NIGHTFALL

A PUBLICATION OF THE HUACHUCA ASTRONOMY CLUB

MAY 2024

KARTCHNER CAVERNS 50TH ANNIVERSARY

It will be 50 years this November since the caverns were discovered by Gary Tenen and Randy Tufts. (read the history here: https://azstateparks.com/kartchner/explore/park-history).

As part of their celebration (and to highlight astronomy at the park) we will be holding several extra star parties this year. We are scheduling star parties for May 4, June 1, September 7, October 5 and a date in November to be announced.

Astronomy programs at Kartchner began in early 2010, when an astronomer at the Johnson Space Center in Houston, Texas asked to video-record an asteroid occultation from Kartchner Caverns. With help from park management and Ranger Ginger Nolan, a few astronomers set up telescopes at Kartchner along the SW side of the main parking area on Feb 5, 2010. This began a discussion about possible future astronomy programs at Kartchner.

The first public astronomy program at Kartchner was held on September 11, 2010. JD Maddy and Bob Gent gave talks on the night sky, and there were about a dozen telescopes set up. HAC, along with JD and Karen Maddy (then representing the Astronomers of Verde Valley) have supported star parties at the park ever since. We typically do two all day star parties each year and support other events like Cave Fest, Guano Happens and things like eclipse watches, Earth Days and Astronomy Days. Kartchner Caverns State Park became an IDA Dark Sky Park in 2017.

While there are significant bureaucratic obstacles to overcome, some within the park management are committed to establishing a public observatory at the park that would be supported by the volunteer efforts of HAC members. It's hoped that increasing the tempo of astronomy events at Kartchner will help keep this effort alive. HAC members are encouraged to attend these star parties to show our support for astronomy at the park.

HAC DUES

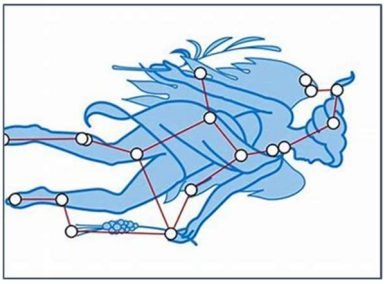
Members in arrears on dues are maintained on the roster until the club's Astronomical League dues are paid. We pay the dues in May, so if your HAC dues are not up to date, you will be dropped from the roster this month. Your name will be removed from the mailing list for the Nightfall monthly newsletter and the Reflector quarterly publication.

If you are unsure of your dues status, please contact the treasurer, Ted Forte at tedforte511@gmail.com to check your membership status and expiration date. You can call Ted on his cell at 757-472-4344. Snail Mail: 1460 N. Clanton Avenue, Sierra Vista 85635-9000.

PATTERSON OBSERVATORY 20TH ANNIVERSARY

The Patterson Observatory officially opened on September 11, 2004. The observatory is owned by the University South Foundation and operated by HAC volunteers. The foundation is planning an anniversary celebration to be held on the evening of September 5, before the regular September Public Night observing session. If you have any ideas for the celebration or wish to be involved in the planning of this event, please contact Ted Forte (see contact info above).

PRESIDENT'S CONSTELLATION EXPLORATION MAY 2024



Virgo, is Latin for maiden and the only female figure in the zodiac, and is one of the oldest constellations and has assumed the identity of numerous important female figures.

The Greek astronomer Ptolemy was the first to catalog the Virgo constellation. In the Babylonian MUL.APIN (c. 10th century BC), part of this constellation was known as "The Furrow", representing the

goddess Shala and her ear of grain. Spica, the brightest star retains this tradition as it is Latin for "ear of grain", one of the major products of the Mesopotamian furrow. For this reason, the constellation became associated with fertility. The constellation of Virgo in Hipparchus corresponds to two Babylonian constellations: the "Furrow" in the eastern sector of Virgo and the "Frond of Erua" in the western sector. The Frond of Erua was depicted as a goddess holding a palm-frond – a motif that still occasionally appears in much later depictions of Virgo.

