Nightfall

Monthly publication of the Huachuca Astronomy Club

JUNE 2014

President's Notes

I had a chance to wax astronomic the other night while waiting for the new Camelopardalid meteor shower to peak, or arrive at all. Defocusing your eyes opens your mind to the peripheral issues.

We have one full hot, dry, clear sky month to view before the monsoons arrive. Make the most of it. Plan your observing, hunt down objects you do not usually look at (remember Vesta and Ceres are [visually] closing in on each other). Make mental or written notes on what would make your observing more pleasant and rewarding. I do not mean expensive things to buy necessarily; it may be as simple as a different observing chair or a pair of deep red glasses to keep your night vision when you need to go inside the house. Off and on over the years, I have used an eye patch at the scope to block out extraneous light and increase perceived contrast. Finally, think about adjusting and collimating your scope. Also, consider creating a regimen that allows you more time spent at the eyepiece or imager. Choose books to read and astronomy projects to work on during the rainy season while waiting for clearings. Catch up on all that image and data processing that has stacked up over the season. Update your software and defrag your hard drives. Reassess your new year's resolutions. Lastly, get into cross-training. I do not mean exercising on a treadmill (well, maybe that too). I mean critter watching. Bird watching is a fun venture on its own, but it is also wonderful training for your eyes. When looking through our scope's eyepiece we are usually making determinations based on shades of gray. That task is simple, but birding opens our eyes to contrasts and colors, far more subtle and complex than were are used to in our nighttime viewing. These daytime exercises of ours will pay off big at the eyepiece after the monsoons pass.

For amateurs, astronomy tends to be a private obsession for the most part. However, as club members we have decided to take part in some collective endeavors. The meeting and outreach events most notably, but I would also like you to share your experiences and techniques by other means. You can do it at the equipment nights, at the general meetings, or write it as an article for the newsletter.

Our club also has various points of presence online. A Facebook page and a Yahoo Group (the HAC list), both of which I believe are underutilized. The Yahoo group is our club's group, a home base, a nurturing place. So ask questions of the group. No questions are dumb, and critiques are to improve understanding and enjoyment of the hobby, not jump down your throat. We have a lot of talent and many different perspectives in the club, asking questions get everyone to shake off the cobwebs and bring conversations we have been having internally in our brains for years out in the public realm. Questions get everyone to think and that is a good thing. We can view anew the old concepts that we take for granted.

The club's sites are also good places to go for help, be it technical, theoretical, or for construction. These are also the prefect places to express and discuss creative ideas, from do-it-yourself projects to club campaigns. Just remember comet ISON let us down but the team never did. As a club, we are up for new projects to focus our strengths and learn from our weaknesses.

New Member Corner

We welcome Sean Ludden of Hereford who joined at the May member's star party. Welcome to the club Sean, we're glad you joined!

Last Call for the Mirror Lab Tour

We need to finalize the number of HAC members who would like to attend the tour of the Mirror Lab at the University of Arizona in Tucson. Right now, we have about a dozen people signed up. The limit is 20 so if you want to see a unique site (even if you've seen it before!) please let Wayne Johnson know at the HAC General Meeting on Friday, June 13th. The tour date is the following day, **Saturday, June 14th.** The Mirror Lab is a little hidden; it is located at the base of the UofA football stadium on Campbell Ave between 6th St. and Speedway. Please arrive a little before **11:30am**.

Cochise County Planning Commission Meeting (by Bob Gent)

The Cochise County Planning Commission will meet in Bisbee at 4 pm on Wednesday, June 11. I have not seen the agenda yet, but revisions to the lighting and sign codes will be discussed before the commission. There will be a call to the public, so it would be helpful if you could attend and make a statement about the importance of our light pollution code and preserving our night skies. Many of us complain about the growth of light pollution. This is your chance to be heard by the commissioners, and it is very important to have a good number of people attend. When I receive the agenda, I will share will everyone. This is not a problem that will disappear by itself; we must remain vigilant and always be ready to speak before commissions and the board. Even better, volunteer to serve on commissions when vacancies arise.

Classes in the Patterson Observatory by Ted Forte

The University South Foundation executive board would like to find ways to use the Patterson Observatory to generate funds. They have asked me for my input on the prospect of conducting short astronomy classes (4 to 6 weeks long) in the observatory. Students would pay a fee and the instructor could be paid.

What I have put forward so far is this. I think an informal "for fun" course (or lecture series) would have the most success: no grades, no tests, no homework, and, for the most part, no math. There would be a short (30-40 minute) lecture followed by some telescope time. It could be designed as a "course" with four to six classes in a logical progression that covers basic astronomy. Alternatively, it could be a series of lectures say one every month or so. In that scenario, each lecture would be a standalone subject and attendees would register and pay a fee for just the ones they want to attend.

While the foundation has offered to pay an instructor, I think if I am doing any of this I would donate my time. After all, the idea is to raise money for the foundation. At this point, I don't know if the board's idea is to have a more formal course, maybe even with some accreditation from U of A South, in which case I assume the instructor would need some credentials and we would actually hire someone. It is likely, though, that this would be as I described above – an informal adult-education style offering that many of us could do.

