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Harvard Lunar Plates

Measures and Reductions.

Mary Lowell.

Volume VI.

Plate no.	Date	Page
978	1911. March 13	1.
979	1911 March 13	18
1029	1911 April 10	38
1028	1911 April 10	55

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MC 978

Comparison Stars – see Vol X pp 56-57
standard coordinates.

	1	2	3
α	$10^h\ 54^m\ 54^s.10$	$10^h\ 55^m\ 02^s.26$	$10^h\ 57^m\ 54^s.59$
Φ	10 58 45	10 58 45.	10 58 45.
α−A	− 3 50.90	− 3 42.74	− 50.41
sin(α−A)	− 230.89	− 222.73	− 50.41
log "	2.363405	2.347788	1.702527
" cosδ	9.999280	9.999011	9.999381
" ξ_0	0.863445	0.845132	0.202857
ξ_0	−7.30220	−7.00005	−1.5980
ξ_1	− 13	− 26	− 4
ξ	10.69967	10.99969	16.40116
x	10.67757	11.13388	16.31303
x−ξ	− 210	+ 1369	− 913

	1	2	3
δ	$+10^\circ\ 24'\ 28''.9$	$+12^\circ\ 10'\ 54''.8$	$+9^\circ\ 39'\ 06''.9$
D	10 54 15	10 54 15	10 54 15
δ−D	− 29 46.1	+ 1 16 39.8	− 1 15 08.1
tan(δ−D)	− 1786.1	+ 4600.6	− 4508.8
log "	3.252190	3.662781	3.654066
" η_0	0.583305	0.99396	0.98521
" tanδ	9.26411	9.33422	9.22988
− ξ_0^2	17269	16903	04078
" η_1	8.0444	8.0779	6.7002
η_0	−3.8287	+9.8620	−9.6652
η_1	+ 111	+ 120	+ 5
η	18.1824	31.8740	12.3353
y	18.2606	31.9462	12.3487
y−η	+ 782	+ 722	+ 134

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Comparison Stars – see Vol V pp. 56-57.
Standard Coordinates.

	1	2	3
α	$10^h\ 54^m\ 54^s.10$	$10^h\ 55^m\ 02^s.26$	$10^h\ 57^m\ 54^s.59$
A	10 58 45	10 58 45.	10 58 45.
α−A	− 3 50.90	− 3 42.74	− 50.41
sin(α−A)	− 230.89	− 222.73	− 50.41
log "	2.363402n	2.347778n	1.702512n
" cosδ	9.994282	9.999011	9.999373
∴ ξ₀	0.863412n	0.845113n	0.203499n
ξ₀	−7.3023	−7.0005	−1.5977
ξ₁	− 13	− 26	− 4
ξ	25.6964	20.8958	14.4989
x	10.6757	11.1338	16.3103
x−ξ	− ~~207~~ 210	+ 1369	− ~~916~~ 913

	1	2	3
δ	$+10°\ 24'\ 28''.9$	$+12°\ 10'\ 54''.8$	$+9°\ 39'\ 06''.9$
D	10 54 15	10 54 15	10 54 15
δ−D	− 29 46.1	+ 1 16 39.8	− 1 15 08.1
sin(δ−D)	− 1786.1	+ 4600.6	− 4508.8
log "	3.252190n	3.662781	3.654061n
" η₀	0.583054n	0.993961	0.985211n
" tanδ	9.2641	9.3342	9.2333
ξ₀²	17269	16903	04078
" η₁	8.0444	8.0779	6.6937
η₀	−3.8287	+9.8620	−9.6652
η₁	+ 111	+ 120	+ 5
η	~~28.8934~~ 28.8398	~~32.8740~~ 32.8740	~~23.3593~~ 23.3593
y	18.2606	31.9462	13.6941
y−η	+ 782	+ 722	+ 134

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Comp. Stars - Standard Coords.

	4		5	
α	$11^h\ 02^m\ 34^s.42$		$11^h\ 05^m\ 57^s.93$	
A	10 58 45		10 58 45	
α-A	+ 3 49.42		+ 7 12.93	
sin(α-A)	+ 229.41		+ 432.86	
log "	2.360 61		2.636 35	
" cos δ	9.99 239		9.99 075	
" ξ_0	0.860 24		1.134 34	
ξ_0	+7.248 83		+13.625 9	
ξ_1	+ 10		+ 76	
ξ	25.249 3		31.632 6	
x	25.251 8		31.734 0	
x - ξ	+ 25		+ 1014	

	4		5	
δ	$+10^\circ\ 41'\ 37''.9$		$+11^\circ\ 47'\ 05''.2$	
D	10 54 15		10 54 15	
δ-D	− 12 37.1		+ 52 50.2	
tan(δ-D)	− 757.1		+ 31 705	
log "	2.879 15n		3.501 15	
" η_0	0.210 30n		0.832 28	
" tan δ	9.276 1		9.319 3	
" ξ_0^2	1.720 5		2.268 5	
" ξ_1	4.050 0		8.641 2	
η_0'	− 1.622 9		+ 6.796 4	
η_1	+ 112		+ 438	
η	20.388 3		26.840 2	
y	20.298 6		28.676 1	
y - η	− 89.7		− 1641	

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Comp. Stars - Standard Coords.

	4	5
α	$11^h\ 02^m\ 34^s.42$	$11^h\ 05^m\ 57^s.93$
A	10 58 45	10 58 45
α-A	+ 3 49.42	+ 7 12.93
sin(α-A)	+ 229.41	+ 432.86
log	2.360611	2.636355
log cos δ	9.999239	9.999065
log $\frac{1}{\Delta_0}$	0.860224	1.134244
3.	+7.24833	+13.62219
3,	+ 10	+ 76
3	25.24933	31.62295
z	25.25118	31.73340
z - 3	+ 2.5	~~+ 1045~~ 1014

	4	5
δ	$+10^\circ\ 41'\ 37''.9$	$+11^\circ\ 47'\ 05''.2$
D	10 54 15	10 54 15
δ-D	- 12 37.1	+ 52 50.2
tan(δ-D)	- 757.1	+ 31705
log	2.879155n	3.501135
log $\frac{\rho}{\rho_0}$	0.210300n	0.832278
log tan δ	9.2761	9.3225
log $\frac{1}{\Delta^2}$	1.7205	2.2685
log $\frac{r}{r_1}$	6.0500	8.6442
η_0	-1.6229	+6.7964
η_1	+ 112	+ 441
η	20.38833	28.84055
y	20.29856	28.67611
y - η	- 897	- 1644

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Comparison Stars - Measures.

	y		N		x		N	
	10.7	17726		15315	16771		14065	
	18.3	15118	20	79149	13520	14	72919	4
		12		13	20		01	
		18		05	69		59	
		18.2607		.2604	10.6748		.6766	
2	11.1	13861		17852	14767		16871	
	31.9	43955	99	173161	61000		15531	25
		99		10	0000		22	
		60		40	68		70	
		31.9462		.9461	11.1332		.1345	
3	16.3	15808		17180	16421		15830	
	12.4	12344	08	106545	95111	14	12720	20
		10		50	13		29	
		96		67	11		30	
		12.3493		.3481	16.3099		.3107	
4	25.2	16249		15481	15911		14439	
	20.3	13256	51	84555	18411	19	11909	16
		59		55	20		18	
		40		79	06		46	
		20.2991		.2981	25.2510		.2527	
5	31.8	14127		17650	15180		17564	
	28.7	73655	64	194123	12516	17	10228	16
		60		10	09		20	20
		17		40	82		70	
		28.6757		.6765	31.7333		.7347	

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Comparison Stars - Measures

	y		N		x		N	
4	10.7	17926	15315		16771		14065	
	18.3	15118	7914	09	13520	14	7291	94
		12	13		20		01	
		18	05		69		59	
		18.2607	.2604		10.6748		.6766	
2	11.1	13861	17852		14767		16871	
	51.9	43995	17316	10	61000		15531	25
		99	10		00		22	
		60	40		68		70	
		31.9462	.9461		11.1332		.1345	
3	16.3	15808	17140		16421		15830	
	12.4	12314	10654	51	95111	14	12720	20
		10	50		13		29	
		96	67		11		30	
		12.3493	.3481		1.630 99		.3107	
4	25.2	16249	15481		15911		14439	
	20.3	13256	84551	61	18411	19	11909	16
		59	55		20		18	
		40	74		06		46	
		20.2991	.2981		25.2510		.2527	
5	31.8	19127	17650		15180		17564	
	28.7	73654	19415	13	12516	17	10220	16
		60	10		09		20	20
		17	40		82		7	
		28.6757	.6765		31.7333		.7347	

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Points on moons limb - measures

4

	d	n
1		
17.0		13698
20.9	7785.89	1305136
	85	30
	7180	
	20.9394	.9341
2		
17.0	17884	15600
24.2	16190 80	7270 63
	00	65
	95	94
	24.1696	.1671
3		
18.0	17836	156550
24.5	12132 31	11335 32
	25	30
	30	41
	24.5704	.5686
4		
18.4	16828	14649
24.6	10950 36	1051230
max in	40	26
4	19	49
	24.5851	.5874
5		
19.0	16794	14689
24.4	12420 90	9054 52
	94	50
	91	83
	24.4392	.4366
6		
19.6		
24.0		

16864	17896
13477275	11270 70
60	74
58	90
19.6607	.6621

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Points on Morris Rinb-Measures

	d	n
1		
17.0		13698
20.9	7785 89	18051
	85	3030
	7180	
	20.9394	.9341
2		
17.0	17884	15600
24.2	16190 80	7270 63
	00	65
	95	94
	24.1696	.1671
3		
18.0	17836	15650
24.5	12132 31	11335 32
	25	30
	30	41
	24.5704	.5686
4		
18.4	16828	14649
24.6	10950 36	10512 30
max	40	26
4	19	49
	24.5881	.5874
5		
19.0	16794	14689
24.4	12420 90	9054 52
	94	50
	91	83
	24.4392	.4366
6		
19.6		16864 17896
24.0		13477 75 11270 70
		60 74
		58 90
		19.6607 .6621

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Points on moon's limb - measures.

	x		N	
7				
16.8		17256		17542
24.0		15319	25	9436	50
		21		49
		51		36
		16.8070		.8092
8				
16.3		16318		17489
23.0		8806	92	14955	72
		01		66
		20		89
		16.2480		.2527
9				
16.2		16340		16461
22.6		8351		14430	39
x =		46	46	29
anim		40		70
		16.2008		.2030
10				
16.4		15392		15450
22.0		8180		12649
		70	62	60	61
		93		40
		16.2778		.2790
11				
16.9		11352		9054	51
21.0		10583		34
		86	87	8279
		16.9233		.9233

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Points on nuclei - measures.

	x	N
7		
16.8	17256	17542
24.0	15319 25	9436 50
	21	49
	51	36
	16.8070	.8092
8		
16.3	16318	17489
23.0	8808 92	14955 72
	01	66
	20	89
	16.2480	.2524
9		
16.2	16340	16461
22.6	8351	14430 39
x ÷	4646	29
min	40	70
	16.2008	.2030
10		
16.4	15392	15450
22.0	8180 62	12649 61
	70	60
	93	40
	16.2778	.2790
11		
16.9	11352	9054 51
21.0	10583 87	34
	86	8279
	16.9233	.9233

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Comp. Stars - Mean measures + Coords of plate center.

Star	x	y	mean R.A.
1	10.6757	18.2606	$10^h\ 59^m\ 17^s$
2	11.1338	31.9462	+ 32
3	16.3103	123487	10 58 45
4	25.2518	20.2986	
5	31.7340	28.6761	mean Decl
5	95.11	111.53	$+10^\circ\ 56'\ 39''$
	19.02	22.31	− 2 24
	−18	−22	10 54 15
	+ 1.02	.31	
	31	465	$A = 10^h\ 58^m\ 45^s$
	31.62	144.15	$D = +10^\circ\ 54'\ 15''$

Preliminary Reduction.

Star	x − 3	−1174	− x	+2372
1	−210 − 2136	= −2346	−11 = −2357	= +15
2	+1369 − 3738	= −2369	−11 = −2380	= −8
3	−913 − 1445	= −2358	−16 = −2374	= −2
4	+25 − 2375	= −2350	−25 = −2375	= −3
5	+1014 − 3355	= −2341	−32 = −2373	= −1
Mean	18.2347 − 2638		−18	= 18.2063

Star	y − η	+115x	−2007	
1	+782	+1228	+2010	= +3
2	+722	+1280	+2002	= −5
3	+134	+1875	+2009	= +2
4	−897	+2904	+2007	= 0
5	−16.41	+3649	+2008	= +1
Mean	22.3528	+2096		= 22.5617

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Comp. Stars - Mean measures + Coords of plate center.

Star	x	y	mean R.A.
1	10.6757	18.2606	$10^h\ 59^m\ 17^s$
2	11.1338	31.9462	+ 32
3	16.3103	1.2348 7	$10\ 58\ 45$
4	25.2518	20.2986	
5	31.7340	28.6761	mean Dec.
5 | 95.11		11153	$+10^\circ\ 56'\ 39''$
	19.02	22.31	− 2 24
	−18.	−22	$10\ 54\ 15$
	+ 1.02	.31	
	31	465	$A = 10^h\ 58^m\ 45^s$
	31.62	14.4,15	$D = +10^\circ\ 54'\ 15''$

Preliminary Reduction.

Star	x − 3	− 1174	− x	+ 2374
1	−210	−2136 = −2346	−11. = −2357	= +15
2	+1369	−3738 = −2369	−11 = −2380	= − 8
3	− 913	−1445 = −2358	−16 = −2374	= − 2
4	+ 25	−2375 = −2350	−25 = −2375	= − 1
5	+1014	−3355 = −2341	−32 = −2373	= − 1
Mean	18.2347	− 7638	− 18	= 18.2063

Star	y − 7	+ 1152	− 2007	
1	+ 782	+ 1228 = + 2010		= + 3
2	+ 722	+ 1280 = + 2002		= − 5
3	+ 134	+ 1875 = + 2009		= + 2
4	− 897	+ 2904 = + 2007		= 0
5	−16.41	+ 3649 = + 2008		= + 1
Mean	22.5528	+ 2096		= 22.5617

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MC 978 1912 Nov. 21. 7

Times etc.

Exp. to stars 1911 Mar 13	8h	27m		To	9h	39m	
" " moon	8	33	02.0		8	33	02.2
clock fast		2	37.7			2	37.7
H. Sid T.	8	30	24.4				
H long	4	44	31.05				
G. Sid T.	13	14	55.45				
Sid. T. for moon	23	20	0.03				
Interval	13	54	55.42				
Reduction	−	2	16.78				
G. M. T.	13	52	38.64				

	R. a.				Decl.			
From Am. Eph.								
moon 14h	10h	57m	22.88		+11°	28′	06.″1	
motion in 1m = 2.0522				14.173				
" " −7.356	−		15.1D		+	1′	44.4	
Tabular place	10h	57m	07.78		11°	29′	50.5	

Moon's parallax 57′ 16.5″
" semidiam. 15′ 37.9

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Times etc.

Exp. to stars	1911 Mar 13	8^h	27^m		7^h	8^h	39^m	
mean		8	33	02.0		8	33	02.2
clock fast			2	37.7			2	37.7
H. Sid T.		8	30	24.4				
H Long		4	44	31.05				
G. Sid T.		13	14	55.45				
Sid. T Mn. noon		23	20	0.03				
Interval		13	54	55.42				
Reduction		–		2 16.78				
G M. T.		13	52	38.64				

	R. a.		Decl.	
From Am. Eph.				
moon 14^h	10^h 57^m	$22^s.88$	$+11°$	$28'$ $06''.1$
motion in 1^m = 2.0529			14.171	
" -7.356	–	15.10	+	$1'$ $44''.3$
Tabular place	10^h 57^m	$07^s.78$	$11°$	$29'$ $50''.4$

Moon's parallax $57'$ $16''.4$

" semidiam. $15'$ $37''.9$

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Plate constants -

Conditional Equations.

	a	b	c	x − x̄	y − ȳ
1	+ 10.68	+ 18.76	+ 1 =	+ 15	+ 3
2	+ 11.13	+ 31.95	+ 1 =	− 8	− 5
3	+ 16.31	+ 12.35	+ 1 =	− 2	+ 2
4	+ 25.25	+ 20.30	+ 1 =	− 3	0
5	+ 31.73	+ 28.68	+ 1 =	− 1	+ 1

Mean Equations.

+ 10.90	+ 25.10	+ 1 =	+ 3.50	− 1.00
+ 24.43	+ 20.44	+ 1 =	− 2.00	+ 1.00
+ 27.41	+ 16.97	+ 1 =	+ 3.33	+ 1.67
+ 21.43	+ 30.32	+ 1 =	− 4.50	− 2.00
− 13.53	+ 4.66	=	+ 5.50	− 2.00
− 4.02	− 13.35	=	+ 7.83	+ 3.67
+ 4.02	− 1.39	=	− 1.64	+ 0.59
	− 14.74	=	+ 6.19	+ 4.26
	b	=	− 0.42	− 0.29

− 13.53a = + 5.50 + 1.96 : + 7.46 − 2.00 + 1.35 : − 0.65

a = − 0.55 = + 0.05

+ 3.5	− 2.0	+ 3.3	− 4.5	− 1.0	+ 1.0	+ 1.7	− 2.0
+ 6.0	+ 13.5	+ 9.6	+ 11.7	− 0.5	− 0.2	− 0.8	− 1.0
+ 10.5	+ 8.6	+ 7.1	+ 12.7	+ 7.3	+ 5.9	+ 4.9	+ 8.7
+ 20.0	+ 20.1	+ 20.0	+ 19.9	+ 5.8	+ 5.7	+ 5.8	+ 5.7

c from x − x̄ c from y − ȳ

Residuals in x	C	O	O − C
− 6 − 8 + 20	+ 6	+ 15	+ 9
− 6 − 13 + 20	+ 1	− 8	− 9
− 9 − 5 + 20	+ 6	− 2	− 8
− 14 − 9 + 20	− 3	− 3	0
− 17 − 12 + 20	− 9	− 1	+ 8

Residuals in y	C	O	O − C
+ 1 − 5 + 6	+ 2	+ 3	+ 1
+ 1 − 9 + 6	− 2	− 5	− 3
+ 1 − 4 + 6	+ 3	+ 2	− 1
+ 1 − 6 + 6	+ 1	0	− 1
+ 2 − 8 + 6	0	+ 1	+ 1

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MC 978. 1912 Dec 17. 8

Plate Constants —

Conditional Equations

	a	b	c	= − 3	4 − 7
1	+ 10.68	+ 18.26	+ 1 =	+ 15	+ 3
2	+ 11.13	+ 31.95	+ 1 =	− 8	− 5
3	+ 16.31	+ 12.35	+ 1 =	− 2	+ 2
4	+ 25.25	+ 20.30	+ 1 =	− 5	0
5	+ 31.73	+ 29.68	+ 1 =	− 1	+ 1

Mean Equations

+ 10.90	+ 25.10	+ 1 =	+ 3.50	− 1.00
+ 24.43	+ 20.44	+ 1 =	− 2.00	+ 1.00
+ 17.41	+ 16.97	+ 1 =	+ 3.33	+ 1.67
+ 21.43	+ 30.32	+ 1 =	− 4.50	− 2.00
− 13.53	+ 4.66	=	+ 5.50	− 2.00
− 9.02	− 13.35	=	+ 7.83	+ 3.67
+ 4.02	− 1.39	=	− 1.64	+ 0.59
	− 14.7 a	=	+ 6.19	+ 4.26
	b	=	− 0.42	− 0.79
− 13.53 a	=	+ 5.50 + 1.96	+ 7.46	− 2.00 + 1.35	− 0.65
	a	=	− 0.55	=	+ 0.05

