

# RASC Toronto Centre – [www.rascto.ca](http://www.rascto.ca)

## The Sky This Month – June 2 to July 7, 2021 (times in EDT)

by Chris Vaughan

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### NEWS

#### Space Exploration – Public and Private

Ref. <http://spaceflightnow.com/launch-schedule/>

##### Launches

**June 3 at 1:29 p.m. EDT** - A SpaceX Falcon 9 rocket from Kennedy Space Center, Florida - payload Dragon 2 spacecraft on 2nd cargo resupply mission to the International Space Station.

**June 10 at TBD** - Long March 2F rocket from Jiuquan, China - payload Shenzhou 12 spacecraft with multiple Chinese astronauts to rendezvous and dock for the first time with the new Chinese space station in low Earth orbit.

**June at TBD** – SpaceX Falcon 9 rocket from Cape Canaveral, Florida - payload SXM 8 satellite for SiriusXM.

**June 15 at TBD** - U.S. Air Force and Northrop Grumman Minotaur 1 rocket from Wallops Island, Virginia – payload classified spy satellite cargo for the U.S. National Reconnaissance Office.

**June at TBD** - GSLV Mk.2 rocket from Satish Dhawan Space Center, Sriharikota, India – payload India's first GEO Imaging Satellite GISAT 1.

**June 17 from 6:00-9:00 p.m. EDT** - SpaceX Falcon 9 rocket from Cape Canaveral Space Force Station, Florida - payload U.S. Space Force's fifth third-generation navigation satellite for the Global Positioning System.

**June 23 at TBD** - United Launch Alliance Atlas 5 rocket from Cape Canaveral Space Force Station, Florida – payload U.S. Space Force STP-3 rideshare mission, including the National Nuclear Security Administration's Space and Atmospheric Burst Reporting System-3 (SABRS-3) payload, and NASA's Laser Communications Relay Demonstration (LCRD) experiment.

**June 29 at TDB** - Soyuz rocket from Baikonur Cosmodrome, Kazakhstan – payload Progress cargo delivery ship to the International Space Station.

**Late June at TDB** - SpaceX Falcon 9 rocket from Cape Canaveral Space Force Station, Florida - payload numerous small microsatellites and nanosatellites for commercial and government customers.

**Late June at TBD** - A Rocket Lab Electron rocket from Mid-Atlantic Regional Spaceport, Wallops Island, Virginia - payload experimental mission for the Space Test Program called Monolith with a space weather instrument.

**July 1 at TBD** - Soyuz rocket from Vostochny Cosmodrome, Russia – payload launch 36 communications satellites into orbit for OneWeb.

#### This Month in History (a sampling)

Ref. <http://www2.jpl.nasa.gov/calendar/>, <http://space.about.com/library/weekly/bldatechoice.htm>,  
<http://www.planetary.org/multimedia/space-images/charts/whats-up-in-the-solar-system-frohn.html>,  
<http://www.lunar-occultations.com/rlo/calendar.pdf>

#### Astro-Birthdays and Milestones

June 5, 1819 - English astronomer **John Couch Adams** is born. Predicted the existence and position of Neptune, using only mathematics.

June 7, 1928 - American astronomer, **Bernard Burke**, is born. In 1955, discovers radio waves emitted by the giant Jupiter.

June 8, 1625 - **Giovanni Cassini** is born. Co-discoverer of the GRS and discoverer of Saturnian moons and the eponymous ring gap. He also determined the Earth-Mars distance using parallax and explained zodiacal light.

June 17, 1839 - American astronomer and clergyman, **Rev. George Mary Searle**, is born (and dies on same day in 1918). Discovered the asteroid 55 Pandora and six galaxies.

Jun 26, 1730 - French Astronomer **Charles Messier** is born. Later he will create his famous Messier Catalogue black list of dim fuzzy objects that are not comets.

Jul 7, 1746 - Italian astronomer and discoverer of Ceres, **Giuseppe Piazzi**, is born.

Jul 7, 1907 – American “dean” of Science Fiction, author **Robert Heinlein**, is born.

