U. S. NAVAL OBSERVATORY COMPLETE LUNAR OCCULTATION PREDICTIONS
COMPUTED FOR WASHINGTON (LAT 38.920 LONG 77.065) FOR 1968 (DISTANCE FROM STANDARD STATION = -0 MILES)
STANDARD STATION AT LAT 38.920 LONG 77.065

DATE	TIME(UT) H M S	ACC SEC	V	O	Z.C.	USNO REF NO	S.A.O. NUMBER	MAG	SP	PH	PERCENT SUNLIT	ELG	PA DEG	CUSP ANGL	VA DEG	MOON ALT	MOON AZI	SUN ALT	AA DEG	LIBRATION LONG	LIBRATION LAT	MIN MAG
MAR 21	7 22 33	6	6	4		217606	186003	9.2	G0	R	51 WAN	91	257	77S	298	4	133		257	5.1	7.1	
MAR 21	7 25 33	5	6	6		217610	186005	9.0	B8	R	51 WAN	91	282	78N	323	5	134		283	5.1	7.1	
MAR 21	7 32 25	6	6	6		217623	186016	9.0	A0	R	51 WAN	91	243	63S	282	5	135		243	5.1	7.1	
MAR 21	7 32 43	8	6	7		217640	186031	8.6	K0	R	51 WAN	91	334	26N	13	6	134		334	5.1	7.1	
MAR 21	7 42 32	17	5	9		217653	186041	7.1	K0	R	51 WAN	91	210	30S	248	6	136		210	5.1	7.1	
MAR 21	8 4 7	5	6	5		217663	186051	9.2	A2	R	51 WAN	91	303	57N	338	9	140		304	5.1	7.2	
MAR 21	8 19 2	5	6	6		217673	186060	9.1	A5	R	51 WAN	91	262	82S	295	11	143		262	5.0	7.2	
MAR 21	8 35 3	5	7	6		217694	186078	9.1	B3	R	51 WAN	91	264	84S	294	13	146		264	5.0	7.2	
MAR 21	8 58 44	6	6	9		217720	186099	8.1	F5	R	51 WAN	91	253	73S	279	15	150		253	4.9	7.3	
MAR 21	8 48 46	9	6	9		217721	186100	7.7	K0	R	51 WAN	91	224	44S	252	14	148		224	5.0	7.2	
MAR 21	8 39 36	9	6	6		217723	186102	9.1	A0	R	51 WAN	91	336	24N	6	13	146		337	5.0	7.2	
MAR 21	9 20 38	5	6	6		217753	186128	9.0	A0	R	51 WAN	91	276	84N	299	17	155		277	4.9	7.3	
MAR 21	9 42 49	5	6	6		217769	186142	9.1	K0	R	51 WAN	90	261	81S	280	19	159		262	4.8	7.3	
MAR 21	9 25 41	19	7	8		217780	186151	8.3	F8	R	51 WAN	91	204	24S	226	17	156		205	4.9	7.3	
MAR 21	9 51 14	5	5	9		217785	186156	7.9	B8	R	50 WAN	90	259	79S	276	19	161		259	4.8	7.3	
MAR 21	9 46 28	11	6	6		217796	186166	8.9	B5	R	51 WAN	90	215	35S	233	19	160		216	4.8	7.3	
MAR 21	10 0 17	6	6	6		217800	186170	9.1	A0	R	50 WAN	90	238	58S	253	20	163		238	4.8	7.3	
MAR 21	10 38 17	5	6	6		217847	186210	9.0	K0	R	50 WAN	90	283	77N	291	21	172	-7	284	4.7	7.4	
MAR 21	10 46 13	11	9	9	2609	217879	186237	4.3	F8P	R	50 WAN	90	210	30S	216	21	173	-5	211	4.7	7.4	5.1
MAR 21	10 47 13	15	6	6		217891	186248	8.7	B8	R	50 WAN	90	345	15N	351	22	173	-5	346	4.7	7.4	
MAR 22	8 6 38	5	6	3	A	219620	187597	8.4	G0	R	40 WAN	78	279	74N	322	2	130		285	5.8	7.5	
MAR 22	8 27 25	5	7	5		219638	187610	9.2	G0	R	40 WAN	78	264	89N	305	5	133		271	5.7	7.6	
MAR 22	8 11 35	5	7	3		219656	187622	9.1	A5	M	40 WAN	78	183	10S	226	3	131		190	5.8	7.5	
