Morning Star

Summer 2016

Contents

By Joe Comeau

It was taken with a 6" RC off my balcony on St. Paul Street in downtown Burlington. Both planets were imaged separately on the same evening with a STS-video camera and processed in Registax 6.

New Members

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

Angela Gatesy
Joel Greene

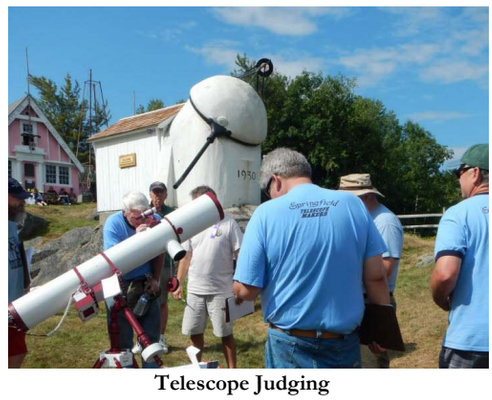
Meetings/Presentations

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.**

July 11

Note - The library is undergoing renovations so it is not be available for July. Instead we will be next door at the Senior Center Annex (coming in the the library's main entrance it is on your the left).

Stellafane Convention Intro
By Jack St. Louis, Dennis Woos and Ron Lewis



Telescope Judging

The annual Stellafane Convention held just outside the town of Springfield Vermont will be Thursday through Sunday Aug 4-7. VAS President Jack St.Louis will provide an overview of the beginnings of Stellafane, what the convention is about and what to expect if you attend. VAS member Dennis Woos will talk about obtaining telescope eyepieces and filters at the Swap Tables, and VAS member Ron Lewis will provide insight on 'making the deal' to get the items you want at great swap prices. If you have not yet been to Stellafane, this meeting is one you do not want to miss.

Comradery, Club Members "Talking Shop"

Treasures at the Swap Tables

August 1

Memorable Observations and Experiences Under the Sky
By Several Members

Come hear stories from your fellow astronomers and share some of your own. Most of us have experienced memorable sky events. Some are planned well in advance . Others are spur of the moment. Still others were

Stargazing Events

All observing events -are weather Permitting unless otherwise stated. Bring extra clothes. We want you to have an enjoyable and comfortable experience. Even a summer evening can be chilly after standing still for a couple hours in damp air.

Keep in mind that last minute cancellations may occur even if the weather is good, so please check the web site (www.vtastro.org) Events page for any last minute cancellations, members will be sent email updates.

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

Events include: Member and Invited Guest Star Gazing and Public Star Gazing / Presentations for schools and libraries.

New Email List for Member Use of the Hinesburg Observing Site

100 Observatory Road, Hinesburg, VT

Currently, there are no planned member star gazing parties at GMO. However, for impromptu star gazing we now have an email account, observing@vtastro.org, for members interesting in observing from the the Hinesburg site ..This will make it easier for members interested in going to the Hinesburg Observing Site (and possibly other sites) to contact each other.

If you are interested in being on this email list contact **Paul Walker at paulwaav@together.net or info@vtastro.org**

All contact information is in blue.

See details below and on the following pages

totally unplanned and unexpected. And then there are those experiences that were unexpected and unexplained and eerie. Some that we can't explain to this day.

September 12

Emu in the Night Sky
Exploring the Southern Stars
By Angele Mott-Nickerson

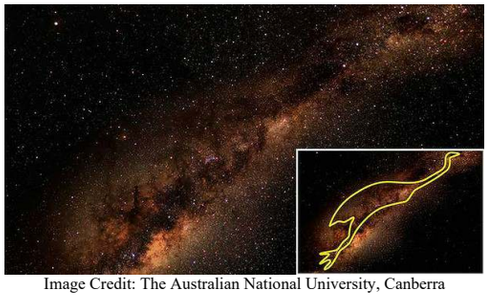


Image Credit: The Australian National University, Canberra

Professor Neville H. Fletcher, now an emeritus professor at Australian National University, once said: "In astronomy circles it is often remarked — mostly by envious northerners — that God, in creating the universe, perversely located all the most interesting regions of our galaxy in the Southern Hemisphere, but all the astronomers in the north." New York Times, 12/27/14

Here in Vermont we're used to seeing the same stars all the time, but travel south and a whole new set of stars and constellations emerge. During this talk we'll take a look at the southern sky; the constellations and special sights that only appear south of the equator. Learn a little history of how the southern constellations came to be and some of the stories associated with the stars. We'll also take a look at the night sky through the eyes of Australia's Aboriginal people to see how they viewed the stars for thousands of years before the arrival of Europeans. If you've heard all about the Southern Cross, the Magellanic Clouds, the Jewel Box, and the Coalsack and Carina Nebulas this is your chance to expand your horizons and maybe plan a trip south.

Member and Invited Guest Star Gazing

–At the Observatory in Hinesburg
–At Angele's in Shelburne
–At Dennis's in New Haven

For Star Gazing in Hinesburg
Contact: Paul Walker
802-388-4220 (H)
802-861-8640 (W)
paulwaav@together.net (H),
walkerp@biotek.com (W)

For Star Gazing at Angele's
Contact: Paul above or
Angele Mott Nickerson
a.mott.nickerson@gmail.com

For Star Gazing at Dennis's
Contact: Paul above or
Dennis 802-453-2360
dpwoos@GMAVT.NET

If you are not a member, you are welcome contact one of the board members listed on the last page, **one of us would be happy to invite you.**

Check your email or the web site for last minute updates and cancellations.

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

Check our website www.vtastro.org for any updates. Members can watch for emails.

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

Bob Horton 802-879-7802,
rhorton16@comcast.net
Ron Anstey (802-524-3653)
Joe Comeau (802-238-1664)
Jack St. Louis (802-658-0184),
jack.st.louis@comcast.net

Green Mountain Alliance of Amateur Astronomers (GMAAA)

All events start about sunset.

Contact Ron Lewis for more details
802-779-5913 (cell)
802-247-5913 (home)
vtpoet@gmail.com

Unless otherwise noted, all GMAAA events are at the Hubbardton Battlefield State Historic Site.
5696 Monument Hill Rd,
Hubbardton, VT 05735

http://historicsites.vermont.gov/directory/ , "Directory of Sites" , "Hubbardton Battlefield", "Things to Do", "Events and Happenings"

August 12-13, Friday night-Saturday morning, Perseid Meteor Shower

The Perseid meteor shower is one of the main celestial events of the summer. This year, skies will be dark after the Moon sets around midnight, leaving the sky ready for peak meteor viewing. This shower's timing is perfect for a summer trip to your favorite dark sky site: the Hubbardton Battlefield! Here's to eating s'mores by the campfire and seeing s'more meteors overhead!

You need no special equipment to enjoy this nighttime spectacle. You don't even have to know the constellations. But you'll definitely want to find a dark, open sky to fully enjoy the show. It also helps to be a night owl. Give yourself at least an hour of observing time, for meteors in meteor showers often come in spurts and are interspersed with lulls; with up to 60 meteors per hours the Perseids is a reliably good meteor shower as the Earth ploughs through the debris of the comet Swift-Tuttle. If our planet happens to pass through an unusually dense clump of meteoroids – comet rubble – we'll see an elevated number of meteors. We can always hope!

An open sky is essential because these meteors appear to fly across the sky in many different directions and in front of numerous constellations. However, if you trace the paths of the Perseid meteors backward, you'd find they come from a point in front of the constellation Perseus. But once again, you don't need to know Perseus or any other constellation to watch this or any meteor shower.

Enjoy the comfort of a reclining lawn chair and look upward in a dark sky, far away from pesky artificial lights. Remember, your eyes can take as long as twenty minutes to truly adapt to the darkness of night. So don't rush the process. All good things come to those who wait.

Members of the Green Mountain Alliance of Amateur Astronomers will be setting up their telescopes for public viewing of deep sky objects.

September 3. Saturday, Discovery Night - The Hidden Deep Sky Mysteries of Our Universe

A tour of the galaxy! A three-day old crescent Moon sets not long after dark and the night kicks off with Saturn and Mars in the southwest above Antares. The Whirlpool Galaxy is still pretty high in the northwest, and M13 in Hercules is still a showpiece high in the west. Countless sights in the summer Milky Way are there to wow any crowd, and by 10 PM Pegasus and Andromeda are high in the East. Stephan's Quintet awaits the 18" Obsession, along with jaw-dropping views of M31 and its companions.

It's Labor Day weekend, and a huge turnout is a definite possibility when those from farther away have had the chance to travel. We've all been greatly impressed by the number of stargazers at past events who had traveled more than an hour's drive to attend our events.

"Spontaneous Night Under the Stars" July or August.

Joe Comeau will once again hold public observing at his observatory, Orchard Hill Observatory at 70 Poor Farm Rd. Alburgh VT. The plan is to make a list of interested people and contact folks up to a few days in advance based on the weather forecast. This event will likely occur in July but it may not happen until August.

Activities will begin at dusk. This will be a no-cost event for people of all ages. Families with children are welcome.

VAS members are invited to bring their telescopes to show participants around the summer sky. There will be a slide show of pictures taken by Astronomical Society members. Invite your friends for an exciting evening.