+ 3.5	− 7.0	+ 3.3	− 4.5	− 1.0	+ 1.0	+ 1.7	− 2.0
+ 6.0	+ 13.5	+ 9.6	+ 11.7	− 0.5	− 4.2	− 0.8	− 1.0
+ 10.5	+ 8.6	+ 7.1	+ 12.7	+ 7.3	+ 3.9	+ 4.9	+ 8.7
+ 20.0	+ 20.1	+ 20.0	+ 19.9	+ 5.8	+ 5.7	− 5.8	+ 5.7

c from x − 3 | c from y − 4

Results for x

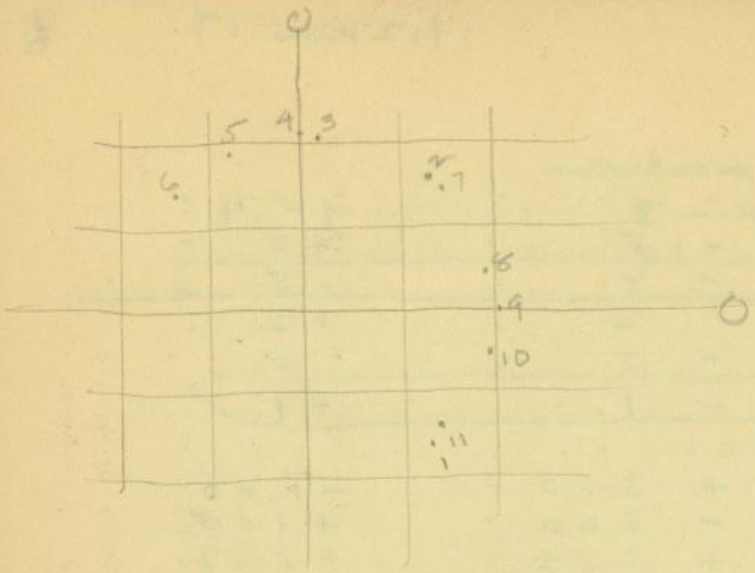
		C	O	O − C
− 6	− 8 + 20	+ 6	+ 15	+ 9
− 6	− 13 + 20	+ 1	− 8	− 9
− 9	− 5 + 20	+ 6	− 2	− 8
− 14	− 9 + 20	− 3	− 3	0
− 17	− 12 + 20	− 9	− 1	+ 8

Results for y

		C	O	O − C
+ 1	− 5 + 6	+ 2	+ 3	+ 1
+ 1	− 9 + 6	− 2	− 5	− 3
+ 1	− 4 + 6	+ 3	+ 2	− 1
+ 1	− 6 + 6	+ 1	0	− 1
+ 2	− 8 + 6	0	+ 1	+ 1

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Point	Pos. ∠	Resid
1	217.°4	+16
11	220.1	−34
10	25-42	−12
9	270.0	−12
8	282.7	+43
7	311.4	−24
2	322.6	+26
3	353.9	−103
4	0.0	+84
5	22.1	+57
6	44.5	−42

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1913 Jan 7

MC 078

Moon's Centre

Point	x	$x - X_0$		Δx	$(x-X_0)^2$	$(x-X_0)^2+(y-Y_0)^2$	O - C
1	17.0000	-1.2360	+	4	1.5267	4.1417	+ 74
2	17.0000	-1.2360	-	4	1.5267	4.1359	+ 16
3	18.0000	-0.2360	-	5	0.0560	4.1195	- 148
4	18.2360	0.0000	-	5	0.0000	4.1376	+ 33
5	19.0000	+0.7640	-	5	0.5830	4.1332	- 11
6	19.6614	+1.4254	-	4	2.0306	4.1274	- 119
7	16.8081	-1.4279	-	4	2.0400	4.1318	- 25
8	16.2504	-1.9856	-	1	3.9430	4.1421	+ 78
9	16.2019	-2.0341		0	4.1376	4.1376	+ 33
10	16.2784	-1.9576	+	1	3.8318	4.1385	+ 42
11	16.9233	-1.3127	+	4	1.7221	4.1367	+ 24
						4.1343	- 3

	y	$y - Y_0$		Δy	$(y-Y_0)^2$
1	20.9368	-1.6170	-	1	2.6150
2	24.1684	+1.6146	+	1	2.6072
3	24.5695	+2.0157	+	1	4.0635
4	24.5878	+2.0340	+	1	4.1376
5	24.4379	+1.8841	+	1	3.5502
6	24.0000	+1.4462	+	1	2.0918
7	24.0000	+1.4462	+	1	2.0918
8	23.0000	+0.4462	+	0	0.1991
9	22.5538	0.0000		0	0.0000
10	22.0000	-0.5538	-	0	0.3067
11	21.0000	-1.5538	-	1	2.4146

Approx Centre.

$x = 17.0$ $y = 20.9368$
24.1684
45.1052

mean $y = 22.5526$
$y = \max = 24.5878$
$R = 2.0352$
$x = \min = 16.2019$
mean $X = 18.2371$

$y = 24.0$ $x = 19.6614$
16.8081
36.4695

mean $X = 18.2348$
$x = \min = 16.2019$
$R = 2.0329$
$y = \max = 24.5878$
mean $Y = 22.5549$

Adopt $X_0 = 18.2360$
$Y_0 = 22.5538$

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1913 Jan 2

MC 978

Moon's Center

Pint	x	$x - X_0$		Δx	$(x-X_0)^2$	$(x-X_0)^2+(y-Y_0)^2$	O - C
1	17.0000	-1.2360	+	4	1.5267	4.1417	+ 74
2	17.0000	-1.2360	-	4	1.5287	4.1359	+ 16
3	18.0000	-0.2360	-	5	0.0560	4.1195	- 148
4	18.2360	0.0000	-	5	0.0000	4.1376	+ 33
5	19.0000	+0.7640	-	5	0.5830	4.1332	- 11
6	19.6614	+1.4254	-	4	2.0306	4.1274	- 119
7	16.8081	-1.4279	-	4	2.0400	4.1318	- 25
8	16.2504	-1.9856	-	1	3.9430	4.1421	+ 78
9	16.2019	-2.0341		0	4.1376	4.1376	+ 33
10	16.2784	-1.9576	+	1	3.8318	4.1385	+ 42
11	16.9233	-1.3127	+	4	1.7221	4.1367	+ 24
						4.1343	- 3

	y	$y - Y_0$		Δy	$(y-Y_0)^2$
1	20.9368	-1.6170	-	1	2.6150
2	24.1684	+1.6146	+	1	2.6072
3	24.5695	+2.0157	+	1	4.0635
4	24.5878	+2.0340	+	1	4.1376
5	24.4379	+1.8841	+	1	3.5502
6	24.0000	+1.4462	+	1	2.0918
7	24.0000	+1.4462	+	1	2.0918
8	23.0000	+0.4462	+	0	0.1991
9	22.5538	0.0000		0	0.0000
10	22.0000	-0.5538	-	0	0.3067
11	21.0000	-1.5538	-	1	2.4146

Approx Centr.

x = 17.0 y = 20.9368
24.1684
45.1052
mean y = 22.5526
y = max = 24.5878
R = 2.0352
x = min = 16.2019
mean X = 18.2371

y = 24.0 x = 19.6614
16.8081
36.4695
mean X = 18.2348
x = min = 16.2019
R = 2.0329
y = max = 24.5878
mean y = 22.5549

Adopt { X_0 = 18.2360
Y_0 = 22.5538

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Formation of Normals.

No		ab		an		bn
1	+	2.01	-	91.8	-	119.9
2	-	2.00	-	19.8	+	25.8
3	-	0.48	+	35.5	-	299.0
4	+	0.00		0.0	+	66.7
5	+	1.43	-	8.3	-	20.7
6	+	2.07	-	170.2	-	172.5
7	-	2.07	+	35.8	-	36.2
8	-	0.90	-	155.2	-	35.1
9	-	0.00	-	66.7	+	0.0
10	+	1.08	-	82.3	-	23.1
11	+	2.03	-	31.4	-	37.2
	+	3.17	-	554.4	-	651.2

$[aa] = +21.40$ $[bb] = +24.08$

$[ac] = -9.25$ $[bc] = +7.17$ $[cc] = -3$

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MC 9-78 1913 January 2. 10

Moon's Center.

Conditional Equations.

	a	b	cc	O					c	c - c
1	− 1.24	− 1.62	+ 1	= + 74	+ 33	+ 34	− 9	=	+ 58	+ 16
2	− 1.24	+ 1.61	+ 1	= + 16	+ 33	− 34	− 9	=	− 10	+ 26
3	− 0.24	+ 2.02	+ 1	= − 148	+ 6	− 42	− 9	=	− 45	− 103
4	0.00	+ 2.03	+ 1	= + 33	0	− 42	− 9	=	− 51	+ 84
5	+ 0.76	+ 1.88	+ 1	= − 11	− 20	− 39	− 9	=	− 68	+ 57
6	+ 1.43	+ 1.45	+ 1	= − 119	− 38	− 30	− 9	=	− 77	− 42
7	− 1.43	+ 1.45	+ 1	= − 25	+ 38	− 30	− 9	=	− 1	− 24
8	− 1.99	+ 0.45	+ 1	= + 78	+ 53	− 9	− 9	=	+ 35	+ 43
9	− 2.03	+ 0.00	+ 1	= + 33	+ 54	− 0	− 9	=	+ 45	− 12
10	− 1.96	− 0.55	+ 1	= + 42	+ 52	+ 11	− 9	=	+ 54	− 12
11	− 1.31	− 1.55	+ 1	= + 24	+ 35	+ 32	− 9	=	+ 58	− 34
									+ 226	− 227

Average (O-C) = 41

Normal Equations

a	b	c	
+ 21.40	+ 3.17	− 9.25	= − 554
+ 3.17	+ 24.08	+ 7.17	= − 651
− 9.25	+ 7.17	+ 11.00	= − 3
− 3.17	− 0.47	+ 1.37	= + 82
+ 9.25	+ 1.37	− 4.00	= − 239
	+ 23.61	+ 8.54	= − 569
	+ 8.54	+ 7.00	= − 242
	− 8.54	− 3.09	= + 206
		+ 3.91	= − 36
	− 10.40	− 8.54	= + 295
	+ 13.21		= − 274

$\frac{\Delta \delta}{\Delta N} = 203 : -.36 = -0.73$

c = − ~~11.5~~ − 9

b = − 21

− 7.77	+ 6.03	+ 9.25	= − 3
+ 6.03	− 4.67	− 7.17	= + 2
+ 13.63	+ 9.20		= − 557
+ 9.20	+ 19.41		= − 649
− 4.35	− 9.20		= + 308
+ 9.28			= − 249

a = − 27

− 160a + 77 | c = —

$\frac{\Delta \alpha}{\Delta N} = 203 : 1.48 = +0.98$

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Conditional Equations.

	a	b	cc	O			c	c − c
1	− 1.24	− 1.62	+ 1	: + 74	+ 33	+ 34 − 9	+ 58	+ 16
2	− 1.24	+ 1.61	+ 1	: + 16	+ 33	− 34 − 9	− 10	+ 26
3	− 0.24	+ 2.02	+ 1	: − 148	+ 6	− 42 − 9	− 45	− 103
4	0.00	+ 2.03	+ 1	: + 33	0	− 42 − 9	− 51	+ 84
5	+ 0.76	+ 1.88	+ 1	: − 11	− 20	− 39 − 9	− 68	+ 57
6	+ 1.43	+ 1.45	+ 1	: − 119	− 38	− 30 − 9	− 77	− 42
7	− 1.43	+ 1.45	+ 1	: − 25	+ 38	− 30 − 9	− 1	+ 24
8	− 1.99	+ 0.45	+ 1	: + 78	+ 53	− 9 − 9	+ 35	+ 43
9	− 2.03	+ 0.00	+ 1	: + 33	+ 54	− 0 − 9	+ 45	− 12
10	− 1.96	− 0.85	+ 1	: + 42	+ 52	+ 11 − 9	+ 54	− 12
11	− 1.31	− 1.55	+ 1	: + 24	+ 35	+ 32 − 9	+ 58	− 34
							−226	−227

Averg (O−C) = 41

Normal Equations.

a	b	c	
+ 21.40	+ 3.17	− 9.25	: − 554
+ 3.17	+ 24.08	+ 7.17	: − 651
− 9.25	+ 7.17	+ 11.00	: − 3
− 3.17	− 0.47	+ 1.37	: + 82
+ 9.25	+ 1.37	− 4.00	: − 239
	+ 23.61	+ 8.54	: − 569
	+ 8.54	+ 7.00	: − 242
	− 26.54	− 3.09	: + 206
		+ 3.91	: − 36
	− 10.40	− 8.54	: + 295
	+ 13.21		: − 274

$\frac{\Delta S}{\Delta N}$ = 203 : −.36 : −0.73

c : ~~−115~~ −9

b : −21

a	b	c	
− 7.77	+ 6.03	+ 9.25	: − 3
+ 6.03	− 4.67	− 7.17	: + 2
+ 13.63	+ 9.20		: − 557
+ 9.20	+ 19.41		: − 649
− 4.35	− 9.20		: + 308
+ 9.28			: − 249

a : −27

−160a +776c = −

$\frac{\Delta X}{\Delta N}$ = 203 : 4.48 : +0.98

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Woods mean position (1911.0)

$X_0 = 18.2360$ $Y_0 = 22.5538$
$+\frac{1}{2}a = -13$ $\frac{1}{2}b = -10$
$X = 18.2347$ $Y = 22.5528$

From preliminary reduction $X = 18.2063$ $Y = 22.5617$
Computed Plate constants. $ax = -10$ $+1$
$by = -9$ -7
$d = +20$ $+6$
$X = 18.2064$ $Y = 22.5617$

$\xi = +0.2064$
$\log \xi = 9.31471$
$\log \cos\delta = 9.99198$
const = 8.50724
$\log(\xi \sec\delta A) = 0.81549$
$\alpha - A = +6.54$
$A = 10\ 58\ 45.$
$\alpha_0 = 10^h\ 58^m\ 51^s.54$
Red = +1.30
$\alpha' = 10^h\ 58^m\ 52^s.84$

$\eta = +0.5617$
$\log \tan\delta = 9.30085$
$\log \eta^2 = 8.62252$
const = 7.0534
$\log \eta_1 = 9.74950$
const = 73115
$\log \eta_0 = 4.9871$
$(\delta - D) = 2.41835$
$\delta - D = +262.0$
$= 4'\ 22.0$
$D = 10\ 54\ 15.$
$\delta_0 = +10^\circ\ 58'\ 37.0$
Red = −5.1
$\delta' = +10^\circ\ 58'\ 31.9$

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Woods mean position (1911.0)

$X_0 = 18.2360$ $Y_0 = 22.5538$

$+\frac{1}{2}a = \quad -13$ $+\frac{1}{2}b = \quad -10$

$X = 18.2347$ $Y = 22.5528$

From preliminary reduction $X = 18.2063$ $Y = 22.5617$

Computed Plate consts. $ax = \quad -10$ $+1$

$by = \quad -9$ -7

$d = \quad +20$ $+6$

$X = 18.2064$ $Y = 22.5617$

$\xi = +0.2064$ $\eta = +0.5617$

log = 9.31494 log 9.3085

cos² = 9.99198 $D\xi^2$ 8.6252

const 8.50724 const 7.0534

$(X\xi + A) = 0.815499$ $\therefore \eta_0 = 4.9871$

$\alpha - A = \quad +6.54$ $\log \eta_1 = 9.74950$

$\alpha = 10\ 58\ 45.$ const 7.32115

$\alpha = 10^h\ 58^m\ 51^s.54$ $\therefore (\delta - D) 241835$

Red. $+\ 130$ $\delta - D = +262.0$

$= 4'\ 22.0$

$\alpha' \quad 10^h\ 58^m\ 52^s.84$ $D = 10\ 54\ 15.$

$\delta = +10°\ 58'\ 37.0$

Red $= \quad -51$

$\delta' = +10°\ 58'\ 31.9$

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1913 Jan 4.

12

Lunar parallax

α'	=	10^h	58^m	$52^s.84$
$\odot$	=	8	30	24.4
$\odot - \alpha'$	=	−2	28	28.4
	=	−37°	07′	06″

$\frac{1}{2}(\alpha - \alpha')$ = − 13 03

$(\odot - \delta') - \frac{1}{2}(\alpha - \alpha')$ = − 36 54 03

δ' = +10° 58′ 31″.9

π = 57′ 16″.5

log parallax ϕ = 9.869137

$\therefore \sin \pi$ = 8.221677

$\therefore \sin(\odot - \alpha')$ = 9.780666 n

$\therefore \cos \delta'$ = 9.991199

$\therefore \sin(\alpha - \alpha')$ = 7.880264 n

App. $(\alpha - \alpha')$ = − 26′ 06″.4

log cos δ = 9.991200

$\therefore \sin(\alpha - \alpha')$ = 7.880264 n

$(\alpha - \alpha')$ = − 26′ 05.6″

= − $1^m 44^s.37$

log tan ϕ' = 9.957277

$\therefore \cos \frac{1}{2}(\alpha - \alpha')$ = 0.000000

$\therefore \cos[(\odot - \alpha') - \frac{1}{2}(\alpha - \alpha')]$ = 9.902792

$\therefore \tan \gamma$ = 0.054485

γ = 48° 34′ 33″.7

δ'	=	10	58	31.9
$\gamma - \phi'$	=	37	36	01.8

log $\rho \sin \phi'$ = 9.826400

$\therefore \sin \pi$ = 8.221677

$\therefore \sin(\gamma - \delta')$ = 9.785447

$\therefore \gamma$ = 9.874969

$\therefore \sin(\gamma - \delta')$ = 7.958555

$\delta - \delta'$ = + 31 14.9

δ = +11 29 46.8

α = 10^h 57^m $08^s.47$

α = 10^h 57^m $07^s.78$

+ 0.69

− 0.01

+ 0.68

Am Eph δ = +11° 29′ 50.5″

O − C = − 3.7

Corr to standard sys 0.0

Final O − C = − 3.7

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lunar parallax

α'	=	10^h	58^m	$52^s.81$	δ'	=	$+10^\circ$ $58'$ $31''.9$
$\odot$	=	8	30	24.4	π	=	$57'$ $16''.4$
$\odot - \alpha'$	=	-2	28	28.4			
	=	-37°	$07'$	$06''$			

$\log \rho \cos\phi' = 9.869.13$
$\sin \pi = 8.221.66$
$\therefore \sin(\odot - \alpha') = 9.780664_n$
$\cos \delta' = 9.991.19$
$\therefore \sin(\alpha - \alpha') = 7.848026_n$

$\frac{1}{2}(\alpha - \alpha')$ = -13 03

$\delta - \delta' - \frac{1}{2}(\alpha - \alpha')$ = -36 54 03

Appr. $(\alpha - \alpha')$ = $-26'$ $06''$

$\log \cos\delta = 9.991.20$
$\therefore \sin(\alpha - \alpha') = 7.848021_n$
$(\alpha - \alpha')$ = $-26'$ 05.6
= $-1^m 44^s.37$

$\log \tan\phi' = 9.957.27$
$\cos^1_2(\alpha - \alpha') = 0.000.00$
$\cos\{(\odot - \alpha') - \frac{1}{2}(\alpha - \alpha')\} = 9.902.92_n$
$\tan \chi = 0.054.35$

$\chi = 48^\circ\ 34'\ 33''.7$
$\delta' = 10\ 58\ 31.9$
$\chi - \phi' = 37\ 36\ 04.1$

$\log \rho \sin\phi' = 9.826.40$
$\sin \pi = 8.221.66$
$\therefore \sin(\chi - \delta') = 9.785.44$
$\therefore Y = 9.874.96$
$\sin(Y - \delta') = 7.958.53$

$\delta - \delta' = +31\ 14.9$

$\delta = +11\ 29\ 46.8$

Am Eph $\delta = +11^\circ\ 29'\ 50''.5$

$O - C = -3.7$

Corr to standard sys: 0.0

Final $O - C$ = -3.7

$K = 10\ 57\ 08.47$

$\alpha = 10^h\ 57^m\ 07^s.78$
$+ 0.69$
$- 0.01$
$+ 0.68$

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1911 Nov. 21

11AC979.

