

RASC Toronto Centre – www.rascto.ca

The Sky This Month –February 22 to March 22, 2017

by Chris Vaughan

NEWS

Space Exploration – Public and Private

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

Launches

Feb 22 at 12:58 am - Soyuz rocket from Baikonur Cosmodrome, payload 66th Progress cargo delivery to ISS.

Feb 28 at 12:27-2:57 am - SpaceX Falcon 9 rocket from Kennedy Space Center, payload EchoStar 23 comsat.

Mar 1 TBD - Atlas 5 rocket from Vandenberg Air Force Base, payload classified spacecraft for the U.S. National Reconnaissance Office.

Mar 6 at 8:49 pm - Arianespace Vega rocket from Kourou, French Guiana, payload Sentinel 2B Earth observation sat.

Mar 8 at 6:48-7:53 pm - Delta 4 rocket from Cape Canaveral Air Force Station, payload military comsat.

Mar TBD - Falcon 9 rocket from Kennedy Space Center, payload SES 10 comsat for Luxembourg.

Mar TBD - GSLV Mk.2 rocket from Satish Dhawan Space Center, India, payload GSAT 9 comsat.

Mar 15 at 9:00-11:00 pm - H-2A rocket from Tanegashima Space Center, Japan, payload reconnaissance sat.

Mar 19 at 10:56-11:26 pm - Atlas 5 rocket from Cape Canaveral Air Force Station, payload Cygnus cargo freighter to ISS.

Mar 21 TBD - Ariane 5 rocket from Kourou, French Guiana, payload SGDC and Koreasat 7 comsats.

JUNO at Jupiter

The main mission 14-day orbits have been scrapped due to sluggish helium pressurizing valves making a main engine burn risky. A total of twelve 53-day orbits will finish out the mission funded to 2018, still allowing close passes 4100 km above clouds, and meaning much less total radiation dose to the spacecraft. Large orbits allow more magnetosphere and magneto-tail science. So far, the Magnetic field and aurorae have been found to be larger than expected, and the belts and zones continue at depth. Next pass on March 27.

Cassini at Saturn

Cassini is currently performing twenty F-ring grazing orbits (every 7.2 day periods) inclined 63.5° to ring plane, and diving to within 150,000 km of Saturn. Has imaged close-ups of density waves in A ring about 134,500 km from Saturn, with clumpy perturbations created by the gravity of moons Janus and Epimetheus. Cassini's first Grand Finale dive occurs on April 26, and end of mission entry into Saturn's atmosphere on Sept 15.

DAWN at Ceres

The close orbit mission is complete, and the spacecraft has climbed to a higher orbit. Recent discoveries: Surface water ice within permanently shadowed craters. Visible Infrared Mapping Spectrometer discovered areas enriched in organic molecules - the first time for a main belt body. When added to water-altered ammoniated clays, hydrated minerals, carbonates, and water ice, Supports evidence for warm and moist conditions at some time within the dwarf planet

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

Feb 22, 1857 – **Heinrich Hertz** is born, German physicist proved existence of EM waves

Feb 27, 1897 – **Bernard Lyot** is born, French astronomer, polarized light, invented Lyot birefringence filter & solar coronagraph, died at 55 returning from Sudan eclipse trip

Mar 1, 1927 – **George O. Abell** is born, American astronomer and educator, catalogued clusters, galaxies, and planetary nebulae

Mar 6, 1787 – **Joseph von Fraunhofer** is born, German physicist improved lens polishing and optical glass, discovered absorption lines in Sun's spectrum, invented stellar spectroscopy, died at 39 from poison vapours

Mar 7, 1837 – **Henry Draper** is born, American amateur astronomer, first to photograph Orion Nebula on Sept 30, 1880, died at 45

Mar 7, 1792 – **Sir John FW Herschel** is born, English astronomer, named outer moons, published fore-runner of the NGC catalogue that included the southern sky

