

UNITED STATES NAVAL OBSERVATORY

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U.S. Naval Observatory, Washington, D. C. 20392

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PHASES OF THE MOON 2000–2049

by

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*The United States Naval Observatory (USNO) web services (<http://www.usno.navy.mil/USNO/astronomical-applications>) supersede this Circular. For the most current dates and times, please visit the *Phases of the Moon* site (<http://www.usno.navy.mil/USNO/astronomical-applications/data-services/phases-moon>).*

Since the publication of this Circular, Jet Propulsion Laboratory (JPL) ephemeris DE405/LE405 has replaced DE200/LE200 as the fundamental ephemeris of The Astronomical Almanac. Therefore, the basis of this Circular and The Astronomical Almanac are no longer the same.

USNO Circular No. 119 mentioned in the preface is now out of print and no longer available from the Nautical Almanac Office. Although copies of USNO Circular No. 112 are still available, it, too, has been superseded by the on-line Moon phase tables and calculators.

PHASES OF THE MOON 2000 - 2049

This Circular provides the times of the phases of the moon, expressed in Terrestrial Dynamical Time (TDT), for the years 2000 - 2049. The basis for this Circular is the same as that for the Astronomical Almanac, namely the Jet Propulsion Laboratory ephemeris designated DE200/LE200.

The phases New Moon, First Quarter, Full Moon, and Last Quarter are defined to occur when the excess of the apparent celestial longitude of the Moon over that of the Sun is 0°, 90°, 180°, and 270°, respectively. In practice the phases are computed by third-order Besselian inverse interpolation of daily values of the excess of longitude.

The common understanding of the times of New, First Quarter, Full, and Last Quarter as applying to the times of apparent minimum illumination, 50% illumination (waxing), maximum illumination, and 50% illumination (waning), respectively, only loosely corresponds to the precise definition of the phases as given above. In particular, the times at which the Moon reaches these particular illumination levels, as viewed from a specific location on the surface of the Earth, may differ from the times tabulated in this Circular by an hour or more.

The argument TDT can be considered to be the extension of Ephemeris Time (ET), used prior to 1984. The difference between TDT and Universal Time (UT1, also known as Greenwich Mean Time) was $(TDT-UT1) = 55.1$ seconds for 1986.5. Due to irregularities in the rotation of the Earth, it is impossible to predict values of $(TDT-UT1)$ into the 21st century, but those values are unlikely to fall outside of the range 0 to 2 minutes, and probably will be approximately 1 minute at the year 2000.

The lunations in this Circular are numbered in continuation of the series of E.W. Brown, of which No. 1 commenced on 1923 January 16 (Mon. Not. Roy. Astr. Soc., 93, 603, 1933).

The Modified Julian Dates (MJD) given for each phase are the Julian dates minus 2440000.5.

Phases of the Moon for other dates are available in these Circulars:

No. 112 PHASES OF THE MOON 1800-1959

No. 119 PHASES OF THE MOON 1960-2003

*available from the Nautical Almanac Office, United States Naval Observatory
Washington, DC 20390-5100.*

PHASES OF THE MOON, TDT

New Moon		First Quarter			Full Moon			Last Quarter										
Lunation	MJD	m	d	h	m	MJD	d	h	m	MJD	d	h	m	MJD	d	h	m	
<u>2000</u>																		
953	51549.7602	Jan	6	18:15	51557.5661	Jan	14	13:35	51564.1955	Jan	21	04:42	51571.3318	Jan	28	07:58		
954	51579.5447	Feb	5	13:04	51586.9739	Feb	12	23:22	51593.6860	Feb	19	16:28	51601.1629	Feb	27	03:55		
955	51609.2207	Mar	6	05:18	51616.2916	Mar	13	07:00	51623.1982	Mar	20	04:45	51631.0151	Mar	28	00:22		
956	51638.7590	Apr	4	18:13	51645.5635	Apr	11	13:31	51652.7379	Apr	18	17:43	51660.8133	Apr	26	19:31		
957	51668.1758	May	4	04:13	51674.8344	May	10	20:02	51682.3163	May	18	07:36	51690.4973	May	26	11:56		
958	51697.5104	Jun	2	12:15	51704.1460	Jun	9	03:30	51711.9362	Jun	16	22:28	51720.0424	Jun	25	01:01		
959	51726.8062	Jul	1	19:21	51733.5374	Jul	8	12:54	51741.5808	Jul	16	13:56	51749.4605	Jul	24	11:03		
960	51756.1015	Jul	31	02:26	51763.0436	Aug	7	01:03	51771.2178	Aug	15	05:14	51778.7859	Aug	22	18:52		
961	51785.4308	Aug	29	10:20	51792.6864	Sep	5	16:28	51800.8180	Sep	13	19:38	51808.0621	Sep	21	01:29		
962	51814.8292	Sep	27	19:54	51822.4585	Oct	5	11:00	51830.3708	Oct	13	08:54	51837.3334	Oct	20	08:00		
963	51844.3327	Oct	27	07:59	51852.3110	Nov	4	07:28	51859.8859	Nov	11	21:16	51866.6427	Nov	18	15:26		
964	51873.9669	Nov	25	23:12	51882.1642	Dec	4	03:56	51889.3777	Dec	11	09:04	51896.0294	Dec	18	00:42		
965	51903.7241	Dec	25	17:23														
<u>2001</u>																		
					51911.9393	Jan	2	22:33	51918.8510	Jan	9	20:25	51925.5248	Jan	16	12:36		
966	51933.5471	Jan	24	13:08	51941.5857	Feb	1	14:03	51948.3005	Feb	8	07:13	51955.1421	Feb	15	03:25		
967	51963.3487	Feb	23	08:22	51971.0863	Mar	3	02:04	51977.7251	Mar	9	17:24	51984.8654	Mar	16	20:46		
968	51993.0570	Mar	25	01:22	52000.4516	Apr	1	10:50	52007.1410	Apr	8	03:23	52014.6473	Apr	15	15:32		
969	52022.6435	Apr	23	15:27	52029.7143	Apr	30	17:09	52036.5789	May	7	13:54	52044.4248	May	15	10:12		
970	52052.1160	May	23	02:47	52058.9238	May	29	22:10	52066.0697	Jun	6	01:40	52074.1454	Jun	14	03:29		
971	52081.4991	Jun	21	11:59	52088.1393	Jun	28	03:21	52095.6284	Jul	5	15:05	52103.7821	Jul	13	18:46		
972	52110.8232	Jul	20	19:45	52117.4231	Jul	27	10:09	52125.2478	Aug	4	05:57	52133.3293	Aug	12	07:54		
973	52140.1225	Aug	19	02:56	52146.8305	Aug	25	19:56	52154.9056	Sep	2	21:44	52162.7921	Sep	10	19:01		
974	52169.4364	Sep	17	10:28	52176.3972	Sep	24	09:32	52184.5763	Oct	2	13:50	52192.1810	Oct	10	04:21		
975	52198.8086	Oct	16	19:24	52206.1246	Oct	24	02:59	52214.2376	Nov	1	05:42	52221.5155	Nov	8	12:22		
976	52228.2786	Nov	15	06:41	52235.9735	Nov	22	23:22	52243.8681	Nov	30	20:50	52250.8283	Dec	7	19:53		
977	52257.8670	Dec	14	20:48	52265.8733	Dec	22	20:57	52273.4455	Dec	30	10:42						
<u>2002</u>																		
													52280.1638	Jan	6	03:56		
978	52287.5623	Jan	13	13:30	52295.7414	Jan	21	17:48	52302.9525	Jan	28	22:52	52309.5654	Feb	4	13:34		
979	52317.3208	Feb	12	07:42	52325.5019	Feb	20	12:03	52332.3873	Feb	27	09:18	52339.0595	Mar	6	01:26		
980	52347.0858	Mar	14	02:04	52355.1037	Mar	22	02:29	52361.7680	Mar	28	18:26	52368.6459	Apr	4	15:30		
981	52376.8071	Apr	12	19:22	52384.5343	Apr	20	12:49	52391.1257	Apr	27	03:01	52398.3035	May	4	07:17		
982	52406.4487	May	12	10:46	52413.8216	May	19	19:43	52420.4947	May	26	11:52	52428.0043	Jun	3	00:06		
983	52435.9914	Jun	10	23:48	52443.0211	Jun	18	00:30	52449.9052	Jun	24	21:43	52457.7225	Jul	2	17:20		
984	52465.4354	Jul	10	10:27	52472.2001	Jul	17	04:48	52479.3806	Jul	24	09:08	52487.4327	Aug	1	10:23		
985	52494.8029	Aug	8	19:16	52501.4260	Aug	15	10:13	52508.9377	Aug	22	22:30	52517.1058	Aug	31	02:32		
986	52524.1329	Sep	7	03:11	52530.7563	Sep	13	18:09	52538.5836	Sep	21	14:00	52546.7110	Sep	29	17:04		
987	52553.4713	Oct	6	11:19	52560.2320	Oct	13	05:34	52568.3063	Oct	21	07:21	52576.2283	Oct	29	05:29		
988	52582.8580	Nov	4	20:36	52589.8703	Nov	11	20:53	52598.0658	Nov	20	01:35	52605.6579	Nov	27	15:47		
989	52612.3163	Dec	4	07:35	52619.6595	Dec	11	15:50	52627.7995	Dec	19	19:11	52635.0223	Dec	27	00:32		

