

The Observer

The Official Publication of the Lehigh Valley Amateur Astronomical Society

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ad astra *****

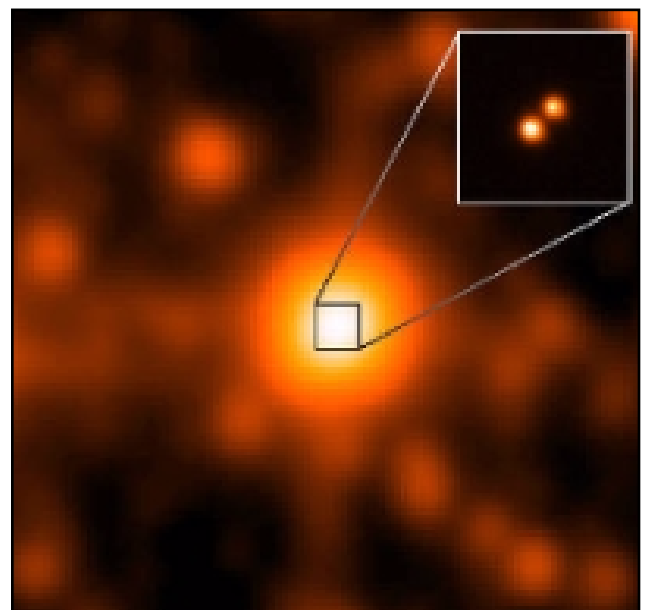
We tried a new seating arrangement at our May General Meeting, thanks to some stealthy volunteers who moved the furniture around when no one was watching, and as a result our corps was more comfortable and better situated than has been possible at South Mountain for quite a while. This is a good thing, because as you will read in Secretary Ron Kunkel's minutes, we welcomed a number of new members. We also managed to approve the proposed changes to our bylaws.

Thanks to our top-notch Programs Committee, and our presenter Dr. Kevin Luhman from Penn State, we enjoyed another great program. Dr. Luhman explained to us how he painstakingly downloaded all of the full-sky infrared survey data from the WISE space telescope, and searched it carefully for any images of a 9th planet hiding out beyond Neptune. He found no planets, so now we have some limits on how big, or how close, Planet X can be if it does exist. But what he did find was two new brown dwarf systems. That's right, the 3rd- and 4th-closest star or brown dwarf systems to the Sun were unknown only 5 years ago, and the scientist who fixed that was in the front of our meeting room, explaining how it was done, on May 15.

Our June meeting will feature our very own Ron Kunkel on the subject of Gravitational Waves. We all know that Ron is not afraid of making waves, to say nothing of speaking about them, so it should make for an excellent evening. It will be at our South Mountain headquarters at 7:00 PM on Sunday, June 12. Don't miss it!

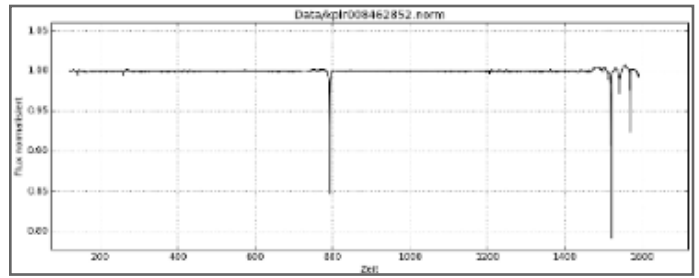
Space Industrious

Maybe it's just me, but the whole field of space and astronomy seems awfully busy lately. SpaceX has landed a second booster on *Of Course I Still Love You*, the most interesting barge in the world. Another barge has delivered the last remaining Space Shuttle external fuel tank to Los Angeles, where as I write this, they are jockeying it through the streets on its way to the California Science Center, like some kind of weird video game.

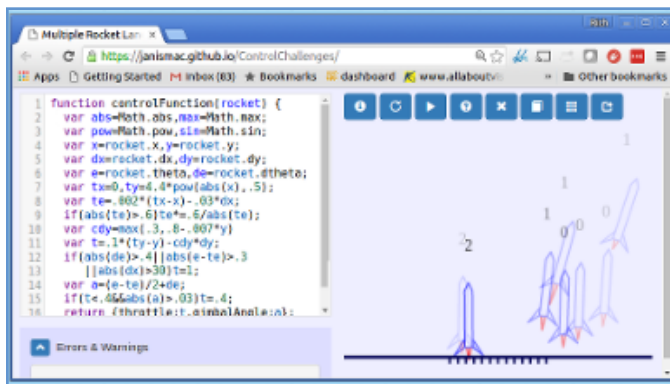


Brown dwarf binary system Luhman 16, shown in images from WISE and GMOS, is 6.5 light-years from Earth.

And the media remains sufficiently intrigued by the anomalous light curve of a star named KIC 8462852, that they had to give it a better name. LVAAS member Dr. Josh Pepper helped with some work on Tabby's Star, as it's now known, leading to a mention in The Daily Galaxy! <http://goo.gl/ch2izX> (Disclaimer: I had no idea what The Daily Galaxy was until I went Googling for something cool-sounding that mentioned Josh by name.)



The light curve of KIC 8462852, also known as "Tabby's Star", could be caused by alien megastructures! Or maybe it just needs to be wiggled in its socket so it makes better contact.



Speaking of video games — we all need a bit of fun now and then, no matter how busy we are — I spent a few hours on this web simulation of the SpaceX booster landing problem. I managed to write an autopilot program that brings all 3 rockets in for a landing in just under 30 seconds. If you like physics and coding, maybe you can do better!

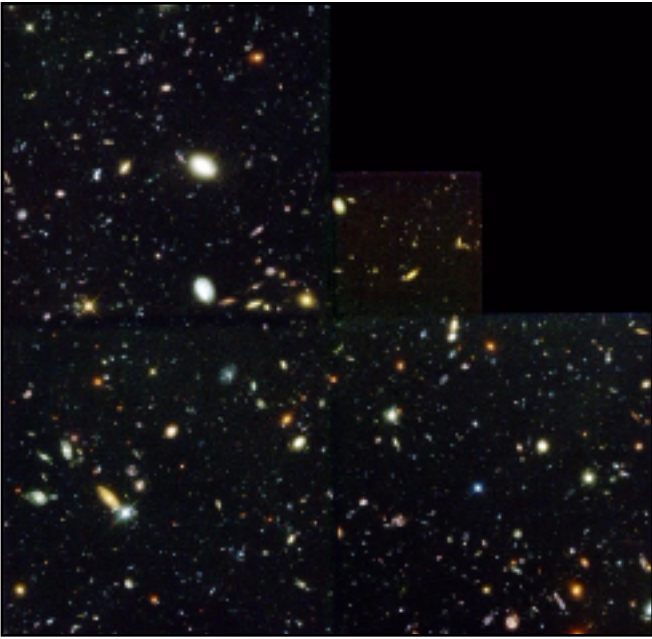
Stupid Astronomy Tricks

I want you to imagine an observing scene that I will describe. There is a dome with a refracting telescope, just a bit larger than what LVAAS has. It is a pretty good dark-sky site, even though there are a country road and a few houses visible across the field, but right now the young astronomers are goofing off while waiting for the clouds to clear. These are the days when *Star Wars* was fresh in their minds, before it even had a sequel; when a film SLR made by Nikon or Pentax was typical for astrophotography. The owner of the camera also has an electronic flash unit.

