

RASC Toronto Centre – www.rascto.ca

The Sky This Month –August 5 to Sept 9, 2015

by Chris Vaughan

NEWS

Space Exploration – Public and Private

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

Launches

Aug. 16 at 9 am - H-2B rocket from Tanegashima Space Center, Japan, payload Japanese fifth H-2 Transfer Vehicle cargo delivery to ISS.

Aug. 20 at ~4 pm - Ariane 5 rocket from Kourou, French Guiana, payload Eutelsat 8 West B and Intelsat 34 comm satellites.

August TBD - GSLV Mk. 2 rocket from Satish Dhawan Space Center, Sriharikota, India, payload GSAT 6 comm satellite.

TBD - Proton rocket from Baikonur Cosmodrome, Kazakhstan, payload Inmarsat 5 F3 comm satellite.

TBD - Proton rocket from Baikonur Cosmodrome, Kazakhstan, payload Express AM8 comm satellite.

TBD - Proton rocket from Baikonur Cosmodrome, Kazakhstan, payload Garpun military comm satellite.

TBD - Proton rocket from Baikonur Cosmodrome, Kazakhstan, payload Turksat 4B comm satellite.

TBD - Proton rocket from Baikonur Cosmodrome, Kazakhstan, payload Eutelsat 9B comm satellite.

Aug. 31 at 4 am - Atlas 5 rocket from Cape Canaveral Air Force Station, Florida, payload 4th Mobile User Objective System (MUOS) tactical satellite for the U.S. Navy.

Sept. 2 at 12:34 am - Soyuz rocket from Baikonur Cosmodrome, Kazakhstan, payload next Expedition crew to ISS. The capsule will remain at the station for about six months as escape capsule.

TBD - Falcon 9 rocket from Cape Canaveral Air Force Station, Florida, payload 8th operational cargo delivery mission to ISS.

TBD - Falcon 9 rocket from Vandenberg Air Force Base, California, payload Jason 3 ocean altimetry mission for NOAA, EUMETSAT, NASA, and CNES.

TBD - Falcon 9 rocket from Cape Canaveral Air Force Station, Florida, payload SES 9 comm satellite.

TBD - Falcon 9 rocket from Cape Canaveral Air Force Station, Florida, payload 11 second-generation Orbcomm comm satellites.

Sept. 4 TBD - Soyuz 2-1v rocket at Plesetsk Cosmodrome, Russia, payload Kanopus ST Earth observation satellite.

Sept. TBD - Long March 6 rocket from Taiyuan, China, payload cluster of small Chinese amateur and university research satellites.

Sept. TBD - PSLV rocket from Satish Dhawan Space Center, Sriharikota, India, payload IRNSS 1E nav satellite.

New Horizons Mission to Pluto-Charon

The New Horizons spacecraft successfully flew through the Pluto-Charon system on July 14, 2015, travelling approx. 14 km per second (49,600 kph). High-resolution data will take another 15 months to flow to Earth. The Pluto team recently shared some geeky ideas for naming features on Pluto and Charon, including characters (Sulu, Kirk, and Spock) and vessels from Sci Fi (Tardis and Serenity) and real life human and robotic (Venera) explorers on Earth and in space. The IAU has responsibility for officially naming features on Solar System bodies, and they are not known for endorsing whim.

DAWN to Ceres

By mid-August, the DAWN spacecraft will have spiralled down to a new orbit 1,500 km above the surface of the dwarf planet Ceres. A colour-coded map of the surface elevation, with crater names, has recently been released.

Rosetta Update

The Rosetta Orbiter is still mapping the comet's surface, classifying surface morphologies, measuring gravity, mass, shape, and analyzing the coma and plasma as it enters perihelion in mid-August. Philae communications have been spotty at best.

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

August 8, 1931 – **Sir Roger Penrose**, mathematical physicist and cosmologist is born

August 29, 1959 – Canadian Astronaut, singer, social media icon **Chris Hadfield**, is born

September 7, 1914 – **James van Allen** – American physicist and magnetospheric researcher is born

Astronomy and Space Exploration

August 6, 2011 - Launch of JUNO mission to Jupiter, scheduled to arrive July 4, 2016, and enter a polar orbit

August 11, 3114 BCE – The Beginning of Creation, according to the Maya civilization

August 11 & 17, 1877 – Asaph Hall discovers Phobos and Deimos (aka Gods of Fear and Dread respectively)

August 13, 1642 – Christiaan Huygens discovers the Martian south polar cap

August 15, 1977 – the WOW! signal is detected by the SETI program using The Big Ear radio telescope. The 72 second signal originating near Chi Sagittarii is never duplicated

August 23, 1966 – Earth is photographed for the first time from lunar orbit by Lunar Orbiter 1

August 24, 2006 – International Astronomical Union (IAU) demotes the planet Pluto to a dwarf planet or "trans-Neptunian object".

