

RASC Toronto Centre – [www.rascto.ca](http://www.rascto.ca)  
The Sky This Month –Sept 10, 2014 to October 8, 2014  
by Chris Vaughan

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## NEWS

### Space Exploration – Public and Private

Ref. <http://www.spaceflightnow.com/tracking/index.html>

#### Launches

Sept 11 pm - Ariane 5 rocket from ELA-3, Kourou, French Guiana, payload Measat 3b & Optus 10 comm satellites

Sept 16 pm - Atlas 5 rocket from SLC-41, Cape Canaveral Air Force Station, Florida, payload CLIO mission for a U.S. government customer

Sept 19 am - Falcon 9 rocket from SLC-40, Cape Canaveral Air Force Station, Florida, payload SpaceX 6th Dragon spacecraft on 4th cargo delivery mission to the ISS

Sept 25 pm - Soyuz rocket from Baikonur Cosmodrome, Kazakhstan, payload next ISS Expedition crew. (capsule to remain at the station for about six months as an escape pod)

Sept 28 TBD - Proton rocket from Baikonur Cosmodrome, Kazakhstan, secretive payload reportedly known as Olymp or Luch

Oct TBD - PSLV rocket from Satish Dhawan Space Center, Sriharikota, India, payload IRNSS 1C navigation satellite

Oct 7 am - H-2A rocket from Tanegashima Space Center, Japan, payload Himawari 8 weather satellite

#### Rosetta Update

Orbiter will map the comet's surface, measure gravity, mass, shape, and analyze the coma and plasma. The 100 kg Philae Lander will make contact on Nov 11, 2014 and use ice-screws to drill/sample comet and harpoons to latch on. The mission will ride the comet to perihelion and beyond!

Five proposed landing ovals have been selected.

#### NASA MAVEN Mission to Mars

**Mars Atmosphere & Volatile Evolution** spacecraft orbital insertion occurs on Sept 21. The primary mission is a 1-year study of Mars' upper atmosphere, ionosphere, effects of solar wind at Mars, and the historical loss of water and volatiles. The spacecraft will have an elliptical, atmospheric skimming orbit (150 km minimum) with some future lower passes. Instrumentation includes:

- Magnetometer
- Neutral Gas and Ion Mass Spectrometer
- Imaging Ultraviolet Spectrometer
- Solar Wind Electron Analyzer
- Solar Wind Ion Analyzer
- Solar Energetic Particles
- SupraThermal And Thermal Ion Composition

#### India's MOM to Mars

India Space Research Organisation's **Mars Orbiter Mission** is scheduled for orbital insertion on Sept 22 (their first interplanetary mission). It is primarily a hardware technology test mission that will study Mars and its atmosphere. Instrumentation includes:

- Mars Colour Camera (MCC)
- Thermal Infrared Imaging Spectrometer (TIS)
- Methane Sensor for Mars (MSM)
- Mars Exospheric Neutral Composition Analyser (MENCA)
- Lyman Alpha Photometer (LAP)

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

Ref: <http://astroplanet.org/next.php>, <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>

### **Astro-Birthdays and Milestones**

September 17, 1764 – John Goodricke – English astronomer is born, pioneer of periodic variable stars, discovering Algol's eclipsing binary mechanism and researching Cepheid variables

September 21, 1874 - Gustav Holst – composer of *The Planets* (which did not include Pluto) is born

September 27, 1918 – Sir Martin Ryle – pioneer of astronomical radio interferometry **is born**

September 28, 1953 – American astronomer Edwin Hubble dies at age 63

### **Astronomy and Space Exploration**

September 15, 1965 – *Lost in Space* premieres only weeks after *Star Trek*

September 18, 1977 – Voyager I images the Earth and Moon together

September 23, 1846 – Johann Galle discovers Neptune within 1 degree of Urbain Le Verrier's predicted position, observing it the same night he received the position and confirming it over subsequent nights, never accepting credit for the discovery.

September 27, 1905 – Einstein's  $E=mc^2$  paper is published

October 1, 1958 – NASA is created by the US Congress

October 4, 1957 – Sputnik One becomes the first manmade object to orbit the Earth.

