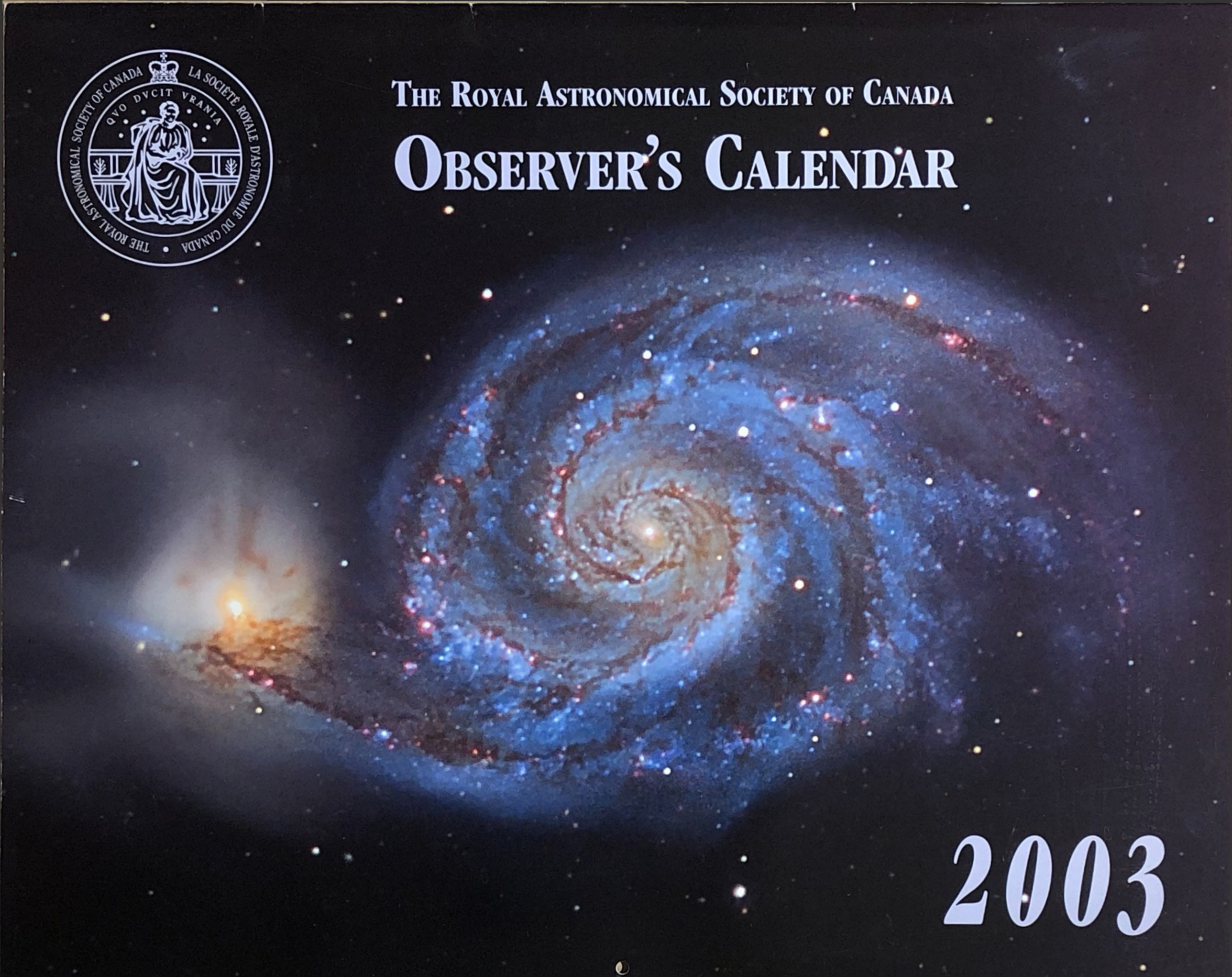
The Royal Astronomical Society of Canada

Observer's Calendar



2003

JANUARY

This Winter, Visit the California Nebula

Looking away from the galactic centre into Perseus and deep space, we find this large emission nebula making stars in an outer arm of the Milky Way. A photographic showpiece, especially as it appears here in this composite of multiple images, it is visually faint and elusive even when viewed through an H-beta filter.

Composite of photos by Matt BenDaniel, Rajiv Gupta, and John Mirtle

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
The planets this month *Mercury: very low in SE in morning twilight late in month* *Venus: very low in SE at dawn* *Mars: low in SSE at dawn* *Jupiter: rises in evening twilight, visible for rest of night* *Saturn: high in E after dark, sets in morning twilight*	*Times in the upper half of the daily boxes are in the 24-hour clock; times in the lower half are given in the 12-hour clock.* *Eastern time is used, except for nse and set events which are given in local time. Detailed instructions on adjusting times for location are given in the back pages.* *Please see back pages for photo details and additional information about this Calendar.*	DECEMBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 FEBRUARY S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	40°N 50°N Rise 6:16 7:00 Set 15:34 14:48 **1** *New Year's Day*	40°N 50°N Rise 7:22 8:09 Set 16:32 15:44 *New Moon* 15:23 **2**	40°N 50°N Rise 8:19 9:05 Set 17:36 16:52 **3** ***Quadrantid meteors peak 7 pm***	40°N 50°N Rise 9:06 9:46 Set 18:43 18:05 **4** Sunrise 7:22 7:58 Sunset 16:48 16:12 ***Earth at perihelion (147,100 Mm) 12 am***
40°N 50°N Rise 9:44 10:16 Set 19:50 19:20 **5**	40°N 50°N Rise 10:16 10:40 Set 20:54 20:33 **6**	40°N 50°N Rise 10:42 10:58 Set 21:56 21:44 **7** ***2 Shadows on Jupiter, visible in all of N. America 2:41 am***	40°N 50°N Rise 11:06 11:14 Set 22:56 22:52 **8** ***2 Shadows on Jupiter, visible in E of N. America 9:09 pm***	40°N 50°N Rise 11:28 11:29 Set 23:55 23:58 **9**	40°N 50°N Rise 11:50 11:43 Set -- -- *1st Quarter* 8:15 **10** ***Venus at greatest elongation W. (47°)***	40°N 50°N Set 0:53 1:05 Rise 12:13 11:58 **11** Sunrise 7:21 7:55 Sunset 16:55 16:21
40°N 50°N Set 1:53 2:12 Rise 12:38 12:16 **12**	40°N 50°N Set 2:53 3:21 Rise 13:06 12:37 **13**	40°N 50°N Set 3:55 4:31 Rise 13:40 13:03 **14** ***2 Shadows on Jupiter, visible in all of N. America 4:48 am***	40°N 50°N Set 4:58 5:40 Rise 14:21 13:38 **15**	40°N 50°N Set 5:59 6:45 Rise 15:11 14:25 **16** ***2 Shadows on Jupiter, visible in all of N. America 12:25 am***	40°N 50°N Set 6:56 7:42 Rise 16:10 15:24 **17**	40°N 50°N Set 7:46 8:28 Rise 17:16 16:35 *Full Moon* 5:48 **18** Sunrise 7:19 7:50 Sunset 17:02 16:31
40°N 50°N Set 8:30 9:05 Rise 18:26 17:54 **19**	40°N 50°N Set 9:06 9:33 Rise 19:39 19:15 **20** *Martin Luther King Jr. Day (USA)*	40°N 50°N Set 9:38 9:56 Rise 20:51 20:37 **21** ***Zodiacal Light visible in W after evening twilight for next two weeks*** ***2 Shadows on Jupiter, visible in W of N. America 7:24 am***	40°N 50°N Set 10:07 10:15 Rise 22:03 21:58 **22**	40°N 50°N Set 10:34 10:33 Rise 23:14 23:19 **23**	40°N 50°N Set 11:01 10:51 Rise -- -- **24** *Crash of Kosmos 954, Soviet nuclear-powered satellite, is reported 25 years ago* ***2 Shadows on Jupiter, visible in E of N. America 8:42 pm***	40°N 50°N Rise 0:25 0:41 Set 11:30 11:11 *3rd Quarter* 3:33 **25** Sunrise 7:15 7:43 Sunset 17:10 16:42
40°N 50°N Rise 1:38 2:03 Set 12:02 11:35 **26** *Tycho Brahe makes his last observation of the Comet of 1577, 425 years ago*	40°N 50°N Rise 2:51 3:25 Set 12:40 12:04 **27** ***Mars 1.5° to left of Cr. Moon 6 am***	40°N 50°N Rise 4:02 4:44 Set 13:25 12:42 **28**	40°N 50°N Rise 5:09 5:56 Set 14:19 13:32 **29**	40°N 50°N Rise 6:09 6:55 Set 15:20 14:34 **30** *Gene Roddenberry, Star Trek creator, receives NASA medal 10 years ago* *A.A. Common photographs the Orion nebula 120 years ago*	40°N 50°N Rise 6:59 7:41 Set 16:25 15:44 **31** *Explorer 1, first U.S. space satellite, is launched 45 years ago*	

FEBRUARY

Star Trails Over Auroral Glow

Here is a photographic painting that combines a simple impression of serenity with a complex harmony of details. Soft hues of the aurora reflected in the lake glow in counterpoint to the sharp silhouettes of trees within the aurora's heart and, beyond, to the sweeping multi-coloured arcs of stars circling the pole.