PHASES OF THE MOON, TDT

Lunation	New Moon			First Quarter			Full Moon			Last Quarter	
	MJD	d	h m	MJD	m	d h m	MJD	m	d h m	MJD	d h
1102	55949.3197	Jan 23	07:40	55927.2609	Jan 1	06:16	55935.3133	Jan 9	07:31	55942.3813	Jan 16 09:09
1103	55978.9414	Feb 21	22:36	55957.1741	Jan 31	04:11	55964.9131	Feb 7	21:55	55971.7118	Feb 14 17:05
1104	56008.6099	Mar 22	14:38	55987.0574	Mar 1	01:23	55994.4031	Mar 8	09:41	56001.0599	Mar 15 01:26
1105	56038.3052	Apr 21	07:20	56016.8207	Mar 30	19:42	56023.8054	Apr 6	19:20	56030.4519	Apr 13 10:51
1106	56067.9918	May 20	23:48	56046.4157	Apr 29	09:59	56053.1501	May 6	03:36	56059.9082	May 12 21:48
1107	56097.6272	Jun 19	15:03	56075.8452	May 28	20:17	56082.4672	Jun 4	11:13	56089.4462	Jun 11 10:42
1108	56127.1841	Jul 19	04:25	56105.1468	Jun 27	03:31	56111.7868	Jul 3	18:53	56119.0757	Jul 11 01:49
1109	56156.6635	Aug 17	15:55	56134.3731	Jul 26	08:57	56141.1449	Aug 2	03:29	56148.7890	Aug 9 18:56
1110	56186.0915	Sep 16	02:12	56163.5796	Aug 24	13:55	56170.5828	Aug 31	13:59	56178.5529	Sep 8 13:16
1111	56215.5025	Oct 15	12:04	56192.8208	Sep 22	19:42	56200.1387	Sep 30	03:20	56208.3155	Oct 8 07:34
1112	56244.9230	Nov 13	22:09	56222.1480	Oct 22	03:33	56229.8268	Oct 29	19:51	56238.0255	Nov 7 00:37
1113	56274.3630	Dec 13	08:43	56251.6060	Nov 20	14:33	56259.6160	Nov 28	14:47	56267.6476	Dec 6 15:33
1114	56303.8227	Jan 11	19:45	56281.2223	Dec 20	05:20	56289.4321	Dec 28	10:22	56297.1659	Jan 5 03:59
1115	56333.3064	Feb 10	07:21	56310.9904	Jan 18	23:46	56319.1941	Jan 27	04:39	56326.5815	Feb 3 13:57
1116	56362.8279	Mar 11	19:52	56340.8554	Feb 17	20:32	56348.8522	Feb 25	20:27	56355.9124	Mar 4 21:54
1117	56392.4003	Apr 10	09:36	56370.7276	Mar 19	17:28	56378.3947	Mar 27	09:28	56385.1928	Apr 3 04:38
1118	56422.0205	May 10	00:30	56400.5222	Apr 18	12:32	56407.8321	Apr 25	19:58	56414.4690	May 2 11:15
1119	56451.6649	Jun 8	15:57	56430.1914	May 18	04:36	56437.1847	May 25	04:26	56443.7912	May 31 18:59
1120	56481.3024	Jul 8	07:15	56459.7255	Jun 16	17:25	56466.4815	Jun 23	11:33	56473.2046	Jun 30 04:55
1121	56510.9110	Aug 6	21:52	56489.1385	Jul 16	03:19	56495.7616	Jul 22	18:17	56502.7392	Jul 29 17:44
1122	56540.4842	Sep 5	11:37	56518.4563	Aug 14	10:57	56525.0734	Aug 21	01:46	56532.4000	Aug 28 09:36
1123	56570.0247	Oct 5	00:36	56547.7149	Sep 12	17:09	56554.4681	Sep 19	11:14	56562.1643	Sep 27 03:57
1124	56599.5354	Nov 3	12:51	56576.9607	Oct 11	23:03	56583.9853	Oct 18	23:39	56591.9872	Oct 26 23:42
1125	56629.0163	Dec 3	00:23	56606.2488	Nov 10	05:58	56613.6367	Nov 17	15:17	56621.8117	Nov 25 19:29
				56635.6340	Dec 9	15:13	56643.3953	Dec 17	09:29	56651.5755	Dec 25 13:49
<u>2014</u>											
1126	56658.4689	Jan 1	11:15	56665.1531	Jan 8	03:40	56673.2037	Jan 16	04:53	56681.2223	Jan 24 05:20
1127	56687.9025	Jan 30	21:40	56694.8078	Feb 6	19:23	56702.9959	Feb 14	23:54	56710.7197	Feb 22 17:16
1128	56717.3339	Mar 1	08:01	56724.5610	Mar 8	13:28	56732.7149	Mar 16	17:09	56740.0744	Mar 24 01:47
1129	56746.7818	Mar 30	18:46	56754.3554	Apr 7	08:32	56762.3218	Apr 15	07:43	56769.3283	Apr 22 07:53
1130	56776.2608	Apr 29	06:15	56784.1361	May 7	03:16	56791.8035	May 14	19:17	56798.5419	May 21 13:00
1131	56805.7787	May 28	18:41	56813.8610	Jun 5	20:40	56821.1754	Jun 13	04:13	56827.7777	Jun 19 18:40
1132	56835.3400	Jun 27	08:10	56843.4999	Jul 5	12:00	56850.4764	Jul 12	11:26	56857.0899	Jul 19 02:09
1133	56864.9464	Jul 26	22:43	56873.0353	Aug 4	00:51	56879.7573	Aug 10	18:10	56886.5187	Aug 17 12:27
1134	56894.5930	Aug 25	14:14	56902.4668	Sep 2	11:12	56909.0690	Sep 9	01:39	56916.0875	Sep 16 02:06
1135	56924.2603	Sep 24	06:15	56931.8150	Oct 1	19:34	56938.4526	Oct 8	10:52	56945.8008	Oct 15 19:13
1136	56953.9151	Oct 23	21:58	56961.1176	Oct 31	02:49	56967.9333	Nov 6	22:24	56975.6365	Nov 14 15:17
1137	56983.5231	Nov 22	12:33	56990.4218	Nov 29	10:07	56997.5194	Dec 6	12:28	57005.5362	Dec 14 12:52
1138	57013.0673	Dec 22	01:37	57019.7726	Dec 28	18:33					

PHASES OF THE MOON, TDT

New Moon		First Quarter				Full Moon				Last Quarter								
Lunation	MJD	m	d	h	m	MJD	m	d	h	m	MJD	m	d	h	m			
											58120.1009	Jan	2	02:25	58126.9350	Jan	8	22:26
1176	58135.0961	Jan	17	02:18		58142.9316	Jan	24	22:22		58149.5611	Jan	31	13:28	58156.6633	Feb	7	15:55
1177	58164.8794	Feb	15	21:06		58172.3405	Feb	23	08:10		58179.0365	Mar	2	00:52	58186.4729	Mar	9	11:21
1178	58194.5505	Mar	17	13:13		58201.6502	Mar	24	15:36		58208.5264	Mar	31	12:38	58216.3046	Apr	8	07:19
1179	58224.0821	Apr	16	01:58		58230.9075	Apr	22	21:47		58238.0412	Apr	30	00:59	58246.0901	May	8	02:10
1180	58253.4923	May	15	11:49		58260.1599	May	22	03:50		58267.5977	May	29	14:21	58275.7728	Jun	6	18:33
1181	58282.8225	Jun	13	19:44		58289.4528	Jun	20	10:52		58297.2043	Jun	28	04:54	58305.3277	Jul	6	07:52
1182	58312.1174	Jul	13	02:49		58318.8288	Jul	19	19:53		58326.8483	Jul	27	20:21	58334.7633	Aug	4	18:19
1183	58341.4159	Aug	11	09:59		58348.3262	Aug	18	07:50		58356.4981	Aug	26	11:57	58364.1101	Sep	3	02:39
1184	58370.7518	Sep	9	18:03		58377.9695	Sep	16	23:16		58386.1205	Sep	25	02:54	58393.4073	Oct	2	09:47
1185	58400.1584	Oct	9	03:48		58407.7520	Oct	16	18:03		58415.6988	Oct	24	16:46	58422.6955	Oct	31	16:41
1186	58429.6689	Nov	7	16:03		58437.6218	Nov	15	14:55		58445.2363	Nov	23	05:40	58452.0139	Nov	30	00:20
1187	58459.3066	Dec	7	07:22		58467.4933	Dec	15	11:50		58474.7428	Dec	22	17:50	58481.3997	Dec	29	09:36

