nightwatch
Newsletter of the Pomona Valley Amateur Astronomers

Maybe that's what life is... a wink of the eye and winking stars.

Jack Kerouac

VIRTUAL CLUB EVENTS
SEE WEBSITE FOR DETAILS

Volume 42 Number 8 ***nightwatch*** **August 2022**

Please join PVAA on Zoom this Friday, August 12th at 7:30 PM to hear Dave Nakamoto speak to us about the missed opportunities before the discovery of Neptune. Hope you can join us.

Here's a link to an interesting article. It discusses the colorization protocols on Webb, shows one before and after pair, and has a nice photo of Stephan's Quintet in infrared.

https://gizmodo.com/webb-space-telescope-image-colorization-1849320633

Ludd Trozpek

Club Events Calendar

Aug 12 General Meeting – Dave Nakamoto
"Missed Opportunities Before the Discovery of Neptune"
7:30 PM
Aug 27 Star Party – Cow Canyon Saddle
Aug 31 Board Meeting 6:15 PM

Sep 3 Star Party in the Park – Cahuilla Park, Claremont
Sep 9 General Meeting – Ken Farley PhD Project Scientist for Mars 2020 Perseverance Rover Mission 7:30 PM
Sep 24 Star Party – TBD
Sept 28 Board Meeting 6:15 PM

Oct 7 General Meeting (presentation: TBD) 7:30 PM
Oct 22 Star Party – TBD
Oct 26 Board Meeting 6:15 PM

Nov 4 General Meeting (presentation: TBD) 7:30 PM
Nov 19 Star Party – TBD
Nov 26 Star Party in the Park – Cahuilla PArk

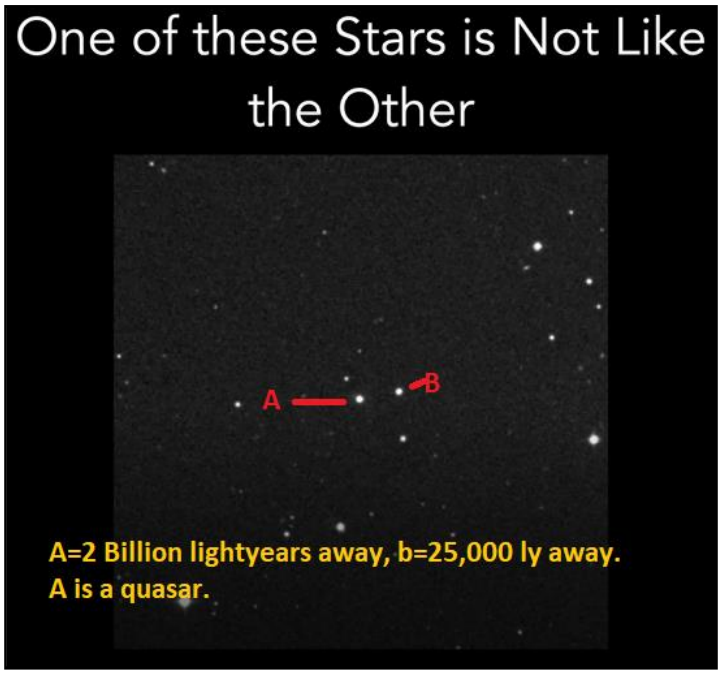
Nov 30 Board Meeting 6:15 PM

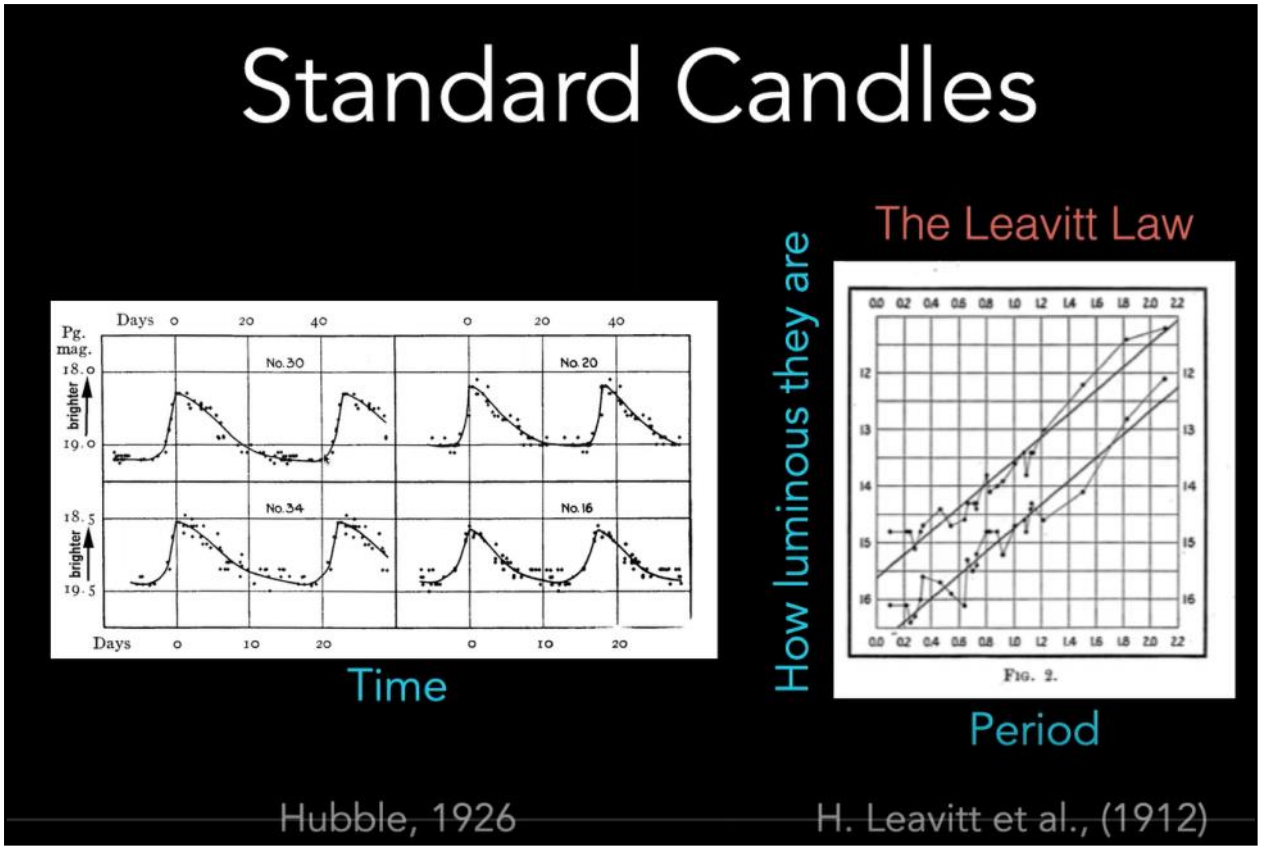
Dec 3 Christmas Party

PVAA General Meeting 07-15- 2022

We held our monthly meeting via Zoom. Our speaker for the night was Chris Burns – Research Associate at the Carnegie Observatories in Chile. He is also a volunteer and telescope operator at Mt. Wilson. His topic was 'Hubble's Troublesome Constant' or 'Why is Cosmology SO hard?' The questions of 'Where did the universe come from?' and 'How old is it?' have been with us ever since the caveman looked up to the stars. You would think we should have figured it out by now, but there are always issues. The biggest problem comes down to distance.