Photo by John Nemy

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
The planets this month *Mercury: very low in SE in morning twilight early in month* *Venus: low in SE in morning twilight* *Mars: rises before 3 am in E, very low in SSE at dawn* *Jupiter: rises before sunset, sets in morning twilight* *Saturn: high in SSE after dark, sets in early morning*	*Times in the upper half of the daily boxes are in the 24-hour clock; times in the lower half are given in the 12-hour clock.* *Eastern time is used, except for rise and set events which are given in local time. Detailed instructions on adjusting times for location are given in the back pages.* *Please see back pages for photo details and additional information about this Calendar.*	JANUARY S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 MARCH S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31				40°N 50°N Rise 7:40 8:15 Set 17:32 16:59 *New Moon* 5:48 Sunrise 7:09 7:34 Sunset 17:19 16:54 **1** *Chinese New Year*
40°N 50°N Rise 8:14 8:41 Set 18:38 18:13 **2** ***Jupiter at opposition***	40°N 50°N Rise 8:42 9:02 Set 19:42 19:26 **3** *Winter Star Party, Florida Keys* *www.scas.org (through Feb. 8)* ***Mercury at greatest elongation W. (25°)***	40°N 50°N Rise 9:07 9:19 Set 20:43 20:35 **4**	40°N 50°N Rise 9:30 9:34 Set 21:43 21:43 **5**	40°N 50°N Rise 9:52 9:48 Set 22:42 22:50 **6**	40°N 50°N Rise 10:14 10:03 Set 23:40 23:57 **7**	40°N 50°N Rise 10:38 10:19 Set -- -- Sunrise 7:02 7:23 Sunset 17:27 17:06 **8**
40°N 50°N Set 0:40 1:05 Rise 11:05 10:38 *1st Quarter* 6:11 **9**	40°N 50°N Set 1:41 2:13 Rise 11:36 11:01 **10**	40°N 50°N Set 2:43 3:22 Rise 12:13 11:32 **11** ***Saturn 2.3° S. of Moon*** ***10 pm***	40°N 50°N Set 3:44 4:29 Rise 12:58 12:13 **12**	40°N 50°N Set 4:42 5:29 Rise 13:52 13:06 **13**	40°N 50°N Set 5:36 6:20 Rise 14:55 14:12 **14** *Valentine's Day*	40°N 50°N Set 6:22 7:01 Rise 16:05 15:28 **15** Sunrise 6:53 7:11 Sunset 17:36 17:18
40°N 50°N Set 7:02 7:33 Rise 17:19 16:51 *Full Moon* 18:51 **16** *Gerard Kuiper discovers Miranda, a moon of Uranus, 55 years ago*	40°N 50°N Set 7:37 7:58 Rise 18:33 18:15 **17** *President's Day (USA)*	40°N 50°N Set 8:07 8:19 Rise 19:47 19:40 **18**	40°N 50°N Set 8:35 8:38 Rise 21:01 21:04 **19** *Nicholas Copernicus is born 530 years ago* ***Zodiacal Light visible in W after evening twilight for next two weeks***	40°N 50°N Set 9:03 8:56 Rise 22:15 22:27 **20** *James Cook observes Aurora Australis 230 years ago*	40°N 50°N Set 9:32 9:16 Rise 23:29 23:51 **21**	40°N 50°N Set 10:04 9:38 Rise -- -- Sunrise 6:44 6:58 Sunset 17:44 17:30 **22**
40°N 50°N Rise 0:43 1:15 Set 10:40 10:05 *3rd Quarter* 11:46 **23**	40°N 50°N Rise 1:55 2:35 Set 11:23 10:40 **24**	40°N 50°N Rise 3:03 3:49 Set 12:13 11:26 **25**	40°N 50°N Rise 4:04 4:51 Set 13:11 12:23 **26**	40°N 50°N Rise 4:56 5:40 Set 14:14 13:31 **27**	40°N 50°N Rise 5:39 6:17 Set 15:20 14:43 **28**	*"Time present and time past* *Are both contained in time future* *And time future contained in time past"* *T.S. Eliot*

MARCH

The Flaming Star Nebula

As the hot star AE Aurigae passes through the dusty clouds of IC 405, it creates a spectacular dance of intertwining emission and reflection nebulae. Rarely have blue-light reflections off grains of dust together with red hydrogen emissions been portrayed in such a three-dimensional and dramatic manner.

Photo by Tony Hallas

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
The planets this month *Mercury: not observable* *Venus: low in ESE in morning twilight* *Mars: rises in SE in early morning, low in SSE at dawn* *Jupiter: high in SE after dark, sets in WNW at dawn* *Saturn: high in SW after dark, sets near 2 am*	*Times in the upper half of the daily boxes are in the 24-hour clock; times in the lower half are given in the 12-hour clock.* *Eastern time is used, except for rise and set events which are given in local time. Detailed instructions on adjusting times for location are given in the back pages.* *Please see back pages for photo details and additional information about this Calendar.*	FEBRUARY S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 APRIL S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30				40°N 50°N Rise 6:14 6:45 Set 16:25 15:57 Sunrise 6:34 6:44 Sunset 17:51 17:42 **1**
40°N 50°N Rise 6:44 7:06 Set 17:29 17:10 *New Moon* 21:35 **2** *1st non-Soviet and non-American cosmonaut (Czech) is launched 25 years ago*	40°N 50°N Rise 7:10 7:24 Set 18:31 18:21 **3** *Robert Hooke, known for quarrels with Newton, dies 300 years ago* *The **Royal** Astronomical Society of Canada formally acquires its name, after permission of King Edward VII, 100 years ago*	40°N 50°N Rise 7:33 7:39 Set 19:32 19:29 **4** *Islamic New Year*	40°N 50°N Rise 7:55 7:53 Set 20:31 20:37 **5**	40°N 50°N Rise 8:17 8:08 Set 21:30 21:44 **6**	40°N 50°N Rise 8:40 8:23 Set 22:29 22:51 **7** *L. Kohoutek discovers his notorious comet 30 years ago*	40°N 50°N Rise 9:05 8:40 Set 23:30 -- **8** Sunrise 6:23 6:29 Sunset 17:59 17:53
40°N 50°N Set -- 0:00 Rise 9:33 9:02 **9**	40°N 50°N Set 0:31 1:08 Rise 10:07 9:28 **10**	40°N 50°N Set 1:31 2:15 Rise 10:48 10:04 *1st Quarter* 2:15 **11**	40°N 50°N Set 2:30 3:17 Rise 11:37 10:50 **12**	40°N 50°N Set 3:24 4:11 Rise 12:35 11:49 **13**	40°N 50°N Set 4:13 4:55 Rise 13:41 13:00 **14** ***Jupiter 3.5° S. of Moon*** ***8 pm***	40°N 50°N Set 4:55 5:30 Rise 14:52 14:20 **15** Sunrise 6:12 6:14 Sunset 18:07 18:05 *Asteroid 1878DA comes within 13 million km. of Earth 25 years ago*
40°N 50°N Set 5:32 5:58 Rise 16:07 15:44 **16**	40°N 50°N Set 6:04 6:20 Rise 17:22 17:10 **17**	40°N 50°N Set 6:33 6:40 Rise 18:38 18:36 *Full Moon* 5:34 **18** *Alexander von Humboldt observes zodiacal light 39°5' above horizon 200 years ago*	40°N 50°N Set 7:02 6:59 Rise 19:54 20:03 **19**	40°N 50°N Set 7:31 7:18 Rise 21:11 21:30 **20** ***Spring Equinox*** ***8:00 pm***	40°N 50°N Set 8:02 7:39 Rise 22:28 22:57 **21**	40°N 50°N Set 8:37 8:05 Rise 23:44 -- **22** Sunrise 6:01 5:59 Sunset 18:14 18:16
40°N 50°N Rise -- 0:23 Set 9:19 8:38 **23**	40°N 50°N Rise 0:56 1:41 Set 10:08 9:21 *3rd Quarter* 20:51 **24**	40°N 50°N Rise 2:00 2:48 Set 11:04 10:16 **25**	40°N 50°N Rise 2:55 3:41 Set 12:06 11:21 **26** *Benjamin Thompson, known for candle power measurement, is born 250 years ago* ***Vesta at opposition***	40°N 50°N Rise 3:40 4:21 Set 13:11 12:32 **27**	40°N 50°N Rise 4:17 4:50 Set 14:17 13:46 **28**	40°N 50°N Rise 4:48 5:13 Set 15:21 14:59 **29** Sunrise 5:49 5:44 Sunset 18:21 18:27
40°N 50°N Rise 5:14 5:31 Set 16:23 16:09 **30**	40°N 50°N Rise 5:38 5:47 Set 17:23 17:18 **31**					

APRIL

A Comet's View of the Andromeda Galaxy

In early April, 2002, Comet Ikeya-Zhang passed within two degrees of M31 and its satellite galaxies, M32 on its left and M110 on its lower right. The comet's great gas (blue) and dust (white) tails overflow the field of this picture, which is at least five degrees across, and dwarf M31, one of the largest of all deep-sky objects.

