SVAS OBSERVER
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Sacramento Valley Astronomical Society
Founded in 1945

Preparing for 2013

The SVAS Officers and Board of Directors have a great agenda for the new year!

Elections are only a few months away! Who will be our next president and vice president? Perry Preston Porter is our Election Committee Chairman, and he will be taking nominations for SVAS officers and odd year board members. If you would like to take part in the future of SVAS, consider stepping up with a nomination for these important positions!

The Steering Committee Chairman, Rich Sandler, is in charge of formulating where the SVAS is going, and how we will get there. Please share your ideas and vision with us.

The official SVAS winter star party site is now Prairie City. It will be located at the same area used for the Venus transit. The gate is locked at night, and it was decided that a responsible board member must be there to unlock and lock the gate. We have scheduled Jan 11-12 and Feb 8-9, as the first winter star party dates. Contact Perry Preston Porter if you would like to attend.

The SVAS Board is working hard on getting new members settled in and feeling welcome! There are many issues with

Scheduled Events

January 11-12 **Star Party at Prairie City. Contact Perry Preston Porter**

***January 18th General Meeting*:**
Ralph Merletti will speak on Solar Eclipses, past, present, & future.

February 8-9 **Star Party at Prairie City. Contact Perry Preston Porter**

Feb 15th, General Meeting:
SVAS welcomes Forrest Lockhart to speak on The Origin & Development of the Cameron Park Community Observatory and it's user group The Sierra Stargazers. This promises to be a great presentation!

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membership cards, orientation, and contact persons to be resolved. This is a volunteer organization, so everyone on the board needs to step up and help with the workload. We have found that some board members simply take on too much, and that invites disaster. Let's all do a little, many hands make for light workloads!

As we announced earlier, the Star-B-Q is scheduled for the July 4th weekend this year. The board passed a motion that July each year will be the official SVAS Star-B-Q month. It was a huge success last year, and early planning for next year will ensure it will be even better! We need lots of support for this event, so please volunteer your time, labor, and ideas. I especially enjoyed the presentation talks that were given a couple years ago, under a canopy outside of HGO, at sunset! It would be great fun to have speakers there again, there's something about the mountain air that enhances the experience as well as the flavor of your steak.

The Nightwatch Observatory is up for sale, http://nightwatch.org/. It's located just to the south of Henry Grieb observatory at Blue Canyon. The rear dome houses a 22" that Phil Mattingly built, and Bud Bafia owns a 14" under the front dome. Walt Heiges is chairing the committee investigating the possible purchase of the property for the SVAS. He feels it's a once in a lifetime opportunity to acquire these observatories, and it could define the SVAS for many years to come. Please convey your thoughts to the board!

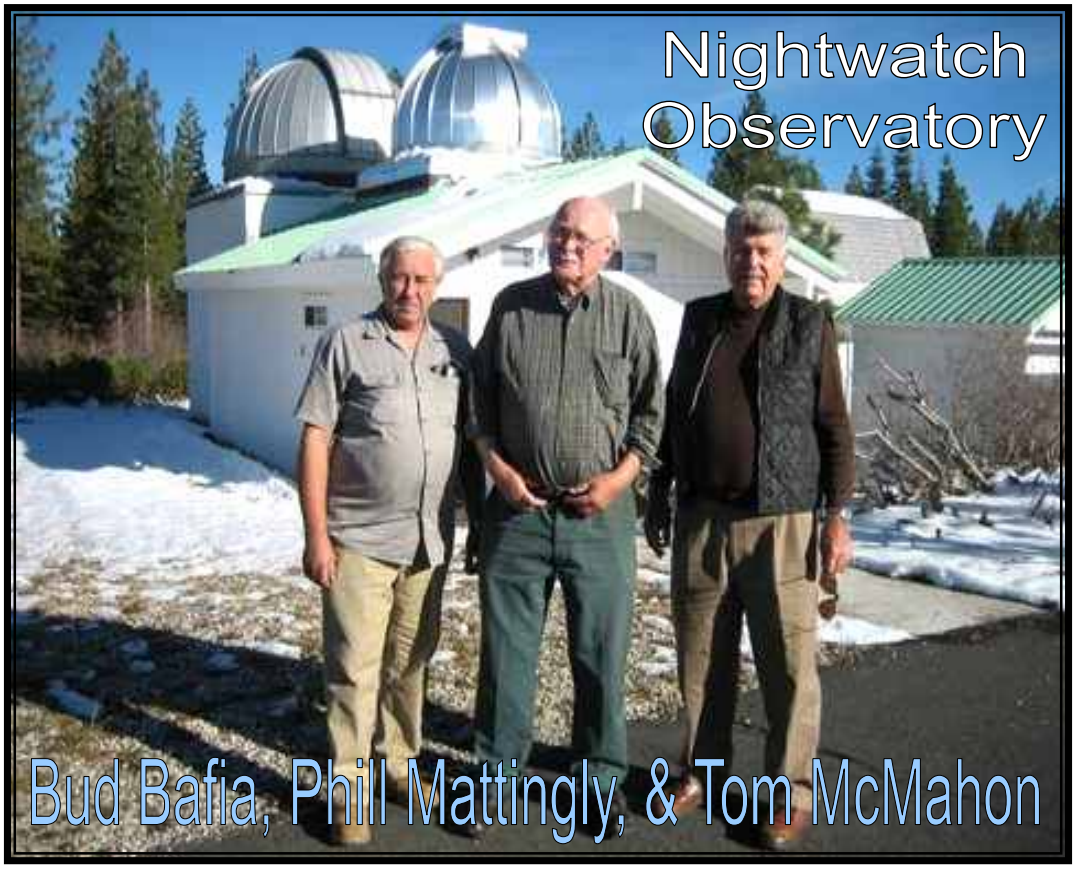
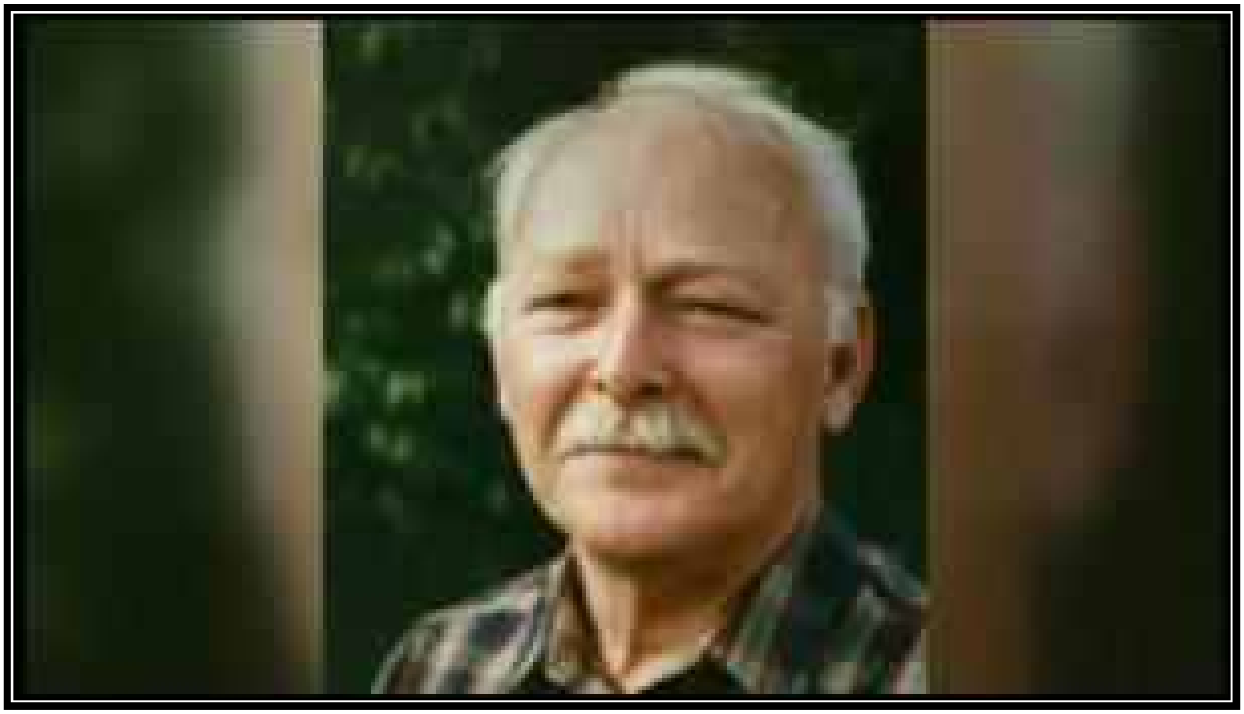


Photo from the Nightwatch web site.

