

# RASC Toronto Centre – [www.rascto.ca](http://www.rascto.ca)

## The Sky This Month – March 19, 2014 to April 16, 2014

by Chris Vaughan

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### NEWS

#### Space Exploration – Public and Private

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

March 21 pm – Launch of Ariane 5 rocket from Kourou, French Guiana, payload ASTRA 5B and Amazonas 4A comsats.

March 24 TBD - Launch of Soyuz rocket from Plesetsk Cosmodrome, Russia, payload Glonass M navsat.

March 25 pm - Launch of Soyuz rocket from Baikonur Cosmodrome, Kazakhstan, payload ISS crew and providing an escape pod.

March 30 TBD - Launch of Falcon 9 rocket from Cape Canaveral Air Force Station, Florida, payload fifth Dragon spacecraft 3rd cargo delivery ISS.

March 31 am - Launch of PSLV rocket from Satish Dhawan Space Center, Sriharikota, India, payload Indian navsat.

April 3 am - Launch of Atlas 5 rocket from Vandenberg Air Force Base, California, payload USAF polar orbiting Meteorological sat.

April 9 am - Launch of Soyuz rocket from Baikonur Cosmodrome, Kazakhstan, payload 55th Progress cargo delivery to the ISS.

April 15 pm - Launch of Zenit rocket from Odyssey platform, Pacific Ocean (154° West, 0° North), payload Eutelsat 3B comsat.

#### ESA Rosetta Mission

Spacecraft currently about 4.6 AU (38 light-minutes) from Earth

Mar 17 – OSIRIS Imaging System scheduled activation

Mar 24 – OSIRIS will image the area of destination Comet 67P/Churymov-Gerasimenko (rendezvous in August, 2014)

The 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 and harpoons to latch on. The mission will ride the comet to perihelion and beyond!

#### China's Chang'e 3 Lander and Yutu 玉兔 Rover on the Moon

Chang'e 3 Lander and Yutu Rover imaged by LRO <http://www.universetoday.com/110020/nasa-lunar-orbiter-snaps-spectacular-images-of-yutu-moon-rover-driving-around-change-3-lander/>

Yutu Rover faults are preventing some mechanical operations, including folding of antenna mast for hibernation and aiming of high-gain antenna

#### 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**

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.

## **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).

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

## **Star Parties, etc.**

Ref: <http://ontariostargazing.ca/astromy-star-parties-events-ontario/>

"RASC City Skies Observing", Bayview Village Park, Toronto – window opens April 7<sup>th</sup>

"RASC Dark Skies Observing", Long Sault, ON – window opens March 24<sup>th</sup>

"Earth Hour", Markham City Centre, etc. – March 29, 2014

"Northeast Astronomy Forum", or NEAF, in Suffern New York – April 12-13, 2014

# **OBSERVING**

## **Messier Marathon 2014**

New Moon weekend of March 29 opens the prime opportunity for a Messier Marathon this year. Watch Yahoo Group for news.

## **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/>

## **Sunrise/Sunset**

March 15, sunrise at 7:35 am, sunset at 7:20 pm

April 15, sunrise at 6:40 am, sunset at 7:57 pm

Vernal Equinox on Thursday, March 20 at 12:57 pm

## **Moon - Phases**

March 8<sup>th</sup> at 9:27 am – First Quarter Moon (sets around midnight)

March 16<sup>th</sup> at 1:08 pm – Full “Worm/Crow/Crust/Sap” Moon  
March 23<sup>rd</sup> at 9:46 pm – Last Quarter Moon (rises around midnight)  
March 30<sup>th</sup> at 2:45 pm – New Moon  
April 7<sup>th</sup> at 4:31 am – First Quarter Moon (sets around midnight)  
April 15<sup>th</sup> at 3:42 am – Full “Pink/Sprouting Grass/Egg/Fish” Moon (Total Lunar Eclipse for Toronto Centre!)  
April 22<sup>nd</sup> at 3:52 am – Last Quarter Moon (rises around midnight)  
April 29<sup>th</sup> at 2:14 am – New Moon (Annular Solar Eclipse over Antarctica!)

