The Observer

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ad astra **********

What are we all doing during this weird and scary time? A lot of our normal activities are more or less off limits. We're not going out, we're not holding events, we're not seeing our friends and associates, at least not as much as we normally would.

If you are just maintaining, staying healthy and sane and making it through, that's good enough! It says so in the advice columns and who could argue with it, since we hear about so many who aren't. I will lay claim to a check mark in the health column, at least so far, thanks to my nerdy, above-average capacity for enduring physical isolation. As for the sanity, you be the judge, after you learn what I've been up to. If I have gone a little crazy, I think at least it's in a way that's constructive and educational. But let's leave that for later.

Pandemic Pastimes

I've received news of a variety of activities that have been keeping my friends busy. Most of them are actually business as usual: a lot of people who have jobs are still at it, though many of them are working from home. My friends Mike and Ed and Ross are all about as busy as they ever are. A few friends who have businesses in areas such as real estate aren't able to do much, and it is hurting them in the wallet and in their mood. Another friend in light agriculture always seems to be on the edge from too much work. This is a huge disruption, and it affects everyone differently.

I am also to understand that appliances and so forth are still breaking down, requiring diagnosis and repair, and it seems like maybe the do-it-yourself approach is a little more popular these days. I could recount a tale of an epic water heater project I heard about, as well as a less-involved clothes dryer adventure and another deal involving a swimming pool stair railing. But nothing about these is unusual. This stuff happens all the time.

One thing that has been out of the ordinary is the popularity of videoconferencing. Zooming is still booming, and it really seems to help. I'm not even sure it is as unhealthy as it seems. My on-line virtual parties, lacking a public brick-and-mortar venue that has inventory to turn over and a loquacious waiter who needs to justify getting a decent tip, seem to require a lower level of food and alcohol than the physical meet-ups did.

There have been some interesting nerdy pursuits too. Fellow LVAAS'er Terry Pundiak ran a contest to see who could guess when his laptop would finish calculating pi to a million digits. I took a shot at it, but my too-optimistic guess did not bring home the prize.

Learning Opportunities

The LVAAS Book Club is in progress. A book has been chosen (***The Big Picture*** by Sean Carroll) and we've decided to have a discussion about each major section. People are reading it; I've finished the first section and am awaiting further instructions. Email Blaine, our Director of Education, if you'd like to get in on it (blaine@ieee.org).

Prof. Carroll has become a major figure in my collection of information and entertainment resources. I previously read ***Something Deeply Hidden*** and I've been listening to his podcast and watching some of his videos. I find we're usually on the same wavelength, in that in most controversial areas of science and philosophy where I have formed a strong opinion, it's usually the same as his. I guess great minds do think alike.

The podcast is very wide-ranging and he is a skillful interviewer, much better than I could ever be. Suffice it to say that some of his guests are not on my wavelength, and I am pretty sure they are not really on his either.

Maybe it is my imagination, but behind the consummate professionalism he presents to his guests I believe I hear evidence of his true feelings. Then again, maybe he is so skilled at it that he makes all of his listeners certain that he is on their side, no matter where they stand.

Observing Precautions

I have been out a couple of times looking at the sky, mostly spotting satellites. The various projects of Space Exploration Technologies Corp., also known as SpaceX, have been on my mind a lot. I'm practicing my skills in viewing their Starlink Internet satellites, partly to understand how they will impact astronomy, and partly because I crave the minor thrill of seeing one of their constellations shortly after a launch: a fleet of 60 Earth-orbiting satellites, closely following each other in the same orbit for a few days after deployment, before they start spreading out to eventually cover the whole sky and potentially make astro-imaging more complicated for everybody.

As I write this, two astronauts are sleeping aboard a SpaceX Crew Dragon capsule, christened Endeavour, on the way to the ISS. It was good to see the launch succeed, but it didn't take my mind off the failure of the previous day. I've been enthusiastic about the ambitious Starship project, hyped as the means by which we will colonize Mars. But now that he has blown up four of them before attempting even a single flight, I'm beginning to think Elon has bitten of more than he can chew.

Quietly Going Crazy

I know the feeling. I've gone totally off the deep end this past month, doing something that I didn't originally plan to. I would love to blame the unusual circumstances, but let's be honest, I do this all the time. My portrait should be next to the definition of "over-extender" in the dictionary. I would also like to blame our Pulpit Rock Observatories Director, whose remark at our May General Meeting thrust me into this rabbit hole, but the truth is it didn't take much of a push. I have no regrets, since I learned a lot and had a lot of fun. Hopefully, by the time you read this, you have had a chance to enjoy the results; if not, check out the write-up in this month's Schlegel Observatory Report. And keep reaching for the stars. Ad Astra!

— Rich Hogg

Orion Nebula M42 (NGC 1976) and The Running Man, M43 (NCC 1982.) Scope = Takahashi FSQ106ED at F3.6, Camera = Starlight Xpress Trius 694 mono filtered through Ha, OIII, SII and RGB. Images taken with multi session from Jan. 29 to Feb. 22 totaling 10 hr. 23min.
Image courtesy of Lynn Krizan.

Minutes from the LVAAS General Meeting – May 3, 2020

The May 2020 LVAAS General Meeting was conducted electronically using an online service in an effort to adhere to the social distancing guidelines outlined by the Governor of Pennsylvania with regards to the COVID-19 pandemic. Approximately 25 people were in attendance.

Director Rich Hogg opened the meeting at 7:05 p.m. It was noted that this was the second online General Meeting and that it was being recorded and would be uploaded to YouTube for future viewing.

The evening's presentation was the viewing of a YouTube video suggested by Blaine Easterwood entitled NASA's Incredible Discovery Machine: The Story of the Hubble Space Telescope. The video was made to recognize the 30th Anniversary of the Space Telescope's launch and discussed the challenges of the launch, setting up the instrument, and the subsequent follow up maintenance missions all conducted with the support of the Space Shuttle program. After a rough start, Hubble, in the years to follow has exponentially revealed what we understand about the universe and has provided a substantially greater view of the universe than could ever be viewed from the ground. After the video concluded, a second shorter Hubble video was shown and after the second video ended, the meeting moved to LVAAS business.

Director comments: Rich Hogg

LVAAS Pulpit Rock and South Mountain sites are closed, except for essential maintenance activities by authorized personnel. In addition, all LVAAS face-to-face gatherings/events have been canceled until further notice.

Assistant Director comments: Tom Duff

Astroimaging has been canceled until further notice. Cherry Springs which was scheduled for June has been canceled. Mega Meet has been canceled as well.