GRAZING OCCULTATION NEARBY-- APPROXIMATE S. LIMIT LAT. = 39.11 + 0.63(W. LONG. - 77.06)																						
MAR 22	9 2 13	6	7	7		219675	187638	8.6	G5	R	40 WAN	78	233	61S	268	9	139		239	5.7	7.6	
MAR 22	8 48 43	28	7	6		219692	187652	8.9	G5	D	40 WAN	78	172	0S	209	7	137		178	5.7	7.6	
GRAZING OCCULTATION NEARBY-- APPROXIMATE S. LIMIT LAT. = 38.41 + 0.62(W. LONG. - 77.06)																						
MAR 22	9 1 35	28	7	6		219692	187652	8.9	G5	R	40 WAN	78	192	20S	228	9	139		199	5.7	7.6	
MAR 22	10 4 43	5	7	5		219723	187673	9.2	G0	R	39 WAN	78	276	76N	302	16	151		283	5.5	7.6	
MAR 22	10 8 32	5	6	6		219726	187677	8.9	K2	R	39 WAN	77	285	67N	310	16	152	-12	292	5.5	7.7	
MAR 22	10 34 20	5	7	6		219746	187693	9.0	G5	R	39 WAN	77	280	72N	300	19	157	-7	287	5.5	7.7	
MAR 22	10 41 35	5	9	9	2788	219757	187701	6.2	K2	R	39 WAN	77	282	70N	301	19	159	-6	288	5.5	7.7	
MAR 23	8 45 14	6	6	2		221247	188873	8.1	G0	R	29 WAN	65	304	41N	349	1	125		315	6.2	7.5	
MAR 23	8 58 20	5	8	2		221254	188880	9.5	F8	R	29 WAN	65	274	71N	318	3	128		286	6.2	7.5	
MAR 23	9 15 57	15	7	4		221282	188901	9.5	F8	R	29 WAN	65	334	11N	16	5	130		346	6.1	7.6	
MAR 23	9 47 52	5	8	7		221291	188910	8.7	K2	R	29 WAN	65	258	87N	295	10	136		269	6.1	7.6	
MAR 23	9 38 55	9	8	6		221295	188913	9.0	K5	R	29 WAN	65	209	44S	247	8	134		220	6.1	7.6	
MAR 23	10 7 46	5	8	9		221303	188920	7.6	K2	R	29 WAN	65	263	82N	297	12	139	-12	275	6.0	7.6	
MAR 23	10 51 32	5	7	6		221321	188935	9.1	G5	R	29 WAN	65	264	81N	294	16	146	-6	276	5.9	7.6	
MAR 24	9 42 58	5	8	4		222528	189952	9.5	G0	R	20 WAN	53	272	67N	316	4	124		288	6.3	7.1	
MAR 24	9 57 31	6	8	4		222546	189964	9.5	G0	R	20 WAN	53	226	67S	269	6	126		242	6.2	7.1	
MAR 24	10 29 3	6	8	7		222562	189973	8.7	G0	R	20 WAN	53	282	57N	322	11	131	-8	298	6.2	7.1	
MAR 25	10 9 23	6	9	3		223523	164741	8.9	K0	R	12 WAN	41	221	67S	269	3	117	-11	240	6.2	6.4	
MAR 26	10 32 16	5	9	4		224270	165257	8.6	K0	R	6 WAN	29	233	77N	302	3	109	-6	274	5.8	5.4	
MAR 29	23 56 12	5	9	4		Z01109	109779	9.1	F5	D	1 WAX	11	54	76N	3	5	277	-6	75	1.5	-0.0	
MAR 29	23 56 31	7	9	7		Z01111	109781	8.7	K0	D	1 WAX	11	113	45S	62	5	276	-6	134	1.5	-0.0	
MAR 30	23 44 23	5	9	2		Z01776	92748	8.3	F5	D	4 WAX	22	80	77S	27	18	273	-3	99	0.3	-1.4	
MAR 31	0 43 25	6	8	9	299	Z01796	92763	6.3	M8	D	4 WAX	22	98	59S	46	7	282		117	0.2	-1.4	
MAR 31	0 59 18	6	9	5		Z01808	92769	9.1	K0	D	4 WAX	22	108	49S	57	4	284		127	0.2	-1.4	