August 28, 1789 – William Herschel discovers Enceladus with a 1.26m telescope, the world's largest

August 29, 1541 – Nicolaus Copernicus' book "De Revolutionibus Orbium Coelestium" ("On the Revolutions of the Celestial Spheres") goes to the printer

September 1, 1804 - German astronomer Karl Ludwig Harding discovers the asteroid, Juno

September 4, 1682 - English astronomer Edmund Halley observes "his" comet

September 6, 1997 - Gladman, Nicholson, Burns, and Kavelaars using the 200-inch Hale telescope discover Caliban and Sycorax, moons of Uranus

September 9, 1892 - Edward Barnard of the Lick Observatory discovers Jupiter's innermost satellite, Amalthea. The first since Galileo's four Galilean moons

Star Parties, etc.

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

"RASC Solar Observing", Ontario Science Centre Teluscape – Sat. 10 to noon, on Aug 8 (or 15)

"RASC Dark Skies Observing", Long Sault Conservation Area, ON – window runs Aug 10-13

"RASC City Skies Observing", Bayview Village Park, Toronto – windows runs Aug 17-20

"Thursday Night Astronomy Nights", Gordon's Park Dark Sky Preserve, Manitoulin Island – July/Aug
(<http://gordonspark.com/astronomy-and-stargazing/>)

“Perseid Meteor Shower Party”, Gordon’s Park Dark Sky Preserve, Manitoulin Island – August 11-13
(<http://gordonspark.com/wp-content/uploads/2015PP.pdf>)

“Starfest”, Mt Forest, ON – August 13-16 (<http://www.nyaa.ca/index.php?page=/sf14/sf.home14>)

“Saskatchewan Summer Star Party, SSSP”, Cyprus Hills, Sask – August 13-16
(<http://www.usask.ca/rasc/starparty.html>)

“The Manitoulin Star Party”, Gordon’s Park Dark Sky Preserve, Manitoulin Island – Aug 14-17
(<http://gordonspark.com/wp-content/uploads/2015MSP.pdf>)

OBSERVING

Globe at Night 2015

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 August and September campaign’s focus is on **Cygnus** from August 5-14 and September 3-12.

Sunrise/Sunset

August 5, sunrise at 6:11 am, sunset at 8:36 pm (14h25m of daylight)
September 9, sunrise at 6:50 am, sunset at 7:39 pm (12h49m of daylight)

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=4>,
<http://www.timeanddate.com/astronomy/canada/toronto>

August 5, astronomical twilight ends at 10:32 pm and starts at 4:15 am (5h43m of imaging time)
September 9, astronomical twilight ends at 9:19 pm and starts at 5:11 am (7h52m of imaging time)

Moon - Orbit

Apogee – Mon, Aug 17 at 11:00 pm
Perigee – Sun, Aug 30 at 11 am

Moon - Phases

Thu, Aug 6 at 10:03 pm – Last Quarter Moon (rises around midnight)
Fri, Aug 14 at 10:53 am – New Moon
Sat, Aug 22 at 3:31 pm – First Quarter Moon (sets around midnight)
Sat, Aug 29 at 2:35 pm – Full “Sturgeon/Green Corn/Grain” Moon (near perigee, large tides)

Moon – Conjunctions, Eclipses, etc.

Lunar X – Friday, August 21 at 11:18 pm, partly...

On rare occasions, for a few hours near the First Quarter Moon, a feature called the Lunar X becomes visible. When the rims of the craters Parbach, la Caille, and Blanchinus are illuminated from a particular angle of sunlight, they form a small, but very clear and bright X shape. It’s located on the terminator about one third of the way up from the southern pole (bottom) of the Moon (at 2° East, 24° South). The prominent round crater Werner sits to the lower right. The next Lunar X will start to develop sometime after 9 pm on Friday, August

21st, peak at 11:18 pm, and be visible until the Moon sets at 11:39 pm - but you'll need a low western horizon. Observers in the west will be able to see the entire event.