Membership: Gwyn Fowler

There were no second readings.

1st Readings:

Brett Fadem is joining as a family membership. Both he and his wife Sara have had their first readings.

Treasurers Report, 2020: Scott Fowler

Income $16,095
Expenses $(4,707)
Net $11,388
General Fund Balance $50,398

Payment from First Energy was received. As a result of the current environment, there has been very little revenue generation. General fund is expected to drop as expenses will exceed income, most notably for insurance and roof repairs.

Pulpit Rock Observatories: Frank Lyter

Looking to powder coat the 40” this June. Frank had asked about the possibility of having Zoom meetings to help people out with telescopes.

UACNJ Representative - Earl Pursell

The state of New Jersey has re-opened parks. Site access will continue to be limited and restroom and facilities are still closed.

Next General Meeting:

The June 2020 General Meeting will be conducted electronically on June 14 at 7 p.m. Check your email for the meeting link from Rich.

The link to the May 2020 general meeting is https://www.youtube.com/watch?v=6jS9t3lp-uw (below.)

The meeting was adjourned at approximately 8:50 p.m.

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UACNJ Reminder

LVAAS is a member organization of the **United Astronomy Clubs of New Jersey**, (uacnj.org) which means that LVAAS members may acquire observing privileges at the UACNJ observatories at **Jenny Jump State Park**, near Hope, NJ. There is a fee of $50.00 per year, plus a commitment to assist at UACNJ Public Nights. Normally, this commitment is for five Public Nights during the year, but it has been reduced to four this year, due to the shortened observing season. The 2020 Observer Form can be found on their website: http://www.uacnj.org/observers/2020ObserverForm.pdf. LVAAS liaison is Earl Pursell.

Also check out the **Meteor Shower Calendar** courtesy of Ken Taylor of UACNJ and thrillist: https://www.thrillist.com/news/nation/meteor-shower-calendar
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June 2020 LVAAS Meeting Announcement

This month's LVAAS General Meeting on **Sunday, June 14, at 7 p.m.** will again be held on-line, using the Zoom teleconferencing system. The program will feature **Rich Hogg**, **Director, LVAAS** presenting "S**pace Engine's Virtual Universe**"

Join Rocket Pilot Rich on a guided tour of Our Universe in a PC, a journey that will take you farther from the safety of your home than reality will ever make possible. We will do a drive-by of a number of celebrated celestial curiosities, and together we will explore a planet that has never before been seen by human (or alien) eyes. Prospective new members should please contact LVAAS Membership Director at (membership@lvaas.org) to arrange for an invitation.

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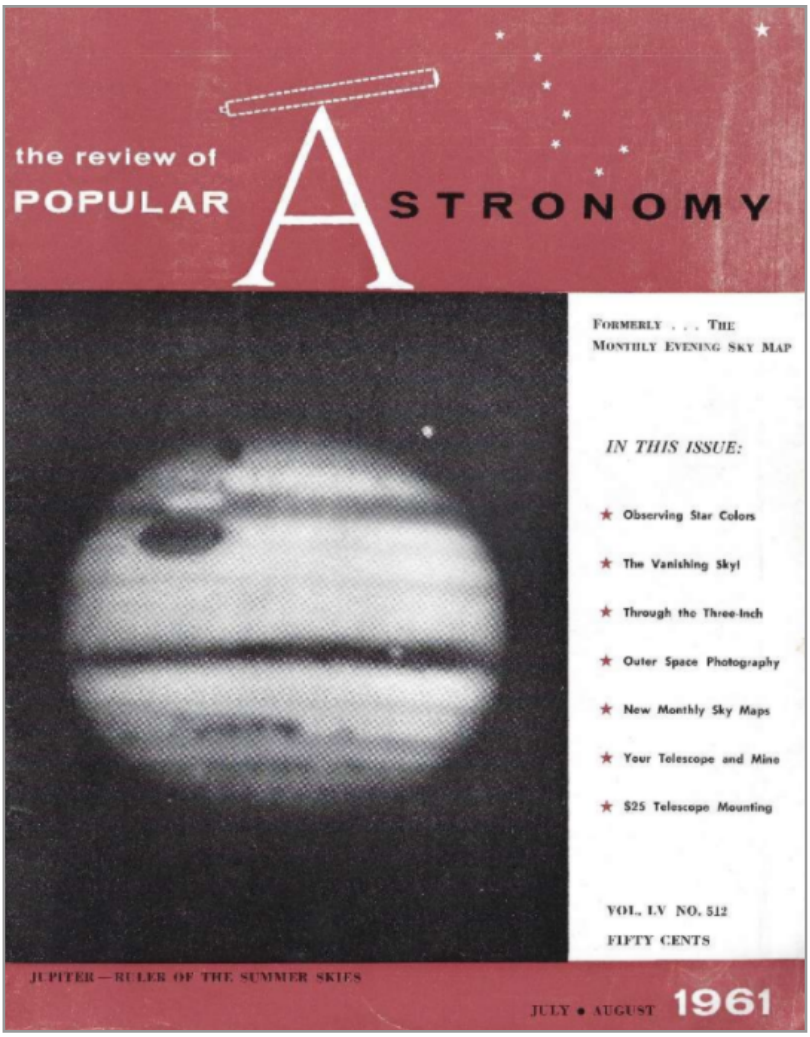
(*top*) Messier 3 and (*bottom)* M101 The Pinwheel Galaxy. Imaged by Bob LaFleur.

From the LVAAS Archives:

Satellite Pollution

by Sandy Mesics

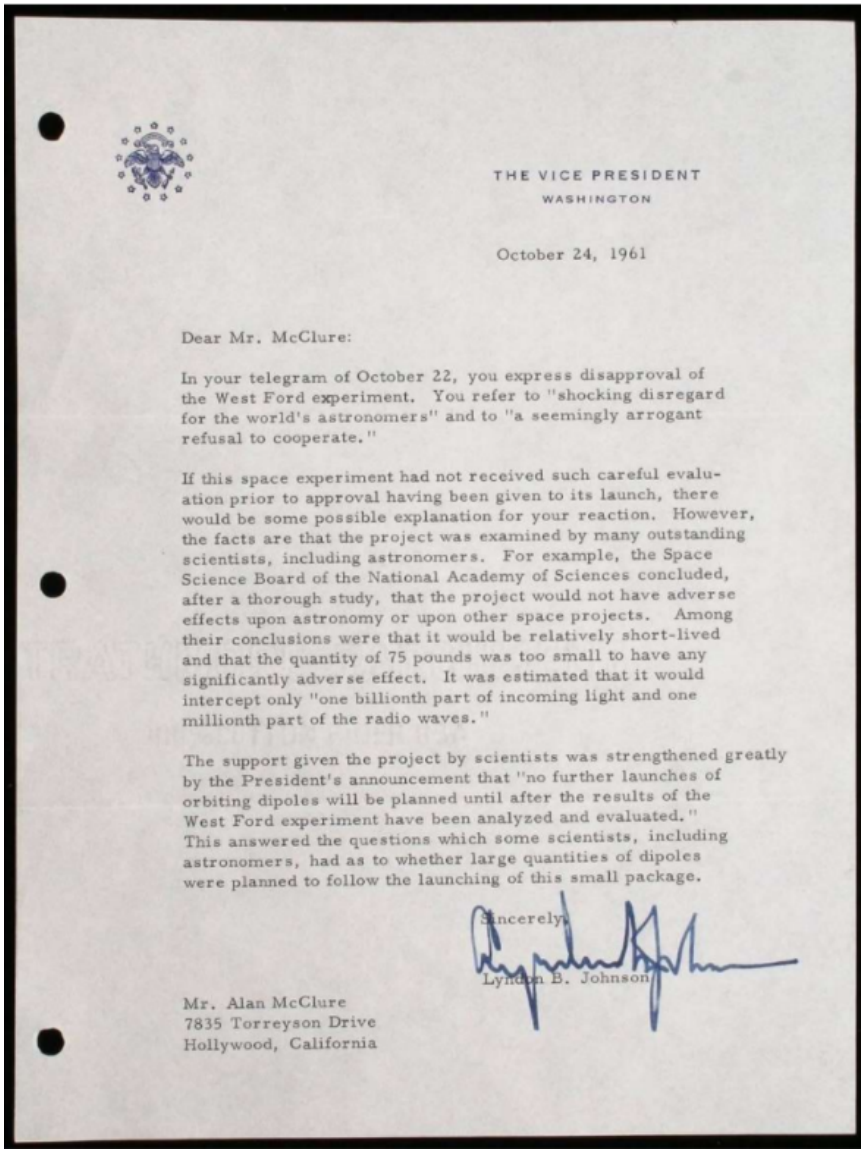
Light pollution, vanishing dark skies, space junk, interference from satellites. Problems unique to the amateur astronomer in the 21st century? Not exactly. While perusing the July/August 1961 issue of The Review of Popular Astronomy, an article called “The Vanishing Sky!” caught my eye. The introduction to the article read, “In gaining space might man lose the beauty of the night sky? Astronomers, both amateur and professional, are increasingly concerned by new space projects being considered now. To gain the light of new knowledge, must we ‘set fire to the last forest?’” This article from 1961 raised the alarm for sky pollution, particularly from spacecraft and space debris.



The article was authored by Alan McClure (1929-2005), a well-known and exceptional amateur astronomer whose reputation was built on his many stunning photographic images of comets that graced the pages and covers of astronomy magazines such as Sky and Telescope and other publications during the 1950s-70s, including Burnham’s Celestial Handbook.

McClure was so alarmed about the prospects of deteriorating night skies that he corresponded with a number of notable individuals about this issue, including then Vice President Lyndon Johnson, scientist Linus Pauling, and astronomers such as Frank Drake, Henry Giclas (Lowell Observatory), and Newton Mayall of Kitt Peak.

In the article, McClure was most worried about proposed passive communication satellites, particularly Project West Ford and Project Rebound. Both of these initiatives, particularly Project Rebound, stemmed from the successful launch of Echo 1 in 1960. Echo 1 was a 100-ft. diameter mylar balloon that appeared in the sky as a magnitude 0 object.



THE VICE PRESIDENT
WASHINGTON

October 24, 1961

Dear Mr. McClure:

In your telegram of October 22, you express disapproval of the West Ford experiment. You refer to "shocking disregard for the world's astronomers" and to "a seemingly arrogant refusal to cooperate."

If this space experiment had not received such careful evaluation prior to approval having been given to its launch, there would be some possible explanation for your reaction. However, the facts are that the project was examined by many outstanding scientists, including astronomers. For example, the Space Science Board of the National Academy of Sciences concluded, after a thorough study, that the project would not have adverse effects upon astronomy or upon other space projects. Among their conclusions were that it would be relatively short-lived and that the quantity of 75 pounds was too small to have any significantly adverse effect. It was estimated that it would intercept only "one billionth part of incoming light and one millionth part of the radio waves."

The support given the project by scientists was strengthened greatly by the President's announcement that "no further launches of orbiting dipoles will be planned until after the results of the West Ford experiment have been analyzed and evaluated." This answered the questions which some scientists, including astronomers, had as to whether large quantities of dipoles were planned to follow the launching of this small package.

Sincerely,

Lyndon B. Johnson

Mr. Alan McClure
7835 Torreyson Drive
Hollywood, California

Letter from Vice President Lyndon Johnson to Alan McClure

Project West Ford

Project West Ford was an Air Force proposal to orbit millions of 1.8 cm. (1⁄2 inch) long whisker-like copper wires, acting as dipole antennas, for military communications. These would be launched in two belts, one polar and one equatorial. The antennas would boost long-range radio broadcasts without depending on the fickle ionosphere.

NASA launched the first batch of West Ford dipoles into space on October 21, 1961. However the payload failed to deploy from the spacecraft, and its ultimate fate was never completely determined. However, news of this launch caused an international outcry.

A headline entitled "U.S.A. Dirties Space" ran in the Soviet newspaper Pravda. Cambridge astronomer Fred Hoyle went so far as to accuse the U.S. of undertaking a military project under “a facade of respectability,” referring to West Ford as an “intellectual crime.”

Size of copper needles dispersed as part of Project West Ford. (NASA)

Undaunted, NASA proceeded. In May 1963 a second West Ford launch successfully dispersed its cargo along an orbit that crossed the North and South Pole. Voice transmissions were successfully relayed between California and Massachusetts, and the experiment was declared a success. However, as the dipole needles continued to disperse, the transmissions fell off considerably. The ultimate fate of the West Ford needles is also surrounded by a cloud of uncertainty.

