

LÍNEA DIVISORIA CON LOS ESTADOS UNIDOS.
Observaciones de los pares de estrellas—Continuación.

ABRIL 25 DE 1898.

Pares.	Cronómetro.	Micrómetro.	Nivel.		δ	$\frac{1}{2}(\delta + \delta')$	Correcciones.				Latitud 31° 20' +
			oc.	ob.			m	n	
10'		44.242	4.0	35.7	31 13 55.25	31 14 33.72	+ 5 32.12	- 0.55	0.09	0.00	5.38
		53.717	2.7	34.3	31 15 12.20						
		44.1965	8.4	40.3	29 15 13.06						
11'		54.6940	8.4	40.3	33 12 42.44	31 13 57.75	+ 6 7.96	0.00	0.10	0.00	5.81
		55.901	7.9	39.6	30 47 32.58						
12'		43.608	6.1	38.0	42 6 59.34	31 27 15.96	- 7 10.90	- 0.85	- 0.13	0.00	4.08
		56.801	7.5	39.4	36 0 35.81						
13'		42.410	8.8	40.7	26 22 50.27	31 11 43.04	+ 8 24.79	- 0.65	0.14	0.00	7.32
		43.9695	8.4	40.3	23 47 22.72						
14'		54.3510	8.5	40.6	38 40 40.42	31 14 1.57	+ 6 3.89	0.10	0.10	0.00	5.66

Discusión.

Pares.	Estrellas.	Latitud 31° 20'	Promedio.	Δ	Δ^2	$\Delta \varphi$	$\Delta \varphi^2$	η
1	Safford 8 A.....	6.19	6.19			0.88	0.7744	1.000
	" 13 A.....							
2	New 582.....	4.35	5.38	0.93	0.8649	0.03	0.0009	0.333
	Safford 28 B.....	5.56		0.28	0.0784			
		5.92		0.64	0.4096			
4	Safford 91 A.....	6.56	6.14	0.08	0.0064	0.83	0.6889	0.333
	" 104 C.....	6.22		0.49	0.2401			
		5.65		0.49	0.2401			
5	8 Draconis A.....	6.55	5.39	1.16	1.3456	0.08	0.0064	0.333
	New 597.....	5.01		0.38	0.1444			
		4.60		0.79	0.6241			
6	Safford 127 A.....	6.79	6.96	0.17	0.0289	1.65	2.7225	0.333
	" 134 B.....	7.20		0.24	0.0576			
		6.89		0.07	0.0049			
7	Safford 142 B.....	6.97	6.61	0.36	0.1296	1.30	1.6900	0.500
	" 132 B.....	6.25		0.36	0.1296			
9	Safford 157 A.....	4.16	5.09	0.93	0.8649	0.22	0.0484	0.500
	" 170 A.....	6.02		0.93	0.8649			
10	Safford 173 B.....	4.87	5.06	0.19	0.0361	0.25	0.0625	0.333
	" 175 A.....	5.50		0.44	0.1936			
		4.80		0.26	0.0676			
11	Safford 188 A.....	4.10	4.09	0.01	0.0001	1.22	1.4884	0.333
	" 195 C.....	4.34		0.25	0.0625			
		3.82		0.27	0.0729			
12	Safford 221 A.....	5.03	5.70	0.67	0.4489	0.39	0.1521	0.333
	" 232 A.....	6.70		1.00	1.0000			
		5.37		0.33	0.1089			

Discusión—Continuación.

