

TABLE 8

MAPPING COORDINATES FOR THE ZONES OF GRAZING ECLIPSE  
TOTAL SOLAR ECLIPSE OF 2009 JULY 22

ΔT = 65.9 s

Longitude	North Graze Zone		Northern	South Graze Zone		Southern	Path Azm °	Elev Fact	Scale Fact km/''
	Latitudes		Limit	Latitudes		Limit			
	Northern Limit	Southern Limit	Universal Time h m s	Northern Limit	Southern Limit	Universal Time h m s			
071°00.0'E	21°33.27'N	21°32.67'N	00:53:14	19°32.69'N	19°32.69'N	00:52:31	68.6	0.15	1.75
072°00.0'E	21°55.85'N	21°55.22'N	00:53:17	19°54.78'N	19°54.78'N	00:52:32	68.6	-0.16	1.76
073°00.0'E	22°18.20'N	22°17.57'N	00:53:22	20°16.67'N	20°16.67'N	00:52:35	68.6	-0.23	1.78
074°00.0'E	22°40.34'N	22°39.69'N	00:53:29	20°38.34'N	20°38.34'N	00:52:40	68.7	-0.26	1.79
075°00.0'E	23°02.23'N	23°01.58'N	00:53:37	20°59.78'N	20°59.78'N	00:52:47	68.7	-0.27	1.80
076°00.0'E	23°23.88'N	23°23.22'N	00:53:48	21°21.56'N	21°19.21'N	00:52:56	68.8	-0.28	1.80
077°00.0'E	23°45.27'N	23°44.59'N	00:54:01	21°42.51'N	21°40.09'N	00:53:07	69.1	-0.25	1.79
078°00.0'E	24°06.38'N	24°05.69'N	00:54:15	22°03.21'N	22°00.75'N	00:53:20	69.3	-0.24	1.78
079°00.0'E	24°27.21'N	24°26.51'N	00:54:32	22°23.62'N	22°21.16'N	00:53:35	69.6	-0.23	1.78
080°00.0'E	24°47.73'N	24°47.02'N	00:54:51	22°43.75'N	22°41.28'N	00:53:52	69.8	-0.23	1.78
081°00.0'E	25°07.93'N	25°07.22'N	00:55:11	23°03.57'N	23°01.09'N	00:54:12	70.1	-0.22	1.77
082°00.0'E	25°27.81'N	25°27.09'N	00:55:34	23°23.09'N	23°20.60'N	00:54:33	70.3	-0.22	1.77
083°00.0'E	25°47.34'N	25°46.63'N	00:55:59	23°42.28'N	23°39.79'N	00:54:57	70.6	-0.21	1.77
084°00.0'E	26°06.52'N	26°05.82'N	00:56:26	24°01.12'N	23°58.64'N	00:55:23	70.9	-0.21	1.77
085°00.0'E	26°25.30'N	26°24.64'N	00:56:55	24°19.62'N	24°17.14'N	00:55:51	71.2	-0.21	1.77
086°00.0'E	26°43.72'N	26°43.08'N	00:57:26	24°37.75'N	24°35.28'N	00:56:21	71.5	-0.20	1.77
087°00.0'E	27°01.75'N	27°01.13'N	00:58:00	24°55.48'N	24°53.07'N	00:56:54	71.8	-0.20	1.77
088°00.0'E	27°19.36'N	27°18.77'N	00:58:35	25°12.84'N	25°10.45'N	00:57:28	72.2	-0.19	1.77
089°00.0'E	27°36.58'N	27°36.00'N	00:59:13	25°29.79'N	25°27.44'N	00:58:05	72.5	-0.19	1.76
090°00.0'E	27°53.41'N	27°52.81'N	00:59:52	25°46.32'N	25°44.01'N	00:58:44	72.9	-0.19	1.76
091°00.0'E	28°09.80'N	28°09.16'N	01:00:34	26°02.41'N	26°00.16'N	00:59:25	73.3	-0.18	1.76
092°00.0'E	28°25.72'N	28°25.06'N	01:01:18	26°18.05'N	26°15.88'N	01:00:09	73.7	-0.18	1.76
093°00.0'E	28°41.16'N	28°40.50'N	01:02:04	26°33.24'N	26°31.05'N	01:00:55	74.2	-0.18	1.76
