

# Morning Star

## Spring 2017



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The planetary nebula NGC2438 on the edge of open cluster M46. See page 14

### New Members

VAS welcomes the following new member who joined us since the last newsletter:

Treresa Zittritsch  
Denise White  
Chris White  
Will Farmer  
Riley Farmer  
John Sinchak

### Meetings/Presentations

Meetings are held the first (non-holiday) Monday of the month, at 7:30 P.M. in the Kolvoord Community Room of the **Brownell Library**, 6 Lincoln St., Essex Jct (2nd building north of Essex 5 corners on the left on Rt. 2A). (see Map on our web site, top of Events page). Extra parking is available in the Bank North parking lot across from the library. **For inclement weather call Jack St. Louis (802-658-0184) or Paul Walker (work # 802-861-8640) to confirm.**

### April 3

**Space Weather from the Surface of the Sun to Aurora Photography**  
By Charles Baldrige



Image taken by Mike Finnefrock in Iceland

Charles will cover the relationship between space weather and aurora activity. The talk will explore different features on the Sun that produce active

aurora on Earth and cover about how to monitor and track the features. We will cover an overview of space weather and how it impacts Earth's magnetosphere. Finally, we will explore the world of aurora photography with some helpful tips and tricks for getting great photos of the northern lights and share some of those images.

Charles is a data scientist working at MyWebGrocer and amateur helioastronomer who manages the website NorthernLightsNow.com and the Twitter account @NorthLightAlert which has over 12,000 followers.

### May 1

### Annual Banquet / Business Meeting

No Presentation. Members and invited guests only. **Contact any member to get an invite.**

If you are having the meal, choices are Turkey with all the fixings or Veggie Lasagna. Paul will send out RSVP's in April.

The **meal is \$20 at the door**, no charge if not eating.

Location: St. Johns Club, 9 Central Ave. South Burlington (take Lakeside Ave from Pine St.).

Social Hour 6-7. Dinner 7-8. Door prizes, awards, annual business meeting 8-9.

### Silent Auction

There will be a silent auction to raise money for the club. If you have items to donate to the cause, let us know

**Elections this year are for Treasurer, Secretary and the 4 Board Members at Large.** Any full member interested in any of these positions please contact any of the board members listed at the end of this newsletter.

## Stargazing and other Events

All observing events -are weather Permitting unless otherwise stated. Bring extra clothes. Even a summer evening can be chilly after standing still for a couple hours in damp air.

Last minute cancellations may occur even if the weather is good, so please check the web site ([www.vtastro.org](http://www.vtastro.org)) Events page.

You are welcome and encouraged to bring your own scope if you have one.

Contact: [info@vtastro.org](mailto:info@vtastro.org)

### New Email List for Member Use of the Hinesburg Observing Site (HOS)

100 Observatory Road, Hinesburg, VT

For impromptu star gazing we now have an email account, [observing@vtastro.org](mailto:observing@vtastro.org), for members interested in observing from the the Hinesburg site. This will make it easier for members to coordinate going to the Hinesburg Site (and possibly other sites).

If interested contact [info@vtastro.org](mailto:info@vtastro.org)

See details below and on the following pages  
Contact information for events is highlighted in blue.

### Public Events

#### April 29<sup>th</sup> , Astronomy Day

Public star party at Dorset Park and / or Burlington Waterfront. The moon will be 3 days old and Jupiter will be in good position. Jack St. Louis will head this up.

#### May 13<sup>th</sup> at 1 PM, Telescope Clinic and Messier Day

Open to the public at Brownell Library. Paul Walker will show images of Messier and other objects he has photographed that can be seen with a small telescope. Keith Lawrence will head this up.

Contact: [info@vtastro.org](mailto:info@vtastro.org)

### June 6

#### Lets Go To Mars, an Exciting Trip to the Red Planet By Al Boudreau

We'll figure out how to get there, look at the landscape, and find a place where we'll land. Then we'll figure out how to develop a Mars colony. Sorry, you'll have to figure out how to get back to Earth (if you want to).



NASA Image from Wikipedia

### Member and Invited Guest Star Gazing and other events

**March 24<sup>th</sup> or 25<sup>th</sup>** (backup March 31 or April 1<sup>st</sup>) - Messier Marathon at Dennis Woos - starts at dusk and runs all night. Beginners can have fun finding objects for the first time, seasoned observers can help find them! Come and see how many objects we can find. This is a star party where people may come and go as they please.

**May 19, 20 or 21** - Star Party at Angele'a starting at dusk.

**June 24<sup>th</sup> (backup 25<sup>th</sup>)** - Club picnic at Dennis Woos. Games for the family, the club will provide drinks.

**Astrophotography workshop - Date to be determined** - A continuation of the workshop of last spring concentrating on processing of images.

**Maker Day** - First session occurred March 25, others to follow - Club members will have a chance to make an observing chair. Keith Lawrence will head this up.

Contact [info@vtastro.org](mailto:info@vtastro.org)

### Green Mountain Astronomers (GMA)

All events start about sunset.

Contact Ron Lewis for info  
802-779-5913 (cell)  
802-247-5913 (home)  
[vtpoet@gmail.com](mailto:vtpoet@gmail.com)

**Sat/Sun, 4/1-4/2** - Lovers Lane, Brandon - Messier Marathon

**Sat, Apr 15** - Castleton University - CU/Unitron Clean-Up Day, with Solar Viewing

**Fri, Apr 28 or Sat, Apr 29** (rain date) - Castleton University - Castleton Night of Wonder, Paramount Theater Auction Prize

**Sat, May 27** - Hubbardton Battlefield - Member and Friends Workshop & Star Party

**Tue, Jun 13** - Castleton University - Concert Series. Obs. after concert.

**Tue, Jun 20** - Castleton University - Concert Series. Obs. after concert.

**Sat, Jun 24** - Hubbardton Battlefield - Solar, Deep Sky Night

(Continued on next page)

(GMA continued from previous page)

**Tue, Jun 27** - Castleton University - Concert Series. Obs. after concert.

**Tue, Jul 4** - Castleton University - Concert Series. Obs. after concert.

**Sat, Jul 8** - Hubbardton Battlefield - Hubbardton Battlefield Reenactment

**Tue, Jul 11** - Castleton University - Concert Series. Obs. after concert.

**Tue, Jul 18** - Castleton University - Concert Series. Obs. after concert.

**Tue, Jul 25** - Castleton University - Concert Series. Obs. after concert.

**Tue, Aug 1** - Castleton University - Concert Series. Obs. after concert.

**Tue, Aug 8** - Castleton University - Concert Series. Obs. after concert.

**Tue, Aug 15** - Castleton University - Concert Series. Obs. after concert.

**Mon, Aug 21** - Castleton University - Solar Eclipse

**Sat, Aug 26** - Hubbardton Battlefield - Solar, Deep Sky Night

**Sat, Sep 23** - Hubbardton Battlefield - Solar, Deep Sky Night

**Sat, Oct 14** - Hubbardton Battlefield - Solar, Deep Sky Night

## Public Star Gazing at Schools, Libraries, and other, groups.

If you know of a group or institution that would like to schedule a star gazing session have them contact:

[info@vtastro.org](mailto:info@vtastro.org)

## Articles

### Chasing the Total Eclipse of the Sun on Monday, 21 August 2017

By Ron Anstey with additional comments by Paul Walker

**Remember Safety first:** Please see Sky and Telescope article at <http://www.skyandtelescope.com/observing/celestial-objects-to-watch/how-to-watch-a-partial-solar-eclipse-safely/>

I started looking on the Internet for information in December 2016. I contacted Paul Walker and he told me he has been planning this for 5 years. So you can see I was a little behind. The first thing I found was a map of the US with the path of totality plotted on it.



After this event the next total solar eclipse in the US will be 08 April 2024 and it will pass through our area.



While searching the Internet I found some suggestion for this event. I list some of them here:

- If this is your first total solar eclipse, consider just taking it all in and observe only.
- [If planning to image, write a plan and practice - Paul's comment]
- [Even if observing, a list of what features to look for, and when, can help produce a more satisfying experience, even if you don't do all on your list. See Bob Berman's *Talking Totality*, Jan. 2017 S&T, page 9 for a nice description of the visual experience]
- Totality is going to be the quickest 2.4 minutes you will experience.
- Do I want to observe, image or a little of both. If you spend all your

time imaging you might miss the event. [Plan, mentally and actually, to drop any and all imaging if any problems arise -write it into your plan]

- Where will I be able to setup? Will I be in a public area? Schools will be in session.
- If you don't have all the equipment you need, get it now. [I do]
- Order solar glasses now. Several places are on back order already [I have several pairs].
- Sign up for vacation time early. Make it a several day event. Get in position early but be prepared to move. It is on a Monday. [I am making it a vacation, 3 days with stops to drive down, a week in Tennessee and 3-4 days to drive back]
- Watch the weather and be close enough to travel 100 - 200 miles the last day. [Already part of my plan. Also will have list of local TV station web sites for checking local conditions]
- If you need to move do it as soon as possible, it is going to be crowded. [If I move, I plan to use a GPS device **and avoid major roads**]
- Join an organized event.
- You may be one of a few that have ever seen an eclipse or know what to expect. Your equipment will be popular. Let it be known that during totality the scope will not be available.
- It is going to be Hot 90 -100 deg.
- Sun screen
- Find a place with shade.
- Cooler with ice/water/other drinks (no alcohol).
- A chair you are going to be there a long time [Since the Sun will be 60 degrees up, make it a lounge chair].
- Bring snacks and lunch. Don't expect to get any at the site.
- Take care of bodily functions early [Written in my plan - bathroom break at T-30 minutes].
- If you are taking children see to their needs well in advance of totality.
- Always have some Duct tape and spare batteries.



- How much equipment do I want to set up? What power do I need and where will I get it.
- Test and retest everything all summer long.
- Listen at totality. Everything will get very quiet – birds will stop chirping.
- During totality you can look at the sun without filters.
- The temperature will drop 10 – 15 degrees.
- Write down memories as soon after the event as possible. Video members of your group.

