

ΔT FROM PHOTOELECTRIC OBSERVATIONS OF OCCULTATIONS IN JAPAN FOR 1955 TO 1959

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Abstract

Data of photoelectric observations of occultation made at the Tokyo Astronomical Observatory and the Hydrographic Office for the years of 1955 to 1959 are combined together, and re-reductions are made employing the Improved Lunar Ephemeris, limb corrections by Watts' profile, International ellipsoid, and corrections $\Delta\varphi = +10''$, $\Delta\lambda = +20''$ to the geodetic datum of Japan.

ΔT 's are evaluated for middle of each year, and combined with provisional values of ΔT for 1960 to 1966. These ΔT 's agree well with those of Washington meridian observations in rate as well as in absolute value. Comparison of provisional values of ΔT with $AT - UT_2$ suggests necessity of research on the adopted frequency of caesium standard in one ephemeris second.

1. Introduction

Observation of occultation by the moon is one of the effective means for practical determination on $\Delta T = ET - UT$. Photoelectric method of occultation observation was devised by Hirose (1949) and Osawa (1949, 1950) of the Tokyo Astronomical Observatory, and has been made as routine at the observatory since 1950 and at the Hydrographic Office since 1953. Their observational data and results of reduction have been published from the respective institutes, as shown in Table 1.

Because of superior accuracy, it seems worthwhile to combine these photoelectric data in a single list and to re-reduce them employing a unified system, i.e. ephemeris of the moon, correction to the moon's limb, reference earth spheroid and correction to the geodetic datum. As a first step, the present paper treats occultation of NZC-stars for 1955 to 1959.

2. Data of Observation and Reduction

Table 2 lists the observing stations. They consist of four groups, i.e.

- Nos. 1 to 7: fixed stations of HO,
- Nos. 11 to 13: temporary stations of HO,
- Nos. 101 to 103: fixed stations of TAO,
- Nos. 111 to 120: temporary stations of TAO.

Geodetic coordinates refer to the International ellipsoid. Provisional corrections of $+10''$ in latitude and $+20''$ in longitude are applied to the geodetic datum of Japan.

TABLE 1. REPORTS ON PHOTOELECTRIC OBSERVATION AND REDUCTION

1. TAO

Year	Star Cat.	Reduction				Author	Publication
		ephemeris	limb corr.	spheroid	datum corr.		
1950—56	NZC, YZC					Hirose et al.	Tokyo Astr. Bull. 2nd Ser. No.111 1958.
1957—60	NZC, YZC					Hirose et al.	Tokyo Astr. Bull. 2nd Ser. No.147 1961.
1954—58	NZC	Brown	Weimer	Bessel	non	Aoki and Endo	Tokyo Astr. Bull. 2nd Ser. No.124 1960.
1952—59	NZC	ILE	Weimer, Watts	Bessel	evaluate	Aoki	Ann. TAO, 2nd Ser. 7, 3, 1961.
1960—62	NZC	ILE	Weimer	Bessel	non, $\Delta\varphi = +10''$, $\Delta\lambda = +20''$	Aoki et al.	Tokyo Astr. Bull. 2nd Ser. No.167 1965.

2. HO

Year	Star Cat.	Reduction				Author	Publication
		ephemeris	limb corr.	spheroid	datum corr.		
1953, 54	NZC, YZC	Brown	non	Bessel	non	Suzuki	Hydrogr. Bull. No.53, 54, 1957.
1954, 55	NZC, YZC	Brown	non	Bessel	non	Yamazaki	Hydrogr. Bull. No.56, 32, 1958.
1954, 55	NZC, YZC	Brown	non	Bessel	non	Yamazaki	Hydrogr. Bull. No.57, 53, 1958.
1956, 57	NZC, YZC	Brown	non	Bessel	non	Yamazaki	Hydrogr. Bull. No.73, 46, 1963.
1958, 59	NZC, YZC	Brown	non	Bessel	non	Yamazaki	Hydrogr. Bull. No.76, 34, 1964.
1960, 61	NZC, YZC	ILE	non	Bessel	non	Yamazaki	Hydrogr. Bull. No.79, 43, 1965.
1962—64	NZC, YZC	ILE	non	Bessel	non	Yamazaki et al.	Data Rep. Hydrogr. Obs., Ser. Astr. Geod. No.1, 1, 1966.
1965, 66	NZC, YZC	ILE	non	Bessel	non	Yamazaki et al.	Data Rep. Hydrogr. Obs., Ser. Astr. Geod. No.2, 1, 1967.
1955—59	NZC, YZC	Brown	Weimer	Bessel	$\Delta\varphi = +10''$, $\Delta\lambda = +20''$	Yamazaki	(unpublished) 1962.
1960—63	NZC, YZC	ILE	Watts	Intern.	$\Delta\varphi = +10''$, $\Delta\lambda = +20''$	Yamazaki	(unpublished) 1965.
1964, 65	NZC, YZC	ILE	Watts	Intern.	$\Delta\varphi = +10''$, $\Delta\lambda = +20''$	Yamazaki	(unpublished) 1966.
1966	NZC, YZC	ILE	Watts	Intern.	$\Delta\varphi = +10''$, $\Delta\lambda = +20''$	Yamazaki	(unpublished) 1967.

TABLE 2 OBSERVING STATIONS

No.	Station	Longitude			Latitude			Elevation m
		°	'	"	°	'	"	
1	Hydrographic Office, Tokyo, 1	-139	45	52.77	+35	39	47.82	4.2
4	Sirahama Hydrographic Observatory, 1	-138	59	02.01	+34	42	56.16	173.1
5	Katu-ura Hydrographic Observatory	-135	56	39.50	+33	37	56.48	35.0
6	Simosato Hydrographic Observatory	-135	56	07.08	+33	34	34.22	57.9
7	Kurasiki Hydrographic Observatory	-133	45	58.39	+34	35	32.92	4.9
11	Atawa	-136	02	26.28	+33	47	13.78	2.8
12	Awa-no-ura	-134	22	00.09	+33	38	00.20	0.8
13	Anami	-134	36	33.45	+33	52	14.63	12.0
101	R-Dome, Tokyo Astronomical Observatory	-139	32	03.891	+35	40	25.704	68
102	K-Dome, Tokyo Astronomical Observatory	-139	32	10.285	+35	40	21.887	61
103	D-Dome, Tokyo Astronomical Observatory	-139	32	01.907	+35	40	27.153	58
111	Hamamatu	-137	46	08.565	+34	43	11.525	6
112	Kamogata	-133	34	41.204	+34	31	05.828	25
113	Ako	-134	23	11.134	+34	44	45.030	30
114	Gihu	-136	44	40.626	+35	26	09.010	14
115	Okazaki-1	-137	12	00.255	+34	55	41.664	19
116	Okazaki-2	-137	12	13.605	+34	56	07.042	36
117	Kawaziri	-132	41	29.385	+34	14	15.123	23
118	Kumayama	-134	06	37.027	+34	47	42.278	5
119	Sakura	-140	14	06.314	+35	40	48.742	35
120	Saidaizi	-134	01	34.666	+34	38	25.961	2

TABLE 3. DATA OF OBSERVATION AND REDUCTION

No.	NZC	Mag.	Age	Phn.	Stn.	Lun.	UT2				α app.				
							d	h	m	s	h	m	s		
1	594	6.9	11.1	d	101	396	1955	Jan.	5	9	40	36.10	3	58	18.542
2	767	5.5	12.1	d	101	"			6	10	37	9.34	5	5	24.575
3	2134	6.1	23.5	r	101	"			17	18	37	15.50	14	54	50.909
4	3397	7.4	3.4	d	101	397			27	10	8	30.32	23	5	27.547
5	251	7.6	6.4	d	101	"			30	9	53	32.61	1	40	2.321
6	399	5.7	7.4	d	101	"			31	11	0	6.73	2	39	50.953
7	"	"	7.4	d	101	"			31	11	0	6.73	"	"	"
8	414	8.4	7.5	d	101	"			31	13	48	21.01	2	45	48.666
9	524	6.6	8.3	d	101	"		Feb.	1	8	24	23.01	3	36	3.915
10	"	"	8.3	d	101	"			1	8	24	23.02	"	"	"
11	714	6.2	9.3	d	101	"			2	9	15	52.48	4	40	32.422
12	218	8.9	3.8	d	101	398			26	10	1	15.62	1	27	30.130
13	493	6.9	5.7	d	101	"			28	9	16	37.68	3	21	58.630
14	997	6.8	8.7	d	101	"		Mar.	3	8	53	32.52	6	27	41.305
15	1582	6.3	11.5	d	101	399		Apr.	4	15	28	29.98	10	49	57.832
16	907	6.9	3.9	d	101	400			26	11	8	50.28	5	57	45.940
17	1829	8.3	9.7	d	101	401		May	31	13	11	5.66	12	42	46.765
18	1364	6.5	3.3	d	101	402		Jun.	23	10	33	31.79	9	7	21.422
19	2398	6.1	12.5	d	101	"		Jul.	2	15	32	57.58	16	38	56.660
20	1752	6.5	5.0	d	101	403			24	10	32	49.15	12	8	10.738
21	2347	4.8	10.0	d	101	"			29	12	15	38.22	16	17	59.568
22	"	"	10.0	d	1	"			29	12	16	15.50	"	"	"
23	2051	5.7	5.6	d	101	404		Aug.	23	10	24	15.49	14	16	11.419
24	"	"	5.6	d	101	"			23	10	24	15.49	"	"	"
25	"	"	5.6	d	1	"			23	10	24	52.22	"	"	"
26	2797	3.0	9.2	d	13	405		Sep.	25	10	41	53.20	19	7	9.443
27	"	"	9.2	d	101	"			25	10	44	24.74	"	"	"
28	"	"	9.2	d	101	"			25	10	44	24.72	"	"	"
29	3185	5.3	7.8	d	101	407		Nov.	22	7	53	6.90	21	42	40.029
30	163	7.2	12.0	d	101	"			26	11	1	19.16	1	4	46.698
31	3027	7.0	4.1	d	111	408		Dec.	18	8	27	25.57	20	42	6.496
32	"	"	4.1	d	101	"			18	8	29	30.99	"	"	"
33	3517	7.9	8.1	d	7	"			22	10	41	25.76	23	51	50.973
34	89	6.5	9.1	d	7	"			23	8	29	31.24	0	38	56.405
35	"	"	9.1	d	101	"			23	8	37	3.03	"	"	"
36	371	6.4	11.0	d	101	"			25	8	9	23.98	2	28	29.547
37	395	7.8	11.3	d	7	"			25	13	52	49.51	2	38	7.151
38	397	7.5	11.3	d	7	"			25	14	31	2.45	2	38	40.486
39	"	"	11.3	d	101	"			25	14	44	13.73	"	"	"
40	525	6.4	12.2	d	7	"			26	12	3	17.68	3	36	28.793
1	2290	2.5	25.6	r	1	408	1956	Jan.	8	20	45	24.64	15	57	43.951
2	465	4.5	9.3	d	7	409			22	10	35	28.95	3	9	8.368
3	657	5.4	10.6	d	7	"			23	16	51	10.33	4	22	49.795
4	828	6.5	11.6	d	7	"			24	17	31	57.21	5	28	6.496
5	163	7.2	4.5	d	7	410		Feb.	16	10	22	22.62	1	4	45.818
6	739	7.4	8.6	d	7	"			20	11	10	41.08	4	53	29.911
7	905	6.7	9.6	d	7	"			21	11	54	0.32	5	57	3.462
8	"	"	9.6	d	101	"			21	11	54	48.01	"	"	"
9	1158	5.2	8.8	d	101	411		Mar.	21	8	50	0.47	7	36	58.619
10	1184	7.8	9.1	d	101	"			21	15	13	12.30	7	48	7.040

