

RASC Toronto Centre – www.rascto.ca

The Sky This Month –April 22 to May 20, 2015

by Chris Vaughan

NEWS

Space Exploration – Public and Private

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

Launches

April 24 aft - Ariane 5 rocket from Kourou, French Guiana, payload Thor 7 com-sats and Sicral 2 military com-sats

April 27 TBD - Falcon 9 rocket from Cape Canaveral Air Force Station, Florida, payload TurkmenAlem 52E/MonacoSat 1 com-sats

April 28 at 3 am - Soyuz rocket from Baikonur Cosmodrome, Kazakhstan, payload 59th Progress cargo for ISS

April 29 TBD - Proton rocket from Baikonur Cosmodrome, Kazakhstan, payload Mexican Mexsat 1 com-sat

May 15 TBD - Soyuz rocket from Plesetsk Cosmodrome, Russia, payload Kobalt M recon-sat for the Russian military

May 19 TBD - Proton rocket from Baikonur Cosmodrome, Kazakhstan, payload Garpun com-sat for the Russian military

May 20 am - Atlas 5 rocket from Cape Canaveral Air Force Station, Florida, payload U.S. Air Force's X-37B space plane and UltraSat, CubeSat secondary payloads

May 20 aft - Ariane 5 rocket from Kourou, French Guiana, payload DirecTV 15 and Sky Mexico 1 com-sats

May TBD – at Cape Canaveral, SpaceX Dragon capsule abort test

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 payed 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 is expected to end its mission by impacting the planet around 3 pm EDT on April 30th. On April 14th, the orbit was lowered to about 9 km above the surface in order to image the surface and map the planet's crustal magnetism in extraordinary detail.

DAWN to Ceres

The DAWN spacecraft is in orbit around the dwarf planet Ceres and will commence Phase One of its science on April 23rd at a distance of 13,500 km. A false colour map of the surface 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. A study recently released uses magnetic field and gravity measurements inferred from Philae's flywheel to reconstruct the Philae landing sequence of events. At the end of its second long bounce, it struck a vertical surface and tumbled to a stop. Details are [here](#).

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

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

Apr 27, 1880 – William Keck, founded Superior Oil, son Howard funded Keck Observatory in Hawaii, Keck Array in Antarctica

April 28, 1900 – Jan Oort, Dutch radio astronomer, mapped Milky Way structure, discovered dark matter, comet researcher

May 15, 1857 - Scottish astronomer, Williamina Fleming. In nine years, she catalogued more than 10,000 stars. During her work, she discovered 59 gaseous nebulae (including the Horsehead Nebula), over 310 variable stars, and 10 novae. In 1907, she published a list of 222 variable stars she had discovered

May 17, 1836 - British solar astronomer, Sir Joseph Norman Lockyer, is born. Sir Lockyer named the Sun's outer layer the "chromosphere", co-discovered Helium, and founded the journal Nature.

May 18, 1048 - Persian poet, mathematician, astronomer, and stellar cartographer, Omar Khayyam, is born. He calculated the length of the year to 6 decimal places with a one day error every 5000 years. (The Gregorian calendar has a one day error every 3330 years.)

Astronomy and Space Exploration

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

Apr 24, 1990 - The Hubble Space Telescope is launched in the Space Shuttle Discovery.

May 1, 1543 - Copernicus circulates 'The Little Commentary,' showing the heliocentricity of the Solar System.

May 2, 1780 - William Herschel discovered the first binary star, Xi Ursae Majoris.

May 3, 1715 - Edmund Halley's total solar eclipse (the last one visible in London for almost 900 years). Halley observes total eclipse phenomenon "Baily's Beads."

May 5, 840 - Emperor Louis of Bavaria, son of Charlemagne, dies of fright during the 5 minutes of eclipse totality he witnessed

May 14, 1973 - The first US space station, Sky Lab, is launched on the last Saturn V rocket.

May 16, 1969 - Venera 5, USSR Venus Atmosphere Probe, descended on parachutes into Venus' atmosphere - data was returned indicating an atmosphere composed of 93-97% carbon dioxide, 2-5% nitrogen, and less than 4% oxygen. The probe returned data down to within 26 kilometers of surface and was then lost - crushed by the pressure on Venus.

