



Nightfall

Monthly publication of the Huachuca Astronomy Club

November 2013

President's Notes

By David Roemer

A Bountiful Harvest

Ah, the long, cold, crisp, clear nights of November. The summer Milky Way is sinking into the west, just peeking out from the gaps in the Huachuca Mountains while Taurus “the bull” and Orion “the hunter” once again rise up from the east to take up the battle stances of their eternal duel. In our own mortal lives November is a time to take stock of the bountiful harvest and usually a time for thanksgiving.

This year the astronomical harvest is especially bountiful as we have a bevy of comets gracing our sky. Some of our members have been following (the latest high count) five separate comets in the night and early morning sky. Some of these comets, we think, are on their first time in from the Ort cloud, the outer region of our solar neighborhood. Some are old friends like periodic comet 2P/Encke. Like comet Halley, comet Encke was not named for the first human to record it (Pierre Méchain in 1786) but for Johann Franz Encke a mathematician, who computed the comet's orbit in 1818 (about 3.3 years) and predicted its return in 1822. The 2P in the comet's designation is in recognition that Encke is the second comet to have its orbital period correctly calculated. Can you guess the first? Since then comet Encke has been observed on almost every one of its subsequent visits to the Sun but it usually quite a faint object getting little notoriety.

This year Encke is predicted to reach about magnitude 7, again not front page material but the comet is also associated with the two Taurid meteor showers that run from October through December so we might be getting nice secondary show from this comet's dusty past. By the way, we have been seeing increased fireball activity recently and the Taurid's are known to produce very few meteors overall but those that are seen tend to be very bright fireballs. The possibility of increased fireball activity (because of Encke's return) should be enough to get you to bundle up and sit on your porch after your thanksgiving feast.

Next Meeting

The next meeting of the Huachuca Astronomy Club will be held on Friday, Nov 22, 2013 at 7PM. It will be in our usual meeting location: the community room in the student union building at Cochise College, Sierra Vista Campus.

The November meeting is the time to elect officers for next year. Currently we have one candidate for each office as follows:

President: David Roemer

Vice President: Chris Ubing

Secretary: Ted Forte

Treasurer: Tommy Neyhart

Member at Large: Doug Snyder

Member at Large: Bob Hoover

Member at Large: Bert Kelher

Member at Large: Gary Grue

If the slate remains un-augmented we will affirm the officers in a fine Soviet style proclamation. Nominations remain open, however, until the election is actually held and you may nominate yourself by declaring your desire to serve. In the case of a contested position, ballots will be cast and the winner decided by majority vote. You must be a member in good standing to vote.

The speaker for the November meeting will be Scott Kardel, Managing Director of the Tucson-based International Dark-Sky Association. He will present "Light Pollution: Perspectives from Earth and Space" --an engaging visual look at the problems of light pollution. Scott will show dramatic still and time-lapse imagery captured from the International Space Station, including nighttime views of Tucson and Phoenix from space. This perspective provides a new and revealing look at how the glow of our city lights wastes energy and impacts astronomy along with the natural world.



Scott is a native of Tucson, AZ. He has a Bachelor's Degree from Northern Arizona University and taught high school science in Arizona for nine years. After completing a Master's Degree in astronomy from the University of Arizona, Scott took his passion for the stars to Kansas, where he served as assistant director for the Lake Afton Public Observatory. Prior to coming to International Dark-Sky Association, Scott served for eight years as the public affairs coordinator for Palomar Observatory. He directed their public outreach program and was the observatory's representative on light pollution issues.

Note from Treasurer Bob Kepple

Both the 2014 Astronomy Wall Calendars and the RASC 2014 Observer's Handbooks are in. If you signed up for one or the other please plan on picking them up at the November meeting. Member discounts for wall calendars are \$7.00 (reg. \$12.95) and the RASC Handbooks are \$20.00 (reg. \$27.95). Please make out checks to Huachuca Astronomy Club or HAC for these amounts. If you want to include 2014 dues you may add this to your check. Membership is \$25.00 per person or \$35.00 per family. Student membership is \$10.00 and Military is \$20.00 or \$25.00 family.

