STELLAR SENTINEL

Grand Traverse Astronomical Society October 2014

# Comet Siding Spring to Sideswipe Mars

*By Bob Moler*

This month we'll have our second big comet event of the year, the encounter of C/2013 A1 Siding Spring with Mars. This will occur on the afternoon of October 19th our time. The good news is NASA will have three operating satellites orbiting Mars and two rovers to observe the comet. The European Space Agency will have one operating, and India should have its first satellite the MOM or Mars Orbiter Mission in place by then. NASA's new MAVEN satellite is now in orbit. The MOM fate will be know before the Stellar Sentinel Extras section is released, so you email subscribers will know when I send you this issue if you haven't heard about it from main stream media, or preferably an astronomical or space website or blog. MAVEN's Mars Orbital Insertion (MOI) was September 21st. MOM's MOI is scheduled for the 23rd our time.

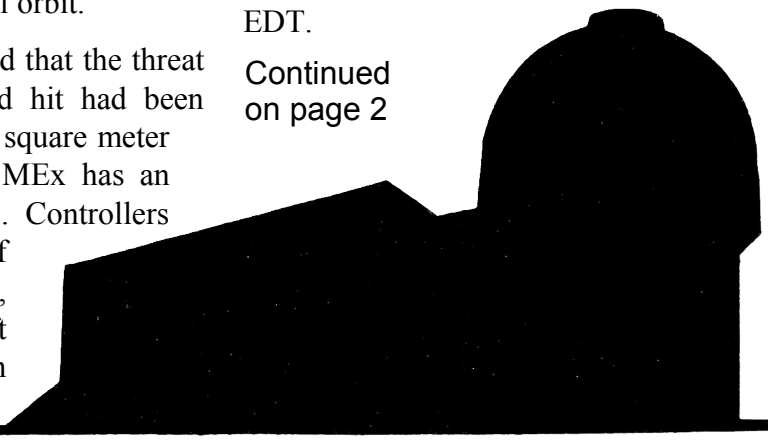
The other satellites, both of NASA's Mars Reconnaissance Orbiter (MRO) and Mars Odyssey, plus the European Space Agency's (ESA) Mars Express (MEx) have phased their orbits so when the greatest amount, if any, debris from the comet is expected, will be behind the planet. Of course a satellite is always moving so it can stay behind the planet for only so long. For Mars Express it's only a half an hour. MAVEN will still be in its instrument calibration mode but should be in its final orbit by then. I believe MOM will be in a highly elliptical orbit.

ESA recently announced that the threat of a significant meteoroid hit had been downgraded from one per square meter to much less than one. MEx has an area of three square meters. Controllers for MEx breathed a sigh of relief, but to make sure, the will fly their spacecraft with the radio dish pointing to the incoming debris. Cometary particles will have a speed of 125,000 miles an hour (56 km/s). The comet is moving in retrograde, and so it's meeting Mars more or less head on.

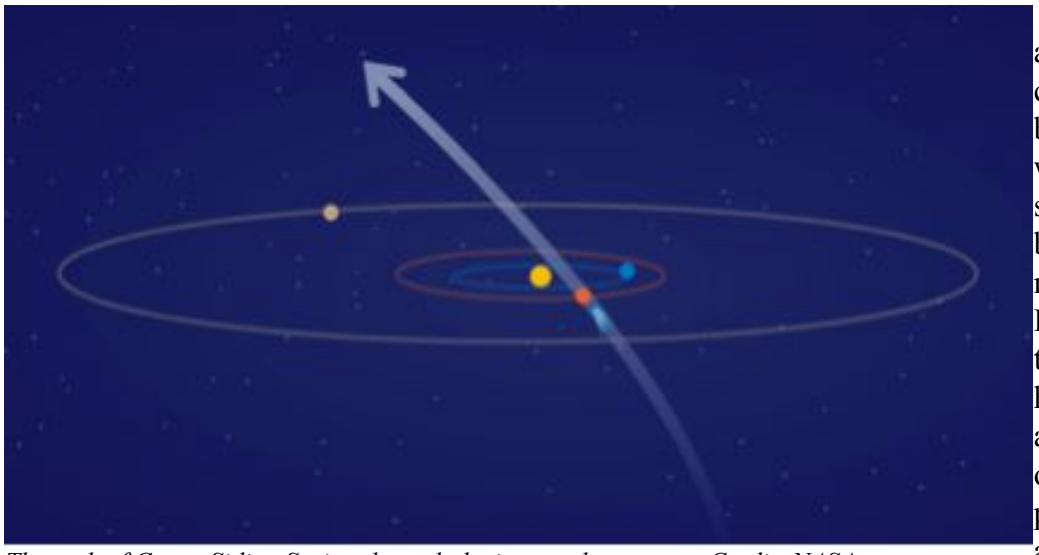
In the document *Comet /2013 A1 Siding Spring Comet Environment Modeling* by Richard Zurek, Jet Propulsion Laboratory, California Institute of Technology, published June 6, 2014, it is felt that Mars will pass near the edge of the comet's debris trail. The larger particles of near half a millimeter in size will be found farthest from the comet's track. However they would have to have been ejected by the comet at least a year before, when the comet was much farther from the sun and when the comet was less active. These more massive particles would have lower ejection velocities. The most debris activity would be when Mars is closest to the orbital path, that being around 27,600 km or 17,150 miles, not when its nearest to the comet 101 minutes earlier at 138,800 km or 86,000 miles.

According to this document Siding Spring's closest approach to Mars will be at 18:28 UTC. Add about 14 minutes to that to account for light time, Mars to Earth, actually 13.5 minutes, making it 18:42 UTC or 2:42 p.m. EDT. Closest approach to the comet's orbit will be 20:37 UTC, 101 minutes later. Adding light time, we'd get 20:51 UTC or 4:51 p.m. EDT.

Continued on page 2



# Comet Siding Spring to Sideswipe Mars (From page 1)



*The path of Comet Siding Spring through the inner solar system. Credit: NASA*

away from Mars. The comet's magnitude will be about 10, and Mars will be very low in the sky, so I don't expect to be able to spot it from northern Michigan. However observers in the southern hemisphere should get an excellent shot at observing and photographing Mars and the comet together.

The problem with observing a comet from the assets in Mars orbit or on the ground, Mars ground that is... Opportunity and Curiosity is that the instruments are generally made to daylight use, and were not attended for astronomical use. Sure we've gotten pictures back of Earth and its moon in the martian twilight along with a martian satellite transiting the sun, but the comet's surface brightness is very low. When Comet ISON flew by Mars last year only the MRO could spot it. Both Opportunity and Curiosity, I believe, were able to detect M31, the Great Andromeda Galaxy, but that was pretty much it, other than stars at night. But there's much more to be studied.