May 17, 1969 - Venera 6 probe returned data down to within 11 kilometers of surface and was then lost - crushed by the pressure on Venus.

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 runs April 20-23

“RASC Solar Observing”, Ontario Science Centre Teluscape – Saturday 10 to noon, on May 2 (or 9) and the week of April 20-25

“RASC Dark Skies Observing”, Long Sault Conservation Area, ON – window runs May 11-14

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

“Texas Star Party”, Ft Davis, Tx – May 10-17 (<https://texasstarparty.org/>)

“Harold Healy Frozen Banana Star Party at Mew Lake”, Algonquin Park, ON – May 7-10

(<http://rascto.ca/content/frozen-banana-star-party-mew-lake-campground>)

“Beyond the Big Dipper”, Grassland National Park, SK – May 16 (<http://www.pc.gc.ca/eng/pn-np/sk/grasslands/activ/activ1.aspx>)

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 May 9-18.

Sunrise/Sunset

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

May 20, sunrise at 5:50 am, sunset at 8:40 pm (14h50m 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>

April 22, astronomical twilight ends at 9:57 pm and starts at 4:36 am (6h39m of imaging time)

May 20, astronomical twilight ends at 10:48 pm and starts at 3:41 am (4h53m of imaging time)

Moon - Orbit

Apogee – Tue/Wed, Apr 28/29 at midnight

Perigee – Thu, May 14 at 8 pm

Moon - Phases

Sat, Apr 25 at 7:55 pm – First Quarter Moon (sets around midnight)

Sun, May 3 at 11:42 pm – Full “Flower/Corn/Planting/Milk” Moon

Mon, May 11 at 6:36 am – Last Quarter Moon (rises around midnight)

Mon, May 18 at 12:13 am – New Moon

Moon – Conjunctions, Eclipses, etc.

Lunar X – April 25/26

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 bottom of the Moon (at 2° East, 24° South). The prominent round crater Werner sits to the lower right. The Lunar X will appear from about 11 pm on Saturday, April 25th to about 2 am Sunday morning.

A **new USGS Topographic Map of the Moon**, using Lunar Reconnaissance Orbiter imagery and laser altimeter data, has been released in two versions (grey-scale imagery and Rukl blue Digital Elevation Model). Low or high-resolution versions can be downloaded for free at <http://pubs.usgs.gov/sim/3316/>.

On the evenings of **April 25th** and **26th**, the First Quarter Moon crosses about 9.5° and 7.5° respectively south of Jupiter. Before dawn on **May 5th**, the Full Moon sits about 4.5° west (to the right) of Saturn. Before dawn on **May 15th**, the old crescent Moon (10% illum.) sits 1.75° southwest (to the right) of Uranus. After dusk on **May 19th**, the young crescent Moon (4.4% illum.) sits 3.5 ° southeast (to the upper left) of Mercury.

Planets and Dwarf Planets

Mercury, (at magnitude -1.0 and fading) climbing in the western evening sky, has already commenced the best apparition of the year. It will reach greatest eastern elongation (farthest from the Sun) on May 7th, when it will be most easily seen and set at 10:25 pm. After that it will drop towards the Sunset, moving out of view after Mid-May. On April 22nd it approaches to within 1.25° north of Mars (observed with difficulty in a bright sky) and then pull away. On April 30th Mercury will pass within 2° of The Pleiades (a binocular challenge from about 9:15 to 10 pm).

Venus is still climbing higher into the western evening sky all month, moving from Taurus into Gemini, and getting closer and brightening to magnitude -3.8. It sets at 11:48 pm on April 22nd and at 12:20 am on May 20th. Its phase will reduce from 70% to 59% illuminated during that period.

Mars, by late April becomes unobservable until mornings of early August. On April 22nd it approaches to 1.25° south of Mercury before moving away (observed with difficulty in twilight).

Jupiter, in Cancer, fades from magnitude -1.76 to -1.56 this month, but remains well placed for observing in the western half of the sky. It sets at sets at 3:32 am on April 22nd and at 1:48 am on May 20th. On the evenings of April 25th and 26th, the First Quarter Moon crosses 7.5° and 9° south of (below) Jupiter. I have been noting mutual moon events and transits in my weekly Skylights.