Comparison Stars see Vol V pp. 57-58.

Standard Coords.

	1	2	3
α	$10^h\ 54^m\ 54^s.10$	$10^h\ 55^m\ 02^s.26$	$10^h\ 57^m\ 54^s.59$
A	10 59 15	10 59 15	10 59 15
α-A	− 4 20.90	− 4 12.74	− 1 20.41
Sin(α-A)	− 260.88	− 252.73	− 80.41
log "	2.416444n	2.402666n	1.905311n
" cosδ	9.992800	9.990011	9.993816
" ξ_0	0.916480n	0.900001n	0.406360n
ξ_0	−8.2505	−7.9435	−2.5489
ξ_1	− 17	− 30	− 7
ξ	26.2522	25.9465	20.5496
x	26.3041	25.8253	20.6778
x−$\bar{x}$	− 519	+ 1212	− 1282

Signs of ξ_0 & η changed.

δ	+10° 24′ 28.″9	+12° 10′ 54.″8	+9° 39′ 06.″9
D	10 56 34	10 56 34	10 56 34
δ−D	− 32 05.1	+ 1 14 20.8	−1 17 27.1
tanδ−D	− 1925.2	+ 4461.5	− 4647.9
log "	3.284848n	3.649948	3.667264n
log η_0	0.615634n	0.980634	0.998411n
" tanδ	9.2641	9.3342	9.2333
" ξ_0^2	1.8330	1.8000	0.8126
" η_1	8.1505	8.1876	7.0993
η_0	−4.1270	+9.5638	−9.9635
η_1	+ 141	+ 154	+ 13
η	26.1129	12.4208	31.9622
η	26.0218	12.3366	31.9418
η−η	+ 911	+ 842	+ 204

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NAC 9-79. 1912 Nov. 21. 18

Comparison Stars see Vol. X pp. 57-58.

Standard Coords.

	1	2	3
α	$10^h\ 54^m\ 54^s.10$	$10^h\ 55^m\ 02^s.26$	$10^h\ 57^m\ 59^s.59$
A	10 59 15	10 59 15	10 59 15
α-A	− 4 20.90	− 4 12.74	− 1 20.41
sin(α-A)	− 260.88	− 252.73	− 80.41
log "	2.416444n	2.402666n	1.905311n
" cos δ	9.99282	9.99011	9.99373
" S_0	0.916650n	0.900011n	0.906284n
S_0	−8.2508	−7.9435	−2.5485
S_1	− 17	− 30	− 7
S	26.2525	25.9465	20.5492
z	26.3041	25.8253	20.6778
x-X	~~− 516~~ 519	+ 1212	~~− 1286~~ 1282

Signs of x + y changed.

δ	+10° 24′ 28.″9	+12° 10′ 54.″8	+9° 39′ 06.″9
D	10 56 34	10 56 34	10 56 34.
δ-D	− 32 05.1	+ 1 14 20.8	−1 17 27.1
S_1-D	− 1925.2	+ 4461.5	− 4647.9
log x_0	3.284448n	3.649948	3.667264n
log y_0	0.615634n	0.980634	0.998414n
+ tan δ	9.2641	9.3542	9.2333
S_0^2	1.8530	1.8000	0.8126
y_1	8.1505	8.1876	7.0993
x_0	−4.12700	+9.56388	−9.96354
y_1	+ 141.	+ 154	+ 13
y	26.1129	12.4208	31.9622
y	26.0218	12.3366	31.9418
y-Y	+ 911	+ 842	+ 204

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MC 979: 1912 Nov. 21

Comp. Stars: Standard coords.

	4		5
α	$11^h\ 02^m\ 34^s.42$		$11^h\ 05^m\ 57.93^v$
A	10 59 15		10 59 15
α−A	+ 3 19.42		+ 6 42.93^v
sin(α−A)	199.41		+ 402.87^v
log	2.299975		2.605177^v
log δ	9.992239		9.990755^v
log ξ_0	0.799938		1.103316^v
ξ_0	+6.3006		+12.6812^v
ξ_1	+ 8		+ 62^v
ξ	11.6986		5.3126^v
x	11.7278		5.2298
x − ξ	− 292		+ 828^v

Signs of x + y changed.

δ	+10° 41′ 37.″9	11° 47′ 05.″2
D	10 56 34	10 56 34
(δ−D)	− 14 56.1	+ 50 31.2^v
tan(δ−D)	− 896.1	+ 3031.4^v
log	2.952856$_n$	3.481657^v
log η_0	0.283514	0.812804
log tan δ	9.2761	9.3193
log ξ_0^2	1.5988	22063
log η_1	7.9283	8.5790
η_0	−1.9209	+6.4983
η_1	+ 85	+ 379
η	23.9124	15.4638
y	24.0044	15.6392
y − η	− 920	− 1754

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IC 979. 1912 Nov. 21

Comp. Stars. Standard Coords.

	4		5
α	$11^h\ 02^m\ 34^s.42$		$11^h\ 05^m\ 57.93$
A	10 59 15		10 59 15
α − A	+ 3 19.42		+ 6 42.93
sin(α − A)	199.41		402.87
log	2.299975		2.605017
log cos δ	9.994239		9.990065
log ξ₀	0.799938		1.103082
ξ₀	+6.3006		+12.6782
ξ₁	+ 8		+ 62
ξ	11.6986		5.3156
x	11.7278		5.2298
x − ξ	− 292		~~+ 858~~ + 828

Signs of x + y changed.

δ	+10° 41′ 37″.9	11° 47′ 05″.2
D	10 56 34	10 56 34
(δ − D)	− 14 56.1	+ 50 31.2
tan(δ − D)	− 896:1	+ 3031.4
log	2.952536n	3.481650
log η₀	0.283514n	0.812800
log tan δ	9.2761	9.3223
log ξ₀²	1.5988	2.2061
log η₁	7.9283	8.5818
η₀	−1.9209	+6.4983
η₁	+ 85	+ 382
η	23.9124	15.4635
η₂	24.0044	15.6392
y − η	− 920	~~− 1757~~ 1754

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MC979 1912 Nov. 15. 20

Comparison stars - measures.

V	d	N	d	N
26.8	12330	7320 19	17660	16870
26.9	12106 12	14	10705 00	13833 27
	11	7105	00	31
			68	90
	26.0220	26.0215	26.3036	26.3046
E.				
25.8	15748	15421	14800	14480
12.3	12371	8770 80	13050 41	6233 29
	71 67	80	51	20
	34	15	00	87
	12.3373	12.3560	25.8247	25.8259
F				
20.7	6415 19	12619	18504	18530
31.9	25	12031 34	15284 78	11751 45
	5840	41	85	49
			20	32
	31.9420	31.9416	20.6772	20.6783
4				
11.8	10270	11435 34	15487	16789
24.0	10227 26	33	12764 65	9511 07
	24	11.390	55	11
			91	97
	24.0044	24.0044	7270	11.7285
S				
	17200	15271	17207	15663
5.2	10796 00	11650 60	9504 14	13360 61
15.6	07	58	11	61
	99	67	20	67
	15.6398	15.6387	5.2294	5.2303

Remeasure x stars. Jan 18

15259	16700
7581 81	14403 01
81	05
83	10
5.2304	5.2299

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MC979 1912 Nov. 15 20

Comparison stars - measures.

V	d		r		d		r	
26.8	12330		7320	19	17660		16870	
26.9	12106	12	14		10705	00	13833	27
	11		7163		00		31	
					64		90	
	26.0220		26.0215		26.3036		26.3046	
2.								
25.8	15748		15421		14800		14480	
12.3	12271		87	90	13050	41	6233	29
	71	67			51		20	
	34		1		00		87	
	12.3372		12.3369		25.8247		25.8259	
3								
20.7	6415	19	12619		18504		18530	
31.9	25		12031	34	15284	78	11751	45
	5840		41		85		49	
					20		32	
	31.9420		31.9416		20.6772		20.6783	
4.								
11.8	10270		11435	34	15497		16789	
24.0	10227	26	33		12764	65	9511	07
	24		11390		55		11	
					91		97	
	24.0044		24.0044		7270		11.7285	
5								
	17209		15271		17207		15665	
5.2	10796	99	11650	60	9514	14	13269	61
15.6	07		58		11		61	
	89		67		20		67	
	15.6398		15.6387		5.2294		5.2505	

Remeasure x stars Jan. 1st

	15259		16700
	75	81	14402
	81		05
	83		10
	5.2304		5.2299

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1912 Nov. 16 21

MC979

Moon's Limb — measures.

	d	N
1		
19.0		
20.5	17838	14540
	13080 80	9284 79
	79	72
	36	37
	20.4757	.4740
2		
18.0	16880	17458
20.3	14783 75	9427 23
	75	10
	90	52
	20.2014	.1967
3		
17.9	16888	17450
20.2	14920 07	9437 20
min	95	00
m	94	53
4		
	20.1982	.1966
4		
17.0	15932	17385
20.5	11475 70	11839 26
	73	20
	45	86
	20.4465	.4447
5		
19.0	9318 28	12572
23.9	60	12286 70
	9132	78
	239797	.9705
6		
16.9		
21.0		

very rough edge.

15362	16768
8940 21	13184 01
30	10
69	68
16.3563	16.3570

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1912 Nov. 16 21

MC979

Moon's limb — measures

	d	N
b		
19.0	17838	14540
20.5	13080 80	9284
	79	72 79
	36	37
	20.4757	.4740
a		
18.6	16880	17458
20.3	14785 75	9427 23
	75	10
	90	52
	20.2014	.1967
a		
17.9	16888	17450
20.2	14920 07	9437 20
min	95	00
m	94	53
q		
	20.1982	.1966
4a		
17.0	15932	17385
20.5	11475 70	11839 26
	73	20
	45	86
	20.4465	.4492
b		
19.0	9 18 28	12572
22.9	60	12280 70
	9132	78
	23.9797	.9705
bi		
16.9		15362 16768
21.0		8940 21 13184 01
		30 10
		69 68
		16.3563 16.3570

very rough edge.

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MC979

1912 Nov. 16. 22

Moon's limb - measures.

	d	x
7		
19.6	16970	15509
21.0	12838 30	96001
	19	96
	70	20
	19.5859	.5915
8		
20.0	1157473	11948
22.2	78	11855 69
max	11519	80
in		
x	20.0056	.0070
9		
20.0	10003	7966 60
22.0	9935 31	64
	34	7920
	19.9930	.9957
10		
19.8	15116	15231
23.0	13662 70	6684 78
	65	82
	52	41
	19.8548	.8559

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MC 979

1912 Nov. 16. 22

Thorne Kinter Measures.

I	d	N
19.6	16970	15509
21.0	12838 70	9600 01
	19	96
	70	20
	19.5859	.5915
8		
20.0	1157473	11948
22.2	78	11855 69
	11519	80
	20.0056	.0070
9		
20.0	10003	7966 60
21.0	9935 31	64
	34	7920
	19.9930	.9957
10		
19.8	15116	15231
23.0	13662 70	6684 78
	65	52
	32	41
	19.8548	.8559

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MC979 1913 Jan. 4.

Comp. Stars - mean measured coords and coord of plate center.

Star	x	y
1	26.3041	26.0218
2	25.8253	12.3366
3	20.6778	31.9418
4	11.7278	24.0044
5	5.2298	15.6392
5	89.76 ✓	109.94 ✓
	17.95	21.99
	-18.00	-22.
	- 0.05	- 0.01
	31	465
	1,55	4.65

mean R.A.
$10^h\ 59^m\ 17^s$
$-\quad 2$
$10\ 59\ 15^s$

mean Decl.
$+10°\ 56'\ 39''$
$-\quad 5$
$10\ 56\ 34$

$A = 10^h\ 59^m\ 15^s$
$D = +10°\ 56'\ 34''$

Prelim Reduction.

	x − x̄	+ 1274 − 2x	[+1274 − 2x]		− 2732
1	− 519	+ 3305 − 53 =	+ 3252	= + 2733	= + 1
2	+ 1212	+ 1567 − 52 =	+ 1515	= + 2727	= − 5
3	− 1282	+ 4056 − 41 =	+ 4015	= + 2733	= + 1
4	− 292	+ 3048 − 23 =	+ 3025	= + 2733	= + 1 ✓
5	+ 828	+ 1986 − 10 =	+ 1976	= [+ 2804]	= − 17.9682
moon	−17.9737	+ 2823 − 36 ✓			

Star	y − ȳ	− 126x	− 4		+ 2425
1	+ 911 − 3315 =	− 2404	− 26 =	− 2430	= − 5
2	+ 842 − 3254 =	− 2412	− 12 =	− 2424	= + 1
3	+ 204 − 2595 =	− 2391	− 32 =	− 2423	= + 2
4	− 920 − 1478 =	− 2398	− 24 =	− 2422	= + 3
5	− 1754 − 659 =	− 2413	− 16 =	− 2429	=
moon	−22.2307 − 2264 ✓		− 22		= − 22.2168 ✓

omit Star 5

Reseau reversed

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MC 979

Comp. Stars. Mean measured coords and Coords of plate center.

Star	x	y
1	26.3041	26.0218
2	25.8253	12.3366
3	20.6778	31.9418
+	11.7278	24.0044
5	5.2298	15.6392
5	89.76'	109.94'
	17.95	21.99
	-18.00	-22.
	- 0.05	- 0.01
	31	465
	1.55	4.65

Mean R.A.
$10^h\ 59^m\ 17^s$
$-\quad\quad 2$
$10\ \ 59\ \ 15^s$

Mean Decl.
$+10^\circ\ 56'\ 39''$
$-\quad\quad 5$
$10\ \ 56\ \ 34$

$A = 10^h\ 59^m\ 15^s$
$D = +10^\circ\ 56'\ 34''$

Prelim Reduction.

	x - 5	+ 127.4 - 2x					-2732
1	- 519	+ 3305 - 53	=	+ 3252	: + 2733	:	+ 1
2	+ 1212	+ 1567 - 52	=	+ 1515	: + 2727	:	- 5
3	- 1282	+ 4056 - 41	=	+ 4015	: + 2733	:	+ 1
4	- 292	+ 3048 - 23	=	+ 3025	: + 2733	:	+ 1
5		+ 1986 - 10	=	+ 1976	:	:	-17.9682
mean	-17.9737	+ 7823 - 36					

Star	y - 9	- 126x		- 4		+ 2425
1	+ 911	- 3315	= -2404	- 26	: -2430	: - 5
2	+ 842	- 3254	= -2412	- 12	: -2424	: + 1
3	+ 204	- 2595	= -2391	- 32	: -2423	: + 2
4	- 920	- 1478	= -2398	- 24	: -2422	: + 3
5	-1754	- 659	= -2413	- 16	: -2429	: - 3
mean	-22.2307	- 2264		- 22		: -22.2168

omit Star 5

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Times etc.

Exp. to star	1911 Mar. 13	8^h	45^m		8^h	56^m
" " moon		8	50	09.2	8	50 09.4
clock fast			2	37.7		
H Sid T		8	47	31.6		
H Long		4	44	31.05		
G. Sid. T		13	32	02.65		
Sid T. M. moon		23	20	0.03		
Interval		14	12	02.62		
Reduction		—	2	19.58		
G. M. T.		14	09	43.04		

	R.a.	Decl.
from Eph.		
moon 14^h	$10^h\ 57^m\ 22^s.88$	$+11°\ 28'\ 06''.1$
Motion in 1^m = 2.05	14.179	
" " 9.72 9.717	19.93	− 2' 17.8"
Tabular place	$10^h\ 57^m\ 42^s.81$	$+11°\ 25'\ 48''.3$
moon's parallax		57' 16".1
" Semidiam.		15' 37".8

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Times etc.

Exp. 2 stars	1911 Mar. 13	8^h	45^m		8^h	56^m
Moon		8	50	09.2	8	50 09.4
Clock fast			2	37.7		
H Sid. T		8	47	31.6		
H Long		4	44	31.05		
G. Sid. T		13	32	02.65		
Sid T. M. Noon		23	20	00.3		
Interval		14	12	02.62		
Reduction			2	19.58		
G.M.T.		14	09	43.04		

From Eph.		R.A.			Decl.		
Moon 14h		10^h	57^m	$22^s.88$	$+11°$	$28'$	$06''.1$
Motion in 1^m	2.05 15			4.178			
9.72				19.93			$17''.9$
Tabular place		10^h	57^m	$44^s.81$	$+11°$	$25'$	$48''.2$
Moon's parallax			$57'$	$16''.1$			
" Semidiam.			$15'$	$37''.8$			

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MC979 1913 January 4. 25

Plate constants Omit star 5.

Conditional Equations

a	b	c		x − 5	y − 7
+26.30	+26.02	+1	=	+1	−5
+25.82	+12.34	+1	=	−5	+1
+20.68	+31.94	+1	=	+1	+2
+11.73	+24.00	+1	=	+1	+3

mean equations

+26.06	+19.18	+1	=	−2.00	−2.00
+16.20	+27.97	+1	=	+1.00	+2.50
+23.49	+28.98	+1	=	+1.00	−1.50
+18.78	+18.17	+1	=	−2.00	+2.00
+ 9.86	− 8.79		=	−3.00	−4.50
+ 4.71	+10.81		=	+3.00	−3.50
− 4.71	+ 4.20		=	+1.43	+2.15
					−1.35
	+15.01		=	+4.43	−0.09
		b	=	+0.30	−4.50 − 0.80 = −5.30
+ 9.86a	= −3.00	+2.60	= −0.40		−0.54
		a	=	−0.04	

−2.0	+1.0	+1.0	−2.0	−2.0	+2.5	−1.5	+2.0
−5.7	−8.3	−8.6	−5.4	+1.7	+2.5	+2.6	+1.6
+1.1	+0.7	+0.9	+0.8	+14.0	+8.7	+12.6	+10.1
−6.6	−6.6	−6.7	−6.6	+13.7	+13.7	+13.7	+13.7

c for (x − 5)

Resids in x

			O	O − C
−1	+ 8	−7 =	0	+1
−1	+ 4	−7 =	−4	−1
−1	+ 9	−7 =	+1	0
0	+ 7	−7 =	0	+1

Resids in y

				C	O	O − C
−14	− 2	+14 =		−2	−5	−3
−14	− 1	+14 =		−1	+1	+2
−11	− 3	+14 =		0	+2	+2
− 6	− 2	+14 =		+6	+3	−3

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Plate constants Omit star 5.