2019

1188	58489.0620	Jan	6	01:29		58497.2824	Jan	14	06:47		58504.2203	Jan	21	05:17	58510.8830	Jan	27	21:12
1189	58518.8783	Feb	4	21:05		58526.9357	Feb	12	22:27		58533.6630	Feb	19	15:55	58540.4784	Feb	26	11:29
1190	58548.6702	Mar	6	16:05		58556.4362	Mar	14	10:28		58563.0723	Mar	21	01:44	58570.1742	Mar	28	04:11
1191	58578.3692	Apr	5	08:52		58585.7965	Apr	12	19:07		58592.4676	Apr	19	11:13	58599.9302	Apr	26	22:19
1192	58607.9491	May	4	22:47		58615.0510	May	12	01:13		58621.8837	May	18	21:13	58629.6908	May	26	16:35
1193	58637.4188	Jun	3	10:03		58644.2503	Jun	10	06:00		58651.3554	Jun	17	08:32	58659.4080	Jun	25	09:48
1194	58666.8037	Jul	2	19:17		58673.4556	Jul	9	10:56		58680.9023	Jul	16	21:39	58689.0550	Jul	25	01:19
1195	58696.1341	Aug	1	03:13		58702.7307	Aug	7	17:32		58710.5211	Aug	15	12:30	58718.6231	Aug	23	14:57
1196	58725.4432	Aug	30	10:38		58732.1331	Sep	6	03:12		58740.1902	Sep	14	04:34	58748.1125	Sep	22	02:42
1197	58754.7691	Sep	28	18:28		58761.7002	Oct	5	16:48		58769.8813	Oct	13	21:09	58777.5281	Oct	21	12:40
1198	58784.1525	Oct	28	03:40		58791.4335	Nov	4	10:24		58799.5664	Nov	12	13:36	58806.8834	Nov	19	21:12
1199	58813.6297	Nov	26	15:07		58821.2912	Dec	4	06:59		58829.2176	Dec	12	05:13	58836.2071	Dec	19	04:58
1200	58843.2183	Dec	26	05:14														

2020

						58851.1990	Jan	3	04:47		58858.8072	Jan	10	19:22	58865.5414	Jan	17	13:00
1201	58872.9050	Jan	24	21:43		58881.0714	Feb	2	01:43		58888.3155	Feb	9	07:34	58894.9294	Feb	15	22:18
1202	58902.6480	Feb	23	15:33		58910.8323	Mar	2	19:59		58917.7423	Mar	9	17:49	58924.3996	Mar	16	09:35
1203	58932.3954	Mar	24	09:29		58940.4322	Apr	1	10:22		58947.1085	Apr	8	02:36	58953.9565	Apr	14	22:57
1204	58962.1021	Apr	23	02:27		58969.8608	Apr	30	20:39		58976.4489	May	7	10:46	58983.5860	May	14	14:04
1205	58991.7361	May	22	17:40		58999.1466	May	30	03:31		59005.8011	Jun	5	19:14	59013.2673	Jun	13	06:25
1206	59021.2796	Jun	21	06:43		59028.3450	Jun	28	08:17		59035.1983	Jul	5	04:46	59042.9793	Jul	12	23:30
1207	59050.7320	Jul	20	17:34		59057.5234	Jul	27	12:34		59064.6666	Aug	3	16:00	59072.6986	Aug	11	16:46
1208	59080.1131	Aug	19	02:43		59086.7492	Aug	25	17:59		59094.2245	Sep	2	05:23	59102.3937	Sep	10	09:27
1209	59109.4593	Sep	17	11:01		59116.0806	Sep	24	01:56		59123.8795	Oct	1	21:06	59132.0282	Oct	10	00:41
1210	59138.8140	Oct	16	19:32		59145.5584	Oct	23	13:24		59153.6183	Oct	31	14:50	59161.5745	Nov	8	13:47
	59168.2142	Nov	15	05:08		59175.1987	Nov	22	04:46		59183.3964	Nov	30	09:31	59191.0262	Dec	8	00:38
	59197.6790	Dec	14	16:18		59204.9878	Dec	21	23:42		59213.1454	Dec	30	03:29				

PHASES OF THE MOON, TDT

		New Moon			First Quarter			Full Moon			Last Quarter				
Lunation	MJD	d	h	m	MJD	d	h	m	MJD	m	d	h	m		
<u>2021</u>															
1213	59227.2093	Jan 13	05:01		59234.8769	Jan 20	21:03		59242.8037	Jan 28	19:17		59220.4017	Jan 6	09:38
1214	59256.7964	Feb 11	19:07		59264.7837	Feb 19	18:48		59272.3461	Feb 27	08:18		59249.7349	Feb 4	17:38
1215	59286.4322	Mar 13	10:22		59294.6122	Mar 21	14:42		59301.7842	Mar 28	18:49		59279.0635	Mar 6	01:31
1216	59316.1056	Apr 12	02:32		59324.2917	Apr 20	07:00		59331.1477	Apr 27	03:33		59308.4192	Apr 4	10:04
1217	59345.7923	May 11	19:01		59353.8012	May 19	19:14		59360.4688	May 26	11:15		59337.8273	May 3	19:51
1218	59375.4540	Jun 10	10:54		59383.1635	Jun 18	03:55		59389.7784	Jun 24	18:41		59367.3094	Jun 2	07:26
1219	59405.0540	Jul 10	01:18		59412.4249	Jul 17	10:12		59419.1098	Jul 24	02:38		59396.8832	Jul 1	21:12
1220	59434.5773	Aug 8	13:51		59441.6394	Aug 15	15:21		59448.5022	Aug 22	12:03		59426.5536	Jul 31	13:17
1221	59464.0368	Sep 7	00:53		59470.8615	Sep 13	20:41		59477.9971	Sep 20	23:56		59456.3016	Aug 30	07:14
1222	59493.4629	Oct 6	11:07		59500.1433	Oct 13	03:26		59507.6235	Oct 20	14:58		59486.0821	Sep 29	01:58
1223	59522.8859	Nov 4	21:16		59529.5328	Nov 11	12:47		59537.3740	Nov 19	08:59		59515.8377	Oct 28	20:06
1224	59552.3223	Dec 4	07:44		59559.0672	Dec 11	01:37		59567.1921	Dec 19	04:37		59545.5200	Nov 27	12:29
													59575.1006	Dec 27	02:25
<u>2022</u>															
1225	59581.7741	Jan 2	18:35		59588.7587	Jan 9	18:12		59596.9928	Jan 17	23:50		59604.5709	Jan 25	13:42
1226	59611.2411	Feb 1	05:47		59618.5773	Feb 8	13:51		59626.7067	Feb 16	16:58		59633.9400	Feb 23	22:34
1227	59640.7333	Mar 2	17:36		59648.4490	Mar 10	10:47		59656.3047	Mar 18	07:19		59663.2350	Mar 25	05:38
1228	59670.2678	Apr 1	06:26		59678.2839	Apr 9	06:49		59685.7890	Apr 16	18:56		59692.4983	Apr 23	11:58
1229	59699.8537	Apr 30	20:29		59708.0157	May 9	00:23		59715.1773	May 16	04:15		59721.7808	May 22	18:44
1230	59729.4802	May 30	11:31		59737.6178	Jun 7	14:50		59744.4950	Jun 14	11:53		59751.1334	Jun 21	03:12
1231	59759.1204	Jun 29	02:53		59767.0940	Jul 7	02:15		59773.7769	Jul 13	18:39		59780.5971	Jul 20	14:20
1232	59788.7474	Jul 28	17:56		59796.4637	Aug 5	11:08		59803.0673	Aug 12	01:37		59810.1925	Aug 19	04:37
1233	59818.3460	Aug 27	08:18		59825.7561	Sep 3	18:09		59832.4169	Sep 10	10:00		59839.9119	Sep 17	21:53
1234	59847.9137	Sep 25	21:56		59855.0106	Oct 3	00:15		59861.8723	Oct 9	20:56		59869.7196	Oct 17	17:16
1235	59877.4513	Oct 25	10:50		59884.2766	Nov 1	06:38		59891.4606	Nov 8	11:03		59899.5613	Nov 16	13:28
1236	59906.9572	Nov 23	22:58		59913.6096	Nov 30	14:38		59921.1731	Dec 8	04:09		59929.3731	Dec 16	08:57
1237	59936.4291	Dec 23	10:18		59943.0567	Dec 30	01:22								
									59950.9646	Jan 6	23:09		59959.0913	Jan 15	02:11
1238	59965.8711	Jan 21	20:54		59972.6389	Jan 28	15:20		59980.7706	Feb 5	18:30		59988.6679	Feb 13	16:02
1239	59995.2966	Feb 20	07:07		60002.3380	Feb 27	08:07		60010.5288	Mar 7	12:42		60018.0899	Mar 15	02:09
1240	60024.7253	Mar 21	17:24		60032.1066	Mar 29	02:34		60040.1914	Apr 6	04:36		60047.3837	Apr 13	09:13
1241	60054.1762	Apr 20	04:14		60061.8897	Apr 27	21:21		60069.7327	May 5	17:35		60076.6038	May 12	14:29
1242	60083.6628	May 19	15:54		60091.6413	May 27	15:23		60099.1548	Jun 4	03:43		60105.8143	Jun 10	19:33
1243	60113.1933	Jun 18	04:38		60121.3270	Jun 26	07:51		60128.4860	Jul 3	11:40		60135.0757	Jul 10	01:49
1244	60142.7729	Jul 17	18:33		60150.9222	Jul 25	22:08		60157.7728	Aug 1	18:33		60164.4372	Aug 8	10:30
1245	60172.4023	Aug 16	09:39		60180.4155	Aug 24	09:58		60187.0672	Aug 31	01:37		60193.9321	Sep 6	22:22
1246	60202.0701	Sep 15	01:41		60209.8145	Sep 22	19:33		60216.4158	Sep 29	09:59		60223.5756	Oct 6	13:49
1247	60231.7474	Oct 14	17:56		60239.1462	Oct 22	03:31		60245.8508	Oct 28	20:25		60253.3597	Nov 5	08:38
1248	60261.3948	Nov 13	09:28		60268.4521	Nov 20	10:51		60275.3871	Nov 27	09:17		60283.2434	Dec 5	05:50
1249	60290.9814	Dec 12	23:33		60297.7781	Dec 19	18:40		60305.0239	Dec 27	00:34				