The 'Great Debate' was over the distances of the 'Andromeda Nebula,' now the Andromeda Galaxy. Two things happened to solve this debate. First George Hale built very large telescopes – the 40-inch refractor at Yerkes Observatory in Wisconsin, then the 60-inch and 100-inch Mt. Wilson telescopes, followed by the 200-inch telescope at Mt. Palomar in San Diego County. Second, we found what we called 'Standard Candles'. If you have something that you know the brightness of, then when you see how bright it looks to you, you can determine its distance. Cephid Variables are such a thing. They have a known curve of brightness. Using these stars, you can determine its distance. Using a spectrograph, you can determine an object's speed using the red shift, (or blue shift – if it is coming towards you.) In 1929 Edwin Hubble published a paper showing the world of just this discovery. Since the Cephid Variables were too dim to see from really far distances, Hubble assumed that the brightest stars in a far away group would be the same brightness and based his graph on that.

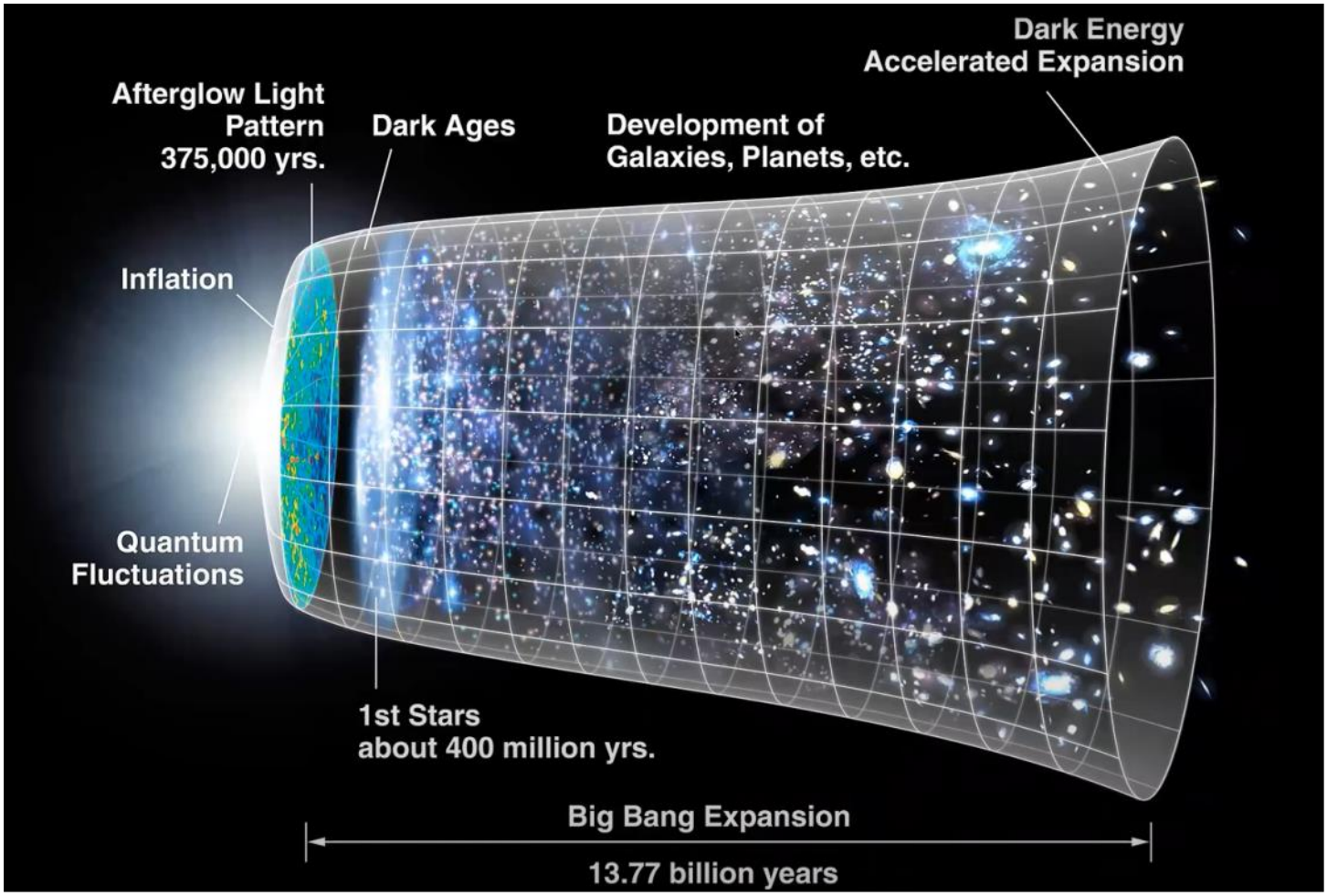




You could also use this to determine the age of the universe. The figure he got was 2 billion years old, which he thought was too young. (We believe it to be almost 14 billion years old now.) The reason for the big error was that there were two kinds of Cephid Variables, which was found out in the 1950s by Walter Baade at Mt Wilson. Later we started using Type1a supernovas as a standard for galaxies that were extremely far away. We are now measuring things where we now must factor in that the universe is expanding faster now than its expansion a billion years ago. Using the Planck spacecraft that measures the Cosmic Microwave Background, this gives us a Standard Ruler! We still have an error bar that the astronomers are trying to narrow down. The James Webb Space Telescope will be used to sharpen the data received. Eventually we will be using gravitational waves to nail the constant down.