★ STAR DUST Published monthly except August by and for members of the NATIONAL CAPITAL ASTRONOMERS, INC., a non-profit public service organization promoting interest and education in astronomy and the related sciences.

WASHINGTON D.C. FEB 29 '68
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★ STAR DUST

March 1968 Vol. XXV No. 7

THE EARLY DAYS OF THE NAVAL OBSERVATORY

Our attention this month will be focused on the early days of our growing American nation when John Quincy Adams' vision of "lighthouses of the skies" began to bear fruit in the 1840's. Central in the rapid growth of American observatories is the U.S. Naval Observatory, the outcome of the urgings of chiefly one Lieutenant James Gilliss, U.S.N. An interesting and important chapter in the history of science will be recaptured by Dr. David Musto, who has studied this period in some detail.

Dr. Musto is by profession a physician, but one whose orbit has been strongly perturbed by an absorbing interest in the history of science. He holds an M.A. degree in the history of science, obtained from Yale University; he is a member of Commission No. 41 (history) of the International Astronomical Union. He is presently a visiting assistant professor of history at Johns Hopkins University.

Those of us who were fortunate enough to hear his paper given at the A.L. Convention in July will look forward to its sequel, and another entertaining description of the beginnings of American astronomy.

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CALENDAR

MARCH 2...... 6:15 p.m. Dinner with the speaker. Bassin's at the corner of 14th and Pennsylvania Avenue, N.W. Call Jerry Hudson: 948-2809 to make reservations.

2...... 8:15 p.m. THE EARLY DAYS OF THE NAVAL OBSERVATORY Dr. David Musto. Dept. of Commerce Auditorium. Followed by regular business meeting.

16...... 8:15 p.m. DISCUSSION GROUP. Dept. of Commerce, Room 2062. Topic will be variable stars; the emphasis is on amateur participation in this interesting and highly useful area. Conducted by Mr. Sterling Anderson.

1,8,15,22,29 Telescope making classes at Chevy Chase Community Center. 7:30-10:00 p.m.

29...... OBSERVING AT THE FIVE INCH on the grounds of the U.S. Naval Observatory 8-10 p.m. with Larry White.

NEXT MONTH... The lecture topic for April promises to be meteoric, when Dr. Henderson, Smithsonian Institution--well-known expert in this area--will be our guest speaker.

CHANGE OF ADDRESS:

Larry White
8610 Queen Elizabeth Blvd.
Annandale, Virginia 22003

****

FEBRUARY APPLICATIONS FOR MEMBERSHIP:

JUNIOR:

David D. Engle
6807 Rosewood Street
Annandale, Virginia 22003

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FEBRUARY LECTURE — GRAVITY WAVES

Using a $1\frac{1}{2}$ ton aluminum cylinder suspended in vacuum, Dr. Joseph Weber, Professor of Physics at Maryland University and our February speaker, hopes to detect gravitational radiation. The gravity waves move at the speed of light according to Einstein's formulation. The cylinder is elaborately isolated from mechanical and electrical sources of energy lest their signals swamp the delicate detector. (However, Dr. Weber mentioned that the apparatus did notice a large Caterpillar tractor--driven by at midnight!) By this means, and by use of electronic tricks involving a superconducting coil, the sensitivity was raised to the Johnson noise limit. This allows gravity-wave-induced changes in length of one part in 10^{16} (less than a tenth of a nuclear radius between the cylinder ends) to be detected. This sensitivity was tested with an artificial gravity signal source. To date, he and his students have been observing about one carefully screened simultaneous "event" a month at two detectors more than a mile apart. The origin of these signals is not known at present, although Dr. Weber mentioned collapsing supernovae as a possible source. Optical confirmations are lacking for this. It appears that more distantly separated detectors with stringent simultaneity checks will be required to rule out some unknown local source.