If you missed the meetings when we did the sign-up for calendars or handbooks we have a few extras. E-mail me to reserve one now. (AstroCards@aol.com)

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Astronomical League Observing Programs - Planetary Nebula November Edition

by Ted Forte

(Captured from the HACList)

We have just nine more planetary nebulae to complete the list of objects in the Astronomical League's Planetary Nebula Program. If you had started with me in January and observed all of the objects each month I could be issuing you your PN program pin as a Christmas present. You can start the PN program anytime, however, and I would remind you that you can use your old observations of these objects provided all of the necessary information was recorded.

The November list, which contains five objects, represents the top of the batting order, the beginning of the RA-sorted list. So what better time could there be to start the PN program? This month we'll consider a couple of my favorite objects.

NGC 40 in Perseus is a favorite of most PN observers. And why not? High in the northern sky, it is accessible most of the year, and it is an impressive sight in even a modest telescope. Discovered by William Herschel it has the nicknames of The Bowtie and The Scarab Nebula. It is representative of a group of planetaries that have a significant contrast between the bright central star and the surrounding nebula which is only half as bright and therefore seems delicate and translucent. The bow tie moniker results from features that might escape smaller scope users; wisps of looping material that form an irregular shell. Most observers see it as blue-green and some report annularity. Try an h-beta filter on this one, it will surprise you. NGC 40 lies on a line between Alrai (Gamma Cephei) and Archird (Eta Cas) and is 5.5 degrees from Alrai.

NGC 246 in Cetus is known as The Skull Nebula, its mottled appearance vaguely reminiscent of a human skull to observers with overactive imaginations. It is located 6 degrees north of Beta Ceti. The faint disk can fade almost to invisibility on less transparent nights leaving just a hint of mist around the 11.8 magnitude central star and its retinue of attending bright stars arrayed in a triangle around it. But when conditions allow, it is a round mottled disk. William Herschel discovered this one in 1785.

Perseus contains one of just four planetaries on the Messier list. M76 is best known as the Little Dumbbell, but has a host of other names like The Cork, or The Barbell - it even earns two NGC numbers: NGC 650 and 651 owing to its dual lobed appearance. It is far less observed than its larger cousin M27 and that is a shame, because it's a really fascinating object. In small scopes, M76 is very rectangular, but larger instruments show it as a peanut shaped object angled NE-SW. The SW lobe is significantly brighter. We may be seeing a broad ring seen edgewise, or two opposing conical outflows, but it is also very possible that it is a more spherically shaped nebula with the brightness variations due merely to the way gases of different densities obscure the light from the central star. It is interesting to note that M76 is about the same size as M27 but appears smaller because it is five times more distant. It is one degree north of the 4th magnitude Phi Persei along a line toward Ruchbah (Delta Cassiopeiae).

IC 1747 in Cassiopeia was discovered by Williamina Fleming in 1905 and for most observers it may fall into the stellar category. But don't dismiss it too fast, there is a bit of structure to be gleaned and it can even show some annularity. The OIII filter and moderate to high power, in larger telescopes, will reward the patient observer.

Abell 4 in Perseus was discovered by George Abell in 1964. In large apertures, it is an easy catch - a bright round disk even without a filter. As aperture decreases, so does its ease of detection, but it remains one of the more accessible planetaries with the Abell designation. Use low power and try the OIII and UHC filters.

Planetary nebulae for November

NGC 40 PN G120.0+09.8 Cep 00h13m34.0s +72°34'19"
NGC 246 PN G118.8-74.7 Cet 00h47m33.3s -11°48'58"
Little Dumbbell M 76 Per 01h42m56.8s +51°37'17"
IC 1747 PN G130.2+01.3 Cas 01h58m18.0s +63°21'57"
Abell 4PN G144.3-15.5 Per 02h46m01.0s +42°35'25"

Arizona Science & Astronomy Expo Tucson Convention Center

Several HAC members attended the ASAE in Tucson over the weekend of November 16-17 and what a great event it was!