Because the copper wires were so light, project leaders assumed they would re-enter the atmosphere within several years, pushed Earthward by solar wind. Most of the needles from the failed 1961 and successful 1963 launch likely met this fate and many now most likely lie beneath snow at the poles. But not all the needles returned to Earth. Thanks to a design flaw, several hundred, perhaps thousands of the dipoles formed clusters of clumped needles which still reside in orbit around Earth, along with the spacecraft that carried them. Ultimately, NASA scrapped Project West Ford, in favor of the newer technology of active communication satellites such as Telestar.

Project Rebound

A successor to the Echo satellite, project Rebound proposed multiple launchings of 3 to 6 rigid 135-ft. spheres. These spheres would be launched using a single launch vehicle, being deployed in a fixed formation, until ultimately 90 of these objects would be placed in orbit. At the time, it was thought that this technique would reduce the costs of establishing multiple-satellite systems, both active and passive.

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ALL ABOUT STARS

Too Many Satellites

By Dora Russell

While most of us admire and wonder at the ingenuity of man in placing his satellites in orbit, others are deeply concerned over the network of moonlets planned for the future.

Sky watchers, both amateur and professional, find they have more than enough to contend with in the nature of street lights, neon signs and blazing porch lights. They are apprehensive over the placing of bright objects in the sky that, in any great numbers, would seriously hamper observational work, which still remains the backbone of astronomy.

The future in this respect does not look bright, for it is feared, and with good reason, that the number of satellites sent orbiting around the earth may reach such proportions as to be more hindrance than help. It has been pointed out that this would interfere, perhaps seriously, with long-exposure photography of the heavens.

One scarcely knows from one day to another what will be put into orbit next. For instance, a system for long distance communications has been devised that will operate through a belt composed of tiny satellites. These, we have been assured, would not interfere with radio astronomy observations.

It may be so. Perhaps in this particular instance, there would be nothing to lose and everything to gain. All that we, as interested laymen can do, is hope fervently that scientists will take every angle into consideration before peppering the heavens with orbiting hardware.

Take the Echo ballon project, for instance. Imagine 50 echo satellites roaming the sky at night. This is no great stretch of the imagination, either, for not only is Echo expected to stay in orbit for several years, but it is planned to have some 50 others join it.

How much of this sort of thing can go on before the stage is reached where astronomical research is confronted with the "satellite problem?" In a recent letter to Sky and Telescope one irate observer complains:

"A large number of slow-moving bright objects would markedly change the appearance of the sky and could only cause its disfigurement. Whether any group of people has the right to change the appearance of the night sky is questionable. Much fainter satellites have been successfully tracked, and I can see no useful purpose in having Echo satellites so bright. Blackening them might help.

"Other potentially harmful proposals include orbiting or placing high in the atmosphere various particles, gases and dusts. Unfortunately, once such objects are in orbit nothing can be done about them."

The writer, Alan McClure, is a top astrophotographer, and knows whereof he speaks.

According to McClure, if Rebound was launched, “those of us wanting to identify constellations and locate ourselves in relation to the night sky would first have to single out all the bright, slow-moving ‘stars.’” Dr. Newton Mayall, Director of Kitt Peak Observatory, said that “a large number of satellites like or larger than Echo 1 could be a real nuisance to some types of astronomical photography.”

McClure correctly projected that by 1970, there would be 2,000-5,000 satellites orbiting the earth.

Project Rebound was canceled in 1962, because the plan was considered “premature” and would require considerable development of spacecraft technology, as well as improved techniques for fabricating passive satellites.

One can only wonder what Alan McClure would have thought about Starlink, SpaceX’s plan to build an interconnected network of about 12,000 small satellites, to provide high-speed internet to anywhere in the world. The company has launched 360 Starlink satellites in the past year, and has plans to put as many as 1,500 such satellites into orbit in 2020 alone. Already, these satellites have interfered with professional astronomers and amateur astroimagers alike.

According to Dave Moll, who I interviewed for this article, “The good news, if there is any, is that these satellites are climbers. They are launched into a lower orbit than the one they will be in when operational. Therefore, they will be dimmer to the naked eye later on. But astro scopes have much lower limiting magnitude than naked eye, and astroimagers are picking up objects much, much dimmer than that. ... So hello Spacex, I see you! But for imagers, there is some other good news. The satellites operate pretty low, even at max altitude, so they are not visible much past astronomical twilight (except very low on the horizon) because they never get out of Earth’s shadow. But if you are a visual astronomer or astroimager who can’t afford to stay up late, you are SOL. You will see the satellites or image them. They will be in the way. So, folks at all our star parties will see them. But they are easier to ignore when working visually.

“I wish astronomers could band together with a single voice on this, but I have seen very few efforts to persuade the FCC to rein in Musk and his cohorts. But hey, even if we did stop it you can be sure that the Russians or the Chinese or the Europeans will just have a go at it themselves. Maybe this is why we haven’t seen a real grass-roots effort rising up against this.”

In 1961 McClure also cautioned that “rockets might be satisfactory for all sorts of advertising stunts.” In fact, in 2019 StartRocket, a Russian firm, announced plans to launch clusters of cubesats into orbit for advertising. After some initial publicity and buzz, there is little new information on whether this company is still on a timeline for a 2021 test launch. But you can be sure we haven’t heard the last of this idea.

Dave Moll summed up the situation this way: “Sad to say it, but I think we will be stuck with the night sky never looking the way we remembered it back in the day.” In this case, I would have to agree, but add that “back in the day” would be prior to 1957. Regardless, just keep looking up.

References:

The Review of Popular Astronomy, July/August 1961. Vol. LV, No. 512. pg 8-11.

http://stony-ridge.org/AlanMcClure.html

The Ottawa Journal, Ottawa, Ontario, Canada. 18 Mar 1961, page 61

https://www.wired.com/2013/08/project-west-ford/

Waxing 'Flower Moon' Supermoon 05/3/2020 Lehigh University Mountaintop Campus. Courtesy Sandra Repash.

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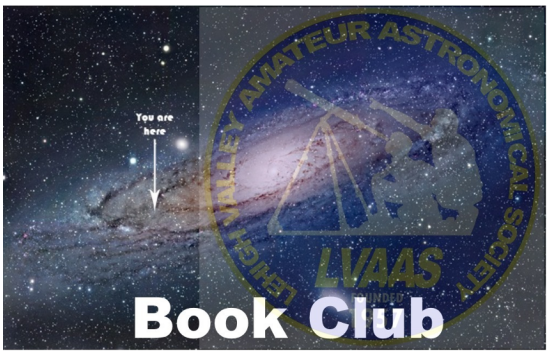


Looking for something to read? Looking to share the experience with fellow LVAAS members? Join our book club!