Oh to be standing in Mars to watch the comet go by!

From the Earth's point of view the comet will be seen to swiftly pass Mars. The closest approach from our point of view will be at 2 p.m. on the 19th. By 9 p.m. when it'll be dark enough to see it, the comet will appear about a moon width

Here's some URLs of interesting websites about Comet Siding Spring:

- http://blogs.esa.int/mex/category/comet-siding-spring/
- http://www.skyandtelescope.com/astronomy-news/mars-orbiters-duck-cover-comet-siding-spring-081420142/
- http://mars.nasa.gov/comets/sidingspring/

These links will be active on your pdf copy.

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If you receive the Stellar Sentinel via email you will receive an Adobe Acobat (PDF) copy of the newsletter. It can be printed, or viewed on the computer screen. Hyperlinks like the ones above can be clicked on to directly link to the page. If you email your email address to info@gtastro you will receive the pdf copy of this issue to start you off plus be enrolled to receive better quality issues with even more content that can be squeezed into 8 pages.

## Grand Traverse Astronomical Society - Est. June 1982 – 32 years of service

| *-----Officers-----* | | *Directors* | *S.S Staff* | *----------Patrons----------* |
|---|---|---|---|---|
| President | Ron Uthe | Jerry Dobek | Bill Renis | Mick Glasser |
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| Editor | Bob Moler | | | Nancy Hammond |
| | | | | Charles Bell |

# Society Events

Check http://www.gtastro.org for late breaking events.

## October

Note that the meeting date is **Saturday** the 4th.

**4 Saturday:** **Board of Directors** – 7 p.m. - NMC Rogers Observatory

**General Meeting** – 8 p.m. - NMC Rogers Observatory.

Program: Dean Connors – The fascinating topic of Sundials

**Star Party** – 9 p.m. - 11 p.m. - NMC Rogers Observatory. **Autumn Astronomy Day**.

8 Wednesday **Total Lunar Eclipse** – 5 - 8 a.m. Rogers Observatory & Sleeping Bear Dunes – Platte River Point

18 Saturday **Star Party** – 9 p.m. - 11 p.m. - NMC Rogers Observatory.

21 Tuesday **44th Anniversary Star Party at Sleeping Bear Dunes National Lakeshore** – 8 p.m. - 10 p.m. **Pierce Stocking Scenic Drive Stop #3**

23 Thursday **Solar Eclipse at sunset** – 5 p.m. - 6:45 p.m. Rogers Observatory & Sleeping Bear Dunes – Platte River Point

## November

7 Friday **Board of Directors** – 7 p.m. - NMC Rogers Observatory

**General Meeting** – 8 p.m. - NMC Rogers Observatory.

Topc to be announced

**Star Party:** 9 p.m. - 11 p.m. - NMC Rogers Observatory.

15 Saturday **Star Party –** 9 p.m. - 11 p.m. - NMC Rogers Observatory.

## ---------- Star Parties ----------

Rogers Observatory star parties for the rest of 2014: 10/4, 10/18, 11/7, 11/15, 12/5. Eclipses: 10/8 lunar a.m., 10/23 solar p.m.

Sleeping Bear Dunes star parties for the rest of 2014: 10/21. Eclipses: 10/8 lunar a.m., 10/23 solar p.m.

### ---------- Some of the best objects for public viewing in October ----------

**Planetary Object(s): Mars**

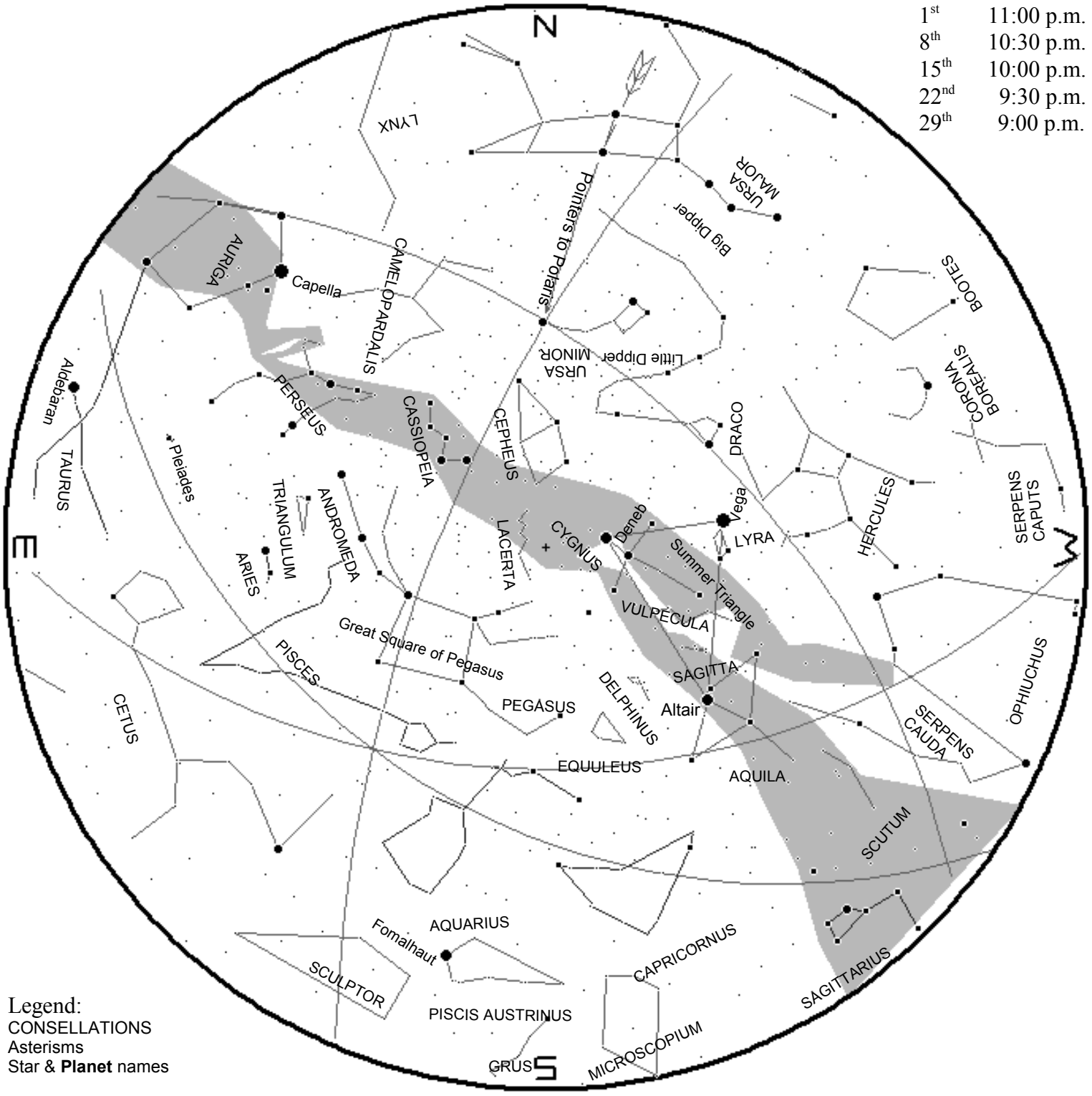
| **Deep Sky Object, description, constellation, distance** | **Rt. Asc.** **hr. min.** | **Declin.** ° ' |
|---|---|---|
| M 13: Great Hercules globular cluster, Her, 25k l.y. | 16 41.7 | +36 28 |
| M 57: Ring Nebula (planetary), Lyr, 1500 l.y. | 18 53.6 | +33 02 |
| Alberio (β Cygni): Gold and blue double star, Cyg, 160 l.y., actual separation = 400b miles | 19 30.3 | +27 43 |
| M 11: A great open (galactic) star cluster, Sct, 5.5k l.y. | 18 50.0 | -06 16 |
| M 27: Dumbbell nebula (planetary), Vul, 900 l.y. | 19 58.8 | +22 43 |
| M 31: Great Andromeda Galaxy, And, 2.3m l.y. | 00 42.7 | +41 16 |
| M52: Rich open cluster, Cas,5.5k l.y. | 23 24.2 | +61 35 |
| Almach (γ Andromedae): Yellow and greenish-blue double star, And, 260 l.y. | 02 03.2 | +42 17 |
| χ & h Persei: Double Cluster, Per, 7k l.y.; χ Per, 8.1k l.y. | 02 20.0 | +57 08 |
| M 2: Globular cluster, Aqr, 50k l.y. | 21 33.5 | -00 49 |
| M 15: Compact globular cluster, Peg, 34-39k l.y. | 21 30.0 | +12 10 |
| NGC 7009: Saturn Nebula (planetary), Aqr, 3.9k l.y.? | 21 04.2 | -11 22 |
| M 45: Pleiades open cluster - use finder or binoculars, Tau, 410 l.y. | 03 47.0 | +24 07 |

