

RASC Toronto Centre – www.rascto.ca

The Sky This Month – March 25 to April 22, 2015

by Chris Vaughan

NEWS

Space Exploration – Public and Private

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

Launches

March 25 afternoon - Delta 4 rocket from Cape Canaveral Air Force Station, Florida, payload USAF's 9th Block 2F GPS navsat.

March 25 pm - Dnepr rocket from Dombrovsky, Russia, payload Kompsat 3A high-resolution Earth observation sat for Korea.

March 25 pm - H-2A rocket from Tanegashima Space Center, Japan, payload Japanese optical reconnaissance sat.

March 27 afternoon - Soyuz rocket from Baikonur Cosmodrome, Kazakhstan, payload manned Soyuz spacecraft to ISS (capsule to remain at ISS for about six months as escape pod).

March 27 pm - Soyuz rocket from Sinnamary, French Guiana, payload two Galileo full operational capability sats for Europe's Galileo navigation constellation.

March 28 am - PSLV rocket from Satish Dhawan Space Center, Sriharikota, India, payload IRNSS 1D navsat, 4th in the Indian Regional System.

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

April 10 pm - Falcon 9 rocket from Cape Canaveral Air Force Station, Florida, payload 8th Dragon spacecraft on the 6th operational commercial cargo delivery mission to ISS.

April 15 TBD - Ariane 5 rocket from Kourou, French Guiana, payload Thor 7 and Sicral 2 satellites.

April TBD - Rockot rocket from Plesetsk Cosmodrome, Russia, payload three Gonets M comsats.

New Horizons Mission to Pluto-Charon

The New Horizons spacecraft is scheduled to fly through the Pluto-Charon system on July 14, 2015, travelling approx. 13.78 km per second (49,600 kph), then head out into the Kuiper Belt. The Pluto-and-moons system will be approximately face-on, so close attention will be paid up to the last days of approach in order to "thread the needle". Radio signal travel times are more than 4 hours one-way. The spacecraft is awake and healthy, and engineers have been recently practicing to refine the science collection work plan while they wait for the July pass. Data will take many months to flow to Earth.

MESSENGER at Mercury

The Messenger spacecraft orbiting Mercury is nearly out of fuel and will end its mission by impacting the planet sometime this spring. In the meantime, the orbit has been lowered to a under 30 km above the surface to image the surface and map the planet's crustal magnetism in extraordinary detail

DAWN to Ceres

The ion-drive equipped DAWN spacecraft is in the process of entering final orbit around the dwarf planet Ceres after arriving on March 6, 2015. It is presently on the unlit side of Ceres, hence no imagery. It will remain in orbit to map the round world in detail.

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. The most recent science announced is the measurement by the ROSINA instrument of molecular nitrogen in the comet. The balance of this nitrogen against other compounds provides clues about the formation temperature of the comet from the protosolar nebula. The Philae Lander has not "phoned home" during recent attempts to signal it; therefore its fate is still uncertain. Engineers have been sending commands that, if received, will optimize the lander's ability to re-charge. There will be more communications opportunities before the comet reaches perihelion in August.

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>

Astro-Birthdays and Milestones

Mar 23, 1749 - Pierre Simon Laplace's is born

Apr 11, 1862 - American astronomer, William Wallace Campbell, is born. Campbell became the leader of stellar motion and radial velocity studies. He was the director of Lick Observatory from 1901 to 1930.

Apr 14, 1629 - Christiaan Huygens', the Dutch astronomer who discovered Saturn's rings is born.

Apr 23, 1858 – Max Planck, quantum physicist, namesake of the Planck satellite that mapped the CMB

Astronomy and Space Exploration

Mar 23, 2001 - MIR is de-orbited into the Pacific Ocean

Mar 24, 1930 - Pluto named

Mar 24, 2006 - Pluto demoted

Mar 25, 1655 - Christian Huygens discovers Titan

Apr 6, 648 BCE - First record solar eclipse by the Greeks

Apr 6, 1973 - The Pioneer 11 spacecraft is launched

Apr 12, 1961 - Russian Yuri Gagarin is the first man in orbit on Vostok 1. Yuri's Night!