How are our finances? They are much better thanks to you the membership! Donate what you can, even if it is just a few extra dollars at membership renewal. We are working on a friendly reminder for past due memberships, I'm sure they are simply forgotten. Please continue to support our Star-B-Q raffle and SVAS clothing purchases, because that money goes a long way to help pay the bills. We all forget the SVAS is like a business with all the overhead of rents, utilities, maintenance, permits, and insurance. Thank goodness we don't have payroll, our members donate their time in that department.

From the SVAS Board of Directors, we wish a great new year to all! Lets all pull together and make it extra special. Come to our meetings and voice your opinions and ideas! We have some great guest speakers scheduled, and it takes a huge effort on their part to present these talks. The only reward they receive is your support by attending and participating. Some of us, me included, are aspiring speakers struggling for that perfect presentation and acceptance from you the members. It's an evolving experience that sometimes requires everyone's patience to nurture! You should give it a try, for I enjoy talks from my fellow members equally as much if not more than a professional's. It's also surprising how much one can learn about this hobby while researching your own presentation. Contact our Speaker Seeker Rich Sandler and raise your right hand to volunteer.

All the best for 2013! SVAS Editor



Phil Mattingly
12/5/1935 – 12/8/2012

For those of you that haven't heard, Phil Mattingly has passed to the great beyond. He is studying the stars from a different perspective. Phil had a long history with the SVAS. As a matter of fact, he was very instrumental in building our very own HGO Observatory back in 1986. With the help of SVAS members, Dick Marasso and the Engineering students from Sierra College, Mr. Mattingly built our first building with the roll-off roof. Phil has been the President and a Director as well. Phil also helped to assemble the dome for the add-on to HGO called RJMEO (Robert J. Matthew Educational Observatory). In August of 2001, Phil arranged to have a crane set the dome on our new building.

The large building to the south of our complex is known as Nightwatch, and was constructed by Phil. It houses two telescopes. There is a 14" SCT in the smaller dome, and a 22" RC in the larger dome. I believe Phil even designed and built most of that telescope. For many years, Phil did scientific studies and published his findings. His prime focus was double stars. The 22" scope was ideal for resolving those select groups of stars. Phil's primary interest was the photometry of chromospherically active stars. The observatory is the product of necessity, a tool if you will, with which to study astronomy. He even went on to co-author a number of photometric project papers.

Over the years, it became exceedingly difficult for Phil to scale the stairs to the 22" telescope for any repairs. Bud Bafia began assisting Phil with his studies and assumed the operators job for him. After losing interest in Astronomy, Phil decided to purchase a WWII tug boat named Eugene-H. He began restoration on his tug and spent much of his time at Mare Island Strait where it is docked. It was there, during one of his working days with his son, that he disappeared. His son had to return to Sacramento for additional parts, and when he returned Phil was not there. It appeared as if Phil was preparing to leave but he was missing. The searching authorities believe he accidentally fell off the tug and was swept away by the "treacherous" currents in the Mare Island Strait. His body was finally found eight days later at Point Pinole Regional Shoreline.

I have known Phil for twenty years and he will be greatly missed.

Walt Heiges

Venus Occulation Observed; Future Eclipse-Type Events for Years to Come

by Ralph Merletti

Ralph observing the June 5th Venus transit.

2012 was an extraordinary year for eclipse-type events--including a major solar eclipse on May 20th (I observed it as annular, in Redding CA), a partial lunar eclipse on the early morning of June 4th, and the second and final transit of Venus this century on the afternoon and evening of June 5th (CA Primary Election Day). Before the sun had set, election officials at my local precinct polling place (where I had voted before the event) also viewed the transit projected through my 10x50 binoculars mounted on a tripod.

I didn't see any Perseid meteors early Sunday morning Aug. 12th, but I did observe both the disappearance (at 111x) and reappearance (at 25x) of Venus behind a waning crescent moon on the afternoon of Monday, Aug. 13th with my 3" refractor. I had trouble keeping the event within view during disappearance (approx.1:26pm PDT), but my observation of reappearance (approx. 2:39pm) was more successful at lower magnification. Some very "un-Venus like shapes" as foretold by Sky & Telescope. Especially at reappearance-- as I thought would happen, a tiny thin bright line appeared from out of nowhere (dark limb of moon), and quickly thickened to eventually reveal once again the complete half-moon phase of Venus. (An issue of the SVAS Newsletter in the summer of 2001 contains my write-up of the last time I observed precisely [Venus/Moon] this type of event.) This was the 4th of 5 eclipse-type events this year. Except for the non-visible beginning, the penumbral (some 80% of the way toward the umbra) lunar eclipse on the morning of Wed. Nov. 28th was clouded out.

So, what's next for Sacramento, Northern California, the American West and beyond... for the remainder of the 2nd decade of the 21st century, and for several years more? Plenty! There's a 50% partial solar eclipse in the early af-

ternoon of Thurs., Oct. 23rd, 2014... a good day and time to show the event to students and staff, at a school of your choice!

Four consecutive total lunar eclipses occur during 2014-2015: (Mon.-Tues.) April 14-15 (just 24 hours ahead of the annual IRS tax deadline!), 2014; Oct. 8 (Wed. morning), 2014; April 4 (Sat. morning), 2015; and Sept. 27 (Sunday evening), 2015.

On the morning of (Mon.) May 9, 2016, there will be a Transit of Mercury in progress across the sun, ending at 11:44am PDT. Mercury will be 12 seconds of arc in apparent diameter. No visible atmosphere around Mercury, but wouldn't it be interesting to see the planet's silhouette against a sunspot, or in front of the solar chromosphere and prominences at the end of the event?

On (Monday) Aug. 21st, 2017, an easily accessible (but short duration) total solar eclipse will be visible from a narrow path all the way across the contiguous United States from Oregon to South Carolina. I've already been looking at Google satellite and ground photography along the Oregon/Idaho border on the Snake River. Weiser ID (approx. 40 miles NW of Boise, and with totality of approx. 2 minutes in duration) is my current pick.

On another Monday morning, (Veterans' Day) Nov.11, 2019, there will again be a Transit of Mercury in progress, ending at an earlier time (10:05am PST) after sunrise. At this event, Mercury's silhouette will have an apparent diameter of just 10 seconds of arc, but do get the most out of it, as the planet finishes a very central crossing of the solar disk... there will be a shorter time of egress between 3rd and 4th contacts. It's the last transit visible from California for three decades (until 2049). Unless you're up to traveling overseas (in 2032, 2039), this is the last one for many of us "baby boomers!" (Perhaps it could be shown to crowds awaiting patriotic military observances, parades, etc.-- on this school, state and federal holiday.)