## **Moon – Total Lunar Eclipse April 15, 2014**

The entire Total Lunar Eclipse of April 15, 2014 is visible from the GTA. A good reference is Observer's Handbook 2014, pp. 126 and pp. 139, by Fred Espenak.

12:53:37 am - Penumbral Begins  
1:58:19 am - Partial Begins  
3:06:47 am - Totality (+30°)  
3:45:40 am - Max Totality  
4:24:35 am - Totality Ends  
5:33:04 am - Partial Ends  
6:37:37 am - Penumbral Ends (under a lightening sky)

## **Moon - Conjunctions**

Visible after Moonrise at midnight on March 20/21, waxing Gibbous Moon is within 2° to the east of Saturn, low in the southeastern sky. Photo op!

Visible in pre-dawn of March 27, the Old Crescent Moon (15% illum.) sits about 3° north of Venus (52% illum.), low in the eastern sky. Photo op!

Visible with difficulty between 6:30 am and sunrise on March 29, the Old Crescent Moon (2% illum.) sits about 7° northeast of Mercury, low in the eastern sky.

Visible dusk to midnight on April 3, the New Moon (20% illum.) visits the Hyades, low in the western sky.

Visible dusk to late evening on April 6, the First Quarter Moon is ~6° south of Jupiter, in the western sky.

Visible all night on April 13/14, the Full Moon leapfrogs Mars, sitting ~8° away both evenings. On the second night, the Moon sits less than 1° north of Spica.

Visible after Moonrise at 10 pm April 16, the "Full" Moon is less than 2° from Saturn, and within 80 arcminutes at 2:30 am, low in the southern sky. Photo op!

## **Moon - Orbit**

Apogee on March 11<sup>th</sup> at 4 pm  
Perigee on March 27<sup>th</sup> at 3 pm  
Apogee on April 8<sup>th</sup> at 11 am  
Perigee on April 23<sup>rd</sup> at 8 pm

## Planets and Dwarf Planets

**Mercury**, reached greatest western elongation on March 14<sup>th</sup>, and is swinging towards superior conjunction on April 26<sup>th</sup>. On March 19<sup>th</sup> it rises at 5 am (mag 0.3 and 62% illum.). Not a very favorable apparition for northern hemisphere due to the shallow Ecliptic. It will become very difficult to observe after the last week of March. Look for the Old Moon 7° to the northeast on March 29 am.

**Venus**, a bright morning object, moves from Capricornus to Aquarius over the next month, and reaches greatest western elongation on March 22<sup>nd</sup>. It rises at 5:25 am on March 19<sup>th</sup> (mag -4.1 and 48% illum) and 5 am on April 16<sup>th</sup> (mag -3.8 and 61% illum). On the morning of March 27<sup>th</sup>, the Old Crescent Moon (15% illum.) sits about 3° north of Venus.

**Mars**, near Spica in Virgo all month, is visible from late evenings to dawn – rising at 9:39 pm on March 19 (mag -0.8) and 7 pm on April 16 (mag -1.2). Mars reaches opposition at 5 pm on April 8, and closest approach to Earth at 9 am on April 14. At magnitude -1.5 and 15.2 arc-seconds across, it's the best encounter since 2007. Just past summer Solstice, Mars' axial tilt provides favorable north polar cap observing/imaging opportunities.

**Jupiter**, already close the Meridian at dusk, can be viewed for most of the night. On March 6, it completed its westward retrograde loop in Gemini and is now shifting east again. It sets at 3:55 am on March 19<sup>th</sup> (mag -1.9) and at 2:14 am on April 16<sup>th</sup> (mag -1.7). On April 6, the First Quarter Moon is ~6° south of Jupiter. On March 23, just after 10 pm, a double shadow transit will take place. (GRS and moon transits are reported in my Skylights.)

**Saturn**, moving in retrograde westward in Libra all month, is a late night and predawn object. It rises at 11:58 pm on March 19<sup>th</sup> (mag 0.5) and at 10 pm on April 16<sup>th</sup> (mag 0.4). It has a close conjunction with the Moon overnight on March 20/21.