Another experiment using the vibrations of the earth (one cycle per 54 min.) as a sensor is being set up. Although the earth intercepts much more gravitational energy, it is also much noisier than the aluminum cylinder. The small changes in gravity at the earth's surface are detected. To date, no signals have been seen with this apparatus, but Dr. Weber hopes to place a similar one on the moon where natural noise (earthquakes, storms, sea tides, etc.) would be much less.

— James Krebs

U. S. NAVAL OBSERVATORY COMPLETE LUNAR OCCULTATION PREDICTIONS
COMPUTED FOR WASHINGTON (LAT 38.920 LONG 77.065) FOR 1968 (DISTANCE FROM STANDARD STATION = -5 MILES)
STANDARD STATION AT LAT 38.920 LONG 77.065

DATE	TIME(UT) H M S	ACC SEC	V Q	Z.C.	USNO REF NO	S.A.O. NUMBER	MAG	SP	PH	PERCENT SUNLIT	ELG	PA DEG	CUSP ANGL	VA DEG	MOON ALT	MOON AZI	SUN ALT	AA DEG	LIBRATION LONG	LIBRATION LAT	MIN MAG
MAR 1	0 5 13	5	9 7		200016	128558	8.8	KO	D	3 WAX	19	40	58N	349	5	264		62	3.0	2.5	
MAR 2	0 31 1	7	8 6		200684	109472	8.9	FO	D	7 WAX	31	109	49S	57	11	266		130	2.0	1.0	
MAR 2	1 22 32	10	8 1		200702	109486	9.2	G5	D	7 WAX	31	122	36S	71	2	274		144	2.0	1.0	
MAR 2	23 36 34	6	7 5		201314	109925	9.2	F8	D	13 WAX	41	28	50N	338	33	255	-7	48	1.1	-0.4	
MAR 3	0 31 56	5	7 8		201349	109947	8.4	KO	D	13 WAX	42	57	79N	5	22	265		77	1.0	-0.4	
MAR 3	1 15 18	14	7 6		201362	109958	9.0	F5	D	13 WAX	42	134	24S	82	14	271		154	0.9	-0.5	
MAR 3	23 35 27	6	7 6		201948	92855	9.1		D	20 WAX	52	101	59S	51	44	251	-7	119	-0.1	-1.8	
MAR 4	2 5 2	5	7 5		201984	92881	9.3		D	20 WAX	53	46	66N	352	16	277		63	-0.4	-1.9	
MAR 4	3 27 22	5	7 2		202016	92900	8.0	AO	D	21 WAX	54	89	71S	34	1	289		106	-0.5	-1.9	
MAR 5	0 42 34	5	7 7		202506	93251	8.7		D	28 WAX	64	61	79N	6	42	241		76	-1.5	-3.1	
MAR 5	4 20 8	6	8 5		202588	93309	7.7	KO	D	29 WAX	65	112	51S	63	2	284		127	-1.9	-3.1	
MAR 5	23 59 7	5	5 6		203190	76265	9.0	A3	D	37 WAX	74	86	81S	35	61	246	-11	97	-2.6	-4.3	
MAR 6	3 6 58	6	6 6		203267	76324	8.9	F8	D	38 WAX	76	49	62N	352	26	281		59	-3.2	-4.3	
MAR 6	3 26 51	6	6 7		203278	76336	8.6	K2	D	38 WAX	76	111	56S	55	22	283		122	-3.2	-4.3	
MAR 6	4 30 31	6	6 6		203306	76360	9.0	F5	D	38 WAX	76	48	61N	355	11	292		58	-3.3	-4.2	
MAR 6	4 26 23	5	6 6		203307	76361	9.0	K5	D	38 WAX	76	62	75N	10	12	291		73	-3.3	-4.2	