Conditional Equations.

a	b	c	x - 5	y - h
+26.30	+26.06	+1	+1	-5
+25.82	+17.34	+1	-5	+1
+20.68	+31.94	+1	+1	+2
+11.73	+24.00	+1	+1	+3

Mean equations

+26.06	+19.18	+1	= -2.00	-2.00
+16.20	+27.97	+1	= +1.00	+2.50
+23.49	+28.98	+1	= +1.00	-1.50
+18.78	+18.17	+1	= -2.00	+2.00
+9.86	-8.79		= -3.00	-4.50
+4.71	+10.81		= +3.00	-3.50
-4.71	+4.20		= +1.43	+2.15
	+15.01		= +4.43	-1.35
		b	= +0.39	-0.09
+9.86a	= -3.00	+2.60	= -0.40	-4.50 - 0.80 = -5.30
		a	= -0.04	-0.54

-2.0	+1.0	+1.0	-2.0	-2.0	+2.5	-1.5	+2.0
-5.7	-8.3	-8.4	-5.4	+1.7	+2.5	+2.6	+1.6
+1.1	+0.7	+0.9	+0.8	+13.0	+8.7	+12.6	+10.1
-6.6	-6.6	-6.7	-6.6	+13.7	+13.7	+13.7	+13.7

c for (x - 5)

Resids: x

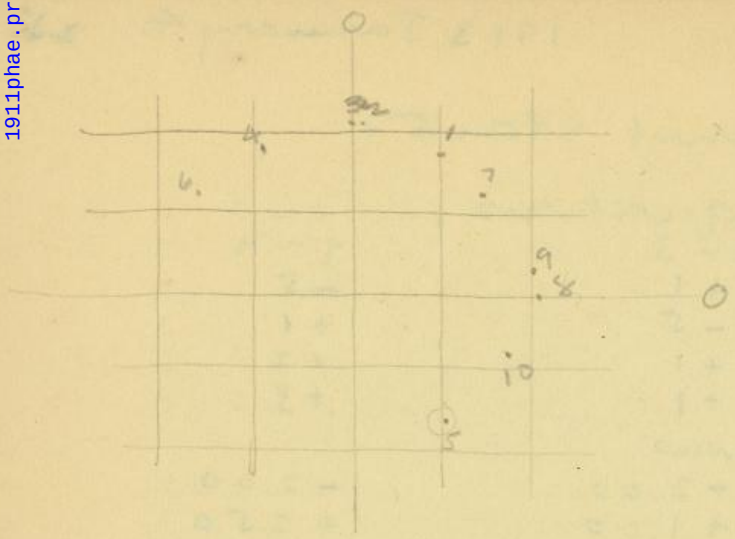
-1	+8	-7	0	+1	+1
-1	+4	-7	-4	-5	-1
-1	+9	-7	+1	+1	0
0	+7	-7	0	+1	+1

Resids: y

-14	-2	+14	-2	-5	-3
-14	-1	+14	-1	+1	+2
-11	-3	+14	0	+2	+2
-6	-2	+14	+6	+3	-3

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Point	Pos. ∠	Resid
10	247.7°	+ 2
8	270.0	− 7
9	276.5	+ 43
7	307.5	− 88
1	329.5	+ 50
2	359.2	− 33
3	0.0	+ 29
4	28.7	+ 33
6	52.5	− 28

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Morris Cantor

	x	$x - X_0$		Δx	$(x-X_0)^2$	$(x-X_0)^2+(y-Y_0)^2$	O − C
1	19.0000	− 1.0284	−	2	1.0580	4.1464	+ 84
2	18.0000	− 0.0284	−	2	0.0008	4.1347	− 33
3	17.9716	0.0000	−	2	0.0000	4.1408	+ 28
4	17.0000	+ 0.9716	−	2	0.9436	4.1366	− 14
5	19.0000	[− 1.0284]	+	2	[1.0572]	[4.0959] reject	
6	16.3566	+ 1.6150	−	1	2.6079	4.1262	− 118
7	19.5837	− 1.6171	−	.1	2.6153	4.1336	− 44
8	20.0063	− 2.0347		0	4.1400	4.1400	+ 20
9	19.9944	− 2.0228	−	0	4.0917	4.1455	+ 75
10	19.8554	− 1.8838	+	1	3.5484	4.1382	+ 2
						4.1380	0

Signs changed on account of reacan.

	y	$(y - Y_0)$		Δy	$(y-Y_1)^2$
1	20.4749	+ 1.7572	+	2	3.0884
2	20.1991	+ 2.0330	+	2	4.1339
3	20.1974	+ 2.0347	+	2	4.1408
4	20.4454	+ 1.7867	+	2	3.1930
5	23.9751	[− 1.7430]	−	2	[3.0387]
6	21.0000	+ 1.2321	+	1	1.5183
7	21.0000	+ 1.2321	+	1	1.5183
8	22.2321	0.0000		0	0.0000
9	22.0000	+ 0.2321		0	0.0538
10	23.0000	− 0.7679	−	1	0.5898

Approx. center

x = 19.0 y = 20.4749
23.9751 poor
44.4500
mean y = 22.2250 wt 1.
y = min 20.1974
R = 2.0276
y = max = 20.0063
mean x = 17.9787 wt 1

y = 21.0 x = 16.3566
19.5837
35.9403
mean x = 17.9702 wt 5
x = max = 20.0063
R = 2.0361
y = min = 20.1974
mean y = 22.2335 wt 5

Adopt $X_0 = 17.9716$
$Y_0 = 22.2321$

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Moons Circles

	x	$x - x_0$		Δx	$(x-x_0)^2$	$(x-x_0)^2+(y-y_0)^2$	O − C
1	19.0000	− 1.0284	−	2	1.0580	4.1464	+ 84
2	18.0000	− 0.0284	−	2	0.0008	4.1347	− 33
3	17.9716	0.0000	−	2	0.0000	4.1408	+ 28
4	17.0000	+ 0.9716	−	2	0.9436	4.1366	− 14
5	19.0000	[− 1.0284]	+	2	[1.0572]	[4.0959]	ccK
6	16.3566	+ 1.6150	+	1	2.6079	4.1262	− 118
7	19.5887	− 1.6171	−	1	2.6153	4.1336	− 44
8	20.0063	− 2.0347		0	4.1400	4.1400	+ 20
9	19.9944	− 2.0228	−	0	4.0917	4.1455	+ 75
10	19.8554	− 1.8838	+	1	3.5484	4.1382	+ 2
						4.1380	0

Sign changed on account of mean

	y	$(y - Y_0)$		Δy	$(y-Y_0)^2$
1	20.4749	+ 1.7572	+	2	3.0884
2	20.1941	+ 2.0330	+	2	4.1339
3	20.1974	+ 2.0347	+	2	4.1408
4	20.4454	+ 1.7867	+	2	3.1930
5	23.9751	[− 1.7430]	−	2	[3.0387]
6	21.0000	+ 1.2321	+	1	1.5183
7	21.0000	+ 1.2321	+	1	1.5183
8	22.2321	0.0000		0	0.0000
9	22.0000	+ 0.2321		0	0.0538
10	23.0000	− 0.7679	−	1	0.5898

Approx Centre

x = 19.0 y = 20.4749

23.9751

44.4500

Mean y = 22.2250

y = min 20.1974

R 2.0276

y - max 20.0063

mean x 17.9787 wt 1

y = 21.0 x = 16.3566

19.5537

35.9103

mean x 17.9702 wt 5

x - max 20.0663

R 2.0361

y - min 20.1974

mean y 22.2335 wt 5

Adopt $\begin{cases} X_0 = 17.9716 \\ Y_0 = 22.2321 \end{cases}$

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no	at	au	bb.
1	− 1.81	− 86.5	+ 147.9
2	− 0.06	+ 1.0	− 67.0
3	0.00	0.0	+ 56.8
4	+ 1.74	− 13.6	− 25.5
6	+ 1.99	− 191.1	− 145.0
7	− 1.99	+ 71.2	− 54.1
8	− 0.00	− 40.6	+ 0.0
9	− 0.47	− 151.3	+ 17.2
10	+ 1.45	− 3.8	− 1.5
	+ 0.85	− 414.7	− 71.2

$[aa] = +19.01$ $[bb] = +18.24$

$[ac] = -6.02$ $[bc] = +9.53$ $[cn] = 0$

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Moon's Center.

Conditional Equations

	a	b	c	O		c	O − C
1	−1.03	+1.76	+1	= +84	+42 +49 −57	= +34	+50
2	−0.03	+2.03	+1	= −33	+1 +56 −57	= 0	−33
3	0.00	+2.03	+1	= +28	0 +56 −57	= −1	+29
4	+0.97	+1.79	+1	= −14	−40 +50 −57	= −47	+33
6	+1.62	+1.23	+1	= −118	−67 +34 −57	= −90	−28
7	−1.62	+1.23	+1	= −44	+67 +34 −57	= +44	−88
8	−2.03	+0.00	+1	= +20	+84 +00 −57	= +27	−7
9	−2.02	+0.23	+1	= +75	+83 +6 −57	= +32	+43
10	−1.88	−0.77	+1	= +2	+78 −21 −57	= +0	+2
							+157 −156

Average (O−C) = 35

Normal Equations

a	b	c	
+19.01	+0.85	−6.02	= −415
+0.85	+18.24	+9.53	= −71
−6.02	+9.53	+9.00	= 0
−0.85	−0.04	+0.27	= +19
+6.02	+0.27	−1.90	= −131
	+18.20	+9.80	= −52
	+9.80	+7.10	= −131
	−9.80	−5.28	= +28
		+1.82	= −103
	−13.54	−9.80	= +181
	+4.66		= +129
−4.03	+6.38	+6.02	= +0
+6.38	−10.11	−9.53	= 0
+14.98	+7.23		= −415
+7.23	+8.13		= −71
−6.44	−7.23		= +63
+8.54			= −352
−4.08c		+1.39c	=

$\frac{\Delta\delta}{\Delta\alpha} = 2.03 \cdot -.54 = -1.09$

c = −57

b = +28

a = −41

$\frac{\Delta x}{\Delta\alpha} = 2.03 \cdot +.54 = +0.69$

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Uccris Auter.

Conditional Equations.

	a	b	c	O		c	O − C
1	−1.03	+1.76	+1	+84	+42 +49 −57	+34	+50
2	−0.02	+2.03	+1	+33	+1 +56 −57	0	−33
3	0.00	+2.03	+1	+28	0 +56 −57	−1	+29
4	+0.97	+1.79	+1	−14	−40 +50 −57	−47	+33
6	+1.62	+1.23	+1	−118	−67 +34 −57	−90	−28
7	−1.62	+1.23	+1	−44	+67 +34 −57	+44	−88
8	−2.03	0.00	+1	+20	+84 +00 −57	+27	−7
9	−2.02	+0.23	+1	+75	+83 +6 −57	+32	+43
10	−1.88	−0.77	+1	+2	+78 −71 −57	+0	+2

+157 −156

Average O−C = 35

Normal Equations

a	b	c	
+19.01	+0.85	−6.02	= −415
+0.85	+18.24	+9.53	= −71
−6.02	+9.53	+9.00	= 0
−0.85	−0.04	+0.27	= +19
+6.02	+0.27	−1.40	= −131
	+18.20	+9.80	= −52
	+9.80	+7.10	= −131
	−9.80	−5.78	= +28
		+1.82	= −103
	−13.54	−9.80	= +181
	+4.66		= +129

$\frac{\Delta S}{\Delta N}$ = 203 · − ⋮ + · −1.09

c = −57

b = +28

−4.03	+6.38	+6.02	= 0
+6.38	−10.11	−9.53	= 0
+14.98	+7.23		= −415
+7.23	+8.13		= −71
−6.44	−7.23		= +63
+8.54			= −352

a = −41

−408c + 139c

$\frac{\Delta K}{\Delta N}$ = 2.03 + ⋮ + 0.69

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$X_0 = -17.9716$ ✓ $\quad Y_0 = -22.2321$ ✓

$\frac{1}{2}a = -21$ ✓ $\quad \frac{1}{2}b = +14$ ✓

$X = -17.9737$ ✓ $\quad Y = -22.2307$ ✓

From prelim. Red. $X = -17.9682$ ✓ $\quad Y = -22.2168$ ✓

∴ computed corrections ax: -1 ✓ $\quad -10$ ✓

by: $+7$ ✓ $\quad -2$

c: -7 ✓ $\quad +14$ ✓

$X = -17.9683$ ✓ $\quad -22.2166$ ✓

$\bar{\xi} = +0.0317$ ✓

log: 8.50106 ✓

∴ cos δ: 9.99207 ✓

∴ const: 6.50724

$-(\alpha - A) = 9.00175$ ✓

$\eta = -0.2166$ ✓

log tan δ: 9.28600

∴ $\bar{\xi}^2$: 7.00021

∴ const: 7.05334

∴ η_0: 3.34155

$\alpha - A = +1^s.00$ ✓

$A = 10\ 59\ 15.$ ✓

$\alpha_0 = 10\ 59\ 16.00$ ✓

Red: $+1.30$ ✓

$\alpha' = 10^h\ 59^m\ 17^s.30$ ✓

log η_1: 9.33566n ✓

∴ const: 7.33115 ✓

∴ $(\delta - D)$: 2.00451n

$\delta - D = -101.0$ ✓

$= -1\ 41.0$ ✓

$D = +10\ 56\ 34$ ✓

$\delta_0 = +10\ 54\ 53.0$ ✓

Red: -5.1 ✓

$\delta' = +10^\circ\ 54'\ 47''.9$ ✓

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$X_0 = -17.9716$ $Y_0 = -22.2321$

a -71 b $+14$

$x = -17.9787$ $Y = -22.2307$

From fiducial Red. $X = -17.9682$ $Y = -22.2168$

computed constants -1 -10

b_y $+7$ -2

c -7 $+14$

$x = -17.9683$ -22.2166

$\xi = +0.0317$ $\eta = -0.2166$

log 8.50106

cos δ 9.99207

const 8.50724

$(\alpha - A) = 9.00175$ log tan δ 9.28600

ξ^2 7.00021

const 7.05344

$-\eta$ 3.33415

log η' 9.33566n

const 7.33115

$(\delta - D)$ 2.00451n

$\alpha - A = +1^s.00$ $\delta - D = -101.0$

$= -141.0$

$\alpha = 10\ 59\ 15.$ $D = +10\ 56\ 34$

$\alpha_0 = 10\ 59\ 16.00$ $\delta_0 = +10\ 54\ 53.0$

Red $+1.30$ Red -5.1

$\alpha' = 10^h\ 59^m\ 17^s.30$ $\delta' = +10^\circ\ 54'\ 47''.9$

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Lunar Parallax.

α' $10^h\ 59^m\ 17.30^s$
θ $8^h\ 47\ 31.6$
$\theta - \alpha' = -2\ 11\ 45.70$
$= -\ 32^\circ\ 56'\ 26''$

$\frac{1}{2}(\alpha - \alpha') = -\ 11\ 11\ 45$

$(\theta - \alpha') - \frac{1}{2}(\alpha - \alpha') = -\ 32\ 44\ 41$

$\log \tan \phi' = 9.95727$
$\therefore \cos \frac{1}{2}(\alpha + \alpha') = 0.000000$
$\therefore \log(\theta' - \frac{1}{2}(\alpha - \alpha')) = 9.92485$
$\therefore \tan \gamma = 0.03242$

$\gamma = 47^\circ\ 08'\ 12''$

$\delta' = 10\ 54\ 47.9$

$\gamma - \delta' = 36\ 13\ 24.1$

$\log \rho \sin \phi' = 9.82640$
$\therefore \sin \pi = 8.22162$
$\therefore \sin(\gamma - \delta') = 9.77154$
$\therefore \therefore \rho = 9.86509$

$\therefore \sin(\delta - \delta') = 7.95447$

$\delta - \delta' = +\ 30\ 57.4$

$\delta = +11\ 25\ 45.3$ $\alpha = 10\ 57\ 43.29$

Am Eph $\delta = +11^\circ\ 25'\ 48.3''$ $\alpha = 10^h\ 57^m\ 42.81^s$

O - C $= -\ 30''$ $+\ 0.48^s$

Corr to tab. radius $-\ 0.7$ $+\ 0.03$

Final (O - C) $-\ 31.7$ $+\ 0.51$

$\delta' = +10^\circ\ 54'\ 47.9''$

$\pi = 57'\ 16.1''$

$\log \rho \cos \phi' = 9.86913$
$\therefore \sin \pi = 8.22162$
$\therefore \sin(\theta - \alpha') = 9.73541_n$
$\therefore \cos \delta = 9.99130$

$\therefore \sin(\alpha - \alpha') = 7.83486_n$

$\text{app}(\alpha - \alpha') = -23^s\ 30''$

$\log \cos \delta =$
$\therefore \sin(\alpha - \alpha') = 7.83486_n$
$\alpha - \alpha' = -23\ 30.2$
$= -\ 1^m\ 34^s.01$

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Lunar Parallax.

α'	10^h	59^m	17.30
θ	8^h	47	31.6
$\theta - \alpha'$	-2^h	11^m	45.70
	$= -$	32°	$56' 26''$

$\frac{1}{2}(\alpha - \alpha') = -\ 11\ 11\ 45$

$(\theta - \alpha') - (\delta - \delta') = -\ 32\ 44\ 41$

$\log \tan \phi = 9.957127$
$\log \cos \frac{1}{2}(\alpha - \alpha') = 0.000000$
$\log (\delta' - \delta) / (\alpha - \alpha') = 9.924855$
$\log \tan \gamma = 0.032272$

$\gamma = 47^\circ\ 08'\ 12$

$\delta' = 10\ 54\ 47.9$

$\gamma - \delta' = 36\ 13\ 24.1$

$\log \rho \sin \phi' = 9.826400$
$\log \sin \pi = 8.221626$
$\log \sin (\gamma - \delta') = 9.771554$
$\log \rho = 9.865091$

$\sin (\delta - \delta') = 7.954477$

$\delta - \delta' = +\ 30\ 57.4$

$\delta = +11\ 25\ 45.3$

Corr$^{\text{n}}$ for $\delta = +11^\circ\ 25'\ 48''.3$

$\theta - c$	$-$	3.0
Corr$^{\text{n}}$ for Ind. radius	$-$	0.7
Final $(\theta - c)$	$-$	3.7

$\delta' = +10^\circ\ 54'\ 47''.9$

$\pi = 57'\ 16.1$

$\log \rho \cos \phi' = 9.865913$
$\log \sin \pi = 8.221626$
$\log \sin (\theta - \alpha') = 9.735541_n$
$\log \cos \delta' = 9.991300$
$\log \sin (\alpha - \alpha') = 7.834860_n$

$\text{Appt}\ (\alpha - \alpha') = -23^s\ 30''$

$\log \cos \delta$
$\log \sin (\alpha - \delta') = 7.834860_n$

$\alpha - \delta' = -23\ 30.2$
$= -1^m\ 34^s.01$

$\alpha = 10^h\ 57^m\ 43^s.29$

$\alpha = 10^h\ 57^m\ 42^s.81$

$\theta - c$	$-$	0.48
Corr$^{\text{n}}$ for Ind. radius	$-$	0.03
Final $(\theta - c)$	$-$	0.51

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1913 Apr. 12

MC 979.

Moons limb - faint nebs.

Reseaux reversed

Reseaux

	α		N		α		N
1	seratic				16911		18914
	16.5	15441	18571		11850	54	13960 71
	10.5	11085 91	12926,5		55		70
		85	12920		09		08
		40	69		16.4943		.4944
		20.4354	.4350				
2					15553		17918
	16.2				69800	88	16450 59
	21.0				79		53
					50		18
					16.1452		.1464
3					7845		11780
	16.0				7771	73	90 91
	21.6				55		1947
	minim				15.9921		.4955
	x						
4					7890	82	10950
	16.0				79		10900 94
	22.0				7845		95
					16.0039		.0054
5					18670		15961
	16.5				12780	80	11848 53
	23.0				77		31
					73		68
					16.4107		.4120
6							
	17.0	16730	18662				
	23.5	11466 80	13930 35				
		71	35				
		30	58				
		23.5258	.5273				
7		16685	18694				
	16.0	8651 50	10712 05				
	23.7	46	13				
	max	61	83				
		23.6035	.6018				

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1913 Apr. 12

MC 979.