PHASES OF THE MOON, TDT

Lunation	New Moon			First Quarter			Full Moon			Last Quarter		
	MJD	m	d h m	MJD	m	d h m	MJD	m	d h m	MJD	d h m	
1250	60320.4990	Jan 11	11:59	60327.1623	Jan 18	03:54	60334.7467	Jan 25	17:55	60313.1469	Jan 4	03:32
1251	60349.9586	Feb 9	23:00	60356.6265	Feb 16	15:02	60364.5220	Feb 24	12:32	60342.9716	Feb 2	23:19
1252	60379.3761	Mar 10	09:02	60386.1749	Mar 17	04:12	60394.2927	Mar 25	07:01	60372.6421	Mar 3	15:25
1253	60408.7653	Apr 8	18:22	60415.8016	Apr 15	19:14	60423.9931	Apr 23	23:50	60402.1360	Apr 2	03:16
1254	60438.1410	May 8	03:23	60445.4925	May 15	11:49	60453.5793	May 23	13:54	60431.4781	May 1	11:28
1255	60467.5270	Jun 6	12:39	60475.2220	Jun 14	05:20	60483.0479	Jun 22	01:09	60460.7179	May 30	17:14
1256	60496.9573	Jul 5	22:59	60504.9514	Jul 13	22:50	60512.4294	Jul 21	10:18	60489.9129	Jun 28	21:55
1257	60526.4682	Aug 4	11:14	60534.6388	Aug 12	15:20	60541.7687	Aug 19	18:27	60519.1199	Jul 28	02:53
1258	60556.0811	Sep 3	01:57	60564.2547	Sep 11	06:07	60571.1081	Sep 18	02:36	60548.3938	Aug 26	09:27
1259	60585.7850	Oct 2	18:50	60593.7891	Oct 10	18:56	60600.4775	Oct 17	11:28	60577.7855	Sep 24	18:51
1260	60615.5335	Nov 1	12:48	60623.2476	Nov 9	05:57	60629.8956	Nov 15	21:30	60607.3363	Oct 24	08:04
1261	60645.2656	Dec 1	06:23	60652.6443	Dec 8	15:28	60659.3770	Dec 15	09:03	60637.0619	Nov 23	01:29
1262	60674.9361	Dec 30	22:28							60666.9301	Dec 22	22:19

2025

				60681.9982	Jan 6	23:57	60688.9362	Jan 13	22:28	60696.8555	Jan 21	20:32
1263	60704.5258	Jan 29	12:37	60711.3356	Feb 5	08:03	60718.5796	Feb 12	13:55	60726.7317	Feb 20	17:34
1264	60734.0319	Feb 28	00:46	60740.6895	Mar 6	16:33	60748.2888	Mar 14	06:56	60756.4796	Mar 22	11:31
1265	60763.4576	Mar 29	10:59	60770.0943	Apr 5	02:16	60778.0162	Apr 13	00:23	60786.0672	Apr 21	01:37
1266	60792.8141	Apr 27	19:32	60799.5785	May 4	13:53	60807.7063	May 12	16:57	60815.4999	May 20	12:00
1267	60822.1274	May 27	03:04	60829.1543	Jun 3	03:42	60837.3229	Jun 11	07:45	60844.8057	Jun 18	19:20
1268	60851.4395	Jun 25	10:33	60858.8134	Jul 2	19:31	60866.8597	Jul 10	20:38	60874.0269	Jul 18	00:39
1269	60880.8003	Jul 24	19:12	60888.5295	Aug 1	12:42	60896.3307	Aug 9	07:56	60903.2176	Aug 16	05:13
1270	60910.2554	Aug 23	06:08	60918.2683	Aug 31	06:26	60925.7569	Sep 7	18:10	60932.4404	Sep 14	10:34
1271	60939.8301	Sep 21	19:55	60947.9965	Sep 29	23:55	60955.1588	Oct 7	03:49	60961.7597	Oct 13	18:14
1272	60969.5183	Oct 21	12:26	60977.6819	Oct 29	16:22	60984.5558	Nov 5	13:20	60991.2287	Nov 12	05:29
1273	60999.2836	Nov 20	06:48	61007.2916	Nov 28	07:00	61013.9689	Dec 4	23:15	61020.8700	Dec 11	20:53
1274	61029.0726	Dec 20	01:44	61036.7993	Dec 27	19:11						

2026

							61043.4195	Jan 3	10:04	61050.6594	Jan 10	15:50
1275	61058.8286	Jan 18	19:53	61066.2003	Jan 26	04:48	61072.9239	Feb 1	22:10	61080.5307	Feb 9	12:44
1276	61088.5016	Feb 17	12:02	61095.5200	Feb 24	12:29	61102.4855	Mar 3	11:39	61110.4025	Mar 11	09:40
1277	61118.0588	Mar 19	01:25	61124.8048	Mar 25	19:19	61132.0924	Apr 2	02:13	61140.2033	Apr 10	04:53
1278	61147.4950	Apr 17	11:53	61154.1062	Apr 24	02:33	61161.7252	May 1	17:24	61169.8831	May 9	21:12
1279	61176.8348	May 16	20:02	61183.4668	May 23	11:12	61191.3655	May 31	08:46	61199.4178	Jun 8	10:02
1280	61206.1218	Jun 15	02:55	61212.9143	Jun 21	21:57	61220.9985	Jun 29	23:58	61228.8126	Jul 7	19:30
1281	61235.4061	Jul 14	09:45	61242.4630	Jul 21	11:07	61250.6089	Jul 29	14:37	61258.0990	Aug 6	02:23
1282	61264.7347	Aug 12	17:38	61272.1163	Aug 20	02:47	61280.1803	Aug 28	04:20	61287.3280	Sep 4	07:52
1283	61294.1446	Sep 11	03:28	61301.8645	Sep 18	20:45	61309.7015	Sep 26	16:50	61316.5599	Oct 3	13:26
1284	61323.6606	Oct 10	15:51	61331.6763	Oct 18	16:14	61339.1756	Oct 26	04:13	61345.8539	Nov 1	20:30
1285	61353.2939	Nov 9	07:03	61361.4923	Nov 17	11:49	61368.6213	Nov 24	14:55	61375.2568	Dec 1	06:10
1286	61383.0368	Dec 9	00:53	61391.2387	Dec 17	05:44	61398.0621	Dec 24	01:29	61404.7921	Dec 30	19:01