Contact Joe at 802-238-1664 or jkcomeau@hotmail.com

Articles

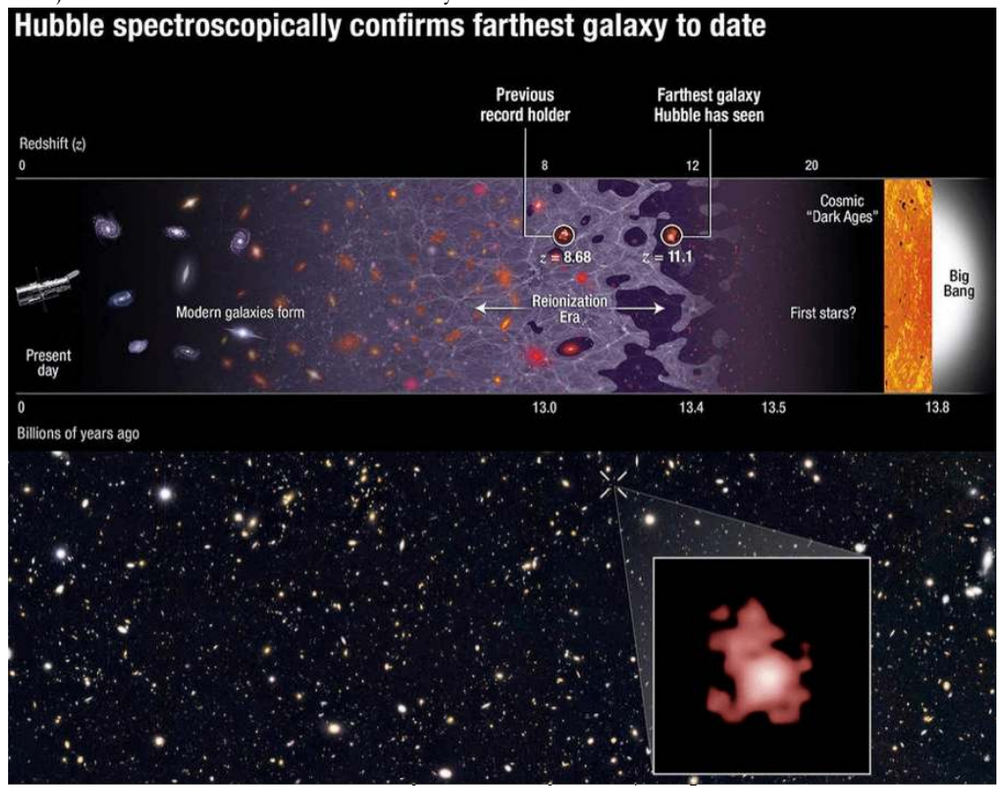
We are partnering with NASA's Space Place (spaceplace.nasa.gov/). We have added the site to our Astro Links page under "Kids Astronomy and Space Sites". For those who do presentations for local schools, you can get small quantities of NASA's Space Place items (bookmarks, stickers, temporary tattoos)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

sored 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."

Hubble Shatters The Cosmic Record For Most Distant Galaxy
By Ethan Siegel

The farther away you look in the distant universe, the harder it is to see what's out there. This isn't simply because more distant objects appear fainter, although that's true. It isn't because the universe is expanding, and so the light has farther to go before it reaches you, although that's true, too. The reality is that if you built the largest optical telescope you could imagine -- even one that was the size of an entire planet -- you still wouldn't see the new cosmic record-holder that Hubble just discovered: galaxy GN-z11, whose light traveled for 13.4 billion years, or 97% the age of the universe, before finally reaching our eyes.
There were two special coincidences that had to line up for Hubble to find this: one was a remarkable technical achievement, while the other was pure luck. By extending Hubble's vision away from the ultraviolet and optical and into the infrared, past 800 nanometers all the way out to 1.6 microns, Hubble became sensitive to light that was severely stretched and redshifted by the expansion of the universe. The most energetic light that hot, young, newly forming stars produce is the Lyman-á line, which is produced at an ultraviolet wavelength of just 121.567 nanometers. But at high redshifts, that line passed not just into the visible but all the way through to the infrared, and for the newly discovered galaxy, GN-z11, its whopping redshift of 11.1 pushed that line all the way out to 1471 nanometers, more than double the limit of visible light!
Hubble itself did the follow-up spectroscopic observations to confirm the existence of this galaxy, but it also got lucky: the only reason this light was visible is because the region of space between this galaxy and our eyes is mostly ionized, which isn't true of most locations in the universe at this early time! A redshift of 11.1 corresponds to just 400 million years after the Big Bang, and the hot radiation from young stars doesn't ionize the majority of the universe until 550 million years have passed. In most directions, this galaxy would be invisible, as the neutral gas would block this light, the same way the light from the center of our galaxy is blocked by the dust lanes in the galactic plane. To see farther back, to the universe's first true galaxies, it will take the James Webb Space Telescope. Webb's infrared eyes are much less sensitive to the light extinction caused by neutral gas than instruments like Hubble. Webb may reach back to a redshift of 15 or even 20 or more, and discover the true answer to one of the universe's greatest mysteries: when the first galaxies came into existence!



Images credit: (top); NASA, ESA, P. Oesch (Yale University), G. Brammer (STScI), P. van Dokkum (Yale University), and G. Illingworth (University of California, Santa Cruz) (bottom), of the galaxy GN-z11, the most distant and highest-redshifted galaxy ever discovered and spectroscopically confirmed thus far.

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

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

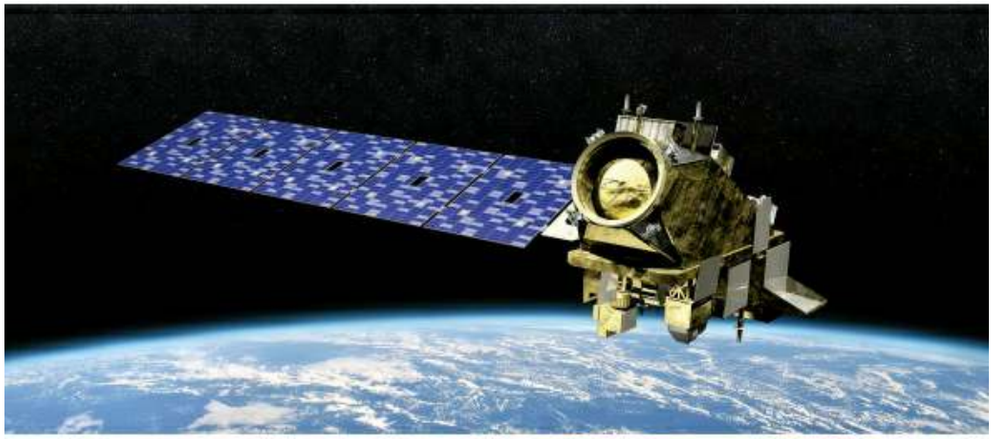
- orbits the Earth very quickly: once every 101 minutes,

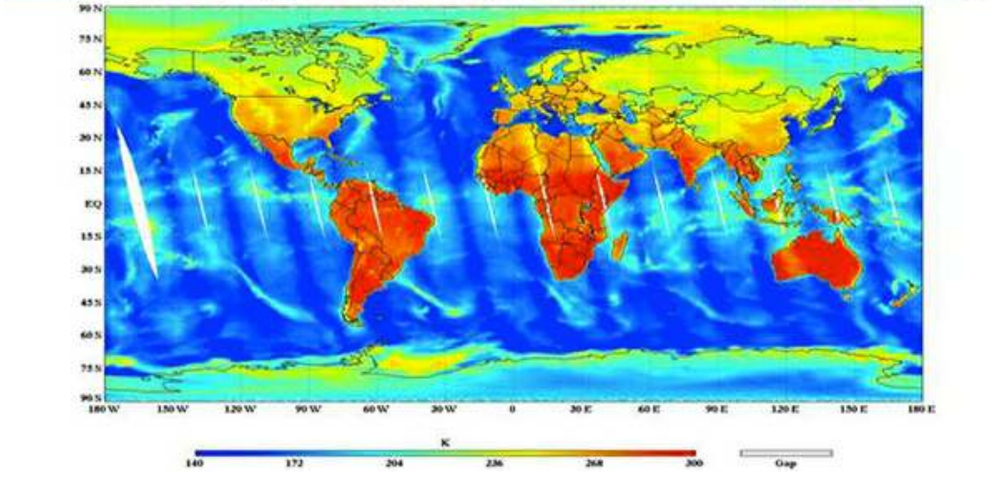
- is close enough at 824 km high to take incredibly high-resolution imagery,
- has five separate instruments each probing various weather and climate phenomena,
- and is capable of obtaining full planet coverage every 12 hours.