094°00.0'E	28°56.11'N	28°55.45'N	01:02:52	26°47.95'N	26°45.68'N	01:01:43	74.6	-0.17	1.76
095°00.0'E	29°10.55'N	29°09.90'N	01:03:42	27°02.16'N	26°59.82'N	01:02:34	75.1	-0.17	1.76
096°00.0'E	29°24.47'N	29°23.85'N	01:04:35	27°15.88'N	27°13.47'N	01:03:26	75.6	-0.16	1.76
097°00.0'E	29°37.87'N	29°37.28'N	01:05:29	27°29.08'N	27°26.61'N	01:04:21	76.1	-0.16	1.75
098°00.0'E	29°50.73'N	29°50.18'N	01:06:26	27°41.75'N	27°39.23'N	01:05:19	76.6	-0.15	1.75
099°00.0'E	30°03.06'N	30°02.53'N	01:07:25	27°53.87'N	27°51.33'N	01:06:18	77.2	-0.15	1.75
100°00.0'E	30°14.82'N	30°14.32'N	01:08:26	28°05.43'N	28°02.87'N	01:07:20	77.7	-0.15	1.75
101°00.0'E	30°26.00'N	30°25.54'N	01:09:29	28°16.42'N	28°13.86'N	01:08:25	78.3	-0.14	1.75
102°00.0'E	30°36.64'N	30°36.17'N	01:10:35	28°26.81'N	28°24.28'N	01:09:32	78.9	-0.14	1.75
103°00.0'E	30°46.68'N	30°46.21'N	01:11:42	28°36.61'N	28°34.11'N	01:10:41	79.5	-0.13	1.75
104°00.0'E	30°56.10'N	30°55.64'N	01:12:52	28°45.79'N	28°43.35'N	01:11:52	80.2	-0.13	1.75
105°00.0'E	31°04.88'N	31°04.44'N	01:14:04	28°54.33'N	28°51.97'N	01:13:07	80.9	-0.12	1.75
106°00.0'E	31°13.00'N	31°12.61'N	01:15:18	29°02.23'N	28°59.97'N	01:14:23	81.5	-0.12	1.75
107°00.0'E	31°20.48'N	31°20.09'N	01:16:34	29°09.46'N	29°07.34'N	01:15:42	82.3	-0.11	1.74
108°00.0'E	31°27.36'N	31°26.90'N	01:17:53	29°16.02'N	29°14.05'N	01:17:03	83.0	-0.11	1.74
109°00.0'E	31°33.55'N	31°33.04'N	01:19:14	29°21.88'N	29°20.11'N	01:18:27	83.7	-0.11	1.74
110°00.0'E	31°39.03'N	31°38.48'N	01:20:37	29°27.03'N	29°25.47'N	01:19:53	84.5	-0.10	1.74
111°00.0'E	31°43.83'N	31°43.21'N	01:22:02	29°31.43'N	29°30.00'N	01:21:22	85.3	-0.10	1.74
112°00.0'E	31°47.89'N	31°47.23'N	01:23:30	29°35.10'N	29°33.59'N	01:22:54	86.1	-0.09	1.74
113°00.0'E	31°51.18'N	31°50.51'N	01:24:59	29°38.02'N	29°36.44'N	01:24:27	86.9	-0.09	1.74
114°00.0'E	31°53.69'N	31°53.03'N	01:26:32	29°40.15'N	29°38.54'N	01:26:04	87.8	-0.08	1.74
115°00.0'E	31°55.47'N	31°54.79'N	01:28:06	29°41.49'N	29°39.89'N	01:27:43	88.7	-0.08	1.74
116°00.0'E	31°56.49'N	31°55.77'N	01:29:43	29°42.01'N	29°40.45'N	01:29:25	89.6	-0.07	1.74
117°00.0'E	31°56.68'N	31°55.94'N	01:31:22	29°41.74'N	29°40.22'N	01:31:10	90.5	-0.07	1.74
118°00.0'E	31°56.02'N	31°55.26'N	01:33:04	29°40.64'N	29°39.16'N	01:32:57	91.4	-0.07	1.74
119°00.0'E	31°54.48'N	31°53.73'N	01:34:48	29°38.67'N	29°37.26'N	01:34:47	92.4	-0.06	1.74
120°00.0'E	31°52.04'N	31°51.34'N	01:36:35	29°35.81'N	29°34.29'N	01:36:40	93.4	-0.06	1.74