Early Greek astronomy associated the Babylonian constellation with their goddess of wheat and agriculture, Demeter. The Romans associated it with their goddess Ceres. Alternatively, the constellation was sometimes identified as the virgin goddess *Iustitia* or Astraea, holding the scales of justice in her hand (that now are separated as the constellation Libra). Another figure who is associated with the constellation Virgo was the spring goddess Persephone, the daughter of Zeus and Demeter who had married Hades and resided in the Underworld during summer. In Greek mythology, the constellation is also associated with the daughter of Zeus, Dike the goddess of justice, who is represented holding the scales of justice.

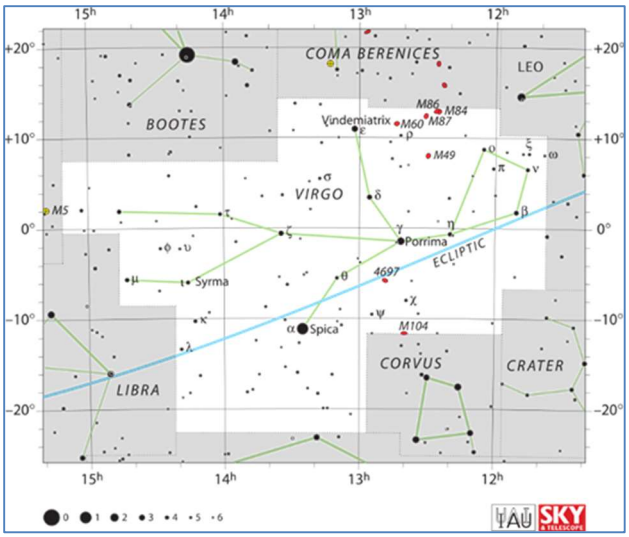
During the Middle Ages, Virgo sometimes was associated with the Blessed Virgin Mary.

Virgo is the largest constellation in the zodiac and the 2nd largest constellation with 9 or 15 main stars (depending on the source) but in total it contains over 1000 stars many to faint to see except in perfect conditions with a large telescope. The ecliptic intersects the celestial equator within this constellation (and Pisces on the other side of the sky). Virgo can be easily found through its brightest star, Spica.

Virgo is prominent in the spring sky in the Northern Hemisphere, visible all night in March and April. As the largest zodiac constellation, the Sun takes 44 days to pass through it, longer than any other. From 1990 and until 2062, this will take place from September 16 to October 30. The bright star, Spica, makes it easy to locate Virgo, as it can be found by following the curve of the Big Dipper/Plough to Arcturus in Boötes and continuing from there in the same curve ("follow the arc to Arcturus and speed on to Spica").

Due to the effects of precession, the first point of Libra, (also known as *the autumn equinox point*) lies within the boundaries of Virgo very close to β Virginis. This is one of the two points in the sky where the celestial equator crosses the ecliptic (the other being the first point of Aries, now in the constellation of Pisces). From the 18th century to the 4th century BC, the Sun was in Libra on the autumnal equinox, shifting into Virgo thereafter. This point will pass into the neighboring constellation of Leo around the year 2440.

The star 70 Virginis has one of the first known extrasolar planetary systems with one confirmed planet 7.5 times the mass of Jupiter. There are 35 verified exoplanets orbiting 29 stars in Virgo.



Virgo contains many excellent sights, including 11 Messier objects — the most of any constellation except Sagittarius. This is because the constellation hosts the Virgo cluster, a large amalgamation of over 1,300 galaxies next to the Local Group, which our Milky Way belongs to. Some of these targets are visible with the naked eye, but for others, you need binoculars or telescopes.

Virgo possesses several galaxy clusters, one of which is HCG 62. A Hickson Compact Group, HCG 62 is at a distance of 200 Mly from Earth and possesses a large central elliptical galaxy. It has a heterogeneous halo of extremely hot gas, posited to be due to the active galactic nucleus at the core of the central elliptical galaxy

M87 is the largest galaxy in the Virgo cluster, and is at a distance of 60 Mly from Earth (redshift 0.0035). It is a major radio source, partially due to its jet of electrons being flung out of the galaxy by its central supermassive black hole. Because this jet is visible in several different wavelengths, it is of interest to astronomers who wish to observe black holes in a unique galaxy.

M84 is another elliptical radio galaxy in the constellation of Virgo; it is at a distance of 60 Mly. Astronomers have surmised that the speed of the gas clouds orbiting the core (approximately 400 km/s) indicates the presence of an object with a mass 300 million times that of the sun, which is most likely a black hole.