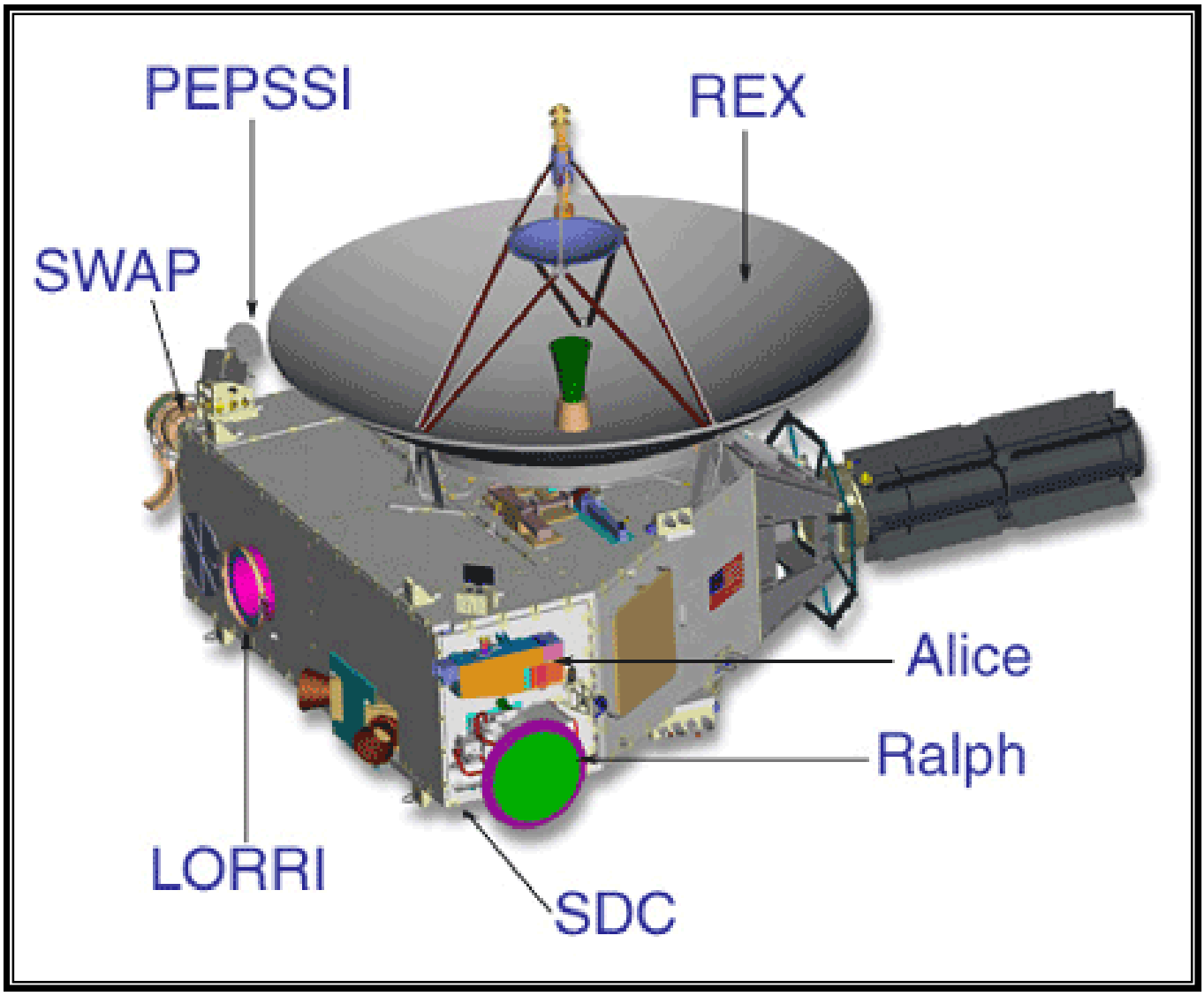
A very wide annular solar eclipse begins at sunrise on the north (Canadian) shore of Lake Superior on (Thurs.) June 10, 2021.

After that, the next annular solar eclipse in the U.S. is on (Monday again!) Oct. 14, 2023, from Oregon (including the extreme NE corner of California in Modoc County, which I hiked to--in Aug. 2006) to Texas and beyond... and the next total solar eclipse (from Mexico and Texas to New England and Canada) is on April 8 (still another Monday!), 2024.

So if you can last another dozen years, there certainly is plenty to plan for--GO FOR IT!!!

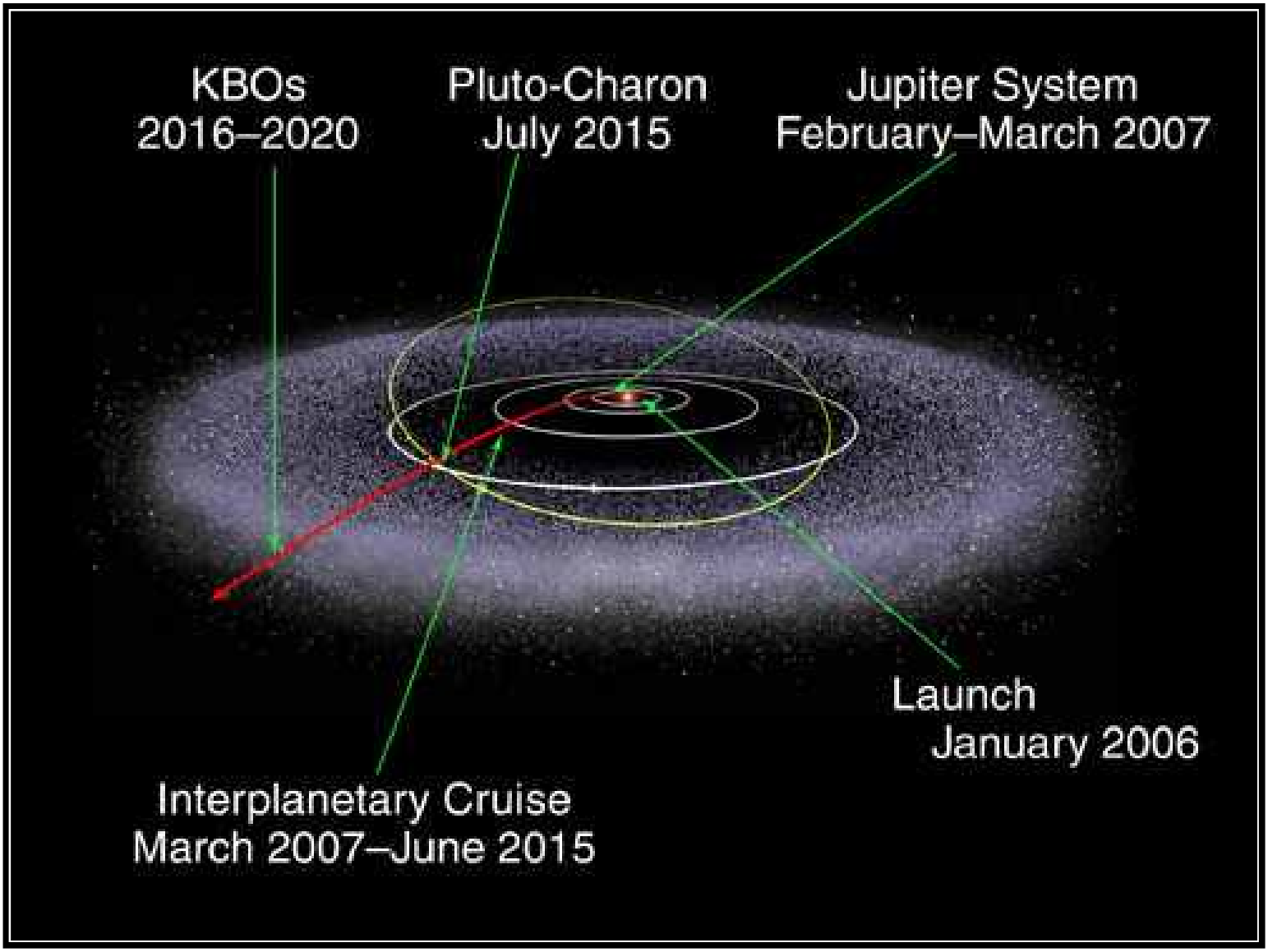
A NEW HORIZON FOR PLUTO: A MISSION TO UNDERSTAND THE OUTER SOLAR SYSTEM

By John A. Jaksich



New Horizons Instrumentation Packages
Source: Wikipedia

Among Solar System objects, the Pluto/Charon system is among the least understood. The ignorance of the Pluto/Charon system is due in part to its distance from Earth, and as well as its size and eccentricity of its orbit around about the Sun. Understanding the outer solar system is important because this part of the solar system most resembles the early stages of the solar system's development.



Trajectory of New Horizons probe

SOURCE: NASA

When the New Horizons spacecraft encounters the Pluto/Charon system in 2015, it will have traveled approximately 33 AU in the shortest time of all the spacecraft to date. The probe will spend approximately 150 earth-days characterizing and measuring the Pluto/Charon system to a much higher level of accuracy than possible from even Hubble. Its science suite consists of seven instrument packages:

RALPH	Visible & IR Mapping
Alice	Ultraviolet Imaging Spectroscopy
REX	Radio Science & Radiometry
SWAP	Solar Wind Mappng
PEPPSI	Energetic Particle Spectroscopy
LORRI	Long-Range & High Resolution Visible Mapping
SDC	Student-Built Dust Counter

The objectives of the New Horizons mission may be summed in one sentence: characterize and understand the aspects of the early Solar System. The methods which New Horizons will use consist of:

1. Understand global geology & morphology of the Pluto/Charon system.

2. Map the Pluto/Charon system.

3. Attempt to identify Pluto's atmosphere.

After numerous Keck and Hubble images, it was determined that Pluto contains a wispy atmosphere that will wax and wane proportionate to its eccentricity and distance from the Sun.