TABLE 8 – CONTINUED

MAPPING COORDINATES FOR THE ZONES OF GRAZING ECLIPSE  
TOTAL SOLAR ECLIPSE OF 2009 JULY 22

ΔT = 65.9 s

Longitude	North Graze Zone		Northern	South Graze Zone		Southern	Path	Elev	Scale
	Latitudes		Limit	Latitudes		Limit			
	Northern	Southern	Universal	Northern	Southern	Universal	Azm	Fact	Fact
	Limit	Limit	Time	Limit	Limit	Time	°		km/"
			h m s			h m s			
121°00.0'E	31°48.68'N	31°48.08'N	01:38:24	29°32.03'N	29°30.38'N	01:38:35	94.4	-0.06	1.74
122°00.0'E	31°44.43'N	31°43.93'N	01:40:16	29°27.34'N	29°25.49'N	01:40:34	95.4	-0.05	1.74
123°00.0'E	31°39.26'N	31°38.86'N	01:42:10	29°21.75'N	29°19.63'N	01:42:35	96.4	-0.05	1.74
124°00.0'E	31°33.34'N	31°32.85'N	01:44:07	29°15.17'N	29°12.83'N	01:44:39	97.5	-0.05	1.73
125°00.0'E	31°26.42'N	31°25.89'N	01:46:06	29°07.58'N	29°05.08'N	01:46:46	98.5	-0.04	1.73
126°00.0'E	31°18.46'N	31°17.95'N	01:48:08	28°58.96'N	28°56.34'N	01:48:57	99.6	-0.04	1.73
127°00.0'E	31°09.45'N	31°09.01'N	01:50:13	28°49.27'N	28°46.59'N	01:51:10	100.7	-0.04	1.73
128°00.0'E	30°59.41'N	30°59.05'N	01:52:21	28°38.49'N	28°35.77'N	01:53:26	101.8	-0.04	1.73
129°00.0'E	30°48.43'N	30°48.03'N	01:54:32	28°26.60'N	28°23.90'N	01:55:46	103.0	-0.04	1.73
130°00.0'E	30°36.31'N	30°35.90'N	01:56:45	28°13.56'N	28°10.95'N	01:58:08	104.1	-0.04	1.73
131°00.0'E	30°23.15'N	30°22.66'N	01:59:01	27°59.35'N	27°56.78'N	02:00:34	105.3	-0.04	1.73
132°00.0'E	30°08.83'N	30°08.29'N	02:01:21	27°43.94'N	27°41.34'N	02:03:03	106.4	-0.04	1.73
133°00.0'E	29°53.29'N	29°52.75'N	02:03:43	27°27.30'N	27°24.74'N	02:05:35	107.6	-0.04	1.73
134°00.0'E	29°36.50'N	29°36.04'N	02:06:08	27°09.41'N	27°06.99'N	02:08:11	108.8	-0.04	1.73
135°00.0'E	29°18.58'N	29°18.14'N	02:08:36	26°50.22'N	26°47.99'N	02:10:49	109.9	-0.04	1.73
136°00.0'E	28°59.28'N	28°58.96'N	02:11:07	26°29.71'N	26°27.74'N	02:13:31	111.1	-0.04	1.73
137°00.0'E	28°38.87'N	28°38.52'N	02:13:42	26°07.87'N	26°06.21'N	02:16:16	112.3	-0.04	1.73
138°00.0'E	28°17.32'N	28°16.78'N	02:16:19	25°44.65'N	25°43.40'N	02:19:04	113.4	-0.04	1.73
139°00.0'E	27°54.38'N	27°53.72'N	02:18:59	25°20.04'N	25°18.99'N	02:21:55	114.6	-0.05	1.73
140°00.0'E	27°30.03'N	27°29.32'N	02:21:42	24°54.03'N	24°52.84'N	02:24:49	115.7	-0.05	1.74
141°00.0'E	27°04.25'N	27°03.54'N	02:24:29	24°26.58'N	24°25.33'N	02:27:46	116.8	-0.05	1.74
142°00.0'E	26°37.00'N	26°36.36'N	02:27:18	23°57.71'N	23°56.46'N	02:30:46	117.9	-0.06	1.74
143°00.0'E	26°08.35'N	26°07.75'N	02:30:10	23°27.54'N	23°26.16'N	02:33:49	119.0	-0.06	1.74