The telescope is capable of being aimed low, targeting the road, literally, as the eyepiece is removed and the flash unit placed at the focal point. Headlights are spotted in the distance and the whine of the charging circuit is initiated. Wait for just the right moment. Turn off the targeting computer. *Use The Force, Luke.*

I don't need to imagine this -- I actually witnessed this experiment. I am being obscure about the specifics, to protect the innocent as well as the guilty. The paradox is that the perpetrators could not justify doing it if they really thought something might happen, but by doing it anyway, they implied in a way that maybe they did. Either way, that flash beam stabbing outward from the objective looked really cool from the open shutter of the "Death Star" but the driver probably just saw a tiny flash of light in his peripheral vision, if anything.

Not all experiments in the realm of science have a scientific purpose. When I used my Dad's 8" Meade to observe Jupiter during one of the Shoemaker-Levy 9 impacts, I did not really expect to learn anything or even see anything unusual, but it was fun to have my eye on the planet at the time that I knew that it was happening. A couple of years after that, I could have worked out how fast Comet Hyakutake would be moving through the eyepiece view during its close approach, but it was a lot more thrilling to just see it. While some of us pursue amateur astronomy with the serious goal of advancing the science, I think most of us, frankly, are in it for the kicks. And once in a while, we all ought to try something that probably won't work, just to see how it feels.



The Hubble Deep Field, captured in 1995, shows almost 3,000 galaxies in a patch of "empty" sky.

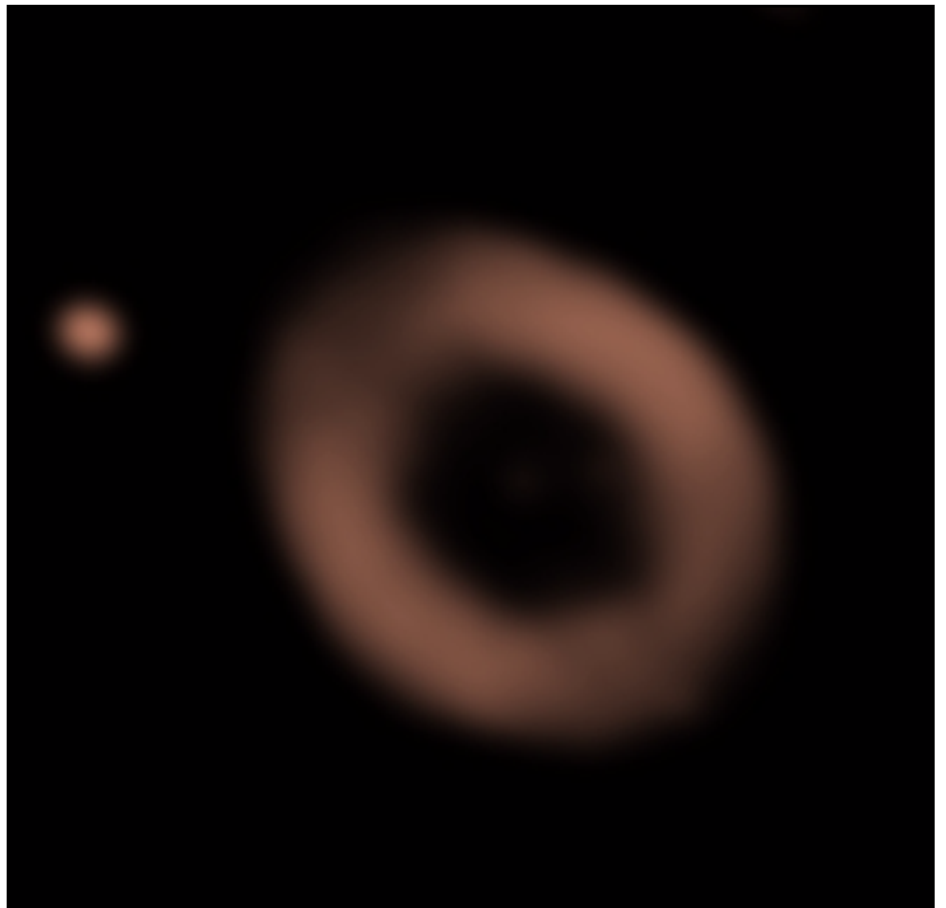
It was during those same years that the "grown-ups" pushed the boundaries of common sense, as well. Keeping the Hubble Space Telescope pointed for 140 hours at a patch of sky that contained, as far as they knew, basically nothing, may not seem like the best use of such an expensive toy, but they knew what they were doing. They just played it up for the publicity value. The result, of course, is awe-inspiring, and motivated repeating the experiment a time or two in subsequent years. Now, I cannot view a long-exposure astroimage without looking behind the primary subject, to see how many of those deep, dim, ancient galaxies are lurking in the background.

There are all kinds of ways to stretch the techniques of any science, to see what can be accomplished, always claiming some territory from "stupid tricks" and adding it to

"accepted practice." I don't know how confident Dr. Josh Pepper and his team were, when they started building his first KELT telescope, that they would really find planets around other stars with a sub-2" aperture telescope. But I believe they would have tried it anyway, just as Dr. Luhman knew it was worthwhile to attempt his "Search for Planet X," whether he found it or not. The successes in science and the serendipitous by-catches are the most fun, but the carefully executed and documented "failures" also enhance our knowledge of our world.

I'll confess one more stupid trick that I've done. It was stupid the first time I did it, and it was stupid the second time, and it will be stupid every time I do it in the future, but I'm going to do it anyway. LVAAS has a Cassegrain telescope at Pulpit Rock whose focal length exceeds 6 meters, and the first "real" object we observed with it was the Ring Nebula. Ron Kunkel has a 6mm eyepiece. You got it - I like to look at the Ring Nebula at 1,000X magnification. You can't see it nearly as well as you can at a lower power, and Ron makes fun of me, but there is still something cool about it and I am looking forward to doing it again. Ad Astra!

— *Rich Hogg*



Author's impression of M57 at 1,000X.

Minutes for the LVAAS General Meeting of 15 May 2016

The May General Meeting was held at the LVAAS South Mountain headquarters in Allentown, PA. The meeting started at 7:00 PM sharp with Director Rich Hogg's opening remarks on some recent events. He then mentioned that the agenda would be the speaker's introduction by Sandy Mesics, a short break, a short business meeting to vote on proposed Bylaws changes, and then an information session on Society happenings, including the membership reports.

Sandy then introduced Dr. Kevin Luhman, Professor of Astronomy and Astrophysics at Penn State University, who gave a presentation on his search for nearby brown dwarf stars and giant planets in our outer solar system. He uses optical data from various satellites and mid-IR data from the WISE satellite to study the formation of stars, including brown dwarfs and planets. His research has ruled out the existence of a large gas giant planet within 20-30 AU of the Sun. But he did discover two nearby brown dwarf stars, the binary WISE1049-5319 (aka Luhman 16) and WISE 0855-0714. The WISE satellite is not capable of detecting Mike Brown's proposed 10 Earth-mass-sized planets in the outer solar system. But in next few months and year there will be more satellite data released to the public, so we wish him luck in searching for the proposed Mike Brown planet.

Following a short break, Rich regrouped the attendees at 8:10 PM to convene a business meeting to consider the proposed Bylaws changes. The summary of the changes was published in the Observer and the full Bylaws, both the current version and the proposed version, are on the website. With little discussion, Bill Dahlenburg moved, Estelle Hines seconded, and the proposed changes were approved. Tom Duff moved and Sandy Mesics seconded to close the business meeting.

Rich then called on Treasurer Scott Fowler for a brief financial report. Scott reported that income for the year is per the budget and expenses a bit under budget.

Rich also reported that our public viewing of the transit of Mercury was a success, despite more members present than visitors. John LaShell also conducted a transit viewing session at his church for some people. Rich reminded the membership that the Board position of Public Relations Director was still vacant. Anyone interested in this position should see Rich.

