nightwatch
Newsletter of the Pomona Valley Amateur Astronomers

The power of the people and the power of reason are one.
Georg Buchner

VIRTUAL CLUB EVENTS
SEE WEBSITE FOR DETAILS

Volume 42 Number 5 ***nightwatch*** **May 2022**

PVAA General Meeting 4/22/22

Our speaker for the night was Anjani Polit who lead the OSIRIS-Rex Science Planning Team as Mission Implementation Senior System Engineer and served as the Vice-Chair of the OSIRIS-Rex Site Selection Board. OSIRIS-Rex is an acronym for: **O**rigins **S**pectral **I**nterpretation **R**esource **I**dentification **S**ecurity **R**egolith **Ex**plorer. This mission's main goal is to bring back a sample of at least 60 grams (2.1 oz) of the asteroid named Bennu.

Launched from Cape Canaveral atop an Atlas V 411 rocket on September 8, 2016, OSIRIS-Rex rendezvoused with Bennu on December 3, 2018. It then surveyed the asteroid to find a suitable site to get a sample. On October 20, 2020, OSIRIS-Rex touched down on Bennu and successfully collected a sample of its loose-rock regolith. It is scheduled to drop off the return sample to the Utah desert on September 24, 2023.

Once in orbit around Bennu, OSIRIS-Rex mapped the entire asteroid down to 5cm per pixel. Not even Earth is mapped to that resolution. After collecting its sample OSIRIS-Rex backed off from Bennu, secured its sample, and then flew back to OSIRIS-Rex to re-photograph the touchdown spot to see the mark it left on the asteroid.

When OSIRIS-Rex first arrived at Bennu, it found that Bennu was a lot rockier than originally thought. It was believed that it would be a lot sandier. A major surprise to the scientists was that Bennu is an 'active' asteroid. They found that several sand-sized pebbles were ejected from the asteroid while OSIRIS-Rex was photographing it. Four different areas were then selected to touch down. These were then down selected to two sites after a close fly-by, to obtain pictures with higher resolution. The sample site, named Nightingale, was selected. After touchdown it was determined that a few of the large pebbles collected were keeping the sample door open. Because of this, the sample was immediately enclosed in its return sample capsule. They originally wanted to spin the spacecraft with the sample on the end of the sample arm to determine the weight of the sample. The team decided that, with the sample door jammed open by a couple of large pebbles and a risk of part of the sample escaping, it would be wiser to enclose the entire sample in its return capsule without weighing it. They are confident that they have well over 60 grams of regolith.

Upon return to Earth 75% of the sample will be preserved for future generations to study. OSIRIS-Rex is now renamed OSIRIS-APEX as an extended mission to asteroid Apophis.

Gary Thompson

NASA Site:
https://www.nasa.gov/osiris-rex

Presentation on our PVAA YouTube channel:
https://www.youtube.com/watch?v=A3BFVIaEhJc

Black Eye & Sombrero

New moon weekend was April 29 and 30 with good weather predicted. With the good weather prediction and spring break, the campground filled quickly. In fact, Saturday night was completely booked, but we did manage to get our reservation in before we were shut out. This month there are two targets. The first was one of several potential dark site targets taken from home for practice, but it came out well enough that I'll share it. The second was the primary target of the list but shot from the dark site. Since it's near the end of galaxy season, they are both galaxies!

First up is Messier 64, the Black Eye galaxy, in Coma Berenices. Being at declination* 21 degrees, it rises quite high at home. You can see from the picture why it is called the Black Eye galaxy – I wonder what the other galaxy in the fight looked like! The unique "black eye" is the result of a dense dust cloud that obscures part of the galaxy and its core. Another unusual feature of this galaxy is that it has counter-rotating inner and outer disks of approximate equal mass, probably due to a galactic merger in the past. M64 is about 17 million light years away and contains about 100 billion stars spanning about 54,000 light years. Glowing at magnitude 9.8, it should be a relatively easy target, however, in the past, it's been difficult to get good contrast in the image to highlight the black eye. Even though the background is somewhat muddy, I was surprised at how well this turned out especially considering I shot broadband images from home.