144°00.0'E	25°38.22'N	25°37.70'N	02:33:05	22°55.88'N	22°54.34'N	02:36:54	120.0	-0.07	1.74
145°00.0'E	25°06.63'N	25°06.25'N	02:36:02	22°22.76'N	22°21.13'N	02:40:01	121.0	-0.08	1.74
146°00.0'E	24°33.76'N	24°33.37'N	02:39:02	21°48.22'N	21°46.53'N	02:43:10	122.0	-0.08	1.74
147°00.0'E	23°59.64'N	23°59.07'N	02:42:04	21°12.26'N	21°10.57'N	02:46:21	122.9	-0.09	1.74
148°00.0'E	23°24.06'N	23°23.37'N	02:45:08	20°34.92'N	20°33.18'N	02:49:34	123.8	-0.10	1.74
149°00.0'E	22°47.04'N	22°46.28'N	02:48:14	19°56.23'N	19°54.44'N	02:52:47	124.6	-0.11	1.74
150°00.0'E	22°08.62'N	22°07.84'N	02:51:21	19°16.21'N	19°14.37'N	02:56:01	125.4	-0.11	1.74
151°00.0'E	21°28.89'N	21°28.10'N	02:54:29	18°34.99'N	18°33.03'N	02:59:16	126.1	-0.12	1.75
152°00.0'E	20°47.82'N	20°47.08'N	02:57:38	17°52.60'N	17°50.56'N	03:02:30	126.8	-0.13	1.75
153°00.0'E	20°05.51'N	20°04.85'N	03:00:48	17°09.14'N	17°07.03'N	03:05:44	127.4	-0.14	1.75
154°00.0'E	19°22.10'N	19°21.48'N	03:03:57	16°24.68'N	16°22.54'N	03:08:56	127.9	-0.15	1.75
155°00.0'E	18°37.66'N	18°37.07'N	03:07:06	15°39.33'N	15°37.18'N	03:12:07	128.4	-0.16	1.75
156°00.0'E	17°52.30'N	17°51.70'N	03:10:14	14°53.20'N	14°51.04'N	03:15:16	128.8	-0.17	1.76
157°00.0'E	17°06.06'N	17°05.47'N	03:13:20	14°06.34'N	14°04.23'N	03:18:22	129.1	-0.18	1.76
158°00.0'E	16°19.07'N	16°18.48'N	03:16:24	13°19.00'N	13°16.89'N	03:21:26	129.3	-0.19	1.76
159°00.0'E	15°31.44'N	15°30.92'N	03:19:26	12°31.22'N	12°29.12'N	03:24:25	129.5	-0.20	1.77
160°00.0'E	14°43.29'N	14°42.79'N	03:22:26	11°43.13'N	11°41.03'N	03:27:21	129.6	-0.21	1.77
161°00.0'E	13°54.76'N	13°54.26'N	03:25:21	10°54.85'N	10°52.75'N	03:30:13	129.6	-0.21	1.77
162°00.0'E	13°05.95'N	13°05.45'N	03:28:13	10°06.50'N	10°04.40'N	03:33:00	129.6	-0.22	1.78
163°00.0'E	12°16.99'N	12°16.50'N	03:31:01	09°18.19'N	09°16.09'N	03:35:42	129.5	-0.23	1.78
164°00.0'E	11°28.00'N	11°27.50'N	03:33:44	08°30.03'N	08°27.91'N	03:38:19	129.4	-0.24	1.78
165°00.0'E	10°39.09'N	10°38.58'N	03:36:23	07°42.11'N	07°39.98'N	03:40:50	129.2	-0.24	1.78
166°00.0'E	09°50.36'N	09°49.85'N	03:38:56	06°54.52'N	06°52.39'N	03:43:16	129.0	-0.25	1.79
167°00.0'E	09°01.91'N	09°01.40'N	03:41:25	06°07.35'N	06°05.22'N	03:45:36	128.7	-0.26	1.79
168°00.0'E	08°13.83'N	08°13.34'N	03:43:47	05°20.68'N	05°18.54'N	03:47:51	128.4	-0.26	1.79
169°00.0'E	07°26.20'N	07°25.70'N	03:46:04	04°34.57'N	04°32.43'N	03:49:59	128.0	-0.27	1.79
170°00.0'E	06°39.10'N	06°38.59'N	03:48:16	03°49.06'N	03°46.94'N	03:52:02	127.6	-0.27	1.80

