

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:

\*\*\*\*\* 2023 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 2023, 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 23	7 18	Dec 29	22 23	Jan 06	20 10	Jan 14	23 13
Jan 21	17 56	Jan 28	12 20	Feb 05	15 31	Feb 13	13 03
Feb 20	4 09	Feb 27	5 07	Mar 07	9 43	Mar 14	22 10
Mar 21	13 27	Mar 28	22 33	Apr 06	0 37	Apr 13	5 13
Apr 20	0 16	Apr 27	17 21	May 05	13 37	May 12	10 29
May 19	11 56	May 27	11 24	Jun 03	23 44	Jun 10	15 32
Jun 18	0 39	Jun 26	3 51	Jul 03	7 41	Jul 09	21 49
Jul 17	14 33	Jul 25	18 08	Aug 01	14 33	Aug 08	6 30
Aug 16	5 39	Aug 24	5 58	Aug 30	21 37	Sep 06	18 23
Sep 14	21 40	Sep 22	15 33	Sep 29	5 58	Oct 06	9 49
Oct 14	14 55	Oct 22	0 30	Oct 28	17 24	Nov 05	5 39
Nov 13	6 27	Nov 20	7 51	Nov 27	6 17	Dec 05	2 52
Dec 12	20 32	Dec 19	15 40	Dec 26	21 34	Jan 04	0 33

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.

\*\*\*\*\* 2023 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
Sun Jan 01/Mon Jan 02		5 03	20 56	22 24	5 10	6 38	3 27	10 13	.....	3 27	79	2 59.0	18 18	6.8
Mon Jan 02/Tue Jan 03		5 07	20 56	22 24	5 11	6 39	3 31	10 18	.....	4 04	87	3 49.3	22 28	6.8
Tue Jan 03/Wed Jan 04		5 11	20 57	22 25	5 12	6 40	3 35	10 23	18 13	4 45	93	4 41.4	25 35	6.8
Wed Jan 04/Thu Jan 05		5 15	20 57	22 25	5 12	6 40	3 39	10 28	19 10	5 31	97	5 35.2	27 31	6.8
Thu Jan 05/Fri Jan 06		5 19	20 57	22 24	5 13	6 41	3 43	10 33	20 04	6 21	99	6 29.7	28 10	6.8
Fri Jan 06/Sat Jan 07		5 22	20 57	22 24	5 14	6 42	3 47	10 38	20 54	.....	100	7 23.8	27 29	6.8
Sat Jan 07/Sun Jan 08		5 26	20 57	22 24	5 15	6 43	3 50	10 43	21 39	.....	98	8 16.4	25 35	6.9
Sun Jan 08/Mon Jan 09		5 30	20 57	22 24	5 16	6 43	3 54	10 48	22 18	.....	95	9 06.8	22 35	6.9
Mon Jan 09/Tue Jan 10		5 34	20 57	22 24	5 17	6 44	3 58	10 53	22 53	.....	91	9 54.7	18 41	6.9
Tue Jan 10/Wed Jan 11		5 38	20 57	22 24	5 18	6 45	4 02	10 58	23 24	.....	85	10 40.5	14 04	6.9
Wed Jan 11/Thu Jan 12		5 42	20 57	22 23	5 19	6 46	4 05	11 03	23 52	.....	77	11 24.8	8 56	6.9
Thu Jan 12/Fri Jan 13		5 46	20 57	22 23	5 21	6 47	4 09	11 08	0 20	.....	69	12 08.5	3 25	7.0
Fri Jan 13/Sat Jan 14		5 50	20 57	22 23	5 22	6 48	4 13	11 13	0 47	.....	59	12 52.4	- 2 16	7.0
Sat Jan 14/Sun Jan 15		5 54	20 57	22 22	5 23	6 49	4 16	11 18	1 16	.....	49	13 37.9	- 7 58	7.0
Sun Jan 15/Mon Jan 16		5 58	20 56	22 22	5 24	6 50	4 20	11 23	1 48	.....	39	14 26.0	-13 28	7.0
Mon Jan 16/Tue Jan 17		6 02	20 56	22 22	5 25	6 50	4 23	11 28	2 24	.....	29	15 17.9	-18 28	7.1
Tue Jan 17/Wed Jan 18		6 06	20 56	22 21	5 26	6 51	4 27	11 33	3 08	.....	19	16 14.7	-22 37	7.1
Wed Jan 18/Thu Jan 19		6 10	20 56	22 21	5 27	6 52	4 30	11 38	4 01	18 03	11	17 16.3	-25 28	7.1
Thu Jan 19/Fri Jan 20		6 14	20 55	22 20	5 28	6 53	4 33	11 43	5 04	19 13	5	18 21.9	-26 36	7.1
Fri Jan 20/Sat Jan 21		6 18	20 55	22 19	5 30	6 54	4 37	11 48	6 16	20 18	1	19 28.9	-25 46	7.2
Sat Jan 21/Sun Jan 22		6 22	20 55	22 19	5 31	6 55	4 40	11 53	.....	21 15	0	20 34.5	-22 58	7.2
Sun Jan 22/Mon Jan 23		6 26	20 54	22 18	5 32	6 56	4 44	11 58	.....	22 04	2	21 36.6	-18 32	7.2
Mon Jan 23/Tue Jan 24		6 29	20 54	22 18	5 33	6 57	4 47	12 03	.....	22 45	7	22 34.3	-12 55	7.3
Tue Jan 24/Wed Jan 25		6 33	20 54	22 17	5 34	6 58	4 50	12 09	.....	23 20	15	23 28.0	- 6 40	7.3
Wed Jan 25/Thu Jan 26		6 37	20 53	22 16	5 35	6 59	4 53	12 14	.....	23 52	24	0 18.7	- 0 11	7.3
Thu Jan 26/Fri Jan 27		6 41	20 53	22 15	5 37	6 59	4 56	12 19	.....	0 24	34	1 07.8	6 08	7.4
Fri Jan 27/Sat Jan 28		6 45	20 52	22 15	5 38	7 00	5 00	12 24	.....	0 55	44	1 56.2	12 02	7.4
Sat Jan 28/Sun Jan 29		6 49	20 52	22 14	5 39	7 01	5 03	12 29	.....	1 28	55	2 45.1	17 17	7.4
Sun Jan 29/Mon Jan 30		6 53	20 51	22 13	5 40	7 02	5 06	12 34	.....	2 03	64	3 35.2	21 41	7.5
Mon Jan 30/Tue Jan 31		6 57	20 50	22 12	5 41	7 03	5 09	12 39	.....	2 43	73	4 27.0	25 04	7.5
Tue Jan 31/Wed Feb 01		7 01	20 50	22 11	5 42	7 04	5 12	12 44	.....	3 27	82	5 20.3	27 17	7.5