MAR 6	4 40 3	6	6 9		203315	76366	7.8	KO	D	38 WAX	76	122	45S	70	9	293		132	-3.3	-4.2	
MAR 7	0 19 25	5	2 8		203835	76725	8.5	K5	D	46 WAX	86	96	76S	46	47	242		103	-3.8	-5.2	
MAR 7	23 49 23	15	4 9	840	204572	77295	6.5	KO	D	56 WAX	97	154	24S	144	79	191	-9	156	-4.7	-6.0	
MAR 7	23 53 14	5	2 8		204599	77314	8.5	B8	D	56 WAX	97	85	87N	72	79	195	-10	87	-4.7	-6.0	
MAR 8	1 19 55	5	2 5		204638	77346	9.3	KO	D	56 WAX	97	68	70N	12	67	245		70	-5.0	-6.0	
MAR 8	1 34 37	5	3 6		204643	77351	9.0	K5	D	56 WAX	97	71	73N	13	64	253		73	-5.1	-6.0	
MAR 8	2 2 42	6	3 7		204655	77359	8.7	B9	D	56 WAX	97	122	56S	62	59	260		124	-5.2	-6.0	
MAR 8	2 35 26	6	3 8		204683	77383	8.4	F5	D	57 WAX	97	118	60S	57	53	266		120	-5.3	-6.0	
MAR 8	3 26 37	15	3 7		204701	77396	8.7	FO	D	57 WAX	98	165	14S	104	43	274		167	-5.4	-5.9	
MAR 8	3 36 48	30	3 6		204708	77401	9.1	G5	D	57 WAX	98	15	16N	313	41	276		16	-5.4	-5.9	
GRAZING OCCULTATION NEARBY-- APPROXIMATE N. LIMIT LAT. = 39.20 + 0.44(W. LONG. - 77.96)																					
MAR 8	3 22 0	5	3 8		204725	77415	8.5	B9	D	57 WAX	98	116	63S	55	44	273		118	-5.4	-5.9	
MAR 8	4 33 36	5	5 9	868A	204806	77478	7.8	AO	D	57 WAX	98	113	66S	54	31	283		114	-5.6	-5.9	
MAR 8	5 10 13	5	4 6		204848	77514	8.9	KO	D	57 WAX	98	77	78N	14	24	287		78	-5.6	-5.8	
MAR 8	5 24 49	8	6 6		204857	77521	9.1	A	D	58 WAX	99	48	49N	351	21	269		49	-5.6	-5.8	
MAR 8	6 7 19	5	6 9		204905	77563	8.0	A3	D	58 WAX	99	115	64S	62	14	295		116	-5.7	-5.8	
MAR 8	6 56 10	6	5 9		204954	77604	7.3	KO	D	58 WAX	99	125	54S	77	5	301		126	-5.7	-5.7	
MAR 8	7 22 7	6	4 6		204973	77619	7.1	F5	D	58 WAX	99	132	47S	86	2	305		133	-5.7	-5.7	
MAR 8	7 18 35	5	7 6		204977	77621	7.8	MO	D	58 WAX	99	87	88N	41	3	304		88	-5.7	-5.7	
MAR 8	23 28 25	8	3 8	A	206079	78461	8.1	AO	D	65 WAX	108	36	32N	83	73	124	-5	33	-5.4	-6.4	
MAR 9	0 7 34	7	3 6		206110	78478	9.0	F2	D	66 WAX	108	52	47N	76	78	152	-12	48	-5.5	-6.5	
MAR 9	0 7 5	5	3 9		206117	78483	7.6	A2	D	66 WAX	108	111	74S	136	74	152	-12	108	-5.5	-6.5	
MAR 9	0 16 24	5	3 7		206123	78488	8.7	A5	D	66 WAX	108	110	75S	127	74	162		107	-5.5	-6.5	
MAR 9	0 42 47	7	2 9		206136	78496	7.8	K2	D	66 WAX	108	136	49S	126	74	191		133	-5.6	-6.5	
MAR 9	0 57 7	9	3 5		206137	78497	9.4	FO	D	66 WAX	108	36	31N	16	74	232		33	-5.7	-6.5	
MAR 9	1 31 17	33	3 6		206146	78506	9.0	KO	D	66 WAX	108	178	7S	134	74	232		175	-5.8	-6.4	
