nightwatch
Newsletter of the Pomona Valley Amateur Astronomers

The progress of the whole human race is regulated by the power available.
Nikola Tesla

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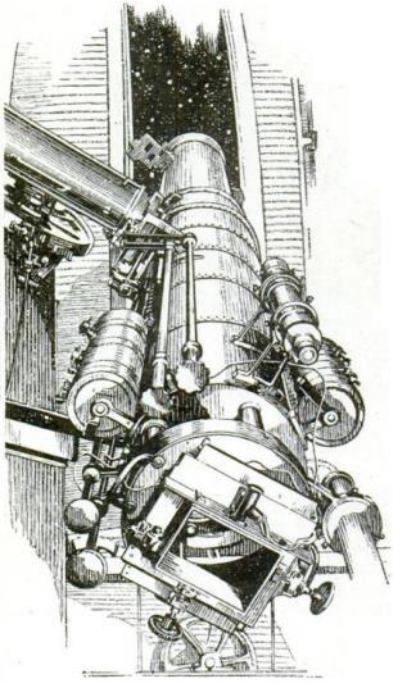
Volume 44 Number 10 ***nightwatch*** **October 2024**

Club Events Calendar

Oct 18	**General Meeting – Dr. Jorge Moreno Soto "Computer Simulations of Galaxy Formation" - 7:30 PM**
Nov 2	**Star Party – GMARS**
Nov 6	**Board Meeting 6:15 PM**
Nov 15	**General Meeting 7:30 PM**
Nov 27	**Board Meeting 6:15 PM**
Dec 7	**Holiday Party**



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President ….....	Mathew Wedel	909-767-9851
Vice President ..	Joe Hillberg	909-949-3650
Secretary	position is currently open	
Treasurer	Gary Thompson	909-935-5509

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Jim Bridgewater (2026).....	909-599-7123
Richard Wismer(2026)	
Ron Hoekwater (2025).....	909-706-7453
Howard Maculsay (2025)……	909-913-1195