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

1. The Cross-track Infrared Sounder (CrIS), which will measure the 3D structure of the atmosphere, water vapor and temperature in over 1,000 infrared spectral channels. This instrument is vital for weather forecasting up to seven days in advance of major weather events.
2. The Advanced Technology Microwave Sounder (ATMS), which assists CrIS by adding 22 microwave channels to improve temperature and moisture readings down to 1 Kelvin accuracy for tropospheric layers.
3. The Visible Infrared Imaging Radiometer Suite (VIIRS) instrument, which takes visible and infrared pictures at a resolution of just 400 meters (1312 feet), enables us to track not just weather patterns but fires, sea temperatures, nighttime light pollution as well as ocean-color observations.
4. The Ozone Mapping and Profiler Suite (OMPS), which measures how the ozone concentration varies with altitude and in time over every location on Earth's surface. This instrument is a vital tool for understanding how effectively ultraviolet light penetrates the atmosphere.
5. Finally, the Clouds and the Earth's Radiant System (CERES) will help understand the effect of clouds on Earth's energy balance, presently one of the largest sources of uncertainty in climate modeling.

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





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

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Video Astronomy, a Primer
By Mike Stadtmauer

Video Astronomy (VA) is defined differently by different people, but for the purposes of this discussion we can say that it is the use of highly sensitive astronomical cameras capable of producing 'finished' deep space images in 3 minutes or less. Astronomical imaging, or astrophotography, on the other hand, often uses exposures of less then 3 minutes, but relies on the stacking of dozens or hundreds of images resulting in total exposure times measured in hours. The idea with VA is that you can produce a finished image, that you are at least content with, in 3 minutes or less of total integration time. Why 3 minutes? This was arbitrarily decided on after much discussion across multiple forums - and, of course, not everyone agrees that there should be any time limitation. The rationale is that VA is primarily an outreach tool where there are often other people, either in person or online, watching what you are doing and 3 minutes seems to be most people's maximum tolerance for waiting. I try to stick to the 3 minute rule in my observations - if for no other reason than it gives something to shoot for.

The other reason for a (self imposed) time limit is the idea that this is supposed to be 'live'. Of course, it can not be truly live in the sense that what we are looking at happened millions of years ago, but that's besides the point. The idea is that you point the telescope

at something and in a very short while, often less then 30 seconds, have a view that far rivals anything that can be accomplished visually - only you are looking at photons from a computer screen instead of outer space. Does it matter? - that is for you to decide. For kids that are disappointed at the little fuzzy smudge it can be magical.

Equipment:

Camera: There are a number of companies making dedicated astronomical video cameras. Before a few years ago, most products were highly tweaked security cameras providing a true video-out signal that could be fed directly into a monitor with no computer needed. The cameras were controlled with on board controls and/or remote controls to set exposure times and other parameters. Now, most products are sold with USB-out signals that require computer control. The cameras are built around a very sensitive chip, which is typically small with very large pixels. Most VA devices output images less than 1 mega pixels in size, but some are larger. These cameras generally trade resolution for sensitivity. However, with greater sensitivity comes lots of hot and warm pixels (the odd colored stars in the images) and 'amp glow' where the sensor picks up the electromagnetic 'glow' of the amplifier. They also tend to be quite noisy.

Telescope/Mount: Just about any telescope will do, but SCT's are popular choices because of their large aperture / light-gathering abilities and 'zoom' quality with their longer focal lengths. Also, since you are limited by the resolution of the camera, the excellent optics of a high quality refractor are wasted. For the mount, most people choose EQ mounts to avoid the rotation issues inherent in Alt/Az mounts. However, if you have a highly sensitive camera, you can often get away with sub 30 second exposures which makes Alt/Az mounts just fine to use. Plus, a number of programs allow you to sum-stack in real time (explained later) which means that in many cases exposure in the 10 second rage are possible so that most any mount will do.

Other equipment: As with most things in astronomy, there is no end to the accessories you can explore, but some of the more popular include:

- Focal reducers: Just like with astrophotography, you want the brightest signal you can get so that you have the shortest exposure time possible. One way to do this is to use a focal reducer, which concentrates the image onto the sensor. I typically use my f/10 SCT reduced down to f/5. This quadruples the intensity of the light on the sensor and reduces exposure time to 25% of the need at f/10 (more or less).

- Remote set up: Let's face it - if its not the mosquitos, its the bitter cold. Observing in VT is not for the meek. Sometimes, if I'm feeling a bit meek, I will watch the stars remotely. I can control 2 cameras, a filter wheel and a focuser through a single powered USB hub and active 50' cable into my laptop. I control the mount via WiFi using my iPad or computer with SkySafariPro and a SkyFi unit that sits on the mount. This lets me sit in my Advanced Environment Controlled Astronomic Viewing Area, otherwise known as my couch, and remain frostbite free.

- Software: With a few exceptions, most cameras have a USB cable that both carries the image to the computer and allows the computer to control the camera. Most manufacturers have their own software that can be used to both control the camera and acquire and process an image. The programs usually offer some degree of histogram manipulation so you can tweak an image in real time as it comes in. They also usually have the ability to stack and register images. This means that the software will line up images as they come in and stack, or add, them together. This is useful in 2 ways. You can use very short exposures, often in the 5-10 second range, and then add them all together to get a single equal to a number of minutes of integration time. This means that defects in tracking or alignment that would ruin a 2 minute exposure can be overcome with a series of very short exposures added together. The other use of stacking is to stack via the 'mean' or average, as opposed to the sum. This places one image on top of another and averages the pixel values, which results in an image that is much cleaner (in terms of noise) and crisper (in terms of detail) than a single shot could ever be.

- Filters: Filters are absolutely essential for VA to be successful. The most popular and useful type is the broadband filter, and the most popular of those is the Lumicon Deep Sky - an excellent general purpose filter that blocks most sky glow. This allows you to image the object you are looking for without the background becoming white. Without a filter, it is difficult to impossible to make the target stand out against the background unless it is very bright and the sky is dark. Narrowband and Ha, Hb and OIII filters can also be useful, but these will require much longer exposure times.

Image Acquisition: Of course, this is what its all about. After all the hard work of getting all your equipment together, getting everything set up, figuring out all the connections and software, and learning how to use your camera you are ready to get to work. There are many different approaches to VA. Some people prefer to spend a lot of time on a single image - tweaking and tweaking until it is as good as it can possibly be. Others (myself) prefer a 'tour of the cosmos' approach where you spend about 5-10 minutes on a single object, get the best image you can, and then move on to the next target. You can easily try for 15-20 targets a night.

Is it better to try a single long exposure or stack together shorter ones? Should you sum stack or average stack? Do you need a 10 second or 60 second exposure? Obviously, there are no right answers and it all depends on the combination of your equipment, the sky conditions, the target in question, and the goal of the session. It has taken me about a year to feel like I can dial in the right parameters within a few tries.

My Set up:

I have 2 VA cameras:

1) Mallincam XT-418: This is an upgraded version of the 'Xtreme" to 'Xterminator' specs. This probably means nothing to you, but it has a -20C Peltier cooler and argon-filled gas chamber for the sensor (eliminates sensor dew issues). It also has highly tweaked and custom electronics to eke the most

sensitivity out of the sensor. This is an older camera and the sensor is a few generations (or more) out of date. It is much less sensitive then current sensors, but what it lacks in sensitivity to more then makes up for in color fidelity. This particular sensor is widely held to have the best color of any current sensor used for VA. As you can see from the pics, the body is an off-the-shelf security camera.

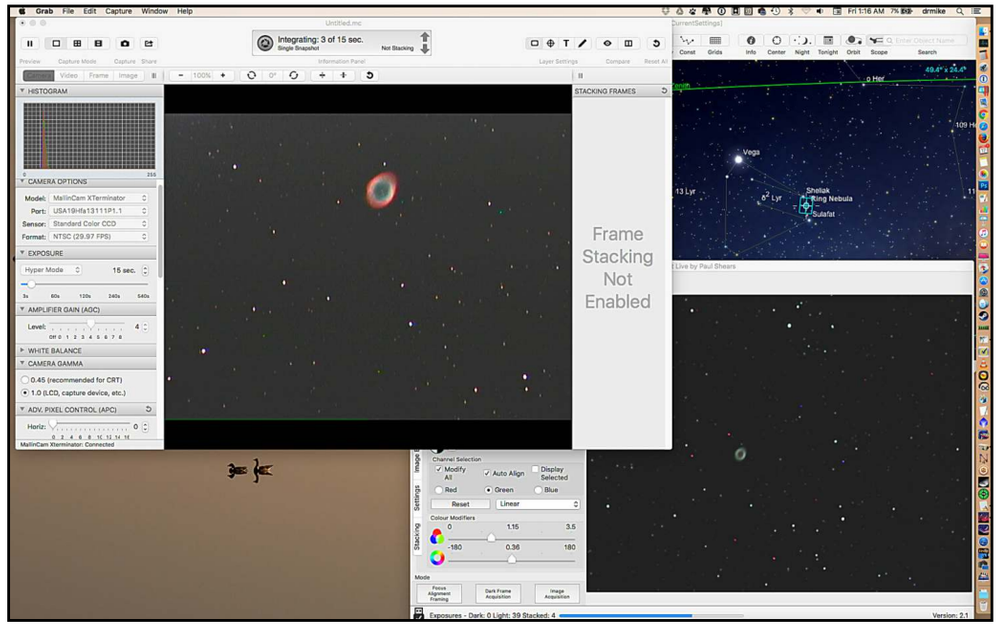
2) Starlight Xpress Lodestar X2 Color: The Lodestar is the best guider on the market bar none. It contains an exceptionally sensitive Sony chip. Thankfully, it also makes a very capable VA device when paired with software designed to take advantage of the sensor's abilities. It is made to fit into standard 1.25 eyepiece holders and has much simpler electronics than the Mallincam.

