



All our knowledge begins with the senses,
 proceeds then to the understanding,
 and ends with reason.
 There is nothing higher than reason.
Immanuel Kant

Newsletter of the Pomona Valley Amateur Astronomers

Volume 36 Number 2

nightwatch

February 2016

President's Message

We have something fun coming up in a couple of weeks. The Children's Book Festival at the Claremont Public Library will be Saturday, March 5, from 1-4 PM. For the past several years the PVAA and the Planetary Society have had a couple of tables at the event, where we show off the library telescopes, pass out educational materials, and have activities for kids like drawing the shapes that people have seen in the moon.

This Children's Book Festival will be special - we're launching the third library telescope soon, and we'll have a contest for kids who come to our table to name the new telescope. For reference, the two existing library telescopes are the Claremont Galactic Space Viewer and the Tell-Me-Scope. The more people we have volunteer for the event, the more fun everyone has. If you're interested in helping out, please let me know.

The evening of March 5 is also our monthly star party, at Cottonwood Springs Campground in Joshua Tree National Park. Please check the club's Facebook page to let people know if you're going, and to see who else is planning to go.

The April issue of Sky & Telescope magazine will hit the newsstands soon. It has an article by yours truly, on observing the Messier galaxies in the Virgo cluster with binoculars. I'll bring a copy to the meeting so you can check it out.

Our speaker this month is Dave Nakamoto of the Los Angeles Astronomical Society, who will speak on "The Modern History of Planet Discovery". Our general meeting starts this Friday, February 26, at 7:30 PM, in Shanahan B460 at Harvey Mudd College. I hope to see you there.

Matt Wedel

PVAA Officers and Board

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Nightwatch	John Stover	909-988-9747

Club Events Calendar

February 26, 2016 General Meeting

March 5, 2016 Star Party--Cottonwood Spr, Joshua Tree

March 17, 2016 Board Meeting

March 25, 2016 General Meeting--Geo Somoza, Light Sail

April 9, 2016 Star Party--Kelso Dunes

April 14, 2016 Board Meeting

April 22, 2016 General Meeting

May 7, 2016 Star Party--Cow Canyon Saddle, Mt Baldy

May 12, 2016 Board Meeting

May 20, 2016 General Meeting

June 3, 2016 Mt Wilson Observing 100"

June 4, 2016 Mt Wilson Observing 60"

PVAA Gen Meeting 1/22/16

PVAA President Matt Wedel opened the meeting. Approximately 7 seven people were 1st time visitors! The club secretary had Space Calendars for sale, which he immediately sold out of. The club's Treasurer was selling 'Eclipse Glasses' for 60 cents each. He bought 300 hundred glasses, and they will also be available at the next meeting. You can look directly at the sun with these glasses with no harm to your eyes.

The speaker for the night was Brian Little from the Planetary Society. The title of his presentation was "Impact Of The Space Program". It was clear that the space program has made a big impression on him. The night's topic was his quest to visit every Apollo Spacecraft. He has yet to finish his quest, but he is getting close.

When you think of the Apollo Spacecraft, most only consider the manned crafts that went to the moon, starting with Apollo 8. There are the "broiler plate" Apollo Command Modules that are also on display around the country, along with Apollo 7 & 9 that only went as far as Earth orbit. Apollo 7 was the 1st manned Apollo Command Module in space, and Apollo 9 tested the Lunar Lander in space for the first time – in LEO (Low Earth Orbit). Apollo 8 did not just make an 'eight' by flying around the moon and heading back, but actually orbited the moon for 10 orbits. Astronauts Frank Borman, William Anders & James Lovell Jr. were the first persons in human history to see the back side of the moon. They did not bring the Lunar Module, so the three were confined to the meager space of just the Command module for the whole trip. (Which, compared to the Mercury and Gemini capsules, was 'spacious'.)

Apollo 11 is the only manned spaceflight without the names of the astronauts on the mission patch.

If you would like to see a command module without going too far, the Columbia Memorial Space Center in Downey has a 'boiler plate' version used in testing. For their hours of operations and more info go to:

<http://columbiaspacescience.org/>

The Command Modules were built in Downey. Another great resource is of course NASA:

http://www.nasa.gov/mission_pages/apollo/index.html

A surprising amount of pictures and information is on Face book:

<https://www.facebook.com/apolloarchive/>

Brian also brought his own scrapbooks with newspaper articles that he cut out about anything Apollo. His presentation had many pictures of him all over the country visiting the Apollo displays. He kept us engrossed and entertained, laughing and learning even more about the Apollo Program.