\*\*\*\*\* 2023 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
Wed Feb 01/Thu Feb 02		7 05	20 49	22 10	5 44	7 05	5 15	12 49	18 00	4 16	88	6 14.5	28 15	7.6
Thu Feb 02/Fri Feb 03		7 09	20 49	22 10	5 45	7 06	5 18	12 55	18 51	5 09	94	7 08.6	27 53	7.6
Fri Feb 03/Sat Feb 04		7 13	20 48	22 09	5 46	7 07	5 21	13 00	19 37	6 05	97	8 01.7	26 16	7.6
Sat Feb 04/Sun Feb 05		7 17	20 47	22 08	5 47	7 08	5 24	13 05	20 18	.....	99	8 52.8	23 30	7.7
Sun Feb 05/Mon Feb 06		7 21	20 46	22 07	5 48	7 08	5 27	13 10	20 54	.....	100	9 41.7	19 45	7.7
Mon Feb 06/Tue Feb 07		7 25	20 46	22 06	5 49	7 09	5 30	13 15	21 26	.....	98	10 28.4	15 14	7.7
Tue Feb 07/Wed Feb 08		7 29	20 45	22 05	5 50	7 10	5 33	13 20	21 55	.....	95	11 13.3	10 07	7.8
Wed Feb 08/Thu Feb 09		7 33	20 44	22 04	5 52	7 11	5 36	13 25	22 23	.....	90	11 57.3	4 37	7.8
Thu Feb 09/Fri Feb 10		7 37	20 43	22 03	5 53	7 12	5 39	13 30	22 50	.....	83	12 41.1	- 1 06	7.8
Fri Feb 10/Sat Feb 11		7 40	20 43	22 02	5 54	7 13	5 42	13 35	23 18	.....	75	13 25.8	- 6 49	7.9
Sat Feb 11/Sun Feb 12		7 44	20 42	22 00	5 55	7 14	5 45	13 40	23 47	.....	65	14 12.5	-12 20	7.9
Sun Feb 12/Mon Feb 13		7 48	20 41	21 59	5 56	7 14	5 47	13 45	0 21	.....	55	15 02.3	-17 24	7.9
Mon Feb 13/Tue Feb 14		7 52	20 40	21 58	5 57	7 15	5 50	13 50	1 00	.....	45	15 56.0	-21 43	8.0
Tue Feb 14/Wed Feb 15		7 56	20 39	21 57	5 58	7 16	5 53	13 55	1 47	.....	34	16 54.3	-24 56	8.0
Wed Feb 15/Thu Feb 16		8 00	20 38	21 56	5 59	7 17	5 56	14 00	2 44	.....	23	17 56.6	-26 38	8.1
Thu Feb 16/Fri Feb 17		8 04	20 37	21 55	6 00	7 18	5 59	14 05	3 50	17 59	14	19 01.5	-26 32	8.1
Fri Feb 17/Sat Feb 18		8 08	20 36	21 54	6 01	7 18	6 01	14 10	5 02	18 58	7	20 06.5	-24 32	8.1
Sat Feb 18/Sun Feb 19		8 12	20 35	21 52	6 02	7 19	6 04	14 15	6 17	19 50	2	21 09.3	-20 45	8.2
Sun Feb 19/Mon Feb 20		8 16	20 34	21 51	6 03	7 20	6 07	14 20	.....	20 34	0	22 08.7	-15 34	8.2
Mon Feb 20/Tue Feb 21		8 20	20 33	21 50	6 04	7 21	6 10	14 25	.....	21 13	1	23 04.4	- 9 25	8.2
Tue Feb 21/Wed Feb 22		8 24	20 32	21 49	6 05	7 22	6 12	14 30	.....	21 47	5	23 57.2	- 2 50	8.3
Wed Feb 22/Thu Feb 23		8 28	20 31	21 48	6 06	7 22	6 15	14 35	.....	22 20	11	0 47.9	3 47	8.3
Thu Feb 23/Fri Feb 24		8 32	20 30	21 46	6 07	7 23	6 18	14 40	.....	22 52	19	1 37.7	10 04	8.3
Fri Feb 24/Sat Feb 25		8 36	20 29	21 45	6 08	7 24	6 20	14 45	.....	23 25	28	2 27.6	15 44	8.4
Sat Feb 25/Sun Feb 26		8 40	20 28	21 44	6 09	7 25	6 23	14 50	.....	0 00	37	3 18.4	20 33	8.4
Sun Feb 26/Mon Feb 27		8 44	20 27	21 43	6 10	7 25	6 26	14 54	.....	0 39	47	4 10.6	24 20	8.5
Mon Feb 27/Tue Feb 28		8 47	20 26	21 41	6 11	7 26	6 28	14 59	.....	1 23	57	5 04.0	26 56	8.5
Tue Feb 28/Wed Mar 01		8 51	20 25	21 40	6 12	7 27	6 31	15 04	.....	2 11	67	5 58.3	28 15	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.

\*\*\*\*\* 2023 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
Wed Mar 01/Thu Mar 02	8 55	20 24	21 39	6 13	7 28	6 34	15 09	.....	3 03	75	6 52.7	28 15	8.6
Thu Mar 02/Fri Mar 03	8 59	20 23	21 38	6 13	7 28	6 36	15 14	17 35	3 58	83	7 46.1	26 58	8.6
Fri Mar 03/Sat Mar 04	9 03	20 22	21 36	6 14	7 29	6 39	15 19	18 18	4 54	89	8 37.8	24 29	8.6
Sat Mar 04/Sun Mar 05	9 07	20 20	21 35	6 15	7 30	6 42	15 23	18 55	5 51	94	9 27.3	20 57	8.7
Sun Mar 05/Mon Mar 06	9 11	20 19	21 34	6 16	7 30	6 44	15 28	19 28	6 47	98	10 14.8	16 34	8.7
Mon Mar 06/Tue Mar 07	9 15	20 18	21 32	6 17	7 31	6 47	15 33	19 58	.....	100	11 00.5	11 31	8.7
Tue Mar 07/Wed Mar 08	9 19	20 17	21 31	6 18	7 32	6 50	15 38	20 26	.....	100	11 45.1	5 59	8.8
Wed Mar 08/Thu Mar 09	9 23	20 16	21 30	6 18	7 32	6 52	15 42	20 54	.....	97	12 29.5	0 12	8.8
Thu Mar 09/Fri Mar 10	9 27	20 15	21 29	6 19	7 33	6 55	15 47	21 21	.....	93	13 14.4	- 5 40	8.8
Fri Mar 10/Sat Mar 11	9 31	20 13	21 27	6 20	7 34	6 58	15 52	21 50	.....	87	14 01.1	-11 21	8.9
Sat Mar 11/Sun Mar 12*	9 35	20 12	21 26	5 21	6 34	7 00	15 57	22 22	.....	80	14 50.3	-16 36	8.9
Sun Mar 12/Mon Mar 13	10 39	19 11	20 25	5 22	6 35	7 03	16 01	21 59	.....	70	15 45.1	-21 23	8.9
Mon Mar 13/Tue Mar 14	10 43	19 10	20 23	5 22	6 36	7 06	16 06	22 42	.....	60	16 42.0	-24 49	9.0
Tue Mar 14/Wed Mar 15	10 47	19 09	20 22	5 23	6 36	7 08	16 11	23 34	.....	48	17 42.6	-26 49	9.0
Wed Mar 15/Thu Mar 16	10 51	19 07	20 21	5 24	6 37	7 11	16 15	0 34	.....	37	18 45.6	-27 09	9.1
Thu Mar 16/Fri Mar 17	10 55	19 06	20 19	5 24	6 38	7 13	16 20	1 42	.....	26	19 48.9	-25 39	9.1
Fri Mar 17/Sat Mar 18	10 59	19 05	20 18	5 25	6 38	7 16	16 25	2 54	.....	17	20 50.7	-22 25	9.1
Sat Mar 18/Sun Mar 19	11 03	19 04	20 17	5 26	6 39	7 19	16 29	4 06	17 26	9	21 49.6	-17 43	9.2
Sun Mar 19/Mon Mar 20	11 06	19 03	20 16	5 27	6 40	7 21	16 34	5 17	18 06	3	22 45.3	-11 56	9.2
Mon Mar 20/Tue Mar 21	11 10	19 01	20 14	5 27	6 40	7 24	16 39	6 25	18 41	0	23 38.2	- 5 30	9.2
Tue Mar 21/Wed Mar 22	11 14	19 00	20 13	5 28	6 41	7 27	16 43	.....	19 14	0	0 29.2	1 11	9.2
Wed Mar 22/Thu Mar 23	11 18	18 59	20 12	5 29	6 41	7 29	16 48	.....	19 47	3	1 19.4	7 41	9.3
Thu Mar 23/Fri Mar 24	11 22	18 58	20 10	5 29	6 42	7 32	16 52	.....	20 19	7	2 09.7	13 43	9.3
Fri Mar 24/Sat Mar 25	11 26	18 57	20 09	5 30	6 43	7 35	16 57	.....	20 54	14	3 00.9	18 57	9.3
Sat Mar 25/Sun Mar 26	11 30	18 55	20 08	5 31	6 43	7 37	17 02	.....	21 33	22	3 53.4	23 11	9.4
Sun Mar 26/Mon Mar 27	11 34	18 54	20 07	5 31	6 44	7 40	17 06	.....	22 15	31	4 47.2	26 13	9.4
Mon Mar 27/Tue Mar 28	11 38	18 53	20 05	5 32	6 45	7 43	17 11	.....	23 03	40	5 41.9	27 58	9.4
Tue Mar 28/Wed Mar 29	11 42	18 52	20 04	5 33	6 45	7 46	17 15	.....	23 54	50	6 36.6	28 21	9.5
Wed Mar 29/Thu Mar 30	11 46	18 51	20 03	5 33	6 46	7 48	17 20	.....	0 49	59	7 30.4	27 24	9.5
Thu Mar 30/Fri Mar 31	11 50	18 49	20 02	5 34	6 46	7 51	17 25	.....	1 45	68	8 22.5	25 15	9.5
Fri Mar 31/Sat Apr 01	11 54	18 48	20 01	5 34	6 47	7 54	17 29	.....	2 42	77	9 12.5	22 01	9.6