### **Astronomy and Space Exploration**

June 3, 1969 - NBC cancels the original **Star Trek** series after a 3 season run

June 4, 781 BCE - **First Solar Eclipse** recorded by the Chinese.

June 16, 1963 - **Valentina Tereshkova** becomes the first woman in space.

June 18, 1983 - **Sally Ride** becomes the first American female astronaut.

June 19, 240 BCE - **Eratosthenes** calculates the circumference of Earth using two sticks.

Jun 22, 1633 - **Galileo Galilei** is forced by the Holy Office of Rome to recant the Solar-centric view of the Universe.

Jun 25, 1638 - The first astronomical event, a **lunar eclipse**, recorded in North America.

Jun 30, 1908 - The great **Tunguska** impact in Siberia.

Jul 1, 1917 - The 100-inch Hooker Telescope mirror arrives at **Mt. Wilson**. The only telescope larger than DDO's 74-inch telescope when it opened in 1935.

Jul 1, 1962 – **Kennedy Space Center** is opened.

Jul 4, 1054 - Chinese astronomers record a bright supernova later to become the **Crab Nebula** (M1).

Jul 6, 1687 - Isaac Newton publishes **Principia** outlining his three Laws of Motion.

Jul 7, 1947 - Alleged UFO crashes in **Roswell**, New Mexico

## **OBSERVING**

### **Globe at Night 2021**

A citizen science program to map light pollution around the world. During the observing window, you are encouraged to make a visual measurement to determine the limiting magnitude of stars you can observe at your location. The website provides charts for assisting observations, instructions for submitting results, and an interactive map showing current and historical results. Details are at <http://www.globeatnight.org/>  
The summer campaign's focus is on **Hercules** from June 1-10 and July 1-9.

### **Sunrise/Sunset**

June 2, sunrise at 5:38 am, sunset at 8:53 pm (15h15m of daylight)

July 7, sunrise at 5:43 am, sunset at 9:00 pm (15h17m of daylight)

**June Solstice** - Sun, June 20 at 11:32 pm EDT

Earth at Aphelion (1.521 million km) - Mon, July 5 at 6 pm EDT

### **Astronomical Twilight**

The skies are not truly dark until the Sun drops well below the horizon. Below are the times of true darkness, when the sun is more than 18° below the horizon - also known as Astronomical Twilight. Astrophotography is best done in full darkness. Details are at <https://www.timeanddate.com/sun/canada/toronto?month=6>  
<http://www.timeanddate.com/astronomy/canada/toronto>

June 2, astronomical twilight ends at 11:10 pm and starts at 3:21 am (4h11m of imaging time)

July 7, astronomical twilight ends at 11:18 pm and starts at 3:27 am (4h09m of imaging time)

## Moon - Orbit

Apogee – Mon, June 7 at 10 pm EDT (406,228 km)

Perigee – Wed, June 23 at 6 am EDT (359,956 km)

Apogee – Mon, July 5 at 11 am EDT (405,341 km)

## Moon - Phases

Wed, Jun 2 at 3:24 am – Third Quarter Moon (rises around midnight)

Thu, Jun 10 at 6:52 am – New Moon (2.3 days past apogee; Annular Solar Eclipse)

Thu, Jun 17 at 11:54 pm – First Quarter Moon (sets around midnight)

Thu, Jun 24 at 2:39 pm – Full “Strawberry/Mead/Rose/Hot” Moon

Thu, Jul 1 at 5:10 pm – Third Quarter Moon (rises around midnight)

Best Moonless observing period(s): June 6 to 13 and July 1 to 12

## Moon – When and What to Observe

COVID-19 is keeping us home more, so why not enjoy the Moon!

The Moon is in the evening sky for Most of this month (Jun 12 to 23). You can view the moon in morning daylight, too from June 29 to July 4. (Rotate a polarized filter to darken the sky).

Evenings centred on Saturday, Jun 12 after sunset, watch for **Earthshine**, reflected sunlight off Earth.