### Web Sites:

Charlie Bates

[www.solarastronomy.org](http://www.solarastronomy.org) Many great links

<http://nationaleclipse.com/> Events planned in each state along path

[www.space.com](http://www.space.com)

<http://www.astronomy.com/great-american-eclipse-2017>

[http://xjubier.free.fr/en/site\\_pages/solar\\_eclipses/TSE\\_2017\\_GoogleMapFull.html](http://xjubier.free.fr/en/site_pages/solar_eclipses/TSE_2017_GoogleMapFull.html)

<http://www.mcglau.com/eclipse/2017/maps.htm> Strip maps of eclipse Path

[http://eclipse2017.org/2017/weather/2017\\_clouds.htm](http://eclipse2017.org/2017/weather/2017_clouds.htm)

[http://xjubier.free.fr/en/site\\_pages/SolarEclipseExposure.html](http://xjubier.free.fr/en/site_pages/SolarEclipseExposure.html) Exp Time calculator

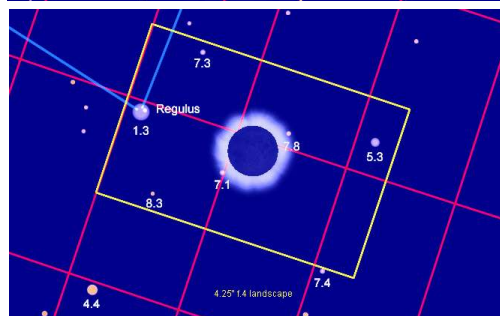
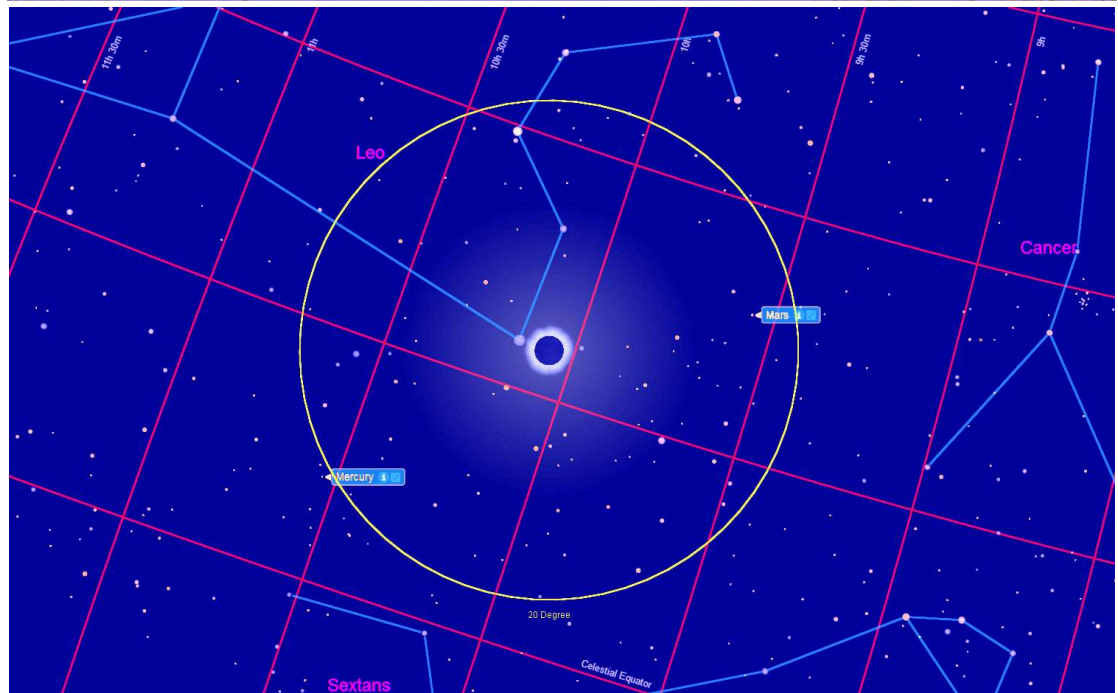
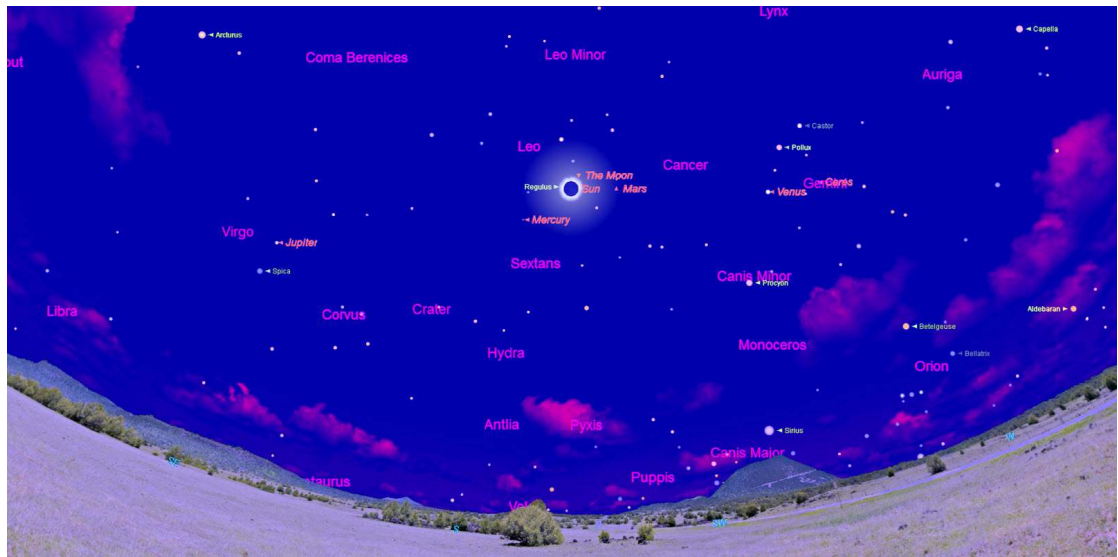
<http://www.celestron.com/2017-eclipse-watch>

<https://www.timeanddate.com/eclipse/list.html>

<http://earthsky.org/astronomy-essentials/august-21-2017-solar-eclipse-4-planets-bright-stars>

### Where in the sky

For those viewing from within the shadow, I (Paul) have produced some charts showing some planets and stars that may be visible. I used Starry Night Pro Planetarium software and Picture Window Pro image processing software. Also see the bottom link above for similar info.



Because you want to be focusing on the main event, we'll start with the bottom chart (yellow rectangle is 2x3 degrees, 4.25" f/4). Regulus will be 1 degree East of the Sun/Moon edge. Because the inner corona is about as

bright as the full Moon, Regulus won't be as easy to see as one might expect.

Next out are Mars, about 8 degrees to the right and Mercury, 8 degrees to the left and slightly down. Mars should be easy at magnitude 1.8. Starry Night Pro indicates Mercury will only be mag. 3.3, but this may be wrong.

Venus will be clearly visible 34 degrees West of the Sun at magnitude -4.0 in Gemini. With Pollux and Castor 7 and 11 degrees to Venus's upper right at mag. 1.1 and 1.6 respectively. 15 degrees below Venus will be 0.4 mag. Procyon. Venus will be readily visible about ½ hour before the eclipse.

Jupiter (mag. -1.8) is 51 degrees to the East and slightly down. Spica at mag. 1.0 should be visible 5 degrees below Jupiter.

There will be a few other stars visible but again don't distract yourself too much from the main attraction.



We are partnering with NASA's Space Place ([spaceplace.nasa.gov/](http://spaceplace.nasa.gov/)). We have added the site to our Astro Links page under "Kids Astronomy and Space Sites". For those who do presentations for local schools, you can get small quantities of NASA's Space Place items (bookmarks, stickers, temporary tattoos) to hand out.

"The mission of NASA's Space Place is to engage kids' interest in Space and Earth science, as well as the technologies that scientists use. Our site offers interactive games and demonstrations, hands-on projects, fun facts and short videos. It is a U.S. government-sponsored website; there are no advertisements or pop-up windows, and NASA's Space Place does not link to any commercial websites. It is a safe place for kids of all ages to visit.

Essentially we provide a free article each month for inclusion your club's newsletter (or posted on your club's website, depending upon the organization's preferred distribution method) and regular mailings of printed materials for sharing with the club's membership. In return, we ask for a copy of the newsletter using our article and a link to our websites be added to your club's web page."

### Solar Eclipse Provides Coronal Glimpse

By Marcus Woo

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

Only during an eclipse, when the moon blocks the light from the sun's

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

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

Ground-based coronagraphs, instruments designed to study the corona by blocking the sun, can't view the full extent of the corona. Solar space-based telescopes don't have the spectrographs needed to measure how the temperatures vary throughout the corona. These temperature variations show how the sun's chemical composition is distributed—crucial information for solving one of long-standing mysteries about the corona: how it gets so hot.

While the sun's surface is ~9980 Farenheit (~5800 Kelvin), the corona can reach several millions of degrees Farenheit. Researchers have proposed many explanations involving magnetoacoustic waves and the dissipation of magnetic fields, but none can account

for the wide-ranging temperature distribution in the corona, Habbal says.

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

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

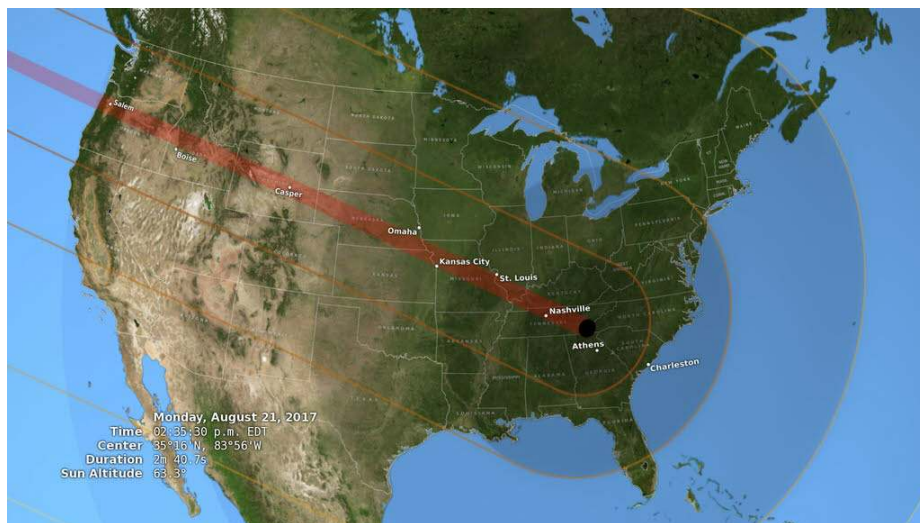
For more information about the upcoming eclipse, please see:

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

NASA Eclipse safety guidelines  
<https://eclipse2017.nasa.gov/safety>

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

*Illustration showing the United States during the total solar eclipse of August*





21, 2017, with the umbra (black oval), penumbra (concentric shaded ovals), and path of totality (red) through or very near several major cities.