I have offered several ideas to the board for possible lecture subjects. However, I would like to hear yours. Since attendees will be charged a fee, I think you should consider this to be a Foundation rather than a club endeavor. I know a lot of you, believe as I do that HAC events should be free to the public. Therefore, I'll be coordinating this for the Foundation and not for the club. I'm looking for ideas, suggestions, thoughts, and potential volunteers to participate. Please contact me if you are interested .

The Patterson Observatory is an important part of our outreach repertoire. Helping it to be of value to the foundation is in the best interest of the club. While the good will provided by making the observatory available is recognized by the foundation, we have to remember that they are not in the business of running an observatory. Their purpose is to support the students, faculty and staff of the university through privately raised funds. For the most part the observatory represents an expense rather than a source of funding. Anything we can do as a club to change or modify that situation will help to ensure the future of the observatory.

Moreover, just as a plug – the observatory classroom is available to rent. If, in your life outside of astronomy, you ever have need of a space to hold a conference or class, or even a party, you can rent the room – the usual fee is $100 a day I believe. You would just contact Rose at 458-8278 x 2129 or by email: sueskind@email.arizona.edu. The foundation office is open 9-12 Monday through Thursday.

Astronomy Day Solar Features Art Hanging Project Complete

By Nancy Hannaford

Based on a quilt project found on the Dark Skies Bright Kids Website [1], and with the idea that students remember material better when they write (or draw) it by hand [2], we threw together a little activity for visitors at our annual Astronomy Day outreach at the Sierra Vista Public Library. Interested visitors were supplied pen and an observation sheet (Figure 1)[3] to record solar features (not to scale) that they observed while viewing through the various Hα and white-light filters. The adventurous then transferred their observations to an 8"x8" fabric square (with a glued-on quarter-circle representing Sol), using color permanent markers. Participants took the observation sheets home (to adorn refrigerators), but we kept the fabric squares (all 25 of'm) and constructed this wall hanging (Figure 2) (using puff-paint for the lettering, and [alas, sacrificing my ISON t-shirt] a fabric logo for embellishment).

Our young participants in this little experiment were enthusiastic observers. It was a pleasure to see the children spend more time at the eyepieces, carefully recording their observations on the sheet. I saw them engage, asking questions of our club members. I also saw club members animatedly describe specific features, and then the observers carefully translate those to paper. Participants transferred observations (in an artistic [not to scale] manner) to one of the fabric squares. The participants appeared to enjoy transferring their work, especially when told that we might be able to display their work in a public place (perhaps our public library)!

Did the kids retain more information? Don't know. But everyone (including parents) seemed to enjoy the activity.

Is it worthy of repeating at future outreach events (such as elementary school STEM days)? Perhaps. If not a wall hanging, I do think that the participants benefited from the observation sheet activity!

I welcome other hands-on ancillary activities, ideas, and assistance that we might use to supplement our public outreach events. Perhaps we can compile our own binder of activities to try.

Notes:
1. University of Virginia Department of Astronomy, Dark Skies – Bright Kids, "'Stuff in the Universe' Quilt," (January 5, 2011), http://www.astro.virginia.edu/dsbk/files/LessonPlants_quilt_v1.pdf.
2. Pam Mueller and Daniel Oppenheimer, "The Pen is Mightier than the Keyboard," *Psychological Science* 25, no. 6: 1159-1168 [as cited in *Science News,* May 31, 2014: 14].
3. The sheet includes a space for the observer's name and age; local time; and observation notes.
The instructions at the bottom reads:
Draw what you observe through the two types of telescope filters (***white light*** and ***hydrogen-alpha*** (red)).
Transfer your data to the permanent observation log (for display in our quilt project).
Keep this page for your personal astronomy observer's logbook.

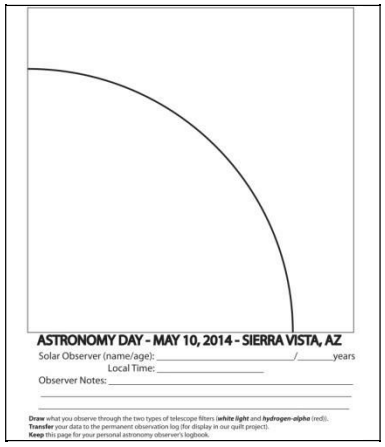

Figure 1. Solar Observation Sheet [3]

Figure 2. "Our Sun" – Astronomy Day Wall Hanging

Space Place in a Snap!

NASA's Space Place is pleased to announce a new way to learn about science—Space Place in a Snap! These brief, narrated stories are engaging and entertaining, and they come with a downloadable poster, too. Check it out: http://spaceplace.nasa.gov/solar-system-formation.

Quick and fun movies that answer big science questions!