Pares.	Estrellas.	Latitud 31° 20'	Promedio	Δ	Δ^2	$\Delta \varphi$	$\Delta \varphi^2$	η .
13	Safford 240 C.....	7.92	7.58	0.34	0.1156	2.27	5.1529	0.333
	" 252 A.....	8.10		0.52	0.2704			
		6.73		0.85	0.7225			
a	Safford 254 A.....	5.29	4.19	1.10	1.2100	1.12	1.2544	0.333
		3.65		0.54	0.2916			
		3.63		0.56	0.3136			
b	Safford 262 B.....	4.63	5.29	0.64	0.4096	0.62	0.0004	0.500
	" 274 A.....	5.94		0.65	0.4225			
c	Safford 292 B.....	5.84	4.61	1.23	1.5129	0.70	0.4900	0.333
	" 304 B.....	3.81		0.80	0.6400			
		4.19		0.42	0.1764			
d	Safford 310 B.....	3.43	3.41	0.02	0.0004	1.90	3.6100	0.333
	" 311 B.....	3.76		0.35	0.1225			
		3.04		0.37	0.1369			
e	Safford 315 A.....	7.15	6.43	0.72	0.5184	1.12	1.2544	0.500
	" 325 C.....	5.70		0.73	0.5329			
f	Safford 328 C.....	4.00	3.51	0.49	0.2401	1.80	3.2400	0.333
	" 334 A.....	3.44		0.07	0.0049			
		3.09		0.42	0.1764			
g	Safford 343 C.....	3.76	3.78	0.02	0.0004	1.53	2.3409	0.500
	" 356 B.....	3.79		0.01	0.0001			
h	Safford 376 C.....	5.89	5.92	0.03	0.0009	0.61	0.3721	0.333
	" 380 B.....	6.06		0.14	0.0196			
		5.80		0.12	0.0144			
i	Safford 386 A.....	3.87	3.92	0.05	0.0025	1.39	1.9321	0.333
	" 402 A.....	4.23		0.31	0.0961			
		3.66		0.26	0.0676			
l	Safford 430 B.....	4.16	4.47	0.31	0.0961	0.84	0.7056	0.333
	" 439 A.....	4.79		0.32	0.1024			
		4.45		0.02	0.0004			
m	Safford 441 A.....	5.77	4.62	1.15	1.3225	0.69	0.4761	0.333
	" 460 A.....	4.34		0.28	0.0784			
		3.74		0.88	0.7744			
1'	Safford 490 A.....	4.65	4.60	0.05	0.0025	0.71	0.5041	0.333
	" 495 A.....	4.70		0.10	0.0100			
		4.44		0.06	0.0036			
2'	Safford 501 B.....	7.05	6.53	0.52	0.2704	1.22	1.4884	0.500
	" 513 A.....	6.01		0.52	0.2704			
3'	Safford 525 A.....	6.57	6.81	0.24	0.576	1.50	2.2500	0.333
	" 544 B.....	6.57		0.24	0.0576			
		7.29		0.48	0.2304			
4'	Safford 556 B.....	5.23	4.25	0.98	0.9604	1.06	1.1236	0.333
	" 562 A.....	3.94		0.31	0.0961			
		3.59		0.66	0.4356			

Discusión—Continuación.

Pares.	Estrellas.	Latitud 31° 20'	Promedio.	Δ	Δ^2	$\Delta \varphi$	$\Delta \varphi^2$	η
5'	Safford 571 A.....	6.66	7.13	0.47	0.2209	1.82	3.3124	0.333
	" 585 B.....	7.57		0.44	0.1936			
		7.17		0.04	0.0016			
6'	Safford 591 A.....	2.56	3.61	1.05	1.1025	1.70	2.8900	0.333
	" 604 A.....	4.28		0.67	0.4489			
		3.99		0.38	0.1444			
7'	Safford 618 B.....	4.73	5.37	0.64	0.4096	0.06	0.0036	0.333
	" 626 A.....	5.53		0.16	0.0256			
		5.85		0.48	0.2304			
8'	Safford 637 A.....	7.13	6.15	0.98	0.9604	0.84	0.7056	0.333
	" 643 A.....	5.60		0.55	0.3025			
		5.71		0.44	0.1936			
9'	Safford 654 A.....	4.53	4.75	0.22	0.0484	0.56	0.3136	0.333
	" 658 C.....	4.99		0.24	0.0576			
		4.73		0.02	0.0004			
10'	Safford 670 B.....	4.33	4.53	0.20	0.0400	0.78	0.6084	0.333
	" 689 A.....	3.88		0.65	0.4225			
		5.38		0.85	0.7225			
11'	Safford 721 A.....	5.14	5.84	0.34	0.1156	0.17	0.0289	0.500
	" 727 C.....	5.81		0.33	0.1089			
12'	Safford 742 A.....	5.89	4.90	0.99	0.9801	0.41	0.1681	0.333
	" 755 A.....	4.72		0.18	0.0324			
		4.08		0.82	0.6724			
13'	Safford 764 B.....	6.55	6.93	0.38	0.1444	1.62	2.6244	0.500
	" 782 C.....	7.32		0.39	0.1521			
14'	Safford 784 A.....	6.16	5.77	0.39	0.1521	0.46	0.2116	0.333
	" 801 AA.....	5.50		0.27	0.0729			
		5.66		0.11	0.0121			
	Promedio.....	5.31			28.7173		44.7961	13.991