The **Lunar Straight Wall** aka “Rupes Recta” is visible in binoculars and telescopes during evening 1-2 days after first quarter, and just before third quarter. It’s a N-S aligned fault scarp that extends for 110 km across SE Mare Nubium, the dark region north of Tycho. At the same phase, the spectacular **Alps Mountains** and **Apennine Mountains** bordering Mare Imbrium look best. These will be highly visible on Friday, June 18.

The **Golden Handle / Jeweled Scimitar** is observable with eyeballs, binoculars and telescopes all night long 3-4 days before full moon. It’s composed of the Jura Mountains around Sinus Iridum, west of Mare Imbrium – plus the Heraclides and Laplace promontories. Use magnification to see wrinkle ridges or “dorsae” in the Bay of Rainbows. The feature will be highly visible on Sunday, June 20.

The nights around full moon (June 22-24) accentuate lunar geology instead of topography. Look for **ray systems** around Tycho, Copernicus, Proclus, and comet-like rays at Messier in Mare Fecunditatis. Look for **terraces in Copernicus** and many nearby **craters with dark haloes** (ejected mare basalt overlying white Copernicus ejecta). Observe the Reiner Gamma Lunar Swirl west of Kepler. Look for dark stains left by now-dormant volcanoes, three in Crater Alphonsus, and two in Crater Atlas.

**Dial-A-Moon!** Request a view of the moon at any hour for any day of 2021 at <https://svs.gsfc.nasa.gov/4874>, then click on it to get a HUGE, annotated map (upright or inverted) (Great for Lunar X predictions)

## Moon - Libration

Due to the moon’s 5° orbital inclination and its elliptical orbit, the centre of the moon’s Earth-facing hemisphere rises and falls and drifts left-and-right through the lunar month – a process known as libration. The minor rotations allow features near the lunar limb to rotate more fully into view (or disappear from view) – permitting up to 59% of the moon’s surface to be observable from Earth over the course of time. Below are the times of greatest libration. Note that, viewed from the Northern Hemisphere, the moon’s northern limb is on top, and the moon’s eastern limb is toward the viewer’s right-hand side, and vice versa.

Moon's N limb most exposed on Jun 2 (+6.8°) and Jun 30 (+6.7°) – third quarter, only half illuminated

Moon's W limb most exposed on Jun 17 (–6.9°) – first quarter, not illuminated

Moon's S limb most exposed on Jun 17 (–6.8°) – first quarter, only half illuminated

Moon's E limb most exposed on Jun 29 (+7.0°) – waning gibbous, not illuminated

## Moon – Conjunctions, Eclipses, etc.

### Lunar Appulses and Conjunctions

The old crescent moon will pass several finger widths below (or 3 degrees to the celestial south) of Uranus on **June 7**.

On **June 11** the very young crescent moon will be positioned several finger widths to the lower right (or 3 degrees to the celestial west) of Venus – allowing both objects to appear together in binoculars, and offering a nice photo opportunity.

The thin crescent moon will sit between Mars and Messier 44 on **June 12-13**.

The waning moon will pass 5 degrees below Saturn on **June 27**.

The waning moon will hop past Jupiter on **June 28-29**.

The waning crescent moon will sit a slim palm's width to the lower right (or 5° to the celestial southwest) of Uranus in the pre-dawn sky on **July 4**.

The half-illuminated moon will pass a finger's width above (or 1° to the north of) Porrima on **June 18**.

The waxing gibbous moon will sit several finger widths above (or 4° north of) Antares on **June 22**.

Thin crescent moon will sit between the Hyades and the Pleiades in the pre-dawn sky on **July 6**.