Lunar Appulses and Conjunctions

In the pre-dawn of **August 5**, the waning gibbous Moon (70% illum.) sits 2° south of (below) Uranus. In the pre-dawn of **August 12**, the waning crescent Moon (5% illum.) sits less than 10° to the southwest (upper right) of Mars. After sunset on **August 19**, the waxing crescent Moon (24% illum.) sits 3.7° northeast (above) Spica. On the evening of **August 22**, the First Quarter Moon (53% illum.) sits 4° east (to upper left) of Saturn.

Planets and Dwarf Planets

Mercury is in a very poor evening apparition (due to shallow Ecliptic) observable from mid-August to early September, dimming throughout the interval. It sets at 9:18 pm (mag. -0.7) on August 5 and at 8:18 pm (mag. 0.4) on September 9. On August 6 at dusk until 9:20 pm, Jupiter sits only 2° south of Mercury. The very young crescent Moon hops over Mercury on the evenings of Aug 15 and 16. Mercury reaches greatest eastern elongation on Sept 4th.

Venus is in inferior conjunction with the Sun on August 15th, so is unobservable until it becomes an eastern pre-dawn object in late August, climbing and brightening. In early September, it overtakes Mars, passing within 9° to the south (right) of Mars from September 1st to 6th. On Sept 9th it rises at 4:23 am (mag. -4.5).

Mars in August is a morning object traversing Cancer. On Aug 5th it rises in twilight at 4:51 am (mag. 1.72) and on Sept 9th it rises in darkness at 4:31 am (mag. 1.78). In the pre-dawn of August 12th, the waning crescent Moon (5% illum.) sits less than 10° to the southwest (upper right) of Mars. On August 20-21st, Mars traverses the Beehive open cluster M44. It will be visible only in morning twilight, low in the eastern sky, after they rise at 4:40 am. In early September, Venus overtakes Mars, passing within 9° to the south (right) of Mars from September 1st to 6th.

Jupiter is prograde in Leo and on August 5 sits very low in the west at dusk, only 2° west of Mercury, setting at 9:20 pm. On August 6th, the two planets are only one degree apart. After the first week of August, Jupiter is unobservable due to conjunction with the Sun on August 26th.

Saturn is in eastern Libra (to the upper right of the claw stars of Scorpius), making it a convenient target in the southwestern evening sky, though not very high due to the shallow night-time Ecliptic. It sets at 12:58 am on August 5th and at 11:43 pm on Sept 9th, dimming through the month from magnitude 0.44 to 0.56. On the evening of Aug 22, the First Quarter Moon (53% illum.) sits 4° east (to upper left) of Saturn.

Uranus (mag. 5.8) is in Pisces, and observable low in the eastern sky in late evening all month, spending the entire month approximately 30 arc-minutes south of the magnitude 5.2 star (ζ) Zeta Pisces. Around August 27th the planet will join the line between (ζ) Zeta Psc and the magnitude 6.0 star 88 Psc. On August 5th, it rises at 11:10 pm and on Sept 9th it rises at 8:51 pm. The Moon, just past full, hops over Uranus on the evenings of Sept 1st and 2nd.

Neptune is moving retrograde in Aquarius all month (mag. 7.8) and is observable nearly all night due to it reaching opposition on Sept 1st, when it will exhibit a 2.4" disk. In early August, when it rises at 9:40 pm, it crosses the meridian, low in the southern sky, around 3 am. On Sept 9th it rises at 7:21 pm, crossing the meridian after midnight. The Full Moon hops over Neptune on the evenings of August 29th and 30th.

Pluto, northeast of Sagittarius' teapot, is a faint mag. 14.1 object. In early August, it's in the southern sky around 11 pm, setting at 3:56 am. On Sept 9th it sets at 1:36 am.