The Hottest Planet in the Solar System

By Dr. Ethan Siegel

When you think about the four rocky planets in our Solar System—Mercury, Venus, Earth and Mars—you probably think about them in that exact order: sorted by their distance from the Sun. It wouldn't surprise you all that much to learn that the surface of Mercury reaches daytime temperatures of up to 800 °F (430 °C), while the surface of Mars never gets hotter than 70 °F (20 °C) during summer at the equator. On both of these worlds, however, temperatures plummet rapidly during the night; Mercury reaches lows of -280 °F (-173 °C) while Mars, despite having a day comparable to Earth's in length, will have a summer's night at the equator freeze to temperatures of -100 °F (-73 °C).

Those temperature extremes from day-to-night don't happen so severely here on Earth, thanks to our atmosphere that's some 140 times thicker than that of Mars. Our average surface temperature is 57 °F (14 °C), and day-to-night temperature swings are only tens of degrees. But if our world were completely airless, like Mercury, we'd have day-to-night temperature swings that were *hundreds* of degrees. Additionally, our average surface temperature would be significantly colder, at around 0 °F (-18 °C), as our atmosphere functions like a blanket: trapping a portion of the heat radiated by our planet and making the entire atmosphere more uniform in temperature.

But it's the *second* planet from the Sun -- Venus -- that puts the rest of the rocky planets' atmospheres to shame. With an atmosphere **93 times as thick as Earth's**, made up almost entirely of carbon dioxide, Venus is the ultimate planetary greenhouse, letting sunlight in but hanging onto that heat with incredible effectiveness. Despite being nearly twice as far away from the Sun as Mercury, and hence only receiving 29% the sunlight-per-unit-area, the surface of Venus is a toasty 864 °F (462 °C), with *no difference* between day-and-night temperatures! Even though Venus takes hundreds of Earth days to rotate, its winds circumnavigate the entire planet every four days (with speeds of 220 mph / 360 kph), making day-and-night temperature differences irrelevant.

Catch the hottest planet in our Solar System all spring-and-summer long in the pre-dawn skies, as it waxes towards its full phase, moving away from the Earth and towards the opposite side of the Sun, which it will finally slip behind in November. A little atmospheric greenhouse effect seems to be exactly what we need here on Earth, but as much as Venus? No thanks!

Check out these "10 Need-to-Know Things About Venus":
http://solarsystem.nasa.gov/planets/profile.cfm?Object=Venus.

Kids can learn more about the crazy weather on Venus and other places in the Solar System at NASA's Space Place: http://spaceplace.nasa.gov/planet-weather.