The Lunar Module is bigger than you think it is:

Gary Thompson

PVAA returns to Mount Wilson

If you missed our nights with the big telescopes on Mount Wilson in 2014 and 2015 this is your chance to remedy that omission. PVAA has reserved the 100-inch telescope at Mount Wilson Observatory on Friday, June 3, 2016. We have the 60-inch telescope the next night, Saturday, June 4, 2016. Having the telescopes on consecutive nights will allow those who wish, to compare the two. In early June the planets Mars, Jupiter, and Saturn will all be near opposition. Early June also gives us the best chance of having a perfect night; that is a night with a dense marine layer to hold down the city lights and very steady seeing. Late summer might be better for steady seeing, but not for a marine layer to block the city light.

On a night with steady seeing both telescopes are great for observing planets. When it comes to deep sky objects both telescopes are best at showing small, high surface brightness objects, such as planetary nebulae, globular clusters, and unusual stars. I am hoping that we might see the Einstein Cross. The Einstein Cross is a gravitationally lensed quasar about 8-9 billion light-years from Earth. To see it will require a near perfect night but, June 3-4 give us a chance for such a night.

We are allowed a maximum of 25 people in the 60-inch dome and a maximum of 18 in the 100-inch dome. The minimum age permitted by the observatory is 12 years. The price for the 60-inch scope is \$100.00 (\$25.00 non-refundable after May 4) and the price for the 100-inch is \$330.00 (\$80.00 non-refundable after May 3). For questions or to reserve a spot contact Ron Hoekwater at astro4ron@gmail.com.

Ron Hoekwater >

What's Up? - Water On Mars Or Our Moon?

Science Fiction stories often have pioneers living on Mars or our Moon. They have nice indoor bathrooms with low gravity showers. A great colonial concept, but where does their water come from? Delivering weighty water by spacecraft is out of the question. And liquid water can't pool on Mars or our Moon because of low gravity and thin atmospheres.

Over a hundred years ago Percival Lowell imagined Martians moving water by a network of canals from the poles to irrigate a dried out planet. This was usually when his father wanted him to come back home to run the family textile factories. The reality of Mars is more freeze dried.

Mars does have visual evidence, revealed by Mariner 9 ('71), that a flood of water (ten thousand times the Mississippi River) gushed from volcanic highlands into lower basins to form lakes. But that was eons ago when volcanoes both thickened the atmosphere and melted frozen ground water to form the great Valles Marineris canyon. Currently over 40,000 eroded river valleys have been identified. Did volcanoes thicken and warm the Martian atmosphere that much, or was Mars closer to the Sun? The Curiosity Rover found stream rounded pebbles and the Opportunity Rover found blueberry-like hematite concretions only formed by flowing water. The remains of many Martian river deltas can be seen, a sure sign that a lot of water once flowed down into lakebeds and perhaps a large shallow ocean. This north polar ocean, the size of Earth's Arctic Ocean, is still controversial.

Today water on Mars exists as ice or seeping liquid brines that can be seen running slowly down hillsides. It's mostly visible on the surface at the polar caps. Although the white caps are mostly carbon dioxide on top, some 20% is water ice protected underneath. Some five million cubic kilometers of ice are near the Martian surface which is enough to cover the whole planet to a depth of 125 ft.

Water ice was actually touched by the polar landing of Phoenix ('08) which blasted away dust to reveal white water ice underneath. It gradually evaporated. The landscape around Phoenix is covered with flat polygons, a classic polar feature formed by the effects of permafrost water ice.

In the polar regions and at higher elevations Mars has icy glaciers. They're covered with a disguise of protective wind blown dust and are odd because they don't move like earthly glaciers. The ground is so cold they're frozen solid and can't slide forward. Polar ice lakes have been found (picture). Mars has an average global temperature of -82 F.