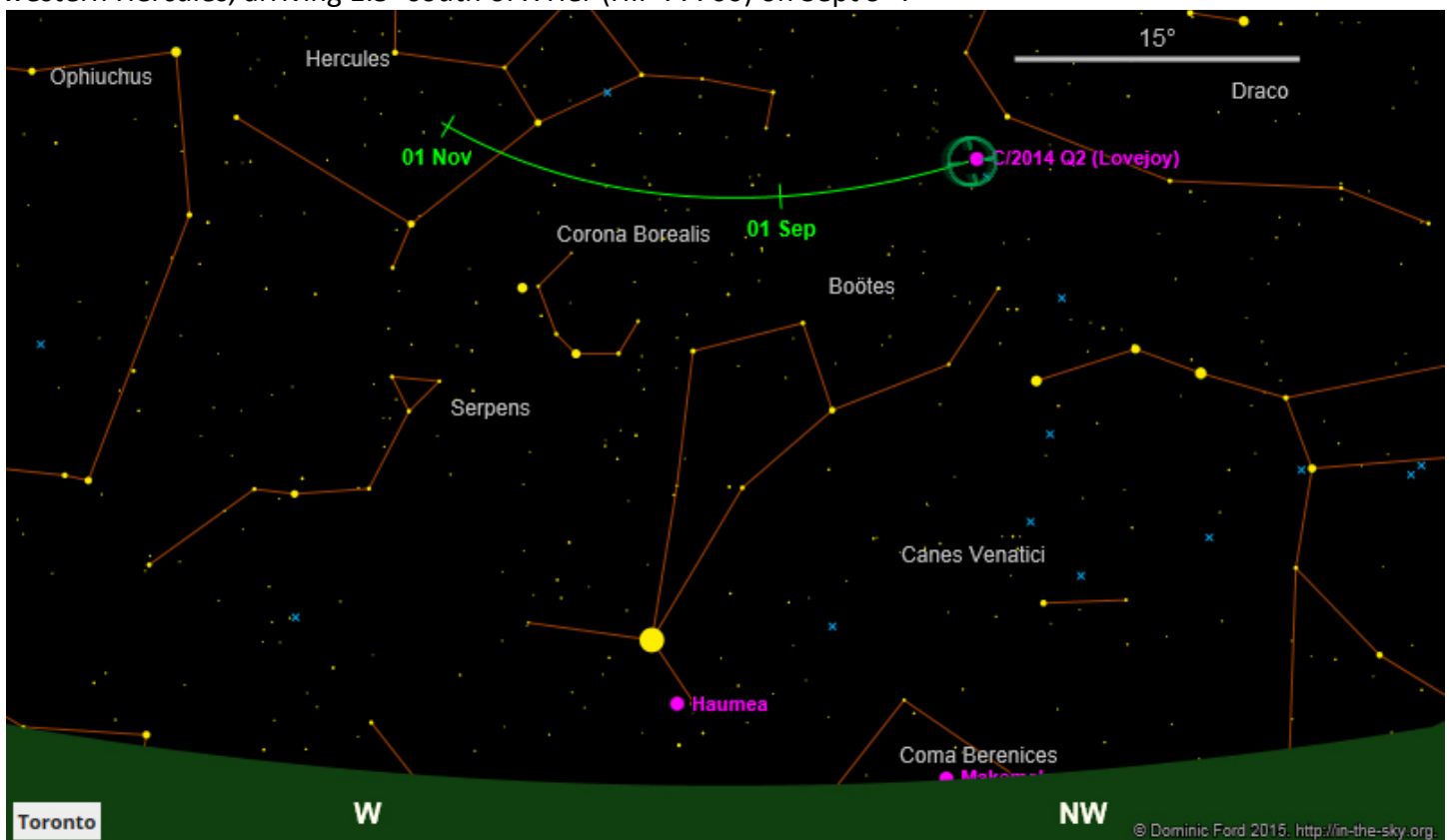
Vesta is an all night target moving in a retrograde loop in Cetus all month, stationary on August 16. It rises at 11:37 pm (mag. 7.1) on Sept 5th and at 9:25 pm (mag. 6.4) on Sept 9th.

Ceres, recently past opposition on July 25, is in the night-time southern sky moving retrograde through eastern Sagittarius. It sets at 4:20 am (mag. 7.6) on Aug 5 and at 1:39 am (mag. 8.3) on Sept 9th.

