



.Anything becomes interesting if you look at it long enough.
Gustave Flaubert

Newsletter of the Pomona Valley Amateur Astronomers

Volume 37 Number 03

nightwatch

March 2017

President's Message

Not much news this time. It's a busy season for me, with lots of travel. Unfortunately I'll be out of town for both this month's general meeting, and for the star party in Death Valley on Saturday the 25th. Curses! Hopefully I'll have some stories of observing from the road when I get back.

It's a busy season for the club, too. This past Tuesday, the 7th, we had an outreach at Oakmont Elementary in Claremont. Cori Charles, Gary Thompson, Jeff Schroeder, Ron Theders, and I were all there with scopes set up. Gary in particular wowed the crowd with views of a very thin crescent Venus.

There's another school outreach next Friday, March 17, at Mountain View Elementary. That will be after the time change, so the observing probably won't start until about 7:30. Please contact Jeff Schroeder if you're interested in attending.

Finally, on Saturday, April 1, we'll be helping out with the Children's Book Fair at the Claremont Public Library, from 1-4 PM. We've been doing this for the past few years and it's a great way to promote the club and astronomy to our community. We're always looking for volunteers to help run our table. If you're interested in participating, please let me know.

The general meeting will be in Shanahan B460 on the Harvey Mudd campus in Claremont, at 7:30 PM Friday evening. Our speaker this month is one of our own, PVAA member and professor of astronomy at Citrus College, Dr. David Kary. He will speak to us about the newly-discovered exoplanets in the habitable zone of the star TRAPPIST 1. Dave's a great speaker and I'm very sad to miss his talk. I hope that you go and enjoy it.

Matt Wedel

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PVAA General Meeting 02/10/17

PVAA President Mathew Wedel started off the meeting with announcements and a little display of items the club has for sale. They included eyepieces, books, an eyepiece holder for a Dobsonian telescope, Collimators, and several Rigel Quickfinders – like ‘small telrads’. The club raised \$62 when they went on sale during the break. We will have more for sale at the March meeting.

The speaker for the night was Dave Nakamoto from JPL. His topic was titled: “The Planet...VULCAN???” (A brief history by Dave Nakamoto)” When we think of the planet Vulcan we think of Spock and Star Trek. But the planet Vulcan was first used in the 1800s for a planet thought to be between the Sun and Mercury. The reason it was believed to exist was the fact that Mercury ‘wobbled’ and did not strictly adhere to a purely Newtonian orbit. Something was affecting it. It had to be another, yet to be discovered, planet inside the orbit of Mercury causing these disturbances.

In 1840 the director of the Paris Observatory, Francois Arago, asked French mathematician Urbain Le Verrier to work on Mercury’s orbit around the sun. In 1843 Le Verrier published his theory, based on Sir Isaac Newton’s laws of motion and gravitation. Later that same year Mercury did a transit of the sun, as seen from Earth. Le Verrier’s predictions did not match the observations. Urbain Le Verrier DID correctly predict a planet beyond Uranus, and where (within a degree) to find it. Thus, Neptune was found to be the 8th planet of our solar system due to his work. (Englishman John Couch Adams also came up with the same results as Le Verrier, but reported them 5 days later.)

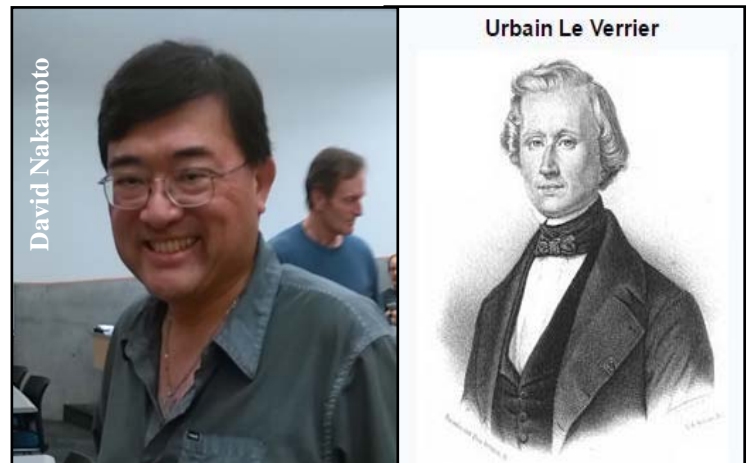
Le Verrier then went over and refined his work. He used the data collected from 14 transits of Mercury and found that the perihelion precession was moving 43 arc seconds per century from the predicted Newtonian values. Le Verrier then proposed that the observed precession could be explained by the presence of a small planet inside the orbit of Mercury. He then spent the rest of his life looking for it. He came across data from James Watson and his wife claiming that they had seen an object in the 7/29/1828 solar eclipse in the United States. This was before astrophotography. James would describe what he was seeing, and his wife would write it down. On 3/26/1859 astronomer Lescarbault says he saw an object 1/4th the size of Mercury, wrote it down on a chalkboard, and then erased it. (It was latter discredited as a sun spot.)