Saturn is moving retrograde in Scorpius and entering Libra on May 13th. Rising at 10:40 pm on April 22nd, it's observable in late evening and morning skies at magnitude 0.38. On May 20th it rises at 8:40 pm (magnitude 0.23) and becomes a nice late evening target. It reaches opposition on May 23rd when it will have a ring diameter of 42" tilted 24.4° towards Earth. Before sunrise on the morning of May 5th, look for the Full Moon sitting about 4.5° west (to the right) of Saturn.

Uranus, in Pisces all month, has just passed conjunction with the Sun, and becomes observable in mornings after mid-May. On May 15th, the old crescent Moon (10% illum.) sits 1.7° southwest (to the right) of magnitude 6.5 Uranus in the pre-dawn eastern sky.

Neptune, in Aquarius all month (mag 7.7) is observable with difficulty (due to the shallow ecliptic) low in the pre-dawn southeastern sky on April 22nd. By May 20th it will rise at 2:44 am, making it easier to observe.

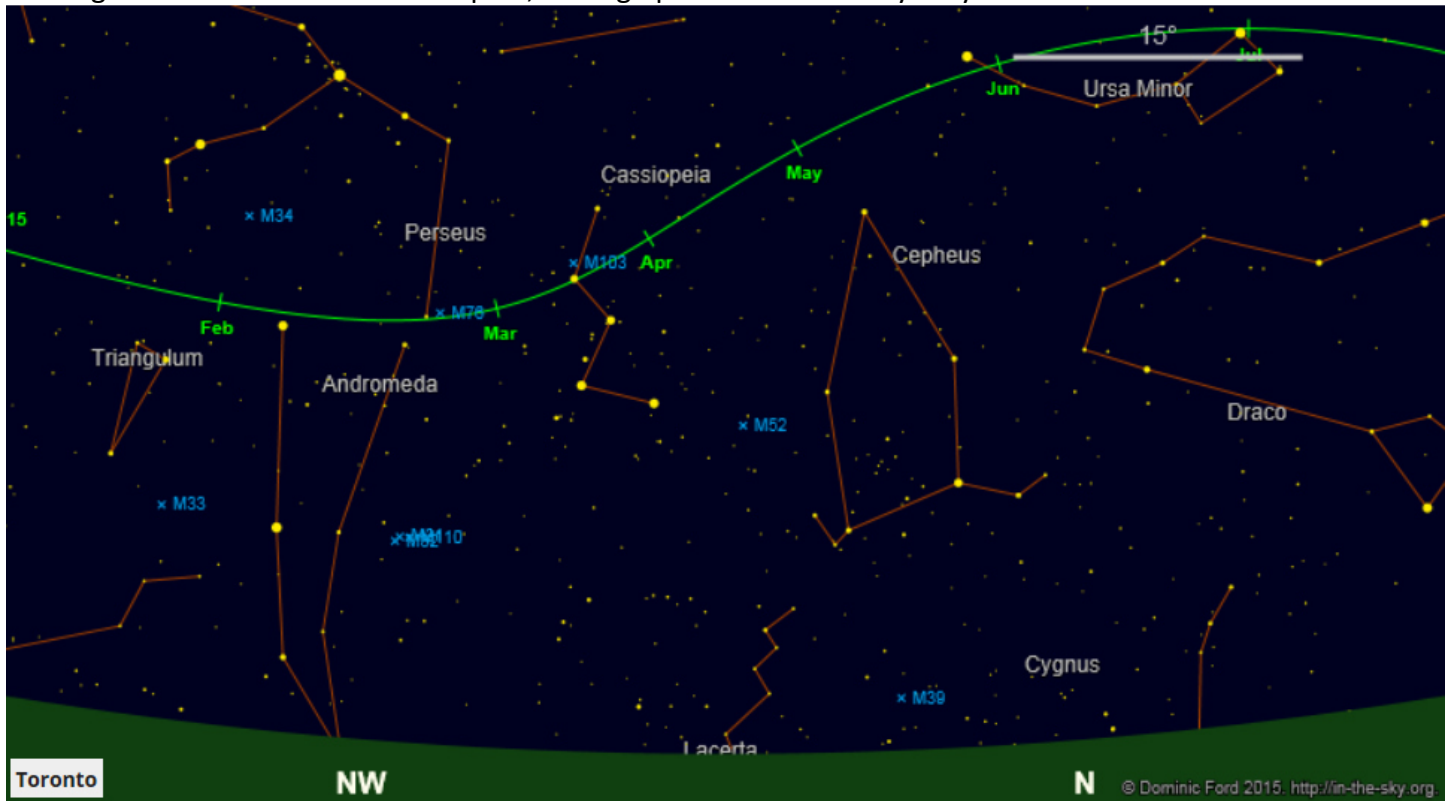
Pluto, northeast of Sagittarius' teapot, is a faint mag 14.2 object in the southern predawn sky. It rises at 1:45 am on April 22nd and at 11:54 pm on May 20th.