PHASES OF THE MOON, TDT

New Moon		First Quarter				Full Moon				Last Quarter						
Lunation	MJD	m	d	h	m	MJD	m	d	h	m	MJD	m	d	h	m	
<u>2027</u>																
1287	61412.8511	Jan	7	20:26	61420.8581	Jan	15	20:36	61427.5129	Jan	22	12:19	61434.4560	Jan	29	10:57
1288	61442.6648	Feb	6	15:57	61450.3330	Feb	14	08:00	61456.9756	Feb	20	23:25	61464.2206	Feb	28	05:18
1289	61472.3962	Mar	8	09:31	61479.6850	Mar	15	16:26	61486.4479	Mar	22	10:45	61494.0383	Mar	30	00:55
1290	61501.9946	Apr	6	23:52	61508.9568	Apr	13	22:58	61515.9363	Apr	20	22:28	61523.8465	Apr	28	20:19
1291	61531.4581	May	6	11:00	61538.1980	May	13	04:45	61545.4585	May	20	11:00	61553.5827	May	28	13:59
1292	61560.8205	Jun	4	19:41	61567.4565	Jun	11	10:57	61575.0316	Jun	19	00:46	61583.2052	Jun	27	04:55
1293	61590.1272	Jul	4	03:03	61596.7779	Jul	10	18:40	61604.6570	Jul	18	15:46	61612.7056	Jul	26	16:56
1294	61619.4211	Aug	2	10:06	61626.2051	Aug	9	04:55	61634.3124	Aug	17	07:30	61642.1031	Aug	25	02:28
1295	61648.7377	Aug	31	17:42	61655.7726	Sep	7	18:32	61663.9616	Sep	15	23:05	61671.4317	Sep	23	10:22
1296	61678.1092	Sep	30	02:37	61685.4921	Oct	7	11:49	61693.5751	Oct	15	13:48	61700.7294	Oct	22	17:30
1297	61707.5679	Oct	29	13:38	61715.3341	Nov	6	08:01	61723.1438	Nov	14	03:27	61730.0343	Nov	21	00:49
1298	61737.1428	Nov	28	03:26	61745.2245	Dec	6	05:23	61752.6735	Dec	13	16:10	61759.3834	Dec	20	09:12
1299	61766.8427	Dec	27	20:13												
					61775.0705	Jan	5	01:42	61782.1696	Jan	12	04:04	61788.8105	Jan	18	19:27
1300	61796.6345	Jan	26	15:14	61804.7997	Feb	3	19:12	61811.6284	Feb	10	15:05	61818.3397	Feb	17	08:09
1301	61826.4434	Feb	25	10:39	61834.3774	Mar	4	09:04	61841.0467	Mar	11	01:07	61847.9750	Mar	17	23:24
1302	61856.1892	Mar	26	04:32	61863.8032	Apr	2	19:17	61870.4360	Apr	9	10:28	61877.6931	Apr	16	16:38
1303	61885.8250	Apr	24	19:48	61893.1020	May	2	02:27	61899.8265	May	8	19:50	61907.4474	May	16	10:44
1304	61915.3454	May	24	08:17	61922.3179	May	31	07:38	61929.2569	Jun	7	06:10	61937.1865	Jun	15	04:29
1305	61944.7699	Jun	22	18:29	61951.5082	Jun	29	12:12	61958.7583	Jul	6	18:12	61966.8734	Jul	14	20:58
1306	61974.1270	Jul	22	03:03	61980.7370	Jul	28	17:41	61988.3409	Aug	5	08:11	61996.4906	Aug	13	11:46
1307	62003.4479	Aug	20	10:45	62010.0674	Aug	27	01:37	62017.9922	Sep	3	23:49	62026.0326	Sep	12	00:47
1308	62032.7673	Sep	18	18:25	62039.5495	Sep	25	13:11	62047.6848	Oct	3	16:26	62055.4986	Oct	11	11:58
1309	62062.1236	Oct	18	02:58	62069.2044	Oct	25	04:54	62077.3878	Nov	2	09:18	62084.8937	Nov	9	21:27
1310	62091.5550	Nov	16	13:19	62099.0110	Nov	24	00:16	62107.0704	Dec	2	01:41	62114.2361	Dec	9	05:40
1311	62121.0885	Dec	16	02:07	62128.9070	Dec	23	21:46	62136.7011	Dec	31	16:50				
													62143.5608	Jan	7	13:28
1312	62150.7262	Jan	14	17:26	62158.8086	Jan	22	19:24	62166.2533	Jan	30	06:05	62172.9121	Feb	5	21:53
1313	62180.4393	Feb	13	10:33	62188.6327	Feb	21	15:11	62195.7162	Feb	28	17:11	62202.3283	Mar	7	07:53
1314	62210.1808	Mar	15	04:20	62218.3155	Mar	23	07:34	62225.1025	Mar	30	02:28	62231.8283	Apr	5	19:53
1315	62239.9037	Apr	13	21:41	62247.8273	Apr	21	19:51	62254.4431	Apr	28	10:38	62261.4092	May	5	09:49
1316	62269.5717	May	13	13:43	62277.1786	May	21	04:17	62283.7769	May	27	18:39	62291.0555	Jun	4	01:20
1317	62299.1609	Jun	12	03:52	62306.4133	Jun	19	09:55	62313.1413	Jun	26	03:24	62320.7490	Jul	3	17:59
1318	62328.6612	Jul	11	15:52	62335.5941	Jul	18	14:15	62342.5673	Jul	25	13:37	62350.4698	Aug	2	11:17
1319	62358.0812	Aug	10	01:57	62364.7892	Aug	16	18:57	62372.0780	Aug	24	01:52	62380.1904	Sep	1	04:34
1320	62387.4482	Sep	8	10:45	62394.0628	Sep	15	01:30	62401.6878	Sep	22	16:30	62409.8736	Sep	30	20:58
1321	62416.8025	Oct	7	19:16	62423.4653	Oct	14	11:10	62431.3949	Oct	22	09:29	62439.4815	Oct	30	11:33
1322	62446.1842	Nov	6	04:25	62453.0253	Nov	13	00:36	62461.1695	Nov	21	04:04	62468.9923	Nov	28	23:49
1323	62475.6204	Dec	5	14:53	62482.7435	Dec	12	17:51	62490.9498	Dec	20	22:48	62498.4098	Dec	28	09:50

2029

PHASES OF THE MOON, TDT

Lunation	New Moon				First Quarter				Full Moon				Last Quarter			
	MJD	m	d	h m	MJD	m	d	h m	MJD	m	d	h m	MJD	m	d	h m
<u>2030</u>																
1324	62505.1186	Jan	4	02:51	62512.5883	Jan	11	14:07	62520.6635	Jan	19	15:55	62527.7608	Jan	26	18:16
1325	62534.6727	Feb	2	16:09	62542.4935	Feb	10	11:51	62550.2645	Feb	18	06:21	62557.0826	Feb	25	01:59
1326	62564.2749	Mar	4	06:36	62572.3672	Mar	12	08:49	62579.7483	Mar	19	17:58	62586.4115	Mar	26	09:53
1327	62593.9192	Apr	2	22:04	62602.1236	Apr	11	02:58	62609.1397	Apr	18	03:21	62615.7779	Apr	24	18:40
1328	62623.5926	May	2	14:13	62631.7171	May	10	17:13	62638.4724	May	17	11:20	62645.2074	May	24	04:59
1329	62653.2656	Jun	1	06:23	62661.1506	Jun	9	03:37	62667.7793	Jun	15	18:42	62674.7228	Jun	22	17:21
1330	62682.8997	Jun	30	21:36	62690.4604	Jul	8	11:03	62697.0925	Jul	15	02:13	62704.3394	Jul	22	08:09
1331	62712.4667	Jul	30	11:12	62719.6971	Aug	6	16:44	62726.4483	Aug	13	10:46	62734.0532	Aug	21	01:17
1332	62741.9642	Aug	28	23:08	62748.9144	Sep	4	21:57	62755.8882	Sep	11	21:19	62763.8317	Sep	19	19:58
1333	62771.4137	Sep	27	09:56	62778.1648	Oct	4	03:57	62785.4500	Oct	11	10:48	62793.6191	Oct	19	14:51
1334	62800.8459	Oct	26	20:18	62807.4980	Nov	2	11:57	62815.1468	Nov	10	03:31	62823.3566	Nov	18	08:33
1335	62830.2831	Nov	25	06:48	62836.9569	Dec	1	22:58	62844.9456	Dec	9	22:42	62853.0016	Dec	18	00:02
1336	62859.7315	Dec	24	17:33	62866.5676	Dec	31	13:37								
<u>2031</u>																
									62874.7687	Jan	8	18:27	62882.5336	Jan	16	12:48
1337	62889.1890	Jan	23	04:32	62896.3224	Jan	30	07:44	62904.5329	Feb	7	12:47	62911.9521	Feb	14	22:51
1338	62918.6598	Feb	21	15:50	62926.1690	Mar	1	04:03	62934.1880	Mar	9	04:31	62941.2757	Mar	16	06:37
1339	62948.1599	Mar	23	03:50	62956.0232	Mar	31	00:33	62963.7239	Apr	7	17:22	62970.5410	Apr	14	12:59
1340	62977.7071	Apr	21	16:58	62985.8060	Apr	29	19:21	62993.1535	May	7	03:41	62999.7973	May	13	19:08
1341	63007.3044	May	21	07:18	63015.4727	May	29	11:21	63022.4998	Jun	5	12:00	63029.0985	Jun	12	02:22
1342	63036.9346	Jun	19	22:26	63045.0140	Jun	28	00:20	63051.7934	Jul	4	19:02	63058.4938	Jul	11	11:51
1343	63066.5704	Jul	19	13:41	63074.4416	Jul	27	10:36	63081.0741	Aug	3	01:47	63088.0172	Aug	10	00:25
1344	63096.1899	Aug	18	04:33	63103.7784	Aug	25	18:41	63110.3901	Sep	1	09:22	63117.6775	Sep	8	16:16
1345	63125.7833	Sep	16	18:48	63133.0562	Sep	24	01:21	63139.7910	Sep	30	18:59	63147.4523	Oct	8	10:51
1346	63155.3485	Oct	16	08:22	63162.3178	Oct	23	07:38	63169.3152	Oct	30	07:34	63177.2940	Nov	7	07:03
1347	63184.8825	Nov	14	21:11	63191.6153	Nov	21	14:46	63198.9720	Nov	28	23:20	63207.1395	Dec	7	03:21
1348	63214.3798	Dec	14	09:07	63221.0012	Dec	21	00:02	63228.7321	Dec	28	17:34				
<u>2032</u>																
													63236.9204	Jan	5	22:05
1349	63243.8388	Jan	12	20:08	63250.5108	Jan	19	12:16	63258.5372	Jan	27	12:54	63266.5764	Feb	4	13:50
1350	63273.2677	Feb	11	06:25	63280.1459	Feb	18	03:30	63288.3225	Feb	26	07:44	63296.0751	Mar	5	01:48
1351	63302.6846	Mar	11	16:26	63309.8735	Mar	18	20:58	63318.0330	Mar	27	00:47	63325.4245	Apr	3	10:11
1352	63332.1116	Apr	10	02:41	63339.6427	Apr	17	15:26	63347.6325	Apr	25	15:11	63354.6687	May	2	16:03
1353	63361.5673	May	9	13:37	63369.4059	May	17	09:45	63377.1100	May	25	02:38	63383.8697	May	31	20:52
1354	63391.0648	Jun	8	01:33	63399.1257	Jun	16	03:01	63406.4817	Jun	23	11:34	63413.0924	Jun	30	02:13
1355	63420.6130	Jul	7	14:43	63428.7731	Jul	15	18:33	63435.7866	Jul	22	18:53	63442.3935	Jul	29	09:27
1356	63450.2171	Aug	6	05:13	63458.3279	Aug	14	07:52	63465.0750	Aug	21	01:48	63471.8157	Aug	27	19:35
1357	63479.8734	Sep	4	20:58	63487.7850	Sep	12	18:50	63494.3969	Sep	19	09:31	63501.3845	Sep	26	09:14
1358	63509.5608	Oct	4	13:28	63517.1588	Oct	12	03:49	63523.7912	Oct	18	18:59	63531.1042	Oct	26	02:30
1359	63539.2403	Nov	3	05:46	63546.4822	Nov	10	11:34	63553.2801	Nov	17	06:43	63560.9506	Nov	24	22:49
1360	63568.8708	Dec	2	20:54	63575.7984	Dec	9	19:10	63582.8682	Dec	16	20:50	63590.8614	Dec	24	20:40

