

I slightly modified Thorstensen's code to print out the time between evening twilight and morning twilight. For Okie-Tex site (site code = o) near Kenton OK I used same time zone as for Oklahoma City.

W. Romanishin- August 2013 - email: wromanishin at ou.edu - Here is stuff from John T. intro:

***** 2019 Night-time Astronomical Calendar for Cerro Tololo *****

By John Thorstensen, Dartmouth College

This calendar is designed to provide information useful for the planning of nighttime observations. The format should minimize confusion; each line gives the phenomena for a single (local!) night, and each line is labeled with both evening and morning (local) day and date. Note that all times given are LOCAL CIVIL (zone) times. DAYLIGHT SAVINGS time is used, with a non-USA convention.

The rise/set times printed are the times at which the center of the object is 50 arcminutes below the geometrical horizon. At the given twilight, the center of the sun is 0.0 degrees below the geometrical horizon.

The moon positions (and rise/set times) are generated by an implementation of the Low-Precision formulae in the Astronomical Almanac. The Almanac states that the error seldom exceeds 0.3 degrees. Topocentric corrections are included. Comparisons with tables for Kitt Peak in the NAOA Newsletter indicate that the rise-set times are good to +/- 2 min or so. The moon's RA, Dec, and illuminated fraction are given for local midnight, regardless of whether the moon is actually up at that time. Note that the moonrise and moonset times are not printed if they occur near mid-day.

The LST at evening and morning twilight are tabulated. This gives an accurate idea of the range of RA's accessible during the night.

The JD is given (severely rounded off) for local midnight. Again, this avoids any ambiguity.

Some credits: The sidereal time and Julian date routines were originally coded in PL/I by Steve Maker of Dartmouth College. The algorithms originated in the old American Ephemeris. The routine to convert JD back to calendar date is adapted from Numerical Recipes in C, by Press et al.

CAUTIONS: I believe that the program which generates these tables is reasonably accurate. However, it has not been exhaustively tested, so you should be sure to run 'sanity checks' on the results. Also, in view of the approximations used, the results should not be used when high precision is needed. Extension to dates far from the present (1990) should be done with great caution. The code has not been tested for the eastern or southern hemispheres. Rise/set times are slightly inaccurate and rather confusing at circumpolar latitudes, where the concept of a 'night' is blurry.

The daylight savings time conventions (if used) are quite specific (to U. S., post-1986) and subject to change. I know that the code has many infelicities; if you should find actual errors, please notify John.Thorstensen@dartmouth.edu

[This output comes from a (hopefully) portable, completely self-contained program in the c language. It is available from the author and may be used freely for scientific or educational purposes. If you use it for profit, please contact the author to arrange a (modest!) fee. Source code is copyright John Thorstensen, 1990.]

MOON PHASES FOR 2019, at Cerro Tololo

Times and dates are given in local time, zone = 4 hr West.
 They are generally better than +- 2 minutes.
 Daylight savings time used.

The end of the previous year and the beginning of the next
 are included for continuity.

NEW		1ST		FULL		LAST	
Dec 07	4 22	Dec 15	8 50	Dec 22	14 50	Dec 29	6 37
Jan 05	22 30	Jan 14	3 46	Jan 21	2 17	Jan 27	18 12
Feb 04	18 05	Feb 12	19 27	Feb 19	12 54	Feb 26	8 30
Mar 06	13 05	Mar 14	6 27	Mar 20	21 43	Mar 28	0 11
Apr 05	4 52	Apr 12	15 06	Apr 19	7 12	Apr 26	18 19
May 04	18 47	May 11	21 13	May 18	17 12	May 26	12 35
Jun 03	6 03	Jun 10	2 01	Jun 17	4 31	Jun 25	5 48
Jul 02	15 17	Jul 09	6 57	Jul 16	17 40	Jul 24	21 20
Jul 31	23 13	Aug 07	13 33	Aug 15	8 31	Aug 23	10 59
Aug 30	6 38	Sep 05	23 12	Sep 14	0 35	Sep 21	22 44
Sep 28	14 28	Oct 05	12 48	Oct 13	18 11	Oct 21	9 42
Oct 28	0 40	Nov 04	7 24	Nov 12	10 37	Nov 19	18 13
Nov 26	12 08	Dec 04	3 59	Dec 12	2 15	Dec 19	1 59
Dec 26	2 16	Jan 03	1 47	Jan 10	16 23	Jan 17	10 01

Calendar for Cerro Tololo, west longitude (h.m.s) = 4 43 16, latitude (d.m) = -30 09.9
 Rise/set times in Chilean time (4 hr W), for 2215 m above surroundings, DAYLIGHT time used, * shows clock reset.
 Moon info is for local midnight, even if moon is down. Program: John Thorstensen, Dartmouth College.

***** 2019 JANUARY *****

Date (eve/morn)		LMST	----- Sun: -----				LST twilight:		----- Moon: -----				Twi-Twi	
		midn	set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec	hours
Tue Jan 01/Wed Jan 02		5 03	20 56	22 24	5 10	6 38	3 27	10 13	4 04	.....	14	15 43.7	-14 22	6.8
Wed Jan 02/Thu Jan 03		5 07	20 56	22 24	5 11	6 39	3 31	10 18	4 44	18 04	8	16 34.1	-17 21	6.8
Thu Jan 03/Fri Jan 04		5 11	20 57	22 25	5 12	6 39	3 35	10 23	5 28	19 00	4	17 25.2	-19 28	6.8
Fri Jan 04/Sat Jan 05		5 14	20 57	22 25	5 12	6 40	3 39	10 28	6 16	19 54	1	18 16.7	-20 39	6.8
Sat Jan 05/Sun Jan 06		5 18	20 57	22 24	5 13	6 41	3 43	10 33	.....	20 45	0	19 08.2	-20 49	6.8
Sun Jan 06/Mon Jan 07		5 22	20 57	22 24	5 14	6 42	3 46	10 38	.....	21 32	1	19 59.0	-20 02	6.8
Mon Jan 07/Tue Jan 08		5 26	20 57	22 24	5 15	6 43	3 50	10 42	.....	22 15	4	20 48.6	-18 20	6.9
Tue Jan 08/Wed Jan 09		5 30	20 57	22 24	5 16	6 43	3 54	10 47	.....	22 54	8	21 36.8	-15 50	6.9
Wed Jan 09/Thu Jan 10		5 34	20 57	22 24	5 17	6 44	3 58	10 52	.....	23 30	14	22 23.7	-12 40	6.9
Thu Jan 10/Fri Jan 11		5 38	20 57	22 24	5 18	6 45	4 02	10 57	.....	0 03	21	23 09.4	- 8 58	6.9
Fri Jan 11/Sat Jan 12		5 42	20 57	22 23	5 19	6 46	4 05	11 02	.....	0 35	29	23 54.5	- 4 51	6.9
Sat Jan 12/Sun Jan 13		5 46	20 57	22 23	5 21	6 47	4 09	11 07	.....	1 07	38	0 39.7	- 0 27	7.0
Sun Jan 13/Mon Jan 14		5 50	20 57	22 23	5 22	6 48	4 12	11 12	.....	1 39	48	1 25.7	4 05	7.0
Mon Jan 14/Tue Jan 15		5 54	20 57	22 22	5 23	6 49	4 16	11 17	.....	2 13	58	2 13.5	8 37	7.0
Tue Jan 15/Wed Jan 16		5 58	20 56	22 22	5 24	6 49	4 20	11 23	.....	2 50	68	3 04.0	12 55	7.0
Wed Jan 16/Thu Jan 17		6 02	20 56	22 22	5 25	6 50	4 23	11 28	.....	3 32	78	3 58.0	16 46	7.1
Thu Jan 17/Fri Jan 18		6 06	20 56	22 21	5 26	6 51	4 27	11 33	.....	4 21	87	4 56.0	19 51	7.1
Fri Jan 18/Sat Jan 19		6 10	20 56	22 21	5 27	6 52	4 30	11 38	18 19	5 16	94	5 57.9	21 48	7.1
Sat Jan 19/Sun Jan 20		6 14	20 55	22 20	5 28	6 53	4 33	11 43	19 23	6 18	98	7 02.7	22 19	7.1
Sun Jan 20/Mon Jan 21		6 18	20 55	22 20	5 30	6 54	4 37	11 48	20 24	.....	100	8 08.3	21 16	7.2
Mon Jan 21/Tue Jan 22		6 21	20 55	22 19	5 31	6 55	4 40	11 53	21 20	.....	99	9 12.9	18 42	7.2
Tue Jan 22/Wed Jan 23		6 25	20 54	22 18	5 32	6 56	4 43	11 58	22 10	.....	94	10 14.7	14 52	7.2
Wed Jan 23/Thu Jan 24		6 29	20 54	22 18	5 33	6 57	4 47	12 03	22 55	.....	87	11 13.3	10 11	7.3
Thu Jan 24/Fri Jan 25		6 33	20 54	22 17	5 34	6 58	4 50	12 08	23 36	.....	78	12 08.7	5 04	7.3
Fri Jan 25/Sat Jan 26		6 37	20 53	22 16	5 35	6 59	4 53	12 14	0 14	.....	68	13 01.6	- 0 08	7.3
Sat Jan 26/Sun Jan 27		6 41	20 53	22 16	5 37	6 59	4 56	12 19	0 50	.....	58	13 52.8	- 5 07	7.4
Sun Jan 27/Mon Jan 28		6 45	20 52	22 15	5 38	7 00	5 00	12 24	1 27	.....	47	14 43.1	- 9 40	7.4
Mon Jan 28/Tue Jan 29		6 49	20 52	22 14	5 39	7 01	5 03	12 29	2 04	.....	37	15 33.3	-13 35	7.4
Tue Jan 29/Wed Jan 30		6 53	20 51	22 13	5 40	7 02	5 06	12 34	2 44	.....	27	16 23.7	-16 46	7.4
Wed Jan 30/Thu Jan 31		6 57	20 50	22 12	5 41	7 03	5 09	12 39	3 27	.....	19	17 14.5	-19 04	7.5
Thu Jan 31/Fri Feb 01		7 01	20 50	22 11	5 42	7 04	5 12	12 44	4 13	17 50	12	18 05.6	-20 27	7.5