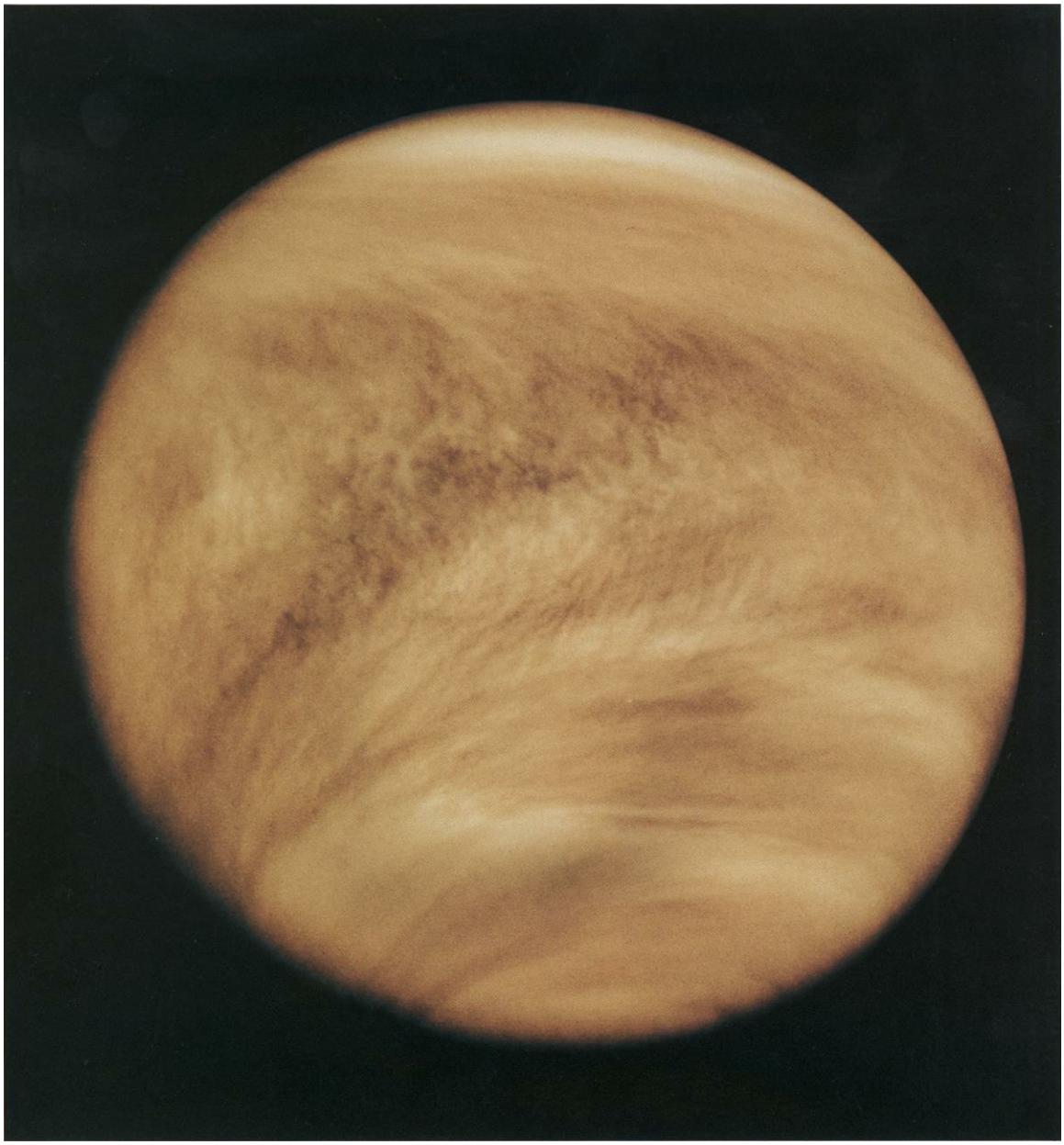

Image credit: NASA's Pioneer Venus Orbiter image of Venus's upper-atmosphere clouds as seen in the ultraviolet, 1979.

Photos taken by Club Members

Nancy Viewing Nova Glyph at Chaco Canyon
By David Roemer

Nova Glyph at Chaco Canyon
By David Roemer

Supernova in M106
By Rick Burke

2014 Spring Observations

By Cindy Lund

My observations lists for 2012 and 2013 were both several pages long, so I decided to split my 2014 observations up by season. My spring observations list includes all the observations I made at star parties in March, April, and May.

I went to five star parties this spring: one at Kartchner, two at Patterson, and two at Gary Grue's Blue Marvel Observatory. I observed Mars, Jupiter and its moons, and Comet PANSTARRS. I saw the star Arcturus, Planetary Nebulae NGC 2438 and NGC 3242 (Ghost of Jupiter), Supernova Remnant M1 (Crab Nebula). I observed the Open Cluster M46, and the Globular Cluster MGC 5139, Omega Centauri. In addition, I observed eight galaxies: M104 (Sombrero Galaxy) M51 (Whirlpool Galaxy) and its companion NGC 5195, M64 (Black Eye Galaxy) M86, NGC 4565 (Bernice's Hair Clip), NGC 4435 and NGC 4438 (The Eyes).

While I have observed most of these objects many times before, some were new to me. I had never observed M86, NGC 4435 or NGC 4438 before. I had seen Arcturus in the sky many times, but never through a telescope. I also saw the Crab Nebula through a telescope for the first time. Before, I had only seen it projected on a screen.

I found that each observation was a worthwhile experience.

March 22, 2014 at Kartchner Caverns		
M1 Crab Nebula	Supernova Remnant	Gray-White Nebulosity. Shaped like a potato with irregular (lumpy) edges. Tilted down and to the left
M104 Sombrero Galaxy	Spiral Galaxy	Small, with a small core. Looked like a sunrise
M46	Open Cluster	No notable core, all stars similar in brightness
NGC 2438	Planetary Nebula	Small ring. Could see through nebula to see the stars in cluster M46
????	Open Cluster	No notable core, some stars brighter than others. (Two levels of star brightness) Some stars made a "9" shape in the center of the field.
Jupiter	Planet, Gas Giant	Observed in the evening. Two horizontal stripes, one above the equator, one below.
3 Galilean Moons	moons of Jupiter	One moon very close to Jupiter (on Jupiter's left). Two other moons to the right.

April 26, 2014 at Blue Marvel Observatory		
Arcturus	Star (Orange Giant)	Bright Orange. Fuzzy because of atmosphere and clouds
M51 Whirlpool Galaxy	Spiral Galaxy	Saw two spiral arms. One started below the core and spiraled to the left side. The other started above the core and ended at the right side.
NGC 5195 (Companion of M51)	Dwarf Galaxy	Core similar in brightness to core of M51.
M104 Sombrero Galaxy	Spiral Galaxy	Bright core. Nebulosity around and above core, in the shape of a half-ellipse. Dark dust lane under core. Dimmer nebulosity under dust lane, to complete the ellipse.

M64 Black Eye Galaxy	Spiral Galaxy	Noted a "C" of darkness around the core. Not right by the core, but close. The dark "C" and core were surrounded by an ellipse of Nebulosity.
M86	Elliptical Galaxy	Saw in lower left corner of the field. Bright core with a lens shape of nebulosity around it.
NGC 4435 and NGC 4438 The Eyes	Lenticular Galaxies	Saw in upper right of the field with M86 in lower left. Eyes were two dots in a horizontal line. Saw very faint nebulosity around The Eyes.
Mars	Planet (inner)	Saw through very turbulent atmosphere. Varying shapes of reddish brown. Top polar cap hard to make out, but visible
Jupiter	Planet, Gas Giant	Two thin horizontal stripes, one above the equator, one below.
4 Galilean Moons	moons of Jupiter	Two on Jupiter's left, close to Jupiter. Two on Jupiter's right, farther from Jupiter.