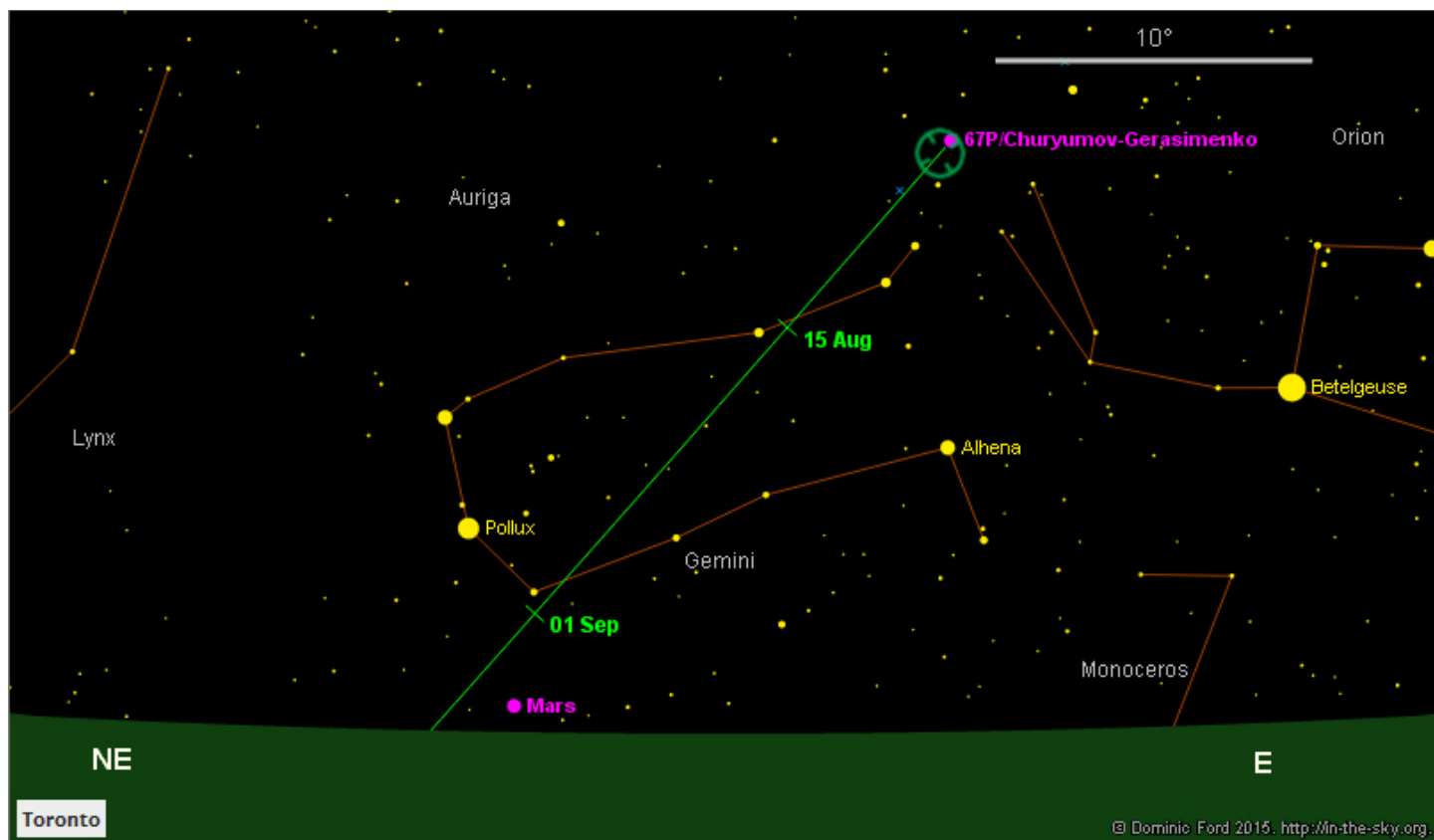
Comets

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/>

C/2014 Q2 (Lovejoy) just keeps on giving! In early August it is around magnitude 9.5 and fading slowly, but remains conveniently positioned for observing in large apertures under dark skies all night this month (circumpolar until late August). On August 5th it is 3° south of Edasich in Draco and heading south towards western Hercules, arriving 1.5° south of X Her (HIP 77760) on Sept 9th.



Comet 67P/Churyumov-Gerasimenko, which the Rosetta spacecraft is orbiting, is a faint pre-dawn comet in the eastern sky. It is moving eastward along the Ecliptic through Gemini during August. It traverses Messier 35 on August 7-8. Although perihelion occurs in August, the comet is predicted to brighten to a maximum of magnitude 12 in October.