***** 2019 FEBRUARY *****

Date (eve/morn)		LMST	----- Sun: -----				LST twilight:		----- Moon: -----				Twi-Twi	
		midn	set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec	hours
Fri Feb 01/Sat Feb 02		7 05	20 49	22 11	5 44	7 05	5 15	12 49	5 01	18 42	7	18 56.7	-20 50	7.6
Sat Feb 02/Sun Feb 03		7 09	20 49	22 10	5 45	7 06	5 18	12 54	5 52	19 30	3	19 47.3	-20 16	7.6
Sun Feb 03/Mon Feb 04		7 13	20 48	22 09	5 46	7 07	5 21	13 00	.....	20 14	1	20 36.9	-18 47	7.6
Mon Feb 04/Tue Feb 05		7 17	20 47	22 08	5 47	7 08	5 24	13 05	.....	20 54	0	21 25.2	-16 29	7.7
Tue Feb 05/Wed Feb 06		7 21	20 47	22 07	5 48	7 08	5 27	13 10	.....	21 31	1	22 12.3	-13 28	7.7
Wed Feb 06/Thu Feb 07		7 25	20 46	22 06	5 49	7 09	5 30	13 15	.....	22 05	4	22 58.1	- 9 53	7.7
Thu Feb 07/Fri Feb 08		7 28	20 45	22 05	5 50	7 10	5 33	13 20	.....	22 37	9	23 43.0	- 5 52	7.8
Fri Feb 08/Sat Feb 09		7 32	20 44	22 04	5 52	7 11	5 36	13 25	.....	23 09	15	0 27.7	- 1 34	7.8
Sat Feb 09/Sun Feb 10		7 36	20 43	22 03	5 53	7 12	5 39	13 30	.....	23 40	23	1 12.7	2 52	7.8
Sun Feb 10/Mon Feb 11		7 40	20 43	22 02	5 54	7 13	5 42	13 35	.....	0 13	31	1 58.8	7 19	7.9
Mon Feb 11/Tue Feb 12		7 44	20 42	22 00	5 55	7 14	5 44	13 40	.....	0 47	41	2 46.9	11 36	7.9
Tue Feb 12/Wed Feb 13		7 48	20 41	21 59	5 56	7 14	5 47	13 45	.....	1 26	52	3 37.8	15 29	7.9
Wed Feb 13/Thu Feb 14		7 52	20 40	21 58	5 57	7 15	5 50	13 50	.....	2 10	62	4 32.1	18 46	8.0
Thu Feb 14/Fri Feb 15		7 56	20 39	21 57	5 58	7 16	5 53	13 55	.....	3 00	73	5 30.2	21 08	8.0
Fri Feb 15/Sat Feb 16		8 00	20 38	21 56	5 59	7 17	5 56	14 00	.....	3 56	82	6 31.8	22 18	8.1
Sat Feb 16/Sun Feb 17		8 04	20 37	21 55	6 00	7 18	5 58	14 05	18 03	5 00	90	7 35.8	22 00	8.1
Sun Feb 17/Mon Feb 18		8 08	20 36	21 54	6 01	7 18	6 01	14 10	19 02	6 08	96	8 40.4	20 10	8.1
Mon Feb 18/Tue Feb 19		8 12	20 35	21 52	6 02	7 19	6 04	14 15	19 55	.....	99	9 44.0	16 54	8.2
Tue Feb 19/Wed Feb 20		8 16	20 34	21 51	6 03	7 20	6 07	14 20	20 43	.....	100	10 45.3	12 30	8.2
Wed Feb 20/Thu Feb 21		8 20	20 33	21 50	6 04	7 21	6 09	14 25	21 27	.....	96	11 43.8	7 21	8.2
Thu Feb 21/Fri Feb 22		8 24	20 32	21 49	6 05	7 22	6 12	14 30	22 07	.....	91	12 39.8	1 55	8.3
Fri Feb 22/Sat Feb 23		8 28	20 31	21 48	6 06	7 22	6 15	14 35	22 46	.....	83	13 33.8	- 3 25	8.3
Sat Feb 23/Sun Feb 24		8 32	20 30	21 46	6 07	7 23	6 18	14 40	23 23	.....	73	14 26.6	- 8 21	8.3
Sun Feb 24/Mon Feb 25		8 36	20 29	21 45	6 08	7 24	6 20	14 44	0 02	.....	63	15 18.7	-12 40	8.4
Mon Feb 25/Tue Feb 26		8 39	20 28	21 44	6 09	7 25	6 23	14 49	0 42	.....	53	16 10.5	-16 10	8.4
Tue Feb 26/Wed Feb 27		8 43	20 27	21 43	6 10	7 25	6 26	14 54	1 24	.....	43	17 02.4	-18 45	8.5
Wed Feb 27/Thu Feb 28		8 47	20 26	21 41	6 11	7 26	6 28	14 59	2 10	.....	33	17 54.1	-20 22	8.5
Thu Feb 28/Fri Mar 01		8 51	20 25	21 40	6 12	7 27	6 31	15 04	2 58	.....	25	18 45.5	-20 58	8.5

Calendar for Cerro Tololo, west longitude (h.m.s) = 4 43 16, latitude (d.m) = -30 09.9
 Rise/set times in Chilean time (4 hr W), for 2215 m above surroundings, DAYLIGHT time used, * shows clock reset.
 Moon info is for local midnight, even if moon is down. Program: John Thorstensen, Dartmouth College.