Gary Thompson

Type 1a supernova



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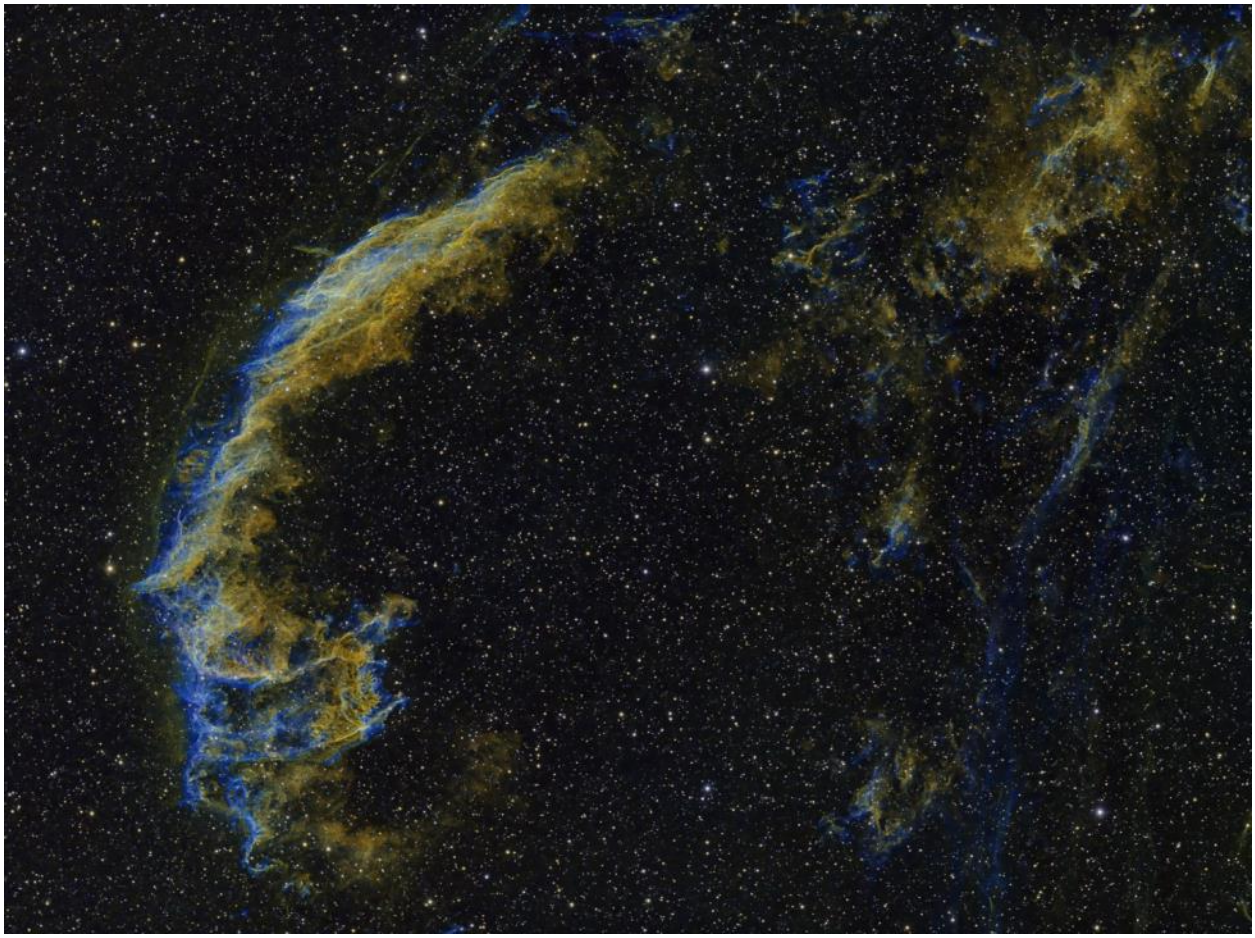
Veil & NGC 6823

The nice thing about having new moon weekend early in a 31-day month, such as July this year, is that there is a second new moon weekend at the end of the month. The bad thing is that we've had such terrible weather that we didn't go to the dark site the weekend of July 29-31due to potential thunderstorms! I did manage three images, although the last one is a little weak on data. We're hoping for better weather toward the end of August.

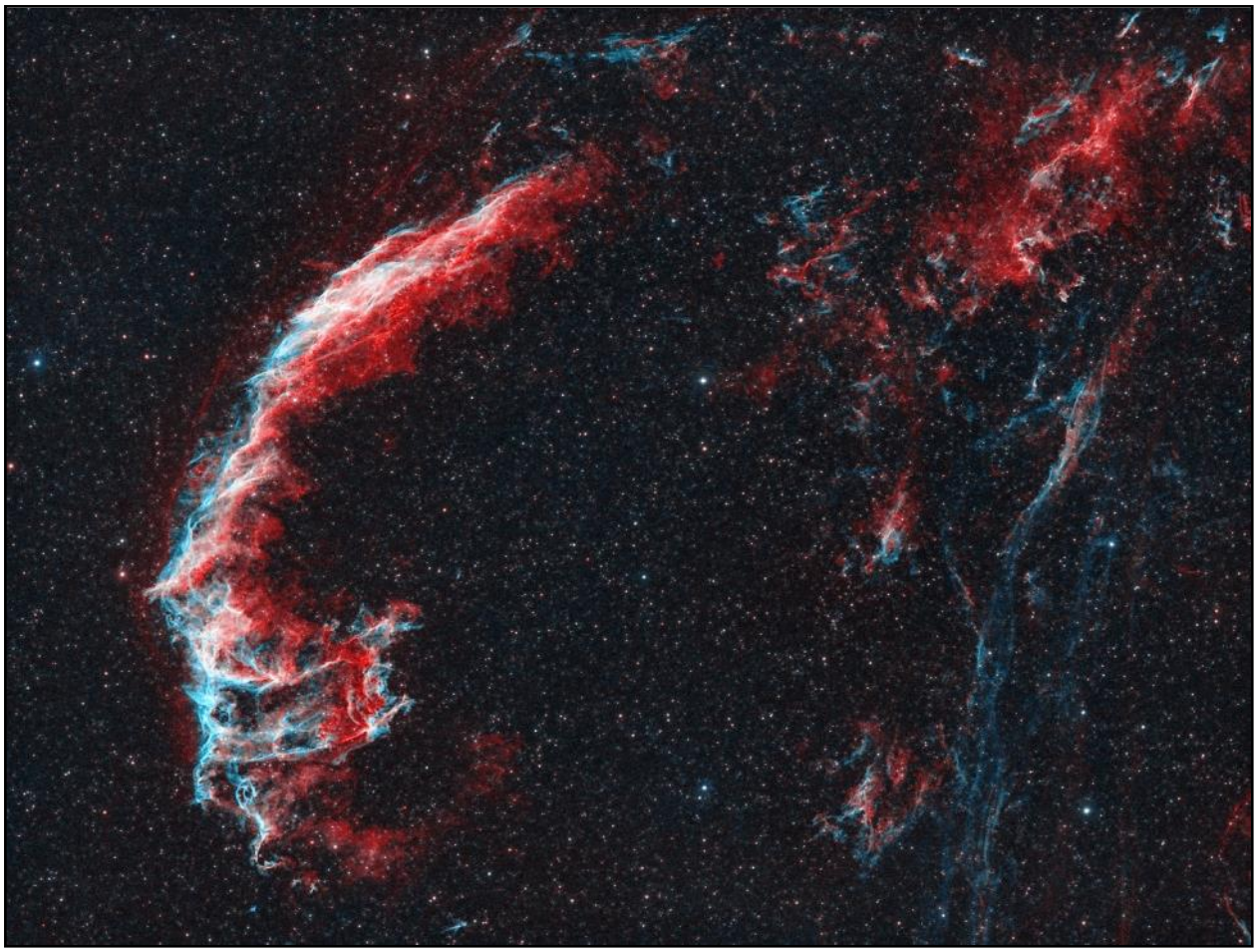
I shot narrow-band from July 17 through July 24 at home but the only data I used for this first image was from the 17th to the 19th. I'm still working on getting an image I truly like from the other 5 nights. The target is the Eastern Veil Nebula (which includes NGC 6992, NGC 6995 (aka the Bat Nebula – the squarish nebula in the lower left of the image), and IC 1340) in Cygnus. The Eastern Veil, Western Veil, Pickering's Triangle, and other wisps make up a supernova remnant, the Cygnus Loop, that exploded 10-20,000 years ago. The star was about 20 times more massive than the sun and should have been visible during the day when it exploded. The latest distance estimates place the Cygnus Loop at about 2,400 light years away and since it spans about 3 degrees of sky, it is about 120 light years in diameter. The version of the Eastern Veil I'm offering first is a narrow-band image presented in the Hubble palette.