Moons limb - faint image

Reseaux

Reseau reversed.

	y		x	
	d	N	d	N
1				
serated.				
16.5	15441	18571	16911	18914
20.5	11085 91	12926 15	11850 54	13960 71
	85	12920	55	70
	40	69	09	08
	20.43554	.4350	16.4945	.4944
2				
16.2			15553	17918
21.0			6980 88	16450 59
			79	53
			30	18
			16.1452	.1464
3				
16.0-			7845	11980 91
21.6			7771 75	90
min in			55	11942
x			15.9921	.9955
4				
16.0+			7890 82	10950
22.0			79	10900 94
			7845	95
			16.0039	.0054
5				
16.5-			18670	15961
23.0			12780 80	11848 53
			77	31
			73	68
			16.4107	.4120
6				
17.0	16730	18662		
23.5	11466 80	13930 35		
	71	31		
	30	58		
	23.5258	.5273		
7	16685	18694		
16.0	8651 50	10712 05		
23.7	46	13		
max	51	89		
y	23803 5	.8018		

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1911phae..pr01.188

NGC 9·79 1913 Apr. 12.

Moons - Reseau reversed.

	d	r	d	r
	15681			
	765060			
	40			
	85			
	23.80 34			
	14643	17722		
19.0	908990	1326070		
23.6	89	70		
	40	18		
	23.55752	.55547		
9	scratch.			
19.4				
23.6	14612	16737	14319	17201
	1299083	836155	938890	121302
	85	68	86	30
	15	32	21	09
	23.1626	.1628	19.5068	.5077

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NGC 979 1913 Apr. 12

Moons – Remeasures.

Reseau reversed.

	4		2	
	a	n	d	n
8	15681			
19.1	765060			
23.6	40			
	85			
mean	23.8034			
4				
8	14643	17722		
19.0	908990	1326070		
23.6	89	70		
	40	18		
	23.5552	.5547		
9	scratch.			
19.4				
23.4	14612	16737	14319	17201
	1299083	836755	938890	1213025
	85	68	86	30
	15	32	21	09
	23.1626	.1628	19.5068	.5077

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MC 979 1913 Apr. 12. 32

Ono on's Center. Reversions

	z	x − X₀		(x − X₀)²	(x − X₀)² + (y − Y₀)²	O − C
1	16.4944	−1.5340	+2	2.3526	4.1292	− 96
2	16.1458	−1.8826	+1	3.5438	4.1336	− 52
3	15.9938	−2.0346	0	4.1396	4.1396	+ 8
4	16.0046	−2.0238	−0	4.0958	4.1496	+108
5	16.4114	−1.6170	−1	2.6150	4.1333	− 55
6	17.0000	−1.0284	−2	1.0580	4.1518	+130
7	18.0000	−0.0284	−2	0.0008	4.1416	+ 28
8	19.0000	+0.9716	−2	0.9436	4.1360	− 8
9	19.5072	+1.4788	−2	2.1864	4.1324	− 64
					4.1388	− 1

	y				
1	20.4352	−1.3327	−2	1.7766	
2	21.0000	−0.7679	−1	0.5898	
3	21.7679	0.0000	0	0.0000	
4	22.0000	+0.2321	+0	0.0538	
5	23.0000	+1.2321	+1	1.5183	
6	23.5266	+1.7587	+2	3.0938	
7	23.8026	+2.0347	+2	4.1408	
8	23.5550	+1.7871	+2	3.1944	
9	23.1627	+1.3948	+2	1.9460	

Approximate Center p. 26.

X = 18.0284
Y = 21.7679

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MC 979 1913 Apr. 12. 32

Photometric Center. Measures

	x	$x-X_0$		$(x-X_0)^2$	$(x-X_0)^2+(y-Y_0)^2$	O-C
1	16.4944	-1.5340	+2	2.3526	4.1292	- 96
2	16.1458	-1.8826	+1	3.5438	4.1336	- 52
3	15.9938	-2.0346	0	4.1396	4.1396	+ 8
4	16.0046	-2.0238	-0	4.0958	4.1496	+108
5	16.4114	-1.6170	-1	2.6150	4.1333	- 55
6	17.0000	-1.0284	-2	1.0580	4.1518	+130
7	18.0000	+0.0284	-2	0.0008	4.1416	+ 28
8	19.0000	+0.9716	-2	0.9436	4.1380	- 8
9	19.5072	+1.4768	-2	2.1864	4.1324	- 64
					4.1388	- 1

	y	$y-Y_0$		$(y-Y_0)^2$
1	20.4352	-1.3327	-2	1.7766
2	21.0000	-0.7679	-1	0.5898
3	21.7679	0.0000	0	0.0000
4	22.0000	+0.2321	+0	0.0538
5	23.0000	+1.2321	+1	1.5183
6	23.5266	+1.7587	+2	3.0938
7	23.8026	+2.0347	+2	4.1408
8	23.5550	+1.7871	+2	3.1944
9	23.1627	+1.3948	+2	1.9460

Approximate Center p. 26.

X = 18.0284
Y = 21.7679

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1	+ 2,04	+ 147.0	+ 127.8
2	+ 1.45	+ 97.8	+ 40.0
3	- 0.00	- 16.2	+ 0.0
4	- 0.48	- 224.7	+ 24.8
5	- 2.03	+ 90.8	- 67.6
6	- 1.81	- 134.0	+ 228.5
7	- 0.06	- 0.8	+ 59.0
8	+ 1.73	- 7.7	- 14.3
9	+ 2.06	- 94.7	- 89.0
	+ 2.90	- 142.5	+ 309.2

$[aa] = +20.94$ $[bb] = +16.31$

$[ac] = -7.78$ $[bc] + 633$ $cr = -1$

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Conditional Equations

a	b	c	O	c	O − C
−1.53	−1.33	+1	= −96	+67 − 76 − 78 = −87	− 9
−1.88	−0.77	+1	= −52	+82 − 44 − 78 = −40	−12
−2.03	+0.00	+1	= + 8	+88 + 0 − 78 = +10	− 2
−2.02	+0.23	+1	= +108	+91 + 14 − 78 = +27	+81
−1.65	+1.23	+1	= −55	+72 + 70 − 78 = +64	−119
−1.03	+1.76	+1	= +130	+45 + 101 − 78 = +68	+62
−0.03	+2.03	+1	= +28	+ 1 + 116 − 78 = +59	−11
+0.97	+1.79	+1	= − 8	−42 + 102 − 78 = −18	+10
+1.48	+1.39	+1	= −64	−64 + 80 − 78 = −62	− 2
					−155 + 113

Average (O − C) = 8.4

Normal Equations.

$$+20.94 + 2.90 - 7.78 = -142$$
$$+2.90 + 16.31 + 6.33 = +309$$
$$-7.78 + 6.33 + 9.00 = -1$$

$$-2.90 - 0.40 + 1.08 = +20$$
$$+7.98 + 1.08 - 2.89 = -53$$

$$+159.1 + 74.1 = +329$$
$$+74.1 + 61.1 = -54$$

$$-74.1 - 34.5 = -153$$
$$+26.6 = -207 \qquad c = -78$$

$$-9.00 - 74.1 = +66$$
$$+69.1 = +395 \qquad b = +57+$$

$$+356 - 290 - 41.2 = +0$$
$$+2006 - 1631 - 2320 = +3$$

$$+2450 - 1190 = -142$$
$$+2296 - 1687 = +312$$

$$-1620 + 1190 = -220$$
$$+830 = -362 \qquad a = -44$$

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Conditional Equations.

a	b	c	O	C	O − C
−1.53	−1.33	+1	= −96	+67 − 76 − 78	= −87	− 9
−1.88	−0.77	+1	= −52	+82 − 44 − 78	= −40	−12
−2.03	+0.00	+1	= + 8	+88 + 0 − 78	= +10	− 2
−2.08	+0.23	+1	= +108	+91 + 14 − 78	= +27	+81
−1.65	+1.23	+1	= −55	+72 + 70 − 78	= +64	−119
−1.03	+1.76	+1	= +130	+45 + 101 − 78	= +68	+62
−0.03	+2.03	+1	= +28	+ 1 + 116 − 78	= +39	−11
+0.97	+1.79	+1	= − 8	−42 + 102 − 78	= −18	+10
+1.48	+1.39	+1	= −64	−64 + 80 − 78	= −62	− 2
					−155	+113

Average (O − C) = 34

Normal Equations.

$$+20.94 + 2.90 - 7.78 = -142$$
$$+ 2.90 + 16.31 + 6.33 = +309$$
$$- 7.78 + 6.33 + 9.00 = - 9$$

$$- 2.90 - 0.40 + 1.08 = + 20$$
$$+ 7.98 + 1.08 - 2.89 = - 53$$

$$+15.91 + 7.41 = +329$$
$$+ 7.41 + 3.11 = - 54$$

$$- 7.41 - 3.45 = -153$$
$$+ 2.66 = - 207 \qquad c = -78$$

$$- 9.00 - 7.41 = + 66$$
$$+ 6.91 \qquad = +395 \qquad b = +57$$

$$+ 3.56 - 2.90 - 4.12 = + 0$$
$$+20.06 - 16.31 - 23.20 = + 3$$

$$+24.50 \qquad - 11.90 = -142$$
$$+22.96 \qquad - 16.87 = +312$$

$$-16.20 \qquad + 11.90 = -220$$
$$+ 8.30 \qquad = -362 \qquad a = -44$$

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$X_0 = 18.0264$
$- \quad 22$
18.0262
$= -17.9738$

$Y = 21.7679$
$+ \quad 29$
21.7708
$= -22.2292$

Practically same as when first measured.

$R^2 = 41388$
$- \quad 78$
41310

$R = 20325$
$\sigma R = \quad 74$
$R = 948.3$

$S = 949.6 \quad R - S = -1.3$

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$X_0 = 18.0284$
$-\ 22$
18.0262
$= -)\ 17.9738$

$Y = 21.7679$
$+\ 29$
21.7708
$= -22.2292$

Practically same as when first measured.

$R^2 = 4.1388$
$-\ 78$
4.1310

$R = 2.0325^-$
$\alpha R = \quad +4$
$R: \quad 948.3$

$S = 949.6 \quad R-S: -1.3$

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MC 1029 — 1913 Jan. 1.

Comparison Stars — Standard Coordinates.

	1.	no	mag	2	no.	mag
C		1569	8.6		1580	8.8
R.a. C.	11^h	27^m	$58^s.07$	11^h	32^m	$00^s.93$
L			18			97
E			10			92
mean	11^h	27	58.12	11	32	00.94
Prec	+		34.08	+		33.97
α(1911)	11	28	32.20	11	32	34.91
A	11	32	58	11	32	58
α − A =	−	4	25.80	−		23.09
sin(α−A) =	−		265.78	−		23.09
log "			2.42452 n			1.36342 n
" cos δ			9.99586			9.99803
" $\bar{3}_0$			0.92762 n			9.86869 n
$\bar{3}_0$			−8.4648			−0.7391
$\bar{3}_1$			− 24			− 2
$\bar{3}$			9.5328			17.2607
x			9.6360			17.1544
x − $\bar{3}$			+ 1032			− 1063
Decl						
C	+ 7°	57′	47.7″	+ 5°	30′	59.1″
L			48.3			59.8
E			47.9			59.7
mean	+ 7°	57	48.0	+ 5	30	59.5
Prec	−	3	38.4	−	3	38.9
δ(1911)	+ 7	54	09.6	+ 5	27	20.6
D	+ 7	03	07.	7	03	07
δ − D		+ 51	02.6	− 1	35	46.4
tan(δ − D) =			+ 3062.8	−		5747.9
log "			3.48612			3.75951 n
" n_0			0.81727			1.09066 n
" tan δ			9.14242			8.98005
" ξ^2			1.8552			9.7374
" η_1			8.0510			5.7708
n_0			+ 6.5656			− 12.3214
η_1			+ 112			+ 1
η			28.5768			9.6787
η			28.6490			9.6710
$\eta - \eta$			+ 722			− 77

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MC 1029

Comparison Stars –
Standard Coordinates.

	1. no	mag	2 no.	mag.
C	1569	8.6	1580	8.8
C	$11^h\ 27^m\ 58^s.07$		$11^h\ 32^m\ 00^s.93$	
L		18		.97
E		10		.92
mean	$11^h\ 27\ 58.12$		$11\ 32\ 00.94$	
Prec.	+	34.08	+	33.97
α (1911)	$11\ 28\ 32.20$		$11\ 32\ 34.91$	
t	$11\ 32\ 58$		$11\ 32\ 58$	
t − A	− 4	25.80	−	23.09
Sec (t − A)	−	26.578	−	23.09
Corr.		2.42452 n		1.36342 n
log cos δ		9.99586		9.99803
Ξ_0		0.92762 n		9.86869 n
Ξ_0		−8.4648		−0.7391
Ξ_1		− 29		− 2
Ξ		9.5328		17.2607
α		9.6360		17.1544
$\alpha - \Xi$		+ 1032		− 1063
C	$+7^\circ\ 57'\ 47''.7$		$+5^\circ\ 30'\ 59''.1$	
L		48.3		59.8
E		47.9		59.7
mean	$+7^\circ\ 57\ 48.0$		$+5\ 30\ 59.5$	
C	− 3	38.4	− 3	38.9
δ (1911)	$+7\ 54\ 09.6$		$+5\ 27\ 20.6$	
D	$+7\ 03\ 07.$		$7\ 02\ 07$	
δ − D	+ 51	02.6	− 1	35 46.4
Sec (δ − D)	+	3062.8	−	5747.9
Corr.		3.48612		3.75951 n
log Δ_0		0.81727		1.09066 n
tan δ		9.14242		8.98005
ξ^2		1.8552		9.7374
η_1		8.0510		5.7708
η_0		+6.5656		−12.3214
η_1		+ 112		+ 1
η		28.5768		9.6787
η		28.6490		9.6710
$\eta - \eta$		+ 722		− 77

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MC1029

Comparison Stars
Standard Coordinates.

	3	no.	mag	4	no.	mag
		1586	5.5		1590	8.0
R.A.						
C	11^h	33^m	$18^s.22$	11^h	35^m	$20^s.61$
L			18.21			20.67
Σ			18.22			20.62
mean	11	33	18.22	11	35	20.63
Prec	+		34.03	+		33.95
α(1911)	11	33	52.25	11	35	54.58
A	11	32	58	11	32	58
α−A	+	0	54.25	+	2	56.58
sin(α−A)	+		54.25	+		176.58
log			1.733440			2.246944
" cosδ			9.995066			9.997900
" $\bar{x}_0$			0.237670			0.752078
$\bar{x}_0$			+1.7246			+5.6504
$\bar{x}_1$			+ 4			+ 22
$\bar{x}$			19.72500			23.65262
x			19.89160			23.56230
$x-\bar{x}$			+1666			− 903
Decl.						
C	+8°	41′	16.5″	+5°	41′	38.8″
L			16.3			39.4
Σ			16.0			38.4
mean	+8	41	16.3	+5	41	38.9
Prec	−	3	39.1	−	3	39.3
δ(1911)	+8	37	37.2	+5	37	59.6
D	7	03	07	7	03	07
δ−D	+1	34	30.2	−1	25	07.4
tan(δ−D)	+		5671.7	−		5108.5
log			3.753772			3.708229
" $\sqrt{m_0}$			1.084847			1.039944
" tanδ			9.18100			8.99740
" $\bar{x}^2$			0.47340			1.50422
" n_1			6.70788			7.55166
m_0			+12.15833			+10.95073
n_1			+ 5			+ 36
η			34.15888			11.05229
y			34.12080			10.97700
$y-\eta$			− 380			− 759

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MC1029

39.

Companion stars

Standard Coordinates

	3 no.	mag	4 no.	mag
c	1586	5.5	1590	8.0
C	11h 33m	18.°22	11h 35m	20.61
		18.21		20.67
		18.22		20.62
mean	11 33	18.22	11 35	20.63
Prec	+	34.03	+	33.95
α(1911)	11 33	52.25	11 35	54.58
A	11 32	58	11 32	58
α-A	+ 0	54.25	+ 2	56.58
Sidd-A)	+	54.25	+	176.58
log	1.73440		2.24694	
" cos δ	9.99506		9.99790	
" ξ₀	0.23670		0.75208	
ξ₀	+ 1.7246		+ 5.6504	
ξ₁	+ 4		+ 22	
ξ	19.7250		23.6526	
x	19.8916		23.5623	
x-ξ	+1666		- 903	
δ				
C	+ 8° 41′	16.5	+ 5° 41′	38.8
		16.3		39.4
		16.0		38.4
mean	+ 8 41	16.3	+ 5 41	38.9
Prec	- 3	39.1	- 3	39.3
δ(1911)	+ 8 37	37.2	+ 5 37	59.6
D	7 03	07	7 03	07
δ-D	+ 1 34	30.2	- 1 25	07.4
log (δ-D)	+	5671.7	-	5108.5
" log	3.75572		3.70829	
" log η₀	1.08487		1.03944	
" tan δ	9.18100		8.97140	
" ξ²	0.4734		1.5042	
" η₁	6.7078		7.5516	
η₀	+ 12.1583		+ 10.9507	
η₁	+ 5		+ 36	
η	34.1588		11.0529	
y	34.1208		10.9770	
y-η	- 380		- 759	

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Comparison Stars - Measures.

	α		ν		α		ν	
1		4				26		
9.7								
28.7	14852		17494		14786		14509	
	8349	41	13979	86	11090	96	8140	40
	47		79		87		44	
	30		80		32		03	
	28.6492		.6489		9.6357		.6364	
2								
17.1	14284		15712		18640		16141	
9.7	7550	51	11824	20	10173	67	14589	96
	51		19		69		86	
	54		92		28		16	
	9.6713		.6706		17.1540		.1547	
3								
19.9	17716		15869		15551		15550	
34.1	16506	05	7089	87	14458	58	6612	21
	10		88		56		16	
	28		84		32		38	
	34.1210		.1206		19.8908		.8923	
4								
23.6	11309	07	13330		15148		17364	
10.9	07		13099	01	10756	61	11720	29
	11074		03		54		28	
					24		42	
	10.9768		.9771		23.5620		.5626	

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MC 1029 1912 Nov. 22.

Comparison Stars - Measures

1		4		2	
9.7	α		α		N
28.7	14852	17499	14786		14509
	8349 41	13979 86	11090 96		8140 40
	47	79	87		44
	30	80	32		03
	28.6492	.6489	9.6357		.6364
3					
17.1	14284	15712	18640		16141
9.7	.7550 51	11824 20	10173 67		14589 96
	51	19	69		86
	54	92	28		16
	9.6713	.6706	17.1540		.1547
5					
19.9	17716	15869	15551		15550
34.1	16506 05	70899 87	14458 58		66121 21
	10	88	56		16
	28	84	32		38
	34.1710	.1706	19.6908		.8983
4					
23.6	11304 07	13350	15148		17364
10.9	07	13099 01	10756 61		11720 29
	11074	03	54		28
			24		42
	10.9768	.9771	23.5620		.5626

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MC1029 1912 Nov. 22. 41

Points on moon's limb
measures.

	d	N
1		
15.0	14901	14122
19.5	91455 27	98200 08
	44	14
	77	98
	19.5448	.5702
2		
14.6		
20.0		
	15813	14540
	11349 55	8982 80
	50	78
	95	10
	14.5548	.5544
3		
14.2		
21.0		
	14721	17570
	6261 50	16006 16
	53	06
	00	60
	14.1552	.1559
4		
14.1		
21.2		
min in x	14689	17590
	8080 82	16141 40
	69	37
	82	76
	14.1394	.1449
5		
14.3		
22.0		
	16611	17657
	9569 77	14637 48
	71	50
	95	32
	14.2972	.3005
6		
15.0	14833	15583
22.8	6150 51	14227 26
	51	30
	03	70
	22.8656	.8647

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MC0029 1912 Nov 22.

