nightwatch
Newsletter of the Pomona Valley Amateur Astronomers

I thought I knew a lot
until I learned a little.
. ***Robin Sharma***

Volume 42 Number 6 ***nightwatch*** **June 2022**

President's Message

Our speaker this month is retired NASA engineer, aware-winning astronomy author, and PVAA member Ken Elchert, who will speak to us about the Apollo 13 mission. Although Ken worked on the space shuttle, he was at NASA late in the Apollo program, and he knew many of the astronauts and engineers involved in the Apollo program personally, so we look forward to an insightful talk.

We'll also be voting for club officer positions using the poll function on Zoom. Which is a reminder to get your dues in if you haven't already – and many thanks to everyone who has. I look forward to seeing you at the meeting!

Matt Wedel

Club Events Calendar

Jun 17	**General Meeting - Ken Elchert "Apollo 13"**
Jun 25	**Star Party – White Mountain**
July 2	**Star Party in the Park**
July 6	**Board Meeting**
July 15	**General Meeting (presentation: TBD)**
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 19	**Star Party – TBD**
Nov 26	**Star Party in the Park**
Nov 30	**Board Meeting**
Dec 3	**Christmas Party**

MEMORIAL FOR LEE COLLINS

Many of you may have already heard of Lee Collins' passing on December 14, 2021. Lee will be profoundly missed, as he touched so many of our lives with his kind nature, intellect and wit.

Please join us as we gather to remember Lee, and share stories, poetry, and song.

Date: Sunday, July 24, 2022

Time: 2:00 p.m.

Location: Unitarian Universalist Church
9195 Monte Vista Avenue
Montclair, CA 91763

An early dinner will be served following the memorial.

Please contact Claire at pvaanightwatch@gmail.com if you'd like to contact the Memorial organizer or let her know you'll be attending so I can connect you.

from my backyard with a canon 60d 300 telo lens

Andrew Bridgewater

PVAA General Meeting 5/13/2022

The PVAA had their monthly meeting via Zoom on May 13th, 2022, with the announcement of elections to the PVAA Board for the next meeting.

Our speaker of the night was Steve Levin of the Jet Propulsion Laboratory – Juno Project Scientist. If you missed his great presentation, you can still see it on our YouTube channel here: https://www.youtube.com/watch?v=YFosV9GHvQo His topic for the night is the current NASA Jupiter mission known as Juno. Juno is the 1st solar-powered mission to Jupiter, and the furthest solar-powered mission from the sun. It has eight science instruments to conduct gravity, magnetic and atmospheric investigations, plus a camera for education and public outreach. Juno launched on the 5th of August 2011 on an Atlas 5. It went into orbit around Jupiter on the 5th of July 2016, one month short of 5 years. Juno has the largest solar panels ever put a space probe. The previous probe to Jupiter – Galileo, had a radioisotope thermoelectric generator for power. These solar panels produce 14 kilowatts in Earth orbit, but only 435 watts at Jupiter. It is in a highly elliptical 53-day orbit where it flies by Jupiter very fast at its closest approach, so that it does not stay too long in Jupiter's high magnetic field. A normal circular orbit would fry the electronics or be too far away to get the data they wanted. Currently the are reducing the orbital period to 33 days by February 2024. Having completed its original goals, it is now on an extended mission to include investigation of Jupiter's moons.