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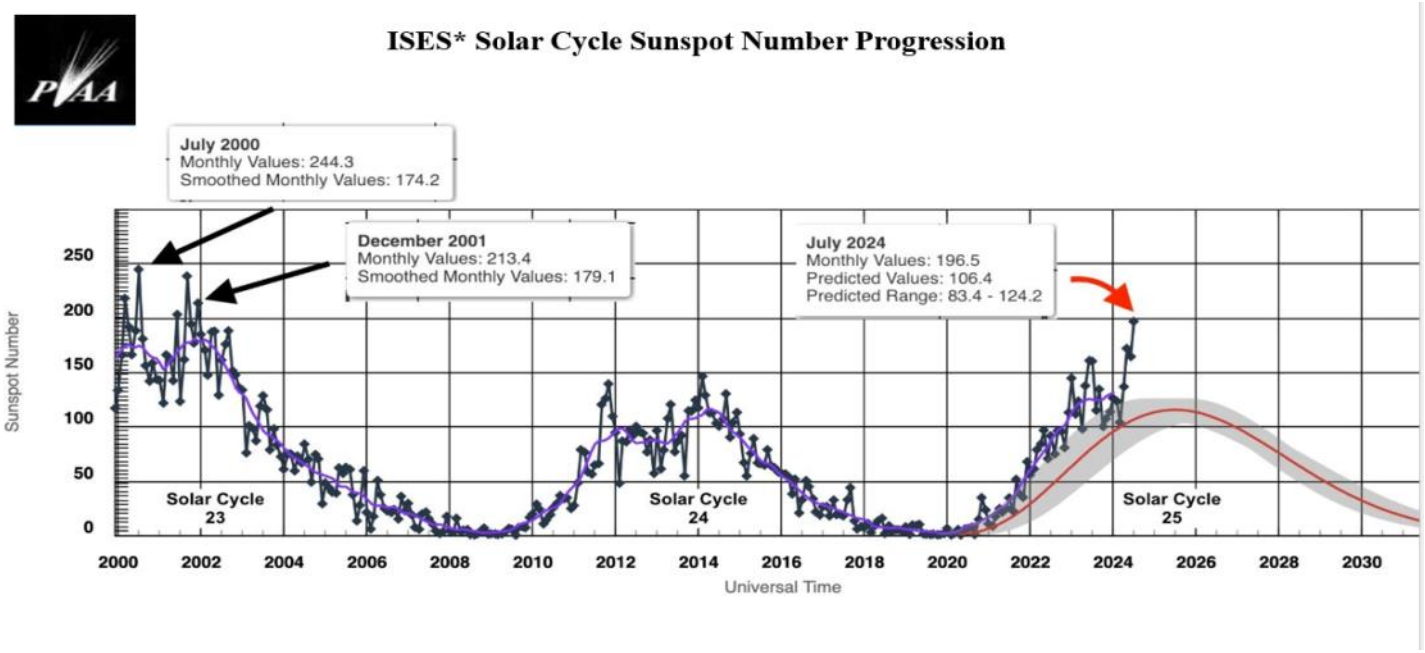
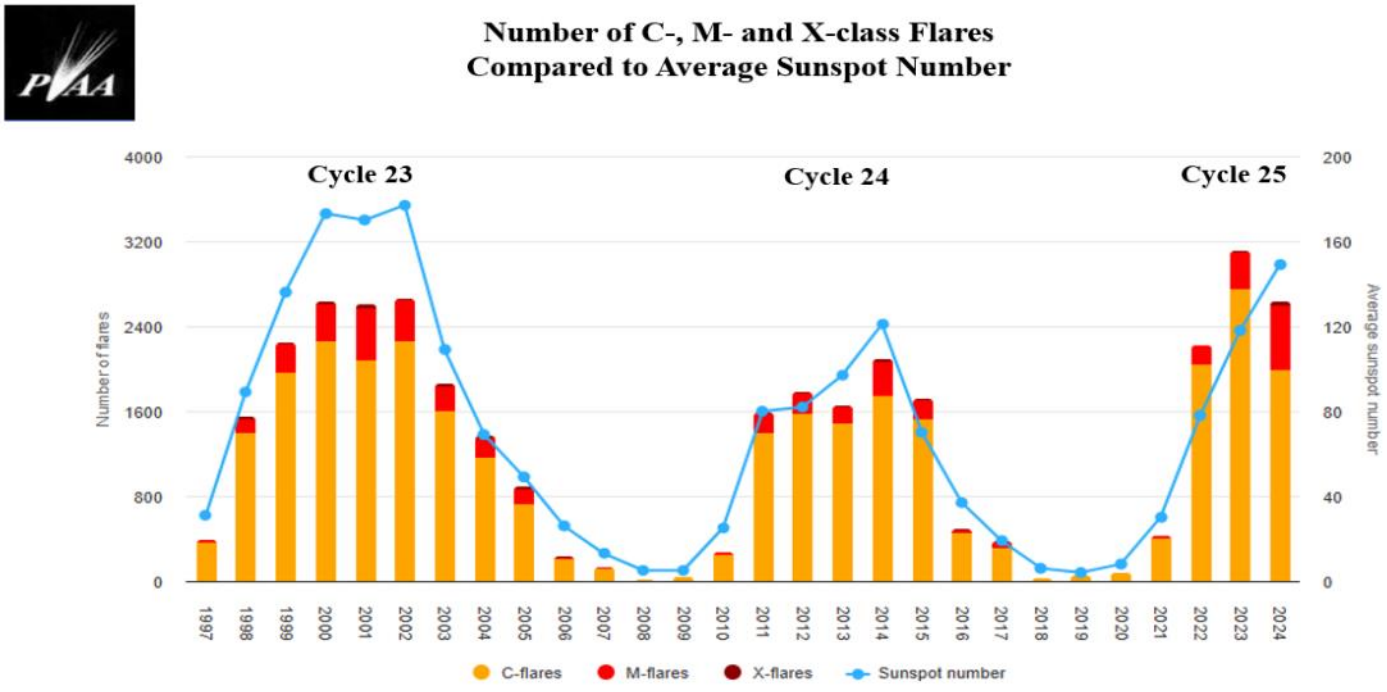
Membership / Publicity....	Gary Thompson .	909-935-5509
Outreach	Jeff Schroeder	909-758-1840
Programs	Ron Hoekwater	909-391-1943

PVAA General Meeting September 20th, 2024

The monthly meetings are back to the usual time at 7:30pm now that the colleges are back in session. We had two speakers for the night. Ken Elchert gave a presentation on "Satellite Migration" as the first speaker of the night.