Mar 11, 1811 – **Urbain Le Verrier** is born, celestial mechanist calculated Uranus' predicted orbit

Mar 11, 1952 – **Douglas Adams** is born, English scifi/comedy novelist, died at 49

Mar 12, 1907 – **Ellen Dorrit Hoffleit** is born, American research astronomer, stellar astrometry

Mar 17, 1837 – **Horace Parnell Tuttle** is born, American astronomer, prolific comet discoverer

Mar 21, 1927 – **Halton Arp** is born, American astronomer, specialized in galactic evolution, Arp catalogue

Astronomy and Space Exploration

Feb 23, 1987 - Supernova 1987A was discovered by Ian Shelton, Oscar Duhalde, and Albert Jones

Feb 24, 1968 – Jocelyn Bell at Cambridge announces the first pulsar PSR1919+21 near Sagitta

Feb 27, 1611 – Johannes Fabricius published De Maculis in Sole Observatis, first paper on sunspots

Mar 10, 1977 – Uranus' rings are discovered

Mar 13, 1781 – Searching for double stars with 6" f/13 newtonian, William Herschel discovers Georgium Sidus now known as Uranus

Mar 21, 1702 – German astronomer Maria Margarethe Kirch becomes first woman to discover a comet, C/1702 H1

Star Parties, etc.

Ref: <http://ontariostargazing.ca/astronomy-star-party-and-astronomy-events-listing-for-canada/>,
<http://www.amsky.com/calendar/events/#may>

"**Winter Star Party**", Florida Keys, USA – Feb 20-26, 2017

"**RASC Dark Skies Observing**", Long Sault Conservation Area – window runs Feb 27-Mar 2

"**RASC Solar Observing**", Ontario Science Centre Teluscape – Sat. 10 to noon, on Mar 4 (or 11)

"**RASC City Skies Observing**", Bayview Village Park, Toronto – windows runs Mar 6-9

OBSERVING

Messier Marathon 2017

New Moon weekend of March 25 opens the prime opportunity for a Messier Marathon this year. Watch the RASC TC Yahoo Group for news.

Globe at Night 2017

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 February campaign's focus is on **Orion** from Feb 18-27. The March focus is on **Leo** from March 20-29.

Sunrise/Sunset

February 22, sunrise at 7:05 am, sunset at 5:57 pm (10h52m of daylight)

March 22, sunrise at 7:17 am, sunset at 7:33 pm (12h16m of daylight)

Daylight Savings Time commences on March 12. (UT-4 hrs commences)

Vernal Equinox on Monday, March 20 at 6:29 am

Astronomical Twilight

The skies are not truly dark until the Sun drops well below the horizon. Below are the times of true darkness, also known as Astronomical Twilight. Astrophotography is best done in full darkness. Details are at <http://www.timeanddate.com/sun/canada/toronto?month=3>,
<http://www.timeanddate.com/astronomy/canada/toronto>

February 22, astronomical twilight ends at 7:33 pm and starts at 5:28 am (9h55m of imaging time)

March 22, astronomical twilight ends at 9:10 pm and starts at 5:42 am (8h32m of imaging time)

Moon - Orbit

Perigee – Fri, Mar 3 at 3 am

Apogee – Sat, Mar 18 at 1 pm

Moon - Phases

Sun, Feb 26 at 9:58 am – New Moon (**South Atlantic Annular Solar Eclipse**)

Sun, Mar 5 at 6:32 am – First Quarter Moon (sets around midnight)

Sun, Mar 12 at 10:54 am – Full “Lenten/Crow/Sap/Worm” Moon

Mon, Mar 20 at 11:58 am – Last Quarter Moon (rises around midnight)

Zodiacal Light

During moonless periods in February and March annually, the steep evening ecliptic favors the appearance of the zodiacal light in the western sky for about half an hour after evening twilight ends. This is reflected sunlight from interplanetary particles of matter concentrated in the plane of the solar system. Once it's dark, during the two weeks March 13 and the new moon on March 27, look south of west (near Mars) for a broad wedge of faint light rising from the horizon. It will be centered on the ecliptic.