Credit: Goddard Science Visualization Studio, NASA

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### Along the Meridian

By Jack St. Louis

The *Meridian* is an imaginary line, part of a "Great Circle" running from the North Celestial Pole, through the point directly overhead - the *Zenith* - continuing to the South Celestial Pole, through the point directly under your feet - the *Nadir* - and back to the NCP. We are only concerned, of course, with the 'visible' portion of the Meridian above the horizon.

Why? When any celestial object crosses the Meridian, that is the time & location when the object is highest in the sky. At that time, you are looking through the least amount of atmosphere and so have the best view of the

object. Viewing areas close to either side of the Meridian won't be noticeably worse, but technically, along the Meridian is the best viewing.

Using a computer planetarium program or a *Planisphere*, also called a *Star & Planet Finder*, can help you plan when to view the objects you want to see along the Meridian. On your program, like the Free on-line Stellarium, you can set the Meridian line On and even select the color of the Meridian for prominence. On some planispheres, there are two small circles where you can punch holes and place a string to mark the Meridian.

The good thing is everyone has their own Meridian, and it follows you wherever you go, you are never without it. Also, your Zenith and Nadir are always with you.

The term '*culmination*' is used to specify when a star or deep sky object is on the Meridian. When culmination occurs at midnight, that object is said to be at '*opposition*', so all the stars, nebulae, clusters and galaxies have an opposition date & time.

minutes past midnight. Not sure if I can stay up that late.

A Planisphere is even easier, simply place your object under the Meridian string on the night you plan to observe and check the time. Say on May 15th I want to view M51, the Whirlpool Galaxy in Ursa Major, and have the best view to sketch or image it; putting M51 on the Meridian gives an approximate time of 10:30 PM I can stay up that late. The difference between EST & EDT will not make much difference in the view.

If you look North, on the section of the Meridian between Polaris and the northern horizon, objects will be at '*lowest culmination*', or the lowest altitude the circumpolar objects will be. So, circumpolar objects have two culminations, high & low.

### April, May & June:

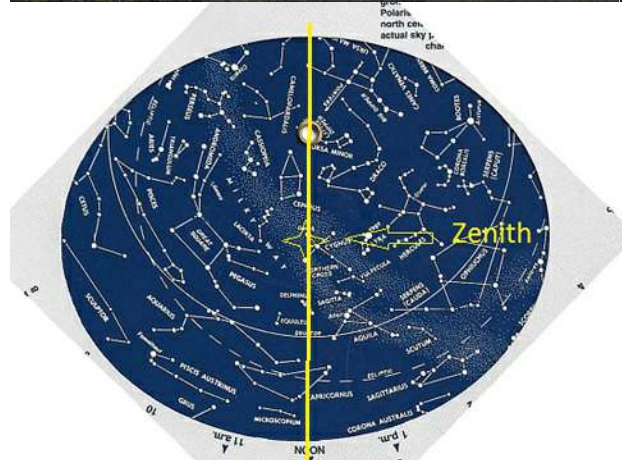
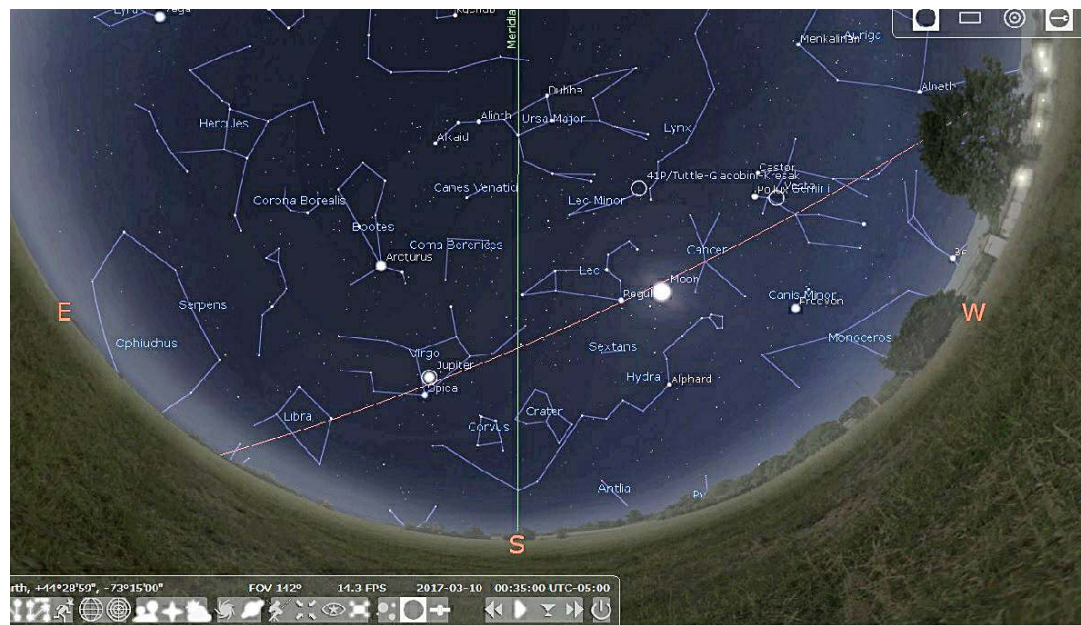
In mid-April, Alpheratz, the brightest star in Hydra, is bit past culmination, as is M44 in Cancer. Well away from the Meridian are the constellations Gemini, Auriga, Orion and Taurus, in increasing distance. Approaching culmination is Regulus, the brightest star in Leo and the stars in the asterism of the Big Dipper. Approaching, but still a couple hours away are Jupiter & Spica, both in Virgo, and further away is Arcturus in Bootes.

On May 15th at 9 PM, Jupiter, Spica and Arcturus are approaching culmination, Denebola, the tail of Leo is very close to culmination, Errai, the 'tip of the house' of Cepheus, is just barely past the Meridian.

June 15th brings longer daylight, so I set the Stellarium clock to 10 PM (22:00) to show Virgo almost completely past the Meridian, Arcturus past culmination, Bootes bisected by the Meridian, Corona Borealis and Hercules approaching culmination.

This gives an idea of how you can plan your viewing program to get the best views of the objects you want to see, easy to do with a planisphere, more accurate with Stellarium or other programs. All you have to do is place your target on the Meridian for the date desired, and then check the time.

To prove the effectiveness of waiting for objects to cross the Meridian for



Using Stellarium, and setting the date to April 15th and the time to 9:00 PM, (21:00:00 - auto adjusts to UTC-4:00 for EDT), I find Alpheratz, in Hydra, past the Meridian, approaching culmination is Regulus, in Leo. Polaris is always close to culmination. Advancing the time to place Regulus on the Meridian gives a time of 9:24 PM (21:24) Setting Jupiter on the Meridian gives a time of 00:20, 20



the best view, compare looking at your target, like Jupiter, first as it just comes up over the horizon and watch how the view improves as Jupiter moves closer to the Meridian.

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## My MyT

By Michael Stadtmauer

I came across a used Paramount MyT ('mighty') that I simply couldn't pass up, so I sold my CGEM-DX and bought it. The Paramount is considered a 'premium' mount and, so far, I'd have to agree. It is made entirely out of CNC machined aluminum parts and is rock solid. Paramount is the same company that makes the very excellent, but somewhat complicated, The Sky X. The Sky X (TSX) is software for Mac, PC, Linux, or Rasp Pi that is a very robust planetarium but it will also control your mount, camera, filter wheel, guider, etc. and everything is integrated. You can click on something in the sky and the mount will go there - precisely. There are a lot of apps that will do this, of course, but TSX has a number of special tricks it can employ when using a Paramount mount. Here is a basic workflow for training a Paramount with TSX:

If you start with the mount more or less level and more or less pointed north, you tell it to 'home' - this move the mount to a precise mechanical orientation (pointing south, close to the meridian). The mount then knows where it is pointing and can then accurately slew anywhere (assuming it is level and was pointed north-ish). Of course, it won't be exact, but so far, just eyeballing north on set up puts a bright star on the chip. Then, you can use the alt and az adjustments to center it. This gives you pretty good rough polar alignment - more than good enough for visual observing. The second step is to do a T-point run. This where the The Sky X comes up with an even distribution of sky points, based on how many you tell it to use, and then slews to those points and takes a picture. It plate solves the image and compares where it thinks it is with what the camera says. 15ish points will allow it to very accurately determine the polar offset. If you slew to a

star, and activate the 'accurate polar align' feature it will move the mount the distance of the offset and then re-centering the star gives you a very accurate polar alignment - within 60 arcsec or less. After doing that twice just to practice, the polar error was 0 in both axis - the whole thing, including 2 iterations, took about 20min. I'm sure I can get it down to 10 or so.

The next project was PEC training (Periodic Error Correction). All mounts are mechanical and thus have slop and imperfections. Typically, the more expensive the mount, the lower its periodic error. It is called period error because errors repeat in a predictable pattern as the worm turns the gears. This pattern can be measured. This involves pointing to a star in the south, close to meridian and at approximately 0 degrees declination. Making sure all mount corrections and autoguiding is off, you let the mount track the star while the guider is recording a log for at least 4 worm cycles (about 20 min). The log is then loaded into TSX which computes the periodic error and comes up with the correction curve, which is applied to the mount. This knocked down the PE from about 6 arcsec peak to peak to less than 2. It was a very windy night, and I think this can be further improved with another run on a clear, still night.