The first solar eclipse of 2021 occurs 2.3 days past lunar apogee, resulting in a small diameter new moon and an **annular solar eclipse**. The moon's shadow will first touch Earth along the northern shore of Lake Superior at 09:55 GMT, and then it will sweep across northwest Greenland and the North Pole. The eclipse will end when the moon's shadow lifts off the Earth in northern Siberia at 11:29 GMT. The partial eclipse will be visible in eastern North America, the North Atlantic, and most of Europe and Asia. When the sun rises (at azimuth 58° E of N) at about 5:30 a.m. EDT in the Great Lakes region, it will already be at mid-eclipse and will be approximately 75% obscured by the moon. The partial phase will persist until the moon completely moves off the sun at approximately 6:30 a.m. EDT. (Use Starry Night to look up your local circumstances.) Proper solar filters will be required to view any portion of this eclipse in person; however, it will be widely available to watch online.

## Planets and Dwarf Planets

During the opening few days of June, magnitude 3.15 **Mercury** might be glimpsed sitting very low in the west-northwestern sky after sunset – especially by observers located at southerly latitudes. But the speedy planet will soon become unobservable from anywhere while it heads to solar conjunction, between Earth and the sun, on June 10. For Northern Hemisphere observers, the very southerly declination of Mercury's orbit during June will prevent the planet from rising very long before the sun, even though its western elongation will be increasing - but those living south of the Equator will be able to see Mercury easily after mid-month and in a dark sky toward month-end. During the final third of June and early July, Mercury will be visible in the east-northeastern pre-dawn sky from both hemispheres. Mercury will reach greatest western elongation 22° from the pre-dawn sun, and peak visibility, on July 4. Viewed in a telescope during that time, the brightening planet will exhibit a waxing crescent phase and a shrinking apparent disk size.

Extremely bright (magnitude -3.85) **Venus** will slowly continue to increase its angle east of the sun during June, but it won't climb high enough to see in a dark sky after sunset until the end of the month. If you have an unobstructed view of the west-northwestern horizon, look for Venus sitting low in the sky. It will set at about 9:45 p.m. local time on the 1<sup>st</sup> and at approximately 10:10 p.m. on June 30. Viewed through a telescope during June, Venus will exhibit a 90% illuminated phase and an apparent disk diameter of around 11 arc-seconds. (As

always, ensure that the sun has completely disappeared below the horizon before using binoculars or telescopes to view Venus.) Our hot sister planet will be traveling eastward through the stars of Gemini from June 2 to 24. Then it will pass into Cancer, where it will rendezvous with Mars on July 12-13. On June 11 the very young crescent moon will be positioned several finger widths to the lower right (or 3 degrees to the celestial west) of Venus – allowing both objects to appear together in binoculars, and offering a nice photo opportunity.

After spending several months parked halfway up the western evening sky, **Mars** will rapidly descend into the post-sunset twilight during June. On the first days of the month, the magnitude 1.75 red planet will be shining a palm's width to the lower left (or 5 degrees to the celestial south) of Gemini's easterly bright star Pollux, and Mars will set at about 11:30 p.m. local time. On June 8, Mars will move into Cancer where, on June 23, its orbital motion will carry it directly through the large open star cluster known as the Beehive or Messier 44. That passage will be a terrific sight in a backyard telescope or binoculars, especially for observers located at southerly latitudes where the cluster will be higher as the sky darkens. Mars will be telescope-close to the "bees" on the surrounding evenings. Telescope views of Mars during June will show a shrinking, 4 arc-seconds-wide disk. At the end of June, Mars will be setting at 10:30 p.m. local time. Much brighter Venus, positioned about a palm's width to Mars' lower right, will already be closing in for their conjunction on July 12-13. Watch for the waxing crescent moon to hop past Mars on June 12-13.