Vesta (mag 7.9) is in Aquarius and **Ceres** (mag 8.5) is in Capricornus all month. Both are observable with difficulty 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 7 and fading slowly, but remains conveniently positioned for observing all night (circumpolar) and all month. It is currently between Camelopardalis and Cepheus and heading towards the north celestial pole, ending up 3° from Polaris by May 20th.



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 it has been fluctuating wildly, and as of April 22nd, it is still an easy to spot magnitude 5.2, rising about 2 am.

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: 511 (~125/month)
Minor Planets Discovered This Year: 38,762 (~9,850/month)
Comets Discovered This Year: 20 (~5/month)
Observations This Year: 7.9 million

Satellites

Current GTA International Space Station evening pass series ends Apr 24th (Most are visible between 8:45 to 9:45 pm). Morning passes commence on May 13th (most between 3 and 5 am). Some higher/brighter ones include*:

Date	Mag.	Time	Direction	Alt.
15-May	-2.3	4:46:32 am to 4:51:51 am	from SSW to ENE	35°
17-May	-3.4	4:32:19 am to 4:37:24 am	from SW to ENE	72°
18-May	-2.4	3:38:49 am to 3:41:46 am	from SE to ENE	35°
18-May	-2.2	5:12:00 am to 5:18:03 am	from W to NE	37°
19-May	-3.1	4:17:39 am to 4:22:34 am	from WSW to NE	61°
20-May	-3.3	3:23:57 am to 3:26:57 am	from ESE to ENE	68°