Now, after I wrote that last paragraph, I decided to quickly process the HOO image from frames captured over the entire 8-day period and I like it much better. This is the blue and red version of the Eastern Veil Nebula. I'll describe what how this image is made in the processing section later.

The second target (third image) was planned for the dark site, and in hindsight, I should have imaged in H-alpha and O-III from home to create an HOO image instead of LRGB, especially given such poor skies. I shot NGC 6820/6823 originally in August of 2015 with an old wedge-mounted ALT/AZ telescope mount and one-shot color camera (cooled but no set point) and I was happy with it at the time. I think this year's version, shot from July 27-29, is a significant improvement over my previous effort. NGC 6820 is an emission nebula, also known as Sharpless 2-86, glowing red with H-alpha in the constellation Vulpecula (the Fox) located about 6,000 light years away. Embedded in the nebula is NGC 6823, an open cluster of 2-million-year-old stars seen in the center of the image. The part of the nebula that I especially like is the "finger" that extends from the nebula toward the cluster. It is believed that the finger is formed by nearby stars eroding the gas and dust within the nebula.



Turning first to the SHO version (Hubble palette) of the Eastern Veil Nebula, the image is a stack of 10-minute sub-frames, 9 each taken through H-alpha, O-III, and S-II filters. The sub-frames were calibrated with 21 dark, 21 flat, and 21 dark flat frames. Stacking was done in Deep Sky Stacker and most of the processing was done in PixInsight, with the "turquoise/gold" color being processed in Photoshop. Unfortunately, the turquoise color doesn't show very well in this image. For the Hubble palette, sulfur was mapped to red, hydrogen to green, and oxygen to blue to create the palette. Once in Photoshop, green was shifted toward yellow, yellow toward red, and cyan toward blue in an attempt to get the pretty turquoise/gold colors.



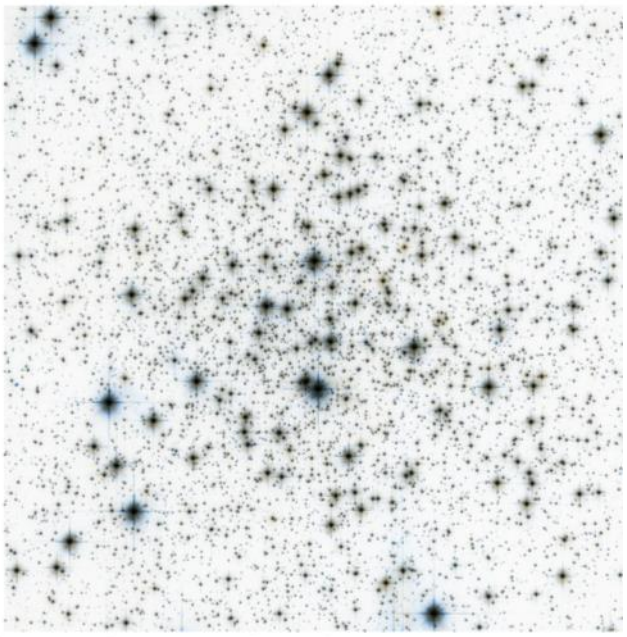
For the HOO version of the Eastern Veil, the sub-frames were calibrated using the same calibration files, but this time, 13 10-minute H-alpha sub-frames and 26 10-minute O-III sub-frames that were collected over the entire range from July 17 to 24 were stacked. Obviously, I didn't stack many of the frames collected since the total number of frames is a little over 6 hours of acquisition time but there were more than 48 hours of data collection time. Stacking and nearly all processing was done in PixInsight. After cleaning up the background gradients in the sky, hydrogen was mapped to the red channel and O-III to both the green and blue channels and then the stars were separated from the nebula. No processing was applied to the stars, but the nebula was carefully stretched to avoid bringing up the noise level. Color saturation was boosted in the blue and red channels to achieve the color balance I wanted. The image was selectively sharpened in the bright areas before the stars were added back. Photoshop was then used only to adjust the black point. While I like this version overall, I feel it may be a little "over-cooked," meaning a little over-processed.

The biggest processing challenge I've had that I can remember is this version of NGC 6820/6823. You would think that by now I'd know better than to try to shoot a faint target in broadband from light polluted skies! Again, shooting between clouds, high humidity, and high temperatures, I managed 107 1-minute luminance, 27 3-minute red, 10 3-minute green, and 36 3-minute blue frames for a total of a little under 5.5 hours of data. The frames were calibrated with 21 1-minute dark, 21 3-minute dark, 21 flat, and 21 flat dark frames before being stacked in PixInsight. All processing was done in PixInsight for this image and took the most time I've ever spent getting a single image from the data. To begin with, the luminance data and color data were processed separately until near the end. After removing the nasty gradients from all of the frames, the RGB data was combined and the stars removed. As with the Eastern Veil, a great deal of careful stretching was done using a variety of masks to avoid noise in the dark areas. Saturation was increased before the stars were added back. The luminance channel was treated similarly with star removal as the first step. After stretching, both noise reduction and selective sharpening were applied before the stars were added back. The luminance and RGB images were then recombined and final touches were added. Keeping the noise under control was difficult and some did sneak in, but on the whole, I think the image came out nicely.