Finally, Albert Einstein came out with his Theory of Relativity which not only predicted the observed precession, but required it. The planet Vulcan died with it and did not re-appear until 1966 with the airing of Star Trek. “Live long and prosper.”

Gary Thompson



Mercury, as taken from NASA’s Messenger spacecraft.



Items on sale during break.

For more information please see these websites:

<http://news.nationalgeographic.com/2015/11/151104-newton-einstein-gravity-vulcan-planets-mercury-astronomy-theory-of-relativity-ngbooktalk/>

https://en.wikipedia.org/wiki/Urbain_Le_Verrier

<http://www.history.com/news/vulcan-the-famous-planet-that-never-existed>)

Club Events Calendar

- March 10, 2017 General Meeting – Dave Kary
- March 25, 2017 Star Party – Mesquite Springs, Death Valley

- Mar 30, 2017 Board Meeting
- Apr 7, 2017 General Meeting
- Apr 22, 2017 Star Party – Cow Canyon Saddle

- May 3, 2017 Board Meeting
- May 12, 2017 General Meeting
- May 25 - 29, Joint RTMC

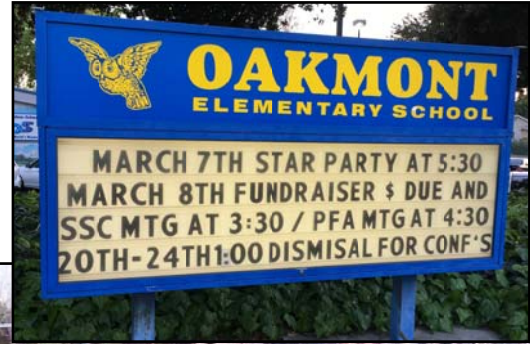
- May 31, 2017 Board Meeting
- June 9, 2017 General Meeting
- June 24, 2017 Star Party – Grandview

- June 29 Board Meeting
- July 7 General Meeting
- July 22 Star Party -Culp Valley Campground, Anza Borrego

- July 27 Board Meeting
- August 4 General Meeting
- August 12 Star Party - Cow Canyon Saddle, Mount Baldy

- August 31 Board Meeting
- September 8 General Meeting
- September 16 Star Party - Palomar Mountain and Observatory tour

- September 28 Board Meeting
- October 6 General Meeting
- October 21 Star Party - Nightfall, Anza Borrego



Ron Theders Setting Up Scope



Cori Charles



Gary Thompson



What's Up? - Venus, Hot Love Goddess

Venus is the second brightest object in the night sky after our Moon. Right now it appears in its “evening star” role. It’s this dazzlingly bright twilight performance that got it named after the beautiful Roman goddess of love. It also appears as the “morning star” since it’s between Earth and the Sun.

Many ancient civilizations thought Venus was both evening and morning star objects. The ancient Greeks named them Hesperus and Phosphorus. The Romans called them Vesper and Lucifer. But some civilizations, like the ancient Babylonians, realized through observation that they were the same object.

It’s the hottest planet in our solar system due to having an extremely thick atmosphere of mostly carbon dioxide. A total example of global warming. This is possibly the result of reoccurring volcanic activity (see picture) and no moon to pull away and thin out its heavy atmosphere. Only a quarter of the Sun’s light reaches Venus’ densely clouded surface. Venus was the first planet to have its movements plotted across the sky. Early astronomers thought of it as being like Earth but warm and tropical. Maybe with dinosaurs living in a steamy jungle. People could go there and hunt them.

This is sad, because even although Venus is the planet most similar in size and mass to our Earth, people would never be able to survive on this oven of a planet. Russia sent a series of Venera orbiters to Venus. Venera 9 landed in 1970 to take the first picture of a rocky, cooked landscape before being destroyed by the 800 degree atmosphere. Venus’ surface is only really visible by radar due to its thick clouds. Its atmospheric surface pressure is 92 times that of Earth. Its high surface temperature hardly changes between day and night.

Besides its many volcanic dome-like montes there are vast hot plains called “planitia” as well as highlands pushed upward by heaving molten rock beneath. It has a thin rocky mantle and basalt crust that covers a molten iron and nickel core. There are fewer impact craters than might be expected because smaller incoming objects fragment and burn up in the extremely thick atmosphere.