TABLE 3. DATA OF OBSERVATION AND REDUCTION

δ _{app.}	χ	χ-ρ	p ₁	q	Δσ	l	b	χ-c'	h	Δσ-h
° / "	°	°			"	°	°	°	"	"
+23 4 41.71	99.7	17.2	+0.585	-0.296	-1.35	-0.48	-3.43	112.7	-1.26	-0.09
+24 12 31.19	96.7	7.4	+0.611	-0.129	-0.49	+1.15	-1.85	103.7	-0.35	-0.14
-21 12 52.50	305.8	202.4	-0.455	+0.381	-0.44	+2.29	+5.57	288.0	-0.05	-0.39
- 0 32 19.36	33.7	328.2	+0.480	+0.528	-0.33	-5.67	-6.18	56.1	-0.20	-0.13
+15 33 16.84	350.0	279.0	+0.091	+0.988	+1.17	-3.21	-5.92	11.8	+0.40	+0.77
+19 49 24.32	32.9	317.3	+0.432	+0.678	-0.29	-2.25	-5.04	51.7	-1.00	+0.71
"	32.9	317.3	+0.432	+0.678	-0.29	-2.25	-5.04	51.7	-1.00	+0.71
+19 49 33.31	94.5	18.3	+0.559	-0.314	-2.21	-2.49	-4.87	112.9	-2.46	+0.25
+22 30 58.95	43.6	323.2	+0.474	+0.599	-0.24	-0.65	-3.84	58.4	-0.40	+0.16
"	43.6	323.2	+0.474	+0.599	-0.25	-0.65	-3.84	58.4	-0.40	+0.15
+24 0 25.05	89.7	3.0	+0.594	-0.051	+0.21	+0.48	-2.39	99.0	+0.33	-0.12
+13 58 46.79	77.3	7.0	+0.588	-0.122	+0.19	-2.67	-5.89	99.6	+0.95	-0.76
+21 53 2.43	14.3	294.9	+0.249	+0.907	-0.75	-0.12	-3.98	30.2	-0.33	-0.42
+22 34 35.39	153.9	56.2	+0.323	-0.831	+1.50	+3.11	+0.61	152.7	+1.53	-0.03
+ 1 15 33.10	166.6	52.7	+0.324	-0.796	+0.91	+4.78	+6.99	144.6	+0.71	+0.20
+22 53 56.41	69.0	333.8	+0.544	+0.441	+0.40	+3.32	+0.66	70.8	-0.04	+0.44
-10 45 33.60	87.3	335.8	+0.464	+0.410	+0.11	+5.69	+7.26	63.7	-0.80	+0.91
+11 44 45.74	63.5	313.0	+0.402	+0.731	-1.23	+5.67	+5.93	47.6	-0.86	-0.37
-24 23 4.56	129.2	36.5	+0.397	-0.595	+0.56	+0.33	+2.48	119.7	+0.77	-0.21
- 7 31 43.16	149.5	36.8	+0.429	-0.598	+0.52	+6.46	+7.46	125.6	-0.22	+0.74
-24 3 54.66	140.1	45.2	+0.347	-0.710	+2.39	+1.63	+2.96	128.7	+2.20	+0.19
"	140.3	45.4	+0.346	-0.712	+2.50	+1.63	+2.96	128.9	+2.11	+0.39
-18 30 45.75	140.9	35.3	+0.416	-0.577	+0.67	+4.40	+5.55	120.4	+0.76	-0.09
"	140.9	35.3	+0.416	-0.577	+0.66	+4.40	+5.55	120.4	+0.76	-0.10
"	141.2	35.6	+0.415	-0.582	-3.73	+4.40	+5.55	120.8	+0.56	-4.29
-21 5 41.04	73.9	355.1	+0.498	+0.086	-0.11	-3.09	-2.03	79.0	+0.21	-0.32
"	73.9	355.1	+0.498	+0.085	-0.10	-3.11	-2.03	79.0	+0.23	-0.33
"	73.9	355.1	+0.498	+0.085	-0.09	-3.11	-2.03	79.0	+0.23	-0.32
- 9 17 2.33	74.2	5.4	+0.511	-0.095	+0.72	-6.64	-5.64	92.8	+1.73	-1.01
+11 19 11.88	68.3	358.1	+0.585	+0.033	+1.33	-6.51	-5.41	91.6	+1.74	-0.41
-14 20 41.98	58.0	346.4	+0.485	+0.236	-0.16	-5.24	-4.92	72.0	+0.00	-0.16
"	58.0	346.4	+0.485	+0.236	-0.16	-5.26	-4.92	72.0	+0.00	-0.16
+ 4 37 43.87	14.8	307.1	+0.326	+0.797	-0.04	-8.13	-6.36	38.6	+0.20	-0.24
+ 9 7 2.78	13.2	304.1	+0.312	+0.828	-0.39	-7.52	-5.71	37.0	-0.05	-0.34
"	22.2	313.1	+0.380	+0.730	-0.89	-7.62	-5.73	46.0	-0.57	-0.32
+17 30 45.31	72.7	357.3	+0.594	+0.047	+1.80	-5.89	-3.62	92.5	+1.30	+0.50
+18 24 48.68	66.1	349.5	+0.589	+0.182	+0.33	-6.57	-3.67	85.3	+0.82	-0.49
+18 36 53.12	24.2	307.5	+0.365	+0.793	+0.37	-6.64	-3.64	43.3	-0.18	+0.55
"	12.4	295.7	+0.260	+0.901	+0.02	-6.72	-3.61	31.5	-0.04	+0.06
+20 46 31.01	139.6	58.2	+0.325	-0.850	+0.89	-4.75	-2.15	154.5	+1.91	-1.02
-22 29 50.67	285.0	188.2	-0.491	+0.143	-0.71	+4.76	+2.34	271.9	-0.57	-0.14
+19 33 48.08	137.4	58.5	+0.306	-0.852	+0.96	-6.22	-2.71	154.5	+2.14	-1.18
+22 6 6.54	50.5	324.6	+0.494	+0.580	-0.41	-5.64	-0.60	61.5	-0.47	+0.06
+22 25 46.59	32.5	300.3	+0.312	+0.864	+0.22	-4.12	+1.23	37.2	+0.05	+0.17
+11 19 6.64	33.5	323.0	+0.437	+0.602	+0.16	-6.59	-5.21	56.9	+0.10	+0.06
+22 30 32.17	35.1	306.5	+0.351	+0.804	+0.96	-4.36	+0.27	43.2	-0.16	+1.12
+21 36 7.78	166.3	71.6	+0.190	-0.949	-1.23	-3.21	+1.98	168.0	-0.42	-0.81
"	150.2	55.6	+0.340	-0.825	+0.93	-3.29	+2.01	152.0	+1.35	-0.42
+17 46 25.62	127.4	24.4	+0.541	-0.413	+0.72	-0.10	+4.61	119.2	+0.55	+0.17
+16 59 20.70	70.4	326.2	+0.494	+0.556	-0.35	-0.85	+5.24	61.1	-0.54	+0.19

TABLE 3. DATA OF OBSERVATION AND REDUCTION (continued)

