.—B. P.	Δ 's Hor. Par. by B. P.	C. S. P.—B. P.
h. m.	° ' "	"	° ' "	"	' "	"
1 40	56 39 46.19	— .01	4 44 08.27	.04	57 57.77	.02
2 10	56 56 41.25	— .01	4 43 25.94	— .02	57 58.99	.01
2 40	57 13 37.09	.03	4 42 43.15	— .04	58 00.21	.00
3 10	57 30 33.70	— .04	4 41 59.95	.01	58 01.44	.00

The obliquity of the ecliptic = $23^\circ 27' 39''.52$.

Hence were computed the moon's right ascension and declination.

Wash. sid. time.	Δ 's R. A. by B. P.	C. S. P.—B. P.	Δ 's decl. by B. P.	C. S. P.—B. P.
h. m.	° ' "	"	° ' "	"
1 40	53 09 16.27	0.04	24 01 47.17	0.00
2 10	53 27 23.18	—0.01	24 05 07.58	— .07
2 40	53 45 31.88	0.05	24 08 25.97	— .08
3 10	54 03 42.37	—0.09	24 11 42.34	— .04

The constants of Alcyone were found to be as follows:

	By B. P.	C. S. P.—B. P.
R. A. of Alcyone	$54^\circ 31' 52''.15$	—0.12
Decl. of Alcyone	23 36 52.08	0.00
Log. F	—0.000038	—0.000000
Log. E	4.3214	—0.0005

STEREOGRAPHIC COORDINATES OF THE MOON REFERRED TO ALCYONE.

The parallax of the moon in right ascension and declination, and its augmented semidiameter were then computed for the Wilkes Observatory at Washington, and for the temporary Observatory at Cambridge. The computations for Washington were made for each ten minutes from 1h. 40m. to 3h. 10m. of Washington sidereal time, and for Cambridge, from 2h. 10m. to 2h. 40m. The following are the values:

1. For Washington.

Wash. sid. time.	$\Delta\pi^a$ by B. P.	C. S. P.—B. P.	$-\Delta\pi^b$ by B. P.	C. S. P.—B. P.	Semidiameter by B. P.	C. S. P.—B. P.
<i>h. m.</i>	"	"	"	"	"	"
1 40	23 36.19	0.01	17 07.10	0.00	964.44	-0.03
1 50	21 44.68	0.02	16 44.91	0.01	964.79	-0.03
2 00	19 50.73	0.00	16 24.47	0.00	965.10	0.00
2 10	17 54.55	0.02	16 05.80	-0.01	965.41	0.02
2 20	15 56.35	-0.01	15 48.93	-0.01	965.69	-0.02
2 30	13 56.33	-0.01	15 33.90	0.00	965.96	0.00
2 40	11 54.72	0.01	15 20.76	0.00	966.20	0.03
2 50	9 51.75	0.00	15 09.53	-0.02	966.43	0.04
3 00	7 47.64	-0.01	15 00.23	0.13	966.63	0.02
3 10	5 42.61	0.00	14 52.88	-0.01	966.82	0.01

2. For Cambridge.

Wash. sid. time.	$\Delta\pi^a$ by B. P.	C. S. P.—B. P.	$-\Delta\pi^b$ by B. P.	C. S. P.—B. P.	Semidiameter by B. P.	C. S. P.—B. P.
<i>h. m.</i>	"	"	"	"	"	"
2 10	12 20.47	0.05	18 52.93	0.06	965.52	0.10
2 20	10 24.55	0.05	18 41.32	0.08	965.75	0.11
2 30	8 27.43	0.05	18 31.51	0.11	965.96	0.13
2 40	6 29.32	0.03	18 23.55	0.12	966.15	0.14

The coordinates of the moon for the stereographic projection of the Pleiades referred to Alcyone as the pole are then computed:

1. For Washington.

Wash. sid. time.	$-x_m$ by B. P.	x_m by C. S. P. — x_m by B. P.	y_m by B. P.	y_m by C. S. P. — y_m by B. P.	Σ_2 by B. P.	Σ_2 by C. S. P. — Σ_2 by B. P.
<i>h. m.</i>	"	"	"	"	"	"
1 40	3246.33	+0.01	478.47	+0.02	964.42	-0.01
1 50	3016.39	-0.03	566.21	-0.05	964.76	-0.01
2 00	2788.63	-0.03	652.09	-0.06	965.07	-0.01
2 10	2562.82	-0.02	736.09	-0.07	965.36	0.00
2 20	2338.75	-0.03	818.19	-0.08	965.64	0.00
2 30	2116.25	-0.03	898.34	-0.09	965.91	-0.01
2 40	1895.12	-0.03	976.49	-0.09	966.15	-0.01
2 50	1675.13	-0.05	1052.60	-0.07	966.37	0.00
3 00	1456.07	-0.09	1126.66	-0.04	966.57	0.00
3 10	1237.76	-0.09	1198.67	-0.03	966.75	0.00

2. For Cambridge.

Wash. sid. time.	$-x_m$ by B. P.	x_m by C. S. P. — x_m by B. P.	y_m by B. P.	y_m by C. S. P. — y_m by B. P.	Σ_2 by B. P.	Σ_2 by C. S. P. — Σ_2 by B. P.
<i>h. m.</i>	"	"	"	"	"	"
2 10	2869.41	-0.01	570.67	-0.05	965.48	0.00
2 20	2643.15	-0.05	647.36	-0.06	965.71	-0.01
2 30	2417.90	-0.05	722.13	-0.08	965.91	0.00
2 40	2193.45	-0.03	794.94	-0.17	966.10	0.00

EQUATIONS FOR CORRECTION OF MOON'S PLACE AND LONGITUDE.

The following are the coefficients of the equations for the correction of the moon's place, and of the longitude:

Star.	$-D_p$		D_p		$-D_{\pi p}$		$-D_{\lambda p}$		δp	
	By B. P.	C. S. P.—B. P.	By B. P.	C. S. P.—B. P.	By B. P.	C. S. P.—B. P.	By B. P.	C. S. P.—B. P.	By B. P.	C. S. P.—B. P.
1. Wash.										
1	.9940	.00	.1080	.00	.5927	.00	.5604	.00	-2.07	.09
4	.9202	-02	.3915	-03	.3413	.19	.5191	-01	-2.07	.09
8	.9824	.02	.1863	-07	.5286	.27	.5544	.00	-2.57	.09
11	.9920	.00	.1271	-02	.4917	.04	.5599	.07	-2.68	.11
13	.8670	.00	.4983	-01	.2388	-11	.4896	.00	-1.39	.05
14	.9298	-04	.3713	-04	.2824	-04	.5245	-04	-1.52	.05
20	.9943	.00	.1021	-01	.2864	.02	.5624	-07	-2.91	.14
2.										
4	.8944	-02	.4173	-03	.1871	.04	.5048	-01	-2.78	.09
11	.9984	.00	.0570	-02	.3363	.02	.5643	-08	+2.26	.13

SOLUTION OF THE EQUATIONS.

The solution of these equations by the method of least squares gives for the final coefficients:

B. P.	C. S. P.—B. P.	B. P.	C. S. P.—B. P.
$[a^2] = .71872$	.0002	$[bm] = 2.5652$	-.0512
$[ab] = 1.2224$	.0006	$[c^2] = 1.2429$	.0005
$[ac] = 2.8313$	.0003	$[cd] = 1.5984$	-.0003
$[ad] = 4.0572$	-.0008	$[cm] = 6.724$	-.239
$[am] = 17.143$	-.587	$[d^2] = 2.2901$	-.0001
$[b^2] = .8126$	.0003	$[dn] = 9.676$	-.339
$[bc] = .2455$	-.0011	$[m^2] = 42.794$	-3.023
$[bd] = .6903$	.0004		

The solution of these equations gives:

$$\text{By B. P. } \delta b = .3903 \delta \pi - 0.''58.$$

$$\text{By C. S. P. } \delta b = .3926 \delta \pi - 0.''501.$$

$$\text{By B. P. } \delta l = -.4603 \delta \pi - 0.5644 \delta \lambda + 2.''484.$$

$$\text{By C. S. P. } \delta l = -.4607 \delta \pi - 0.5643 \delta \lambda + 2.''389.$$

The substitution of these values in the given equations for each observation leaves for the residual coefficients the following values:

By B. P. and C. S. P.