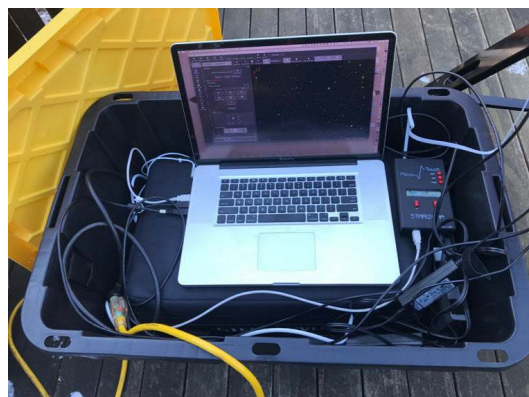
With PEC established the next step was to run a large T-point run. I asked the mount to map out 350 points in the sky. As it slews around the sky taking pictures, it measures things like flexure and mechanical slop to learn how the mount behaves when pointing to different areas. You can use this model to activate 'Protrack' which makes corrections over and above PEC and gives you close to guided performance without guiding. A lot of folks are able to get 10 minute unguided subs with this method.

Next was to get guiding going. Guiding calibration is much different in TSX compared to PHD and takes about 10 seconds. So, with PEC, Protrack and guiding I was getting an RMS error of about .4-.5 arcsec/pixel in between wind gusts. For perspective, this is very small amount of error and would allow for 30-60 minute exposures if desired. The entire process above took a good few hours, but only needs to be done once, assuming I can recreate more or less the same physical set up - as long as the telescope situated approximately the same on the mount, I can simply recall the models above, do a short recalibration model, and be good to go.

Below and on the next page, is the mount set up with my new portable power/computer box. I know a lot of guys are going with PC sticks and Raspberry Pi's on their mounts, but mostly







because I had it laying around I decided to go with my semi-retired 2011 17" MacBook Pro (aka - the best laptop ever made). I like having a screen next to the mount - it comes in handy. Most of the time, though, I am inside the house, Screen Sharing and controlling the outside computer over wifi. I also wanted something that would protect all the electronics and computer from the ridiculous dew that we get in the summer. The only thing I still need to figure out is how to get power up to the dew heater going through the mount. As you can see - all cords are routed through the mount (which was much easier than I thought it would be) and nothing at all is hanging or pulling, which is important for long exposure photography. Being set up on a deck is much less than optimal, but it is what it is right now.

## Board Talk

### Board meeting summaries:

#### January

Discussed the club's responsibility for informing members about safe solar observing when relating info on observing the upcoming solar eclipse. For details on safe observing we will defer to the info available on the Sky & Telescope web site.

Discussed the possibility of setting up public observing event(s) for the upcoming solar eclipse. Talked about setting up rules to ensure safe solar observing (ex. A member must be stationed at each scope at all times).

Keith will contact the Libraries with Loaner Scopes about not letting the scopes out during the time of the eclipse.

Keith is gathering items for the silent auction at the Annual Meeting.

Keith suggested we make a new building to house the 18" Obsession. And another thought for the future, add goto capability to the 18".

Motions made:

Jack moved we give Keith the go ahead to start on the design of a new building better suited for the 18" Obsession. 2<sup>nd</sup> by Keith. Approved unanimously.

Bob worked with a senior at Winoski HS to build a telescope.

#### February

We are started the process of adding info about the Library Loaner Scope Program to the web site.

The Membership Committee has produced a busy slate of activities for the Spring of member and public star gazing and a Maker Day (for assembling observing chairs).

#### March

Gary has offered to do a 2 part talk next Spring to help us prepare for next year's apparition of Mars.

Angele has been working on updating our single sheet informational hand-out.

Paul Marino is working on the web site to standardize the look of the pages.

Keith is putting together the list of auction items for the Annual Meeting.

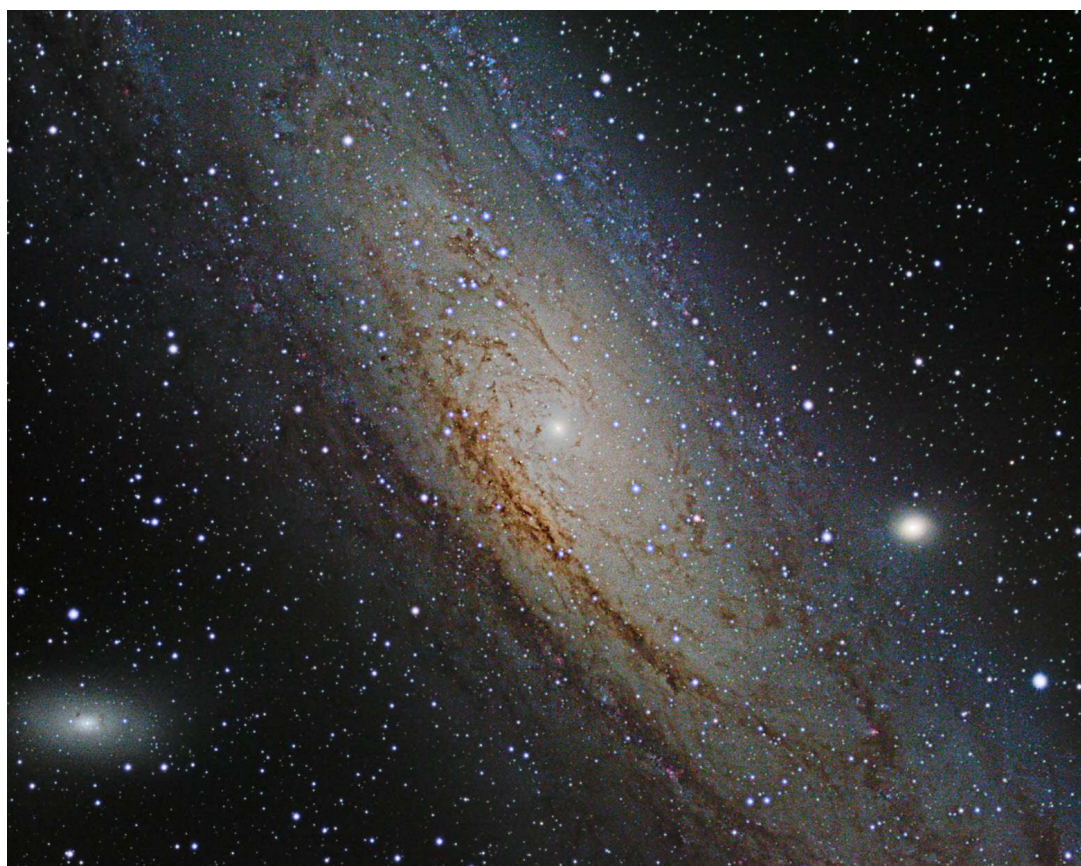
## Observers Page

### M31 - 10 sec. Experiment

By Michael Stadtmauer

So, with all the issues that we run into here - poor seeing, wind, poor seeing, clouds, poor seeing - oh, and my (former) mount wanting to jump around at the most inopportune times, I decided to explore what I could with short exposures.

Traditionally, this was thought a very bad idea because the chips were so noisy that achieving any kind of useable SNR (signal to noise ratio) meant having to take longer exposures to build up the signal. But now we have very low noise chips, like the Sony ICX-814 in my (former) camera, that can allow very short exposures to have a meaningful SNR. Plus, we also now have much more sophisticated software and, most especially, mathematical algorithms that can be applied in order to more fully realize the potential of the captured data. But, mostly, I was tired of fighting my mount and wanted to see if I could





## Hawaii Skies

Joe Comeau

'remove' the mount from the picture by taking short exposures.

Here is the result - M31, in 10 sec. Luminance (clear filter) and 20 sec. R, G and B filters exposure times. For reference, although there are a lot of different ways to go about doing this, usually you will be taking exposures in the 2-10 minute range for a very bright object like this. The longer exposures create a much more desirable SNR and a resulting image that has lower overall noise - a much cleaner image. So, in terms of photons, capturing an hour's worth of data in 5 minute or 10 sec. exposures will be exactly equivalent - the signal is the signal. And, we have software that will add everything up to make a final image that is exactly the same. But, what will be very different is the noise of the image, and you would expect that in the 10 sec. exposure, a lot of the data would never get 'off the floor' - it would never rise above the noise and so would be lost. But, again, we now have new gear that can maybe bend those rules a little.

About an hour's worth of data was gathered for each filter in 10 or 20 second exposures, but only about 45 minutes for each channel was useable. In the end, the image is certainly not as fine as can be achieved with other methods, but it was a fun experiment and I'm pretty happy with the result. What I really like is the detail around the core, which is usually blown out by longer exposures. Oh, and by the way, its the Andromeda galaxy that you've seen a thousand times.

### Technical Details:

L: 270x10s

RGB: 375x20s (total)

The 645 subs were processed in PixInsight.

### Equipment:

CGEM-DX mount

SX-814 camera

LodestarX2c guiding camera

Explore Scientific 102mm APO scope with 0.8x reducer

\*\*\*\*\*

I went to Hawaii and while there took wide field shots of the constellations.

