



THE ROYAL ASTRONOMICAL SOCIETY OF CANADA
OBSERVER'S CALENDAR

2002





FEBRUARY

Lunar Seas of the First-Quarter Moon

Three great seas dominate the image: Mare Serenitatis at centre, Mare Tranquillitatis below it, and Mare Crisium at the right limb. Note the slash at upper left (Valles Alpes), the craters Aristoteles and Eudoxus to its right, and the chain of mountains (Montes Caucasus) sweeping downwards past the seas.

Photo by Alan Dyer

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
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<p>3</p> <p>50°N 40°N</p> <p>Rise 10:31 10:44</p> <p>Set -- --</p>	<p>4</p> <p>Rise 0:40 0:22</p> <p>Set 10:54 11:15</p> <p>3rd Quarter 8:33</p>	<p>5</p> <p>Rise 1:58 1:31</p> <p>Set 11:20 11:49</p>	<p>6</p> <p>Rise 3:12 2:38</p> <p>Set 11:52 12:28</p>	<p>7</p> <p>Rise 4:21 3:41</p> <p>Set 12:31 13:11</p>	<p>8</p> <p>Rise 5:23 4:40</p> <p>Set 13:18 14:01</p>	<p>9</p> <p>Rise 6:15 5:32</p> <p>Set 14:14 14:56</p> <p>Sunrise 7:21 7:00</p> <p>Sunset 17:08 17:29</p>
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<p>Juno at opposition</p>	<p>Winter Star Party, Florida Keys www.scas.org (through Feb. 16)</p>		<p>Johann Dreyer, compiler of NGC catalogue, born 150 years ago</p> <p>Farthest Lunar Apogee of 2002 8 pm</p>	<p>Valentine's Day</p>	<p>Ulysses' closest approach to Jupiter at 454,000 km, 10 years ago</p> <p>Birth of Jacques Cassini, Director of Paris Observatory, 325 years ago</p>	
<p>17</p> <p>50°N 40°N</p> <p>Rise 9:25 9:34</p> <p>Set 22:59 22:46</p>	<p>18</p> <p>Rise 9:43 9:59</p> <p>Set -- 23:46</p>	<p>19</p> <p>Set 0:07 --</p> <p>Rise 10:04 10:27</p>	<p>20</p> <p>Set 1:16 0:48</p> <p>Rise 10:29 11:00</p> <p>1st Quarter 7:02</p>	<p>21</p> <p>Set 2:27 1:52</p> <p>Rise 11:02 11:39</p>	<p>22</p> <p>Set 3:37 2:56</p> <p>Rise 11:45 12:26</p>	<p>23</p> <p>Set 4:41 3:58</p> <p>Rise 12:41 13:24</p> <p>Sunrise 6:55 6:42</p> <p>Sunset 17:32 17:45</p>
	<p>First flight (piggy back) of first Space Shuttle, Enterprise, 25 years ago</p>		<p>John Glenn first American in space, 40 years ago</p> <p>Moon occults Saturn visible in most of USA and east of Canada 7 pm</p>	<p>Mercury at greatest elongation W. (27°) not easily observed</p>	<p>Jupiter 0.6° S. of Moon best in north of N. America 9 pm</p>	
<p>24</p> <p>50°N 40°N</p> <p>Set 5:36 4:55</p> <p>Rise 13:51 14:31</p>	<p>25</p> <p>Set 6:21 5:46</p> <p>Rise 15:11 15:45</p>	<p>26</p> <p>Set 6:57 6:30</p> <p>Rise 16:38 17:02</p>	<p>27</p> <p>Set 7:25 7:07</p> <p>Rise 18:06 18:20</p> <p>Full Moon 4:17</p>	<p>28</p> <p>Set 7:50 7:41</p> <p>Rise 19:33 19:38</p>		
<p>Ian Shelton discovers Supernova 1987a, 15 years ago</p>			<p>Largest Full Moon of 2002</p> <p>Closest Lunar Perigee of 2002 3 pm</p>			<p>"... instantly a light upon the lurl Fell like a flash, and lol as I looked up, The Moon hung naked in a firmament Of azure without cloud." Wordsworth</p>



MARCH

Showpiece of the Southern Skies: the Great Eta Carinae Nebula

Resembling the Trifid, but on a much vaster scale, the southern hemisphere's Keyhole is named for the dark lanes that divide its sweeping emission clouds. Its intense luminosity is driven by Eta Carinae, its most mysterious and intriguing star, a gigantic variable that seems fated to end its life as a supernova.