***** 2019 MARCH *****

Date (eve/morn)	LMST midn	----- Sun: -----				LST twilight:		----- Moon: -----				Twilight	
		set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec	hours
Fri Mar 01/Sat Mar 02	8 55	20 24	21 39	6 13	7 28	6 34	15 09	3 48	17 27	17	19 36.3	-20 36	8.6
Sat Mar 02/Sun Mar 03	8 59	20 23	21 38	6 13	7 28	6 36	15 14	4 40	18 12	11	20 26.0	-19 17	8.6
Sun Mar 03/Mon Mar 04	9 03	20 22	21 36	6 14	7 29	6 39	15 18	5 33	18 54	6	21 14.5	-17 08	8.6
Mon Mar 04/Tue Mar 05	9 07	20 20	21 35	6 15	7 30	6 42	15 23	6 27	19 31	2	22 01.6	-14 16	8.7
Tue Mar 05/Wed Mar 06	9 11	20 19	21 34	6 16	7 30	6 44	15 28	.....	20 06	0	22 47.6	-10 46	8.7
Wed Mar 06/Thu Mar 07	9 15	20 18	21 32	6 17	7 31	6 47	15 33	.....	20 39	0	23 32.7	- 6 49	8.7
Thu Mar 07/Fri Mar 08	9 19	20 17	21 31	6 18	7 32	6 50	15 37	.....	21 11	2	0 17.4	- 2 33	8.8
Fri Mar 08/Sat Mar 09	9 23	20 16	21 30	6 18	7 32	6 52	15 42	.....	21 42	6	1 02.2	1 54	8.8
Sat Mar 09/Sun Mar 10*	9 27	20 15	21 29	5 19	6 33	6 55	15 47	.....	22 14	11	1 47.8	6 22	8.8
Sun Mar 10/Mon Mar 11	10 31	19 13	20 27	5 20	6 34	6 58	15 52	.....	21 48	18	2 37.2	10 49	8.9
Mon Mar 11/Tue Mar 12	10 35	19 12	20 26	5 21	6 34	7 00	15 56	.....	22 25	26	3 26.5	14 44	8.9
Tue Mar 12/Wed Mar 13	10 39	19 11	20 25	5 21	6 35	7 03	16 01	.....	23 06	36	4 18.5	18 05	8.9
Wed Mar 13/Thu Mar 14	10 43	19 10	20 23	5 22	6 36	7 05	16 06	.....	23 52	46	5 13.6	20 38	9.0
Thu Mar 14/Fri Mar 15	10 47	19 09	20 22	5 23	6 36	7 08	16 11	.....	0 44	57	6 11.9	22 06	9.0
Fri Mar 15/Sat Mar 16	10 51	19 08	20 21	5 24	6 37	7 11	16 15	.....	1 43	68	7 12.6	22 17	9.0
Sat Mar 16/Sun Mar 17	10 55	19 06	20 19	5 24	6 38	7 13	16 20	.....	2 47	79	8 14.6	21 04	9.1
Sun Mar 17/Mon Mar 18	10 58	19 05	20 18	5 25	6 38	7 16	16 25	.....	3 54	88	9 16.7	18 25	9.1
Mon Mar 18/Tue Mar 19	11 02	19 04	20 17	5 26	6 39	7 19	16 29	.....	5 03	94	10 17.7	14 30	9.1
Tue Mar 19/Wed Mar 20	11 06	19 03	20 16	5 27	6 40	7 21	16 34	.....	6 12	99	11 16.9	9 38	9.2
Wed Mar 20/Thu Mar 21	11 10	19 01	20 14	5 27	6 40	7 24	16 38	.....	18 57	100	12 14.2	4 12	9.2
Thu Mar 21/Fri Mar 22	11 14	19 00	20 13	5 28	6 41	7 27	16 43	.....	19 37	98	13 10.1	- 1 22	9.2
Fri Mar 22/Sat Mar 23	11 18	18 59	20 12	5 29	6 41	7 29	16 48	.....	20 16	93	14 05.0	- 6 43	9.3
Sat Mar 23/Sun Mar 24	11 22	18 58	20 11	5 29	6 42	7 32	16 52	.....	20 55	87	14 59.3	-11 30	9.3
Sun Mar 24/Mon Mar 25	11 26	18 57	20 09	5 30	6 43	7 35	16 57	.....	21 35	78	15 53.4	-15 28	9.3
Mon Mar 25/Tue Mar 26	11 30	18 55	20 08	5 31	6 43	7 37	17 02	.....	22 18	69	16 47.3	-18 29	9.4
Tue Mar 26/Wed Mar 27	11 34	18 54	20 07	5 31	6 44	7 40	17 06	.....	23 03	59	17 41.0	-20 26	9.4
Wed Mar 27/Thu Mar 28	11 38	18 53	20 06	5 32	6 44	7 43	17 11	.....	23 51	49	18 34.0	-21 18	9.4
Thu Mar 28/Fri Mar 29	11 42	18 52	20 04	5 32	6 45	7 45	17 15	.....	0 42	40	19 26.0	-21 07	9.5
Fri Mar 29/Sat Mar 30	11 46	18 51	20 03	5 33	6 46	7 48	17 20	.....	1 34	31	20 16.6	-19 57	9.5
Sat Mar 30/Sun Mar 31	11 50	18 49	20 02	5 34	6 46	7 51	17 24	.....	2 27	22	21 05.6	-17 55	9.5
Sun Mar 31/Mon Apr 01	11 54	18 48	20 01	5 34	6 47	7 54	17 29	.....	3 20	15	21 53.2	-15 08	9.6

***** 2019 APRIL *****

Date (eve/morn)	LMST midn	----- Sun: -----				LST twilight:		----- Moon: -----				Twilight	
		set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec	hours
Mon Apr 01/Tue Apr 02	11 58	18 47	19 59	5 35	6 47	7 56	17 33	4 14	17 07	9	22 39.3	-11 43	9.6
Tue Apr 02/Wed Apr 03	12 02	18 46	19 58	5 36	6 48	7 59	17 38	5 07	17 40	5	23 24.6	- 7 48	9.6
Wed Apr 03/Thu Apr 04	12 06	18 45	19 57	5 36	6 49	8 02	17 43	6 01	18 12	1	0 09.3	- 3 31	9.7
Thu Apr 04/Fri Apr 05	12 09	18 43	19 56	5 37	6 49	8 05	17 47	6 55	18 44	0	0 54.1	0 58	9.7
Fri Apr 05/Sat Apr 06	12 13	18 42	19 55	5 37	6 50	8 07	17 52	.....	19 16	1	1 39.7	5 30	9.7
Sat Apr 06/Sun Apr 07	12 17	18 41	19 54	5 38	6 50	8 10	17 56	.....	19 49	3	2 26.6	9 54	9.7
Sun Apr 07/Mon Apr 08	12 21	18 40	19 52	5 38	6 51	8 13	18 01	.....	20 25	8	3 15.5	13 59	9.8
Mon Apr 08/Tue Apr 09	12 25	18 39	19 51	5 39	6 52	8 16	18 05	.....	21 05	14	4 06.8	17 30	9.8
Tue Apr 09/Wed Apr 10	12 29	18 38	19 50	5 40	6 52	8 19	18 10	.....	21 49	22	5 00.9	20 14	9.8
Wed Apr 10/Thu Apr 11	12 33	18 36	19 49	5 40	6 53	8 22	18 14	.....	22 39	32	5 57.6	21 58	9.9
Thu Apr 11/Fri Apr 12	12 37	18 35	19 48	5 41	6 53	8 24	18 19	.....	23 35	42	6 56.4	22 29	9.9
Fri Apr 12/Sat Apr 13	12 41	18 34	19 47	5 41	6 54	8 27	18 23	.....	0 35	53	7 56.4	21 40	9.9
Sat Apr 13/Sun Apr 14	12 45	18 33	19 46	5 42	6 55	8 30	18 28	.....	1 40	65	8 56.3	19 30	9.9
Sun Apr 14/Mon Apr 15	12 49	18 32	19 45	5 42	6 55	8 33	18 32	.....	2 46	75	9 55.5	16 05	10.0
Mon Apr 15/Tue Apr 16	12 53	18 31	19 44	5 43	6 56	8 36	18 37	.....	3 53	85	10 53.2	11 40	10.0
Tue Apr 16/Wed Apr 17	12 57	18 30	19 43	5 44	6 56	8 39	18 41	.....	4 59	92	11 49.6	6 31	10.0
Wed Apr 17/Thu Apr 18	13 01	18 29	19 42	5 44	6 57	8 42	18 46	.....	6 06	97	12 44.9	1 00	10.0
Thu Apr 18/Fri Apr 19	13 05	18 28	19 41	5 45	6 58	8 45	18 50	.....	7 11	100	13 39.7	- 4 31	10.1
Fri Apr 19/Sat Apr 20	13 09	18 27	19 40	5 45	6 58	8 48	18 55	.....	18 46	99	14 34.4	- 9 40	10.1
Sat Apr 20/Sun Apr 21	13 13	18 26	19 39	5 46	6 59	8 51	18 59	.....	19 26	96	15 29.4	-14 08	10.1
Sun Apr 21/Mon Apr 22	13 16	18 25	19 38	5 46	7 00	8 54	19 04	.....	20 09	91	16 24.7	-17 42	10.1
Mon Apr 22/Tue Apr 23	13 20	18 24	19 37	5 47	7 00	8 57	19 08	.....	20 54	83	17 20.1	-20 10	10.2
Tue Apr 23/Wed Apr 24	13 24	18 23	19 36	5 47	7 01	9 00	19 13	.....	21 42	75	18 15.0	-21 30	10.2
Wed Apr 24/Thu Apr 25	13 28	18 22	19 35	5 48	7 01	9 03	19 17	.....	22 32	66	19 08.9	-21 41	10.2
Thu Apr 25/Fri Apr 26	13 32	18 21	19 34	5 48	7 02	9 06	19 22	.....	23 25	57	20 01.2	-20 49	10.2
Fri Apr 26/Sat Apr 27	13 36	18 20	19 33	5 49	7 03	9 09	19 26	.....	0 18	47	20 51.6	-18 59	10.3
Sat Apr 27/Sun Apr 28	13 40	18 19	19 33	5 49	7 03	9 12	19 31	.....	1 12	38	21 40.0	-16 22	10.3
Sun Apr 28/Mon Apr 29	13 44	18 18	19 32	5 50	7 04	9 15	19 35	.....	2 05	29	22 26.8	-13 04	10.3
Mon Apr 29/Tue Apr 30	13 48	18 17	19 31	5 50	7 04	9 18	19 39	.....	2 59	21	23 12.3	- 9 14	10.3
Tue Apr 30/Wed May 01	13 52	18 16	19 30	5 51	7 05	9 21	19 44	.....	3 52	14	23 57.0	- 5 00	10.3

Calendar for Cerro Tololo, west longitude (h.m.s) = 4 43 16, latitude (d.m) = -30 09.9
 Rise/set times in Chilean time (4 hr W), for 2215 m above surroundings, DAYLIGHT time used, * shows clock reset.
 Moon info is for local midnight, even if moon is down. Program: John Thorstensen, Dartmouth College.