Moon – Conjunctions, Eclipses, etc.

Lunar Appulses and Conjunctions

In the western early evening sky on Wednesday, **March 1**, the young crescent moon will form a triangular grouping with Venus and Mars (Photo op!). Use binoculars or a telescope to hunt for Uranus 2 degrees below Mars, and for dwarf planet Ceres sitting 14 degrees to the upper left of Mars. For the GTA, low in the western sky during late evening on Saturday, **March 4**, the moon will graze/occlude the naked eye star Aldebaran, with closest approach at approximately 11:17 pm EST. Starting in late evening on Tuesday, **March 14**, Jupiter, only 4° from the waning gibbous moon will rise together in the eastern sky about 9:40 pm local time, cross the night sky together, and be visible low in the southwestern sky before sunrise. Low in the eastern sky in the

hours before dawn on Monday, **March 20**, the last quarter moon will sit 2.5 degrees above the ringed planet Saturn. The pair is best viewed between about 3:30 and 7 am local time.

Planets and Dwarf Planets

A few days after superior conjunction beyond the sun on March 7, **Mercury** commences the best evening apparition of the year for northern hemisphere observers, becoming visible low in the west after sunset from mid-month onwards. During the month, it approaches Earth – causing its disk to increase in diameter, while dropping in brightness, and waning from a nearly full disk to half illuminated. On March 18 and 19, descending Venus passes 9 degrees to the north (right) of Mercury.

Between late February and mid-March, **Venus** will shine brightly in the western early evening sky amid the stars of Pisces. Around mid-March, it will rapidly descend sunward into the evening twilight. While it heads towards inferior conjunction on March 25, Venus' disk will grow in diameter and wanes to a thin crescent. For a few days around this conjunction, it can be glimpsed in the morning and the evening twilight. On **March 18 and 19**, Venus passes 9 degrees to the north (right) of much fainter Mercury. At the end of March, Venus will be visible in the east for about 45 minutes before sunrise.

Reddish **Mars** remains in the western early evening sky, moving from Pisces into Aries on March 8. It continues to drop in brightness and disk size as we pull farther away from it. On **March 1**, the crescent moon will sit 5 degrees to the left of Mars.

Very bright **Jupiter** is moving retrograde through the body of Virgo all month, remaining about 6 degrees above that constellation's brightest star Spica. In late February, the planet rises in the east about 10pm. But, by late March, Jupiter rises around 9 pm local time and remains visible all night long as it approaches opposition in early April. On **March 14**, the waning gibbous moon will sit 4.5 degrees to the lower left (northeast) of the planet.

In late February, yellow tinted **Saturn** rises about 3:20 am in the eastern pre-dawn sky near the Milky Way, among the stars of Sagittarius. Throughout March, it can be spotted low in the southeastern sky until just before dawn. By late March it rises about 2:30 am. On Monday morning, **March 20**, the last quarter moon will sit about 2.5 degrees above (north of) Saturn.

At magnitude 5.9, **Uranus** is visible with binoculars or a small telescope as a tiny blue-green dot. During March, it is descending sunwards in the southwestern evening sky among the stars of Pisces. For the first half of March, it remains observable from nightfall until mid evening, after which it becomes lost in the western twilight. Just after 7 pm Eastern Standard Time on the evening of Sunday, February 26, Mars will pass within 34 arc-minutes (about the moon's diameter) to the upper right of blue-green Uranus.

Neptune, in the constellation of Aquarius all month, reaches conjunction with the sun on March 1 and is invisible all month.

Pluto, northeast of Sagittarius' teapot, is a faint mag. 14.7 object. In late February, it's low in the southeastern sky before dawn, rising at 4:37 am. On March 22nd it rises at 4 am. Poor observability.