Composite of photos by Rajiv Gupta and Duncan Munro

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<p>Launch of Pioneer 10, first artificial object to leave solar system, 30 years ago</p>		<p>Death of Pierre Simon Laplace, mathematical astronomer, 175 years ago</p> <p>Gerardus Mercator, Flemish geographer known for map projection, born 490 years ago</p>	<p>65th birthday of Valentina Tereshkova, first woman in space</p>	<p>John Herschel, who discovered 525 nebulae, born 210 years ago</p>	<p>Birth of Arthur A. Wachmann, nova and comet discoverer, 100 years ago</p>	<p>Zodiacal Light visible in west after evening twilight for next two weeks</p>
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	<p>Kuiper Airborne Observatory discovers 5 rings of Uranus, 25 years ago</p>					
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	<p>Edward Sabine discovers Earth's periods of magnetic disturbance, 150 years ago</p>		<p>Death of Sir Isaac Newton, 275 years ago</p> <p>Saturn 2.5° E. of Moon best in west of N. America</p> <p>Spring Equinox 12 am 2:16 pm</p>	<p>Birth of Halton C. Arp, compiler of Atlas of Peculiar Galaxies, 75 years ago</p>	<p>Jupiter 1.5° E. of Moon best in west of N. America 2 am</p>	
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				<p>Discovery of second asteroid, Pallas, by H.W.M. Olbers, 200 years ago</p>	<p>Good Friday</p>	
<p>☉ Set 50°N 40°N</p> <p>Rise 7:19 7:42</p> <p>Set 22:40 22:10</p> <p>31</p>						
<p>Easter Sunday</p>						





MAY

The Dusty Trifid (M20)

The dark lanes and red central regions of the Trifid here are dwarfed by vast clouds of blue reflection nebulae, some of the largest to be seen anywhere in the heavens. The blue colour arises from light glancing off dust-grains and extends from the bright, enveloping ring at centre to delicate arcs trailing off at the right side.

Composite of photos by Rajiv Gupta

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<p>Texas Star Party, Fort Davis, TX</p> <p>www.metronet.com/~tsp (through May 12)</p> <p>η-Aquarid meteors peak 12 am</p>		<p>Venus 2.5° N. of Saturn</p> <p>Mars is also nearby 9 pm</p>			<p>Venus 0.3° N. of Mars 9 pm</p>	
<p>50°N 40°N</p> <p>Rise 5:39 6:03</p> <p>Set 20:58 20:28</p> <p>New Moon 6:45</p> <p>12</p>	<p>Rise 6:04 6:35</p> <p>Set 22:09 21:32</p> <p>13</p>	<p>Rise 6:35 7:14</p> <p>Set 23:17 22:35</p> <p>14</p>	<p>Rise 7:16 7:59</p> <p>Set -- 23:35</p> <p>15</p>	<p>Set 0:20 --</p> <p>Rise 8:09 8:54</p> <p>16</p>	<p>Set 1:12 0:30</p> <p>Rise 9:14 9:55</p> <p>17</p>	<p>Set 1:55 1:17</p> <p>Rise 10:27 11:03</p> <p>Sunrise 5:10 5:42</p> <p>Sunset 20:43 20:11</p> <p>18</p>
<p>Mother's Day</p>	<p>Nice evening grouping of Cresc. Moon, Saturn, Venus, Mars, and faint Mercury</p>	<p>Venus 1° N. of Cresc. Moon best in east of N. America</p> <p>Mars is also nearby 9 pm</p>			<p>RASC General Assembly, Montreal</p> <p>www.rasc.ca/ga2002 (through May 19)</p>	
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<p>Hermann Klein observes an apparently new lunar crater, Hyginus, 125 years ago</p>	<p>Victoria Day (Canada)</p>				<p>Riverside Telescope Makers Conference, Big Bear, CA, www.rimc-inc.org (to May 26)</p>	
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	<p>Memorial Day (USA)</p>				<p>2 Shadows on Jupiter end visible in E. of N. America 7:05 pm</p>	



JUNE

The Nucleus of Our Galaxy

The epic scale of this image reveals a breathtaking view of the central "bulge" of our spiral galaxy. In a cosmic counterpoint of light and darkness, colossal dust-lanes, seas of star-clouds, and red stellar nurseries crowd along the galactic plane, while dark tendrils reach up from the plane toward the red giant star Antares at upper centre in Scorpius.