Photo by Gerald Rhemann

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The planets this month *Mercury: low in WNW in evening twilight, best at mid-month* *Venus: very low in E in bright morning twilight* *Mars: rises near 3 am in SE, low in SSE at dawn* *Jupiter: high in SW after dark, sets in WNW in early morning* *Saturn: in W after dark, sets after midnight*		1 40°N 50°N Rise 5:59 6:01 Set 18:23 18:25 *New Moon* 14:19	2 40°N 50°N Rise 6:21 6:15 Set 19:22 19:33 *Selenographical Journal, 1st magazine of lunar studies, begins 125 years ago*	3 40°N 50°N Rise 6:43 6:29 Set 20:21 20:40	4 40°N 50°N Rise 7:07 6:45 Set 21:21 21:48	5 40°N 50°N Rise 7:34 7:05 Set 22:22 22:57 Sunrise 5:38 5:29 Sunset 18:28 18:38
6 40°N 50°N Rise 9:06 8:29 Set -- -- ***Daylight Saving Time Begins*** ***2 am***	7 40°N 50°N Set 0:23 1:05 Rise 9:43 9:00 ***Saturn 2.8° S. of Cr. Moon visible in NE of N. America*** ***8 pm***	8 40°N 50°N Set 1:21 2:08 Rise 10:28 9:41	9 40°N 50°N Set 2:17 3:05 Rise 11:22 10:34 *1st Quarter* 19:40	10 40°N 50°N Set 3:06 3:52 Rise 12:23 11:39	11 40°N 50°N Set 3:50 4:29 Rise 13:30 12:53	12 40°N 50°N Set 4:27 4:58 Rise 14:41 14:13 Sunrise 6:27 6:14 Sunset 19:35 19:49
13 40°N 50°N Set 5:00 5:22 Rise 15:55 15:36	14 40°N 50°N Set 5:30 5:42 Rise 17:09 17:01	15 40°N 50°N Set 5:58 6:01 Rise 18:25 18:28 *F.G.W. Struve, patriarch of Struve dynasty, is born 210 years ago*	16 40°N 50°N Set 6:27 6:19 Rise 19:43 19:57 *Full Moon* 15:36 ***Mercury at greatest elongation E. (20°) best evening view in 2003*** ***Largest Full Moon of 2003***	17 40°N 50°N Set 6:57 6:39 Rise 21:02 21:27 *First Day of Passover*	18 40°N 50°N Set 7:31 7:03 Rise 22:22 22:57 *Good Friday*	19 40°N 50°N Set 8:11 7:33 Rise 23:39 -- Sunrise 6:17 6:00 Sunset 19:42 20:00
20 40°N 50°N Rise -- 0:23 Set 8:58 8:13 *Easter Sunday*	21 40°N 50°N Rise 0:50 1:38 Set 9:54 9:05	22 40°N 50°N Rise 1:50 2:38 Set 10:56 10:09 ***Lyrid meteors peak*** ***1 pm***	23 40°N 50°N Rise 2:40 3:23 Set 12:02 11:20 *3rd Quarter* 8:18	24 40°N 50°N Rise 3:20 3:56 Set 13:09 12:35	25 40°N 50°N Rise 3:52 4:20 Set 14:14 13:48	26 40°N 50°N Rise 4:20 4:39 Set 15:16 15:00 Sunrise 6:07 5:46 Sunset 19:49 20:11 *Arno Penzias, co-discoverer of cosmic background radiation, is born 70 years ago*
27 40°N 50°N Rise 4:44 4:55 Set 16:17 16:09 *Rolf Meier (Ottawa) is first to discover a comet from Canada, 25 years ago* *Texas Star Party, Fort Davis, TX www.texasstarparty.org (through May 4)*	28 40°N 50°N Rise 5:05 5:09 Set 17:16 17:16	29 40°N 50°N Rise 5:27 5:23 Set 18:15 18:23	30 40°N 50°N Rise 5:48 5:37 Set 19:14 19:30	*"When beggars die, there are no comets seen. The heavens themselves blaze forth the death of princes."* *Shakespeare, Julius Caesar*	*Times in the upper half of the daily boxes are in the 24-hour clock; times in the lower half are given in the 12-hour clock.* *Eastern time is used, except for rise and set events which are given in local time. Detailed instructions on adjusting times for location are given in the back pages.* *Please see back pages for photo details and additional information about this Calendar.*	MARCH S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 MAY S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

MAY

Grand Design in a Spiral Galaxy

The great blue spiral arms of M51 (The Whirlpool) take sharp, angular turns thanks to their interaction with NGC 5195, which is receding behind one of the arms and leaving milky, swirling clouds of stars in its wake. The size of M51 is startling in relation to at least half a dozen background galaxies.

Photo by Tony Hallas

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40°N 50°N Rise 7:43 7:01 Set 23:16 -- **4**	40°N 50°N Set -- 0:01 Rise 8:25 7:38 **5** *International Astronomy Week (through May 11)* ***η-Aquarid meteors peak*** ***7 pm***	40°N 50°N Set 0:12 1:00 Rise 9:15 8:26 **6**	40°N 50°N Set 1:03 1:50 Rise 10:12 9:26 **7** ***Mercury Transits the Sun end visible after sunrise in NE USA and Eastern Canada***	40°N 50°N Set 1:48 2:30 Rise 11:16 10:36 **8**	40°N 50°N Set 2:26 3:01 Rise 12:24 11:52 *1st Quarter* 7:53 **9**	40°N 50°N Set 3:00 3:25 Rise 13:34 13:11 **10** Sunrise 5:50 5:22 Sunset 20:03 20:32 *International Astronomy Day* *www.astroleague.org/al/astroday/astroday.html* *www.rasc.ca/activity/astroday*
40°N 50°N Set 3:29 3:46 Rise 14:46 14:33 **11** *Mother's Day*	40°N 50°N Set 3:57 4:04 Rise 15:59 15:56 **12**	40°N 50°N Set 4:24 4:22 Rise 17:14 17:22 **13**	40°N 50°N Set 4:52 4:40 Rise 18:32 18:50 **14** *Skylab 1, first U.S. space station, is launched 30 years ago*	40°N 50°N Set 5:24 5:02 Rise 19:51 20:21 *Full Moon* 23:36 **15** ***Total Lunar Eclipse most of the umbral phase visible in all of N. America***	40°N 50°N Set 6:00 5:28 Rise 21:12 21:51 **16**	40°N 50°N Set 6:45 6:03 Rise 22:28 23:15 **17** Sunrise 5:43 5:12 Sunset 20:10 20:42
40°N 50°N Set 7:38 6:50 Rise 23:36 -- **18**	40°N 50°N Rise -- 0:25 Set 8:39 7:50 **19** *Victoria Day (Canada)*	40°N 50°N Rise 0:33 1:19 Set 9:47 9:02 **20** *Pioneer Venus Orbiter, 1st U.S. craft to orbit Venus, is launched 25 years ago.*	40°N 50°N Rise 1:18 1:57 Set 10:56 10:18 **21**	40°N 50°N Rise 1:54 2:25 Set 12:03 11:35 *3rd Quarter* 20:31 **22**	40°N 50°N Rise 2:24 2:46 Set 13:08 12:48 **23** *Riverside Telescope Makers Conference, Big Bear, CA, www.rtmc-inc.org (to May 25)*	40°N 50°N Rise 2:49 3:03 Set 14:09 13:59 **24** Sunrise 5:38 5:03 Sunset 20:16 20:51
40°N 50°N Rise 3:11 3:18 Set 15:09 15:07 **25**	40°N 50°N Rise 3:33 3:31 Set 16:08 16:14 **26** *Memorial Day (USA)*	40°N 50°N Rise 3:54 3:45 Set 17:07 17:21 **27**	40°N 50°N Rise 4:16 3:59 Set 18:07 18:28 **28**	40°N 50°N Rise 4:41 4:16 Set 19:07 19:37 **29**	40°N 50°N Rise 5:09 4:37 Set 20:09 20:46 **30**	40°N 50°N Rise 5:43 5:03 Set 21:09 21:54 *New Moon* 0:20 **31** Sunrise 5:34 4:57 Sunset 20:22 20:59 *Nicholas Copernicus obtains degree of Doctor of Canon Law 500 years ago* ***Annular Solar Eclipse partial phase visible in parts of N. Canada and Alaska***

JUNE

Star Clouds, Star Factories

At right, the Sagittarius Star Cloud (M24) features the dark nebula B92 on its northern (left) edge. This dark cloud may eventually become an emission nebula, such as the red HII regions M17 and M16 at lower centre and lower left, and result ultimately in a cluster of new stars such as small but bright M18 just below centre.