Apr 17, 1970 - Crippled Apollo 13 returns safely to Earth

Apr 21, 1994 - Alexander Wolszczan announces the first discoveries of extra-solar planets.

Apr 22, 1056 - Last recorded naked-eye observation of the Crab Nebula (M1).

Star Parties, etc.

Ref: <http://www.amsky.com/calendar/events/#may>, http://stardate.org/nightsky/star_parties

"RASC City Skies Observing", Bayview Village Park, Toronto – windows opens March 23

"RASC Solar Observing", Ontario Science Centre Teluscape – Saturday 10 to noon, April 11 (or Apr 18?)

"RASC Dark Skies Observing", Long Sault Conservation Area, ON – window opens April 13

"Northeast Astronomy Forum", or NEAF, in Suffern New York – April 18-19, 2015

(<http://www.rocklandastronomy.com/neaf.html>)

"Astronomy Day", Worldwide – Apr 25 (<https://www.astroleague.org/al/astroday/astroday.html>)

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 next campaign focus is on **Leo** from April 9-18.

Sunrise/Sunset

March 25, sunrise at 7:14 am, sunset at 7:35 pm (12h24m of daylight)

April 22, sunrise at 6:26 am, sunset at 8:08 pm (13h42m of daylight)

Moon - Orbit

Apogee – Wed, Apr 1 at 9 am

Perigee – Thu/Fri, Apr 16/17 at midnight

Moon - Phases

Fri, Mar 27 at 3:43 am – First Quarter Moon (sets around midnight)

Sat, Apr 4 at 8:06 pm – Full “Grass/Egg” Moon (Eclipsed!)

Sat, Apr 11 at 11:44 pm – Last Quarter Moon (rises around midnight)

Sat, Apr 18 at 2:57 pm – New Moon

Moon – Conjunctions, Eclipses, etc.

On **March 29th** evening, the waxing gibbous Moon (76% illum.) sits about 6.5° southwest (to lower right) of Jupiter. On **April 4th** overnight, the Full Moon sits about 3° north (above) of Spica. On **April 8th** from midnight to dawn, the waning gibbous Moon (86% illum.) sits about 2.5° northwest (to upper right) of Saturn. On **April 19th** after dusk, the young Moon (2% illum.) sits about 4° and 6.5° southeast (left) of Mars and Mercury respectively. On **April 21st** the young Moon (13.1% illum.) sits ~7° southeast (to the left) of Venus.

On April 21st at 11:45 am EDT, the dark southern limb of the waxing crescent Moon will sit less than 2 arc-minutes from the magnitude 0.85 star Aldebaran (28° above the eastern horizon). Daytime star observing with binoculars and telescopes!

On the morning of **April 4th, 2015**, a **Total Lunar Eclipse** occurs (Member 30 of 71 for Saros 132) with the Moon just barely passing within the Earth’s shadow. In the GTA the Moon meets the horizon at 6:55 am EDT, while still entering the umbra (approx. 40% of the Moon in shadow). Here are the timings for the eclipse events (adapted from F. Espenak, NASA’s GSFC <http://eclipse.gsfc.nasa.gov/LEplot/LEplot2001/LE2015Apr04T.pdf>):

5:01:27 am EDT – Penumbral Phase commences

6:15:45 am EDT – Umbral Phase commences (in twilight)