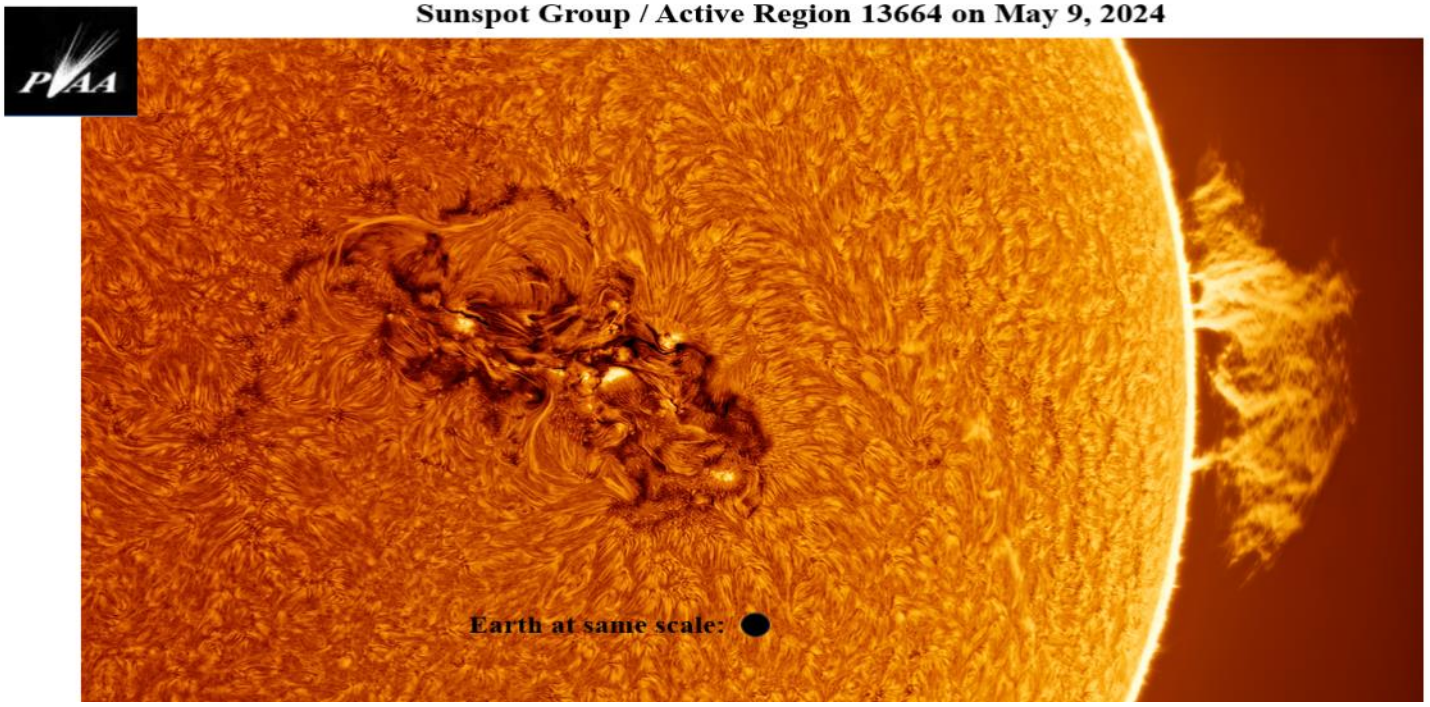
His topic is how the Sun, at the height of its 11-year solar cycle, is currently interacting with our atmosphere. This is causing atmospheric molecules and atoms to go further out into space – creating drag on Low Earth Orbit (LEO) satellites. This in turn lowers their orbit and can cause them to fall into the atmosphere to burn up, if not counter-acted. We are currently in the 25th solar cycle since the first records were made of it in 1755. The cycle affects activity on the sun's surface, such as sunspots and solar flares. This cycle (SC25) has averaged 35% more sunspots per day than SC24. From December 1, 2023, to August 8, 2024, the sunspots were 70% higher than SC24.