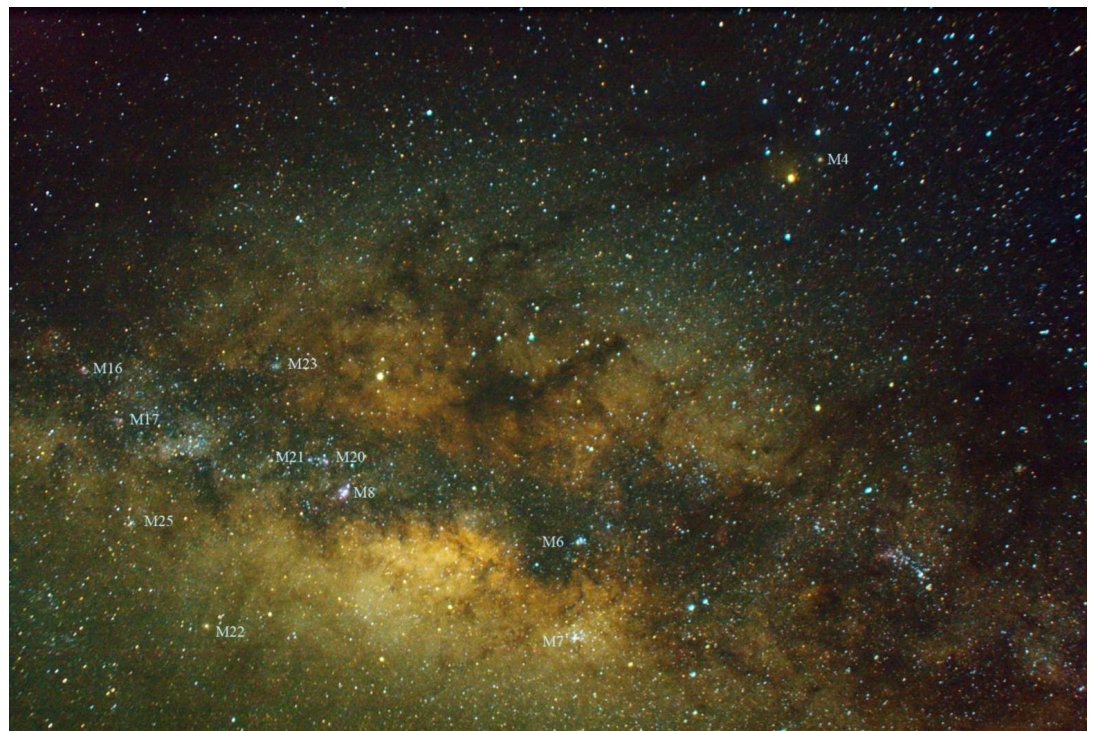
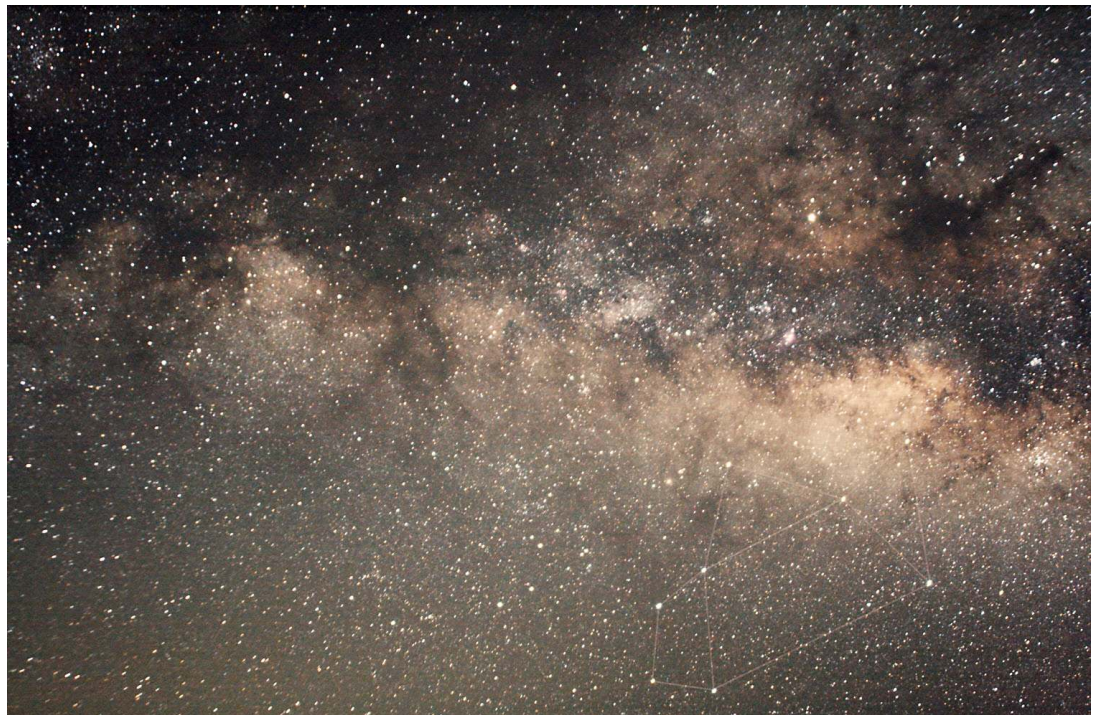
Using an unmodified Canon camera, a 200 mm lens and a simple tripod (non-tracking) to minimize weight, I was limited to 15 second exposures before excessive star trailing. I collected 10-15 shots and stacked them with Nebulosity software.

I took the images from the Mauna Kea Observatory visitor center (9000 ft elevation), one of the darkest sites in

the northern hemisphere. I could easily see M33 without averted vision and could see the Pipe Nebula as well. The only light visible on the horizon was a slight glow in the southeast.

On my second night, I thought it was a car coming up the mountain. There was a cloud layer below me so I couldn't tell for sure. On the next trip, the sky was clear down to the ocean and it became apparent that the glow was the Kiluea volcano with a lava trail going to the sea.

The first image includes a faint outline of the teapot in Sagittarius.







\*\*\*\*\*

**In spite of the weather, Larry Garrett has been able to squeeze in some observing:**

"On Monday February 24th, on the way to work, I spotted the Moon. Just 5.4 degrees high, and 5.15% illuminated. I wanted to see if I could spot this again today, having found it the morning before as well.

I observed the thin crescent both naked eye, and with 10x25mm binoculars. Little did I know I had completed the first observation in a series as posted at Sky and telescope, three crescents

and a sinking comet. Bob King put together this article to highlight the crescents of the Moon visible on Feb. 24 and 27, with Venus making the third crescent. The sinking comet was comet 2/P Encke. Sunday brought clear skies and a chance to see the comet.

I added an 8x50mm finder to my Orion XT6 as finding that comet with a red dot finder would be almost impossible. This brought Encke and the now large comet 45P/Honda-Mrkos-Pajdušakova into view, also mentioned in the [S&T] article.

Monday cleared at sunset to reveal the last crescent in the series, now just 1.88% illuminated. This 1.28 day old

Moon held several near limb features I had yet to see, adding to the project's success. Venus was very impressive as well this night."

I really saw a host of deep sky objects with that telescope for the first time with the new finder. I forgot I even HAD that finder, I found in looking for something else.

—Later Larry

\*\*\*\*\*

These clear nights, starting Friday until today [3/20/17], have held many good sights.

Friday— Green comet 41P/Tuttle-Giacobini-Kresak was seen on Saint Patrick's day, local time. Did not see the green, but have in other comets. Venus was seen at 4% illumination. Resolved even in 7x 35mm binoculars. Used 20x80mm binoculars for 41P-T-G-K.

Saturday— Saw 41P-T-G-K in XT6 telescope at 30x. Then moved over to M97 (owl Nebula) and M108 galaxy, as this comet will be visible in the same field of view on March 22-23 UT (two nights), local time March 21-22. The second night has the less optimal of the views if you have a good wide field.

Sunday- Held another comet P/2016 VZ18. Not exactly a household name. But, I found this on the Yahoo comets list, as in outburst, and much brighter than predicted. Like 7 magnitudes brighter! I was hoping members might try this, but after last night I found this to be about ~14th magnitude, star like. This had peaked at Mv 10.1, from the predicted 17.9.

Wow, but might be well gone by now. I plan to keep watching the list details. Even to find this at ~14mv is quite good. Could be mid 13's too, hard to tell. I used my 12.5" reflector on this, 117x. Just like spotting a faint asteroid really.

Monday- Monday morning held the Moon, 2.3 degrees north of Saturn. And not just north, but the terminator was in perfect alignment with Saturn at 10h30m UT. Guide 9.0 displays the terminator as curved at this time, but it was perfectly straight! This allowed two mountain chains running into the terminator darkness to be illuminated. Visible as curved mountain ranges



against the dark background. These were Mon Blanc, Promontorium Agassiz, and Promontorium Deville of the Alpes Montes (the Alps). (Rukl's map #12) And Apenninus Montes (Apennines) Rukl's map #22 . Perhaps the best part, was that no telescope was needed at all to enjoy the sight. I just used my 7x35mm and 10x25mm binoculars to observe this, plus many shadows on crater floors. Proof that steady held optics, almost no matter how small, can reveal a great show on the Moon. A great way to start the day before work.

Later Lawrence Garrett

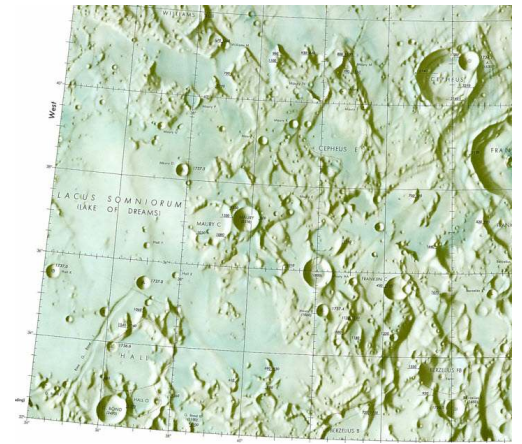
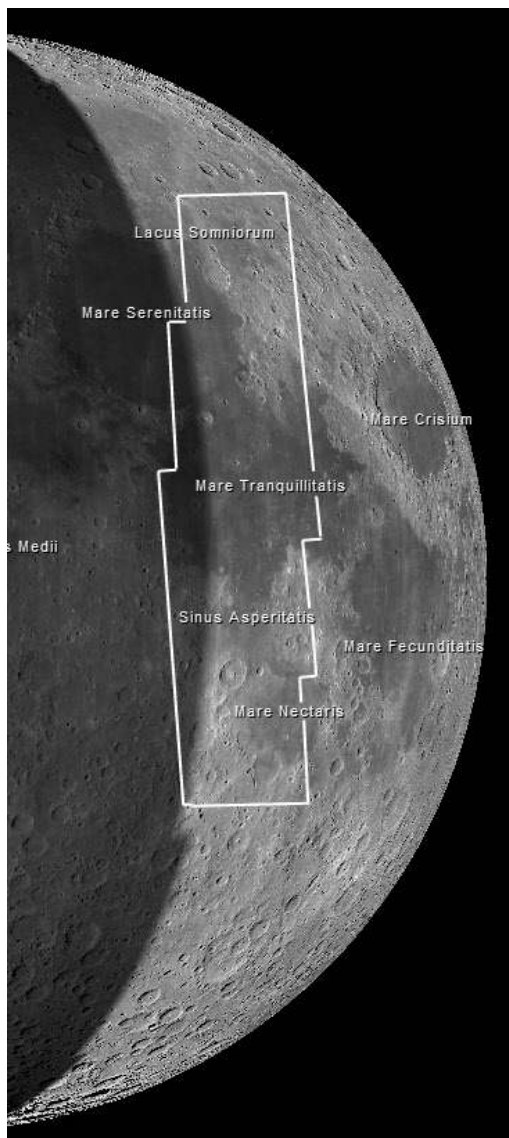
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### Moon Fun

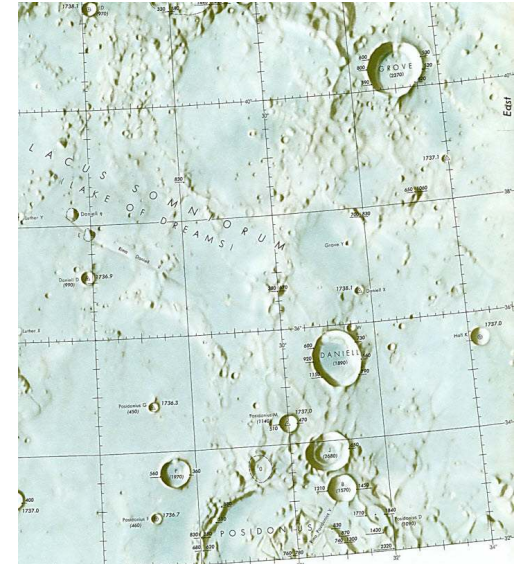
By Paul Walker

The Moon is always a fun and easy target whether observing or imaging or a little of both.