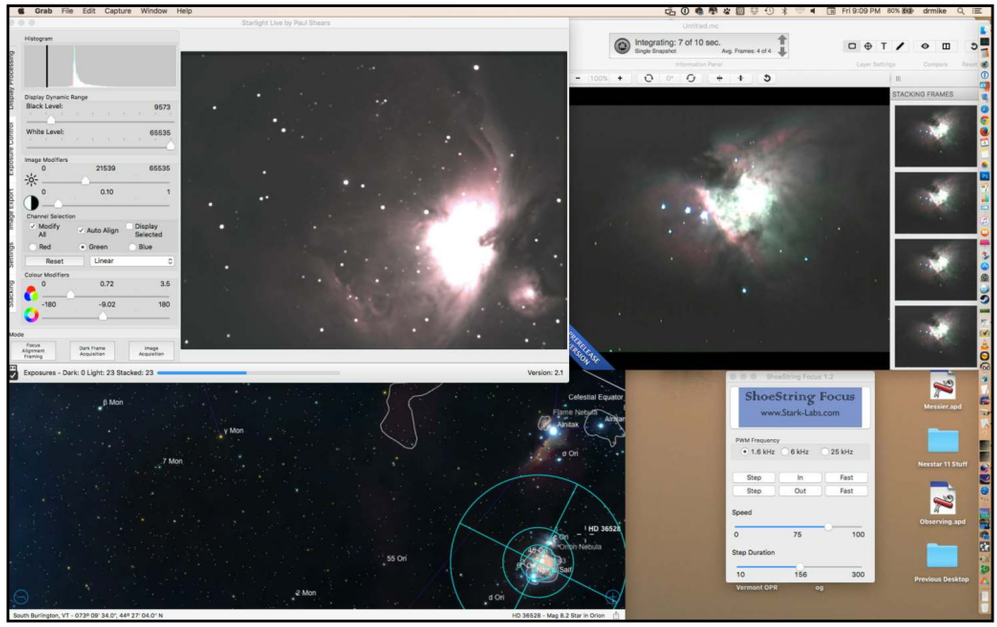
In the pictures, the Mallincam is attached to the C11 (aka the Beast). There is a focal reducer attached to the nose of the camera which fits inside the focuser/visual back - it is not visible in the picture. The reducer achieves about .5x.

Piggybacked to the C11 is my Explore Scientific 102mm APO triplet. Attached to that is the Lodestar, which sits behind a .8x reducer. Both cameras have Lumicon Deep Sky filters attached (not visible). As you can see, the Mallincam requires 3 cords (power, control and signal) while the Lodestar only needs the 1 USB cable.

The idea behind this set up is to give both a wide angle and zoomed in look at whatever you are targeting. In practice, the difference in views is not as big as I'd like and it is something I am working on. Plus, its more fun and keeps you busier to control 2 cameras at once. In the screen shots, you can see both cameras operating simultaneously with their respective software (Miloslick for the Mallincam and Starlight Live for the Lodestar)

Ring Nebula (top right): In this image, the Mallincam is in the upper left and is a single 15 second exposure. The Lodestar in the lower right is a sum stack of 4 10 second exposures. In the upper right is the telescope mount control software, Sky Safari.





Trapezium (center right): This is an older image, but the Lodestar is on the left this time and Mallincam on the right. For this one, I let the Lodestar continue to stack in sum mode. Here is 23 stacked 10 second exposures. The summing of the images blew out the central stars, but also brought out amazing nebulosity detail.

If you are interested in what you've read here, please don't hesitate to contact me with questions. I hope to have at least part of the set up present at some events this summer and beyond. I want to send a special thanks to long time but elusive member, Stephen Scaravella, for introducing me to video autonomy and its many wonders. Clear skies!

Mike Stadtmauer
drmike@vermontfunctionalmedicine.com

Below and on the next page are 3 of my favorite shots from the past year - NGC 891, M81 and M27. All are between 10-30 second exposures. All were taken with the Mallincam. M81 shows significant amp glow - the green in the upper left, which is usually just ignored.

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Visit the VAS Website!
By Mark Moyer

If you haven't visited the Vermont Astronomical Society website, it's a good place to find out what VAS is all about: http://vtastro.org/. With a background consisting of beautiful astrophotography by club members, the site is divided into ten main sections, accessible from the front page menu. Let's take a brief look at each of these sections.

What We Do: This section has a page describing the VAS telescope making workshop, a page for accessing current and past newsletters, and, foremost, a page giving an overview of VAS, describing who we are, describing visual observing, both with binoculars and telescopes, describing the mentoring program and outreach activities, etc.

Events: The Events page lays out the upcoming club-related activities. This includes dates and a synopsis of upcoming meetings, any upcoming public star gazing parties, any upcoming Member and Invited Guest Star Gazing Parties, any other public presentations hosted by the club, and any star parties hosted by our sister club in Rutland, the Green Mountain Alliance of Amateur Astronomers.

Contacts: The club email address, as well as the names and phone numbers of the officers is found here.

Image Gallery: This page highlights members' stellar (sorry!) astrophotography — come take a look at these wonderful images!

Articles: In this section you can find articles that members have written on a variety of topics. Currently one finds, "How to Find GREAT DEALS at the Swap Tables at Stellafane" and "Observing Interplanetary Dust."

Astro Links: Links are provided to various other sites for a wide variety of astronomy-related topics, such as astronomy for kids, weather forecasts, other nearby astronomy clubs, star charts, sites for buying used equipment, and a variety of other resources.

Membership: This site has two pages, one a page with some photos of our members in action, and the other page describing the different levels of membership (associate, full, and life), the cost for each, and how to go about becoming a member.

Observing Certificates: The club offers observing certificates for Lunar observing, Planetary observing, and, for those interested in deep sky objects, Messier objects for binoculars, Messier objects for telescopes, Herschel 400 objects, and NGC objects. Each of these, except the lunar certificate, allows both a basic certificate and an advanced certificate. Each of the certificates lists a variety of objects to be observed (e.g., craters, planetary features, deep sky objects), and the task is to describe and sketch the object. These are a great way to gain a more thorough knowledge of the heavens.

History: Curious about the history of astronomical observing in Vermont? This page starts with Samuel de Champlain's astronomical observations in 1609 and follows the outstanding aurorae displays, eclipses, and comet sightings, as well as the events that shaped astronomy in Vermont up through VAS's 50th anniversary in 2014.

Memorials: VAS has gradually evolved over its 52-year history, changing in membership through the years. As a result, VAS is often an extended 'family' drawn together by shared interests. To remember some of the members who have passed away, we describe their interests and their association with the club.

That's an overview of the VAS website. Like the club, the website also gradually evolves, so if you haven't seen it before, or haven't visited lately, drop on by and check it out!

Board Talk

Board meetings are currently held at BioTek Instruments (Paul's employer) the 3rd Tuesday of the month, 7:30 to 9:00 PM. They are open to all members, contact any Board Member for info.

Board meeting summaries:

April

John Picanza, Steve Quigley and Mark Moyer requested consideration for full membership. Bill Wick moved that the board approve all 3 for consideration by the Full Membership. Keith Lawrence 2nd the motion. The vote was a unanimous yes.

Angele Mott-Nickerson also requested consideration for full membership and was approved by the board via email.

Keith read off a list of items collected for a silent auction at the Annual Meeting.

The on-line survey has gone out. It was created by the Membership Committee. Angele did the work of setting it up on-line on Survey Monkey.

Joe reported that he and Ron Anstey worked on a slide show for an upcoming event at Champlain College.

Keith mentioned a request for a page on our web site with a list of challenge objects for beginners. (Anyone up for writing something up?).

Need to schedule a work party at the observatory before Green-up Day to to dig out some old tires that are great for breeding mosquitoes (Peter Gillette pulled out a bunch before Green-up Day and several of us showed up on Green-up Day, pulled out the rest and brought them down to the transfer station).

Bob is progressing with the re-figuring of the mirror from a 14" Newtonian that was donated to the club.
Gary is progressing with the re-figuring of Russ Chmela's scope.