Photo by Stephen Barnes

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1 40°N 50°N Rise 6:23 5:38 Set 22:07 22:55	2 40°N 50°N Rise 7:11 6:23 Set 23:01 23:48 *A.A. Common, 1st to study nebulae photographically, dies 100 years ago*	3 40°N 50°N Rise 8:07 7:19 Set 23:47 -- ***Mercury at greatest elongation W. (24°) not easily observed***	4 40°N 50°N Set -- 0:31 Rise 9:08 8:26	5 40°N 50°N Set 0:27 1:04 Rise 10:14 9:40	6 40°N 50°N Set 1:02 1:30 Rise 11:23 10:57	7 40°N 50°N Set 1:32 1:51 Rise 12:32 12:15 *1st Quarter* 16:28 Sunrise 5:31 4:52 Sunset 20:26 21:06 *Asteroid Herculina occults a star and is found to have a satellite, 25 years ago*
8 40°N 50°N Set 1:59 2:10 Rise 13:42 13:35	9 40°N 50°N Set 2:25 2:27 Rise 14:53 14:56 *Sir William Herschel announces existence of binary stars to Royal Society 200 years ago* ***Pluto at opposition***	10 40°N 50°N Set 2:51 2:44 Rise 16:07 16:20	11 40°N 50°N Set 3:20 3:03 Rise 17:24 17:48	12 40°N 50°N Set 3:53 3:26 Rise 18:42 19:17	13 40°N 50°N Set 4:32 3:55 Rise 20:01 20:45 *Pioneer 10 is 1st manmade object to leave solar system 20 years ago*	14 40°N 50°N Set 5:21 4:36 Rise 21:14 22:03 *Full Moon* 7:16 Sunrise 5:31 4:50 Sunset 20:30 21:10
15 40°N 50°N Set 6:19 5:30 Rise 22:18 23:06 *Father's Day*	16 40°N 50°N Set 7:25 6:38 Rise 23:09 23:52 *Valentina Tereshkova is 1st woman in space 40 years ago*	17 40°N 50°N Set 8:36 7:55 Rise 23:51 -- *David Rittenhouse makes 1st accurate eclipse observation in U.S., 225 years ago*	18 40°N 50°N Rise -- 0:25 Set 9:46 9:14 *Sally Ride is 1st American woman in space 20 years ago*	19 40°N 50°N Rise 0:24 0:50 Set 10:54 10:31 ***Mars 2.5° N. of Moon*** *3 am*	20 40°N 50°N Rise 0:51 1:08 Set 11:58 11:44	21 40°N 50°N Rise 1:15 1:24 Set 13:00 12:54 *3rd Quarter* 10:45 Sunrise 5:31 4:51 Sunset 20:32 21:13 ***Mercury 0.4° S. of Venus best in S of N. America*** *5 am* ***Summer Solstice*** *3:10 pm*
22 40°N 50°N Rise 1:37 1:38 Set 14:00 14:02 *James Christy and Robert Harrington discover Pluto's moon, Charon, 25 years ago*	23 40°N 50°N Rise 1:58 1:52 Set 14:59 15:09	24 40°N 50°N Rise 2:20 2:06 Set 15:58 16:17 *St.-Jean-Baptiste Day (Quebec)* *David Rittenhouse makes 1st accurate eclipse observation in U.S., 225 years ago*	25 40°N 50°N Rise 2:44 2:22 Set 16:58 17:26	26 40°N 50°N Rise 3:11 2:41 Set 17:59 18:35 *SEASAT 1, first oceanographic satellite, is launched 25 years ago*	27 40°N 50°N Rise 3:43 3:06 Set 19:01 19:43 *RASC General Assembly, Vancouver www.rasc.ca/ga2003 (through Jun. 29)*	28 40°N 50°N Rise 4:21 3:37 Set 20:00 20:47 Sunrise 5:33 4:53 Sunset 20:33 21:13
29 40°N 50°N Rise 5:07 4:19 Set 20:56 21:44 *New Moon* 14:39	30 40°N 50°N Rise 6:00 5:12 Set 21:45 22:30 *A solar eclipse is observed from the Concorde for 74 minutes, 30 years ago*		*"The stars are mansions built by nature's hand, And, haply, there the spirits of the blest Dwell clothed in radiance, their immortal vest."* *Wordsworth*	**The planets this month** *Mercury: not easily observable* *Venus: very low in ENE in bright morning twilight* *Mars: rises after midnight in ESE, in SE at dawn* *Jupiter: low in W in evening twilight* *Saturn: not easily observable*	*Times in the upper half of the daily boxes are in the 24-hour clock; times in the lower half are given in the 12-hour clock.* *Eastern time is used, except for rise and set events which are given in local time. Detailed instructions on adjusting times for location are given in the back pages.* *Please see back pages for photo details and additional information about this Calendar.*	MAY S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 JULY S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

JULY

Dark Clouds Near the Galactic Centre

The centre of the Milky Way lies just to the right of this image. Even in this dense field of over 185,000 stars just above the spout of the Sagittarius Tea Pot, B86 (The Inkspot) is an astonishing dark triangular cloud right next to NGC 6520, a fine open cluster. Both are magnificent in any telescope.

Photo by Matt BenDaniel

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
The planets this month *Mercury: very low in WNW after sunset late in month* *Venus: very low in ENE in bright morning twilight, lost in twilight late in month* *Mars: rises after dark in ESE, in S after dawn* *Jupiter: very low in WNW after sunset, lost in twilight late in month* *Saturn: very low in ENE morning twilight late in month*	*"They toiled and built a thousand years,* *In love's all powerful might:* *And so the Milky Way was made —* *A starry bridge of light!"* *Topelius*	1 40°N 50°N Rise 7:01 6:17 Set 22:28 23:07 *Canada Day*	2 40°N 50°N Rise 8:07 7:30 Set 23:04 23:35	3 40°N 50°N Rise 9:15 8:46 Set 23:35 23:57	4 40°N 50°N Rise 10:24 10:05 Set -- -- *Independence Day (USA)* ***Earth at aphelion (152,100 Mm)*** ***2 am***	5 40°N 50°N Set 0:03 0:16 Rise 11:33 11:23 Sunrise 5:37 4:58 Sunset 20:32 21:11
6 40°N 50°N Set 0:29 0:33 Rise 12:42 12:42 *1st Quarter* 22:32	7 40°N 50°N Set 0:54 0:50 Rise 13:53 14:03	8 40°N 50°N Set 1:21 1:07 Rise 15:06 15:26	9 40°N 50°N Set 1:51 1:28 Rise 16:22 16:52	10 40°N 50°N Set 2:26 1:53 Rise 17:38 18:18	11 40°N 50°N Set 3:09 2:27 Rise 18:52 19:40	12 40°N 50°N Set 4:02 3:14 Rise 20:00 20:49 Sunrise 5:41 5:04 Sunset 20:30 21:07
13 40°N 50°N Set 5:04 4:15 Rise 20:57 21:43 *Full Moon* 15:21	14 40°N 50°N Set 6:13 5:29 Rise 21:43 22:22	15 40°N 50°N Set 7:25 6:48 Rise 22:20 22:50	16 40°N 50°N Set 8:35 8:08 Rise 22:51 23:12	17 40°N 50°N Set 9:42 9:25 Rise 23:16 23:29 ***Mars 0.5° N. of Moon*** ***3 am***	18 40°N 50°N Set 10:46 10:37 Rise 23:39 23:44	19 40°N 50°N Set 11:48 11:47 Rise -- 23:58 Sunrise 5:47 5:12 Sunset 20:25 21:00
20 40°N 50°N Rise 0:01 -- Set 12:48 12:56	21 40°N 50°N Rise 0:23 0:12 Set 13:47 14:04 *3rd Quarter* 3:01	22 40°N 50°N Rise 0:46 0:27 Set 14:48 15:12	23 40°N 50°N Rise 1:12 0:45 Set 15:48 16:21	24 40°N 50°N Rise 1:42 1:07 Set 16:50 17:30 *Henri A. Deslandres, known for solar studies, is born 150 years ago*	25 40°N 50°N Rise 2:17 1:35 Set 17:50 18:36 ***Mercury 0.4° N. of Jupiter best in S of N. America*** ***8 pm***	26 40°N 50°N Rise 3:00 2:13 Set 18:48 19:36 Sunrise 5:53 5:21 Sunset 20:20 20:51 *Mount Kobau Star Party, Osoyoos, BC www.mksp.ca (through Aug. 3)* ***Saturn at perihelion***
27 40°N 50°N Rise 3:51 3:03 Set 19:40 20:26	28 40°N 50°N Rise 4:50 4:04 Set 20:25 21:07	29 40°N 50°N Rise 5:55 5:15 Set 21:04 21:38 *New Moon* 2:53 *James C. Watson claims to have observed 2 planets within Mercury's orbit 125 years ago* ***S. δ-Aquarid meteors peak*** ***2 am***	30 40°N 50°N Rise 7:04 6:33 Set 21:37 22:02	31 40°N 50°N Rise 8:14 7:52 Set 22:06 22:22	*Times in the upper half of the daily boxes are in the 24-hour clock; times in the lower half are given in the 12-hour clock.* *Eastern time is used, except for rise and set events which are given in local time. Detailed instructions on adjusting times for location are given in the back pages.* *Please see back pages for photo details and additional information about this Calendar.*	JUNE S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 AUGUST S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

AUGUST

The Helix Nebula

The white dwarf star at its centre powers this planetary nebula (NGC 7293) with its tiny, comet-like streamers that lead to its great toroidal shells of fluorescent energy. At half the diameter of the Full Moon, the Helix is a large but elusive object that benefits visually from an OIII filter; even more elusive is the small galaxy at upper right.