**Uranus**, in Pisces, is not observable due to Solar conjunction.

**Neptune**, a morning sky object in Aquarius (mag 7.8) reached conjunction on February 23<sup>rd</sup>, and rises too close to Sunrise for observers in the northern hemisphere. A close conjunction with Mercury occurs on March 22<sup>nd</sup>.

**Pluto**, northeast of Sagittarius' teapot, a faint mag 14.2 object, rises at 3:47 am on March 19<sup>th</sup> and at 1:57 am on April 16<sup>th</sup>.

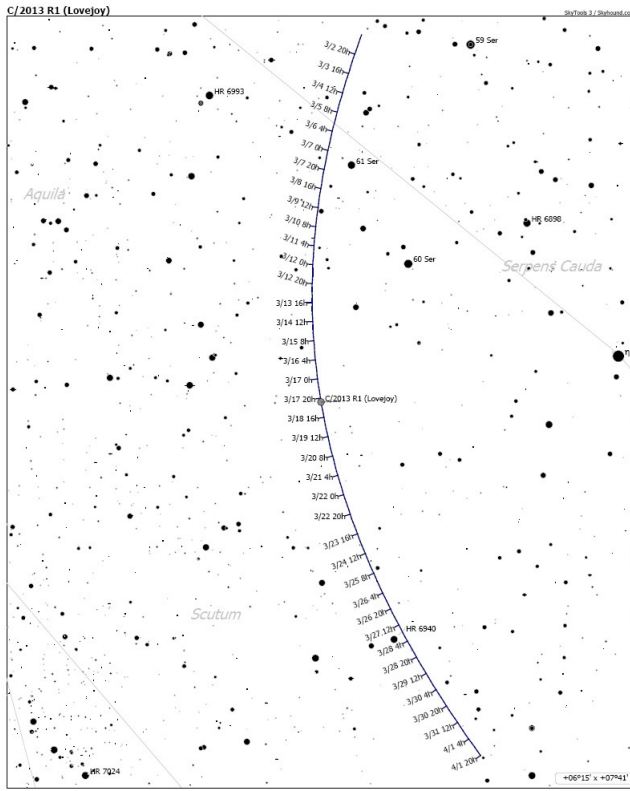
**Vesta** (mag 5.7) and **Ceres** (mag 6.9) are in the same area, about 10-12° northeast of Mars in Virgo. They are brighter and well placed for late night and early morning viewing. They will reach opposition on April 13<sup>th</sup> and 15<sup>th</sup> respectively.

## Comets

Ref <http://www.aerith.net/comet/weekly/current.html>, <http://cometchasing.skyhound.com/>