Next up is Messier 104, the Sombrero galaxy, in Virgo near its border with Corvus. From home, this target is not possible due to it being at declination -11 degrees. It ends up in the trees at the southern end of my yard. Fortunately, the dark site was clear, and even though the campground was full, there was not much campfire smoke to mess up the images. The Sombrero is about 28 million light years away and shines at magnitude 8, about 6 times brighter than the Black Eye even though it's a little less than twice as far. The galaxy is about 50,000 light years wide and has up to about 2000 globular clusters orbiting it, about 10 times more than the Milky Way, making it one of the largest galaxies in the Virgo Cluster. The Sombrero is a spiral galaxy positioned nearly edge-on with thick dust lanes very prominently displayed along the edge. Other dust lanes can be seen toward the outer regions of the galactic disk. This is another target I've had difficulty with in the past, but I think this one turned out quite well.

The Black Eye was shot through the 8" Ritchey-Chretien telescope from home. It was also processed nearly entirely with PixInsight, software developed specifically for processing astronomic images, but finished in PhotoShop. My trial version of PixInsight was over, but I liked the processing results enough that I bought the software. Data was collected the nights of April 23 and 24, consisting of 98 3-minute luminance frames (4 hours, 54 minutes), 5 5-minute red and blue frames (25 minutes each), and 6 5-minute green frames (30 minutes). The frames were stacked in DeepSkyStacker, using 21 dark frames, flat frames, and dark flat frames, along with 150 bias frames. The stacked frames were initially processed as a luminance image and an RGB image before being combined into an LRGB image in PI. Final setting of the background level and sharpening was done in PS.

The set up for imaging the Sombrero was the same, except that it was shot from a much darker site. I had problems with polar alignment of the mount, though. For some reason, after an initial polar alignment, the mount control software wouldn't plate solve (determine where the scope was actually pointing). I had to restart the program each time to verify alignment, so I settled for "good enough" polar alignment. Fortunately, guiding was sufficient to correct for the inaccuracy in the alignment. This image is also an LRGB picture processed similarly to the Black Eye. Data was collected on April 29 and 30 evenings. I collected 92 3-minute luminance frames (4 hours, 36 minutes), 12 5-minute red and green frames (1 hour each), and 11 5-minute blue frames (55 minutes). This time stacking was done in PixInsight as well as most of the processing. Like the Black Eye processing, final background level and sharpening was done in PS.

* In case the term declination is confusing, I'll try to explain it. Just like the Earth, the sky can be mapped to a coordinate system useful for locating points on the "celestial" globe. Instead of latitude and longitude, the sky is divided by lines of right ascension and declination. Right ascension is similar to longitude in that lines of right ascension pass through the north and south celestial poles whereas lines of longitude pass through the Earth's north and south poles. Declination is similar to the Earth's latitude. In fact, if you just extend the Earth's latitude and longitude lines to infinity, you will end up with the celestial coordinates. The celestial equator is located midway between the north and south celestial poles and assigned declination 0. The north celestial pole is at declination 90 degrees and the south celestial pole is at declination -90 degrees.

By next month, we should be out of galaxy season, so more nebulae should be in the works soon. I hope you enjoyed this year's galaxy season offerings!

Ron Ugolick

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

Club Events Calendar

May 13	**General Meeting - Steven M. Levin, PhD, Project Scientist on the Juno Mission to Jupiter**
May 28	**Star Party – GMARS**
Jun 8	**Board Meeting**
Jun 17	**General Meeting (presentation: TBD)**
Jun 25	**Star Party – White Mountain**
July 2	**Star Party in the Park**
July 6	**Board Meeting**
July 15	**General Meeting (presentation: TBD)**
July 25-29	**Nature at Night – Girl Scout Event**
July 30	**Star Party – TBD**
Aug 3	**Board Meeting**
Aug 12	**General Meeting (presentation: TBD)**
Aug 27	**Star Party – TBD**
Aug 31	**Board Meeting**
Sep 3	**Star Party in the Park**
Sep 9	**General Meeting (presentation: TBD)**
Sep 24	**Star Party – GMARS**
Sept 28	**Board Meeting**
Oct 7	**General Meeting (presentation: TBD)**
Oct 22	**Star Party – TBD**
Oct 26	**Board Meeting**
Nov 4	**General Meeting (presentation: TBD)**
Nov 26	**Star Party – TBD**
Nov 26	**Star Party in the Park**
Nov 30	**Board Meeting**
Dec 3	**Christmas Party**

We have numerous club officer and board positions up for election this year, so please nominate yourself if you're interested in serving. Also, club dues are due this month -- $30 for individuals, $40 for families.