Photo by Jack Newton

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
The planets this month *Mercury: very low in W after sunset early in month* *Venus: not observable* *Mars: rises in evening twilight in ESE, low in SW in morning twilight* *Jupiter: not observable* *Saturn: rises before 3 am in ENE, in E at dawn*	*Times in the upper half of the daily boxes are in the 24-hour clock; times in the lower half are given in the 12-hour clock.* *Eastern time is used, except for rise and set events which are given in local time. Detailed instructions on adjusting times for location are given in the back pages.* *Please see back pages for photo details and additional information about this Calendar.*	JULY S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 SEPTEMBER S M T W T F S 1 2 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30			40°N 50°N Rise 9:24 9:12 Set 22:33 22:40 **1** *Nova East, Smiley's Provincial Park, NS halifax.rasc.ca/ne (through Aug. 3)* *Stellafane Convention, Springfield, VT www.stellafane.com (through Aug. 2)*	40°N 50°N Rise 10:34 10:32 Set 22:58 22:56 **2** Sunrise 5:59 5:30 Sunset 20:13 20:41
40°N 50°N Rise 11:45 11:52 Set 23:24 23:13 **3**	40°N 50°N Rise 12:57 13:14 Set 23:53 23:32 **4** *Civic Holiday (Canada)* ***Neptune at opposition***	40°N 50°N Rise 14:10 14:37 Set -- 23:55 *1st Quarter* 3:28 **5**	40°N 50°N Set 0:25 -- Rise 15:25 16:02 **6**	40°N 50°N Set 1:04 0:25 Rise 16:38 17:23 **7**	40°N 50°N Set 1:52 1:06 Rise 17:47 18:36 **8** *Pioneer 13 is 1st U.S. spacecraft to land on Venus 25 years ago*	40°N 50°N Set 2:49 2:00 Rise 18:47 19:35 **9** Sunrise 6:06 5:40 Sunset 20:05 20:30
40°N 50°N Set 3:55 3:08 Rise 19:36 20:18 **10**	40°N 50°N Set 5:05 4:25 Rise 20:16 20:50 **11**	40°N 50°N Set 6:16 5:45 Rise 20:49 21:14 *Full Moon* 0:48 **12**	40°N 50°N Set 7:25 7:03 Rise 21:17 21:33 **13** ***Perseid meteors peak 1 am***	40°N 50°N Set 8:31 8:18 Rise 21:41 21:48 **14** ***Mercury at greatest elongation E. (27°) not easily observed***	40°N 50°N Set 9:34 9:30 Rise 22:03 22:03 **15**	40°N 50°N Set 10:35 10:40 Rise 22:25 22:16 **16** Sunrise 6:12 5:51 Sunset 19:56 20:17
40°N 50°N Set 11:36 11:49 Rise 22:47 22:31 **17**	40°N 50°N Set 12:36 12:57 Rise 23:12 22:48 **18** ***Venus at superior conjunction***	40°N 50°N Set 13:37 14:06 Rise 23:40 23:08 *3rd Quarter* 20:48 **19**	40°N 50°N Set 14:38 15:15 Rise -- 23:33 **20**	40°N 50°N Rise 0:13 -- Set 15:38 16:23 **21** *Starfest, Mount Forest, ON www.nyaa-starfest.com (through Aug. 24)*	40°N 50°N Rise 0:52 0:07 Set 16:37 17:25 **22**	40°N 50°N Rise 1:40 0:51 Set 17:31 18:19 **23** Sunrise 6:19 6:01 Sunset 19:46 20:03 *Saskatchewan Star Party, Cypress Hills, SK prana.usask.ca/~rasc/rasc.html (to Aug. 25)*
40°N 50°N Rise 2:35 1:47 Set 18:19 19:03 **24** ***Uranus at opposition***	40°N 50°N Rise 3:39 2:55 Set 19:00 19:38 **25**	40°N 50°N Rise 4:47 4:12 Set 19:36 20:05 **26** *Meteorite shower drops about 3000 fragments on Laigle, France 200 years ago*	40°N 50°N Rise 5:58 5:32 Set 20:07 20:26 *New Moon* 13:26 **27** ***Mars at closest approach, 0.3727 AU nearest approach to Earth in past 2000 years 5:51 am***	40°N 50°N Rise 7:10 6:54 Set 20:35 20:45 **28** *Galileo probe makes 1st images of an asteroid's moon, Dactyl, 10 years ago* ***Mars at opposition***	40°N 50°N Rise 8:22 8:16 Set 21:01 21:02 **29**	40°N 50°N Rise 9:34 9:38 Set 21:27 21:19 **30** Sunrise 6:26 6:12 Sunset 19:35 19:49 *Guion Bluford, Jr. is 1st black American in space 20 years ago*
40°N 50°N Rise 10:47 11:01 Set 21:55 21:37 **31**						

SEPTEMBER

The Great Cygnus Supernova Loop

At nearly three degrees across, this grand-scale view of the Veil Nebula supernova remnant reveals how its blast has cleared away interstellar dust and exposed more background stars than in the regions outside its bow-shock. Its delicate filaments wind red hydrogen and green oxygen emissions together in breathtaking intricacy.

Composite of photos by Matt BenDaniel and Rajiv Gupta

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
The planets this month *Mercury: very low in E before sunrise late in month* *Venus: not easily observable* *Mars: rises before sunset, sets before dawn* *Jupiter: very low in E at dawn late in month* *Saturn: rises after midnight in ENE, high in E before dawn*	1 40°N 50°N Rise 12:01 12:26 Set 22:26 21:59 *Labour Day*	2 40°N 50°N Rise 13:16 13:51 Set 23:03 22:26	3 40°N 50°N Rise 14:30 15:14 Set 23:48 23:03 *1st Quarter* 8:34	4 40°N 50°N Rise 15:40 16:29 Set -- 23:52	5 40°N 50°N Set 0:41 -- Rise 16:41 17:31	6 40°N 50°N Set 1:43 0:55 Rise 17:33 18:18 Sunrise 6:32 6:22 Sunset 19:24 19:34
7 40°N 50°N Set 2:51 2:08 Rise 18:15 18:52	8 40°N 50°N Set 4:01 3:26 Rise 18:49 19:18	9 40°N 50°N Set 5:10 4:44 Rise 19:18 19:38 ***Mars 1.8° E. of Moon best in W of N. America*** ***2 am***	10 40°N 50°N Set 6:16 6:00 Rise 19:43 19:54 *Full Moon* 12:36	11 40°N 50°N Set 7:20 7:13 Rise 20:06 20:08	12 40°N 50°N Set 8:22 8:24 Rise 20:27 20:22	13 40°N 50°N Set 9:23 9:33 Rise 20:49 20:36 Sunrise 6:39 6:32 Sunset 19:13 19:19
14 40°N 50°N Set 10:24 10:43 Rise 21:13 20:52	15 40°N 50°N Set 11:25 11:52 Rise 21:39 21:10	16 40°N 50°N Set 12:26 13:01 Rise 22:10 21:33	17 40°N 50°N Set 13:27 14:09 Rise 22:46 22:02	18 40°N 50°N Set 14:26 15:14 Rise 23:29 22:41 *3rd Quarter* 15:03	19 40°N 50°N Set 15:21 16:11 Rise -- 23:32	20 40°N 50°N Rise 0:21 -- Set 16:11 16:59 Sunrise 6:45 6:43 Sunset 19:01 19:03 *Max Wolf discovers asteroid Athalia photographically 100 years ago*
21 40°N 50°N Rise 1:20 0:34 Set 16:55 17:36	22 40°N 50°N Rise 2:26 1:46 Set 17:32 18:06	23 40°N 50°N Rise 3:36 3:05 Set 18:05 18:29 ***Fall Equinox*** ***6:47 am***	24 40°N 50°N Rise 4:47 4:27 Set 18:34 18:48 ***Zodiacal Light visible in E before morning twilight for next two weeks***	25 40°N 50°N Rise 6:00 5:50 Set 19:01 19:06 *New Moon* 23:09 *Alberta Star Party, Caroline, AB www.syz.com/rasc (through Sep. 28)*	26 40°N 50°N Rise 7:14 7:14 Set 19:27 19:23 ***Mercury at greatest elongation W. (18°) best morning view in 2003***	27 40°N 50°N Rise 8:29 8:39 Set 19:55 19:41 Sunrise 6:52 6:53 Sunset 18:49 18:48 *Rosh Hashanah*
28 40°N 50°N Rise 9:45 10:06 Set 20:26 20:01 *Edwin Hubble, founder of extragalactic astronomy, dies 50 years ago*	29 40°N 50°N Rise 11:02 11:34 Set 21:01 20:27	30 40°N 50°N Rise 12:19 13:01 Set 21:44 21:01			*Times in the upper half of the daily boxes are in the 24-hour clock; times in the lower half are given in the 12-hour clock.* *Eastern time is used, except for rise and set events which are given in local time. Detailed instructions on adjusting times for location are given in the back pages.* *Please see back pages for photo details and additional information about this Calendar.*	AUGUST S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 OCTOBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

OCTOBER

Auroral Crown and Veil Over Orion

A great aurora often shows a crown and covers much more than half the sky. Here, the strength of the display is showering over Gemini at left, Orion below centre, and Taurus and the Pleiades at upper right. This image records the memorable event of October 28, 2001, when Jupiter, Sirius, and Saturn formed a "winter triangle."