May 1, 2014 at Patterson Observatory		
M51 Whirlpool Galaxy	Spiral Galaxy	Core of M51 and companion visible, one above the other. Faint nebulosity around lower core. Spiral arms not visible.
NGC 5195 (Companion of M51)	Dwarf Galaxy	Core appeared similar in brightness to core of M51
Mars	Planet (inner)	Red, with large bluish patches near the bottom and smaller bluish patches going up toward the top. The bluish patches formed a backwards L. White polar caps visible, upper one bigger than lower.
C/2011 L4 (PANSTARRS)	Comet	Faint fuzzy. Oval with a hint of a tail

May 31, 2015 at Blue Marvel Observatory		
NGC 5139 Omega Centauri	Globular Cluster	Bright, lots of stars. Very dense, filled the telescope's field. Cluster appears to be half core by diameter. Core looked like a dense spider web or a huge snowball. Outer part much less dense,
M104 Sombrero Galaxy	Spiral Galaxy	Bright dot core at center, Nebulosity surrounding core in a very flat lens shape. Dark lane (line) below the nebulosity and core. More nebulosity below the dark lane, in smaller, fainter lens shape then above. All appeared at a 45 degree angle.
NGC 4565 Bernice's Hair Clip	Spiral Galaxy	Like M104, but bigger. Dark lane above core, with a bit of nebulosity above the dark line. Much more nebulosity below the core in a flat lens shape.
M51 Whirlpool Galaxy	Spiral Galaxy	Two bright arms, wrapping around the core, One arm leads to the companion galaxy
NGC 5195 (Companion of M51)	Dwarf Galaxy	Core fainter than that of M51, nebulosity around it. About one-quart the size of M51
NGC 3242 Ghost of Jupiter	Planetary Nebula	Light blue oval, (O shaped) with slightly irregular edges. Color faint, but noticeable.
Jupiter	Planet, Gas Giant	Yellow dish with two thin brown lines near the equator, one on either side. Looked for great red spot but did not see it.
4 Galilean Moons	moons of Jupiter	Two on left side, one very close to Jupiter and a bit reddish. To on Jupiter's right.

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2014–Astronomically Handy Sky Calendar from Doug Snyder & the H.A.C.–2014

ARIZONA Observers SKY EVENTS Calendar for 2014 –All Times listed are MOUNTAIN STANDARD

JANUARY 2014

HIGHLITES:

Quadrantid Meteors
Jupiter at Opposition

01 We ● **NEW MOON** 0414 hrs. (MST)
03 Fr **QUADRANTIDS** Meteor Shower very favorable; view after midnight; radiant near constellation Bootes; possible hourly rate of up to 120
04 Sa Earth at perihelion 0500hrs.; 0.983 A.U.
04 Sa **HAC** Member Star Party (S.P.)
05 Su JUPITER AT OPPOSITION 1400 hrs.; Mag. –2.7 distance=4.2 AU size=47″
07 Tu ☽ First Quarter Moon 2040 hrs.
09 Th **HAC** Public S.P.; P.O.;SS@ 1735 hrs.
10 Fr **HAC Meeting,** Cochise College 7pm
15 We ○ Full Moon 2153 hrs.; smallest of 2014
23 Th ☾ Last Quarter Moon 2220 hr
25 Sa Saturn 1.2° north of Moon, 0535 hrs.
30 Th ● **NEW MOON** 1439 hrs.; lunation 1127
31 Fr Mercury G_ Elong. East (18☒0300 h., view as 'evening' star in western sky 1/2 hour after sunset; mag. –0.7

Jupiter's Galilean Moons—January 2014
There are no double-transit events this month, but satellite Callisto has four encounters with its mother planet (local dates and times):
1/11:1944 hrs. Occultation Disappearance
1/12: 0044 hrs. Eclipse Reappearance
1/20: 0438 hrs. Transit Ingress
1/28: 1854 hrs. Eclipse Reappearance
Note:**HAC=H**uachuca **A**stronomy **C**lub

FEBRUARY 2014

HIGHLITES:

Venus at its brightest,
Callisto's Shadow on Jupiter

01 Sa **HAC** Member S.P.
06 Th ☽ First Quarter Moon 1221 hrs.
Double Shadow Transit, Jupiter; 0323 hrs. (Europa & Callisto); rare
HAC Public S.P.; P.O.;SS@ 1800 hrs.
07 Fr Alpha Centaurid Meteors, Pk. 2305 hrs. Radiant point in southern hemisphere
11 Tu Venus greatest magnitude: -4.6, 1600h.
14 Fr ○ Full Moon 1654 hrs.
HAC Meeting, Cochise College 7pm
15 Sa Venus at greatest illumination, mag.-4.9; morning 'star' in southeast sky
17 Mo Zodiacal Light in the west for next two weeks following evening twilight
19 We Spica (star) within 2.5° of Moon,0500 h.
22 Sa ☾ Last Quarter Moon 1016 hrs.
26 We Venus within 6° of Moon, 0500 hrs.