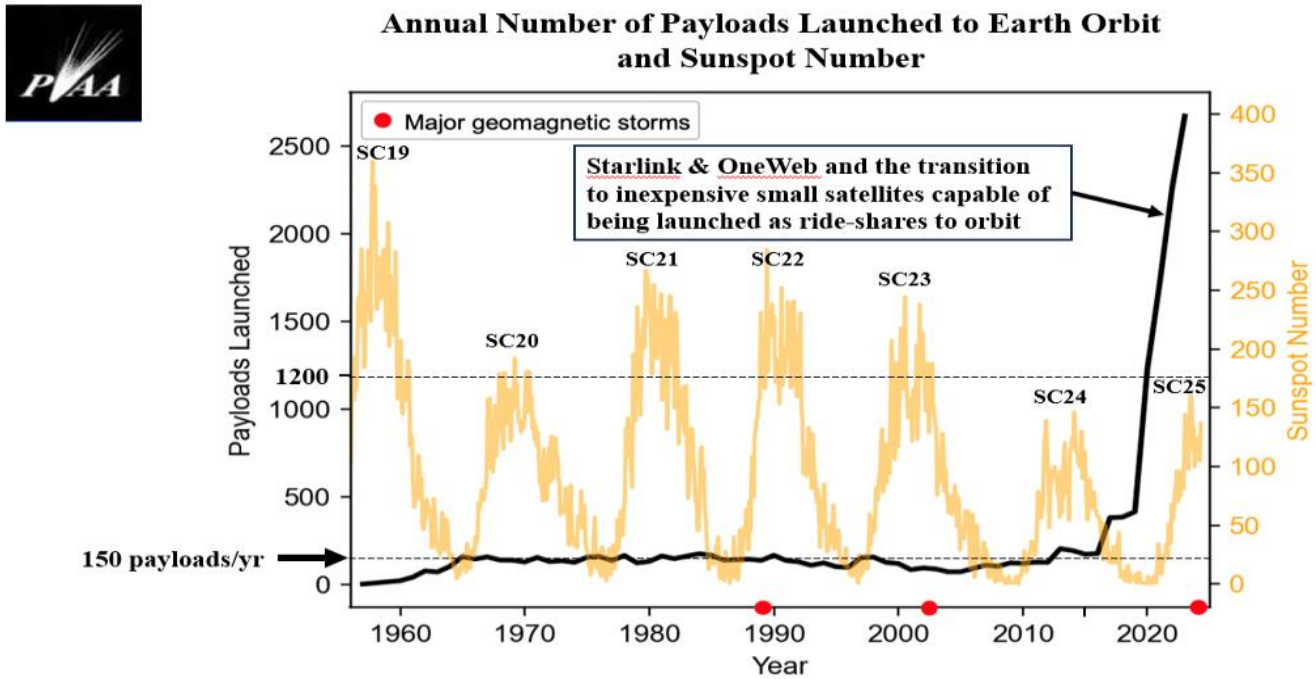




This last May, a massive grouping of sunspots formed on the sun's surface that grew to be roughly 124,300 miles across, more than 15 times the diameter of Earth. It was responsible for 11 enormous X-class solar flares, accompanied by at least 5 Coronal Mass Ejections (CME). The first CME - made of solar plasma – hit the Earth on May 10th. This resulted in the largest geomagnetic storm (May 10-12) since 2003.

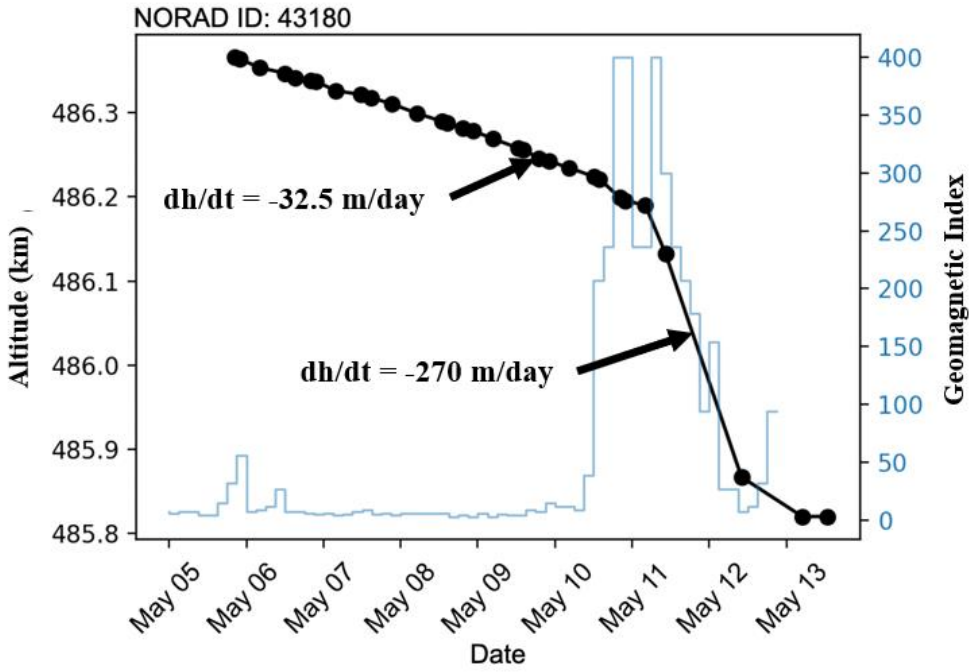
The key effects of solar activity on our upper atmosphere, thermosphere, and ionosphere are increased temperature, density, and radiation along with disruptions to communications and the power grid. With that in mind, there are about 10,000 active payloads in LEO. Satellites and space debris were sinking toward Earth at 590 feet per day during the 4-day storm. Automated station-keeping, especially from the Starlink constellation, caused nearly half of all the active satellites in LEO to maneuver at once. Thousands of satellites began firing their thrusters at once to maintain their altitude. Collision avoidance systems didn't have time to calculate the satellites' changing paths. Fortunately, no collisions were reported. Space is big.