Rich then called on Don Hines for the Membership report. Don Hines, Membership Director, held second readings for Kalpesh Jasapara (family membership including Rahul, Adita, and Nanda), James Carabello, and Gary Robinson. First readings were held for Kathlene Borger, Roy Borger, Lezheng Fang (Lef), Krittanon Sirorattanakul (Pond), Steve Favorito, and Jacqueline Olix.

Rich then pointed out the changes made to the seating in the planetarium to accommodate more members. He also announced the intent to appoint a committee to look at further long term meeting arrangements.

The meeting adjourned at 8:50 PM after it was announced that the June meeting could be held at South Mountain on June 12, 2016 at 7:00 PM. The speaker at that meeting would be Ron Kunkel, on the topic of Gravitational Waves.

Minutes prepared and submitted by Ron Kunkel, Secretary.

Opening: Public Relations Director

LVAAS has a volunteer opportunity on the Board of Governors for a Public Relations Director. Currently, I am filling this position in an "acting" mode, and I can testify that it is a "cake" job. It is only once in a while that we do something that requires additional publicity, such as our recent event to cover the Transit of Mercury, and in preparation for that I had even laid the groundwork by collecting some web links where announcements can be submitted.

Reasonably good communications skills and facility with the Web are required, but otherwise it is probably only a few hours work, at most a handful of times each year, and irregular attendance at BOG meetings could be accommodated. I and the other officers would collaborate with you (probably by email) on crafting our communications.

If you are interested in this position or are willing to be persuaded to accept it by minor, but heartfelt, acts of kindness and generosity, please contact me by email to director@lvaas.org.

Rich Hogg, Director

YORK COUNTY STAR PARTY 2016

**Shreveport North Airport
380 Kralltown Road
Wellsville, PA**

July 27-31, 2016 Help us celebrate our 1ST year!

<http://www.yorkcountystarparty.org>

Many people have attended a star party at this site for many years. Same location, same volunteers, same chairperson, just a new name. It is all geared for a fun and relaxing time for the entire family. Some of the events and activities are listed here below:

A dark site, 2,600 foot grass runway, camping, bathrooms with flush toilets, showers, and hot water, event speakers, raffle prizes, and vendors

The Busy Bee Food Vendor will be on site during the entire party!

The horizon is extremely flat, stars are visible at less than 10 degrees about the horizon, the night is fairly dark, and the Milky Way is easily visible.



For complete information and registration/T-shirt orders, more photos, please go to: <http://www.yorkcountystarparty.org>

Ron's Ramblings



Ron's Ramblings is a monthly series of articles describing some recent or otherwise important event in astronomy. The ramblings will attempt to describe both the astronomical event and its significance. Obviously, the description will be that of a rambling amateur astronomer.

Finally – An Intermediate Mass Black Hole in the Milky Way?

For years astronomers have known about and detected two sizes of black holes, stellar mass black holes and galactic supermassive black holes. The former being remnants for massive stars, stars greater than 8 solar masses, and the latter residing in the cores of most galaxies. Stellar mass black holes are typically on the order of less than 15 solar masses, while the supermassive black holes are millions and billions of times the mass of the Sun. Many astronomers have searched for intermediate mass black holes but with very limited success. To date no definitive detection of an intermediate mass black hole has been observed. Now a January 15, 2016 announcement describes the likely detection of a 100,000 solar mass black hole, aka an intermediate-mass black hole, not far from the center of the Milky Way galaxy's supermassive black hole.

Astronomers from the University of Japan, using the Nobeyama 45 meter Radio Telescope, have detected an enigmatic gas cloud, CO-0.40-022, only 200 light years away from the center of the Milky Way. The gas in the cloud has a surprisingly wide velocity dispersion, meaning it contains gas with a very wide range of speeds. The elliptical-shaped cloud actually consists of two components; a compact object with a wide velocity dispersion and another larger component with a narrow velocity dispersion. Because neither X-rays nor infrared observations detected any compact objects, the large velocity dispersion is not the result of a supernova explosion.

In an effort to identify the possible source of such an enigmatic cloud, the astronomers used various computer simulations of gas clouds flung by a strong gravitation source. The team found that a model using a gravity source with 100,000 times the mass of the Sun inside an area with a radius of 0.3 light years provided the best fit to the observed data. Since no X-ray or infrared sources were observed, they concluded that the best candidate is an intermediate mass black hole.

The significance of this detection, if confirmed, is that it lends tremendous support to one of the theories of how the supermassive black holes in the centers of galaxies form, i.e. by the merger of intermediate mass black holes. These results also demonstrate an entirely new way to search for black holes by using radio telescopes. Recent observations with radio telescopes have revealed that there are a number of such wide-velocity dispersion compact clouds like CO-0.40-0.22 surrounding the Milky Way center.

Reference:

<http://phys.org/news/2016-01-largest-black-hole-milky-link.html>

The end of my ramblings until next month. Ron Kunkel





The Rosette Nebula in Monoceros, NGC2237, imaged on February 28, 2016. Astro-Tech AT111EDT scope, SBIG 8300C camera, Lodestar X2 with PHD2 guiding, iOptron CEM-60 mount. 30 X 5-minute frames for 2.5 hours total integration, aligned, stacked and pre-processed in Nebulosity4, Photoshop CC process. David M. Moll photo©.

by Gary A. Becker



Lucky Punk

“I know what you’re thinking. Did he fire six shots or only five? Well, to tell you the truth in all this excitement, I’ve kind of lost track myself. But being this is a .44 Magnum, the most powerful handgun in the world and would blow your head CLEAN off, you’ve got to ask yourself one question. Do I feel lucky? Well, do ya, punk?”

You can hear Clint Eastwood’s voice and see his arm stretched out, barrel forward, confronting the robber, the villain’s shotgun within arm’s reach. In the 1971 *Dirty Harry* feature, Eastwood’s gun was actually empty, but the crook didn’t know it and backed down. I didn’t have a gun pointed at my head, but it surely felt that way with 12 successive days of drizzly, English weather, no practice, and one of nature’s rarest events about to unfold, a transit of Mercury on May 9.

Transits of Mercury and Venus occur when the orbital planes of these inferior planets cross Earth’s orbit exactly at the moment when we are figuratively looking down the barrel of a gun, with the planet and the sun in our sights. There are 11 Mercury transits left for this century and none for Venus until December 2117, and that happens on the other side of the world while it is nighttime here.

Still, even English weather needs a break now and then. Late on the afternoon of Saturday the 7th, the sky brightened, and Sunday turned out to be a glorious Santa Fe-type day, breezy with a saturated turquoise sky and lots of hope for the transit. I was able to cut the grass, set up the telescope, snap the images that I needed to get the correct exposure, and practice the techniques that I wanted to use to capture the event.

Taking portraits of Sol in bright sunlight is difficult because the filtered solar image is dim, creating difficulties with obtaining a precise focus. When the sun cleared my backyard trees on Monday morning, there was tiny Mercury. The fun for me lasted until just after noon when the clouds rolled in again, shutting down the event. Yeah, this “punk” really got lucky! A photo is online at astronomy.org.