Long Period Variable Stars– Feb. 2014
Verify with www.aavso.org ;listed are stars brighter than mag. 8 at max.: period in days (d);date is predicted epoch max.

0228-13;U Cet;7.5>12.6;235d;Feb.10
1811+36;W Lyr;7.9>12.2;196d;Feb.17
1901+08;R Aql;6.1>11.5;267d; Feb.15
2044-05;T Aqr;7.7>13.1;202d; Feb. 04

MARCH 2014

HIGHLITES:

Kartchner Caverns S.P.(22)
Messier Marathon?(29)

01 Sa ● **NEW MOON** 0100 hrs.
01 Sa **HAC** Member S.P.
06 Th **HAC** Public S.P.; P.O.; SS@1823 hrs.
08 Sa ☽ First Quarter Moon 0628 hrs.
14 Fr Mercury G_Elong. W. (28°); morning 'star' in twilight to the east
14 Fr **HAC Meeting,** Cochise College 7pm
16 Su ○ Full Moon 1010 hrs.
18 Tu Zodiacal Light in the west for next two two weeks following evening twilight
20 Th **Vernal Equinox** 0957 hrs.
21 Fr Saturn close (north) to Moon
22 Sa **Kartchner Caverns S.P. ;**1830 hrs.
23 Su ☾ Last Quarter Moon 1847 hrs.
29 Sa **HAC Messier Marathon**-Proposed This date 110 objects should be visible
30 Su ● **NEW MOON** 1146 hrs.

Possible Favorable Periodic Comets—Reaching Perihelion March 2014
Obtain elements/ephemerides at www.minorplanetcenter.net; listed dates/times are in UT (to retain MPC accuracy)
P/2007 H3 (Garradd); Mar 01.23;1.8 AU
P/2008 A2 (LINEAR); Mar 03.40; 1.3 AU
52P (Harrington-Abell); Mar 07.54; 1.8 AU
290P/1998 U3(Jager); Mar 12.57; 2.15 AU
117P/Helin-Roman-Alu; Mar 27.16; 3.0 AU

APRIL 2014

HIGHLITE: ***Total Lunar Eclipse (1 of 2 in 2014)***

03 Th **HAC** Public S.P.; P.O.; SS@1841 hrs.
07 Mo ☽ First Quarter Moon 0132 hrs.
08 Tu MARS at opposition, 1400 hrs.
09 We Comet 124P (Mrkos) at perihelion 0738 hrs.; perihelion distance 1.6 AU
11 Fr **HAC Meeting,** Cochise College 7pm
12 Sa Asteroid 4 Vesta at opposition 2200hrs.
14 Mo Mars closest approach, 0600 hrs.; 0.62 AU from Earth, mag. –1.5; Size:15.2 arc-seconds
14>15 (Mo>Tu): **Total Lunar Eclipse** 2157 hrs. (14th) to 0337 h.(15th) Total from 0010h. to 0124h. (15th)
15 Tu ○ Full Moon 0043 hrs.
17 Th Saturn close (north) to Moon, 0000h.
22 Tu ☾ Last Quarter Moon 0053 hrs.
23 We **Lyrid Meteor Shower,** Pk. 1045 h.; some 46% moon; view on 23rd am
26 Sa **HAC** Member S.P.
28 Tu ● **NEW MOON** 2315 hrs.

MAY 2014

HIGHLITE: ***Astronomy Day & Saturn at opposition, May 10***

01 Th **HAC** Public S.P.; P.O.; SS@1900 hrs.
1 Th Mercury @ perihelion; evening star, mag. –1.6; view WNW at dusk
6 Tu **Eta Aquarid Meteor Shower**, Pk@ 0100 hrs.;40% Moon; rate 60+?
06 Tu ☽ First Quarter Moon 2016 hrs.
09 Fr **HAC Meeting,** Cochise College 7pm
10 Sa **NATIONAL ASTRONOMY DAY** (**HAC** event at Sierra Vista City Library)
10 Sa **Saturn** at opposition, 1100 hrs.; mag. +0.1, 8.9 AU from Earth, total size of 42.4″ (planet itself 18.7″)
14 We ○ Full Moon 1217 hrs.
21 We ☾ Last Quarter Moon 0600 hrs.
24 Sa **NEW** Meteor Shower? Predicted strong peak from Midnight to 0100 on am of 24th; radiant in Camelopardalis; from Comet 209P/LINEAR; best of 2014?
28 We ● **NEW MOON** 1141 hrs.
31 Sa **HAC** Member S.P.

JUNE 2014

HIGHLITE:

Venus/Moon Conjunction
(photo-op?)

05 Th **HAC** Public S.P.; P.O.;SS@1923 hrs.
☽ First Quarter Moon 1340 hrs.
12 Th ○ Full Moon 2112 hrs.
13 Fr **HAC Meeting,** Cochise College 7pm
19 Th ☾ Last Quarter Moon 1140 hrs.
21 Sa **Summer Solstice** 0351 hrs.
24 Tu Conjunction of crescent 7% Moon and Venus; 0518 to ENE
27 Fr June Bootids Meteor Shower; overhead to dawn on 27th; may show outburst
27 Fr ● **NEW MOON** 0109 hrs.
28 Sa **HAC** Member S.P.