At this point, let's speak more of the instrumentation packages:

RALPH is a single telescope with two separate image collectors—Visible and infrared:

1. Multispectral visible imaging camera (MVIC) will produce visible color images of the Pluto/Charon system.

2. Linear Etalon Imaging Spectral Array (LEISA) is an infrared imager designed to measure the distribution of Methane, molecular Nitrogen, Carbon Monoxide and Water.

Alice is a UV spectrometer—it will measure Ultraviolet light absorption of Pluto in two modes:

1. Sun/star occultation.

2. "'Airglow mode'"- no star occultation.

REX is a Radio experiment that has two purposes:

1. Through the bending of the radio waves through interplanetary space—it is designed to characterize the average molecular weight of Pluto's atmosphere.

2. REX is also designed to measure weak radio emissions from Pluto's surface—namely, it will derive an accurate temperature of the night-side.

LORRI enables investigators to map Pluto down to 100 meter resolution in the visible light with an effective 8 inch aperture.

PEPPSI is a low-resolution plasma detection device designed to roughly count the escape of atoms from Pluto.

SWAP will measure the amount of solar wind near Pluto—and in effect determines Pluto's magnetosphere.

Finally, a public outreach experiment—the Student Dust Counter (SDC) is built and managed by students at the University of Colorado, Boulder. The main objective of SDC is to count and measure the size of interplanetary dust particles.

When the New Horizons probe completes its Solar System trek—we may muse that it was just a small step in a long journey past the Pluto/Charon system. We might—if luck prevails—have a better understanding of our Solar System's origins as a result New Horizons, as well as by future probes.

Astro Photography

by Wayne Lord

Chapter 2: Equipment for Astro-Photography

When I visited the Mt. Wilson and Mt. Palomar observatories in the late 1940s, the photos I saw there were taken with large plate cameras, basically hold-over's from the early days of photography using sensitized glass plates. They represented hours of exposure through the large apertures of these telescopes. (Ever wonder where the term “plate solving” came from? Know you know!) I don’t know if they were hand-guided, but suspect they may have been. Fortunately for us taking pictures of the skies is much easier now, and we can achieve better results even with smaller telescopes.

Almost everyone has a digital camera these days that they carry around with them along with their cell phones. While some of them have pretty large chips, they are not necessarily ideal for taking low-light pictures through a telescope. During the solar eclipse and Venus transit this year, I had people attempting to take pictures through the eyepiece of my telescopes. Some were successful and others weren’t. Using eyepiece projection is tricky, and unless you can get the camera lens right down close to the eyepiece it suffers from serious vignetting illuminating only a small portion of the sensor. People have been quite creative in rigging ways to hold their cameras steady, and now various manufacturers are coming up with devices to do the same thing. At the other end of the spectrum are high end Digital Single Lens Reflex cameras (DSLRs) and very expensive Charge-Coupled Device (CCD) cameras with thermoelectric cooling to reduce or eliminate hot pixels. Due to the wide variation between these extremes, I am going to postpone a serious discussion of cameras for the next chapter.

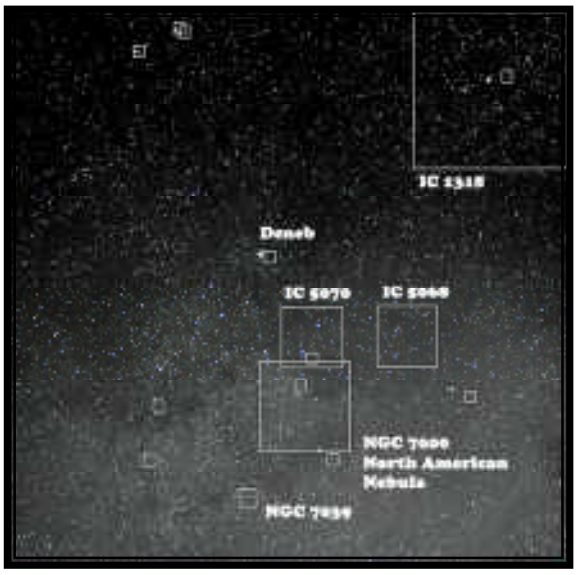
No matter what camera you choose, you will need something to mount it on and to look through; in other words you need a mount and a telescope (or some other magnifying device). What you choose for these devices depends in part on what equipment you already have, and your choice of astrophotography targets.

Probably the simplest way to take pictures is through wide-field imaging. Wide field implies that you are taking pictures of large expanses of sky without the use of a telescope. At its simplest, you mount your camera along with its normal lens on a regular photographic tripod, set it for high sensitivity (called ISO speed), set for as long as the camera allows the shutter to stay open, and trip the shutter taking your picture. Voila, you have your picture. What it shows depends on what you aimed at, what lens focal length you used and how bright it is. Taking pictures of the Moon is pretty easy as it is a relatively large bright object, and usually only needs exposures of fractions of a second. But unless you have a pretty long telephoto lens, all you will see is a bright dot in the middle of a black sky. Get up to around 150 to 200mm focal length, and you will be able to blow it up to see more detail. Another possibility, if your camera has the ability to take long duration exposures of 30 seconds or more, is to aim for the Milky Way. But, pretty much any image longer than 30 seconds (and sometimes less depending on magnification) will show star trailing with an exposure that long. You can take that trailing to extremes if you point the camera at Polaris, take multiple exposures or one really long one, and capture the stars making circles around it. You have probably seen some of these, and they are fun to try…once. The excitement quickly pales for this type of imaging! So, if the problem is star motion in long exposures, how do we overcome it? Hopefully inexpensively since I am all for doing things without spending all my hard-earned money.

Do an Internet or Wikipedia search for “barn door tracker” or Haig or Scotch mount. These are simple devices

that consist of a platform with a hinge on one edge, aimed at Polaris and equipped with a screw drive, turned either manually or by a slow geared motor, and has a ¼-20 screw for mounting your camera or another adapter to fit on a sturdy tripod. The dimensions and placement of the camera mount are carefully set so that a rotation of the screw drive, at once per minute, will keep the camera aimed at the same point in the sky for minutes to hours depending on how accurately it is made and controlled. Many people have made these and there are plans floating around for various designs. I haven't come across anyone who manufactures them for sale, but that's not to say they aren't out there. You might also find someone selling one second-hand. Or if you are handy, get the plans and parts and make your own. I have seen some beautiful wide-field shots taken with one of these devices, so I know they work, but have no direct experience using one.

Probably the next step up is to mount your camera on an astronomical mount, either an altazimuth or equatorial type. I have done this recently and came up with a very nice image of the Milky Way near Deneb showing the North American Nebula (NGC7000), the Pelican Nebula (IC5070) and several others. This was taken with my Canon DSLR equipped with a 70-200mm zoom lens, set at 70 mm, mounted on my Sirius EQ5 mount.



But, for those nice, beautiful, colorful images of M81/82, M51, etc. you need to go with a CCD camera on a very stable mount. More about cameras later since we have to build that firm foundation first. Many dedicated astro-photographers spend more money on their mounts than they do on their cameras since even a modern inexpensive camera can take some good images if it is well mounted and guided. If your mount is good enough for visual work, it may be good enough for imaging, but you won't really know until you try. That is what I did with my original SkyView Pro mount, until I found that it wouldn't track well enough to do any long term imaging, and didn't have a way to guide it, which is absolutely necessary for long exposures.