6:58:00 am EDT – Moon Set ☹

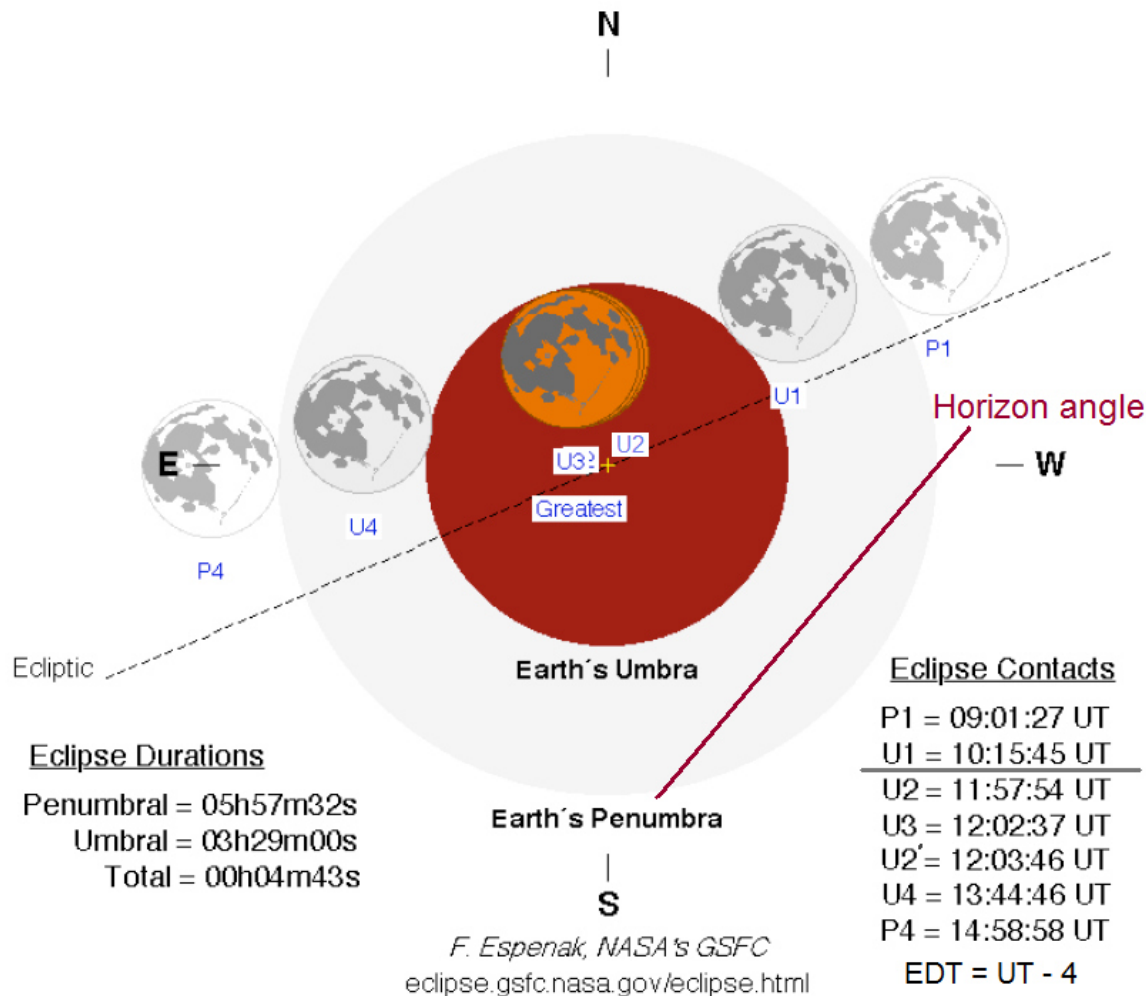
7:57:54 am EDT – Full Eclipse commences

8:02:37 am EDT – Maximum Eclipse

8:03:46 am EDT – Full Eclipse ends

9:44:46 am EDT – Umbral Phase ends

10:58:58 am EDT – Penumbral Phase ends



Planets and Dwarf Planets

Mercury is in a poor morning apparition due to the shallow ecliptic, reaches superior conjunction on April 10th, and then moves into an excellent evening apparition starting after mid-April. It has a loose grouping with Mars and the young Moon (2% illum.) on April 19th. On April 22nd it approaches to 1.25° north of Mars before moving away (observed with difficulty).

Venus, at about magnitude -3.5, climbs the western evening sky all month, moving from Aries into Taurus. It sets at 10:42 pm on March 25th and at 11:48 pm on April 22nd. Its phase will reduce from 80% to 70% illuminated during that period. From April 10th to 12th it moves past the Pleiades - within 3° on the 11th. On **April 21st** the young Moon (13.1% illum.) sits ~7° southeast (to the left) of Venus.

Mars, around magnitude 1.6, continues to be observable with aid in twilight, low in the western sky after dusk. Over the next month, it continues to recede and shift eastward from Pisces into Aries, setting at 9:20 pm all month. It has a loose grouping with Mercury and the young Moon (2% illum.) on April 19th. On April 22nd it approaches to 1.25° south of Mercury before moving away (observed with difficulty). By late April it becomes unobservable until late July.