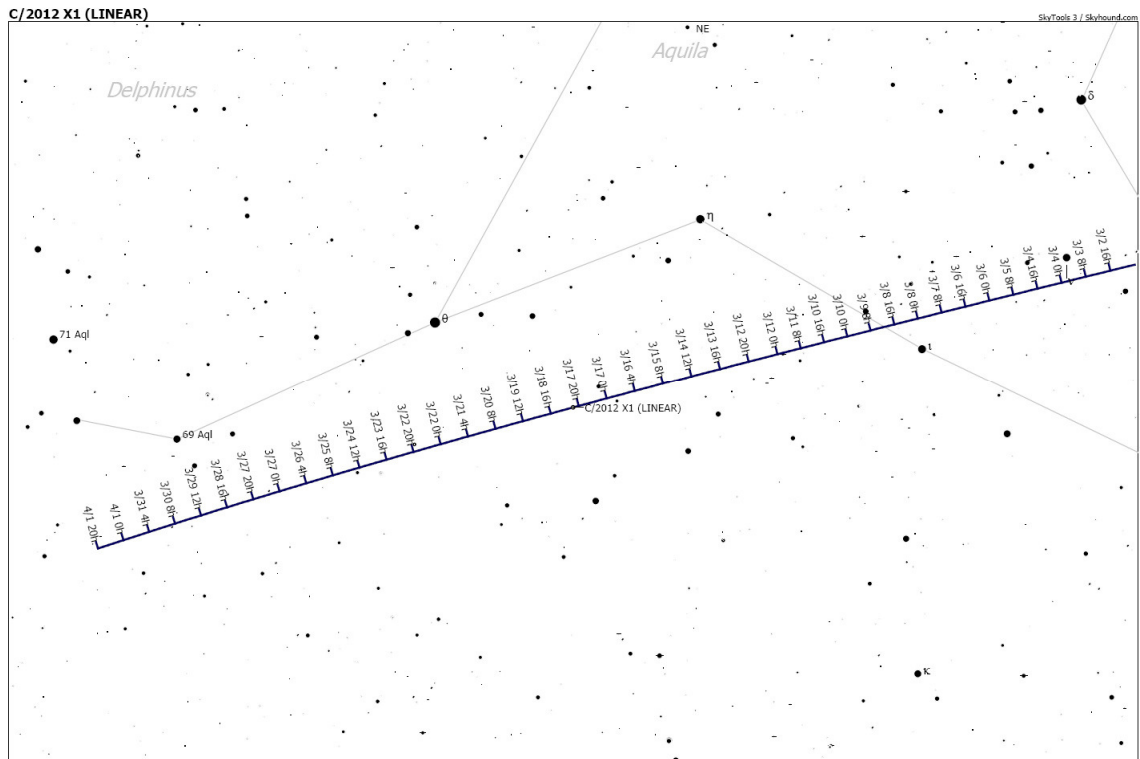
### Comet C/2013 R1 Lovejoy

Lovejoy is in Serpens Cauda, moving southwest daily between Ophiuchus and Scutum in southeastern pre-dawn sky (about mag 8.4) (Small scopes). It rises at 2:16 am on March 19 and at 12:32 am on April 16. Remains well positioned for months, becoming an evening object by summer.



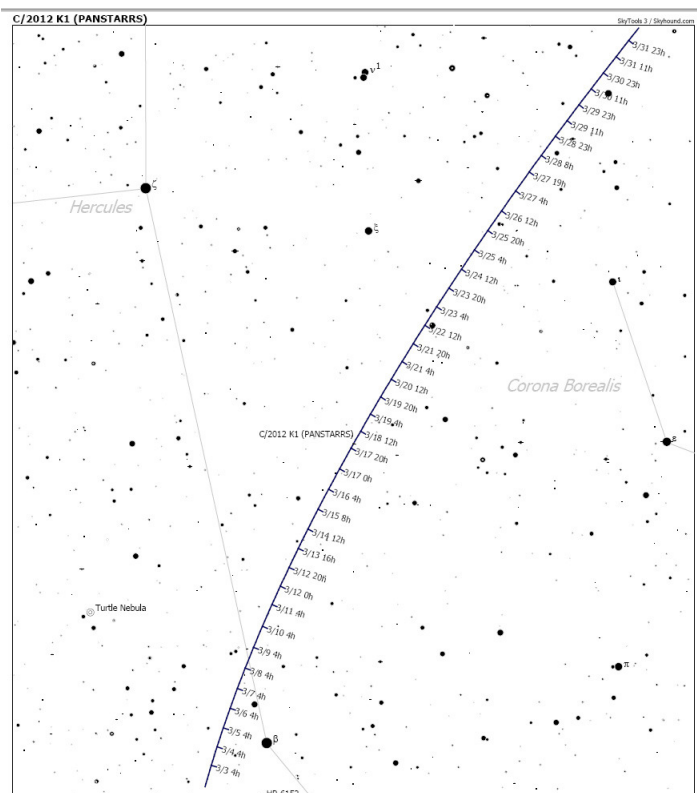
### Comet C/2012 X1 Linear

Linear is approximately 8<sup>th</sup> magnitude, and has already peaked. It's shifting eastward from Altair towards Aquarius in the eastern pre-dawn sky (Binos & small scopes). It rises about 3:45 am on March 19 and 3:12 am on April 16. On March 19, it sits ~2° to the right (southwest) of Theta Aquilae. It will remain well positioned for months.