***** 2019 MAY *****

Date (eve/morn)	LMST midn	----- Sun: -----				LST twilight:		----- Moon: -----				Twi-Twi hours	
		set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec	
Wed May 01/Thu May 02	13 56	18 15	19 29	5 52	7 06	9 25	19 48	4 46	16 44	8	0 41.8	- 0 31	10.4
Thu May 02/Fri May 03	14 00	18 14	19 29	5 52	7 06	9 28	19 53	5 42	17 16	3	1 27.2	4 05	10.4
Fri May 03/Sat May 04	14 04	18 14	19 28	5 53	7 07	9 31	19 57	6 38	17 49	1	2 13.9	8 37	10.4
Sat May 04/Sun May 05	14 08	18 13	19 27	5 53	7 08	9 34	20 02	7 37	18 24	0	3 02.7	12 54	10.4
Sun May 05/Mon May 06	14 12	18 12	19 26	5 54	7 08	9 37	20 06	.....	19 03	2	3 54.0	16 40	10.5
Mon May 06/Tue May 07	14 16	18 11	19 26	5 54	7 09	9 41	20 11	.....	19 46	5	4 48.0	19 42	10.5
Tue May 07/Wed May 08	14 20	18 10	19 25	5 55	7 09	9 44	20 15	.....	20 35	11	5 44.7	21 44	10.5
Wed May 08/Thu May 09	14 23	18 10	19 25	5 55	7 10	9 47	20 20	.....	21 30	19	6 43.4	22 33	10.5
Thu May 09/Fri May 10	14 27	18 09	19 24	5 56	7 11	9 51	20 24	.....	22 29	28	7 43.1	22 03	10.5
Fri May 10/Sat May 11	14 31	18 08	19 23	5 56	7 11	9 54	20 29	.....	23 32	39	8 42.4	20 13	10.5
Sat May 11/Sun May 12	14 35	18 08	19 23	5 57	7 12	9 57	20 33	.....	0 37	51	9 40.6	17 09	10.6
Sun May 12/Mon May 13	14 39	18 07	19 22	5 57	7 13	10 01	20 38	.....	1 42	62	10 37.2	13 03	10.6
Mon May 13/Tue May 14	14 43	18 06	19 22	5 58	7 13	10 04	20 42	.....	2 47	73	11 32.1	8 13	10.6
Tue May 14/Wed May 15	14 47	18 06	19 21	5 58	7 14	10 08	20 46	.....	3 51	82	12 25.9	2 54	10.6
Wed May 15/Thu May 16	14 51	18 05	19 21	5 59	7 14	10 11	20 51	16 04	4 55	90	13 19.2	- 2 32	10.6
Thu May 16/Fri May 17	14 55	18 05	19 20	5 59	7 15	10 14	20 55	16 41	5 59	96	14 12.6	- 7 48	10.7
Fri May 17/Sat May 18	14 59	18 04	19 20	6 00	7 16	10 18	21 00	17 20	7 02	99	15 06.6	-12 33	10.7
Sat May 18/Sun May 19	15 03	18 04	19 19	6 00	7 16	10 21	21 04	18 00	8 05	100	16 01.6	-16 33	10.7
Sun May 19/Mon May 20	15 07	18 03	19 19	6 01	7 17	10 25	21 09	18 44	.....	98	16 57.3	-19 33	10.7
Mon May 20/Tue May 21	15 11	18 03	19 19	6 01	7 17	10 29	21 13	19 31	.....	94	17 53.3	-21 24	10.7
Tue May 21/Wed May 22	15 15	18 02	19 18	6 02	7 18	10 32	21 18	20 21	.....	88	18 48.7	-22 04	10.7
Wed May 22/Thu May 23	15 19	18 02	19 18	6 02	7 19	10 36	21 22	21 14	.....	81	19 42.7	-21 34	10.7
Thu May 23/Fri May 24	15 23	18 01	19 18	6 03	7 19	10 39	21 26	22 08	.....	73	20 34.8	-20 03	10.8
Fri May 24/Sat May 25	15 27	18 01	19 17	6 03	7 20	10 43	21 31	23 02	.....	64	21 24.6	-17 39	10.8
Sat May 25/Sun May 26	15 31	18 00	19 17	6 04	7 20	10 47	21 35	23 56	.....	54	22 12.4	-14 31	10.8
Sun May 26/Mon May 27	15 34	18 00	19 17	6 04	7 21	10 50	21 40	0 49	.....	45	22 58.5	-10 48	10.8
Mon May 27/Tue May 28	15 38	18 00	19 16	6 05	7 21	10 54	21 44	1 42	.....	35	23 43.4	- 6 40	10.8
Tue May 28/Wed May 29	15 42	17 59	19 16	6 05	7 22	10 58	21 48	2 36	.....	27	0 27.9	- 2 14	10.8
Wed May 29/Thu May 30	15 46	17 59	19 16	6 06	7 23	11 02	21 53	3 30	.....	19	1 12.8	- 2 22	10.8
Thu May 30/Fri May 31	15 50	17 59	19 16	6 06	7 23	11 05	21 57	4 26	.....	11	1 58.9	6 58	10.8
Fri May 31/Sat Jun 01	15 54	17 59	19 16	6 06	7 24	11 09	22 02	5 24	16 21	6	2 47.0	11 24	10.8

***** 2019 JUNE *****

Date (eve/morn)	LMST midn	----- Sun: -----				LST twilight:		----- Moon: -----				Twi-Twi hours	
		set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec	
Sat Jun 01/Sun Jun 02	15 58	17 58	19 16	6 07	7 24	11 13	22 06	6 24	16 58	2	3 37.7	15 25	10.9
Sun Jun 02/Mon Jun 03	16 02	17 58	19 15	6 07	7 25	11 17	22 10	7 27	17 40	0	4 31.4	18 47	10.9
Mon Jun 03/Tue Jun 04	16 06	17 58	19 15	6 08	7 25	11 21	22 15	.....	18 27	1	5 28.2	21 13	10.9
Tue Jun 04/Wed Jun 05	16 10	17 58	19 15	6 08	7 26	11 24	22 19	.....	19 21	4	6 27.5	22 27	10.9
Wed Jun 05/Thu Jun 06	16 14	17 58	19 15	6 09	7 26	11 28	22 23	.....	20 20	9	7 28.1	22 19	10.9
Thu Jun 06/Fri Jun 07	16 18	17 58	19 15	6 09	7 26	11 32	22 28	.....	21 24	17	8 28.5	20 48	10.9
Fri Jun 07/Sat Jun 08	16 22	17 58	19 15	6 09	7 27	11 36	22 32	.....	22 30	26	9 27.6	18 00	10.9
Sat Jun 08/Sun Jun 09	16 26	17 58	19 15	6 10	7 27	11 40	22 36	.....	23 35	37	10 24.6	14 07	10.9
Sun Jun 09/Mon Jun 10	16 30	17 58	19 15	6 10	7 28	11 44	22 41	.....	0 40	48	11 19.4	9 27	10.9
Mon Jun 10/Tue Jun 11	16 34	17 58	19 15	6 10	7 28	11 48	22 45	.....	1 44	60	12 12.5	4 18	10.9
Tue Jun 11/Wed Jun 12	16 38	17 58	19 15	6 11	7 29	11 52	22 49	.....	2 47	71	13 04.6	- 1 02	10.9
Wed Jun 12/Thu Jun 13	16 41	17 58	19 15	6 11	7 29	11 56	22 54	.....	3 49	80	13 56.6	- 6 16	10.9
Thu Jun 13/Fri Jun 14	16 45	17 58	19 15	6 11	7 29	12 00	22 58	.....	4 51	88	14 49.0	-11 07	10.9
Fri Jun 14/Sat Jun 15	16 49	17 58	19 16	6 12	7 30	12 04	23 02	15 57	5 53	94	15 42.5	-15 20	10.9
Sat Jun 15/Sun Jun 16	16 53	17 58	19 16	6 12	7 30	12 08	23 06	16 38	6 53	98	16 37.1	-18 41	10.9
Sun Jun 16/Mon Jun 17	16 57	17 58	19 16	6 12	7 30	12 12	23 11	17 23	7 52	100	17 32.6	-20 59	10.9
Mon Jun 17/Tue Jun 18	17 01	17 58	19 16	6 13	7 31	12 16	23 15	18 12	.....	99	18 28.2	-22 06	10.9
Tue Jun 18/Wed Jun 19	17 05	17 58	19 16	6 13	7 31	12 21	23 19	19 03	.....	96	19 23.2	-22 03	10.9
Wed Jun 19/Thu Jun 20	17 09	17 58	19 16	6 13	7 31	12 25	23 23	19 57	.....	92	20 16.6	-20 53	10.9
Thu Jun 20/Fri Jun 21	17 13	17 59	19 17	6 13	7 31	12 29	23 27	20 52	.....	86	21 07.8	-18 46	10.9
Fri Jun 21/Sat Jun 22	17 17	17 59	19 17	6 14	7 31	12 33	23 32	21 46	.....	78	21 56.8	-15 50	10.9
Sat Jun 22/Sun Jun 23	17 21	17 59	19 17	6 14	7 32	12 37	23 36	22 40	.....	70	22 43.8	-12 16	10.9
Sun Jun 23/Mon Jun 24	17 25	17 59	19 17	6 14	7 32	12 41	23 40	23 33	.....	61	23 29.2	- 8 15	10.9
Mon Jun 24/Tue Jun 25	17 29	18 00	19 17	6 14	7 32	12 45	23 44	0 26	.....	52	0 13.7	- 3 53	10.9
Tue Jun 25/Wed Jun 26	17 33	18 00	19 18	6 14	7 32	12 50	23 48	1 19	.....	42	0 58.1	0 39	10.9
Wed Jun 26/Thu Jun 27	17 37	18 00	19 18	6 14	7 32	12 54	23 52	2 13	.....	32	1 43.2	5 15	10.9
Thu Jun 27/Fri Jun 28	17 41	18 00	19 18	6 15	7 32	12 58	23 56	3 10	.....	24	2 30.0	9 44	10.9
Fri Jun 28/Sat Jun 29	17 45	18 01	19 19	6 15	7 32	13 02	0 00	4 08	.....	15	3 19.3	13 54	10.9
Sat Jun 29/Sun Jun 30	17 49	18 01	19 19	6 15	7 32	13 07	0 04	5 10	.....	9	4 11.7	17 33	10.9
Sun Jun 30/Mon Jul 01	17 52	18 02	19 19	6 15	7 32	13 11	0 08	6 13	16 17	3	5 07.5	20 23	10.9