May (Annual Meeting/Banquet)

Jack opened the meeting and gave the President's report. In the report he listed the monthly meeting topics, stargazing parties, public presentations, classes, etc. that club members provided to the area.
Joe gave the VP's report. His report included mention of Member Clinics and Star Gazing and several community activities the club has been and will be involved in.
Paul gave the Secretary's report. Paid up membership is 70 (out of 100), Associate paid up is 48 (out of 67), Full paid up is 22 (out of 27), Life members 5 (3 Full, 2 Associate).
Jack gave the Treasurer's report (any member can ask for details).
Keith reported on the Library Loan Scope Program. Keith started the program in the Fall or 2014. We placed 4 more scopes- St. Albans , Franklin, Bristol, and Hinesburg. Most paid the full cost of $350 for the scopes [for a total of 5 I believe]. As a thank you to Hinesburg for using some of their land for our observatory, we footed half the cost for their scope. Keith thanked his wife, Cheryl, Dennis and Jody Woos, Angele Mott-Nickerson, the VAS Board, and the New Hampshire Astronomical Society for their assistance in this endeavor.
Keith also updated us on the work of the Observatory Committee and Membership Committee.
Voting: Jack St. Louis was re-elected as President, Joe Comeau was re-elected as V.P. The following was re-elected as Board Members- Gary Nowak, Bill Wick, Bob Horton and Keith Lawrence. The following were voted in as new Full Members- John Picanza, Steve Quigley and Mark Moyer and Angele Mott Nickerson.
Jack presented Howard (Howie) Druckerman the Gobble Award for his contribution to the VAS Stellafane Turkey Fry and Pot Luck Dinner. Other Service Awards went to Donna Lescoe, Brian Johnson, Peter Gillette, Mark Moyer, Ron Anstey, Dennis Woos, Bill Wick, Bob Horton, Joe Comeau, Keith Lawrence, Gary Nowak and Paul Walker for presentations, helping at public stargazing parties, work parties at the observatory and other service to the club.
The following observing awards were presented. Messier Telescopic Observation Award - Advanced to Keith Lawrence and Greg Warrington, Herschel 400 Telescopic Observation Award - Advanced to Mark Moyer. Joe Comeau got an Imaging Award for having taken the first earliest image of the first recorded outburst of Dwarf Nova 955+22 C VAR Vul 2005 (the Dwarf Nova was discovered by Jörg Hanisch in Germany).
Ray Harvey won the free lunch with the President (Jack) drawing.

June

We reviewed the changes to the Hinesburg Agreement that the town had made. We made a few other adjustments. Jack will send it back and answer their questions.

Paul brought up the question of inviting non-members on general astronomy discussion email list (vtastronomy@list.uvm.edu) to be including on the new observing@vtastro.org list (see top of page 2). Also brought up the question of temporally including people coming to Vermont on vacation who have inquired about good observing locations (I have told such people they are welcome to walk in even if the gate is locked). Keith will bring these questions to the Site Committee and the Membership Committee.

Joe talked about several Public Stargazing and Presentation events we have held recently. Jack mentioned the South Hero Land Trust wants to have an event.

Keith said the Membership Committee had done 3 Members Star Parties this Spring and are talking about having an open house at the observatory in Hinesburg sometime in September.
There will be a VAS Picnic at Dennis's house in New Haven Saturday, June 25. (Happened yesterday as I write this).
He received 2 more requests from libraries for Library Loan Telescopes (Georgia and Swanton).

Keith said the silent auction at the Annual Banquet / Business Meeting brought in $400. This means the club came out a little ahead financially.

Jack and Ray Harvey mowed the observing site the other day. Jack sent out a request for members to volunteer to help with mowing so the club keep the cost down.

We briefly discussed the VAS Member Survey results. The Membership Committee with review it in more detail.

Gary continues to work on re-figuring the optics on Russel Chmela's telescope.

Motions:

We received a renewal notice from the IDA (International Darksky Association). Paul made the motion to renew our membership, Jack 2nd it. All voted in favor.

Observers Page

Mercury Transit
By Paul Walker

A big highlight this Spring was the transit of Mercury across the face of the Sun. This occurred on May 9. The weather was good enough that many people around the area were able to observe it

Mercury is quite small (only 12 arc seconds across (1/5 the diameter of Venus and 1/25th the area). So, where as during the Venus Transit a few years ago, Venus was easy to see with Eclipse Glasses I don't know as anyone was able to see Mercury without some magnification. Here in Vermont we were well positioned for the transit. For us it started at 7:12 AM and ended at 2:41 PM. Had there been fewer cloud we would have seen the whole event. Total transit was 7-1/2 hours in length with mid-transit is at 10:57 AM.

Transits of Mercury occur on average about every 7 years, 13 to 14 times a century. They can only happen in May and November as that is when the Earth crosses the ecliptic plane. The last few were 4½, 3½ and 9 ½ years apart. The next one is in 3 ½ years (Nov. 11, 2019) with the whole transit visible from Vermont but the Sun will

be very low. After that it will be 13 years to the next one., Nov. 13, 2032.

VAS members were set up in several places, affording the general public the opportunity to view the transit. Ron Anstey set up at the Town Central School in St. Albans from 9:00 AM to 2:00 PM. Ron Lewis set up at the Hubbardton Battlefield State Historic Site in Hubbardton. Jack St. Louis and Joe Comeau were on Church Street with a white light scope and a Lunt Hydrogen-Alpha setup. Greg Warrington and Mark Moyer had an H-alpha scope set up on the UVM campus.

I wasn't set up for the general public but Donna Lescoe did take me up on my offer to members to join me in my backyard. I had an 8" f/4 with a full aperture white light solar filter which I alternated between visual, imaging and video. A 4" f/5 "Chinese refractor with a full aperture white light filter set up for visual only. A 10" f/4 (semi-permanent setup) with an 8" white light filter which I used for imaging only. I had carefully scoped out the location for the 8" and 4" were so I could catch the start of the event as the Sun moved in-between 2 trees. Unfortunately we missed the ingress due to clouds and the clouds parted only intermittently for the first hour. Not long enough to focus the camera that was on the 8". Donna and I did catch a few glimpses during this time through the 4" scope. I had a good viewing for the next 2 hours. Caught a little of the middle with only occasionally glimpse after that missing the end.

My 15 seconds of fame –- Channel 3 News had heard that someone was set up for viewing the transit in the Shaws parking lot here in Middlebury and sent one of their videographers and Nick Borelli, one of their meteorologist, down to check it out. At 1:42 PM I sent Channel 3 a couple of my images including where they were taken. They thought I might be the person at Shaws so at 1:52 Nick Borelli replied to my email asking if I was still around. I just happened to check my email shortly after that (maybe 2:00 or so) and called the number in the email at 2:02. I told them I was not the person they were looking for but that I wasn't far from there. They were still in the area and asked if they could come over and do an interview. I said sure — and the rest is history. They managed to find something that I said that was reasonably coherent and weaved it into a nice piece. The video clips of the transit they used were mine. Taken through the 8" using a Nikon AW110 point & shoot. I copied all the clips onto a memory stick they had so they could pick out what would work for them.

Image credit- Channel 3 News

Reports from other sites:

From Ron Lewis – We had 57 show up at the Hubbardton Battlefield today, so I call that a mild success, especially for a daytime event. Keith Lawrence showed up with the Lunt [H-alpha solar scope], and we also had a Coronado [H-alpha solar scope] for viewing; 6 telescopes in all.

A beautiful, partly cloudy, windy and cold day! When the Sun popped out, it seemed to get 20 degrees warmer in just a couple seconds!

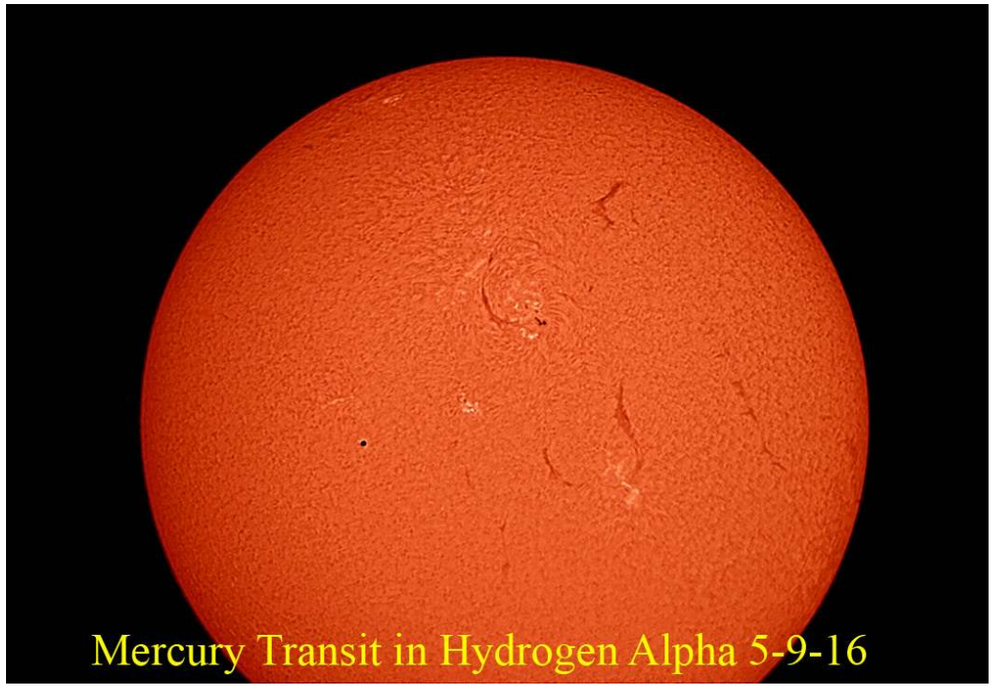
From Ron Anstey - I set up at the St. Albans town school at 9:00 AM. We had a few spot between the clouds and around 25 students saw it on my system. After that it was completely covered and did not improve. I set up a computer and projector in a resource room and got a live feed over the Internet. I ended up staying until 2:00 PM and showed and discussed the transit with about 250 students. All around a successful transit.