At visual magnitude 7.0, asteroid **(4) Vesta** is observable in binoculars or a small telescope throughout March. It is moving within the Gemini, ranging between 2.5 and 4 degrees south of the bright star Pollux.

Ceres is partway up the western evening sky, moving from Cetus into Aries on March 3. Due to the onset of Daylight Savings Time, it sets at 11 pm over the next four weeks.

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/~ids/>, <http://www.cobs.si/>

No bright comets this month.

Meteor Shower(s)

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

Nothing major to report

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:	237 (~135/month)
Minor Planets Discovered This Year:	5,208 (~2,976/month)
Comets Discovered This Year:	9 (~5/month)
Observations This Year:	2.8 million

Satellites

A GTA International Space Station morning pass series commences on March 1 (Most are visible between 4 and 7 am). No evening passes Some higher/brighter ones include*:

Date	Mag.	Time	Direction	Alt.
05-Mar	-3.4	5:47:58 am to 5:53:42 am	from WSW to NE	77°
06-Mar	-3.0	4:57:39 am to 5:01:02 am	from SSE to ENE	59°
08-Mar	-2.9	4:49:21 am to 4:52:11 am	from NNE to NE	56°
18-Mar	-3.0	6:38:30 am to 6:45:04 am	from NW to ESE	66°
20-Mar	-3.2	6:29:24 am to 6:35:49 am	from WNW to SE	59°
21-Mar	-3.3	5:39:00 am to 5:43:03 am	from NW to ESE	78°

*far future predicted times may shift slightly

Iridium Flares most frequent evening flares occur between 6:30 pm and 7:30 pm, with morning flares common from 5 to 6:30 am. Local occurrences info at www.heavens-above.com and enter your location, from phone/tablet apps, Astronomy Skylights (subscribe to email [here](#) or visit www.astrogeoguy.tumblr.com)

Feb 23 at 7:36:48 pm	mag -8.0	47 ° alt due SE (near Procyon)
Feb 25 at 6:37:35 pm	mag -6.1	58 ° alt due NNE (upper right of Polaris)

Occultations – Lunar and Asteroidal

Ref: <http://www.asteroidoccultation.com/> and <http://www.poyntsource.com/New/Global.htm> (additional links on the following URLs open track maps)

Lunar Occultations (*Close double - observations highly desired by IOTA)

*Saturday, **Mar 4 at 6:52:10 pm** (dark twilight) to 8:07:10 pm - First quarter moon occults mag 3.8 star Hyadum III (Theta 1 Tau)