Here's the Plan:

Step One: Express your interest. If you are interested, let me know either in person, or via email: blaine@ieee.org. I will add you to our private Facebook group. If you don't have Facebook, let me know, we can setup an email list and communicate that way too.

Step Two: Choose a book. We will do this via our private Facebook group and email (if there are any who do not use Facebook.) So far the following are in the running:

1. The Big Picture, by Sean Carroll (*current choice)
2. Astrophysics for People in a Hurry, by Neil deGrasse Tyson
3. Moonshot: What Landing a Man on the Moon Teaches Us About Collaboration, Creativity, and the Mind-set for Success, by Richard Wiseman
4. The Trouble with Gravity: Solving the Mystery Beneath Our Feet

Step Three: Set the meeting schedule. Our plan is to meet in the library, but we can augment that with online conversations.

Step Four: Read, enjoy, discuss, and learn! We can do this both in-person and through online discussions.

This is the first time we are doing this, so I consider it "experimental." I am completely open to suggestions and changes as we go.

Thank you!

Blaine Easterwood, Education Director

Schlegel Observatory Report

by Rich Hogg – June 2020

The bad news is, I didn't do any engineering work on the telescope this month. I had planned to, but I got distracted, and by the time you receive this newsletter you should have had an opportunity to look at what I've created. In this column I'm just going to describe it briefly for the historical record and talk a little bit about how it was created.

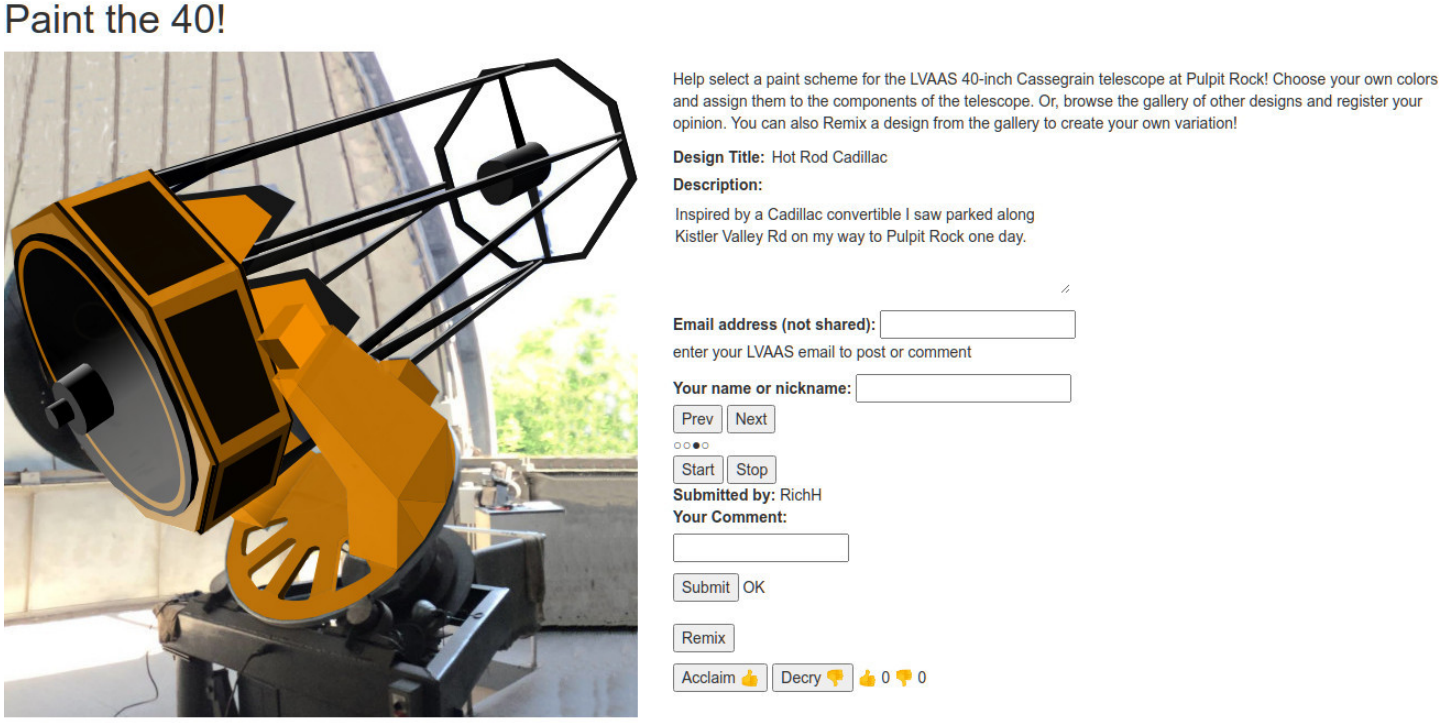
Project Status **-** the Schlegel Observatory is LVAAS' project to build a 40-inch classical Cassegrain telescope at Pulpit Rock, begun in the 1980's. The observatory, the mount, and the optical tube assembly were mostly completed well over 10 years ago, but the project languished due to delays in getting the optical set completed. Now the optical set is ready, and the mechanical work has fallen behind.

We've been busy finishing up some incomplete parts of the mechanical construction (for example, the truss portion of the tube was never sufficiently joined together) and dealing with a few issues (like the inability to polar align the mount properly), and in the process we've decided to make improvements in a couple of areas. I've reported on most of this work in this column over the last few years.

Now, we're dealing with the paint job. The telescope is all apart, with the tube assembly completely removed from the fork. There had been a two-tone paint scheme of black and gray applied, but it failed due to many years' exposure to changing temperatures and moisture levels in the observatory, long before the telescope was ever completed. We're looking at options for a new finish, and having some fun impromptu debates about the colors.

Which brings me to my project. At LVAAS' May 2020 General Meeting, Frank Lyter (our Pulpit Rock Observatories Director) commented that we needed to decide on a paint scheme, and that it would be nice to have a way of visualizing the telescope painted in various colors. I had an idea how to do this that was probably not what Frank had in mind, but had the advantage that it could potentially get all of LVAAS involved. I started playing around with it, and I liked the way it was going. So I allowed myself to dive in and make it my obsession for the month.

The result is the ***Paint the 40!*** web page, which is up and running on our server at the time of publication of this column. I'm not going to describe it in detail, but here is an image of it in action. In brief, it allows any LVAAS member to design a paint scheme for the telescope, and submit it to the "gallery" database. They may also view others' submissions and register comments, as well as upvotes and downvotes.