Jupiter fades from magnitude -1.9 to -1.7 this month, but remains well placed for observing in the western half of the sky. It sits about 5° southeast of M44, moving retrograde in Cancer until April 8th. It sets at 5:22 am on March 25th and sets at 3:32 am on April 22nd. On the evening of March 29th, the waxing gibbous Moon (76%

illum.) sits about 6.5° southwest (to the lower right) of Jupiter. I have been noting mutual moon events and transits in my weekly Skylights.

Saturn is moving retrograde in Scorpius all month, observable in the morning sky. On March 25th it rises at 12:36 am (magnitude 0.53) and on April 22nd, it will rise at 10:40 pm (mag 0.38). On April 8th from midnight to dawn, the waning gibbous Moon (86% illum.) sits about 2.5° northwest (to the upper right) of Saturn.

Uranus is in Pisces all month in conjunction with the Sun.

Neptune, in Aquarius all month (mag 7.8) will become observable with difficulty (due to the shallow ecliptic) low in the pre-dawn southeastern sky after mid-April. On April 15th, the waning crescent Moon (15.7% illum.) will sit about 2.5° north of (above) Neptune.

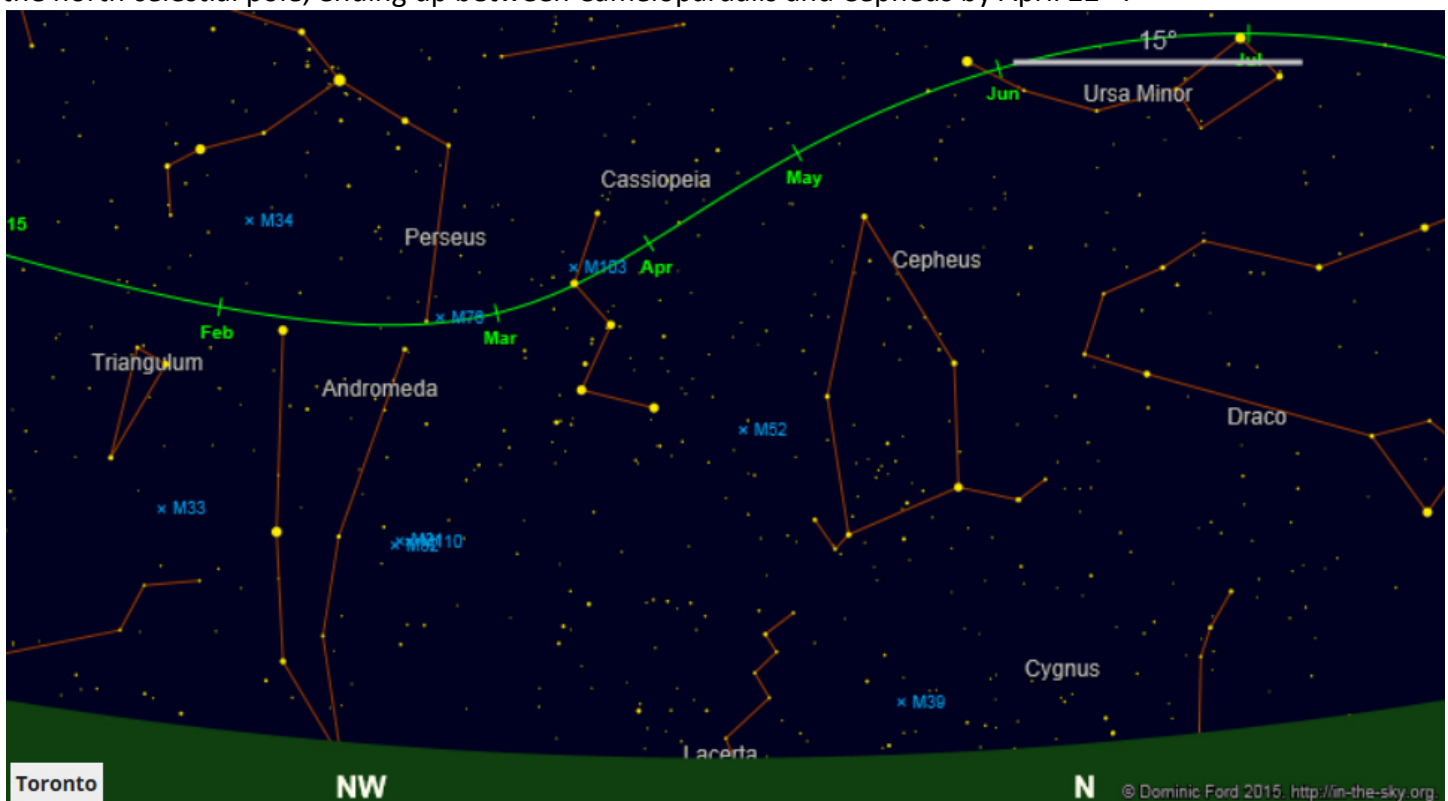
Pluto, northeast of Sagittarius' teapot, a faint mag 14.2 object in the southeastern predawn sky, rises at 3:30 am on March 25th and at 1:45 am on April 22nd.