GRAZING OCCULTATION NEARBY-- APPROXIMATE S. LIMIT LAT. = 38.73 + 0.20(W. LONG. - 77.26)																					
MAR 9	1 33 18	5	8 9	1008	206170	78524	5.1	AO	D	66 WAX	108	117	68S	71	74	237		113	-5.8	-6.4	
MAR 9	1 54 30	7	3 9	A	206178	78530	8.0	B9	D	66 WAX	109	56	51N	3	70	243		52	-5.9	-6.4	
MAR 9	1 59 31	6	3 6		206180	78532	9.1	A3	D	66 WAX	109	63	58N	11	71	243		59	-5.9	-6.4	
MAR 9	1 52 0	5	3 5		206181	78533	9.3	KO	D	66 WAX	109	109	76S	58	71	242		105	-5.9	-6.4	
MAR 9	2 34 34	6	4 5		206198	78541	9.4	GO	D	66 WAX	109	138	47S	79	63	255		134	-6.0	-6.4	
MAR 9	2 52 49	5	4 6		206213	78553	8.9	G5	D	66 WAX	109	109	76S	48	6E	259		105	-6.1	-6.4	
MAR 9	3 54 26	6	4 9		206246	78580	7.4	A2	D	67 WAX	109	131	54S	69	4E	27C		127	-6.2	-6.3	
MAR 9	6 34 50	6	7 9		206394	78685	8.2	B9	D	68 WAX	110	142	44S	87	1E	291		137	-6.3	-6.1	
MAR 9	6 59 12	5	6 9	1035	206426	78710	6.8	KO	D	68 WAX	111	80	74N	27	14	294		76	-6.5	-6.1	
MAR 9	7 24 37	5	7 6		206445	78725	9.0	KO	D	68 WAX	111	107	79S	56	1E	293		102	-6.5	-6.1	
MAR 9	23 21 10	7	4 1		207398	79413	9.0	MO	D	75 WAX	120	137	34S	194	61	105	-5	129	-5.9	-6.6	
MAR 9	23 44 14	5	4 4		207420	79431	8.3	K2	D	75 WAX	120	104	87S	159	64	112	-7	96	-5.8	-6.6	
MAR 10	1 56 13	5	4 5		207497	79484	9.3	F5	D	75 WAX	120	118	74S	93	77	238		109	-6.3	-6.6	
MAR 10	2 46 55	22	4 6		207501	79490	8.7	G5	D	76 WAX	121	185	7S	136	65	239		176	-6.4	-6.5	
MAR 10	3 10 34	6	5 5		207533	79511	9.3	K5	D	76 WAX	121	14C	52S	86	6E	247		131	-6.5	-6.5	
MAR 10	3 19 49	5	5 5		207543	79520	9.0	KO	D	76 WAX	121	127	65S	72	64	250		118	-6.5	-6.5	
MAR 10	3 30 40	5	5 7		207555	79530	8.4	KO	D	76 WAX	121	174	88S	47	62	253		95	-6.6	-6.5	
MAR 10	3 36 0	5	5 5		207558	79532	9.0	K7	D	76 WAX	121	104	88S	47	61	254		95	-6.6	-6.5	
MAR 10	6 17 52	8	8 5		207657	79595	9.0	F2	D	77 WAX	122	62	50N	3	31	291		53	-6.9	-6.3	
MAR 10	6 57 53	7	8 6	1162	207674	79612	8.5	K2	D	77 WAX	122	151	42S	95	23	286		142	-6.9	-6.2	
MAR 10	7 23 26	5	8 5		207706	79629	9.0	G5	D	77 WAX	122	105	89S	49	19	289		94	-6.9	-6.2	
MAR 10	8 13 2	35	8 5		207722	79643	9.1	F5	D	77 WAX	123	190	3S	138	10	29e		180	-6.9	-6.1	
GRAZING OCCULTATION NEARBY-- APPROXIMATE S. LIMIT LAT. = 38.56 + 0.65(W. LONG. - 77.06)																					
MAR 10	8 0 40	5	9 9	1169	207735	79650	5.4	K5	D	77 WAX	123	124	69S	71	12	294		114	-6.9	-6.1	