Building a SPA with AJAX

I realize that that sub-heading probably looks like the cat jumped on the keyboard, but I'm about to explain. The technology that I used to implement the ***Paint the 40!*** is to me, one of the greatest things about the modern Internet, and I have been reading about it and occasionally dabbling with it for quite some time. This is the first more-or-less complete application that I have done with it. It was a chance to find out how much I really knew and fill in some of the holes.

Web pages were originally built with just plain HTML, as everybody knows. Since that beginning, a lot of cool features have been added on, and miraculously all of the competing vendors of web browsers, web servers, and web page designers have managed to converge the technology into a very powerful standard. I developed the page for Chrome browser, but it seems to work well on Firefox and Edge and my smartphone, without much additional effort. Here is a list of the technology components, roughly in the order that they were developed:

The **SQL database** has been around since before the Internet and was originally developed at IBM for managing tabular data on their mainframes. It has been improved, adapted, and refined in so many ways that it is still almost always the best solution, despite many attempts to design something "more modern."

HTML is the original language used to define how a web page looks. It has also been refined and extended, and has survived attempts to replace it. **HTTP** is the signaling protocol used to send **HTML**

data from the server to the web browser. They stand for **Hypertext Markup Language** and **Hypertext Transfer Protocol**. **HTTPS** is an extension of **HTTP** that makes secure, authenticated transfers easier.

CSS, or **Cascading Style Sheets**, is a way of controlling how the **HTML** looks, separate from what it says. I know the least about **CSS** of any of these technologies. I can usually get something to work OK, but it takes a lot of trial and error for me.

JavaScript is a programming language that Netscape developed to use inside web pages in their Navigator web browser, along with **DHTML**, where the **D** stands for **Dynamic**. The original purpose was to let web pages have animated text and so forth.

XML was an attempt to build something like **HTML** but a lot more general and systematic. It is still used for other things, but not used very much for dynamic web pages these days.

However, **XML** was used in the original version of **AJAX**, which stands for **Asynchronous Javascript And XML**. The idea was that the Javascript could do more than just make the text bounce around; it could send **XML** messages to the server, and then do something with the response. This often involved the server fetching information from, or storing it to, an **SQL** database.

A more friendly data format called **JSON** (**JavaScript Object Notation**) has mostly replaced **XML** in the **AJAX** system, which is why I was tempted to call it **AJAJ**. History being what it is, the **JavaScript** function that you use to send **JSON** to the server over **HTTP** is called **XMLHttpRequest**, even though almost everybody uses **JSON** instead of **XML** (and **HTTPS** instead of **HTTP**) these days.

Finally, **SVG** or **Scalable Vector Graphics** is a language for precisely representing illustrations that is based on **XML** and has been incorporated into web browsers.

All of these things can be used to build a **Single-Page Application** or **SPA**, which allows you to do pretty near anything a computer can do in the context of a single web page. ***Paint the 40!*** is an example of this. Here is how it works: when you are designing a color scheme on the page, you are working locally in your browser. There is an **SVG** drawing of the telescope embedded in the **HTML** of the web page, and overlaid on top of a photo of the observatory background using **CSS**. **Javascript** that has been downloaded along with the page is activated by your control inputs, and modifies the **SVG** (treating it like **DHTML**) to reflect your design changes. When you press the Submit button, the **Javascript** sends the specs for your design to the server in **JSON** format using the **XMLHttpRequest** function, and the server stores it in an **SQL** database.

The only reason I've learned enough over the years to tame this mess is because you can learn it a little at a time, and have fun in the process. (And because I'm a computer nerd, and I have been for almost half a century.) But for now, I think I've had enough for a while. I hope some of my fellow LVAASers enjoy trying it out, and I am looking forward to getting back to work on the actual engineering of the telescope.

from the field: Mike Waddell

"I felt that Saturday's Spacex launch to the International Space Station was something to cheer about in this crazy time so when I got an email from nasa.gov saying that the ISS was visible this evening, and I saw that it was going by the moon and the sky was clear...well, here's what I saw. This is 26 images stitched together in Microsoft moviemaker...very easy to create." ~ Mike

StarWatch

by Gary A. Becker

Lunar Librations Lead to Libations

I had a rough night's sleep this past week. When counting asteroids and melatonin didn't work, my wife asked me what was bothering me. I said, Lunar librations…I'm trying to visualize them in my mind." Her response was, "Why are you just picturing them? Place an order at the State Store." "Not libations," I responded, "librations, the wobbling effect that the moon goes through as it orbits the Earth." "Can't help you there," she responded, falling back to sleep.

There are three of them, two in longitude (east-west) and one in latitude (north-south). Over a 30-year period, they allow astronomers to view 59 percent of the lunar surface, not just the normal 50 percent that most individuals believe can be observed. The never before seen far side of the moon was first imaged by the former Soviet Union's Luna 3 in 1959. The moon keeps its same face pointing towards Earth, a synchronous dance that allows Luna to complete one rotation (spin) in exactly the same interval of time that it needs to complete one revolution (orbit) around the Earth. The moon's rotation takes place at a uniform (angular) rate. While the moon is acting very proper in its rotation, it is also revolving around the Earth in an elliptical (oval-shaped) orbit, moving towards and away from our planet, continually changing its orbital speed.

When the moon is nearest at perigee and farthest at apogee, Luna basically has no longitudinal librations. At perigee the moon is orbiting at its greatest velocity. As the moon begins to move away from perigee, Luna's angular change due to rotation lags behind the more rapid angular change due to its orbital motion, and we get to peek around the eastern limb of the moon. By the time the moon reaches apogee, its farthest distance from Earth, we basically see it face on again with almost no libration in longitude. Here the moon is moving at its slowest orbital motion around the Earth, but it continues to rotate at an even angular rate slowly outpacing its orbital motion. We now get to peek around the western limb (side) of the moon. Another smaller diurnal (daily) libration in longitude is at its maximum when the moon rises and sets.