Throughout June, bright, white, magnitude -2.4 **Jupiter** will shine among the modest stars of western Aquarius – and about two fist diameters to the left (or celestial east) of fainter Saturn. On June 1, Jupiter will rise at about 1 a.m. local time and will remain visible until almost sunrise. Around June 20, Jupiter will begin to rise before midnight. The following day Jupiter will temporarily cease its regular eastward motion and then commence a retrograde loop that will last until mid-October. At the end of June, Jupiter will be rising at about 11:15 p.m. local time, and it will have brightened to magnitude -2.64. Unfortunately, the low summertime ecliptic will prevent the planet from climbing very high before the sky brightens. Telescope views of Jupiter during June will show that its large, banded disk is increasing in apparent diameter from 41.1 to 45.2 arc-seconds. The Great Red Spot will be visible crossing Jupiter's disk every second or third night. Single transits across Jupiter's disk by the round, black shadows of its Galilean moons will be commonplace. A double shadow transit event will be visible from the GTA on **June 26**. At 1:04 am EDT (or 5:04 GMT) Io's smaller, faster-moving shadow will join Callisto's larger shadow already in transit. Io's shadow will catch up and pass a short distance north of Callisto's shadow at 2:25 am EDT (or 6:25 GMT) – and then it will lead the way across Jupiter until 3:22 am EDT (or 7:22 GMT). Callisto's slower shadow will complete its crossing at 4:21 am EDT. The waning moon will sit 6 degrees below Jupiter on June 1 and will return to hop past Jupiter on June 28-29.

During May, yellow-tinted **Saturn** will be located in the southeastern sky, travelling retrograde westward among the stars of Capricornus. The magnitude 0.57 planet will rise at about 12:20 a.m. local time on June 1 and then begin rising before midnight starting a week later. At the end of June Saturn will have brightened to magnitude 0.38 and will then rise at about 10:20 p.m. local time; however, the low summer ecliptic will keep the ringed planet from ever climbing more than one-third of the way up the southern sky. When viewed through a backyard telescope during June, Saturn will exhibit its majestic rings, a number of moons, and an apparent disk size that grows from 17.6 to 18.3 arc-seconds. Saturn's separation west of Jupiter will increase from 18 to 19.5 degrees during the month, and the waning moon will pass 5 degrees below Saturn on June 27.

Even though blue-green **Uranus** will be steadily increasing its elongation west of the sun throughout June, the steeply dipping morning ecliptic will prevent the magnitude 5.9 planet, and the stars of southern Aries surrounding it, from climbing very high before the dawn sky begins to brighten. Uranus will rise at 4 a.m. local time on June 1, and two hours earlier at month end. The old crescent moon will pass several finger widths below (or 3 degrees to the celestial south) of Uranus on June 7.

During June the distant and slow-moving planet **Neptune** will be located in the lower part of the southeastern sky in eastern Aquarius. That's a palm's width below (or to the celestial south of) the ring of stars that form western Pisces and about two fist diameters to the left (or celestial east) of much brighter Jupiter. On June 26, Neptune will temporarily cease its regular eastward motion and commence a retrograde loop that will last until early December. The blue, magnitude 7.9 planet will become observable in backyard telescopes starting an hour or two after it rises, which will be at about 1 a.m. local time on the 1<sup>st</sup> and at midnight at month's end.

**Pluto** is a faint mag. 14.3 object moving retrograde in northeastern Sagittarius. Pluto is an all-night target, but a challenge to see due to its dim nature and the low summer ecliptic.

The minor planet **(4) Vesta**, at magnitude 7.2, is within easy reach of binoculars and small telescopes. It is best observed after dusk while it's higher. On June 2, Vesta will be moving prograde through Leo, approximately a thumb's width below Chertan. Vesta will pass just 0.4° south of the Leo Triplet of galaxies on June 9-12 and then end the month in western Virgo.

**(1) Ceres**, at magnitude 9.2, is in the ENE pre-dawn sky, not far from Uranus. It will move prograde through eastern Cetus and then southern Aries and western Taurus – and become observable in a dark sky after end of June.

**(2) Pallas**, at magnitude 10.4, is observable after the wee hours in the eastern pre-dawn sky - moving prograde along the Pegasus/Pisces border.

On Sunday, June 6, **(3) Juno** will reach opposition. At that time, Earth will be passing between Juno and the sun, minimizing our distance from Juno and causing it to appear at its brightest and largest for this year. The magnitude 10.1 asteroid will be visible in backyard telescopes all night long. On opposition night, Juno will be traversing the stars of Ophiuchus, and positioned just two finger widths to the left (or 2.5 degrees to the celestial east) of the bright globular star cluster Messier 10. On June 17-18 Juno's westward motion will carry it through that cluster, allowing both objects to appear together in telescopes for several nights.