October 5, 1923 – Edwin Hubble identifies the first extra-galactic Cepheid variable stars

October 6, 1995 – The first exo-planet is detected around the star 51 Peg

October 7, 1959 – Luna 3 photographs the far side of the Moon for the first time

### **Star Parties, etc.**

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

**"RASC Solar Observing"**, Ontario Science Centre Teluscape – Saturday 10-noon, September 13 and October 4

**"RASC City Skies Observing"**, Bayview Village Park, Toronto – window opens October 6

**"RASC Dark Skies Observing"**, Long Sault Conservation Area, ON – window opens September 22

**"17th Annual Algonquin Adventure Star Party"**, Mew Lake, Algonquin Park – Sept 18-21

(<http://www.rascto.ca/content/2014-annual-algonquin-adventure>)

**"Northern Prairie Star Party"**, Black Nugget Lake, AB – Sept 23-28 (<http://www.edmontonrasc.com/nps.html>)

“Fall’N’Stars 2014”, Thomasburg, ON – Sept 26-28 (<http://rascbelleville.ca/fallinstars/>)

“Astronomical League Astronomy Day”, Oct 4, 2014 (<http://www.astroleague.org/al/astroday/astroday.html>)

## OBSERVING

### Globe at Night 2014

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 campaign focus is on **Cygnus** from September 15-24.

### Sunrise/Sunset

September 1, sunrise at 6:43 am, sunset at 7:52 pm (13h09m of daylight)

October 1, sunrise at 7:19 am, sunset at 6:58 pm (11h39m of daylight)

September 22 at 10:29 pm – Autumnal Equinox

### Moon - Orbit

Perigee – Sept 7/8 at midnight (near Full Moon, large tides)

Apogee - Sept 20 at 10 am

Perigee – Oct 6 at 6 am

Apogee – Oct 18 at 2 am

### Moon - Phases

Tues., Sept 2 at 7:11 am – First Quarter Moon (sets around midnight)

Mon., Sept 8 at 9:38 pm – Full “Harvest/Barley/Corn” Moon (last “Supermoon” for 2014)

Mon., Sept 15 at 10:05 pm – Last Quarter Moon (rises around midnight)

Wed., Sept 24 at 2:14 am – New Moon

Wed., Oct 1 at 3:33 pm – First Quarter Moon (sets around midnight)

Wed., Oct 8 at 6:51 am – Full “Hunter’s/Travel/Dying Grass” Moon

### Moon - Conjunctions

On **September 10<sup>th</sup>** at 8:40 pm EDT, Uranus will emerge from behind the one day past Full Moon, shortly after the pair rise in the eastern evening sky.

On the morning of **September 20<sup>th</sup>**, in the eastern sky, the Old Crescent Moon (12% illum) sits about 6° to the south (lower right) of Jupiter. Photo op!

On **September 26<sup>th</sup>** the young crescent Moon (7% illum) will be situated about 6° to the northeast of Mercury.

On early evening on **September 27<sup>th</sup>**, the waxing crescent Moon (13% illum) will be situated approximately 3° to the lower right (west) of Saturn. Binocular/Photo op!

On **September 29<sup>th</sup>**, the waxing crescent Moon (30% illum) will be situated 3° above (northeast of) Mars.

## Moon – Total Lunar Eclipse October 8, 2014

The first part of the Total Lunar Eclipse of October 8, 2014 is visible from the GTA. A good reference is Observer's Handbook 2014, p. 129 and p. 131-3, by Fred Espanek. At 5:14 am, contact with the Umbra will begin with the Moon 22° above the western horizon. Totality commences at 6:25 am with the Moon only 10° above the horizon. The Moon sets minutes after totality ends at 7:24 am. Photo op!

Note that the Moon's left (southern) edge will be darker due to deeper umbra immersion. The planet Uranus will be positioned approximately 30 arc-minutes (one lunar diameter) to the left (south) of the eclipsed Moon.

4:15:33 am - Penumbral Begins

5:14:48 am - Partial Begins (+22° alt)

6:25:10 am - Totality (+10° alt)

6:54:36 am - Max Totality (+5° alt) (twilight)

7:24:00 am - Totality Ends (+0° alt) (Moonset, daylight)

8:34:21 am - Partial Ends (daylight)

9:33:43 am - Penumbral Ends (daylight)

## Planets and Dwarf Planets

**Mercury's** shallow Ecliptic evening apparition can be observed with difficulty for the early part of September. It reaches greatest eastern elongation on September 22. On September 20, it passes about 40 arc-minutes to the south (lower left) of Spica, very low in the western sky. On September 26<sup>th</sup> the young crescent Moon (7% illum) will be situated about 6° to the northeast of Mercury. On September 10<sup>th</sup>, Mercury will set at 8:22 pm (mag +0.15) and be 73% illuminated. On October 8<sup>th</sup>, Mercury will set at 7:03 pm (mag +1.33) and be 16% illuminated.