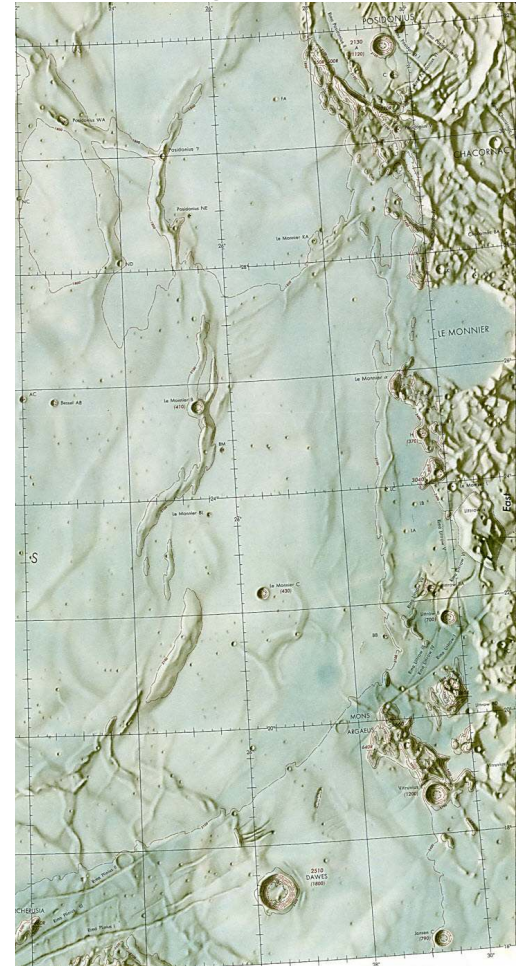
Any time I image the Moon I always make visual observations it first.



Top right of image. Section of LAC # 26

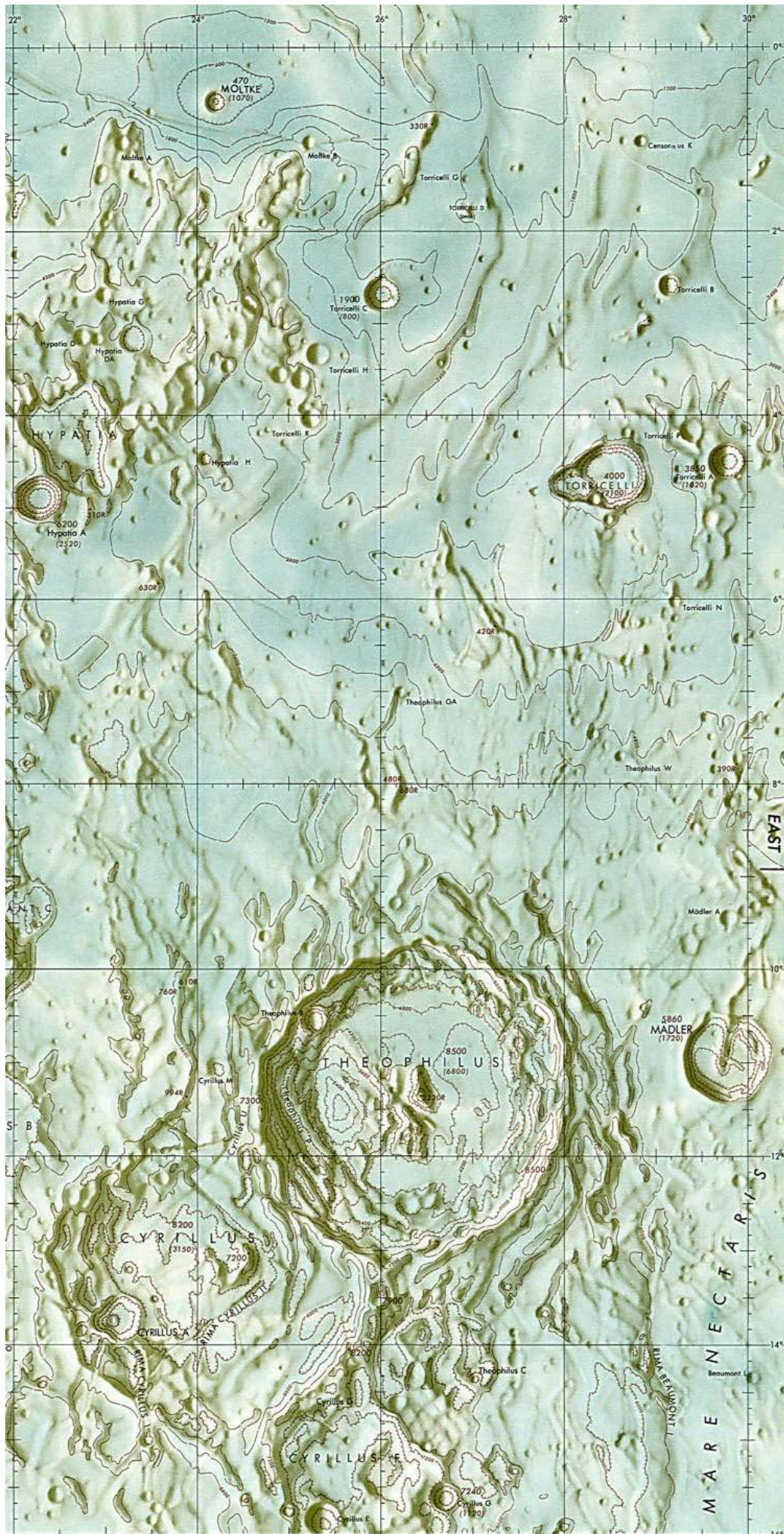


Top left of image. Section of LAC # 27



Near top of image. Section of LAC # 42





Bottom of image. Section of LAC # 78

Primarily to find out whether the seeing is good enough for imaging. But also to decide whether to image the whole Moon or just parts of it and, if parts, which parts. But also to just to observe interesting shadows, craters and other features.

On the night I took the images for this mosaic, 2016-12-04, the Moon was 5.28 days old. The wrinkle ridges on the east side of Mare Serenitatis (Sea of Serenity) were obliquely lit so they stood out nicely. So too, many of the wrinkles on the floor of Mare Tranquillitatus (Sea of Tranquility).

The context chart was created by using the export function of Virtual Moon Atlas (<https://www.ap.i.net/avl/en/download>). Be sure to also download and install the version 6.1 update). The outline was created in Picture Window Pro.

The detailed maps are from the Lunar Astronautical Chart (LAC) Series (Published by ACIC). Downloaded from Lunar and Planetary Institute <http://www.lpi.usra.edu/resources/mapcatalog/LAC/>. For those who attended the February meeting where the presentation was “Cool Space Stuff” you may remember that Ron Lewis brought a printed set of the LAC that he had recently purchased. The printed size is 29 x 22 inches. I downloaded the 150 dpi version of the charts. I found that the 300 dpi versions did not have any more usable detail but were more than twice the size. All together the charts take up about 150 MB of hard drive space.

The maps are so detailed that it is difficult to match up features with the image (a suggestion - start by locating the largest craters. The smallest crater on the LAC's are about 1 mile across. Smaller than what one can see through a scope under typical conditions. The maps do not cover the entire mosaic.

Each of the 4 images of the mosaic are 900 frames taken from 1 minute video clips of each section. I used Registax to do the stacking and sharpening and Panorama Plus X4 to stitch the mosaic.

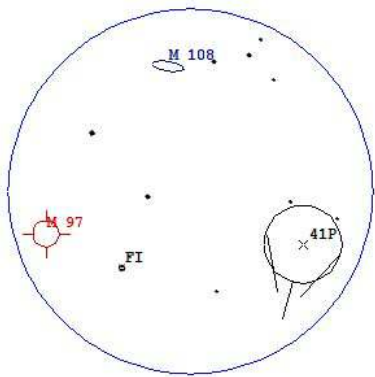
I used a Nikon AW-110 point and shoot, shooting high definition video on my 10 inch f/5.6 equatorially mounted Newtonian.



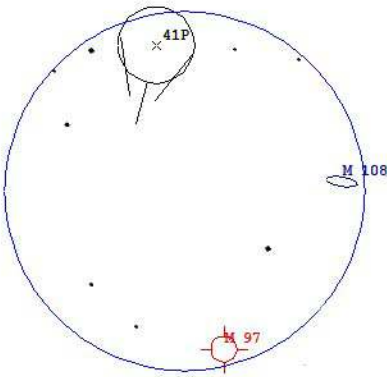
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**Larry Garrett** observed Venus on 3/26/17 - I missed it low yesterday, but found it today, 22 hours after conjunction. Always a great view of the 1 percent illuminated crescent phase. I used my XT6 6" reflector.

And a comet - Also, I observed the transit between M108 and M97 of comet Comet 41P Tuttle-Giacobini-Kresak on Monday and Tuesday nights [3/20 & 3/21]. I have attached images with a 1.43 degree field of view I had in my XT6 telescope for the observations. The comet did not quite completely fit in the field of view on the 23rd. These are "chart mode" images, white background with black stars. Comet marked 41P, Messier 97 (The Owl planetary nebulae) in red, and Messier 108 galaxy (blue type, black oval). Nice pairing of subjects.



3/22/17.



3/23/17

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**Allon Wildgust** got a shot of the same comet.

Saturday evening [3/25/17] I went out for the third try to find Comet C41P/Tuttle. This time I barely saw it with my 8x42 binoculars. I set up my

double barn door platform and photographed it successfully pouring out of the big dipper.