## Planets – Appulses / Conjunctions

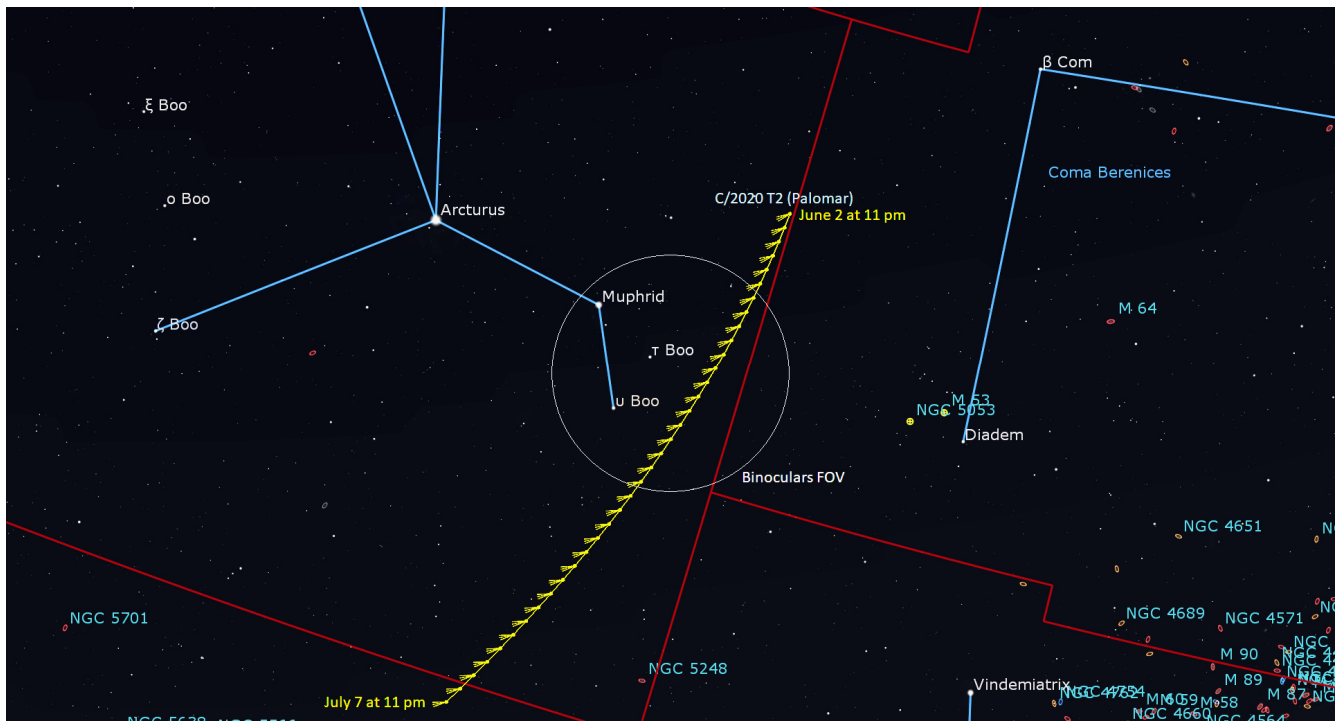
On Wednesday, **June 23**, the orbital motion of Mars will carry it directly through the large open star cluster known as the Beehive or Messier 44 in Cancer. The passage will be a terrific sight in a backyard telescope – although binoculars will show the cluster's stars, too. Mars will be telescope-close to the “bees” on the surrounding evenings.

Mars and Venus will move within 3.3° of one another in the WNW sky by **July 7**.