TABLE 8 – CONTINUED

MAPPING COORDINATES FOR THE ZONES OF GRAZING ECLIPSE  
TOTAL SOLAR ECLIPSE OF 2009 JULY 22

$\Delta T = 65.9$  s

Longitude	North Graze Zone		Northern	South Graze Zone		Southern	Path Azm °	Elev Fact	Scale Fact km/''
	Latitudes		Limit	Latitudes		Limit			
	Northern Limit	Southern Limit	Universal Time h m s	Northern Limit	Southern Limit	Universal Time h m s			
171°00.0'E	05°52.58'N	05°52.07'N	03:50:22	03°04.22'N	03°02.12'N	03:53:59	127.2	-0.28	1.80
172°00.0'E	05°06.70'N	05°06.19'N	03:52:22	02°20.08'N	02°18.02'N	03:55:51	126.7	-0.28	1.80
173°00.0'E	04°21.52'N	04°21.00'N	03:54:16	01°36.68'N	01°34.66'N	03:57:37	126.2	-0.28	1.80
174°00.0'E	03°37.14'N	03°36.54'N	03:56:05	00°54.04'N	00°52.09'N	03:59:17	125.7	-0.28	1.80
175°00.0'E	02°53.50'N	02°52.85'N	03:57:49	00°12.18'N	00°10.31'N	04:00:52	125.2	-0.29	1.80
176°00.0'E	02°10.65'N	02°09.94'N	03:59:27	00°28.88'S	00°30.68'S	04:02:22	124.7	-0.29	1.80
177°00.0'E	01°28.59'N	01°27.84'N	04:00:59	01°09.13'S	01°10.92'S	04:03:47	124.2	-0.29	1.80
178°00.0'E	00°47.34'N	00°46.57'N	04:02:27	01°48.60'S	01°50.32'S	04:05:06	123.6	-0.29	1.80
179°00.0'E	00°06.91'N	00°06.13'N	04:03:49	02°27.21'S	02°28.98'S	04:06:21	123.1	-0.29	1.80
180°00.0'E	00°32.70'S	00°33.42'S	04:05:06	03°05.00'S	03°06.80'S	04:07:31	122.5	-0.29	1.80
179°00.0'W	01°11.48'S	01°12.19'S	04:06:19	03°41.98'S	03°43.80'S	04:08:37	122.0	-0.29	1.80
178°00.0'W	01°49.45'S	01°50.12'S	04:07:27	04°18.15'S	04°19.96'S	04:09:38	121.4	-0.29	1.80
177°00.0'W	02°26.59'S	02°27.21'S	04:08:30	04°53.51'S	04°55.30'S	04:10:35	120.9	-0.29	1.80
176°00.0'W	03°02.92'S	03°03.48'S	04:09:29	05°28.07'S	05°29.83'S	04:11:27	120.3	-0.29	1.80
175°00.0'W	03°38.45'S	03°38.92'S	04:10:24	06°01.85'S	06°03.55'S	04:12:16	119.7	-0.28	1.80
174°00.0'W	04°13.17'S	04°13.55'S	04:11:15	06°34.85'S	06°36.48'S	04:13:01	119.2	-0.28	1.80
173°00.0'W	04°47.11'S	04°47.38'S	04:12:02	07°07.09'S	07°08.62'S	04:13:43	118.6	-0.28	1.80
172°00.0'W	05°20.21'S	05°20.42'S	04:12:45	07°38.57'S	07°40.01'S	04:14:21	118.1	-0.28	1.80
171°00.0'W	05°52.43'S	05°52.69'S	04:13:25	08°09.30'S	08°10.69'S	04:14:55	117.6	-0.28	1.80
170°00.0'W	06°23.84'S	06°24.19'S	04:14:01	08°39.27'S	08°40.67'S	04:15:27	117.0	-0.27	1.80
169°00.0'W	06°54.50'S	06°54.93'S	04:14:33	09°08.54'S	09°09.93'S	04:15:55	116.5	-0.27	1.80
168°00.0'W	07°24.43'S	07°24.94'S	04:15:03	09°37.10'S	09°38.46'S	04:16:20	115.9	-0.27	1.79
167°00.0'W	07°53.66'S	07°54.23'S	04:15:29	10°04.98'S	10°06.29'S	04:16:42	115.4	-0.26	1.79
166°00.0'W	08°22.18'S	08°22.81'S	04:15:53	10°32.18'S	10°33.42'S	04:17:01	114.9	-0.26	1.79
165°00.0'W	08°50.03'S	08°50.69'S	04:16:13	10°58.72'S	10°59.89'S	04:17:18	114.3	-0.25	1.79
164°00.0'W	09°17.22'S	09°17.89'S	04:16:31	11°24.62'S	11°25.79'S	04:17:32	113.7	-0.23	1.78
163°00.0'W	09°43.74'S	09°44.44'S	04:16:46	11°49.91'S	11°51.47'S	04:17:44	112.9	-0.17	1.76
162°00.0'W	10°09.62'S	10°10.33'S	04:16:58	12°14.35'S	12°14.35'S	04:17:53	112.5	-0.17	1.76
161°00.0'W	10°34.87'S	10°35.58'S	04:17:08	12°38.39'S	12°38.39'S	04:18:00	112.4	-0.24	1.78
160°00.0'W	10°59.50'S	11°00.19'S	04:17:16	13°01.83'S	13°01.83'S	04:18:05	112.3	-0.39	1.86
159°00.0'W	11°23.51'S	11°24.19'S	04:17:21	13°24.71'S	13°24.71'S	04:18:07	112.2	-0.80	2.22