Vesta (mag 8.0) is in Aquarius and **Ceres** (mag 9.1) moves from Sagittarius into Capricornus at the end of March. Ceres is observable in the pre-dawn hours over the course of the month.

Comets

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

C/2014 Q2 (Lovejoy) is around magnitude 6 and fading slowly, but remains conveniently positioned for observing all night (circumpolar) and all month. It is currently about 2° north of Ruchbah and heading towards the north celestial pole, ending up between Camelopardalis and Cepheus by April 22nd.



Meteor Shower(s)

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

Lyrids (April 16 to 25)

The Lyrids are a medium strength, narrow maximum meteor shower, peaking before dawn on April 22nd. Derived from debris from comet C/1861 G1 Thatcher, the meteors are medium speed that generally lack persistent trails, but may include fireballs. The peak rate is 10-20 per hour and the radiant is well placed for the GTA, about 9° Southwest of Vega, in the constellation of Hercules (RA 18h 04m, Decl. +34°). Young crescent Moon (22% illum.) sets about 11:30 pm allowing for a good show.

Eta Aquarids (April 19 to May 26)

The Eta Aquarids are a strong, broad maximum meteor shower better viewed from southern latitudes as the radiant is southerly and rises soon before the Sun in the GTA. The shower peaks before dawn on May 6th. These are fast meteors with persistent trails, few fireballs at a rate of 10-30 per hour in the GTA. The source of the shower is Halley's Comet. The radiant is coincident with Eta Aquarius (RA 22h 32m, Decl. -1°). This year, the Moon will be nearly full on the peak date.

Nova

Nova Sagittarii 2015 No. 2 is a pre-dawn object below the Teapot's Lid in Sagittarius. It has already peaked in brightness at magnitude 4.3 but, as of March 24, it is still an easy to spot magnitude 5.7. On March 25th it rises about 4 am.

Asteroids

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

According to the Minor Planet Centre...

Near-Earth Objects Discovered This Year: 374 (~125/month)

Minor Planets Discovered This Year: 29,512 (~9,850/month)

Comets Discovered This Year: 14 (~5/month)

Satellites

Current GTA International Space Station morning pass series ends Apr 1st (Most are visible between 4:30 to 6:30 am). Evening passes commence on Apr 2nd running until Apr 24th (most between 8:30 and 10:30 pm). Some higher/brighter ones include*:

Date	Mag.	Time	Direction	Alt.
27-Mar	-3.4	6:36:54 am to 6:43:21 am	from WNW to SE	78°
28-Mar	-2.9	5:44:28 am to 5:49:58 am	from NW to ESE	59°
29-Mar	-2.6	6:26:41 am to 6:32:40 am	from WNW to SSE	35°
30-Mar	-3.5	5:35:17 am to 5:39:33 am	from WNW to SE	68°
04-Apr	-2.9	8:57:44 pm to 9:02:13 pm	from SSW to E	40°
05-Apr	-2.7	9:40:18 pm to 9:44:16 pm	from WSW to NNE	54°
06-Apr	-3.4	8:46:33 pm to 8:53:05 pm	from SW to ENE	87°
08-Apr	-2.4	8:35:36 pm to 8:41:58 pm	from WSW to NE	49°
16-Apr	-2.4	9:27:57 pm to 9:32:16 pm	from NW to ENE	40°
17-Apr	-2.7	10:10:13 pm to 10:12:55 pm	from WNW to W	51°
18-Apr	-3.3	9:16:08 pm to 9:21:01 pm	from NW to ESE	72°
20-Apr	-2.9	9:04:18 pm to 9:09:50 pm	from WNW to SE	55°