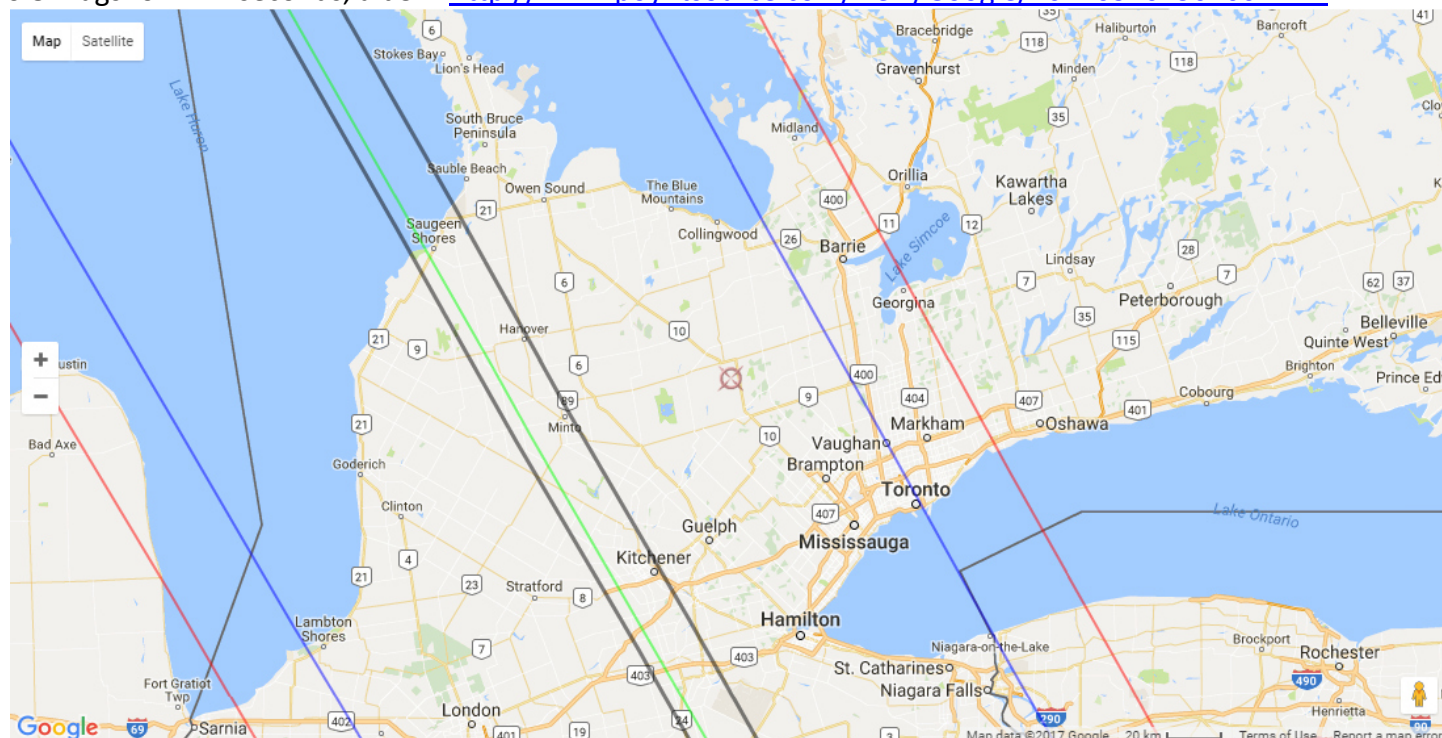
*Saturday, **Mar 4 at 6:59:05 pm** (dark twilight) to 8:01:42 pm - First quarter moon occults mag 3.4 star Hyadum IV (Theta 2 Tau)

*Saturday, **Mar 4 at 8:09:40 pm** to 9:20:12 pm - First quarter moon occults mag 6.5 star HIP21053

Saturday, Mar 4 at 11:16:55 pm - First quarter moon grazes mag 0.9 star Aldebaran !

*Saturday, **Mar 4 at 11:56:30 pm** to 12:23:15 pm - First quarter moon occults mag 5.8 star 89 Tau

Rank 100 - 10 Mar at 5:15 UT asteroid (386) Siegena (mag 12.1) occults star 2UCAC 33931460 (mag 12.0), dips 0.8 mags for 11.4 seconds, alt 54° http://www.poyntsource.com/New/Google/20170310_50460.HTM



Constellations near the Meridian (Annually in March)

8 pm: Canis Major, Lepus, Monoceros, Canis Minor, Orion, Gemini, E Auriga, W Lynx

10 pm: Pyxis, W Hydra, Cancer, E Lynx

12 am: Antlia, Hydra, Crater, Sextans, Leo, Leo Minor, Ursa Major

Late Winter Star party Skylights (Annually in March)

A list of suggested interesting targets was presented at the February 6th, 2016 Members Night at DDO. The contents, complete with a Sky Safari app targets list, are available for download at

<http://rascto.ca/content/february-targets-list>

See you at Long Sault C A, Glen Major Forest, Bayview Village Park, CAO, or DDO!

Questions or comments to chris.vaughan@astrogeo.ca

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