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Moravian College Astronomy - astronomy.org

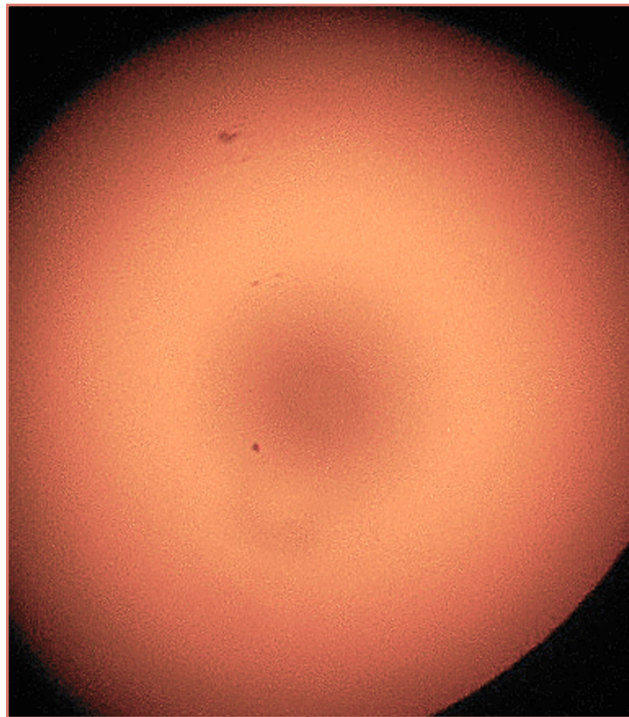
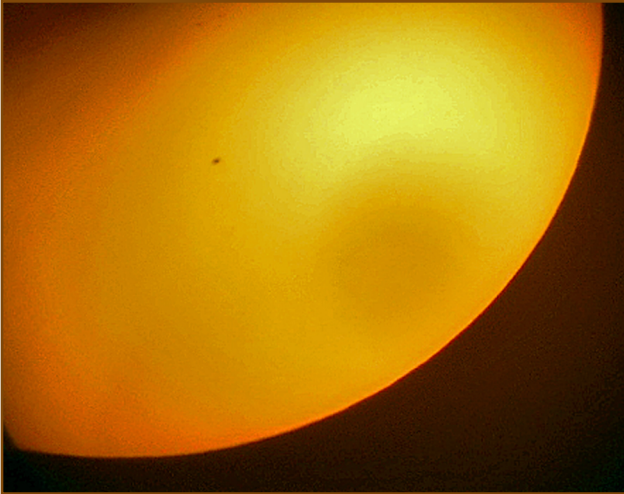


Although the 7-hour transit of Mercury was visible in its entirety across much of the nation, backyard trees and then clouds allowed for only three hours of continuous photography.

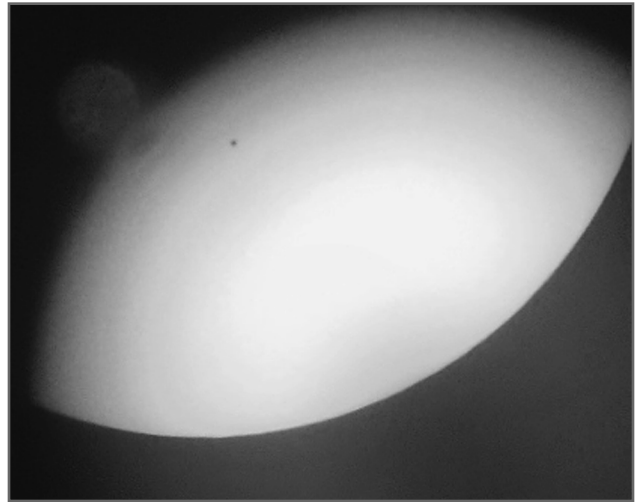
Intervals were spaced at approximately 15 minutes. The next Mercury transit visible to the East Coast occurs on November 11, 2019. After that date, the continental US doesn't get the opportunity of viewing Mercury in transit across the sun's disk until May 7, 2049.

Gary A. Becker composite photography

Mercury Transit May 2016



These three photos of the transit of Mercury on May 9, 2016 were taken by LVAAS Member Services Director Chuck Bradbury using a Celestron NexStar 6SE fitted with a 32mm eyepiece and snapped with a handheld point-and-shoot Nikon camera. Sunspots are visible in the bottom-most photo of the group.



LVAAS astronomers who enjoyed the view of the Mercury transit from South Mountain included Priscilla Jacobsen and Dave Moll (l and r) with guests.



"I processed Mercury transit images today. I took nearly 80 images, but was only stacked a max of 6 color JPEGs. I stacked 6 at 0.0007 sec and 4 at 0.0002 sec. The sun was darker and bluer at top. Not sure why. Lighter version sequence ended at 10:43 and the darker at 11:13. C8 at F6.3 and Canon T3 unmodified." ~ Lynn Krizan



From the LVAAS Archives:

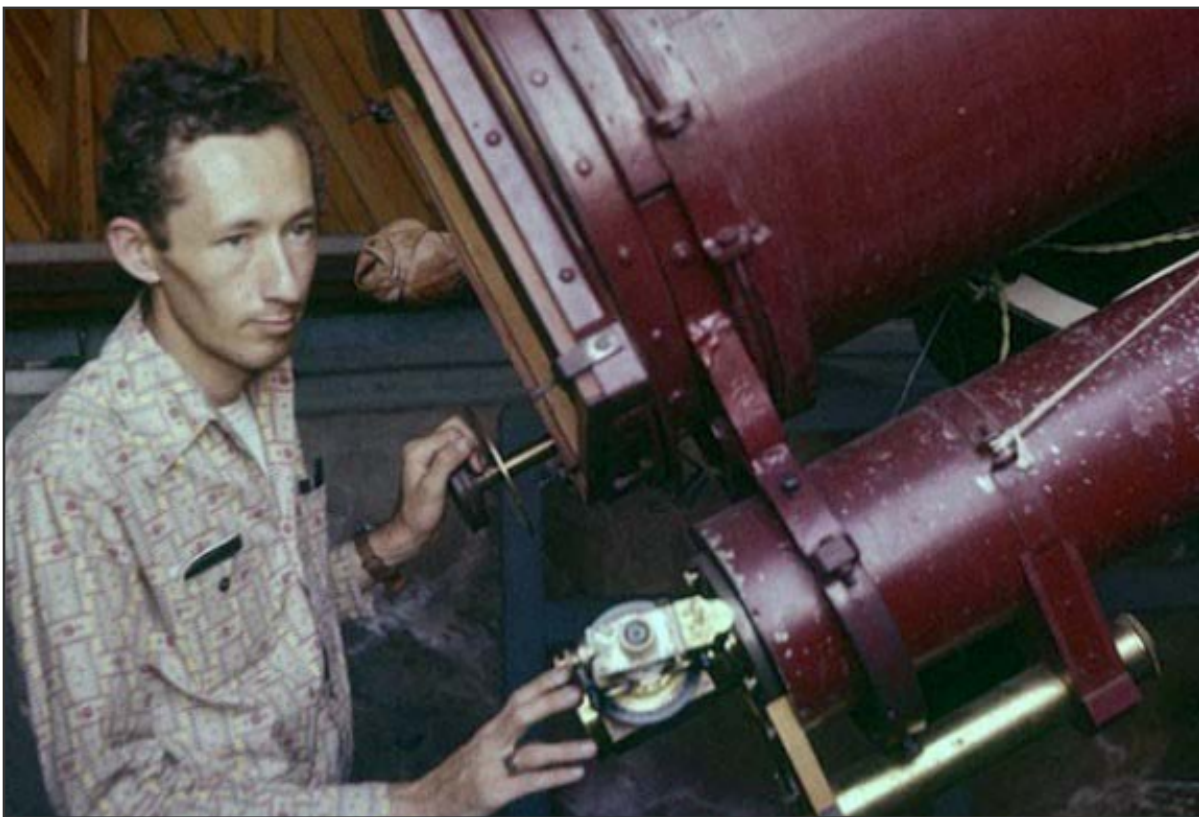
A Handbook and a Planetarium Projector

By Sandy Mesics

One sentence from the minutes of the June 1966 General Meeting jumped out: “[Bill] McHugh mentioned a letter from Mr. Burnham regarding the next edition of the looseleaf handbook.”