I hope you enjoy this late month's efforts. Until next month, clear skies!

Ron Ugolick

https://www.astrobin.com/users/ruccdu/



Another Look
2022 August
Dave Phelps
July 28 new moon, August 12 Full Moon,
August 27 New Moon
August: **Sturgeon Moon,** green corn moon, grain moon, and the red moon for the reddish hue it often takes on in the summer haze.

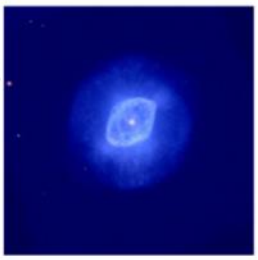
Astronomical Twilight 2052 PDT 08/27/22

High above us on warm summer evenings is one of the linchpins of first year astronomy courses...the Summer Triangle. Made by connecting Vega, Deneb and Altair we help our star party visitors by fixing their eyes on a high, visible, bright star grouping. The triangle includes the constellations of Lyra, Aquila and Cygnus in addition to Sagitta and Vulpecula. I also include Delphinus in with the group, lest it be forgotten.

Delphinus has an interesting history and is also one of the original 48 by Ptolemy. In reference, the Greeks attributed two myths and an Italian gentleman may have been guilty of overweening egotism or, perhaps, a practical joke. The Greeks are easy. In one the Dolphin saves a poet and in the other Poseidon searches for his reluctant fiancee.
In reference to our Italian gentleman, we have Alpha α Delphini whose name is Sualocin and Beta β Delphini whose name is Rotanev. The names have no meaning. Italian astronomer Niccolo Cacciatore, turned his family name, Venator, backward and gave Beta his family name. He did the same thing to Alpha. He turned his first name, Nicholas around and named it Sualocin. Somehow it stuck.
Beta is also interesting as a double star. Very close in separation, about 44" and magnitude a slightly variable 4.1 to 5.0 magnitude.

https://en.wikipedia.org/wiki/File:Sidney_Hall_-_Urania%27s_Mirror_-_Delphinus,_Sagitta,_Aquila,_and_Antinous.jpg

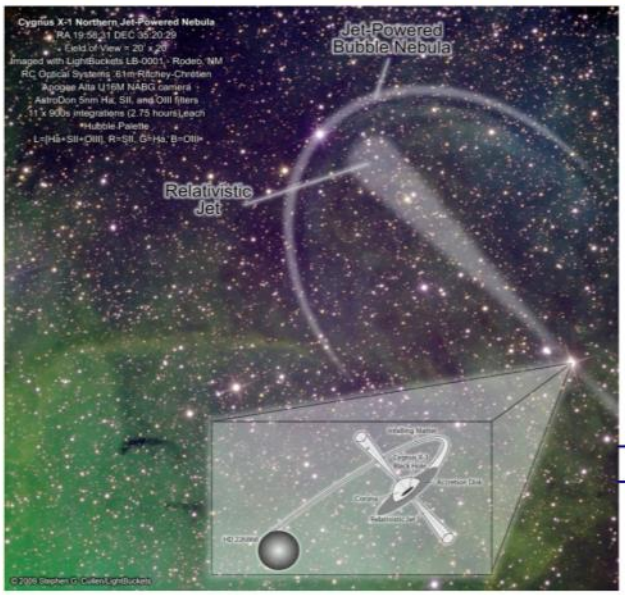
We also have two Caldwell globulars and two planetaries worth looking for in Delphinus. Caldwell 42, NGC 7006 is a 10th magnitude, rather pretty, globular and Caldwell 47 is a brighter 8th magnitude globular, also rather pretty. Neither NGC 6891, a rather nice planetary or NGC 6805, the Blue Flash planetary, are particularly bright but should be easily seen. N6891 is 10.5 and N6805 is 10.9. Your backyard telescope should find a smallish blueish or blue-greenish blob. An interesting note is that the four star rhombus, Sualocin, Rotanev, Delta δ and Gamma γ Delphini are named Job's Coffin, no one seems to know why.



https://ar.wikipedia.org/wiki/NGC_6891

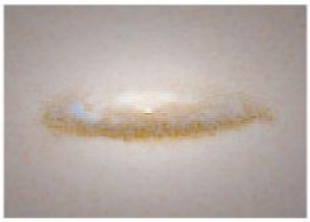
Vulpecula is the home of the first Pulsar discovered in 1967 by PhD student Jocelyn Bell and her advisor Dr. Anthony Hewish. You won't see it, but its near Brocchi's Cluster and, if you wish, you can

stare at its place in the sky. It's given the prosaic name PSR B1919+21. You can check the Sinbad registry and you will find no optical component to the Pulsar.
APOD: 2009 June 8 – Possible Jet Blown Shells Near Microquasar Cygnus X1 (nasa.gov)



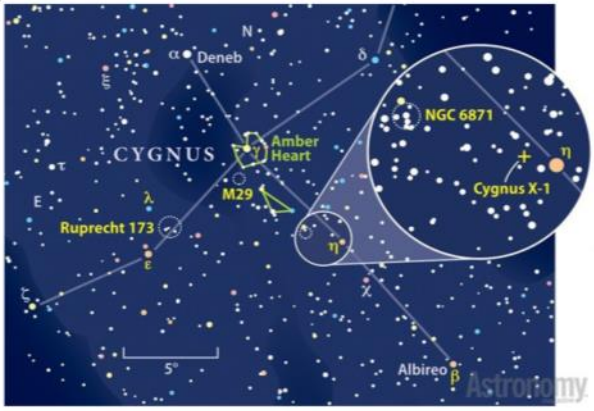
By the way there were those who claimed that Ms. Bell should have been given equal credit for the discovery. Even she disputes that:

Dr. Bell Burnell has had a very vibrant career in science and is honored by her discoveries and her generosity. She was awarded the Special Breakthrough Prize in Fundamental Physics which included a $2.8 million dollar prize. She donated the award to support women, ethnic minorities, and aid refugee students in physics research. (Jocelyn Bell Burnell and the Discovery of Pulsars – SciHi BlogSciHi Blog).