The Sombrero Galaxy, M104, is an edge-on spiral galaxy located 28 million light-years from Earth. It has a bulge at its center made up of older stars that are larger than normal. It is surrounded by large, bright globular clusters and has a very prominent dust lane made up of polycyclic aromatic hydrocarbons.

Virgo, with its size, location and cluster of interesting objects, can provide many hours of viewing pleasure. Remember from the big Dipper to “arc” to Arcturus then “speed” on to Spica and begin exploring.

NASA Night Sky Notes May 2024

This article is distributed by NASA Night Sky Network

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.org to find local clubs, events, and more!

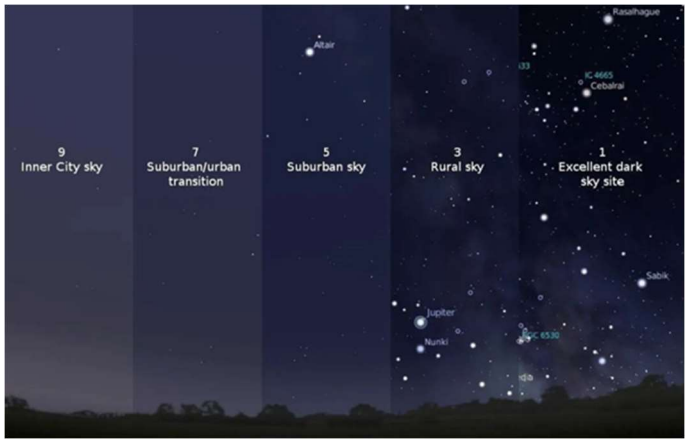
May's Night Sky Notes: Stargazing for Beginners

By Kat Troche

Millions were able to experience the solar eclipse on April 8, 2024, inspiring folks to become amateur astronomers – hooray! Now that you've been 'bitten by the bug', and you've decided to join your local astronomy club, here are some stargazing tips.

The Bortle Scale

Before you can stargaze, you'll want to find a site with dark skies. It's helpful learn what your Bortle scale is. But what is the Bortle scale? The Bortle scale is a numeric scale from 1-9, with 1 being darkest and 9 being extremely light polluted; that rates your night sky's darkness. For example, New York City would be a Bortle 9, whereas Cherry Springs State Park in Pennsylvania is a Bortle 2.

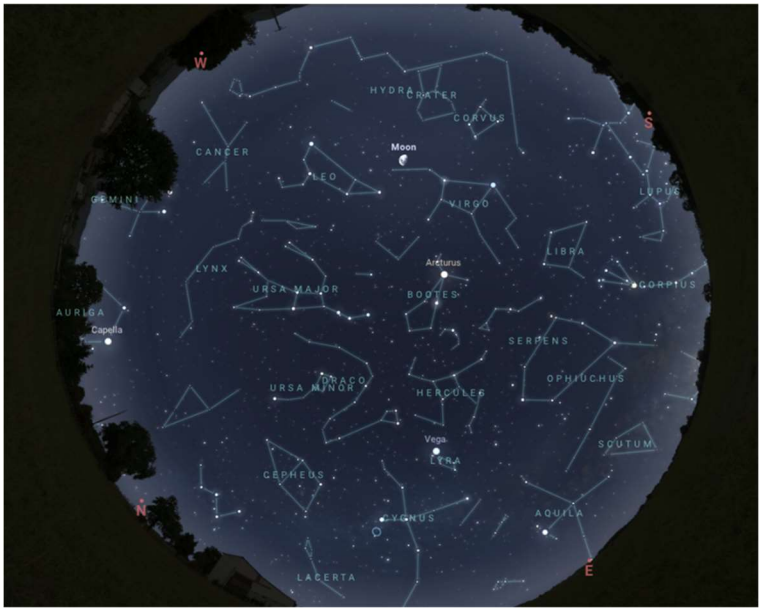


The Bortle scale helps amateur astronomers and stargazers to know how much light pollution is in the sky where they observe. Credit: International Dark Sky Association

Determining the Bortle scale of your night sky will help narrow down what you can expect to see after sunset. Of course, other factors such as weather (clouds namely) will impact seeing conditions, so plan ahead. Find Bortle ratings near you here: www.lightpollutionmap.info

No Equipment? No Problem!