Place.	Star.	$D_{\pi p}$	$D_{\lambda p}$	δp B. P.	δp C. S. P.
1	1	-.093	0	.46	.45
1	4	-.070	0	-.01	.02
1	8	-.005	0	-.02	-.04
1	11	.016	0	-.14	-.14
1	13	-.034	0	.47	.48
1	14	.00	0	.57	.46
1	20	.132	0	-.50	-.44
2	4	.050	0	-.82	-.78
2	11	.146	0	4.77	

The observation of place 2, star 11, was omitted in the computations, from its evident error. The computations are contained in the accompanying 21 sheets, marked B. P. 1-7, and C. S. P. 1-14.

Very respectfully,

BENJAMIN PEIRCE.

A. D. BACHE, LL.D.,
Superintendent United States Coast Survey.

DEAR SIR: I have the honor to communicate the following report upon the occultations of the Pleiades of September 6, 1841, which I designate as No. V.

The immersions were on the moon's dark limb, and were observed at Washington, by Mr. Gilliss.

RECORD OF OBSERVATIONS.

Washington.—The observations are printed in Gilliss's astronomical observations, page 480, and all are marked as "good."

No. of star.	Mean Washington time of immersion.	Sidereal time.
2	11h. 54m. 53.2s.	22h. 58m. 18.35s.
1	12 04 13.9	23 08 40.59
4	12 14 55.2	23 19 23.64
11	12 33 53.5	23 38 35.06
13	12 34 34.6	23 39 06.27
14	12 40 33.0	23 45 05.65

EPHEMERIS.

The places of the moon were computed from Hansen's tables for 23h. 50m., 23h. 20m., 23h. 50m., sidereal time of Wilkes's Observatory at Washington, and were as follows:

Wash. sid. time.	D's longitude by B. P.	C. S. P. —B. P.	D's latitude by B. P.	C. S. P. —B. P.	D's Hor. Par. B. P.	C. S. P. —B. P.
h. m.	° ' "	"	° ' "	"	"	"
22 50	56 44 56.72	0.00	4 54 56.96	—0.04	57 41.88	0.02
23 20	57 01 44.22	0.12	4 55 28.17	—0.03	57 42.65	0.01
23 50	57 18 32.18	0.13	4 55 58.97	—0.03	57 43.42	0.01

The obliquity of the ecliptic = 23° 27' 41".41.

Hence the moon's right ascension and declination were computed.

Wash. sid. time.	D's R. A. by B. P.	C. S. P. —B. P.	D's declination B. P.	C. S. P. —B. P.
h. m.	° ' "	"	° ' "	"
22 50	53 11 39.01	0.03	24 14 30.85	—0.04
23 20	53 29 35.86	0.15	24 18 02.40	—0.04
23 50	53 47 34.21	0.18	24 21 31.89	0.00

The following were the constants of Alcyone:

	B. P.	C. S. P. —B. P.
R. A. of Alcyone.....	54° 31' 33".32	—0."09
Decl. of Alcyone.....	23 36 45.34	0.01
Log. F	0.000040	0
Log. E	6.2118	0

STEREOGRAPHIC CO-ORDINATES OF THE MOON REFERRED TO ALCYONE.

The parallax of the moon in right ascension and declination, and its augmented semidiameter, were computed for the place of observation for every ten minutes from 22h. 50m. to 23h. 50m. sidereal time.

The following are the values:

Wash. sid. time.	$\Delta\pi^a$		$-\Delta\pi^b$		Σ_1	
	B. P.	C. S. P. —B. P.	B. P.	C. S. P. —B. P.	B. P.	C. S. P. —B. P.
h. m.	"	"	"	"	"	"
22 50	46 45.57	0.01	27 05.35	—0.05	953.55	0
23 00	46 04.15	0.00	26 21.55	—0.01	954.08	0
23 10	45 17.77	0.01	25 38.35	—0.01	954.60	0
23 20	44 26.52	0.02	24 55.81	—0.01	955.11	0
23 30	43 30.49	0.02	24 14.01	.00	955.61	0
23 40	42 29.76	0.02	23 33.03	.01	956.10	0
23 50	41 24.42	0.03	22 52.95	.01	956.59	0

The following are the coordinates of the moon for the stereographic projection of the Pleiades referred to Alcyone as the pole:

Wash. sid. time.	$-x_m$		y_m		Σ_2	
	B. P.	C. S. P. —B. P.	B. P.	C. S. P. —B. P.	B. P.	C. S. P. —B. P.
h. m.	"	"	"	"	"	"
22 50	1820.03	—0.09	643.30	0.17	953.66	0.01
23 00	1529.25	—0.13	757.00	—0.01	954.18	.00
23 10	1243.00	—0.17	869.95	—0.05	954.70	.00
23 20	961.19	—0.20	982.17	—0.04	955.21	.00
23 30	683.74	—0.22	1093.60	—0.02	955.71	.00
23 40	410.56	—0.22	1204.14	.00	956.20	.00
23 50	141.58	—0.23	1313.73	—0.01	956.69	—0.01

EQUATIONS FOR CORRECTION OF THE MOON'S PLACE AND OF THE LONGITUDE.

The following are the coefficients for the correction of the moon's place and of the longitude; the star 13 is omitted because there seems to be an error in the record:

Place.	Star.	D_1p		D_2p		D_3p		D_4p		δp	
		B. P.	C. S. P. —B. P.	B. P.	C. S. P. —B. P.	B. P.	C. S. P. —B. P.	B. P.	C. S. P. —B. P.	B. P.	C. S. P. —B. P.
1	2	.7922	.02	.6103	—02	—1767	.00	.4435	.30	1.30	—0.08
1	1	1.	0	—0.0106	—02	.3233	.01	.5599	.37	1.95	—0.08
1	4	.8442	0	—0.5361	—01	.5326	—14	.4726	.31	.32	—0.20
1	11	.9992	.02	.0347	—05	.2638	.33	.5795	.40	1.83	—0.23
1	14	.8826	—02	—0.4699	—07	.4673	—08	.4942	.34	2.75	—0.36

SOLUTION OF THE EQUATIONS.

The solution of these equations by the method of least squares gives the following values of the coefficients of the final equations:

By B. P.	C. S. P.—B. P.	By B. P.	C. S. P.—B. P.
$[a^2] = 4.1177$	.0003	$[bc] = -.6027$	-.0035
$[ab] = -.3598$	-.0003	$[bm] = -.7815$	.3427
$[ac] = 1.3060$	.0013	$[c^2] = .7058$	-.0004
$[am] = 7.506$	-.863	$[cm] = 2.3336$	-.3433
$[b^2] = .8826$	-.0002	$[m^2] = 16.507$	-.3236

The solution of these equations gives:

By B. P., $\delta b = .5741 \delta \pi + 0''.12$.

By C. S. P., $\delta b = .5781 \delta \pi + 0''.20$.

By B. P., $\delta l = -.2670 \delta \pi - .5600 \delta \lambda + 1''.833$.

By C. S. P., $\delta l = -.2669 \delta \pi - .5600 \delta \lambda + 1''.631$.

The substitution of these values in the individual equations leaves for the residual coefficients the following values:

Star.	B. P. and C. S. P.		δp	
	$D_{\pi p}$	$D_{\lambda p}$	B. P.	C. S. P.
2	-.036	0	-.0.22	-.0.19
1	.050	0	.12	.24
4	0	0	-1.14	-1.15
11	.016	0	-.01	-.02
14	-.040	0	1.19	1.04

The computations are contained in the accompanying sheets, marked B. P. 1—4, C. S. P. 1—7.

Very respectfully,

BENJAMIN PEIRCE.

A. D. BACHE, LL.D.,

Superintendent United States Coast Survey.

APPENDIX No. 18.

REPORT OF DR. B. A. GOULD, ON THE COMPUTATIONS CONNECTED WITH OBSERVATIONS BY THE TELEGRAPHIC METHOD FOR DIFFERENCE OF LONGITUDE.

CAMBRIDGE, November, 1863.

DEAR SIR: The work under my direction during the past year has been of the same character as during the year preceding, consisting in great measure of computations and reductions of the field-work of former years. The determinations of six differences of longitude have been completed, and the former reductions repeated, wherever the new and more accurate data now at our disposal promised any appreciable improvement in the accuracy of the main result, or of any important collateral ones.

The subsidiary results continue to offer new inducements to further research, and but for the smallness of the force at my disposal many of the yet unexplained indications would have been further investigated. But my primary duty was manifestly to complete the definite determinations of longitude; and the greater part of our labor has been directed exclusively to this end.