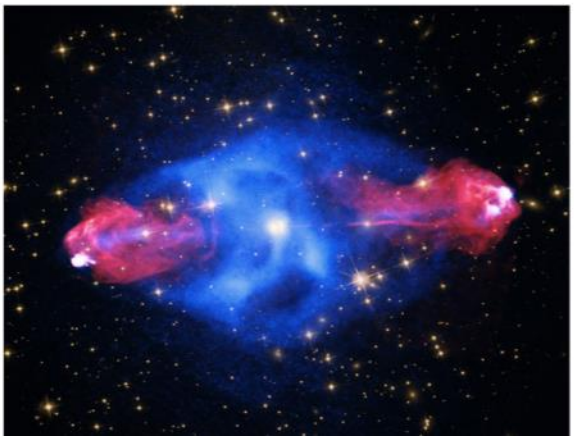


If you are interested in supermassive black holes, and who isn't, look for 13th magnitude NGC 7052 near the border of Vulpecula and Pegasus. I massaged this 1998 Hubble image to show more detail.
https://apod.nasa.gov/apod/ap980622.html

Another awesome discovery was Cygnus X-1, a distant X-ray binary containing a supergiant and unseen massive companion that was the first object we think is a black hole.
If you would like to see for yourself, Cyg X-1 is close to Eta η Cygni, (an inner telrad circle) the middle star in the Neck and is 9th magnitude.
(Credit:AstronomyMagazine-https://astronomy.com/magazine/weirdest-objects/2015/04/37-black-hole-cygnus-x1)

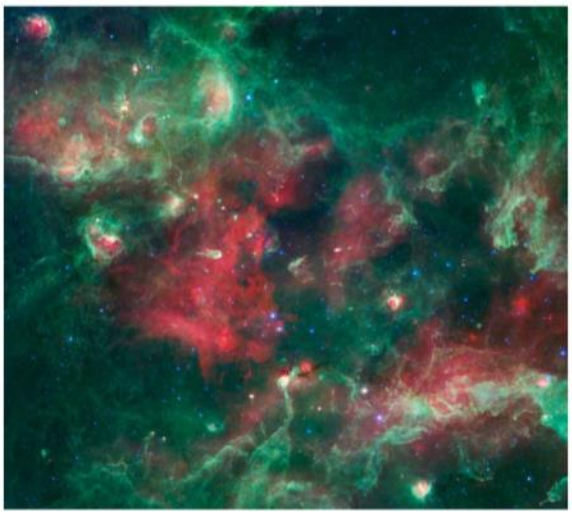


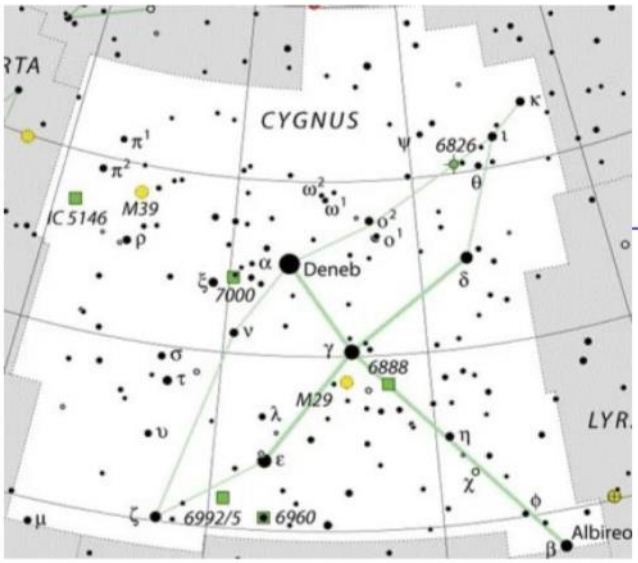
A third major discovery was Cygnus A, the first radio galaxy discovered at a distance of 730 million light-years from Earth, it is the closest powerful radio galaxy but, alas, it shines at only 16th magnitude so you will have to be satisfied with this image.
APOD: 2015 January 24 – Light from Cygnus A (nasa.gov)



Cyg A's location is along the left wing of the Swan, not too far from Delta δ. While there, be sure to look more closely at δ. It is a triple star system that is together brighter than 3rd magnitude. Interestingly enough, Delta's proper name is Farwaris, from the Arabic for rider, nothing at all to do with the various Greek myths of the Swan.

Cygnus X (confusing, isn't it) is the largest star-forming region nearby and includes not only some of the brightest and most massive stars known (such as Cygnus OB2-12), but also Cygnus OB2, a massive stellar association thought by some to be a young globular cluster. The nebulousity around Sadr, Gamma Cygni γ is a part of the association. The Spitzer Space Telescope image shows a region of complex and frenetic activity, quite beautiful to the eye. **https://www.spitzer.caltech.edu/image/ssc2012-02a-stars-brewing-in-cygnus-x**

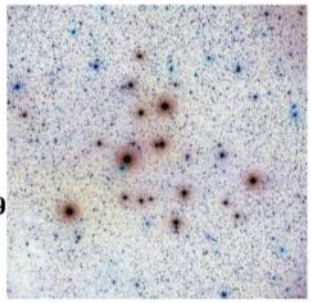




If you go to **https://skyandtelescope.org/observing/a-trip-down-the-great-rift/** you see where they point out the Cygnus Rift and the Northern Coalsack. Cyg X is partially hidden behind it. It explains why we need the Spitzer.

Cygnus has seven Caldwell objects. Caldwell 12 is known as the Fireworks galaxy, though, at least one list puts it into Cepheus. The Fireworks galaxy, NGC 6946 is notable for 10 supernova but is rather small and 9th magnitude. You will find it by searching among the stars of the Milky Way.

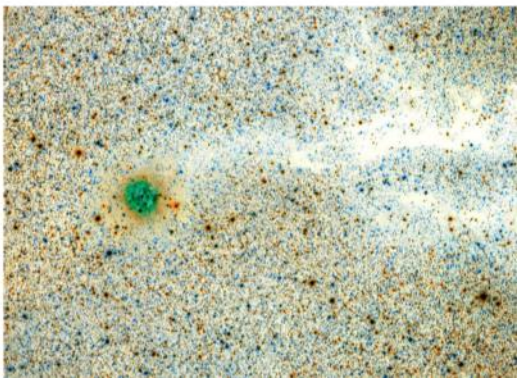
There is an abundance of deep-sky objects, with many open clusters, nebulae of various types and supernova remnants found in Cygnus because it sits right on top of the Milky Way. ***https://www.constellation-guide.com/constellation-list/cygnus-constellation*** When you look, be aware that some open clusters can be difficult to make out from such a rich background of stars.



M39 (NGC 7092) is an open cluster 950 light-years from Earth that is visible to the unaided eye under dark skies. It is loose, with about 30 stars spread out. You can see that it has a rather triangular outline, something to confirm visually.

https://freestarcharts.com/messier-39

Caldwell 15, NGC 6826, was discovered by Herschel way back in 1793. It is in a way a perfect example of visual astronomy. C15 is called the Blinking Planetary. Its bright 8th magnitude central white dwarf takes over the eyepiece. When you use averted vision, the planetary seems to "blink" into view. The 1997 APOD image by J. Balick **(APOD: December 19, 1997 - NGC 6826: The Blinking Eye (nasa.gov)** was also featured in 2001. C15 is located 3 or 4 degrees from Theta θ and can be found easily in your atlas and the chart above.