Photo by Alan Dyer

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
The planets this month *Mercury: very low in E before sunrise early in month* *Venus: very low in WSW in evening twilight late in month* *Mars: in SSE after dark, sets near 3 am* *Jupiter: low in E at dawn* *Saturn: rises before midnight in ENE, visible for rest of night*	*Times in the upper half of the daily boxes are in the 24-hour clock; times in the lower half are given in the 12-hour clock.* *Eastern time is used, except for rise and set events which are given in local time. Detailed instructions on adjusting times for location are given in the back pages.* *Please see back pages for photo details and additional information about this Calendar.*	SEPTEMBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 NOVEMBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	40°N 50°N Rise 13:32 14:21 Set 22:36 21:46 **1** *NASA is estabilised by U.S. Congress 45 years ago*	40°N 50°N Rise 14:37 15:28 Set 23:36 22:46 *1st Quarter* 15:09 **2** *Dominique F.J. Arago, known for laws of light polarization, dies 150 years ago*	40°N 50°N Rise 15:32 16:19 Set -- 23:56 **3**	40°N 50°N Set 0:42 -- Rise 16:16 16:57 **4** Sunrise 6:59 7:04 Sunset 18:38 18:33
40°N 50°N Set 1:51 1:13 Rise 16:52 17:24 **5** *Edwin Hubble discovers Cepheid variables in the Andromeda Galaxy 80 years ago*	40°N 50°N Set 3:00 2:31 Rise 17:22 17:44 **6** *Yom Kippur*	40°N 50°N Set 4:06 3:46 Rise 17:47 18:01 **7**	40°N 50°N Set 5:10 4:59 Rise 18:10 18:16 **8** *Ejnar Hertzsprung, Danish astronomer, is born 130 years ago*	40°N 50°N Set 6:12 6:10 Rise 18:31 18:29 **9** ***Draconid meteors peak*** ***5 am***	40°N 50°N Set 7:13 7:20 Rise 18:53 18:43 *Full Moon* 3:27 **10** *Venera 15 begins orbiting Venus 20 years ago*	40°N 50°N Set 8:14 8:29 Rise 19:16 18:57 **11** Sunrise 7:06 7:15 Sunset 18:27 18:18
40°N 50°N Set 9:15 9:39 Rise 19:41 19:14 **12**	40°N 50°N Set 10:16 10:48 Rise 20:09 19:35 **13** *Thanksgiving Day (Canada)* *Columbus Day (USA)* ***Pallas at opposition***	40°N 50°N Set 11:17 11:57 Rise 20:43 20:01 **14**	40°N 50°N Set 12:17 13:03 Rise 21:23 20:36 **15**	40°N 50°N Set 13:13 14:03 Rise 22:11 21:21 **16**	40°N 50°N Set 14:05 14:54 Rise 23:06 22:18 **17**	40°N 50°N Set 14:50 15:35 Rise -- 23:25 *3rd Quarter* 8:31 **18** Sunrise 7:13 7:26 Sunset 18:17 18:03
40°N 50°N Rise 0:08 -- Set 15:29 16:06 **19**	40°N 50°N Rise 1:14 0:39 Set 16:03 16:31 **20**	40°N 50°N Rise 2:24 1:58 Set 16:32 16:52 **21**	40°N 50°N Rise 3:35 3:19 Set 16:59 17:09 **22** ***Orionid meteors peak*** ***5 am***	40°N 50°N Rise 4:47 4:42 Set 17:25 17:26 **23**	40°N 50°N Rise 6:02 6:06 Set 17:52 17:43 **24** ***Zodiacal Light visible in E before morning twilight for next two weeks***	40°N 50°N Rise 7:18 7:34 Set 18:22 18:02 *New Moon* 8:50 **25** Sunrise 7:21 7:38 Sunset 18:07 17:50
40°N 50°N Rise 7:38 8:05 Set 17:56 17:26 **26** ***Daylight Saving Time Ends*** ***2 am***	40°N 50°N Rise 8:58 9:36 Set 18:36 17:56 **27** *First day of Ramadân* *1.4 kg meteorite penetrates garage roof in Canon City, Colorado, 30 years ago*	40°N 50°N Rise 10:16 11:03 Set 19:26 18:38 **28**	40°N 50°N Rise 11:28 12:19 Set 20:25 19:34 **29**	40°N 50°N Rise 12:28 13:17 Set 21:32 20:44 **30**	40°N 50°N Rise 13:17 14:00 Set 22:42 22:01 *1st Quarter* 23:25 **31** *Halloween*	

NOVEMBER

Leonid Fireball West of Orion

Next to the Perseids, the Leonids often put on the best meteor showers. On the night of November 17, 2001, the Leonids were spectacular, as in this shot of a fireball heading between Saturn and Aldebaran and dramatically lighting up stray clouds in the foreground. A fainter streak is passing just to the right of orange Betelgeuse.

Photo by Barry Burgess

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
The planets this month *Mercury: not easily observable* *Venus: very low in SW in evening twilight* *Mars: in SSE after dark, sets in WSW near 1 am* *Jupiter: rises near 1 am in E, in SE at dawn* *Saturn: rises in early evening in ENE, visible for rest of night*	*Times in the upper half of the daily boxes are in the 24-hour clock; times in the lower half are given in the 12-hour clock.* *Eastern time is used, except for rise and set events which are given in local time. Detailed instructions on adjusting times for location are given in the back pages.* *Please see back pages for photo details and additional information about this Calendar.*	OCTOBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 DECEMBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31				40°N 50°N Rise 13:55 14:30 Set 23:51 23:19 **1** Sunrise 6:29 6:49 Sunset 16:58 16:37
40°N 50°N Rise 14:26 14:52 Set -- -- **2**	40°N 50°N Set 0:58 0:36 Rise 14:53 15:09 **3**	40°N 50°N Set 2:03 1:49 Rise 15:16 15:24 **4** ***S. Taurid meteors peak 5 pm***	40°N 50°N Set 3:05 3:00 Rise 15:37 15:37 **5**	40°N 50°N Set 4:05 4:09 Rise 15:58 15:51 **6**	40°N 50°N Set 5:06 5:18 Rise 16:20 16:05 **7**	40°N 50°N Set 6:06 6:27 Rise 16:44 16:20 *Full Moon* 20:13 Sunrise 6:37 7:01 Sunset 16:50 16:26 **8** ***Total Lunar Eclipse most of the umbral phase visible in all of N. America***
40°N 50°N Set 7:07 7:37 Rise 17:11 16:39 **9** *William Christie, Astronomer Royal, becomes Knight Commander of the Bath 100 years ago*	40°N 50°N Set 8:09 8:46 Rise 17:43 17:04 **10** *Ian Halliday, who determined Pluto's diameter, is born 75 years ago*	40°N 50°N Set 9:09 9:54 Rise 18:21 17:35 **11** *Remembrance Day (Canada)* *Veteran's Day (USA)*	40°N 50°N Set 10:07 10:56 Rise 19:06 18:16 **12**	40°N 50°N Set 11:00 11:50 Rise 19:58 19:08 **13** ***N. Taurid meteors peak 3 pm***	40°N 50°N Set 11:47 12:34 Rise 20:57 20:11 **14**	40°N 50°N Set 12:28 13:08 Rise 22:00 21:22 **15** Sunrise 6:45 7:12 Sunset 16:44 16:16
40°N 50°N Set 13:02 13:34 Rise 23:06 22:37 *3rd Quarter* 23:15 **16**	40°N 50°N Set 13:32 13:56 Rise -- 23:54 **17** ***Leonid meteors peak 10:00 pm***	40°N 50°N Rise 0:14 -- Set 13:59 14:13 **18**	40°N 50°N Rise 1:24 1:13 Set 14:24 14:30 **19**	40°N 50°N Rise 2:35 2:34 Set 14:50 14:46 **20**	40°N 50°N Rise 3:48 3:58 Set 15:17 15:03 **21**	40°N 50°N Rise 5:06 5:26 Set 15:48 15:24 **22** Sunrise 6:53 7:23 Sunset 16:39 16:08 *IRAS, discoverer of many new asteroids and comets, becomes inoperative 20 years ago*
40°N 50°N Rise 6:26 6:58 Set 16:25 15:50 *New Moon* 17:59 **23** ***Total Solar Eclipse visible only from Antarctica and nearby S. Indian Ocean*** ***Closest Lunar Perigee of 2003 6 pm***	40°N 50°N Rise 7:48 8:30 Set 17:11 16:27 **24**	40°N 50°N Rise 9:05 9:55 Set 18:07 17:17 **25**	40°N 50°N Rise 10:14 11:05 Set 19:13 18:23 **26**	40°N 50°N Rise 11:10 11:56 Set 20:25 19:41 **27** *Thanksgiving Day (USA)*	40°N 50°N Rise 11:54 12:32 Set 21:38 21:02 **28**	40°N 50°N Rise 12:28 12:57 Set 22:48 22:22 **29** Sunrise 7:00 7:34 Sunset 16:36 16:02 *Christian J. Doppler, known for the Doppler effect of sound waves, is born 200 years ago*
40°N 50°N Rise 12:57 13:16 Set 23:54 23:38 *1st Quarter* 12:16 **30**		*"Heavens utmost deep* *Gives up her stars, and like a flock of sheep* *They pass before his eye, are number'd, and roll on."* *Shelley*				