The May 2024 geomagnetic storm was the first major storm to occur during a new paradigm in LEO satellite operations dominated by commercial small satellites and proliferated LEO constellations

Effect of the Geomagnetic Storm on the Time-averaged Orbital Altitude of SATCAT



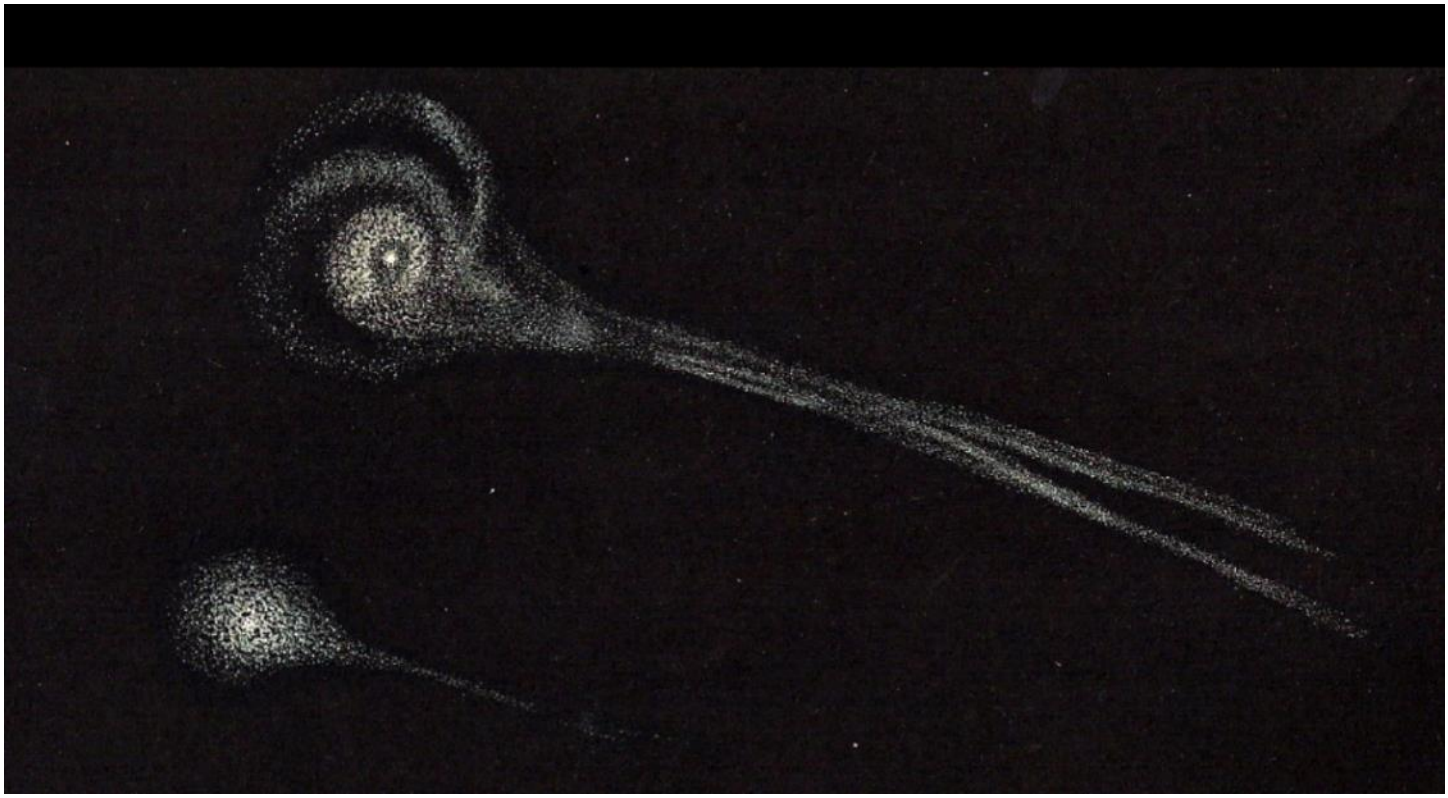
The decay is much more rapid during the storm as the thermosphere expands in response to the geomagnetic enhancement