Burnham’s *Celestial Handbook* was originally self-published in the form of loose-leaf pages beginning in 1966. At that time you subscribed to the Handbook and got pages as Burnham finished them. This “book” wasn’t typeset; it looked as if it came straight off Burnham’s typewriter. Eventually, it would be professionally published and was comprised of three fat volumes totaling over 2,000 pages.

The life of Robert Burnham is replete with accomplishment and failure. He was a recluse who craved public recognition, but couldn’t handle it when it came. He devoted years of labor to extraordinary, disciplined work, and yet he was incapable of managing his daily life affairs. He was a brilliant writer with a superb memory, but could not express himself verbally in social situations. He knew the night sky like few other people have, but was oblivious to earthly concerns.



Burnham, circa 1960, at the telescope Clyde Tombaugh used to find Pluto 30 years earlier
<http://www.villagevoice.com/news/robert-burnham-jrs-1983-testament-an--inscribes-his-universe-part-i-6708412>

Burnham started surveying the sky with small refractors, and then began building his own larger reflecting telescopes. With one of these scopes, he discovered his first comet in 1957. Eventually, he would bag six comets. By 1957 his survey filled six notebooks comprised of 1,200 pages.

His comet discovery caught the attention of Lowell Observatory, where he was offered a job to do celestial motion studies, a project that would probably take 2-3 years, at a salary of \$6,000 per year. Staff at Lowell hoped that Burnham would return to school and get a college degree in order to advance in the field of astronomy, but Burnham took no interest in this academic pursuit.

The success of this project impressed the National Science Foundation, which continued to fund the three-year project for 20 years. But all during this time, instead of pursuing a degree, Burnham continued to pursue his *Celestial Handbook*, using Lowell resources in the process.

Robert Neil Stewart's review of the Handbook in the June 1966 issue of *Sky & Telescope* seemed positive, though guarded: "Mr. Burnham's manual promises to be about 10 times more inclusive than its strongest competitor." Burnham continued to self-publish the book until 1976, when he secured a deal with Dover Publications, Inc. in New York to republish the Handbook in three paperback volumes. Two years later, the books appeared. At about that time, In April 1979, Burnham received official notice that his employment at Lowell Observatory would end in December of that year. The observatory also offered Burnham help finding further employment.

Instead, Burnham left Lowell and became obsessed with money-making schemes. Viola Courtney, Burnham's sister, says her brother lost money in at least one pyramid scheme during the early 1980s. He also tried several times to sell items door to door using a unique marketing technique: an army of children. Burnham also began selling off the collections of coins, meteorites, jade and other items that he'd spent years collecting.

Then, in July 1985, Burnham vanished. His VW Bus was found in the desert nearby, but no sign of Burnham. Then, seven weeks after Burnham had disappeared, a Newport Beach, California, police officer noticed a disheveled man walking aimlessly on the beach. Burnham was wearing a long-sleeve shirt and pants, but his feet were bare, and they were covered with second-degree burns from exposure to the sun. He had no clear memory of the past 7 weeks, but reported what could only have been hallucinations. Burnham's sister collected him and moved him to Phoenix, where for a while they shared a trailer, but that arrangement was short-lived. In May, 1986, he withdrew the last \$20 from his bank account. He left with the money, the clothes on his back, and his social security card, and went to San Diego.

There, for the next seven years, Burnham lived in a residential hotel paid for by the meager royalties on his Handbook, and by selling paintings of cats in Balboa Park. On March 20, 1993, he died of congestive heart failure, a heart attack, a blood clot in his heart, gangrene in one foot, and double pneumonia.

Burnham's looseleaf book came to LVAAS in sections: the second section arrived in September, 1966, and we have had a copy in the library ever since.

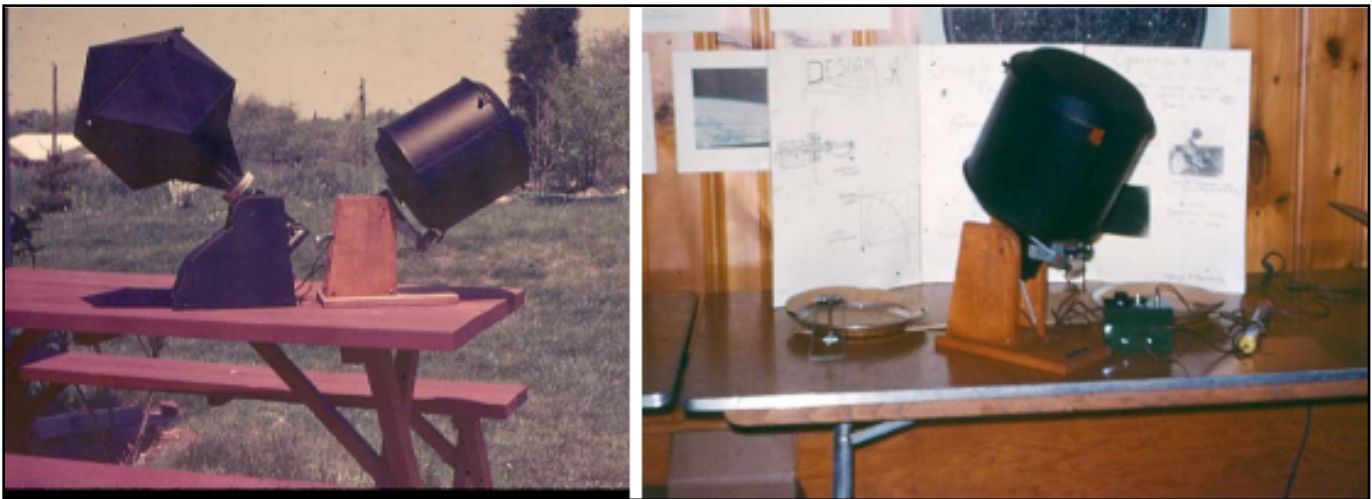
Meanwhile, in June 1966, the Mideast Region of the Astronomical League (MERAL) held their annual convention in Harrisburg. Two LVAAS members did presentations at this meeting: Ernie Robson spoke on observing globular clusters and George Maurer spoke on building a simple planetarium projector.

George Maurer spent many years as an active LVAAS'er. He served on the Board for many years, was elected to the posts of Director and Assistant Director, edited the Observer for a while, and for a long time was the planetarium director. During this time, he constructed at least two planetarium projectors,

and a host of “special effects” projectors to supplement the star projections. He produced quite a few narrated and audio-taped planetarium programs that utilized the star projector, effects projectors, and slide projectors to produce quite sophisticated programs.



George Maurer presenting at MERAL in June 1966



Some examples of George Maurer's “simple” planetarium projectors

References:

Sky Writer by Tony Ortega. <http://www.phoenixnewtimes.com/news/sky-writer-6448321>

Highlights of the June Sky

(and a little lunacy)

by

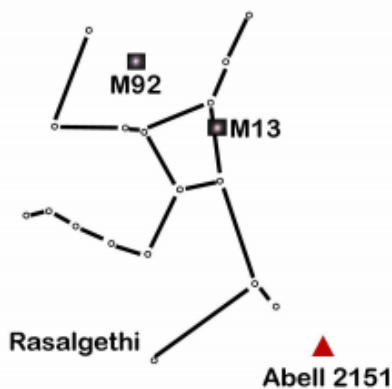
Carol Kiely



This month is going to be a great month for planet gazing. As the sun sets, Jupiter will be high in the south-western sky, and Mars and Saturn will be just above the horizon in the south-east. Both Mars and Saturn are the closest they've been to Earth for a while so they will be much brighter than usual, and because they are just rising as darkness falls, they will be in the sky all night.