No.	NZC	Mag.	Age	Phn.	Stn.	Lun.	UT2				$\alpha_{app.}$				
							d	h	m	s	h	m	s		
11	1320	6.8	10.1	d	101	411	1956	Mar.	22	15	41	54.84	8	46	17.071
12	991	6.1	5.3	d	112	412		Apr.	16	10	45	31.38	6	25	21.228
13	"	"	5.3	d	7	"			16	10	45	38.40	"	"	"
14	"	"	5.3	d	101	"			16	10	50	40.26	"	"	"
15	989	6.6	5.3	d	112	"			16	10	56	7.73	6	25	10.789
16	995	4.1	5.4	d	112	"			16	11	37	8.54	6	26	22.626
17	"	"	5.4	d	101	"			16	11	34	5.97	"	"	"
18	"	"	5.4	d	7	"			16	11	36	52.64	"	"	"
19	1124	6.9	6.3	d	101	"			17	9	36	54.41	7	23	22.698
20	1271	5.9	7.4	d	7	"			18	12	26	25.51	8	26	12.234
21	1359	5.1	5.9	d	7	413		May	16	11	14	45.93	9	5	23.801
22	"	"	5.9	d	113	"			16	11	15	0.10	"	"	"
23	"	"	5.9	d	101	"			16	11	17	41.17	"	"	"
24	1800	5.4	9.9	d	101	"			20	11	33	35.74	12	31	33.261
25	1670	5.1	6.6	d	101	414		Jun.	15	10	46	59.47	11	28	6.234
26	"	"	6.6	d	1	"			15	10	47	26.42	"	"	"
27	1745	Var.	5.3	d	101	415		Jul.	13	11	43	49.93	12	5	1.758
28	2228	5.9	9.4	d	7	"			17	14	31	7.35	15	35	46.377
29	2798	6.3	13.5	d	7	"			21	17	29	0.88	19	7	16.964
30	2580	6.6	10.0	d	101	416		Aug.	16	12	0	59.00	17	53	46.574
31	2995	6.2	13.2	d	101	"			19	16	9	7.69	20	28	40.935
32	2131	7.7	4.6	d	101	417		Sep.	9	9	42	44.38	14	53	52.810
33	2825	6.4	9.7	d	101	"			14	11	44	5.30	19	19	6.643
34	531	5.5	20.0	r	1	"			24	19	36	8.51	3	39	50.816
35	3453	4.9	10.7	d	7	419		Nov.	13	10	35	8.38	23	24	44.655
36	"	"	10.7	d	114	"			13	10	41	57.72	"	"	"
37	"	"	10.7	d	115	"			13	10	42	3.90	"	"	"
38	"	"	10.7	d	116	"			13	10	42	4.78	"	"	"
39	"	"	10.8	d	101	"			13	10	47	31.57	"	"	"
40	3455	6.4	10.7	d	7	"			13	10	39	18.01	23	25	3.597
41	"	"	10.8	d	115	"			13	10	48	44.55	"	"	"
42	"	"	10.8	d	116	"			13	10	48	45.38	"	"	"
43	"	"	10.8	d	101	"			13	10	55	16.86	"	"	"
44	29	7.2	11.8	d	7	"			14	11	27	57.38	0	13	27.186
45	"	"	11.8	d	101	"			14	11	42	10.40	"	"	"
46	1197	6.0	19.8	r	7	"			22	13	2	41.04	7	54	34.315
47	1234	6.1	20.2	r	7	"			22	20	50	49.97	8	8	35.248
48	1332	5.7	20.9	r	7	"			23	13	52	20.60	8	53	35.732
49	3287	5.9	7.1	d	7	420		Dec.	9	10	36	57.36	22	21	52.849
50	"	"	7.1	d	5	"			9	10	41	59.56	"	"	"
51	"	"	7.1	d	101	"			9	10	46	25.19	"	"	"
52	"	"	7.1	d	101	"			9	10	46	25.97	"	"	"
53	3410	7.7	8.2	d	101	"			10	13	27	6.67	23	10	48.673
54	3518	7.8	9.1	d	7	"			11	9	51	40.63	23	52	8.049
55	"	"	9.1	d	101	"			11	10	11	8.57	"	"	"
56	230	7.4	11.2	d	101	"			13	12	9	24.07	1	32	35.793
57	1309	5.7	18.4	r	117	"			20	17	0	5.92	8	40	52.141
58	"	"	18.4	r	101	"			20	17	15	15.51	"	"	"
59	1318	"	18.5	r	101	"			20	19	34	40.18	8	44	36.517
60	1662	6.3	21.3	r	7	"			23	15	37	48.68	11	25	42.870

TABLE 3. DATA OF OBSERVATION AND REDUCTION (continued)

$\delta_{app.}$	χ	$\chi-\rho$	p_1	q	$\Delta\sigma$	l	b	$\chi-c'$	h	$\Delta\sigma-h$
° / "	°	°			"	°	°	°	"	"
+12 42 23.81	115.7	7.6	+0.590	-0.133	-0.01	+0.39	+6.32	101.2	+0.31	-0.32
+20 31 24.30	107.5	10.3	+0.584	-0.179	-0.67	-0.89	+3.35	106.5	-0.97	+0.30
"	107.1	9.8	+0.585	-0.171	-0.79	-0.89	+3.36	106.0	-0.86	+0.07
"	96.5	359.3	+0.593	+0.013	+1.37	-0.95	+3.40	95.5	+1.12	+0.25
+20 49 0.77	31.2	293.9	+0.241	+0.914	+0.54	-0.91	+3.37	30.1	+0.54	+0.00
+20 14 25.35	156.8	59.3	+0.303	-0.860	+2.66	-0.97	+3.46	155.6	+2.05	+0.61
"	142.2	44.8	+0.421	-0.705	+0.39	-1.00	+3.50	141.0	-0.29	+0.68
"	156.1	58.6	+0.309	-0.854	+2.67	-0.97	+3.46	154.9	+1.87	+0.80
+18 14 2.10	110.7	8.7	+0.584	-0.151	-0.06	+0.41	+4.68	103.9	-0.31	+0.25
+14 21 16.98	78.4	331.8	+0.517	+0.473	-0.28	+1.28	+6.06	65.7	-0.62	+0.34
+10 50 34.28	135.9	27.0	+0.524	-0.454	+1.38	+3.21	+6.82	119.8	+1.07	+0.31
"	134.7	25.8	+0.530	-0.435	+0.97	+0.32	+6.83	118.5	+0.79	+0.18
"	125.4	16.5	+0.564	-0.284	+0.77	+3.17	+6.87	109.3	+0.12	+0.65
- 9 12 54.42	185.6	75.2	+0.140	-0.967	-1.45	+5.96	+6.37	161.5	-0.16	-1.29
- 2 45 55.60	93.7	341.8	+0.538	+0.312	+0.63	+6.49	+7.24	70.0	-0.09	+0.72
"	93.4	341.5	+0.537	+0.317	+0.57	+6.49	+7.24	69.7	-0.13	+0.70
- 6 31 31.70	120.7	9.5	+0.561	-0.166	+1.19	+7.04	+6.78	96.5	+0.46	+0.73
-20 52 30.49	54.7	316.4	+0.370	+0.690	+0.26	+5.74	+1.91	39.6	-0.02	+0.28
-19 52 17.58	82.9	3.6	+0.493	-0.062	+0.03	+0.40	-3.67	88.2	+0.02	+0.01
-21 56 57.65	31.4	305.4	+0.288	+0.815	-1.17	+3.71	-1.94	29.3	-0.58	-0.59
-15 11 57.39	114.2	40.6	+0.375	-0.651	+1.44	-0.98	-5.29	127.3	+1.15	+0.29
-18 45 13.45	80.8	339.0	+0.506	-0.359	-0.45	+6.74	+2.56	62.4	-1.29	+0.84
-19 18 53.72	119.0	40.3	+0.376	-0.646	+2.17	+1.75	-4.15	125.6	+1.60	+0.57
+19 33 50.16	252.1	170.0	-0.553	-0.174	-1.67	-5.20	-0.19	266.7	-2.19	+0.52
+ 1 1 20.66	49.7	340.8	+0.486	+0.328	+0.34	-4.47	-5.82	73.5	+0.64	-0.30
"	52.6	343.7	+0.494	+0.281	-0.71	-4.54	-5.83	76.3	-0.01	-0.70
"	54.6	345.7	+0.499	+0.247	-0.11	-4.54	-5.84	78.4	+0.59	-0.70
"	54.6	345.7	+0.499	+0.247	-0.07	-4.54	-5.84	78.4	+0.59	-0.66
"	56.5	347.7	+0.503	+0.214	+0.16	-4.59	-5.85	80.3	+0.57	-0.41
+ 0 53 18.90	85.9	17.1	+0.492	-0.294	-2.34	-4.49	-5.82	109.7	-2.46	+0.12
"	91.6	22.7	+0.475	-0.387	+0.29	-4.57	-5.84	115.4	+0.57	-0.28
"	91.6	22.7	+0.475	-0.386	+0.22	-4.57	-5.84	115.4	+0.56	-0.34
"	94.0	25.1	+0.466	-0.424	+0.45	-4.62	-5.85	117.7	+0.38	+0.07
+ 5 36 26.70	72.7	3.1	+0.528	-0.053	+0.14	-5.12	-5.12	97.1	+0.25	-0.11
"	79.2	9.6	+0.521	-0.166	-0.59	-5.25	-5.15	103.6	-0.03	-0.56
+15 54 17.25	282.8	179.2	-0.600	-0.014	+7.68	+1.23	+6.13	272.5	-1.76	+9.44
+14 45 23.03	246.0	141.1	-0.466	-0.629	-1.42	+0.45	+6.45	234.3	-0.65	-0.77
+11 47 23.80	257.6	150.3	-0.517	-0.495	-1.36	+2.54	+6.80	242.1	-0.56	-0.80
- 5 3 12.44	80.7	11.4	+0.486	-0.197	+1.03	-4.00	-6.42	102.1	+1.58	-0.55
"	87.4	18.1	+0.471	-0.311	-2.36	-4.04	-6.45	108.9	-2.54	+0.18
"	85.4	16.1	+0.476	-0.277	-1.99	-4.08	-6.44	106.8	-1.86	-0.13
"	85.4	16.1	+0.476	-0.278	-2.25	-4.08	-6.44	106.8	-1.86	-0.39
- 0 12 5.13	77.2	8.3	+0.498	-0.145	-1.08	-5.51	-6.20	100.6	+0.67	-1.75
+ 3 26 28.60	108.2	39.0	+0.398	-0.630	-0.21	-5.69	-5.45	132.5	+0.62	-0.83
"	118.9	49.7	+0.331	-0.763	-0.18	-5.83	-5.48	143.2	+0.77	-0.95
+12 20 27.95	94.0	21.1	+0.508	-0.359	-0.58	-6.95	-3.44	116.8	+1.16	-1.74
+12 50 0.43	266.9	160.2	-0.581	-0.339	+0.86	+1.78	+6.64	252.3	+0.92	-0.06
"	280.1	173.4	-0.613	-0.115	-1.91	+1.66	+6.70	265.6	-0.53	-1.38
+12 15 57.94	255.5	148.4	-0.525	-0.524	+1.72	+1.38	+6.91	240.6	+0.16	+1.56
- 1 27 52.78	4.8	253.7	-0.164	+0.960	-0.19	+6.44	+6.35	340.9	-0.76	+0.57

TABLE 3. DATA OF OBSERVATION AND REDUCTION (continued)