The second presentation for the night was "The Comet That Refused to Die!" by David Nakamoto of Griffith Observatory. Biela's Comet or Comet Biela was first discovered by Jacques Montaigne and independently by Charles Messier in 1772. It was again discovered in1805 by Jean-Louis Pons. In 1826 Wilhelm von Biela observed the comet and calculated its orbit to be periodic with a period of 6.6 years. This was only the third comet known to be periodic. The other comets were Halley and Encke. The comet was named after Biela, which created some controversy. Felix Adolph Gambart also provided mathematical proof linking the 1826 and 1805 comets in the same issue of *Astronomishce Nachrichten*. The comet appeared again as predicted in 1832, discovered by John Herschel. This time it created a popular sensation, as the Earth passed through the coma. Some had predicted the destruction of the Earth or other terrible things. In 1839 the Earth was on the other side of the Sun, and no observations were made.

In 1845 Biela was rediscovered again, but this time it had broken into two components. Neither component has been seen again, but on November 27, 1872, a brilliant meteor shower of 3,000 per hour was observed. Biela is now believed to be no more than an asteroid, with no out-gassing which makes a comet a comet. We may find it out there yet.

Gary Thompson

The two components of Biela in 1852, as drawn by Secchi. Wikipedia



The two components of Biela in 1852, as drawn by Secchi. Wikipedia

Phantom of the Opera

The camping trip this month was much calmer than last time, with no non-astronomers anywhere near us. We camped for three nights from October 3-6. The weather was hot, but not as hot as July was. Nights are getting longer and the summer constellations are setting. Fall has arrived!

I had originally planned to image a small quintet of interacting galaxies, but upon looking at the rise and set times, I missed it by about a month. Maybe next year. So instead, I targeted a fairly popular emission nebula that I somehow have never imaged before, SH2-173. It's also known as the Phantom of the Opera Nebula due to its resemblance to the mask worn in the movie and musical. The nebula is located about 8,800 light years away in the northern constellation Cassiopeia and spans about 77 light years. Like other emission nebulae, it glows because of hydrogen being excited by UV light from nearby stars in the same way that a neon light works. It is reported that it is a star-forming region and some of the stars being formed are probably helping to light it up. Most of the images I've seen are very heavy in the red channel, but I purposely kept the red less intense to show the brownish dust and bluish reflections that are also present. Also in the image is a small open cluster to the southeast of the mask identified as NGC 103 that is about 4,600 light years away and an interesting structure to the northwest that doesn't seem to have an identifier. Two dark nebulae formed from thick dust clouds are also present, LDN 1282 and 1283, the latter one forming the mask's mouth and presumably the former is forming both eyes.

For as often as I've seen images of this nebula, I was not prepared for how faint it is. Usually, 5-minute shots through the red, green, and blue filters show a decent amount of signal with a simple screen stretch (automatic brightening of the picture on the viewing screen only), but there was nothing in either the green or blue frames and only a hint of the nebula in the red frames. The H-alpha, "HA", frames had low signal, but the nebula was clearly visible. To make matters worse, because I was shooting very long exposures for HA, I felt I needed to guide. The guider couldn't locate a guide star after the mount flip on the last night, so about 17% of my shots over the weekend were lost.

This image is similar to an LRGB image, except I used the HA stack as the luminance channel, making it an HARGB image. The image is a combination of stacks of 38 15-minute HA exposures, and 41, 37, and 38 5-minute exposures through the red, green, and blue filters, respectively. Total exposure time was 19 hours, 10 minutes. The HA frames were calibrated with 8 dark frames and the RGB frames were calibrated with 15 dark frames. 15 flat and dark flat frames were also used during calibration.

All frames except the darks were taken with a 90mm StellarVue triplet refractor reduced to 488mm focal length mounted on a Software Bisque Paramount MYT and controlled by The SkyX software. A ZWO 8-position filter wheel and ASI294-MM Pro monochrome camera cooled to -10C were in the image train. Focusing was done automatically with an Optec SVX30 focuser. Images were acquired using NINA and processed using PixInsight.