\*\*\*\*\* 2023 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
Sat Apr 01/Sun Apr 02	11 58	18 47	19 59	5 35	6 48	7 56	17 34	.....	3 38	84	10 00.3	17 52	9.6
Sun Apr 02/Mon Apr 03	12 02	18 46	19 58	5 36	6 48	7 59	17 38	17 00	4 33	91	10 46.4	12 58	9.6
Mon Apr 03/Tue Apr 04	12 06	18 45	19 57	5 36	6 49	8 02	17 43	17 28	5 29	96	11 31.4	7 31	9.7
Tue Apr 04/Wed Apr 05	12 10	18 43	19 56	5 37	6 49	8 05	17 47	17 56	6 25	99	12 16.1	1 41	9.7
Wed Apr 05/Thu Apr 06	12 14	18 42	19 55	5 37	6 50	8 08	17 52	18 23	7 22	100	13 01.5	- 4 18	9.7
Thu Apr 06/Fri Apr 07	12 17	18 41	19 54	5 38	6 51	8 10	17 56	18 52	.....	99	13 48.5	-10 12	9.7
Fri Apr 07/Sat Apr 08	12 21	18 40	19 52	5 38	6 51	8 13	18 01	19 23	.....	96	14 38.2	-15 45	9.8
Sat Apr 08/Sun Apr 09	12 25	18 39	19 51	5 39	6 52	8 16	18 05	19 59	.....	90	15 31.2	-20 36	9.8
Sun Apr 09/Mon Apr 10	12 29	18 38	19 50	5 40	6 52	8 19	18 10	20 40	.....	83	16 28.2	-24 24	9.8
Mon Apr 10/Tue Apr 11	12 33	18 36	19 49	5 40	6 53	8 22	18 14	21 30	.....	73	17 28.6	-26 48	9.9
Tue Apr 11/Wed Apr 12	12 37	18 35	19 48	5 41	6 54	8 24	18 19	22 27	.....	63	18 31.3	-27 32	9.9
Wed Apr 12/Thu Apr 13	12 41	18 34	19 47	5 41	6 54	8 27	18 23	23 32	.....	52	19 34.2	-26 28	9.9
Thu Apr 13/Fri Apr 14	12 45	18 33	19 46	5 42	6 55	8 30	18 28	0 41	.....	40	20 35.5	-23 41	9.9
Fri Apr 14/Sat Apr 15	12 49	18 32	19 45	5 42	6 55	8 33	18 32	1 51	.....	29	21 33.8	-19 25	10.0
Sat Apr 15/Sun Apr 16	12 53	18 31	19 44	5 43	6 56	8 36	18 37	3 00	.....	19	22 28.9	-14 02	10.0
Sun Apr 16/Mon Apr 17	12 57	18 30	19 43	5 44	6 57	8 39	18 41	4 07	16 39	11	23 21.1	- 7 55	10.0
Mon Apr 17/Tue Apr 18	13 01	18 29	19 42	5 44	6 57	8 42	18 46	5 13	17 12	5	0 11.4	- 1 24	10.0
Tue Apr 18/Wed Apr 19	13 05	18 28	19 41	5 45	6 58	8 45	18 50	6 17	17 43	1	1 00.9	5 07	10.1
Wed Apr 19/Thu Apr 20	13 09	18 27	19 40	5 45	6 58	8 48	18 55	7 21	18 15	0	1 50.5	11 19	10.1
Thu Apr 20/Fri Apr 21	13 13	18 26	19 39	5 46	6 59	8 51	18 59	.....	18 49	1	2 41.1	16 54	10.1
Fri Apr 21/Sat Apr 22	13 17	18 25	19 38	5 46	7 00	8 54	19 04	.....	19 26	5	3 33.3	21 34	10.1
Sat Apr 22/Sun Apr 23	13 21	18 24	19 37	5 47	7 00	8 57	19 08	.....	20 07	10	4 27.1	25 07	10.2
Sun Apr 23/Mon Apr 24	13 24	18 23	19 36	5 47	7 01	9 00	19 13	.....	20 53	17	5 22.1	27 22	10.2
Mon Apr 24/Tue Apr 25	13 28	18 22	19 35	5 48	7 01	9 03	19 17	.....	21 44	24	6 17.5	28 15	10.2
Tue Apr 25/Wed Apr 26	13 32	18 21	19 34	5 48	7 02	9 06	19 22	.....	22 38	33	7 12.0	27 46	10.2
Wed Apr 26/Thu Apr 27	13 36	18 20	19 33	5 49	7 03	9 09	19 26	.....	23 34	42	8 04.9	26 00	10.3
Thu Apr 27/Fri Apr 28	13 40	18 19	19 33	5 49	7 03	9 12	19 31	.....	0 31	52	8 55.4	23 07	10.3
Fri Apr 28/Sat Apr 29	13 44	18 18	19 32	5 50	7 04	9 15	19 35	.....	1 27	61	9 43.6	19 17	10.3
Sat Apr 29/Sun Apr 30	13 48	18 17	19 31	5 51	7 04	9 18	19 40	.....	2 23	70	10 29.9	14 40	10.3
Sun Apr 30/Mon May 01	13 52	18 16	19 30	5 51	7 05	9 21	19 44	.....	3 18	79	11 14.8	9 26	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.  
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\*\*\*\*\* 2023 MAY \*\*\*\*\*