As far as constellations are concerned, you should be able to find Leo. He has been visible in the night sky since March and has been using Jupiter as a soccer ball - you find the planet close to one of his hind legs. Boötes - the herdsman - is high in the sky and you should have no problem finding Arcturus (without having to follow the arc of the Big Dipper). Turning eastwards, you will come across a semi-circle of stars, Corona Borealis - Princess Ariadne's wedding crown - and next to that are four stars, in the shape of a keystone, that represent the body of the strongman, Hercules. He is kneeling upside down in the sky at the moment.

HERCULES



Unfortunately, there are no really bright stars in this constellation but, for those who rise to the challenge of resolving double stars, it is a good area of the sky to explore. Rasalgethi, its second brightest star, is a resolvable double: the primary star is a red giant whose magnitude fluctuates from 3 to 4, while the secondary has a blue-green hue. Take a close look at K - Herculis and you'll find two stars, one yellow and the other orange, while R - Hercules is a pair of blue-green stars, and there are plenty more.

Hercules also houses one of the oldest globular clusters in our galaxy, M92, an object often overlooked by many amateur astronomers who favor its more spectacular younger brother, M13. There is also a cluster known as Abell 2151, just above Hercules's right hand, in which every point of light is not a star but a galaxy over 500 million light years away.

For many, however, it is the story of Hercules that captivates us - everyone loves a summer blockbuster, even the ancient Greeks. I do not, however, recommend Hollywood's most recent version (released in 2014). The 1997 Disney film is much better!

And now for a little lunacy.....

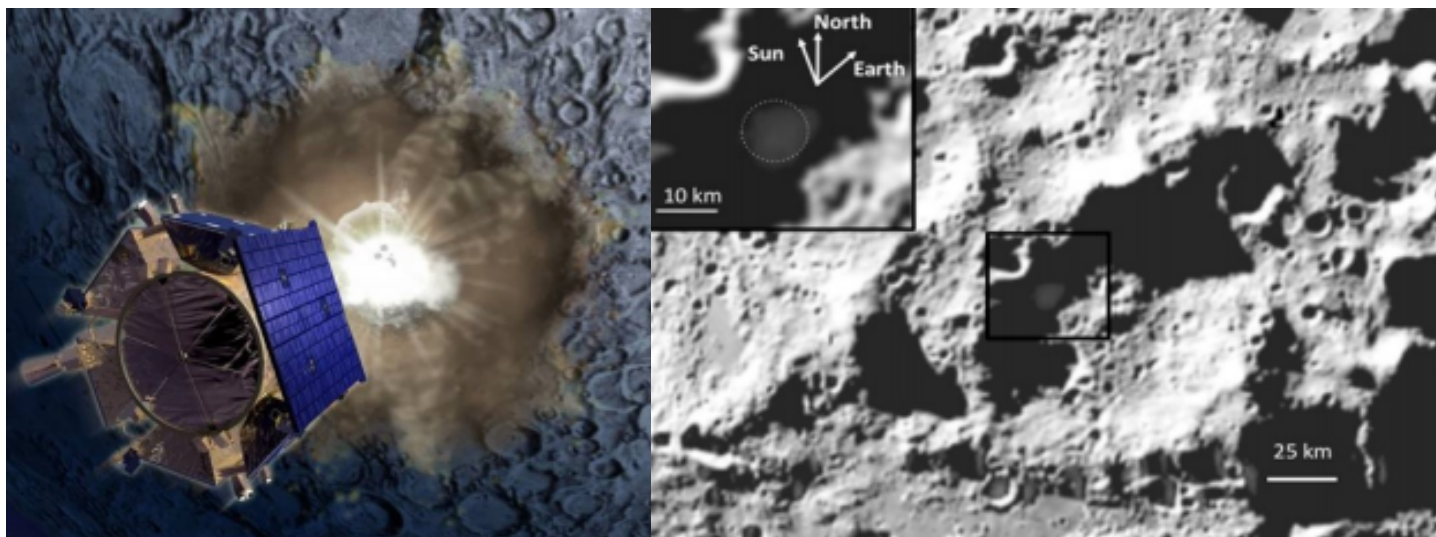
We all know that the lunar seas are not really filled with water. They look dark because most are large impact basins that have been filled with lava which cooled to form a gray rock known as basalt. The surface of the moon is in fact a very dry and desolate place. Extensive analysis of the samples brought back by the Apollo astronauts, however, has revealed that some contain tiny amounts of water. From these findings, scientists estimate that the interior of the Moon contains 10 to 300 parts per million water.

Over the years, some of this water has been vented to the surface by volcanic activity and impact cratering events. In areas illuminated by the sun, it then simply evaporated into outer space. Close to the poles however, there are regions that never see the sun. These areas are extremely cold and in these areas it is thought that the water would turn to ice rather than evaporate. In 2010, infrared and ultraviolet spectra of the plume of material ejected after crashing the upper stage of NASA's LCROSS satellite into Cabeus crater (close to the lunar south pole) revealed that this crater did, in fact, contain water ice.

The question that has been bothering scientists is where did the Moon get its water?

In a paper, just published in Nature Communications (May 31st, 2016), a team of international scientists believe they have the answer. By comparing the isotopic composition of the water in comet and meteoritic samples of asteroids, they conclude that over 80% of the water in them came from asteroids that crashed into the Moon while it was still molten, 4.3 - 4.5 billion years ago. The rest (<20%) is believed to have come from deuterium-rich Oort cloud or Kuiper belt comets.

Happy Stargazing!



An artists depiction of the upper stage of NASA's LCROSS satellite crashing into Cabeus crater. Plume after impact into Cabeus crater. Schultz et al (2010)

by Gary A. Becker



Saturn Run

Last week, the spotlight was on Mars which was at opposition, visible all night, rising at sunset and setting at sunrise. This week on the 3rd of June, Saturn is exactly in the same location. This means looking south into the midnight sky, Saturn and Mars will be close together. Fainter Saturn will be to the left, and below the planets will be Antares, the red supergiant of Scorpius the Scorpion, the faintest of the triad.

Saturn's focus this week reminds me of John Sandford's and photographer Ctein's *Saturn Run* (G. P. Putnam's Sons) which I have recently read. Set in 2066, a Caltech intern, Sanders Heacock Darlington, discovers a starlike object decelerating and settling into an orbit within the rings of Saturn. The US has proprietary discovery, but it doesn't take long before the ship departs with everyone knowing that out there lies something of immense intellectual value. The race is on to secure that knowledge, but our competitors, this time the Chinese, who are in the process of preparing a mission to Mars, quickly begin to refit their ship for a much deeper space venture—Saturn.

Like Andy Weir's book, *The Martian*, Ctein, a Caltech graduate in physics and English, bases the science fiction parameters of *Saturn Run* upon the extrapolation of current real science objectives and not just drug-induced hallucinations. What intrigued me the most was the actual extraterrestrial contact. We arrive there first, and the US initially gets all of the information; however, we never shake hands with the aliens. Instead, all contact is made through an overly polite but extremely obsessive-compulsive computer that allows us as much access to their advanced technology as time and memory storage can handle. It's done this way because, in the alien's experiences with face-to-face contact, things really haven't worked out so well. While the Chinese keep making mistakes and blowing things up, the race for home adds yet another twist to the story that results in compromise and maybe a more cooperative and stable future world.