To process, I first applied deconvolution to all the stacked frames to sharpen the images. The RGB frames were combined to make the RGB image which was then color calibrated. The automatic color calibration was a little off as the heels of the R, G, and B channels were not aligned, so I manually adjusted them. Stars were removed from the HA and RGB images and were stretched separately. The stars were combined into an HARGB star frame. The starless HA and RGB frames were then both denoised and resharpened. Both were stretched using generalized hyperbolic stretching functions. This is where processing went wrong. When I combined the starless images together to make the HARGB starless image, I got very noisy and blotchy transitions from light regions to dark regions and a very ugly, salmon-pink nebula. After many attempts, I figured out that I was overstretching the nebula frames. Once I was able to get an HARGB starless frame that I liked, I screened the stars back into the image. Using a mask to limit changes to the reds, I increased the saturation to get a more pleasing red color. A little contrast enhancement resulted in the included photo.

I know that last part was probably a lot more than many needed to know, but there are some on my mailing list that want to know. As always, just read the sections that are of interest to you and enjoy the photo. Clear skies until next time.

Ron Ugolick

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

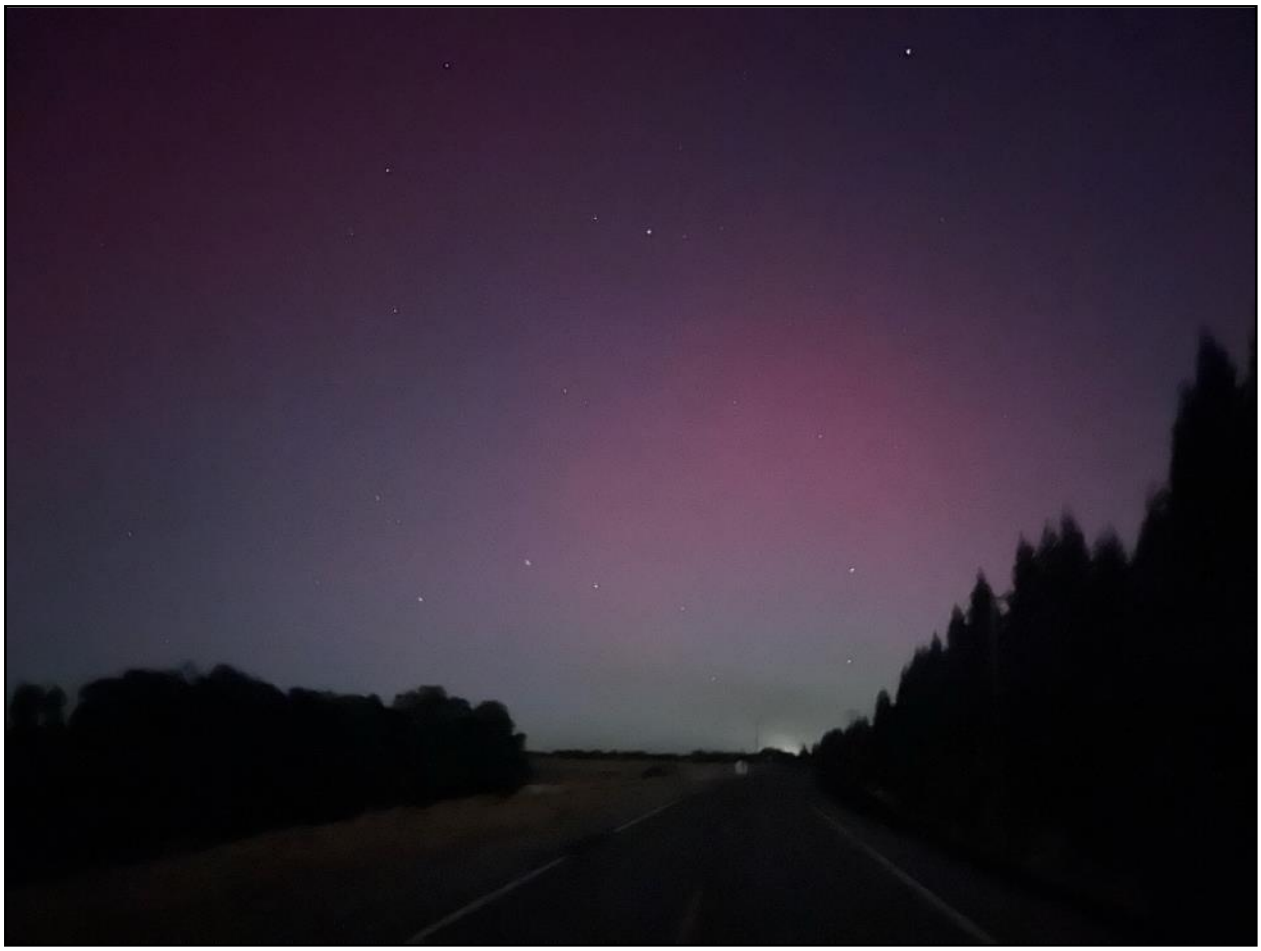
Sky Observers

Several of us who have attended the Grand Canyon Star Party have been enjoyed the fun of sharing the night skies with others – but what to do when the event is only one week out of the year? Why do it virtually, of course!