*far future predicted times may shift slightly

Iridium Flares most frequent evening flares occur between 8 pm and 9:30 pm, with morning flares common from 5:30 to 6:30 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)

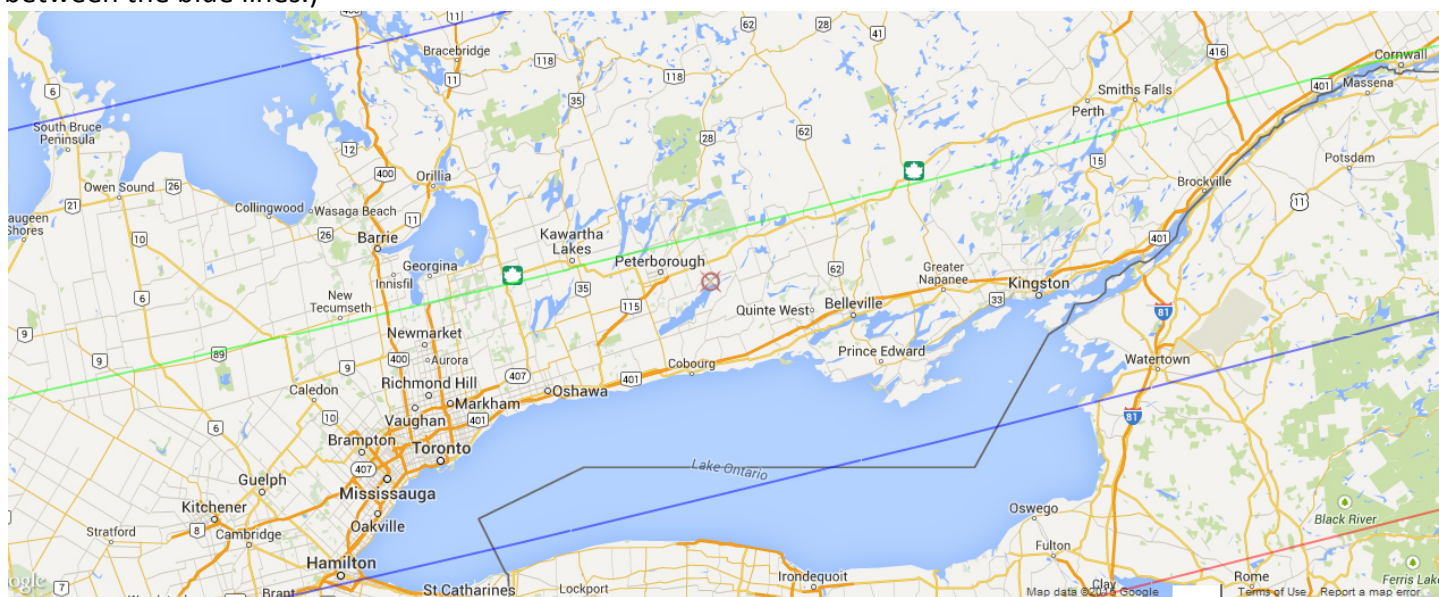
Occultations

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

Rank 97 - On Apr 15, 2015 at 03:32 am EDT, Asteroid (595) Polyxena (mag 12.3) occults star HIP 68025 (mag 8.9) – predicted centre of track from Lake Huron through Mt. Forest, Shelburne, Kawartha Lakes, Marmora, Cornwall, etc. - dips 3.4 magnitudes for 7.6 seconds, alt. 34°

(http://www.asteroidoccultation.com/2015_04/0415_595_34581.htm)

(Below: The predicted centre of the track is shown in green, with the occultation expected to be visible between the blue lines.)