El catálogo de los pares observados se encuentra en las páginas 215 y 216.

$$n = 98 \quad m = 36 \quad n - m = 62$$

$$e = 0.6745 \sqrt{\frac{\Delta^2}{n - m}} = 0.4593 \quad e^2 = 0.2107$$

$$E_{\varphi}^2 = 0.455 \frac{\Delta \varphi^2}{m} = 0.5822$$

$$e^2 = \frac{e^2 \left[\frac{1}{n} \right]}{m - 1} = 0.0842$$

$$= E_{\delta}^2 = E_{\varphi}^2 - e^2 = 0.5822 - 0.0842 = 0.4981$$

$$E_{\delta} = \pm 0.71$$

$$w = \frac{1}{E_{\delta}^2 + \frac{e^2}{n}}$$

Pesos de los promedios.

- 1 observación $w = 1.41 = 0.80$
- 2 observaciones $w = 1.66 = 0.96$
- 3 " " $w = 1.76 = 1.00$



CALLE INTERNACIONAL, EN NOGALES.

Determinación de la Corrección al Valor R del Micrómetro.

Pares.	Ecuaciones.	Pesos.	Pares.	Ecuaciones.	Pesos.
1	$\varphi - 7.10 \text{ d R} - 6.19 = 0$	0.80	A	$\varphi - 8.97 \text{ d R} - 5.92 = 0$	1.00
2	$\varphi - 7.79 \text{ d R} - 5.28 = 0$	1.00	i	$\varphi + 2.91 \text{ d R} - 3.92 = 0$	1.00
4	$\varphi - 4.88 \text{ d R} - 6.14 = 0$	1.00	l	$\varphi + 2.03 \text{ d R} - 4.47 = 0$	1.00
5	$\varphi + 2.86 \text{ d R} - 5.39 = 0$	1.00	m	$\varphi - 1.35 \text{ d R} - 4.62 = 0$	1.00
6	$\varphi - 9.74 \text{ d R} - 6.96 = 0$	1.00	1'	$\varphi - 3.39 \text{ d R} - 4.60 = 0$	1.00
7	$\varphi - 7.82 \text{ d R} - 6.61 = 0$	0.96	2'	$\varphi + 4.59 \text{ d R} - 6.53 = 0$	0.96
9	$\varphi - 7.54 \text{ d R} - 5.09 = 0$	0.96	3'	$\varphi - 5.37 \text{ d R} - 6.81 = 0$	1.00
10	$\varphi - 1.06 \text{ d R} - 5.06 = 0$	1.00	4'	$\varphi + 9.29 \text{ d R} - 4.25 = 0$	1.00
11	$\varphi + 0.93 \text{ d R} - 4.09 = 0$	1.00	5'	$\varphi - 14.59 \text{ d R} - 7.13 = 0$	1.00
12	$\varphi + 8.12 \text{ d R} - 5.70 = 0$	1.00	6'	$\varphi + 7.36 \text{ d R} - 3.61 = 0$	1.00
13	$\varphi - 3.30 \text{ d R} - 7.58 = 0$	1.00	7'	$\varphi + 5.36 \text{ d R} - 5.37 = 0$	1.00
a	$\varphi - 5.46 \text{ d R} - 4.19 = 0$	1.00	8'	$\varphi - 8.13 \text{ d R} - 6.15 = 0$	1.00
b	$\varphi - 5.39 \text{ d R} - 5.29 = 0$	0.96	9'	$\varphi + 1.66 \text{ d R} - 4.75 = 0$	1.00
c	$\varphi - 5.13 \text{ d R} - 4.61 = 0$	1.00	10'	$\varphi - 4.73 \text{ d R} - 4.53 = 0$	1.00
d	$\varphi + 4.91 \text{ d R} - 3.41 = 0$	1.00	11'	$\varphi - 5.36 \text{ d R} - 5.48 = 0$	0.96
e	$\varphi - 4.16 \text{ d R} - 6.43 = 0$	0.96	12'	$\varphi + 6.20 \text{ d R} - 4.90 = 0$	1.00
f	$\varphi - 3.99 \text{ d R} - 3.51 = 0$	1.00	13'	$\varphi - 7.30 \text{ d R} - 6.93 = 0$	0.96
g	$\varphi - 3.61 \text{ d R} - 3.78 = 0$	0.96	14'	$\varphi - 5.21 \text{ d R} - 5.77 = 0$	1.00