<Short side note here – it would have been possible to do manual guiding on the SVP mount, but that is a very tedious process involving peering through a separate guide scope equipped with a cross-hair eyepiece and using delicate, small adjustments to keep the guide star centered over the length of the exposure. With auto-guiding able to make sub-pixel adjustments, in my estimation it's the only way to go.>

So, a nice sturdy mount, but what type, fork and wedge equatorial or German equatorial? Some of you have nice large Celestron scopes on altazimuth mounts with GPS, GoTo, other nice features, and this category includes Dobsonian mounts. However, with an altazimuth type mount you need to employ some mechanism to rotate the camera during tracking or the photos will show star trails. Equatorial mounts that rotate the optical tube on the celestial axis do this automatically. The German equatorial is the preferred choice when you have lots of photo and guiding equipment to balance, and the large counter weights are easily adjusted. Equatorial fork mounts work well if balance can be achieved. You will have to decide on what your budget allows toward the purchase of a mount. I settled for Orion's Sirius mount, currently going for $1200. I would have liked to buy their Atlas mount, but couldn't swing the extra $300 for it. With a bigger budget, you could go for a Vixen SXD mount at $2699. I'm sure there are more expensive mounts out there, but they are way over my budget!

Of course, to do A-P you also need a telescope. Here again there are two basic options, refractor and reflector, with all the sub-variations in each category. And there are pros and cons for each type, for both visual and photography. Refractors have the advantage of optical simplicity and rarely need collimation. They are also generally

lighter in weight than reflectors. Refractors show stars as pinpoints rather than with diffraction spikes coming from a reflector's secondary spider. Most folks have come to appreciate the spikes as normal, and like the way they emphasize brighter stars. Refractors have better sharpness and resolution (could be a big advantage for planetary photography), because they lack the secondary mirror which diffracts light out of the Airy disk. Poorly corrected refractors can display chromatic aberration, a colored hue surrounding bright objects originating from different light frequencies (colors) refracting to different points like a prism. Reflectors exhibit no chromatic aberration. Reflectors cost far less, inch for inch, than refractors, another major point in their favor. Orion's premium 80mm Apochromatic f/6 refractor costs $900 but still gives you only three inches of aperture! Remember, light grasp is a function of aperture size and not the f/ratio. For the same aperture, different f/ratios produce different focal lengths. Magnification is a direct function of the focal length, and lower magnification produces brighter images and wider fields of view. Photographers usually attach their cameras without using eyepieces to adjust power (focal length), and it's called prime focus. This is why they prefer low f/ratios, with their shorter focal lengths netting lower magnification and higher image brightness. Our modern digital cameras used for long exposures gather lots of light, and software can stack many photos for even more light, so why would we need the increased light gathering of a bigger aperture? It's true A-P requires much less light than visual, but the one big advantage to large aperture is shorter exposure times and less tracking error. Resolution (detail, sharpness, contrast) and angular resolution (splitting double stars) also greatly improves with larger aperture. Reflector or refractor? Choose the one that best fits your type of astrophotography and budget.

<Another side note: You will notice I am one-sided on Orion products. There are a couple of reasons for that. Other than my 10-inch Coulter Optics Compact Dob, all my other purchases have been from Orion so I am most familiar with their products over any other manufacturer. While Orion's products may not be top-notch, they do a good job providing affordable products to amateur astronomers that don't have deep pockets, and stand by their products fairly well. There have been several instances where I have needed piece parts for my gear (lens cap, rubber feet, etc.) and they have sent them free of charge; and I have also sent back items that were purchased in ignorance and received a refund or replacement. Plus, they have donated stuff to SVAS for Star-B-Que!>

The final piece in the equipment category is something with which to guide your telescope to keep it centered on your target. So you need a guide scope and an auto-guider camera, plus the cables to attach to your laptop and to the guiding port on your mount. The best way of doing this is to purchase Orion's "Awesome AutoGuider Refractor Telescope Package" or their "Magnificent Mini AutoGuider Package." The former gives you a Short Tube 80 refractor plus all the accessories needed to start guiding with it, including PHD (Push Here Dummy) guiding software. The latter is similar except uses a 50mm guide scope instead of the ST-80. I have both, but prefer using the 50mm guide scope since it attaches in place of a finder scope and weighs much less than the ST-80 with rings, etc. In the days of film and manual guiding, the recommendation was to use a guide scope of about half the focal length of the main imaging telescope. You may still see that recommendation, but since the PHD software and CCD camera provide much better detail, many people including myself are successfully guiding 1500mm telescopes with the 50mm guider. Of course, in order to guide you will need a computer of some sort to provide the software (PHD) for guiding. I purchased a refurbished Dell Latitude D610 laptop that provides reasonable battery life and happily runs the programs I need for control, imaging and guiding. More on software in a later chapter.

There are many more accessories needed, such as battery packs, eyepieces, finder scopes, star charts, etc. but hopefully you have many of these items already, or will get them when and where they are needed.

To summarize, use what you already have to get started, being aware that you may be limited as to what you can do. When you are able to upgrade, do so while purchasing the best gear you can within your budget, concentrating on getting as good a mount as possible first and then upgrading your Optical Tube Assembly and other gear when you can.

Next chapter 3– cameras

Don’t be a Lightning Rod!

A lightning storm is one of the most dramatic shows of nature. You may feel like rushing outside to experience the blinding bolts, with the loud CRACKs and rumbles of surround-sound thunder following close behind.

But don’t. Lightning is dangerous. Stay inside.

In this storm over Boston, Massachusetts, lightning is finding lots of tall objects to strike. NOAA's National Weather Service (NWS) Collection, photo by Boston Globe.

Each year there are around 25 million lightning flashes in the United States. That’s a lot of chances to be a lightning victim. Although most people who are struck by lightning survive, many are badly injured, some permanently.

But what causes lightning? And how can we stay safe?

Lightning starts inside a storm cloud. Strong winds inside the cloud toss ice particles and water drops around like underwear in a clothes dryer. The ice and water particles rub together, which builds up static electricity. Sometimes the same thing happens to your underwear in the dryer! But in a cloud, it's on a humongous scale.

The strong static electrical charge that builds up in the cloud "wants" to discharge. So it seeks out something with the opposite kind of charge, which is usually another cloud. But often it is the ground. The charge—in the form of a lightning bolt—travels along the easiest route to the ground. That usually means the nearest, tallest, or most conductive object—such as a tree or a lightning rod. Don't let that lightning rod be you!

People have been struck by lightning while talking on a corded phone, while leaning on freezer in their garage, while working on plumbing in the house, while sailing, while camping, while playing golf (this one is a no-brainer!), and while doing any number of other activities outside. One poor park ranger just doing his job over the years was struck by lightning seven times!

Understanding how lightning behaves will help you keep safe before, during, and after a storm. If you cannot reach shelter inside, at least you will know, for example, not to stand under or near a tree or a metal pole or fence. Metal is a great conductor of electricity and invites lightning looking for a fast, easy way to the ground.

Find out more about lightning and lightning safety at the NOAA/NASA SciJinks website at http://scijinks.gov/lightning. It is by the same people who bring you The Space Place (http://spaceplace.nasa.gov).

This article was written by Diane K. Fisher and provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

A personal lightning story:

I recently saw a TV program on research into the Hindenburg disaster. They attempted to duplicate various causes on a 1/10th scale model, but none of the known causes seemed to fit. Then they discovered a young man whose father had taken him up on a hill close by, and he recalled seeing blue flickering lights over the top of the airship close to the vertical fin. Since the landing was attempted with a thunder storm close by, and the landing lines had been dropped onto the wet ground providing electrical grounding of the airship, the blue glow could have been St. Elmo's fire. That combined with the fact that the Hindenburg was tail heavy, which indicated a loss of hydrogen at the tail, was enough to result in the ignition of the hydrogen and loss of the airship.

My own personal experience with lightning as a young lad was during a thunderstorm in my hometown of Schenectady. We had a large covered front porch on our house, and I sat there in a chair during a thunderstorm. Since it was during a hot sticky day, it was pleasant to get the cool breeze and occasional mist from the rain. Suddenly there was a bright light and loud boom, and I saw something glowing shoot from the house two doors up from ours that landed in their front yard. I later found out that the lightning had struck the chimney of that house, and the glowing object was a brick that had been instantly heated to glowing red and flung out from the chimney. That gave me a new respect for the power of lightning!