## Comets

Ref <http://www.aerith.net/comet/weekly/current.html>, <http://cometchasing.skyhound.com/>, <https://in-the-sky.org/data/comets.php>, <https://www.ast.cam.ac.uk/~jds/>, <http://www.cobs.si/>

Comet **C/2020 T2 (Palomar)** is observable nearly all night. On June 2 it is near its peak predicted brightness of magnitude 10.5 and is located midway between Arcturus and Beta Com. During the next month it will travel south past the Herdsman's western leg/foot, and then cross into Virgo on July 6. (Note that Stellarium and SkySafari report a much fainter magnitude.)



## Meteor Shower(s)

Ref. <http://www.amsmeteors.org/meteor-showers/meteor-shower-calendar/>

## Asteroids

Ref. <http://neo.jpl.nasa.gov/ca/>, <http://www.minorplanetcenter.net/>  
<https://www.youtube.com/watch?v=ONUSP23cmAE#action=share>

No notable close asteroids

According to the Minor Planet Centre...

Near-Earth Objects Discovered This Year: 1124 (~225/month)

Minor Planets Discovered This Year: 1,905 (~381/month)

Comets Discovered This Year: 24 (~4.8/month)

Observations This Year: 16.2 million

## Satellites

For the GTA the current International Space Station evening pass series ends on June 3 (Most are visible around 9:45 pm). Pre-dawn passes resume June 27. Some higher/brighter ones include\*:

Date	Mag.	Time	Direction	Alt.
29-Jun	-3.5	4:28 am to 4:33 am	from SW to ENE	57°
01-Jul	-3.3	4:29 am to 4:35 am	from WSW to NE	57°
02-Jul	-3.8	3:43 am to 3:47 am	from WSW to ENE	87°

\* predicted times may shift slightly in the far future

The Chinese space station **Tianhe-1** will resume pre-dawn passes on June 18. Some peak at magnitude 1.1

Local occurrences info at [www.heavens-above.com](http://www.heavens-above.com) and enter your location, from phone/tablet apps, Chris Vaughan's Skylights (subscribe to email [here](#) or visit [www.astrogeo.ca/skylights](http://www.astrogeo.ca/skylights))