No.	NZC	Mag.	Age	Phn.	Stn.	Lun.	UT2				α app.				
							d	h	m	s	h	m	s		
1	3482	5.7	6.3	d	101	421	1957	Jan.	7	8	26	57.47	23	34	12.027
2	"	"	6.3	d	1	"			7	8	27	19.14	"	"	"
3	309	7.9	9.4	d	101	"			10	12	42	30.83	2	4	23.093
4	595	6.8	11.5	d	7	"			12	14	15	36.27	3	58	38.547
5	3326	6.4	2.5	d	7	422		Feb.	2	9	21	40.25	22	38	34.513
6	"	"	2.5	d	101	"			2	9	24	5.57	"	"	"
7	519	7.9	8.6	d	101	"			8	12	1	4.43	3	32	51.984
8	826	6.9	10.5	d	7	"			10	10	9	9.36	5	27	43.807
9	837	6.1	10.6	d	7	"			10	12	18	3.28	5	31	7.579
10	1006	6.9	11.6	d	7	"			11	11	35	18.73	6	32	9.502
11	"	"	11.6	d	101	"			11	11	46	7.66	"	"	"
12	1038	6.8	11.8	d	101	"			11	17	39	7.38	6	43	52.143
13	1309	5.7	13.7	d	101	"			13	14	26	31.65	8	40	52.944
14	240	5.6	3.8	d	5	423		Mar.	5	11	28	16.11	1	34	49.471
15	353	7.8	4.8	d	101	"			6	10	23	25.45	2	22	6.498
16	622	8.2	6.8	d	7	"			8	11	26	59.26	4	11	51.860
17	765	5.3	7.7	d	101	"			9	8	52	12.72	5	5	17.194
18	783	7.7	7.9	d	101	"			9	13	23	20.03	5	12	40.407
19	790	6.9	7.9	d	101	"			9	14	13	41.17	5	15	0.071
20	793	6.3	7.9	d	101	"			9	14	56	1.17	5	16	43.648
21	940	5.7	8.8	d	7	"			10	11	45	45.03	6	9	30.457
22	"	"	8.8	d	101	"			10	11	55	6.94	"	"	"
23	1234	6.1	10.8	d	7	"			12	11	30	31.43	8	8	36.462
24	"	"	10.8	d	101	"			12	11	35	29.21	"	"	"
25	1359	5.1	11.8	d	101	"			13	10	15	38.88	9	5	27.722
26	2017	6.4	17.1	r	1	"			18	17	24	51.42	14	2	9.744
27	888	6.0	6.0	d	101	424		Apr.	6	9	42	16.73	5	49	51.891
28	895	5.9	6.1	d	7	"			6	11	4	40.09	5	52	25.275
29	"	"	6.1	d	101	"			6	11	8	28.59	"	"	"
30	1318	5.7	9.0	d	101	"			9	9	54	19.77	8	44	36.803
31	1256	7.1	4.0	d	7	426		Jun.	2	12	0	33.10	8	19	31.015
32	1495	5.9	6.0	d	101	"			4	12	16	22.13	10	10	35.874
33	2828	6.0	16.1	r	7	"			14	14	22	48.46	19	19	24.128
34	1907	6.7	5.3	d	7	428		Aug.	1	10	38	22.65	13	15	8.512
35	"	"	5.3	d	101	"			1	10	42	8.20	"	"	"
36	"	"	5.3	d	1	"			1	10	42	27.27	"	"	"
37	2296	7.1	8.2	d	101	"			4	10	21	36.35	16	0	40.426
38	1234	6.1	25.3	r	7	429		Sep.	19	19	32	50.24	8	8	36.430
39	593	5.8	18.8	r	7	430		Oct.	12	14	56	32.60	3	58	24.402
40	736	6.2	19.8	r	7	"			13	14	45	3.95	4	52	30.891
41	1318	5.7	24.0	r	7	"			17	18	41	19.59	8	44	37.561
42	3002	6.2	7.3	d	5	431			30	11	45	18.96	20	31	51.486
43	3354	7.9	10.3	d	7	"		Nov.	2	11	42	14.12	22	50	30.783
44	3494	4.6	11.4	d	5	"			3	14	51	29.33	23	39	55.113
45	1281	6.4	21.6	r	7	"			13	19	14	21.74	8	31	26.031
46	1397	5.5	22.6	r	1	"			14	19	40	12.62	9	26	12.759
47	3075	7.1	5.8	d	7	432			27	10	23	40.13	20	59	42.253
48	"	"	5.8	d	1	"			27	10	26	25.91	"	"	"
49	1234	6.1	18.9	r	101	"		Dec.	10	14	40	51.28	8	8	38.853
50	3021	7.6	3.1	d	101	433			24	8	32	21.51	20	38	52.753

TABLE 3. DATA OF OBSERVATION AND REDUCTION (continued)

$\delta_{app.}$	χ	$\chi - \rho$	p_1	q	$\Delta\sigma$	l	b	$\chi - c'$	h	$\Delta\sigma - h$
° / "	°	°			"	°	°	°	"	"
+ 1 51 53.47	46.6	337.6	+0.462	+0.381	-0.45	-5.49	-5.58	70.6	+0.00	-0.45
"	47.0	338.0	+0.463	+0.375	-0.40	-5.49	-5.58	71.0	+0.22	-0.62
+14 22 50.76	116.2	41.4	+0.405	-0.661	-0.55	-8.21	-2.46	137.6	+0.19	-0.74
+20 4 50.38	40.7	317.0	+0.424	+0.682	-0.57	-7.75	+0.70	53.8	+0.04	-0.61
- 3 46 39.49	104.2	34.9	+0.405	-0.573	+0.67	-3.62	-6.13	126.5	+1.23	-0.56
"	103.8	34.6	+0.407	-0.568	+0.14	-3.64	-6.13	126.2	+0.79	-0.65
+18 45 41.85	94.3	12.9	+0.538	-0.224	+1.69	-8.54	+0.27	109.7	-1.64	+3.33
+20 31 6.16	120.0	28.9	+0.515	-0.484	+0.07	-6.93	+3.24	124.6	+0.97	-0.90
+20 26 39.52	131.2	39.6	+0.454	-0.637	-0.77	-7.29	+3.34	135.4	+0.10	-0.87
+19 27 41.78	119.1	22.4	+0.562	-0.381	-0.75	-5.77	+4.66	117.2	-0.08	-0.67
"	112.7	15.9	+0.585	-0.274	-2.65	-5.88	+4.69	110.7	-2.73	+0.08
+18 52 55.75	83.8	345.8	+0.594	+0.245	+0.58	-6.32	+5.28	80.7	+0.21	+0.37
+12 49 55.78	117.9	11.7	+0.623	-0.202	-0.28	-2.05	+6.68	103.4	-0.59	+0.31
+11 55 21.61	82.8	9.5	+0.510	-0.164	-0.37	-6.73	-2.70	105.6	-0.15	-0.22
+15 19 52.58	26.4	310.2	+0.339	+0.764	-0.02	-7.31	-1.39	46.8	-0.29	+0.27
+19 28 20.03	138.1	53.4	+0.328	-0.803	+1.19	-7.94	+1.66	150.1	+1.39	-0.20
+20 21 44.83	97.1	7.9	+0.557	-0.138	-1.40	-7.28	+3.00	104.0	-0.39	-1.01
+20 0 27.34	149.3	59.2	+0.289	-0.859	+0.72	-7.93	+3.37	155.4	+0.84	-0.12
+20 5 10.38	110.5	20.2	+0.531	-0.346	+0.33	-7.96	+3.47	116.4	+0.31	+0.02
+20 5 24.30	98.3	7.9	+0.561	-0.137	-0.44	-7.96	+3.56	104.1	-0.31	-0.13
+19 48 0.19	98.4	3.5	+0.579	-0.061	+0.15	-7.01	+4.52	98.7	+0.53	-0.38
"	88.9	354.0	+0.577	+0.104	+1.28	-7.10	+4.56	89.3	+1.39	-0.11
+14 45 16.06	157.0	53.0	+0.368	-0.799	-0.49	-4.21	+6.44	145.3	+0.11	-0.60
"	144.5	40.5	+0.464	-0.650	-0.02	-4.30	+6.48	132.9	+0.42	-0.44
+10 50 16.44	164.3	57.1	+0.338	-0.839	+0.81	-2.19	+6.82	147.7	+0.87	-0.06
-14 46 8.33	303.1	198.0	-0.559	+0.310	+1.67	+6.46	+2.72	281.7	+0.43	+1.24
+19 51 24.69	106.4	13.3	+0.550	-0.229	-1.91	-6.26	+4.35	108.8	-2.47	+0.56
+19 44 28.71	116.7	23.2	+0.520	-0.394	-0.31	-6.39	+4.44	118.8	-0.20	-0.11
"	106.8	13.3	+0.551	-0.230	-2.15	-6.45	+4.49	108.9	-2.55	+0.40
+12 15 53.64	133.5	27.4	+0.530	-0.460	+0.44	-3.19	+6.95	118.6	+0.82	-0.38
+13 45 32.47	89.3	344.5	+0.574	+0.267	+0.11	-2.22	+7.18	76.6	+0.01	+0.10
+ 4 49 24.71	150.9	41.3	+0.446	-0.659	+2.26	+0.37	+7.30	129.8	+2.18	+0.08
-18 23 10.79	271.4	191.7	-0.505	+0.203	-0.18	+4.18	-5.58	235.3	-1.02	+0.84
-11 15 38.43	155.1	47.6	+0.395	-0.739	+1.30	+5.82	+3.47	131.6	+1.48	-0.18
"	150.1	42.7	+0.431	-0.678	+0.63	+5.77	+3.49	126.6	+0.72	-0.09
"	150.2	42.7	+0.431	-0.678	-0.11	+5.76	+3.49	126.6	+0.88	-0.99
-19 43 25.84	30.5	293.9	+0.220	+0.914	-0.93	+6.94	-1.10	17.6	+0.18	-1.11
+14 45 18.15	293.0	190.0	-0.590	+0.173	+0.22	-4.83	+6.81	281.0	-0.63	+0.85
+18 4 35.33	229.1	145.9	-0.436	-0.561	+0.74	-5.34	+2.74	242.1	+0.38	+0.36
+19 25 4.42	317.7	230.2	-0.344	+0.768	+0.29	-5.63	+4.10	325.6	-0.63	+0.92
+12 15 53.48	265.9	160.7	-0.555	-0.331	+1.05	-4.14	+7.03	250.6	+0.36	+0.69
-13 51 52.51	64.2	348.8	+0.495	+0.194	-0.75	+4.44	-6.37	78.2	-0.41	-0.34
- 2 50 49.60	18.3	307.9	+0.302	+0.790	-0.36	+1.16	-5.34	41.5	-0.60	+0.24
+ 1 33 3.93	76.4	6.0	+0.493	-0.105	-0.33	-0.71	-4.57	100.9	+0.29	-0.62
+13 24 2.21	347.2	242.7	-0.264	+0.889	-0.20	-3.77	+7.07	333.1	-1.14	+0.94
+ 9 14 22.66	287.1	179.8	-0.584	-0.004	-1.13	-2.88	+7.03	268.5	-2.28	+1.15
-11 51 36.86	7.5	293.6	+0.203	+0.916	-1.75	+3.51	-6.34	24.0	-0.39	-1.36
"	15.4	301.5	+0.264	+0.853	-1.79	+3.45	-6.35	31.8	-1.02	-0.77
+14 45 8.86	304.0	201.0	-0.543	+0.359	+0.80	-2.63	+6.88	291.9	+0.31	+0.49
-13 38 56.61	74.4	359.3	+0.517	+0.012	-0.31	+3.21	-6.20	89.1	+0.09	-0.40