# The Stars and Planets for October 2014

By Bob Moler

Planets are plotted for mid month. The star positions are correct for:

| | |
|---|---|
| 1st | 11:00 p.m. |
| 8th | 10:30 p.m. |
| 15th | 10:00 p.m. |
| 22nd | 9:30 p.m. |
| 29th | 9:00 p.m. |



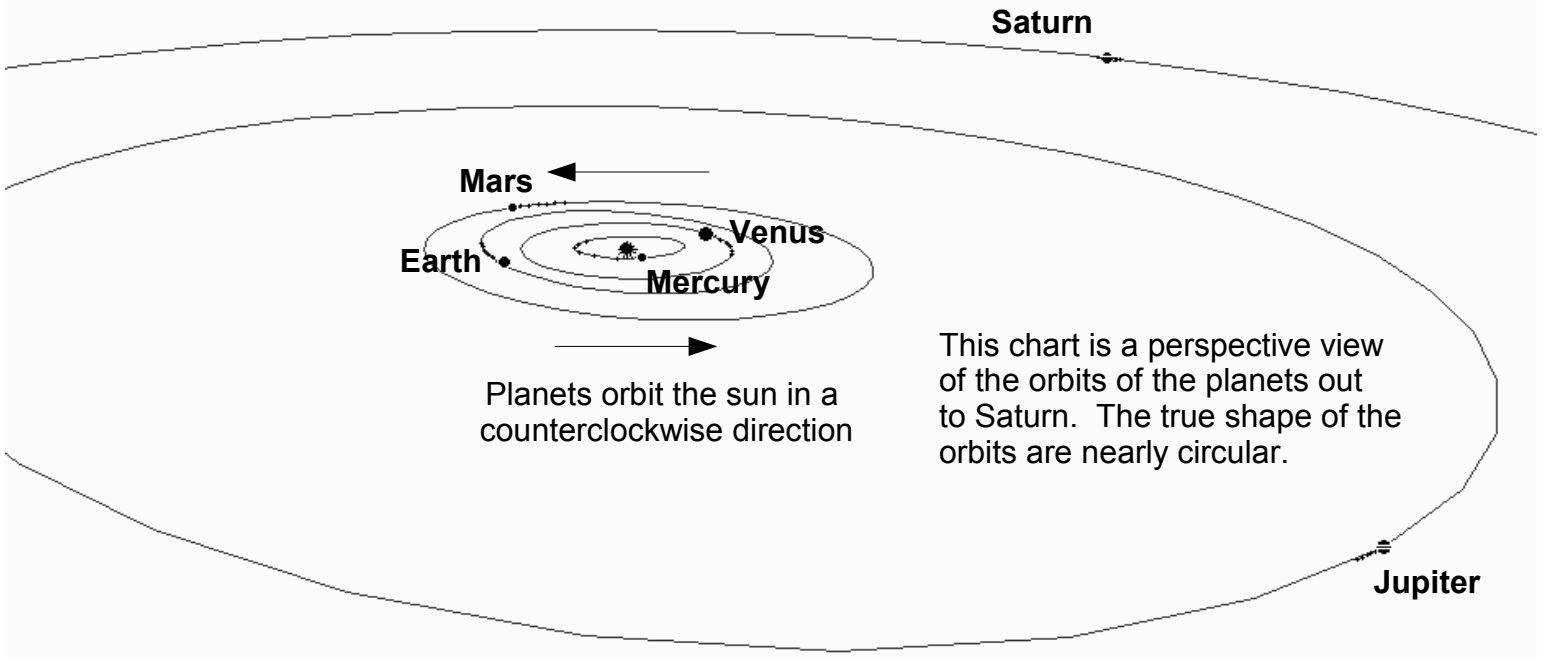

Legend:
CONSELLATIONS
Asterisms
Star & **Planet** names

There are no planets visible at chart time. October brings the autumn constellations into prominence in the eastern half of the sky. The Pleiades is the beautiful star cluster rising in the east. The northernmost of the summer constellations are still hanging on in the western sky. The Milky Way, overhead, rotates slowly counterclockwise over the evening. Another sign of Autumn is low in the south, the bright star Fomalhaut appears for a few hours in the evening.