From Mary Lou West [New Jersey] – We had 7 telescopes set up at a 9/11 park in NJ and got pretty good views of the transit between clouds. I'll share your images with my NJAG club at our meeting on Wednesday.

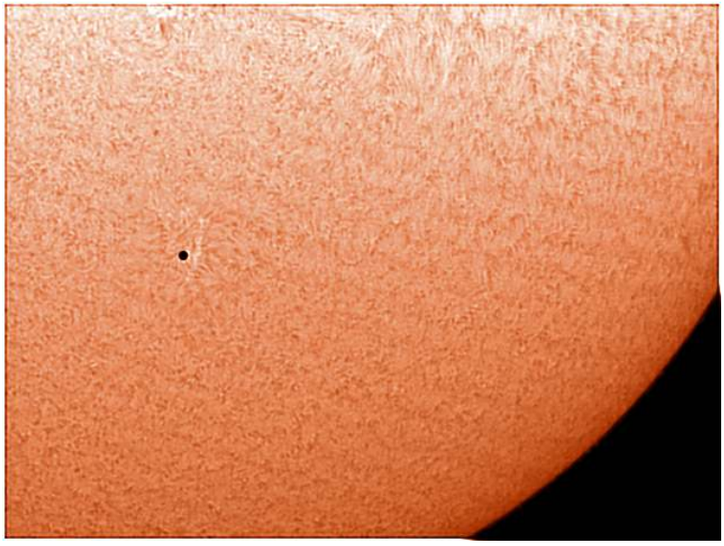
From Greg Warrington and Mark Moyer – A week ago I had emailed the guy who teaches astronomy classes on campus, so he emailed all of his students (250, I think he said) letting them know we'd be there, so we also had a good number of interested people stopping by. One guy riding by on a bike asked what we were doing since he saw someone set up by the waterfront with a telescope and then he saw more people on Church St. set up with a telescope and then he saw us.

From Joe Comeau – Jack and I watched the transit on church street. There were lots of interested spectators. Jack had a white light scope and I used a Lunt Hydrogen alpha setup.

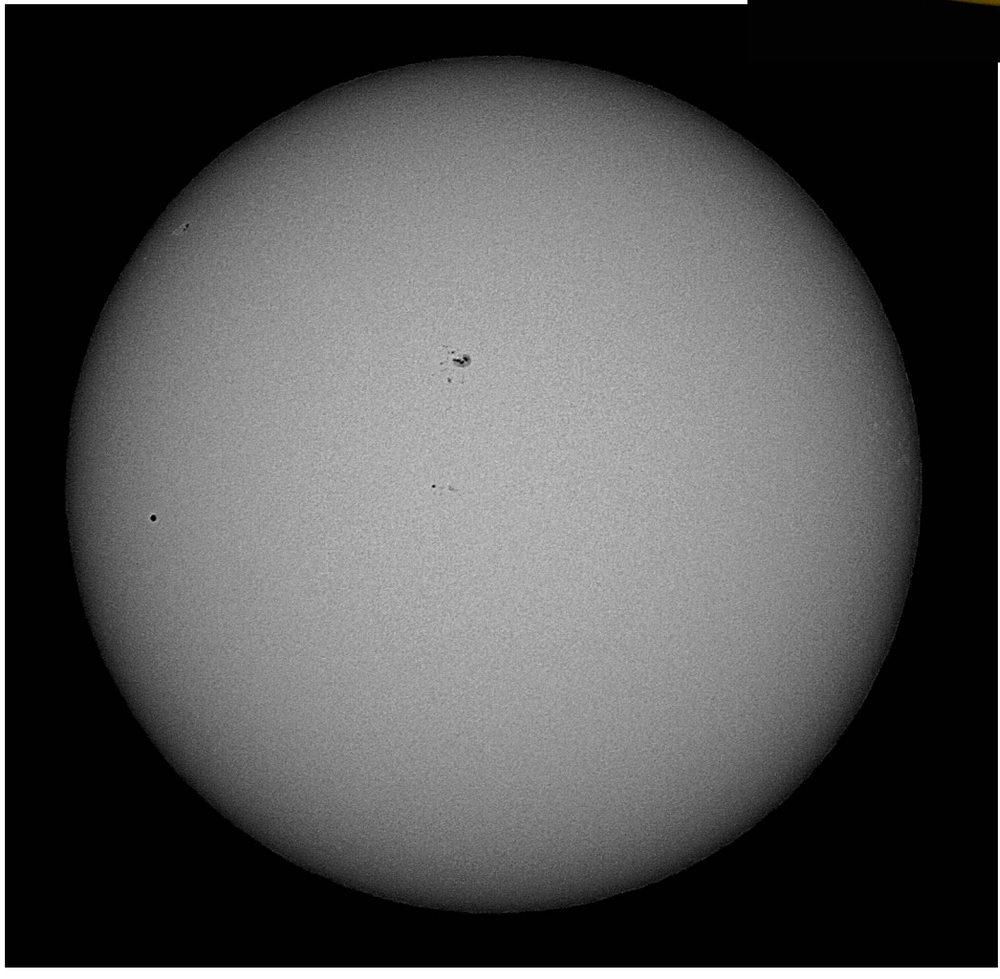
From Lawrence (Larry) Garrett – I observed the ingress, first seeing Mercury on the limb at 7:14 AM, in my 90mm ETX. I then hit the road to show off the event in Burlington at work, and last to my wife at work. I watched the mid transit there. I tracked the sun



with holes in the clouds ending 2:31 PM! Missing just 10 minutes of the event, as at 2:41:45 PM, Mercury was gone from the disk. I do have some images, but it was so windy the whole time they are not as sharp as Paul's. What a great show!!! I also observed in my 20x80mm binoculars and Celestron 8.

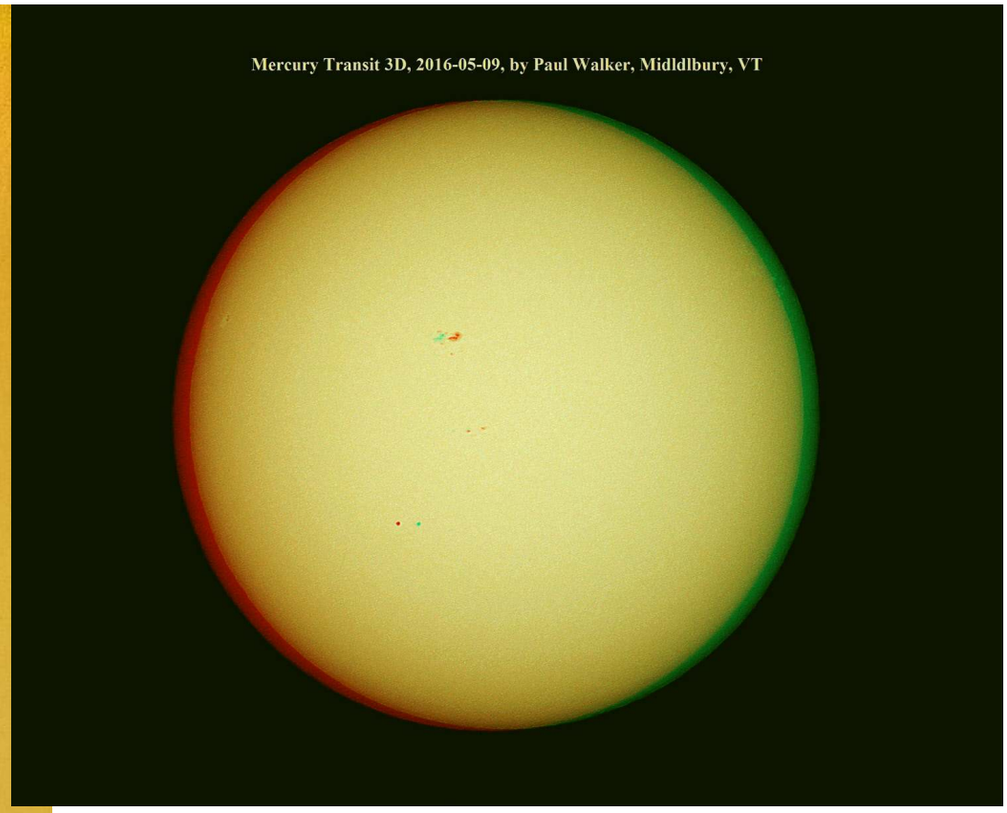


To help you re-live the event, here's some images. The first 2 images are by Joe Comeau, taken in Hydrogen-Alpha light (656.3 nm wavelength) with his Lunt Solar Telescope.



