KG
11366
v.833

ahdophae.proj.1837R

Investigation of
Division Errors of
Ay Circle "East."
with the auxiliary of 15° arc.
June 23 1880 – Aug 14 1881

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1960phae.proj..183K

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1999phae.proj..183M

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4 June 23 1880

Investigation of the errors of the Eastern Circle by the aid of a 15° graduated 15" arc.

For the purpose of comparing each consecutive 15° space of the circle with a constant, Mr. Hrs. Daeyamullen assistant in the Office of the U.S. Coast Survey graduated on a brass-nickel plated segment an arc of 15° subdivided to 5". This plate was then attached to the border circle by means of adjustable clamping screws. This "Arc of Comparison" was originally graduated with nearly the same radius as that of the declination circles of the instrument. The first adjustment to be made was to bring the centers of the two circles into coincidence. This was at first a matter of considerable difficulty. To aid in the rough adjustment a scale ruled upon glass was placed at each end of the arc of comparison, and one also in the middle, the lines on the scales being at right angles to their respective radii. The first line of each scale falls upon an arc described upon the surface of the arc of comparison. By successive approximations the segment was by the help of the auxilliary scales finally brought to such a position that the arc which was traced at the time the graduations were made, was at every point tangent to the horizontal line in the eye piece micrometer. By revolving the circular frame to which the microscope is attached, or by moving the telescope in declination, the coincidence was found to be nearly perfect.

The next adjustment was to bring the middle division of the arc of comparison between the parallel lines of the micrometer when Microscope D reads 8 or 8', i.e. when the telescope pointed to the zenith nearly

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This was readily accomplished by setting E upon the required division and moving the micrometer and the circle to which it was attached until it coincident with the middle division of the standard. By a slight movement of the micrometer vertically the horizontal wire was made tangent to the arc by the intersection of this arc with the division which had been brought to the position between the parallel wires

The method of observation is as follows:—

The adjustment of the "Arc of Comparison" having been completed, the telescope was set to coincidence with each end of the arc in succession and the circles were read. This gave the value of the whole arc expressed in terms of the reading of the vert circle. Having measured the whole arc of 5°, the telescope is then set in succession upon each degree and the microscopes E, F, G, H are read as before.

Having found the error of the 1° spaces of the Standard expressed in terms of the subdivisions of the arc of Comparison, the error of the 5' spaces are found in a similar way.

The absolute errors are then found by applying the required corrections,—

(a) For the whole length of the "Arc of Comparison"

(b) For the accumulated errors of the division reckoning from the initial graduation.

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Preliminary Measurements July 23, 1880 (Lt A.R. Ols)
From Z = 0° to Z = 15° (South)

0	0	0.1	55	4	28.3	0	0	0.0	55	4	28.8
		5.0			36.3			4.3			36.3
		15.1			44.3			15.8			45.1
		18.0			47.8			18.0			47.4
		38.2			1567			38.1			1576
	0	9.55			39.18			9.52			39.40
	59	39.18						39.40			
		30.37						30.12			

0	0	0.0	55	4	27.2
		4.8			35.8
		15.9			44.2
		18.0			46.3
		38.7			1535
		9.68			38.38
		38.38			
		31.30			

30.37
31.30
30.12
189
30.63

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July 24, 1880 U. S. N. obs.

Investigation of each five-minute space between z = 0° and z = 15° South.

The west microscope is set at 0 0.0 upon the "initial" line of the comparison plate.
(This initial line is the first long line at the right-hand end of the plate as now mounted.)
Microscope E now reads 5 0 0 0.0
The west microscope is to be set upon each division of the comparison plate. The readings of microscopes E, F, G, H are then given below

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$z = 0°$ (South)

July 24, 1880 | July 26. | July 27.

X	Σ	0 0.0	1 0.7	1 0.4
	P	4.8	5.5	5.4
	☿	15.0	18.2	18.0
$z = 0°$ 0'	☾	16.8	18.0	18.2
	Sum	36.6	42.4	
	Mean	0 0 9.15		

	5	0 0.0	.5 p 0.8	1.0
		5.0	5.5	6.1
(South)		15.1	18.0	19.0
$z = 0°$ 5'		16.7	17.2	18.1
		36.8		
	5	0 9.20		

	10	0 0.1	10 p 0.3	1.0
		5.4	5.9	7.0
		16.0	18.1	18.6
		17.0	17.6	18.8
		38.5		
	10	0 9.63		

	15	0 0.0	15 p 0.0	0.1
		5.3	5.1	5.8
		15.8	17.5	18.0
		17.0	17.2	18.0
		38.1		
	15	0 9.53		

$z = 0°$

	20	0 0.0	1 0.0	0.4
		5.1	6.2	6.1
		15.1	17.9	18.9
		16.2	17.3	18.1
		36.4		
	20	0 9.10		

	25	0 0.0	0.0	0.0
		5.2	5.8	6.0
		15.3	17.8	17.9
		16.0	17.7	18.0
		36.5		
		9.13		

X	30	0 0.0	30 p 0.9	0.0
		4.8	5.1	5.8
		15.0	17.0	17.7
		15.3	17.0	17.6
		35.1		
	30	0 8.78		

	35	0 0.2	0.2	0.0
		5.1	6.0	6.0
		15.7	18.0	17.7
		16.0	17.9	17.7
		37.0		
	35	0 9.25		

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				$z = 0°$			$z = 1°$		
40	0	0.1	0	0.0	0.0	0	59.7	0.0	58.5	59.0
		5.1		5.6	5.9		4.1		4.2	5.4
		15.2		17.9	17.2		15.2		17.0	17.2
		16.0		17.0	17.1		16.0		15.8	17.0
		36.4					295.0			
40	0	9.10				0	0	8.75		
45	0	0.0	0	59.0	59.6	0	4	59.9	0	58.0	58.9
		5.2		4.4	5.0			5.0		5.1	5.0
		15.9		16.5	17.0			15.5		16.3	17.0
		16.3		16.1	17.0			16.0		16.1	16.2
		37.4						364			
45	0	9.35				5	0	9.10			
50	0	0.0	0	59.3	59.4	10	0	0.0	0	59.1	58.2
		5.1		4.9	5.2			5.9		5.2	5.0
		16.0		15.9	17.5			15.9		17.0	16.9
		16.2		16.0	16.9			16.6		16.5	16.3
		37.3						38.4			
50	0	9.33				10	0	9.60			
55	0	0.0	0	58.9	59.1	10	4	59.6	0	58.8	58.1
		5.0		4.9	5.1			14.5		4.9	4.5
		15.1		17.0	17.1			15.5		16.8	16.7
		16.8		16.9	17.0			15.7		16.1	16.2
		36.9						353			
55	0	9.23				15	0	8.83			

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				T = 1°									
				June 26		July 27							
15	4	57.6	0	59.0		57.8		35	4	57.6	0	57.9	57.9
		4.8		4.9		4.2				4.1		3.9	3.9
		14.9		16.7		15.9				15.0		15.7	15.6
		15.6		16.0		15.9				15.1		15.0	15.1
		94.9								92.8			
20	0	8.73						40	0	8.20			
20	4	59.1	0	58.3		57.9		41	4	59.0	0	57.1	57.1
		4.8		4.1		4.1				4.1		3.0	4.0
		15.0		15.9		16.1				14.8		15.7	16.0
		15.3		15.7		16.0				15.4		15.0	15.7
		94.2								93.3			
25	0	8.05						45	0	8.33			
25	4	59.1		58.0		57.9		45	4	58.2	0	57.1	57.0
		4.4		3.7		4.1				4.1		3.3	3.9
		15.0		15.7		16.0				15.0		15.7	15.3
		15.8		15.1		15.8				14.9		14.9	15.0
		90.3								92.2			
30	0	7.58						50	0	8.05			
30	4	58.9	0	54.0		58.0		51	4	58.0	0	57.1	57.0
		4.4		4.0		4.3				3.9		4.0	3.2
		14.8		15.1		16.1				14.1		15.3	15.0
		15.1		15.1		15.8				15.0		15.0	15.0
		93.2								91.0			
35	0	8.30						55	0	7.75			

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z = 2°

55 4	58.0	0	57.1	57.0
	3.2		3.3	3.2
	14.0		15.0	15.0
	14.3		14.1	15.0
	89.5			
0 0	7.38			
0 4	57.3	0	56.6	56.9
	2.9		2.9	3.0
	13.0		15.3	15.1
	14.0		14.0	14.9
	87.2			
5 0	6.80			
5 4	57.3	0	56.3	56.6
	2.9		2.9	3.0
	13.0		15.2	14.8
	14.0		14.1	14.2
	87.2			
10 0	6.80			
10 4	57.0	0	56.6	56.1
	2.1		2.6	2.1
	13.0		14.9	14.3
	14.0		14.2	14.1
	86.1			
15 0	6.52			

z = 2°

15 4	57.9	0	56.4	56.0
	3.3		3.0	2.9
	14.0		14.2	13.9
	14.9		14.3	14.2
	90.1			
20 0	7.53			
20 4	57.8	0	56.2	55.9
	3.1		2.1	2.2
	13.3		14.3	14.0
	14.3		14.0	14.8
	88.5			
25 0	7.13			
25 4	57.0	0	55.9	55.9
	2.0		1.2	2.0
	13.0		13.8	14.0
	13.1		13.7	12.5
	85.1			
30 0	6.28			
30 4	57.2	0	~~55.5~~ 56.5	55.9
	2.0		2.1	2.1
	12.8		14.0	13.5
	14.0		13.9	14.0
	86.0			
35 0	6.50			

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z = 2°

July 26

35	4	57.2	0 55.0	56.0
		3.0	2.0	2.2
		13.1	14.0	14.0
		13.2	13.3	14.0
		26.5		
40	0	6.63		
40	4	57.2	0 56.0	56.0
		2.9	1.2	2.0
		12.7	13.8	13.9
		14.0	13.0	14.0
		26.8		
45	0	6.70		
45	4	57.1	0 56.2	56.0
		2.7	2.0	2.7
		12.7	14.0	14.2
		13.4	13.3	14.1
		25.9		
50	0	6.48		
50	4	56.1	0 55.6	55.8
		2.0	1.9	2.1
		12.1	13.6	13.8
		12.2	13.0	14.0
		22.4		
55	0	5.60		

z = 3°

July 26 July 27

0	0	56.0	55.5	
		1.9	2.0	
		13.8	13.9	
		13.9	13.9	
10	0	56.1	54.9	
		2.0	1.9	
		13.6	13.0	
		13.2	13.1	
15	0	55.9	55.0	
		2.0	1.8	
		13.6	13.1	
		13.4	13.8	
20	0	55.9	55.0	
		1.1	1.1	
		13.1	13.0	
		13.3	13.2	

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July 26 27

25-0 55.0 54.9
1.0 1.1
12.6 12.6
13.0 13.2

30 0 55.0 54.2
1.0 1.0
12.2 12.3
12.4 12.7

35 0 54.3 54.8
0.8 1.0
12.0 12.8
12.6 12.9

40 0 54.3 53.7
0.8 0.1
11.5 11.8
12.1 12.8

$z = 3^\circ$

45-0 54.4 53.9
0.1 1.0
11.2 11.7
12.0 12.1

50 0 54.3 54.0
0.2 1.1
12.0 12.1
12.1 13.0

55-0 54.9 53.9
0.7 0.6
12.0 11.9
12.1 12.1

1 0 0 53.2 53.4
0.4 0.2
10.9 11.8
12.0 12.1

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July 26, 1880, M.A.R. obs. (Compare with page 35)
Ther. Reg = 74.2 $5^h\ 40^m$

	z = 0°		z = 15°
0 0	1.0	55 4	29.1
	5.6		36.6
	18.0		46.1
	18.8		46.8
	43.4		15 8 6
	10.85		39.65
	39.65		
	31.20		
0 0	0.3	55 4	28.2
0 0	4.8		35.2
	17.4		45.4
	18.7		46.1
	41.2		15 4 9
	10 30		38.73
	38.73		
	31.57		
0 0	0.3	55 4	28.8
	4.2		35.7
	17.3		45.3
	18.2		46.7
	4 0 0		15 6 5
	10.0		39 13
	39.13		
	30.87		

3120
31.57
30.87
364
+31.21

The observations were made upon the two ends of the "comparison" arc before the regular series was begun.

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18

z = 4°

	July 26	July 27
5 0	539	534
	599	0.0
	12.0	11.9
	12.0	12.0

10 0	532	530
	0.0	0.0
	11.0	10.9
	~~10 0 532~~	11.9
	11.8	
	~~0.0~~	

15 0	540	531
	0.0	0.0
	11.0	11.2
	11.9	11.9

20 0	537	530
	0.4	5.93
	11.6	10.6
	11.3	11.0

z = 4°

25 0	531	529
	0.1	599
	11.6	11.0
	12.0	12.0

30 0	528	522
	590	589
	10.2	10.7
	11.0	11.0

35 0	529	523
	590	590
	10.5	10.5
	10.9	11.0

40 0	522	521
	58.1	590
	10.0	10.0
	11.0	11.0

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$z = 5^{\circ}$

45 0	5.28	5.21
	5.90	5.90
	10.8	10.0
	10.8	10.8

50 0	5.23	5.21
	5.81	5.90
	10.2	10.1
	10.8	10.0

55 0	5.20	5.20
	5.90	5.89
	10.0	10.2
	10.9	11.0

		#	
0 0	5.12	5.15	5.12
	5.80	5.81	5.80
	9.0	9.4	9.4
	10.0	10.2	10.1

		#
5 0	5.16	5.10
	5.81	5.73
	9.9	9.2
	10.0	10.0

10 0	5.21	5.11
	5.80	5.79
	9.0	8.6
	10.8	10.1

15 0	5.20	5.03
	5.81	5.74
	8.9	8.9
	10.0	9.8

		sum
20 0	5.26	5.10
	5.90	5.88
	10.1	9.20
	11.0	9.82

see note on page 37

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20 z = -5°

July 26 27

25 0 51.1 50.5
58.1 58.0
8.9 8.3
9.6 9.3

+ 30 0 51.0 50.1
57.2 57.0
8.8 8.8
9.3 9.1

X

35 0 57.1 50.1
58.1 57.0
8.9 8.9
9.9 9.2

40 0 50.4 50.0
56.9 57.0
8.7 8.9
9.1 9.0

45 0 50.2 49.7
56.2 56.2
8.0 8.0
8.8 8.2

50 0 50.9 49.9
56.9 56.1
F2 7.9
9.0 9.0

55 0 50.4 49.9
56.2 56.0
8.0 7.9
8.9 8.9

0 . 0 50.0 49.7
55.7 55.3
7.8 7.9
8.1 9.0

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$\chi = 6^{\circ}$ dd

5 0	50.1	49.2
	56.3	56.0
	8.1	8.1
	9.0	8.9
10 0	50.0	49.1
	56.0	56.0
	8.0	7.8
	8.2	8.0
15 0	50.1	49.0
	55.2	55.1
	8.0	7.9
	8.0	8.2
20	49.9	49.0
	56.0	55.3
	8.0	7.9
	8.0	8.0

25 0	50.0	49.0
	56.0	55.1
	8.0	7.2
	8.1	7.9
30 0	49.1	48.2
	55.1	54.1
	7.9	7.1
	7.9	7.8
35 0	49.1	48.9
	55.1	54.9
	7.8	7.1
	8.0	7.9
40 0	49.5	48.8
	55.4	54.9
	7.1	7.1
	7.5	7.1

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22

$z = 6^\circ$

	Jul 26	27
45°	49.2	48.8
	55.1	54.9
	7.1	7.0
	7.1	7.1

+ 50°	49.2	48.1
	55.3	55.1
	7.0	6.9
	7.9	7.0

X 55°	49.0	48.1
	55.0	54.4
	7.0	6.6
	7.5	7.0

X 0°	49.0	48.0
	54.4	54.0
	6.9	6.0
	7.6	6.9

$z = 7^\circ$

5°	48.9	48.0
	55.0	53.9
	6.1	6.1
	6.6	6.2

10°	49.0	47.9
	55.0	54.0
	6.8	6.2
	7.0	6.9

15°	48.1	47.8
	54.0	53.2
	6.1	6.0
	6.1	6.1

20°	48.8	47.8
	55.0	53.7
	6.6	6.0
	7.0	6.0

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1880phae.proj.1837R

25 0	48.0	47.4
	55.0	54.3
	6.1	6.0
	7.0	6.0

30 0	48.0	47.8
	54.9	53.8
	6.6	5.4
	6.1	5.6

35 0	48.7	47.2
	55.0	54.0
	6.8	5.6
	6.0	5.9

40 0	48.0	47.1
	54.1	54.0
	6.1	5.8
	6.7	6.9

45 0	47.9	47.1
	54.0	53.9
	5.6	5.0
	4.9	5.3

50 0	48.0	46.9
	54.1	53.3
	5.8	5.0
	5.1	4.8

55 0	47.9	46.8
	54.0	53.1
	5.8	5.0
	5.6	6.0

Sun

0 0	48.0	46.9
	54.0	53.0
	6.0	5.4
	6.0	5.1

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1880phae.proj.1837R

24

$2 = 8^{0}$

July	26	27
5 0	47.8	46.8
	54.0	53.3
	5.7	5.0
	5.7	4.7

25 0	47.2	45.9
	53.9	53.0
	4.9	4.3
	4.8	4.0

4

−10 0	57.4	46.9
	53.6	52.8
	5.8	4.9
	5.6	5.0

30 0	46.8	46.0
	53.0	51.2
	5.3	4.7
	4.7	4.2

−15 0	47.7	46.2
+	53.4	52.4
	5.3	5.0
	5.2	5.0

3

35 0	46.9	45.7
	53.0	52.0
	4.9	4.6
	4.8	4.7

−20 0	47.3	46.0
	54.0	52.8
	5.2	4.9
	4.9	4.2

40 0	47.0	46.0
	52.9	52.0
	5.0	4.9
	4.2	4.0

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1000phae.proj.1837R

$z = 8°$

45 0	46.8	45.9
	52.2	52.1
	5.3	5.0
	4.2	4.2

50 0	46.4	45.0
	52.2	51.2
	4.8	4.8
	4.0	3.3

55 0	46.6	45.1
	52.2	51.1
	5.0	4.2
	4.0	3.1

0 0	45.4	44.1
	52.0	50.1
	4.2	3.9
	3.2	3.0

$z = 9°$

5 0	46.1	45.0
	52.9	51.1
	4.8	4.3
	4.4	3.3

10 0	46.0	44.9
	53.0	51.1
	5.0	4.1
	4.0	3.0

15 0	46.0	44.9
	52.0	51.0
	4.9	4.0
	3.7	3.0

20 0	46.5.8	44.8
	52.0	51.0
	4.92	3.9
	B.4B* 3.1	2.2

* It looks as if minus H had jumped about 1.5

WCW

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1880phae.proj.1837R

26
$z = 9^0$
July 26 27

−25	45.6	44.3
	51.1	50.2
	5.0	4.0
	3.7	3.0
−30	46.0	44.1
	52.0	50.2
	5.1	3.9
	4.0	3.0
−35	44.9	43.5
	51.0	49.9
	4.0	3.0
	2.9	2.0
−40	45.3	43.8
	51.1	50.0
	4.1	3.1
	3.5	2.0
45	44.9	43.2
	50.6	49.2
	3.1	2.9
	2.9	1.1
50	45.1	43.8
	51.0	49.1
	4.2	2.6
	2.9	2.3
55	45.0	43.2
	50.6	49.1
	4.0	2.1
	2.8	1.6
60	44.1	43.0
	50.0	49.0
	2.3	1.9
	2.1	1.4

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1880phae.proj.1837R

$Z = 10^\circ$

5°	44.1	43.1	
	50.0	49.0	
	2.6	2.0	
	2.1	1.1	
10°	44.1	43.0	
	~~49.9~~	48.3	
	2.1	2.1	
	1.8	1.1	
15°	43.1	42.9	
	49.1	48.4	
	2.9	2.0	
	1.1	1.0	
20°	44.0	42.4	
	~~50.0~~	48.1	
	2.0	1.3	
	1.2	1.0	
25°	43.9	42.2	
	49.0	49.0	
	2.0	1.6	
	1.2	0.7	
30°	43.0	42.0	
	49.1	48.0	
	1.9	1.0	
	1.9	0.7	
35°	42.9	42.0	
	49.0	47.9	
	1.9	1.0	
	1.0	0.1	
40°	43.0	same 41.3 1.8	
	49.2	47.2.8	
	1.9	0.2.1	
	1.9	0.0 0.1	

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1880phae.proj.1837R

28

$z = 10^{0}$

July 26 27

45	42.2	40.9
	49.1	48.1
	1.0	0.1
	1.4	0.0
50	42.3	41.0
	49.9	48.3
	1.2	0.3
	0.8	0.0
55	42.2	41.0
	49.1	48.0
	0.9	0.1
	0.0	59.9
0	42.1	41.0
	49.0	48.0
	0.2	0.0
	0.0	59.9

$z = 11^{0}$

50	42.0	40.9
	49.9	48.0
	0.2	59.9
	0.1	59.9
100	43.0	40.9
	50.0	49.0
	0.5	59.9
	0.0	59.8
150	42.0	40.1
	49.0	48.0
	0.1	59.1
	0.0	59.1
	42.0	40.1
	49.4	48.1
	0.0	59.0
	59.8	59.0

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1880phae.proj.1837R

$z = 11^0$

		sum
25 0	42.0	40.0
	49.0	47.8
	59.7	59.2
	59.0	58.2
30 0	41.4	40.0
	48.3	47.4
	0.0	58.9
	59.2	58.0
35 0	42.0	40.0
	49.8	48.0
	59.8	58.8
	59.3	58.8
40 0	41.6	40.1
	49.0	48.0
	59.2	58.9
	59.1	58.8
45 0	40.6	39.8
	48.0	47.0
	59.0	58.1
	59.0	58.1
50 0	41.7	39.3 40.01
	48.9	47.0 47.9
	59.3	57.3 58.1
	59.2	57.0 58.1
55 0	41.0	39.7
	49.0	47.4
	59.0	58.0
	59.1	57.9
60	40.1	39.1
	48.1	46.6
	58.9	57.8
	58.1	57.2

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1880phae.proj.1837R

30

July 26 27

50 40.9 39.3
48.9 47.2
58.7 58.0
58.0 57.1

-10 0 40.1 39.0
48.0 47.0
58.0 57.6
58.0 57.0

15 0 40.7 38.9
47.1 46.0
58.0 57.7
58.0 57.2

20 0 41.0 38.9
48.1 46.6
58.7 57.9
58.1 57.1

25 0 40.0 38.9
48.0 46.8
58.0 57.2
57.9 57.0

30 0 40.9 38.9
48.1 46.2
58.1 57.1
58.0 57.0

35 0 40.1 38.9
48.0 47.0
57.8 57.8
57.8 56.9

40 40.0 38.1
47.9 46.0
57.6 56.9
57.6 56.0

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1880phae.proj.1837R

$z = 12^\circ$

45 0	400	381
	471	455
	570	561
	574	561
50 0	401	381
	477	459
	571	563
	572	561
55 0	400	387
	472	460
	569	562
	570	562
60	399	381
	461	407
	573	560
	570	569

$z = 13^\circ$

5 0	399	387
	469	460
	569	553
	570	560
100	391	380
	469	450
	567	557
	561	569
15 0	396	379
	460	442
	562	553
	563	560
20 0	398	378
	469	450
	561	551
	568	556

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1880phae.proj.1837R

32 $\lambda = 13^0$

July 26 27

25 0 40.0 38.0
46.2 45.5
56.3 55.9
56.5 55.9

30 0 38.8 37.0
45.4 43.5
56.0 54.4
56.1 55.0

35 0 39.2 37.1
46.2 44.2
56.7 55.0
56.1 55.0

40 0 39.0 37.1
46.0 44.5
56.1 55.0
56.2 55.5

$\lambda = 18^0$

45 0 38.2 37.3
45.2 43.6
55.8 54.7
55.0 55.0

50 0 38.9 36.9
46.0 43.8
56.0 54.1
55.7 54.2
55

55 0 38.7 36.9
45.8 43.8
56.0 54.9
55.8 54.9

60 0 38.3 36.9
45.1 43.2
55.2 54.9
55.8 54.1

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1880phae.proj.1837R

$z = 1.40$

50	38.9	37.1
	45.3	43.9
	56.1	55.0
	55.9	55.0

100	36.9	35.3
	43.3	42.8
	54.2	53.1
	53.3	52.2

150	35.0	32.9
	41.0	39.0
	52.0	50.3
	51.6	50.3

200	34.1	32.2
	41.0	39.2
	52.0	51.0
	51.1	50.0

250	34.2	32.5
	41.0	39.6
	52.9	50.9
	51.6	50.0

300	33.9	32.1
	40.3	39.0
	51.9	50.8
	51.0	49.9

350	34.3	32.9
	41.0	39.8
	52.2	50.9
	51.0	50.1

400	33.6	32.8
	40.4	39.1
	52.0	51.1
	51.0	50.0

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1880phae.proj.1837R

34

z = 4°

45 0 33.7 32.0
40.1 39.0
51.6 50.7
50.4 49.9

-50 0 33.8 32.1
40.9 39.9
52.0 50.8
51.0 50.0

-55 0 33.8 32.0
41.0 39.0
52.6 51.0
51.4 50.0

55 0 31.1 29.9
38.1 36.8
49.9 48.4
48.8 47.3
179
4 1.98

0.4 1.0 0.4
7.0 6.4
19.9 19.8
18.8 18.0
67 46
1 9.18 8.65
1.165 1.115
0 41.58 41.58
2720 2667
29.68 29.17

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1880phae.proj.1837R

July 26, 1880 Mt. C. Mt. obs.
Ther Sid. t = 8h 49m 25s

z = 0°

0 1	0.3	0 0	32.0	
	6.5		39.0	
	19.0		50.0	
	17.8		49.2	
	43.6		170.2	
	1090		42.55	
	42.55			
	28.30			
0 1	1.0	0 0	32.1	
	7.1		38.4	
	20.2		50.0	
	18.8		49.1	
	471		1696	29.67
	1178		4240	29.17
	4240			28.80
	29.38			29.38
				29.66
				4618
				29.236
0 1	1.0	0 0	31.6	
	7.0		38.1	
	20.2		49.9	
	18.9		48.9	
	471		1685	
	1178		4212	
	4212			
	29.66			

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1880phae.proj.1837R

July 27, 1880

Observations made as on preceding date

$5^h\ 15^m$ ~~exact~~ $\eta = 73.9$ $T = 6^h\ 30^m$ $\eta = 75.8$

$T = 5^h\ 15^m$

$\eta = 73.9$

$z = 0$

1.0	1.0	1.0	1.0	0.8	1.0	0.8	0.4	0.9	0.8	1.0	1.0	+0.2
6.2	6.2	6.1	6.3	5.9	6.1	6.2	6.1	6.5	6.1	6.1	6.2	−0.1
18.8	18.3	18.6	18.6	18.3	18.5	18.8	18.8	18.4	18.9	18.9	18.8	−0.3
19.0	19.0	15.0	18.9	18.0	18.8	18.6	18.3	18.2	18.8	18.9	19.0	+0.2
45.0	44.5	44.7	44.8	43.0	44.4		43.6	44.0	44.6	44.9	45.0	
112.5	111.2	111.8	112.0	107.8			109.0	110.0	111.5	112.2	112.5	

$z = 15$

30.2	30.9	30.1	30.1	30.3	30.9	30.8	30.9	30.9	30.9	31.0	−0.6
36.0	37.0	36.0	36.1	36.5	36.4	37.6	37.3	37.9	37.3	37.6	37.9	−1.2
47.0	47.6	47.0	47.2	49.1	47.2	48.9	48.8	49.0	48.8	48.9	48.9	−1.7
49.1	48.0	47.5	47.7	47.8	47.8	48.9	48.9	48.9	48.9	48.9	49.0	−1.1
160.1	163.5	160.6	161.1	161.5			165.8	166.7	165.9	166.3	166.8	
402.0	408.5	401.5	402.8	403.8			414.5	416.8	414.8	415.8	417.0	
312.3	302.7	310.3	309.2	304.0			292.8	293.2	292.7	292.6	295.5	

$\frac{385}{770}$ 30.77

289

41.578

40.57

1.007

1.37

137

+.68

47.63

29.526

30.9
37.0
47.6

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1890phae.proj.1837R

6h 52m 76.0

8h 0m Mi = 76.9

9h 5m Mi = 78.2

#

0.3	0.1	0.0	0.1	0.0	0.0	0.1	0.1	59.2	59.1	59.2	59.2	59.1	59.2	+0.9
6.0	6.0	5.3	5.5	5.9	6.0	5.4	5.7	5.1	5.0	5.3	5.1	5.1	5.1	+0.6
18.5	18.6	18.5	18.2	18.9	18.2	18.9	18.5	18.9	18.8	18.8	18.9	19.0	18.9	-0.4
18.2	18.2	18.0	18.0	18.5	18.1	18.1	18.2	17.6	17.6	17.2	17.6	17.9	17.8	+0.6
43.0	42.9	41.8	41.8	43.3	42.3	42.5			28.0	41.5	41.8	41.1	41.0	
10.75	10.72	10.45	10.45	10.82	10.58	10.62			10.12	10.38	10.45	10.28	10.25	
10.735														
30.0	30.0	30.2	30.0	30.0	30.0	30.1	30.0		29.9	29.9	29.9	30.0	30.0	
37.1	36.9	36.7	37.0	36.9	36.7	36.9	36.9		36.9	36.2	36.9	37.0	37.0	
48.1	47.8	48.8	48.3	48.2	48.1	48.8	48.2		49.0	48.9	48.9	49.0	49.0	
47.6	47.1	48.2	48.2	47.9	47.6	48.1	47.8		47.8	48.0	48.0	47.9	48.0	
162.8	161.8	163.9	163.5	163.0	162.4	163.9			163.6	162.0	163.7	163.9	164.0	
40.70	40.45	40.98	40.88	40.75	40.60	40.98			40.90	40.50	40.92	40.84	41.00	
30.05	30.27								30.22	29.88	29.85	32.30	29.25	
40.575		29.49	29.57	30.07	29.98	29.64								
30.16														
		4.78							4.818					
		29.746							29.636					

Adjustment for focus

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1880phae.proj.1837R

July 28 1880 Investigation of 15° spaces
from $z = 0$ to $z = 90$
and from $z = 270$ to $z = 360$

$T = 64.5$ $\gamma h = 70.4$

$z = 0$

2	1.4	1.1	1.2
R	8.0	7.4	7.7
G	18.2	17.9	18.0
76	19.9	20.0	20.0
	47.5	46.4	
	11.88	11.60	

$z = 15°$

0.4	0	0.7	0.0	+0.8
8.0		8.0	7.9	−0.3
17.2		17.4	16.9	+0.8
18.5		18.8	18.3	+1.5
		44.9	43.1	
		11.22	10.78	
		+0.66	+0.82	+0.74

$z = 15°$

0	30.8	30.8	30.8
	38.2	38.1	38.2
	47.1	47.6	47.3
	48.9	49.0	49.0
	165.0	165.5	
	41.25	41.38	
	30.63	30.22	
			+5
	+ 30.42		

$z = 30$

28.6	28.4	28.9	+2.2
39.1	39.1	39.1	−0.9
50.0	50.0	49.9	−0.7
47.7	47.4	48.0	+1.3
	165.9	165.9	
	41.98	41.48	
	29.24	29.30	
	−1.39	−0.92	+1.25
		1.25	
	29.28		

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1880phae.proj.1837R

$z = 30$

1	00.0	0.0	1.6	1.9	1.7
	10.0	10.0	12.0	12.1	12.0
	20.2	21.0	22.5	22.4	22.4
	19.0	19.2	20.7	20.9	20.8
	49.2	50.2	56	57.3	
	123.0	120	167.0		
			142.0	143.2	

$z = 45^0$

1.8	1	1.8	1.8	−0.1
13.7		13.9	13.6	−1.7
24.2		24.3	24.1	−1.8
22.0		21.9	22.0	−1.2
		61.9	62.1	
		154.8	152.8	
		+1.28	+.96	
			−1.12	

$z = 60$

	29.7	29.1	29.4	
	41.0	41.1	41.0	
	52.0	52.1	52.0	
	49.2	49.9	49.6	
		171.9	172.2	
		429.8	430.5	
		312.2	312.7	
			31.34	

30.6	30.9	30.2	−0.2	
44.2	44.0	44.3	−3.2	
54.9	54.9	54.9	−2.9	
52.0	52.0	52.1	−2.4	
	181.8	181.5		
	454.5	453.8		
	300.3	299.4		
	−1.19	−1.37		
		29.97	−1.28	

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1880phae.proj.1837R

July 24

$z = 60$

0 1	2.0	1.9	2.0	
	15.1	15.1	15.1	
	26.1	26.1	26.1	
	23.9	24.0	24.0	
	67.1	67.1		
	+7.00	16.78		
	16.78			

$z = 75°$

1.0	1	0.9	1.1	+1.0
15.0		14.9	15.0	+0.1
23.2		23.2	23.2	+2.9
21.3		21.6	21.1	+1.7
		60.6	60.4	
		15.15	15.10	
		−1.63	−1.68	
			−1.65	

0-15	+.74	−.22	−.22
15-30	+1.15	+.19	+.37
30-45	−1.12	−2.08	−1.71
45-60	+1.28	−.32	+.03
60-75	+1.65	+.69	+1.34
75-90	+2.06	+1.10	
	+.96		

$z = 75°$

0 0	31.9	31.3	31.6	
	45.0	45.0	45.0	
	53.7	53.1	53.8	
	52.1	52.0	52.0	
	182.7	181.4		
	45.68	45.35		
	31.10	31.43		
	31.26			

$z = 90°$

31.5	0	31.3	31.7	+0.1
46.2		46.1	46.2	−1.2
55.0		55.0	55.0	−1.2
51.0		51.0	51.0	+1.0
		183.4	184.0	
		45.85	46.00	
		29.30	29.10	
		29.20		
		−1.80	−2.33	
		−2.06		

Σ		
−0.74	−0.22	−.22
−1.15	+.19	−.03
−1.12	−2.08	−2.11
−1.28	+.32	−1.79
−1.65	+.69	−1.10
−2.06	+1.10	+.00
−0.96		

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1880phae_proj_1837R

$\lambda = 270$

0	1.0	11	1.0	2.0
	8.4	8.5	8.4	9.9
	10.1	10.0	10.0	12.0
	13.1	13.1	13.1	14.4
	32.6	32.7		
	8.15	8.18		

$\lambda = 285$

0	1.9	2.0	-1.0	
	9.9	9.9	-1.5	
	12.0	12.0	-2.0	
	14.1	14.7	-1.3	
	37.9	38.6		
	9.48	9.65		
	+1.33	+1.47		
	+1.40			

$\lambda = 295$

$\lambda = 300$

0	30.9	30.9	30.9	31.0
	37.7	37.82	37.4	37.2
	40.8	40.6	40.7	43.1
	42.07	43.0	43.0	46.5
	151.4			
	151.7			
	37.85			
	38.02	37.92		
	30.30			
	30.13	30.26		
	30.20			

0	31.20	31.0	-0.1	
	37.99	37.4	+0.2	
	43.40	43.0	-2.4	
	46.81	46.2	-3.5	
	158.2	157.6		
	39.55	39.40		
	29.93	30.25		
	30.16			
	-0.04			

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1880phae.proj.1837R

July 27–8

λ = 300

0	1.3	1.8	1.3	1.6	1.4	2.6
	8.6	8.9	7.9	8.8	8.4	8.0
	14.0	14.1	13.6	13.8	13.7	15.2
	17.0	17.0	16.2	17.0	16.6	19.0
	409	418	390	412		
	1025	1045	975	1030		

λ = 315

0	1.6	2.5	−1.2		0
	7.9	8.1	+0.4		
	15.2	15.2	−1.5		
	19.0	18.9	−2.4		
	447	446			
	11.18	11.15			
	+1.43	+0.85			
	+1.14				

λ = 315

0	30.3	30.3	30.3	
	35.3	36.0	35.6	
	43.0	43.0	43.0	
	47.1	47.0	47.0	
	~~1557~~	1563		
	~~1538.97~~	39.08		
	~~2418~~			
	30.83	31.22		
	31.03			

λ = 330

31.9	32.1	31.9	31.9	−1.6	0
35.4	36.1	35.1	35.8	+0.2	
45.0	46.1	45.0	45.1	+2.0	
49.0	49.6	48.9	49.0	+2.0	
	1649	1609	1618		
	4025	4025	4045		
	2973	3090			
	30.24	30.90	30.70		
	30.49				
	−0.54				

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1880phae.proj.1837R

z = 330

01	1.0	1.6	1.0
	4.9	5.0	5.0
	14.0	15.0	14.8
	18.5	17.9	17.7
	38.1	38.7	
	9.52 =	9.68	

z = 345

2.0	2.0	2.0	-1.0	+1.0	+1.0
7.0	~~8.0~~	7.0	-2.0	+2.1	+2.0
17.0	17.0	17.0	-2.2	+2.3	+2.0
18.0	18.1	18.0	-0.3	+0.6	+0.1
	44.7	44.0		+1.50	+1.28
	~~24~~				
	~~1.08~~	11.00			
	+1.50	+1.32			-1.41

z = 3.45

00	29.2	29.1	29.2
	34.9	34.2	34.6
	44.7	44.3	44.5
	46.0	45.1	45.6
	154.8	153.7	
	387.0	384.2	
	3.082	3.126	
	31.06		

z = 360

3.00	00	300	299	-0.8
37.0		37.0	36.9	-2.4
48.0		48.0	48.0	-3.5
49.4		49.7	49.1	-3.8
		164.7	163.9	
		411.8	409.8	
		2.984	3.002	
		2.993	+1.24	
		+1.13		+1.18

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1880phae.proj.1837R

270–285	−1.40	−1.04	−104
285–300	+.04	+41	−63
300–315	−1.14	−78	−1.41
315–330	+.54	+91	−50
330–345	−1.41	−104	−159
345–360	+1.18	+1.15	+.00
	−.365		

z = 0

22	22	2.2
9.2	9.4	9.3
20.8	20.6	20.7
22.0	22.0	22.0
542	542	
~~1807~~	~~1807~~	
1355	1355	

0 4.0 17.2
16.8
30.6

z = 1

31.1	31.2	31.2
39.7	39.4	39.6
49.0	49.0	49.0
51.0	50.5	50.8
170.8	1761	
4270	4225	
30.85	30.85	
3,		
30.83		
30.42		
125		
3062		

270–285	+1.40	−1.19	+1.19
285–300	−.04	+.34	−.34
	+1.14	−.83	+.83
	−0.54	+.54	−.75
	+1.41	−.21	+.21
	−1.13	+1.13	+.25
	+.30		
	+2.95		
	−1.71		
	124		
	+.21		

3048

+30.00	+19	+19
+30.16	+23	+42
+31.03	−64	−22
+30.49	−10	−32
30.06	−67	−99
29.63	+49	−53
30.62	−23	−76
29.28	+1.11	+35
31.34	−.95	−60
29.57	+.42	−18
31.26	−.87	−105
29.20	+1.19	+.84
36464		
30.039		

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1880phae_proj_1837R

Settings of A by W.A.R.