Calendar for Cerro Tololo, west longitude (h.m.s) = 4 43 16, latitude (d.m) = -30 09.9
 Rise/set times in Chilean time (4 hr W), for 2215 m above surroundings, DAYLIGHT time used, * shows clock reset.
 Moon info is for local midnight, even if moon is down. Program: John Thorstensen, Dartmouth College.

***** 2019 JULY *****

Date (eve/morn)		LMST	----- Sun: -----				LST twilight:		----- Moon: -----				Twi-Twi	
		midn	set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec	hours
Mon Jul 01/Tue Jul 02		17 56	18 02	19 20	6 15	7 32	13 15	0 12	7 16	17 08	1	6 06.5	22 06	10.9
Tue Jul 02/Wed Jul 03		18 00	18 02	19 20	6 15	7 32	13 19	0 16	.....	18 06	0	7 07.7	22 29	10.9
Wed Jul 03/Thu Jul 04		18 04	18 03	19 20	6 15	7 32	13 24	0 20	.....	19 09	2	8 09.6	21 24	10.9
Thu Jul 04/Fri Jul 05		18 08	18 03	19 21	6 15	7 32	13 28	0 24	.....	20 16	7	9 10.6	18 55	10.9
Fri Jul 05/Sat Jul 06		18 12	18 04	19 21	6 15	7 32	13 32	0 28	.....	21 24	15	10 09.5	15 15	10.9
Sat Jul 06/Sun Jul 07		18 16	18 04	19 21	6 15	7 32	13 37	0 32	.....	22 31	24	11 05.8	10 41	10.9
Sun Jul 07/Mon Jul 08		18 20	18 04	19 22	6 15	7 32	13 41	0 36	.....	23 37	35	12 00.0	5 34	10.9
Mon Jul 08/Tue Jul 09		18 24	18 05	19 22	6 15	7 32	13 45	0 40	.....	0 40	46	12 52.4	0 14	10.9
Tue Jul 09/Wed Jul 10		18 28	18 05	19 23	6 14	7 32	13 50	0 43	.....	1 43	57	13 44.1	- 5 01	10.9
Wed Jul 10/Thu Jul 11		18 32	18 06	19 23	6 14	7 31	13 54	0 47	.....	2 44	68	14 35.7	- 9 57	10.9
Thu Jul 11/Fri Jul 12		18 36	18 06	19 23	6 14	7 31	13 58	0 51	.....	3 45	78	15 28.0	-14 17	10.8
Fri Jul 12/Sat Jul 13		18 40	18 07	19 24	6 14	7 31	14 03	0 55	.....	4 46	86	16 21.3	-17 51	10.8
Sat Jul 13/Sun Jul 14		18 44	18 07	19 24	6 14	7 31	14 07	0 59	.....	5 44	92	17 15.7	-20 25	10.8
Sun Jul 14/Mon Jul 15		18 48	18 08	19 25	6 14	7 30	14 12	1 02	16 06	6 40	97	18 10.6	-21 54	10.8
Mon Jul 15/Tue Jul 16		18 52	18 08	19 25	6 13	7 30	14 16	1 06	16 56	7 31	99	19 05.4	-22 13	10.8
Tue Jul 16/Wed Jul 17		18 56	18 09	19 26	6 13	7 30	14 20	1 10	17 49	.....	100	19 59.2	-21 25	10.8
Wed Jul 17/Thu Jul 18		18 59	18 09	19 26	6 13	7 29	14 25	1 13	18 43	.....	98	20 51.2	-19 35	10.8
Thu Jul 18/Fri Jul 19		19 03	18 10	19 26	6 12	7 29	14 29	1 17	19 38	.....	95	21 41.2	-16 53	10.8
Fri Jul 19/Sat Jul 20		19 07	18 10	19 27	6 12	7 28	14 33	1 21	20 32	.....	90	22 29.1	-13 29	10.8
Sat Jul 20/Sun Jul 21		19 11	18 11	19 27	6 12	7 28	14 38	1 24	21 25	.....	83	23 15.1	- 9 34	10.7
Sun Jul 21/Mon Jul 22		19 15	18 12	19 28	6 11	7 28	14 42	1 28	22 18	.....	76	23 59.9	- 5 17	10.7
Mon Jul 22/Tue Jul 23		19 19	18 12	19 28	6 11	7 27	14 47	1 31	23 11	.....	67	0 44.1	- 0 48	10.7
Tue Jul 23/Wed Jul 24		19 23	18 13	19 29	6 11	7 27	14 51	1 35	0 04	.....	58	1 28.6	3 46	10.7
Wed Jul 24/Thu Jul 25		19 27	18 13	19 29	6 10	7 26	14 56	1 38	0 58	.....	48	2 14.2	8 15	10.7
Thu Jul 25/Fri Jul 26		19 31	18 14	19 30	6 10	7 25	15 00	1 42	1 54	.....	38	3 01.8	12 30	10.7
Fri Jul 26/Sat Jul 27		19 35	18 14	19 30	6 09	7 25	15 04	1 45	2 53	.....	29	3 52.1	16 18	10.7
Sat Jul 27/Sun Jul 28		19 39	18 15	19 31	6 09	7 24	15 09	1 49	3 54	.....	19	4 45.8	19 25	10.6
Sun Jul 28/Mon Jul 29		19 43	18 16	19 31	6 08	7 24	15 13	1 52	4 56	.....	12	5 43.0	21 35	10.6
Mon Jul 29/Tue Jul 30		19 47	18 16	19 32	6 08	7 23	15 18	1 56	5 59	.....	5	6 43.3	22 30	10.6
Tue Jul 30/Wed Jul 31		19 51	18 17	19 32	6 07	7 22	15 22	1 59	6 58	16 49	1	7 45.3	22 00	10.6
Wed Jul 31/Thu Aug 01		19 55	18 17	19 32	6 07	7 22	15 26	2 02	7 52	17 55	0	8 47.5	20 01	10.6