MAR 10	8 37 25	10	8 7		207767	79672	8.1	KO	D	77 WAX	123	48	35N	358	6	299		38	-6.9	-6.1	
MAR 11	3 16 55	5	8 9	1270	208543	80204	6.1	A5	D	84 WAX	132	93	75N	132	73	133		79	-6.2	-6.4	
MAR 11	3 49 30	5	8 3		208604	80235	8.5	GO	D	84 WAX	133	96	78N	51	66	237		83	-6.6	-6.2	
MAR 11	4 17 33	14	9 1		208674	80276	9.0	F5	D	85 WAX	134	47	28N	349	39	277		33	-6.9	-6.0	
MAR 11	6 30 0	6	8 2	A	208696	80288	8.8	KO	D	85 WAX	134	88	69N	30	37	272		74	-7.0	-6.0	
MAR 11	7 44 54	5	9 1		208751	80321	9.0	KO	D	85 WAX	135	125	74S	69	23	282		111	-7.2	-5.8	
MAR 12	1 51 40	5	9 5	1393	209510	80809	6.7	G5	D	91 WAX	145	123	84S	158	65	133		103	-5.9	-5.8	
MAR 12	4 45 0	5	9 2	1400	209572	98596	8.0	F5	D	91 WAX	146	101	77N	61	63	231		84	-6.4	-5.6	
MAR 12	7 54 52	8	9 1		209636	98638	8.3	F2	D	92 WAX	147	168	36S	113	29	272		151	-6.7	-5.2	
MAR 12	7 35 35	9	9 2		209638	98640	7.8	KO	D	92 WAX	147	66	42N	11	32	268		49	-6.6	-5.2	
MAR 12	8 1 6	5	9 1		209665	98664	8.4	K2	D	92 WAX	147	115	89S	60	27	273		97	-6.7	-5.2	
MAR 14	2 29 43	16	9 1		210888	118702	7.9	K5	D	99 WAX	171	197	23S	237	45	125		175	-4.1	-3.6	
MAR 14	9 10 43	5	9 9	1644	211043	118804	4.1	AO	D	100 WAX	174	148	73S	98	25	257		126	-4.9	-2.7	
MAR 15	1 11 17	5	9 3	1732	211543	119150	7.0	KO	R	100 WAN	175	301	63N	351	23	104		279	-2.7	-2.2	
MAR 17	1 56 22	13	9 6	1971A	213043	158152	5.8	KO	R	92 WAN	148	234	31S	284	1	116		214	0.2	1.4	
MAR 17	3 40 43	6	7 2		213096	158184	8.0	MO	R	92 WAN	147	335	48N	17	14	126		316	0.2	1.6	
MAR 17	4 21 46	9	7 3		213103	158190	7.3	MO	R	92 WAN	147	249	46S	265	24	132		230	0.2	1.7	
MAR 17	4 59 40	5	4 4		213123	158203	7.0	G5	R	92 WAN	146	312	71N	342	29	141		293	0.1	1.8	
MAR 17	9 21 23	6	9 5	2002	213214	158269	6.8	G5	R	91 WAN	145	336	47N	310	31	212		317	-0.4	2.4	
MAR 18	4 4 36	6	7 4		213932	158786	8.1	KO	R	84 WAN	133	266	66S	309	9	123		250	1.7	3.3	
MAR 18	6 6 18	6	9 1	A	213984	158823	9.0	FO	R	84 WAN	132	269	69S	296	25	147		253	1.6	3.4	
MAR 18	6 54 53	13	9 2		214045	158863	8.7	GO	R	83 WAN	132	12	8N	29	29	158		356	1.5	3.8	
MAR 18	8 34 35	5	9 5		214066	158880	7.9	F2	R	83 WAN	131	298	82N	294	31	185		283	1.3	4.0	
MAR 18	9 14 10	6	9 6	2129	214079	158890	7.5	KO	R	83 WAN	131	327	53N	314	30	195		311	1.2	4.0	
MAR 18	9 40 49	5	9 2		214085	158895	9.0	K2	R	83 WAN	131	315	65N	297	23	202		300	1.1	4.1	
MAR 18	10 11 26	5	9 4		214098	183020	8.2	KO	R	82 WAN	130	280	80S	256	25	210		265	1.1	4.1	