Sometimes called Earth’s sister planet it has feminine naming tradition. The surface features are named after the divine Venus’ sister goddesses from other non Roman cultures. So there is Lakshmi Planum, Maat Mons, Lavinia Planitia, Tellus

Tessera and Aphrodite Terra. Its northern continent is named Ishtar Terra (from Ishtar the Babylonian goddess of love). Here is a feature named after a man. The highest mountain Maxwell Montes is named after astronomer James Clerk Maxwell.

This unusual second planet from the Sun orbits in 225 Earth days (a Venusian year). But takes a long slow 243 Earth days to rotate on its axis (a Venusian day). With a slightly tilted angle of 2.7 degrees it moves in a retrograde direction around the Sun. It also has no magnetic field.

This lack of a magnetic field is very odd considering that Venus is almost the same size as Earth. It was expected to have a dynamo at its core. But a dynamo must have a conductive liquid, convection and rotation. It’s thought that Venus rotates too slowly to produce a dynamo. Its core heat is used to constantly reheat the crust. The result is no internal dynamo to drive a magnetic field.

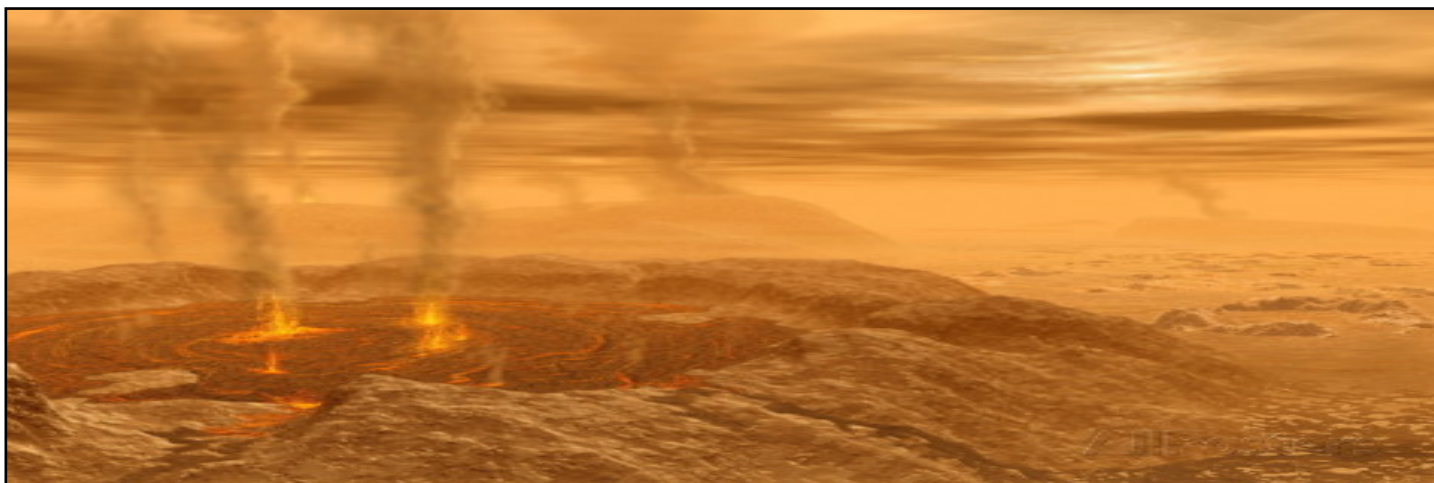
Venus’ lack of any moon is also odd. Early astronomers thought they had found a moon but their observations turned out to be stars. It may have once had a moon that impacted into the planet billions of years ago. This may have caused the unique reversal of the planet’s spin direction.

In a telescope Venus displays phases (like our Moon) because it’s between us and the Sun. A full Venus can never be seen because it’s obscured by the Sun at that time. It also transits in front of the Sun, but rarely. It passed in front of the Sun in 1874, 1882, 2004, and 2012. The next transits will be in 2117 and 2125.

Because it’s the closest planet Venus can reach a very bright magnitude of -4.9. It is often reported as an unidentified flying object. President Carter reported Venus as a UFO. It can be seen in a clear daytime sky, but it always lies within some 47 degrees from the Sun. It overtakes the Earth every 584 days in its solar orbit. Then it changes from “evening star” to “morning star”.

When Galileo observed Venus in a telescope he saw it had phases like our Moon. This was the first observation that strongly contradicted that Ptolemaic geocentric idea that our solar system was centered on the Earth.

Lee Collins





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Solar Eclipse Provides Coronal Glimpse

On August 21, 2017, North Americans will enjoy a rare treat: The first total solar eclipse visible from the continent since 1979. The sky will darken and the temperature will drop, in one of the most dramatic cosmic events on Earth. It could be a once-in-a-lifetime show indeed. But it will also be an opportunity to do some science.