The next images are by Paul Walker. The the one to the left shows the whole disk of the Sun. This was taken at 8:06 AM on a 10" f/4 (1016mm f.l.) Schmidt-Newtonian scope outfitted with an 8" Baader Planetarium solar filter. These filters product a white image. The camera is a Canon XTi Digital SLR. This is a single image (not a stack of multiple images), ISO100, 1/1250 sec exposure, due to the 8" filter the f/ratio is f/5. Note, I did dry runs on both the 8" and 10" scope so I would know the best exposure times to use.

The one above is a stack of 10 images taken at 1:32 PM or about an hour before the end of the transit. This is also through the 10" f/4 but using a 2" diameter 2x Barlow. Because the focal plane of the camera is outside the Barlow rather than inside as with an eyepiece the magnification factor is 2.65x. To give the image a more pleasing look I colorized it. Canon Xti camera, ISO400, 1/640 sec., f/13, 2700mm f.l.



Above is the highest resolution I produced. It is from a stack of 300 HD video frames taken with a Nikon AW110 point & shoot through the 8" f/4 scope. It was taken shortly after mid-transit at 11:02 AM.

Get your red and blue 3-D glasses out. At the top right is a 3-D image of the transit using images taken 20 minutes apart at 9:35 and 10:03 AM. Those viewing an electronic version of this newsletter, zoom in and try to touch Mercury

The image immediately above, shows how much bigger Venus was against the Sun's disk than Mercury.

Mars - Low Down but Good
By Paul Walker

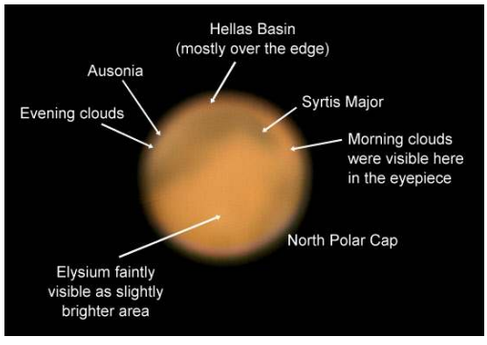
Mars was (still is) another highlight this year. Though it is very low in the South we have been afforded a few good nights for viewing Mars. The apparent size of it's disk is shrinking now as it is slowing working its way to the West as it follows the ecliptic. Currently it reaches 25 degree above the horizon at about 9:30 PM with an apparent diameter of 16.2 arc seconds. At its closest it appeared only a little larger at 18.6" and was only a little lower at 24 degrees high when due South. In mid-July it will still be about 24 degrees at its highest and 14.6" in diameter.

Here's an image of Mars created by stacking 500 video frames from a 1 min. 38 sec. video taken a 11:47 PM, May 20.

Mars 5/20/16, effective magnification 1000x.

10" f/5.6, 1407mm fl, 24mm eyepiece, 3x Barlow in a 2x Barlow (352x), 5x zoom (2.8x eff mag.) on a Nikon AW110 point & shoot

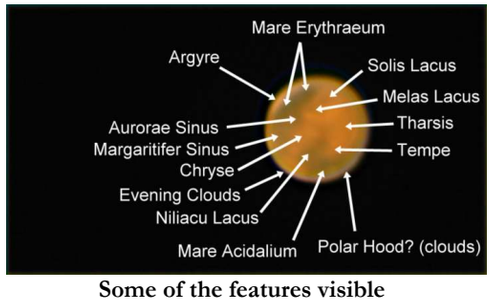
Here's a cropped version



Here's a version pointing out some of the features visible

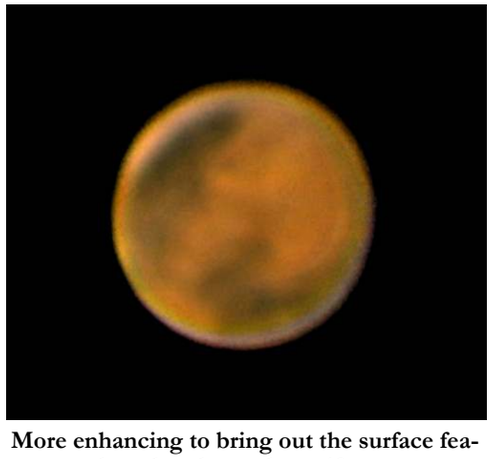
June 10 was a better night for viewing and imaging Mars. Here's an image of Mars created by stacking 300 video frames from a 1 minute 39 second video taken at 11:34 PM, June 10. To bring out the surface detail I had to process to the point of creating some image processing artifacts around the edge of the disk. Even so, some of the details on the edge are from actual features. North is to the lower right.

Full Frame (not cropped)



Some of the features visible

Cropped



More enhancing to bring out the surface features but also shows the artifacts more.

Taken through my 10" f/5.6 Newtonian, 16mm eyepiece in a 3x Barlow in a 2x Barlow for 527x, plus 5x zoom (about 2.8x effective) on a Nikon AW110 camera for a total of about 1500X effective magnification.

Visually I could see the more prominent dark areas but not the subtle ones (yes I was observing up to 527x). I also used a 2 degree wedge prism to reduce the atmospheric refraction. More useful for visual observations than imaging as the red and blue components of the image can be aligned through software.

I noticed that the 2 degree wedge, even though it helped was not enough fully cancel the atmospheric refraction at such a low altitude.

This last shot was taken on June 24. It is a stack of 3 still shots taken through my 10" F/5.6 (I also took some HD video but surprisingly they did not produce as good results).

10mm eyepiece with 4 and 2 degree wedge prisms (to counter atmospheric refraction, visually it looked like the refraction was fully compensated but the images still showed some color dispersion and so I had to do some additional color registration with software), 2x Barlow and a 3x Barlow (844x visual), Nikon AW110 camera at 5x zoom (appox. 2.8x effective), total magnification was approx 2400x (effective visual). This image is not cropped. The camera was on auto, setting were ½ second exposure, ISO800, f/4.8.

Even in this image it is surprising what you can see. For the obvious are the dark areas Syrtis Major extending down from the top (South) and Utopia, on the bottom (North). For light areas you can see Arabia to the right (West) of Syrtis Major, Isidis Regio to the immediate left of Syrtis and Amenthes to the left of that. As for more subtle features there is Hellas Basin (or clouds or

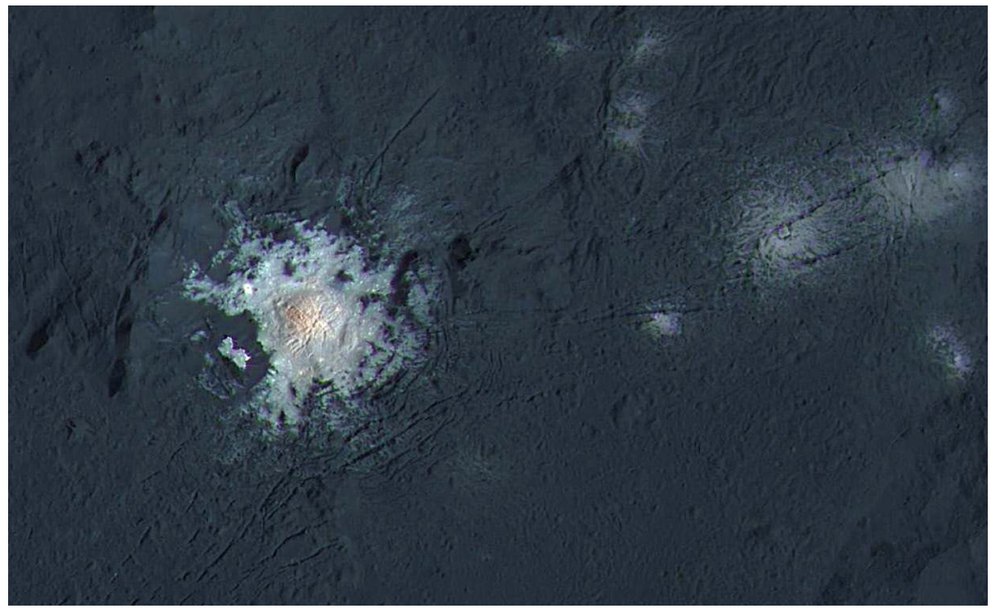
frost associated with Hellas) South of Syrtis Major (near the top edge of the disk) and perhaps a hint of clouds in northern Utopia (near but not on the edge of the disk). There is also a hint of a dark feature right on the Eastern limb (left). Someone like Gary, with more experience observing the planets, can probably make out additional features.

Saturn
By Paul Walker

Like Mars, Saturn is not well placed. It is located near Mar to the East of Scorpio and rises only a degree higher than Mars. But as with Mars you can still get some good views and the rings are wide open giving the best view of the rings in years and they are mostly out of the way of viewing the cloud bands in the cloud tops. This image was taken the same night as the last Mars image June 24 (11:08 PM).

The Cassini Division is visible all the way around except for where it is blocked by Northern pole (bottom of image). I had noticed that the division was hard to make out on the south portion. I thought is was just that the seeing that night wasn't quite good enough but only now did I realize the main reason. The disk of Saturn is visible through the gap making the gap appear lighter! The dark north polar cap is visible. As is the Crepe ring. There is some image processing artifacts but if you ignore them you can still see the Crepe Ring against Saturn's disk and shadow of the disk on the rings.