When Luna rises, our terrestrial position is “higher” than the moon’s location, and we get a little peek over the eastern boundary, similar to being on the summit of a high mountain and being able to look over the curvature of the Earth. Likewise when the moon sets, we look a little beyond its western limb. Those are the two geometrical librations in longitude, but what about the libration in latitude? The moon’s axis, which points in the same direction as it orbits the Earth, is tilted about 1.5 degrees to the perpendicular of its orbital plane, but the plane of the moon’s orbit is also tilted by about 5.2 degrees to the plane of Earth’s orbit (the ecliptic) causing the moon to have a total tilt of about 6.7 degrees in latitude. Again, think of yourself as being on a mountain. When the moon is located below the ecliptic, we have a view beyond the lunar north pole, but when the moon is above the ecliptic, we now get a peek past the lunar south pole. Keep in mind that while these librations are occurring the moon is moving closer and farther from the Earth as well as above and below the ecliptic plane, exaggerating the wobbling motions. Here is a link to an amazing full year of lunar librations as compiled by NASA’s Lunar Reconnaissance Orbiter during 2013: https://www.youtube.com/watch?v=ixroBOCm8M8.

In addition, you can check out two slides I have enclosed on my website online at https://astronomy.org/StarWatch/May/index-5-20.html#5-31-20 which I modified from Launch Pad Astronomy’s video on eclipses which should help explain the major lunar librations in a more visual sense.

Having now been able to envision these three librations in my mind and write descriptively about them, I feel the need to celebrate, taking my wife’s advice, with a libation. Cheers!

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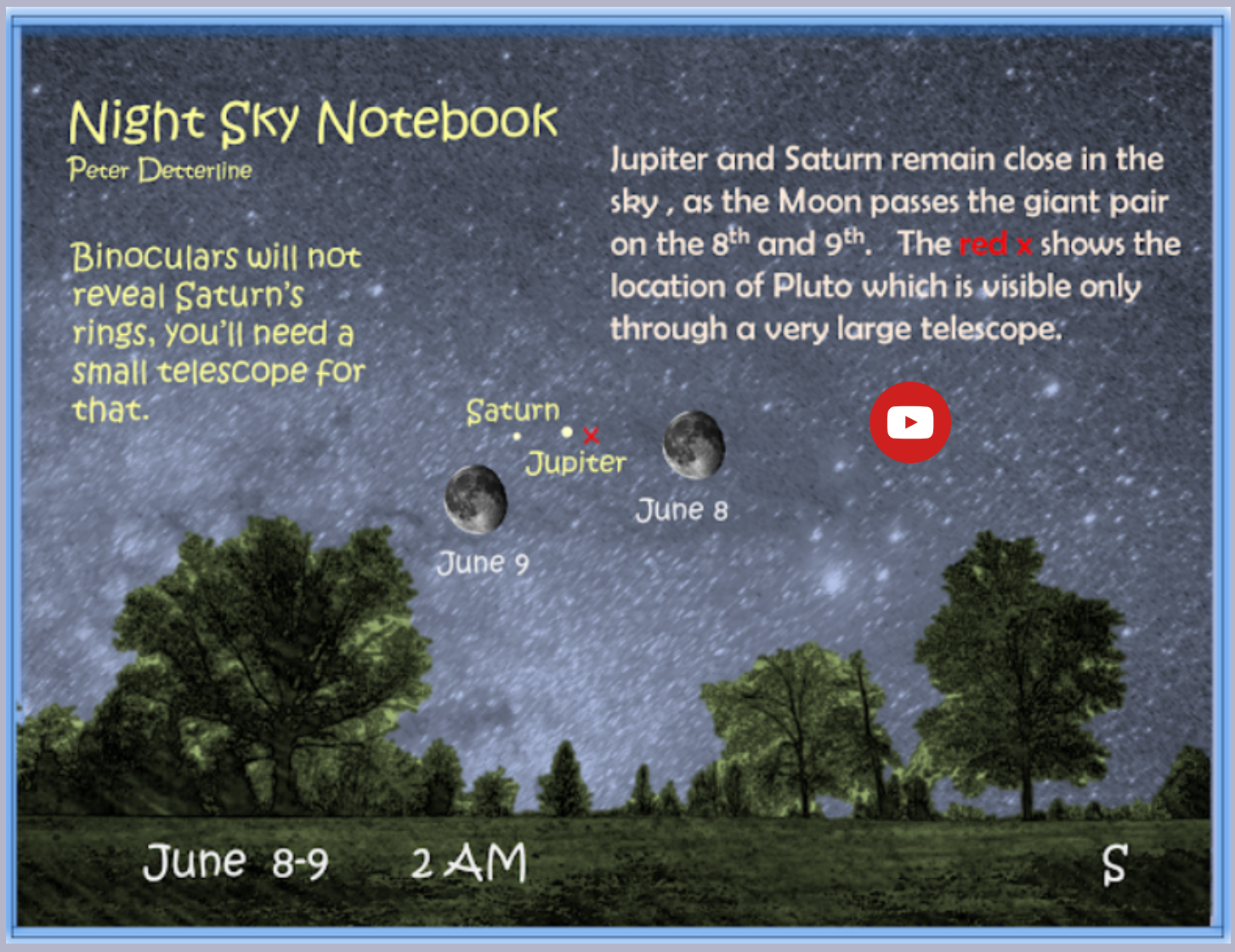
astronomy.org facebook.com/StarWatchAstro/