Only during an eclipse, when the moon blocks the light from the sun's surface, does the sun's corona fully reveal itself. The corona is the hot and wispy atmosphere of the sun, extending far beyond the solar disk. But it's relatively dim, merely as bright as the full moon at night. The glaring sun, about a million times brighter, renders the corona invisible.

"The beauty of eclipse observations is that they are, at present, the only opportunity where one can observe the corona [in visible light] starting from the solar surface out to several solar radii," says Shadia Habbal, an astronomer at the University of Hawaii. To study the corona, she's traveled the world having experienced 14 total eclipses (she missed only five due to weather). This summer, she and her team will set up identical imaging systems and spectrometers at five locations along the path of totality, collecting data that's normally impossible to get.

Ground-based coronagraphs, instruments designed to study the corona by blocking the sun, can't view the full extent of the corona. Solar space-based telescopes don't have the spectrographs needed to measure how the temperatures vary

throughout the corona. These temperature variations show how the sun's chemical composition is distributed—crucial information for solving one of long-standing mysteries about the corona: how it gets so hot.

While the sun's surface is ~9980 Farenheit (~5800 Kelvin), the corona can reach several millions of degrees Farenheit. Researchers have proposed many explanations involving magneto-acoustic waves and the dissipation of magnetic fields, but none can account for the wide-ranging temperature distribution in the corona, Habbal says.

You too can contribute to science through one of several citizen science projects. For example, you can also help study the corona through the Citizen CATE experiment; help produce a high definition, time-expanded video of the eclipse; use your ham radio to probe how an eclipse affects the propagation of radio waves in the ionosphere; or even observe how wildlife responds to such a unique event.

Otherwise, Habbal still encourages everyone to experience the eclipse. Never look directly at the sun, of course (find more safety guidelines here: <https://eclipse2017.nasa.gov/safety>). But during the approximately 2.5 minutes of totality, you may remove your safety glasses and watch the eclipse directly—only then can you see the glorious corona. So enjoy the show. The next one visible from North America won't be until 2024.

Marcus Woo

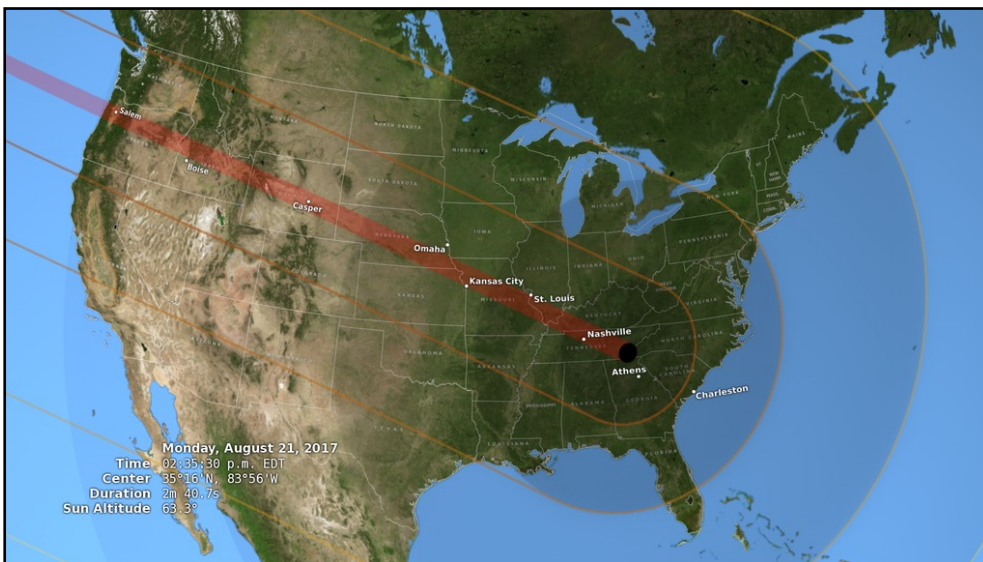


Illustration showing the United States during the total solar eclipse of August 21, 2017, with the umbra (black oval), penumbra (concentric shaded ovals), and path of totality (red) through or very near several major cities. Credit: Goddard Science Visualization Studio, NASA

For more information about the upcoming eclipse, please see:

NASA Eclipse citizen science page

<https://eclipse2017.nasa.gov/citizen-science>

NASA Eclipse safety guidelines

<https://eclipse2017.nasa.gov/safety>

Want to teach kids about eclipses? Go to the NASA Space Place and see our article on solar and lunar eclipses!
<http://spaceplace.nasa.gov/eclipses/>