DECEMBER

The Christmas Tree and Its Cone

Embedded within the bright emission region left of centre is NGC 2264, a cluster of stars that telescopically resembles an upside-down Christmas tree. The tiny dark Cone Nebula pierces its top. The blue reflection nebula IC 2169 is at the right of the image, and Hubble's Variable Nebula, below centre left, looks like a small comet.

Photo by Matt BenDaniel

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
The planets this month *Mercury: very low in SW after sunset early in month* *Venus: low in SW in evening twilight* *Mars: in S after dark, sets in W after midnight* *Jupiter: rises before midnight in E, high in S at dawn* *Saturn: rises in evening twilight in ENE, visible for rest of night*	40°N 50°N Rise 13:21 13:32 Set -- -- **1**	40°N 50°N Set 0:58 0:50 Rise 13:43 13:46 **2**	40°N 50°N Set 1:59 2:00 Rise 14:04 13:59 **3** *Pioneer 10 is 1st spacecraft to fly by Jupiter 30 years ago* *Edmund Halley receives MA degree from Queen's College, Oxford, 325 years ago*	40°N 50°N Set 2:59 3:09 Rise 14:26 14:12 **4** *Pioneer Venus Orbiter begins orbiting Venus for a record 14 years, 25 years ago*	40°N 50°N Set 3:59 4:17 Rise 14:49 14:27 **5**	40°N 50°N Set 5:00 5:26 Rise 15:14 14:45 **6** Sunrise 7:07 7:43 Sunset 16:35 15:59
40°N 50°N Set 6:01 6:36 Rise 15:45 15:07 **7**	40°N 50°N Set 7:02 7:44 Rise 16:20 15:36 *Full Moon* 15:37 **8**	40°N 50°N Set 8:01 8:49 Rise 17:03 16:14 **9** ***Mercury at greatest elongation E. (21°)***	40°N 50°N Set 8:56 9:46 Rise 17:53 17:03 **10**	40°N 50°N Set 9:45 10:33 Rise 18:50 18:03 **11**	40°N 50°N Set 10:28 11:10 Rise 19:52 19:11 **12** *Norman Lockyer reports theory of celestial dissociation to Royal Society 125 years ago*	40°N 50°N Set 11:03 11:38 Rise 20:57 20:24 **13** Sunrise 7:13 7:50 Sunset 16:35 15:58 ***Geminid meteors peak*** *11 pm*
40°N 50°N Set 11:34 12:01 Rise 22:03 21:39 **14**	40°N 50°N Set 12:01 12:19 Rise 23:10 22:55 **15** *Voyager 1 begins imaging Jupiter 25 years ago*	40°N 50°N Set 12:26 12:35 Rise -- -- *3rd Quarter* 12:42 **16**	40°N 50°N Rise 0:17 0:13 Set 12:50 12:50 **17**	40°N 50°N Rise 1:27 1:32 Set 13:16 13:06 **18**	40°N 50°N Rise 2:39 2:55 Set 13:43 13:24 **19**	40°N 50°N Rise 3:56 4:22 Set 14:16 13:47 **20** Sunrise 7:18 7:55 Sunset 16:37 16:00
40°N 50°N Rise 5:15 5:52 Set 14:56 14:17 **21** *First Apollo manned mission (orbital) to Moon 35 years ago*	40°N 50°N Rise 6:35 7:21 Set 15:47 14:59 **22** ***Winter Solstice*** ***2:04 am*** ***Ursid meteors peak*** ***7 pm***	40°N 50°N Rise 7:49 8:40 Set 16:49 15:57 *New Moon* 4:43 **23** *Gerard P. Kuiper, who theorized belt of objects beyond Neptune, dies 30 years ago*	40°N 50°N Rise 8:53 9:42 Set 18:00 17:12 **24**	40°N 50°N Rise 9:44 10:26 Set 19:15 18:35 **25** *Christmas Day*	40°N 50°N Rise 10:25 10:57 Set 20:29 19:59 **26** *Boxing Day (Canada)*	40°N 50°N Rise 10:57 11:20 Set 21:39 21:19 **27** Sunrise 7:21 7:59 Sunset 16:41 16:04
40°N 50°N Rise 11:23 11:37 Set 22:46 22:35 **28**	40°N 50°N Rise 11:46 11:52 Set 23:49 23:47 **29**	40°N 50°N Rise 12:08 12:06 Set -- -- *1st Quarter* 5:03 **30** *Skylab obtains 1st space image of a comet, Kohoutek, 30 years ago*	40°N 50°N Set 0:50 0:57 Rise 12:30 12:19 **31** ***Saturn at opposition***	*"Even the modern observer is touched by a strange sensation of having been present at the drama of creation."* *Robert Burnham, on viewing the Cone*	*Times in the upper half of the daily boxes are in the 24-hour clock; times in the lower half are given in the 12-hour clock.* *Eastern time is used, except for rise and set events which are given in local time. Detailed instructions on adjusting times for location are given in the back pages.* *Please see back pages for photo details and additional information about this Calendar.*	NOVEMBER S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 JANUARY S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

The Royal Astronomical Society of Canada Observer's Calendar

How to Use this Calendar

A graphical representation of the Moon's phase at midday is given in each daily box. The depicted size of the Moon varies, reflecting the change in the apparent size of the Moon in the sky as it moves closer to or further from Earth.

Daily Moon and weekly Sun rise and set times, and the times of Moon phases, are shown in the top portion of the boxes. If no Moon rise or set time is given, this event occurs the next day. Special astronomical events, such as eclipses, meteor showers, occultations, interesting planetary events, and equinoxes and solstices, are given at the bottom of the boxes.

The Calendar lists events observable in some part of Canada or the United States. Days on which particularly interesting phenomena occur are highlighted with light green shading. Detailed information on all events, including their visibility from particular locations, may be determined by consulting the *Observer's Handbook*, which is published annually by the RASC.

Adjusting Times for Actual Location

All times are adjusted for Daylight Saving Time. Moon phases and special events are given in Eastern time. The user's local time for events *other than* Moon and Sun rise and set may be determined by converting the given time to the user's time zone (e.g. Pacific time is Eastern time minus 3 hours).

Two sets of rise and set times are given to accommodate North American observers in midnorthern latitudes. Times are displayed for locations 40° N latitude and 75° W longitude and for 50° N, 75° W. The actual times for a given location must be calculated using the tables at the right.

The tables give corrections in minutes to the tabulated rise and set times for selected Canadian and US cities. In the column labelled **Correction**, an entry such as *50° N + 25* means add 25 minutes to the displayed 50° N time. This computed time is an approximation. In the column labelled **Accuracy**, the approximate maximum error in minutes for Moon rise and set using this method is indicated. The error for Sun rise and set is less. These errors can be substantially reduced by interpolating according to latitude, as explained in the following section.

Note that the rise and set times calculated using the above method *will be local times*. It is not necessary to adjust them for time zone.

Canadian Locations

City	Correction	Accuracy	Latitude
Calgary	50° N + 36	15	51
Charlottetown	40° N + 12	20	46
Edmonton	50° N + 34	25	54
Halifax	40° N + 14	25	45
Hamilton	40° N + 20	15	43
Kingston	40° N + 6	20	44
Kitchener	40° N + 22	15	43
London	40° N + 25	15	43
Moncton	40° N + 19	20	46
Montreal	50° N – 6	20	46
Niagara	40° N + 16	15	43
Kelowna	50° N – 3	10	50
Ottawa	50° N + 3	20	45
Prince George	50° N + 11	25	54
Québec	50° N – 15	15	47
Regina	50° N + 58 (1)	10	50
St. John's	50° N + 1	20	48
Sarnia	40° N + 30	15	43
Saskatoon	50° N + 67 (1)	15	52
Thunder Bay	50° N + 57	10	48
Toronto	40° N + 18	20	44
Vancouver	50° N + 12	15	49
Victoria	50° N + 13	20	49
Windsor	40° N + 32	15	42
Winnipeg	50° N + 29	5	50

U.S. Locations

City	Correction	Accuracy	Latitude
Atlanta	40° N + 37	30	34
Boston	40° N – 16	10	42
Chicago	40° N – 10	15	42
Cincinnati	40° N + 38	10	39
Denver	40° N + 0	10	40
Flagstaff	40° N + 27 (1)	30	35
Kansas City	40° N + 18	10	39
Los Angeles	40° N – 7	35	34
Minneapolis	40° N + 13	25	45
New York	40° N – 4	5	41
San Francisco	40° N + 10	20	38
Seattle	50° N + 9	20	48
Tucson	40° N + 24 (1)	40	32
Washington	40° N + 8	5	39

(1) Subtract 60 minutes in the summer.