***** 2019 AUGUST *****

Date (eve/morn)		LMST	----- Sun: -----				LST twilight:		----- Moon: -----				Twi-Twi	
		midn	set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec	hours
Thu Aug 01/Fri Aug 02		19 59	18 18	19 33	6 06	7 21	15 31	2 06	.....	19 05	2	9 48.4	16 41	10.6
Fri Aug 02/Sat Aug 03		20 03	18 18	19 33	6 05	7 20	15 35	2 09	.....	20 15	6	10 47.1	12 17	10.5
Sat Aug 03/Sun Aug 04		20 06	18 19	19 34	6 05	7 19	15 40	2 12	.....	21 23	13	11 43.3	7 10	10.5
Sun Aug 04/Mon Aug 05		20 10	18 20	19 34	6 04	7 19	15 44	2 15	.....	22 30	22	12 37.5	1 44	10.5
Mon Aug 05/Tue Aug 06		20 14	18 20	19 35	6 03	7 18	15 48	2 19	.....	23 34	32	13 30.4	- 3 41	10.5
Tue Aug 06/Wed Aug 07		20 18	18 21	19 35	6 03	7 17	15 53	2 22	.....	0 37	43	14 22.6	- 8 47	10.5
Wed Aug 07/Thu Aug 08		20 22	18 21	19 36	6 02	7 16	15 57	2 25	.....	1 39	54	15 15.0	-13 19	10.4
Thu Aug 08/Fri Aug 09		20 26	18 22	19 36	6 01	7 15	16 02	2 28	.....	2 40	65	16 08.0	-17 05	10.4
Fri Aug 09/Sat Aug 10		20 30	18 22	19 37	6 00	7 15	16 06	2 32	.....	3 39	74	17 01.7	-19 53	10.4
Sat Aug 10/Sun Aug 11		20 34	18 23	19 37	6 00	7 14	16 11	2 35	.....	4 35	83	17 55.9	-21 38	10.4
Sun Aug 11/Mon Aug 12		20 38	18 24	19 38	5 59	7 13	16 15	2 38	.....	5 28	90	18 50.2	-22 15	10.4
Mon Aug 12/Tue Aug 13		20 42	18 24	19 38	5 58	7 12	16 19	2 41	.....	6 16	95	19 43.8	-21 44	10.3
Tue Aug 13/Wed Aug 14		20 46	18 25	19 39	5 57	7 11	16 24	2 44	16 37	6 59	98	20 36.1	-20 11	10.3
Wed Aug 14/Thu Aug 15		20 50	18 25	19 39	5 56	7 10	16 28	2 47	17 32	7 38	100	21 26.5	-17 43	10.3
Thu Aug 15/Fri Aug 16		20 54	18 26	19 40	5 55	7 09	16 33	2 50	18 26	.....	99	22 14.9	-14 29	10.3
Fri Aug 16/Sat Aug 17		20 58	18 26	19 40	5 55	7 08	16 37	2 53	19 19	.....	97	23 01.6	-10 40	10.2
Sat Aug 17/Sun Aug 18		21 02	18 27	19 41	5 54	7 07	16 42	2 56	20 12	.....	93	23 46.9	- 6 26	10.2
Sun Aug 18/Mon Aug 19		21 06	18 28	19 41	5 53	7 06	16 46	2 59	21 05	.....	88	0 31.3	- 1 57	10.2
Mon Aug 19/Tue Aug 20		21 10	18 28	19 41	5 52	7 05	16 50	3 02	21 57	.....	81	1 15.7	2 37	10.2
Tue Aug 20/Wed Aug 21		21 14	18 29	19 42	5 51	7 04	16 55	3 05	22 50	.....	73	2 00.6	7 08	10.1
Wed Aug 21/Thu Aug 22		21 17	18 29	19 42	5 50	7 03	16 59	3 08	23 45	.....	64	2 47.0	11 26	10.1
Thu Aug 22/Fri Aug 23		21 21	18 30	19 43	5 49	7 02	17 04	3 11	0 41	.....	54	3 35.7	15 21	10.1
Fri Aug 23/Sat Aug 24		21 25	18 30	19 43	5 48	7 01	17 08	3 14	1 40	.....	44	4 27.2	18 39	10.1
Sat Aug 24/Sun Aug 25		21 29	18 31	19 44	5 47	7 00	17 12	3 17	2 40	.....	33	5 22.0	21 07	10.0
Sun Aug 25/Mon Aug 26		21 33	18 31	19 44	5 46	6 59	17 17	3 20	3 41	.....	24	6 19.9	22 29	10.0
Mon Aug 26/Tue Aug 27		21 37	18 32	19 45	5 45	6 58	17 21	3 23	4 40	.....	15	7 20.2	22 32	10.0
Tue Aug 27/Wed Aug 28		21 41	18 32	19 45	5 44	6 56	17 26	3 26	5 36	.....	8	8 21.8	21 08	10.0
Wed Aug 28/Thu Aug 29		21 45	18 33	19 46	5 43	6 55	17 30	3 29	6 28	16 40	3	9 23.1	18 19	9.9
Thu Aug 29/Fri Aug 30		21 49	18 34	19 46	5 41	6 54	17 35	3 31	7 15	17 50	0	10 23.1	14 16	9.9
Fri Aug 30/Sat Aug 31		21 53	18 34	19 47	5 40	6 53	17 39	3 34	.....	19 01	1	11 21.1	9 18	9.9
Sat Aug 31/Sun Sep 01		21 57	18 35	19 47	5 39	6 52	17 44	3 37	.....	20 10	5	12 17.2	3 48	9.9

Calendar for Cerro Tololo, west longitude (h.m.s) = 4 43 16, latitude (d.m) = -30 09.9
 Rise/set times in Chilean time (4 hr W), for 2215 m above surroundings, DAYLIGHT time used, * shows clock reset.
 Moon info is for local midnight, even if moon is down. Program: John Thorstensen, Dartmouth College.

***** 2019 SEPTEMBER *****

Date (eve/morn)	LMST midn	----- Sun: -----				LST twilight:		----- Moon: -----					Twi-Twi hours
		set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec	
Sun Sep 01/Mon Sep 02	22 01	18 35	19 48	5 38	6 51	17 48	3 40	.....	21 18	11	13 11.8	- 1 50	9.8
Mon Sep 02/Tue Sep 03	22 05	18 36	19 48	5 37	6 49	17 52	3 43	.....	22 24	19	14 05.6	- 7 15	9.8
Tue Sep 03/Wed Sep 04	22 09	18 36	19 49	5 36	6 48	17 57	3 45	.....	23 29	29	14 59.2	-12 07	9.8
Wed Sep 04/Thu Sep 05	22 13	18 37	19 49	5 35	6 47	18 01	3 48	.....	0 32	39	15 53.0	-16 12	9.8
Thu Sep 05/Fri Sep 06	22 17	18 37	19 50	5 33	6 46	18 06	3 51	.....	1 33	50	16 47.3	-19 19	9.7
Fri Sep 06/Sat Sep 07	22 21	18 38	19 50	5 32	6 45	18 10	3 54	.....	2 31	60	17 41.8	-21 21	9.7
Sat Sep 07/Sun Sep 08	22 24	18 38	19 51	5 31	6 43	18 15	3 56	.....	3 25	70	18 36.2	-22 15	9.7
Sun Sep 08/Mon Sep 09	22 28	18 39	19 51	5 30	6 42	18 19	3 59	.....	4 14	78	19 29.8	-22 01	9.6
Mon Sep 09/Tue Sep 10	22 32	18 39	19 52	5 29	6 41	18 24	4 02	.....	4 59	86	20 22.1	-20 42	9.6
Tue Sep 10/Wed Sep 11	22 36	18 40	19 52	5 27	6 40	18 28	4 05	.....	5 39	92	21 12.7	-18 27	9.6
Wed Sep 11/Thu Sep 12	22 40	18 40	19 53	5 26	6 39	18 33	4 07	.....	6 15	96	22 01.5	-15 23	9.6
Thu Sep 12/Fri Sep 13	22 44	18 41	19 54	5 25	6 37	18 37	4 10	17 15	6 48	99	22 48.5	-11 41	9.5
Fri Sep 13/Sat Sep 14	22 48	18 42	19 54	5 24	6 36	18 42	4 13	18 08	7 20	100	23 34.2	- 7 30	9.5
Sat Sep 14/Sun Sep 15	22 52	18 42	19 55	5 22	6 35	18 46	4 15	19 01	.....	99	0 18.9	- 3 01	9.5
Sun Sep 15/Mon Sep 16	22 56	18 43	19 55	5 21	6 34	18 51	4 18	19 53	.....	96	1 03.5	1 37	9.4
Mon Sep 16/Tue Sep 17	23 00	18 43	19 56	5 20	6 32	18 55	4 21	20 46	.....	92	1 48.4	6 13	9.4
Tue Sep 17/Wed Sep 18	23 04	18 44	19 56	5 18	6 31	19 00	4 23	21 40	.....	85	2 34.5	10 38	9.4
Wed Sep 18/Thu Sep 19	23 08	18 44	19 57	5 17	6 30	19 04	4 26	22 35	.....	78	3 22.4	14 41	9.3
Thu Sep 19/Fri Sep 20	23 12	18 45	19 58	5 16	6 29	19 09	4 29	23 32	.....	69	4 12.6	18 09	9.3
Fri Sep 20/Sat Sep 21	23 16	18 45	19 58	5 15	6 27	19 13	4 31	0 31	.....	59	5 05.7	20 51	9.3
Sat Sep 21/Sun Sep 22	23 20	18 46	19 59	5 13	6 26	19 18	4 34	1 29	.....	49	6 01.6	22 31	9.2
Sun Sep 22/Mon Sep 23	23 24	18 46	19 59	5 12	6 25	19 22	4 36	2 28	.....	38	6 59.8	23 00	9.2
Mon Sep 23/Tue Sep 24	23 28	18 47	20 00	5 11	6 24	19 27	4 39	3 23	.....	28	7 59.4	22 07	9.2
Tue Sep 24/Wed Sep 25	23 32	18 48	20 01	5 09	6 22	19 31	4 42	4 15	.....	18	8 59.4	19 51	9.1
Wed Sep 25/Thu Sep 26	23 35	18 48	20 01	5 08	6 21	19 36	4 44	5 03	.....	10	9 58.8	16 18	9.1
Thu Sep 26/Fri Sep 27	23 39	18 49	20 02	5 07	6 20	19 41	4 47	5 47	.....	4	10 56.8	11 40	9.1
Fri Sep 27/Sat Sep 28	23 43	18 49	20 03	5 05	6 19	19 45	4 49	6 28	17 45	1	11 53.4	6 19	9.0
Sat Sep 28/Sun Sep 29	23 47	18 50	20 03	5 04	6 17	19 50	4 52	7 08	18 54	0	12 48.8	0 36	9.0
Sun Sep 29/Mon Sep 30	23 51	18 50	20 04	5 03	6 16	19 54	4 55	.....	20 03	3	13 43.7	- 5 05	9.0
Mon Sep 30/Tue Oct 01	23 55	18 51	20 05	5 01	6 15	19 59	4 57	.....	21 10	8	14 38.4	-10 21	8.9