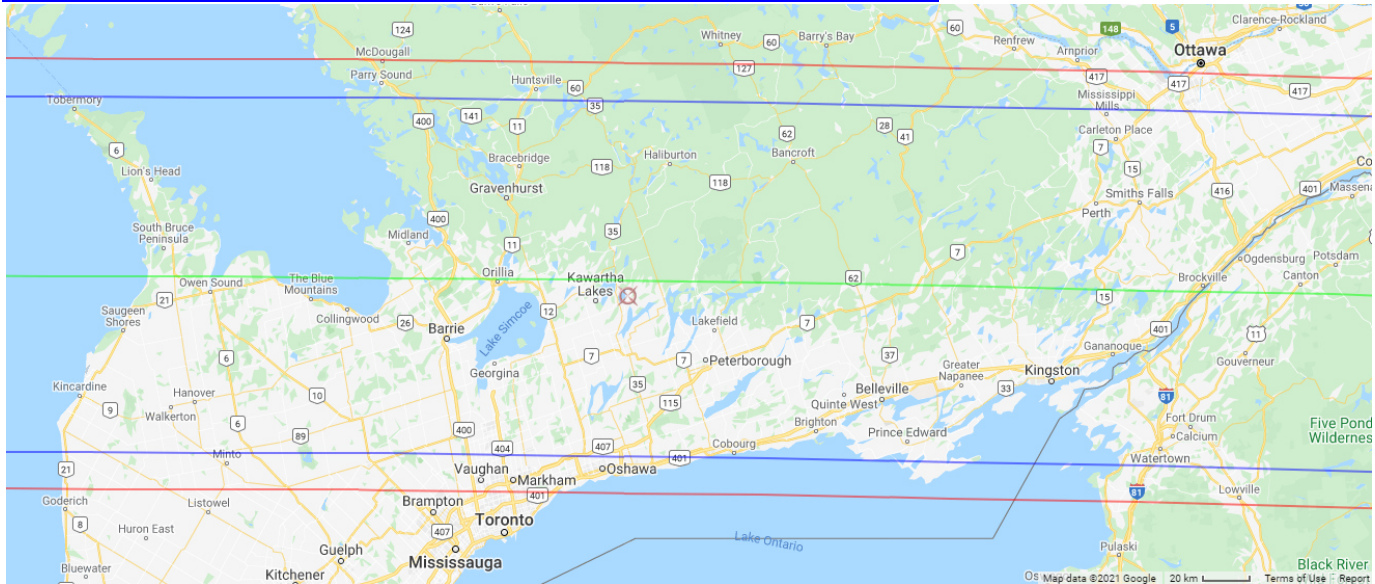
## Occultations – Lunar and Asteroidal

Ref: <http://asa.usno.navy.mil/SecA/olist18.html>, <http://www.asteroidoccultation.com/> and <http://www.poyntsource.com/New/Global.htm> (additional links on the following URLs open track maps)

### No Lunar Occultations

**Rank 99** - 19 Jun 2021 at 03:59 UT, asteroid (3451) Mentor (mag 15.5) occults star UCAC4 487-093267 (mag13.9), dips 1.79 mags for 9.0 seconds, alt 55°. Star near NGC 6781 and 19 Aql

[https://www.asteroidoccultation.com/2021\\_06/0619\\_3451\\_74402.htm](https://www.asteroidoccultation.com/2021_06/0619_3451_74402.htm)



## Variable Stars

**Sheliak**, also designated Beta Lyrae, is an eclipsing binary system that varies in brightness between 3.3 and 4.4 over a period of 12.94 days. At peak, it shines as bright as Sulafat. At minimum, as dim as Delta Lyrae.

**Almizan II**, or Eta Aquilae, is a Cepheid variable star that ranges from 3.5 to 4.4 over 7.18 days. At maximum, it shines almost as brightly as Lambda Aquilae, the tail of the eagle. At minimum, as faint as Iota Aql.

## Double Stars

See Canes Venatici targets below

## Constellations near the Meridian (Annually in early June)

11 pm: N. Lupus\*, N. Centaurus\*, Libra, E. Virgo, Serpens Caput, Bootes, Corona Borealis

1 am: Scorpius, Ophiuchus, Hercules

3 am: Corona Australis\*, Sagittarius, Scutum, Serpens Cauda, Aquila, Sagitta, Vulpecula, Lyra, W. Cygnus

\*On the southern horizon

## Constellations near the Meridian (Annually in early July)

11 pm: Scorpius, Ophiuchus, Hercules

1 am: Corona Australis\*, Sagittarius, Scutum, Serpens Cauda, Aquila, Sagitta, Vulpecula, Lyra, W. Cygnus

3 am: Microscopium, Capricornus, W Aquarius, Equuleus, Delphinus, E. Vulpecula, Cygnus

\*On the southern horizon



## Chris' Picks in early June

Spend time in **Canes Venatici** (nice and high)!

**Bright Globular Cluster: M3**

**Messier Galaxies:** Croc's Eye Galaxy **M94**, Whirlpool Galaxy **M51, M106**, Sunflower Galaxy **M63**

**Finest NGC List Galaxies:** **Whale Galaxy** NGC 4631, **Box Galaxy** NGC4449, **NGC 4228** (aka NGC 4214), **Cocoon Galaxy** NGC 4490, **Hockey Stick Galaxy** NGC 4656, **Waterbug Galaxy** NGC 5033 (plus NGC 5005), and **Silver Needle Galaxy** NGC 4244

**Double Stars:** easy **Cor Corali** and more challenging coloured double **2 CVn** (both in RASC DS program)

Carbon Star: **La Superba** aka Y CVn pulsates between magnitude 4.8 and 7.3 over ~157 days.

Also: Galaxies beside X UMa - **NGC 3877** edge-on spiral and NGC 3893 small bright spiral (Use the Stellarium DSS button!)

**Post-COVID, see you at DDO, Long Sault C A, Bayview Village Park, or the CAO!**

Questions or comments to [chris.vaughan@astrogeo.ca](mailto:chris.vaughan@astrogeo.ca)

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