Other Locations, and Improving Accuracy

For locations not listed in the tables to the left, the user should calculate a correction factor. This amount is +4 minutes for each degree that the user's location is west of the central meridian of the user's time zone or –4 minutes for each degree that it is east. This correction factor should be added to the displayed 50° N or 40° N time for the location whose latitude is nearest that of the user's site. The accuracy in minutes for Moon rise and set can be calculated by multiplying the difference in latitude between the user's location and that of the 50° N or 40° N site used by 4.5 and adding 0.2 times the difference in longitude.

Improvement in accuracy may be obtained for many sites by interpolating or extrapolating the 50° N and 40° N times depending on the user's latitude. For example, the latitude of Ottawa is approximately midway between 50° N and 40° N. An observer in Ottawa can improve accuracy to better than 5 minutes by averaging the given 50° N and 40° N times and then adding the correction factor for Ottawa, which is 3 minutes. Western observers may gain additional accuracy by adding about 10% of the difference between the listed time and the next day's time.

The Royal Astronomical Society of Canada

Since it was founded in 1890, the RASC has filled a special role in both amateur and professional astronomy. Today, it has over 4500 members who share a passion for the night sky and make contributions to astronomy in many ways.

The RASC has a long tradition of high-quality, volunteer-produced publications. The *Observer's Handbook* has been published since 1908 and is recognized worldwide as the leading handbook of its type. The *Journal*, now in its 96th year of publication, contains articles of interest to amateur and professional astronomers. The *Beginner's Observing Guide* is an introduction to the night sky for the novice observer, and the *Observer's Calendar* is a forum for astrophotography by amateur astronomers.

For information on joining the Society, or to order an RASC publication, contact the national office at:

136 Dupont Street
Toronto ON M5R 1V2
Canada
888-924-7272 (toll free in Canada) or 416-924-7973

rasc@rasc.ca www.rasc.ca

The Photos and the Calendar

Many of the images in this Calendar were digitally processed, with details as given below and to the right. Monthly grids with data were generated using special software written in the Fortran and PostScript programming languages.

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Printing
University of Toronto Press Inc.

Cover/May *(Grand Design in a Spiral Galaxy):* Composite image formed using *RegiStar*, *CCDSharp*, and *Photoshop* from a total of 21 CCD images: 5 each at 20 minutes, 20 minutes, and 32 minutes red-, green-, and blue-filtered respectively, and 6 at 20 minutes unfiltered, on an SBIG ST-10E CCD camera using a 14.5-inch f/8 classical Cassegrain (Tony Hallas).

January *(This Winter, Visit the California Nebula):* Composite image formed using *RegiStar* and *Photoshop* from a total of 6 exposures: 90 minutes and 108 minutes on medium-format Kodak PPF 400 using a 5-inch f/6 Astro-Physics refractor (Matt BenDaniel); 120 minutes red-filtered on medium-format Tech Pan using a 5-inch f/6 Astro-Physics refractor (Rajiv Gupta); 17 minutes, 60 minutes, and 65 minutes red-, green-, and blue-filtered respectively on Tech Pan using a Celestron 8-inch f/1.5 Schmidt camera (John Mirtle). (Image formed by Rajiv Gupta.)

February *(Star Trails Over Auroral Glow):* 3-hour fixed-tripod exposure on Kodak Elitechrome 200 using a 28-mm lens at f/4.5; photo taken November 16, 2001 from Torrance Barrens Dark Sky Reserve, Torrance, Ontario (John Nemy).

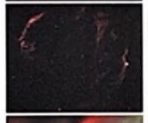
March *(The Flaming Star Nebula):* Composite image formed using *RegiStar* and *Photoshop* from 4 exposures, 90 minutes each on gas-hypersensitized Kodak RG 200 using a 14.5-inch f/8 classical Cassegrain (Tony Hallas).

April *(A Comet's View of the Andromeda Galaxy):* Composite image formed using *RegiStar* and *Photoshop* from 3 exposures: 3½ and 4½ minutes on medium-format Kodak Ektachrome 100, and 5 minutes on medium-format Tech Pan, using a 7½-inch f/2.3 Schmidt camera; exposures taken April 4, 2002 at 19h UT (Gerald Rhemann).

June *(Star Clouds, Star Factories):* Composite mosaic image formed using *RegiStar* and *Photoshop* from 2 exposures, 7 minutes each on Kodak Ektachrome 200 using an 8-inch f/1.5 Schmidt camera (Stephen Barnes).

July *(Dark Clouds Near the Galactic Centre):* 60-minute exposure on medium-format Kodak PPF 400 using a 5-inch f/6 Astro-Physics refractor; photo taken in Chile (Matt BenDaniel).

August *(The Helix Nebula):* Composite image formed using *MaxIm DL* and *Photoshop* from 4 exposures: 6 minutes, 8 minutes, and 8 minutes red-, green-, and blue-filtered respectively, and 8 minutes unfiltered, on a Finger Lakes 1024 x 1024 CCD camera using a 16-inch f/10 Meade SCT (Jack Newton).



September *(The Great Cygnus Supernova Loop):* Composite image formed using *RegiStar* and *Photoshop* from 4 exposures: 90 minutes on medium-format Kodak PPF 400 using a 5-inch f/6 Astro-Physics refractor (Matt BenDaniel) and 100 minutes, 120 minutes, and 120 minutes red-, red-, and cyan-filtered respectively on medium-format Tech Pan using a 5-inch f/6 Astro-Physics refractor (Rajiv Gupta). (Image formed by Rajiv Gupta.)

October *(Auroral Crown and Veil Over Orion):* 30-second fixed-tripod exposure on Kodak Ektachrome 200 using a 16-mm fisheye lens at f/3.5; photo taken October 28, 2001 near Calgary (Alan Dyer).

November *(Leonid Fireball West of Orion):* 6-minute exposure on Fuji Superia 400 using a 35-mm f/2 lens and homemade barn-door tracker; photo taken Nov. 18, 2001 at 8h UT in St. Croix, Nova Scotia (Barry Burgess).

December *(The Christmas Tree and Its Cone):* 97-minute exposure on medium-format Kodak PPF 400 using a 5-inch f/6 Astro-Physics refractor (Matt BenDaniel).

Note: "Tech Pan" refers to gas-hypersensitized Kodak Technical Pan black-and-white film.

2003

January

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February

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30	31					

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25	26	27	28	29	30	***31***

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27	28	***29***	30	31		

August

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31						

September

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28	29	30				

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December

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21	22	***23***	24	25	26	27
28	29	30	31			

2004

January

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18	19	20	***21***	22	23	24
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February

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March

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April

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30	31					

June

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13	14	15	16	***17***	18	19
20	21	22	23	24	25	26
27	28	29	30			

July

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				1	2	3
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11	12	13	14	15	16	***17***
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25	26	27	28	29	30	31

August

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15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

September

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			1	2	3	4
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12	13	***14***	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

October

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24	25	26	27	28	29	30
31						

November

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7	8	9	10	11	***12***	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

December

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			1	2	3	4
5	6	7	8	9	10	***11***
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

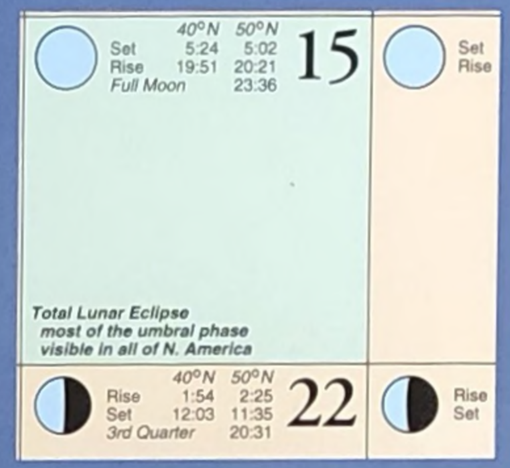
New Moon dates are displayed in ***bold****.*

"What we have learnt
Is like a handful of earth;
What we have yet to learn
Is like the whole world..."

Poetess Avvaiyar
(1st century B.C.)

All photos in this unique Calendar were taken by amateur astronomers using backyard telescopes or ordinary cameras. Volunteer members of the Royal Astronomical Society of Canada handled all aspects of this Calendar's assembly and production.

This Calendar includes comprehensive listings of astronomical data such as lunar and planetary conjunctions, Sun and Moon rise and set times, eclipses, and major meteor showers.



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