Readings by W.C.W.

div	q	r	s	n
A = 25.0	0	0	0	0
21.2	+	+	+	+
18.6	0	+	+	+
23.0	0	0	+	+
25.6	0	0	0	0
24.7	0	0	+	0
30.0	−	−	−	−
29.0	−	0	0	0
26.0	−	0	0	0
30.5	−	−	−	−
26.2	−	0	0	0
24.7	0	0	+	+
21.5	0	±	±	±

30.6 + 4
29.9 − 3
31.4 + 4
31.0 + 5
32.0 + 9
29.1 − 8
30.5 − 1
29.7 + 4
30.0 − 1.3
29.3 − 7
29.7 − 1.6
28.1 − 1.2

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1880phae.proj.1837R

July 29 / 1880 W C De Vores Mercury

π = 9h m+ R De Vores Micrometer

h = 668

z = 270

I

h = 692

II

z = 285

III

z = 315

IV

z = 285

V

z = 285

VI

I begins at 9h 11m

II begins at 12h 11

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1880phae.proj.1837R

z = 300

I	II
30	31.3
9.3	9.7
12.2	12.5
14.2	18.8
467	481
1062	1078

II	
11	10
8.2	8.8
12.2	11.8
16.9	16.1
384	377
960	945

z = 315

I	II
0.6	0.4
5.4	5.2
10.0	10.0
16.1	16.1
321	377
802	992

II	
0.0	0.3
5.0	5.2
10.0	10.0
11.9	16.0
309	
772	

z = 315

I	II
0.0	0.0
5.2	5.0
11.0	10.9
16.0	16.0
322	319
805	795

I	II
313	313
360	365
413	420
475	478
1561	1576
3902	3940
3740	3138

II	
308	309
360	360
419	421
470	469
1557	1589
3892	3898
3068	3047

31,39

30.57

z = 330

I	II
295	290
329	323
406	401
459	457
1489	1145
3722	1471
3084	3144

II	
291	290
322	325
401	403
451	456
1465	
3678	3662
3144	3134

224 212

31,05

−0.34

I	II
292	291
330	329
411	412
459	455
1492	1491
3730	3728
3075	3067

30.71

+0.14

For July 29 The Nautical Ephemeris
for Stars

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1880phae.proj.1837R

July 29

$z = 330$

I	II	I	II
07	33 31	33	29 29
−1.6 +2.7	6.9 7.1	3.2	0.0 6.9
−3.6 +2.1	14.6 14.9	7.0	15.4 14.9
−3.8 +1.9	19.9 19.9	14.4 14.6	20.0 19.8
−0.9 +4.5	450	19.7 439	19.9 456
188	11.25	1098	1390 1365
11.18	11.14		1140 1112
			11.26

$z = 345$

I	II
0 1	4.9 −3
	10.9 −7
	18.8 −8
	20.9 −4
	55.5
	1388
	−68
	13.20

I	II
4.6 4.8	04 00 −2
	.02
10.3 10.6	50 48 48
	14.9
18.1 18.4	138 130 129
	13.4
20.2 20.6	150 155 149
	15.4
53.2	342 336 324
1330	855 840 810
13.25	8.35
+2.11	−2.91

$z = 345$

$z = 345$

$z = 0$

0			#					
29.9	31.0	30.9	30.8	33.1	32.4 32.3	33.7	33.8	28.9 29.0
35.5	36.2	36.2	36.2	37.8	37.1 37.2	40.6	41.0	35.4 35.1
42.9	43.6	43.8	43.8	46.8	45.9 45.5	49.9	49.6	45.0 45.0
45.6	46.0	46.1	46.1	48.1	48.0 48.1	52.1	52.4	48.0 48.0
155.9	156.8	157.0	156.9	165.8	163.4 163.1	176.3	176.8	157.3 157.1
384.8	392.0	392.5	392.2	414.0	407.5 407.8	440.8	441.0	393.5 392.8
32.10	32.00			32.46	32.50			
31.98				29.95	30.55 30.34	29.12	29.10	29.20 29.12 28.82
31.99		31.96		30.28		29.11		29.04
						−.88		−2.72

Newfoundland Plate

Can't make anything of the descendents of this date for $z = 330$ to $z = 0$

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1880phae.proj.1837R

z = 0

I		II	
1.0	1.0 1.0	04	01 02
8.1	7.9 8.0	7.1	7.1 7.1
17.3	10.5 17.4	16.7	17.0 16.8
20.0	19.5 19.8	19.0	19.0 19.0
464	459	432	432
1160	1148	1080	1080
		−.80	−.68

z = 15

I		II		I II
20	19 20	08	09 0.8	−1.0 −0.6
10.1	10.4 10.2	10.8 9.0	9.0 11.0	−2.2 −1.9
17.9	17.9 17.9	17.0	16.7 16.8	−0.5 0.0
20.1	20.3 20.2	19.5	19.9 19.9	−0.4 −0.9
501	505	467	465	
1252	1262	1168	1162	
+.92	+1.14	+.88	+.82	
			−0.94	

z = 15

30.1	30.3 30.5	30.0	29.9 30.0
38.8	39.0 38.9	37.9	38.0 38.0
46.1	46.1 46.1	45.9	46.0 46.0
48.3	48.9 48.6	49.0	48.9 49.0
1639	1643	1658	1628
4098	4108	4145	4070
30.62	3040	4.85	30.10
	30.51	29.35	
		29.72	

	I	II
z	+0.1	+0.1
h	−2.1	−2.0
g	−4.1	−3.8
H.	−1.2	+0.0

z = 30

30.9	30.1 30.4	29.9	29.9 29.9
41.1	41.0 41.0	39.9	40.1 40.0
50.4	50.2 50.3	49.6	49.9 49.8
49.5	50.0 49.8	48.0	49.1 49.0
1717	1713	1684	1690
4295	4282	4210	4225
29.57	29.80	29.5	29.37
	29.68		29.44
	−0.83		−0.25

(454)

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1880phae.proj.1837R

$2 = 30$

0	1	07	04	08	0.6	2.4	26421	−1.8
		11.3	11.4	11.3	11.4	12.8	13.0-3127	−1.4
		20.8	20.2	20.5	20.5	22.7	22.9-6 22.5	−2.2
		19.5	20.0	20.0	19.8	21.6	22.0-3 21.1	−1.8
		523	520	526			605 584	
		1308	1300	1315			1512 ~~1710~~	
				13.07			40 1460	
							14.62 14,66	
							+1.64 +1.53	

$2 = 4.5$

0	1/4	29.4	29.6	29.9	29.6	31.1	31.1	−1.5
	1/4	42.0	42.0	41.9	42.0	43.1	43.1	−1.1
	2/2	51.0	51.1	51.1	51.1	53.2	53.2	−2.2
	2/0	500	499	500	500	518	519	−1.8
	10	1724	1726	1729		1792	1793	
		4310	4315	4322		4480	4482	
		29.98	29.85	29.53		29.92	29.88	
			29.88	29.89			29.85	
				29.93				

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1990phae.proj.1837R

z = 60 I II

01	1.9	1.9	1.9	2.4	2.4	2.3	-0.5
	14.0	13.9	14.0	14.2	14.1	14.4	-0.2
	23.2	23.3	23.2	24.8	24.8	24.8	-1.6
	21.4	21.3	21.4	22.8	22.6	22.9	-1.4
	605	604			639	644	
	1512	1510			~~1548~~	1610	
					1590		

15.11 − 2.04

1600 + 1.00 + 1.36 = −1.70

I + II = −.42

z = 60

	31.0	31.1	31.0	32.1	32.0	32.2	-1.1
	45.0	45.2	45.1	45.8	46.1	45.6	-0.7
	54.1	54.1	54.1	56.0	55.9	56.0	-1.9
	52.9	53.0	53.0	54.4	54.8	54.0	-1.4
	1830	1834			1888	1878	
	4575	4585			4720	4695	
	2937	2925			2875	2915	

29.31 + .62

2855 + 0.62 + 0.90 = +1.76

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1880phae.proj.1837R

0. ω 90

2

−.94 −.83 −.83
+.54 +.55 −.28
−1.70 +1.59 −.87
−.42 −.31 −.28
+.76 +.57 +.31
+1.08 +1.19 —
−.11

12 = 60°

I II

I	II			
	11.0	08	4.2	4.5 4.4
−1.1	15.0	15.1 15.0	18.1	18.1 18.1
−1.3	24.1	24.6 24.3	28.2	28.3 28.2
+1.5	23.0	23.9 23.0	26.2	26.0 26.1
+0.4	63.1	63.4	76.7	76.9
	2.10	1.58	19.18	+.72
	15.78			19.22
	15.81		19.20	
			−.38	

2 = 75°

I II

I	II			
01	1.9	20	2.1 2.0	4.1 4.9 4.9 4.9
	16.9	16.0	16.1 16.3	18.1 18.2 18.9 18.6
	22.1	23.0	23.2 22.8	26.0 26.0 26.1 26.0
	21.9	22.8	23.1 22.6	25.2 25.9 26.0 26.0
	6.8	5.8	6.4 5	7.34 7.50 7.59
	1.42	1.47		18.80 18.75 18.98
	15.41	1.59	16.12	1.85
		15.84		1.20
		15.91		+.35
		−.03		
				+.16

2 = 75

I II

I	II						
−1.3	−0.4	32.1	32.6 32.3	36.6	36.7 36.6	34.0	33.8 33.4 33.6	37.1	36.9 37.0
−2.9	−2.0	46.1	46.1 46.1	49.9	50.2 50.0	49.0	49.0 49.0	52.0	51.9 52.0
−2.4	−1.9	53.0	53.2 53.1	57.6	57.4 57.5	55.2	55.9 55.8	59.6	59.2 59.4
−0.2	+0.4	53.0	53.0 53.0	57.2	57.1 57.2	53.7	53.2 53.2	57.9	57.8 57.8
		18.42	18.49	20.13	20.14	19.19	19.14	20.56	20.46
		46.05	46.22	50.32	50.35	48.72	47.98	51.40	51.10
		27.73	29.63	28.86	28.87	27.53	27.97	28.37	27.35 27.78
			29.68			27.47	29.73	29.63	28.86 29.47
							+1.76	+1.36	+1.51 −.31
									+1.08

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1880phae.proj.1837R

$\lambda = 270$ $\eta h = 69.2$ $\pi = 1^k$ ηh 70.2

01	1.9	1.6	1.0	1.9	1.1	1.5	3.5	20	20	20	3.9	4.0	4.0
	9.5	9.9	9.0	9.8	9.0	9.4	11.8	10.9	11.1	10.9	12.1	12.1	12.0
	10.1	10.0	9.0	9.8	9.0	9.6	13.7	13.1	13.1	13.0	13.9	14.0	18.9
	15.0	14.7	13.1	14.0	13.2	14.0	16.8	16.1	16.4	16.3	17.2	17.1	17.0
	365	362	321	355	323			42.1	42.6	42.2	42.1	45.2	46.9
	9.12	9.05	8.02	8.88	8.08			10.52	10.65	10.5	11.78	11.80	11.72
			8.63							11.46			
										+2.83			

Σ -2.0
η -2.4
ϑ -2.1
μ -2.8

$\lambda = 285$

	31.9	31.02	31.0	31.1	31.1	31.3	34.4	33.4	33.8	35.5	35.2	−3.1	
	39.1	39.0	39.1	39.3	38.5	39.1	42.5	42.1	42.0	43.1	43.0	−3.4	
	40.1	40.0	40.1	40.0	40.0	40.0	45.1	44.7	44.8	45.2	45.6	−5.1	
	43.9	43.1	43.1	43.1	43.1	43.3	47.4	46.9	46.9	48.0	48.8	−4.1	
	1550	1533	1533	1535	1530			1671	1678	1718	1716		
	3875	3832	3835	3838	3827			4178	4188	4295	4290		
	~~3037~~	~~3013~~	~~2967~~	~~3050~~	~~2983~~			~~2874~~	~~2881~~	~~2885~~	~~2882~~		
	~~3000~~ 38.41							~~2880~~	~~2888~~	4238			
									~~7.39~~	+8.97			

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1880phae.proj.1837R

May 8 1881 Series I Run 2 = 2700 to 00

Continuation of investigation of Scale

W. V. B. Webber.

2 = 2700 Cont = 7 53.6 Run 4 = 48.0

	I				II					mean
Σ	0 1	1.2	1.6	1.0	1.3	41.2	0 42.0	41.2	+19.7	+20.0 +19.8
F		5.8	5.8	6.7	5.8	45.4	45.6	45.3	+20.4	20.5 +20.4
G		20.5	19.9	19.6	20.0	0.4	0.7	0.0	+19.6	18.8 +19.2
H		12.9	12.8	12.9	12.9	52.2	52.0	52.5	+20.7	20.0 +20.4
		40.4	40.1	39.2			190			
		10.10	10.02	9.80	9.97		497			49.91 + 20.06
					2nd 1 = 5-13		Cont = 7			53.6

Σ	0 1	1.3	1.5	1.4	41.0	0	41.4	41.3	+20.0	
F		5.5	6.9	5.7	45.2		45.1	45.3	+20.5	
G		19.6	19.7	19.6	0.8		0.8	0.7	+18.8	
H		12.5	12.4	12.4	52.4		52.4	52.2	+20.0	
		38.9	39.5				398	395		
		9.72	9.87	9.79			59.95	59.87	59.91	+ 19.88

4.004

2.02

10 3v Ends. After opening of shutters

0	0	13.8	14.7	130	131	130	0 0	54.1	54.1	+27.9
		19.6	24.0	18.5	180	182		58.8	58.8	+19.4
		34.1	34.5	32.8	32.9	32.8		13.6	13.5 13.8	+19.2
		26.2	27.2	24.5	24.8	24.6		5.6	5.7 5.8	+19.0
				988	988				2578 2525	
				2340	2470	2470			6295 6312	
					24.70				2.03	+ 22.67

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1880phae.proj.1837R

8.5

z = 2~~.5~~ Cent = f 05.0

	F			II		
E o	42.0	43.2	42.6	21.3 a o	21.0 21.1	+21.3
F	45.8	45.9	45.8	24.4	24.5 24.3	+21.4
G	0.3	0.5	0.4	42.5	42.4 42.3	+17.9
M	52.2	52.8	52.5	34.8	35.1 34.4	+17.7
	~~4~~03	~~0~~24			1238 1221	
	~~5008~~	5060			30.5 30.2	
	~~6008 6060~~				19.13 +20.10	
	50.08	50.60			+19.62	

z = 2~~.0~~0

o	1	8.0	8.1	8.2	48.3 o 48.4	48.2 +19.4
		12.0	11.9	12.0	50.7 50.5 50.9	+21.3
		29.5	29.6	29.6	10.3 10.5 10.3	+19.3
		220	220	22.0	3.5 3.5 3.5	+18.5
		7~~1~~.5	7.20		4327 4329	
		17.87	18.00		~~4318 4322~~	
					5818 5822	
					19.69 19.78	
					+19.73	

z = ~~22~~.5 31.5

o	1	16.4	17.1	17.0	57.2 o o 57.3	57.0 +19.8
		19.4	19.3	19.4	57.6 57.7	57.5 +21.8
		39.0	38.9	39.0	20.0 20.0	19.9 +19.0
		31.2	30.5	31.8	13.1 13.0	13.2 +18.7
		1064	1078		2680	2676
		26.60	26.90		6700	6690
					19.60	20.05
						19.82

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1880phae.proj.1837R

2 = 21.4330

I

0 1 10.0 —
10.9 —
33.1 —
26.4 —
8.04
30.10

II

0 0 50.1 — +19.9
52.0 — +18.9
14.3 — +18.8
55 — +20.9
24.19
60.48
19.62

n = 345 – sec

0 1 ~~44~~ – 25.8 1 54.9 55.0 55.0
~~6.3~~ – 28.1 57.3 57.11 57.5
~~25.0~~ – 49.9 19.1 19.3 19.4
~~19.8~~ – 41.2 9.5 9.2 9.8
145.0 26.08
362.5 65.20

0 1 7.0 0 1 36.4 36.2 36.3
10.4 39.9 39.9 39.9
34.7 3.7 3.6 3.6
25.5 54.6 53.9 54.2
7.7.6 19.46
19.40 48.65
16.85 16.55
+16.70 +1.50
18.20

Stopped for Polaris 1h 10m ST

+19.57	–.73	+.48	+48
19.62	–.38	+.13	+.61
19.73	–.49	+.24	+.85
19.82	–.58	+.33	+1.18
19.62	–.38	+.13	+1.31
18.20	+1.24	–1.29	–.02
~~55.46~~			
~~19.24~~			
19.49			

			mean
Σ	+18.8	+18.7	+18.7
7	+17.7	+17.6	17.6
5	+15.2	15.8	15.5
H	+15.7	+15.6	15.6

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1880phae.proj.1837R

May 8 Series II From z = 270 to z = 0

I — Beginning 6h.5 pm — II

z = 270

0 1	20.14	1.7	43.6 0 0	43.3	43.9	+18.1 +18.0	+ 18.0 (Mean)
	6.9 7.0	7.0	48.5	48.4	48.6	+18.5 18.5	18.5
	25.1 25.0	25.0	7.2	7.0	7.4	+17.8 18.1	18.0
	16.0 15.5	15.8	57.4	57.6	57.2	+18.4 18.4	18.4
	50.0 48.9			21.63	21.71		
	12.50 12.22			54.08	54.28		
	~~12.36~~			18.42	17.94		
				18.18			

z = 270 – 285

0 1	6.0 6.3 5.3 5.8	5.8	47.8 0	0	47.9	48.3	47.7	47.5	+18.0
	12.0 12.1 11.1 11.4	11.6	53.1		53.0	53.2	53.2	52.9	+18.5
	31.0 30.5 29.2 29.3	30.0	11.9		12.0	12.1	12.0	11.4	+18.1
	21.1 20.8 19.4 19.5	20.0	1.6		1.9	1.4	1.5	1.4	+18.4
	70.1 69.7 65.0 66.0				23.48	23.50	23.44	23.32	
	17.52 17.42 16.25 16.50				58.70	58.75	58.60	58.30	
					18.82	18.67	17.65	18.20	
					18.30				

z = 285 – 300

0 1	8.0	8.4	9.4	8.6	50.6 0 0	50.1	50.3	51.5	+18.0
	13.0	13.7	15.0	13.9	54.6	54.0	53.9	55.9	+19.3
	32.2	32.2	33.8	32.7	16.2	15.7	15.6	17.2	+16.5
	22.0	22.4	24.0	22.8	7.6	7.1	6.9	8.9	+15.2
	75.2	76.7	82.2			69	67	135	
	18.80	19.17	20.55			1.72	1.67	3.37	
						17.08	17.50	17.18	
							17.25		

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1880phae.proj.1837R

58

May 9

2 = 300 – 315

0	0	46.5	49.0 48.8	40.36				
		53.1	52.8 53.0	47.7				
		14.2	15.0 14.6	30.0				
		5.5	6.0 5.8	20.8				
		241.3	28	621				
		0.32	0.70	15.52				
		0.51						

0	0	29.5	29.5 29.5	45.8	+19.3	+17.8	+18.3	Mean
		32.2	32.3 32.2	47.5	+20.8	+20.2	+20.4	
		55.6	56.0 55.8	12.0	+18.8	+18.0	+18.3	
		48.0	48.2 48.1	41.1	+17.7	+16.7	+17.8	
		1653	1660	2294				
		41.32	41.50	57.35				
		41.41	41.72	57.35				
		19.10		18.17				
		18.63						

2 = 315 – 330

0	1	6.9	6.9 6.9	32				
		10.1	9.6 9.8	5.9				
		33.5	33.7 33.6	30.1				
		25.0	25.4 25.2	22.1				
		755	756	613				
		18.87	18.90	15.32				
		18.88		15.32				

0	0	50.2	50.1 50.1	46.0	+16.8	+17.2	+17.0	Mean 16.9
		51.7	51.4 51.6	46.9	+18.2	+19.0	+18.6	
		17.2	17.1 17.1	13.2	+16.5	+16.9	+16.7	
		9.0	9.0 9.0	5.5	+16.2	+16.6	+16.4	
		81	76	2316				
		2.02	1.90	57.90				
		1.96		57.90				
		16.92		17.42				
		17.17						

2 = 330 – 345

0	1	7.3	7.2 7.2	2.6				
		8.9	9.1 9.0	3.5				
		34.5	34.4 34.4	30.0				
		26.5	26.7 26.6	22.5				
		772	774	586				
		19.30	19.35	14.65				
		19.32		14.65				

0	0	49.5	49.3 49.4	45.3	+17.8	+17.3		
		52.3	52.2 52.2	44.6	+16.8	+15.9		
		18.4	18.3 18.4	14.0	+16.0	+16.0		
		8.0	7.8 7.9	4.4	+18.7	+18.1		
		82	76	2273				
		2.05	1.90	56.82				
		1.97		56.82				
		17.35		17.83				
		17.59						

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1880phae.proj.1837R

2 = 345 = 0

0	1	9.0	9.3	9.2	51.0	0	0	51.0	51.0	+48.2
		12.5	12.2	12.4	56.0			56.0	56.1	+16.4
		38.2	38.1	38.2	24.0			23.9	24.0	+14.2
		28.0	28.0	28.0	12.8			12.8	12.9	+15.2
		877	876					2637	2640	
		21.97	21.90					5.92	6.00	
		21.93						5.96		
		2 = 345 = 0						15.97		

0	1	9.4	5.1	5.9	5.8	5.6	0	0	51.0	48.0	47.7	48.5	48.1
		12.8	8.0	8.4	8.0	8.2			56.0	51.4	51.5	52.2	51.7
		38.5	34.1	35.2	34.8	34.7			23.9	20.0	20.1	20.5	20.2
		28.0	24.1	24.0	24.4	24.2			13.0	9.8	9.9	10.2	10.0
		887	713	735	733				2639	92	92	114	
		End 1/2 = 50 =							Mean				
		22.17	17.82	18.38	18.32				5.98	2.30	2.30	2.85	
		22.17		18.17					5.98	2.48			
									16.19	15.69			
									15.94				

Mean
+17.6
+16.45
+16.0
+18.5

+18.28	+.76	+.76	
17.25	+.22	+.54	
18.63	+1.16	+1.70	
17.17	+.30	+1.40	
17.59	+.12	+1.52	
15.95	+1.52	+0.00	
17.47			

Mean

18.2	+18.4	+17.5	+17.8
16.4	+16.8	+16.5	+16.5
14.2	+14.6	+14.5	+14.5
15.2	+15.0	+14.2	+14.6

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1880phae.proj.1837R

May 9 1881 Bo[illegible] Reeder

$\lambda = 270 - 285$

0	1	6.4			1	4.3	4.8	4.3	4.5	0	0	48.5	47.3	47.0	47.0	47.1			
+17.9	+17.4	11.9	17.65			9.9	10.1	9.9	10.0			53.8	52.6	52.0	52.2	52.3			
+18.1	+17.7	31.0	17.88			29.0	28.6	28.9	28.8			13.7	12.0	11.8	12.2	12.0			
+17.3	+16.8	21.5	16.9			19.1	19.0	18.6	18.9			2.2	2.3	1.5	1.7	1.8			
+19.3	+17.1		17.6																
		708				623	625	617				2382	2342	2323	2331				
		17.70				15.57	15.62	15.42				59.55	58.55	58.07	58.27				
							15.54							58.30					
												18.15		17.24					
													17.69						

$\lambda = 285 - 300$

0	1	7.4								0	0	50.7	+16.7						
		12.8										54.1	+18.7						
		32.2										17.0	+15.2						
		22.1										8.4	+13.7						
		74.5										130.2							
		18.62										32.55							
												16.07							

$\lambda = 285 - 300$

0	1	8.0								0	0	50.7	+17.3						
		12.4										53.2	+18.9						
		34.2										17.9	+16.3						
		26.7										9.8	+16.3						
		26.1										116							
		80.4										2.90							
		20.10																	
												17.20							

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1880phae..proj..1837R

z = 345 – 380

0 1 6.3
8.9
33.1
24.4
727
18.17

0 0 49.9 +16.4
50.9 +18.0
17.4 +15.7
9.9 +14.5
81
2.02
16.15

z = 330 – 345

0 1 10.1 5.4
10.5 7.0
33.1 33.3
24.1 25.9
707
17.67

0 0 49.1 16.3 +16.3
57.5 15.5 +15.5
18.9 19.24 +14.4
17.8 17.2 +17.2
214
1.82 1660
15.85

z = 330–345

0 1 10.5
13.2
40.1
29.5
933
23.32

0 0 55.0
57.2
26.4
16.2
35.8
8.95
14.37

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1880phae.proj.1837R

$\eta = 345 - \Theta$

0	1	4.4	21.9	22.1	22.0	4.7	4.3	5.1	+17.3	15.8	+16.6
8	4	24.7	25.2	25.0	8.8	8.5	9.1	+16.2	14.8	+15.5
345	5	50.9	51.3	51.1	37.0	36.5	37.5	+14.1	13.2	+13.6
285	4	40.0	40.0	40.0	25.6	25.0	26.2	+14.4	12.9	+13.6
		1375	1386			743	779			
		34.38	34.65			18.58	19.47			
			34.52				19.02			
							15.50			

$\eta = 345 - \upsilon$

0	1	10.5	10.2	10.4	0	54.6	0	55.0	54.2	+15.8
		13.2	12.9	13.0		58.2	58.7	58.1	+14.8
		40.1	39.6	39.8		26.6	26.4	26.9	+13.2
		29.5	28.9	29.2		16.3	16.2	16.4	+12.9
		933	916				358	356		
		23.32	22.90				17.90	17.80		
			23.11					17.85		
								15.26		

							$\bar{\eta}$
270 - 285	=	16.88	17.69	+1.30	−1.36	+1.67	+1.17
285 - 300		17.20	16.07	+.32	−.98	+.45	+.72
300 - 315		16.15	17.20	−.81	−1.79	+.68	+1.40
315 - 330		15.85	16.15	+.34	−1.75	+.37	+1.03
330 - 345		14.37	16.60	+.34	−1.41	+.08	+1.11
345 - 0		15.38	15.38	+1.91	−.19	+1.14	—
		35.83	16.39				
		15.97	16.52				

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1880phae.proj.1837R

May 10

$\lambda = 270 - 285$

0	1	7.3	7.4	8.1	7.6	51.2	0	0	5.76	5.71	5.70	+16.4
		14.3	14.1	14.2	14.2	5.73			5.70	5.77	5.72	+16.9
		37.5	37.2	36.7	37.1	21.1			21.5	21.0	20.9	+16.0
		24.3	24.1	24.8	24.5	7.1			7.1	7.1	7.0	+17.4
		834	832	838					25.72	25.69	25.61	
		2085	2080	2095					6430	6422	6402	
									16.55	16.56	16.93	
										16.69		

$\lambda = 285 - 300$

0	1	9.0	8.8	8.2	7.0	7.7	8.0	0	0	5.23	5.24	5.13	5.13	5.10
		15.0	13.9	13.9	12.6	13.2	13.7		5.17	5.69	5.71	5.55	5.55	5.54
		38.0	36.3	36.9	35.9	36.2	36.7		5.63	23.1	22.9	21.3	21.8	21.4
		25.5	24.2	24.1	23.0	23.7	24.1		22.1	12.3	11.8	10.7	10.2	10.5
		875	827	831	785	868			11.1	2646	2642	2588	2588	2583
		2188	2065	2075	1962	2020				6615	6605	6470	6470	6458
										15.73	14.60	16.06	14.97	15.62
												15.39		

E +16.3
H +17.4
G +14.6
A +13.0

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1880phae.proj.1837R

Aug 10

$\lambda = 300 - 315$

0	1	7.2	6.8	6.9	6.2	6.3	49.3	0 0	499 495 490 489 +17.0
		11.4	10.8	10.3	10.4	10.7	52.4		528 524 523 520 +18.3
		36.9	36.0	35.3	35.8	36.0	19.3		201 189 191 190 +16.7
		26.3	25.8	25.0	25.2	25.6	9.7		102 98 97 91 +15.9
		81.8	79.4	76.6	77.6				2530 2506 2501 2490
		20.40	19.85	19.15	19.40				6320 6262 6252 6225
									17.20 17.23 16.63 17.15
									17.05

$\lambda = 315 - 330$

0	1	100	89	89		9.3	53.0	0 0	532 528 529 +16.3
		12.8	12.1	11.9		12.3	54.4		549 542 541 +17.9
		39.3	39.1	38.9		39.1	24.3		248 241 240 +14.8
		30.1	29.0	29.1		29.7	14.2		148 138 139 +15.5
		92.2	89.1	88.8					2678 2649 2649
		230.5	222.8	222.0					6695 6622 6622
									16.19 16.06 15.98
									16.08

$\lambda = 330 - 345$

0	1	90	94	96		9.3	52.5	520	527 529 +16.8
		110	114	111		11.2	55.1	548	555 551 +16.1
		40.1	40.5	40.2		40.3	24.7	244	248 250 +15.6
		30.8	30.9	30.8		30.8	13.1	129	129 135 +17.7
		90.9	92.2	91.7					2641 2659 2665
		227.2	230.5	229.2					6602 6648 6662
									16.70 16.57 16.30
									16.52

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1880phae.proj.1837R

$z = 3.45 - 0$

0	1	475	78	74	71	7.4	50.6	0	0	501	504	510	510	+16.8
		95	103	103	102	10.1	54.8			544	546	553	550	+15.3
		395	393	391	391	39.3	25.8			255	258	260	260	+13.5
		272	274	274	270	27.3	13.8			135	134	140	136	+13.5
		837	861	845	834					2635	2642	2663	2658	
		2092	2152	2112	2085					6588	6605	6658	6645	
										1504	1547	1454	1440	
												1486		

+1665	±.60	+60
15.39	±.70	+10
17.05	±.96	+85
16.05	±.04	+81
16.52	±.43	+1.24
14.86	±1.23	+.01
16.09		

Seis

I	II	III	IV	Mean			
~~-.41~~ -.48	-.76	-1.80/11	-.60	-0.78	-0.78	-0.78	-0.75
-.13	+.22	+.32/.43	+.70	+0.13	+0.28	-0.59	+0.31
-.24	-1.16	-.51/.68	-.86	-0.77	-0.79	-1.29	-0.76
-.33	+.30	+.34/.37	+.04	-0.15	+0.06	-1.31	+0.10
-.13	-.12	±.07/.08	-0.43	-0.51	-0.80	-1.24	-0.19
+1.29	+1.52	+1.04	+1.23	+0.95	+1.26	+.12	+1.29

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1880phae.proj.1837R

May 11 1881 $m = 70.6$ $6^h\ 10^m$ Begin

$z = 57^\circ - 28^\circ$

	I						II						Mean
0	0	59.1	59.7	59.6	59.3	59.3	59.5	0	44.3	43.9	44.0	44.2	+15.5 15.6 +15.4
		5.9	5.4	5.3	5.4	5.1	5.3	49.6	50.0	49.5	49.6	49.2	+15.7 15.1 +15.4
		28.4	28.9	28.6	28.3	28.1	28.5	13.6	14.0	13.6	13.5	13.2	+14.9 14.1 +14.5
		16.1	16.2	15.7	16.0	16.2	16.0	0.5	0.8	0.3	0.2	0.6	+15.5 15.3 +15.4
			50.2	49.0	49.0	48.7			22.91	22.73	22.03	22.73	
			12.55	12.25	12.25	12.18			57.28	56.82	56.82	56.82	
									14.73	15.43	15.43	15.36	
									15.27		15.37		

End

0	1	14.3	14.3	14.8	14.5		59.90	0	57.8	58.8	0.2		+14.6
		21.3	20.9	21.1	21.1		6.0		5.8	6.0	6.2		+15.1
		44.1	43.9	43.9	44.0		29.9		29.8	30.0	29.9		+14.1
		31.8	31.8	31.5	31.7		16.4		16.0	16.4	16.7		+15.3
		111.5	110.9	111.3					51.4	52.2	53.0		
		27.88	27.72	27.82					12.85	13.05	13.25		
									15.03	14.67	14.57		
										14.75			

$z = 28^\circ - 30^\circ$

0	1	14.4	14.0	13.9	14.1		58.6	0	59.3	58.4	58.2		+15.5
		19.8	19.4	18.0	19.4		2.8		3.3	2.6	2.4		+16.6
		44.0	43.2	43.0	43.4		29.9		30.3	29.9	29.5		+13.5
		30.8	29.9	30.0	30.2		18.1		18.8	17.6	17.8		+12.1
		10.90	10.65	10.59					5.17	4.85	4.78		
		27.25	26.62	26.48					12.92	12.12	11.95		
									14.38	14.50	14.53		
										14.45			

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1880phae.proj.1837R

3 – 300 – 315

0	1	20.1	19.8	19.7	19.9	4.6	0	1	4.8	4.4	4.6	+15.3
		24.8	24.2	24.2	24.4	7.9			8.0	7.9	7.8	+16.5
		51.0	50.5	50.5	50.7	35.3			35.4	35.4	35.5	+15.4
		39.9	39.4	39.1	39.5	25.4			25.5	25.5	25.2	+14.1
		1358	1339	1335					729	729	731	
		3385	3348	3338					1845	1822	1828	
									1550	1526	1510	
										1529		

315 – 330

81		5.5	5.0	4.8	5.1	5.6	0	1	5.6	5.3	5.9	+14.5
		8.8	8.3	8.1	8.4	5.4			5.3	5.1	5.9	+16.0
		36.9	36.3	35.9	36.4	22.3			22.4	22.2	22.3	+14.1
		26.5	25.8	25.3	25.9	12.4			12.2	12.6	12.3	+13.5
		777	754	741					2575	2572	2574	
		1942	1885	1852					6438	6430	6435	
									1504	1455	1414	
										1459		

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1880phae.proj.1837R

$\lambda = 330 - 345$

01

13.8	13.1	13.3	13.4	5790	0	576	580	580	+15.5
15.3	15.6	15.2	15.4	0.8		0.6	0.9	0.8	+14.6
45.4	45.5	45.8	45.6	31.1		31.1	31.1	31.0	+14.5
35.2	35.2	34.9	35.1	18.5		18.8	18.2	18.6	+16.6
109.7	109.4	109.2				288.1	288.2	28.84	
27.42	27.35	27.30				7202	7201	7210	
						1540	1530	15.20	
							1530		

$\lambda = 345 - 0$

01

51	56	60	56	+1537	+56	+56	49.9	49.9	49.5	4.99	+15.7
89	89	9.3	9.1	14.45	-37	+19	54.3	54.2	54.9	544	+14.8
39.1	40.1	39.9	39.5	15.29	+48	+67	27.0	27.0	26.9	29.1	+12.5
26.2	26.0	26.8	26.5	14.59	-.23	+44	13.8	13.6	13.2	14.0	+12.7
793	853	820		15.30	+29	+73		1447	1487	1454	
1982	2132	2050		13.89	-93	-.00		3618	3892	3635	
	2092			14.815				1364	1548	1415	
								1440		13.89	

Beg.