Points on Nebula's Rim

Measures

	d	N		d	N
1/				15813	14140
15.0	14901	14122		11349 53	8982 80
19.5	9145 27	9820 08		50	78
	44	14		95	10
	77	98			
	19.5748	.5702		14.5548	.5544
2/					
14.6				14721	17570
20.0				6261 50	16006 16
				53	06
				00	60
				14.1552	.1559
3/					
14.2				14689	17590
21.0				6080 82	16141 40
				69	37
				82	76
				14.1394	.1449
4/					
14.1				16611	17657
21.2				9569 77	14637 48
				71	50
				95	32
				14.2972	.3005
5/					
14.3					
22.0					
6/					
15.0	14833	15583			
22.8	6150 51	14227 26			
	51	30			
	03	70			
	8.2865 6	.8647			

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MC1029. 1912 Nov. 22. 42.

Moon's Limb – measures.

	y			x	
	d	N		d	N
7				15490	16625
15.2				77128	14346 45
23.0				08	48
				80	00
				15.2227	15.2274
8					
16.0	18740	15005			
23.2	16554 60	7168 70			
	58	58			
	19	90			
	23.2178	.2172			
9					
16.2	17739	15017			
23.2	15458 48	7257 50			
Lunar	45	54			
m	09	10			
4					
	23.2282	.2242			
10					
17.0	15545	14089			
23.1	15183 90	4410 11			
	61	09			
	15	70			
	23.0372	.0359			
11				17525 25	17290
17.1				10	16570 82
23.0				11800	80
					82
				17.0719	17.0712

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MC 1029. 1912 Nov. 22. 42

Moon's limb - measures.

4

7	d	n
15.2		
23.0		

x

d	N
15490	16625
77122 08	14546 45
08	48
80	00
15.22277	15.22774

8

16.0	18740	15005
23.2	14554 60	7168 70
	58	58
	19	90
	23.21878	.2172

9

16.2	17739	15017
23.2	15458 48	7257 50
	45	54
	09	10
	23.22282	.2242

10

17.0	15545	14059
23.1	15183 90	4410 11
	61	09
	15	70
	23.03572	.0359

11

17.1	17525 25	17290
23.0	10	16570 82
	11800	80
		42
	17.07119	17.07122

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Mean measured Coords.
+ Centre of plate.

Star	x	y	R.A.	Decl.
1	9.6360	28.6490	$11^h 28^m 32^s$	$+7^\circ 54' 10''$
2	17.1544	9.6710	32 35	+5 27 21
3	19.8916	34.1208	33 52	+8 37 37
4	23.5623	10.9770	35 55	+5 38 00
	4 | 70.24	| 83.42	| 130 54	| 27 37 08
	17.56	20.86	11^h 32 44	+6 54 17
	−18	−22	+ 14	+ 8 50
	0.44	1.14	11 32 58	+7 03 07
	31	465		
	44	570		
	132	684		
	13.64	456		
		530.10		

Preliminary Reduction.

x − 5	− 1114	− 2x	+ 2167
+1032	−3180 = −2148	−19 = −2167	= 0
−1063	−1073 = −2136	−34 = −2170	= −3
+1666	−3787 = −2121	−40 = −2161	= +6
−903	−1219 = −2122	−47 = −2169	= −2
mean 16.1483	−2355	−32	= 16.1263

y − 4	+ 1062x	− 1738
+722	+1022 = +1744	= +6
−77	+1818 = +1741	= +3
−380	+2108 = +1728	= −10
−759	+2497 = +1738	= 0
mean 21.2189	+1712	= 21.2163

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Mean Measures Winds
+ Centre of plate

Star	x	y	R. A.	Decl.
1	9.6360	28.6490	11h 28m 32.3s	+7° 54' 10"
2	17.1549	9.6710	32 35	+5 27 21
3	19.5916	34.1208	33 52	+8 37 37
4	23.5623	10.9770	35 55	+5 38.00
4	70.24	83.43	130 54	27 37 08
	17.56	20.86	11h 32 44	+6 54 17
	1.8	22	+ 14	1 8 50
	0.44	1.14	11 32 58	+7 03 07
	31	465		
	44	570		
	132	684		
	13.64	456		
		530.10		

Preliminary Reduction.

x − 5 − 1.114		− 2x	+ 2.167
+1032 − 3180	= −2148 − 19	= −2167	= 0
−1063 − 1073	= −2136 − 34	= −2170	= −3
+1664 − 3787	= −2121 − 40	= −2161	= +6
−903 − 1219	= −2122 − 47	= −2169	= −2
6.1483 − 2355		− 32	14.1263

y − 4	+ 1062x	− 1738	
+722	+ 1022	+ 1744	= +6
−77	+ 1818	+ 1741	= +3
−380	+ 2108	+ 1728	= −10
−759	+ 2497	+ 1738	= 0
21.2189	+ 1712		= 21.2163

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Plate constants.

a	b	c	x − 3	y − n
+ 9.64	+ 28.65	+ 1	= 0	+ 6
+ 17.15	+ 9.67	+ 1	= − 3	+ 3
+ 19.89	+ 34.12	+ 1	= + 6	− 10
+ 23.56	+ 10.98	+ 1	= − 2	0

Mean Equations

+ 13.40	+ 19.16	+ 1	= − 1.50	+ 4.50
+ 21.72	+ 22.55	+ 1	= + 2.00	− 5.00
+ 14.72	+ 31.38	+ 1	= + 3.00	− 2.00
+ 20.36	+ 10.82	+ 1	= − 2.50	+ 1.50
− 8.32	− 3.39		= − 3.50	+ 9.50
− 5.64	+ 20.56		= + 5.50	− 3.50
+ 5.64	+ 2.30		= + 2.37	− 6.44
	+ 22.86 b		= + 7.87	− 9.94
	b		= + 0.34	− 0.43

− 8.32a = − 3.50 + 1.17 = − 2.33 ; + 9.50 − 1.47 = + 8.03

a = + 0.28 ; = − 0.97

− 1.5	+ 2.0	+ 3.0	− 2.5	+ 4.5	− 5.0	− 20	+ 1.5
− 6.6	− 7.8	− 10.8	− 3.7	+ 8.3	+ 9.8	+ 13.6	+ 4.7
− 3.8	− 6.1	− 4.1	− 5.7	+ 13.0	+ 21.0	+ 14.2	+ 19.6
− 11.9	− 11.9	− 11.9	− 11.9	+ 25.8	+ 25.8	+ 25.8	25.8

Resids in x

			c	o	o − c
+ 3	+ 10	− 12	= + 1	0	− 1
+ 5	+ 3	− 12	= − 4	− 3	+ 1
+ 6	+ 12	− 12	= + 6	+ 6	0
+ 7	+ 4	− 12	= − 1	− 2	− 1

			c	o	
− 9	− 12	+ 26	= + 5	+ 6	= + 1
− 13	− 4	+ 26	= + 5	+ 3	= − 2
− 19	− 15	+ 26	= − 8	− 10	− 2
− 23	− 5	+ 26	= − 2	0	+ 2

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Plate constants.

a	b	c	x - 3	y - 7
+ 9.64	+ 28.65	+ 1 =	0	+ 6
+ 17.15	+ 9.61	+ 1 =	- 3	+ 3
+ 19.89	+ 34.12	+ 1 =	+ 6	- 10
+ 23.56	+ 10.98	+ 1 =	- 2	0

Mean Equations.

+ 13.40	+ 19.16	+ 1 =	- 1.50	+ 4.50
+ 21.72	+ 22.55	+ 1 =	+ 2.00	- 5.00
+ 14.72	+ 31.38	+ 1 =	+ 3.00	- 2.00
+ 20.36	+ 10.82	+ 1 =	- 2.50	+ 1.50
- 8.32	- 3.39		= - 3.50	+ 9.50
- 5.64	+ 20.56		= + 5.50	- 3.50
+ 5.64	+ 2.30		= + 2.37	- 6.44
	+ 22.86 b		= + 7.87	- 9.94
	b		= + 0.34	- 0.43

- 8.32a = - 3.50 + 1.17 = - 2.33 + 9.50 - 1.47 + 8.03

a = + 0.28 = - 0.97

- 1.5	+ 2.0	+ 3.0	- 2.5	+ 4.5	- 5.0	- 2.0	+ 1.5
- 6.6	- 7.8	- 10.8	- 3.7	+ 8.3	- 9.8	+ 13.6	+ 4.7
- 3.8	- 6.1	- 4.1	- 5.7	+ 13.0	+ 21.0	+ 14.2	+ 19.6
- 11.9	- 11.9	- 11.9	- 11.9	+ 25.8	+ 25.8	+ 25.8	+ 25.8

Resids.	x		c	o	o - c
+ 3	+ 10	- 12 =	+ 1	0	- 1
+ 5	+ 3	- 12 =	+ 4	- 3	+ 1
+ 6	+ 12	- 12 =	+ 6	+ 6	0
+ 7	+ 4	- 12 =	+ 1	- 2	- 1

			c	o	
- 9	- 12	+ 26 =	+ 5	+ 6	+ 1
- 13	- 4	+ 26 =	+ 5	+ 3	- 2
- 19	- 15	+ 26 =	- 8	- 10	- 2
- 23	- 5	+ 26 =	- 2	0	+ 2

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Times etc.

Exp. to stars 1911 Apr. 10	10h	05m		-	10h	14m	
" " moon	10	09	21.4	-	10	09	21.6
clock fast		2	49.0				
H. Sid T.	10	06	32.5				
H Long	4	44	31.05				
G. Sid. T.	14	51	03.55				
Sid. T. M. noon	1	10	23.53				
Interval	13	40	40.02				
Reduction		2	14.45				
G M. T.	13	38	25.57				

From Am Ephem:	R. A.			Decl.		
Moon 13h	11h	29m	43.83s	+7°	39'	08.8"
motion in 1m = 1.9442					14.529	
" " 38.426		1	14.71		9	18.3
Tabular place	11	30	58.54	+7	29	50.5

moon's parallax	56'	28.3"	
" semidiam.	15'	24.9	

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Times etc.

Exp. Potsdam 1911 Apr. 10	10^h	05^m		- 10^h	14^m	
mean	10	09	21.4	- 10	09	21.6
clock fast		2	49.0			
H. Sid T.	10	06	32.5			
H Long	4	44	31.05			
G Sid. T.	14	51	03.55			
Sid. T m. noon	1	10	23.53			
Interval	13	40	40.02			
Reduction		2	1445			
G m T.	13	38	25.57			

From Am Ephem.	R.A.			Decl.		
noon 13^m	11^h	29^m	$43^s.83$	$+7^\circ$	$39'$	$08''.8$
motion in 1^m $\quad$ $38^s.426$	$=1^s.19442$			$14''.539$		
		2	14.71		9	18.3
Tabular place	11	30	58.54	+7	29	50.5

moon's parallax	$56'$	$28''.3$	
Semidiam.	15	24.9	

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	Pos. ∠	Resid
1	215°.0	+32
2	232.5	0
3	263.7	-72
4	270.0	-16
5	293.0	+53
6	325.0	+42
7	332.5	+3
8	355.7	-81
9	0.0	+07
10	25.2	+2
11	27.5	-8

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Moon's Center.

	x	x − X₀		Δx	(x−X₀)²	(x−X₀)²+(y−Y₀)²	O − C
1	15.0000	−1.1490	+	2	1.3197	4.0326	+63
2	14.5546	−1.5944	+	2	2.5421	4.0295	+32
3	14.1556	−1.9934	+	0	3.9736	4.0218	−45
4	14.1422	−2.0068		0	4.0272	4.0272	+ 9
5	14.2988	−1.8502	−	1	3.4236	4.0331	+68
6	15.0000	−1.1490	−	2	1.3207	4.0300	+37
7	15.2250	−0.9240	−	3	0.8543	4.0256	− 7
8	16.0000	−0.1490	−	3	0.0223	4.0159	−104
9	16.1490	0.0000	−	3	0.0000	4.0284	+21
10	17.0000	+0.8510	−	3	0.7237	4.0230	−33
11	17.0716	+0.9226	−	3	0.8506	4.0219	−44
						4.0263	− 3

	y	y − Y₀		Δy	(y−Y₀)²
1	19.5725	−1.6469	−	2	2.7129
2	20.0000	−1.2194	−	2	1.4874
3	21.0000	−0.2194	−	0	0.0482
4	21.2194	0.0000		0	0.0000
5	22.0000	+0.7806	+	1	0.6095
6	22.8652	+1.6458	+	2	2.7093
7	23.0000	+1.7806	+	2	3.1713
8	23.2175	+1.9981	+	3	3.9936
9	23.2262	+2.0068	+	3	4.0284
10	23.0356	+1.8162	+	2	3.2993
11	23.0000	+1.7806	+	2	3.1713

Aphr. Centers.

x = 15.0 y: 19.5725
22.8653
42.4377
mean y = 21.2188
y: max = 23.2262
R = 2.0074
x: min = 14.1422
mean x = 16.1496

y = 23.0 x: 15.2250
17.0716
32.2966
mean x: 16.1483
x: min = 14.1422
R = 2.0061
y: max = 23.2262
mean y = 21.2201

Adopt { X₀ = 16.1490
Y₀ = 21.2194

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Moon's Center.

	x	x − X₀		Δx	(x − X₀)²	(x − x₀)² + (y − y₀)²	O − C
1	15.0000	− 1.1490	+	2	1.3197	4.0326	+ 63
2	14.5546	− 1.5944	+	2	2.5421	4.0295	+ 32
3	14.1556	− 1.9934	+	0	3.9736	4.0218	− 45
4	14.1422	− 2.0068		0	4.0272	4.0272	+ 9
5	14.2988	− 1.8502	−	1	3.4236	4.0331	+ 68
6	15.0000	− 1.1490	−	2	1.3207	4.0300	+ 37
7	15.2250	− 0.9240	−	3	0.8543	4.0256	− 7
8	16.0000	− 0.1490	−	3	0.0223	4.0159	− 104
9	16.1490	0.0000	−	3	0.0000	4.0284	+ 21
10	17.0000	+ 0.8510	−	3	0.7237	4.0230	− 33
11	17.0716	+ 0.9226	−	3	0.8510	4.0219	− 44
						4.0263	− 3

	y	y − Y₀		Δy	(y − y₀)²
1	19.5725	− 1.6469	−	2	2.7129
2	20.0000	− 1.2194	−	2	1.4874
3	21.0000	− 0.2194	−	6	0.0482
4	21.2194	0.0000		0	0.0000
5	22.0000	+ 0.7806	+	1	0.6095
6	22.8652	+ 1.6458	+	2	2.7093
7	23.0000	+ 1.7806	+	2	3.1713
8	23.2175	+ 1.9981	+	3	3.9936
9	23.2262	+ 2.0068	+	3	4.0284
10	23.0356	+ 1.8162	+	2	3.2993
11	23.0000	+ 1.7806	+	2	3.1713

Aphr. Center.

x = 15.0 y: 19.5725
22.8652
42.4377
mean y = 21.2188
y: max = 23.2262
R = 2.0074
x: min = 14.1422
mean X = 16.1496

y = 23.0 x: 15.2250
17.0716
32.2966
mean X = 16.1483
x: min = 14.1422
R = 2.0061
y: max = 23.2262
mean y = 21.2201

Adopt { X₀ = 16.1490
Y₀ = 21.2194

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No		a_t		a_n		b_n
1	+	1.90	−	72.5	−	103.8
2	+	1.94	−	50.9	−	39.0
3	+	0.44	+	89.5	+	9.9
4	−	0.00	−	18.1	+	0.0
5	−	1.44	−	125.8	+	53.0
6	−	1.90	−	42.5	+	61.0
7	−	1.64	+	6.4	−	12.5
8	−	0.30	+	15.6	−	20.80
9		0.00		0.0	+	42.2
10	+	1.55	−	28.0	−	58.3
11	+	1.64	−	40.5	−	78.4
	+	2.19	−	266.8	−	333.9

60.0

$[aa] = +19.06$ $[bb] = +25.25$

$[ac] = -9.04$ $[bc] = +8.73$ $[cm] = -3$

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Moon's Center

Conditional Equations

	a	b	e	O		c		O − C
1	− 1.15	− 1.65	+ 1	= + 63	+ 17 + 18 − 4	= + 31		+ 32
2	− 1.59	− 1.22	+ 1	= + 32	+ 23 + 13 − 4	= + 32		0
3	− 1.99	− 0.22	+ 1	= − 45	+ 29 + 2 − 4	= + 27		− 72
4	− 2.01	+ 0.00	+ 1	= + 9	+ 29 − 0 − 4	= + 25		− 16
5	− 1.85	+ 0.78	+ 1	= + 68	+ 27 − 8 − 4	= + 15		+ 53
6	− 1.15	+ 1.65	+ 1	= + 37	+ 17 − 18 − 4	= − 5		+ 42
7	− 0.92	+ 1.78	+ 1	= − 7	+ 13 − 19 − 4	= − 10		+ 3
8	− 0.15	+ 2.00	+ 1	= − 104	+ 2 − 21 − 4	= − 23		− 81
9	0.00	+ 2.01	+ 1	= + 21	0 − 22 − 4	= − 26		+ 47
10	+ 0.85	+ 1.82	+ 1	= − 33	− 12 − 19 − 4	= − 35		+ 2
11	+ 0.92	+ 1.78	+ 1	= − 44	− 13 − 19 − 4	= − 36		− 8
								+ 179 − 177

Average (O − C) = 32

Normal Equations

a	b	c	
+ 19.06	+ 2.19	− 9.04	= − 267
+ 2.19	+ 25.23	+ 8.73	= − 334
− 9.04	+ 8.73	+ 11.00	= − 3

$\frac{\Delta a}{\Delta c}$ = + 0.519

− 2.19	− 0.25	+ 1.04	= + 31
+ 9.04	+ 1.04	− 4.29	= − 126

+ 24.98	+ 9.77	= − 303
+ 9.77	+ 6.71	= − 129

$\frac{\Delta b}{\Delta c}$ = − 0.39

− 9.77	− 3.82	= + 118
	+ 2.89	= − 11

c = − 4

− 14.25	− 9.77	= + 188
+ 10.73		= − 115

b = − 11

+ 2.27	− 2.19	− 2.76	= + 1
+ 26.16	− 25.23	− 31.80	= + 9

+ 21.33	− 11.80	= − 266
+ 28.35	− 23.07	= − 325

− 14.50	− 11.80	= + 166
+ 6.83 a		= − 100

a = − 15

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Woods Cañon

Conditional Equations

	a	b	c	o			c	
1	−1.15	−1.65	+1	+63	+17	+18 −4	+31	+32
2	−1.59	−1.22	+1	+32	+23	+13 −4	+32	0
3	−1.99	−0.22	+1	−45	+29	+2 −4	+27	−72
4	−2.01	+0.00	+1	+9	+29	−0 −4	+25	−16
5	−1.85	+0.78	+1	+68	+27	−8 −4	+15	+53
6	−1.15	+1.65	+1	+37	+17	−18 −4	−5	+42
7	−0.92	+1.78	+1	−7	+13	−19 −4	−10	+3
8	−0.15	+2.00	+1	−104	+2	−21 −4	−23	−81
9	+0.00	+2.01	+1	+21	0	−22 −4	−26	+47
10	+0.85	+1.82	+1	−33	−17	−19 −4	−35	+2
11	+0.92	+1.78	+1	−44	−13	−19 −4	−36	−8

+179 −177

Average −c = 32

Normal Equations.

a	b	c	
+19.06	+ 2.19	− 9.04	= −267
+ 2.19	+25.23	+ 8.73	= −334
− 9.04	+ 8.73	+11.00	= −3
− 2.19	− 0.25	+ 1.04	= + 31
+ 9.04	+ 1.04	− 4.29	= −126
	+24.98	+ 9.77	= −303
	+ 9.77	+ 6.71	= −129
	− 9.77	− 3.82	= +118
		+ 2.89	= − 11

c = −4

	−14.25	− 9.77	= +188
	+10.73		= −115

b = −11

+ 2.27	− 2.19	− 2.76	= + 1
+26.16	−25.23	−31.80	= + 9
+21.33		−11.80	= −266
+28.35		−23.07	= −325
−14.50		−11.80	+166
+ 6.83a			= −100

a = −15

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Moon's mean position (1911.0).