Meteor Shower(s)

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

Perseids - Active period July 13 – Aug 26, peaking before dawn on August 13th. The New Moon will benefit observers. The shower radiant point is between Camelopardalis and Perseus in the NE sky – and nearly overhead by dawn (RA 3h 12m, Dec. +57.6°). Source of material is comet 109P/Swift-Tuttle (130 year period). Usually 60-80 per hour at the peak, many are of a fireball nature.

Asteroids

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

According to the Minor Planet Centre...

| | |
|--|-----------------------|
| Near-Earth Objects Discovered This Year: | 868 (~120/month) |
| Minor Planets Discovered This Year: | 54,410 (~7,560/month) |
| Comets Discovered This Year: | 34 (~6/month) |
| Observations This Year: | 11.1 million |

Satellites

Current GTA International Space Station evening pass series ends August 20th (Most are visible between 9 pm and midnight). Morning passes commence on September 8th (most between 5 and 6 am). Some higher/brighter ones include*:

| Date | Mag. | Time | Direction | Alt. |
|------|------|------|-----------|------|
|------|------|------|-----------|------|

| | | | | |
|--------|------|----------------------------|-----------------|-----|
| 13-Aug | -2.5 | 10:49:03 pm to 10:51:32 pm | from WNW to WNW | 49° |
| 14-Aug | -2.9 | 9:55:56 pm to 10:00:17 pm | from NW to E | 53° |
| 16-Aug | -3.4 | 9:46:00 pm to 9:50:27 pm | from WNW to SE | 77° |
| 17-Aug | -3.1 | 8:52:51 pm to 8:59:18 pm | from NW to ESE | 61° |
| 19-Aug | -3.1 | 8:42:52 pm to 8:49:21 pm | from WNW to SE | 66° |

*far future predicted times may shift slightly

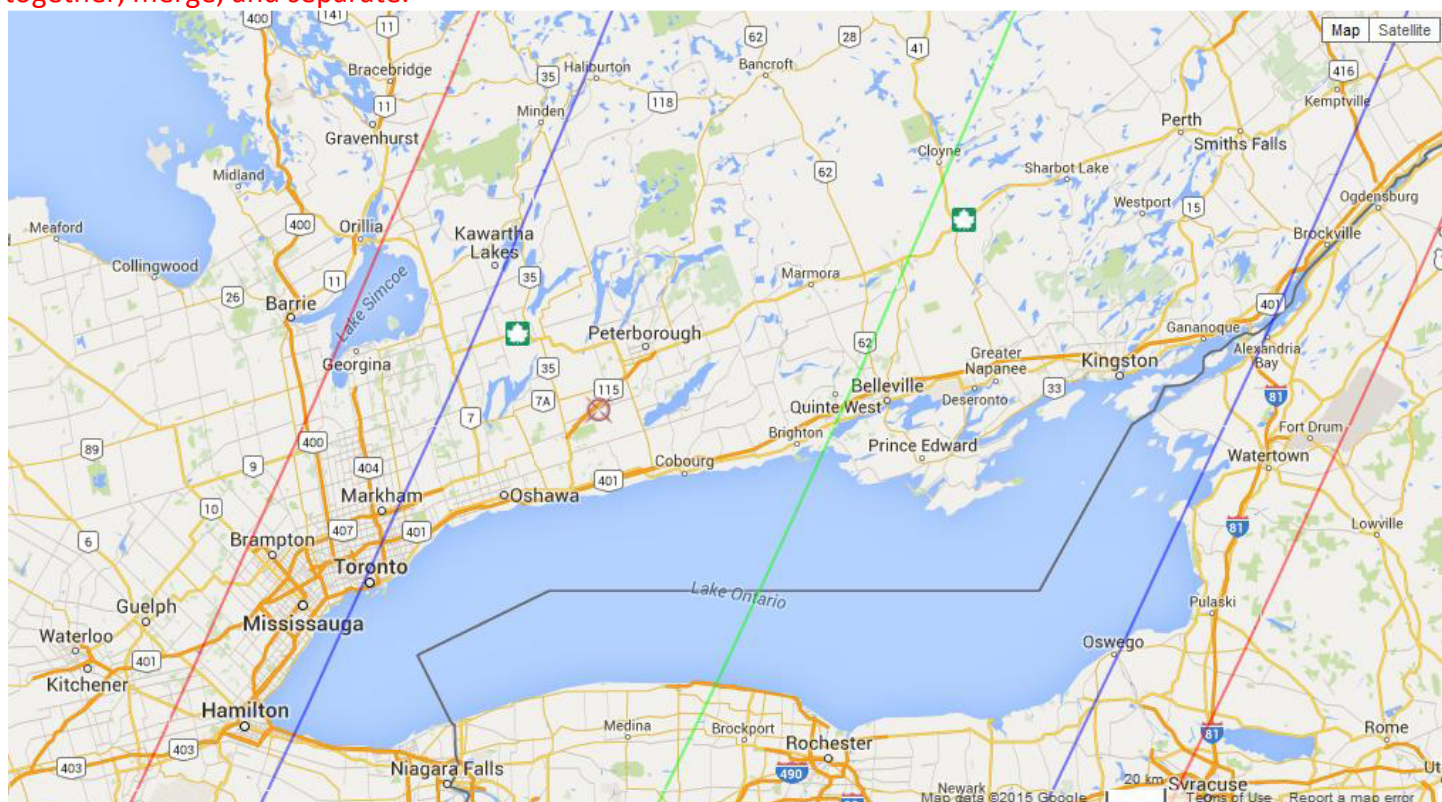
Iridium Flares most frequent evening flares occur between 11 pm and midnight, with morning flares common from 3 to 5:30 am. Local occurrences info at www.heavens-above.com and enter your location, from phone/tablet apps, Chris Vaughan's Skylights (subscribe to email [here](#) or visit www.astrogeoguy.tumblr.com)