The photo is a combination of four shots: 1, 2, 3 and 3 minutes. with my 300mm lens f/4 at 1600 ISO.

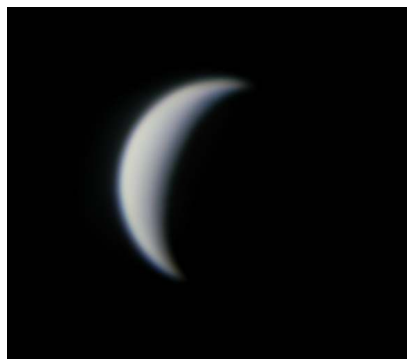
There is a second comet (c/2015 V2 Johnson) above Hercules but I was unable to find it.



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### Venus

By Paul Walker



2/20/2017, 40" of arc



2/26/17, 44" of arc



3/5/17, 50" of arc

Venus put on a good show this Spring. I managed to get out on a few nights of so-so seeing to view and image it.

These 3 images show the crescent getting thinner and bigger as Venus approached conjunction with the Sun. The magnification factor is not exactly the same for the images so the relative size of Venus is slightly exaggerated from top to bottom, the middle is exaggerated by about 1.6% on top of Venus being 10% larger than the earlier date, the bottom by 3.2% more than the 25% larger compared to the first date.

Each consists of a stack of 1000 video frames. I used my 10" f/5.6 Newtonian because it has good optics and a larger image scale than any of my other scopes (and a better view to the West). Even so, I used a 24mm eyepiece in a 3x Barlow which itself was in a 2x Barlow. This gave magnification of (1407mm / 24 mm) X 3 X 2 for a total of 350X. I use the 24mm because other eyepieces have smaller eye lenses and vignette the image. The camera zoom multiplied this by about 3.5x for an effective magnification of about 1200X.

Even at this magnification I had to use 2 polarizers, slightly crossed, to keep Venus's brightness from saturating the camera. I also used a 4 degree wedge prism on the front of the eyepiece to reduce the atmospheres chromatic dispersion. Visually this was enough so that I could not detect any chromatic dispersion (red fringe on one side, blue on the other). The camera however, still showed some dispersion which was easily removed using RGB Alignment in Registax (the same software I used to stack the frames).

For the camera, I used a Nikon AW-110 point & shoot with HD video capability. I shot about 1 minute of video and used a little over half of the frames to produce each image. Any features visible are likely image processing artifacts. Registax does not like the MOV format the camera creates, so with movie software I converted the HD video clips to AVI format at 1/2 the resolution of the original HD (HD is overkill as far as available detail so I don't lose any resolution by down sampling this much).



### M46 & NGC 2438

By Paul Walker

This was an unexpected find. I'm pretty sure I had heard about them but was not aware of where they were located. The night of March 20<sup>th</sup> I was thinking of imaging M41 in Canis Major. However, scoping things out in Starry Night Pro I saw the nearby open clusters M47 and M46 in Puppis. Zooming in to check them out I noticed a little donut shape on the edge of M46. It was the planetary nebula NGC 2438 and decided they would be my target for the night.

M46 is about 5,500 light-years away, has about 500 members and is about 300 million years old. It is believed that NGC 2439 is not part of M46 because they have different radial velocities.

10" f/4 Newtonian, Canon XT (modified), Orion Broad Band Nebula Filter, Baader Coma Corrector, ISO 800, 3 min X 21 (63 minutes total exposure time).

I also viewed them in my 10" f/5.6 with and without a nebula filter. A nice

sight for sure. The bright star in NGC 2438 was visible but not the central white dwarf (17.7mv), which may be just detectable right next to it.

### Gary's Astronomical Events for the Month

can be viewed via WCAX at  
[www.wcax.com/story/6330547/astronomical-events](http://www.wcax.com/story/6330547/astronomical-events)

### Angele on the Radio

Listen to Angele's astronomy update on radio station WJOY AM (AM 1230) on Ginny McGehee's 'Breakfast Table' morning show. Airst the first Wednesday of the month at 8:40 AM.

## Book Review

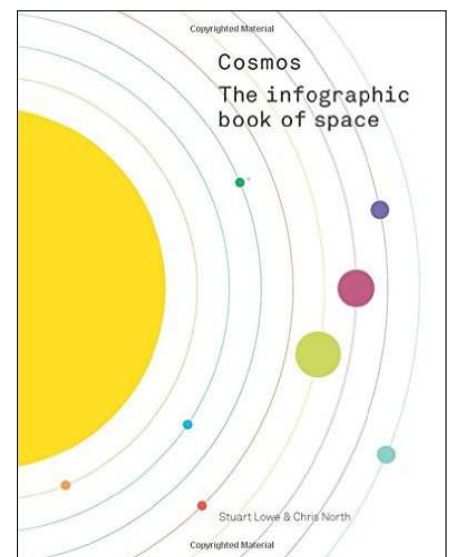
**Cosmos:  
The Infographic Book of Space**  
Stuart Lowe & Chris North

*Review By Angele Mott-Nickerson*

As astronomers we often remark about the largeness of space, the vastness of distances and sizes, the massive numbers that seem to accompany any talk of the universe. Astronomers Lowe and North wanted to take the overwhelming nature of space data and put it into a visual form. Importantly, they wanted a visual take on the universe that also reflected space accurately, but fit into the size of a book. While their resulting book is slightly oversize, they have managed to successfully pack an overwhelming amount of data into a visual, easily comprehensible format.

The authors have broken down their book into nine sections covering such areas as space travel, the planets, galaxies, and miscellaneous. Each two-page spread of the book contains a short paragraph or two explaining the accompanying visual diagram. And the visuals are the key to this book. There are graphs of every imaginable shape and format, timelines, drawings representing size, maps, and new, novel ways of exploring data visually. All of the visuals have a feeling of 1960s space-age artwork to them, making simply looking at the book an experience in itself without digesting the data.

This is not a book which is read all in one sitting. You can easily take a great deal of time exploring only a page or two each evening. Lowe and North also extended the value of the book by creating a website to allow for interactive data, updates and revisions, and a place to discover the sources of their information. Overall, the authors have given us a new way of exploring the cosmos even on cloudy Vermont nights.





## The Glass Universe: How the Ladies of the Harvard Observatory Took the Measure of the Stars

Dava Sobel

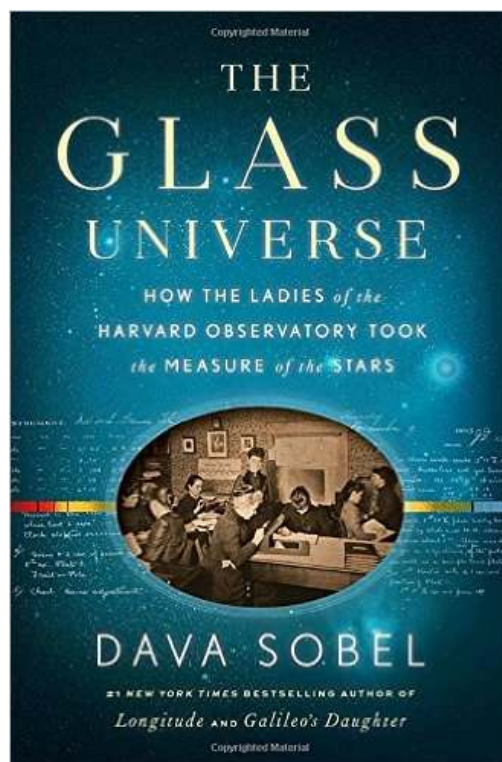
*Review By Angele Mott-Nickerson*

Author Dava Sobel is a long-time science writer having published a number of other books and articles on science topics and the personalities involved in the scientific effort. Like her previous work, this recently released book is a good blend of the people who made the science possible as well as a grasp of the actual science itself. Sobel's work roughly covers the years of 1885 through the 1940s at the Harvard Observatory when the focus was on photographing stellar spectra and analyzing results. The account focuses specifically on the women who worked in the observatory as "human computers."

The 'computers' of 100 years ago painstakingly examined each of the glass plate photographs of the stars to ascertain their exact position and classify the resulting spectrum of light they discovered. In reading the book it was remarkable to realize how many aspects of astronomy we take for granted today arise from the work done at Harvard University only 100 years ago. The full sky catalogs, an understanding of variables, what the stars are made of, their distances, the nature of nova stars, star life cycles, and even the nature of the shape of the universe all can trace their origins through the photographs made by Harvard Observatory. It was the women themselves, the 'computers,' who were responsible for examining these photographs and answering many of the questions of astronomy.

Considering the many astronomers and their discoveries who passed through the Harvard Observatory during this 60-plus year period, Sobel's work is well-written and easy to follow. She charts a course for not only grasping the significance of the work itself but for these women's place within the scientific community. A long the way she exposes how unusual it was for the women to be given a significant place at the scientific table, why they needed to be there, and their struggles to be recognized in their chosen field. Overall

however, the reader is simply left with a feeling of wonderment that so much knowledge came out of something as simple as photographs of the night sky.



## Equipment Review

**Wide View Binoculars (2.3x40)**  
from Kasai Trading Co. of Japan

*Review by Paul Walker*

I had seen these binoculars advertised in Sky & Telescope for a while and was curious how well they work. However, they seemed kind of specialize so I was not in a hurry to buy them. Besides I seldom use the binoculars I have. Luckily Dennis bought a pair last Fall and brought them to a monthly meeting. I tried them out briefly from light polluted Essex Jct. Looked at few constellations and the first quarter Moon.

It peaked my interest enough to buy a pair. Well, actually my wife asked if I would like them for Christmas and I said yes. So I bought them (she had already bought her Christmas present so it was a wash). I also bought the 2" adapters for attaching nebula filters to the front.

I have used them a few times. Once going up to Dennis's to compare his and my pair and to attach nebula

filters to one (I don't have 2 of the same filters but between the 2 of us we do). The 2 binoculars tested out the same, we could not tell any difference between them. The field of view is great. Dennis and I could both get 20 degree fields of view. They are advertised as 28 degrees, but that is for young eyes with 7 mm pupils. Based on that, 20 degrees calculates out to 5 mm exit pupils. About right for older folks like us.