Long Period Variable Stars–June 2014
Verify with www.aavso.org ;listed are stars brighter than mag. 8 at max.: period in days (d);date is predicted epoch max.

1946+32; x Cyg; 5.2>13.4; 407d; Jun 24
1432+27; R Boo; 7.2>12.3; 223d; Jun 21

*Times/Dates= ARIZONA Mountain STANDARD Time (MST; 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= **N**ear **E**arth **A**steroid; am=morning; mag.=magnitude; **meteor dates reflect predicted Peak Morning, but Moon may still be present; P.O.= Patterson Observatory; dbl= double; I=Io; Eu=Europa; G=Ganymede; C=Callisto; UT=Universal Time; **bold text=**possibly a promising/noteworthy event, activity or object; G_Elong=Greatest Elongation; AU=Astronomical Unit (93 million miles); °= degrees; *compiler*: **Doug Snyder**(C/2002 E2,MP15512, starhaven@me.com);V1.1.2014

2014—Astronomically Handy Sky Calendar from Doug Snyder & the H.A.C.—2014

ARIZONA Observers SKY EVENTS Calendar for 2014 —All Times shown are MOUNTAIN STANDARD TIME*

JULY 2014

HIGHLITE: Due to Monsoons, no scheduled observing events

03 Th Earth at aphelion,1700 hrs.; 1.016 AU
04 Fr Pluto at opposition, 0100 hrs.; mag. 14.1, distance 32.5 AU
05 Sa ☽ First Quarter Moon 0500 hrs.
07 Mo Saturn within 1.5° of 76% Moon; 2030 hrs.
11 Fr **HAC Meeting,** Cochise College, 7 pm
12 Sa ○ Full Moon 0426 hrs.
12 Sa Mercury G_Elong. W. (21°); morning 'star' in East, mag. +0.4; reaches mag. 0.0 on July 15
18 Fr ☾ Last Quarter Moon 1909 hrs.
26 Sa ● **NEW MOON** 1543 hrs.
29 Tu **Delta Aquarids** Meteor Shower Pk. at 0200 hrs.; rate may approach 20 per hour, some persistent trains.
30 We Alpha Capricornids Meteors– weak, slow moving, but yellowish fireballs can be photogenic; best rate of 5/hour?

July (first-half): C/2012 K1; evening hrs. in LEO; mag 7?

AUGUST 2014

HIGHLITE: Monsoon Season; Choose your own Highlite !

03 Su ☽ First Quarter Moon 1751 hrs.
08 Fr **HAC Meeting,** Cochise College, 7 pm
10 Su ○ Full Moon 1110 hrs; **largest** of 2014
12>13 Tu>We Perseid Meteor Shower Pk. at 1700 hrs. on the 12th; v. unfavorable due to strong moonlight; rates can be high as 90/hour under dark skies
17 Su **Conjunction:** Venus/Jupiter within 1.0° and close to Beehive cluster; 0500 hrs.; But very low in the ENE skies; closest planet-planet conjunction of 2014
17 Su ☾ Last Quarter Moon 0527 hrs.
24 Su Comet Siding Spring (C/2013 A1) at opposition, 1800 hrs.; may collide with MARS in mid-October !
25 Mo ● **NEW MOON** 0714 hrs.
29 Fr Neptune at opposition, 0800 hrs.; mag. +7.8; distance 29 AU; size 2.4"
31 Su Moon/Saturn/Mars within 5° circle; Moon will be at about 35%; 2000 hrs.

SEPTEMBER 2014

HIGHLITE: Comet Possibilities

01 Mo Aurigid Meteor Shower; peak after midnight of Aug. 31 and into morning of Sept.01; fast and many are bright ; low hourly rate (5) but may outburst
02 Tu ☽ First Quarter Moon 0412 hrs.
08 Mo ○ Full Moon 1839 hrs; Harvest Moon
12 Fr **HAC Meeting,** Cochise College, 7 pm
15 Mo ☾ Last Quarter Moon 1906 hrs.
20 Sa **Kartchner Caverns/HAC S.P.,** dusk
21 Su Zodiacal Light in east before morning twilight for next two weeks
22 Mo **Autumnal Equinox** 1929 hrs.
23 Tu ● **NEW MOON** 2315 hrs.
25 Th **HAC** Public S.P.; P.O.; SS@1813 hrs.
27 Sa **Saturn** within 2° of 14% Moon, low in the WSW, 2000 hrs.

Comet Possibilities for September 2014
C/2013 A1:v.low in S., early evening;9/17>9/30 (Siding Spring); encounter MARS on 10/19
C/2012 K1: low in E., early morning; 9/1>9/30
C/2013 V5: low in E., morning; 9/1>9/13

OCTOBER 2014

HIGHLITES: MARS & COMET; 1 LUNAR ECLIPSE & 1 SOLAR ECLIPSE IN SAME MONTH !