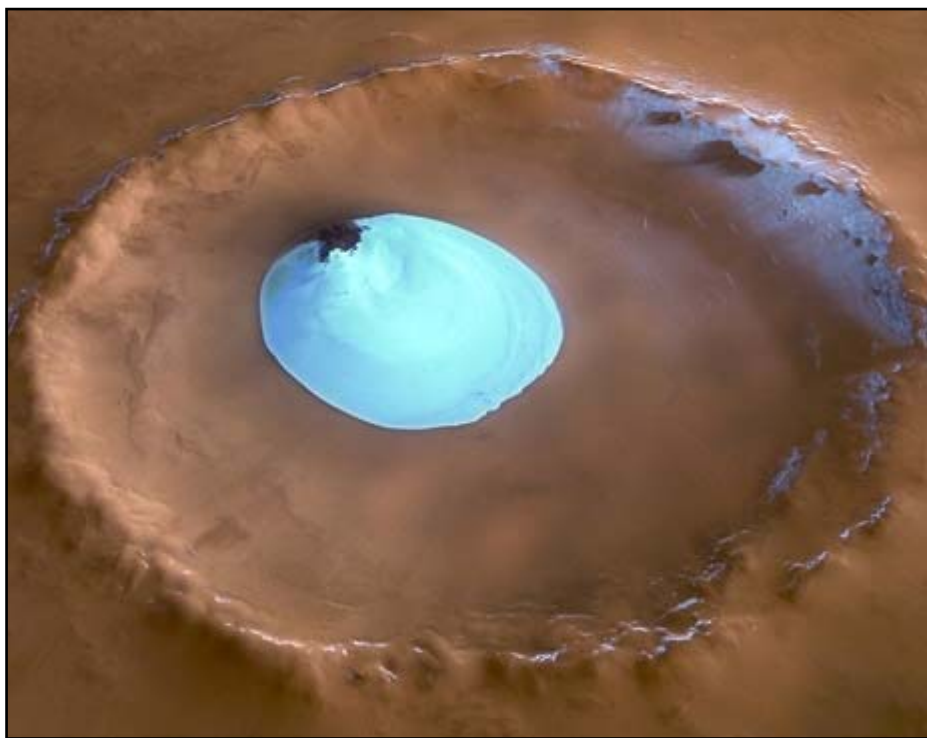
Closer to home, our Moon may have collected water from crashing comets or asteroids. A search goes on for ice in deep craters where the sun never shines. A number of suggestive detections of available water ice at the lunar poles exists.

Most recently, India searched for water with its Moon Mineralogy Mapper's imaging spectrometer. In 2008 and 2009 India's Chandrayann I craft released impact probes that detected evidence of water in the thin lunar atmosphere. Where was it coming from? India investigated more than 40 permanently dark craters at the lunar north pole where the temperature never rises above -280 F degrees. In 2009 NASA announced its LCROSS probe detected evidence of the hydroxyl water group thrown up from its south polar crater impact.

As early as 1978 Soviet scientists declared that samples returned to Earth by its Luna 24 probe contained evidence of water. These reports lead to our 1994 Clementine probe (to "be lost and gone forever" as in the comic miner's song Oh My Darling Clementine). It beamed searching radio waves into possibly icy craters at the lunar south pole but results were inconclusive. In 1998 NASA's Lunar Prospector went on a mission to search for evidence of water with a neutron spectrometer. It found evidence of hydrogen at both poles that could be from frozen water. It was announced that "we have areas at both poles with layers of near-pure water ice." There may be billions of tons of water buried just beneath dry surface soil. Just one billion tons would be enough to support a colony of 2,000 people for a hundred years and fill 300,000 swimming pools (should they want to go swimming). Lunar Prospector ended its mission by hurtling itself into a maybe ice filled crater. Earth based telescopes hoped to detect water flung out by the impact, however they saw nothing.

So, although ice exists on both Mars and our Moon, those low gravity indoor showers are still far in our future.

Lee Collins



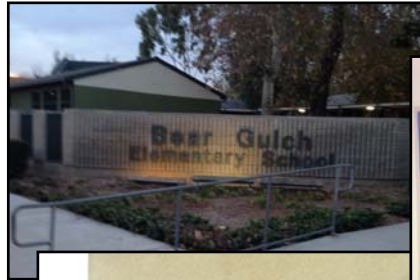
Bear Gulch Space Night

On Wednesday evening, January 27, 2016 from 5:00 pm to 8:30 pm, Jeff Schroder and I participated at the 3rd annual Bear Gulch Elementary School Space Night. This school had multiple Space related activities throughout the classrooms, and a large Sky Dome inflatable Planetarium show: Alien Art, Fizzing Planets, Supper Space Goggles, Tiny Universe, Swirling Planets, Rocket Blasters, Gnarly Nebulas, Space Bingo, Ore Moon Phases, Space Age & Weight, Glow Dough, Flying Saucers, Space Gear, Constellation Creations, Galaxy Goo, Space Web Quest, Rocket Races, Face Painting, Bounce House, Cosmic Games, Space Store, and Telescope Viewing. Some very creative activities for the students, kudos to those teachers!

Jeff shared meteorite pieces that had fallen in Texas, Africa, and Russia. I provided space and science related handouts from The Planetary Society. Featured at the telescope was The Pleiades, it was a fun night!

Cori Charles

Here are a few photos:



The Closest New Stars To Earth

When you think about the new stars forming in the Milky Way, you probably think of the giant star-forming regions like the Orion Nebula, containing thousands of new stars with light so bright it's visible to the naked eye. At over 400 parsecs (1,300 light years) distant, it's one of the most spectacular sights in the night sky, and the vast majority of the light from galaxies originates from nebulae like this one. But its great luminosity and relative proximity makes it easy to overlook the fact that there are a slew of much closer star-forming regions than the Orion Nebula; they're just much, much fainter.