15.37	-10	15.27	-.73	-73	15.06	-21	-56
14.45	-30	14.257	+.26	-.44	14.48	+40	+36
14.28	-31	14.98	-.44	-.88	15.29	-44	-48
14.59	-41	14.18	+.36	-.52	14.59	+26	+22
15.30	-51	14.29	+.25	-.27	15.30	-45	+49
14.40	-62	13.78	+.76	-.01	14.40	+45	+92
13.89		14.54			14.85		

End 14.75 81

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1880phae.proj.1837R

May

Aug. 12 21^{h} 30^{m} M. 62.0

3 = 27a-28J

01	4.6	4.9	4.9	5.1	5.1	4.9	46.6	46.6	47.0	46.9	46.2	46.1	+18.3
	11.8	11.9	11.4	11.7	12.0	11.8	52.3	52.3	52.5	52.2	52.4	52.3	+19.5
	32.0	31.8	31.6	31.9	32.0	31.9	13.6	13.7	13.6	13.8	13.3	13.5	+18.3
	21.0	21.2	21.1	21.0	21.7	21.2	2.5	2.6	2.5	2.9	2.0	2.2	+18.7
	694	686	690	697	708		2354	2356	2358	2339	2341		
	~~2236~~	~~2245~~	~~2205~~				5885	5890	5895	5846	5852		
	17.35	17.22	17.52	17.42	17.90		18.50	18.32	18.27	18.14	19.16		

18.64

End.

Mean

01	13.1	13.7	13.9	13.6	55.0	00	55.2	54.9	55.0	+18.6	18.3	+18.4	
	20.7	20.4	20.4	20.3	1.4		1.3	1.4	1.4	+18.9	19.5	+19.2	
	40.6	40.9	41.0	40.8	22.9		23.0	23.0	22.6	+17.9	18.3	+18.1	
	29.9	30.1	30.0	30.0	11.0		11.1	10.9	11.0	+19.0	18.7	+18.8	
	1037	1051	1053				2706	2702	2700				
	2592	2628	2632				6765	6755	6750				
							1827	1873	1882				

18.61

2 = 28J - 3Lv

01	7.0	7.4	7.3	7.4	48.8	48.9	48.8	48.5	+18.6	
	13.4	13.9	13.5	13.6	53.8	53.8	53.8	53.7	+19.8	
	35.0	34.6	34.7	34.8	17.7	17.9	17.9	17.3	+17.1	
	23.1	23.7	23.2	23.3	8.0	8.0	8.0	8.0	+15.3	
	790	798	787		2486	2485	2475			
	1975	1995	1968		6215	6212	6188			
					17.60	17.83	17.80			

17.74

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1880phae.proj.1837R

λ = 300 – 315

O 1	9.1	9.0	8.9	9.0	50.6	O O	51.0	50.6	50.2	+18.4
	14.8	14.5	14.8	14.8	54.9		54.7	55.0	54.1	+19.9
	38.8	38.7	38.8	38.8	20.6		20.9	20.8	20.2	+18.2
	28.7	28.6	28.5	28.6	11.4		11.5	11.5	11.1	+17.2
	914	911	910				2581	2579	2556	
	2285	2278	2275				6452	6446	6350	
							18.33	18.30	18.85	
								18.49		

λ = 315 – 330

O 1	6.1	5.9	5.9	6.0	47.5	O O	47.9	47.5	47.1	+18.5
	10.4	10.0	10.0	10.1	50.3		50.7	50.2	49.9	+19.8
	36.2	36.0	36.0	36.1	18.3		18.6	18.2	18.0	+17.8
	27.1	26.8	26.7	26.9	8.8		9.0	9.0	8.5	+18.1
	798	787	786				2462	2449	2435	
	1995	1966	1965				6155	6122	6088	
							18.40	18.96	18.77	
								18.54		

λ = 330 – 345

O 1	6.6	6.8	6.6	6.7	47.5	O O	47.6	48.0	47.9	+19.2
	9.9	9.6	9.4	9.6	51.5		51.8	51.4	51.4	+18.1
	37.4	37.7	37.3	37.5	19.6		19.7	19.6	19.5	+17.9
	28.3	28.0	27.8	28.0	7.9		7.9	8.0	7.8	+20.1
	822	811	811				2470	2470	2455	
	2055	2025	2025				6175	6170	6142	
							18.80	18.50	18.83	
								18.71		

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1880phae.proj.1837R

01	7.0	6.5	6.8	6.8	47.3	00	47.6	47.4	46.9	+1.95
	10.8	11.0	10.9	10.9	52.9		52.6	53.0	53.2	+1.80
	38.5	39.0	39.0	38.8	22.6		22.4	22.7	22.7	+1.62
	27.0	27.2	26.6	26.9	10.3		10.1	10.2	10.2	+1.66
	8.33	8.37	8.33				2.31	2.38	2.48	
	20.82	20.78	20.82				63.26	63.32	63.70	
							17.54	17.63	~~15.92~~ 17.12	
									17.45	

18.62	+.37	+37
17.74	+.51	-.14
18.49	+.24	+.10
18.54	+.29	+.39
18.71	+.46	+.85
17.43	+.82	-.03
18.25		

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1880phae.proj.1837R

72

May 14 11h ST Mon = 67.0 = 4.11 hr

λ = 280 - 285

Beginning

											Mean
0 1	7.0	7.3	7.9	7.4	0	50.2	49.9	50.0	50.6	+17.2	17.1	17.2
	15.4	15.9	16.0	15.8		57.7	57.9	57.5	57.8	+18.1	17.6	17.8
	35.8	37.1	37.4	36.9		20.0	19.8	20.2	20.0	+16.9	17.0	17.0
	24.6	25.0	24.9	24.8		6.6	6.4	6.5	7.0	+18.2	18.1	18.1
	8.28	8.57	8.62				2840	2542	2356			
	20.70	21.42	21.55				6350	6855	6840			
							~~19.70~~	~~20.37~~				
							17.20	17.67	18.15			

2322
17.74
17.51
N 5
17.62

End. 66.7 dd. hr

0 1	15.2	15.3	15.6	15.30	0	58.2	58.8	58.4	58.5	+17.1	
	24.3	23.7	23.9	24.11	23.9	6.0	6.3	6.3	5.9	+17.6	
	44.9	44.5	44.5	43	44.4	27.4	27.5	27.9	27.1	27.1	+17.0
	33.8	33.5	33.0	33.6	33.4	15.3	16.2	15.5	15.7	15.3	+18.1
	4.82	11.70	11.67	11.76			2806	2865	2861	2866	
1	29.50	29.25	29.18	29.40			7212	7152	7165		
							16.90	17.13	17.66	17.15	

λ = 285 - 300

0 1	11.6	11.5	11.9	11.7		54.9	55.0	55.0	54.6	17.54	
	19.6	19.2	19.2	19.3		0.7	0.8	1.0	0.3	+16.8	
	41.2	41.0	40.9	41.0		25.3	25.5	25.4	25.0	+18.6	
	28.8	28.4	28.6	28.6		14.7	14.8	14.8	14.5	+15.7	
	10.12	10.01	10.06				2761	2762	2746	+13.9	
	25.30	25.02	25.15				6902	6905	6865		
							16.28	15.97	16.50		

1875
16.25

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1880ophae.proj.1837R

λ = 302 – 315

0 1	11.1	10.4	10.5	10.7	53.4	00	53.5	53.3	53.5	+17.3
	17.0	16.7	16.6	16.8	57.8		58.0	57.5	58.0	+19.0
	41.1	40.8	40.6	40.8	24.0		24.0	23.9	24.0	+16.8
	30.5	30.4	30.1	30.3	14.4		14.8	14.4	13.9	+15.9
	99.7	97.9	97.8				26.03	24.91	26.94	
	24.95	24.48	24.40				~~40.06~~	67.28	67.35	
							67.58	17.20	17.10	
							17.37	17.20	17.10	67
										17.22

λ = 315 – 330

0 1	5.0	4.9	5.0	5.0	47.8	00	47.9	47.4	47.8	+17.2
	9.9	9.9	9.8	9.7	50.8		52.9	51.4	50.6	+18.9
	35.9	36.0	36.0	36.0	19.2		19.1	19.5	19.1	+16.8
	26.2	25.9	26.1	26.1	9.4		9.5	9.4	9.1	+16.7
	77.0	76.7	76.9				24.04	24.88	24.66	
	19.25	19.18	19.22				61.85	62.20	61.65	
							17.40	16.58	17.5	
									21.95	
										17.32

λ = 330 – 345

0 1	5.5	5.7	5.3	5.5	48.0		48.0	48.1	48.0	+17.5
	9.3	9.1	8.5	9.0	52.6		52.5	52.6	52.8	+16.4
	37.5	37.0	37.0	37.2	21.3		21.1	21.4	21.5	+15.9
	27.6	27.5	27.0	27.4	9.6		9.7	9.2	9.9	+17.8
	7.99	7.93	7.78				25.13	25.13	25.22	
	19.98	19.82	19.45				62.82	62.82	63.05	
							17.16	17.00	16.40	

1685
2456
771

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1880phae.proj.1837R

74

$2 = 345 - 0$

0	1	1.9	1.6	1.6	1.7	44.7	0	2	445	449	446	+17.0
		6.2	6.7	6.4	6.4	50.3			520	506	504	+16.1
		351	348	350	350	21.0			208	210	211	+14.0
		230	228	224	227	9.0			9.0	9.0	9.1	+13.7
		662	659	654					2443	2455	2452	
		1655	1648	1635					6107	6138	6130	
									1548	1510	1505	
											1521	63

17.62	−92	+86	+86
16.25	−55	+51	+35
17.22	−142	+46	+81
17.37	−58	+56	+137
1698	−39	+19	+156
15.21	+1.59	+149	+107
4087			
1684			
16.76			

May 11		May 12		May 14			
−56	−37	−86	144.0	−47	−48	−60	
+86	+51	+55	146	+37	+36	+46	
−48	−24	−46	1470	−37	−28	−39	
+28	−29	−36	581	−19	−20	21	
−49	−46	−45	55.5	160	−43	−37	−38
+1.92	+1.82	+1.49		+1.98	+1.92	2/104	

2-6

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1880phae.proj.1837R

May 15 ~~6h~~ 22h 0m ~ Att m = 56.5

2 = 0 - 15 Beginning

0 1	11.9	11.7	12.0	11.9	51.5	0 0	51.4	51.9	51.1	+20.4
	16.4	16.6	16.5	16.5	57.9		58.0	57.8	58.0	+18.6
	44.3	43.8	44.0	44.0	23.4		23.6	23.4	23.3	+20.6
	32.2	32.8	33.0	32.7	12.1		12.2	12.1	12.1	+20.6
	1039	1049	1055				2652	2652	2645	
	2598	2622	2638				6630	6630	6612	
							1968	1992	2026	
								1995	~~2986~~	

2 = 0 - 15 End

											Mean
0 1	9.1	9.8	9.4		48.8		48.6	48.9		+20.6	20.4+20.5
	13.8	14.0	13.9		55.0		55.0	55.1		+28.9	18.6+18.8
	40.2	40.6	40.4		20.2		20.0	20.5		+20.2	20.6+20.4
	29.9	29.6	29.8		9.1		9.3	8.9		+20.7	20.6+20.6
	930	935					2531	2534			
	2325	2338					6328	6335			
							1997	2003			
									2000		

2 = 15 - 30

0 1	11.4	11.3	11.5	11.4	50.0	0	50.3	50.8	50.5	+20.9
	17.6	17.5	17.9	17.7	59.0		58.8	59.0	59.1	+18.7
	42.5	43.1	43.0	42.9	26.3		26.5	26.2	26.3	+16.6
	31.5	32.5	32.1	32.0	12.2		12.2	12.1	12.2	+19.8
	1030	1044	1045				1478	1481	1481	
	2575	2610	2621				3695	3702	3702	
							1880	1908	1919	
								1902		

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1880phae.proj.1837R

2 = 30 – 45

0	1	28	31	33	3.0	42.2	0 0	42.2	42.3	42.2	+20.8
		12.0	11.5	12.0	11.8	52.2		52.4	52.1	52.1	+19.6
		38.2	38.4	38.4	38.3	20.0		19.9	20.0	20.0	+18.3.
		24.8	24.4	24.2	24.5	4.3		4.1	4.4	4.4	+20.2
		778	774	779				2386	2388	2387	
		1945	1936	1948				5965	5970	5968	
								19.80	19.66	19.80	
									19.75	226	

2 = 45 – 60 +5

0	1	3.9	50	5.0	4.8	43.8	0 1, 0	43.7	43.8	43.8	+21.0
		14.1	15.3	15.0	15.0	56.2		56.0	56.1	56.4	+18.8
		41.8	42.3	42.2	42.3	23.2		22.9	23.0	23.7	+19.1
		26.2	27.2	27.3	27.1	7.6		6.9	8.0	8.0	+19.5
		860	898	895				2495	2509	2519	
		2290	2245	2238				6238 ~~4317~~	~~327~~ 62.72	6295	
								~~1833~~ 19.62	19.73	19.43 / 17.8 / 19.59	

2 = 60 – 75

0	1	2.1	3.1	3.0	3.1	3.2	3.1	0 0	44.4	44.0	44.1	44.8	44.6	+18
		14.0	15.3	15.0	15.1	15.5	15.2		56.3	55.8	56.0	56.5	56.8	+18
		41.0	42.7	42.6	42.1	42.5	42.5		21.3	21.2	21.5	21.2	21.3	+21
		25.9	26.9	27.0	26.9	27.2	27.0		6.6	6.4	6.2	6.8	6.8	+20
		860	880	876	892	884				2474	2478	2493	2495	
		2275	2200	2195	2180	2210				6185	6185	6232	6238	
										~~1890~~ 20.15	20.25 / 19.89	19.48	19.72	

1880phae.proj.1837R

2=75-80

0 1	5.0	5.8	6.0	5.9	5.9	47.0	0	46.9	47.2	47.3	+18.8
169	17.3	18.0	17.4	17.6	0.0			59.8	59.8	03	+17.6
415	42.2	42.2	42.0	42.1	25.1			24.8	25.3	25.2	+17.0
27	28.0	28.2	28.2	28.1	8.6			8.4	8.7	8.7	+19.5
906	9.3	9.4	9.5				25	99	26.0	26.15	
2345	23.32	23.60	23.38					6507	65.25	65.38	
								6498			
								1884	18.35	18.00	
										69	
									18.23		

0 1 9.1	1997	+.56	+.56
	190.2	+.39	+.17
	19.75	+.34	+.54
	19.19	+.18	+.69
	19.89	+.52	+1.21
	18.23	18.8	+.53
	56 45		
	19.41		

+18.7
+18.9
+21.2
+20.4

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1880phae.proj.1837R

78

May 15 1881 Att. M = 5 5.5 / 4 0 m

z = 0–15 Beginning

Mean

01	~~57~~ 47	~~43~~ 44	4.6	43.7	00	438	437	435	+20.6	20.6	+20.6
	39.0 9.2	47 9.3	9.7	9.4	50.7	5-0.2	504	500	+19.2	19.5	+19.4
	~~29~~ 36.0	35.9	36.2	36.0	14.9	14.7	15.0	15.0	+21.1	20.6	+20.8
	~~2~~ 24.9	24.9	24.5	24.8	3.8	3.9	3.7	3.8	+21.0	20.6	+20.5
	748	748	748			23.26	23.28	23.23			
	1795	1791				5815	58.20	58.08			
	18.70	18.70	18.70			1980	19.75	20.62			
						20.55	20.50				
							20.56				

z = 0–15 End

01	13.4	13.0	12.4	12.9	52.3	00	52.3	52.5	52.2	+20.6		
	18.2	17.9	17.3	17.8	58.3		58.1	58.6	58.3	+19.5		
	44.2	43.8	43.5	43.8	23.2		23.1	23.1	23.3	+20.6		
	32.8	32.8	32.9	32.8	12.2		12.2	12.3	12.2	+20.6		
	1086	1075	1061				2657	2665	2660			
	2715	2686	2652				~~6392~~	6662	6650			
							6643					
							20.73	20.26	20.02			
									101			90
									20.34			

z = 15 – 30

01	4.8	5.0	~~1.09~~	4.9	43.9	00	439	439	+21.0			
	11.1	11.1		11.1	52.3		52.3	52.3	+18.8			
	36.1	36.1		36.1	18.8		19.1	18.6	+17.3			
	25.0	25.0		25.0	4.4		4.5	4.2	+20.6			
	770	762					2398	2390				
	1925	1905					5995	5975				
							1930	1930				
								19.30				

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1880phae.proj.1837R

$\lambda = 3045$

01	10.9	10.8	10.8		49.9	00	50.0	48.8	+20.9
	19.3	19.5	19.4		0.2		01	02	+19.2
	45.9	46.0	46.0		27.4		27.4	27.3	+18.6
	31.0	31.6	31.3		11.4		11.3	11.5	+19.9
	10.71	10.79					2388	2388	
	26.78	26.98					5970	5970	
							17.08	17.28	
							6720	6720	
							19.58	19.78	
								19.68	

01	13.4	14.0	14.1	14.2	53.20		53.2	53.2	+21.0
	24.9	24.7	24.3	24.5	5.3		5.3	5.3	+19.2
	50.7	51.0	51.0	51.0	32.0		31.9	32.0	+19.0
	36.5	36.3	36.2	36.2	16.4		16.8	16.1	+19.8
	1231	1262	1256				2872	2866	
	3054	3155	3140				7180	7165	
							1975	1975	
								1975	

01	12.6	11.7	11.4	11.6	53.0	00	53.1	52.9	+1.86
	22.6	23.8	23.8	23.8	4.9		4.8	5.0	+18.9
	49.1	50.0	50.0	50.0	29.0		29.0	28.9	+21.0
	34.0	34.5	34.9	34.7	15.1		15.2	15.0	+19.6
		1200	1201				2821	2818	
		3000	3002				7052	7045	
							1948	1952	
								1950	

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1880phae.proj.1837R

01	11.6	11.8	11.0	11.5	12.3	5.2	5.1	5.4	+19.2
	23.7	23.3	23.2	23.4	5.5	5.2	5.8	5.6	+17.9
	47.8	47.5	47.0	47.4	29.9	29.9	30.0	29.8	+17.5
	33.9	33.3	33.6	33.6	13.2	13.3	13.0	13.2	+20.4
						2806	2812	2810	
	1170	1159	1148			7016	7030	7025	
	2925	2895	2870			1910	1865	1855	
							2630		
							1877		

7045	+.87	+87
19.30	+.28	+69
19.68	+.10	+69
19.75	+.17	+86
19.53	+.05	+81
18.77	+.81	+.00
5748		
1958		

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1880phae.proj.1837R

May 16 1h, Cath M = 49.5

z = 0 – 15 Beginning

0	1	10.3	10.0	10.2	9.9	10.1	477	0	1	47.3	47.6	48.0	48.0	+22.4
		14.1	14.5	14.1	13.8	14.1	52.7			52.3	52.6	53.0	52.8	+21.4
		37.6	37.5	37.8	37.6	37.6	14.6			14.5	14.3	14.9	14.8	+23.0
		27.9	28.0	28.2	28.1	28.0	5.2			5.2	4.7	5.8	5.2	+22.8
		899	900	903	894					2393	2392	2417	2408	
		2248	2250	2256	2235					5982	5980	6042	6020	
										2266	2270	2276	2215	
											2242		160	

Dark

2242
2180
422

0	1	3.6	3.0	3.3	40.8	0	1	40.7	40.8	+22.5	22.4	+22.4
		6.9	6.4	6.6	45.9			46.1	45.7	+20.7	21.4	+21.0
		30.0	29.3	29.6	7.7			8.0	7.4	+21.9	23.0	+22.4
		200	203	202	68.1			58.3	57.9	+22.1	22.8	+22.4
		605	590					2131	2118			
		1512	1475					6826	5295			
								5328				
								2184	2180			

22.11 Mean

z = 15 – 30

0	1	11.4	12.1	11.8	49.5	0	0	49.7	49.3	+22.3	
		17.3	17.2	17.2	57.0			57.0	57.0	+20.2	
		38.6	38.4	38.5	20.0			20.0	19.9	+18.5	
		29.3	29.5	29.4	7.2			7.5	6.9	+22.2	
		966	972					2542	2531		
		2415	2430					6355	6328		
								2060	2102		
								2081			

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1880phae.proj.1837R

82

$z = 30 - 45$

0 1	8.6	8.7	8.6	46.0	0 0	46.0	45.9	+22.6
	16.1	16.3	16.2	55.0		55.0	55.1	+21.2
	39.1	39.4	39.2	18.7		18.9	18.5	+20.5
	26.9	26.8	26.8	5.0		5.1	5.0	+21.8
	90.7	91.2				24.50	24.45	
	22.65	22.80				61.20	61.12	
						21.43	21.68	
						21.55	"	

0 1	6.7	6.7	6.7	43.9	0 0	43.9	43.9	+22.8
	15.8	15.9	15.8	55.2		55.3	55.0	+20.6
	39.0	39.1	39.0	18.3		18.6	18.1	+20.7
	25.9	25.5	25.7	4.4		4.6	4.2	+21.3
	87.4	87.2				24.24	24.12	
	21.85	21.80				60.60	60.30	
						21.25	21.50	
						21.38		

0 1	6.4	6.5	8.2	8.4	8.3	48.0	0 0	45.9	46.0	47.8 48.3	+20.3
	17.7	17.9	19.5	19.6	19.6	59.2		56.2	56.9	59.1 59.2	+20.4
	40.7	40.8	42.5	42.6	42.6	19.9		17.8	18.0	19.4 20.4	+22.7
	27.2	27.1	28.7	28.6	28.8	7.2		4.8	4.8	7.1 7.6	+21.6
	92.0	92.3	98.9	99.4				24.69	24.37	25.34 25.52	
	23.00	23.07	24.72	24.85				61.07	60.92	63.35 63.80	
				24.80				21.93	21.95	21.37 21.00	
										21.18	

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1880phae.proj.1837R

2 = 75 - 90

07	11.1	11.0	12.0	12.2	11.8	0 0 51.2	51.0	51.0	51.7	+20.6
	22.1	22.0	23.0	23.3	22.8	3.1	3.1	2.8	3.5	+19.7
	14.3	42.6	43.4	43.6	43.2	24.3	24.1	24.0	24.7	+18.9
	30.5	31.0	31.3	31.2	31.2	9.6	9.4	9.6	9.9	+21.6
	~~80~~	1066	1097	1103			26.76	26.74	26.98	
	1950	~~1915~~	2742	2758			6690	6685	6741	
		2650					~~2240~~	~~2230~~		
							19.95	20.3	20.13	

15.25
24.37
20.13
60.45
20.15

22.11	+.91	+91
20.81	+.39	+52
21.55	+.35	+87
21.36	+.18	+105
21.15	+.02	+103
20.13	+.05	+02
718		
21.20		

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1880phae.proj.1837R

84

May 16 $3^h 45^m$ S.T. Obs. $\eta = 50.0$

$Z = 0 - 15$

									Mean
0 1	21.5	21.4	21.4	59.6	0 0	59.6	59.5	+21.8	21.7 +21.8
	25.5	26.0	25.8	4.8		4.8	4.9	+21.0	20.5 +20.8
	48.3	48.4	48.4	26.0		26.1	26.0	+22.4	22.0 +22.2
	39.3	39.5	39.4	16.8		17.0	16.6	+22.6	22.2 +22.4
	1346	1353				2875	2870		
	3365	3382				7188	7175		
						2177	2207		
						384			
						21.92			

21.82

End $\eta = 50.1$

0 1	5.4	5.1	5.2	43.5	0 0	43.6	43.4	+21.7
	9.2	9.2	9.2	48.7		48.9	48.5	+20.5
	32.1	32.0	32.0	10.0		10.1	10.0	+22.0
	23.0	22.4	22.7	0.5		0.6	0.4	+22.2
	697	697				2232	2223	
	1742	1741				5580	5558	
						21.62	21.84	
						21.72		

$Z = 15 - 30$

0 1	3.0	2.9	3.0	39.8	0 0	39.8	39.8	+23.2
	8.1	8.8	8.4	48.0		48.0	47.9	+20.4
	29.5	29.0	29.2	10.6		10.9	10.3	+18.6
	20.7	20.2	20.4	57.9		57.8	58.0	+22.5
	613	609				2165	2160	
	1532	1522				5412	5400	
						21.20	21.22	

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1880phae.proj.1837R

2 = 30 - 45

0	1	6.2	6.6	6.4	43.8	0 0	43.8 43.8	+22.6
		~~42.1~~	14.3	14.2	53.0		~~53.0~~ 53.1	+21.2
		~~14.2~~			16.2		16.2 16.3	+21.0
		~~37.4~~	36.9	37.2	3.1		3.~~8~~ 3.1	+21.5
		~~24.6~~	24.5	24.6			2368 2363	
		824	823				5902 5907	
		2060	2058				21.~~58~~ 21.51	
							21.56	

3 = 45 - 60

0	1	6.3	6.3	6.3	43.5	0 1	43.5 43.5	+22.8
		15.8	15.5	15.6	55.0		55.1 55.0	+20.6
		39.0	39.0	39.0	18.4		18.5 18.2	+20.6
		25.8	25.7	25.8	4.0		4.0 4.0	+21.8
		869	865				2411 2407	
		21.72	21.62				6028 6018	
							21.44 21.44	
							21.44	

0	1	5.1	5.0	5.0	45.2	0 1	45.1 45.3	+19.8
		16.9	16.9	16.9	56.3		56.2 56.4	+20.6
		39.6	39.7	39.6	17.1		17.0 17.2	+22.5
		26.0	25.8	25.9	5.2		5.1 5.2	+20.7
		876	874				2434 2441	
		2190	2185				6085 6102	
							21.05 2083	
							20.94	

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1880phae.proj.1837R

86 $z = 75° - 90°$ May 16

01	39	40	4.0	48.1	00	430	432	+20.9
	14.5	14.9	14.7	55.3		55.3	55.3	+19.4
	35.1	35	35.3	16.8		17.0	16.6	+18.5
	23.6	23.0	23.3	1.9		1.9	1.9	+21.4
	7.1	7.4				23.72	23.70	
	19.28	19.30				59.30	59.25	
						19.98	20.10	
						20.04		

21.82	+.55	+65
21.21	+.04	+69
21.55	+.38	+107
21.44	+.27	+134
20.94	+.23	+111
20.04	±1.13	100
21.17		

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1880phae.proj.1837R

Series				Mean	
I	II	III	IV		
-.56	-.87	-.91	-.50	-0.72	-0.72
+.39	+.28	+.39	-.04	+0.25	-.47
-.34	-.10	-.30	-.38	-0.29	-.76
-.18	-.17	-.16	-.27	-0.21	-.97
-.52	+.05	+.02	+.23	-0.05	-1.02
+1.18	+.81	+.05	+1.13	+1.04	+.02

Cond.,

May 16	+21.17	"
16	+21.20	
15	+19.58	
15	+19.41	
14	+16.76	
12	+18.25	

At Mt. Red to 620

T-620			
500	+1.20	-3.00	18.17
49.5	+1.25	-3.17	18.03
55.5	+6.5	-3.17	17.41
56.5	+5.5	-1.83	17.58
67.0	-5.0	+1.67	18.43
62.0	+0.0	0.00	18.25
			17.98

1° = 0.25"

$A = a + bx$

At 62°. Cond = 17.98"

1880phae.proj.1837R

88

May 17 $22^h\ 25^m$ m. 48.0

3 − 0 − 15

0	1	2.9	2.4	2.6	39.6	0	39.5	39.6	+23.0	23.0
		6.8	7.0	6.9	44.5		44.5	44.5	+22.1	21.6
		28.2	28.2	28.2	5.0		5.0	4.9	+23.2	23.4
		19.3	19.4	19.4	56.4		56.2	56.6	+23.0	23.2
		57.2	57.0				20.52	20.56		
		19.30	14.25				5130	~~5165~~		
							~~77~~	51.40		
							23.00	22.85		
								22.92		

Mean

End $2^h\ 5^m$ 48.2

0	1	7.0	6.9	7.0	44.0	0	0	44.0	44.1	+23.0
		10.5	10.6	10.6	49.0			49.0	48.9	+21.6
		32.6	32.4	32.6	9.2			9.2	9.2	+23.4
		23.3	23.5	23.4	0.2			0.2	0.1	+23.2
		0.34	7.37					22.24	22.23	
		18.35	18.42					~~5060~~	55.58	
								55.60		
								22.75	22.84	
									22.81	

2 − 15 − 30

0	1	9.0	9.2	8.1	7.8	8.0	43.8	0	0	43.8	43.9	+24.2
		40	10.54	12.9	13.0	13.0	51.1			51.2	51.0	+21.9
		34.8	34.3	32.9	33.2	33.0	12.9			13.0	12.8	+20.1
		25.8	25.1	24.0	24.0	24.0	0.8			0.9	0.6	+23.2
		8.23	7.71	7.80						22.89	22.83	
		20.85	19.46	19.50						57.22	57.07	
										22.26	22.43	

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1880phae.proj.1837R

2=30 45

01	5.0	5.0	5.0	42.0	0 0	420 420	+23.0
	12.8	12.6	12.7	50.4		50.0 50.7	+22.3
	34.2	34.2	34.2	12.5		12.5 12.5	+21.7
	21.8	21.9	21.8	59.4		59.3 59.6	+22.4
	73.8	73.7				2238 2248	
	184.0	184.2				5591 5620	
						2250 2222	
						2236	

2=

01	6.8	6.4	6.6	43.0	0 0	431 429	+23.6
	15.1	15.2	15.2	54.0		54.0 53.9	+21.2
	37.7	37.6	37.6	15.9		15.7 16.1	+21.7
	24.3	24.2	24.2	1.9		1.9 1.9	+22.3
	83.9	83.4				2347 2348	
	209.8	208.5				5868 5870	
	~~209.1~~					2230 2215	
						22,22	
01	3.8	3.7	3.8	43.0	0 0	430 430	+20.8
	14.2	14.8	14.5	53.7		53.8 53.6	+20.8
	37.0	36.9	37.0	13.1		13.2 13.0	+23.9
	23.0	23.0	23.0	1.2		1.1 1.2	+21.8
	78.0	78.4				2311 2308	
	195.0	196.0				5778 5770	
						2172 2190	
						2181	

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1880phae.proj.1837R

90 z = 75 − 80

0	0	53	51	5.2	43.2	00	43.2	43.1	+22.0
		15.8	15.8	15.8	55.2		55.0	55.5	+20.6
		35.2	34.9	35.0	15.0		15.2	14.9	+20.0
		24.0	23.2	23.6	0.6		0.6	0.7	+23.0
		8.03	7.90				2340	2342	
		20.07	19.75				5850	5855	
							21.57	21.20	
								21.37	

22.86	+70	+.70
22.34	+18	+88
22.36	+20	+108
22.22	+06	+114
21.87	−35	+79
21.37	−51	28
22.16		

0 − 15

			2		
22.86	+95	+95	+1.58	+57	
22.34	+33	+43	+1.38	+35	+.27
22.36	+35	+45	+1.83	+37	+1.09
22.22	+41	−69	+1.14	−79	+.82
21.87	−20	−10	+1.04	−18	
21.37	−44	−1.54		−1.62	
21.99					

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1880phae_proj_1837R

May 18/881 Alt 49.0

3 h 52 m

Z = 2200

01	55	50	5.2	43.2	00	431	432	+22.0	21.6	+21.8
	93	93	9.3	47.2		473	470	+22.1	22.0	+22.0
	221	220	22.0	0.8		06	09	+21.2	21.0	+21.1
	140	144	14.2	52.0		522	519	+22.2	22.2	+22.2
	509	507				2032	2030			
	1272	1268				5080	5075			
						219	2193			
	End 5 h 00 m			49.4			21.92			

00	140	140	14.0	52.4	521	523	21.92		+21.6
	187	184	18.6	56.6	565	563	21.66		+22.0
	315	317	31.6	10.6	107	104	156		+21.0
	232	237	23.4	1.2	12	13	21.78		+22.2
	877	878			2419	2403			
	2165	2195			6046	6008			
	2192				21.44	21.87			
					21.66				

31

25 - Jun

01	99	100	82	85	9.2	47.3	00	476	477	469	470
	135	138	124	123	13.0	49.9		459	524	497	497
	275	275	260	262	26.6	6.2		65	64	59	58
	191	183	165	174	17.8	58.9		595	595	582	584
	700	696	631	644				2235	2240	2209	2207
	1750	1740	1578	1610				6588	5600	5578	2000
								2162	2140	21.341	

Σ +21.9
I +23.1
g +20.4
H +18.9

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1880phae.proj.1837R

92

$\lambda = 300 - 315$

0	1	5.9	5.9	5.9	44.2	0	0	443 442 +21.7
		9.0	9.0	9.0	46.2			464 461 +22.8
		25.4	25.3	25.4	3.7			3.7 3.7 +21.7
		18.0	17.9	18.0	58.0			58.2 57.9 +20.0
		583	581					2126 2119
		1458	1452					5315 5298
								21.43 21.54
								21.48

$30 = 330$

$\lambda = 315 - 330$

0	1	3.9	3.9	3.9	42.8	0	0	42.9 42.8 +21.1
		5.9	5.9	5.9	43.6			43.9 43.2 +22.3
		24.0	23.8	23.9	3.2			3.5 3.0 +20.7
		17.7	~~17.9~~	17.6	56.6			56.8 56.4 +21.0
		575	576					2071 2084
		1288	1280					5178 5130
								21.10 21.45
								21.28

$330 - 345$

0	1	4.0	4.0	4.0	42.4	0	0	42.6 42.3 +21.6
		4.8	4.5	4.6	44.7			44.8 44.6 +19.9
		25.4	25.7	25.2	4.6			4.8 4.5 +20.6
		17.8	~~18.0~~	17.9	55.0			55.0 55.0 +22.9
		520	516					2072 2064
		1300	1290					5180 5160
								21.20 21.30
								21.25

21.78 +.64 +.64
21.34 +.20 +.14
21.68 +.34 +1.18
21.28 +.14 +1.32
21.25 +1.1 +1.43
19.72 +1.42 +1.00
21.14

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1880phae.proj.1837R

2 = 345 - 0

0 1

41 46 4.3 42.5
61 63 6.2 46.0
265 264 26.4 8.0
177 173 17.5 59.2
544 546
230
1360 1365

0 0

428 422 +21.8
460 459 +20.2
79 81 +18.4
593 590 +18.3
2160 2152
5400 5380
1960 1985
1972

2 = 0 - 15

0 1

21 20 2322 2.2 40.0
53 52 53 52 5.2 44.8
270 271 272 272 27.1 4.9
181 182 181 181 18.1 56.0
525 525 529 537
1312 1313 1322 1342

0 0

402 400 399 400 +22.2
449 448 448 445 +20.4
48 49 50 48 +22.2
562 564 555 518 +22.1
2061 2061 2052 2057
5152 5152 5130 5128
2160 2161 2192 2214
2182

2 = 15 - 30

0 1

55 54 5.4 43.2
101 105 10.3 50.6
309 306 30.8 12.4
217 212 21.4 0.0
682 677
1701 1695

0 0

483 432 +22.2
505 506 +19.7
125 128 +18.4
0.0 59.9 +21.4
2263 2260
5658 5650
2047 2043
2046

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1880phae.proj.1837R

z = 30–45

01	5.0	5.2	5.1	43.9	02	43.9	43.9	+21.2					
	12.3	12.6	12.4	52.2		5.22	5.23	+20.2					
	34.1	34.5	34.3	14.8		14.7	14.8	+19.5					
	22.2	21.8	22.0	1.2		1.5	1.0	+20.8					
	736	741				23.23	2320						
	1840	1855				58.08	5800						
						20.32	~~+45~~ 20.15						
							2024						

z = 45–60

01	7.4	7.5	7.4	45.6	00	456	485	+21.8					
	15.9	16.3	16.1	56.1		560	562	+20.0					
	38.2	38.0	38.1	18.6		188	185	+19.5					
	25.0	25.0	25.0	4.2		4.1	4.2	+20.8					
	865	868				2445	2444						
	2162	2170				61.12	6110						
						2050	2060						
							2055						

z = 60–75

01	~~7.3~~	7.1	7.1	7.5	7.2	46.9	00	467	470	469	470	+20.3	
	18.1	18.1	18.3	18.5	18.2	57.3		570	579	573	572	+20.9	
	40.2	40.2	40.1	40.0	40.1	17.0		169	170	17.1	16.9	+23.1	
	26.2	25.8	25.5	25.1	25.6	4.5		4.2	4.3	5.0	4.5	+21.1	
	918	912	910	901				2448	2462	2463			
	~~2541~~							6120	6155	6158			
	2295	2280	2271	2252				21.75	21.25				