***** 2019 OCTOBER *****

Date (eve/morn)	LMST midn	----- Sun: -----				LST twilight:		----- Moon: -----					Twi-Twi hours
		set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec	
Tue Oct 01/Wed Oct 02	23 59	18 52	20 05	5 00	6 14	20 04	5 00	.....	22 17	15	15 33.5	-14 55	8.9
Wed Oct 02/Thu Oct 03	0 03	18 52	20 06	4 59	6 12	20 08	5 02	.....	23 21	24	16 29.0	-18 30	8.9
Thu Oct 03/Fri Oct 04	0 07	18 53	20 07	4 57	6 11	20 13	5 05	.....	0 22	34	17 24.7	-20 58	8.8
Fri Oct 04/Sat Oct 05	0 11	18 53	20 07	4 56	6 10	20 18	5 08	.....	1 19	44	18 20.2	-22 13	8.8
Sat Oct 05/Sun Oct 06	0 15	18 54	20 08	4 55	6 09	20 22	5 10	.....	2 11	54	19 14.7	-22 18	8.8
Sun Oct 06/Mon Oct 07	0 19	18 55	20 09	4 53	6 08	20 27	5 13	.....	2 58	64	20 07.7	-21 16	8.7
Mon Oct 07/Tue Oct 08	0 23	18 55	20 10	4 52	6 06	20 32	5 15	.....	3 39	73	20 58.8	-19 14	8.7
Tue Oct 08/Wed Oct 09	0 27	18 56	20 10	4 51	6 05	20 36	5 18	.....	4 16	81	21 47.9	-16 21	8.7
Wed Oct 09/Thu Oct 10	0 31	18 56	20 11	4 49	6 04	20 41	5 21	.....	4 50	88	22 35.2	-12 47	8.6
Thu Oct 10/Fri Oct 11	0 35	18 57	20 12	4 48	6 03	20 46	5 23	.....	5 22	93	23 21.0	- 8 41	8.6
Fri Oct 11/Sat Oct 12	0 39	18 58	20 13	4 47	6 02	20 51	5 26	.....	5 53	97	0 06.0	- 4 13	8.6
Sat Oct 12/Sun Oct 13*	0 42	18 58	20 14	5 45	7 00	20 55	5 29	17 48	7 23	99	0 50.6	0 27	8.5
Sun Oct 13/Mon Oct 14	23 46	19 59	21 14	5 44	6 59	21 00	5 31	19 41	.....	100	1 34.6	4 58	8.5
Mon Oct 14/Tue Oct 15	23 50	20 00	21 15	5 43	6 58	21 05	5 34	20 35	.....	98	2 20.6	9 33	8.5
Tue Oct 15/Wed Oct 16	23 54	20 00	21 16	5 41	6 57	21 10	5 36	21 31	.....	95	3 08.3	13 48	8.4
Wed Oct 16/Thu Oct 17	23 58	20 01	21 17	5 40	6 56	21 15	5 39	22 28	.....	90	3 58.2	17 31	8.4
Thu Oct 17/Fri Oct 18	0 02	20 02	21 18	5 39	6 55	21 19	5 42	23 26	.....	83	4 50.6	20 29	8.4
Fri Oct 18/Sat Oct 19	0 06	20 02	21 19	5 38	6 54	21 24	5 44	0 24	.....	74	5 45.5	22 29	8.3
Sat Oct 19/Sun Oct 20	0 10	20 03	21 20	5 36	6 53	21 29	5 47	1 22	.....	64	6 42.4	23 19	8.3
Sun Oct 20/Mon Oct 21	0 14	20 04	21 21	5 35	6 52	21 34	5 50	2 17	.....	54	7 40.6	22 52	8.2
Mon Oct 21/Tue Oct 22	0 18	20 05	21 21	5 34	6 51	21 39	5 53	3 09	.....	43	8 39.0	21 05	8.2
Tue Oct 22/Wed Oct 23	0 22	20 05	21 22	5 33	6 50	21 44	5 55	3 56	.....	32	9 36.7	18 03	8.2
Wed Oct 23/Thu Oct 24	0 26	20 06	21 23	5 31	6 49	21 49	5 58	4 40	.....	22	10 33.4	13 54	8.1
Thu Oct 24/Fri Oct 25	0 30	20 07	21 24	5 30	6 48	21 53	6 01	5 21	.....	13	11 28.8	8 55	8.1
Fri Oct 25/Sat Oct 26	0 34	20 08	21 25	5 29	6 47	21 58	6 03	6 00	17 32	6	12 23.4	3 23	8.1
Sat Oct 26/Sun Oct 27	0 38	20 08	21 26	5 28	6 46	22 03	6 06	6 38	18 39	2	13 17.6	- 2 20	8.0
Sun Oct 27/Mon Oct 28	0 41	20 09	21 27	5 27	6 45	22 08	6 09	.....	19 47	0	14 12.1	- 7 53	8.0
Mon Oct 28/Tue Oct 29	0 45	20 10	21 28	5 25	6 44	22 13	6 12	.....	20 54	1	15 07.3	-12 55	8.0
Tue Oct 29/Wed Oct 30	0 49	20 11	21 29	5 24	6 43	22 18	6 15	.....	22 01	5	16 03.5	-17 05	7.9
Wed Oct 30/Thu Oct 31	0 53	20 11	21 30	5 23	6 42	22 23	6 17	.....	23 06	11	17 00.4	-20 10	7.9
Thu Oct 31/Fri Nov 01	0 57	20 12	21 31	5 22	6 41	22 28	6 20	.....	0 07	19	17 57.4	-22 01	7.8

Calendar for Cerro Tololo, west longitude (h.m.s) = 4 43 16, latitude (d.m) = -30 09.9
 Rise/set times in Chilean time (4 hr W), for 2215 m above surroundings, DAYLIGHT time used, * shows clock reset.
 Moon info is for local midnight, even if moon is down. Program: John Thorstensen, Dartmouth College.