PHASES OF THE MOON, TDT

New Moon		First Quarter		Full Moon		Last Quarter		
Lunation	MJD	d h m	MJD	d h m	MJD	m d h m	MJD	m d h m
<u>2033</u>								
1361	63598.4292	Jan 1 10:18	63605.1497	Jan 8 03:36	63612.5474	Jan 15 13:08	63620.7409	Jan 23 17:47
1362	63627.9174	Jan 30 22:01	63634.5663	Feb 6 13:35	63642.2954	Feb 14 07:05	63650.4960	Feb 22 11:54
1363	63657.3505	Mar 1 08:25	63664.0613	Mar 8 01:28	63672.0685	Mar 16 01:39	63680.0770	Mar 24 01:51
1364	63686.7450	Mar 30 17:53	63693.6355	Apr 6 15:15	63701.8045	Apr 14 19:19	63709.4885	Apr 22 11:43
1365	63716.1162	Apr 29 02:47	63723.2823	May 6 06:46	63731.4471	May 14 10:44	63738.7709	May 21 18:30
1366	63745.4846	May 28 11:38	63752.9861	Jun 4 23:40	63760.9725	Jun 12 23:20	63767.9797	Jun 19 23:31
1367	63774.8807	Jun 26 21:08	63782.7176	Jul 4 17:13	63790.3956	Jul 12 09:30	63797.1725	Jul 19 04:08
1368	63804.3429	Jul 26 08:14	63812.4354	Aug 3 10:27	63819.7561	Aug 10 18:09	63826.4057	Aug 17 09:44
1369	63833.9034	Aug 24 21:41	63842.1006	Sep 2 02:25	63849.0984	Sep 9 02:22	63855.7325	Sep 15 17:35
1370	63863.5701	Sep 23 13:41	63871.6902	Oct 1 16:34	63878.4579	Oct 8 10:59	63885.2005	Oct 15 04:49
1371	63893.3122	Oct 23 07:30	63901.1996	Oct 31 04:47	63907.8564	Nov 6 20:33	63914.8403	Nov 13 20:10
1372	63923.0697	Nov 22 01:40	63930.6363	Nov 29 15:16	63937.3079	Dec 6 07:23	63944.6452	Dec 13 15:29
1373	63952.7831	Dec 21 18:48	63960.0148	Dec 29 00:21				
<u>2034</u>								
					63966.8252	Jan 4 19:48	63974.5543	Jan 12 13:18
1374	63982.4185	Jan 20 10:03	63989.3564	Jan 27 08:33	63996.4207	Feb 3 10:06	64004.4654	Feb 11 11:10
1375	64011.9663	Feb 18 23:11	64018.6912	Feb 25 16:35	64026.0912	Mar 5 02:11	64034.2817	Mar 13 06:46
1376	64041.4276	Mar 20 10:16	64048.0553	Mar 27 01:20	64055.8056	Apr 3 19:20	64063.9488	Apr 11 22:46
1377	64070.8105	Apr 18 19:27	64077.4833	Apr 25 11:36	64085.5117	May 3 12:17	64093.4565	May 11 10:57
1378	64100.1346	May 18 03:14	64106.9991	May 24 23:59	64115.1633	Jun 2 03:55	64122.8230	Jun 9 19:45
1379	64129.4355	Jun 16 10:27	64136.6086	Jun 23 14:36	64144.7401	Jul 1 17:46	64152.0835	Jul 9 02:00
1380	64158.7614	Jul 15 18:16	64166.2960	Jul 23 07:06	64174.2470	Jul 31 05:56	64181.2858	Aug 7 06:51
1381	64188.1627	Aug 14 03:54	64196.0309	Aug 22 00:45	64203.7017	Aug 29 16:50	64210.4879	Sep 5 11:43
1382	64217.6771	Sep 12 16:15	64225.7782	Sep 20 18:41	64233.1236	Sep 28 02:58	64239.7541	Oct 4 18:06
1383	64247.3152	Oct 12 07:34	64255.5029	Oct 20 12:04	64262.5303	Oct 27 12:44	64269.1448	Nov 3 03:28
1384	64277.0538	Nov 11 01:17	64285.1685	Nov 19 04:03	64291.9398	Nov 25 22:33	64298.6997	Dec 2 16:48
1385	64306.8442	Dec 10 20:16	64314.7404	Dec 18 17:46	64321.3720	Dec 25 08:56		
<u>2035</u>								
							64328.4182	Jan 1 10:02
1386	64336.6280	Jan 9 15:04	64344.1990	Jan 17 04:47	64350.8457	Jan 23 20:18	64358.2526	Jan 31 06:04
1387	64366.3495	Feb 8 08:23	64373.5543	Feb 15 13:18	64380.3716	Feb 22 08:55	64388.1266	Mar 2 03:02
1388	64395.9657	Mar 9 23:11	64402.8446	Mar 16 20:16	64409.9468	Mar 23 22:43	64417.9638	Mar 31 23:08
1389	64425.4576	Apr 8 10:59	64432.1222	Apr 15 02:56	64439.5569	Apr 22 13:22	64447.7049	Apr 30 16:55
1390	64454.8368	May 7 20:05	64461.4373	May 14 10:30	64469.1854	May 22 04:27	64477.3138	May 30 07:32
1391	64484.1402	Jun 6 03:22	64490.8273	Jun 12 19:51	64498.8185	Jun 20 19:39	64506.7805	Jun 28 18:44
1392	64513.4170	Jul 5 10:01	64520.3154	Jul 12 07:34	64528.4431	Jul 20 10:38	64536.1228	Jul 28 02:57
1393	64542.7174	Aug 3 17:13	64549.9123	Aug 10 21:54	64558.0427	Aug 19 01:01	64565.3814	Aug 26 09:09
1394	64572.0839	Sep 2 02:01	64579.6170	Sep 9 14:48	64587.6005	Sep 17 14:25	64594.6117	Sep 24 14:41
1395	64601.5473	Oct 1 13:08	64609.4101	Oct 9 09:50	64617.1089	Oct 17 02:37	64623.8736	Oct 23 20:58
1396	64631.1250	Oct 31 03:00	64639.2442	Nov 8 05:52	64646.5764	Nov 15 13:50	64653.2205	Nov 22 05:18
1397	64660.8186	Nov 29 19:39	64669.0461	Dec 8 01:06	64676.0239	Dec 15 00:34	64682.6873	Dec 21 16:30
1398	64690.6056	Dec 29 14:32						