MAR 18	10 28 28	6	9 3		214104	183019	8.8	F8	R	82 WAN	130	257	57S	230	23	213	-10	242	1.0	4.1	
MAR 18	10 36 13	5	9 5		214111	183024	8.0	G5	R	82 WAN	130	274	74S	246	23	215	-8	259	1.0	4.2	
MAR 19	4 41 8	7	6 1		214998	183774	8.9	GO	R	74 WAN	119	252	57S	298	2	121		241	3.1	4.9	
MAR 19	4 45 25	5	5 1		215000	183776	9.4	KO	R	74 WAN	119	284	89S	329	3	124		272	3.1	4.9	
MAR 19	5 5 43	7	5 5		215029	183803	9.2	KO	R	74 WAN	119	345	30N	28	5	127		333	3.1	4.9	
MAR 19	5 15 53	8	8 9	2257	215040	183813	6.7	AO	R	74 WAN	119	346	29N	28	7	129		335	3.1	5.0	
MAR 19	7 24 53	9	7 6		215099	183867	9.4	F8	R	73 WAN	118	243	48S	265	22	154		232	2.9	5.3	
MAR 19	8 16 50	6	7 7		215120	183891	9.0	KO	R	73 WAN	118	267	73S	279	25	166		256	2.8	5.4	
MAR 19	8 23 21	6	9 9	2269	215133	183900	5.4	B5	R	73 WAN	117	332	42N	342	26	168		321	2.8	5.4	
MAR 19	9 13 34	7	8 8		215162	183929	8.8	KO	R	73 WAN	117	336	38N	336	27	180		325	2.6	5.5	
MAR 19	10 34 16	5	8 7		215199	183961	9.3	A3	R	73 WAN	117	269	75S	252	23	200	-8	258	2.4	5.6	
MAR 19	10 37 57	8	8 7		215200	183963	9.2	K2	R	73 WAN	117	238	44S	221	23	199	-9	227	2.4	5.6	
MAR 19	10 41 30	7	8 9		215205	183968	8.5	A3	R	73 WAN	117	245	51S	226	23	231	-7	234	2.4	5.6	
MAR 20	6 10 31	6	6 3		216039	184718	9.7	A	R	63 WAN	105	254	66S	296	4	130		248	4.2	6.2	
MAR 20	6 25 24	6	6 6		216063	184739	9.1	K	R	63 WAN	105	316	52N	356	6	132		310	4.2	6.2	
MAR 20	7 14 8	5	7 7		216088	184761	8.7	F5	R	63 WAN	105	297	71N	330	12	141		291	4.1	6.3	
MAR 20	7 23 20	5	7 8	A	216108	184777	8.3	AO	R	63 WAN	104	313	55N	345	13	143		307	4.1	6.4	
MAR 20	7 44 16	5	7 9		216114	184783	7.7	G5	R	62 WAN	104	283	85N	311	15	147		277	4.1	6.4	
MAR 20	8 25 26	5	7 6		216146	184812	9.0		R	62 WAN	104	299	69N	320	19	155		293	4.0	6.5	
MAR 20	8 25 56	5	7 6		216147	184813	9.0	A2	R	62 WAN	104	298	70N	319	19	156		292	4.0	6.5	
MAR 20	8 35 52	16	7 8		216148	184814	8.5	F8	R	62 WAN	104	218	30S	241	18	154		212	4.0	6.5	
MAR 20	9 3 31	5	7 6		216165	184828	9.0	F8	R	62 WAN	104	281	87N	295	21	164		275	3.9	6.5	
MAR 20	9 45 36	6	7 5		216209	184863	9.4	AO	R	62 WAN	104	319	48N	324	23	173		313	3.8	6.6	
MAR 20	9 50 21	8	8 8		216222	184877	8.4	KO	R	62 WAN	104	337	30N	342	23	174		332	3.8	6.6	
MAR 20	10 34 7	6	7 8		216247	184896	8.5	FO	R	62 WAN	103	310	57N	305	23	185	-8	304	3.7	6.6	