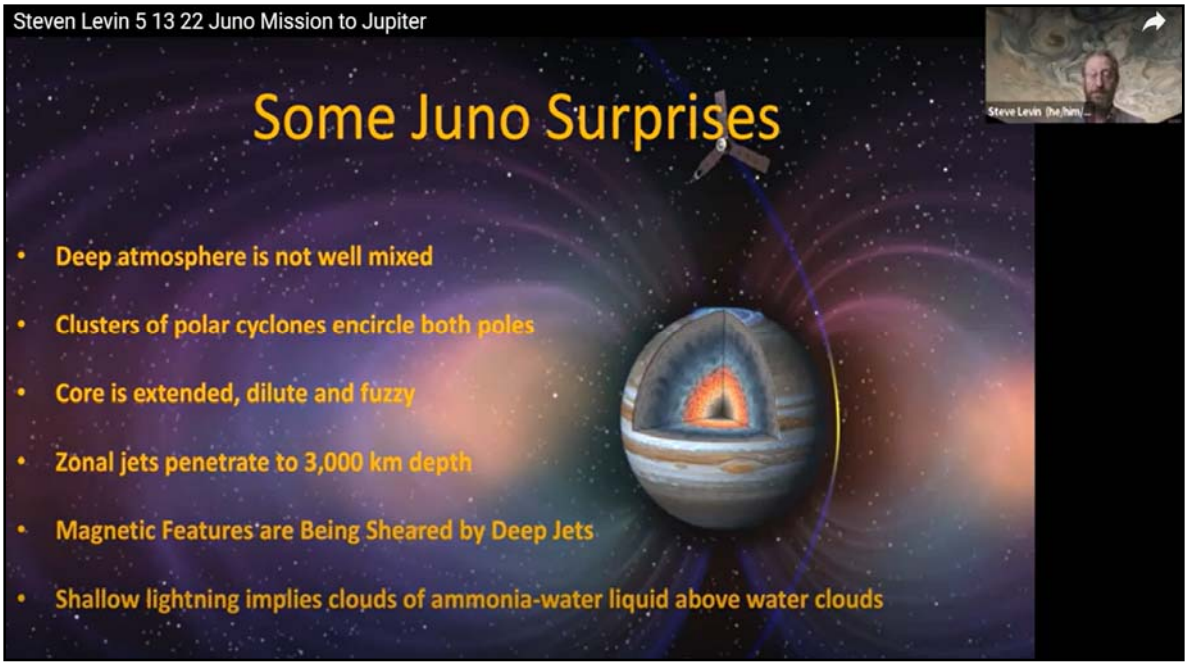
For more information Steven suggested these web sites:
http://missionjuno.swri.edu
http://www.nasa.gov/juno

Juno has a person in charge of the whole project who is known as a Principal Investigator. Scott Bolton of the Southwest Research Institute leads the Juno mission. This has worked out extremely well. Scott has kept the team on track to investigate the 4 main goals of the mission:

1.) Origin – Determine the abundance of water and constrain the mass of Jupiter's core to distinguish among theories of planet formation.
2.) Interior - Understand Jupiter's interior structure and how material moves deep within the planet by mapping its gravitational and magnetic fields.
3.) Atmosphere – Map variations in atmospheric composition, temperature, cloud opacity and dynamics to depths greater than 100 bars at all latitudes.
4.) Magnetosphere – Characterize and explore the three-dimensional structure of Jupiter's polar magnetosphere and auroras.

While looking into the data received, the first thing the team learned was humility. Before its arrival at Jupiter, everyone had an idea of what we would see, and everyone had expectations of what Jupiter would be like. In every single new way we looked at Jupiter, we were surprised. Every time we measured something that we hadn't done before it didn't look like something we thought we were going to get. The summary of what we found is: It's a whole new Jupiter! Juno revolutionizes our understanding of what Jupiter is, what it is like, and how it was formed.

Key surprises: Deep atmosphere is not well mixed. Clusters of polar cyclones encircle both poles. Core is extended, dilute and fuzzy. Zonal jets penetrate to 3,000 km depth. Magnetic Features are sheared by deep jets. Shallow lightning clouds of ammonia-water liquid above water clouds.



Gary Thompson

Mission Phase: Perijove 34 Credit: David Marriott
Submitted by: livelongandprosper

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

Seyferts and Sunflower

Memorial Day weekend was the correct weekend to be under dark skies since new moon was Monday, May 30, but the campground was fully booked a month in advance. We ended up going out a weekend later under a partial waxing moon. It turns out that in spite of a favorable weather forecast, only Friday night was marginally clear for my primary target. Saturday fogged up less than an hour after "official" darkness. Even worse, just prior to fogging up, the telescope mount malfunctioned and wouldn't move in the declination axis – I couldn't have imaged even if the weather had been clear. Fortunately, I imaged a backup target starting in mid-May through June 1.

So, while I said last month that galaxy season was over, it looks like there were a few more left. I started shooting the Sunflower galaxy, the back up target, from home on May 18, and after dodging overcast and misty weather, I finished on June 1. The last time I imaged this target was more than 7 years ago with my old imaging system, so it was overdue for a redo! Also known as M 63, the Sunflower galaxy is in Canes Venatici and lies about 27 to 29 million light years from Earth by most estimates. The galaxy spans an area of about 12 arcminutes by 7 arcminutes of the sky making it reasonably large. While the galaxy has two spiral arms, they are ill-defined and appear discontinuous leading it to be classified as a flocculent galaxy. I'm not sure I captured the fluffy nature very well, but it sort of shows up.