Wayne Lord

Observing Guide

for January & February 2013

by Davin Enigl

Our observing plans for these months assume the best viewing time is from 10 p.m. to 5 a.m. and there is no Moon, or very little Moon visible. This depends on Moon rise and set times. With that in mind, the best observing for these three months is from the night before the New Moon to five nights after that, see the summary table below. The best guides are the Herald-"Bobroff" *Astroatlas* and *Stellarium* (free computer program), although almost any sky chart will help locate the objects. We should also search the Internet using the NGC numbers. All the objects listed below have NGC numbers as well as names. A planisphere is also needed to find constellations by time and night-of-the-month. It uses a rotating star map. We also need to travel to the darkest winter site available. The new SVAS winter star party site is Prairie City. Cronan Ranch is another option.

The best viewing angle is 45 degrees up from the horizon, but we can go as far as straight up and unbelievably, to the horizon at times. Yet, it's best to concentrate in the area 20-70 degrees above the horizon.

Normally from Blue Canyon, we can see the Southern sky objects as low as -38 degrees declination (DEC) on the celestial equator. However Cronan Ranch has a lower elevation and hills, so we can see fewer Southern objects. From a practical point of view, it's best to stay -18 DEC and up. The best time for viewing Southern Hemisphere objects is when they are crossing the South compass line called the Meridian. That is as high as they ever get for us in the Northern Hemisphere. For example the Omega Centauri (NGC5139) globular star cluster is -47.5 degrees DEC. Amazingly, it has been seen from Blue Canyon once or twice over a ten year period (but reportedly not from Cronan Ranch). In fact, it is about 5 degrees above the horizon at it's highest. Directly about 5 degrees above that is the Centaurus-A galaxy at -43 DEC (NGC5128, Arp 153), so that makes it 10 degrees above the horizon. The reason we can see these even below -38 DEC is possibly because the 5,300 foot elevation above sea level gives a better viewing angle. The higher the elevation, the more South we can see over the curvature of the Earth. However, to see these Southern objects, the sky glow must be low, the humidity must be low, and the winds must be calm (ideally all the way from the surface to high altitudes). Therefore, it's best to assume we can view no lower than 20 degrees above the horizon.

The approximate best Right Ascension (RA) ranges as follows: at 10 p.m. are the Western-most objects start at 0100 (01) hours RA in December, 03 hours in January and 05 hours in February. At 5 a.m. the best Eastern-most RA is 13 hours in December, 15 hours in January and 17 hours in February. This can be calculated from a planisphere to suit your observing style and goals. You may want to widen or narrow these ranges.

We have defined our three month's arcs across the sky over time and the available dark nights. On page A-06 of the "Bobroff" chart, are the basic (most popular) NGCs we can see. The approximate best NGC range for December at 10 p.m. is at N250 (01hr RA) and goes to N5000 (13hr RA) at 5 a.m. The approximate best NGC range for January at 10 p.m. is from N1250 (03hr RA) to N5800 (15hr RA) at 5 a.m. The approximate best NGC range for Feb-

ruary at 10 p.m. is from N1700 (05hr RA) to N6300 (17hr RA) at 5 a.m. Of course we must keep in mind our lowest -38 DEC.

	10 p.m. Western-most start	5 a.m. Eastern-most end
December 12th-18th, 2012	N250 (01hr RA)	N5000 (13hr RA)
January 12th-18th, 2012	N1250 (03hr RA)	N5800 (15hr RA)
February 9th-15th, 2012	N1700 (05hr RA)	N6300 (17hr RA)

We can not see between N250 and N6300 (or see poorly, if at all) during these three months. Wait for Summer.

For a comprehensive list of objects, enter the time range, date and other aspects of your observing goals (kinds of object you like) at http://dso-browser.com/ . We can print a list by brightest to dimmest magnitude for instance, but it will probably number hundreds or thousands of objects long (I hope we have enough paper in the printer). That is very difficult. Therefore we can select a shorter list from guide books, which is much more fun, see below. The list below concentrates on O'Meara's *Hidden Treasures* guide book (HT#), sticking only to those objects that have NGC numbers and names. These were picked for their obscurity. You will find few (if any) popular objects on these lists. Let's widen our horizons.

December only:
HT3, NGC281 (N281), bright nebula (bn), Cassiopeia, Pacman Nebula - associated with oc, IC1590. Near Alpha Cass, 9,400 light years (ly) away, 17 ly across.
HT5, N404, galaxy (gx), Andromeda (And), Mirach's Ghost Galaxy, Lost Pearl - in the glare of Beta And.
HT6, N584, gx, Cetus, Little Spindle Galaxy - N586 is the companion galaxy next to it.
HT7, N659, open clusters (oc), Cassiopeia (Cas), The "Caroline Herschel" Cluster - 2.5 degrees E-NE of Delta Cas.
HT8, N772, gx, Aries, Fiddlehead Galaxy - 80 billion stars, 106 million ly away. Twice the diameter of the Milky Way.
HT10, N1023, gx, Perseus, The Perseus Lenticular Galaxy - 34 million ly away, barred, 11 globular cluster orbit which are 5 billion years older than the galaxy itself.

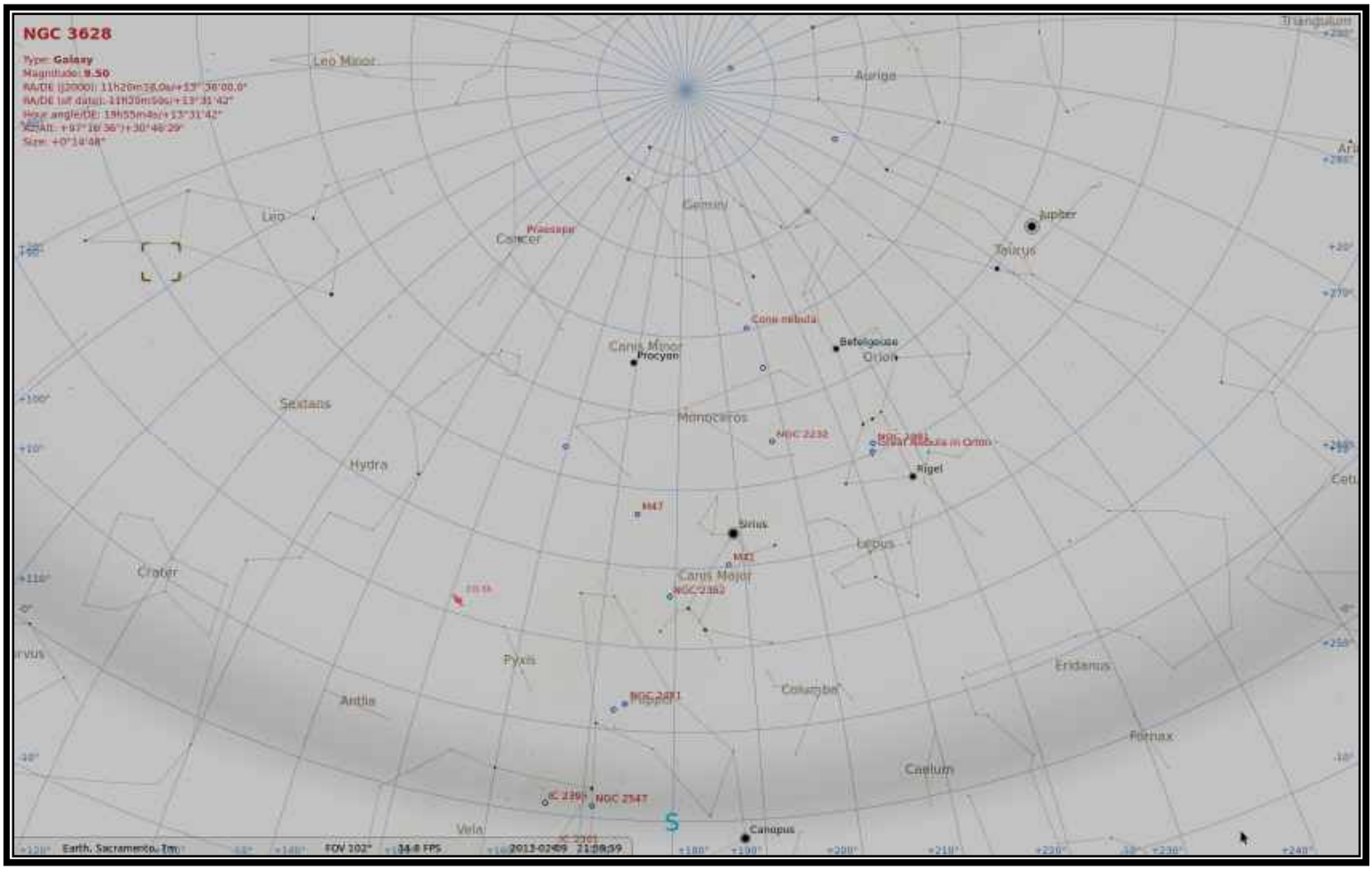
Overlap December and January:
HT15, N1333, bn, Perseus, Embryo Nebula - 1,100 ly away, reflection, large star-forming areas.
HT22, N1501, pn, Camelopardalis, Oyster Nebula - try to use O-III and UHC (nebula) filters too.
HT23, N1502, oc, Camelopardalis, Jolly Roger Cluster - 2,650 ly away.
HT24, N1535, pn, Eridanus, Cleopatra's Eye, Celestial Jellyfish - bright, hypnotic, 5,200 ly away.
HT25, N1528, oc, Perseus, m & m Double Cluster - This is not the popular "Double Cluster:. It's another one that is double, companion is HT26, try to use 7x50 binocular too.
HT26, N1545, oc, Perseus, m & m Double Cluster, aka Running Man, aka The Magic Pentagram see HT25.
HT27, N1647, oc, Taurus, Pirate Moon Cluster - glow behind stars looks like a ghostly Moon.