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1880phae.proj.1837R

2 = 75 - 90

0 1	10.5	10.5	10.5	505	0 0 5 2 5	+20.0
	21.2	21.5	21.4	2.5	2.4 2.6	+18.9
	40.5	40.6	40.6	22.1	22.0 22.2	+18.5
	28.2	28.8	28.5	7.3	7.5 7.1	+21.2
	100.4	101.6			28.4 28.4	
	25.10	25.40			6582 6560	
					19.80	
					19.24 19.54	

~~1111~~

21.82	+1.16	+1.16
20.46	-.20	+.86
20.24	-.42	+.54
20.54	-.11	+.43
21.50	+.84	+1.27
19.41	-1.25	+.02
20.66		

.03
20.9
.31
1.1

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1880phae.proj.1837R

18

May 19 1881

Investigation of the curve
degrees from $z = 249$ to 285
Sun 40m Att. $M = 49.8$

$z = 270 - 285$

										Mean
0	1	24	19	29	2.4	40.6	0	0	409 404 404	+21.8 21.2 +21.5
		5.9	6.9	6.5	6.1	44.1			44.3 44.0 44.0	22.0 22.3 +22.2
		18.6	19.0	19.2	18.9	58.1			58.2 58.0 58.0	20.8 20.9 +20.8
		10.4	11.2	11.5	11.2	49.5			49.8 49.2 49.5	21.7 21.8 +21.8
		377	381	401					1932 1916 1929	
		942	952	1002					48.30 4790 48.2	
									21.12 21.62 21.80	
									21.51	454

End. Series I

~~R = 0 — 1~~

0	1	9.0	8.6	8.4	8.7	47.5	0	0	473 473 479	+21.2
		13.8	13.8	14.0	13.9	57.6			57.1 57.4 57.2	+22.3
		25.1	24.9	24.8	24.9	4.0			4.0 3.8 4.1	+20.9
		18.0	18.0	18.5	18.2	56.4			56.0 55.9 57.3	+21.8
		659	653	657					2184 2224 2215	
		1648	1632	1642					5460 5560 5538	
									~~5460 2088 2072 2104~~	
									60	
									2188 2072 2104	
										364
										20.91
										21.51
										243
										21.21

End $2^h 45^m$ Att $M = 50.2$

For second Series suppose 102

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1880phae.proj.1837R

$z = 270° - 271°$

0	102.5	82		
	64	135		
	18.4	295		
	11.2	180		
	385	756		
	962	1851		

			I	II
0	9	09	7.2	+1.6 +1.0
		5.1	11.9	+1.3 +1.6
		17.2	25.0	+1.2 +0.9
		10.2	17.1	+1.0 +0.9
		33.4	61.2	
		83.5	153.0	
		+1.32		

$z = 271 - 272$

0	1	06	6.9	
		4.9	12.0	
		17.4	25.0	
		10.0	17.2	
		38.3	61.1	
		63.2	152.8	

			I	II
0	0	59.0	5.8	+1.6 +1.1
		3.0	10.1	+1.9 +1.9
		16.8	23.8	+1.0 +1.2
		8.6	16.0	+1.4 +1.2
		28.4	55.7	
		66.0	139.5	
		+1.72	1.33	

$z = 272 - 273$

0	7	8.1	10.9	
		13.3	16.1	
		25.9	29.4	
		18.4	21.0	
		65.7	77.4	
		164.2	193.5	

			I	II
0	0	7.6	9.9	+0.5 +1.0
		12.0	14.0	+1.3 +2.1
		24.6	27.8	+1.3 +1.6
		16.6	18.9	+1.8 +2.1
		60.8	70.6	
		152.0	176.5	
		+1.22	+1.70	

$z = 273 - 274$

0	1	7.4	10.4	
		12.1	14.7	
		24.8	28.7	
		16.9	19.8	
		61.2	73.6	
		153.0	184.0	

			I	II
0	1	6.5	9.6	+0.9 +0.8
		8.9	12.4	+3.2 +2.3
		22.9	26.5	+1.9 +2.2
		14.9	18.0	+2.0 +1.8
		53.3	66.5	
		133.2	×1.58 166.2	+1.78

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1880phae.proj.1837R

Z = 274-75

			I	II
0	1	8.5 9.0		
		11.9 12.0		
		24.8 26.4		
		17.0 18.0		
		622 654		
		1550 1635		
0	1	6.4 7.8	+2.1	+1.2
		10.9 11.3	+1.0	+0.7
		22.9 25.0	+1.9	+1.4
		15.2 16.1	+1.8	+1.9
		554 602		
		1385 1505		
		1165 1.30		

2 = 275-76

0	1	9.0 6.4		
		13.8 10.2		
		25.1 22.2		
		17.9 14.4		
		658 532		
		1645 1330		
0	1	E2 5.1	+0.8	+1.3
		11.9 8.1	+1.9	+2.1
		23.2 21.3	+1.9	+0.9
		15.9 12.9	+2.0	+1.5
		592 474		
		1480 1185		
		+1.65 +1.45		

2 276-277

0	1	6.0 7.0		
		12.3 15.3		
		23.6 23.3		
		16.0 15.4		
		599 560		
		1498 1400		
0	1	X6.6 5.3	+1.4	+1.4
		9.6 8.7	+2.7	+1.6
		22.0 21.9	+1.6	+1.4
		14.8 13.6	+1.2	+1.8
		530 495		
		1325 1238		
		+1.73 +1.62		

2 = 277-278

2

0	1	11.9 8.5		
		15.2 11.0		
		29.5 24.8		
		20.4 16.7		
		750 610		
		1875 1525		
		10.1 6.9	+1.8	+1.6
		14.9 10.2	+0.3	+0.8
		26.3 23.6	+1.2	+1.2
		19.3 15.5	+1.1	+1.2
		706 562		
		1765 1405		
		610 1.24		

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1880phae.proj.1837R

λ = 278–279

			I	II
0	1	79	69	
		121	103	
		240	241	
		181	161	
		611	594	
		1528	1435	
0	1	61	52	+1.8 +1.7
		101	88	+2.0 +1.5
		219	220	+2.1 +2.1
		160	150	+1.1 +1.4
		541	570	
		1352	1275	
		1.78	+1.60	

λ = 279–280

0	1	75	108	
		122	135	
		234	269	
		175	203	
		606	715	
		1515	1788	
0	1	59	81	+1.6 +2.7
		96	115	+2.4 +2.0
		219	247	+1.5 +2.2
		157	175	+1.8 +2.8
		533	615	
		1332	1540	
		1.83	43	

λ = 280–281

0	1	101	79	
		144	117	
		256	240	
		201	172	
		802	608	
		~~1285~~	1520	
		1.755		
0	1	84	68	+1.7 +1.1
		124	97	+2.0 +2.0
		251	235	+0.5 +0.5
		174	153	+2.7 +1.9
		638	553	
		1582	1382	
		1.793	1.38	

λ = 281–282

0	1	87	61	
		121	96	
		252	238	
		169	145	
		629	540	
		1572	1350	
0	1	60	46	+2.7 +1.5
		103	75	+1.8 +2.1
		233	222	+1.9 +1.6
		150	129	+1.9 +1.6
		546	572	
		1365	1430	
		2.07		

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1880phae.proj.1837R

2 = 282 - 283

0	1	6.1	11.2	5.0	10.5	+1.1	+0.7
		10.5	15.0	9.2	14.4	+1.3	+0.6
		23.0	29.2	21.8	28.1	+1.2	+1.1
		15.3	20.9	13.2	19.0	+2.1	+1.9
		54.9	76.3	49.2	72.0		
		137.2	190.7	123.0	182.0		
				+1.4	11.07		

2 = 283 - 284

0	1	9.7	10.9	8.0	9.3	+1.4	+1.6
		14.1	14.1	13.8	13.8	+0.3	+0.3
		26.6	28.0	25.0	27.6	+1.6	+0.4
		18.0	19.1	17.0	18.5	+1.0	+0.6
		68.4	72.1	63.8	69.2		
		171.0	180.2	159.5	173.0		
				1.15	0.72		

2 = 285 - 286

0	1	8.1	9.2	10.0	9.7	9.6	7.1	8.1	8.2	7.9	8.2	+1.0	+1.5
		13.4	14.0	13.9	14.1	14.0	11.8	12.1	11.9	12.1	12.2	+1.6	+1.9
		35.1	27.9	27.8	28.1	27.9	26.0	26.2	26.0	26.0	26.5	+1.1	+1.7
		19.0	18.2	19.0	19.1	18.8	15.7	17.7	17.9	17.8	17.5	+1.3	+1.1
		73.6	69.3	70.7	71.0		68.6		64.0	63.8	64.4		
		184.0	173.2	176.8	177.5		171.5		160.0	159.5	161.0		
							1.25		1.32	1.23	1.65		

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Recapitulation for Series I & II

Series I

1.37	+20	+.20	+.20
1.72	-.16	+.04	+.04
1.22	+36	+.40	+.40
1.98	+.41	+.99	-.01
1.65	-.07	+.92	-.08
1.65	-.08	+.84	+.16
1.73	-.16	+.68	-.32
1.10	+.48	+1.16	+.16
1.73	-.16	+1.00	+.00
1.83	-.25	+.75	-.25
1.73	-.16	+.59	-.41
2.07	-.49	+.10	-.90
1.42	+.15	+.25	-.75
1.15	+.42		-.33
1.25	+.33		+.00
1.573			

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1880phae.proj.1837R

May 15/19 June 4h 0 Att M, 51.0°

0	1	8.2	8.5	8.4	480	0 0	48.1 47.9	+20.4
		12.5	13.3	12.9	52.0		51.5 52.0	+20.9
		25.5	25.1	25.3	4.2		4.2 4.7	+21.1
		17.8	18.2	18.0	56.6		56.4 56.4	+21.4
		6.40	6.51				24.2 24.06	
		16.00	16.28				55.30 55.15	
							20.70 21.13	

Mid June 4.55 Att M = 51.1° 20.91

0	1	11.1	11.4	11.2	51.0	0 0	51.0 51.1	+20.2
		15.9	16.5	16.2	54.4		54.6 54.3	+21.8
		29.0	28.8	28.9	8.5		8.2 8.5	+20.4
		21.0	20.7	20.8	0.2		0.0 0.3	+20.6
		7.90	7.94				23.38 23.42	
		19.25	19.35				58.45 58.58	
							20.80 20.80	
							20.80	

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1880phae.proj.1837R

Aug 19

2=279-280

0 1 8.2
13.8
8.9
180
796
1890

2=270 to 285

22 obs

0 1 7.2
11.9
2.0
14.1

Att M = 51.2

0 1 41 39 4.0 42.9
7.8 8.2 8.0 46.2
21.9 21.6 21.8 1.1
13.3 14.0 13.6 52.8
47.1 47.7
11.78 11.92
2=285-290

0 0 43.0 [illegible] +21.1
46.1 46.3 +21.8
1.2 1.0 +20.7
52.9 52.8 +20.8
2032 2029
5080 5072
20.95 21.00
20.99

2=285-290

0 1 7.1 7.1 7.1 7.2 7.5 7.2 45.8 0
11.8 11.4 11.7 11.6 11.7 11.6 48.9 0
26.0 26.0 26.2 26.5 26.7 26.3 6.4
17.2 17.0 17.4 17.1 17.1 17.2 58.9
621 615 624 624 630
1552 1538 1560 1560 1575
Aug 23 15 51.7
0 1 11.6 11.3 11.4 49.8
15.1 14.9 15.0 52.7
30.0 29.9 30.0 9.8
21.2 21.1 21.2 2.6
74.9 74.8 77.2
1930

0 0 45.9 45.3 46.1 46.1 +21.4
49.0 48.6 48.9 49.2 +22.7
6.0 5.8 6.8 6.8 +19.9
58.9 59.2 58.9 58.0 +18.3
2198 2189 2207 2205
5495 5472 5516 5512
2057 2066 2042 2053
2055
0 0 [illegible] 49.9 49.8 +21.6
[illegible] 52.5 52.9 +22.3
[illegible] 9.6 9.9 +20.2
[illegible] 2.8 2.4 +18.6
2348 2350
58.70 58.75
20.70 20.55
20.63

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1880phae.proj.1837R

z 285-286

	I	II			I	II	
0 1	7.3	13.0	13.1	13.0	5.9	11.2	11.20	11.2	+1.4	+1.8
	11.6	16.4	16.7	16.6	9.7	15.2	15.0	15.1	+1.9	+1.5
	26.6	31.9	32.3	32.1	24.8	30.9	30.9	30.9	+1.8	+1.2
	17.1	22.5	23.0	22.8	15.5	21.3	21.6	21.4	+1.6	+1.4
	626	83.8	85.1		559	786	788			
	1565	2095	2128		1398	1965	1970			
					+1.67	+1.80	+1.58			
						+1.44				

z 286-287

	I	II			I	II
0 1	10.2	6.1		0 1	9.0	5.1	+1.2	+1.0
	14.1	9.9			12.2	8.1	+1.9	+1.8
	25.9	25.1			27.5	23.8	+1.7	+1.3
	20.6	16.6			19.0	15.6	+1.6	+1.0
	741	577			677	526		
	1852	1442			1692	1315		
					+1.60	+1.27		

z = 287-288

	I	II			I	II
0 1	8.8	4.9	4.9	4.9	0 1	7.4	3.7	3.8	3.8	+1.4	+1.1
	11.9	8.5	8.1	8.3		11.2	7.9	7.8	7.8	+0.7	+0.5
	28.0	23.7	23.5	23.6		26.8	23.1	23.3	23.2	+1.2	+0.4
	19.0	15.1	15.0	15.0		17.3	14.2	13.9	14.0	+1.4	+1.0
	677	522	515			620	489	488			
	1692	1305	1288			1558	1222	1220			
							+0.83	+0.68			
					+1.14						

z = 289-290

	I	II				I	II
0 1	7.3	7.9	7.0	6.8	6.9	0	10.64	6.2	6.3	6.1	6.2	+0.9	+0.7
	11.1	11.8	11.0	11.1	10.1		10.8	9.9	10.0	10.2	10.1	+0.3	0.0
	26.8	26.5	26.2	26.1	26.2		26.0	25.6	25.8	26.0		+0.8	+0.3
	17.6	18.1	17.4	17.0	17.2		15.3	16.1	16.2	15.9	16.0	+2.5	+1.2
	630	643	618	610			585	578	583	582			
	1575	1608	1505	1540	1525		1462	1471	1458	1455			
							+1.13	0.92	+0.82	+1.01			

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2 = 290-291

								I	II
0	1	5.9	5.8	5.9	5.8	0	1	4.4	3.9	3.8	3.8	+1.5	+2.0
		9.8	9.4	9.5	9.4			7.7	7.3	7.8	7.6	+2.1	+1.8
		25.3	25.4	25.3	25.4			24.1	23.9	23.9	23.9	+1.2	+1.5
		15.2	15.5	15.5	15.5			13.2	12.8	13.0	12.9	+2.0	+2.6
		56.2	56.1	56.2				49.4	47.9	48.5			
		~~35.5~~						123.5	119.8	121.2			
		140.5	140.5	140.5				1.70	2.07	1.93			
										+2.00			
								9.8	3.5	3.4		+1.1	+1.7
								13.9	7.7	6.5		+1.1	+1.5
								29.9	23.2	23.5		+1.2	+1.6
								19.5	12.9	13.0		+0.5	+1.0
								73.1	47.3	47.4			
								182.8	118.5	118.5			
								0.97	1.43	1.45			

2 = 291-292

0	1	10.9	5.7	5.7									
		15.0	9.0	9.1									
		31.1	25.0	25.0									
		20.0	14.0	14.0									
		97.0	53.1	53.2									
		192.5	132.6	133.0									

3 = 292-293

0	1	7.4	5.3										
		11.1	9.0										
		27.1	25.7										
		16.8	14.9										
		62.4	54.9										
		156.0	137.2										

2 = 293-294

0	1	10.6	3.0										
		14.0	6.4										
		31.1	23.0										
		22.3	14.8										
		78.0	57.2										
		195.0	143.0										

0	1	6.1	2.9										
		9.4	6.4										
		26.3	23.0										
		17.8	14.5										
		59.6	46.8										
		149.0	117.0										
		0.70	1.02										
		10.2	1.8										
		12.9	4.9										
		29.4	21.7										
		22.1	14.5										
		74.6	52.9										
		186.1	132.2										
		+0.85	+4.08										

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Z = 294 - 295

0	1	10	9.4	10.3	10.6	10.4			
		13	12.8	14.0	14.8	14.4			
		29	29.0	30.3	31.6	31.4			
		22	22.0	23.4	23.7	23.6			
			7.32	7.80	8.07				
			18.30	19.52	20.18				

			I	II		
0	1	7.9	10.2	9.6	9.8	+1.5 +0.6
		10.8	12.8	12.8	12.8	+2.0 +1.6
		28.0	29.8	30.3	30.0	+1.0 +1.4
		20	21.9	22.0	22.0	+1.9 +1.6
		6.66	7.45	7.47		
		16.80	18.6	18.65		
		+1.60	85	1.53		

Z = 295 - 296

0	1	7.9	8.0						
		10.9	11.3						
		28.0	28.5						
		21.0	21.0						
		6.66	6.88						
		16.70	17.20						

			I	II		
0	1	6.2	6.1	+1.7	+1.9	
		9.3	10.2	+1.6	+1.1	
		26.7	27.0	+1.3	+1.5	
		19.0	19.9	+1.0	+1.1	
		6.12	6.32			
		15.30	15.80			
		+1.40	+1.40			

Z = 296 - 297 ~~6.7~~

#		5.85	6.2	6.0	6.1				
#		9.1	9.8	9.4	9.6				
		25.9	26.5	26.7	26.6				
		18.8	19.6	19.8	19.7				
		~~5.83~~	6.21	5.19					
		~~1.506~~	1.552	1.548					
		14.82							

			I			
		4.0	4.7	4.8	4.8	+1.5 +1.3
		7.2	8.0	8.2	8.1	+1.9 +1.5
		23.8	24.7	25.0	24.8	+2.1 +1.8
		16.9	18.2	18.6	18.4	+1.9 +1.3
		5.19	5.56	5.41		
		1.295	1.390	1.365		
		1.87	1.62	1.83		

Z = 297 - 298

		8.0	6.7						
		11.4	10.9						
		27.8	26.1						
		21.5	19.5						
		6.87	6.23						
		17.18	15.58						

			I	II		
		6.0	4.5	+2.0	+2.2	
		9.2	8.0	+2.2	+2.0	
		26.4	25.0	+1.4	+1.1	
		19.1	17.9	+2.4	+1.6	
		6.07	5.54			
		15.18	13.85			
		+2.00	+1.73			

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297-298

				I	II
6	10.0	5.9	9.4	4.9	+1.6 +1.0
	14.0	10.1	12.9	8.9	+1.1 +1.2
	30.9	26.5	30.0	26.0	+0.9 +0.5
	24.0	19.5	23.1	19.2	+0.9 +0.3
	7.99	6.20	7.54	5.90	
	19.98	15.50	18.85	14.75	
			+1.13	+0.75	

3 = 296-299

	9.0	6.6	6.2 6.4	7.6	5.3 5.2 5.2	+1.4 +1.2
	12.9	10.5	10.5 10.5	11.4	8.6 8.6 8.7	+1.5 +1.8
	30.0	27.5	27.5 27.5	29.5	26.1 26.0 26.0	+0.5 +1.5
	23.5	20.8	20.8 20.8	22.0	19.0 19.0 19.0	+1.5 +1.8
	7.54	6.54	6.50	7.05	5.90 5.91	
	18.85	16.35	16.05	17.62	14.78 14.88	
				1.20	1.57 1.27	
					1.42	

2 = 299-300

	8.1	16.8	16.8 16.8	7.1	16.3 16.1 16.2	+1.0 +0.6
	11.4	20.0	20.3 20.2	10.4	20.0 19.9 20.0	+1.0 +0.2
	28.9	37.7	38.0 37.8	27.7	37.1 37.2 37.2	+1.2 +0.6
	21.8	30.4	30.8 30.8	20.4	30.5 30.0 30.2	+1.4 +0.6
	7.02	10.58	10.59	6.56	10.39 10.32	
	17.50	26.48	26.48	16.40	25.98 25.80	
		26.32		+1.15	0.84 +.68	
					+.52	

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Aug 20. $1^h\ 0^m$ Mt Hamilton

$z = 270 - 285$

0 1	8.9	9.0	8.9	8.9	47.4	0 0	47.3	47.3	47.6	+21.5
	13.9	13.8	13.6	13.8	51.5		51.3	51.4	51.9	+22.3
	28.1	28.1	28.2	28.1	7.4		7.6	7.5	7.2	+20.7
	19.2	19.3	20.0	19.5	57.7		57.9	57.3	57.8	+21.8
	701	702	707				2241	2235	2245	
	1782	1785	1768				5602	5585	5612	
							21.50	21.70	21.56	
								21.62	52.2	
								20.99	57.2	
								2131		

Begins $1^h\ 10^m$

$z = 285 - 300$

0 1	11.7	11.8	12.3	11.9	50.9	0 0	51.8	50.8	50.9	51.0	+21.0
	15.9	15.8	16.2	16.0	54.0		54.5	54.1	54.0	53.8	+22.0
	31.4	31.0	31.7	31.4	11.8		11.8	11.7	11.9	11.9	+19.6
	22.0	21.8	22.2	22.0	4.0		4.1	4.1	3.8	4.0	+18.0
	810	804	824				2407	2406	2407		
	2025	2010	2064				6018	6015	6018		
							20.07	19.95	20.53		

End $3^h\ 40^m$ -3.3°

0 1	7.3	7.1	6.8	7.0	47.0	0 0	47.0	47.1	47.0	47.1	+20.0
	11.5	11.5	11.4	11.6	50.1		50.3	50.4	49.5	49.7	+21.4
	26.5	26.4	26.2	26.4	8.0		7.9	8.2	7.9	7.9	+18.3
	17.4	17.2	19.5	17.4	0.6		0.6	0.5	17.2	0.8	+16.9
	627	640	622	624			2258	2262	2252		
	15681	5550	5550	5560			5645	5655	5630	5642	
							1905	1905	1908	1908	

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Clouds and evening temperature
June May 12

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May 22 22h 20m 44s 57.

2 = 270 - 285

0 1 59 57 70
110 104 115
294 291 300
188 183 198
657 635 684
1628 1588 1710

0 1 469 466 474
510 511 521
103 105 109
593 591 592
2275 2273 2296
5685 5682 5740
1690 1906 1970
1943

300-Bit

2.

0 1 28 31 124 126 124 12.5
6.1 6.3 16.0 16.0 16.5 16.2
284 279 378 377 375 377
1911 980 277 283 280
942 940 947
235 235 236.5

5240 0525 523 523 +20.1
551 549 552 552 +21.1
184 182 187 183 +19.3
95 100 94 92 +18.5
2536 2186 2550
6390 6390 6375
1965 1960 1993

0 1 87 81 8.4
121 120 12.0
335 331 33.3
235 232 23.4
976 764
1945 1910

480 481 478 +20.4
506 508 505 +21.4
138 136 140 +19.5
53 55 51
2380 2374 +18.1
5950 5935
1955 1976

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1880phae.proj.1837R

May 22/23 May 23/24

300 301
$\lambda = 311 - 16$

				I	II	
0	1	12.3	11.4	11.6	10.1	+0.7 +1.3
		16.0	16.4	14.4	15.1	+1.6 +1.3
		37.3	38.0	36.3	37.1	+1.0 +0.9
		28.1	28.2	26.8	26.9	+1.3 +1.5
		93.7	94.0	89.1	89.0	
		234.2	231.2	222.8	222.5	
				1.14	1.25	

301 302
$\lambda = 316 - 17$

11.0	8.9	10.4	8.5	+0.6 +0.4
14.2	13.3	13.1	12.6	+1.1 +0.7
36.2	35.5	34.9	34.0	+1.3 +1.5
26.6	25.1	25.0	23.9	+1.6 +1.2
88.0	82.8	83.4	77.0	
220.0	207.0	208.5	199.5	
		1.15	1.45	

302 303
$\lambda = 317 - 18$

9.8	8.3	7.3	6.0	+2.5 +2.3
12.0	12.3	10.8	10.8	+1.2 +1.5
34.0	34.9	33.8	33.0	+1.0 +1.0
24.1	23.4	22.5	22.0	+1.6 +1.4
79.9	78.0	70.6	71.8	
195.8	195.0	176.1	179.5	
		1.38	1.55	

303 304
$\lambda = 318 - 19$

7.0	5.6	5.9	4.3	+1.1 +1.3
10.1	10.4	9.1	9.1	+1.0 +1.3
32.2	33.0	30.9	31.5	+1.3 +1.5
22.0	20.6	21.4	21.4	+0.6 −0.8
71.3	69.6	67.3	66.3	
178.2	174.5	168.2	165.8	
		1.00	0.87	

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1880phae.proj.1837R

112 May 22/23 May 23/24

2 = 319–20 (304–305)

0 /	5.1	4.5	4.1 4.3	0 /	3.5	3.8	4.0 3.9	+1.6 +0.4
	8.2	9.0	9.2 9.1		6.1	7.8	7.9 7.8	+2.1 +1.3
	30.5	31.2	30.9 31.0		29.0	30.9	30.0	+1.8 +0.6
	20.8	20.9	20.8 20.8		19.7	20.4	20.8 20.6 (304)	+1.1 +0.2
	649	656	650		583	629	627	
	1622	~~1912~~ 1640	1622		1458	1572	1568	
					1.64	0.68	0.54	

2 = 320–21 (305–306)

	3.8	3.7		2.5	2.5 +1.3 +1.2
	5.9	7.5		4.8	6.1 +1.1 +1.4
	29.0	30.0		28.0	30.0 +1.0 +0.0
	19.3	20.2		17.9	19.1 +1.4 +1.1
	580	614		532	577
	1450	1535		1330	1442
				1.20	0.93

2 = 321–22 (306–307)

	2.9	2.2		23	
	5.3	5.9		4.5	~~4.2~~ 1.3 +0.6 +0.9
	28.7	29.3		28.3	5.0 +0.9 +0.9
	17.9	18.6		17.2	29.0 +0.4 +0.3
	548	560		523	574
	1370	1400		1308	527
				0.62	1318
					0.82

2 = 322–23 (307–308)

	1.5	3.4		0.6	2.6 +0.9 +0.8
	3.8	7.7		3.4	6.8 +0.4 +0.9
	27.6	31.1		26.7	30.6 +0.9 +0.5
	16.1	20.1		15.1	18.2 +1.0 +1.9
	490	623		458	582
	~~1476~~ 1225	1558		~~1145~~ 1145	1455
					1.03

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2 = 323 – 24 (308 – 304)

0,188	2.5⁻	7.9	1.9	+0.9 +0.6
11.4	6.6	10.3	5.1	+1.1 +1.5
34.8	30.9	33.8	28.9	+1.0 +1.1
23.0	18.4	22.4	17.3	+0.6 +1.1
78.3	55.5⁻	74.4	53.2	
1958	1438	1860	1330	
		0.98	1.08	

3 = 324 – 25 (309 – 310)

7.3	6.2	6.1	5.4	+1.2 +0.8
9.1	10.1	8.1	9.1	+1.0 +1.0
32.7	33.2	31.0	30.2	+1.7 +3.0
20.4	20.9	21.1	21.1	-0.7 -0.2
69.5	70.4	66.3	65.8	
1738	1760	1658	1645⁻	
		0.80	1.15	

3 = 325 – 26 (310 – 311)

5.7	5.4	5.3	5.0	+0.4 +0.4
7.8	9.0	7.0	8.2	+0.8 +0.8
31.1	32.6	29.9	31.5⁻	+1.2 +1.1
20.2	21.3	20.2	21.8	0.0 -0.5
62.6	68.3	62.4	66.5⁻	
~~1520~~	1708	1560	1662	
16.20		0.60	0.45	

3 = 326 – 7 (311 – 312)

3.9	5.2⁻	3.0	4.3	+0.9 +0.9
5.7	8.8	4.1	7.2	+1.6 +1.6
28.6	31.8	27.4	30.5⁻	+1.2 +1.3
18.6	22.0	17.5⁻	21.0	+1.1 +1.0
56.8	67.8	52.0	63.0	
1420	1695	1300	1575⁻	
		1.20	1.20	

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		May 22/23	May 23/24				
7 =		313	313				
0	1	33	29	0	1	1.6	1.8	+1.7	+1.1
		4.6	6.0			3.8	5.3	+0.8	+0.7
		27.8	29.1			26.5	27.6	+1.3	+1.5
		18.1	19.7			18.3	19.4	-0.2	+0.3
		538	577			50.2	54.1		
		1348	1442			125.5	135.2		
						0.93	0.90		
313 - 314									
32 8 - 9									
		12.1	7.8			10.6	6.5	+1.5	+0.8
		14.4	11.5			13.5	10.7	+0.9	+0.8
		36.8	33.6			35.6	33.1	+1.0	+0.5
		28.0	25.2			27.6	25.0	+0.4	+0.2
		913	776			875	853		
		2282	1940			2185	1882		
						0.97	0.88		
314 - 315									
32 9 - 30									
		11.0	6.8	7.1 7.0		9.5	5.9	6.1 6.0	+1.5	+1.0
		13.5	11.3	11.2 11.2		11.9	10.3	10.7 10.5	+1.6	+0.7
		35.3	33.6	33.7 33.6		34.3	33.3	33.1 33.2	+1.0	+0.4
		27.2	25.3	25.3 25.3		25.9	24.1	24.5 24.3	+1.3	+1.0
		870	770	773		816	736	744		
		2175	1925	1932		2040	1840	1860		
						1.35	0.85	0.72		

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May 23/24 ST = 22h 25m Lat N = 59.3

h = 300 – 315

0	1	11.4	11.0	11.4	11.4	11.3	51.1	0	0	50.9	51.3	51.1	51.1	+20.2
		16.4	16.4	16.2	16.4	16.4	55.0			54.9	54.8	55.2	55.7	+21.4
		38.0	38.1	38.4	38.4	38.2	18.6			18.6	18.0	18.8	19.0	+19.6
		28.2	28.1	27.5	28.0	28.0	9.3			9.5	9.6	8.7	9.5	+18.7
		944	946	935	942					2539	2538	2538	2546	
		2360	2365	2338	2355					6348	6342	6345	6366	
										20.12	20.23	19.9	19.90	

h
May 23 30m Lat N = 59.7

0	1	3.1	2.5	2.2	2.7	3.0	43.2	0	0	43.4	43.5	43.1	43.0	
		7.0	7.3	7.3	7.9	7.7	47.0			47.2	47.3	46.8	47.1	
		29.9	29.3	29.0	29.7	29.5	10.1			10.2	10.4	10.0	10.2	
		20.0	19.1	19.2	19.9	19.7	1.5			1.8	2.7	1.1	1.6	
		610	581	577	602					2226	2262	2210	2219	
		15.22	15.21	19.42	15.05					5565	5580	5022	5048	
										19.57	19.80	19.12	19.57	

E. +19.8
F. +20.7
G. +19.4
H. 18.2

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1880phae.proj.1837R

May 24 (881 G.T. 2h 38m 59s

$\lambda_2 = 3$ ~~62 - 24~~ 38

0	1	12.5	11.0	11.0	10.7	10.9	10.7	10.9	0	57.5	57.5	57.4	57.4	+19.5
		15.6	15.6	15.7	15.7	15.4	15.6	15.6	51.4	54.9	54.9	55.1	55.1	+20.8
		~~39.5~~	39.1	39.0	38.5	38.7	~~38.5~~	38.8	54.8	20.2	19.8	20.0	20.0	+18.8
		30.0	29.3	29.7	29.6	29.8	~~28.4~~	29.6	20.0	11.1	10.7	10.8	10.9	+18.7
		9.7	9.5.0	9.5.4	9.4.5	9.4.8			10.9	25.7	25.70	25.73	25.74	
		~~24.28~~	23.95	23.85	23.62	23.70				64.42	64.25	64.32	64.35	
										19.33	19.60	19.30	19.35	
													15.8	

1939

Dark 22h 30m m = 59.9

0	1	9.4	9.6	9.7	9.5	9.6	50.8	50.9	50.7	50.9	50.6	+18.8
		14.2	14.2	14.1	14.1	14.2	54.1	54.2	54.1	54.0	54.0	+20.1
		36.8	37.0	37.0	37.2	37.0	19.0	19.0	19.0	19.2	18.6	+18.0
		28.2	28.0	27.9	28.0	28.0	9.9	9.6	10.0	10.0	9.9	+18.1
		8.8.6	8.8.8	8.8.7	8.8.8			25.37	25.36	25.41	25.31	
		~~22.15~~	22.20	22.18	22.20			63.42	~~58.45~~	63.52	63.48	
								~~21.24~~	63.45			
								18.73	18.75	18.66	18.92	
											18.77	

1877

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May 23

3 1/5 = 16, May 24

3 = ~~330~~ 3

01	~~108~~	~~96~~ 75	9.6	7.2	+1.1 +0.3
	155	~~79~~ 114	14.1	11.3	+1.4 +1.1
	388	~~34~~ 37.0	35.0	35.9	+1.8 +1.1
	296	270	28.4	26.9	+1.2 +0.1
	946	839	89.1	81.3	
	236	2098	22.28	2032	
			1.37	*0.66	

	9.8	7.9	9.5	7.0	+0.4 +0.9
	14.3	11.4	13.9	12.0	+0.4 −0.6
	37.1	36.5	36.2	35.5	+0.9 +1.0
	28.5	26.9	26.9	25.3	+1.6 +1.6
	89.6	82.7	86.5	79.8	
	22.45	20.68	21.62	19.95	
			0.83	0.73	

	9.5	7.7	8.5	6.3	+1.0 +1.4
	14.1	12.1	13.8	11.8	+0.3 +0.3
	36.5	36.0	34.7	34.5	+1.8 +1.5
	28.0	26.3	27.0	25.7	+1.0 +0.6
	88.6	82.1	84.0	78.3	
	22.02	20.52	21.02	19.58	
			1.02	0.94	

	8.4	6.6	7.0	5.5	+1.4 +1.1
	13.4	11.6	12.9	10.5	+0.5 +1.1
	34.4	34.8	33.5	34.0	+0.9 +0.8
	26.1	26.2	26.0	25.6	+0.1 +0.6
	82.3	79.2	79.4	75.6	
	20.58	19.80	19.85	18.90	
			0.73	0.90	

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1880phae.proj.1837R

1182 = May 24 May 24

7.7	6.7
13.3	10.8
34.1	34.0
27.0	25.8
821	763
2052	1908

6.5⁻	4.9	+1.2	+0.8
12.1	10.0	+1.2	+0.8
33.1	32.9	+1.0	+1.1
26.6	25.3	+0.4	+0.5
783	731		
1958	1828		
0.94	0.80		

7.2	6.0	4.9	4.9	4.9
12.3	10.2	10.1	10.0	10.1
34.0	33.1	33.1	33.2	33.1
27.1	25.7	25.6	25.3	25.5⁻
806	740	737	736	
~~1765~~	1850	1842	1835	
2015				

7.41	5.1	5.1	5.1	−0.2 −0.2
11.9	9.4	9.7	9.6	+0.4 +0.5
32.2	32.4	32.2	32.3	+1.8 +0.8
26.5⁻	25.4	25.8	25.9	+0.6 −0.4
780	713	728		
1950	1782	1820		
760	0.680	0.22	0.15⁻	

8.4	5.2
13.3	9.5
33.9	32.0
27.9	25.3
835⁻	720
2058	1800

8.0	4.8	~~3.8~~ +0.4	+0.4
12.5⁻	8.7	+0.8	+0.8
32.9	31.8	+1.0	+0.2
27.5⁻	25.4	+0.4	−0.1
809	707		
2022	1768		
+0.66	+0.32		

8.0	4.7	6.7	3.8	+1.3 +0.9
12.1	8.3	11.9	8.4	+0.2 −0.1
32.9	31.4	32.2	31.1	+0.7 +0.3
27.5⁻	25.0	26.2	25.0	+1.3 +0.0
805⁻	694	770	683	
2012	1785⁻		1708	
		1925⁻	0.27	
		0.87		

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z = May 24 May 24

0 1	7.4	3.8		
	12.6	8.2		
	33.0	30.9		
	27.9	24.8		
	80.9	67.7		
	202.2	169.2		
			6.4	2.9 +1.0 +0.9
			11.4	7.2 +1.2 +1.0
			32.5	30.8 +0.5 +0.1
			26.9	24.1 +1.0 +0.7
			77.2	65.0
			193.0	162.5
			.92	0.67