Date (eve/morn)	LMST midn	----- Sun: -----			LST twilight:		----- Moon: -----				Twi-Twi		
		set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec	hours
Mon May 01/Tue May 02	13 56	18 15	19 29	5 52	7 06	9 25	19 49	.....	4 13	86	11 59.2	3 44	10.4
Tue May 02/Wed May 03	14 00	18 14	19 29	5 52	7 06	9 28	19 53	16 24	5 10	93	12 44.2	- 2 13	10.4
Wed May 03/Thu May 04	14 04	18 14	19 28	5 53	7 07	9 31	19 57	16 52	6 09	97	13 30.8	- 8 13	10.4
Thu May 04/Fri May 05	14 08	18 13	19 27	5 53	7 08	9 34	20 02	17 22	7 11	100	14 20.0	-14 01	10.4
Fri May 05/Sat May 06	14 12	18 12	19 26	5 54	7 08	9 38	20 06	17 57	.....	100	15 12.9	-19 15	10.5
Sat May 06/Sun May 07	14 16	18 11	19 26	5 54	7 09	9 41	20 11	18 37	.....	97	16 10.0	-23 32	10.5
Sun May 07/Mon May 08	14 20	18 10	19 25	5 55	7 09	9 44	20 15	19 24	.....	92	17 11.2	-26 27	10.5
Mon May 08/Tue May 09	14 24	18 10	19 25	5 55	7 10	9 47	20 20	20 20	.....	85	18 15.2	-27 41	10.5
Tue May 09/Wed May 10	14 28	18 09	19 24	5 56	7 11	9 51	20 24	21 24	.....	76	19 19.6	-27 02	10.5
Wed May 10/Thu May 11	14 31	18 08	19 23	5 56	7 11	9 54	20 29	22 33	.....	66	20 22.3	-24 35	10.5
Thu May 11/Fri May 12	14 35	18 08	19 23	5 57	7 12	9 57	20 33	23 43	.....	54	21 21.6	-20 37	10.6
Fri May 12/Sat May 13	14 39	18 07	19 22	5 57	7 13	10 01	20 38	0 52	.....	43	22 17.0	-15 28	10.6
Sat May 13/Sun May 14	14 43	18 06	19 22	5 58	7 13	10 04	20 42	1 58	.....	32	23 09.2	- 9 33	10.6
Sun May 14/Mon May 15	14 47	18 06	19 21	5 58	7 14	10 08	20 47	3 02	.....	22	23 58.9	- 3 14	10.6
Mon May 15/Tue May 16	14 51	18 05	19 21	5 59	7 14	10 11	20 51	4 05	.....	13	0 47.4	3 10	10.6
Tue May 16/Wed May 17	14 55	18 05	19 20	5 59	7 15	10 15	20 55	5 07	16 15	7	1 35.9	9 22	10.7
Wed May 17/Thu May 18	14 59	18 04	19 20	6 00	7 16	10 18	21 00	6 10	16 47	2	2 25.2	15 03	10.7
Thu May 18/Fri May 19	15 03	18 04	19 19	6 00	7 16	10 22	21 04	7 13	17 22	0	3 16.2	19 59	10.7
Fri May 19/Sat May 20	15 07	18 03	19 19	6 01	7 17	10 25	21 09	.....	18 01	0	4 09.0	23 53	10.7
Sat May 20/Sun May 21	15 11	18 03	19 19	6 01	7 17	10 29	21 13	.....	18 45	2	5 03.5	26 34	10.7
Sun May 21/Mon May 22	15 15	18 02	19 18	6 02	7 18	10 32	21 18	.....	19 34	6	5 58.9	27 55	10.7
Mon May 22/Tue May 23	15 19	18 02	19 18	6 02	7 19	10 36	21 22	.....	20 27	12	6 53.9	27 52	10.7
Tue May 23/Wed May 24	15 23	18 01	19 18	6 03	7 19	10 39	21 27	.....	21 23	19	7 47.4	26 30	10.8
Wed May 24/Thu May 25	15 27	18 01	19 17	6 03	7 20	10 43	21 31	.....	22 20	27	8 38.7	23 58	10.8
Thu May 25/Fri May 26	15 31	18 00	19 17	6 04	7 20	10 47	21 35	.....	23 17	35	9 27.3	20 27	10.8
Fri May 26/Sat May 27	15 35	18 00	19 17	6 04	7 21	10 50	21 40	.....	0 12	45	10 13.7	16 07	10.8
Sat May 27/Sun May 28	15 39	18 00	19 16	6 05	7 21	10 54	21 44	.....	1 07	54	10 58.4	11 09	10.8
Sun May 28/Mon May 29	15 42	17 59	19 16	6 05	7 22	10 58	21 49	.....	2 01	64	11 42.2	5 42	10.8
Mon May 29/Tue May 30	15 46	17 59	19 16	6 06	7 23	11 02	21 53	.....	2 57	73	12 26.2	- 0 04	10.8
Tue May 30/Wed May 31	15 50	17 59	19 16	6 06	7 23	11 05	21 57	.....	3 54	82	13 11.4	- 6 00	10.8
Wed May 31/Thu Jun 01	15 54	17 59	19 16	6 06	7 24	11 09	22 02	.....	4 54	89	13 59.1	-11 51	10.8

\*\*\*\*\* 2023 JUNE \*\*\*\*\*

Date (eve/morn)	LMST midn	----- Sun: -----			LST twilight:		----- Moon: -----				Twi-Twi		
		set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec	hours
Thu Jun 01/Fri Jun 02	15 58	17 58	19 16	6 07	7 24	11 13	22 06	15 52	5 58	95	14 50.4	-17 20	10.9
Fri Jun 02/Sat Jun 03	16 02	17 58	19 15	6 07	7 25	11 17	22 11	16 30	7 06	99	15 46.4	-22 05	10.9
Sat Jun 03/Sun Jun 04	16 06	17 58	19 15	6 08	7 25	11 21	22 15	17 14	.....	100	16 47.3	-25 38	10.9
Sun Jun 04/Mon Jun 05	16 10	17 58	19 15	6 08	7 26	11 25	22 19	18 08	.....	98	17 52.1	-27 32	10.9
Mon Jun 05/Tue Jun 06	16 14	17 58	19 15	6 09	7 26	11 28	22 24	19 11	.....	94	18 58.8	-27 30	10.9
Tue Jun 06/Wed Jun 07	16 18	17 58	19 15	6 09	7 26	11 32	22 28	20 21	.....	87	20 04.4	-25 30	10.9
Wed Jun 07/Thu Jun 08	16 22	17 58	19 15	6 09	7 27	11 36	22 32	21 33	.....	78	21 06.5	-21 47	10.9
Thu Jun 08/Fri Jun 09	16 26	17 58	19 15	6 10	7 27	11 40	22 37	22 43	.....	68	22 04.3	-16 45	10.9
Fri Jun 09/Sat Jun 10	16 30	17 58	19 15	6 10	7 28	11 44	22 41	23 51	.....	57	22 58.0	-10 53	10.9
Sat Jun 10/Sun Jun 11	16 34	17 58	19 15	6 10	7 28	11 48	22 45	0 56	.....	45	23 48.5	- 4 34	10.9
Sun Jun 11/Mon Jun 12	16 38	17 58	19 15	6 11	7 29	11 52	22 49	1 58	.....	34	0 37.2	1 49	10.9
Mon Jun 12/Tue Jun 13	16 42	17 58	19 15	6 11	7 29	11 56	22 54	3 00	.....	24	1 25.1	8 01	10.9
Tue Jun 13/Wed Jun 14	16 46	17 58	19 15	6 11	7 29	12 00	22 58	4 01	.....	16	2 13.6	13 45	10.9
Wed Jun 14/Thu Jun 15	16 49	17 58	19 16	6 12	7 30	12 04	23 02	5 03	.....	9	3 03.4	18 47	10.9
Thu Jun 15/Fri Jun 16	16 53	17 58	19 16	6 12	7 30	12 08	23 07	6 05	15 59	4	3 55.0	22 53	10.9
Fri Jun 16/Sat Jun 17	16 57	17 58	19 16	6 12	7 30	12 12	23 11	7 06	16 40	1	4 48.5	25 51	10.9
Sat Jun 17/Sun Jun 18	17 01	17 58	19 16	6 13	7 31	12 17	23 15	8 03	17 27	0	5 43.2	27 32	10.9
Sun Jun 18/Mon Jun 19	17 05	17 58	19 16	6 13	7 31	12 21	23 19	.....	18 18	1	6 38.1	27 51	10.9
Mon Jun 19/Tue Jun 20	17 09	17 58	19 16	6 13	7 31	12 25	23 23	.....	19 14	4	7 31.9	26 50	10.9
Tue Jun 20/Wed Jun 21	17 13	17 59	19 17	6 13	7 31	12 29	23 28	.....	20 11	8	8 23.6	24 37	10.9
Wed Jun 21/Thu Jun 22	17 17	17 59	19 17	6 14	7 31	12 33	23 32	.....	21 08	14	9 12.8	21 22	10.9
Thu Jun 22/Fri Jun 23	17 21	17 59	19 17	6 14	7 32	12 37	23 36	.....	22 03	21	9 59.4	17 16	10.9
Fri Jun 23/Sat Jun 24	17 25	17 59	19 17	6 14	7 32	12 41	23 40	.....	22 58	29	10 44.0	12 32	10.9
Sat Jun 24/Sun Jun 25	17 29	18 00	19 17	6 14	7 32	12 46	23 44	.....	23 52	38	11 27.3	7 18	10.9
Sun Jun 25/Mon Jun 26	17 33	18 00	19 18	6 14	7 32	12 50	23 48	.....	0 46	48	12 10.2	1 44	10.9
Mon Jun 26/Tue Jun 27	17 37	18 00	19 18	6 14	7 32	12 54	23 52	.....	1 41	58	12 53.8	- 4 01	10.9
Tue Jun 27/Wed Jun 28	17 41	18 01	19 18	6 15	7 32	12 58	23 56	.....	2 38	67	13 39.4	- 9 47	10.9
Wed Jun 28/Thu Jun 29	17 45	18 01	19 19	6 15	7 32	13 03	0 00	.....	3 39	77	14 28.1	-15 19	10.9
Thu Jun 29/Fri Jun 30	17 49	18 01	19 19	6 15	7 32	13 07	0 04	.....	4 45	85	15 21.2	-20 19	10.9
Fri Jun 30/Sat Jul 01	17 53	18 02	19 19	6 15	7 32	13 11	0 08	.....	5 53	92	16 19.5	-24 22	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.