On Saturday we heard a talk by astrophysicist Alex Filippenko entitled Dark Energy and the Runaway Universe. Then there was a Science Discussion panel that included Geoff Notkin, The "meteorite man" who moderated the panel. The panel included Carin Bondar (Biologist), Amy Shira Teitel (Spaceflight Historian), Emily Lakdawalla (Planetary Society senior editor) Michael Belfori (Futurist) Lauren B. Worley (NASA Press Secretary), Steve Ramsden (Charlie Bates Solar astronomy project) and retired astronaut Story Musgrave who filled in for Phil Plait. Musgrave gave a follow-on talk titled "Design a Life For Yourself" to end the first day.

Emily Lakdawalla (Planetary Society) kicked off day two with her talk titled "The Golden Age of Planetary Exploration" There was a Comet Discussion panel moderated by Carl Hergenrother of the LPL in Tucson. The panel included David Levy, Jim Scotti (Spacewatch), David Eicher (Astronomy Magazine Senior Editor) and Steve Larson (Catalina Sky Survey). The last talk of the day was by author Timothy Ferris entitled "The State of the Universe" which was cut short due to some sort of reported emergency. The building was evacuated before he finished his talk. We did not discover the nature of the "emergency"

There were scores of vendors with so many, many toys - Santa's workshop for astronomers! Most had some great deals too.

Comet ISON Report

Bob Gent

There is no doubt. Comet ISON has brightened by a magnitude or two in the past two days. In the image below, the star closest to Comet ISON at the left is HIP62421, and it is magnitude 6.2. Also the galaxy NGC4697 is visible to the right of ISON. It's 10.10 magnitude. ISON was an easy target in 10x50 binoculars, and in the 80 mm finder-scope I could clearly see the tail.

Comet Lovejoy is putting on a nice show too. I think these are both visible with unaided eyes (averted vision), but they are not overwhelmingly bright.



This image was taken this morning, November 14, 2013 at 5:00 am MST. This is a 25 second exposure with the C11 HD using HyperStar and a Canon Digital Rebel attached. The temperature was 43 degrees F with partly cloudy skies, mostly to the west, and ISON was in the clear. The relative humidity was 73 percent and the SQM-L reading was 20.72 mag/arcsecond sq.

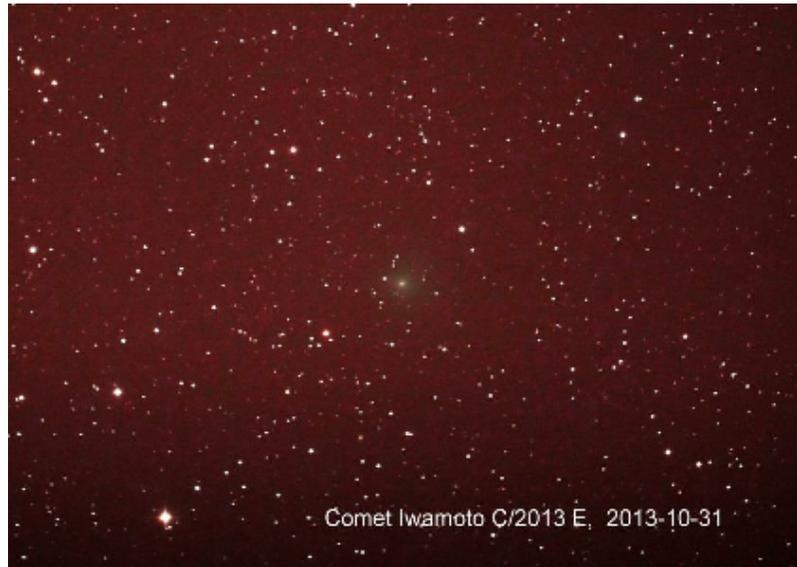
The moon will be interfering with imaging for the next few nights, and ISON is now 59 million miles from the sun and closing at almost 33 miles per second. Also, it will be harder to spot in the morning twilight, and perihelion is Nov 28.