TABLE 3. DATA OF OBSERVATION AND REDUCTION (continued)

No.	NZC	Mag.	Age	Phn.	Stn.	Lun.	UT2				$\alpha_{app.}$				
							d	h	m	s	h	m	s		
51	209	7.2	9.3	d	7	433	1957	Dec.	30	14	9	14.92	1	23	46.324
52	"	"	9.3	d	101	"			30	14	15	24.18	"	"	"
53	"	"	9.3	d	1	"			30	14	15	33.72	"	"	"
54	319	7.6	10.2	d	101	"			31	10	48	33.23	2	7	31.829
55	"	"	10.2	d	1	"			31	10	49	5.49	"	"	"
1	593	5.8	12.4	d	101	433	1958	Jan.	2	15	30	15.28	3	58	25.267
2	736	6.2	13.3	d	7	"			3	14	11	0.84	4	52	32.159
3	"	"	13.3	d	101	"			3	14	24	55.44	"	"	"
4	"	"	13.3	d	1	"			3	14	25	25.51	"	"	"
5	41	8.0	5.6	d	101	434			25	11	27	56.46	0	18	12.456
6	391	7.4	8.5	d	7	"			28	9	42	57.09	2	36	42.349
7	232	8.5	4.8	d	101	435		Feb.	23	9	48	33.13	1	33	20.395
8	1318	5.7	12.8	d	101	"		Mar.	3	10	16	55.56	8	44	40.269
9	1332	"	13.0	d	7	"			3	15	8	0.25	8	53	40.356
10	"	"	13.0	d	118	"			3	15	8	28.14	"	"	"
11	"	"	13.0	d	5	"			3	15	12	47.13	"	"	"
12	"	"	13.0	d	11	"			3	15	12	48.87	"	"	"
13	"	"	13.0	d	101	"			3	15	17	50.87	"	"	"
14	2118	2.9	19.1	r	7	"			9	18	31	53.24	14	48	35.170
15	"	"	19.1	r	103	"			9	18	44	13.85	"	"	"
16	"	"	19.1	r	101	"			9	18	44	13.92	"	"	"
17	710	7.1	6.0	d	7	436			26	10	55	1.96	4	40	25.311
18	718	6.1	6.1	d	7	"			26	12	59	22.91	4	43	50.416
19	1136	7.8	9.1	d	7	"			29	12	6	23.54	7	27	5.560
20	"	"	9.1	d	101	"			29	12	13	29.65	"	"	"
21	1147	5.1	9.2	d	7	"			29	14	28	47.93	7	31	14.394
22	"	"	9.2	d	101	"			29	14	29	34.24	"	"	"
23	"	"	9.2	d	5	"			29	14	31	24.80	"	"	"
24	1145	6.7	9.2	d	101	"			29	14	39	49.94	7	31	2.738
25	1256	7.1	10.0	d	101	"			30	9	41	39.40	8	19	34.948
26	951	6.9	5.3	d	7	437		Apr.	24	10	15	35.90	6	13	14.586
27	1318	5.7	5.7	d	7	438		May	24	10	52	37.38	8	44	39.130
28	"	"	5.7	d	5	"			24	10	56	35.51	"	"	"
29	"	"	5.7	d	101	"			24	10	59	46.31	"	"	"
30	1792	7.1	9.8	d	7	"			28	14	45	5.70	12	27	54.731
31	"	"	9.8	d	101	"			28	14	52	11.74	"	"	"
32	1917	7.0	10.7	d	7	"			29	11	10	25.53	13	19	2.775
33	"	"	10.7	d	12	"			29	11	11	29.45	"	"	"
34	"	"	10.7	d	101	"			29	11	25	22.63	"	"	"
35	2826	4.0	16.8	r	7	"		Jun.	4	13	53	26.76	19	19	17.356
36	2969	3.3	17.9	r	101	"			5	17	17	34.78	20	18	41.979
37	1397	5.5	4.1	d	101	439			21	11	17	45.14	9	26	13.647
38	2313	7.0	4.9	d	7	442		Sep.	18	10	33	37.20	16	5	44.170
39	2316	6.4	5.0	d	7	"			18	11	30	36.24	16	7	32.370
40	2463	6.9	6.0	d	7	"			19	12	11	10.85	17	7	49.382
41	2870	7.6	6.5	d	7	443		Oct.	19	9	30	30.09	19	36	50.579
42	"	"	6.5	d	101	"			19	9	44	6.98	"	"	"
43	2871	7.1	6.5	d	7	"			19	9	30	53.44	19	36	51.147
44	"	"	6.5	d	101	"			19	9	44	25.69	"	"	"
45	3508	5.8	11.7	d	101	"			24	14	49	32.50	23	47	22.196

TABLE 3. DATA OF OBSERVATION AND REDUCTION (continued)

δ app.	χ	$\chi - \rho$	p_1	q	$\Delta\sigma$	l	b	$\chi - c'$	h	$\Delta\sigma - h$
° / "	°	°			"	°	°	°	"	"
+10 11 23.77	37.4	324.2	+0.407	+0.585	-0.51	-4.25	-1.57	60.7	-0.58	+0.07
"	31.3	318.0	+0.373	+0.669	-0.27	-4.29	-1.54	54.6	-0.70	+0.43
"	31.2	318.0	+0.373	+0.669	-0.22	-4.30	-1.54	54.6	-0.61	+0.39
+12 58 42.49	78.9	3.6	+0.509	-0.063	-0.88	-4.65	-0.24	100.3	+0.40	-1.28
"	79.2	3.9	+0.509	-0.068	-0.65	-4.66	-0.24	100.5	+0.19	-0.84
+18 4 35.43	110.9	27.8	+0.478	-0.466	-0.09	-6.55	+2.83	124.1	+0.40	-0.49
+19 25 3.71	64.9	337.4	+0.513	+0.384	-0.02	-6.18	+4.07	72.9	+0.21	-0.23
"	58.3	330.8	+0.485	+0.488	+0.04	-6.29	+4.10	66.3	-0.10	+0.14
"	58.2	330.7	+0.485	+0.489	-0.08	-6.30	+4.10	66.2	-0.15	+0.07
+ 4 32 47.43	44.1	333.0	+0.439	+0.453	-0.31	-2.53	-3.07	68.8	-0.08	-0.23
+14 40 47.95	30.5	313.5	+0.349	+0.726	+0.37	-5.71	+0.89	50.0	+0.53	-0.16
+10 20 50.22	35.4	321.6	+0.387	+0.621	-0.64	-4.35	-0.70	58.3	-0.53	-0.11
+12 15 39.01	168.3	63.8	+0.268	-0.897	+1.44	-5.07	+6.88	152.9	+1.68	-0.24
+11 46 59.75	93.0	347.9	+0.597	+0.209	+0.05	-5.61	+7.04	76.9	+0.11	-0.06
"	91.9	346.9	+0.595	+0.227	+0.37	-5.61	+7.05	75.9	+0.00	+0.37
"	92.5	347.4	+0.596	+0.218	+0.18	-5.65	+7.05	76.4	+0.22	-0.04
"	91.9	346.8	+0.595	+0.228	+0.32	-5.65	+7.05	75.9	+0.07	+0.25
"	81.2	336.1	+0.559	+0.405	-0.26	-5.68	+7.10	65.2	-0.07	-0.19
-15 52 10.81	273.6	171.6	-0.592	-0.147	+2.03	+5.94	-0.71	255.0	+1.12	+0.91
"	281.5	179.5	-0.599	-0.009	+1.06	+5.83	-0.67	262.9	+0.81	+0.25
"	281.5	179.5	-0.599	-0.009	+1.06	+5.83	-0.67	262.9	+0.81	+0.25
+18 38 29.39	48.2	321.9	+0.407	+0.618	+0.04	-7.79	+4.58	57.3	-0.68	+0.72
+18 39 31.31	20.4	293.7	+0.208	+0.916	+1.01	-8.03	+4.77	29.1	+0.34	+0.67
+16 14 54.80	113.0	13.5	+0.547	-0.233	-1.30	-8.14	+7.04	104.9	-0.91	-0.39
"	102.9	3.4	+0.562	-0.058	+1.52	-8.22	+7.09	94.8	+2.10	-0.58
+15 54 54.34	114.6	14.7	+0.546	-0.254	-2.58	-8.40	+7.22	106.1	-1.99	-0.59
"	105.9	6.0	+0.562	-0.104	-0.24	-8.42	+7.26	97.4	+0.28	-0.52
"	114.6	14.7	+0.546	-0.253	-2.56	-8.42	+7.22	106.1	-1.99	-0.57
+15 43 37.53	152.2	52.2	+0.346	-0.791	-0.15	-8.42	+7.27	143.7	-0.54	+0.39
+13 45 18.10	124.8	21.9	+0.538	-0.373	-2.77	-6.97	+7.09	111.6	-2.69	-0.08
+18 18 34.66	104.9	11.0	+0.524	-0.190	-1.83	-7.56	+6.37	104.4	-0.99	-0.84
+12 15 41.82	86.7	342.2	+0.536	-0.306	-0.13	-5.98	+7.19	71.3	-0.74	+0.61
"	86.2	341.7	+0.535	-0.314	-0.23	-6.01	+7.20	70.8	-0.23	+0.00
"	75.7	331.2	+0.494	+0.482	+0.14	-6.02	+7.24	60.3	-0.05	+0.19
- 5 47 40.87	59.6	311.1	+0.398	+0.753	+0.02	-2.24	+3.31	34.8	-0.09	+0.11
"	52.4	304.0	+0.338	+0.829	+0.08	-2.27	+3.33	27.7	+0.12	-0.04
- 9 47 1.55	87.8	340.9	+0.576	+0.327	-0.86	-0.34	+1.65	64.3	-0.63	-0.23
"	89.6	342.7	+0.582	+0.297	-1.16	-0.36	+1.64	66.1	-0.85	-0.31
"	75.0	328.1	+0.518	+0.528	-0.28	-0.45	+1.70	51.5	+0.08	-0.36
-17 55 27.03	243.3	162.0	-0.531	-0.309	+0.85	+6.85	-6.43	207.1	+0.83	+0.02
-14 54 39.92	302.1	225.0	-0.381	+0.707	+0.90	+6.02	-5.95	315.5	+0.98	-0.08
+ 9 14 13.61	130.4	23.9	+0.526	-0.406	-2.00	-4.41	+6.87	111.6	-1.61	-0.39
-18 7 50.05	89.8	352.9	+0.586	+0.124	+0.94	+5.15	-3.58	77.5	-0.02	+0.96
-18 13 49.87	107.7	11.0	+0.579	-0.191	+1.19	+5.06	-3.66	95.6	+0.84	+0.35
-19 22 58.69	118.4	26.3	+0.514	-0.444	+1.29	+5.50	-5.49	157.2	+0.82	+0.47
-17 0 8.08	98.5	17.8	+0.520	-0.306	+1.95	+7.58	-6.13	107.9	+0.74	+1.21
"	102.6	21.9	+0.506	-0.374	+0.23	+7.46	-6.14	112.0	+0.27	-0.04
-17 0 2.76	98.4	17.7	+0.520	-0.303	+1.74	+7.58	-6.13	107.7	+0.63	+1.11
"	102.4	21.7	+0.507	-0.370	+1.08	+7.46	-6.14	111.7	+0.26	+0.82
+ 0 51 0.36	34.8	323.4	+0.399	+0.597	-0.63	+3.14	-2.53	59.6	-0.64	+0.01