\*\*\*\*\* 2023 JULY \*\*\*\*\*

Date (eve/morn)	LMST midn	----- Sun: -----				LST twilight:		----- Moon: -----				Twilight	
		set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec	hours
Sat Jul 01/Sun Jul 02	17 57	18 02	19 20	6 15	7 32	13 15	0 12	15 52	7 03	97	17 23.0	-27 00	10.9
Sun Jul 02/Mon Jul 03	18 00	18 02	19 20	6 15	7 32	13 20	0 16	16 52	8 09	100	18 30.2	-27 48	10.9
Mon Jul 03/Tue Jul 04	18 04	18 03	19 20	6 15	7 32	13 24	0 20	18 00	.....	99	19 38.1	-26 31	10.9
Tue Jul 04/Wed Jul 05	18 08	18 03	19 21	6 15	7 32	13 28	0 24	19 14	.....	95	20 43.8	-23 16	10.9
Wed Jul 05/Thu Jul 06	18 12	18 04	19 21	6 15	7 32	13 33	0 28	20 28	.....	89	21 45.3	-18 27	10.9
Thu Jul 06/Fri Jul 07	18 16	18 04	19 21	6 15	7 32	13 37	0 32	21 39	.....	80	22 42.2	-12 33	10.9
Fri Jul 07/Sat Jul 08	18 20	18 04	19 22	6 15	7 32	13 41	0 36	22 47	.....	70	23 35.2	- 6 06	10.9
Sat Jul 08/Sun Jul 09	18 24	18 05	19 22	6 15	7 32	13 46	0 40	23 51	.....	59	0 25.5	0 30	10.9
Sun Jul 09/Mon Jul 10	18 28	18 05	19 23	6 14	7 32	13 50	0 44	0 54	.....	48	1 14.5	6 52	10.9
Mon Jul 10/Tue Jul 11	18 32	18 06	19 23	6 14	7 31	13 54	0 47	1 56	.....	38	2 03.3	12 46	10.9
Tue Jul 11/Wed Jul 12	18 36	18 06	19 23	6 14	7 31	13 59	0 51	2 57	.....	28	2 52.9	17 58	10.8
Wed Jul 12/Thu Jul 13	18 40	18 07	19 24	6 14	7 31	14 03	0 55	3 59	.....	19	3 44.0	22 14	10.8
Thu Jul 13/Fri Jul 14	18 44	18 07	19 24	6 14	7 31	14 07	0 59	4 59	.....	12	4 36.7	25 24	10.8
Fri Jul 14/Sat Jul 15	18 48	18 08	19 25	6 14	7 30	14 12	1 02	5 57	.....	6	5 30.8	27 19	10.8
Sat Jul 15/Sun Jul 16	18 52	18 08	19 25	6 13	7 30	14 16	1 06	6 51	16 13	3	6 25.2	27 54	10.8
Sun Jul 16/Mon Jul 17	18 56	18 09	19 26	6 13	7 30	14 20	1 10	7 39	17 07	1	7 19.0	27 09	10.8
Mon Jul 17/Tue Jul 18	19 00	18 09	19 26	6 13	7 29	14 25	1 13	.....	18 03	0	8 10.9	25 11	10.8
Tue Jul 18/Wed Jul 19	19 04	18 10	19 26	6 12	7 29	14 29	1 17	.....	19 00	2	9 00.5	22 09	10.8
Wed Jul 19/Thu Jul 20	19 07	18 11	19 27	6 12	7 28	14 34	1 21	.....	19 57	5	9 47.5	18 14	10.8
Thu Jul 20/Fri Jul 21	19 11	18 11	19 27	6 12	7 28	14 38	1 24	.....	20 52	10	10 32.2	13 39	10.7
Fri Jul 21/Sat Jul 22	19 15	18 12	19 28	6 11	7 28	14 42	1 28	.....	21 45	16	11 15.3	8 33	10.7
Sat Jul 22/Sun Jul 23	19 19	18 12	19 28	6 11	7 27	14 47	1 31	.....	22 39	24	11 57.6	3 08	10.7
Sun Jul 23/Mon Jul 24	19 23	18 13	19 29	6 11	7 27	14 51	1 35	.....	23 32	32	12 40.1	- 2 29	10.7
Mon Jul 24/Tue Jul 25	19 27	18 13	19 29	6 10	7 26	14 56	1 38	.....	0 28	42	13 23.8	- 8 08	10.7
Tue Jul 25/Wed Jul 26	19 31	18 14	19 30	6 10	7 25	15 00	1 42	.....	1 26	52	14 09.9	-13 36	10.7
Wed Jul 26/Thu Jul 27	19 35	18 14	19 30	6 09	7 25	15 04	1 45	.....	2 27	62	14 59.8	-18 40	10.7
Thu Jul 27/Fri Jul 28	19 39	18 15	19 31	6 09	7 24	15 09	1 49	.....	3 33	72	15 54.4	-23 00	10.6
Fri Jul 28/Sat Jul 29	19 43	18 16	19 31	6 08	7 24	15 13	1 52	.....	4 41	82	16 54.3	-26 11	10.6
Sat Jul 29/Sun Jul 30	19 47	18 16	19 32	6 08	7 23	15 18	1 56	.....	5 48	90	17 59.0	-27 46	10.6
Sun Jul 30/Mon Jul 31	19 51	18 17	19 32	6 07	7 22	15 22	1 59	.....	6 50	96	19 06.5	-27 23	10.6
Mon Jul 31/Tue Aug 01	19 55	18 17	19 32	6 07	7 22	15 27	2 02	16 47	7 45	99	20 13.8	-24 57	10.6