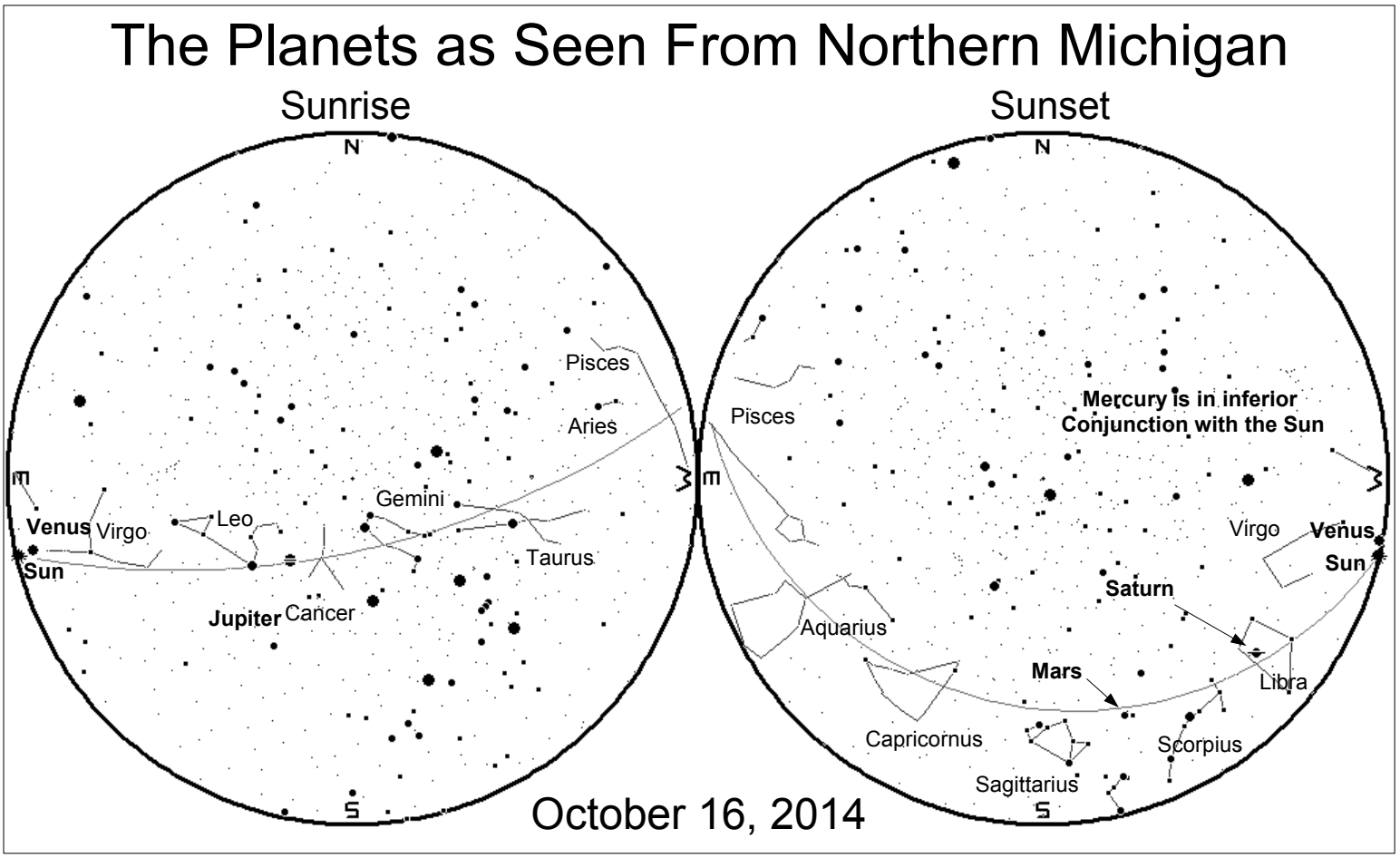
For more information on planets and stars each month:
http://ephemeris.bjmoler.org and bobmoler.wordpress.com

# The Naked Eye Planets

## October 1st, 6th, 11th, 16th, 21st, 26th, 31st




# The Planets as Seen From Northern Michigan



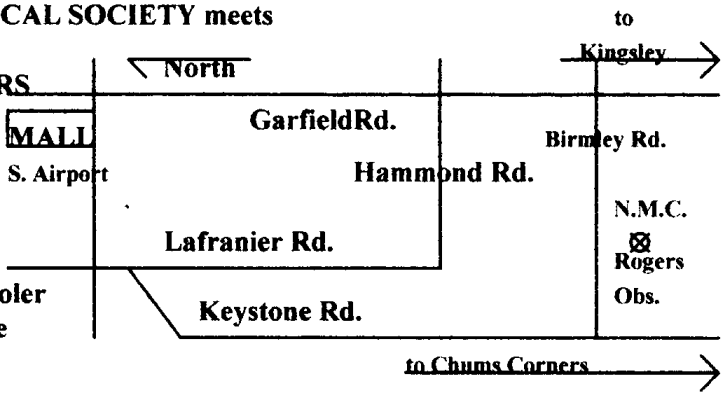

October 16, 2014

# CELESTIAL CALENDAR

| | | |
|---|---|---|
| Oct 01 | 3:33 p.m. | FIRST QUARTER MOON |
| **04** | **8 p.m.** | **GTAS Monthly meeting – NMC Observatory** |
| **04** | **9 p.m.** | **Star Party – Autumn Astronomy Day – NMC Observatory** |
| 06 | 5:41 a.m. | Moon at Perigee: 362481 km |
| 07 | 4 p.m. | Uranus at Opposition |
| 08 | 6:51 a.m. | FULL MOON |
| **08** | **6:55 a.m.** | **Total Lunar Eclipse; mag=1.162 See Extras or gtastro.org** |
| 08 | 1:44 p.m. | Moon at Descending Node |
| 12 | 5:58 a.m. | Aldebaran 1.4°S of Moon |
| 15 | 3:12 p.m. | LAST QUARTER MOON |
| 16 | 5 p.m. | Mercury at Inferior Conjunction |
| 17 | 11:25 p.m. | Jupiter 5.4°N of Moon |
| 18 | 2:05 a.m. | Moon at Apogee: 404898 km |
| **18** | **9 p.m.** | **Star Party – NMC Observatory** |
| 18 | 10:08 p.m. | Regulus 4.7°N of Moon |
| 21 | 12 n. | Orionid Meteor Shower |
| **21** | **8 p.m.** | **44th Anniversary Star Party at Sleeping Bear Dunes National Lakeshore Pierce Stocking Scenic Drive Stop #3** |
| 22 | 8:46 p.m. | Moon at Ascending Node |
| **23** | **5:45 p.m.** | **Partial Solar Eclipse; mag=0.811 See Extras or gtastro.org** |
| 23 | 5:57 p.m. | NEW MOON |
| 25 | 3 a.m. | Venus at Superior Conjunction |
| 25 | 12:04 p.m. | Saturn 1.0°S of Moon: Occn. |
| 25 | 5 p.m. | Mercury at Perihelion |
| 30 | 10:48 p.m. | FIRST QUARTER MOON |