When there are aurora to be seen, comets in the sky, or Space X launches happening, there are often flurries of emails in advance advising how we should spend the evening. Then during the event itself, texts sharing viewing tips and photos if any good ones are obtained. With viewers in Central California, Southern California, Arizona, and sometimes even Oregon we cover much of the Western US with our observations.

Below are a few from the latest solar flare up – with a nod to Mike Magras for his help with sky object identification.

Claire Stover



Claire Stover – October 10, 2024 22:12 taken 6 miles outside of Knights Landing with iPhone 13 mini

Claire Stover – October 10, 2024 22:10 taken 6 miles outside of Knights Landing with iPhone 13 mini

Robin Trozpek – October 10, 2024 9:49pm near Enterprise, Oregon. The very bright dot just above the horizon between the smaller trees is Jupiter. Much of its constellation of Auriga is visible, though Capella is blocked by trees. The 2 bright stars directly below the Pleiades and in the notches between trees are Aldebaran (left, lower, brighter) and the nice double star theta Taurus, along with most of the rest of the V-shaped Hades.

NASA Night Sky Notes November 2024

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!

November's Night Sky Notes: Snowballs from Space

By Kat Troche

If you spotted comet C/2023 A3 (Tsuchinshan-ATLAS) in person, or seen photos online this October, you might have been inspired to learn more about these visitors from the outer Solar System. Get ready for the next comet and find out how comets are connected to some of our favorite annual astronomy events.

Comet Composition

A comet is defined as an icy body that is small in size and can develop a 'tail' of gas as it approaches the Sun from the outer Solar System. The key traits of a comet are its **nucleus**, **coma**, and **tail**.

The **nucleus** of the comet is comprised of ice, gas, dust, and rock. This central structure can be up to 80 miles wide in some instances, as recorded by the Hubble Space Telescope in 2022 – large for a comet but too small to see with a telescope. As the comet reaches the inner Solar System, the ice from the nucleus starts to vaporize, converting into gas. The gas cloud that forms around the comet as it approaches the Sun is called the **coma**. This helps give the comet its glow. But beware: much like Icarus, sometimes these bodies don't survive their journey around the Sun and can fall apart the closer it gets.

The most prominent feature is the **tail** of the comet. Under moderately dark skies, the brightest comets show a dust tail, pointed away from the Sun. When photographing comets, you can sometimes resolve the *second* tail, made of ionized gases that have been electronically charged by solar radiation. These ion tails can appear bluish, in comparison to the white color of the dust tail. The ion tail is also always pointed away from the Sun. In 2007, NASA's STEREO mission captured images of C/2006 P1 McNaught and its dust tail, stretching over 100 million miles. Studies of those images revealed that solar wind influenced both the ion and dust tail, creating striations – bands – giving both tails a feather appearance in the night sky.

Comet McNaught over the Pacific Ocean. Image taken from Paranal Observatory in January 2007. Credits: ESO/Sebastian Deiries

Coming and Going

Comets appear from beyond Uranus, in the Kuiper Belt, and may even come from as far as the Oort Cloud. These visitors can be **short-period** comets like Halley's Comet, returning every 76 years. This may seem long to us, but **long-period** comets like Comet Hale-Bopp, observed from 1996-1997 won't return to the inner Solar System until the year 4385. Other types include **non-periodic** comets like NEOWISE, which only pass through our Solar System once.

But our experiences of these comets are not limited to the occasional fluffy snowball. As comets orbit the Sun, they can leave a trail of rocky debris in its orbital path. When Earth finds itself passing through one of these debris fields, we experience meteor showers! The most well-known of these is the Perseid meteor shower, caused by Comet 109P/Swift-Tuttle. While this meteor shower happens every August in the northern hemisphere, we won't see Comet Swift-Tuttle again until the year 2126.

A view of the 2023 Perseid meteor shower from the southernmost part of Sequoia National Forest, near Piute Peak. Debris from comet Swift-Tuttle creates the Perseids. Credit: NASA/Preston Dyches

See how many comets (and asteroids!) have been discovered on NASA's Comets page, learn how you can cook up a comet, and check out our mid-month article where we'll provide tips on how to take astrophotos with your smartphone!