\*\*\*\*\* 2023 AUGUST \*\*\*\*\*

Date (eve/morn)	LMST midn	----- Sun: -----				LST twilight:		----- Moon: -----				Twilight	
		set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec	hours
Tue Aug 01/Wed Aug 02	19 59	18 18	19 33	6 06	7 21	15 31	2 06	18 03	.....	100	21 18.4	-20 38	10.6
Wed Aug 02/Thu Aug 03	20 03	18 18	19 33	6 05	7 20	15 35	2 09	19 18	.....	97	22 18.8	-14 56	10.5
Thu Aug 03/Fri Aug 04	20 07	18 19	19 34	6 05	7 19	15 40	2 12	20 29	.....	91	23 15.1	- 8 22	10.5
Fri Aug 04/Sat Aug 05	20 11	18 20	19 34	6 04	7 19	15 44	2 16	21 38	.....	83	0 08.2	- 1 29	10.5
Sat Aug 05/Sun Aug 06	20 15	18 20	19 35	6 03	7 18	15 49	2 19	22 43	.....	73	0 59.4	5 16	10.5
Sun Aug 06/Mon Aug 07	20 18	18 21	19 35	6 03	7 17	15 53	2 22	23 47	.....	63	1 49.8	11 33	10.5
Mon Aug 07/Tue Aug 08	20 22	18 21	19 36	6 02	7 16	15 57	2 25	0 50	.....	52	2 40.5	17 05	10.4
Tue Aug 08/Wed Aug 09	20 26	18 22	19 36	6 01	7 15	16 02	2 29	1 52	.....	42	3 32.2	21 39	10.4
Wed Aug 09/Thu Aug 10	20 30	18 22	19 37	6 00	7 15	16 06	2 32	2 54	.....	32	4 25.2	25 05	10.4
Thu Aug 10/Fri Aug 11	20 34	18 23	19 37	6 00	7 14	16 11	2 35	3 53	.....	23	5 19.4	27 15	10.4
Fri Aug 11/Sat Aug 12	20 38	18 24	19 38	5 59	7 13	16 15	2 38	4 48	.....	15	6 13.9	28 05	10.4
Sat Aug 12/Sun Aug 13	20 42	18 24	19 38	5 58	7 12	16 20	2 41	5 38	.....	9	7 07.8	27 34	10.3
Sun Aug 13/Mon Aug 14	20 46	18 25	19 39	5 57	7 11	16 24	2 44	6 21	.....	5	8 00.0	25 49	10.3
Mon Aug 14/Tue Aug 15	20 50	18 25	19 39	5 56	7 10	16 28	2 47	6 59	16 54	2	8 49.8	22 58	10.3
Tue Aug 15/Wed Aug 16	20 54	18 26	19 40	5 55	7 09	16 33	2 50	7 33	17 51	0	9 37.2	19 12	10.3
Wed Aug 16/Thu Aug 17	20 58	18 26	19 40	5 55	7 08	16 37	2 53	.....	18 47	1	10 22.3	14 43	10.2
Thu Aug 17/Fri Aug 18	21 02	18 27	19 41	5 54	7 07	16 42	2 56	.....	19 41	3	11 05.5	9 42	10.2
Fri Aug 18/Sat Aug 19	21 06	18 28	19 41	5 53	7 06	16 46	2 59	.....	20 34	7	11 47.7	4 20	10.2
Sat Aug 19/Sun Aug 20	21 10	18 28	19 42	5 52	7 05	16 51	3 02	.....	21 28	12	12 29.7	- 1 15	10.2
Sun Aug 20/Mon Aug 21	21 14	18 29	19 42	5 51	7 04	16 55	3 05	.....	22 22	19	13 12.4	- 6 51	10.1
Mon Aug 21/Tue Aug 22	21 18	18 29	19 42	5 50	7 03	16 59	3 08	.....	23 18	27	13 57.0	-12 17	10.1
Tue Aug 22/Wed Aug 23	21 22	18 30	19 43	5 49	7 02	17 04	3 11	.....	0 17	36	14 44.4	-17 23	10.1
Wed Aug 23/Thu Aug 24	21 25	18 30	19 43	5 48	7 01	17 08	3 14	.....	1 20	47	15 35.8	-21 50	10.1
Thu Aug 24/Fri Aug 25	21 29	18 31	19 44	5 47	7 00	17 13	3 17	.....	2 25	57	16 31.9	-25 19	10.0
Fri Aug 25/Sat Aug 26	21 33	18 31	19 44	5 46	6 59	17 17	3 20	.....	3 30	68	17 32.8	-27 27	10.0
Sat Aug 26/Sun Aug 27	21 37	18 32	19 45	5 45	6 58	17 21	3 23	.....	4 33	78	18 37.3	-27 51	10.0
Sun Aug 27/Mon Aug 28	21 41	18 32	19 45	5 44	6 56	17 26	3 26	.....	5 30	87	19 43.3	-26 19	10.0
Mon Aug 28/Tue Aug 29	21 45	18 33	19 46	5 43	6 55	17 30	3 29	.....	6 20	94	20 48.2	-22 50	9.9
Tue Aug 29/Wed Aug 30	21 49	18 34	19 46	5 41	6 54	17 35	3 31	16 50	7 03	99	21 50.3	-17 41	9.9
Wed Aug 30/Thu Aug 31	21 53	18 34	19 47	5 40	6 53	17 39	3 34	18 04	.....	100	22 48.8	-11 21	9.9
Thu Aug 31/Fri Sep 01	21 57	18 35	19 47	5 39	6 52	17 44	3 37	19 15	.....	98	23 44.3	- 4 22	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.

\*\*\*\*\* 2023 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	
Fri Sep 01/Sat Sep 02	22 01	18 35	19 48	5 38	6 51	17 48	3 40	20 24	.....	93	0 37.7	2 45	9.8
Sat Sep 02/Sun Sep 03	22 05	18 36	19 48	5 37	6 49	17 53	3 43	21 31	.....	86	1 30.1	9 31	9.8
Sun Sep 03/Mon Sep 04	22 09	18 36	19 49	5 36	6 48	17 57	3 46	22 36	.....	77	2 22.5	15 36	9.8
Mon Sep 04/Tue Sep 05	22 13	18 37	19 49	5 35	6 47	18 01	3 48	23 41	.....	67	3 15.8	20 42	9.8
Tue Sep 05/Wed Sep 06	22 17	18 37	19 50	5 33	6 46	18 06	3 51	0 45	.....	57	4 10.2	24 36	9.7
Wed Sep 06/Thu Sep 07	22 21	18 38	19 50	5 32	6 45	18 10	3 54	1 46	.....	47	5 05.5	27 10	9.7
Thu Sep 07/Fri Sep 08	22 25	18 38	19 51	5 31	6 43	18 15	3 56	2 44	.....	37	6 01.0	28 20	9.7
Fri Sep 08/Sat Sep 09	22 29	18 39	19 51	5 30	6 42	18 19	3 59	3 35	.....	28	6 55.7	28 06	9.6
Sat Sep 09/Sun Sep 10	22 32	18 39	19 52	5 29	6 41	18 24	4 02	4 21	.....	20	7 48.7	26 35	9.6
Sun Sep 10/Mon Sep 11	22 36	18 40	19 53	5 27	6 40	18 28	4 05	5 01	.....	13	8 39.2	23 55	9.6
Mon Sep 11/Tue Sep 12	22 40	18 40	19 53	5 26	6 39	18 33	4 07	5 35	.....	8	9 27.1	20 18	9.6
Tue Sep 12/Wed Sep 13	22 44	18 41	19 54	5 25	6 37	18 37	4 10	6 06	16 41	3	10 12.6	15 56	9.5
Wed Sep 13/Thu Sep 14	22 48	18 42	19 54	5 24	6 36	18 42	4 13	6 34	17 36	1	10 56.2	10 59	9.5
Thu Sep 14/Fri Sep 15	22 52	18 42	19 55	5 22	6 35	18 46	4 15	7 00	18 30	0	11 38.6	5 38	9.5
Fri Sep 15/Sat Sep 16	22 56	18 43	19 55	5 21	6 34	18 51	4 18	.....	19 23	1	12 20.6	0 03	9.4
Sat Sep 16/Sun Sep 17	23 00	18 43	19 56	5 20	6 32	18 55	4 21	.....	20 17	4	13 03.1	- 5 36	9.4
Sun Sep 17/Mon Sep 18	23 04	18 44	19 56	5 18	6 31	19 00	4 23	.....	21 13	8	13 47.0	-11 07	9.4
Mon Sep 18/Tue Sep 19	23 08	18 44	19 57	5 17	6 30	19 04	4 26	.....	22 11	15	14 33.4	-16 17	9.3
Tue Sep 19/Wed Sep 20	23 12	18 45	19 58	5 16	6 29	19 09	4 29	.....	23 12	23	15 23.1	-20 51	9.3
Wed Sep 20/Thu Sep 21	23 16	18 45	19 58	5 15	6 27	19 13	4 31	.....	0 16	32	16 16.9	-24 32	9.3
Thu Sep 21/Fri Sep 22	23 20	18 46	19 59	5 13	6 26	19 18	4 34	.....	1 20	42	17 14.8	-27 00	9.2
Fri Sep 22/Sat Sep 23	23 24	18 46	19 59	5 12	6 25	19 22	4 36	.....	2 22	53	18 16.1	-27 56	9.2
Sat Sep 23/Sun Sep 24	23 28	18 47	20 00	5 11	6 24	19 27	4 39	.....	3 20	64	19 19.4	-27 05	9.2
Sun Sep 24/Mon Sep 25	23 32	18 48	20 01	5 09	6 22	19 32	4 42	.....	4 11	75	20 22.5	-24 23	9.1
Mon Sep 25/Tue Sep 26	23 36	18 48	20 01	5 08	6 21	19 36	4 44	.....	4 55	85	21 23.7	-20 00	9.1
Tue Sep 26/Wed Sep 27	23 40	18 49	20 02	5 07	6 20	19 41	4 47	.....	5 33	92	22 22.1	-14 15	9.1
Wed Sep 27/Thu Sep 28	23 43	18 49	20 03	5 05	6 19	19 45	4 50	16 50	6 08	98	23 18.0	- 7 34	9.0
Thu Sep 28/Fri Sep 29	23 47	18 50	20 03	5 04	6 17	19 50	4 52	18 00	6 42	100	0 12.1	- 0 26	9.0
Fri Sep 29/Sat Sep 30	23 51	18 50	20 04	5 03	6 16	19 55	4 55	19 08	.....	99	1 05.3	6 39	9.0
Sat Sep 30/Sun Oct 01	23 55	18 51	20 05	5 01	6 15	19 59	4 57	20 15	.....	95	1 58.8	13 16	8.9