Best wishes and good observing,

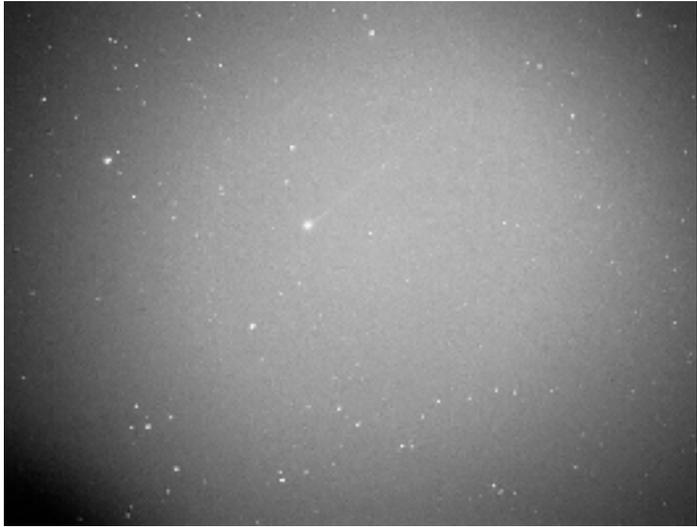
Bob Gent

More Comet Images from HAC Members

Bob Kepple



David Roemer



Comet Encke 1



Comet ISON 1



Comet Lovejoy 1

The most volcanically active place is out-of-this-world!