PVAA Officers and Board

Officers

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

Board

Jim Bridgewater (2022).....	909-599-7123
Richard Wismer(2022)	
Ron Hoekwater (2023).....	909-706-7453
Jay Zacks (2023) …….	

Directors

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

My Latest Image of the Leo Triplet.

Mike a I went out to GMARS on April 27 hoping to get 4 nights of imaging. The winds had other ideas.The trailer rocked in the wind gusts for two nights. On Thursday, I set my RedCat 51 up in the trailer and did calibration frames, hoping we would be able to image on Friday night. Friday turned out to be a beautiful night with very little wind. It was so good that we decided to stay on Saturday night. Well, Saturday the wind came back, although not as gusty as Wednesday and Thursday.

Image Description:

Leo Triplet NGC 3628 (also known as the Hamburger Galaxy), Messier 66 and Messier 65 in the constellation of Leo.

This cropped mage is 121 images at 180 seconds, captured at GMARS on April 29 and 30 with the RedCat 51, ASI2600MC Pro camera with an Optolong L-Pro filter, mounted on a Rainbow Astro RST-135 controlled by ASIAIR Pro and processed in PixInsight.

Sharol Carter

Martian Lunar Transit video

https://www.cnn.com/2022/04/21/world/perseverance-rover-mars-eclipse-scn/index.html

Ludd Trozpek

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.gov to find local clubs, events, and more!

Night Lights: Aurora, Noctilucent Clouds, and the Zodiacal Light

David Prosper

Have you spotted any "night lights"? These phenomena brighten dark skies with celestial light ranging from mild to dazzling: the subtle light pyramid of the zodiacal light, the eerie twilight glow of noctilucent clouds, and most famous of all, the wildly unpredictable and mesmerizing aurora.

Aurora, often referred to as the northern lights (aurora borealis) or southern lights (aurora australis), can indeed be a wonderful sight, but the beautiful photos and videos shared online are often misleading. For most observers not near polar latitudes, auroral displays are relatively rare and faint, and without much structure, more gray than colorful, and show up much better in photos. However, geomagnetic storms can create auroras that dance and shift rapidly across the skies with several distinct colors and appear to observers much further away from the poles - on very rare occasions even down to the mid-latitudes of North America! Geomagnetic storms are caused when a magnetic storm on our Sun creates a massive explosion that flings a mass of particles away from its surface, known as a Coronal Mass Ejection (CME). If Earth is in the path of this CME, its particles interact with our planet's magnetic field and result in auroral displays high up in our ionosphere. As we enter our Sun's active period of its 11-year solar cycle, CMEs become more common and increase the chance for dazzling displays! If you have seen any aurora, you can report your sighting to the Aurorasaurus citizen science program at aurorasaurus.org