01 We ☽ First Quarter Moon 1233 hrs.
04 Sa **NATIONAL ASTRONOMY DAY** **HAC** opens Patterson Observatory for Public Exhibits and Viewing
07 Tu Uranus at opposition, 1400 hrs.
08 We ○ Full Moon 0351 hrs.
08 We **TOTAL LUNAR ECLIPSE** Start: 0117hrs., End: shortly after moonset at 0630 hrs.; Totality: 0328 h. to 0423 hrs.
09 Th Draconids Meteor Shower; unfavorable due to bright Moonlight
10 Fr S. Taurids Meteor Shower; Pk. 0500h.
10 Fr **HAC Meeting,** Cochise College, 7 pm
15 We ☾ Last Quarter Moon 1213 hrs.
19 Su **Comet Siding Spring** (C/2013 A1) **Close** Encounter/Graze with **MARS!**
20 Mo Zodiacal Light in East before morning twilight for next two weeks
21 Tu **Orionid Meteor Shower**; v. favorable; Swift, some bright, rate about 20+/hr.
23 Th ● **NEW MOON** 1457 hrs.
23 Th Partial **Solar ECLIPSE,** Start:1430 hrs. End: 1648 hrs.; max: 1543 hrs.(29.3%) **HAC** viewing at S.V. City Library, 1 pm
25 Sa **HAC** Member S.P.
30 Th **HAC** Public S.P.; P.O.; SS@1733
30 Th ☽ First Quarter Moon 1949 hrs.

NOVEMBER 2014

HIGHLITE: METEORS & FIREBALLS

01 Sa Mercury at G_Elong. W.(19°), 0600 hrs.; **best** morning apparition of 2014, east
06 Th C/2012 K1 (PanSTARRS) at (2nd) opposition, 2000 hrs., in Pictor; possibly will or will have brightened to mag. 6
06 Th ○ Full Moon 1523 hrs.
11 Tu North Taurids Meteor Shower; rate of about 5/hr; waning 77% moon & bright
14 Fr **HAC Meeting,** Cochise College, 7 pm
14 Fr ☾ Last Quarter Moon 0816 hrs.
17>18 Mo>Tu **Leonid Meteor Shower** Peak at 1500 hrs on 17th; view pm hrs on 17th into am hours on 18th; about 20% moon; fast meteors & bright; a good number leave persistent 'trails' ; no 'storm' has been predicted, but do you remember 2001? Some of us do. WOW.
20 Th **HAC** Public S.P.; P.O.; SS@1720 hrs.
22 Sa ● **NEW MOON** 0532 hrs.
22 Sa **HAC** Member S.P.
29 Sa ☽ First Quarter Moon 0306 hrs.

Comet Of The Month—An Observing and Imaging Challenge for C/2012 K1 (PanSTARRS)
Throughout November, this comet will remain VERY low near our southern horizon and reside in these constellations: Pictor, Dorado, Phoenix, Reticulum, Horologium, and Eridanus, but may reach mag. 6 this month. Close encounter with Globular Cluster NGC1261 on 11/13; good luck!

DECEMBER 2014

HIGHLITE: GEMINID METEOR SHOWER

06 Sa ○ Full Moon 0527 hrs.
12 Fr **HAC Meeting,** Cochise College, 7 pm
13 Sa **Geminid** Meteor Shower Pk. Favorable Year, but with 50% moon; Pk. 0500 hrs. Saturday am; hourly rate can be as high as 120/hr.; mostly bright, few leaving 'trains';12/14 (Sunday) morning activity is possible also; Parent body is asteroid 3200 Phaethon (1.5 year orbit); radiant is near Castor
14 Su ☾ Last Quarter Moon 0551 hrs.
15 Mo **Dbl. Shadow Transit**, J. ; 2312 hrs. (Europa & Io); Note: At 0025 hrs. on 12/16, **both** Europa & Io will be in the process of transiting Jupiter! See 'em?
18 Th **HAC** Public S.P.; P.O.; SS@1721 hrs.
20 Sa **HAC** Member S.P.
21 Su Winter Solstice, 1603 hrs.
21 Su ● **NEW MOON** 1836 hrs..
22 Mo Ursids Meteor Shower Pk. 1300 hrs.; good date, but poor peak timing; (favors northern Asia); radiant is near β Ursa Minor (Kokab); rate is about 10/hour; faint, with a few fireballs. Parent comet is 8P Tuttle
25 Th *MERRY CHRISTMAS TO ALL !*
28 Su ☽ First Quarter Moon 1132 hrs.
28 Su Conjunction of Moon and Uranus; 2245 hrs.; less than 1.0° apart; first quarter Moon and mag. 5.8 Uranus

HAPPY NEW YEAR !

*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= **N**ear **E**arth **A**steroid; am=morning; mag.=magnitude; **meteor dates reflect predicted Peak Morning, but Moon may still be present; P.O.=Patterson Observatory; ; dbl=double; 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; AU=Astronomical Unit(93 million miles); °= degrees; *compiler*: **Doug Snyder**(C/2002 E2, MP15512,starhaven@me.com); V1.1.2014