$$\begin{aligned}
 [a \text{ a. p}] &= + 35.52 & [a \text{ b. p}] &= - 82.18 \\
 [a \text{ n. p}] &= - 188.33 & [b \text{ b. p}] &= 950.36 \\
 [b \text{ b. p}] &= 1140.50 & [b \text{ n. p}] &= 545.75 \\
 & & [b \text{ n. p}] &= 110.26
 \end{aligned}$$

$$\begin{aligned}
 \varphi &= 5.03'' \\
 d R &= - 0.116 \\
 d R' &= g' \frac{1}{950.36} \\
 \varphi' = \chi' &= \frac{1}{29.60}
 \end{aligned}$$

Resultado final.

Pares.	Latitudes.	p	p φ	Δ	Δ²	p Δ²	Pares.	Latitudes.	p	p φ	Δ	Δ²	p Δ²	
1	5.51	0.80	4.408	0.48	0.2304	0.1843	h	5.06	1.00	5.06	0.03	0.0009	0.0009	
2	4.53	1.00	4.530	0.50	0.2500	0.2500	i	4.30	1.00	4.30	0.83	0.6889	0.6889	
4	5.67	1.00	5.670	0.64	0.4096	0.4096	l	4.67	1.00	4.67	0.36	0.1296	0.1296	
5	5.66	1.00	5.660	0.63	0.3969	0.3969	m	4.49	1.00	4.49	0.54	0.2916	0.2916	
6	6.02	1.00	6.020	0.99	0.9801	0.9801	1'	4.28	1.00	4.28	0.75	0.5625	0.5625	
7	5.84	0.96	5.606	0.83	0.6889	0.6613	2'	6.97	0.96	6.091	1.94	3.7636	3.6131	
9	4.37	0.96	4.195	0.66	0.4356	0.4182	3'	6.39	1.00	6.39	1.26	1.5876	1.5876	
10	4.96	1.00	4.960	0.07	0.0049	0.0049	4'	5.14	1.00	5.14	0.11	0.0121	0.0121	
11	4.19	1.00	4.190	0.84	0.7056	0.7056	5'	5.73	1.00	5.73	0.70	0.4900	0.4900	
12	6.48	1.00	6.480	1.45	2.1025	2.1025	6'	4.31	1.00	4.31	0.72	0.5184	0.5184	
13	7.27	1.00	7.270	2.24	5.0176	5.0176	7'	5.87	1.00	5.87	0.84	0.7056	0.7056	
a	3.67	1.00	3.670	1.36	1.8496	1.8496	8'	5.37	1.00	5.37	0.84	0.7056	0.7056	
b	4.77	0.96	4.579	0.36	0.0676	0.0649	9'	4.91	1.00	4.91	0.12	0.0144	0.0144	
c	4.12	1.00	4.120	0.91	0.8281	0.8281	10'	4.08	1.00	4.08	0.65	0.4225	0.4225	
d	3.88	1.00	3.880	1.15	1.3225	1.3225	11'	4.97	0.96	4.771	0.06	0.0036	0.0036	
e	6.03	0.96	5.789	1.00	1.0000	0.9600	12'	5.50	1.00	5.50	0.47	0.2209	0.2209	
f	3.13	1.00	3.130	1.90	3.6100	3.6100	13'	6.24	0.96	5.99	1.21	1.4641	1.4055	
g	3.43	0.96	3.293	1.60	2.5600	2.4576	14'	5.27	1.00	5.27	0.24	0.0576	0.0576	
										35.52			33.9894	33.5440

$$\begin{aligned}
 \text{Latitud del punto de observación} & \dots\dots\dots 31^{\circ} 20' 5.03'' \pm 0.11 \\
 \text{Reducción al Monumento 122} & \dots\dots\dots = 4.06 \\
 \text{Latitud del Monumento 122} & \dots\dots\dots 31^{\circ} 20' 0.97
 \end{aligned}$$

Las latitudes puestas en la tabla de esta página, son las que resultan después de haber introducido en los cálculos la corrección encontrada arriba, para el valor angular de las revoluciones del tornillo micrométrico.