\*\*\*\*\* 2023 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	
Sun Oct 01/Mon Oct 02	23 59	18 52	20 05	5 00	6 14	20 04	5 00	21 22	.....	89	2 53.2	19 00	8.9
Mon Oct 02/Tue Oct 03	0 03	18 52	20 06	4 59	6 12	20 09	5 03	22 29	.....	82	3 49.1	23 34	8.9
Tue Oct 03/Wed Oct 04	0 07	18 53	20 07	4 57	6 11	20 13	5 05	23 33	.....	73	4 46.1	26 44	8.8
Wed Oct 04/Thu Oct 05	0 11	18 53	20 07	4 56	6 10	20 18	5 08	0 34	.....	63	5 43.4	28 25	8.8
Thu Oct 05/Fri Oct 06	0 15	18 54	20 08	4 55	6 09	20 23	5 10	1 29	.....	53	6 40.0	28 36	8.8
Fri Oct 06/Sat Oct 07	0 19	18 55	20 09	4 53	6 07	20 27	5 13	2 18	.....	44	7 34.5	27 24	8.7
Sat Oct 07/Sun Oct 08*	0 23	18 55	20 10	5 52	7 06	20 32	5 16	4 00	.....	34	8 26.4	24 59	8.7
Sun Oct 08/Mon Oct 09	23 27	19 56	21 10	5 51	7 05	20 37	5 18	4 36	.....	26	9 12.7	21 40	8.7
Mon Oct 09/Tue Oct 10	23 31	19 56	21 11	5 49	7 04	20 41	5 21	5 08	.....	19	9 58.9	17 29	8.6
Tue Oct 10/Wed Oct 11	23 35	19 57	21 12	5 48	7 03	20 46	5 23	5 37	.....	12	10 43.0	12 41	8.6
Wed Oct 11/Thu Oct 12	23 38	19 58	21 13	5 47	7 02	20 51	5 26	6 03	17 23	6	11 25.7	7 25	8.6
Thu Oct 12/Fri Oct 13	23 42	19 58	21 14	5 45	7 00	20 56	5 29	6 29	18 17	3	12 07.9	1 51	8.5
Fri Oct 13/Sat Oct 14	23 46	19 59	21 14	5 44	6 59	21 00	5 31	6 56	19 11	0	12 50.4	- 3 51	8.5
Sat Oct 14/Sun Oct 15	23 50	20 00	21 15	5 43	6 58	21 05	5 34	.....	20 07	0	13 34.2	- 9 29	8.5
Sun Oct 15/Mon Oct 16	23 54	20 00	21 16	5 41	6 57	21 10	5 37	.....	21 05	2	14 20.2	-14 50	8.4
Mon Oct 16/Tue Oct 17	23 58	20 01	21 17	5 40	6 56	21 15	5 39	.....	22 06	5	15 09.4	-19 39	8.4
Tue Oct 17/Wed Oct 18	0 02	20 02	21 18	5 39	6 55	21 20	5 42	.....	23 09	11	16 02.2	-23 38	8.3
Wed Oct 18/Thu Oct 19	0 06	20 02	21 19	5 38	6 54	21 24	5 45	.....	0 13	19	16 59.0	-26 27	8.3
Thu Oct 19/Fri Oct 20	0 10	20 03	21 20	5 36	6 53	21 29	5 47	.....	1 16	28	17 59.0	-27 49	8.3
Fri Oct 20/Sat Oct 21	0 14	20 04	21 21	5 35	6 52	21 34	5 50	.....	2 15	38	19 00.8	-27 29	8.2
Sat Oct 21/Sun Oct 22	0 18	20 05	21 21	5 34	6 51	21 39	5 53	.....	3 06	49	20 02.5	-25 24	8.2
Sun Oct 22/Mon Oct 23	0 22	20 05	21 22	5 33	6 50	21 44	5 55	.....	3 51	61	21 02.4	-21 41	8.2
Mon Oct 23/Tue Oct 24	0 26	20 06	21 23	5 31	6 49	21 49	5 58	.....	4 30	72	21 59.8	-16 34	8.1
Tue Oct 24/Wed Oct 25	0 30	20 07	21 24	5 30	6 48	21 54	6 01	.....	5 05	82	22 54.7	-10 25	8.1
Wed Oct 25/Thu Oct 26	0 34	20 08	21 25	5 29	6 47	21 59	6 04	.....	5 38	90	23 47.7	- 3 37	8.1
Thu Oct 26/Fri Oct 27	0 38	20 08	21 26	5 28	6 46	22 03	6 06	17 46	6 10	96	0 40.0	3 24	8.0
Fri Oct 27/Sat Oct 28	0 42	20 09	21 27	5 27	6 45	22 08	6 09	18 53	6 43	99	1 32.6	10 13	8.0
Sat Oct 28/Sun Oct 29	0 46	20 10	21 28	5 25	6 44	22 13	6 12	20 00	.....	100	2 26.5	16 26	8.0
Sun Oct 29/Mon Oct 30	0 49	20 11	21 29	5 24	6 43	22 18	6 15	21 07	.....	98	3 22.2	21 39	7.9
Mon Oct 30/Tue Oct 31	0 53	20 11	21 30	5 23	6 42	22 23	6 17	22 14	.....	93	4 19.7	25 33	7.9
Tue Oct 31/Wed Nov 01	0 57	20 12	21 31	5 22	6 41	22 28	6 20	23 18	.....	87	5 18.4	27 57	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.