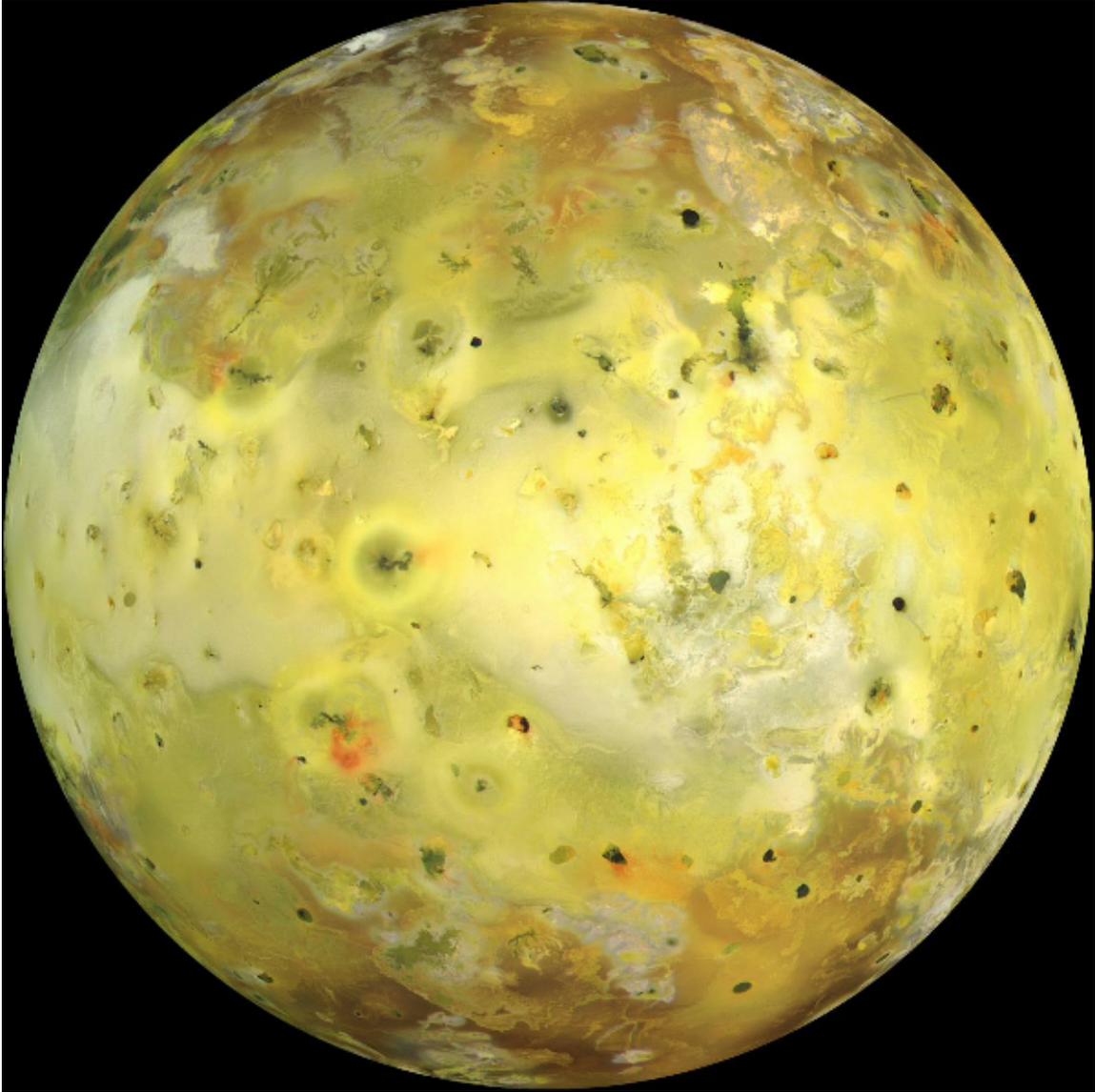
By Dr. Ethan Siegel

Volcanoes are some of the most powerful and destructive natural phenomena, yet they're a vital part of shaping the planetary landscape of worlds small and large. Here on Earth, the largest of the rocky bodies in our Solar System, there's a tremendous source of heat coming from our planet's interior, from a mix of gravitational contraction and heavy, radioactive elements decaying. Our planet consistently outputs a tremendous amount of energy from this process, nearly three times the global power production from all sources of fuel. Because the surface-area-to-mass ratio of our planet (like all large rocky worlds) is small, that energy has a hard time escaping, building-up and releasing sporadically in catastrophic events: volcanoes and earthquakes!

Yet volcanoes occur on worlds that you might never expect, like the tiny moon Io, orbiting Jupiter. With just 1.5% the mass of Earth despite being more than one quarter of the Earth's diameter, Io seems like an unlikely candidate for volcanoes, as 4.5 billion years is more than enough time for it to have cooled and become stable. Yet Io is anything but stable, as an abundance of volcanic eruptions were predicted before we ever got a chance to view it up close. When the Voyager 1 spacecraft visited, it found no impact craters on Io, but instead hundreds of volcanic calderas, including actual eruptions with plumes 300 kilometers high! Subsequently, Voyager 2, Galileo, and a myriad of telescope observations found that these eruptions change rapidly on Io's surface.

Where does the energy for all this come from? From the combined tidal forces exerted by Jupiter and the outer Jovian moons. On Earth, the gravity from the Sun and Moon causes the ocean tides to raise-and-lower by one-to-two meters, on average, far too small to cause any heating. Io has no oceans, yet the tidal forces acting on it cause the world itself to stretch and bend by an astonishing **100 meters** at a time! This causes not only cracking and fissures, but also heats up the interior of the planet, the same way that rapidly bending a piece of metal back-and-forth causes it to heat up internally. When a path to the surface opens up, that internal heat escapes through quiescent lava flows and catastrophic volcanic eruptions! The hottest spots on Io's surface reach 1,200 °C (2,000 °F); compared to the average surface temperature of 110 Kelvin (-163 °C / -261 °F), Io is home to the most extreme temperature differences from location-to-location outside of the Sun.