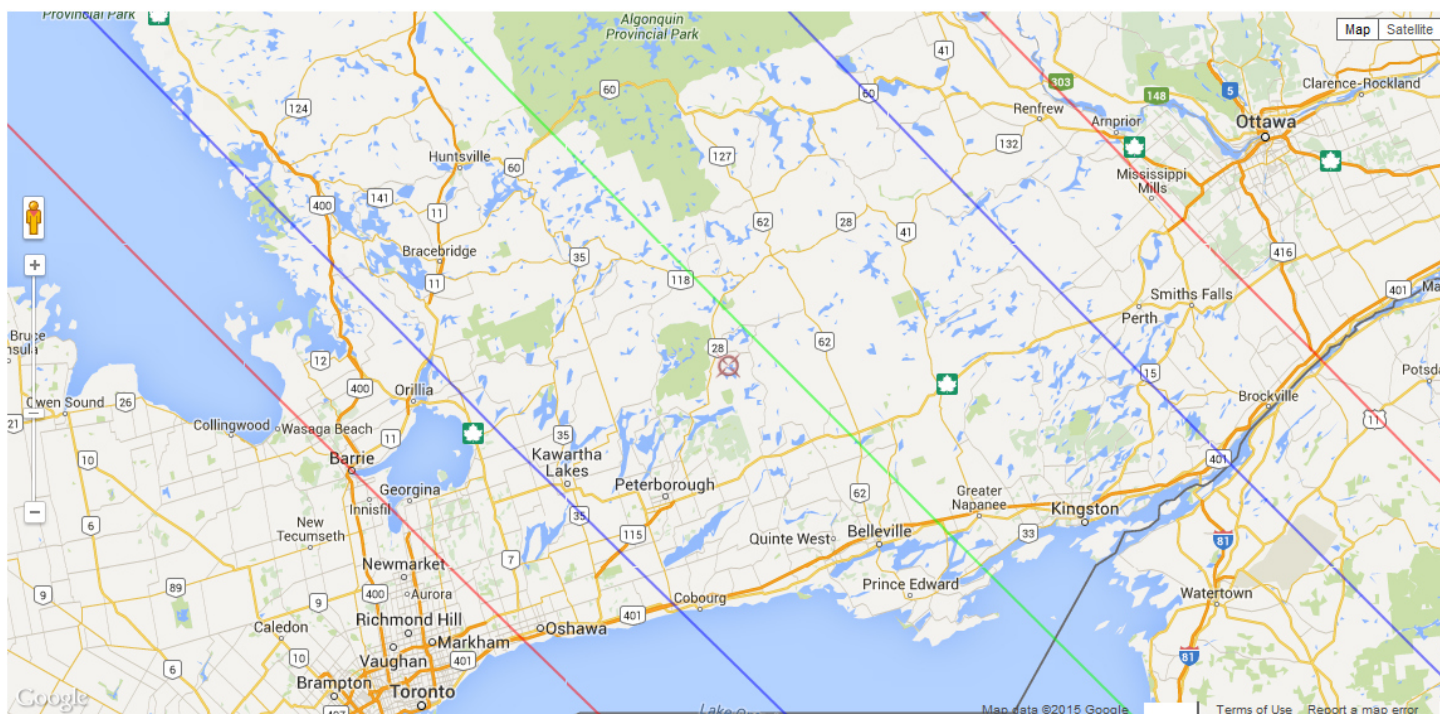
*far future predicted times may shift slightly

Iridium Flares most frequent evening flares occur between 9:30 pm and 11:30 pm, with morning flares common from 3:30 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

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

Rank 99 - On May 7, 2015 at 11:07 pm EDT, Asteroid (35) Leukothea (mag 14.2) occults star 2UCAC 41698821 (mag 11.6) – predicted centre of track is from between Sudbury and North Bay through Huntsville/W Algonquin to Belleville/Napanee, and Utica, NY - dips 2.7 magnitudes for 3.5 seconds, alt. 37°
(http://www.asteroidoccultation.com/2015_05/0508_35_36058.htm,
http://www.poyntsource.com/New/Google/20150508_36058.HTM)
(Below: The predicted centre of the track is shown in green, with the occultation is expected to be observable between the blue lines.)



Constellations near the Meridian (Annually in April/May)

10 pm: Eastern Hydra, Corvus, Crater, Sextans, Leo, and Leo Minor

12 am: Virgo, Bootes, Coma Berenices, and Canes Venatici

2 am: Libra, Western Serpens, Corona Borealis, Bootes, and Draco

Early Spring Star party Targets (Annually in April/May)

The Big Dipper, Leo, and Hercules (eye / binoculars)

Spring Buds (Selected high surface brightness galaxies) – M81, M82 Bode's Nebulae and M101 Pinwheel Galaxy (UMa), M94, M106, M51 Whirlpool and M63 Sunflower (CVn), NGC 2903, M65 and M66 Leo Triplet (Leo), M104 Sombrero, M60, and M49 (Vir), M64 Black-eye (Com), M83 Southern Pinwheel (Hya) (very low in south), etc. (telescope)

Spring Bulbs – NGC 2392 Eskimo Nebula (Gem), NGC 3242 Ghost of Jupiter (Hya), NGC 6210 Turtle Nebula (Her), NGC 6543 Cat's Eye (Dra), etc. (telescope)

Spring Blooms - M13 and M92 (Her), M5 (Serp), M3 (CVn), Melotte 111 (Com), M53 (Com), etc. (binoculars, telescope)

Double Plays – Regulus and Algieba (Leo), iota Cancri (Cnc), Cor Caroli (CVn), Porphyrion (Vir), Izar (Boo), etc. (telescope)