At the camp site on June 3, I targeted Seyfert's Sextet, a group of interacting galaxies in Serpens. Sitting in the center of my image, there are actually only four galaxies interacting. One of the "six" is really a background galaxy while one of the others isn't a galaxy at all but a tidal tail pulled away by the interactions. Seyfert's Sextet is about 160 million light years away, making the galaxies quite small when viewed from Earth. They only shine at dim magnitudes 14.7 to 16.5. Along the left edge of the image is another small galaxy, PGC 56636, which shines a little brighter at magnitude 13.89. If you look closely, you can find many other small distant galaxies that are even dimmer.

Both images were shot through the 8" Ritchey-Chretien telescope with a monochrome ASI1600MM camera cooled to -15C. The Sunflower is an LRGB image with all the luminance frames having 3-minute exposure times, while both 3- and 5-minute exposure times were used for the RGB frames. All the frames were calibrated with 21 dark, flat, and dark flat frames. In total, a little more than 9 hours of luminance data, 2 hours of green and blue data, and nearly 3 hours of red data. Total time was 16 hours and 7 minutes. As you can tell, Seyfert's Sextet is only monochrome, specifically shot through the luminance filter. Given that clouds rolled through all night long, I was surprised at how well this turned out, especially since I got no data for RGB or additional luminance Saturday night. A total of 5 hours' worth of 5-minute frames were collected and calibrated with 21 dark, flat, and dark flat frames. You might also notice this image is about ¼ the size of the Sunflower image. This is because Seyfert's Sextet was shot in binned mode where pixels are grouped by four. In other words, every set of 2x2 pixels is combined into a single, larger pixel. When I shoot using the RC and this camera, unbinned images are somewhat over-sampled, meaning I'm using more pixels than needed to see details that are present and oversampling causes stars to appear soft. Both images were stacked using DeepSkyStacker and mostly processed using PixInsight. Finishing touches were done in Photoshop.

I opened my mount and hopefully fixed what I think the issue was. Fingers crossed for more cooperative weather next month.

Clear skies!

Ron Ugolick

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

M3 with Meteor

Comet 73P/Schwassmann-Wachmann 3 was discovered May 2, 1930 at the Hamburg Observatory in Bergedorf, Germany. It was not bright enough to be see with the naked eye, but could be seen with binoculars and telescopes. In the fall of 1995, it became a naked-eye comet and was observed to be fragmented. It has become more fragmented at each return. The resulting meteor shower is known as the Tau Herculids

Mike and I were out at GMARS on May 30th to try to catch the Tau Herculids meteor shower. It was predicted that the peak would be around 10 PM PDT on May 30 and could be up to 1,000 meteors per hour. I set up my RedCat 51 aimed at M3, hoping to catch a meteor. I only got eighteen 300 second images before the wind got gusty and I took down my telescope. I was lucky to catch one meteor. Mike and I saw about 9 meteors.

Sharol Carter

Image description: M3 in the constellation of Canes Venatici with one meteor form the tau Herculids shower. Single 300 second exposure, captured at GMARS on May 30, 2022 with the RedCat 51, ASI2600MC Pro camera with an Optolong L-Pro filter, mounted on a Rainbow Astro RST-135, controlled by ASIAIR Plus and processed in PixInsight and CS5.

Lunar Eclipse

Sunday evening was our first total lunar eclipse for quite some time, at least for us here in So. Cal. Unfortunately, the moon rose already partially eclipsed, but that meant we'd be able to see the ending at a reasonable hour! I didn't use any of my telescopes, but instead just used a camera on a tripod. Yes, that does work!

The first picture with the palm tree in the foreground is a single image taken at about 8:41 pm. I used a Canon 80D, fully manual, f/5.6, 4 second exposure, ISO 400, at a focal length of 127 mm. Even at 4 seconds, the stars moved enough that any pixel peepers will notice trailing. And, you'll kindly notice the fly-by in the upper left of the picture! See the pilot waving hello? At least in this kind of picture it adds interest. In my other images they're annoyances!

The second picture is a combination of two images taken seconds apart at about 10:08 pm as the moon was coming out of totality. Both pictures were shot at 250 mm focal length, f/5.6, ISO 400. One was a 1 second exposure and the other 1/15 of a second exposure. The idea was to get detail in the bright portion with the shorter exposure and in the eclipsed portion in the longer exposure. I had hoped to use an HDR (high dynamic range) technique to combine the two, but the image moved too much in that short amount of time that it didn't work. I had to manually align the images and blend them together. While not exactly what I wanted, it looks reasonable to me.