6				
	6.9	2.8		
	11.7	7.2		
	33.1	30.1		
	27.0	23.8		
	78.7	63.9		
	196.8	159.8		
			5.8	1.1 +1.1 +1.7
			9.9	5.7 +1.8 +1.5
			32.9	29.9 +0.2 +0.2
			25.7	22.8 +1.3 +1.0
			74.3	59.5
			185.8	148.8
			1.10	1.10

	6.0	7.6		
	10.1	10.4		
	32.5	35.7		
	25.9	28.8		
	74.5	83.5		
	186.2	208.8		
			4.6	7.0 +1.4 +0.6
			8.7	10.5 +1.4 +0.9
			32.6	35.5 −0.1 +0.2
			24.6	27.4 +1.3 +1.4
			70.5	80.4
			176.2	201.0
			1.00	.78

	4.9	6.0		
	8.5	9.2		
	32.7	34.6		
	24.8	27.0		
	70.9	76.8		
	177.2	194.0		
			3.8	5.1 +1.1 +0.9
			7.8	8.6 +0.7 +0.6
			32.0	34.6 +0.7 0.0
			23.6	25.7 +1.2 +1.3
			67.2	74.0
			168.0	185.0
			.92	.70

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1880phae.proj.1037R

	May 24				May 24					I	II
1	3.2	5.8	6.0	5.9	3.0	5.1	5.4	5.2	+0.2	+0.7	
	7.6	9.0	9.5	9.2	6.4	8.8	8.9	8.8	+1.2	+0.4	
	32.1	35.1	35.4	35.2	31.0	35.0	34.9	35.0	+1.1	+0.2	
	25.2	26.0	26.3	26.2	21.2	24.9	25.0	25.0	+2.0	+1.2	
	661	759	772		616	738	742				
	1652	1895	1930		1540	1845	1855				
					1.12	0.50	0.75				
							.63				
	2.8	6.1	5.1		2.8	5.3	5.7	5.0	0.0	+0.1	
	7.0	9.0	8.5		5.5	8.1	8.3	8.2	+1.5	+0.6	
	31.0	35.4	35.0		30.2	34.3	34.9	34.6	+0.8	+0.6	
	22.2	25.9	24.9		21.5	24.8	25.1	24.8	+0.7	+0.4	
	630	764	735		600	725	740				
	1575	1905	1838		1520	1812	1850				
		1910			0.75	1.78	.80				
						.98					
							.89				
	2.9	5.0	5.6	5.5	5.5	5.4	2.3	4.2	3.5	4.0	4.8	5.0	+0.6	+1.2
	6.1	7.9	8.0	8.3	8.6	8.2	5.5	7.2	6.9	6.4	7.9	7.8	+0.6	+1.0
	30.7	34.2	34.1	34.3	34.9	34.4	29.9	33.8	33.0	33.0	34.3	34.4	+0.8	+0.6
	21.4	24.0	25.0	25.2	25.3	24.9	21.6	24.4	23.8	24.2	24.9	24.8	−0.2	+0.5
	611	711	727	733	743		593		676	676	719	720		
	1528	1778	1818	1832	1858		1482		1690	1690	1798	1800		
							0.40		.88	1.28	0.34	.58		
										0.55		218		

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1880phae.proj.1837R

May 24 01-22 31

h 31

h 22

Land schulers

h 22 33 55		23 55 55		59.8	59.8	59.8					
			22 41	22 46	22 50	23 3					
0 1 9.4	9.3	7.6	7.9	7.8	7.1		50.2	50.2	48.9	49.5	49.6	48.2
16.3	13.5	12.0	12.3	12.3	11.3		53.9	54.0	53.9	52.6	52.4	51.7
37.0	37.1	35.9	35.9	35.9	34.9		18.5	18.5	17.3	18.0	17.9	16.8
27.5	29.5	26.3	26.5	26.3	25.7		9.7	9.4	7.6	8.0	8.5	6.8
88.7	87.8	81.8	82.6	82.3	79.0		25.23	25.25	24.57	24.81	24.84	24.35
220.5	219.6	204.5	206.5	205.8	197.5		63.08	63.12	61.42	62.02	62.10	60.58
							189.7	188.3	190.3	186.3	184.8	188.7

h 17.2
11.5
30.0
25.7
79.4
198.5

48.2 +21.0
51.4 +20.1
16.5 +18.5
17.5 +18.2
243.6
609.0
189.5

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May 24 1881 8h 6m Att M. 62.2

3 = ~~330-347~~ 315-330

O 1	7.1	6.8	7.1	7.5	7.1	51.6	51.4	51.7	51.9	52.0	+25.5
	~~11.5~~	11.7	11.9	12.2	11.8	54.8	~~54.7~~	54.5	54.9	54.9	+17.0
	36.7	35.9	37.0	37.0	36.6	21.4	21.2	20.9	21.8	21.8	+15.2
	25.8	26.0	26.7	27.0	26.4	11.4	11.1	11.0	11.8	11.7	+15.0
	811	804	~~827~~	837		2584	2576	2604	2604		
	2028	2010	2066	2092		6460	6440	6510	6510		
						15.68	15.70	~~15.98~~	15.82		

End. 4h 10m 63.4

O	1083	8.1	8.2	52.8	52.8	52.7	+15.4	
	12.8	12.4	12.6	55.4	55.0	~~55.8~~	+17.2	
	37.0	37.5	37.2	22.5	22.4	22.6	+14.7	
	27.7	27.3	27.5	12.8	12.9	12.7	+14.7	
	~~855~~ 858	853		2631	2638			
	~~2345~~	2132		6578	6595			
	2145			~~1817~~	~~1463~~			
				15.67	15.37			

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1880phae.proj.1837R

May 25 / 1F1 May 25

3 = ~~3 45 6~~ 330-31

0	1	5.8	~~10.1~~	10.1	0	1	4.7	9.0	+1.1 +1.1
		8.9	~~13.0~~	13.0			7.9	11.8	+1.0 +1.2
		33.7		37.4			32.3	36.0	+1.4 +1.4
		24.1		28.6			23.5	27.9	+0.6 +0.7
		7 25		89.1			6.4.4	8.4.7	
		18.12		22.28			1.0.10	2.1.18	
							1.02	1.10	

3 = ~~4 6 7~~ 31-32

1		4.5	9.0	9.5 9.2			3.1	8.3	8.1 8.2 +1.4 +1.0
		7.5	12.2	12.2 12.2			6.3	11.2	11.2 11.2 +1.5 +1.0
		32.3	35.9	36.0 36.0			31.5	35.9	35.9 35.9 +0.8 +0.1
		23.5	27.6	27.9 27.8			22.2	26.9	26.9 26.9 +1.3 +0.9
		6.8.1	8.4.7	8.5.6			6.3.1	~~8~~ 23	~~8~~ 2.1
		1.7.0.2	2.1.18	2.1.40			1.5.7.8	~~2.3.0.8~~ 20.78	~~2.3.0.4~~ 20.5.2
							1.24	0.60	.88

3 = ~~3 4 6~~ 32.33

		3.3	8.7				2.5	8.0	+0.8 +0.7
		6.5	11.5				5.5	10.1	+1.0 +1.4
		31.7	35.9				30.8	35.0	+0.9 +0.9
		22.4	26.7				20.2	26.0	+2.2 +0.7
		6.3.9	8.2.8				5.9.0	8.9.1	
		1.5.9.8	2.0.7.0				1.4.2.8	1.9.2.6	
							1.20	.92	

3 = ~~3 4 4 9~~ 38-34

		2.4	7.9				2.1	7.8	+0.3 +0.1
		5.7	10.8				4.3	9.8	+1.4 +1.0
		30.9	35.2				30.0	34.1	+0.9 +1.1
		20.1	26.2				21.2	26.5	-1.1 -0.3
		5.9.1	8.0.1				5.7.6	7.8.2	
		1.4.7.8	2.0.0.2				1.9.4.0	1.9.5	
							+.38	+.47	

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1980phae.proj..1637R

May 25 May 25

2 = ~~34-35~~ 34-35

1	7.4	7.2			
	9.8	9.4			
	35.1	33.9			
	26.1	26.0			
	78.4	76.5			
	19.60	19.12			

0 ~~1~~ #69 6.5 +0.5 +0.7
9.8 9.2 0.0 +0.2
34.1 33.1 +1.0 +0.8
25.8 25.0 +0.3 +1.0
76.6 73.8
19.15 18.45
0.45 .67

2 = ~~33-34~~ 35-36

	6.9	6.8			
	10.1	9.4			
	34.9	33.0			
	25.4	25.2			
	77.3	74.4			
	19.32	18.60			
	36-37				
	6.1	5.7	6.1	5.9	5.7
	8.3	8.2	8.8	8.6	8.5
	33.7	32.1	32.1	32.2	32.1
	24.2	24.1	24.1	24.2	24.1
	72.3	69.4	71.1	70.9	
	18.08	17.30	17.78	17.72	
	37-38				
	5.0	4.4	4.4	4.4	
	7.5	7.0	7.8	7.4	
	31.4	30.5	31.0	30.8	
	23.5	23.0	23.0	23.0	
	67.4	64.9	66.2		
	16.85	16.22	16.55		

64 60 +0.5 +0.8
8.7 8.3 +1.4 +1.1
33.3 31.9 +1.6 +1.1
24.3 24.0 +1.1 +1.2
72.7 70.2
18.18 17.55
1.14 1.06

	~~5.8~~	4.4	4.4	4.4	4.3 +0.3 +1.3
	7.9	7.1	7.2	7.3	6.9 +0.4 +1.4
	32.2	30.8	30.8	31.0	30.5 +1.5 +1.3
	24.0	22.5	22.9	22.5	22.8 +0.2 +1.6
	~~67.0~~ 64.8		68.8	65.2	63.9
	17.~~28~~		16.82	16.30	15.98
	.60		~~1.60~~ 1.46	1.42	1.74
	3.4	3.3	3.3	3.3	+1.6 +1.1
	5.4	5.4	5.5	5.3	+2.1 +2.0
	30.9	29.9	29.9	29.9	+0.5 +0.9
	21.3	21.2	21.3	21.1	+2.2 +1.8
	61.0		60.6	~~59.6~~	
	15.25		~~1.50~~	~~1.90~~	
	1.60		1.22	1.40	
				1.15	

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May 25 May 25

3-8-09

0 1	4.5	10.9	8.1	10.3	+1.4	+0.6
	6.3	13.6	6.1	13.0	+1.2	+0.6
	31.0	38.0	31.0	37.7	0.0	+0.3
	21.6	29.0	20.9	28.6	+0.7	+0.5
	63.4	91.5	60.1	89.6		
	158.5	228.8	150.2	223.7		
	8.0-4.0		.83	0.51		
	3.2	10.1	2.4	9.5	+0.8	+0.6
	5.3	12.9	4.9	12.2	+0.4	+0.7
	31.1	37.0	30.1	36.3	+1.0	+0.7
	21.2	28.0	25.3	27.4	+0.9	+0.6
	60.8	88.0	57.7	88.4		
	152.0	220.0	144.2	213.5		
			.78	0.65		
	4.0-4.1					
	2.3	9.0	1.2	8.3	+1.1	+0.7
	5.0	12.4	4.1	11.3	+0.9	+1.1
	30.1	36.5	28.9	35.7	+1.2	+0.8
	20.1	27.4	18.0	25.4	+2.1	+2.0
	54.5	85.3	52.2	80.7		
	14.88	21.35	13.05	20.18		
			1.33	1.17		
	4.2-4.3					
	1.4	8.2	8.1 8.2	3.0	7.2	7.2	+0.4	+1.0
	4.6	11.0	11.4 11.2	4.1	10.3	10.4	+0.5	+0.8
	29.4	35.9	37.0 36.2	29.0	35.1	35.0	+0.4	+1.2
	18.3	25.0	24.9 25.0	17.7	23.9	24.1	+0.6	+1.0
	53.7	80.1	81.0	51.8	76.5	76.7		
	134.2	200.2	202.5	129.5	191.2	191.8		
				0.47	.90	1.07		

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2 42-43

0	1	4.8	6.1	6.1	6.1	3.9	4.9	4.9	4.9 +0.9 +1.2
		7.9	9.0	9.2	9.1	7.0	8.2	8.0	8.1 +0.9 +1.0
		32.9	34.0	33.9	34.0	31.8	32.4	32.0	32.2 +1.1 +1.8
		21.4	22.0	22.4	22.2	20.7	21.5	21.5	21.5 +0.7 +0.7
		67.0	71.1	71.6		63.4	67.0	66.4	
		167.5	177.8	179.0		158.1	167.5	166.0	
						0.90	1.03	1.30	

3 48-49

	3.1	11.1	2.0	10.8	+1.1 +0.3
	5.9	15.1	5.4	13.8	+0.5 +1.3
	30.7	38.5	30.5	38.3	+0.2 +0.2
	19.3	28.1	19.7	27.7	-0.4 +0.4
	59.0	92.8	57.6	90.6	
	147.5	232.0	144.0	226.5	
			3.5	0.55	

344-45

	2.0	9.1	0.9	8.8	+1.1 +0.3
	5.1	13.0	4.5	13.1	+0.6 -0.1
	30.3	38.0	29.5	37.0	+0.8 +1.0
	18.8	27.0	18.1	26.1	+0.7 +0.9
	56.2	89.1	53.0	85.0	
	140.5	217.8	132.5	212.5	
			0.80	1.53	

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1880phae.proj.1837R

May 25 1881 ?

λ = 330 – 345

0	1	6.9	6.5	5.9	5.9	0	0	45.2	45.3	44.5	44.7
		9.7	9.6	8.8	9.0			48.9	49.0	48.5	48.4
		34.7	34.5	34.0	34.0			14.1	14.1	14.0	14.0
		25.7	25.1	24.7	24.5			3.1	3.0	1.9	2.0
		76.4	75.7	73.4				2313	2314	2289	2291
		1910	1892	1835				5782	5785	5724	5724
								2128	2110	2113	

22 35 – 56.2

Mid. June = 2338 + 56.1

λ = 330 – 345

0	1	6.0	6.1	6.4	6.8	6.3	45.2	45.2	45.2	45.4	45.1
		9.1	9.0	9.3	9.1	9.1	49.3	49.3	49.4	49.4	49.1
		33.3	33.0	33.5	33.5	33.3	13.4	13.8	13.3	13.3	13.5
		24.5	24.7	25.1	25.0	24.8	2.8	3.0	3.0	2.9	2.3
		72.9	72.8	74.3	74.4			2308	2309	2310	2300
		1822	1820	1858	1860			5780	5782	5785	5772
								2052	2048	2083	2110

E. +21.1
F. +19.8
G. +19.9
H +22.0

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1880phae.proj.1837R

May 25

$\lambda_1 = 330 - 34$ Time $1^h 33^m$ Att Ht. = 56.4

0'	1	10.0	10.1	10.0	48.9	49.2	48.6 +21.1
		13.0	12.8	12.9	52.7	52.9	52.5 +20.2
		37.0	37.0	37.0	17.4	17.2	17.6 +19.6
		28.2	28.3	28.2	6.0	6.0	6.1 +22.2
		88.2	88.2			225.3	244.8
		22.5	22.5			~~56.2~~ 61.3	61.20
						20.73	20.85

June $2^h 58^m$ 57.1

7.3	7.4	7.4	7.5	7.4	47.7	48.1	47.8	44.4 47.5 +19.7
10.3	10.8	10.3	10.5	10.5	51.5	51.5	51.5	51.6 +19.0
34.4	34.5	34.9	34.6	34.6	15.5	15.5	16.0	16.0 15.9 +18.8
25.3	25.4	25.9	26.0	25.6	5.0	5.1	5.7	4.6 5.0 +20.6
78.3	78.1	78.5	78.6			240.2	246.4	239.5 00
~~19.32~~	~~19.52~~	19.62	19.65			6.00.5	6.0.10	59.88 00
19.32	19.52					19.32	19.42	19.74 19.65

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1880phae.proj.1837R

May 26 May 26 = circle
(60°)

3 =

2 = 43 45-46

42	6.1	3.1	~~60~~ 60	+1.1 +0.1
8.1	~~10.3~~	5.1	~~7.9~~ 9.2	+1.0 +1.1
33.3	37.3	8.26	36.5	+0.7 +0.8
2.20	24.0	21.1	23.3	+0.9 +0.7
676	777	639	750	
16.90	19.45	1598	1875	
		0.92	0.80	

3 = 346-7 (59)

11.0	6.0	10.3	~~5.1~~ 5.1	+0.7 +0.9
15.8	9.6	15.0	9.1	+0.8 +0.5
40.7	37.1	39.7	35.6	+1.0 +1.5
29.1	23.9	28.9	22.9	+0.2 +1.0
966	766	939	727	
24.15	19.15	2348	1818	
		0.67	0.97	

3 = 347-8 (580)

10.3	5.0	9.3	3.6	+1.0 +1.4
15.1	9.1	14.1	8.2	+1.0 +0.9
39.9	34.9	39.0	34.5	+0.9 +0.4
28.9	23.2	28.1	22.0	+0.8 +1.2
942	722	905	683	
23.55	18.05	2265	1708	
	(571)	0.90	.97	

3 = 348-9

9.2	3.9	8.0	2.1	+1.2 +1.8
14.3	7.9	12.9	6.1	+1.4 +1.8
39.5	34.0	38.3	33.7	+1.2 +1.3
280	220	26.2	20.5	+1.8 +1.5
910	688	854	624	
2278	1720	2135	1560	
			+143	+160

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1880phae.proj.1837R

130

Thy 26

02 = 349-350 (56)

01	86	23		7.1	0.0	+1.5	+2.3
	13.3	6.1		12.8	5.0	+0.5	+1.1
	38.9	33.1		37.0	32.0	+1.9	+1.1
	268	204		25.5	18.6	+1.3	+1.8
	876	619		824	556		
	2190	1548		2060	1390		
			(55)	1.30	1.58		

2 = 350-1

	17.2	11.9	9.4	+0.1 +0.2	7.1	11.7	8.9	+0.2	+0.5
	12.3	17.1	14.1	+0.4 +0.9	11.9	16.2	13.2	+0.6	+0.9
	37.9	42.1	41.3	+0.4 +0.6	37.5	41.5	40.4	+0.5	+0.9
	26.0	30.9	28.0	+0.4 +0.4	25.6	30.5	27.4	+0.4	+0.6
	834	1020	928		821	999	899		
	2085	2550	2320		2052	2498	2248		
					.33	.62	.72		

3 = 351-2 (54)

73	89	89	6.8	8.6	+0.5	+0.3	
11.7	32.1	32.1	10.8	12.3	+0.9		
37.5	42.1	42.1	35.6	39.0	+1.9	+3.1	
25.5		27.8	24.8	26.9	+0.4	+0.9	
820		1109	780	868			
2050		2772	1950	2170			
			1.00	1.02			

Remit-page

1 1

2 = 352-4 (52)

45	94	83	8.4	72.40	7.1	+1.0	+1.2
17.1	14.1	12.2	12.2	11.1	11.2	11.2	+1.9	+1.0
43	39.1	38.5	37.5	37.5	37.3	37.4	+1.6	+1.1
366	279	266	266	261	259	260	+1.3	+0.6
	965	856	847	878	814			
	2362	2140	2118	2048	2035			
			1.14	.90	1.05			

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1880phae.proj.1837R

May 26

(51)

z = 353-4

01	8.1	7.2	01	7.0	5.4	+.11 +1.8
	12.4	11.0		11.4	10.2	+1.0 +1.0
	36.9	37.8		36.6	37.0	+0.3 +0.8
	26.9	25.4		25.7	24.3	+1.2 +1.1
	8.43	8.11		8.07	7.87	
	20.26	20.28		20.14	19.18	
				0.90	1.10	

(50) z = 354-5

	6.3	5.1		5.8	5.3	+0.5 +0.9
	11.4	9.9		10.6	4.2	+0.8 +0.6
	37.2	37.0		35.9	9.3	+1.3 +1.1
	25.8	24.2		24.1	35.9	+1.4 +1.1
	8.67	7.62		7.64	2.31	
	20.18	19.05		19.10	7.25	
				1.08	1.81	(0.93)

(49) z = 355-6

	6.0	6.1	6.0	4.2	5.1	5.1 5.1	3.9 +0.9 +0.3
	11.0	10.9	11.0	9.3	10.5	10.3 10.8	8.8 +0.2 +0.5
	35.9	35.8	35.7	36.7	35.6	35.6 35.6	36.1 +0.1 +0.6
	24.3	24.3	24.3	22.8	25.0	24.9 25.0	23.3 -0.7 -0.5
	7.70	7.68		7.30	7.62	7.59	7.21
	19.25	19.20		18.25	19.05	18.98	18.02
					0.20	.22	.23

(48) z = 356-7

6.3	3.4		5.2	2.6	+1.1 +0.8
12.0	8.5		10.8	7.5	+1.2 +1.0
37.1	36.2		36.9	35.6	+0.2 +0.6
25.5	23.0		25.7	22.1	+0.4 +0.9
8.09	7.11		7.80	6.78	
20.72	17.78		19.50	16.95	
			0.72	.80	

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May 26

$\tau = 3578$

(47)

57	57	24	41	1.1	+1.0	+1.3
108	106	75	94	6.2	+1.2	+1.3
362	350	352	352	34.5	+1.0	+0.5
247	228	241	240	22.1	+0.7	+0.7
766	677	726	727	63.9		
1915	1698	1810	1818	1590		
		190	097	1.03		

(46)

4.0	11	11	1.1	3.1	−0.2	−.2	−0.2	+0.9	+1.3
9.9	6.3	6.3	6.3	8.7	4.9	5.1	5.0	+1.2	+1.3
35.9	34.5	34.9	34.7	35.1	33.4	33.1	33.2	+0.8	+1.5
242	220	220	220	23.8	20.8	20.8	20.8	+0.4	+1.2
740	639	643		707	589	588	588		
1850	1590	1607		1768	1472	1470			
				+0.82	+1.23	+1.37			

(45)

1 ~~3 −3°~~ (53°)

8.1	9.1	8.7	8.6	7.9	8.1	7.8	8.0	+0.8	+0.7
12.5	13.1	12.7	12.89	11.9	11.9	11.9	12.0	+0.6	+1.0
38.9	39.3	39.0	39.1	38.87	38.9	38.5	38.9	+0.0	+0.4
27.0	27.5	27.3	27.84	26.64	26.3	26.3	26.9	+0.9	+0.8
865	890				860	845	858		
2165	22				2150	2113	2145		
					+15				

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May 26 $\lambda = 345 - 360$, $P_{in} = 22^h 9^m$, Attn = 590

01

4.1	4.0	3.9	4.2	4.0	0	43.5	434	437	432	436	+20.5
8.1	8.4	7.7	8.1	8.1		47.5	49.1	49.4	49.8	49.7	+18.6
33.2	33.2	33.3	33.3	33.2		16.2	16.1	16.5	16.1	15.9	+17.0
22.0	21.6	21.9	22.0	21.9		4.8	4.7	4.7	5.0	4.9	+17.1
~~68.4~~	67.2	66.8	67.6				2333	2343	2341	2341	
~~170.4~~	168.0	167.0	169.0				5832	5858	5852	5852	
168.5							18.53	18.22	18.18	18.34	

~~End~~

~~38~~

~~40~~ End 203 27

5-9.3

~~36.6~~	4.1	4.2	3.9	4.1	44.2	0	44.5	44.2	44.0	+19.9	
~~20.8~~	8.4	8.0	~~7.8~~	8.1	49.3		49.6	49.4	49.0	+18.8	
	33.1	33.0	32.9	33.0	16.4		16.1	16.5	16.4	+16.6	
	22.0	21.9	~~21.2~~	21.7	4.9		4.9	4.9	4.9	+16.8	
	67.6	67.1	65.8				2357	2350	2343		
	169.0	167.8	164.5				5878	5870	5858		
							18.12	18.03	18.87		

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1880phae.proj.1837R

May 26 1881

Time 8 3 Mn. Tu = 64.9

0	1	~~59~~	59	6.1	6.0	5.8	0	0	50.2	50.5	50.1	50.7	+15.6	
		10.5	10.2	10.3	10.3	10.3		50.2	55.3	55.0	54.8	54.9	+15.3	
		~~37.4~~	37.2	37.1	37.4	37.2		23.5	23.7	23.8	23.6	23.3	+13.7	
		23.5	23.8	23.9	24.2	23.8		11.0	11.1	11.0	11.0	11.0	+12.8	
		773	771	774	779				~~269.8~~	2603	2595	2592		
		19.32	19.78	19.35	19.98				~~67.4~~	6.508	6485	6480		
									649.5	14.90	14.50	15.16		
									14.37					

Mn
Ecl. 4 6 66.1

0	1	8.7	8.0	8.1	7.9	8.2		53.3	53.3	53.3	53.6	53.9	+14.9	
		13.3	13.1	12.8	13.1	13.1		58.3	58.2	58.3	58.3	58.4	+14.8	
		39.9	40.0	40.0	40.0	40.0		27.0	27.0	27.0	27.1	26.9	+13.0	
		26.8	27.1	26.5	26.6	26.8		14.1	14.0	14.4	14.1	14.0	+12.7	
		887	882	874	876				2725	2730	2731	2723		
		22.18	22.05	21.85	21.90				6812	6825	6828	6806		
									14.06	13.80	13.57	13.82		

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1880phae.proj.1837R

May 1 ST = 7h 27m m = 748

Single degrees from 0° to 15°

0°–15°

" "

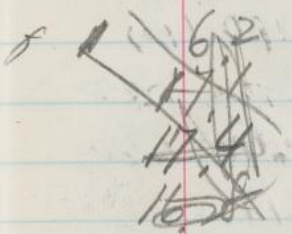
11.6	11.8	10.5	10.4
21.9	22.0	21.3	21.4
21.9	22.0	21.3	21.6
22.3	22.0		

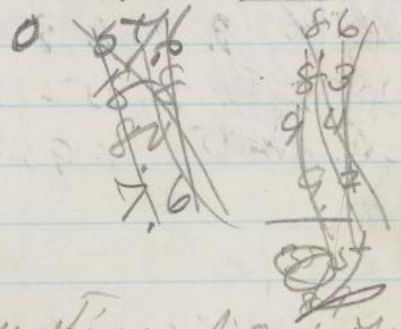
Set

" "

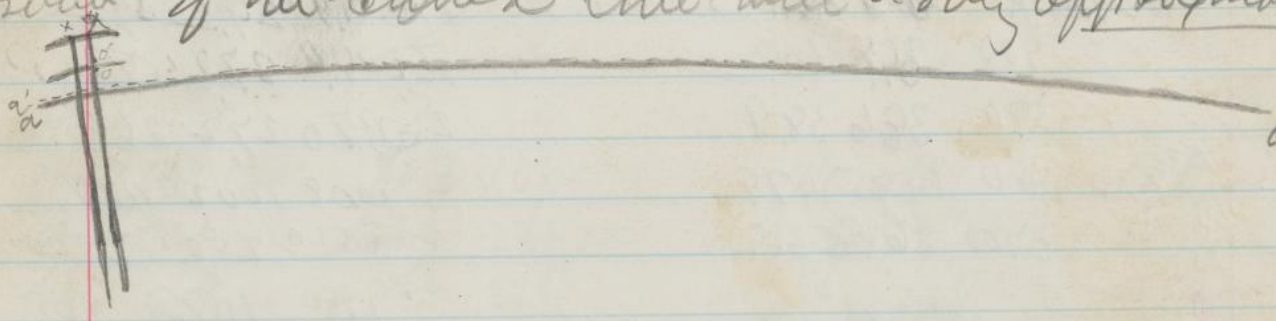
22.3	22.6	22.0
33.6	33.3	33.3
32.9	32.8	32.3
33.8	33.4	33.2

Set





In adjusting the brass plate for declinations, I was at first sure that the curved line of the plate was a little below (apparently) the line of cross line of the microscope. For this position of the plate, the 15° space was found to be 46.5" too short. The curved line of the plate was then 2d-0f. The end of the double lines or 01 x x'. It was then found to be 89" too short. There are two dots on the right edge of the apparent right hand line. The curved line of the plate will hereafter be found between o and o'. Since the microscope is continually undergoing change of position, the value of the arc for this position of the curved line will be only approximately



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1881

Aug. 2 #1 18 1 ST. = 2h 40m Yh = 72.0

0° to 15° Single degrees

0° to 15°:

0	1	149	158	159	156	157	157.0	3.9	4.2	4.1	3.8	4.1	3.9	+11.8
		266	268	276	272	275	27.4	16.4	17.0	16.6	16.4	16.4	16.4	+11.0
		265	271	271	270		27.0	14.7	14.9	14.8	14.5	14.8	14.9	+12.3
		251	260	258	259		25.9	14.2	14.1	14.1	14.1	14.3	14.1	+11.7
		232	966	957				508	496	488	496	493		
		2326	2415	2392				1265	1240	1220	1240	1232		
								1073	1090	1195	1152	1160		

ST = 4h 0m Yh = 72.1

0	1	248	264	263	264	14.8	15.0	14.4	+11.6
		361	374	380	377	27.6	27.8	27.5	+10.1
		378	380	380	380	25.3	25.2	24.7	+12.7
		364	364	362	363	25.0	24.9	25.2	+11.3
			1382	1385			929	928	
			3455	3465			2322	2320	
							1133	1145	

ST = 0h 6h 0m Yh = 72.4

0	1	157	289	288	290	289	16.8	17.0	16.6	16.7	+12.1
		401	403	400	401	29.3	29.4	29.2	29.2	+10.8
		400	398	400	399	27.3	27.4	27.2	27.3	+12.6
		390	386	389	388	27.3	27.0	27.2	26.8	+11.5
		1480	1495	1479			1008	1002	1000		
		3700	3685	3695			2520	2505	2500		
				15°			1180	1183	1205		

Adjusted plate. Inv. value of 15° in this plate

1880phae..proj..1837R

Separate readings

$0^\circ - 1^\circ$ (5)

0	15.7	16.1	15.9		11.9	11.8	12.0		15.0	15.0	+0.9
	28.5	28.0	28.2		23.6	23.8	23.5		27.4	27.3	27.1	+0.8
	27.0	27.4	27.3		23.0	22.9	23.0		26.7	26.8	26.6	+0.6
	25.9	26.3	26.1		22.9	21.8	23.1		25.2	25.2	25.2	+0.9
	981	981				813	816			943	939	
	2428	2452				2032	2040			2358	2348	
										0.67	1.04	

Mean Series
$11 = 7 \quad 2.30$

	I			II		
11.0	11.0	11.0	+0.9			
23.1	23.0	23.2	+0.5			
22.4	22.3	22.6	+0.6			
22.0	21.9	22.0	+0.9			
	78.2	78.8				
	1955	1970				
	.77	.70				

$1^\circ - 2^\circ$ (4)

	18.0	18.0	18.0		13.0	13.0	13.1		17.0	16.9	17.2	+1.0
	30.1	30.0	30.0		25.0	24.9	25.0		29.8	29.7	29.8	+0.2
	29.4	29.5	29.4		24.2	24.3	24.2		29.0	28.9	29.0	+0.4
	28.0	28.2	28.1		23.7	23.6	23.8		27.2	27.0	27.0	+0.9
	1055	1057				858	861			1030	1030	
	2638	2642				2145	2652			2575	2575	
										.63	.67	

	I			II		
12.1	12.0	12.2	+0.9			
24.9	24.8	25.0	+0.1			
24.0	23.9	24.0	+0.2			
23.0	22.9	23.0	+0.7			
	836	842				
	2090	2105				
	0.53	0.47				

$2^\circ - 3^\circ$ (3)

1	12.1	12.0	12.0			12.2			12.0	12.2	11.9	
	25.4	25.1	25.2			24.9			24.4	24.5	24.4	
	23.9	24.1	24.0			24.1			23.0	23.0	23.0	
	22.6	22.5	22.6			23.2			22.3	22.2	22.4	
	840	837				844				819	817	
	2100	2092				2110				2048	2042	
										0.52	0.50	

	11.5	+0.0	+0.3			
	24.2	+0.8	+0.5			
	22.9	+1.0	+1.1			
	22.8	+0.3	+0.8			
	814					
	2035					
	0.75					

$3^\circ - 4^\circ$ (2)

1	15.3	15.4	15.4			11.3	10.6		14.6	14.4	14.7	
	28.1	28.1	28.1			23.6	23.2		27.4	27.2	27.7	
	26.4	26.9	26.6			24.2	22.0		26.0	26.1	25.9	
	25.0	25.4	25.2			22.7	22.0		25.6	25.3	25.9	
	948	958				763	718			930	943	
	2370	2395				1962	1945			2321	2358	
										0.45	0.37	

	10.1	+0.8	+0.5			
	22.9	+0.7	+0.3			
	21.2	+0.6	+0.8			
	21.8	-0.4	+0.2			
	760					
	1900					
	0.43					

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4°–5° (1)

													I	II
0 1	15.0	15.2	15.1	10.0	9.6	9.8	14.4	14.7	14.1	9.1	9.2	9.0	+0.7	+0.7
	28.3	28.2	28.2	23.0	22.8	22.9	27.3	27.5	27.1	22.3	22.5	22.2	+0.9	+0.6
	26.6	26.5	26.6	21.1	20.9	21.0	25.4	25.4	25.3	20.1	20.2	20.0	+1.2	+0.9
	26.3	26.5	26.4	22.0	21.6	21.8	25.7	25.8	25.6	21.2	21.4	21.0	+0.7	+0.6
	96.2	96.4		76.1	74.9			93.4	92.1		73.3	72.2		
	240.5	241.0		190.2	187.2			233.5	230.2		183.5	180.5		
								0.70	1.08		0.67	.67		

5–6 (0)

0 1	12.5	12.4	12.4	9.2			11.6	11.9	~~12.4~~ 11.4		8.8		+0.8	+0.4
	25.1	25.2	25.2	22.1			24.3	24.6	~~25.2~~ 24.1		21.1		+0.9	+1.0
	23.8	23.5	23.6	20.0			23.0	22.9	~~23.5~~ 23.1		19.8		+0.6	+0.2
	23.1	23.8	23.4	21.5			22.9	23.0	22.8		20.2		+0.5	+1.3
	84.5	84.9		72.8				82.4	81.4		69.9			
	211.2	212.2		182.0				206.0	203.5		174.8			
								.52	.87		.72			

6–7 (9)

0 1	11.8	11.7	11.8	8.5	8.4	8.4	11.2	11.4	11.0	8.1	8.1	8.1	+0.6	+0.3
	24.1	24.3	24.2	21.0	21.1	21.0	23.3	23.1	23.5	20.6	20.7	20.6	+0.9	+0.4
	23.1	23.1	23.1	19.8	19.8	19.8	22.0	22.0	22.0	19.2	19.2	19.2	+1.1	+0.6
	22.8	23.0	22.9	20.6	20.9	20.8	22.4	22.5	22.4	20.1	20.1	20.2	+0.5	+0.7
	81.8	82.1		69.9	70.2			79.0	78.9		68.1	68.1		
	204.5	205.2		174.8	175.5			197.5	197.2		170.2	170.2		
								0.70	0.80		0.46	0.53		

7–8 (8)

0 1	7.0	6.9	7.0	11.6			6.6	6.6	6.6		11.5		+0.4	+0.1
	19.0	19.3	19.1	24.2			18.9	18.9	18.9		24.2		+0.2	0.0
	18.0	18.0	18.0	22.5			17.6	17.5	17.7		22.5		+0.4	0.0
	18.3	18.0	18.2	23.9			17.2	17.3	17.2		22.8		+1.0	+1.1
	52.3	52.2		82.2				50.3	50.4		81.0			
	130.8	130.5		205.5				125.8	126.0		202.5			
								0.50	0.45		0.35			

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8° – 9° (7)

									I	II
0	1	16.4	16.3	16.4	11.7	1	5.4	5.3	5.2	10.9	+1.0	+0.8
		18.5	18.8	18.6	23.9		17.3	17.3	17.3	23.1	+1.3	+0.8
		17.0	17.5	17.2	22.8		17.6	17.2	17.9	22.8	−0.4	0.0
		16.8	17.0	16.9	22.6		16.0	16.0	16.0	21.8	+0.9	+0.8
		15.7	15.6		8.10			15.8	15.6	7.86		
		14.68	14.90		20.25			13.9J	14.1J	19.6J		
								0.73	0.75	0.60		

9 – 10 (6)

0	1	12.0	12.3	12.2	10.4	1	11.0	11.0	11.1	9.7	+1.2	+0.7
		23.9	24.1	24.0	22.8		23.3	23.1	23.5	21.7	+0.7	+1.1
		24.2	24.4	24.3	22.8		23.0	22.9	23.1	21.5	+1.3	+1.3
		23.3	23.1	23.2	22.0		22.6	22.8	22.3	21.0	+0.6	+1.0
		8.34	8.49		7.80			7.88	8.00	7.39		
		20.85	21.22		19.50			19.70	20.00	18.48		
								1.15	1.22	1.02		