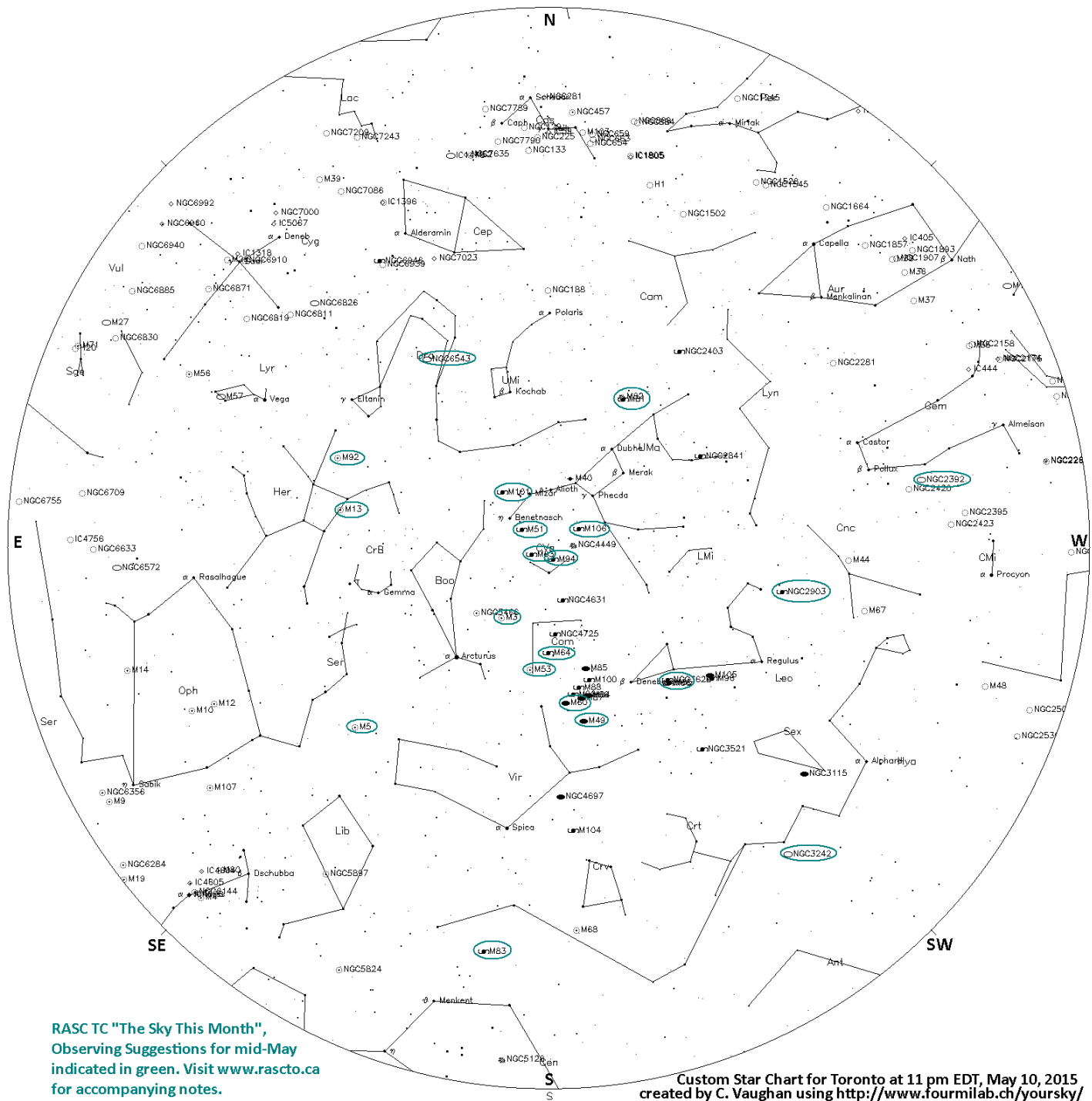
Hit Singles – Vega (Lyr), Arcturus (Boo), Spica (Vir), Capella (Aur), etc. (eye, binoculars, telescope)

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



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

Custom Star Chart for Toronto at 11 pm EDT, May 10, 2015
 created by C. Vaughan using <http://www.fourmilab.ch/yoursky/>