There's plenty to see with your eyes alone. Get familiar with the night sky by studying star maps in books, or with a planisphere. These are great to begin identifying the overall shapes of constellations, and what is visible during various months.



A full view of the northern hemisphere night sky in mid-May. Credit: Stellarium Web.

Interactive sky maps, such as Stellarium Web, work well with mobile and desktop browsers, and are also great for learning the constellations in your hemisphere. There are also several astronomy apps on the market today that work with the GPS of your smartphone to give an accurate map of the night sky.

Keep track of Moon phases. Both the interactive sky maps and apps will also let you know when planets and our Moon are out! This is especially important because if you are trying to look for bright deep sky objects, like the Andromeda Galaxy or the Perseus Double Cluster, you want to avoid the Moon as much as possible. Moonlight in a dark sky area will be as bright as a streetlight, so plan accordingly! And if the Moon is out, check out this Skywatcher's Guide to the Moon: bit.ly/MoonHandout

Put On That Red Light

If you're looking at your phone, you won't be able to see as much. Our eyes take approximately 30 minutes to get dark sky adapted, and a bright light can ruin our night vision

temporarily. The easiest way to stay dark sky adapted is to avoid any bright lights from car headlights or your smartphone. To avoid this, simply use red lights, such as a red flashlight or headlamp. The reason: white light constricts the pupils of your eyes, making it hard to see in the dark, whereas red light allows your pupils to stay dilated for longer. Most smartphones come with adaptability shortcuts that allow you to make your screen red, but if you don't have that feature, use red cellophane on your screen and flashlight.

Up next: why binoculars can sometimes be the best starter telescope, with Night Sky Network's upcoming mid-month article through NASA's website!

The Bucket List May, 2024

by Vince Sempronio

This column highlights interesting non-seasonal nighttime, and sometimes daytime sky events that the reader may not be aware of and may wish to observe. We will also cover one-off events that are special, rare, or uncommon.

TERM OF THE MONTH

Earthshine – Simply stated, earthshine is sunlight reflected off the earth. We see this effect as partial illumination of the "dark side" of the moon. It is most easily seen 3-4 days on either side of a new moon. This reflected light on the moon is also referred to as the Moon's ashen glow. Amazing as it appears, this light represents only 0.01% of the direct sunlight hitting the moon. Leonardo da Vinci, in the 15th century believed the light was caused by reflections from the Earth's oceans. Today we know that the sun reflecting off clouds accounts for most of the light.

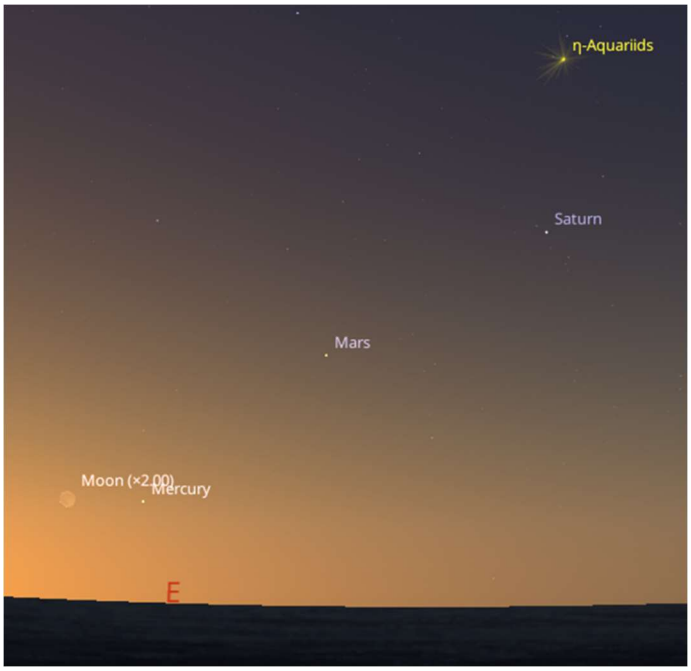
IN THE SKY

In the Evening Sky

We are about to lose Orion in the western evening sky. Look for this iconic constellation near the western horizon just after twilight. The loss of Orion in the west signals the arrival of the heart of our galaxy in the east. Scorpio and Sagittarius rise after sunset and are high enough by midnight to observe near the center of the Milky Way. On the 18th, Jupiter makes its transition from an evening object to a morning object. This occurs at solar conjunction when an outer planet is on the far side of the Sun from our perspective.