Calendar of Astronomical Events Courtesy of Fred Espenak, www.AstroPixels.com

**The GRAND TRAVERSE ASTRONOMICAL SOCIETY meets on the first Friday of each month at the NORTHWESTERN MICHIGAN ROGERS OBSERVATORY at 8 p.m. The public is invited to attend all Society functions as our guests. We are a non-profit group dedicated to the study of astronomy and the sky above us. If you would like more information on GTAS, please call Bob Moler at 946-8649, or write to the address on the last page of this publication.**



| Ephemeris of Sky Events for NMC Observatory | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **October, 2014 - Local time zone: EDT** | | | | | | | | | | |
| **Date** | | **Sun** | | | **Twilight*** | | **Moon** | | | **Illum** |
| | | **Rise** | **Set** | **Hours** | **End** | **Start** | **Phase** | **R/S**** | **Time** | **Fractn** |
| Wed | 1 | 07:40a | 07:23p | 11:42 | 09:00p | 06:03a | F Qtr | Set | 12:43a | 52% |
| Thu | 2 | 07:41a | 07:21p | 11:39 | 08:58p | 06:04a | | Set | 01:50a | 63% |
| Fri | 3 | 07:42a | 07:19p | 11:36 | 08:56p | 06:05a | | Set | 03:01a | 74% |
| Sat | 4 | 07:44a | 07:17p | 11:33 | 08:54p | 06:06a | | Set | 04:14a | 84% |
| | | | | | | | | | | |
| Sun | 5 | 07:45a | 07:15p | 11:30 | 08:52p | 06:08a | | Set | 05:28a | 92% |
| Mon | 6 | 07:46a | 07:13p | 11:27 | 08:50p | 06:09a | | Set | 06:42a | 97% |
| Tue | 7 | 07:47a | 07:12p | 11:24 | 08:48p | 06:10a | | Set | 07:56a | 100% |
| Wed | 8 | 07:48a | 07:10p | 11:21 | 08:46p | 06:12a | Full | Rise | 07:23p | 100% |
| Thu | 9 | 07:50a | 07:08p | 11:18 | 08:45p | 06:13a | | Rise | 08:01p | 97% |
| Fri | 10 | 07:51a | 07:06p | 11:15 | 08:43p | 06:14a | | Rise | 08:41p | 92% |
| Sat | 11 | 07:52a | 07:04p | 11:12 | 08:41p | 06:15a | | Rise | 09:25p | 85% |
| | | | | | | | | | | |
| Sun | 12 | 07:53a | 07:03p | 11:09 | 08:39p | 06:17a | | Rise | 10:12p | 76% |
| Mon | 13 | 07:55a | 07:01p | 11:06 | 08:38p | 06:18a | | Rise | 11:04p | 67% |
| Tue | 14 | 07:56a | 06:59p | 11:03 | 08:36p | 06:19a | | Rise | 11:57p | 58% |
| Wed | 15 | 07:57a | 06:57p | 11:00 | 08:34p | 06:20a | L Qtr | Rise | 12:53a | 48% |
| Thu | 16 | 07:59a | 06:56p | 10:57 | 08:33p | 06:22a | | Rise | 01:50a | 39% |
| Fri | 17 | 08:00a | 06:54p | 10:54 | 08:31p | 06:23a | | Rise | 02:47a | 30% |
| Sat | 18 | 08:01a | 06:52p | 10:51 | 08:29p | 06:24a | | Rise | 03:45a | 21% |
| | | | | | | | | | | |
| Sun | 19 | 08:02a | 06:51p | 10:48 | 08:28p | 06:25a | | Rise | 04:44a | 14% |
| Mon | 20 | 08:04a | 06:49p | 10:45 | 08:26p | 06:26a | | Rise | 05:43a | 8% |
| Tue | 21 | 08:05a | 06:47p | 10:42 | 08:25p | 06:28a | | Rise | 06:44a | 4% |
| Wed | 22 | 08:06a | 06:46p | 10:39 | 08:23p | 06:29a | | Rise | 07:46a | 1% |
| Thu | 23 | 08:08a | 06:44p | 10:36 | 08:22p | 06:30a | New | Set | 06:45p | 0% |
| Fri | 24 | 08:09a | 06:43p | 10:33 | 08:20p | 06:31a | | Set | 07:20p | 1% |
| Sat | 25 | 08:10a | 06:41p | 10:30 | 08:19p | 06:33a | | Set | 08:00p | 5% |
| | | | | | | | | | | |
| Sun | 26 | 08:12a | 06:40p | 10:27 | 08:17p | 06:34a | | Set | 08:46p | 10% |
| Mon | 27 | 08:13a | 06:38p | 10:25 | 08:16p | 06:35a | | Set | 09:38p | 18% |
| Tue | 28 | 08:14a | 06:37p | 10:22 | 08:15p | 06:36a | | Set | 10:37p | 27% |
| Wed | 29 | 08:16a | 06:35p | 10:19 | 08:13p | 06:37a | | Set | 11:41p | 37% |
| Thu | 30 | 08:17a | 06:34p | 10:16 | 08:12p | 06:39a | F Qtr | Set | 12:49a | 49% |
| Fri | 31 | 08:18a | 06:32p | 10:13 | 08:11p | 06:40a | | Set | 01:59a | 60% |
| * Astronomical Twilight | | | | | | | | | | |
| ** Moonrise or moonset, whichever occurs between sunset and sunrise | | | | | | | | | | |

## Grand Traverse Astronomical Society – Membership Application 2014

___ I am interested, please send me more information about the next GTAS meeting.

___ I'll join, payment enclosed  Email Address:_____

___ Membership renewal  **Newsletter Delivery: ___ Email ___ Mail**

Interests: _____

Name: _____ Telephone: _____

Address: _____

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Dues: ___ Single Membership .....$25.00/yr

___ Family.....$30.00/yr

___ Student (up to 18 years age)....$15.00/yr

**Mail check to:** G.T.A.S.

Gary Carlisle, Treasurer

1473 Birmley Road

Traverse City, MI 49686

**WANTED: Astronomers interested in working with Project ASTRO POLARIS.**
**Willingness to work with K-12 students and teachers. Visiting classrooms and conducting experiments, discussing astronomy interests and events. Sharing your love of astronomy with others. Will provide; training, materials, instuctionals and support.**
**Please contact: Jerry Dobek Site Coordinator Project ASTRO POLARIS NMC Science & Math 1701 East Front Street Traverse City, MI 49686 email jdobek@nmc.edu phone 946-1787 obsv. 223-4545 home**





**The Stellar Sentinel**
**Bob Moler, Editor**
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**Traverse City, MI 49685**

GRAND TRAVERSE ASTRONOMICAL SOCIETY
GTAS

# Extras – October 2014

## Contents:

**India's Mars Orbiter Mission** arrived at Mars late evening our time Tuesday September 23rd. The spacecraft is in excellent health and has returned images of the Red planet.