Overlap December, January and February:
HT30, N1981, oc, Orion, Coal Tar Cluster - very bright, North sword of Orion.
HT32, N1977, bn, Orion, Mermaid's Purse Nebula - South sword of Orion.
HT33, N1999, bn, Orion, 13th Pearl Nebula, Rubber Stamp - a star with nebula.
HT34, N2024, bn, Orion, Lips Nebula - just North of the Horse Head nebula.
HT35, N2163, bn, Orion, Cederblad 62 - nebula shooting light both North and South. Very unusual.
HT36, N2169, oc, Orion, Shopping Cart Cluster, aka The Little Pleiades - looks like the Pleiades shrunk.
HT38, N2264, oc, Monoceros, Christmas Tree Cluster - a bubbling cauldron of stars. Three-D look.
HT39, N2301, oc, Monoceros, Hagrid's Dragon - looks like a Unicorn stick figure.

HT40, N2353, oc, Monoceros, (pirate) Avery's Island - numerous clusters near and nebulocity.
HT45, N2539, oc, Puppis, "The Dish" Cluster - 59 stars, some blue (4), maybe unknown foreground objects.
HT47, N2683, gx, Lynx, UFO Galaxy - very bright, elongated core.
HT49, N2841, gx, Ursa Major, Tiger's Eye Galaxy - Seyfert-like compact active star core.
HT52, N3184, gx, Ursa Major, Little Pinwheel Galaxy - face-on spiral, similar to M101 but tilted 20 degrees.
HT55, N3344, gx, Leo Minor, Sliced Onion Galaxy - face-on.
HT58, N3628, gx, Leo, King Hamlet's Ghost Galaxy - dark central lane, edge-on.
HT60, N4216, gx, Virgo, Silver Streak Galaxy, aka Weaver's Shuttle Galaxy - Very bright edge-on.
HT63, N4490, gx, Canes Venatici, Cocoon Galaxy - Arp 269 with N4485 companion.
HT65, N4526, gx, Virgo, Hairy Eyebrow Galaxy - dark lane is difficult to see Hint: look Southwest.
HT66, N4605, gx, Ursa Major, Faberge' Egg Galaxy, aka Frankenstein Galaxy - asymmetrical.
HT67, N4656, gx, Canes Venatici, "Messier's" Hockey Stick Galaxy, aka, The Hook, The Hummingbird - asymmetrical.
HT68, N4699, gx, Virgo, Vinyl LP Galaxy - a few degrees Northwest of M104, oval.

Overlap January and February:
HT74, N5746, gx, Virgo, Blade & Pearl Galaxy - edge-on with dark lane.

February only:
HT75, N5866, gx, Draco, Fool's Gold Galaxy - possible candidate for the missing M102.
HT78, N6210, pn, Hercules, Turtle Nebula - arms and legs from a central "turtle shell".



SVAS ATM Connection

NCA Nevada County Astronomers

STOCKTON ASTRONOMICAL SOCIETY FOUNDED 1950

by Lonnie Robinson

Visiting ATM'er Jeff Baldwin

Bill Thomas and I were on the road again, Saturday Oct 6th, acting as unofficial ATM ambassadors. This time we visited Jeff Baldwin at his home in Lathrop, CA., just south of Stockton. Jeff is well respected in the ATM community, and the go-to guy for the Stockton Astronomical Society's (SAS) ATM workshops. Bill again drove down from Colfax to my home in Citrus Heights, and we took my car for the Lathrop run. The trips seem so much shorter with the company of a good friend.

Jeff's street was easy to find, even without my Garmin, and even easier to find him busily turning a large mirror blank in his open garage. He has a three car garage all used for the optical shop. How great is that having all the room you need? After introductions, we got right down to the topic at hand, that of grinding telescope mirrors.

Jeff's friend, Greg Wilhite (photo on left) from Manteca, CA., has started manufacturing very thin meniscus mirror blanks. These blanks are only 3/4 of an inch thick center to edge, and

heat slumped to the desired f/number. They have the look of a giant salad bowl. In the first photo, Jeff is carefully placing the concave 25" glass tile tool on the back of the meniscus blank preparing to rough grind the back side. The tool and the blank will then fit perfectly so he can use the tool for a supporting mount

while grinding and polishing the front optical surface. Wow, this is cutting edge stuff (pun intended)! Bill and I can't wait to hear how it turns out. Not too many years ago, a full thickness mirror of 1/6th the diameter was considered minimum. That means the 25" would be over 4" thick and weigh, I'm guessing, 160 plus lbs!! This 25" meniscus is only fraction of that enabling construction of a 60lb or so telescope anyone could handle. Check out Greg holding a 25" blank in one hand! He's either a body builder on the sly or that meniscus blank is really lightweight! His web site is, http://meniscusmirrors.com/products.

The photo above is Jeff watering his lawn and cleaning the 25" at the same time. Bill is looking on. To the top right, Jeff is setting up for another grinding session on his new mirror machine he calls "Ol Yeller". He and Greg Wilhite did a great job of build-

ing a very sturdy, double arm, and great looking unit. Just look at the heavy duty DC motor gearboxes turning a very large central shaft, and the electrical DC speed controllers. The photo at left

gives you an idea of how much the back of the meniscus mirror blank is curved or slumped. The hope is this mirror will be very temperature stable, because of it's even thinness, allowing consistent and quick cooling across the entire surface. The bowl shape will hopefully reduce the potato-chipping (mirror bending from it's own weight) effect when the mirror is supported on edge. The plan is to silicon glue the mirror to a standard wiffle tree support system, of 27 to 54 points, across the back side without using a sling or edge supports. This will reduce the load of each support down to about half a pound each. During testing it will be secured with double backed tape with a emergency catch system planned just in case it comes loose. It will be tested at various positions making sure the glass is properly supported. I am very excited about this concept becoming the accepted standard of future amateur mirrors. Jeff is very straightforward saying it is very experimental, and it may fail if all the problems can't be solved. There must have been an equal amount of trial and error, with a liberal addition of skepticism, when ATM'ers adopted what we now call lightweight mirrors.

One of the SAS members brought up stress testing of the glass blanks, so Jeff invited us in for a little TV viewing. Normally, as a Windows PC user, a blue screen means the kiss of death. For stress testing, Jeff disconnected the satellite feed to make a blue screen appear. This light from a LCD type screen is highly polarized and perfect to bring out areas in the glass that have stress potential. When the glass is poured and annealed, it's possible to form unequal areas of grain and tension. When grinding and figuring mirrors, these areas wreak havoc

causing the glass to essentially perpetually warp as the tension is relieved during grinding. This makes it very difficult to keep the dreaded astigmatism at bay. You can see the stress lines in the photo.

The next photo is Jeff and Bill checking out a Hat Box storage case for his ultra light upper cage. We discussed the Servo Cat installation on the same big bearing, small mirror box, Dobsonian scope.