$X_0 = 16.1490$ $\quad Y_0 = 21.2194$

$\frac{1}{2}a = -7$ $\quad \frac{1}{2}b = -5$

16.1483 $\quad 21.2189$

From Prelim Reduction $\quad X = 16.1263$ $\quad Y = 21.2163$

∴ computed plate constants $\quad ax = +5$ $\quad -16$

$by = +7$ $\quad -9$

$c \quad -12$ $\quad +26$

16.1263 $\quad 21.2164$

$\xi = -1.87737$

$\log \xi : 0.27270_n$

$\therefore \cos\delta = 999680$

$\therefore \text{const} = 8.50724$

$\therefore (\alpha - A) = 1.76866_n$

$\alpha - A = -58.70$

$A = 11^h\ 32\ 58$

$\alpha_0 = 11^h\ 31^m\ 59^s.30$

$\eta = -0.7836$

$\log \text{Tan}\ \delta = 9.0923$

$\therefore \xi^2 = 0.5454$

$\therefore \eta_1 = 6.6911$

$\eta_1 = +5$

$\eta_0 = -0.7841$

$\log \eta_0 = 9.894377_n$

$\text{const} = 733115$

$\therefore (\delta - D) = 2.563272_n$

$\delta - D = -365.8''$

$= -6'\ 05.8''$

$D = +7\ 03\ 07$

$\delta_0 = +6^\circ\ 57'\ 01.2''$

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mean places (1911.0).

X = 16.1490 − 7 = 16.1483

Y = 21.2194 − 5 = 21.2189

Provisional Reduction

X = 16.1763 + 5 + 7 − 12 = 16.1763

Y = 21.2163 − 16 − 9 + 26 = 21.2164

δ = −1.8737

log ρ sin φ = 0.77270

log ρ cos φ = 9.99680

φ = 8.50724

(φ − A) = 1.76866

φ − A = −58.70

A = 11° 32′ 58″

α = 11 31 59.30

ρ sin φ = 0.7836

tan φ = 9.0923

φ = 0.05454

π = 6.6911 + 5

π = 0.7841

log ρ = 9.89437

7 33115

(δ − D) = 2.56322

δ − D = − 365.8

= − 6′ 05.8

D = +7 03 07

δ = +6° 57′ 01.2

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1911phae.pro: 188

Red. ad. & app.

$\delta = +6^\circ\ 57'\ 01''.2$

$H + \alpha_2 9^h\ 57^m = 61^\circ\ 15'$

H	16	33	00
K	11	31	59.30
G	16	25	30
G+α29	57	=	89° 15'

log ζ 0.8829n
∴ cos δ 9.9968
∴ (ζ) 0.8797n

log cos(G+K₀)	8.1169	log sin δ₀	9.0828
∴ δ	0.8742	∴ cos(H+α₀)	9.6821
∴ sin(G+α₀)	0.0000	∴ h	1.2779
∴ cos δ	9.0860	∴ sin(H+K)	9.9429
∴ 1/r	8.8239	∴ sec δ₀	0.0032
		∴ 1/r	8.8239

log(ξ')	8.9911	log(η')	0.0428
∴ ξ₀	8.7841	∴ η₀	0.0479

(ξ)	+0.12
(δ)	+0.06
(η)	+1.12
Red in α	+1.30

$\alpha' = 11^h\ 32^m\ 00^s.60$

(ξ')	+0.10
(η')	+1.10
(ζ)	−7.58
Red in δ	−6.38

$\delta' = +6^\circ\ 56'\ 54''.8$

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1029

Red. and Ecl. appl.

$\delta = +6^\circ\ 57'\ 01''.2$

H + 9^h	05	=	61° 15′
H	16	33	00
α	11	31	59.30
G	16	25	30
G + α 29	57	=	89° 15′

log i	0.8829 n
cos δ	9.9968
∴ (c)	0.8797 n

log cos(G + α$_0$)	8.1169	log sin δ$_0$	9.0828
δ	0.8742	cos(H + α$_0$)	9.6621
cos(G + α$_0$)	0.0000	h	1.2779
− log δ	9.0860	∴ log(H + A)	9.9429
∴	= 8.8239	− log δ$_0$	0.0032
		∴	8.8239

log (δ′ / δ$_0$)	8.9911	log (h′ / h)	0.0428
(δ / δ$_0$)	8.7841	(h / h)	0.0479

δ	+0.12
(δ)	+0.06
(c)	+1.12
Red. α :	+1.30

(g′)	+0.10
(h′)	+1.10
(c)	−7.58
Red. δ	−6.38

$\alpha' = 11^h\ 32^m\ 00^s.60$ $\quad \delta' = +6^\circ\ 56'\ 54''.8$

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1029

Lunar Parallax.

α' =	11	32	00.60	✓
α	10	08	32.5	✓
$\theta - \alpha$ =	−1	25	28.1	✓
	−21°	22′		
$\frac{1}{2}(\alpha - \alpha')$	−7	43	40	
	−21	14	20	
	−13	43		

δ =	+6°	56′	54.8″	✓
π		56′	28.3″	✓

9.957127
0.000000
0.012544 ✓ 0.003055
log 9.969814 ✓ 9.487782

δ'	43	00	36.0	✓
	44	11	48.0	
δ	+6	56	54.8	
	37	14	53.2	✓
$\delta' - \delta$ =	26	03	41.2	

9.826400 ✓ 9.826400
8.215544 ✓ 8.215-54
9.769866 9.781955
0.166614 ✓ 0.156669
sin(θ−δ′) 7.977924 7.480058

$\delta - \delta'$		32	52.5
	+	32	40.5
	+7	29	47.3
δ	+7	29	35.3

Am Eph δ = +7 29 50.5″

$\theta - \zeta$ − 3.2

Correction for nadir − 0.8

− 4.5

9.868913 ✓
8.215544 ✓
9.561500 ✓
0.003733 ✓
sin(α−α′) 7.649990 ✓

$\alpha - \alpha'$ = −15′ 21.15″ ✓
= −1m 01.41s ✓

α = 11 30 59.19 ✓
κ = 11 30 58.54 ✓
+ 0.65 ✓
+ 0.8
+ 0.73

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1029

Lunar Parallax.

	h	m	s
α' =	11	32	00.60
6	10	08	32.5
$\Theta - \alpha$ =	−1	25	28.1
	−21°	22′	
$\frac{1}{2}(\alpha - \delta)$	−7	47	40
	−21	14	20
	−13	42	

	°	′	″
δ' =	+6	56	59.8
IT		56′	28.3″

	9.86913
	8.21554
	9.56150n
	000373
$\sin(\alpha - \delta')$	7.64990n

	9.95727	
	.000000	
	001254	003055
log	996981	998782

$\alpha - \alpha'$ = −15′ 21.″5

= −1′ 01.s41

δ	43	00	36.0
	44	11	48.0
δ	+6	56	54.8
	37	14	53.2
$\delta - \delta'$	26	02	41.2

9.82640	9.82640	
8.21554	8.21554	
9.76986	9.78195	
016614	015669	
$\sin(\delta - \delta')$	7.97094	7.48058

		32	52.5
$\delta - \delta'$		32	40.5
	+7	29	47.3
δ	+7	29	35.3

α =	11	30	5.919
α =	11	30	5.8.54
			+ 0.65
			+ 08
			+ 0.73

Corr. E/W to δ = +7 29 5.0.5

$\Theta - \alpha$ − 3.2

Correction for − 06

− 4.0

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MC 1028 1913 Jan. 2. 55

Comp. Stars - Standard Coords.

	1	2
α	$11^h\ 28^m\ 32^s.20$	$11^h\ 32\ 34.91$
A	11 32 39.	11 32 39
α−A	− 4 6.80	− 4.09
sin(α−A)	− 246.79	− 4.09
log "	2.392233	0.611728
" cosδ	9.999586	9.999803
ξ₀	0.895543	9.116999
ξ₀	− 7.8602	− 0.1309
ξ₁	− 18	0
ξ	10.1380	17.8691
x	10.2456	17.7076
x − ξ	+ .1076	− .1615
δ	+7° 54′ 09.6″	+5° 27′ 20.6″
D	7 08 56	7 08 56.
δ − D	+ 45 13.6	−1 41 35.4
tan(δ−D)	+ 2713.8	− 6097.2
log "	3.433598	3.785513
cosδ₀	0.764773	1.116128
tanδ	9.1474	8.9800
η²	1.7909	8.2340
η₁	7.9867	4.2674
η₀	+ 5.8174	− 13.0700
η₁	+ 97	0
η	27.8271	8.9300
y	278800	6.8762
y − ŋ	+ 529	− 538

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NGC 1078

Calyp. Planet Comparison Stars

	1	2
α	$11^h\ 28^m\ 32^s.20$	$11^h\ 32\ 34.91$
A	11 32 39.	11 32 39
α − A	− .4 6.80	− 4.09
sin(α − A)	− 246.79	− 4.09
log	2.392353	0.611728
− cos δ	9.995866	9.998031
ξ_0	0.895437	9.116997
ξ_0	− 7.8602	−0.1309
ξ_1	− 18	0
ξ	10.1380	17.8691
z	10.2456	17.7076
z − ξ	+ .1076	− 1615

	1	2
δ	$+7^\circ\ 54'\ 09''.2$	$+5^\circ\ 27'\ 20''.6$
D	7 08 56	7 08 56.
δ − D	+ 45 13.6	−1 41 35.4
sin(δ − D)	+ 2713.8	− 6097.2
log	3.433558	3.785132
cos δ₀	0.764783	1.116287
tan δ	9.1424	8.9800
ξ^2	1.1909	8.2340
η_1	7.9867	4.2674
η_0	+ 5.8174	− 13.0700
η_1	+ 97	0
η	27.8271	8.9300
η	27.8800	6.8762
η − ξ	+ 2529	− 538

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MC 1028. 1913 Jan 2. 56

Comp Star Standard Coords.

	3	4
α	$11^h\ 38^m\ 52^s.25$	$11^h\ 35^m\ 54^s.58$
A	11 32 39	11 32 39
α − A	+ 1 13.25	+ 3 15.58
sin(α − A)	+ 73.25	+ 1.9557
log	1.864810	2.291300
log sec δ	9.995060	9.997900
ξ₀	0.367110	0.796440
ξ₀	+2.3287	+6.2580
ξ₁	+ 8	+ 28
ξ	20.3295	24.2608
x	20.5179	24.1217
x − ξ	+ 1884	− 1391
δ	+8° 37′ 37″.2	+5° 37′ 59″.6
D	7 08 56	7 08 56
δ − D	+1 28 41.2	−1 30 56.4
tan(δ − D)	+ 5322.4	− 5457.7
log	3.726111	3.737101 n
η₀	1.057726	1.068116 n
tan δ	9.1810	8.9940
ξ²	0.7342	1.5929
η₁	6.9686	7.6403
η₀	+11.4092	−11.6992
η₁	+ 9	+ 44
η	33.4101	10.3052
y	33.3195	10.1620
y − η	− 906	− 1432

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NC 1028.

1913 Jan. 2.

56

	3	4.
α	$11^h\ 35^m\ 52^s.25$	$11^h\ 35^m\ 54^s.58$
A	11 32 39	11 32 39
α − A	+ 1 13.25	+ 3 15.58
sin(α − A)	+ 73.25	+ 195.57
log	1.86481	2.29130
cos δ	9.99506	9.99790
B₀	0.36711	0.79644
B₀	+2.32887	+6.25580
	+ 8	+ 28
B	20.32955	24.26608
z	20.51791	24.12177
z − 3	+ 1884	− 1391

δ	+8° 37′ 37″.2	+5° 37′ 59″.6
D	7 08 56	7 08 56
δ − D	+1 28 41.2	−1 30 56.4
sin(δ − D)	+ 5322.4	− 5457.7
log	3.72611	3.73701 n
η₀	1.05726	1.06816 n
cos δ	9.18910	8.99940
ξ²	0.73342	1.59929
η₁	0.96686	1.64032
η₀	+11.40928	−11.69928
η₁	+ 9	+ 44
η	33.41015	10.30052
ξ	33.31955	10.16200
ξ − η	− 906	− 1432

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Remeasure 3, 2c

d	d
19200	18770
14377 85	13555 50
7077	4956
99	37
4823	.4818

Mean .4820 = .5180

1 2c

N	d
19139	17369
11688 05	14908 15
0100	1711
45	68
7542	.7544

.7543 = .2457

2 2c

17537	17026
14918 15	9953 50
0818	4852
42	20
.2920	.2930

.2925 = .7075

4

14960	15420
6179 78	14201 10
7070	0800
57	05
.8783	.8788

.8786 .1214

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MC 1028. 1902. Nov. 25.

Comparison Stars - Measures.
Reseau Reversed.

	d	N	d	N
1	25.7 18476	16797	16608	17469
	16.1 17272 76	80009 99	14151 50	99332 1
	74	98	50	28
	75	00	00	72
	16.1202	.1199	25.7544	.7544
2	18.2 16520	17728	18045	17760
	35.1 15281 85	89579 57	10968 60	14831 31
	78	52	70	30
	18	19	48	65
	35.1239	.1236	18.2919	.2930
3	15.5 13920	17097	15703	18569
	10.6 7120 21	13901 10	10526 27	13758 55
	25	01	28	52
	20	92	06	
	10.6801	.6809	15.4823	.4819
4	17401	15749	16542	15251
	11.9 9008 15	14126 29	15120 24	64617 76
	33.8 20	25	18	73
	95	41	41	58
	33.8382	.8379	11.8779	.8787

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MC 1028. 1912. Nov. 25. 57

Comparison Stars - Measures.

1	d	N	d	N
	25.7 18476	16797	16608	17469
	16.1 17272 76	80099	19157 50	99338 21
	74	98	50	28
	75	00	60	72
	16.1202	.1199	25.7544	.7544
3				
	15.2 16520	17728	18045	17760
	35.1 15281 85	69597	10968 60	14831 31
	78	52	70	30
	18	19	48	63
	35.1239	.1236	18.2919	.2930
3				
	15.8 13920	17097	15707	18569
	10.6 71320 21	13901 10	10526 27	13758 55
	25	01	28	52
	2	92	06	
	10.6801	.6809	15.4523	.4519
2				
	17401	15749	16542	15251
	11.9 9008 15	14126 29	15120 24	64761 76
	20	25	18	73
	33.8 95	41	41	58
	33.8382	.8379	11.8779	.8787

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MC 1028. 1912 Nov. 25. 58

Points on moon's limb — measures.

	y		x	
1/	d	N	d	N
21.0	16087	17907		
24.7	84372 1	15510 24		
	21	15		
	67	18		
	24.7646	.7606		
			17389	15239
2/			14447 59	81870 70
21.6			48	68
24.0			76	39
			21.7060	.7066
			16424	14171
3/			15790 97	48111 87
21.9			83	96
23.0			30	78
max in x			21.9366	.9379
			15520	17088
4/			11831 38	10759 60
21.6			47	56
22.0			15	95
			21.6321	.6334
5/				
21.0	15003	16080		
21.4	11392 03	96897 78		
	87	86		
	12	79		
	21.3612	.3605		
6/				
20.0	14065	16036		
21.1	13512 94	66000 00		
min in y	01	90		
	75	32		
	21.0564	.0565		

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MC 1028. 1912 Nov. 25.

Points on Moon's Limb — Measures.

	y			x	
1/	d	N		d	N
21.0	16087	17907			
24.7	8437 21	15510 29			
	21	15			
	67	18			
	24.7646	.7606			
2/				17389	15239
21.6				14497 59	8180 70
24.0				48	68
				76	39
				21.7060	.7066
3/				16424	14171
21.9				15790 97	4811 87
23.0				83	96
mm				30	78
in x					
				21.9366	.9379
4/				15520	17088
21.6				11831 38	10759 60
22.0				47	56
				15	91
				21.6321	.6334
5/					
21.0	15003	16080			
21.4	11392 08	9689 78			
	87	86			
	12	79			
	21.3612	3605			
6/					
20.0	14065	16036			
21.1	13512 94	6600 00			
mm	01	90			
in	75	72			
y					
	21.0564	.0565			

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MC 01028 1912 Nov. 25. 59.

Points on Moon's Limb – measures.

7/	a		N	
19.0	14140		16180	
21.4	11286	84	9007	07
	90		04	
	50		71	
	21.2856		.2852	

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1912 Jan 5.25.

MC 61029

Plots on Vecchio's Comet Photographs.

		4					
7/							
		W			N		
19:0		14146			16180		
21.4		11286	84		90707		
		90			04		
		50			71		
		21.2856			.2832		

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Mean measured coords of stars and coords of centre of plate

Star	x	y
1	10.2456	27.8800
2	17.7076	8.8762
3	20.5179	33.3195
4	24.1217	10.1620
	72459	80.44
	−18.15	−20.11
	+18	+22
	.15	1.89
	.31	.465
	−4.65	.945
		1134
		756
		878.85

mean α = $11^h\ 32^m\ 44^s$
$-\ 5$
A = 11 32 39

mean δ = $+6^\circ\ 54'\ 17''$
$+\ 14\ 39$
D = $+7^\circ\ 08\ 56$

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MC 1028. 1913 Jan 1. 60

Mean measured coords of stars and coords of centre of plate.

Star	x	y
1	10.2456	27.8800
2	17.7076	8.8762
3	20.5179	33.3195
4	24.1217	10.1620
5	41.7259	8044
	−18.15	−20.11
	1 16	1 22
	15	1.89
	31	465
	−4.65	945
		1134
		756
		878.85

mean α = $11^h\ 32^m\ 44^s$
− 5
A = 11 32 39

mean δ: + 6° 54′ 17″
+ + 14 39
D = + 7° 08 56

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Times etc.

Ext. to stars	1911 Apr. 10	9h	48m		-	9h	58m	
" " moon		9	52	55.2	-	9	52	55.4
clock fast			2	49.0				
H. Sid T.		9	50	06.3				
" Corr.		4	44	31.05				
G. Sid T.		14	34	37.35				
Sid. T. M. noon		1	10	23.53				
Interval		13	24	13.82				
Reduction			2	11.75				
G. M. T.		13	22	02.07				

From Am. Eph.

moon 13h		11h	29m	43.83		+7°	39'	08".8
motion in 1m = 1.9447					14.526			
" " 22.0345		+	42.85			-	5	20.1
Tabular place		11	30	26.68		+7	33	48.7

moons parallax 56' 28".6

" semidiam. 15 24.9

age of moon 11 da.

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Times etc.

Sup. & stars 1911 Apr. 10	9^h	48^m	9^s 58^m
Mean	9	57	55.2 — 9 52 55.4
Sweets fast		2	49.0
M. Sid. T.	9	50	06.3
Long.	4	44	31.05
G. Sid. T.	14	34	37.35
Sid. T. M. Noon	1	10	23.53
Interval	13	24	13.82
Reduction		2	11.75
G. M. T.	13	22	02.07

From Cin. Ephs.

Noon 13^d	$+1^h$	29^m	43.83	$+7°$	$39'$	$08''.8$
Interval 1914				19.526		
			+ 42.85		− 5	20.1
Intercepts	11	30	− 26.68	+7	33	48.7

Tropic parallax 56′ 28″.6
Semidiameter 15′ 19.9

age of moon

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MC1028. 1913 Jan. 30. 62

Preliminary Reduction.