Just by orbiting where it does, Io gets distorted, heats up, and erupts, making it the most volcanically active world in the entire Solar System! Other moons around gas giants have spectacular eruptions, too (like Enceladus around Saturn), but no world has its surface shaped by volcanic activity quite like Jupiter's innermost moon, Io!



Io. Image credit: NASA / JPL-Caltech, via the Galileo spacecraft.

Download photo here: <http://photojournal.jpl.nasa.gov/catalog/PIA02308>

Learn more about Galileo's mission to Jupiter: <http://solarsystem.nasa.gov/galileo/>.

Kids can explore the many volcanoes of our solar system using the Space Place's Space Volcano Explorer: <http://spaceplace.nasa.gov/volcanoes>.

Huachuca Astronomy Club – Board of Directors



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2013—ARIZONA's Astronomically Handy Sky Calendar from Doug Snyder & the H.A.C.—2013
ARIZONA Observers SKY EVENTS Calendar for 2013 —All Times shown are MOUNTAIN STANDARD TIME*

January 2013

HIGHLIGHT1: Moon & Jupiter on 21st
HL2(month): Saturn's Rings open to 4.8°
 Note: **HAC** = Huachuca Astronomy Club
 03 Th Quadrantids Meteor Shower - unfavorable year due to Moon light! 04
 Fr ☾ Last Quarter Moon 2058 hrs.
 11 Fr ● **NEW MOON** 1244 hrs.(lunation#1114)
 12 Sa **HAC Member Star Party** (S.P.)
 17 Th **HAC Pub. S.P.; P.O.; SS@1743h.**
 18 Fr ☽ First Quarter Moon 1645 hrs.
 21 Mo MOON & Jupiter v. close, 2000h
 25 Fr **HAC Meeting**, Cochise College, 1900 hrs
 26 Sa ○ Full Moon, 2138 hrs.
 29 Tu Zodiacal Lt. in W., pm, next two weeks after evening twilight.

February 2013

HIGHLIGHT: Merc. & Mars close on Feb. 8th
 03 Su ☾ Last Quarter Moon 0656 hrs.
 09 Sa **HAC Member Star Party** (S.P.)
 10 Su ● **NEW MOON** 0020 hrs.
 14 Th **HAC Pub. S.P.; P.O.; SS@1808hrs.** 15
 Fr **NEA** 2012 DA14; to mag.12 in evening hrs.; size= 57meters; visit spaceweather.com
 16 Sa Merc. evening planet in W., 9"
 17 Su ☽ First Quarter Moon 1331 hrs. 22
 Fr **HAC Meeting**, Cochise College
 25 Mo ○ Full Moon 1326 hrs.
 27 We Zodiacal Lt. in W., pm, next two weeks after evening twilight

March 2013

HIGHLIGHT: Messier Marathon S.P. 04
 Mo ☾ Last Quarter Moon 1453 hrs. 09
 Sa **HAC Messier Marathon S.P.**
 09 Sa **Comet Pan-Starrs** (C/2011 L4); 2100hrs, at Perihelion—Mag. 0?
 11 Mo ● **NEW MOON** 1251 hrs.
 14 Th **HAC Pub. S.P.; P.O.; SS@1829h.**
 16 Sa **Kartchner Caverns State Park** SP.
 17 Su Moon&Jup. close;1900hrs; 1.4°
 19 Tu ☽ First Quarter Moon 1027 hrs.
 20 We **Vernal Equinox**, 0402 hrs.
 22 Fr **HAC Meeting**, Cochise College
 27 We ○ Full Moon 0227 hrs.
 31 Su ● Merc. morning planet in E. size 9"
 Easter Sunday