## Comet C/2012 K1 (PANSTARRS)

New Comet C/2012 K1 (PANSTARRS) is approximately 12th magnitude and brightening, with a predicted peak in late 2014. It is curving north and westward from between Hercules and CrB towards Nekkar in the orthwestern pre-dawn sky. It rises about 11:45 pm on March 19 and 4:11 pm on April 16. It will remain well positioned for months.



## Meteor Shower(s)

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

Lyrids window opens on April 16<sup>th</sup>.

## Supernovae

Supernova PSN (Preliminary Supernova) J09554214+6940260 in M82 or Bode's Nebulae "only" 12 million light-years away, peaked in brightness at mag 10.6 around February 2. It appears to be a Type Ia supernova (standard candle to measure the expansion of the universe). Closest supernova since the Supernova 1987A and the closest supernova Type Ia since SN 1972E." The discovery was made by students working with astrophysicist Steve Fossey at University College London. AAVSO light curve at [http://www.aavso.org/lcg/plot?auid=000-BLG-310&starname=PSN+J09554214%2B6940260&lastdays=80&start=2456678&stop=2456758&obscode=&obscode\\_symbol=2&obstotals=yes&calendar=calendar&forcetics=&grid=on&visual=on&r=on&fainterthan=on&bband=on&v=on&pointsize=1&width=800&height=500&mag1=-&mag2=-&mean=&vmean=](http://www.aavso.org/lcg/plot?auid=000-BLG-310&starname=PSN+J09554214%2B6940260&lastdays=80&start=2456678&stop=2456758&obscode=&obscode_symbol=2&obstotals=yes&calendar=calendar&forcetics=&grid=on&visual=on&r=on&fainterthan=on&bband=on&v=on&pointsize=1&width=800&height=500&mag1=-&mag2=-&mean=&vmean=)

## Asteroids

Ref. <http://neo.jpl.nasa.gov/ca/>

No major events.

## Satellites

Current GTA International Space Station morning pass series continues until April 3 (between 4 am and 6:30 am). Evening passes from April 4 to 24 (Most are visible between 8:30 pm and 10 pm).

Some higher/brighter ones include\*:

Date	Mag.	Time	Direction	Alt.
16-Mar	-2.9	5:51:55 am to 5:56:00 am	moving SSW to ENE	57°
18-Mar	-3.2	5:50:21 am to 5:54:11 am	moving WNW to NE	61°
29-Mar	-3.2	6:25:00 am to 6:31:40 am	moving WNW to ESE	82°
01-Apr	-3.4	5:34:16 am to 5:39:10 am	moving WNW to SE	71°
06 Apr	-3.4	9:18:37 pm to 9:22:52 pm	moving SW to E	62°
09 Apr	-3.3	8:25:13 pm to 8:31:51 pm	moving SW to ENE	88°