TABLE 3. DATA OF OBSERVATION AND REDUCTION (continued)

No.	NZC	Mag.	Age	Phn.	Stn.	Lun.	UT2				α app.				
							d	h	m	s	h	m	s		
46	3508	5.8	11.7	d	119	443	1958	Oct.	24	14	50	20.65	23	47	22.196
47	1106	3.7	20.9	r	7	"		Nov.	2	19	17	14.50	7	15	44.494
48	1341	4.3	22.8	r	7	"			4	15	38	58.31	8	56	14.495
49	"	"	22.8	r	101	"			4	15	41	39.33	"	"	"
50	3163	7.3	4.7	d	101	445		Dec.	15	9	0	55.85	21	34	42.460
51	"	"	4.7	d	1	"			15	9	1	15.04	"	"	"
52	3411	7.2	6.6	d	1	"			17	8	51	37.87	23	11	59.761
53	228	8.8	9.7	d	101	"			20	10	4	36.60	1	31	47.121
54	1519	6.5	20.1	r	101	"			30	20	7	58.67	10	21	7.938
1	301	6.8	8.2	d	101	446	1959	Jan.	17	9	56	40.58	2	0	46.887
2	314	8.3	8.3	d	101	"			17	12	53	52.95	2	5	56.307
3	829	7.0	12.4	d	101	"			21	15	27	58.62	5	29	16.974
4	1002	7.8	9.1	d	7	448		Mar.	18	13	3	45.62	6	29	55.499
5	"	"	9.1	d	1	"			18	13	20	3.89	"	"	"
6	1003	7.2	9.1	d	7	"			18	13	5	4.18	6	29	56.207
7	"	"	9.1	d	101	"			18	13	22	4.82	"	"	"
8	"	"	9.1	d	1	"			18	13	22	42.92	"	"	"
9	1106	3.7	9.9	d	101	"			19	8	13	40.70	7	15	45.678
10	1256	7.1	11.2	d	7	"			20	15	14	55.55	8	19	38.069
11	1320	6.8	9.3	d	120	449		Apr.	17	11	19	46.92	8	46	25.694
12	"	"	9.3	d	13	"			17	11	21	47.16	"	"	"
13	"	"	9.3	d	101	"			17	11	30	36.21	"	"	"
14	1429	"	10.3	d	7	"			18	11	24	40.04	9	39	5.166
15	"	"	10.3	d	101	"			18	11	30	6.88	"	"	"
16	1440	6.7	10.5	d	101	"			18	15	4	24.74	9	45	7.673
17	3278	5.4	23.6	r	101	"		May	1	18	1	48.54	22	18	3.156
18	1281	6.4	6.7	d	7	450			14	12	19	31.31	8	31	29.698
19	"	"	6.7	d	101	"			14	12	20	46.01	"	"	"
20	"	"	6.7	d	1	"			14	12	20	53.46	"	"	"
21	"	"	6.7	d	6	"			14	12	22	32.01	"	"	"
22	1735	6.5	10.6	d	7	"			18	10	41	15.45	11	58	57.659
23	2826	4.0	18.0	r	7	"			25	19	19	2.88	19	19	20.184
24	1364	6.5	5.0	d	6	451		Jun.	11	11	1	27.23	9	7	33.514
25	2573	7.3	9.8	d	101	453		Aug.	14	10	43	48.34	17	49	57.554
26	2390	6.7	6.4	d	7	454		Sep.	9	11	51	28.24	16	36	8.182
27	2531	7.3	7.4	d	7	"			10	10	52	25.08	17	34	39.845
28	2494	7.9	4.9	d	7	455		Oct.	7	10	10	28.97	17	17	7.439
29	2649	6.6	5.8	d	1	"			8	8	46	4.00	18	15	28.811
30	2653	6.4	5.9	d	1	"			8	9	36	58.40	18	16	21.194
31	2658	Var.	5.9	d	7	"			8	10	38	43.66	18	19	0.693
32	"	"	5.9	d	101	"			8	10	47	12.82	"	"	"
33	2826	4.0	7.0	d	7	"			9	11	28	43.94	19	19	20.402
34	"	"	7.0	d	101	"			9	11	40	40.60	"	"	"
35	"	"	7.0	d	1	"			9	11	41	18.27	"	"	"
36	3103	7.7	9.0	d	7	"			11	11	58	37.48	21	11	56.196
37	"	"	9.0	d	101	"			11	12	8	22.16	"	"	"
38	3380	6.2	11.1	d	7	"			13	15	6	40.96	22	59	27.783
39	692	1.1	18.0	r	7	"			20	12	21	45.49	4	33	37.695
40	970	6.5	20.1	r	7	"			22	15	50	32.75	6	19	5.699

TABLE 3. DATA OF OBSERVATION AND REDUCTION (continued)