I hope some of you were able to get out and see at least some of the eclipse. The next one for us will be the night of November 7-8, but totality won't occur until about 2:15 am! I doubt I'm going to see that one!

Ron Ugolick

NASA Night Sky Notes June 2022

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

Solstice Shadows

David Prosper

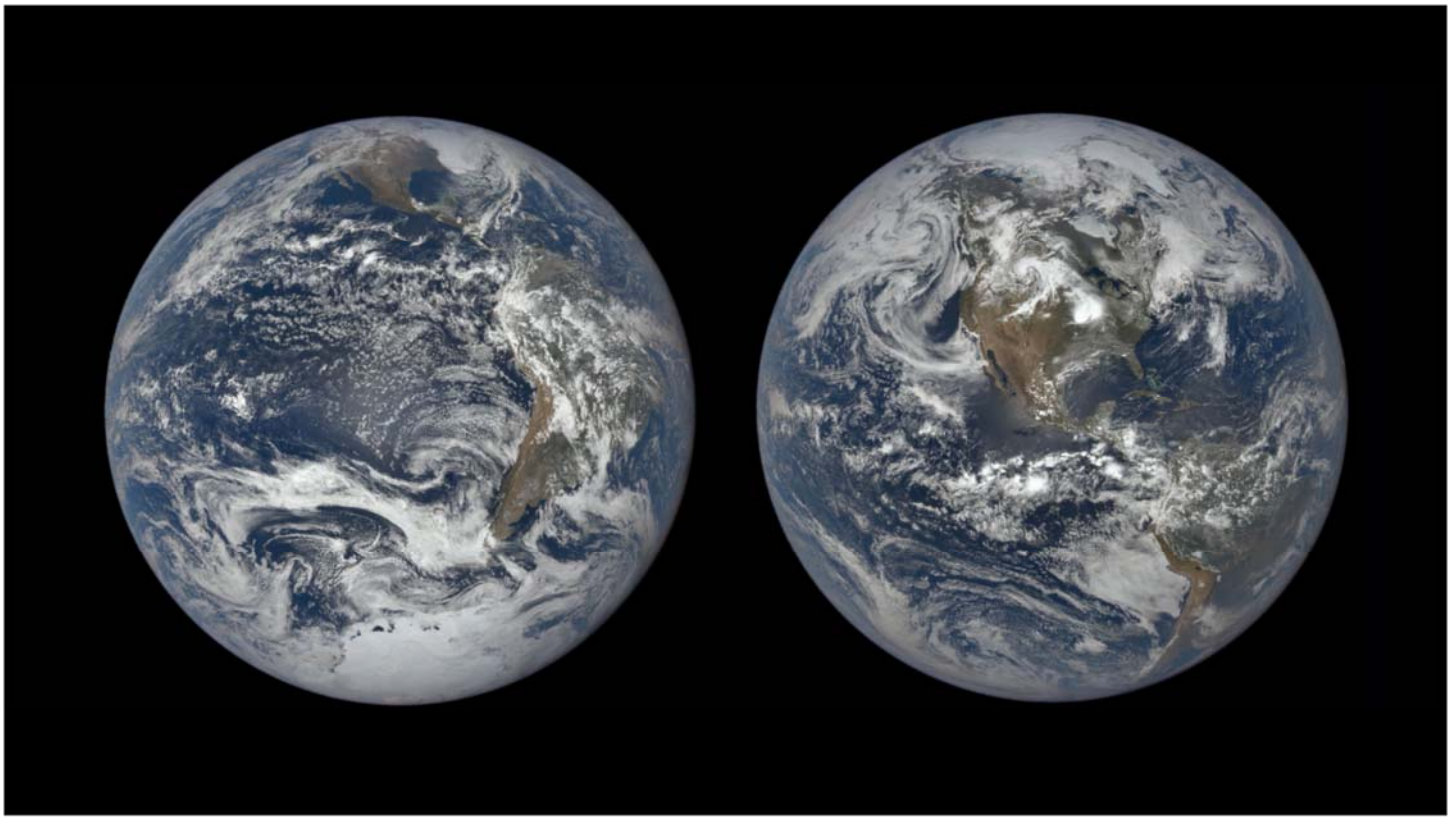
Solstices mark the changing of seasons, occur twice a year, and feature the year's shortest and longest daylight hours - depending on your hemisphere. These extremes in the length of day and night make solstice days more noticeable to many observers than the subtle equality of day and night experienced during equinoxes. Solstices were some of our earliest astronomical observations, celebrated throughout history via many summer and winter celebrations.