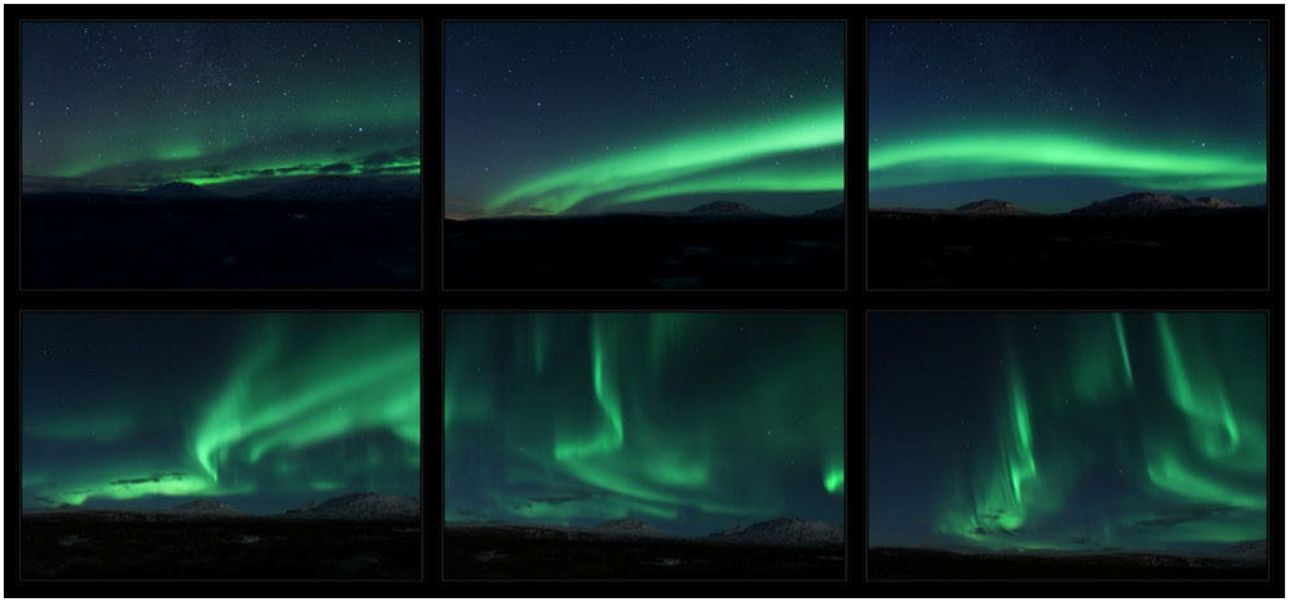
Have you ever seen wispy clouds glowing an eclectic blue after sunset, possibly towards your west or northwest? That wasn't your imagination; those luminescent clouds are noctilucent clouds (also called Polar Mesospheric Clouds (PMC)). They are thought to form when water vapor condenses around 'seeds' of dust from vaporized meteorites - along with other sources that include rocket launches and volcanic eruptions - around 50 miles high in the mesosphere. Their glow is caused by the Sun, whose light still shines at that altitude after sunset from the perspective of ground-based observers. Noctilucent clouds are increasing both in frequency and in how far south they are observed, a development that may be related to climate change. Keeping in mind that observers closer in latitude to the poles have a better chance of spotting them, your best opportunity to spot noctilucent clouds occurs from about half an hour to two hours after sunset during the summer months. NASA's AIM mission studies these clouds from its orbit high above the North Pole: go.nasa.gov/3uV3Yj1

You may have seen the zodiacal light without even realizing it; there is a reason it's nicknamed the "false dawn"! Viewers under dark skies have their best chance of spotting this pyramid of ghostly light a couple of hours after sunset around the spring equinox, or a couple of hours before dawn around the autumnal equinox. Unlike our previous two examples of night lights, observers closer to the equator are best positioned to view the zodiacal light! Long known to be reflected sunlight from interplanetary dust orbiting in the plane of our solar system, these fine particles were thought to originate from comets and asteroids. However, scientists from NASA's Juno mission recently published a fascinating study indicating a possible alternative origin: dust from Mars! Read more about their serendipitous discovery at: go.nasa.gov/3Onf3kN

Curious about the latest research into these night lights? Find news of NASA's latest discoveries at nasa.gov

Comet NEOWISE flies high above a batch of noctilucent clouds in this photo from Wikimedia contributor Brwynog.
License and source CC BY-SA 4.0 https://commons.wikimedia.org/wiki/File:Comet_Neowise_and_noctilucent_clouds.jpg

The zodiacal light extends into the Pleiades, as seen in the evening of March 1, 2021 above Skull Valley. Utah.
The Pleiades star cluster (M45) is visible near the top.
Credit and source:: NASA/Bill Dunford .https://www.flickr.com/photos/gsfc/51030289967



A sampling of some of the various patterns created by aurora, as seen from Iceland in 2014. The top row photos were barely visible to the unaided eye and were exposed for 20-30 seconds; in contrast, the bottom row photos were exposed for just 4 seconds- and were clearly visible to the photographer, Wikimedia contributor Shnuffel2022.
License and source: CC BY-SA 4.0 https://commons.wikimedia.org/wiki/File:Aurora_shapes.jpg