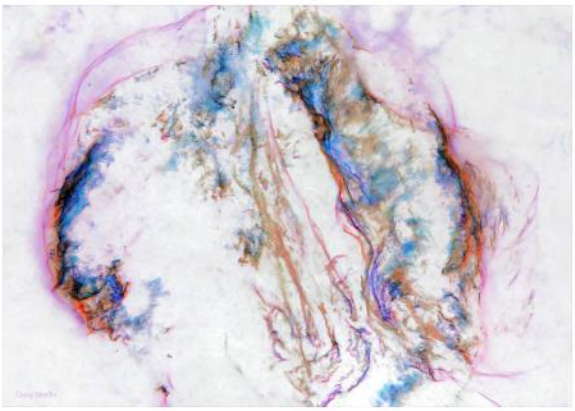


Look for the Open Cluster M39, NGC 7092. Its part of the tour you take with your telescope when you scan the North American and Pelican nebulae. It is a Messier, so you go to it and its not bad, a bright sprinkling of stars 4th or 5th magnitude and rather pretty to look at. So, there you are and you decide to move your telescope a little westward and Wow! You discover a really great dark nebula: B168, a long cylindrical darkness that leads you right to another two

really great objects; Caldwell 19, IC 5146 and Sharpless 2-125. C19 is a mottled light and dark nebula with an open cluster embedded. **APOD: 2011 September 29 – Cocoon Nebula Wide Field (nasa.gov)** The Cocoon is a great name for everything put together.
This 2011 wide field by non other than Tony Hallas is a job well done.

Caldwell 20, NGC 7000, the North American Nebula is not as good, I think, in photographs as visually. The camera blows everything out. Visually, with a nebular or pollution filter, you will be able to trace the outlines of the continent and maybe even pick up a little Alaska. Hudson Bay will also be readily visible.
One of the great objects to search for in Cygnus is the Crescent Nebula. Its on the line from Deneb to Sadr to Eta η. Start at Sadr, the center star in the cross and try to find traces of the nebulousity that Sadr is immersed in, Cygnus X. I remember one year a Phoenix, Arizona amateur showed us a black and white image of the whole region between Deneb, Delta and Eta including the northeastern part of Cygnus. It was a spiderweb of nebulousity that I have not seen before or since. It was an amazing piece of work for 30 years ago.

If you start at Sadr and scan down less than a Telrad and you will find the Crescent, Caldwell 27, NGC 6888. Be sure to study it well, with and without filters. It is possible to fill in the area inside the crescent.



Recently, a fellow amateur, was talking about filters fitted onto his binoculars and how the Veil was tremendous. Still, I remember how pleased I was with myself the first time I found the Veil. I was soon able to move my telescope between the individual pieces and look at the lace-like structure of the east and the west lit up by its embedded star, Caldwell's 33 and 34. While there be sure to find the little triangular notch between the two.
There is so much to see in Cygnus, it is worthy of a marathon of its own. **Image Credit & Copyright: Craig Stocks (Utah Desert Remote Observatories) https://commons.wikimedia.org/wiki/File:Johann_Bayer_-_Cygnus.jpg#/media/File:Johann_Bayer_-_Cygnus.jpg**

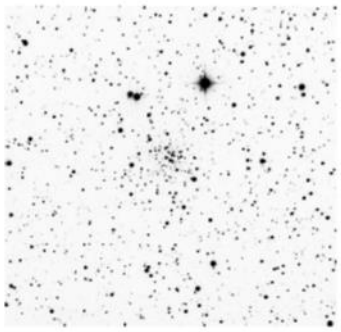
One night I was trekking up through Scutum looking for dark nebula. The area is full of nebula and clusters so there is plenty to find. There are a ton of dark nebulae in the area, B-111 B-117 and B-119a are prominent dark nebulae just across the border into Scutum, but I wanted to try to stay in Aquila. Specifically I wanted to find a triple Barnard's, B-130 B-129 and B-127, a grouping of dark nebulae at the tail of Aquila. Eta η Aquilae is a 3 to 4th magnitude variable at the tail of the Eagle. Close by and between Eta and Lambda is 4th magnitude 12 Aquila, finder star for our Barnard's. They are not all that easy to see except for the dense milky way background. While there I noticed that 12 was a part of a hook of stars that led directly to the deepest red star I had seen. V Aquilae is a genuine carbon star, variable from 6.5 to 8.5 magnitude and a wonderful surprise in your eyepiece.

While on the subject of Red Stars up between Delta δ and Zeta ζ Aquilae you will find R Aquilae, an older orange giant with a wild variable range of between 5th and 12th magnitude. The dimmer R gets, the deeper red it gets. Its a good star on which to hone your AAVSO chops. In that same area are four 11th and 12th magnitude planetaries NGC 6804, 6805, 6807 and M1- 70. These you can use to hone your star hopping skills.

Lastly in Aquila is Palomar 11. Its a difficult star-hop. You will need to find Kappa κ, about 4 degrees south of Theta θ, the left wingtip of Aquila. Pal 11 will be close to the outside circle on your telrad. Once you are in the right position, then comes the hard part, finding it. Pal 11 is fairly big at 10' and fairly bright at 10th magnitude but it is the loosest class IX globular I have ever seen.

Find it at: Palomar 11 (seds.org)

Dark Skys Dave Phelps



Lunar Phases

Needle thin crescent gold,
sewing up patches of dark.
Elfin thin but bent to hold
a gray old moon in your arms.
Both pierced by dusty wounds,
but sewing a twilight with charm.
Now thin and clear
a new moon's fluted note
etched on silent sky.
The narrow edge—
a single curve of silver.
Now of the moon's ripe fruit
only a shriveled rind is left
for hungry dark to gnaw upon.

Lee Collins

NASA Night Sky Notes August 2022

This article is distributed by NASA's Night Sky Network (NSN). The NSN program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

Artemis 1: A Trip Around the Moon – and Back!

David Prosper

We are returning to the Moon - and beyond! Later this summer, NASA's Artemis 1 mission will launch the first uncrewed flight test of both the Space Launch System (SLS) and Orion spacecraft on a multi-week mission. Orion will journey thousands of miles beyond the Moon, briefly entering a retrograde lunar orbit before heading back to a splashdown on Earth.