Photo by Alan Dyer

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<p>Johanne Galle, discoverer of Neptune, born 190 years ago</p>	<p>Annular Solar Eclipse partial phase visible in most of N. America except extreme east</p>		<p>Jupiter 2° to left of Cresc. Moon best in west of N. America 8 pm</p>	<p>Venus 2° E. of Cresc. Moon best in east of N. America 8 pm</p>		
<p> Set ^{50°N} 1:00 ^{40°N} 0:36 Rise 10:56 11:17 16</p>	<p> Set 1:24 1:08 Rise 12:17 12:29 1st Quarter 17</p>	<p> Set 1:44 1:37 Rise 13:38 13:40 18</p>	<p> Set 2:04 2:05 Rise 14:58 14:52 19</p>	<p> Set 2:23 2:34 Rise 16:20 16:03 20</p>	<p> Set 2:45 3:04 Rise 17:41 17:16 21</p>	<p> Set 3:10 3:38 Rise 19:02 18:28 22</p> <p>Sunrise 4:51 5:32 Sunset 21:13 20:32</p>
<p>Father's Day</p>	<p>Death of Werner von Braun, a pioneer German space scientist, 25 years ago</p>				<p>Summer Solstice 9:24 am Mercury at greatest elongation W. (23°)</p>	
<p> Set ^{50°N} 3:42 ^{40°N} 4:18 Rise 20:19 19:38 23</p>	<p> Set 4:22 5:04 Rise 21:27 20:42 Full Moon 17:42 24</p>	<p> Set 5:13 5:58 Rise 22:23 21:38 25</p>	<p> Set 6:13 6:57 Rise 23:06 22:26 26</p>	<p> Set 7:21 7:59 Rise 23:39 23:05 27</p>	<p> Set 8:31 9:03 Rise -- 23:38 28</p>	<p> Rise 0:05 -- Set 9:41 10:05 29</p> <p>Sunrise 4:54 5:34 Sunset 21:13 20:33</p>
	<p>St.-Jean-Baptiste Day (Quebec) First French astronaut launched on mission to Salyut 7 space station, 20 years ago</p>					
<p> Rise ^{50°N} 0:25 ^{40°N} 0:06 Set 10:49 11:05 30</p>			<p>"At a single glance, I survey the whole Universe. He will never be happy, who such pleasures fail to please." Tao Ch'ien</p>			



JULY

The Intricate Ring (M57)

This famous planetary nebula is more than a ghostly doughnut. This image discloses toroidal filaments and delicate and graceful details of the excited gases (in particular, oxygen) around its dying central star. That star, a visual challenge, "winks" at observers using large apertures and high magnifications on nights of good "seeing."

Composite of CCD images by Stephen Barnes and Benoit Schillings

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<p>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.</p> <p>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.</p> <p>Please see back pages for photo details and additional information about this Calendar.</p>	<p>50°N 40°N Set 11:56 12:04 Rise -- --</p> <p>1</p> <p>Canada Day Jocelyn Bell discovers first pulsar, 35 years ago</p>	<p>Rise 0:58 0:54 Set 13:02 13:03 3rd Quarter 13:19</p> <p>2</p>	<p>Rise 1:14 1:17 Set 14:08 14:01</p> <p>3</p> <p>Mercury 1.3° W. of Saturn 4:45 am</p>	<p>Rise 1:29 1:40 Set 15:15 15:00</p> <p>4</p> <p>Independence Day (USA)</p>	<p>Rise 1:47 2:05 Set 16:24 16:01</p> <p>5</p>	<p>Rise 2:08 2:33 Set 17:35 17:05</p> <p>6</p> <p>Sunrise 4:59 5:38 Sunset 21:10 20:32</p> <p>Isaac Newton publishes Principia, 315 years ago Earth at aphelion (152,094 Mm) 12 am</p>																																																																																											
<p>50°N 40°N Rise 2:34 3:07 Set 18:47 18:09</p> <p>7</p> <p>Comet Shoemaker-Levy 9 fragments into 21 pieces, 10 years ago</p>	<p>Rise 3:07 3:47 Set 19:56 19:13</p> <p>8</p> <p>Saturn 1° S. of Cresc. Moon visible in all of N. America 5 am</p>	<p>Rise 3:52 4:36 Set 20:59 20:14</p> <p>9</p> <p>Venus 1.6° N. of Regulus 9 pm</p>	<p>Rise 4:50 5:34 Set 21:50 21:09 New Moon 6:26</p> <p>10</p>	<p>Rise 6:00 6:41 Set 22:31 21:56</p> <p>11</p>	<p>Rise 7:19 7:52 Set 23:03 22:36</p> <p>12</p>	<p>Rise 8:42 9:06 Set 23:29 23:10</p> <p>13</p> <p>Sunrise 5:05 5:42 Sunset 21:06 20:29</p>																																																																																											
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AUGUST

The Swan Takes Flight

Here is the entirety of Cygnus or the Northern Cross from the bright star Deneb on the left to the "nose" star Albireo on the right. Below Deneb, the North America Nebula radiates its red emissions against the Northern Coalsack on its right which marks the beginning of the Great Rift that runs all the way to the Galactic Centre.