If you get a collapsing molecular cloud many hundreds of thousands (or more) times the mass of our sun, you'll get a nebula like Orion. But if your cloud is only a few thousand times the sun's mass, it's going to be much fainter. In most instances, the clumps of matter within will grow slowly, the neutral matter will block more light than it reflects or emits, and only a tiny fraction of the stars that form—the most massive, brightest ones—will be visible at all. Between just 400 and 500 light years away are the closest such regions to Earth: the molecular clouds in the constellations of Chamaeleon and Corona Australis. Along with the Lupus molecular clouds (about 600 light years distant),

these dark, light-blocking patches are virtually unknown to most sky watchers in the northern hemisphere, as they're all southern hemisphere objects.

In visible light, these clouds appear predominantly as dark patches, obscuring and reddening the light of background stars. In the infrared, though, the gas glows brilliantly as it forms new stars inside. Combined near-infrared and visible light observations, such as those taken by the Hubble Space Telescope, can reveal the structure of the clouds as well as the young stars inside. In the Chameleon cloud, for example, there are between 200 and 300 new stars, including over 100 X-ray sources (between the Chamaeleon I and II clouds), approximately 50 T-Tauri stars and just a couple of massive, B-class stars. There's a third dark, molecular cloud (Chamaeleon III) that has not yet formed any stars at all.

While the majority of new stars form in large molecular clouds, the closest new stars form in much smaller, more abundant ones. As we reach out to the most distant quasars and galaxies in the universe, remember that there are still star-forming mysteries to be solved right here in our own backyard.

Ethan Siegel

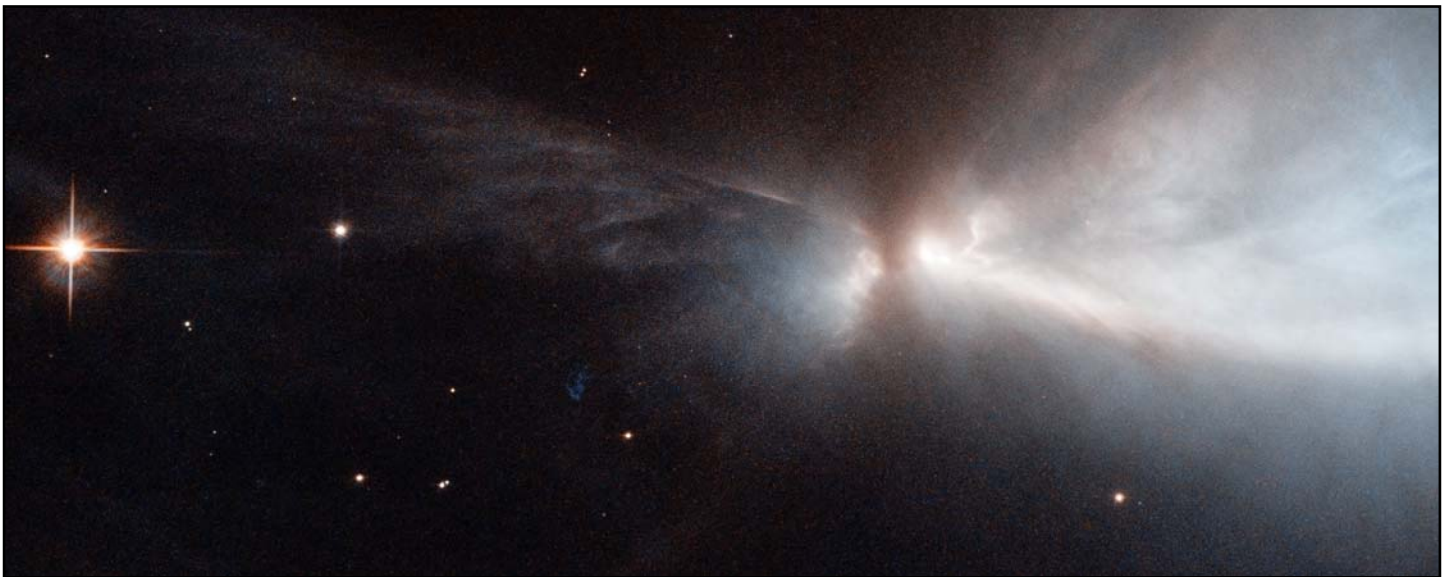


Image credit: NASA and ESA Hubble Space Telescope. Acknowledgements: Kevin Luhman (Pennsylvania State University), and Judy Schmidt, of the Chamaeleon cloud and a newly-forming star within it—HH 909A—emitting narrow streams of gas from its poles.

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