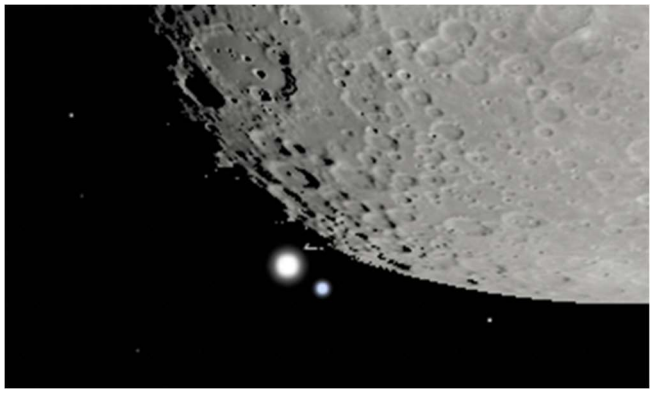
In the Morning Sky

On the morning of May 4th in the East, just before sunrise, the planets Mercury, Mars, and Saturn are joined by the thin waning crescent moon. Shown here is the alignment at 5am. A day later, on the 5th, the Moon appears between Mercury and Mars. The next morning (the 6th), the very thin crescent Moon and Mercury are at the same altitude. Optical help might be needed to see the Moon. The Eta-Aquariids meteor shower peaks on the 6th. It may produce up to 100 meteors per hour. The location of its radiant is shown on the chart.

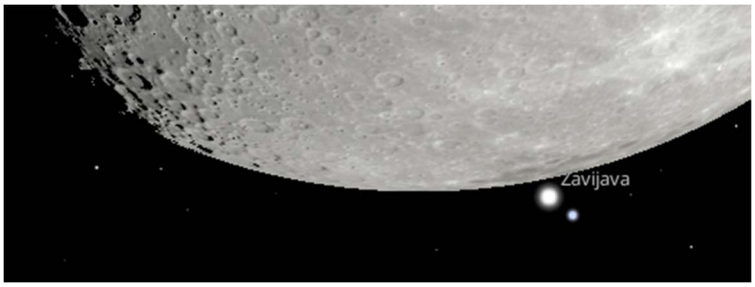


Moon Event Highlights

The New Moon is on the 7th, and on the 9th, the thin crescent makes its appearance low in the western sky after sunset. The next night, it is among the bright stars Betelgeuse, Procyon, Pollux, Castor, and Capella. On the evening of the 17th, around 10:50pm, the gibbous moon occults Zavijava (Beta Virginis). Thank you to Karen M. for pointing this event out. The star is magnitude 3.6 and is an easy target in a small telescope. The disappearance is close to the southern edge of the Moon, very close to the terminator and the sunlit features. The reappearance occurs on the fully illuminated bright limb around 11:08pm. Zavijava is an optical triple star and is 36 light years distant. At 2.9 billion years old, it is younger than our Sun, its spectral type is F9, making it slightly hotter than Sol. Its mass is 1.4x, its diameter is 3.3x, and is 3.6 times as luminous as the Sun. On the 23rd, The Full Moon rises in the southeast just after occulting the brightest star in Scorpio, Antares. Unfortunately for us, that event occurs below the horizon. On the morning of the 31st, around 2am, the 3rd quarter moon is near Saturn. This month's Full Moon is known as the Flower Moon as it is associated with the blooming of flowers in the Northern Hemisphere.