**Venus** is a bright early morning object swinging sunward from Leo into Virgo. It becomes more difficult to observe through the month of September, and is lost in the dawn by October. It rises at 5:52 am on September 10<sup>th</sup> (mag -3.4 and 98% illum) and at 7:03 am on October 8<sup>th</sup> (mag -3.5 and 100% illum).

**Mars** is an orange-red object low in the southwestern sky after dusk. Over the next month, it rapidly shifts eastward from Libra into Scorpius and then Ophiuchus and remains small, but observable in early evenings. It sets at 10:17 pm on September 10<sup>th</sup> (mag +0.9) and at 9:33 pm (mag +1.0) on Oct 8<sup>th</sup>. On September 23<sup>rd</sup> Mars will pass only 0.5° northeast of the globular cluster Messier 80. On the days surrounding September 27<sup>th</sup>, look for Mars to pass approximately 3° above (north of) its "rival" Antares – with the best binocular/photo ops on Sept 27<sup>th</sup> and also on Sept 29<sup>th</sup> – when the waxing crescent Moon (30% illum) will be situated 3° above (northeast of) Mars.

**Jupiter**, in Cancer all month, is climbing away from Sunrise and is available all month for morning viewing. It rises at 3:45 am on September 10<sup>th</sup> (mag -1.4) and at 2:22 am (mag -1.5) on October 8<sup>th</sup>. On the morning of September 20<sup>th</sup>, in the eastern sky, the Old Crescent Moon (12% illum.) sits about 6° to the south (lower right) of Jupiter. Photo op!

**Saturn** is an early evening magnitude +0.8 object low in the southwestern sky in Libra all month, steadily becoming less observable as it shifts into the sunset's glare. It sets at 10:08 pm on September 10<sup>th</sup> and at 8:25 pm on Oct 8<sup>th</sup>. On early evening on September 27<sup>th</sup>, the waxing crescent Moon (13% illum) will be situated approximately 3° to the lower right (west) of Saturn. Binocular/Photo op! On Oct 4-5<sup>th</sup>, the dwarf planet Ceres will pass within 25 arc-minutes of the planet.

**Uranus** (mag 6.1) is moving retrograde (west) in Pisces (eastern evening sky) all month, and is an all-night observing target from mid-September onward. On September 10<sup>th</sup> it rises at 8:33 pm, and on October 8<sup>th</sup> it rises at 6:40 pm. On September 10, Uranus will rise just as it emerges from behind the one day past Full Moon. It reaches opposition on October 7<sup>th</sup>.

**Neptune**, (mag 7.6) moving retrograde in Aquarius is in the southeastern evening sky, making it an all-night target in early September and an evening target in October. It sets at 5:52 am on September 10<sup>th</sup> and sets at 3:59 am on October 8<sup>th</sup>. The nearly Full Moon sits 3° to the upper left (northeast) of Neptune on October 5<sup>th</sup>.

**Pluto**, north of Sagittarius' teapot, a faint mag 14.1 object, sets at 1:24 am on September 10<sup>th</sup> and at 11:34 pm on October 8<sup>th</sup>.

**Vesta** (mag 7.8) and **Ceres** (mag 9.0) are in the same area, about 3° north of Zubenelgenubi in Libra and are travelling east, both passing near Saturn. They are available only for early evening viewing. On Oct 4-5<sup>th</sup>, Ceres will pass within 25 arc-minutes of Saturn.

## Comets

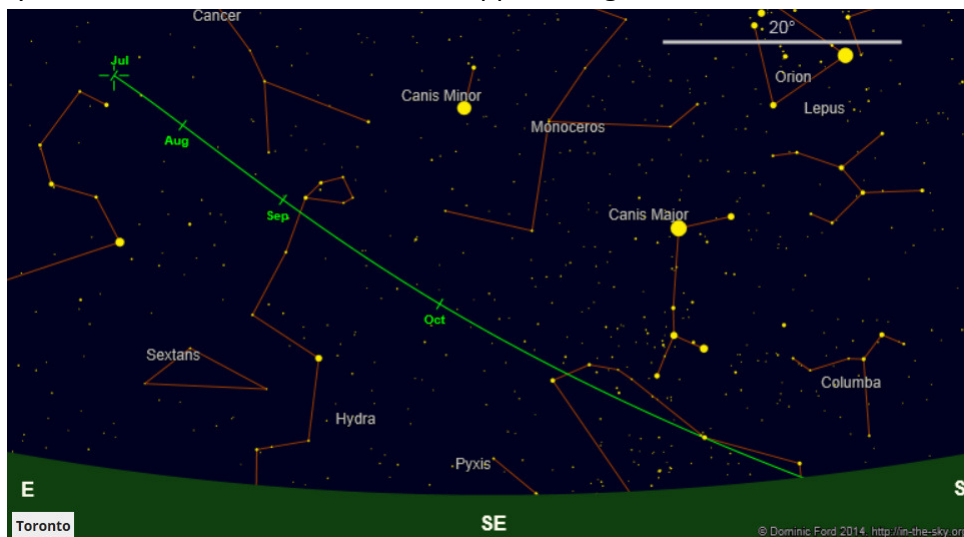
Ref <http://www.aerith.net/comet/weekly/current.html>, <http://cometchasing.skyhound.com/>, <http://in-the-sky.org/comets.php>