Constellations on the Meridian (Annually in March/April)

9 pm: Pyxis, Puppis, Hydra, Monoceros, Canis Minor, Cancer, and Lynx

11 pm: Antlia (the Pump), Crater, Hydra, Sextans, Leo, and Leo Minor

1 am: Hydra, Corvus, Virgo, Coma Berenices, and Canes Venatici

Interesting Targets in the Corvus, Crater, Sextans, Hydra, Leo, Cancer Region

Ref: http://www.dibonsmith.com/mon_con.htm, "Objects in the Heavens", Sky Safari app, etc.

The evening southern sky in mid-April is off the Milky Way. Aside from the galaxies of late spring (best seen later), there are many interesting objects to look at. (Note that the " symbol represents an angular measurement in arc-seconds or 1/3600 degree. The ' symbol is 1/60 of a degree. The Moon is 30' or 1800" across.)

Hydra

Messier 48 or NGC 2548– Large (30-50'), but sparse mag 5.8 open cluster (binoculars)

Caldwell 59 or NGC 3242 or "Ghost of Jupiter" – A small, but bright magnitude 7.8 planetary nebula about 0.6 arc-minutes across and discovered by John Herschel from Cape of Good Hope in 1785.

Messier 68 – Medium sized (12') mag 7.7 globular cluster, difficult before late evening due to southern declination (binoculars)

Crater & Corvus

Caldwell 61 or **Antennae Galaxies** or NGC 4038/4039 – Pair of gravitational distorted galaxies with high surface brightness (mag 10.4) and tight cores about 5.4" across. Lots of star formation and radio source.

NGC 4361 or PK 294+43.1 – A small green mag 10.3 planetary nebula about 45" across

Algorab or Delta Corvus – Yellow (mag 3) and lilac/orange (mag 8.5) wide double star (sep 25")

M104 or **Sombrero Galaxy** or NGC 4594 – Bright mag 8.0, good sized (7.1x4.4') nearly edge-on galaxy with a dark dust lane rim (on the Corvus/Virgo boundary)

Stargate Asterism or STF1659– Six stars forming a triangle inside a triangle with magnitudes from 6.6 to 11.5, only 1° from M104, between Porrima and Algorab (Search for HIP61486)

Cancer (And don't forget Jupiter!)

Iota Cancri – Orange (mag 4.1) and green/blue (mag 6.0) double star (sep 31") easy in telescope

M44 or Praesepe or **The Beehive** – At mag 3.1, a nearby and huge (95') open cluster (binoculars and unaided eyes under dark skies)

Zeta Cancri or **Tegmine** or 16 Cancri – Tightly (sep 6") triple star, yellow (mags 4.9, 5.3, and 6.3) needs high magnification

M67 or NGC2682 – An ancient open cluster equal to the Moon in diameter. At mag 6.9 is a good target in binoculars or small telescopes

X Cancri or HIP43811 – Pulsating variable (mag 5.7-6.9) red carbon star (1.5° from Jupiter in 2015)

Caldwell 48 or NGC2775 – A mag 10.3 smoothed spiral galaxy about 4.6x3.7' across, has hosted 5 supernovae in the last 30 years!

Sextans

35 Sextans or HIP52452 – Tight Orange (mag 6.9) and yellow (mag 8.4) double star (7" sep)

Spindle Galaxy or **Caldwell 53** or NGC 3115 – A bright magnitude 8.9 edge-on lenticular shape (8x3') without structure (FNGC)

Leo

Algieba or gamma Leonis – Bright and tight orange (mag 2.4) and yellow (mag 3.6) double star (5" sep)

NGC 2903 – A very large (12x6') mag 9.0 elongated spiral galaxy (FNGC)

M95 / 96 / 105 or NGC 3351/3368/3379 – A close grouping of relatively bright (mag 9.2-9.7) galaxies within a ~1° field, part of the Leo Group