Pictures from HAC Astro

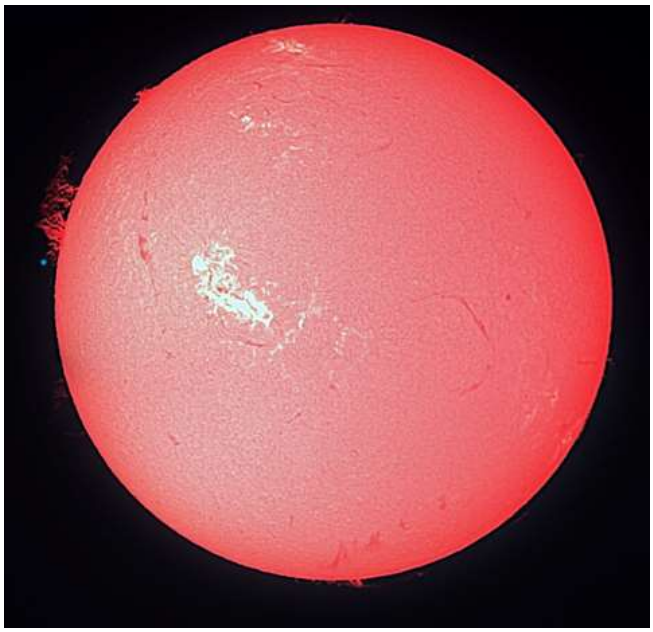


Pictures from HAC Astro

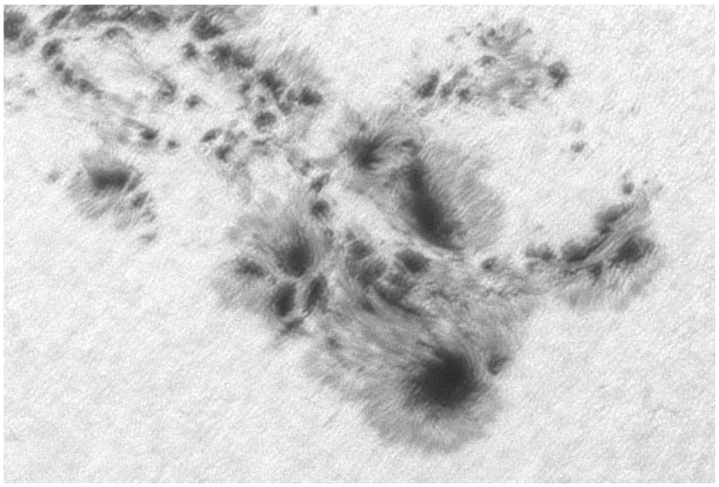
Total Solar Eclipse by Mark Orvek

Diamond Ring Effect Through Clouds by Mitch Cherbavaz

Sierra Vista Aurora by Richard Lighthill

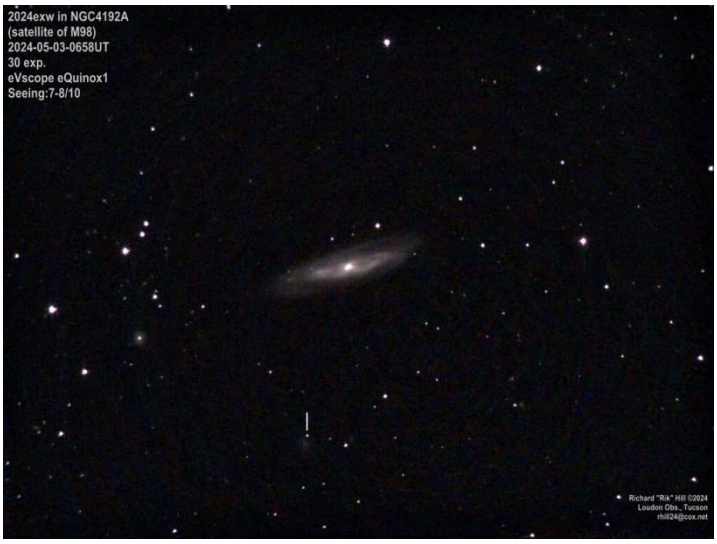


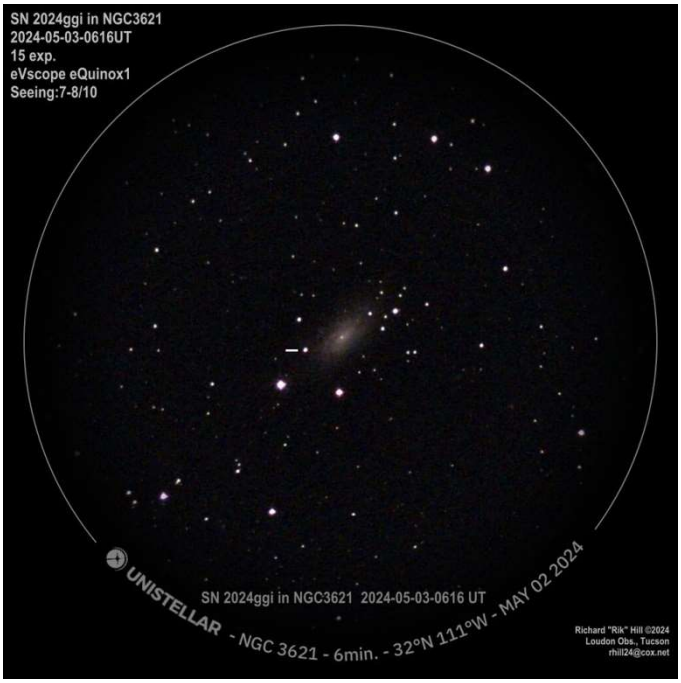
HA Sun with Superimposed Earth by Michael Morrison