$\delta_{app.}$	χ	$\chi - \rho$	p_1	q	$\Delta\sigma$	l	b	$\chi - c'$	h	$\Delta\sigma - h$
° ' "	°	°			"	°	°	°	"	"
+ 0 51 0.36	35.5	324.2	+0.403	+0.586	-0.57	+3.13	-2.54	60.4	-0.52	-0.05
+16 36 50.52	253.3	155.4	-0.480	-0.416	+0.83	-6.76	+7.07	245.8	+0.43	+0.40
+12 1 0.20	316.5	212.4	-0.468	+0.535	+0.58	-6.20	+6.65	299.7	+0.36	+0.22
"	317.4	213.3	-0.463	+0.549	+0.86	-6.22	+6.65	300.7	+0.35	+0.51
-10 21 27.84	62.9	349.0	+0.528	+0.192	-0.25	+6.26	-5.07	82.5	-0.93	+0.68
"	63.3	349.3	+0.529	+0.186	-0.16	+6.26	-5.07	82.8	-0.79	+0.63
- 2 51 26.42	94.6	23.2	+0.468	-0.394	-0.32	+5.28	-3.01	118.8	+0.43	-0.75
+ 8 47 2.14	61.3	347.7	+0.481	+0.213	+0.86	+1.59	+0.95	84.3	+0.31	+0.55
+ 5 54 1.65	276.6	168.9	-0.555	-0.192	+0.02	-4.62	+5.07	254.2	+0.32	-0.30
+10 49 18.19	344.2	269.4	-0.005	+1.000	+0.78	+0.32	+2.04	5.8	-0.07	+0.85
+10 59 45.20	68.2	353.1	+0.489	+0.121	+0.41	-0.28	+2.10	89.5	+0.27	+0.14
+18 12 45.88	108.3	19.2	+0.490	-0.329	-2.98	-4.84	+6.35	112.1	-1.81	-1.17
+17 48 25.26	50.1	316.5	+0.374	+0.689	+0.53	-6.85	+7.16	47.5	+0.25	+0.28
"	30.2	296.5	+0.230	+0.895	-0.08	-6.93	+7.22	27.4	-0.27	+0.19
+17 48 42.47	48.2	314.6	+0.362	+0.713	+0.56	-6.86	+7.17	45.5	+0.01	+0.55
"	26.9	293.2	+0.203	+0.919	-0.06	-6.94	+7.22	24.2	-0.62	+0.56
"	26.2	292.5	+0.197	+0.924	+0.52	-6.94	+7.22	23.5	-0.51	+1.03
+16 36 44.63	120.2	23.4	+0.484	-0.396	-2.62	-6.33	+7.09	112.7	-2.27	-0.35
+13 45 6.51	151.5	50.0	+0.353	-0.766	-0.63	-7.51	+6.94	137.8	-0.34	-0.29
+12 41 43.52	101.2	358.3	+0.543	+0.030	-0.29	-7.76	+6.48	85.2	+0.66	-0.95
"	102.7	359.8	+0.543	+0.004	-0.02	-7.78	+6.47	86.7	+0.80	-0.82
"	90.8	347.9	+0.531	+0.210	-1.01	-7.85	+6.52	74.8	-0.84	-0.17
+ 9 10 43.86	151.1	45.6	+0.393	-0.714	+0.20	-7.47	+5.59	131.1	+0.20	+0.00
"	138.8	33.2	+0.470	-0.548	-0.75	-7.55	+5.64	118.8	-0.31	-0.44
+ 8 45 24.53	90.2	344.3	+0.543	+0.271	-0.55	-7.97	+5.74	69.8	-0.78	+0.23
- 8 1 32.33	199.2	126.1	-0.309	-0.808	+0.69	+7.41	-3.49	221.5	+0.78	-0.09
+13 23 43.04	116.4	14.2	+0.511	-0.246	+0.81	-7.77	+6.69	101.6	+1.44	-0.63
"	108.0	5.9	+0.524	-0.102	+0.90	-7.79	+6.72	93.3	+1.10	-0.20
"	107.8	5.7	+0.524	-0.099	+0.98	-7.79	+6.72	93.1	+1.52	-0.54
"	116.5	14.3	+0.510	-0.247	+1.43	-7.80	+6.69	101.7	+1.49	-0.06
- 1 32 33.76	97.2	348.8	+0.582	+0.195	-0.44	-6.08	+1.90	72.2	+0.42	-0.86
-17 55 20.78	238.3	155.6	-0.542	-0.413	+0.46	+5.94	-5.83	246.4	-0.07	+0.53
+11 43 44.69	73.3	329.2	+0.456	+0.512	-1.54	-6.98	+5.98	55.5	-0.77	-0.77
-19 6 35.77	88.5	358.1	+0.594	+0.034	+0.22	+1.56	-5.79	87.2	+0.02	+0.20
-18 8 18.00	140.7	44.8	+0.420	-0.704	+1.75	+0.85	-5.40	131.8	+0.87	+0.88
-18 57 54.13	104.2	12.6	+0.573	-0.218	+0.29	+2.10	-5.87	101.3	+0.21	+0.08
-18 54 42.03	144.9	52.0	+0.368	-0.788	+0.00	+2.65	-5.82	140.2	-1.72	+1.72
-18 48 43.36	69.3	340.9	+0.556	+0.328	-0.85	+4.03	-5.99	70.8	-0.13	-0.72
-18 38 1.59	27.6	299.3	+0.288	+0.872	-0.63	+3.90	-6.02	29.2	-1.06	+0.43
-18 52 36.83	101.6	13.5	+0.572	-0.234	+0.53	+3.83	-6.05	103.4	-0.07	+0.60
"	104.6	16.6	+0.563	-0.285	-0.07	+3.75	-6.07	106.4	-0.67	+0.60
-17 55 18.37	131.3	47.8	+0.387	-0.741	-0.43	+4.70	-5.88	139.4	-0.59	+0.16
"	138.7	55.2	+0.329	-0.821	+0.03	+4.61	-5.90	146.8	-0.23	+0.26
"	139.3	55.8	+0.324	-0.827	+0.59	+4.61	-5.90	147.4	-0.20	+0.79
-12 37 50.22	46.1	329.7	+0.479	+0.504	-1.13	+5.73	-4.36	64.3	-1.89	+0.76
"	51.1	334.8	+0.502	+0.426	-0.43	+5.63	-4.38	69.3	-0.56	+0.13
- 4 55 31.79	64.8	352.4	+0.531	+0.132	-0.19	+5.20	-1.87	88.8	-0.22	+0.03
+16 25 43.10	218.5	134.9	-0.348	-0.708	+0.23	-0.13	+6.75	227.5	-0.33	+0.56
+17 46 54.10	266.7	175.0	-0.493	-0.088	-1.47	-2.92	+7.13	264.6	-1.70	+0.23

TABLE 3. DATA OF OBSERVATION AND REDUCTION (continued)

No.	NZC	Mag.	Age	Phn.	Stn.	Lun.	UT2				$\alpha_{app.}$				
							d	h	m	s	h	m	s		
41	2764	6.3	4.4	d	7	456	1959	Nov.	5	8	47	24.54	18	57	4.987
42	"	"	4.4	d	101	"			5	8	59	58.47	"	"	"
43	"	"	4.4	d	102	"			5	8	59	59.13	"	"	"
44	"	"	4.4	d	1	"			5	9	0	40.87	"	"	"
45	3072	6.6	6.6	d	7	"			7	12	23	55.08	20	58	55.455
46	"	"	6.6	d	101	"			7	12	31	16.34	"	"	"
47	"	"	6.6	d	102	"			7	12	31	16.67	"	"	"
48	"	"	6.6	d	1	"			7	12	31	42.42	"	"	"
49	"	"	6.6	d	6	"			7	12	31	36.89	"	"	"
50	3473	7.7	9.6	d	7	"			10	11	56	49.21	23	31	38.375
51	50	6.0	10.7	d	7	"			11	14	47	57.70	0	23	21.490
52	"	"	10.7	d	6	"			11	14	55	57.22	"	"	"
53	3008	6.9	4.0	d	101	457		Dec.	4	9	51	38.69	20	35	5.483
54	"	"	4.0	d	1	"			4	9	52	36.51	"	"	"
55	3015	5.3	4.1	d	101	"			4	10	44	23.04	20	37	1.024
56	"	"	4.1	d	102	"			4	10	44	23.28	"	"	"
57	"	"	4.1	d	101	"			4	10	44	24.06	"	"	"
58	"	"	4.1	d	102	"			4	10	44	24.39	"	"	"
59	"	"	4.1	d	1	"			4	10	44	46.87	"	"	"
60	113	8.0	9.0	d	101	"			9	8	42	13.98	0	49	52.644
61	360	6.8	11.0	d	1	"			11	8	25	35.14	2	24	37.579
62	376	7.0	11.2	d	7	"			11	14	8	56.21	2	32	16.983

TABLE 3. DATA OF OBSERVATION AND REDUCTION (continued)

$\delta_{app.}$	χ	$\chi-\rho$	p_1	q	$\Delta\sigma$	l	b	$\chi-c'$	h	$\Delta\sigma-h$
° ' "	°	°			"	°	°	°	"	"
-18 37 11.61	134.5	49.3	+0.390	-0.758	-0.70	+5.06	-5.83	140.4	-0.85	+0.15
"	140.3	55.1	+0.342	-0.821	+0.34	+4.97	-5.85	146.2	-0.17	+0.51
"	140.3	55.2	+0.342	+0.821	+0.32	+4.97	-5.85	146.2	-0.17	+0.49
"	140.9	55.7	+0.337	-0.826	+0.13	+4.96	-5.85	146.8	-0.24	+0.37
-13 41 10.01	120.7	43.8	+0.407	-0.692	+0.33	+6.45	-4.61	138.0	-0.02	+0.35
"	126.7	49.8	+0.364	-0.763	+0.12	+6.40	-4.62	143.9	-0.50	+0.62
"	126.7	49.8	+0.364	-0.763	+0.14	+6.40	-4.62	143.9	-0.50	+0.64
"	127.2	50.3	+0.360	-0.769	+0.17	+6.40	-4.63	144.5	-0.46	+0.63
"	131.3	54.4	+0.328	-0.813	+1.26	+6.42	-4.64	148.6	+0.71	+0.55
- 2 27 52.48	54.7	342.8	+0.502	+0.295	-0.79	+6.33	-0.70	79.4	-0.62	-0.17
+ 1 43 7.71	113.6	41.8	+0.385	-0.666	-0.33	+5.16	+0.71	138.5	-0.10	-0.23
"	122.4	50.5	+0.328	-0.772	+0.49	+5.12	+0.69	147.3	+0.45	+0.04
-15 17 8.99	146.9	68.5	+0.217	-0.930	-1.33	+6.16	-4.73	162.2	-1.25	-0.08
"	148.2	69.8	+0.204	-0.939	-0.87	+6.16	-4.73	163.5	-1.20	+0.33
-15 5 42.42	131.9	53.6	+0.350	-0.805	+0.93	+6.12	-4.76	147.4	-0.36	+1.29
"	131.9	53.7	+0.350	-0.805	+0.97	+6.12	-4.76	147.4	-0.36	+1.33
"	131.9	53.7	+0.349	-0.806	+0.68	+6.12	-4.76	147.4	-0.34	+1.02
"	132.0	53.7	+0.349	-0.806	+0.69	+6.12	-4.76	147.4	-0.33	+1.02
"	132.5	54.2	+0.345	-0.811	+1.21	+6.12	-4.76	148.0	+0.78	+0.43
+ 3 50 35.00	8.8	296.7	+0.230	+0.893	+0.13	+6.49	+1.98	33.1	-0.81	+0.94
+10 23 7.84	130.0	54.9	+0.287	-0.818	+0.87	+4.54	+4.51	150.1	+1.06	-0.19
+11 25 47.14	64.8	349.1	+0.488	+0.188	+0.59	+3.41	+4.40	84.4	-0.10	+0.69

Table 3. shows data of observation and reduction. UT2 in the 8th column of left-hand page is taken from original records of observation of HO or the published reports of TAO. For reduction the Improved Lunar Ephemeris is employed. Limb corrections h , in the 10th column of right-hand page, is made with the moon's profile by Watts (1963), values of libration, in the 7th to 9th columns, being taken from the British Nautical Almanac. Then, values of $\Delta\sigma-h$ in the last column are applied to analysis.