**Lunar Eclipse October 8, 2014**

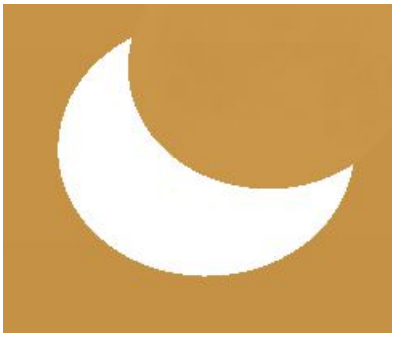
- Partial phase starts at 5:15 a.m. EDT
- Totality begins at 6:25 a.m.
- Mid eclipse at 6:54 a.m.
- Totality ends at 7:24 a.m.
- Sun will rise at 7:48 a.m.
- The moon will set at 7:56 a.m.
- Partial phase ends at 8:34 a.m. (unseen, moon has set)

A diagram of the eclipse is on page 2. Contact P1 and P4 events are invisible. The penumbral shadow becomes noticeable about a half hour before U1, the beginning of the partial phase.

**Partial Solar Eclipse October 23, 2014**

- Eclipse starts at 5:32 p.m.
- Sun sets at 6:44 p.m.

Note that the times are slightly variable depending on your location. There times are for the Rogers Observatory. Within the Grand Traverse region there shouldn't vary by more than a few minutes. Most variable is the sunset time, which assumes a clean horizon. See the NASA eclipse diagram on page 3. Note about times on the eclipse diagrams. EDT is UT – 4 hours.



Above: a simulation via Stellarium of the appearance of the eclipsed sun just before sunset. Stellarium also simulates atmospheric refraction giving rise to a somewhat squashed Sun.

**NASA's Space Place Article** for October: Twinkle, Twinkle Variable Star Page 4.

FIGURE 3

# Total Lunar Eclipse of 2014 Oct 08

Ecliptic Conjunction = 10:51:42.8 TD ( = 10:50:35.5 UT )
Greatest Eclipse = 10:55:43.6 TD ( = 10:54:36.2 UT )

Penumbral Magnitude = 2.1456 P. Radius = 1.2787° Gamma = 0.3827
Umbral Magnitude = 1.1659 U. Radius = 0.7451° Axis = 0.3824°

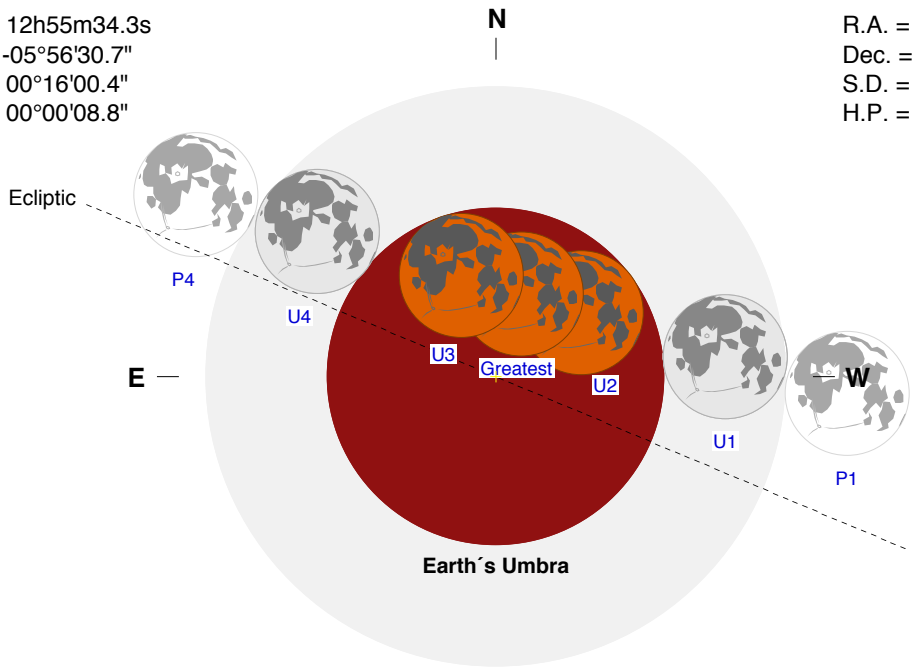
Saros Series = 127 Member = 42 of 72

**Sun at Greatest Eclipse**
(Geocentric Coordinates)

R.A. = 12h55m34.3s
Dec. = -05°56'30.7"
S.D. = 00°16'00.4"
H.P. = 00°00'08.8"

**Moon at Greatest Eclipse**
(Geocentric Coordinates)

R.A. = 00h55m07.2s
Dec. = +06°18'26.8"
S.D. = 00°16'20.3"
H.P. = 00°59'57.9"




**Eclipse Durations**

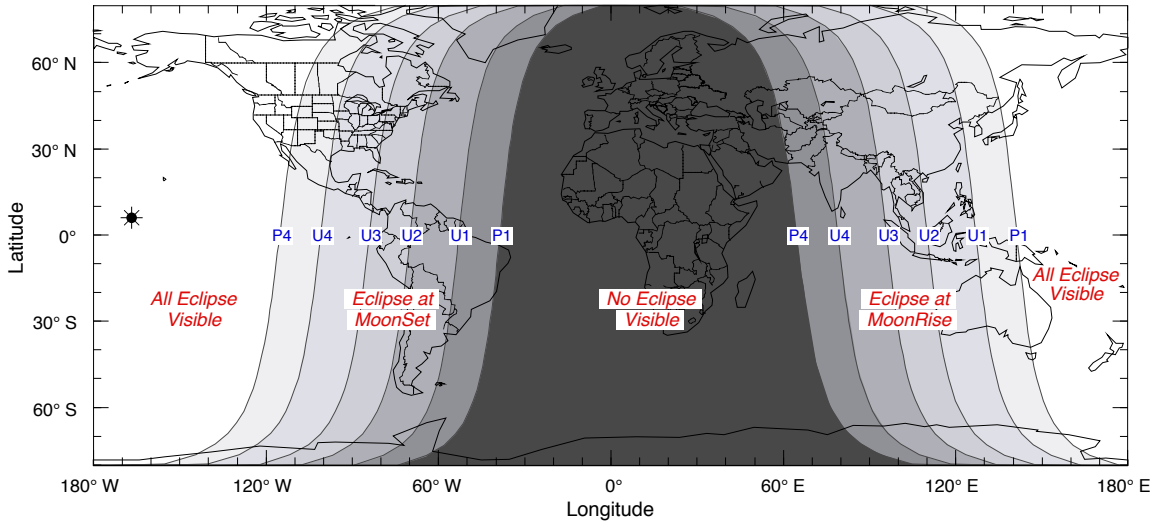
Penumbral = 05h18m10s
Umbral = 03h19m33s
Total = 00h58m50s