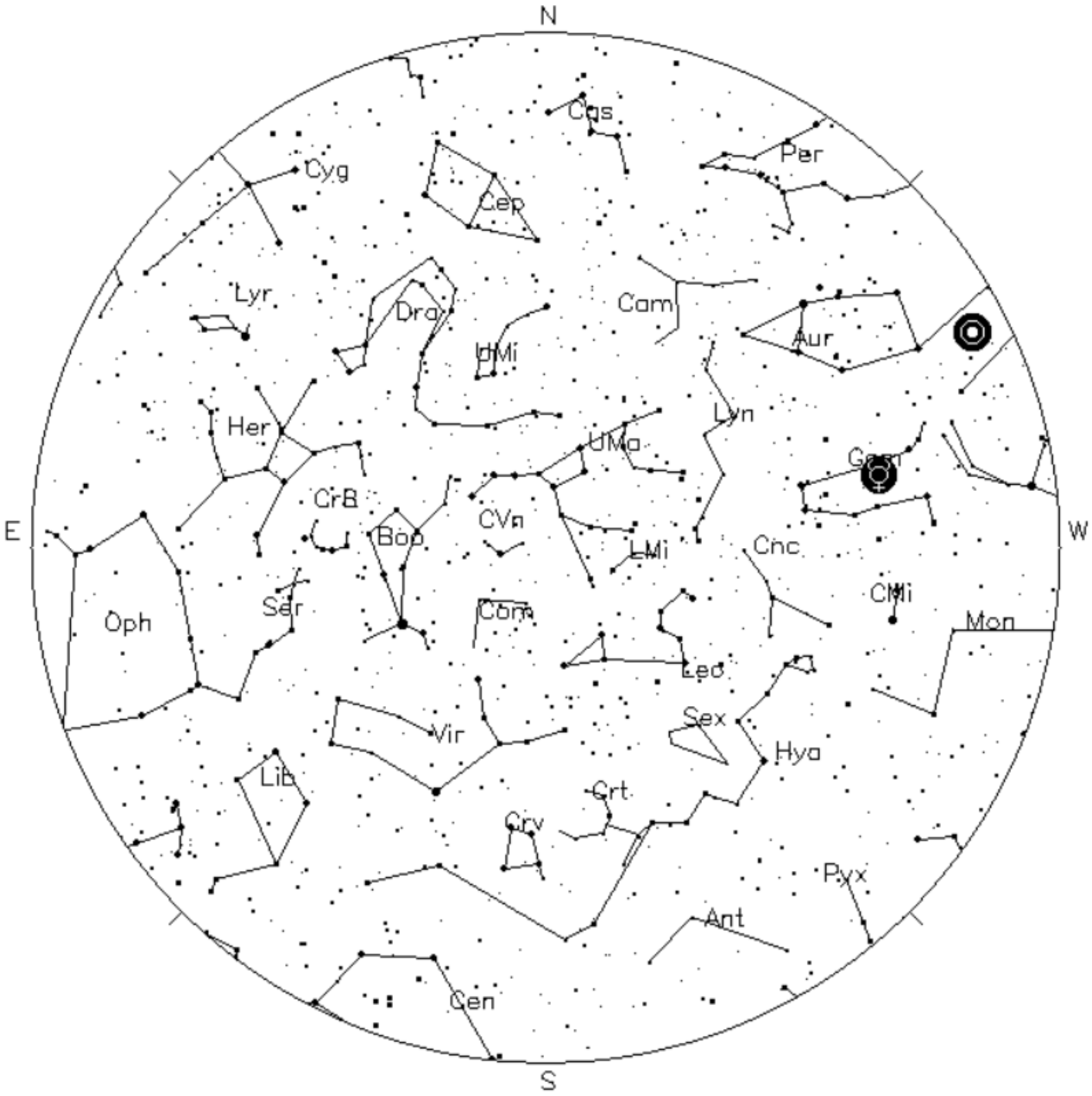
Night Sky Notebook for June

by

Peter Detterline



Sky above 40°33'58"N 75°26'5"W Monday June 08 2020 00:00 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

Lempel-Zim compression based on "compress"

Modified by Marcel Wijkstra

Customize Your Sky at **http://www.fourmilab.ch/yoursky/**

JUNE 2020

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	01	02	03	04	Full Moon 05	06
07	08	09	10	11	12	Last Quarter Moon 13 Astro Imaging - 7:00 PM - CANCELED
General Meeting - Online 7:00 PM 14	15	16	17	18	19	20
Deadline for submissions to the Observer 21 New Moon	22	23	24	25	26	Star Party CANCELED 27
First Quarter Moon 28 LVAAS Board of Governors Meeting	29	30				

JULY 2020

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
			01	02	03	04
Full Moon 05	06	07	08	09	10	General Meeting/Picnic - 5:00 PM South Mountain 11
Last Quarter Moon 12 General Meeting (rain date)	13	14	15	16	17	Astro Imaging - 7:00 PM 18
Deadline for submissions to the Observer 19	New Moon 20	21	22	23	24	Star Party 25
LVAAS Board of Governors Meeting 26	First Quarter Moon 27	28	29	30	31	

2020 LVAAS Event Calendar

**** Due to the COVID pandemic, please see the website for updates on all events ~ editor***

2020 LVAAS Event Calendar

	Sundays				Thursday	Saturday	Mondays	Multi-Day Weekends	Moon Phase			
	General Meeting time	Date/location	Board meeting	Observer submission deadline	Astro Imaging	Star Parties	Scouts at S. Mountain	Scouts at Pulpit R.	New	First	Full	Last
January	2:00 PM	12 Muhlenberg	26	19	16	no mtg		no camping	24	2	10	17
February	2:00 PM	9 Muhlenberg	23	16	13	no mtg		no camping	23	1	9	15
March	2:00 PM	8 Muhlenberg	29	22	12	7		6 – 7 – 8	24	2	9	16
April	7:00 PM	5 S.M.	26	19	18	4		10 – 11 -12	22	1 30	7	14
May	7:00 PM	3 S.M.	31	24	16	2		8 – 9 – 10	22	29	7	14
June	7:00 PM	14 S.M.	28	21	13	27		5 – 6 – 7	21	28	5	13
July	5:00 PM	11 S.M.	26	19	18	25		3 – 4 – 5 31	20	27	5	12
August	7:00 PM	8 Pulpit	30	23	15	22		1 – 2	18	25	3	11
September	7:00 PM	13 S.M.	27	20	12	26		4 – 5 – 6	17	23	2	10
October	7:00 PM	11 S.M.	25	18	15	24		2 – 3 – 4 30 – 31	16	23	1 31	9
November	7:00 PM	8 S.M.	29	22	12	21		1	15	21	30	8
December	**	12	27	20	10	no mtg		no camping	14	21	29	7

July, Aug & Dec are Saturday meetings with rain date on Sunday
Jan, Feb & March meetings are at Muhlenberg College
August meeting is at Pulpit Rock
December meeting / Holiday Party ** check website for time

NEAF	April 4 – 5
Cherry Springs S.P.	June 18 – 21
Stellafane	Aug 13 – 16
Black Forest S.P.	Sept 18 – 20 (not confirmed)
MegaMeet	May 22-24

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.

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

The Observer is the official monthly publication of the Lehigh Valley Amateur Astronomical Society, Inc. (LVAAS), 620-B East Rock Road, Allentown, PA, 18103, and as of June 2016 is available for public viewing. Society members who would like to submit articles or images for publication should kindly do so by emailing The Observer editor, Frances Kopy at editorlvaas@gmail.com. Articles submitted prior to the Sunday before the monthly meeting of the board of governors (please see calendar on website) will appear in the upcoming month's issue. PDF format is preferred. Early submissions are greatly appreciated. Articles may be edited for publication. Comments and suggestions are welcome.

LVAAS members please feel free to submit ads for astronomy equipment you have for sale, and additionally you may sponsor a maximum of three ads from non-members per year. Every attempt will be made to include submissions in a timely manner.

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Existing members please update your LVAAS profile information by emailing the membership director at membership@lvaas.org