Up to the minute breaking news! Jeff just sent this photo of the 25" meniscus mirror being polished. Note the glass tile tool he used to grind the convex back is now under the mirror for support. He is using an 18" pitch lap and a "fixed post" polishing position. The fixed post method is most interesting. By using a 75% sized tool to mirror diameter for grinding and polishing, and locating it one or two inches over the edge, a neutral fixed working position can be found. A magic spot that won't change the focal length, and will maintain a perfect sphere for figuring. It's a great procedure because the 75% spinning tool will create a very smooth zone free surface. The 75% polish tool should be located with a little less overhang to prevent the dreaded turned down edge. I believe Jeff uses Gugolz 64 pitch for polishing and figuring. The excitement is building! I cant wait to see the test results, let alone first light!

Bill and I had a great time! Jeff said it best; "Most of the fun ATMing is the gabbing you do with each other". We agree, and there are very few ATM'ers out there so we need to stick together. Somehow our wives tire of listening to us describe our many exciting ATM discoveries? Imagine that!

What will be our next ATM destination? Stay tuned, could be Chabot in Oakland, CA.? We have an opportunity to visit Forrest Lockhart at the Cameron Park Rotary Community Observatory next month, and I will give you a full report. Bill and I are always on the lookout for other ATM'ers to visit. A big thanks to Jeff for allowing us to attend his workshop and enjoying a really fun and informative afternoon! We will do it again soon, and we are anxious to demonstrate Bill's awesome new mirror test called the Slit Image Test. It has the potential to make ATM life much easier! After all, you can only make a mirror as good as you can test.

Our goal is to bring all Astronomy clubs closer together by sharing our fun and knowledge.

Community Outreach

Horizon Charter School Community Star Party

by Wayne Lord

October 18, 2012 Horizon Charter School Star Party, American River Canyon Overlook Park, Auburn, California.

This was a night when everything went right, for the most part. I arrived early at the site, attempting to avoid some of the outbound commute up I-80. I saw two people in their vehicles on the way in, but didn't know either of them, so proceeded on toward the dirt area I had seen from Google Earth. Parked my car in one of the nearest slots and got out to scope out the situation. (pun intended) Jay Schudel hadn't yet put in an appearance, but he had told us via e-mail what he hoped to view, which included setting up a solar viewing scope, so I was eyeing where the sun was and where a scope could be set up to view it longest. I heard vehicles behind me and turned around to find the two gentlemen who had been parked back a ways had pulled up and one hailed me. Turns out they were also packing scopes in their rigs and were there for the star party. Among us we decided to drive down onto the dirt area at least to unpack our gear and move them later if necessary. As it turned out it wasn't, and soon others, including Jay, arrived and started setting up.

It soon became apparent that the sun would set before any of the students arrived. I did set up my 5" Mak-Cas on the VersaGo altazimuth mount with the solar filter and saw some nice sunspots, but that was pretty much it. Set up my 8" Astrograph on the GoTo mount, with only a little effort at leveling

and using my GPS app on the smart phone to orient to True North. Some people wandered over from the park to see what we were doing, and some early students arrived, so about the only thing visible to show them was the Moon. As it got darker Mars also appeared, close to the Moon and the star Antares. I was running my Stellarium program on the laptop, so was able to show the relationship between the three bodies on that.

I was getting concerned that I wouldn't have time to do an alignment on the main scope, but Jay called everyone to gather around him so he could give his planned presentation, which lasted around 15 minutes. During that time I was able to get a two-star alignment done, and was happy to see that it slewed fairly accurately to the Moon and Mars. Jay's talk covered some of the history of telescopes, their uses and types, and introduced those of us there along with our scopes. He also mentioned the objects he hoped we would be able to show during the evening.

As the group broke up and people started going to the various scopes, I stuck in a higher power eyepiece to give a better view of Mars and then went to the 5", which had drifted off the Moon by then. I showed the visitors how to adjust the mount and gave them permission to adjust it as needed. I had to repeat these instructions at various times throughout the evening, but people seemed to like the chance to have a hands-on experience with the telescope, and passed on the info to others waiting behind them.

Back to the big scope to check on how Mars was doing, I found it had drifted some, but was still in the field-of-view, so tracking was working well even at 80X. Throughout the evening I had the 5" scope mainly aimed at the Moon, and when it got too low I switched to the double star in the handle of the Big Dipper, Alcor and Mizar. They were fairly easy to find and aim at. On the 8", after looking at Mars for a while I went to M13, then to the famous double Albireo (comparing it to the double star in Ursa Major was interesting for folks), then the

Perseus Double Cluster, and, when it rose, M45 the Pleiades cluster. Meanwhile, other scopes were aimed at some of the other objects such as M81/82, the Ring and Dumbbell nebulae, Andromeda, and others. One of the visitors asked about planets other than Mars that might be visible. I searched for Neptune, and may have spotted it but it was so tiny I couldn't be sure. Fortunately one of the big Celestrons found it. We knew Jupiter was going to rise if we waited long enough. Using my Google Sky app on my smart phone, I showed one gentleman that it was right on the horizon, but behind some trees. He must have told someone else as I soon heard others mentioning that Jupiter was rising. On a whim, I went out close to the edge of the drop-off and spotted Jupiter, so told the folks it was visible in binoculars there. Jay moved his Dob and I grabbed the 5-inch so we had two scopes for viewing in addition to the binoculars.

What went right – alignment, which I was worried about, worked fine for the purposes. We had a good turnout, with many students and adults from the charter school where Jay's daughter attends as well as incidental visitors from the park. I would estimate 75-100 people at the busiest time, and more total attendance as some came and went. We were able to field many questions and broaden the knowledge of quite a number of people. Sometimes it seemed that the adults were more enthused about looking through the scopes than the students, but then they passed it on to the kids.

What went wrong – not much. I did have one time when I was trying to adjust my scope while standing on the step stool. I heard a grinding sound from my mount and discovered one leg of my stool was blocking movement of the counterweights. Hopefully I didn't damage any gear teeth!

Editors note: Please support the SVAS in this rewarding endeavor, that of sharing your knowledge of the skies with students and the general public. These Outreach Star Parties are mostly planned for the winter to spring months, during the times when HGO is snowed in. It's amazing to share someone's excitement of seeing Saturn for the first time, or the moons of Jupiter. We have all seen these views many times, so we forget how impressive they really are! Contact the SVAS outreach director for future Public Star Party schedules. Give something back about our fantastic hobby!

Special thanks to Nick and Wayne Lord for the great photos!

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Where We Meet

General Meetings the third Friday of each month beginning at 8:00pm.
Board Meetings begin at 6:30 on the same day. All members are welcome.
Star Parties on weekends nearest the new Moon.

Sacramento City College
Mohr Hall Room 3
3835 Freeport Boulevard
Sacramento, CA.

WWW.SVAS.ORG

SVAS Observer

To Subscribe– First send in your membership application form below, with your dues, and upon approval by the board of directors the Observer (published bi-monthly) will be sent to your supplied email address in .pdf format. Second, request to join the SVAS Yahoo Group at http://groups-yahoo.com/group/svas-members. This group will keep you informed with the day to day current events and discussions.

Articles– Manuscripts and letters are welcome in MS Word, MS Publisher, or plain text format, and emailed to the SVAS Editor. Deadline is the 22nd of the month prior to the newsletter release.

Advertising– Commercial, non-personal advertising, business card, and full page are available. Classified advertising is free to SVAS members.

SVAS Membership Application

Choose Membership Level: New: ___ or Renew:___

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Detach and mail with payment to:

SVAS Membership Application
PO Box 15274
Sacramento, California. 95851-0274

Observatory Membership Approvals

The benefits of a regular membership plus private use of the Henry Grieb Observatory (HGO) at Blue Canyon. You must be a regular member for six months or longer, be certified and approved by the Observatory Director, and then be approved by the SVAS Board of Directors.

Note: It may take the board of directors 30 or more days to process and approve this application.

By signing this application, I acknowledge I have accessed the SVAS website, read and understand the SVAS bylaws and the rules governing the USFS Special Use Permit. In doing so, I agree to abide by the respective "terms and conditions" of each as they relate to the SVAS, use of its property and its facilities. I further understand and acknowledge that failure to abide by these "terms and conditions" can result in revocation of use privileges and/or SVAS membership.

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_____

Date_____