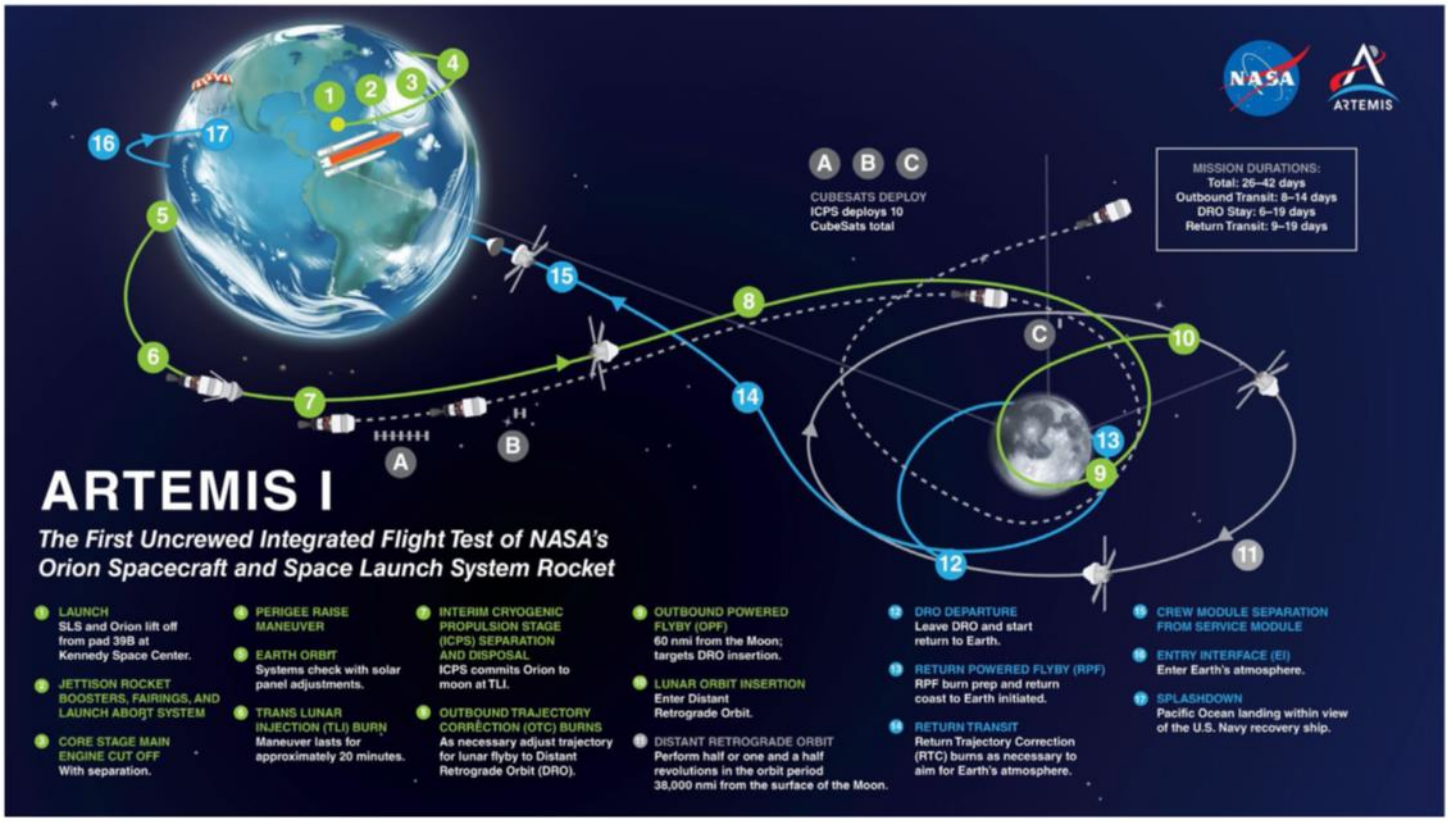
The massive rocket will launch from Launch Complex 39B at the Kennedy Space Center in Florida. The location's technical capabilities, along with its storied history, mark it as a perfect spot to launch our return to the Moon. The complex's first mission was Apollo 10 in 1968, which appropriately also served as a test for a heavy-lift launch vehicle (the Saturn V rocket) and lunar spacecraft: the Apollo Command and Service Modules joined with the Lunar Module. The Apollo 10 mission profile included testing the Lunar Module while in orbit around the Moon before returning to the Earth. In its "Block-1" configuration, Artemis 1's SLS rocket will take off with 8.8 million pounds of maximum thrust, even greater than the 7.6 millions pounds of thrust generated by the legendary Saturn V, making it the most powerful rocket in the world!

Artemis 1 will serve not only as a test of the SLS and the Orion hardware, but also as a test of the integration of ground systems and support personnel that will ensure the success of this and future Artemis missions. While uncrewed, Artemis-1 will still have passengers of a sort: two human torso models designed to test radiation levels during the mission, and "Commander Moonikin Campos," a mannequin named by the public. The specialized mannequin will also monitor radiation levels, along with vibration and acceleration data from inside its mission uniform: the Orion Crew Survival Suit, the spacesuit that future Artemis astronauts will wear. The "Moonikin" is named after Arturo Campos, a NASA electrical engineer who played an essential role in bringing Apollo 13's crew back to Earth after a near-fatal disaster in space.

The mission also contains other valuable cargo for its journey around the Moon and back, including CubeSats, several space science badges from the Girl Scouts, and microchips etched with 30,000 names of workers who made the Artemis-1 mission possible. A total of 10 CubeSats will be deployed from the Orion Stage Adapter, the ring that connects the Orion spacecraft to the SLS, at several segments along the mission's path to the Moon. The power of SLS allows engineers to attach many secondary "ride-along" mission hardware like these CubeSats, whose various missions will study plasma propulsion, radiation effects on microorganisms, solar sails, Earth's radiation environment, space weather, and of course, missions to study the Moon and even the Orion spacecraft and its Interim Cryogenic Propulsion Stage (ICPS)!

If you want to explore more of the science and stories behind both our Moon and our history of lunar exploration, the Night Sky Network's **Apollo 11 at 50 Toolkit** covers a ton of regolith: bit.ly/nsnmoon! NASA also works with people and organizations around the world coordinating **International Observe the Moon Night**, with 2022's edition scheduled for Saturday, October 1: moon.nasa.gov/observe. Of course, you can follow the latest news and updates on Artemis 1 and our return to the Moon at nasa.gov/artemis-1

NASA Night Sky Notes August 2022



Follow along as Artemis 1 journeys to the Moon and back! A larger version of this infographic is available from NASA at:

nasa.gov/image-feature/artemis-i-map

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Full Moon over Artemis-1 on July 14, 2022, as the integrated Space Launch System and Orion spacecraft await testing.
Photo credit: NASA/Cory Huston Source: https://www.nasa.gov/image-feature/a-full-moon-over-artemis/