	1	2	3	4
36-x	10.2456	17.7076	20.5179	24.1217
3	9.5328	17.2607	19.7250	23.6526
x-3	+ 7128	+ 4469	+ 7929	+ 4691
44y	27.8800	8.8762	33.3195	10.1620
4n	28.5768	9.6787	34.1588	11.0529
y-n	- 6968	- 8025	- 8393	- 8909

Star	x-3	-4469	-1414		-4x		+1316	
1	+7.1128 =	+2659	-3931	= -1272	-41	= -1313	=	+3
2	+4469 =		0	-1252	-71	= -1323	=	-7
3	+7929 =	+3460	-4698	= -1238	-82	= -1320	=	-4
4	+4691 =	+ 222	-1453	= -1211	-96	= -1307	=	+9
Means	16.0688		- 2952		- 64		=	15.4519

Star	y-n	+6968	+139x		- 4		-1397	
1	-6968 =		0	+1424	-28	= +1396	=	-1
2	-8025 =	-1057	+2462	= +1405	- 9	= +1396	=	-1
3	-8393 =	-1425	+2852	= +1427	-33	= +1394	=	-3
4	-1941 =	-1941	+3353	= +1412	-10	= +1402	=	+5
Means	20.9571		+ 2234		- 21		=	21.7155

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MC1028. 1913 Jan. 30.

Preliminary Reduction.

	1	2	3	4
	10.2456	17.7076	20.5179	24.1217
	9.5328	17.2607	19.7250	23.6526
-3	+ 7128	+ 4469	+ 7929	+ 4691
	27.8800	8.8762	33.3195	10.1620
	28.5768	9.6787	34.1588	11.0529
-4	- 6968	- 8025	- 8393	- 8909

Star	x - 3	- 4469	- 1414		- 4x		+ 1316
1	+ 7128	= + 2659	- 3931	= - 1272	- 41	= - 1313	= + 3
2	+ 4469	=	0 - 1257	= - 1252	- 71	= - 1323	= - 7
3	+ 7929	= + 3460	- 4698	= - 1238	- 82	= - 1320	= - 4
4	+ 4691	= + 222	- 1433	= - 1211	- 96	= - 1307	= + 9
now	16088		- 2952		- 64		= 15.4519

Star	y - m	+ 6968	+ 1397		- 4		- 1397
1	- 6968	=	0 + 1424	= + 1424	- 28	= + 1396	= - 1
2	- 8025	= - 1057	+ 2462	= + 1405	- 9	= + 1396	= - 1
3	- 8393	= - 1425	+ 2852	= + 1427	- 33	= + 1394	= - 3
4	- 1941	= + 1941	+ 3353	= + 1412	- 10	= + 1402	= + 5
now	20.9371		+ 2239		- 21		= 21.7155

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MC1028

1913 Jan 30

Equations of Condition.

a	b	c	x − 5	y − 7
−10.25	+27.88	+1	= +3	−1
17.71	+ 8.88	+1	= −7	−1
−20.52	+33.32	+1	= −4	−3
24.12	+10.16	+1	= +9	+5

Mean Equations.

a	b	c		
13.98	+18.38	+1	= −2.00	−1.00
22.32	+21.74	+1	= +2.50	+1.00
15.38	+30.60	+1	= −0.50	−2.00
20.92	+ 9.52	+1	= +1.00	+2.00
−8.34	− 3.36		= −4.50	−2.00
−5.54	+21.08		= −1.50	−4.00
+5.54	+ 2.24		= +3.00	+1.33
	+23.32		= +1.50	−2.67
		b	= +0.06	−0.11
−8.34a	= −4.50 + 0.22	= −4.28		z = −2.00 − 0.38 = −2.38
		a	= +0.51	+0.29

−2.0	+2.5	−0.5	+1.0	−1.0	+1.0	−2.0	+2.0
−7.2	−11.5	−7.9	−10.7	−4.0	−6.4	−4.4	−6.0
−1.2	−1.4	−2.0	−0.6	+2.1	+2.5	+3.5	+1.1
−10.4	−10.4	−10.4	−10.3	−2.9	−2.9	−2.9	−2.9

Residuals.

	c	o	o − c
+1 5 + 2 − 10	= −3	+3	+6
+1 9 + 1 − 10	= 0	−7	−7
+1 1 + 2 − 10	= +3	−4	−7
+1 2 + 1 − 10	= +3	+9	+6

+3 − 3 − 3	= −3	−1	+2
+5 − 1 − 3	= +1	−1	−2
+6 − 4 − 3	= −1	−3	−2
+7 − 1 − 3	= +3	+5	+2

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1913 Jan 30

Equations of Condition.

a	b	c	n − 5	4 − n
10.25	+ 27.68	+ 1 =	+ 3	− 1
17.71	+ 8.88	+ 1 =	− 7	− 1
20.52	+ 33.32	+ 1 =	− 4	− 3
24.12	+ 10.16	+ 1 =	+ 9	+ 5

Mean Equations.

a	b	c		
13.98	+ 18.38	+ 1	= − 2.00	− 1.00
22.32	+ 21.74	+ 1	= + 2.50	+ 1.00
15.38	+ 30.60	+ 1	= − 0.50	− 2.00
20.92	+ 9.52	+ 1	= + 1.00	+ 2.00
− 8.34	− 3.36		= − 4.50	− 2.00
− 5.54	+ 21.08		= − 1.50	− 4.00
+ 5.54	+ 2.24		= + 3.00	+ 1.33
	+ 23.32		= + 1.50	− 2.67
		G	= + 0.06	− 0.11
− 8.34 a	= − 4.50	+ 0.22	= − 4.28	z = − 2.00 − 0.33 + − 2.33
		a	= + 0.51	+ 0.29

− 2.0	+ 2.5	− 0.5	+ 1.0	− 1.0	+ 1.0	− 2.0	+ 2.0
− 7.2	− 11.5	− 7.9	− 10.7	− 4.0	− 6.4	− 4.4	− 6.0
− 1.2	− 1.4	− 2.0	− 0.6	+ 2.1	+ 2.5	+ 3.5	+ 1.1
− 10.4	− 10.4	− 10.4	− 10.3	− 2.9	− 2.9	− 2.9	− 2.9

Residuals

		c	0	0 − c
+ 15	+ 2 − 10	= − 3	+ 3	+ 6
+ 19	+ 1 − 10	= 0	− 7	− 7
+ 11	+ 2 − 10	= + 3	− 4	− 7
+ 12	+ 1 − 10	= + 3	+ 4	+ 6
+ 3	− 3 − 3	= − 3	− 1	+ 2
+ 5	− 1 − 3	= + 1	− 1	− 2
+ 6	− 4 − 3	= − 1	− 3	− 2
+ 7	− 1 − 3	+ 3	+ 5	+ 2

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	Pos. L	Read
1	212°.3	−9
2	242.0	+51
3	270°.0	−43
4	302.0	−63
5	327.7	+64
6	0.0	−4
7	27.8	−20

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MC1028. 1913 Feb 3.

Moore's Center

	36 − x	x − X_0	Δx	$(x-X_0)^2$	$(x-X_0)^2+(y-Y_0)^2$	O − C
1	15.0000	−1.0681	+ 3	1.1402	4.0339	+ 44
2	14.2937	−1.7746	+ 2	3.1485	4.0371	+ 76
3	14.0628	−2.0053	− 0	4.0212	4.0250	− 45
4	14.3672	−1.7009	− 2	2.8937	4.0211	− 84
5	15.0000	−1.0681	− 3	1.1415	4.0352	+ 57
6	16.0000	−0.0681	− 4	0.0047	4.0271	− 24
7	17.0000	+0.9319	− 3	0.8679	4.0274	− 21

mean = 4.0295 ± 3.

	44 − y	y − Y_0	Δy	$(y-Y_0)^2$
1	19.2374	−1.7009	− 2	2.8937
2	20.0000	−0.9383	− 1	0.8806
3	21.0000	+0.0617	+ 0	0.0038
4	22.0000	+1.0617	+ 1	1.1274
5	22.6392	+1.7009	+ 2	2.8937
6	22.9436	+2.0053	+ 3	4.0224
7	22.7156	+1.7773	+ 2	3.1595

Approximate Center of plate.

x = 15.0 y = 19.2374
22.6392
41.8766
mean y = 20.9383
y max = 22.9436
R = 2.0053
x min = 14.0628
mean x = 16.0681

X_0 = 16.0681
Y_0 = 20.9383

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Measures Center

	36 − x	x − X_0	Δx	$(x-X_0)^2$	$(x-X_0)^2+(y-Y_0)^2$	O − C
1	15.0000	−1.0681	+ 3	1.1402	4.0339	+ 44
2	14.2937	−1.7746	+ 2	3.1485	4.0371	+ 76
3	14.0628	−2.0053	− 0	4.0212	4.0250	− 45
4	14.3672	−1.7009	− 2	2.8937	4.0211	− 84
5	15.0000	−1.0681	− 3	1.1415	4.0352	+ 57
6	16.0000	−0.0681	− 4	0.0047	4.0271	− 24
7	17.0000	+0.9319	− 3	0.8679	4.0274	− 21

mean = 4.0295 ± 3.

	49 − y	y − Y_0	Δy.	$(y-Y_0)^2$
1	19.2374	−1.7009	− 2	2.8937
2	20.0000	−0.9383	− 1	0.8806
3	21.0000	+0.0617	+ 0	0.0038
4	22.0000	+1.0617	+ 1	1.1274
5	22.6392	+1.7009	+ 2	2.8937
6	22.9436	+2.0053	+ 3	4.0224
7	22.7156	+1.7773	+ 2	3.1595

Approximate Center of plate.

x = 15.0 y = 19.2374
22.6392
41.8766
mean y = 20.9383
y − mean = 22.9436
R = 2.0053
x − mean = 14.0628
mean = 16.0681

X_0 = 16.0681
Y_0 = 20.9383

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Formation of Normals

No.	ab	ac	bc
1	+ 1.82	- 47.0	- 74.8
2	+ 1.66	- 134.4	- 71.4
3	- 0.12	+ 90.5	- 2.7
4	- 1.80	+ 142.8	- 89.0
5	- 1.82	- 60.9	+ 96.8
6	- 0.14	+ 1.7	- 48.2
7	+ 1.66	- 19.5	- 37.4
	+1.26	- 26.8	-226.7

$[aa] = +13.22^{v}$ $[bb] = +14.98^{v}$

$[ac] = -6.76^{v}$ $[bc] = +3.97^{v}$ $[cc] = +3$

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MC1028 1913 Feb. 3. 65

Moon's Center.

Conditional Equations.

	a	b	c	O		C	O − C
1	−1.07	−1.70	+1	= +44	−15 + 40 + 28	= +53	−19
2	−1.77	−0.94	+1	= +76	−25 + 22 + 28	= +25	+51
3	−2.01	+0.06	+1	= −45	−29 − 1 + 28	= −2	−43
4	−1.70	+1.06	+1	= −84	−24 − 25 + 28	= −21	−63
5	−1.07	+1.70	+1	= +57	−15 − 40 + 28	= −27	+84
6	−0.07	+2.01	+1	= −24	−1 − 47 + 28	= −20	−4
7	+0.93	+1.78	+1	= −21	+13 − 42 + 28	= −1	−20

−139 + 135

Average (O − C) = 39

Normal Equations.

a	b	c	
+13.22	+1.26	−6.76	= −27
+1.26	+14.98	+3.97	= −227
−6.76	+3.97	+7.00	= +3
−1.26	−0.12	+0.64	= +3
+6.76	+0.64	−3.46	= −14
	+14.86	+4.61	= −224
	+4.61	+3.54	= −11
	−4.61	−1.44	= +70
		+2.10	= +59
	−6.00	−4.61	= +14
	+8.86		= −210

$\frac{\Delta z}{\Delta x} = +108$

$\frac{\Delta y}{\Delta x} = -0.64$

c = +28

b = −24

+2.14	−1.26	−2.22	= −1
+25.50	−14.98	−26.40	= −11
+15.36		−8.98	= −28
+26.76		−22.43	= −238
−10.70		+8.98	= +95
+4.66			= +67

a = +13

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Morris Cantle.

Conditional Equations.

	a	b	c	O	C	O − C
1	−1.07	−1.76	+1	+44	−15 + 40 + 28 : +53	−9
2	−1.77	−0.99	+1	+76	−25 + 22 + 28 : +25	+51
3	−2.01	+0.06	+1	−45	−29 − 1 + 28 : −2	−43
4	−1.70	+1.06	+1	−84	−24 − 25 + 28 : −21	−63
5	−1.07	+1.70	+1	+57	−15 − 40 + 28 : −27	+84
6	−0.07	+2.01	+1	−24	−1 − 47 + 28 : −20	−4
7	+0.93	+1.78	+1	−21	+13 − 42 + 28 : −1	−20

−139 + 135

Average (O − C) = 39

Normal Equations.

a	b	c	
+13.22	+1.26	+6.76	: −27
+1.26	+14.98	+3.97	: −227
−6.76	+3.97	+7.00	: +3
−1.26	−0.12	+0.64	: +3
+6.76	+0.64	−3.46	: −14
	+14.86	+4.61	: −224
	+4.61	+3.54	: −111
	−4.61	−1.44	: +70
		+2.10	: +59

c : +28

−6.00	−4.61	+14	
+8.86			: −210

b : −24

+2.14	−1.26	−2.22	: −1
+25.50	−14.98	−26.40	: −11
+15.36		−8.98	: −28
+2.676		−22.43	: −238
−10.70		+8.98	: +95
+4.66			: +67

a : ~~+13~~

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MC 1028

1913 Feb 4.

Moon's mean position (1911.0)

$X_0 = 16.0681$ ✓ $\quad Y_0 = 20.9383$ ✓

$\frac{1}{2}a = +7$ ✓ $\quad \frac{1}{2}b = -12$ ✓

$X_1 = 16.0688$ ✓ $\quad Y = 20.9371$ ✓

From Julian. Red. to plate centre

	X	Y
	15.4519 ✓	21.7155 ✓
ax	+8	+4
by	+1	−2
c	−10	−3
	15.4518 ✓	21.7154 ✓

$\zeta = -2.5482$ ✓

log ζ = 0.406234 n

∴ cos δ = 9.996744

∴ const. 8.507240

∴ $(\alpha - A)$ 1.902258 n ✓

$\alpha - A = -79.85$ ✓

$= -1^m 19^s.85$ ✓

$A = 11^h 32^m 58^s$ ✓

$\alpha = 11^h 31^m 38^s.15$ ✓

Red to app. place +1.30

$\alpha' = 11\ 31\ 39.45$ ✓

$\eta = -0.2846$

log tan δ = 9.09235 ✓

∴ ζ^2 = 0.81254 ✓

∴ η_1 = 6.95829 ✓

$\eta_1 = +0.9$

$\eta_0 = -0.2855$

log η_0 = 9.455614 n

∴ const. 7.331154

∴ $(\delta - D)$ = 2.124468 n ✓

$\delta - D = -133.2$ ✓

$= -2\ 13.2$

$D = +7\ 03\ 07$ ✓

$\delta = +7\ 00\ 53.8$ ✓

Red. to app. place −6.4

$\delta' = +7\ 00\ 47.4$ ✓

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1913 Oct. 4.

$X_0 = 16.0681$ $Y_0 = 20.9383$

$+ 7$ $- 12$

$X = 16.0688$ $Y = 20.9371$

$x = 15.4519$ $Y = 21.7155$

$+ 8$ $+ 4$

$+ 1$ $- 2$

$- 10$ $- 3$

$x = 15.4518$ $Y = 21.7154$

$\delta = -2.5482$

$\log \Delta = 0.406234_n$

$\cos \delta = 9.99674$

$\log \sin \delta = 8.50729$

$(\alpha - A) \quad 1.90225^s{}_n$

$\alpha - A = - 79.85^s$

$= - 1^m 19.85^s$

$A = 11^h 32\ 58.$

$\alpha = 11^h 31\ 38.15^s$

Reduct. appt. $+ 1.30$

$\alpha' = 11\ 31\ 39.45$

$\eta = -0.2846$

$\log \cos \delta = 9.9263$

$\delta^2 = 0.8125$

$= 6.9582$

$\eta_1 = + \quad 9$

$\eta_0 = -0.2855$

$\log \eta_0 = 9.455614_n$

733115

$(\delta - D) = 2.124\,46^s{}_n$

$\delta - D = - \quad 133.2$

$- \quad 2\ 13.2$

$D = +7\ 03\ 07^s$

$\delta = +7\ 00\ 53.8^s$

Red. ad. l. appt. $- \quad 6.4$

$\delta' = +7\ 00\ 47.4$

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H + α 28 06 = 61° 30′

H 16 33

χ 11 33

G 18 25

δ + α 29 58 = 89 30

δ = +7 01

+0.8829m

9.9967

log(l) 0.8796m

7.9408

0.8740

0.0000

9.0902

8.8239

9.6787

9.0869 2

1.2779

9.9439

0.0033

8.8239

log(g′) : 8.8148

∴ (g) 8.7881

log(h′) 0.0435

∴ (h) 0.0490

f = +0.12

g = +0.06

h = +1.12

+1.30

(g′) = +0.07

(h′) +1.11

(l) = +7.58

−6.40

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H + A	28	06	= 61° 30′
H	16	38	
α	11	33	
G	18	25″	
G + 9	29	58	= 89 30

5 = + 7 01

− 0.8829n
9.9967
log(4) 0.8796n

	7.9408
	0.8740
	0.0000
	9.0902
	8.8239

	9.6787
	9.0852
	1.2779
	9.9439
	0.0033
	8.8239

log(8′) 8.8148
(8) 8.7881

log(h′) 0.0435
(h) 0.0490

t =	+ 0.12
9 =	+ 0.06
h =	+ 1.12
	+ 1.30

(9′) =	+ 0.07
(h)	+ 1.11
(t) =	+ 7.58
	− 6.40

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1028

Lunar parallax.

α	11	31	39.45
Θ	9	50	06.3
$\alpha - \Theta$ =	−1	41	33.15
=	−25°	23′	17″

	−	9	02
	−25	14	15

δ	+7	00	47.4
π		56	28.6

9.869913
8.215558
9.632220 m
000380
$\sin(\alpha - \Lambda)$ = 772071 m

$\alpha - \alpha'$ = − 18′ 04.28″
= − 1m 12s.28

9.957127
0.000000
004356
$\tan\varphi$ = 000083

φ = 45 03 16.1

δ + 7 00 47.4

38 02 28.7

9.826640
8.215558
9.789774
015010
$\sin(\delta - \delta')$ = 798182

$\delta - \delta'$ = + 32 58.1

δ = +7 33 45.5

Am Eph δ = +7 33 48.7

− 3.2

Correction + 0.5

− 2.7

α = 11 30 27.17

α = 11 30 26.68

+ 0.49

− 006

+ 0.43

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1928

Lunar parallax.

α	11	31	39.45
Θ	9	50	06.3
$\alpha - \alpha$:	−1	41	33.15
:	−	25°	23' 17
		− 9	02
	−25	14	15

δ	+7	00	47.4
π		56	28.6

9.869913
8.215558
9.632220 n
000360
sin(α − A) 772071 n

α − α' = − 18' 04.28
− 1m 12s.28

9.957727
0.000000
004356
tan γ 0.000083

γ 45 03 16.1
δ + 7 00 47.4
38 02 28.7

9.826490
8.215558
978974
015010
cos(δ − δ') 798182

δ − δ' = + 32 58.1
δ : +7 33 45.5
Corr Eph δ : +7 33 48.7
− 3.2
Corr to stand = + 05
− 27

α : 11 30 27.17
α : 11 30 26.68
+ 0.49
− 006
+ 0.43

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