ΔT = 67 s
Rule = CdT (Danjon)
Eph. = VSOP87/ELP2000-85

*F. Espenak, NASA's GSFC*
eclipse.gsfc.nasa.gov/eclipse.html

**Eclipse Contacts**

P1 = 08:15:33 UT
U1 = 09:14:48 UT
U2 = 10:25:10 UT
U3 = 11:24:00 UT
U4 = 12:34:21 UT
P4 = 13:33:43 UT




*"Eclipses During 2014"*, F. Espenak, **Observer's Handbook - 2014**, Royal Astronomical Society of Canada

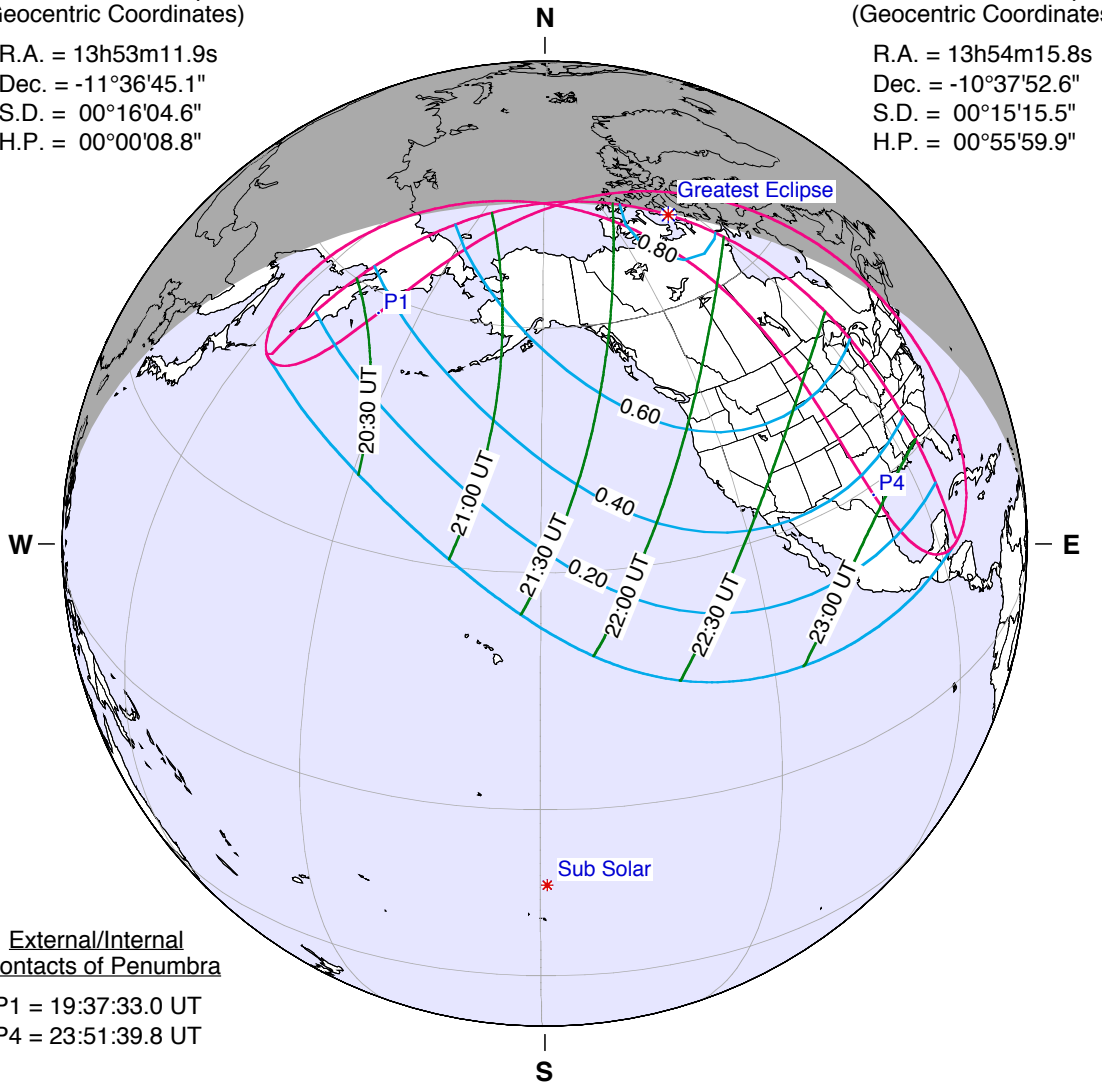
**FIGURE 4**

# Partial Solar Eclipse of 2014 Oct 23

Ecliptic Conjunction = 21:57:46.8 TD ( = 21:56:39.5 UT )
Greatest Eclipse = 21:45:38.7 TD ( = 21:44:31.4 UT )

Eclipse Magnitude = 0.8114 Gamma = 1.0908

Saros Series = 153 Member = 9 of 70




Sun at Greatest Eclipse
(Geocentric Coordinates)

R.A. = 13h53m11.9s
Dec. = -11°36'45.1"
S.D. = 00°16'04.6"
H.P. = 00°00'08.8"

Moon at Greatest Eclipse
(Geocentric Coordinates)

R.A. = 13h54m15.8s
Dec. = -10°37'52.6"
S.D. = 00°15'15.5"
H.P. = 00°55'59.9"

External/Internal
Contacts of Penumbra

P1 = 19:37:33.0 UT
P4 = 23:51:39.8 UT

Constants & Ephemeris

ΔT = 67.4 s
k1 = 0.2724880
k2 = 0.2722810
Δb = 0.0" Δl = 0.0"
Eph. = VSOP87/ELP2000-85

0 1000 2000 3000 4000 5000
Kilometers

Geocentric Libration
(Optical + Physical)

l = -4.52°
b = -1.27°
c = 21.96°
Brown Lun. No. = 1136

*F. Espenak, NASA's GSFC*

eclipse.gsfc.nasa.gov/eclipse.html

*"Eclipses During 2014"*, F. Espenak, **Observer's Handbook - 2014**, Royal Astronomical Society of Canada

# Twinkle, twinkle, variable star

By Dr. Ethan Siegel

As bright and steady as they appear, the stars in our sky won't shine forever. The steady brilliance of these sources of light is powered by a tumultuous interior, where nuclear processes fuse light elements and isotopes into heavier ones. Because the heavier nuclei up to iron (Fe), have a greater binding energies-per-nucleon, each reaction results in a slight reduction of the star's mass, converting it into energy via Einstein's famous equation relating changes in mass and energy output, $E = mc^2$. Over timescales of tens of thousands of years, that energy migrates to the star's photosphere, where it's emitted out into the universe as starlight.