Photo by Stephen Barnes

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
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<p>50°N 40°N Rise 1:02 1:39 Set 17:38 16:56</p> <p>4</p>	<p>Rise 1:41 2:23 Set 18:43 17:59</p> <p>5</p> <p>Civic Holiday (Canada)</p> <p>Saturn 3° to right of Moon best in east of N. America 3 am</p>	<p>Rise 2:33 3:17 Set 19:40 18:56</p> <p>6</p>	<p>Rise 3:38 4:21 Set 20:26 19:47</p> <p>7</p> <p>Victor Hess discovers cosmic rays, 90 years ago</p>	<p>Rise 4:55 5:32 Set 21:02 20:31 New Moon 15:15</p> <p>8</p> <p>Starfest, Mount Forest, ON www.nyaa-starfest.com (through Aug. 11)</p>	<p>Rise 6:18 6:47 Set 21:30 21:08</p> <p>9</p> <p>Stellafane Convention, Springfield, VT www.stellafane.com (through Aug. 10)</p> <p>Saskatchewan Star Party, Cypress Hills, SK prana.usask.ca/~rasc/rasc.html (to Aug. 11)</p> <p>Nova East, Smiley's Provincial Park, NS halifax.rasc.ca/ne (through Aug. 11)</p>	<p>Rise 7:44 8:02 Set 21:54 21:41</p> <p>10</p> <p>Sunrise 5:42 6:07 Sunset 20:28 20:03</p> <p>First meteor known to enter and leave the atmosphere observed, 30 years ago</p>
<p>50°N 40°N Rise 9:09 9:18 Set 22:14 22:11</p> <p>11</p> <p>Asaph Hall Sr. discovers Martian moon, Deimos, 125 years ago</p>	<p>Rise 10:33 10:31 Set 22:34 22:40</p> <p>12</p> <p>First free flight of a Space Shuttle, Enterprise, 25 years ago</p> <p>Pallas at opposition Perseid meteors peak 6 pm</p>	<p>Rise 11:55 11:44 Set 22:54 23:09</p> <p>13</p>	<p>Rise 13:17 12:57 Set 23:17 23:40</p> <p>14</p>	<p>Rise 14:38 14:08 Set 23:44 -- 1st Quarter 6:12</p> <p>15</p>	<p>Set -- 0:16 Rise 15:55 15:18</p> <p>16</p>	<p>Set 0:17 0:56 Rise 17:07 16:24</p> <p>17</p> <p>Sunrise 5:53 6:13 Sunset 20:15 19:54</p> <p>Asaph Hall Sr. discovers Mars' inner satellite, Phobos, 125 years ago</p>
<p>50°N 40°N Set 1:00 1:44 Rise 18:09 17:24</p> <p>18</p>	<p>Set 1:52 2:38 Rise 19:00 18:16</p> <p>19</p> <p>Uranus at opposition</p>	<p>Set 2:54 3:37 Rise 19:39 19:00</p> <p>20</p> <p>Launch of Voyager 2 to Jupiter, Saturn, Uranus, and Neptune, 25 years ago</p>	<p>Set 4:02 4:39 Rise 20:09 19:37</p> <p>21</p>	<p>Set 5:12 5:41 Rise 20:33 20:08 Full Moon 18:29</p> <p>22</p> <p>Venus at greatest elongation E. (46°)</p>	<p>Set 6:21 6:43 Rise 20:52 20:35</p> <p>23</p>	<p>Set 7:30 7:44 Rise 21:09 21:00</p> <p>24</p> <p>Sunrise 6:03 6:20 Sunset 20:01 19:44</p>
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SEPTEMBER

The Pelican Contemplates North America

Near the bright star Deneb (see August) reside the North America and Pelican emission nebulae. Note the difference in their colours: the darker and fainter reds of the Pelican in contrast to the intense magentas of its larger neighbour. Unlike North America, the Pelican requires a nebula filter for visual observation.