PHASES OF THE MOON, TDT

		New Moon		First Quarter				Full Moon			Last Quarter		
Lunation	MJD	m	d h m	MJD	m	d h m	MJD	d h m	MJD	m	d h		
				65790.3182	Jan 2	07:38	65798.4908	Jan 10	11:47	65805.7798	Jan 17	18:43	
1436	65812.5676	Jan 24	13:37	65820.1989	Feb 1	04:46	65828.1531	Feb 9	03:40	65835.1092	Feb 16	02:37	
1437	65842.1380	Feb 23	03:19	65850.0946	Mar 3	02:16	65857.6918	Mar 10	16:36	65864.4228	Mar 17	10:09	
1438	65871.7505	Mar 24	18:01	65879.9138	Apr 1	21:56	65887.1208	Apr 9	02:54	65893.7557	Apr 15	18:08	
1439	65901.4000	Apr 23	09:36	65909.5893	May 1	14:09	65916.4731	May 8	11:21	65923.1377	May 15	03:18	
1440	65931.0689	May 23	01:39	65939.1012	May 31	02:26	65945.7840	Jun 6	18:49	65952.5957	Jun 13	14:18	
1441	65960.7240	Jun 21	17:23	65968.4712	Jun 29	11:19	65975.0866	Jul 6	02:05	65982.1524	Jul 13	03:40	
1442	65990.3301	Jul 21	07:55	65997.7437	Jul 28	17:51	66004.4152	Aug 4	09:58	66011.8175	Aug 11	19:37	
1443	66019.8693	Aug 19	20:52	66026.9706	Aug 26	23:18	66033.8089	Sep 2	19:25	66041.5742	Sep 10	13:47	
1444	66049.3502	Sep 18	08:24	66056.2040	Sep 25	04:54	66063.3087	Oct 2	07:25	66071.3755	Oct 10	09:01	
1445	66078.7988	Oct 17	19:10	66085.4943	Oct 24	11:52	66092.9427	Oct 31	22:37	66101.1578	Nov 9	03:47	
1446	66108.2412	Nov 16	05:47	66114.8875	Nov 22	21:18	66122.7019	Nov 30	16:51	66130.8652	Dec 8	20:46	
1447	66137.6897	Dec 15	16:33	66144.4187	Dec 22	10:03	66152.5270	Dec 30	12:39				
										66160.4630	Jan 7	11:07	
1448	66167.1434	Jan 14	03:26	66174.0989	Jan 21	02:22	66182.3305	Jan 29	07:56	66189.9400	Feb 5	22:34	
1449	66196.6012	Feb 12	14:26	66203.8992	Feb 19	21:35	66212.0422	Feb 28	01:01	66219.3055	Mar 6	07:20	
1450	66226.0746	Mar 13	01:47	66233.7502	Mar 20	18:00	66241.6340	Mar 28	15:13	66248.5885	Apr 4	14:07	
1451	66255.5844	Apr 11	14:01	66263.5685	Apr 19	13:39	66271.1105	Apr 27	02:39	66277.8340	May 3	20:01	
1452	66285.1452	May 11	03:29	66293.2929	May 19	07:02	66300.4918	May 26	11:48	66307.0963	Jun 2	02:19	
1453	66314.7530	Jun 9	18:04	66322.8983	Jun 17	21:34	66329.8059	Jun 24	19:20	66336.4299	Jul 1	10:19	
1454	66344.3861	Jul 9	09:16	66352.3871	Jul 17	09:17	66359.0881	Jul 24	02:07	66365.8799	Jul 30	21:07	
1455	66374.0192	Aug 8	00:28	66381.7758	Aug 15	18:37	66388.3826	Aug 22	09:11	66395.4707	Aug 29	11:18	
1456	66403.6354	Sep 6	15:15	66411.0894	Sep 14	02:09	66417.7390	Sep 20	17:44	66425.1963	Sep 28	04:43	
1457	66433.2272	Oct 6	05:27	66440.3628	Oct 13	08:42	66447.2022	Oct 20	04:51	66455.0195	Oct 28	00:28	
1458	66462.7897	Nov 4	18:57	66469.6421	Nov 11	15:25	66476.7968	Nov 18	19:07	66484.8811	Nov 26	21:09	
1459	66492.3155	Dec 4	07:34	66498.9799	Dec 10	23:31	66506.5118	Dec 18	12:17	66514.7109	Dec 26	17:04	
<u>2041</u>													
1460	66521.7979	Jan 2	19:09	66528.4216	Jan 9	10:07	66536.3004	Jan 17	07:13	66544.4405	Jan 25	10:34	
1461	66551.2390	Feb 1	05:44	66557.9871	Feb 7	23:41	66566.0990	Feb 16	02:23	66574.0208	Feb 24	00:30	
1462	66580.6532	Mar 2	15:41	66587.6614	Mar 9	15:52	66595.8475	Mar 17	20:20	66603.4396	Mar 25	10:33	
1463	66610.0630	Apr 1	01:31	66617.4026	Apr 8	09:40	66625.5013	Apr 16	12:02	66632.7259	Apr 23	17:25	
1464	66639.4914	Apr 30	11:48	66647.1635	May 8	03:55	66655.0372	May 16	00:54	66661.9355	May 22	22:27	
1465	66668.9564	May 29	22:57	66676.9041	Jun 6	21:42	66684.4582	Jun 14	11:00	66691.1343	Jun 21	03:13	
1466	66698.4709	Jun 28	11:18	66706.5929	Jul 6	14:14	66713.7931	Jul 13	19:02	66720.3850	Jul 20	09:14	
1467	66728.0441	Jul 28	01:04	66736.2041	Aug 5	04:54	66743.0874	Aug 12	02:06	66749.7391	Aug 18	17:44	
1468	66757.6788	Aug 26	16:17	66765.7222	Sep 3	17:20	66772.3925	Sep 10	09:25	66779.2320	Sep 17	05:34	
1469	66787.3629	Sep 25	08:43	66795.1485	Oct 3	03:34	66801.7527	Oct 9	18:04	66808.8795	Oct 16	21:06	
1470	66817.0636	Oct 25	01:32	66824.5043	Nov 1	12:06	66831.1977	Nov 8	04:45	66838.6720	Nov 15	16:08	
1471	66846.7346	Nov 23	17:38	66853.8264	Nov 30	19:50	66860.7385	Dec 7	17:43	66868.5653	Dec 15	13:34	
1472	66876.3385	Dec 23	08:08	66883.1576	Dec 30	03:47							