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Moravian College Astronomy - astronomy.org



NOAA's Joint Polar Satellite System (JPSS) to revolutionize Earth-watching

by Ethan Siegel

If you want to collect data with a variety of instruments over an entire planet as quickly as possible, there are two trade-offs you have to consider: how far away you are from the world in question, and what orientation and direction you choose to orbit it. For a single satellite, the best of all worlds comes from a low-Earth polar orbit, which does all of the following:

- orbits the Earth very quickly: once every 101 minutes
- is close enough at 824 km high to take incredibly high-resolution imagery
- has five separate instruments each probing various weather and climate phenomena
- is capable of obtaining full-planet coverage every 12 hours

The type of data this new satellite – the Joint Polar Satellite System-1 (JPSS-1) -- will take will be essential to extreme weather prediction and in early warning systems, which could have severely mitigated the impact of natural disasters like Hurricane Katrina. Each of the five instruments on board are fundamentally different and complementary to one another. They are:

1. The Cross-track Infrared Sounder (CrIS), which will measure the 3D structure of the atmosphere, water vapor and temperature in over 1,000 infrared spectral channels. This instrument is vital for weather forecasting up to seven days in advance of major weather events.

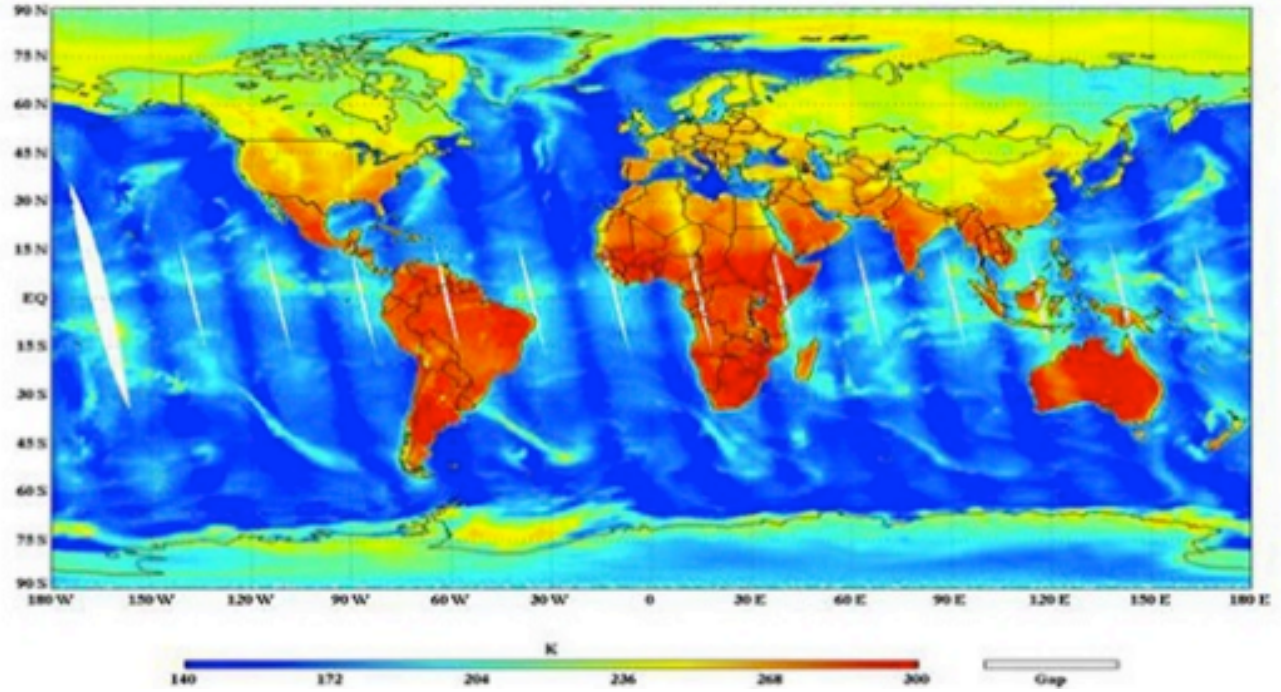
2. The Advanced Technology Microwave Sounder (ATMS), which assists CrIS by adding 22 microwave channels to improve temperature and moisture readings down to 1 Kelvin accuracy for tropospheric layers.

3. The Visible Infrared Imaging Radiometer Suite (VIIRS) instrument, which takes visible and infrared pictures at a resolution of just 400 meters (1312 feet), enables us to track not just weather patterns but fires, sea temperatures, nighttime light pollution as well as ocean-color observations.

4. The Ozone Mapping and Profiler Suite (OMPS), which measures how the ozone concentration varies with altitude and in time over every location on Earth's surface. This instrument is a vital tool for understanding how effectively ultraviolet light penetrates the atmosphere.

5. Finally, the Clouds and the Earth's Radiant System (CERES) will help understand the effect of clouds on Earth's energy balance, presently one of the largest sources of uncertainty in climate modeling.

The JPSS-1 satellite is a sophisticated weather monitoring tool, and paves the way for its sister satellites JPSS-2, 3 and 4. It promises to not only provide early and detailed warnings for disasters like hurricanes, volcanoes and storms, but for longer-term effects like droughts and climate changes. Emergency responders, airline pilots, cargo ships, farmers and coastal residents all rely on NOAA and the National Weather Service for informative short-and-long-term data. The JPSS constellation of satellites will extend and enhance our monitoring capabilities far into the future.



Images credit: an artist's concept of the JPSS-2 Satellite for NOAA and NASA by Orbital ATK (top); complete temperature map of the world from NOAA's National Weather Service (bottom).

What's Happening at Pulpit Rock

Our observatories and grounds at Pulpit Rock and South Mountain require regular maintenance, and many renovations are currently being planned. Members who are willing to devote some time and energy to help keep our facilities in top working condition, please watch this space for updates on work in progress or being planned.

Below are cabinets recently made and installed by Ron Kunkel into the Schlegel-McHugh observatory, which houses the 18" Tinsley telescope. One photo shows the cabinet closed, the other shows it open. There were actually 5 of these cabinets installed into the perimeter wall of the building. The installation of the cabinets made it possible to get rid of the rather large table that was used for storage and as a working surface. The cabinets provide both storage space and a place to put your working materials while using the telescope.



Per ardua ad astra!



Cosmic Chuckles

moderated by

Dave Moll

Four billion years from now, the Sun, redder and with the expanding waistline of late middle-age, walks into a bar. He's looking for a little 'action.' Looking around, he spots a beautiful main-sequence dwarf sitting alone at the bar. He sidles over and says, "Hey baby, wanna go for a ride? I just got a Mercury."

"No thank you," the dwarf says, "I'm enjoying the ride in my Galaxy."

When the astronomy department found out their famous professor was not going to get the Nobel prize this year, they decided to hold a party for him anyway and give him a constellation prize instead.

Two atoms bump into each other. One says "I've lost an electron."

"Are you sure?"

"Yes, I'm positive."

Astronomers say the universe is finite, which is a comforting thought for those people who can't remember where they leave things.

Jay Leno: "Which is more useful, the Sun or the Moon?"

A thirteen-year old: [Pause] "I think it's the Moon, because the moon shines at night when you need the light, whereas the Sun shines during the day when you don't."

It is reported that Copernicus's parents said the following to him at the age of twelve:

"Nicolaus, young man, when are you going to come to terms with the fact that the world does not revolve around you?"

<https://xkcd.com/1231/>



TO MESS WITH AN ASTRONOMER, PUT A MIRROR IN THE PATH OF THEIR TELESCOPE.

Have a joke or cartoon you'd like to share? Send it along to Dave, Polaris41N@outlook.com or to the Observer editor editorlvaas@gmail.com. Interested in doing illustrations for this section? Contact editorlvaas@gmail.com.

Oh, Snap!