Composite of photos by John Mirtle

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY																																																																																				
<p>50°N 40°N Set 16:28 15:44 Rise -- --</p> <p>1</p> <p>Mercury at greatest elongation E. (27°) not easily observed</p>	<p>Rise 0:18 1:02 Set 17:27 16:42</p> <p>2</p> <p>Labour Day</p>	<p>Rise 1:15 2:00 Set 18:17 17:35</p> <p>3</p>	<p>Rise 2:26 3:07 Set 18:57 18:22</p> <p>4</p>	<p>Rise 3:47 4:20 Set 19:29 19:02</p> <p>5</p> <p>Launch of Voyager 1 to Jupiter and Saturn, 25 years ago Zodiacal Light visible in east before morning twilight for next two weeks</p>	<p>Rise 5:13 5:37 Set 19:54 19:37 New Moon 23:10</p> <p>6</p>	<p>Rise 6:40 6:54 Set 20:16 20:09</p> <p>Sunrise 6:24 6:33 Sunset 19:31 19:22</p> <p>7</p>																																																																																				
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<p>50°N 40°N Set 17:00 16:15 Rise 0:32 --</p> <p>15</p> <p>Britain adopts Gregorian Calendar, 250 years ago</p>	<p>Set 0:46 1:30 Rise 17:42 17:01</p> <p>16</p>	<p>Set 1:52 2:31 Rise 18:14 17:39</p> <p>17</p>	<p>Set 3:01 3:34 Rise 18:39 18:12</p> <p>18</p> <p>Launch of Kosmos 954, which later crashed in northern Canada, 25 years ago First photo taken of crescent Earth and Moon by Voyager 1, 25 years ago</p>	<p>Set 4:11 4:35 Rise 18:59 18:39</p> <p>19</p>	<p>Set 5:19 5:36 Rise 19:16 19:04</p> <p>20</p>	<p>Set 6:27 6:35 Rise 19:31 19:27 Full Moon 9:59 Sunrise 6:45 6:47 Sunset 19:00 18:59</p> <p>21</p> <p>First student-built rocket payload, measuring ozone density, launched 10 years ago</p>																																																																																				
<p>50°N 40°N Set 7:33 7:34 Rise 19:46 19:49</p> <p>22</p> <p>First day of the French Republican Calendar, 210 years ago</p>	<p>Set 8:39 8:32 Rise 20:01 20:11</p> <p>23</p> <p>Death of Urbain Leverrier, who determined the orbit of Neptune, 125 years ago Fall Equinox 12:55 am</p>	<p>Set 9:45 9:31 Rise 20:18 20:35</p> <p>24</p>	<p>Set 10:53 10:30 Rise 20:37 21:02</p> <p>25</p> <p>Launch of Mars Observer, 10 years ago</p>	<p>Set 12:01 11:31 Rise 21:00 21:33</p> <p>26</p> <p>Venus at greatest brilliancy</p>	<p>Set 13:10 12:32 Rise 21:30 22:09</p> <p>27</p>	<p>Set 14:17 13:33 Rise 22:09 22:53</p> <p>Sunrise 6:55 6:53 Sunset 18:45 18:47</p> <p>28</p>																																																																																				
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OCTOBER

The Rainbow Aurora

Have any two auroras ever been the same? This one distinctively parades a rainbow of colours, among which its rose, purple, and violet hues are remarkable. A green slash runs over Mizar and Alcor in the handle of the Big Dipper as bright Arcturus peeks through the trees at lower left.