***** 2019 NOVEMBER *****

Date (eve/morn)	LMST midn	----- Sun: -----				LST twilight:		----- Moon: -----				Twilight	
		set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec	hours
Fri Nov 01/Sat Nov 02	1 01	20 13	21 32	5 21	6 40	22 33	6 23	.....	1 03	27	18 53.7	-22 36	7.8
Sat Nov 02/Sun Nov 03	1 05	20 14	21 33	5 20	6 40	22 38	6 26	.....	1 53	37	19 48.5	-21 58	7.8
Sun Nov 03/Mon Nov 04	1 09	20 15	21 34	5 19	6 39	22 43	6 29	.....	2 37	46	20 41.1	-20 14	7.7
Mon Nov 04/Tue Nov 05	1 13	20 15	21 36	5 18	6 38	22 48	6 32	.....	3 16	56	21 31.3	-17 36	7.7
Tue Nov 05/Wed Nov 06	1 17	20 16	21 37	5 17	6 37	22 53	6 35	.....	3 52	66	22 19.3	-14 13	7.7
Wed Nov 06/Thu Nov 07	1 21	20 17	21 38	5 16	6 36	22 58	6 38	.....	4 24	74	23 05.5	-10 16	7.6
Thu Nov 07/Fri Nov 08	1 25	20 18	21 39	5 15	6 36	23 03	6 41	.....	4 54	82	23 50.6	- 5 53	7.6
Fri Nov 08/Sat Nov 09	1 29	20 19	21 40	5 14	6 35	23 08	6 43	.....	5 24	89	0 35.2	- 1 14	7.6
Sat Nov 09/Sun Nov 10	1 33	20 20	21 41	5 13	6 34	23 13	6 47	17 34	5 54	94	1 20.0	3 33	7.5
Sun Nov 10/Mon Nov 11	1 37	20 20	21 42	5 12	6 34	23 18	6 50	18 28	6 26	98	2 05.9	8 16	7.5
Mon Nov 11/Tue Nov 12	1 41	20 21	21 43	5 11	6 33	23 23	6 53	19 23	.....	100	2 53.6	12 45	7.5
Tue Nov 12/Wed Nov 13	1 45	20 22	21 44	5 10	6 32	23 28	6 56	20 21	.....	100	3 43.6	16 46	7.4
Wed Nov 13/Thu Nov 14	1 48	20 23	21 45	5 09	6 32	23 34	6 59	21 19	.....	97	4 36.3	20 04	7.4
Thu Nov 14/Fri Nov 15	1 52	20 24	21 47	5 09	6 31	23 39	7 02	22 19	.....	93	5 31.7	22 24	7.4
Fri Nov 15/Sat Nov 16	1 56	20 25	21 48	5 08	6 31	23 44	7 05	23 18	.....	86	6 29.1	23 35	7.3
Sat Nov 16/Sun Nov 17	2 00	20 26	21 49	5 07	6 30	23 49	7 08	0 14	.....	78	7 27.7	23 26	7.3
Sun Nov 17/Mon Nov 18	2 04	20 26	21 50	5 06	6 30	23 54	7 11	1 07	.....	69	8 26.3	21 58	7.3
Mon Nov 18/Tue Nov 19	2 08	20 27	21 51	5 06	6 29	23 59	7 15	1 55	.....	58	9 23.8	19 13	7.2
Tue Nov 19/Wed Nov 20	2 12	20 28	21 52	5 05	6 29	0 04	7 18	2 38	.....	47	10 19.8	15 23	7.2
Wed Nov 20/Thu Nov 21	2 16	20 29	21 53	5 04	6 29	0 09	7 21	3 19	.....	36	11 14.0	10 41	7.2
Thu Nov 21/Fri Nov 22	2 20	20 30	21 54	5 04	6 28	0 14	7 25	3 57	.....	25	12 07.1	5 25	7.2
Fri Nov 22/Sat Nov 23	2 24	20 31	21 56	5 03	6 28	0 19	7 28	4 34	.....	16	12 59.6	- 0 09	7.1
Sat Nov 23/Sun Nov 24	2 28	20 32	21 57	5 03	6 28	0 24	7 31	5 11	.....	8	13 52.4	- 5 42	7.1
Sun Nov 24/Mon Nov 25	2 32	20 32	21 58	5 02	6 27	0 29	7 35	5 50	18 34	3	14 46.0	-10 53	7.1
Mon Nov 25/Tue Nov 26	2 36	20 33	21 59	5 02	6 27	0 34	7 38	.....	19 40	0	15 41.0	-15 25	7.0
Tue Nov 26/Wed Nov 27	2 40	20 34	22 00	5 01	6 27	0 39	7 42	.....	20 46	0	16 37.3	-19 00	7.0
Wed Nov 27/Thu Nov 28	2 44	20 35	22 01	5 01	6 27	0 44	7 45	.....	21 50	3	17 34.5	-21 24	7.0
Thu Nov 28/Fri Nov 29	2 48	20 36	22 02	5 00	6 27	0 49	7 49	.....	22 49	7	18 31.8	-22 31	7.0
Fri Nov 29/Sat Nov 30	2 52	20 37	22 03	5 00	6 26	0 54	7 52	.....	23 43	13	19 28.0	-22 22	6.9
Sat Nov 30/Sun Dec 01	2 55	20 38	22 04	5 00	6 26	0 59	7 56	.....	0 31	21	20 22.1	-21 02	6.9

***** 2019 DECEMBER *****

Date (eve/morn)	LMST midn	----- Sun: -----				LST twilight:		----- Moon: -----				Twilight	
		set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec	hours
Sun Dec 01/Mon Dec 02	2 59	20 38	22 05	4 59	6 26	1 04	8 00	.....	1 13	29	21 13.8	-18 41	6.9
Mon Dec 02/Tue Dec 03	3 03	20 39	22 06	4 59	6 26	1 09	8 03	.....	1 50	39	22 02.9	-15 32	6.9
Tue Dec 03/Wed Dec 04	3 07	20 40	22 07	4 59	6 26	1 14	8 07	.....	2 24	48	22 49.8	-11 44	6.9
Wed Dec 04/Thu Dec 05	3 11	20 41	22 08	4 59	6 26	1 19	8 11	.....	2 55	57	23 35.0	- 7 29	6.8
Thu Dec 05/Fri Dec 06	3 15	20 42	22 09	4 59	6 26	1 24	8 15	.....	3 25	67	0 19.3	- 2 56	6.8
Fri Dec 06/Sat Dec 07	3 19	20 42	22 10	4 59	6 26	1 29	8 19	.....	3 55	75	1 03.7	1 49	6.8
Sat Dec 07/Sun Dec 08	3 23	20 43	22 11	4 59	6 27	1 34	8 23	.....	4 25	83	1 48.8	6 34	6.8
Sun Dec 08/Mon Dec 09	3 27	20 44	22 12	4 59	6 27	1 39	8 26	.....	4 58	90	2 35.6	11 11	6.8
Mon Dec 09/Tue Dec 10	3 31	20 45	22 13	4 59	6 27	1 43	8 30	18 09	5 34	95	3 24.9	15 27	6.8
Tue Dec 10/Wed Dec 11	3 35	20 45	22 14	4 59	6 27	1 48	8 34	19 08	6 15	99	4 17.2	19 07	6.8
Wed Dec 11/Thu Dec 12	3 39	20 46	22 14	4 59	6 27	1 53	8 39	20 08	.....	100	5 12.7	21 54	6.7
Thu Dec 12/Fri Dec 13	3 43	20 47	22 15	4 59	6 27	1 58	8 43	21 09	.....	99	6 11.0	23 33	6.7
Fri Dec 13/Sat Dec 14	3 47	20 47	22 16	4 59	6 28	2 02	8 47	22 08	.....	96	7 11.1	23 50	6.7
Sat Dec 14/Sun Dec 15	3 51	20 48	22 17	4 59	6 28	2 07	8 51	23 03	.....	90	8 11.5	22 42	6.7
Sun Dec 15/Mon Dec 16	3 55	20 49	22 17	5 00	6 28	2 12	8 55	23 54	.....	82	9 10.8	20 13	6.7
Mon Dec 16/Tue Dec 17	3 59	20 49	22 18	5 00	6 29	2 16	8 59	0 39	.....	72	10 08.0	16 33	6.7
Tue Dec 17/Wed Dec 18	4 03	20 50	22 19	5 00	6 29	2 21	9 04	1 20	.....	62	11 02.9	11 59	6.7
Wed Dec 18/Thu Dec 19	4 06	20 50	22 19	5 01	6 30	2 26	9 08	1 58	.....	50	11 55.9	6 50	6.7
Thu Dec 19/Fri Dec 20	4 10	20 51	22 20	5 01	6 30	2 30	9 12	2 34	.....	39	12 47.7	1 22	6.7
Fri Dec 20/Sat Dec 21	4 14	20 52	22 21	5 02	6 30	2 35	9 17	3 10	.....	29	13 39.1	- 4 06	6.7
Sat Dec 21/Sun Dec 22	4 18	20 52	22 21	5 02	6 31	2 39	9 21	3 47	.....	19	14 31.0	- 9 18	6.7
Sun Dec 22/Mon Dec 23	4 22	20 53	22 22	5 03	6 31	2 44	9 26	4 27	.....	11	15 24.0	-13 57	6.7
Mon Dec 23/Tue Dec 24	4 26	20 53	22 22	5 03	6 32	2 48	9 30	5 10	18 30	5	16 18.6	-17 47	6.7
Tue Dec 24/Wed Dec 25	4 30	20 53	22 22	5 04	6 33	2 52	9 35	5 57	19 33	1	17 14.5	-20 35	6.7
Wed Dec 25/Thu Dec 26	4 34	20 54	22 23	5 04	6 33	2 57	9 39	.....	20 35	0	18 11.1	-22 11	6.7
Thu Dec 26/Fri Dec 27	4 38	20 54	22 23	5 05	6 34	3 01	9 44	.....	21 31	1	19 07.5	-22 30	6.7
Fri Dec 27/Sat Dec 28	4 42	20 55	22 23	5 06	6 34	3 05	9 48	.....	22 22	4	20 02.5	-21 35	6.7
Sat Dec 28/Sun Dec 29	4 46	20 55	22 24	5 06	6 35	3 09	9 53	.....	23 07	8	20 55.4	-19 36	6.7
Sun Dec 29/Mon Dec 30	4 50	20 55	22 24	5 07	6 36	3 14	9 58	.....	23 47	15	21 45.6	-16 42	6.7
Mon Dec 30/Tue Dec 31	4 54	20 56	22 24	5 08	6 36	3 18	10 03	.....	0 23	22	22 33.4	-13 06	6.7
Tue Dec 31/Wed Jan 01	4 58	20 56	22 24	5 09	6 37	3 22	10 07	.....	0 55	30	23 19.1	- 9 00	6.7