10 – 11 (5)

0	1	11.0	11.0	11.0	9.2	8.8	9.0	9.5	10.0	9.8	7.5	7.5	7.5	+1.2	+1.5
		23.0	23.3	23.2	21.0	21.2	21.1	23.0	23.3	23.1	21.0	21.0	21.0	+0.1	+0.1
		23.3	23.1	23.2	21.1	20.8	21.0	21.2	21.2	21.2	18.9	19.0	18.8	+2.0	+2.1
		22.2	22.2	22.2	20.4	20.5	20.6	21.1	21.3	21.2	19.0	19.0	18.9	+1.0	+1.6
		7.95	8.96		7.20	7.13		7.48	7.58		6.65	6.62			
		19.88	22.40		18.00	17.82		18.70	18.95		16.62	16.55			
								1.18	1.45		1.38	1.27			

11° – 12° (4)

0	1	10.0	10.1	9.8	10.0	7.4	7.8	7.6	9.1	9.0	9.0	9.0	7.3	7.3	+1.0 +0.3
		23.3	23.5	23.8	23.6	21.3	21.4	21.4	22.9	22.8	23.0	22.9	21.0	21.0	+0.7 +0.4
		21.3	21.3	21.5	21.4	19.3	19.4	19.4	20.9	20.6	20.5	20.7	18.1	18.2	+0.7 +1.2
		21.5	21.6	21.3	21.5	19.1	19.3	19.2	20.8	20.5	20.8	20.7	18.5	18.3	+0.8 +0.8
		9.61	9.67	9.64		7.61	7.79		9.37	9.29	9.33		6.49	6.48	
		24.02	24.18	24.10		16.78	16.98		23.44	23.25	23.34		16.22	16.20	
									0.58	0.96	0.78		.56	.78	

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z = 12° – 13° (3)

λ	1	9.3"	8.9	9.1	6.0						
		23.1	23.0	23.0	19.9						
		20.4	20.2	20.3	17.5						
		20.5	20.2	20.3	17.5						
		733	723		609						
		1832	1808		1522						

					I	II
O	1	8.5	8.2	8.3	5.3	+0.8 +0.7
		21.4	21.5	21.4	18.8	+1.6 +1.1
		18.5	18.3	18.4	15.8	+1.8 +1.7
		19.2	19.0	19.4	16.2	+1.1 +1.3
			680	690	561	
			1700	1675	1402	
			1.32	1.33	1.20	

13 – 14 (2)

O	λ	8.2	8.2	8.2	5.2	8.1	8.2	8.0	5.1	+0.1	+0.1
		21.8	21.5	21.6	18.2	21.0	21.1		17.3	+0.6	+0.9
		18.8	18.5	18.6	15.7	18.2	18.5	17.9	15.2	+0.4	+0.5
		19.1	19.0	19.0	16.2	18.5	18.8	18.3	15.4	+0.5	+0.8
		679	672		553		665	653	530		
		1658	1680		1382		1662	1632	1325		
							0.36	0.48	0.57		

14 – 15 (1)

	1	8.4	8.8	8.6	5.1	4.9	5.2	5.0	7.8	7.9	7.8	4.0	4.8	4.0	4.0
		21.6	21.3	21.9	18.0	17.6	18.0	18.1	20.7	20.7	20.7	16.5	16.9	16.4	16.6
		18.6	19.1	18.8	15.4	15.3	15.4	15.5	18.2	18.3	18.1	15.0	15.3	15.0	14.9
		19.0	19.5	19.2	15.9	15.9	15.8	16.0	18.2	18.2	18.2	15.0	15.4	15.0	15.1
		676	687		547	544	546		651	648		518	504	506	
		1690	1718		1365	1360	1365		1628	1620		1298	1260	1265	
									0.62	0.98		1.34	1.00	1.00	

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Aug 2

$\lambda = 10° - 15°$ Deepozo B6

$ST = 7^h 18^m$ $\gamma h = 732$

0	1	10.6	11.2	11.3	11.4	11.8	11.4	0	59.8	59.9	59.9	59.9 +11.5
		22.7	22.9	23.1	23.3	23.8	23.3		12.7	12.3	12.9	12.8 12.8 +10.6
		22.4	22.8	22.9	22.5	22.9	22.8		10.5	10.4	10.5	10.5 10.6 +12.3
		21.9	22.3	22.4	22.8	22.8	22.6		11.0	10.9	11.1	11.1 10.9 +11.6
		7.8	7.92	7.97	8.00	8.13			29.34		34.4	33.3 34.7
		19.82	19.80	19.92	20.00	20.32			8.33		8.60	8.35 8.52
									11.45		11.32	11.65 11.80

$ST = 8^h 55^m$ γh 747

		7.0	6.8	7.2	7.0			55.9	55.8	56.0	55.9	+11.1
		19.0	19.0	19.2	19.1			8.4	8.3	8.6	8.3	+10.7
		19.1	19.6	19.5	19.4			7.0	7.0	6.8	7.3	+12.4
		17.9	18.2	18.2	18.1			6.8	6.6	6.7	7.0	+11.3
I	II	6.30	6.36	6.41				25.77		25.81	25.85	
+0.8	+1.1	15.75	15.90	16.02				64.42		64.52	64.62	
+1.2	+1.5							11.33		11.36	11.40	
+0.6	+0.4											
+1.0	+0.9											

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Aug 8 1881

ST = 13 0 — Yh = 7 8.0

z = 0 − 15

0	1	14.0	15.0	12.3	12.7	12.6	12.5	3.7	3.6	1.1	1.4	1.5
		26.0	27.0	24.3	24.8	24.6	24.5	15.8	15.6	13.9	14.0	14.0
		27.1	28.0	26.0	26.2	26.2	26.1	15.6	15.9	13.8	13.6	14.0
		25.8	26.3	24.2	24.3	24.3	24.3	14.7	14.7	13.2	13.0	13.3
		9.24	9.63	8.68	8.80	8.77		4.98	4.98	4.20	4.20	4.28
		23.22	24.08	21.70	22.00	21.92		12.40	12.45	10.50	10.50	10.70
								10.77	11.63	11.20	11.50	11.22

1.3 +1.09 +1.12
14.0 +1.08 +10.5
13.8 +1.18 +12.3
13.2 +1.14 +11.1

0 0 — ST = 13 15 — Yh = 24.0

z = 15 − 30

0	1	11.1	11.0	11.0	11.0		59.5	59.4	59.5	59.5		+11.5
		23.8	24.1	24.1	24.0		14.2	14.0	14.1	14.4		+ 9.8
		23.7	24.0	23.9	23.9		15.6	15.7	15.6	15.5		+8.3
		22.0	22.8	22.7	22.2		12.0	12.1	11.9	12.0		+10.2
		8.16	8.49	8.47				4.12	4.11	4.14		
		20.40	20.48	20.42				10.30	10.28	10.35		
								10.10	10.20	10.07		

z = 15 − 30

ST = 14 48 — Yh = 7 8.9

	1	4.0	3.3	3.3	3.5		51.5	51.6	51.7	51.2		+12.0
		17.8	17.3	17.1	17.4		6.9	6.8	7.0	6.8		+10.5
		17.3	16.9	16.8	17.0		8.1	8.3	8.2	7.8		+8.9
		15.7	15.2	15.1	15.3		3.9	4.1	3.8	3.7		+11.4
		5.48	5.27	5.23				2.08	2.07	2.05		
		13.70	13.18	13.08				6.70	6.68	4.58		

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144 ST = 13h 28m

Aug 3

ST = 16h 27m

z = 15–16 (20)

						I	II
0	1	11.0	12.0	9.8	10.5	+1.2	+1.5
		24.1	26.0	23.3	25.3	+0.8	+0.7
		24.0	24.2	23.8	23.3	+0.5	+0.9
		22.7	23.3	22.0	22.8	+0.7	+0.5
		8.8	8.5	7.86	8.19		
		20.45	~~24.15~~ 21.38	19.88	~~25.45~~ 20.48		
				0.80	~~1.0~~ 0.90		

z = 16 17 (9)

0	1	9.5	9.6	9.6	10.1	9.4	9.4	9.3	10.0	+0.2	+0.1
		23.4	23.9	23.6	25.5	23.4	23.4	23.4	24.6	+0.2	+0.9
		23.5	23.8	23.6	22.8	23.4	23.3	23.5	22.3	+0.2	+0.5
		22.1	22.0	22.0	22.5	21.7	21.6	21.8	22.0	+0.3	+0.5
		9.8.5	7.9.3		8.0.9		7.7.7	7.8.0	7.6.9		
		19.6.2	19.8.2		20.22		19.4.2	19.5.0	19.7.2		
							0.20	0.3.2	0.5.0		

z = 17–18 (8)

1	9.2	9.9	9.1	9.5	+0.1	+0.4
	23.3	24.6	23.0	24.5	+0.3	+0.1
	23.4	22.81	22.9	21.8	+0.5	+0.3
	21.9	22.0	21.0	21.6	+0.9	+0.4
	7.7.8	7.8.6	7.6.0	7.7.4		
	19.4.5	19.6.5	19.0.0	19.3.5		
			0.4.5	0.30		

z = 18–19 (7)

1	9.0	9.4	8.5	8.8	+0.5	+0.6
	23.2	24.4	23.0	24.0	+0.2	+0.4
	22.9	21.8	22.1	20.5	+0.8	+1.3
	21.1	21.2	20.1	20.5	+1.0	+0.7
	7.6.2	7.6.8	7.3.7	7.3.6		
	19.0.5	19.2.0	19.4.2	18.4.5		
			0.6.3	0.5.5		

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Amp

$\lambda = 19 - 20$ (6)

1	8.3	8.5	8.4	8.4	9.4	7.4	7.4	7.9	+1.0 +0.8
	23.1	23.0	23.0	24.2	22.3	22.2	22.4	23.3	+0.7 +0.9
	21.8	21.6	21.7	20.5	20.0	20.0	19.9	18.8	+1.7 +1.7
	20.4	20.2	20.3	21.0	19.7	19.8	19.6	19.8	+0.6 +1.2
	7.36	7.33		7.44		6.94	6.93	6.98	
	18.40	18.32		18.60		17.30	17.32	17.45	
						1.05	1.00	1.15	

$\lambda = 20 - 21$ (5)

1	7.3	7.4		7.9		7.0	6.6	7.2	+0.8 +0.7
	22.1	22.1		23.7		21.5	21.7	22.2	+1.4 +1.5
	20.0	19.9		19.0		20.3	19.8	18.3	+0.1 +0.7
	19.0	19.6		20.0		19.3	19.1	19.4	+0.5 +0.6
	6.70	6.90		7.06		6.81	6.72	6.91	
	17.25	17.20		17.65		16.82	16.80	16.98	
						0.43	0.45	.89	

$\lambda = 21 - 22$ (4)

1	6.4			7.0		5.4	6.0	~~5.6~~	+1.0 +1.0
	21.7			22.3		20.7	21.4		+1.0 +1.9
	19.9			18.3		21.0	19.3		−1.1 −1.0
	19.0			19.1		17.7	18.0		+1.3 +1.1
	6.70			6.67		6.48	6.47		
	16.75			16.68		16.20	16.18		
						0.55	0.50		

$\lambda = 22 - 23$ (3)

1	5.4	5.3		5.6	4.8	4.0	4.8	5.2	5.2	4.0	4.6	4.1	3.3	+0.2	+0.8
	20.6	20.5		21.0	19.9	19.6	20.2	20.0	20.1	19.3	19.9	19.3	18.6	+0.6	+0.9
	20.8	20.6		19.1	18.4	17.8	18.4	20.2	20.4	18.1	19.0	18.2	17.1	+0.6	+0.3
	18.0	17.8		17.9	17.0	16.3	17.1	18.0	18.2	16.2	16.8	16.4	15.3	+0.0	+0.9
	6.48	6.37		6.36	6.01	5.71		6.34	6.40		6.03	5.80	5.43		
	16.20	16.22		15.90	15.02	14.42		16.86	16.82		15.08	14.50	13.58		
								+0.85			0.82	0.52	0.84		

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146 Hey. B

z = 23-24 (2)

1	6.4		3.0 2.1 2.6		5.4 1.5	1.8	1.2 1.3	+1.0 +1.1
	21.2		18.1 17.8 18.0		21.2 17.2	17.4	16.9	0.0 +0.8
	22.1		16.8 16.7 16.8		21.4 15.7	16.1	15.3	+0.7 +1.1
	18.5		15.6 14.8 15.2		18.1 13.7	13.9	13.5	+0.4 +1.5
	682		535 574		661	481	469	
	17.05		13.58 12.85		16.52	12.28	11.72	
					+0.53	1.10	1.13	

z = 24-25 (1)

								I	II
1	54	41	07	595 588	49	46	560	588	588	+0.5 +0.4
	21.1	21	60 59.2	154 150	20.7	20.9	58.8 144	14.1	14.7	14.2 +0.4 +0.8
	21.9	21.2	15.2							
			14.6	14.2 138	21.8	21.8	136	14.0	13.7	13.6 +0.1 +0.4
	17.6	17.9	12 11.5	11.6 11.4	17.9	18.0	11.2	11.4	11.2	11.1 -0.3 +0.3
	660	656	430	407 2790	653	651	395	384	277	
	26.50	26.39	10.50	10.18 6915	16.32	16.98	9.88	67.60	69.42	
					+0.18	+0.32	+0.28	0.58	0.33	

z = 25-26 (0)

1	5.5	5.4	18.4	5.8 4.2	10.8	+0.5 +0.6
	21.0		34.9	20.1	33.4	+0.9 +1.5
	22.1		34.0	21.5	33.0	+0.6 +1.0
	18.0		31.4	17.0	29.8	+1.0 +1.6
	666		1187	636	1140	
	166.5		2968	15.90	28.50	
				0.75	1.18	

z = 26-27

1	5.0	4.7 4.8	17.1	3.6	3.7	8.5	15.9 +1.2 +1.2
	19.5	19.5 19.5	32.6	19.1	18.0	19.2	32.1 +0.4 +0.5
	21.4	21.2 21.3	32.4	19.8	19.9	19.8	31.0 +1.5 +1.4
	17.0	16.8 16.9	29.2	15.8	15.8	15.9	27.8 +1.1 +1.4
	629	632	1113		584	584	1068
	15.72	15.80	27.82		14.60	14.60	26.70
					1.12	1.20	1.12

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3 - 27 - 28

1	4.2	15.9	1	4.1	15.7	+0.1	+0.8
	19.9	31.8		19.4	31.6	+0.5	+0.2
	20.1	31.0		20.8	30.9	−0.7	+0.1
	16.4	28.2		15.5	26.9	+0.9	+1.3
	6.06	10.69		5.98	10.40		
	15.15	26.72		14.95	26.12		
				+0.20	+0.60		

3 = 28 - 29

II									
+0.4	1	3.9	15.4	15.8 15.6	3.0	14.8	15.0	14.7	+0.9 +0.8
+0.8		19.8	31.9	32.2 32.0	18.4	31.4	31.4	31.4	+1.4 +0.6
+0.4		20.9	32.8	32.1 32.4	19.6	31.2	31.4	31.0	+1.3 +1.2
+0.3		15.3	27.0	27.4 27.2	14.9	26.8	26.9	26.8	+0.4 +0.4
		5.99	10.71	10.75	5.59		10.41	10.39	
		14.98	26.78	26.88	13.98		26.02	25.98	
					+1.00		+0.76	0.90	

3 = 29 30

	1	3.6	14.9	14.5 14.7	2.8	13.7	13.9	13.5	+1.1 +1.0
		18.9	31.5	31.0 31.2	18.6	30.2	30.4	30.1	+0.3 +1.0
		19.5	31.0	30.3 30.6	19.0	29.7	29.7	29.7	+0.5 +0.9
		14.9	26.5	26.4 26.4	15.0	26.0	25.9	26.0	−0.1 +0.4
		5.69	10.39	10.22	5.51		9.99	9.99	
		14.23	25.98	25.55	13.78		29.95	24.82	
					+0.45		1.03	~~1.05~~ 1.02	

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148

Aug 3 65 ST = 6h 2m

Z = 0-15

0	1.59	1.51	1.52	1.53
	2.86	2.79	2.79	2.81
	2.80	2.79	2.79	2.77
	2.75	2.71	2.70	2.72
	1.00	0.980	0.978	0.983
	2.56	2.450	2.445	2.458

Z = 0-15 ST = 7 56

	20.4	20.9	20.6	
	32.9	33.6	33.8	
	34.1	33.6	33.8	
	32.7	32.8	32.8	
	12.11	12.09		
	30.28	30.22		

Z = 15-30

0	1	12.8	12.7	12.0	12.3
		26.6	26.2	26.0	26.3
		24.4	24.1	24.2	24.2
		23.6	24.0	23.3	23.6
		8.74	8.65	8.55	
		21.85	21.62	21.38	

15°-30° ST. 8h 8m

	9.7	9.0	9.0	9.2
	24.0	23.0	23.0	23.3
	21.8	21.0	21.0	21.3
	21.8	20.8	21.0	21.2
	7.73	7.38	7.40	
	19.32	18.45	18.50	

Yh = 72.3

bodfocus

0	1	0.9	1.0	0.9	1.0
		1.44	1.43	1.48	1.50
		1.24	1.25	1.29	1.24
		1.22	1.24	1.25	1.28
		4.09	4.02	4.11	4.15
		8.97	10.05	10.28	10.38
		14.03	14.45	14.17	14.20

Yh = 73.9

7.2		7.1	7.2	+13.4
21.0		21.1	21.0	+12.8
19.2		19.2	19.2	+14.6
19.0		18.9	19.1	+13.8
		6.63	6.65	
		16.58	16.6	
		13.70	13.60	

56.8	0	0	5.68	5.67	5.69	+15.5
12.9			1.29	1.28	1.29	+13.4
12.6			1.28	1.22	1.29	+11.6
9.1			9.1	9.3	9.0	+14.5
			27.16	27.10	27.17	
			67.90	67.75	67.92	
			13.95	13.87	13.96	

Yh = 73.9

56.3		5.64	5.62	5.64	+12.9
12.4		1.24	1.23	1.24	+10.9
11.9		11.7	12.1	12.0	+9.4
8.8		8.8	8.4	8.8	+12.4
		26.93	26.89	26.96	
		67.82	67.23	27.40	
		12.00	11.22	11.10	

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150

Aug 4 S.T = 12h 55m m = 78.9°

0 – 15°

0°	1	8.0	7.3	7.3	7.5	56.7	57.0	56.8	56.4	+10.8
		20.3	19.8	20.0	20.0	9.9	10.1	10.0	9.5	+10.1
		22.1	22.0	22.1	22.1	9.8	9.8	10.0	9.6	+12.3
		20.2	19.5	19.4	19.7	8.9	9.0	8.9	8.8	+10.8
		70.6	68.6	68.8			27.9	26.5	26.48	
		17.65	17.15	17.20			6.98	6.64	6.608	
							11.1	10.51	11.12	

Z = 30–45° m = 13h 10m

1		2.8	1.9	1.9	1.7	1.4	1.9	50.0	50.4	50.2	49.9	49.8	49.5	+11.9
		17.9	17.0	17.1	17.2	17.2	17.3	6.3	6.4	6.3	6.3	6.2	6.1	+11.0
		19.7	18.9	18.5	19.0	18.9	19.0	8.7	8.9	9.0	8.6	8.7	8.4	+10.3
		15.2	14.4	14.0	13.8	13.8	14.6	3.8	4.5	4.4	3.4	3.5	3.0	+10.8
		55.6	52.2	51.5	51.7	51.3		24.9	25.9	24.99	24.82	24.82	24.4	
		1390	1305	1288	1292	1282		624.2	624.8	620.5	620.5	618.5		
								114.6	105.7	108.3	108.7	109.7		

m = 15h 20m m = 80.6°

1	28.8	28.2	28.6	28.5	16.9	16.8	16.9	17.0	+11.6
	45.5	44.8	45.7	45.1	34.2	34.0	34.1	34.4	+10.9
	48.6	47.5	47.5	47.5	36.9	36.9	36.8	37.0	+10.6
	41.8	41.3	41.0	41.4	30.8	30.4	30.8	31.1	+10.4
						18.1	18.6		
						29.82	29.25		

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2=30-31 (5)

01	16.3	16.7	16.5	16.2	16.2	16.3	16.2 +0.3
	32.5	33.1	32.8	32.4	32.5	32.4	+0.4
	34.4	35.0	34.7	33.5	33.2	33.8	+1.2
	28.9	29.1	29.0	28.9	28.9	28.9	+0.1
	11.21	11.39			1108	1114	
	2802	2848			2770	2786	
					+0.32	+0.03	

2=31-32 (4)

	16.9	16.9	16.9	16.0	15.9	16.2	+0.9
	32.7	32.9	32.8	32.2	32.4	32.1	+0.6
	34.1	34.0	34.0	33.3	33.4	33.2	+0.7
	30.1	30.1	30.1	29.6	29.8	29.5	+0.5
	338	339			315	310	
	28.45	28.47			27.87	27.75	+0.58 +0.72

2=32-33 (3)

	16.0	16.1	16.0	15.4	15.4	15.4	+0.6
	32.3	32.3	32.3	32.0	32.1	31.9	+0.3
	33.5	33.3	33.4	32.4	32.5	32.4	+1.0
	29.5	29.5	29.5	28.0	28.0	28.0	+1.5
	313	312			280	277	
	27.82	27.80			27.00	26.92	+0.82 +0.88

2=33-34 (2)

	15.2	14.9	15.0	14.5	14.6	14.4	+0.5
	32.0	31.4	31.7	30.9	30.9	30.9	+0.8
	32.2	32.2	32.2	31.9	31.8	32.0	+0.3
	28.0	27.9	28.0	26.4	26.9	26.5	+1.3
	274	264			242	238	
	26.85	26.60			26.05	25.95	+0.80 +0.65

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z = 34 – 35 (11)

0	1	14.2	14.1	14.1	14.1	12.7	12.4 13.0 12.8 +1.4
		30.4	30.6	30.8	30.6	30.2	30.0 30.4 30.1 +0.4
		31.7	31.4	31.8	31.6	31.2	30.9 31.4 31.1 +0.4
		26.8	26.4	26.3	26.5	26.2	26.0 26.8 26.1 +0.3
		231	225	230			193 214 201
		25.78	25.62	25.75			24.82 25.35 25.02
							+0.96 +0.27 +0.73

z = 35 – 36 (10)

0	1	12.9	12.7		12.6	12.0	12.0 11.9 +0.6
		30.5	30.3		30.4	30.2	30.3 30.0 +0.2
		31.5	31.0		31.2	30.7	30.3 30.0 +1.0
		26.3	26.1		26.2	25.8	25.9 25.8 +0.4
		212	201				185 177
		25.30	25.02				24.62 24.42
							+0.68 +0.60

z =

z = 36 – 37 (9)

1		12.0	12.0		12.0	11.2	11.0 11.3 +0.8
		29.9	30.1		30.0	29.3	29.2 29.5 +0.7
		29.8	30.0		29.9	29.0	28.7 29.2 +0.9
		25.5	26.1		25.8	24.8	24.5 25.2 +1.0
		172	182				134 152
		24.30	24.55				23.35 23.80
							+0.95 +0.75

z = 37 – 38 (8)

1		16.0	16.0		16.0	15.4	15.4 15.4 +0.6
		34.0	34.2		34.1	33.8	33.8 33.8 +0.3
		34.0	34.0		34.0	32.9	32.9 32.8 +1.1
		29.4	29.8		29.6	29.1	29.0 29.2 +0.5
		334	340				311 312
		28.45	28.50				27.77 27.80
							+0.68 +0.70

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2-38-39 (7)

01	15,3	15,4	15.4	15.1	15,2	15,0	+0.3
	33,7	33,3	33.5	33.4	33,4	33,3	+0.1
	32,9	33,1	33.0	32.8	32,8	32,8	+0,2
	28,9	29,1	29.0	29.1	29,1	29,1	−0.1
	308	309			305	302	
	27.70	27.72			27.62	27,55	
					+0.08	+0,17	

2-39-40 (6)

	14,9	14,9	15,0	14.9	14,7	14,8	14,8 / 14,9	+0.2
	33.2	33.0	33.3	33.2	31,9	32,0	31,6 32,0	+1.3
	32,7	32,5	32,9	32,7	32,2	32,5	32,0 32,1	+0.5
	28,8	28,8	25,2	28.9	28,7	28,6	28,6 28,8	+0.2
	29,6	29,2	30,4			27,9	26,5 27,8	
	27,40	27.30	27.60			26.97	26.62 26.95	
						+0.43	+0.68 +0,65	

2-40-41 (6)

	14,8	15,1	~~14,7~~ 15	15.0	14,6	14,7	14,4	+0.4
	32,1	32,1	32	32.1	32,0	31,8	32,2	+0.1
	32,3	32,6		32.4	33,1	33,1	33,1	−0.7
	28,9	29,3		29.1	29,0	29,0	28,9	+0.1
	281	291				286	286	
	27.02	27.27				27.15	27.15	
						−0.13	+0.12	

341-2 (4)

1	14,6	14,9	14.8	14.2	14,4	13,9	+0.6
	32,3	32,4	32.4	31.8	31,8	31,8	+0.6
	33,5	33,7	33.6	33.3	33,3	33,3	+0.3
	29,1	29,3	29.4	29.0	29,0	29,0	+0.4
	295	303			285	280	
	27.37	27.57			27.12	27.00	
					+0.25	+0.57	

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2 = 342-3 (3)

1	140	141	14.1	1	136	138	+0.4
	31.4	31.8	31.6	13.7 30.5	30.3	30.7	+1.1
	33.4	33.6	33.5	33.6	33.9	33.8	−0.1
	28.6	28.8	28.7	27.8	27.4	28.1	+0.9
	274	283			246	264	
	26.85	27.07			26.15	26.60	
					+0.70	+0.47	

2 = 343-4 (2)

1	140	142	14.1	13.3	13.2	13.4	+0.8
	31.0	31.1	31.0	30.4	30.4	30.5	+0.6
	33.9	34.5	33.2	33.2	33.3	33.2	0.0
	28.2	28.5	28.4	27.2	27.4	27.1	+1.2
	271	273			243	242	
	26.77	26.82			26.07	26.05	
					+0.70	+0.77	

2 = 344-5 (1)

	13.4	13.4	~~(4)~~ 13.4	12.6	12.8	12.4	+0.8
	30.4	30.4	30.4	29.8	29.8	29.7	+0.6
	33.2	33.6	33.4	32.2	32.2	32.3	+1.2
	27.2	27.5	27.4	26.0	26.1	26.0	+1.4
	242	249			209	204	
	26.05	26.22			25.22	25.10	
					+0.83	+1.12	

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1880phae.proj.1837R

Aug

Feb. 4 1881 ST = 6h 4m Th = 70.8

3 = 0 — 15

0	1	13.0	12.5	12.2	12.0	12.4	58.4	58.9	58.6	58.0	58.1	+14.0
		24.9	24.5	24.9	24.2	24.6	11.5	11.8	11.8	11.3	11.0	+13.1
		26.9	26.3	26.3	25.9	26.3	11.5	12.0	11.9	10.8	11.4	+14.8
		24.9	24.6	24.1	24.1	24.4	10.4	10.9	10.5	10.0	10.0	+14.0
		89.7	87.9	87.5	62			273.6	272.8	270.1	270.5	
		224.2	219.8	218.8	21.55			68.40	68.20	67.52	67.62	
								14.02	13.78	14.36	13.93	

3 = ~~45~~ 60 (0)

0	1	20.0	19.0	20.2	20.1		5.6	5.8	5.6	5.5	+14.5
		34.3	37.6	37.3	37.4		24.7	24.5	24.6	25.0	+12.7
		39.5	39.2	39.1	39.3		26.8	26.9	26.9	26.5	+12.5
		33.6	33.8	33.6	33.7		20.9	21.0	20.9	21.8	+12.8
		1304	1306	1333				782	780	778	
		~~2760~~ 3260	3245	3332				1955	1962	1941	
								1305	1315	1287	

45 — 64

T = 7h 10m Th. = 76.4

1		14.0	14.2	14.3	~~58.~~ 73.9	14.1	59.8	59.9	59.9	59.7	59.5	+14.3
		31.9	31.8	31.9	19.2 31.3	31.7	19.2	19.4	19.2	19.1	19.0	+12.5
		33.0	33.5	33.4	~~32.8~~ 32.4	33.1	20.8	20.8	21.0	20.5	20.8	+12.3
		27.2	27.9	27.9	27.0	27.5	14.9	15.0	14.8	14.7	15.0	+12.6
		2061	1074	1075				553	549	540		
		~~5154~~ 2652	2685	2688				1382	1372	1350		
								1270	1313	1338		

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6^h30^m 7^h29^m

$\lambda = 45 - 46$ (0)

0 1	203	139	64	1	19.0	12.8	6.2	+1.3 +1.1
	37.3	31.3	6.0		36.0	30.1	5.9	+1.3 +1.2
	32.1	32.4	6.7		38.3	32.3	6.0	+0.8 +0.1
	33.6	27.0	6.6		33.7	26.6	7.1	−0.1 +0.4
	+03	246			70	218		
	32.57	26.15			31.75	25.45		
					+0.82	+0.70		

$\lambda = 46 - 7$ (9)

1	23.0	23.2		23.5	23.3	−0.1	−0.1
	41.0	40.8		40.6	40.8	+0.4	0.0
	43.0	43.0		42.0	42.1	+1.0	+0.9
	37.7	37.3		37.2	37.5	+0.5	−0.2
	247	243		229	237		
	36.17	36.07		35.72	35.92		
				+0.45	+0.15		

$\lambda = 47 - 8$ (8)

1	23.0	23.1	22.4	22.9	+0.3	+0.2
	40.0	40.4	38.5	39.2	+1.5	+1.2
	~~42.8~~	42.2	41.4	41.5	+1.4	+0.4
	37.1	37.4	36.0	36.3	+1.1	+1.1
	229	231	186	199		
	35.72	35.77	34.65	34.97		
			+1.07	+0.80		

$\lambda = 48 - 9$ (7)

1	22.8	23.3	23.5	23.4	21.7	22.4	22.3	+1.1 +1.0
	38.7	39.2	39.7	39.5	38.0	39.0	38.9	+0.7 +0.5
	41.4	41.9	42.0	42.0	41.0	41.7	41.5	+0.4 +0.3
	35.9	36.2	36.9	36.5	34.0	35.2	35.7	+0.7 +1.3
	188	207	221		147	188	184	
	34.70	35.17	35.52		33.67 ~~36.17~~	34.70	34.60	
					+1.03	+0.47	+0.92	

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2 = 49–52	(6)					
1	21.3	~~37~~	20.5	21.6	+0.8	+0.7
	38.0	22.3	36.8	37.8	+1.2	+1.3
	41.1	39.1	40.2	41.1	+0.9	+0.9
	34.6	42.0	33.3	34.1	+1.3	+1.1
	150	35.2	108	146		
	33.75	186	32.70	33.65		
		34.65	+1.05	+1.00		
2 = 52–54	(4)					
1	21.0	21.4	20.0	20.2	+1.0	+1.2
	37.2	37.5	36.5	36.3	+0.3	+1.2
	40.4	40.9	40.0	40.4	+0.4	+0.5
	33.6	33.8	33.4	34.0	−0.1	−0.2
	122	136	96	109		
	33.05	33.40	32.40	32.72		
			+0.65	+0.68		
3 = 51–2	(4)					
1	19.9	20.1	19.0	19.3	+0.9	+0.8
	35.5	36.2	35.0	35.2	+0.5	+1.0
	40.1	40.1	39.5	40.0	+0.6	+0.1
	33.5	33.8	33.1	33.1	+0.4	+0.7
	190	102	66	76		
	32.25	32.55	31.65	31.90		
			+0.60	+0.65		
2 = 52–3	(3)					
	19.1	19.5 19.4 (19.4)	18.0	18.9 18.9 18.9	+1.1	+0.5
	35.1	35.5 35.4 (35.4)	34.1	34.9 34.7 35.1	+1.0	+0.5
	39.7	40.0 39.9 (40.0)	38.3	39.1 39.1 39.2	+1.4	+0.9
	33.1	33.1 33.0 (33.0)	31.0	32.0 32.0 32.0	+2.1	+1.0
	70	81 77	14	47 52		
	31.75	32.02 31.92	30.35	31.17 31.30		
			+1.40	+0.85 +0.62		

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3 – 53 – 4 (2)

0 1	17.9	18.9	17.1	17.9	+0.8 +1.0
	33.8	35.0	33.9	34.5	−0.1 +0.5
	38.4	39.2	38.1	38.4	+0.6 +0.8
	31.2	32.0	30.5	31.2	+0.7 +0.8
	16	51	396	20	
	30.40	31.27	29.90	30.50	
			+0.50	+0.77	

3 – 54 – 5 (1)

1	17.3	17.7	15.9	16.4	+1.4 +1.3
	33.9	34.4	33.7	34.8	+0.2 −0.1
	37.9	38.5	37.0	38.1	+0.9 +0.4
	30.9	31.0	30.4	30.9	+0.5 +0.1
	00	19	370	62	
	30.00	30.47	29.25	30.05	
			+0.75	+0.42	

5 – 5 – 6 (0)

	16.0	16.9	15.2	16.1	+0.8 +0.8
	33.3	34.4	33.1	34.3	+0.2 +0.1
	36.9	37.9	36.0	36.8	+0.9 +1.1
	30.1	30.7	29.1	30.1	+1.0 +0.6
	363	399	334	373	
	29.07	29.97	28.35	29.32	
			+0.72	+0.65	

5 – 6 – 4 (9)

	15.0	16.1	14.6	15.2	+0.4 +0.9
	33.2	34.4	33.0	33.9	+0.2 +0.5
	36.0	36.9	35.1	35.8	+0.9 +1.1
	29.4	30.1	28.9	29.7	+0.5 +0.4
	336	375	316	346	
	28.40	29.37	27.90	28.65	
			+0.50	+0.72	

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160

Z = 57-8 (a)

/	14.3	~~13.5~~ 16.2	/	13.5	14.4	+0.8 +0.8
	33.2	34.0		32.8	33.5	+0.4 +0.5
	35.1	35.8		~~34.0~~ 33.3	34.2	+1.8 +1.6
	28.6	29.6		28.5	29.0	+0.1 +0.6
	31.2	34.6		28.1	31.1	
	27.80	28.65		27.02	27.77	
				+0.78	+0.88	

Z = 58.9 (b)

/	13.6	14.2	12.7	13.3	+0.9 +0.9
	32.8	33.5	31.9	32.7	+0.9 +0.8
	34.0	34.3	33.2	33.5	+0.8 +0.8
	28.2	29.0	27.6	28.4	+0.6 +0.3
	28.6	31.0	25.4	28.2	
	27.15	27.75	26.35	27.05	
			+0.80	+0.70	
			8	15	(77.3)

π = 4 2/5

59-60 (b)

	12.8	13.1	11.7	11.9	+1.1 +1.2
	31.9	32.2	31.2	31.7	+0.7 +0.5
	33.1	33.8	32.9	33.1	+0.2 +0.7
	27.8	28.1	26.8	27.0	+1.0 +1.1
	25.6	27.2	22.6	23.7	
	26.40	26.80	25.65	25.92	
			+0.75	+0.88	

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Aug 6 T = 16 50 M = 84.4

Z = 0 - 15

1	16	23.6	23.0	23.4	23.3	19.9	9.8	9.9	9.9	+13.4
	30.8	35.0	35.2	35.0	35.1	22.8	23.0	22.5	22.8	+12.3
	34.1	38.3	38.3	38.5	38.4	24.7	24.8	24.9	24.5	+13.7
	30.8	34.8	35.2	35.8	35.3	22.1	22.2	21.9	22.3	+13.2

131.7
32.92

19.8
19.88
13.04

T = 17 00

Z = 60 - 75

1	18.4	18.3	18.0	18.2	6.8	6.9	7.0	6.5	+11.4
	37.1	37.3	36.9	37.1	25.0	25.1	25.7	24.9	+12.1
	41.0	40.8	40.5	40.8	26.4	26.3	26.5	26.3	+14.4
	34.9	34.5	34.0	34.4	21.7	21.4	22.1	21.6	+12.7

131.4
32.85

7.7
1.992
12.93

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$\lambda = 60-60$ (5)

18.0	17.9	18.0		17.1	17.2	17.4	+0.4
36.9	36.9	36.9		35.6	35.5	35.5	+1.3
40.5	40.3	40.4		39.7	39.5	39.9	+0.7
34.0	33.7	33.8		32.8	32.7	33.0	+1.0

$61-62$ (4)

17.8	18.0	17.8		17.0	17.0	17.0	+0.8
36.9	36.4	36.2		35.8	35.9	35.8	+0.4
39.8	40.0	39.9		39.2	38.9	39.4	+0.7
32.7	33.3	33.0		32.3	31.9	32.7	+0.7

$\lambda = 62-3$ $\lambda = 3$

17.0	17.0	17.0		16.1	16.0	16.2	+0.9
36.0	36.0	36.0		35.8	35.8	35.9	+0.2
39.3	39.7	39.5		38.0	38.0	38.1	+1.5
32.4	32.5	32.4		32.0	32.0	32.1	+0.4

(2)

20.9	21.1	21.2	21.1	20.3	20.2	20.4	20.0	+0.8
40.4	40.6	40.5	40.5	39.4	39.3	39.6	39.2	+1.1
43.3	43.3	43.1	43.2	42.9	42.9	42.9	42.9	+0.3
36.7	37.1	37.2	37.0	36.8	36.4	37.0	36.8	+0.2

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1880phae.proj.1837R

(V)

1	20.3	20.3	20.3	20.2	20.1	20.3	+0.1
	39.4	39.5	39.4	38.8	38.6	39.1	+0.6
	44.0	43.9	44.0	43.4	43.6	43.2	+0.6
	36.7	36.5	36.6	35.6	35.4	35.9	+1.0

(O)

1	20.3	20.1	20.2	19.0	19.0	19.0	+1.2
	39.0	39.0	39.0	38.0	38.0	37.9	+1.0
	43.1	43.1	43.1	41.8	41.9	41.6	+1.3
	35.9	36.0	36.0	35.0	35.1	34.8	+1.0

(9)

1	18.8	19.0	18.9	18.1	18.1	18.1	+0.8
	37.4	38.2	38.0	36.6	36.6	36.5	+1.4
	41.3	41.9	41.6	41.0	41.1	40.9	+0.6
	35.0	35.1	35.0	33.8	33.7	34.0	+1.2

(8)

1	17.4	16.1	16.8	15.4	16.1	14.7	+1.4
	36.0	35.0	35.5	34.4	34.9	33.8	+1.1
	39.3	38.2	38.8	37.4	37.8	37.1	+1.4
	32.9	32.0	32.4	31.5	32.1	31.0	+0.9

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(7)

1	14.2	15.0	14.6	13.8	13.7	13.9	+0.8
	33.7	34.0	33.8	33.3	~~34.0~~ 33.5	33.1	+0.5
	36.9	37.0	37.0	36.0	36.1	35.8	+1.0
	31.0	31.4	31.2	30.0	30.0	29.9	+1.2

(6)

	13.7	13.5	13.6	13.4	13.4	13.2	+0.2
	33.9	33.5	33.7	32.8	32.~~8~~	32.8	+0.9
	36.0	35.9	36.0	35.0	35.0	35.1	+1.0
	29.8	29.4	29.6	29.0	28.9	29.0	+0.6

(6)

	13.2	13.2	13.2	12.8	12.8	12.9	+0.4
	32.9	32.7	32.8	32.0	31.9	32.0	+0.8
	35.0	35.0	35.0	33.4	33.75	33.3	+0.6
	29.8	28.9	29.0	28.1	28.0	28.2	+0.9

(4)

	12.7	12.6	12.6	11.8	12.4	11.9	11.8	+0.8
	32.1	31.8	32.0	31.2	31.2	31.2	31.2	+0.8
	33.3	33.1	33.4	32.1	33.0	32.1	32.1	+1.3
	28.1	28.0	28.0	27.6	28.2	27.7	27.5	+0.4

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(3)

1	11,3	15.6		10.8	11.2	+0.3	+0.4	+0.4
	31,0	35,1		29.6	34,3	+1.4	+0,8	+1.1
	32,0	36,3		31.0	35.3	+1.0	+1.0	+1.0
	27.5	31.0		~~28.6~~ 26.0	30.2	+1.0	+0.8	+0.9

(2)

1	15.0	15.2	15.1	14.4	14.6	14.3	+0.7
	~~34.8~~	34,3	34.2	34.4	34.3	34.1	-0.2
	35,0	35.2	35.1	34.6	34.8	34.5	+0.5
	30.2	30.2	30.2	29.6	29.7	29.5	+0.6

T=1827 (1)

	14.2	14.4	14.3	13.6	13.8	13.5	+0.7
	34.0	34.0	34.0	32.7	32.7	32.7	+1.3
	34.5	34.2	34.3	33.4	33.5	33.4	+0.9
	29.4	29.5	29.3	28.0	28.0	27.9	+1.3

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May 7 1881 S.T. = 6h 51m M = 72.0

Investigation of 15° spaces.