Photo by Norma Chambers

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<p>50°N 40°N Rise 15:44 15:01 Set 23:41 -- 1st Quarter 1:33</p> <p>13</p>	<p>Set -- 0:23 Rise 16:19 15:42</p> <p>14</p>	<p>Set 0:51 1:26 Rise 16:45 16:16</p> <p>15</p>	<p>Set 2:01 2:28 Rise 17:06 16:44</p> <p>16</p>	<p>Set 3:10 3:29 Rise 17:24 17:09</p> <p>17</p>	<p>Set 4:17 4:29 Rise 17:39 17:32</p> <p>18</p>	<p>Set 5:24 5:27 Rise 17:54 17:54</p> <p>19</p> <p>Sunrise 7:28 7:15 Sunset 18:01 18:15</p>
<p>Mercury at greatest elongation W. (18°) best morning view in 2002</p> <p>50°N 40°N Set 6:30 6:25 Rise 18:08 18:16</p> <p>20</p>	<p>Set 7:36 7:24 Rise 18:24 18:40 Full Moon 3:20</p> <p>21</p>	<p>Set 8:44 8:24 Rise 18:42 19:05</p> <p>22</p>	<p>Set 9:53 9:24 Rise 19:04 19:34</p> <p>23</p>	<p>Set 11:02 10:26 Rise 19:31 20:08</p> <p>24</p>	<p>Set 12:09 11:27 Rise 20:06 20:49</p> <p>25</p>	<p>Set 13:12 12:26 Rise 20:52 21:38</p> <p>26</p> <p>Sunrise 7:40 7:22 Sunset 17:48 18:05</p>
<p>Death of Harlow Shapley, who studied star properties and the Milky Way, 30 years ago</p> <p>50°N 40°N Set 13:07 12:21 Rise 20:50 21:35</p> <p>27</p>	<p>Set 13:52 13:10 Rise 21:59 22:39</p> <p>28</p>	<p>Set 14:27 13:52 Rise 23:16 23:49 3rd Quarter 0:28</p> <p>29</p>	<p>Set 14:56 14:29 Rise -- --</p> <p>30</p>	<p>Rise 0:37 1:01 Set 15:19 15:02</p> <p>31</p>	<p>SEPTEMBER</p> <p>S M T W T F S</p> <p>1 2 3 4 5 6 7</p> <p>8 9 10 11 12 13 14</p> <p>15 16 17 18 19 20 21</p> <p>22 23 24 25 26 27 28</p> <p>29 30</p>	<p>NOVEMBER</p> <p>S M T W T F S</p> <p>1 2</p> <p>3 4 5 6 7 8 9</p> <p>10 11 12 13 14 15 16</p> <p>17 18 19 20 21 22 23</p> <p>24 25 26 27 28 29 30</p>
<p>Daylight Saving Time Ends 2 am</p>		<p>Orionid meteors peak 4 am</p>		<p>Halloween</p> <p>The Vatican absolves Galileo of all heresy charges, 10 years ago</p> <p>Venus at inferior conjunction</p>	<p>Birth of Henry Norris Russell, known for stellar properties diagram, 125 years ago</p>	<p>Saturn 3° S. of Moon visible in all of N. America 6 am</p>



NOVEMBER

At left, *nu Andromedae* is the star from which most observers hop to find M31 and its satellite galaxies: M32 just below the nucleus and M110 above. What distinguishes this portrait is its ability to show how young, blue Population I stars extend in a vast oval covering nearly twice the area revealed visually or in customary photographs.