There's only a finite amount of fuel in there, and when stars run out, the interior contracts and heats up, often enabling heavier elements to burn at even higher temperatures, and causing sun-like stars to grow into red giants. Even though the cores of both hydrogen-burning and helium-burning stars have consistent, steady energy outputs, our sun's overall brightness varies by just ~0.1%, while red giants can have their brightness's vary by factors of thousands or more over the course of a single year! In fact, the first periodic or pulsating variable star ever discovered—Mira (omicron Ceti)—behaves exactly in this way.

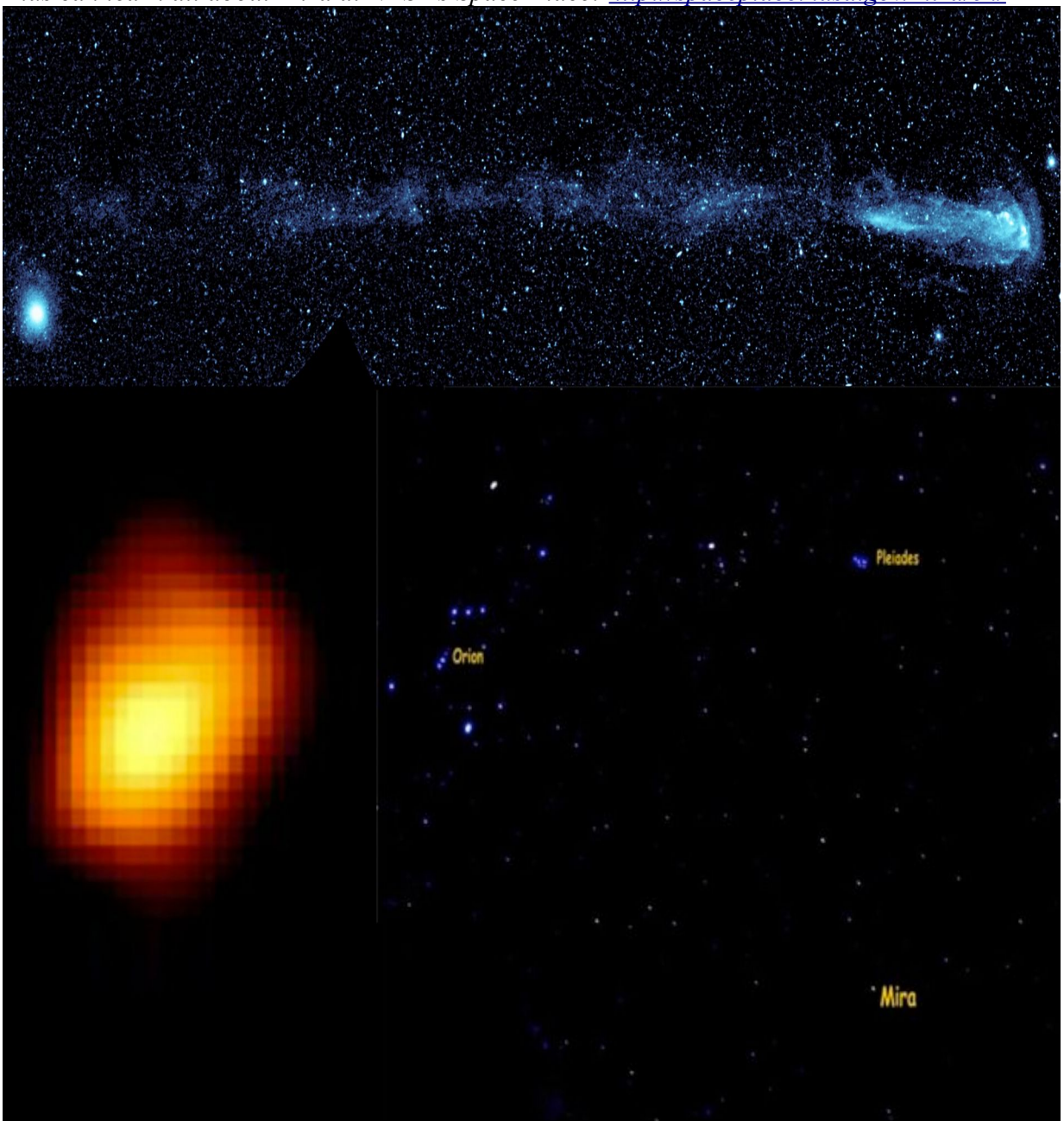
There are many types of variable stars, including Cepheids, RR Lyrae, cataclysmic variables and more, but it's the Mira-type variables that give us a glimpse into our Sun's likely future. In general, the cores of stars burn through their fuel in a very consistent fashion, but in the case of pulsating variable stars the outer layers of stellar atmospheres vary. Initially heating up and expanding, they overshoot equilibrium, reach a maximum size, cool, then often forming neutral molecules that behave as light-blocking dust, with the dust then falling back to the star, ionizing and starting the whole process over again. This temporarily neutral dust absorbs the visible light from the star and re-emits it, but as infrared radiation, which is invisible to our eyes. In the case of Mira (and many red giants), it's Titanium Monoxide (TiO) that causes it to dim so severely, from a maximum magnitude of +2 or +3 (clearly visible to the naked eye) to a minimum of +9 or +10, requiring a telescope (and an experienced observer) to find!

Visible in the constellation of Cetus during the fall-and-winter from the Northern Hemisphere, Mira is presently at magnitude +7 and headed towards its minimum, but will reach its maximum brightness again in May of next year and every 332 days thereafter. Shockingly, Mira contains a huge, 13 light-year-long tail -- visible only in the UV -- that it leaves as it rockets through the interstellar medium at 130 km/sec! Look for it in your skies all winter long, and contribute your results to the AAVSO (American Association of Variable Star Observers) International Database to help study its long-term

behavior!

*Check out some cool images and simulated animations of Mira here: http://www.nasa.gov/mission_pages/galex/20070815/v.html*

*Kids can learn all about Mira at NASA's Space Place: http://spaceplace.nasa.gov/mira/en/*




*Images credit: NASA's Galaxy Evolution Explorer (GALEX) spacecraft, of Mira and its tail in UV light (top); Margarita Karovska (Harvard-Smithsonian CfA) / NASA's Hubble Space Telescope image of Mira, with the distortions revealing the presence of a binary companion (lower left); public domain image of Orion, the Pleiades and Mira (near maximum brightness) by Brocken Inaglory of Wikimedia Commons under CC-BY-SA-3.0 (lower right).*