0 – 15

1	24.0	24.1	24.1	24.1	6.8	6.9	6.8	6.7	+17.3	16.8	+16.8	+17.0
	37.5	37.5	37.6	37.5	21.7	21.4	21.9	21.8	+15.8	15.5	+15.4	+15.6
	37.8	37.7	37.6	37.7	20.1	20.4	20.0	19.9	+17.6	17.4	+17.4	+17.4
	36.0	35.8	35.5	35.8	18.4	18.7	18.3	18.3	+17.4	16.2	+16.9	+16.8
	135.3	135.1	134.8			67.1	67.0	66.7				
	33.82	33.78	33.70			16.78	16.75	16.92				
						17.04	17.03	16.78				
							16.89					

7 = 0 – 15 T =

	31.1	31.4	31.2	31.2	14.4	14.3	14.5	14.3	+16.8		
	45.3	45.7	45.3	45.4	29.9	29.9	30.3	29.5	+15.5		
	45.0	45.0	44.8	44.9	27.5	27.5	27.5	27.6	+17.4		
	42.0	43.2	43.1	42.7	26.5	26.5	26.6	26.5	+16.2		
	163.4	165.1	164.4			98.2	98.9	97.9			
	40.85	41.28	41.10			24.55	24.72	24.48			
						163.0	165.6	166.2			
							16.49				

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1880phae.proj.1837R

$\lambda = 270 - 285$

0	1	31.0	31.1	31.0	31.1	14.1	14.0	14.2	14.0	+17.0
		45.9	45.3	45.5	45.6	28.7	28.4	28.9	28.4	+16.9
		37.1	37.1	37.0	37.1	20.5	20.5	20.7	20.3	+16.6
		37.0	37.1	36.9	37.0	19.6	19.6	19.8	19.4	+17.4
		1870	1506	1504			828	836	~~875~~ 821	
		~~2704~~ 37.7	376	376			2070	2090	2052	
							16.95	16.75	17.08	
									16.93	

$\lambda = 285 - 300$

	~~28.1~~	28.2	28.1	28.1	11.6	11.8	11.8	11.3	+16.5
	42.8	42.2	42.4	42.5	24.6	24.9	24.7	24.3	+17.9
	34.9	34.9	34.8	34.9	19.5	19.4	19.8	19.3	+15.4
	34.0	34.0	33.7	33.9	20.0	20.0	20.1	19.8	+13.9
	1398	1393	~~8420~~ 1390			761	764	747	
	34.9	34.8	34.7			1902	1910	1868	
						15.93	15.92	16.07	
								15.91	

$\lambda = 300 - 315$

1		26.0	26.0	26.0	26.0	9.1	9.2	9.0	9.0	+16.9
		34.1	39.2	39.9	39.4	21.2	21.2	21.3	21.1	+18.2
		34.1	34.1	34.2	34.1	17.5	17.8	17.94	17.94	+16.6
		34.8	34.9	35.0	34.9	19.2	19.3	19.4	~~19.8~~ 19.0	+15.7
		1340	1342	1351			675	676	665	
		33.50	33.55	33.78			1688	1690	1662	
							16.62	16.65	17.16	
									16.48	

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1880phae.proj.1837R

170

z = 315 - 330

25.2	25.4	25.5	25.5	9.7	9.6	9.6	9.9	+15.8
37.9	38.1	38.1	38.0	20.3	20.1	20.2	20.4	+17.7
33.9	33.9	34.0	33.9	18.2	18.1	18.1	18.4	+15.7
35.8	36.0	36.1	36.0	20.0	20.0	20.0	20.0	+16.0
1328	1337	1337		678	679	690		
3320	3342	3342		1695	1698	1725		
				1625	1644	1617		
					1622			

z = 330 - 45

25.7	25.5	25.8	25.7	9.5	9.5	9.7	9.2	+16.2
36.8	36.9	36.8	36.8	21.2	21.3	21.3	21.0	+15.6
34.8	34.8	34.7	34.8	19.5	19.4	19.8	19.2	+15.3
36.5	36.2	36.4	36.4	18.4	18.6	18.4	18.2	+18.0
1338	1334	1337		688	692	676		
3348	3335	3342		1720	1730	1690		
				1628	1605	1652		
					1628			

z = 345 - 00

37.2	37.4	37.0	37.2	21.0	21.1	21.1	20.9	+16.2
49.4	49.2	49.4	49.3	34.5	34.8	34.4	34.4	+14.8
47.7	47.7	47.5	47.6	34.3	34.1	34.1	34.1	+13.3
46.6	46.2	46.2	46.3	32.9	32.9	33.0		+13.4
1809	1805	1801		1235	1225	1224		
4522	4512	4502		3088	3062	3060		
				1434	1450	1442		
				~~13~~	14.42			

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z = 0–15

32.1	31.0	31.1	31.0	30.8	31.2	14.4	14.7	14.5	14.6	14.0	+16.8	mean p 168
45.4	44.8	44.8	45.0	44.3	44.7	29.3	29.5	29.8	29.4	29.5	28.9	+15.4
45.0	44.4	44.4	44.1	44.1	44.4	27.3	27.7	27.9	27.1	27.5	27.0	+17.1
44.2	43.0	43.1	43.0	42.8	43.3	26.4	26.9	27.1	26.2	26.3	26.1	+16.9
166.2	163.2	163.4	162.4	162.0			98.8	99.9	97.2	97.9	96.0	
41.68	40.80	40.85	40.60	40.50			24.70	24.98	24.30	24.48	24.01	
							16.98	15.82	16.55	16.12	16.50	
									16.52			

z = 15–30

33.1	33.0	33.0	33.0	16.2	16.1	16.2	16.2	+16.8	
48.2	47.9	48.4	48.1	33.3	33.2	33.4	33.3	+14.8	
45.9	45.8	46.1	45.9	33.1	33.1	33.2	33.0	+12.8	
44.9	45.2	44.9	45.0	28.8	28.9	28.8	28.6	+16.2	
1721	1719	1721			1113	1116	1111		
43.02	42.98	43.02			27.82	27.90	27.78		
					15.20	15.30	15.24		
						15.08			
						15.14			

z = 30–45

31.5	31.8	31.8	31.7	14.4	14.4	14.8	14.1	+17.3	
49.1	49.2	49.0	49.1	32.9	33.0	33.0	32.8	+16.2	
48.6	48.2	48.4	48.4	33.2	33.3	33.3	33.0	+15.2	
44.2	44.2	44.0	44.1	28.0	28.3	28.0	27.8	+16.1	
1734	1734	1732			1090	1091	1077		
43.35	43.35	43.30			27.25	27.28	26.92		
					16.10	16.07	16.38		
						16.18			

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1880phae.proj.1837R

z = 45 – 60

1	29.3	28.4	28.4	28.7	11.9	12.0	11.9	11.9	+16.8
	47.8	47.4	47.7	47.6	32.7	32.8	32.7	32.4	+14.9
	47.7	47.4	47.2	47.4	32.3	32.5	32.4	32.0	+15.1
	42.9	42.0	42.0	42.3	27.2	27.3	27.4	26.8	+15.1
	1647	1652	1647			1046	1044	1031	
	41.92	41.30	41.18			2615	2610	2578	
						1577	1520	1540	
							15.46		

z = 60 – 75

1	31.8	31.7	31.9	31.8	16.8	16.9	16.8	16.8	+15.0
	52.8	52.4	52.3	52.5	37.7	37.9	37.8	37.4	+14.8
	52.6	52.8	52.3	52.4	34.7	34.8	34.6	34.7	+17.7
	47.0	46.5	47.0	46.8	30.9	31.1	30.9	30.8	+15.9
	1842	1829	1835			1207	1201	1197	
	46.05	45.72	45.88			3018	3002	2992	
						1587	1576	1596	
							15.74		

	32.0	31.3	31.2	31.5	16.8	17.0	17.0	16.6	+14.7
	52.4	52.0	52.1	52.2	38.2	38.3	38.2	38.2	+14.0
	49.1	49.0	49.1	49.1	36.1	36.2	36.1	35.9	+13.0
	46.0	45.5	45.3	45.6	29.9	30.0	29.9	29.7	+15.7
	1795	1778	1777			1215	1212	1203	
	44.88	44.45	44.42			3038	3030	3008	
						1450	1415	1434	
							14.33		

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1890phae.proj - 1837R

X6

16.93	-1.3	+99 +55		-91
15.917	+0.11	-13 +86		+11
0-80 16.45	-0.68	+44 +130		-0.46
16.22	-0.42	+18 +148		-0.20
16.28	-.48	+24 +172		-0.26
14.82	+1.48	-16.2 +.10		+1.60
16.34	-0.04	+97 +97	16.02	-.02
270-0 15.17	+0.63	-40 +57		+.40
16.18	-0.38	+57 +108		-.61
15.46	+0.34	+17 +125		+11
15.74	+0.06	+1.24 -.10		-.17
15.5? 14.33	+1.47		15.54	+1.24
15.80				

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1880phae.proj.1837R

Aug 8 1881

15-0 Spectro

T = 5h 59m Th = 6.8.8

Sub 177 Mean

1.	34.4	34.4	34.4	34.5	17.3	17.5	17.5	17.0	+17.2	17.1	+17.2
	49.3	49.0	49.2	49.2	33.0	33.0	33.0	32.9	+16.2	15.6	+15.7
	47.0	47.0	47.0	47.0	29.3	29.2	29.3	29.5	+17.7	17.4	+17.6
	47.8	47.5	47.3	47.5	30.1	30.0	30.3	30.0	+17.4	17.1	+17.2
	1788	1779	1779			1097	1101	1094			
	44.70	44.48	44.48			2742	2752	2735			
						17.28	16.96	17.13			

17.12

$\pi_1 = 0 - 1^-$

T = 8 15 Th = 70.3

~~127.3~~	28.5	28.5	28.4	28.5	11.4	11.5	11.3	11.5	+17.1
~~42.8~~	43.2	43.4	43.3	43.3	27.7	27.7	27.7	27.8	+15.6
~~40.5~~	41.1	41.1	41.1	41.1	23.7	23.9	23.4	23.6	+17.4
~~40.8~~	41.7	41.5	41.3	41.5	24.4	24.2	24.4	24.5	+17.1
~~1509~~	1545	1545	1541			873	871	874	
~~2877~~	3862	3862	3852			2182	2178	2185	
						~~1520~~			
						16.80	16.84	16.67	
						~~3862~~	~~5862~~	~~3852~~	
						21.82	21.78	~~21.43~~	
								+21.81	

16.77

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1880phae.proj.1837R

$\lambda = 270 - 285$

0	1	228	230	230	22.9	5.4	5.2	5.4	5.3	+17.5
		380	382	381	38.1	20.4	20.5	20.3	20.4	+17.7
		271	274	275	27.3	10.4	10.5	10.3	10.5	+16.9
		294	300	297	29.7	11.8	11.8	11.7	11.8	+17.9
		1173	1186	1183			480	477	480	
		2932	2965	2958			1200	1192	1200	
							857	1773	1756	
							1732			
								17.57		

$\lambda = 285 - 300$

		280	279	279	28.1	10.9	11.2	11.1	10.5	+17.2
		437	433	433	43.4	25.0	25.1	25.2	24.6	+18.4
		339	335	332	33.5	17.5	17.9	17.7	17.0	+16.0
		346	342	345	34.4	20.2	19.9	20.0	20.8	+14.2
		1405	1369	1389			741	740	729	
		3535	3472	3472			1852	1850	1822	
		3512					1680	1622	1650	
								16.44		

$\lambda = 300 - 315$

		280	279	279	27.9	10.5	10.8	10.3	10.4	+17.4
		424	419	416	42.0	23.4	23.4	23.3	23.2	+18.6
		351	345	344	34.7	17.4	17.5	17.3	17.5	+17.3
		380	373	370	37.4	21.1	21.1	21.1	21.2	+16.3
		1435	1416	1409			731	720	723	
		3588	3540	3522			1828	1800	1808	
							1760	1740	1714	
								17.28		

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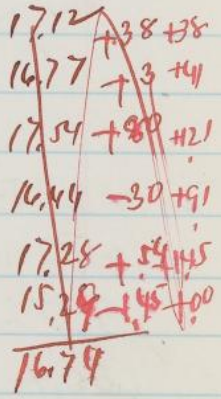
176

3 = 335 - 345

1	361	354	359	36.0	19.6	193	195	199	+16.4
	495	492	496	49.4	31.2	310	314	311	+18.2
	435	430	430	43.2	27.6	275	274	278	+15.6
	466	468	464	46.6	30.8	310	305	308	+15.8
	1757	1749	1749			1088	1088	1096	
	4392	4372	4372			2720	2720	2740	
						1672	1652	1632	
							1652		

2 = 330 - 340

	407	413	411	41.0	23.9	238	238	240	+17.1
	529	532	530	53.0	36.5	362	365	368	+16.5
	489	489	490	48.9	33.1	330	331	333	+15.8
	521	524	524	52.3	33.7	339	334	339	+18.6
	1946	1968	1955			1269	1268	1280	
	4865	4910	4888			3172	3170	3200	
		4895				1693	1725	1688	
							1702		



3 = 345 - 360

	240	239	239	23.9	6.9	68	69	69	+17.0
	367	370	368	36.8	21.1	210	212	211	+15.7
	331	332	332	33.2	18.8	189	188	188	+14.4
	342	338	334	33.8	19.7	195	200	195	+14.1
	1280	1279				662	669	663	
	3200	3198				1655	1675	1658	
						1545	1523	1540	
								1529	

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z = 0 – 15

338	332	333	33.4	16.3	16.3	16.3	16.3	+17.1	17.2	17.1	+17.1
48.0	47.9	48.0	48.0	32.0	31.9	32.1	32.0	+16.0	16.2	15.6	+15.9
45.5	45.4	45.1	45.3	28.0	27.9	28.0	28.2	+17.3	17.7	17.4	+17.5
45.9	46.1	45.9	46.0	29.0	28.9	29.0	29.0	+17.0	17.4	17.1	+17.2
1732	1726	1723			1050	1054	1056				
4330	4315	4308			2625	2631	2638				
					1705	1680	1670				
						16.85					

z = 15 – 30

332	331	332	33.2	15.9	16.0	15.9	15.9	+17.3
49.2	49.2	49.3	49.2	33.8	33.8	34.0	33.5	+15.4
45.2	44.9	44.8	45.0	31.7	31.3	31.8	31.9	+13.3
463	45.9	45.5	45.9	29.2	29.5	29.1	29.0	+16.7
1739	1731	1728			1106	1108	1103	
4348	4328	4320			2765	2770	2758	
					1583	1558	1562	
						15.68		

z = 30 – 45

391	393	391	39.2	21.6	21.5	21.8	21.5	+17.6
57.6	57.5	57.5	57.5	41.0	40.8	41.2	41.1	+16.5
54.8	54.9	55.0	54.9	39.0	39.1	38.9	39.0	+15.9
52.5	52.5	52.9	52.6	36.1	35.9	36.3	36.0	+16.5
2040	2042	2045			1373	1382	1376	
5100	5105	5112			3932	3455	3460	
					1668	1650	1672	
						16.63		

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1880phae.proj.1837R

$\lambda = 45-60$

1	~~169~~ 328	328	329	32.8	14.9	15.0	15.0	148	+17.9
	363 523	524	522	52.3	36.5	36.4	36.8	364	+15.8
	50.0	50.1	50.0	50.0	34.3	34.3	34.5	34.3	+15.7
	47.0	46.9	47.1	47.0	30.9	30.7	31.1	31.0	+16.1
	1821	1822	822			1164	1174	1165	
	4552	4550	4550			2910	2930	2912	
						1642	1615	1638	
								16.32	

$\lambda = 60-75$

	298 ~~448~~ ~~309~~	301	301	30.0	14.9	14.9	15.0	14.9	+15.1
	517 ~~536~~ ~~528~~	514	520	51.7	36.1	36.1	36.2	36.1	+15.6
	49.2 ~~50.6~~	49.9	49.5	49.5	31.9	31.8	31.9	32.0	+17.6
	46.1 ~~46.9~~	45.8	46.0	46.0	30.0	30.1	30.0	30.0	+16.0
	1768 ~~1807~~	1772	1776			1128	1131	1130	
	4420 ~~4525~~	4430	4440			2820	2828	2825	
	~~46.07~~					~~1698~~	1602	1615	
						16.00		16.06	

$\lambda = 75-90$

	36.9	36.9	36.9	36.9	21.0	20.9	21.0	21.1	+15.9
	58.3	58.2	58.1	58.2	43.3	43.3	43.3	43.3	+14.9
	53.3	53.2	53.3	53.3	39.2	39.2	39.2	39.1	+14.1
	52.0	51.8	51.1	51.6	35.1	35.3	35.0	35.7	+16.5
	2105	2001	1994			1387	1385	1386	
	50.12	50.02	49.85			3468	3462	3465	
						15.44	15.40	15.20	
								15.35	

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1880phae.proj.1837R

270. --80

		MR	
17.59	−.86	+16	+82
16.84	+.24	−24	+62
17.28	−.60	+60	+122
16.52	+.16	−14	+1.06
17.02	−.34	+34	+1.40
15.29	+1.39	−1.39	+0.00
16.68			

0−90
17.12
16.77

80−90

		MR	
16.85	+.70		+.70
17.68	−.47		+.23
16.63	+.48		+.71
16.32	+.17		+.88
16.06	−.09		+.81
17.30	−.80		+.01
16.15			

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1880phae.proj.1837R

Aug 9 1881

270° to 90°

T = 6h 25m m = 725

1	280	240	242	248	244	24.5	78	7.4	7.7	7.8	7.9	7.3	+16.8
	382	378	37.3	378	373		221	222	22.2	223	221		+15.3
	374	367	36.9	363	365	37.5	19.8	19.2	19.5	19.6	19.6	19.3	+17.1
	371	366	36.7	371	369	36.8	198	20.0	20.2	20.1	205	200	+16.6
	1354	1330	1352	1360	1346	1390	690	680	697	703	687		
	3436	3390	3380	3400	3372	3475	1725	1700	1742	1758	1718		
							1711	1638	1638	1642	1654		

16.45

T = 9h 2m m = 750

	345	350	357	351	349	19.7	198	200	201			+15.0
	493	496	497	494	495	35.2	352	353	352			+14.3
	495	504	501	495	499	33.4	333	337	335			+16.4
	482	488	483	484	484	33.1	328	331	338			+15.3
	1815	1832	1832	1824		17.4	1211	1221	1221			
	4538	4580	4580	4560		3035	3028	3052	3015			
						1503	1552	1528	1508			

15.29

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1880phae.proj.1837R

z = 270 - 285

1	27.4	24.3	27.3	27.3	11.3	11.1	11.5	11.3	+16.0
	41.8	41.8	41.9	41.8	25.7	25.5	26.0	25.7	+16.1
	33.1	32.8	32.9	32.9	17.3	17.4	17.1	17.3	+15.6
	34.5	34.0	34.1	34.2	18.0	18.2	17.9	17.8	+16.2
	136.8	135.9	136.2			72.2	72.5	72.1	
	342.0	339.8	340.0			180.5	181.2	180.2	
						161.5	158.6	160.3	
								158.5	

z = 285 - 300

i	~~29.8~~	28.3	28.1	28.2	28.2	12.8	13.2	13.3	12.8	12.5	+15.4
	~~44.2~~	42.7	42.7	42.8	42.7	25.8	26.4	26.2	25.2	25.1	+16.9
	~~35.6~~	34.2	34.2	34.0	34.1	19.9	20.5	20.4	19.7	19.6	+14.2
	~~36.6~~	34.9	35.0	35.0	35.0	22.4	23.0	22.9	22.0	22.1	+12.6
	~~146.2~~	140.1	140.0	140.0			82.1	82.8	79.7	79.9	
	~~351.0~~	350.2	350.0	350.0			205.2	209.0	199.2	199.8	
							145.0	~~143.3~~	150.8	150.2	
										148.7	

z = 300 - 315

	31.1	30.8	30.8	30.9	14.9	14.9	14.9	14.9	+16.0
	44.2	44.2	44.0	44.1	27.0	27.1	27.0	26.9	+17.1
	38.1	37.9	38.0	38.0	22.5	22.5	22.7	22.2	+15.5
	41.0	40.3	40.6	40.6	26.6	26.2	26.0	25.8	+14.6
	154.4	153.2	153.4			90.7	90.6	89.8	
	386.0	383.0	383.5			226.8	226.5	224.5	
						159.2	156.5	159.0	
								158.2	

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1880phae.proj.1837R

182

2 = 345 − 332

1	34.0	33.5	33.8	33.8	19.1	19.0	19.4	18.9	+14.7
	45.8	45.8	45.3	45.6	29.3	29.4	29.4	29.0	+16.3
	41.4	41.2	40.9	41.2	27.1	27.2	27.1	27.0	+14.1
	45.1	44.3	44.8	44.7	30.3	30.2	30.5	30.2	+14.4
	166.3	164.8	164.8			108.8	106.4	105.7	
	41.58	41.20	41.20			26.45	26.60	26.28	
						15.13	14.60	14.92	
							14.88		

2 = 330 − 041

1	33.3	33.2	33.4	33.3	18.4	18.6	18.2	18.3	+14.9
	44.1	44.3	44.2	44.2	29.6	29.4	29.8	29.7	+14.6
	41.6	42.0	42.0	41.9	27.9	27.9	27.9	27.8	+14.0
	44.2	44.9	44.5	44.5	28.2	28.4	28.2	28.0	+16.3
	163.2	164.4	164.1			104.3	104.1	103.8	
	40.80	41.10	41.02			~~26.55~~	~~26.52~~	25.95	
						26.25	26.02	15.07	
						14.58	15.08		
							14.91		

3 = 345 − 0

	30.2	30.0	30.1	30.1	14.8	14.7	15.0	14.8	+15.3
	41.4	41.4	41.5	41.4	27.4	27.5	27.5	27.3	+14.0
	39.8	39.5	39.5	39.6	27.1	27.1	27.1	27.0	+12.5
	40.0	39.5	39.5	39.7	27.7	27.5	28.0	27.5	+12.0
	151.4	150.4	150.6			96.8	97.6	96.6	
	37.85	27.60	37.65			24.20	24.40	24.15	
						13.65	13.20	13.50	
								13.45	

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1880phae.proj.1837R

z = 0 – 15

342	346	347	346	199	199	200					
478	478	473	475	340	336	338					
466	469	470	466	31.7	31.5	31.9					
460	472	472	473	328	330	325					
1738	1765	1762	1759	1999	329	1182					
4340	4412	4400	4358	1184	1179	2955					
				2960	2948	4138					
				1482	1464	1443					
278	267	264	27.0	10.8	11.1	11.1	10.7	+16.2			
407	399	399	40.2	25.3	25.8	25.2	24.9	+14.9			
401	391	395	39.6	22.6	23.3	22.3	22.1	+17.0			
403	390	391	395	23.5	23.8	23.3	23.3	+16.0			
1469	1447	1449			2129	2129	2105				
3712	3618	3622			1620	2048	2012				
						1545	1610				7600
322	319	318	320	15.4	15.8	15.4	15.0	+16.6			
463	461	462	462	31.5	31.5	31.8	31.1	+14.7			
440	439	440	440	30.9	31.3	31.1	30.4	+13.1			
446	445	447	446	28.7	28.9	28.8	28.5	+15.9			
1671	1684	1667			1075	1071	1050				
4178	4210	4168			2688	2678	2625				
					1490	1532	1543				
							1522				

z = 30 – 45

300	299	302	300	18.6	13.6	13.6	13.5	+16.4			
465	466	466	466	31.2	31.4	31.2	31.1	+15.4			
454	457	458	456	31.1	30.9	31.1	31.2	+14.5			
433	430	430	433	28.0	28.1	28.0	28.0	+15.3			
1652	1652	1659			1040	1035	1038				
4130	4132	4148			2600	2598	2591				
					1530	1532	1553				
							1528				

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1880phae.proj.1837R

Z = 45–60

333	330	329	33.1	16.3	16.5	16.3	16.2 +16.8
51.3	51.1	50.9	51.1	36.2	36.2	36.3	36.2 +14.9
51.4	51.0	50.9	51.1	36.1	36.1	36.3	35.9 +15.0
47.3	47.1	47.1	47.2	32.8	32.9	32.9	32.5 +14.4
1833	1822	1818		1217	1218	1206	
45.82	45.55	45.45		3042	3045	3020	
				15.40	15.10	15.25	
						15.25	

Z = 60–75

31.2	31.2	31.1	31.2	16.9	16.9	16.9	16.9 +14.3
51.5	51.4	51.4	51.4	36.6	36.7	36.7	36.5 +14.8
51.3	51.3	51.2	51.3	34.1	34.0	34.3	34.1 +17.2
47.0	47.1	46.7	46.9	32.1	32.4	32.1	31.8 +14.8
1810	1810	1804			1200	1210	1193
45.22	45.25	45.10			3000	~~2971~~ 3025	2985
					15.22	15.00	15.25
						15.16	

Z = 75–90

281	279	279	28.0	14.3	14.3	14.1	14.1 +13.7
48.1	48.1	48.1	48.1	35.1	35.1	35.3	34.8 +13.0
45.6	45.0	45.3	45.3	33.0	33.1	33.1	32.7 +12.3
43.1	43.1	43.0	43.1	28.4	28.4	28.9	28.0 +14.7
1649	1641	1643			1109	1117	1096
41.2	41.02	41.08			2772	2792	2740
					13.50	13.10	13.68
						13.43	

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1880phae.proj.1837R

Au

270 – 0

15.85	+.89	+.89	+89	+89
14.87	+1.09	+.98	−.09	+80
15.82	+.86	+1.84	+84	+164
14.88	+.08	+.92	−.08	+156
14.91	+.05	+.18	−.05	+150
13.45	+1.51		−1.51	.000
29.78				
14.96				

0 – 90

16.07	+.92	+.92
15.22	+.14	+1.06
15.29	+.21	+1.27
15.25	+.17	+1.44
15.16	+.08	1.52
13.43	+1.68	+0.20
15.06		

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1880phae.proj.1837R

186

Aug 10 1880 T = 13h 0m Δh = 78.8

0 – 15

1	321	314	313	316	31.6	17.0	17.0	17.1	16.8	17.0	+14.6	13.6	Mean see p. 189
	45.0	44.7	45.2	45.2	45.0	31.0	30.8	30.8	31.2	31.1	+14.0	13.0	
	45.6	45.3	45.4	45.4	45.5	30.3	30.2	30.2	30.2	30.4	+15.2	14.8	
	44.2	44.2	44.1	44.8	44.3	30.2	30.2	30.3	30.1	30.1	+14.1	13.9	
	1669	1656	1663	1670		1082		1084	1085	1086			
	41.72	41.40	41.58	41.75		2705		2710	2702	2715			
						14.67		14.30	14.46	14.60			
									14.51				

0 – 15 T = 14 30 Δh = 78.2

1	26.2	26.1	26.2	12.6	12.5	12.6	+13.6			
	40.2	40.1	40.2	27.2	27.3	27.0	+13.0			
	41.4	41.6	41.5	26.7	26.9	26.5	+14.8			
	40.0	39.8	39.9	26.0	26.0	26.0	+13.9			
	1478	1476			92.7	92.1				
	3698	3690			2318	2302				
					1380	1388				
						13.84				

T = 15 24 Δh = 78.1

	38.2	38.7	38.6	38.3	24.0	38.1		23.9	24.1	23.9	+14.3
	54.0	53.9	54.1	54.0	40.1	53.9		40.0	40.3	40.1	+13.9
	55.1	55.1	55.2	55.1	39.4	55.1		39.7	39.3	39.3	+15.7
	52.2	52.0	52.9	52.4	37.8	52.2		37.6	38.0	37.9	+14.6
	1895	1891	1908			1993		1412	1417	1412	
	4548	4582	4620			4988		3530	3542	3530	
	4988		5020					14.58	14.60	14.90	
										14.63	

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1880phae.proj.1837R

λ = 270 – 285

279	281	281	280	13.9	136	140	141	+14.1
445	448	445	44.6	29.8	297	298	299	+14.8
380	379	375	37.8	22.7	230	232	227	+15.1
372	370	370	37.1	21.7	223	217	215	+15.4
240					218			
448	476	1478	1471		874	887	882	
	3690	3695	3678		5452	2218	2205	
					2185			
					1505	1477	1473	
						1485		

λ = 285 – 300

311	315	312		17.1	171	171	+14.1	
470	470	47.0		31.0	311	309	+16.0	
399	400	40.0		26.6	266	266	+13.4	
391	390	39.0		27.5	275	275	+11.5	
1571	1575				1023	1021		
3928	3934				2556	2552		
	3938				1372	1386		
						1379		

λ = 300 – 315

281	282	282		13.8	288	138	137	+14.4
421	421	42.1		26.2	421	262	262	+15.9
378	379	37.8		23.6	379	230	231	+14.8
386	387	38.6		25.2	385	252	251	+13.4
1466	1469					882	881	
3665	3672					2205	2205	
						1460	1467	
							1464	

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1880phae.proj.1837R

2 = 315 – 330

1	28.0	27.9	28.0	14.2	14.3	14.1	+13.8
	40.4	40.4	40.4	24.5	24.5	24.5	+15.9
	37.5	37.9	37.7	24.4	24.4	24.3	+13.3
	39.2	39.3	39.2	26.2	26.0	26.8	+13.0
	145.1	145.8			89.2	89.2	
	36.28	36.38			2230	2230	
					13.98	14.08	
						14.03	

3 = 330 – 345

1	33.2	33.2	33.2	18.4	18.4	18.3	+14.8
	44.1	43.9	44.0	29.3	29.3	29.3	+14.7
	43.3	43.1	43.2	29.8	29.6	30.0	+13.4
	45.0	45.0	45.0	29.0	29.1	29.0	+16.0
	165.6	165.2			1064	1066	
	41.40	41.30			2660	2665	
					14.80	14.65	
						14.73	

3 = 345 – 0

	35.0	35.2	35.1	20.3	35.2	20.3	20.3	+14.8
	46.3	46.4	46.4	32.9	46.4	33.0	32.8	+13.3
	46.3	46.4	46.4	34.6	46.4	34.7	34.5	+11.8
	46.2	46.1	46.1	33.7	46.0	33.6	33.8	+12.4
	173.8	174.1			174.0	121.6	121.4	
	43.45	43.52				3040	3035	
						13.05	13.17	
							13.11	

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3 = 0 − 15

27.9	28.0	27.0	27.0	27.5
40.9	40.5	40.1	40.0	40.4
42.3	42.0	41.1	41.2	41.6
41.3	41.8	40.6	40.6	41.2
1524	1523	1490	1490	
3870	3808	37.25	37.25	

b 1.86

E	+14.1	14.6	13.6	14.3	mean +14.2
F	+13.1	14.0	13.0	13.9	+13.5
G	+14.6	15.2	14.8	15.7	+15.1
H	+14.2	14.1	13.9	14.6	+14.2

13.4	140	138	129	129
27.3	27.8	27.5	26.9	27.1
27.0	27.3	27.5	26.6	26.6
27.0	27.6	27.7	26.3	26.5
	967	975	927	931
	2418	2438	2318	232
	1392	1370	1407	1397

13.92

14.51	E +14.1
13.84	F +13.1
1463	G +14.6
	H +14.2

14.22

~~2770~~ 15 − 30

1340	339	336	335	209	339	33.8	18.9	18.9	185	189	189	18
490	490	490	506	503	508	49.8	35.4	35.5	35.3	1273	12707	
481	481	481	499	491	498	48.8	36.8	366	36.5	3800	378	37
476	475	476	481	472	478	47.6	32.5	328	324	3310	33.3	33.0
1787	1785	1783	1811	1805	1820	32.8	2316	1238	1227	3162	88.6	88.6
4468	4462	4458	4552	4512	4558		3090	3095	3068	1370		
							1378	1367	1390	1370	1374	1376

13.68

E +15.0
F +13.6
G +11.6
H +14.8

306	303	30.4	15.0	14.9	15.0	+15.4
478	478	47.8	33.0	32.9	33.0	+14.8
485	486	48.6	34.9	35.0	348	+13.7
450	444	44.7	30.2	300	304	+14.5
1719	1711			1128	1132	
4298	4278			2820	2830	
				1478	1448	
					14.63	

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1880phae.proj.1837R

190

2 – 45 – 60

33.1	33.2	33.2	17.0	17.0	17.0	+16.2
57.5	57.8	57.6	37.2	37.1	37.2	+14.4
52.8	53.1	53.0	38.8	38.8	38.9	+14.2
48.8	48.5	48.6	34.0	33.9	34.0	+14.6
186.2	186.6			126.8	127.1	
48.05	46.65			31.70	32.78	
46.55				14.85	14.87	
					14.86	