\*\*\*\*\* 2023 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
Wed Nov 01/Thu Nov 02	1 01	20 13	21 32	5 21	6 40	22 33	6 23	0 18	.....	79	6 16.9	28 47	7.8
Thu Nov 02/Fri Nov 03	1 05	20 14	21 33	5 20	6 39	22 38	6 26	1 10	.....	70	7 13.6	28 05	7.8
Fri Nov 03/Sat Nov 04	1 09	20 15	21 34	5 19	6 39	22 43	6 29	1 56	.....	61	8 07.6	26 04	7.7
Sat Nov 04/Sun Nov 05	1 13	20 15	21 36	5 18	6 38	22 48	6 32	2 35	.....	52	8 58.2	22 57	7.7
Sun Nov 05/Mon Nov 06	1 17	20 16	21 37	5 17	6 37	22 53	6 35	3 08	.....	42	9 45.6	18 57	7.7
Mon Nov 06/Tue Nov 07	1 21	20 17	21 38	5 16	6 36	22 58	6 38	3 38	.....	33	10 30.5	14 17	7.6
Tue Nov 07/Wed Nov 08	1 25	20 18	21 39	5 15	6 36	23 03	6 41	4 05	.....	25	11 13.5	9 08	7.6
Wed Nov 08/Thu Nov 09	1 29	20 19	21 40	5 14	6 35	23 08	6 44	4 31	.....	17	11 55.7	3 39	7.6
Thu Nov 09/Fri Nov 10	1 33	20 20	21 41	5 13	6 34	23 13	6 47	4 57	.....	11	12 38.0	- 2 01	7.5
Fri Nov 10/Sat Nov 11	1 37	20 20	21 42	5 12	6 34	23 18	6 50	5 25	17 57	5	13 21.4	- 7 41	7.5
Sat Nov 11/Sun Nov 12	1 41	20 21	21 43	5 11	6 33	23 24	6 53	5 55	18 54	2	14 07.0	-13 10	7.5
Sun Nov 12/Mon Nov 13	1 45	20 22	21 44	5 10	6 32	23 29	6 56	6 29	19 55	0	14 55.6	-18 12	7.4
Mon Nov 13/Tue Nov 14	1 49	20 23	21 45	5 09	6 32	23 34	6 59	.....	20 58	1	15 48.2	-22 29	7.4
Tue Nov 14/Wed Nov 15	1 53	20 24	21 47	5 09	6 31	23 39	7 02	.....	22 04	3	16 44.7	-25 40	7.4
Wed Nov 15/Thu Nov 16	1 56	20 25	21 48	5 08	6 31	23 44	7 05	.....	23 09	8	17 44.7	-27 24	7.3
Thu Nov 16/Fri Nov 17	2 00	20 26	21 49	5 07	6 30	23 49	7 08	.....	0 10	15	18 46.6	-27 28	7.3
Fri Nov 17/Sat Nov 18	2 04	20 26	21 50	5 06	6 30	23 54	7 12	.....	1 04	24	19 48.4	-25 46	7.3
Sat Nov 18/Sun Nov 19	2 08	20 27	21 51	5 06	6 29	23 59	7 15	.....	1 51	35	20 48.3	-22 26	7.2
Sun Nov 19/Mon Nov 20	2 12	20 28	21 52	5 05	6 29	0 04	7 18	.....	2 31	46	21 45.3	-17 43	7.2
Mon Nov 20/Tue Nov 21	2 16	20 29	21 53	5 04	6 29	0 09	7 21	.....	3 06	57	22 39.3	-11 57	7.2
Tue Nov 21/Wed Nov 22	2 20	20 30	21 54	5 04	6 28	0 14	7 25	.....	3 38	68	23 31.2	- 5 31	7.2
Wed Nov 22/Thu Nov 23	2 24	20 31	21 56	5 03	6 28	0 19	7 28	.....	4 09	79	0 21.9	1 14	7.1
Thu Nov 23/Fri Nov 24	2 28	20 32	21 57	5 03	6 28	0 24	7 31	.....	4 41	87	1 12.6	7 57	7.1
Fri Nov 24/Sat Nov 25	2 32	20 33	21 58	5 02	6 27	0 29	7 35	17 42	5 15	94	2 04.6	14 15	7.1
Sat Nov 25/Sun Nov 26	2 36	20 33	21 59	5 02	6 27	0 34	7 38	18 48	5 52	98	2 58.7	19 48	7.0
Sun Nov 26/Mon Nov 27	2 40	20 34	22 00	5 01	6 27	0 40	7 42	19 55	.....	100	3 55.2	24 13	7.0
Mon Nov 27/Tue Nov 28	2 44	20 35	22 01	5 01	6 27	0 45	7 45	21 00	.....	99	4 53.8	27 15	7.0
Tue Nov 28/Wed Nov 29	2 48	20 36	22 02	5 00	6 27	0 50	7 49	22 03	.....	96	5 53.2	28 43	7.0
Wed Nov 29/Thu Nov 30	2 52	20 37	22 03	5 00	6 26	0 55	7 53	22 59	.....	91	6 51.8	28 35	6.9
Thu Nov 30/Fri Dec 01	2 56	20 38	22 04	5 00	6 26	1 00	7 56	23 48	.....	85	7 47.9	27 00	6.9

\*\*\*\*\* 2023 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
Fri Dec 01/Sat Dec 02	3 00	20 38	22 05	4 59	6 26	1 04	8 00	0 30	.....	77	8 40.7	24 11	6.9
Sat Dec 02/Sun Dec 03	3 04	20 39	22 06	4 59	6 26	1 09	8 04	1 06	.....	69	9 29.9	20 24	6.9
Sun Dec 03/Mon Dec 04	3 07	20 40	22 07	4 59	6 26	1 14	8 07	1 38	.....	60	10 15.9	15 53	6.9
Mon Dec 04/Tue Dec 05	3 11	20 41	22 08	4 59	6 26	1 19	8 11	2 06	.....	51	10 59.6	10 51	6.8
Tue Dec 05/Wed Dec 06	3 15	20 42	22 09	4 59	6 26	1 24	8 15	2 32	.....	41	11 41.9	5 28	6.8
Wed Dec 06/Thu Dec 07	3 19	20 42	22 10	4 59	6 26	1 29	8 19	2 58	.....	32	12 23.9	- 0 07	6.8
Thu Dec 07/Fri Dec 08	3 23	20 43	22 11	4 59	6 27	1 34	8 23	3 24	.....	24	13 06.6	- 5 45	6.8
Fri Dec 08/Sat Dec 09	3 27	20 44	22 12	4 59	6 27	1 39	8 27	3 52	.....	16	13 51.1	-11 16	6.8
Sat Dec 09/Sun Dec 10	3 31	20 45	22 13	4 59	6 27	1 44	8 31	4 25	17 39	9	14 38.5	-16 27	6.8
Sun Dec 10/Mon Dec 11	3 35	20 45	22 14	4 59	6 27	1 48	8 35	5 02	18 42	4	15 29.8	-21 00	6.8
Mon Dec 11/Tue Dec 12	3 39	20 46	22 14	4 59	6 27	1 53	8 39	5 47	19 47	1	16 25.6	-24 35	6.7
Tue Dec 12/Wed Dec 13	3 43	20 47	22 15	4 59	6 27	1 58	8 43	.....	20 54	0	17 25.4	-26 49	6.7
Wed Dec 13/Thu Dec 14	3 47	20 47	22 16	4 59	6 28	2 03	8 47	.....	21 59	2	18 28.1	-27 23	6.7
Thu Dec 14/Fri Dec 15	3 51	20 48	22 17	4 59	6 28	2 07	8 51	.....	22 57	6	19 31.4	-26 08	6.7
Fri Dec 15/Sat Dec 16	3 55	20 49	22 17	5 00	6 28	2 12	8 55	.....	23 48	12	20 33.0	-23 07	6.7
Sat Dec 16/Sun Dec 17	3 59	20 49	22 18	5 00	6 29	2 17	8 59	.....	0 30	21	21 31.4	-18 38	6.7
Sun Dec 17/Mon Dec 18	4 03	20 50	22 19	5 00	6 29	2 21	9 04	.....	1 08	31	22 26.5	-13 03	6.7
Mon Dec 18/Tue Dec 19	4 07	20 50	22 19	5 01	6 30	2 26	9 08	.....	1 41	42	23 18.6	- 6 45	6.7
Tue Dec 19/Wed Dec 20	4 11	20 51	22 20	5 01	6 30	2 30	9 12	.....	2 12	54	0 08.9	- 0 08	6.7
Wed Dec 20/Thu Dec 21	4 14	20 52	22 21	5 02	6 30	2 35	9 17	.....	2 43	65	0 58.6	6 28	6.7
Thu Dec 21/Fri Dec 22	4 18	20 52	22 21	5 02	6 31	2 39	9 21	.....	3 15	75	1 49.0	12 45	6.7
Fri Dec 22/Sat Dec 23	4 22	20 53	22 22	5 03	6 32	2 44	9 26	.....	3 50	84	2 41.1	18 23	6.7
Sat Dec 23/Sun Dec 24	4 26	20 53	22 22	5 03	6 32	2 48	9 30	17 42	4 30	91	3 35.6	23 03	6.7
Sun Dec 24/Mon Dec 25	4 30	20 53	22 22	5 04	6 33	2 52	9 35	18 46	5 15	96	4 32.6	26 29	6.7
Mon Dec 25/Tue Dec 26	4 34	20 54	22 23	5 04	6 33	2 57	9 39	19 49	6 06	99	5 31.2	28 27	6.7
Tue Dec 26/Wed Dec 27	4 38	20 54	22 23	5 05	6 34	3 01	9 44	20 48	.....	100	6 30.1	28 52	6.7
Wed Dec 27/Thu Dec 28	4 42	20 55	22 23	5 06	6 34	3 05	9 49	21 40	.....	98	7 27.4	27 45	6.7
Thu Dec 28/Fri Dec 29	4 46	20 55	22 24	5 06	6 35	3 09	9 53	22 25	.....	95	8 21.9	25 17	6.7
Fri Dec 29/Sat Dec 30	4 50	20 55	22 24	5 07	6 36	3 14	9 58	23 03	.....	90	9 12.9	21 44	6.7
Sat Dec 30/Sun Dec 31	4 54	20 56	22 24	5 08	6 36	3 18	10 03	23 36	.....	84	10 00.4	17 23	6.7
Sun Dec 31/Mon Jan 01	4 58	20 56	22 24	5 09	6 37	3 22	10 07	0 06	.....	77	10 45.1	12 26	6.7