Solstices occur twice yearly, and in 2022 they arrive on June 21 at 5:13 am EDT (9:13 UTC), and December 21 at 4:48pm EST (21:48 UTC). The June solstice marks the moment when the Sun is at its northernmost position in relation to Earth's equator, and the December solstice marks its southernmost position. The summer solstice occurs on the day when the Sun reaches its highest point at solar noon for regions outside of the tropics, and those observers experience the longest amount of daylight for the year. Conversely, during the winter solstice, the Sun is at its lowest point at solar noon for the year and observers outside of the tropics experience the least amount of daylight- and the longest night – of the year. The June solstice marks the beginning of summer for folks in the Northern Hemisphere and winter for Southern Hemisphere folks, and in December the opposite is true, as a result of the tilt of Earth's axis of rotation. For example, this means that the Northern Hemisphere receives more direct light from the Sun than the Southern Hemisphere during the June solstice. Earth's tilt is enough that northern polar regions experience 24-hour sunlight during the June solstice, while southern polar regions experience 24-hour night, deep in Earth's shadow. That same tilt means that the Earth's polar regions also experience a reversal of light and shadow half a year later in December, with 24 hours of night in the north and 24 hours of daylight in the south. Depending on how close you are to the poles, these extreme lighting conditions can last for many months, their duration deepening the closer you are to the poles.

While solstice days are very noticeable to observers in mid to high latitudes, that's not the case for observers in the tropics - areas of Earth found between the Tropic of Cancer and the Tropic of Capricorn. Instead, individuals experience two "zero shadow" days per year. On these days, with the sun directly overhead at solar noon, objects cast a minimal shadow compared to the rest of the year. If you want to see your own shadow at that moment, you have to jump! The exact date for zero shadow days depends on latitude; observers on the Tropic of Cancer (23.5° north of the equator) experience a zero shadow day on the June solstice, and observers on the Tropic of Capricorn (23.5° south of the equator) get their zero shadow day on December's solstice. Observers on the equator experience two zero shadow days, being exactly in between these two lines of latitude; equatorial zero shadow days fall on the March and September equinoxes.

There is some serious science that can be done by carefully observing solstice shadows. In approximately 200 BC, Eratosthenes is said to have observed sunlight shining straight down the shaft of a well during high noon on the solstice, near the modern-day Egyptian city of Aswan. Inspired, he compared measurements of solstice shadows between that location and measurements taken north, in the city of Alexandria. By calculating the difference in the lengths of these shadows, along with the distance between the two cities, Eratosthenes calculated a rough early estimate for the circumference of Earth – and also provided further evidence that the Earth is a sphere!

Are you having difficulty visualizing solstice lighting and geometry? You can build a "Suntrack" model that helps demonstrate the path the Sun takes through the sky during the seasons; find instructions at stanford.io/3FY4mBm. You can find more fun activities and resources like this model on NASA Wavelength: science.nasa.gov/learners/wavelength. And of course, discover the latest NASA science at nasa.gov.



These images from NASA's DSCOVR mission shows the Sun-facing side of Earth during the December 2018 solstice (left) and June 2019 solstice (right). Notice how much of each hemisphere is visible in each photo; December's solstice heavily favors the Southern Hemisphere and shows all of South America and much of Antarctica and the South Pole, but only some of North America. June's solstice, in contrast, heavily favors the Northern Hemisphere and shows the North Pole and the entirety of North America, but only some of South America.

Credit: NASA/DSCOVR EPIC Source: https://www.nasa.gov/image-feature/goddard/2021/summer-solstice-in-the-northern-hemisphere

A presenter from the San Antonio Astronomy Club in Puerto Rico demonstrating some Earth-Sun geometry to a group during a "Zero Shadow Day" event. As Puerto Rico lies a few degrees south of the Tropic of Cancer, their two zero shadow days arrive just a few weeks before and after the June solstice. Globes are a handy and practical way to help visualize solstices and equinoxes for large outdoor groups, especially outdoors during sunny days!

Credit & Source: Juan Velázquez / San Antonio Astronomy Club

Note to Editors: The images attached to March's "Embracing the Equinox" article can also be used with this article if desired, though slight updates to the captions might be desired to change to focus from equinox to solstice. You can find the archive at: https://nightsky.jpl.nasa.gov/docs/PartnerArticleMarch2022.zip