2 = 60 – 75

1	30.8	30.6	30.7	16.2	16.3	16.2	+14.5
	57.0	57.0	57.0	36.4	36.4	36.3	+14.6
	52.1	52.1	52.1	35.3	35.4	35.2	+16.8
	47.9	47.9	47.9	32.5	32.2	32.8	+15.4
	181.8	181.6			120.3	120.5	
	45.45	45.41			30.08	30.12	
						15.20	
						14.78	

1	31.0	30.9	31.0	17.6	~~30.9~~	17.4	17.7	+13.4
	51.4	51.4	51.4	39.0		38.9	39.0	+12.4
	50.1	49.6	49.8	37.6		37.8	37.4	+12.2
	47.1	47.1	47.1	32.5		32.5	32.0	+14.6
	196.6	196.0				126.6	126.6	
	49.90	49.05				31.65	31.65	
						13.25	13.10	
							13.17	

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1880phae.proj.1837R

2 70 - O

14 85	+ .66	+66
13.79	+ .40	+20
14.64	+ .45	+9
14.03	+ 16	+55
14.73	+ .54	+99
13.21	+ .98	.00
14.19		

O 2

14 22	+ 00	+01 +01
13.68	+ 64	+53 -52
14 63	- 31	+42 -08
14.86	- 54	+65 +57
14.73	- 1.09	+52 +1.09
13.17	+ 1.15	-1.04 .00
14.82		
21		

O - 9

14.17

Recapitulation

I	II	III	IV	Mean		I	II	III	IV	Mean	
-91	-86	-89	-66	-83	-83	-97	-70	-92	-101	-65	-65
+11	+24	-09	+40	+17	-66	+40	+47	-14	+68	+31	-34
-46	-60	-86	-41	-59	-125	-61	-48	-21	-42	-43	-77
-20	+16	+08	+16	+05	-120	+11	-17	-17	-65	-22	-99
-26	-34	+05	-54	-27	-147	-17	+09	-08	-52	-17	-116
+1.60	+139	+157	+108	+1.53	+06	+1.24	+82	+165	+1.04	+1.18	+02

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1880phae.proj.1837R

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Run 75° to 90° h m

z = 0 - 15 T = 6 55 Tm = 6 8.0

1	18.9	18.5	18.8	19.1	19.7	19.0	0.8	0.5	0.7	0.9	0.8	1.0	+18.1
	33.8	34.1	33.8	33.9	33.8	33.9	17.1	17.0	17.1	17.1	17.1	17.1	+16.8
	32.2	32.5	32.4	32.0	32.0		13.6	13.9	13.7	13.4	13.5	13.3	
	31.9	32.0	32.1	32.5	32.4	32.2		14.2	13.3	14.0	14.0	14.1	
	1168	1171	1179	1175	1179			456	458	454	454	455	
	29.20	29.28	29.48	29.38	29.48			1140	1120	1135	1134	1138	
								17.80	18.08	18.13	18.03	18.10	

z = 75 - 90

1	36.1	35.9	36.0	35.7	35.9	19.2	19.4	19.4	19.0	19.2	+16.7		
	58.0	57.8	57.9	57.5	57.8	42.4	42.4	42.8	42.2	42.3	+15.4		
	53.8	53.4	53.2	53.3	53.4	38.5	38.6	38.4	38.3	38.7	+14.9		
	51.6	51.0	51.5	51.0	51.3	33.6	33.9	33.8	33.3	33.4	+17.7		
	1995	1981	1986	1975			1343	1344	1328	1336			
	49.88	49.53	49.65	49.38			3358	3360	3320	3340			
							16.30	15.92	16.45	15.98			

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1880phae..proj..1837R

3 = DJ = 76 (9)

1	357	355	35.6	34.3	34.1	34.5	+1.3
	575	575	57.5	56.9	56.9	56.9	+0.6
	533	531	53.2	52.1	52.0	52.2	+1.1
	510	511	51.0	49.4	49.2	49.7	+1.6
	1975	1972			1922	1933	
	4938	4930			4805	4832	
					1.33	0.98	

3 = 76-77 (9)

1	342	341	34.2	33.0	33.0	32.9	+1.2
	569	566	56.8	55.1	55.0	55.2	+1.7
	524	524	52.4	51.5	51.3	51.7	+0.9
	498	498	49.8	48.8	48.9	48.6	+1.0
	1933	1929			1882	1884	
	4832	4822			4705	4710	
					1.27	1.12	

3 = 77-8 (8)

	333	330	331	33.1	31.9	31.8	32.0	32.1	+1.2
	552	557	551	55.1	54.1	54.1	54.2	53.9	+1.0
	519	513	516	51.6	50.4	50.2	50.6	50.5	+1.2
	492	489	493	49.1	47.4	47.2	47.5	47.6	+1.7
	1896	1886	1891			1853	1843	1841	
	4740	4708	4728			4582	4608	4682	
						1.58	1.00	1.26	
							1.29		

3 = 78-9 (7)

	290	292	291	28.0	28.1	28.0	+1.1
	513	513	513	50.3	50.3	50.3	+1.0
	478	478	478	46.2	46.2	46.2	+1.4
	448	445	444	43.3	43.3	43.3	+1.1
	1728	1728			1679	1678	
	432	432	430		4198	4195	
	302				1.04	1.25	

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$Z = 79-80$ (6)

1	28.1	27.9	28.0	27.2	27.2	27.3	+0.8
	50.3	50.3	50.3	49.0	49.0	49.1	+1.3
	46.0	46.2	46.1	45.2	45.2	45.1	+0.9
	43.4	43.2	43.3	42.0	42.1	41.9	+1.3
	1678	1676			1635	1634	
	4195	4190			4088	4085	
					1.07	1.05	

$Z = 80-81$ (5)

	27.2	27.0	27.1	27.0	25.3	26.1	25.3	25.3	+1.7
	49.1	48.6	48.9	48.8	48.0	48.5	47.9	48.2	+0.8
	44.1	44.9	45.1	45.0	43.8	44.1	43.8	43.7	+1.2
	42.0	41.7	42.3	42.0	40.6	41.0	40.5	40.8	+1.4
	1634	1624	1634			1600	1575	1580	
	4088	4060	4085			4000	3938	3950	
						0.85	1.22	1.35	

$Z = 81-82$ (4)

1	25.2	25.3	25.2	24.5	24.0	24.4	+0.7
	48.0	47.9	48.0	46.4	46.7	46.1	+1.6
	43.8	43.9	43.8	43.0	43.0	42.9	+0.8
	40.6	40.8	40.7	40.4	40.5	40.3	+0.3
	1576	1579			1548	1537	
	3940	3948			3870	3842	
					0.70	1.06	

$Z = 82-83$ (3)

1	24.5	24.3	24.4	23.5	23.7	23.3	+0.9
	46.4	46.5	46.4	45.4	45.4	45.3	+1.0
	42.3	42.5	42.5	41.6	41.5	41.7	+0.9
	40.2	40.4	40.3	39.2	39.2	39.3	+1.1
	1534	1540			1498	1496	
	3875	3850			3745	3740	
					1.90	1.10	

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1880phae.proj.1837R

2 -83 84 (2)

1	23.2	23.2	23.2	22.3	22.5	22.2	+0.9
	45.3	45.3	45.3	44.0	44.0	44.0	+1.3
	41.3	41.3	41.3	40.4	40.4	40.5	+0.9
	39.4	39.0	39.2	38.1	38.0	38.2	+1.1
	149.2	148			144.9	144.9	
	3730	3720			3622	3622	
					1.08	0.98	

83-85 (1)

223	223	22.3	21.2	21.2	21.3	+1.1
43.8	43.9	43.8	43.6	43.5	43.6	+0.2
40.6	40.8	40.7	39.3	39.4	39.2	+1.4
38.0	38.4	38.2	36.4	36.5	36.4	+1.8
144.7	145.4			140.6	140.5	
3618	3635			3575	3572	
				1.03	1.22	

85-86 (0)

21.1	21.1	21.1	21.1	20.6	21.1	20.4	20.8	+0.5
43.3	43.2	43.1	43.2	42.4	42.3	42.3	42.5	+0.8
39.3	39.1	39.1	39.1	38.4	38.8	38.2	38.7	+0.7
36.5	36.2	36.3	36.2	35.4	35.0	35.2	35.5	+0.8
140.3	139.6	139.6			138	136.1	137.8	
3458	3450	3450			3420	3402	3428	
38.09					0.88	.88	0.62	

86-87 (9)

21.0	20.8	20.9	20.0	20.1	19.9	+0.9
42.2	42.9	42.6	42.2	42.2	42.2	+0.4
38.6	38.8	38.7	38.1	38.2	38.0	+0.6
35.8	35.0	35.4	34.6	34.6	34.7	+0.8
139.6	137.5			135.9	134.8	
3440	3438			3378	3370	
				.62	.68	

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1880phae.proj.1837R

1	20.2	20.1	20.0	18.9	1	18.9	18.9	+1.1
	42.0	42.1	42.0	41.6		41.5	41.6	+0.4
	38.1	38.1	38.1	37.2		37.0	37.4	+0.9
	34.4	35.0	34.7	33.6		33.5	33.8	+1.1
	134.5	138.3				130.9	131.7	
	362	338.2				327.2	329.2	
						.90	.90	

	23.9	24.4	24.2	22.9		22.8	23.0	+1.3
	46.9	47.1	47.0	46.2		45.9	46.4	+0.8
	42.4	42.8	42.6	41.7		41.4	42.1	+0.9
	38.6	39.1	38.8	37.6		37.5	37.8	+1.2
	157.8	153.4				147.6	149.3	
	379.5	383.5				369.0	373.2	
						1.00	1.03	

	23.2	23.7	23.2	23.4	22.2	22.7	22.4	22.1	+1.2
	46.2	46.7	46.4	46.4	45.3	45.5	45.3	45.2	+1.7
	41.8	42.0	42.0	41.9	40.8	40.8	40.8	40.8	+1.1
	37.7	38.0	38.0	37.9	37.0	37.0	36.9	36.9	+0.9
	148.9	150.4	149.6			145.5	145.2	145.2	
	370.3	376.0	374.0			363.8	363.0	362.5	
						0.98	1.30	1.15	
								1.12	

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1880phae.proj.1837R

T' Yh =

z = 25-40 ES

1	309	309	304	30.7	15.9	15.9	16.0	15.7	+14.8
	533	53.1	534	53.3	38.9	38.9	38.9	38.9	+14.4
	48.3	47.9	47.9	48.0	34.8	34.6	34.7	35.0	+13.2
	46.9	46.4	46.4	46.6	30.3	30.7	30.2	30.0	+16.3
	1794	1783	1781			1201	1208	1196	
	4485	4458	4452			3002	2995	2990	
						14.83	14.63	14.62	

T = 9 h 70 m Yh = 70.7

z = 0 - 15

	388	39.2	39.2	39.1	22.5	22.2	22.3	23.0	+16.6
	54.4	55.2	55.4	55.0	39.4	39.3	39.3	39.8	+15.6
	53.0	53.7	53.5	53.4	36.1	36.1	36.0	36.3	+17.3
	53.2	53.0	53.4	53.2	36.5	36.5	36.2	36.8	+16.7
	1994	2011	2015			1341	1338	1359	
	4985	5028	5038			3352	3345	3398	
						16.33	16.83	16.40	

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1880phae.proj.1837R

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Investigation of 4 quadrants

ΣR^2 = Constant

0 – 90		90–180		180–270		270–0	
R	B	R	B	R	B	R	B
00	00	0.0	0.0	00	00	00	00
16.4	16.3	23.4	23.9	22.8	22.9	17.3	17.4
14.9	15.0	21.2	21.2	16.8	16.8	8.9	9.1
12.8	15.0	17.8	17.2	10.9	10.8	11.7	11.2
14.1	16.3	624	623	505	505	359	357
14.28	~~14.72~~ 14.08	1560	1586	1262	~~1412~~ 1262	9486	9.42
14.18		15.59		12.62		9.45	

14.18 − 1.22

15.59 − 2.63

12.62 + 0.34

9.45 + 3.51

5184

12.96

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Equation of Intergradient point

[illegible]

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200

0 – 90

0	32.3	32.2	31.9	32.0	16.0	15.5	15.5	15.4
	47.8	48.0	47.6	47.5	39.3	38.3	38.4	38.5
	46.4	46.2	46.1	45.9	35.6	35.0	35.4	34.9
	47.1	46.7	47.1	46.5	32.2	31.9	31.8	32.0
	17.36	17.31	17.27	17.19	12.31	12.07	12.11	12.08
	43.40	43.26	43.15	43.04	30.78	30.18	30.28	30.20
					7.62	7.31	7.90	7.76

90 – 180 0 – 90

0	26.0	25.9	25.8	33.4	33.4	33.8
	42.3	42.0	42.2	57.0	57.1	57.2
	40.9	40.3	39.7	52.8	52.9	53.1
	41.2	40.5	41.1	48.9	49.7	50.2
	15.04	14.87	14.88	19.21	19.31	19.43
	37.60	37.18	37.20	48.03	48.28	48.58
				8.90	8.62	

90 – 180

2.73	28.0	28.1	40.5	41.0	
51.2	52.1	52.0	2.2	2.8	
47.3	48.5	58.4	84.0	84.2	
46.6	44.8	44.2	49.5	49.5	
19.34	19.27		24.62	24.75	
43.36	43.35	43.18			
			6.80	5	
			5.56	5.18	
				8.70	

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1880phae.proj.1837R

180–270

594	596
218	215
133	135
79	76
~~2824~~	2822
~~2560~~	1055
~~1060~~	

~~233~~	116	118
~~245~~	272	270
~~397~~	180	180
~~437~~	220	213
~~1646~~	788	781
~~4411~~	1970	1952
	910	899
	904	

270 – 0

116	116
~~211~~	273
108	180
212	211
779	782
1948	1955

~~178~~	182	183
~~273~~	331	331
~~389~~	333	333
	349	349
	1195	1196
	2588	2990
	1033	1035
		1034

8.98	+23	23
8.79	+42	60
~~9.04~~	+17	82
10.04	–.83	
36 85		
9.21		

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202

Rapid Scans

0—90

24.9 25.0 24.9
40.8 40.8 40.9
39.7 40.0 40.0
40.0 40.3 40.5
14.54 14.61 14.63
36.35 36.52 36.58

35.4 35.4 35.6
58.9 58.6 58.5
55.9 56.1 55.9
52.6 52.5 52.8
20.28 20.26 20.28
50.95 50.65 50.70
14.60 14.13 14.12
14.28

90—180

35.0 36.0 35.9
58.0 59.8 0.0
54.9 57.0 57.3
52.0 52.0 52.5
19.99 20.48 20.57
49.98 57.20 51.42

57.2 51.8 57.4 57.5
13.3 13.3 13.3 13.2
6.8 6.6 7.1 6.7
1.3 1.3 0.9 0.4
20.26 20.30 20.30 20.43
63.15 63.25 63.35 63.85
13.19 12.05 11.83 11.43
12.35 7.05
2.35

180—270

26.1 25.0 25.0
47.5 47.7 47.4
41.0 40.7 40.6
34.3 33.6 34.0
14.89 14.70 14.70
36.28 36.75 36.75

40.0 40.1 40.6
56.1 56.4 56.2
48.1 48.1 48.1
50.9 50.9 51.1
20.51 20.55 20.60
51.78 51.38 51.50
14.55 14.63 14.75

193
1464

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270 – 0

240	24.02	240
393	410	409
326	326	326
339	350	355
1283	1328	1330
3208	3320	3325

339	339
491	493
501	505
571	516
1842	1853
4605	4635
1301	1310
1285	
1297	

	II		I		Mean
1428	−.72	+23	−49	−.24	−24
1235	+1.21	+42	+1.63	+81	+57
1464	−1.08	+17	−.91	−45	+12
1297	+59	−83	−24	−12	−.00
1424					
1356					

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0 – 90

2 2.1
37.9
~~27.1~~
37.0
124
~~3 403~~

28.8 ~~27.7~~
45.0 45.4
44.6 45.1
45.6 ~~44.0~~
~~16~~ 1633
4052 ~~4082~~

~~3.97~~
36.9
~~59.2~~
57.6
~~54.2~~
2079
~~51.98~~
~~1146~~

33.4 33.4 33.5 33.7
50.8 50.9 50.6 50.7
50.6 50.5 50.8 50.9
49.1 49.1 49.2 49.1
1839 1839 1841 1844
45.98 45.98 46.02 46.10

36.1 36.9 36.9 36.9
59.3 59.9 60.1 59.8
57.8 58.1 58.1 57.5
53.4 54.0 53.9 53.9
2066 2089 2090 2081
5165 5222 5225 5202
5.67 6.24 6.23 5.90
6.01 4.04

90 – 180

26.9 26.2 26.2
50.8 50.7 50.9
47.8 48.2 48.2
43.9 43.9 43.8
1694 1690 1691
42.35 42.25 42.28

33.1 33.1 33.0
54.4 54.9 55.0
49.4 49.2 48.9
44.0 43.8 42.9
1809 1810 ~~1898~~
4522 45.25 ~~44.95~~
2.87 3.00 ~~4.92~~ 2.67 ~~2.54~~ 2.13
~~2.14~~

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180 - 270

23.3	22.6	22.5
45.5	45.4	45.3
39.1	39.0	38.7
33.2	31.6	32.1
141.1	138.6	138.6
35.28	34.65	34.65

28.9	28.6	28.9
44.9	44.6	45.1
37.6	37.5	37.1
40.6	40.8	40.8
152.0	157.5	151.9
38.00	37.88	37.55
2.72	3.23	3.30

270 - 360

29.2	26.9	27.1
45.8	44.3	44.5
37.4	36.4	36.3
40.8	38.2	38.5
153.2	145.8	146.4
36.30	36.45	36.60

30.3	30.6	31.1
46.1	46.5	46.6
48.0	47.9	47.5
48.9	48.8	48.6
173.3	173.8	
43.35	43.45	
5.05	7.00	

0 - 90

30.9	32.5	
46.8	49.0	
46.9	49.2	
48.2	49.0	
172.8		
43.20		

35.8	35.9	
0.0	0.1	
59.0	58.6	
55.2	54.8	

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May 13 1881 Set. of zero with Lamont-scale

Pointing of quadrant-Bores

$\zeta = 45^\circ$ $R = 0$

E	A	G	N	E	A	G	N	G	N	E	D	N	E	D	G
0.0	14.4	16.4	15.8	0.0	1.8	1.1	45,0	0.0	59.8	43.9	58.9	0.0	44.4	59.2	0.7
0.0	14.2	16.0	15.1	0.0	1.2	0.8	45.7	0.0	0.0	44.4	58.8	0.0	44.7	58.9	0.5
0.0	14.2	16.2	16.0	0.0	1.8	1.3	45.6	0.0	59.8	43.8	59.0	0.0	43.9	58.3	0.2
0.0	15.4	16.1	16.0	0.0	1.6	0.8	45.8	0.0	59.7	44.0	58.5	0.0	44.0	58.4	0.1
0.0	14.9	16.4	16.2	0.0	1.7	1.6	45.3	0.0	59.8	43.9	58.4	0.0	43.7	59.0	0.1
0.0	14.9	16.7	15.9	0.0	1.5	0.9	46.0	0.0	59.9	44.1	58.9	0.0	44.0	58.3	59.9
		40	28	300			36	65	334		590	24	516		247	524
		14.67	16.47	15.00	0.0	1.60	1.08	45.57	0.0	59.82	44.02	58.60	0.0	44.12	58.85	0.25

$\zeta = 13^\circ$ $2R = 60$

0.0	22.1	22.7	18.4	0.0	0.2	56.1	38.2	0.0	55.7	37.6	59.9	0.0	42.0	4.0	4.6
0.0	20.8	22.8	18.4	0.0	0.2	55.9	38.1	0.0	55.2	37.9	59.9	0.0	42.0	4.1	4.2
0.0	22.7	23.1	19.1	0.0	0.1	55.8	37.9	0.0	55.9	37.9	0.1	0.0	42.2	4.2	4.2
0.0	22.4	23.2	18.6	0.0	0.2	55.8	38.0	0.0	55.6	38.0	59.6	0.0	41.9	4.1	4.1
0.0		12	118	348		7	36	2		24	314	395		8	4	11
	22.30	22.95	18.63	0.0	0.18	55.90	38.05	0.0	55.60	37.85	59.88	0.0	42.02	4.10	4.28

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$F = 225$ $2 = 180$

0.7	0.0	21.9	17.4	10.0	0.0	55.0	48.1	38.2	0.0	52.9	42.9	4.1	0.0	48.9	10.6	6.7
25	0.0	21.7	16.9	10.0	0.0	55.3	47.6	38.3	0.0	53.1	42.8	4.1	0.0	49.2	10.5	6.5
0.2	0.0	21.3	16.6	9.9	0.0	54.8	47.8	38.6	0.0	53.2	42.7	4.2	0.0	49.0	10.7	6.2
0.1	0.0	21.1	16.7	9.7	0.0	54.9	48.2	38.3	0.0	53.0	43.1	4.0	0.0	48.9	10.2	6.1
											35	4		360	40	15
0.1	0.0	20	36	34		200	317	14								
59	0.0	21.50	16.60	9.85	0.0	55.00	47.92	36.25	0.0	53.05	42.88	4.10	0.0	49.00	10.50	6.38

$z=2$

0.25

$F = 325$ $2 = 270$

1.6	0.0	15.0	8.8	11.8	0.0	54.2	56.1	45.4	0.0	2.4	51.6	6.8	0.0	49.2	4.9	57.3
1.2	0.0	15.1	8.8	10.9	0.0	54.0	56.0	45.3	0.0	2.1	51.8	7.0	0.0	49.0	4.8	57.7
1.2	0.0	15.9	8.3	11.8	0.0	53.9	56.0	44.9	0.0	2.0	51.3	7.0	0.0	49.7	5.1	58.2
1.1	0.0	15.6	8.8	11.0	0.0	53.4	56.2	45.1	0.0	2.1	51.6	7.1	0.0	49.7	4.8	58.0
11		16	17	55	0.0	155	3	207			23	29		16	196	32
428	0.0	15.40	8.68	11.38	0.0	53.88	56.08	45.18	0.0	2.15	51.58	6.98	0.0	49.40	4.90	57.80

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1880phae.proj.1837R

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	Σ−F	F−G	G−H	H−Σ
0	14.67	6.60	5.82	4.12
90	22.30	55.00	55.60	42.02
180	21.50	55.00	53.05	49.00
270	15.40	53.88	62.15	49.40
	13.87		30.62	24.54
	18.47		56.40	46.13
		56.52	57.65	

	Σ−F	F−G	G−H	H−Σ
0	+3.80	−3.83	−3.03	+3.07
90	−3.83	+1.46	+3.42	+4.11
180	−3.03	+1.08	+0.80	−2.87
270	+3.07	−2.30	−4.28	−3.27
			−2.17	
			+2.05	
			+4.60	
			−4.50	

	Σ−F	F−G	G−H	H−Σ
0	+3.80	−3.54	−2.17	+2.01
90	−3.83	−2.52	+2.05	+4.11
180	−3.03	+2.66	+4.60	−2.87
270	+3.07	+3.78	−4.50	−3.27
			−2.17	
			+2.05	
			+4.60	
			−4.50	

(Σ − F) + (F − G) + (G − H) + (H − Σ) = 0

	0°	90°	180°	270°
Σ−F	+3.80	−3.83	−3.03	−3.07
F−G	−3.54	−2.52	+2.66	+3.78
G−H	−2.17	+2.05	+4.60	+4.50
H−Σ	+2.01	+4.11	−2.87	−3.27
4	−.07	−.05	+0.37	+.48

Mean of 4 Mirrorings

+3.78"	−3.53	−3.11	+3.08
−3.93	−2.63	+2.18	+4.38
−1.93	+2.03	+4.40	−4.60
+1.90	+4.40	−3.50	−2.75
−.05	+.02	+.02	+.02

0−90 90−180 180−270 270−360

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						July 1881	June 1879
		E — F			Mean		
0–90	1	-14.67	14.43	14.38	14.64	-14.58 +2.78	+2.79
90–180	2	-22.30	21.85	22.03	22.08	-22.09 -3.73	-4.04
180–270	3	-21.50	21.65	21.22	21.50	-21.47 -3.11	-2.17
270–360	4	-15.40	14.85	15.40	15.50	-15.28 +3.08	+3.28
						-18.36 +0.00	

F — G

0–90	1	-1.60	1.40	1.80	1.50	1.58 -3.93 -3.93	-5.35
90–180	2	-0.18	0.65	0.12	0.18	0.28 +2.63 -6.56	-2.97
180–270	3	-55.00	55.10	55.80	55.88	55.47 +2.18 -4.38	+4.78
270–360	4	-53.88	53.28	53.02	52.90	53.27 +4.38 0.00	+3.51
						57.65 0.00	

G — H

0–90	1	59.82	58.83	59.48	59.70	59.64 -1.93	-2.05
90–180	2	55.60	55.67	55.72	55.72	55.68 +2.03	+6.07
180–270	3	58.05	53.25	52.92	53.62	53.21 +4.50	+4.04
270–360	4	62.15	62.70	62.20	62.20	62.31 -4.60	-4.56
						57.71 0.00	

H — E

0–90	1	44.12	45.00	44.49	44.20	44.45 +1.90	+3.71 -1.90
90–180	2	42.02	41.38	42.15	42.25	41.95 +4.40	-6.30
180–270	3	49.00	50.15	50.43	49.83	49.85 -3.50	-2.80
270–360	4	49.40	48.62	49.10	49.43	49.14 -2.09 -3.80	0.00
						46.35 0.11	

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212 Aug 14 1881 R Sr. Quadrant points

ERGN FAINT GREEN NEEDS

Σ=45 z=0

~~24.7~~	40.5	38.4	~~39.6~~	40.2	38.6	39.7	24.8	~~39.6~~ ~~40.1~~	39.8 ~~24.3~~	24.3 ~~40.1~~	40.1 ~~38.9~~	40.1	24.3	40.1	38.9
24.3	40.0	39.1	39.7	40.1	39.0	39.9	24.1	38.9	39.7	24.0	39.8	39.4	23.8	40.0	39.1
24.3	40.0	38.8	39.7	39.9	38.7	39.8	24.4	39.0	40.1	24.6	39.9	39.7	24.7	39.7	38.9
13	5	23	22	2	23	24	13	5	26	9	28	22	8	28	29
24.43	40.17	38.77	39.73	40.07	38.77	39.80	24.43	39.17	39.87	24.30	39.93	39.73	24.27	39.93	38.97

Σ=135 z=90

31.3	54.9	51.3	47.8	55.0	51.3	47.7	31.3	51.3	47.3	31.2	54.3	47.4	31.3	54.4	51.3
31.2	54.6	51.3	47.6	54.8	51.1	47.6	31.4	51.2	47.8	31.3	54.5	47.8	31.0	54.7	51.2
31.4	54.8	51.3	48.0	55.2	51.1	47.8	31.4	51.3	47.8	31.3	54.7	48.0	31.3	54.7	51.2
9	23	9	24	0	5	21	11	8	19		15	22	6	18	7
31.30	54.77	51.3	48.80	55.00	51.17	47.7	31.37	51.27	47.63	31.27	54.5	47.73	31.20	54.6	51.2

Σ=225 z=180

26.7	49.2	41.3	35.6	49.8	41.2	35.8	27.1	40.8	35.1	27.2	49.4	35.3	27.2	49.2	40.6
27.2	49.1	40.9	35.7	49.0	41.2	35.9	27.0	41.2	35.6	27.6	49.6	35.7	27.3	49.4	41.2
27.0	49.6	41.1	35.3	49.5	41.3	35.4	27.0	41.2	35.4	27.0	49.7	35.6	27.2	49.0	41.2
1	9	3	16	13	7	21	1	2	11	8	17	16	7	6	0
27.03	49.30	41.1	35.53	49.43	41.23	35.70	27.03	41.07	35.87	27.27	49.57	35.53	27.23	49.20	41.00

Σ=270

24.3	40.1	30.6	33.7	39.8	30.2	33.8	24.4	30.2	34.0	24.6	40.3	35.0	24.6	40.2	30.4
14.6	30.0	20.7	24.1	30.0	20.5	24.3	14.6	20.6	24.2	14.6	29.8	23.8	14.4	29.7	20.0
14.8	29.8	20.6	24.2	30.2	20.3	24.0	14.2	20.3	24.1	14.6	30.4	23.8	14.3	29.9	20.4
14.3	30.0	20.3	23.9	29.9	20.4	23.8	14.3	20.3	24.0	14.2	30.2	23.8	14.2	30.0	20.3
12	28	16	2	1	12	1	1			14	4			26	27
14.40	29.93	20.53	24.07	30.03	20.40	24.07	14.03	20.40	24.10	14.47	30.13	23.80	14.30	29.87	20.2

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B Le

E T-9 N6 T-9 N6 E 9 N6 EF N6 EF 9

24.3 39.9 37.8 39.9 39.9 38.6 39.5 24.4 38.6 39.7 24.3 40.0 39.5 24.3 39.7 38.4
24.4 39.8 38.3 39.4 39.9 38.6 39.7 24.8 38.5 39.5 24.4 39.9 39.4 24.3 40.0 38.4
24.5 39.7 38.8 39.8 39.7 38.6 39.6 24.2 38.3 39.2 24.3 39.7 39.3 24.5 39.7 38.5
15 24 4 21 25 18 14 14 14 10 26 11 24 13

24.50 39.80 38.13 39.90 39.83 38.60 39.60 24.47 38.47 39.47 24.33 39.87 39.46 24.37 39.80 38.43

31.3 54.7 51.2 46.9 54.4 51.2 47.1 31.3 51.4 47.2 31.3 54.3 46.9 31.4 54.7 51.6
31.2 54.9 51.2 47.1 54.5 51.3 47.0 31.4 51.5 46.9 31.6 54.3 47.0 31.7 54.6 51.0
31.4 54.5 51.2 47.0 54.6 50.9 47.1 31.4 51.2 47.4 31.5 54.9 47.0 31.3 54.7 51.1
9 21 0 17 4 2 11 11 5 14 15 29 14 20 7

31.30 54.70 51.20 47.00 54.57 51.13 47.07 31.37 51.37 47.17 31.47 54.5 46.97 31.47 54.67 51.23

27.5 49.2 41.2 34.9 49.2 40.8 35.0 27.3 40.9 35.1 27.1 49.5 35.1 27.6 49.3 40.8
27.1 49.3 41.1 35.1 49.0 40.8 35.2 27.1 40.9 35.2 27.2 49.4 84.9 27.2 49.5 41.0
27.5 49.0 41.0 35.0 49.3 41.1 35.3 27.1 41.0 35.2 27.1 49.2 35.2 27.1 49.6 41.1
11 5 3 0 5 27 5 5 28 5 4 11 2 9 14 29

27.37 49.17 41.10 35.00 49.17 40.90 35.17 27.17 40.93 35.17 27.13 49.37 35.07 27.30 49.47 40.97

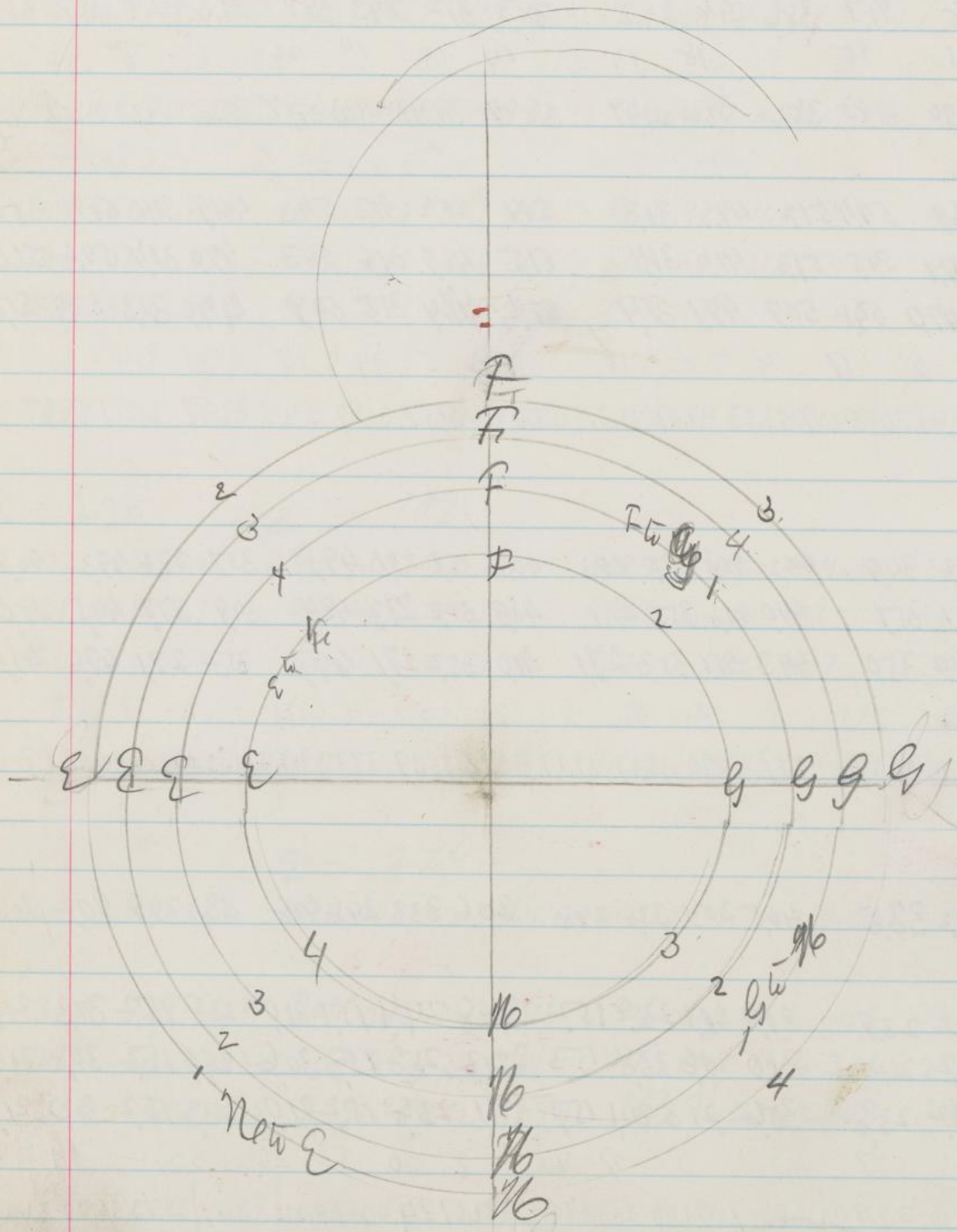
25.0 40.2 30.2 33.5 40.5 30.4 33.8 24.8 30.6 33.3 24.8 40.8 33.1 24.9 40.2 30.5

15.2 31.0 20.9 23.9 31.0 21.1 23.8 15.2 20.8 24.4 15.7 31.0 23.9 15.2 31.3 21.0
15.7 30.9 21.2 24.0 31.0 20.6 23.8 15.3 21.3 23.8 15.3 30.6 24.0 15.2 30.8 21.2
15.7 30.8 21.2 23.8 30.6 21.3 24.1 15.5 21.1 23.8 15.2 31.0 23.3 15.2 31.0 21.1
15.3 6 27 3 27 26 0 27 10 2 0 26 22 1

15.20 30.90 21.10 23.90 30.87 21.00 23.90 15.33 21.07 24.00 15.20 30.87 23.73 15.20 31.03 21.10

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Σ	ν_0	
170	17.6	
158	14.9	
168	25	
184	16.2	−2,2
5-1	10.1	
28	12.3	
75	24	
4.0	11.2	+ 9.2 / 50
		12.5

51.2
243
26.9

14
41
33
2.0

14.9	4.2
266	17.0
265	14.9
251	14.1

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198 – 149
170. 176

18
3–
14.5

42 23
41

303
321

182
61

10.0	5 6.8	132			
21.1	8.8	128			
21.7	7.4	133			
20.1	7.3	128			
	3	113			
		12.8			
13.8	6.8	153	7.0	6.1	
25.0	10.8	142	14	13.7	(4 seems next)
25.5	9.6	154	14	21.8	
24.7	9.4	143	4.2	10.9	– 6.7
		207			
		8.2			
			18.0	16.7	
13.9	5.8.4	135	19.8	14.7	
25.2	10.8	144	17.1	7.3	
25.9	9.5	164	16.5	120	
24.5	8.8	157	18.45	16.00	– 2.4
		220			9.1
	5	15.5			4.5
	2.5				
12.5	5.8.0	145		76	
24.0	10.2	138		62	
24.2	9.0	15.2		14	
23.0	8.9	14.1		3.8	
		176			
		14.7			

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