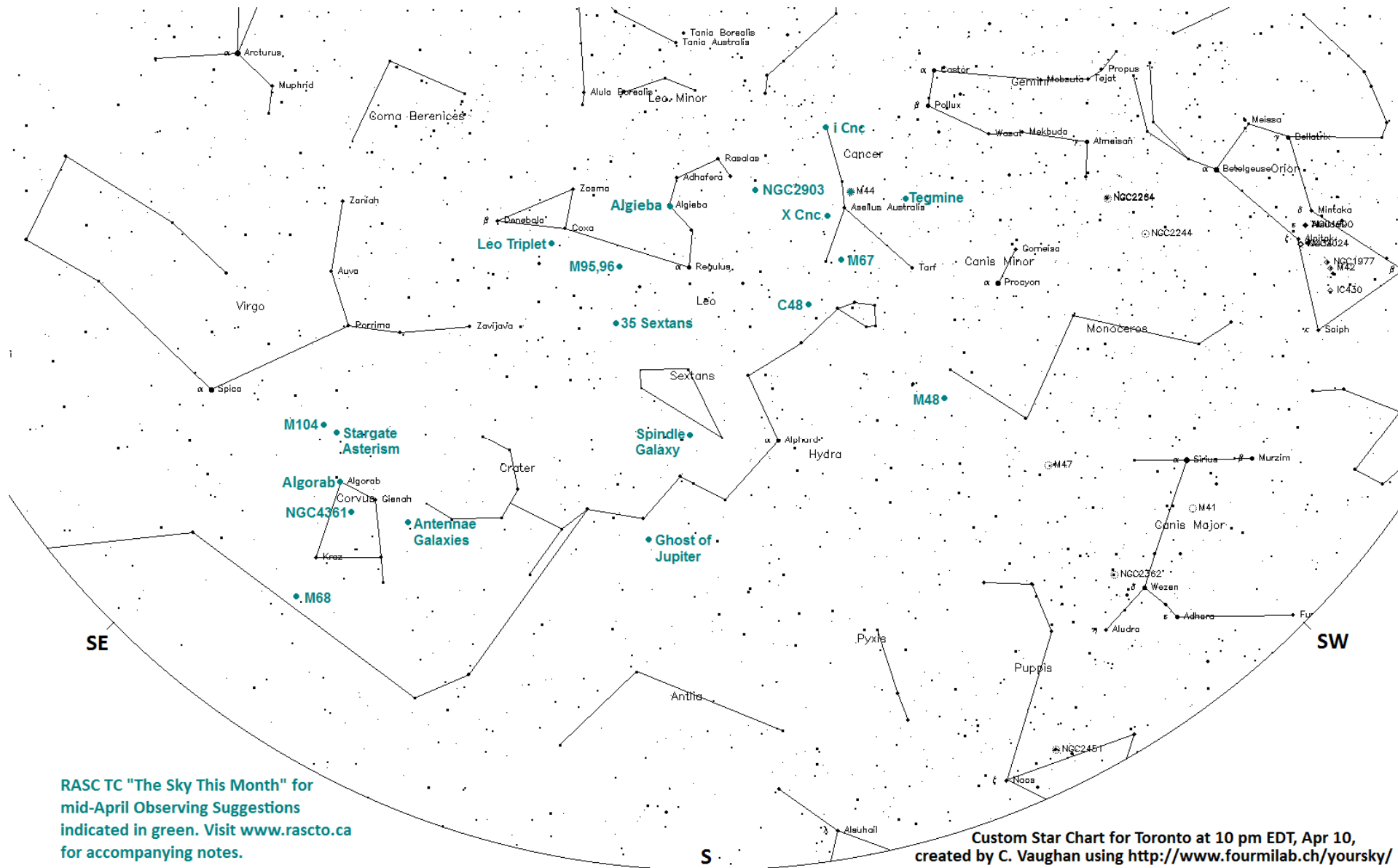
Leo Triplet or M65, M66, and NGC 3628 – Close grouping (with 35') of galaxies in different orientations, some quite bright (mag 8.9 -9.3)

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

Questions or comments to chris.vaughan@astrogeo.ca

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("Skylights" content archived at www.astrogeoguy.tumblr.com)



RASC TC "The Sky This Month" for
mid-April Observing Suggestions
indicated in green. Visit www.rascto.ca
for accompanying notes.

Custom Star Chart for Toronto at 10 pm EDT, Apr 10,
created by C. Vaughan using <http://www.fourmilab.ch/yoursky/>