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)

Rank 99 - 09 Sep 2015 at 12:31 am, asteroid (192) Nausikaa (mag 10.5) occults star TYC 1807-02014-1 (mag 10.0), visible over Toronto, dips 1.1 mags for 10.0 seconds, alt 32° (Predicted track between blue lines) (http://www.asteroidoccultation.com/2015_09/0909_192_35059.htm)

The similarity in magnitudes between the star and the asteroid will make for interesting viewing as they move together, merge, and separate.



Lunar Occultation

On September 5, from 12:04 am (just after moonrise) to 12:40:48 am, the **Last Quarter Moon occults the star Aldebaran** (mag. 0.9). The Moon will only be 8° above the horizon at last contact. This event can be observed with unaided eyes, binoculars, and telescopes.

Constellations near the Meridian (Annually in Late August)

10 pm: Corona Australis, Sagittarius, Scutum, Eastern Serpens, Hercules, Lyra, and Draco

12 am: Microscopium, Capricornus, Aquila, Aquarius, Equuleus, Delphinus, Sagitta, Vulpecula, and Cygnus

2 am: Pisces Austrinus, Aquarius, Pegasus, Cygnus, Lacerta, and Cepheus

Summer Star party Skylights (Annually in August)

Milky Way, the Big Dipper, Northern Cross/Cygnus, Scorpius, the Teapot (Sag), Milky Way, the Coathanger, etc. (eye / binoculars)

Summer Globes – M13, M92 (Her), M15 (Equ), M5 (Ser), M22 (Sag), M4 (Sco), etc. (binoculars / telescope)

Summer Blobs – M8 Lagoon, M20 Trifid, M17 Omega/Swan (Sag), C34 Veil, C20 North American, C27 Crescent (Cyg), M16 Eagle (Ser), etc. (binoculars / telescope)

Summer Knobs – M57 Ring (Lyr), M27 Dumbbell (Vul), C15 Blinking Planetary (Cyg), C6 Cat's Eye (Dra), etc. (binoculars / telescope)

Fireworks – Mel 111 (Com), M11 Wild Duck Cluster (Scu), Graff's Cluster (Ser), M6 Butterfly Cluster, M7 (Sag) (binoculars / telescope)

Double Plays – Icarus (Boo), Albireo (Cyg), Epsilon Lyrae Double-double (Lyr), Marfik (Her/Oph), etc. (binoculars / telescope)

Hit Singles - Antares (Sco), Vega (Lyr), Altair (Aqu), Deneb (Cyg), Arcturus (Boo), Herschel's Garnet Star (Ceph) (eye / binoculars / telescope)

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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