Their web site clearly states that the true field of view is limited by the exit pupil of your eye and to get the maximum view you must get your eye as close to the eyepieces as possible. This is because they have Galilean optics, which they also clearly state and describe.

20 degrees is wide enough to see the whole of Orion, Auriga, Gemini and many more constellation. Typical 7x50 binos only have a field view of 7 or 8 degrees, 10x50's only about 5 degrees. Only 1/3 and 1/4 the field of these binos. I can hardly wait to scan the summer Milkyway with them, both with and without filters.

I was kind of expecting to see more stars than I did. If I had read the site more carefully I would not have expected this. They claim 1 to 2 magnitude gain for the faintest stars visible versus the eye alone. I did some limiting mag testing. On a typical night at my house I can see 5.3 magnitude stars near Polaris fairly readily, 5.6 if really good night. With the these binos I found 5.9, 6.1, 6.25 to be readily visible. 6.5 and 6.65 less so. The faintest star I detected was 7.3. So the magnitude



Shown with nebula filters.

Image credit: KASAI TRADING CO. OF JAPAN

Continued on page 17



## For Sale

### **Celestron Omni XLT 120mm Refractor Telescope with Equatorial Mount.**

In great condition as it has been barely used  
Full accessories include padded cases, 5 eyepieces, 2 planetary filters, dew zapper, wheelie

Original price \$550 for telescope;  
\$150 for accessories

Yours for **\$300 OBO**,

Location South Burlington.  
Call Gary Glick at 203-247-5354

### **Meade DS-2114S** (early 2000's vintage)

Dia. =114mm, f.l.=1000mm  
focal ratio f/8.8

Automated, computerized with Meade Autostar handbox

Automatic tracking, guided tours, many other features

Excellent, like new condition, on a tripod, three eyepieces, original hand-book

I called the company (Meade) and they say it is similar to their current Polaris 114 (\$170-\$200), but automated and computerized like their ETX 90 (currently \$500. Their ETX series doesn't have a 114, but if they did it would cost more). So I am asking a "hybrid", used (once or twice) **price of \$160 (new price).**

Contact Paul Cameron at  
[paulcameron1@msn.com](mailto:paulcameron1@msn.com), 802-249-3595 or 802-223-2204

### **Celestron SP-C80 refractor telescope and tripod**, rarely used.

Comes with the original manuals, and 3 books on astronomy and a viewing the universe tool.

**Asking \$350 or best offer.**

Contact Aimee Green,  
[leftlanegreen@yahoo.com](mailto:leftlanegreen@yahoo.com)

### **4 inch, 550mm f.l. brass Televue Renaissance scope** with carrying case

Equatorial mount with oak tripod

2", 20mm Nagler type 2

2" 45deg. righting prism

2" Big Barlow

2", 4.8mm Nagler

1-1/4", 26mm Plossl

2", 45deg. Prism camera adapter

**Price \$2450 - will negotiate.**

Contact Richard Cummings at  
[Rick@vsbmetal.com](mailto:Rick@vsbmetal.com)

Or you can contact Ron Anstey  
[anstey@myfairpoint.net](mailto:anstey@myfairpoint.net)

### **Celestron 23mm Axiom**

Basically unused and very clean condition. Buyer to pay for shipping of their choice and PayPal fees. **\$100**

Contact Douglas Duncan  
[douglasd@3w3d.com](mailto:douglasd@3w3d.com)

PO Box 8, West Glover, VT 05875  
(802) 525-4904

### **Alt-Az mount and scope.**

Both are practically new and are in new condition.

### Explore Scientific **Twilight I Mount & Tripod** (MAZ01-00). Paid - \$230.

Explore Scientific 80mm f/6 Apochromatic Triplet Refractor Telescope (FCD100 ED). Paid - \$1000.

**Asking \$600 for the pair.**

Stephen Scaravella, 802-434-3884 or  
[englishnotation@gmail.com](mailto:englishnotation@gmail.com)

### **Feather-touch focuser for a**

**Schmidt-Cassigrain.** Brand new, hardly used. For specs go to [http://starlightinstruments.com/store/index.php?route=product/product&product\\_id=51](http://starlightinstruments.com/store/index.php?route=product/product&product_id=51). **Asking \$200** for it.

Stephen Scaravella, 802-434-3884 or  
[englishnotation@gmail.com](mailto:englishnotation@gmail.com)

### **Telescope mirrors and a couple mounting cells**

**3.5" f/10** with 3/4" diagonal.

**6"**, probably f/8.

**8"**, probably f/8, in nice **cast aluminum cell**.

**10" f/9, 1/10 wave** (measured by Bob several years ago), Beral coating that is in good condition though the edge has several chips (edge not beveled) and a note from the coater says there are a few scratches and it is not fully polished (may be saying that because of the scratches). From St. Michael's College.

**12"**, probably f/8, **plate glass mirror** in **nice 18 point mirror cell**. The cell is worth more than the mirror. If I remember correctly this came from St. Michael's College, from the old scope they had in their observatory.

Other than the 10" f/9 I cannot vouch for the figure of the mirrors.

The only one that may be Pyrex is the 8" mirror, I'd have to pull it out of the cell and look again. The rest have a slight greenish-yellow tint.

**Make an offer on any of the items.**

Paul Walker 802-388-4220 or  
[paulwaav@together.net](mailto:paulwaav@together.net)

### **Meade 6" LXD55 telescope** with

the following: 26mm eye piece, Spotting Scope, Anniversary eye piece kit with 15mm; 6.4mm; 9.7mm; 12.4mm; 40mm; 32mm; and 20mm. Solar filter, Dew cap, Autostar Instruction Manual, Martin Preston users guide

**Asking \$450 (new price)** with the accessories listed.

Contact Bruce Harmon, 802-876 7535 or [bdhinv@yahoo.com](mailto:bdhinv@yahoo.com).

## Wanted

For selling & buying also check out:  
[www.marketplace.skyandtelescope.com](http://www.marketplace.skyandtelescope.com)



Continued from page 15

improvement for me was more than 1 magnitude maybe as much as 1.5. Of course it depends on which stars one looks at and how accurate the source info is. I used some stars in and around the "kids" in Auriga and near the 2 western belt stars in Orion and Starry Night Pro as my source.

Because the magnification is so low, on stars, we are not going to get nearly to the theoretical limit for a 40 mm objective. Found a web site ([http://www.cruxis.com/scope/limitin\\_gmagnitude.htm](http://www.cruxis.com/scope/limitin_gmagnitude.htm)) that calculated 6.7. Also small open star clusters and most globular cluster are hard to make out. However, on sufficiently large extended objects we should see an improvement more in line with the 40 mm.

I don't have astigmatism but based on Dennis's input (he has some) the low magnification may minimize any issues that astigmatism normally causes. Which is good because you can't wear glasses when using these binos. For me the stars are fairly sharp though all are "spiky". Similar to viewing with the unaided eye.

Focusing is a bit tricky, mostly I think, because the position on eye behind the eyepieces affects focus. The process I found worked: Adjust the inter-pupillary distance, focus one side, focus the other side, check your eye position on each side, adjust inter-pupillary distance if needed, refocus. I noticed for a while I kept having to refocus the left side (but not the right side). I think the issue was that I wasn't keeping the left eye properly positioned.

The process of buying them was a little funky. They have a web site and I bought them directly from Kasai Trading Co. But they are not set up to receive orders via the web. You send an email to them with what you want to buy. They email you back with the total price in Yen. You can pay via Pay Pal or direct money wire. If you pay via Pay Pal, you log onto your account and send the payment in Yen to their Pay Pal account.

Now that I have a pair of these binoculars, I can hardly wait until the next large bright comet appears. These binos should provide a breathtaking view.

KASAI TRADING CO. OF JAPAN  
Price- 15,000 Yen (\$135)  
Clear Aperture- 40mm  
Power- 2.3x  
Field of View- 28-degree (requires your pupils to dilate 7mm, "only" 20 degree field if your pupils only dilate 5mm)  
Interpupillary Distance- 52mm - 73mm  
Diopter Range to focus infinity > -6 diopter  
Standard Accessories- Front & Rear Dustcovers, Neckstrap, Soft Carrying Case  
Additional Accessories- 2 filter adaptor rings, 3,800 Yen (\$34)  
- Wide Bino Goggles for 8,000 Yen (\$72).

<http://www.kasai-trading.jp/englishindex.html>

They also have a few Crayford type focusers and a 6" f/5 travel scope for \$683 among a few other items.

## Dues

**Renewal Time for Annual Dues**  
Members with email will get an email reminder.

**Associate Members \$15**  
**Full Members \$25**

Contact Paul Walker  
802-388-4220  
[paulwaav@together.net](mailto:paulwaav@together.net)

Send dues and  
any updates to your address (or email)  
to  
VAS, PO Box 782, Williston, VT 05495.

Or bring to any monthly meeting.

Thanks

## Announcements

**Annual Banquet /  
Business Meeting**

### Elections

**Elections this year are for Treasurer, Secretary and the 4 Board Members at Large.** Any full member interested in any of these positions please contact any of the board members listed at the end of this newsletter.

## Silent Auction (at Annual Meeting)

There will be a silent auction to raise money for the club.

**See Meeting / Presentations on page 1 for more information.**

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**Associate Members interested in becoming full members** make your interest known to one of the board members.

## Club Info

### Observing Certificates

Several certificates (beginner to advanced) are available to members as encouragement to get out under the stars and hone their observing skills. Follow the link on our web site.

### Wanted - Webmaster

### Also wanted PR person

If interested in either position contact Jack St. Louis or Paul Walker.

**Looking for 5-10 minute product reviews for the monthly meetings.**

### **Moving or Changing Email?**

Please send changes to Paul Walker, 53 Valley View, Middlebury, VT 05753, [paulwaav@together.net](mailto:paulwaav@together.net)

### Web Site

[www.vtastro.org](http://www.vtastro.org)

Email: [info@vtastro.org](mailto:info@vtastro.org)

Paul Marino is the webmaster:

[webmaster@vtastro.org](mailto:webmaster@vtastro.org)

### Board Members

Jack St. Louis	Pres	658-0184
Joe Comeau	VP	238-1664
Doug Williamson	Treas	388-3482
Paul Walker	Sec'y	388-4220
Bob Horton		879-7802
Gary Nowak		879-4032
Bill Wick		485-7877
Keith Lawrence		453-5496

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(My apologies if I missed anyone)