### Comet C/2013 V5 (Oukaimeden)

Not easily observed from the GTA. It is predicted to peak at mag 4.3 on September 19<sup>th</sup>. On September 10<sup>th</sup> it is dropping towards the Sun just before dawn on the Hydra/Pyxis border. In early October, it will become an evening object low in the west after sunset.

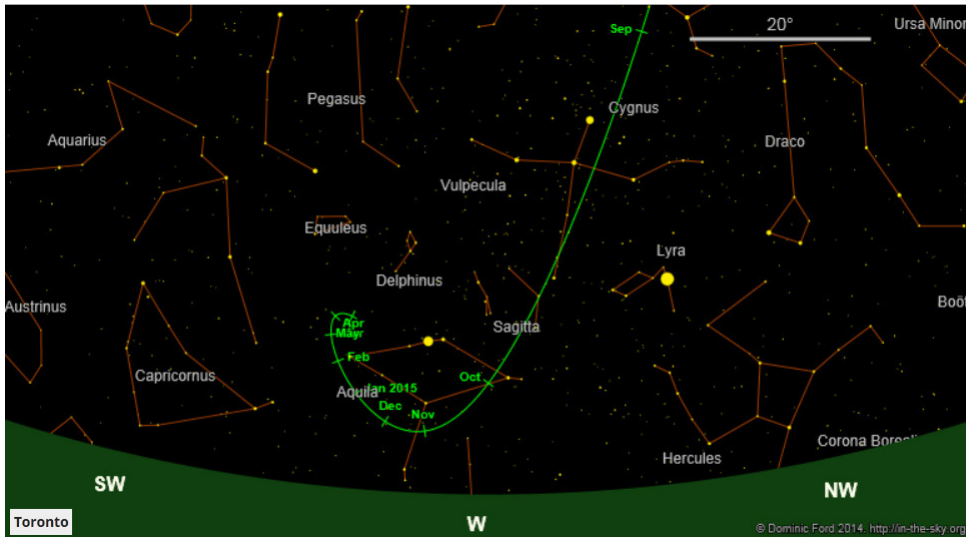
### Comet C/2012 K1 (PANSTARRS)

Still slowly brightening, around mag 7, it is expected to peak around magnitude 6.7 in late October. On September 10<sup>th</sup> it is a pre-dawn object all month, rising at 4:48 am and heading south through the west end of Hydra. On October 8<sup>th</sup>, it will be in Puppis, rising at 3:41 am.



## Comet C/2014 E2 (Jacques)

On September 10<sup>th</sup>, it is approximately mag 10 and declining. It is an all-night object, high overhead in Cygnus. For the rest of September, it will follow the Milky Way towards Aquila. In October, setting around 1:30 am, it will make a loop south and eastward around Aquila and remain there the rest of the year.



## Meteor Shower(s)

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

**No major showers**

## Asteroids

Ref. <http://neo.jpl.nasa.gov/ca/>, <http://www.minorplanetcenter.net/>

According to the Minor Planet Centre...

Near-Earth Objects Discovered This Year: 863 (~105/month)  
 Minor Planets Discovered This Year: 47,563 (~5800/month)  
 Comets Discovered This Year: 37 (~4.5/month)

September 9 - Asteroid 276049 - 2002 CE26 (3.5 km) will pass within 48 Lunar Distances, peak mag. 16.8

October 7 - Asteroid 68267 - 2001 EA16 (1.2 - 2.6 km) will pass within 35.5 Lunar Distances, peak mag. 16.8

## Satellites

Current GTA International Space Station morning pass series runs until Oct 1<sup>st</sup> (Most are visible between 5 to 6:30 am). Evening passes commence on Oct 5<sup>th</sup>.