It is a stack of 1000 video frames taken though my 10" f/5.6. Saturn, being dimmer than Mars, does not take magnification as well. For this image I used a 10mm eyepiece with a 3x Barlow and 4x (2.2x effective) optical zoom on the Nikon AW110 for a total magnification of 950x.



Nasa Update from Ceres

For some of you who may have missed the latest from NASA's Dawn spacecraft at the dwarf planet Ceres in the Asteroid Belt between Mars and Jupiter.

This enhanced-color image from NASA's Dawn spacecraft reveals subtle differences in the bright material in Ceres' crater Occator. The close-up view reveals a dome in a smooth-walled pit in the crater's bright center (left center of image). Numerous linear features and fractures crisscross the dome's top and flanks.

The brightest area on Ceres, located in the mysterious Occator Crater, has the highest concentration of carbonate minerals ever seen outside Earth, according to a new study from scientists on NASA's Dawn mission. The study, published online in the journal Nature, is one of two new papers about the makeup of Ceres.

"This is the first time we see this kind of material elsewhere in the solar system in such a large amount," said Maria Cristina De Sanctis, lead author and principal investigator of Dawn's visible and infrared mapping spectrometer. De Sanctis is based at the National Institute of Astrophysics, Rome.

At about 80 million years old, Occator is considered a young crater. It is 57 miles (92 kilometers) wide, with a central pit about 6 miles (10 kilometers) wide. A dome structure at the center, covered in highly reflective material, has radial and concentric fractures on and around it.

De Sanctis' study finds that the dominant mineral of this bright area is sodium carbonate, a kind of salt found on Earth in hydrothermal environments. This material appears to have come from inside Ceres, because an impacting asteroid could not have delivered it. The upwelling of this material suggests that temperatures inside Ceres are warmer than previously believed. Impact of an asteroid on Ceres may have helped bring this material up from below, but researchers think an internal process played a role as well.

More intriguingly, the results suggest that liquid water may have existed beneath the surface of Ceres in recent geological time. The salts could be remnants of an ocean, or localized bodies of water, that reached the surface and then froze millions of years ago.

"The minerals we have found at the Occator central bright area require alteration by water," De Sanctis said. "Carbonates support the idea that Ceres had interior hydrothermal activity, which pushed these materials to the surface within Occator."

The spacecraft's visible and infrared mapping spectrometer examines how various wavelengths of sunlight are reflected by the surface of Ceres. This allows scientists to identify minerals that are likely producing those signals.

NASA / JPL-Caltech / UCLA / MPS / DLR / IDA / PSI / LPI

Gary's Astronomical Events for the Month
can be viewed via WCAX at 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. Airs the first Wednesday of the month at 8:40 AM.

For Sale

10" Meade Schmidt-Cassegrain (LX200 GPS UHTC), Autostar II High Precision Drive, tripod and JMI hard case
Includes equatorial wedge for astrophotography. This is a heavily accessorized observing package. The scope looks brand new and the optics are perfect This package is flawless. I only used this scope a few times a year. It has been carefully maintained. I will only sell everything as a complete bundle.

Specifications:
Optical Design: Schmidt Cassegrain
Autostar Suite Software CD
Clear Aperture: 254mm (10")
Focal Length: 2500mm
Focal Ratio: f/10
Resolving Power: .045 arc sec
Primary Mirror Coatings: Equipped with the Optional Meade Super Muti-Coatings (UHTC: Ultra-High Transmission Coating) ($300 value)
Mounting: Cast-aluminum, double-tine forks
Gears: 5.75" diameter worm gears.
Periodic Error Correction: Both Axes
Slew Speed: 1x sidereal to 8 degrees/sec
Power: 8 C-cell batteries (supplied)
Variable height, heavy duty field tripod
Meade 8X50mm rear-focus finderscope
4-speed Zero Image-Shift Microfocuser
16-channel GPS receiver
Net telescope weight: 62 pounds
Net tripod weight: 20 pounds
Color: Norwegian Blue and Black

Accessories (Totaling $1,532):
Meade Equatorial Wedge ($289 value)
12v power supply ($100 value)
ScopeSaver plate/tray with hardware ($200+ value)
Orion electronic eyepiece (color) ($95 value)
Meade broadband sky glow filter - never used ($100 value)
Peterson EZ Focus Kit (Focus Upgrade)($30 value)
Peterson EZ Clutch Kit (Declination Clutch Upgrade)($30 value)
Flexible Dew Shield ($50 value)
JMI Hard Case ($589 value)
Meade DC 607 Adaptor cable ($25)
Meade Interface Cable ($24 value)

Only $3,300 OBO – a tremendous deal! With over $1,500 in accessories! (Must be picked up, as I will not ship.) Payment can be made only by Cash, Certified Cashiers Check, Bank Check, or Treasurer's Check. Everything offered here would cost over $5,000 if purchased new. A brand new Meade 10" LX200 GPS w/ UHTC coatings will cost you $3,500.

Additional Items for sale:
Meade Series 5000 5-element Plossl eyepieces, which are 8 eyepieces ranging from 6.4mm to 40mm. Come with their own custom aluminum case and are all in plastic (bullet) cases. ($250)
A f/6.3 focal reducer/field flattener that you may need for astrophotography, which improves edge-of-field correction and reduces exposure times by a factor of 2.5. ($125 value)
Meade #895 Vibration Isolation Pads ($53 value)

Contact Ron Lewis, 247-5913, vtpoet@gmail.com

5" Newtonian Telescope (Vixen R130SF) and Vixen Porta II Mount
The R130SF comes standard with the 6 x 30 optical finder scope and a dovetail plate that fits very well on all the Vixen mounts.
650 mm focal length operating at a fast f/5 focal ratio for a wide, true field of view. Weighs only 9 pounds.
This lovely telescope and mount are brand new and have no blemishes whatsoever.
The Vixen Porta II is a great grab and go alt azimuth Mount! It has a 15 lb payload capacity and features Slow Motion Flexible Handles. The Porta II accepts various dovetail mounted optical tubes and binoculars.

Total Value: $969, **Selling price $550 OBO**. Must sell as complete set, with case. You must arrange for pick up.

Contact Ron Lewis, 247-5913, vtpoet@gmail.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
Or you can contact Ron Anstey anstyer@myfairpoint.net

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

Lumicon EC Diagonal - 96% LD1010 paid $100, selling for **$50**
Cosmo Comfort Observing Chair paid $180, selling for **$75**
Lumicon Deep Sky Filter LF3010 paid $120, selling for **$65**
Lumicon OIII Filter LF3040 paid $120, selling for **$65**
Lumicon UHC Filter LF3025 paid $120, selling for **$65**
Lumicon Lunar &Planetary Filter Set (Light) LF5080 paid $85, selling for **$40**

Package Deal:
Lumicon ND50 Density Filter LF1090
Lumicon 23A Light Red Filter LF1035
Lumicon 80A Blue Filter LF1070
Lumicon 12 Deep Yellow Filter LF1020
Paid $25 each.
Sell 4 Filter Package for **$50**

Contact Sean Sullivan, spsullivan1970@gmail.com

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 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 $695 with the accessories listed

Contact Bruce Harmon, 802-876 7535 or bdhinvt@yahoo.com.

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 handbook

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 $350**.
Contact Paul Cameron at paulcameron1@msn.com, 802-249-3595 or 802-223-2204

Meade LX 80 heavy-duty go-to mount.
Capable of holding two telescopes at once, or being used as an equatorial mount with one scope. Used only once. Selling because it's too heavy for an old guy like me. O
riginal price $1000.
Selling for $500. See picture.

Contact Al Boudreau at astromanvt@gmavt.net or 802-349-8308

FREE - 2 T-shirts if anyone wants them. One is a Vermont Astronomical T-shirt the other from the Texas Star Party.
Contact Connie Kite at parkite3@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. **Asking $200** for it.

Stephen Scaravella, 802-434-3884 or englishnotation@gmail.com

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

For selling & buying also check out: www.marketplace.skyandtelescope.com

Wanted

Wanted: Your **older mono CCD imaging system** that you never use anymore. Get in touch and let me know what you have.
Wanted: **8-10" f/4 imaging Newtonian**
Send emails to bvtguy@yahoo.com.

Dues

Associate Members $15
Full Members $25

Contact Paul Walker or Doug Williamson

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

Announcements

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

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50th ANNIVERSARY PATCHES are still available. Pricing $3 each or 2 for $5. You can get them at the monthly meetings.

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

Web Site

www.vtastro.org
Email: webmaster@vtastro.org
Paul Walker is acting webmaster.

Board Members

Jack St. Louis	Pres	658-0184
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(My apologies if I missed anyone)

Rocket Launch at the VAS Picnic at Dennis's

Angele bought her son (far right) a rocket for his birthday. They didn't have the launch control but Dennis had one. Dennis is at the control with Angele's husband to his right. Paul took HD video of the event from which this is a frame.

Moonrise

Taken June 18, 2016 by Paul Walker
Handheld, Canon Xti, 1/400 sec, iso 400, 200mm fl, f/8
See how many of the features visible in this image you can see with your eye.