PHASES OF THE MOON, TDT

New Moon		First Quarter				Full Moon				Last Quarter						
Lunation	MJD	m	d	h	m	MJD	m	d	h	m	MJD	m	d	h	m	
1473	66905.8634	Jan	21	20:43	66912.5346	Jan	28	12:50	66890.3716	Jan	6	08:55	66898.4761	Jan	14	11:26
1474	66935.3195	Feb	20	07:40	66941.9796	Feb	26	23:31	66920.0827	Feb	5	01:59	66928.3038	Feb	13	07:18
1475	66964.7252	Mar	21	17:24	66971.5007	Mar	28	12:01	66949.8411	Mar	6	20:11	66957.9738	Mar	14	23:22
1476	66994.0976	Apr	20	02:21	67001.0976	Apr	27	02:21	66979.5952	Apr	5	14:17	66987.4655	Apr	13	11:10
1477	67023.4556	May	19	10:56	67030.7635	May	26	18:19	67009.2846	May	5	06:50	67016.8051	May	12	19:19
1478	67052.8260	Jun	17	19:49	67060.4792	Jun	25	11:30	67038.8677	Jun	3	20:49	67046.0427	Jun	11	01:01
1479	67082.2452	Jul	17	05:53	67090.2103	Jul	25	05:03	67068.3407	Jul	3	08:11	67075.2357	Jul	10	05:39
1480	67111.7518	Aug	15	18:03	67119.9144	Aug	23	21:57	67097.7323	Aug	1	17:35	67104.4416	Aug	8	10:36
1481	67141.3691	Sep	14	08:51	67149.5569	Sep	22	13:22	67127.0858	Aug	31	02:04	67133.7154	Sep	6	17:10
1482	67171.0863	Oct	14	02:04	67179.1211	Oct	22	02:54	67156.4413	Sep	29	10:36	67163.1084	Oct	6	02:36
1483	67200.8539	Nov	12	20:30	67208.6059	Nov	20	14:33	67185.8261	Oct	28	19:50	67192.6616	Nov	4	15:53
1484	67230.6047	Dec	12	14:31	67238.0200	Dec	20	00:29	67215.2550	Nov	27	06:07	67222.3889	Dec	4	09:20
									67244.7389	Dec	26	17:44				
													67252.2565	Jan	3	06:09
1485	67260.2878	Jan	11	06:54	67267.3792	Jan	18	09:06	67274.2902	Jan	25	06:58	67282.1777	Feb	2	04:16
1486	67289.8812	Feb	9	21:09	67296.7093	Feb	16	17:01	67303.9161	Feb	23	21:59	67312.0476	Mar	4	01:09
1487	67319.3823	Mar	11	09:10	67326.0447	Mar	18	01:04	67333.6024	Mar	25	14:28	67341.7899	Apr	2	18:57
1488	67348.7971	Apr	9	19:08	67355.4238	Apr	16	10:10	67363.3085	Mar	24	07:24	67371.3751	Apr	2	09:00
1489	67378.1406	May	9	03:22	67384.8794	May	15	21:06	67392.9848	Apr	24	07:24	67400.8097	May	2	09:00
1490	67407.4419	Jun	7	10:36	67414.4306	Jun	14	10:20	67422.5985	May	23	23:38	67430.1210	May	31	19:26
1491	67436.7446	Jul	6	17:52	67444.0750	Jul	14	01:48	67452.1427	Jun	22	14:22	67459.3499	Jun	30	02:54
1492	67466.1000	Aug	5	02:24	67473.7905	Aug	12	18:58	67481.6290	Jul	22	03:25	67488.5489	Jul	29	08:24
1493	67495.5546	Sep	3	13:19	67503.5432	Sep	11	13:02	67511.0752	Aug	20	15:06	67517.7789	Aug	27	13:10
1494	67525.1343	Oct	3	03:13	67533.2960	Oct	11	07:06	67540.4978	Sep	19	01:48	67547.1033	Sep	25	18:42
1495	67554.8324	Nov	1	19:59	67563.0100	Nov	10	00:14	67569.9123	Oct	18	11:57	67576.5743	Oct	25	02:29
1496	67584.6098	Dec	1	14:38	67592.6449	Dec	9	15:29	67599.3356	Nov	16	21:54	67606.2123	Nov	23	13:47
1497	67614.4092	Dec	31	09:49						Dec	16	08:03		Dec	23	05:06
<u>2044</u>																
					67622.1688	Jan	8	04:03	67628.7864	Jan	14	18:52	67635.9918	Jan	21	23:48
1498	67644.1707	Jan	30	04:06	67651.5745	Feb	6	13:47	67658.2799	Jan	13	06:43	67665.8482	Feb	20	20:21
1499	67673.8428	Feb	28	20:14	67680.8878	Mar	6	21:18	67687.8211	Feb	13	19:42	67695.7039	Mar	21	16:54
1500	67703.3938	Mar	29	09:27	67710.1571	Apr	5	03:46	67717.4030	Mar	13	09:40	67725.4929	Apr	20	11:50
1501	67732.8217	Apr	27	19:43	67739.4371	May	4	10:29	67747.0124	Apr	12	09:40	67755.1689	Apr	20	11:50
1502	67762.1533	May	27	03:41	67768.7741	Jun	2	18:35	67776.6371	May	12	00:18	67784.7091	May	20	04:03
1503	67791.4344	Jun	25	10:26	67798.2012	Jul	2	04:50	67806.2662	Jun	10	15:17	67814.1166	Jun	18	17:01
1504	67820.7165	Jul	24	17:12	67827.7372	Jul	31	17:42	67835.8855	Jul	10	06:23	67843.4198	Jul	18	02:48
1505	67850.0467	Aug	23	01:07	67857.3888	Aug	30	09:20	67865.4761	Aug	8	21:15	67872.6659	Aug	16	10:04
1506	67879.4616	Sep	21	11:05	67887.1471	Sep	29	03:32	67895.0217	Sep	7	11:26	67901.9124	Sep	14	15:59
1507	67908.9845	Oct	20	23:38	67916.9784	Oct	28	23:29	67924.5193	Oct	7	00:31	67931.2158	Oct	13	21:54
1508	67938.6243	Nov	19	14:59	67946.8178	Nov	27	19:38	67953.9827	Nov	5	12:28	67960.6205	Nov	12	05:11
1509	67968.3711	Dec	19	08:54	67976.5842	Dec	27	14:01		Dec	4	23:35		Dec	11	14:54

PHASES OF THE MOON, TDT

Lunation	New Moon			First Quarter			Full Moon			Last Quarter		
	MJD	m	d h m	MJD	m	d h m	MJD	m	d h m	MJD	m	d h m
1547	69090.4817	Jan 15	11:34	69097.9148	Jan 22	21:57	69076.2905	Jan 1	06:58	69083.7852	Jan 8	18:51
1548	69120.0227	Feb 14	00:33	69127.8081	Feb 21	19:24	69106.0108	Jan 31	00:15	69113.1374	Feb 7	03:18
1549	69149.6034	Mar 14	14:29	69157.6700	Mar 22	16:05	69135.6106	Feb 29	14:39	69142.4489	Mar 7	10:46
1550	69179.2229	Apr 13	05:21	69187.4190	Apr 21	10:03	69165.0872	Mar 30	02:06	69171.7582	Apr 5	18:12
1551	69208.8746	May 12	20:59	69217.0121	May 21	00:17	69194.4682	Apr 28	11:14	69201.0997	May 5	02:24
1552	69238.5355	Jun 11	12:51	69246.4519	Jun 19	10:51	69223.7906	May 27	18:58	69230.5041	Jun 3	12:06
1553	69268.1704	Jul 11	04:05	69275.7728	Jul 18	18:33	69253.0898	Jun 26	02:09	69259.9993	Jul 2	23:59
1554	69297.7501	Aug 9	18:00	69305.0230	Aug 17	00:33	69282.3994	Jul 25	09:35	69289.6054	Aug 1	14:32
1555	69327.2679	Sep 8	06:26	69334.2536	Sep 15	06:05	69311.7558	Aug 23	18:08	69319.3216	Aug 31	07:43
1556	69356.7405	Oct 7	17:46	69363.5148	Oct 14	12:21	69341.1998	Aug 23	04:48	69349.1158	Sep 30	02:47
1557	69386.1941	Nov 6	04:40	69392.8542	Nov 12	20:30	69370.7682	Sep 22	04:48	69378.9276	Oct 29	22:16
1558	69415.6468	Dec 5	15:31	69422.3127	Dec 12	07:30	69400.4727	Oct 21	18:26	69408.6908	Nov 28	16:35
							69430.2781	Nov 20	11:21	69438.3560	Dec 28	08:33
								Dec 20	06:40			

2049

1559	69445.1012	Jan 4	02:26	69451.9146	Jan 10	21:57	69460.1044	Jan 19	02:30	69467.8988	Jan 26	21:34
1560	69474.5535	Feb 2	13:17	69481.6525	Feb 9	15:40	69489.8671	Feb 17	20:49	69497.3177	Feb 25	07:37
1561	69504.0088	Mar 4	00:13	69511.4774	Mar 11	11:27	69519.5170	Mar 19	12:24	69526.6330	Mar 26	15:11
1562	69533.4864	Apr 2	11:40	69541.3116	Apr 10	07:29	69549.0458	Mar 19	12:24	69555.8836	Apr 24	21:12
1563	69563.0085	May 2	00:12	69571.0824	May 10	01:59	69578.4687	Apr 18	01:06	69585.1217	May 24	02:55
1564	69592.5843	May 31	14:01	69600.7484	Jun 8	17:58	69607.8111	May 17	11:15	69614.4045	Jun 22	09:42
1565	69622.2025	Jun 30	04:52	69630.2995	Jul 8	07:11	69637.1048	Jun 15	19:28	69643.7846	Jul 21	18:50
1566	69651.8392	Jul 29	20:08	69659.7451	Aug 6	17:53	69666.3894	Jul 15	02:31	69673.3000	Aug 20	07:12
1567	69681.4721	Aug 28	11:20	69689.1038	Sep 5	02:29	69695.7122	Aug 13	09:21	69702.9618	Aug 20	07:12
1568	69711.0877	Sep 27	02:06	69718.4028	Sep 5	02:29	69695.7122	Sep 11	17:06	69702.9618	Sep 18	23:05
1569	69740.6780	Oct 26	16:16	69747.6808	Oct 4	09:40	69725.1212	Sep 11	17:06	69702.9618	Sep 18	23:05
1570	69770.2340	Nov 25	05:37	69776.9867	Oct 4	09:40	69725.1212	Oct 11	02:55	69732.7478	Oct 18	17:57
1571	69799.5851	Dec 24	14:03	69806.6968	Nov 2	16:20	69754.6522	Oct 11	02:55	69732.7478	Oct 18	17:57
							69784.3120	Nov 9	15:39	69762.6065	Nov 17	14:33
								Dec 9	07:29	69792.4693	Dec 17	11:16