Composite of photos by Rajiv Gupta

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY																																																																																				
<p>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.</p> <p>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.</p> <p>Please see back pages for photo details and additional information about this Calendar.</p>	<p>OCTOBER</p> <table border="1"> <tr><td>S</td><td>M</td><td>T</td><td>W</td><td>T</td><td>F</td><td>S</td></tr> <tr><td></td><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td></tr> <tr><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td></tr> <tr><td>20</td><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td></tr> <tr><td>27</td><td>28</td><td>29</td><td>30</td><td>31</td><td></td><td></td></tr> </table>	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			<p>DECEMBER</p> <table border="1"> <tr><td>S</td><td>M</td><td>T</td><td>W</td><td>T</td><td>F</td><td>S</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr> <tr><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td></tr> <tr><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td><td>21</td></tr> <tr><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td></tr> <tr><td>29</td><td>30</td><td>31</td><td></td><td></td><td></td><td></td></tr> </table>	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							<p> Rise 2:01 2:15 Set 15:40 15:31 1</p>	<p> Rise 3:26 3:30 Set 15:59 16:00 2</p> <p>Sunrise 6:51 6:30 Sunset 16:35 16:57</p>
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<p> Rise 50°N 4:53 40°N 4:46 Set 16:19 16:30 3</p> <p>S. Taurid meteors peak 3 am</p>	<p> Rise 6:21 6:04 Set 16:41 17:02 4</p> <p>New Moon</p>	<p> Rise 7:50 7:22 Set 17:08 17:38 5</p>	<p> Rise 9:17 8:40 Set 17:42 18:21 6</p>	<p> Rise 10:38 9:53 Set 18:26 19:11 7</p>	<p> Rise 11:46 10:59 Set 19:21 20:08 8</p>	<p> Rise 12:40 11:55 Set 20:26 21:10 9</p> <p>Sunrise 7:03 6:38 Sunset 16:24 16:49</p>																																																																																				
<p> Rise 50°N 13:20 40°N 12:40 Set 21:36 22:14 10</p>	<p> Rise 13:50 13:17 Set 22:48 23:18 11</p> <p>1st Quarter</p> <p>Remembrance Day (Canada) Veterans Day (USA)</p>	<p> Rise 14:13 13:48 Set 23:58 -- 12</p>	<p> Set -- 0:20 Rise 14:31 14:14 13</p> <p>Tycho Brahe discovers a comet, marking beginning of comet study, 425 years ago</p> <p>N. Taurid meteors peak 2 am</p>	<p> Set 1:07 1:21 Rise 14:47 14:38 14</p>	<p> Set 2:13 2:20 Rise 15:02 15:00 15</p>	<p> Set 3:19 3:18 Rise 15:16 15:22 16</p> <p>Sunrise 7:14 6:46 Sunset 16:15 16:43</p>																																																																																				
<p> Set 50°N 4:26 40°N 4:16 Rise 15:31 15:44 17</p>	<p> Set 5:33 5:16 Rise 15:48 16:09 18</p> <p>Leonid a meteors peak 11:00 pm</p>	<p> Set 6:42 6:16 Rise 16:08 16:36 19</p> <p>Full Moon</p> <p>Leonid b meteors peak 5:36 am Penumbral Lunar Eclipse visible in all of N. America 8:34 pm</p>	<p> Set 7:52 7:18 Rise 16:34 17:09 20</p>	<p> Set 9:01 8:21 Rise 17:06 17:48 21</p>	<p> Set 10:07 9:21 Rise 17:49 18:34 22</p> <p>Saturn 2.8° S. of Moon best in west of N. America 5 am</p>	<p> Set 11:04 10:18 Rise 18:43 19:29 23</p> <p>Sunrise 7:25 6:54 Sunset 16:07 16:38</p> <p>European Space Agency launches its first satellite, Meteosat 1, 25 years ago British Isles fireball 100 times louder than a thunder clap, 125 years ago</p>																																																																																				
<p> Set 50°N 11:52 40°N 11:09 Rise 19:48 20:31 24</p>	<p> Set 12:30 11:53 Rise 21:02 21:38 25</p>	<p> Set 13:00 12:30 Rise 22:20 22:48 26</p>	<p> Set 13:24 13:03 Rise 23:41 23:59 27</p> <p>3rd Quarter</p>	<p> Set 13:44 13:32 Rise -- -- 28</p>	<p> Rise 1:02 1:10 Set 14:03 14:00 29</p>	<p> Rise 2:25 2:23 Set 14:22 14:28 30</p> <p>Sunrise 7:35 7:02 Sunset 16:02 16:36</p> <p>Thanksgiving Day (USA)</p>																																																																																				



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 50° N latitude and 75° W longitude and for 40° 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
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 95th 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 members of the Society.

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

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

rasc@rasc.ca

www.rasc.ca

The Photos and the Calendar

Most of the images in this Calendar were digitally processed, with details as given. The components of many of the composite images were registered using Auriga Imaging's *RegiStar*, and then the images were further manipulated and enhanced using Adobe Systems' *Photoshop*.

Monthly grids with data were generated using special software written in the Fortran and Postscript programming languages.

Editing and Production

Rajiv Gupta (gupta@interchange.ubc.ca)

Images

Randy Altwood
Stephen Barnes
Norma Chambers
Alan Dyer
Rajiv Gupta
John Mirtle
Duncan Munro
Jack Newton
Benoit Schillings

Monthly Grids

Rajiv Gupta
David Lane

Captions

Lee Johnson

Historical Anniversaries

Diane Brooks
David Chapman

Literary Quotations

Greta Holsten
Lee Johnson

Digital Film Output

Copydot, Burnaby, B.C.

Printing

University of Toronto Press Inc.



Cover/October (*The Rainbow Aurora*): 35-second fixed-tripod exposure on Kodak Portra 800 film using a 16-mm fisheye lens at f/2.8 (original photo somewhat cropped); photo taken October 28, 2000 from a location 150 km northeast of Edmonton (Norma Chambers).



January (*Cosmic Creation in the Winter Milky Way*): Composite image formed using *RegiStar* and *Photoshop* from a total of 6 exposures: 45 minutes red-filtered on Tech Pan film using a Celestron 8-inch f/1.5 Schmidt camera (John Mirtle), 2 exposures 50 minutes each on Kodak Supra 400 film using a 5-inch f/6 Astro-Physics refractor at f/4.5 (Alan Dyer), and 90, 110, and 120 minutes cyan-filtered on medium-format Tech Pan film using a 5-inch f/6 Astro-Physics refractor (Rajiv Gupta). (Image formed by Rajiv Gupta.)