3. Analysis and Discussion

ΔTO and ΔB for each year are evaluated by the method of least squares employing the observation equations:

$$p_1(a+bt)+q(c+dt)=\Delta\sigma-h.$$

t is reckoned from the middle of each year in unit of year, then a and c denote ΔT and ΔB at the middle of the year, respectively. And

$$p_1 = \cos(\chi - \rho) \sqrt{(15\Delta\alpha_t \cos\delta_t)^2 + (\Delta\delta_t)^2} / 3600,$$

$$q = -\sin(\chi - \rho),$$

where $\Delta\alpha_t$ and $\Delta\delta_t$ are hourly changes of the moon's position. Data with $\Delta\sigma-h \geq 2''$ are not adopted to the analysis. Solutions are listed in Table 4.

At first, HO- and TAO-observations are solved separately, as shown in Tables 4a and 4b. There seems to exist no systematic difference between them. Further, the authors have once evaluated ΔT 's and ΔB 's for TAO-data of 1960 to 1962, except for the observations made at temporary stations. Some of these occultations were observed simultaneously at HO-stations. In Table 5 solutions for these simultaneous observations are given. We find no systematic difference between HO- and TAO-observations. Then, they can be combined together to evaluate ΔT and ΔB . Results are shown in Table 4c.

Yamazaki has evaluated ΔTO 's and ΔB 's from the HO-data for 1960 to 1966, and authors have evaluated for most of the TAO-data of 1960 to 1962. We make weighted means of these HO- and TAO-values for 1960 to 1962.

Values of ΔTO thus obtained are shown in the second column of Table 6. In the third column of the table are given ΔTO 's from meridian observation of the moon at the U.S. Naval Observatory, Washington, D. C. (Adams and Scott, 1964, 1965a, 1965b, 1967).

TABLE 4a. SOLUTION FOR TAO-DATA

	N	a	(p.e.)	b	(p.e.)	c	(p.e.)	d	(p.e.)
		s	s	s	s	"	"	"	"
1955	32	+29.96	± 0.12	-0.51	± 0.33	+0.04	± 0.11	-0.47	± 0.32
56	35	30.13	.19	-2.20	.59	.12	.17	-.15	.62
57	25	30.53	.17	-0.92	.46	.03	.17	-.30	.52
58	26	31.01	.10	+1.15	.30	.06	.10	-.02	.36
59	25	32.31	.14	+3.64	.50	.32	.10	-1.17	.27

TABLE 4b. SOLUTION FOR HO-DATA

	N	a (p.e.)		b (p.e.)		c (p.e.)		d (p.e.)	
1955	7	^s +29.81	^s ±1.11	^s -2.11	^s ±2.65	^s -0.96	^s ±0.70	^s +3.18	^s ±1.52
56	24	30.14	0.16	-0.24	0.47	+ .56	.13	0.21	0.34
57	30	29.80	.13	-0.24	.39	.18	.11	.18	.31
58	28	31.02	.14	+2.09	.50	.42	.20	-.97	.63
59	37	31.75	.16	+1.67	.62	.04	.11	-1.14	.36

TABLE 4c. SOLUTION FOR COMBINED DATA

	N	a (p.e.)		b (p.e.)		c (p.e.)		d (p.e.)	
1955	39	^s +29.90	^s ±0.11	^s -0.83	^s ±0.30	^s +0.14	^s ±0.09	^s -0.03	^s ±0.24
56	59	30.12	.13	-1.47	.38	.30	.11	+ .03	.33
57	55	30.16	.11	-0.83	.31	.15	.09	+ .97	.27
58	54	31.06	.09	+1.46	.27	.17	.10	-.44	.34
59	62	31.89	.11	+2.27	.41	.13	.08	-1.29	.24

TABLE 5. COMPARISON FOR COMMON OCCULTATIONS

	TAO				H O					
	N	ΔT _O	p.e.	ΔB	p.e.	N	ΔT _O	p.e.	ΔB	p.e.
1960. 5	12	^s +31.77	^s ±0.23	^s -0.15	^s ±0.13	17	^s +31.47	^s ±0.17	^s -0.05	^s ±0.11
1961. 5	15	32.00	.18	+ .23	.14	19	32.00	.36	+ .56	.29
1962. 5	9	32.21	.19	- .25	.18	11	32.82	.14	- .42	.13

Improved Lunar Ephemeris, Watts' limb correction, International Ellipsoid, and Datum corr, Δφ=+10", Δλ=+20" are employed.

Approximate values of ΔT₁ for the middle of each year are obtained through

$$\begin{aligned} \Delta T_1 - \Delta T_O &= -1.821 \Delta \lambda \\ &= +0.344 \sin \varrho - 0.131 \sin (2\Gamma' - 2\varrho), \end{aligned}$$

ignoring the term in sin D. Values of sin ρ in the present approximation is that at the middle of the year, and sin (2Γ' - 2ρ) is integrated through the year. ΔT₁'s of Japan occultation are shown in the fourth column of Table 6, and (AT-UT₂)'s by BIH are in the fifth column. In Fig. 1 ΔT₁ of Japan occultation and AT-UT₂ are shown.

Difference in ΔT_O between Japan occultation and Washington meridian is shown in Fig. 2 and is expressed by

$$\begin{aligned} \Delta T_J - \Delta T_W &= -0.03 + 0.02 t, \\ &\pm .06 \pm .02 \quad (\text{p.e.}) \end{aligned}$$

where t reckoned from 1900.0 in unit of year. We find that ΔT_O of Japan occultation is very close to that of Washington meridian in timely rate as well as in absolute value.

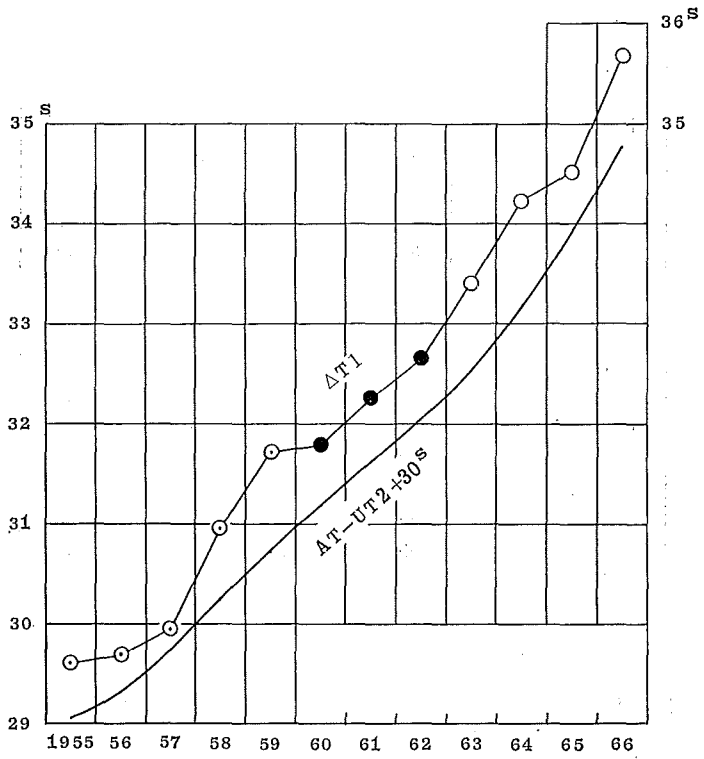


Fig. 1

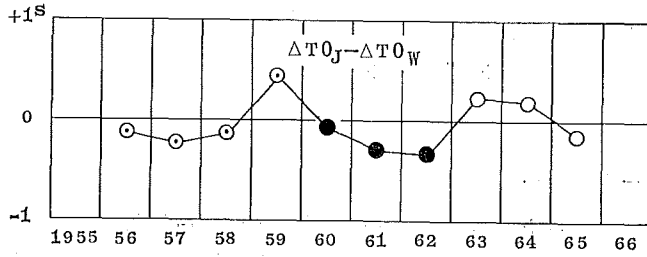


Fig. 2

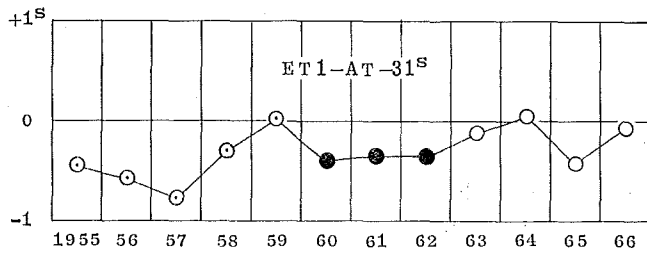


Fig. 3

TABLE 6. COMPARISON OF UT, ET AND AT

	$\Delta T O_J$	$\Delta T O_W$	$\Delta T I_J$	AT-UT2
1955. 5	^s +29.90	^s	^s +29.60	^s -0.96
1956. 5	30.12	+30.24	29.70	-0.69
1957. 5	30.16	30.39	29.97	-0.27
1958. 5	31.06	31.17	30.95	+0.25
1959. 5	31.89	31.45	31.73	+0.71
1960. 5	31.67	31.76	31.80	+1.18
1961. 5	32.04	32.31	32.26	+1.60
1962. 5	32.54	32.88	32.69	+2.04
1963. 5	33.03	32.80	33.41	+2.53
1964. 5	33.85	33.67	34.24	+3.20
1965. 5	34.30	34.45	34.52	+3.95
1966. 5	35.34		35.68	+4.80

Difference between ET1 from Japan occultation and AT of BIH is shown in Fig. 3 and is expressed by

$$\Delta E_J A = ET1_J - AT = 30.659 + 0.036 t. \\ \pm .044 \pm .012$$

Further, ΔTO of Washington meridian is reduced to ΔTI by same process as for Japan occultation, and difference between this ET1 of Washington meridian and AT of BIH is expressed by

$$\Delta E_W A = ET1_W - AT = 30.671 + 0.036 t. \\ \pm .030 \pm .011$$

Remarkable agreement between ΔE_JA and ΔE_WA in the coefficient of linear term confirms the agreement of ΔT's of Japan occultation with those of Washington meridian, and suggests the necessity of researches on the adopted value of caesium frequency standard in one ephemeris second.

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(Astronomical Section)

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