Some higher/brighter ones include\*:

Date	Mag.	Time	Direction	Alt.
15-Sep	-3.3	5:43:03 am to 5:48: 50 am	moving SW to ENW	88°
28-Sep	-3.2	6:22:51 am to 6:29:21 am	moving WNW to SE	58°
29-Sep	-3.3	5:36:08 am to 5:40:15 am	moving NW to ESE	84°
07-Oct	-3.1	8:31:37 pm to 8:34:32 pm	moving SW to SSW	61°

\*far future predicted times may shift slightly



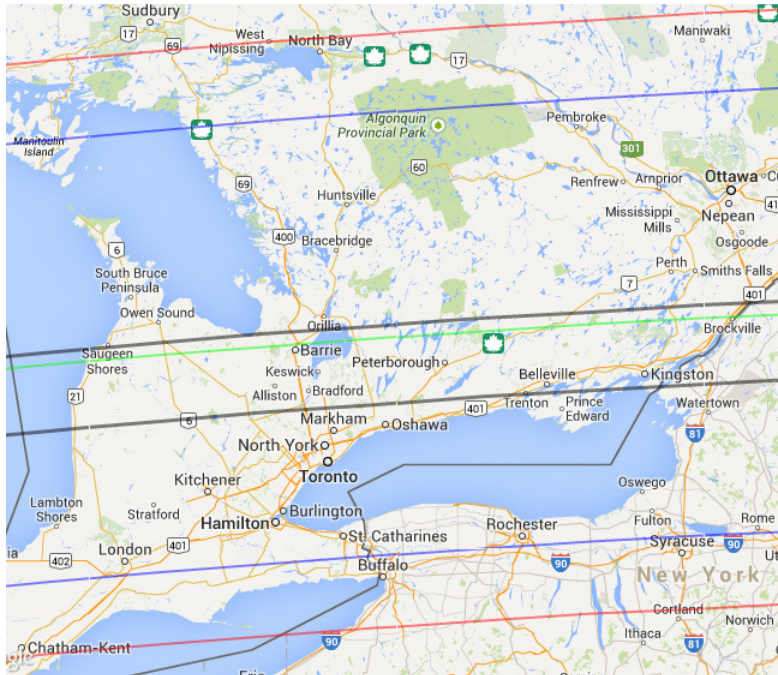
**Iridium Flares** most frequent evening passes occur between 7:45 pm and 9:30 pm. Local occurrences info at [www.heavens-above.com](http://www.heavens-above.com) and enter your location, from phone/tablet apps, Chris Vaughan's Skylights (subscribe to email or visit [www.astrogeoguy.tumblr.com](http://www.astrogeoguy.tumblr.com))

## Occultations

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

**Rank 99 - 08 Oct 2014 , 06:56 UT Asteroid (3) Juno (mag 9.5) occults star TYC 0780-01502-1 (mag 11.9) – visible across southern Ontario, drops 0.1 mags for 11.0 seconds, alt. 58° (very low mag drop)**

[http://www.asteroidoccultation.com/2014\\_10/1008\\_3\\_33102.htm](http://www.asteroidoccultation.com/2014_10/1008_3_33102.htm)



## Constellations near the Meridian (Annually in September)

9 pm: Corona Australis, Sagittarius, Scutum, Aquila, Sagitta, Vulpecula, Cygnus, Lyra, and Draco

11 pm: Microscopium, Piscis Austrinus, Capricornus, Aquarius, Equuleus, Delphinus, Lacerta, Cygnus, and Cepheus

1 am: Sculptor, Aquarius, Pisces, Pegasus, Andromeda, Cassiopeia, and Cepheus

## Early Autumn Star party Skylights (Annually in September)

The Teapot, Summer Triangle, Milky Way, the Coathangar, Pegasus, etc. (eye / binoculars),

Early Fall Globes – M13, M92 (Her), M22 (Sag), M2 (Aqr), M15 (Peg), etc. (binoculars / telescope)

Early Fall Blobs – Double Cluster (Per), M31 Andromeda Galaxy (And), M33 Galaxy (Tri), Heart, Soul (Cas), Veil, N American, Crescent (Cyg), etc. (binoculars / telescope),

Early Fall Knobs – Ring (Lyr), Dumbbell (Vul), Blinking Planetary (Cyg), Cat's Eye (Dra), etc. (binoculars / telescope)

Seeing Double – Albireo (Cyg), Eps Lyrae Double-double (Lyr), Marfik (Her/Oph), Almaach (And), etc. (binoculars / telescope)

Hit Singles - Antares (Sco), Vega (Lyr), Altair (Aqu), Deneb (Cyg), Arcturus (Boo), Capella (Aur) (eye / binoculars / telescope)

**Come out to Long Sault C A, Bayview Village Park, CAO, or DDO!**