April 2013

HIGHLIGHT: Saturn Opposition, 4/28
HL2: Comet Pan-Starrs (early in month & bright?)
 02 Tu ☾ Last Quarter Moon, 2137 hrs. 06
 Sa **HAC Member S.P.**
 10 We ● **NEW MOON** 0235 hrs.
 14 Su Jupiter within 4° of crescent Moon
 18 Th ☽ First Quarter Moon 0531 hrs.
 Th **HAC Pub. S.P.; P.O.; SS@1852h.**
 20 Sa **ASTRONOMY DAY—Global**
 22 Mo Lyrid Meteors—v. unfavorable due to moonlight; peak 0400?
 25 Th ○ Full Moon, 1257 hrs.
 26 Fr **HAC Meeting**, Cochise College
 28 Su Saturn at **Opposition**, 0100 hrs. mag. +0.1, size 18.8", 8.82 AU

May 2013

HIGHLIGHT: Merc., Venus, Jup. Conjunction! 02
 Th ☾ Last Quarter Moon, 0414 hrs.
 05 & 06 Su & Mo **η Aquarid Meteors**; favorable; pk@4am each morning; possibly 40 per hr.
 09 Th ● **NEW MOON** 1728 hrs.
 11 Sa **HAC Member S.P.**
 16 Th **HAC Pub. S.P.; P.O.; SS@1912hrs.**
 17 Fr ☽ First Quarter Moon 2134 hrs.
 24 Fr ○ Full Moon, 2125 hrs.
 very shallow penumbral Lunar Eclipse, 1.5%; mostly undetectable, starts at 2053hrs.
 24 Fr **HAC Meeting**, Cochise College
24-29 Planetary Conjunction, best of 2013; evening twilight line up of Merc., Venus, Jup.; 26th is !!
 31 Fr ☾ Last Quarter Moon, 1158 hrs.

June 2013

HIGHLIGHT: (Gamma) Delphinids?
 04 Tu Venus in **M35**, pm, low in NW
 08 Sa ● **NEW MOON** 0856 hrs.
HAC Member S.P.
 11 Tu **Meteors—Del.**; 0100-dawn? v. favorable year, activity is ??
 12 We Merc. G. Elong. 24°, pm planet
 13 Th **HAC Pub. S.P.; P.O.; SS@1927hrs.**
 16 Su ☽ First Quarter Moon 1024 hrs. 20
 Th Merc. 2° S. of Venus, pm
 20 Th Summer **Solstice** 2204 hrs. 23
 Su ○ Full Moon, 0432h. largest of 2013 28
 Fr **HAC Meeting**, Cochise College
 29 Sa ☾ Last Quarter Moon, 2153 hrs.

July 2013

HIGHLIGHT: Mars, Jup., Merc., am, E., July 22nd
 01 Mo Pluto at Opposition, 1800 hrs.
 06 Fr Moon/Mars close; . low in E., 0430h.
 08 Mo ● **NEW MOON** 0014 hrs.
 15 Mo ☽ First Quarter Moon 2018 hrs.
 22 Mo ○ Full Moon, 1116 hrs.
 26 Fr **HAC Meeting**, Cochise College
 29 Mo ☾ Last Quarter Moon, 1043 hrs.
 29-30 Mo-Tu: **Meteors: Delta(δ) Aquarids;** am hrs.; favorable year

August 2013

HIGHLIGHT1: Perseid Meteor Shower
HL2: Moon/Planet pairings, am! & pm during month
 06 Tu ● **NEW MOON** 1451 hrs
 11-13 Su-Tu; **Perseids**; Pk. am of 12th; fast, bright
 14 We ☽ First Quarter Moon 0356 hrs.
 20 Tu ○ Full Moon, 1845 hrs.
 23 Fr **HAC Meeting**, Cochise College
 26 Mo **Neptune** at Opposition, 1900 hrs.
 28 We ☾ Last Quarter Moon, 0235 hrs.