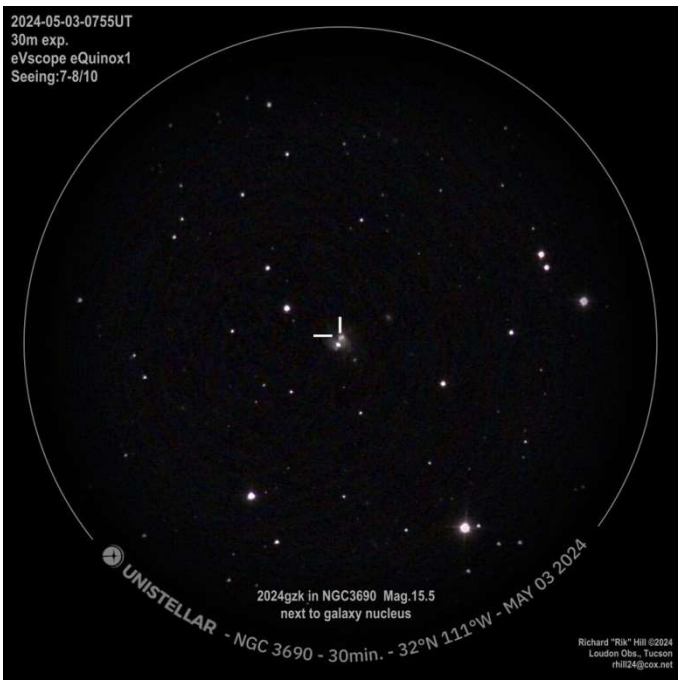


Sunspot Group 3668 & 3664 by Richard Lighthill/\

\/Sunspots in Solar Funnel Image by Karen Madtes

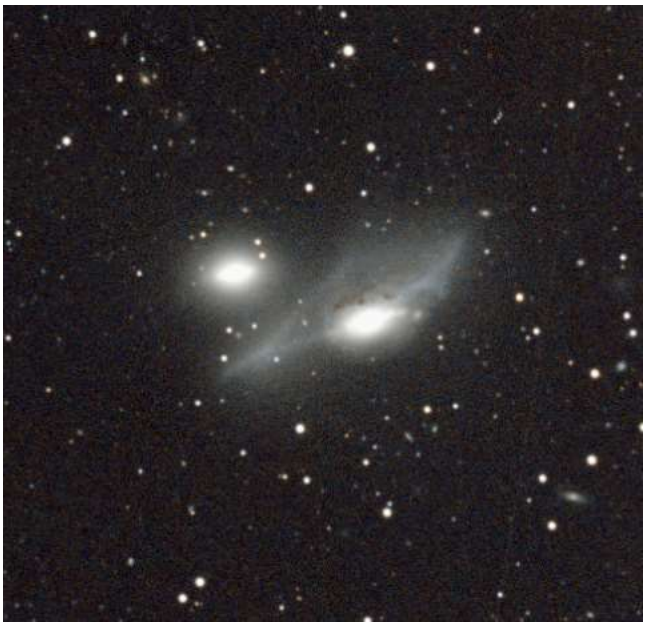






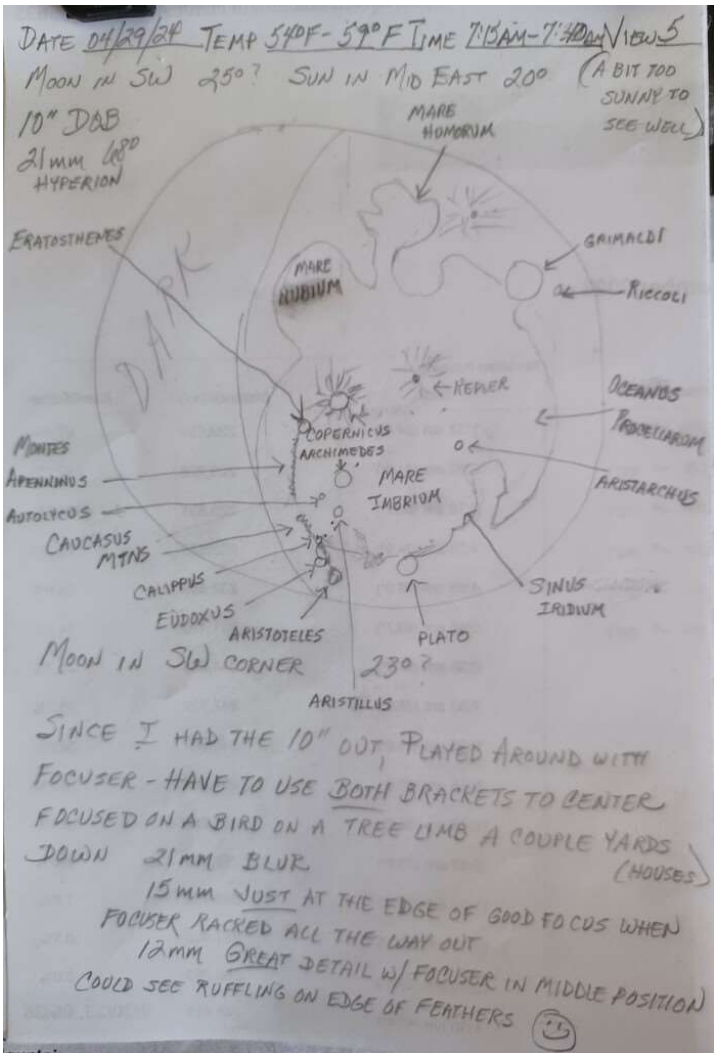
Various Supernovae by Rik Hill

Comet C/2023 A3 (Tsuchinshan-ATLAS) by Rik Hill



NGC 4435 and NGC 4438 by Michael Morrison

NGC 5139 - Omega Centauri by Michael Morrison



Moon Sketch and Notes by Karen Madtes

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HAC May-Jun Calendar of Events

SU	MO	TU	WE	TH	FR	SA
28	**29**	**30**	**May 1** **5:27 AM**	**2**	**3** Saturn/Moon 0.8 °	**4** Kartchner Star Party noon to 9 PM Eta Aquariid Meteors
5 Army students at Patterson 7:30 PM Eta Aquariid Meteors	**6** Mercury/moon 4° Eta Aquariid Meteors	**7** **9:22 PM**	**8**	**9** School Field Trip Pat Obs. 9 AM Italian Exchange Students Patterson 7 PM	**10**	**11** Solar SaturdayS.V. Library 10 AM
12 	**13**	**14**	**15** **5:48 AM**	**16** Public Night at Patterson 7:30 PM	**17**	**18** Astronomy Day at S.V. Library 10 AM to 4 PM
19 Pallas Opposition	**20**	**21**	**22**	**23** **7:53AM**	**24** HAC Meeting Room A102 Downtown 7PM	**25**
26	**27** 	**28**	**29**	**30** **11:13 AM**	**31** Saturn/Moon 0.4 °	**1 Jun**
2	**3**	**4**	**5**	**6** **6:38 AM**	**7**	**8** Solar SaturdayS.V. Library 10 AM
9	**10**	**11**	**12**	**13** **11:18 PM** Public Night at Patterson 8:00 PM	**14**	**15**
16	**17**	**18**	**29**	**20** Patterson Open House for Bus at Twilight 5-7 PM	**21** **7:08 PM** HAC Meeting Room A102 Downtown 7PM	**22**
23	**24**	**25**	**26**	**27**	**28** **3:53 PM**	

All times local MST
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Send an email to: HACAstro+subscribe@groups.io