February (*Lunar Seas of the First-Quarter Moon*): Approximately 50% crop of high-resolution mosaic formed using *Photoshop* from 4 exposures on Kodak Ektachrome 100 film taken at Las Campanas Observatory, Chile in April, 1993 using the 24-inch f/16 Helen Sawyer Hogg Telescope at f/11 (Alan Dyer).



March (*Showpiece of the Southern Skies: the Great Eta Carinae Nebula*): Composite image formed using *RegiStar* and *Photoshop* from 3 exposures: 65 minutes on medium-format Tech Pan film using a 5-inch f/6 Astro-Physics refractor (Rajiv Gupta), and 10 and 20 minutes respectively on Kodak Ektachrome P1600 film pushed to 1600 ASA, piggyback using 135- and 300-mm telephoto lenses (Duncan Munro). (Image formed by Rajiv Gupta.)



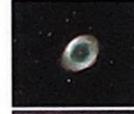
April (*The Magnetic Sun*): 1/80-second exposure with a 90-mm Coronado H-alpha filter on a Meade Pictor 1616XTE CCD camera using a 5-inch f/8 Meade refractor stopped down to 90 mm at f/25, post-processed using *Maxim DL* and colorized using *Photoshop* (Jack Newton).



May (*The Dusty Trifid (M20)*): Composite image formed using *RegiStar* and *Photoshop* from a total of 6 exposures, all on medium-format Tech Pan using a 5-inch f/6 Astro-Physics refractor: 95 minutes red-filtered, 55 minutes yellow-filtered, 180 minute green-filtered, and 110, 125, and 141 minutes cyan-filtered (Rajiv Gupta).



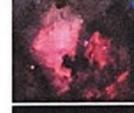
June (*The Nucleus of Our Galaxy*): 15-minute piggyback exposure on Kodak Ektachrome E200 film using a 28-mm wide-angle lens at f/2.8, processed using *Photoshop*; photo taken from Siding Spring Observatory, Australia (Alan Dyer).



July (*The Intricate Ring (M57)*): Composite image formed using *Maxim DL*, *RegiStar*, and *Photoshop* from a total of 13 CCD images: 2 minutes, 3 minutes, and 6 minutes red-, green-, and blue-filtered on an SBIG ST-6 CCD camera using York University's 24-inch f/13 Cassegrain telescope (Stephen Barnes, taken in 1993), and 10 exposures 5 minutes each on an SBIG ST-8E CCD camera with an AO-7 high-speed guiding system using a homemade f/15 Cassegrain telescope (Benoit Schillings). (Image formed by Stephen Barnes.)



August (*The Swan Takes Flight*): 25-minute piggyback exposure on Fuji Super G 800 film using a 50-mm lens at f/2.8 (Stephen Barnes).



September (*The Pelican Contemplates North America*): Tricolour composite image formed using *RegiStar* and *Photoshop* from 17-minute, 60-minute, and 65-minute red-, green-, and blue-filtered exposures on Tech Pan using a Celestron 8-inch f/1.5 Schmidt camera (John Mirtle). (Image formed by Rajiv Gupta.)



November (*Blue Island Universe (M31)*): Composite image formed using *RegiStar* and *Photoshop* from a total of 7 exposures, all medium-format using a 5-inch f/6 Astro-Physics refractor: 65, 70, and 70 minutes on Kodak PPF film; 50 minutes unfiltered, 60 minutes yellow-filtered, and 85 and 120 minutes cyan-filtered on Tech Pan (Rajiv Gupta).



December (*The Totality of Totality in a Solar Eclipse*): Composite image formed using *Photoshop* from a 1/250-second exposure and a 1/2-second exposure on Kodak 200 Elite slide film; photos taken during the total solar eclipse of August 11, 1999 (Randy Altwood). (Image formed by Rajiv Gupta.)

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

2002

January

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23	24	25	26	27	28	29

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

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		



All photos in this unique Calendar were taken by amateur astronomers. Volunteer members of the Royal Astronomical Society of Canada provided all the images and 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.

	Rise 4:35 Set 21:05 New Moon	5:11 20:25 19:46	10		Rise Set
Annular Solar Eclipse partial phase visible in most of N. America except extreme east					
	Set 1:24 Rise 12:17 1st Quarter	1:08 12:29 20:29	17		Set Rise

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