September 2013

HIGHLIGHT: Moon&Venus close, pm, 8th
 03 Tu Zodiacal Lt. in E., am, next two weeks before twilight.
 05 Th ● **NEW MOON** 0436 hrs.
 12 Th ☽ First Quarter Moon 1008 hrs.
HAC Public S.P., P.O.; SS@1830hrs.
 19 Th ○ Full Moon (Harvest), 0413 hrs.
 22 Su Fall **Equinox**, 1344 h. (Aurora?)
 26 Th ☾ Last Quarter Moon, 2055 hrs.
 27 Fr **HAC Meeting**, Cochise College

October 2013

HIGHLIGHT: Jup. Dbl Shadow Transits (3) 17th, 18th, 26th; details online
 03 Th Zodiacal Lt. in E., am, next two wks.
Uranus at Opposition, 0700 hrs.
 04 Fr ● **NEW MOON** 1734 hrs.
HAC Member S.P.
 05 Sa **Kartchner Caverns State Park** S.P.
 10 Th **HAC Public S.P., P.O.; SS@1755hrs.**
 11 Fr ☽ First Quarter Moon 0402 hrs.
 12 Sa **Astronomy Day** (Autumn)
 18 Fr ○ Full Moon, 1638h.; Lunar eclipse @MR
 25 Fr **HAC Meeting**, Cochise College
 26 Sa ☾ Last Quarter Moon, 1640 hrs.

November 2013

HIGHLIGHT: Comet ISON (C/2012 S1) !!!! ??? 01
 Fr Venus G. Elong. E.(47°), 0100hrs., pm planet
 02 Sa **HAC Member S.P.**
 Jup., dbl. Shadow Tr., 0414hrs., I & Eu;
 03 Su ● **NEW MOON** 0550 hrs.
 05 Tu S. Taurid meteors Pk., 0400 hrs.; favorable;
 07 Th **HAC Public S.P., P.O.; SS@1727 hrs.**
 09 Sa ☽ First Quarter Moon 2257 hrs.
 17 Su ○ Full Moon, 0816 hrs.; Merc. am planet 22
 Fr **HAC Meeting**, Cochise College
 25 Mo ☾ Last Quarter Moon, 1228 hrs.
 28 Th **Comet ISON, Perihelion** @ 1600hrs.
 30 Sa **HAC Member S.P. (for December)**

December 2013

HIGHLIGHT: Comet ISON ??? !!!!
 02 Mo ● **NEW MOON** 1722 hrs.
 06 Fr Venus @ greatest illumination, mag. -4.9, 26% illuminated, size 41" 09
 Mo ☽ First Quarter Moon 1008 hrs. 12
 Th **HAC Public S.P., P.O.; SS@1714h.** 13
 Fr Geminid Meteors Pk. 2300h., fair? 14
 Sa **HAC Meeting/XMAS Party** 17
 Tu ○ Full Moon, 0413h. (smallest 2013)
 21 Sa Winter **Solstice**, 1011 hrs.
 22 Su Ursid Meteors Pk., 0700 hrs.
 25 We ☾ Last Quarter Moon, 0648 hrs.
 26 Th **C/ISON: closest to Earth**, 0300h.

*Times/Dates = ARIZONA Mountain Standard Time (NO DST; UT-7hrs); **updates/ details**, see: www.hacastronomy.com or <http://skycalendar.blackskies.org>;
Abbr: Tr=Transit; Pk=Peak; Merc=Mercury; E=East W=West; S=South; N=North; J, Jup.=Jupiter; V=Venus; v. = very; °=arc seconds; SS=SunSet; S.P.=Star Party;
 h., hrs.=hours (24 hour time system); MP=Minor Planet; MS=Moon Set; MR=Moon Rise; wks=weeks; Lt=Light; pm=evening; @=at; Pub.=Public; NEA= Near Earth Asteroid; am=morning; mag.=magnitude; **meteor dates reflect predicted Peak Morning, but Moon may still be present; P.O.=Patterson Observatory; ; I=Io; Eu=Europa; G=Ganymede; C=Callisto; UT=Universal Time; **bold text**=possibly a promising worthy event, activity or object; G_Elong=Greatest Elongation; dbl= double; AU=Astronomical Unit; °= degrees; **compiler: Doug Snyder** (C/2002 E2, MP15512); V1.1.2013