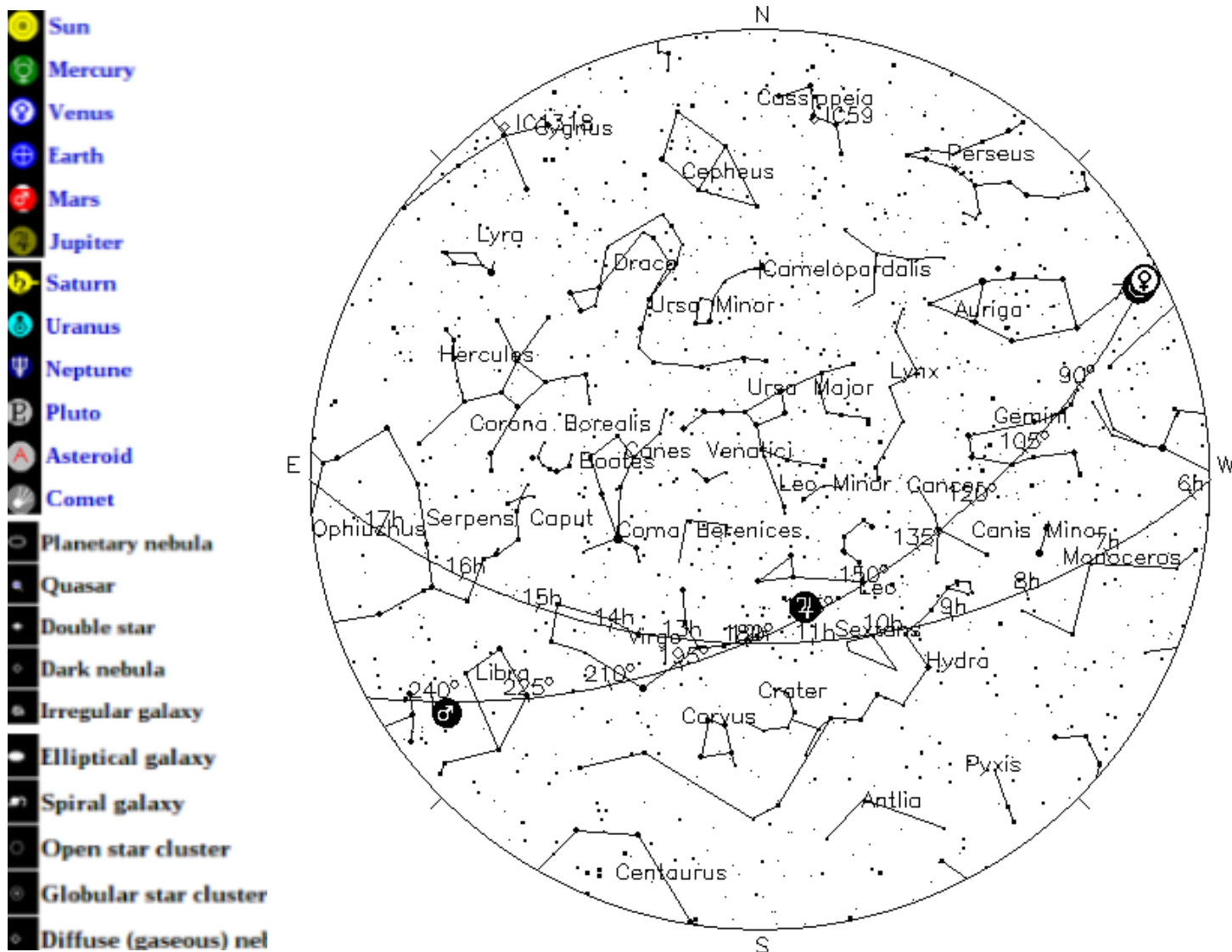
"...but we decide which is right, and which is an illusion."

Only for mere moments, reflected in a bubble, is our sun, setting behind a group of trees and illuminating the sky with color. (Photo: editor)



Read about Bubble Optics here: <http://www.atoptics.co.uk/fz618.htm>

Sky above 40°33'58"N 75°26'5"W at Fri 2016 June 3 0:00 UTC



Your Sky was implemented by John Walker in January and February of 1998. The calculation and display software was adapted from Home Planet for Windows.

The GIF output file generation is based upon the ppmtogif module of Jef Poskanzer's pbmplus toolkit, of which many other components were used in creating the images you see here.

ppmtogif.c - read a portable pixmap and produce a GIF file

Based on GIFENCOD by David Rowley [mgardi@watdsu.waterloo.edu].

Lempel-Zim compression based on "compress".

Modified by Marcel Wijkstra [wijkstra@fwi.uva.nl]

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Check out additional features of *Your Sky* at : <http://www.fourmilab.ch/yoursky/>

JUNE 2016

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			01	02	03	04 New Moon
05	06	07	08	09	10 LVAAS Lunatics and Star gazers Evening	11 Star Party
12 First Quarter Moon	13	14	15	16	17	18
General Meeting - South Mountain						
19	20 Full Moon	21	22	23	24	25
26 LVAAS Board of Governors Meeting	27 Last Quarter Moon	28	29	30		

JULY 2016

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					01	02
03	04 New Moon	05	06	07	08	09 General Meeting/Picnic - 5:00 PM South Mountain
10	11 First Quarter Moon	12	13	14	15	16 Star Party
17	18	19 Full Moon	20	21	22	23
24	25	26 Last Quarter Moon	27	28	29	30
31 LVAAS Board of Governors Meeting						

2016 LVAAS Event Calendar

2016 LVAAS Event Calendar												
	Sundays			Thursday	Saturdays		Monday	Multi-Day Weekends Scouts at Pulpit R.	Moon Phase			
	General Meeting	Board meeting		Astro-Imaging		Star Parties	Scouts at S. Mountain		New	First	Full	Last
January	2:00 PM 10-m	31		21		no mtg		no camping	9	16	23	2 31
February	2:00 PM 14-m	28		25		13		no camping	8	15	22	
March	13	20		24		19		no camping	8	15	23	1 31
April	10	24		21		16		22-24	7	14	22	29
May	15	22		19		14		20-22	6	13	21	29
June	12	26		no mtg		11		24-26	4	12	20	27
July	05:00 PM 9-s	31		no mtg		16		15-17	4	11	19	26
August	13-sp	28		no mtg		6		19-21	2	10	18	24
September	11	25		15		10		16-18	1 30	9	16	23
October	9	30		13		8		14-16	30	9	16	22
November	2:00 PM 13	27		17		5		11-13	29	7	14	21
December	2:00 PM 10-sc	18		15		3		no camping	29	7	13	20

(-s) = Saturday meetings - Rain date on Sunday
 (-m) = Muhlenburg College
 (-sp) = Saturday meeting at Pulpit Rock
 (-sc) = Saturday Holiday Party at Grace Community Church
All meetings 7:00 PM unless noted otherwise

Contributed by Bill Dahlenburg

Publishing images is a balancing act!

When preparing your images for publication in The Observer, please consider the following guidelines:

Put the quality in:

- ▶ Considering the "print" size of the image, make sure you have at least 150 pixels/inch.
- ▶ Use a reasonably good quality for the JPEG compression ratio.

But watch the "waistline"!

- ▶ Don't go too much above 200 pixels/inch max.
- ▶ Use the lowest JPEG quality that still looks good!
- ▶ Shoot for <300KB for a 1/2 page image or <600KB for a full page. (We want to keep each issue of The Observer to about 5MB.)

Tip: If you're not Photoshop-savvy, you can re-size and compress undemanding images ("human interest", not astro-images), with an online tool such as

<http://www.ivertech.com/freeOnlineImageResizer/freeOnlineImageResizer.aspx> . It will also tell you the pixel size and file size of your original, even if you don't download the processed copy.

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Members please use above email address for submissions.

Photo editor is Dave Moll, Polaris41N@outlook.com

Society members who would like to submit an article or photo for publication should kindly do so by the Sunday before the monthly meeting of the BOG (please see calendar on website) for the article to appear in the upcoming month's issue. Early submission are greatly appreciated. Articles may be edited for publication. Your comments and suggestions are invited.

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