\*far future predicted times may shift slightly

**Iridium Flares** most frequent evening passes occur between 8 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

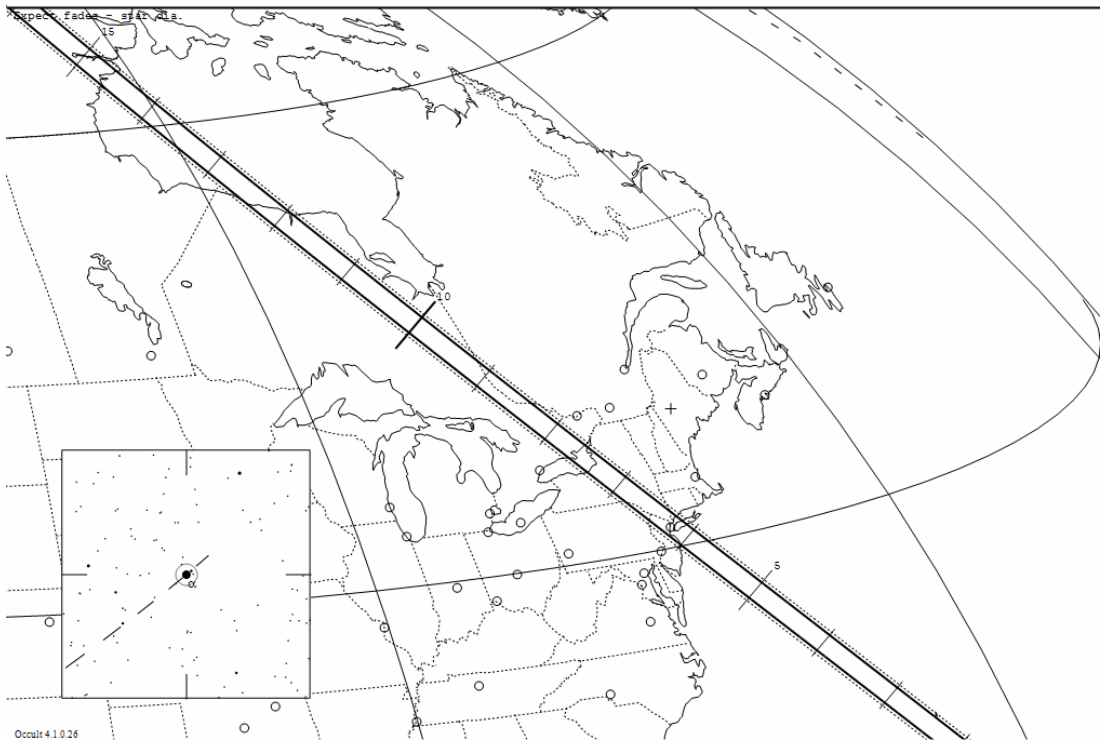
Ref: <http://www.asteroidoccultation.com/> (additional links on the following URLs open track maps)

**Rank 99 - 20 Mar 2014 at 06:07 UT** Asteroid 99 (163) Erigone (mag 12.4) occults wide double star Regulus (mag 1.3) - visible over eastern Lake Ontario, drops 11.1 mags for 14.3 seconds, alt. 43°

[http://www.asteroidoccultation.com/2014\\_03/0320\\_163\\_32317.htm](http://www.asteroidoccultation.com/2014_03/0320_163_32317.htm)

163 Erigone occults HIP 49669 on 2014 Mar 20 from 5h 53m to 6h 22m UT

Star:	Dia = 1mas	Max Duration = 14.3 secs	Asteroid:
Mv = 1.3	Mp = 1.3	Mag Drop = 11.1 (10.7r)	Mag = 12.4
RA = 10 8 22.0688 (J2000)	Sun : Dist = 150 deg		Dia = 72km
Dec = 11 58 2.038	Moon: Dist = 72 deg		Parallax = 7.421"
[of Date: 10 9 9, 11' 58 37"]	illum = 87 %		Hourly dRA = -1.110s
Prediction of 2014 Mar 14.0	E 0.022"x 0.012" in PA 104		dDec = 13.72"



## Constellations on the Meridian (Annually in March/April)

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

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

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

## Early Spring Star party Skylights (Annually in March/April)

The Big Dipper, Orion and his Belt, Canis Major, Auriga, and the Winter Hexagon (eye / binoculars)

Spring Slushies – M35 Cluster (Gem), NGC884/869 Double Cluster (Per), M45 The Pleiades (Tau),

M44 The Beehive (Cnc), etc. (binoculars, telescope)

Cold Hearts – M42 Orion Nebula and M78 (Ori), etc. (telescope)

Spring Buds – M81,82 Bode's "Nebulae" (Uma), Eskimo Nebula (Gem), Owl Nebula (UMa), etc. (telescope)

Seeing Double – Castor (Gem), Regulus and Algieba (Leo), iota Cancr (Cnc), Cor Caroli (CVn), Mizar (UMa), etc. (telescope)

Hit Singles – Arcturus (Boo), Sirius (CMa), Procyon (CMi), Betelgeuse and Rigel (Ori), Capella (Aur), Aldebaran (Tau) (eye, binoculars, telescope)

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